



# Sensors, Test & Measurement Products





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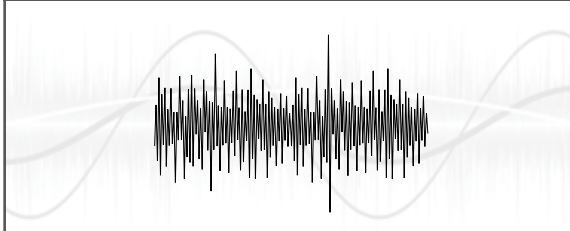
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**TECHNICAL DATA**

# SiteHawk Analyzer

Models SK-200-TC, SK-4500-TC



**Works with the  
Bird RF Meter App!**  
Free download from Google Play Store

- Easy to operate and field ready for first-time, occasional and experienced users.
- FDR (Frequency Domain Reflectometry) 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.
- Units cover frequency ranges of 300 kHz-200 MHz and 1-4500 MHz.
- USB communication port for connection to storage device and battery charging.
- Three year warranty!
- Includes Bird RF Meter app.

## STANDARD ACCESSORIES – SK-200-TC (provided)

Calibration Combo .....	SK-CAL-MN-C
Stylus .....	SK-TP-112
AC Adapter (5 Vdc Output) .....	5B2229-510H-3
Hard Carrying Case .....	7002A218-1
USB Interface Cable, Power, 1 meter long .....	5A2653-3R5NL4
RF Cable, 1.0 meter long .....	SK-TC-MNFN-1M

Instruction Manual .....	920-SK-4000
Soft Carrying Case .....	7002A219-1
USB Drive .....	5A2745-1
USB Interface Cable, 15 cm long .....	5A2653-0R4NL5
Battery .....	BIRD-BTY-TMI3C

## STANDARD ACCESSORIES (provided)

Calibration Combo .....	SK-CAL-MN-C
Stylus .....	SK-TP-112
AC Adapter (12 Vdc Output) .....	SK-PW12V-3A
Hard Carrying Case .....	7002A218-2
RF Cable, 1.0 meter long .....	SK-TC-MNFN-1M
Instruction Manual .....	920-SK-4500

Soft Carrying Case .....	7002A219-1
USB Drive .....	5A2745-1
USB OTG Connector .....	SK-CONN-OTG-2
Charging Dock .....	SK-DOCK-1203

## OPTIONAL ACCESSORIES

Adapter, N(m) to 7-16 DIN(f) . . . . . PA-MNFE

International Adapter . . . . . 5A5002-6

# SiteHawk Analyzer

Models SK-200-TC, SK-4500-TC

	SK-200-TC	SK-4500-TC
Frequency Range	300 kHz to 200 MHz	1 MHz - 4500 MHz
Frequency Accuracy	±2.5x10 <sup>-6</sup>	
Frequency Resolution	1 kHz	
Output Power	-10dBm	
Reflect Amplitude Accuracy	-15 dB to 0 dB : 0.4 dB -25 dB to -15 dB: 1.5 dB -35 dB to -25 dB: 4.0 dB	
Trace Noise Amplitude (IFBW 1kHz)	0.02 dB rms	
Measurement Speed	1 ms / data point	
Measurement Points	51 to 3201	
Measure Bandwidth	100 Hz to 30kHz	
Temperature Stability	0.01 dB/°F, 0.02 dB/°C	
Return Loss Measurement Range	0 dB to -60 dB	
Resolution	0.01 dB	
VSWR Measurement Range	1.0 to 65.0	
Cable Loss Measurement Range	0 dB to 30 dB	
DTF Range	0 to 5000 (ft), 0 to 1500 (m)	
Test Port Connector Impedance	N-type, Female 50 ohms	
Connector	Micro USB B, USB 2.0	USB Type-C, USB 3.0
Languages	English, Chinese, Spanish	
Recommended Calibration Interval	3 Year	
Dimensions (LxWxH)	7.2" x 3.8" x 1.9" (182mm x 95mm x 46.5mm)	7.7" x 3.6" x 2.4" (182mm x 95mm x 46.5mm)
Weight	1.98 (lbs), 0.9 (kg)	
Max Input Voltage	50V	
Operates In Temperature	14°F to 131°F / -10°C to +55°C	
Storage Temperature	-40°F to 176°F / -40°C to +80°C	
Battery Charging Temperature	32°F to 95°F / 0°C to +35°C	
Battery Charge Time	5 Hrs Full Charge	
Battery	Lithium-ion rechargeable	
Battery Typical Operating Time	4 Hrs	9 Hrs
Storage Capacity	Thousands of Traces and Setups	
Immunity to Interfering Signals	+13dBm	
CE		
EMC	Standard EN 61326-1:2006	
Safety	Standard EN 71010-1:2001	
Power Measurement	Yes	
Compatible With	7020, 5012D, 5014, 5015, 5015-EF, 5016D, 5017D, 5018D, 5019D	

# SignalHawk™

## SH-42S

- New Small Form Factor Spectrum Analyzer
- Modular RF Design
- Ships in hard carry case and includes a full set of standard accessories
- Competitive low price



<b>Frequency Range</b>	10 MHz to 4.2 GHz
<b>Reference Aging</b>	±1 ppm
<b>Frequency Span Accuracy</b>	±1%
<b>Sweep Time</b>	1.1ms ~ 1600s
<b>Bandwidth Range</b>	10 Hz ~ 5 MHz
<b>Bandwidth Accuracy</b>	≥ 1 MHz, ±10% , < 1 MHz, ±2%
<b>Measurement Range</b>	DANL to +20 dBm
<b>Input Attenuator Range</b>	0 ~ 30dB, 1dB step
<b>Max Safe Input Level Sensitivity</b>	<b>Low:</b> +30 dBm <b>Medium:</b> 0 dBm <b>High:</b> -20 dBm
<b>Reference Level Range</b> (Ref Level Offset: ON)	-140 dBm ~ +20 dBm -190 dBm ~ +70 dBm
<b>Amplitude Accuracy</b>	-5 to -30 dBm, ±1.5 dBm
<b>Switching Uncertainty</b>	±0.3 dB
<b>Input Attenuator Level Accuracy</b>	±0.6 dB
<b>Average Noise Level Sensitivity</b>	<b>Low:</b> 1 GHz, -131 dBm/Hz (Typ -133 dBm/Hz) <b>Medium:</b> 1 GHz, -151 dBm/Hz (Typ -153 dBm/Hz) <b>High:</b> 1 GHz, -168 dBm/Hz (Typ -169 dBm/Hz)

<b>Residual Responses</b>	-75 dBm
<b>Input Related Responses</b>	
10 MHz - 1.285 GHz	-70 dBc
1.285 GHz - 1.625 GHz	-42 dBc
1.625 GHz - 1.775 GHz	-55 dBc
1.775 GHz - 2.35 GHz	-42 dBc
2.35 GHz - 2.71 GHz	-25 dBc
2.71 GHz - 3.22 GHz	-42 dBc
3.22 GHz - 3.7GHz	-70 dBc
3.7 GHz - 4.2 GHz	-70 dBc
<b>Second Harmonic</b>	1.6 GHz - 70 dBc
<b>Third Order Intercept</b>	+15 dBm (-10 dBm tones, 1MHz apart, Sensitivity LOW, Reference Level -10dBm)
<b>P1dB</b>	+5 dBm Nominal
<b>Phase Noise</b>	-96 dBc/Hz @10 kHz(Typ -98 dBc/Hz) -118 dBc/Hz @1 MHz(Typ -120 dBc/Hz)
<b>Connectors</b>	<b>RF In:</b> N type, female, 50 Ω <b>USB:</b> Type C <b>Power Interface:</b> Slim Tip, DC20V
<b>Display</b>	5.5 in. 1280 *720p
<b>Operating System</b>	Android
<b>Battery Operating Time</b>	6 hours
<b>Battery Charging Time</b>	2.5 hours
<b>Operating Temperature</b>	0°C to 50°C
<b>Storage Temperature</b>	-20°C to 70°C
<b>Size</b>	7.8 in x 3.9 in x 2.6 in (200mm x 99mm x 67mm)
<b>Weight</b>	2.3 - 2.8 lb (1.05 - 1.25 kg)

### STANDARD ACCESSORIES

Hard Carry Case . . . . .	SPM-AS007
Soft Carry Case . . . . .	SPM-AS008
AC Power Adapter . . . . .	SPM-AS001
AC Power cable (US standard) . . . . .	SPM-AS003
USB Cable . . . . .	SPM-AS004

USB OTG Cable . . . . .	SPM-AS005
Touch Pen . . . . .	SPM-AS006
USB Drive . . . . .	SPM-AS009
Manual . . . . .	.920-SH-42S



# Rack Mount SignalHawk™

Model SH-36S-RM



- Over an Ethernet network, remotely analyze the performance of your system
- Diagnose problems from any computer on your network, whether in the same room or across the country
- High Performance in a Rack-Mount Spectrum Analyzer
- 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
- Multiple sites can be monitored from one centralized location



ANALYZERS

<b>Frequency Range</b>	100 kHz to 3.6 GHz
<b>Frequency Resolution</b>	1 Hz
<b>Frequency Uncertainty</b>	± 1 ppm
<b>Reference Aging</b>	± 1 ppm / year
<b>Temperature Drift</b>	± 1 ppm / °C
<b>Spectral Purity</b>	-85 dBc @ 30 kHz
<b>Sweep Time</b>	2 s, full span; 1 ms, zero span
<b>Resolution Bandwidth</b>	100 Hz to 1 MHz RBW
<b>Video Bandwidth</b>	10 Hz to 300 kHz VBW
<b>Amplitude Accuracy</b>	± 1.0 dB typ, ± 1.5 dB max
<b>Dynamic Range</b>	66 dB, intermod-free
<b>Noise Floor</b>	-135 dBm DANL

<b>Attenuator</b>	0, 10, 20, or 30 dB; internal
<b>Pre-Amplifier</b>	+24 dB gain, internal
<b>Data Points</b>	705 displayed (settable)
<b>Single-Button Measurements</b>	Occ BW, Channel Power, ACPR, Field Strength, AM/FM Demod, C/I
<b>CE Compliant</b>	Yes
<b>RF Input, N(F)</b>	+20 dBm (100 mW) max
<b>Connectivity</b>	Ethernet and USB 2.0
<b>Operating &amp; Store Temperature</b>	0° to +50°C oper; -20° to +80°C store
<b>Humidity &amp; Altitude</b>	95% humidity; 4600 m altitude
<b>Size and Weight</b>	19" x 10" x 3.5", 10 lbs.
<b>Emissions Mask</b>	IBOC, Analog FM, DTV and many others

## OPTIONAL ACCESSORIES

Operators Manual . . . . .	920-SHPC-OPS
Start-Up Instructions . . . . .	920-SHPC-REF
USB Cable, 10 ft, USB A (M) to USB B (M) . . . . .	5A2653-10
Attenuator, 100 W, 40 dB, N(M) to N(F), 2.4 GHz . . . . .	100-SA-MFN-40
Attenuator, 50 W, 30 dB, N(M) to N(F), 4 GHz . . . . .	50-A-MFN-30
Attenuator, 25 W, 30 dB, N(M) to N(F), 4 GHz . . . . .	25-A-MFN-30
Attenuator, 10 W, 30 dB, N(M) to N(F), 4 GHz . . . . .	10-A-MFN-30
Attenuator, 5 W, 20 dB, N(M) to N(F), 4 GHz . . . . .	5-A-MFN-20
Attenuator, 2 W, 20 dB, N(M) to N(F), 4 GHz . . . . .	2-A-MFN-20

Adapter, N(M) to 7/16 DIN(M) . . . . .	PA-MNME
Adapter, N(F) to 7/16 DIN(M) . . . . .	PA-FNME
Adapter, N(M) to 7/16 DIN(F) . . . . .	PA-MNFE
Adapter, N(F) to 7/16 DIN(F) . . . . .	PA-FNFE
Adapter Kit, 7/16 DIN . . . . .	4240-550
Adapter, N(F) to N(F) . . . . .	4240-500-1
Adapter, N(M) to N(M) . . . . .	4240-500-6
Adapter, N(M) to SMA(F) . . . . .	4240-500-10

NOTE: Spare standard accessories are available as optional accessories. Manuals and soft/firmware updates available at [www.bird-electronic.com](http://www.bird-electronic.com).

# PC SignalHawk™

Model SH-36S-PC



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

<b>Frequency Range</b>	100 kHz to 3.6 GHz
<b>Frequency Resolution</b>	1 Hz
<b>Frequency Uncertainty</b>	± 1 ppm
<b>Reference Aging</b>	± 1 ppm / year
<b>Temperature Drift</b>	± 1 ppm / °C
<b>Spectral Purity</b>	-85 dBc @ 30 kHz
<b>Sweep Time</b>	2 s, full span; 1 ms, zero span
<b>Resolution Bandwidth</b>	100 Hz to 1 MHz RBW
<b>Video Bandwidth</b>	10 Hz to 300 kHz VBW
<b>Amplitude Accuracy</b>	± 1.0 dB typ, ± 1.5 dB max
<b>Dynamic Range</b>	66 dB, intermod-free
<b>Noise Floor</b>	-135 dBm DANL

<b>Attenuator</b>	0, 10, 20, or 30 dB; internal
<b>Pre-Amplifier</b>	+24 dB gain, internal
<b>Data Points</b>	705 displayed (settable)
<b>Single-Button Measurements</b>	Occ BW, Channel Power, ACPR, Field Strength, AM/FM Demod, C/I
<b>Environmental</b>	Per MIL-PRF-28800F, Class 2
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001
<b>RF Input, N(F)</b>	+20 dBm (100 mW) max
<b>Connectivity</b>	USB 2.0
<b>Operating &amp; Store Temperature</b>	0° to +50°C oper; -20° to +80°C store
<b>Humidity &amp; Altitude</b>	95% humidity; 4600 m altitude
<b>Size and Weight</b>	7.5" x 7.0" x 3.0", 3.5 lbs
<b>Emissions Mask</b>	IBOC, Analog FM, DTV and many others

## STANDARD ACCESSORIES

Operators Manual . . . . .	920-SHPC-OPS	Car Adapter/Charger . . . . .	5A2238-2
Start-Up Instructions . . . . .	920-SHPC-REF	Internal Li-Ion Battery, Field Replaceable . . . . .	RPK5B2431
USB Cable, 10 ft, USB A (M) to USB B (M) . . . . .	5A2653-10	PC Tool Software and Manual CD's . . . . .	7002A148
AC Adapter/Charger . . . . .	5A2436		



# Antenna Testers

## AT Series



- Cost-effective, fast, graphical way of determining the quality of mobile and base station antennas
- Rugged, easy-to-use, hand-held design with extended battery life makes it ideal for use in the field
- Tests the system in VSWR, Return Loss, Match Efficiency, or Reflection Coefficient (Rho)
- Single frequency readings and frequency sweeps allow for everything from pin-point tests to system optimization and tuning
- Can save up to 12 traces for comparison and tracking over time
- RS232 Interface allows communication

ANALYZERS

	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	<b>VSWR:</b> 1.00 - 99.99, <b>Match Efficiency:</b> 00 to 100.0%, <b>Return Loss:</b> 0.0 to -32.0 dB	
Measurement Speed (Typical)	<b>Single Frequency:</b> 5 readings/second, <b>Swept Frequency:</b> 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	
Test Port	Impedance: 50 ohm, nominal. Connector (others available) N (F)	3m @ 12.6 W ERP 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)	
CE	EMC EN 61326-1:2006 and Safety EN 61010-1:2001	

### STANDARD ACCESSORIES

Battery, NiMH, 1.2V AA.....	5B2230	Antenna - 900MHz TNC/f.....	5A2228-1
Connector, N(f).....	4240-403	Book, Instruction.....	920-AT500
Antenna - UHF N(m).....	5A2228-3	Fuse.....	RP5-1976-11

### OPTIONAL ACCESSORIES

N/m Adapter.....	4240-402	SMA/m Adapter.....	4240-410
BNC/m Adapter.....	4240-404	SMA/f Adapter.....	4240-411
BNC/f Adapter.....	4240-405	Cigarette Lighter Adapter.....	5A2238-1
TNC/m Adapter.....	4240-406	Verification Kit, AT-500.....	7000A545
TNC/f Adapter.....	4240-407	Verification Kit, AT-800.....	7000A845
UHF/m Adapter.....	4240-408	Carrying Case.....	5000-030
UHF/f Adapter.....	4240-409		



- System of matched components calibrated for superior accuracy
- Measures voltage, current and the phase angle in complex applications
- Up to 3 fundamental frequencies can be measured simultaneously
- Proprietary architecture maintains correct phase angle information between the fundamental and harmonics
- Harmonic Levels up to 150 MHz are available for analysis



<b>Frequency Range</b>	300 kHz - 150 MHz (Sensor Dependent)
<b>Frequency Resolution</b>	100 Hz
<b>Frequency Accuracy</b>	± 1 kHz
<b>Harmonics</b>	10 maximum, up to 150 MHz (Sensor Dependent)
<b>Number of fundamentals (F0)</b>	Maximum of 3 simultaneously
<b>Digital</b>	> Voltage, current, phase, frequency, impedance, power at frequencies selected by user
<b>Analog</b>	5 Outputs, 0-10Vdc, 1000Ω-source
<b>Update Rates</b>	60 Hz typical for 1 fundamental (Note 1)
<b>Network Protocol</b>	DeviceNet, Ethernet

<b>RF Power, Max</b>	10 kW or maximum power limit of RF connector (Note 2)
<b>RF Connector</b>	Custom or QC
<b>Receiver Operating Temp.</b>	+20 to +40 °C (68 to 104 °F)
<b>Receiver Storage Temp.</b>	-20 to +80 °C (-4 to +176 °F)
<b>Cable Operating Temp.</b>	0 to +100 °C (32 to 212 °F)
<b>Cable Storage Temp.</b>	-20 to +100 °C (-4 to 212 °F)
<b>Sensor Operating/Storage Temp.</b>	Refer to Sensor Specification
<b>Humidity, Max;</b>	85% Non-condensing
<b>Air Pressure, Min.</b>	745 mbar (equivalent to 2,500 m/ 8,200 ft. max altitude)
<b>Operating Power</b>	11-24 Vdc, 1.4-3A input to receiver

Parameter	Voltage	Current	Phase Angle
Measurement	RF: 1 to 3000 V <sub>rms</sub> (Note 2)	0.1 to 100 A <sub>rms</sub> (Note 2)	-180° to + 180°
Resolution	IEEE 754 Single Precision Floating Point		
Uncertainty 300 kHz-1 MHz (Note 3)	for F <sub>n</sub> , ± 0.5 V or 1% of reading whichever is greater for F <sub>n</sub> , ± 1.0 V or 2% of reading, whichever is greater (95% confidence interval)	for F <sub>n</sub> , ± 0.05 A or 1% of reading whichever is greater for F <sub>n</sub> , ± 0.10 A or 2% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>n</sub> > 10 V, 1 A: ±1° for F <sub>n</sub> < 10 V, 1 A: ±4° for F <sub>n</sub> > 10 V, 1 A: ±2° for F <sub>n</sub> < 10 V, 1 A: ±6° (95% confidence interval)
Uncertainty 1-100 MHz (Note 3)	for F <sub>n</sub> , ± 0.1 V or 1% of reading whichever is greater for F <sub>n</sub> , ± 0.2 V or 2% of reading, whichever is greater (95% confidence interval)	for F <sub>n</sub> , ± 0.01 A or 1% of reading whichever is greater for F <sub>n</sub> , ± 0.02 A or 2% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>n</sub> > 10 V, 1 A: ±1° for F <sub>n</sub> < 10 V, 1 A: ±4° for F <sub>n</sub> > 10 V, 1 A: ±2° for F <sub>n</sub> < 10 V, 1 A: ±6° (95% confidence interval)
Uncertainty 100-150 MHz (Note 3)	for F <sub>n</sub> , ± 0.2 V or 2% of reading whichever is greater for F <sub>n</sub> , ± 0.4 V or 4% of reading, whichever is greater (95% confidence interval)	for F <sub>n</sub> , ± 0.02 A or 2% of reading whichever is greater for F <sub>n</sub> , ± 0.04 A or 4% of reading, whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>n</sub> > 10 V, 1 A: ±2° for F <sub>n</sub> < 10 V, 1 A: ±8° for F <sub>n</sub> > 10 V, 1 A: ±4° for F <sub>n</sub> < 10 V, 1 A: ±12° (95% confidence interval)
Receiver Temperature Derating - from 25 °C	± 0.05% / °C	± 0.05% / °C	± 0.1 / °C

**Note 1:** Typical data rate for 1 fundamental, 10 harmonics, auto-ADC mode, and no averaging is 60 Hz. Data rate can vary significantly depending on configuration, network traffic, and host performance.

