

TEST REPORT

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1. Client						
• Name:		Sena Technologies Co	o., Ltd.			
• Address.	:	19, Heolleung-ro 569	-gil, Gangna	am-gu, Seoul, Korea		
2. Use of Rep	2. Use of Report : FCC Approval					
3. Sample Des	scription					
Product I	Name :	Wireless Communicati	on Systems			
 Model Na 	ame :	SHARK MW				
4. Date of Rec	ceipt:	2024-07-05				
5. Date of Tes	t:	2024-07-21 ~ 2024-	07-31			
6. Test Method	d:	FCC Part 15 Subpart (C 15.247			
7. Test Results Refer to the test results						
 The results shown in this test report are the results of testing the samples provided. This test report is prepared according to the requirements of ISO / IEC 17025. 						
Affirmation	Tested by	LC	Technical			
Jong-Myoung, Shin (Sign) Kyung-Taek, Lee (Sign)						
Aug 12, 2024						
EMC Labs Co., Ltd.						



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<u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION	
KR0140-RF2408-004	Aug 12, 2024	Initial Issue	

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1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant Information

Applicant Sena Technologies Co., Ltd.	
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1.2. Manufacturer Information

Manufacturer Sena Technologies Co., Ltd.	
Manufacturer Address	19, Heolleung-ro 569-gil, Gangnam-gu, Seoul, Korea

1.3 Test Laboratory Information

Laboratory	EMC Labs Co., Ltd.		
Laboratory Address	100, Jangjateo-ro, Hobeop-myeon, Icheon-si, Gyeonggi-do, Republic of		
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FCC Designation No.	KR0140		
FCC Registration No.	580000		
IC Site Registration No.	28751		



2. Equipment under Test(EUT) Information

2.1 General Information

Product Name Wireless Communication Systems	
Model Name	SHARK MW
Variant Model Name	N-Com Mesh
FCC ID	S7A-SP168
Rated Voltage	DC 3.7 V

2.2 Additional Information

Operating Frequency	2 402 MHz ~ 2 480 MHz
Number of channel	40
Modulation Type GFSK	
Antenna Type PCB Pattern Antenna	
Antenna Gain	0.38 dBi
Firmware Version	1.0
Hardware Version	1.0
Test software	Lab Test Tool V2.9.1

2.3 Test Frequency

Test mode	Test Frequency (MHz)			
	Low Frequency	Middle Frequency	High Frequency	
BLE	2 402	2 442	2 480	

2.4 Mode of operation during the test

 The EUT continuous transmission mode during the test with set at Low Channel, Middle Channel, and High Channel. To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, YZ, XZ planes.

2.5 Modifications of EUT

- None

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3. Test Summary

Applied	FCC Rule	IC Rule	Test Items	Test Condition	Result	
\square	15.203	-	Antenna Requirement		С	
	15.247(a)	RSS-247 (5.2)	6 dB Bandwidth		С	
	_	RSS GEN (6.7)	Occupied Bandwidth (99%)	Canduatad	С	
	15.247(b)	RSS-247 (5.4)	Maximum Peak Output Power		С	
	15.247(e)	RSS-247 (5.2)	Peak Power Spectral Density		С	
	15.247(d)	RSS-247 (5.5)	Conducted Spurious Emission		С	
	15.247(d) 15.205 & 15.209	RSS-247 (5.5) RSS-GEN (8.9 & 8.10)	Radiated Spurious Emission	Radiated	С	
	15.207	RSS-GEN (8.8)	Conducted Emissions	AC Line Conducted	С	
<u>Note 1</u> : C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable						

The sample was tested according to the following specification: ANSI C63.10:2013.

Compliance was determined by specification limits of the applicable standard according to customer requirements.



4. Used equipment on test

Description	Manufacturer	Model Name	Serial Name	Next Cal.
TEMP & HUMID CHAMBER	JFM	JFMA-001	20200929-01	2024.12.07
CONTROLLER	AMWON TECHNOLOGY	TEMI2500	S7800VK191 0707	2024.12.07
PSA SERIES SPECTRUM ANALYZER	AGILENT	E4440A	MY45304057	2024.12.08
MXG ANALOG SIGNAL GENERATOR	AGILENT	N5183A	MY50141890	2024.12.08
SYSTEM DC POWER SUPPLY	AGILENT	6674A	MY53000118	2024.12.11
VECTOR SIGNAL GENERATOR	ROHDE & SCHWARZ	SMBV100A	257524	2024.12.08
DIRECTIONAL COUPLER	AGILENT	773D	2839A01855	2024.12.08
ATTENUATOR	AGILENT	8493C	73193	2024.12.08
TERMINATIOM	HEWLETT PACKARD	909D	07492	2024.12.08
POWER DIVIDER	HEWLETT PACKARD	11636A	06916	2024.12.08
SLIDE-AC	DAEKWANG TECH	SV-1023	NONE	2024.11.10
DIGITAL MULTIMETER	HUMANTECHSTORE	15B+	50561541WS	2024.12.08
ATTENUATOR	ACE RF COMM	ATT SMA 20W 20dB 8GHz	A-0820.SM20.2	2025.04.04
DC POWER SUPPLY	AGILENT	E3634A	MY40012120	2025.02.22
USB Peak Power Sensor	Anritsu	MA24408A	12321	2024.11.09
High Pass Filter	WT Microwave INC.	WT-A3314-HS	WT22111804-1	2024.12.08
High Pass Filter	WT Microwave INC.	WT-A1935-HS	WT22111804-2	2024.12.08
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSU26	200444	2025.02.22
ATTENUATOR	Mini-Circuits	BW-K3-2W44+	2318-1	2025.06.28
ATTENUATOR	Mini-Circuits	BW-K3-2W44+	2318-2	2025.06.28
Balanced Temperature and Humidity Control System	ESPEC CORP.	SH-241	92004650	2025.06.13
ACTIVE LOOP ANTENNA	TESEQ	HLA 6121	55685	2024.12.22
Biconilog ANT	Schwarzbeck	VULB 9160	3260	2026.04.01
Biconilog ANT	Schwarzbeck	VULB9168	902	2024.11.30
Horn ANT	Schwarzbeck	BBHA9120D	974	2024.11.30
Horn ANT	Schwarzbeck	BBHA9120D	1497	2025.01.04
Amplifier	TESTEK	TK-PA18H	200104-L	2025.03.14
Horn ANT	Schwarzbeck	BBHA9170	01188	2025.03.19
Horn ANT	Schwarzbeck	BBHA9170	01189	2025.03.19
AMPLIFIER	TESTEK	TK-PA1840H	220105-L	2025.03.14
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW44	101952	2025.03.14
Test Receiver	ROHDE & SCHWARZ	ESR7	101616	2025.06.27
LISN	ROHDE & SCHWARZ	ENV216	100409	2025.01.04
PULSE LIMITER	lignex1	EPL-30	NONE	2025.01.04

