

## TEST REPORT

100, Jangjateo-ro, Hobeop-myeon, Icheon-si, Gyeonggi-do, 17396, Korea Tel: 031-637-8898 / Fax: 0505-116-8895

1. Client					
• Name	: Sena Technologies Co., Ltd.				
Address					
2. Use of Repo	ort FCC Approval				
3. Sample Des	scription				
<ul> <li>Product N</li> </ul>	Name : SC2 Standard				
<ul> <li>Model Na</li> </ul>	ame: SP170				
4. Date of Rec	ceipt:: 2024-06-04				
5. Date of Tes	t:: 2024-06-20 ~ 2024-07-04				
6. Test Method	d FCC Part 15 Subpart C 15.247				
7. Test Results	7. Test Results : Refer to the test results				
<ul> <li>The results shown in this test report are the results of testing the samples provided.</li> <li>This test report is prepared according to the requirements of ISO / IEC 17025.</li> </ul>					
Affirmation	Tested byTechnical ManagerJoonyoung, Jeon(Sign)Jong-Myoung, Shir(Sign)				
	July 11, 2024 EMC Labs Co., Ltd.				

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# <u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION	
KR0140-RF2407-002	July 11, 2024	Initial Issue	

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## 1. Applicant & Manufacturer & Test Laboratory Information

#### 1.1 Applicant Information

Applicant	Sena Technologies Co., Ltd.
Applicant Address 19, Heolleung-ro 569-gil, Gangnam-gu, Seoul, Korea	
Contact Person Seunghyun Kim	
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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 Korea
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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	SC2 Standard
Model Name	SP170
FCC ID	S7A-SP170
Rated Voltage	DC 3.8 V

#### 2.2 Additional Information

Operating Frequency	2 402 MHz ~ 2 480 MHz
Number of channel	40
Modulation Type	GFSK
Antenna Type	PCB Antenna
Antenna Gain	Max. Gain 0.56 dBi
Firmware Version	1.0
Hardware Version	1.0
Test software	BlueTest3 v3.3.5

#### 2.3 Test Frequency

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



## 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%)		С	
	15.247(b)	RSS-247 (5.4)	Maximum Peak Output Power	Conducted	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	
Note 1: 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 Antenna. The directional peak gain of the antenna is 0.56 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  $\geq$  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  $\geq$  6 dB.

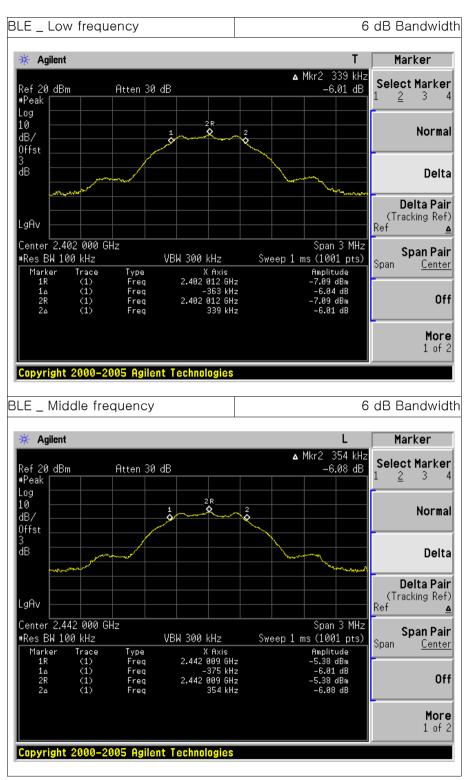
#### 6.4 Test Result

Test Mode	Test Frequency	6 dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
	Low	0.702	1.048
BLE	Middle	0.729	1.046
	High	0.699	1.044

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#### 6.5 Test Plot



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0BW Span 3.0000000 MHz

> **x dB** -26.00 dB

Optimize

**Ref Level** 

Span 3 MHz

99.00 %

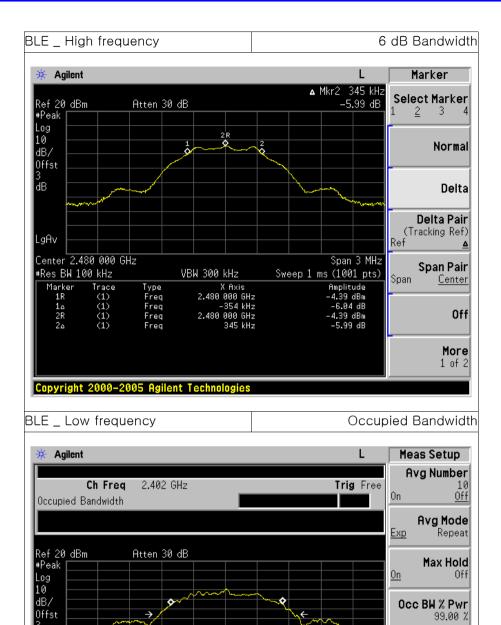
-26.00 dB

Sweep 3.2 ms (1001 pts)