**Note 2:** Maximum power is limited by the size of the sensor line section and connectors. See sensor specification document.

**Note 3:** At customer specified frequencies.

# Diagnostic System

BDS Series



- Measure multiple fundamental, harmonic and intermodulation frequencies
- Measures voltage and current in complex applications
- Operates while maintaining the phase angle of each measurement
- Enables users to identify small process discrepancies
- Works in environments with variable impedance
- An incredible tool for researching new RF technologies and repeating high precision processes

<b>Frequency Range</b>	1 MHz - 500 MHz (Sensor Dependent)
<b>Frequency Resolution</b>	100 Hz
<b>Frequency Accuracy</b>	± 1 kHz
<b>Harmonics</b>	15 maximum, up to 500 MHz (Sensor Dependent)
<b>Number of fundamentals (F0)</b>	Maximum of 5 simultaneously
<b>Digital</b>	> Voltage, current, phase, frequency, impedance, power at frequencies selected by user
<b>Analog</b>	5 Outputs, 0-10Vdc, 1000Ω-source
<b>Update Rates</b>	60 Hz typical for 1 fundamental (Note 1)
<b>Network Protocol</b>	DeviceNet, Ethernet
<b>RF Power, Max</b>	10 kW or maximum power limit of RF connector (Note 2)
<b>RF Connector</b>	Custom or QC

<b>Receiver Operating Temp.</b>	+20 to +40 °C (68 to 104 °F)
<b>Receiver Storage Temp.</b>	-20 to +80 °C (-4 to +176 °F)
<b>Cable Operating Temp.</b>	0 to +100 °C (32 to 212 °F)
<b>Cable Storage Temp.</b>	-20 to +100 °C (-4 to 212 °F)
<b>Sensor Operating/Storage Temp.</b>	Refer to Sensor Specification
<b>Humidity, Max;</b>	85% Non-condensing
<b>Air Pressure, Min.</b>	745 mbar (equivalent to 2,500 m/ 8,200 ft. max altitude)
<b>Operating Power</b>	Sensor: Provide by receiver; Receiver: 11-24 Vdc, 1.4-3A
<b>Environmental</b>	MIL-PRF-28800F Class 3
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001
<b>FCC</b>	CFR 47 Part 18 C:2005 Radiated Emissions

Parameter	Voltage	Current	Phase Angle
Range	RF: 1 - 3000 V <sub>rms</sub> DC Bias: 3500 V dc Breakdown: > 10kV @ 745 mbar, 100 °C (Note 2)	0.1 - 100 A <sub>rms</sub> (Note 2)	-180° to + 180° Resolution: 0.1°
Uncertainty 1-100 MHz (Note 3)	± 0.2V or 2% of reading whichever is greater (95% confidence interval)	± 0.2V or 2% of reading whichever is greater (95% confidence interval)	Absolute Angle: for F <sub>o</sub> < 10V, 1A: ±1° for F <sub>o</sub> < 10V, 1A: ±4° for F <sub>n</sub> < 10V, 1A: ±2° for F <sub>n</sub> < 10V, 1A: ±6° (95% confidence interval)
Uncertainty 100-500 MHz (Note 3)	± 0.3V or 3% of reading whichever is greater 25 W to 1 kW	± 0.3V or 3% of reading whichever is greater 25 W to 1 kW	Absolute Angle: for F <sub>o</sub> < 10V, 1A: ±2° for F <sub>o</sub> < 10V, 1A: ±8° for F <sub>n</sub> < 10V, 1A: ±4° for F <sub>n</sub> < 10V, 1A: ±12° (95% confidence interval)
Receiver Temperature Derating - from 25 °C	± 0.05% / °C	± 0.05% / °C	± 0.1 / °C

**Note 1:** Typical data rate for 1 fundamental, 10 harmonics, auto-ADC mode, and no averaging is 60 Hz. Data rate can vary significantly depending on configuration, network traffic, and host performance.

**Note 2:** Maximum power is limited by the size of the sensor line section and connectors. See sensor specification document.

**Note 3:** At customer specified frequencies.

SEMICONDUCTOR PRODUCTS



# Power Sensors

## 4020 Series



- Cost-effective solution for maintaining critical RF systems
- Only 5 models are required to cover the frequency range of 100 KHz to 3 GHz and power range from 300 mW - 10 kW
- Full-Scale Accuracy  $\pm 3\%$  for applications requiring accurate forward and reflected power measurement
- Direct plug-in operation with industry-standard Bird® 4421 Multifunction Power Meter
- Low insertion loss (<0.05 dB)

	4021	4022	4023A3G	4024	4025
<b>Frequency Range</b>	1.8-32 MHz	25 MHz-1 GHz	800-3000MHz	1.5-32 MHz	100 kHz-2.5 MHz
<b>Power Input</b>	300 mW to 1 kW (1.2 kW max.)		300mW to 200W	3 W to 10 kW (12 kW max.)	
<b>Accuracy, Forward</b>	$\pm 3\%$ of reading from rated Max to rated Min. VSWR Measurement Range				
<b>VSWR Measurement Range</b>	1.00 to 2.00 (40.0 to 9.5 dB Return Loss)				
<b>Directivity, Min.</b>	30 dB		28 dB	28 dB, 1.5-2.5 and 25-32 MHz 30 dB, 2.5-25 MHz	28 dB, 100-125 kHz 30 dB, 125-2500 kHz
<b>Insertion Loss Max. (with female "N" connectors)</b>	0.05 dB	0.05 dB, 25-512 MHz 0.13 dB, 512 MHz-1 GHz	0.15 dB	0.05 dB	
<b>VSWR, Max.</b>	1.05:1	1.05:1, 25-512 MHz 1.10:1, 512 MHz-1 GHz	1.10:1	1.05:1	
<b>Sampling Rate</b>	Nominal 2 readings per second				

### POWER REQUIREMENTS

**External DC** 12 VDC, supplied from Bird 4421 Power Meter

### PHYSICAL SPECIFICATIONS

**Dimensions** 5.2" L x 2.5" W x 3.25" H  
(137 x 64 x 83 mm)

**Weight** 1lb., 11oz. (0.8 kg)

**Connectors** N (F) standard, other customer specified from QC list appropriate for frequency and power.

### ENVIRONMENTAL SPECIFICATIONS

**Operating Temperature** 0 to 50°C (32 to 122 °F)

**Storage Temperature** -20 to 70°C (-4 to +158 °F)

**Humidity** 95% maximum (non-condensing)

**Altitude** Up to 10,000 feet (3,048 m)

**General EMC** Designed to carry CE mark

**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

**CE** EMC EN 61326-1:2006

**Calibration Cycle** Nominal 1 year

# Power Sensors

## 4027A Series



- Bird's® Precision power sensors for precision laboratory applications
- Designed to bring superb accuracy and ease of use together for the laboratory engineer
- Capable of 1% accuracy at the calibrated frequency and power levels
- Calibration traceable to the National Institute of Standards and Technology
- Plug and Play with 4421 Meter
- No field calibration required
- Dozens of connector options available
- Automatic frequency compensation scheme, eliminating the error due to directional coupler frequency response

### POWER MEASUREMENT

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

### CONNECTORS

<b>Type</b>	Customer specified
<b>Sensor Interface</b>	Latch-n-Lock

### POWER REQUIREMENTS

**External DC** 12 VDC, supplied from Bird 4421 Power Meter

### PHYSICAL SPECIFICATIONS

<b>Dimensions</b>	5.2" L x 2.5" W x 3.25" H
<b>Weight</b>	1 lb. 13 oz. (0.8 kg)
<b>Operating Temperature</b>	15°C to 35°C (59°F to 95°F)
<b>Storage Temperature</b>	-40°C to 80°C (-40°F to 176°F)
<b>Humidity</b>	95% maximum (non-condensing)
<b>Altitude</b>	Up to 10,000 feet (3,048 m)
<b>General EMC</b>	Designed to carry CE mark
<b>Emissions</b>	EN-55011, 1991, Class B
<b>Immunity</b>	EN-50082-1, 1995
<b>Safety</b>	EN-61010, 1993 in accordance with Council Directives 73/23/EEC and 93/68/EEC
<b>CE</b>	EMC EN 61326-1:2006
<b>Calibration Cycle</b>	6 month

### POWER SENSOR SELECTION GUIDE

4027A SERIES	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 4kW	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 Sensors

## 4027F Series



- Bird's® Precision power sensors for precision laboratory applications
- Designed to bring superb accuracy and ease of use together the laboratory engineer
- Filtered Design eliminates the effects of amplitude modulation and harmonics from the measurement
- Capable of 1% accuracy at the calibrated frequency and power levels
- Calibration traceable to the National Institute of Standards and Technology
- Plug and Play with 4421 Meter
- No field calibration required
- Dozens of connector options available

### POWER MEASUREMENT

<b>Accuracy</b>	±1% (1σ) at calibration frequencies and power levels; ±2% at other frequencies and power levels.
<b>Accuracy, RFL</b>	Forward Accuracy + [FWD Power/10^(Directivity/10)]
<b>Accuracy, VSWR</b>	Calculated from FWD and RFL Power VSWR = [1 + sqrt (PR/PF)] / [1 - sqrt (PR/PF)]
<b>VSWR Range</b>	1.0 to 2.0 (40.00 to 9.5 dB return loss)
<b>Directivity, Min</b>	28 dB
<b>Insertion Loss, Max</b>	0.05 dB (with female "N" connectors)
<b>Impedance, Nominal</b>	50 Ohms
<b>Sampling Rate, Nominal</b>	2 Readings/Seconds
<b>Repeatability, Multiple Measurements Single Sensor</b>	± 0.3% (95% C.I.) (with female "N" connectors)
<b>VSWR, Max</b>	1.05:1
<b>Connectors</b>	Customer specifies from QC list, appropriate for frequency and power.

### POWER REQUIREMENTS

**External DC** 12 VDC, supplied from Bird 4421 Power Meter

### PHYSICAL SPECIFICATIONS

<b>Dimensions</b>	5.2" L x 2.5" W x 3.25" H (137 x 64 x 83 mm)
<b>Weight</b>	1 lb. 13 oz. (0.8 kg)
<b>Operating Temperature</b>	0°C to 50°C (32°F to 122°F) (derate accuracy outside 25 ± 5°C)
<b>Storage Temperature</b>	-20°C to 70°C (-4°F to 158°F)
<b>Humidity</b>	95% non-condensing
<b>Altitude</b>	10,000 feet (3,000 m)
<b>General EMC</b>	Designed to carry CE mark
<b>Emissions</b>	EN-55011, 1991, Class B
<b>Immunity</b>	EN-50082-1, 1995
<b>Safety</b>	EN-61010, 1993 in accordance with Council Directives 73/23/EEC and 93/68/EEC
<b>CE</b>	EMC EN 61326-1:2006
<b>Calibration Cycle</b>	6 months

	4027F2M	4027F10M	4027F60M
<b>Frequency Range</b>	1.8 MHz - 2.2 MHz	12 MHz - 15 MHz	57-63 MHz
<b>RF Power Range</b>	100 W-10 kW		100 W-6 kW
<b>Calibration Frequencies, Typical</b>	1.8, 2.0, 2.17 MHz	12.0, 12.5, 13.56, 14.0, 15.0 MHz	57.0, 58.5, 60.0, 61.5, 63 MHz
<b>Calibration Power, Typical</b>	1.7 kW		
<b>Harmonic Rejection, Min.</b>	26 dB @ 3.6-3.8 MHz, 30 dB @ >3.8 MHz	30 dB @ >25 MHz	30 dB @ >114.0 MHz
<b>LF Rejection</b>	Not Specified		30 dB @ < 15.0 MHz
<b>Max. Error Induced By 10% AM</b>	0.2% @ <5 kW, 1% @ 5-10 kW		0.2% @ <1.5 kW, 1% @ 1.5- 3 kW

# Power Sensors

## 4028 Series



- Family of high accuracy sensors for use in high power LCD, TFT, Solar, and Semiconductor processes
- Achieve tighter, more consistent RF power measurements for improved yield
- $\pm 2\%$  accuracy at specified calibration frequencies and power levels
- Direct, plug-in operation with the Bird Model 4421 RF Power Meter
- Measures power levels up to 50kW
- 4028A Series sensor can be configured with a wide range of connectors

### POWER MEASUREMENT

<b>Accuracy</b>	$\pm 2\%$ at calibration frequencies and power levels; $\pm 3\%$ at other frequencies and power levels. Add 2% to uncertainty outside $25 \pm 10^\circ\text{C}$
<b>Calibration Power Level</b>	1.7kW
<b>VSWR Range</b>	1.0 to 2.0 (40.00 to 9.5 dB return loss)
<b>Directivity</b>	28 dB
<b>Insertion Loss</b>	< 0.05dB
<b>Uniformity</b>	2% maximum unit to unit, at calibration frequency and power levels.
<b>Speed</b>	2 readings per second.
<b>Maximum Power</b>	4028AxxK: 20kW 4028AxxM: 25kW 4028B: 25kW 4028C: 50kW

### CONNECTORS

<b>4028A Series</b>	Customer specified
<b>4028B Series</b>	1-5/8 EIA Flanged
<b>4028C Series</b>	3-1/8 EIA Flanged
<b>Sensor Interface</b>	Latch-n-Lock

### POWER REQUIREMENTS

<b>External DC</b>	12 VDC, supplied from Bird 4421 Power Meter
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### PHYSICAL SPECIFICATIONS

<b>Dimensions</b>	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)
<b>Weight</b>	3.3 lbs. (4028A Series) 5.2 lbs. (4028B Series) 7.3 lbs. (4028C Series)

### ENVIRONMENTAL SPECIFICATIONS

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

### POWER SENSOR SELECTION GUIDE

4028 SERIES	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

# Multifunction Power Meter

4421



- Precision Power Meter for Semiconductor Processing Applications
- $\pm 1\%$  Accuracy when used with the Bird 4027 Series Sensors
- 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

<b>Power Range</b>	100 mW to 50 kW FS
<b>Frequency Range</b>	100 kHz - 1 GHz
<b>VSWR Range</b>	1.0 - 199.9
<b>Functions</b>	Forward and reflected power in W or dBm, VSWR, return loss in dB and min./max. values
<b>Overrange</b>	Audible warning when RF power input exceeds 120% of sensor's maximum power range
<b>Indication Display</b>	3 1/2 digit-liquid crystal display with indicator for mode, measurement units, battery condition, programming status, and trend arrows. Switchable backlight.
<b>Operating Power</b>	115/230 VAC, 50/60 Hz or 8 nickel metal hydride 1.2 V cells (NEDA type 10014)
<b>Nominal Size</b>	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)
<b>Weight</b>	11 lbs. (5 kg.)
<b>Interconnects</b>	1 meter latch-n-lock coiled cable
<b>Interfaces</b>	IEEE-488 and RS-232 standard
<b>Dimensions</b>	4 1/2" x 6 1/2" (114 x 165 mm)
<b>Required Product</b>	RF Power Sensor
<b>Accessories</b>	Case 4300A215 19" Panel Mount Kit 4421-250 Latch & Lock Cable 4421-038
<b>CE</b>	EMC EN 61326-1:2006



# Multifunction Power Meter

4422



- Manage multiple sensors simultaneously
- Multiple Displays Functions: Digital, Analog and Strip Chart
- Each Display Window can be Customized for user preference
- Compatible with a wide array of USB enabled Bird Field Sensors
- Data logging capability with playback of saved log files
- Log file in either XML and Comma Delimited formats
- Snapshot Capabilities
- Ideal for use as a stand alone display
- No calibration required.
- Functions: True Average Power (Forward and Reflected), VSWR, Peak power, Crest Factor, CCDF, Burst Power, Peak envelope power, and all IEEE pulse related parametric measurements.

## POWER MEASUREMENT

<b>Power Range</b>	Sensor dependent
<b>Frequency Range</b>	Sensor dependent
<b>VSWR Range</b>	1.0 – 199.9 ma
<b>Return Loss Display</b>	0 to 40 dB max
<b>Multiple sensor support</b>	Enable individual windows for each sensor connected.
<b>Connection to sensor</b>	Wired
<b>Data Logging</b>	Yes

## GENERAL SPECIFICATIONS

<b>Sensor Detection</b>	Automatic Sensor detection opens appropriate display for each sensor type
<b>Display Type</b>	10.4" TFT LCD (LED back light)
<b>Display Resolution</b>	800 x 600
<b>Display Viewability</b>	Indoor Viewable
<b>Touch Screen</b>	Fire wire resistive
<b>Languages</b>	English, Chinese, Spanish
<b>Calibration interval</b>	Not required
<b>Operating System</b>	Windows 7 Embedded

## COMPLIANCE

<b>EMC Standard</b>	CE Compliant
<b>Safety Standard</b>	CE Compliant

## AC/DC POWER SUPPLY

<b>Input Voltage</b>	12 VDC, supplied from Bird 4421 Power Meter
<b>Power Consumption</b>	25W

## PHYSICAL SPECIFICATIONS

<b>Dimensions, nominal</b>	<b>Open:</b> 4 5/8 in. x 13 5/8 in. x 13 in. (371 mm x 346 mm x 330 mm) <b>Stowed:</b> 14 5/8 in. x 3 1/8 in. x 13 in. (371 mm x 79 mm x 330 mm)
<b>Weight, max</b>	11.1 lbs (5035 g)
<b>Clean Room Rating</b>	Class 100 / ISO 5

## ENVIRONMENTAL SPECIFICATIONS

<b>Operating Temperature</b>	<b>Open Chassis:</b> 0° to 50° C (32° to 122° F) <b>Closed Chassis:</b> 0° to 45° C (32° to 113° F)
<b>Storage Temperature</b>	-20° to 60° C (-4° to 140° F)
<b>Relative Humidity</b>	10 to 95% at 40° C (Non-Condensing)
<b>Altitude, max</b>	15,000 ft (4500 m)
<b>Shock</b>	10 G Peak acceleration (11 ms duration)
<b>Vibration</b>	5 to 500 Hz, 1 G RMS
<b>IP Grade</b>	IP65 (LCD panel only)
<b>Cooling</b>	Fanless/Passive

## OPTIONAL ACCESSORIES

Adapter .....	4421B540-2
USB Cable .....	4421-038

AC Power Cord .....	5A2976-10-2
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# Calibration Cart

## SCC7 Series



- Turnkey RF Measurements
- Designed for easy transportation and effortless use
- Suitable for use in a clean room environment
- Stainless Steel Mobile Cart with Locking Wheels
- Available in International and Domestic Versions
- High Return Loss Ensures Minimal Power Measurement Error Contribution
- Frequency and Power Upgrades Available (Contact factory for more details)
- Service Plans Available with Bird® Service Center

<b>Power Levels</b>	1, 2.5, 5, 10 kW	<b>Casters</b>	4 locking swivel
<b>Meter</b>	4421	<b>Connector Type</b>	*Customer Specified
<b>Sensor Options</b>	4020 Series, 4027A Series or 4027F Series	<b>Operating Position</b>	Vertical only
<b>Load Options</b>	8251, 8890-300, 8921, 8931-115, 8931-230	<b>Power Requirements</b>	115/230 VAC, ±10%, 50/60 Hz
<b>Impedance</b>	50 ohm	<b>Ambient Temp Range</b>	0°C to 45°C (For 10 kW 0°C to +40°C)
<b>Frequency Range 4020 Sensor</b>	100 kHz - 1000 MHz	<b>Storage Temperature</b>	-20°C to +70°C
<b>Frequency Range 4027A Sensor</b>	250 kHz - 65 MHz	<b>Humidity</b>	85% Max., Non condensing
<b>Frequency Range 4027F Sensor</b>	1.8 MHz - 65 MHz	<b>Altitude</b>	Load derated above 5,000 feet
<b>Accuracy 4020 Series</b>	±3% (1s) across power and frequency range	<b>5 kW &amp; 10 kW Size/Weight</b>	52" L x 20" W x 42" H / 250 lbs. Fully assembled
<b>Accuracy 4027A Series</b>	±1% (1s) at calibration frequency and power levels; ±2% (1s) over remainder of power range, and at other than calibration frequencies	<b>1 kW &amp; 2.5 kW Size/Weight</b>	42" L x 20" W x 42" H / 175 lbs. Fully assembled
<b>Accuracy 4027F Series</b>	±1% (2s) across power and frequency range; ±2% (2s) over remainder	<b>Material of Construction</b>	Stainless steel cart
		<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001

