



SGS-CSTC Standards Technical Services
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Report No.: GLEMO080702086RFT

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FCC ID: ONFT1X1

FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

TEST REPORT

Application No. : GLEMO080702086RF
Applicant: Tele Radio AB
FCC ID: ONFT1X1
Frequency Band 2405-2480MHz
Equipment Under Test (EUT):
Name: Transceiver
Model No.: T1-1
Serial No.: Not supplied by client
Standards: FCC PART 15 SUBPART C: 2007
Please refer to section 2 for further details.
Date of Receipt: July 07, 2008
Date of Test: July 25, 2008
Date of Issue: July 29, 2008

Test Result :	PASS *
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In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Stephen Guo
Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Field Strength of Fundamental	FCC PART 15 :2007	Section 15.249 (a)	PASS
Field Strength of Unwanted Emissions	FCC PART 15 :2007	Section 15.249 (a) Section 15.249 (d)	PASS
Occupied Bandwidth	FCC PART 15 :2007	Section 15.215 (c)	PASS
Band Edges	FCC PART 15 :2007	Section 15.249 (d)	PASS

Remark:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.



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4 General Information

4.1 Client Information

Applicant Name: Tele Radio AB
Applicant Address: Datavägen 21, SE-43632 Askim, Sweden

4.2 General Description of E.U.T.

Product Name: Transceiver
Model: T1-1
Power Supply: DC 3V (Size "AAA" x 2)
Power Cord: N/A

4.3 Description of EUT operation

Type of Modulation O-QPSK(Offset QPSK), spread spectrum
Frequency Band 2405MHz ~ 2480MHz
Antenna Type Integrate Antenna

4.4 Standards Applicable for Testing

The standard used was FCC PART 15, SUBPART C (2007) section 15.249.

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,

198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.6 Other Information Requested by the Customer

None.



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4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP – Lab Code: 200611-0**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **FCC – Registration No.: 282399**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002. With the above and NVLAP's accreditation, SGS-CSTC is an authorized test laboratory for the DoC process.



5 Equipments Used during Test

RE in Chamber						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	N/A	N/A
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	28-01-2008	28-01-2009
N/A	EMI Test Software	Audix	E3	N/A	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	04-12-2007	04-12-2008
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	12-08-2008	12-08-2009
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	12-08-2008	12-08-2009
EMC0517	Horn Antenna	Rohde & Schwarz	HF906	100095	12-08-2008	12-08-2009
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	05-12-2007	05-12-2008
EMC0520	0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	11-03-2008	11-03-2009
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	11-03-2008	11-03-2009
EMC0075	310N Amplifier	Sonama	310N	272683	10-09-2007	10-09-2008
EMC0523	Active Loop Antenna	EMCO	6502	00042963	09-08-2008	09-08-2010
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	10-08-2008	10-08-2009

Conducted Emission						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m ³	N/A	N/A	N/A
EMC0102	LISN	Schaffner Chase	MNZ050D/1	1421	14-12-2007	14-12-2008
EMC0118	Two-line v-netwok	Rohde & Schwarz	ENV216	3560.6550.02	28-07-2008	28-07-2009
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	14-12-2007	14-12-2008
EMC0107	Coaxial Cable	SGS	2m	N/A	24-11-2007	26-11-2008
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	N/A
EMC0120	8 Line LISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	21-02-2008	21-02-2009
EMC0121	4 Line LISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	21-02-2008	21-02-2009
EMC0122	2 Line LISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	21-02-2008	21-02-2009

General used equipment						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0006	DMM	Fluke	73	70681569	27-09-2007	27-09-2008
EMC0007	DMM	Fluke	73	70671122	27-09-2007	27-09-2008



6 Test Result

6.1 E.U.T. Operation

Power supply:	DC 3V (Size "AAA" x 2)
Operating Environment:	
Temperature:	26°C
Humidity:	56% RH
Atmospheric Pressure:	1005mbar
EUT Operation:	Test the EUT in continue transmitting mode at the lowest (2405MHz), middle (2440MHz) and the highest (2480MHz) channel.