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5. Antenna Requirement

Accoding to §15.203 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.

Accoding to §15.247(b)(4) e conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1 Result

Complies

(The transmitter has a PCB Pattern Antenna. The directional peak gain of the antenna is 0.38 dBi.)



6. 6 dB Bandwidth & Occupied Bandwidth (99%)

6.1 Test Setup

Refer to the APPENDIX I.

6.2 Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

6.3 Test Procedure

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the EUT's antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

- 1. Set resolution bandwidth (RBW) = 100 kHz
- 2. Set the video bandwidth (VBW) \geq 3 x RBW.
- 3. Detector = Peak.
- 4. Trace mode = Max Hold.
- 5. Sweep = Auto
- 6. Allow the trace to stabilize.
- 7. Option 1 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
 - Option 2 The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 x RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

6.4 Test Result

Test Mode	Test Frequency	Test Frequency 6 dB Bandwidth (MHz)			
	Low	0.719	1.044		
BLE	Middle	0.721	1.045		
	High	0.720	1.046		

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6.5 Test Plot



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BLE _ Middle frequency	Occup	bied Bandwidth
* Agilent	L	Freq/Channel
Ch Freq 2.442 GHz Occupied Bandwidth	Trig Free	Center Freq 2.44200000 GHz
		Start Freq 2.44050000 GHz
Ref 20 dBm Atten 30 dB #Peak Log		Stop Freq 2.44350000 GHz
10 dB/ 0ffst 3	the second secon	CF Step 300.000000 kHz <u>Auto</u> Man
dB	Span 3 MHz Sweep 3.2 ms (1001 pts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth 1.0446 MHz	Осс ВМ % Рwr 99.00 % × dB -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error -32.606 kHz x dB Bandwidth 1.276 MHz		
Copyright 2000–2005 Agilent Technologies		
BLE _ High frequency	Occur	bied Bandwidth
* Agilent	L	Freq/Channel
Ch Freq 2.48 GHz Occupied Bandwidth	Trig Free	Center Freq 2.48000000 GHz
		Start Freq 2.47850000 GHz
Ref 20 dBm Atten 30 dB #Peak Log		Stop Freq 2.48150000 GHz
10		
dB/ Offst	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	CF Step 300.000000 kHz <u>Auto</u> Man
dB/ Offst 3 dB Center 2.480 000 GHz	Span 3 MHz Sweep 3.2 ms (1001 pts)	300.000000 kHz
dB/ Offst 3 dB Center 2.480 000 GHz	Span 3 MHz Sweep 3.2 ms (1001 pts) Осс ВЖ % Риг 99.00 % х dB -26.00 dB	300.000000 kHz Auto Man
dB/ Offst 3 dB Center 2.480 000 GHz *Res BW 30 kHz *VBW 100 kHz Occupied Bandwidth	Sweep 3.2 ms (1001 pts) Occ BW % Pwr 99.00 %	300.000000 kHz <u>Auto</u> Man Freq Offset 0.00000000 Hz Signal Track

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7. Maximum Peak Output Power

7.1 Test Setup

Refer to the APPENDIX I.

7.2 Limit

The maximum permissible conducted output power is 1 Watt.

7.3 Test Procedure

A transmitter antenna terminal of EUT is connected to the input of a spectrum analyzer. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

- 1. Set the RBW \geq DTS bandwidth
- 2. Set VBW \geq 3 x RBW
- 3. Set span \geq 3 x RBW.
- 4. Sweep time = auto couple
- 5. Detector = peak
- 6. Trace mode = max hold
- 7. Allow trace to fully stabilize
- 8. Use peak search function to determine the peak amplitude level.

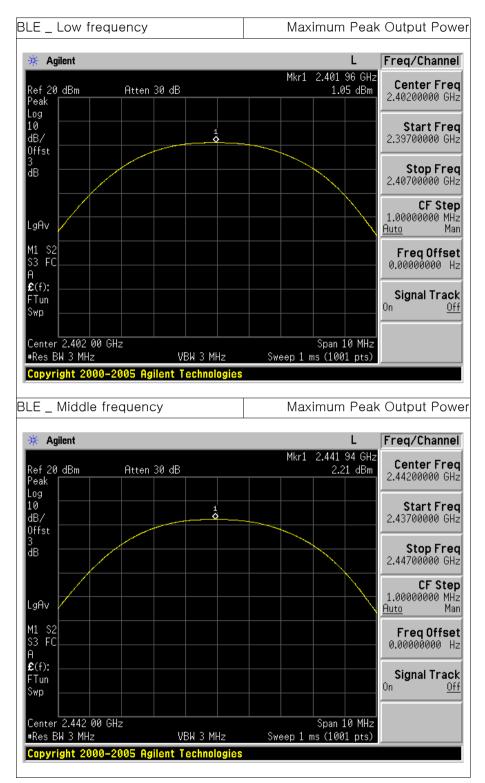
7.4 Test Result

Test Mode	Tost Fraguanay	Peak Output Power				
iest mode	Test Frequency	dBm	mW			
	Low	1.05	1.27			
BLE	Middle	2.21	1.66			
	High	2.92	1.96			



