



## FCC/IC- TEST REPORT

Report Number : **68.950.15.197.01** Date of Issue: October 15, 2015

Model : TT1

Product Type : GSM Wristphone

Applicant : Tinitell AB

Address : Hollandarsgatan 20, 11160 Stockholm, Sweden

Production Facility : Shenzhen Galapad Technology Limited Bao'an Branch

Address : Hequn Community, Lingxia Road, the Fourth Industrial  
District of Phoenix, Fuyong Town, Bao'an District, Shenzhen

Test Result :  Positive  Negative

Total pages including Appendices : 24

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch  
Building 12&13, Zhiheng Wisdomland Business Park,  
Nantou Checkpoint Road 2, Nanshan District,  
Shenzhen City, 518052,  
P. R. China

FCC Registration Number: 502708

Telephone: 86 755 8828 6998  
Fax: 86 755 828 5299

### 3 Description of the Equipment under Test

#### Description of the Equipment Under Test

Product: GSM Wristphone  
Model no.: TT1  
FCC ID: 2AFVQ-TT1A  
IC: 20743-TT1A  
Options and accessories: NIL  
Rating: DC3.7V (Supplied by Li-ion rechargeable battery)  
DC5.0V (Charged by USB Port)

RF Transmission Frequency: 2402-2480MHz  
No. of Operated Channel: 40  
Modulation: GFSK  
Duty Cycle: 61.8%  
Antenna Type: Intergral Antenna  
Antenna Gain: 0dbi  
Description of the EUT: The Equipment Under Test (EUT) is a GSM Wristphone which supports GSM900/DCS1800, it owns WLAN/BT and GPS functions.



## 4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 4 November 2014	General Requirements for the Certification of Radio Apparatus
RSS-247 Issue 1 May 2015	RSS-247— Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).



## 5 Summary of Test Results

Technical Requirements							
FCC Part 15 Subpart C, RSS-Gen, RSS-210			Pages	Test Site	Test Result		
Test Condition		Pass	Fail	N/A			
§15.207	RSS-Gen A8.8	Conducted emission AC power port	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247 (b) (1)	RSS-247 5.4(2)	Conducted peak output power	10	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(a)(1)	RSS-247 5.1(1) & RSS-Gen 6.6	20dB bandwidth	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)	RSS-247 5.1(2)	Carrier frequency separation	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii)	RSS-247 5.1(4)	Number of hopping frequencies	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii)	RSS-247 5.1(4)	Dwell Time	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(2)	RSS-247 5.2(1)	6dB bandwidth and 99% Occupied Bandwidth	11	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(e)	RSS-247 5.2(2)	Power spectral density	13	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d)	RSS-247 5.5	Spurious RF conducted emissions	15	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d)	RSS-247 5.5	Band edge	19	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d) & §15.209	RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	21	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203	RSS-Gen 8.3	Antenna requirement	See note 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a patch antenna, which gain is 0dBi. In accordance to §15.203 and RSS-Gen 8.3 , It is considered sufficiently to comply with the provisions of this section.



## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for ID: 2AFVQ-TT1A, IC: 20743-TT1A complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-210.

### SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: August 19, 2015

Testing Start Date: August 20, 2015

Testing End Date: October 15, 2015

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

Reviewed by: Supervised by:

A handwritten signature in black ink, appearing to read "John Zhi".

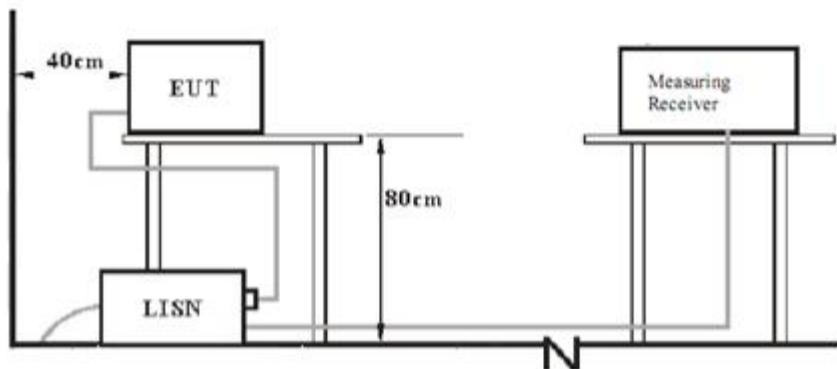
John Zhi  
EMC Project Manager

A handwritten signature in black ink, appearing to read "Simon Wang".

