

RF TEST REPORT



Report No.: SL18121702-MED-028A1-NCC_WR9220_BLE

Supersede Report No.:

Applicant	:	Medtronic Inc.
Product Name	:	Thor
Model No.	:	WR9220
Test Standard	:	LP0002: 2018
Test Method	:	LP0002: 2018 ANSI C63.10: 2013
Dates of test	:	12/17/2018 to 12/31/2018
Issue Date	:	12/31/2018
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X]		
Equipment did not comply with the specification []		

This Test Report is Issued Under the Authority of:

	
Shuo Zhang	Chen Ge
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
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Laboratory Introduction

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



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

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

Accreditations for Product Certifications

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

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
SL18121702-MED-028A1-NCC_WR9220_BLE	None	Original	12/31/2018

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Medtronic Inc.
Product: Thor
Model: WR9220

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	:	Medtronic, Inc.
Applicant Address	:	710 Medtronic Parkway N.E., Minneapolis, MN 55432
Manufacturer Name	:	Medtronic, Inc.
Manufacturer Address	:	710 Medtronic Parkway N.E., Minneapolis, MN 55432

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	Thor
Model No.	WR9220
Trade Name	Medtronic Inc.
Serial No.	NPR000137N
Host Model No.	N/A
Input Power	3.6 Vdc from Battery, and 5.0Vdc USB charge
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	04/28/2018
Equipment Class/ Category	DTS
Port/Connectors	Micro-USB

6.2 Radio Description

Bluetooth LE:

Radio Type	Bluetooth LE
Operating Frequency	2402MHz-2480MHz
Modulation	GFSK
Channel Spacing	2MHz
Antenna Type	Integral
Antenna Gain	1 dBi
Antenna Connector Type	PCB antenna
Note	N/A

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Latitude E7440	N/A	Dell	N/A

7.2 Cabling Description

Item	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Blue Magic 1.95	Set the EUT to transmit continuously in different test modes and channels

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Antenna Requirement	NCC	LP0002, 2.2	LP0002: 2018 Appendix III 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	NCC	LP0002, 2.3	LP0002: 2018 Appendix III	☐ Pass ☒ N/A
Restricted Band of Operation	NCC	LP0002, 2.7	LP0002: 2018 Appendix III 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A

DTS Band Requirement

Test Item	Test standard		Test Method/Procedure	Pass / Fail
6 dB Bandwidth	NCC	LP0002, 3.10.1.6	LP0002: 2018 Appendix II 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
Band Edge and Radiated Spurious Emissions	NCC	LP0002, 3.10.1.5	LP0002: 2018 Appendix II 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
Output Power	NCC	LP0002, 3.10.1.2	LP0002: 2018 Appendix II 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
Antenna Gain > 6 dBi	NCC	LP0002, 3.10.1.3	-	☐ Pass ☒ N/A
Power Spectral Density	NCC	LP0002, 3.10.1.6	LP0002: 2018 Appendix II 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. - The device is operating at near 98% duty cycle.			

9 Measurement Uncertainty

Emissions			
Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
RF conducted measurement	150KHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±0.95dB
Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB
Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB

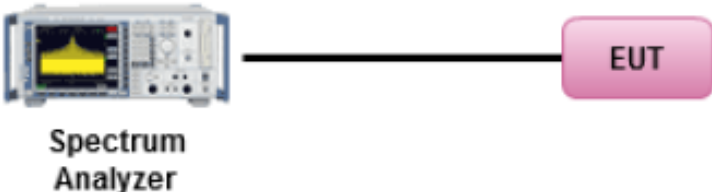
10 Measurements, Examination and Derived Results

10.1 Antenna Requirement

Spec	Requirement	Applicable
LP0002:2018	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. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) The antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.	☒
Remark	The EUT uses PCB antenna that is permanently attached to the board which meets the requirement.	
Result	☒ PASS ☐ FAIL	

10.2 6dB Bandwidth

Requirement(s):

Spec	Requirement	Applicable
LP0002:2018	6dB BW $\geq$ 500KHz;	☒
LP0002:2018	The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth	☒
Test Setup		
Test Procedure	558074 D01 DTS Meas Guidance v05, 8.1 DTS bandwidth <u>6dB Emission bandwidth measurement procedure</u> - Set RBW = 100 kHz. - Set the video bandwidth (VBW) $\geq 3 \times$ 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.	
Test Date	12/31/2018	Environmental condition Temperature 23°C Relative Humidity 42% Atmospheric Pressure 1021mbar
Remark	N/A	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A

