



849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

RADAR TEST REPORT

PER FCC PT 80 & 90

APPLICANT	Consilium Marine US
	4370 Oakes RD #721
	FT Lauderdale FL 33314 USA
FCC ID	W9P-SRT25002
MODEL NUMBER	SRT25-002, SRT25-003
PRODUCT DESCRIPTION	25K WATT X-BAND MARINE RADAR
DATE SAMPLE RECEIVED	10/5/2009
DATE TESTED	10/9/2009
TESTED BY	Nam Nguyen
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	2412AUT9TestReport.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

DUT SPECIFICATION.....	4
TEST SETUP INFORMATION.....	4
EQUIPMENT LIST	5
TEST PROCEDURE.....	6
RF POWER OUTPUT	7
MODULATION CHARACTERISTICS.....	8
OCCUPIED BANDWIDTH PLOT(S)	10
SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED).....	13
FIELD STRENGTH OF SPURIOUS EMISSIONS	15
FREQUENCY STABILITY.....	17

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 30, 2009

DUT SPECIFICATION

DUT Description	25k WATT X-BAND MARINE RADAR
FCC ID	W9P-SRT25002
IC Certification	8709A-SRT25002
Model Number	SRT25-002, SRT25-003
Serial Number	N/A
Operating Frequency	(9375 +/- 30) MHz or (9410 +/- 30) MHz
Modulation	38M0P0N
DUT Power Source	<input checked="" type="checkbox"/> 110–120Vac/50– 60Hz
	<input type="checkbox"/> DC Power ()
	<input type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input type="checkbox"/> Pre-Production
	<input checked="" type="checkbox"/> Production
Type of Equipment	<input checked="" type="checkbox"/> Fixed
	<input type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
Antenna	2 available: 29 dBi and 31 dBi

TEST SETUP INFORMATION

Test facility	Timco Engineering, Inc. 849 NW State Road 45, Newberry, FL 32669
Test Condition	The DUT was tested under normal temperature and humidity. The temperature was 26°C with a relative humidity of 50%.
Modifications	None
Test Exercise	The DUT was placed in continuous transmit mode of operation
Applicable Standards	ANSI/TIA 603-C;2004 , FCC CFR 47 Part 80/90

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
Spectrum Analyzer	R&S	ESIB 40		11/25/2008	11/25/2010

TEST PROCEDURE

Power Line Conducted Interference: 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/TIA 603-C:2004 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.

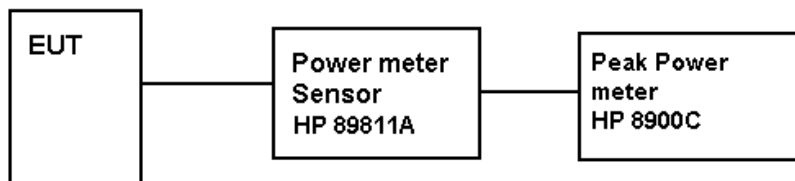
RF POWER OUTPUT

Rule Part No.: FCC Pt 2.1046(a), Pt 80, RSS-138

Test Requirements: FCC Pt 2.1046(a), Pt 80, RSS-138

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

Test Setup Diagram:



Test Data:

OUTPUT POWER: High = 21300 Watts Peak
Low = 19500 Watts Peak

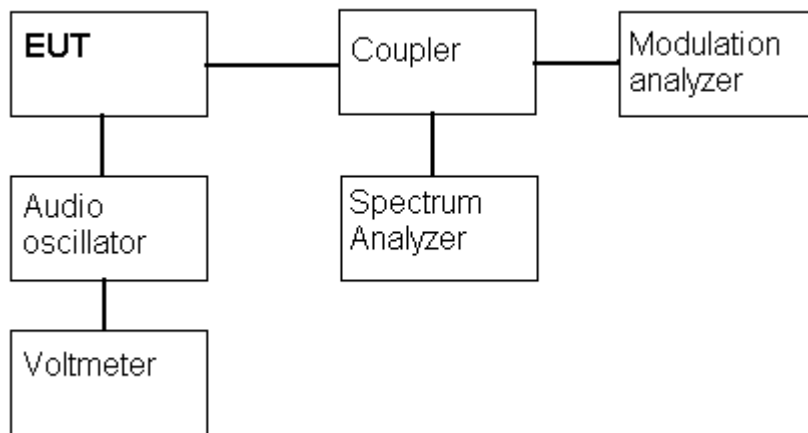
Part 2.1033 (C)(8) DC Input into the final amplifier

