Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: IC 3463A-1
TCB ID: DE 0001

Accredited by the
German Accreditation Council
DAR–Registration Number
DAT-P-176/94-D1

Accredited Bluetooth® Test Facility (BQTF)

Test report no.	**:**	**2-4869-01-05/07**
Applicant	**:**	**Broadcast Microwave Services GmbH&Co. KG**
Type	**:**	**CT2400LD**
Test Standard	**:**	**FCC Part 74 / FCC Part 90 SPRS-302.0**
FCC ID	**:**	**VFB-CT2400LD-0000**
Certification No. IC	**:**	**-/-**

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1. Administrative data

1.1. Administrative data of the test facility

1.1.1 Identification of the testing laboratory

Company name:	Cetecom ICT Services GmbH
Address:	Untertürkheimerstr. 6-10 D-66117 Saarbruecken Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF)
Responsible for testing laboratory:	Harro Ames Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

.....
Responsible for testing
(Harro Ames)

1.1.2 Organizational items

Reference No.:	2-4869-01-05/07
Order No.:	
Receipt of EUT:	2008-01-28
Date(s) of test:	2008-01-28 to 2008-01-29
Date of report:	2008-04-07
Number of report pages:	54
Version of template: 1.8	

.....
Responsible for laboratory
(Michael Berg)

Note:
The test results of this test report relate exclusively to the item tested as specified in this report. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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During the test no hardware and software changes are allowed to be performed at the EUT.

1.1.3 Applicant´s details

Applicant´s name:	Broadcast Microwave Services GmbH&Co.KG
Address:	Schwalbacherstrasse 12 65321 Heidenrod Kemel Germany
Contact person:	Mr. Gerd Otto Phone: +49 (0) 6124 723900 Fax: +49 (0) 6124 723929 email: gotto@bms-inc.com

1.2 Administrative data of manufacturer / member

Manufacturer´s name:	same as applicant
Address:	

1.3 Description of the Equipment under test (EUT)

1.3.1 EUT: Type, S/N etc.

Product name	:	CT2400LD
Product ID	:	CT2400LD
Description	:	Television broadcast transmitter
S/N serial number	:	-
HW hardware status	:	-
SW software status	:	-
Frequency Band [MHz]	:	2450- 2483.5 MHz
Type of Modulation	:	7M75D7W
Antenna	:	N Antenna-connector with rod antenna: VLA2406LP (Procom FLX2412/2450 SMA) VLA2400LP (WiMo 17010.10)
Power Supply	:	13.8$V_{DC,}$ normally powered by battery
Temperature Range	:	-20°C to +55°C

Max. power radiated: +25.6 dBm
Max. power conducted: +29.1 dBm

FCC ID: VFB-CT2400LD-0000
IC: -/-

Remark:
The signal is COFDM 2K modulated. There are 3 different sub-modulations (QPSK, 16QAM, 64QAM).

1.3.2 If RF component testing only, describtion of additional used HW/SW

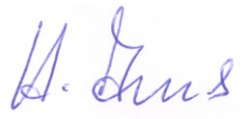
	Product name	Product ID	Description	S/N serial number	HW hardware status	SW software status
1						
2						
3						
4						

1.3.3 Additional EUT information For IC Canada (appendix 2)

Company Number:	7191A
Model Name:	CT2400LD
Manufacturer (complete Adress):	Broadcast Microwave Services GmbH&Co.KG Schwalbacherstrasse 12 65321 Heidenrod Kemel Germany
Tested to Radio Standards Specification (RSS) No.:	SRSP-302-0
Open Area Test Site Industry Canada Number:	IC 3463A-1
Frequency Range (or fixed frequency) [MHz]:	2450 – 2483.5
RF: Power [W] (max):	Rad. EIRP: 0.324 W Ant: 2400LP 0.363 W Ant: 2406LP Conducted : 0.821 W Peak
Antenna Type:	SMA antenna-connector with rod antenna
Type of Modulation:	7M75D7W
Emission Designator (TRC-43):	7M75D7W

ATTESTATION: I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all the applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:



Date: 2008-04-07

Testengineer: Harro Ames, Senior Engineer, Cetecom ICT Services GmbH

1.3.4 EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
Op. 0	Normal mode	Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the testplan

1.3.5 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature / humidity	T_{nom}	°C / %	+21 / 43
Low Temperature	T_{low}	°C	-20
High Temperature	T_{high}	°C	+55
Nominal Power Source	V_{nom}	V	13.8
Low Power Source	V_{low}	V	12.0
High Power Source	V_{high}	V	16.2

Type of powersource: V DC

Deviations from this values are reported in chapter 2

2. Teststandard & summary list of all performed test cases

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 74 / FCC Part 90 CANADA SRSP.302.0	PASS	2008-02-14	

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
§ 74.636 / § 2.1046 SRSP-302.0 – 5.2	Maximum Peak Output Power (conducted)	Yes			
§ 74.636 SRSP-302.0 - 7	Maximum Peak Output Power (radiated)	Yes			
§ 74.637 / § 2.1049 SRSP-302.0 – 5.2	Occupied Bandwidth	Yes			
§ 74.637 SRSP-302.0 – 5.5	Emission mask	Yes			
§ 74.661 / § 2.1055	Frequency Stability vs. Voltage	Yes			
§ 74.661 / § 2.1055	Frequency Stability vs. Temperature	Yes			
§ 74.637 / § 2.1051 SRSP-302.0 – 5.5	Spurious Emissions - conducted	Yes			
§ 74.637 / § 2.1051 SRSP-302.0 – 5.5	Spurious Emissions - radiated	Yes			

3. RF measurement testing

3.1 Description of test set-up

3.1.1 Radiated measurements

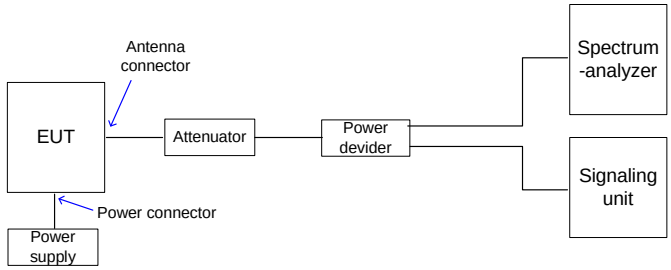
Description:

Measuring of Spurious/Harmonic Emissions using Substitution Method

(a) Set the EMI Receiver (for measuring E-Field) and Receiver #2 (for measuring EIRP) as follows:
Center Frequency : equal to the signal source
Resolution BW: 10 kHz for f < 1 GHz, 1 MHz for f > 1 GHz
Video BW: 300 kHz for f < 1 GHz, 3 MHz for f > 1 GHz
Detector Mode : positive
Average : off
(b) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor
E (dBuV/m) = Reading (dBuV) + Total Correction Factor (dB/m)
(c) Select the frequency and E-field levels for ERP/EIRP measurements.
(d) Substitute the EUT by a signal generator and one of the following transmitting antenna (substitution antenna): DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz }.
(e) Mount the transmitting antenna at 1.5 meter high from the ground plane.
(f) Use one of the following antenna as a receiving antenna: .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz }.
(g) If the DIPOLE antenna is used, tune it's elements to the frequency as specified in the calibration manual.
(h) Adjust both transmitting and receiving antenna in a VERTICAL polarization.
(i) Tune the EMI Receivers to the test frequency.
(j) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(k) The transmitter was rotated through 360 o about a vertical axis until a higher maximum signal was received.
(l) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.
(m) Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.
(n) Record the power level read from the Average Power Meter and calculate the ERP/EIRP as follows:
P = P1 - L1 = (P2 + L2) – L1 = P3 + A + L2 - L1
EIRP = P + G1 = P3 + L2 - L1 + A + G1
ERP = EIRP – 2.15 dB
Total Correction factor in EMI Receiver # 2 = L2 – L1 + G1
Where: P: Actual RF Power fed into the substitution antenna port after corrected.
P1: Power output from the signal generator
P2: Power measured at attenuator A input
P3: Power reading on the Average Power Meter
EIRP: EIRP after correction
ERP: ERP after correction
(o) Adjust both transmitting and receiving antenna in a HORIZONTAL polarization, then repeat step (k) to (o)
(p) Repeat step (d) to (o) for different test frequency
(q) Repeat steps (c) to (j) with the substitution antenna oriented in horizontal polarization.
(r) Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.

3.1.2 Conducted measurements

The EUT´s RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is connected to the spectrum analyzer. The specific losses of the signal path is first checked within a calibration. The measuerment readings on the spectrum analyzer are corrected by the specific test set-up loss. The attenuator and the spectrum analyzer are impedance matched on 50 Ohm.



3.2 Referenced documents

none

3.3 Additional comments

The system transmit frequency is programmable in 100 kHz steps in the range from 2450 to 2483.5 MHz.

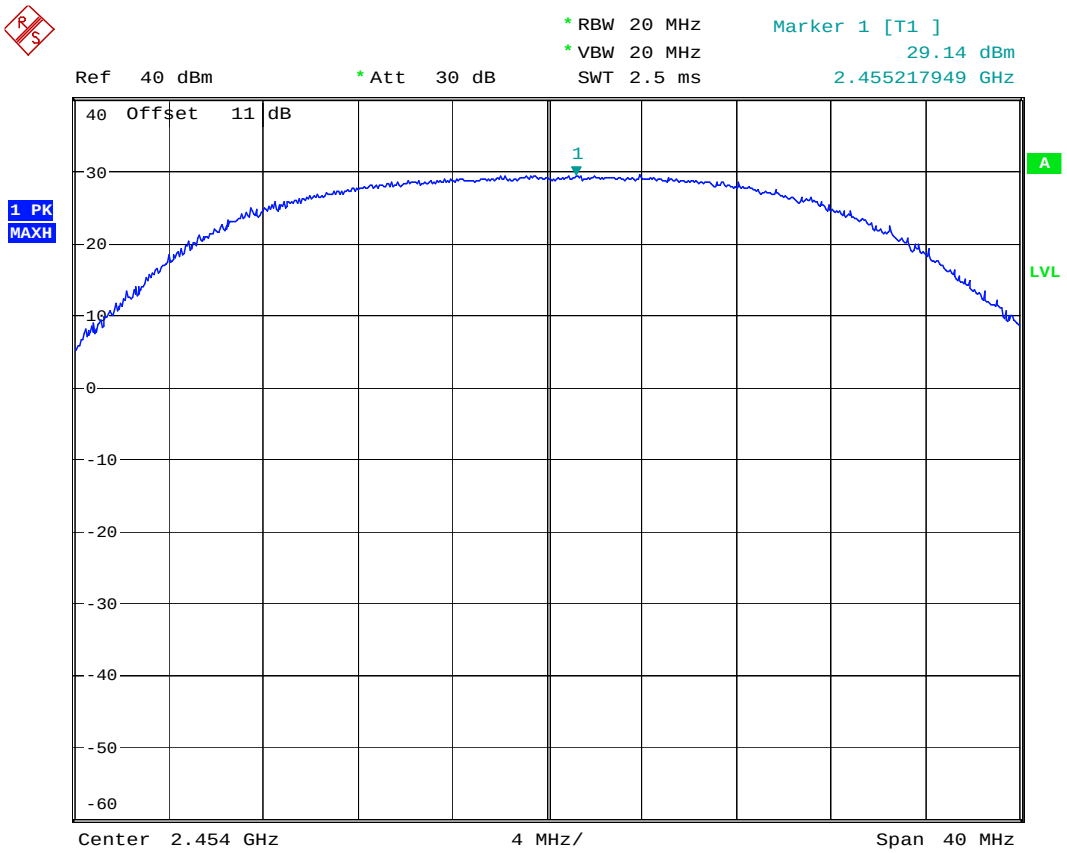
We used three frequencies for testing. 2454 MHz, 2467 MHz and 2479 MHz.
As the OBW of the signal is < 8 MHz, all emissions of the modulated signal are within the band limits.

3.4 Maximum Peak Output Power (conducted) § 74.636 / 2.1046 / SRSP-302.0 – 5.2

TEST CONDITIONS			MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)			2454	2467	2479
T_{nom}(23)°C	V_{nom}(13.8)V	Peak	29.1	29.1	28.7
		AV	20.1	20.3	19.5
Measurement uncertainty			±3dB		

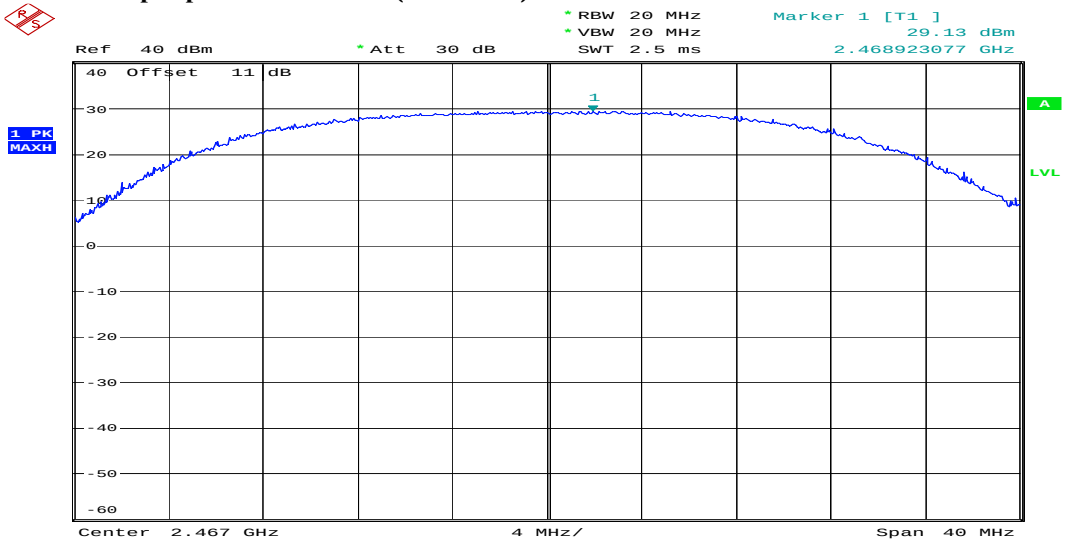
RBW / VBW : 10 MHz

Plot 1: Peak output power 2454 MHz (conducted)



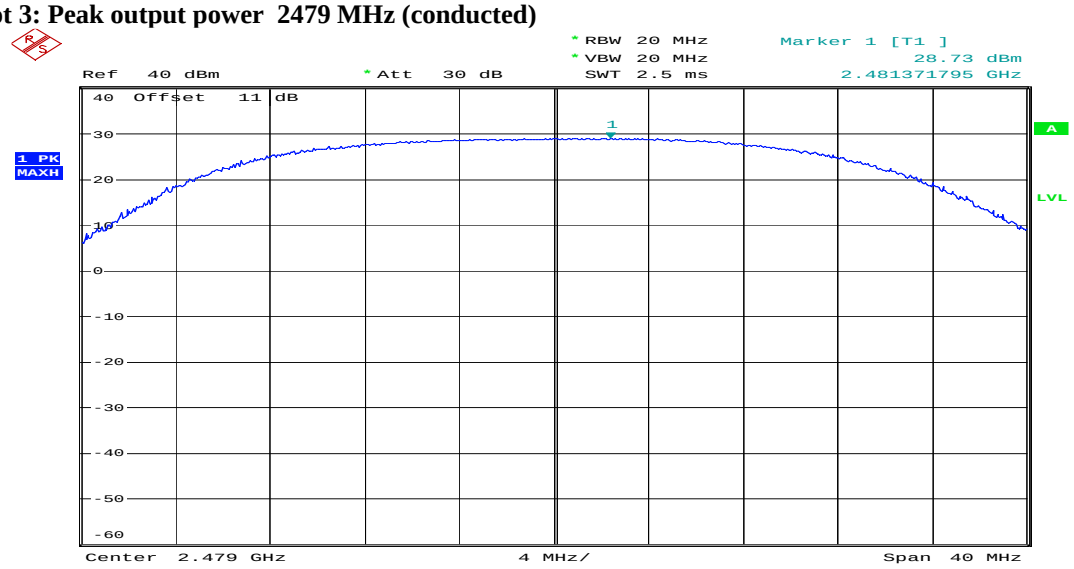
Date: 28.JAN.2008 10:49:16

Plot 2: Peak output power 2467 MHz (conducted)



Date: 28.JAN.2008 10:48:35

Plot 3: Peak output power 2479 MHz (conducted)



Date: 28.JAN.2008 10:44:26

LIMITS **SUBCLAUSE § 74.636**

For the Frequency Band 2,025 to 2,110 MHz: **Maximum allowable transmitter power for mobile: 12 W**	**Pass**

LIMITS **SRSP-302.0 – 5.2**

The transmitter power delivered to the antenna input shall not exceed the limits per RF channel shown below.

