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FCC PART 90 TEST REPORT

APPLICANT	MIDLAND RADIO CORPORATION
	5900 PARRETTA DRIVE
	KANSAS CITY, MO 64120
FCC ID	MMA90105
MODEL NUMBER	STP105B
PRODUCT DESCRIPTION	PORTABLE TRANSCEIVER
DATE SAMPLE RECEIVED	11/1/2006
DATE TESTED	12/20/2006
TESTED BY	JOSEPH SCOGLIO
APPROVED BY	MARIO DE ARANZETA
TIMCO REPORT NO.	3035AUT6TestReport.doc
TOTAL PAGES	31
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

STATEMENT OF COMPLIANCE.....	3
GENERAL INFORMATION	4
TEST PROCEDURES	5
RF POWER OUTPUT	6
OTHER MODULATION CHARACTERISTICS	7
MODULATION CHARACTERISTICS.....	8
VOICE MODULATED COMMUNICATION EQUIPMENT	10
Part 2.1049 OCCUPIED BANDWIDTH	14
METHOD OF MEASURING CONDUCTED EMISSIONS	21
FIELD STRENGTH OF SPURIOUS EMISSIONS.....	22
FREQUENCY STABILITY.....	24
TRANSIENT FREQUENCY BEHAVIOUR	25
TRANSIENT FREQUENCY RESPONSE PLOTS	27
EMC TEST EQUIPMENT	31

STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.



Certificate #0955-01

Authorized by: Mario de Aranzeta
Signature: <Mario de Aranzeta>
Function: Engineer
Date: 1/8/2007

GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.	
DUT Description	PORTABLE TRANSCEIVER
FCC ID	MMA90105
Model Number	STP105B
Serial Number	N/A
Operating Frequency	136-174
No. of Channels	Single
Type of Emission	F3E
Modulation	FM
DUT Power Source	<input type="checkbox"/> 110-120Vac/50- 60Hz
	<input type="checkbox"/> DC Power
	<input checked="" 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 type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input checked="" type="checkbox"/> Portable
Antenna	Helical
Antenna Connector	SMA
Test Condition	The DUT was tested in the laboratory with normal temperature and humidity. The temperature was 26°C with a relative humidity of 50%.
Modification to the DUT	None
Test Exercise	The DUT was placed in continuous transmit
Applicable Standards	TIA 603
	FCC CFR 47 Part 90
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA.

TEST PROCEDURES

Power Line Conducted Interference: If required for DUT, the procedure used was ANSI/TIA 603-C:2004 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.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to 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.

Radiation Interference: The test procedure used was 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.

RF POWER OUTPUT

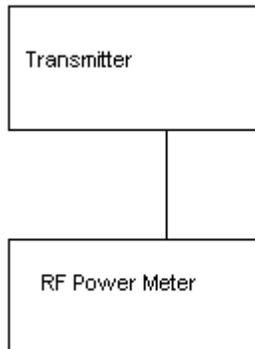
Rule Part No.: Part 2.1046(a), Part 87.131

Test Requirements:

Method of Measurement: RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

For the device has a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

Test Setup Diagram:



Test Data:

OUTPUT POWER: HIGH -5.00 Watts Conducted
LOW - 1.00 Watts Conducted

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

FOR LOW POWER SETTING INPUT POWER: $(7.5V)(.850A) = 6.37$ Watts
FOR HIGH POWER SETTING INPUT POWER: $(7.5V)(1.7 A) = 12.75$ Watts

Applicant: MIDLAND RADIO CORPORATION

FCC ID: MMA90105

Report: M\MidlandRadio_MMA\3035AUT6\3035AUT6TestReport.doc

OTHER MODULATION CHARACTERISTICS

Part 2.1033(c)

Part 2.1033(c) (4) Type of Emission: 11K0F1D , 11K0F2D, and 11K0F1E

Part 90.209

Part 90.207 $B_n = 2M + 2DK$

$$M = B/2 = 9600/2 = 4800$$

$$D = 800$$

$$K=1$$

$$B_n = 2(4800)+2(800) = 11.0k$$

Part 2.1033(c) (4) Type of Emission: 11K0F3E

Part 90.209

Part 90.207 $B_n = 2M + 2DK$

$$M = 3000$$

$$D = 2350$$

$$K=1$$

$$B_n = 2(3000)+2(2350) = 10.7k$$

Part 2.1033(c) (4) Type of Emission: 16K0F3E

Part 90.209

Part 90.207 $B_n = 2M + 2DK$

$$M = 3000$$

$$D = 4770$$

$$K=1$$

$$B_n = 2(3000)+2(4770) = 15.54k$$

MODULATION CHARACTERISTICS

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

Test Requirements:

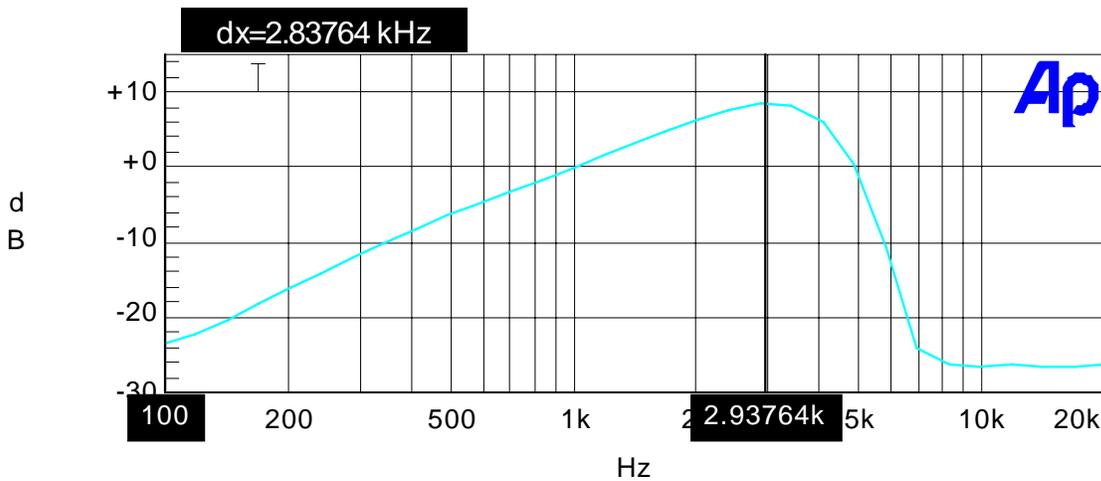
Method of Measurement:

Audio frequency response

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with no exception. 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 FREQUENCY RESPONSE PLOT- NARROW BAND

3035aut6 audio freq response 11/16/06 10:50:30
 12.5khz narrow
 max deviation 2350hz

