



FCC ID: Z3K-EVOLVE10 **Report No.:** T210429C12-RP2 IC: 9930A-EVOLVE10

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RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-247

Test Standard	FCC Part 15.247 RSS-247 issue 2 and RSS-GEN issue 5
Product name	Evolve Universal 10 inch Headrest Monitor
Brand Name	Ford
Model No.	661183
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:

Komil Ison

Kevin Tsai Deputy Manager

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,不可部份複製。

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Revision History

Rev.		lssue Date	Revisions	Effect Page	Revised By
00	July	y 28, 2021	Initial Issue	ALL	Doris Chu



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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	JET OPTOELECTRONICS CO., LTD. 3F., No.300, Yangguang St., Neihu Dist., Taipei City 11491, Taiwan
Manufacturer	JET OPTOELECTRONICS CO., LTD. 3F., No.300, Yangguang St., Neihu Dist., Taipei City 11491, Taiwan
Equipment	Evolve Universal 10 inch Headrest Monitor
Model No.	661183
Model Discrepancy	N/A
Trade Name	Ford
Received Date	April 29, 2021
Date of Test	June 21 ~ July 14, 2021
Power Supply	Power from Power Supply: DC 12V
HW Version	20210126 D01
SW Version	95126
EUT Serial #	(1) Conducted: GA51RX0011030083 (2) Radiated: GA51RX 0011030014

Remark:

1. For more details, please refer to the User's manual of the EUT.

2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

3. The EUT (model: 661183) had been tested under operating condition.



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1.2 EUT CHANNEL INFORMATION

Frequency Range	2402MHz-2480MHz	
Modulation Type	GFSK for BLE 1 Mbps & 2 Mbps	
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					

1.3 ANTENNA INFORMATION

Antenna Type	🛛 Ceramic 🗌 PCB 🗌 Dipole 🗌 Coils
Antenna Gain	Gain :1 dBi
Antenna Connector	N/A

Remark:

1. The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203 and RSS-Gen 6.8.



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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.



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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, Taiwan. (R.O.C.)

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	-	Not applicable, because EUT doesn't connect to AC Main Source direct.
Radiation	Ray Li	-
RF Conducted	Lance Chen	-

Remark: The lab has been recognized as the FCC accredited lad under the KDB 974614 D01 and is listed in the FCC pubic Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Coaxial Cable	Woken	WC12	CC003	06/28/2021	06/27/2022	
Coaxial Cable	Woken	WC12	CC001	06/28/2021	06/27/2022	
EXA Signal Analyzer	KEYSIGHT	N9010B	MY55460167	09/07/2020	09/06/2021	
Power Meter	Anritsu	ML2487A	6K00003260	05/24/2021	05/23/2022	
Power Seneor	Anritsu	MA2490A	032910	05/24/2021	05/23/2022	
Software			N/A			



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3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/08/2021	02/07/2022
Bilog Antenna	Sunol Sciences	JB3	A030105	07/24/2020	07/23/2021
Horn Antenna	ETS LINDGREN	3116	00026370	12/11/2020	12/10/2021
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/24/2021	02/23/2022
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/19/2020	09/18/2021
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	12/09/2020	12/08/2021
K Type Cable	Huber+Suhner	SUCOFLEX 102	22470/2	12/09/2020	12/08/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/06/2021	01/05/2022
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021
Loop Ant	COM-POWER	AL-130	121051	04/07/2021	04/06/2022
Pre-Amplifier	EMEC	EM330	060609	02/24/2021	02/23/2022
Pre-Amplifier	HP	8449B	3008A00965	12/25/2020	12/24/2021
Pre-Amplifier	MITEQ	AMF-6F-18004000-37-8P	985646	09/02/2020	09/01/2021
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	07/24/2020	
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				

Remark: Each piece of equipment is scheduled for calibration once a year.



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1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

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

	Support Equipment						
No.	No. Equipment Brand Model Series No. FCC ID IC						
1	DC Power Source	Agilent	E3640A	N/A	N/A	N/A	
2	NB(E)	Lenovo	IBM 7663	N/A	N/A	N/A	
3	NB(L)	Toshiba	PORTEGE R30-A	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, RSS-247 Issue 2 and RSS-GEN Issue 5



2. TEST SUMMARY

FCC **IC Standard** Report Standard **Test Item** Result Section Section Section 15.203 RSS-Gen 6.8 1.3 Antenna Requirement Pass 15.207(a) **RSS-GEN 8.8** 4.1 AC Conducted Emission N/A RSS-247(5.2)(a) 4.2 6 dB Bandwidth Pass 15.247(a)(2) 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 RSS-GEN 8.9, 8.10 **Radiation Spurious Emission** 15.247(d) 4.6 Pass

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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

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

Remark:

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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

Radiated Emission Measurement Above 1G			
Test Condition	Radiated Emission Above 1G		
Power supply Mode Mode 1: EUT power by Power supply			
Worst Mode Mode 1 Mode 2 Mode 3 Mode 4			
Worst Position	 Placed in fixed position. Placed in fixed position at X-Plane (E2-Plane) Placed in fixed position at Y-Plane (E1-Plane) Placed in fixed position at Z-Plane (H-Plane) 		

Radiated Emission Measurement Below 1G				
Test Condition	Test Condition Radiated Emission Below 1G			
Power supply Mode	Power supply Mode Mode 1: EUT power by Power supply			
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

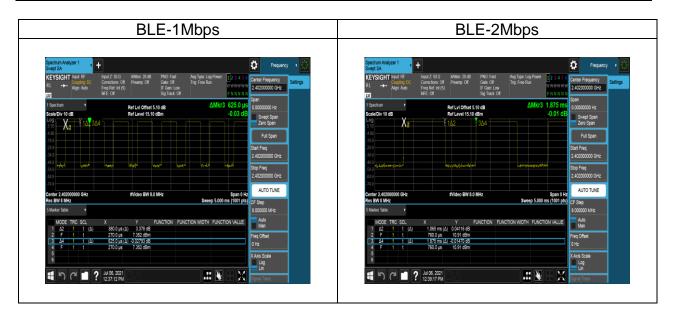


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3.3 EUT DUTY CYCLE

Temperature:	20.1 ~ 25.9 ℃	Humidity:	54 ~ 61% RH
Tested by:	Lance Chen	Test date:	July 5 ~ 14, 2021

Duty Cycle					
Configuration	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW Setting (kHz)	
BLE-1Mbps	61.00	2.15	2.63	3.00	
BLE-2Mbps	57.00	2.44	0.94	1.00	





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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	

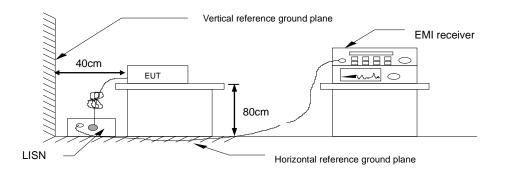
* Decreases with the logarithm of the frequency.

