

Interface Control Document

E Series Products *Encrypted Video / Audio / Data* *Transmitters & Receivers*

EST1 Transmitter



ESR1 Receiver



EDR1 Diversity Receiver



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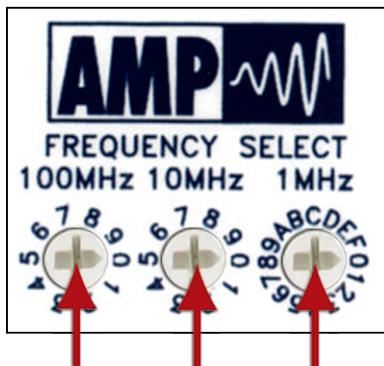
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AMP E-Series Interface Control Document

This document guides you through the steps to program your E-series transmitter or receiver using a standard serial communications port interface. All information contained herein is applicable to the programming of the units at any of the available signalling levels, which may be RS232 (default), 5V TTL, 3.3V TTL, or RS422 as specified at time of purchase.

Step 1

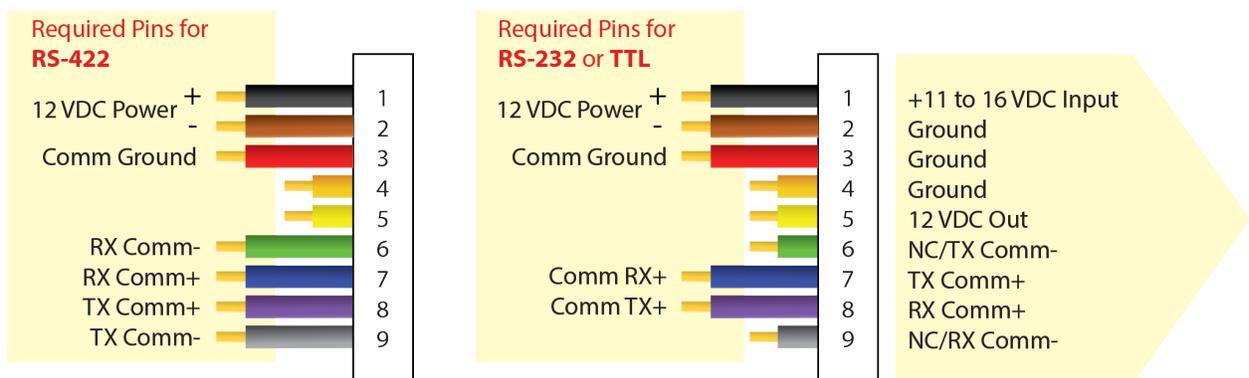
Set all three rotary switches on the unit lid to the “0” position as shown below to set the unit to Remote Mode. The serial communications port is not active in any mode other than Remote Mode. The unit must be in Remote Mode to accept commands, answer queries, and program the Preset configurations. To access Preset Mode, the first two rotary switches (0-9) must be set to the “0” position while the third switch (0-F) is set to the desired Preset Number (1-F).



Step 2

Wire the power and comm (TX and RX) to the MDM-9P connector using the wiring guide below.

WHSMDM9-SSLH0 Mating Connector



Step 3

Set up your terminal.

