



FCC ID: P4Q-N635A Report No.: T191105W01-RP2

IC: 2420C-N635A

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# RADIO TEST REPORT FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-247

Test Standard	FCC Part 15.247 IC RSS-247 issue 2 and IC RSS-GEN issue 5
Product name	Chiron pro
Brand Name	Mitac, Mio, Navman, Magellan
Model No.	N635
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:

Tested by:

Komil Ison

Kevin Tsai Deputy Manager

Dally . Hong

Dally Hong Engineer

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部分複製。

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SGS Compliance Certification Service Inc. 程智科技股份有限公司 No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan / 新北市五股區五工六路 11 號 t:(886-2) 2299-9720 f:(886-2) 2298-1882 www.sgs.tw www.ccsrf.com



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## **Revision History**

Rev.	lssue Date	Revisions	Effect Page	Revised By
00	January 17, 2020	Initial Issue	ALL	Allison Chen



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## 1. GENERAL INFORMATION

## **1.1 EUT INFORMATION**

FCC Applicant	Mitac Digital Technology Corporation No.200, Wen Hwa 2nd Rd.,Kuei Shan Dist. Taoyuan, 33383 Taiwan					
IC Applicant	MiTAC Digital Technology Corporation No.200, Wenhua 2nd Rd., Guishan Dist. Taoyuan City 333 Taiwan					
Manufacturer	MITAC COMPUTER (KUNSHAN) CO., LTD. No. 269, 2nd Avenue, District A, Comprehensive Free Trade Zone, Kunshan, Jiangsu, P.R. China					
Equipment	Chiron pro					
Model No.	N635					
Model Discrepancy	Difference of the those trade names (list on this report) are just for marketing purpose only.					
Trade Name	Mitac, Mio, Navman, Magellan					
Received Date	November 5, 2019					
Date of Test	November 25 ~ December 9, 2019					
Output Power (W)	BLE-1Mbps: 0.0012 (EIRP: 0.0017)					
Power Operation	<ol> <li>Power from Rechargeable Li-ion Polymer Battery. Rating: 3.7VDC, 4000mAh, 14.8Wh</li> <li>Power from Adapter. I/P: 100-240VAC, 50/60Hz, 0.5A O/P: 5.0VDC, 2A</li> </ol>					
HW Version	R02					
SW Version	R15					



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## **1.2 EUT CHANNEL INFORMATION**

Frequency Range	2402MHz-2480MHz
Modulation Type	GFSK for BLE-1Mbps
Number of channels	40 Channels

#### Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested					
Frequency range inNumber ofLocation in frequencywhich device operatesfrequenciesrange of operation					
1 MHz or less	1	Middle			
1 MHz to 10 MHz	2	1 near top and 1 near bottom			
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom			

## **1.3 ANTENNA INFORMATION**

Antenna Type	🗌 PIFA 🗌 PCB 🗌 Dipole 🗌 Coils 🛛 Integral		
Antenna Gain	Gain: 1.31 dBi		
Antenna Connector	i-pex		



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## **1.4 MEASUREMENT UNCERTAINTY**

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

#### Remark:

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

2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

## **1.5 FACILITIES AND TEST LOCATION**

All measurement facilities used to collect the measurement data are located at No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	Dally Hong	-
Radiation	Jerry Chang	-
RF Conducted	Jane Wang	-

**Remark:** The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.



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## **1.6 INSTRUMENT CALIBRATION**

RF Conducted Test Site						
Equipment	ipment Manufacturer Model S/N Cal Date Cal Due					
Coaxial Cable	Woken	WC12	CC003	06/28/2019	06/27/2020	
Power Meter	Anritsu	ML2495A	1149001	02/12/2019	02/11/2020	
Power Seneor	Anritsu	MA2491A	030982	02/12/2019	02/11/2020	
Signal Analyzer	R&S	FSV 40	101073	09/25/2019	09/24/2020	
Software			N/A			

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/26/2019	02/25/2020
Bilog Antenna	Sunol Sciences	JB3	A030105	07/26/2019	07/25/2020
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Coaxial Cable	EMCI	EMC105	190914+25111	09/20/2019	09/19/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	10/04/2019	10/03/2020
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 6.11-20180413				

AC line Conduction Test Room						
Equipment	Manufacturer	Manufacturer Model S/N Cal Date Cal Due				
CABLE	EMCI	CFD300-NL	CERF	06/27/2019	06/26/2020	
EMI Test Receiver	R&S	ESCI	100064	07/26/2019	07/25/2020	
LISN	SCHWARZBECK	NSLK 8127	8127-541	01/31/2019	01/30/2020	
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2019	02/12/2020	
Software	EZ-EMC(CCS-3A1-CE)					

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. N.C.R. = No Calibration Required



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## **1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT**

EUT Accessories Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC ID
	N/A					

Support Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC ID
1	NB(J)	TOSHIBA	PT345T-00L002	N/A	PD97260H	1000M-7260H

## **1.8 TEST METHODOLOGY AND APPLIED STANDARDS**

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 558074 D01, RSS-247 Issue 2 and RSS-GEN Issue 5



