

FCC TEST REPORT (BLUETOOTH)

 REPORT NO.:
 RF131227C13-2

 MODEL NO.:
 Lenovo S660

 FCC ID:
 YCNS660

 RECEIVED:
 Dec. 27, 2013

 TESTED:
 Jan. 06, 2014 ~ Jan. 23, 2014

 ISSUED:
 Jan. 24, 2014

APPLICANT: Lenovo Mobile Communication Technology Ltd.

ADDRESS: No.999, Qishan North 2nd Road, Information & Optoelectronics Park, Torch Hi-tech Industry Development Zone, Xiamen, P.R.China

- **ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
- LAB ADDRESS: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)
- **TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance to the specification



Table of Contents

1. 2.	CERTIFICATION SUMMARY OF TEST RESULTS	
2.1 M	EASUREMENT UNCERTAINTY	9
3.	GENERAL INFORMATION	
3.1	GENERAL DESCRIPTION OF EUT	
3.2	DESCRIPTION OF TEST MODES	
3.2.1	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	
3.4 3.4.1	DESCRIPTION OF SUPPORT UNITS CONFIGURATION OF SYSTEM UNDER TEST	
3.4.1 4.	TEST TYPES AND RESULTS (FOR Bluetooth EDR)	
4.1	Radiated Emission AND BANDEDGE Measurement	
4.1.1	LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT	
4.1.2	TEST INSTRUMENTS	19
4.1.3	TEST PROCEDURES	20
4.1.4	DEVIATION FROM TEST STANDARD	20
4.1.5	TEST SETUP	21
4.1.6	EUT OPERATING CONDITIONS	21
4.1.7	TEST RESULTS	22
4.2	CONDUCTED EMISSION MEASUREMENT	28
4.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	28
4.2.2	TEST INSTRUMENTS	28
4.2.3	TEST PROCEDURES	29
4.2.4	DEVIATION FROM TEST STANDARD	29
4.2.5	TEST SETUP	30
4.2.6	EUT OPERATING CONDITIONS	
4.2.7	TEST RESULTS	31
4.3	NUMBER OF HOPPING FREQUENCY USED	
4.3.1	LIMIT OF HOPPING FREQUENCY USED	
4.3.2	TEST SETUP	
4.3.3	TEST INSTRUMENTS	
4.3.4	TEST PROCEDURES	
4.3.5	DEVIATION FROM TEST STANDARD	
4.3.6	TEST RESULTS	
4.4	DWELL TIME ON EACH CHANNEL	
4.4.2	TEST SETUP	35



4.4.3	TEST INSTRUMENTS	35
4.4.4	TEST PROCEDURES	35
4.4.5	DEVIATION FROM TEST STANDARD	35
4.4.6	TEST RESULTS	36
4.5	CHANNEL BANDWIDTH	39
4.5.1	LIMITS OF CHANNEL BANDWIDTH	39
4.5.2	TEST SETUP	39
4.5.3	TEST INSTRUMENTS	39
4.5.4	TEST PROCEDURE	39
4.5.5	DEVIATION FROM TEST STANDARD	39
4.5.6	EUT OPERATING CONDITION	39
4.5.7	TEST RESULTS	40
4.6	HOPPING CHANNEL SEPARATION	41
4.6.1	LIMIT OF HOPPING CHANNEL SEPARATION	41
4.6.2	TEST SETUP	41
4.6.3	TEST INSTRUMENTS	41
4.6.4	TEST PROCEDURES	41
4.6.5	DEVIATION FROM TEST STANDARD	
4.6.6	TEST RESULTS	
4.7	MAXIMUM OUTPUT POWER	43
4.7.1	LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT	43
4.7.2	TEST SETUP	43
4.7.3	TEST INSTRUMENTS	
4.7.4	TEST PROCEDURES	43
4.7.5	DEVIATION FROM TEST STANDARD	43
4.7.6	EUT OPERATING CONDITION	43
4.7.7	TEST RESULTS	44
4.8	CONDUCTED OUT OF BAND EMISSION MEASUREMENT	45
4.8.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT	45
4.8.2	TEST INSTRUMENTS	45
4.8.3	TEST PROCEDURE	
4.8.4	DEVIATION FROM TEST STANDARD	45
4.8.5	EUT OPERATING CONDITION	45
4.8.6	TEST RESULTS	
5.	TEST TYPES AND RESULTS (FOR Bluetooth LE 4.0)	
5.1	RADIATED EMISSION AND BANDEDGE MEASUREMENT.	
5.1.1	LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT	
5.1.2		
5.1.3		
5.1.4	DEVIATION FROM TEST STANDARD	
5.1.5	TEST SETUP	51



5.1.6	EUT OPERATING CONDITIONS	.51
5.1.7	TEST RESULTS	.52
5.2	CONDUCTED EMISSION MEASUREMENT	.58
5.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	.58
5.2.2	TEST INSTRUMENTS	
5.2.3	TEST PROCEDURES	.58
5.2.4	DEVIATION FROM TEST STANDARD	.58
5.2.5	TEST SETUP	.58
5.2.6	EUT OPERATING CONDITIONS	.58
5.2.7	TEST RESULTS	.59
5.3	6dB BANDWIDTH MEASUREMENT	.61
5.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	.61
5.3.2	TEST SETUP	.61
5.3.3	TEST INSTRUMENTS	.61
5.3.4	TEST PROCEDURE	.61
5.3.5	DEVIATION FROM TEST STANDARD	.61
5.3.6	EUT OPERATING CONDITIONS	.61
5.3.7	TEST RESULTS	.62
5.4	CONDUCTED OUTPUT POWER	.63
5.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT	.63
5.4.2	TEST SETUP	.63
5.4.3	TEST INSTRUMENTS	.63
5.4.4	TEST PROCEDURES	.63
5.4.5	DEVIATION FROM TEST STANDARD	.63
5.4.6	EUT OPERATING CONDITIONS	.63
5.4.7	TEST RESULTS	.63
5.5	POWER SPECTRAL DENSITY MEASUREMENT	.64
5.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	.64
5.5.2	TEST SETUP	.64
5.5.3	TEST INSTRUMENTS	.64
5.5.4	TEST PROCEDURE	.64
5.5.5	DEVIATION FROM TEST STANDARD	.64
5.5.6	EUT OPERATING CONDITION	.64
5.5.7	TEST RESULTS	.65
5.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT	.66
5.6.1	LIMITS OF OUT OF BAND EMISSION MEASUREMENT	.66
5.6.2	TEST SETUP	.66
5.6.3	TEST INSTRUMENTS	.66
5.6.4	TEST PROCEDURE	.66
5.6.5	DEVIATION FROM TEST STANDARD	.67



5.6.6	EUT OPERATING CONDITION	67
5.6.7	TEST RESULTS	67
5.6.8	TEST RESULTS	68
6.	PHOTOGRAPHS OF THE TEST CONFIGURATION	69
7.	INFORMATION ON THE TESTING LABORATORIES	70
8.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES	-
	TO THE EUT BY THE LAB	71



RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131227C13-2	Original release	Jan. 24, 2014



1. CERTIFICATION

PRODUCT: Lenovo Mobile Phone
MODEL NO.: Lenovo S660
BRAND: lenovo
APPLICANT: Lenovo Mobile Communication Technology Ltd.
TESTED: Jan. 06, 2014 ~ Jan. 23, 2014
TEST SAMPLE: Production Unit
STANDARDS: FCC Part 15, Subpart C (Section 15.247) ANSI C63.10-2009

The above equipment (model: Lenovo S660) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Vera Huang **, DATE :** Jan. 24, 2014 PREPARED BY Vera Huang / Specialist **APPROVED BY , DATE :** Jan. 24, 2014 Sam Chen / Senior Project Engineer



2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

A	APPLIED STANDARD: FCC Part 15, Subpart C (Bluetooth EDR)								
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK						
15.207	Meet the requirement of limit. Minimum passing margin is -20.82dB at 0.28281MHz.								
15.247(a)(1) (iii)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.						
15.247(a)(1) (iii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.						
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.						
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.						
15.247(d)	Transmitter Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.97dB at 347.6MHz.						
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.						
15.203	Antenna Requirement	PASS	No antenna connector is used.						

NOTE: If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) (Bluetooth LE 4.0)								
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK					
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -21.20dB at 0.92734MHz.					
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.74dB at 347.6MHz.					
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.					
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.					
15.247(b)	Conducted power	PASS	Meet the requirement of limit.					
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.					
15.203	Antenna Requirement	PASS	No antenna connector is used.					