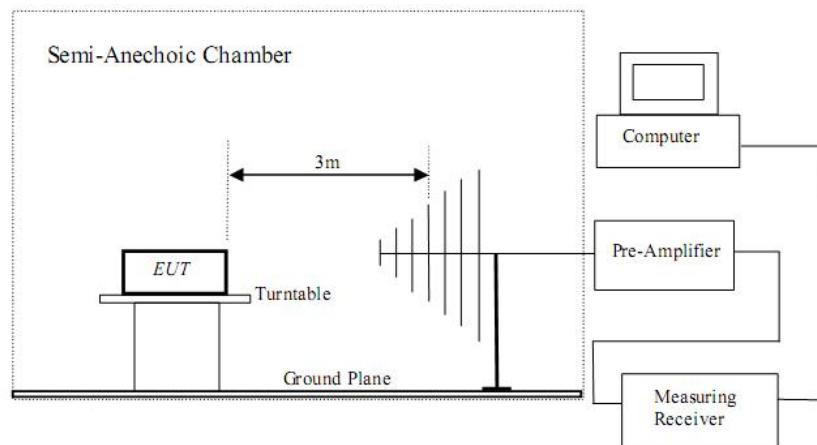
Simon Wang  
EMC Project Engineer

## 7 Test Setups

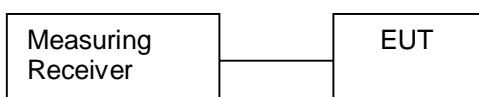
### 7.1 AC Power Line Conducted Emission test setups



### 7.2 Radiated test setups



### 7.3 Conducted RF test setups





## 8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
---	---	---	---



## 9 Technical Requirement

### 9.1 Conducted peak output power

#### Test Method

9.11. Use the following spectrum analyzer settings:

RBW > the 6 dB bandwidth of the emission being measured, VBW $\geq$ 3RBW, Span $\geq$ 3RBW

9.1 Sweep = auto, Detector function = peak, Trace = max hold.

9.12. Add a correction factor to the display.

3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the

9.1 peak of the emission. The indicated level is the peak output power.

#### Limits

9.1	Frequency Range	Limit	Limit
	MHz	W	dBm
	2400-2483.5	$\leq 1$	$\leq 30$

9.1 Test result as below table

9.1	Frequency	Conducted Peak		Result
		MHz	Output Power	
9.1	Low channel 2402MHz		-1.27	Pass
	Middle channel 2440MHz		-3.36	Pass
9.1	High channel 2480MHz		-2.37	Pass

9.1

9.1

9.1

9.1

9.1

9.1

9.1

9.1

9.1

9.1



## 9.2 6dB bandwidth and 99% Occupied Bandwidth

### Test Method

1. Use the following spectrum analyzer settings:  
RBW=100K, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq$  6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

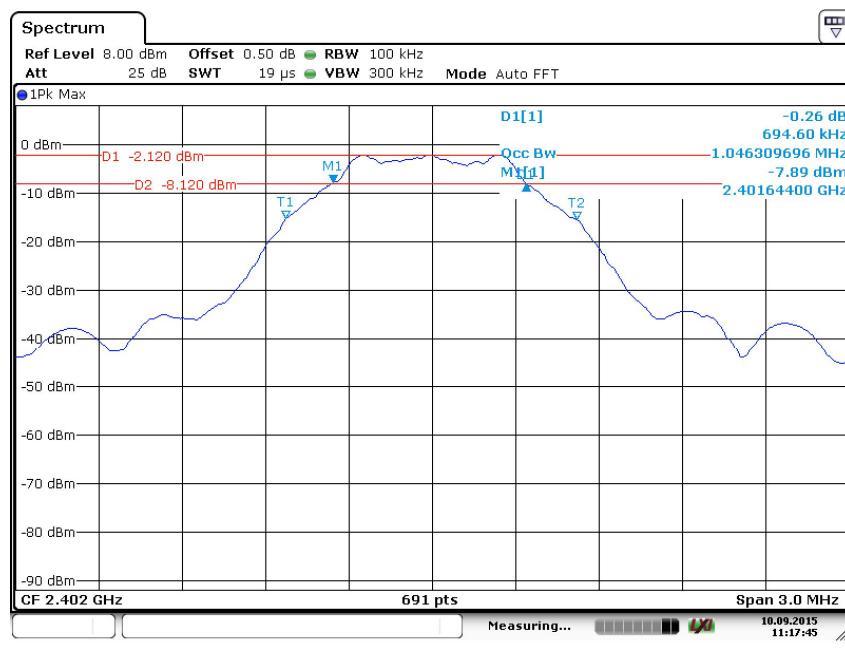
### Limit

Limit [kHz]