6.2 Test Procedure & Measurement Data

6.2.1 Field Strength of Fundamental & Field Strength of Unwanted Emissions

Test Requirement: FCC Part15 C Section 15.249(a) & (d)
 Test Method: Based on FCC Part15 C Section 15.249 & ANSI C63.4
 Test Date: July 25, 2008
 Measurement Distance: 3m (Semi-Anechoic Chamber)
 Frequency range: 30 MHz – 25GHz for transmitting mode.
 Test instrumentation resolution bandwidth
 120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 25GHz)
 Operation: Receive antenna scan height 1 - 4 m, polarization Vertical/ Horizontal, a turntable rotate through 360° in the horizontal plane and it is used to support the test sample at 0.8m above the ground plane.

Requirements:

FCC Part 15.249(a)

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m @ 3m)	Field Strength of Harmonics (dBuV/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

FCC Part 15.249(d)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Remark:

The fundamental frequency rang of the EUT is 2405MHz ~ 2480MHz.

The limit for average field strength dBuV/m for the fundamental frequency = 94.0 dBμV/m.

The limit for Peak field strength dBuV/m for the fundamental frequency = 114.0 dBμV/m.

No fundamental is allowed in the restricted bands.

The limit for average field strength dBμV/m for the harmonics = 54.0 dBμV/m.

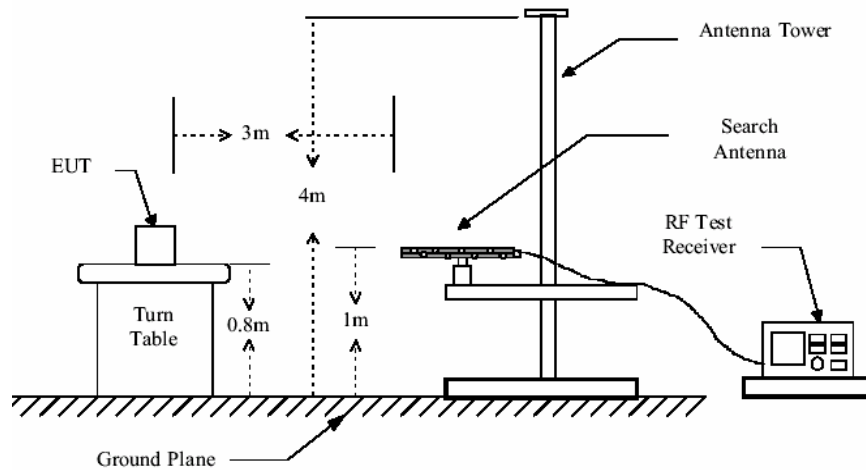
The limit for peak field strength dBμV/m for the harmonics = 74.0 dBμV/m.

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or 54.0 dBμV/m in 15.209. Here the limit for the other emission is 54.0 dBμV/m.

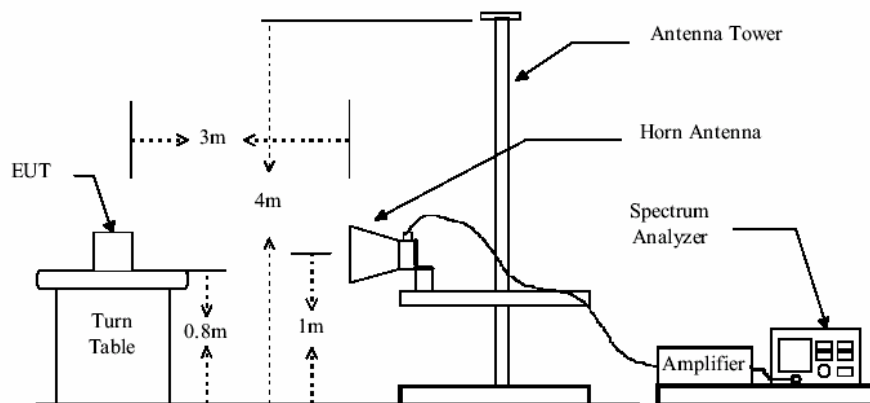
Test Procedure: The procedure used was ANSI Standard C63.4-2003. The receive was scanned from 30MHz to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery. Pretest the equipment on 3 axis, and the worst case emissions were reported.

