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## COMPLIANCE TEST REPORT PER FCC PART 90

APPLICANT	TELTRONIC, S.A.U
	Poligono Malpica Calle F Parceia 12 ZARAGOZA 50057 SPAIN
FCC ID	WT7PTRUNK25RF760
PRODUCT DESCRIPTION	RF Unite 764 – 776 MHz
DATE SAMPLE RECEIVED	May 16, 2009
DATE TESTED	May 29, 2009
TESTED BY	Nam Nguyen
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	1092AUT9TestReport.pdf
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL  
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.



Certificate # 0955-01



## TABLE OF CONTENTS

<b>ATTESTATIONS.....</b>	<b>3</b>
<b>DUT SPECIFICATION.....</b>	<b>4</b>
<b>TEST ENVIRONMENT AND TEST SETUP .....</b>	<b>5</b>
<b>TEST EQUIPMENT.....</b>	<b>6</b>
<b>TEST PROCEDURE .....</b>	<b>7</b>
<b>TEST RESULTS .....</b>	<b>10</b>
RF Power Output.....	10
Occupied Bandwidth.....	11
Modulation Characteristics .....	15
Other Modulation Characteristics.....	16
Audio Frequency Response.....	17
Audio Input Versus Modulation Plot.....	18
Spurious Emissions At Antenna Terminals (Conducted) .....	20
Field Strength of Spurious Emissions.....	22
Frequency Stability .....	23
Transient Frequency Behavior .....	24
Adjacent Channel Power.....	25



## ATTESTATIONS

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025:2005 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.  
849 NW State Road 45  
Newberry, FL 32669



### Authorized Signatory Name:

Mario de Aranzeta C.E.T.  
Compliance Engineer/ Lab. Supervisor

**Date:** June 4, 2009

**DUT SPECIFICATION**

DUT Description	RF Unit 764 – 776 MHz
FCC ID	WT7PTRUNK25RJ760
Serial Number	N/A
Operating Frequency	764 ~ 776 MHz
Type of Emission	F1W, F3E
Modulation	FM, Digital
DUT Power Source	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input checked="" type="checkbox"/> DC Power 24V
	<input type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
Type of Equipment	<input checked="" type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input type="checkbox"/> Portable

## TEST ENVIRONMENT AND TEST SETUP

Test Facility	All tests were conducted by Timco Engineering Inc. located at 849 NW State Road 45, Newberry, FL 32669 USA
Laboratory Test Condition	Temperature: 26°C Relative humidity: 50%.
Deviation from the standards	No deviation
Modification to the DUT	No modification was made.
Test Exercise (software etc.)	The DUT was placed in continuous transmitting mode of operation.
System Setup	Stand alone device.



## TEST EQUIPMENT

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/07	12/7/09
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/07	12/7/09
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/07	12/8/09
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/07	12/8/09
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/09	4/29/11
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	CAL 12/29/08	12/29/10
Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 7/16/07	7/16/09

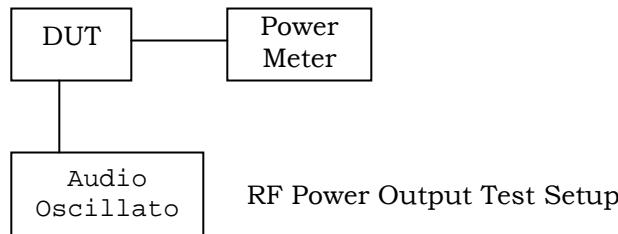
## TEST PROCEDURE

### Power Line Conducted Interference

The procedure used was ANSI 63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

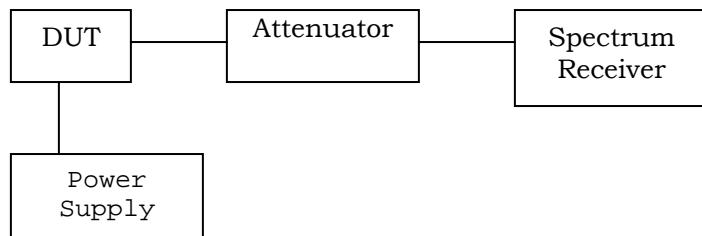
### RF Power Output

The RF power output was measured at the antenna feed point using a peak power meter. A 50-ohm, resistive wattmeter was connected to the RF output connector. With a nominal battery voltage or supply voltage, and the transmitter properly adjusted the RF output measures:



