

TEST REPORT

Applicant:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address:	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China
Equipment Type:	Mobile Phone
Model Name:	CPH2523
Brand Name:	OPPO
FCC ID:	R9C-CPH2523
Test Standard:	47 CFR Part 15 Subpart C (refer section 3.1)
Sample Arrival Date:	Nov. 21, 2022
Test Date:	Nov. 25, 2022
Date of Issue:	Dec. 19, 2022

ISSUED BY:

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	Version Issue Date Revisions			
	<u>Rev. 01</u>	Dec. 19, 2022	Initial Issue	
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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.	
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road,	
	Nanshan District, Shenzhen, Guangdong Province, P. R. China	
Phone Number	+86 755 6685 0100	

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi
	Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Location	1/F, Building B, Ganghongji High-tech Intelligent Industrial Park,
	No. 1008, Songbai Road, Yangguang Community, Xili Sub-district,
	Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a
	accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City,
	Guangdong, China

2.2 Manufacturer Information

Manufacturer	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City,
	Guangdong, China

2.3 Factory Information

Factory	Guangdong OPPO Mobile Telecommunications Corp., Ltd.	
Address	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City,	
	Guangdong, China	

2.4 General Description for Equipment under Test (EUT)

EUT Name	Mobile Phone
Model Name Under Test	CPH2523
Series Model Name	N/A
Description of Model	N/A
name differentiation	N/A
Hardware Version	11
Software Version	ColorOS V13.1.0
Dimensions (Approx.)	N/A
Weight (Approx.)	183g
EUT ID	S08
IMEI Number	IMEI1: 861067060021976, IMEI2: 861067060021968



2.5 Technical Information

	2G Network GSM/GPRS/EDGE 850/1900 MHz	
	3G Network WCDMA/HSDPA/HSUPA Band 4/5	
	4G Network LTE FDD Band 4/5/12/17/26	
Notwork and Wireless	LTE TDD Band 38/41	
Network and Wireless connectivity	LTE CA Uplink (UL): CA_41C	
	Bluetooth (BR+EDR+BLE)	
	2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/40)	
	5G WIFI 802.11a, 802.11n(HT20/40) and 802.11ac(VHT20/40/80)	
	U-NII-1/2A/2C, GPS, GLONASS, BDS, Galileo, FM receiver, NFC	

Note: The EUT is a mobile phone, supporting dual SIM card slots and ESIM card slot under the same transceiver.

The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	DTS	
Modulation Type	GFSK	
Product Type	⊠ Portable	
	Fix Location	
Transfer Rate	1 Mbps, 2 Mbps	
Frequency Range	The frequency range used is 2400 MHz to 2483.5 MHz.	
Number of Channel	40 (at intervals of 2 MHz)	
Tested Channel	0 (2402 MHz), 19 (2440 MHz), 39 (2480 MHz)	
Antenna Type	PIFA Antenna	
Antenna Gain	-3.0 dBi (In test items related to antenna gain, the final results reflect	
	this figure. This value is provided by the applicant.)	
Antenna Impedance	50Ω	
Antenna System		
(MIMO Smart Antenna)	N/A	



3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional radiators of radio frequency equipment
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules



3.2 Test Verdict

No.	Description	FCC Part No.	Channel	Test Result	Verdict
1	Antenna Requirement	15.203	N/A		Pass ^{Note1}
2	Output Power	15.247(b)	Low/Middle/High	ANNEX A.1	Pass
3	Occupied Bandwidth	15.247(a)	Low/Middle/High	ANNEX A.2	Pass
4	Conducted Spurious Emission	15.247(d)	Low/Middle/High	ANNEX A.3	Pass
5	Band Edge(Authorized- band band-edge)	15.247(d)	Low/High	ANNEX A.4	Pass
6	Conducted Emission	15.207	Low/Middle/High	ANNEX A.5	Pass
7	Radiated Spurious Emission	15.209 15.247(d)	Low/Middle/High	ANNEX A.6	Pass
8	Band Edge(Restricted- band band-edge)	15.209 15.247(d)	Low/High	ANNEX A.7	Pass
9	Power spectral density (PSD)	15.247(e)	Low/Middle/High	ANNEX A.8	Pass
10	Receiver Spurious Emissions			N/A	N/A ^{Note2}

Note ¹: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

Note ²: Only radio communication receivers operating in stand-alone mode within the band 30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable.

Note ³: Compared with the EUT of test report BL-SZ2210473-602, the EUT of this report replace the:

1. Different Model Name.

2. The material of battery cover has been changed from plastic to glass.

3. Color os changed from 12.0 to 13.1, Android version changed from Android R to Android T.

4. Hardware: The PCB remains unchanged, storage upgraded from 6G+128G to 8G+128G, and the audio IC is changed from WCD-9370-0-WLPSP55-SR-00-1 to WLPSPWCD-9370-0-WLPSP55-TR-01-4 WLPSP.

5. The power supply of image changes from FAN53870 to VWL2868C.

Therefore, only the 1 test items, which include Radiated Spurious Emission (GFSK (BLE 2Mbps) HIGH CHANNEL) were tested in this report, others test data please refer to report BL-SZ2210473-602, which was issued by Shenzhen BALUN Technology Co., Ltd. on Mar. 07, 2022.



4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 60%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22.4℃ to +23.6℃
Working Voltage of the EUT	NV (Normal Voltage)	3.87 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-40	101544	2022.01.04	2023.01.03	
Spectrum Analyzer	KEYSIGHT	N9020A	MY50531259	2022.09.06	2023.09.05	
Signaling Unit	ROHDE&SCHWARZ	CMW500	171150	2022.06.29	2023.06.28	
Test Antenna-Horn		BBHA	00400	2024 05 40	2024 05 08	
(1-18 GHz)	SCHWARZBECK	9120D	02460	2021.05.19	2024.05.08	
Test Antenna-Horn	A-INFO	LB-	J211060273	2021.07.02	2024.07.01	
(18-40 GHz)	A-INFO	180400KF	JZ11000273	2021.07.02	2024.07.01	
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2021.08.16	2024.08.15	

4.3 Test Software List

Description	Manufacturer	Software Version	Serial No.	Applicable test Setup
BL410R	BALUN	V2.1.1.488	N/A	The section 4.5.1
BL410E	BALUN	V19.8.28.435	N/A	The section 4.5.2&4.5.3&4.5.4&4.5.5



4.4 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

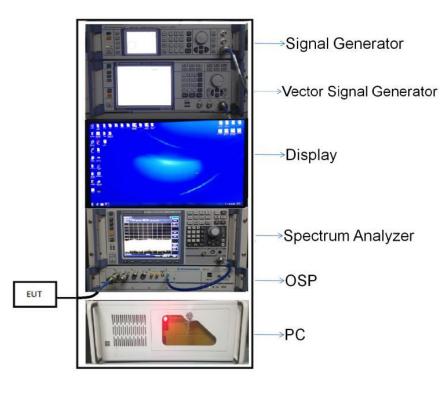
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.82°C
Humidity	4.1%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

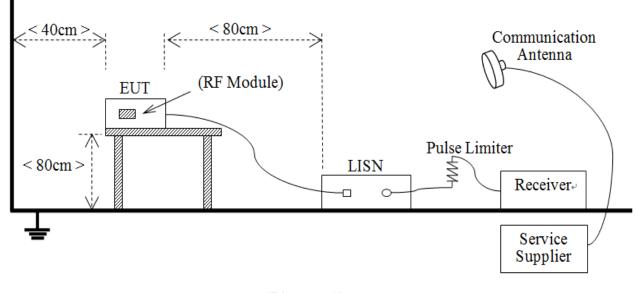
For example: the measurement value is 10 dBm and the cable 0.5dBm used, then the final result of EUT: Conducted value (dBm) = 10 dBm + 0.5 dB = 10.5 dBm



(Diagram 1)

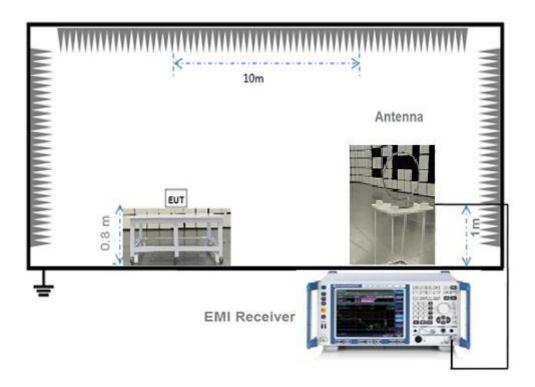


4.5.2 For AC Power Supply Port Test





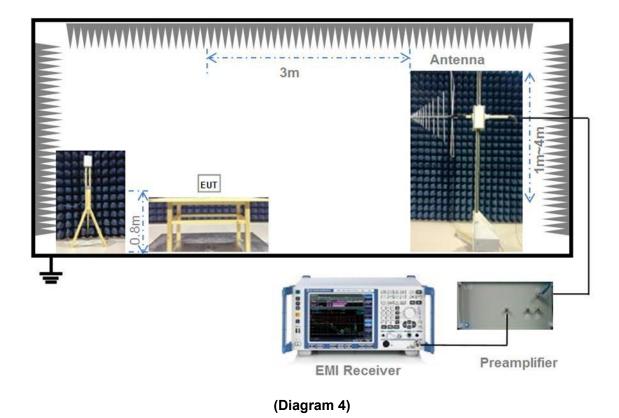
4.5.3For Radiated Test (Below 30 MHz)



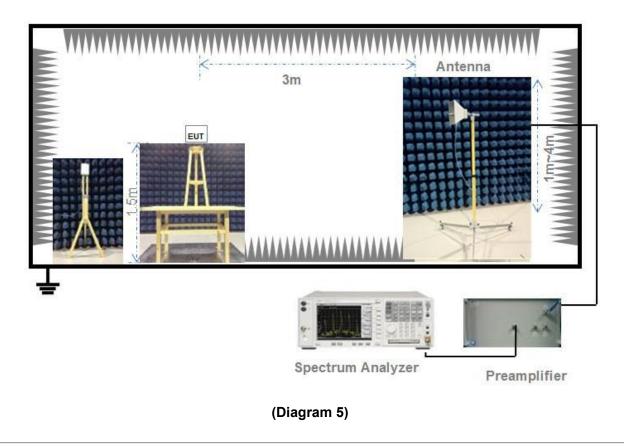
(Diagram 3)



4.5.4 For Radiated Test (30 MHz-1 GHz)



4.5.5 For Radiated Test (Above 1 GHz)





4.6 Measurement Results Explanation Example

4.6.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

4.6.2For radiated band edges and spurious emission test:

E = EIRP – 20log D + 104.8

where:

E = electric field strength in $dB\mu V/m$,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.



5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203 & 15.247(b)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the	An embedded-in antenna design is used.
product.	

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



5.2 Output Power

5.2.1 Test Limit

FCC § 15.247(b)

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, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements.

5.2.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

a) Maximum peak conducted output power

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

Set the RBW \geq DTS bandwidth.

Set VBW ≥ 3 x RBW.

Set span ≥ 3 x RBW

Sweep time = auto couple.

Detector = peak.

Trace mode = max hold.

Allow trace to fully stabilize.

Use peak marker function to determine the peak amplitude level.

b) Measurements of duty cycle

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

Set the center frequency of the instrument to the center frequency of the transmission.

Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

Set VBW ≥ RBW. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T \leq 16.7 microseconds.)

5.2.4 Test Result

Please refer to ANNEX A.1.





5.3 Occupied Bandwidth

5.3.1 Limit

FCC §15.247(a)

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.

5.3.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3Test Procedure

Use the following spectrum analyzer settings:

Set RBW = 100 kHz.

Set the video bandwidth (VBW) \geq 3 RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.3.4 Test Result

Please refer to ANNEX A.2.