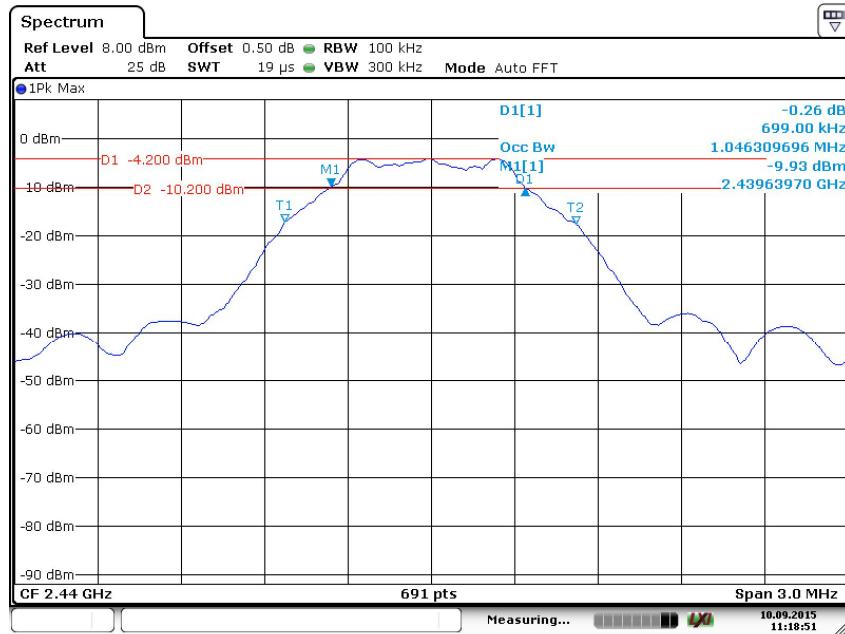
$\geq 500$

### Test result

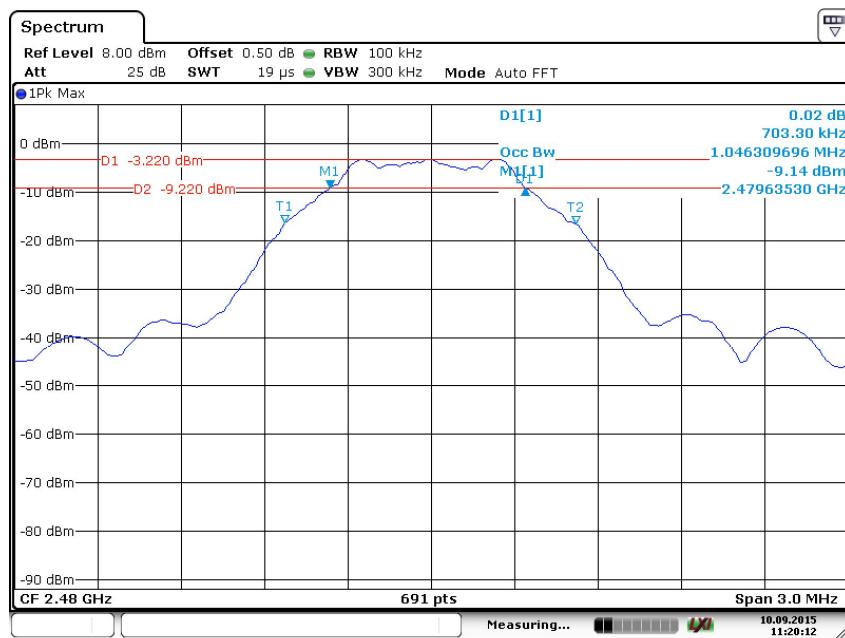
Frequency MHz	6dB bandwidth kHz	99% Bandwidth kHz	Result
Top channel 2402MHz	694.60	1046.3	Pass
Middle channel 2440MHz	699.00	1046.3	Pass
Bottom channel 2480MHz	703.30	1046.3	Pass



2402MHz



Date: 10.SEP.2015 11:18:51

**2440MHz**

Date: 10.SEP.2015 11:20:12

**2480MHz**

## 9.3 Power spectral density

### Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.  
RBW=3kHz, VBW $\geq$ 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

