



General Catalog



YOU'RE HEARD, LOUD AND CLEAR.

YOU'RE HEARD, LOUD AND CLEAR.

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Bird® Technologies Group maintains an aggressive program of testing products for conformity applicable electromagnetic and safety standards, including European Union Directives. We are proud to announce that, where applicable, Bird products carry the "CE" Mark. A CE marked product complies with the relevant EU Directives and is approved for sale in the European Union. The specific standards that were used to evaluate the product compliance are listed on the Declaration of Conformity (DOC).

Bird® Technologies Group provides solutions to the following markets. For your convenience, each product represented in the catalog includes the market icon(s) for your reference. For more application information, please visit our website www.bird-technologies.com.



Public Safety

Integrated Antenna Analysis
Reliable, Rugged, Power Measurement
Rugged, Versatile Load and Attenuator Kits Available



Government/Military

Integrated Antenna Analysis
Field Testing of Tactical Radio Systems
Power Measurement, Resistive Components and Subassemblies
Rugged, Versatile Load and Attenuator Kits Available



Semiconductor

Precision Power Measurement Solutions and Calorimetric Systems
Highly Stable, Reliable, Terminations, Loads, and Attenuators
Integrated Power Measurement and Load Systems
RF Accessories, Mismatches, Adapters, Subassemblies



Broadcast Market Solutions

Analog and Digital Universal Power Measurement
High Power Digital Load Solutions
Broadcast Accessories



Wireless Market Solutions

Integrated Antenna Analysis
Analog and Digital Universal Power Measurement
Lightweight, Portable Resistive Products
Spread Spectrum



Special Markets

Solutions for Medical, Avionics, Transportation
and Other Markets



Bird® Service Center

Service and Calibration of Bird® Products



SIGNALHAWK™ VNA | Spectrum Analyzer with Power Meter Option

MODEL SH-362S: Spectrum Analyzer & 2-Port VNA

MODEL SH-361S: Spectrum Analyzer & 1-Port VNA

MODEL SH-362: 2-Port VNA (1.6MHz to 3.6GHz)

MODEL SH-36S: Spectrum Analyzer (100kHz to 3.6GHz)

Bird Technologies SignalHawk™ Analyzes radio frequency spectrum. Measures intended and interfering signals. Allows setup of parameters such as frequency, amplitude, and markers. Graphically displays signal amplitude vs. frequency and saves traces.

KEY FEATURES

- Fast, Accurate, and Sensitive: -42 dB Directivity and -135 dBm Noise Floor
- Large High-Resolution Display: Full Color, Indoor/Outdoor Viewable
- Easy-to-Use: Intuitive Menus, One-Button Setup, and On-Board Help
- Long Battery Life: 5.5 Hours per Charge, Field Replaceable Battery
- Rugged: Drop Tested per Military and European Standards
- USB Connectivity: USB Drive Stores 90,000 Traces

WORLDWIDE APPLICATIONS

Cellular, PCS, DCS, 2G, 3G, 4G, CDMA, cdmaOne, CDMA 2000, 1x, 1x EV-DO, GSM, GPRS, EDGE, UMTS, HSDPA, W-CDMA, TDMA, AMPS 802.11, Bluetooth, Broadcast, Emergency, Fire, GPS, HDTV, IBOC, In-Building, Lab, Microwave, NPSPAC, Paging, Police, Private, Project 25, Public Safety, Tactical Military, Telematics, Tetra, Trunking, Utilities, WiMAX, WLAN and WLL.

VECTOR NETWORK ANALYZER (VNA) & SPECTRUM ANALYZER

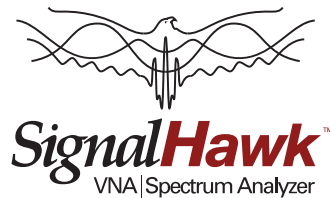
The 1-Port VNA sweeps antennas (VSWR/return loss dB vs. frequency) and provides cable distance-to-fault (DTF); the 2-Port VNA tests insertion loss and amplifier gain. Also, the Spectrum Analyzer measures and analyzes intended and interfering signals.



Model SH-36S SignalHawk™



Model SH-362S SignalHawk™



SignalHawk™ SPECIFICATIONS

Display	8.4", TFT, 800 x 600 pixel
Battery	5.5 hour, field replaceable
Drop Test	1 meter per EN 61010-1
Transit Drop Test	10 drops per MIL-PRF-28800F
Explosive Atmosphere	Per MIL-PRF-28800F 4.5.6.3
CE Compliant	Yes
RF Input, N(F)	+20 dBm (100 mW) max
USB Connectivity	PC; USB drive and accessories
Size and Weight	11.5" x 10.5" x 3.8", 7.8 lbs
Saved Trace Storage	300 internal; 90,000 USB drive
Win CE Viewers	Word, Excel, PPT, PDF, Image
Power Meter	5012A, 5010B, 5010T, 5011, 5011-EF, 5016, 5017 External Sensors, Optional

SPECTRUM ANALYZER SPECIFICATIONS

Frequency Range	100 kHz to 3.6 GHz
Frequency Resolution	1 Hz
Frequency Uncertainty	± 1 ppm
Reference Aging	± 1 ppm / year
Temperature Drift	± 1 ppm / °C
Data Points	705 displayed
Spectral Purity	-85 dBc @ 30 kHz
Sweep Time	2.2 s, full span; 1 ms, zero span
Resolution Bandwidth	100 Hz to 1 MHz RBW
Video Bandwidth	10 Hz to 300 kHz VBW
Amplitude Accuracy	± 1.0 dB typ, ± 1.5 dB max
Dynamic Range	66 dB, intermod-free
Noise Floor	-135 dBm DANL
Attenuator	0, 10, 20, or 30 dB; internal
Pre-Amplifier	+24 dB gain, internal
Single-Button Measurements	Occ BW, Channel Power, ACPR, Field Strength, AM/FM Demod, C/I

VNA (Vector Network Analyzer) SPECIFICATIONS

Frequency Range	1.6 MHz to 3.6 GHz
Frequency Resolution	± 2 ppm uncertainty, 40kHz res
Data Points	705 default, 12 to 11265 selectable
Sweep Time	0.6 s with 705 data points
RF Output, N(F)	-40 dBm to +10 dBm, 1 dB steps
Interference Immunity	+13 dBm
Directivity	-42 dB calibrated
1-Port VNA Measurements	Match (VSWR & Return Loss dB), Distance-to-Fault, Cable Loss
2-Port VNA Loss/Gain	-90 to +50 dB, 12/24 V Int Bias Tee
2-Port VNA Measurements	Gain & Loss (Amplifier Gain, Insertion Loss, Antenna Isolation)

POWER METER FEATURE

SignalHawk™ is compatible with Models 5012A, 5010B, 5010T, 5011, 5011-EF, 5016 and 5017 external power sensors. These sensors provide ± 5% (± 0.2 dB) forward average power accuracy. Other measurements include reflected power, VSWR, return loss (dB), peak power, burst average power, crest factor, and CCDF.



SIGNALHAWK™

OPTIONAL EXTERNAL POWER SENSORS



Directional Power Sensor



Wideband Power Sensor



Terminating Power Sensor

WIDEBAND POWER SENSORS (MODELS 5012, 5016, 5017)

Wideband Power Sensors, 25 MHz to 4 GHz, 25 mW to 500 W Avg, 1300 W Peak. Measures fwd/rfl avg, VSWR, return loss (dB), peak, burst avg, crest, CCDF. Forward average power accuracy is 4% (0.2 dB).

DIRECTIONAL POWER SENSOR (MODEL 5010B)

Directional Power Sensor, 2 to 2700 MHz, 100 mW to 10 kW, requires elements. Measures forward and reflected average, VSWR, return loss (dB), and peak. Forward average power accuracy is 5% (0.2 dB).

DIRECTIONAL POWER SENSOR (MODEL 5010T) TETRA VERSION

Directional Power Sensor, 2 to 2700 MHz, 12.5 mW to 10 kW, requires elements. Measures forward and reflected average, VSWR, return loss (dB), and peak. Forward average power accuracy is 5% (0.2 dB).

TERMINATING POWER SENSOR (MODEL 5011)

Terminating Power Sensor, 40 MHz to 4 GHz, 10 μ W to 10 mW (-20 dBm to +10 dBm). Measures forward average power. Accuracy is 5% (0.2 dB).

TERMINATING POWER SENSOR (MODEL 5011-EF)

Terminating Power Sensor, 40 MHz to 12 GHz, 10 μ W to 10 mW (-20 to +10 dBm) Measures forward average power. Accuracy is 5% (0.2 dB).



Standard Accessories

STANDARD ACCESSORIES

MODEL	DESCRIPTION
7002A220-1	Soft Carry Case
920-SH36-OPS	Operators Manual
920-SH36-REF	Start-Up Instructions
5A2653-10	USB Cable, 10 ft, USB A (M) to USB B (M)
5A2264-09-MF-10	RS-232 Cable, 10 ft, 9-pin, (M) to (F)
5A2743-1	AC Adapter/Charger
5A2238-3	Car Adapter/Charger
5A2720-2	Internal Li-Ion Battery, Field Replaceable
7002A210	PC Tool Software and Manual CD's
5A2745-1	USB Drive, Win CE Compatible
5A2746-1	Headphones
7002A221	Connector Cover

Spare standard accessories are available as optional accessories. Manuals and soft/firmware updates available at www.bird-electronic.com.

OPTIONAL ACCESSORIES

MODEL	DESCRIPTION
7002A222-1	GPS Sensor
7002A225-1	Hard Transit Case, Watertight
USB-MOUSE	USB Mouse, Ultra-Portable, Optical
USB-HUB	USB Hub, 4-Port, Micro
TC-MNFN-1.5	Test Cable, 1.5 m, N(M) to N(F)
TC-MNFN-3.0	Test Cable, 3.0 m, N(M) to N(F)
TC-MNMN-1.5	Test Cable, 1.5 m, N(M) to N(M)
TC-MNMN-3.0	Test Cable, 3.0 m, N(M) to N(M)
TC-MNFE-1.5	Test Cable, 1.5 m, N(M) to 7/16 DIN(F)
TC-MNFE-3.0	Test Cable, 3.0 m, N(M) to 7/16 DIN(F)
TC-MNME-1.5	Test Cable, 1.5 m, N(M) to 7/16 DIN(M)
TC-MNME-3.0	Test Cable, 3.0 m, N(M) to 7/16 DIN(M)
PA-MNME	Adapter, N(M) to 7/16 DIN(M)
PA-FNME	Adapter, N(F) to 7/16 DIN(M)
PA-MNFE	Adapter, N(M) to 7/16 DIN(F)
PA-FNFE	Adapter, N(F) to 7/16 DIN(F)
4240-550	Adapter Kit, 7/16 DIN
4240-500-1	Adapter, N(F) to N(F)
4240-500-6	Adapter, N(M) to N(M)
4240-500-10	Adapter, N(M) to SMA(F)*
4240-401	Interseries Adapter Kit, N/SMA/T/BNC

* Note: Adapter 4240-500-10 required for field strength antenna.

VNA OPTIONAL ACCESSORIES

MODEL	DESCRIPTION
CAL-MN-C	Calibration Combo, Open/Short/Load, N(M)
CAL-FN-C	Calibration Combo, Open/Short/Load, N(F)
CAL-ME-C	Calibration Combo, Open/Short/Load, 7/16 DIN(M)
CAL-FE-C	Calibration Combo, Open/Short/Load, 7/16 DIN(F)
2-T-MN	Load, 2W, N(M)
2-T-FN	Load, 2W, N(F)

SPECTRUM ANALYZER OPTIONAL ACCESSORIES

MODEL	DESCRIPTION
4240-500-10	Field Strength Antenna Adapter, N(M) to SMA(F) *Recommended for field strength antennas.
ANT-100	Field Strength Antenna, 136 to 221 MHz, SMA(M)*
ANT-400	Field Strength Antenna, 400 to 512 MHz, SMA(M)*
ANT-800	Field Strength Antenna, 824 to 894 MHz, SMA(M)*
ANT-900	Field Strength Antenna, 890 to 960 MHz, SMA(M)*
ANT-1800	Field Strength Antenna, 1710 to 1880 MHz, SMA(M)*
ANT-1900	Field Strength Antenna, 1850 to 1990 MHz, SMA(M)*
ANT-2400	Field Strength Antenna, 2400 to 2500 MHz, SMA(M)*
100-SA-MFN-40	Attenuator, 100 W, 40 dB, N(M) to N(F), 2.4 GHz
50-A-MFN-30	Attenuator, 50 W, 30 dB, N(M) to N(F), 4 GHz
25-A-MFN-30	Attenuator, 25 W, 30 dB, N(M) to N(F), 4 GHz
10-A-MFN-30	Attenuator, 10 W, 30 dB, N(M) to N(F), 4 GHz
5-A-MFN-20	Attenuator, 5 W, 20 dB, N(M) to N(F), 4 GHz
2-A-MFN-20	Attenuator, 2 W, 20 dB, N(M) to N(F), 4 GHz

PC SIGNALHAWK™ Spectrum Analyzer**MODEL SH-36S-PC: Spectrum Analyzer (100kHz to 3.6GHz)**

Transform your laptop into a spectrum analyzer! The PC SignalHawk is a lightweight, modular spectrum analyzer that communicates via USB with a Windows application, moving the display and user interface to your laptop or PC.

KEY FEATURES

- Fast, Accurate, and Sensitive: -135 dBm Noise Floor
- Built in FCC Compliance Masks
- Waterfall display
- Same "Spectrum Analyzer" functionality as our hand held and rack mount units but in a convenient model
- Sophisticated Spectrum Analysis software package included
- Ideal solution for field techs who already carry a laptop with them as standard equipment.

WORLDWIDE APPLICATIONS

Cellular, PCS, DCS, 2G, 3G, 4G, CDMA, cdmaOne, CDMA 2000, 1x, 1x EV-DO, GSM, GPRS, EDGE, UMTS, HSDPA, W-CDMA, TDMA, AMPS as well as 802.11, Bluetooth, Broadcast, Emergency, Fire, GPS, HDTV, IBOC, In-Building, Lab, Microwave, NPSPAC, Paging, Police, Private, Project 25, Public Safety, Tactical Military, Telematics, Tetra, Trunking, Utilities, WiMAX, WLAN and WLL.

SPECTRUM ANALYZER SPECIFICATIONS

Frequency Range	100 kHz to 3.6 GHz
Frequency Resolution	1 Hz
Frequency Uncertainty	± 1 ppm
Reference Aging	± 1 ppm / year
Temperature Drift	± 1 ppm / °C
Spectral Purity	-85 dBc @ 30 kHz
Sweep Time	2 s, full span; 1 ms, zero span
Resolution Bandwidth	100 Hz to 1 MHz RBW
Video Bandwidth	10 Hz to 300 kHz VBW
Amplitude Accuracy	± 1.0 dB typ, ± 1.5 dB max
Dynamic Range	66 dB, intermod-free
Noise Floor	-135 dBm DANL
Attenuator	0, 10, 20, or 30 dB; internal
Pre-Amplifier	+24 dB gain, internal
Data Points	705 displayed (settable)
Single-Button Measurements	Occ BW, Channel Power, ACPR, Field Strength, AM/FM Demod, C/I
Transit Drop Test	10 drops per MIL-PRF-28800F
CE Compliant	Yes
RF Input, N(F)	+20 dBm (100 mW) max
Connectivity	USB 2.0
Operating & Store Temperature	0° to +50°C oper; -20° to +80°C store
Humidity & Altitude	95% humidity; 4600 m altitude
Size and Weight	7.5" x 7.0" x 3.0", 3.5 lbs
Emissions Mask	IBOC, Analog FM, DTV and many others

**STANDARD ACCESSORIES**

MODEL	DESCRIPTION
920-SHPC-OPS	Operators Manual
920-SHPC-REF	Start-Up Instructions
5A2653-10	USB Cable, 10 ft, USB A (M) to USB B (M)
5A2436	AC Adapter/Charger
5A2238-2	Car Adapter/Charger
5B2431	Internal Li-Ion Battery, Field Replaceable
7002A144-1	PC Tool Software and Manual CD's

OPTIONAL ACCESSORIES

MODEL	DESCRIPTION
7002A224-1	Hard Carry Case
ANT-100	Field Strength Antenna, 136 to 221 MHz, SMA(M)*
ANT-400	Field Strength Antenna, 400 to 512 MHz, SMA(M)*
ANT-800	Field Strength Antenna, 824 to 894 MHz, SMA(M)*
ANT-900	Field Strength Antenna, 890 to 960 MHz, SMA(M)*
ANT-1800	Field Strength Antenna, 1710 to 1880 MHz, SMA(M)*
ANT-1900	Field Strength Antenna, 1850 to 1990 MHz, SMA(M)*
ANT-2400	Field Strength Antenna, 2400 to 2500 MHz, SMA(M)*
100-SA-MFN-40	Attenuator, 100 W, 40 dB, N(M) to N(F), 2.4 GHz
50-A-MFN-30	Attenuator, 50 W, 30 dB, N(M) to N(F), 4 GHz
25-A-MFN-30	Attenuator, 25 W, 30 dB, N(M) to N(F), 4 GHz
10-A-MFN-30	Attenuator, 10 W, 30 dB, N(M) to N(F), 4 GHz
5-A-MFN-20	Attenuator, 5 W, 20 dB, N(M) to N(F), 4 GHz
2-A-MFN-20	Attenuator, 2 W, 20 dB, N(M) to N(F), 4 GHz

* Note: Recommend N(M) to SMA(F) Adapter Model 4240-500-10 for Field Strength Antennas

OPTIONAL TEST CABLES AND ADAPTERS:

MODEL	DESCRIPTION
TC-MNFN-1.5	Test Cable, 1.5 m, N(M) to N(F)
TC-MNFN-3.0	Test Cable, 3.0 m, N(M) to N(F)
TC-MNMN-1.5	Test Cable, 1.5 m, N(M) to N(M)
TC-MNMN-3.0	Test Cable, 3.0 m, N(M) to N(M)
TC-MNFE-1.5	Test Cable, 1.5 m, N(M) to 7/16 DIN(F)
TC-MNFE-3.0	Test Cable, 3.0 m, N(M) to 7/16 DIN(F)
TC-MNME-1.5	Test Cable, 1.5 m, N(M) to 7/16 DIN(M)
TC-MNME-3.0	Test Cable, 3.0 m, N(M) to 7/16 DIN(M)
PA-MNME	Adapter, N(M) to 7/16 DIN(M)
PA-FNME	Adapter, N(F) to 7/16 DIN(M)
PA-MNFE	Adapter, N(M) to 7/16 DIN(F)
PA-FNFE	Adapter, N(F) to 7/16 DIN(F)
4240-550	Adapter Kit, 7/16 DIN
4240-500-1	Adapter, N(F) to N(F)
4240-500-6	Adapter, N(M) to N(M)
4240-500-10	Adapter, N(M) to SMA(F)*

* Note: Recommend N(M) to SMA(F) Adapter Model 4240-500-10 for Field Strength Antennas

RACK MOUNT SIGNALHAWK™ Spectrum Analyzer

MODEL SH-36S-RM: Spectrum Analyzer (100kHz to 3.6GHz)

Over an Ethernet network, you can remotely analyze the performance of your system and diagnose problems from any computer on your network, whether in the same room or half way across the state.



KEY FEATURES

- Fast, Accurate, and Sensitive: 66 dB Dynamic Range and -135 dBm Noise Floor.
- Minimal Rack Space Required: Only 2 RU
- Eliminates trips to difficult remote locations
- Same "Spectrum Analyzer" functionality as our hand held unit all from your office PC.
- Multiple sites can be monitored from one centralized location.
- Along with our BPME you can view your RF Spectrum and be alerted of any RF Power alarm - A TOTAL 1-STOP PACKAGE
- Built in FCC Compliance Masks
- Waterfall display



WORLDWIDE APPLICATIONS

Cellular, PCS, DCS, 2G, 3G, 4G, CDMA, cdmaOne, CDMA 2000, 1x, 1x EV-DO, GSM, GPRS, EDGE, UMTS, HSDPA, W-CDMA, TDMA, AMPS as well as 802.11, Bluetooth, Broadcast, Emergency, Fire, GPS, HDTV, IBOC, In-Building, Lab, Microwave, NPSAP, Paging, Police, Private, Project 25, Public Safety, Tactical Military, Telematics, Tetra, Trunking, Utilities, WiMAX, WLAN and WLL.

SPECTRUM ANALYZER SPECIFICATIONS

Frequency Range	100 kHz to 3.6 GHz
Frequency Resolution	1 Hz
Frequency Uncertainty	± 1 ppm
Reference Aging	± 1 ppm / year
Temperature Drift	± 1 ppm / °C
Spectral Purity	-85 dBc @ 30 kHz
Sweep Time	2 s, full span; 1 ms, zero span
Resolution Bandwidth	100 Hz to 1 MHz RBW
Video Bandwidth	10 Hz to 300 kHz VBW
Amplitude Accuracy	± 1.0 dB typ, ± 1.5 dB max
Dynamic Range	66 dB, intermod-free
Noise Floor	-135 dBm DANL
Attenuator	0, 10, 20, or 30 dB; internal
Pre-Amplifier	+24 dB gain, internal
Data Points	705 displayed (settable)
Single-Button Measurements	Occ BW, Channel Power, ACPR, Field Strength, AM/FM Demod, C/I
CE Compliant	Yes
RF Input, N(F)	+20 dBm (100 mW) max
Connectivity	Ethernet and USB 2.0
Operating & Store Temperature	0° to +50°C oper; -20° to +80°C store
Humidity & Altitude	95% humidity; 4600 m altitude
Size and Weight	19" x 10" x 3.5", 10 lbs.
Emissions Mask	IBOC, Analog FM, DTV and many others

ACCESSORIES

MODEL	DESCRIPTION
920-SHPC-OPS	Operators Manual
920-SHPC-REF	Start-Up Instructions
5A2653-10	USB Cable, 10 ft, USB A (M) to USB B (M)
100-SA-MFN-40	Attenuator, 100 W, 40 dB, N(M) to N(F), 2.4 GHz
50-A-MFN-30	Attenuator, 50 W, 30 dB, N(M) to N(F), 4 GHz
25-A-MFN-30	Attenuator, 25 W, 30 dB, N(M) to N(F), 4 GHz
10-A-MFN-30	Attenuator, 10 W, 30 dB, N(M) to N(F), 4 GHz
5-A-MFN-20	Attenuator, 5 W, 20 dB, N(M) to N(F), 4 GHz
2-A-MFN-20	Attenuator, 2 W, 20 dB, N(M) to N(F), 4 GHz
PA-MNME	Adapter, N(M) to 7/16 DIN(M)
PA-FNME	Adapter, N(F) to 7/16 DIN(M)
PA-MNFE	Adapter, N(M) to 7/16 DIN(F)
PA-FNFE	Adapter, N(F) to 7/16 DIN(F)
4240-550	Adapter Kit, 7/16 DIN
4240-500-1	Adapter, N(F) to N(F)
4240-500-6	Adapter, N(M) to N(M)
4240-500-10	Adapter, N(M) to SMA(F)

* Note: Spare standard accessories are available as optional accessories.
Manuals and software/firmware updates available at www.bird-technologies.com

SITE ANALYZER® SERIES

MODEL SA-6000EX (25 - 6000 MHz), MODEL SA-2500EX (780 - 2500 MHz), MODEL SA-1700EX (25 - 1700 MHz), MODEL SA-1700EXP (25 - 1700 MHz)

- ONE UNIT covers the entire 25-6000 MHz range!
- Easy to operate and field ready for first-time, occasional and experienced users.
- Suitable for use in Worldwide Cellular and PCS/DCS; supporting measurement of CDMA, GSM, TDMA and AMPS modulation schemes.
- Other applications include 3G, Broadcast, Government, Tactical Military, Microwave, Paging, Public Safety, Trunking, WLAN and WLL, and TETRA (see model matrix).
- Color display is clearly visible in direct sunlight
- With a single download you can view as Distance to Fault or Measurement Match-**no need to store two traces.**
- FDR (Frequency Domain Relectrometry) measurement method results in a highly reliable assessment of the health of critical components in your system; ultimately providing a “heads-up” before a failure occurs.
- Fault location or DTF mode indicates VSWR or Return Loss levels at each point along the cable and antenna system length.
- Cable Loss function measures insertion loss of the cable system over a given frequency range.

Bird's® Site Analyzer® is the user-friendly test solution for installing, maintaining, and troubleshooting your antenna and cable systems. Field engineers and technicians rely on this rugged handheld tool to get the job done. Wireless equipment manufacturers, service providers, contractors, tower erectors, and military field personnel world wide approve of the analyzer's precision VSWR and Return Loss results.

This versatile unit also includes a Digital Power Meter option to accurately measure the output power of your base station. Wideband Power Sensors are available from Bird up to 4 GHz for use with this option, and are listed with the Accessories.



Model SA-6000EX Site Analyzer®



Model SA-1700EX Site Analyzer®



Model #	SA-6000EX	SA-2500EX	SA-1700EXP	SA-1700EX
Frequency Range	25 - 6000 MHz	780 - 2500 MHz	25 - 1700 MHz	25 - 1700 MHz
Frequency Resolution	25 kHz from 25-800 MHz 50 kHz from 800-2500 MHz 150 kHz from 2500-6000 MHz	50 kHz	25 kHz from 25-800 MHz 50 kHz from 800-1700 MHz	25 kHz from 25-800 MHz 50 kHz from 800-1700 MHz
Power Measurement	Yes	Yes	Yes	No
Return Loss	0 to -60 dB			
Test Port	N-type female connector			
Impedance	50			
Speed	1 multi-frequency scan - (238 points)/2 seconds; (475 points)/3.5 seconds; (949 points)/6 seconds			
Trace Resolution	238 (default), 475, or 949 per trace data points			
Storage Capacity	15 Set-Ups/(300) 238 point traces			
Immunity to Interfering Signals	Rejects on-frequency signals up to +13 dBm			
Maximum Input Signal	+22 dBm			
Data Transfer	9-pin RS-232 (DB9), compatible with serial port			
Internal	Rechargeable Lithium-Ion batteries. 3-hour minimum operating time. Auto shut-off conserves battery life.			
External DC	9 to 16 VDC fused, <3A			
External AC	90 to 264 VAC @ 45-66 Hz; AC/DC adapter required			
Operating Temperature	-10°C to 50°C (14°F to 122°F)			
Storage Temperature	-40°C to 80°C (-40°F to 176°F)			
Humidity	95% ±5% max., (non-condensing)			
Altitude	Up to 15,000 feet (4572 m)			
Dimensions	10.5" x 8.4" x 3.3" (265 mm x 212 mm x 83 mm)			
Weight	5.5 lbs. (2.5 kg)			
Upgradeable	No	Yes, SA-6000EX	Yes, SA-6000EX	Yes, SA-6000EX



SITE ANALYZER®

OPTIONAL EXTERNAL POWER SENSORS

The Digital Power Meter feature allows accurate power readings for digital or analog systems including those with CDMA, GSM, TDMA or AMPS modulation. Operators of analog and digital two-way radio systems, including tactical military users, will benefit as well.

