MOTOROLA SOLUTIONS VRX1000 Vehicle Two-Way Radio Enhancer User Guide

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Ordering Guide

Important Notes

1. Custom Filtering: Only the frequency plans shown in this ordering guide are available as standard configurations. For custom filtering, please contact a Sales Solution Specialist for assistance.
2. Frequencies Required: VRX1000 frequencies must be specified when placing an order. If an in-band filter is ordered it is custom tuned and cannot be re-tuned in the field.
3. Delivery Time: Standard VRX1000 delivery time is 22-24 weeks after receipt of a purchase order and a valid frequency plan. Frequency information must be accurate and in accordance with the frequency plan requirements described in this document in order to avoid delays.
4. Control Heads: The APX'" Mobile radio can operate with up to two control heads while interfaced to a VRX1000.
5. MSU Transmit Power: In all In-Band configurations, the MSU Transmit power must not exceed 50 Watts on DVRS Enabled MSU Modes due to the in-band filters' power rating. The in-band filters connected to the MSU have typical insertion loss of 1.5dB
6. Subscriber Options: APX'" Mobile Radios operating as the host mobile for the VRX1000 require subscriber option GA00631 for operation. APX™ Portable Radios operating through a VRX1000, utilizing the P25 Enhanced feature set require subscriber option QA00631.

Mobile Radio Type

Compatible Mobile Radios
Please refer to the Compatibility Charts under the Firmware section for complete information.
When Pairing with an APX™BS00 Mobile Radio

1. Interface Kits: Depending on the isolation available between the APX™ BS00 mobile and VRX1000 antennas, an interface kit may be required. Download the Interface Kit Selection tool under the Ordering Guide header to determine which (if any) kit and installation drawing is required.
   NOTE: For quoting purposes, the No Kit option may be selected but note that there is an additional cost if an interface kit is determined to be required later.
2. Required Y Cable: One of the following Y cables are required:
   - Without SmartConnect- GA01515 (or KT000247 A01 as standalone accessory)
   - splits the J2 into J2 and J600(DB25)
   - With SmartConnect- GA01779 (or KT000247A04 as standalone accessory)
   - allows RS232 and USB line to be used concurrently

How to Interpret a Frequency Plan Diagram

Below is an example of a frequency plan with the set of rules that must be met for it to be a valid selection. For this example, additional color coding was added for clarity.

7001800MHz Frequency Plan Example

- Ensure the VRX1 000 and System/Mobile frequencies are within the Valid frequency range (MHz)
  - X/ VRX TX/Rx 769-773
  - X/ MSU Rx Range 1 773-775
  - X/ MSU Tx Range 2 806-824
  - MSU Tx Range 1 799-805
  - MSU Rx Range 2 851-869
- Ensure the Minimum separation (MHz) frequency requirements are met
  - at least 3MHz between the highest VRX Tx/Rx frequency and lowest MSU Rx Range 1 frequency
- Ensure the Maximum bandpass (MHz) is not exceeded
  - difference between the highest – lowest VRX Tx/Rx frequencies must be less than or equal to 1 MHz

Preparing a Quote Without Customer Frequencies
If preparing a quote before customer frequencies are known, please use the following:

Frequency Band (MHz)	Operation Mode	Frequency Plan	Lowest VRX1000 Transmit	Highest VRX1000 Transmit	System (Mobile Radio) Frequencies
700/800	In-Band	A1	770	771	Leave Blank
	Cross -Band	A			
VHF	In-Band	A1	136	1 36.1	Leave Blank
	Cro ss-Band	A			
UHF	In-Band	Al	380	380.1	Leave Blank
	Cro ss-Band	A			

NOTE: This will allow the quoting process to continue but the order cannot be placed until the correct frequency plan and exact frequencies have been entered.