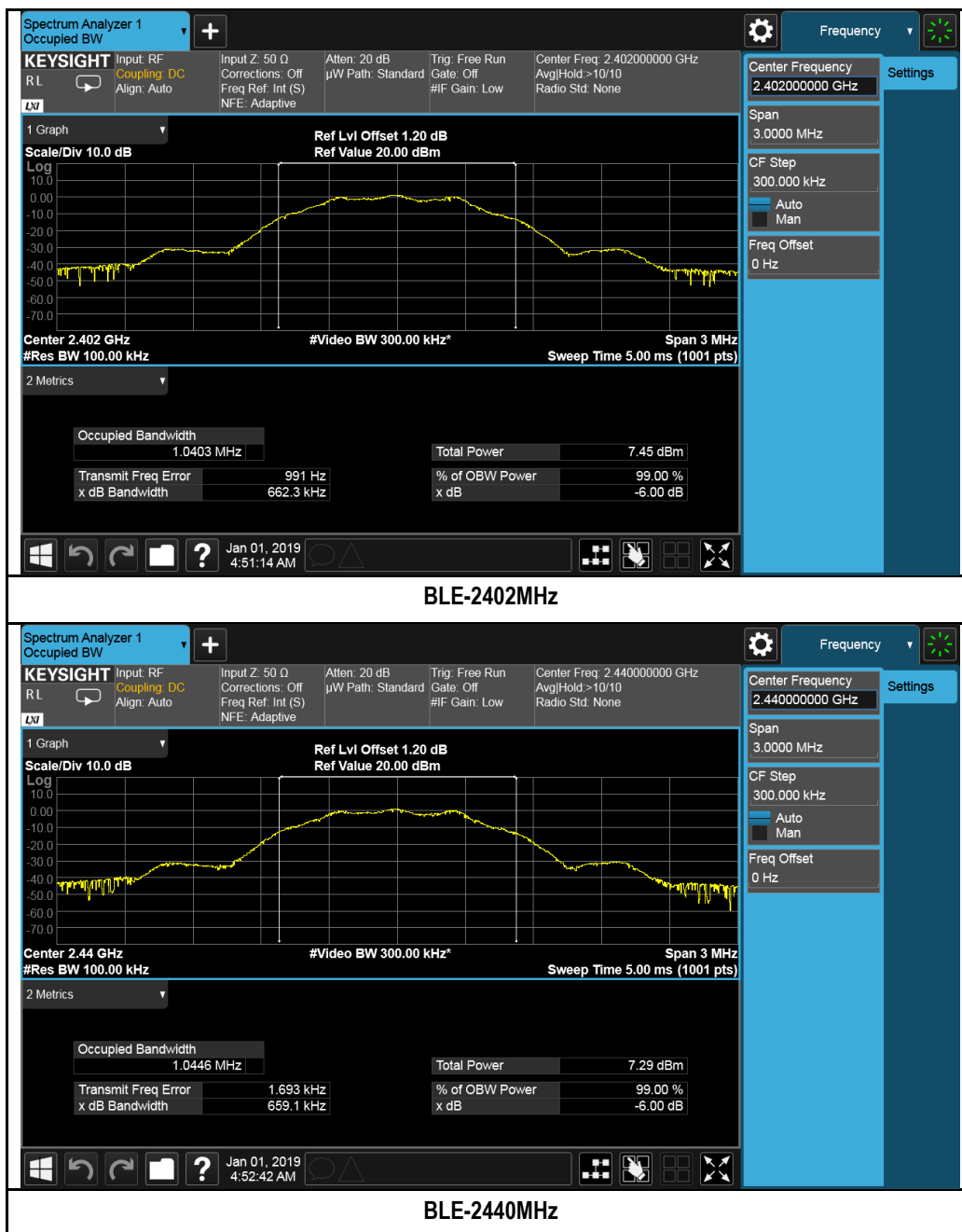
Test Plot ☒ Yes ☐ N/A

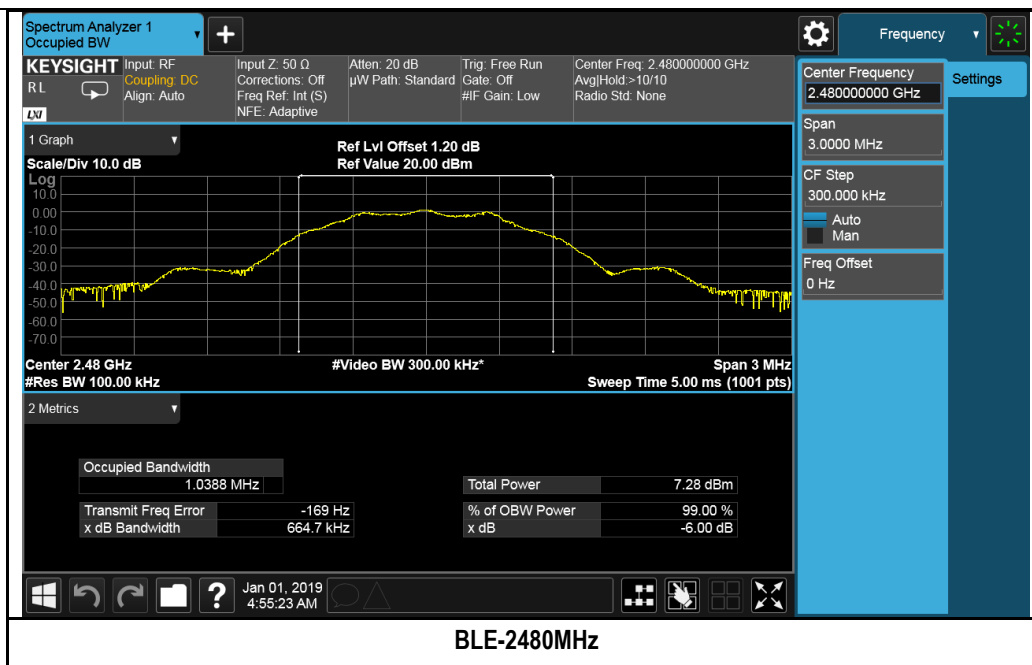
Test was done by Shuo Zhangat RF test site.