x dB

Occ BW % Pwr





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ďВ

Center 2.402 000 GHz #Res BW 30 kHz

**Transmit Freq Error** 

x dB Bandwidth

Occupied Bandwidth

#VBW 100 kHz

1.0475 MHz

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13.469 kHz

1.263 MHz



BLE _ Middle frequency	Occup	ied Bandwidth
* Agilent	L	Meas Setup
Ch Freq 2.442 GHz Occupied Bandwidth Span 3.000000000 MHz	Trig Free	Avg Number 10 0n <u>Off</u> Avg Mode
Ref 20 dBm Atten 30 dB #Peak Log 10 dB/ Offst 3 dB	×.	Exp Repeat Max Hold On Off Occ BW % Pwr 99.00 %
Center 2.442 000 GHz #Res BW 30 kHz #VBW 100 kHz Occupied Bandwidth 1.0456 MHz	Span 3 MHz Sweep 3.2 ms (1001 pts) Occ BW % Pwr 99.00 % x dB -26.00 dB	0BW Span 3.0000000 MHz x dB -26.00 dB
Transmit Freq Error       13.700 kHz         × dB Bandwidth       1.259 MHz         Copyright 2000-2005 Agilent Technologies	Γ	Optimize Ref Level
BLE _ High frequency		bied Bandwidth
★ Agilent           Ch Freq         2.48 GHz           Occupied Bandwidth         ■	L Trig Free	Meas Setup Avg Number 10 0n <u>Off</u> Avg Mode Exp Repeat
Ref 20 dBm Atten 30 dB #Peak Log 10 dB/ Offst	¢ E	Max Hold           On         Off           Occ BW % Pwr         99.00 %
dB Center 2.480 000 GHz #Res BW 30 kHz #VBW 100 kHz Cccupied Bandwidth	Span 3 MHz Sweep 3.2 ms (1001 pts) Occ BW % Pwr 99.00 %	0BW Span 3.00000000 MHz x dB -26.00 dB
<b>1.0443 MHz</b> Transmit Freq Error 13.094 kHz X dB Bandwidth 1.254 MHz	<b>x dB</b> −26.00 dB	Optimize RefLevel

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Transmit Freq Error x dB Bandwidth

13.094 kHz 1.254 MHz

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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		Peak Out	put Power
iest mode	Test Frequency	dBm	mW
	Low	-5.43	0.29
BLE	Middle	-3.70	0.43
	High	-2.60	0.55





#### 7.5 Test Plot

BLE _ Low frequ	ency		Max	ximum Peak	Output Powe
🔆 Agilent				L	Peak Search
Ref 20 dBm #Peak	Atten 30 dB		Mkr1	2.402 099 GHz -5.43 dBm	Next Peak
Log 10 dB/ Offst					Next Pk Right
3 dB					Next Pk Left
LgAv					Min Search
M1 S2 S3 FC A					Pk-Pk Search
<b>£</b> (f): FTun Swp					Mkr → CF
Center 2.402 000 GI #Res BW 3 MHz		BW 8 MHz	Sweep 1	Span 3 MHz ms (1001 pts)	More 1 of 2
LE _ Middle fre	quency		Ма	ximum Peak L	Output Pow
★ Agilent Ref 20 dBm #Peak	Atten 30 dB		Mkr1	2.441 448 GHz -3.70 dBm	Next Peak
Log 10 dB/ 0ffst	1				Next Pk Right
3 dB					Next Pk Left
LgAv					Min Search
M1 S2 S3 FC A					Pk-Pk Search
<b>£</b> (f): FTun Swp					Mkr → CF
Center 2.442 000 G #Res BW 3 MHz	Hz V	BW 8 MHz	Sweep 1	Span 3 MHz ms (1001 pts)	<b>More</b> 1 of 2
Copyright 2000-20	005 Agilent T	echnologies			

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LE _ High frequency	/	Maximum Peak	Cutput Powe
🔆 Agilent		L	Peak Search
Ref 20 dBm Atter #Peak	1 30 dB	Mkr1 2.479 859 GHz —2.60 dBm	
Log 10 dB/ Offst	1		Next Pk Right
dB			Next Pk Left
LgAv			Min Search
M1 S2 S3 FC A			Pk-Pk Search
£(f): FTun Swp			Mkr → CF
Center 2.480 000 GHz #Res BW 3 MHz	VBW 8 MHz	Span 3 MHz Sweep 1 ms (1001 pts)	More 1 of 2
Copyright 2000-2005 A	gilent Technologie:	5	