2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	EASUREMENT FREQUENCY	
Conducted emissions	9kHz~30MHz	2.44 dB
	30MHz ~ 200MHz	2.93 dB
Dedicted emissions	200MHz ~1000MHz	2.95 dB
Radiated emissions	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Lenovo Mobile Phone				
MODEL NO.	Lenovo S660				
MID	66000011				
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion battery)				
	Bluetooth EDR	GFSK, π /4-DQPSK, 8DPSK			
MODULATION TYPE	Bluetooth LE 4.0	GFSK			
TRANSFER RATE	Bluetooth EDR	1/2/3Mbps			
	Bluetooth LE 4.0	1Mbps			
OPERATING FREQUENCY	2402 ~ 2480MHz				
NUMBER OF CHANNEL	Bluetooth EDR	79			
	Bluetooth LE 4.0	40			
CHANNEL SPACING	Bluetooth EDR	1MHz			
CHANNEL SPACING	Bluetooth LE 4.0	2MHz			
OUTPUT POWER	Bluetooth EDR	1.021mW			
	Bluetooth LE 4.0	0.308mW			
ANTENNA TYPE	PIFA antenna with ·	-1.87dBi gain			
ANTENNA CONNECTOR	NA				
DATA CABLE	Refer to Note as below				
I/O PORTS	Refer to user's manual				
ACCESSORY DEVICES	Refer to Note as be	low			



NOTE:

1. The EUT contains following accessory devices.

ITEM	BRAND	MODEL	DESCRIPTION
AC Adapter	Lenovo	CP-62	I/P: 100-240Vac, 50/60Hz, 300mA O/P: 5Vdc, 1500mA
Li-ion Battery	Lenovo	BL222	Rating: 3.8Vdc, 3000mAh
Earphone	Lenovo	TS300-01MS21-8S	1.07m cable
USB cable	Lenovo	SLX-A163A	1m cable
LCM + Touch Panel 1	TIANMA	TM046XVHP01-00	
LCM + Touch Panel 2	YASSY	YT47F02G3	
Memory 1	SAMSUNG	KMK7X000VM-B314	
Memory 2	HYNIX	H9TP65A8JDACPR- KGM	
Camera 1	SUNNY	P8V11A-20	
Camera 2	O-FILM	L8825A10	
Phone Cover	N/A	N/A	

2. The device has 2 configurations as below.

Main Sample (A): LCM + Touch Panel 1 + Memory 1 + Camera 1

2nd Sample (B): LCM + Touch Panel 2 + Memory 2 + Camera 2

3. The above EUT information is declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



3.2 DESCRIPTION OF TEST MODES

For Bluetooth EDR:

79 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

For Bluetooth LE 4.0:

40 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL For Bluetooth EDR:

EUT CONFIGURE		APPLICA	ABLE TO	DECODIPTION	
MODE	RE≥1G	RE<1G	PLC	APCM	DESCRIPTION
А	\checkmark	\checkmark	\checkmark	\checkmark	Main Sample
В	\checkmark	\checkmark	-	-	2nd Sample

Where RE≥1G: Radiated Emission above 1GHz PLC: Power Line Conducted Emission **RE<1G:** Radiated Emission below 1GHz **APCM:** Antenna Port Conducted Measurement

NOTE: 1. For Radiated emission test, pre-tested GFSK, π /4-DQPSK, 8DPSK modulation type and found 8DPSK was the worse, therefore chosen for the final test and presented in the test report.

2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane.**

RADIATED EMISSION TEST (ABOVE 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
А	0 to 78	0, 39, 78	8DPSK	DH5
В	0 to 78	78	8DPSK	DH5

RADIATED EMISSION TEST (BELOW 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
А, В	0 to 78	78	8DPSK	DH5

POWER LINE CONDUCTED EMISSION TEST:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

Following channel(s) was (were) selected for the final test as listed below.

 EUT DNFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
А	0 to 78	78	8DPSK	DH5



ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	PACKET TYPE
	0 to 78	0, 39, 78	GFSK	DH5
А	0 to 78	0, 39, 78	π /4-DQPSK	DH5
	0 to 78	0, 39, 78	8DPSK	DH5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Johnson Liao
APCM	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao



FOR Bluetooth LE 4.0:

EUT		APPLICA	APPLICABLE TO		
CONFIGURE MODE	RE≥1G	RE<1G	PLC	APCM	DESCRIPTION
А	\checkmark	\checkmark	\checkmark	\checkmark	Main Sample
В	\checkmark	\checkmark	-	-	2nd Sample

Where **RE≥1G:** Radiated Emission above 1GHz **PLC:** Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

RADIATED EMISSION TEST (ABOVE 1GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
А	0 to 39	0, 19, 39	GFSK	1.0
В	0 to 39	39	GFSK	1.0

RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
А, В	0 to 39	39	GFSK	1.0

POWER LINE CONDUCTED EMISSION TEST:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
A	0 to 39	39	GFSK	1.0



ANTENNA PORT CONDUCTED MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
A	0 to 39	0, 19, 39	GFSK	1.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Johnson Liao
АРСМ	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247) ANSI C63.10-2009 FCC Public Notice DA 00-705

All test items have been performed and recorded as per the above standards.

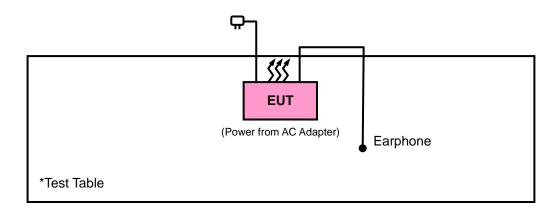
NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B. The test report has been issued separately.



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST





4. TEST TYPES AND RESULTS (FOR Bluetooth EDR)

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)		
0.009 ~ 0.490	2400/F(kHz)	300		
0.490 ~ 1.705	24000/F(kHz)	30		
1.705 ~ 30.0	30	30		
30 ~ 88	100	3		
88 ~ 216	150	3		
216 ~ 960	200	3		
Above 960	500	3		

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION	
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 15, 2013	Apr. 14, 2014	
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Dec. 18, 2013	Dec. 17, 2014	
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Mar. 25, 2013	Mar. 24, 2014	
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Sep. 12, 2013	Sep. 11, 2014	
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 18, 2013	Dec. 17, 2014	
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014	
Preamplifier Agilent	8447D	2944A10631	Aug. 30, 2013	Aug. 29, 2014	
Preamplifier Agilent	8449B	3008A1960	Aug. 30, 2013	Aug. 29, 2014	
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2013	Dec. 26, 2014	
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4	Oct. 18, 2013	Oct. 17, 2014	
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2013	Oct. 17, 2014	
RF signal cable Worken	RG-213	NA	Nov. 07, 2013	Nov. 06, 2014	
Software BV ADT	E3 6.120103	NA	NA	NA	
Antenna Tower MF	MFA-440H	NA	NA	NA	
Turn Table MF	MFT-201SS	NA	NA	NA	
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA	
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jul. 18, 2013	Jul. 17, 2014	
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA	
Communications Tester-Wireless	E5515C	MY52102544	Sep. 05, 2012	Sep. 04, 2014	
Radio Communication Analyzer	MT8820C	6201300640	Aug. 01, 2013	Jul. 31, 2014	

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 690701.

5. The IC Site Registration No. is IC 7450F-10.



4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

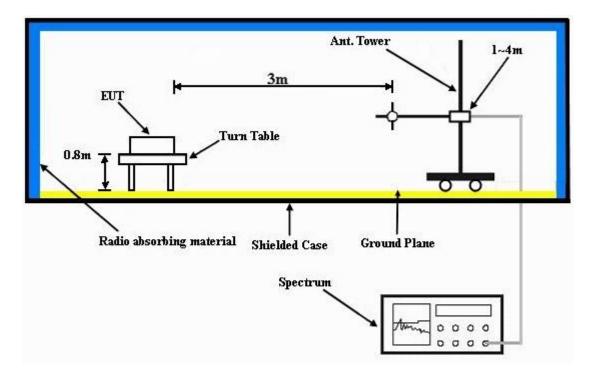
- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.



4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.



4.1.7 TEST RESULTS

MODE A

ABOVE 1GHz WORST-CASE DATA : 8DPSK

EUT TEST CONDITION		MEASUREMENT DETAI	L		
CHANNEL	Channel 0	FREQUENCY RANGE	1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	33.84	40.91	54	-20.16	26.91	3.52	37.5	102	296	Average
2386	48.17	55.24	74	-25.83	26.91	3.52	37.5	102	296	Peak
2402	84.12	91.19			26.91	3.54	37.52	102	296	Average
2402	95.1	102.17			26.91	3.54	37.52	102	296	Peak
2500	34.13	40.56	54	-19.87	27.2	3.62	37.25	102	296	Average
2500	48.01	54.44	74	-25.99	27.2	3.62	37.25	102	296	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2384	33.71	40.83	54	-20.29	26.86	3.52	37.5	145	294	Average
2384	49.18	56.3	74	-24.82	26.86	3.52	37.5	145	294	Peak
2402	82.89	89.96			26.91	3.54	37.52	145	294	Average
2402	93.67	100.74			26.91	3.54	37.52	145	294	Peak
2498	34.13	40.56	54	-19.87	27.2	3.62	37.25	145	294	Average
2498	49.49	55.92	74	-24.51	27.2	3.62	37.25	145	294	Peak

REMARKS:

1. 2402MHz: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 39	FREQUENCY RANGE	1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120\/ac_60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2334	33.4	40.67	54	-20.6	26.72	3.48	37.47	102	222	Average
2334	48.12	55.39	74	-25.88	26.72	3.48	37.47	102	222	Peak
2441	84.18	90.93			27.06	3.58	37.39	102	222	Average
2441	94.77	101.52			27.06	3.58	37.39	102	222	Peak
2496	34.12	40.55	54	-19.88	27.2	3.62	37.25	102	222	Average
2496	47.76	54.19	74	-26.24	27.2	3.62	37.25	102	222	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2362	33.52	40.7	54	-20.48	26.81	3.5	37.49	131	280	Average
2362	47.38	54.56	74	-26.62	26.81	3.5	37.49	131	280	Peak
2441	82.81	89.56			27.06	3.58	37.39	131	280	Average
2441	93.14	99.89			27.06	3.58	37.39	131	280	Peak
2492	34.1	40.53	54	-19.9	27.2	3.62	37.25	131	280	Average
2492	47.84	54.27	74	-26.16	27.2	3.62	37.25	131	280	Peak

REMARKS:

1. 2441MHz: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 78	FREQUENCY RANGE	1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120\/ac_60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2354	33.52	40.7	54	-20.48	26.81	3.5	37.49	100	224	Average
2354	47.68	54.86	74	-26.32	26.81	3.5	37.49	100	224	Peak
2480	83.71	90.28			27.15	3.6	37.32	100	224	Average
2480	94.21	100.78			27.15	3.6	37.32	100	224	Peak
2486	34.69	41.26	54	-19.31	27.15	3.6	37.32	100	224	Average
2486	48.65	55.22	74	-25.35	27.15	3.6	37.32	100	224	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2356	33.52	40.7	54	-20.48	26.81	3.5	37.49	104	254	Average
2356	47.74	54.92	74	-26.26	26.81	3.5	37.49	104	254	Peak
2480	82.68	89.25			27.15	3.6	37.32	104	254	Average
2480	92.98	99.55			27.15	3.6	37.32	104	254	Peak
2484	34.53	41.1	54	-19.47	27.15	3.6	37.32	104	254	Average
2484	48.17	54.74	74	-25.83	27.15	3.6	37.32	104	254	Peak

REMARKS:

1. 2480MHz: Fundamental frequency.



