



*Full*

# TEST REPORT

**No. I16D00097-BLE**

*For*

**Client : Haier Telecom (Qingdao)Co.,Ltd**

**Production : GSM/WCDMA/LTE handset**

**Model Name : L30**

**FCC ID: SG7201605L30**

**Hardware Version: V1.01**

**Software Version: L30-H02-S021-Tigo**

**Issued date: 2016-06-15**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

**Test Laboratory:**

ECIT Shanghai, East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

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**Revision Version**

Report Number	Revision	Date	Memo
I16D00097-BLE	00	2016-06-15	Initial creation of test report

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## 1. Test Laboratory

### 1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

### 1.2. Testing Environment

Normal Temperature:	15-35°C
Extreme Temperature:	-10/+55°C
Relative Humidity:	20-75%

### 1.3. Project data

Project Leader:	Xu Yuting
Testing Start Date:	2016-05-28
Testing End Date:	2016-06-14

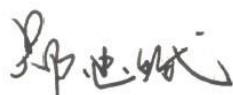
### 1.4. Signature



Wang Changqing  
(Prepared this test report)



Liu Jianquan  
(Reviewed this test report)



Zheng Zhongbin  
Director of the laboratory  
(Approved this test report)

## 2. Client Information

### 2.1. Applicant Information

Company Name: Haier Telecom (Qingdao)Co.,Ltd  
Address: No1,Haier Road,Hi-tech Zone,Qingdao, China  
Telephone: 0532-88937273  
Postcode: 266101

### 2.2. Manufacturer Information

Company Name: Haier Telecom (Qingdao)Co.,Ltd  
Address: No1,Haier Road,Hi-tech Zone,Qingdao, China  
Telephone: 0532-88937273  
Postcode: 266101

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

EUT Description	GSM/WCDMA/LTE handset
Model name	L30
UMTS Frequency Band	WCDMA BandII and V
GSM Frequency Band	GSM850/900/1800/1900
BLE Frequency	2402MHz-2480Mhz
BLE Channel	Channel0-Channel39
BLE Modulation	GFSK
Extreme Temperature	-10/+55°C
Nominal Voltage	3.8V
Extreme High Voltage	4.35V
Extreme Low Voltage	3.6V

Note: Photographs of EUT are shown in ANNEX A of this test report.

#### 3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	861864030000217	V1.01	L30-H02-S021-Tigo	2016-05-27

\*EUT ID: is used to identify the test sample in the lab internally.

#### 3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	---	---

\*AE ID: is used to identify the test sample in the lab internally.

## 4. Reference Documents

### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15,Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	June 13, 2016
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

## 5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247(b)	/	P
Peak Power Spectral Density	15.247(e)	/	P
6dB Occupied Bandwidth	15.247(a)	/	P
Band Edges Compliance	15.247(d)	/	P
Transmitter Spurious Emission-Conducted	15.247	/	P
Transmitter Spurious Emission-Radiated	15.247	/	P
AC Powerline Conducted Emission	15.107,15.207	/	NA

Please refer to part 5 for detail.

The measurements are according to ANSI C63.10.

Terms used in Verdict column

P	Pass, the EUT complies with the essential requirements in the standard.
NP	Not Perform, the test was not performed by ECIT.
NA	Not Applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

Test Conditions

T <sub>nom</sub>	Normal Temperature
T <sub>min</sub>	Low Temperature
T <sub>max</sub>	High Temperature
V <sub>nom</sub>	Normal Voltage
V <sub>min</sub>	Low Voltage
V <sub>max</sub>	High Voltage
H <sub>nom</sub>	Norm Humidity
A <sub>nom</sub>	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	T <sub>nom</sub>	22°C
Voltage	V <sub>nom</sub>	3.7V
Humidity	H <sub>nom</sub>	32%
Air Pressure	A <sub>nom</sub>	1010hPa

**Note:**

- a. All the test data for each data were verified, but only the worst case was reported.
- b. The GFSK,  $\pi/4$  DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for  $\pi/4$  DQPSK, 3-DH1 for 8DPSK.
- c. The DC and low frequency voltages' measurement uncertainty is  $\pm 2\%$ .

## 5.1. Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

The following deviation from, additions to, or exclusions from the test specifications have been made. See section 3.

## 5.2. Statements

The product name L30, supporting  
GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/HSPA+/LTE/WLAN/BT/BLE, manufactured  
by Haier Telecom (Qingdao)Co.,Ltd is a new product for testing.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

## 6. Test result

### 6.1. Peak Output Power-Conducted

#### 6.1.1 Measurement Limit

Standard	Limit (dBm)
FCC Part 15.247(b)(1)	< 30

#### 6.1.2 Test Condition:

Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	3MHz	10MHz	9MHz	Auto

#### 6.1.3 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.5.

1. The output power of EUT was connected to the spectrum analyzer by cable. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Measure the conducted output power and record the results it.

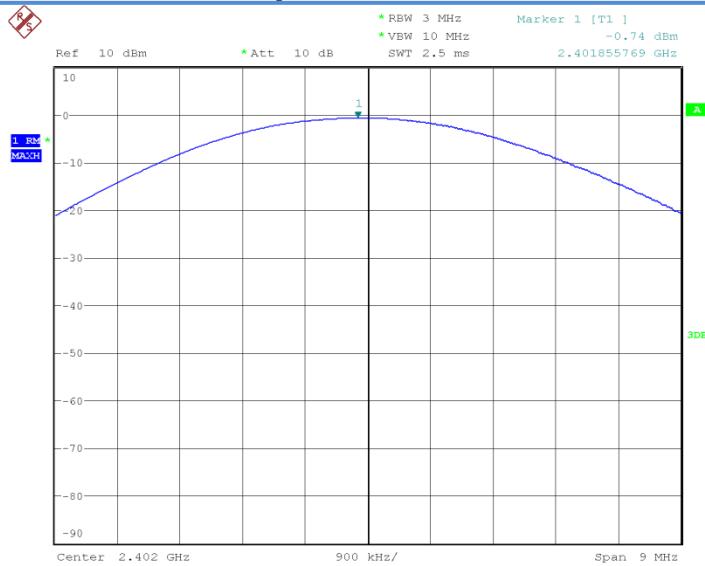
#### 6.1.4 Measurement Results:

##### For GFSK

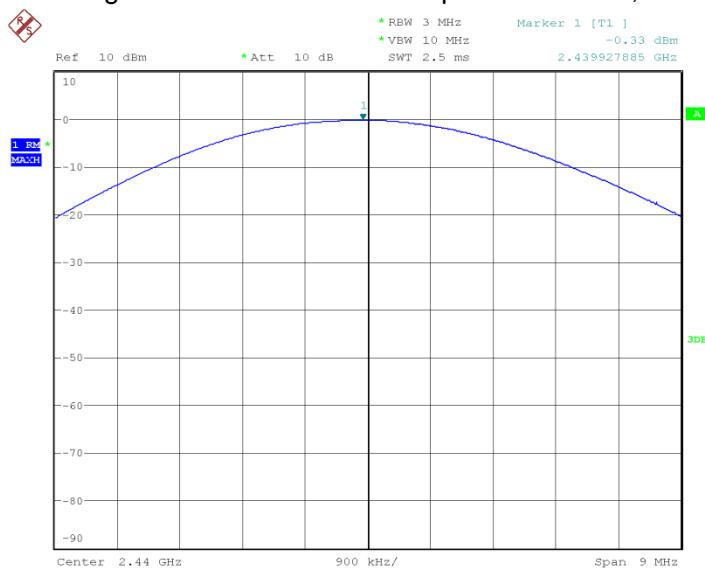
Channel	Ch0 2402 MHz	Ch19 2440 MHz	CH39 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	-0.74	-0.33	-0.94	P
	Fig.1	Fig.2	Fig.3	

**Conclusion: PASS**

**Test graphs an below**

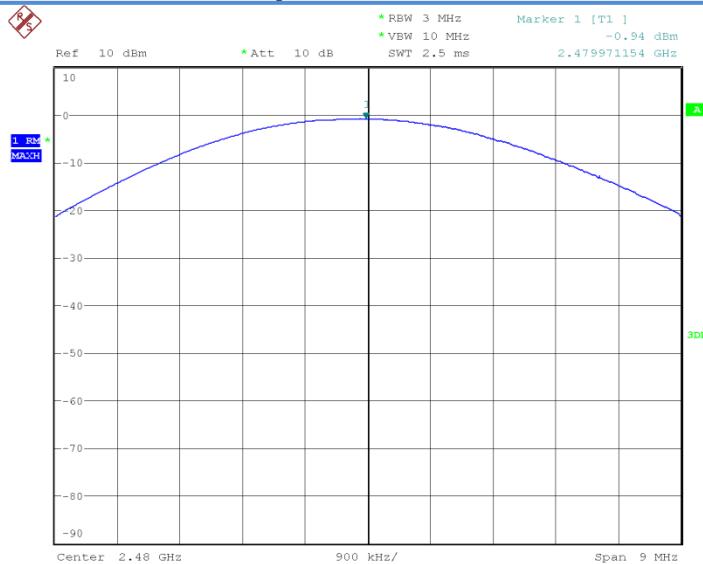


Date: 31.MAY.2016 16:49:10

**Fig.1 Peak Conducted Output Power CH0, DH1**


Date: 31.MAY.2016 16:51:46

**Fig.2 Peak Conducted Output Power CH19, DH1**



Date: 31.MAY.2016 16:52:55

Fig.3 Peak Conducted Output Power CH39, DH1

## 6.2. Peak Power Spectral Density

### 6.2.1 Measurement Limit:

Standard	Limit
FCC CFR Part 15.247(e)	< 8dBm/3 KHz

### 6.2.2 Test procedures

The measurement is according to ANSI C63.10 clause 11.10.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set analyzer center frequency to DTS channel center frequency.
4. Set the span to 1.5 times the DTS bandwidth.
5. Set the RBW to  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
6. Set the VBW  $\geq [3 \times \text{RBW}]$ .
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum amplitude level within the RBW.
12. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

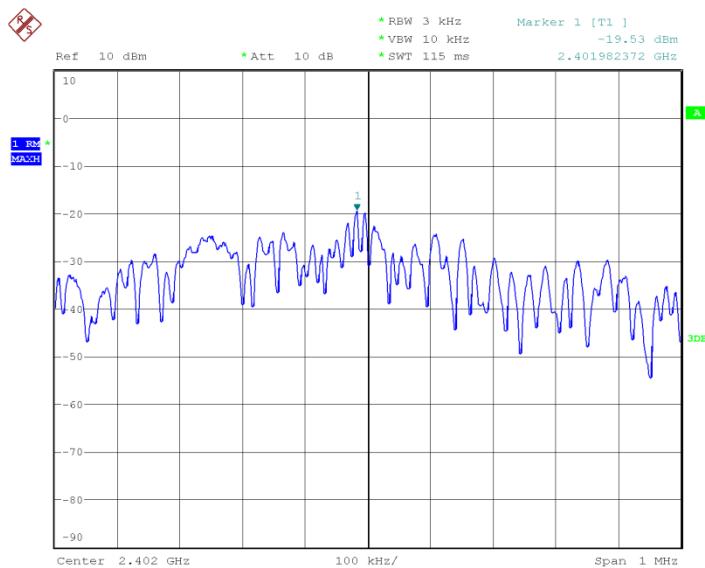
**6.2.3 Measurement Uncertainty:**

Measurement Uncertainty	0.75dB
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**6.2.4 Measurement Results:**
**802.11b/g mode**

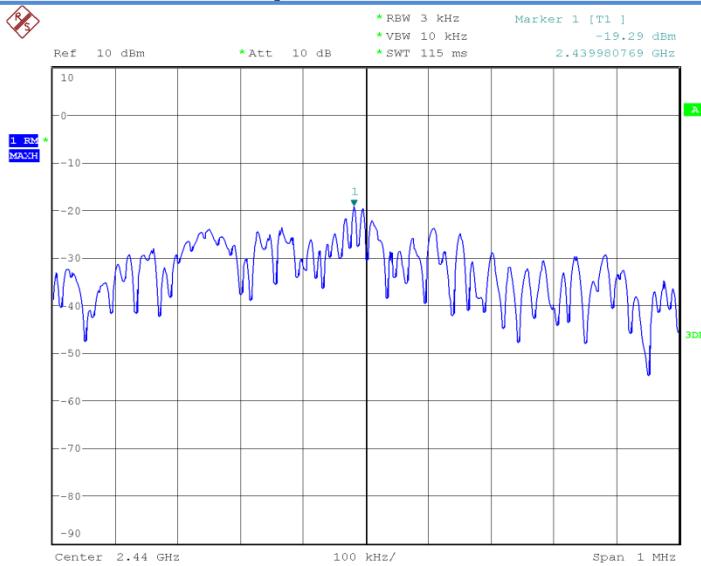
Mode	Channel	Power Spectral Density(dBm/3kHz)		Conclusion
BT4.0	00	Fig.4	-19.53	P
	19	Fig.5	-19.29	P
	39	Fig.6	-19.72	P