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

Not applicable, because EUT doesn't connect to AC Main Source direct.



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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

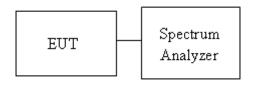
Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as ANSI C63.10: 2013,

- 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





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4.2.4 Test Result

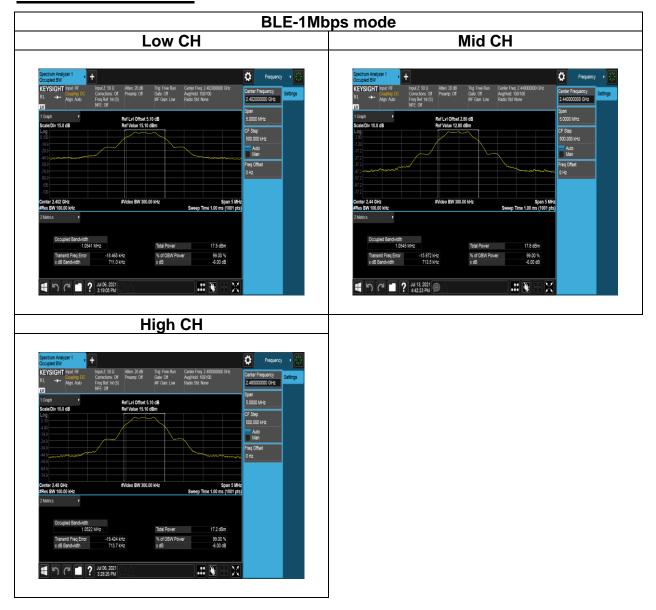
Temperature:	20.1 ~ 25.9 ℃	Humidity:	54 ~ 61% RH
Tested by:	Lance Chen	Test date:	July 5 ~ 14, 2021

Test mode: BLE-1Mbps mode / 2402-2480 MHz						
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (MHz)	6dB limit (kHz)		
Low	2402	1.0296	0.711			
Mid	2440	1.0289	0.7135	≥500		
High	2480	1.027	0.7137			
	Test mode: BLE-2Mbps mode / 2402-2480 MHz					
Low	2402	2.0535	1.25			
Mid	2440	2.052	1.245	≥500		
High	2480	2.0477	1.249			



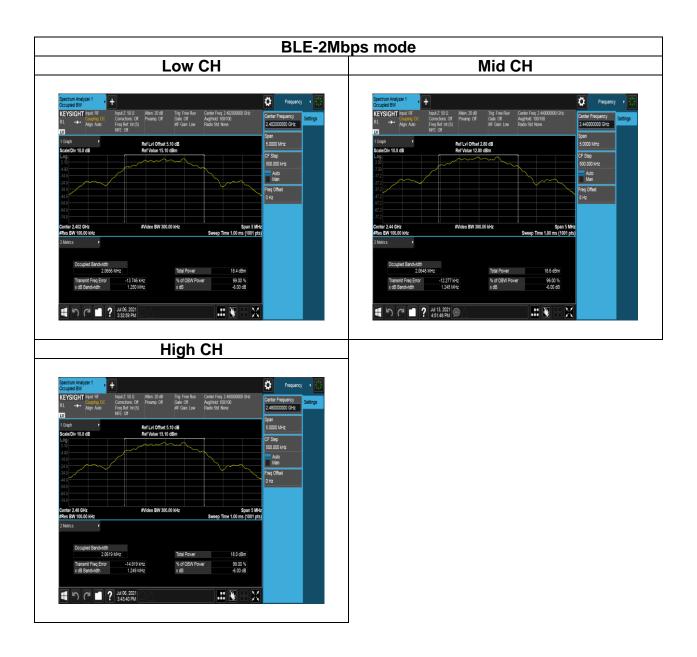
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Test Data 6dB BANDWIDTH





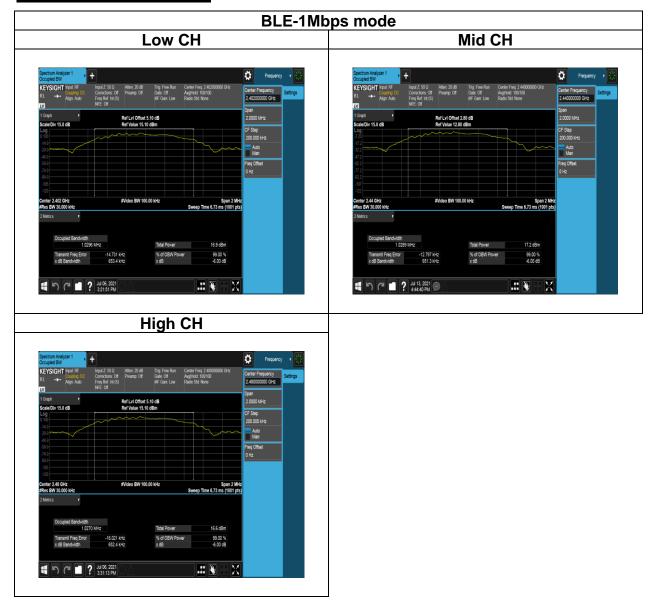
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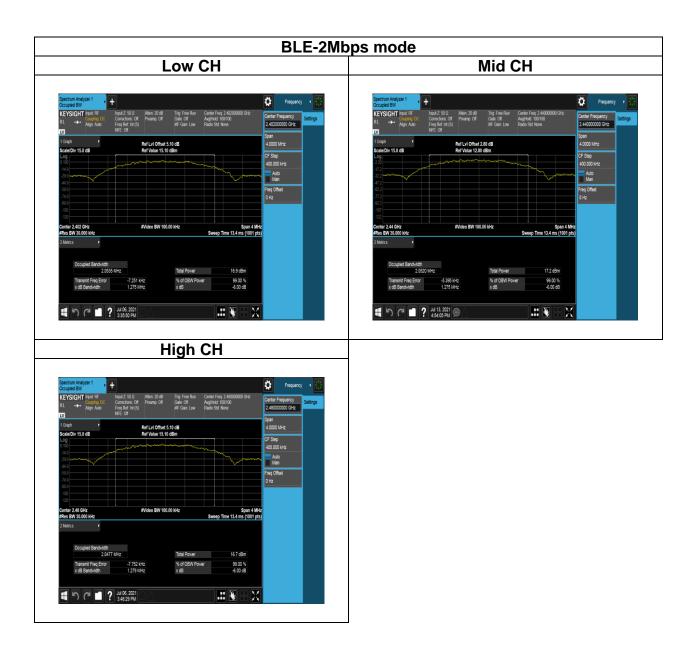
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<u>Test Data</u> BANDWIDTH (99%)





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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 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement,

IC

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 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.