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

### POWER SENSOR SELECTION GUIDE

4020 SERIES	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	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	Frequency Range	Power Input
4027F2M	1.8-2.2 MHz	100 W to 10 kW
4027F10M	12-15 MHz	100 W to 10 kW

### LOADS GUIDE

HIGH POWER	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		
ULTRA-STABLE	Frequency Range & VSWR	Power Rating
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 Volt
8931-230SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	10 kW, 230 Volt

# Multi-Sensor Calibration Cart

## MSCC7 Series



- Turnkey RF measurements
- Designed for easy transportation and effortless use
- Integrates two switchable precision power sensors
- Suitable for use in a clean room environment
- Stainless steel mobile cart with locking wheels
- Available in International and Domestic versions
- Frequency and power upgrades available (Contact factory for more details)
- Service plans available with Bird® Service Center

<b>Power Levels</b>	5 kW or 10 kW for either sensor
<b>Meter</b>	4421
<b>Sensor Options</b>	4020, 4027A, or 4027F Series
<b>Load Options</b>	8921A100, 8931A400-115, 8931A400-230
<b>Impedance</b>	50 ohm
<b>Frequency Range</b>	100 kHz - 30 MHz (depending on sensor)
<b>Accuracy 4020 Series</b>	±3% (1s)
<b>Accuracy 4027A Series</b>	±1% (1s)
<b>Accuracy 4027F Series</b>	±1% (2s)
<b>Casters</b>	4 locking swivel

<b>Connector Type</b>	*Customer Specified
<b>Operating Position</b>	Vertical only
<b>Power Requirements</b>	115/230 VAC, ±10%, 50/60 Hz
<b>Ambient Temp Range</b>	0°C to 35°C (For 10 kW 0°C to +40°C)
<b>Storage Temperature</b>	-20°C to +70°C
<b>Humidity</b>	85% Max., Non condensing
<b>Altitude</b>	Load derated above 5,000 feet
<b>5 kW &amp; 10 kW Size/Weight</b>	52" L x 20" W x 42" H /290 lbs. Fully assembled
<b>Material of Construction</b>	Stainless steel cart
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001

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

### POWER SENSOR SELECTION GUIDE

4020 SERIES	Frequency Range	Power Input
4021	1.8-32 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	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
4027F SERIES	Frequency Range	Power Input
4027F2M	1.8-2.2 MHz	100 W to 10 kW
4027F10M	12-15 MHz	100 W to 10 kW

### LOADS FOR SEMICONDUCTOR GUIDE

High Power	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

# High Power Calibration Cart

## SCC8 Series



- Capable of measuring and terminating 25kW of RF power
- Designed for easy transportation and effortless use
- Suitable for use in a clean room environment
- 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

<b>Frequency Range</b>	250 kHz - 30 MHz, depending on sensor (see chart)
<b>Power Range</b>	1 kW - 25 kW
<b>Accuracy</b>	±2% of reading at calibration frequency and power levels, ±3% of reading at other power levels and frequencies within sensor range.
<b>Connector</b>	Customer specified, appropriate for power level.
<b>Impedance</b>	50 ohm nominal
<b>Sensor VSWR</b>	1.05 max. (32.2 dB return loss)
<b>Load VSWR</b>	1.1 max. (26.4 dB return loss)
<b>Coolant</b>	100% water or 35% industrial ethylene glycol/65% water, 9 quarts (8.5 liters), forced air cooling
<b>Particle Generation</b>	156 per cfm (0.5 µm), 29 per cfm (1 µm), 0 per cfm (3 µm)

<b>Power Requirements</b>	115/230 VAC, ±10%, 50/60 Hz
<b>Humidity</b>	85% maximum, non-condensing
<b>Altitude</b>	Load derated above 5000 feet
<b>Operating Temperature</b>	+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
<b>Storage Temperature</b>	+5°C to +50°C, 100% water, -20°C to +50°C, 35% ethylene glycol/65% water
<b>Size</b>	39.5" L x 21.5" W x 39.5" H (1003.3mm x 546.1mm x 876.3mm)
<b>Weight</b>	240 lbs (109 kg)
<b>Material of Construction</b>	Stainless steel cart
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001

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

### POWER SENSOR SELECTION GUIDE

4028 SERIES	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

# BDS™ Calibration Cart

- Designed for easy transportation and effortless use
- Turnkey RF measurements
- High return loss ensures minimal power measurement error contribution
- Available in International and Domestic versions
- Service plans available with Bird® Service Center



<b>Frequency Range</b>	400 kHz to 100 MHz
<b>Frequency Resolution</b>	100 Hz
<b>Frequency Accuracy</b>	± 1 kHz
<b>Power Accuracy</b>	± 2% at 400 kHz, 2 MHz, 13.56 MHz, 27.12 MHz, 60 MHz ± 4% at all other frequencies
<b>Update Rates</b>	60 Hz typical
<b>RF Power, Max.</b>	10 kW or maximum power limit of RF connector
<b>RF Connector</b>	7/16 DIN (f)
<b>Operating Temperature</b>	+20 to +40°C (68 to 104°F)
<b>Storage Temperature</b>	-20 to +80°C (-4 to +176°F)
<b>Cable Operating Temperature</b>	0 to +100°C (32 to 212°F)

<b>Humidity, Max.</b>	85% Non-condensing
<b>Impedance</b>	50 Ohm
<b>Casters</b>	4 locking swivel
<b>Operating Position</b>	Vertical Only
<b>Power Requirements</b>	115/230 VAC, ± 10%, 50/60 Hz
<b>Altitude</b>	Load derated above 5,000 feet
<b>5 kW &amp; 10 kW Size/Weight</b>	52" L x 20" W x 44" H / 250 lbs. Fully assembled
<b>Material of Construction</b>	Stainless steel cart
<b>Application Standards</b>	CE

## POWER SENSOR SELECTION GUIDE

Model	Frequency Range & VSWR	Power Input
8921SC13		5 W
8931-115SC13	DC to 28 MHz at 1.1 max. (VSWR less than 1.05:1)	10 kW
8931-230SC13		10 kW

## HIGH POWER LOADS

Model	Frequency Range & VSWR	Power Input
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		10 kW continuous w/ blower on 2.5 kW continuous w/ blower off

# Digital Power Meter

## DPM Series



- Rugged field meter tested to military standards
- Works with all Bird field sensors
- Up to 60 hours of continuous battery life
- Automatically detects sensor and displays appropriate screen
- Data logging capable with up to 7 days of onboard memory

### MODEL 5000-XT

<b>Display</b>	Indoor/Outdoor Viewable Monochrome VGA Display with Backlight
<b>Functions</b>	VSWR, Peak Power, True Average Power, Crest Factor CCDF, Burst Power, Data Logging
<b>Sensor Detection</b>	Automatic
<b>Battery</b>	Rechargeable, Field Replaceable, Lithium Ion Batteries
<b>AC Adapter/Charger</b>	115/230 VAC, 50/60 Hz
<b>Battery Life</b>	20 Hours Continuous Usage with WPS Series Sensors 60 Hours Continuous Usage with All Other Sensors
<b>Calibration Interval</b>	No calibration required
<b>Languages</b>	English, Mandarin, Spanish
<b>Dimensions</b>	6.6" H x 4.0" W x 1.95" D (168 mm x 102 mm x 50 mm)
<b>Sensor Interface</b>	DB9, USB 2.0 SeaLatch Type A
<b>PC Interface</b>	USB 2.0 SeaLatch Type B
<b>Weight w/ Battery</b>	1.4 lbs.
<b>Operating Temp.</b>	0°C to +50°C
<b>Storage Temp.</b>	-20°C to +50°C
<b>Environmental</b>	MIL-PRF-28800F, Class 2*
<b>International Certs.</b>	CE, RoHS
<b>CE</b>	EMC EN 61326-1:2006
<b>Compatible Devices</b>	All Bird Field Sensors

\*contact Bird Applications Engineering for specific tests conducted

### STANDARD ACCESSORIES

Battery, Installed . . . . .	5A5001-1	DB9 Cable, 10' . . . . .	5A2264-09-MF-10
Power Supply, Includes Brick, cord, 3 Intl Adaptors . . . . .	5A5002-1	Operations Manual , Multilanguage . . . . .	920-5000-XT
Cigarette adaptor . . . . .	5A2238-4	Soft Case . . . . .	5A5000-1
USB SeaLatch Cable, 6' . . . . .	5A2653-6L2		

# Power Sensor

## 7020 Series

- Economical, broad band sensor
- Modulation independent measurements
- Inline device - no directional coupler required
- Every unit ships with a free Virtual Power Meter
- NIST traceable calibration



**Works with the  
Bird RF Meter App!**

Free download from Google Play Store

<b>Frequency Range</b>	<b>Low Frequency Version:</b> 25 MHz - 1.0 GHz <b>Standard Frequency Version:</b> 350 MHz - 4.0 GHz
<b>Power Range</b>	<b>Low Frequency Version:</b> 0.5 W - 500 W <b>Standard Frequency Version:</b> 0.15 W - 150 W
<b>Accuracy</b>	+/- (4% of reading + 0.05 W) (above 35 °C or below 15 °C add 3%)
<b>Min. Forward Power for Reflected Measurement</b>	5.0 W
<b>Peak/Average Ratio, Max</b>	12 dB
<b>Insertion Loss, Max</b>	0.1 dB
<b>Insertion VSWR</b>	1.10 max
<b>Impedance, Nominal</b>	50 ohms
<b>Response Time</b>	3 seconds
<b>VSWR Range</b>	1.15 to 99.9
<b>RF Connector</b>	From host instrument via cable
<b>Directivity, Min:</b>	28 dB
<b>Recommended Calibration Interval</b>	Annually
<b>Compatible Devices</b>	SA-3600XT, SA-6000XT, 5000-XT, VPM3

### POWER SUPPLY

<b>Source</b>	5Vdc from USB host
<b>Current Draw</b>	35 mA

### INTERFACE

<b>Protocol</b>	USB 2.0
<b>Connector</b>	USB Type 'B' with SeaLatch locking USB connector
<b>Data Logging</b>	with VPM3 Software

### STANDARDS COMPLIANCE

<b>CE</b>	EMC EN 61326-1:2006
<b>RoHS</b>	Compliant
<b>Upgradability</b>	Firmware field-upgradable via the USB port

### MECHANICAL SPECIFICATIONS

<b>Dimensions, Nominal</b>	4.8" x 2.2" x 1.3" (122mm x 54mm x 32mm)
<b>Weight, nominal</b>	0.8 lbs (0.36 kg)
<b>Environmental</b>	MIL-PRF-28800F Class 3
<b>Operating Temperature</b>	-10 to +50 °C (+14 to +122 °F)
<b>Storage Temperature</b>	-40°C to 80°C (-40°F to 176°F)
<b>Humidity, Max</b>	95% maximum (non-condensing)
<b>Altitude, Max</b>	4,572 m (15,000ft)



### STANDARD ACCESSORIES

SeaLatch USB Cable, 6'	5A2653-6L2
Virtual Power Meter	VPM3

Instruction Manual (Sensor)	920-7020S
Instruction Manual (VPM3)	920-VPM3

# Wideband Power Sensor

## WPS Series



- Measures True Average Power, Peak Power, and Duty Cycle directly with exceptional accuracy
- Calculates VSWR, Return Loss, Reflection Coefficient, Crest Factor, Average Burst Power, and CCDF
- Works with any Modulation scheme
- Compatible with all digital mobile radio platforms
- Compatible with all analog, digital, and multi-carrier signals
- Sensor plugs and plays with 5000-XT meter
- Virtual Power Meter software is also included for free
- No field calibration required
- NIST traceable calibration



**Works with the  
Bird RF Meter App!**  
Free download from Google Play Store

<b>Connectors</b>	N Female (Both)
<b>Power Supply</b>	<b>USB Port:</b> Less than one low-power, <b>USB load DC Input Connector:</b> 7-18 VDC at less than 0.1A
<b>Impedance</b>	50 Ohms (nominal)
<b>Weight</b>	1.2 lb. maximum
<b>Dimensions HxWxD [inches (mm)]</b>	4.8" x 4.6" x 1.3" (122 mm x 117 mm x 33 mm)
<b>Operating Temps [°C(°F)]</b>	-10° to +50°C (+14° to +122°F)
<b>Storage Temps [°C(°F)]</b>	-40° to +80°C (-40° to +176°F)
<b>Mechanical Shock &amp; Vibration</b>	IAQ MIL-PRF-28800F Class 3
<b>CE</b>	EMC EN 61326-1:2006
<b>Data Logging</b>	Requires 5000-XT or VPM3
<b>Compatible Devices</b>	5000-EX, 5000-XT, VPM2, VPM3, SA-1700 EXP*, SA-2500 EX*, SA-6000 EX*, SA-3600 XT, SA-6000 XT, SH-36S, SH-361S, SH-362, SH-362S <small>*Models 5018D and 5019D are not compatible with SA-1700 EXP, SA-2500 EX and SA-6000 EX</small>

### INTERFACES

<b>DPM</b>	DB9 proprietary interface
<b>PC Interface (1)</b>	RS -232, 9600 Baud, no parity, 8 data bits, 1 stop bit, DB9
<b>PC Interface (2)</b>	USB 2.0 Type B

### STANDARD ACCESSORIES

USB Cable 10' . . . . .	5A2653-10	Instruction Book . . . . .	920-5012S
Virtual Power Meter . . . . .	VPM3	Instruction Book . . . . .	920-VPM3

### OPTIONAL ACCESSORIES

Power Supply, Intl . . . . .	5A2226	DB9 Cable, 10" . . . . .	5A2264-09-MF-10
Power Supply, US . . . . .	5A2229		



# Wideband Power Sensor

## WPS Series

	5012D	5016D	5017D	5018D	5019D
<b>Frequency Range</b>	350 MHz - 4.0 GHz	350 MHz - 4.0 GHz	25 MHz - 1.0 GHz	150 MHz - 4.0 GHz	25 MHz - 1.0 GHz
<b>Power Range</b>	150 mW - 150 W Avg. 400 W Peak	25 mW - 25 W Avg. 60 W Peak	500 mW - 500 W Avg. 1300 W Peak	100 mW - 25 W Avg 60 W Peak	100 mW - 100 W .260 W Peak
<b>Insertion VSWR</b>	<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	<1.05 from 0.35 to 2.5 GHz, <1.10 from 2.5 to 4 GHz	<1.05
<b>Insertion Loss</b>	<0.05 dB from 0.35 to 1.0 GHz <0.1 dB from 1 to 4 GHz	<0.05 dB from 0.35 to 1.0 GHz <0.1 dB from 1 to 4 GHz	<0.05 dB	<0.05 dB from 0.35 to 1.0 GHz <0.1 dB from 1 to 4 GHz	<0.05 dB
<b>Directivity</b>	30dB up to 3.0 GHz, 28dB up to 4.0 GHz	30dB up to 3.0 GHz, 28dB up to 4.0 GHz	28dB up to 100 MHz, 30dB from 100-1000 MHz	30dB up to 3.0 GHz, 28dB up to 4.0 GHz	28dB up to 100 MHz, 30dB from 100-1000 MHz
<b>Average Power</b>					
<b>Average Forward Power Range</b>	150 mW - 150 W Avg, 400 W Peak	25 mW - 25 W Avg, 60 W Peak	500 mW - 500 W Avg, 1300 W Peak	100 mW - 25 W Avg, 60 W Peak	100 mW - 100 W, 260 W Peak
<b>*Accuracy, Average Forward Power</b>	± 4% of reading, + 0.05 W	± 4% of reading, + 0.008 W	± 4% of reading, + 0.17 W	± 4% of reading, + 0.008 W	± 4% of reading, + 0.04 W
<b>Minimum Forward Power for Reflected Measurement</b>	0.5 W	0.1 W	0.5 W	0.1 W	0.3 W
<b>Return Loss</b>	0.0 to 23 dB				
<b>VSWR</b>	1.15 to 99.9				
<b>Burst Average Power</b>					
<b>Burst Average Power Range</b>	4 W - 150 W Avg	.7 W - 25 W Avg	13.5 W - 500 W Avg	.7 W - 25 W Avg	2.7 W - 100 W Avg
<b>Burst Width</b>	1 µs to 5 ms				
<b>Repetition Rate</b>	5 Hz, Min				
<b>Duty Cycle (D)</b>	.002 to 1.0				
<b>*Accuracy, Burst Average Power</b>	± 6% of reading, + 0.05 W	± 6% of reading, + 0.008 W	± 6% of reading, + 0.17 W	± 6% of reading, + 0.008 W	± 6% of reading, + 0.04 W
<b>Peak Envelope Power</b>					
<b>Peak Envelope Power Range</b>	4.0 - 400 W	0.7 - 60 W	13.5 - 1300 W	0.7 - 60 W	2.7 - 260 W
<b>*Peak Envelope Power Accuracy</b>					
<b>Burst Width &gt; 200 µs</b>	± 7% of reading, + 0.20 W	± 7% of reading, + 0.05 W	± 7% of reading, + 0.70 W	± 7% of reading, + 0.05 W	± 7% of reading, + 0.13 W
<b>1 µs &lt; Burst Width &lt; 200 µs</b>	± 10% of reading, + 0.40 W	± 10% of reading, + 0.10 W	± 10% of reading, + 1.40 W	± 10% of reading, + 0.10 W	± 10% of reading, + 0.26 W
<b>0.5 µs &lt; Burst Width &lt; 1 µs</b>	± 15% of reading, + 0.40 W	± 15% of reading, + 0.10 W	± 15% of reading, + 1.40 W	± 15% of reading, + 0.10 W	± 15% of reading, + 0.26 W
<b>Burst Width &lt; 0.5 µs</b>	± 20% of reading, + 0.40 W	± 20% of reading, + 0.10 W	± 20% of reading, + 1.40 W	± 20% of reading, + 0.10 W	± 20% of reading, + 0.26 W
<b>Crest Factor</b>					
<b>Crest Factor Measurement Range</b>	150 mW - 150 W	25 mW - 25 W	500 mW - 25 W	25 mW - 25 W	100 mW - 100 W
<b>*Accuracy, Crest Factor</b>	Linear Sum of Peak and Average Power Accuracies				
<b>Complementary Cumulative Distribution Function (CCDF)</b>					
<b>CCDF Measurement Range</b>	0.1 to 100%				
<b>Threshold Measurement Range</b>	4.0 - 400 W	0.7 - 25 W	13.5 - 500 W	0.7 - 25 W	2.7 - 100 W
<b>Measurement Uncertainty</b>	± 0.2%				
<b>Threshold Measurement Range</b>	As Peak Envelope Power Accuracy + 2.0%				

\* for temperatures above 35°C or below 15°C add 3.0% to stated accuracies

# Statistical Power Sensor

## 7022 Series



- Can be used with all known communication formats
- Detailed breakdown of a single or multiple pulses
- Includes a wide range of IEEE pulse parameters
- Analytical results of Signal of Interest using CCDF parameters
- Isolate and identify specific breakpoints with the use of markers
- True Average measurement of Forward and Reflected power
- Peak and Burst Power measurements

<b>Measurement Type</b>	Thru-Line Power
<b>Frequency Range</b>	350 MHz to 6 GHz
<b>Frequency Measurement Accuracy</b>	± 3% of reading with CW signals
<b>Power Measurement Range</b>	0.025 W to 500 W average, Average Power Rating limited by Chart below
<b>Dynamic Range</b>	33 dB
<b>Peak to Average Ratio</b>	12 dB, absolute peak power limited to 1500 W
<b>Impedance, Nominal</b>	50 Ohms
<b>Insertion Loss, Max</b>	0.05 dB
<b>Insertion VSWR, Max</b>	1.065 350-2500 MHz, 1.12, 2500-6000 MHz
<b>Dynamic Range</b>	66 dB, intermod-free
<b>Directivity, Min</b>	<-30 dB, 350-1000 MHz, <-28 dB, 1000-6000 MHz
<b>Factory Calibration</b>	NIST Traceable
<b>Field Calibration</b>	No Field Calibration Required
<b>Data Logging</b>	Yes, with the VPM3 software
<b>Interface</b>	USB 2.0 Type B (USBTMC)
<b>Power Supply</b>	USB Port