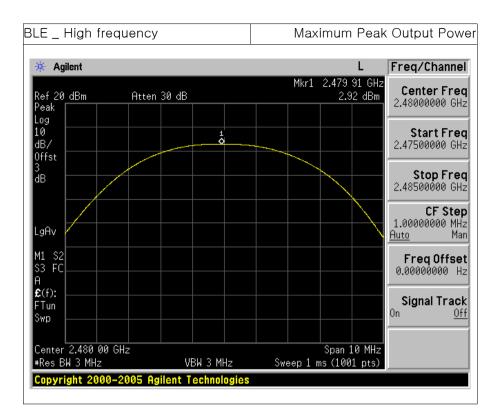


7.5 Test Plot



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8. Peak Power Spectral Density

8.1 Test Setup

Refer to the APPENDIX I.

8.2 Limit

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

8.3 Test Procedure

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

(ANSI C63.10-2013 _ Section 11.10.2 - Method PKPSD)

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS bandwidth.
- 3. Set the RBW : 3 kHz \leq RBW \leq 100 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = Peak.
- 6. Sweep time = Auto
- 7. Trace mode = Max Hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Mode	Test Frequency	Peak Power Spectral Density (dBm)			
	Low	-14.33			
BLE	Middle	-13.15			
	High	-12.43			

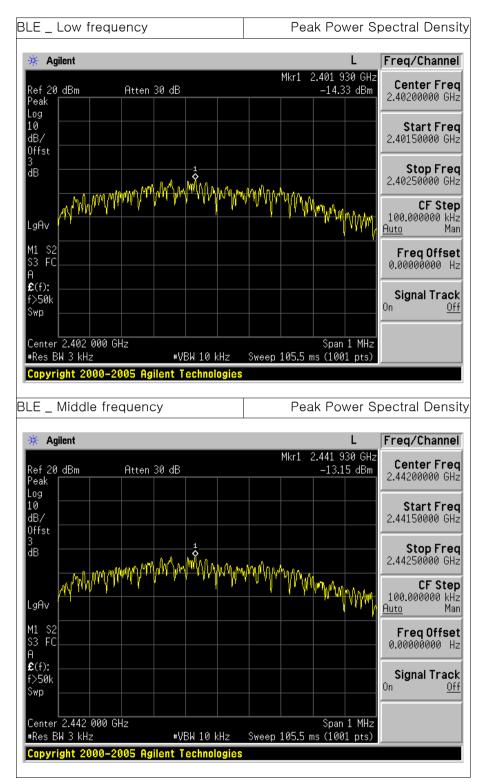
8.4 Test Result

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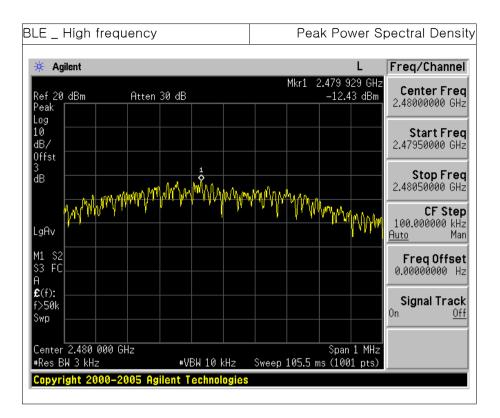


8.5 Test Plot



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9. TX Radiated Spurious Emission and Conducted Spurious Emission

9.1 Test Setup

Refer to the APPENDIX I.

9.2 Limit

According to §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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

According to § 15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional

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Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1705	24000/F (kHz)	30
1705 ~ 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

radiator shall not exceed the field strength levels specified in the following table

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 - 88 MHz, 174 - 216 MHz or 470 - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.



According to § 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

0010111		
MHz	MHz	GHz
16.42 ~ 16.423	399.90 ~ 410	4.5 ~ 5.15
16.69475 ~ 16.69525	608 ~ 614	5.35 ~ 5.46
16.80425 ~ 16.80475	960 ~ 1240	7.25 ~ 7.75
25.5 ~ 25.67	1300 ~ 1427	8.025 ~ 8.5
37.5 ~ 38.	1435 ~ 1626.5	9.0 ~ 9.2
25 73 ~ 74.6	1645.5 ~ 1646.5	9.3 ~ 9.5
74.8 ~ 75.2	1660 ~ 1710	10.6 ~ 12.7
108 ~ 121.94	1718.8 ~ 1722.2	13.25 ~ 13.4
149.9 ~ 150.05	2200 ~ 2300	14.47 ~ 14.5
156.52475 ~ 156.52525	2310 ~ 2390	15.35 ~ 16.2
156.7 ~ 156.9	2483.5 ~ 2500	17.7 ~ 21.4
162.0125 ~ 167.17	2690 ~ 2900	22.01 ~ 23.12
3345.8 ~ 3358	3260 ~ 3267	23.6 ~ 24.0
3600 ~ 4400	3332 ~ 3339	31.2 ~ 31.8
3345.8 ~ 3358	240 ~ 285	36.43 ~ 36.5
3600 ~ 4400	322 ~ 335.4	Above 38.6
	$\begin{array}{r} \mbox{MHz} \\ 16.42 \sim 16.423 \\ 16.69475 \sim 16.69525 \\ 16.80425 \sim 16.80475 \\ 25.5 \sim 25.67 \\ 37.5 \sim 38. \\ 25.73 \sim 74.6 \\ 74.8 \sim 75.2 \\ 108 \sim 121.94 \\ 149.9 \sim 150.05 \\ 156.52475 \sim 156.52525 \\ 156.7 \sim 156.9 \\ 162.0125 \sim 167.17 \\ 3345.8 \sim 3358 \\ 3600 \sim 4400 \\ 3345.8 \sim 3358 \\ \end{array}$	MHzMHz $16.42 \sim 16.423$ $399.90 \sim 410$ $16.69475 \sim 16.69525$ $608 \sim 614$ $16.80425 \sim 16.80475$ $960 \sim 1240$ $25.5 \sim 25.67$ $1300 \sim 1427$ $37.5 \sim 38.$ $1435 \sim 1626.5$ $25.73 \sim 74.6$ $1645.5 \sim 1646.5$ $74.8 \sim 75.2$ $1660 \sim 1710$ $108 \sim 121.94$ $1718.8 \sim 1722.2$ $149.9 \sim 150.05$ $2200 \sim 2300$ $156.52475 \sim 156.52525$ $2310 \sim 2390$ $156.7 \sim 156.9$ $2483.5 \sim 2500$ $162.0125 \sim 167.17$ $2690 \sim 3267$ $3600 \sim 4400$ $3332 \sim 3339$ $3345.8 \sim 3358$ $240 \sim 285$