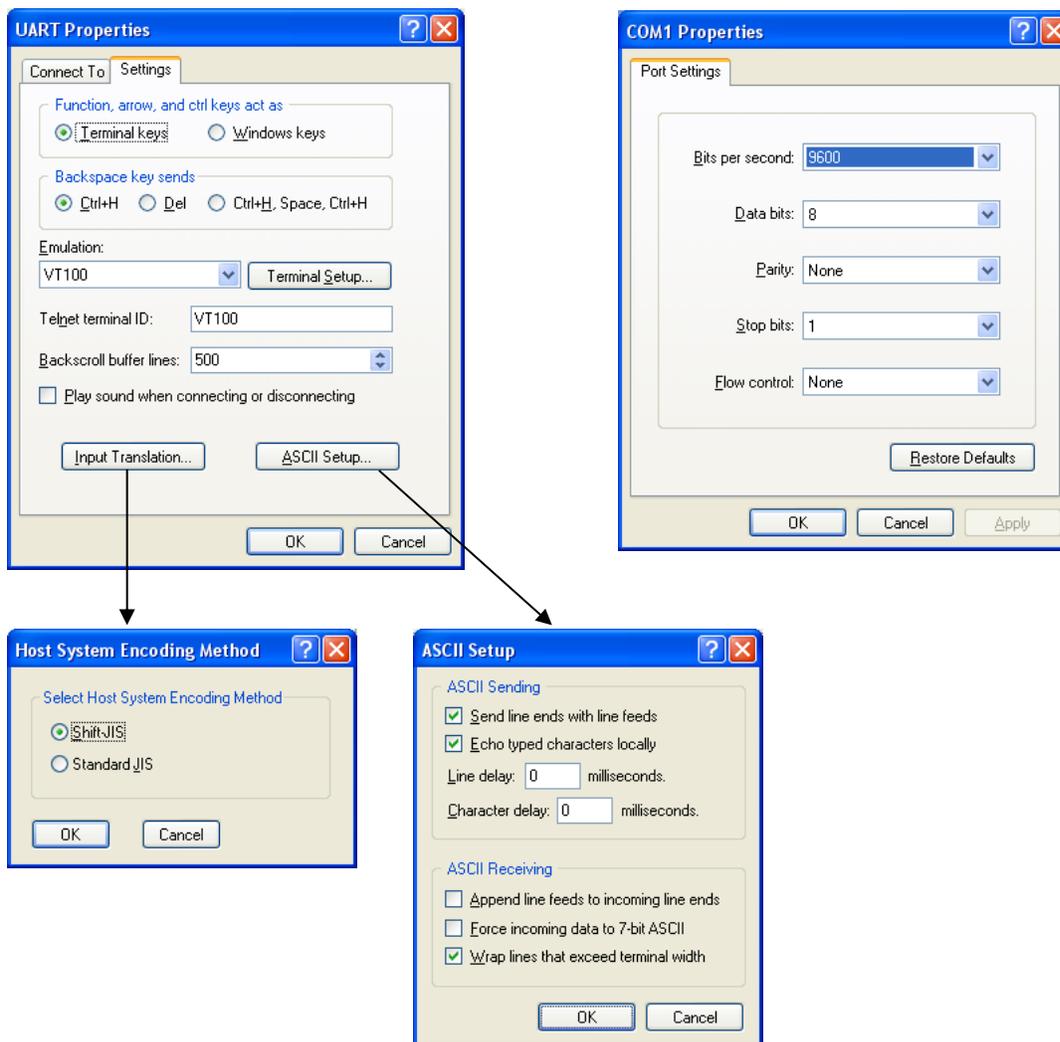
Hardware Parameters

UART/RS-232

Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Handshake	None

Terminal Setup

When using a terminal program such as HyperTerminal or equivalent to interface with the E series, the following settings are recommended.



Step 4

Establish communication and send commands to your unit. Some commands may not be applicable depending on your product configuration.

