SHEN ZHEN ZHIKE COMMUNICATION CO.,LTD

GSM Mobile Phone

Main Model: i9
Serial Model: i9 Pro

March 15, 2012
Report No.: 12070027-FCC-R2-V1

(This report supersedes NONE)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Deon Dai	Alex Liu	
Deon Dai Compliance Engineer	Alex Liu Technical Manager	

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Test result presented in this test report is applicable to the representative sample only.

RF Test Report

To: FCC Part 15.247: 2011

SIEMIC, INC.
Accessing global markets

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

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Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety

Accreditations for Product Certifications

Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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CONTENTS

1 EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programme was to demonstrate compliance of the SHEN ZHEN ZHIKE COMMUNICATION CO.,LTD ,GSM Mobile Phone and model: i9 against the current Stipulated Standards. The GSM Mobile Phone has demonstrated compliance with the FCC Part 15.247: 2011.

EUT Information

EUT Description	:	**GSM Mobile Phone**
Main Model	:	**i9**
Serial Model	:	**i9 Pro (Note)**
Antenna Gain	:	**GSM: 1dBi** **PCS: 0.5dBi** **Bluetooth: 2dBi**
Input Power	:	**Powered by Power Adapter** **Input:100-240 VAC, 50/60 Hz, 0.15A** **Output: DC 5.0 V, 500 mA** **Li-ion Rechargeable battery** **Model : BL-4D** **Charging Voltage: 3.7 V 1200 mAh** **Restrictive Voltage: 4.2 V**
Classification Per Stipulated Test Standard	:	**FCC Part 15.247: 2011**

Note: *There is no electrical change has been made to equipment that alters the compliance characteristics. The difference of these three models is for different logo and color.*

2 TECHNICAL DETAILS

Purpose	**Compliance testing of GSM Mobile Phone with stipulated standard**
Applicant / Client	**SHEN ZHEN ZHIKE COMMUNICATION CO.,LTD** **1805， Tower A , Phase I, Tianan High-Tech Plaza, Futian District, Shenzhen China**
Manufacturer	**SHENZHEN GSTAR TELECOMMUNICATION CO., LTD** **ROOM 501, NO.88 PAIBANG XINGWANG ROAD, SILIAN COMMUNITY, HENGGANG STREET, LONGGANG DISTRICT, SHENZHEN, P. R. CHINA**
Laboratory performing the tests	**SIEMIC Nanjing (China) Laboratories** **NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China** **Tel:+86(25)86730128/86730129** **Fax:+86(25)86730127** **Email:info@siemic.com**
Test report reference number	**12070027-FCC-R2-V1**
Date EUT received	**March 1, 2012**
Standard applied	**FCC Part 15.247: 2011**
Dates of test (from – to)	**March 9, 2012**
No of Units	**#1**
Equipment Category	**DSS**
Trade Name	iPro
RF Operating Frequency (ies)	**GSM850 TX : 824.2 ~ 848.8 MHz; RX :869.2 ~ 893.8 MHz** **PCS1900 TX : 1850.2 ~ 1909.8 MHz; RX :1930.2 ~ 1989.8 MHz** **Bluetooth: 2402 - 2480 MHz** **WiFi: 2412 – 2462 MHz**
Number of Channels	**300CH (PCS1900) and 125CH (GSM850)** **Bluetooth: 79CH** **WiFi: 11 CH**
Modulation	**GSM\PCS: GMSK** **Bluetooth: GFSK** **WiFi: DSSS**
FCC ID	**AODZKTXIPROI9**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

DSS Product

Test Results Summary

Test Standard	Description	Product Class	Pass / Fail
§15.247(i), §2.1093	RF Exposure	See Above	Pass
§15.203	Antenna Requirement	See Above	Pass
§15.207(a)	AC Line Conducted Emissions	See Above	Pass
§15.205, §15.209, §15.247(d)	Spurious Emissions	See Above	Pass
§15.247(a)(1)	20 dB Bandwidth	See Above	Pass
§15.247(a)(1)	Channel Separation	See Above	Pass
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	See Above	Pass
§15.247(a)(1)(iii)	Quantity of Hopping Channel	See Above	Pass
§15.247(b)(1)	Peak Output Power	See Above	Pass
§15.247(d)	Band Edge	See Above	Pass

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 §15.247 (i) and §2.1093 – RF Exposure Test Result

Standard Requirement:

According to §15.247 (i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters

<table>
<tr><th></th><th>Individual Transmitter</th><th>Simultaneous Transmission</th></tr>
<tr><td>Licensed Transmitters</td><td>Routine evaluation required</td><td rowspan="2">SAR not required:
Unlicensed only
○ when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas
Licensed & Unlicensed
○ when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas
○ when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3
SAR required:
Licensed & Unlicensed
antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition
Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</td></tr>
<tr><td>Unlicensed Transmitters</td><td>When there is no simultaneous transmission –
○ output ≤ 60/f: SAR not required
○ output > 60/f: stand-alone SAR required
When there is simultaneous transmission –
Stand-alone SAR not required when
○ output ≤ $2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas
○ output ≤ P_{Ref} and antenna is ≥ 2.5 cm from other antennas
○ output ≤ P_{Ref} and antenna is < 2.5 cm from other antennas, each with either output power ≤ P_{Ref} or 1-g SAR < 1.2 W/kg
Otherwise stand-alone SAR is required
When stand-alone SAR is required
○ test SAR on highest output channel for each wireless mode and exposure condition
○ if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures</td></tr>
<tr><td>Jaw, Mouth and Nose</td><td>Flat phantom SAR required
○ when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues
○ position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations</td><td>When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.</td></tr>
</table>

Routine SAR evaluation refers to that specifically required by §2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

Two antennas are available for the EUT, (GSM antenna, and Bluetooth antenna).

BT and GSM Antenna separation is **7cm>5cm**, and the maximum output power is **0.97mW<2* Pref(12mW)**. According to KDB 648474, no stand-alone required for BT

Test Result: Pass

The SAR measurement is exempt.

5.2 §15.203 – Antenna Requirement Test Result

Standard Requirement:

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Connector Construction

The EUT has 2 antennas, one is a monopole antenna for Bluetooth and WIFI, the gain is 2.0dBi; one is a PIFA antenna for GSM, the gain are 1dBi for GSM and 0.5dBi for PCS which in accordance to section 15.203, please refer to the internal photos.

Test Result: Pass

5.3 §15.207 (a) – AC Line Conducted Emissions Test Result

Standard Requirement:

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

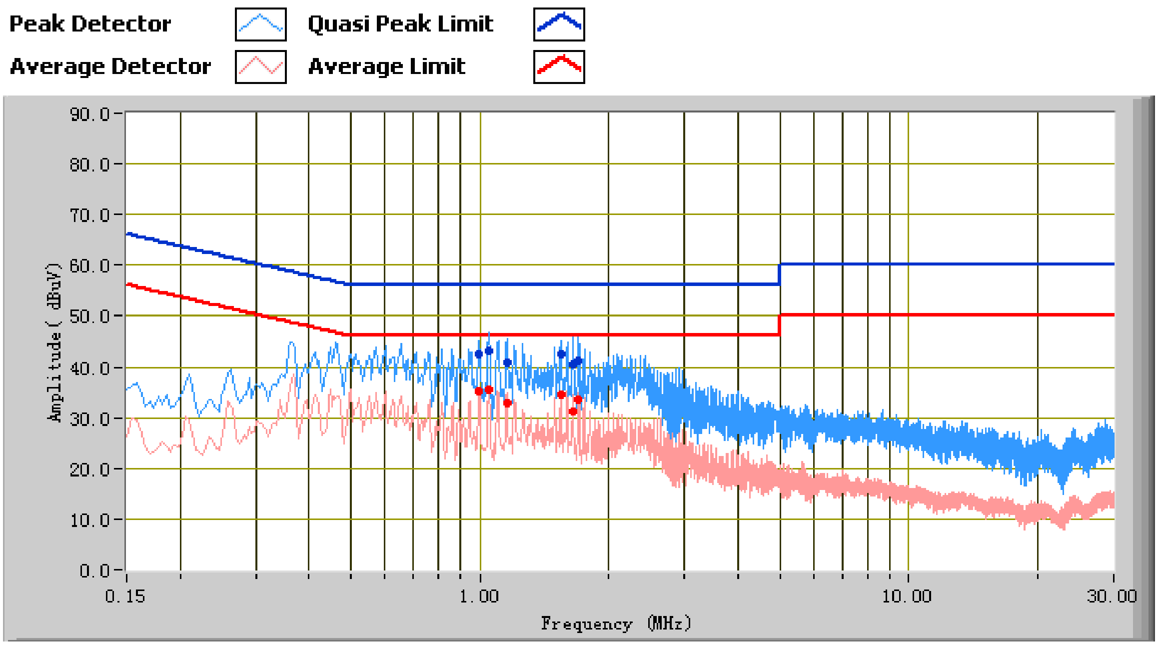
1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions

Environmental Conditions	Temperature	22°C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