Limit	Antenna not exceed 6 dBi : 30dBm
	[Limit = 30 – (DG – 6)]

Average output power : For reporting purposes only.



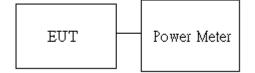
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4.3.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

- 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.

4.3.3 Test Setup





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4.3.4 Test Result

Temperature:	20.1 ~ 25.9 ℃	Humidity:	54 ~ 61% RH
Tested by:	Lance Chen	Test date:	July 5 ~ 14, 2021

Peak output power :

BLE 1M mode:

СН	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit (dBm)
Low	2402	7	11.87	30
Mid	2440	7	12.08	30
High	2480	7	11.27	30

BLE 2M mode:

СН	Frequency (MHz)	Power set	Peak Power Output (dBm)	Required Limit (dBm)
Low	2402	7	11.85	30
Mid	2440	7	12.06	30
High	2480	7	11.26	30

Average output power :

BLE 1M mode:

СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit (dBm)
Low	2402	7	11.69	30
Mid	2440	7	11.90	30
High	2480	7	10.97	30

BLE 2M mode:

СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit (dBm)
Low	2402	7	11.16	30
Mid	2440	7	11.67	30
High	2480	7	11.21	30



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EIRP power :

EIRP BLE 1M mode

СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)		Limit	
Low	2402	7	11.69	1.00	12.69	4W=	36	dBm
Mid	2440	7	11.90	1.00	12.90	4W=	36	dBm
High	2480	7	10.97	1.00	11.97	4W=	36	dBm

EIRP BLE 2M mode

СН	Frequency (MHz)	Power set	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)		Limit	
Low	2402	7	11.16	1.00	12.16	4W=	36	dBm
Mid	2440	7	11.67	1.00	12.67	4W=	36	dBm
High	2480	7	11.21	1.00	12.21	4W=	36	dBm



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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

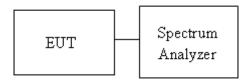
Antenna not exceed 6 dBi : 8dBm Antenna with DG greater than 6 dBi [Limit = 8 - (DG - 6)] Point-to-point operation :

4.4.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

- 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 = 10kHz, 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





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4.4.4 Test Result

Temperature:	20.1 ~ 25.9 ℃	Humidity:	54 ~ 61% RH
Tested by:	Lance Chen	Test date:	July 5 ~ 14, 2021

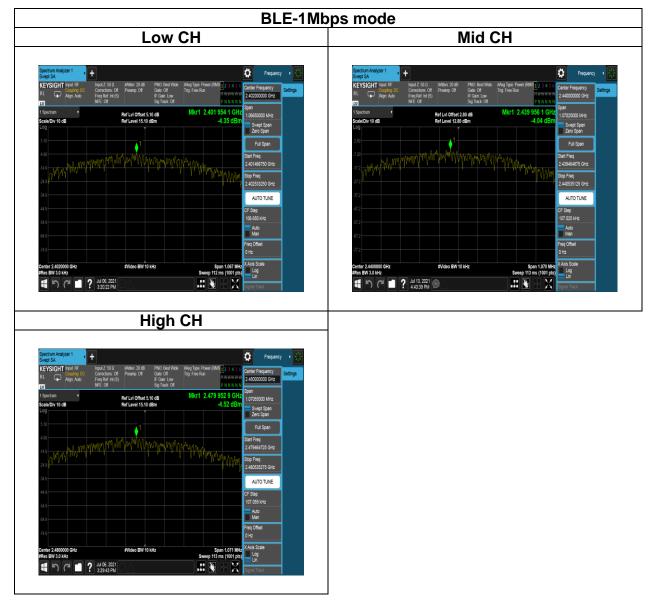
Test mode: BLE-1Mbps mode / 2402-2480 MHz				
Channel	Frequency (MHz)	PSD (dBm)	FCC limit (dBm)	
Low	2402	-4.345		
Mid	2440	-4.043	8	
High	2480	-4.518		

Test mode: BLE-2Mbps mode / 2402-2480 MHz				
Channel	Frequency (MHz)	PSD (dBm)	FCC limit (dBm)	
Low	2402	-8.312		
Mid	2440	-8.014	8	
High	2480	-8.466		



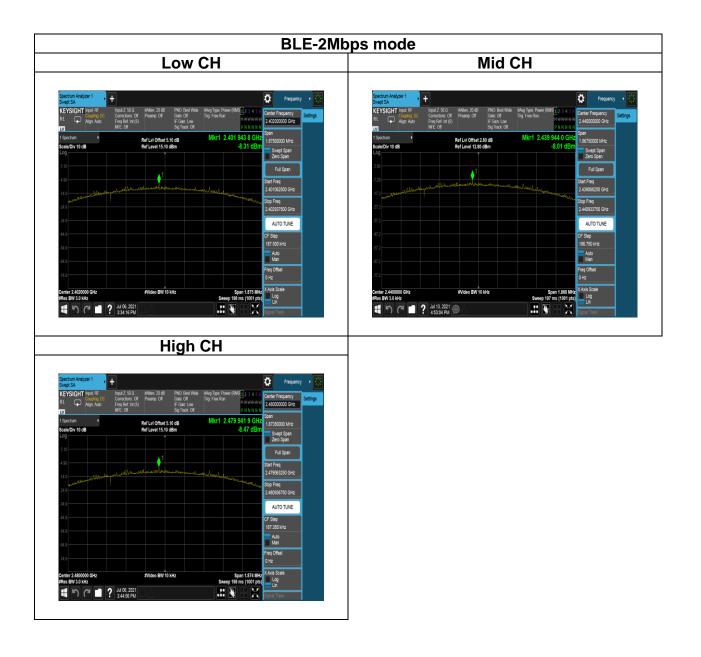
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Test Data





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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

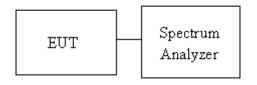
Test method Refer as ANSI C63.10:2013.

