

Specification Sheet

VIAVI 8800SX

Digital Radio Test Set

General Specifications

User Interface	
Dimensions	13.50 in (W) x 11.54 in (L) x 5.75 in (D) 34.3 cm (W) x 29.3 cm (L) x 14.6 cm (D)
Display Size	30.5 cm (12 in)
Weight	7.71 kg (17 lbs) Base Unit
Internal Battery	2.5+ Hour at Full Backlight
Rugged	30 G Shock, MIL-STD 28800F Class 3
Direct Input Power	50 W Continuous, 125 W Cyclical
In-Line Power Meter	500 W, 4% Accuracy
Record & Playback	Digital Audio Quality
Quick Presets	Ultra-Fast Test Setup
Frequency Lists	Tx Frequency, Tx Level; Rx Frequency
"Fast Stack"	Instant Access to Multiple Meters
Tracking Generator	VSWR, Return Loss, Distance-to-Fault, Tuning Duplexers
LMR System Support	
P25	P25 Phase II DMR NXDN™
dPMR	ARIB T98 AM/FM PTC
RF Generator	
Port Input Protection	
GEN Port	+20 dBm (Input Power Alarm Typical)
T/R Port	+52 dBm CW (Input Power Alarm Typical)
T/R Port	>+90°C (Temperature Alarm Typical)
Frequency	
Range	2 MHz to 1000 MHz <2 MHz to 100 kHz Usable Range
Accuracy	Same as timebase
Range	1 Hz

RF Generator (continued)	
Output Level	
Range	T/R Port: -50 to -125 dBm ANT Port: -30 to -90 dBm GEN Port: -5 to -65 dBm
Accuracy	±2 dB; ±1.5 dB (Typ)
Resolution	1 dB 0.1 dB (0 to -6 relative to selected level); HOLD ATTEN: ON
Port VSWR	
ANT Port	<1.5:1 Typical
GEN Port	<1.5:1 Typical
T/R Port	<1.2:1
SSB Phase Noise	-90 dBc/Hz at 20 kHz offset -95 dBc/Hz at 1 GHz at 20 kHz offset, Typical
Spurious	Harmonics: -30 dBc, -42 dBc Typical Non-Harmonics: -40dBc, -50 dBc Typical (±20 kHz offset from carrier; 0 to 1 GHz)
Residual FM	<20 Hz rms in 300 Hz to 3 kHz BW <4 Hz rms, Typical <100 MHz <6 Hz rms, Typical <800 MHz <11 Hz rms, Typical >800 MHz
Residual AM	<0.5% rms in 300 Hz to 3 kHz BW

RF Generator Modulation

RF Generator Modulation Type	
Group	Modulation
Analog	None, FM and AM
Digital	P25 (C4FM, H-CPM, H-DQPSK), DMR, dPMR, ARIB T98, NXDN, PTC
DTMF	None, FM and AM
DCS	None, FM and AM
Two-Tone Sequential	None, FM and AM
Tone Remote	None, FM and AM
Tone Sequential	None, FM and AM

RF Generator Modulation (continued)

FM Modulation - Internal (GEN 1, GEN 2)

Modulation Frequency Range

Range:	0 Hz to 20 kHz
Resolution:	0.1 Hz
Accuracy:	Timebase ± 2 Hz
FM Deviation Range:	Off 0 Hz to 100 kHz (GEN 1 and GEN 2 Selectable)
Total Harmonic Distortion:	3% (1000 Hz rate, >2 kHz Deviation, 300 Hz - 3 kHz BP filter)
Resolution:	1 Hz
Accuracy:	$\pm 5\%$ at 1 kHz rate; 2 kHz to 50 kHz deviation ($\pm 1\%$ typical) $\pm 10\%$ at 150 Hz to 3 kHz rate; 2 kHz to 50 kHz deviation

FM Modulation - External (MIC, AUDIO IN)