5. Test date : March 9, 2012
   Tested By : Deon Dai

Test Result: Pass

Test Mode:	GFSK Transmitting

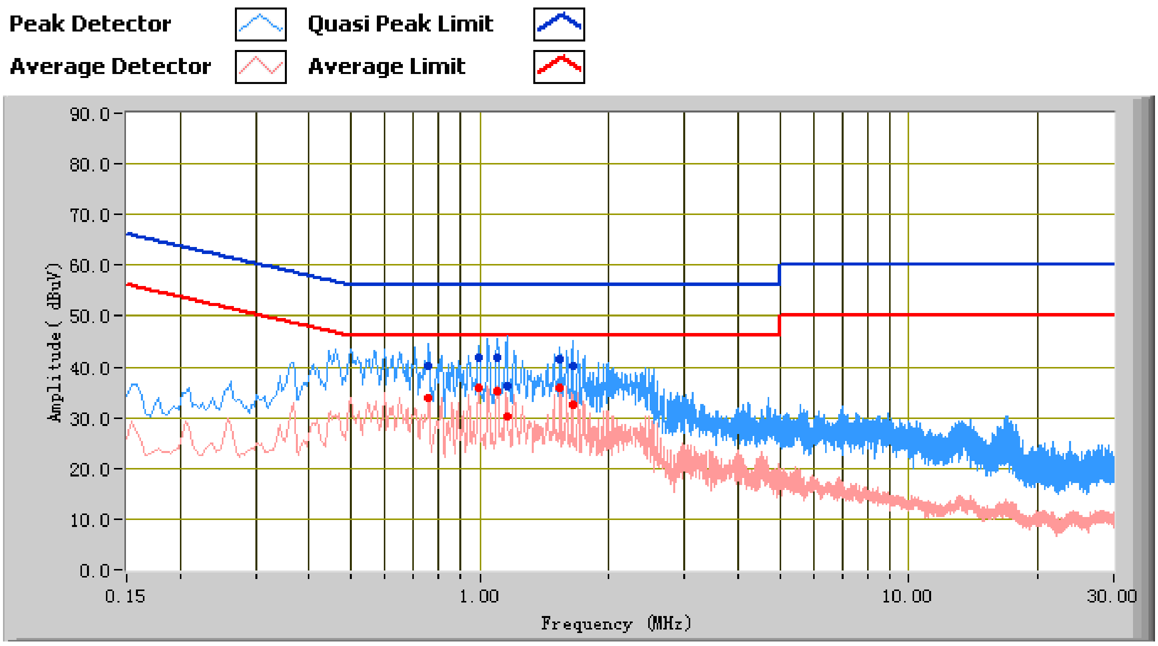


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
1.05	43.17	56.00	-12.83	35.67	46.00	-10.33	10.16
1.70	41.02	56.00	-14.98	33.44	46.00	-12.56	10.19
1.65	40.56	56.00	-15.44	31.10	46.00	-14.90	10.19
1.15	40.78	56.00	-15.22	32.81	46.00	-13.19	10.17
0.99	42.65	56.00	-13.35	35.24	46.00	-10.76	10.16
1.54	42.51	56.00	-13.49	34.43	46.00	-11.57	10.18

Test Mode:	GFSK Transmitting



Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
1.16	36.35	56.00	-19.65	30.17	46.00	-15.83	10.17
1.10	41.85	56.00	-14.15	35.27	46.00	-10.73	10.16
1.65	40.11	56.00	-15.89	32.71	46.00	-13.29	10.19
0.76	40.04	56.00	-15.96	33.84	46.00	-12.16	10.14
0.99	41.87	56.00	-14.13	35.81	46.00	-10.19	10.16
1.54	41.48	56.00	-14.52	35.81	46.00	-10.19	10.18

5.4 §15.209, §15.205 & §15.247(d) - Spurious Emissions Test Result

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz (QP only @ 3m & 10m) is +5.6dB/-4.5dB (for EUT s < 0.5m X 0.5m X 0.5m), in the range 1GHz – 6GHz (PK & AV only @ 3m) is +4dB/-4dB (for EUT s < 0.5m X 0.5m X 0.5m).
4. Environmental Conditions

Environmental Conditions	Temperature	22^{o}C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

5. Test date : March 9, 2012
   Tested By : Deon Dai

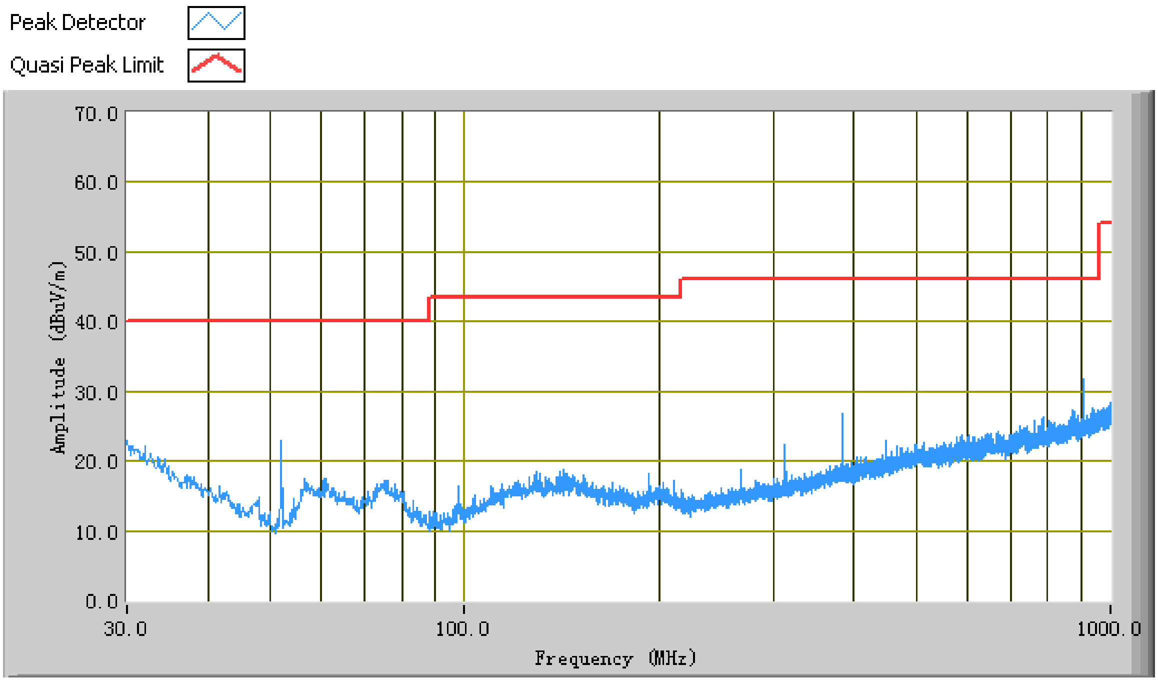
Standard Requirement:

The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Test Result: Pass

Test Mode:	GFSK Transmitting

Below 1GHz



Test Data

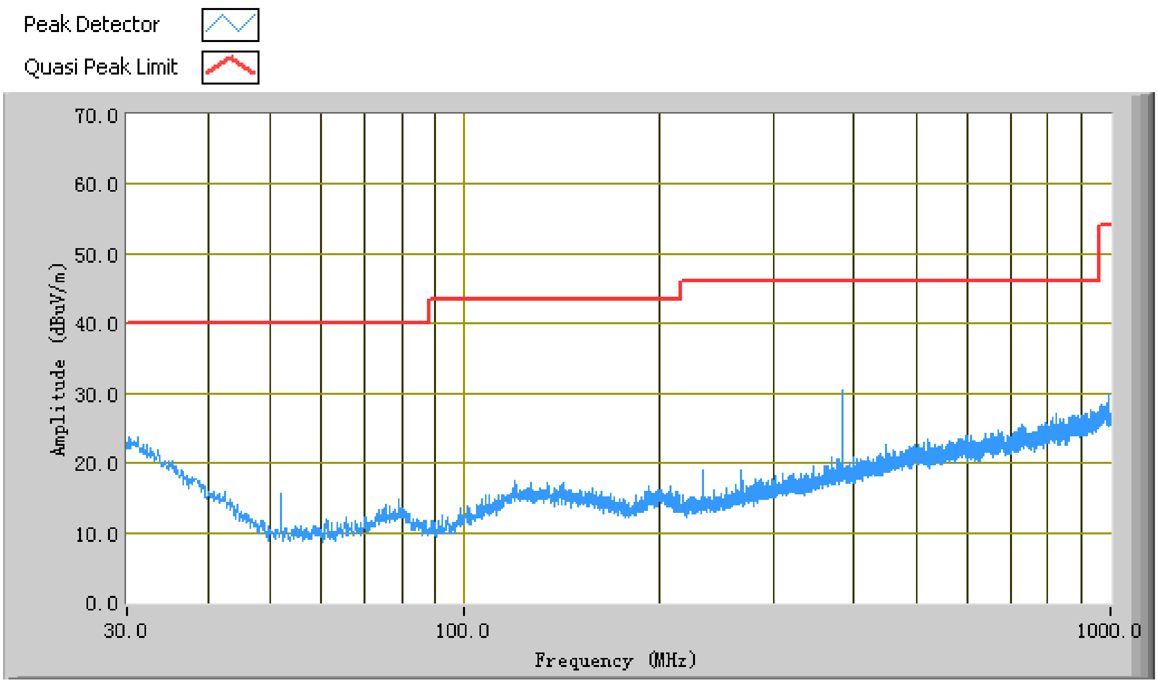
Vertical Polarity Plot @3m

Frequency (MHz)	Peak (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
908.58	31.84	111.90	V	400.00	-21.04	46.00	-14.16
51.95	22.98	193.40	V	100.00	-37.42	40.00	-17.02
30.00	22.80	224.70	V	100.00	-23.74	40.00	-17.20
937.80	27.52	5.90	V	400.00	-21.21	46.00	-18.48
872.32	27.43	245.10	V	300.00	-21.97	46.00	-18.57
945.32	27.39	221.50	V	300.00	-21.03	46.00	-18.61

Note: QP measurement is not performed because which is below 20 dB of limit.