## 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	-21.33
BLE	Middle	-19.46
	High	-18.23

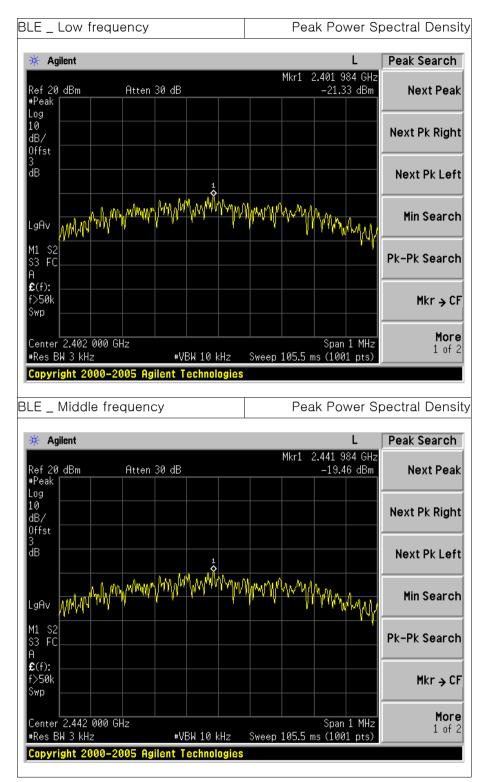
#### 8.4 Test Result

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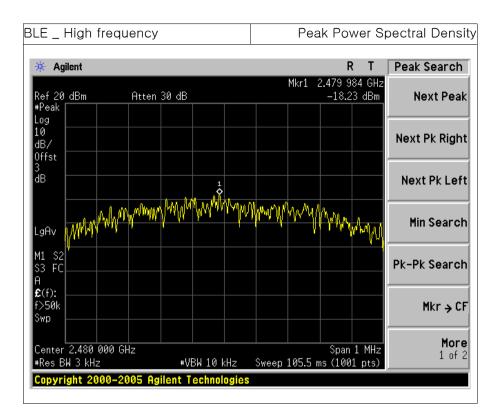


#### 8.5 Test Plot



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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:

6
6
-
5
5
7
.4
.5
.2
4
12
0
8
.5
6
()

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.
- 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

	Rea	ding		Ŧc	0.05	Lin	nits	Re	sult	Mai	rgin
Frequency	(dBu	V/m)	Pol.	T.F (dB)	DCF (dB)	(dBu	V/m)	(dBu	V/m)	(d	B)
(MHz)	AV /	<sup>/</sup> Peak		(00)	(00)	AV /	Peak	AV /	Peak	AV /	Peak
2 389.96	37.13	50.87	V	9.04	2.11	54.0	74.0	48.3	59.9	5.7	14.1
4 804.55	33.54	44.64	V	-1.11	2.11	54.0	74.0	34.5	43.5	19.5	30.5

#### • Middle frequency

Fraguaday	Rea	ding		<b></b>	0.05	Lin	nits	Re	sult	Mar	rgin
Frequency	(dBu	V/m)	Pol.	T.F (dB)	DCF (dB)	(dBu	V/m)	(dBu	V/m)	(d	B)
(MHz)	AV ,	/ Peak		(48)	(48)	AV /	Peak	AV /	Peak	AV /	Peak
4 883.80	32.27	43.68	V	-1.14	2.11	54.0	74.0	33.2	42.5	20.8	31.5

#### • High frequency

Frequency	Rea	ding		<b>.</b>	0.05	Lin	nits	Re	sult	Ма	rgin
Frequency	(dBu	V/m)	Pol.	T.F (dB)	DCF (dB)	(dBu	V/m)	(dBu	V/m)	(d	B)
(MHz)	AV /	/ Peak		(48)	(48)	AV /	Peak	AV /	Peak	AV /	Peak
2 483.87	39.37	52.95	V	9.87	2.11	54.0	74.0	51.3	62.8	2.7	11.2
4 959.35	31.90	43.04	V	-0.94	2.11	54.0	74.0	33.1	42.1	20.9	31.9

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)

-  $T_{\text{on}}$  = 0.384 ms /  $T_{\text{off}}$  = 0.240 ms

- Duty Cycle = T\_on / (T\_on+T\_off) = 0.384 / (0.384+0.240) = 0.624

- DCF = 10 x log(1/Duty Cycle) dB = 10 x log(1/0.624) dB = 2.11 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