Microphone In

Alternate MIC Configurations	MIC Connector Pins
Range 1: 2-15 mVrms (8 mVrms Typical)	Pin 2-OPEN, Pin 6-GND
Range 2: 35-350 mVrms (100 mVrms Typical)	Pin 2-GND, Pin 6-OPEN (Range 2 enables a nominal 3 Vdc Bias Voltage)
Range 3: 2-32 mVrms (20 mVrms Typical)	Pin 2-OPEN, Pin 6-OPEN
MIC Frequency Range	300 Hz to 3 kHz
MIC Level	Off, 0 Hz to 80 kHz
MIC Modulation Accuracy	$\pm 20\%$ (300 Hz to 1.2 kHz) $\pm 30\%$ (>1.2 kHz)
MIC Slope	Positive voltage yields positive deviation

Audio In

AUD IN Input	Range: 30 V, 3V
AUD IN Switchable Loads	3 V Range: 150 ohms, 600 ohms, 1K ohms, High Z 30 V Range: High Z
AUD IN Input Levels	3 V Range: 0.05 to 3.2 Vrms 30 V Range: 3 Vrms - 30 Vrms
AUD IN	300 Hz to 5 kHz
AUD IN	3 V Range: 1 kHz/35 mVrms Typical 30 V Range: 1 kHz/350 mVrms Typical
AUD IN	Positive voltage yields positive deviation

AM Modulation - Internal (GEN 1, GEN 2)

Modulation Frequency Range

Range	0 Hz to 20 kHz
Resolution	0.1 Hz
Accuracy	Timebase ± 2 Hz
Range	Off, 0 to 100% (GEN1 and GEN2 Selectable)
Resolution	0.1%
Total Harmonics Distortion	3% (20% to 90% mod, 1000 Hz rate, 300 Hz to 3 kHz BP filter)
Modulation Accuracy	10% setting, 150 Hz to 5 kHz rate 10% to 90% modulation

AM Modulation - External (MIC, AUDIO IN)

Microphone In

Alternate MIC Configurations	MIC Connector Pins
Range 1: 2-15 mVrms (8 mVrms Typical)	Pin 2-OPEN, Pin 6-GND
Range 2: 35-350 mVrms (100 mVrms Typical)	Pin 2-GND, Pin 6-OPEN (Range 2 enables a nominal 3 Vdc bias voltage)
Range 3: 2-32 mVrms (20 mVrms Typical)	Pin 2-OPEN, Pin 6-GND
MIC Frequency Range	300 Hz to 3 kHz
MIC Modulation	0% to 80%
MIC Modulation Accuracy	$\pm 20\%$ (300 Hz to 1.2 kHz) $\pm 30\%$ (>1.2 kHz)

Audio In

AUD IN Input	Range: 30 V, 3 V
AUD IN Switchable Loads	3 V Range: 150 ohm, 600 ohms, 1 K ohms, High Z 30V Range: High Z
AUD IN Input Levels	3 V Range: 0.05 to 3.2 Vrms 30 V Range: 3 Vrms - 30 Vrms
AUD IN AM Frequency Range	300 Hz to 5 kHz
AUD IN Level Sensitivity	3 V Range: 1% / 35 mVrms Typical (High Z Load) 30 V Range: 1% / 350 Vrms Typical (High Z Load)

AFGEN 1 and AFGEN 2

Frequency

Range	0.0 Hz to 20.0 KHz
Resolution	0.1 kHz
Accuracy	Timebase ± 2 Hz

Output Level

Audio Out Port Impedance	<1 ohm
Audio Level Out	0 Vrms to 1.57 Vrms
Resolution	0.001 Vrms
Accuracy	$\pm 10\%$; >100 mVrms, 30 Hz to 3 kHz
Distortion	<3% (1 kHz rate, sine 300 Hz to 3 kHz)

