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1. SPECIFICATIONS**1.1 Introduction**

The P42/44 UHF are a radio trancivers module that is intended to be a subassembly in terminals products. The radio covers the trancivers frequency ranges of 403-433Mhz and 438-470Mhz the at 12.5KHz channel spacing. It includes no voice processing circuitry and is optimized for dataoperation. The purpose of this document is to define the performance requirements for the UHF radios.

1.2 Detailed Technical Specification

All specifications will be met over the temperature range of -30 to +60 degree C at the supply 7.5 volt DC.

1.2.1 General

Frequency range	FRN5916/7 p42 403-433Mhz/438-470Mhz FRN5922/23 p44 403-433Mhz/438-470Mhz
Modulation	FM
Antenna Impedance	50 ohms
Frequency stability	2.5 ppm
Duty Cycle	
Normal opration :	20% Tx 80% Rx - 10 Sec Tx., 40 Sec Rx.
Maximum Rating :	Continuous transmission should not exceed 25 seconds.

1.2.2 Transmitter

RF Output - High power: 4W min. at room temperature and 7.5 VDC
+2/-3 dB from -30 to 70 degree C 6 to 9 VDC

Measured per EIA RS-152-B section 3

Conducted Spurious: -60dBc non-harmonic
-60 dBc harmonic

Measured per EIA RS-152-B section 4

Radiated Spurious: 500uV/m at 3 m

Measured per FCC Part 15.

Audio Frequency Response: 3Hz to 5KHz ; +/- 2dB

Measured per Section 5.7 in this spec.

Distortion: 5%

Measured per Section 5.5 in this spec.

Hum and Noise 25 dB

Measured per Section 5.6 in this spec.

MOD Input sensitivity 350mVrms/ +/-2khz dev +/-0.5dB

Measured per Section in this spec.

Modulation Stability +/-10%

Measured per Section 5.4 in this spec.

Tx Turn-on Time: 10 msec.

Transmit Current 2.5A

Frequency Stability 2.5ppm

1.2.3 Receiver

Receiver Sensitivity
 12 dB Sinad -113dBm
Measured per RS-204-C Paragraph 7.0 with external de-emphasis network.

Adjacent Channel Selectivity
 60dB
Measured per RS-204-C Paragraph 12.0 with external de-emphasis

Spurious and Image
 60dB
Measured per RS-204-C Paragraph

Intermodulation
 60dB
Measured per RS-204-C Paragraph 14.0 with external de-emphasis network.

Conducted Spurious Emission -57dBm
Measured per RS-204-C Paragraph 16.0 .

Audio Frequency Response
 3 Hz to 5 KHz +/-2dB
Measured per Section 4.4 in this spec.

Distortion
 5%
Measured per Section 4.2 in this spec.

Hum and Noise
 25dB
Measured per Section 4.3 in this spec.

DISC Output Stability +/- 10%
Measured per Section 4.2 in this spec.

RSSI Output
 See Figure 7.1
Measured per Section 4.5 in this spec.

Receiver settling Time
 10 msec.
Measured per APPENDIX I, Section 4

Receiver Settling Time From
 Battery Save Mode to fully
 operation
 10 msec
Measured per APPENDIX I, Section 5

1.2.4 Power Supply ...

Nominal Voltage
 7.5 volts DC

Operational Voltage Range
 6 to 9 volts DC

Polarity
 Negative Ground

Current Drain :
 Battery Save Mode:
 Receiver :
 10mA
 50mA

Transmit :

2.5A@4watt

1.2.5 Enviromental

Temperature : The radio will operate and meet the stated specifications from -30 to +60 degree C.
Storage temperature -40 to +80 degree C.

Humidity: 95% humidity at +50 degree C, 63.5 hrs exposed.

Vibrations and Shock : Per EIA RS152B MDI doc #910,0436, Survival four foot drop on concrete when installed inside host product.