Bandwith (MHz)	Power Limit Watts (dBW)
10 / 7	10.0 (+10)
5	5.0 (+7)
2.5	2.0 (+3)
1.25 / 0.05	1.0 (0)

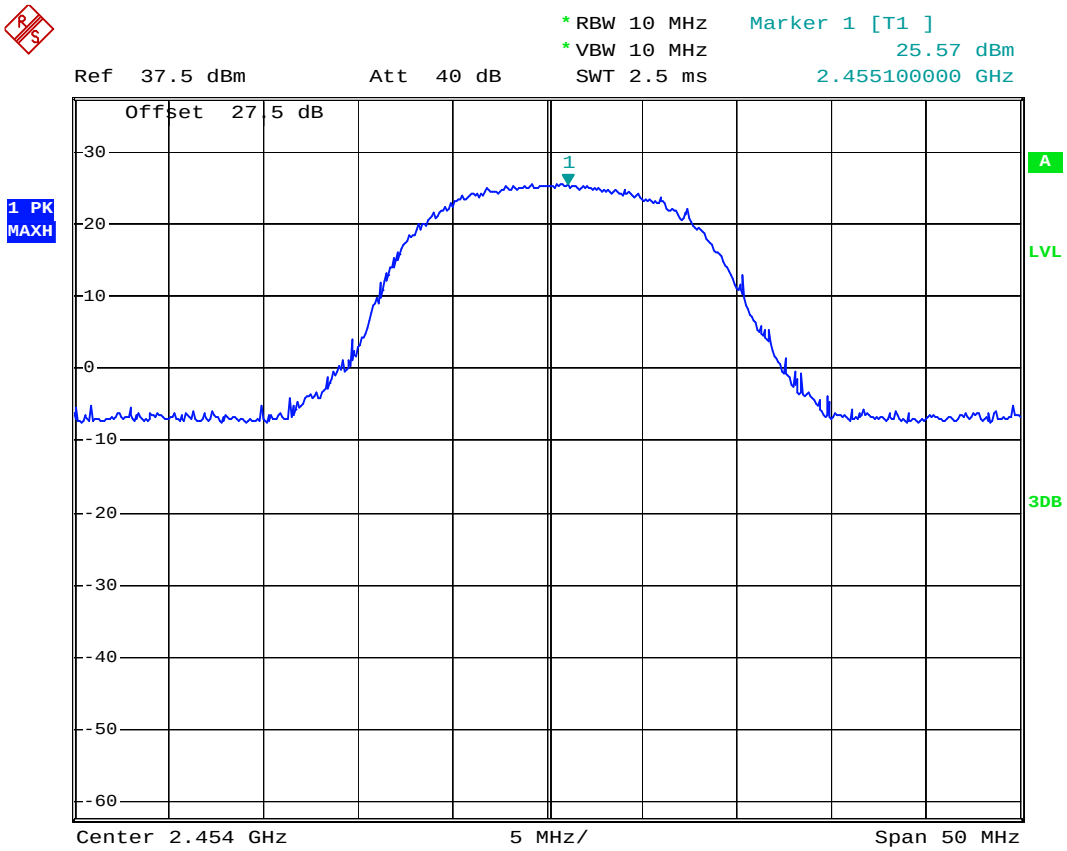
Pass

3.5 Maximum Peak Output Power (radiated) § 74.636 / 2.1046 / SRSP-302.0 – 7

TEST CONDITIONS			MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)			2454	2467	2479
T_{nom}(23)°C	V_{nom}(13.8)V	Ant: 2406LP	25.6	24.3	25.3
		Ant: 2400LP	25.1	23.9	24.8
Measurement uncertainty			±3dB		

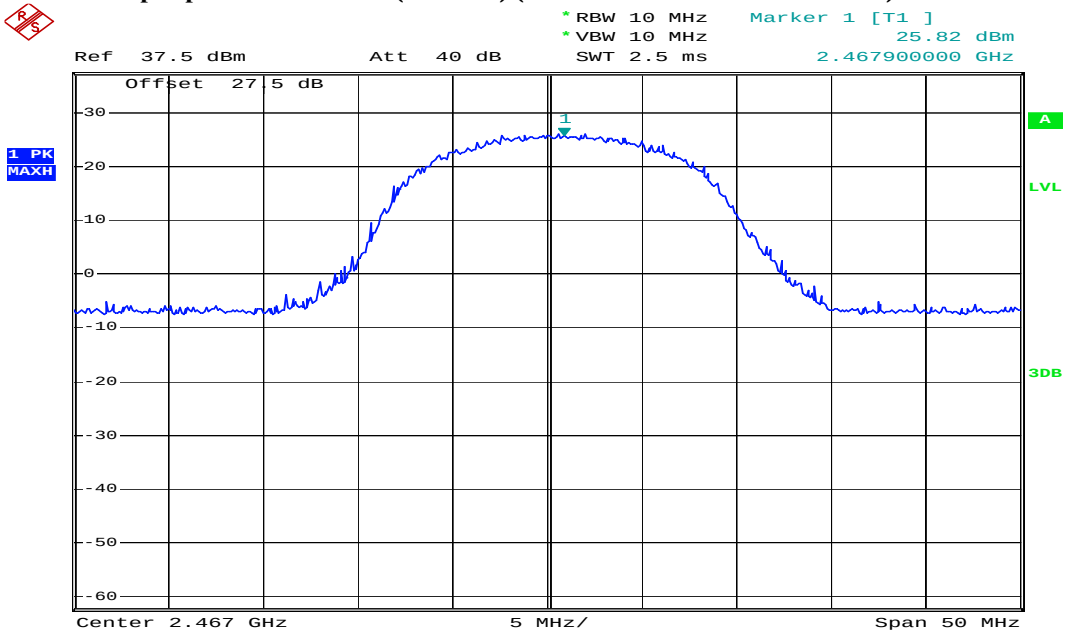
RBW / VBW : 10 MHz

Plot 1: Peak output power 2454 MHz (radiated) (cable correction factor included) Ant: 2406LP



Date: 29.JAN.2008 19:05:38

Plot 2: Peak output power 2467 MHz (radiated) (cable correction factor included) Ant: 2406LP



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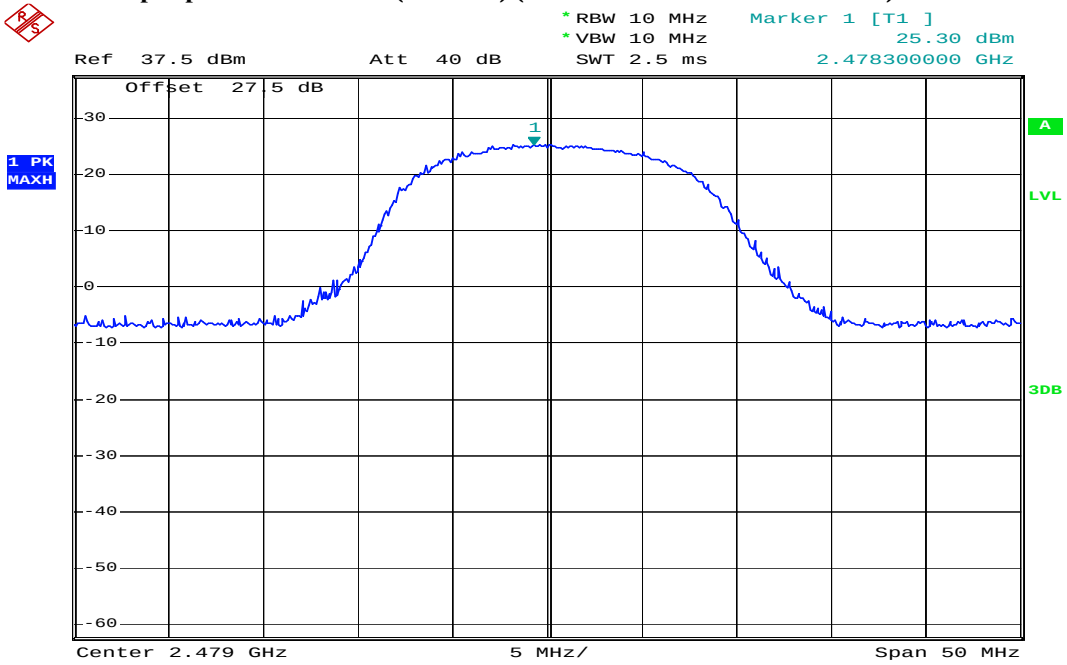
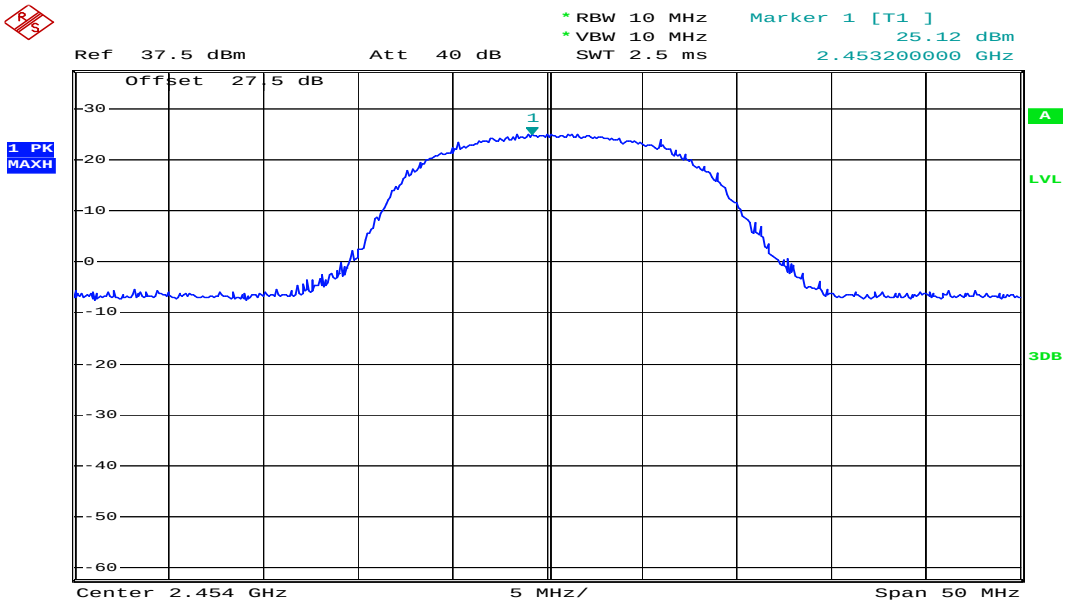
Plot 3: Peak output power 2479 MHz (radiated) (cable correction factor included) Ant: 2406LP



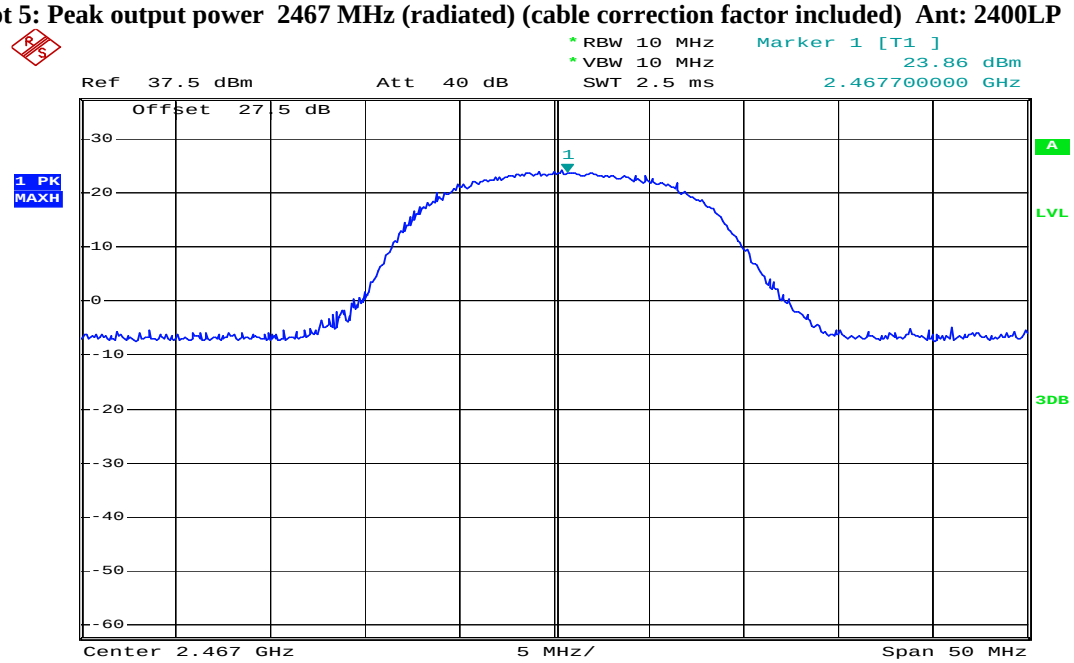
Date: 29.JAN.2008 19:00:10

Plot 4: Peak output power 2454 MHz (radiated) (cable correction factor included) Ant: 2400LP



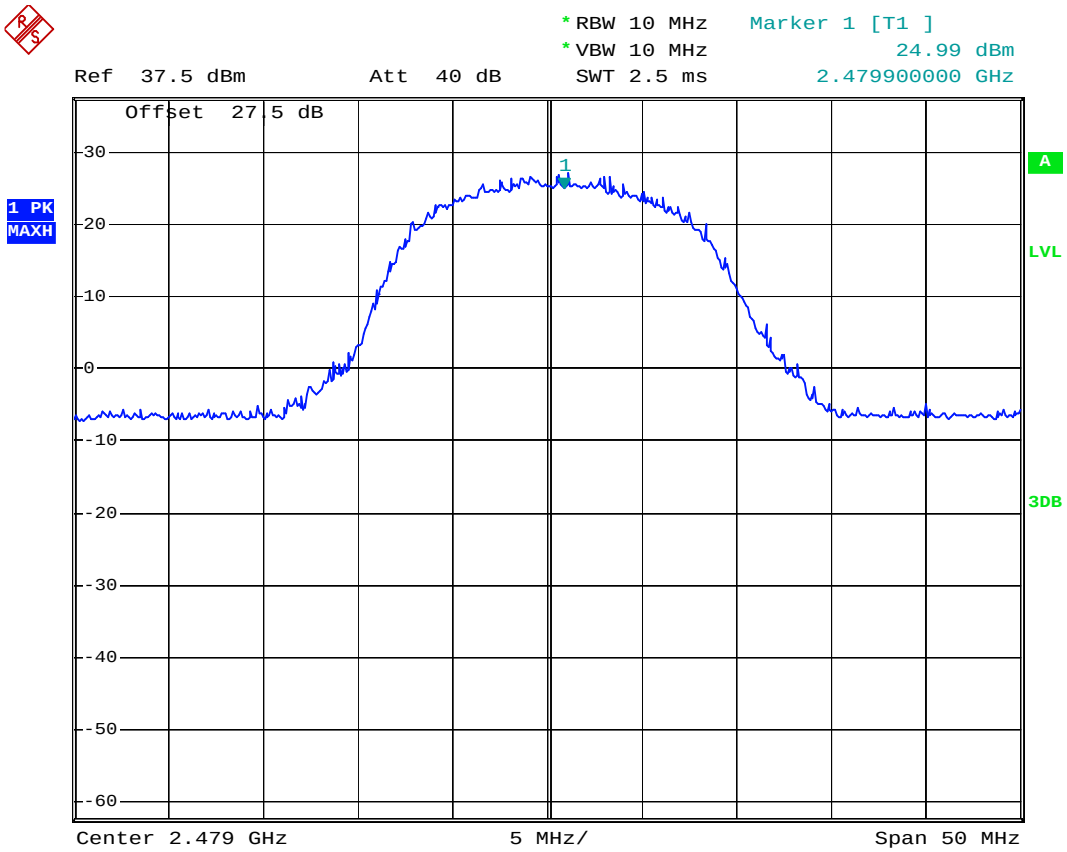
Date: 29.JAN.2008 19:04:53

Plot 5: Peak output power 2467 MHz (radiated) (cable correction factor included) Ant: 2400LP