RF Receiver

Port Input Protection

ANT Port	+20 dBm (Input Power Alarm Typical)
T/R Port	+52 dBm CW
T/R Port	>+90°C (Temperature Alarm Typical)

Frequency

Range	2 MHz to 1000 MHz <2 MHz to 100 kHz Usable Range
Accuracy	Same as Timebase
Resolution	1 Hz

RF Receiver (continued)

Input Amplitude	
Sensitivity	ANT: -80 dBm, typical 10 dB SINAD (-110 dBm with preamp) T/R: -40 dBm, typical, 10 dB SINAD
Minimum Level Receiver Measurements	ANT: -60 dBm Preamp off, -80 dBm Preamp On, RF Error Meter T/R: -20 dBm Preamp Off, -40 dBm Preamp ON, RF Error Meter
DEMODO Meters	ANT: Distortion, SINAD, Modulation, AF Counter T/R: Modulation, Distortion, SINAD, AF Counter
Maximum Input Level Receiver Measurements	ANT: +10 dBm (Auto, Preamp off) T/R: +47 dBm CW, FM +41 dBm AM

Receiver Demodulation Types

AM, FM, DMR, dPMR, ARIB T98, NXDN, P25 (C4FM, H-CPM, H-DQPSK), PTC

AM Modulation - External (MIC, AUDIO IN)

IF Bandwidth	FM: 5 kHz, 6.25 kHz, 8.33 kHz, 10 kHz, 12.5 kHz, 25 kHz, 30 kHz, 100 kHz, 300 kHz AM: 5 kHz, 6.25 kHz, 8.33 kHz, 10 kHz, 12.5 kHz, 25 kHz, 30 kHz
Audio Filters Bandwidth	FM: C-WT BP, CCITT BP, NONE, 15 kHz LP, 300 Hz LP, 300 Hz HP, 5 kHz LP, 300 Hz to 5 kHz BP, 300 Hz to 3 kHz BP, 300 Hz to 20 kHz BP, 3 kHz LP AM: C-WT BP, CCITT BP, NONE, 15 kHz LP, 0.3 kHz LP, 0.3 kHz HP, 5 kHz LP, 300 Hz to 5 kHz BP, 300 Hz to 3 kHz BP, 0.3 kHz to 20 kHz BP, 3 kHz LP
Audio Output, Level Sensitivity	FM: 3 Vrms/kHz Dev/IF BW (kHz, $\pm 15\%$) AM: 7 mVrms/% AM, $\pm 15\%$
LO EMISSIONS	<-50 dBc

RF Frequency Error Meter

Units	Hz, PPM
Range	± 200 kHz, ± 1000 PPM
Resolution	1 Hz
Accuracy	Timebase ± 1 Hz

RSSI (Receive Signal Strength Indicator) RF Power Within Receiver IF Bandwidth

Units	dBm, Watts, microWatts
Range	-120 dBm to +60 dBm
RF Level Range	T/R Port (preamp off): -50 dBm to +47 dBm ANT Port (preamp off): -90 dBm to +10 dBm ANT Port (preamp on): -110 dBm to -10 dBm
Resolution	0.01 dBm
Accuracy	± 3 dB; (1.5 Typical) Normalized
Ext Attenuation	-50 to +50 dB, 0.01 dB resolution

RF Power Meter (Broadband RF Power Into T/R Port)

Maximum Input Level	50 Watts continuous, +25°C, $\pm 10^\circ\text{C}$ 125 Watts Cyclical (Max "ON" of 30 sec and Min "OFF" for 90 sec) for power levels >50 Watts
Alarms	+49 dBm (Input RF Power Alarm) >+90°C (+194°F) (Temperature Alarm)
Meter Range	+20 to +53 dBm
Meter Floor	0.10 W/+20 dBm
Averaging Range	1 to 99
Display Units	Watts, dBm
Resolution	0.01 W, 0.1 dBm
Accuracy	10% of reading, (6% Typical)
Ext Attenuation	-50 to +50 dB, 0.01 dB resolution