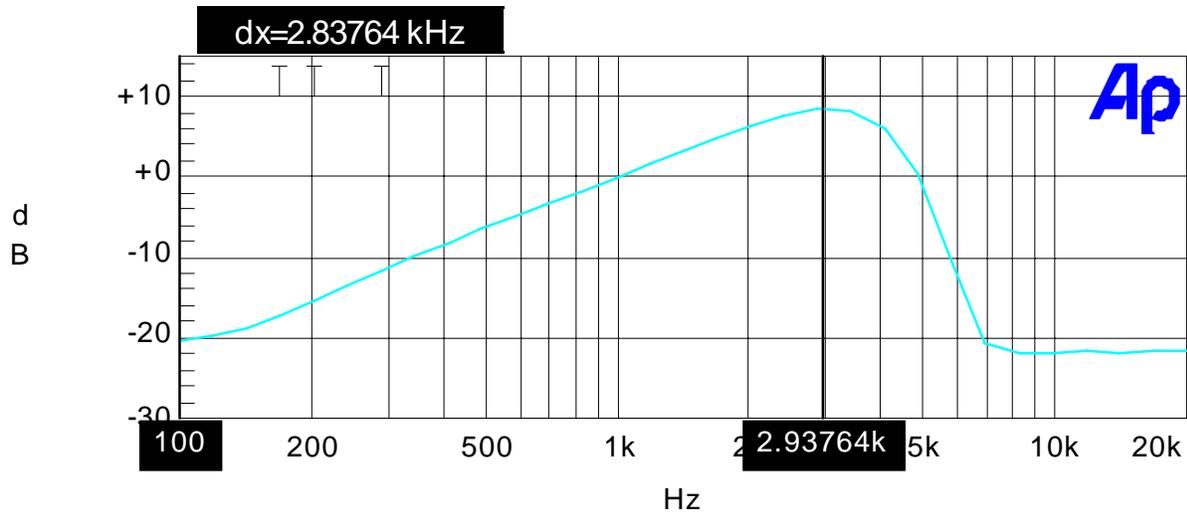


Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

AUDIO FREQUENCY RESPONSE PLOT- WIDE BAND

3035aut6 audio freq response 25khz 11/16/06 11:05:12
 wide
 max deviation 2350hz



Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

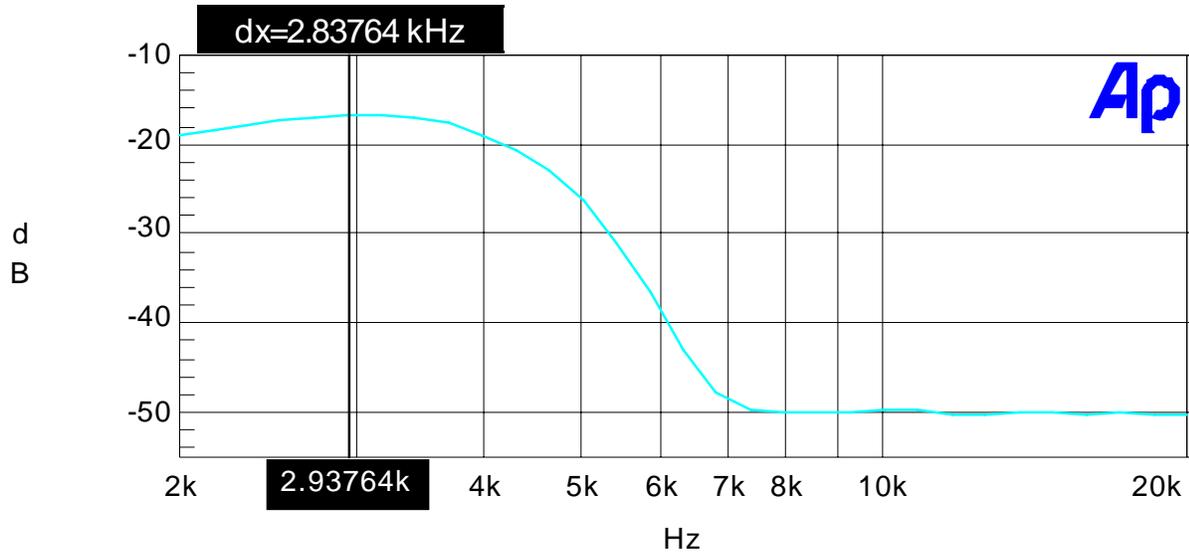
VOICE MODULATED COMMUNICATION EQUIPMENT

Part 2.1047(a) Voice modulated communication equipment: 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 LOW PASS FILTER. - NARROW BAND

3035aut6 audio low pass narrow

11/16/06 11:15:20



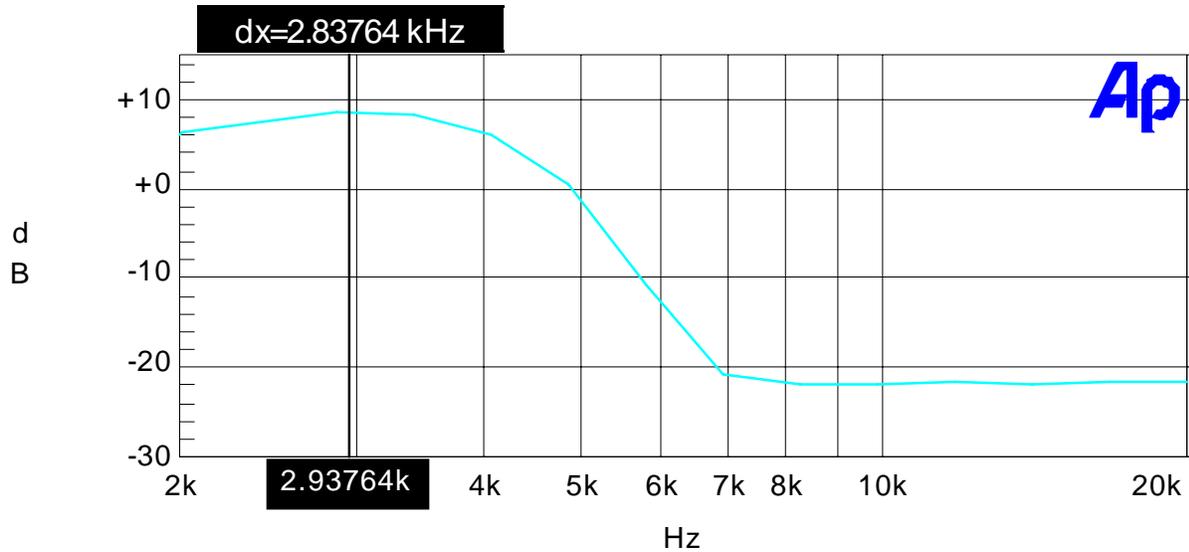
Color	Line Style	Thick	Data	Axis	Cursor1	Cursor2
Cyan	Solid	1	Anlr.Level A	Left