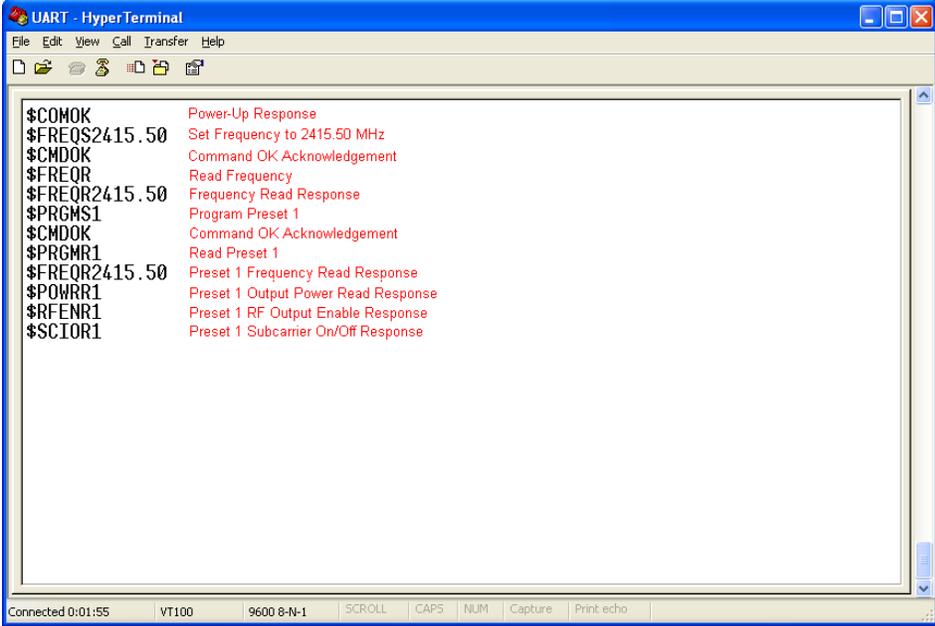
Power Up/Reset

All configurable parameters are stored in non-volatile flash memory internal to unit. After a power reset or fluctuation, the unit runs an initialization routine and restores itself to its last commanded state within 1 second. Once the unit is initialized and ready to receive commands, it will transmit the Communications OK string, \$COMOK[CR][LF].

If the switches are set to zero (0), once the unit is initialized and ready to receive commands, it will transmit the Communications OK string, \$COMOK[CR][LF]. If the unit is running and connected to a terminal when the switches are set to zero (0), the unit will transmit the Communications OK string, \$COMOK[CR][LF], indicating that it is ready to receive commands.

Example Terminal Session

Descriptions are overlaid in red.



```
UART - HyperTerminal
File Edit View Call Transfer Help
$COMOK
$FREQS2415.50
$CMDOK
$FREQR
$FREQR2415.50
$PRGMS1
$CMDOK
$PRGMR1
$FREQR2415.50
$POWRR1
$RFENR1
$SCIOR1
Power-Up Response
Set Frequency to 2415.50 MHz
Command OK/Acknowledgement
Read Frequency
Frequency Read Response
Program Preset 1
Command OK/Acknowledgement
Read Preset 1
Preset 1 Frequency Read Response
Preset 1 Output Power Read Response
Preset 1 RF Output Enable Response
Preset 1 Subcarrier On/Off Response
Connected 0:01:55 VT100 9600 8-N-1 SCROLL CAPS NUM Capture Print echo
```

Custom Serial Interface Considerations

When interfacing to a custom serial interface, the hardware parameters listed earlier in this document must be used. The following information may also be helpful for the interface programmer.

ASCII Character	Description	Hex Value	C Code Mnemonic
[LF]	Line Feed, New Line	A	\n
[CR]	Carriage Return	D	\r

Remote Commands

Command	Description	Applicable To		
		EST1	ESR1	EDR1
\$BYPAR	Clear/Encrypted Video Read	X		
\$BYPAS	Clear/Encrypted Video Set	X		
\$CTEST	Communications Test Read	X	X	X
\$DFLTS	Reset Unit to Factory Defaults	X	X	X
\$DINTR	LED RSSI Intensity Read		X	X
\$DINTS	LED RSSI Intensity Set		X	X
\$FREQR	Frequency Read	X	X	X
\$FREQS	Frequency Set	X	X	X
\$PFTPR	Power Foldback Thermal Protection Read	X		
\$PFTPS	Power Foldback Thermal Protection Set	X		
\$POWRR	RF Power Level Read	X		
\$POWRS	RF Power Level Set	X		
\$RFENR	RF Output Enable Read	X		
\$RFENS	RF Output Enable Set	X		
\$RSIAR	Port A RSSI Read		X	X
\$RSIBR	Port B RSSI Read			X
\$SENKS	Encryption Key Set	X	X	X
\$TEMPR	Temperature Read	X	X	X