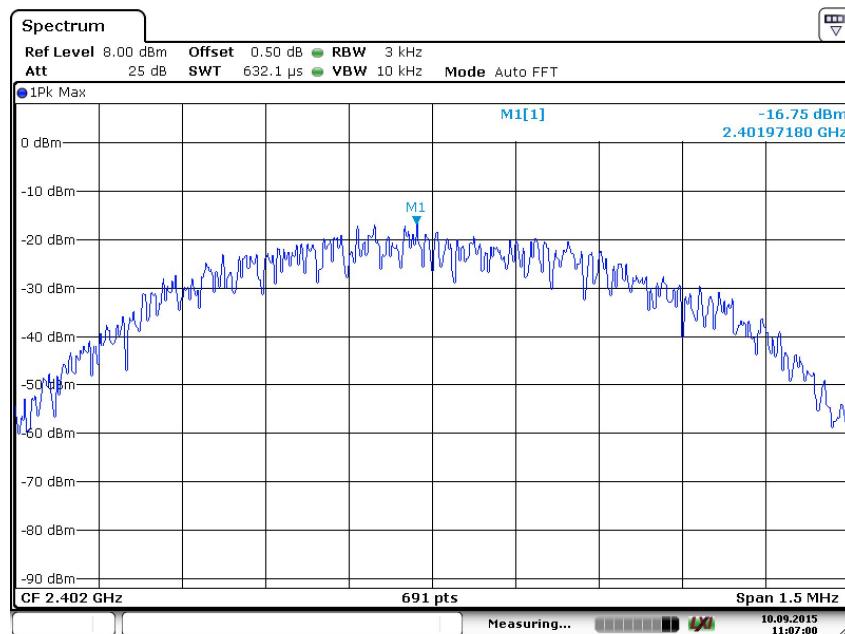
### Limit

Limit [dBm]

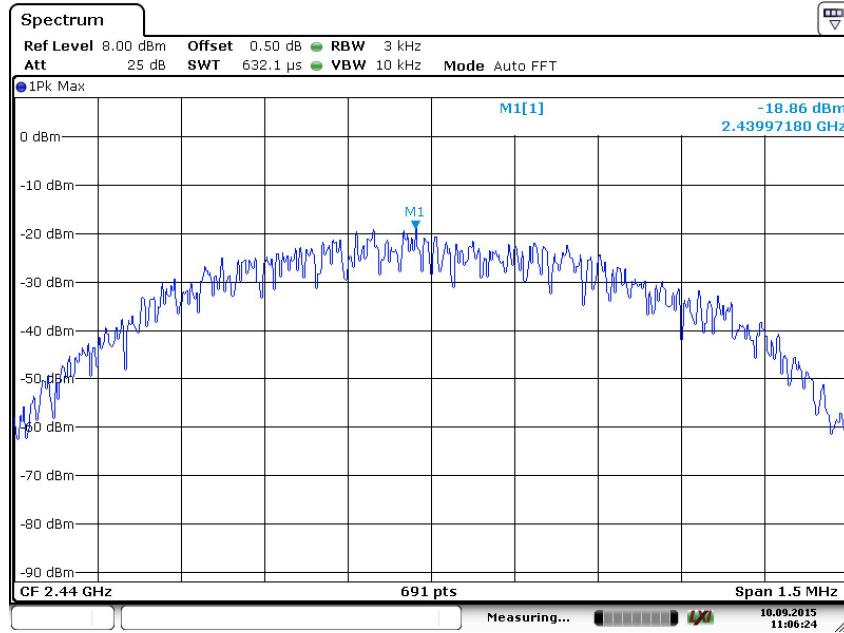
$\leq 8$

### Test result

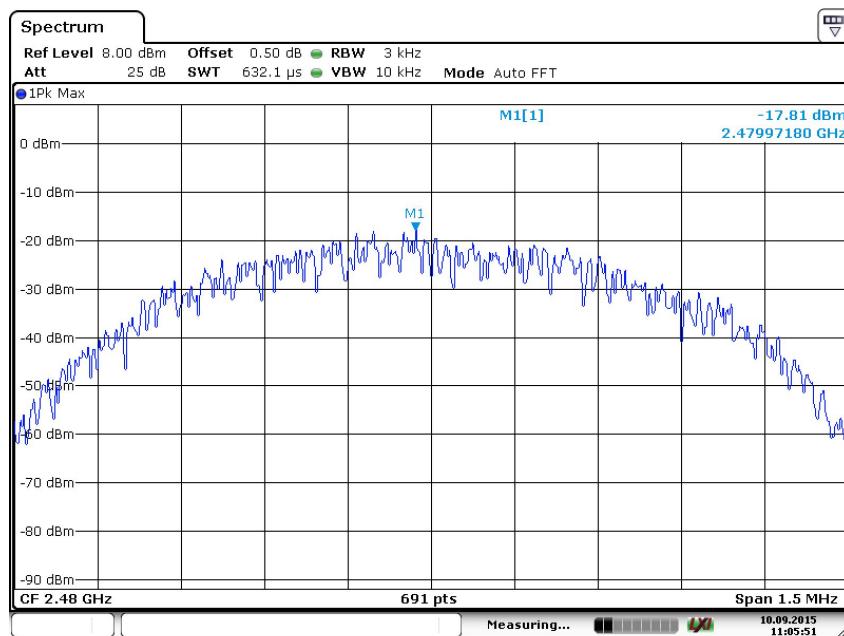
Frequency MHz	Power spectral density dBm	Result
Top channel 2402MHz	-16.75	Pass
Middle channel 2440MHz	-18.86	Pass
Bottom channel 2480MHz	-17.81	Pass