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.



9.3 Test Procedure for Radiated Spurious Emission

- 1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3.75 meter away from the interference-receiving antenna.
- 3. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.
- 4. The antenna is a Broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading. (The EUT was pre-tested with three axes (X, Y, Z) and the final test was performed at the worst case.)
- 6. Repeat above procedures until the measurements for all frequencies are complete.

Measurement Instrument Setting

- 1. Frequency Range: Below 1 GHz RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak
- 2. Frequency Range: Above 1 GHz

```
Peak Measurement
RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto,
Trace mode = Max Hold until the trace stabilizes
```

Average Measurement RBW = 1 MHz, VBW = 3 MHz, Detector = RMS (Number of points ≥ 2 x Span / RBW), Trace Mode = Average (Averaging type = power(i.e. RMS)), Sweep Time = Auto, Sweep Count = at least 100 traces

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:

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- 1) If power averaging (RMS) mode was used in step 4, 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 4, 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 (≥ 98 percent duty cycle) rather than tuning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

9.4 Test Procedure for Conducted Spurious Emission

- 1. The transmitter output was connected to the spectrum analyzer.
- 2. The reference level of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 kHz, VBW = 300 kHz.
- 3. The conducted spurious emission was tested each ranges were set as below. Frequency range: 30 MHz ~ 26.5 GHz
 RBW = 100 kHz, VBW = 300 kHz, Sweep Time = Auto, Detector = Peak, Trace = Max Hold

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)



9.5 Test Result

9 kHz \sim 25 GHz Data for BLE

• Low frequency

Frequency	Rea	ding		ŦĊ			Limits		Result		Margin	
Trequency	(dBu	V/m)	Pol.	T.F (dB)		DCF (dBuV/m) (dBuV/m)		(dB)				
(MHz)	AV /	[/] Peak		(46)	(00)	AV / Peak		AV / Peak		AV / Peak		
2 389.08	17.42	31.08	Н	9.00	2.20	54.0	74.0	28.6	40.1	25.4	33.9	
4 803.97	36.38	44.10	V	-0.92	2.20	54.0	74.0	37.7	43.2	16.3	30.8	

Middle frequency

Frequency	Rea	ding			TE		Limits		Result		Margin	
Frequency	(dBu	V/m)	Pol.	T.F (dB)		(dBuV/m)		(dBuV/m)		(dB)		
(MHz)	AV / Peak			(00)	(00)	AV / Peak		AV / Peak		AV / Peak		
4 883.90	36.67	44.48	V	-0.95	2.20	54.0	74.0	37.9	43.5	16.1	30.5	

• High frequency

Frequency	Rea	ding			T C C C C C C C C C C		Limits		Result		Margin	
Frequency	(dBu	V/m)	Pol.	T.F DCF (dBuV/m)		IV/m)	(dBuV/m)		(dB)			
(MHz)	AV /	/ Peak		(UD)	(00)	AV /	Peak	AV / Peak		AV / Peak		
2 483.57	19.75	40.41	Н	9.84	2.20	54.0	74.0	31.8	50.3	22.2	23.8	
4 959.83	37.45	44.63	V	-0.82	2.20	54.0	74.0	38.8	43.8	15.2	30.2	

Note 1: The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

Note 2: DCF(Duty Cycle Factor)

- T_{on} = 0.377 ms / T_{off} = 0.248 ms

- Duty Cycle = T_{on} / (T_{on}+T_{off}) = 0.377 / (0.377+0.248) = 0.625

- DCF = $10 \times \log(1/\text{Duty Cycle}) dB = 10 \times \log(1/0.625) dB = 2.20 dB$

Note 3: Sample Calculation.