BELOW 1GHz WORST-CASE DATA : 8DPSK

EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 78	FREQUENCY RANGE	30MHz ~ 1GHz		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-Peak (QP)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
112.62	27.36	47.81	43.5	-16.14	10.27	1.14	31.86	100	145	Peak
161.76	29.94	47.85	43.5	-13.56	12.54	1.4	31.85	100	193	Peak
256.26	36.14	54.53	46	-9.86	11.65	1.85	31.89	100	115	Peak
347.6	43.03	58.56	46	-2.97	14.08	2.22	31.83	100	142	Peak
435.8	36.55	49.95	46	-9.45	16.04	2.56	32	100	231	Peak
733.3	26.72	33.46	46	-19.28	21.29	3.53	31.56	100	151	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
92.1	24.28	46.76	43.5	-19.22	8.45	1.03	31.96	100	125	Peak
165	24.67	42.81	43.5	-18.83	12.25	1.42	31.81	100	141	Peak
256.26	30.84	49.23	46	-15.16	11.65	1.85	31.89	123	126	Peak
350.4	37.46	52.92	46	-8.54	14.15	2.23	31.84	100	235	Peak
435.8	34.57	47.97	46	-11.43	16.04	2.56	32	100	139	Peak
708.1	26.45	33.82	46	-19.55	20.93	3.45	31.75	100	188	Peak

REMARKS:



MODE B

ABOVE 1GHz WORST-CASE DATA : 8DPSK

EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 78 FREQUENCY RANGE		1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120\/ac_60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	34.31	41.38	54	-19.69	26.91	3.54	37.52	100	224	Average
2390	46.73	53.8	74	-27.27	26.91	3.54	37.52	100	224	Peak
2480	81.91	88.48			27.15	3.6	37.32	100	224	Average
2480	93.01	99.58			27.15	3.6	37.32	100	224	Peak
2484	35.71	42.28	54	-18.29	27.15	3.6	37.32	100	224	Average
2484	47.89	54.46	74	-26.11	27.15	3.6	37.32	100	224	Peak
	Α	NTENN		RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	33.79	40.86	54	-20.21	26.91	3.54	37.52	104	254	Average
2390	46.22	53.29	74	-27.78	26.91	3.54	37.52	104	254	Peak
2480	81.08	87.65			27.15	3.6	37.32	104	254	Average
2480	91.18	97.75			27.15	3.6	37.32	104	254	Peak
2484	34.87	41.44	54	-19.13	27.15	3.6	37.32	104	254	Average
2484	48.17	54.74	74	-25.83	27.15	3.6	37.32	104	254	Peak

REMARKS:

1. 2480MHz: Fundamental frequency.



BELOW 1GHz WORST-CASE DATA : 8DPSK

EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 78	FREQUENCY RANGE	30MHz ~ 1GHz		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-Peak (QP)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
114.24	26.15	46.41	43.5	-17.35	10.46	1.15	31.87	100	169	Peak
167.7	26.22	44.59	43.5	-17.28	11.96	1.43	31.76	100	145	Peak
261.93	32.24	50.44	46	-13.76	11.82	1.87	31.89	100	295	Peak
353.2	41.05	56.47	46	-4.95	14.22	2.24	31.88	100	148	Peak
444.9	35.67	48.83	46	-10.33	16.23	2.6	31.99	100	162	Peak
813.1	27.24	32.62	46	-18.76	22.39	3.73	31.5	100	195	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
92.64	22.79	45.19	43.5	-20.71	8.53	1.03	31.96	100	142	Peak
167.7	23.8	42.17	43.5	-19.7	11.96	1.43	31.76	100	118	Peak
259.23	28.02	46.28	46	-17.98	11.74	1.86	31.86	100	153	Peak
347.6	37.31	52.84	46	-8.69	14.08	2.22	31.83	100	206	Peak
433	33.76	47.24	46	-12.24	15.98	2.55	32.01	100	154	Peak
766.2	26.63	32.63	46	-19.37	21.75	3.61	31.36	100	119	Peak

REMARKS:



4.2 CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED	LIMIT (dBµV)
0.15 ~ 0.5	Quasi-peak	Average
0.13 ~ 0.5	66 to 56	56 to 46
5~30	56	46
3~30	60	50

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

NOTE: 1. The lower limit shall apply at the transition frequencies.

- 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 17, 2013	Nov. 16, 2014
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 23, 2013	Dec. 22, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-2047.

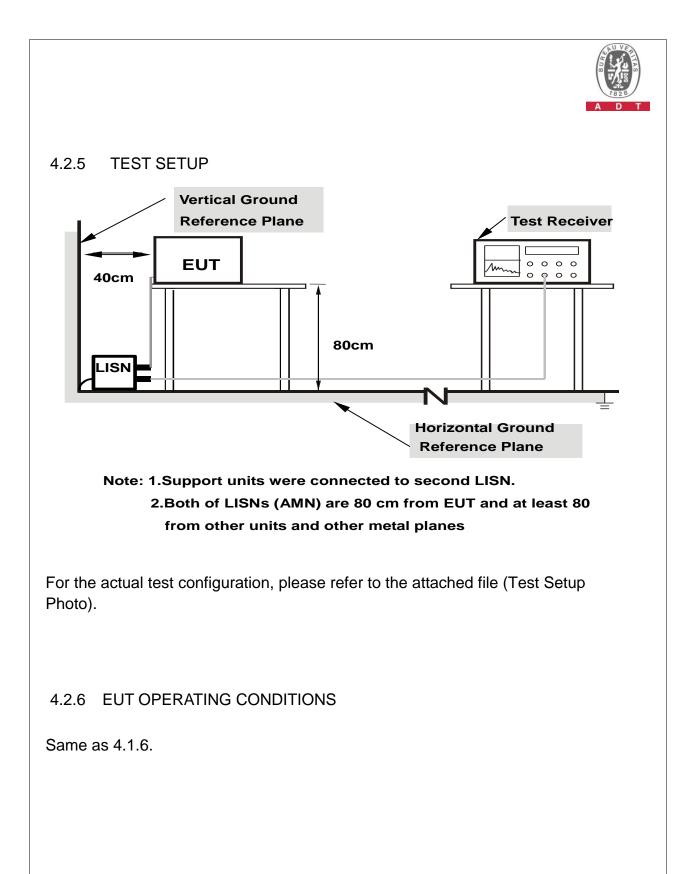


4.2.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit 20dB) was not recorded.
- NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.





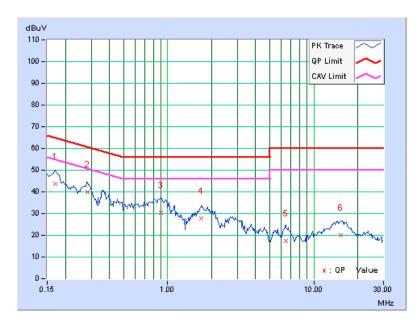
4.2.7 TEST RESULTS

CONDUCTED WORST CASE DATA:

PHA	PHASE Line 1 6dB BANDWIDTH 9kHz				Ηz					
Freq. Corr. Reading Value Emission Level Limit						Ma	rain			
No	Troq.	Factor		V		[dB (uV)] [dB (uV)]			Margin (dB)	
	[MHz]	(dB)	Q.P.	ÁV.	Q.P.	AV.	Q.P.	ÁV.	Q.P.	AV.
1	0.16953	0.27	43.40	32.10	43.67	32.37	64.98	54.98	-21.31	-22.61
2	0.28281	0.29	39.62	29.45	39.91	29.74	60.73	50.73	-20.82	-20.99
3	0.89609	0.33	30.08	23.10	30.41	23.43	56.00	46.00	-25.59	-22.57
4	1.69922	0.35	27.43	20.97	27.78	21.32	56.00	46.00	-28.22	-24.68
5	6.42969	0.46	16.91	10.10	17.37	10.56	60.00	50.00	-42.63	-39.44
6	15.32813	0.53	19.37	12.19	19.90	12.72	60.00	50.00	-40.10	-37.28

REMARKS:

- 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
- 2. The emission levels of other frequencies were very low against the limit.
- 3. Margin value = Emission level Limit value
- 4. Correction factor = Insertion loss + Cable loss
- 5. Emission Level = Correction Factor + Reading Value

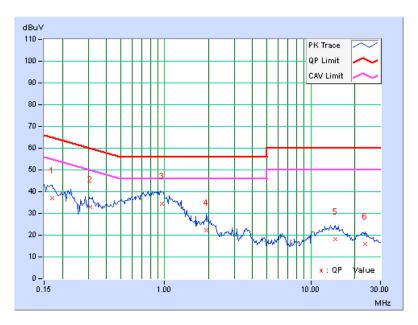




PHA	PHASE Line 2			6d	6dB BANDWIDTH			9kHz		
	Freq. Corr. Reading Value Emission Lev				on Level	Lir	nit	Ма	rgin	
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB ((uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	0.27	36.64	27.86	36.91	28.13	64.98	54.98	-28.07	-26.85
2	0.31016	0.29	32.79	23.95	33.08	24.24	59.97	49.97	-26.89	-25.73
3	0.95469	0.34	33.97	23.71	34.31	24.05	56.00	46.00	-21.69	-21.95
4	1.93750	0.37	22.01	15.27	22.38	15.64	56.00	46.00	-33.62	-30.36
5	14.67188	0.56	17.64	10.76	18.20	11.32	60.00	50.00	-41.80	-38.68
6	23.44922	0.59	15.28	7.43	15.87	8.02	60.00	50.00	-44.13	-41.98

REMARKS:

- 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
- 2. The emission levels of other frequencies were very low against the limit.
- 3. Margin value = Emission level Limit value
- 4. Correction factor = Insertion loss + Cable loss
- 5. Emission Level = Correction Factor + Reading Value



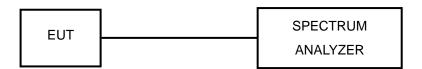


4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

4.3.5 DEVIATION FROM TEST STANDARD

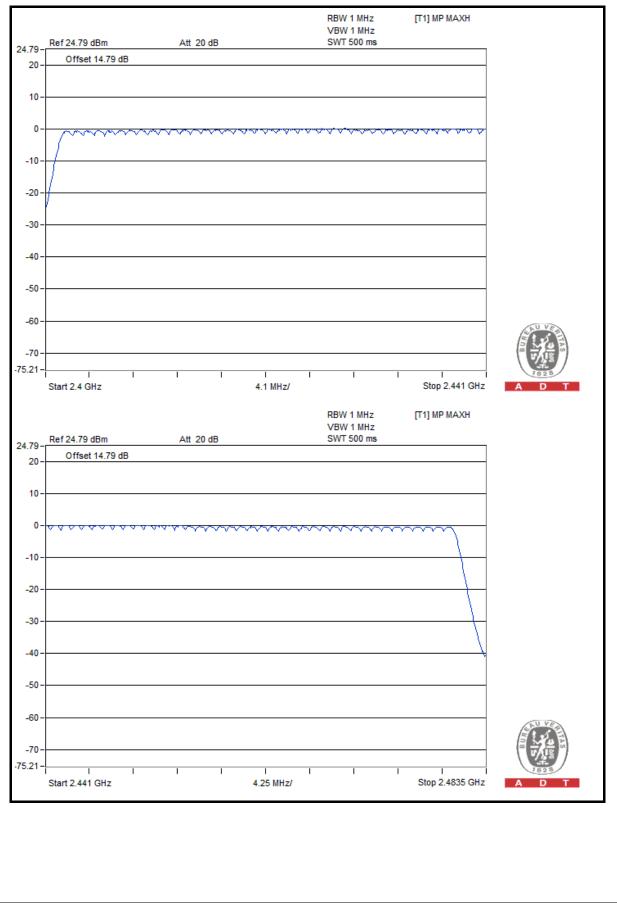
No deviation.

4.3.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plot, it shows that the hopping frequencies are equally spaced.

A D T

8DPSK



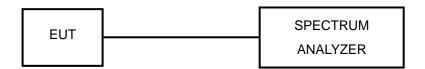


4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

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.

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.



4.4.6 TEST RESULTS

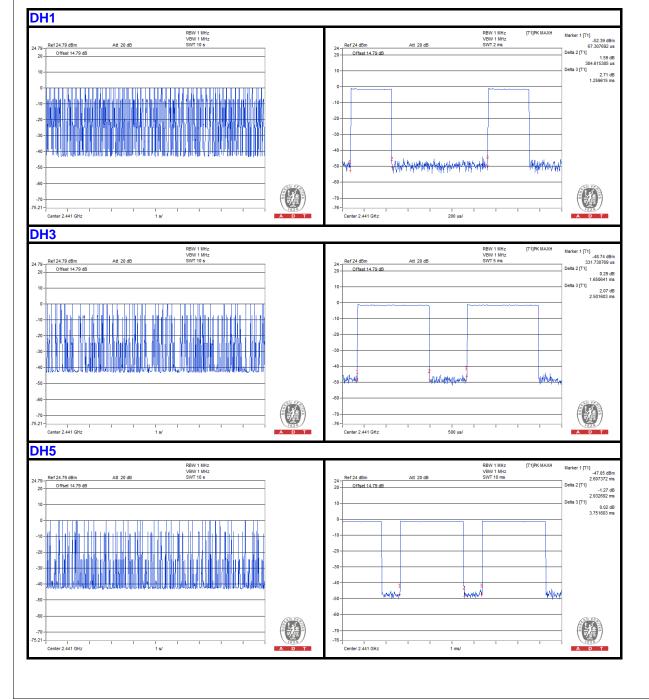
Mode	Average Hopping Channel	Package Transfer Time (usec)	Result (sec)	Limit (sec)
DH1	9.10	384.62	0.11	0.4
DH3	4.70	1650.64	0.25	0.4
DH5	3.70	2932.69	0.34	0.4

NOTE:

1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time

- 2. 79 channels come from the Hopping Channel number
- 3. Average Hopping Channel = hops/sweep time
- 4. t: Package Transfer Time(us)

5. Test plots of the transmitting time slot are shown as below.





π/4-DQPSK

Mode	Average Hopping Channel	Package Transfer Time (usec)	Result (sec)	Limit (sec)
DH1	9.20	387.82	0.11	0.4
DH3	4.70	1653.85	0.25	0.4
DH5	3.00	2919.87	0.28	0.4

NOTE:

- 1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
- 2. 79 channels come from the Hopping Channel number
- 3. Average Hopping Channel = hops/sweep time
- 4. t: Package Transfer Time(us)
- 5. Test plots of the transmitting time slot are shown as below.





8DPSK

Mode	Average Hopping Channel	Package Transfer Time (usec)	Result (sec)	Limit (sec)
DH1	8.70	387.82	0.11	0.4
DH3	5.00	1669.87	0.26	0.4
DH5	3.70	2935.90	0.34	0.4

NOTE:

- 1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
- 2. 79 channels come from the Hopping Channel number
- 3. Average Hopping Channel = hops/sweep time
- 4. t: Package Transfer Time(us)
- 5. Test plots of the transmitting time slot are shown as below.



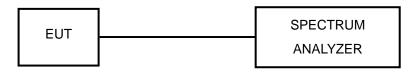


4.5 CHANNEL BANDWIDTH

4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

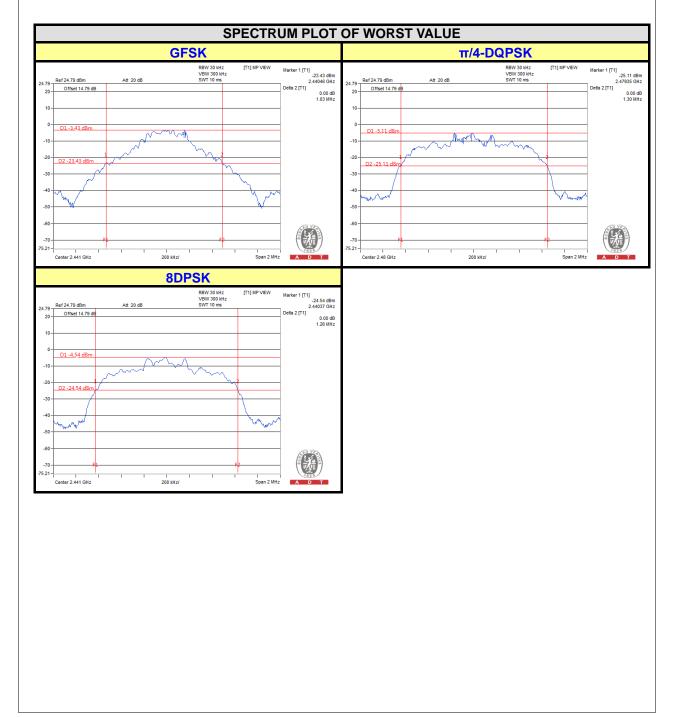
4.5.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



4.5.7 TEST RESULTS

CHANNEL	FREQUENCY	20dB BANDWIDTH (MHz)						
ONANNEL	(MHz)	GFSK	π/4-DQPSK	8DPSK				
0	2402	1.03	1.29	1.26				
39	2441	1.03	1.29	1.26				
78	2480	1.03	1.30	1.26				



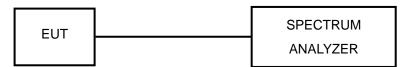


4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURES

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- 3. By using the MaxHold function record the separation of two adjacent channels.
- 4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- 5. Repeat above procedures until all frequencies measured were complete.

4.6.5 DEVIATION FROM TEST STANDARD

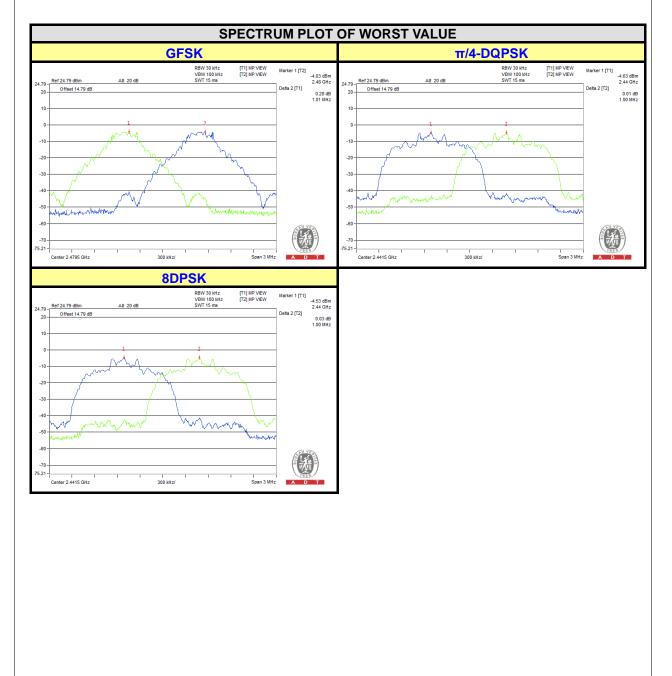
No deviation.



4.6.6 TEST RESULTS

CHAN.	FREQ. (MHz)		CENT CHA EPARATIOI (MHz)		20dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)		PASS / FAIL	
		GFSK	π/4-DQPSK	8DPSK	GFSK	π/4-DQPSK	8DPSK	GFSK	π/4-DQPSK	8DPSK	
0	2402	1.00	1.00	1.00	1.03	1.29	1.26	0.687	0.860	0.840	PASS
39	2441	1.00	1.00	1.00	1.03	1.29	1.26	0.687	0.860	0.840	PASS
78	2480	1.01	1.00	1.00	1.03	1.30	1.26	0.687	0.867	0.840	PASS

NOTE: The minimum limit is two-third 20dB bandwidth.



