

General Life Biotechnology Co., Ltd.

TEST REPORT

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Radio Spectrum TEST REPORT

Applicant:	General Life Biotechnology Co., Ltd. 5F., No. 240, Shinshu Rd., Shin Juang Dist., New Taipei City 242, Taiwan
Product:	Blood Glucose Monitoring Meter
Model No.:	BSG01D
Brand Name:	BeneCheck Uni
FCC ID:	2ASXQ-BSG01D
Test Site Number:	960839
Test Method/ Standard:	47 CFR FCC Part 15.249 & ANSI C63.10 2013
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan



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Revision History

Report No.	Issue Date	Revision Summary
181000392TWN-001	Apr. 17, 2019	Original report

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Summary of Tests

Test	Reference	Results
20dB Bandwidth	15.215(c)	Pass
Radiated Emission test	15.249(c), 15.209	Pass
Emission on the Band Edge	15.249(d)	Pass
Conducted Emission of AC Power	15.207	N/A
Antenna Requirement	15.203	Pass

1. General Information

1.1 Identification of the EUT

Product:	Blood Glucose Monitoring Meter
Model No.:	BSG01D
Operating Frequency:	2402 MHz ~ 2480 MHz
Channel Number:	2402+2k MHz, k=0~39
Access scheme:	OFDM
Rated Power:	DC 3V from battery
Power Cord:	N/A
Sample receiving date:	Nov. 02, 2018
Sample condition:	Workable
Test Date(s):	Nov. 06, 2018 ~ Nov. 08, 2018

1.2 Antenna description

Antenna Gain : -6.285 dBi

Antenna Type : Printed Antenna

Connector Type : Fixed

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

TX mode: The EUT power on to entering test mode and press the button to change different channel.

The signal is maximized through rotation and placement in the three orthogonal axes.



X axis



Y axis



Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Z axis. The final test data was executed under this configuration.

3. 20dB Bandwidth test

3.1 Operating environment

Temperature:	25	°C
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa

3.2 Test setup & procedure

Step 1: The 20dB bandwidth was measured using a 50 ohm spectrum analyzer

Step 2: The span range for the SA display shall be between two times and five times the OBW.

Step 3: The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending on the applicable requirement.

Step 4: The test was performed at 1 channel. The maximum 20dB modulation bandwidth is in the following Table.

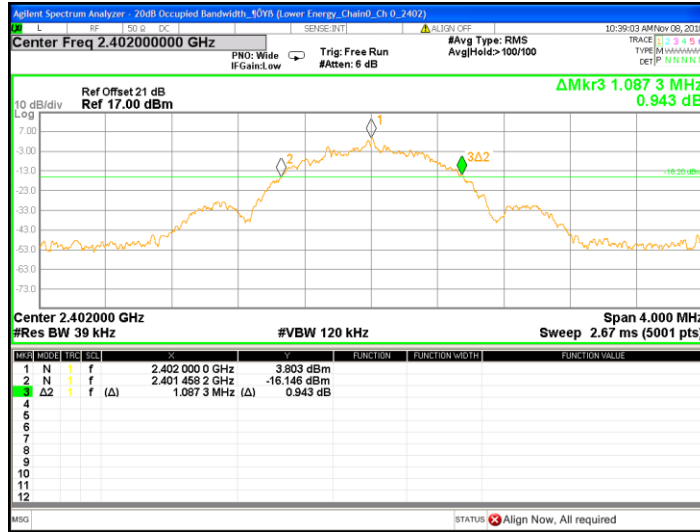
3.3 Measured data of modulated bandwidth test results