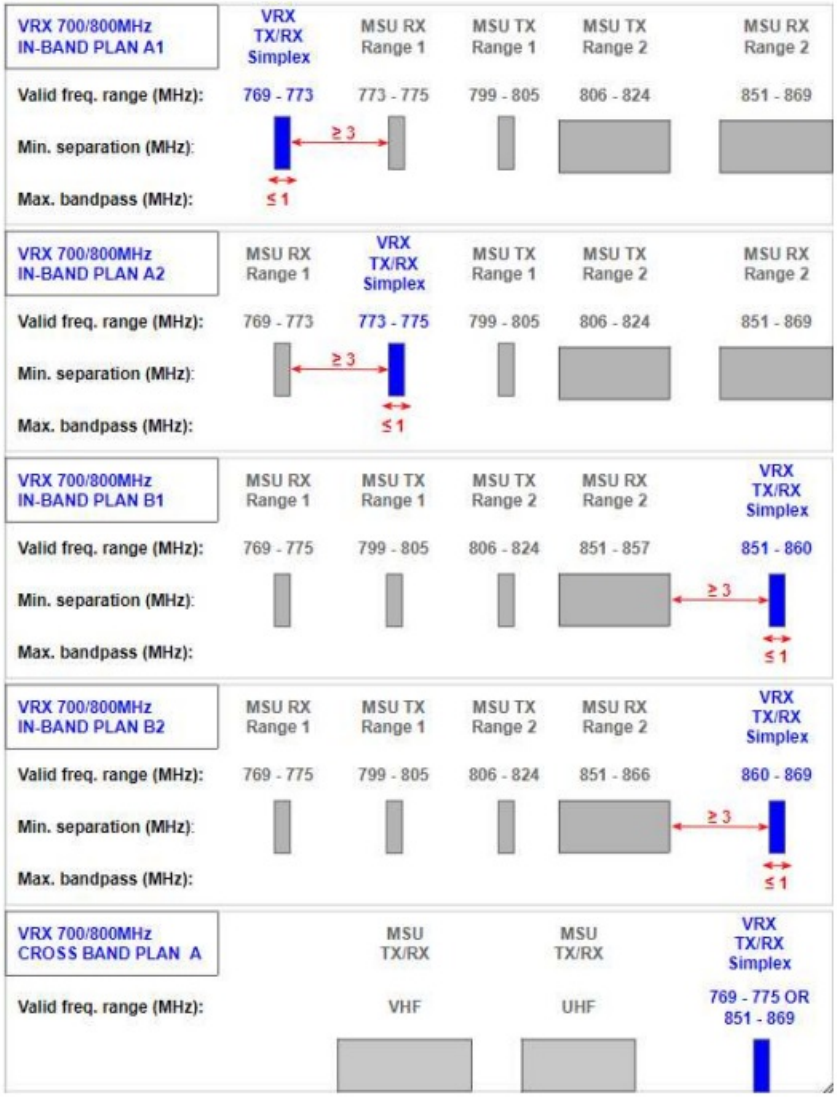
Selecting a Frequency Plan

Standard Frequency Plans
When the customer frequencies are known, follow the specified frequency requirements in the set of standard frequency plan diagrams to select the correct plan.
Custom Frequency Plans
When customer frequencies cannot meet all of the requirements of a standard frequency plan, this is a custom request. Please contact a Sales Solution Specialist to determine if a custom frequency plan is viable. If viable, a per unit custom charge is applicable.

