Southwest Research Institute -Statement of Work (SOW)

The following is a statement of work including testing parameters to be conducted by Southwest Research Institute (SwRI) on the Harris XG-75P, XL-200P, and Motorola APX 8000XE-3.5 radio units to include all related accessory items, belt clip and carrying cases.

Background

The City of San Antonio (City) is currently in the process of soliciting a vendor for the San Antonio Public Safety Radio System (SAPSRS). In order for the City to purchase radio units with the assurance they will provide safe and reliable use by Police, EMS, and Fire operations personnel, the radios must comply with stringent and rigorous operational standards. The City has obtained test reports and specifications submitted by radio manufacturers, and wishes to have those manufacturer test results reviewed by an accredited laboratory in order to validate the testing was performed on the proposed equipment in accordance with the referenced test specifications. In addition, the City wishes to have all equipment under consideration validated against standards that are representative of operational use or standards. In particular, the City suggest an accredited laboratory conduct unique testing of public safety radio equipment and accessories against MIL-STD-810G, IEC 60529, NIST-TN-1850 and NFPA 1802 guidelines using San Antonio Police and Fire real-world criteria. These radio units are the public safety operators' full-time means of communication to conduct duties in support of the public safety for themselves and the entire community of San Antonio and Bexar County. The testing described in this SOW and the corresponding reports will be a validation tool for operators and evaluation committees to ensure the radio units purchased can safely and reliably fulfill their intended purpose.

The radios and attached accessories listed are designed, tested and marketed as MIL-STD-810G certified radios. During operational use the radios are subject to constant water over spray, immersion, intense heat, and drop shock. Radios and attached accessories are carried at the hip and in upper pockets of fire fighter gear. Further details can be found in the attached specification sheets and incorporated as "Attachment A" for each model. The City wishes to have the radios validated against the testing conditions described in the MIL-STD-810G and IEC 60529 standards, and to also conduct testing under NIST-TN-1850 and NFPA 1802 guidelines established for the extreme thermal class environments in which the fire fighters often operate. The testing proposed in this SOW is designed to address Class I-III thermal environments and to validate the temperature tolerance of the radio within these conditions. This SOW will allow the City to have test reports submitted by radio manufacturers on performance of their equipment assessed by an accredited third party laboratory.

Attachment A

Equipment

The following equipment will be provided for testing purposes. It is recognized that equipment items may change before the testing begins, the quantities will remain the same however, description names and model numbers will change. Serial numbers will be provided at time of testing inventory:

Three (3) Harris XG-75P series immersion rated portable radio Model # EVXG-PF78Y with belt clip and carrying cases

Three (3) Harris XL-200 series immersion rated portable radio Model # XL-PFM1M& XL-PAZA with belt clip and carrying cases

Three (3) Motorola APX 8000XE-3.5 series immersion rated portables radios Model # H91TGD9PW7 N with belt clip and carrying cases

Three (3) Harris P7300 immersion rated lapel Mic's Model # MC-011617-606 Rev A for attachment to XG-75P series portable radio

Three (3) Harris immersion rated lapel Mic's Model # XL-AE9N for attachment to XL-200 series portable radio

Three (3) Motorola Remote Speaker Microphone IMPRES Windreporting RSM, IP55 Immersion rated Mic's Model # PMMN4099A for attachment to APX 8000XE-3.5series portable radio

Three (3) Battery 7.4 LiON Model Number BR-023406-006 Rev D for attachment to XG-75series portable radio

Three (3) Battery LiON,3100,HAZLOC RADIO – ADDER Model Number XL-PA2A for attachment to XL-200 series portable radio

Three (3) Battery GEN2 ISA Div2 Hi-Cap (PMNN4505A) - 4850 mAH ,Model Number QA05595A for attachment to APX 8000XE-3.5 series portable radio

Test Witnesses

The City requires employees witness testing. Test witnesses will be pre-designated and will abide by all required safety standards and practices as designated by the testing laboratory. No City witnesses will record testing via phone or photograph cameras. City employees will present City identification and driver license for entry into the test venue.

Testing Parameters

Testing shall be conducted in accordance with MIL-STD-810G, IEC 60529 Edition 2.2, NIST-TN-1850 and NFPA 1802 guidelines and follow the following summary of testing:

Method	Description	Procedure
501.6	High Temperature	PI,PII/Climate A2
502.6	Low Temperature	PI,PII/Climate A2
503.6	Temperature Shock	PI (C)
505.6	Solar Radiation (240 hrs)	PI/Cat A1
506.6	Blowing Rain	PI
507.6	Humidity	PII
509.6	Salt Fog	PII
510.6	Blowing Dust & Sand	PI, PII
511.5	Explosive Atmosphere*	PI
514.7	Vibration**	PI /Cat 4 & PII/Cat 5
516.7	Shock (Drop)***	PIV
IEC 60529	Wire Access Probe (1.0mm)	12.2
IEC 60529	Dust Test	13.4 & 13.6
IEC 60529	Continuous Immersion	14.2.8
Thermal Class	Pre-test Immersion/Audio	
Thermal Class II &III	Dry High Temperature	
Thermal Class II & III	High Temperature Rapid Cooling	
Thermal Class II & III	Wet to High Temperature	
Thermal Class	Post-test Immersion/Audio	

*To elevation of 14,000 feet ASL only
**Connection point to belt clip (pocket), belt clip (traditional), carrying case
***No transportation in box testing required

Results

Results of the testing will be provided to the City in final test report format in both electronic format (PDF) and hard copy. The report will include photographs, test data, results, listing of test equipment, procedure details, results and conclusions, laboratory logs and video/audio record. A review of the submitted manufactures test results will be conducted by the accredited third party laboratory and validity findings of the manufactures results will be included as part of test results. All materials will be picked-up by City personnel at the test laboratory location with the exception of the electronic format. Electronic format will be emailed to: Richard.morales@sanantonio.gov.

Attachment "A"

Specification Sheets

XG-75P PORTABLE
VHF, UHF-L, 700/800 MHz

RELIABLE OPERATION UNDER HARSH CONDITIONS

Delivering high reliability, clear audio quality, and secure communications, the XG-75P portable radio provides a fully trusted communications device for those who defend, protect, and serve communities in day-to-day operations as well as emergency situations. The XG-75P is the next generation ruggedized P25 Phase 2 capable radio designed for mission-critical communications in extreme conditions.

FEATURES

Instant recall of received audio replays the last transmission received to avoid repetition.