BLE:

Channel	Channel Frequency (MHz)	OBW		Minimum Limit (MHz)
		99% (MHz)	6dB(KHz)	
Low	2402	1.04	662.3	0.5
Mid	2440	1.04	659.1	0.5
High	2480	1.04	664.7	0.5

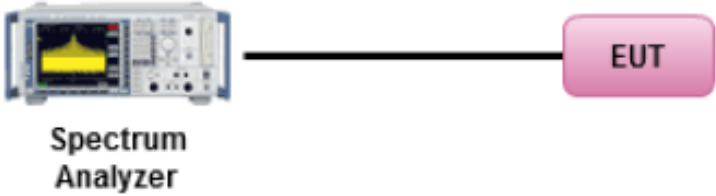
6dB & 99% Bandwidth Test Plots





10.3 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
LP0002:2018	1	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.	☒
Test Setup	 Spectrum Analyzer		
Test Procedure	558074 D01 DTS Meas Guidance v05, 9.2.2.2 <u>Measurement using a Spectrum Analyzer (SA)</u> (a) Set span to at least 1.5 times the OBW (b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz. (c) Set VBW $\geq 3 \times$ RBW. (d) Number of points in sweep $\geq 2 \times$ span / RBW. (This gives bin-to-bin spacing $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.) (e) Sweep time = auto. (f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. (g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run". (h) Trace average at least 100 traces in power averaging (i.e., RMS) mode (i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.		
Test Date	12/31/2018	Environmental condition	Temperature 23°C Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Shuo Zhang at RF test site.

Output Power measurement results for BLE:

Type	Freq (MHz)	Test mode	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	2402	Bluetooth LE	Low	1.88	≤30	Pass
	2440	Bluetooth LE	Mid	1.84	≤30	Pass
	2480	Bluetooth LE	High	1.74	≤30	Pass

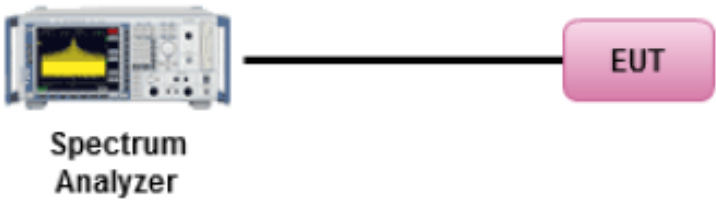
Test Plots:





10.4 Band Edge

Requirement(s):

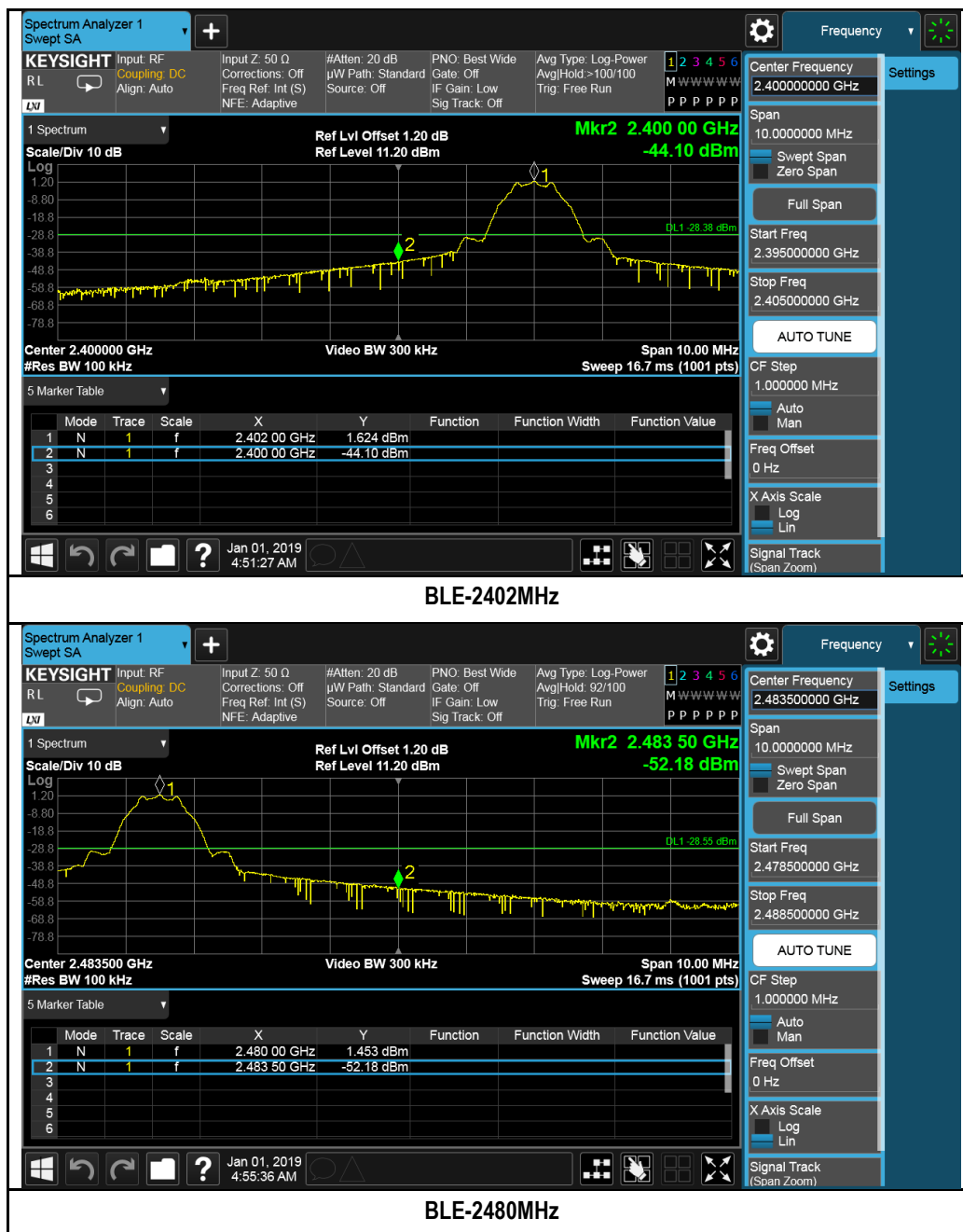
Spec	Item	Requirement	Applicable
LP0002:2018	d)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209 (a) is not required ☐ 20 dB down ☒ 30 dB down	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v05 <u>Band Edge measurement procedure</u> 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 30 dB down from the highest emission level within the authorized band as a measured. The attenuation shall be 30 dB instead of 20 dB when Peak conducted output power procedure is used. 3. Change modulation and channel bandwidth then repeat step 1 to 2. 4. Measured and record the results in the test report.		
Test Date	12/31/2018	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