Date: 29.JAN.2008 19:02:37

Plot 3: Peak output power 2479 MHz (radiated) (cable correction factor included) Ant: 2400LP



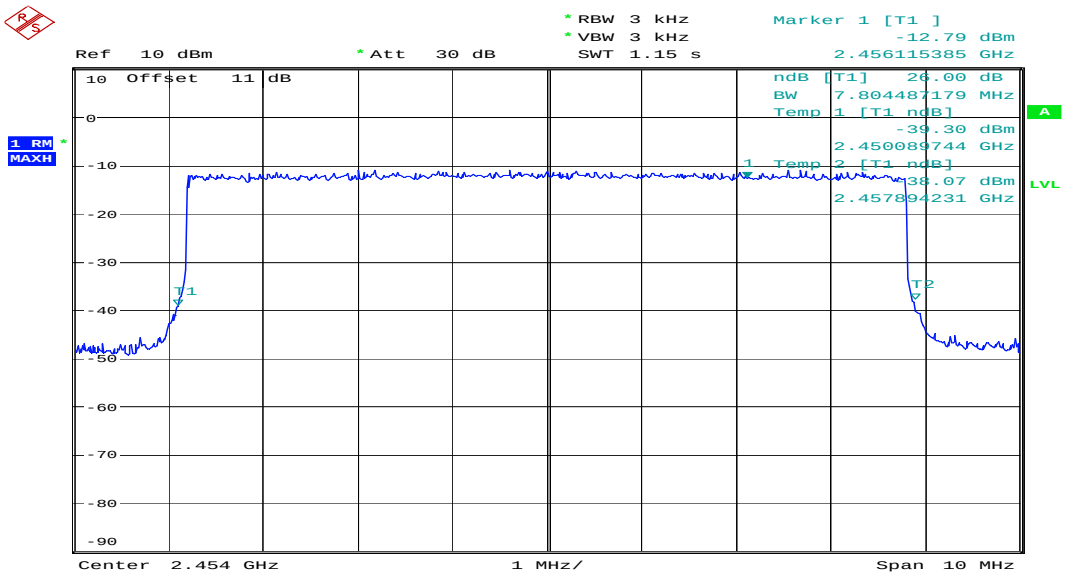
Date: 29.JAN.2008 18:59:26

LIMITS	SUBCLAUSE § 74.636
For the Frequency Band 2.450 to 2.4835 MHz: **Maximum allowable EIRP for mobile: 35 dBW** **Maximum allowable EIRP for fixed: 45 dBW**	**Pass**

LIMITS	SRSP-302.0 – 7
The maximum EIRP from the antenna must not in any case exceed + 55 dBW per RF channel.	**Pass**

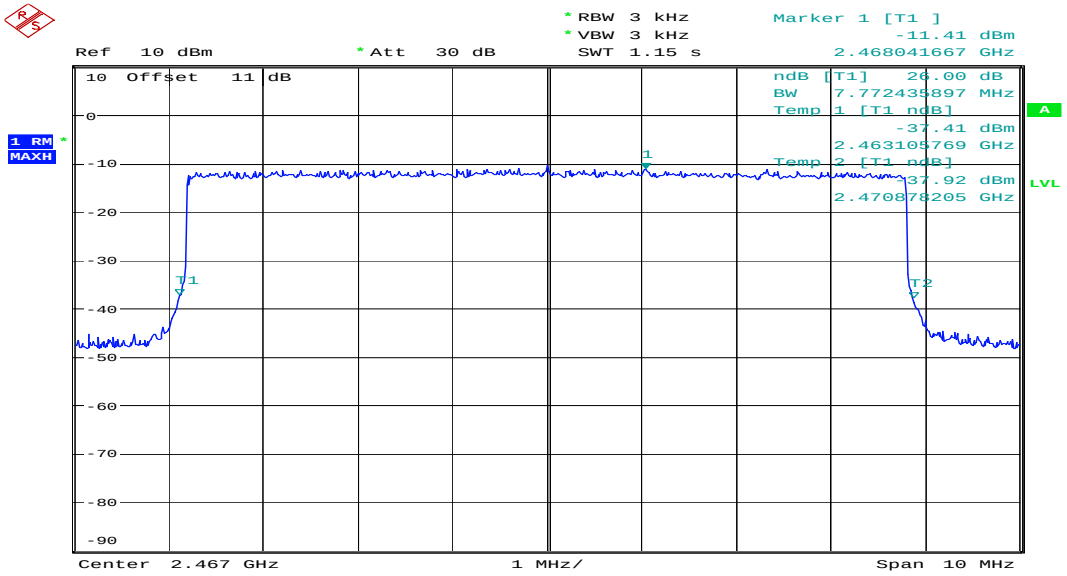
3.6 Occupied Bandwidth § 74.637 (g) / 2.1049 / SRSP-302.0 – 5.2

Plot 1: 2454 MHz (max. power), modulated with test modulation



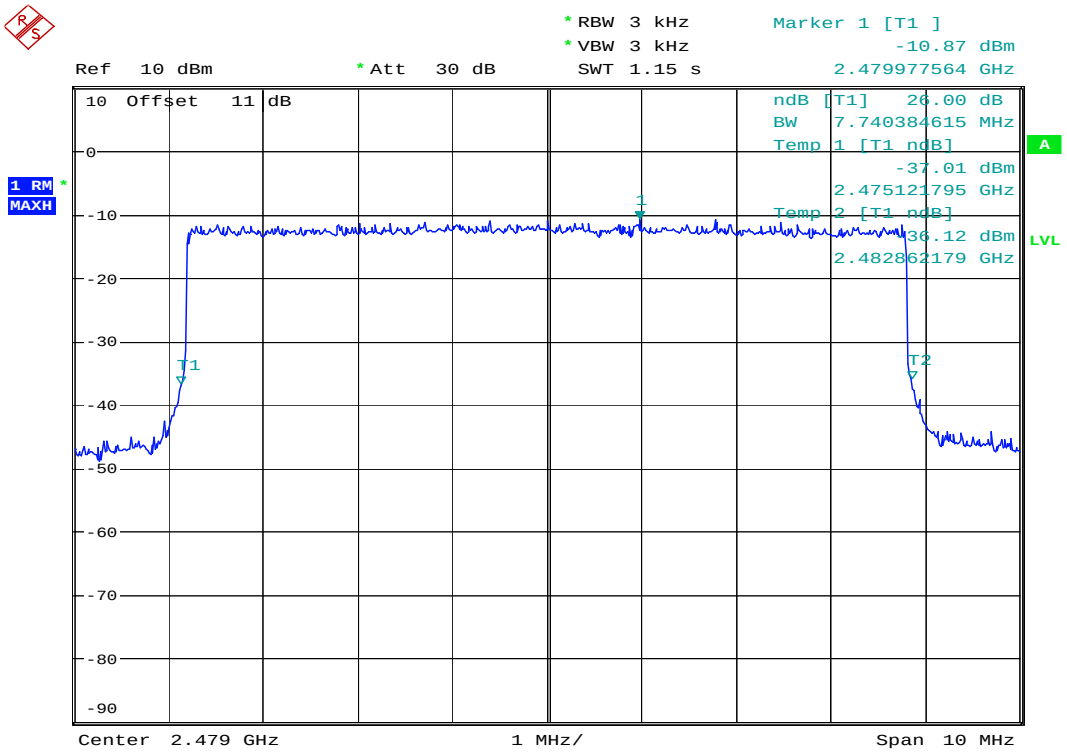
Date: 28.JAN.2008 10:55:04

Plot 2: 2467MHz (max. power), modulated with test modulation



Date: 28.JAN.2008 10:56:20

Plot 3: 2479 MHz (max. power), modulated with test modulation



Date: 28.JAN.2008 10:57:18

TEST CONDITIONS			OCCUPIED BANDWIDTH (MHz)		
Frequency (MHz)			2454	2467	2479
T_{nom}(23)°C	V_{nom}(13.8)V	Max	7.805	7.740	7.724
Measurement uncertainty			± 10 kHz		

LIMITS **Note 2 of 90.209(b)(5)**

For the Frequency Band 2.450 to 2.4835 MHz: **Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in the bands subject to this footnote will be reviewed and authorized on a case-by-case basis.**	**Pass**

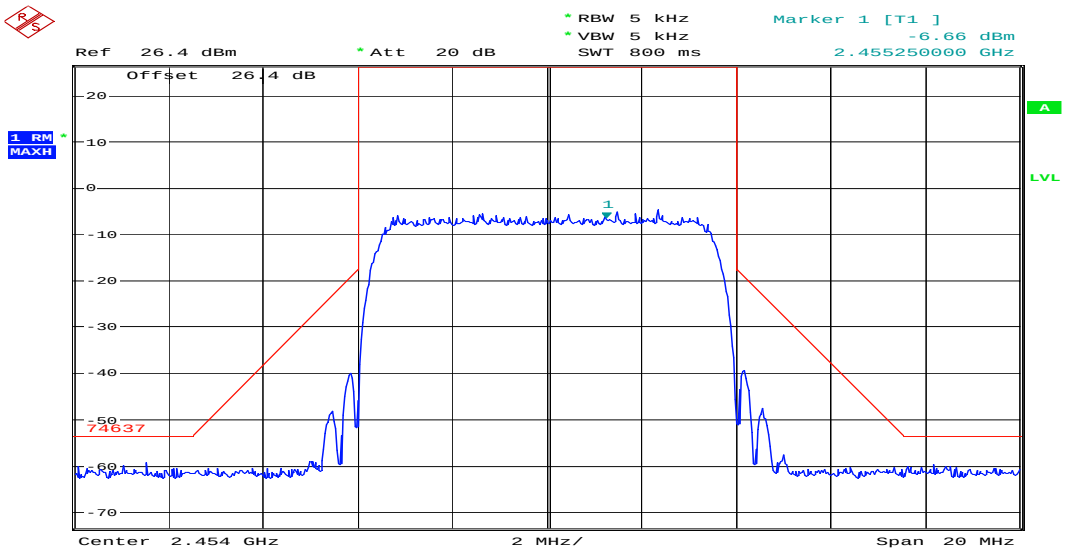
LIMITS **SRSP-302.0 – 5.2**

Maximum authorized bandwith: 10 MHz	**Pass**

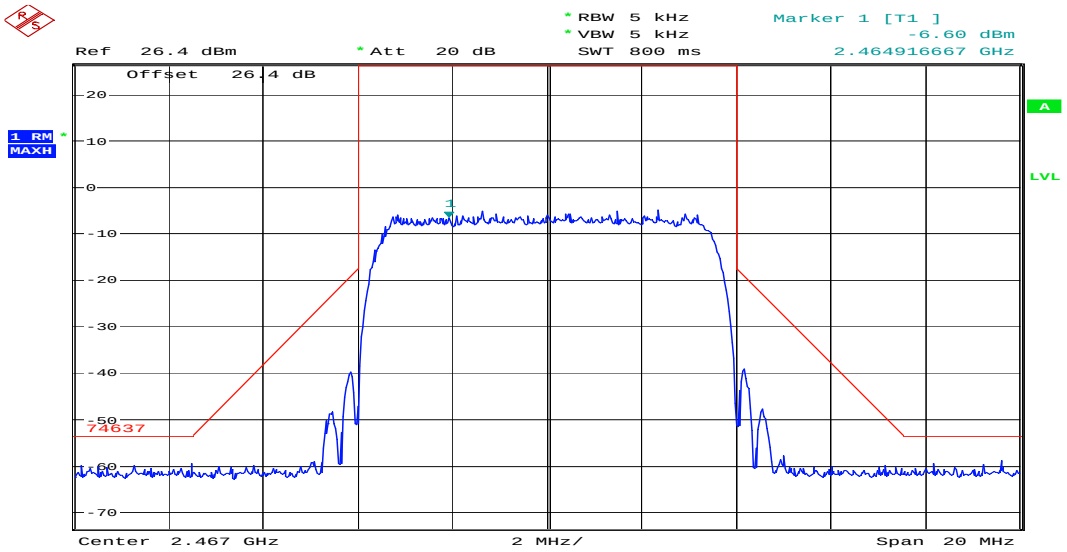
3.7 Emission mask § 74.637 / SRSP-302.0 – 5.5

Measurement was done using the emission mask for using transmissions employing digital modulation techniques:

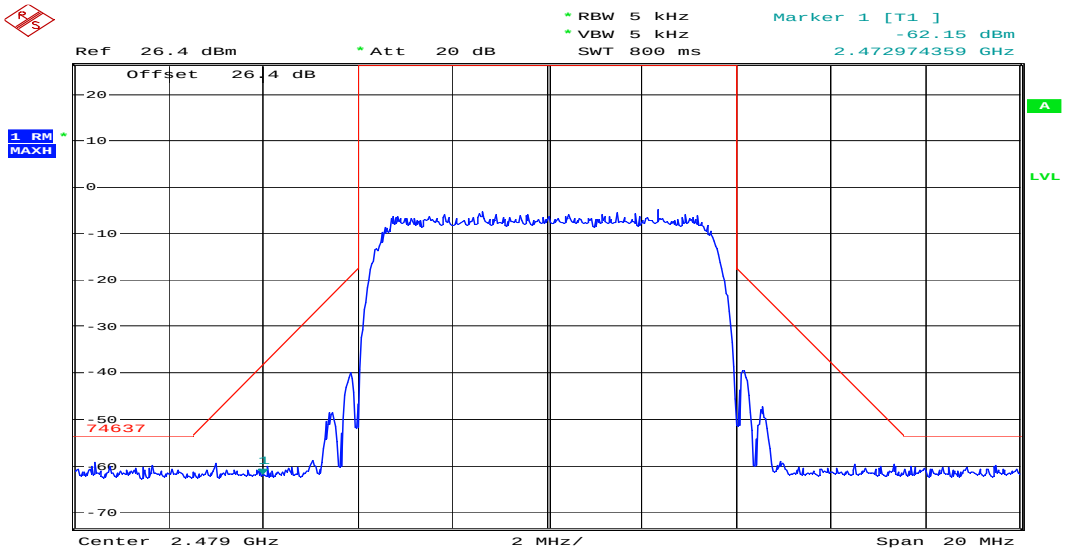
Plot 1: 2454 MHz (max. power), QPSK



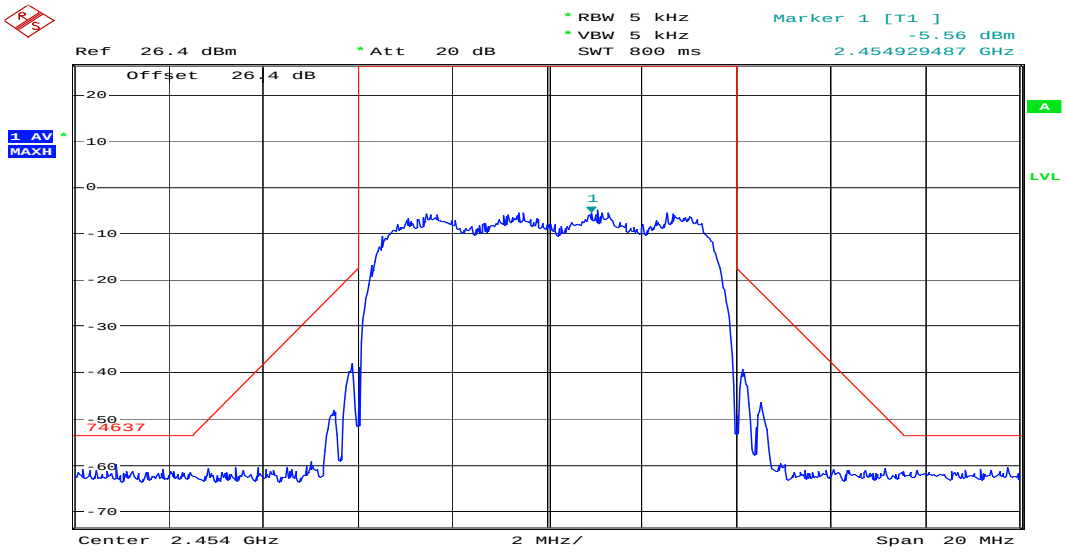
Plot 2: 2467 MHz (max. power), QPSK



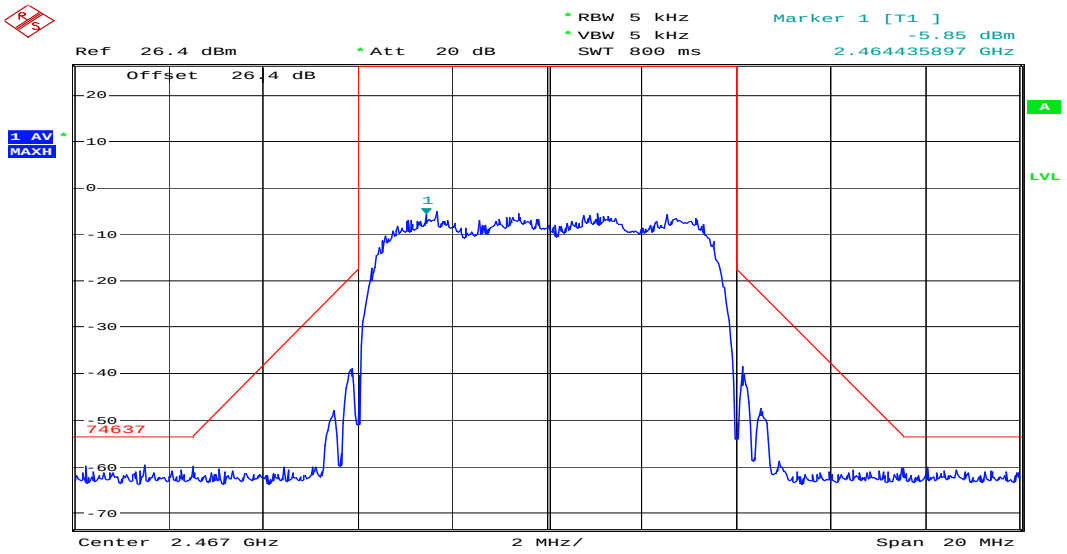
Plot 3: 2479 MHz (max. power), QPSK



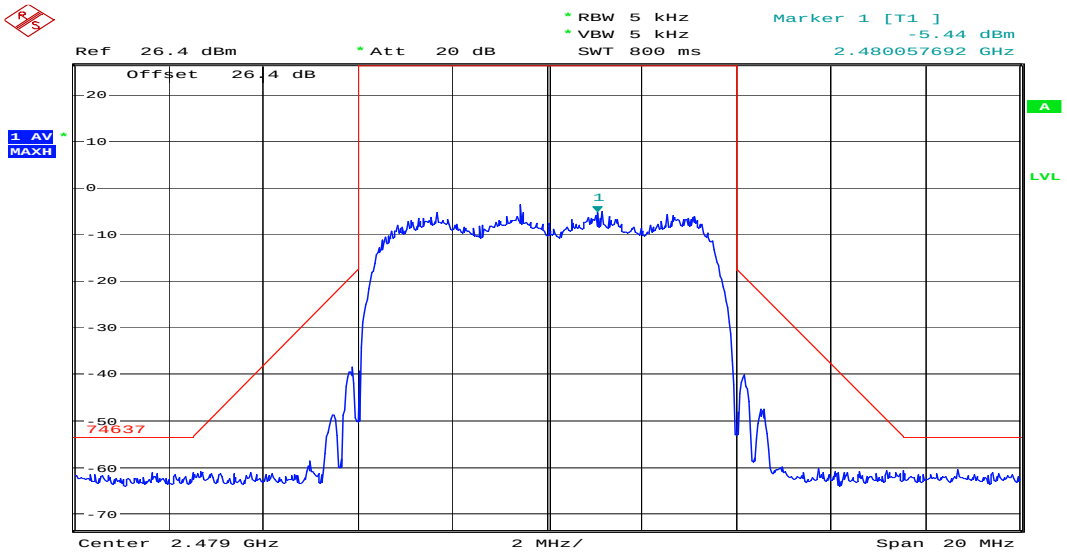
Plot 4: 2454 MHz (max. power), 16QAM



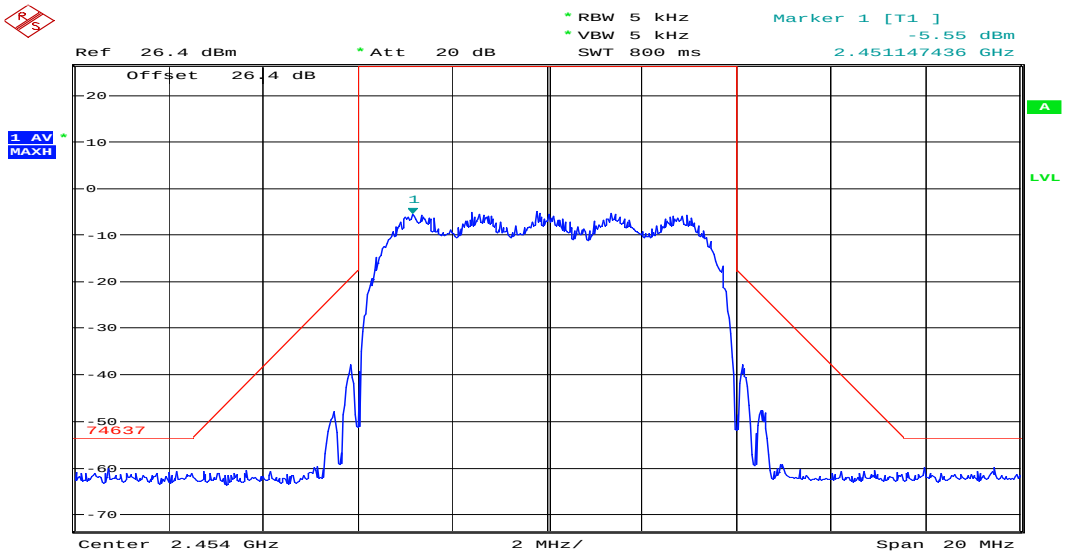
Plot 5: 2467 MHz (max. power), 16QAM



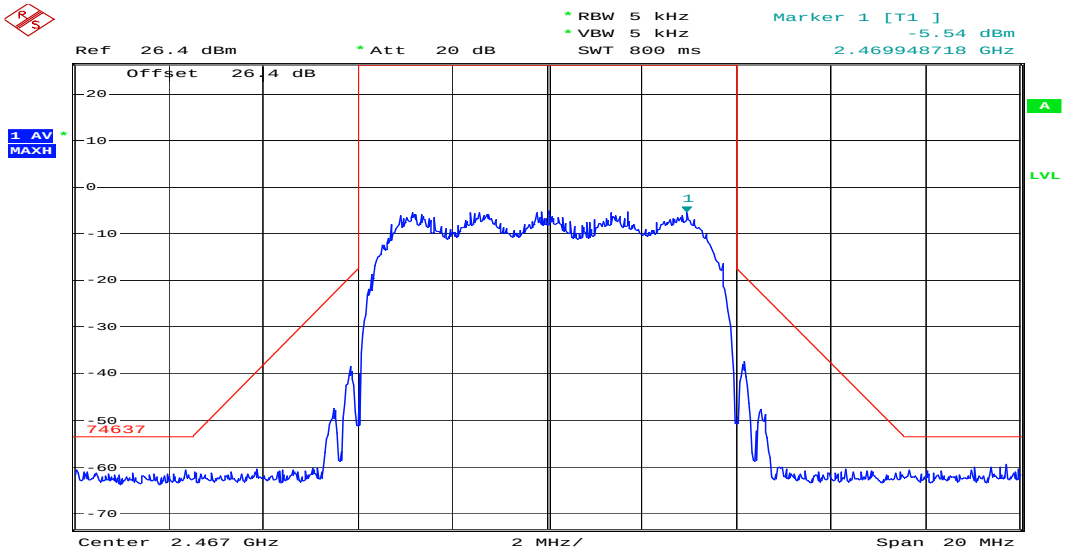
Plot 6: 2479 MHz (max. power), 16QAM



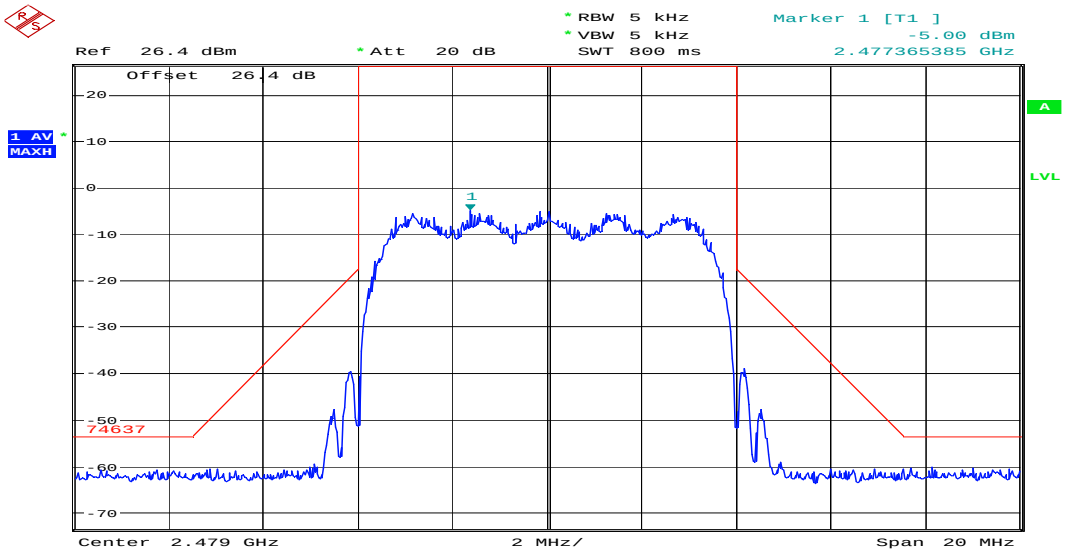
Plot 7: 2454 MHz (max. power), 64QAM



Plot 8: 2467 MHz (max. power), 64QAM



Plot 9: 2479 MHz (max. power), 64QAM



LIMITS	SUBCLAUSE § 74.637 / SRSP-302.0 – 5.5
The mean power of emissions shall be attenuated below the mean transmitter power (P_{MEAN}) in accordance with the following schedule: **For operating frequencies below 15 GHz, in any 4 kHz reference bandwidth (B_{REF}), the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:** **$A = 35 + 0.8 (G – 50) + 10 \text{ Log}_{10} B$** **(Attenuation greater than 80 decibels is not required.)**	**Pass**

3.8 Frequency Stability vs. Voltage § 74.661 / 2.1055

nom. Voltage	Voltage [V]	Frequency error [kHz]	Frequency [MHz]	Error in ppm
13.8V	12.0	-3.686	2454	1.50
13.8V	12.3	-3.686	2454	1.50
13.8V	12.6	-3.686	2454	1.50
13.8V	12.9	-3.686	2454	1.50
13.8V	13.2	-3.686	2454	1.50
13.8V	13.5	-3.686	2454	1.50
13.8V	13.8	-3.686	2454	1.50
13.8V	14.1	-3.686	2454	1.50
13.8V	14.4	-3.686	2454	1.50
13.8V	14.7	-3.686	2454	1.50
13.8V	15.0	-3.686	2454	1.50
13.8V	15.3	-3.686	2454	1.50
13.8V	15.6	-3.686	2454	1.50
13.8V	15.9	-3.686	2454	1.50
13.8V	16.2	-3.686	2454	1.50

nom. Voltage	Voltage [V]	Frequency error [kHz]	Frequency [MHz]	Error in ppm
13.8V	12.0	-3.686	2467	1.50
13.8V	12.3	-3.686	2467	1.50
13.8V	12.6	-3.686	2467	1.50
13.8V	12.9	-3.686	2467	1.50
13.8V	13.2	-3.686	2467	1.50
13.8V	13.5	-3.686	2467	1.50
13.8V	13.8	-3.686	2467	1.50
13.8V	14.1	-3.686	2467	1.50
13.8V	14.4	-3.686	2467	1.50
13.8V	14.7	-3.686	2467	1.50
13.8V	15.0	-3.686	2467	1.50
13.8V	15.3	-3.686	2467	1.50
13.8V	15.6	-3.686	2467	1.50
13.8V	15.9	-3.686	2467	1.50
13.8V	16.2	-3.686	2467	1.50

nom. Voltage	Voltage [V]	Frequency error [kHz]	Frequency [MHz]	Error in ppm
13.8V	12.0	-3.686	2479	1.49
13.8V	12.3	-3.686	2479	1.49
13.8V	12.6	-3.686	2479	1.49
13.8V	12.9	-3.686	2479	1.49
13.8V	13.2	-3.686	2479	1.49
13.8V	13.5	-3.686	2479	1.49
13.8V	13.8	-3.686	2479	1.49
13.8V	14.1	-3.686	2479	1.49
13.8V	14.4	-3.686	2479	1.49
13.8V	14.7	-3.686	2479	1.49
13.8V	15.0	-3.686	2479	1.49
13.8V	15.3	-3.686	2479	1.49
13.8V	15.6	-3.686	2479	1.49
13.8V	15.9	-3.686	2479	1.49
13.8V	16.2	-3.686	2479	1.49

LIMITS	SUBCLAUSE § 74.661
For the Frequency Band 2.450 to 2.4835 MHz: Frequency tolerance: 0.001 % (10ppm)	Pass

3.9 Frequency Stability vs. Temperature § 74.661 / 2.1055

Teperature [°C]	Frequency error [kHz]	Frequency [MHz]	Error in ppm
-20	-0.320	2454	0.13
-10	-1.571	2454	0.64
0	-1.992	2454	0.81
+10	-2.532	2454	1.03
+20	-3.686	2454	1.50
+30	-3.173	2454	1.29
+40	-3.141	2454	1.28
+50	-2.500	2454	1.02
+55	-2.083	2454	0.85

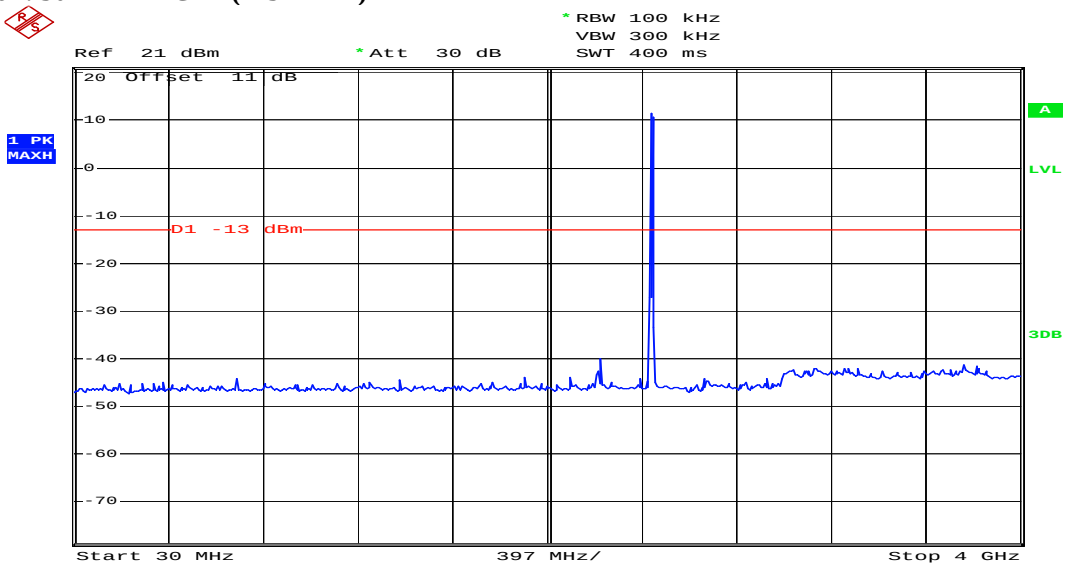
Teperature [°C]	Frequency error [kHz]	Frequency [MHz]	Error in ppm
-20	-0.320	2467	0.13
-10	-1.603	2467	0.65
0	-2.051	2467	0.83
+10	-2.532	2467	1.03
+20	-3.686	2467	1.50
+30	3.269	2467	1.32
+40	-3.141	2467	1.27
+50	-2.628	2467	1.07
+55	-2.083	2467	0.84