### Spurious Emissions at Antenna Terminals (Conducted)

The carrier was modulated 100%. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz. The measurements were made in accordance with standard ANSI/TIA-603-C: 2004



### Radiation Interference

The test procedure used was ANSI/TIA-603-C: 2004 and ANSI C63.4-2003 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

## Modulation Characteristic

### Audio frequency response

The audio frequency response was measured in accordance with ANSI/TIA 603-C: 2004. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

### Audio Low Pass Filter

The audio low pass filter for voice-modulated equipment was measured in accordance with ANSI/TIA 603-C: 2004. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.

### Audio Input versus modulation

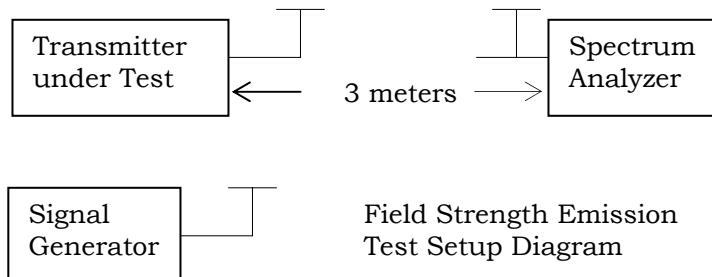
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

## Frequency Stability

The frequency stability was measured per ANSI/TIA 603-C: 2004.

## Field Strength of Spurious Emissions

The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C: 2004 using the substitution method.

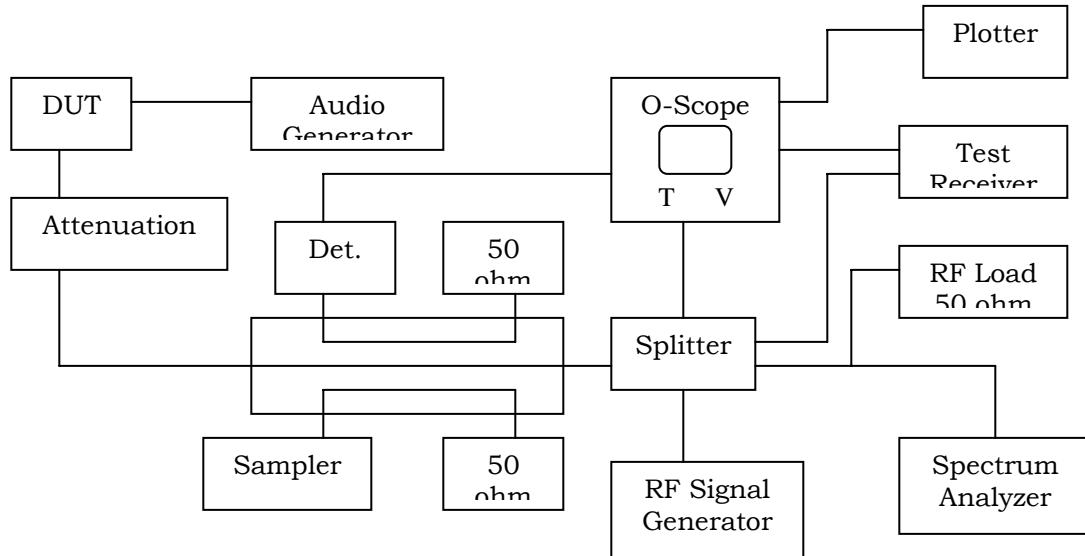


## Transient Frequency Behavior

The test procedure was ANSI/TIA 603-C: 2004 Para 2.2.19.

- Using the variable attenuator. The transmitter level was set to 40 dB below the test receivers maximum input level,
- Then the transmitter was turned off.
- With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
- Reduce the attenuation between the transmitter and the RF detector by 30 dB.
- With the levels set as above the transient frequency behavior was observed & recorded.