Preset Commands

Command	Description	Applicable To		
		EST1	ESR1	EDR1
\$PREFR	Preset Frequency Read	X	X	X
\$PREFS	Preset Frequency Set	X	X	X
\$PREPR	Preset RF Power Level Read	X		
\$PREPS	Preset RF Power Level Set	X		
\$PRERR	Preset RF Output Enable Read	X		
\$PRERS	Preset RF Output Enable Set	X		
\$PREVR	Preset Video Clear/Encrypted Read	X		
\$PREVS	Preset Video Clear/Encrypted Set	X		

Command Definitions

“Remote” Commands

\$BYPAR[CR][LF]

\$BYPAR[CR][LF] is sent to the unit to query the Video Clear/Encrypted status. The unit will respond with \$BYPAR*[CR][LF] where * = 0 represents Encrypted Video and * = 1 represents clear (unencrypted) video.

\$BYPAS*[CR][LF]

\$BYPAS*[CR][LF] is sent to the unit to set the Video Clear/Encrypted. * = 0 represents Encrypted Video and * = 1 represents Clear (unencrypted) video.

\$CMDER[CR][LF]

The Command Error response \$CMDER[CR][LF] will be sent by the unit if an invalid or erroneous command is sent to it. Invalid commands include attempting to command the unit to an invalid frequency or configuration and miss-spelled commands.

\$CTEST[CR][LF]

When the Communications Test query \$CTEST[CR][LF] is sent the unit performs a self test including verification of on board peripherals and external communications. If the self test is successful, the unit responds with \$COMOK[CR][LF]. If the self test is unsuccessful, the unit will not respond. A successful response will be received within 100ms of the query.

\$DFLTS[CR][LF]

\$DFLTS[CR][LF] is sent to the unit to Reset Unit to Factory Default settings including preprogrammed frequencies and encryption keys. In order for a link to be operational while using the factory default settings, the \$DFLTS[CR][LF] command must be sent to both the transmitter and receiver. After the \$DFLTS[CR][LF] command has been sent, the unit will respond with \$CMDOK[CR][LF].

\$DINTR[CR][LF]

\$DINTR[CR][LF]] is sent to the unit to query the LED intensity on receivers equipped with LED RSSI meters. The unit will respond with \$DINTR*[CR][LF] where * = 0 represents OFF, * = 1 represents Dim, and * = 2 represents Bright.

\$DINTS*[CR][LF]

\$DINTS*[CR][LF] is sent to the unit to set the LED intensity on receivers equipped with LED RSSI meters. * = 0 represents OFF, * = 1 represents Dim, and * = 2 represents Bright.

\$FREQR[CR][LF]

\$FREQR[CR][LF] is sent to query the unit's current Frequency setting. The unit will respond with \$FREQR****[CR][LF] where **** represents the frequency in MHz.

\$FREQS** [CR][LF]**

\$FREQS**** [CR][LF] is sent to the unit to set the desired Frequency. **** represents the frequency in MHz as illustrated in the following example table:

Band	Desired Frequency (MHz)	Command
U	345.5	\$FREQS345.5 [CR][LF]
L	1710	\$FREQS1710 [CR][LF]
S	2250	\$FREQS2250 [CR][LF]
C	4800	\$FREQS4800 [CR][LF]

Channelization (channel spacing) for all standard units is as follows: 100 kHz for UHF, 1 MHz for all other bands.