Test Mode:	**GFSK Transmitting**

Below 1GHz



Test Data

Horizontal Polarity Plot @3m

Frequency (MHz)	Peak (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
385.50	30.55	221.60	H	100.00	-30.62	46.00	-15.45
30.12	23.78	107.90	H	200.00	-22.53	40.00	-16.22
931.49	27.60	207.80	H	100.00	-20.78	46.00	-18.40
957.68	27.41	188.60	H	200.00	-19.99	46.00	-18.59
945.56	27.39	272.60	H	300.00	-20.57	46.00	-18.61
940.22	27.25	55.00	H	100.00	-20.82	46.00	-18.75

Note: QP measurement is not performed because which is below 20 dB of limit.

Test Mode:	**GFSK Transmitting**

Above 1 GHz

Note: Other Bluetooth modes were verified; only the result of worst case DH5 mode was presented.

Low Channel (2402 MHz)

Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4804	37.68	AV	150	120	V	34	2.6	26.79	47.49	54	-6.51
4804	36.59	AV	160	120	H	33.8	2.6	26.79	46.20	54	-7.80
4804	53.64	PK	150	120	V	34	2.6	26.79	63.45	74	-10.55
4804	52.45	PK	160	120	H	33.8	2.6	26.79	62.06	74	-11.94
1322.54	35.65	AV	140	110	V	25.3	1.3	26.51	35.74	54	-18.26
1322.54	34.85	AV	150	110	H	23.8	1.3	26.51	33.44	54	-20.56
1322.54	44.61	PK	140	110	V	23.8	1.3	26.51	43.20	74	-30.80
1322.54	45.25	PK	150	110	H	25.3	1.3	26.51	45.34	74	-28.66

Middle Channel (2441 MHz)

Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4882	38.25	AV	170	130	V	33.6	2.6	26.78	47.67	54	-6.33
4882	37.66	AV	150	130	H	33.8	2.6	26.78	47.28	54	-6.72
4882	50.25	PK	170	130	V	33.6	2.6	26.78	59.67	74	-14.33
4882	51.63	PK	150	130	H	33.8	2.6	26.78	61.25	74	-12.75
1348.55	31.85	AV	120	120	V	25.1	1.3	26.65	31.60	54	-22.40
1348.55	31.77	AV	140	120	H	25.1	1.3	26.65	31.52	54	-22.48
1348.55	41.55	PK	120	120	V	25.3	1.3	26.65	41.50	74	-32.50
1348.55	42.98	PK	140	120	H	25.3	1.3	26.65	42.93	74	-31.07

High Channel (2480 MHz)

Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4960	36.88	AV	150	120	V	34.6	2.7	26.75	47.43	54	-6.57
4960	36.75	AV	120	130	H	34.7	2.7	26.75	47.40	54	-6.60
4960	53.34	PK	150	120	V	34.6	2.7	26.75	63.89	74	-10.11
4960	53.99	PK	120	130	H	34.7	2.7	26.75	64.64	74	-9.36
1422.25	31.25	AV	180	110	V	25.3	1.4	26.65	31.30	54	-22.70
1422.25	32.05	AV	180	110	H	25.5	1.4	26.65	32.30	54	-21.70
1422.25	44.56	PK	180	110	V	25.3	1.4	26.65	44.61	74	-29.39
1422.25	43.54	PK	180	110	H	25.5	1.4	26.65	43.79	74	-30.21

Spurious emissions in restricted band

Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2383.65	31.64	AV	80	120	V	30.1	1.8	26.83	36.71	54	-17.29
2484.26	31.85	AV	60	110	V	30.6	1.8	26.83	37.42	54	-16.58
2484.26	30.58	AV	110	130	H	30.6	1.8	26.83	36.15	54	-17.85
2383.65	32.58	AV	130	120	H	30.1	1.8	26.83	37.65	54	-16.35
2484.26	40.52	PK	60	110	V	30.6	1.8	26.83	46.09	74	-27.91
2383.65	41.95	PK	80	120	V	30.1	1.8	26.83	47.02	74	-26.98
2484.26	41.64	PK	110	130	H	30.6	1.8	26.83	47.21	74	-26.79
2383.65	45.25	PK	130	120	H	30.1	1.8	26.83	50.32	74	-23.68

5.5 §15.247(a) (1)-Channel Separation Test Result

1. Conducted Measurement
   EUT was set for low, middle, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions
   Temperature 22°C
   Relative Humidity 50%
   Atmospheric Pressure 1019mbar
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : March 9, 2012
   Tested By : Deon Dai

Standard Requirement:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

Procedures:

1. Place the EUT on the table and set it in hopping function transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span, Video (or Average) Bandwidth (VBW) ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
5. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

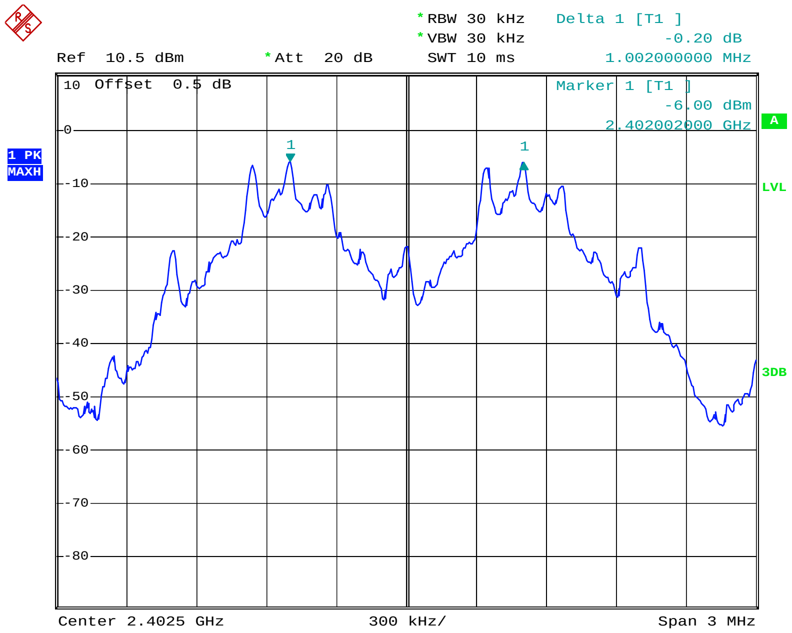
Test Result: Pass

Test Mode:	GFSK Transmitting

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.002	0.705	Pass
Adjacency Channel	2403			
Middle Channel	2440	1.002	0.705	Pass
Adjacency Channel	2441			
High Channel	2480	1.002	0.705	Pass
Adjacency Channel	2479			

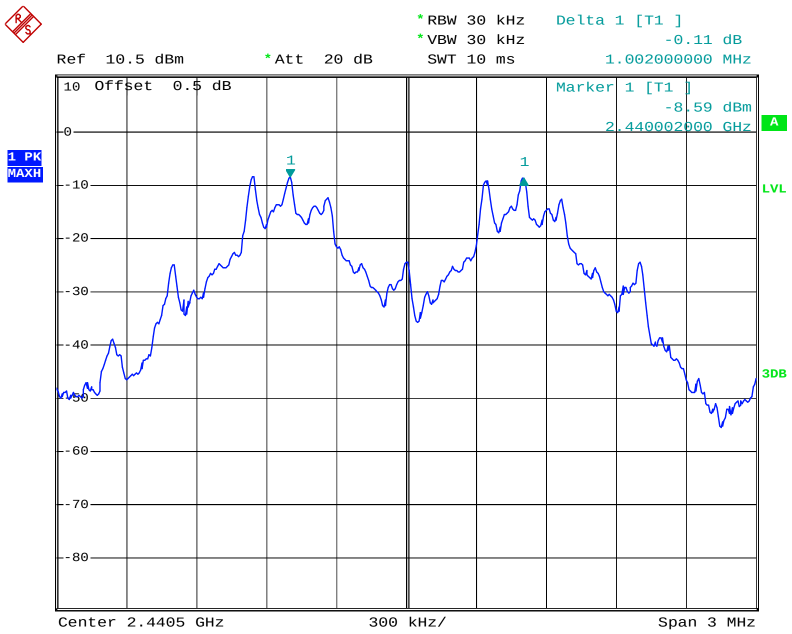
Please refer to the following plots.

Low Channel



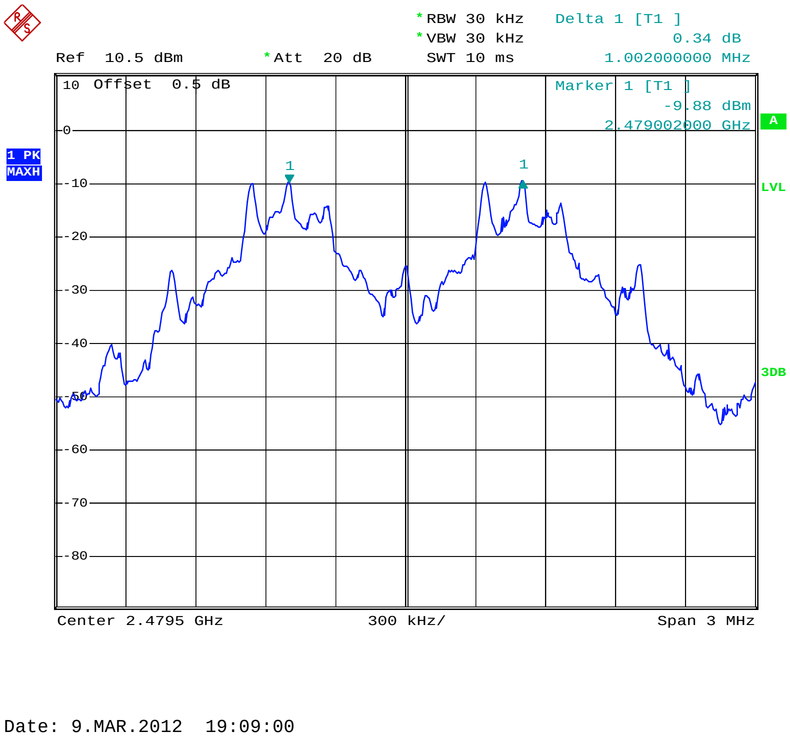
Date: 9.MAR.2012 19:03:20

Middle Channel



Date: 9.MAR.2012 19:07:26

High Channel



§15.247(a) (1) – 20dB Bandwidth Test Result

1. Conducted Measurement
   EUT was set for low, middle, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions
   Temperature 22°C
   Relative Humidity 50%
   Atmospheric Pressure 1019mbar
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : March 9, 2012
   Tested By : Deon Dai

Standard Requirement:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Procedures:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel, RBW ≥ 1% of the 20dB bandwidth, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
4. Set the measured low, middle and high frequency and test 20dB bandwidth with spectrum analyzer.