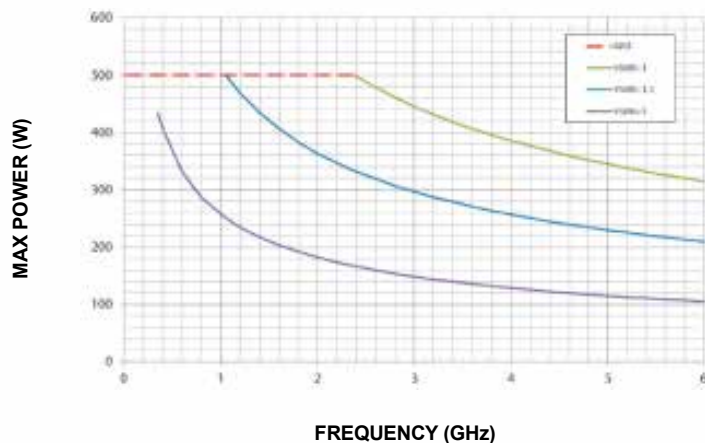
<b>Sample Rate</b>	44 M Samples/s Max
<b>Time Resolution</b>	50nSec to 10 Sec
<b>Time Base Accuracy</b>	.01%
<b>Display Refresh Rate</b>	10 times/ sec (Limited by communication)
<b>Video Bandwidth</b>	Settable: 20 MHz (none), 5 MHz, 400 kHz, 4.5 kHz
<b>Points per screen</b>	1001
<b>Trigger input connector</b>	BNC female (1MΩ Impedance; 3V High, 1.2V Low)
<b>Operating Temperature</b>	-10 to +50 °C (+14 to +122 °F)
<b>Storage Temperature</b>	-40 to +80 °C (-40 to +176 °F)
<b>Humidity, Max</b>	95% maximum (non-condensing)
<b>Altitude, Max</b>	15,000 ft. (4,500 m)
<b>Dimensions, Nominal</b>	5.8" x 4.8" x 1.3" (147 mm x 122 mm x 33 mm)
<b>Weight, Max</b>	1.5 lbs.
<b>Mechanical Shock &amp; Vibration</b>	IAW MIL-PRF-28800F class 3
<b>Certifications</b>	EMC Directive (2004/108/EC) European Standard: EN 61326— Electrical Equipment for measurement, control and laboratory use; EMC Requirements

Test Spec (for radiated immunity):  
EN 61000-4-3—Testing and measurement techniques - 10V/meter

CE Mark

RoHS

**MAXIMUM POWER**



# Statistical Power Sensor

7022 Series

## STATISTICAL MODE

<b>Peak-to-Average Ratio (Horizontal Axis)</b>	0 to 16 dB
<b>Percent Time Above Average Power (Vertical Axis)</b>	.0001 to 100% (log display)
<b>Number of samples*</b>	268 M samples max
<b>Elapsed Time*</b>	6.5 Seconds max
<b>Confidence Band*</b>	85-99.99 adjustable
<b>Modes on full buffer</b>	Re-start Stop

\*\*Number of samples, Elapsed Time and Confidence Band are all related, if one is set the other two parameters are calculated.

## AVERAGE MODE

<b>Average Forward Power Range</b>	0.25 W to 500 W
<b>Average Forward Power Accuracy</b>	4% of Reading $\pm$ 16 mW +3% outside 15-35°C
<b>Average Reflected Power Range</b>	0.025 W to 50 W
<b>Average Reflected Power Accuracy</b>	4% of Reading $\pm$ 1.6 mW +3% outside 15-35°C
<b>Return Loss</b>	0 to 23 dB
<b>VSWR</b>	1.15 to 99.9
<b>Rho</b>	0.07 to 1.0

## TIME DOMAIN MODE MEASUREMENT

<b>Peak Envelope Power Accuracy (up to 500 W)</b>	$\pm$ 5% +3.75% outside 15-35°C
<b>Peak Envelope Power</b>	up to 500 W
<b>Peak Envelope Power Accuracy (500 W to 1500 W)</b>	$\pm$ 11% +3.75% outside 15-35°C
<b>Burst Average Power Accuracy (0.25 W to 2 W)</b>	$\pm$ 7% +3.75% outside 15-35°C
<b>Burst Average Power Accuracy (2 W to 500 W)</b>	$\pm$ 5% +3.75% outside 15-35°C
<b>Burst Average Power Accuracy (500 W to 1500 W)</b>	$\pm$ 11% +3.75% outside 15-35°C
<b>Pulse Measurements</b>	All IEEE Std 194 Pulse Parameters Pulse Off Time Pulse Width Pulse fall-time Pulse repetition frequency Pulse rise time Pulse period Pulse duty cycle Peak power Pulse overshoot
<b>Triggers</b>	Auto Free Run Marker Based (Video Trigger) External Trigger Hold Off

## STANDARD ACCESSORIES

USB SeaLatch™ Cable . . . . . 5A2653-6L2  
 Virtual Power Meter . . . . . VPM3  
 Manual for Statistical Power Sensor . . . . . 920-7022

Manual for Virtual Power Meter . . . . . 920-VPM3  
 BNC / BNC Trigger Cable . . . . . 5A2918-11-6



# Directional Power Sensors

## DPS Series



- Can measure True Average Power or Peak Power
- Available with a wide range of Bird Elements
- Every unit ships with a free Virtual Power Meter
- No field calibration required
- NIST traceable calibration



**Works with the  
Bird RF Meter App!**

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	5010B	5014
<b>Frequency Range</b>	Element dependent, 2 MHz to 2.7 GHz	
<b>Power Range</b>	Element dependent, 500 mW to 1 kW full scale	
<b>Impedance</b>	50 Ohm	
<b>Peak/Average Ratio</b>	10 dB maximum with DPM elements	
<b>Accuracy</b>	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	
<b>Insertion VSWR</b>	1.05:1 from 0.45 to 1000 MHz (with N connectors)	
<b>Settling Time</b>	< 2 seconds	
<b>Connectors</b>	QC Type. Female N normally supplied.	
<b>Power Supply</b>	From host instrument via cable	
<b>Interface</b>	DB9 (proprietary configuration)	USB 2.0 (Type B)
<b>Dimensions</b>	1.875" H x 1.875" W x 3.5" D 47.7 mm x 47.7 mm x 88.9 mm excluding connectors	
<b>Weight</b>	1.12 lbs. (0.51 kg)	
<b>Directivity</b>	30 dB typical (exact value depends on element selected)	
<b>Humidity</b>	95% max. (non-condensing)	
<b>Pulse Width</b>	>100 MHz	800 ns min.
<b>Parameters</b>	26-99 MHz 2-25 MHz	1.5 µs min. 15 µs min.
<b>Pulse Rep. Rate Peak</b>	15 pps min.	
<b>Pulse Duty Factor</b>	1 x 10 <sup>-4</sup> min.	
<b>Dynamic Range</b>	16 dB	
<b>Operating Temp.</b>	-10°C to +50°C	
<b>Storage Temp.</b>	-40°C to +75°C	
<b>Environmental</b>	MIL PRM-2880F Class 2	
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001	
<b>Compatible Devices</b>	SH-36S, SH-361S, SH-362, SH-362S, 5000-XT	SA-3600XT, SA-6000XT, 5000-XT, VPM3, Bird RF Meter App

### AVERAGE POWER ELEMENT SELECTION GUIDE\*

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

\* Note: For Peak Power Readings, use elements from Tables 1-6 on pages 44-45

# Antenna & Cable Monitor

## ACM Series



- Accurately monitors your antenna and cable system VSWR levels
- Also provides accurate in-line power measurement functionality
- Provides alarms if an antenna or cable failure should occur
- Monitors transmitter output power and includes low and high power alarms
- Measures true average power of signals with high peak-to-average characteristics - works with any modulation!
- Included as standard Push-To-Talk (PTT) input to avoid false alarm triggering when the transmitter (radio) is not keyed

### FORWARD POWER MEASUREMENT

<b>Frequency Range*</b>	136 - 225 MHz 225 - 520 MHz 470 - 960 MHz 960 - 2400 MHz
*Other frequencies & power ranges available - contact factory.	
<b>Measurement Range</b>	ACM: 2.5 W to 100 W ACM 500: 12.5 W to 500 W
<b>Power Accuracy</b>	136 - 225 MHz, $\pm 10\%$ 225 - 520 MHz, $\pm 8\%$ 470 - 960 MHz, $\pm 5\%$ 960 - 2400 MHz, $\pm 5\%$
<b>Insertion Loss</b>	0.1 dB, 136 - 960 MHz 0.15 dB, 960 - 2400 MHz
<b>VSWR</b>	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

### VSWR ALARM CHARACTERISTICS

<b>Alarm Set Point</b>	1.3, 1.4, 1.5, 1.6, 1.7, 1.8 to 1
<b>Relay Contact Type</b>	Dry, Form C, relay contacts, common, normally open, normally closed.
<b>Contact Rating</b>	100 VDC @ 0.5 A
<b>Visual Alarm</b>	Red LED will illuminate to indicate alarm
<b>Stimulus</b>	VSWR set point exceeded, response time proportional to overload.
<b>Reset</b>	Local Mechanical reset switch. Remote input (Reset if VDC is 0 to +0.8 volts).
<b>Monitor Port Connectors</b>	Female N, TNC or BNC
<b>Coupling</b>	-63 dB approx., Subject to changes in full-scale power
<b>Interface Port Connector</b>	Female DB-9, compatible with IBM PC AT serial port.

### REFLECTED POWER MEASUREMENT

<b>Directivity</b>	30 dB, 136 - 960 MHz 26 dB, 960 - 2400 MHz
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### ACM (SERIAL) PART NUMBER DEFINITION

MODEL (POWER RANGE)	FREQ. RANGE (MHz)	RF INPUT CONN	RF OUTPUT CONN.	MONITOR PORT CONN.	INPUT VOLTAGE
ACM = 2.5 - 100 W ACM 500 = 12.5 - 500 W	L1 = 136 - 225 MHz L2 = 225 - 520 MHz M = 470 - 960 MHz *H = 960 - 2400 MHz	NM = N Male NF = N Female DM = 7/16 DIN Male DF = 7/16 DIN Female	NM = N Male NF = N Female DM = 7/16 DIN Male DF = 7/16 DIN Female	N = N Female T = TNC Female B = BNC Female	L = $\pm$ (11 to 26) VDC H = $\pm$ (36 to 72) VDC

### ACMI (ETHERNET) PART NUMBER DEFINITION

MODEL (POWER RANGE)	FREQ. RANGE (MHz)	RF INPUT CONN	RF OUTPUT CONN.	MONITOR PORT CONN.	INPUT VOLTAGE
ACMI = 2.5 - 100 W ACMI 500 = 12.5 - 500 W	L1 = 136 - 225 MHz L2 = 225 - 520 MHz M = 470 - 960 MHz *H = 960 - 2400 MHz	NM = N Male NF = N Female DM = 7/16 DIN Male DF = 7/16 DIN Female	NM = N Male NF = N Female DM = 7/16 DIN Male DF = 7/16 DIN Female	N = N Female T = TNC Female B = BNC Female	L = $\pm$ (11 to 26) VDC M = $\pm$ (18 to 36) VDC H = $\pm$ (36 to 72) VDC

\*H frequency band unavailable with 500W version

### PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS

<b>General</b>	ThruLine® sensor for direct insertion in 50-ohm line
<b>RF Connectors</b>	N or 7/16 DIN
<b>Max Line Section Power</b>	Dependent on frequency and connector
<b>Alarm/Power Connector</b>	15-pin female "D" connector
<b>Operating Temperature</b>	0°C to 50°C
<b>Storage Temperature</b>	-20°C to 80°C
<b>Humidity</b>	0 to 95% maximum (non-condensing)
<b>Altitude</b>	Up to 3000 meters above sea level
<b>Passive Intermodulation Products</b>	Less than -130 dBc
<b>Power Requirements</b>	+11 to +26 VDC or $\pm 36$ to $\pm 72$ VDC
<b>Dimensions</b>	4.75" (121 mm) wide (7.55" (192 mm) with connectors) 4.2" (107 mm) high, 1.06" (27 mm) deep
<b>Weight</b>	less than 2 lbs. (0.9 kg)
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001

### INTERFACE SPECIFICATIONS

<b>ACM: RS-232 Serial Port</b>	9600 baud, no parity, 8 data bits, 1 stop bit, no handshake
<b>ACMI: Ethernet Port</b>	10/100-BASE-T (auto-sensing)
<b>Compatibility</b>	Ethernet Version 2.0 / IEEE 802.3
<b>Protocols</b>	ARP, UDP/IP, DHCP, BOOTP, Auto IP, HTTP, and SNMP
<b>Left LED</b>	Amber: 10 Mbps, Green: 100 Mbps
<b>Right LED</b>	Amber: Half-duplex, Green: Full-duplex
<b>Security</b>	128-bit encryption

# Broadcast Power Monitor

## BPME Series



- Continuously monitor key system measurements
- ±5% of reading accuracy for power
- Operates in digital, analog and multi-carrier systems
- Hard Contact alarms
- Remote access with IP Enabled Ethernet connectivity

### BPME

<b>Frequency Range*</b>	See chart below
<b>Forward/Reflected Power Range*</b>	See chart below
<b>Measurement Type</b>	In-line, True Average Power
<b>Peak/Average Ratio</b>	10 dB
<b>Coupler Directivity</b>	26 dB minimum, 30 dB typical
<b>Accuracy</b>	±5% of reading
<b>Dynamic Power Range</b>	20 dB
<b>Alarms</b>	VSWR, No/Low Forward Power High Forward Power
<b>Outputs</b>	SPDT relay contact
<b>Display Options</b>	BPME PC Software, 3129
<b>Remote Interface</b>	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
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001
<b>Operating Temperature</b>	0°C to +50°C (32°F to 122°F)
<b>Storage Temperature</b>	-20°C to + 80°C (-4°F to 176°F)
<b>Humidity</b>	95% ±5% max. (noncondensing)
<b>Altitude</b>	up to 10,000 feet (3,048 m)
<b>Calibration Cycle</b>	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	Power Designator	VHF (45-230 MHz)	UHF (470-890 MHz)
		Forward Power Range	Forward Power Range
7/8"	Low Medium High	5W – 500 W 20 W – 2000 W 50 W – 5000 W	2.5 W – 250 W 10 W – 1000 W 25 W – 2500 W
1 5/8"	Low Medium High	20 W – 2000 W 80 W – 8 kW 200W – 20 kW	5 W – 500 W 20 W – 2000 W 50 W – 5000 W
3 1/8"	Low Medium High	50 W – 5000 W 200 W – 20 kW 500 W – 50 kW	25 W – 2500 W 100 W – 10 kW 250 W – 25 kW
4 1/16" & 4 1/2"	Low Medium High	100 W – 10 kW 400 W – 40 kW 1000 W – 100 kW	40 W – 4 kW 150 W – 15 kW 400 W – 40 kW
6 1/8"	Low Medium High	200 W – 20 kW 800 W – 80 kW 2000 W – 200 kW	80 W – 8 kW 300 W – 30 kW 750 W – 75 kW

# Channel Power Monitor

## CPM Series

- Data logging
- Slim 1RU package
- Built-in web Server provides SNMP messaging
- Push-to-talk (PTT) compatibility is standard
- Full control of alarm and data logging settings
- 16 channels with expansion modules to cover your largest radio systems
- Software and hard contact alarms



### MODEL 3141 (Channel Power Monitor Display)

<b>Operating Voltage</b>	115/230 VAC @ 50/60Hz
<b>Operating Power</b>	Less than 10 watts
<b>Dimensions</b>	5.25" x 19" x 1.75" (133.35 mm x 483 mm x 44.5 mm)
<b>Weight</b>	Approximately 2.0 lbs (0.85kg)
<b>Operating Temp</b>	0°C to + 50°C (32°F to 122°F)
<b>Storage Temp</b>	-20°C to + 80°C (-4°F to 176°F)
<b>Humidity</b>	95% ±5% max. (Noncondensing)
<b>Altitude</b>	up to 10,000 feet (3048 m)

### MODEL 4043 (Directional Power Sensor)

<b>Frequency Range by Model</b>	4043-1-440505-0201: 144 MHz to 174 MHz 4043-1-450505-0201: 380 MHz to 420 MHz 4043-1-460505-0201: 450 MHz to 512 MHz 4043-1-470505-0201: 762 MHz to 806 MHz 4043-1-480505-0201: 806 MHz to 869 MHz 4043-1-490505-0201: 896 MHz to 940 MHz
<b>Max Average Forward Power</b>	500 W
<b>Max Average Reflected Power</b>	50 W
<b>Dynamic Range</b>	13 dB
<b>Accuracy</b>	±5% of reading
<b>Impedance</b>	50 Ohm
<b>Insertion Loss</b>	< 0.02 dB
<b>Insertion VSWR</b>	<1.15:1
<b>Intermodulation Distortion (PIM)</b>	<-145 dBc
<b>Instrument Interface</b>	RS-485 via RJ-25 Connector
<b>RF Connectors</b>	N(M) / N(F)
<b>Power Supply</b>	7/18 VDC, <50 mA (from 3141)
<b>Operating Temperature</b>	0 to 50° C
<b>Dimensions</b>	5.2" x 3.8" x 1.4" (132mm x 96.5mm x 35.5mm)
<b>Weight</b>	0.5 lbs (0.3 kg)
<b>Compliance</b>	CE, RoHS

### MODEL 4044 (Non-Directional Power Sensor)

<b>Frequency Range by Model</b>	4044-1-440404-0201: 144 MHz to 174 MHz 4044-1-450404-0201: 380 MHz to 420 MHz 4044-1-460404-0201: 450 MHz to 512 MHz 4044-1-470404-0201: 762 MHz to 806 MHz 4044-1-480404-0201: 806 MHz to 869 MHz 4044-1-490404-0201: 896 MHz to 940 MHz
<b>Power Range</b>	2.5 - 100 W
<b>Accuracy</b>	±5% of reading
<b>Impedance</b>	50 Ohm
<b>Insertion Loss</b>	< 0.1 dB
<b>Insertion VSWR</b>	<1.10:1 max
<b>Intermodulation Distortion (PIM)</b>	<-140 dBc
<b>Instrument Interface</b>	0-4 VDC via RJ-25 Connector
<b>RF Connectors</b>	N(M) / N(F)
<b>Power Supply</b>	15 VDC, 5 mA max (from 3141)
<b>Operating Temperature</b>	0 to 50° C
<b>Dimensions</b>	2.3" x 2.2" x 1.7" (50mm x 56mm x 43mm)
<b>Weight</b>	0.2 lbs (0.14 kg)
<b>Compliance</b>	CE, RoHS

# Displays

## 3129 Digital & 3140 Meter



### 3129 Digital Display

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



### 3140A4 (4 Channels)

### 3140A8 (8 Channels)

<b>Operating Voltage</b>	115/230 VAC 50/60Hz
<b>Operating Power</b>	Less than 10 watts
<b>Dimensions</b>	3.5" X 19" X 3.5" (2 RU) (89mm X 483mm X 89mm)
<b>Weight</b>	Approximately 2.5 lbs (0.85kg)
<b>Operating Temp</b>	-10 to + 50° C (-14 to 122° F)
<b>Storage Temp</b>	-40 to + 80° C (-40 to 176° F)
<b>Humidity</b>	95% ±5% (Noncondensing)
<b>Altitude</b>	up to 10,000 feet (3048 m)



# Transmitter Power Monitor

## TPM Series

- Low Cost in-situ power measurement solution
- Integrated precision directional & non-directional couplers
- ±5% Accuracy with both analog and digitally modulated systems



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

### LINE SECTION

<b>Operating Temperature</b>	0° to +50° C (32° to 122° F)
<b>Storage Temperature</b>	-20° to +80° C (-4° to 176° F)
<b>Humidity</b>	95% ±5% max. (noncondensing)
<b>Altitude</b>	up to 10,000 feet (3048 m)
<b>Weights</b>	TPM7 = 3.5 lbs TPM1 = 5.5 lbs TPM3 = 8.0 lbs 3140 = 2.5 lbs
<b>Calibration Cycle</b>	Annual*

**CE** EMC EN 61326-1:2006 and Safety EN 61010-1:2001

\* 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](http://www.bird-electronic.com)

### SELECTION GUIDE

#### VHF (54-216 MHz)

#### UHF (470-806 MHz)

Line Size	Forward Power Range	Power Designator	Forward Power Range	Power Designator
7/8"	15 W – 500 W 30 W – 1.0 kW 80 W – 2.5 kW 150 W – 5 kW	Low Medium High Very High	15 W – 500 W 30 W – 1 kW 80 W – 2.5 kW	Low Medium High
1 5/8"	30 W – 1.0 kW 80 W – 2.5 kW 150 W – 5 kW 300 W – 10 kW	Low Medium High Very High	30 W – 1.0 kW 80 W – 2.5 kW 150 W – 5.0 kW	Low Medium High
3 1/8"	150 W – 5 kW 300 W – 10 kW 800 W – 25 kW 1.5 kW – 50 kW	Low Medium High Very High	150 W – 5.0 kW 300 W – 10 kW 800 W – 25 kW	Low Medium High

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

### 7/8" LINE SECTION PART NUMBER DEFINITION

MODEL (LINE SECTION)	INPUT CONNECTOR	OUTPUT CONNECTOR	FREQUENCY BAND	POWER**	UHF SUB-BAND
TPM7 = 7/8" line section	CONNECTOR OPTIONS		L = 54-88 MHz F = 88-108 MHz H = 174-216 MHz U = 470-806 MHz	L = Low M = Medium H = High S = Very High	A = 470-554 MHz B = 554-638 MHz C = 638-722 MHz D = 722-806 MHz
	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)			

### 1 5/8" OR 3 1/8" LINE SECTIONS PART NUMBER DEFINITION

MODEL (LINE SECTION)	LINE INTERFACE****	FREQUENCY BAND	POWER**	UHF SUB-BAND
TPM1 = 1 5/8" line section TPM3 = 3 1/8" line section	U = Unflanged, Recessed Center Conductor UF = Unflanged, Flush Center Conductor	L = 54-88 MHz F = 88-108 MHz H = 174-216 MHz U = 470-806 MHz	L = Low M = Medium H = High S = Very High	A = 470-554 MHz B = 554-638 MHz C = 638-722 MHz D = 722-806 MHz

\* Patent Pending

\*\* see Chart for power ranges

\*\*\* Other sizes and power ranges available upon request

\*\*\*\*For Flanged, leave blank.