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IultiView 🕀 Spectra	ım 🕱 Sp	ectrum 2	Spectrum 3	X Spectru	m 4 🕅 🕱	1		_ ▼
			e Auto Sweep			L Fr	requency 2.3	500000 GH
Input 1 AC Frequency Sweep	PS On	Notch Off					equency 2.5	• 1Pk Max
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tultiView ::) Spectra	m X Sp	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l		V
Ref Level 87.00 dBµ\ Att 0 dE Input 1 AC		ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	Band –	▼ 500000 GH
Ref Level 87.00 dBµA Att 0 dE Input 1 AC Frequency Sweep	m	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l		▼ 500000 GH •1Rm Avg 37.13 dBµ
Ref Level 87.00 dBµA Att 0 dE Input 1 AC Frequency Sweep	ип 🕱 бр SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg 37.13 dBµ
Ref Level 87.00 dBμλ           Att         0 dE           Input         1 AC           Frequency Sweep           0 dBμV	m x sp swt 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg 37.13 dBµ
Ref Level 87.00 dBµλ           Att         0 db           Input         1 AC           Frequency Sweep         0           0 dbµV         0           0 dbµV         0	m I Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg
Ref Level 87.00 dBµλ           Att         0 db           Input         1 AC           Frequency Sweep         0           0 dbµV         0           0 dbµV         0	m x Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg 37.13 dBµ
Ref Level 87.00 dBµX           Att         0 db           Input         1 AC           Frequency Sweep         0           0 dbµV         0           0 dbµV         0           0 dbµV         0	m X Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg 37.13 dBµ
Ref Level \$7.00 dbju/ ht         0.dt           Input         1.40           Frequency Sweep         0           0 dbju/         0	ип II Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg 37.13 dBµ
Ref Level \$7.00 db, \u03c4         0 db           Att         0 db           Input         1 AC           Frèquency Sweep         0           0 db, \u03c4         0	m x Sp swT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	▼ 500000 GH ●18m Avg 37.13 dBµ
Ref Level \$7.00 db, \u03c4         0 db           Att         0 db           Input         1 AC           Frèquency Sweep         0           0 db, \u03c4         0	m x Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	requency 2.3	v         18m Avg           37.13 dBµ         2.3897200 GH
Ref Level \$7.00 dBµ/ ht         0 dB           Input         1 AC           Frequency Sweep         0 dBµ/           0 dBµ/         0 dBµ/	m I Sp SWI 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	MI[1]	v         18m Avg           37.13 dBµ         2.3897200 GH
Ref Level \$7.00 dBµ/ht         0 dB           Att         0 dB           Input         1 AC           Frequency Sweep         0           0 dBµ/         0	m X Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	MI[1]	v         18m Avg           37.13 dBµ         2.3897200 GH
Ref Level \$7.00 dBµ/ht         0 dB           Att         0 dB           Input         1 AC           Frequency Sweep         0           0 dBµ/         0	m X Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	MI[1]	v         18m Avg           37.13 dBµ         2.3897200 GH
Ref Level \$7.00 dBµ/ ht         0 dB           Input         1 AC           Frequency Sweep         0 dBµ/           0 dBµ/         0 dBµ/	m X Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	MI[1]	v         18m Avg           37.13 dBµ         2.3897200 GH
Ref Level 67.00 dBµ/ht         0 dB           Att         0 dB           Input         1 AC           Frequency Sweep         0           0 dBµ/         0	ITTI Z Sp SWT 1.01 ms PS On	ectrum 2 🕱	Spectrum 3	SGL Spectru	Res	l	MI[1]	v         18m Avg           37.13 dBµ         2.3897200 GH
Autiview         Spectra           Ref Level \$7.00 dBµ/ Att         0 dBµ           0 dBµV         1 AC           0 dBµV         0           10 dBµV         0           10 dBµV         2.31 GHz	m x Sp	ectrum 2 🕱	Spectrum 3 e Auto Sweep	SGL Count 100/100	Res	l	MI[1]	v         18m Avg           37.13 dBµ         2.3897200 GH

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							Spurio	us - Pe
		Spectrum 2	X					$\nabla$
efLevel 80.00 dBμ\ tt 0 dE nput 1 AC	SWT 1.01 ms PS Off	<ul> <li>RBW 1 MHz</li> <li>VBW 3 MHz N</li> <li>Notch Off</li> </ul>	Node Auto Sweep			Fi	requency 4.	8040000 GH
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dBµV								4.80454900 GH
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iBμV								
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fLevel 80.00 dBµ\ t 0 dB	,	= DRW 1 MHz	Spec		]			<b>v</b>
fLevel 80.00 dBμ\ t 0 dB put 1 AC	,	● RBW 1 MHz			1		requency 4.	▼ 8040000 GH
f Level 80.00 dBµV t 0 dE put 1 AC requency Sweep	,	= DRW 1 MHz			1			▼ 8040000 GH ● 1Rm Avg 33.54 dBp
f Level 80.00 dBµV t 0 dE put 1 AC requency Sweep	,	= DRW 1 MHz			1		requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
If Level 80.00 dBµV t 0 dE put 1 AC equency Sweep	,	= DRW 1 MHz			)		requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
if Level 80.00 dB/v t 0 dE put 1 AC requency Sweep IB/V	,	= DRW 1 MHz			)		requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
if Level 80.00 dB/v t 0 dE put 1 AC requency Sweep IB/V	,	= DRW 1 MHz			1		requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
fLevel 80.00 dBμ/r           tevel 80.00 dBμ/r           o dB           put         1 AC           requency Sweep           /Bμ/r           /Bμ/r	,	= DRW 1 MHz			)		requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
ft Level 80.00 dBμ/         0 dB           0 put         0 dB           put         1 AC           requency Sweep         0           //Bμ/         0           //Bμ/         0           //Bμ/         0	,	= DRW 1 MHz					requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
ft Level 80.00 dBμ/         0 dB           0 put         0 dB           put         1 AC           requency Sweep         0           //Bμ/         0           //Bμ/         0           //Bμ/         0	,	= DRW 1 MHz					requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
I Level 80.00 dBµ/ t 0 db put 1 AC requency Sweep IBµ/	,	= DRW 1 MHz					requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
ft_evel 80.00 dBµ/t         0 dB           0 dB         0 dB           put         1 AC           cequency Sweep         18µ/           ////////////////////////////////////	,	= DRW 1 MHz			<u>)</u>		requency 4.	₹ 8040000 GH • 1Rm Avg 33.54 dBp
f Level 80.00 dBµ/ 0 dB put 1.2C requency Sweep IBµ/ IBµ/ IBµ/ IBµ/ IBµ/ IBµ/ IBµ/ IBµ/ IBµ/ IBµ/	,	= DRW 1 MHz					requency 4.	₹ 8040000 GH • 1Rm Avg 33.54 dBp
If Level 80.00 dBµ/ t 0 db put 1 AC requency Sweep л8µ∨	,	= DRW 1 MHz					requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
f Level 80.00 dBµ/ t 0 db put 1 AC requency Sweep iBµ/	,	= DRW 1 MHz					requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
f Level 80.00 dBµ/ t 0 db put 1 AC requency Sweep iBµ/	,	= DRW 1 MHz					requency 4.	▼ 8040000 GH ● 1Rm Avg 33.54 dBp
f Level 80.00 dBuy	,	BBW 11MHz     VBW 31MHz     Notch Off		Count 100/100	0 MHz/		requency 4.	8040000 GH