Single-key DES encryption and Encryption Lite are standard. Single-key DES interoperates across the industry. Encryption Lite allows communication with commonly available encrypted radios using a 40-bit key.

A 2-position A-B switch allows access to 32 talkgroups/channels directly from the top of the radio.

Optional features are available for IP68 immersion, UL certification for C1D1 HAZLOC use, and FIPS for enhanced security using federally approved 256-bit AES for encrypted communications.

MULTIMODE AND MULTI-PROTOCOL SUPPORT

Designed for users on P25 platforms as well as Harris legacy platforms, the XG-75P supports P25, EDACS®, ProVoice™, and OpenSky® users who want one radio to manage their migration needs.

BEST-IN-CLASS AUDIO

The XG-75P delivers the clear and exceptional audio that users have grown to expect from Harris. The enlarged speaker chamber provides extremely powerful audio. Combining a dual microphone, active noise cancellation algorithm, and AMBE+2™ vocoder, this radio provides a best-in-class audio experience in extreme noise and harsh environments. The vocoder also controls distortion that may occur from shouting into the microphone.

FUTURE READY

The XG-75P is a safe investment that agencies can rely on as transitions occur to P25 technology. The portable radio supports wideband and narrowband channels (per applicable regulatory standards), and its software-defined architecture allows field upgrading to operating modes such as P25 Phase 2 trunking.

ERGONOMIC PACKAGE

From the keypad buttons to the battery, each aspect of the XG-75P has been developed to provide a better user experience. The knobs and buttons of the radio are designed to be strong enough to protect against impact and are shaped to avoid incidental change while being managed by users wearing gloves.

HARRIS® TECHNOLOGY TO CONNECT, INFORM AND PROTECT™

GENERAL SPECIFICATIONS

Radio Models
Full Keypad: Dot matrix LCD and DTMF keypad
Partial Keypad: Dot matrix LCD and limited keypad

Dimensions (Without Antenna, Battery, and Knobs)

	Inches	Millimeters
Height:	5.89	149.6
Width:	2.44	62.0
Depth:	1.86	47.2

Weight (Without Antenna and Battery)

	Ounces	Grams
Portable:	10.4	294.5

Housing Colors
Midnight Black, Black-Gray, Black-Yellow, and Tactical Green

Environmental Specifications

Relative Humidity:	95% @ 140°F (+60°C)
Vibration:	9.2G (per US Forest Service)
Drop Shock:	1.5 meter drop to concrete (exceeds TIA-603-C)
Immersion*:	2 meters for 4 hours in accordance with MIL-STD-810G/IP68 (per IEC60529)

*Optional feature

Environmental Specifications (Cont'd)

	°F	°C
Operating Temperature *:	-22 to +140	--30 to +60

*Extremely low temperatures adversely affect battery life

	°F	°C
Storage Temperature*:	-40 to +176	-40 to +80

*Store batteries at the following temperatures:

	°F	°C
Li-Ion:	-40 to + 176	-40 to +80
Li-Polymer:	-22 to +176	-30 to +80
NiMH:	-40 to + 176	-40 to +80

Altitude	Feet	Meters
Operational:	15,000	4,572
In Transit:	50,000	15,240

Electrical
Input Voltage: 7.5 VDC (nominal)

Safety
HAZLOC Options:
UL certified to ANSI/TIA-4950, ANSI/ISA 12.12.01, CAN/CSA-C22.2 No. 157-92, CAN/CSA-C22.2 No. 213-15 standards as suitable for use in Class I, Division 1, Groups C and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations; Class I, Division 2, Groups A, B, C, and D or non-hazardous (unclassified) locations only

RoHS compliant

TRANSMITTER

Typical Performance Specifications	VHF	UHF-L	700/800
Frequency Range (MHz):	136-174	378-470	764-776, 794-805, 806-825, 851-870
Rated RF Power (W):	6	5	3 (Trnk & Talkaround)
Frequency Stability (-30 to +60°C, +25°C Ref) (ppm):	±1.5	±1.5	±1.5
Frequency Separation (MHz):	Full Bandwidth	Full Bandwidth	NA
Modulation Deviation (kHz):	5.0 (wideband*) 2.5 (narrowband)	5.0 (wideband*) 2.5 (narrowband)	2.5, 4, or 5 FM
FM Hum and Noise Companion Receiver (dB):	-52 (wideband*) -50 (narrowband)	-50 (wideband*) -45 (narrowband)	44 (700 MHz) 47 (800 MHz NPSPAC) 48 (800 MHz non-NPSPAC)
Spurious and Harmonics (dBm/dBc):	-36/-75	-36/-75	-55/90
Audio Response (dB):	+1/-3	+1/-3	Meets TIA-603-C Section 3.2.6
Audio Distortion (1 kHz tone):			
@ 3 kHz deviation:	1% (wideband)	1% (wideband)	1% (800 MHz non-NPSPAC)
@ 2.4 kHz deviation:	NA	NA	1% (800 MHz NPSPAC)
@ 1.5 kHz deviation:	1% (narrowband)	1% (narrowband)	1% (700 MHz)
Project 25 Modulation Fidelity (%):	<5	<5	1
Project 25 Adjacent Channel Power (dBc):	>67	>67	73

*VHF and UHF product is compliant with applicable FCC narrowbanding mandate below 512 MHz.

REGULATORY DATA

Frequency Range (MHz)	RF Output (W)	Frequency Stability (ppm)	FCC Type Acceptance Number	Applicable FCC Rules	Industry Canada Certification Number	Applicable Industry Canada Rules	NTIA Certification Number
136-174	6	±1.5	OWDTR-0059-E	22, 80, 90	3636B-0059	RSS-119	J/F 12/9974
378-470	5	±1.5	OWDTR-0070-E	90	3636B-0070	RSS-119	J/F 12/9974
764-776, 794-806 806-824, 851-869, 854-869	3	0.2	OWDTR-0074-E	90	3636B-0074	RSS-119	NA

Technical specifications are subject to change without notice. Product sales are subject to applicable U.S. export control laws.