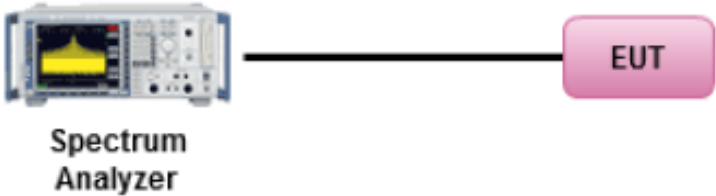
Test was done by Shuo Zhang at RF test site.

Test Plots



10.5 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
LP0002:2018	e)	DSSS: $\leq 8\text{dBm}/3\text{KHz}$	☒
	f)	DSSS in hybrid sys with FH turned off: $\leq 8\text{dBm}/3\text{KHz}$	☐
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v05, 10.2 Method PKPSD (peak PSD) <u>Peak spectral density measurement procedure</u> - 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 $\geq 3 \times \text{RBW}$. - 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.		
Test Date	12/31/2018	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

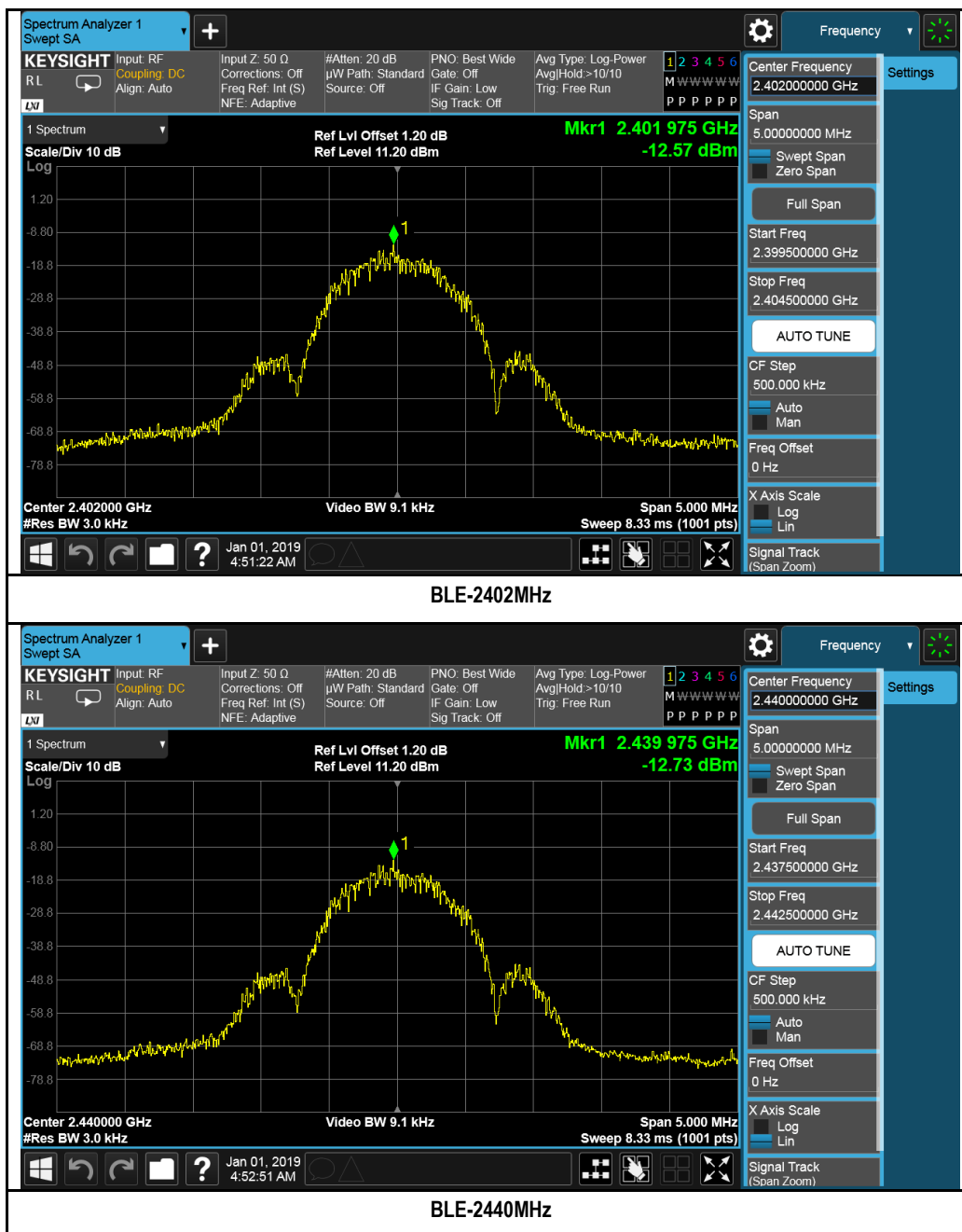
Test Plot ☒ Yes (See below) ☐ N/A

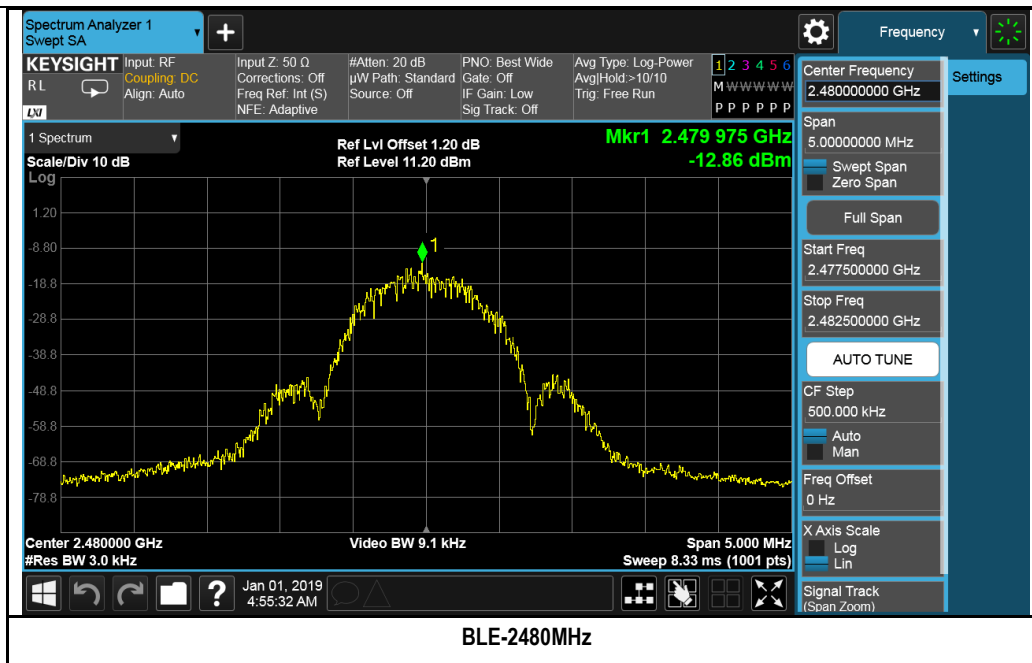
Test was done by Shuo Zhang at RF test site.

PSD measurement results for BLE:

Type	Freq (MHz)	Test mode	CH	Conducted PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
PSD	2402	Bluetooth LE	Low	-12.56	8	Pass
	2440	Bluetooth LE	Mid	-12.73	8	Pass
	2480	Bluetooth LE	High	-12.92	8	Pass