5.4 Conducted Spurious Emission

5.4.1 Limit

FCC §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.4.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3Test Procedure

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

The following procedures shall be used to demonstrate compliance to these limits. Note that these procedures can be used in either an antenna-port conducted or radiated test set-up. Radiated tests must conform to the test site requirements and utilize maximization procedures defined herein.

Reference level measurement:

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to \geq 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW \ge 3 x RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.



Use the peak marker function to determine the maximum PSD level.

Emission level measurement:

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

Set the RBW = 100 kHz.

Set the VBW \geq 3 x RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

5.4.4 Test Result

Please refer to ANNEX A.3.



5.5 Band Edge (Authorized-band band-edge)

5.5.1 Limit

FCC §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.5.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3Test Procedure

The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is utilized, use the procedure described in 13.2.1. Use the procedure described in 13.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., duty cycle \geq 98%). Use the procedure described in 13.2.3 when using an average detector and the EUT cannot be configured to transmit continuously but the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent). Use the procedure described in 13.2.4 when using an average detector for those cases where the EUT cannot be configured to transmit continuously and the duty cycle is not constant (duty cycle variations equal or exceed 2 percent).

When using a peak detector to measure unwanted emissions at or near the band edge (within 2 MHz of the authorized band), the following integration procedure can be used.

Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

Set span to 2 MHz

RBW = 100 kHz.

VBW \geq 3 x RBW.

Detector = peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)

Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency (femission) \pm 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission \pm 0.5 MHz.

5.5.4 Test Result

Please refer to ANNEX A.4.





5.6 Conducted Emission

5.6.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μ H/50 Ω line impedance stabilization network (LISN).

Frequency range	Conducted Limit (dBµV)				
(MHz)	Quai-peak	Average			
0.15 - 0.50	66 to 56	56 to 46			
0.50 - 5	56	46			
0.50 - 30	60	50			

5.6.2 Test Setup

See section 4.5.2 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.6.3Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.6.4 Test Result

Please refer to ANNEX A.5.



5.7 Radiated Spurious Emission

5.7.1 Limit

FCC §15.209&15.247(d)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
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. Field Strength (dB μ V/m) = 20*log[Field Strength (μ V/m)].
- 2. In the emission tables above, the tighter limit applies at the band edges.
- 3. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
- For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.7.2 Test Setup

See section 4.5.3 to 4.5.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.7.3Test Procedure

Since the emission limits are specified in terms of radiated field strength levels, measurements performed to demonstrate compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for demonstrating compliance to the specified limits; however antenna-port conducted measurements are also now acceptable to demonstrate compliance (see below for details). When radiated measurements are utilized, test site requirements and procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 shall be followed.

Antenna-port conducted measurements may also be used as an alternative to radiated measurements



for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

General Procedure for conducted measurements in restricted bands:

a) Measure the conducted output power (in dBm) using the detector specified (see guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).

b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see guidance on determining the applicable antenna gain)

c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies \leq 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).

d) For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).

e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

 $\mathsf{E} = \mathsf{EIRP} - 20 \mathsf{log} \ \mathsf{D} + 104.8$

where:

E = electric field strength in $dB\mu V/m$,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

f) Compare the resultant electric field strength level to the applicable limit.

g) Perform radiated spurious emission test.

Quasi-Peak measurement procedure

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

Peak power measurement procedure:

Peak emission levels are measured by setting the instrument as follows:

a) RBW = as specified in Table 1.

b) VBW \geq 3 x RBW.



c) Detector = Peak.

d) Sweep time = auto.

e) Trace mode = max hold.

f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be longer for low duty cycle applications).

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

Table 1—RBW as a function of frequency

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

Trace averaging across on and off times of the EUT transmissions followed by duty cycle correction:

If continuous transmission of the EUT (i.e., duty cycle \geq 98 percent) cannot be achieved and the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then the following procedure shall be used:

a) The EUT shall be configured to operate at the maximum achievable duty cycle.

b) Measure the duty cycle, x, of the transmitter output signal as described in section 6.0.

c) RBW = 1 MHz (unless otherwise specified).

d) VBW \geq 3 x RBW.

e) Detector = RMS, if span/(# of points in sweep) \leq (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

f) Averaging type = power (i.e., RMS).

1) As an alternative, the detector and averaging type may be set for linear voltage averaging.

2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

g) Sweep time = auto.

h) Perform a trace average of at least 100 traces.

i) A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:



1) If power averaging (RMS) mode was used in step f), then the applicable correction factor is $10 \log(1/x)$, where x is the duty cycle.

2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $20 \log(1/x)$, where x is the duty cycle.

3) If a specific emission is demonstrated to be continuous (\geq 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

NOTE: Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

Determining the applicable transmit antenna gain:

A conducted power measurement will determine the maximum output power associated with a restricted band emission; however, in order to determine the associated EIRP level, the gain of the transmitting antenna (in dBi) must be added to the measured output power (in dBm).

Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.

See KDB 662911 for guidance on calculating the additional array gain term when determining the effective antenna gain for a EUT with multiple outputs occupying the same or overlapping frequency ranges in the same band.

Radiated spurious emission test:

An additional consideration when performing conducted measurements of restricted band emissions is that unwanted emissions radiating from the EUT cabinet, control circuits, power leads, or intermediate circuit elements will likely go undetected in a conducted measurement configuration. To address this concern, a radiated test shall be performed to ensure that emissions emanating from the EUT cabinet (rather than the antenna port) also comply with the applicable limits.

For these cabinet radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Procedures for performing radiated measurements are specified in ANSI C63.10. All detected emissions shall comply with the applicable limits.

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the



Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for f < 1 GHz VBW \ge RBW Sweep = auto Detector function = peak Trace = max hold

5.7.4 Test Result

Please refer to ANNEX A.6.



5.8 Band Edge (Restricted-band band-edge)

5.8.1 Limit

FCC §15.209&15.247(d)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

5.8.2 Test Setup

See section 4.5.3 to 4.5.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.8.3Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for f < 1 GHz VBW \ge RBW Sweep = auto Detector function = peak Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

For transmitters operating above 1 GHz repeat the measurement with an average detector.

5.8.4 Test Result

Please refer to ANNEX A.7.



5.9 Power Spectral density (PSD)

5.9.1 Limit

FCC §15.247(e)

The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of Section 5.4(4), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

5.9.2 Test Setup

See section 4.5.1 (Diagram 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.9.3 Test Procedure

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.

Set the VBW \geq 3 RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.9.4 Test Result

Please refer to ANNEX A.8.



ANNEX A TEST RESULT

A.1 Output Power, Duty Cycle

Peak Power Test Data

	Measured Outpu	ut Peak Power	Limit dBm mW			
Channel	GFSK (BLE	E 1Mbps)			Verdict	
	dBm	mW				
Low	7.45	5.56			Pass	
Middle	7.60	5.75	30	1000	Pass	
High	8.79	7.57	1		Pass	

	Measured Outpu	ut Peak Power	Lin	nit		
Channel	GFSK (BL	GFSK (BLE 2Mbps)	dBm mW	m\//	Verdict	
	dBm	mW				
Low	7.51	5.64			Pass	
Middle	7.87	6.12	30	1000	Pass	
High	9.08	8.09			Pass	



Test Plots

GFSK (BLE 1Mbps) LOW CHANNEL



GFSK (BLE 1Mbps) MIDDLE CHANNEL



GFSK (BLE 1Mbps) HIGH CHANNEL

RL RF 50 Center Freq 2.4800		INT REF Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>1/1	09:50:41 AM Feb 11, 2022 TRACE 2 3 4 5 0 TYPE DET P NNNNN	Frequency
10 dB/div Ref 15.00	dBm		Mkr1	2.480 015 GHz 8.793 dBm	Auto Tune
5.00		•1			Center Free 2.480000000 GH
-150					Start Fre 2.478500000 GH
35.0					Stop Fre 2.481500000 GH
45.0					CF Ste 300.000 kH Auto Ma
65.0					Freq Offse 0 H
75.0				0	
Center 2.480000 GHz #Res BW 1.0 MHz		3.0 MHz	Sweep	Span 3.000 MHz 1.000 ms (601 pts)	
ss 📣 Points changed; al	Il traces cleared		STATUS	1	

GFSK (BLE 2Mbps) LOW CHANNEL



GFSK (BLE 2Mbps) MIDDLE CHANNEL





GFSK (BLE 2Mbps) HIGH CHANNEL

RL RF 50 2 AC enter Freq 2.480000000	PNO: East	INT REF	Avg Type: Log-Pwr Avg Hold:>1/1	09:59:00 AM Feb 11, 2022 TRACE 1 2 3 4 5 0 TYPE M	Frequency
0 dB/div Ref 15.00 dBm			Mkr	1 2.479 88 GHz 9.079 dBm	Auto Tuni
og 5.00					Center Free 2.480000000 GH
15.0					Start Fre 2.477000000 GH
150 150					Stop Fre 2.483000000 GH
50					CF Ste 600.000 kH Auto Ma
5.0					Freq Offs 0 F
Eenter 2.480000 GHz Res BW 3.0 MHz	#VBW 8.	0 MHz	Sween	Span 6.000 MHz 1.000 ms (601 pts)	



Duty Cycle Test Data

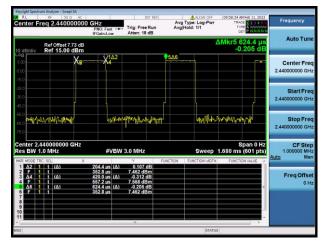
Band	On Time	On+Off Time	Duty Cycle
Danu	(ms)	(ms)	(%)
GFSK (BLE 1Mbps)	0.3892	0.6244	62.33
GFSK (BLE 2Mbps)	0.2044	0.6244	32.74

Test Plots

GFSK (BLE 1Mbps)

RL RF 50 Ω AC	100000 A	INT REF	ALIGN OFF	09:50:08 AM Feb 11, 2022	
enter Freq 2.4400000	PNO: Fast	Trig: Free Run Atten: 18 dB	Avg Type: Log-Pwr Avg Hold: 1/1	TRACE 2 3 4 5 6 TYPE A WWWWW DET P N N N N N	Frequency
Ref Offset 7.73 dB	IFGain:Low	Atten: 18 dB		∆Mkr5 624.4 µs	Auto Tune
dB/div Ref 15.00 dBm				-0.209 dB	
X	<u>√1</u> ∆2	€46			-
10	//4				Center Fre 2.440000000 GH
.0					
0					Start Fre
i.0		ŕ			2.440000000 GH
0	il work of the se		1.1.1941.1974.19		Stop Fre
i.0	11 1 34				2.44000000 GH
enter 2.440000000 GHz es BW 1.0 MHz	#VBW	3.0 MHz	Sweep	Span 0 Hz 1.680 ms (601 pts)	CF Step 1.000000 MH
R MODE TRC SCL X		Y FI	INCTION FUNCTION WIDTH		<u>Auto</u> Ma
Δ2 1 t (Δ)	389.2 μs (Δ) 81.20 μs	0.140 dB 7.372 dBm			
Δ4 1 t (Δ)	235.2 µs (Δ)	-0.349 dB			Freq Offse
Δ6 1 t (Δ)	470.4 μs 624.4 μs (Δ)	7.511 dBm -0.209 dB			0 H
	81.20 µs	7.372 dBm			
				· .	
	1 A.				
			STATUS	5	

GFSK (BLE 2Mbps)





A.2 Occupied Bandwidth

<u>Test Data</u>

Test Mode	GFSK (BLE 1Mbps)			
Channel	6 dB Bandwidth	99% Bandwidth	6 dB Bandwidth	
	(kHz)	(kHz)	Limits (kHz)	
Low Channel	675.000	1030.800	≥500	
Middle Channel	675.000	1030.000	≥500	
High Channel	675.000	1022.900	≥500	