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## 2. TEST SUMMERY

FCC Standard Section	IC Standard Section	Report Section	Test Item	Result
15.203	-	1.3	Antenna Requirement	Pass
15.207(a)	RSS-GEN 8.8	4.1	AC Conducted Emission	Pass
15.247(a)(2)	RSS-247(5.2)(a)	4.2	6 dB Bandwidth	Pass
-	RSS-GEN 6.7	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)(3)	RSS-247(5.4)(d)	4.3	Output Power Measurement	Pass
15.247(e)	RSS-247(5.2)(b)	4.4	Power Spectral Density	Pass
15.247(d)	RSS-247(5.5)	4.5	Conducted Band Edge	Pass
15.247(d)	RSS-247(5.5)	4.5	Conducted Spurious Emission	Pass
15.247(d)	RSS-GEN 8.9, 8.10	4.6	Radiation Band Edge	Pass
15.247(d)	RSS-GEN 8.9, 8.10	4.6	Radiation Spurious Emission	Pass



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## 3. DESCRIPTION OF TEST MODES

## **3.1 THE WORST MODE OF OPERATING CONDITION**

Operation mode	BLE Mode (1Mbps)
Test Channel Frequencies	1.Lowest Channel : 2402MHz 2.Middle Channel : 2440MHz 3.Highest Channel : 2480MHz

Remark:

Г

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.



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## **3.2 THE WORST MODE OF MEASUREMENT**

AC Power Line Conducted Emission					
Test Condition	AC Power line conducted emission for line and neutral				
	Mode1: EUT Power by Battery (DC 3V) Mode 2: EUT power by adapter + Type C USB Mode3: EUT Power by Type C USB+ CarCharge (DC12V) Mode4: EUT Power by Cradle(N564)+Micro USB+Adapter Mode5: EUT Power by Cradle(N564)+Micro USB+ CarCharge (DC12V) Mode6: EUT Power by Cradle(N564) + Cable(DC 12V) Mode7: EUT Power by Cradle(N564_TN)+Micro USB+Adapter Mode8: EUT Power by Cradle(N564_TN)+Micro USB+CarCharge (DC12V) Mode9: EUT Power by Cradle(N564_TN) + Cable(DC 12V) Mode10: EUT Power by Cradle(N635_V)+Micro USB+Adapter Mode11: EUT Power by Cradle(N635_V)+Micro USB+CarCharge (DC12V) Mode12: EUT Power by Cradle(N635_V)+Micro USB+CarCharge (DC12V) Mode13: EUT Power by Cradle(N635_V) + Cable(DC 12V) Mode14: EUT Power by Cradle(N635_VL)+Micro USB+Adapter Mode14: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode15: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode15: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode15: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode16: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V)				
Worst Mode	☐ Mode 1 ☐ Mode 2 ☐ Mode 3 ⊠ Mode 4				

	Radiated Emission Measurement
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode1: EUT Power by Battery (DC 3V) Mode2: EUT Power by Adapter + Type C USB Mode3: EUT Power by Type C USB+ CarCharge (DC12V) Mode4: EUT Power by Cradle(N564)+Micro USB+Adapter Mode5: EUT Power by Cradle(N564)+Cable(DC 12V) Mode6: EUT Power by Cradle(N564) + Cable(DC 12V) Mode7: EUT Power by Cradle(N564_TN)+Micro USB+Adapter Mode8: EUT Power by Cradle(N564_TN)+Micro USB+CarCharge (DC12V) Mode9: EUT Power by Cradle(N564_TN) + Cable(DC 12V) Mode10: EUT Power by Cradle(N635_V)+Micro USB+Adapter Mode11: EUT Power by Cradle(N635_V)+Micro USB+CarCharge (DC12V) Mode12: EUT Power by Cradle(N635_V) + Cable(DC 12V) Mode13: EUT Power by Cradle(N635_VL)+Micro USB+Adapter Mode14: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode15: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode15: EUT Power by Cradle(N635_VL) + Cable(DC 12V) Mode16: EUT Power by Cradle(N635_VL) + Cable(DC 12V)
Worst Mode	☑ Mode 1
Worst Position	<ul> <li>Placed in fixed position.</li> <li>Placed in fixed position at X-Plane (E2-Plane)</li> <li>Placed in fixed position at Y-Plane (E1-Plane)</li> <li>Placed in fixed position at Z-Plane (H-Plane)</li> </ul>



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	Radiated Emission Measurement Below 1G				
Test Condition	Radiated Emission Below 1G				
Power supply Mode	Mode1: EUT Power by Battery (DC 3V) Mode2: EUT Power by Adapter + Type C USB Mode3: EUT Power by Type C USB+ CarCharge (DC12V) Mode4: EUT Power by Cradle(N564)+Micro USB+Adapter Mode5: EUT Power by Cradle(N564)+Micro USB+ CarCharge (DC12V) Mode6: EUT Power by Cradle(N564) + Cable(DC 12V) Mode7: EUT Power by Cradle(N564_TN)+Micro USB+Adapter Mode8: EUT Power by Cradle(N564_TN)+Micro USB+Adapter Mode9: EUT Power by Cradle(N564_TN) + Cable(DC 12V) Mode10: EUT Power by Cradle(N564_TN) + Cable(DC 12V) Mode10: EUT Power by Cradle(N635_V)+Micro USB+Adapter Mode11: EUT Power by Cradle(N635_V)+Micro USB+Adapter Mode11: EUT Power by Cradle(N635_V) + Cable(DC 12V) Mode12: EUT Power by Cradle(N635_VL)+Micro USB+Adapter Mode13: EUT Power by Cradle(N635_VL)+Micro USB+Adapter Mode14: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode15: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V) Mode16: EUT Power by Cradle(N635_VL)+Micro USB+CarCharge (DC12V)				
Worst Mode	🛛 🖾 Mode 1 🔲 Mode 2 🗌 Mode 3 🗌 Mode 4				