Test figure as below:



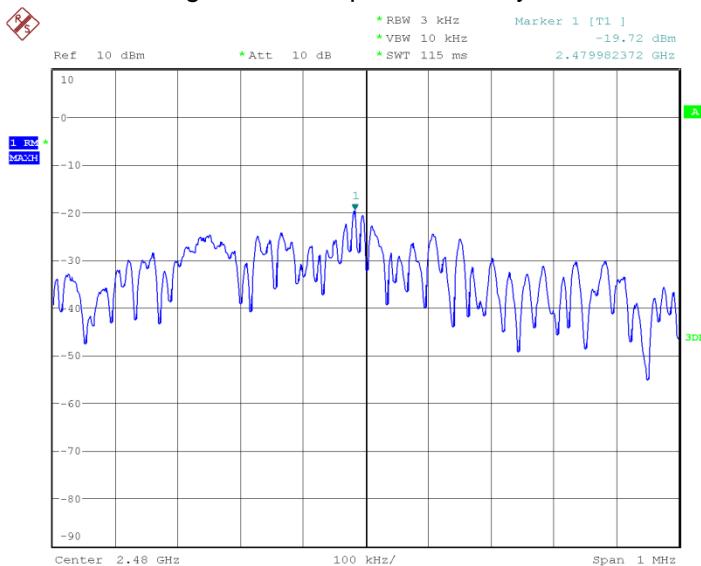
Date: 31.MAY.2016 17:05:49

**Fig.4 Power spectral density: CH0**



Date: 31.MAY.2016 17:06:38

**Fig.5 Power spectral density: CH19**



Date: 31.MAY.2016 17:07:16

**Fig.6 Power spectral density: CH39**

### 6.3. 6dB Bandwidth

#### 6.3.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a) (1)	N/A

### 6.3.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.7

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit maximum power.
3. Set the spectrum analyzer as
4. Span: two or five times of OBW
5. RBW= 1% to 5% of the OBW; VBW $\geq$ 3RBW; Max Hold.
6. Select the max peak, and N DB DOWN=20dB.
7. Record the results.

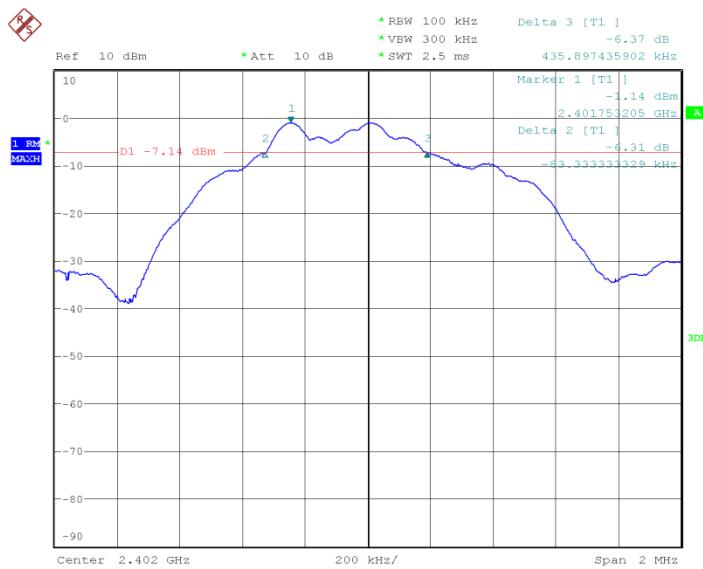
### Measurement Result:

For GFSK

Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.7	519.230	P
39	Fig.8	519.230	P
78	Fig.9	503.250	P