The following table illustrates the default programmed frequencies for units equipped with a 16 position rotary switch:

Frequency Band

Preset	U1	L1	L2	S1	S2	S3	C1	C2	C3
1	340 MHz	1435 MHz	1700 MHz	2200 MHz	2400 MHz	2200 MHz	4400 MHz	4900 MHz	4400 MHz
2	344 MHz	1442 MHz	1711 MHz	2214 MHz	2407 MHz	2221 MHz	4436 MHz	4907 MHz	4443 MHz
3	349 MHz	1449 MHz	1721 MHz	2228 MHz	2414 MHz	2243 MHz	4471 MHz	4914 MHz	4486 MHz
4	353 MHz	1456 MHz	1732 MHz	2243 MHz	2421 MHz	2264 MHz	4507 MHz	4921 MHz	4528 MHz
5	357 MHz	1464 MHz	1743 MHz	2257 MHz	2428 MHz	2285 MHz	4543 MHz	4928 MHz	4571 MHz
6	361 MHz	1471 MHz	1754 MHz	2271 MHz	2435 MHz	2307 MHz	4579 MHz	4935 MHz	4614 MHz
7	366 MHz	1478 MHz	1764 MHz	2285 MHz	2442 MHz	2328 MHz	4614 MHz	4942 MHz	4657 MHz
8	370 MHz	1485 MHz	1775 MHz	2300 MHz	2450 MHz	2350 MHz	4650 MHz	4950 MHz	4700 MHz
9	374 MHz	1492 MHz	1786 MHz	2314 MHz	2457 MHz	2371 MHz	4686 MHz	4957 MHz	4742 MHz
A	379 MHz	1499 MHz	1796 MHz	2328 MHz	2464 MHz	2392 MHz	4721 MHz	4964 MHz	4785 MHz
B	383 MHz	1506 MHz	1807 MHz	2342 MHz	2471 MHz	2414 MHz	4757 MHz	4971 MHz	4828 MHz
C	387 MHz	1514 MHz	1818 MHz	2356 MHz	2478 MHz	2435 MHz	4793 MHz	4978 MHz	4871 MHz
D	391 MHz	1521 MHz	1829 MHz	2371 MHz	2485 MHz	2456 MHz	4829 MHz	4985 MHz	4913 MHz
E	396 MHz	1528 MHz	1839 MHz	2385 MHz	2492 MHz	2478 MHz	4864 MHz	4992 MHz	4956 MHz
F	399.9 MHz	1535 MHz	1850 MHz	2399 MHz	2499 MHz	2499 MHz	4900 MHz	4999 MHz	4999 MHz

"Config Select" Preset

\$PFTPR[CR][LF]

\$PFTPR[CR][LF] is sent to the unit to query the Power Foldback Thermal Protection status. The unit will respond with \$PFTPR*[CR][LF] where * = 1 represents protection enabled and * = 0 represents protection disabled.

\$PFTPS*[CR][LF]

\$PFTPS*[CR][LF] is sent to the unit to enable or disable the Power Foldback Thermal Protection (PFTP). * = 1 represents protection enabled and * = 0 represents protection disabled. When PFTP is enabled, the unit monitors its operating temperature and reduces RF output power as necessary to avoid thermal damage. RF output power reduction does not occur until the unit exceeds +75C. PFTP is enabled by default. Adequate heat sinking should be employed to maintain an operating temperature of less than +75C.

***Disabling Power Foldback Thermal Protection voids the manufacturer warranty.**

\$POWRR[CR][LF]

\$POWRR[CR][LF] is sent to the unit to query the RF Power Level setting. The unit will respond with \$POWRR*[CR][LF] where * = 1 represents 250mW, * = 2 represents 500mW, * = 3 represents 1W, and * = 4 represents 2W. Only the power levels specified at time of purchase are available.

\$POWRS*[CR][LF]

\$POWRS*[CR][LF] is sent to the unit to set the desired RF Power Level. * = 1 represents 250mW, * = 2 represents 500mW, * = 3 represents 1W, and * = 4 represents 2W. Only the power levels specified at time of purchase are available.

\$RFENR[CR][LF]

\$RFENR[CR][LF] is sent to the unit to query the RF Output Enable status. The unit will respond with \$RFENR*[CR][LF] where * = 0 represents disabled and * = 1 represents enabled.