Test Mode	GFSK (BLE 2Mbps)			
Channel	6 dB Bandwidth	99% Bandwidth	6 dB Bandwidth	
	(kHz)	(kHz)	Limits (kHz)	
Low Channel	1160.000	2053.600	≥500	
Middle Channel	1180.000	2031.100	≥500	
High Channel	1160.000	2040.900	≥500	



Test Plots

6 dB Bandwidth

GFSK (BLE 1Mbps) LOW CHANNEL



GFSK (BLE 1Mbps) HIGH CHANNEL

RL RF 50.0 AC enter Freq 2.480000000	PNO: Wide Trig	INT REF Av Free Run Avg n: 18 dB	ALIGN OFF g Type: Log-Pwr Hold: 1000/1000	09:51:01 AM Feb 11, 20 TRACE 2 2 4 TVPE 000000000000000000000000000000000000	Frequency
Ref Offset 7.5 dB dB/div Ref 15.00 dBm	PGanLOW 7444			∆Mkr2 675 kH -0.164 d	
99 00 00	X3	24	3	2634	Center Free 2.480000000 GH
5.0					Start Free 2.478500000 GH
5.0					Stop Fre 2.481500000 GH
enter 2.480000 GHz Res BW 100 kHz	#VBW 300	KHZ FUNCTION	Sweep	Span 3.000 MI 1.000 ms (601 pt FUNCTION VALUE	12 S) CF Ste 300.000 kH Auto Ma
2 Δ3 1 f (Δ) 3 F 1 f 2.47 5	675 kHz (Δ) -0	29 dBm 164 dB 29 dBm			Freq Offse
6 7 8 9 9					
					-

GFSK (BLE 2Mbps) LOW CHANNEL



GFSK (BLE 2Mbps) MIDDLE CHANNEL



GFSK (BLE 1Mbps) MIDDLE CHANNEL





GFSK (BLE 2Mbps) HIGH CHANNEL



99% Bandwidth

GFSK (BLE 1Mbps) LOW CHANNEL

RL RF 58 Q AC enter Freq 2.402000000	Trig:	INT REF	JGN OFF 09:43:36 AM Radio Std: 1 0/50 Radio Devic	None Frequency
Ref Offset 7.58 dl dB/div Ref 5.00 dBm	в			
			hann	Center Free 2.402000000 GHz
30				
enter 2.402 GHz Res BW 30 kHz	v	'BW 300 kHz	Spa Sweep 3	n 3 MHz .133 ms 300.000 kHz
Occupied Bandwidt 1.	հ 0308 MHz	Total Power	13.6 dBm	Auto Mar Freq Offset
Transmit Freq Error x dB Bandwidth	5.235 kHz 1.241 MHz	% of OBW Power x dB	99.00 % -26.00 dB	0112

GFSK (BLE 1Mbps) MIDDLE CHANNEL



GFSK (BLE 1Mbps) HIGH CHANNEL





GFSK (BLE 2Mbps) LOW CHANNEL



GFSK (BLE 2Mbps) HIGH CHANNEL

RL RF 50 Ω AC Center Freq 2.480000000	Trig:	INT REF 44 r Freq: 2.48000000 GHz Free Run Avg Hold: 50 n: 12 dB	IGN OFF 09:59:18 AM Feb Radio Std: No 0/50 Radio Device:	ne Frequency
Ref Offset 7.5 dB 15 dB/div Ref 5.00 dBm				
Log 100 250 400 550 550 550 550 550 550			for the second s	Center Freq 2.480000000 GHz
Center 2.48 GHz #Res BW 30 kHz		/BW 300 kHz	Span Sweep (
2.	0409 MHz			Freq Offset
Transmit Freq Error x dB Bandwidth	17.938 kHz 2.400 MHz	% of OBW Power x dB	99.00 % -26.00 dB	0 12
50			STATUS	

GFSK (BLE 2Mbps) MIDDLE CHANNEL





A.3 Conducted Spurious Emissions

<u>Test Data</u>

	GFSK (BLE 1Mbps)							
	Measured Max. Out of	Limit (o	dBm)					
Channel	Band Emission (dBm)	Carrier Level	Calculated 20 dBc Limit	Verdict				
Low	-37.96	7.26	-12.74	Pass				
Middle	-38.79	7.44	-12.56	Pass				
High	-38.28	8.69	-11.31	Pass				

	GF	SK (BLE 2Mbps)		
	Measured Max. Out of	Limit (o	dBm)	
Channel	Band Emission (dBm)	Carrier Level	Calculated	Verdict
	Daliu Ellission (ubili)	Carrier Lever	20 dBc Limit	
Low	-39.05	7.20	-12.80	Pass
Middle	-37.97	7.42	-12.58	Pass
High	-37.84	8.73	-11.27	Pass



Test Plots

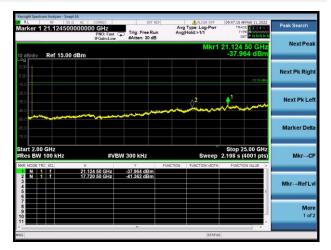
GFSK (BLE 1Mbps) LOW CHANNEL, CARRIER LEVEL

RL RF 50 9 enter Freq 2.40200		Trig: Free Run #Atten: 30 dB	Avg Avg	ALIGN OFF Type: Log-Pwr told:>1/1	09:43:44 AM Feb 11, 2022 TRACE 1 2 3 4 5 TYPE M WWWWWW DET P N N N N N	Frequency
0 dB/div Ref 15.00	dBm			Mkr1	2.402 005 GHz 7.260 dBm	Auto Tun
6 g 5.00 .00						Center Fre 2.402000000 GH
50 50 50						Start Fre 2.400500000 GH
56.0 56.0 75.0						Stop Fre 2.403500000 GH
enter 2.402000 GHz Res BW 100 kHz	#VI	BW 300 kHz			Span 3.000 MHz 1.000 ms (601 pts)	CF Ste 300.000 kH Auto Ma
KR MODE TRC SCL 1 N 1 F 2 3 4	× 2.402 005 GHz	∀ 7.260 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offse
5 6 7 8 9 9					r	
		π		STATUS		

GFSK (BLE 1Mbps) LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

larker 1 2.90987		INT REF	Avg	ALIGN OFF Type: Log-Pwr Hold:>1/1	09:46:46 AN Feb 11, 2022 TRACE 2 3 4 5 6 TYPE NOTICE	Marker
	PNO: Fast IFGain:Low	#Atten: 30 dB	Avg	Hold.>1/1	DET P NNNNN	Select Marker
0 dB/div Ref 15.0	00 dBm			Mk	r1 2.909 9 GHz -47.433 dBm	1
og 5.00						Norma
5.00					-12.74 dBm	NOTIN
5.0						
6.0				02	1	Delt
5.0 6.0	An an and the stan out the	and the second			and some of the	
5.0						Fixed
5.0						
tart 0.030 GHz Res BW 100 kHz	#VE	300 kHz		Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts)	o
Res BW 100 kHz	X	Y	FUNCTION	Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts) FUNCTION VALUE	0
Res BW 100 kHz		W 300 kHz -47 433 dBm -50 239 dBm	FUNCTION		83.9 ms (1001 pts)	
Res BW 100 kHz KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 5	× 2.909 9 GHz	Y -47.433 dBm	FUNCTION		83.9 ms (1001 pts)	
Res BW 100 kHz KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 3 S 4 S 5 S 6 7 8	× 2.909 9 GHz	Y -47.433 dBm	FUNCTION		83.9 ms (1001 pts)	Properties
Res BW 100 kHz KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 5 5 6 7 7	× 2.909 9 GHz	Y -47.433 dBm	FUNCTION		83.9 ms (1001 pts)	O Properties Mor 1 of

GFSK (BLE 1Mbps) LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz





GFSK (BLE 1Mbps) MIDDLE CHANNEL, CARRIER LEVEL

RL Center Fi	req 2.4400000	CORREC	Trig: Free Run #Atten: 30 dB	Aug Type: Log-Pwr Avg Hold:>1/1	09:49:01 AM Feb 11, 2022 TRACE 2 3 4 5 0 TYPE NUMBER OF PINNINN	Frequency
0 dB/div	Ref 15.00 dB	m		Mkr1	2.440 000 GHz 7.444 dBm	Auto Tune
5 00 5 00 5 00		/				Center Free 2.440000000 GH
25.0						Start Free 2.438500000 GH
56.0 55.0 75.0						Stop Fre 2.441500000 GH
Res BW	RC SCL	X	W 300 kHz	Sweep	Span 3.000 MHz 1.000 ms (601 pts) FUNCTION VALUE	CF Ste 300.000 kH Auto Ma
1 N 1 2 3 4 5		2.440 000 GHz	7.444 dBm			Freq Offse 0 H
6 7 8 9						
<u> </u>			н	STATUS	-	

GFSK (BLE 1Mbps) MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

larker 1 2.76076000000	CORREC O GHz PNO: Fast	INT REF	Avg Type: Log-Pwr AvgHold:>1/1	09:49:38 AM Feb 11, 2022 TRACE 2 3 4 5 0 TYPE	Marker
	IFGain:Low	#Atten: 30 dB		DET PNNNN	Select Marker
0 dB/div Ref 15.00 dBm			M	48.691 dBm	1
69 5 00 5 00				-12.55 dBm	Norma
5.0 5.0 6.0					Delt
15.0 56.0 ann an 11 an 11 156.0	unarde energy	gerliftet haardearen ferdet jand			Fixed
tart 0.030 GHz Res BW 100 kHz	#VBW	300 kHz	Sweep 2	Stop 3.000 GHz 283.9 ms (1001 pts)	o
tart 0.030 GHz Res BW 100 kHz		Y P	Sweep 2	283.9 ms (1001 pts)	o
tart 0.030 GHz Res BW 100 KHz WR MODE TRCI SCLI X 1 N 1 7 2, 3 1 7 2, 4 5 1 1 1 1 1 2 2 3 1 1 1 1 1 1 1 1 1 1 1 1	760 8 GHz			283.9 ms (1001 pts)	OProperties
tart 0.030 GHz Res BW 100 kHz NR MODE TRC: SCL X 1 N 1 f 2; 2 N 1 f 2; 3 4	760 8 GHz	Y Fi -48.691 dBm		283.9 ms (1001 pts)	

GFSK (BLE 1Mbps) MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz





GFSK (BLE 1Mbps) HIGH CHANNEL, CARRIER LEVEL

enter Fi	RF 50 Q AC req 2.48000000	CORREC 10 GHz PNO: Wide C IEGain:Low	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>1/1	09:51:14 AM Feb 11, 2022 TRACE 1 2 3 4 5 TYPE MWWWWWW DET PNNNNN	Frequency
0 dB/div og r	Ref 15.00 dBm			Mkr1	2.479 995 GHz 8.686 dBm	Auto Tune
5.00 5.00		/				Center Free 2.480000000 GH
15.0 15.0 15.0						Start Free 2.478500000 GH
6.0 6.0 5.0						Stop Fre 2.481500000 GH
	480000 GHz 100 kHz		W 300 kHz	Sweep	Span 3.000 MHz 1.000 ms (601 pts)	CF Stej 300.000 kH Auto Ma
1 N 1 2 3 4 5 6	f 2.8	179 995 GHz	8.686 dBm		2 	Freq Offse 0 H
7 8 9 0			_		-	
a				STATUS		

