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FCC PART 90
AND IC RSS-119, RSS-GEN
TEST REPORT

APPLICANT	TELTRONIC, S.A.U Poligono Malpica Calle F Parcela 12 ZARAGOZA 50057 Spain
FCC ID	WT7PTRNKTBSR75450
IC CERTIFICATION	IC: 8624A-PTRKT450
MODEL NUMBER	BSR75 450-470 MHz
PRODUCT DESCRIPTION	UHF RADIO
DATE SAMPLE RECEIVED	10/27/2009
DATE TESTED	11/17/2009
DATE MODIFIED	10/20/2010
TESTED BY	Joe Scoglio
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	2604AT10TestReport.pdf
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENTS

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: October 20, 2010

DUT SPECIFICATION

DUT Description	UHF RADIO
FCC ID	WT7PTRNKTBSR75450
IC Certification	IC: 8624A-PTRKT450
Model Number	BSR75 450 - 470 MHz
Serial Number	N/A
Operating Frequency	TX: 450 – 470 MHz, Rx:
Test Frequencies	450 MHz, 460 MHz, 470 MHz
Type of Emission	Digital
Modulation	π/4-DQPSK
DUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power 26.4V
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ 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.

EMC EQUIPMENT LIST

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 7/16/09	7/16/11

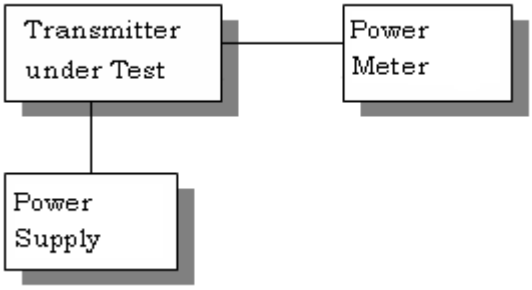
TEST PROCEDURES

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.

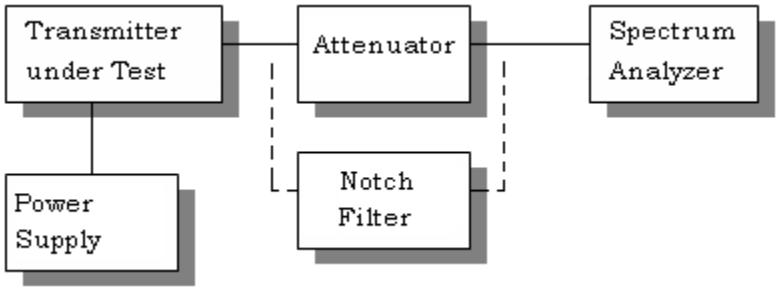
RF Power Output

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.

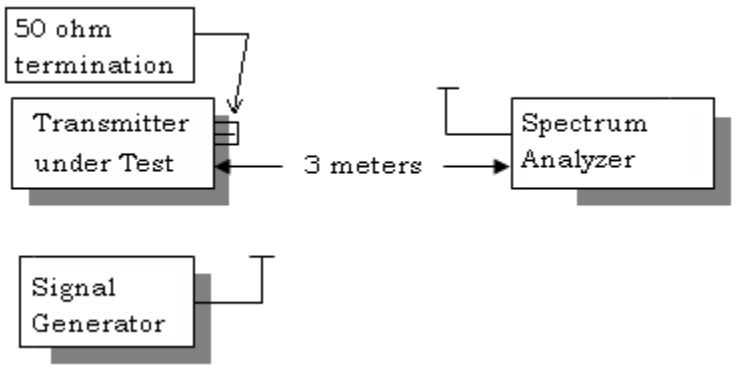
Audio Input versus modulation
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