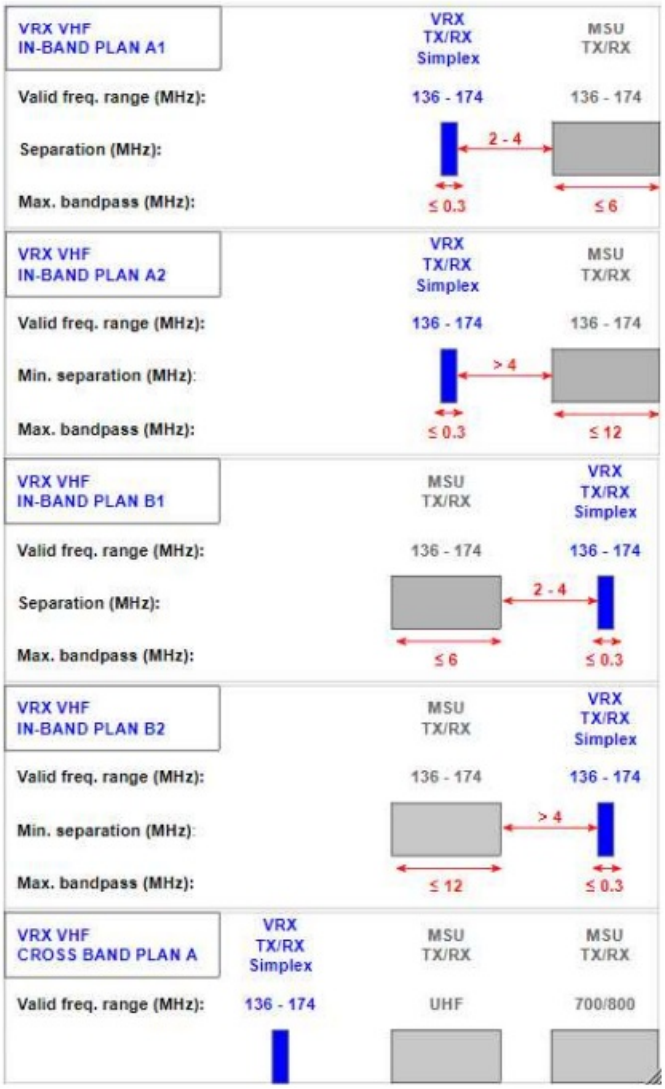
Standard Frequency Plans

Frequency Band	Frequency Plan
700/S00MHz	In-Band Plan Al
	In-Band Plan A2
	In-Band Plan Bl
	In-Band Plan B2
	Cross-Band Plan A
VHF	In-Band Plan Al
	In-Band Plan A2
	In-Band Plan Bl
	In-Band Plan B2
	Cross-Band Plan A
UHF	In-Band Plan Al
	In-Band Plan A2
	In-Band Plan 81
	In-Band Plan 82
	Cross-Band Plan A