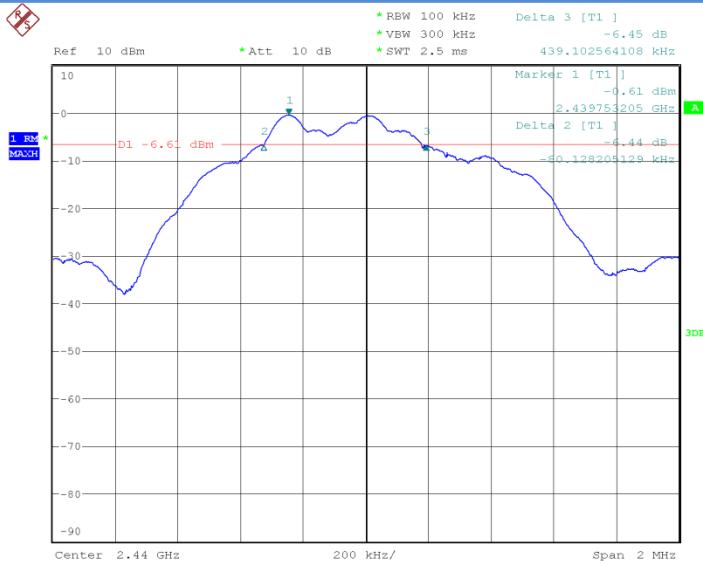
**Conclusion: PASS**

**Test graphs as below:**

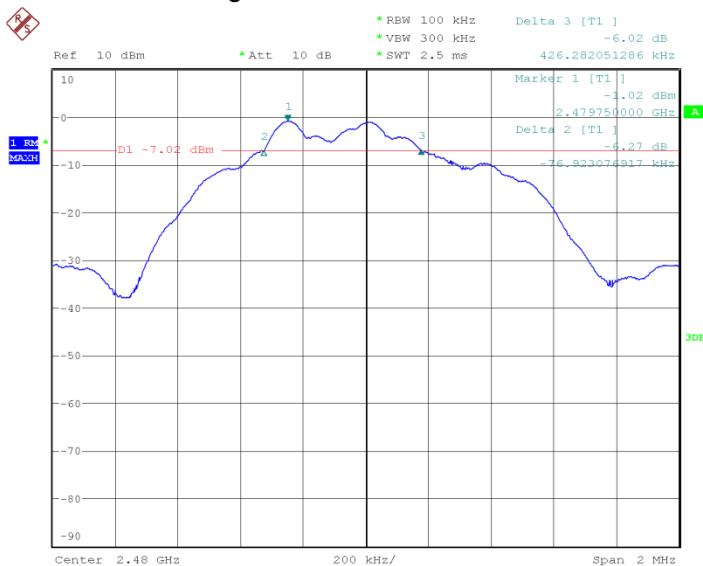


Date: 31.MAY.2016 19:53:42

Fig.7 6dB Bandwidth: Ch0



Date: 31.MAY.2016 19:55:32

**Fig.8 6dB Bandwidth: Ch19**


Date: 31.MAY.2016 19:57:24

**Fig.9 6dB Bandwidth: Ch39**
**Fig.78 20dB Bandwidth: Ch39**

#### 6.4. Frequency Band Edges-Conducted

##### 6.4.1 Measurement Limit:

Standard	Limited(dBc)
FCC 47 CFR Part 15.247(d)	>20

#### 6.4.2 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.6.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz, span more than 1.5 times channel bandwidth (2MHz).
3. Detector =peak, sweep time=auto couple, trace mode=max hold.
4. Allow sweep to continue until the trace stabilizes.

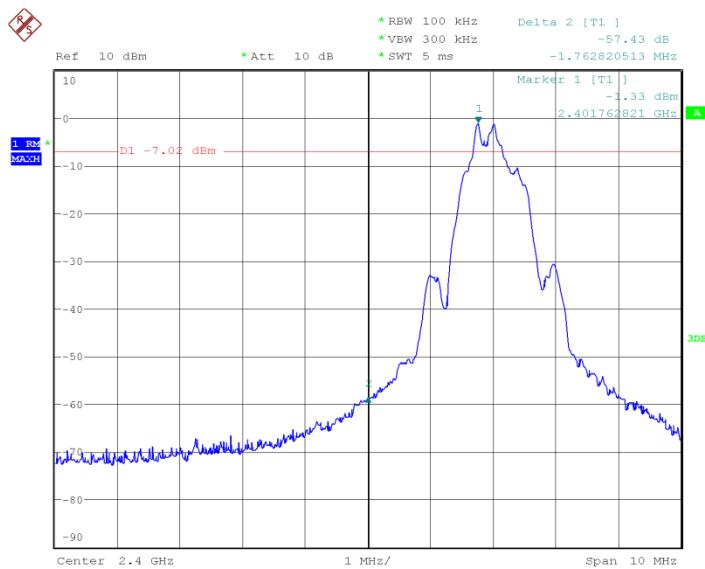
#### 6.4.3 Measurement results

For GFSK

Channel	Band Edge Power (dBc)	Conclusion
00	Fig.10	P
39	Fig.11	P

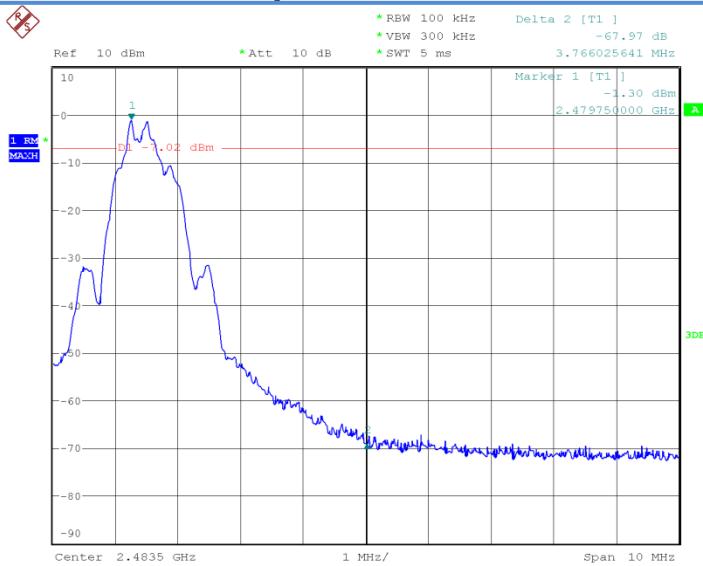
**Conclusion: PASS**

**Test graphs an below**



Date: 31.MAY.2016 20:00:08

Fig.10 Frequency Band Edge: GFSK, Ch0, Hopping OFF



Date: 31.MAY.2016 20:06:10

Fig.11 Frequency Band Edge: GFSK, Ch0, Hopping ON

## 6.5. Conducted Emission

### 6.5.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part15.247 (d)	20dB below peak output power in 100KHz bandwidth

### 6.5.2 Test procedures

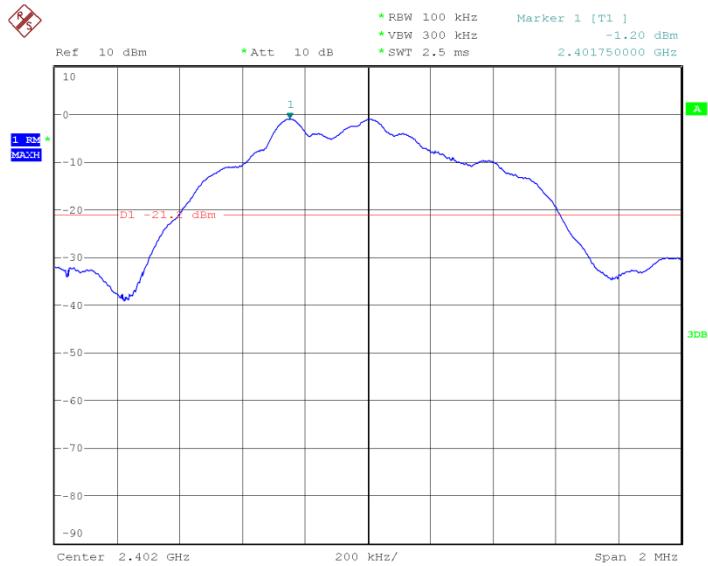
The measurement is according to ANSI C63.10 clause 7.8.8.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz.
3. Detector =peak, sweep time=auto couple, trace mode=max hold.