For UHF-L frequencies

RECEIVER

Typical Performance Specifications	VHF	UHF-L	700/800
Frequency Range (MHz):	136-174*	378-470	764-776, 851-870
Frequency Separation (MHz):	Full Bandwidth	Full Bandwidth	NA
Channel Spacing (kHz):	25/30 (wideband**) 12.5/15 (narrowband)	25 (wideband**) 12.5 (narrowband)	12.5, 25, PLL Steps
Frequency Stability (-30 to +60°C, +25°C Ref) (ppm):	±1.5	±1.5	±1.5
Sensitivity (12 dB SINAD) (µV/dBm):	0.20/-121	0.25/-119.0	0.25/-119.0
Adjacent Channel Selectivity @ 25 kHz (dB):	79 (wideband**)	>73	75 (800 MHz non-NPSPAC)
@12.5 kHz (dB):	66 (narrowband)	>60	67 (700 MHz)
Intermodulation (dB):	77	75	75
Spurious and Image Rejection (dB):	80	80	>80
FM Hum and Noise (dB):	>50 (wideband**) >45 (narrowband)	>50 (wideband**) >45 (narrowband)	>40 (700 MHz) >43 (851-854 MHz NPSPAC) >45 (854-870 MHz wideband**) >60 squelched
Audio Output (mW):	500 rated (3800 max)	500 rated (3800 max)	500 rated
Audio Distortion @ Rated Power (%):	1.5	1.5	1.5
Project 25 Reference Sensitivity @ 5% BER (µV/dBm):	0.22/-121	0.25/-119	0.22/-120
Project 25 Adjacent Channel Rejection (dB):	>60	>60	64

*The following self-quieting frequencies cannot be programmed as receive frequencies: 144.000, 153.600, 163.200, and 172.800 MHz.
**VHF and UHF product is compliant with applicable FCC narrowbanding mandate below 512 MHz.

ENVIRONMENTAL STANDARDS

Standard	Parameter	Methods	Procedures/Categories
MIL-STD-810G*	Low Pressure	500.5	1,2
	High Temperature	501.5	1,2
	Low Temperature	502.5	1,2
	Temperature Shock	503.5	1-B
	Solar Radiation	505.5	2
	Blowing Rain	506.5	1
	Humidity	507.5	2
	Salt Fog	509.5	1
	Blowing Dust	510.5	1
	Immersion**	512.5	1
	Vibration (Minimum Integrity)	514.6	1, Category 24
	Vibration (Basic Transportation)	514.6	1, Category 4
	Shock (Functional/Basic)	516.6	1
	Shock (Transit Drop)	516.6	4
IEC 60529	Dust-tight, Continuous Immersion	IP68	
U.S. Forest Service	Vibration (10-60 Hz)	USDA LMR Standard Section 2.15	
TIA-603-C***	Shock (1-meter drop)	Paragraph 3.3.5.3	

*Also meets equivalent superseded MIL-STD-810D, -E, and -F.
**XG-75 immersion model only. Available option that must be ordered. Additional certification for water intrusion with water depth of 2 meters for 4 hours.
***Environmental test certification of 1.5-meter drop shock to concrete using parameters of TIA-603-C 1.0-meter drop shock with additional height.

DIGITAL OPERATION

Protocol	OpenSky® (700/800 MHz)	ProVoice™	P25
Vocoding Method:	AMBE + 2™ Half Rate & Enhanced Half Rate	AMBE + 2 Enhanced Full Rate	AMBE + 2 Enhanced Full Rate & Enhanced Half Rate
Signaling Rate (kbps):	19.2 & 9.6	9.6	9.6
Modulation:	4-Level GFSK & M4FM	GFSK	Phase1 TX: C4FM, RX: C4FM & WCQPSK Phase 2 TX: HCPM, RX: WCQPSK

ENCRYPTION

Encryption Algorithms:	AES (FIPS-140-2 certified), DES, Encryption Lite (40-bit)*
Encryption Keys per Radio:	Capable of storing 128 keys (64 AES, 64 DES)

*Option included as standard with the radio. Interoperates with commonly available ARC4 encryption algorithms.

BATTERIES

Type	Dimensions (L x W x D)	Weight	Life (@5% Tx, 5% Rx, and 90% standby)	Capacity (mAh)
Li-Ion	4.42 x 2.44 x 0.83 in.	5.1 oz (145g)	10 hours	2400
Li-Polymer	4.42 x 2.44 x 0.83 in.	6.6 oz (187g)	16 hours	3600
NiMH	4.42 x 2.44 x 0.83 in.	9.5 oz (270g)	10 hours	2400

Technical specifications are subject to change without notice. Product sales are subject to applicable U.S. export control laws.

ACCESSORIES

The XG-75P offers a full complement of accessories that operate under the extreme conditions experienced by first responders. Several are shown below.

Audio Accessories

The XG-75P can be used with a wide variety of audio accessories including speaker microphones, headsets, and covert audio accessories to provide a complete user-gear solution for the industrial, public safety, utility, and transportation markets. Heavy-duty and lightweight headsets are available with in-ear or over-the-ear hearing protection, flexible boom microphones with noise-reduction technology, and standard or remote PTTs. In addition, the XG-75P can be used with Bone Conducting Skull Headsets and Throat Microphone/Headset Kits. Covert audio kits are available in black or beige, and in 2-wire or 3-wire configurations with earpiece, microphone, and PTT.

| Speaker Microphone | Fire Speaker Microphone | Tactical Headset | 3-Wire Mini-Lapel Microphone |

Carrying Cases

Harris offers a versatile line of carrying cases for the XG-75P radio. Options include a standard belt clip and premium belt loop, both of which afford the radio user a low-profile, integrated carrying option. In addition, a premium leather holster is available for attaching to a belt or wearing with the premium leather shoulder strap.

| Nylon Carrying Case | Belt Clip | Leather Carrying Case |

Chargers

Harris offers a variety of chargers for the XG-75P radio: Single-Bay, Multi-Bay, and a Vehicular Charger for in-car charging. The chargers are designed to quickly and safely charge battery packs in approximately 1 to 4 hours.

| Single-Bay Charger | Multi-Bay Charger | Vehicular Charger |

Additional Accessories Available

Antennas, Bluetooth® speaker microphones, Bluetooth covert earpieces, public safety speaker microphones, Lithium batteries, PC programming software, and cables are available.

About Harris Corporation

Harris Corporation is a leading technology innovator that creates mission-critical solutions that connect, inform and protect the world. The company's advanced technology provides information and insight to customers operating in demanding environments from ocean to orbit and everywhere in between. Harris has approximately $8 billion in annual revenue and supports customers in 125 countries through four customer-focused business segments: Communication Systems, Space and Intelligence Systems, Electronic Systems, and Critical Networks.