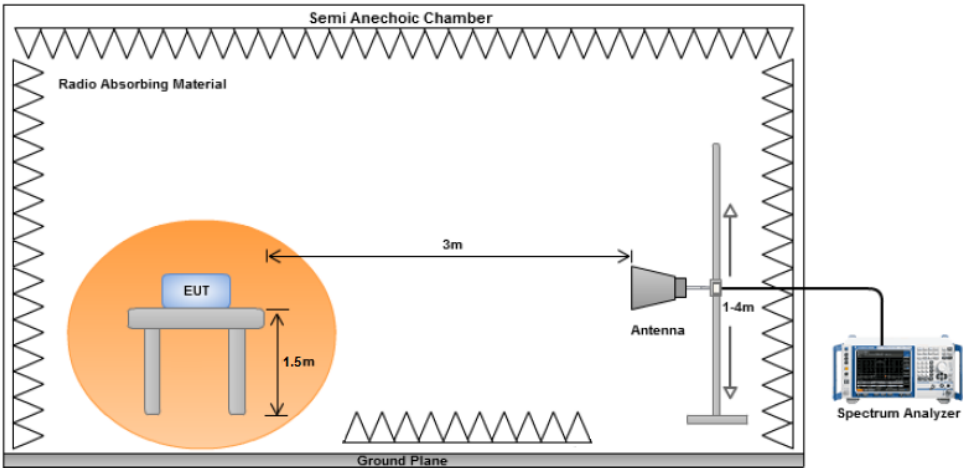
Test Plots:





10.6 Radiated Spurious Emissions in restricted band

Requirement(s):

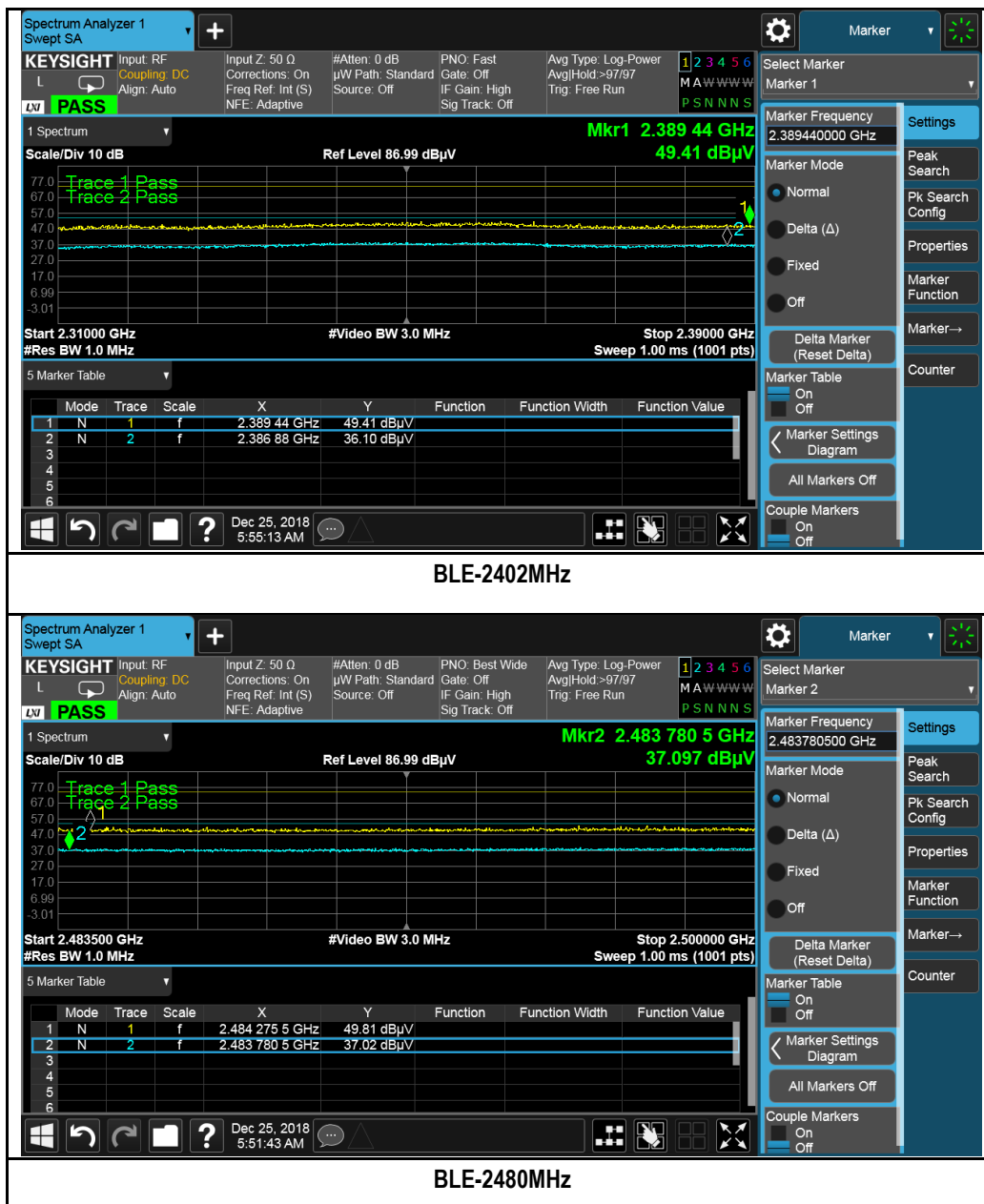
Spec	Item	Requirement	Applicable
LP0002:2018	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. Radiated measurement was measured with antenna port terminated, there isn't outstanding emission found at the edge of restricted frequency, within x dB margin		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