\$RFENS*[CR][LF]

\$RFENS*[CR][LF] is sent to the unit to set the RF Output Enable. * = 0 represents disabled and * = 1 represents enabled. This command allows the transmitter to remain powered on and locked on frequency without broadcasting any video.

\$RSIAR[CR][LF]

\$RSIAR[CR][LF] is sent to the unit to query antenna Port A RSSI (Received Signal Strength Indication). The unit will respond giving the RSSI in dBm up to a maximum of approximately -30 dBm where the RSSI detection compresses. For example, if the strength of the received signal at antenna port A is -45dBm, the unit will respond with \$RSIAR-45[CR][LF].

\$RSIBR[CR][LF]

\$RSIBR[CR][LF] is sent to the unit to query antenna Port B RSSI (Received Signal Strength Indication). The unit will respond giving the RSSI in dBm up to a maximum of approximately -30 dBm where the RSSI detection compresses. For example, if the strength of the received signal at antenna port B is -45dBm, the unit will respond with \$RSIBR-45[CR][LF].

\$SENKS***[CR][LF]**

\$SENKS*****[CR][LF] is sent to the unit to set the 256 bit encryption key. 32 ASCII characters must be entered in order to set the encryption key. The encryption keys on the transmitter and receiver must be set the same in order to establish a secure video link.

\$TEMPR[CR][LF]

\$TEMPR[CR][LF] is sent to the unit to query the current Temperature of the unit. The unit will respond with \$TEMPR*##[CR][LF] where * indicates the sign of the temperature and ## represents the temperature in degrees Celcius.

“Preset” Commands

\$PREFR*[CR][LF]

\$PREFR*[CR][LF] is sent to the unit to query the center Frequency for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F). The unit will respond with \$PREFR*-#### where * = 0-F and #### = frequency in MHz.

\$PREFS*-####[CR][LF]

\$PREFS*-####[CR][LF] is sent to the unit to set the center Frequency for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F) and #### represents the frequency in MHz.

\$PREPR*[CR][LF]

\$PREPR*[CR][LF] is sent to the unit to query the RF Power Level setting for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F). The unit will respond with \$PREPR*-# where * = 0-F and # = 1-4 (1 = 250mW, 2 = 500mW, 3 = 1W, and 4 = 2W).

\$PREPS*-[CR][LF]

\$PREPS*-[CR][LF] is sent to the unit to set the RF Power Level for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F) and # represents the output power level (1 = 250mW, 2 = 500mW, 3 = 1W, and 4 = 2W). Only the power levels specified at time of purchase are available.

\$PRERR*[CR][LF]

\$PRERR*[CR][LF] is sent to the unit to query the RF Output Enable status for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F). The unit will respond with \$PRERR*-[CR][LF] where * = 0-F and # = 0 or 1 (0 = Disabled, 1 = Enabled).

\$PRERS*-[CR][LF]

\$PRERS*-[CR][LF] is sent to the unit to set the RF Output Enable for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F) and # represents RF enable setting (0 = Disabled, 1 = Enabled).

\$PREVR*[CR][LF]

\$PREVR*[CR][LF] is sent to the unit to query the Video Clear/Encrypted status for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F). The unit will respond with \$PREVR*-[CR][LF] where * = 0-F and # = 0 or 1 (0 = Encrypted, 1 = Clear (unencrypted)).

\$PREVS*-[CR][LF]

\$PREVS*-[CR][LF] is sent to the unit to set the Video Clear/Encrypted for an individual rotary switch preset. * represents the rotary switch Preset Number (0-F) and # represents the video inversion setting (0 = Encrypted, 1 = Clear (unencrypted)).