2.TEST EQUIPMENT &PROGRAMS

DC Power Supply, 0-10v, 0-5a
Digital Multimeter (Fluke 87 Or Eq.)
Oscilloscope (0 .. 100 MHz)
IBM PC XT/AT or Compatible Computer
HP8920A Communication Test Set
HP 8656B/8657A Signal Generator X 3
3 Way RF Combiner
Modulation Analyzer c/w Power Sensor HP8901B/HP11722A
Audio Analyzer HP8903B

2.1. RADIO ALIGNMENT AND ADJUSTMENTS - GENERAL

There are total of 5 alignments and adjustments to be made in the radio. holes are located on the top
The test fixture uses a PC computer to load the information for the channel frequency, modulation
function, adapt timer, TX keying, battery save mode etc. to the synthesizer IC for the p42 .For the p44
use p44 RSS (radio service software) to load frequencies

2.1.TRANSMITTER CALIBRATION

Key radio only while making adjustments or measurements. The transmitter tune-up frequency is
455MHz.

Adjust the DC supply voltage to 7.5+/-0.1 volts DC.

Program the radio transmitter to the tune-up frequency and key the radio with no modulation
applied. Monitor transmitter RF sample on the modulation analyzer and set the tune-up uency
to the following limit by adjusting the trimmer (R532)

Modulation Analyzer settings:

Measurement : FREQ.

Specials : 7.1 SPCL

Limit: 455MHz +/-200 Hz

Using the same procedure, monitor the RF power output on the modulation analyzer.
Set the output power to the following limit by adjusting R595,

Modulation Analyzer settings:

Measurement : RF POWER

Limit: 1 to 4W (according to the request) +/-0.15W

Using the same procedure as and MOD Attenuation value per the table bellow , Key the radio and apply 2400 Hz tone at 350mVrms to the MOD inputs of the Radio (pin 6). Adjust as MOD ATT with the software. on the top housing . set deviation to the to 2khz +/-50hz.

Note: Apply the 20Hz tone and check deviation of 2khz +/- 0.5db.

Modulation Analyzer settings:

Measurement : FM

LP Filter :15KHz

Detector : Peak+

Limit: 2KHz +/- 0.5db

2.2.RECEIVER CALIBRATION

The receiver tune-up frequency is 455MHz.

Program the radio receiver to the tune-up frequency and set the RF generator to the tune-up
Apply -47dB RF signal modulated by 2.4KHz tone 2KHz deviation
check carrier detector 5v.

Apply an modulated RF signal at -110 dBm at the tune-up frequency. Adjust 593, that is

For carrier detect CAL to 0 volt .increase the signal level to -107dbm and verify 5v on the
carrier detect output. .

3.RECEIVE FINAL TEST SPECIFICATIONS

CAUTION: AVOID TRANSMISSION DURING RECEIVER TESTS

Note 1: All receiver tests are to be performed with an RF test cable connected to

Note 2: Modulation frequency must be set to 0 Hz to avoid unwanted noise at the DISC inputs.

Note 3: "Extreme conditions", unless otherwise specified, refers to voltage variations between 6 V and 9 VDC and temperature range of -30°C to +60°C .

Note 4: Tests are provided on frequencies: low, middle, high.

3.1. Sensitivity/Selectivity

3.1.1. 12dB Sinad

Apply an on-channel RF signal at a level of -113 dBm. Modulate with a 1KHz tone at 2KHz deviation. Measure the SINAD

Audio Analyzer settings:

Measurement : SINAD

LP Filter : 30KHz

PSHF : ON

Limit: 12 dB min.

3.1.2. Adjacent channel selectivity

Measured per ETS 300 113 5.2.5 Subclause 9.6

3.1.3. Spurious response rejection

Measured per ETS 300 113 5.2.6 Subclause 9.7

3.1.4. Intermodulation response rej

Measured per ETS 300 113 5.2.7 Subclause 9.8

3.2.DISC Output and Distortion

Apply an on-channel RF signal at a level of -47 dBm. Modulate with a 2.4KHz tone at 2KHz deviation. Measure the level and distortion at the DISC output of the test fixture. Change the RF level to -80 dBm and -47dBm and measure the distortion at each level.

Audio Analyzer settings:

Measurement : AC LEVEL : for Disc level measurement
 : DISTN : for distortion measurement
LP Filter : 30KHz

Limits :

AC Level : 140mVrms +/- 20mV

Distortion :

@-80dBm : 5% max.