- Compatible with the Model 5010B Directional Power Sensor to display forward and reflected power as well as VSWR and Return Loss, DPM elements range from 2 MHz - 2700 MHz.
- Compatible with the Model 5011, 5011-EF Terminating Power Sensor to measure power directly or via a coupled test port from 40 MHz - 12 GHz.
- Compatible with the Model 5012A Wideband Power Sensor to display forward and reflected power 350 MHz - 4000 MHz. Digital Power Meter option included with SA-6000EX, SA-2500EX and SA-1700EXP.



Model SA-2500EX Site Analyzer® with Digital Power Option

WIDEBAND POWER SENSOR (MODEL 5012A)

The Model 5012A provides customers a TOTAL RF POWER MEASUREMENT SOLUTION for Directional Power Measurement with Accuracy of $\pm 5\%$ of readings.

DIRECTIONAL POWER SENSOR (MODEL 5010B)

The Model 5010B provides customers a TOTAL RF POWER MEASUREMENT SOLUTION for ThruLine® (In-line) Power Measurements with Accuracy of $\pm 5\%$ of readings.

TERMINATING POWER SENSOR (MODEL 5011, 500-EF)

The Model 5011, 5011-EF provides customers a TOTAL RF POWER MEASUREMENT SOLUTION to measure Base Station Power and/or Broadcast Transmitter Power with Accuracy of $\pm 5\%$ of readings.



Model 5010B Directional Power Sensor



Model 5011, 5011-EF Terminating Power Sensor



Model 5012A Wideband Power Sensor

STANDARD ACCESSORIES

The Site Analyzer® includes Carrying Case, Instruction Manual, Serial Cable, PC Tool Software for Windows, AC Power Supply and Automotive Power Adapter.



Standard Accessories

Calibration Combos

ACCESSORIES

Model	Description
CAL-MN-C	Calibration combo, (M) N
CAL-FN-C	Calibration combo, (F) N
CAL-ME-C	Calibration combo, (M) 7/16 DIN
CAL-FE-C	Calibration combo, (F) 7/16 DIN
5012A	Wideband Power Sensor 350 - 4000MHz
5011	Terminating Power Sensor 40 - 4000MHz
5011-EF	Terminating Power Sensor 40MHz - 12GHz
5010B	Directional Power Sensor 2 - 2700MHz
TC-MNMN-1.5	Test cable, 1.5 m., N (M) conn.
TC-MNMN-3.0	Test cable, 3 m., N (M) conn.
TC-MNFN-1.5	Test cable, 1.5 m., N (M)/N (F) conn.
TC-MNFN-3.0	Test cable, 3 m., N (M)/N (F) conn.
TC-MNME-1.5	Test Cable, 1.5m, N(M) - 7/16 DIN (M)
TC-MNME-3.0	Test Cable, 3.0m, N(M) - 7/16 DIN (M)
TC-MNFE-1.5	Test cable, 1.5 m., N (M)/7/16 DIN (F) conn.
TC-MNFE-3.0	Test cable, 3 m., N (M)/7/16 DIN (F) conn.
PA-MNME	Adapter, N (M) to 7/16 DIN (M)
PA-FNME	Adapter, N (F) to 7/16 DIN (M)
PA-MNFE	Adapter, N (M) to 7/16 DIN (F)
PA-FNFE	Adapter, N (F) to 7/16 DIN (F)
4240-550	Precision Connector Adapter Kit, 7/16 DIN, SA-Series
7002C870	Hard shell transit case
SA-BATPAK	External battery pack
DC-DB9-USB	Serial-USB Adapter
RPK5B2431	Battery, Spare



BIRD® ANTENNA & CABLE MONITOR

Accurately detects antenna system degradation and failures

- Compatible with analog or digital cellular and two-way radio systems
- Worldwide applications include Tetra, Cellular, PCS and many others
- Monitors VSWR and power levels and provides alarm outputs
- Sensitive to antenna faults that internal transmitter VSWR monitors may not detect
- Local or remote operation via PC software
- Ideal for multi-carrier applications



Antenna & Cable Monitor

PC Software Tool 7005A970 (Optional Accessory)

FORWARD POWER MEASUREMENT

Frequency Range*	136* - 225 MHz 225 - 520 MHz 470 - 960 MHz 960 - 2400 MHz
Measurement Range	ACM: 2.5 W to 100 W ACM 500: 12.5 W to 500 W
Power Accuracy	136 - 225 MHz, ±10% 225 - 520 MHz, ±8% 470 - 960 MHz, ±5% 960 - 2400 MHz, ±5%
Insertion Loss	0.1 dB, 136 - 960 MHz 0.15 dB, 960 - 2400 MHz
VSWR	1.07, 136 - 960 MHz 1.1, 960 - 2400 MHz, N Connectors 1.1, 960 - 2000 MHz, 7/16 Connectors 1.2, 2000 - 2400 MHz, 7/16 Connectors

*Other frequencies & power ranges available - contact factory.

REFLECTED POWER MEASUREMENT

Directivity	30 dB, 136 - 960 MHz 26 dB, 960 - 2400 MHz
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VSWR ALARM CHARACTERISTICS

Alarm Set Point	1.3, 1.4, 1.5, 1.6, 1.7, 1.8 to 1
Relay Contact Type	Dry, Form C, relay contacts, common, normally open, normally closed.
Contact Rating	100 VDC @ 0.5 A
Visual Alarm Stimulus	Red LED will illuminate to indicate alarm VSWR set point exceeded, response time proportional to overload.
Reset	Local Mechanical reset switch. Remote input (Reset if VDC is 0 to +0.8 volts).

Monitor Ports - Connectors Female N, TNC or BNC
Coupling -63 dB approx., Subject to changes in full-scale power
Interface Port - Connector Protocol Female DB-9, compatible with IBM PC AT serial port. Serial RS-232, 9600 baud, no parity, 8 data bits, 1 stop bit, no handshake.

MODEL NUMBER DEFINITION

ACM = 2.5 - 100 W ACM 500 = 12.5 - 500 W	Freq. Range L1 = 136* - 225 MHz L2 = 225 - 520 MHz M = 470 - 960 MHz H** = 960 - 2400 MHz	RF Input Connector NM = N Male NF = N Female DM = 7/16 DIN Male DF = 7/16 DIN Female	RF Output Connector NM = N Male NF = N Female DM = 7/16 DIN Male DF = 7/16 DIN Female	Monitor Port Connector N = N Female T = TNC Female B = BNC Female	Input Voltage L = + (11 to 26) VDC H = ± (36 to 72) VDC
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PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS

General	Thurline® sensor for direct insertion in 50-ohm line
RF Connectors	N or 7/16 DIN
Maximum Line Section Power	Dependent on frequency and connector
Alarm/Power Connector	15-pin female "D" connector
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 80°C
Humidity	0 to 95% maximum (non-condensing)
Altitude	Up to 3000 meters above sea level
Passive Intermodulation Products	Less than -130 dBc
Power Requirements	+11 to +26 VDC or ±36 to ±72 VDC
Dimensions	4.75" (121 mm) wide (7.55" (192 mm) with connectors) 4.2" (107 mm) high, 1.06" (27 mm) deep
Weight	less than 2 lbs. (0.9 kg)
EMC	European Standard EN 61326-1:1997+ Addendums A1: 1998 and A2: 2001- Electrical equipment for measurement, control and laboratory use
Safety	European Standard EN 61010-1:2001- Safety Requirements - Electrical equipment for measurement, control and laboratory use- ECM requirements

ACCESSORIES

Model	Description
7005A970	PC software, displays Antenna & Cable Monitor readings and alarms, controls alarm set points
ACM-RACK	19" rack shelf, mounts up to two Antenna & Cable Monitors
ACM-RACKU	19" rack shelf with universal power supply (100 to 240 VAC, 50 - 60 Hz), mounts up to two +12 to +26 VDC Antenna & Cable Monitors
SUBCON-15/M-SH	DB 15-pin connector



(Contact factory to inquire about other optional accessories. Specifications are subject to change.)

Options

Any combination of male or female N or 7/16 DIN input/output connector, female N or TNC coupler connector, or +11 VDC to +25 VDC or ±36 VDC to ±72 VDC power supply.

H Frequency band unavailable with the ACM 500 version.

AT-500, AT-800



Frequency Range	2 - 520 MHz	806 - 960 MHz
Frequency Resolution	20 kHz	30 kHz
Frequency Accuracy	±50 kHz	±100 kHz
Measurement Range	VSWR: 1.00 - 99.99, Match Efficiency: 00 to 100.0%, Return Loss: 0.0 to -32.0 dB	
Measurement Speed (Typical)	Single Frequency: 5 readings/second, Swept Frequency: 1 sweep/second	
Preprogrammed Bands	AMPS, NADC, GSM, PDC, CT2	
Field Strength	0 to 100% (relative) Sensitivity for Full-scale deflection:	
	0.22 v/m @ 400 MHz	3m @ 12.6 W ERP
Test Port	Impedance: 50 ohm, nominal. Connector (others available)	
	N (F)	TNC (F)
Interface	Serial (female DB-9 connector)	
Power Requirements	Batteries: 6 rechargeable AA (KR-15/51) External DC: 11-16 VDC, External AC Adapter: 108-132 VAC @ 57-63 Hz, or 207-253 VAC @ 48-52 Hz	
Operating Temperature	0°C to 50°C (32°F to 122°F)	
Storage Temperature	-41°C to 71°C (-40°F to 160°F)	
Size (including connector)	8" H x 4 5/8" W x 1 3/4" D, (205 mm x 118mm x 42 mm)	
Weight	1 3/4 lbs. (0.8 kg)	



BDS - BIRD® DIAGNOSTIC SYSTEM

The Bird Diagnostic System (BDS) is a revolutionary tool for measuring voltage and current in complex applications. In applications where repeatability of sensitive RF measurements are required, like semiconductor process tools, the BDS gives access to data never before seen. Using a streamlined architecture, the BDS is able to measure multiple fundamental, harmonic and intermodulation frequencies while maintaining the phase angle of each measurement. With this data, composite signals up to 500 MHz can be recreated in the time domain, giving users the ability to identify small discrepancies that may make the difference between a successful and a failed process. This makes the BDS an incredible tool for researching new RF technologies and repeating high precision processes.



APPLICATIONS

- Chamber to Chamber Matching
- Waveform Reconstruction enables chamber comparisons to identify large and small changes
- Impedance Matching can reveal problems such as poor RF connections, worn electrodes and changes in the process gas mixture
- Harmonic Levels up to 500 MHz are available for analysis
- V, I and Delivered Power Comparison

SPECTRUM ANALYZER SPECIFICATIONS

Frequency Range	1 MHz - 500 MHz (Sensor Dependent)
Frequency Resolution	100 Hz
Frequency Accuracy	± 1 kHz
Harmonics	15 maximum, up to 500 MHz (Sensor Dependent)
Number of fundamentals (F0)	Maximum of 5 simultaneously
Digital	> Voltage, current, phase, frequency, impedance, power at frequencies selected by user
Analog	5 Outputs, 0-10Vdc, 1000Ω-source
Update Rates	10 ms
Network Protocol	RS-232, DeviceNet, Ethernet
RF Power, Max	10 kW or maximum power limit of RF connector
RF Connector	Custom or QC
Receiver Operating Temp.	+20 to +40 °C (68 to 104 °F)
Receiver Storage Temp.	-20 to +80 °C (-4 to +176 °F)
Cable Operating Temp.	0 to +100 °C (32 to 212 °F)
Cable Storage Temp.	-20 to +100 °C (-4 to 212 °F)
Sensor Operating/Storage Temp.	Refer to Sensor Specification
Humidity, Max;	85% Non-condensing
Air Pressure, Min.	745 mbar (equivalent to 2,500 m / 8,200 ft. max altitude)
Operating Power	Sensor: Provide by receiver; Receiver: 11-24 Vdc, 1.4-3A

PARAMETER	VOLTAGE	CURRENT	PHASE ANGLE
Range	RF: 3000 V rms DC Bias: 3500 V dc Breakdown: > 10kV @ 745 mbar, 100 °C	100 Arms	-180° to + 180° Resolution: 0.1°
Uncertainty 1-100 MHz	± 0.2V or 2% of reading whichever is greater (95% confidence interval)	± 0.2A or 2% of reading whichever is greater (95% confidence interval)	Absolute Angle: for Fo < 10V, 1A: ±1° for Fo < 10V, 1A: ±4° for Fn < 10V, 1A: ±2° for Fn < 10V, 1A: ±6° (95% confidence interval)
Uncertainty 100-500 MHz	± 0.3V or 3% of reading whichever is greater (95% confidence interval)	± 0.3A or 3% of reading whichever is greater (95% confidence interval)	Absolute Angle: for Fo < 10V, 1A: ±2° for Fo < 10V, 1A: ±8° for Fn < 10V, 1A: ±4° for Fn < 10V, 1A: ±12° (95% confidence interval)
Receiver Temperature Derating - from 25 °C	± 0.05% / °C	± 0.05% / °C	0.1° / °C

BIRD® CALIBRATION CART

Turnkey RF Measurements at Your Fingertips

- Stainless steel mobile cart with locking wheels
- High return loss ensures minimal power measurement error contribution
- Available in international and domestic versions
- Frequency and power upgrades available (Contact factory for more details)
- Service plans available with Bird® Service Center

The SCC7 Series provides quality turnkey calibration for fab houses and equipment suppliers. The system consists of (1) 4421 Power Meter, (1) Power Sensor, (1) Oil Load, (1) Mobile Cart, and Minor Accessories.



4020 Series Power Sensor

Model	Frequency Range	Power Input
4021	1.8-32 MHz	300 mW to 1 kW (1.2 kW max.)
4022	25-1000 MHz	300 mW to 1 kW (1.2 kW max.)
4024	1.5-32 MHz	3 W to 10 kW (12 kW max.)
4025	100-2500 kHz	3 W to 10 kW (12 kW max.)

4027A Series Power Sensor

Model	Frequency Range	Power Input
4027A250K	250-400 kHz	3 W to 10 kW
4027A400K	400-550 kHz	3 W to 10 kW
4027A800K	800-950 kHz	3 W to 10 kW
4027A2M	1.5-2.5 MHz	3 W to 10 kW
4027A4M	3-5 MHz	3 W to 10 kW
4027A10M	10-15 MHz	3 W to 10 kW
4027A12M	10-15 MHz	300 mW to 1kW
4027A25M	25-30 MHz	3 W to 9 kW
4027A35M	35-45 MHz	3 W to 7.5 kW
4027A60M	45-65 MHz	3 W to 6 kW
4027A100M	95-105 MHz	3 W to 4 kW
4027A150M	150-170 MHz	3.75 W to 3.75 kW

4027F Series Filtered Power Sensor

Model	Frequency Range	Power Input
4027F2M	1.8-2.2 MHz	100 W to 10 kW
4027F10M	12-15 MHz	100 W to 10 kW

High Power Loads

Model	Frequency Range & VSWR	Power Rating
8251	DC to 1 GHz at 1.1 max.	1000 W continuous
8890-300	DC to 1 GHz at 1.1 max. 1 GHz to 2 GHz at 1.25 max. 2 GHz to 2.4 GHz at 1.3 max.	2500 W continuous
8921	DC to 1 GHz at 1.1 max.	5000 W continuous
8931-115	DC to 400 MHz at 1.15 max. 400 MHz to 1 GHz at 1.20 max.	10 kW continuous w/ blower on 2.5 kW continuous w/ blower off
8931-230	DC to 400 MHz at 1.15 max. 400 MHz to 1 GHz at 1.20 max.	10 kW continuous w/ blower on 2.5 kW continuous w/ blower off

Ultra-Stable SC13 Loads

Model	Frequency Range & VSWR	Power Rating
8865SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	1 kW
8890-300SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	2.5 kW
8921SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	5 kW
8931-115SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	10 kW, 115 V
8931-230SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	10 kW, 230 V

- Power Levels** 1, 2.5, 5, 10 kW
- Meter** 4421
- Sensor Options** 4020 Series or 4027A Series
- Load Options** 8251, 8890-300, 8921, 8931-115, 8931-230
- Impedance** 50 ohm
- Frequency Range 4020 Sensor** 100 kHz - 1000 MHz
- Frequency Range 4027A Sensor** 250 kHz - 65 MHz
- Accuracy 4020 Series** ±3% (1σ) across power and frequency range
- Accuracy 4027A Series** ±1% (1σ) at calibration frequency and power levels; ±2% (1σ) over remainder of power range, and at other than calibration frequencies
- Accuracy 4027F Series** ±1% (2σ) across power and frequency range; ±2% (2σ) over remainder
- Casters** 4 locking swivel
- Connector Type** *Customer Specified
- Operating Position** Vertical only
- Power Requirements** 115/230 VAC, ±10%, 50/60 Hz
- Ambient Temp Range** 0°C to 45°C (For 10 kW 0°C to +40°C)
- Storage Temperature** -20°C to +70°C
- Humidity** 85% Max., Non condensing
- Altitude** Load derated above 5,000 feet
- 5 kW & 10 kW Size/Weight** 52" L x 20" W x 42" H / 250 lbs. Fully assembled
- 1 kW & 2.5 kW Size/Weight** 42" L x 20" W x 42" H / 175 lbs. Fully assembled
- Material of Construction** Stainless steel cart
- Applicable Standards** CE pending

*For connector options, please refer to our catalog or contact sales at 866.695.4569 or sales@bird-technologies.com



Multi-Sensor Calibration Cart & High Power Calibration Cart

BIRD® MULTI-SENSOR CALIBRATION CART

Turnkey RF Measurements at Your Fingertips

- Stainless steel mobile cart with locking wheels
- High return loss ensures minimal power measurement error contribution
- Available in international and domestic versions
- Frequency and power upgrades available (Contact factory for more details)
- Service plans available with Bird® Service Center

The MSCC7 Series provides quality turnkey calibration for fab houses and equipment suppliers. The system consists of (1) 4421 Power Meter, (2) Power Sensors, (1) Oil Load, (1) Mobile Cart, and Minor Accessories.

4020 Series Power Sensor

Model	Frequency Range	Power Input
4021	1.8-30 MHz	300 mW to 1 kW (1.2 kW max.)
4024	1.5-30 MHz	3 W to 10 kW (12 kW max.)
4025	100-2500 kHz	3 W to 10 kW (12 kW max.)

4027A Series Power Sensor

Model	Frequency Range	Power Input
4027A250K	250-400 kHz	3 W to 10kW
4027A400K	400-550 kHz	3 W to 10kW
4027A800K	800-950 kHz	3 W to 10kW
4027A2M	1.5-2.5 MHz	3 W to 10kW
4027A4M	3-5 MHz	3 W to 10kW
4027A10M	10-15 MHz	3 W to 10kW
4027A12M	10-15 MHz	300 mW to 1kW
4027A25M	25-30 MHz	3 W to 9 kW

4027F Series Filtered Power Sensor

Model	Frequency Range	Power Input
4027F2M	1.8-2.2 MHz	100 W to 10 kW
4027F10M	12-15 MHz	100 W to 10 kW

High Power Loads for Semiconductor

Model	Frequency Range & VSWR	Power Rating
8921A100	DC to 30 MHz at 1.1 max. (less than 1.05 typical)	5 kW
8931A400-115		10 kW
8931A400-230		10 kW



- Power Levels** 5 kW or 10 kW for either sensor
- Meter** 4421
- Sensor Options** 4020, 4027A, or 4027F Series
- Load Options** 8921A100, 8931A400-115, 8931A400-230
- Impedance** 50 ohm
- Frequency Range** 100 kHz - 30 MHz (depending on sensor)
- Accuracy 4020 Series** ±3% (1σ)
- Accuracy 4027A Series** ±1% (1σ)
- Accuracy 4027F Series** ±1% (2σ)
- Casters** 4 locking swivel
- Connector Type** *Customer Specified
- Operating Position** Vertical only
- Power Requirements** 115/230 VAC, ±10%, 50/60 Hz
- Ambient Temp Range** 0°C to 35°C (For 10 kW 0°C to +40°C)
- Storage Temperature** -20°C to +70°C
- Humidity** 85% Max., Non condensing
- Altitude** Load derated above 5,000 feet
- 5 kW & 10 kW Size/Weight** 52" L x 20" W x 42" H /290 lbs. Fully assembled
- Material of Construction** Stainless steel cart
- Applicable Standards** CE

*For connector options, please refer to our catalog or contact sales at 866.695.4569 or sales@bird-technologies.com



BIRD® HIGH POWER CALIBRATION CART

- Stainless steel mobile cart with locking wheels
- High return loss ensures minimal power measurement error contribution
- Available in international and domestic versions
- Service plans available with Bird® Service Center

The SCC8 Series provides quality turnkey calibration for fab houses and equipment suppliers. The system consists of (1) 4421 Power Meter, (1) 4028 A or B Series Power Sensor, (1) Moduload, (1) Mobile Cart, and Minor Accessories.

4028 Series Power Sensor

Model	Frequency Range	Power Range
4028A10M	10-15 MHz	1kW-25kW
4028A250k	250-400 kHz	1kW-20kW
4028A25M	25-30 MHz	1kW-25kW
4028A2M	1.5-2.5 MHz	1kW-25kW
4028A3M	2.5-3.5 MHz	1kW-25kW
4028A400K	400-550 kHz	1kW-20kW
4028A4M	3.5-4.5 MHz	1kW-25kW
4028B10M	10-15 MHz	1kW-25kW
4028B3M	3-4 MHz	1kW-25kW

- Frequency Range** 250 kHz - 30 MHz, depending on sensor (see chart)
- Power Range** 1 kW - 25 kW
- Accuracy** ±1% of reading at calibration frequency and power levels, ±2% of reading at other power levels and frequencies within sensor range.
- Connector** Customer specified, appropriate for power level.
- Impedance** 50 ohm nominal
- Sensor VSWR** 1.05 max. (32.2 dB return loss)
- Load VSWR** 1.1 max. (26.4 dB return loss)
- Coolant** 100% water or 35% industrial ethylene glycol/65% water, 9 quarts (8.5 liters), forced air cooling
- Particle Generation** 156 per cfm (0.5 μm), 29 per cfm (1 μm), 0 per cfm (3 μm)
- Humidity** 85% maximum, non-condensing
- Altitude** Load derated above 5,000 ft (1,524 m)
- Operating Temperature** +5°C to +30°C, < 25 kW, 100% water, +5°C to +45°C, < 20 kW, 100% water, 0°C to +25°C, < 25 kW, 35% ethylene glycol/65% water, 0°C to +35°C, < 20 kW, 35% ethylene glycol/65% water
- Storage Temperature** +5°C to +50°C, 100% water, -20°C to +50°C, 35% ethylene glycol/65% water
- Size** 39.5" L x 21.5" W x 39.5" H (1003.3mm x 546.1mm x 876.3mm)
- Weight** 240 lbs (109 kg)
- Material of Construction** Stainless steel cart
- Applicable Standards** CE pending

SEMICONDUCTOR

4020 SERIES — Power Sensor



	4021	4022	4024	4025
Power Input	300 mW to 1 kW (1.2 kW max.)	300 mW to 1 kW (1.2 kW max.)	3 W to 10 kW (12 kW max.)	3 W to 10 kW (12 kW max.)
Frequency Range	1.8-32 MHz	25-1000 MHz	1.5-32 MHz	100-2500 kHz
Insertion Loss	<0.05 dB	<0.05 dB	<0.05 dB	<0.05 dB
Accuracy	±3% of reading from rated max. to rated min.			



BIRD® MODEL 4421

Precision Power Meter for Semiconductor Processing Applications

- ±1% Accuracy - Accomplished through the use of sensors with an automatic frequency compensation scheme, where the error contributions due to directional coupler frequency response characteristics are eliminated.
- Wide Dynamic Range - The instrument will meet the full accuracy specification over a 35 dB dynamic range.
- Excellent Measurement Repeatability - Typically <0.1%
- Digital Display - Along with automatic VSWR calculation
- Computer Interface - RS-232 and IEEE-488 standard



Model 4421

The Bird® Model 4421 is a precision RF power meter that, while originally intended for general purpose laboratory applications where high accuracy is required, has found wide acceptance in semiconductor processing applications. The product is configured as a system, consisting of the Model 4421 digital display and a precision power sensor selected for the application based upon maximum power and operating frequency.

MODEL 4421 MULTIFUNCTION POWER METER

Power Range	100 mW to 25 kW FS
Frequency Range	100 kHz - 1 GHz
VSWR Range	1.0 - 199.9
Functions	Forward and reflected power in W or dBm, VSWR, return loss in dB and min./max. values
Overrange	Audible warning when RF power input exceeds 120% of sensor's maximum power range
Indication Display	3 1/2 digit-liquid crystal display with indicator for mode, measurement units, battery condition, programming status, and trend arrows. Switchable backlight.
Operating Power	115/230 VAC, 50/60 Hz or 8 nickel metal hydride 1.2 V cells (NEDA type 10014)
Nominal Size	12 9/32" L x 12 5/32" W x 4 1/4" H (312 mm x 309 mm x 108 mm) with handle extended 15 7/16" L (392 mm)
Weight	11 lbs. (5 kg.)
Interconnects	1 meter latch-n-lock coiled cable
Interfaces	IEEE-488 and RS-232 standard
Dimensions	4 1/2" x 6 1/2" (114 x 165 mm)
Required Product	RF Power Sensor
Accessories	Case 4300A215 19" Panel Mount Kit 4421-250 Latch & Lock Cable 4421-038



MODEL 4421A530 CALIBRATION KIT

Calibration Key

Weight	3 oz. (85 g.)
Cable Length	Approx. 3 ft. (1 m)
Required Products	4421 power meter, 4020 Series power sensor, RF power source, RF low-pass filter, RF terminating power standard (Bird® Model 6091 calorimeter recommended) and IBM compatible computer fitted with a GPIB card-specify standard.
Performance Measurement Cycle	1 Year
Limitation	Not compatible with 4027 Series Sensor



BIRD® Model 4027A

Precision Power Sensors for Precision Process Applications

Achieves tighter, more consistent RF power measurements for improved yield.

- ±1% accuracy at specified calibration frequencies and power levels.
- Direct, plug-in operation with the industry standard Bird® Model 4421 RF Power Meter.
- Multiple sensors provide for measurement of 0.3 W - 10 kW over a 250 kHz - 170 MHz frequency range.

Bird's® 4027A Series Power Sensors represent a family of sensors for use in semiconductor processing and other precision process applications. Intended for use with the industry standard Bird® Precision Laboratory Power Meter Model 4421, these products provide a threefold improvement in long-term unit-to-unit accuracy.



4027A SERIES — Power Sensor

Model	Power Range	Frequency
4027A12M	300mW to 1kW	10-15 MHz
4027A250K	3 W to 10kW	250-400 kHz
4027A400K	3 W to 10kW	400-550 kHz
4027A800K	3 W to 10kW	800-950 kHz
4027A2M	3 W to 10kW	1.5-2.5 MHz
4027A4M	3 W to 10kW	3-5 MHz
4027A10M	3 W to 10kW	10-15 MHz
4027A25M	3 W to 9kW	25-30 MHz
4027A35M	3 W to 7.5kW	35-45 MHz
4027A60M	3 W to 6kW	45-65 MHz
4027A100M	3 W to 5kW	95-105 MHz
4027A150M	3.75 W to 4kW	150-170 MHz

* For applications with harmonic content greater than -50 dBc, contact the factory for versions of the 4027A sensors with filtering included.