Frequency Stability

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

Field Strength of Spurious Emissions

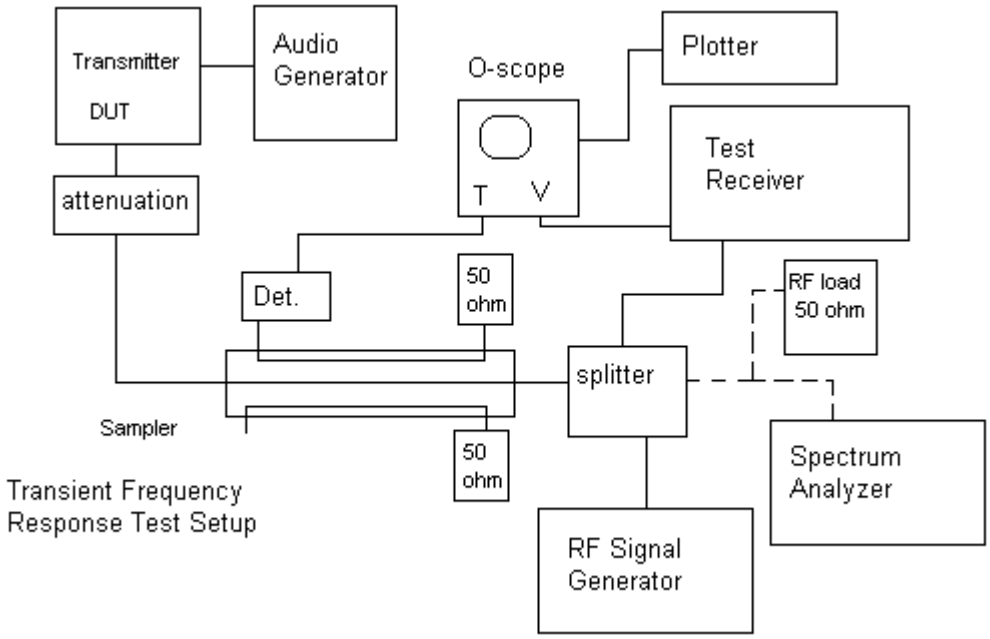
The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C: 2004 using the substitution method.



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

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 – 75 Watts

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

FOR HIGH POWER SETTING INPUT POWER: (26.4V)(14.0A) = 369.6 Watts

MODULATION CHARACTERISTICS

Part 2.1033(c)
Part 2.1033(c) (4) Type of Emission: 20K0D7W, 20K0D7E, and 20K0D7D

FCC Part 90.209,
FCC Part 90.207

The modulation is a π/4 DQPSK digital modulation scheme that in compasses both voice and data in the same transmission.

AUDIO FREQUENCY RESPONSE

Rule Part No.: Pt 2.1047(a)(b), RSS-119

Test Requirements: Pt 2.1047(a)(b), RSS-110

Test Data: N/A

Data Low Pass Filter

Audio Input Versus Modulation Plot

N/A

Audio Frequency Response Plot

N/A

OCCUPIED BANDWIDTH

Rule Part No.: Pt 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 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 + 10log(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 than10 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(fd2/11)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(Po)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 kHz) 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 + 10log(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 f0 to 3.0 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 3.0 kHz but no more than 4.6 kHz: At least 30 + 16.67(fd – 3.0 kHz) or 55 + 10 Log(P) or 65, whichever us the lesser attenuation.
(3) On any frequency removed from the center of the authorized bandwidth by more than 4.6kHz: At least 55 + 10log(P) dB or 65 dB, whichever is the lesser attenuation.