FOR POWER SETTING (HIGH) INPUT POWER: Volts DC = 697
Current Amperes = 7.5
= 5227.5 Watts

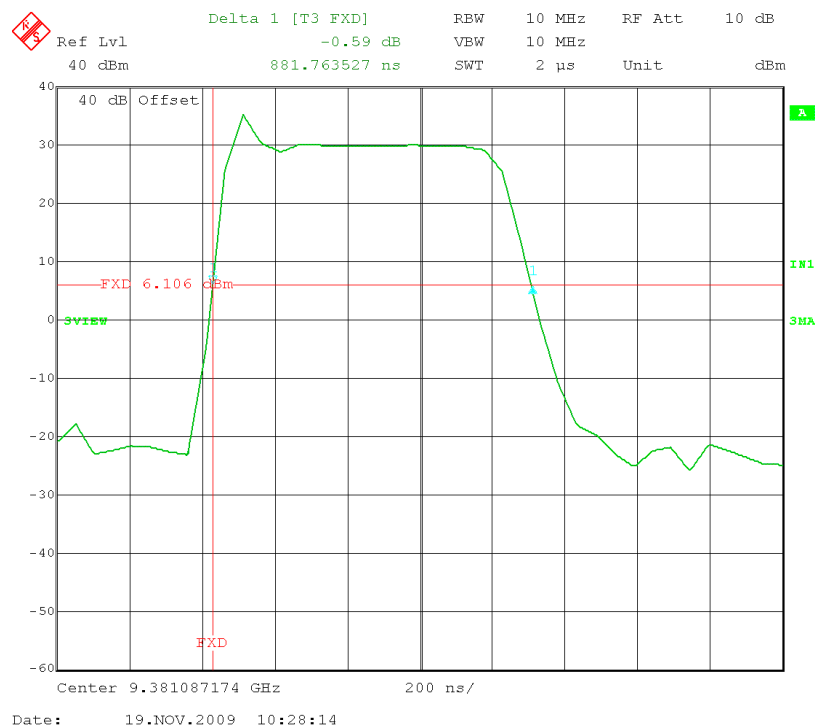
MODULATION CHARACTERISTICS

Method of Measurement: ANSI/TIA 603-C:2004

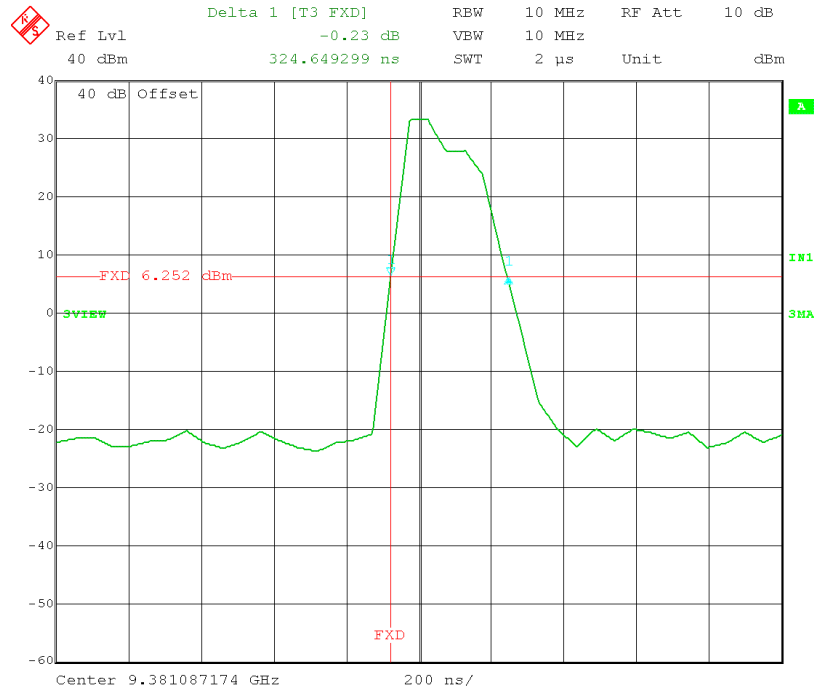
Test Setup Diagram:



Longest duration pulse from single pulse set

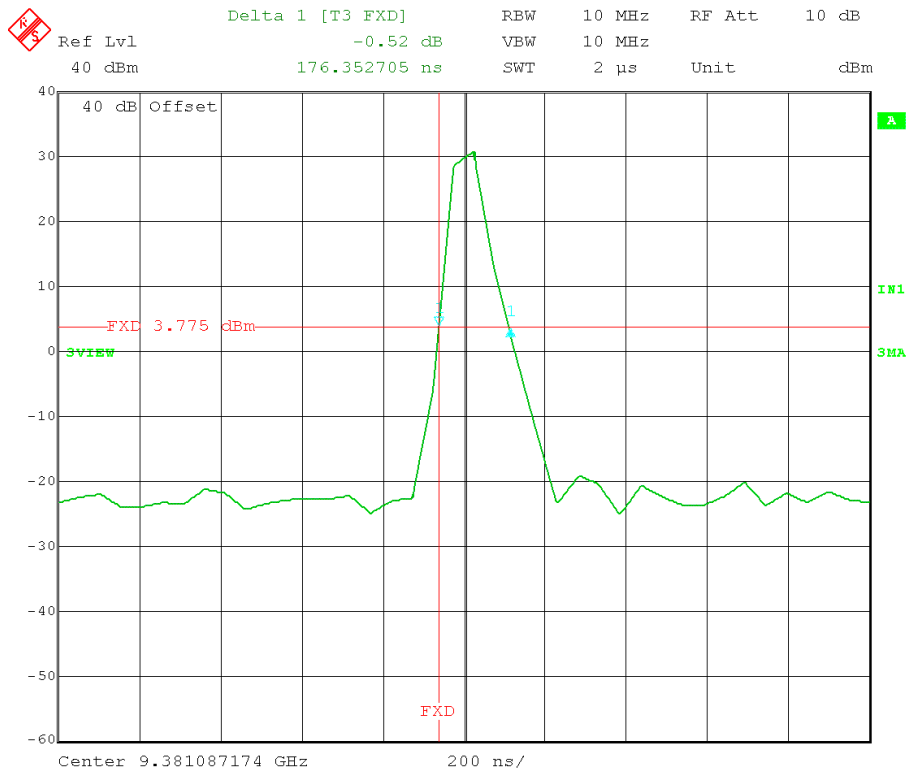


Medium duration pulse from single pulse set



Date: 19.NOV.2009 10:17:47