FM Deviation Meter

Range	500 Hz to ± 100 kHz
Meter Type	Peak+, Peak-, (Peak-Peak)/2, RMS
Resolution	0.1 Hz
Accuracy	$\pm 10\%$ of reading, 500 Hz to 100 kHz Deviation $\pm 5\%$ of reading, 1 kHz to 10 kHz Deviation (150 Hz to 1 kHz rate) $\pm 3\%$ of reading, 1 kHz to 10 kHz Deviation (1 kHz to 1.5 kHz rate)

AM Percent Meter

Range	5% to 100%
Modes	Peak+, Peak-, (Peak-Peak)/2, RMS
Resolution	0.001%
Accuracy	$\pm 5\%$ of reading, 1 kHz rate 30% to 90% modulation, 3 kHz LPF

SINAD Meter

Measurement Sources	AUD IN, Demod
DEMODO	FM: >2 kHz Deviation (IF BW set appropriately for received modulation BW) AM: >25% Modulation (IF BW set appropriately for received modulation BW)

AUDIO IN Port

Frequency Range	300 Hz to 10 kHz
Input Level	3 V (Audio Config setup): 0.9 Vp-p to 9 Vp-p 30 V (Audio Config setup): 9 Vp-p to 90 Vp-p
Audio Frequency Notch	1 kHz
Reading Range	0 dB to 60 dB
Resolution	0.001 dB
Accuracy	± 1.5 dB, reading >8 dB, <40 dB

Distortion Meter	
Measurement Sources	AUD IN, Demod
DEMOD	FM: >2 kHz Deviation (IF BW set appropriately for received modulation BW) AM: >25% Modulation (IF BW set appropriately for received modulation BW)

Audio IN Port	
Frequency Range	300 Hz to 10 kHz
Input Level	3 V (Audio Config setup): 0.9 Vp-p to 9 Vp-p 30 V (Audio Config setup): 9 Vp-p to 90 Vp-p
Audio Frequency Notch	1 kHz
Reading Range	0% to 100%
Resolution	0.001%
Accuracy	±10% of reading +0.1% Distortion, >1% to <20%

Audio Frequency Counter	
Measurement Sources	AUD IN, Demod
DEMOD	FM: 15 Hz to 20 kHz Rate (IF BW set appropriately for received modulation BW) AM: 100 Hz to 10 kHz Rate (IF BW set appropriately for received modulation BW)

AUDIO IN PORT	
Frequency Range	300 Hz to 20 kHz
Input Level	3 V (Audio Config setup): 28 mVp-p to 9 Vp-p 30 V (Audio Config setup): 280 mVp-p to 90 Vp-p
Frequency Range	15 Hz to 20 kHz
Resolution	0.1 Hz
Accuracy	±1 Hz

Audio Frequency Level Meter	
Measurement Sources	AUD IN, SCOPE

Input Range	
Aud In Range	3 V, 30 V
Scope Range	2 VDC, 40 VDC
Frequency Range	200 Hz to <5 kHz

Load Selection	
Scope	High Z
Aud In	3 V Input Range: High Z, 150 ohms, 600 ohms, 1 Kohms 30 V Input Range: 10 K

Input Level	
Aud In Port	3 V Range: 10 mV rms to 3.2 V rms 30 V Range: 1 V rms to 30 V rms
Scope Port	2.0 VDC Range: 10 mV rms to 1 V rms 40 VDC Range: 1 V rms to 28.28 V rms
Display Unit Resolution	Volts: 0.001 V mV: 0.001 mV dBuV: 0.001 dBuV dBm: 0.001 dBm Watts: 0.001 W
Accuracy	±5% AUD IN Port

P25 MEASUREMENTS

Modulation Fidelity	
Range	0 to 10%
Resolution	0.1%
Accuracy	<5.0% of reading (2.5 to 10%)