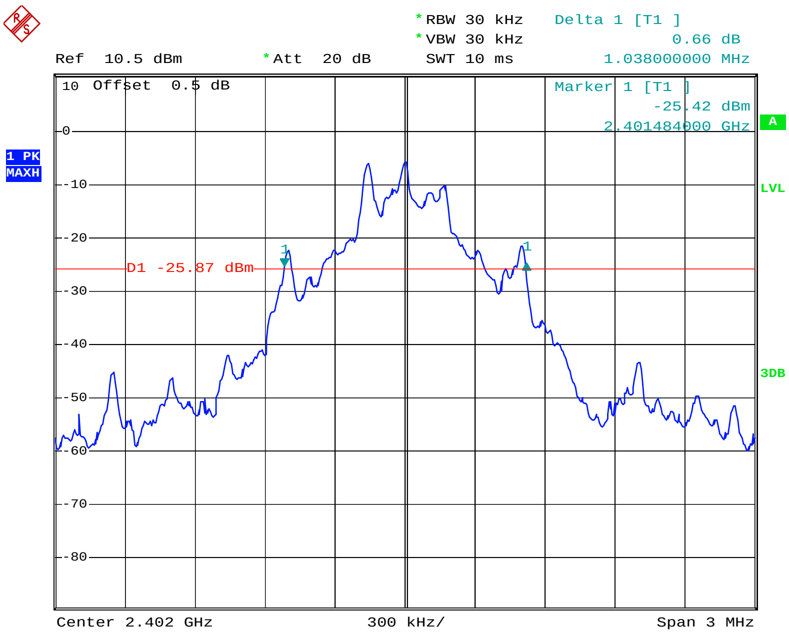
Test Result: Pass

Test Mode:	**GFSK Transmitting**

Channel	**Frequency (MHz)**	**20 dB Bandwidth (MHz)**
Low	2402	1.038
Middle	2441	1.044
High	2480	1.038

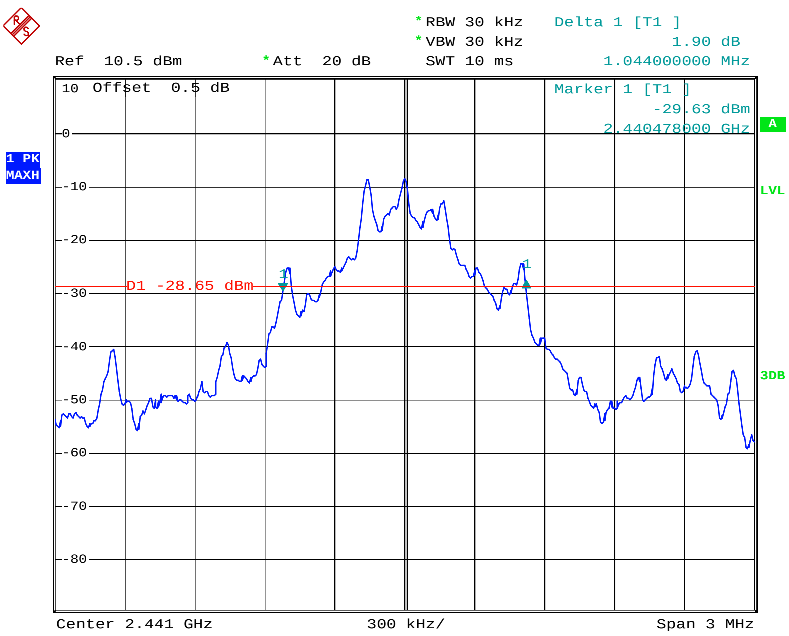
Please refer to the following plots.

Low Channel



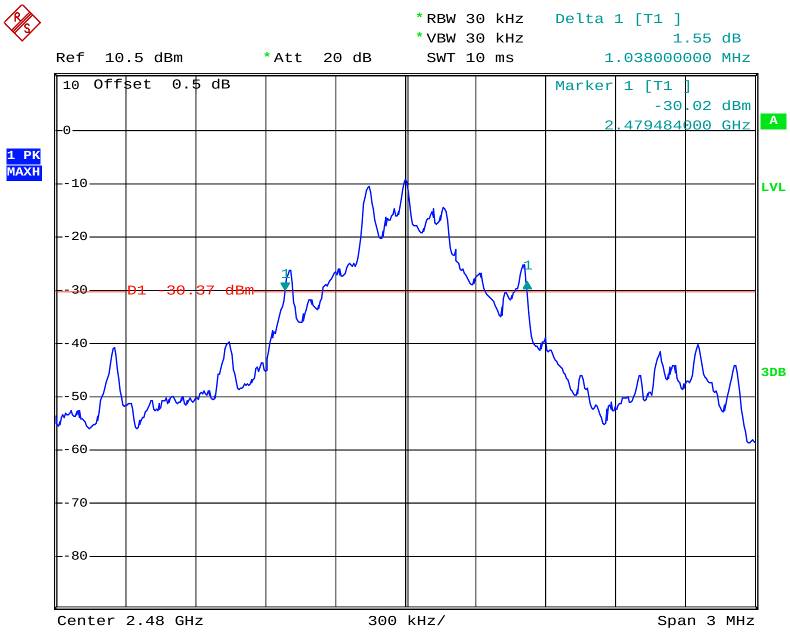
Date: 9.MAR.2012 19:00:07

Middle Channel



Date: 9.MAR.2012 18:58:21

High Channel



Date: 9.MAR.2012 18:55:35

5.6 §15.247(a) (1) (iii)-Number of Hopping Channels Test Result

1. Conducted Measurement
   EUT was set for low, middle, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions
Environmental Conditions	Temperature	22°C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar
4. Test date : March 9, 2012
   Tested By : Deon Dai

Standard Requirement:

According to §15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5MHz band shall use at least 15 channels.

Procedures:

1. Place the EUT on the table and set it in hopping function transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Start=2400MHz, Stop = 2483.5MHz, Span = the frequency band of operation, RBW ≥1% of the span, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
4. Count the quantity of peaks to get the number of hopping channels.

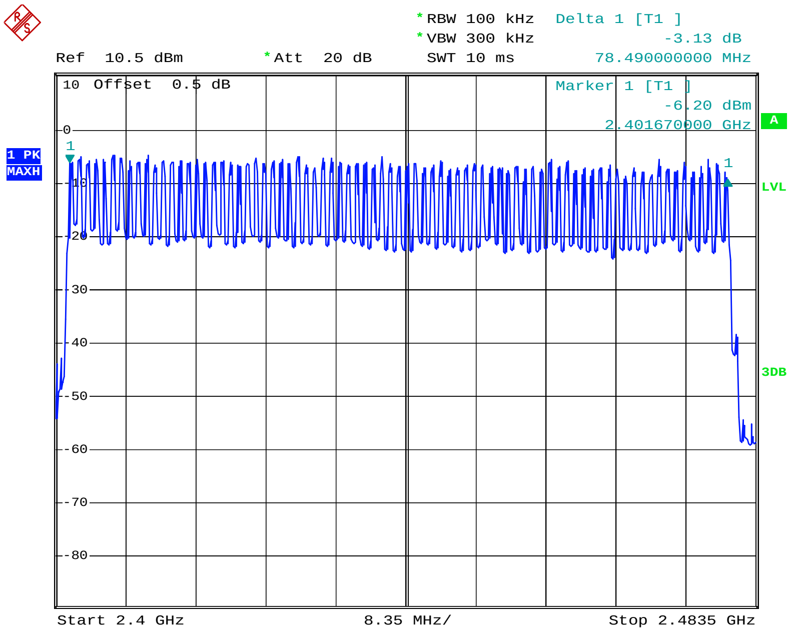
Test Result: Pass

Test Mode:	Hopping Mode With GFSK Modulation

Frequency Range (MHz)	Number of Hopping Channels	Limit
2400-2483.5	79	≥15

Please refer to following tables and plots

Number of Hopping Channels



Date: 9.MAR.2012 19:15:39

5.7 §15.247(a) (1) (iii) -Time of Occupancy (Dwell Time) Test Result

1. Conducted Measurement
   EUT was set for low, middle, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Environmental Conditions	Temperature	22^{o}C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

4. Test date : March 9, 2012
   Tested By : Deon Dai

Standard Requirement:

According to §15.247(a)(1)(iii), The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Procedures:

1. Place the EUT on the table and set it in transmitting mode and switch on frequency hopping function.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Span = zero span, centered on a hopping channel,
   RBW=1MHz, VBW ≥ RBW, Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold.
4. Calculate the time of occupancy in a period with time occupancy of a burst and quantity of bursts.