Single TX

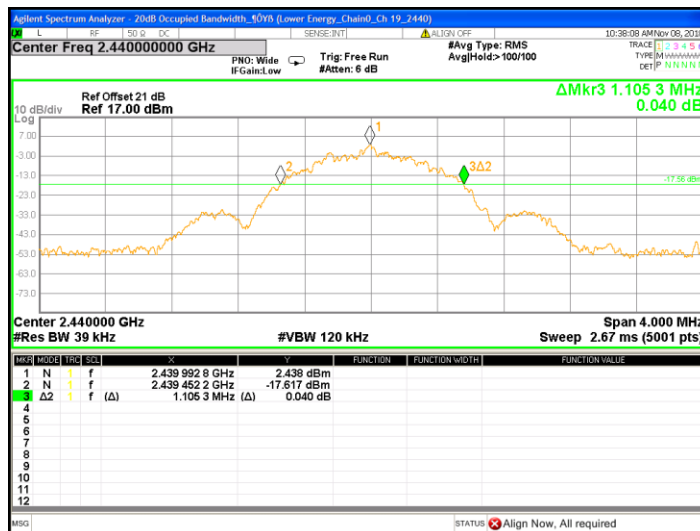
Mode	Frequency (MHz)	20dB Occupied Bandwidth (MHz)
BLE	2402	1.0873
	2440	1.1053
	2480	1.0918

Please see the plot below.

20dB Bandwidth @ BLE_Channel 0



20dB Bandwidth @ BLE_Channel 19



20dB Bandwidth @ BLE_Channel 39



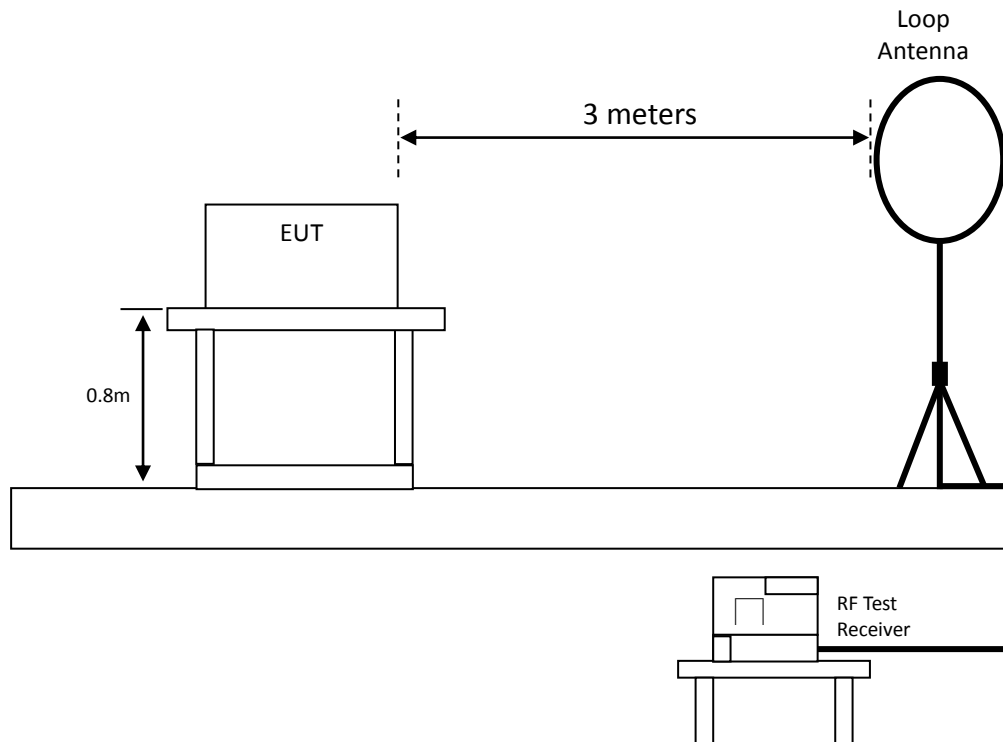
4. Radiated emission test FCC 15.249 (C)