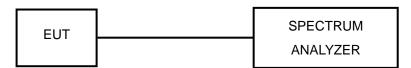


4.7 MAXIMUM OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

4.7.2 TEST SETUP



4.7.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.7.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- d. Measure the captured power within the band and recording the plot.
- e. Repeat above procedures until all frequencies required were complete.

4.7.5 DEVIATION FROM TEST STANDARD

No deviation.

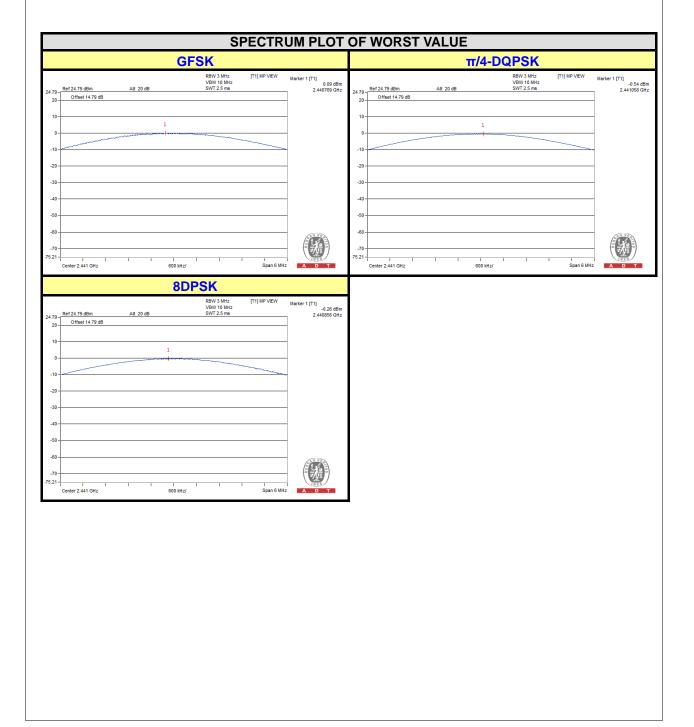
4.7.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



4.7.7 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	OU	TPUT POW (mW)	/ER	OU	TPUT POW (dBm)	POWER LIMIT (mW)	PASS / FAIL	
		GFSK	π/4-DQPSK	8DPSK	GFSK	π/4-DQPSK	8DPSK		(11147)
0	2402	0.933	0.809	0.857	-0.30	-0.92	-0.67	125	PASS
39	2441	1.021	0.883	0.942	0.09	-0.54	-0.26	125	PASS
78	2480	0.836	0.726	0.776	-0.78	-1.39	-1.10	125	PASS





4.8 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

4.8.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.8.3 TEST PROCEDURE

- 1. Set RBW = 100 kHz.
- 2. Set VBW =300 kHz.
- 3. Set span to encompass the spectrum to be examined
- 4. Detector = peak.
- 5. Trace Mode = max hold.
- 6. Sweep = auto couple.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit continuously.

4.8.6 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



GFSK

	3	u_ LUII	Channe					_				
			RBW 100 kHz VBW 300 kHz	[T1] MP VIEW	Marker 1 [T1] -1.54 dBm		_			RBW 100 kHz VBW 300 kHz	[T1] MP VIEW	Marker 1 [T1] -1.40 2.479963
Ref 24.79 dBn Offset 14.			SWT 10 ms		2.402071 GHz Marker 2 [T1]	24.79 - Ref 24.79 20 - Offset	IBm 14.79 dB	Att 20 dB		SWT 10 ms		Marker 2 [T1]
					-50.28 dBm 2.400000 GHz							-49.2
					2.400000 GHz Marker 3 [T1] -49.46 dBm 2.390000 GHz	10						2.48350 Marker 3 [T1] -48.7 2.50000
D1-1.54	18m				Deta 4 [T1] 45.68 dB	0- <u>1</u>	8 d8m					Delta 4 [T1] 45
					-7.532051 MHz Delta 5 [T1]	-10-						7.37179
D	10				45.63 dB -89.903846 MHz	-20- 02-21	0 10					
-DZ-21,54 (upm				-		o dBm					1
					-	-30-						-
5				4	_	-40	4					-
- attrange	anger war have been	dynama wysąkych wysąkych w sawa stawa s	m-Manapalan-pala	market have been	*	-50-Mal 4	ht. which when had	and the sheet of the second	ventultenetalta	www.comber	www.www.com	4
					_	-60 -						
				1		-70		Ê				
Center 2.358 C	SHz	10 MHz/		Span 100 MH:	Z A D T	Center 2.5	42 GHz		10 MHz/		Span 100 MHz	A D
nnin	g disable	d Hiał	h Chann	وا		-						
PPill	9 0130510	a_ i ngi				1				0000000000		
Ref 24.79 dBn	n Att 20 dB		RBW 100 kHz VBW 300 kHz SWT 2.5 s	[T1] MP VIEW	Marker 1 [T1] -3.68 dBm	Ref 24.79	10	Att 20 dB		RBW 100 kHz VBW 300 kHz SWT 2.5 s	[T1] MP VIEW	Marker 1 [T1] -3.
Offset 14.			5W1 2.5 8		2.390946 GHz Marker 2 [T1] 1910.75 dBm		14.79 dB	Att 20 dB		5W1 2.5 8		2.4709 Marker 2 [T1] 1950. -46.9791
												-46.9791 Marker 3 [T1]
					Marker 3 [T1] 2470.98 dBm -47.827717 MHz	10						-46.9791 Marker 3 [T1] 2350. -47.6512
<u></u>	18m				Marker 4 [T1] 3511.39 dBm	0- <u>D1-1</u> 4	3 d0m					Marker 4 [T1] 3511.3
					-48.028091 MHz	-10-						-47.5068
D2 -21 54 1	dBm					-20- D2-21	8 dBm					
						20						
					1	-40						
and the second	hosperine where we have been some	and the second second second	adam-diadon-donasiana	with an	*	-50	warman	and an	adamental second and	norman Anna hAnna	an have been and the second	
					- COVER	-60						EU VED
						-70						
			, , , ,			-75.21-						
01-1-20 101-	1 1	2 407 00-1		Eton 25 CH					2 407 00-1		Stop 25 CH	1828
	1 1	2.497 GHz/		I Stop 25 GH:	Z A D T	Start 30 MH			2.497 GHz/		Stop 25 GHz	A D
Start 30 MHz	g enabled		Channe		z A D T			abled_		Channe		1826 A D
	g enabled		RBW 100 kHz		Marker 1 (T1)	Start 30 MH		abled_		RBW 100 kHz		Marker 1 IT 1
ppin	m Att 20 dB			el	Marker 1 [T1] -1.35 dBm	Start 30 MH Hoppi	ng en	abled_			el	Marker 1 [T1] -1.2
ppin	m Att 20 dB		RBW 100 kHz	el	Marker 1 [T1] -1.35 dBm 2.402200 GHz Marker 2 [T1] -48.15 dBm	Start 30 MH Hoppi 24.79-r ^{Ref} 24.79	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] -1.2 2.4750 Marker 2 [T1] -48.3
ppin	m Att 20 dB		RBW 100 kHz	el	Marker 1 [T1] -1.35 dBm 2.402200 GHz Marker 2 [T1] -48.15 dBm 2.400000 GHz Marker 3 [T1] -46.84 dBm	Start 30 MH Hoppi	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] -1.: 2.4750 Marker 2 [T1] -48. 2.4835 Marker 3 [T1] -47.
ppin	m Att 20 dB		RBW 100 kHz	(T1) MP VIEW	Marker 1 [T1] 	Start 30 MH Hoppi 24.79 - Ref 24.79 20 - Offset	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] 2.4750 Marker 2 [T1] 48. 2.4835 Marker 3 [T1] 2.5000 Deta 4 [T1]
ppin	m Att 20 dB		RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.41.5 GBm 2.40000 GHz 2.300000 GHz 2.300000 GHz 2.300000 GHz 2.300000 MHz 2.300000 MHz 0.543 4 [T1] 0.643 4 (T1) 0.643 4 (T1)	Start 30 MH Hoppi 24.79 - Ref 24.79 20 - Offset 10 -	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] -1.: 2.47500 Marker 2 [T1] .2.4351 Marker 3 [T1] -47.7 Detta 4 [T1] .4
ppin	m Att 20 dB		RBW 100 kHz	(T1) MP VIEW	Marker 1 [11] - 1.35 dBm 2.402200 GHz Marker 2 [11] - 4.81 5 dBm 2.40000 GHz - 2390000 GHz Debta 4 [11] - 43 4 dB	Start 30 M Hoppin 24.79 - Ref 24.79 20 - Offset 10 - 1 -10 - 1 -10 - 1	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] -1.: 2.47500 Marker 2 [T1] .2.4351 Marker 3 [T1] -47.7 Detta 4 [T1] .4
ppin	m Att 20 dB		RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M Hoppin 24.79 - Ref 24.79 20 - Offset 10 - 1 0 - 1	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] 2.47500 Marker 2 [T1] 4.8350 Marker 3 [T1] 4.75 2.50000 Detta 4 [T1] 44
ppin	m Att 20 dB		RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M Hoppin 24.79 - Ref 24.79 20 - Offset 10 - 1 -10 - 1 -10 - 1	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] -1.: 2.47500 Marker 2 [T1] .2.4351 Marker 3 [T1] -47.7 Detta 4 [T1] .4
ppin	m Att 20 dB		RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M ³ Hoppin 24.79 - Ref 24.79 20 Offset 10 - 1 - 0 - 1 - 10 - 10	ng en			RBW 100 kHz VBW 300 kHz	el	Marker 1 [T1] -1.: 2.47500 Marker 2 [T1] .2.4351 Marker 3 [T1] -47.7 Detta 4 [T1] .4
ppin	m Att 20 dB	I_Low	RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M ³ Hoppin 24.79 - Ref 24.79 20 - Offset 10 - D - D - D - D - D - D - D - D - D -	ng en	Att 20 dB	High	RBW 100 kHz VBW 300 kHz	EI [T1] MP VEW	Marker 1 [T1] -1.: 2.47500 Marker 2 [T1] .2.4351 Marker 3 [T1] -47.7 Detta 4 [T1] .4
ppin	n Att 20 dB 79 dB 18m 48m	I_Low	RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M/ Hoppin 24.79 - Ref 24.79 20 - Orfset 10	ng en	Att 20 dB	High	RBW 100 H/z VBW 300 H/z SWT 10 ms	EI [T1] MP VEW	Marker 1 [T1] -1.: 2.47500 Marker 2 [T1] .2.4351 Marker 3 [T1] -47.7 Detta 4 [T1] .4
ppin	n Att 20 dB 79 dB 18m 48m	I_Low	RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M/ Hoppin 24.79 - Ref 24.79 20 Orfset 10	ng en	Att 20 dB	High	RBW 100 H/z VBW 300 H/z SWT 10 ms	EI [T1] MP VEW	Marker 1 [T1] 2.47500 Marker 2 [T1] 4.8350 Marker 3 [T1] 4.75 2.50000 Detta 4 [T1] 44
ppin	n Att 20 dB 79 dB 18m 48m	I_Low	RBW 100 kHz	[T1] MP VEW	Marker 1 [T1] 2.402200 GHz Marker 2 [T1] 4.815 GBm 2.300000 GHz Detta 4 [T1] 4.34 dB 3.300000 Hz Detta 5 [T1] 4.94 dB	Start 30 M/ Hoppin 24.79 - Ref 24.79 20 - Orfset 10	ng en	Att 20 dB	High	RBW 100 H/z VBW 300 H/z SWT 10 ms	EI [T1] MP VEW	Marker 1 [T1] 2.47500 Marker 2 [T1] -48.2 2.2.48350 Marker 3 [T1] -47.5 2.5000