# RF Monitor/Alarms

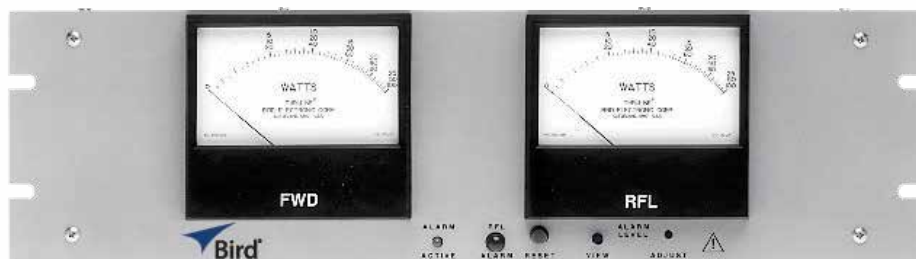
Wattcher® Series



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

# RF Monitor/Alarms

Wattcher® Series



## 3128A (Single Carrier)

<b>Power Range</b>	100 mW to 10 kW using Bird® Plug-in Elements*
<b>Frequency Range</b>	450 kHz - 2.7 GHz
<b>Insertion VSWR</b>	with N connectors 1.05 max. to 1000 MHz, 1.1 max. to 2700 MHz
<b>Accuracy</b>	±5% of full scale
<b>Meter Scales</b>	FWD and RFL 25, 50, 100 W
<b>Meter Sensitivity</b>	30 $\mu$ A/1400 $\Omega$
<b>Alarms</b>	Front Panel Buzzer and red LED
<b>Front Panel Controls</b>	Reset push-button, reflected power limit display button, adjust alarm level recessed screw
<b>Rear Panel Features</b>	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.
<b>Cable</b>	Includes two 25 ft. DC cables
<b>AC Power</b>	115/230 VAC, 50/60 Hz @ 0.125A
<b>DC Power</b>	9 - 16 VDC @ 1A
<b>Finish</b>	Gray powder coat
<b>Nominal Size</b>	19" W x 5 7/32" H x 3 3/4" D (483 mm x 133 mm x 95 mm)
<b>Weight</b>	5 lbs. (2.28 kg)
<b>Required Products</b>	Line Section: 4522-002-5 QC connectors: Two Elements: Two from Tables 1, 2, 3, 3A, 4, or 6

# RF Monitor/Alarms

High-Speed Wattcher® Series



## 3170B (Dual Meter - Dual Element - Single Carrier)

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

# RF Monitor/Alarms

High-Speed Wattcher® Series



	3171B (Dual Meter - Single Carrier)	3171B020 (Dual Meter - Single Carrier)
<b>Power Range</b>	100 W to 250 kW using Bird® Plug-in Elements	
<b>Frequency Range</b>	2 MHz - 1 GHz	
<b>Accuracy</b>	±5% of full scale	
<b>Meter Scales</b>	FWD and RFL 5, 10, 25 kW	FWD and RFL 15, 30, 60 kW
<b>Alarms</b>	Front Panel Buzzer, "Active" and "Trip" LEDs for forward/reflected	
<b>Response Time</b>	25 µs max.	
<b>Activate Forward</b>	73 µs to 50 ms nominal (adjustable) Monitor Delay	
<b>Front Panel Controls</b>	Reset push-button, adjust FWD/RFL alarm levels screw	
<b>Rear Panel Features</b>	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.	
<b>Inputs/Outputs</b>	TTL compatible +5 V logic. Outputs for remote meter	
<b>Cable</b>	Includes two 25 ft. DC cables	
<b>AC Power</b>	115/230 V, 50/60 Hz @ 56 mA max.	
<b>DC Power</b>	12.7 to 16.0 VDC @ 400 mA max.	
<b>Finish</b>	Gray powder coat	
<b>Nominal Size</b>	19" W x 5 7/32" H x 9 21/64" D (483 mm x 133 mm x 237 mm)	
<b>Weight</b>	5 1/2 lbs. (2.5 kg)	
<b>Required Products</b>	Line Section: 1 5/8", 3 1/8", 4 1/16", 6 1/8"	
<b>Elements</b>	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.
<b>Accessories</b>	Cable: If length other than 25 ft. is desired, order two BNC (M) cables.	

# Portable Wattmeters

Thruline® RF Directional



## 43

<b>Power Range</b>	100 mW - 10 kW using Bird® Plug-in Elements.*
<b>Frequency Range</b>	450 kHz - 2.7 GHz (depending on element)
<b>Insertion VSWR</b>	with N Connectors 1.05 max. to 1000 MHz
<b>Accuracy</b>	±5% of full scale
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Light Gray powder coat
<b>Nominal Size includes connectors</b>	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
<b>Weight</b>	3 lbs. (1.4 kg)
<b>Elements</b>	Tables 1, 2, 3, 3A, 4, 6



## 43P (with Peak Power Retrofit Kit 4300-400)

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



## 4431 (Variable RF TAP)

<b>Power Range</b>	5 kW max. 2 - 30 MHz
<b>Frequency Range</b>	1 kW max. 30 - 1000 MHz** using Bird® Plug-in Elements*
<b>Insertion VSWR</b>	with N Connectors 1.07 max.** to 1000 MHz
<b>Accuracy</b>	±5% of full scale
<b>Insertion Loss</b>	0.1 dB max. (2-512 MHz), 0.2 dB max. (512-1000 MHz)*
<b>RF Sample Output</b>	Variable -15 to -70 dB from BNC (Female) port
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Gray powder coat
<b>Nominal Size includes connectors</b>	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
<b>Weight</b>	3 1/2 lbs. (1.6 kg)
<b>Elements</b>	Tables 1, 2, 3, 3A, 4, 6 (within power/frequency range limits stated above)
<b>Accessories</b>	Case

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

\*\*Applies only when coupling is less than 30 dB

# Portable Wattmeters

Thruline® RF Directional



## 4314C (P EP, Single Element)

<b>Power Range</b>	100 mW - 10 kW using Bird® Plug-in Elements.*
<b>Frequency Range</b>	450 kHz - 2.7 GHz (depending on element)
<b>Insertion VSWR</b>	with N Connectors 1.05 max. to 1000 MHz
<b>Accuracy</b>	±5% of full scale CW, ±8% PEP
<b>Pulse Parameters</b>	(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 <sup>-4</sup> min.
<b>Battery</b>	Two 9-Volt alkaline transistor batteries
<b>AC Power</b>	120 VAC, 60 Hz or 220 VAC, 60 Hz (using Bird® adapter)
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Light Gray powder coat
<b>Nominal Size includes connectors</b>	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
<b>Weight</b>	3 lbs. (1.4 kg)
<b>Elements</b>	Tables 1, 2, 3, 3A, 4, 5, 6
<b>Accessories</b>	Case, spare batteries, extra QC connectors.



## 4305A (High-Power)

<b>Power Range</b>	50 W - 25 kW using Bird® Plug-in Elements.*
<b>Frequency Range</b>	450 kHz - 2.3 GHz (depending on element)
<b>Insertion VSWR</b>	with N Connectors 1.05 max.
<b>Accuracy</b>	±5% of full scale
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Gray powder coat
<b>Nominal Size includes connectors</b>	6 5/16" H x 5 1/8" W x 4 1/4" D, (161 mm x 131 mm x 108 mm)
<b>Weight</b>	3 1/4 lbs. (1.5 kg)
<b>Elements</b>	4305A element table below and 1 5/8AA table
<b>Accessories</b>	Case

### 4305A ELEMENT SELECTION GUIDE

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

# Portable Wattmeters

Thruline® RF Directional



## 4304A (Fixed 25-1000 MHz 5-500 Watt Element)

<b>Power Ranges</b>	5, 15, 50, 150, 500 W, with no scale limitations except power limited to 150 W from 800-1000 MHz
<b>Frequency Range</b>	25 MHz - 1.0 GHz
<b>Insertion VSWR</b>	25-521 MHz, 1.05 max. (with UHF female conn.), 512-1000 MHz, 1.07 max.
<b>Insertion Loss</b>	25-512 MHz, 0.10 dB max. with UHF female conn., 512-1000 MHz range, 0.13 dB max.
<b>Accuracy</b>	25-100 MHz, $\pm 7\%$ of full scale, using correction charts. 100-512 MHz, $\pm 6\%$ of full scale, no correction needed. 512-1000 MHz, $\pm 7\%$ of full scale, no correction needed.
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Light Gray powder coat
<b>Nominal Size includes connectors</b>	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
<b>Weight</b>	3 lbs. (1.36 kg)
<b>Accessories</b>	Case



## 4308 (Cellular Specialist)

<b>Power Ranges</b>	1.5, 5, 15, 50 W, with no scale limitations
<b>Frequency Range</b>	440 MHz - 960 MHz
<b>Insertion VSWR</b>	1.05 with TNC connectors (QC Type)
<b>Accuracy</b>	$\pm 5\%$ of full scale
<b>Connectors</b>	QC Type (Female TNC normally supplied)
<b>RF Sample Output</b>	Variable -15 to -70 dB from BNC (Female) port
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Gray powder coat
<b>Nominal Size includes connectors</b>	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
<b>Weight</b>	3 lbs. (1.36 kg)
<b>Accessories</b>	Case



# Portable Wattmeters

Thruline® RF Directional



## 4410 Series (Multipower)

<b>Battery</b>	4410A - 9V Alkaline Battery 4412A-Rechargeable Battery
<b>Power Range</b>	300 mW - 1 kW or 2 W - 10 kW full scale in one single Plug-in Element
<b>Frequency Range</b>	200 kHz - 2.3 GHz CW or FM
<b>Insertion VSWR</b>	with N Connectors 1.25 max. to 2300 MHz
<b>Accuracy</b>	±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.)
<b>Ambient Temp. Range</b>	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)
<b>Over-Range</b>	To 120% of nominal full scale
<b>Protection</b>	(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.
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Gray powder coat
<b>Nominal Size includes connectors</b>	6 7/8" H x 5 1/8" W x 3 5/8" D, (175 mm x 130 mm x 92 mm)
<b>Weight</b>	4410A: 3 lbs. (1.4 kg), 4412A: 3 1/3 lbs. (1.5 kg)
<b>Elements</b>	Tables 9, 10, 11, 12 (below)
<b>Accessories</b>	Case, spare battery

### 4410 ELEMENT SELECTION GUIDE

TABLE 10	Full-Scale Power and Frequency Ranges 0-100, 300 Milliwatts, 1, 3, 10, 30, 100 Watts						
	Frequency Bands (MHz)						
	25-80	50-125	100-250	200-500	400-1000	1000-1800	1800-2300
	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				
	Frequency Bands (MHz)				
	2-30	25-80	50-200	144-520	200-1000
	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		
	Frequency Bands (MHz)		
	0.2-0.535	0.45-2.5	2-30
	4410-1	4410-2	4410-4

\*Accuracy is ±8% of reading

# Portable Wattmeters

Thruline® RF Directional



## APM-16 (Average Reading Power Meter)

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

### ELEMENT SELECTION GUIDE

	Frequency Bands (MHz)										
	2-30	25-60	50-125	100-250	200-500	400-1000	950-1260	1100-1800	1700-1990	1990-2200	2200-2300
<b>1 W</b>	—	—	APM-1B	APM-1C	—	APM-1E	APM-1J	—	APM-1L1	APM-1L2	APM-1M
<b>2.5 W</b>	—	—	APM-2.5B	—	APM-2.5D	APM-2.5E	APM-2.5J	APM-2.5K	APM-2.5L1	APM-2.5L2	—
<b>5 W</b>	APM-5H	APM-5A	APM-5B	APM-5C	APM-5D	APM-5E	APM-5J	APM-5K	APM-5L1	APM-5L2	—
<b>10 W</b>	APM-10H	APM-10A	APM-10B	APM-10C	APM-10D	APM-10E	APM-10J	APM-10K	APM-10L1	APM-10L2	—
<b>25 W</b>	—	—	APM-25B	APM-25C	APM-25D	APM-25E	—	APM-25K	APM-25L1	APM-25L2	—
<b>50 W</b>	—	—	—	APM-50C	APM-50D	APM-50E	APM-50J	APM-50K	APM-50L1	APM-50L2	—
<b>100 W</b>	APM-100H	APM-100A	APM-100B	APM-100C	APM-100D	APM-100E	APM-100J	—	APM-100L1	—	—
<b>250 W</b>	APM-250H	APM-250A	APM-250B	APM-250C	APM-250D	APM-250E	—	—	—	—	—
<b>500 W</b>	APM-500H	—	APM-500B	APM-500C	APM-500D	APM-500E	—	—	—	—	—
<b>1000 W</b>	APM-1000H	—	APM-1000B	APM-1000C	—	APM-1000E	—	—	—	—	—

# Portable Wattmeters

Thruline® RF Directional



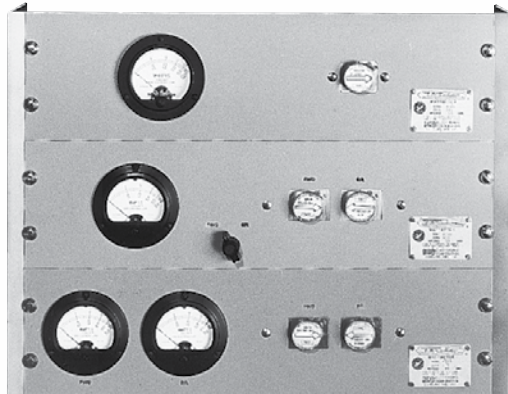
## 4391A (Rugged, RF Power Analyst®)

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

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

# Panel Mount Wattmeters

Thruline® RF Directional



## 4521, 4522 & 4526

<b>Power Range</b>	100 mW - 10 kW using Bird® Plug-in Elements
<b>Frequency Range</b>	450 kHz - 2.7 GHz (depending on element)
<b>Insertion VSWR</b>	with N Connectors 1.05 max. to 1000 MHz
<b>Accuracy</b>	±5% of full scale
<b>Connectors</b>	QC Type (Female N normally supplied)
<b>Finish</b>	Gray powder coat
<b>Nominal Size</b>	19" W x 5 7/32" H x 1 11/16" D (483 mm x 133 mm x 43 mm)
<b>Weight</b>	3 1/2 lbs. (1.6 kg)
<b>Weight</b>	3 lbs. (1.36 kg)
<b>Elements</b>	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



## 4527 (2-512 MHz with Sampler Port)

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

# Field Replacement Meter

Thruline® Wattmeter Movement Kit



## RPK 43-4

Type	3 1/2" Round Kit w/ Cable
Current	30 $\mu$ A/1400 $\Omega$
Scales	25/50/100 W
Use with	1, 2, 3, 3A, 4, 6
Element Tables	



## 4210A100

Type	3 1/4" Square Meter in Housing
Current	30 $\mu$ A/1400 $\Omega$
Scales	25/50/100 W
Use with	1, 2, 3, 3A, 4, 6
Element Tables	

# Rigid Line Sections

Thruline® Wattmeter Components



## 1 5/8" LINE SECTIONS

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



## 3 1/8" LINE SECTIONS

	Connector Type	Line Size (Inches)	Element Sockets	Length (Inches)	Weight
4610-000	EIA Flg.	3 1/8"	2	7.03	7.25
4801-100	UnFlg. (Rec. 0.438")	3 1/8"	2	6.5	4.25
4802-000	UnFlg. (Flush)	3 1/8"	2	6.5	4.25



## 4 1/16" LINE SECTIONS

	Connector Type	Line Size (Inches)	Element Sockets	Length (Inches)	Weight
4642-010	Flg. (MYAT)	4 1/16"	2	8.13	8.88



## 6 1/8" LINE SECTIONS

	0.0556 in	Line Size (Inches)	Element Sockets	Length (Inches)	Weight
4905-000	EIA Flg.	6-1/8"	2	10.22	17
4909-000	UnFlg. (Rec. 0.438")	6-1/8"	2	9.63	12.75

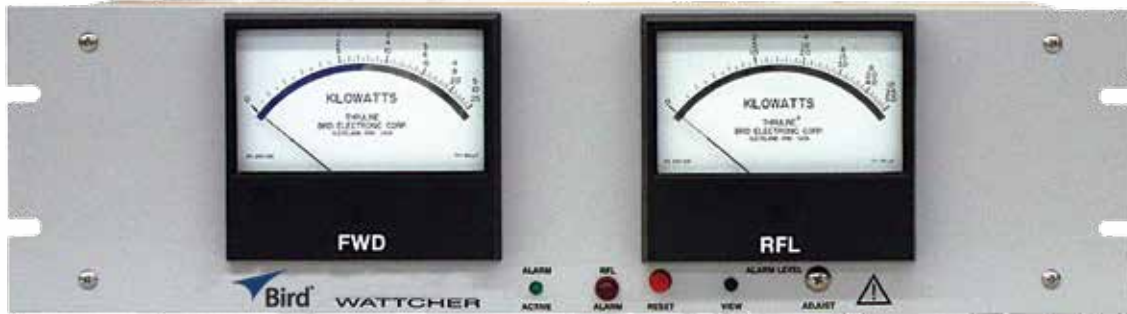


## 7/8" LINE SECTIONS

	Connector Type	Line Size (Inches)	Element Sockets	Length (Inches)	Weight
4230-018	N-Type (F)	7/8"	1	5 1/2	1 1/3
4230-006-1	QC (not included)	7/8"	1	4	1
4230-059	QC (not included)	7/8"	1 w/bracket	6 7/32	1 1/4
4522-002-5	QC (not included)	7/8"	2 panel mt.	6.38	1 1/4

# Rigid Line Wattmeters

3127 & 6810 Series



3127 Series	SELECTION GUIDE	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



6810 Series	SELECTION GUIDE	Type	Scales	DC Cable (Ft.)	Uses Line Section
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