Shortest duration pulse from single pulse set

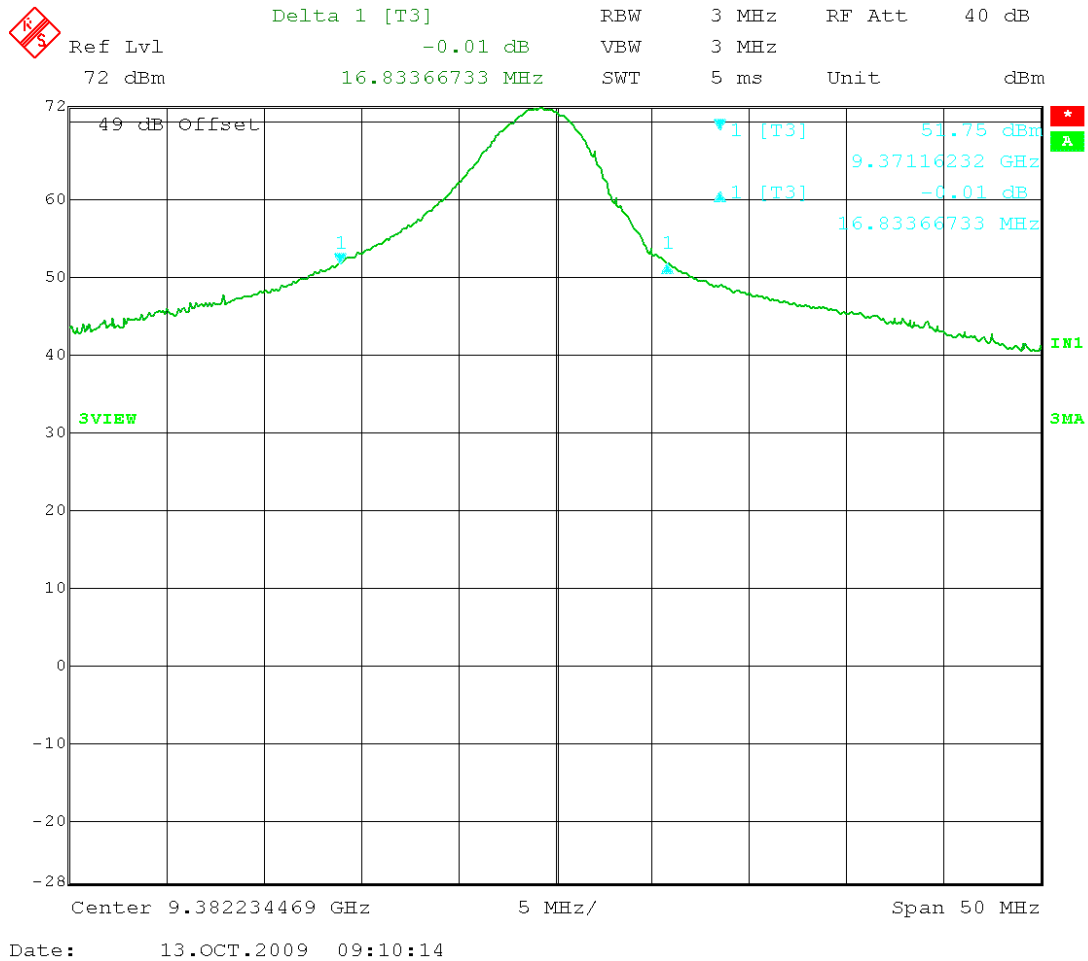


Date: 19.NOV.2009 10:29:59

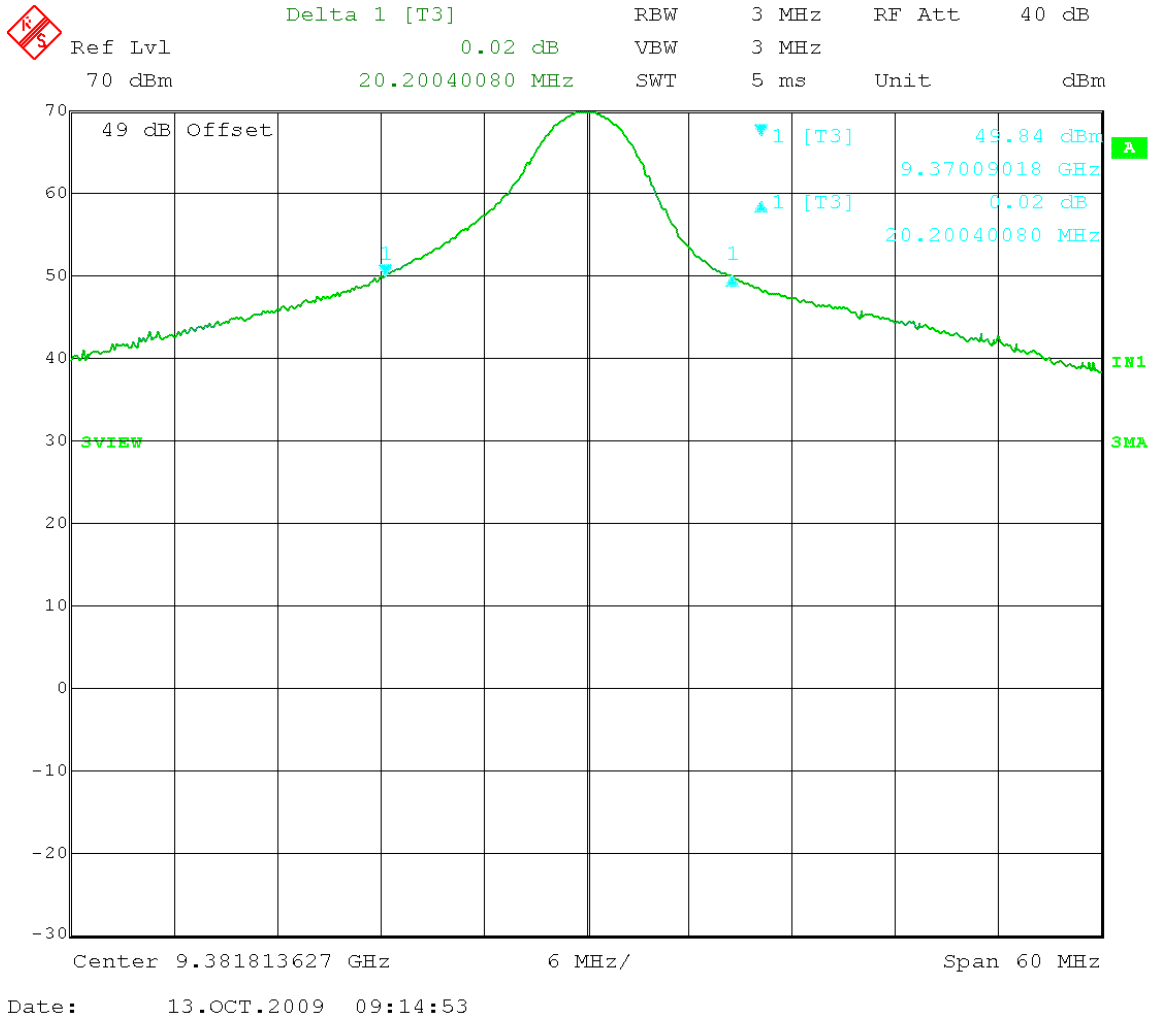
OCCUPIED BANDWIDTH PLOT(S)