Margin = Limit - Result / Peak Result = Peak Reading + TF / Average Result = Average Reading + TF + DCF

TF = Ant factor + Cable Loss + Filter Loss - Amp Gain + Distance Factor

Distance Factor = 20log(applied distance/required distance) = 20log(3.75m/3m) = 1.94



9.6 Test Plot for Radiated Spurious Emission

• BLE _ Low frequency

						F	Restricte	ed Band	d – Peak
MultiView #	Spectrum	Spectrur	m 2 🕱	Spectrum 3	X Spectru	ım 4 🕅 🕱			_ ▽
Ref Level 97 Att	7.00 dBµV 0 dB SWT	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mode	e Auto Sweep			Fre	equency 2.35	500000 GHz
Input 1 Frequency S	1 AC PS	On Not	ch Off	'					●1Pk Max
90 dBµV								M1[1]	31.08 dBµV 2.3890810 GHz
80 dBµV									
70 dBµV									
60 dBµV									
50 dBµV									
40 dBµV									
30 dBµV								downwowe	Annor Werthout
	on interneting		adda ^{rw} ard ^{on} Februikel, oo W	and and a share of the second s	ant photo-allow-allowed		an a		
20 dBµV									
10 dBµV									
0 dBµV									
2.31 GHz			1001 pt	S	8	.0 MHz/			2.39 GHz
						Rest	ricted (Band -	Average
							ricted (Band -	Average
MultiView Ref Level 97	Spectrum	Spectrum • RBY	m 2 🗶	Spectrum 3	Spectru SGL				
Ref Level 97 Att Input	7.00 dBµV 0 dB SWT 1 AC PS		V 1 MHz V 3 MHz Mod			ım 4 🛛 🕱			▼ 500000 GHz
Ref Level 97 Att	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	⊽ 500000 GHz • 1Rm Avg
Ref Level 97 Att Input 1 Frequency S	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 ⊕ Att Input I Frequency \$ 90 d8µV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input I Frequency 9 90 dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 ⊕ Att Input I Frequency \$ 90 d8µV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 # Att Input # Frequency 90 d8µv 80 d8µv 70 d8µv 60 d8µv	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input IFrequency 9 90 dBµV 80 dBµV 70 dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 # Att Input # Frequency 90 d8µv 80 d8µv 70 d8µv 60 d8µv	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input 1 Frequency 1 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input Input I Frequency 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 40 dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input Input I Frequency 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 40 dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 # Att Input 1 90 d8µv 80 d8µv 70 d8µv 60 d8µv 50 d8µv 30 d8µv	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input 1 90 d8µv 80 d8µv 70 d8µv 60 d8µv 50 d8µv 30 d8µv 20 d8µv 10 d8µv 10 d8µv	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod		SGL	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV
Ref Level 97 Att Input 1 90 d8µv 80 d8µv 70 d8µv 60 d8µv 50 d8µv 30 d8µv 20 d8µv 20 d8µv	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	V 1 MHz V 3 MHz Mod	e Auto Sweep	SGL Count 100/100	ım 4 🛛 🕱		equency 2.35	▼ 500000 GHz ●1Rm Avg 17,42 dBµV

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							S	Spuriou	s – Peak
MultiView	Spectrum	x Si	pectrum 2	X Spect	rum 3 🛛 🔉				∇
Ref Level 97 Att Input	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB On No	WI1 MHz WI3 MHz Mod tch Off	e Auto Sweep			Fr	equency 4.8	040000 GHz
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80 dBµV									
70 dBµV									
60 dBµV									
50 dBµV									
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30 dBµV									
20 dBµV									
10 dBµV									
0 dBµV									
CF 4.804 GHz			1001 pt	s		1.0 MHz/			Span 10.0 MHz
							Spu	rious –	Average
	Spectrum		pectrum 2				Spu	rious –	Average
Ref Level 97 Att Input	.00 dBµV 0 dB SWT 1 AC PS	• RB	WI MHz WI 3 MHz Mod		SGL				 040000 GHz
Ref Level 97 Att Input	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	V 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input I Frequency S	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	▼ 040000 GHz ●1Rm Avg
Ref Level 97 Att Input I Frequency S 90 dBµV	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	V 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input I Frequency S 90 dBµV	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	V 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 ■ Att Input 1 Frequency S 90 dBµV 80 dBµV	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	v 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	v 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	v 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input Input I requiring S 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	v 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input Input I requiring S 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	WI MHz WI 3 MHz Mod		SGL			equency 4.8	v 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input Input I Frequency S 90 dBµV 80 dBµV 70 dBµV 50 dBµV 50 dBµV 40 dBµV	.00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB	W 1 MHz Mod		SGL			equency 4.8	v 040000 GHz • 1Rm Avg 36.38 dBµV
Ref Level 97 Att Input I Frequency S 90 dBµV 80 dBµV 70 dBµV 60 dBµV	.00 dBµV 0 dB SWT 1 AC PS weep	RB 1.01 ms WB Cn No	W 1 MHz Mod		SGL		Fr	equency 4.8	v
Ref Level 97 Att Input Input Input I Frequency S 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 90 dBµV 40 dBµV 90 dBµV 20 dBµV	.00 dBµV 0 dB SWT 1 AC PS weep	RB 1.01 ms WB Cn No	W 1 MHz Mod		SGL		Fr	equency 4.8	040000 GHz 1Rm Avg 36.38 48µV .80402000 GHz
Ref Level 97 Att Input Input I Frequency S 90 dbµV 80 dbµV 70 dbµV 60 dbµV 50 dbµV 90 dbµV	.00 dBµV 0 dB SWT 1 AC PS weep	RB 1.01 ms WB Cn No	W 1 MHz Mod		SGL		Fr	equency 4.8	v