FLORIDA | NEW YORK | VIRGINIA | BRAZIL | UNITED KINGDOM | UAE | SINGAPORE

HARRIS® TECHNOLOGY TO CONNECT, INFORM AND PROTECT™

XL-200P PORTABLE
FULL-SPECTRUM MULTIBAND RADIO

The Harris XL-200P is the industry's only full-spectrum, LTE-ready multiband radio. Capable of operating on VHF, UHF, and 700/800 MHz frequencies, this powerful portable also supports voice and data over LTE broadband. Users have the flexibility to purchase the XL-200P as single band, dual band, or full spectrum, with options to upgrade by adding bands or LTE as organizational needs change.

Designed from the ground up with input from mission-critical users, the XL-200P is an entirely new radio platform. Its advanced processor, memory and software technologies merge robust LMR voice with voice and data over cellular, LTE and Wi-Fi, for leading-edge connectivity.

The XL-200P is engineered for audio excellence, pairing a powerful 1.5 watt audio amplifier with woofer and tweeter speakers complete with resonant cavities and tuned ports to deliver the highest-quality sound experience of any handheld radio available today. Compact and ergonomic, the portable's shape is based on extensive research, resulting in a radio that fits naturally in users' hands. Controls are shaped and arranged for ease of use and optimum performance, including accessory connections.

With its ruggedized aluminum I-beam frame and tough seals, the XL-200P is built to operate in severe environments. This radio meets MIL-STD-810G for durability, including Method 511.5 for explosive atmospheres and Method 504.1 for contamination by fluids, so it can be scrubbed with cleansers and biological sanitizers.

EXCEPTIONAL COMMUNICATIONS IN SEVERE ENVIRONMENTS

KEY FEATURES

Industry's only full-spectrum, LTE-ready multiband radio

Instant recall of received audio replays transmissions to avoid missed calls

Wi-Fi® connectivity for voice delivery outside coverage areas through Harris BeOn® application

Optional cell modem for voice and data wherever cellular/LTE is available

Built-in GPS, Bluetooth®, Active Noise Cancellation, and 4-position A-B-C-D switch standard

HARRIS® TECHNOLOGY TO CONNECT, INFORM AND PROTECT™

SPECIFICATIONS FOR: XL-200P PORTABLE FULL-SPECTRUM MULTIBAND RADIO

GENERAL

Radio Models:	
Full Keypad	TFT LCD w/DTMF keypad, navigation cluster, soft keys
Partial Keypad	TFT LCD w/partial keypad, navigation cluster, soft Keys
Dimensions w/Battery (H x W x D)	5.8 x 2.3 x 1.4 in (148.0 x 60.0 x 36.0 mm)

Weight	**w/Battery and Antenna** 16.2 oz (464 g)	**w/o Battery and Antenna** 10.4 oz (296 g)

Housing Colors	Midnight Black, High-Visibility Yellow
Interfaces:	
Front Display	320 x 178 pixels, 1.8 in transflective LCD, 16-bit color with backlight
Top Display	128 x 32 pixels, 1.1 in multi-color backlight, sunlight readable
Keypad	Backlight, 3 soft keys, 5-way navigation key, full DTMF keypad
Buttons	Large PTT button, on/off knob, volume knob, red emergency button, 16-position top-mounted rotary knob, 2-position concentric switch, 4-position toggle switch, 3 programmable side buttons
Tx/Rx Indicator	Multi-colored LEDs

Transceiver	**Supported Bands** VHF, UHF, 700/800 MHz and LTE	**Channel Capacity** 12,500 (1,250 per mission plan)

Environmental:	
Relative Humidity	5% @ 140°F (+60°C), 95% @ 122°F (+50°C)
Vibration	USDA LMR Standard, Section 2.15 and MIL-STD-810G, Test Method 514.6
Drop Shock	1.0 meter drop to concrete (exceeds TIA-603-D)
Immersion[1]	2 meters for 4 hours in accordance with MIL-STD-810G/IP68
Operating Temperature[2]	-22°F to +140°F (-30°C to +60°C)
Storage Temperature[3]	-40°F to +176°F (-40°C to +80°C)

Altitude	**Operational** 15,000 feet (4,572 meters)	**In Transit** 50,000 feet (15,240 meters)

Electrical Input Voltage	7.5 VDC (nominal)
GPS/GNSS Specifications:	
Channels	52
Tracking Sensitivity (dBm)	-166 (GPS), -163 (GLONASS)
Acquisition Sensitivity (dBm)	-146 (GPS)
Cold Start w/-130 dBm input	<35 seconds
Hot Start w/-130 dBm input	<1 second
Safety:	
Hazardous Location Options	Approved for use in the US and Canada in Class I, Division 2 Groups A, B, C and D hazardous locations
RoHS Compliant	

[1] Optional feature
[2] Extreme low temperatures adversely affect battery life
[3] Store batteries at +25°C ± 5°C

LMR TRANSMITTER

Frequency Bands	VHF*	UHF*	700/800 MHz
Frequency Ranges (MHz) Option 1 (US)	136-174	378-522	768-776, 798-806, 806-816, 851-861
Option 2 (International)	136-174	378-522	763-776, 793-806, 806-825, 851-870**
Rated RF Power/Talkaround (W)	1-6	1-5	0.5-3
Frequency Stability (-30 to +60°C)	±1.0 ppm	±1.0 ppm	±1.0 ppm
Modulation Limiting (kHz)	2.5, 4, 5 (FM)	2.5, 4, 5 (FM)	2.5, 4, 5 (FM)
Audio Response (dB)	+1/-3	+1/-3	+1/-3
Spurious and Harmonics (dBc)	-80 (FCC Part 90)	-80 (FCC Part 90)	-80 (FCC Part 90)
FM Hum and Noise Companion Receiver (dB): @ 25 kHz @ 12.5 kHz	 70 47	 60 47	 55 45
Audio Distortion (%)	<1.25	<1.25	<1.25
Project 25 Modulation Fidelity (%)	1.0	1.0	1.0
Project 25 Adjacent Channel Power (dBc)	>71	>71	>71

*Full-spectrum multiband VHF and UHF product is compliant with applicable FCC narrowbanding mandate below 512 MHz
**Future option