Teperature [°C]	Frequency error [kHz]	Frequency [MHz]	Error in ppm
-20	-0.320	2479	0.13
-10	-1.571	2479	0.63
0	-2.019	2479	0.81
+10	-2.564	2479	1.03
+20	-3.686	2479	1.50
+30	-3.397	2479	1.37
+40	-3.109	2479	1.25
+50	-2.692	2479	1.09
+55	-2.083	2479	0.84

LIMITS	SUBCLAUSE § 74.661
For the Frequency Band 2.450 to 2.4835 MHz: Frequency tolerance: 0.001 % (10ppm)	Pass

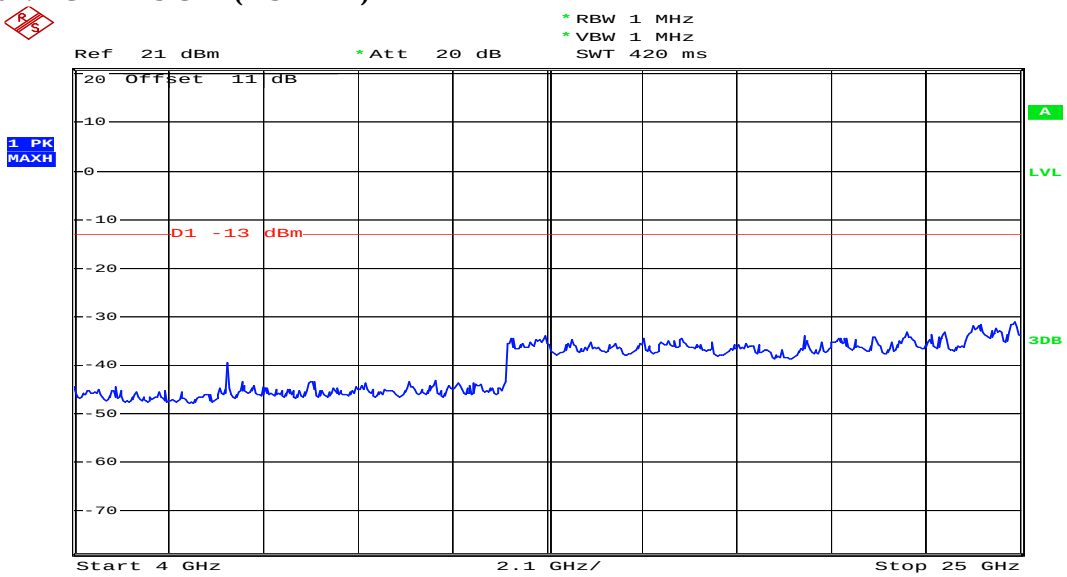
3.10 Spurious Emissions - conducted § 74.637 / 2.1051/ SRSP-302.0 – 5.5

Plot 1: 30 MHz –4 GHz (2454 MHz)



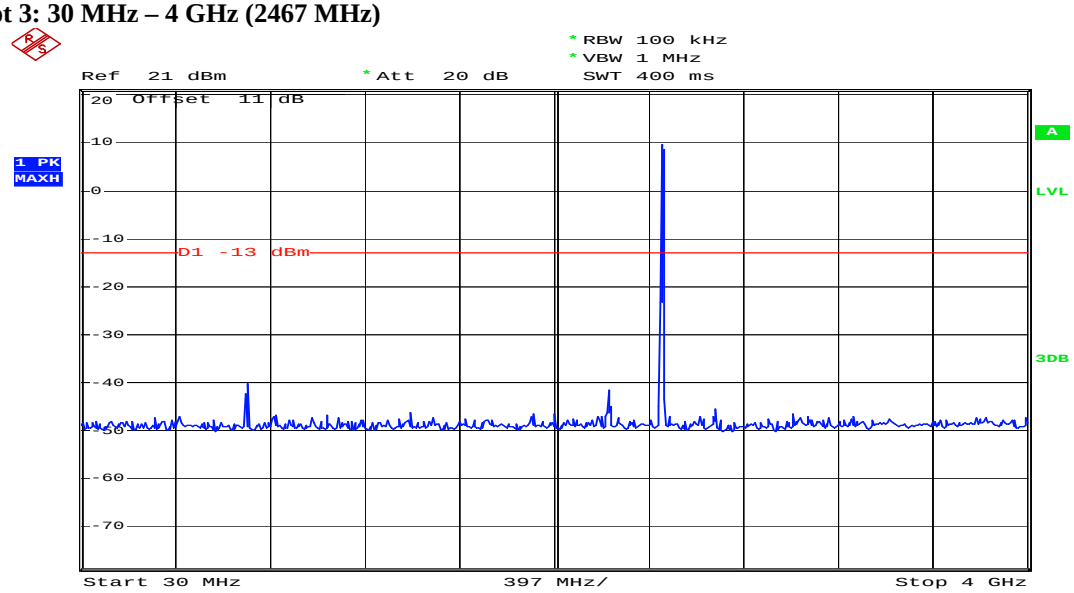
Date: 29.JAN.2008 19:27:06

Plot 2: 4 GHz – 25 GHz (2454 MHz)



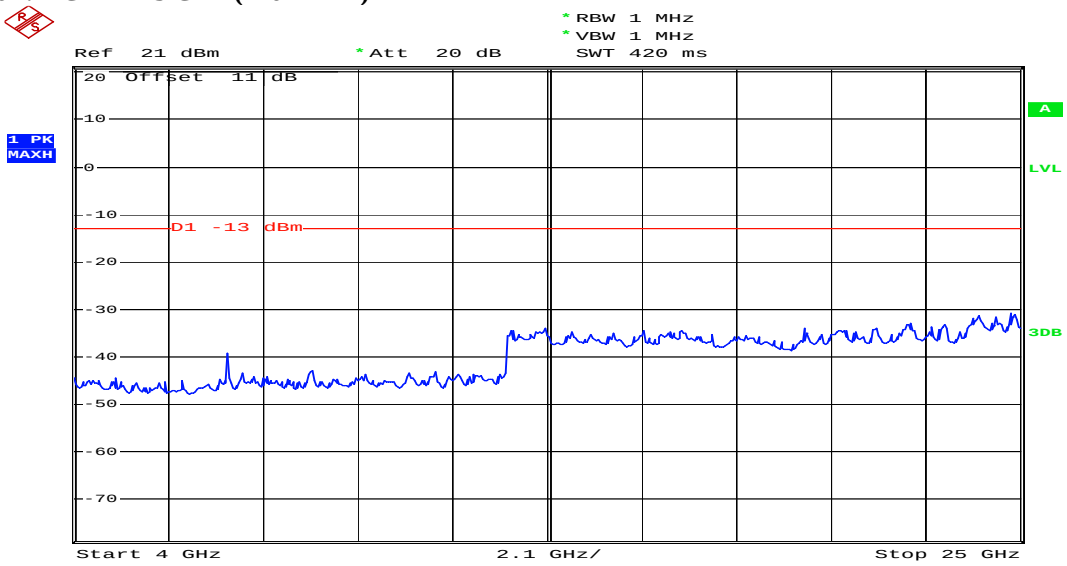
Date: 29.JAN.2008 19:28:52

Plot 3: 30 MHz – 4 GHz (2467 MHz)



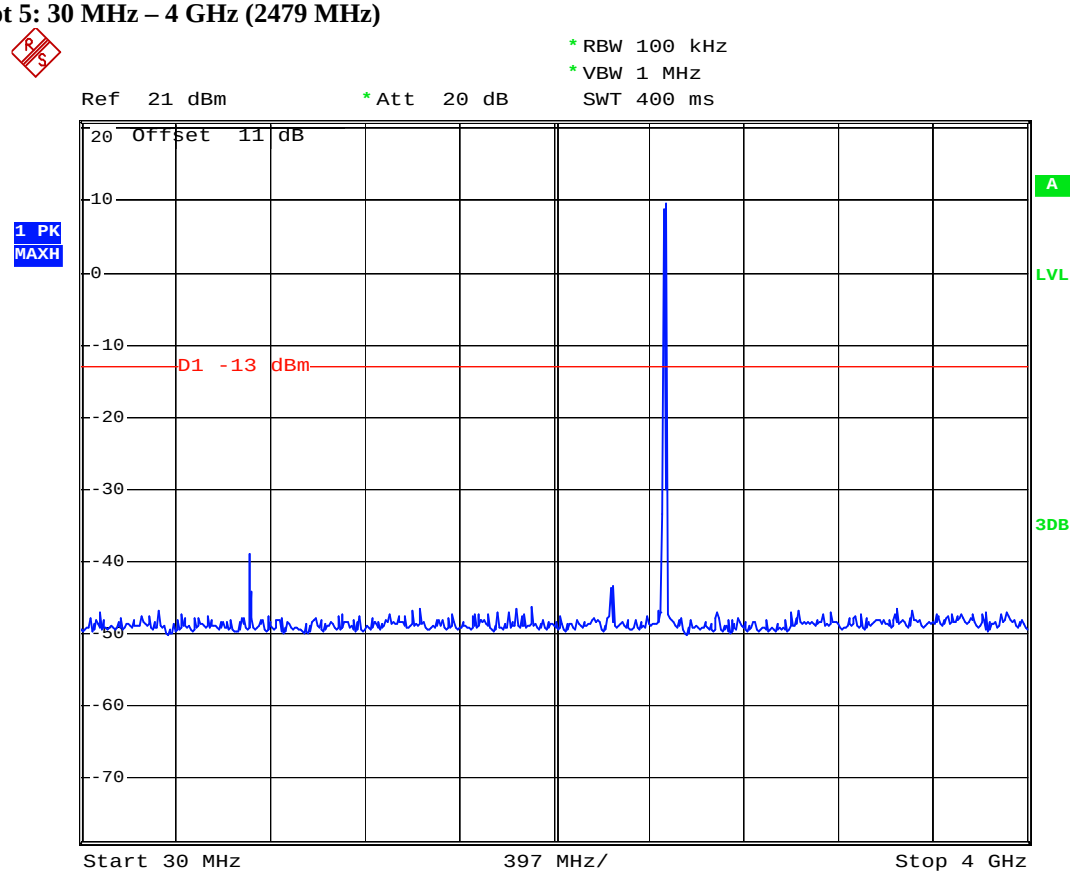
Date: 29.JAN.2008 19:29:34

Plot 4: 4 GHz – 25 GHz (2467 MHz)



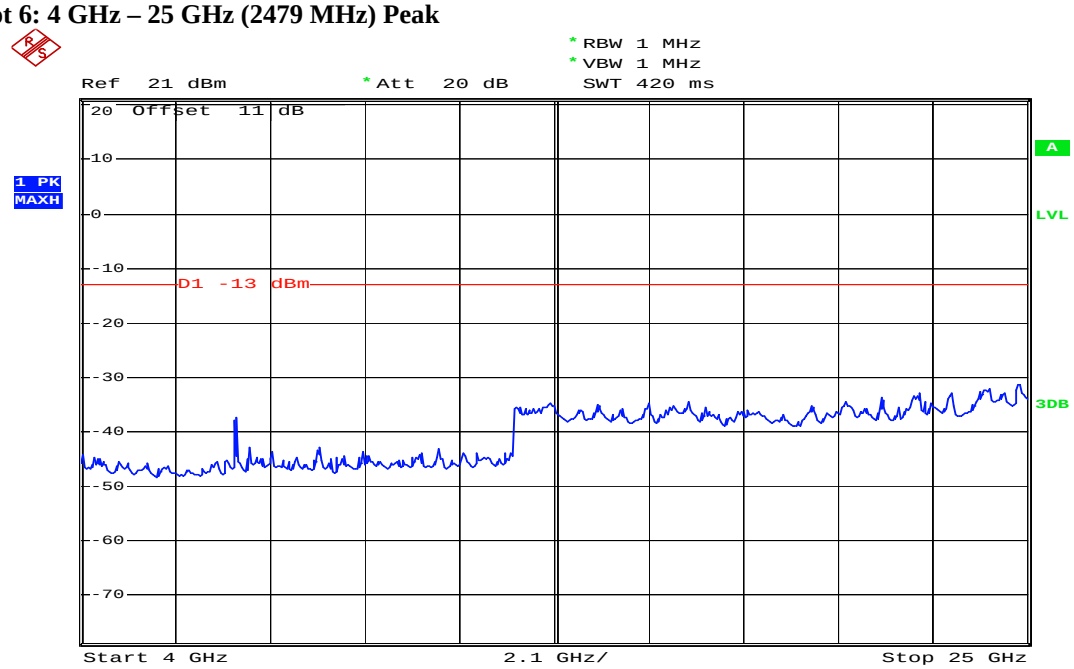
Date: 29.JAN.2008 19:29:05

Plot 5: 30 MHz – 4 GHz (2479 MHz)



Date: 29.JAN.2008 19:30:03

Plot 6: 4 GHz – 25 GHz (2479 MHz) Peak



Date: 29.JAN.2008 19:30:30

Result & Limits:

SPURIOUS EMISSIONS LEVEL (dBm)								
2454 MHz			2467 MHz			2479 MHz		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
no	peaks	found	closer	15dB	to the	limit	line	
Measurement uncertainty			±3 dB					

RBW : 100 kHz/1MHz **VBW: 100 kHz/1MHz**
> 4 GHz: 1 MHz **> 4 GHz: 1 MHz**

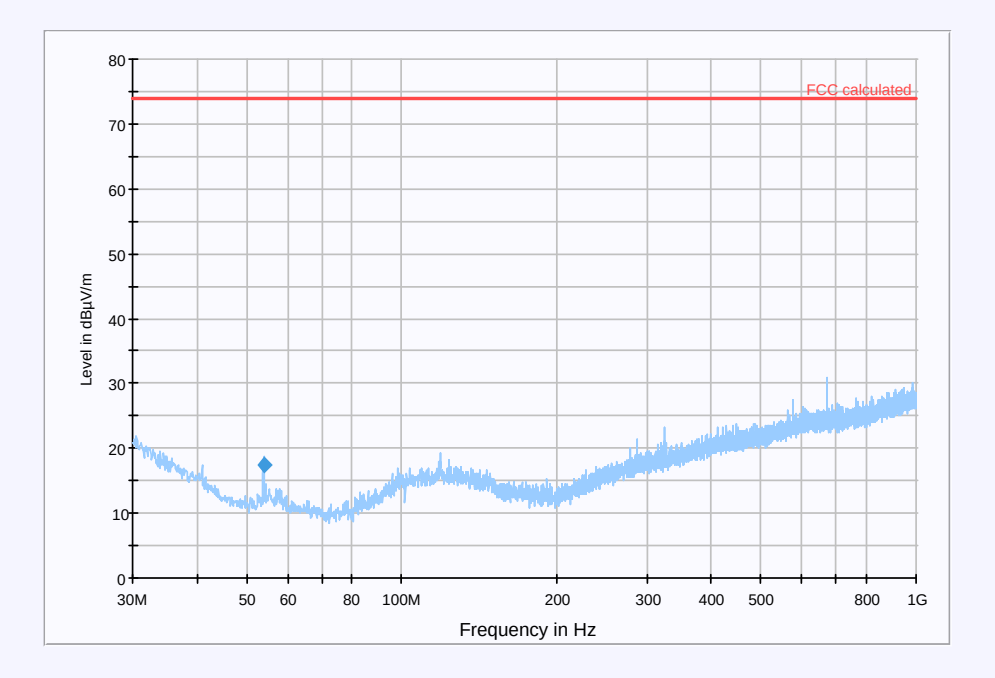
LIMITS **SUBCLAUSE § 74.637 / SRSP-302.0 – 5.5**

The mean power of emissions shall be attenuated below the mean transmitter power (P_{MEAN}) in accordance with the following schedule: **In any 4 kHz reference bandwidth (B_{REF}), the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:** **At least 43 + 10 Log10 (P_{MEAN} in watts) decibels, or 80 decibels, whichever is the lesser attenuation.**	**Pass**