GFSK (BLE 1Mbps) HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

Inclusion After: 30 dB Oct PRIME V0 dBldtv Ref 15.00 dBm -47.839 dBm -47.839 dBm 0 dBldtv Ref 15.00 dBm -47.839 dBm No 0 dBldtv Ref 15.00 dBm -47.839 dBm File 0 dBldtv Ref 15.00 dBm -47.839 dBm File 0 dBldtv Ref 15.00 dBm -47.839 dBm File 0 dBldtv Ref 15.00 dBm Ref 15.00 dBm File 0 dBldtv Ref 15.00 dBm Ref 16.00 dBm File 0 dBldtv Ref 15.00 dBm File File 1 dBldtv Sweep 283.0 ms (1001 pb) File </th <th></th> <th>F 50 R AC</th> <th></th> <th>Trig: Free Run</th> <th>Avg Type: Log-Pwr AvgIHold:>1/1</th> <th>09:52:34 AN Feb 11, 2022 TRACE 2 3 4 5 0 TYPE</th> <th>Marker</th>		F 50 R AC		Trig: Free Run	Avg Type: Log-Pwr AvgIHold:>1/1	09:52:34 AN Feb 11, 2022 TRACE 2 3 4 5 0 TYPE	Marker
0 dBddiv Ref 15,00 dBm - 47,839 dBm 50 50 50 50 50 50 50 50 50 50			IFGain:Low	#Atten: 30 dB		DET PNNNN	Select Marker
600	10 dB/div R	ef 15.00 dBm			. Mi	r1 2.690 9 GHz -47.839 dBm	1
100 20 2 1 1 1 1 1 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1 1 2 1	5.00						Norma
Composition Composition <thcomposition< th=""> <thcomposition< th=""></thcomposition<></thcomposition<>						.11.21 dBn	
RF INCESTIC SCI X YEW FUNCTION						1	Delt
Start 0.030 GHz Stop 3.000 GHz Res BW 100 kHz #VBW 300 kHz Sweep 283.9 ms (100 GHz) APR MOS FR: SCL X Y Placton Placton HD (10 Hz) APR MOS FR: SCL X Y Placton Placton HD (10 Hz) APR MOS FR: SCL X Y Placton Placton HD (10 Hz) APR MOS FR: SCL X Y Placton HD (10 Hz) Placton HD (10 Hz) A 1 1 2.334 7 GHz 49.833 dBm Froper A Froper		۵۰۰ مېږ د و. د چه د ۲۰ ورو ورو ورو ورو ورو ورو ورو ورو ورو ور	to the tensor want of	ويومونه والمترجي ومحمد والمترجي	Alexandra and a second and a second as	and a stand of the second s	Fixed
Res BW 100 kHz #VBW 300 kHz Sweep 28.9 ms (1001 pts) NR MOZ FR: SCI × Y Flocton Flocton volue N 1 f 2.304 7 GHz 47.836 dBm Flocton volue N 1 f 2.334 7 GHz 49.883 dBm Flocton volue Flocton volue R - - - - - - -							
N 1 f 2.890 GHz 47,250 dBm Z N 1 f 2.334 7 GHz 49,883 dBm G G G G G G G G G G G G G G G G	Res BW 100	kHz	#VB	W 300 kHz	Sweep 2	83.9 ms (1001 pts)	0
3 5 5 7 7	1 N 1 f	2.		-47.839 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	-
	3 4 5	2.	334 7 GHZ	-49.883 dBm			Properties
	7 8 9						Mor 1 of
	11					· ·	1 or

GFSK (BLE 1Mbps) HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz





GFSK (BLE 2Mbps) LOW CHANNEL, CARRIER LEVEL

enter Fi	RF 50 Q AC req 2.40200000	O GHZ PNO: Wide C	Trig: Free Run	Auton OFF Avg Type: Log-Pwr Avg Hold:>1/1	09:54:19 AM Feb 11, 2022 TRACE 2 3 4 5 TYPE MWWWWW DET P N N N N N	Frequency
) dB/div	Ref 15.00 dBm	I Guint Ow		Mkr1	2.402 010 GHz 7.202 dBm	Auto Tuni
.00 .00 .00		~~~			~	Center Fre 2.402000000 GH
5.0						Start Fre 2.400500000 GH
5.0 5.0 5.0						Stop Fre 2.403500000 GH
	402000 GHz 100 kHz		W 300 kHz	Sweep	Span 3.000 MHz 1.000 ms (601 pts)	CF Ste 300.000 kH Auto Ma
1 N 1 2 3 4 5 6 6 7 7 8 9		102 010 GHz	7.202 dBm		E	Freq Offse 0 H
1						

GFSK (BLE 2Mbps) LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

RL RF 50 Q AC	00 GHz	INT REF	Avg Type: Log-Pwr AvgIHold:>1/1	09:55:01 AM Feb 11, 2022 TRACE 2 3 4 5 0 TYPE	Marker
		#Atten: 30 dB		DET PNNNN	Select Marker
0 dB/div Ref 15.00 dBn	n		Mk	r1 2.690 1 GHz -48.034 dBm	1
5.00					Norma
5.00				-12.00 eDm	
25.0					Delt
45.0				1	
55.0 	aloritaridanandalegoarda	and the second state of th	and a second and a second s		Fixed
75.0					
tart 0.030 GHz Res BW 100 kHz	#VBW 3	00 kHz	Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts)	O
KR MODE TRC SCL	× 2.690 1 GHz -4	Y FUN 18.034 dBm	CTION FUNCTION WIDTH	FUNCTION VALUE	
	2.299 1 GHz -4	19.878 dBm			Properties
5					
8					Mor 1 of
					1 01
10			STATUS		_

GFSK (BLE 2Mbps) LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz





GFSK (BLE 2Mbps) MIDDLE CHANNEL, CARRIER LEVEL

RL Center F	RF 50 Q /	C CORREC 000 GHz PNO: Wide IFGain:Low	Trig: Free Run #Atten: 30 dB	Aug Type: Log-Pwr Avg Hold:>1/1	09:57:22 AM Feb 11, 2022 TRACE 2 2 3 4 5 5 TYPE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Frequency
0 dB/div	Ref 15.00 dB	m		Mkr1	2.440 000 GHz 7.424 dBm	Auto Tuni
5.00 5.00 5.00		~~			~	Center Free 2.440000000 GH
25.0						Start Fre 2.438500000 GH
56.0 66.0 75.0						Stop Fre 2.441500000 GH
		x	W 300 kHz	Sweep	Span 3.000 MHz 1.000 ms (601 pts)	CF Ste 300.000 kH Auto Ma
2 3 4		2.440 000 GHz	7.424 dBm			Freq Offse
5 6 7 8 9						
0						

GFSK (BLE 2Mbps) MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

10 gBuller 10 gBu	TYPE M WWWWW	Marker
0 dBeet 0	DET PNNNNN	Select Marker
0 0	2.642 0 GHz -47.864 dBm	1
1 1 1 2.442 GHz 47.494 dBm 2.442 GHz 50.000 GHz Sweep 283 2 N 1 1 2.442 GHz 47.494 dBm 2.442 GHz 47.494 dBm 2 N 1 1 2.442 GHz 47.494 dBm 50.000 GHz 50.000 GHz 3 N 1 1 2.349 S GHz -50.188 dBm 1 1 1 2.349 S GHz -50.188 dBm 1 1 1 1 1 1 2.349 S GHz -50.188 dBm 1		Norma
0 0	-12.50 dBm	NOTIN
1 2 3 2 3 2 3 2 3 2 3 2 3		
80 50 50 50 50 50 50 50 50 50 5	×1	Delt
tar1 0.030 GHz Res BW 100 KHz #VBW 300 KHz Sweep 283 Sweep 28	- marken and and and and and and and and and an	
tar 0.030 GHz Ros BW 100 kHz #VBW 300 kHz Sweep 283 08 ⊌00 kHz ¥ VBW 300 kHz Sweep 283 08 ⊌00 kHz 42 kHz 1 2 542 0 GHz 4784 dBm 2 N 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 40 kHz 2 N 1 1 1 2 2542 6 GHz 2 N 1 1 2 2542 6 GHz 2 N 1 1 2 1 2 2542 6 GH		Fixed
N 1 7 2.642.0 GHz 4V BW 300 kHz Sweep 283 NR MODETIC SCL X Y Function Function Function N 1 7 2.642.0 GHz -47.84 dBm Function Function 2 N 1 7 2.642.0 GHz -50.188 dBm Function Function 3 N 1 7 2.849.6 GHz -50.188 dBm Function Function 6		
1 N 1 f 2.942 0 GHz -47.864 dBm 2 N 1 f 2.349 6 GHz -50.169 dBm 3 - - - - - 4 - - - - - 5 - - - - - 6 - - - - - 7 - - - - - 8 - - - - - -	Stop 3.000 GHz 3.9 ms (1001 pts)	0
2 N 1 f 2.349 6 GHz -50.158 dBm	FUNCTION VALUE	
6 7 8 9		Properties
		Properties
		Mo
		1 of
		5

GFSK (BLE 2Mbps) MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz





GFSK (BLE 2Mbps) HIGH CHANNEL, CARRIER LEVEL

Center Fi	req 2.4800000		Trig: Free Run #Atten: 30 dB	Auton OFF Avg Type: Log-Pwr Avg Hold:>1/1	09:59:26 AM Feb 11, 2022 TRACE 1 2 3 4 5 1 TYPE M WWWWW DET P N N N N N	Frequency
10 dB/div	Ref 15.00 dB	m		Mkr1	2.480 000 GHz 8.726 dBm	Auto Tune
- 09 5.00 5.00 16.0		~~			~	Center Free 2.480000000 GH
25.0 35.0 45.0						Start Free 2.478500000 GH
66.0 66.0 75.0						Stop Fre 2.481500000 GH
Center 2. Res BW		#VE	W 300 kHz	Sweep	Span 3.000 MHz 1.000 ms (601 pts)	CF Stej 300.000 kH Auto Ma
MAR MODE IF 1 N 1 2 3 4 5 6 7 8 9 10		2.480 000 GHz	8.726 dBm	PUNCTOR WOTH	FUNCTION VALUE	Freq Offse 0 H
11					· · ·	

GFSK (BLE 2Mbps) HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

RL RF 50 Q arker 1 2.646320000	AC CORREC 000 GHz PNO: Fast	INT REF	Aug Type: Log-Pwr Avg Hold:>1/1	10:00:01 AN Feb 11, 2022 TRACE 2 3 4 5 6 TYPE NOVEMBER	Marker
	IFGain:Low	#Atten: 30 dB		DET P NNNN N	Select Marker
o dBidiv Ref 15.00 dE	m		Mk	r1 2.646 3 GHz -48.499 dBm	1
og 5.00					Name
5.00				-11 27 cDire	Norm
5.0					
35.0					Delt
5.0			\diamond^2		
56.0	anna Marana Matanair fry de	and an	and a state the second s		Fixed
15.0					Fixed
tart 0.030 GHz				Stop 3.000 GHz	
Res BW 100 kHz	#VB	W 300 kHz	Sweep 2	83.9 ms (1001 pts)	0
KR MODE TRC SCL	X 2.646 3 GHz	Y Fi -48,499 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 f	2.171 4 GHz	-49.477 dBm			Properties
4 5					Tropences
8					Mo
9					1 of
0			STATUS		

GFSK (BLE 2Mbps) HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz





A.4 Band Edge (Authorized-band band-edge)

Note: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

<u>Test Data</u>

	GFSK	(BLE 1Mbps)			
Channel	Measured Max. Band	Limit			
	Edge Emission (dBm)	Carrier Level	Calculated	Verdict	
		Camer Lever	20 dBc Limit		
Low Channel	-51.65	7.26	-12.74	Pass	
High Channel	-58.06	8.69	-11.31	Pass	

	GFSK	(BLE 2Mbps)		
Channel	Measured Max. Band	Limit		
			Calculated	Verdict
	Edge Emission (dBm)	Carrier Level	20 dBc Limit	
Low Channel	-48.71	7.20	-12.80	Pass
High Channel	-58.15	8.73	-11.27	Pass