REGULATORY DATA

Frequency Range	RF Output	Frequency Stability	FCC Type Acceptance No.	Applicable FCC Rules	Industry Canada Certification No.	Applicable Industry Canada Rules	NTIA Cert. No.
136-174 MHz	6 W	±1.0 ppm	OWDTR-0133-E, OWDTR-0145-E	22, 74, 80, 90	3636B-0133, 3636B-0145	RSS-119	SPS-217 49/1
378-522 MHz	5 W	±1.0 ppm	OWDTR-0133-E, OWDTR-0145-E	22, 74, 80, 90	3636B-0133, 3636B-0145	RSS-119	SPS-217 49/1
768-776 MHz	3 W	±1.0 ppm	OWDTR-0133-E, OWDTR-0145-E	90	3636B-0133, 3636B-0145	RSS-119	
798-806 MHz	3 W	±1.0 ppm	OWDTR-0133-E, OWDTR-0145-E	90	3636B-0133, 3636B-0145	RSS-119	
806-816 MHz	3 W	±1.0 ppm	OWDTR-0133-E	90	3636B-0133	RSS-119	
806-825 MHz	3 W	±1.0 ppm	OWDTR-0145-E	90	3636B-0145	RSS-119	
851-861 MHz	3 W	±1.0 ppm	OWDTR-0133-E	90	3636B-0133	RSS-119	
851-869 MHz	3 W	±1.0 ppm	OWDTR-0145-E	90	3636B-0133	RSS-119	

Frequency Range	RF Output	Frequency Stability	FCC Type Acceptance No.	Applicable FCC Rules	Industry Canada Certification No.	Applicable Industry Canada Rules	NTIA Cert. No.
2402-2480 MHz	0.2 W	TBD	OWDTR-0133-E, OWDTR-0145-E	15	3636B-0133, 3636B-0145	RSS-119	
5180-5825 MHz	0.1 W	TBD	OWDTR-0133-E, OWDTR-0145-E	15	3636B-0133, 3636B-0145	RSS-119	

Technical specifications are subject to change without notice. Product sales are subject to applicable U.S. export control laws.

LMR RECEIVER

Frequency Bands	VHF	UHF	700/800 MHz
Frequency Ranges (MHz):			
Option 1 (US)	136-174	378-522	768-776, 851-861
Option 2 (International)	136-174	378-522	763-776, 851-870**
Channel Spacing (kHz)	25 (wideband*), 12.5 (narrowband), 6.25 equiv (TDMA P25 Phase 2)		
Frequency Stability (-30 to +60°C)	±1.0 ppm	±1.0 ppm	±1.0 ppm
Sensitivity (dBm): @ 12 dB SINAD	-122	-121	-121 (700 MHz) -120 (800 MHz)
Project 25 Reference Sensitivity (dBm): @ 5% BER	-122	-121	-120.5
Analog Selectivity (dB):			
@ 25 kHz	77	77	74
@ 12.5 kHz	71	70	64
Project 25 Adjacent Channel Rejection (dB)	66.2	62.2	62
Offset Channel Selectivity (dB): @ NPSPAC	NA	NA	30
Intermodulation (dB)	79	78	75
Spurious and Image Rejection (dB)	80	81	78
FM Hum and Noise (dB):			
@ 25 kHz	-60	-60	-55
@ 12.5 kHz	-55	-53	-50
Audio Output - Rated/Max (mW)	1500/4000	1500/4000	1500/4000
Audio Distortion @ Rated Power (%)	1.1	1.1	1.1

*Full-spectrum multiband VHF and UHF product is compliant with applicable FCC narrowbanding mandate below 512 MHz
**Future option

ENVIRONMENTAL STANDARD

Applicable MIL-STD	Parameter	Methods	Procedure/Categories
MIL-STD-810G*	Low pressure	500.5	1, 2
	High temperature	501.5	1, 2
	Low temperature	502.5	1, 2
	Temperature shock	503.5	1
	Solar radiation	505.5	1
	Contamination by fluids	504.1	2
	Rain	506.5	1, 3
	Humidity	507.5	2
	Salt fog	509.5	1
	Blowing dust and sand	510.5	1, 2
	Explosive atmosphere	511.5	1
	Immersion in water**	512.5	1
	Vibration (minimum Integrity)	514.6	1, Category 24
	Vibration (basic transportation)	514.6	1, Category 4
	Shock (functional/basic)	516.6	1
	Shock (transit drop)	516.6	4
	Shock (bench handling)	516.6	6
IEC 60529	Dust-tight, continuous immersion in water**		IP68

*Also meets equivalent superseded MIL-STD-810D, -E and -F
**Optional feature

CELLULAR BROADBAND

LTE Protocol	3GPP Release 9, Power Class 3 UE with Rx diversity*
Public Safety Broadband	Band 14, 788-798 MHz Tx, 758-768 MHz Rx, 5 or 10 MHz BW*
Commercial Broadband	Band 13, 777-787 MHz Tx, 746-756 MHz Rx, 5 or 10 MHz BW*
Commercial Broadband	Band 4, 1710-1755 MHz Tx, 2110-2155 MHz Rx, 5, 10, 15, or 20 MHz BW*
Wi-Fi	802.11 b/g/n 2.4 GHz and 5 GHz
Bluetooth	Bluetooth 4.0 (128-bit encryption)

*Future option

DIGITAL OPERATION

Protocol	ProVoice™*	P25
Vocoding Method	AMBE +2™ enhanced full rate	AMBE +2 enhanced full rate and enhanced half rate

*Future option

DIGITAL OPERATION (Continued)

Protocol	ProVoice™*	P25
Signaling Rate (kbps)	9.6	9.6
Modulation	GFSK	Phase 1 Tx: C4FM, Rx: C4FM and WCQPSK

*Future option

ENCRYPTION

Encryption Algorithms	AES, DES-OFB
Encryption Keys per Radio	Capable of storing 128 keys (64 AES, 64 DES)
Keying	Harris Key Loader, Over-the-Air Rekeying (OTAR), Motorola KVL 3000+/4000
Standards	FIPS 140-2, FIPS 197

BATTERIES

Type	Dimensions (H x W x D)	Weight	Capacity (mAh)
Li-Ion	3.0 x 2.3 x 0.9 in	4.8 oz (136 g)	3100

Technical specifications are subject to change without notice. Product sales are subject to applicable U.S. export control laws.

ACCESSORIES

The XL-200P is available with a selection of dependable Harris accessories that operate in a range of environments. Several are shown below.