MaxFreq.at1

AUDIO LOW PASS FILTER. -WIDE BAND

3035aut6 audio low pass wide

11/16/06 11:05:12



Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

AUDIO INPUT VERSUS MODULATION

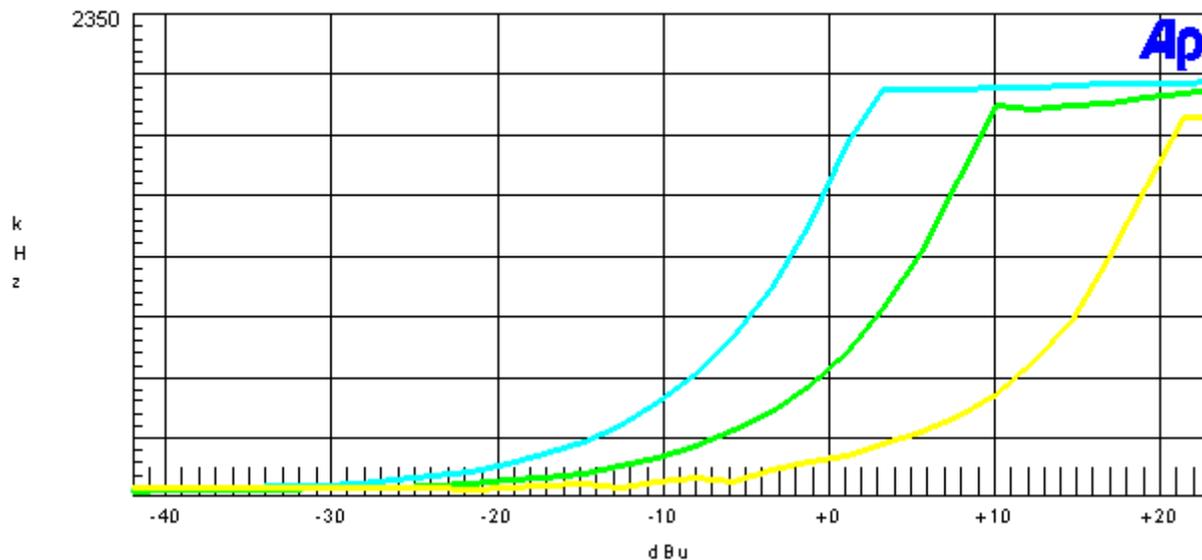
Rule Part No.: Part 2.1047(b) & 90

Test Requirements:

Method of Measurement: **Modulation cannot exceed 100%**, The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C:2004. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

MODULATION LIMITING PLOT - NARROW BAND

3035aut6 modulation limiting narrow
blue 2.5khz green 1khz yellow 300hz



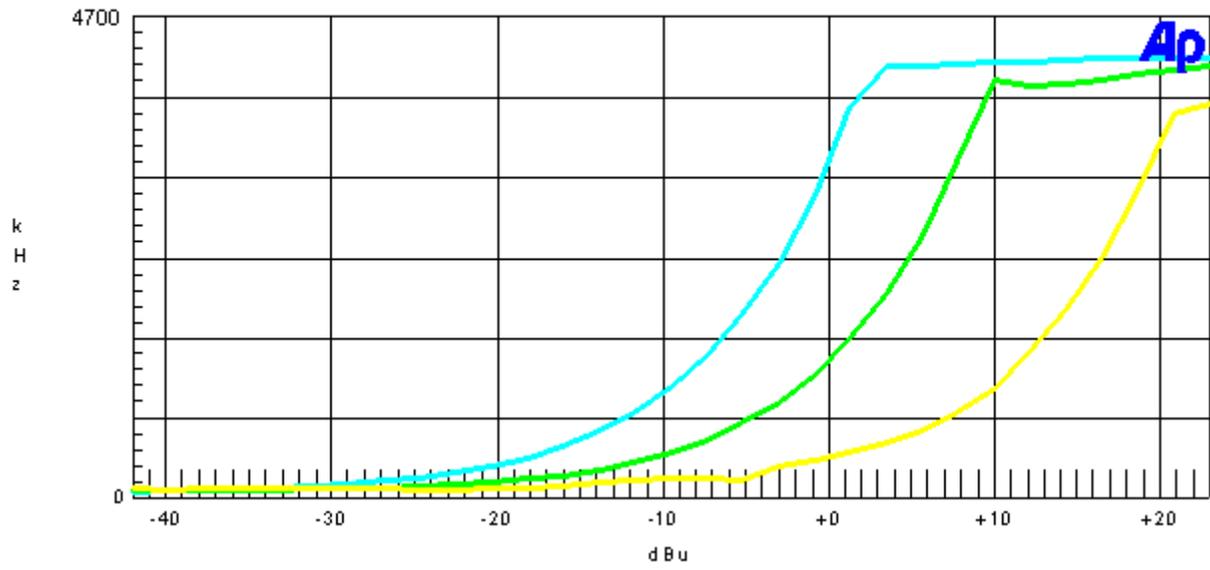
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MODULATION LIMITING PLOT - WIDE BAND

3035aut6 modulation limiting wide
 blue 2.5khz green 1khz yellow 300hz



Part 2.1049 OCCUPIED BANDWIDTH

Part 90.210(b) 25kHz 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 unmodulated carrier output power 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 5 kHz but not more than 10 kHz: At least $83 \log(f_d/5)$ dB; (2) 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 not more than 250% of the authorized bandwidth: At least $29 \log(f_d^2/11)$ 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 $43+10 \log(P_o)$ 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 f_0 to 5.625 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 5.625 kHz but no more than 12.5 kHz: At least $7.27 (f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10\log(P)$ dB or 70 dB, whichever is the lesser attenuation.