#### Remark:

1. The worst mode was record in this test report.

2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report

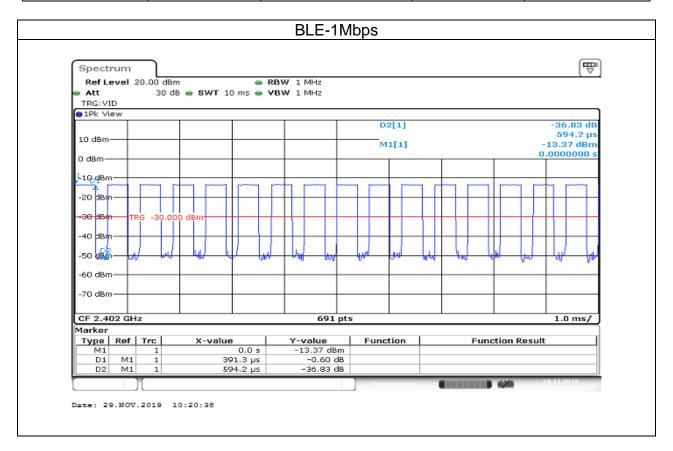
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.



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## **3.3 EUT DUTY CYCLE**

		Duty Cycle		
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
BLE-1Mbps	65.85%	1.81	2.56	3.00





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## 4. TEST RESULT

## 4.1 AC POWER LINE CONDUCTED EMISSION

## 4.1.1 Test Limit

According to §15.207(a) and RSS-GEN section 8.8,

Frequency Range	Limits(dBµV)		
(MHz)	Quasi-peak	Average	
0.15 to 0.50	66 to 56*	56 to 46*	
0.50 to 5	56	46	
5 to 30	60	50	

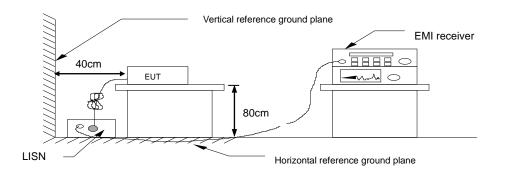
\* Decreases with the logarithm of the frequency.

### 4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

- 1. The EUT was placed above horizontal ground plane and 0.4m above vertical ground plane
- 2. EUT connected to the line impedance stabilization network (LISN)
- 3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. Recorded Line for Neutral and Line.

## 4.1.3 Test Setup



## 4.1.4 Test Result

#### Pass.



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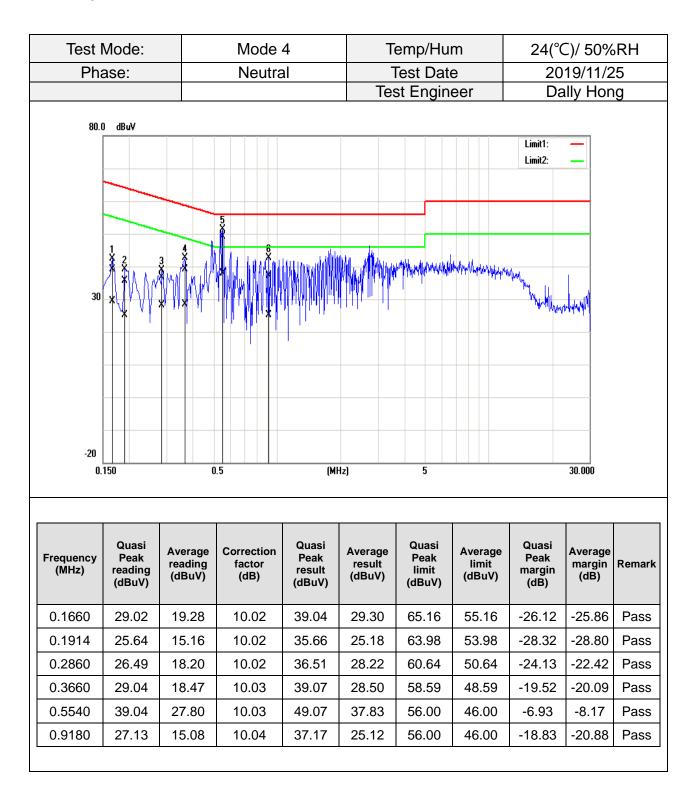
### Test Data

Test I	Node:		Mode 4	1	Te	emp/Hur	n	24(°0	C)/ 50%	RH
Pha	ase:		Line		Т	Test Date		2019/11/25		5
					Tes	st Engine	er	Da	ally Hon	g
80.0	) dBuV							Limit1: Limit2:	_	
30		***** ********************************		han sign and sign a	White A Maynorth	Yh <mark>la</mark> a Ar balanna	ann hann hann h	na Mar	ANANAN	
-20 0.	150		.5	(Mł	łz)	5			30.000	
Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remarl
	Peak reading	reading	factor	Peak result	result	Peak limit	limit	Peak margin	margin	
(MHz)	Peak reading (dBuV)	reading (dBuV)	factor (dB)	Peak result (dBuV)	result (dBuV)	Peak limit (dBuV)	limit (dBuV)	Peak margin (dB)	margin (dB)	Remark Pass Pass
(MHz) 0.2100	Peak reading (dBuV) 36.29	reading (dBuV) 20.58	factor (dB) 10.13	Peak result (dBuV) 46.42	result (dBuV) 30.71	Peak limit (dBuV) 63.21	limit (dBuV) 53.21	Peak margin (dB) -16.79	margin (dB) -22.50	Pass Pass
(MHz) 0.2100 0.3020	Peak reading (dBuV) 36.29 23.33	reading (dBuV) 20.58 13.39	factor (dB) 10.13 10.14	Peak result (dBuV) 46.42 33.47	result (dBuV) 30.71 23.53	Peak limit (dBuV) 63.21 60.19	limit (dBuV) 53.21 50.19	Peak margin (dB) -16.79 -26.72	margin (dB) -22.50 -26.66	Pass Pass Pass
(MHz) 0.2100 0.3020 0.3500	Peak reading (dBuV) 36.29 23.33 29.09	reading (dBuV) 20.58 13.39 20.52	factor (dB) 10.13 10.14 10.14	Peak result (dBuV) 46.42 33.47 39.23	result (dBuV) 30.71 23.53 30.66	Peak limit (dBuV) 63.21 60.19 58.96	limit (dBuV) 53.21 50.19 48.96	Peak margin (dB) -16.79 -26.72 -19.73	margin (dB) -22.50 -26.66 -18.30	Pass