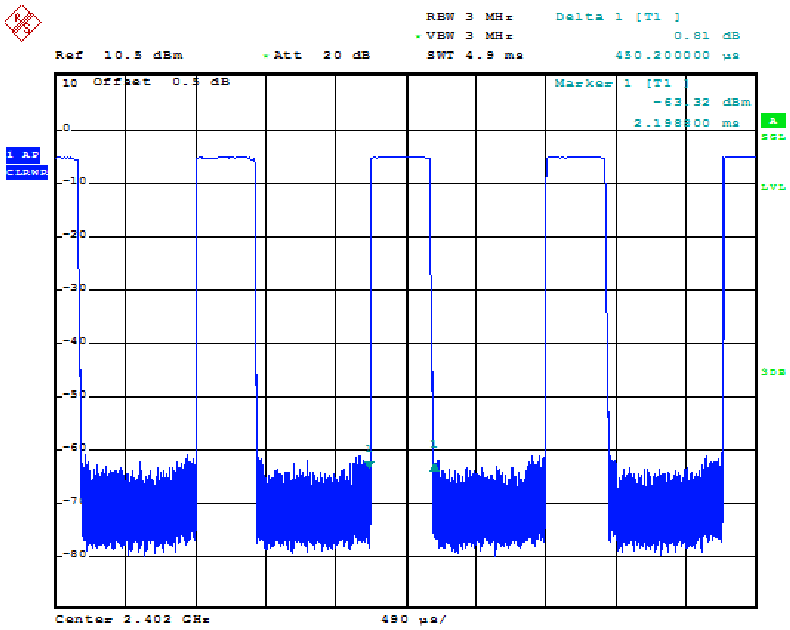
Test Result: Pass

Test Mode:	**Hopping Mode With GFSK Modulation**

Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
DH 1	Low	0.450	0.14400	0.4	Pass
	Middle	0.469	0.15008	0.4	Pass
	High	0.460	0.14720	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Low	1.724	0.27584	0.4	Pass
	Middle	1.724	0.27584	0.4	Pass
	High	1.724	0.27584	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Low	2.978	0.31765	0.4	Pass
	Middle	2.978	0.31765	0.4	Pass
	High	2.978	0.31765	0.4	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

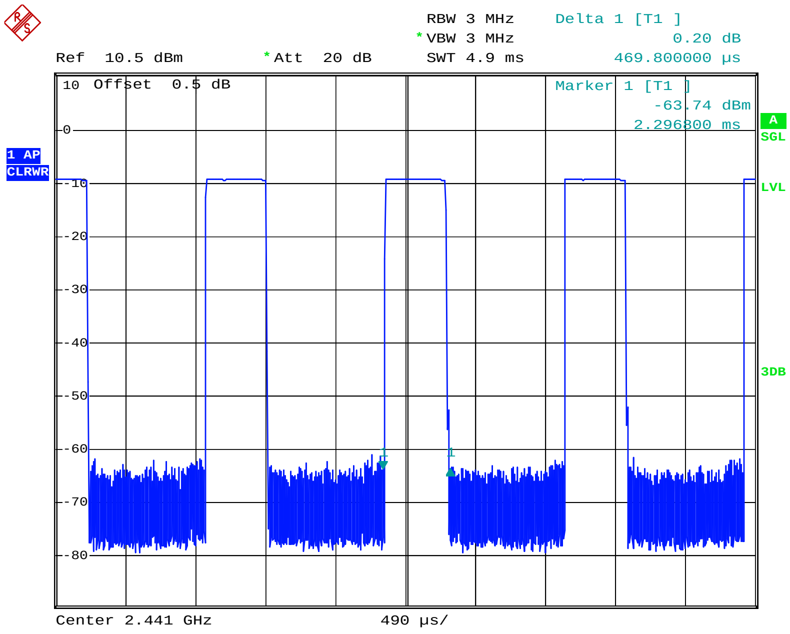
Please refer to the following plots.