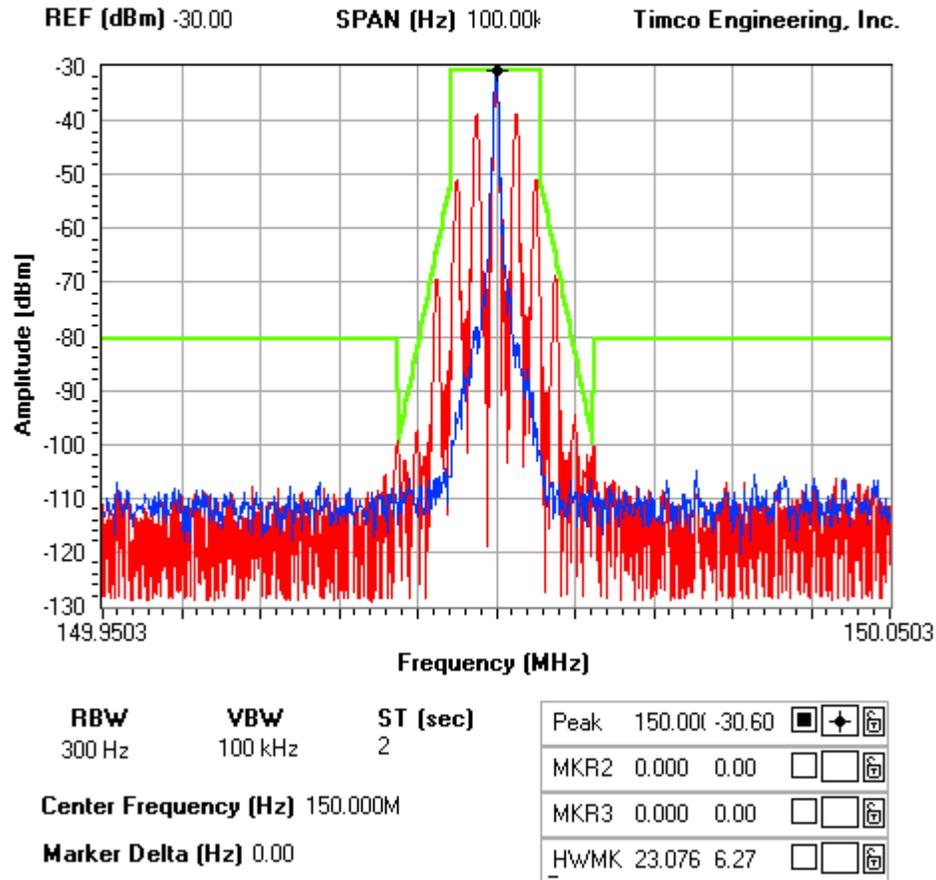
OCCUPIED BANDWIDTH PLOTS

Part 90.210(d) Emission Mask D - 12.5 kHz channel

NOTES:

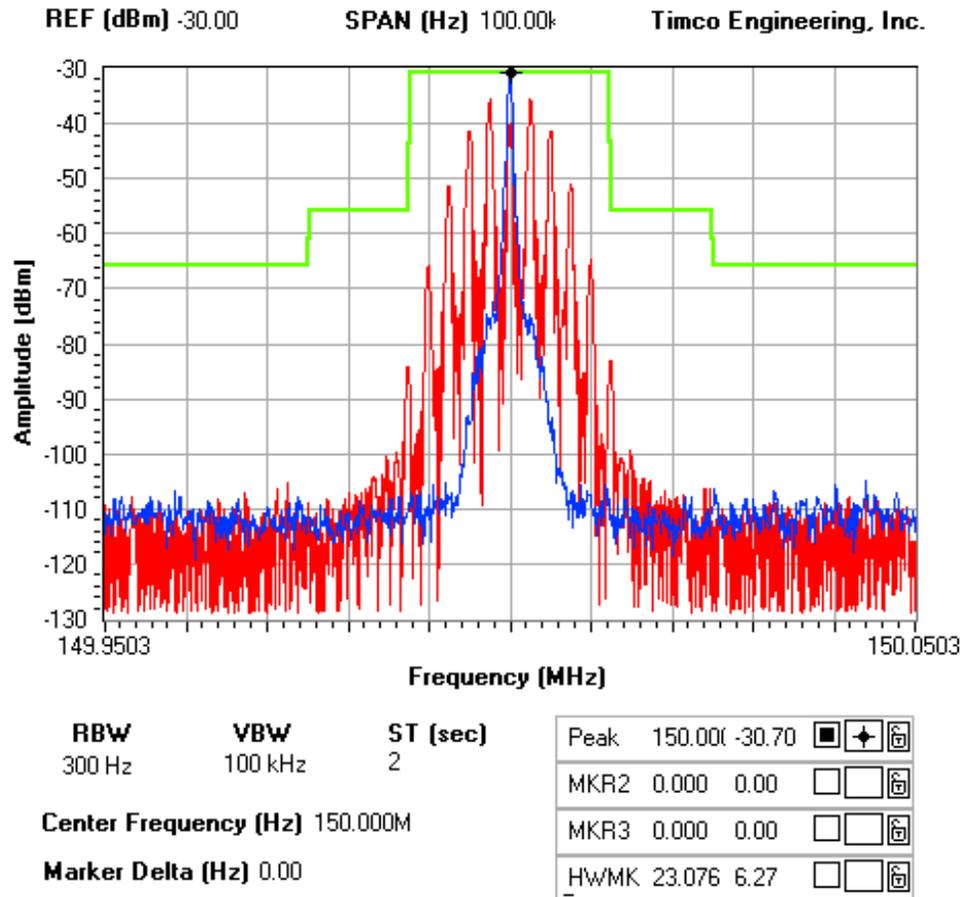
3035aut6 occupied bandwidth 12.5khz

FCC 90.210 Mask D



NOTES:

3035aut6 occupied bandwidth 25 khz



Applicant: MIDLAND RADIO CORPORATION

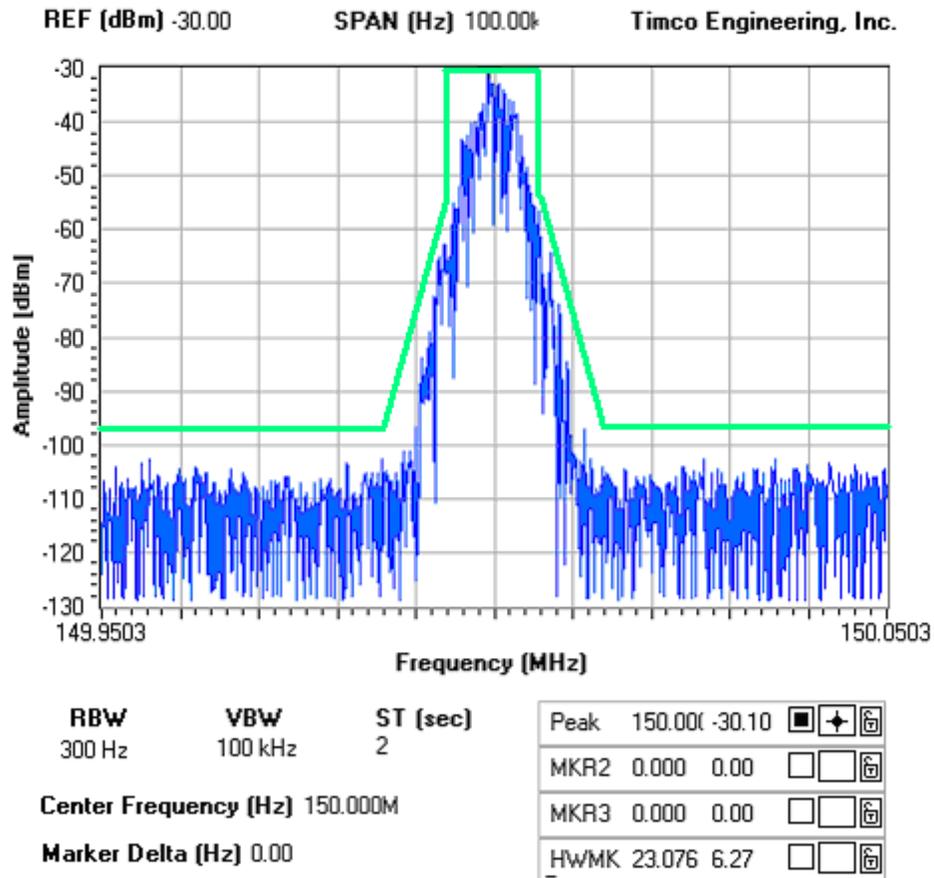
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NOTES:

3035aut6 occupied bandwidth digital

FCC 90.210 Mask D



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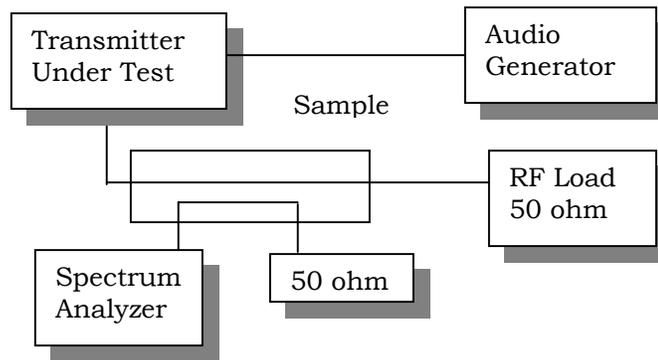
FCC ID: MMA90105

Report: M\MidlandRadio_MMA\3035AUT6\3035AUT6TestReport.doc

Test Requirements:

Method of Measurement: TIA 603

Test Setup Diagram:



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Requirements: 25kHz Channel Spacing = HIGH: $43+10\log(5) = 50$ dB
 LOW: $43+10\log(1) = 43$ dB

12.5kHz Channel Spacing = HIGH: $50+10\log(5) = 57$ dB
 LOW: $50+10\log(1) = 50$ dB

Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with ANSI/TIA 603-C:2004.

Test Data:

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
136.00	136.00	0.0		136.00	136.00	0.0
	272.00	81.9			272.00	76.5
	408.00	90.8			408.00	105.8
	544.00	91.2			544.00	106.3
	680.00	93.6			680.00	111.1
	816.00	99.4			816.00	109.1
	952.00	105.0			952.00	108.9
	1088.00	109.0			1088.00	NE

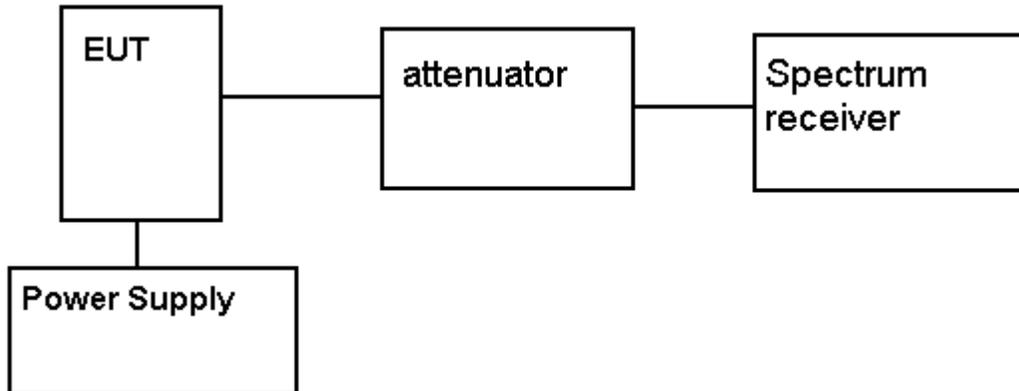
TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
150.00	150.00	0.0		150.00	150.00	0.0
	300.00	94.6			300.00	85.9
	450.00	97.5			450.00	101.2
	600.00	101.3			600.00	106.8
	750.00	112.5			750.00	104.4
	900.00	109.3			900.00	94.8
	1050.00	108.0			1050.00	104.2
	1200.00	NE			1200.00	NE
	1350.00	NE			1350.00	NE
	1500.00	NE			1500.00	NE

NE = NO EMISSION

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
174.00	174	0.0		174.00	174	0.0
	348.00	82.0			348.00	75.9
	522.00	99.3			522.00	107.7
	696.00	111.8			696.00	107.9
	870.00	112.9			870.00	99.3
	1044.00	110.0			1044.00	108.3
	1218.00	NE			1218.00	NE
	1392.00	NE			1392.00	NE
	1566.00	NE			1566.00	NE
	1740.00	NE			1740.00	NE

NE = NO EMISSION

METHOD OF MEASURING CONDUCTED EMISSIONS



METHOD OF MEASUREMENT: The procedure used was ANSI/TIA 603-C:2004. The measurements were made at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

FIELD STRENGTH OF SPURIOUS EMISSIONS

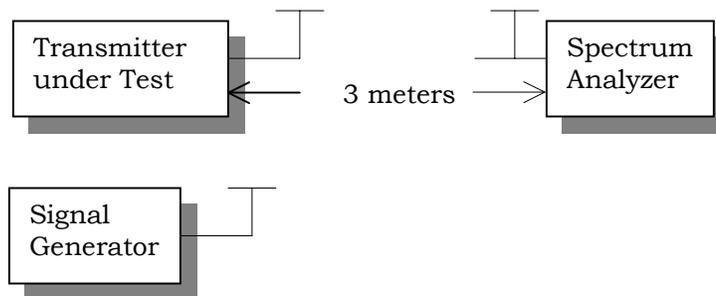
Rule Parts. No.: Part 2.1053

Requirements: 25kHz Channel Spacing = HIGH: $43+10\log(5) = 50$ dB
 LOW: $43+10\log(1) = 43$ dB

12.5kHz Channel Spacing = HIGH: $50+10\log(5) = 57$ dB
 LOW: $50+10\log(1) = 50$ dB

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. 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. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

Test Setup Diagram:



Test Data:

TF HIGH POWER	EF	Ant Polarity	dB below carrier	TF LOW POWER	EF	Ant Polarity	dB below carrier
136	136.00	V	0	136	136.00	V	0
	272.00	H	94.4		272.00	H	89.3
	408.00	H	95.93		408.00	H	98.63
	544.00	H	103		544.00	H	101.6
	680.00	V	91.28		680.00	V	93.58
	816.00	V	82.17		816.00	V	81.97
	952.00	H	84.52		952.00	H	90.52
	1088.00	V	91.37		1088.00	V	88.27
	1224.00	H	88.24		1224.00		NE

NE = NO EMISSION

Applicant: MIDLAND RADIO CORPORATION

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Report: M\MidlandRadio_MMA\3035AUT6\3035AUT6TestReport.doc

FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

Requirements: 25kHz Channel Spacing = HIGH: $43+10\log(5) = 50$ dB
 LOW: $43+10\log(1) = 43$ dB

12.5kHz Channel Spacing = HIGH: $50+10\log(5) = 57$ dB
 LOW: $50+10\log(1) = 50$ dB

Test Data:

TF HIGH POWER	EF	Ant Polarity	dB below carrier	TF LOW POWER	EF	Ant Polarity	dB below carrier
150.00	150.00	V	0	150	150.00	V	0
	300.00	H	102.37		300.00	H	95.17
	450.00	H	98.55		450.00	H	97.15
	600.00	V	103.85		600.00	H	96.35
	750.00	V	94.23		750.00	V	91.93
	900.00	H	84.84		900.00	H	80.64
	1050.00	V	84.16		1050.00	V	83.06

TF HIGH POWER	EF	Ant Polarity	dB below carrier	TF LOW POWER	EF	Ant Polarity	dB below carrier
174	174.00	V	0	174	174.00	V	0
	348.00	V	92.7		348.00	V	92.9
	522.00	H	84.01		522.00	H	83.31
	696.00	V	90.12		696.00	V	88.22
	870.00	V	79.34		870.00	H	82.44
	1044.00	V	74.43		1044.00	V	70.33
	1218.00	H	90.47		1218.00	H	86.97
	1392.00	V	90.21		1392.00	V	88.11
	1566.00	H	90.57		1566.00		NE
	1740.00	H	93.01		1740.00		NE

NE = NO EMISSION

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 90.213

Requirements: Temperature range requirements: -30 to +50° C.
Voltage Variation +, -15%
±2.5 PPM

Method of Measurements: TIA/EIA 603.

Test Data:

Assigned Frequency (Ref. Frequency) (MHz)		150.000080
Temperature (°C)	Frequency (MHz)	Frequency Stability (PPM)
-30	150.000031	-0.33
-20	149.999987	-0.62
-10	150.000006	-0.49
0	150.000067	-0.09
+10	150.000144	0.43
+20	150.000075	-0.03
+30	150.000078	-0.01
+40	150.000091	0.07
+50	150.000104	0.16

Assigned Frequency (Ref. Frequency) (MHz)		
% Battery	Frequency (MHz)	Frequency Stability (PPM)
-15%	150.000008	0.00
0		
+15%	150.000082	0.01

Temperature and voltage tests were performed to verify that the frequency remains within the 2.5 ppm specification limit. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25° C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30° C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50° C.

Readings were also taken at plus and minus 15% of the battery voltage.

Part 90.214 TRANSIENT FREQUENCY BEHAVIOUR
Part 2.1055(a)(1) Frequency stability

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	± 25.0 kHz	5.0 mS	10.0 mS
t_2	± 12.5 kHz	20.0 mS	25.0 mS
t_3^4	± 25.0 kHz	5.0 mS	10.0 mS

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

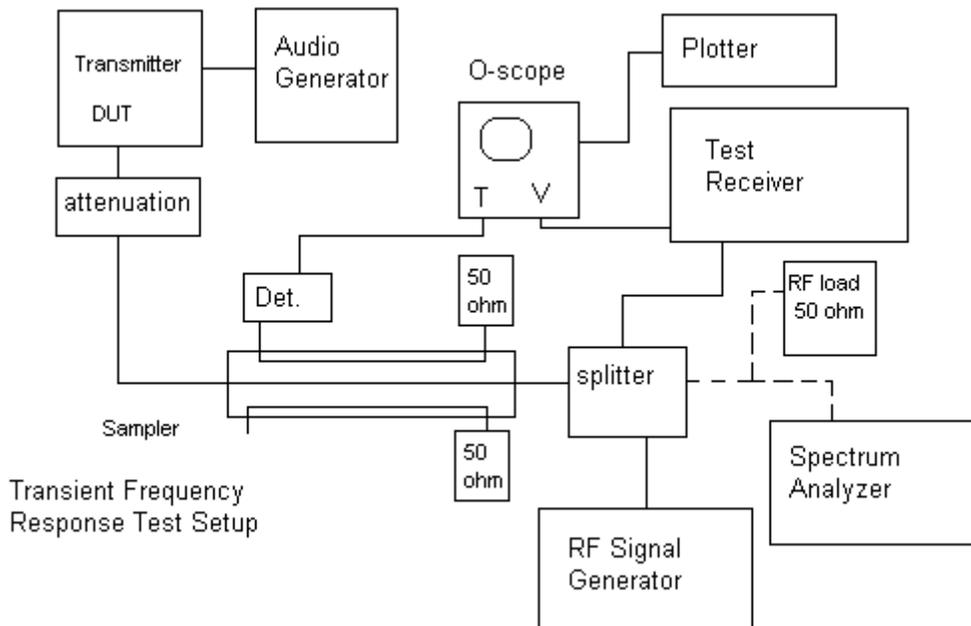
t_1^4	± 12.5 kHz	5.0 mS	10.0 mS
t_2	± 6.25 kHz	20.0 mS	25.0 mS
t_3^4	± 12.5 kHz	5.0 mS	10.0 mS

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

t_1^4	± 6.25 kHz	5.0 mS	10.0 mS
t_2	± 3.125 kHz	20.0 mS	25.0 mS
t_3^4	± 6.25 kHz	5.0 mS	10.0 mS