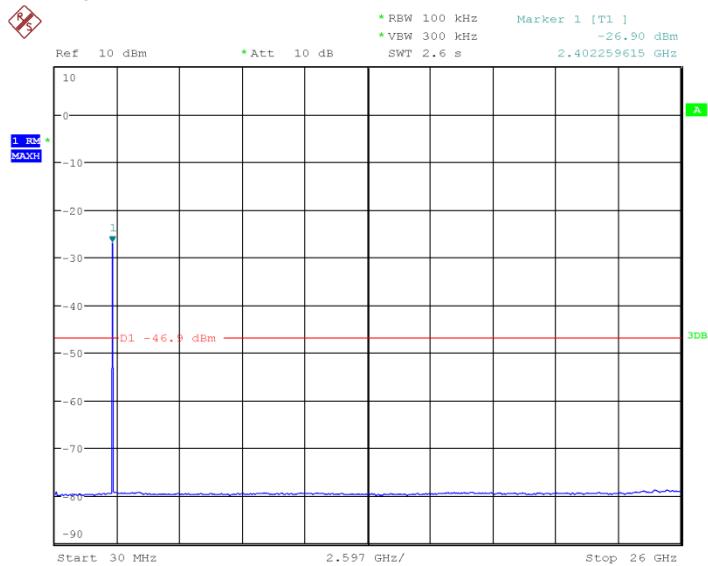
### 6.5.3 Measurement Results:

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.12	P
	30MHz~26GHz	Fig.13	P
Ch19 2440MHz	Center Freq.	Fig.14	P
	30MHz~26GHz	Fig.15	P
Ch39 2480MHz	Center Freq.	Fig.16	P

	30MHz~26GHz	Fig.17	P
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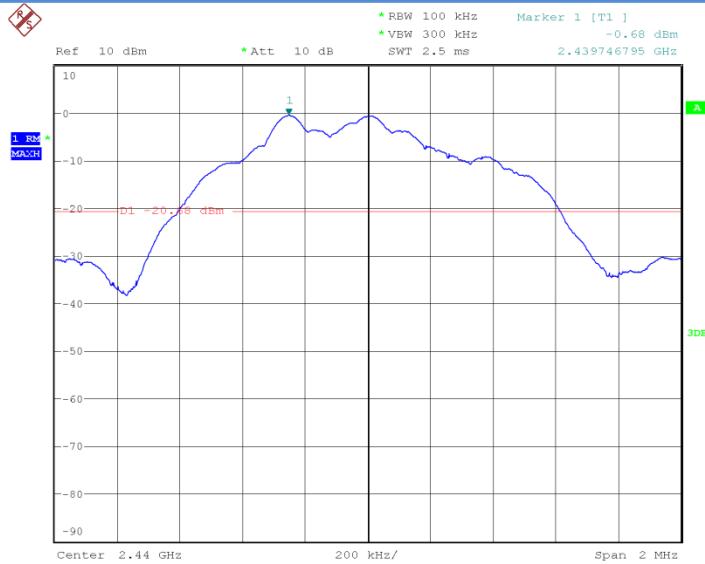
**Conclusion: PASS**
**Test graphs as below**


Date: 31.MAY.2016 20:09:24

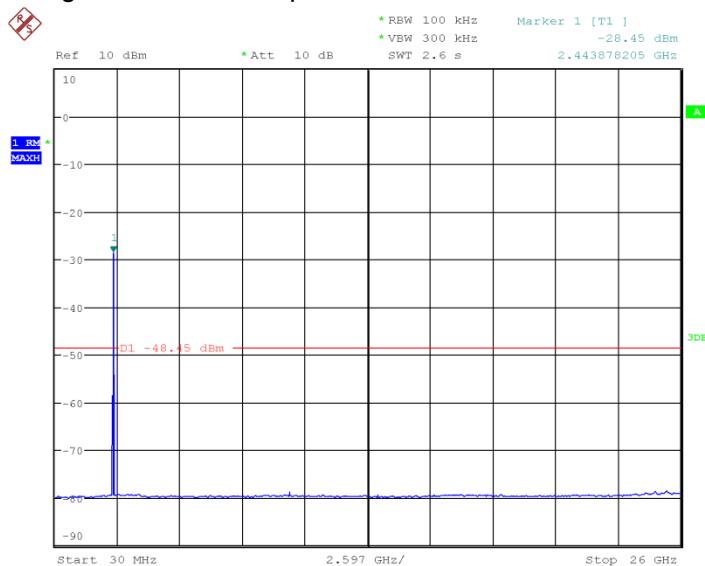
**Fig.12 Conducted spurious emission: Ch0, 2402MHz**