π/4-DQPSK

opping disabled_	Low Channe	el 📃				
	RBW 100 kHz VBW 300 kHz SWT 10 ms	[T1] MP VIEW	Marker 1 [T1] -2.89 dBm	0. (0.(70.10	RBW 100 VBW 300 Att 20 dB SWT 10 m	kHz -3.03 dBm
9-Ref 24.79 dBm Att 20 dB 0-Offset 14.79 dB	SWI 10 ms		2.402071 GHz Marker 2 [T1] -50.42 dBm 2.400000 GHz	24.79 - Ref 24.79 dBm 20 - Offset 14.79 dB	Att 20 dB SWT 10 m	Marker 2 [T1]
			-50.42 dBm 2.400000 GHz			-49.92 dBn
			2.400000 GHz Marker 3 [T1] -50.44 dBm 2.390000 GHz	10		2.483500 GHz Marker 3 [T1] -48.58 dBm 2.500000 GHz
D1 -2 89 dBm		1	2.390000 GHz Delta 4 [T1] 45.03 dB	0-1 D1+3 D3 dBm		2.500000 GH2 Detta 4 [T1] 43.59 dE
51-2.05 00m		1	-3.525641 MHz	-10-		43.59 db 15.705128 MHz
			Delta 5 [T1] 43.61 dB -19.230769 MHz	-10-		
02 -22,89 dBm			-18.230708 MI12	-20- D2 -23 03 dBm		
			_	-30-		
				-40		
	5	4		-40 4 3		
of open the second of the seco		susperies to the	4	-50-1966/ Maryh to be lever	hilligene anter der ster der der der der der der der der der d	and a contraction of the
				-60 -		
				-70 - FL - F	-	
Center 2.358 GHz	10 MHz/	Span 100 MH	Z A D T	Center 2.5242 GHz	10 MHz/	Span 100 MHz A D T
pping disabled_	High Channy					
pping disabled_						
	RBW 100 kHz VBW 300 kHz SWT 2.5 s	[T1] MP VIEW	Marker 1 [T1] -7.47 dBm		RBW 100 VBW 300 Att 20 dB SWT 2.5 s	kHz -7.66 dBm
ef 24.79 dBm Att. 20 dB Offset 14.79 dB	SWT 2.5 s		2.390946 GHz Marker 2 [T1] 2430.96 dBm	24.79 - Ref 24.79 dBm 20 - Offset 14.79 dB	Att 20 dB SWT 2.5 s	2.470978 GHz Marker 2 [T1] 2671.06 dBn
				20-		
			-46.644386 MHZ Marker 3 [T1] 2831.12 dBm -46.907616 MHz	10-		-47.748840 MH: Marker 3 [T1] 3271.30 dBn -47.768494 MH:
D1 320 J0			-46.907616 MHz Marker 4 [T1] 3351.33 dBm -47.346111 MHz	0- 01 202 d0m		-47.768494 MH: Marker 4 [T1] 3511.39 dBn -46.601280 MH:
+ +			-47.346111 MHz	<u>DI -3.05 dBm</u>		3511.39 dBn -46.601280 MHz
			-	-10-		
D2 -22,89 dBm			_	-20 - D2 -23 03 dBm		
				-30-		
			-	-40-		
denthing bearing bearing to be a second	-	ensemp ^{er} tellaradhistellerik	*	-50 - regeneration	normal constraints and a second s	An address and the And The age and the
			_	-60 -		
				-70		
Start 30 MHz	2.497 GHz/	I Stop 25 GH	Z A D T	Start 30 MHz	2.497 GHz/	Stop 25 GHz A D T
pping enabled	Low Channel			Hopping ena	abled_ High Cha	nnol
pping enabled_	RBW 100 kHz	[T1] MP VIEW		nopping end	RBW 100	
Ref 24.79 dBm Att 20 dB	VBW 100 kHz SWT 10 ms	[TI] MP VEW	Marker 1 [T1] -3.01 dBm 2.402200 GHz	0 (0) 70 10	VBW 100 VBW 300 Att 20 dB SWT 10 n	kHz -5.55 dBa
Ref 24.79 dBm Att 20 dB Offset 14.79 dB	SWITUMS		2.402200 GHz Marker 2 [T1] -48.80 dBm	24.79 - Ref 24.79 dBm 20 - Offset 14.79 dB	Att 20 dB SW110 h	2.478000 GH2 Marker 2 [T1] -48.15 dBn
				20-		
			2.400000 GHz Marker 3 [T1] -48.17 dBm 2.390000 GHz	10		2.483500 GHz Marker 3 [T1] -47.11 dBn 2.50000 GHz
D1 -3 01 dBm		1	2.390000 GHz Delta 4 [T1] 43.49 dB	0-1		2.500000 GH: Delta 4 [T1] 39.67 dt
<u>01 0.01 00m</u>		Million	-10.600000 MHz	D1 -5.55 dBm		39.67 dt 8.300000 MH
			Delta 5 [T1] 43.30 dB -78.400000 MHz	-10-		
D2 -23.01 dBm			-70.400000 MHZ	-20 - D2 -25 55 dBm		
			_	-30-		
5	3	4 4	1	-40		
werten terminister with the second second	ener lagersteten het alt alt stere eller van sone eller suite	trupad	-	-50- holimpharriaking motor	turnestantenationskatet herdestatetet	the decision of the second
				-60 -		
	F			-70- -75.21-	2	
Center 2.358 GHz	10 MHz/	Span 100 MH	Z A D T	-75.21 - Center 2.5242 GHz	10 MHz/	Span 100 MHz A D T



8DPSK Hopping disabled_ Low Channel RBW 100 kHz VBW 300 kHz SWT 10 ms RBW 100 kHz VBW 300 kHz SWT 10 ms (T1) MP VIEV Marker 1 [T1] -3.14 dBm 2.402071 GHz Marker 2 [T1] -49.86 dBm 2.400000 GHz Marker 3 [T1] -49.27 dBm 2.390000 GHz Detta 4 [T1] 44.53 dB Marker 1 [T1] Marker 1 [T1] Marker 1 [T1] -2.09 dBm 2.479809 GHz Marker 2 [T1] -49.87 dBm 2.483500 GHz Marker 3 [T1] -47.48 dBm 2.500000 GHz Detta 4 [T1] 45.39 dB 24.79 - Ref 24.79 dBm Att 20 dB Ref 24.79 dBm Att 20 dB Offset 14.79 dB Offset 14.79 dB 20-20-10 10 [T1] 45.39 dB 20.191026 MHz A -10 -10 44.15 dB -18.269231 MHz -20--20 D2 -23.14 dBn Т -30 -31 -50 -51 -60 -70 -70 75.21-5.21-Center 2.358 GHz I Span 100 MHz 10 MHz/ Span 100 MHz Center 2.5242 GHz 10 MHz/ A • Hopping disabled_ High Channel Marker 1 [T1] -5.06 dBm 2.390946 GHz Marker 2 [T1] 2551.01 dBm -47.927326 MHz Marker 3 [T1] 2991.19 dBm -48.233196 MHz Marker 4 [T1] 3551.41 dBm -47.225151 MHz RBW 100 kHz VBW 300 kHz SWT 2.5 s RBW 100 kHz VBW 300 kHz SWT 2.5 s IT11 MP VIEW IT11 MP VIEW Marker 1 [T1] Ref 24.79 dBm Offset 14.79 dB 24.79 - Ref 24.79 dBm 20 - Offset 14.79 dB Att 20 dB Att 20 dB 24 79 20-20--10 -11 -20--20 D2 -2 -30 -30 -40 -40 -50 l begiption and how and the second state and the property of the second state of the second state of the second -60 -60 Ø (Ka -70 75.21-5.21 -Start 30 MHz 1 2.497 GHz/ Start 30 MHz Stop 25 GHz Stop 25 GHz 1 2.497 GHz/ A D A D Hopping enabled_ Low Channel Hopping enabled_ High Channel Marker 1 [T1] -1.94 dBm 2.402900 GHz Marker 2 [T1] -47.75 dBm 2.400000 GHz Marker 3 [T1] A7.85 dBm 2.390000 GHz Deta 4 [T1] 44.77 dB Marker 1 [11] -1.86 dBm 2.473600 GHz Marker 2 [11] 2.4833 dBm 2.483500 GHz Marker 3 [11] -47.69 dBm 2.500000 GHz Deta 4 [11] 44.51 dB 10.600000 MHz RBW 100 kHz VBW 300 kHz SWT 10 ms RBW 100 kHz VBW 300 kHz SWT 10 ms [T1] MP VIEW [T1] MP VIEW Ref 24.79 dBm Offset 14.79 dB Att 20 d Ref 24.79 dl 24.79 4.79 Offset 14.79 dB 20 20 10 1 Ueta 4 [T1] 44.77 dB -6.000000 MHz Deta 5 [T1] wM -10 .10 [T1] 44.25 dB -30.400000 MHz -3 -40 -40 washers the stand and a stand of the second -51 -60 -60 -70 -70 5.21 75.21-Center 2.358 GHz I Span 100 MHz 10 MHz/ 10 MHz/ I Span 100 MHz Center 2.5242 GHz A