POWER MEASUREMENT

Accuracy	±1% (1σ) at calibration frequencies and power levels; ±2% at other frequencies and power levels.
Calibration Power Level	1000 W units: 700 watts. 10 kW units: 1700 watts.
VSWR Range	1.0 to 2.0 (40.00 to 9.5 dB return loss)
Directivity	28 dB
Insertion Loss	< 0.05dB
Uniformity	2% maximum unit to unit, at calibration frequency and power levels.
Speed	2 readings per second.
Maximum Power	10 kW units - 12 kW max. 1 kW units - 1.2 kW max.

CONNECTORS

Type	Customer specified
Sensor Interface	Latch-n-Lock

POWER REQUIREMENTS

External DC	12 VDC, supplied from Bird 4421 Power Meter
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PHYSICAL SPECIFICATIONS

Dimensions	5.2" L x 2.5" W x 3.25" H
Weight	1 lb. 13 oz. (0.8 kg)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	15°C to 35°C (59°F to 95°F)
Storage Temperature	-40°C to 80°C (-40°F to 176°F)
Humidity	95% maximum (non-condensing)
Altitude	Up to 10,000 feet (3,048 m)
General EMC	Designed to carry CE mark (with immunity exception noted below)
Emissions	EN-55011, 1991, Class B
Immunity	EN-50082-1, 1995
Safety	EN-61010, 1993 in accordance with Council Directives 73/23/EEC and 93/68/EEC
Calibration Cycle	6 month. Performance before and performance after data to be supplied for units.



BIRD® Model 4028

High Power, Precision Power Sensors for Precision Process Applications

Achieves tighter, more consistent RF power measurements for improved yields.

- ± 2% at calibration frequencies and power levels.
± 4% at other frequencies and power levels. Add 2% to uncertainty outside 25 ± 10 °C.
- Direct, plug-in operation with the industry standard Bird® Model 4421 RF Power Meter.
- Multiple sensors provide for measurement over a 250 kHz to 30 MHz frequency range
- Capable of power measurements up to 50kW.

With the expanding surface areas in the LCD and Solar panel industry, higher power levels are necessary for the industries processes. The Bird 4028 series sensor is designed to meet the growing RF power measurement challenge with accuracy, repeatability and versatility to meet current and future applications. Bird continues to innovate useful sensor technology to meet these fast paced markets.



4028 SERIES — Power Sensor

Model	Power Range	Frequency
4028A250K	1.0 kW-20 kW	250-400 kHz
4028A400K	1.0 kW-20 kW	400-550 kHz
4028A2M	1.0 kW-25 kW	1.5-2.5 MHz
4028A3M	1.0 kW-25 kW	2.5-3.5 MHz
4028A4M	1.0 kW-25 kW	3.5-4.5 MHz
4028A10M	1.0 kW-25 kW	10-15 MHz
4028A25M	1.0 kW-25 kW	25-30 MHz
4028B3M	1.0 kW-25 kW	2.5-4 MHz
4028B10M	1.0 kW-25 kW	10-15 MHz
4028C10M	500 W-50 kW	10-15 MHz

POWER MEASUREMENT

Accuracy	±2% (1σ) at calibration frequencies and power levels; ±4% at other frequencies and power levels. Add 2% to uncertainty outside 25 ± 10°C
Calibration Power Level	250 and 400kHz units: 1.7kW
VSWR Range	1.0 to 2.0 (40.00 to 9.5 dB return loss)
Directivity	28 dB
Insertion Loss	< 0.05dB
Uniformity	2% maximum unit to unit, at calibration frequency and power levels.
Speed	2 readings per second.
Maximum Power	4028AxxK: 20kW 4028AxxM: 25kW 4028B: 25kW 4028C: 50kW

CONNECTORS

4028A Series	Customer Specified
4028B Series	1-5/8 EIA Flanged
4028C Series	3-1/8 EIA Flanged
Sensor Interface	Latch-n-Lock

POWER REQUIREMENTS

External DC	12 VDC, supplied from Bird 4421 Power Meter
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PHYSICAL SPECIFICATIONS

Dimensions	4.7" L x 3.2" W x 4.0" H (4028A Series) 6.8" L x 3.5" W x 4.8" H (4028B Series) 8.0" L x 5.2" W x 6.4" H (4028C Series)
Weight	3.3 lbs. (4028A Series) 5.2 lbs. (4028B Series) 7.3 lbs. (4028C Series)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	0°C to 50°C (32°F to 122°F) (derate accuracy outside 25 ± 10°C)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	95% non-condensing
Altitude	10,000 feet (3,000 m)
General EMC	Designed to carry CE mark (with immunity exception noted below)
Emissions	EN-55011, 1991, Class B
Immunity	EN-50082-1, 1995
Safety	EN-61010, 1993 in accordance with Council Directives 73/23/EEC and 93/68/EEC
Calibration Cycle	6 months



BIRD® Model 5012A, 5016, 5017

Site Management Solutions for Power Measurement

The Wideband Power Sensor (WPS) family now includes two new models. The 5016 is designed specifically for LOW POWER applications measuring power down to 25 mW and the 5017 is focused on LOW FREQUENCY applications operating at frequencies as low as 25 MHz. Both of these models as well as the 5012A can be used with any modulation, operate with our new hand-held meter, the 5000-XT, and provide a wide variety of measurements including:

- True Average Forward Power
- True Average Reflected Power
- Peak Power
- Duty Cycle
- Return Loss
- Reflection Coefficient
- Crest Factor
- Average Burst Power
- Voltage Standing Wave Ratio (VSWR)
- Complementary Cumulative Distribution Function (CCDF)



Model 5012A
Wideband Power Sensor

Specifications

	5012A	5016	5017
Frequency Range	350 MHz - 4.0 GHz	350 MHz - 4.0 GHz	25MHz - 1.0 GHz
Power Range	150mW - 150 Watts Avg. 400 Watts Peak	25mW - 25 Watts Avg. 60 Watts Peak	500mW - 500 Watts Avg. 1300 Watts Peak
Impedance	50 Ohms (nominal)		
Reflection Measurement Characteristics	Measurement Range: Return Loss, 0.0 to 23 dB (VSWR, 1.15 to 99.9 Rho, 0.07 to 1.0)		
Minimum Forward Power for Reflected Measurement Accuracy	0.5W	0.1W	1.5W
Insertion VSWR	Average Power = ±5% of Reading (+15 °C to +35°C), Burst Average Power = ±6% of Reading (+15 °C to + 35°C), Peak Envelope Power = ±7% of Reading (+15 °C to + 35°C), CCDF = ±0.2%		
Insertion Loss	<1.05 from 0.35 to 2.5 GHz, <1.10 from 2.5 to 4 GHz	<1.05 from 0.35 to 2.5 GHz, <1.10 from 2.5 to 4 GHz	<1.05
Connector(s)	N Female (Both)		
Power Supply	USB Port: Less than one low-power USB load DC Input Connector: 7-18 VDC at less than 0.1A		
Interface(s)	DPM Interface: DB9 proprietary interface PC Interface (1): RS -232, 9600 Baud, no parity, 8 data bits, 1 stop bit, DB9 PC Interface (2): USB 1.1 Type B, compliant interface		
Weight	1.2 lb. maximum		
Dimensions HxWxD [inches (mm)]	4.8" x 4.6" x 1.3" (122 mm x 117 mm x33 mm)		
Directivity	0 dB up to 3.0 GHz, 28dB up to 4.0 GHz	30 dB up to 3.0 GHz, 28dB up to 4.0 GHz	30 dB
Data Logging	Requires 5000-XT or VPM2		
Operating Temps [°C(°F)]	-10° to +50°C (+14° to +122°F)		
Storage Temps	-40 ° to +80°C (-40° to +176°F)		
Mechanical Shock & Vibration	IAQ MIL-PRF-2880F class 3		

ACCESSORIES

PTA-MNMN	Precision Test Adapter Male N to Male N
PTA-MNME	Male N to Male 7/16 (DIN)
PTA-MNFE	Male N to Female 7/16 (DIN)
5A2226	Power Supply, Intl
5A2229	Power Supply, US
5A2653-10	USB Cable, 10'
5A2264-09-MF-10	DB9 Cable, 10'

COMPATIBLE DEVICES

5000-EX	Digital Power Meter
5000-XT	Digital Power Meter
SH-36S	SignalHawk® Spectrum Analyzer
SH-361S	SignalHawk® Spectrum Analyzer/1-Port VNA
SH-362	SignalHawk® 2-Port VNA
SH-362S	SignalHawk® Spectrum Analyzer/2-Port VNA
SA-1700EXP	Site Analyzer® Antenna, & Cable Tester
SA-2500EX	Site Analyzer® Antenna, & Cable Tester
SA-6000EX	Site Analyzer® Antenna, & Cable Tester
VPM2	PC VIA Virtual Power Meter

Model 5011, 5011-EF, 5015, 5015-EF Terminating Power Sensor

BIRD® Model 5011, 5011-EF, 5015, 5015-EF Terminating Power Sensor Designed to make Terminating Power Measurements with the full flexibility of a portable precision instrument

The Bird Terminating Power Sensor (TPS) is the easiest to use and most cost competitive terminating sensor on the market. This one port measurement device will provide True Average Power for forward power or reflected power if attached to a directional coupler or total power in the line if connected to a non-directional coupler. The TPS is a true plug and play solution with no front panel calibration required at any time. The TPS is truly the most economical terminating sensor, half the price of our leading competitors. Quite a value considering the TPS is a highly accurate (5%) device with calibration traceable to the National Institute of Standards and Technology (NIST). Now available in a USB compatible version.



Model 5011
Terminating Power Sensor

Specifications

	5011	5011-EF	5015	5015-EF
Frequency Range	40 MHz - 4.0 GHz	40 MHz - 12 GHz	40 MHz - 4.0 GHz	40 MHz - 12 GHz
Power Range	-20.000 to +10.000 dBm (10.0010 µW to 10.000 mW)			
Impedance	50 Ohms (nominal)			
Peak/Average Ratio	12 dB max.			
Accuracy	± 5% of Reading. When operating below 100 MHz and above 40 °C, add 1 %			
Insertion VSWR	Typical 1.03 (36.6 dB return loss) Maximum 1.20 (20.8 dB return loss)	Typical 1.05 (32.3 dB return loss) Maximum 1.25 (19.1 dB return loss)	Typical 1.03 (36.6 dB return loss) Maximum 1.20 (20.8 dB return loss)	Typical 1.05 (32.3 dB return loss) Maximum 1.25 (19.1 dB return loss)
Warm Up Time	5 Minutes			
Connector(s)	Precision N Male			
Power Supply	From host instrument via cable connection			
Interface(s)	DB9 proprietary interface	DB9 proprietary interface	USB 2.0 Type B	USB 2.0 Type B
Weight	.75 lb. maximum			
Dimensions [inches (mm)]	6" (152 mm) long (including connector); 1.5" (38 mm) diameter			
Altitude	15,000 ft. operating			
Humidity, Max.	95% maximum (non-condensing)			
Safety	Complies with EN-61010-1:1995 including Amendment 2 IAW Low Voltage Directive (73/23/EEC)			
Humidity, Max.	Complies with EN 61326-1:1997 IAW EMC Directive (89/336/EEC)			
Operating Temps [°C(°F)]	-10° to +50°C (+14° to +122°F)			
Storage Temps [°C(°F)]	-40° to +80°C (-40° to +176°F)			
Mechanical Shock & Vibration	IAQ MIL-PRF-2880F class 3			



ACCESSORIES

8353A040-50	40 dB Attenuator, 50 W, 4 GHz
8353A030-10	30 dB Attenuator, 10 W, 4 GHz
8353A040-50-18	40 dB Attenuator, 50 W, 18 GHz
8353A030-10-18	30 dB Attenuator, 10 W, 18 GHz
4240-500-1	Adapter, N (F) to N (F)
4240-500-3	Adapter, right angle, N (F) to N (M)
4240-500-4	Adapter, N (F) to SMA (F)
4240-500-5	Adapter, N (F) to SMA (M)
PA-FNME	Adapter, N (F) to 7/16 DIN (M)
PA-FNFE	Adapter, N (F) to 7/16 DIN (F)
TC-MNFN-1.5-G	Test cable, 1.5 m., N (M)/N (F) conn.
TC-MNFN-1.5	Test cable, armored, PS, 1.5 m., N (F) to N (M)
TC-MNFN-3.0	Test cable, armored, PS, 3.0 m., N (F) to N (M)
5011A035-1	DC Block, N (F) to N (M)
5A2653-10L2	USB SeaLatch Cable, 10'
5A2653-10	USB Cable, 10'
5A2264-09-MF-10	DB9 Cable, 10'

COMPATIBLE DEVICES: 5011 & 5011-EF

5000-EX	Digital Power Meter
5000-XT	Digital Power Meter
SA-1700EXP	Site Analyzer® & Cable Tester
SA-2500EX	Site Analyzer® & Cable Tester
SA-6000EX	Site Analyzer® & Cable Tester
SH-36S	SignalHawk® Spectrum Analyzer
SH-361S	SignalHawk® Spectrum Analyzer/ 1-Port VNA
SH-362	SignalHawk® 2-Port VNA
SH-362S	SignalHawk® Spectrum Analyzer/ 2-Port VNA

COMPATIBLE DEVICES: 5015 & 5015-EF

5000-XT	Digital Power Meter
VPM2	Virtual Power Meter

BIRD® Wideband Coupler

- Cost effective
- Portable
- Easy-to-use

SPECIFICATIONS

Frequency Range	45 MHz - 230 MHz (VHF Models) 450 MHz - 890 MHz (UHF Models) 450 MHz - 800 MHz (6" UHF Models)
Maximum Power	Transmission line and frequency dependent
Nominal Coupling	Transmission line dependent (See Table 1)
Directivity	28 dB Min.
Coupler Output Connector	Type "N" Female
Coupler Output VSWR	1.2 Max.
Main Line VSWR	1.1 Max.
Coupling Uncertainty (after correction)	±0.05 dB
Operating Temp.	-10°C to 40°C
Storage Temp.	-20°C to 85°C
Weight	Transmission Line Dependent (See Table 2)
Dimensions	Transmission Line Dependent (See Table 2)



TABLE 1

Line Size	VHF	UHF
1-5/8"	62 dB ±2 dB	59 dB ±2 dB
3-1/8"	69 dB ±2 dB	64 dB ±2 dB
4-1/16"	70 dB ±2 dB	67 dB ±2 dB
6-1/8"	75 dB ±2 dB	75 dB ±2 dB

TABLE 2

Model Number	Line Size	Frequency Range	Length (in.)	Weight (lbs.)
WBC1-45	1-5/8 Flanged	VHF	6.75	3.65
WBC1U-45	1-5/8 Unflanged	VHF	6.38	1.8
WBC1-400	1-5/8 Flanged	UHF	6.75	3.65
WBC1U-400	1-5/8 Unflanged	UHF	6.38	1.8
WBC3-45	3-1/8 Flanged	VHF	7.03	6
WBC3U-45	3-1/8 Unflanged (Recessed)	VHF	6.5	2.75
WBC3UF-45	3-1/8 Unflanged (Flush)	VHF	6.5	2.75
WBC3-400	3-1/8 Flanged	UHF	7.03	6
WBC3U-400	3-1/8 Unflanged (Recessed)	UHF	6.5	2.75
WBC3UF-400	3-1/8 Unflanged (Flush)	UHF	6.5	2.75
WBC4-45	4-1/16 Flanged (Dielectric)	VHF	8.38	8.88
WBC4M-45	4-1/16 Flanged (MYAT)	VHF	8.38	8.88
WBC4U-45	4-1/16 Unflanged (Dielectric)	VHF	7.5	2.88
WBC4-400	4-1/16 Flanged (Dielectric)	UHF	8.38	8.88
WBC4M-400	4-1/16 Flanged (MYAT)	UHF	8.38	8.88
WBC4U-400	4-1/16 Unflanged (Dielectric)	UHF	7.5	2.88
WBC6-45	6-1/8 Flanged	VHF	10.22	13.2
WBC6U-45	6-1/8 Unflanged	VHF	9.63	7.2
WBC6-400	6-1/8 Flanged	UHF	10.22	13.2
WBC6U-400	6-1/8 Unflanged	UHF	9.63	7.2

BIRD® Model 5010B & 5014 Dual-Socket Thruline® Directional Power Sensor

Bird's® Most Flexible Thruline® Sensor System

The Bird Directional Power Sensor (DPS) is the most flexible RF sensor on the market today. With this Dual-Socket, Thruline® sensor, you may select from a wide range of Bird Elements to tailor the unit to your needs over a wide range of frequencies and power levels. Also, select field changeable input and output RF connectors from dozens of types including (N, BNC, HN, 7/16 DIN). Operate your sensor with either our new hand held display, the 5000-XT, or via a computer with our windows compatible software tool the VPM2.

The DPS measures True Average Power and/or Peak Power with exceptional accuracy that is traceable to National Institute of Standards and Technology (NIST). It is also a highly economical RF power measurement tool offering reliable results for hundreds, not thousands of dollars.

MEASUREMENTS PERFORMED

Standard elements: true average forward power, true average reflected power
Peak detecting elements: peak forward power

CALCULATIONS PERFORMED

VSWR, Return loss, Reflection Coefficient

Element Selection Guide

Frequency Range	Forward Power Range	Reflected Power Range	Forward Element	Reflected Element
2 - 30 MHz	1.25 W to 50 W	125 mW to 5 W	DPM-50H	DPM-5H
	12.5 W to 500 W	1.25 W to 50 W	DPM-500H	DPM-50H
25 - 60 MHz	1.25 W to 50 W	125 mW to 5 W	DPM-50A	DPM-5A
	12.5 W to 500 W	1.25 W to 50 W	DPM-500A	DPM-50A
50 - 125 MHz	1.25 W to 50 W	125 mW to 5 W	DPM-50B	DPM-5B
	12.5 W to 500 W	1.25 W to 50 W	DPM-500B	DPM-50B
100 - 250 MHz	25 W to 1 kW	2.5 W to 100 W	DPM-1000B	DPM-100B
	1.25 W to 50 W	125 mW to 5 W	DPM-50C	DPM-5C
200 - 500 MHz	12.5 W to 500 W	1.25 W to 50 W	DPM-500C	DPM-50C
	62.5 W to 2.5 kW	6.25 W to 250 W	DPM-2500C	DPM-250C
400 - 960 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5D	DPM-5D
	1.25 W to 50 W	125 mW to 5 W	DPM-50D	DPM-5D
950 - 1260 MHz	12.5 W to 500 W	1.25 W to 50 W	DPM-500D	DPM-50D
	125 mW to 5 W	12.5 mW to 500 mW	DPM-5E	DPM-5E
1100 - 1800 MHz	1.25 W to 50 W	125 mW to 5 W	DPM-50E	DPM-5E
	2.5 W to 100 W	250 mW to 10 W	DPM-100E	DPM-10E
1700 - 1990 MHz	12.5 W to 500 W	1.25 W to 50 W	DPM-500E	DPM-50E
	25 W to 1 kW	2.5 W to 100 W	DPM-1000E	DPM-100E
1900 - 2200 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5J	DPM-5J
	1.25 W to 50 W	125 mW to 5 W	DPM-50J	DPM-5J
2200 - 2300 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5K	DPM-5K
	1.25 W to 50 W	125 mW to 5 W	DPM-50K	DPM-5K
2300 - 2500 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5L1	DPM-5L1
	1.25 W to 50 W	125 mW to 5 W	DPM-50L1	DPM-5L1
2500 - 2700 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5L2	DPM-5L2
	1.25 W to 50 W	125 mW to 5 W	DPM-50L2	DPM-5L2
2500 - 2700 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5M	DPM-5M
	625 mW to 25 W	62.5 mW to 2.5 W	DPM-25M	DPM-2.5M
2500 - 2700 MHz	125 mW to 5 W	12.5 mW to 500 mW	DPM-5N	DPM-5N
	125 mW to 5 W	12.5 mW to 500 mW	DPM-5R	DPM-5R



Model 5010B
 Thruline® Directional
 Power Sensor

SPECIFICATIONS

Frequency Range	Element dependent, 2 MHz to 2.7 GHz
Power Range	Element dependent, 500 mW to 1 kW full scale
Impedance	50 Ohm
Peak/Average Ratio	10 dB maximum with DPM elements
Accuracy	True Average Power, ±5% of reading (15°C to 35°C), ±7% of reading (-10°C to 50°C) PEAK POWER, ±8% of full scale
Insertion VSWR	1.05:1 from 0.45 to 1000 MHz (with N connectors)
Settling Time	< 2 seconds
Connectors	QC Type. Female N normally supplied.
Power Supply Interface	From host instrument via cable 5010B: DB9 (proprietary configuration) 5014: USB 2.0 (Type B)
Dimensions	1.875" H x 1.875" W x 3.5" D (47.7 mm x 47.7 mm x 88.9 mm) excluding connectors
Weight	1.12 lbs. (0.51 kg)
Directivity	30 dB typical (exact value depends on element selected)
Humidity	95% max. (non-condensing)
Pulse width Parameters	>100 MHz 800 ns min. 26-99 MHz 1.5 µs min. 2-25 MHz 15 µs min.
Pulse Rep. Rate Peak	15 pps min.
Pulse Duty Factor	1 x 10 ⁻⁴ min.
Dynamic Range	16 dB
Operating Temp.	-10°C to +50°C
Storage Temp.	-40°C to +75°C

COMPATIBLE DEVICES: 5010B

- 5000-EX** Digital Power Meter
- 5000-XT** Digital Power Meter
- SA-1700EXP** Site Analyzer® & Cable Tester
- SA-2500EX** Site Analyzer® & Cable Tester
- SA-6000EX** Site Analyzer® & Cable Tester
- SH-36S** SignalHawk® Spectrum Analyzer
- SH-361S** SignalHawk® Spectrum Analyzer/1-Port VNA
- SH-362** SignalHawk® 2-Port VNA
- SH-362S** SignalHawk® Spectrum Analyzer/2-Port VNA

COMPATIBLE DEVICES: 5014

- 5000-XT** Digital Power Meter
- VPM2** Virtual Power Meter



BIRD® Model 5000XT Hand-Held Digital Power Meter

The "NEW" Industry Standard Hand-Held RF Power Meter

The hand-held digital power meter has been completely redesigned with the new Bird® 5000-XT. Ideally suited for field techs and engineers who need to make power measurements anywhere they go, the 5000-XT's new user interface has an intuitive, menu-driven design, making it the easiest to use on the market. It's operable even with one hand and compatible with all our field and legacy sensors.

- Indoor/outdoor viewable monochrome VGA display with backlight
- Up to 60 hours of continuous use battery life
- Single key allows one-hand toggling through operations
- Locking mechanism prevents unintentional sensor disconnects
- Compliant with MIL spec drop test
- Lightweight at 1.4 lbs
- Automatically detects sensor and displays appropriate power measurement screen
- Data logging capability with comparison 1 GB of memory, storing and transfer of up to 7 days of data



Model 5000-XT
RF Digital Power Meter

SIGNALS MEASURED

WiMAX, (IEEE 802.16), GSM/EDGE, W-CDMA, LTE, WiFi (802.11), HSUPA/HSDPA, TD-SCDMA, TETRA, P25, Zigbee (IEEE 802.15), Bluetooth, RFID, DVB, DMB and MediaFlo

MEASUREMENTS PERFORMED

VSWR, peak power, true average power, crest factor, CCDF and burst power

SPECIFICATIONS

Display	Indoor/Outdoor Viewable Monochrome VGA Display with Backlight
Functions	VSWR, Peak Power, True Average Power, Crest Factor CCDF, Burst Power, Data Logging
Sensor Detection	Automatic
Battery	Rechargeable, Field Replaceable, Lithium Ion Batteries
AC Adapter/Charger	115/230 VAC, 50/60 Hz
Battery Life	20 Hours Continuous Usage with WPS Series Sensors 60 Hours Continuous Usage with All Other Sensors
Calibration Interval	No calibration required
Languages	English, Mandarin, Spanish
Dimensions	6.6" H x 4.0" W x 1.95" D (168 mm x 102 mm x 50 mm)
Sensor Interface	DB9, USB 2.0 SeaLatch Type A
PC Interface	USB 2.0 SeaLatch Type B
Weight w/ Battery	1.4 lbs.
Operating Temp.	0°C to +50°C
Storage Temp.	-20°C to +50°C
Drop Tested	EN 61010-1, MIL-STD-810F, MIL-PRF-28800F, Class 2
International Certs.	CE, RoHS



STANDARD ACCESSORIES

5A5001-1	Battery, Installed
5A5002-1	Power Supply, Includes Brick, cord, 3 Intl Adaptors
5A2238-4	Cigarette adaptor
5A2653-10L2	USB SeaLatch Cable, 10'
5A2264-09-MF-10	DB9 Cable, 10'
920-5000-XT	Operations Manual , Multilanguage
5A5000-1	Soft Case
5A5000-2	Lanyard
5A5000-3	Carabiner

COMPATIBLE SENSORS

5010	Directional Power Sensor, Legacy
5010B	Directional Power Sensor, DB9
5011	Terminating Power Sensor, 4 GHz, DB9
5011-EF	Terminating Power Sensor, 12 GHz, DB9
5012	Wideband Power Sensor, Legacy
5012A	Wideband Power Sensor
5014	Directional Power Sensor, USB
5015	Terminating Power Sensor, 4GHz, USB
5015-EF	Terminating Power Sensor, 12GHz, USB
5016	Wideband Power Sensor, Low Power Version
5017	Wideband Power Sensor, Low Frequency Version

Digital Power Sensors

Directional Power Sensor (Model 5010B, 5014)

Terminating Power Sensor (Model 5011, 5011-EF, 5015, 5015-EF)

Wideband Power Sensor (Model 5012A, 5016, 5017)



Terminating
Power Sensor



Directional
Power Sensor



Wideband
Power Sensor

Transmitter Power Monitor (TPM*)

BIRD® TPM

In-situ power measurement

- Low Cost in-situ power measurement solution designed for operation inside the transmitter
- DB9 output provides a linear DC voltage output from 0 to 4 volts allowing for a wide variety of interface options
- In-line calibration capability allows for greater accuracy in a single application (with an accurate power reference)
- Integrated non-directional coupler allows for spectral analysis of the signal in minimal space requirements
- Accurately measures true average power for digitally modulated systems
- +/- 5% of reading accuracy for both forward and reflected power (10:1 ratio for forward to reflected power)
- Handles peak-to-average ratio of 10 dB
- 7/8", 1 5/8", and 3 1/8", 50 ohm lines available for FM, VHF, and UHF broadcast frequencies



Transmitter Power Monitor

TPM OPERATING CHARACTERISTICS

Frequency Ranges	L = 54-88 MHz F = 88-108 MHz H = 174-216 MHz U = 470-806 MHz
Forward Power Range	See tables below
Reflected Power Range	10% of Forward Power Range
Measurement Type	In-Line, True Average Power
Peak Average Ratio	10dB Maximum
Directivity Rfl	30 typical, 26 dB minimum
Accuracy	±5% of reading
Dynamic Power Range	16 dB
Outputs	DB 9 Voltage I/O
Displays Offered	3140-A4 (4 Channel) 3140-A8 (8 Channel)

LINE SECTION

Operating Temperature	-10° to +50° C (14° to 122° F)
Storage Temperature	-40° to +80° C (-40° to 176° F)
Humidity	95% ±5% max. (noncondensing)
Altitude	up to 10,000 feet (3048 m)
Weights	TPM7 = 3.5 lbs TPM1 = 5.5 lbs TPM3 = 8.0 lbs 3140 = 2.5 lbs
Calibration Cycle	Annual*

* Standard calibration cycle of 1 year for reverification, but can be recalibrated by the customer with an accurate power reference. See the Application note on TPM calibration at www.bird-electronic.com

Line Size	VHF (54-216 MHz)		UHF (470-806 MHz)	
	Forward Power Range	Power Designator	Forward Power Range	Power Designator
7/8"	15 W – 500 W	Low	15 W – 500 W	Low
	30 W – 1.0 kW	Medium	30 W – 1 kW	Medium
	80 W – 2.5 kW	High	80 W – 2.5 kW	High
	150 W – 5 kW	Very High		
1 5/8"	30 W – 1.0 kW	Low	30 W – 1.0 kW	Low
	80 W – 2.5 kW	Medium	80 W – 2.5 kW	Medium
	150 W – 5 kW	High	150 W – 5.0 kW	High
	300 W – 10 kW	Very High		
3 1/8"	150 W – 5 kW	Low	150 W – 5.0 kW	Low
	300 W – 10 kW	Medium	300 W – 10 kW	Medium
	800 W – 25 kW	High	800 W – 25 kW	High
	1.5 kW – 50 kW	Very High		

Note: For best accuracy, pick the lowest power range that includes your maximum average operating power.