Date: 10 SEP 2015 11:06:59



Date: 10.SEP.2015 11:06:24



Date: 10.SEP.2015 11:05:51



## 9.4 Spurious RF conducted emissions

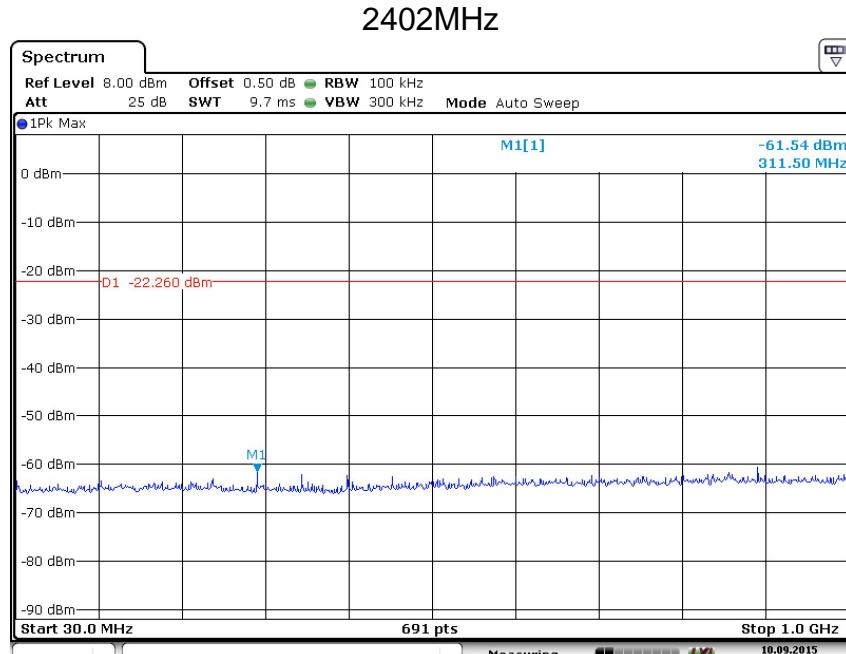
### Test Method

1. Establish a reference level by using the following procedure:
  - a. Set RBW=100 kHz. VBW $\geq$ 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
  - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
  - a. Set the center frequency and span to encompass frequency range to be measured.
  - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

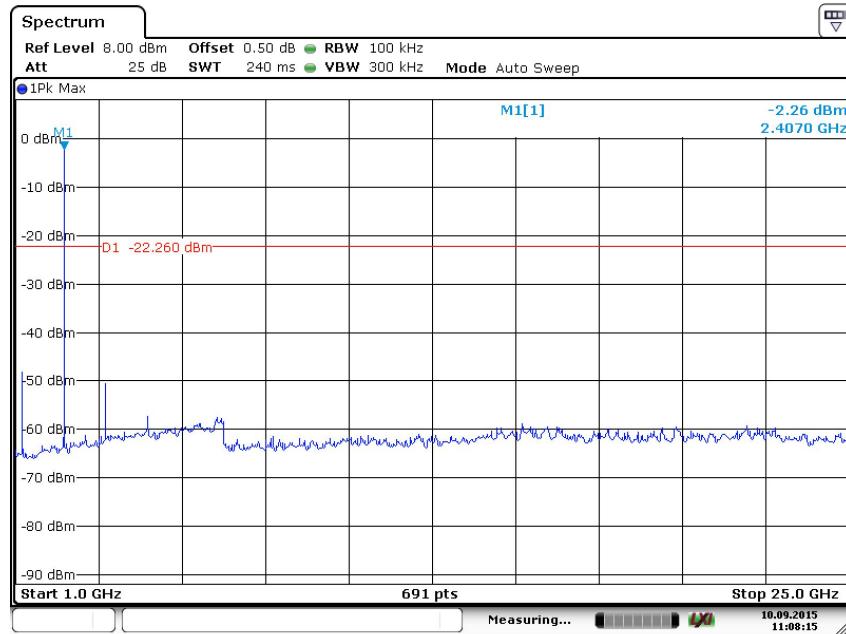
### Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