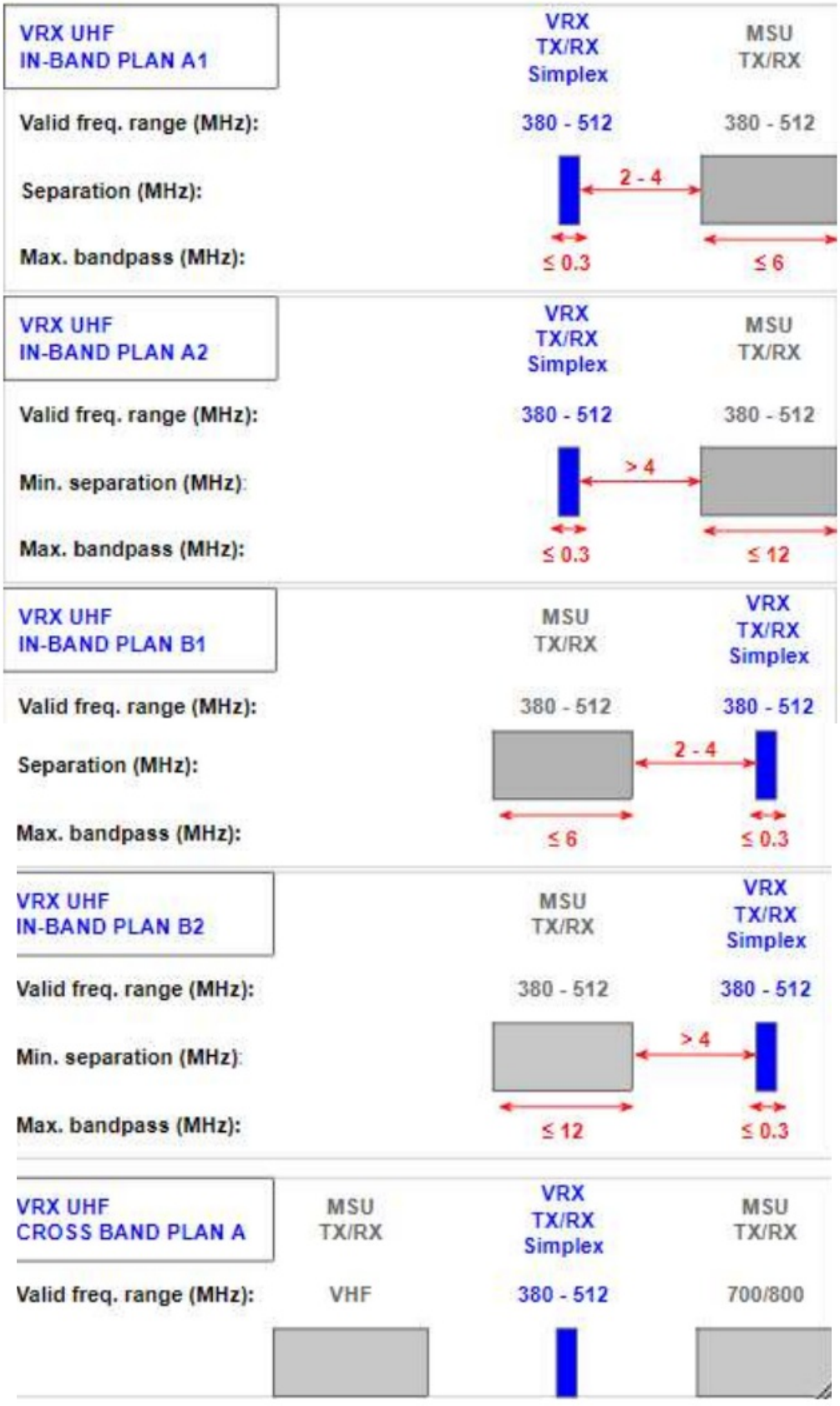
7001800MHz Frequency Plans



VHF 136-174MHz Frequency Plans



UHF Frequency Plans



Main Models: Dropship to New Part Numbers Mapping

The table below shows the mapping between the old dropship part numbers and the new model and option numbers. To compare a new quote to an older quote with dropship part numbers, each dropship number will map to the following:

- Main Model

- Tier 2 or Tier 3 (if applicable)
- In-Band Option (if applicable)
- Custom Frequency Plan (if applicable) TT06580AA->QA09537AA

APX Mobile Radio

Compatible Mobile Radio	Dropship #	Mobile Radio {CPQ)	Option#
APX™ 250 0/ 4500/ 5500/ 6500	TT05715AA	Single Band	QA09576AA
APX™ 750 0	TT05716AA	Dual Band {APX 7500)	QA09577AA
APX™ 8500	TT06279AA	All Band {APX 8500)	QA09578AA

Main Model Description	Option Description	Dropship #	New Model/Option #
VHF Cross-Band Analog (Tier 1)		TT2792A	M87KSS9AW1AN
	P25 Operation & P25 Encryption (Tier 2)	TT05951AA	QA09634AA
	P25 Enhanced Trunking Features (Tier 3)	TT05953AA	QA09635AA
	VHF Frequency Plan A (In-Band Filter Kit)	TT05945AA	QA09289AA
	VHF Frequency Plan B (In-Band Filter Kit)	TT05946AA	QA09289AA
UHF Cross-Band Analog (Tier 1)		TT2793A	M87PSS9PW1 **AN**
	P25 Operation & P25 Encryption (Tier 2)	TT05951AA	QA09634AA
	P25 Enhanced Trunking Features (Tier 3)	TT05953AA	QA09635AA
	UHF Frequency Plan A (In-Band Filter Kit)	TT05947AA	QA09289AA
	UHF Frequency Plan B (In-Band Filter Kit)	TT05948AA	QA09289AA
7001800MHz Cross-Band Analog (Tier 1)		TT2794A	M87USS9PW1AN
	P25 Operation & P25 Encryption (Tier 2)	TT05951AA	QA09634AA
	P25 Enhanced Trunking Features (Tier 3)	TT05953AA	QA09635AA
	7001800MHz Frequency Plan A (In-Band Filter Kit)	TT05949AA	QA09590AA
	7001800MHz Frequency Plan B (In-Band Filter Kit)	TT05950AA	QA09590AA

Standalone Accessories

Functional Tiers and Feature Licenses
NOTES: All serial numbers must be provided at the time of order. Feature license(s) are not transferable between units.
If a feature license f1le{s) is lost, it must be re-purchased.