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



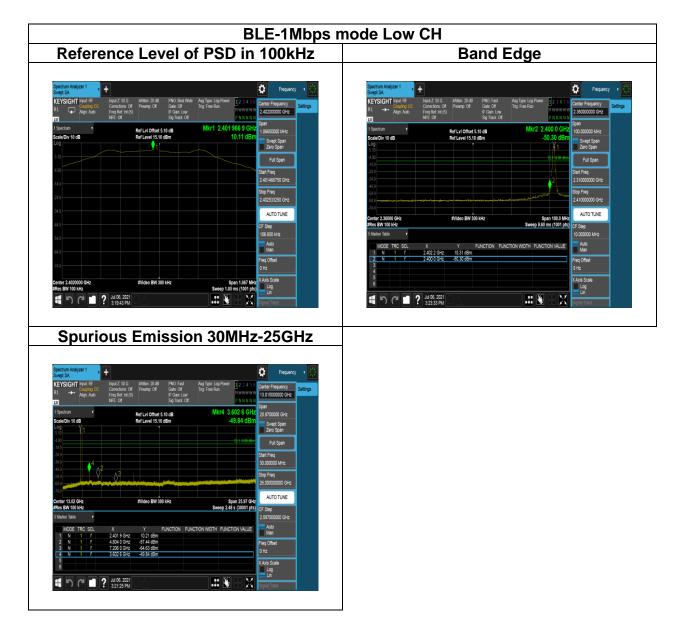


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4.5.4 Test Result

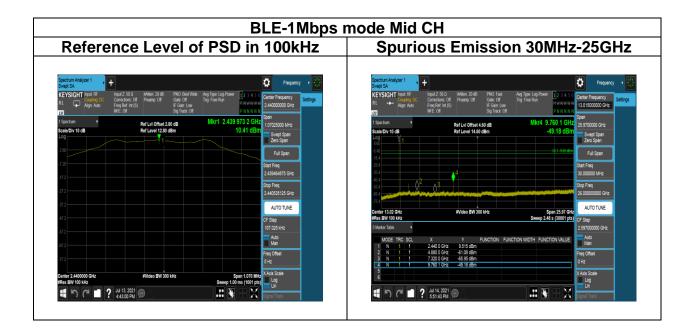
Test Data

Temperature:	20.1 ~ 25.9 ℃	Humidity:	54 ~ 61% RH
Tested by:	Lance Chen	Test date:	July 5 ~ 14, 2021



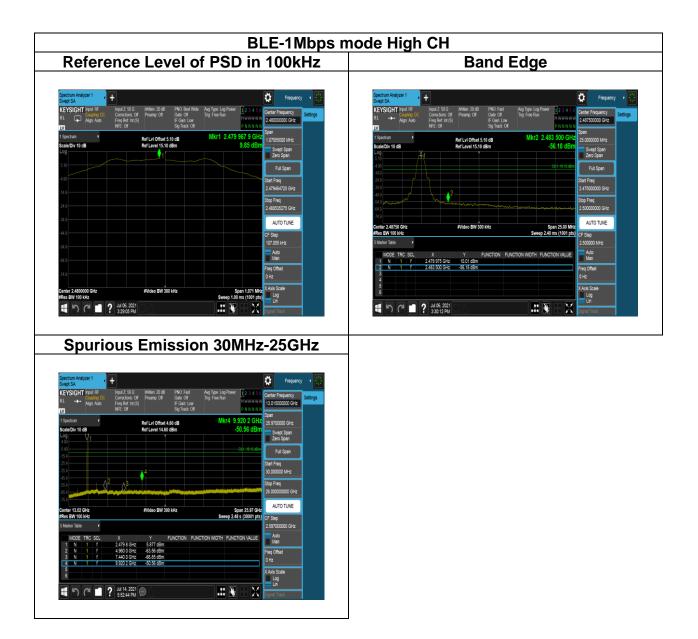


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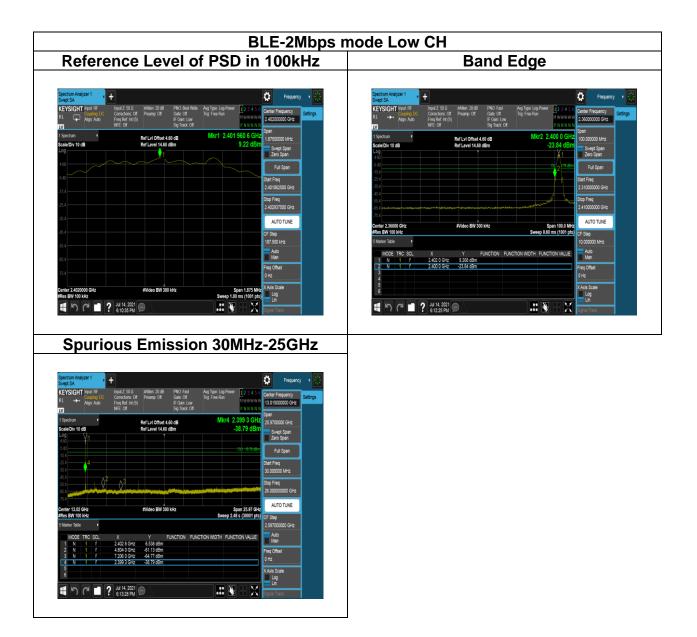


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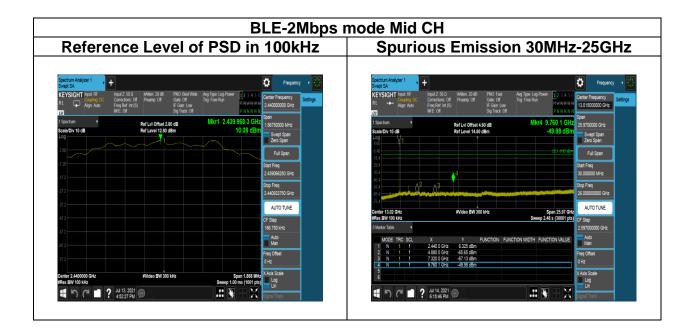