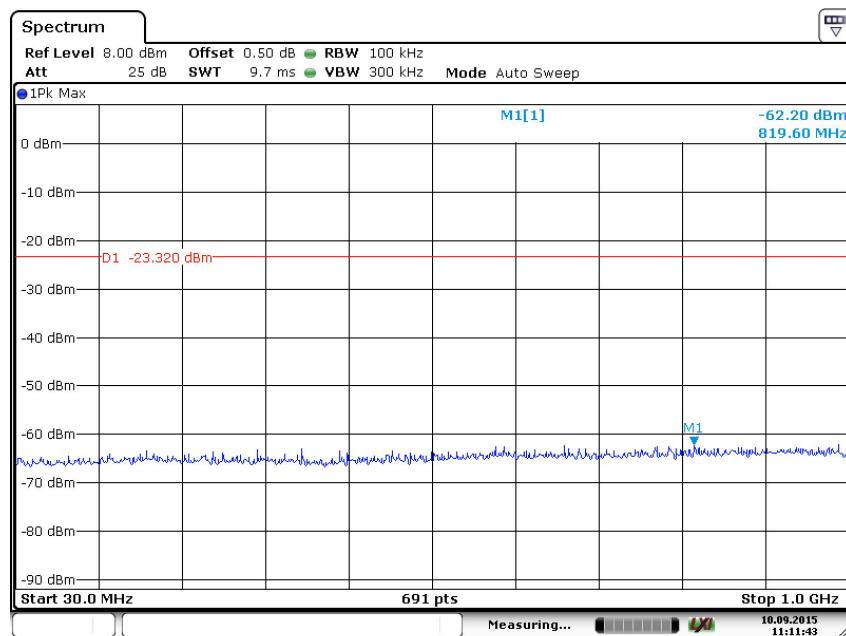
## Spurious RF conducted emissions



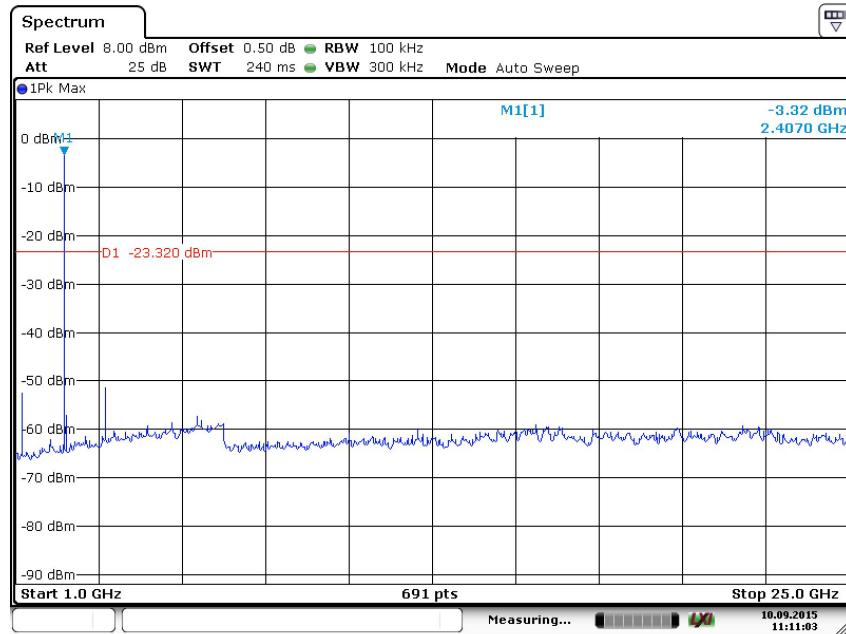
Date: 10.SEP.2015 11:10:22



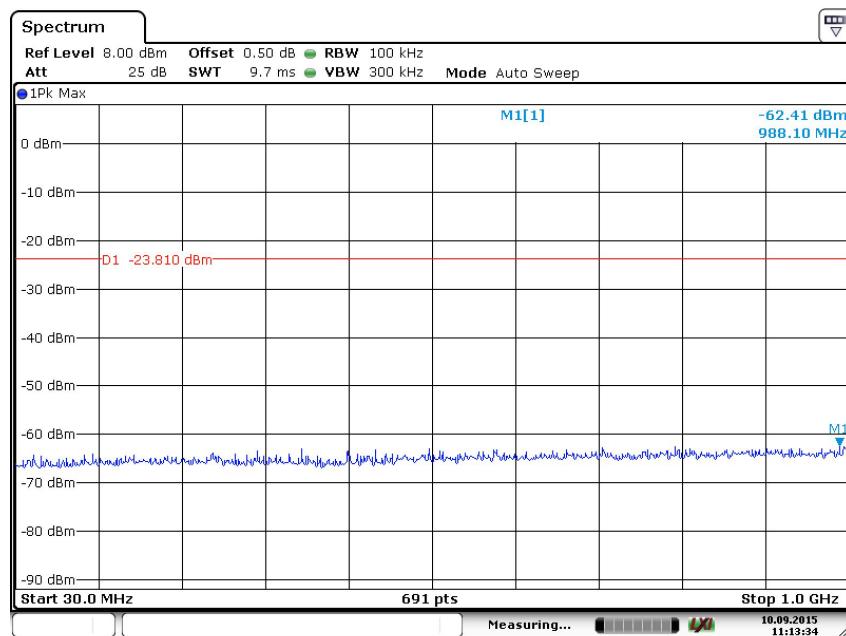
Date: 10.SEP.2015 11:08:15

**2440MHz**

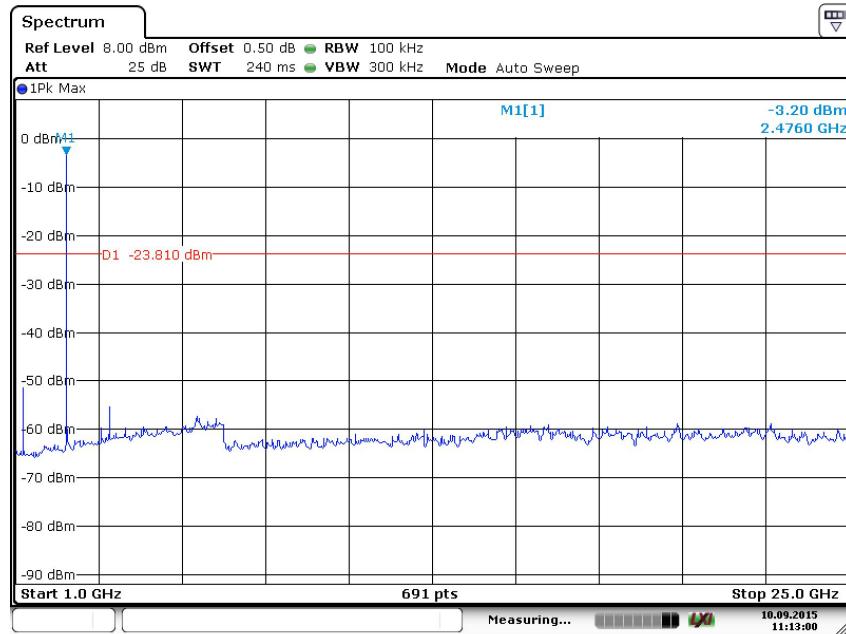
Date: 10.SEP.2015 11:11:43



Date: 10.SEP.2015 11:11:03

**2480MHz**

Date: 10.SEP.2015 11:13:35



Date: 10 SEP 2015 11:13:00

## 9.5 Band edge

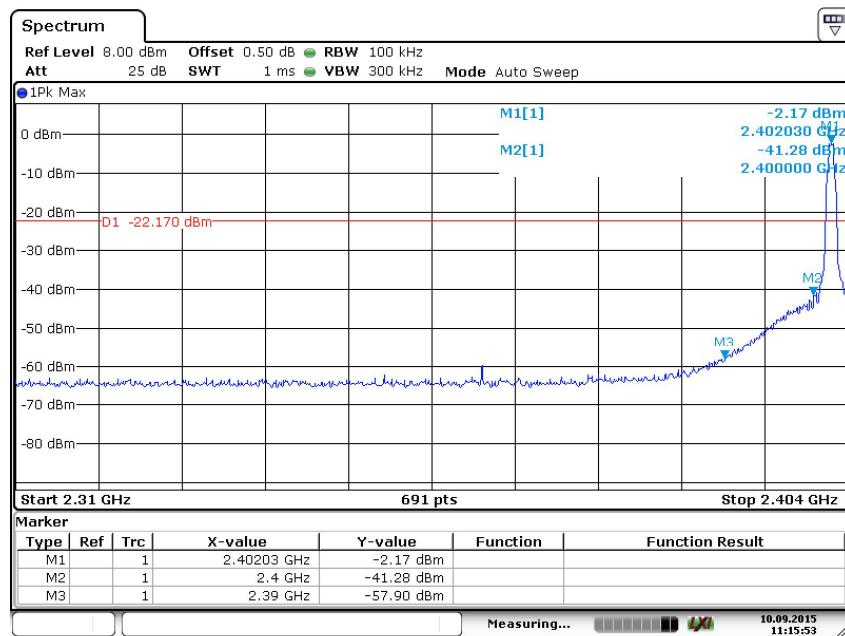
### Test Method

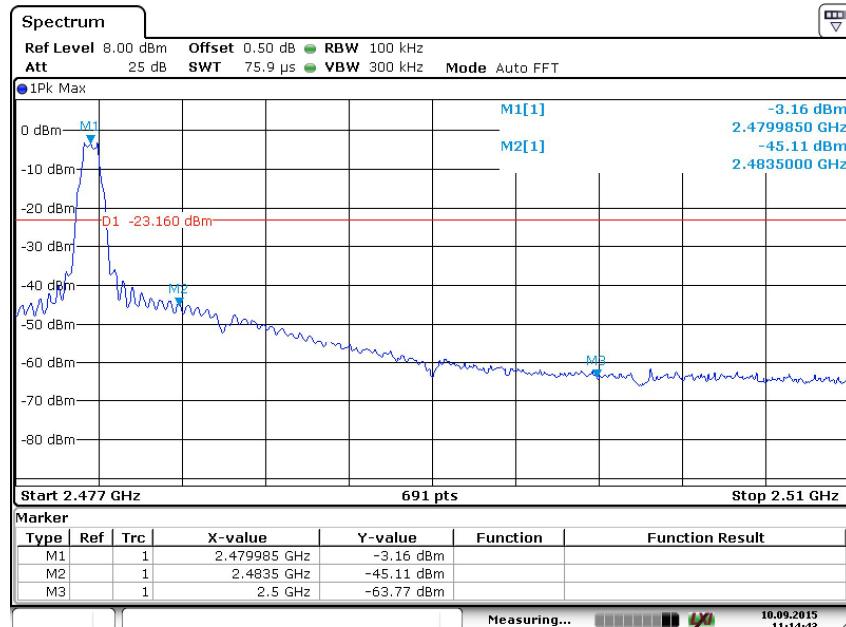
- 1 Use the following spectrum analyzer settings:  
Span = wide enough to capture the peak level of the in-band emission and all spurious  
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

### Limit

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

### Test result





Date: 10 SEP 2015 11:14:43

## 9.6 Spurious radiated emissions for transmitter

### Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:  
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for  $f \geq 1\text{GHz}$ , 100 kHz for  $f < 1\text{ GHz}$ , VBW  $\geq$  RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.  