# Plug-In Elements

## Selection Guide



**Model** . . . . . Select Element From Table(s)

**3128A** . . . . . 1, 2, 3, 3A, 4, 6, 14\*

**3170B** . . . . . 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

**4314C** . . . . . 1, 2, 3, 3A, 4, 5, 6, 14\*

**Model** . . . . . Select Element From Table(s)

**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.

**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**

Part No.	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
040-1	050-1	060-1	080-1	095-1	110-1	150-1	200-1	275-1	425-1	801-1	
Part No.	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
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	—



# Plug-In Elements

## Selection Guide



**TABLE 4 LOW-FREQUENCY ELEMENTS**

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

Cat. No.	100 mW Frequency (MHz)													
	40-50	72-76	108-136	135-175	320-340	328-336	400-420	420-450	450-470	600-800	800-1000			
	430-266	430-2	430-57	430-86	430-205	430-3	430-7	430-208	430-8	430-169	430-263			
Cat. No.	250 mW Frequency (MHz)													
	72-76	88-108	105-120	116-126	130-150	190-210	450-470	800-1000						
	430-22	430-217	430-20	430-48	430-13	430-65	430-61	430-264						
Cat. No.	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	
	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
4274-025	25-1000	-50 dB ± 2 dB (-66 dB @ 2 MHz)	500 W
4274-050	100-400	-35 to -48 dB (±1 dB) Adjustable	500 W

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

Model No.	Frequency Bands (MHz)		
	Freq Band (MHz)	Nominal Coupling	Max. Main Line Power
400-50	50-100	-40 dB	1 kW
400-75	75-150	-40 dB	1 kW
400-125	125-250	-40 dB	1 kW
400-225	225-450	-40 dB	1 kW
400-400	400-800	-40 dB	1 kW
400-750	750-1250	-40 dB	1 kW

**TABLE 16 DIRECTIONAL COUPLER ELEMENTS FOR 3 1/8" EIA LINE**

Model No.	Frequency Bands (MHz)		
	Freq Band (MHz)	Nominal Coupling	Max. Main Line Power
553-25	25-40	-55 dB	25 kW
553-50	50-100	-55 dB	25 kW
553-75	75-150	-55 dB	25 kW
553-125	125-250	-55 dB	25 kW
553-225	225-450	-55 dB	25 kW
553-401	400-800	-55 dB	15 kW
553-750	750-1250	-55 dB	10 kW

**TABLE 15 DIRECTIONAL COUPLER ELEMENTS FOR 1 5/8" EIA LINE**

Model No.	Frequency Bands (MHz)		
	Freq Band (MHz)	Nominal Coupling	Max. Main Line Power
501-50	50-100	-50 dB	10 kW
501-75	75-150	-50 dB	10 kW
501-125	125-250	-50 dB	10 kW
501-225	225-450	-50 dB	10 kW
501-400	400-800	-50 dB	5 kW

**TABLE 17 DIRECTIONAL COUPLER ELEMENTS FOR 6 1/8" EIA LINE**

Model No.	Frequency Bands (MHz)		
	Freq Band (MHz)	Nominal Coupling	Max. Main Line Power
606-50	50-100	-60 dB	60 kW
606-75	75-150	-60 dB	60 kW
606-125	125-250	-60 dB	60 kW
606-225	125-250	-60 dB	60 kW
606-400	400-870	-60 dB	60 kW

NOTE: For use in any line section including BPME

# Plug-In Elements

## Selection Guide



**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

**Model** . . . . . Select Element From Table(s)

- 3171B020** . . . . . 1 5/8 BB, 3 1/8 BB, 4 1/16 BB, 6 1/8 BB
- 3171B** . . . . . 1 5/8 AA, 3 1/8 AA, 4 1/16 AA, 6 1/8 AA
- 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
- 6810-250** . . . . . 4 1/16 C, 6 1/8 C
- 6810-307** . . . . . 1 5/8 B, 3 1/8 B, 4 1/16 B, 6 1/8 B
- 6810-265** . . . . . 4 1/16 C, 6 1/8 C

**TABLE 1 5/8 A STANDARD ELEMENTS 100 µA**

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
	100 W	—	100B1	100C1
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 5/8 AA STANDARD ELEMENTS 30 µA**

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
	100 W	—	100B12	100C12
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 5/8 B STANDARD ELEMENTS 100 µA**

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
	300 W	—	300B1	300C1
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 5/8 BB STANDARD ELEMENTS 30 µA**

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
	300 W	300H12	300B12	300C12
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 5/8 C STANDARD ELEMENTS 100 µA**

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

**TABLE 3 1/8 A STANDARD ELEMENTS 100 µA**

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
	100 W	—	100B3	100C3
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 1/8 AA STANDARD ELEMENTS 30 µA**

Power Range	Frequency Bands (MHz)			
	2-30	50-125	100-250	400-1000
	100 W	—	100B32	100C32
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 1/8 B STANDARD ELEMENTS 100 µA**

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
	600 W	600B3	600C3
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

POWER METERS



# Plug-In Elements

## Selection Guide



**TABLE 3 1/8 BB STANDARD ELEMENTS 30  $\mu$ A**

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 1/8 C STANDARD ELEMENTS 100  $\mu$ A**

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

**TABLE 4 1/16 A STANDARD ELEMENTS 100  $\mu$ 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 1/16 AA STANDARD ELEMENTS 30  $\mu$ A**

Power Range	Frequency Bands (MHz)		
	50-125	100-250	400-1000
2500 W	2500B5	2500C52	2500E52
5000 W	5000B52	5000C52	5000E52
10 kW	10KB52	10KC52	10KE52
25 kW	25KB52	25KC52	25KE52

**TABLE 4 1/16 B STANDARD ELEMENTS 100  $\mu$ 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 1/16 BB STANDARD ELEMENTS 30  $\mu$ 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 1/16 C STANDARD ELEMENTS 100  $\mu$ A**

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

**TABLE 6 1/8 A STANDARD ELEMENTS 100  $\mu$ 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	10KH6	100KB6	100KC6	—
250 kW	250KH6	—	—	—

**TABLE 6 1/8 AA STANDARD ELEMENTS 30  $\mu$ 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 1/8 B STANDARD ELEMENTS 100  $\mu$ 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 1/8 BB STANDARD ELEMENTS 30  $\mu$ 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 1/8 C STANDARD ELEMENTS 100  $\mu$ A**

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



# Convection Cooled Loads



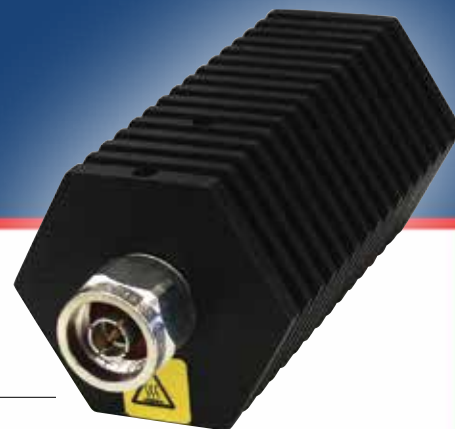
- Self cooling design, needs no cooling plate
- Frequencies up to 18 GHz
- Fully shielded against production of extraneous radiation
- Load requires no AC power
- Rugged Construction
- Broadband Operation

<b>Coolant Method</b>	Dry, Convection Cooled	<b>Ambient Temperature</b>	-40°C to 40°C
<b>Impedance</b>	50 Ohm	<b>AC Power</b>	None**
<b>Operating Position</b>	Any	<b>Humidity</b>	95% non-condensing
<b>PIM</b>	-110 dBc Min.		

	Power Rating	Connector	VSWR & Frequency Range	Dimensions (LxWxH)	Weight	Finish
2-T	2 W	SMA, BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	2.9" x 1.4" Dia 74 x 36 Dia. mm	4.6 oz. 131 g	Tri-alloy
2-NT	2 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.15:1 from 1 to 3 GHz	2.9" x 1.4" Dia 74 x 36 Dia. mm	4.6 oz. 131 g	
2-18T	2 W	SMA, N	1.20:1 from DC to 12.4 GHz 1.25:1 from 12.4 to 18 GHz	1.0" x 0.9" Dia. 26 x 23 Dia. mm	2.0 oz. 57 g	Stainless Steel
5-T	5 W	BNC, 7/16 DIN, N, TNC, MD	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	2.9" x 1.4" Dia 74 x 36 Dia. mm	4.6 oz. 131 g	Tri-alloy
5-NT	5 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	2.9" x 1.4" Dia 74 x 36 Dia. mm	4.6 oz. 131 g	
5-18T	5 W	SMA, N	1.15:1 from DC to 4 GHz 1.25:1 from 4 to 12.4 GHz 1.35:1 from 12.4 to 18 GHz	1.4" x 0.9" Dia. 36 x 23 Dia. mm	2.0 oz. 57 g	Stainless Steel
10-T	10 W	SMA, BNC, 7/16 DIN, N, TNC, MD	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	2.6" x 2.3" Dia. 67 x 59 Dia. mm	3 oz. 86 g	Black Anodized Aluminum
10-NT	10 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.15:1 from 1 to 3 GHz	2.2" x 2.3" Dia. 56 x 59 Dia. mm	5.9oz. 168 g	
10-18T	10 W	SMA, N	1.15:1 from DC to 4 GHz 1.25:1 from 4 to 12.4 GHz 1.35:1 from 12.4 to 18 GHz	1.7" x 1.0" Dia. 44 x 26 Dia. mm	2.0 oz. 57 g	
25-T	25 W	SMA, BNC, 7/16 DIN, N, TNC, MD	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	5.3" x 2.3" Dia. 135 x 59 Dia. mm	7 oz. 199 g	
25-NT	25 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	4.9" x 2.3" Dia. 125 x 59 Dia. mm	7 oz. 199 g	
25-6T	25 W	SMA, N	1.20:1 from DC to 6 GHz	3.5" x 2.3" x 2.3" 89 x 59 x 59 mm	14.0 oz. 397 g	
25-18T	25 W	SMA, N	1.20:1 from DC to 6 GHz 1.30:1 from 6 to 12.4 GHz 1.40:1 from 12.4 to 18 GHz	3.5" x 2.3" x 2.3" 89 x 59 x 59 mm	14.0 oz. 397 g	

\*\*1500 W models require 115/230V AC power

# Convection Cooled Loads



## CONVECTION COOLED LOAD PART NUMBER DEFINITION

POWER RATING (WATTS)	PRODUCT TYPE	CONNECTOR GENDER	CONNECTORS*
See chart below for models	T, WT – Convection-cooled CT – Conduction-cooled ST – Square Convection Cooled	F – Female M – Male	A – SMA B – BNC E – IEC 7/16 N – N T – TNC MD – Mini DIN-IEC 4.1/9.5

\*Call for custom connector options not shown in this catalog

	Power Rating	Connector	VSWR & Frequency Range	Dimensions (LxWxH)	Weight	Finish
50-T	50 W	SMA, BNC, 7/16 DIN, N, TNC, MD	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	5.3" x 2.3" Dia. 135 x 59 Dia. mm	1.3 lbs. 590 g	Black Anodized Aluminum
50-NT	50 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.15:1 from 1 to 3 GHz	5.3" x 2.3" Dia. 135 x 59 Dia. mm	1.2 lbs. 545 g	
50-6T	50 W	N	1.20:1 from DC to 6 GHz	4.0" x 3.0" x 3.0" 102 x 77 x 77 mm	1.6 lbs. 726 g	
50-18T	50 W	N	1.25:1 from DC to 6 GHz 1.35:1 from 6 to 12.4 GHz 1.45:1 from 12.4 to 18 GHz	4.0" x 3.0" x 3.0" 102 x 77 x 77 mm	1.6 lbs. 726 g	
75-T	75 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.20:1 from 1 to 3 GHz	7.2" x 2.3" Dia. 183 x 59 Dia. mm	1.5 lbs. 682 g	
100-T	100 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	6.8" x 6.4" x 2.6" 173 x 163 x 67 mm	3.6 lbs. 1.6 kg	
100-ST	100 W	BNC, 7/16 DIN, N, TNC, MD	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	7.4" x 2.8" x 2.8" 188 x 72 x 72 mm	2.7 lbs. 1.2 kg	
100-NST	100 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.20:1 from 1 to 3 GHz	7.3" x 2.8" x 2.8" 186 x 72 x 72 mm	2.7 lbs. 1.2 kg	
100-6T	100 W	N	1.20:1 from DC to 2 GHz 1.30:1 from 2 to 4 GHz 1.40:1 from 4 to 6 GHz	5.5" x 3.5" x 3.8" 140 x 89 x 97 mm	2.2 lbs. 1.0 kg	
150-T	150 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3.0 GHz	6.8" x 11.5" x 2.6" 173 x 293 x 67 mm	6.0 lbs. 2.8 kg	
150-ST	150 W	BNC, 7/16 DIN, N, TNC, MD	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3.0 GHz	8.1" x 4.0" x 4.0" 206 x 102 x 102 mm	5.0 lbs. 2.3 kg	
150-WT	150 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	4.9" x 5.4" x 4.8" 125 x 138 x 122 mm	2.5 lbs. 1.2 kg	
300-T	300 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	7.4" x 5.4" x 10.9" 188 x 138 x 277 mm	11.5 lbs. 5.3 kg	
300-WT	300 W	BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	8.2" x 5.4" x 4.8" 209 x 138 x 122 mm	4.7 lbs. 2.2 kg	
500-WT	500 W	7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	11.0" x 5.4" x 4.8" 280 x 138 x 122 mm	7.8 lbs. 3.6 kg	
600-T	600 W	7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	12.4" x 9.6" x 7.4" 315 x 244 x 188 mm	21.5 lbs. 9.8 kg	
1000-T	1000 W	7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	12.3" x 9.6" x 12.8" 313 x 244 x 326 mm	26.5 lbs. 12.0 kg	
1000-WT	1000 W	7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	18.5" x 10.6" x 4.8" 470 x 270 x 122 mm	26.5 lbs. 12.0 kg	
1500-WT**	1500 W	7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	20" x 10.6" x 6.0" 508 x 270 x 152 mm	30.0 lbs. 13.6 kg	

\*\*1500 W Models require 115/230V AC Power

# Conduction Cooled Loads



- Ultra compact, lightweight design
- Economical design
- Fully shielded against production of extraneous radiation
- Load requires no AC power
- 750, 1500, and 2500 W models rated for 13dB Peak Power

<b>Coolant Method</b>	Dry, Conduction Cooled	<b>Max Flange Temp for Full Rated Power</b>	-40°C to 40°C
<b>Impedance</b>	50 Ohm	<b>AC Power</b>	None
<b>Operating Position</b>	Any	<b>Humidity</b>	95% non-condensing
<b>PIM</b>	-110 dBc Min.		

	Power Rating	Connector	VSWR & Frequency Range	Dimensions (LxWxH)	Weight	Finish
<b>25-CT</b>	25 W	SMA	1.15:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	0.9" x 1.0" x 0.5" (23 x 26 x 13 mm)	0.4 oz 12 g	Tri-alloy
<b>50-CT</b>	50 W	SMA	1.15:1 from DC to 3 GHz 1.25:1 from 3 to 6 GHz	0.8" x 0.9" x 0.4" (21 x 23 x 11 mm)	1.1 oz 32 g	
<b>100-CT</b>	100 W	SMA	1.15:1 from DC to 2 GHz 1.25:1 from 2 to 3 GHz	1.4" x 1.4" x 0.6" (36 x 36 x 16 mm)	1.0 oz 30 g	
<b>150-CT</b>	150 W	N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	1.9" x 1.2" x 1.1" (49 x 31 x 28 mm)	2.2 oz 63 g	
		SMA	1.15:1 from DC to 2 GHz 1.25:1 from 2 to 3 GHz	2.1" x 2.1" x 0.6" (54 x 54 x 16 mm)		
<b>151-CT</b>	150 W	N	1.10:1 from DC to 1 GHz	2.0" x 2.0" x 1.1"	2.2 oz. 63 g	
			1.25:1 from 1 to 4 GHz	(51 x 51 x 28 mm)		
<b>250-CT</b>	250 W	BNC, N, TNC	1.10:1 from DC to 1 GHz	2.5" x 2.2" x 1.1"	5.2 oz. 148 g	
			1.25:1 from 1 to 2.4 GHz	(64 x 56 x 28 mm)		
		SMA	1.15:1 from DC to 2 GHz 1.25:1 from 2 to 3 GHz	2.1" x 2.1" x 0.6" (54 x 54 x 16 mm)		
<b>300-CT</b>	300 W	BNC, N, TNC, 7/16 DIN	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	4.8" x 2.0" x 1.2" (122 x 51 x 31 mm)	12 oz. 340 g	
<b>500-CT</b>	500 W	SMA, BNC, N, TNC, 7/16 DIN	1.10:1 from DC to 1 GHz 1.30:1 from 1 to 3 GHz	2.7" x 2.0" x 1.2" (69 x 51 x 31 mm)	8.2 oz. 233 g	
<b>750-CT</b>	750 W	7/16 DIN	1.2:1 from DC - 250 MHz 1.3:1 from 250 - 1000 MHz	5.4" x 3.0" x 1.5" (138 x 78 x 38 mm)	2.3 lbs 1.1 kg	Al / Cu
<b>1500-CT</b>	1500 W	7/16 DIN	1.2:1 from DC - 250 MHz 1.3:1 from 250 - 1000 MHz	8.1" x 3.0" x 1.5" (208 x 78 x 38 mm)	3.5 lbs 1.6 kg	
<b>2500-CT</b>	2500 W	7/16 DIN	1.2:1 from DC - 250 MHz 1.3:1 from 250 - 1000 MHz	9.4" x 3.0" x 1.5" (240 x 78 x 38 mm)	4.2 lbs 2.0 kg	

# Oil Loads



- Wide range of available RF input connectors
- Compact design
- Capable of up to 10 dB peak to average power ratios
- Broadband operation
- Self-contained cooling system that includes cooling fans for higher power models

<b>Altitude</b>	1520 m (5000 ft.)	<b>Finish</b>	Gray Powder Coat
<b>Humidity</b>	95% noncondensing max	<b>Load Coolant</b>	8135, 8201, 8251: Refined Mineral Oil All Others: Silicone Oil
<b>Impedance</b>	50 Ohms Nominal	<b>CE</b>	EMC EN 61326-1:2006 (units w/blowers) and Safety EN 61010-1:2001 (all units)
<b>Ambient Temperature Range</b>	-40°C to +45°C		
<b>Operating Position</b>	Vertical Only		