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• BLE _ Middle frequency

					l		S	Spurious	s – Peak
MultiView	E Spectrum	x Sp	pectrum 2	X Spectr	um 3 🛛 🕱	2			_ ▽
Ref Level 97	.00 dBuV	• RB	W 1 MHz W 3 MHz Mod			1			240000 CH-
 Att Input 1 Frequency S 	1 AC PS	On Not	tch Off	e Auto Sweep			rie	equency 4.88	• 1Pk Max
								M1[1]	44.48 dBµV 88390000 GHz
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80 dBµV									
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ro do u									
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Ha, dan Ann	monderland	anifelissone whereas a	rydab-gwyraddwr de	Julanderal	www. and and and and and		Montheration	the way to the way way and	mparticulation
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30 dbp+									
20 dBµV									
10 dBµV									
10 0001									
0 dBµV									
CF 4.884 GHz			1001 pt	s	1	.0 MHz/			pan 10.0 MHz
					L		Spu	rious –	Average
MultiView	Spectrum	X SI	pectrum 2	Spectr	um 3 🕅	3			▽
Ref Level 97 Att	.00 dBµV 0 dB SWT	● RB'	WF 1 MHz WF 3 MHz Mod		SGL Count 100/100	ے/ ۱	Fre	equency 4.88	40000 GHz
Input 1 Frequency S	1 AC PS	On Not	tch Off						•1Rm Avg
90 dBµV								M1[1] 4;	36.67 dBµV 88393000 GHz
80 dBµV									
70 dBµV									
60 dBµV									
50 dBµV									
40 dBµV					m				
30 dBµV			And the second	are and the second seco	-	Mary 6	handle and the		
and a start of the second s	and any and and	pressionesse	and a star and a star of the s			- Annal manya	kunternationade	N.Margaer washington	and a second
20 dBµV									
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0 dBµV	1	1	1	1		1	1	1	
CF 4.884 GHz			1001 pt	s	1	.0 MHz/		c	pan 10.0 MHz

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• BLE _ High frequency

						F	Restrict	ed Ban	d – Pea
1ultiView 🗄	Spectrum	X Spectrur	m 2 🕱	Spectrum 3	X Spectru	um 4 🕱			▽
Ref Level 97 Att	7.00 dBµV 0 dB SWT	1.01 ms 🖷 VBV	V 1 MHz V 3 MHz Mode	e Auto Sweep			Fr	equency 2.4	917500 GH
Input Frequency S	1 AC PS	On Note	ch Off						●1Pk Max
							N	1[1]	40.41 dBµ\ 2.4835740 GH:
) dBµV									
dBµV									
dBµV−−−−									
dBµV									
upp v									
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dBµV	which have	Mulill	1 Health	at a lar					
dBµV	Contraction (Sec. 14.064/V)	v ~ Wardhallih	an millig	multally	Whom bulle	the food when the	human human	alaabely, my f	he water the strengthe
dBµV									
40.41									
dBµV									
dBµV									
4835 GHz	1								
			1001 pt	S	1.	.65 MHz/			2.5 GH
			1001 pt	\$	1.		ricted	Band -	
			1001 pt	S	1.		ricted	Band -	
ultiView 🕀		X Spectrur	n 2 🕅	Spectrum 3	X Spectru	Rest	ricted	Band -	
Ref Level 97	7.00 dBµV 0 dB SWT	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mod	Spectrum 3		Rest			Averag
lultiView Ref Level 97 Att Input	7.00 dBµV 0 dB SWT 1 AC PS	● RBV	n 2 🕱 V 1 MHz V 3 MHz Mod	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: • 1Rm Avg
ultiView E Ref Level 97 Att Input Frequency S	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr		Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView E Ref Level 97 Att Input Frequency S	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	2.5 GHz 2.5 GHz
ultiView P Ref Level 97 Att Input Trequency S dBµV———	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averac v 917500 GH •18m Avg 19.75 dBµ
ultiView P Ref Level 97 Att Input requency S dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView C Ref Level 97 Att Input Frequency S I dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView P Ref Level 97 Att Input Frequency 9 I dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView P Ref Level 97 Att Input Frequency 9 I dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
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ultiView :: Ref Level 97 Att Input Frequency : i dBµV i dBµV dBµV dBµV dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView :: Ref Level 97 Att Input Frequency : i dBµV i dBµV dBµV dBµV dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiview Image: Constraint of the second secon	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiview Image: Constraint of the second secon	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mode	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averac v 917500 GH •18m Avg 19.75 dBµ
ultiview Image: Constraint of the second secon	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mod	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView Image: Constraint of the second secon	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mod	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
ultiView Image: Constraint of the second secon	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mod	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA
Introduction International State Ref Level 97 Ref Level 97 Att Input Frequency 9) dBµV	7.00 dBµV 0 dB SWT 1 AC PS	● RBV 1.01 ms ● VBV	n 2 🕱 V 1 MHz V 3 MHz Mod	Spectrum 3	Spectru SGL	Rest	Fr	equency 2.4	Averag v 917500 GH: •1Rm Avg 19.75 dBµA