Symbol Deviation	
Range	1620 to 1980 Hz
Resolution	0.1 Hz
Accuracy	±10 Hz (1620 to 1980 Hz)

Symbol Clock Error	
Range	±12 ppm
Resolution	0.01 ppm
Accuracy	1 ppm (±0.0048 Hz)

DMR MEASUREMENTS

FSK Error	
Range	0 to 10%
Resolution	0.1%
Accuracy	<5.0% of reading (2.5 to 10%)

Symbol Deviation	
Range:	1745 to 2140 Hz
Resolution:	0.1 Hz
Accuracy:	±10 Hz

Symbol Clock Error	
Range:	±12 ppm
Resolution:	0.01 ppm
Accuracy:	±1 ppm (±0.0048 Hz)

Oscilloscope

Source	SCOPE, AUD IN, Demod
Bandwidth	5 kHz

Input Impedance	
Scope Input	2.0 V Range: 53 K ohm 40 V Range: 1 M ohm
Audio I/O Input	3 V Range: 150 ohm, 600 ohm, 1 k ohm, High Z 30 V Range: 10 k ohm
Coupling	Scope: AC, DC and GND Audio In: AC only FM Internal Demod: DC AM Internal Demod: AC

Oscilloscope (continued)

Vertical Range	
Scope, Audio In	10 mV to 10 V-div in a 1, 2, 5 sequence
FM Internal Demodulation	0.1 kHz to 50 kHz/div in a 1, 2, 5 sequence
AM Internal Demodulation	5, 10, 20, 50%/div
Vertical Accuracy	10% of full scale (DC to 5 kHz)
Horizontal Sweep	0.5 ms/div to 0.1 sec/div
Horizontal Accuracy	3% of full scale
Trigger Type	Internal (Auto, Normal)
Trigger Level	Variable on vertical scale
Markers	Two markers Displays vertical measurement (Voltage, kHz, % modulation) Displays Delta in time between markers

Channel Analyzer

Range	2 MHz to 1 GHz
Span	10 kHz to 5 MHz (1, 2, 5 steps)
Windows	Hanning, Flat Top, Rectangle
Vertical Scale	2, 5, 10, 15, 20 dB/div
Marker Bandwidth	1 kHz to 5 MHz (1, 2, 5 steps)
Marker Offset	±1 kHz to ±1/2 Span (1, 2, 5 steps)
Power Band Width (PdB) Accuracy	±3 dB typical (30 dB signal to noise)
Noise Floor	-123 dBm (preamp off) -140 dBm (preamp on) (span 100 kHz), typical

Digital Multimeter (DMM)

AC/DC Voltmeter	
Range	200 mV, 2 V, 20 V, 200 V, 2000 V, Auto (150 VAC RMS to VDC MAX input, Category II)
Resolution	3.5 digits (2000 counts)
Accuracy	DC: ±1% FS ±1 count AC: ±5% FS ±1 count +25 mV
AC/DC Ammeter	
Range	200 mA, 2 A, 20 A, Auto (20 A range uses optional shunt connected to Voltmeter)
Maximum Open Circuit Input Voltage	30 V RMS referenced to COMMON or EARTH GROUND, Category I
Resolution	3.5 digits (2000 counts)
Accuracy	DC: ±5% FS ±1 count AC: ±5% FS ±1 count
AC Volts Frequency Range	50 Hz to 10 kHz
Ohmmeter	
Range	200 ohms, 2 k ohms, 20 k ohms, 200 k ohms, 2 M ohms, 20 M ohms, Auto
Resolution	3.5 digits (2000 counts)
Accuracy	±5% FS ±1 count

In-Line Power Meter	
RF Measurement Type	Average Power, Peak, Burst, Crest, CCDF
Frequency Range	25 MHz to 1 GHz
Power Range	500 mW to 500 W Average 13.3 W to 1300 W Peak
Insertion VSWR	<1.05
Insertion Loss	<0.05 dB
Directivity	29 dB up to 50 MHz 30 dB from 51 to 1000 MHz