MODEL NOMENCLATURE

7/8" LINE SECTIONS

TPM7

Line Section 7 = 7/8"	Input Connector	Output Connector	Frequency Band L = 54-88 MHz F = 88-108 MHz H = 174-216 MHz U = 470-806 MHz	POWER** L = Low M = Medium H = High S = Very High	Connector Options A = N (F) B = N (M) C = LC (F) D = 7/8 EIA	H = DIN (F) J = DIN (M) K = UHF (F) L = UHF (M)
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1 5/8, 3 1/8" LINE SECTIONS***

TPM

Line Section 1 = 1 5/8" 3 = 3 1/8"	Line Interface**** U = Unflanged, Recessed Center Conductor UF = Unflanged, Flush Center Conductor	Frequency Band L = 54-88 MHz F = 88-108 MHz H = 174-216 MHz U = 470-806 MHz	POWER** L = Low M = Medium H = High S = Very High
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* Patent Pending
** see Chart for power ranges
*** Other sizes and power ranges available upon request
****For Flanged, leave blank.

BIRD® BPME Series

Broadcast Power Monitors for Your Digital and Analog Applications

- Frequency/Channel Field Configurable - Provides channel flexibility when needed
- Integral RF Test Port - Enables mask compliance testing with SignalHawk™ Spectrum Analyzer
- Ethernet & RS-232 Enabled - Future-ready remote monitoring, control & instant alarm alert
- Data Logging Capabilities-System trends and anomalies before failures
- Accurately measures power in digitally modulated and multi-carrier systems - Provides measurements you can trust to ensure regulatory requirements are met
- VSWR, Return Loss and Match Efficiency calculations using hardware or PC-based software tools - Provides essential feedback on the health of your system
- Handles peak to average ratio of greater than 10 dB - This is a must have for digital systems or antenna problems.



BPME



Model 3129

BPME OPERATING CHARACTERISTICS

Frequency Range*	See chart below
Forward/Reflected Power Range*	See chart below
Measurement Type	In-line, True Average Power
Peak/Average Ratio	10 dB
Coupler Directivity	26 dB minimum, 30 dB typical
Accuracy	±5% of reading
Dynamic Power Range	20 dB
Alarms	VSWR, No/Low Forward Power High Forward Power
Outputs	SPDT relay contact
Display Options	BPME PC Software, 3129
Remote Interface	Ethernet 10BASE-T or 100BASE-TX(auto-sensing) Ethernet Version 2.0/IEEE 802.3 Protocols: ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, and HTTP Security: 256-bit encryption Serial RS-232, 9600 baud, no parity, 8 data bits, 1 stop bit, no handshake

MODEL 3129 DIGITAL DISPLAY

Operating Voltage	115/230 VAC @ 50/60 Hz
Operating Power	Less than 10 watts
Dimensions	5.25" X 19" X 1.75" (133.35 mm X 483 mm X 44.5 mm)
Weight	Approximately 2 lbs. (0.85 kg)
Supplied with	50 feet of cable to connect RS-232 and serial ports between 3129 and line section, and serial interface cable

LINE SECTION

Operating Temperature	-10°C to +50°C (14°F to 122°F)
Storage Temperature	-40°C to + 80°C (-40°F to 176°F)
Humidity	95% ±5% max. (noncondensing)
Altitude	up to 10,000 feet (3,048 m)
Calibration cycle	Annual



*Frequency and power level depend on line section, sensor element, and selected display option. While designed for digital broadcast, the Broadcast Power Monitor can be used for a wide range of frequencies, power levels, and applications. Please contact the factory to discuss your application and requirements.

SELECTION GUIDE

Line Size	VHF (45-230 MHz)		UHF (470-890 MHz)	
	Maximum Forward Power	Power Designator	Maximum Forward Power	Power Designator
7/8"	50 – 500 W	Low	25 – 250 W	Low
	500 W – 2 kW	Medium	250 W – 1 kW	Medium
	2 – 5 kW	High	1 – 2.5 kW	High
1 5/8"	200 W – 2 kW	Low	50 – 500 W	Low
	2 – 8 kW	Medium	500 W – 2 kW	Medium
	8 – 20 kW	High	2 – 5 kW	High
3 1/8"	500 W – 5 kW	Low	250 W – 2.5 kW	Low
	5 – 20 kW	Medium	2.5 – 10 kW	Medium
	20 – 50 kW	High	10 – 25 kW	High
4 1/16"	1 – 10 kW	Low	400 W – 4 kW	Low
	10 – 40 kW	Medium	4 – 15 kW	Medium
	40 – 100 kW	High	15 – 40 kW	High
6 1/8"	2 – 20 kW	Low	800 W – 8 kW	Low
	20 – 80 kW	Medium	8 – 30 kW	Medium
	80 – 200 kW	High	30 – 75 kW	High

Portable Wattmeters



MODEL 43 — Portable Wattmeter

- Power Range** 100 mW - 10 kW using Bird® Plug-in Elements.*
- Frequency Range** 450 kHz - 2.7 GHz (depending on element)
- Insertion VSWR** with N Connectors 1.05 max. to 1000 MHz
- Accuracy** ±5% of full scale
- Connectors** QC Type (Female N normally supplied)
- Finish** Light Gray powder coat
- Nominal Size** 6 7/8" H x 5 1/8" W x 3 5/8" D, (includes connectors)
- Weight** 3 lbs. (1.4 kg)
- Elements** Tables 1, 2, 3, 3A, 4, 6



WATTMETER 4314B — Portable Wattmeter

- Power Range** 100 mW - 10 kW using Bird® Plug-in Elements.*
- Frequency Range** 450 kHz - 2.7 GHz (depending on element)
- Insertion VSWR** with N Connectors 1.05 max. to 1000 MHz
- Accuracy** ±5% of full scale CW, ±8% PEP
- Pulse Parameters** (min.) Pulse width 0.4 µs (100-2300 MHz), 1.5 µs (26-99 MHz) and 15 µs (2-25 MHz); repetition rate 30 pps and duty factor 1 x 10⁻⁴ min.
- Battery** Two 9-Volt alkaline transistor batteries
- AC Power** 120 VAC, 60 Hz or 220 VAC, 60 Hz (using Bird® adapter)
- Connectors** QC Type (Female N normally supplied)
- Finish** Light Gray powder coat
- Nominal Size** 6 7/8" H x 5 1/8" W x 3 5/8" D, (includes connectors)
- Weight** 3 lbs. (1.4 kg)
- Elements** Tables 1, 2, 3, 3A, 4, 5, 6
- Accessories** Case, spare batteries, extra QC connectors.



MODEL 43P — Portable Wattmeter

PEAK POWER RETROFIT KIT 4300-400 — Portable Wattmeter

- Power Range** 100 mW - 10 kW using Bird® Plug-in Elements.*
- Frequency Range** 450 kHz - 2.7 GHz (depending on element)
- Accuracy** CW Mode: ±5% full scale, Peak mode: ±8% full scale
- Modulation** Normal voice audio; or (Peak Mode) Rectangular Pulses
Duty cycle: 2% (min),
Repetition rate: 100 pps (min),
Pulse width: 200 µs (min)
- Battery Life** 48 hours typical
- Weight** Adds 1 lb. to Model 43



HIGH-POWER WATTMETER 4305A — Portable Wattmeter

- Power Range** 50 W - 25 kW using Bird® Plug-in Elements.*
- Frequency Range** 450 kHz - 2.3 GHz (depending on element)
- Insertion VSWR** with N Connectors 1.05 max.
- Accuracy** ±5% of full scale
- Connectors** QC Type (Female N normally supplied)
- Finish** Gray powder coat
- Nominal Size** 6 5/16" H x 5 1/8" W x 4 1/4" D, (includes connectors)
- Weight** 3 1/4 lbs. (1.5 kg)
- Elements** 4305A element table below and 1 5/8AA table
- Accessories** Case



VARIABLE RF TAP 4431 — Portable Wattmeter

- Power and Frequency Range** 5 kW max. 2 - 30 MHz, 1 kW max. 30 - 1000 MHz** using Bird® Plug-in Elements*
- Insertion VSWR** with N Connectors 1.07 max.** to 1000 MHz
- Accuracy** ±5% of full scale
- Insertion Loss** 0.1 dB max. (2-512 MHz), 0.2 dB max. (512-1000 MHz)*
- RF Sample Output** Variable -15 to -70 dB from BNC (Female) port
- Connectors** QC Type (Female N normally supplied)
- Finish** Gray powder coat
- Nominal Size** 6 7/8" H x 5 1/8" W x 3 5/8" D, (includes connectors)
- Weight** 3 1/2 lbs. (1.6 kg)
- Elements** Tables 1, 2, 3, 3A, 4, 6 (within power/frequency range limits stated above)
- Accessories** Case



MODEL 4304A FIXED 25-1000 MHz 5-500 WATT ELEMENT — Portable Wattmeter

- Power Ranges** 5, 15, 50, 150, 500 W, with no scale limitations except power limited to 150 W from 800-1000 MHz
- Frequency Range** 25 MHz - 1.0 GHz
- Insertion VSWR** 25-521 MHz, 1.05 max. (with UHF female conn.), 512-1000 MHz, 1.07 max.
- Insertion Loss** 25-512 MHz, 0.10 dB max. with UHF female conn., 512-1000 MHz range, 0.13 dB max.
- Accuracy** 25-100 MHz, ±7% of full scale, using correction charts. 100-512 MHz, ±6 of full scale, no correction needed. 512-1000 MHz, ±7% of full scale, no correction needed.
- Connectors** QC Type (Female N normally supplied)
- Finish** Light Gray powder coat
- Nominal Size** 6 7/8" H x 5 1/8" W x 3 5/8" D, (includes connectors)
- Weight** 3 lbs. (1.36 kg)
- Accessories** Case



4305A Elements	Frequency (MHz)					
	45-2.5	2-30	50-125	100-250	400-1000	1100-1800
50 W	—	—	—	—	—	50K7
2500 W	—	—	2500B7	2500C7	2500E7	—
5000 W	—	—	5000B7	—	—	—
10 kW	—	10KH7	—	—	—	—
25 kW	25KP7	—	—	—	—	—

*Quoted accuracy only when used with other Bird® Products
**Applies only when coupling is less than 30 dB



MODEL 4308 CELLULAR SPECIALIST WATTMETER — Portable Wattmeter

- Power Ranges** 1.5, 5, 15, 50 W, with no scale limitations
- Frequency Range** 440 MHz - 960 MHz
- Insertion VSWR** 1.05 with TNC connectors (QC Type)
- Accuracy** ±5% of full scale
- Connectors** QC Type (Female TNC normally supplied)
- Finish** Gray powder coat
- Nominal Size** 6 7/8" H x 5 1/8" W x 3 5/8" D,
(includes connectors) (175 mm x 130 mm x 92 mm)
- Weight** 3 lbs. (1.36 kg)
- Accessories** Case



MULTIPOWER, ±5% READING ACCURACY 4410 SERIES— Portable Wattmeters

- 4410A - 9V Alkaline battery**
- 4412A - Rechargeable battery**

- Power Range** 2 mW to 10 W, 20 mW to 100 W, 200 mW to 1 kW or 2 W to 10 kW full scale in one single Plug-in Element. Any Bird® Series 4410-Element may be used.
- Frequency Range** 200 kHz - 2.3 GHz CW or FM
- Insertion VSWR** with N Connectors 1.25 max. to 2300 MHz
- Accuracy** ±5% of reading for any reading above 20% of the Power Range selected for FM or CW signals without AM. This accuracy is maintained for a full 37 dB dynamic range with each 4410 Element (except No. 4410-1 200 kHz-535 kHz which is accurate to ±10% of reading, and 4410-15 1.0-1.8 GHz and 4410-16 1.8-2.3 GHz which are accurate to ±8% of reading.)
- Ambient Temperature Range** Elements 4410-1 through -8 and -10 through -16 are temperature compensated for rated accuracy from 0°C to 50°C (32°F to 122°F) and 4410-20 through -27 from 20°C to 30°C (68°F to 86°F)
- Over-Range Protection** To 120% of nominal full scale (i.e. 12 W, 120 W, 1200 W, or 12,000 W). No damage or degradation to the unit will result, regardless of the Range Selector Switch position.
- Connectors** QC Type (Female N normally supplied)
- Finish** Gray powder coat
- Nominal Size** 6 7/8" H x 5 1/8" W x 3 5/8" D,
(includes connectors) (175 mm x 130 mm x 92 mm)
- Weight** 4410A: 3 lbs. (1.4 kg), 4412A: 3 1/3 lbs. (1.5 kg)
- Elements** Tables 9, 10, 11, 12 (below)
- Accessories** Case, spare battery



4410 Elements

Table 9 - Full-Scale Power and Frequency Ranges 0-10, 30, 100, 300 Milliwatts, 1, 3, 10 Watts

MHz	30-50	50-88	88-108	–	150-250	225-400	400-800	800-900	900-1000
Model	4410-20	4410-21	4410-27	–	4410-23	4410-24	4410-25	4410-26	4410-28

Table 10 - Full-Scale Power and Frequency Ranges 0-100, 300 Milliwatts, 1, 3, 10, 30, 100 Watts

MHz	25-80	50-125	100-250	200-500	400-1000	1000-1800	1800-2300
Model	4410-10	4410-11	4410-12	4410-13	4410-14	4410-15*	4410-16*

Table 11 - Full-Scale Power and Frequency Ranges 0-1, 3, 10, 30, 100, 300, 1000 Watts

MHz	2-30	25-80	50-200	144-520	200-1000
Model	4410-3	4410-5	4410-6	4410-7	4410-8

Table 12 - Full-Scale Power and Frequency Ranges 0-10, 30, 100, 300, 1000, 3000, 10,000 Watts

MHz	0.2-0.535	0.45-2.5	2-30
Model	4410-1	4410-2	4410-4

*Accuracy is ±8% of reading



MODEL APM-16 AVERAGE-READING POWER METER — Portable Wattmeters

Power Range	1 W - 1000 W
Frequency Range	2 MHz - 2.3 GHz
Accuracy	10°C to 35°C ±4% reading, ±1% full scale, -20°C to 50°C ±6% reading, ±2% full scale
Peak/Avg. Ratio	In excess of 10 dB
Insertion VSWR	(with N connector) 1.05 max. to 1000 MHz
Setting Time	< 1 second
Meter	Shock mounted, linear scale with expanded scales of 25, 50 and 100 for full scale 1 to 1000 W readings. Mirrored scale includes 5% overrange.
Temp. Ranges	-20°C to 50°C operating; -25°C to 65°C storage
Humidity	95% ±5% max. (noncondensing)
Battery	Internal 9 volt
Connectors	QC type (Female N normally supplied)
Nominal Size	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
Weight	3 lbs. (1.4 kg)
Elements	Special APM Series (below)
Recommended Accessories	Case



APM-16 Elements

Frequency Bands (MHz)

Power Range	2-30	25-60	50-125	100-250	200-500	400-1000	950-1260	1100-1800	1700-1990	1990-2200	2200-2300
1W	—	—	APM-1B	APM-1C	—	APM-1E	APM-1J	—	APM-1L1	APM-1L2	APM-1M
2.5 W	—	—	APM-2.5B	—	APM-2.5D	APM-2.5E	APM-2.5J	APM-2.5K	APM-2.5L1	APM-2.5L2	—
5 W	APM-5H	APM-5A	APM-5B	APM-5C	APM-5D	APM-5E	APM-5J	APM-5K	APM-5L1	APM-5L2	—
10 W	APM-10H	APM-10A	APM-10B	APM-10C	APM-10D	APM-10E	APM-10J	APM-10K	APM-10L1	APM-10L2	—
25 W	—	—	APM-25B	APM-25C	APM-25D	APM-25E	—	APM-25K	APM-25L1	APM-25L2	—
50 W	—	—	—	APM-50C	APM-50D	APM-50E	APM-50J	APM-50K	APM-50L1	APM-50L2	—
100 W	APM-100H	APM-100A	APM-100B	APM-100C	APM-100D	APM-100E	APM-100J	—	APM-100L1	—	—
250 W	APM-250H	APM-250A	APM-250B	APM-250C	APM-250D	APM-250E	—	—	—	—	—
500 W	APM-500H	—	APM-500B	APM-500C	APM-500D	APM-500E	—	—	—	—	—
1000 W	APM-1000H	—	APM-1000B	APM-1000C	—	APM-1000E	—	—	—	—	—



0.45 - 2700 MHz, Model 4521, 4522, and 4526 — Panel-Mount Wattmeters

Models	4521, 4522, 4526
Power Range	100 mW - 10 kW using Bird® Plug-in Elements
Frequency Range	450 kHz - 2.7 GHz (depending on element)
Insertion VSWR	with N Connectors 1.05 max. to 1000 MHz
Accuracy	±5% of full scale
Connectors	QC Type (Female N normally supplied)
Finish	Gray powder coat
Nominal Size	19" W x 5 7/32" H x 1 11/16" D (483 mm x 133 mm x 43 mm)
Weight	3 1/2 lbs. (1.6 kg)
Elements	Tables 1, 2, 3, 3A, 4, 6



*Applies only when coupling is less than 30 dB

**Quoted accuracy only when used with other Bird® Products



2-512 MHz with Sampler Port

MODEL 4527 — Panel-Mount Wattmeters

Power Range	100 mW to 10 kW using Bird® Plug-in Elements*
Frequency Range	2 - 512 MHz (depending on element)
Insertion VSWR	with N Connectors 1.05 max. to 512 MHz
Accuracy	±5% of full scale
RF Sample Output	Fixed at -53 dB from 512 to 10 MHz, decreasing to -70 dB at 2 MHz BNC (Female) port
Connectors	QC Type (Female N normally supplied)
Finish	Gray powder coat
Nominal Size	19" W x 5 7/32" H x 1 11/16" D (483 mm x 133 mm x 43 mm)
Weight	3 1/2 lbs. (1.6 kg)
Elements	2 to 512 MHz models within Tables 1, 2, 6



High Speed, FWD/RFL Alarm Wattmeter®

MODEL 3170A — Wattcher® Single Carrier RF Monitoring System

Power Range	100 mW to 10 kW using Bird® Plug-in Elements*
Frequency Range	450 kHz - 2.7 GHz
Insertion VSWR	with N connectors 1.05 max. to 1000 MHz, 1.1 max. to 2700 MHz
Accuracy	±5% of full scale
Meter Scales	FWD and RFL 25, 50, 100 W
Alarms	Front Panel Buzzer, "Active" and "Trip" LEDs for forward/reflected
Response Time	25 µs max.
Activate Forward	73 µs to 50 ms nominal (adjustable) monitor delay
Front Panel Controls	Reset push-button, adjust FWD/RFL alarm levels screw, element sockets
Rear Panel Features	DC FWD/RFL signal inputs, main and remote meter drive outputs, external 12-16 VDC supply input, alarm in/out, reset in/out, AC line voltage selector, fuse, IEC 320 AC receptacle.
Inputs/Outputs	TTL compatible +5 V logic. Outputs for remote meter
AC Power	115/230 VAC, 50/60 Hz @ 56 mA
DC Power	12.7 to 16.0 VDC @ 400 mA max.
Connectors	QC Type (Female N normally supplied)
Finish	Gray powder coat
Nominal Size	19" W x 5 7/32" H x 9 5/16" D (483 mm x 133 mm x 237 mm)
Weight	7 lbs. (3.2 kg)
Required Products	Elements: Two from Tables 1, 2, 3, 3A, 4, or 6
Calibration Cycle	1 Year for element



Note: Elements calibrated to a 7/8" line section (standard) can be interchanged. Wattcher® Model 3170A is at interim 7/8" line section.



100 mW - 10 kW Wattcher®

MODEL 3128A — Wattcher® Single Carrier RF Monitoring System

Power Range	100 mW to 10 kW using Bird® Plug-in Elements*
Frequency Range	450 kHz - 2.7 GHz
Accuracy	±5% of full scale
Meter Scales	FWD and RFL 25, 50, 100 W
Meter Sensitivity	30 µA/1400 Ω
Alarms	Front Panel Buzzer and red LED
Front Panel Controls	Reset push-button, reflected power limit display button, adjust alarm level recessed screw
Rear Panel Features	FWD/RFL DC signal inputs (BNC), DC power/remote reset connector, DPDT interlock relay connector, fail-safe/nonfail-safe selector, alarm buzzer disable, AC line voltage selector, safety fuses and IEC 320 AC receptacle.
Cable	Includes two 25 ft. DC cables
AC Power	115/230 VAC, 50/60 Hz @ 0.125A
DC Power	9 - 16 VDC @ 1A
Finish	Gray powder coat
Nominal Size	19" W x 5 7/32" H x 3 3/4" D (483 mm x 133 mm x 95 mm)
Weight	5 lbs. (2.28 kg)
Required Products	Line Section: 4522-002-5 QC connectors: Two Elements: Two from Tables 1, 2, 3, 3A, 4, or 6



Rugged, RF Power Analyst®

MODEL 4391A — Portable Wattmeter

Power Range	100 mW to 10 kW using Bird® Plug-in Elements*
Frequency Range	450 kHz - 2.7 GHz
Insertion VSWR	with N connectors 1.05 max. to 1000 MHz
Accuracy	Power Readings: ±5% of full scale CW, ±8% PEP VSWR: ±10% of reading % Modulation: (CW power 1/3 or more of full scale) ±5% (0-90%), ±10% (90-100%)
Usable Over-range	to 120% of scale (CW, PEP, SWR and Return Loss)
Sampling Rate	2 to 3 readings per second
Display	3 1/2 digit, 0.3" LED strobed
Modulation Frequency	25 to 10,000 Hz (Audio)
Pulse Parameters	(min.) Pulse width 0.8 µs (100-2700 MHz), 1.5 µs (26-99 MHz) and 15 µs (2-25 MHz) Repetition Rate 25 PPS, and Duty Factor 1 x 10 ⁻⁴
Return Loss	±0.3 dB to corresponding SWR value
Battery Life	8 hours (rechargeable)
AC Power	100-130/200-260 V, 50/60 Hz, 6 W
Connectors	QC Type (Female N normally supplied)
Finish	Blue vinyl with silver anodized side panels
Nominal Size	9 9/16" L x 5 7/32" W x 4 5/16" H (243 mm x 158 mm x 110 mm)
Weight	5 3/4 lbs. (2.6 kg)
Elements	Select two elements in a 10:1 power ratio from Tables 1, 2, 3, 3A, 4, 5, 6 and 14
Accessories	Case



*Quoted accuracy only when used with other Bird® products.



RF Signal Samplers

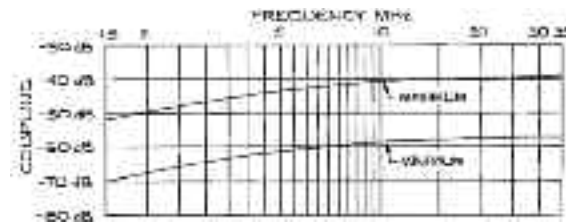
The Model 4273 (1.5 to 35 MHz, 5 kW max.) and Model 4275 (20 to 1000 MHz, 1 kW max.) are “stand-alone,” wide-range THRULINE® RF coupling probes for spectrum analysis, RF signal observation on a scope, or frequency counting and control. They feature very low VSWR throughout a broad frequency and attenuation range. Insertion loss is a negligible 0.1 dB. Both Models produce an unrectified sample at the BNC port that is adjustable. Once adjusted, the setting can be locked in place. The main power connectors are Bird® QC type.

VARIABLE RF SIGNAL SAMPLERS, MODEL 4273, 4275

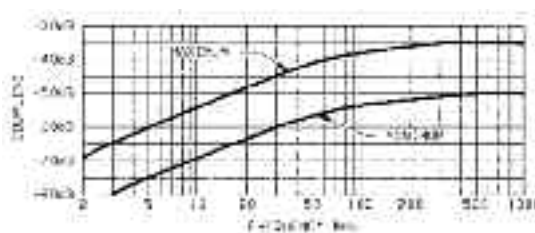
	4273	4275
Power Rating	5 kW max	1 kW max
Frequency Range	1.5 - 35 MHz	20 - 1000 MHz
Impedance	50 ohm nominal	50 ohm nominal
Insertion VSWR	with N Connectors 1.07 max	with N Connectors 1.1 max. 2 to 512 MHz, 1.25 max. 512 to 1000 MHz
Insertion Loss	0.1 dB max.	0.1 dB max. 2 to 512 MHz, 0.2 dB max. 512 to 1000 MHz
Coupling Ambient Temperature Range	Adjustable as shown within ±3 dB -40°C to +45°C	
Connectors	QC Type (Input and Output Ports)	
Finish	Bright silver plate	
Nominal Size	2 51/64" L x 2 7/8" W x 1 1/4" D, (71 mm x 73 mm x 32 mm)	
Weight	10 oz. (280 g)	



MODEL 4273



MODEL 4275





Model 4041

FIELD-STRENGTH METER MODEL 4041

	4041
Frequency Range	1 to 1000 MHz
Dynamic Range	30 dB min.
Typical Sensitivity	Full Scale deflection at 8 ft. (2 1/2 m) from a 1 W source broadcasting at 150 MHz through a quarter wave antenna
Battery Life	200 hours min.
Battery Type	One, 9V alkaline, "Transistor" battery (NEDA No. 1604A)
Ambient Temp Range	0°C to +50°C
Nominal Size	(w/o antenna) 4 3/8" L x 2 1/4" W x 1 15/16" D, (111 mm x 57 mm x 49 mm)
Weight	(includes batteries) 10 oz. (283 g)



RPK 43-4

FIELD REPLACEMENT METERS

THRULINE® WATTMETER METER MOVEMENT 30µA KIT



4210A100

	RPK 43-4	4210A100
Type	3 1/2" Round Kit w/ Cable	3 1/4" Square Meter in Housing
Current	30 µA/1400 Ω	30 µA/1400 Ω
Scales	25/50/100 W	25/50/100 W
Use with Element Tables	1, 2, 3, 3A, 4, 6	1, 2, 3, 3A, 4, 6



THRULINE® WATTMETER COMPONENTS— Line Sections Cable 7/8" Rigid Line

Model	4230-018	4230-006-1	4230-059	4522-002-5
Line Type	Cable	Cable	Cable	Cable
Connector Type	QC-N (F)	QC (not incl.)	QC (not incl.)	QC (not incl.)
Element Sockets	1	1	1 w/bracket	2 panel mt.
Length (Inches)	5 1/2	4	4	6 7/32
Weight (lbs.)	1 1/3	1	1 1/4	1 1/4
Use with Wattmeter	—	—	—	3128A





HIGH SPEED, FWD/RFL ALARM WATTCHER® MODEL 3171A — Single Carrier RF Monitoring System

Models	3171A	3171A020
Power Range	100 W to 250 kW using Bird® Plug-in Elements	
Frequency Range	2 MHz - 1 GHz	
Accuracy	±5% of full scale	
Meter Scales	FWD and RFL 5, 10, 25 kW	FWD and RFL 15, 30, 60 kW
Alarms	Front Panel Buzzer, "Active" and "Trip" LEDs for forward/reflected	
Response Time	25 µs max.	
Activate Forward	73 µs to 50 ms nominal (adjustable) Monitor Delay	
Front Panel Controls	Reset push-button, adjust FWD/RFL alarm levels screw	
Rear Panel Features	DC FWD/RFL signal inputs, main and remote meter drive outputs, external 12-16 VDC supply input, alarm in/out, reset in/out, AC line voltage selector, fuse, IEC 320 AC receptacle.	
Inputs/Outputs	TTL compatible +5 V logic. Outputs for remote meter	
Cable	Includes two 25 ft. DC cables	
AC Power	115/230 V, 50/60 Hz @ 56 mA max.	
DC Power	12.7 to 16.0 VDC @ 400 mA max.	
Finish	Gray powder coat	
Nominal Size	19" W x 5 7/32" H x 9 21/64" D (483 mm x 133 mm x 237 mm)	
Weight	5 1/2 lbs. (2.5 kg)	
Required Products	Line Section: 1 5/8", 3 1/8", 4 1/16", 6 1/8"	
Elements	Two from Tables 1 5/8 AA, 3 1/8 AA, 4 1/16 AA, or 6 1/8 AA.	Two from Tables 1 5/8 BB, 3 1/8 BB, 4 1/16 BB, or 6 1/8 BB.
Accessories	Cable: If length other than 25 ft. is desired, order two BNC (M) cables.	