Transient Frequency Response Test setup





## TEST RESULTS

### RF Power Output

**Rule Part No.:** FCC Part 2.1046(a), IC RSS-119 4.1 and 5.4, RSS-GEN 4.8

**Test Requirements:** FCC Part 2.1046(a), IC RSS-119 4.1 and 5.4, RSS-GEN 4.8

#### Test Data:

OUTPUT POWER: HIGH – 100 Watts (conducted)

Part 2.1033 (C)(8) DC Input into the final amplifier

Input Power: 24Volts dc 18.4Amps = 441 Watts

## Occupied Bandwidth

**Rule Part No.:** FCC Part 2.1049(c), RSS-GEN 4.6, ANSI/TIA-603-C: 2004 para 2.2.11.

### Requirements:

#### FCC Part 90.210(b) RSS-119 4.2 25 kHz Channel Spacing

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least  $43 + 10\log(P)$ dB.

#### Part 90.210(c) 12.5kHz Channel Spacing Not Equipped with a Low Pass Filter

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows: (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz but not more than 10 kHz: At least  $83 \log(fd/5)$  dB; (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least  $29 \log(fd^2/11)$ dB or 50 dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least  $43 + 10 \log(P_0)$ dB.

#### Part 90.210(d) Emission Mask D - 12.5 kHz channel BW equipment.

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27 (fd - 2.88)$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least  $50 + 10\log(P)$  dB or 70 dB, whichever is the lesser attenuation.

Part 90.210(e) Emission Mask E – 6.25 kHz channel BW equipment

For transmitters designed to operate with a 6.25 kHz bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 3.0 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(f_d - 3.0 \text{ kHz})$  or  $55 + 10 \log(P)$  or 65, whichever is the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least  $55 + 10 \log(P)$  dB or 65 dB, whichever is the lesser attenuation.

Part 90.210(g) Emission Mask G

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log(f_d/6.1)$  dB, or  $50 + 10 \log(P)$  dB, or 70 dB, whichever is the lesser attenuation;
- (2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.