@-47dBm : 5% max.

Limit at extreme conditions :

AC Level : 140mVrms +/-40mV

Distortion : 10% max. at any level .

3.3.RX Hum and Noise

Apply an on-channel RF signal at a level of -47 dBm. Modulate with a 2.4KHz tone at 2KHz deviation. Measure the level at the DISC output of the test fixture and record as 0dB reference . Remove the modulation and measure the relative AC level in dB note the hum and noise level.

Audio Analyzer settings:

Measurement : AC Level
 Ratio, Log
LP Filter : 30KHz

Limit: -25 dB min.

Limit at extreme conditions: 20dB

3.4.Receiver Audio Frequency Response

Apply an on-channel RF signal at a level of -47 dBm. Modulate with 2.4KHz tone at 2KHz deviation. Measure the level at the test fixture DISC output. Establish a 0 dB reference. Change the modulation frequency to 20 Hz, then to 500 Hz, then to 5000 Hz. Verify that the audio frequency response (relative to the 0 dB reference) is within the following limits.

Audio Analyzer settings:

Measurement : AC Level
 Ratio, Log
LP Filter : 30KHz

Limit: +/- 2dB max .

Limit at extreme conditions : +/- 2dB max.

3.5.RSSI

Apply an on-channel RF signal with no modulation at a level of -110 dBm. Measure the DC voltage at the RSSI output.

Repeat the test at -66 dBm.

Audio Analyzer settings:

Measurement : DC Level

LP Filter : 30KHz

Limits :

@ -110dBm : 1VDC +/- 150mV

@ -66dBm : 2.2VDC min.

4.2VDC max.

Limit at extreme conditions:

@ -110dBm : 1VDC +/- 200mV

@ -66dBm : 2.2VDC min. 4.2VDC max.

3.6.Standby Current Drain

4.6.1 RECEIVER CURRENT:

Measure the receiver current drain with no RF signal applied to the receiver

Limit : 50mA max.

4.6.2 SLEEP CURRENT

Measure the receiver current drain with no RF signal applied to the receiver ,Set channel 8 on the p44 and on p42 send the Standby synthesizer word.

Limit : 10mA max.

4. TRANSMIT FINAL TEST SPECIFICATIONS

WARNING: The radio shall transmit continuously no more than 20 seconds without a heat sink

Note : test frequencies:

Channel 1 frequency: 438.000MHz

Channel 2 frequency: 455.000MHz (tune-up frequency)

Channel 3 frequency: 470.000MHz

4.1. Transmitter Frequency Accuracy

Verify that the exact frequency (on any channel) is within the following limit.

Modulation Analyzer settings:

Measurement : FREQ

Specials : 7.1 SPCL

Limit: +/-200Hz max

Limit at extreme conditions: 2.5ppm

4.2. RF Power Output

Measure the RF power output on the three test channels

Modulation Analyzer settings:

Measurement : RF POWER

Limits :

antenna (J1):

High power : 4 +/- 0.3W

Low Power : 1W +/- 0.2W

Limit at extreme conditions:

antenna (J1):

High power : 4W +/-3dB

Low Power : 1W +/- 3dB

4.3. Transmitter Current Drain

Measure the transmitter current drain while keyed at each antenna using a calibrated ammeter or current measuring power supply. Verify that current drain is within the following limit.

Limit : 2.5 A max. @ High power

4.4. Modulation Stability (Deviation)

5.4.1 Key the radio, set the Mod Attenuation according to the following table:

Apply a 2.4KHz tone at a propriety level to achieve 350mVrms on radio Mod terminals.

Measure deviation (while the radio is keyed) on the Modulation Analyzer.

5.4.2 Key the radio, set the Mod Attenuation according to the following table:

Apply a 20Hz tone at a propriety level to achieve 350mVrms on radio Mod terminals.

Measure deviation (while the radio is keyed) on the Modulation Analyzer.

Modulation Analyzer settings :

Measurement : FM

LP Filter :15KHz

Detector : Peak+

Limit : 2KHz +/-0.1KHz @ 455MHz with 2.4khz tone
2KHz +/-0.2KHz @ any other channel and with 20hz tone

Limit at extreme conditions : 2KHz +/-0.4KHz

4.5. Transmitter Distortion

Using the same procedure as above, key the radio and measure the distortion. Verify that the distortion is within the following limit.