Headsets

The XL-200P can be used with a wide variety of headsets and covert audio accessories to provide a complete user-gear solution for the industrial, public safety, utility, and transportation markets. Heavy-duty and lightweight headsets are available with in-ear or over-the-ear hearing protection, flexible boom microphones with noise-reduction technology, and standard or remote PTTs. In addition, the XL-200P can be used with Bone Conducting Skull Headsets and Throat Microphone/Headset Kits. Covert audio kits are available in black or beige, 2-wire or 3-wire configurations with ear-piece, microphone and PTT.

3-Wire Mini-Lapel Microphone

Tactical Headset

Carrying Cases

Harris offers a versatile line of carrying cases for the XL-200P full-spectrum multiband radio. Options include a standard belt clip and premium belt loop, both of which afford the radio user a low-profile, integrated carrying option. In addition, a premium leather holster is available for attaching to a belt or wearing with the premium leather shoulder strap.

Belt Clip

Leather Carrying Case

Chargers

Harris offers a variety of chargers for the XL-200P: Single-Bay, Multi-Bay and a Vehicular Charger for in-car charging. The chargers are designed to quickly and safely charge battery packs in approximately 1 to 4 hours.

Single-Bay Charger

*Multi-Bay Charger**

*Vehicular Charger**

Additional Accessories Available

Bluetooth speaker microphones, Bluetooth covert earpieces, standard speaker microphones, Lithium Ion battery, PC programming software and cables, other subminiature surveillance accessories, and antennas.

*Accessories unavailable in Brazil

About Harris Corporation: Harris Corporation is a leading technology innovator that creates mission-critical solutions that connect, inform and protect the world. The company's advanced technology provides information and insight to customers operating in demanding environments—from ocean to orbit and everywhere in between. Harris has approximately $7.5 billion in annualized revenue and supports customers in more than 100 countries through four customer-focused business segments: Communication Systems, Space and Intelligence Systems, Electronic Systems and Critical Networks.

FLORIDA | NEW YORK | VIRGINIA | BRAZIL | UNITED KINGDOM | UAE | SINGAPORE

HARRIS® TECHNOLOGY TO CONNECT, INFORM AND PROTECT™

APX™ 8000XE ALL-BAND P25 PORTABLE RADIO

Working together with firefighters around the world, we designed the APX™ Extreme Series, a safe, and easy and efficient to use portfolio of ergonomically advanced, ultra-rugged radios and accessories. With over eighty years of experience in ergonomics, design and technology for public safety, the APX XE Series is the culmination of cross-disciplines and user input.

Firefighters said they wanted equivalent extreme features as the APX Extreme Series including a larger display, exaggerated control knobs, and the capability to communicate with surrounding municipalities within an all-band radio solution. The APX 8000XE brings together not only these requirements, but also the integration of WiFi® for programming flexibility.

The APX 8000XE is redefining mission critical communications by delivering an ultra-durable radio that combines unlimited interoperability, loud audio, and secure WiFi connectivity. With a dedicated channel knob and ability to withstand 500 degrees heat exposure, the APX XE500 Remote Speaker Microphone is the perfect companion to the APX 8000XE. When combined, the APX 8000XE All-Band Portable Radio and XE500 Remote Speaker Microphone create the ultimate mission critical solution designed for safety personnel in extreme environments.

KEY FEATURES

- Unlimited interoperability with one device
- Secure WiFi for seamless software updates
- Extra-large buttons for glove use
- IP68 submersion (2 meters, 4 hours)
- ANSI/ISA-12.12.01-2015 CAN/CSA C22.2 NO. 213-15, Nonincendive Electrical Equipment for Use in Class I, Division 2, Groups A, B, C, D; Class II, Division 2, Groups F, G; Class III, Division 2
- Integrated GPS/GLONASS for outdoor location tracking
- Equipped with FIPS - certified encryption hardware
- RFID volume knob for asset tracking (optional)
- Bluetooth-enabled APX radios capable of transmitting SCBA voice and data
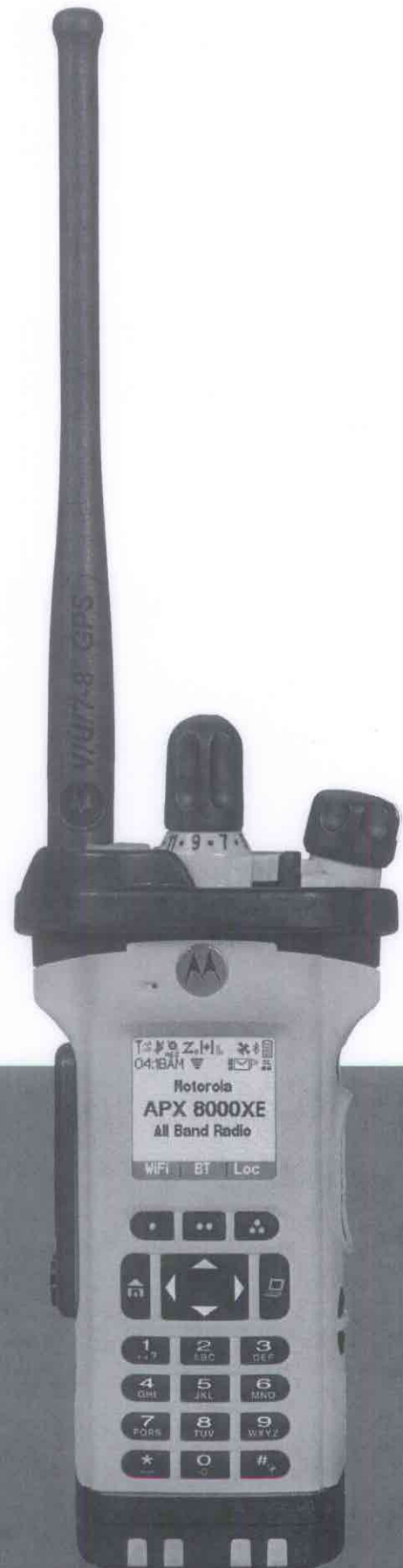
RF BANDS

- 700/800 MHz, VHF, UHF Range 1 & 2

OPERATION MODES

- 9600 Baud Digital APCO P25 Phase 1 FDMA and Phase 2 TDMA Trunking
- 3600 Baud SmartNet®, SmartZone®, Omnilink Trunking
- Digital APCO 25, Conventional, Analog MDC 1200, Quick Call II System Configurations
- Narrow and wide bandwidth digital receiver (6.25 kHz equivalent/25/20/12.5 KHz)