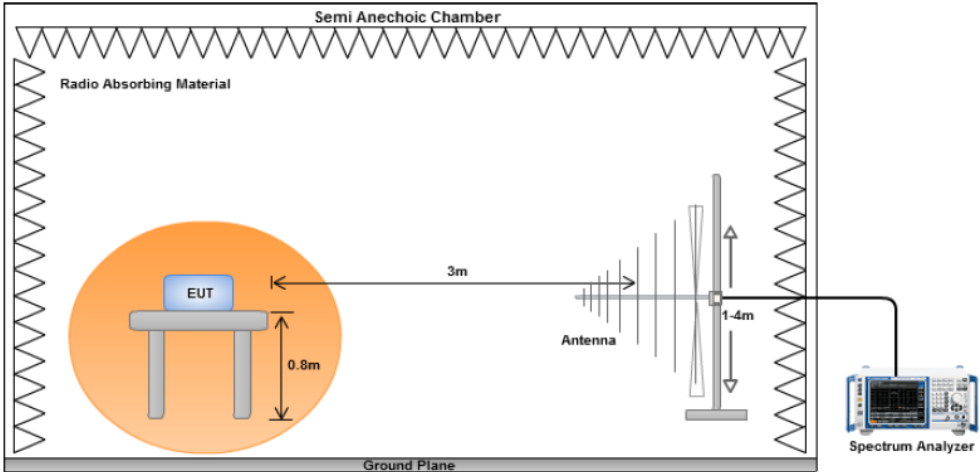
Test was done by Shuo Zhang at 10m chamber.

Restricted Band Measurement Plots:



10.7 Radiated Spurious Emissions below 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable										
LP0002:2018	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges <table><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	☒
Frequency range (MHz)	Field Strength (uV/m)												
30 – 88	100												
88 – 216	150												
216 960	200												
Above 960	500												
Test Setup													
Procedure	1. 2. 3. 4. The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. b. c. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. The EUT was then rotated to the direction that gave the maximum emission. Finally, the antenna height was adjusted to the height that gave the maximum emission. A Quasi-peak measurement was then made for that frequency point. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.												
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.												
Result	☒ Pass ☐ Fail												

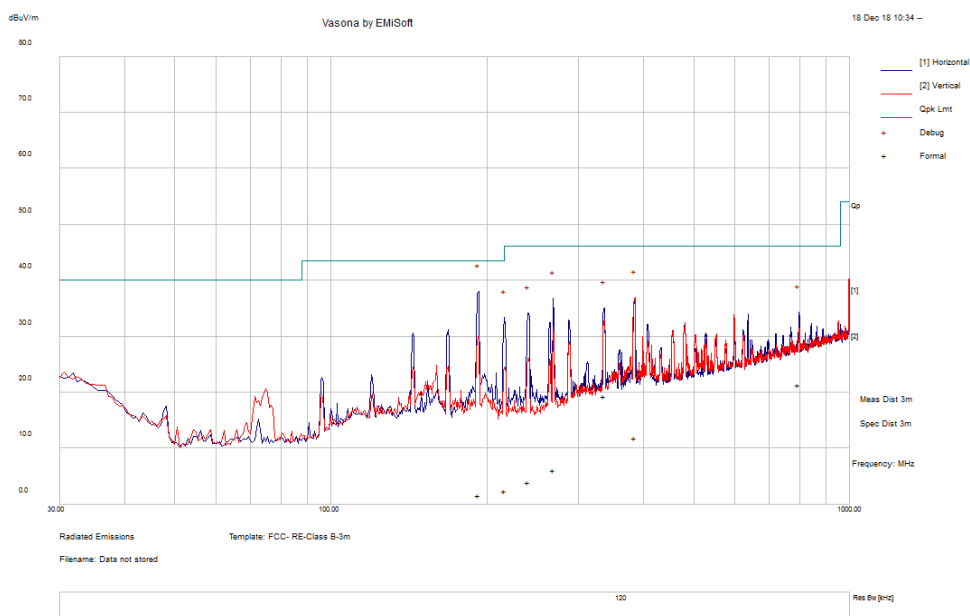
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Shuo Zhang at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz				
Environmental Conditions:	Temp (°C):	26	Result	Pass	
	Humidity (%)	47			
	Atmospheric (mbar):	1020			
Mains Power:	120VAC, 60Hz				
Tested by:	Shuo Zhang				
Test Date:	12/18/2018				
Remarks:	BLE Middle Channel				