Average Power	
Average Forward Power Range	500 mV to 200 W Average
Peak/Average Ratio, Max	12 dB
Accuracy, Average Forward Power	±4% of reading +166 mW Maximum accuracy performance at 25°C (±10°C) (77°F ±50°F)
Return Loss	0 to 23 dB
VSWR	1.15 to 99.9

Burst Average Power	
Burst Average Power Range	13.5 W to 500 W Average
Burst Width	1 μs to 5 ms
Repetitions Rate Min	200 Hz
Duty Cycle (D)	0.001 to 1.0 (D=Burst Width/Period)
Accuracy, Burst Average Power	±6% of reading +0.116/D mW

Peak Envelope Power	
Peak Envelope Power Range	13.3 to 1300 W
Peak Envelope Power Accuracy	Burst width >200 μs: ±7% of reading, +0.70 W 1 μs <burst width <200 μs: ±10% of reading, +1.40 W 0.5 μs <burst width <1 μs: ±15% of reading, +1.40 W Burst width <0.5 μs: ±20% of reading, +1.40 W

Crest Factor	
Measurement Range	500 mW to 300 W, 13.3 W Minimum Peak
Accuracy, Crest Factor	Linear Sum of Peak and Average Power Accuracies

Complementary Cumulative Distribution Function (CCDF)	
Measurement Range	0.1 to 100%
Threshold Measurement Range	13.5 to 500 W
Measurement Uncertainty	±0.2%
Level Set Accuracy	As Peak Envelope, Power Accuracy +2.0%

Speaker Output	
Speaker	On or OFF
Output	75 dBA min at 0.5 m, 600 to 1800 Hz, max volume Speaker disconnects when headphones installed.

Volume Control	
Level Range	Scale 0 to 100
Timebase	
Temperature Stability	±0.15 ppm at -20° C to 70° C (-4°F to 158°F)
Aging	0.5 ppm/First Year 0.3 ppm/After First Year
External 10 MHz Reference Input	
External Input Frequency Range	10 MHz ±150 Hz
External Input Level	-10 dBm to +10 dBm
Max Input	+15 dBm
Freq-Flex (Externally Referenced Timebase Calibration)	
Input Frequency Range	2 MHz to 1000 MHz
Reference Input Port	T/R: >-20 dBm Antenna: >-40 dBm
Freq-Flex Accuracy	<0.5 Hz from external source applied + Stability + Aging
Example: 10 MHz External Input, after Freq-Flex = ±0.5Hz to external input. 10 MHz ±0.5 Hz = 0.05 ppm + Stability + Aging	
I/O Connections	
T/R Connector Type: N-Type Female	
ANT Connector Type: N-Type Female	
GEN Connector Type: N-Type Female	
Scope Connector Type: BNC Female	
AUD IN Connector Type: BNC Female	
AUD OUT Connector Type: BNC Female	
Headphone Jack: 3.5 mm Jack	
USB Connectors (Qty 3) Type: USB Type A	
External 10 MHz Reference Input: BNC Female	
Ethernet Connector Type: RJ45	
DC Power in Connector: 2-position 2.5 mm Jack	
GND Connector: Banana	
DMM (Qty 3): Banana (Optional)	
IN (In-Line Power Meter): N-Type Female (Optional)	
OUT (In-Line Power Meter): N-Type Female (Optional)	
Front Panel Indicators	
SYS Indicator	Green: 88XX Power On/Awake Mode
	Blue: 88XX Sleep Mode
	Red: 88XX Shutting Down
	Green/Red Flashing: Battery Temperature >60°C (>140°F)
BAT Indicator	Green Flashing: Battery Life <5%
	Green: Battery at full charge Amber: Battery is charging