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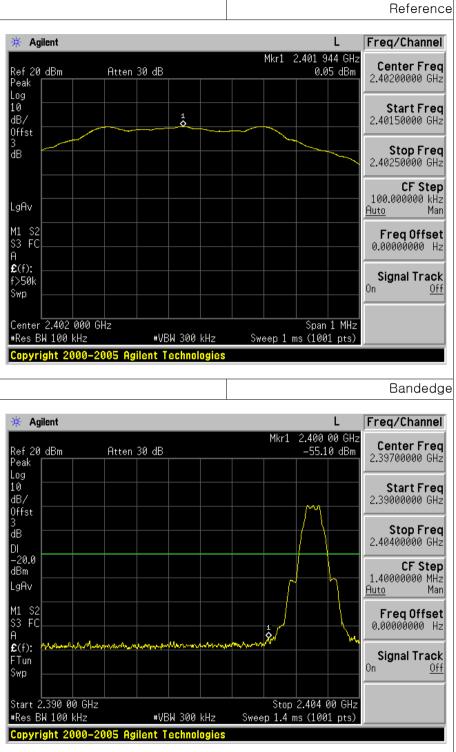
		ç	Spurious – Peak
MultiView 🗄 Spectrum 🕱 Spectrum 2	X Spectrum 3 X)	▽
Ref Level 97.00 dBµV RBW 1 MHz Att 0 dB SWT 1.01 ms VBW 3 MHz Mode A Input 1 AC PS On Notch Off	auto Sweep	Fre	equency 4.9600000 GHz
1 Frequency Sweep			• 1Pk Max M1[1] 44.63 dBμV
90 dBµV			4.95983000 GHz
80 dBµV			
70 d8µv			
60 dBµV			
50 dBµV	MI		
40 dBull whether and a second a secon	Martin Martin	tomart metric how how	ral manufacture and a second and
30 dBµV			
20 dBµV			
10 dBµV			
20.000			
0 dBμV CF 4.96 GHz 1001 pts	1.0) MHz/	Span 10.0 MHz
		Spu	rious – Average
MultiView :: Spectrum 🕱 Spectrum 2	x Spectrum 3 x		_ ▽
Ref Level 97.00 dBµV ■ RBW 1 MHz ● Att 0 dB SWT 1.01 ms ● VBW 3 MHz	SGL	LFre	equency 4.9600000 GHz
Input 1 AC PS On Notch Off 1 Frequency Sweep			• • • 1Rm Avg M1[1] 37.45 dBµV
90 dBµV			
			4.95991000 GHz
80 dBµV			4.95991000 GHz
			4,95991000 GHz
70 dBµV			4.35991000 GHz
			4.35991000 GHz
70 dBµV			4.35991000 GHz
70 dBµV			4.35991000 GHz
70 dBµv 60 dBµv 50 dBµv 40 dBµv 30 dBµv	*		
70 dBµv	*		4.35991000 GHz
70 dbµv			
70 dBµv	*		

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9.7 Test Plot for Conducted Spurious Emission

BLE _ Low frequency



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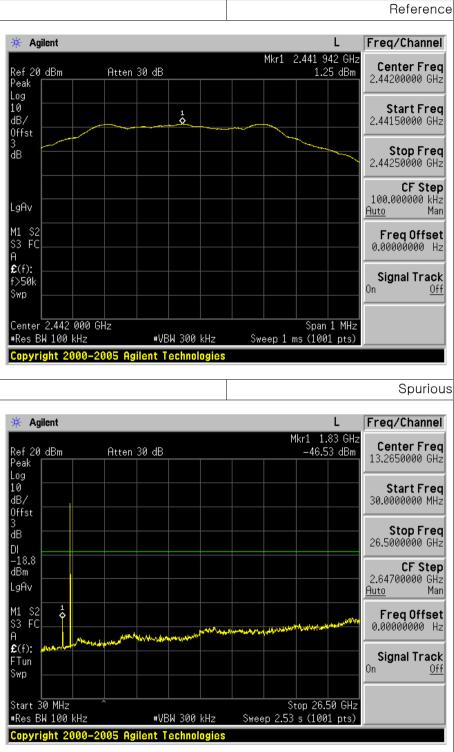


				Spurio
Agilent			L	Freq/Channel
əf 20 dBm əak	Atten 30 dB		Mkr1 1.83 GH: -39.58 dBm	Contor Froz
0 0 B/				Start Fred 30.0000000 MH:
В				Stop Fred 26.5000000 GH:
20.0 Bm gAv <u>1</u>				CF Step 2.64700000 GH: <u>Auto</u> Mar
1 S2 3 FC	مىنى بىغىرىلىرى بەردىنى بەردىنى بىلىلىرى بىرىنى بىلىرىنى بىرىنى بىلىرىنى بىرىنى بىلىرىنى بىلىرىنى بىلىرىنى بىلى	and the stand of the	مريون مريون مريون المريون المريون المريون مريون مر	Freq Offset 0.00000000 Hz
(f): Tun				Signal Tracl
tart 30 MHz Res BW 100 kHz	+VBW 30	0 kHz Sw	\$top 26.50 GHz eep 2.53 s (1001 pts)	

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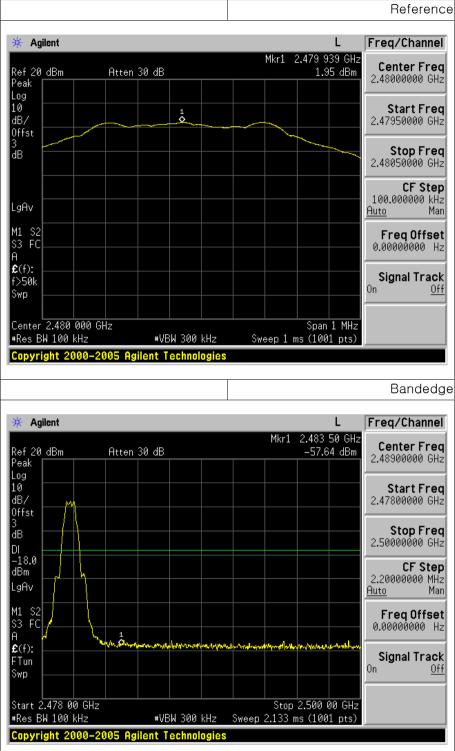
• BLE _ Middle frequency



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BLE _ High frequency



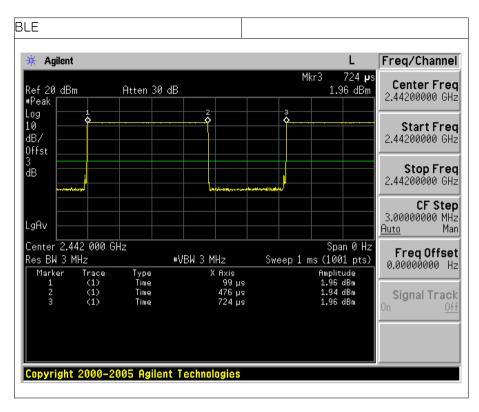
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					Spurio
Agilent				L	Freq/Channe
ef 20 dBm eak	Atten 30 dB			6.21 GHz .87 dBm	Center Fred 13.2650000 GH:
og Ø B/					Start Free 30.0000000 MH;
ffst B					Stop Free 26.500000 GH
18.0 Bm gAv					CF Ster 2.64700000 GH <u>Auto</u> Ma
1 S2 3 FC	بالمرجعة والمراجع والمراجع والمراجع والمراجع	Monoral Annalisman	elahan yalan kutuka sa sa sa sa	1	Freq Offse 0.00000000 H
r(f): Δηγμαλικά τουμα Tun wp					Signal Tracl On <u>Of</u>
tart 30 MHz Res BW 100 kHz	#VBW	300 kHz	Stop 20 Sweep 2.53 s (10	6.50 GHz 001 pts)	