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## 4.26dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

### 4.2.1 Test Limit

According to §15.247(a)(2) and RSS-247 section 5.2(a)

#### 6 dB Bandwidth :

Limit

Shall be at least 500kHz

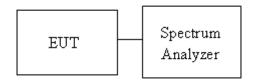
**Occupied Bandwidth(99%)** : For reporting purposes only.

### 4.2.2 Test Procedure

Test method Refer as KDB 558074 D01 and ANSI C63.10: 2013 clause 6.9.2,

- 1. The EUT RF output connected to the spectrum analyzer by RF cable.
- 2. Setting maximum power transmit of EUT.
- 3. SA set RBW =100KHz, VBW = 300KHz and Detector = Peak, to measurement 6dB Bandwidth.
- 4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth.
- 5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

### 4.2.3 Test Setup



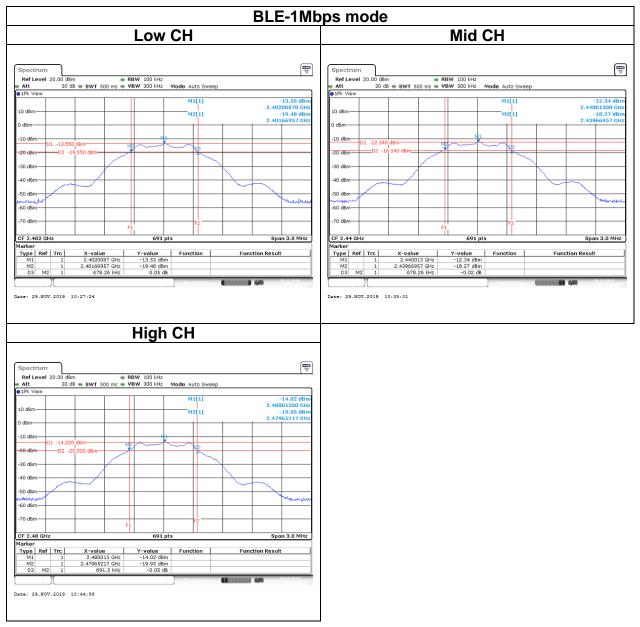
### 4.2.4 Test Result

	Test mode: BLE-1Mbps mode / 2402-2480 MHz						
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (MHz)	6dB limit (kHz)			
Low	2402	1.0593	0.6782				
Mid	2440	1.0593	0.6782	>500			
High	2480	1.0593	0.6913				



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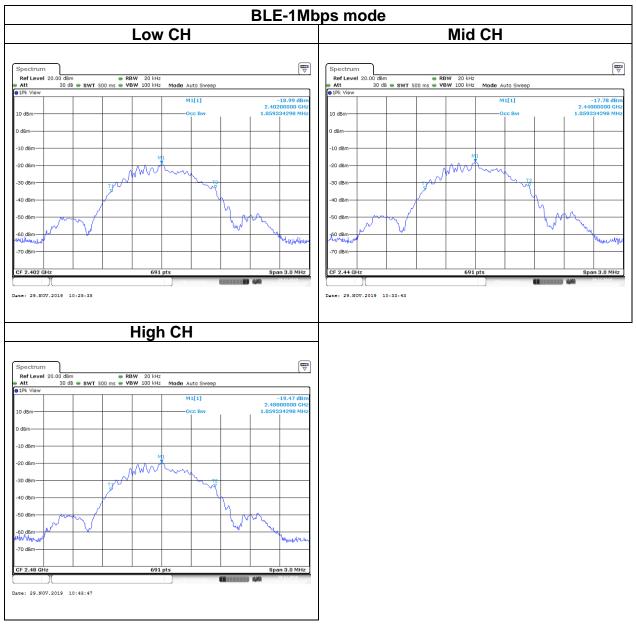
## 6dB BANDWIDTH Test Data





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## BANDWIDTH (99%) Test Data





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## 4.3 OUTPUT POWER MEASUREMENT

### 4.3.1 Test Limit

According to §15.247(b)(3) and RSS-247 section 5.4(d),

#### Peak output power :

#### FCC

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt(30 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

#### IC

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Antenna not exceed 6 dBi : 30dBm
<ul> <li>Antenna with DG greater than 6 dBi</li> <li>[Limit = 30 - (DG - 6)]</li> <li>Point-to-point operation</li> </ul>

Average output power : For reporting purposes only.