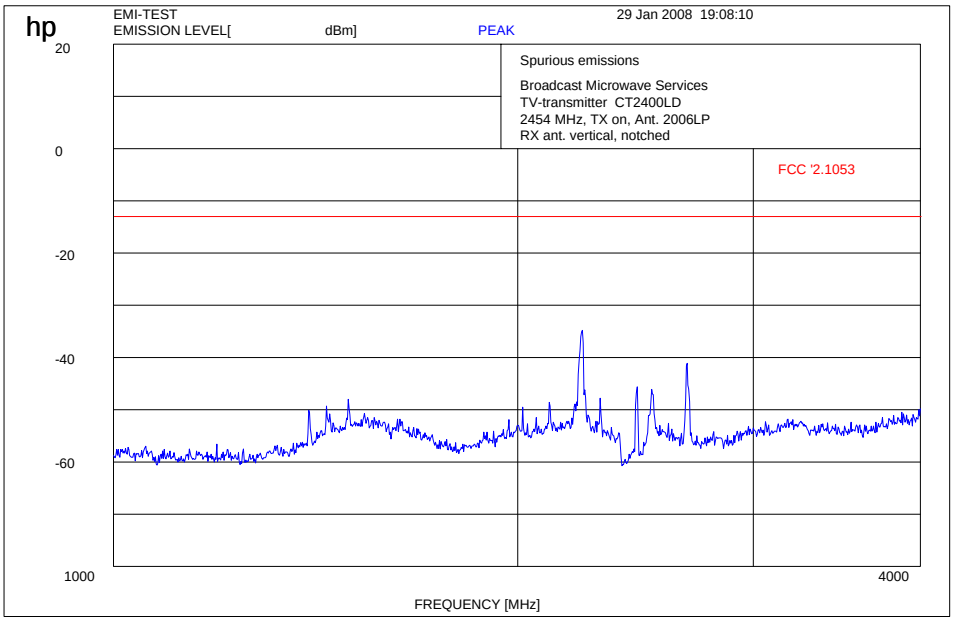
3.11 Spurious Emissions - radiated § 74.637 / 2.1051/ SRSP-302.0 – 5.5

Plot 1: TX-Mode 2454 MHz (30 MHz – 1 GHz) Ant: 2406LP

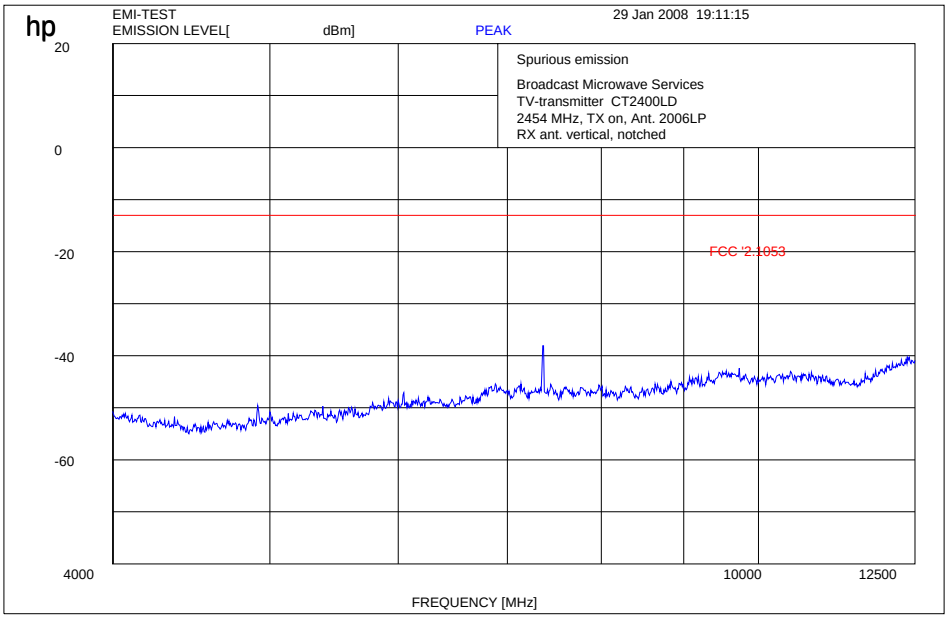
results are substituded, see table of results:



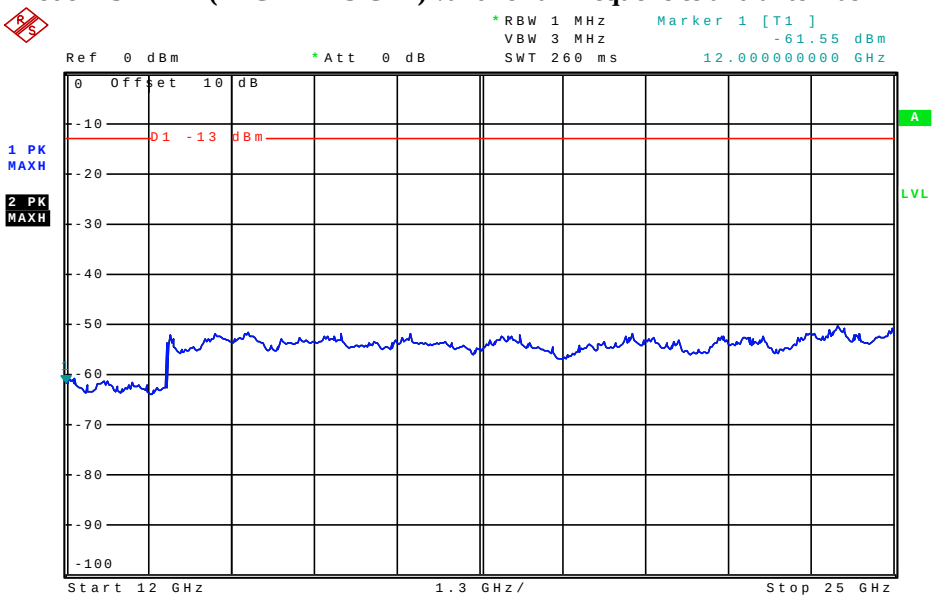
Plot 2: TX-Mode 2454 MHz (1 GHz – 4 GHz) Ant: 2406LP



Plot 3: TX-Mode 2454 MHz (4 GHz – 12 GHz) Ant: 2406LP

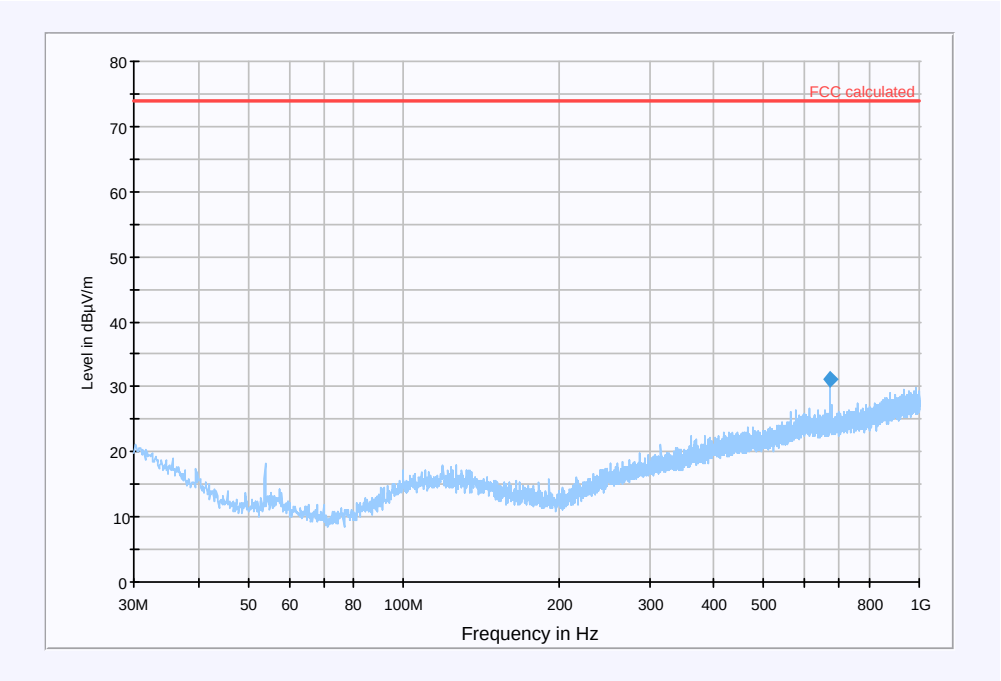


Plot 4: TX-Mode 2454 MHz (12 GHz – 25 GHz) valid for all frequencies and antennas

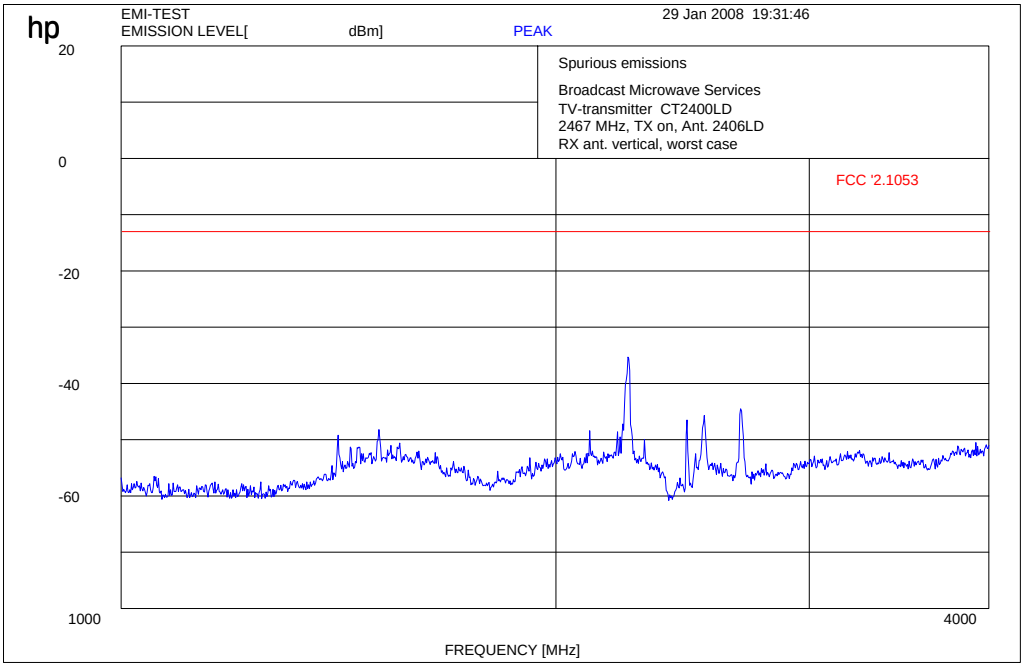


Plot 5: TX-Mode 2467 MHz (30 MHz – 1 GHz) Ant: 2406LP

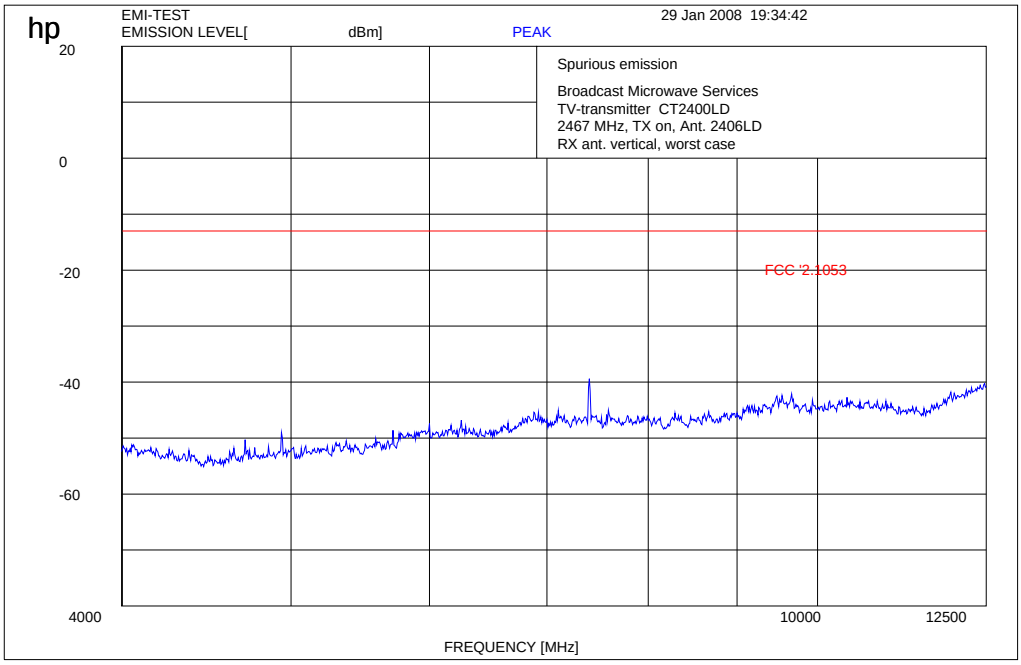
results are substituded, see table of results:



Plot 6: TX-Mode 2467 MHz (1 GHz – 4 GHz) Ant: 2406LP

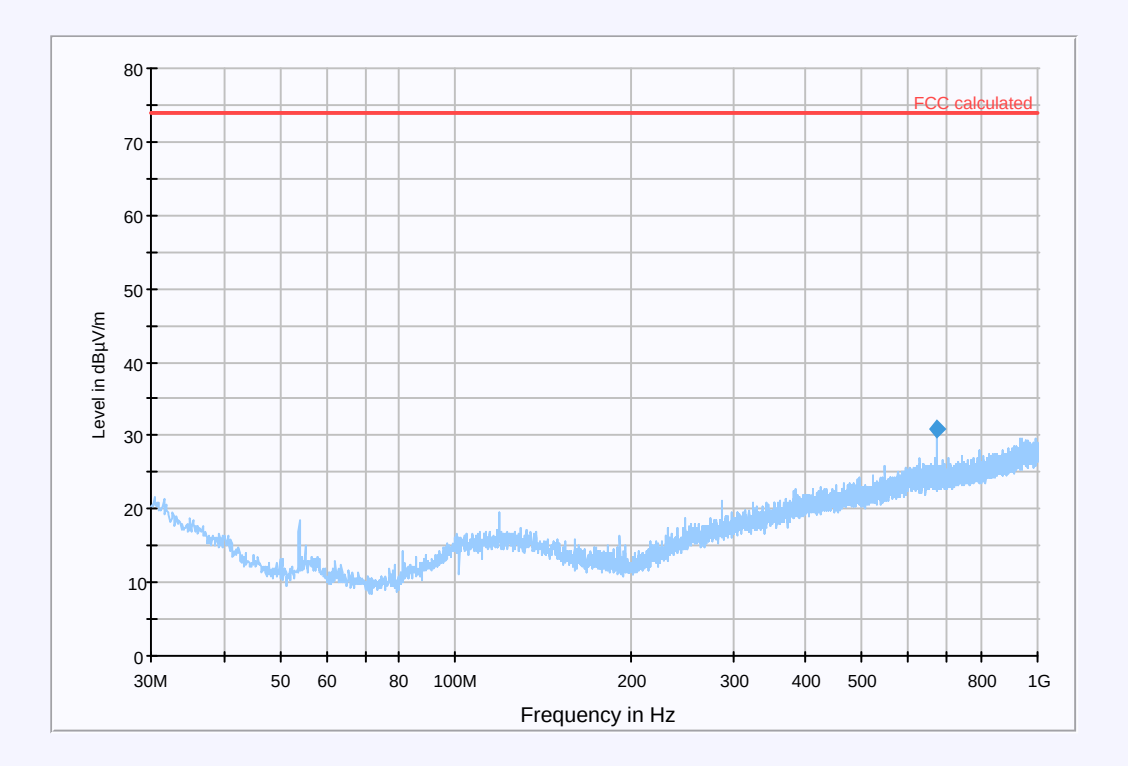


Plot 7: TX-Mode 2467 MHz (4 GHz – 12 GHz) Ant: 2406LP



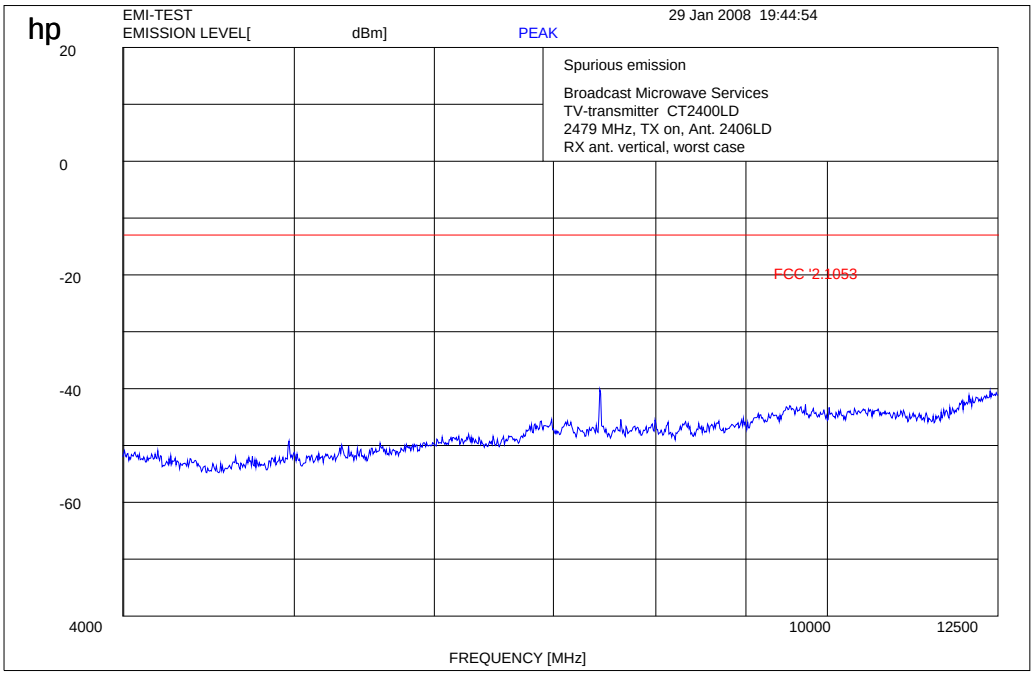
Plot 8: TX-Mode 2479 MHz (30 MHz – 1 GHz) Ant: 2406LP

results are substituded, see table of results:



Plot 9: TX-Mode 2479 MHz (1 GHz – 4 GHz) Ant: 2406LP

Plot 10: TX-Mode 2479 MHz (4 GHz – 12 GHz) Ant: 2406LP



Results:

SPURIOUS EMISSIONS LEVEL (dBm)								
2454 MHz			2467 MHz			2479 MHz		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
7362	Peak	-38.2	7401	Peak	-39.6	7437	Peak	-40.1
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz **f ≥ 1GHz : RBW/VBW: 1 MHz**

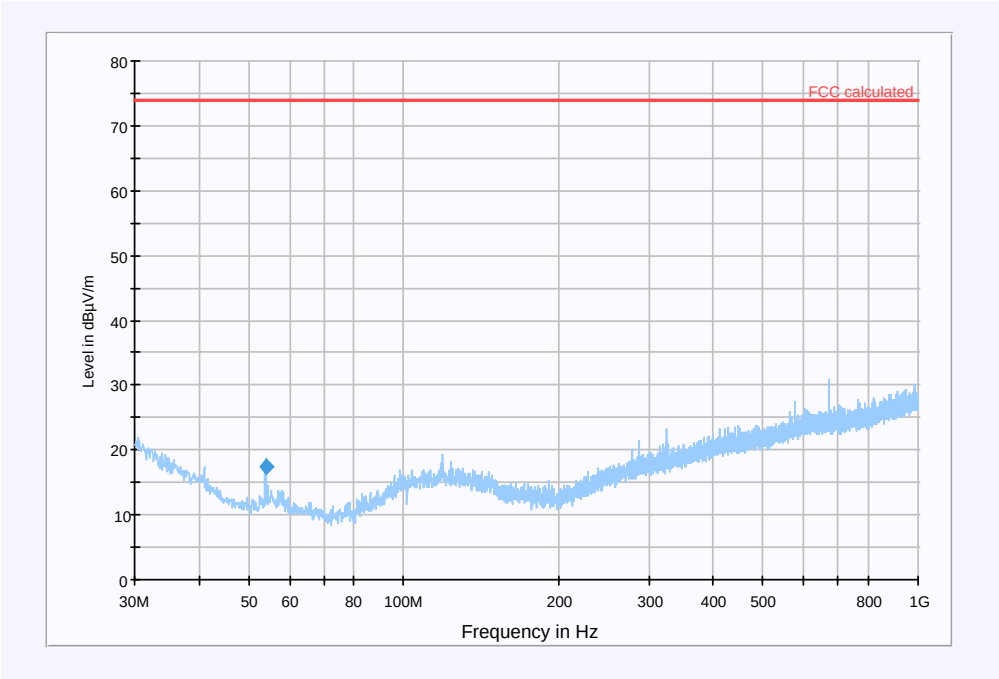
LIMITS **SUBCLAUSE § 74.637 / SRSP-302.0 – 5.5**

The mean power of emissions shall be attenuated below the mean transmitter power (P_{MEAN}) in accordance with the following schedule: **In any 4 kHz reference bandwidth (B_{REF}), the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:** **At least 43 + 10 Log_{10} (P_{MEAN} in watts) decibels, or 80 decibels, whichever is the lesser attenuation.**	**Pass**

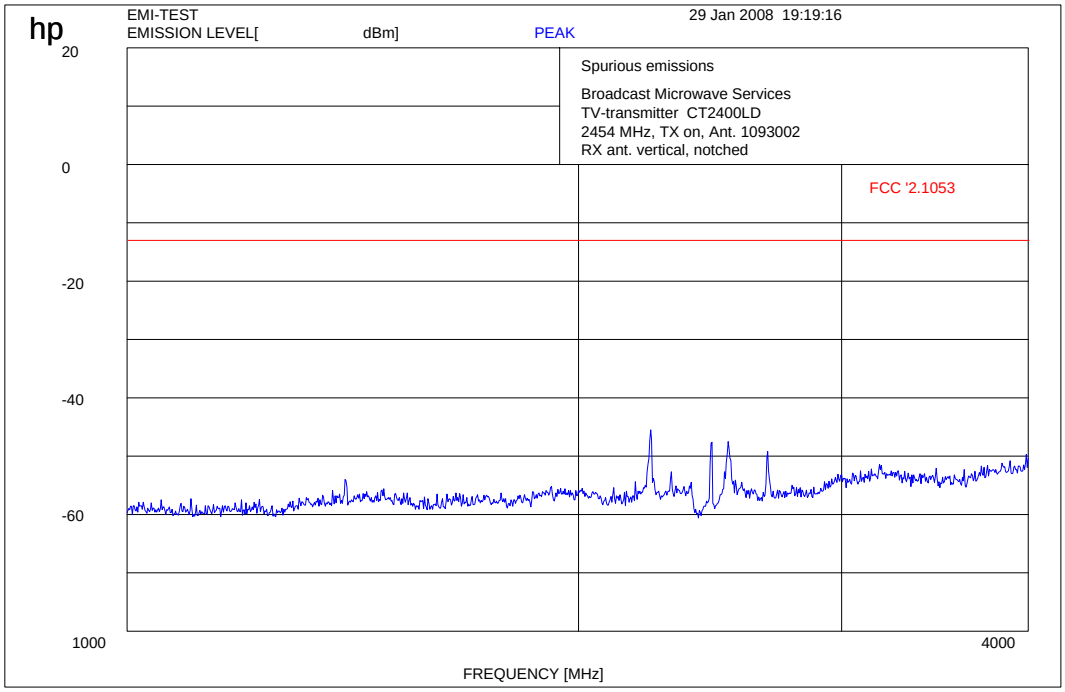
Antenna: 2400LP

Plot 1: TX-Mode 2454 MHz (30 MHz – 1 GHz)

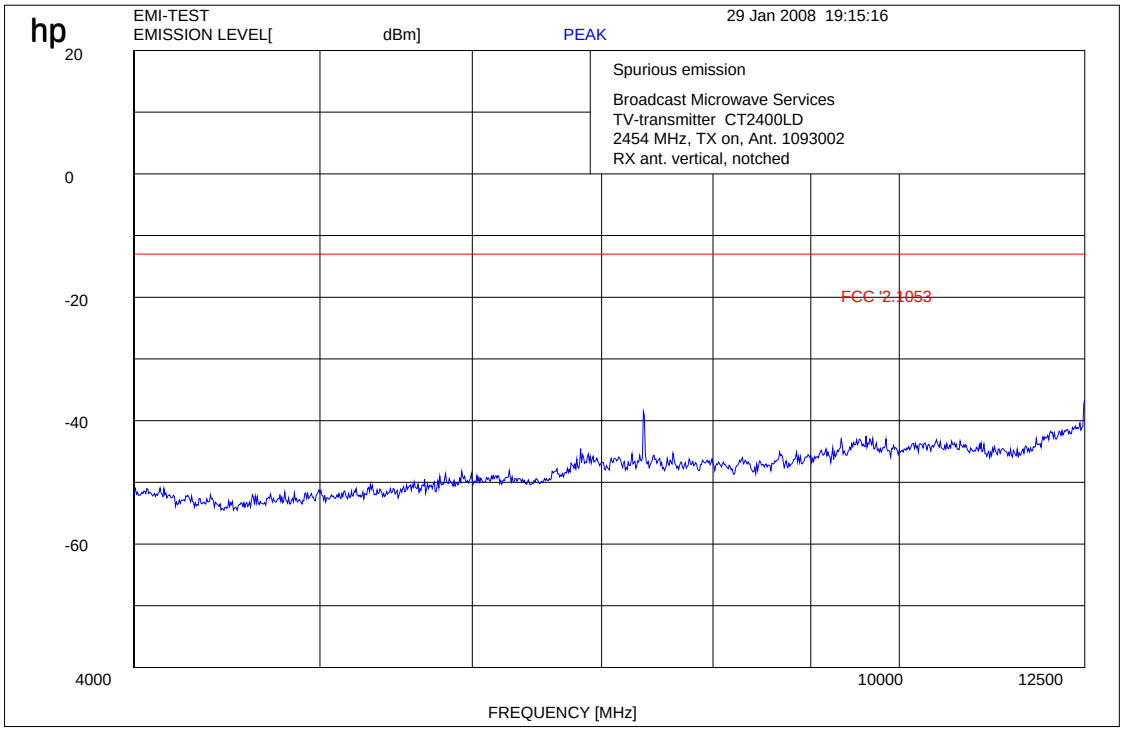
results are substituded, see table of results:



Plot 2: TX-Mode 2454 MHz (1 GHz – 4 GHz)

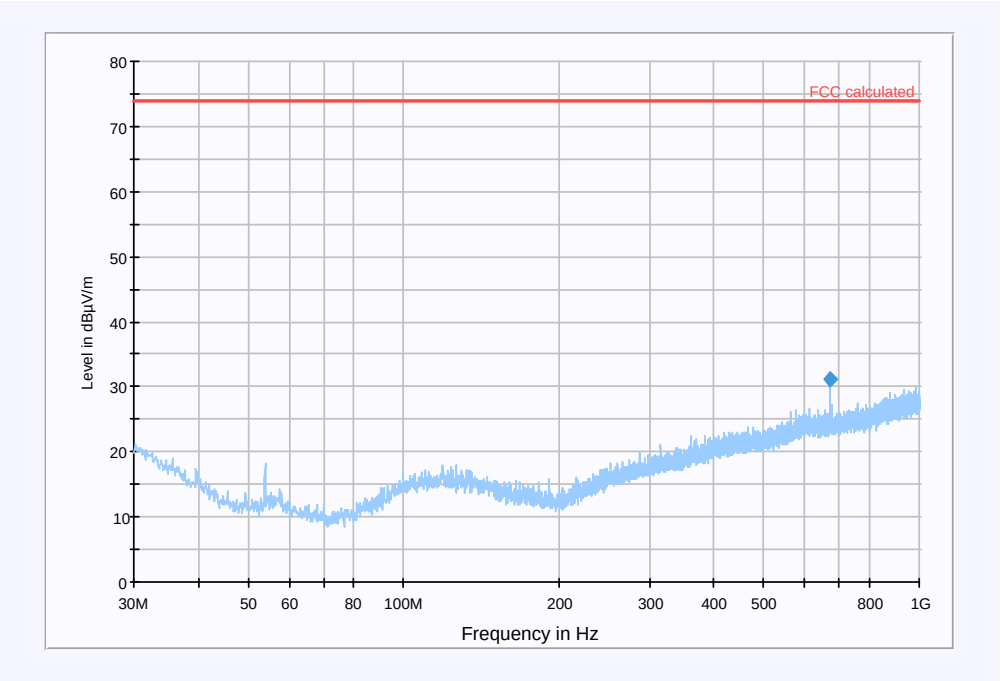


Plot 3: TX-Mode 2454 MHz (4 GHz – 12 GHz)

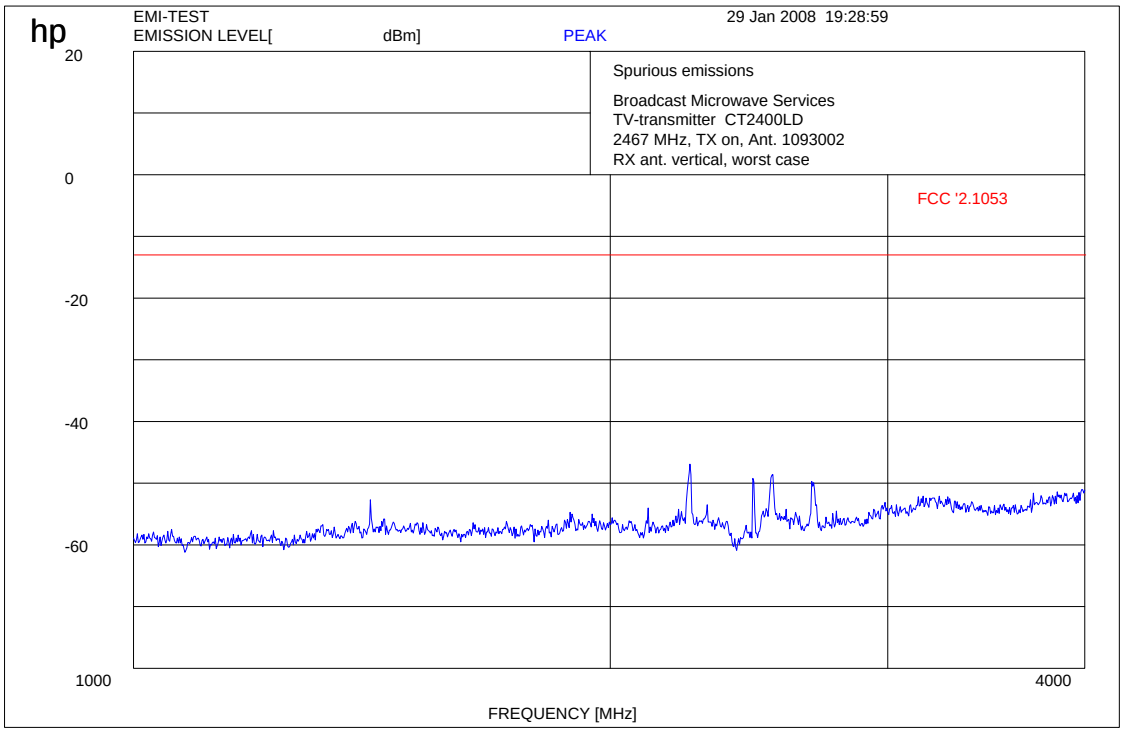


Plot 5: TX-Mode 2467 MHz (30 MHz – 1 GHz)