Test Plots

GFSK (BLE 1Mbps) LOW CHANNEL, CARRIER LEVEL



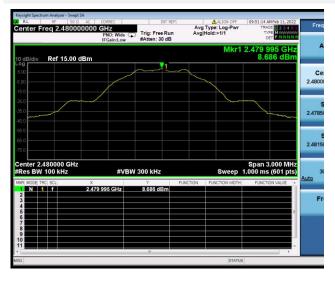
GFSK (BLE 1Mbps) LOW CHANNEL, REFERENCE LEVEL

Keysight Spectrum Analyzer - Swept SA					Keysight Spectrum Analyzer - Swep			2014			1
Center Freq 2.40000000	PNO: Wide Trig: Free Rui	Avg Type: Log-Pwr	09:47:35 AM Feb 11, 2022 TRACE 2 3 4 5 TYPE M WWW	Freq	Band Span 993.333	PNO: Wide	Trig: Free Ru	#Avg In Avg H	ALIGN OFF Type: RMS fold: 100/100	09:47:43 AM Feb 11, 203 TRACE 2 3 4 TVPE A WWWW DET A NNN	Band
n.c.	IFGain:Low #Atten: 30 dB					IFGain:Low	#Atten: 30 dB	3			Dan
10 dB/div Ref 15.00 dBm		Mkr1	2.400 000 GHz -47.190 dBm		10 dB/div Ref 15.00	dBm		E	Mkr1 Band Pow	2.399 500 GH er -51.654 dBr	2 993.3
5.00		~~~		Ce	5.00						Ban
-5.00				2.40000	-5.00						2.39900
-15.0					-16.0						1.00000
-25.0			\	s	-25.0						Bar
-35.0	1		1	2.39500	-35.0						2.39999
-45.0	and a second a second second second		- marine	2	-45.0	1.000					
-55.0				s	-55.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		m		
-65.0				2.40500	-65.0						
-/5.0					-/5.0						
Center 2.400000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep	Span 10.00 MHz 1.000 ms (601 pts)	1.00	Center 2.400000 GH: #Res BW 100 kHz		3W 300 kHz*		Sweep	Span 2.000 MH 1.000 ms (601 pt	z s)
MKR MODE TRC SCL		FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto	MKR MODE TRC SCL	X	Y		FUNCTION WIDTH		<u>.</u>
1 N 1 f 2.4	400 000 GHz -47.190 dBm			En	1 N 1 f	2.399 500 GHz	-61.730 dBm	Band Power	993.3 kHz	-51.654 dB	
3					3 4						
6			_		5						E
7					7						
9					9						1
11			-		11						
uro l		STATU			uno.				STATU		_
		anno							annia	1	

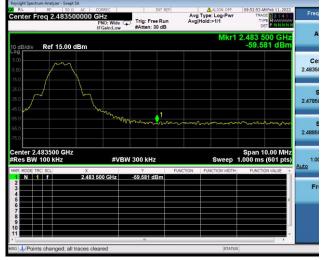
GFSK (BLE 1Mbps) LOW CHANNEL, BAND EDGE



GFSK (BLE 1Mbps) HIGH CHANNEL, CARRIER LEVEL



GFSK (BLE 1Mbps) HIGH CHANNEL, REFERENCE LEVEL



GFSK (BLE 1Mbps) HIGH CHANNEL, BAND EDGE

B	M Feb 11, 2022 DE 1 2 3 4 5 PE A WWWWW ET A NNNN	TRAC	ALIGN OFF Type: RMS Iold: 100/100	#Avg	Trig: Free Ru #Atten: 30 dB	CORREC MHZ PNO: Wide ↔ IFGain:Low	00000 I	⊮ 50 1.0000			an
		2.484 0 er -58.0	Mkr1 Band Pow	E			0 dBm	ef 15.00	/ R	B/di	d
E											ю 00
2.48										\vdash	
2.48										\vdash	
			1 							~	
	.000 MHz (601 pts)	Span 2 1.000 ms	Sweep		300 kHz*	#VBV	z	500 GH) kHz			
	ON VALUE		FUNCTION WIDTH	FUNCTION	Y	E.	X		TRC S		RI
	58.057 dB	6	1.000 MHz	Band Power	-67.618 dBm	4 000 GHz	2.484		1	N	2
											6
											B 📕
											9



GFSK (BLE 2Mbps) LOW CHANNEL, CARRIER LEVEL

RL RF 50 Ω A enter Freq 2.4020000		Trig: Free Run #Atten: 30 dB		ALIGN OFF Type: Log-Pwr Hold:>1/1	09:54:19 AM Feb 11, 2022 TRACE 2 3 4 9 TYPE M	F
0 dB/div Ref 15.00 dBr	n			Mkr1	2.402 010 GHz 7.202 dBm	
°9 5.00 (5.00	~~				~	2.40
5.0						2.4
5.0						2.4
enter 2.402000 GHz Res BW 100 kHz	#VB	W 300 kHz	FUNCTION	Sweep	Span 3.000 MHz 1.000 ms (601 pts)	Auto
1 N 1 f 2 2 3 4	.402 010 GHz	7.202 dBm	PONCTION	PONCTION MOTH	POINT FOR VALUE	
5 6 7 8 9 9						
1		-		STATUS	-	

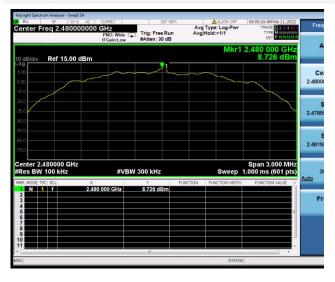
GFSK (BLE 2Mbps) LOW CHANNEL, REFERENCE LEVEL

Keysight Spectrum Analyzer - Swept SA	Keysight Spectrum Analyzer - Swept SA
00// RL FF 50.0 AC CORREC IDT REF Advalor 0FF (9.552:12) AF6 bit 1,2022 FF Center Freq 2.400000000 GHz Trig: Free Run Arg Type: LogP-Wr Trig Trig Trig	M RL pc 30.9 AC COOREC INT REF Δ_ALIGN OFF 095522 March 12, 202 Band Span 1.000000000 MHz PNC: Wide →→ Trig: Free Run Avg Hold: 100/100 Triket p2 are run Triket p2 are run
Mkr1 2.400 000 GHz 10 dB/div Ref 15.00 dBm -37.945 dBm	A Mkr1 2.399 500 GHz 10 10 dB/div Ref 15.00 dBm Band Power -48.706 dBm 1
400 2.400	Log 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3
	s 30 24
450 Martin Ma	450 41 24
2.40	75.0
Auto	Center 2.400000 GHz Span 2.000 MHz #Res BW 100 kHz #VBW 300 kHz* Sweep 1.000 ms (601 pts)
MRR MOGE TRC SCLI X Y FUNCTION HUTH FUNCTION WIDTH FUNCTION WILLE A Later ST 7.945 dBm FUNCTION WIDTH FUNCTION WILLE A Later ST 7.945 dBm FUNCTION WIDTH FUNCTION WILLE A Later ST 7.945 dBm FUNCTION WIDTH FUNCTION WILLE A Later ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A Later ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 dBm FUNCTION WIDTH FUNCTION WILL A LATER ST 7.945 WILL A RATER ST 7.955 WILL A RA	INER MODE TRC SCL X Y FUNCTION WIDTH FUNCTION WIDTH <t< td=""></t<>
MSG Points changed; all traces cleared	Mac

GFSK (BLE 2Mbps) LOW CHANNEL, BAND EDGE



GFSK (BLE 2Mbps) HIGH CHANNEL, CARRIER LEVEL



GFSK (BLE 2Mbps) HIGH CHANNEL, REFERENCE LEVEL



GFSK (BLE 2Mbps) HIGH CHANNEL, BAND EDGE

and S	Span		0 Ω AC	CORREC WHZ PNO: Wide IFGain:Low		un Avgil	ALIGN OFF Type: RMS Hold: 100/100	10:00:28 AM Feb 11, 2022 TRACE 2 3 4 9 TYPE A WWWWWW DET A NNNNN	Ba
0 dB/di	v	Ref 15.0	0 dBm					2.484 000 GHz r -58.145 dBm	
og 5.00									В
5.00									2.483
15.0 25.0									В
95.0									2.484
45.0									
5.0							·····	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
75:0									
enter Res B		3500 GH 10 kHz	Hz	#VE	3W 300 kHz*		Sweep 1	Span 2.000 MHz .000 ms (601 pts)	
IKR MODE			X		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
1 N 2	1	r	2.48	4 000 GHz	-67.890 dBn	Band Power	1.000 MHz	-58.145 dB	
4 5									
6 7 8									
9									
11									



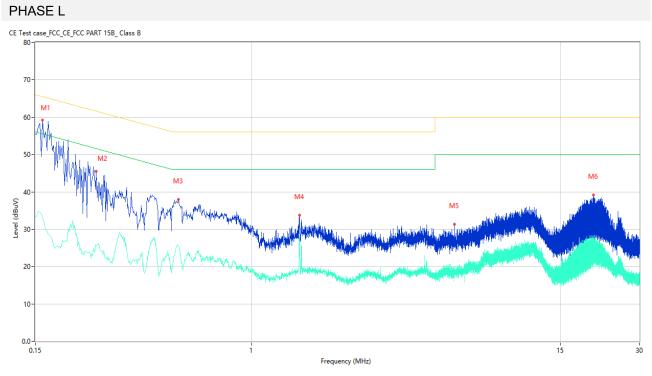
A.5 Conducted Emissions

Note ¹: The EUT is working in the Normal link mode.

Note 2: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Note ³: Results (dBuV) = Original reading level of Spectrum Analyzer (dBuV) + Factor (dB)

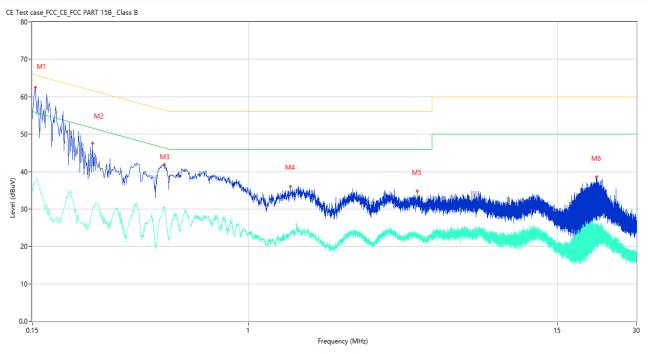




No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Line	Verdict
	(MHz)	(dBuV)	(dB)	(dBuV)	(dB)			
1	0.160	59.24	10.17	65.46	-6.22	Peak	L	Pass
1**	0.160	33.07	10.17	55.46	-22.39	AV	L	Pass
2	0.256	45.43	10.08	61.56	-16.13	Peak	L	Pass
2**	0.256	25.46	10.08	51.56	-26.10	AV	L	Pass
3	0.526	37.91	10.11	56.00	-18.09	Peak	L	Pass
3**	0.526	25.65	10.11	46.00	-20.35	AV	L	Pass
4	1.520	33.71	9.94	56.00	-22.29	Peak	L	Pass
4**	1.520	27.96	9.94	46.00	-18.04	AV	L	Pass
5	5.932	31.28	10.07	60.00	-28.72	Peak	L	Pass
5**	5.932	18.86	10.07	50.00	-31.14	AV	L	Pass
6	20.010	39.21	10.28	60.00	-20.79	Peak	L	Pass
6**	20.010	25.69	10.28	50.00	-24.31	AV	L	Pass

Page No. 50 / 73

PHASE N



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Line	Verdict
	(MHz)	(dBuV)	(dB)	(dBuV)	(dB)			
1	0.152	59.80	10.19	65.89	-6.09	Peak	Ν	Pass
1**	0.152	37.12	10.19	55.89	-18.77	AV	Ν	Pass
2	0.254	47.61	10.08	61.63	-14.02	Peak	Ν	Pass
2**	0.254	29.64	10.08	51.63	-21.99	AV	Ν	Pass
3	0.476	41.88	10.11	56.41	-14.53	Peak	Ν	Pass
3**	0.476	30.08	10.11	46.41	-16.33	AV	Ν	Pass
4	1.440	35.99	9.96	56.00	-20.01	Peak	Ν	Pass
4**	1.440	23.54	9.96	46.00	-22.46	AV	Ν	Pass
5	4.378	34.78	10.03	56.00	-21.22	Peak	Ν	Pass
5**	4.378	23.03	10.03	46.00	-22.97	AV	Ν	Pass
6	21.116	38.58	10.29	60.00	-21.42	Peak	Ν	Pass
6**	21.116	24.68	10.29	50.00	-25.32	AV	Ν	Pass





A.6 Radiated Spurious Emission

Note ¹: The symbol of "--" in the table which means not application.