The emission mask for this device requires that the emission only need stay in the band.

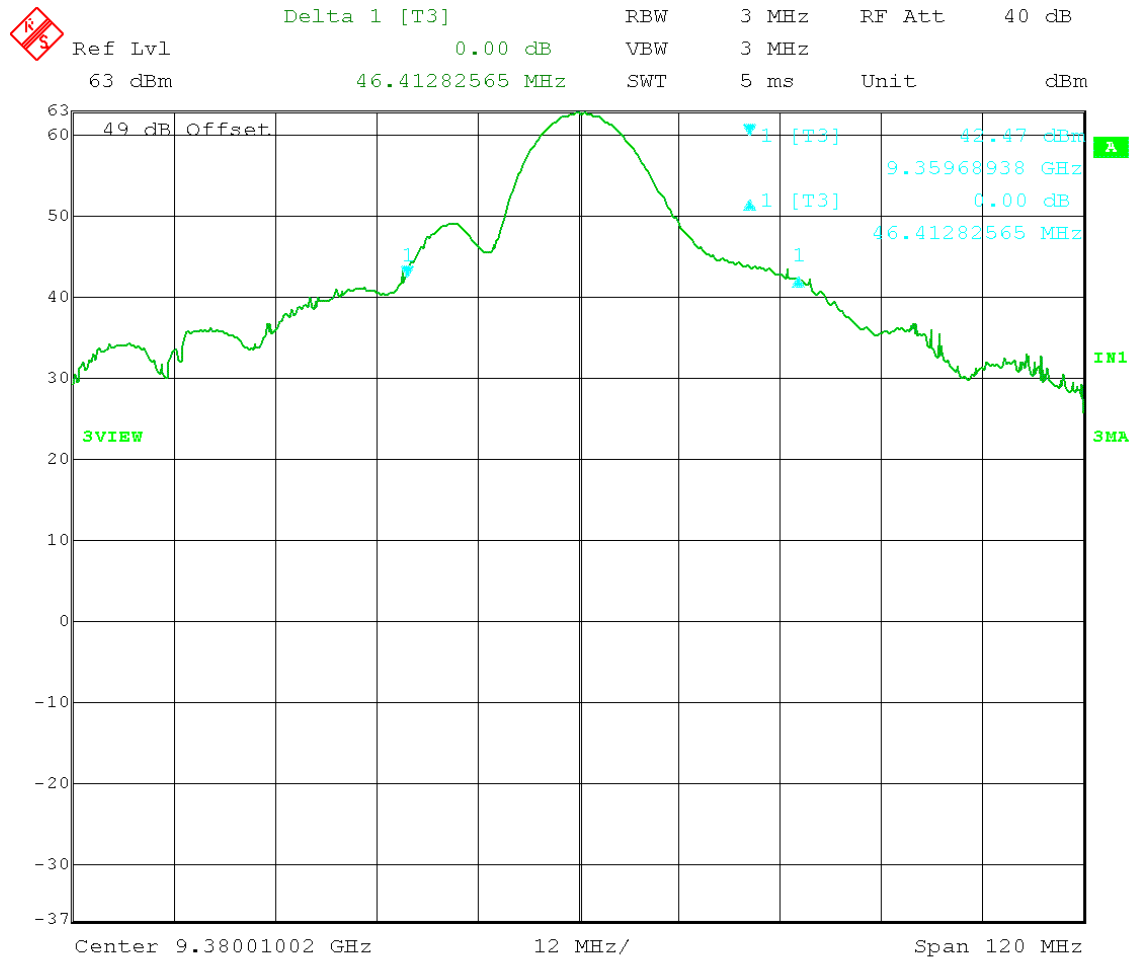
OBW for a longest duration pulse



OBW for a medium duration pulse



OBW for a shortest duration pulse



Date: 13.OCT.2009 09:21:19

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: FCC Pt 2.1051(a),

Requirements: $P_o(\text{peak})\text{dBm} - [43 + 10\log(\text{mean power})]$
 Long pulse: $71.8 - [43 + 10\log(12.78)] = 17.7 \text{ dBm}$
 Med pulse: $69.8 - [43 + 10\log(7.99)] = 17.8 \text{ dBm}$
 Short pulse: $62.5 - [43 + 10\log(3.83)] = 13.7 \text{ dBm}$

Method of Measurement: The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental or 40 GHz. The measurements were made in accordance with standard ANSI/TIA 603-C:2004 or ANSI 63.4:2003.

The mean power was calculated based on the standard formula for radar systems:

$P_a = P_m * T_d * f_r$. Where T_d is pulse duration, P_m is peak power, and f_r is pulse rep rate.

Long pulse: $21300 * (800 * 10^{-9}) * 750 = 12.78 \text{ Watts}$
 Med pulse: $21300 * (250 * 10^{-9}) * 1500 = 7.99 \text{ Watts}$
 Short pulse: $21300 * (60 * 10^{-9}) * 3000 = 3.83 \text{ Watts}$

Test Data:

Longest pulse

Tuned Freq. (MHz)	Emission Freq. MHz	Level (dBm)	Limit (dBm)
9382	18764	14.58	17.7
	28146	NF	17.7
	37528	NF	17.7

Medium pulse:

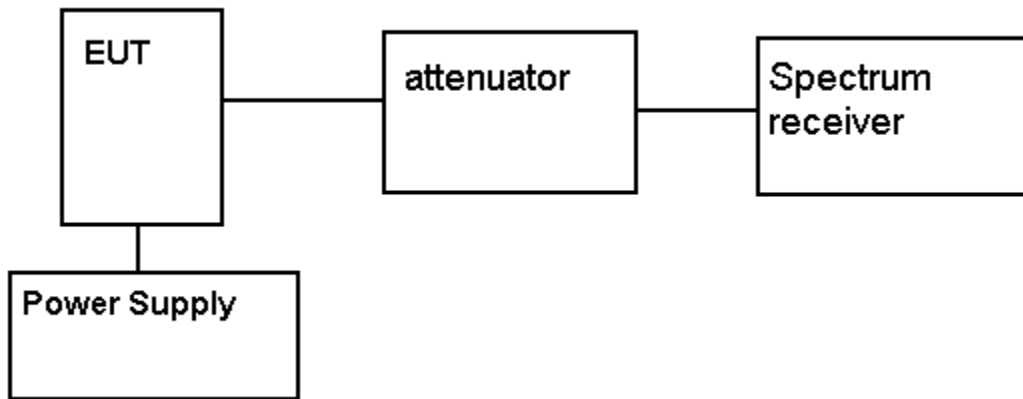
Tuned Freq. (MHz)	Emission Freq. MHz	Level (dBm)	Limit (dBm)
9381	18762	11.3	17.8
	28143	NF	17.8
	37524	NF	17.8

Shortest pulse:

Tuned Freq. (MHz)	Emission Freq. MHz	Level (dBm)	Limit (dBm)
9380	18760	10.5	13.7
	28140	NF	13.7
	37520	NF	13.7

Various modes and center frequencies were tested and the worst case presented above. Harmonics were checked to the 10th harmonic.