Date: 7.JUN.2016 15:23:12

**Fig.13 Conducted spurious emission: Ch0, 30MHz~26GHz**

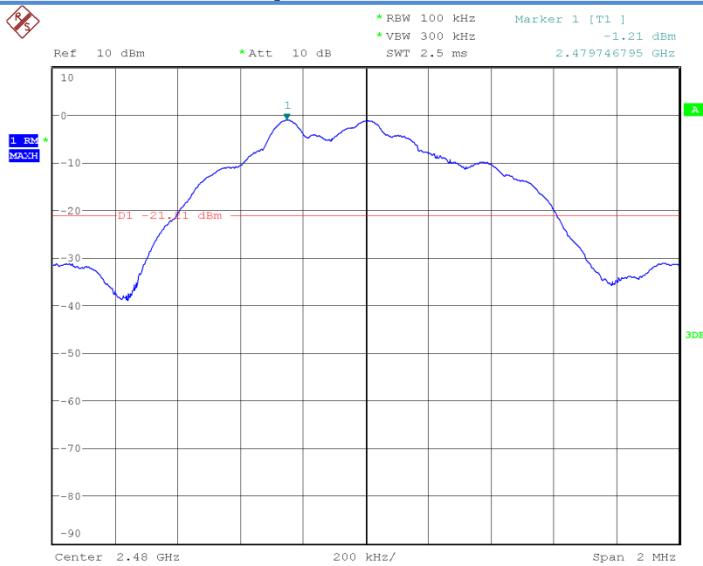


Date: 31.MAY.2016 22:26:54

**Fig.14** Conducted spurious emission: Ch19, 2441MHz


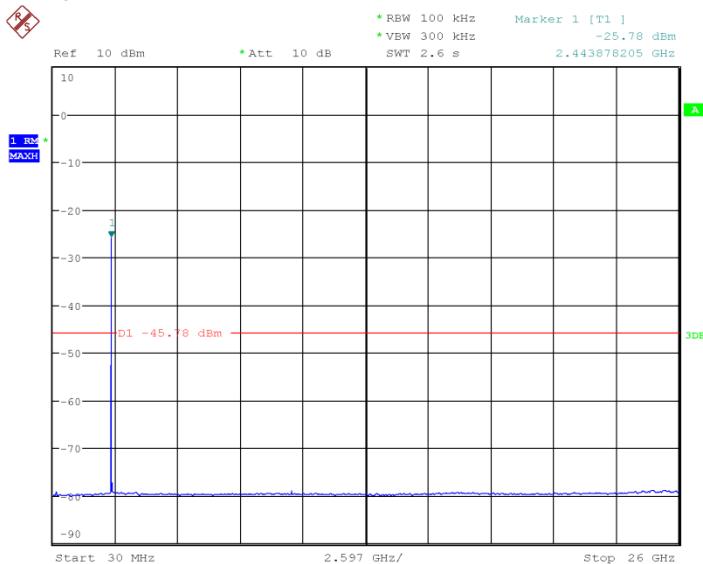
Date: 7.JUN.2016 15:24:29

**Fig.15** Conducted spurious emission: Ch19, 30MHz~26GHz



Date: 31.MAY.2016 22:27:55

Fig.16 Conducted spurious emission: Ch39, 2480MHz



Date: 7.JUN.2016 15:25:44

Fig.17 Conducted spurious emission: Ch39, 30MHz~26GHz

## 6.6. Radiated Emission

### 6.6.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a),

must also comply with the radiated emission limits specified in 15.209(a) (see 15.205(c)).

**Limit in restricted band:**

Frequency of emission (MHz)	Field strength (uV/m)	Field strength (dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

**6.6.2 Test Method**

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/1MHz	15
4000~18000	1MHz/1MHz	40
18000~26500	1MHz/1MHz	20

**6.6.3 Measurement Results:**

A “reference path loss” is established and  $A_{Rpi}$  is the attenuation of “reference path loss”, and including the gain of receive antenna , the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

$$A_{Rpi} = \text{Cable loss} + \text{Antenna Gain-Preamplifier gain}$$

Result =  $P_{Mea} + A_{Rpl}$ 

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MHz~1GHz	Fig.18	P
	1GHz~3GHz	Fig.19	P
	3GHz~18GHz	Fig.20	P
Power	2.38GHz~2.4GHz	Fig.21	P
Power	2.45GHz~2.5GHz	Fig.22	P

Channel	Frequency Range	Test Results	Conclusion
Ch0 2480MHz	30MHz~1GHz	Fig.23	P
	1GHz~3GHz	Fig.24	P
	3GHz~18GHz	Fig.25	P
All channels	18GHz~26GHz	Fig.26	P

**Ch0 30MHz-1GHz**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.838324	15.09	-25.9	40.99	V
34.700320	12.05	-25.9	37.95	V
47.399556	15.04	-24.9	40.84	V
73.516792	11.53	-28.2	36.13	V
220.939764	12.28	-23.8	36.88	V
764.967572	18.01	-10.5	42.71	H

**Ch0 1GHz-3GHz**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2232.211200	48.63	5.3	74.53	V
2542.773653	52.34	8.9	78.24	V
2625.818269	53.16	9.6	78.96	H



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2715.130577	52.67	10.1	77.27	H
2850.451538	53.21	10.9	77.81	H
2933.335385	54.54	11.3	79.24	V

### Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13065.712067	51.59	16.8	77.49	V
14368.350933	54.43	20.0	80.33	V
14919.194200	56.84	22.1	82.64	V
16185.272933	58.95	25.6	83.55	V
17031.887267	60.39	27.1	84.99	H
17669.933067	61.74	28.8	86.44	H

### Ch39 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.772492	10.41	-25.9	36.31	V
34.507340	13.99	-25.9	39.89	V
37.193628	9.97	-25.4	35.77	V
47.374972	14.31	-24.9	38.91	V
73.639844	13.74	-28.2	38.34	V
905.956180	21.08	-7.4	45.78	H

### Ch39 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2343.591200	50.76	7.6	76.66	H
2568.665577	51.44	9.1	77.34	H
2629.913846	52.56	9.7	78.36	H
2805.914616	53.44	10.5	78.04	H
2905.631538	54.74	11.3	79.34	H

2954.029615	54.34	11.3	79.04	H
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**Ch39 3GHz-18GHz**

Frequency(MHz)	Result(dBuV/m)	ARPI (dB)	PMea(dBuV/m)	Polarity
13664.765400	52.92	17.5	78.82	H
14893.563933	57.29	22.1	83.19	H
15458.608467	56.55	23.3	82.35	H
16021.194467	58.67	25.2	83.27	V
17107.629400	59.99	27.1	84.59	H
17593.567267	62.34	17.5	87.04	H

**All Ch 18GHz~26.5GHz**

Frequency(MHz)	Result(dBuV/m)	ARPI (dB)	PMea(dBuV/m)	Polarity
19525.786000	49.0	6.97	42.03	V
20684.980000	47.7	6.97	40.73	H
22119.789000	45.3	3.05	42.05	V
23627.899000	43.8	3.05	40.75	H
24606.319000	43.4	3.05	40.35	V
25244.558000	43.6	3.05	40.55	H