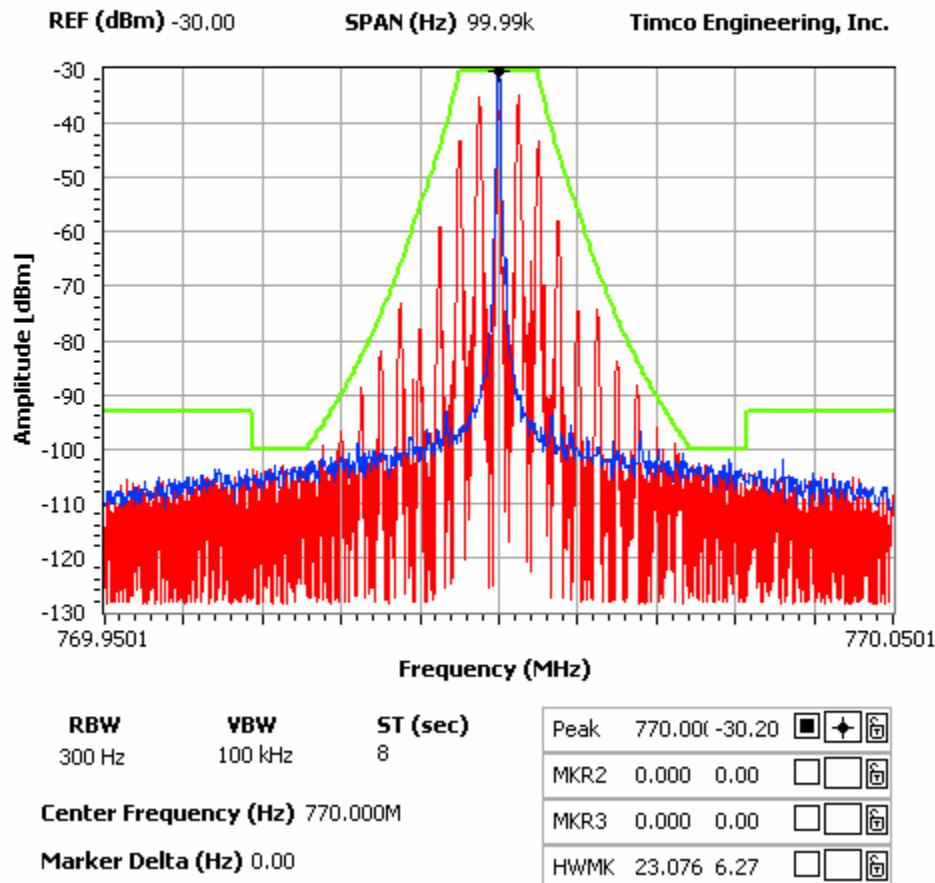
Part 90.210(h) Emission Mask H

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of 4 kHz or less: Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least  $107 \log(f_d/4)$  dB;
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least  $40.5 \log(f_d/1.16)$  dB;
- (4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 15 kHz, but no more than 25 kHz: At least  $116 \log(f_d/6.1)$  dB;
- (5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least  $43 + \log(P)$  dB.

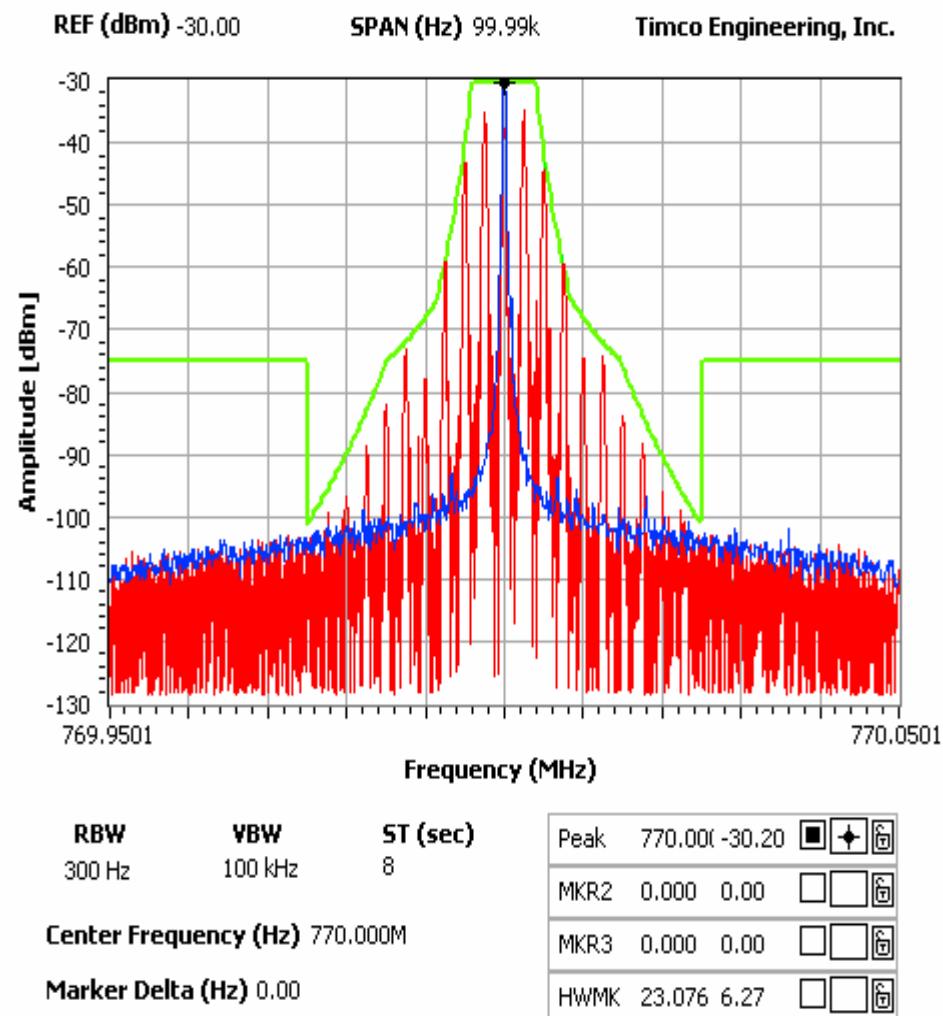
**NOTES:**

 TELTRONIC, S.A.U.  
 OCCUPIED BANDWIDTH PLOT

**FCC 90.210 Mask G**


**NOTES:**

 TELTRONIC, S.A.U -  
 OCCUPIED BANDWIDTH PLOT

**FCC 90.210 Mask H**




## **Modulation Characteristics**

**Rule Part No.:** Pt 2.1047(a)(b), Pt 90

### **Test Requirements:**

**Test data:** Please see other files associated with the report. Please see plots below.



## Other Modulation Characteristics

Part 2.1033(c)