5. TEST TYPES AND RESULTS (FOR Bluetooth LE 4.0)

5.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

5.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

5.1.2 TEST INSTRUMENTS

Same as 4.1.2.



5.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Height of receiving antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

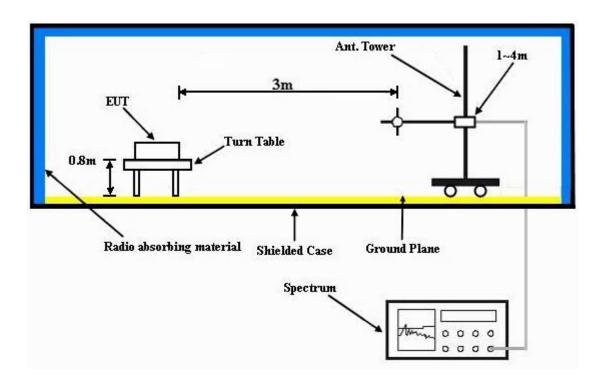
- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.



5.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

5.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.



5.1.7 TEST RESULTS

MODE A

ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL Channel 0		FREQUENCY RANGE	1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2382	35.31	42.43	54	-18.69	26.86	3.52	37.5	106	357	Average
2382	48.07	55.19	74	-25.93	26.86	3.52	37.5	106	357	Peak
2402	87.53	94.6			26.91	3.54	37.52	106	357	Average
2402	88.51	95.58			26.91	3.54	37.52	106	357	Peak
2484	35.62	42.19	54	-18.38	27.15	3.6	37.32	106	357	Average
2484	47.4	53.97	74	-26.6	27.15	3.6	37.32	106	357	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2380	35.12	42.24	54	-18.88	26.86	3.52	37.5	100	49	Average
2380	48.1	55.22	74	-25.9	26.86	3.52	37.5	100	49	Peak
2402	82.39	89.46			26.91	3.54	37.52	100	49	Average
2402	83.31	90.38			26.91	3.54	37.52	100	49	Peak
2494	35.59	42.02	54	-18.41	27.2	3.62	37.25	100	49	Average
2494	47.31	53.74	74	-26.69	27.2	3.62	37.25	100	49	Peak

REMARKS:

1. 2402MHz: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL Channel 19		FREQUENCY RANGE	1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120Vac 60 Hz		Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	AN	TENNA	POLARI	TY & TES	T DISTAN	ICE: HC	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2328	34.88	42.15	54	-19.12	26.72	3.48	37.47	104	351	Average
2328	47.8	55.07	74	-26.2	26.72	3.48	37.47	104	351	Peak
2440	87.69	94.51			27.06	3.58	37.46	104	351	Average
2440	88.5	95.32			27.06	3.58	37.46	104	351	Peak
2488	35.5	42	54	-18.5	27.2	3.62	37.32	104	351	Average
2488	48.48	54.98	74	-25.52	27.2	3.62	37.32	104	351	Peak
	Α	NTENN	A POLAR	RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	35.03	42.1	54	-18.97	26.91	3.52	37.5	123	51	Average
2386	48.18	55.25	74	-25.82	26.91	3.52	37.5	123	51	Peak
2440	82.8	89.62			27.06	3.58	37.46	123	51	Average
2440	83.62	90.44			27.06	3.58	37.46	123	51	Peak
2488	35.56	42.06	54	-18.44	27.2	3.62	37.32	123	51	Average
2488	47.82	54.32	74	-26.18	27.2	3.62	37.32	123	51	Peak

REMARKS:

1. 2440MHz: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL				
CHANNEL	Channel 39	FREQUENCY RANGE	1GHz ~ 25GHz			
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)			
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin			

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2384	35.21	42.33	54	-18.79	26.86	3.52	37.5	103	351	Average
2384	48.11	55.23	74	-25.89	26.86	3.52	37.5	103	351	Peak
2480	88	94.57			27.15	3.6	37.32	103	351	Average
2480	88.75	95.32			27.15	3.6	37.32	103	351	Peak
2492	36	42.43	54	-18	27.2	3.62	37.25	103	351	Average
2492	47.69	54.12	74	-26.31	27.2	3.62	37.25	103	351	Peak
	Α	NTENN		RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	35.09	42.16	54	-18.91	26.91	3.54	37.52	123	41	Average
2390	48.3	55.37	74	-25.7	26.91	3.54	37.52	123	41	Peak
2480	82.25	88.82			27.15	3.6	37.32	123	41	Average
2480	83.03	89.6			27.15	3.6	37.32	123	41	Peak
2500	35.65	42.08	54	-18.35	27.2	3.62	37.25	123	41	Average
2500	48.69	55.12	74	-25.31	27.2	3.62	37.25	123	41	Peak

REMARKS:

1. 2480MHz: Fundamental frequency.



BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL				
CHANNEL	Channel 39	FREQUENCY RANGE	30MHz ~ 1GHz			
INPUT POWER (SYSTEM)	120\/ac 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-Peak (QP)			
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin			

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
57.27	27.6	45.89	40	-12.4	12.25	0.81	31.35	100	184	Peak
159.06	29.96	47.7	43.5	-13.54	12.73	1.38	31.85	100	165	Peak
256.26	36.29	54.68	46	-9.71	11.65	1.85	31.89	100	125	Peak
347.6	43.26	58.79	46	-2.74	14.08	2.22	31.83	100	191	Peak
441.4	36.46	49.72	46	-9.54	16.16	2.58	32	100	241	Peak
621.3	26.09	35.23	46	-19.91	19.87	3.15	32.16	100	174	Peak
	Α	NTENN		RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
57	28.1	46.39	40	-11.9	12.25	0.81	31.35	100	254	Peak
164.73	24.93	43.07	43.5	-18.57	12.25	1.42	31.81	100	152	Peak
255.99	30.82	49.21	46	-15.18	11.65	1.85	31.89	100	325	Peak
347.6	38.14	53.67	46	-7.86	14.08	2.22	31.83	100	118	Peak
435.8	34.83	48.23	46	-11.17	16.04	2.56	32	100	215	Peak
752.2	28.27	34.47	46	-17.73	21.56	3.58	31.34	100	162	Peak

REMARKS:



MODE B

ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 39	FREQUENCY RANGE	1GHz ~ 25GHz		
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin		

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HC	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	35.68	42.75	54	-18.32	26.91	3.54	37.52	101	346	Average
2390	45.66	52.73	74	-28.34	26.91	3.54	37.52	101	346	Peak
2480	87.34	93.91			27.15	3.6	37.32	101	346	Average
2480	88.7	95.27			27.15	3.6	37.32	101	346	Peak
2484	35	41.57	54	-19	27.15	3.6	37.32	101	346	Average
2484	48.02	54.59	74	-25.98	27.15	3.6	37.32	101	346	Peak
	Α	NTENN	A POLAR	ITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	33.69	40.76	54	-20.31	26.91	3.54	37.52	127	0	Average
2390	44.28	51.35	74	-29.72	26.91	3.54	37.52	127	0	Peak
2480	85.61	92.18			27.15	3.6	37.32	127	0	Average
2480	85.99	92.56			27.15	3.6	37.32	127	0	Peak
2484	34.27	40.84	54	-19.73	27.15	3.6	37.32	127	0	Average
2484	44.22	50.79	74	-29.78	27.15	3.6	37.32	127	0	Peak

REMARKS:

1. 2480MHz: Fundamental frequency.



BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL				
CHANNEL	Channel 39	FREQUENCY RANGE	30MHz ~ 1GHz			
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-Peak (QP)			
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Anson Lin			

	AN	TENNA	POLARI	TY & TES	ST DISTAN	ICE: HO	RIZONTA	AL AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
56.73	27.36	45.65	40	-12.64	12.25	0.81	31.35	100	287	Peak
161.76	29.43	47.34	43.5	-14.07	12.54	1.4	31.85	100	235	Peak
250.32	32.62	51.24	46	-13.38	11.48	1.84	31.94	100	169	Peak
353.2	42.65	58.07	46	-3.35	14.22	2.24	31.88	100	204	Peak
426.7	34.53	48.15	46	-11.47	15.87	2.53	32.02	100	314	Peak
724.2	26.27	33.24	46	-19.73	21.16	3.5	31.63	100	258	Peak
	Α	NTENN		RITY & TE	EST DISTA	NCE: V	ERTICAL	. AT 3 M		
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
57.54	27.27	45.56	40	-12.73	12.25	0.81	31.35	100	158	Peak
159.06	21.46	39.2	43.5	-22.04	12.73	1.38	31.85	100	317	Peak
261.93	24.89	43.09	46	-21.11	11.82	1.87	31.89	100	269	Peak
344.8	34.97	50.56	46	-11.03	14.03	2.21	31.83	100	205	Peak
438.6	34.5	47.83	46	-11.5	16.1	2.57	32	100	307	Peak
621.3	25.45	34.59	46	-20.55	19.87	3.15	32.16	100	189	Peak

REMARKS:



5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

Same as 4.2.1.