Name	Description	Option# (Old Dropship#)
Tier 2: P25 Digital Conve ntional Operation and Encryption	Enables the transparent pass through of P25 encryption between the P25 infrastructure, system subscriber units, t he mobile radio, portable radios on the VRX1000 channel .	HKVN4974A (DDN1960A)
	Required: • Tier 1: Analog Operation • APX MSU is on a P25 FDMA or P25 conventional cha nnel	
Tier 3: P25 Enhanced Tru nking Operation	Allows the use of “DVRS Enabled” portable radios and pr ovides the associated trunking features through the VRX 1000.	HKVN4975A (DDN1962A)
	P25 OTAR is supported via the VRX1000 on P25 Trunked FNE; P25 OTAR is NOT supported on P25 Conventional FNE.	
	Prerequisite for: • End to end digital operation on TDMA talkgroups • FDMA Conventional Operation • FDMA or TDMA Trunking	
	Required: • Tier 2: P25 Digital Conventional Operation and Encryption • PSU Option QA00631	
Authentication	Portable Link Layer authentication through the VRX1000 prevents unauthorized portables accessing the radio net work (per unit) **Required:** • Tier 3: P25 Enhanced Trunking Operation • VRX1000 software release 1.51 or greater • Mobile and portable to be running compatible firmwar e version (R20.02.00)	HKVN4976A (DDN3116A)

RM-OTAP	Enables the operator to perform firmware and configuration updates on each VRX1000 unit using Motorola Radio Management via the Mobile Radio. **Required:** • VRX1000 software release 1.60 or greater • Mobile to be running compatible firmware version (R21.01.00 or greater)	HKVN4977A (DDN3119A)
PSU Conventional Scan (Bulk Order)	Enables an enhanced PSU to support conventional scan while the VRX1000 is configured as its system type. **Required:** • Tier 3: P25 Enhanced Trunking Operation • PSU Option DVRS Enabled PSU QA00631 • PSU Option DVRS PSU Conventional Scan • HA00677 • VRX1000 software release 1.61 or greater • Mobile and portable to be running compatible firmware version (R21.20.00 or greater) **Note:** To qualify for bulk order, all serial numbers must be provided at the time of order. This license will only be applicable to the serial numbers provided. Should the customer fail to provide the serial numbers for all units at the time or order, the customer must place a new order when the remaining serial numbers are available.	HKVN4978A (DDN3174A)
SmartConnect In-Vehicle Range Extension	Enables a “DVRS enabled” PSU to maintain voice and emergency services when SmartConnect MSU is connected via broadband (LTE, SAT, Wi-Fi) (per unit) **Required:** • SmartConnect GA01630 • DVRS MSU GA00631 • V CABLE GA01779 • VRX1000 software release 1.24 or greater • Mobile and portable to be running compatiblefirmware version (R23.00.00 or greater)	**HKVN4979A** (DDN3229A)

GPS Driven Deactivation	Enables a VRX1000 to be deactivated by a pre-configured GPS based (Speed & Distance) threshold to decide when to deactivate the primary VRX1000. (Per Unit) **Required:** • VRX1000 compatibility software release 1.27 or greater • Mobile to be running compatible firmware version (R2 4.00.00 or greater) • Mobile GPS Activation GA00229	HKVN4980A (DDN3262A)

Cables

Name	**Description**	**Option#** **(Old Dropship#)**
Programming Cable	**Details:** USB to mini USB, 1 Oft (PN AK672M_2-3-GR-R)	VKN0003A (DDN1968A)
VRX to MSU Control Cable SPARE	Connects the VRX1000 to the MSU **Details:** DB25 to DB25, 3ft (PN 7W087X07-01 is equivalent 1W087B01-01)	• 3ft: VKN0004A • 5ft: VKN0005A • 1Oft: VKN0006A • 15ft: VKN0007A • 20ft: VKN0008A • 25ft: VKN0009A (DDN1969A)
VRX to MSU Y Control Cable (AUX) SPARE	Connects the VRX1000 to the MSU and provides access to the VRX1000 AUX pins (DB15) **Details:** DB25 to DB25 & DB15 (PN 7W087X08-01 is equivalent to 1W087B05-01)	• 3ft: VKN0011 A • 5ft: VKN0012A • 1Oft: VKN0013A • 15ft: VKN0014A • 20ft: VKN0015A • 25ft: VKN0016A (DDN1970A)
RF Switch Cable SPARE	For use with Relay Kit (VLN0003A) **Details:** 1 ft (PN 7W083X09-01)	VKN0028A (DDN9032A)
VRX to MSU Y Control Cable (Siren) SPARE	Connects the VRX1000 to the MSU and provides connection for Motorola Siren **Details:** DB25 to DB25 & DB25, 3ft (PN 7W087X09-01)	VKN0018A (DDN2053A)