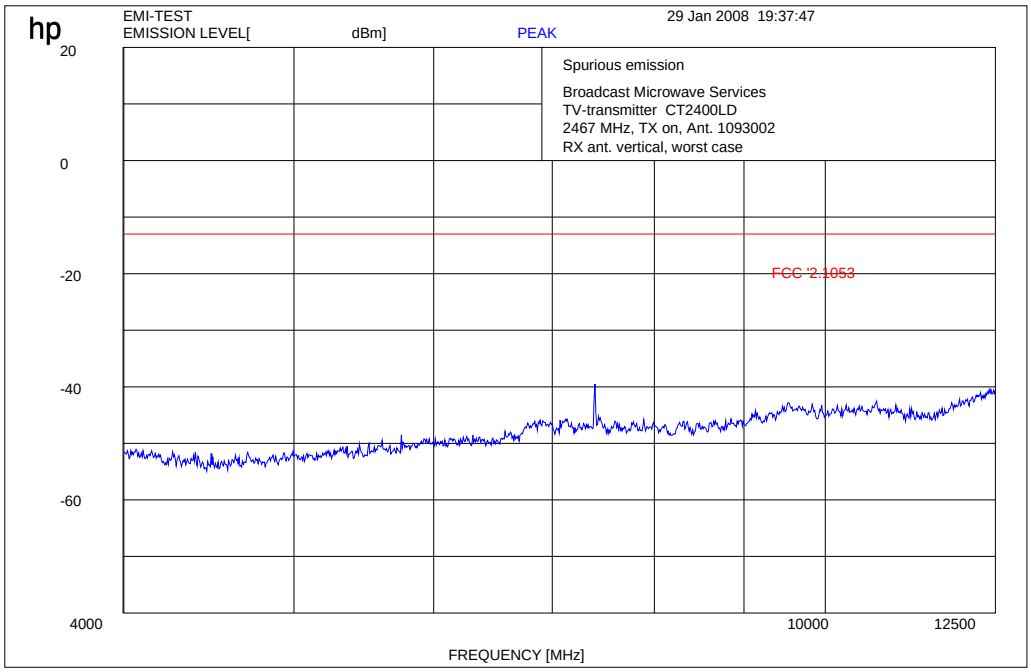
results are substituded, see table of results:



Plot 6: TX-Mode 2467 MHz (1 GHz – 4 GHz)

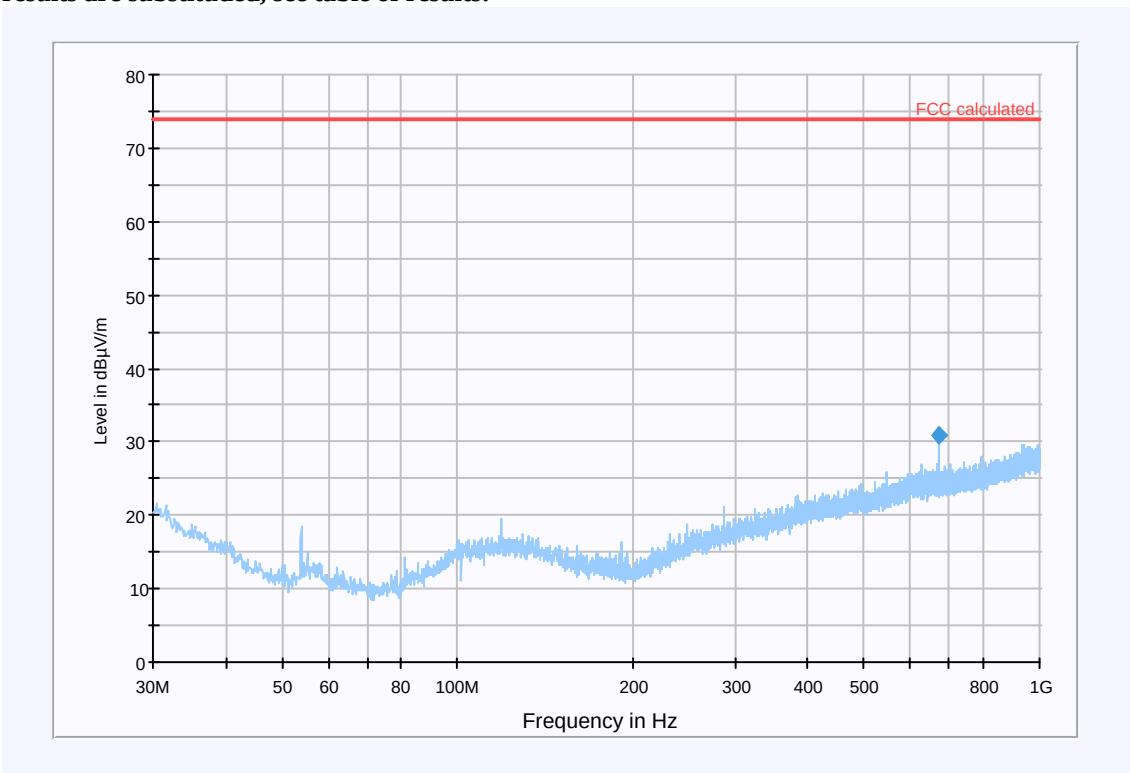


Plot 7: TX-Mode 2467 MHz (4 GHz – 12 GHz)

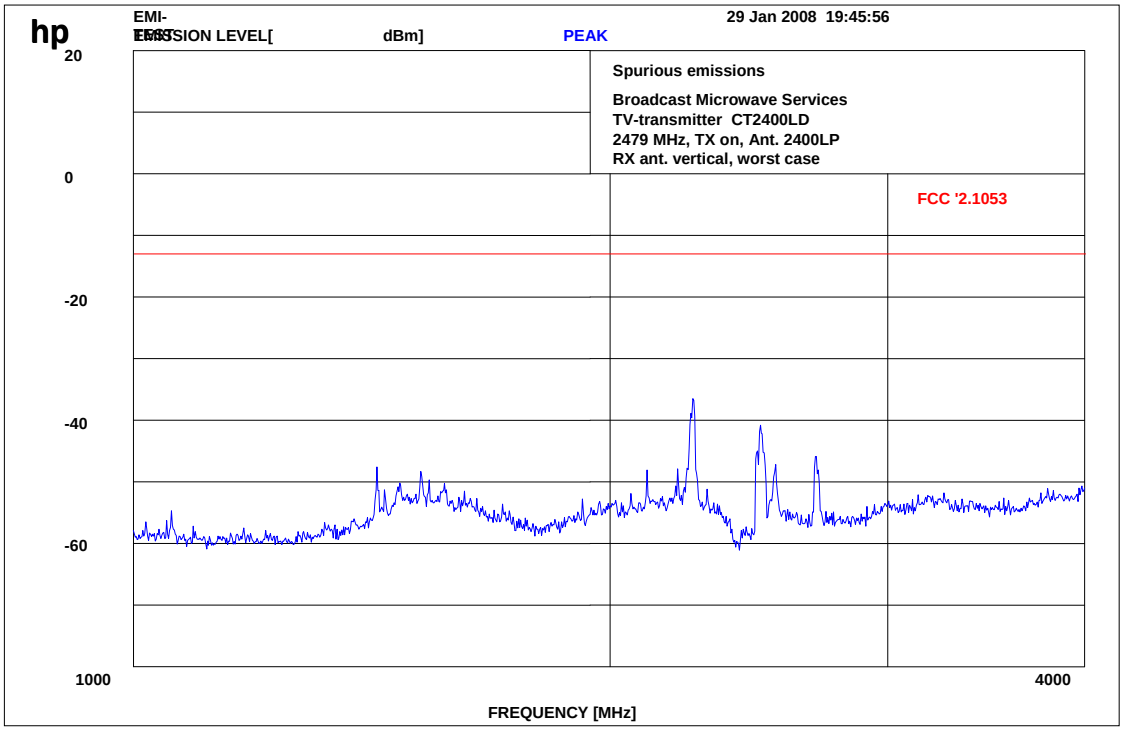


Plot 8: TX-Mode 2479 MHz (30 MHz – 1 GHz)

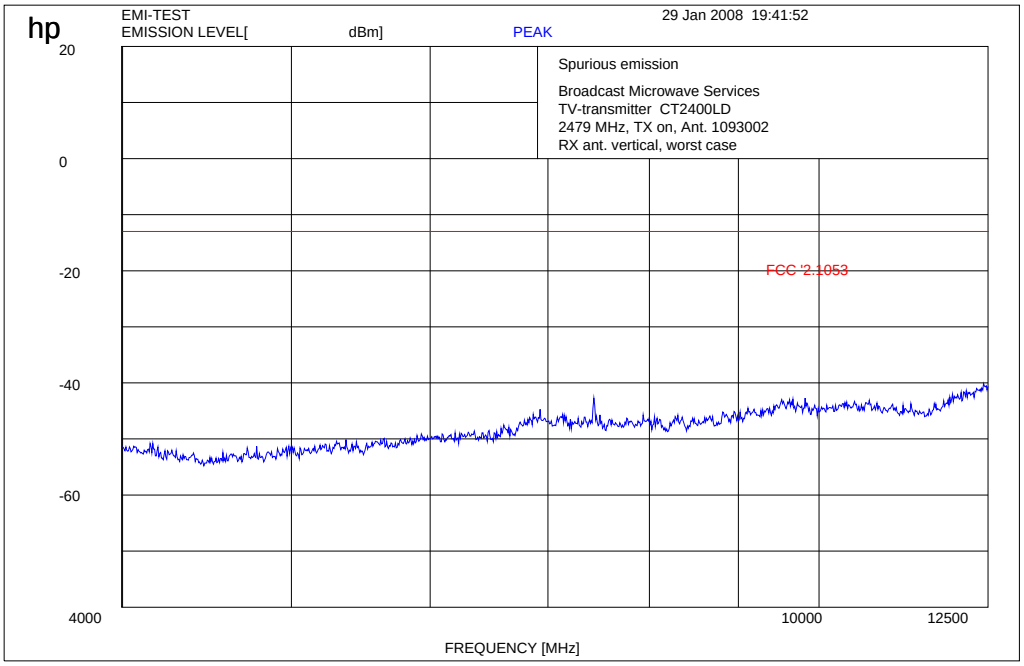
results are substituded, see table of results:



Plot 9: TX-Mode 2479 MHz (1 GHz – 4 GHz)



Plot 10: TX-Mode 2479 MHz (4 GHz – 12 GHz)



Results:

SPURIOUS EMISSIONS LEVEL (dBm)								
2454 MHz			2467 MHz			2479 MHz		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
7362	Peak	-38.4	7401	Peak	-39.1	7437	Peak	-42.6
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz **f ≥ 1GHz : RBW/VBW: 1 MHz**

LIMITS **SUBCLAUSE § 74.637 / SRSP-302.0 – 5.5**

The mean power of emissions shall be attenuated below the mean transmitter power (P_{MEAN}) in accordance with the following schedule: **In any 4 kHz reference bandwidth (B_{REF}), the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:** **At least 43 + 10 Log_{10} (P_{MEAN} in watts) decibels, or 80 decibels, whichever is the lesser attenuation.**	**Pass**

Results: RX/Idle-Mode

<u>Equipment does not have a RX/Idle-mode.</u>

SPURIOUS EMISSIONS LEVEL (dBm)								
F [MHz]	**Detector**	**Level [dBm]**	**F [MHz]**	**Detector**	**Level [dBm]**	**F [MHz]**	**Detector**	**Level [dBm]**
Not applicable								
Measurement uncertainty			**±3 dB**					

f < 1 GHz : RBW/VBW: 100 kHz **f ≥ 1GHz : RBW/VBW: 1 MHz**

LIMITS **SUBCLAUSE § 74.637 / SRSP-302.0 – 5.5**

The mean power of emissions shall be attenuated below the mean transmitter power (P_{MEAN}) in accordance with the following schedule: **In any 4 kHz reference bandwidth (B_{REF}), the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:** **At least 43 + 10 Log10 (P_{MEAN} in watts) decibels, or 80 decibels, whichever is the lesser attenuation.**	**Pass**

3.12 MPE calculation

These equations are generally accurate in the far field of an antenna but will over predict power density in the near field, where they could be used for making a "worst case" prediction.

$$S = PG/4\pi R^2$$

where S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units e.g. mW)
G = power gain of the antenna in the direction of interest relative to the isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units e.g. cm)

Or

$$S = EIRP/4\pi R^2$$

where EIRP = equivalent isotropically radiated power

Calculation:

(Calculated for max. EIRP)

EIRP: 25.6 dBm =363.1 mW

calculated at distance of 20 cm:

power density = $363.1 / 4\pi 20^2$ = 0.072 mW/cm^2

Limit:

1mW/cm^2 is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

4 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	05.10.2007	24	15.10.2009
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

Bluetooth Rack:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

SRD Laboratory Room 002:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	System Controller PSM 12	R&S	835259/007	3000002681-00xx	n.a.		
2	Memory Extension PSM-K10	R&S	To 1	3000002681	n.a.		
3	Operating Software PSM-B2	R&S	To 1	3000002681	n.a.		
4	19’’ Monitor		22759020-ED	3000002681	n.a.		
5	Mouse		LZE 0095/6639	3000002681	n.a.		
6	Keyboard		G00013834L 461	3000002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	3000002681-0005	01.08.2006	24	01.08.2008
8	Tracking Generator FSIQ-B10	R&S	835107/015	3000002681	s.No.7		
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	3000002681-0002	01.08.2006	36	01.08.2009
11	Modulation Coder SMIQ-B20	R&S	To 10	3000002681	s.No.10		
12	Data Generator SMIQ-B11	R&S	To 10	3000002681	s.No.10		
13	RF Rear Connection SMIQ-B19	R&S	To 10	3000002681	s.No.10		
14	Fast CPU SM-B50	R&S	To 10	3000002681	s.No.10		
15	FM Modulator SM-B5	R&S	835676/033	3000002681	s.No.10		
16	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	3000002681-0001	01.08.2006	36	01.08.2009
17	Modulation Coder SMIQ-B20	R&S	To 16	3000002681	s.No.16		
18	Data Generator SMIQ-B11	R&S	To 16	3000002681	s.No.16		
19	RF Rear Connection SMIQ-B19	R&S	To 16	3000002681	s.No.16		
20	Fast CPU SM-B50	R&S	To 16	3000002681	s.No.16		
21	FM Modulator SM-B5	R&S	836061/022	3000002681	s.No.16		
22	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	3000002681-0003	01.08.2006	36	01.08.2009
23	Attenuator SMP-B15	R&S	835136/014	3000002681	S.No.22		
24	RF Rear Connection SMP-B19	R&S	834745/007	3000002681	S.No.22		
25	Power Meter NRVD	R&S	835430/044	3000002681-0004	01.08.2006	24	01.08.2008

26	Power Sensor NRVD-Z1	R&S	833894/012	3000002681-0013	01.08.2006	24	01.08.2008
27	Power Sensor NRVD-Z1	R&S	833894/011	3000002681-0010	01.08.2006	24	01.08.2008
28	Rubidium Standard RUB	R&S		3000002681-0009	01.08.2006	24	01.08.2008
29	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681-0006	01.08.2006	24	01.08.2008
30	Laser Printer HP Deskjet 2100	HP	N/A	3000002681-0011	n.a.		
31	19’’ Rack	R&S	11138363000 004	3000002681	n.a.		
32	RF-cable set	R&S	N/A	3000002681	n.a.		
33	IEEE-cables	R&S	N/A	3000002681	n.a.		
34	Sampling System FSIQ-B70	R&S	835355/009	3000002681	s.No.7		
35	RSP programmable attenuator	R&S	834500/010	3000002681-0007	01.08.2006	24	01.08.2008
36	Signalling Unit	R&S	838312/011	3000002681	n.a.		
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
38	Climatic box VT 4002	Heraeus Vötsch	58566046820 010	300003019	11.05.2007	24	11.05.2009
39	Signaling Unit CMU200	R&S	832221/0055	300002862	12.01.2006	24	12.01.2008
40	Power Splitter 6005-3	Inmet Corp.	none	300002841	23.12.2006	24	23.12.2008
41	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
42	CBT32 with EDR Signaling Unit	R&S					
43	Coupling unit	Narda	N/A	--	n.a.		
44	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
45	RF-cable set	R&S	N/A	different	n.a.		
46	IEEE-cables	R&S	N/A	--	n.a.		

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	08.11.2006	24	08.11.2008
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	08.11.2006	24	08.11.2008
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	08.11.2006	24	08.11.2008
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010
6	Spektrum Analyzer FSU50	R&S	2000012	300003443	12.05.2007	24	12.05.2009