Modulation Analyzer settings :

Measurement : FM

LP Filter : 15KHz

Detector : Peak+

Specials : 2.2SPCL

Audio Analyzer settings :

Measurement : DISTN

LP Filter: 30KHz

Limit : 5% max.

Limit at extreme conditions : 7% max.

4.6. Tx Hum and Noise

Using the same procedure as above, key the radio. Measure the AC level at Modulation Analyzer audio output and set the Audio analyzer to 0 dB reference. Set the Mod.Frequency to 0Hz. Read the hum and noise ratio .

Modulation Analyzer settings :

Measurement : FM

LP Filter :15KHz

Detector : Peak+

Specials : 2.2SPCL

Audio Analyzer settings :

Measurement : AC Level

Ratio, Log

LP Filter: 30KHz

Limit: -25dB max.

Limit at extreme conditions: -20dB max.

4.7. Transmitter Audio Frequency Response

Using the same procedure ,Apply a 2.4 kHz signal to the MOD input. Establish RMS position on the Modulation analyzer and 0dB reference. Change audio frequency to 50 Hz, 500 Hz, 1000 Hz and 5000 Hz. Verify that the response is within the following limit relative to deviation at 2.4KHz tone..

Modulation Analyzer settings :

Measurement : FM

LP Filter :15KHz

Detector : RMS or AVG

Limit : +/-2 dB max.

Limit at extreme conditions: +/- 2dB max.

4.8. Transmitter attack time

Measured per ETS 300 113 5.1.7 Subclause 8.8 and 8.10.1

4.9. Transmitter Spurious emissions

Measured per ETS 300 113 5.1.5 Subclause 8.6

5. P44 INTERFACE

P1 INTERFACE CONNECTOR PIN OUT

PINS	SYMBOL	TYPE	DESCRIPTION
1			GND
2	SWB+	+7.5V DC	RADIO POWER SUPPLY
3	XB+	+7.5V DC	7.5V IN TRANSMIT MODE
4	RX 5V	+5V	5V IN RECEIVE MODE ONLY
5	TX 5V	+5V	5V IN TRANSMIT MODE ONLY
6	MOD IN+	INPUT	DIFFERENTIAL INPUT FOR DATA MODULATION
7	SQ DET	OUTPUT	CARRIER DETECT
8	RESET	INPUT	PULL DOWN WHILE PROGRAMING
9	RSSI	OUTPUT	RECEIVED SIGNAL STRENGTH INDICATOR
10	DISC+	OUTPUT	DISCRIMINATOR OUTPUT
11	CH SEL B	INPUT	SELECTING CHANNEL
12	CH SEL A	INPUT	PULL DOWN TO LOUD CHANNEL
13	CH SEL C	INPUT	SELECTING CHANNEL
14	CH SEL D	INPUT	SELECTING CHANNEL

6. P42 INTERFACE

P1 INTERFACE CONNECTOR PIN OUT

PINS	SYMBOL	TYPE	DESCRIPTION
1			GND
2	SWB+	+7.5V DC	RADIO POWER SUPPLY
3	XB+	+7.5V DC	7.5V IN TRANSMIT MODE
4	RX 5V	+5V	+5V IN RECEIVE MODE ONLY
5	TX 5V	+5V	+5V IN TRANSMIT MODE ONLY
6	MOD IN+	INPUT	DIFFERENTIAL INPUT FOR DATA MODULATION
7	LOCK DET	OUTPUT	SYNTHESIZER LOCK INDEICATION
8	SYN LE	INPUT	PULL DOWN WHILE LOUDING SYN PAR.
9	SYN DATA	INPUT	DATA TO SYNTHESIZER
11	SQ DET	OUTPUT	CARRIER DETECT IND./ADAPT (FOR INTERMEC)
12	RSSI	OUTPUT	RECEIVED SIGNAL STRENGTH INDICATOR
13	DISC+	OUTPUT	DISCRIMINATOR OUTPUT
14	+5V	INPUT	SYN +5V

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