Test Configuration:

30MHz to 1GHz:



Above 1GHz:





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The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier . The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Peramplifier Factor}$$

The following test results were performed on the transmitting mode:

1. Test in Channel lowest (2405MHz), keep in continuously transmitting status.

(a) Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
2405.0	73.74	28.60	4.60	34.76	72.19	114.00	-41.81	Peak
2405.0	59.09	28.60	4.60	34.76	57.53	94.00	-36.47	Average
4810.0	48.85	33.19	6.90	33.01	55.93	74.00	-18.07	Peak
4810.0	33.81	33.19	6.90	33.01	40.89	54.00	-13.11	Average

(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
2405.0	77.39	28.60	4.60	34.76	75.83	114.00	-38.17	Peak
2405.0	60.88	28.60	4.60	34.76	59.32	94.00	-34.68	Average
4810.0	47.28	33.19	6.90	33.01	54.36	74.00	-19.64	Peak
4810.0	35.28	33.19	6.90	33.01	42.30	54.00	-11.70	Average

2. Test in Channel middle (2440MHz), keep in continuously transmitting status.

(a) Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
2440.000	73.26	28.69	4.60	34.74	71.81	114.00	-42.19	Peak
2440.000	51.87	28.69	4.60	34.74	50.73	94.00	-43.27	Average
4880.000	48.98	33.27	7.20	32.97	56.48	74.00	-17.52	Peak
4880.000	34.98	33.27	7.20	32.97	42.21	54.00	-11.79	Average



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(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
2440.000	74.06	28.69	4.60	34.74	72.62	114.00	-41.38	Peak
2440.000	55.32	28.69	4.60	34.74	53.42	94.00	-40.58	Average
4880.000	35.03	33.27	7.20	32.97	42.53	54.00	-11.47	Average
4880.000	47.03	33.27	7.20	32.97	54.34	75.00	-20.66	Peak

3.Test in Channel highest (2480MHz), keep in continuously transmitting status.

(a) Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
2480.0	52.21	28.78	4.67	34.72	50.94	94.00	-43.06	Average
2480.0	71.54	28.78	4.67	34.72	70.27	114.00	-43.73	Peak
4960.0	48.16	33.36	7.33	32.92	55.93	74.00	-18.07	Peak
4960.0	35.16	33.36	7.33	32.92	42.65	54.00	-11.35	Average

(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
2480.0	72.99	28.78	4.67	34.72	71.72	114.00	-42.28	Peak
2480.0	53.77	28.78	4.67	34.72	52.50	94.00	-41.50	Average
4960.0	44.19	33.36	7.33	32.92	51.96	74.00	-22.04	Peak
4960.0	35.19	33.36	7.33	32.92	42.96	54.00	-11.04	Average

Remark:

- 1). According to 15.249 (e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 2) Sweep from 30MHz to 25GHz, find the max radiated emissions and record it, when the emissions are too weak to be detected, it will not be reported.

TEST RESULTS: The unit does meet the FCC requirements.



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6.2.2 Occupied Bandwidth & Band Edge

Test Requirement: FCC Part 15 C Section 15.215 & 15.249

Test Method: ANSI C63.4 and FCC Part 2.1049
Operation within the band 2400-2483.5MHz

Test Date: July 25, 2008

Requirements: 15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that, the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