Command Quick Reference

Command	Command Description	Data	Response	Response Description
\$BYPAR	Clear/Encrypted Video Read		\$BYPAR*	* = 0 or 1, 0 = Encrypted, 1 = Clear (unencrypted)
\$BYPAS*	Clear/Encrypted Video Set	* = 0 or 1, 0 = Encrypted, 1 = Clear (unencrypted)	\$CMDOK	Command OK Response
\$CTEST	Communications Test Read		\$COMOK	Unit Communications OK
\$DFLTS	Reset Unit to Factory Defaults		\$CMDOK	Command OK Response
\$DINTR	RSSI LED Intensity Read		\$DINTR*	* = 0- 2, 0 = OFF, 1 = Dim, 2 = Bright
\$DINTS*	RSSI LED Intensity Set	* = 0- 2, 0 = OFF, 1 = Dim, 2 = Bright	\$CMDOK	Command OK Response
\$FREQR	Frequency Read		\$FREQR****	**** = MHz
\$FREQS****	Frequency Set	**** = Frequency in MHz	\$CMDOK	Command OK Response
\$PFTPR	Power Foldback Thermal Protection Read		\$PFTPR*	* = 0 or 1, 0 = Disabled, 1 = Enabled
\$PFTPS*	Power Foldback Thermal Protection Set	* = 0 or 1 (0 = Disable, 1 = Enable)	\$CMDOK	Command OK Response
\$POWRR	RF Power Level Read		\$POWRR*	* = 1-4, 1 = 250mW, 2 = 500mW, 3 = 1W, 4 = 2W
\$POWRS*	RF Power Level Set	* = 1-4 (1 = 250mW, 2 = 500mW, 3 = 1W, 4 = 2W)	\$CMDOK	Command OK Response
\$RFENR	RF Output Enable Read		\$RFENR*	* = 0 or 1, 0 = Disabled, 1 = Enabled
\$RFENS*	RF Output Enable Set	* = 0 or 1 (0 = Disable, 1 = Enable)	\$CMDOK	Command OK Response
\$RSIAR	Port A RSSI Read		\$RSIAR-**	* = RSSI in dBm
\$RSIBR	Port B RSSI Read		\$RSIAB-**	* = RSSI in dBm
\$SENKS*	Encryption Key Set	* = 32 ASCII Characters	\$CMDOK	Command OK Response
\$TEMPR	Temperature Read		\$TEMPR*##	* = + or – and ## = degrees Celcius
\$PREFR*	Preset Frequency Read	* = 0-F (Preset)	\$PREFR*-#####	* = 0-F (Preset) and ##### = Frequency (MHz)
\$PREFS*-#####	Preset Frequency Set	* = 0-F (Preset) and ##### = Frequency (MHz)	\$CMDOK	Command OK Response
\$PREPR*	Preset RF Power Level Read	* = 0-F (Preset)	\$PREPR* -#	* = 0-F (Preset) and # = 1-4 (1 = 250mW, 2 = 500mW, 3 = 1W, 4 = 2W)

\$PREPS* -#	Preset RF Power Level Set	* = 0-F (Preset) and # = 1-4 (1 = 250mW, 2 = 500mW, 3 = 1W, 4 = 2W)	\$CMDOK	Command OK Response
\$PRERR*	Preset RF Output Enable Read	* = 0-F (Preset)	\$PRERR* -#	* = 0-F (Preset) and # = 0 or 1 (0 = Disabled, 1 = Enabled)
\$PRERS* -#	Preset RF Output Enable Set	* = 0-F (Preset) and # = 0 or 1 (0 = Disable, 1 = Enable)	\$CMDOK	Command OK Response
\$PREVR*	Preset Video Clear/Encrypted Read	* = 0-F (Preset)	\$PREVR* -#	* = 0-F (Preset) and # = 0 or 1 0 = Encrypted, 1 = Clear (unencrypted)
\$PREVS* -#	Preset Video Clear/Encrypted Set	* = 0-F (Preset) and # = 0 or 1 0 = Encrypted, 1 = Clear (unencrypted)	\$CMDOK	Command OK Response

Technical Support Information

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