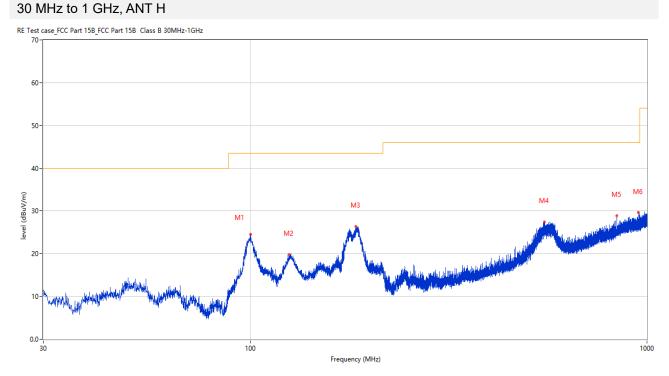
Note ²: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note ³: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note ⁴: The EUT is working in the Normal link mode below 1 GHz. All modes have been tested and BLE 2M-High channel mode is the worst.

Note ⁵: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

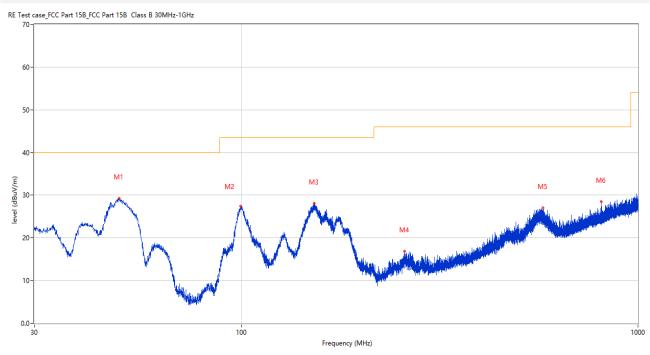
Test Data and Plots



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	100.179	24.52	-26.71	43.5	-18.98	Peak	233.00	200	Horizontal	Pass
2	125.108	19.79	-29.48	43.5	-23.71	Peak	360.00	200	Horizontal	Pass
3	184.278	26.41	-28.17	43.5	-17.09	Peak	60.00	200	Horizontal	Pass
4	551.084	27.48	-17.59	46.0	-18.52	Peak	103.00	200	Horizontal	Pass
5	839.174	28.82	-10.97	46.0	-17.18	Peak	109.00	200	Horizontal	Pass
6	950.530	29.66	-9.42	46.0	-16.34	Peak	360.00	200	Horizontal	Pass



30 MHz to 1 GHz, ANT V



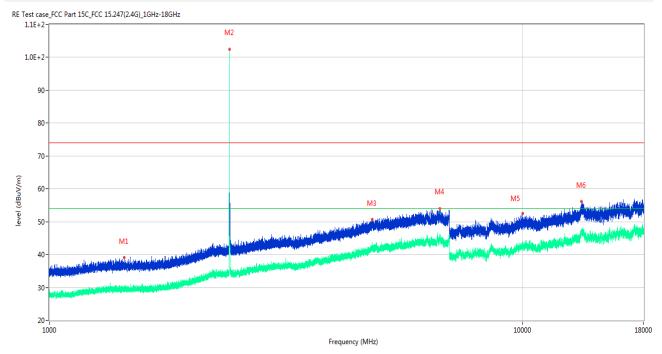
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	49.060	29.31	-25.41	40.0	-10.69	Peak	240.00	100	Vertical	Pass
2	99.452	27.45	-26.79	43.5	-16.05	Peak	294.00	100	Vertical	Pass
3	152.317	28.03	-30.05	43.5	-15.47	Peak	279.00	100	Vertical	Pass
4	257.562	16.90	-24.65	46.0	-29.10	Peak	136.00	100	Vertical	Pass
5	575.237	27.06	-16.91	46.0	-18.94	Peak	185.00	100	Vertical	Pass
6	808.716	28.43	-11.95	46.0	-17.57	Peak	144.00	100	Vertical	Pass



Note 1: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

Note 2: The spurious from 18GHz-25GHz is noise only, do not show on the report.

GFSK (BLE 1Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT H

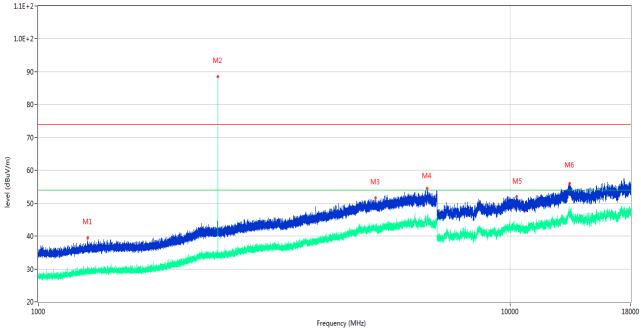


No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1438.300	39.03	-17.44	74.0	-34.97	Peak	7.00	150	Horizontal	Pass
1**	1438.300	29.30	-17.44	54.0	-24.70	AV	7.00	150	Horizontal	Pass
2	2402.200	102.42	-12.26	74.0	28.42	Peak	204.00	150	Horizontal	N/A
2**	2402.200	101.60	-12.26	54.0	47.60	AV	204.00	150	Horizontal	N/A
3	4800.600	50.60	-2.56	74.0	-23.40	Peak	82.00	150	Horizontal	Pass
3**	4800.600	42.53	-2.56	54.0	-11.47	AV	82.00	150	Horizontal	Pass
4	6679.800	54.00	-0.53	74.0	-20.00	Peak	43.00	150	Horizontal	Pass
4**	6679.800	45.63	-0.53	54.0	-8.37	AV	43.00	150	Horizontal	Pass
5	9984.250	52.44	-0.88	74.0	-21.56	Peak	0.00	150	Horizontal	Pass
5**	9984.250	42.92	-0.88	54.0	-11.08	AV	0.00	150	Horizontal	Pass
6	13307.813	56.27	0.86	74.0	-17.73	Peak	0.00	150	Horizontal	Pass
6**	13307.813	46.27	0.86	54.0	-7.73	AV	0.00	150	Horizontal	Pass



GFSK (BLE 1Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT V

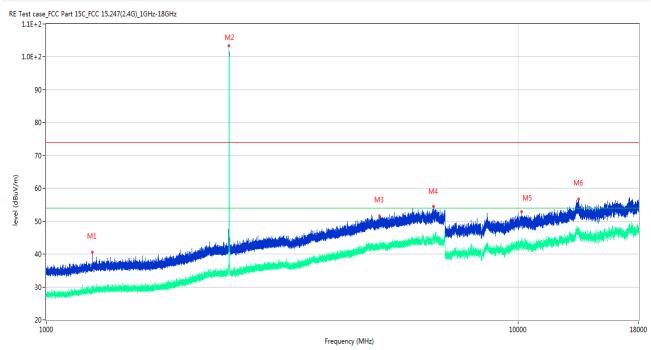
RE Test case_FCC Part 15C_FCC 15.247(2.4G)_1GHz-18GHz



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1272.600	39.45	-17.34	74.0	-34.55	Peak	43.00	150	Vertical	Pass
1**	1272.600	29.25	-17.34	54.0	-24.75	AV	43.00	150	Vertical	Pass
2	2401.800	88.46	-12.26	74.0	14.46	Peak	55.00	150	Vertical	N/A
2**	2401.800	87.55	-12.26	54.0	33.55	AV	55.00	150	Vertical	N/A
3	5180.000	51.63	-2.69	74.0	-22.37	Peak	337.00	150	Vertical	Pass
3**	5180.000	42.79	-2.69	54.0	-11.21	AV	337.00	150	Vertical	Pass
4	6672.600	54.47	-0.81	74.0	-19.53	Peak	109.00	150	Vertical	Pass
4**	6672.600	45.92	-0.81	54.0	-8.08	AV	109.00	150	Vertical	Pass
5	10309.412	51.97	-0.32	74.0	-22.03	Peak	149.00	150	Vertical	Pass
5**	10309.412	41.64	-0.32	54.0	-12.36	AV	149.00	150	Vertical	Pass
6	13372.912	55.99	0.69	74.0	-18.01	Peak	360.00	150	Vertical	Pass
6**	13372.912	46.69	0.69	54.0	-7.31	AV	360.00	150	Vertical	Pass

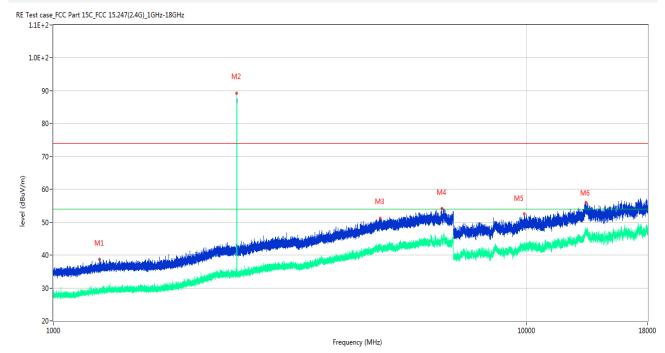


GFSK (BLE 1Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1250.600	40.51	-17.72	74.0	-33.49	Peak	143.00	150	Horizontal	Pass
1**	1250.600	29.15	-17.72	54.0	-24.85	AV	143.00	150	Horizontal	Pass
2	2439.600	103.30	-12.64	74.0	29.30	Peak	350.00	150	Horizontal	N/A
2**	2439.600	101.14	-12.64	54.0	47.14	AV	350.00	150	Horizontal	N/A
3	5088.600	51.55	-2.50	74.0	-22.45	Peak	263.00	150	Horizontal	Pass
3**	5088.600	42.86	-2.50	54.0	-11.14	AV	263.00	150	Horizontal	Pass
4	6620.200	54.58	-0.18	74.0	-19.42	Peak	238.00	150	Horizontal	Pass
4**	6620.200	44.82	-0.18	54.0	-9.18	AV	238.00	150	Horizontal	Pass
5	10155.312	52.82	-0.16	74.0	-21.18	Peak	19.00	150	Horizontal	Pass
5**	10155.312	43.18	-0.16	54.0	-10.82	AV	19.00	150	Horizontal	Pass
6	13424.362	56.68	0.40	74.0	-17.32	Peak	342.00	150	Horizontal	Pass
6**	13424.362	46.81	0.40	54.0	-7.19	AV	342.00	150	Horizontal	Pass