100 W — 250 kW WATTCHER® MODELS 3126A, 3127A — Single Carrier RF Monitoring System

Models	3126A	3127A
Power Range	300 W to 60 kW using Bird® Plug-in Elements	100 W to 250 kW using Bird® Plug-in Elements
Frequency Range	2 MHz - 1 GHz	
Accuracy	±5% of full scale	
Meter Scales FWD	15, 30, 60 kW	5, 10, 25 kW
Meter Scales RFL	1.5, 3, 6 kW	1, 2.5, 5 kW
Meter Sensitivity	100 µA/3000 Ω	
Alarms	Front panel buzzer and red LED	
Front Panel Controls	Reset push-button, reflected power limit display button, adjust alarm level recessed screw	
Rear Panel Features	FWD/RFL DC signal inputs (BNC), DC power/remote reset connector, DPDT interlock relay connector, fail-safe/nonfail-safe selector, alarm buzzer disable, AC line voltage selector, safety fuses and IEC 320 AC receptacle.	
Cable	Includes two 25 ft. DC cables	
AC Power	115/230 V, 50/60 Hz @ 0.125 A max.	
DC Power	9 to 16 V @ 1 A max.	
Finish	Gray powder coat	
Nominal Size	19" W x 5 7/32" H x 3 3/4" D (483 mm x 133 mm x 95 mm)	
Weight	5 lbs. (2.28 kg)	
Required Products	Line Section: 1 5/8", 3 1/8", 4 1/16", 6 1/8"	
Elements	Two from Tables 1 5/8 B, 3 1/8 B, 4 1/16 B, or 6 1/8 B.	Two from Tables 1 5/8 A, 3 1/8 A, 4 1/16 A, or 6 1/8 A.
Accessories	Cable: If length other than 25 ft. is desired, order two BNC (M) cables.	



Rigid Line Sections & Meters for Rigid Line Use

THRULINE® WATTMETER COMPONENTS— Rigid Line Sections



Model	Line Size	Connector Type	Element Sockets	Length (Inches)	Weight (Lbs.)
4715-000	1 5/8"	EIA Flg.	2	6.75	3.25
4723-000	1 5/8"	UnFlg. (Rec. 0.438")	2	6.38	1.5
4723-020	1 5/8"	UnFlg. (Flush)	2	6.38	1.5



4610-000	3 1/8"	EIA Flg.	2	7.03	7.25
4801-100	3 1/8"	UnFlg. (Rec. 0.688")	2	6.5	4.25
4802-000	3 1/8"	UnFlg. (Flush)	2	6.5	4.25



4642-000*	4 1/16"	Flg. (Dielectric)	2	8.13	8.88
4642-010	4 1/16"	Flg. (MYAT)	2	8.13	8.88
4844-000	4 1/16"	UnFlg. (Rec. 0.531")	2	7.5	2.88



4905-000	6 1/8"	EIA Flg.	2	10.22	17
4909-000	6 1/8"	UnFlg. (Rec. 0.968")	2	9.63	12.75



THRULINE® WATTMETER COMPONENTS METERS — Rigid Line Use



Model 3127-040

Model	Type	Scales	DC Cable (Ft.)	Uses Line Section
3127-035	Single 4-1/2" rectangular on panel	5/10/25 kW	25	Double Socket
3127-055	Single 4-1/2" rectangular on panel w/fwd. and rfl. switch	5/10/25 kW	25	Double Socket
3127-040	Dual 4-1/2" rectangular on panel	5/10/25 kW	25	Double Socket
3127-080	Single 4-1/2" rectangular on panel w/fwd. and rfl. switch	15/30/60 kW	25	Double Socket
3127-075	Dual 4-1/2" rectangular on panel	15/30/60 kW	25	Double Socket



Model 6810 Series

6810-220	4-1/2" rectangular in housing w/fwd. and rfl. switch	5/10/25 kW	10	Double Socket
6810-230	4-1/2" rectangular in housing w/fwd. and rfl. switch	15/30/60 kW	10	Double Socket
6810-250	4-1/2" rectangular in housing w/fwd. and rfl. switch	8/80 kW	10	Double Socket
6810-265	4-1/2" rectangular in housing	8/80 kW	10	Single Socket
6810-307	4-1/2" rectangular in housing	15/30/60 kW	10	Single Socket
6810-309-7	4-1/2" rectangular in housing	5/10/25 kW	10	Single Socket



Use this Model Number Definition to specify part numbers when ordering T, ST, WT, and CT Series dry loads.

* Termination Model Number Definition: **100 - T - FN**

Power Rating (Watts) Product Type T, WT – Convection-cooled CT – Conduction-cooled ST – Square Convection Cooled	Connector Gender F – Female M – Male	Connectors+ A – SMA B – BNC E – IEC 7/16 N – N T – TNC	+ Call for custom connector options not shown in this catalog
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MODELS 0.5-T, 2-T, 5-T, 10-T

Models	0.5-T	2-T *	5-T **	10-T ***
Power Rating	1/2 Watt	2 Watt	5 Watt	10 Watt
Connector	SMA	BNC, N, TNC, SMA	BNC, N, TNC, 7/16	BNC, N, TNC, 7/16, SMA
Frequency Range	DC to 4 GHz			
VSWR	1.25:1 max.			
Ambient Temperature	-40 °C to +40 °C			
Operating Position	Any			
Coolant	Dry (Convection cooled)			
Finish	Silver or Tri-Alloy			Black Anodized (Silver or Tri-Alloy Connectors)
Dimensions	1.6" L x 0.8" dia.	1.6" L x 0.8" dia.	2.85" L x 0.8" dia.	2.5" x 2.3" x 2.6"
Weight	1.9 oz.	1.9 oz.	1.9 oz.	3.0 oz.



*Note: The 2-T is rated up to 6 GHz for the TNC(F), N(M), N(F), and SMA(M) connectors.

**Note: The 5-T is rated up to 6 GHz for the N(F) and up to 10 GHz for the N(M) connectors.

***Note: The 10-T is rated up to 10 GHz for the N(M) connectors.

MODELS 25-T, 50-T, 75-T, 100-T

Models	25-T	50-T	75-T	100-T
Power Rating	25 Watt	50 Watt	75 Watt	100 Watt
Connector	BNC, N, TNC, 7/16, SMA	BNC, N, TNC, 7/16, SMA	BNC, N, TNC, 7/16, SMA	BNC, N, TNC, 7/16
Frequency Range	DC to 4.0 GHz			
VSWR	1.25:1 max.			
Ambient Temperature	-40 °C to +40 °C			
Operating Position	Any			
Coolant	Dry (Convection cooled)			
Finish	Black Anodized Aluminum			
Dimensions	5.2" x 2.3" x 2.6"	5.3" x 2.3" x 2.6"	7.3" x 2.3" x 2.6"	7.3" x 6.4" x 2.6"
Weight	7 oz.	1.1 lbs.	1.3 lbs	3.6 lbs.



MODELS 25-6T, 50-6T, 100-6T

Models	25-6T	50-6T	100-6T
Power Rating	25 Watt	50 Watt	100 Watt
Connector	N	N	N
Frequency Range	DC to 6.0 GHz		
VSWR	1.20:1 max.	1.20:1 max.	1.40:1 max.
Ambient Temperature	-40 °C to +40 °C		
Operating Position	Any	Any	Heat Sink Vertical
Coolant	Dry (Convection cooled)		
Finish	Black Anodized Aluminum		
Dimensions	3.5" L x 2.3" sq.	4.0" L x 3.0" sq.	5.5" x 3.8" x 3.5"
Weight	13.3 oz.	1.6 lbs.	2.2 lbs.



MODELS 2-18T, 5-18T, 10-18T, 25-18T, 50-18T

Models	2-18T	5-18T	10-18T	25-18T	50-18T
Power Rating	2 Watt	5 Watt	10 Watt	25 Watt	50 Watt
Connector	N, SMA	N	N	N	N
Frequency Range	DC to 18 GHz				
VSWR	1.25:1 max.	1.35:1 max.	1.35:1 max.	1.40:1 max.	1.45:1 max.
Ambient Temperature	-65 °C to +125 °C				
Operating Position	Any				
Coolant	Dry (Convection cooled)				
Finish	Stainless Steel	Black Anodized Aluminum			
Dimensions	1.0" L x 0.86" dia.	1.4" L x .86" dia.	1.7" L x 1.0" dia.	3.5" L x 2.3" sq.	4.0" L x 3.0" sq.
Weight	2.0 oz.	2.0 oz.	2.0 oz.	13.3 oz.	1.6 lbs.





25-CT-FA, 25 CT-MA (25 Watt)**

Power Rating 25 W max. @ 100°C flange temperature, derated to 0 W @ 150°C

Connectors SMA

Frequency Range and VSWR DC to 1 GHz at 1.15:1 max., 1 GHz to 3 GHz at 1.25:1 max.

Operating Position Any

Coolant Dry (Conduction cooled)

Finish Silver or Tri-alloy plated

Nominal Size 0.9" L x 1.0" W x 0.5" H, (includes connector) (22.9 mm x 25.4 mm x 12.7 mm)

Base to Connector Center 0.25" (6.4 mm)

Mounting Centers 0.614" (15.6 mm)

Weight 0.4 oz. (11.4 g)



100-ST SERIES (100 WATT)

Connectors BNC, N, TNC, IEC 7/16

Frequency Range DC to 1 GHz at 1.10:1 max., 1 GHz to 4 GHz at 1.25:1 max.

Ambient Temp. -40°C to +40°C

Operating Position Any

Coolant Dry (Convection cooled)

Finish Black anodized fins.

Nominal Size Silver or Tri-alloy plated connector (with N-type connector): 6.95" H x 2.75" W x 2.75" D, (174 mm x 69.9 mm x 69.9 mm)

Weight 2.62 lbs. (1.20 kg)



150-T SERIES (150 WATT)*

Connectors BNC, N, TNC, IEC 7/16

Frequency Range and VSWR DC to 1 GHz at 1.10:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.

Ambient Temp. -40°C to +40°C

Operating Position Vertical

Coolant Dry (Convection cooled)

Finish Black semigloss paint per Federal Standard 595.

Nominal Size Silver or Tri-alloy plated connector (with N-type connector): 10.87" H x 2.6" W x 6.8" D, (276.1 mm x 66.1 mm x 172.8 mm)

Weight 6.0 lbs. (2.73 kg)



* WT SERIES also available

** When mounted to a suitable heatsink capable of maintaining a 100°C or lower flange temperature.



50-CT-FA, 50-CT-MA (50 WATT)**

Power Rating 50 W max. @ 100°C flange temperature, derated to 0 W @ 150°C

Connectors SMA

Frequency Range and VSWR DC to 3 GHz at 1.15:1 max., 3 GHz to 6 GHz at 1.25:1 max.

Operating Position Any

Coolant Dry (Conduction cooled)

Finish Silver or Tri-alloy plated

Nominal Size 0.86" L x 0.75" W x 0.39" H, (includes connector) (21.9 mm x 19.2 mm x 10.0 mm)

Base to Connector Center 0.162" (4.12 mm)

Mounting Centers 0.52" (13.3 mm)

Weight 1.1 oz. (31.2 g)



100-CT-FA, 100-CT-MA (100 WATT)**

Power Rating 100 W max. @ 100°C flange temperature derated to 0 W at 150°C

Connectors SMA

Frequency Range and VSWR DC to 2 GHz at 1.15:1 max., 2 GHz to 3 GHz at 1.25:1 max.

Operating Position Any

Coolant Dry (Conduction cooled)

Finish Silver or Tri-alloy plated

Nominal Size 1.34" L x 1.375" W x 0.56" H, (includes connector) (34.1 mm x 35 mm x 14.3 mm)

Base to Connector Center 0.26" (6.6 mm)

Mounting Centers 0.625" x 1.125" (15.9 mm x 28.6 mm)

Weight 1.0 oz. (28.4 g)



150-ST SERIES (150 WATT)

Connectors BNC, N, TNC, IEC 7/16

Frequency Range and VSWR DC to 1 GHz at 1.10:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.

Ambient Temp. -40°C to +40°C

Operating Position Vertical

Coolant Dry (Convection cooled)

Finish Black anodized fins.

Nominal Size Silver or Tri-alloy plated connector (with N-type connector): 7.54" H x 4.0" W x 4.0" H, (189 mm x 100 mm x 100 mm)

Weight 5.0 lbs. (2.30 kg)



Termaline® RF Coaxial Termination



150-CT SERIES (150 WATT)**

Power Rating	150 W max. @ 100°C flange temperature, derated to 0 W @ 150°C
Connectors	BNC, N, TNC, SMA
Frequency Range and VSWR	DC to 1 GHz at 1.15:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.
Operating Position	Any
Coolant	Dry (Conduction cooled)
Finish	Silver or Tri-alloy plated
Nominal Size	(with N connector): 1.86" L x 1.25" W x 1.062" H, (47.3 mm x 31.8 mm x 27.0 mm)
Base to Connector Center	0.531" (13.5 mm)
Mounting Centers	0.575" x 0.825" (14.6 mm x 21.0 mm)
Weight	(with N connector): 2.2 oz. (62.5 g)



250 CT-SERIES (250 WATT)**

Power Rating	250 W max. @ 100°C flange temperature, derated to 0 W @ 150°C
Connectors	BNC, N, TNC, SMA
Frequency Range and VSWR	SMA: DC to 2 GHz at 1.15:1 max., 2 GHz to 3 GHz at 1.25:1 max.; All Others: DC to 1 GHz at 1.15:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.
Operating Position	Any
Coolant	Dry (Conduction cooled)
Finish	Silver or Tri-alloy plated
Nominal Size	(includes connector) 2.36" L x 2.00" W x 1.062" H, (60.0 mm x 50.8 mm x 27.0 mm)
Base to Connector Center	SMA: 0.26" (6.6 mm), N: 0.515" (13.1 mm)
Mounting Centers	0.875" x 1.625" (22.3 mm x 41.3 mm)
Weight	(with N connector) 5.2 oz. (147.6 g)



300-T SERIES (300 WATT) (WT SERIES also available)

Connectors	BNC, N, TNC, IEC 7/16
Frequency Range and VSWR	DC to 1 GHz at 1.10:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.
Ambient Temp.	-40°C to +40°C
Operating Position	Vertical
Coolant	Dry (Convection cooled)
Finish	Black semigloss paint per Federal Standard 595. Silver or Tri-alloy plated connector
Nominal Size	(with N-type connector): 10.9" H x 5.4" W x 16.8" D, (276.9 mm x 137.2 mm x 172.8 mm)
Weight	11.5 lbs. (5.23 kg)



MODEL 8135 (150 WATT)

Power Rating	150 W continuous
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., 1 to 2.5 GHz at 1.2 max., 2.5 to 4 GHz at 1.3 max.
Ambient Temp.	-40°C to +45°C
Connector	QC type (Female N normally supplied)
Operating Position	Horizontal only
Load Coolant	0.1 gal. (380 ml) refined mineral oil
Finish	Gray powder coat
Nominal Size	9 1/2" L x 6 11/32" H x 3 15/16" W, (241 mm x 161 mm x 100 mm)
Weight	6.0 lbs. (2.7 kg)



MODEL 8141 (250 WATT)

Power Rating	250 W continuous
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., 1 GHz to 1.8 GHz at 1.2 max., 1.8 to 2.5 GHz at 1.3 max.
Ambient Temp.	-40°C to +45°C
Connector	QC type (Female N normally supplied)
Operating Position	Horizontal only
Load Coolant	0.35 gal. (1.3 liters) silicone oil
Finish	Gray powder coat
Nominal Size	9 9/16" L x 8 1/2" H x 5 15/16" W, (243 mm x 216 mm x 151 mm)
Weight	10 lbs. (4.5 kg)



MODEL 8072A-1 (300 WATT)**

Power Rating	300 W continuous @ 100°C case temperature
Connectors	N female
Frequency Range and VSWR	DC to 1 GHz at 1.10:1 max., 1 to 2.5 GHz at 1.20:1 max.
Ambient Temp.	-40°C to +45°C
Operating Position	Any
Coolant	Dry (Conduction cooled)
Finish	Silver or Tri-alloy, Silver plated or Tri-alloy connectors
Nominal Size	(with N-type connector): 4.4" L x 2" W x 1.3" H, (110 mm x 51 mm x 26 mm)
Weight	12 oz. (340 g)



** When mounted to a suitable heatsink capable of maintaining a 100°C or lower flange temperature.



500-WT SERIES (500 WATT)

Connectors N, TNC, IEC 7/16
Frequency Range and VSWR DC to 1 GHz at 1.10:1 max., 2.5 GHz at 1.25:1 max.
Operating Position Any, except mounting surface up
Coolant Dry (Convection cooled)
Finish Black anodized fins, tri-alloy plated connectors (with female N-type connector; excludes removable feet):
Nominal Size 10.59" L x 5.4" W x 4.3" H, (266.7 mm x 137.2 mm x 109.3 mm)
 1.812" x 7.687",
4 Mounting Holes, Center and Size typical 10-32 thread x 0.5" D
Weight 7.8 lbs. (3.6 kg)



MODEL 8201 (500 WATT)

Power Rating 500 W continuous
Frequency Range and VSWR DC to 1 GHz at 1.1 max., 1 GHz to 2.5 GHz at 1.25 max.
Ambient Temp. -40°C to +45°C
Connector QC type (Female N normally supplied)
Operating Position Horizontal only
Load Coolant 0.9 gal. (3.42 liters) refined mineral oil
Finish Gray powder coat
Nominal Size 16 13/16" L x 5 15/16" W x 8 1/2" H (427 mm x 151 mm x 216 mm)
Weight 21 lbs. (9.5 kg)



MODEL 8401 (600 WATT)

Power Rating 600 W continuous
Frequency Range and VSWR DC to 1 GHz at 1.1 max., 1 GHz to 2.8 GHz at 1.2 max., 2.8 GHz to 3 at 1.3 max.
Ambient Temp. -40°C to +45°C
Connector QC type (Female N normally supplied)
Operating Position Horizontal only
Load Coolant 0.7 gal. (2.65 liters) refined mineral oil
Finish Gray powder coat
Nominal Size (16 13/16" H x 8 1/2" W x 5 15/16" D, (427 mm x 216 mm x 151 mm)
Weight 20 lbs. (9.1 kg)



500-CT SERIES (500 WATT)**

Power Rating 500 W max. @ 100°C flange temperature, derated to 0 W @ 150°C
Connectors BNC, N, TNC, SMA, IEC 7/16
Frequency Range and VSWR DC to 1 GHz at 1.10:1 max.
Operating Position Any
Coolant Dry (Conduction cooled)
Finish Silver or Tri-alloy plated
Nominal Size **N:** 2.36" L x 2.00" W x 1.062" H, (60.0 mm x 50.8 mm x 27.0 mm); **IEC 7/16:** 2.80" L x 2.00" W x 1.20" H, (71.2 mm x 50.8 mm x 30.5 mm)
Base to Connector Center **N:** 0.515 (13.1 mm)
Mounting Centers **IEC 7/16:** 0.675" (17.2 mm)
Weight **N:** 8.2 oz. (232.9 g), **IEC 7/16:** 6.0 oz. (170.3 g)



600-T-QFN (600 WATT)

Frequency Range and VSWR DC to 1 GHz at 1.10:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.
Ambient Temp. -40°C to +40°C
Connector QC type (Female N supplied)
Coolant Dry (Convection cooled)
Finish Black anodized fins, tri-alloy plated connector
Nominal Size 12.25" L x 9.65" W x 8.875" H
Weight 21.5 lbs.
Accessories QC Connector



1000-WT (1000 WATT)

Connectors N, TNC, IEC 7/16
Frequency Range and VSWR DC to 1 GHz at 1.10:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.
Operating Position Any, except mounting surface up
Coolant Dry (Convection cooled)
Finish Black anodized fins, tri-alloy plated connectors (with female N-type connector; excludes removable feet):
Nominal Size 17.98" L x 8.95" W x 4.3" H
 1.885" x 14.65",
4 Mounting Holes, Center and Size typical 1/4 - 20 thread x 0.5" D
Weight 26.5 lbs. (12.1 kg)



** When mounted to a suitable heatsink capable of maintaining a 100°C or lower flange temperature.

Termaline® RF Coaxial Termination



8251 SERIES

Model 8251, 8251N & 8251D (1 kW)

Power Rating	1000 W continuous
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., 1 GHz to 2 GHz at 1.25 max., 2 GHz to 2.4 at 1.3 max. (1.065 max., 470-860 MHz for "D" Model)
Ambient Temperature Range	-40°C to +45°C
Connector	QC type (Female LC normally supplied, and Female N normally supplied unmounted)
Operating Position	Horizontal only
Load Coolant	1.1 gal. (4.1 liters) silicone oil
Finish	Gray powder coat
Nominal Size	17 29/32" L x 5 15/16" W x 8 1/2" H (includes connector) (455 mm x 151 mm x 216 mm)
Weight	25 lbs., 8 oz. (11.5 kg)



8890-300 SERIES (2.5 kW)

Models	8890-300	8892-300*	8895-300	8891-300
Power Rating	2500 W continuous			
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., 1 GHz to 2 GHz at 1.25 max., 2 GHz to 2.4 GHz at 1.3 max.			
Impedance	50 ohm nominal	50 ohm nominal	50 ohm nominal	50 ohm nominal
Ambient Temperature Range	-40°C to +45°C			
Connector	QC-LC (F)	1 5/8" EIA fig.	1 5/8" Unflg.	3 1/8" EIA fig.
Recess (In.)	—	0.625	0.438	0.922
Operating Position	Horizontal only			
Load Coolant	2.9 gal. (11 liters) silicone oil			
Finish	Gray powder coat			
Nominal Size	23 1/8" L x 7" W x 17 3/16" H, (587 mm x 178 mm x 437 mm)	23 1/8" L x 7" W x 17 3/16" H, (587 mm x 178 mm x 437 mm)	22 3/16" L x 7" W x 17 3/16" H, (564 mm x 178 mm x 437 mm)	25 1/8" L x 7" W x 17 3/16" H, (638 mm x 178 mm x 437 mm)
Weight	57 lbs. (26 kg)	58 lbs. (26 kg)	58 lbs. (26 kg)	59 lbs. (27 kg)



*NOTE: Overload thermostat P/N 8890-008 is optional. Free assembly when ordered as a package.
* Available in special 8892D300 model for Digital Broadcast. VSWR = 1.065 max., 470 – 860 MHz.*



8860 SERIES (1.5 kW)

Models	8860	8861	8862 & 8862 D	8863	8864 & 8864D
Power Rating	1500 W continuous				
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., (1.065 max., 470-860 MHz for "D" Model) 1 GHz to 2 GHz at 1.25 max.				
Ambient Temperature Range	-40°C to +45°C				
Connector	QC-LC (F)	1 5/8" Unflg.	1 5/8" EIA fig.	3 1/8" Unflg.	3 1/8" EIA fig.
Operating Position	Horizontal only				
Load Coolant	1.5 gal. (5.68 liters) silicone oil				
Finish	Gray powder coat				
Nominal Size	17 1/8" L x 7 1/2" W x 13 1/8" H, (445 mm x 184 mm x 333 mm)	17 7/8" L x 7 1/2" W x 13 1/8" H, (454 mm x 184 mm x 333 mm)	17 1/8" L x 7 1/2" W x 13 1/8" H, (445 mm x 184 mm x 333 mm)	18 5/8" L x 7 1/2" W x 13 1/8" H, (473 mm x 184 mm x 333 mm)	19 1/2" L x 7 1/2" W x 13 1/8" H, (495 mm x 184 mm x 333 mm)
Weight	30 lbs. (13.6 kg)	31 lbs. (14.1 kg)	31 lbs. (14.1 kg)	32 lbs. (14.5 kg)	32 lbs. (14.5 kg)



8890-300 SERIES with BA 300-115, -230 (5 kW)

Models with BA-300-***	8890 -315 -320	8892 -315 -320	8895 -315 -320	8891 -315 -320	8897 -315 -320
Power Rating	5000 W continuous with blower on, 1250 W with blower off				
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., 1 GHz to 2 GHz at 1.25 max., 2 GHz to 2.4 GHz at 1.3 max.				
Impedance	50 ohm nominal	50 ohm nominal	50 ohm nominal	50 ohm nominal	50 ohm nominal
Ambient Temperature Range	-40°C to +45°C				
Connector	QC-LC (F)	1 5/8" EIA fig.	1 5/8" Unflg.	3 1/8" EIA fig.	3 1/8" Unflg.
Recess (In.)	—	0.625	0.438	0.922	0.0
Operating Position	Horizontal only				
Load Coolant	2.9 gal. (11 liters) silicone oil				
Finish	Gray powder coat				
Nominal Size	23 1/8" L x 7 3/8" W x 22 11/16" H, (587 mm x 187 mm x 560 mm)	23 1/8" L x 7 3/8" W x 22 11/16" H, (587 mm x 187 mm x 560 mm)	22 3/16" L x 7 3/8" W x 22 11/16" H, (564 mm x 187 mm x 560 mm)	25 1/8" L x 7 3/8" W x 22 11/16" H, (638 mm x 187 mm x 560 mm)	24 5/32" L x 7 3/8" W x 22 11/16" H, (614 mm x 187 mm x 560 mm)
Weight	70 lbs. (32 kg)	72 lbs. (33 kg)	72 lbs. (33 kg)	73 lbs. (33 kg)	73 lbs. (33 kg)