In-Band Notch Filter Cable SPARE	Connects the VRX1ODO to VRX1ODO In-Band filter OR Connects non-APX™ 8500 Mobile Radio to Mobile Radio In-Band filter **Details:** Mini UHF (m) to mini UHF (m), 20″ (PN 7W087X11-01)	VKN0002A (DDN1967A)
In-Band Notch Filter Cable for APX8500 SPARE	Connects APX™ 8500 Mobile Radio to Mobile Radio In-Band filter **Details:** QMA RA (m) to mini UHF (m), 20″ (PN 7W900X94-01)	VKN0024A (DDN2719A)
DC Power Cable SPARE	**Details:** M12 Circular connector, 18ft (PN 7W087X20-01)	VKN0001 A (DDN1966A)

Installation/Mounting Kits

Name	**Description**	**Option#** **(Old Dropship#)**
VRX1000 Mounting Kit SPARE		VBN0001A (DDN1963A)
VRX1000 In-Band Filter Mounting Bracket Kit	For use with stacked mount in-band filters	VBN0002A (DDN1965A)
VRX1000 Installation Kit SPARE	Includes Bracket, Mini UHF Connector, Fuse Kit, Power Cable	VBN0003A IDDN2751A)

Antennas

Name	Description	Option# (Old Dropship#)
VEHICLE ROOF/TRUNK MOUNT ANTENNAS- UNITY GAIN (OdBd)		
VHF Unity Gain Antenna	136 – 144MHz	HAD4006A
VHF Unity Gain Antenna	144 – 150.8MHz	HAD4007A
VHF Unity Gain Antenna	1 50.8 – 162MHz	HAD4008A
VHF Unity Gain Antenna	162 -174MHz	HAD4009A
UHF Unity Gain Antenna	380 – 433MHz	HAE6012A
UHF Unity Gain Antenna	450 – 470MHz	HAE4003A
UHF Unity Gain Antenna	470- 512MHz	HAE4004A
7001800MHz Unity Gain A ntenna	764 – 870MHz	HAF4016A
MAG MOUNT ANTENNAS- UNITY GAIN (OdBd)		
VHF Unity Gain Mag Moun t Antenna	For use with APX™ 8500 mobile radio **Freq Range :** 136 – 174MHz	VAD0001A (DDN9014A)
VHF Unity Gain Mag Moun t Antenna	For use with non-APX™ 8500 mobile radios and VRX1000 **Freq Range :** 136 – 174MHz	VAD0002A (DDN9014A)
UHF Unity Gain Mag Moun t Antenna	For use with APX™ 8500 mobile radio **Freq Range :** 380 – 520MHz	VAE0001A (DDN9015A)
UHF Unity Gain Mag Moun t Antenna	For use with non-APX™ 8500 mobile radios and VRX1000 **Freq Range :** 380 – 520MHz	VAE0002A (DDN9015A)
7001800MHz Unity Gain M ag Mount Antenna	For use with APX™ 8500 mobile radio **Freq Range :** 764 – 869MHz	VAF0001A (DDN9016A)
7001800MHz Unity Gain M ag Mount Antenna	For use with non-APX™ 8500 mobile radios and VRX1000 **Freq Range :** 764 – 869MHz	VAF0002A (DDN9016A)