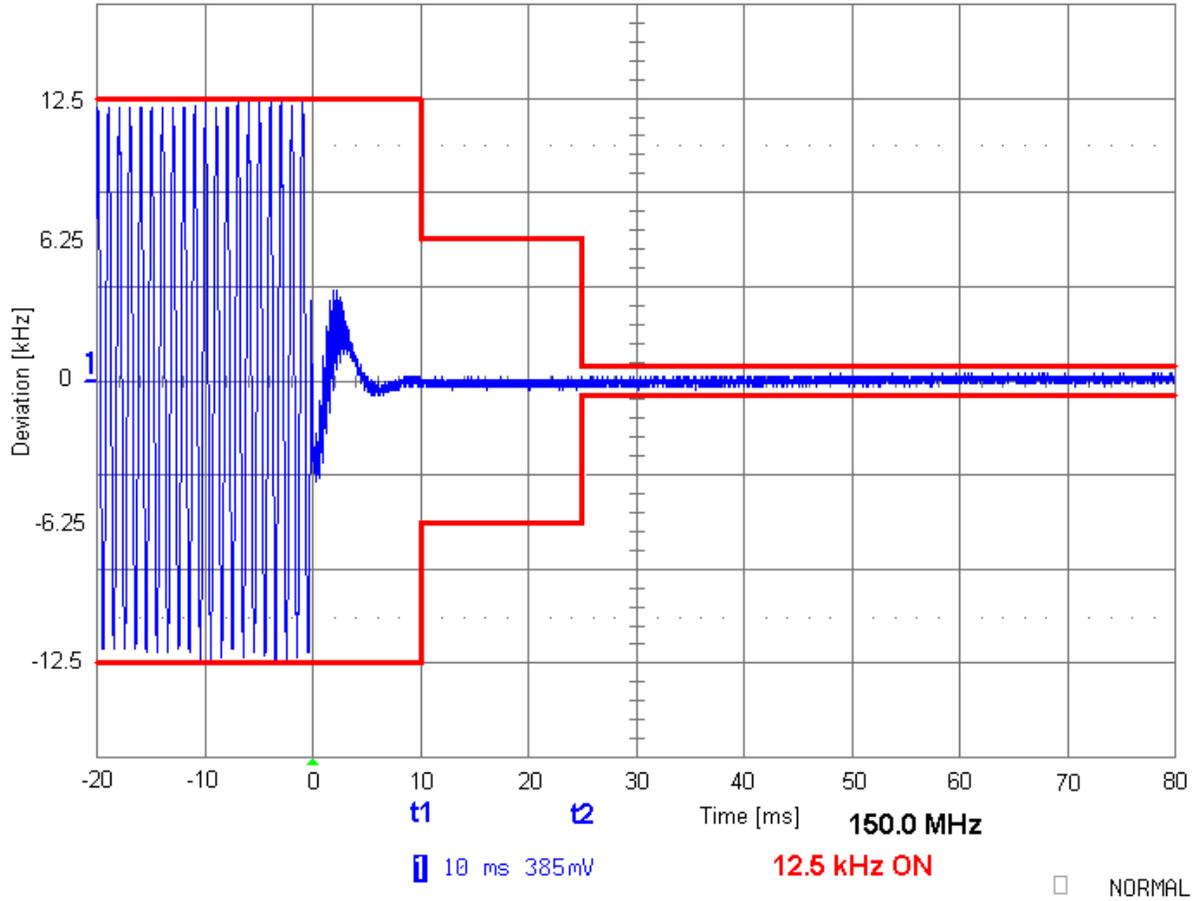
TEST PROCEEDURE: ANSI/TIA 603-C:2004 PARA 2.2.19, the levels were set as follows;

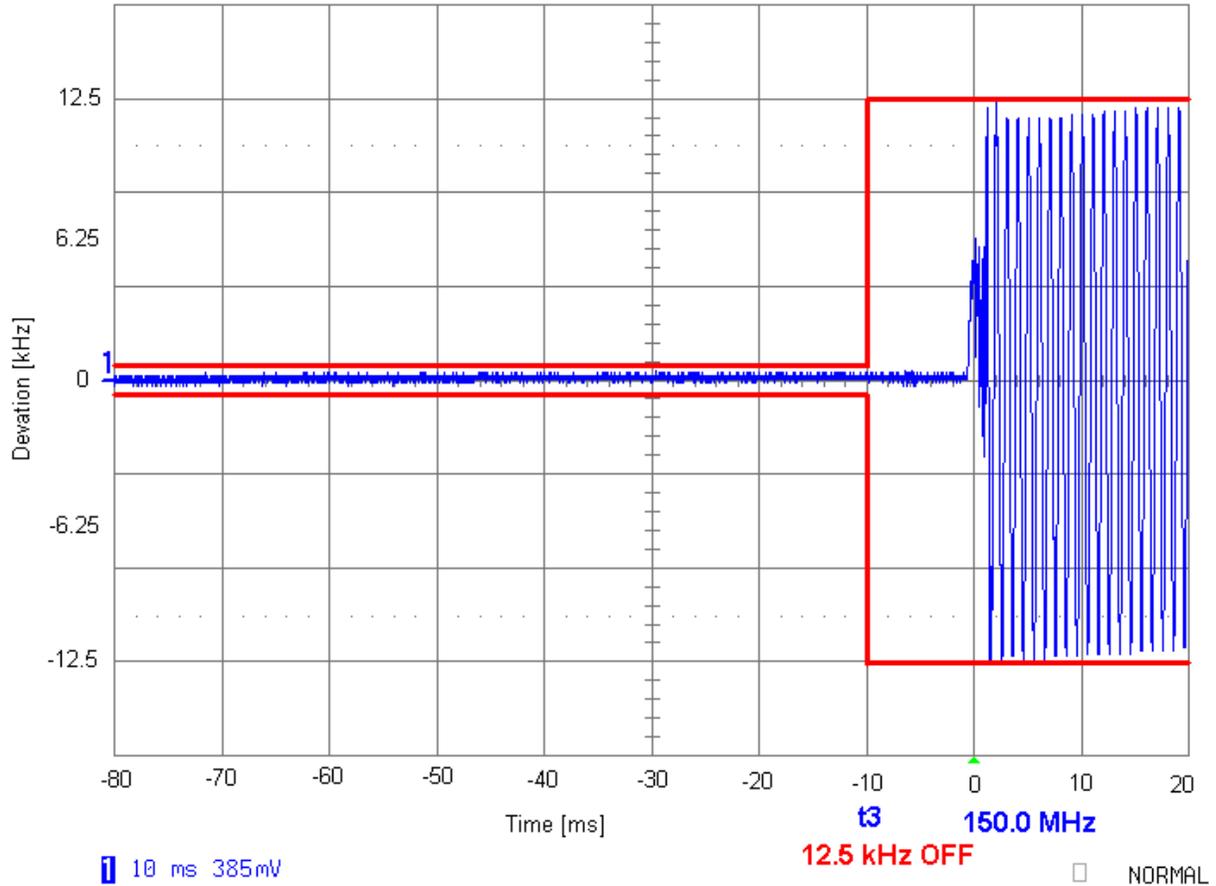
1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained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



TRANSIENT FREQUENCY RESPONSE PLOTS

12.5 kHz PLOTS:



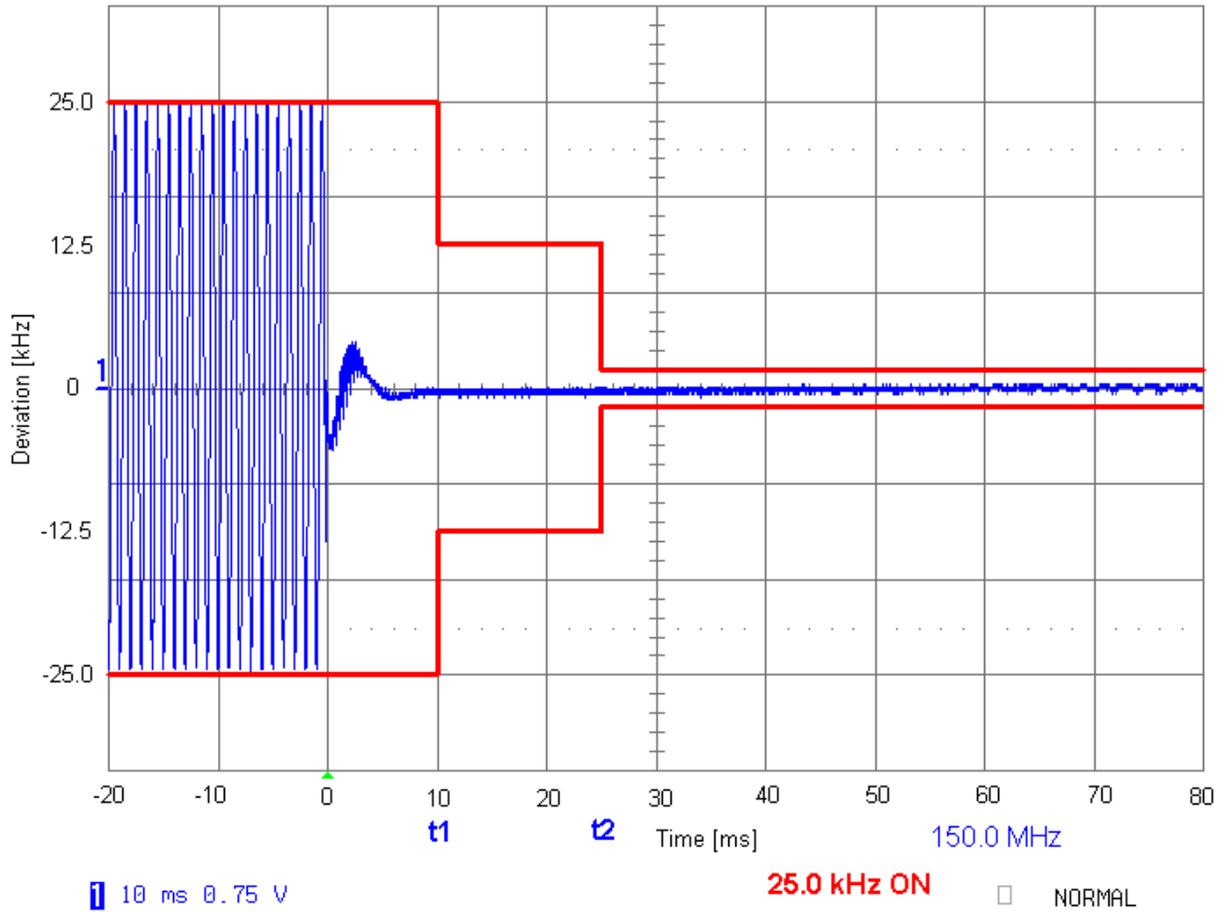


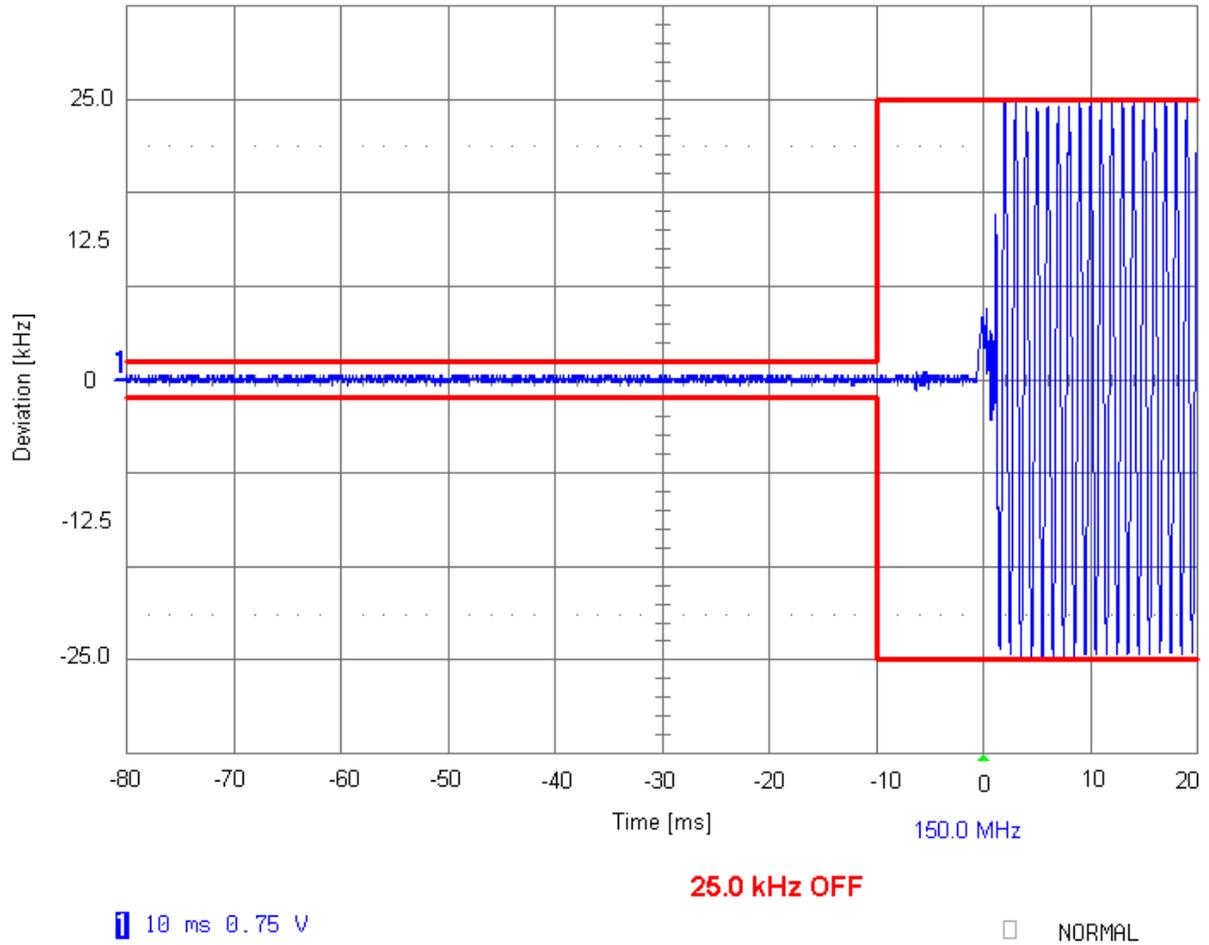
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Report: M\MidlandRadio_MMA\3035AUT6\3035AUT6TestReport.doc

25 kHz PLOTS:





Applicant: MIDLAND RADIO CORPORATION

FCC ID: MMA90105

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EMC TEST EQUIPMENT

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower Preamplifier	HP	8449B- H02	3008A00372	CAL 12/8/05	12/8/07
Antenna: Biconnical LISN	Electro- Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
	Electro- Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08