Part 2.1033(c) (4) Type of Emission: 11K2F3E, 16K0F3E, and 8K1F1W

FCC Part 90.209, IC RSS-119 5.5

FCC Part 90.207

Type of Emission: 11K0F3E

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 2600$$

$$K=1$$

$$B_n = 2(3000) + 2(2600) = 11.2k$$

Type of Emission: 16K0F3E

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 5000$$

$$K=1$$

$$B_n = 2(3000) + 2(5000) = 16k$$

Type of Emission: 8K1F1W

Carson's rule for this digital modulation yields an excessive result. We are instead using the 99% energy rule as allowed under 2.989. Measurements were performed in accordance with TIA/EIA 102. CAAB.

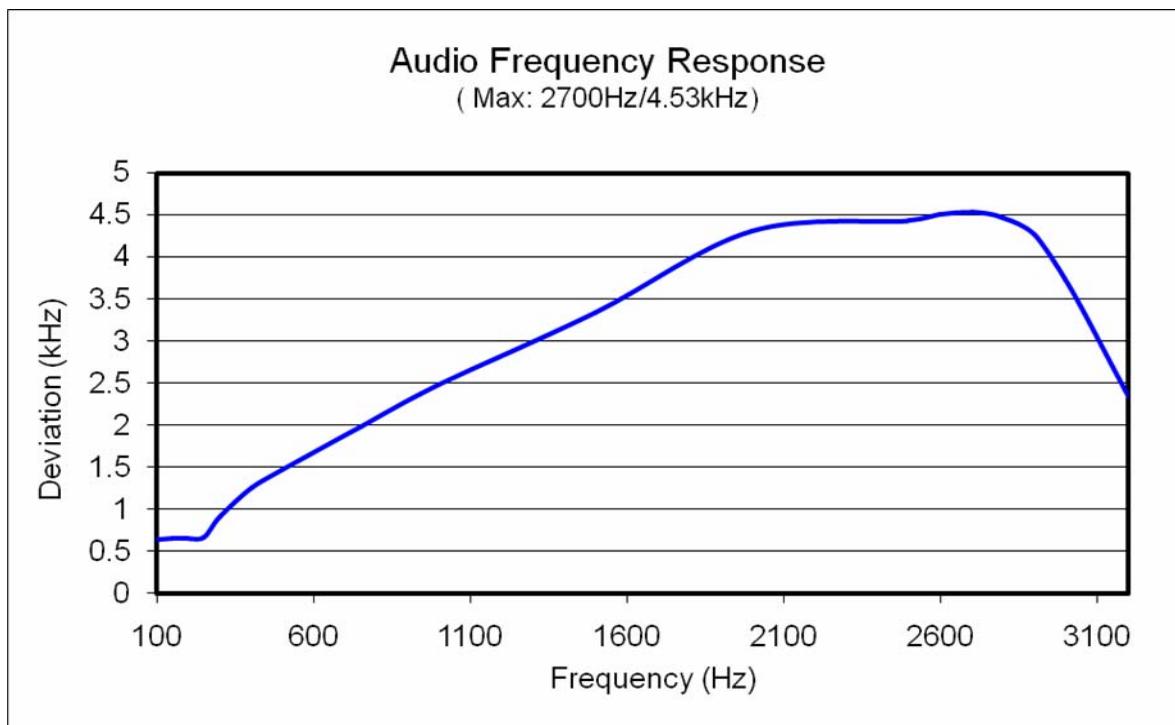
## **Audio Frequency Response**

**Rule Part No.:** FCC Part 2.1047(a)(b)

**Test Requirements:**

**Test Data:**

**AUDIO FREQUENCY RESPONSE PLOT**

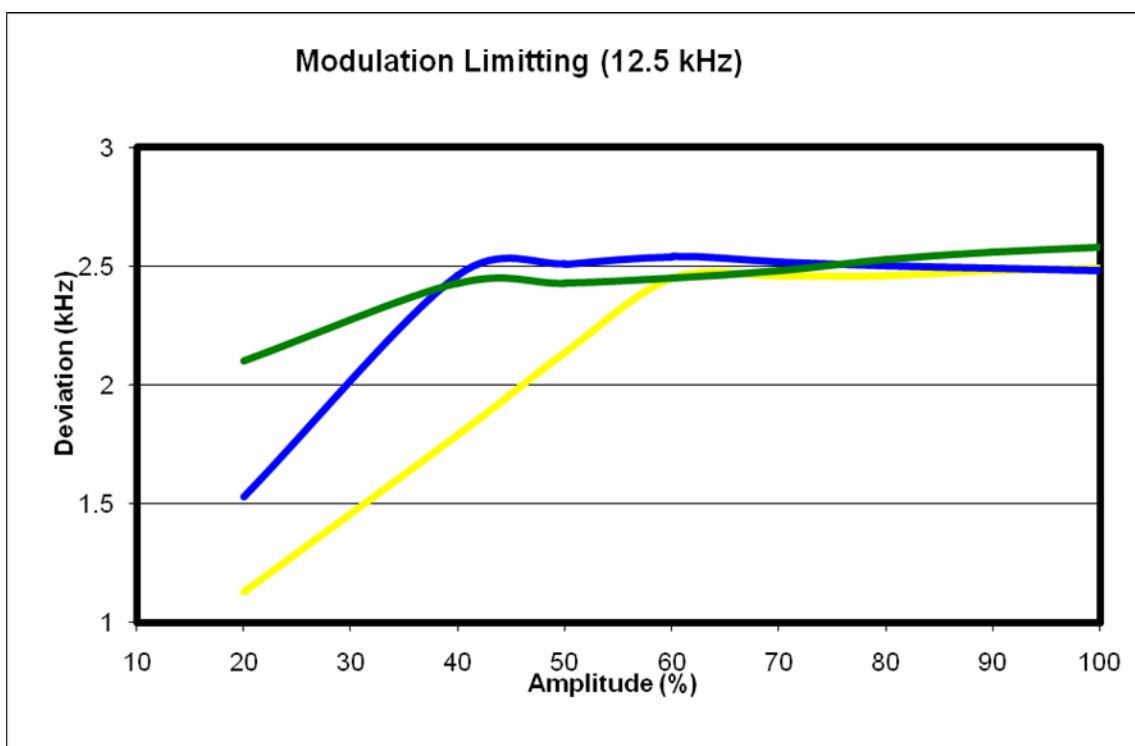


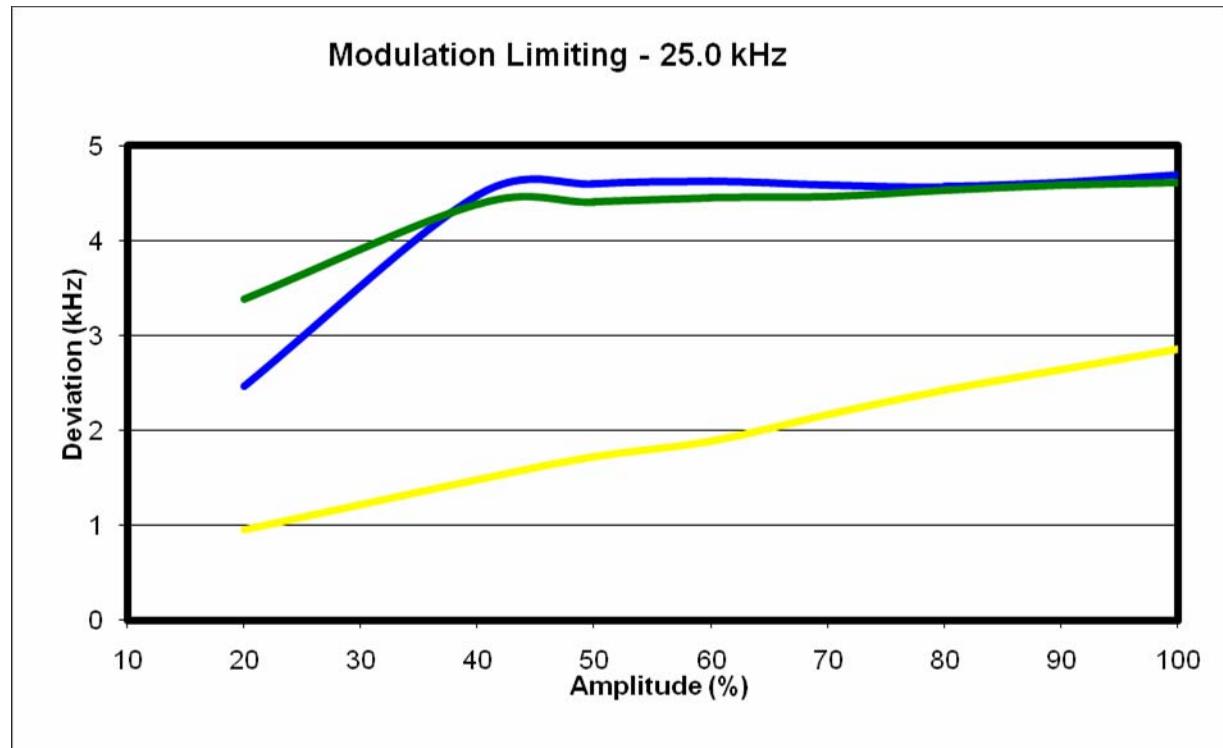