Low Channel for DH1



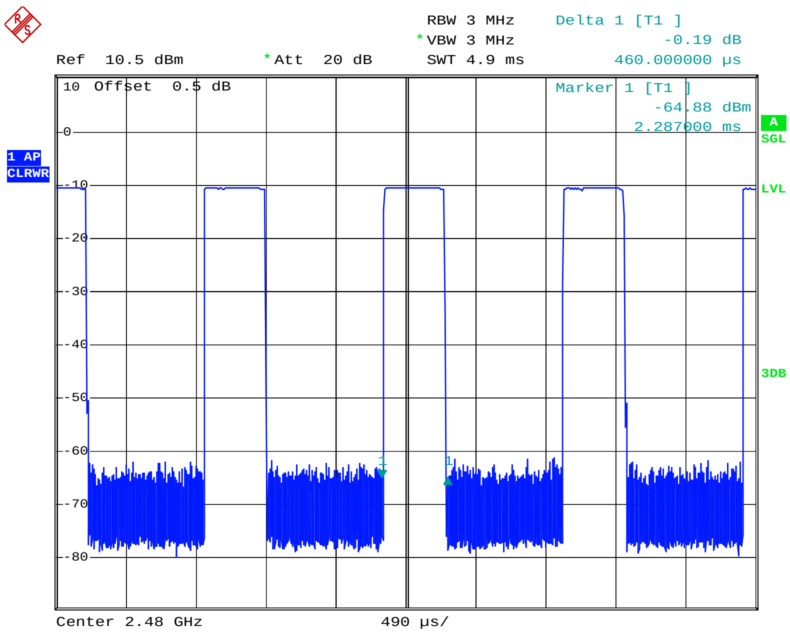
Date: 9.MAR.2012 19:19:57

Middle Channel for DH1



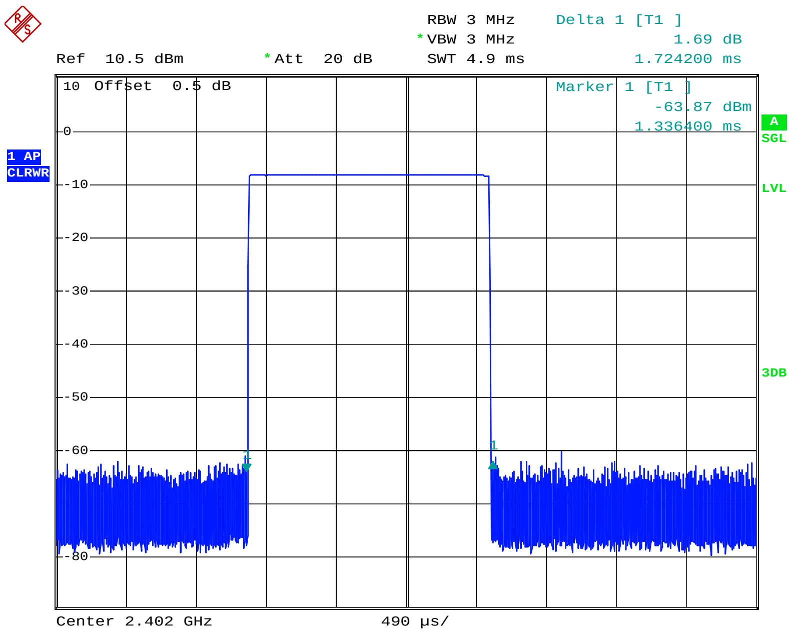
Date: 9.MAR.2012 19:25:01

High Channel for DH1



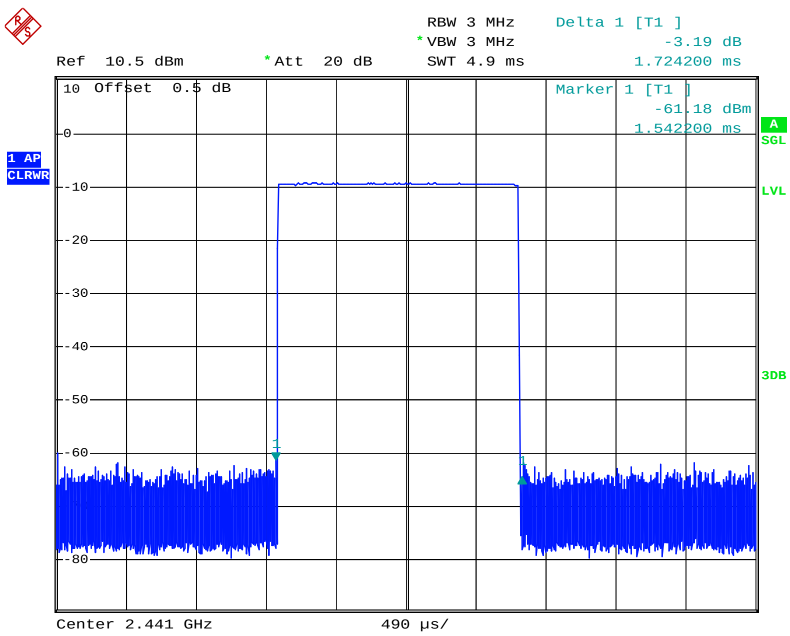
Date: 9.MAR.2012 19:25:53

Low Channel for DH3



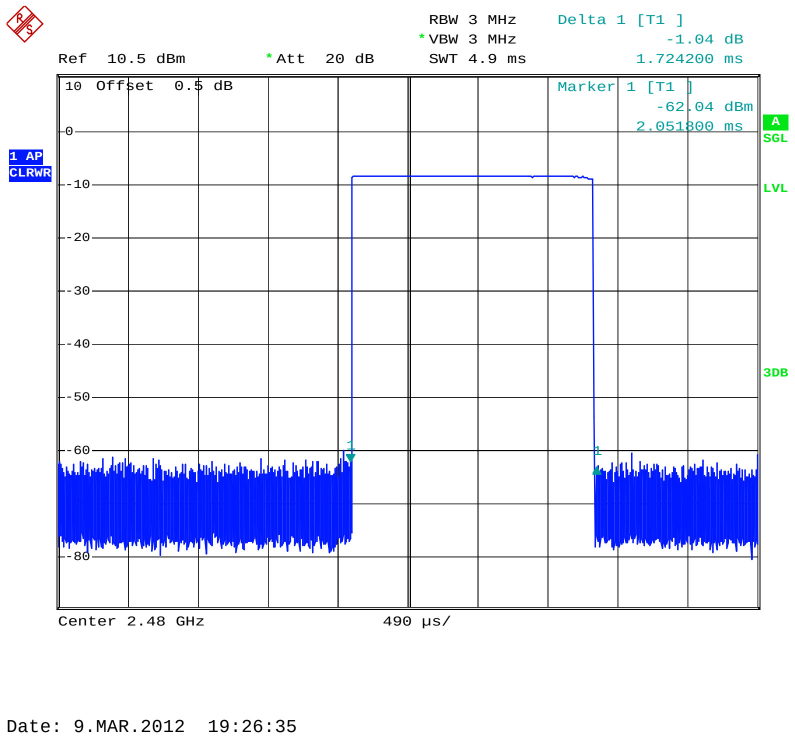
Date: 9.MAR.2012 19:21:02

Middle Channel for DH3

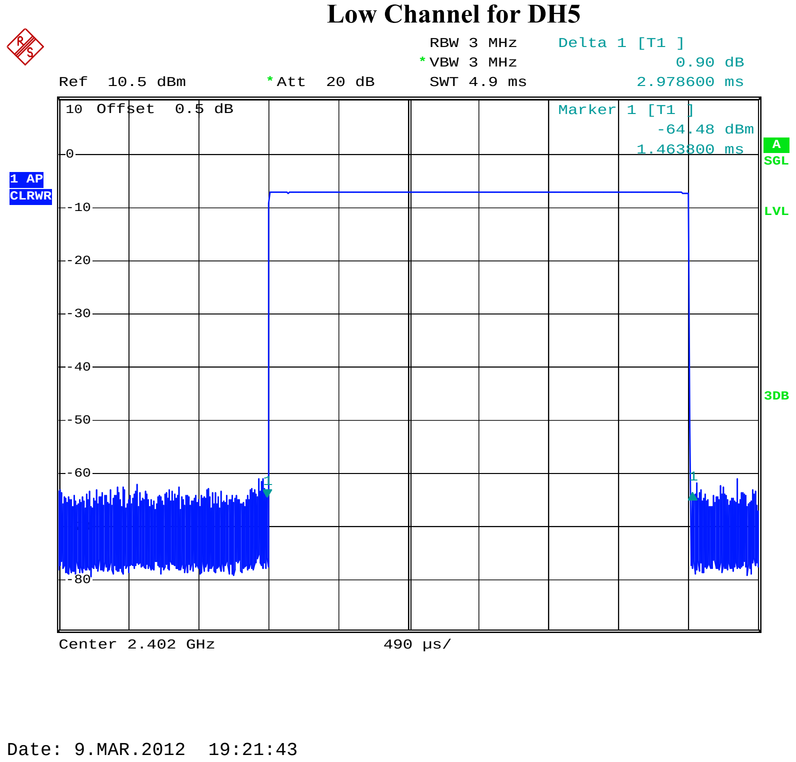


Date: 9.MAR.2012 19:23:56

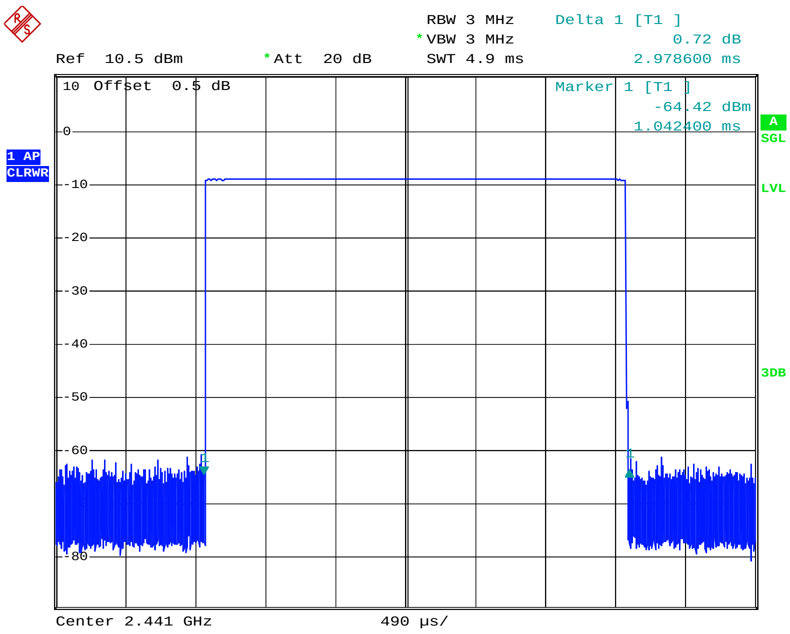
High Channel for DH3



Low Channel for DH5

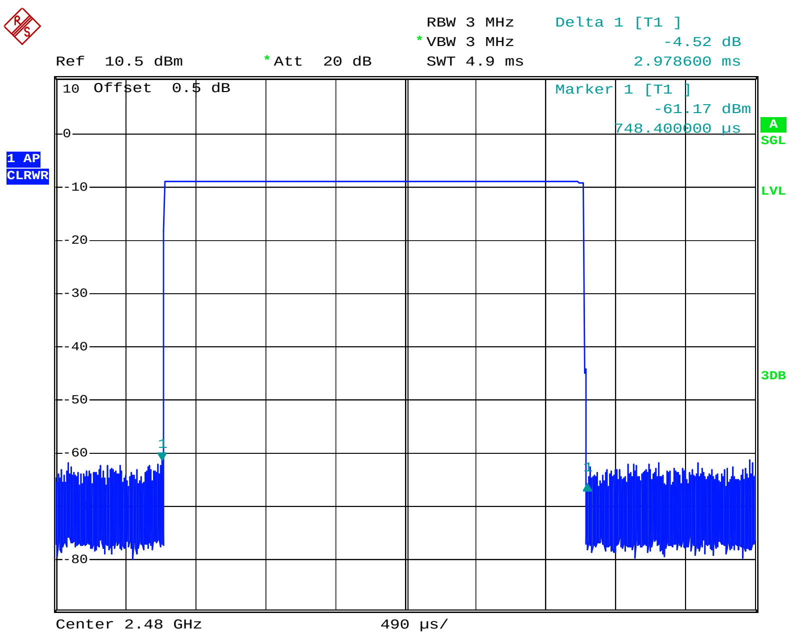


Middle Channel for DH5



Date: 9.MAR.2012 19:23:07

High Channel for DH5



Date: 9.MAR.2012 19:27:06

5.8 §15.247(b) (1) - Peak Output Power Test Result

1. Conducted Measurement
   EUT was set for low, middle, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Environmental Conditions	Temperature	22°C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

4. Test date : March 9, 2012
   Tested By : Deon Dai

Standard Requirement:

According to §15.247(b)(2), For frequency hopping systems in the 2400-2483.5MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band: 0.125watts.

Procedures:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel, RBW > the 20dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep=auto, Detector function=peak, Trace = max hold.
4. Then set the EUT to transmit at low, middle and high channel and measure the conducted output power separately.

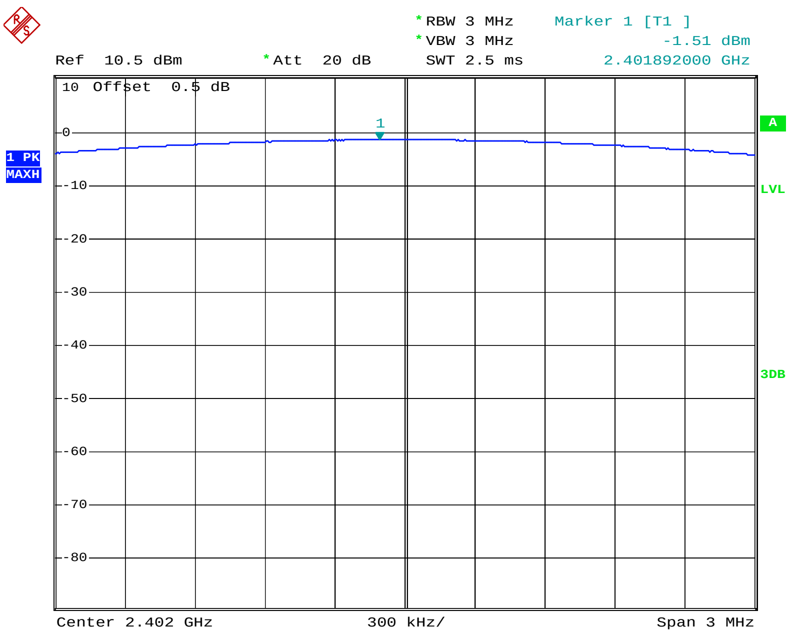
Test Result: Pass

Test Mode:	GFSK Transmitting

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Output Power (mW)	Limit (mW)
Low	2402	-1.51	0.71	125
Middle	2441	-2.40	0.58	125
High	2480	-0.15	0.97	125