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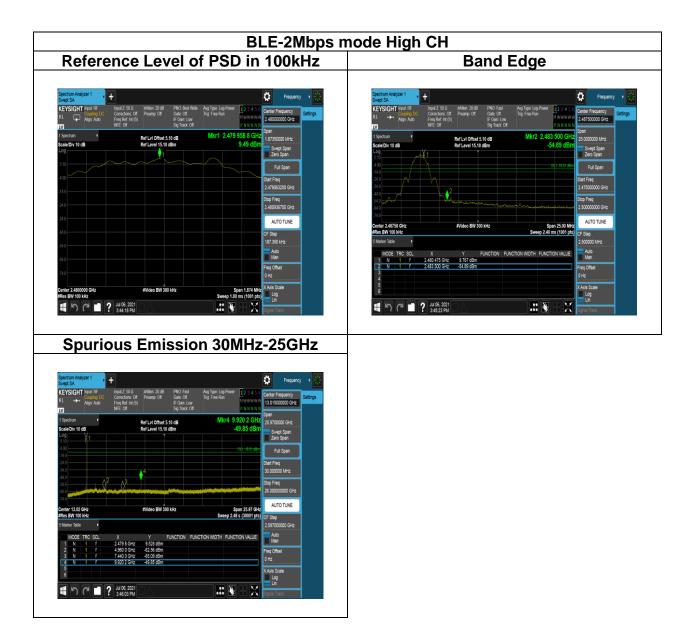


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4.6 RADIATION BANDEDGE AND SPURIOUS EMISSION

4.6.1 Test Limit

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

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

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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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 (MHz)	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 ^{Note}	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 ANSI C63.10:2013.

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.

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).

- 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

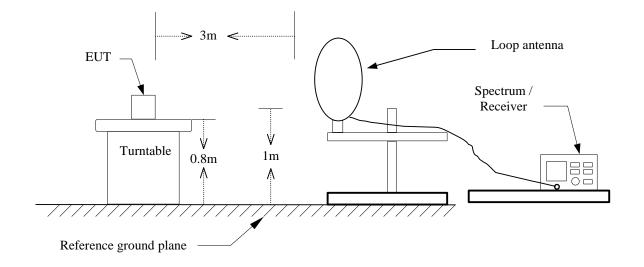
If Duty Cycle \geq 98%, VBW=10Hz.

'If Duty Cycle < 98%, VBW=1/T.

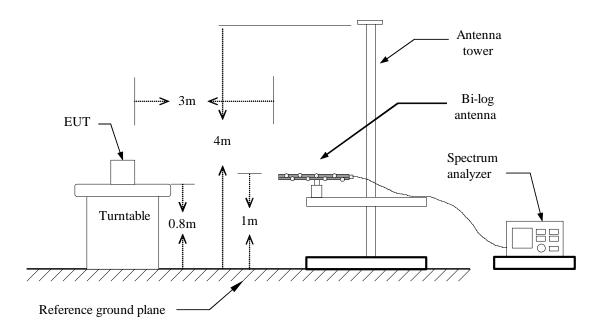


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4.6.3 Test Setup <u>9kHz ~ 30MHz</u>



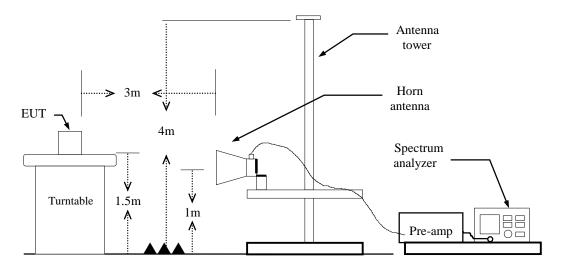
<u>30MHz ~ 1GHz</u>





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Above 1 GHz





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4.6.4 Test Result

Band Edge Test Data

Test Mo	de:	BLE-1Mbps Low (CH T	emp/Hum	22.8(℃)/ 52%Rł
Test Ite	m	Band Edge	-	Test Date	June	21, 2021
Polariz	ze 🛛	Vertical	Tes	st Engineer	Ra	ay Li
Detect	or	Peak / Average				
120 Level (dBu	V/m)					
110						
90						<u>A</u>
70						
50			- Martin	an malilian and	man	tim
30						
10						
0 <mark></mark> 2310	2330.	2350. Fr	2 equency (MHz)	370.	2390.	2410
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
2390.00	Peak	45.39	-1.00	44.39	74.00	-29.61
	Average	36.92	-1.00	35.92	54.00	-18.08

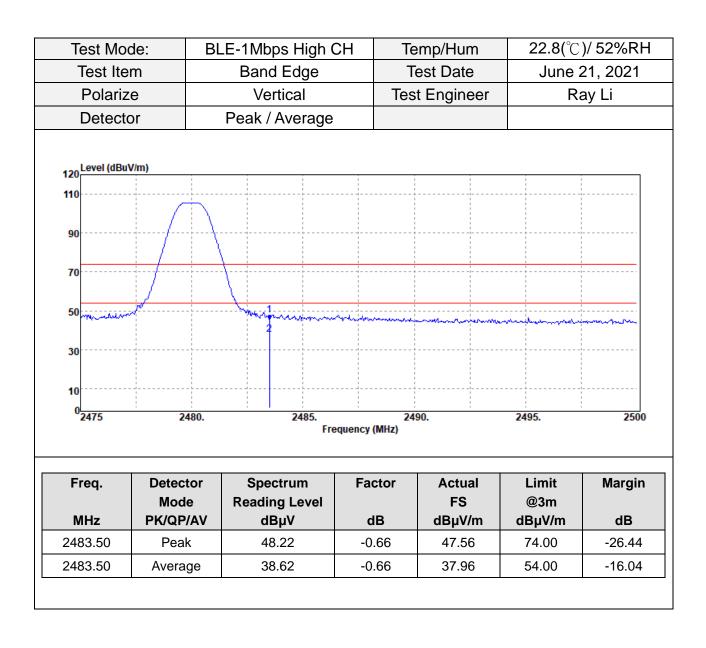


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Test Mo	de: B	LE-1Mbps Low C	н т	emp/Hum	22.8(℃)/ 52%RH
Test Ite	m	Band Edge	-	Test Date June 21		21, 2021
Polariz	ze 🛛	Horizontal	Tes	st Engineer	R	ay Li
Detect	or	Peak / Average				
120 Level (dBu	V/m)					
120						
110						
90						
70			 		 	<u> </u>
50	manum	manganamatan	mannen		mont	him
30					2	
10			 			
0 <mark></mark> 2310	2330.	2350.		370.	2390.	2410
		Fre	quency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	J
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Peak	45.90	-1.00	44.90	74.00	-29.10
2390.00	Average	35.00	-1.00	34.00	54.00	-20.00