### 4.3.2 Test Procedure

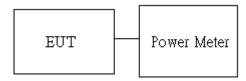
Test method Refer as KDB 558074 D01.

- 1. The EUT RF output connected to the power meter by RF cable.
- 2. Setting maximum power transmit of EUT.
- 3. The path loss was compensated to the results for each measurement.
- 4. Measure and record the result of Peak output power and Average output power. in the test report.



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### 4.3.3 Test Setup



### 4.3.4 Test Result

#### Peak output power :

	BLE Mode								
Config.	СН	Freq. (MHz)	Power Setting	PK Power (dBm)	EIRP PK Power (dBm)	PK Power (W)	EIRP PK Power (W)	FCC Limit (dBm)	IC Limit (dBm)
BLE	0	2402	Default	0.05	1.36	0.0010	0.0014		
Data rate:	19	2440	Default	0.95	2.26	0.0012	0.0017	30	36
1Mbps	39	2480	Default	-0.31	1.00	0.0009	0.0013		

#### Average output power :

BLE Mode					
Config.	СН	Freq. (MHz)	AV Power (dBm)		
BLE	0	2402	-0.21		
Data rate: 1Mbps	19	2440	0.67		
	39	2480	-0.61		



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## 4.4 POWER SPECTRAL DENSITY

## 4.4.1 Test Limit

According to §15.247(e) and RSS-247 section 5.2(b)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Limit

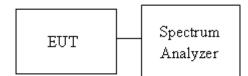
Antenna not exceed 6 dBi : 8dBm
 Antenna with DG greater than 6 dBi
 [ Limit = 8 - (DG - 6) ]
 Point-to-point operation :

### 4.4.2 Test Procedure

Test method Refer as KDB 558074 D01.

- 1. The EUT RF output connected to the spectrum analyzer by RF cable.
- 2. Setting maximum power transmit of EUT
- 3. SA set RBW = 3kHz, VBW = 30kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
- 4. The path loss and Duty Factor were compensated to the results for each measurement by SA.
- 5. Mark the maximum level.
- 6. Measure and record the result of power spectral density. in the test report.

### 4.4.3 Test Setup



### 4.4.4 Test Result

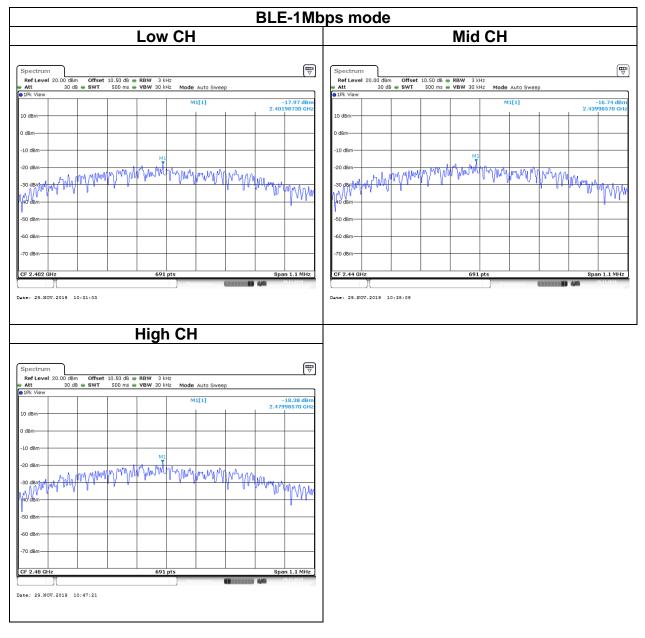
Test mode: BLE-1Mbps mode / 2402-2480 MHz					
Channel	Frequency (MHz)	PSD (dBm)	FCC / IC limit (dBm)		
Low	2402	-17.97			
Mid	2440	-16.74	8		
High	2480	-18.38			

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## Test Data





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## 4.5 CONDUCTED BAND EDGE AND SPURIOUS EMISSION

### 4.5.1 Test Limit

According to §15.247(d) and RSS-247 section 5.5

FCC: In any 100 kHz bandwidth outside the authorized frequency band,

Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement 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).

**IC:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### 4.5.2 Test Procedure

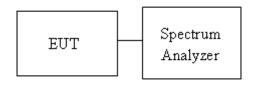
Test method Refer as KDB 558074 D01.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.

2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.