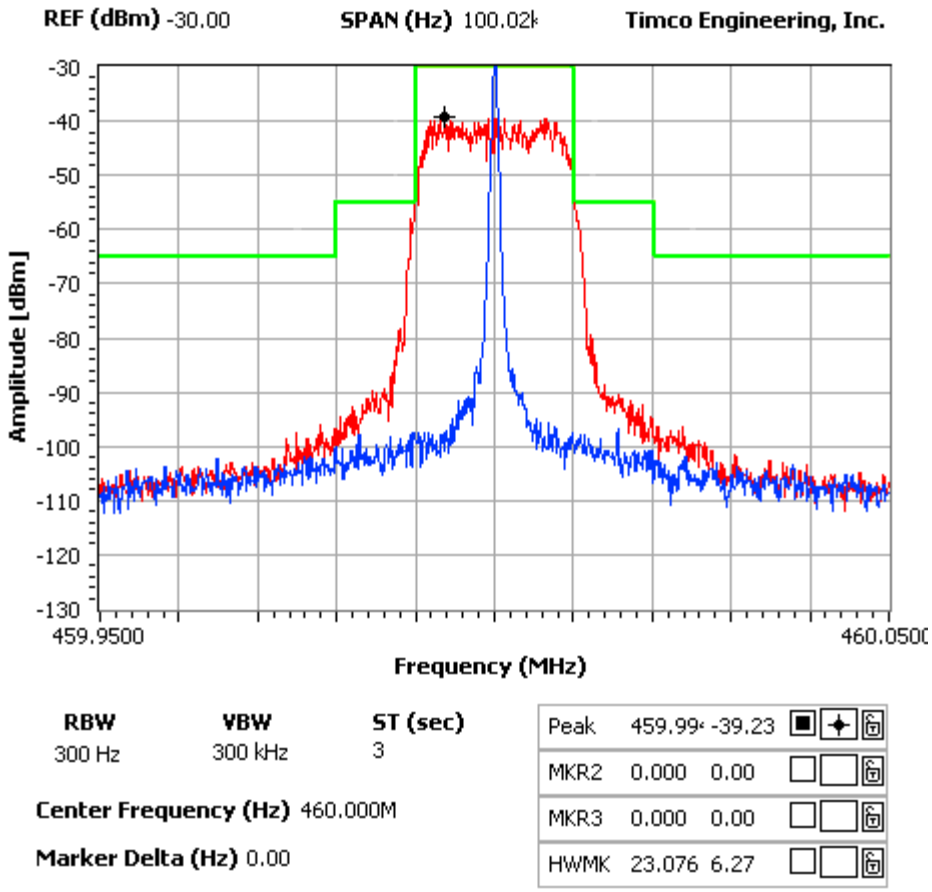
Test Data: See the plots below

25 kHz Digital

Mask B

NOTES:

occupied bandwidth

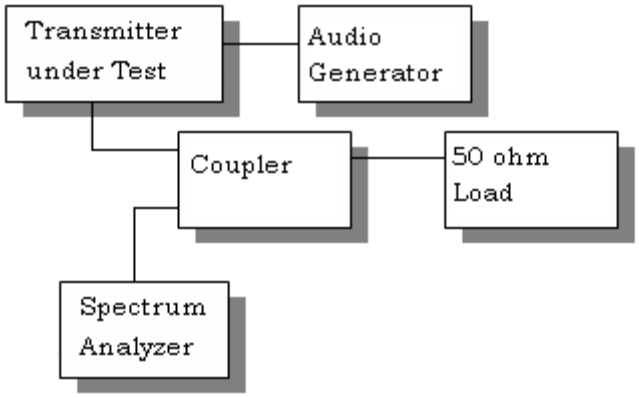


OCCUPIED BANDWIDTH MEASUREMENT

Test procedure: ANSI/TIA-603-C:2004 para 2.2.11.

Test Setup Diagram:

OCCUPIED BANDWIDTH MEASUREMENT



Test Data: See the plots below

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

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

Requirements: 25kHz Channel Spacing
43 + 10log(p) = 43 + 10log() = 65 dBc

Test Data:

TF	EF	dB below carrier	TF	EF	dB below carrier	TF	EF	dB below carrier
450	450	0	460	460	0	470	470	0
	900	93.1		920	92.1		940	93.4
	1350	95.8		1380	89.6		1410	67.2
	1800	101.4		1840	99.2		1880	100.6
	2250	94.5		2300	98.5		2350	93.6
	2700	106.9		2760	105.1		2820	113.8
	3150	104.3		3220	100.5		3290	107.5
	3600	117.2		3680	110.5		3760	115.3
	4050	109		4140	112.1		4230	117
	4500	118.3		4600	116.5		4700	119.7

FIELD STRENGTH OF SPURIOUS EMISSIONS

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

Requirements: 25kHz Channel Spacing:
43 + 10log(p) = 43 + 10log() = 65 dBc

Test Data:

TF	EF	Ant Polarity V/H	dB below carrier	TF	EF	Ant Polarity V/H	dB below carrier	TF	EF	Ant Polarity V/H	dB below carrier
450	450.00	V	0	460	460.00	V	0	470	470.00	V	0
	900.00	H	113.86		920.00	H	110.98		940.00	H	111.49
	1350.00	V	104.48		1380.00	V	110.15		1410.00	V	108.30
	1800.00	V	101.72		1840.00	H	102.98		1880.00	H	99.32
	2250.00	H	109.84		2300.00	H	110.58		2350.00	V	106.32
	2700.00	H	106.35		2760.00	V	101.59		2820.00	V	98.92
	3150.00	V	103.87		3220.00	V	96.20		3290.00	V	97.23
	3600.00	H	102.44		3680.00	H	104.52		3760.00	H	104.79
	4050.00	H	105.78		4140.00	H	106.16		4230.00	H	99.74
	4500.00	V	106.21		4600.00	V	106.73		4700.00	V	107.24