4.1 Operating environment

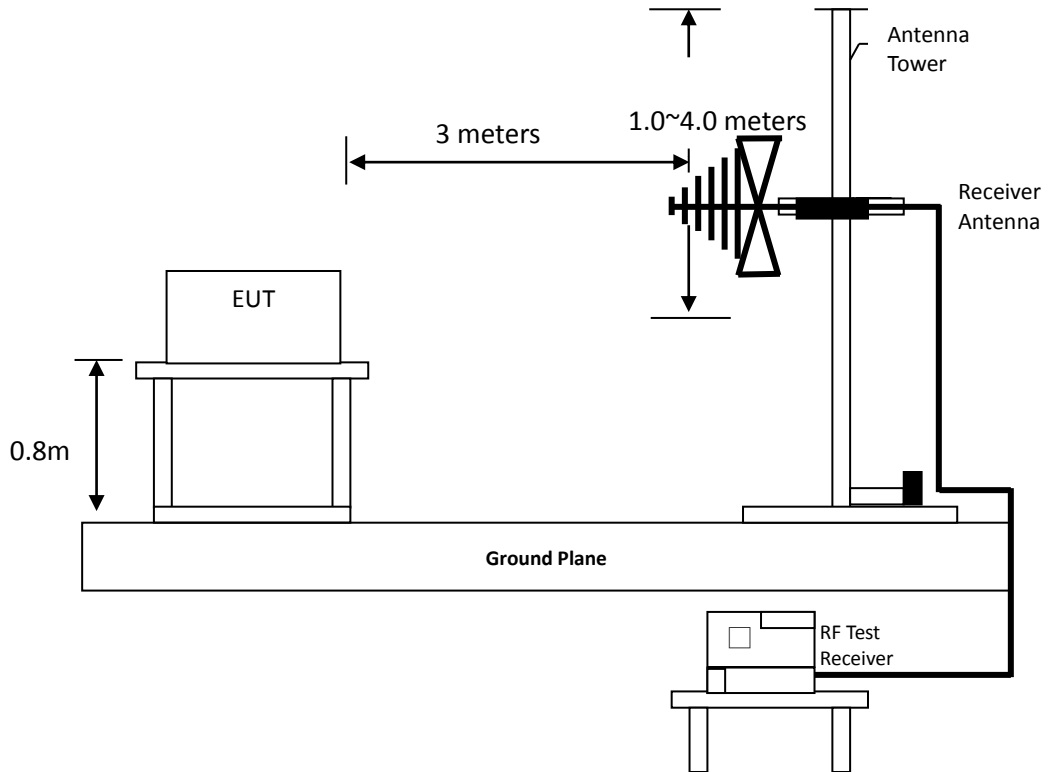
Temperature:	25	°C
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa

4.2 Test setup & procedure

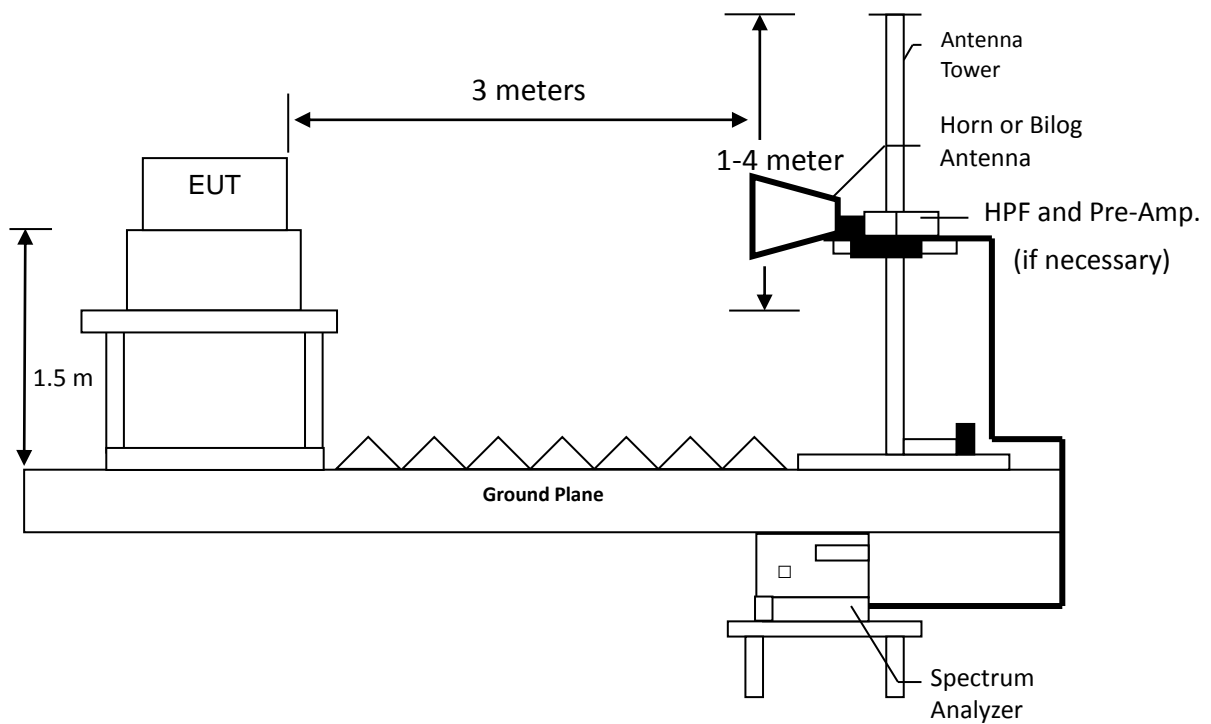
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