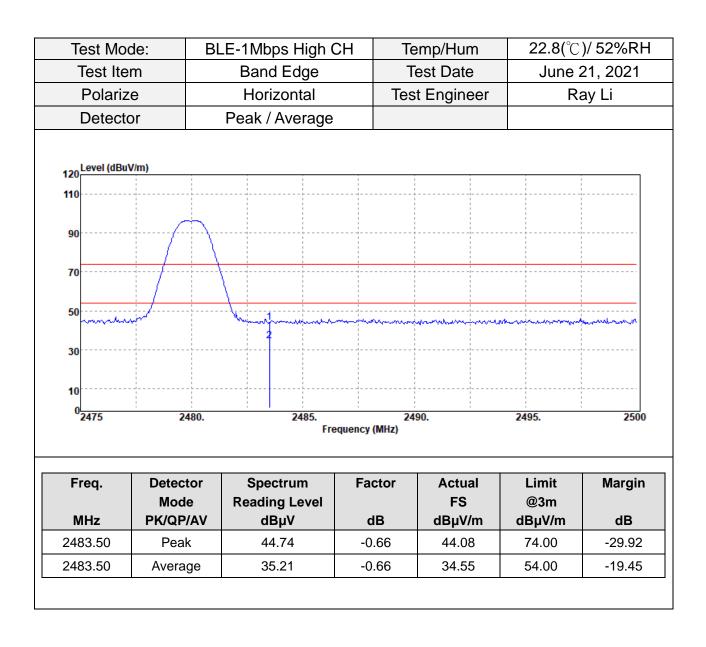


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de: B	LE-2Mbps Low C	H Te	emp/Hum	22.8(℃)/ 52%Rł
m	Band Edge Test Date		June 2	21, 2021	
e	Vertical	Tes	st Engineer	Ra	ay Li
or	Peak / Average				
V/m)					
			I I I I I V V V V V V V V V V V V V V V		
					n l
an marine	ware and a second se	den an	harrown	man	tim
				2	
2330.	2350. Fre		370.	2390.	2410
Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
	•			-	dB
Peak		-1.00			-28.68
	35.03	-1.00	34.03	54.00	-19.97
	m e Dr V/m) V/m) 2330.	m Band Edge e Vertical pr Peak / Average //m) /////////////////////////////////	m Band Edge T e Vertical Test or Peak / Average V/m)	m Band Edge Test Date e Vertical Test Engineer or Peak / Average	m Band Edge Test Date June 2 e Vertical Test Engineer Ra or Peak / Average

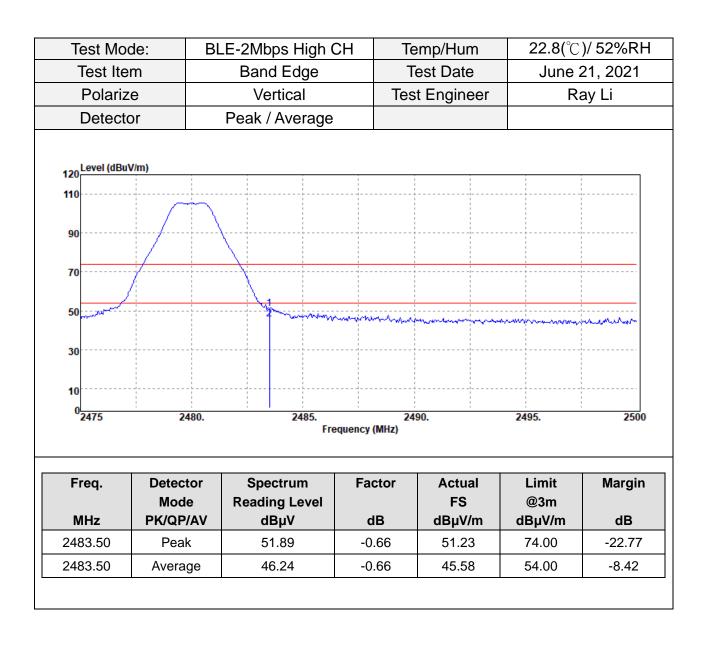


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le: Bl	LE-2Mbps Low C	н т	emp/Hum	22.8(℃)/ 52%Rł
n	Band Edge Test Date		June	21, 2021	
e	Horizontal	Tes	st Engineer	R	ay Li
r	Peak / Average				
/m)					
					~
 			 		<u>{-</u> }
a-a-himan-himan	- man man market and a second	marian	mound	undernation	moun
				2	
2330.	2350.		370.	2390.	2410
	Fre	quency (MHZ)			
Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level		FS	@3m	
	-		-	-	dB
Peak	44.82	-1.00	43.82	74.00	-30.18
Average	34.81	-1.00	33.81	54.00	-20.19
)	e in in iteration is a second	e Horizontal r Peak / Average //m)	Horizontal Test Implementation Test //m) //m //m)	e Horizontal Test Engineer r Peak / Average ////////////////////////////////////	e Horizontal Test Engineer R r Peak / Average ////////////////////////////////////

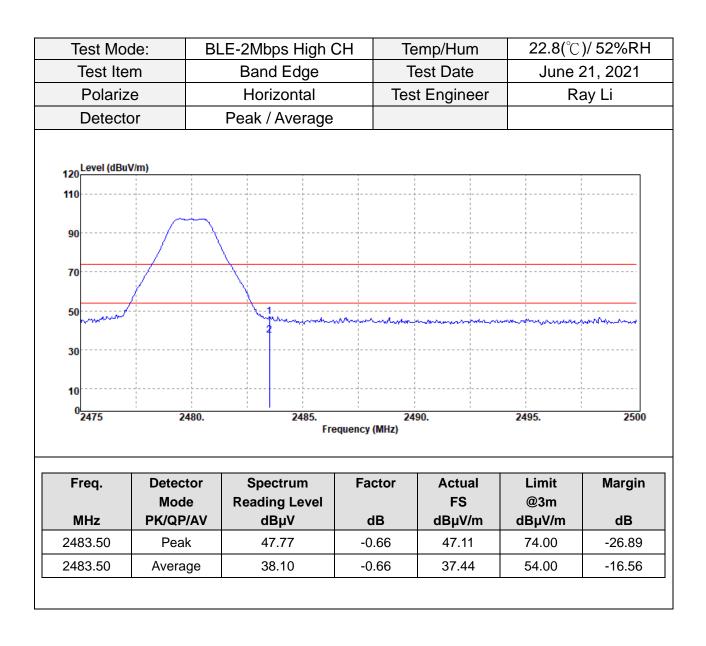


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Below 1G Test Data

Test Mo	de:	BLE-1Mbps Mo	de	Temp/Hum	23(°C)	/ 63%RH
Test Item		30MHz-1GHz		Test Date	June 22, 2021	
Polariz	ze	Vertical		Fest Engineer	R	ay Li
Detect	or	Peak				
120 Level (dBu	ıV/m)					
110						
90					 	
					1	
70					I I I I I	
50	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·	 	
	2	j 4			_	
30				·	5	6
40						
10 0 30						
-30	224.	418. F	requency (MHz	612.)	806.	100
Frog	Detector	Spectrum	Factor	Actual	Limit	Margin
Freq.	Mode	Reading Level	Factor	FS	@3m	wargin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
65.89	Peak	53.40	-15.54	37.86	40.00	-2.14
120.21	Peak	49.29	-9.11	40.18	43.50	-3.32
267.65	Peak	51.54	-9.16	42.38	46.00	-3.62
420.91	Peak	42.47	-5.02	37.45	46.00	-8.55
757.50	Peak	28.42	0.95	29.37	46.00	-16.63
101.00						