STANDARD FEATURES

- Mission Critical Wireless Bluetooth*
- ASTRO 25 Integrated Voice & Data
- Integrated GPS/GLONASS for outdoor location tracking
- Software Key
- Text-Messaging
- Voice Announcements
- ISSI 8000 Roaming
- Radio Profiles, Dynamic Zone
- Intelligent Lighting
- Single-key ADP Encryption
- IP68 submersion (2 meters, 4 hours)

- IMPRES Battery
- ANSI/ISA-12.12.01-2015 CAN/CSA C22.2 NO. 213-15, Nonincendive Electrical Equipment for Use in Class I, Division 2, Groups A, B, C, D; Class II, Division 2, Groups F, G; Class III, Division 2

ADAPTIVE AUDIO ENGINE

- 3 Watt Speaker with Adaptive Equalization
- Adaptive Dual-sided Operation
- Adaptive Noise Suppression Intensity
- Adaptive Gain Control
- Adaptive Windporting

PROGRAMMING

- Utilizes Windows 7 & 8 Customer Programming Software (CPS) with Radio Management

OPTIONAL FEATURES

- WiFi 802.11 b/g/n
- RFID Volume Knob
- Multikey for 128 keys and multi-algorithm
- Programming Over Project 25 (OTAP)
- Over the Air Rekey (OTAR)
- Digital Tone Signaling
- P25 Authentication
- Man Down Sensor

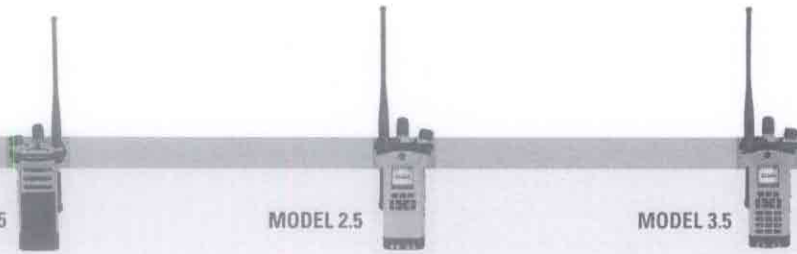* Compatible with BT 4.0, BT 2.1, HSP, PAN, DUN and SPP Profiles found in off-the-shelf BT accessories

TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

		700/800	VHF	UHF Range 1	UHF Range 2
Frequency Range/Bandsplits		764-776, 794-806 MHz 806-825, 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing		25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj'		700 MHz: 1-2.5 Watts 800 MHz: 1-3 Watts	1-6 Watts	1-5 Watts	1-5 Watts
Frequency Stability' (−30°C to +60°C; +25°C Ref.)		+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm
Modulation Limiting'		±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz
Emissions (Conducted and Radiated)'		-75 dBc	-75 dBc	-75 dBc	-75 dBc
Audio Response'		+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
FM Hum & Noise (25kHz / 12.5kHz)'	700 MHz 800 MHz	-49 dB / -47 dB -49 dB / -46 dB	-51 dB / -51 dB	-51 dB / -51 dB	-51 dB / -47 dB
Audio Distortion (25kHz / 12.5kHz)'	700 MHz 800 MHz	0.90 % / 0.90 % 0.60 % / 0.90 %	0.50 % / 0.90 %	0.50 % / 0.90 %	0.60 % / 0.90 %

BATTERIES FOR APX 8000XE

Battery Capacity / Type	Dimensions (HxWxD)	Weight	Battery Part Number	Battery Capacity
Li-Ion IMPRES UL2054 DIV 2 Rugged 3400 mAh IP68**	3.4" x 2.3" x 1.7"	6.5 oz	PMNN4504A	3400 mAh
Li-Ion IMPRES UL2054 DIV 2 Rugged 4850 mAh IP68	5" x 2.3" x 1.7"	10 oz	PMNN4505A	4850 mAh

KEY AUDIO ACCESSORIES****

Name	Type	Part Number	Features
IMPRES Display RSM	Wired	HMN4104	Windporting, Audio Jack, Channel Knob, Volume Control, Orange Button, IP68
IMPRES XE RSM BLACK	Wired	NNTN8575ABLK	Windporting, Audio Jack, Strobe Light, Volume Control, Orange Button, IP68
IMPRES XE RSM GREEN	Wired	NNTN8575	Windporting, Audio Jack, Strobe Light, Volume Control, Orange Button, IP68
IMPRES XE500 RSM BLACK	Wired	PMMN4106ABLK	Adaptive Audio Engine, Audio Jack, Strobe Light, Volume Control, Channel Knob, Orange Button, IP68
IMPRES XE500 RSM GREEN	Wired	PMMN4106	Adaptive Audio Engine, Audio Jack, Strobe Light, Volume Control, Channel Knob, Orange Button, IP68

** Ships standard with radio
**** Pending Hazardous Certification

RADIO MODELS

	MODEL 1.5	MODEL 2.5	MODEL 3.5
Display	Full bitmap monochromatic LCD top display 1 line text x 8 characters 1 line of icons No menu support Multi-color backlight	Top display plus: Full bitmap color LCD display 4 lines of text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight	Top display plus: Full bitmap color LCD display 4 lines of text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight
Keypad	none	Backlit keypad 3 soft keys 4 direction navigation key Home and Data buttons	Backlit keypad 3 soft keys 4 direction navigation key 4x3 keypad Home and Data buttons
Channel Capacity	1200	3000	3000
FLASHport Memory	2 GB	2 GB	2 GB
700/800 MHz (764-870 MHz)			
VHF (136-174 MHz)			
UHF Range 1 (380-470 MHz)	H91TGD9PW5AN	H91TGD9PW6AN	H91TGD9PW7AN
UHF Range 2 (450-520 MHz)			
Buttons & Switches	Large PTT button • Angled On/Off volume control • X-large orange emergency button • 16 position top-mounted rotary switch 2-position concentric switch • Glove accessible 3-position switch • 3 programmable side buttons		

Regulatory Information

FCC ID	AZ489FT7061
Industry Canada	109U-89FT7061
Emission Designators	LMR: 8K10F1D, 8K10F1E, 8K10F1W, 11K0F3E, 16K0F3E***, 20K0F1E*** Bluetooth®: 852KF1D, 1M17F1D, 1M19F1D, 1M04F1D WLAN (WiFi): 13M7G1D, 17M0D1D, 18M1D1D

*** In accordance with FCC mandate, the APX 8000XE all band radio is restricted to 12.5kHz operation only and does NOT support 25kHz in the VHF and UHF Bands (excluding T-Band). This applies to customers under Rule Part 90.

RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

		700	800	VHF	UHF
Frequency Range/Bandsplits		764-776 MHz	851-870 MHz	136-174 MHz	380-520 MHz
Channel Spacing		25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Speech Loudness at 30cm		105 Phons	105 Phons	105 Phons	105 Phons
Audio Output Power at Rated/Max		3 Watt/5 Watt	3 Watt/5 Watt	3 Watt/5 Watt	3 Watt/5 Watt
Frequency Stability[1] (-30°C to +60°C; +25°C Ref.)		+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm
Analog Sensitivity[1] Digital Sensitivity[2]	12 dB SINAD 1% BER 5% BER 5% BER Faded	0.224 uV 0.316 uV 0.211 uV 0.562 uV	0.224 uV 0.316 uV 0.211 uV 0.562 uV	0.168 uV 0.251 uV 0.149 uV 0.562 uV	0.199 uV 0.282 uV 0.158 uV 0.530 uV
Selectivity (25 kHz / 12.5 kHz)[1,5]		79 dB / 72 dB	78 dB / 72 dB	82 dB / 77 dB	80 dB / 74 dB
Intermodulation Rejection[1]		81 dB	80 dB	82 dB	80 dB
Spurious Rejection[1]		98 dB	98 dB	92 dB	98 dB
FM Hum and Noise (25 kHz / 12.5 kHz)[1]		-55 dB / -53 dB	-54 dB / -52 dB	-57 dB / -55 dB	-56 dB / -54 dB
Audio Distortion at Rated		1.2%	1.3%	1.3%	1.2%

PORTABLE MILITARY STANDARDS 810 C, D, E, F & G

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.5	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1C3	503.3	I/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Explosive Atmosphere	-	-	-	-	-	-	511.4	I	511.5, 511.6	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Submersion	512.1	I	512.2	I	512.3	I	512.4	I	512.5	I
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.6	I, V, VI
Shock (Drop)	516.2	II	516.2	IV	516.4	IV	516.5	IV	516.6	IV

DIMENSIONS OF THE RADIOS WITHOUT BATTERY

	Inches	Millimeters
Length	6.15	156.2
Width Push-To-Talk button	2.39	60.7
Depth Push-To-Talk button	1.40	35.5
Width Top	3.32	84.3
Depth Top	2.13	54.1
Depth Bottom of Battery	1.24	31.5
Weight of the radios without battery	13.9 oz	394.1 g

ENCRYPTION

Supported Encryption Algorithms	ADP, AES, DES, DES-XL, DES-OFB, DVP-XL, Localized Algorithm
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 128 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 360 mSec
Encryption Keying	Key Loader and Over the Air Rekeying (OTAR)
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital and SecureNet
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3 FIPS 197

GPS/GNSS SPECIFICATIONS

Constellations	GPS & GLONASS
Tracking Sensitivity	−164 dBm
Accuracy[3]	<5 meters (95%)
Cold Start[3]	<60 seconds (95%)
Hot Start[3]	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature[4]	-30°C / +60°C
Storage Temperature[4]	-50°C / +85°C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water and Dust Intrusion	IP68 (2 meters, 4 hours)

RUGGED SPECIFICATIONS

|	
Leakage (submersion)	MIL-STD-810 C, D, E, F and G Method 512.X Procedure I, IP68 (2 meters, 4 hours)

HOUSING COLOR

Black (Standard), Public Safety Yellow, and High Impact Green

WIRELESS CONNECTIVITY & SECURITY

Frequency Range/Bandsplits:
Bluetooth: 2402 - 2480 MHz, WLAN (WiFi): 2400 - 2483.5 MHz

WLAN (WiFi) 802.11 b/g/n supports WPA-2, WPA, WEP security protocols; radio can be pre-provisioned with up to 20 SSIDs[6]

Mission Critical Wireless Bluetooth 2.1 uses 96 bit encryption for pairing & 128 bit encryption for voice, signaling and data. The radio BT supports up to 6 data connections and 1 audio connection

Bluetooth 4.0 Low Energy uses 128-bit AES-CCM encryption

[1] Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.
[2] Measured conductively in digital mode per TIA / EIA IS 102 CAAA under nominal conditions.
[3] Measured conductively with >6 satellites visible at a nominal −130 dBm signal strength. Specs provided are 95th percentile values.
[4] Temperatures listed are for radio specifications. Battery storage is recommended at 25°C. +5°C to ensure best performance.
[5] Measured using the TIA-603 single-tone method.
[6] 2400 - 2483.5 MHz for EMEA region and includes guardband. Channels 1 - 11 used for FCC/IC region
Specifications subject to change without notice.

All specifications shown are typical.
Radio meets applicable regulatory requirements.
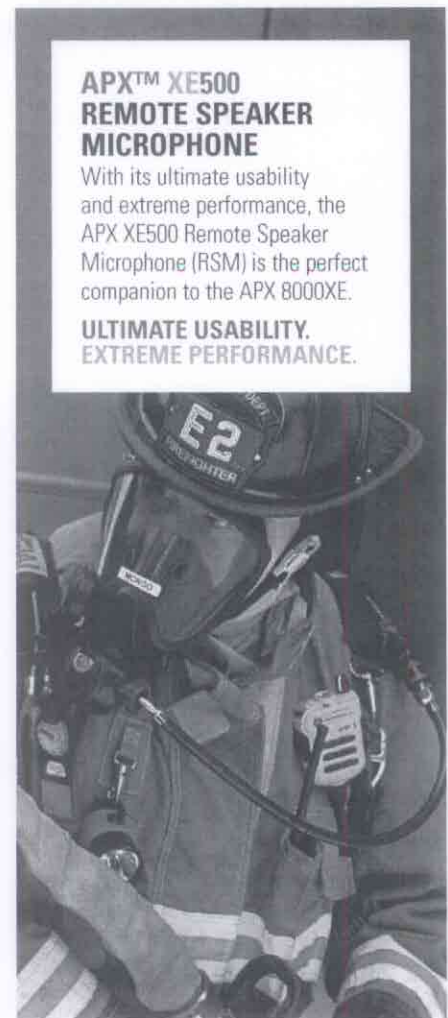
For more information, please visit: www.motorolasolutions.com/APX8000XE

MOTOROLA SOLUTIONS