Microphone Connector			
6 PIN MIC CONNECTOR			
Pin Number	Name		Characteristic
1	GROUND		
2	SPEAKER+	Output	75 dBa min at 0.5 m, 600 to 1800 Hz, max volume
3	PTT	Input	GND, open (with internal pullup)
4	Mic/Audio	Input	0 to 30 mVrms, voiced tone (whistle), 300 Hz to 3 kHz
5	MICSEL 1	GND, open with pullup	GND = 3 V DC bias (active Mic) and Mic audio gain of 2 Open = 0 V DC bias and Mic audio gain of 3
6	MICSEL 2	GND, open with pullup	

Environmental/Physical

Overall Dimensions	34.3 cm (W) x 29.3 cm (L) x 14.6 cm (D) 13.5 in (W), 11.54 in (L) x 5.75 in (D)
Weight	17 lbs (No hardware options installed)
Temperature	Storage: -40°C to +71°C (-40°F to +159.8°F), MIL-PRF-28800F, Class 3 Note: Battery must not be subjected to temperatures below -20° C, nor above +60° C

8800S Operation

DC Operation	-20°C to +50°C (-4°F to 122°F)
AC/DC Power Supply	See AC Input Power Section
Battery Operation	-20°C to approximately +50°C ^{1,2} (-4°F to approximately +122°F)

Relative Humidity

Operation	5 to 95%, tested in accordance with MIL-PRF-28800F, Class 3
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Altitude

Battery Only Operation	4,600 m (MIL-PRF-28800F, Class 3)
AC Power Supply Operation	3,048 m (MIL-PRF-28800F, Class 3)

Shock, Functional

Operation	30 G Shock (Functional Shock), tested in accordance with MIL-PRF-28800F, Class 3
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Vibration

Operation	5 to 500 Hz random vibrations, tested in accordance with MIL-PRF-28800F, Class 3
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Bench Handling

Operation	Tested in accordance with MIL-PRF-28800F, Class 3
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1: Battery operation over temperature based on actual temperature rise of battery and intrument usage

2: Battery must not be subjected to temperature below -20° C nor above +60° C

Environmental/Physical (continued)

Compliance

EMC

Emissions and Immunity	MIL-PRF-28800F, Class 3 EN61326-1, Class A EN61000-3-2 EN61000-3-3
Safety	UL 61018-1 EN61010-1 CSA C22.2 No 61010-1
Reliability	20,000 hours at 25°C (77°F)

AC Input Power (AC to DC Converter/Charger Unit)

AC Input Voltage Range	100 to 250 VAC, 3 A max., 47 Hz - 63 Hz
AC Input Voltage Fluctuation	Less than 10% of the nominal input voltage
Transient Overvoltage	According to Installation Category II
Usage Environment	Indoor use, Maximum Relative Humidity 80% for temperatures up to 31°C (87.8°F) decreasing linearly to 50% RH at +40°C (104°F), Installation Category II, Pollution degree 2
Operating Temperature	0°C to +40°C (32°F to 104°F)
Storage Temperature	-20°C to +85°C (-4°F to +185°F)
EMI	EN55022 Class B, EN61000-3-2, Class D
Safety	UL 1950, CSA 22.2 No 234 and No 950, IEC 950/EN 60950

DC Input Power

Voltage Range	11 to 24 VDC
Maximum Power	55 W, 65 W charging Optional Battery
Typical Power	30 W
Fused	5 A, 32 VDC, Type F

Supplemental Items

Battery Type	Lithium Ion (Li Ion) battery pack Note: Battery must not be subjected to temperatures below -20°C, nor above +60°C
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Battery Operation Time

100% Backlight	2 1/2 hours typical
Minimum Backlight (still viewable)	3 hours typical
Battery Charge Time	4 hours Unit Power Off Typical 4 hours Unit Powered On Typical Note: Battery to be charged at temperatures between 0°C and +45°C (32°F and +113°F) Charge dead battery (<10% capacity) for 20 minutes before operation on external DC power



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