In-Band Filter Kits

Name	Description	Option# (Old Dropship#)
Relay Kit	Filter Bypass kit provides access to full MSU frequenc y band when VRX1000 disabled. Optional for use with all inband VRX1000 .	VLN0003A(DDN2808A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band A1	VFE0004A (DDN2077A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band A1 and APX™ 85 00	VFE0005A (DDN2077A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band A2	VFF0007A(DDN2078A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band A2 and APX™ 85 00	VFF0008A(DDN2078A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band 81	VFF0002A(DDN2078A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band 81and APX™ 85 00	VFF0005A(DDN2078A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band 82	VFF0009A (DDN2077 A)
VRX1000 IN-BAND FILTE R KIT 71800MHz	For use with frequency plan in-band 82 and APX™ 85 00	VFF001QA (DDN2077A)
VRX1000 IN-BAND FILTE R KIT VHF	For use with any frequency plan	VFD0021A (DDN2073A/ DDN2074A)
VRX1000 IN-BAND FILTE R KIT VHF	For use with any frequency plan and APX™ 8500	VFD0022A (DDN2073A/ DDN2074A)
VRX1000 IN-BAND FILTE R KIT UHF	For use with any frequency plan	VFE0016A (DDN2075A/DDN2076A)
VRX1000 IN-BAND FILTE R KIT UHF	For use with any frequency plan and APX™ 8500	VFE0017A (DDN2073A/DDN2074A)
VRX1000 IN-BAND FILTE R KIT CUSTOM	For use with any custom frequency plan	VFN0016A
VRX1000 IN-BAND FILTE R KIT CUSTOM	For use with any custom frequency plan and APX™ 8 500	VFN0017A

APX™SS00 Interface Kits
Use the Interface Kit Selection tool available here for download under Ordering Guide header to determine which (if any) kit and installation drawing are required.

Name	Description	Option# (Old Dropship#)
Single Triplexer Kit		H1919
Single Triplexer w Relay Kit	For use with VHF Cross-Band	VFN0009A(DDN2658A)
Single Triplexer w Relay Kit	For use with UHF Cross-Band	**VFN001 QA** (DDN2658A)
Single Triplexer w Relay Kit	For use with 7001800MHz Cross-Band	VFN0011 A (DDN2658A)
Dual Triplexer Kit	For use with Cross-Band	VFN0008A (DDN2657A)
Dual Triplexer Kit	For use with In-Band	VFN0007A (DDN2657 A)
Dual Triplexer w Relay Kit	For use with VHF Cross-Band	VFN0012A(DDN2659A)
Dual Triplexer w Relay Kit	For use with UHF Cross-Band	VFN0013A (DDN2659A)
Dual Triplexer w Relay Kit	For use with 7001800MHz Cross-Band	VFN0014A (DDN2659A)
Relay Kit	For use with Cross-Band	VLN0004A(DDN2808A)
Relay Kit	For use with In-Band	VLN0002A(DDN2808A)

Training

Name	Description	Option# (Old Dropship #)

Basic Training (1 Day)	Includes soft copy of training materials. Customized training available subject to content and price negotiation. **Training the Trainer/End User** Provides a general overview of Mobile Repeater solutions with respect to the agency's particular use case. Best practices highlighted for common deployment scenarios. Participants will receive hands-on training for practical operation and control. **Requirements:** a minimum of 1 VRX1000 to be tested and in use on the system. **OR** **Technical and Programming Training** Provides radio technicians an in-depth understanding on how the VRX1000 is integrated into the everyday operation of the agency. Focuses on code plug compatibility, Futurecom Repeater Configurator (FRC) software functionality and programming for optimal end user experience. **Requirements:** a minimum of two fully functioning Portable radios (PSUs) programmed to the current system and at least one functional DVRS setup. DVRS setup includes a VRX1000 and a mobile radio (MSU) set. **Requirement:** Contact **debra.oster@motorolasolutions.com** or **maria.tabladillo@motorolasolutions.com** from the Worldwide Education organization to coordinate a training session. Please note that the lead time is ~180 days.	PSV01S04247A (DDN3699A)
Extended Training	1 additional day of on-site and/or virtual training **Requirements:** Basic Training	PSV01S04246A (DDN3700A)

Warranties & Services

NOTE: Warranties can be ordered as standalone up to 90 days after product purchase through after the fact purchase process.

Name	Description	Option#
Essential Services	3/5/7 year duration	LSV01S04106A
Essential Services with Accidental Damage	3/5/7 year duration	LSV01S04109A
Installation Services		LSV01Q03645A
Programming Services		LSV01Q03648A
Professional Services	Deployment Optimization	LSV01 Q03650A

Documents / Resources

	MOTOROLA SOLUTIONS VRX1000 Vehicle Two-Way Radio Enhancer [pdf] User Guide VRX1000 Vehicle Two-Way Radio Enhancer, VRX1000, Vehicle Two-Way Radio Enhancer, Two -Way Radio Enhancer, Way Radio Enhancer, Radio Enhancer

References

- User Manual