RECEIVER RADIATED SPURIOUS EMISSIONS

Rule Parts. No.: FCC Part 15.109, RSS-GEN 4.10, 6

Requirements:

30-88 MHz	40.0 dBµV/m measured at 3 meters
88-216 MHz	43.5 dBµV/m
216-960 MHz	46.0 dBµV/m
ABOVE 960 MHz	54.0 dBµV/m

Test Data:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity V/H	Coax Loss dB/m	Correction Factor dB/m	Field Strength dBµV/m	Margin dB
450.0	405.00	11.8	V	1.21	15.80	28.81	17.20
450.0	405.00	16.4	H	1.21	16.15	33.76	12.25
450.0	810.00	3.8	V	1.91	21.10	26.81	19.20
450.0	810.00	4.9	H	1.91	21.70	28.51	17.50
460.0	415.00	13.3	V	1.22	15.95	30.47	15.54
460.0	415.00	21.4	H	1.22	16.20	38.82	7.18
460.0	830.00	2.7	V	1.92	21.40	26.02	19.99
460.0	830.00	3.5	H	1.92	22.10	27.52	18.49
470.0	425.00	13.5	V	1.23	16.05	30.78	15.23
470.0	425.00	19.0	H	1.23	16.35	36.58	9.42
470.0	850.00	1.5	V	1.93	22.10	25.53	20.48
470.0	850.00	2.0	H	1.93	22.60	26.53	19.48

FREQUENCY STABILITY

Rule Parts. No.: FCC Part 2.1055, Part 90.213, RSS-119 5.3, RSS-GEN 7.2.4

Requirements: Temperature range requirements: -30 to +50° C.
Voltage Variation +, -15%
±1.5 PPM

Test Data:

Assigned Frequency (Ref. Frequency) (MHz)		460.00005
Temperature (°C)	Frequency (MHz)	Frequency Stability (PPM)
-30	460.000051	0.00
-20	460.000051	0.00
-10	460.000051	0.00
0	460.000050	0.00
+10	460.000051	0.00
+20	460.00005	0.00
+30	460.000051	0.00
+40	460.000049	0.00
+50	460.00005	0.00

Assigned Frequency (Ref. Frequency) (MHz)		
% Battery (%)	Frequency (MHz)	Frequency Stability (PPM)
-15%	460.00005	0.00
	460.00005	
+15%	460.00005	0.00

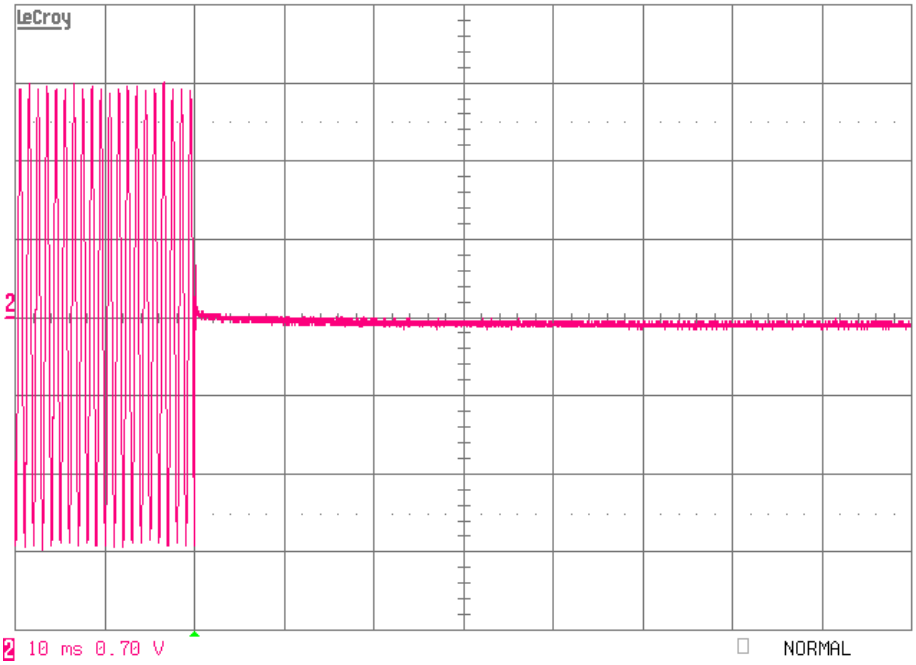
TRANSIENT FREQUENCY BEHAVIOR

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
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
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
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

Turn on



Turn off