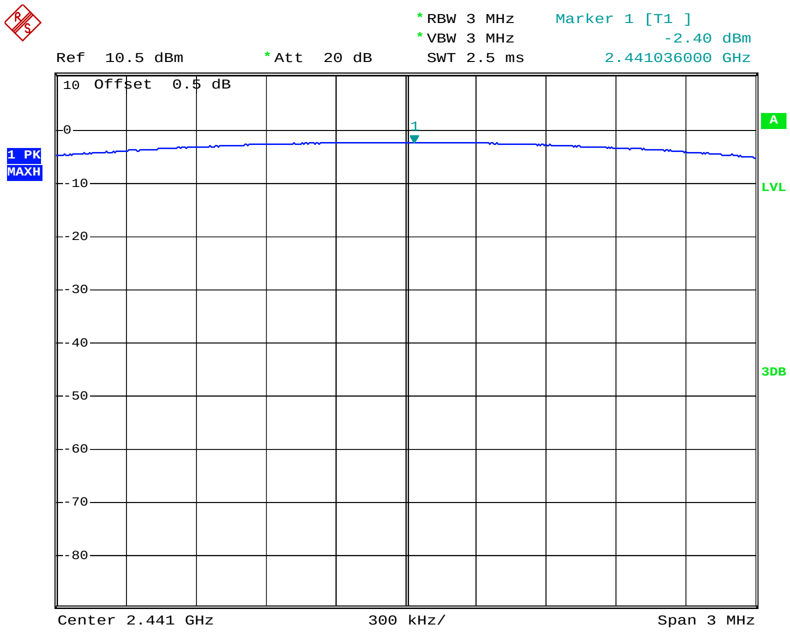
Please refer to the following plots.
Note: *The data above was tested in conducted mode.*

Low Channel



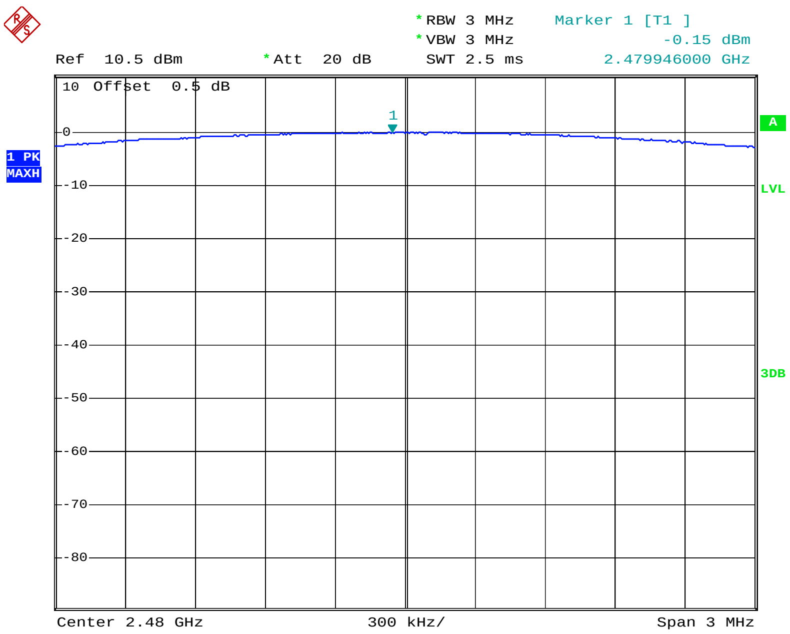
Date: 9.MAR.2012 19:32:08

Middle Channel



Date: 9.MAR.2012 19:31:22

High Channel



Date: 9.MAR.2012 19:30:36

5.9 §15.247(d) - Band Edge Test Result

1. Conducted Measurement
   EUT was set for low and high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Environmental Conditions	Temperature	22°C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

4. Test date : March 9, 2012
   Tested By : Deon Dai

Standard Requirement:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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)).

Procedures:

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

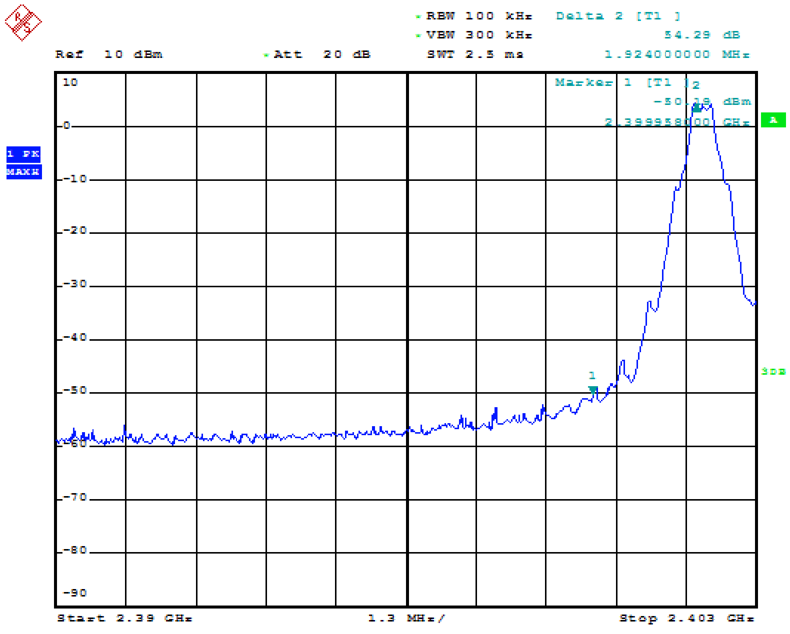
Test Result: Pass

Test Mode:	GFSK Transmitting

Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)
2399.958	54.29	20
2483.788	59.46	20

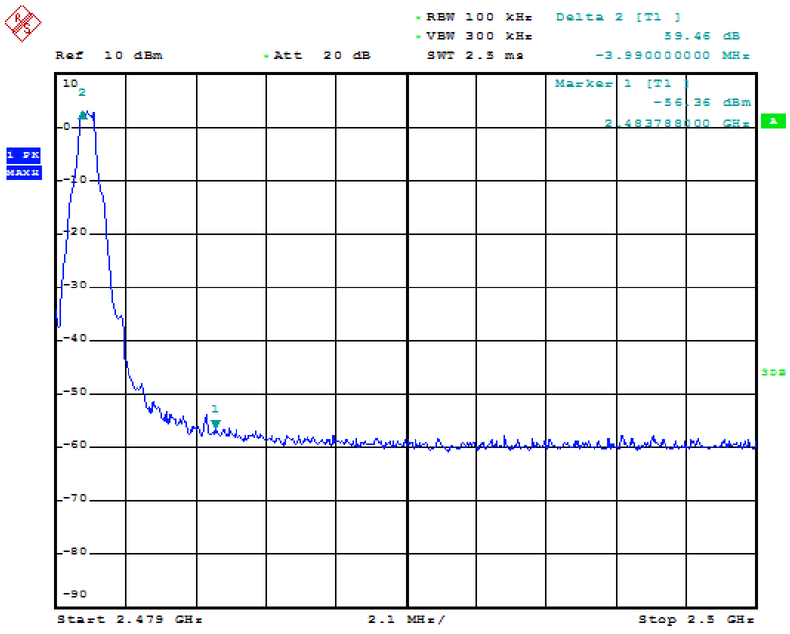
Note: The point fall into the strict band was recorded in FCC 15.209, please refer to the restrict band testing.

Band Edge Lowest Channel



Date: 9.MAR.2012 16:51:57

Band Edge Highest Channel



Date: 9.MAR.2012 16:55:35

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Calibration Date	Calibration Due Date
Com-Power LISN	LI-115	05/26/2011	05/25/2012
Hp Spectrum Analyzer	8563E	01/10/2012	01/09/2013
R&S EMI Receiver	ESPI3	08/26/2011	08/25/2012
Antenna (30 MHz~2 GHz)	JB1	10/04/2011	10/03/2012
ETS-Lindgren Antenna(1 ~18 GHz)	3115	10/04/2011	10/03/2012
A-INFOMW Antenna(1 ~18 GHz)	JXTXLB-10180	06/25/2011	06/24/2012
Horn Antenna (18~40 GHz)	AH-840	07/23/2011	07/22/2012
Microwave Pre-Amp (18~40 GHz)	PA-840	Every 2000 Hours	
Hp Agilent Pre-Amplifier	8447F	05/26/2011	05/25/2012
MITEQ Pre-Amplifier(1 ~ 18 GHz)	AMF-7D-00101800-30-10P	05/26/2011	05/25/2012
Universal Radio Communication Tester	CMU200	05/22/2011	05/22/2012

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

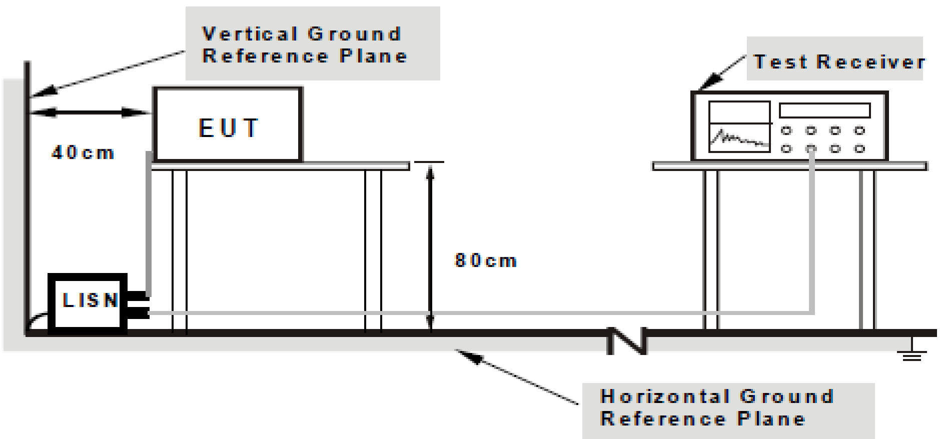
Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration1.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Description of Conducted Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the common scan range from 150kHz to 30MHz; the program will first start a peak and average scan on selectable measurement time and step size. After the program complete the pre-scan, this program will perform the Quasi Peak and Average measurement, based on the pre-scan peak data reduction result.