### **Audio Low Pass Filter**

Not applicable.

### **Audio Input Versus Modulation Plot**

Modulation Limiting Plot





## Spurious Emissions At Antenna Terminals (Conducted)

**Rule Part No.:** FCC Part 2.1051(a), RSS-GEN 7.1.4

**Requirements:** As applicable

$$43 + 10\log(p) = 43 + 10\log(100) = 63 \text{ dBc}$$

$$12.5 \text{ kHz Spacing} = 70.0$$

$$50 + 10\log(p) = 50 + 10\log(100) = 70 \text{ dBc}$$

$$6.25 \text{ kHz Channel Spacing} = \text{N/A}$$

### Test Data:

TF HIGH POWER	EF	dB below carrier
764	1528.00	78.1
	2292.00	73.5
	3056.00	94.2
	3820.00	104.1
	4584.00	111.6
	5348.00	ne
	6112.00	ne
	6876.00	ne
	7640.00	ne

TF HIGH POWER	EF	dB below carrier
770	1540.00	85.8
	2310.00	90.7
	3080.00	106.3
	3850.00	106.5
	4620.00	111.3
	5390.00	117.9
	6160.00	111.2
	6930.00	ne
	7700.00	ne

ne= no emissions

TF HIGH POWER	EF	dB below carrier
776	1552.00	82.7
	2328.00	88
	3104.00	110.1
	3880.00	111.1
	4656.00	111.5
	5432.00	ne
	6208.00	112.7
	6984.00	117.7
	7760.00	ne

## Field Strength of Spurious Emissions

**Rule Parts. No.:** FCC Part 2.1053, RSS-GEN 4.9

**Requirements:** The FCC limits for radiated emissions are the same as previously stated for the conducted emissions.

**Test Data:** Power was measured at 100 W

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
764.00	0	0	770.00	0	0	776.00	0	0
1528.00	V	86.29	1540.00	V	88.58	1552.00	V	90.68
2292.00	V	94.20	2310.00	V	93.94	2328.00	V	94.99
3056.00	V	90.83	3080.00	V	92.52	3104.00	V	92.91
3820.00	H	93.09	3850.00	V	91.09	3880.00	V	97.50
4584.00	0	NF	4620.00	0	NF	4656.00	0	NF
5348.00	0	NF	5390.00	0	NF	5432.00	0	NF
6112.00	0	NF	6160.00	0	NF	6208.00	0	NF
6876.00	0	NF	6930.00	0	NF	6984.00	0	NF
7640.00	0	NF	7700.00	0	NF	7760.00	0	NF