3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

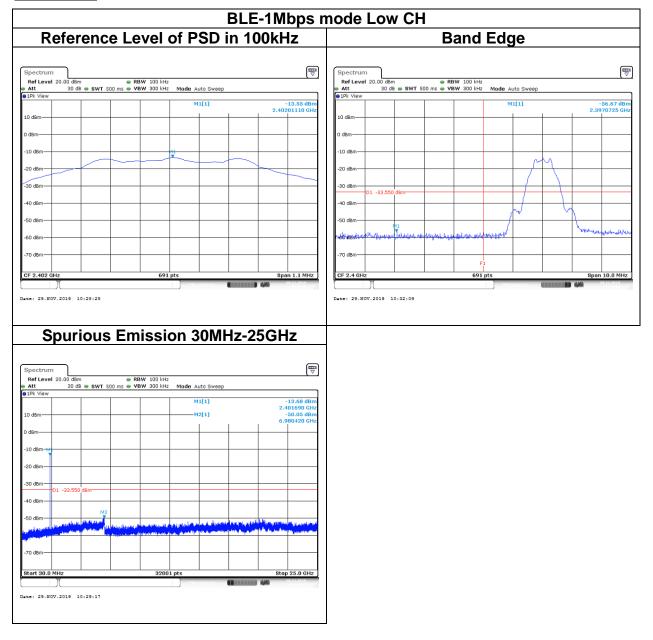
### 4.5.3 Test Setup





### 4.5.4 Test Result

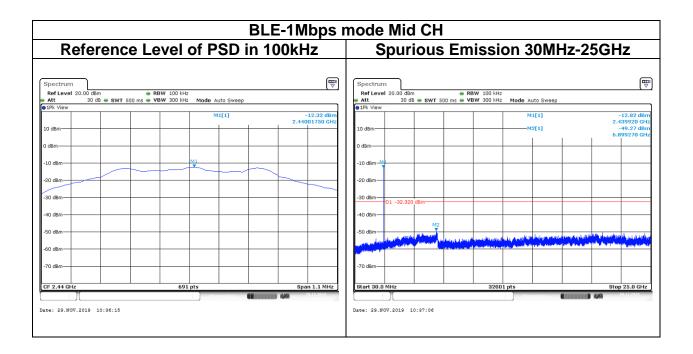
### Test Data



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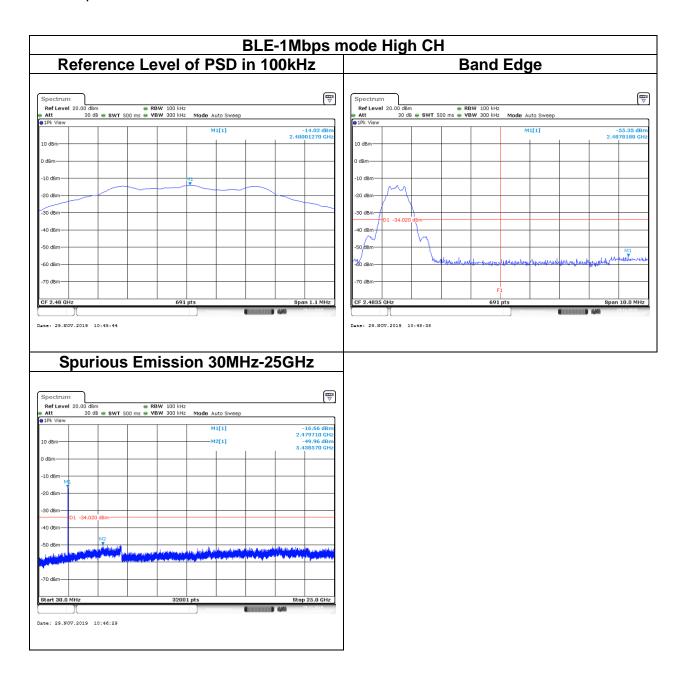


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## 4.6 RADIATION BANDEDGE AND SPURIOUS EMISSION

### 4.6.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

#### Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

#### Above 30 MHz

Frequency	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)				
(MHz)	Transmitters	Receivers			
30-88	100 (3 nW)	100 (3 nW)			
88-216	150 (6.8 nW)	150 (6.8 nW)			
216-960	200 (12 nW)	200 (12 nW)			
Above 960	500 (75 nW)	500 (75 nW)			

Remark:

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



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Report No.: T191105W01-RP2

#### IC according to RSS-247 section 5.5, RSS-Gen, Section 8.9 and 8.10

#### <u>RSS-Gen Table 3 and Table 5 – General Field Strength Limits for Transmitters and</u> <u>Receivers at Frequencies Above 30 MHz</u> (Note)

Frequency	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)				
(MHz)	Transmitters	Receivers			
30-88	100 (3 nW)	100 (3 nW)			
88-216	150 (6.8 nW)	150 (6.8 nW)			
216-960	200 (12 nW)	200 (12 nW)			
Above 960	500 (75 nW)	500 (75 nW)			

*Note:* Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with Section 6.6.

#### <u>RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies</u> <u>Below 30 MHz (Transmit)</u>

Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (m)
9-490 kHz <sup>Note</sup>	6.37/F (F in kHz)	300
490-1,705 kHz	63.7/F (F in kHz)	30
1.705-30 MHz	0.08	30

*Note:* The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.



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### 4.6.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.

3. Span shall wide enough to full capture the emission measured. The SA from 9KHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

4. The SA setting following :

- (1) Below 1G : RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.
- (2) Above 1G:
  - (2.1) For Peak measurement : RBW = 1MHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.
  - (2.2) For Average measurement : RBW = 1MHz, VBW

If Duty Cycle  $\geq$  98%, VBW=10Hz.

If Duty Cycle < 98%, VBW=1/T.

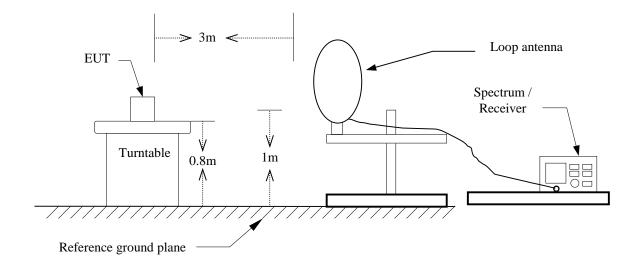
Remark:

 Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
 No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