*NOTE: Overload thermostat P/N 8890-008 is optional. Free assembly when ordered as a package. * Available in special 8892D320 model for Digital Broadcast. VSWR = 1.065 max., 470 – 860 MHz. Specify -115 for 115 VAC Blower or -230 for 230 VAC Blower*



8921 SERIES (5 kW OIL DIELECTRIC)

Models	8921	8922 & 8922D	8926 & 8926D	8927 & 8927D
Power Rating	5000 W continuous			
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., (1.065 max., 470-860 MHz for "D" Model)			
Ambient Temperature Range	-40°C to +45°C			
Connector	QC-LC (F)	1 5/8" EIA fig.	3 1/8" EIA fig.	3 1/8" Unflg.
Operating Position	Horizontal only			
Load Coolant	6 2/3 gal. (25.3 liters) silicone oil			
Finish	Gray powder coat			
Nominal Size	30 27/32" L x 9 1/2" W x 25 13/16" H, (783 mm x 241 mm x 656 mm)	30 27/32" L x 9 1/2" W x 25 13/16" H, (783 mm x 241 mm x 656 mm)	32 3/4" L x 9 1/2" W x 25 13/16" H, (832 mm x 241 mm x 656 mm)	31 7/8" L x 9 1/2" W x 25 13/16" H, (809 mm x 241 mm x 656 mm)
Weight	119 lbs. (54 kg)	121 lbs. (55 kg)	126.5 lbs. (57 kg)	126 lbs. (57 kg)




*NOTE: An 8890-008 over-temperature interlock safety switch is optional. * Available in special 8922 D model for Digital Broadcast. VSWR = 1.065 max., 470-860 MHz*



8931-115, -230 SERIES (10 kW OIL DIELECTRIC)

Models	8931-**-	8932-**-	8936-**-	8937-**-
Power Rating	10 kW continuous with blower on, 2.5 kW with blower off			
Frequency Range and VSWR	DC to 400 MHz at 1.15 max., 400 MHz to 1 GHz at 1.20 max.			
Ambient Temperature Range	-40°C to +45°C			
Connector	QC-LC (F)	1 5/8" EIA fig.	3 1/8" EIA fig.	3 1/8" Unfig.
Operating Position	Horizontal only			
Load Coolant	6 2/3 gal. (25.3 liters) silicone oil			
Finish	Gray powder coat			
Nominal Size	30 7/32" L x 9 1/2" W x 33 5/16" H, (768 mm x 241 mm x 847 mm)	30 7/32" L x 9 1/2" W x 33 5/16" H, (768 mm x 241 mm x 847 mm)	32 1/8" L x 9 1/2" W x 33 5/16" H, (816 mm x 241 mm x 847 mm)	31 1/4" L x 9 1/2" W x 33 5/16" H, (793 mm x 241 mm x 847 mm)
Weight	135 lbs. (61 kg)	137 lbs. (62 kg)	142 lbs. (64.8 kg)	142 lbs. (64.5 kg)

 NOTE: The 8892-333 blower control switch is included. The 8890-017 over-temperature interlock safety switch is optional.
** AC power 115 or 230 VAC, 50/60 Hz (add suffix -115 or -230 to Model number)

8710 SERIES (1 kW DIRECT WATER COOLED)



Models	8710F	8710M	8713
Power Rating	1000 W continuous		
Frequency Range and VSWR	DC to 1 GHz at 1.1 max., 1 GHz to 3 GHz at 1.3 max., 3 GHz to 3.5 GHz at 1.35 max.		
Water Temp Range	+8°C to +80°C		
Water Flow Rate	1 quart/minute @ 8°C to 3 gpm @ 80°C (.95 liters/minute @ 8°C to 2.84 lpm @ 80°C)		
Waterlines	1/8" FPT		
Connectors	N Female	N Male	7/8" EIA Fig.
Operating Position	Any		
Load Coolant	Potable water		
Finish	Silver plated		
Nominal Size	(excl. 18" waterlines) 3 21/32" L x 1 11/16" Dia., (93 mm x 17 mm)		
Weight	5 oz. (142 g)	5 oz. (142 g)	14 oz. (397 g)



8720, 8726 (5 kW DIRECT WATER COOLED)



Models	8720	8726
Power Rating	5 kW continuous	
Frequency Range and VSWR	DC to 500 MHz at 1.1 max., 500 MHz to 900 MHz at 1.15 max., 900 MHz to 2000 MHz at 1.25 max.	DC to 500 MHz at 1.1 max., 500 MHz to 2000 MHz at 1.25 max.
Water Temp Range	+5°C to +80°C	
Water Flow Rate	1 gal./minute @ 5°C to 4 gpm @ 80°C (3.8 liters/minute @ 5°C to 15.21 lpm @ 80°C)	
Waterlines	1/4" FPT	3/4" hose
Connectors	1 5/8" EIA Fig.	QC type (Female LC normally supplied)
Operating Position	Any	
Load Coolant	Potable water	
Finish	Bright nickel plated	
Nominal Size	(excl. 8" waterlines) 8 1/32" L x 1 5/8" Dia., (204 mm x 41 mm)	10 7/16" L x 1 5/8" Dia., (225 mm x 41 mm)
Input Flange	3 1/2" Dia.	—
Weight	2 lbs. (900 g)	2 1/2 lbs. (1.1 kg)



8730A, 8731, 8738A (10 kW Econoload®)



Models	8730A*	8731	8738A*
Power Rating	10 kW continuous		
Frequency Range and VSWR	1.1 max. DC to 1 GHz	1.1 max. 1 kHz to 1 GHz (DC for continuity checks)	1.1 max. DC to 1 GHz
Water Temp Range	+5°C to +60°C		
Water Flow Rate	4 gals./minute @ 5°C to 6 gpm @ 60°C (15.2 liters/minute @ 5°C to 22.8 lpm @ 60°C)		
Waterlines	1/2" FPT or 3/4" hose		
Connectors	1 5/8" EIA Fig.	3 1/8" EIA Fig.	3 1/8" Unfig. (Flush)
Operating Position	Any		
Load Coolant	Distilled water (<1KHz). Distilled or potable water (>1KHz).		
Finish	Black powder coat		
Nominal Size	14 3/4" L x 2 3/4" Dia., (375 mm x 70 mm)	14 3/4" L x 2 3/4" Dia., (375 mm x 70 mm)	14 3/4" L x 2 3/4" Dia., (375 mm x 70 mm)
Input Flange	3 1/2" Dia. (89 mm)	5 3/16" Dia. (132 mm)	—
Weight	7 lbs. 14 oz. (3.6 kg)	6 lbs. 10 oz. (3 kg)	6 lbs. (2.8 kg)

*Recommended for areas with water quality conditions



Termaline® RF Coaxial Termination



8745, 8746 (20 kW Econoload®)

Models	8745	8746
Power Rating	20 kW continuous	
Frequency Range and VSWR	1.1 max. 1 kHz - 900 MHz (DC for continuity checks)	
Water Temperature Range	+5°C to +60°C	
Water Flow Rate	6 gal./minute @ 5°C to 8 gpm @ 60°C (22.8 liters/minute @ 5°C to 30.4 lpm @ 60°C)	
Waterlines	1/2" FPT or 3/4" hose	
Connectors	3 1/8" EIA Fig.	3 1/8" Unfig. (Flush)
Operating Position	Any	
Load Coolant	Potable water	
Finish	Black powder coat	
Nominal Size	19 1/2" L x 3 1/2" Dia., (495 mm x 90 mm)	
Input Flange	5 3/16" Dia. (132 mm)	
Weight	15 lbs. 13 oz. (7.2 kg)	15 lbs. 5 oz. (7 kg)



8755, 8756 (30 kW Econoload®)

Models	8755	8756
Power Rating	30 kW continuous	
Frequency Range and VSWR	1.1 max. 1 kHz - 900 MHz (DC for continuity checks)	
Water Temperature Range	+5°C to +60°C	
Water Flow Rate	7 gal./minute @ 5°C to 9 gpm @ 60°C (26.6 liters/minute @ 5°C to 34.2 lpm @ 60°C)	
Waterlines	1/2" FPT or 3/4" hose	
Connectors	3 1/8" EIA Fig.	3 1/8" Unfig. (Flush)
Operating Position	Any	
Load Coolant	Potable water	
Finish	Black powder coat	
Nominal Size	19 1/2" L x 3 1/2" Dia., (495 mm x 90 mm)	
Input Flange	5 3/16" Dia. (132 mm)	
Weight	15 lbs. 13 oz. (7.2 kg)	15 lbs. 5 oz. (7 kg)



8765 (40 kW Econoload®)

Model	8765
Power Rating	40 kW continuous
Frequency Range and VSWR	1.1 max. 1 kHz - 900 MHz (DC for continuity checks)
Water Temperature Range	+5°C to +60°C
Water Flow Rate	8 gal./minute @ 5°C to 10 gpm @ 60°C (30.4 liters/minute @ 5°C to 37.9 lpm @ 60°C)
Waterlines	1/2" FPT or 3/4" hose
Connectors	3 1/8" EIA Fig.
Operating Position	Any
Load Coolant	Potable water
Finish	Black powder coat
Nominal Size	19 1/2" L x 3 1/2" Dia., (495 mm x 90 mm)
Input Flange	5 3/16" Dia. (132 mm)
Weight	15 lbs. 13 oz. (7.2 kg)



8775, 8776 (50 kW Econoload®)

Models	8775	8776
Power Rating	50 kW continuous	
Frequency Range and VSWR	1.1 max. 1 kHz - 900 MHz (DC for continuity checks)	
Water Temperature Range	+5°C to +60°C	
Water Flow Rate	9 gal./minute @ 5°C to 11 gpm @ 60°C (34.2 liters/minute @ 5°C to 41.8 lpm @ 60°C)	
Waterlines	1/2" FPT or 3/4" hose	
Connectors	3 1/8" EIA Fig.	3 1/8" Unfig. (Flush)
Operating Position	Any	
Load Coolant	Potable water	
Finish	Black powder coat	
Nominal Size	19 1/2" L x 3 1/2" Dia., (495 mm x 90 mm)	
Input Flange	5 3/16" Dia. (132 mm)	
Weight	15 lbs. 13 oz. (7.2 kg)	15 lbs. 5 oz. (7 kg)



8792 (80 kW Econoload®)

Model	8792
Power Rating	80 kW continuous
Frequency Range and VSWR	1.15 max. 1 kHz - 800 MHz (DC for continuity checks)
Water Temperature Range	+5°C to +60°C
Water Flow Rate	9 gal./minute @ 5°C to 12 gpm @ 60°C (34.2 liters/minute @ 5°C to 45.6 lpm @ 60°C)
Waterlines	1/2" FPT or 3/4" hose
Connectors	6 1/8" EIA Fig.
Operating Position	Any
Load Coolant	Potable water
Finish	Black powder coat
Nominal Size	34" L x 5" Dia., (864 mm x 127 mm)
Input Flange	8 1/8" Dia. (206 mm) add approximately 1 1/4" (32 mm) to length for rear water fitting
Weight	30 lbs. 10 oz. (14 kg)



8631B, 8635B, 8638B (10 kW Moduload®)



Models	8631B	8635B	8638B
Power Rating	10 kW continuous		
Frequency Range and VSWR	1.1 max. 1 kHz - 1000 MHz (DC for continuity checks)		
Ambient Temperature Range	(per power level and coolant mix) ≤10 kW: (100% Water) +5°C to +45°C; ≤10 kW: (35% Ethylene Glycol/65% Water) -20°C to +35°C		
Connector	3 1/8" EIA Flg.	1 5/8" EIA Flg.	3 1/8" Unflg.
Operating Position	Horizontal only		
Load Coolant	10 pts. (4.75 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced-air cooling		
Finish	Gray powder coat		
Nominal Size	22 1/8" L x 15 15/16" W x 15 13/16" D, (562 mm x 405 mm x 402 mm)		
Weight	110 lbs. (50 kg)		
AC power	115 V models: 9 1/2 A nominal @ 115 V ± 10% 60 Hz; 230 V models: 4 3/4 A nominal @ 230 V ± 10% 50 Hz		
Optional Dolly	P/N 6771-011		

Power	Add Suffix to Model
115 V 60 Hz	-115
230 V 50 Hz	-230



8645B, 8646B (25 kW Moduload®)

Models	8645B	8646B
Power Rating	25 kW continuous	
Frequency Range and VSWR	1.1 max. 1 kHz - 900 MHz (DC for continuity checks)	
Ambient Temperature Range	(per power level and coolant mix) ≤25 kW: (100% Water) +5°C to +30°C; <20 kW: (100% Water) +5°C to +45°C; ≤25 kW: (35% Ethylene Glycol/65% Water) -20°C to +25°C; <20 kW: (35% Ethylene Glycol/65% Water) -20°C to +35°C	
Connector	3 1/8" EIA Flg.	3 1/8" Unflg.
Operating Position	Horizontal only	
Load Coolant	9 qts. (8.5 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced-air cooling	
Finish	Gray powder coat	
Nominal Size	25 15/16" L x 19 5/32" W x 19 9/16" D, (659 mm x 487 mm x 497 mm)	
Weight	155 lbs. (70 kg)	
AC power	115 V models: 11 A nominal @ 115 V ± 10% 60 Hz; 230 V models: 5 1/2 A nominal @ 230 V ± 10% 50 Hz	
Optional Dolly	P/N 6771-011	

Power	Add Suffix to Model
115 V 60 Hz	-115
230 V 50 Hz	-230
230 V 60 Hz	-230-6



8655B, 8656B (50 kW Moduload®)

Models	8655B	8656B
Power Rating	50 kW continuous	
Frequency Range and VSWR	1.1 max. 1 kHz - 900 MHz (DC for continuity checks)	
Ambient Temperature Range	(per power level and coolant mix) ≥40 kW: (100% Water) +5°C to +30°C; <40 kW: (100% Water) +5°C to +45°C; ≥40 kW: (35% Ethylene Glycol/65% Water) -20°C to +25°C; <40 kW: (35% Ethylene Glycol/65% Water) -20°C to +35°C	
Connector	3 1/8" EIA Flg.	3 1/8" Unflg. (Flush)
Operating Position	Horizontal only	
Load Coolant	17 qts. (16.1 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced-air cooling	
Finish	Gray powder coat	
Nominal Size	50 1/2" L x 19 5/32" W x 19 9/16" D, (1283 mm x 487 mm x 497 mm)	
Weight	275 lbs. (125 kg)	
AC power	115 V models: 14 A nominal @ 115 V ± 10% 60 Hz; 230 V models: 7 A nominal @ 230 V ± 10% 50 Hz	
Optional Dolly	P/N 6772B011	

Power	Add Suffix to Model
115 V 60 Hz	-115-6
230 V 50 Hz	-230-5
230 V 60 Hz	-230-6



8578B100, 8578B150 (10 kW, 15 kW, Dry, Forced Air Load)

Models	8578B100	8578B100-1	8578B150	8578B150-1
Power Rating	10 kW continuous	10 kW continuous	15 kW continuous	15 kW continuous
Frequency Range and VSWR	1.15:1, 87.5 - 108 MHz			
Ambient Temp.	-40°C to +40°C			
Connector	1 5/8" EIA Flanged (Swivel)	3 1/8" Unflg.	1 5/8" EIA Flanged (Swivel)	3 1/8" Unflg.
Operating Position	Any (except blockage of air inlets and exhaust)			
Load Coolant	Dry (forced air)			
Resistors	Tubular type, parallel connection, 50 ohm nominal			
Finish	Gray powder coat			
Nominal Size	39 7/32" H x 16 15/32" W x 13 7/16" D, (996 mm x 418 mm x 341 mm)			
Weight	70 lbs. (31.8 kg)			
AC power	115/230 ± 10% VAC, 50/60 Hz 8.6 amps max. @ 115 VAC			



Bird® High-Power Forced Air Loads for Broadcast Applications

- Low maintenance and high reliability.
- Handles > 10 dB Peak to Average power ratio.
 < 1.05:1 typical VSWR (1.1:1 max.) across rated frequency range.
- Ductable exhaust and cool-to-the-touch exterior surfaces.
- Flanged and unflanged EIA & IEC industry standard connectors.
- Fully shielded against the production of extraneous radiation.
- Manual/automatic fan modes, plus interlock for overload protection.



Digital Air® Load

VHF

Impedance 50 ohm nominal
VSWR (DC-240 MHz) 1.05:1 typical, 1.10:1 maximum
Cooling Method Forced air-cooled
Peak to Average Power >10 dB
Ambient Temperature -40°C to +45°C (-40°F to +113°F)
Interlock Contact Rating 10 A @ 120 VAC, 5 A @ 250 VAC
Finish Blue Powder Coat
AC Power Required 115 V/230 V 50/60 Hz

UHF

Impedance 50 ohm nominal
VSWR (470-890 MHz) 1.05:1 typical, 1.10:1 maximum
Cooling Method Forced air-cooled
Peak to Average Power >10 dB*
Ambient Temperature -40°C to +45°C (-40°F to +113°F)
Interlock Contact Rating 10 A @ 120 VAC, 5 A @ 250 VAC
Finish Blue Powder Coat
AC Power Required 115 V/230 V 50/60 Hz

*DA40 Peak to Average is 14 dB



Model	Power Rating	Frequency Range	Dimensions (L x W x H)	Weight	Connector	AC Power
DA10V1F15	10 kW	0-240 MHz-AM, FM, VHF			1 5/8" Flanged	115 VAC
DA10V1U15	10 kW	0-240 MHz-AM, FM, VHF	23.5" x 23.5" x 59"	130 lbs.	1 5/8" Unflanged	115 VAC
DA10V1F30	10 kW	0-240 MHz-AM, FM, VHF	597 mm x 597 mm x 1499 mm	58.97 kg	1 5/8" Flanged	230 VAC
DA10V1U30	10 kW	0-240 MHz-AM, FM, VHF			1 5/8" Unflanged	230 VAC
DA10V3F15	10 kW	0-240 MHz-AM, FM, VHF			3 1/8" Flanged	115 VAC
DA10V3U15	10 kW	0-240 MHz-AM, FM, VHF	23.5" x 23.5" x 59"	130 lbs.	3 1/8" Unflanged	115 VAC
DA10V3F30	10 kW	0-240 MHz-AM, FM, VHF	597 mm x 597 mm x 1499 mm	58.97 kg	3 1/8" Flanged	230 VAC
DA10V3U30	10 kW	0-240 MHz-AM, FM, VHF			3 1/8" Unflanged	230 VAC
DA25V3F15	25 kW	0-240 MHz-AM, FM, VHF			3 1/8" Flanged	115 VAC
DA25V3U15	25 kW	0-240 MHz-AM, FM, VHF	27" x 27" x 61"	160 lbs.	3 1/8" Unflanged	115 VAC
DA25V3F30	25 kW	0-240 MHz-AM, FM, VHF	686 mm x 686 mm x 1549 mm	72.57 kg	3 1/8" Flanged	230 VAC
DA25V3U30	25 kW	0-240 MHz-AM, FM, VHF			3 1/8" Unflanged	230 VAC
DA25V4U15	25 kW	0-240 MHz-AM, FM, VHF	27" x 27" x 61"	160 lbs.	4 1/2" Unflanged	115 VAC
DA25V4U30	25 kW	0-240 MHz-AM, FM, VHF	686 mm x 686 mm x 1549 mm	72.57 kg	4 1/2" Unflanged	230 VAC
DA5F15	5 kW	470-890 MHz UHF			3 1/8" Flanged	115 VAC
DA5U15	5 kW	470-890 MHz UHF	17" x 17" x 64"	100 lbs.	3 1/8" Unflanged	115 VAC
DA5F30	5 kW	470-890 MHz UHF	432 mm x 432 mm x 1608 mm	45.5 kg	3 1/8" Flanged	230 VAC
DA5U30	5 kW	470-890 MHz UHF			3 1/8" Unflanged	230 VAC
DA10F15	10 kW	470-890 MHz UHF			3 1/8" Flanged	115 VAC
DA10U15	10 kW	470-890 MHz UHF	19.5" x 19.5" x 68.5"	130 lbs.	3 1/8" Unflanged	115 VAC
DA10F30	10 kW	470-890 MHz UHF	495 mm x 495 mm x 1740 mm	58.97 kg	3 1/8" Flanged	230 VAC
DA10U30	10 kW	470-890 MHz UHF			3 1/8" Unflanged	230 VAC
DA15F15	15 kW	470-890 MHz UHF			3 1/8" Flanged	115 VAC
DA15U15	15 kW	470-890 MHz UHF	25" x 25" x 76.5"	192 lbs.	3 1/8" Unflanged	115 VAC
DA15F30	15 kW	470-890 MHz UHF	635 mm x 635 mm x 1943 mm	87.09 kg	3 1/8" Flanged	230 VAC
DA15U30	15 kW	470-890 MHz UHF			3 1/8" Unflanged	230 VAC
DA25F15	25 kW	470-890 MHz UHF			4 1/16" Myat Flanged	115 VAC
DA25U15	25 kW	470-890 MHz UHF			4 1/16" Myat Unflanged	115 VAC
DA25F30	25 kW	470-890 MHz UHF	27" x 27" x 76.5"	245 lbs.	4 1/16" Myat Flanged	230 VAC
DA25U30	25 kW	470-890 MHz UHF	686 mm x 686 mm x 1943 mm	111.13 kg	4 1/16" Myat Unflanged	230 VAC
DA25-4U15	25 kW	470-890 MHz UHF			4 1/2" IEC Unflanged	115 VAC
DA25-4U30	25 kW	470-890 MHz UHF			4 1/2" IEC Unflanged	230 VAC
DA40-5U15	40 kW	470-890 MHz UHF			4 7/8" IEC Unflanged	115 VAC
DA40-5U30	40 kW	470-890 MHz UHF	27.5" x 27.5" x 84"	310 lbs.	4 7/8" IEC Unflanged	230 VAC
DA40F15	40 kW	470-890 MHz UHF	701 mm x 701 mm x 2134 mm	140.6 kg	6 1/8" IEC Unflanged	115 VAC
DA40F30	40 kW	470-890 MHz UHF			6 1/8" IEC Flanged	230 VAC
DA40U30	40 kW	470-890 MHz UHF			6 1/8" IEC Unflanged	230 VAC

Other models available, please consult factory.

Oil Dielectric

SC 13 Series

Ultra-Stable, Oil-Dielectric RF Termination Loads For Semiconductor Processing Advantages

- No warm-up time
- Ultra-stable: 0.1 dB total change in VSWR from 0 to 100% rating power at 13.56 MHz
- Passive design
- Ultra-low VSWR – typically 1.05:1 at process critical frequencies
- Homogeneous RF design provides long-term repeatability

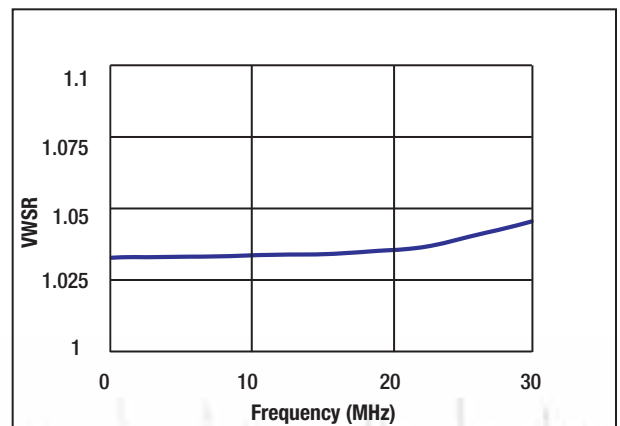
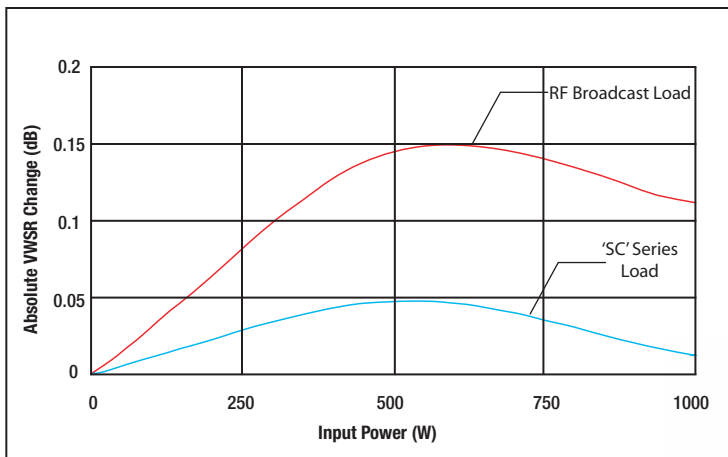
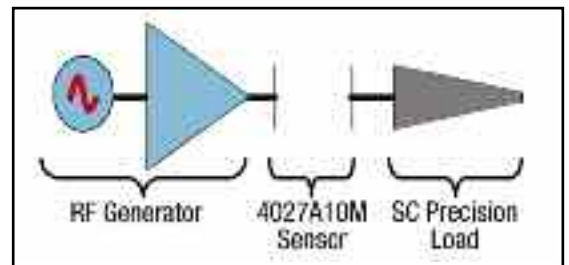
For maximum process repeatability and consistency, modern plasma applications require precise RF power regulation and control. A key component in ensuring accurate and repeatable RF power delivery to the chamber is calibration, regulation, and monitoring of the RF generator.

Bird® now offers ultra-stable, low VSWR loads for quick and precise measurement of generator power output when used with precision power sensors such as the Bird® 4020 & 4027A Series.

Bird® models 8865SC13, 8890-300SC13, 8921SC13 & 8931-115SC13/-230SC13 not only provide low VSWR but also less than 0.1 dB total change in VSWR at process critical frequencies. There is no need for load warm-up or risk of repeatability due to calibration for different lengths of time. This can minimize the errors associated with this calibration and control one of the more critical process variables in the etch process.



Model	Frequency Range & VSWR	Power Rating
8865SC13	DC to 28 MHz at 1.1 max. (less than 1.05 typical)	1 kW
8890-300SC13	DC to 28 MHz at 1.1 max. (less than 1.05 typical)	2.5 kW
8921SC13	DC to 28 MHz at 1.1 max. (less than 1.05 typical)	5 kW
8931-115SC13	DC to 28 MHz at 1.1 max. (less than 1.05 typical)	10 kW, 115 V
8931-230SC13	DC to 28 MHz at 1.1 max. (less than 1.05 typical)	10 kW, 230 V



*** Attenuator Model Number Definition:**

	100 - A - QQC - XX			
Power Rating (watts)	Product Type A, SA, WA - Attenuator	Connector Gender MF - Male/Female FF - Female/Female	Connectors+ A - SMA B - BNC N - N T - TNC E - IEC 7/16	Attenuation Value in dB 03 - 3 dB 10 - 10 dB 06 - 6 dB 20 - 20 dB 30 - 30 dB

+ Call for other connector options.