Method of Measuring Conducted Spurious Emissions



METHOD OF MEASUREMENT: The procedure used was ANSI/TIA-603-C:2004 or ANSI 63.4:2003

FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: FCC Pt 2.1053,

Requirements: the calculation for the radiated spurious emission

$$P_{\text{peak}}(\text{dB}\mu\text{V/m}) - [43 + 10\log(\text{mean power})]$$

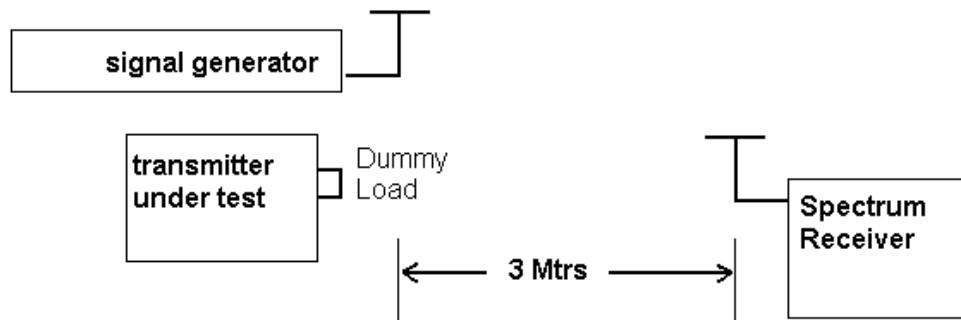
Long pulse: $178.8 - [43 + 10\log(12.78)] = 124.7 \text{ dB}\mu\text{V/m}$

Medium pulse: $176.8 - [43 + 10\log(7.99)] = 124.8 \text{ dB}\mu\text{V/m}$

Short pulse: $169.5 - [43 + 10\log(3.83)] = 120.7 \text{ dB}\mu\text{V/m}$

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 or 40 GHz. This test was conducted per ANSI/TIA 603-C:2004 using the substitution method.

Test Setup Diagram:



Test Data:

Longest pulse:

Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	Level (dB μ V/m)	Limit (dB μ V/m)
9382	18764	H	46.85	124.7
	18764	V	49.37	124.7

Shortest pulse:

Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	Level (dB μ V/m)	Limit (dB μ V/m)
9380	18760	H	32.51	120.7
	18760	V	34.12	120.7

Three places in the band were measured, various modes of operation were checked and the worst case reported.

RECEIVER RADIATED SPURIOUS EMISSIONS

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

Requirements:

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

Test Data:

Emission Frequency MHz	Meter Reading dB μ V	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dB μ V/m	Margin dB
33.10	21.9	V	0.42	12.59	34.91	5.09
49.00	14.7	H	0.50	11.86	27.06	12.95
52.60	25.1	V	0.51	10.07	35.68	4.32
68.40	21.0	H	0.56	5.43	26.99	13.01
69.80	17.6	V	0.57	5.61	23.78	16.22
104.00	27.1	V	0.65	11.34	39.09	4.41
158.50	14.3	V	0.73	17.09	32.12	11.38
186.70	15.3	H	0.85	13.57	29.72	13.78
275.60	11.8	V	1.05	13.47	26.32	19.68
310.20	9.7	H	1.11	15.20	26.01	19.99
310.40	10.5	V	1.11	15.08	26.69	19.31
607.20	6.9	V	1.61	18.89	27.40	18.60
1,927.00	11.5	V	2.84	30.73	45.07	8.93
2,586.00	7.6	H	3.31	32.52	43.43	10.57
2,924.00	7.2	V	3.55	32.58	43.33	10.67
4,034.00	7.5	V	4.52	33.63	45.65	8.35
4,653.00	7.8	H	4.83	34.10	46.73	7.27
7,404.00	7.6	H	5.84	36.08	49.52	4.48
7,984.00	8.0	V	6.19	36.00	50.19	3.81
9,072.00	8.1	H	6.62	36.34	51.06	2.94
10,250.00	7.1	V	7.03	37.35	51.48	2.53
12,874.00	3.5	H	8.41	39.10	51.01	2.99
13,169.00	3.5	V	8.57	39.07	51.14	2.86
15,263.00	1.7	H	9.41	40.53	51.64	2.36
16,094.00	2.3	V	9.76	41.76	53.82	0.18

FREQUENCY STABILITY

Rule Parts. No.: FCC Pt 2.1055, Pt 80,

Requirements: Emission need only remain in the band.

Method of Measurements: ANSI/TIA 603-C: 2004

Test Data:

	Ref. Freq. MHz	
	9381.162320	
TEMPERATURE °C	FREQUENCY MHz	PPM
-30°C	9389.178360	854.48
-20°C	9386.673350	587.46
-10°C	9386.172340	534.05
-0°C	9385.546090	467.29
10°C	9384.043090	307.08
20°C	9383.291580	226.97
30°C	9381.287575	13.35
40°C	9378.782570	-253.67
50°C	9378.532060	-280.38
Battery. Volts		PPM
-15%		0
+15%		0