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#### • BLE \_ Middle frequency

Spurious – Pe						
	X	X Spectrur	ectrum 2	x Sp	Spectrum	IultiView
Frequency 4.8840000 G		Auto Sweep	1 MHz 3 MHz Mod	● RBW 1.01 ms ● VBW Off Note	0 dB SWT 1 AC PS	ef Level 80.0 itt nput
• 1Pk Ma M1[1] 43.68 dB					weep	Frequency Sv
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						dBµV
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z/ Span 10.0 Mi	1.0 MHz/	s	1001 p			4.884 GHz
Spurious - Avera						
Spurious – Avera					~	
	<u>ک</u> 0/100	Spectrur Auto Sweep Gou	ectrum 2 7 1 MHz Mod	= RBW	00 dBuV	ultiView af Level 80.0
Frequency <b>4.8840000 G</b>			1 MHz		0 dBµV 0 dB SWT 1 AC PS	ultiView = ef Level 80.0 tt put
Frequency <b>4.8840000</b> G		SGL	1 MHz	= RBW	0 dBµV 0 dB SWT 1 AC PS	ultiView 11 of Level 80.0 tt tr pput requency SV
Frequency <b>4.8840000 G</b>		SGL	1 MHz	= RBW	0 dBµV 0 dB SWT 1 AC PS	ultiView El of Level 80.0 tr Pour Beguency Sy dByV
Frequency <b>4.8840000 G</b>		SGL	1 MHz	= RBW	0 dBµV 0 dB SWT 1 AC PS	IltiView 3 of Level 80.0 put requercy Sy IB <sub>µ</sub> V IB <sub>µ</sub> V
Frequency <b>4.8840000 G</b>		SGL	1 MHz	= RBW	0 dBµV 0 dB SWT 1 AC PS	altiView a fLevel 80.0 tt requercy Sy dBµV dBµV
Frequency <b>4.8840000 G</b>		SGL	1 MHz	= RBW	0 dBµV 0 dB SWT 1 AC PS	altiView at Level 80.0 it put for the second
Frequency <b>4.8840000 G</b>		SGL	: 1 MHz : 3 MHz Mod h Off	= RBW	0 dBµV 0 dB SWT 1 AC PS	altiView         3           of Level 80.0         4           tt         tpput           requency SV         4           dbµV         4           dbµV         4           dbµV         4           dbµV         4
Frequency <b>4.8840000 G</b>		SGL	1 MHz	= RBW	0 dBµV 0 dB SWT 1 AC PS	altiView         2           of Level 80.0         2           tt         pput           requency SV         3           d8µV         3           d8µV         4           d8µV         4           d8µV         4           d8µV         4           d8µV         4
Frequency <b>4.8840000 G</b>		SGL	: 1 MHz : 3 MHz Mod h Off	= RBW	0 dBµV 0 dB SWT 1 AC PS	ultiView         B           ef Level 80.0         B           trequency Sy         B           d8µv         B
Frequency <b>4.8840000 G</b>		SGL	: 1 MHz : 3 MHz Mod h Off	= RBW	0 dBµV 0 dB SWT 1 AC PS	ultiView         П           f Level 80.0         1           uppt         1           d8µv         1
Frequency <b>4.8840000 G</b>		SGL	: 1 MHz : 3 MHz Mod h Off	= RBW	0 dBµV 0 dB SWT 1 AC PS	ultiView         П           f Level 80.0         1           uppt         1           d8µv         1
Frequency <b>4.8840000 G</b>		SGL	: 1 MHz : 3 MHz Mod h Off	= RBW	0 dBµV 0 dB SWT 1 AC PS	alitiView         ef           ef         Level         80.0           tt         tpput         es           requency         SV         dsµv           dsµv         dsµv         dsµv
Frequency 4.8840000 G		Auto Sweep Cou	: 1 MHz : 3 MHz Mod h Off	= RBW	0 dBµV 0 dB SWT 1 AC PS	ШЕІУІем         П           Idel Level 80.0         Idel View           ide / Level 80.0         Idel View           ide //         Idel View