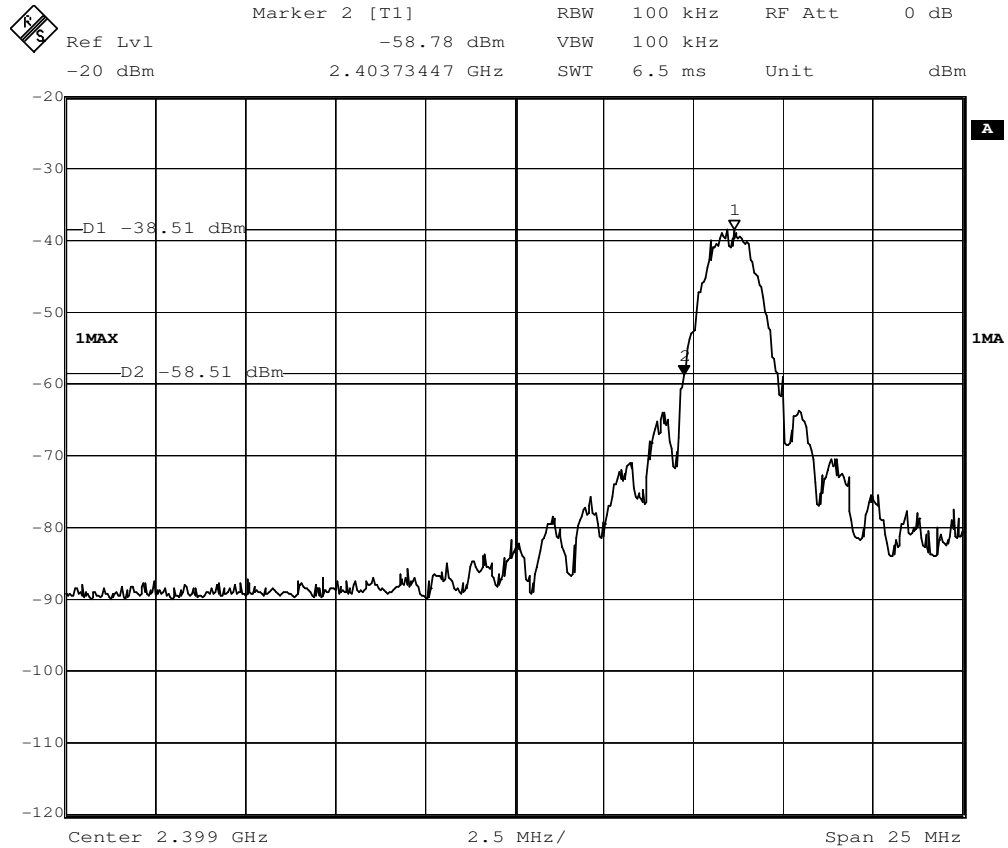
15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Method of measurement: A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.



The occupied bandwidth as below:

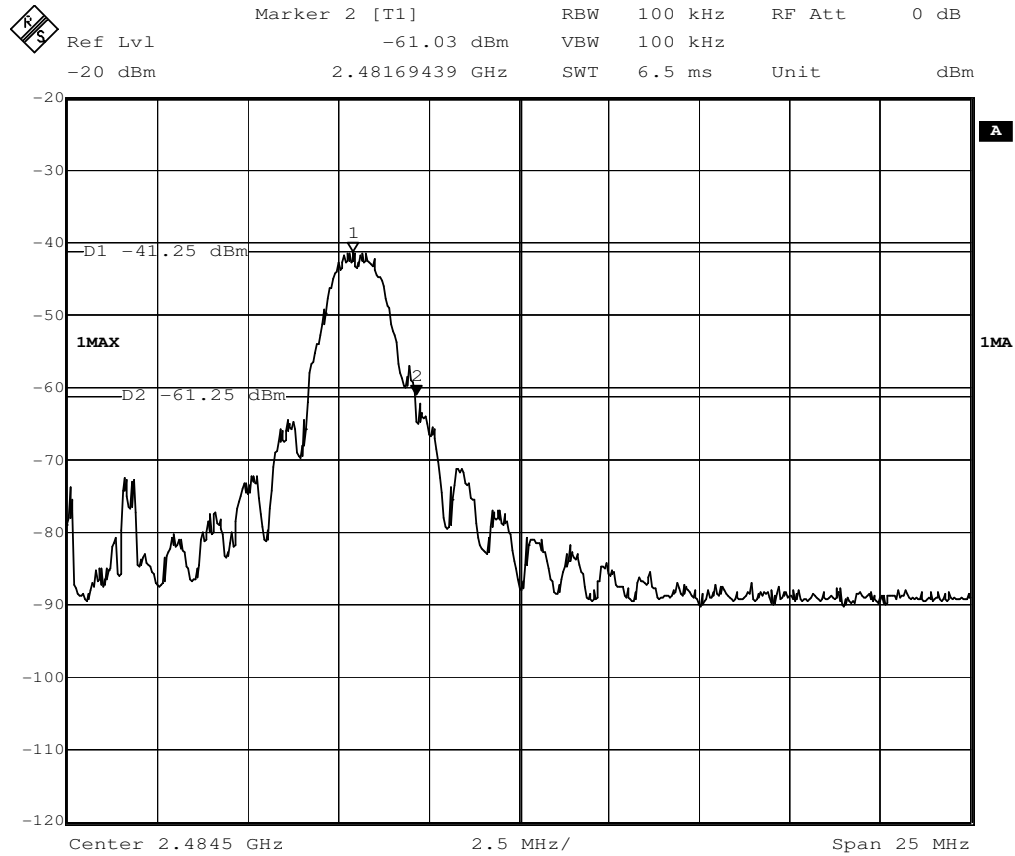
Lowest Channel:2405MHz:



The lower frequency is: 2.40373447GHz.



Highest Channel 2480MHz:



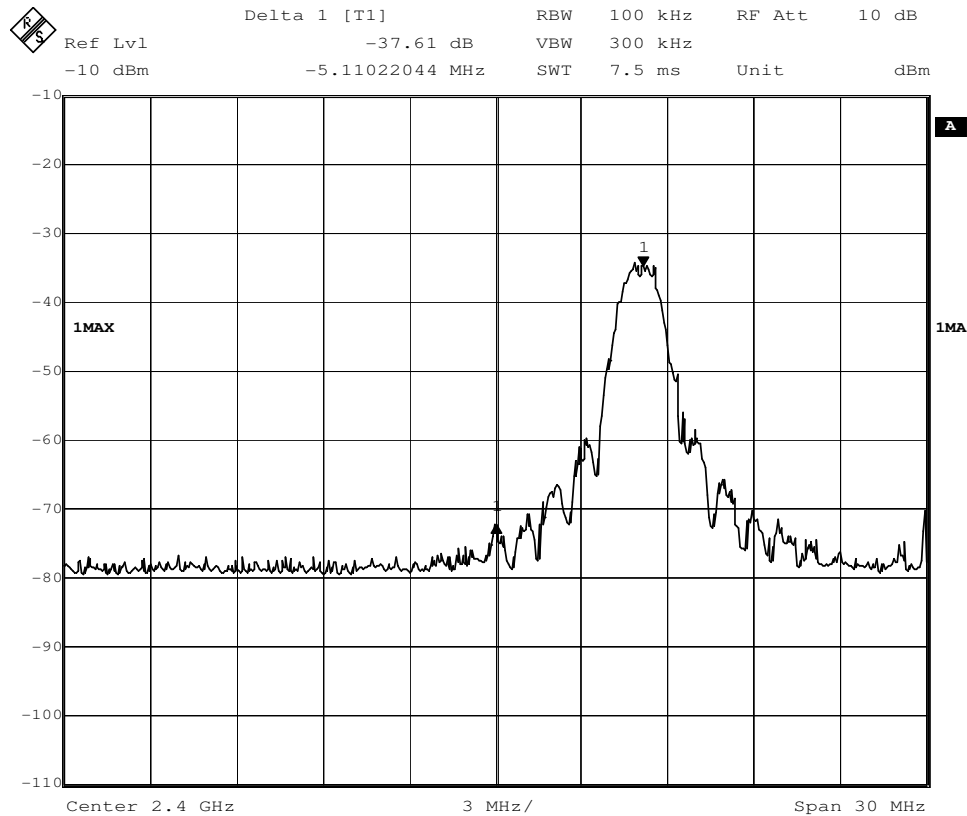
The higher frequency is: 2.48169439GHz.