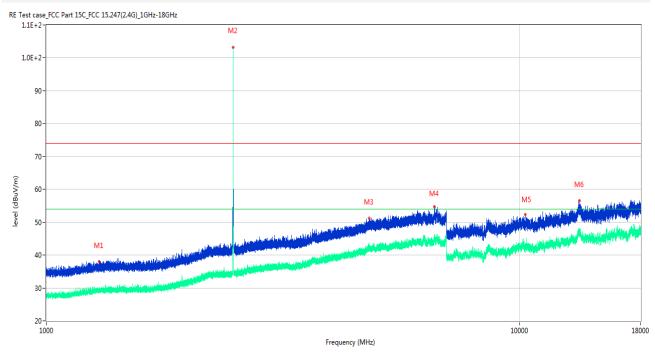


GFSK (BLE 1Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V

		-	-		-	-			-	<u> </u>
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1251.100	38.72	-17.71	74.0	-35.28	Peak	107.00	150	Vertical	Pass
1**	1251.100	29.24	-17.71	54.0	-24.76	AV	107.00	150	Vertical	Pass
2	2439.700	89.16	-12.64	74.0	15.16	Peak	130.00	150	Vertical	N/A
2**	2439.700	87.46	-12.64	54.0	33.46	AV	130.00	150	Vertical	N/A
3	4899.400	51.16	-2.88	74.0	-22.84	Peak	170.00	150	Vertical	Pass
3**	4899.400	42.09	-2.88	54.0	-11.91	AV	170.00	150	Vertical	Pass
4	6608.600	54.09	0.14	74.0	-19.91	Peak	292.00	150	Vertical	Pass
4**	6608.600	45.26	0.14	54.0	-8.74	AV	292.00	150	Vertical	Pass
5	9868.675	52.43	-0.79	74.0	-21.57	Peak	195.00	150	Vertical	Pass
5**	9868.675	42.87	-0.79	54.0	-11.13	AV	195.00	150	Vertical	Pass
6	13325.662	55.93	0.93	74.0	-18.07	Peak	208.00	150	Vertical	Pass
6**	13325.662	46.57	0.93	54.0	-7.43	AV	208.00	150	Vertical	Pass



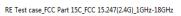
GFSK (BLE 1Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT H

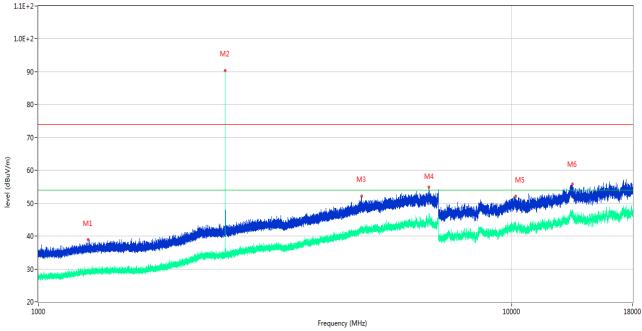


No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1291.900	37.98	-17.48	74.0	-36.02	Peak	34.00	150	Horizontal	Pass
1**	1291.900	29.19	-17.48	54.0	-24.81	AV	34.00	150	Horizontal	Pass
2	2479.600	103.12	-12.44	74.0	29.12	Peak	209.00	150	Horizontal	N/A
2**	2479.600	101.80	-12.44	54.0	47.80	AV	209.00	150	Horizontal	N/A
3	4800.200	51.23	-2.55	74.0	-22.77	Peak	270.00	150	Horizontal	Pass
3**	4800.200	43.88	-2.55	54.0	-10.12	AV	270.00	150	Horizontal	Pass
4	6600.400	54.65	-0.42	74.0	-19.35	Peak	193.00	150	Horizontal	Pass
4**	6600.400	44.94	-0.42	54.0	-9.06	AV	193.00	150	Horizontal	Pass
5	10275.775	52.24	0.17	74.0	-21.76	Peak	148.00	150	Horizontal	Pass
5**	10275.775	42.00	0.17	54.0	-12.00	AV	148.00	150	Horizontal	Pass
6	13356.900	56.56	0.91	74.0	-17.44	Peak	0.00	150	Horizontal	Pass
6**	13356.900	46.61	0.91	54.0	-7.39	AV	0.00	150	Horizontal	Pass



GFSK (BLE 1Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT V

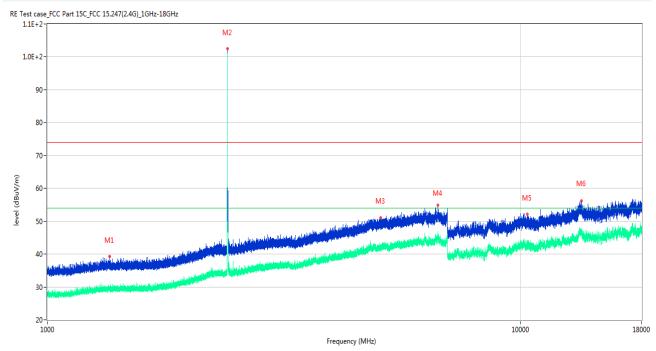




No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1273.500	38.99	-17.35	74.0	-35.01	Peak	47.00	150	Vertical	Pass
1**	1273.500	28.78	-17.35	54.0	-25.22	AV	47.00	150	Vertical	Pass
2	2479.700	90.37	-12.43	74.0	16.37	Peak	60.00	150	Vertical	N/A
2**	2479.700	89.18	-12.43	54.0	35.18	AV	60.00	150	Vertical	N/A
3	4822.400	52.22	-3.42	74.0	-21.78	Peak	146.00	150	Vertical	Pass
3**	4822.400	41.76	-3.42	54.0	-12.24	AV	146.00	150	Vertical	Pass
4	6685.400	54.90	-0.18	74.0	-19.10	Peak	273.00	150	Vertical	Pass
4**	6685.400	45.40	-0.18	54.0	-8.60	AV	273.00	150	Vertical	Pass
5	10197.862	52.13	0.47	74.0	-21.87	Peak	339.00	150	Vertical	Pass
5**	10197.862	43.98	0.47	54.0	-10.02	AV	339.00	150	Vertical	Pass
6	13423.838	55.73	0.40	74.0	-18.27	Peak	106.00	150	Vertical	Pass
6**	13423.838	46.32	0.40	54.0	-7.68	AV	106.00	150	Vertical	Pass



GFSK (BLE 2Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT H

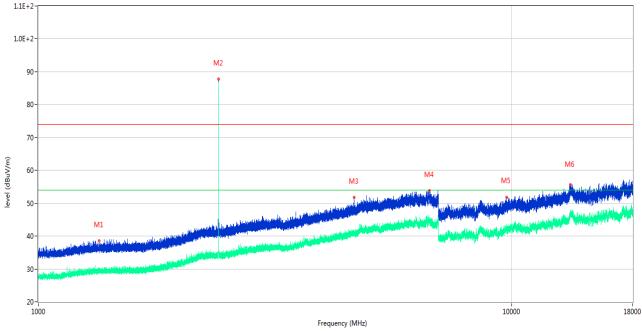


No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1353.900	39.28	-17.35	74.0	-34.72	Peak	0.00	150	Horizontal	Pass
1**	1353.900	28.98	-17.35	54.0	-25.02	AV	0.00	150	Horizontal	Pass
2	2402.400	102.38	-12.27	74.0	28.38	Peak	344.00	150	Horizontal	N/A
2**	2402.400	100.66	-12.27	54.0	46.66	AV	344.00	150	Horizontal	N/A
3	5055.000	51.05	-2.91	74.0	-22.95	Peak	64.00	150	Horizontal	Pass
3**	5055.000	41.92	-2.91	54.0	-12.08	AV	64.00	150	Horizontal	Pass
4	6678.800	54.92	-0.55	74.0	-19.08	Peak	213.00	150	Horizontal	Pass
4**	6678.800	45.70	-0.55	54.0	-8.30	AV	213.00	150	Horizontal	Pass
5	10328.100	52.08	-0.02	74.0	-21.92	Peak	325.00	150	Horizontal	Pass
5**	10328.100	43.82	-0.02	54.0	-10.18	AV	325.00	150	Horizontal	Pass
6	13423.838	56.23	0.40	74.0	-17.77	Peak	273.00	150	Horizontal	Pass
6**	13423.838	47.61	0.40	54.0	-6.39	AV	273.00	150	Horizontal	Pass



GFSK (BLE 2Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT V

RE Test case_FCC Part 15C_FCC 15.247(2.4G)_1GHz-18GHz



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1344.000	38.57	-17.28	74.0	-35.43	Peak	283.00	150	Vertical	Pass
1**	1344.000	29.81	-17.28	54.0	-24.19	AV	283.00	150	Vertical	Pass
2	2401.500	87.79	-12.26	74.0	13.79	Peak	62.00	150	Vertical	N/A
2**	2401.500	83.26	-12.26	54.0	29.26	AV	62.00	150	Vertical	N/A
3	4640.800	51.70	-3.47	74.0	-22.30	Peak	19.00	150	Vertical	Pass
3**	4640.800	41.42	-3.47	54.0	-12.58	AV	19.00	150	Vertical	Pass
4	6691.200	53.72	-0.29	74.0	-20.28	Peak	60.00	150	Vertical	Pass
4**	6691.200	44.46	-0.29	54.0	-9.54	AV	60.00	150	Vertical	Pass
5	9751.663	51.82	-0.42	74.0	-22.18	Peak	37.00	150	Vertical	Pass
5**	9751.663	41.90	-0.42	54.0	-12.10	AV	37.00	150	Vertical	Pass
6	13283.925	55.56	0.74	74.0	-18.44	Peak	275.00	150	Vertical	Pass
6**	13283.925	47.55	0.74	54.0	-6.45	AV	275.00	150	Vertical	Pass



GFSK (BLE 2Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H

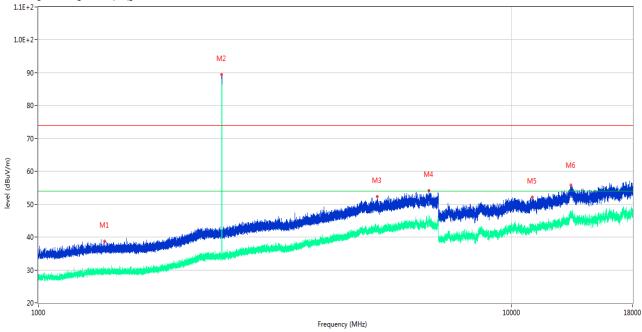


No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1153.000	37.46	-18.00	74.0	-36.54	Peak	88.00	150	Horizontal	Pass
1**	1153.000	28.33	-18.00	54.0	-25.67	AV	88.00	150	Horizontal	Pass
2	2439.400	103.94	-12.64	74.0	29.94	Peak	347.00	150	Horizontal	N/A
2**	2439.400	99.76	-12.64	54.0	45.76	AV	347.00	150	Horizontal	N/A
3	4779.600	51.02	-2.88	74.0	-22.98	Peak	319.00	150	Horizontal	Pass
3**	4779.600	41.40	-2.88	54.0	-12.60	AV	319.00	150	Horizontal	Pass
4	6682.600	53.92	-0.43	74.0	-20.08	Peak	360.00	150	Horizontal	Pass
4**	6682.600	45.65	-0.43	54.0	-8.35	AV	360.00	150	Horizontal	Pass
5	10379.275	52.34	0.19	74.0	-21.66	Peak	99.00	150	Horizontal	Pass
5**	10379.275	43.25	0.19	54.0	-10.75	AV	99.00	150	Horizontal	Pass
6	13444.312	56.45	0.55	74.0	-17.55	Peak	75.00	150	Horizontal	Pass
6**	13444.312	47.43	0.55	54.0	-6.57	AV	75.00	150	Horizontal	Pass



GFSK (BLE 2Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V

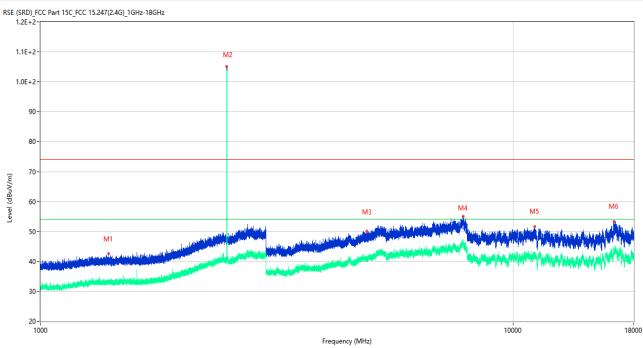
RE Test case_FCC Part 15C_FCC 15.247(2.4G)_1GHz-18GHz