5.2.2 TEST INSTRUMENTS

Same as 4.2.2.

5.2.3 TEST PROCEDURES

Same as 4.2.3.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP

Same as 4.2.5.

5.2.6 EUT OPERATING CONDITIONS

Same as 4.2.6.



5.2.7 TEST RESULTS

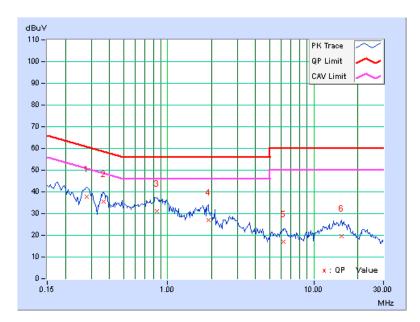
CONDUCTED WORST CASE DATA:

	PHASE	Line 1	6dB BANDWIDTH	9kHz
--	-------	--------	---------------	------

	Freq.	Corr.	Readin	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.27891	0.29	37.63	27.93	37.92	28.22	60.85	50.85	-22.93	-22.63	
2	0.36484	0.30	35.39	25.11	35.69	25.41	58.62	48.62	-22.93	-23.21	
3	0.84922	0.33	30.60	22.72	30.93	23.05	56.00	46.00	-25.07	-22.95	
4	1.90625	0.36	26.73	19.76	27.09	20.12	56.00	46.00	-28.91	-25.88	
5	6.21094	0.46	16.42	9.69	16.88	10.15	60.00	50.00	-43.12	-39.85	
6	15.42188	0.54	19.02	12.16	19.56	12.70	60.00	50.00	-40.44	-37.30	

REMARKS:

- 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
- 2. The emission levels of other frequencies were very low against the limit.
- 3. Margin value = Emission level Limit value
- 4. Correction factor = Insertion loss + Cable loss
- 5. Emission Level = Correction Factor + Reading Value



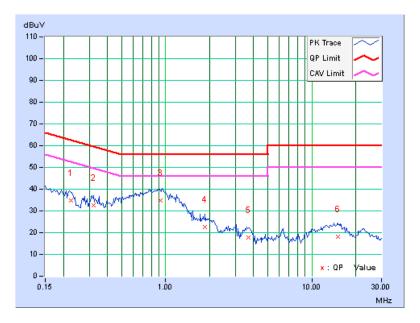


|--|

	Freq.	Corr.	Readin	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB ((uV)]	[dB	(uV)]	[dB ((uV)]	(d	B)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.22422	0.28	34.37	24.99	34.65	25.27	62.66	52.66	-28.01	-27.39	
2	0.32188	0.29	32.18	24.33	32.47	24.62	59.66	49.66	-27.19	-25.04	
3	0.92734	0.34	34.46	23.79	34.80	24.13	56.00	46.00	-21.20	-21.87	
4	1.85938	0.37	22.39	15.71	22.76	16.08	56.00	46.00	-33.24	-29.92	
5	3.69141	0.43	17.31	8.73	17.74	9.16	56.00	46.00	-38.26	-36.84	
6	15.02344	0.57	17.62	10.63	18.19	11.20	60.00	50.00	-41.81	-38.80	

REMARKS:

- 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
- 2. The emission levels of other frequencies were very low against the limit.
- 3. Margin value = Emission level Limit value
- 4. Correction factor = Insertion loss + Cable loss
- 5. Emission Level = Correction Factor + Reading Value





5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 TEST SETUP



5.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.3.4 TEST PROCEDURE

- 1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
- 2. Set the video bandwidth (VBW) \ge 3 x RBW, Detector = Peak.
- 3. Trace mode = max hold.
- 4. Sweep = auto couple.
- 5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.3.5 DEVIATION FROM TEST STANDARD

No deviation.

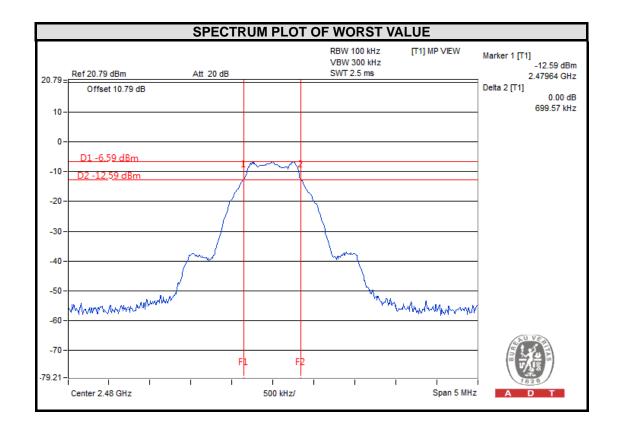
5.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



5.3.7 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (KHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	696.94	0.5	PASS
19	2440	693.06	0.5	PASS
39	2480	699.57	0.5	PASS



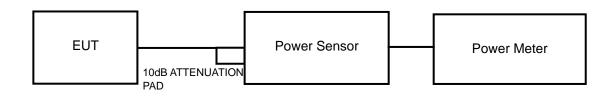


5.4 CONDUCTED OUTPUT POWER

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz: 1 Watt (30dBm)

5.4.2 TEST SETUP



5.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

5.4.7 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
0	2402	0.193	-7.14	30	PASS
19	2440	0.286	-5.43	30	PASS
39	2480	0.308	-5.11	30	PASS

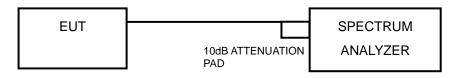


5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST SETUP



5.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURE

- a. Set the RBW = 3 kHz, VBW = 10 kHz, Detector = peak.
- b. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- c. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

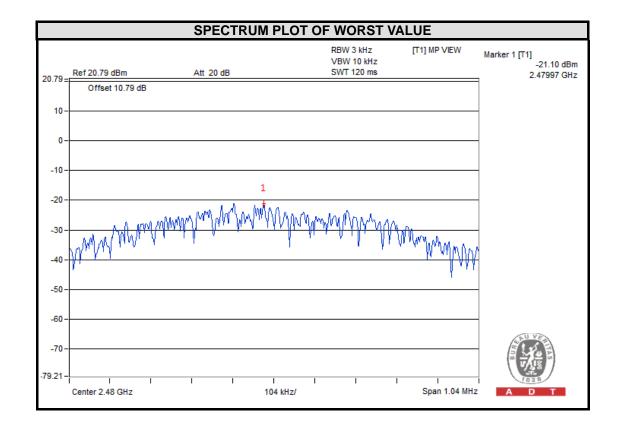
5.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



5.5.7 TEST RESULTS

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-23.17	8	PASS
19	2440	-21.57	8	PASS
39	2480	-21.10	8	PASS





5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.6.2 TEST SETUP



5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

- 1. Set the RBW = 100 kHz.
- 2. Set the VBW \ge 300 kHz.
- 3. Detector = peak.
- 4. Sweep time = auto couple.
- 5. Trace mode = max hold.
- 6. Allow trace to fully stabilize.
- 7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



MEASUREMENT PROCEDURE OOBE

- 1. Set RBW = 100 kHz.
- 2. Set VBW ≥ 300 kHz.
- 3. Set span to encompass the spectrum to be examined
- 4. Detector = peak.
- 5. Trace Mode = max hold.
- 6. Sweep = auto couple.

5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

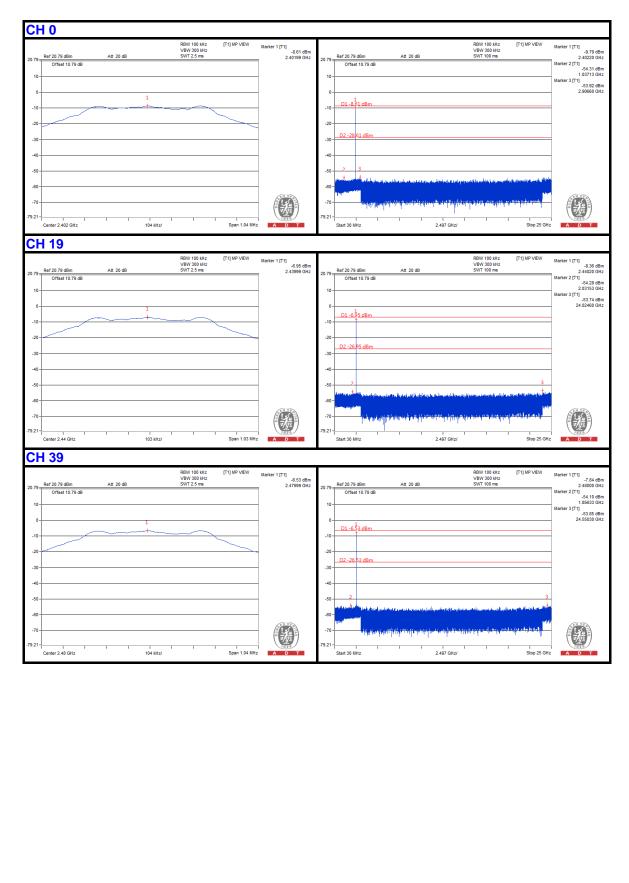
5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.6.7 TEST RESULTS

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

5.6.8 TEST RESULTS





6. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



7. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab: Tel: 886-2-26052180 Fax: 886-2-26051924 Hsin Chu EMC/RF Lab: Tel: 886-3-5935343 Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab: Tel: 886-3-3183232 Fax: 886-3-3270892

Email: <u>service.adt@tw.bureauveritas.com</u> Web Site: <u>www.bureauveritas-adt.com</u>

The address and road map of all our labs can be found in our web site also.



8. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---- END ----