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			Frequ	iency (MHz)			
0 30	0	224.	418.	612.	806	5. 1000	
10							
30 **							
-	1	2	3 4		5	6	
50							
70							
90							
110							
4 20 LE	evel (dBuV/m)						
L	Detector		Peak				
	Polarize		Horizontal	Test En	gineer	Ray Li	
	est Item	3	0MHz-1GHz	Test I		June 22, 2021	
	st Mode:		BLE-1Mbps Mode		Hum	23(°C)/ 63%R	

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
109.54	Peak	44.39	-10.52	33.87	43.50	-9.63
172.59	Peak	49.17	-11.00	38.17	43.50	-5.33
343.31	Peak	45.84	-7.59	38.25	46.00	-7.75
420.91	Peak	41.76	-5.02	36.74	46.00	-9.26
745.86	Peak	29.60	0.77	30.37	46.00	-15.63
993.21	Peak	26.38	4.50	30.88	54.00	-23.12
lote: No emiss	sion found betw	een lowest interna	al used/genera	ted frequency t	to 30MHz (9kH	z~30MHz).



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MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	Mode	Reading Level		FS	@3m	
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
30	224.	418. F	6 requency (MHz)	12.	806.	1000
030	224			40	000	
10						
30						
		4			5	6
50			 			· · · · · · · · · · · · · · · · · · ·
70						
90						
110						
120 Level (dB	uV/m)		1			
Detec	tor	Peak				
Polari	ze	Vertical	Tes	st Engineer	R	ay Li
Test Item		30MHz-1GHz	: 7	Fest Date	June	22, 2021
Test Mo	Jue.	BLE-2Mbps Mode		emp/Hum	23(°C)/ 63%RH	

	65.89	Peak	53.51	-15.54	37.97	40.00	-2.03
	120.21	Peak	49.42	-9.11	40.31	43.50	-3.19
	267.65	Peak	51.00	-9.16	41.84	46.00	-4.16
	420.91	Peak	41.46	-5.02	36.44	46.00	-9.56
	757.50	Peak	29.82	0.95	30.77	46.00	-15.23
	993.21	Peak	25.04	4.50	29.54	54.00	-24.46
1							

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



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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
			requency (min	£)		
0 <mark></mark> 30	224.	418.	Frequency (MH	612.	806.	1000
10						
30						
	1 2	3	4		5	6
50						
70			 			
90						
110						
120 Level (dBu	uV/m)	i				
Detect	tor	Peak				
Polari	ze	Horizontal		Test Enginee		Ray Li
Test Ite	em	30MHz-1GH		Test Date	June	22, 2021
Test Mo	ode:	BLE-2Mbps Mo	ode	Temp/Hum	23(°C)/ 63%RH

Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
107.60	Peak	44.97	-10.95	34.02	43.50	-9.48
172.59	Peak	47.91	-11.00	36.91	43.50	-6.59
343.31	Peak	46.10	-7.59	38.51	46.00	-7.49
458.74	Peak	37.59	-4.12	33.47	46.00	-12.53
757.50	Peak	28.59	0.95	29.54	46.00	-16.46
993.21	Peak	25.58	4.50	30.08	54.00	-23.92
Note: No emiss	sion found betw	een lowest interna	al used/generat	ted frequency t	to 30MHz (9kH	z~30MHz).



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Above 1G Test Data

Test Mo	de: B	LE-1Mbps Low	CH	Temp/Hum	22.8(°C)/ 52%Rł
Test Ite		Harmonic		Test Date		21, 2021
Polariz	ze	Vertical		Test Engineer	R	ay Li
Detect	or	Peak				
120 Level (dBu	V/m)		1			
110						
90						
70						
50						
30						
10						1 1 1 1 1 1
0 <mark></mark> 1000	<mark>6100.</mark>	11200. Fi	requency (N	16300. IHz)	21400.	26500
Freq.	Detector Mode	Spectrum Reading Level	Facto	FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4804.00	Peak	34.52	5.62		74.00	-33.86
7206.00	Peak	32.57	13.13	3 45.70	74.00	-28.30
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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			Frequ	uency (MHz)			
0 <mark></mark>	6100		11200.		300.	21400.	26500
10							
30						 ! ! !	
50		2					
70							
90							
110							
120 Level (dBu	JV/m)						
Detec	tor		Peak				
Polari		ŀ	lorizontal	Te	st Enginee	r	Ray Li
Test It			Harmonic		Test Date		ne 21, 2021
Test Mo			Mbps Low C		Temp/Hum		(°C)/ 52%R⊦

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4804.00	Peak	33.50	5.62	39.12	74.00	-34.88
7206.00	Peak	32.94	13.13	46.07	74.00	-27.93
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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	0 <mark></mark>	6100.		11200.	163	300.	21400.	26500
	10						<u>-</u>	
	30							-
		1	Ĩ					
	50		2					
	70							
	90							
	110							
		V/m)						
		V/m)						
	Detect	tor		Peak				
	Polariz	ze	V	ertical	Tes	st Engineer	R	lay Li
Test Engineer Ray Li	Test Ite	em	Ha	rmonic	Т	est Date	June	21, 2021
Test DateJune 21, 2021Test EngineerRay Li	Test Mo	lue.	DLL-IIV	1bps Mid Cl		emp/Hum	22.0(()/ 52%R⊦

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.00	Peak	33.56	5.98	39.54	74.00	-34.46
7320.00	Peak	31.68	13.21	44.89	74.00	-29.11
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)								
0 <mark></mark>	6100.	11200.	16300.	21400.	26500			
10								
40								
30								
50	2							
70					 			
90								
110								
120 Level (dBuV/r	n)							
120 Level (dBuV/r	n)							
Detector		Peak						
Polarize		Horizontal	Test Engir	neer	Ray Li			
Test Item		Harmonic	Test Dat		June 21, 2021			
Test Mode		-1Mbps Mid CH	Temp/Hu		°C)/ 52%Rŀ			