The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{duty cycle}/100\text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

### Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB $\mu$ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK



## Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

### Transmitting spurious emission test result as below:

2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dB $\mu$ V/m		dB $\mu$ V/m		dB $\mu$ V/m	
4804	48.33	Horizontal	74	PK	25.67	Pass
4804	49.51	Vertical	74	PK	24.49	Pass

2440MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dB $\mu$ V/m		dB $\mu$ V/m		dB $\mu$ V/m	
4880	48.42	Horizontal	74	PK	25.58	Pass
4880	50.80	Vertical	74	PK	23.20	Pass

2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dB $\mu$ V/m		dB $\mu$ V/m		dB $\mu$ V/m	
4960	43.39	Horizontal	74	PK	30.61	Pass
4960	45.86	Vertical	74	PK	28.64	Pass

Remark:

- (1) AV Emission Level= PK Emission Level+20log (dutycycle)
- (2) Data of measurement within 30-1000MHz frequency range shown “--” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) “\*\*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

## 10 Test Equipment List

### List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2016-7-24
	LISN	Rohde & Schwarz	ENV4200	100249	2016-7-24
	LISN	Rohde & Schwarz	ENV216	100326	2016-7-24
	ISN	Rohde & Schwarz	ENY81	100177	2016-7-24
	ISN	Rohde & Schwarz	ENY81-CAT6	101664	2016-7-24
	High Voltage Probe	Rohde & Schwarz	TK9420(VT9 420)	9420-58	2016-7-24
	RF Current probe	Rohde & Schwarz	EZ-17	100816	2016-7-24
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2016-7-24
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2016-7-24
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2016-7-24
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/10085 1	2016-7-24
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
	Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

#### C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density\*
- Spurious RF conducted emissions
- Band edge

## 11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Radiation emission	U=4.32dB (30MHz-25GHz)
Output power test	0.94 dB
Power density test	2.10 dB
Bandwidth	1x10 <sup>-9</sup>