High Frequency Components

Models	2-6A	5-6A	10-6A	25-6A	50-6A	100-6A
Power Rating	2 Watt	5 Watt	10 Watt	25 Watt	50 Watt	100 Watt
Connector	N (Male/Female)	N (Male/Female)	SMA (Male/Female)	N (Male/Female)		
Frequency Range	DC to 6 GHz					
VSWR	1.30:1 max.	1.25:1 max.	1.20:1 max.	1.20:1 max.	1.20:1 max.	1.45:1 max.
Operating Temperature	-65°C to +125°C					
Body	Passivated Stainless Steel					
Dimensions	1.76" L x .83 Dia.	2.25" L x .83 Dia.	2.5" L x .83 Dia.	4.2" L x 2.3" SQ.	4.75" L x 3.0" SQ	6.39" x 3.50" x 3.80"
Weight	2.5 oz.	3.0 oz.	3.5 oz.	13.5 oz.	1.66 lbs.	2.2 lbs.

Models	2-18A	5-18A	10-18A	25-18A	50-18A
Power Rating	2 Watt	5 Watt	10 Watt	25 Watt	50 Watt
Connector	N (Male/Female)		SMA (Male/Female)	N (Male/Female)	
Frequency Range	DC to 18 GHz				
VSWR	1.35:1 max.	1.35:1 max.	1.45:1 max.	1.40:1 max.	1.45:1 max.
Operating Temperature	-65°C to +125°C				
Body	Passivated Stainless Steel				
Dimensions	2.25" L x .83 Dia.	2.25" L x .83 Dia.	2.5" L x .83 Dia.	4.2" L x 2.3" SQ.	4.75" L x 3.0" SQ
Weight	2.5 oz.	3.0 oz.	3.5 oz.	13.3 oz.	1.66 lbs.

All Attenuators 100 W or lower (as well as 150-A & 300-A) are Bi-Directional

Models	2-A-MFA Series (2 WATT)	2-A SERIES (2 WATT)*	3-A-MFB-K1 AND 3-A MFB-XX	5-A (5 WATT)*	10-A (10 WATT)*	25-A (25 WATT)*
Connector	SMA (Male or Female)	N, BNC (Male or Female)	BNC (Male or Female)	N, BNC, TNC (Male or Female)	SMA, N, BNC, TNC (Male or Female)	N, BNC, TNC IEC 7/16
Frequency Range and VSWR	DC to 6 GHz at 1.30:1 max	DC to 1 GHz at 1.10:1 max., 1 GHz to 4 GHz at 1.25:1 max.				
Ambient Temp.	-40°C to +40°C					
Finish	Nickel Plated	Silver or Tri-alloy plated, except Nickel plate for BNC			Black anodized. Silver or Tri-alloy plated connectors	
Nominal Size	1.32" L x 0.42" Dia., (33.6 mm x 10.7 mm)	(with N-type connectors): 2.2" L x 0.8" Dia., (55.9 mm x 20.4 mm)	1.4" L x .50 Dia.	(with N-type connectors): 2.2" L x 0.8" Dia., (55.9 mm x 20.4 mm)	(with N-type connectors): 2.2" L x 2.3" Dia., (66.1 mm x 58.5 mm)	(with N-type connectors): 5.3" L x 2.3" Dia., (134.7 mm x 58.5 mm)
Weight	0.4 oz. (11.4 g)	3.1 oz. (88 g)	—	3.1 oz. (88 g)	4 oz. (176.7 g)	9 oz. (373.4 g)



Models	50-A (50 WATT)	75-A (75 WATT)	100-A* (100 WATT)	100-SA (100 WATT)	150-A, SA (150 WATT)	300-A, WA*** (300 WATT)	500-WA (500 WATT)**
Connectors	N, BNC, TNC, IEC 7/16						N, TNC, or IEC 7/16
Frequency Range and VSWR	DC to 1 GHz at 1.10:1 max., 1 GHz to 2.4 GHz at 1.25:1 max.						
Ambient Temperature Range	-40°C to +40°C						
Operating Position	Any	Any	Vertical	Fin Vertical	Vertical	Vertical	Any, except mounting surface up
Finish	Black anodized. Silver or Tri-alloy plated connectors						
Nominal Size (with N-type Connectors)	5.3" L x 2.3" Dia., (134.7 mm x 58.5 mm)	7.3" L x 2.3" Dia., (185.5 mm x 58.5 mm)	6.4" H x 2.6" W x 6.8" D, (162.6 mm x 66 mm x 172.8 mm)	7.30" H x 2.75" W x 2.75" D, (192.8 mm x 69.9 mm x 69.9 mm)	11.9" H x 2.6" W x 6.8" D, (302 mm x 66 mm x 173 mm)	10.9" H x 5.3" W x 6.8" D, (277 mm x 137 mm x 173 mm)	11.31" L x 5.4" W x 4.3" H (285.3 mm x 137.2 mm x 109.3 mm)
Weight	1.0 lb. (0.57 kg)	1.6 lbs. (0.73 kg)	4.3 lbs. (1.95 kg)	2.82 lbs. (1.29 kg)	6.5 lbs. (2.95 kg)	12 lbs. (5.45 kg)	7.9 lbs. (3.6 kg)



* Also available in -40 dB
 ** 4 Mounting Holes, Centers and Size: 1.812" x 7.687", typical 10-32 thread x 0.5" D
 *** WA SERIES Compact Size



600-A-QFFN-XX (600 WATT UNI-DIRECTIONAL)
(See table p. 37)

- Connectors** QC N-type Female
- Frequency Range and VSWR** DC to 1 GHz at 1.10:1 max.,
1 GHz to 2.4 GHz at 1.25:1 max.
- Operating Position** Vertical
- Coolant** Dry (Convection cooled)
- Finish** Black anodized. Silver or Tri-alloy plated connectors
- Nominal Size** 13.15" L x 9.65" W x 8.875" H
- Weight** 21.5 lbs. (9.75 kg)
- Accessories** Quick disconnect options



1000-WA-QQC-XX SERIES (1000 WATT)
(See p. 37 for QQC #)

- Connectors** N, TNC, or IEC 7/16
- Coolant** Dry (Convection cooled)
- Operating Position** Any, except mounting surface up
- Frequency Range and VSWR** DC to 1 GHz at 1.10:1 max.,
1 GHz to 2.4 GHz at 1.25:1 max.
- Attenuator Operation** Unidirectional.
Standard attenuation values 3, 6, 10, 20 and 30 dB; others available on request
- Finish** Black anodized. Silver or Tri-alloy plated connectors
- Nominal Size** (with female N connector; excludes removable feet),
18.65" L x 10.53" W x 4.9" H
(587.6 mm x 229.4 mm x 137.2 mm)
- 4 Mounting Holes, Centers and Size** 1.885" x 14.40", typical 1/4-20 thread x 0.5" D
- Weight** Approximately 26.5 lbs. (12.1 kg)

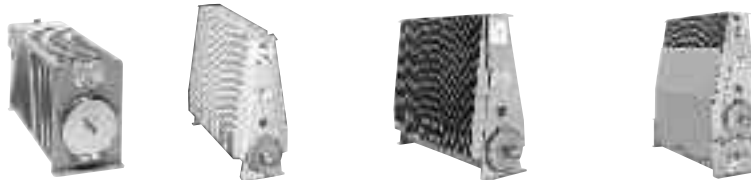


XX VALUE

dB Atten.	Accuracy ± dB DC-1 GHz	Accuracy ± dB 1-2.4 GHz	"XX" Value
3	0.3	0.5	03
6	0.4	0.6	06
10	0.4	0.8	10
20	0.5	1.0	20
30	0.8	1.3	30

ACCURACY 1000-WA

dB Atten.	Accuracy ± dB DC-1 GHz	Accuracy ± dB 1-2.4 GHz	"XX" Value
3	0.5	+1.0 dB/-0.5 dB	03
6	0.6	+1.2 dB/-0.5 dB	06
10	0.6	+1.5 dB/-0.5 dB	10
20	0.6	+1.5 dB/-0.5 dB	20
30	1.0	+1.5 dB/-0.5 dB	30



Models	8325 (500 WATT)	8327-300 (1 kW)	8329-300 (2 kW)	8329-300 with BA-300-115 (4 kW)	8329-300 with BA-300-230 (4 kW)
Power Rating	500 W continuous	1000 W continuous	2000 W continuous	4000 W continuous with blower on, 1000 W with blower off	
Frequency Range and VSWR	Input 1.1 max. DC to 500 MHz				
Attenuation	30 dB				
Accuracy	±0.5 dB (Calibration Data supplied for 30, 100, 200, 300, 400, and 500 MHz which is accurate to ±0.2 dB)				
Ambient Temperature Range	-40°C to +45°C				
Connectors	QC type N(F)		QC type LC(F) input, N(F) output		
Coolant	0.9 gal. (3.4 liters) refined mineral oil	2.9 gal. (11 liters) refined mineral oil	2.9 gal. (11 liters) silicone oil	2.9 gal. (11 liters) silicone oil with forced-air cooling	
Operating Position	Horizontal only				
Finish	Gray powder coat				
Nominal Size	17 1/2" L x 5 15/16" W, x 8 1/2" H (445 mm x 151 mm x 216 mm)	23 15/16" L x 7 1/8" W x 17 3/16" H, (596 mm x 181 mm x 437 mm)		23 15/32" L x 7 1/8" W x 22 1/16" H, 596 mm x 181 mm x 560 mm)	
Weight	25 lbs. (11 kg)	57 lbs. (26 kg)		70 1/2 lbs. (32 kg)	
Note	—		Overload thermoswitch P/N 8329-028 is optional		Overload thermoswitch P/N 8329-028 is optional. When ordered as a package, attenuator and blower are factory assembled at no additional charge.





50-OHM COAXIAL SELECTOR SWITCHES — 71, 72 R, 74 SERIES

Frequency Range	DC to 10 GHz
Maximum RF Voltage	500 volts rms
Attenuation to Unused Channel	75 dB (cross talk)
Ambient Temp.	-60°C to +65°C (-76°F to +149°F)
Weight	Varies by model, approx. 2 1/2 lbs. (1.1 kg)



TYPICAL OPERATING VALUES

FREQUENCY	VSWR	INSERTION LOSS	MAX RF POWER RATING @ 65°C				
100 MHz	Negligible	0.02 dB	850 W				
1000 MHz	1.06 max.	0.09 dB	200 W				
4000 MHz	1.30 max.	0.22 dB	75 W				

Model	7422	7441	7431	74	718	7181	72-2	72 R
Positions	2	3	4	6	8	10	2	reversing
Coaxial Circuits	1	1	1	1	1	1	2	2

MINIATURE COAXIAL COUPLER



Models	50-AC-FFA-XX	100-CC-FFN-XX
Frequency Range	0.5 GHz - 1.0 GHz	800 - 3500 MHz
Coupling Factor	10, 20, 30 dB	20, 30 dB
Directivity	25 dB, minimum	18 dB, minimum
Frequency Sensitivity	±0.75 dB, maximum	±1.0 dB, maximum
VSWR	1.15:1, maximum (primary and secondary line)	1.20:1, maximum (primary and secondary line)
Insertion Loss	0.2 dB, excluding coupled power, 0.8 dB true	0.25 dB (excluding coupled power)
Maximum Operating Temp.	+105°C (221°F)	+105°C (221°F)
Dimensions	3.6" L x 0.86" W x 0.42" H	5.2" L x 1.85" W x 0.812" H
Weight	1.3 oz (37 g)	8 oz.

*Depends on external load



COMBINER / DIVIDER

Models	2-AD-FFN-X	30-AD-FFN-2	100-AD-FFN-02*	350-BD-FFN-2*
Power Rating	2 watts	30 watts into 1.15:1; 10 watts into 1.50:1; 1 watt into open *	100 watts cw *	350 watts into matched loads; 150 watts into mismatched loads *
Frequency	2.0 GHz - 2.5 GHz	800 MHz - 2.4 GHz	806 MHz - 906 MHz	460 MHz - 970 MHz
Insertion Loss	0.6 dB (above 3 dB split)	0.5 dB max (above 3 dB split)	3.25 dB max (above 3 dB split)	0.4 dB
Isolation	20 dB min. (J2 to J3)	25 dB min. (J2 to J3)	20 dB min. (J2 to J3)	20 dB min.
VSWR	1.17:1 max.	1.2:1 max.	1.2:1 max. (all ports) 1.15:1 max.	Input: (J1) 1.3:1 max.; Output: (J2, J3)
Matching	1.5 degree phase dB amplitude (typically 0.3 dB)	2 degree phase (typically 0.5) 0.5 dB amplitude	1 degree phase (typically 0.2) (0.1 dB amplitude) (typically 0.05 dB)	2 degree max.
Housing Finish	Aluminum Tri-alloy	Aluminum Clear Iridite	Aluminum Tri-Alloy	Aluminum Tri-Alloy per Fed. Std. 26492
Nominal Size	2.75" L x 2.75" W x 1.062" H	2.20" L x 2.72" W x 1.04" H	1.15" H x 3.00" W x 3.00" D	3.27" L x 2.50" W x 0.80" H
Connectors	Female (N)	Female (N)	Female (N)	Female (N)

* Weatherproof





ELEMENT SELECTION GUIDE

Wattmeter Model	Select Element from Table(s)
3128A	1, 2, 3, 3A, 4, 6, 14*
3170A	1, 2, 3, 3A, 4, 6, 14*
43	1, 2, 3, 3A, 4, 6, 14*
43P	1, 2, 3, 3A, 4, 5, 6
4305A	4305A Elements, 1 5/8AA
4314B	1, 2, 3, 3A, 4, 5, 6, 14*
4391A	1, 2, 3, 3A, 4, 5, 6, 14*
4410A, 4412A	(see page 24)
4431	1, 2, 3, 3A, 4, 6, 14*
4521, 4522	1, 2, 3, 3A, 4, 6, 14*
4526	1, 2, 3, 3A, 4, 6, 14*
4527	2 MHz to 512 MHz elements in 1,2, 6,14*

*Table 14 describes coupler elements used for RF sampling. The instrument meter does not read when these elements are installed, but simply serves as a line section.

ELEMENT TABLE FREQUENCY & POWER LIMITS

ELEMENT TABLE	MIN. PWR (WATTS F.S.)	MAX. PWR (WATTS F.S.)	MIN. FREQ (MHz)	MAX. FREQ (MHz)
APM	1	1000	2	2300
1	5	5000	2	1000
2	1	2.5	25	1000
3	1	250	950	2700
3A	0.1	0.5	950	2600
4	1000	10,000	0.45	2.5
5	500	10,000	2	1260
6	0.1	0.5	45	1000
8	50	25,000	0.45	2300
9	0.01	10	30	1000
9A	0.001	1	864	970
10	0.1	100	25	2300
11	1	1000	2	1000
12	10	10,000	0.2	30
14	1000	1000	50	1250

TABLE 1 — STANDARD ELEMENTS

Power Range	Frequency Bands (MHz)					
	2-30	25-60	50-125	100-250	200-500	400-1000
5 W	—	5A	5B	5C	5D	5E
10 W	—	10A	10B	10C	10D	10E
25 W	—	25A	25B	25C	25D	25E
50 W	50H	50A	50B	50C	50D	50E
100 W	100H	100A	100B	100C	100D	100E
250 W	250H	250A	250B	250C	250D	250E
500 W	500H	500A	500B	500C	500D	500E
1000 W	1000H	1000A	1000B	1000C	1000D	1000E
2500 W	2500H	—	—	—	2500D	—
5000 W	5000H	—	—	—	—	—

TABLE 2 — LOW-POWER ELEMENTS

1 Watt												
Frequency (MHz)	40-50	50-60	60-80	80-90	95-125	110-160	150-250	200-300	275-450	425-850	800-1000	
Part Number	040-1	050-1	060-1	080-1	095-1	110-1	150-1	200-1	275-1	425-1	801-1	
2.5 Watt												
Frequency (MHz)	25-30	30-40	40-50	50-60	60-80	80-95	95-150	150-250	200-300	250-450	400-850	800-1000
Part Number	025-2	030-2	040-2	050-2	060-2	080-2	095-2	150-2	200-2	250-2	400-2	801-2

TABLE 3 — HIGH-FREQUENCY ELEMENTS, ENTIRE TABLE ±8% FS

Power Range	Frequency Bands (MHz)								
	950-1260	1100-1800	1700-1990	1990-2200	2200-2300	2300-2400	2400-2500	2500-2600	2600-2700
1 W	1J	1K	1L1	1L2	1M	431-17	431-20	431-23	431-120
2.5 W	2.5J	2.5K	2.5L1	2.5L2	2.5M	431-110	431-107	431-108	431-117
5 W	5J	5K	5L1	5L2	5M	432-15	432-28	432-2	432-12
10 W	10J	10K	10L1	10L2	10M	432-125	432-141	432-102	432-104
25 W	25J	25K	25L1	25L2	25M	433-19	433-20	433-35	433-36
50 W	50J	50K	50L1	50L2	50M	433-37	433-38	433-163	433-164
100 W	100J	—	—	—	—	—	—	—	—
250 W	250J	—	—	—	—	—	—	—	—

TABLE 3A - HIGH FREQUENCY MILLIWATT ELEMENTS

Power Range	Frequency Bands (MHz)						
	950-1260	1250-1500	1500-1700	1700-2200	2300-2400	2400-2500	2500-2600
100 mW	430-82	430-209	430-210	430-178	430-211	430-182	—
250 mW	—	—	—	430-1	430-239	430-240	430-241
500 mW	—	430-259	—	430-95	—	430-159	—

TABLE 4 — LOW-FREQUENCY ELEMENTS

Power Range	Frequency Band
1000 W	.45 - 2.5 MHz
2500 W	1000P
5000 W	2500P
10000 W	5000P
	10000P

TABLE 5 — PULSE-POWER ELEMENTS, ENTIRE TABLE ±8% OF FULL SCALE

Power Range	Frequency Bands (MHz)					
	2-30	25-60	50-125	100-250	400-1000	950-1260
500 W	—	—	—	—	—	500J
1000 W	—	—	—	—	—	1000J
2500 W	—	2500A	2500B	2500C	2500E	2500J
5000 W	—	5000A	5000B	5000C	5000E	5000J
10000 W	10000H	—	10000B	—	10000E	—

Refer to "Transmission Power Rating Chart" for max. power ratings. Elements are capable of reading peak and average power.

TABLE 6 — MILLIWATT ELEMENTS

100 mW													
Frequency (MHz)	45-50	72-76	108-136	135-175	320-340	328-336	400-420	420-450	450-470	600-800	800-1000		
Cat. No.	430-266	430-2	430-57	430-86	430-205	430-3	430-7	430-208	430-8	430-169	430-263		
250 mW													
Frequency (MHz)	72-76	88-108	105-120	116-126	130-150	190-210	450-470	800-1000					
Cat. No.	430-22	430-217	430-20	430-48	430-13	430-65	430-61	430-264					
500 mW													
Frequency (MHz)	72-76	88-108	105-120	120-136	136-150	240-290	290-340	340-360	350-400	400-450	450-500	600-800	800-1000
Cat. No.	430-33	430-247	430-26	430-248	430-249	430-27	430-253	430-157	430-254	430-255	430-256	430-258	430-265

NONDIRECTIONAL SAMPLER ELEMENTS FOR QC-TYPE OR 7/8" EIA LINE

Frequency Band (MHz)	Nominal Coupling	Max. Main Line Power	Model
25-1000	-50 dB ± 2 dB (-66 dB @ 2 MHz)	500 W	4274-025
100-400	-35 to -48 dB (±1 dB) Adjustable	500 W	4274-050

TABLE 14 — DIRECTIONAL COUPLER ELEMENTS FOR QC-TYPE OR 7/8" EIA LINE

Frequency Band (MHz)	Nominal Coupling	Max. Main Line Power	Model
50-100	-40 dB	1 kW	400-50
75-150	-40 dB	1 kW	400-75
125-250	-40 dB	1 kW	400-125
225-450	-40 dB	1 kW	400-225
400-800	-40 dB	1 kW	400-400
750-1250	-40 dB	1 kW	400-750

TABLE 16 — DIRECTIONAL COUPLER ELEMENTS FOR 3 1/8" EIA LINES

Frequency Band (MHz)	Nominal Coupling	Max. Main Line Power	Model
25-40	-55 dB	25 kW	553-25
50-100	-55 dB	25 kW	553-50
75-150	-55 dB	25 kW	553-75
125-250	-55 dB	25 kW	553-125
225-450	-55 dB	25 kW	553-225
400-800	-55 dB	15 kW	553-401
750-1250	-55 dB	10 kW	553-750

TABLE 15 — DIRECTIONAL COUPLER ELEMENTS FOR 1 5/8" EIA LINES

Frequency Band (MHz)	Nominal Coupling	Max. Main Line Power	Model
50-100	-50 dB	10 kW	501-50
75-150	-50 dB	10 kW	501-75
125-250	-50 dB	10 kW	501-125
225-450	-50 dB	10 kW	501-225
400-800	-50 dB	5 kW	501-400

TABLE 17— DIRECTIONAL COUPLER ELEMENTS FOR 6 1/8" EIA LINES

Frequency Band (MHz)	Nominal Coupling	Max. Main Line Power	Model
50-100	-60 dB	60 kW	606-50
75-150	-60 dB	60 kW	606-75
125-250	-60 dB	60 kW	606-125
400-870	-60 dB	60 kW	606-400

NOTE: For use in any line section including BPME

ELEMENT SELECTION GUIDE

Wattmeter Model	Select Element from Table(s)
3126A	1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B
3127A	1 5/8 A, 3 1/8 A, 6 1/8 A
3127-035	1 5/8 A, 3 1/8 A, 4 1/16 A, 6 1/8 A
3127-040	1 5/8 A, 3 1/8 A, 4 1/16 A, 6 1/8 A
3127-055	1 5/8 A, 3 1/8 A, 4 1/16 A, 6 1/8 A
3127-075	1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B
3127-080	1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B
3171A	1 5/8 AA, 3 1/8 AA, 4 1/16 AA, 6 1/8 AA
3171-020	1 5/8 BB, 3 1/8 BB, 4 1/16 BB, 6 1/8 BB
6810-220	1 5/8 A, 3 1/8 A, 4 1/16 A, 6 1/8 A
6810-309-7	1 5/8 A, 3 1/8 A, 4 1/16 A, 6 1/8 A
6810-230	1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B
6810-307	1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B
6810-265	1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B

TABLE 1 5/8A — STANDARD ELEMENTS 100 µA

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
100 W	—	100B1	100C1	100E1
250 W	—	250B1	250C1	250E1
500 W	—	500B1	500C1	500E1
1000 W	1000H1	1000B1	1000C1	1000E1
2500 W	2500H1	2500B1	2500C1	2500E1
5000 W	5000H1	5000B1	5000C1	5000E1
10 kW	10KH1	10KB1	10KC1	—
25 kW	25KH1	25KB1	—	—

TABLE 1 5/8AA — STANDARD ELEMENTS 30 µA

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
100 W	—	100B12	100C12	100E12
250 W	—	250B12	250C12	250E12
500 W	500H12	500B12	500C12	500E12
1000 W	1000H12	1000B12	1000C12	1000E12
2500 W	2500H12	2500B12	2500C12	2500E12
5000 W	5000H12	5000B12	5000C12	5000E12
10 kW	10KH12	10KB12	—	—
25 kW	25KH12	25KB12	—	—

TABLE 1 5/8B — STANDARD ELEMENTS 100 µA

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
300 W	—	300B1	300C1	300E1
600 W	—	600B1	600C1	600E1
1500 W	1500H1	1500B1	1500C1	1500E1
3000 W	3000H1	3000B1	3000C1	3000E1
6000 W	6000H1	6000B1	6000C1	6000E1
15 kW	15KH1	15KB1	—	—

TABLE 1 5/8BB — STANDARD ELEMENTS 30 µA

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
300 W	300H12	300B12	300C12	300E12
600 W	600H12	600B12	600C12	600E12
1500 W	1500H12	1500B12	1500C12	1500E12
3000 W	3000H12	3000B12	3000C12	3000E12
6000 W	6000H12	6000B12	6000C12	6000E12
15 kW	15KH12	15KB12	—	—

TABLE 1 5/8C — STANDARD ELEMENTS 100 µA

Power Range	Frequency Bands (MHz)	
	50-125	100-250
8000 W	8000B1	8000C1

TABLE 3 1/8A — STANDARD ELEMENTS 100 µA

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
100 W	—	100B3	100C3	100E3
250 W	—	250B3	250C3	250E3
500 W	—	500B3	500C3	500E3
1000 W	—	1000B3	1000C3	1000E3
2500 W	2500H3	2500B3	2500C3	2500E3
5000 W	5000H3	5000B3	5000C3	5000E3
10 kW	10KH3	10KB3	10KC3	10KE3
25 kW	25KH3	25KB3	25KC3	25KE3
50 kW	50KH3	50KB3	50KC3	—
100 kW	100KH3	—	—	—

TABLE 3 1/8AA — STANDARD ELEMENTS 30 µA

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
100 W	—	100B32	100C32	100E32
250 W	—	250B32	250C32	250E32
500 W	500H32	500B32	500C32	500E32
1000 W	1000H32	1000B32	1000C32	1000E32
2500 W	2500H32	2500B32	2500C32	2500E32
5000 W	5000H32	5000B32	5000C32	5000E32
10 kW	10KH32	10KB32	10KC32	10KE32
25 kW	25KH32	25KB32	25KC32	25KE32
50 kW	50KH32	50KB32	50KC32	—
100 kW	100KH32	—	—	—

TABLE 3 1/8B — STANDARD ELEMENTS 100 µA

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
600 W	600B3	600C3	600E3
1500 W	1500B3	1500C3	1500E3
3000 W	3000B3	3000C3	3000E3
6000 W	6000B3	6000C3	6000E3
15 kW	15KB3	15KC3	15KE3
30 kW	30KB3	30KC3	30KE3

TABLE 3 1/8BB — STANDARD ELEMENTS 30 µA

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
600 W	600B32	600C32	600E32
1500 W	1500B32	1500C32	1500E32
3000 W	3000B32	3000C32	3000E32
6000 W	6000B32	6000C32	6000E32
15 kW	15KB32	15KC32	15KE32
30 kW	30KB32	30KC32	30KE32

TABLE 3 1/8C — STANDARD ELEMENTS 100 µA

Power Range	Frequency Bands (MHz)
	100-250
8000 W	8000C3

TABLE 4 1/16A — STANDARD ELEMENTS 100 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
2500 W	2500B5	2500C5	2500E5
5000 W	5000B5	5000C5	5000E5
10 kW	10KB5	10KC5	10KE5
25 kW	25KB5	25KC5	25KE5
50 kW	50KB5	50KC5	—

TABLE 4 1/16AA — STANDARD ELEMENTS 30 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
2500 W	2500B52	2500C52	2500E52
5000 W	5000B52	5000C52	5000E52
10 kW	10KB52	10KC52	10KE52
25 kW	25KB52	25KC52	25KE52

TABLE 4 1/16B — STANDARD ELEMENTS 100 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
1500 W	1500B5	1500C5	1500E5
3000 W	3000B5	3000C5	3000E5
6000 W	6000B5	6000C5	6000E5
15 kW	15KB5	15KC5	15KE5
30 kW	30KB5	30KC5	30KE5
60 kW	60KB5	60KC5	—

TABLE 4 1/16BB — STANDARD ELEMENTS 30 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
1500 W	1500B52	1500C52	1500E52
3000 W	3000B52	3000C52	3000E52
6000 W	6000B52	6000C52	6000E52
15 kW	15KB52	15KC52	15KE52
30 kW	30KB52	30KC52	30KE52
60 kW	60KB52	60KC52	—

TABLE 4 1/16C — STANDARD ELEMENTS 100 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
8000 W	8000B5	8000C5	8000E5
80 kW	80KB5	80KC5	—

TABLE 6 1/8A — STANDARD ELEMENTS 100 μ A

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
1000 W	—	1000B6	1000C6	1000E6
2500 W	—	2500B6	2500C6	2500E6
5000 W	—	—	5000C6	5000E6
10 kW	10KH6	10KB6	10KC6	10KE6
25 kW	25KH6	25KB6	25KC6	25KE6
50 kW	50KH6	50KB6	50KC6	50KE6
100 kW	100KH6	100KB6	100KC6	—
250 kW	250KH6	—	—	—

TABLE 6 1/8AA — STANDARD ELEMENTS 30 μ A

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
250 W	—	—	250C62	250E62
500 W	—	500B62	500C62	500E62
1000 W	1000H62	1000B62	1000C62	1000E62
2500 W	2500H62	2500B62	2500C62	2500E62
5000 W	—	5000B62	5000C62	5000E62
10 kW	10KH62	10KB62	10KC62	10KE62
25 kW	—	25KB62	25KC62	25KE62
50 kW	50KH62	50KB62	50KC62	50KE62
100 kW	100KH62	100KB62	100KC62	—

TABLE 6 1/8B — STANDARD ELEMENTS 100 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
3000 W	3000B6	3000C6	3000E6
6000 W	6000B6	6000C6	6000E6
15 kW	15KB6	15KC6	15KE6
30 kW	30KB6	30KC6	30KE6
60 kW	60KB6	60KC6	60KE6

TABLE 6 1/8BB — STANDARD ELEMENTS 30 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
3000 W	3000B62	3000C62	3000E62
6000 W	6000B62	6000C62	6000E62
15 kW	15KB62	15KC62	15KE62
30 kW	30KB62	30KC62	30KE62
60 kW	60KB62	60KC62	60KE62

TABLE 6 1/8C — STANDARD ELEMENTS 100 μ A

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
8000 W	8000B6	8000C6	8000E6
80 kW	80KB6	80KC6	80KE6









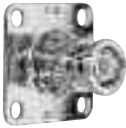
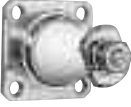





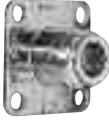


Many TERMINALINE® load resistors, attenuators and absorption wattmeters, as well as THRULINE® wattmeters, employ our patented QC-type “Quick-Change” RF Connectors. These products may be ordered with the connector(s) most convenient for use with your equipment. Many customers order additional connectors to avoid using performance robbing adapters. QC Connectors are easily changed in the field by removing and replacing four screws. Because of the wide variety of connectors and possible applications, electrical specifications for QC-equipped products are quoted with the standard connectors normally supplied with the equipment.