The Band Edge Emission as below:

Lowest Band Edge 2400MHz

Detector mode:Peak



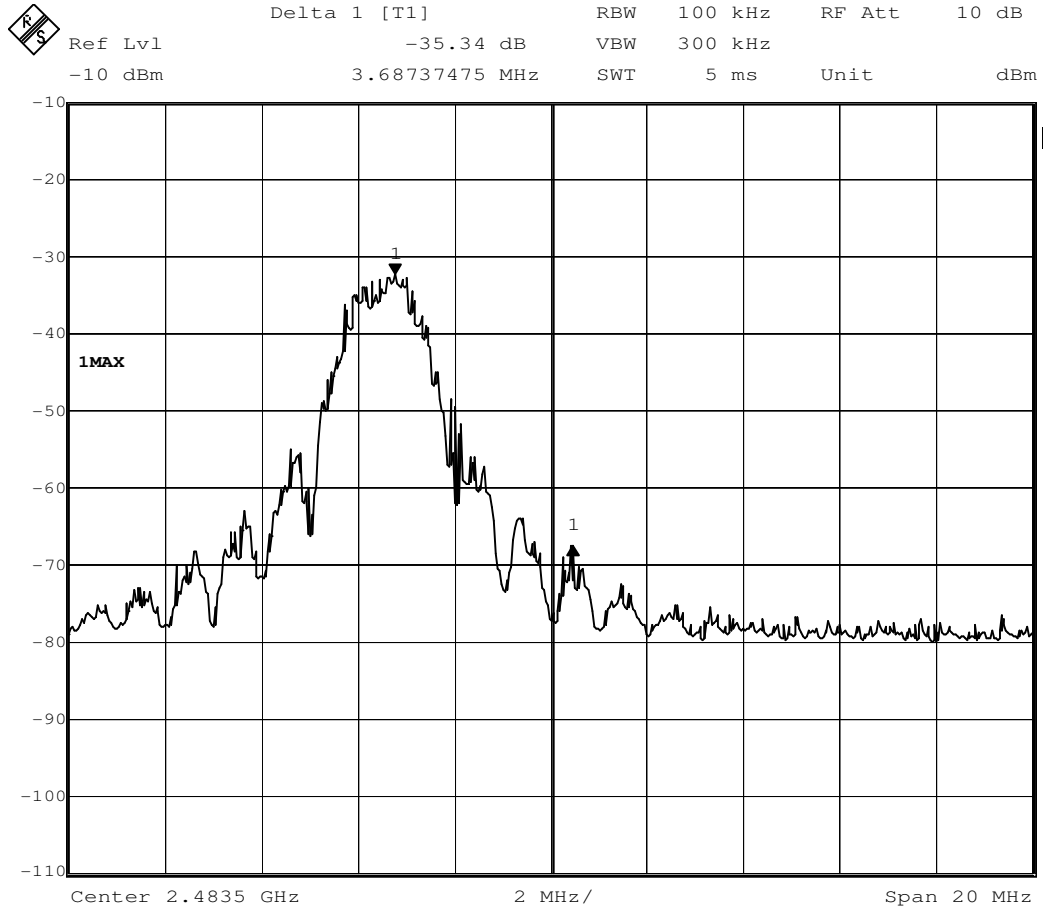
For 2400MHz bandedge checked with 2405MHz frequency operated, the delta shown at the plots are 37.61dB for peak detector mode.

The fundamental emission at the frequency of 2405MHz is 75.83dBuV/m for peak detector mode, so the badge emission at 2400MHz is 37.82dBuV/m for peak detector mode.



Highest Band Edge 2483.5MHz

Detector mode:Peak



For 2483.5MHz bandedge checked with 2480MHz frequency operated, the delta shown at the plots are 35.34dB for peak detector mode.

The fundamental emission at the frequency of 2480MHz is 71.72dBuV/m for peak detector mode, so the badge emission at 2483.5MHz is 36.38dBuV/m for peak detector mode.

The test result for the Emissions radiated outside of the specified frequency bands , please refer to the section 6.2.1 of this report.

The results: The unit does meet the FCC requirements.

--End of the Report--