	Power Rating	Frequency Range/VSWR	Cooling Method	Connector	Dimensions	Weight
<b>8135</b>	150 W	DC to 1 GHz at 1.1:1 max 1 to 2 GHz at 1.2:1 max 2.5 to 4 GHz at 1.3:1 max	Convection	QC - N(f)	9.6" x 6.5" x 4" 242mm x 164mm x 102mm	6.0 lbs. 2.7 kg
<b>8141</b>	250 W	DC to 1 GHz at 1.1:1 max 1 to 1.8 GHz at 1.2:1 max 1.8 to 2.5 GHz at 1.3:1 max	Convection	QC - N(f)	9.6" x 8.5" x 6" 243mm x 216mm x 151mm	10 lbs. 4.5 kg
<b>8201</b>	500 W	DC to 1 GHz at 1.1:1 max 1 to 2.5 GHz at 1.25:1 max	Convection	QC - N(f)	16.8" x 8.5" x 6" 427mm x 216mm x 151mm	20 lbs. 9.1 kg
<b>8401</b>	600 W	DC to 1 GHz at 1.1:1 max 1 to 2.8 GHz at 1.2:1 max 2.8 to 3 GHz at 1.3:1 max	Convection	QC - N(f)	16.2" x 8.5" x 6" 408mm x 216mm x 151mm	20 lbs. 9.1 kg
<b>8251</b>	1000 W	DC to 1 GHz at 1.1:1 max 1 to 2 GHz at 1.25:1 max 2 to 2.4 GHz at 1.3:1 max	Convection	QC - LC(f)	17.9" x 8.5" x 6" 455mm x 216mm x 151mm	25 lbs. 11.5 kg
<b>8860</b> <b>8861</b> <b>8862</b> <b>8863</b> <b>8864</b>	1500 W	DC to 1 GHz at 1.1:1 max 1 to 2 GHz at 1.25:1 max	Convection	QC - LC(f) 1-5/8 EIA Unflg 1-5/8 EIA Flg 3-1/8 EIA Unflg 3-1/8 EIA Flg	19.5" x 7.5" x 13.2" 496mm x 184mm x 334mm	32 lbs. 14.5 kg
<b>8890-300</b> <b>8891-300</b> <b>8892-300</b> <b>8895-300</b>	2500 W		Convection	QC - LC(f) 3-1/8 EIA Flg 1-5/8 EIA Flg 1-5/8 EIA Unflg	25.2" x 7" x 17.2" 638mm x 178mm x 437mm	59 lbs. 27 kg
<b>8890-315</b> <b>8890-320</b> <b>8891-315</b> <b>8891-320</b> <b>8892-315</b> <b>8892-320</b> <b>8895-315</b> <b>8895-320</b> <b>8897-315</b> <b>8897-320</b>	5000 W	DC to 1 GHz at 1.1:1 max 1 to 2 GHz at 1.25:1 max 2 to 2.4 GHz at 1.3 max	115 VAC Fan 230 VAC Fan 115 VAC Fan 230 VAC Fan 115 VAC Fan 230 VAC Fan 115 VAC Fan 230 VAC Fan	QC - LC(f) QC - LC(f) 3-1/8 EIA Flg 1-5/8 EIA Flg 1-5/8 EIA Unflg	25.2" x 7.4" x 22.7" 638mm x 187mm x 560mm	73 lbs. 33 kg
<b>8921</b> <b>8922</b> <b>8926</b> <b>8927</b>	5000 W	DC to 1 GHz at 1.1:1 max	Convection	QC - LC(f) 1-5/8 EIA Flg 3-1/8 EIA Flg 3-1/8 EIA Unflg	32.8" x 9.5" x 26.9" 832mm x 241mm x 681mm	126 lbs. 57 kg
<b>8931-115</b> <b>8931-230</b> <b>8932-115</b> <b>8932-230</b> <b>8936-115</b> <b>8936-230</b> <b>8937-115</b> <b>8937-230</b>	10000 W	DC to 400 MHz at 1.15:1 max, 400 MHz to 1 GHz at 1.2:1 max	115 VAC Fan 230 VAC Fan 115 VAC Fan 230 VAC Fan 115 VAC Fan 230 VAC Fan 115 VAC Fan 230 VAC Fan	QC - LC(f) QC - LC(f) 1-5/8 EIA Flg 1-5/8 EIA Flg 3-1/8 EIA Flg 3-1/8 EIA Flg 3-1/8 EIA Unflg 3-1/8 EIA Unflg	32.8" x 9.5" x 33.4" 832mm x 241mm x 847mm	142 lbs. 65 kg

# Market-Specific Oil Loads



- Compact design
- Tuned for optimal performance over target frequency ranges
- Capable of up to 10 dB peak to average power ratios
- Self-contained cooling system that includes fans for higher power levels
- Wide range of available RF input connectors

<b>Impedance</b>	50 Ohm
<b>Altitude</b>	5000 ft (1520 m)
<b>Humidity</b>	95% noncondensing max
<b>Ambient Temperature Range</b>	<b>Digital Broadcast Loads:</b> -40° to 113° F (-40° to 45° C) <b>Semiconductor Precision Loads:</b> 41° to 104° F (5° to 40° C)

<b>Storage Temperature</b>	-40° to 113° F (-40° to 45° C)
<b>Operating Position</b>	None
<b>Load Coolant</b>	Silicone Oil
<b>Finish</b>	<b>Digital Broadcast Loads:</b> Gray Powder Coat <b>Semiconductor Precision Loads:</b> Black Powder Coat

## DIGITAL BROADCAST OIL LOADS

	Power Rating	Frequency Range/VSWR	Cooling Method	Connector	Dimensions	Weight		
8251D	1 kW	470-860 MHz at 1.065:1 VSWR Max	Convection	1-5/8 EIA Flg	17.9" x 8.5" x 6"	25 lbs.		
8251D7-16	1 kW			QC-DIN(F)	(455 mm x 216 mm x 151 mm)	11.5 kg		
8862D	1.5 kW			1-5/8 EIA Flg	19.5" x 7.5" x 13.2" (496 mm x 184 mm x 334 mm)	32 lbs. 14.5 kg		
8862D13-30	1.5 kW			13-30 IEC (M)				
8864D	1.5 kW			3-1/8 EIA Flg	25.2" x 7" x 17.2" (638 mm x 178 mm x 437 mm)	59 lbs. 27 kg		
8891D300	2.5 kW			3-1/8 EIA Flg				
8892D13-30	2.5 kW			13-30 IEC (M)				
8892D300	2.5 kW			1-5/8 EIA Flg				
8892D320	5 kW			470-860 MHz at 1.15:1 VSWR Max	230 VAC Fan	1-5/8 EIA Flg	32.8" x 9.5" x 26.9" (832 mm x 241 mm x 681 mm)	73 lbs. 33 kg
8922D	5 kW				Convection	1-5/8 EIA Flg		
8926D	5 kW	3-1/8 EIA Flg						
8927D	5 kW	3-1/8 EIA Flg						
8936D115	10 kW	470-860 MHz at 1.15:1 VSWR Max	115 VAC Fan		3-1/8 EIA Flg	32.8" x 9.5" x 33.4" (832 mm x 241 mm x 847 mm)		142 lbs. 65 kg
8936D230	10 kW		230 VAC Fan	3-1/8 EIA Flg				

## SEMICONDUCTOR PRECISION OIL LOADS

	Power Rating	Frequency Range/VSWR	Cooling Method	Connector	Dimensions	Weight	
8865SC13	1 kW	DC to 28 MHz at 1.10:1 VSWR max	Convection	QC-LC(F)	19.5" x 7.5" x 13.2" (496 mm x 184 mm x 334 mm)	32 lbs. 14.5 kg	
8890-300SC13	2.5 kW				25.2" x 7" x 17.2" (638 mm x 178 mm x 437 mm)	59 lbs. 27 kg	
8921SC13	5 kW				32.8" x 9.5" x 26.9" (832 mm x 241 mm x 681 mm)	126 lbs. 57 kg	
8931-115SC13	10 kW				32.8" x 9.5" x 33.4" (832 mm x 241 mm x 847 mm)	142 lbs. 65 kg	
8931-230SC13	10 kW			QC-DIN(F)	230 VAC Fan	43" x 9.5" x 33.4" (1092 mm x 241 mm x 847 mm)	236 lbs. 107 kg
8941-115SC13	15 kW						
8941-230SC13	15 kW						
8941-230SC13	15 kW						



# Econoloads

- Econoloads are the smallest load design for the power dissipated
- Utilizing an external water supply, the Econoloads have no input power requirements
- Surface cool to the touch
- May be mounted in any orientation
- Standard EIA RF connections and NPT Water connections



<b>Impedance</b>	50 Ohm
<b>Finish</b>	5 kW - Bright Nickel Plate 10kW - 80 kW - Black Powder Coat
<b>Load Coolant</b>	Potable Water
<b>Operating Position</b>	Any

<b>Waterlines</b>	5 kW, 8720 - 1/4" FPT 5 kW, 8726 - 3/4" Hose 10kW - 80 kW - 3/4" Hose
<b>Water Inlet Temp.</b>	5 kW - 5°C to 80°C 10kW - 80 kW - 5°C to 60°C

	Power Rating	Frequency Range/VSWR	Connector	Flow Rate	Dimensions	Weight
8720	5 kW	DC to 500 MHz at 1.1:1 max 500 to 900 MHz at 1.15:1 max 900 to 2000 MHz at 1.25:1 max	1-5/8" EIA Flg	1 GPM (4 LPM) @ 5°C to 4 GPM (15 LPM) @ 80°C	8.1" x 3.5" Dia. 204 mm x 89 mm Dia.	2 lbs. 2 oz. 964 g
8726	5 kW	DC to 500 MHz at 1.1:1 max 500 to 2000 MHz at 1.25:1 max	QC - LC(f)		10.5" x 1.7" Dia. 265 mm x 43 mm Dia.	2 lbs. 8 oz. 1.1 kg
8730A	10 kW	DC to 1 GHz at 1.1:1 max	1-5/8" EIA Flg		16.0" x 4.4" Dia. 406 mm x 111 mm Dia.	8 lbs. 3.6 kg
8731	10 kW	1 kHz to 1 GHz at 1.1:1 max	3-1/8" EIA Flg	4 GPM (15 LPM) @ 5°C to 6 GPM (23 LPM) @ 60°C	14.7" x 5.2" Dia. 372 mm x 132 mm Dia.	6 lbs. 4 oz. 2.9 kg
8738A	10 kW	1 kHz to 1 GHz at 1.1:1 max	3-1/8" EIA Unflg		16.0" x 4.4" Dia. 406 mm x 111 mm Dia.	6 lbs. 2.8 kg
8745	20 kW	1 kHz to 900 MHz at 1.1:1 max	3-1/8" EIA Flg	6 GPM (23 LPM) @ 5°C to 8 GPM (30 LPM) @ 60°C	19.5" x 5.2" Dia. 495 mm x 132 mm Dia.	15 lbs. 13 oz. 7.2 kg
8746	20 kW		3-1/8" EIA Unflg			15 lbs. 5 oz. 7.0 kg
8755	30 kW		3-1/8" EIA Flg	7 GPM (26 LPM) @ 5°C to 9 GPM (34 LPM) @ 60°C		15 lbs. 13 oz. 7.2 kg
8756	30 kW		3-1/8" EIA Unflg			15 lbs. 5 oz. 7.0 kg
8765	40 kW		3-1/8" EIA Flg	8 GPM (30 LPM) @ 5°C to 10 GPM (38 LPM) @ 60°C		15 lbs. 13 oz. 7.2 kg
8775	50 kW		3-1/8" EIA Flg	9 GPM (34 LPM) @ 5°C to 11 GPM (42 LPM) @ 60°C		15 lbs. 13 oz. 7.2 kg
8776	50 kW		3-1/8" EIA Unflg			15 lbs. 5 oz. 7.0 kg
8792	80kW		1 kHz to 800 MHz at 1.15:1 max	6-1/8" EIA Flg		9 GPM (34 LPM) @ 5°C to 12 GPM (46 LPM) @ 60°C

# Digital Air Loads

## DA Series

- Self-contained and convenient means of dissipating large amounts analog, digital, and combined signals
- Excellent VSWR performance with <1.05:1 typical VSWR (1.1:1 max) across rated frequency range
- Handles >13 dB Peak to Average power ratio
- Ductable exhaust and cool-to-the-touch exterior surfaces
- Double shielded against the production of extraneous radiation

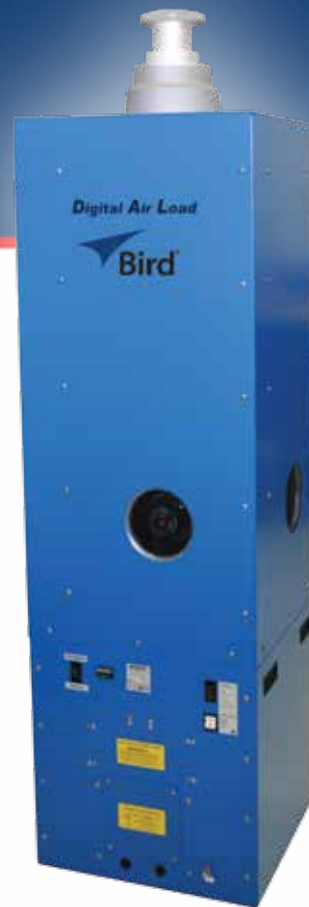
### VHF

<b>Impedance</b>	50 ohm nominal
<b>VSWR (DC-240 MHz)</b>	1.05:1 typical, 1.10:1 maximum
<b>Cooling Method</b>	Forced air-cooled
<b>Peak to Average Power</b>	>10 dB
<b>Ambient Temperature</b>	-40°C to +45°C (-40°F to +113°F)
<b>Interlock Contact Rating</b>	10 A @ 120 VAC, 5 A @ 250 VAC
<b>Finish</b>	Blue Powder Coat
<b>AC Power Required</b>	115 V/230 V 50/60 Hz
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001

### UHF

<b>Impedance</b>	50 ohm nominal
<b>VSWR (470-890 MHz)</b>	1.05:1 typical, 1.10:1 maximum
<b>Cooling Method</b>	Forced air-cooled
<b>Peak to Average Power</b>	>10 dB*
<b>Ambient Temperature</b>	-40°C to +45°C (-40°F to +113°F)
<b>Interlock Contact Rating</b>	10 A @ 120 VAC, 5 A @ 250 VAC
<b>Finish</b>	Blue Powder Coat
<b>AC Power Required</b>	115 V/230 V 50/60 Hz
<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001

\*DA40 Peak to Average is 14 dB



# Digital Air Loads

## DA Series

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

Other models available, please consult factory.

# Moduloads



- Forced-air heat exchanger cooled load for high-power applications up to 900 MHz
- High power RF dissipation with 10, 25 and 50 kW versions are available
- Available in models to work with 115 or 230 volts at 50 or 60 Hz
- Compact, low-profile design saves space in crowded transmitter sites
- Interlock control circuit provides fail-safe protection of the transmitter

<b>Frequency Range</b>	10kW - 1 kHz to 1000 MHz at 1.1:1 max 25 kW & 50 kW - 1 kHz to 900 MHz at 1.1:1 max	<b>Operating Position</b>	Horizontal Only
<b>Finish</b>	Gray Powder Coat	<b>CE</b>	EMC EN 61326-1:2006 and Safety EN 61010-1:2001
<b>Load Coolant</b>	100 % Water 35% Ethylene Glycol / 65% Water		

	Input Power	[Power Rating] Operating Temperature	Connector	Dimensions (Lx- WxH)	Weight				
<b>8631B115</b>	9.5 A @ 115V, 60Hz	[10 kW] 100% Water: +5°C to +45°C, 35% Ethylene Glycol / 65% Water: -20°C to +35°C	3-1/8" EIA Flg	24.6" x 15.9" x 17.5" 623 mm x 402 mm x 443 mm	113 lbs. 50.9 kg				
<b>8631B230</b>	4.75A @ 230V, 50Hz								
<b>8631B230-6</b>	4.75A @ 230V, 60Hz								
<b>8635B115</b>	9.5 A @ 115V, 60Hz		1-5/8" EIA Flg						
<b>8635B230</b>	4.75A @ 230V, 50Hz								
<b>8638B115</b>	9.5 A @ 115V, 60Hz								
<b>8638B230</b>	4.75A @ 230V, 50Hz	[25 kW] 100% Water: +5°C to +30°C, 35% Ethylene Glycol / 65% Water: -20°C to +25°C	3-1/8" EIA Unflg	28.5" x 19.6" x 20.9" 723 mm x 497 mm x 528 mm	155 lbs. 70 kg				
<b>8638B230-6</b>	4.75A @ 230V, 60Hz								
<b>8645B115</b>	11 A @ 115V, 60Hz	[20 kW] 100% Water: +5°C to +45°C, 35% Ethylene Glycol / 65% Water: -20°C to +35°C	3-1/8" EIA Flg			53" x 19.6" x 20.9" 1347 mm x 497 mm x 528 mm	275 lbs. 125 kg		
<b>8645B230</b>	5.5 A @ 230V, 50Hz								
<b>8645B230-6</b>	5.5 A @ 230V, 60Hz	[40kW] 100% Water: +5°C to +45°C, 35% Ethylene Glycol / 65% Water: -20°C to +35°C	3-1/8" EIA Unflg						
<b>8646B115</b>	11 A @ 115V, 60Hz								
<b>8646B230</b>	5.5 A @ 230V, 50Hz	3-1/8" EIA Flg							
<b>8646B230-6</b>	5.5 A @ 230V, 60Hz								
<b>8655B115-6</b>	15 A @ 115V, 60Hz	[50kW] 100% Water: +5°C to +35°C, 35% Ethylene Glycol / 65% Water: -20°C to +25°C			3-1/8" EIA Flg				
<b>8655B230-5</b>	8 A @ 230V, 50Hz								
<b>8655B230-6</b>	8 A @ 230V, 60Hz	[40kW] 100% Water: +5°C to +45°C, 35% Ethylene Glycol / 65% Water: -20°C to +35°C			3-1/8" EIA Unflg				
<b>8656B115-6</b>	15 A @ 115V, 60Hz								
<b>8656B230-5</b>	8 A @ 230V, 50Hz	3-1/8" EIA Flg							
<b>8656B230-6</b>	8 A @ 230V, 60Hz								

# Oil Convection Cooled Attenuators



- Self cooling design
- Broadband operation
- Rugged construction
- Fully shielded against production of extraneous radiation
- Other Attenuation values available upon request

**Coolant Method** Oil, Convection Cooled  
**Impedance** 50 Ohm  
**Operating Position** Horizontal Only

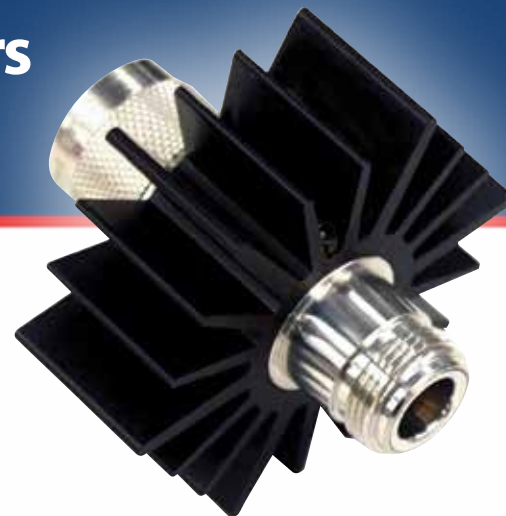
**Ambient Temperature** -40°C to 45°C  
**Humidity** 95% non-condensing  
**Standard Attenuation Value** 30 dB

	Power Rating	Connector	VSWR & Frequency Range	Cooling Method	Dimensions (LxWxH)	Weight
8325	500 W	QC - N(f) Input; QC - N(f) Output	DC to 500 MHz at 1.1:1 max	Convection	17.5" x 6.0" x 8.5" 445mm x 151mm x 216mm	25 lbs. 11.0 kg
8327-300	1000 W	QC - LC(f) Input; QC - N(f) Output			24.0" x 7.2" x 17.2" 596mm x 181mm x 437mm	57 lbs. 26.0 kg
8329-300	2000W	QC - LC(f) Input; QC - N(f) Output			24.0" x 7.2" x 17.2" 596mm x 181mm x 437mm	
8329-300 w/ BA-300-115	4000 W	QC - LC(f) Input; QC - N(f) Output		Forced Convection, 115 VAC Fan	23.5" x 7.2" x 22.1" 596mm x 181mm x 560mm	70.5 lbs. 32 kg
8329-300 w/ BA-300-230	4000 W			Forced Convection, 230 VAC Fan		

## OPTIONAL ACCESSORIES

- Interlock Thermoswitch . . . . . 2450-056 (8327 Models only)  
 Interlock Thermoswitch . . . . . 8329-028 (8329 Models only)

# Convection Cooled Attenuators



- Self cooling design, needs no cooling plate
- Frequencies up to 18 GHz
- Fully shielded against production of extraneous radiation
- Attenuator requires no AC power
- Rugged construction
- Broadband operation
- Other attenuation values available upon request
- Models to cover all LTE frequencies

<b>Coolant Method</b>	Dry, Convection Cooled
<b>Impedance</b>	50 Ohm
<b>Operating Position</b>	Any
<b>Ambient Temperature</b>	-40°C to 40°C
<b>PIM</b>	-110 dBc Min.