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.00	Peak	33.03	5.98	39.01	74.00	-34.99
7320.00	Peak	31.08	13.21	44.29	74.00	-29.71
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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0 <mark></mark>	6100.	11200.	16300.	21400.	26500
10					
10		 		 	
30					
20					
50	2 1				
					1 1 1
70					
					1
90	·	 		 	
110		 			1 1 1
120 Level (dBuV/r	n)		i i i		
120 Level (dBuV/r	n)				
Detector		Peak			
Polarize		Vertical	Test Engine	er R	ay Li
Test Item		Harmonic	Test Date		21, 2021
Test Mode		Mbps High CH	Temp/Hum)/ 52%Rł

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Peak	32.40	6.73	39.13	74.00	-34.87
7440.00	Peak	30.94	13.13	44.07	74.00	-29.93
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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1	1000	0100.			ency (MHz)	JJ00.	21400.	20000
0	1000	6100.		11200.	44	300.	21400.	26500
10								
30								
50		1	2					
70								
90								
110								
120 ^L	evel (dBuV/m))						
	Detector		Pe	eak				
	Polarize			zontal	Те	st Engineer	F	Ray Li
	Test Item			nonic		Test Date		21, 2021
10	est Mode	. Di		os High Cl	1	emp/Hum	22.0(C)/ 52%RH

Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
Peak	32.34	6.73	39.07	74.00	-34.93
Peak	31.59	13.13	44.72	74.00	-29.28
	Mode PK/QP/AV Peak	ModeReading LevelPK/QP/AVdBµVPeak32.34	ModeReading LevelPK/QP/AVdBµVdBPeak32.346.73	Mode PK/QP/AVReading Level dBµVFS dBPeak32.346.7339.07	Mode PK/QP/AVReading Level dBµVFS dB@3m dBµV/mPeak32.346.7339.0774.00

- 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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30			 		1 1 1 	
50	1	-2				
70						
90					!	
110			 			
120 Level	(dBuV/m)					
	ector		Peak			
	Item arize		rmonic ertical	Test Da Test Engi		21, 2021 ay Li
	Mode:		bps Low CH			 / 52%RH

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4804.00	Peak	34.19	5.62	39.81	74.00	-34.19
7206.00	Peak	32.92	13.13	46.05	74.00	-27.95
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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				uency (MHz)			
0 <mark></mark>	6100.	I i	11200.	16	300.	21400.	26500
10					L	·	I
30					 	·	
	1						
50		-2			· · · · · · · · · · · · · · · · · · ·		
70							
70							
90			 	1 		 	
110					; ; ; *		
120 Level (dBuV/i	m)						
Detecto	r		Peak				
Polarize		H	orizontal	Те	st Engineer	R	ay Li
Test Iter			armonic		Test Date		21, 2021
Test Mod			Abps Low C		emp/Hum)/ 52%RF

Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
Peak	33.53	5.62	39.15	74.00	-34.85
Peak	33.31	13.13	46.44	74.00	-27.56
	Mode PK/QP/AV Peak	ModeReading LevelPK/QP/AVdBµVPeak33.53	Mode PK/QP/AVReading Level dBµVPeak33.535.62	Mode PK/QP/AVReading Level dBµVFS dBPeak33.535.6239.15	Mode PK/QP/AVReading Level dBµVFS dB@3m

- 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 Mo Test Ite			Ibps Mid CH armonic		np/Hum st Date	-)/ 52%R⊦ 21, 2021
Polariz			ertical	Test	Engineer	r.	ay Li
Detect	or		Peak				
120 Level (dBu\	//m)						
110					 		
90					 		
70							
50	1	2					
30							
50							
10							
0 <mark></mark>	6100		11200.	16300	1	21400.	26500
1000	0100			ency (MHz)		21400.	20300

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.00	Peak	33.43	5.98	39.41	74.00	-34.59
7320.00	Peak	31.32	13.21	44.53	74.00	-29.47
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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$\begin{array}{c} 90 \\ \hline \\ 70 \\ \hline \\ 50 \\ \hline \\ 50 \\ \hline \\ 10 \\ 0 \\ \hline \\ 10 \\ 0 \\ \hline \\ 100 \\ \hline \\ 6100. \\ \hline \\ 11200. \\ \hline \\ 16300. \\ \hline \\ 21400. \\ \hline \\ 21400. \\ \hline \\ \end{array}$			Fromo	ncy (MHz)		
70 50 30	0 ^L 1000	6100.			21400.	26500
70 50 30	10					
70 50 2 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
70	30	·				
70		1				
	50	2				
90	70					
50	90					
110	110					
120 Level (dBuV/m)	120 Level (dBuV/n	n)				1
	I					
	Detector		Peak			
	Polarize		Horizontal	Test Engin	eer	Ray Li
	Test Item	1	Harmonic	Test Dat	e Jun	e 21, 2021
Polarize Horizontal Test Engineer Ray L	Test Mode	BLE	-2Mbps Mid CH	Temp/Hu	111 22.0(℃)/ 52%R ŀ

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4880.00	Peak	32.50	5.98	38.48	74.00	-35.52
7320.00	Peak	31.43	13.21	44.64	74.00	-29.36
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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110		 	
90			
70			
50	2 1		
30			

Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
Peak	32.02	6.73	38.75	74.00	-35.25
Peak	31.90	13.13	45.03	74.00	-28.97
	Mode PK/QP/AV Peak	ModeReading LevelPK/QP/AVdBµVPeak32.02	ModeReading LevelPK/QP/AVdBµVdBPeak32.026.73	Mode PK/QP/AVReading Level dBµVFS dBPeak32.026.7338.75	Mode PK/QP/AVReading Level dBµVFS dB@3m dBµV/mPeak32.026.7338.7574.00

- 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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		Frequer	ncy (MHz)		
0 <mark></mark>	6100.	11200.	16300.	21400.	26500
10			1 1 1 1 1 1 1 1		
30					I I I I
50	2				
70					
90					
110					
120 Level (dBuV	//m)				
Deleon		T Cak			
Detecto		Peak	Test Engli		
Polariz		Horizontal	Test Engin		Ray Li
Test Ite	m	Harmonic	Test Dat	e Ju	ne 21, 2021
Test Mod	Je: BLE-	2Mbps High CH	Temp/Hu	m 22.0	8(°C)/ 52%Rŀ

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Peak	32.01	6.73	38.74	74.00	-35.26
7440.00	Peak	31.62	13.13	44.75	74.00	-29.25
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--