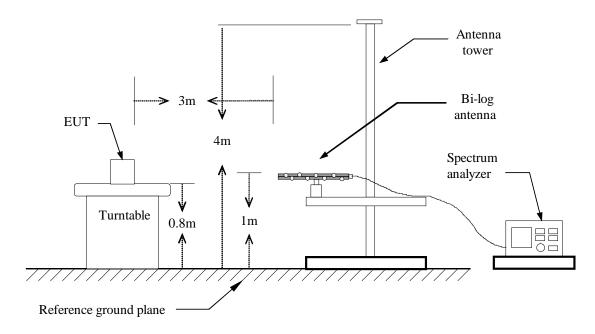


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## 4.6.3 Test Setup <u>9kHz ~ 30MHz</u>

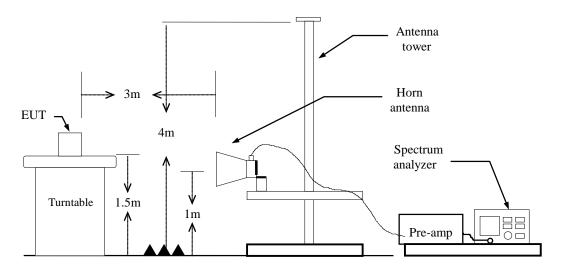


#### <u>30MHz ~ 1GHz</u>





Above 1 GHz



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## 4.6.4 Test Result

### Band Edge Test Data

Test Mo	ode: E	BLE-1Mbps Low	СН	Temp/Hum	18.6(°C	.)/ 59%RF	
Test Ite	em	Band Edge		Test Date	Decemb	December 9, 201	
Polariz	ze	Vertical	Т	est Engineer	Jerry Chan		
Detect	tor	Peak / Average	9				
130 Level (dBi	uV/m)					:	
120							
400							
100							
80						1 1 1 1	
60					2	1	
40		· · · · · · · · · · · · · · · · · · ·				1 1 1 1 1	
20							
0 <mark></mark> 2310	2330.	2350.	1	2370.	2390.	2410	
			equency (MHz)				
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
2390.00	Average	38.92	-3.38	35.54	54.00	-18.46	
2390.00	Peak	52.08	-3.38	48.70	74.00	-25.30	



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Test Mo	ode: E	BLE-1Mbps Low (	СН	Temp/Hum	18.6(°C	C)/ 59%RI	
Test Ite	əm	Band Edge		Test Date	Decem	December 9, 20 <sup>2</sup>	
Polariz	ze	Horizontal	Т	est Engineer	Jerry	/ Chang	
Detect	tor	Peak / Average	•				
130 Level (dBu	uV/m)						
120				· · · · · · · · · · · · · · · · · · ·		1	
100			     	· · · · · · · · · · · · · · · · · · ·	     	1 1 1 1	
80							
60						     	
00					2		
40		L					
20						1	
0 <mark>0</mark>	2330.	2350.		2370.	2390.	2410	
		Fr	equency (MHz)				
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
rieq.	Mode	Reading Level	Faciol	FS	@3m	wargin	
MHz		_	dB		_	dB	
	PK/QP/AV	dBµV		dBµV/m	dBµV/m		
2390.00 2390.00	Average	39.89	-3.38	36.51	54.00	-17.49	
	Peak	50.17	-3.38	46.79	74.00	-27.21	



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Test Mo	ode:	BLE-	1Mbps Hig	h CH	Ten	np/Hum	18.6(°0	C)/ 59%RH	
Test Ite	em		Band Edge	)	Test Date		Decem	December 9, 201	
Polariz	ze		Vertical		Test	Engineer	Jerr	y Chang	
Detect	or	Pe	eak / Avera	ge					
120 Level (dBu 110 90 70	ıV/m)								
50			2						
30			1						
10									
0 <mark></mark> 2475	248	30.	2485.	Frequency (	2490 MHz)	•	2495.	2500	
Freq.	Detecto Mode		Spectrum eading Leve	Fact	or	Actual FS	Limit @3m	Margin	
MHz	PK/QP/A	V	dBµV	dB	5	dBµV/m	dBµV/m	dB	
2483.50	Average	e	37.30	-2.8	3	34.47	54.00	-19.53	
2483.50	Peak		49.00	-2.8	3	46.17	74.00	-27.83	



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18.6(°C)/ 59%RH
December 9, 201
r Jerry Chang
2495. 2500
Limit Margin
@3m
dBµV/m dB
54.00 -19.41
74.00 -27.52
1



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#### Below 1G Test Data

Test Mod	e: B	LE-1Mbps Mode	Temp/Hu	um	18.6(°	C)/ 59%Rł
Test Iten	Test Item 30MHz-1GHz		Test Da	te	Decen	nber 9, 201
Polarize	;	Vertical	Test Engir	neer	Jer	ry Chang
Detecto	r	Peak				
100 Level (dBuV	(m)					
90			· · · · · · · · · · · · · · · · · · ·			
80						
70						
60				<sup>1</sup>		
50						
40 1						1 
30	2				<b>34</b>	5 6
20						
10						
030	224.	418.	612.		806.	1000
		Freque	ncy (MHz)			

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
66.86	47.05	-15.16	31.89	40.00	-8.11	Peak
206.54	35.41	-11.42	23.99	43.50	-19.51	Peak
801.15	26.21	1.72	27.93	46.00	-18.07	Peak
844.80	25.24	3.12	28.36	46.00	-17.64	Peak
949.56	25.15	4.02	29.17	46.00	-16.83	Peak
980.60	24.17	5.72	29.89	54.00	-24.11	Peak

Note: No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).