<b>AC Power</b>	None**
<b>Humidity</b>	95% non-condensing
<b>Standard Attenuation Values</b>	3, 6, 10, 20, 30 dB

	Power Rating	Connector	VSWR & Frequency Range	Dimensions (LxWxH)	Weight	Finish
<b>2-A</b>	2 W	BNC, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	2.4" x 0.8" Dia. 61 x 21 Dia. mm	3.1 oz. 88 g	Tri-Alloy
<b>2-A</b>	2 W	SMA	1.15:1 from DC to 2.5 GHz 1.30:1 from 2.5 to 6 GHz	0.9" x 0.4" Dia. 23 x 11 Dia. mm	1.2 oz. 34 g	Stainless Steel
<b>2-6A</b>	2 W	N	1.25:1 from DC to 6 GHz	1.8" x 0.9" Dia. 46 x 23 Dia. mm	2.5 oz. 71 g	
<b>2-18A</b>	2 W	SMA, N	1.15:1 from DC to 4 GHz 1.20:1 from 4 to 8 GHz 1.25:1 from 8 to 12.4 GHz 1.35:1 from 12.44 to 18 GHz	1.8" x 0.9" Dia. 46 x 23 Dia. mm	2.5 oz. 71 g	
<b>3-A</b>	3 W	BNC, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	1.5" x 0.6" Dia. 39 x 16 Dia. mm	3.1 oz. 88 g	Tri-Alloy
<b>5-A</b>	5 W	BNC, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	2.6" x 0.8" Dia. 67 x 21 Dia. mm	3.1 oz. 88 g	Stainless Steel
<b>5-6A</b>	5 W	N	1.25:1 from DC to 6 GHz	2.4" x 0.9" Dia. 61 x 23 Dia. mm	3.0 oz. 86 g	
<b>5-18A</b>	5 W	SMA, N	1.15:1 from DC to 4 GHz 1.25:1 from 4 to 12.4 GHz 1.35:1 from 12.4 to 18 GHz	2.5" x 0.9" Dia. 64 x 23 Dia. mm	3.5 oz. 100 g	
<b>10-A</b>	10 W	SMA, BNC, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	2.8" x 2.3" Dia. 72 x 59 Dia. mm	5.0 oz. 142 g	Black Anodized Aluminum
<b>10-6A</b>	10 W	SMA, N	1.20:1 from DC to 4 GHz 1.30:1 from 4 to 6 GHz	2.5" x 1.1" Dia. 64 x 28 Dia. mm	3.5 oz. 100 g	Stainless Steel
<b>10-18A</b>	10 W	N	1.20:1 from DC to 4 GHz 1.30:1 from 4 to 12.4 GHz 1.45:1 from 12.4 to 18 GHz	2.5" x 0.9" Dia. 64 x 23 Dia. mm	3.5 oz. 100 g	
<b>25-A</b>	25 W	SMA, BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 4 GHz	5.3" x 2.3" Dia. 135 x 59 Dia. mm	9.0 oz. 256 g	
<b>25-6A</b>	25 W	N	1.20:1 from DC to 6 GHz	4.2" x 2.3" x 2.3" 107 x 59 x 59 mm	13.5 oz. 383 g	Stainless Steel
<b>25-18A</b>	25 W	N	1.20:1 from DC to 4 GHz 1.30:1 from 4 to 12.4 GHz 1.40:1 from 12.4 to 18 GHz	4.2" x 2.3" x 2.3" 107 x 59 x 59 mm	13.5 oz. 383 g	

\*\*1500 W models require 115/230V AC power

# Convection Cooled Attenuators



## CONVECTION COOLED ATTENUATOR PART NUMBER DEFINITION

POWER RATING (WATTS)	PRODUCT TYPE	CONNECTOR GENDER	CONNECTORS*	ATTENUATION VALUE (in dB)
See chart below for models	A, SA, WA – Attenuator	M/F – Male/Female F/F – Female/ Female	A - SMA B - BNC N - N T - TNC E - IEC 7/16	03 – 3 dB 06 – 6 dB 10 – 10 dB 20 – 20 dB 30 – 30 dB

\*Call for custom connector options not shown in this catalog

Power Rating	Connector	VSWR & Frequency Range	Dimensions (LxWxH)	Weight	Finish
<b>50-A</b>	50 W SMA, BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	6.4" x 2.3" Dia. 163 x 59 Dia. mm	1.0 lbs. 454 g	Black Anodized Aluminum
<b>50-6A</b>	50 W N	1.20:1 from DC to 6 GHz	4.7" x 3.0" x 3.0" 120 x 77 x 77 mm	1.7 lbs. 772 g	Stainless Steel
<b>50-18A</b>	50 W N	1.25:1 from DC to 6 GHz 1.35:1 from 6 to 12.4 GHz 1.45:1 from 12.4 to 18 GHz	4.7" x 3.0" x 3.0" 120 x 77 x 77 mm	1.7 lbs. 772 g	Stainless Steel
<b>75-A</b>	75 W SMA, BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3.0 GHz	7.3" x 2.3" Dia. 186 x 59 Dia. mm	1.6 lbs. 726 g	Black Anodized Aluminum
<b>100-A</b>	100 W SMA, BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	7.3" x 2.6" x 6.4" 186 x 67 x 163 mm	3.6 lbs.	Black Anodized Aluminum
<b>100-6A</b>	100 W N	1.20:1 from DC to 2 GHz 1.35:1 from 2 to 4 GHz 1.40:1 from 4 to 6 GHz	6.4" x 2.7" x 3.8" 163 x 69 x 97 mm	2.4 lbs. 1.7 kg	Stainless Steel
<b>100-SA</b>	100 W BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	8.4" x 2.8" x 2.8" 214 x 72 x 72 mm	3.0 lbs. 1.4 kg	Black Anodized Aluminum
<b>150-A</b>	150 W BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 3 GHz	6.7" x 2.6" x 11.9" 171 x 67 x 303 mm	6.6 lbs. 3.0 kg	
<b>150-SA</b>	150 W SMA, BNC, 7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	9.1" x 4.0" x 5.0" 232 x 102 x 127 mm	5.5 lbs. 2.5 kg	
<b>150-WA</b>	150 W BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	5.6" x 5.4" x 4.3" 143 x 138 x 110 mm	2.5 lbs. 1.2 kg	
<b>300-A</b>	300 W BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	7.3" x 5.4" x 10.9" 186 x 138 x 277 mm	12.0 lbs. 5.5 kg	
<b>300-WA</b>	300 W BNC, 7/16 DIN, N, TNC	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	9.0" x 5.4" x 4.8" 229 x 138 x 122 mm	4.6 lbs. 2.1 kg	
<b>500-WA</b>	500 W 7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	12.4" x 5.4" x 4.8" 315 x 138 x 122 mm	7.9 lbs. 3.6 kg	
<b>600-A</b>	600 W 7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	12.7" x 9.4" x 9.6" 323 x 239 x 244 mm	21.5 lbs. 9.8 kg	
<b>1000-A*</b>	1000 W 7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	13.6" x 12.8" x 9.6" 346 x 326 x 244 mm	26.5 lbs. 12.0 kg	
<b>1000-WA*</b>	1000 W 7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	19.6" x 10.6" x 4.8" 498 x 270 x 122 mm	26.5 lbs. 12.0 kg	
<b>1500-WA*</b>	1500 W 7/16 DIN, N	1.10:1 from DC to 1 GHz 1.25:1 from 1 to 2.4 GHz	20.4" x 10.7" x 5.9" 519 x 272 x 150 mm	30.0 lbs. 13.6 kg	

\*Note: attenuators 1000 W and above are not available in attenuation values less than 10 dB

# Variable RF Signal Samplers

## 4273 & 4275 Series



- Very low insertion VSWR across the operating frequency range with an insertion loss is less than 0.2 dB
- Available with a wide variety of Quick Change (QC) connectors
- Passive device requiring no external source of power or utility service
- Includes locking devices on the attenuation control knob

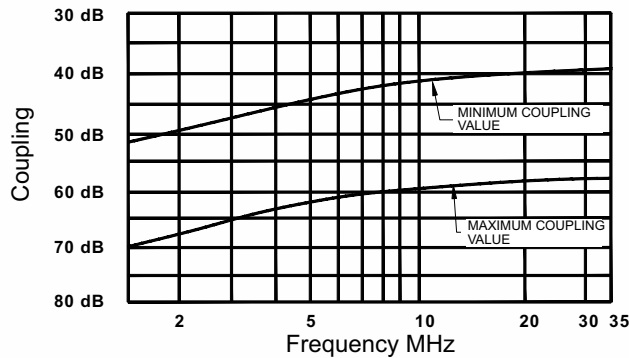
ACCESSORIES

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

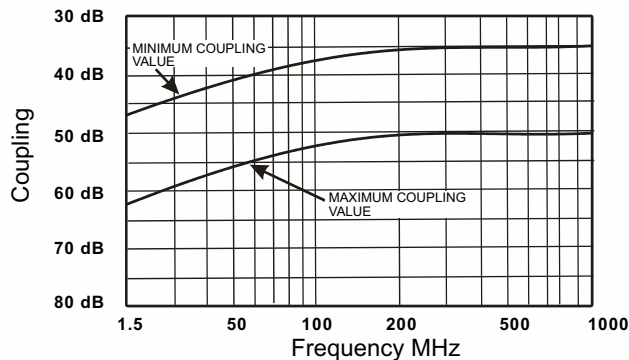
### POWER CONNECTORS

	"QC" CONNECTOR
4273	None
4273-020	N (Male/Female)
4275	None
4275-020	N (Male/Female)
4275-025	N (Female/Female)

### Model 4273



### Model 4275





# Coaxial Selector Switches

71, 72 R, 74 Series

- Rugged and reliable design which permits positive contact
- Low insertion VSWR and negligible cross talk between channels
- Can't be operated accidentally - must be operated by intentional sequential movement
- Switches may be panel-mounted



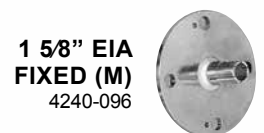
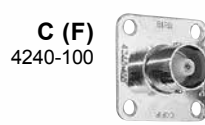
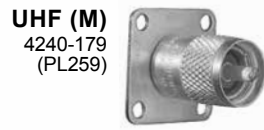
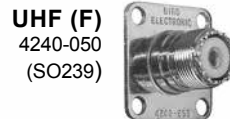
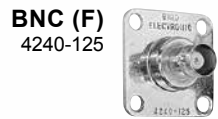
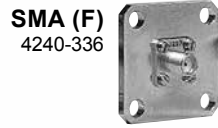
<b>Frequency Range</b>	DC to 10 GHz
<b>Maximum RF Voltage</b>	500 volts rms
<b>Attenuation to Unused Channel</b>	75 dB (cross talk)
<b>Ambient Temp.</b>	-60°C to +65°C (-76°F to +149°F)
<b>Weight</b>	Varies by model, approx. 2 1/2 lbs. (1.1 kg)

## 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

	7422	7441	7431	74	718	7181	72-2	72R
<b>Positions</b>	2	3	4	6	8	10	2	Reversing
<b>Coaxial Circuits</b>	1	1	1	1	1	1	2	2

# QC Connectors



# Adapters & Connectors



## INTERSERIES ADAPTER KITS 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 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)	.	.	.	.	.	.	.

## INTERSERIES ADAPTERS

	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

	Description
4240-165	QC (F) to QC (F)
4240-180	Copl. (M) 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)

## COUPLING KITS

	Description	ohm
4240-220	7/8" Flg.	50
4712-020	1 5/8" Flg.	50
4600-020	3 1/8" Flg.	50
4902-020	6 1/8" Flg.	50

## FLANGE-TO-FLANGE ADAPTERS

	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

# Miscellaneous Accessories

## DC CABLE ASSEMBLIES

	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

	Use With	Volts	Type	Notes
5A1230	4391A	1.25	NiMH	6 req.
5A1587	4412A	9	NiMH	-
5-1375	4314B, 4410A, 4041, 4410, APM-16	9	Alkaline	-

## MISCELLANEOUS

	Use With	Description
3610-031	All Element Sockets	Dummy Plug
5A2229	AT Series	Power Supply 120 V
5A2226	AT Series	Power Supply 230 V
5B2229-156E	4314C	Power Supply 115 V /230 V
7500-076	-	DC Connector



## CASES

	Description
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
4300A085	4391 POWER ANALYST®, signal sampler, and other accessories
4300-055	4410 Wattmeter, 100-ST load, elements and accessories
4300A215	4421 Wattmeter and power sensors
5000-030	Soft Case - AT-800 Antenna Testers, 5000-EX
5000-035	Hard Transit Case - 5000-XT 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.

# Load and Cooling Accessories

## THERMOSWITCHES FOR AIR-COOLED LOADS

	Connector	Temp. Set Point	Use With Group
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

## WATER-COOLED ACCESSORIES

	Product	Power
RPK6770A120	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

## REPLACEMENT RESISTORS

	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

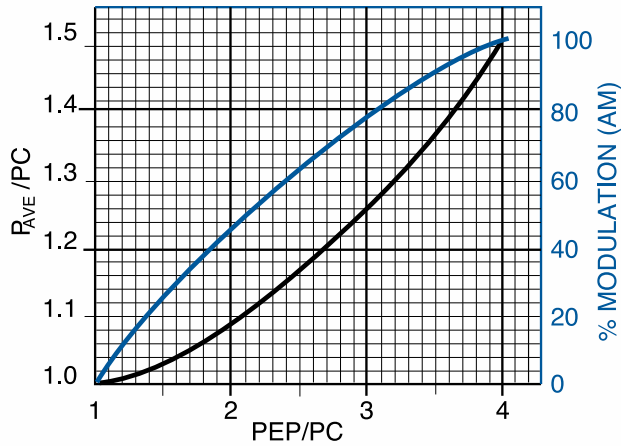
## COOLANTS

	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

## DOLLIES

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

# Technical Data



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

In the table below,  $Z^{\circ} = 50$  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 <sub>RMS</sub> (arbitrary)	PEP = PEV <sub>RMS</sub> <sup>2</sup> / Z <sub>0</sub>	P <sub>AVE</sub> (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		$\frac{400}{\sqrt{2}}$ V	1600 W	400 W	-	1600 W	-	-	400W
Table B CW		$\frac{100}{\sqrt{2}}$ V	100 W	100 W	100 W	100 W	0%	100 W	100W
Table C AM 100% Mod.		$\frac{200}{\sqrt{2}}$ V	400 W	150 W	100 W	400 W	100%	100 W	150 W
Table D AM 75% Mod.		$\frac{173}{\sqrt{2}}$ V	300 W	127 W	100 W	300 W	73%	100 W	127 W
Table E SSB 1 Tone		$\frac{100}{\sqrt{2}}$ V	100 W	100 W	100 W	100 W	0%	100 W	100 W
Table F SSB 2 Tones		$\frac{100}{\sqrt{2}}$ V	100 W	50 W	25 W	100 W	100%	40.5 W	50 W
Table G SSB Voice		$\frac{100}{\sqrt{2}}$ V	100 W	-	-	100 W	-	-	-
Table H TV Black Level		$\frac{100}{\sqrt{2}}$ V	100 W	60.1 W	Models 4314B and 4391A only			59.6 W	60.1 W
Table I Pulse		$\frac{100}{\sqrt{2}}$ V	100 W	10 W	-	100 W	100%	-	10 W
Table J Pulse		$\sqrt{400Z_0}$	400 W	100 W	130 W	400 W	-	130 W	100 W



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

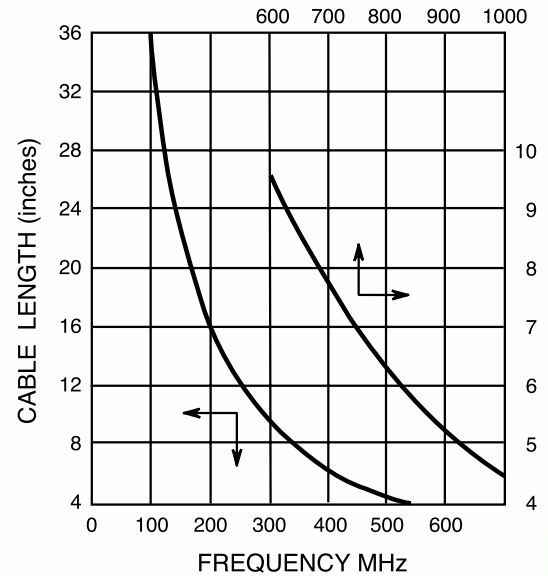
When a Model APM-16, 43, 4431, 4314B or 4391A is used to match a load to a transmitter and a good match is obtained, removing the instrument will not cause any change in the conditions, since a good 50 ohm load can be placed at the end of a 50 ohm transmission line of any length without altering conditions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

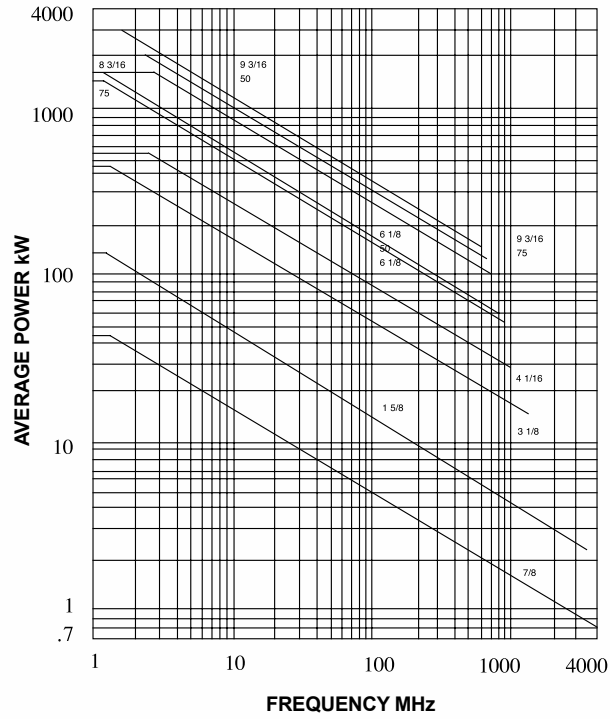
	Avg. Power	Pulse Width (μs)				
		1	10	100	1000	5000
<b>8135</b>	150 W	10 kW	8.0 kW	5.75 kW	3.5 kW	2.0 kW
<b>8201</b>	500 W	200 kW	150 kW	105 kW	57 kW	25 kW
<b>8251</b>	1000 W	200 kW	150 kW	105 kW	57 kW	25 kW
<b>8890 Series</b>	2.5 kW	150 kW	115 kW	80 kW	54 kW	22 kW
<b>8920 Series</b>	5 kW	150 kW	115 kW	80 kW	54 kW	22 kW
<b>8930 Series</b>	10 kW	150 kW	120 kW	85 kW	55 kW	30 kW

### TYPICAL PEAK POWER RATINGS - DIRECT WATER COOLED LOADS

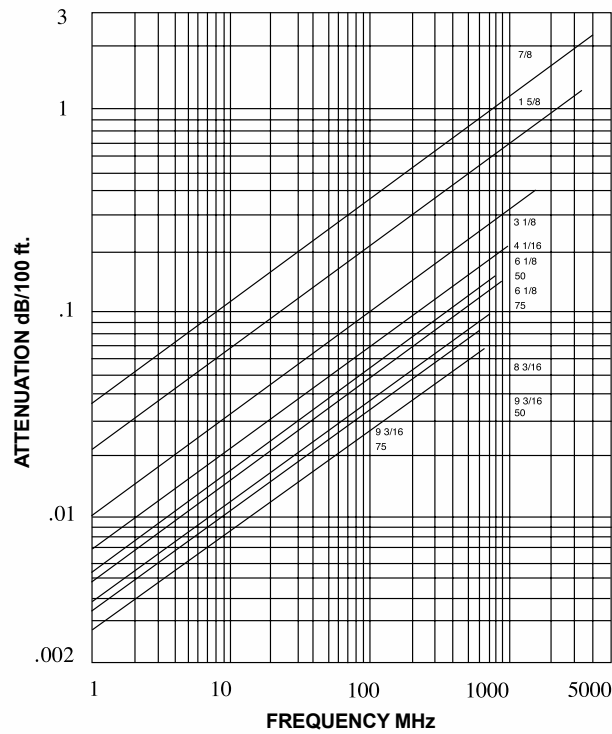
	Avg. Power	Pulse Width (μs)				
		1	10	100	1000	5000
<b>8730 Series</b>	10 kW	100 kW	77 kW	56 kW	32 kW	16 kW
<b>8740 Series</b>	20 kW	250 kW	190 kW	135 kW	75 kW	35 kW
<b>8750 Series</b>	30 kW	250 kW	190 kW	135 kW	75 kW	40 kW
<b>8760 Series</b>	40 kW	250 kW	190 kW	145 kW	90 kW	55 kW
<b>8770 Series</b>	50 kW	250 kW	190 kW	145 kW	97 kW	65 kW
<b>8790 Series</b>	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





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