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## BLE \_ High frequency

					I		ed Ban	
1ultiView ⊞ Spectrum			Spectrum 3	X Spectru	um 4 🛛 🕱	l		~
Ref Level 95.00 dBμV           Att         0 dB	SWT 1.01 ms = VB	W 1 MHz W 3 MHz Mode	e Auto Sweep			Fr	equency 2.4	917500 GH
Input 1 AC Frequency Sweep	PS On Not	tch Off						• 1Pk Max
0 dBµV							M1[1]	52.95 dBµ\ 2.4838710 GHz
0 dBµV								
0 dBµV								
0 dBµV								
Bernandersteinsteinkeiter								
	wall when welling	um show they	and the second					
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) dBµV						4.00.000	manestones	-where he was a war
) dBµV								
) dBµV								
dBµV								
.4835 GHz		1001 pt	s	1.	65 MHz/			2.5 GHz
					Res	tricted	Band –	Averag
			Seestrum 2			tricted	Band -	Averag
			Spectrum 3 e Auto Sweep	SGL Count 100/100	um 4 🛛 🕱	L		Ţ
RefLevel 87.00 dBµV Att 0 dB : Input 1 AC	■ Spectru ● RB SWT 1.01 ms ● VB PS On Not			SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●1Rm Avg
Ref Level 87.00 dBµV Att 0 dB 1 Input 1 AC 1 Frequency Sweep				SGL	um 4 🛛 🕱	L		♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBµV Att 0 dB 1 Input 1 AC Frequency Sweep				SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBµV Att 0 dB 1 Input 1 AC Frequency Sweep				SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level         87.00 dBµV           Att         0 dB           Input         1 AC           I Frequency Sweep           0 dBµV           0 dBµV				SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBy//           Att         0 dB = 1           Input         1 AC           Frèquency Sweep           0 dBy/           0 dBy/           0 dBy/				SGL	um 4 🛛 🕱	L	equency 2.4	₹ 917500 GH
Ref Level 87.00 dBy//           Att         0 dB = 1           Input         1 AC           Frèquency Sweep           0 dBy/           0 dBy/           0 dBy/				SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBy/v           Att         0 dB           Input         1 AC           Input         1 AC           Input         1 AC           Input         1 AC           0 dBy/v         0           0 dBy/v         0           0 dBy/v         0				SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBy/l           Atex         0 dB           Input         0 dB           Input         1 AC           Input         0 dB           0 dBy/l         0				SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBy/l           Atex         0 dB           Input         0 dB           Input         1 AC           Input         0 dB           0 dBy/l         0	* # # # # # # # # # # # # # # # # # # #			SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBy/V           Att         0 dB           Input         1 AC           Input         1 AC           IFEQUENCY Sweep         0           0 dBy/V         0	* # # # # # # # # # # # # # # # # # # #		e Auto Sweep	SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dByV         0 dB           Att         0 dB           Input         1 AC           Input         0 dByV           0 dByV         0 dByV           0 dByV         0 dByV           0 dByV         0 dByV           0 dByV         0 dByV	* # # # # # # # # # # # # # # # # # # #		e Auto Sweep	SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dByV         0 dB           Att         0 dB           Input         1 AC           Input         0 dByV           0 dByV         0 dByV           0 dByV         0 dByV           0 dByV         0 dByV           0 dByV         0 dByV	* # # # # # # # # # # # # # # # # # # #		e Auto Sweep	SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 37.00 dBy/         0 dB         0         0 dB         1         0         0 dB         1         0	* # # # # # # # # # # # # # # # # # # #		e Auto Sweep	SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
Ref Level 87.00 dBy/           Att         0 dB           Input         1.02           Input         1.02           Frequency Sweep         0           0 dBy/         0	* # # # # # # # # # # # # # # # # # # #		e Auto Sweep	SGL	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V
	* # # # # # # # # # # # # # # # # # # #		e Auto Sweep	SGL Count 100/100	um 4 🛛 🕱	L	equency 2.4	♥ 917500 GH: ●18m Avg 39.37 dB/V