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Test Mode		E-1Mbps M		Temp/Hum	-	)/ 59%RI
Test Item	(	30MHz-1GH	Iz	Test Date	December 9, 201	
Polarize		Horizontal	Те	est Engineer	Jerry Chan	
Detector		Peak				
100 Level (dBuV/m	)					
90						
80						
70						
60						
50	1					
40						
40 1 30	3					56
			4			
20						
10						
0 <mark></mark>	224.	418.	6 Frequency (MHz)	512.	806.	1000
-	<b>D</b>	Correct	<b>D</b>			
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
		Factor				<b>Remark</b> Peak
(MHz)	(dBuV)	Factor (dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
(MHz) 66.86	(dBuV) 48.14	Factor (dB/m) -15.16	(dBuV/m) 32.98	(dBuV/m) 40.00	(dB) -7.02	Peak
(MHz) 66.86 133.79	(dBuV) 48.14 37.93	Factor (dB/m) -15.16 -9.31	(dBuV/m) 32.98 28.62	(dBuV/m) 40.00 43.50	(dB) -7.02 -14.88	Peak Peak
(MHz) 66.86 133.79 204.60	(dBuV) 48.14 37.93 42.29	Factor (dB/m) -15.16 -9.31 -11.19	(dBuV/m) 32.98 28.62 31.10	(dBuV/m) 40.00 43.50 43.50	(dB) -7.02 -14.88 -12.40	Peak Peak Peak



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#### Above 1G Test Data

				ency (MHz)				
0 <mark></mark>	6100.	1	11200.	163	300.	21400.	2650	
10		·				 I I I		
30			       		       	       	1 1 	
50	1							
50								
70			 				 	
90								
110							         	
120 Level (dBu)	V/m)	i	i	; ;	i		i	
Detecto	or	P	eak					
Polariz	e	Vertical		Tes	Test Engineer		erry Chang	
Test Ite	m	Har	monic	Т	est Date	Dece	mber 9, 20 <sup>-</sup>	
Test Mo	ue.		ops Low C⊢		Temp/Hum		18.6(°C)/ 59%R	

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804.00	37.56	2.84	40.40	74.00	-33.60	Peak
N/A						

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit



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Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
01000	6100.	11200	Frequency (MHz)	16300.	21400.	26500
10						
30						
	1					
50						
70						
90						
120						
120Level (dBuV/m)						
Detector		Peak				
Polarize		Horizonta	.l -	Test Engineer		Chang
Test Item		Harmonic	;	Test Date	Decemb	oer 9, 201
Test Mode	: BLI	E-1Mbps Lo	W CH	Temp/Hum	18.6(°C	)/ 59%Rł

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804.00	37.44	2.84	40.28	74.00	-33.72	Peak
N/A						
<b></b>	•	•	•	•	•	-

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit



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Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
			Frequency (MHz)			
0 <mark></mark>	6100.	11200.		6300.	21400.	26500
10						
30						
30	1					
50						
70						
90						
110			       			
120						
Detector		Peak				
Polarize		Vertical	Te	est Engineer	Jerry	Chang
Test Item		Harmonic		Test Date	December 9, 20 <sup>-</sup>	
Test Mode	: BL	E-1Mbps Mi	аСн	Temp/Hum	18.6(°C	)/ 59%RH

Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
36.70	3.02	39.72	74.00	-34.28	Peak
		(dBuv) (dB/m)	(dB/m) (dB/m)	(dBuv) (dB/m) (dBuv/m) (dBuv/m)	(dBuv) (dB/m) (dBuv/m) (dBuv/m) (dB)

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remarl
			Frequency (MHz)			
01000	6100.	11200.	16	300.	21400.	26500
10					1 1 1 1	
30						
	1					
50						- - - 
70						
90						
110						
120 Level (dBuV/r	n)					
Detector		T Cak				
Polarize Detector		Horizontal Peak		st Engineer	Jerry	Chang
Test Item		Harmonic		Test Date	December 9, 201	
Test Mode		E-1Mbps Mid		emp/Hum		)/ 59%RI

Remark:

N/A

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit



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Frequency	Reading	Correct Factor	Result	Limit	Margin	Remark
			Frequency (MHz)			
0 <mark></mark>	6100.	11200		6300.	21400.	26500
10		· · · · · · · · · · · · · · · · · · ·				
30						
	1					
50						
70						
90	       					
110						
120 Level (dBuV/m)	)	-::				
Deteotor		i cuit				
Polarize Detector		Vertical Peak	IE	est Engineer	Jerry	Chang
Test Item		Harmonic		Test Date	December 9, 20	
Test Mode:		-1Mbps Hig		Temp/Hum		)/ 59%RH

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4960.00	36.81	3.85	40.66	74.00	-33.34	Peak
N/A						
	-			•	•	

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit



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Test Mode:	: BLE	-1Mbps Hig	gh CH	Temp/Hu	Im	18.6(°C	)/ 59%RH
Test Item		Harmonic		Test Dat	te	Decemb	er 9, 201
Polarize		Horizontal		Test Engineer		Jerry Chang	
Detector		Peak					
120 Level (dBuV/m)			1	i			]
110							
90							
70	     			       +	    - -		
50	4		       		 		
30				 I I I I			
10			       				
0 <mark></mark>	6100.	11200		16300.	1	21400.	26500
1000	0100.	11200	Frequency (MHz			21400.	20500
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Lin (dBu)		Margin (dB)	Remark
4960.00	36.69	3.85	40.54	74.	00	-33.46	Peak
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

--End of Test Report--