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1380.300	38.73	-17.35	74.0	-35.27	Peak	142.00	150	Vertical	Pass
1**	1380.300	29.69	-17.35	54.0	-24.31	AV	142.00	150	Vertical	Pass
2	2439.600	89.47	-12.64	74.0	15.47	Peak	129.00	150	Vertical	N/A
2**	2439.600	87.84	-12.64	54.0	33.84	AV	129.00	150	Vertical	N/A
3	5198.200	52.30	-2.73	74.0	-21.70	Peak	223.00	150	Vertical	Pass
3**	5198.200	41.59	-2.73	54.0	-12.41	AV	223.00	150	Vertical	Pass
4	6685.200	54.14	-0.19	74.0	-19.86	Peak	3.00	150	Vertical	Pass
4**	6685.200	45.94	-0.19	54.0	-8.06	AV	3.00	150	Vertical	Pass
5	11045.987	52.21	-0.61	74.0	-21.79	Peak	187.00	150	Vertical	Pass
5**	11045.987	42.73	-0.61	54.0	-11.27	AV	187.00	150	Vertical	Pass
6	13320.412	55.89	0.91	74.0	-18.11	Peak	180.00	150	Vertical	Pass
6**	13320.412	46.17	0.91	54.0	-7.83	AV	180.00	150	Vertical	Pass

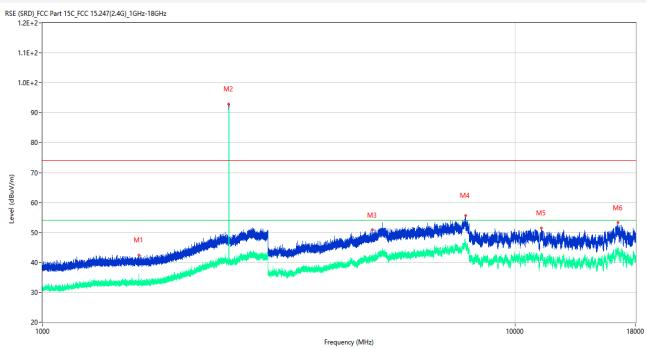


GFSK (BLE 2Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1394.400	42.58	-16.67	74.0	31.42	Peak	233.00	400	Horizontal	Pass
1**	1394.400	33.26	-16.67	54.0	20.74	AV	233.00	400	Horizontal	Pass
2	2479.500	105.18	-10.54	74.0	-31.18	Peak	233.00	100	Horizontal	N/A
2**	2479.500	101.74	-10.54	54.0	-47.74	AV	233.00	100	Horizontal	N/A
3	4905.000	50.16	-2.51	74.0	23.84	Peak	0.00	150	Horizontal	Pass
3**	4905.000	40.24	-2.51	54.0	13.76	AV	0.00	150	Horizontal	Pass
4	7851.000	55.05	2.41	74.0	18.95	Peak	0.00	200	Horizontal	Pass
4**	7851.000	45.82	2.41	54.0	8.18	AV	0.00	200	Horizontal	Pass
5	11119.799	51.64	-0.98	74.0	22.36	Peak	119.00	400	Horizontal	Pass
5**	11119.799	42.31	-0.98	54.0	11.69	AV	119.00	400	Horizontal	Pass
6	16348.613	53.35	0.81	74.0	20.65	Peak	5.00	400	Horizontal	Pass
6**	16348.613	43.44	0.81	54.0	10.56	AV	5.00	400	Horizontal	Pass





GFSK (BLE 2Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT V

										1
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	1599.900	42.45	-16.85	74.0	31.55	Peak	127.00	100	Vertical	Pass
1**	1599.900	36.01	-16.85	54.0	17.99	AV	127.00	100	Vertical	Pass
2	2479.500	92.95	-10.54	74.0	-18.95	Peak	265.00	100	Vertical	N/A
2**	2479.500	89.63	-10.54	54.0	-35.63	AV	265.00	100	Vertical	N/A
3	4984.000	50.85	-2.54	74.0	23.15	Peak	168.00	150	Vertical	Pass
3**	4984.000	41.73	-2.54	54.0	12.27	AV	168.00	150	Vertical	Pass
4	7865.750	55.62	2.18	74.0	18.38	Peak	132.00	300	Vertical	Pass
4**	7865.750	46.13	2.18	54.0	7.87	AV	132.00	300	Vertical	Pass
5	11381.049	51.46	-1.73	74.0	22.54	Peak	0.00	100	Vertical	Pass
5**	11381.049	42.07	-1.73	54.0	11.93	AV	0.00	100	Vertical	Pass
6	16505.588	53.24	0.31	74.0	20.76	Peak	360.00	400	Vertical	Pass
6**	16505.588	44.68	0.31	54.0	9.32	AV	360.00	400	Vertical	Pass



A.7 Band Edge (Restricted-band band-edge)

Note 1: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

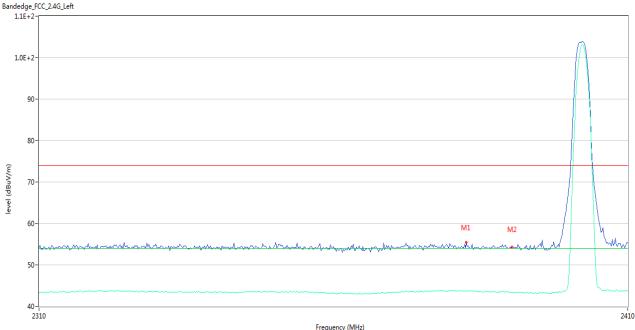
Note ²: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.

Note ³: According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasipeak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 4: The Level (dBuV/m) has been corrected by factor.

Test Data and Plots

GFSK (BLE 1Mbps) LOW CHANNEL

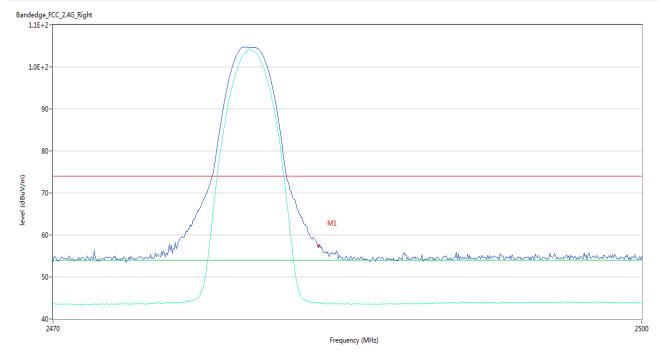


No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	2382.167	55.41	-0.58	74.0	-18.59	Peak	360.00	150	Horizontal	Pass
1**	2382.167	43.67	-0.58	54.0	-10.33	AV	360.00	150	Horizontal	Pass
2	2390.000	54.34	-0.50	74.0	-19.66	Peak	237.00	150	Horizontal	Pass
2**	2390.000	43.27	-0.50	54.0	-10.73	AV	237.00	150	Horizontal	Pass

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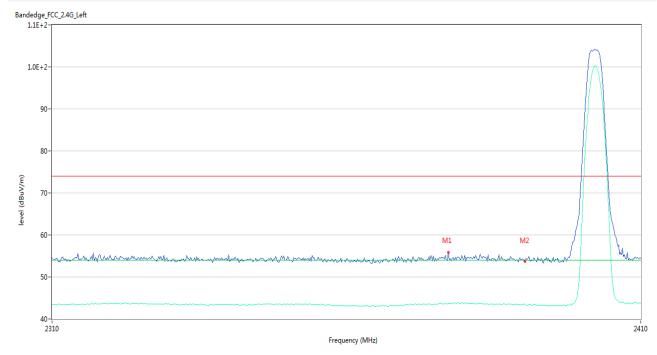
GFSK (BLE 1Mbps) HIGH CHANNEL



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	2483.500	57.47	-0.36	74.0	-16.53	Peak	204.00	150	Horizontal	Pass
1**	2483.500	43.82	-0.36	54.0	-10.18	AV	204.00	150	Horizontal	Pass



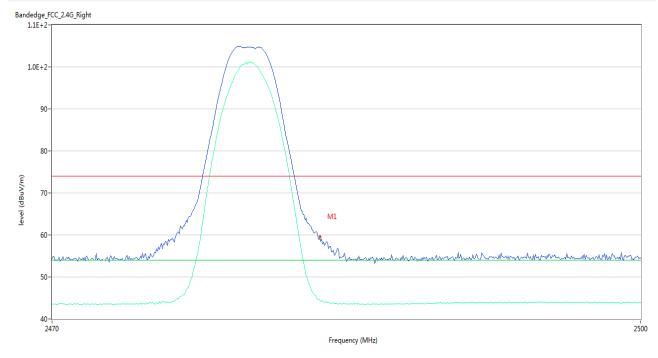
GFSK (BLE 2Mbps) LOW CHANNEL



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	2376.833	55.89	-0.50	74.0	-18.11	Peak	217.00	150	Horizontal	Pass
1**	2376.833	43.68	-0.50	54.0	-10.32	AV	217.00	150	Horizontal	Pass
2	2390.000	53.71	-0.50	74.0	-20.29	Peak	13.00	150	Horizontal	Pass
2**	2390.000	43.41	-0.50	54.0	-10.59	AV	13.00	150	Horizontal	Pass



GFSK (BLE 2Mbps) HIGH CHANNEL



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	Antenna	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(Degree)	(cm)		
1	2483.500	59.58	-0.36	74.0	-14.42	Peak	200.00	150	Horizontal	Pass
1**	2483.500	44.46	-0.36	54.0	-9.54	AV	200.00	150	Horizontal	Pass



A.8 Power Spectral Density (PSD)

<u>Test Data</u>

GFSK (BLE 1Mbps)											
Channel	ChannelSpectral power densityLimit(dBm/3kHz)(dBm/3kHz)										
Low Channel	-7.42	8	Pass								
Middle Channel	-7.24	8	Pass								
High Channel	-6.01	8	Pass								

GFSK (BLE 2Mbps)											
Channel	Spectral power density	Limit	Verdict								
Channel	(dBm/3kHz)	(dBm/3kHz)	Veruici								
Low Channel	-11.02	8	Pass								
Middle Channel	-10.81	8	Pass								
High Channel	-9.60	8	Pass								

Test Plots

GFSK (BLE 1Mbps) LOW CHANNEL



GFSK (BLE 1Mbps) MIDDLE CHANNEL

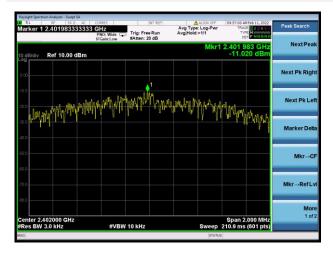




GFSK (BLE 1Mbps) HIGH CHANNEL



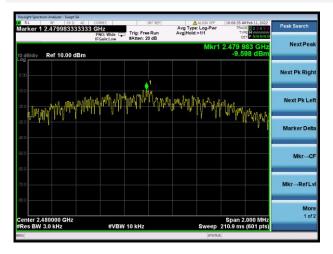
GFSK (BLE 2Mbps) LOW CHANNEL



GFSK (BLE 2Mbps) MIDDLE CHANNEL



GFSK (BLE 2Mbps) HIGH CHANNEL





ANNEX B TEST SETUP PHOTOS

Please refer the document "BL-SZ22B0814-AR.PDF".

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ22B0814-AW.PDF".

ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ22B0814-AI.PDF".



Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.

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--END OF REPORT--