Sample Calculation Example

At 20MHz limit = 250μV = 47.96dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20MHz = 11.20dB

Q-P reading obtained directly from EMI Receiver = 40.00dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

Annex A. iii. RADIATED EMISSIONS TEST DESCRIPTION

Limit

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500*	3

Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

EUT Characterisation

EUT characterisation, over the frequency range from 30 MHz to 10th Harmonic, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

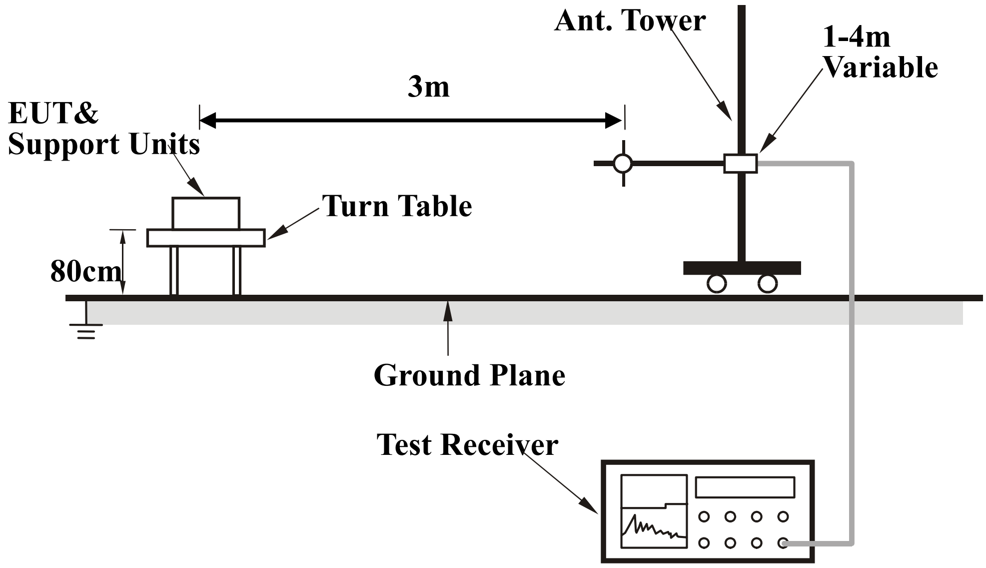
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred; clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS) or EMC chamber.

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on an open test site. As the same purpose, for emission frequencies measured above 1GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured was complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100kHz	100kHz
Above 1000	Peak	1MHz	1MHz
	Average	1MHz	10Hz

Description of Radiated Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the scan on four different antenna heights, 2 antenna polarity, and 360 degrees table rotation. For example, the program was set to run 30MHz to 1GHz scan; the program will first start from a meter antenna height and divide the 30MHz to 1GHz into 10 separate parts of maximum hold sweeps. Each parts of maximum hold sweep, the program will collect the data from 0 degree to 360 degrees table rotation. After the program complete the 1m scan, the antenna continues to rise to 2m and continue the scan. The step will repeated for all specified antenna height and polarity. This program will perform the Quasi Peak measurement after the signal maximization process and pre-scan routine. The final measurement will be base on the pre-scan data reduction result.

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

And the average value is

Average = Peak Value + Duty Factor or

Set RBW = 1MHz, VBW = 10Hz.

Note:

If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1GHz. And the measuring instrument is set to quasi peak detector function.

Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Please see attachment

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

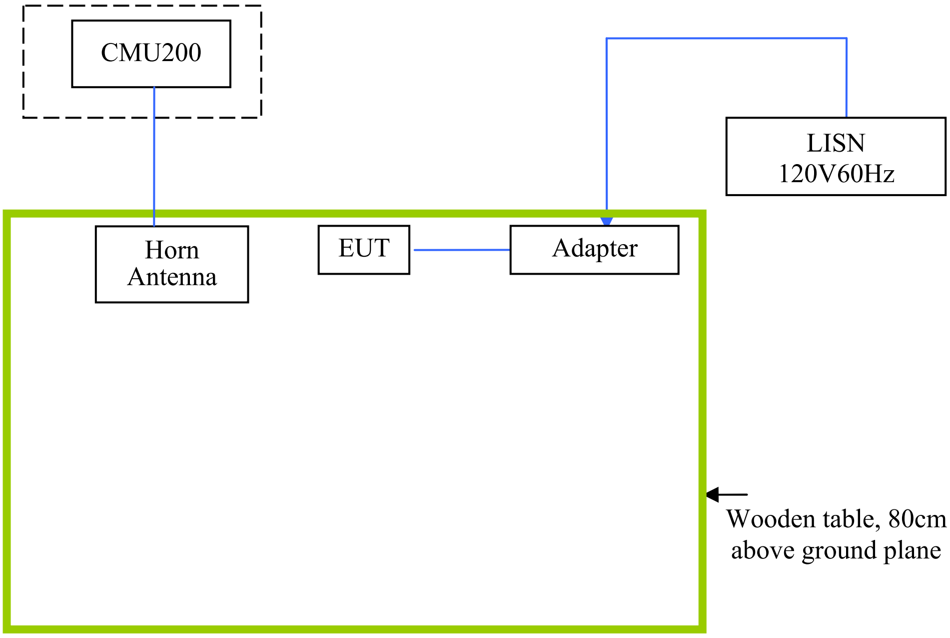
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

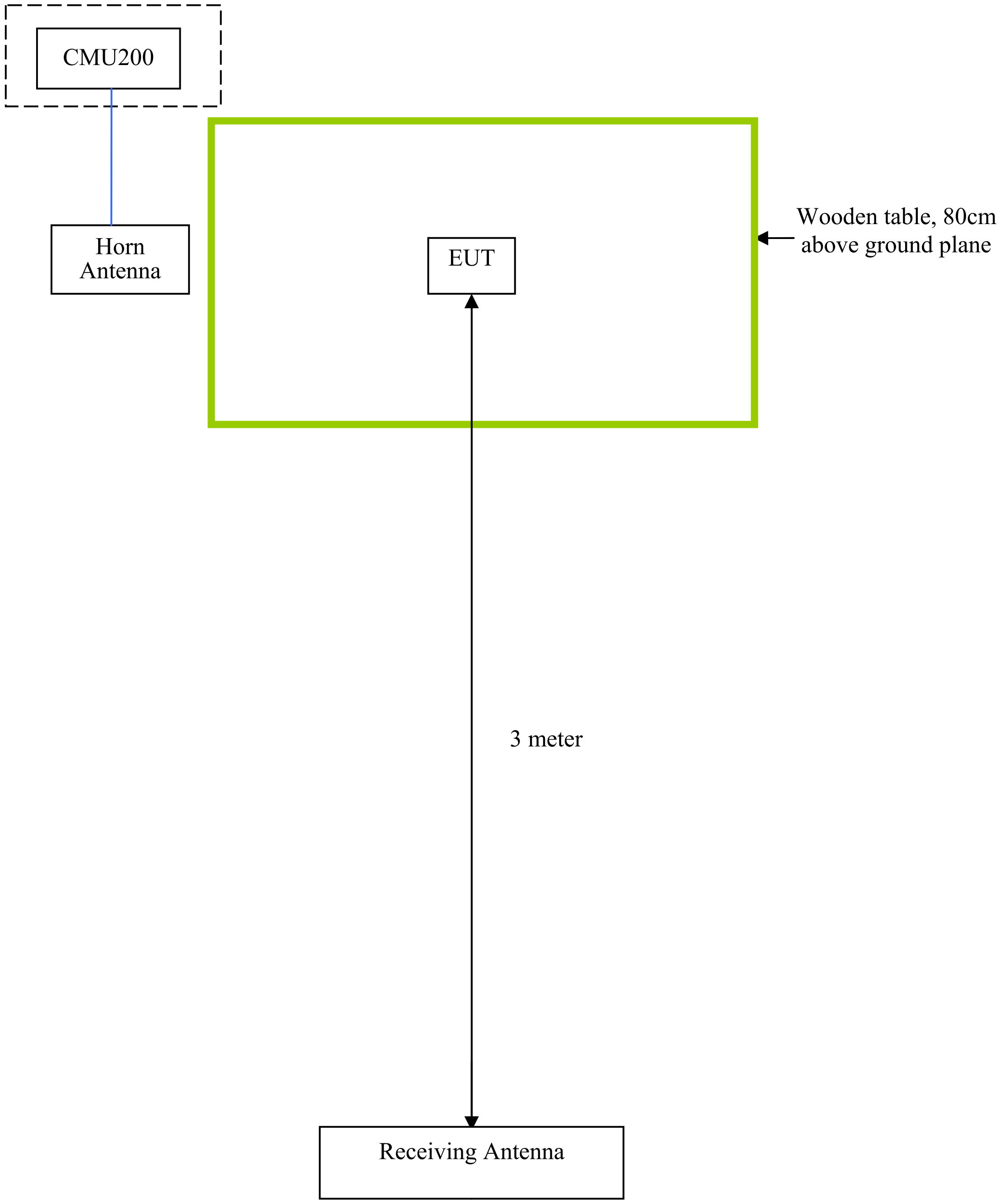
The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description (Including Brand Name)	Model	Calibration Date	Calibration Due Date
A-INFOMW	Horn Antenna	JXTXLB-10180	06/02/2011	06/02/2012
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	05/22/2011	05/22/2012

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	The EUT was continuously transmitting to stimulate the worst case.

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment

Annex E. DECLARATION OF SIMILARITY

There is no electrical change has been made to equipment that alters the compliance characteristics. The difference of these three models is for different logo and color.