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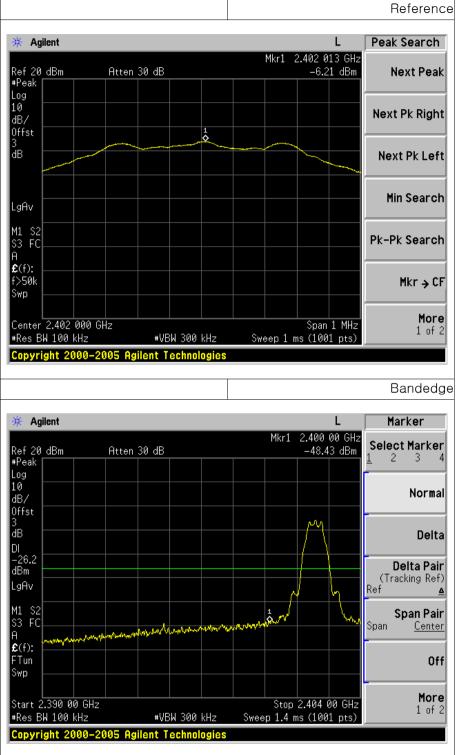
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ultiView			pectrum 2	X Spect	um 3 🛛 🕱	n l			~
ef Level 80. tt 1put	00 dBµV 0 dB SWT 1 AC PS	● RB 1.01 ms ● VB Off Not	W 1 MHz W 3 MHz Mode tch Off	Auto Sweep		_	F	requency 4.9	9600000 GH
requency S	Sweep							M1[1]	
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ef Level 80. It iput	00 dBµV 0 dB SWT 1 AC PS	■ RB 1.01 ms ■ VB Off NB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr					- Avera
af Level 80. It put	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	um 3 🕱			irequency 4.9	- Avera
ef Level 80. t put requency S	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	um 3 🕱			irequency 4.9	- Avera
af Level 80. it put requency \$ J <sub>Bµ</sub> v	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	um 3 🕱			irequency 4.9	- Avera
af Level 80. It put requency \$ JBµV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	um 3 🕱			irequency 4.9	- Avera
af Level 80. It ipput requency \$ d8µV d8µV d8µV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	um 3 🕱			irequency 4.9	- Avera
sf Level 80. it put requency 5 18µV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	um 3 🕱			irequency 4.9	- Avera
sf Level 80. it put requency 5 18µV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	rum 3 📰 SGL Sount 100/100			irequency 4.9	- Avera
af Level 80.           tt           tpput           requency S           d8µV           d8µV           d8µV           d8µV           d8µV           d8µV           d8µV           d8µV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	rum 3 📰 SGL Sount 100/100			irequency 4.9	- Avera
sf Level 80. tt tr requency 5 d8µV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	rum 3 📰 SGL Sount 100/100			irequency 4.9	- Avera
ef Level 80. tt put requency 5 dBµV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	rum 3 📰 SGL Sount 100/100			irequency 4.9	- Avera
f Level 80. тециелсу 5 dBµV	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	rum 3 📰 SGL Sount 100/100			irequency 4.9	- Avera
ultiView ef Level 80. tt requency 5 d8µv d	00 dBµV 0 dB SWT 1 AC PS	= RB 1.01 ms = VB	pectrum 2 ₩ 1.MHz ₩ 3.MHz Mode	X Spectr	rum 3 📰 SGL Sount 100/100			irequency 4.9	- Avera

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#### 9.7 Test Plot for Conducted Spurious Emission

• BLE \_ Low frequency



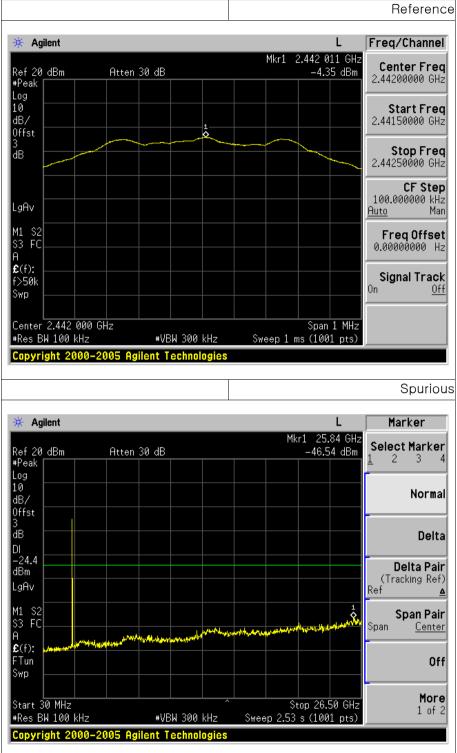
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Agilent				L	Marker
f 20 dBm 'eak	Atten 30 dB		Mk	r1 25.85 GH -46.82 dBm	
g					
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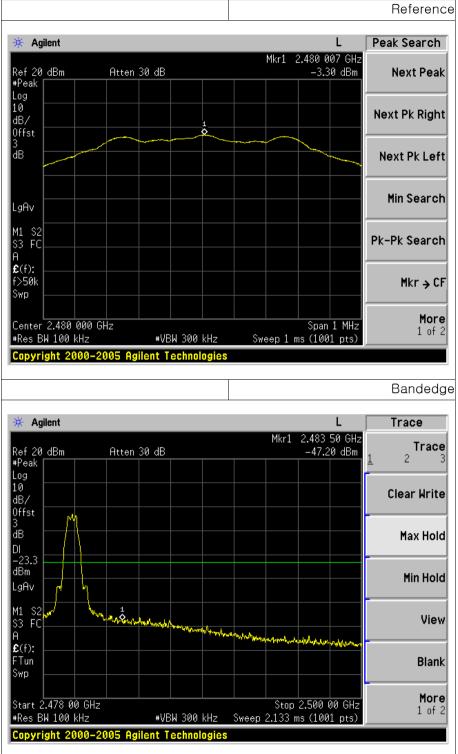
BLE \_ Middle frequency