## Frequency Stability

**Rule Parts. No.:** FCC Part 2.1055, Part 90.539, RSS-119 5.3, RSS-GEN 7.2.4

**Requirements:** Temperature range requirements: -30 to +50° C.  
 Voltage Variation +, -15%  
 ±100 PPB

### Test Data:

Assigned Frequency (Ref. Frequency) (MHz)		776.000087
Temperature (°C)	Frequency (MHz)	Frequency Stability (PPM)
-30	776.000075	-0.02
-20	776.000080	-0.01
-10	776.000084	0.00
0	776.000085	0.00
+10	776.000087	0.00
+20	776.000087	0.00
+30	776.000091	0.01
+40	776.000098	0.01
+50	776.000102	0.02

Assigned Frequency (Ref. Frequency) (MHz)		776.000087
% Battery (%)	Frequency (MHz)	Frequency Stability (PPM)
-15%	776.000078	-0.01
	776.000087	0
+15%	776.000091	0.01

## Transient Frequency Behavior

**Rule Part No.:** FCC Part 2.1055(a)(1), FCC Part 90.214, IC RSS-119 5.8

**Requirements:** Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time Intervals	Maximum frequency difference	All Equipment	
		150-174 MHz	421-512 MHz

Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels

$t_1^4$	$\pm 25.0$ kHz	5.0 ms	10.0 ms
$t_2$	$\pm 12.5$ kHz	20.0 ms	25.0 ms
$t_3^4$	$\pm 25.0$ kHz	5.0 ms	10.0 ms

Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels

$t_1^4$	$\pm 12.5$ kHz	5.0 ms	10.0 ms
$t_2$	$\pm 6.25$ kHz	20.0 ms	25.0 ms
$t_3^4$	$\pm 12.5$ kHz	5.0 ms	10.0 ms

Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels

$t_1^4$	$\pm 6.25$ kHz	5.0 ms	10.0 ms
$t_2$	$\pm 3.125$ kHz	20.0 ms	25.0 ms
$t_3^4$	$\pm 6.25$ kHz	5.0 ms	10.0 ms

**Test Result:** No applicable  
 Transmitter in the 764 – 776 MHz band

## Adjacent Channel Power

**Rule Part No.:** FCC Part 90.543

**Requirements:** Transmitters designed to operate in 769–775 MHz and 799–805 MHz frequency bands must meet the emission limitations in paragraphs (a) through (d) of this section. Transmitters operating in 763–768 MHz and 793–798 MHz bands must meet the emission limitations in (e) of this section.

### Test Data:

6.25 kHz Base Transmitter ACP Requirements (N/A)

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	(Limit) Maximum ACP (dBc)
6.25	6.25	-40
12.50	6.25	-60
18.75	6.25	-60
25.00	6.25	-65
37.50	25	-65
62.50	25	-65
87.50	25	-65
150.00	100	-65
250.00	100	-65
350.00	100	-65
>400 to 12 MHz	30 (s)	-80
12 MHz to paired receive band	30 (s)	-80
In the paired receive band	30 (s)	-100

**Test Data**
**12.5 kHz Base Transmitter ACP Requirements**

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	ACP Measurement Reading (dBc)	(Limit) Maximum ACP (dBc)
9.375	6.25	-65	-40
15.625	6.25	-69	-60
21.875	6.25	-70	-60
37.5	25	-66	-60
62.5	25	-67	-65
87.5	25	-66	-65
150	100	-69	-65
250	100	-71	-65
350.00	100	-73	-65
>400 kHz to 12 MHz	30 (s)	-80	-80
12 MHz to paired receive band	30 (s)	-80	-80
In the paired receive band	30 (s)	-100	-100

**Test Data**
**25 kHz Base Transmitter ACP Requirements**

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	ACP Measurement Reading (dBc)	(Limit) Maximum ACP (dBc)
15.625	6.25	-62	-40
21.875	6.25	-67	-60
37.5	25	-66	-60
62.5	25	-67	-65
87.5	25	-66	-65
150	100	-69	-65
250	100	-71	-65
350	100.00	-73	-65
>400 kHz to 12 MHz	30 (s)	-80	-80
12 MHz to paired receive band	30 (s)	-80	-80
In the paired receive band	30 (s)	-100	-100