9.8 Test Plot for Duty Cycle





10. Conducted Emission

10.1 Test Setup

See test photographs for the actual connections between EUT and support equipment.

10.2 Limit

According to §15.207(a) 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 or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBuV)				
Frequency Range (MHZ)	Quasi-Peak	Average			
0.15 ~ 0.5	66 to 56 *	56 to 46 *			
0.5 ~ 5	56	46			
5~30	60	50			

* Decreases with the logarithm of the frequency

10.3 Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10.

- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

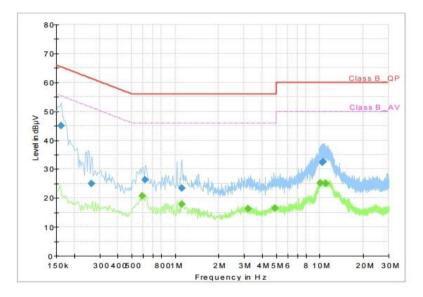
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10.4 Test Result

• AC Line Conducted Emission (Graph)

SHARK MW_Charging Mode_L1



Conducted Emission

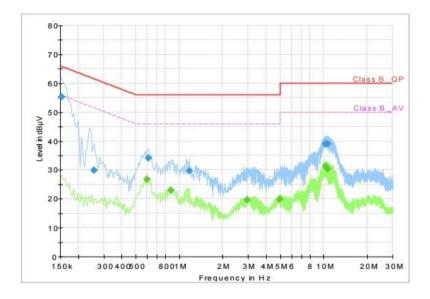
Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.162	45.05		65.36	20.31	9	L1	20.8
0.262	24.86		61.37	36.51	9	L1	20.5
0.590		20.76	46.00	25.24	9	L1	20.7
0.620	26.20		56.00	29.80	9	L1	20.6
1.110		17.85	46.00	28.15	9	L1	20.0
1.110	23.42		56.00	32.58	9	L1	20.0
3.200		16.17	46.00	29.83	9	L1	19.9
4.930		16.41	46.00	29.59	9	L1	19.9
10.100		25.20	50.00	24.80	9	L1	20.0
10.380	32.34		60.00	27.66	9	L1	20.0
10.530	32.58		60.00	27.42	9	L1	20.0
11.000		24.91	50.00	25.09	9	L1	20.0

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SHARK MW_Charging Mode_N



Conducted Emission

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.154	55.34		65.78	10.44	9	N	20.7
0.258	29.85		61.50	31.65	9	N	20.5
0.600		26.84	46.00	19.16	9	N	20.7
0.610	34.16		56.00	21.84	9	N	20.7
0.880		22.99	46.00	23.01	9	N	19.9
1.180	29.61		56.00	26.39	9	N	20.0
2.940		19.63	46.00	26.37	9	N	19.9
4.960		19.89	46.00	26.11	9	N	19.9
10.260		31.15	50.00	18.85	9	N	20.0
10.290	39.10	· · · · · · · · · · · · · · · · · · ·	60.00	20.90	9	N	20.0
10.600	38.96		60.00	21.04	9	N	20.0
10.660		30.32	50.00	19.68	9	N	20.0

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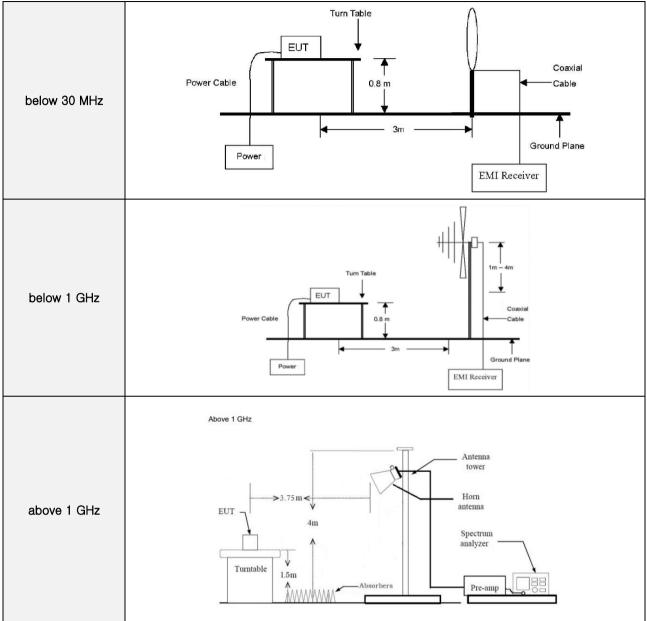
APPENDIX I

TEST SETUP

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Radiated Measurement



• Conducted Measurement

		_			
Conducted	EUT		Attenuator	Spectrum Analyzer	

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APPENDIX II

UNCERTAINTY

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Measurement Item	Expanded Uncertainty U = <i>k</i> Uc (<i>k</i> =2)
Conducted RF power	0.34 dB
Conducted Spurious Emissions	0.34 dB
Radiated Spurious Emissions	6.34 dB
Conducted Emissions	1.74 dB