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• BLE \_ High frequency



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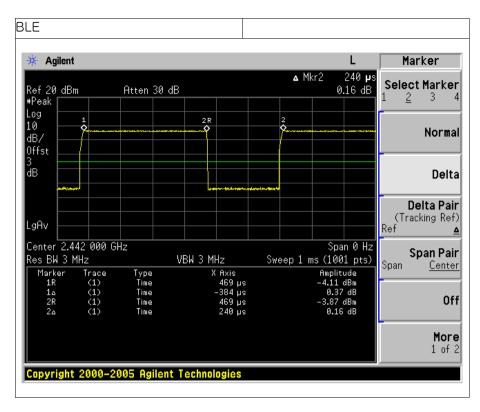


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## 9.8 Test Plot for Duty Cycle





## 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.

Fraguanay Danga (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.

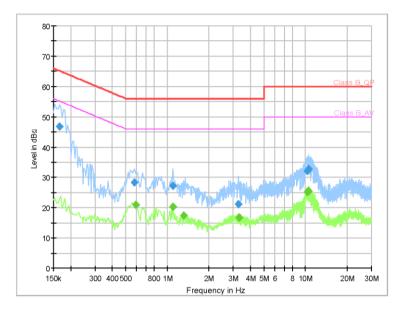
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#### 10.4 Test Result

• AC Line Conducted Emission (Graph)

SP170\_Charging Mode\_L1



## **Conducted Emission**

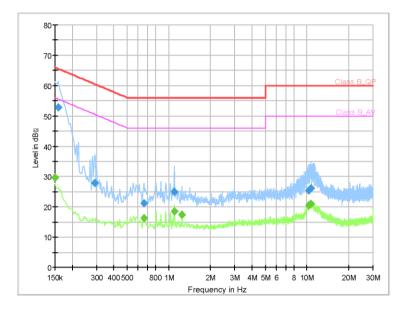
#### Final\_Result

Frequency	QuasiPeak	CAverage	Limit	Margin	Bandwidth	Line	Corr.
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(kHz)		(dB)
0.166	46.90		65.16	18.26	9	L1	20.8
0.580	28.36		56.00	27.64	9	L1	20.7
0.590		20.86	46.00	25.14	9	L1	20.7
1.100		20.30	46.00	25.70	9	L1	20.0
1.100	27.23		56.00	28.77	9	L1	20.0
1.320		17.36	46.00	28.64	9	L1	19.9
3.260	21.27		56.00	34.73	9	L1	19.9
3.320		16.61	46.00	29.39	9	L1	19.9
10.310	32.13		60.00	27.87	9	L1	20.0
10.340		25.29	50.00	24.71	9	L1	20.0
10.500	32.65		60.00	27.35	9	L1	20.0
10.590		25.41	50.00	24.59	9	L1	20.0

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SP170\_Charging Mode\_N



## **Conducted Emission**

#### Final\_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.150		29.56	56.00	26.44	9	N	20.6
0.158	52.85		65.57	12.72	9	N	20.7
0.290	27.78		60.52	32.75	9	N	20.6
0.660		16.36	46.00	29.64	9	N	20.3
0.660	21.16		56.00	34.84	9	N	20.3
1.100		18.59	46.00	27.41	9	N	20.0
1.100	25.05		56.00	30.95	9	N	20.0
1.250		17.32	46.00	28.68	9	N	20.0
10.320	25.52		60.00	34.48	9	N	20.0
10.330		20.47	50.00	29.53	9	N	20.0
10.640		20.85	50.00	29.15	9	N	20.0
10.700	25.97		60.00	34.03	9	N	20.0



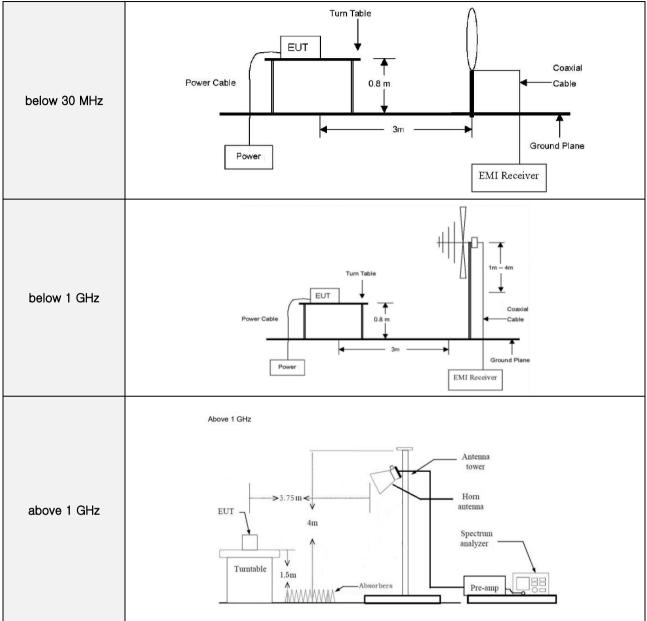
APPENDIX I

TEST SETUP

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#### • Radiated Measurement



#### • Conducted Measurement

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Conducted	EUŢ		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		