SQC Connectors, (used with the 4110 Series, 4304 Wattmeter, 8072-1, 8431 Load Resistors, etc.) are shown below.

Description	Part Number
Female N	4100-014
Male N	4100-015
Female BNC	4110-014

QC Connectors are frequency and power level specific. If unsure of your application, contact Bird for assistance.

QC Connectors

	SMA (F) 4240-336		HN (M) 4240-278		DIN (F) IEC 7/16 (F) - Jack Type 169-4 4240-344
	SMA (M) 4240-334		UHF (F) 4240-050 (S0239)		DIN (M) IEC 7/16 (M) - Plug Type 169-4 4240-363
	Mini-UHF (F) 4240-346		UHF (M) 4240-179 (PL259)		7/8" EIA 4240-002
	BNC (F) 4240-125		C (F) 4240-100		LT (F) 4240-018
	BNC (M) 4240-132		Open Term. #10-32 Nut 4240-080		LT (M) 4240-012
	TNC (F) 4240-156		SC (F) 4240-090		LC (F) 4240-031
	TNC (M) 4240-160		N (F) 4240-062		LC (M) 4240-025
	HN (F) 4240-268		N (M) 4240-063		1 5/8" EIA Swivel (M) 4240-208
					1 5/8" EIA Fixed (M) 4240-096

INTERSERIES ADAPTER KITS

Model 4240-400

	N (F)	N (M)	UHF (F)	UHF (M)	BNC (F)	BNC (M)	TNC (F)
N (F)	•						
N (M)	•	•					
UHF (F)	•	•					
UHF (M)	•	•	•				
BNC (F)	•	•	•	•			
BNC (M)	•	•	•	•	•		
TNC (F)	•	•	•	•	•	•	
TNC (M)	•	•	•	•	•	•	•

Model 4240-401

	N (F)	N (M)	BNC (F)	BNC (M)	TNC (F)	TNC (M)	SMA (F)	SMA (M)	UHF (F)
N (F)	•								
N (M)	•	•							
BNC (F)	•	•							
BNC (M)	•	•	•						
TNC (F)	•	•	•	•					
TNC (M)	•	•	•	•	•				
SMA (F)	•	•	•	•	•	•			
SMA (M)	•	•	•	•	•	•	•		
UHF (F)	•	•	•	•	•	•	•	•	
UHF (M)	•	•	•	•	•	•	•	•	•



INTERSERIES ADAPTERS

Model	Description
4240-402	Precision Connector Adapter, AT-Series, N Male
4240-403	Precision Connector Adapter, AT-Series, N Female
4240-404	Precision Connector Adapter, AT-Series, BNC Male
4240-405	Precision Connector Adapter, AT-Series, BNC Female
4240-406	Precision Connector Adapter, AT-Series, TNC Male
4240-407	Precision Connector Adapter, AT-Series, TNC Female
4240-408	Precision Connector Adapter, AT-Series, UHF Male
4240-409	Precision Connector Adapter, AT-Series, UHF Female
4240-410	Precision Connector Adapter, AT-Series, SMA Male
4240-411	Precision Connector Adapter, AT-Series, SMA Female

QC ADAPTERS, CONNECTORS

Model	Description
4240-165	QC (F) to QC (F)
4240-180	Copl. (M) to QC (F)
4240-187	3 1/8" Unflg. 51.5 ohm to QC (F)
4240-194	3 1/8" Flg. to QC (F)
4240-201	7/8" Flg. to QC (F)
4240-244	Rt. Angle QC
4240-260	1 5/8" Flg. to QC (F)

DC CABLE ASSEMBLIES

Model	Connector	Length	Use With Group*
3170-058-1	BNC (M)	14"	I
3170-058-3	BNC (M)	25'	I
3170-058-5	BNC (M)	50'	I
3170-058-9	BNC (M)	100'	I
4220-097-1	Spade Lug	12"	II
4220-097-7	Spade Lug	10'	II
4220-097-10	Spade Lug	25'	II
4220-097-17	Spade Lug	50'	II
4220-097-13	Spade Lug	75'	II
4220-097-16	Spade Lug	100'	II
7500-072-1	DC Plug	39 1/2'	III
7500-072-4	DC Plug	10'	III
7500-072-2	DC Plug	25'	III

*WATTMETER GROUPS

Group I	3171-020, 3171, 3171A020, 3171A, 3127-055, 3127-080
Group II	3127-035, 3127-075, 3127-040
Group III	4305A, 4909, 4715, 4610, 4723, 4802



WATTMETER BATTERIES

Model	Use With	Volts	Type	Notes
5A1230	4391A	1.25	NiCd	6 Required
5A1587	4412A	9	NiCd	—
5-1375	4314B, 4410A, 4041, 4410, APM-16	9	Alkaline	—



CASES

Model	Case Holders
CC-6	Portable THRULINE® Wattmeter*, 5 elements, and 1 small load
EC-1	12 elements
4300-061	Model 43 or 43P Wattmeter, load, signal sampler, QC connectors, and 4 elements
4300-070	Portable THRULINE® Wattmeter*, test cable, screw driver, QC connectors, and 15 elements
4300-085	4391 POWER ANALYST®, signal sampler, and other accessories
4300-055	4410 Wattmeter, load, elements, and other accessories
4300A215	4421 Wattmeter and power sensors
5000-030	Soft Case - AT-100, AT-400, AT-800 Antenna Testers, 5000-EX
5000-035	Hard Transit Case - 5000-EX and Sensors
7002C870	Site Analyzer®
7002A225-1	SignalHawk™

*For use with THRULINE® Wattmeter Models: APM-16, 43, 43P, 4304A, 4308, 4314B, 4410A, 4430 and 4431.

MISCELLANEOUS

Model	Use With	Description
3610-031	All Element Sockets	Dummy Plug
5-1864	4314B	Power Supply 115 V
5-1940	4314B	Power Supply 230 V
5A2229	AT Series	Power Supply 120 V
5A2226	AT Series	Power Supply 230 V
7500-076		DC Connector

DOLLIES

Model	Description
6771-011	For 10 and 25 kW MODULOAD
6772B011	For 50 kW MODULOAD

REPLACEMENT RESISTORS

Model	For	Power
8731-031-1	8731 ECONOLOADS	10 kW
RPK8738A072	8730A/8738A ECONOLOADS	10 kW
RPK8755-027-2	8745/8746 ECONOLOADS	20 kW
RPK8755-027-3	8755/8756 ECONOLOADS	30 kW
RPK8755-027-4	8765/8766 ECONOLOADS	40 kW
RPK8755-027-5	8775/8776 ECONOLOADS	50 kW
RPK8792-010-1 one reqd.	8792 ECONOLOADS	80 kW
RPK5A2388	8578A100 Forced-Air Load	10 kW
RPK5A2393	8578A150 Forced-Air Load	15 kW

COUPLING KITS

Model	Line Type	ohm
4240-220	7/8" Flg.	50
4712-020	1 5/8" Flg.	50
4600-020	3 1/8" Flg.	50
5-726	3 1/8" Unfig.	50
4902-020	6 1/8" Flg.	50

COOLANTS

Model	Description	Volume/Pkg.
5-030-3	Refined Mineral Oil	1 Gallon Can
5-1070-2	DC-200 Silicone	1 Gallon Can
5-1134-3	Ethylene Glycol, Industrial Grade	1 Gallon Can

FLANGE-TO-FLANGE ADAPTERS

Model	Description
4600-025	3 1/8" Flg. To 1 5/8" EIA Flg. 50 ohm
4712-015	1 5/8" Flg. To 7/8" EIA Flg. 50 ohm

WATER-COOLED ACCESSORIES

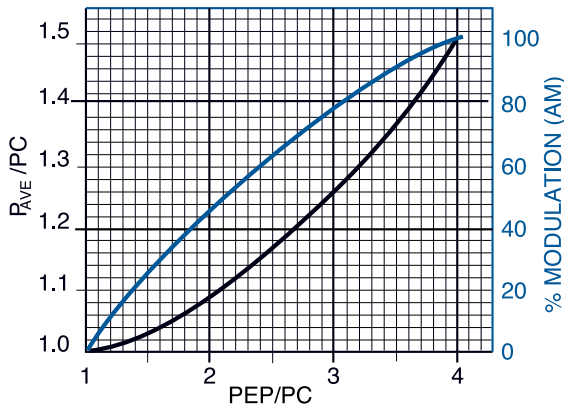
Model	Product	Power
RPK6770-120	Wall Mounting Bracket	10 kW
RPK5-898-6	Water Flow Switch	10 kW
RPK5-898-2	Water Flow Switch	20 kW
RPK5-898-3	Water Flow Switch	30 kW
RPK5-898-4	Water Flow Switch	40 kW
RPK5-898-7	Water Flow Switch	50 kW, 80 kW

THERMOSWITCHES FOR AIR-COOLED LOADS

Model	Function	Temp. Set Point	Use With
8630-013	Over Temp. Interlock	Opens @ 86°C	8630 Series
8640-066	Over Temp. Interlock	Opens @ 77°C	8640/8650 Series
8890-008	Over Temp. Interlock	Opens @ 236°C	8890/8920 Series
8890-017	Over Temp. Interlock	Opens @ 226°C	8930 Series
8892-333	Blower	Closes @ 60°C	8930 Series

Interpreting readings on peak Wattmeters with Multicarrier, CW, AM, SSB, and pulsed signals

Figure 1



In the table below, $Z^{\circ} = 50 \text{ ohm}$, PEP is peak envelope power, and PEV is peak envelope voltage. The PEV of the carrier (or suppressed carrier) C was arbitrarily chosen at 100 volts in all examples, $PEV_{RMS} = \frac{PEV}{1.414}$.

The graph at left shows correlation of peak-envelope-power (PEP), average heating power (P_{AVE}) and % modulation of AM signals for Tables B, C, and D below.

Transmission Type and Scope Pattern	Frequency Spectrum (C = Carrier)	PEV _{RMS} (arbitrary)	PEP = $\frac{PEV_{RMS}^2}{Z_0}$	P _{AVE} (Average Heating)	Models 4314B, 4391A			Model 43 4304A, 4308	Model APM-16, 5010B, 5011 ACM, BPME
					CW Mode Power)	PEP% Mode	MOD Mode		
Table A Multiple Carriers		$\frac{400}{\sqrt{2}} \text{ V}$	1600W	400W	—	1600W	—	—	400W
Table B CW		$\frac{100}{\sqrt{2}} \text{ V}$	100W	100W	100W	100W	0%	100W	100W
Table C AM 100% Mod.		$\frac{200}{\sqrt{2}} \text{ V}$	400W	150W	100W	400W	100%	100W	150W
Table D AM 75% Mod.		$\frac{173}{\sqrt{2}} \text{ V}$	300W	127W	100W	300W	73%	100W	127W
Table E SSB 1 Tone		$\frac{100}{\sqrt{2}} \text{ V}$	100W	100W	100W	100W	0%	100W	100W
Table F SSB 2 Tones		$\frac{100}{\sqrt{2}} \text{ V}$	100W	50W	25W	100W	100%	40.5W	50W
Table G SSB Voice		$\frac{100}{\sqrt{2}} \text{ V}$	100W	—	—	100W	—	—	—
Table H TV Black Level		$\frac{100}{\sqrt{2}} \text{ V}$	100W	60.1W	Models 4314B, 4391A only			59.6W	60.1W
Table I Pulse		$\frac{100}{\sqrt{2}} \text{ V}$	100W	10W	—	100W	100%	—	10W
Table J Pulse		$\sqrt{400Z_0}$	400W	100W	130W	400W	—	130W	100W

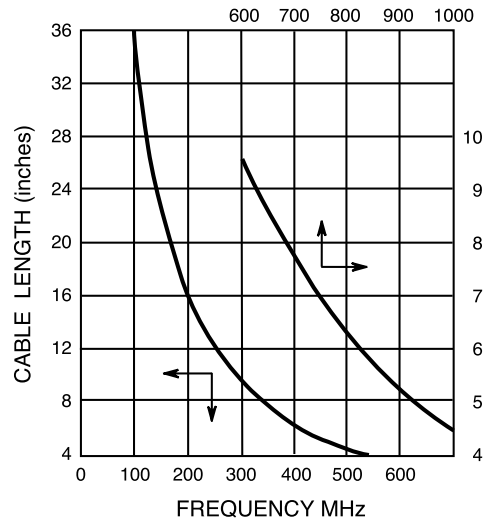
Required length of cable to equal 1/2 or 1 wavelength when added to a THRULINE® Wattmeter

When a Model APM-16, 43, 4431, 4314B or 4391A is used to match a load to a transmitter and a good match is obtained, removing the instrument will not cause any change in the conditions, since a good 50 ohm load can be placed at the end of a 50 ohm transmission line of any length without altering conditions at the transmitter.

What happens when the load is not well matched, as with an antenna with a VSWR of 1.5 or 2.0? Since the length of line between a mismatched load and the source transforms the impedance of the load as seen at the source, line length now becomes critical. If the adjustments for maximum power transfer were made with the Model 43 in place, removing it shortens the line by four inches, plus two connectors. This still is no cause for concern at low frequencies where four to five inches is a small fraction of a wavelength. At higher frequencies; e.g., above 100 MHz, power output and frequency of the source may be affected.

It is a principle of transmission line theory that the impedance is identical on either side of 1/2 wavelengths. In order to duplicate the conditions in your transmission line with the above Model wattmeters either in or out of the line, it is only necessary to insert or remove one or more 1/2 wavelengths. This is easily done by making up a length of cable which, when added to the THRULINE®, equals one or more 1/2 wavelengths at the frequency of measurement. If more than one frequency is involved, one cable is needed for each frequency.

- 1) Physical cable length shown in inches is measured from end to end of outer conductor of connectors (TNC and N Male connectors), except for cables with UHF or Mini-UHF plugs where the cable length is measured from tip to tip of the center pins.
- 2) Dimensions shown are for solid polyethylene cable (e.g., RG-58C/U, RG-8/U) which has 66% the velocity of propagation relative to air. If so-called "RG-58 type" or "RG-8 type" cables (which often contain foam polyethylene) are used, the dimensions in the graph must be multiplied by that cable's relative velocity (eg. 79%) divided by 66% (i.e., by a factor of $79\% \div 66\% = 1.2$).

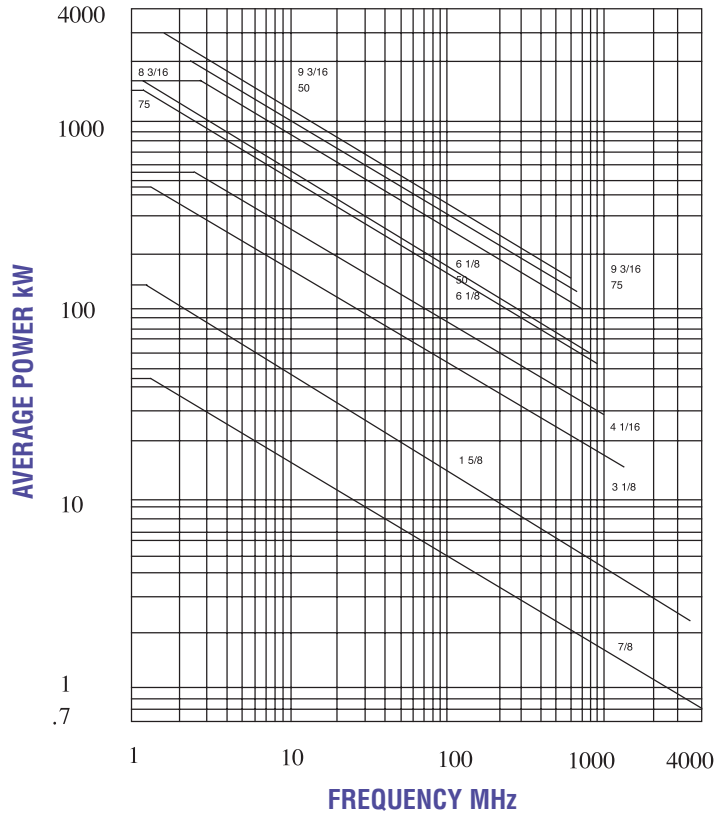


TYPICAL PEAK POWER RATINGS

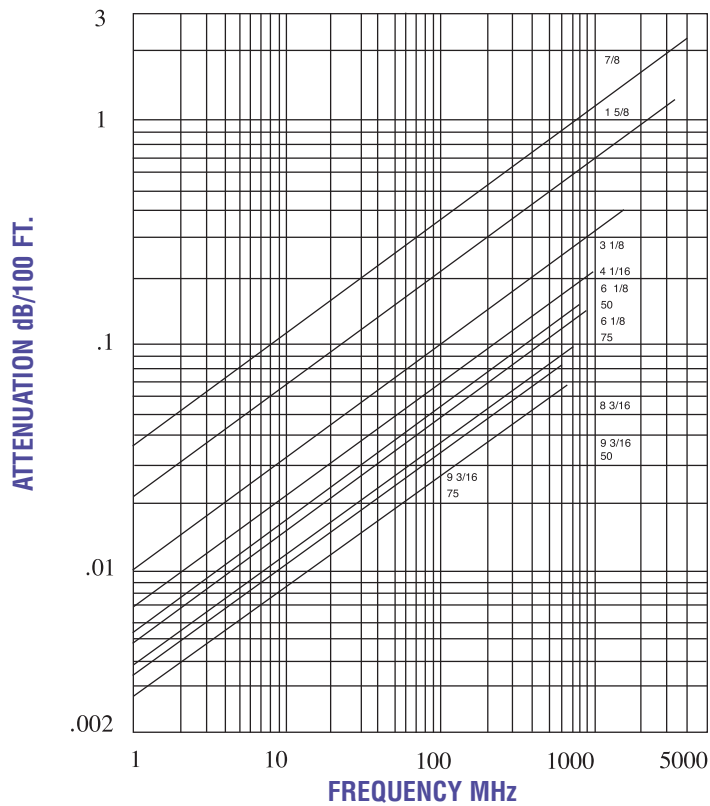
Models	Avg. Power	Pulse Width (µs)				
		1	10	100	1000	5000
Oil Dielectric Loads						
8135	150 W	10 kW	8.0 kW	5.75 kW	3.5 kW	2.0 kW
8201	500 W	200 kW	150 kW	105 kW	57 kW	25 kW
8251	1000 W	200 kW	150 kW	105 kW	57 kW	25 kW
8890 Series	2.5 kW	150 kW	115 kW	80 kW	54 kW	22 kW
8920 Series	5 kW	150 kW	115 kW	80 kW	54 kW	22 kW
8930 Series	10 kW	150 kW	120 kW	85 kW	55 kW	30 kW
Direct Water-Cooled Loads						
8730 Series	10 kW	100 kW	77 kW	56 kW	32 kW	16 kW
8740 Series	20 kW	250 kW	190 kW	135 kW	75 kW	35 kW
8750 Series	30 kW	250 kW	190 kW	135 kW	75 kW	40 kW
8760 Series	40 kW	250 kW	197 kW	145 kW	90 kW	55 kW
8770 Series	50 kW	250 kW	197 kW	145 kW	97 kW	65 kW
8790 Series	80 kW	250 kW	210 kW	170 kW	130 kW	100 kW

Note: The duty factor should be such that the average power rating of the load is never exceeded.

Transmission Line Power Rating



Transmission Line Attenuation



Model	Description	Page #	Model	Description	Page #	Model	Description	Page #
1000-WA-QQC-XX	Coaxial Attenuators	42	4028A10M	4028 Series	15	4308	Portable Wattmeters	24
1000-WT	Dry Loads	34	4028A250K	4028 Series	15	4314B	Portable Wattmeters	23
100-A	Coaxial Attenuators	41	4028A25M	4028 Series	15	4391A	Portable Wattmeters	26
100-AD-FFN-02	Combiner/Divider	43	4028A2M	4028 Series	15	43P	Portable Wattmeters	23
100-CC-FFN-XX	Coaxial Coupler	43	4028A3M	4028 Series	15	4410A	Portable Wattmeters	24
100-CT-FA	Dry Loads	32	4028A400K	4028 Series	15	4410A Elements	Elements	24
100-CT-MA	Dry Loads	32	4028A4M	4028 Series	15	4412A	Portable Wattmeters	24
100-SA	Coaxial Attenuators	41	4028B10M	4028 Series	15	4421	4421 Power Meter	11, 12, 13
100-SA-MFN-40	Attenuators	4, 5, 6	4028B3M	4028 Series	15	4421A530	Calibration Kit	13
100-ST Series	Dry Loads	32	4028C10M	4028 Series	15	4431	Portable Wattmeters	23
100-T Series	Dry Loads	32	4210A100	Meter Movements	28	4521	Panel Wattmeter	25
10-18A Series	Coaxial Attenuators	41	4220-097-1	DC Cable Assemblies	49	4522	Panel Wattmeter	25
10-6A Series	Coaxial Attenuators	41	4220-097-10	DC Cable Assemblies	49	4522-002-5	7/8" Line Sections	28
10-A	Coaxial Attenuators	41	4220-097-13	DC Cable Assemblies	49	4526	Panel Wattmeter	25
10-A-MFN-30	Coaxial Attenuators	4, 5, 6	4220-097-16	DC Cable Assemblies	49	4527	Panel Wattmeter	26
10-A-FFI-XX	Coaxial Attenuators	41	4220-097-17	DC Cable Assemblies	49	4610-000	Rigid Line Sections	30
10-T	Dry Loads	31	4220-097-7	DC Cable Assemblies	49	4642-000	Rigid Line Sections	30
10-T-MN	Dry Loads	31	4230-006-1	7/8" Line Sections	28	4642-010	Rigid Line Sections	30
150-A,SA	Coaxial Attenuators	41	4230-018	7/8" Line Sections	28	4715-000	Rigid Line Sections	30
150-CT Series	Dry Loads	33	4230-059	7/8" Line Sections	28	4723-000	Rigid Line Sections	30
150-ST Series	Dry Loads	32	4240-002	QC Connectors	48	4723-020	Rigid Line Sections	30
150-T Series	Dry Loads	32	4240-012	QC Connectors	48	4801-100	Rigid Line Sections	30
2-A-MFN-20	Attenuators	4, 5, 6	4240-018	QC Connectors	48	4802-100	Rigid Line Sections	30
2-18A Series	Coaxial Attenuators	41	4240-025	QC Connectors	48	4844-000	Rigid Line Sections	30
250 CT-Series	Dry Loads	33	4240-031	QC Connectors	48	4905-000	Rigid Line Sections	30
25-A	Coaxial Attenuators	41	4240-050	QC Connectors	48	4909-000	Rigid Line Sections	30
25-A-MFN-30	Attenuators	4, 5, 6	4240-062	QC Connectors	48	5000-XT	Digital Power Meter	20
25-CT-FA	Dry Loads	32	4240-063	QC Connectors	48	500-CT	Dry Loads	34
25-CT-MA	Dry Loads	32	4240-080	QC Connectors	48	500-WA	Coaxial Attenuators	41
25-T	Dry Loads	31	4240-090	QC Connectors	48	500-WT	Dry Loads	34
2-6A Series	Coaxial Attenuators	41	4240-096	QC Connectors	48	5010B	ThruLine Sensor	19
2-A Series	Coaxial Attenuators	41	4240-100	QC Connectors	48	5011	Terminating Sensor	17
2-AD-FFN-X	Combiner/Divider	43	4240-125	QC Connectors	48	5011-EF	Terminating Sensor	17
2-A-MFA Series	Coaxial Attenuators	41	4240-132	QC Connectors	48	5012A	Wideband Sensor	16
2-T	Dry Loads	31	4240-156	QC Connectors	48	5014	ThruLine Sensor	19
300-A,WA	Coaxial Attenuators	41	4240-160	QC Connectors	48	5015	Terminating Sensor	17
300-T Series	Dry Loads	33	4240-165	QC Adapters	49	5015-EF	Terminating Sensor	17
30-AD-FFN-2	Combiner/Divider	43	4240-179	QC Connectors	48	5016	Wideband Sensor	16
3126A	Wattcher(r)	29	4240-180	QC Adapters	49	5017	Wideband Sensor	16
3127-035	Panel Meter	30	4240-187	QC Adapters	49	5-030-3	Coolants	50
3127-040	Panel Meter	30	4240-194	QC Adapters	49	50-A	Coaxial Attenuators	41
3127-055	Panel Meter	30	4240-201	QC Adapters	49	50-A-MFN-30	Attenuators	4, 5, 6
3127-075	Panel Meter	30	4240-244	QC Adapters	49	50-AC-FFA-XX	Coaxial Coupler	43
3127-080	Panel Meter	30	4240-260	QC Adapters	49	50-CT-FA	Dry Loads	32
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