**Note: all the test data shown was peak detected.**

**Conclusion: PASS**

**Test graphs as below:**

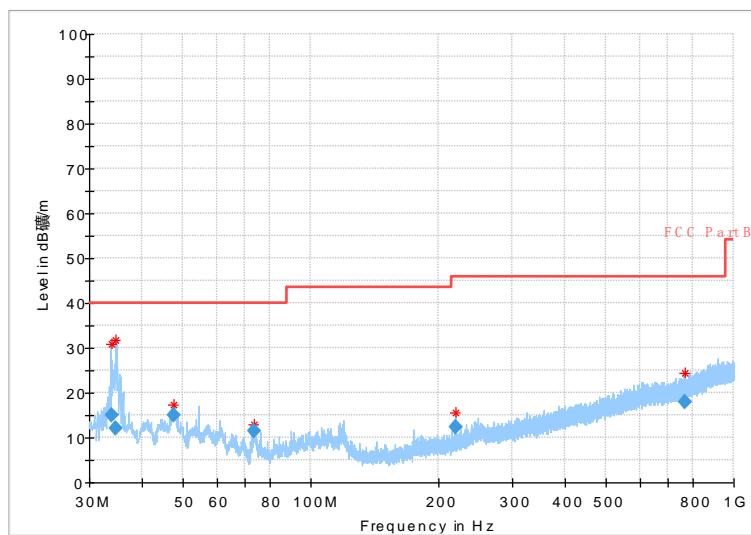


Fig.18 Radiated emission: Ch0, 30MHz~1GHz

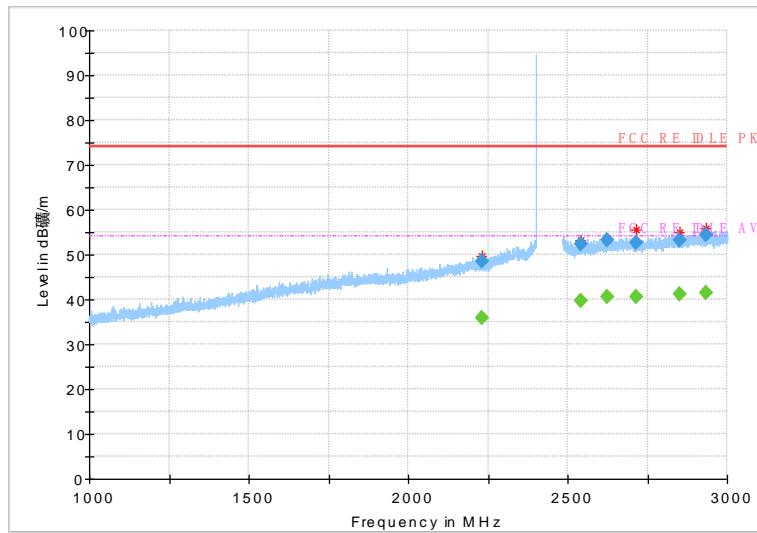


Fig.19 Radiated emission: Ch0, 1GHz~3GHz

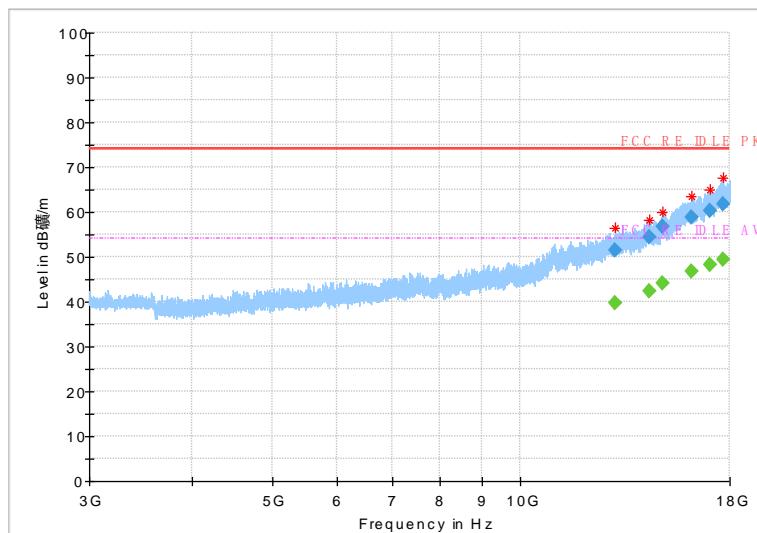


Fig.20 Radiated emission: Ch0, 3GHz~18GHz

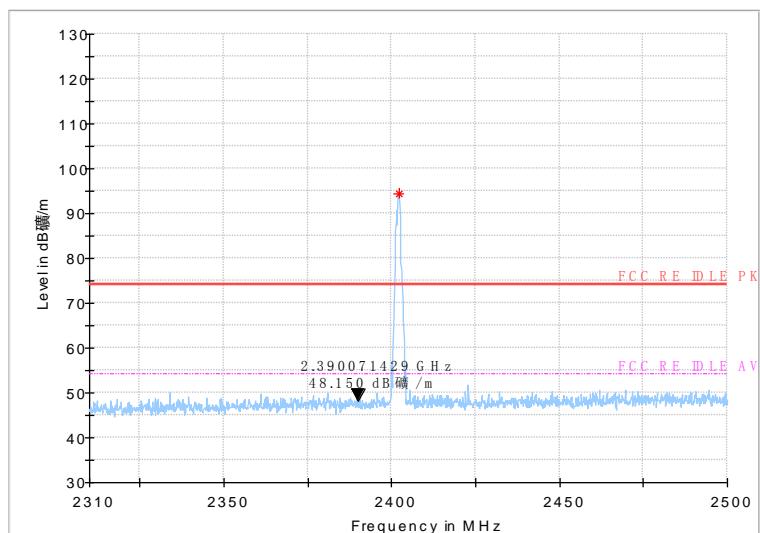


Fig.21 Radiated emission (Power): low channel

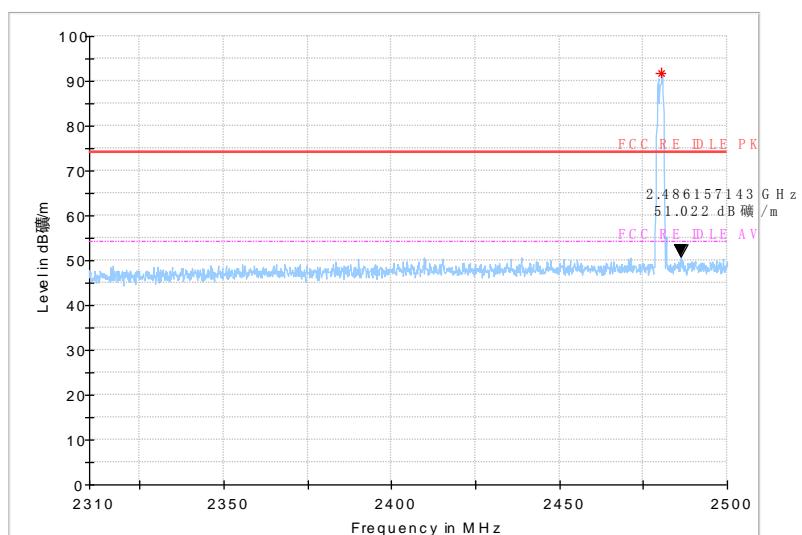


Fig.22 Radiated emission (Power): high channel

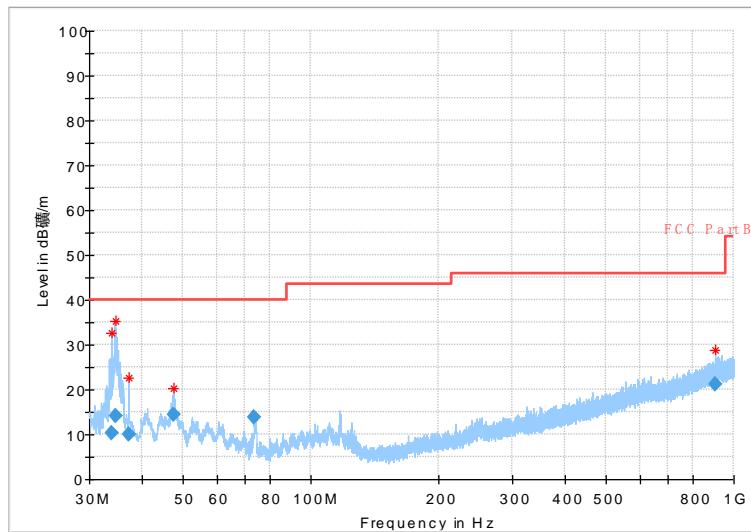


Fig.23 Radiated emission: Ch39, 30MHz~1GHz

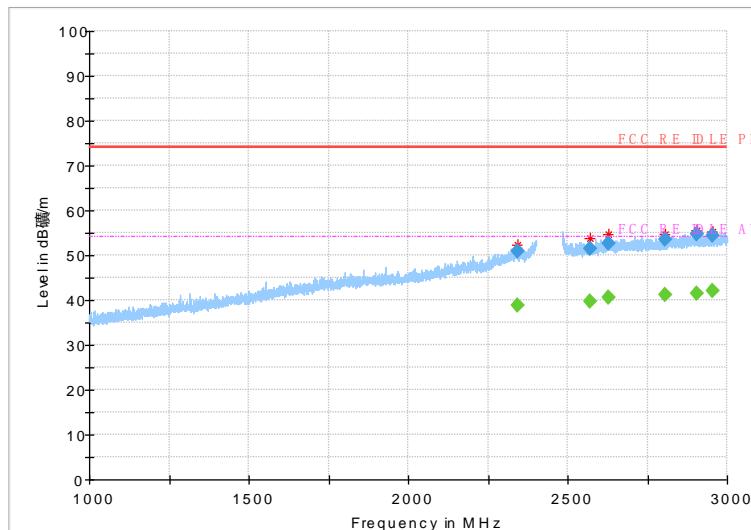


Fig.24 Radiated emission: Ch39, 1GHz~3GHz

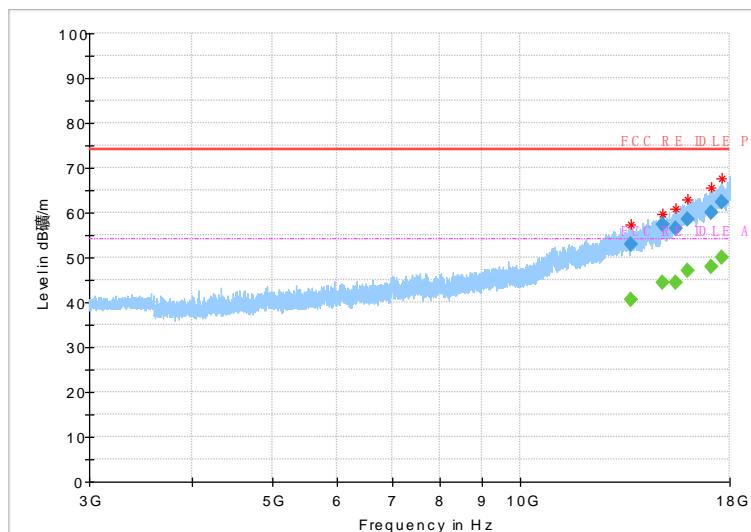


Fig.25 Radiated emission: Ch39, 3GHz~18GHz

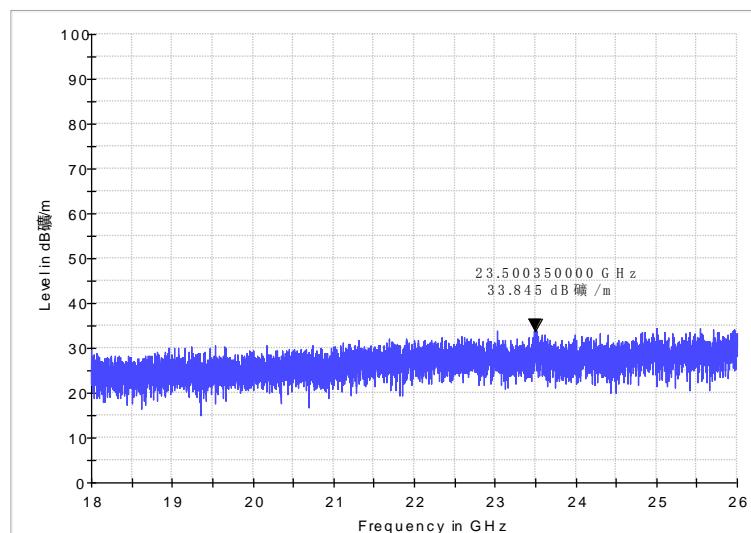


Fig.26 Radiated emission: 18 GHz - 26 GHz

## 7. Test Equipments and Ancillaries Used For Tests

The test equipments and ancillaries used are as follows.

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal.interval
1	Vector Signal Analyser	FSQ26	101096	Rohde&Schwarz	2016-05-12	1
2	Bluetooth Tester	CBT32	100785	Rohde&Schwarz	2016-05-12	1
3	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2016-05-12	1

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal.interval
1	Universal Radio Communicati	CMU200	123126	R&S	2016-05-12	1
2	Test Receiver	ESU40	100307	R&S	2016-05-12	1
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2014-11-05	3
4	Double Ridged Guide Antenna	ETS-3117	00135885	ETS	2014-05-06	3
5	2-Line V-Network	ENV216	101380	R&S	2016-05-12	1

### Anechoic chamber

Fully anechoic chamber by Frankonia German.

## 8. Test Environment

**Shielding Room1** (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

**Control room** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

**Fully-anechoic chamber1** (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

**Fully-anechoic chamber2** (Tapered Section: 8.75 meters×3.66 meters×3.66 meters, Rectangular Section: 7.32 meters×3.97 meters×3.66 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %



## RF Test Report

Report No.: I16D00097-BLE

Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 30MHz to 40000MHz



## **ANNEX A. Deviations from Prescribed Test Methods**

No deviation from Prescribed Test Methods.

\*\*\*\*\*End The Report\*\*\*\*\*