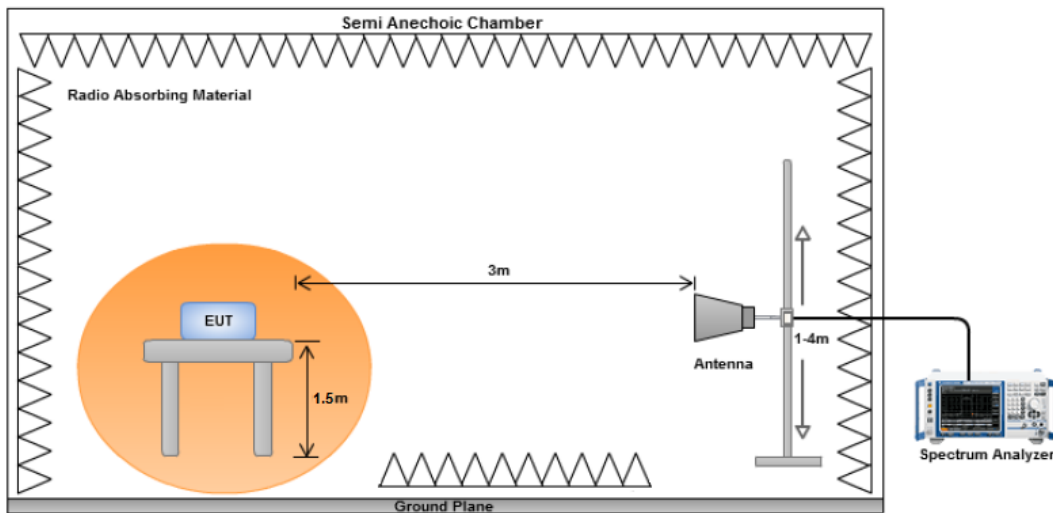


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
192.36	13.99	12.55	-24.87	1.67	Quasi Max	H	281	201	43.5	-41.83	Pass
385.30	18.36	13.67	-20.09	11.95	Quasi Max	V	284	8	46	-34.05	Pass
268.46	16.26	13.08	-23.21	6.13	Quasi Max	H	254	266	46	-39.87	Pass
335.99	26.91	13.48	-21.12	19.28	Quasi Max	H	254	299	46	-26.72	Pass
796.53	20.14	15.47	-14.28	21.34	Quasi Max	H	333	27	46	-24.66	Pass
239.90	15.43	12.89	-24.33	3.99	Quasi Max	H	231	147	46	-42.01	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

10.8 Radiated Spurious Emissions between 1GHz – 25GHz

Requirement(s):

Spec	Item	Requirement	Applicable
LP0002:2018	a)	For non-restricted band, 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 or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. There isn't outstanding emission found at the edge of restricted frequency.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Shuo Zhang at 3m chamber.

Radiated Emission Test Results (Above 1GHz)

Above 1GHz-25GHz- BLE - 2402MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7206.70	49.19	5.15	-0.45	53.88	Peak Max	V	199	328	74	-20.12	Pass
3071.59	41.3	3.33	-1.44	43.18	Peak Max	V	236	208	74	-30.82	Pass
4877.94	41.41	4.17	-0.99	44.59	Peak Max	V	222	51	74	-29.41	Pass
7206.70	35.74	5.15	-0.45	40.43	Average Max	V	199	328	54	-13.57	Pass
3071.59	29.16	3.33	-1.44	31.04	Average Max	V	236	208	54	-22.96	Pass
4877.94	28.17	4.17	-0.99	31.35	Average Max	V	222	51	54	-22.65	Pass

Above 1GHz-25GHz- BLE - 2440MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
9042.70	40.64	5.65	0.14	46.44	Peak Max	V	157	45	74	-27.57	Pass
7110.97	39.93	5.12	-0.42	44.63	Peak Max	V	108	203	74	-29.37	Pass
4782.72	41.42	4.08	-0.92	44.58	Peak Max	V	101	301	74	-29.42	Pass
9042.70	27.07	5.65	0.14	32.86	Average Max	V	157	45	54	-21.14	Pass
7110.97	27.16	5.12	-0.42	31.86	Average Max	V	108	203	54	-22.14	Pass
4782.72	28.19	4.08	-0.92	31.35	Average Max	V	101	301	54	-22.65	Pass

Above 1GHz-25GHz- BLE - 2480MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
6302.53	40.56	4.69	-0.3	44.95	Peak Max	V	332	143	74	-29.05	Pass
6470.84	40.69	4.81	-0.2	45.3	Peak Max	V	128	343	74	-28.7	Pass
4007.96	41.08	3.86	-0.3	44.63	Peak Max	V	105	212	74	-29.37	Pass
6302.53	27.3	4.69	-0.3	31.69	Average Max	V	332	143	54	-22.31	Pass
6470.84	26.9	4.81	-0.2	31.51	Average Max	V	128	343	54	-22.49	Pass
4007.96	27.92	3.86	-0.3	31.48	Average Max	V	105	212	54	-22.53	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	06/08/2018	1 Year	06/08/2019	☒
CHASE LISN	MN2050B	1018	08/07/2018	1 Year	08/07/2019	☒
Radiated Emissions						
Spectrum Analyzer	N9010A	10SL0219	08/20/2018	1 Year	08/20/2019	☒
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2018	1 Year	08/12/2019	☒
Horn Antenna (1GHz~26GHz)	3115	100059	08/25/2018	1 Year	08/25/2019	☒
Horn Antenna (26GHz~40GHz)	AH-840	101013	08/28/2018	1 Year	08/28/2019	☒
Pre-Amp (30MHz~40GHz)	LPA-6-30	11140711	02/10/2018	1 Year	02/10/2019	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	08/20/2018	1 Year	08/20/2019	☒

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1 , A2 , A3 , A4 , B1 , B2 , B3 , B4 , C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		Radio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I , Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		(Phase II) OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		Radio: Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		Radio: A1. Terminal equipment for purpose of calling Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI EMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68 Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4 Radio communications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771 Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06, AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2