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Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

4.3 Emission limit

4.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

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4.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dBµV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

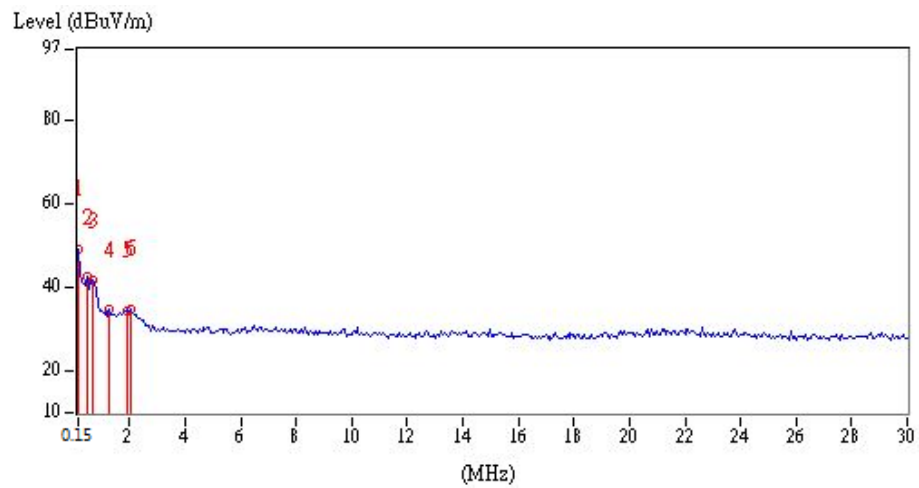
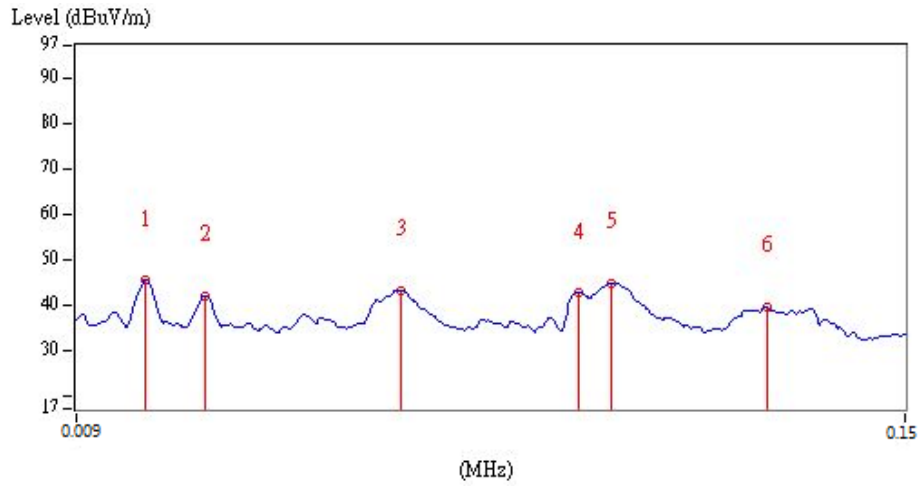
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

4.4 Radiated spurious emission test data

4.4.1 Measurement results: frequency range from 9 kHz to 30 MHz

EUT: BSG01D

Polarity (circle)	Frequency (MHz)	Detection value	Factor (dB/m)	Reading (dBµV)	Value (dBµV/m)	Limit @ 3m (dBµV/m)	Tolerance (dB)
Plane	0.02	PK	19.29	26.08	45.37	121.58	-76.21
Plane	0.03	PK	19.54	22.44	41.98	118.06	-76.08
Plane	0.06	PK	18.97	24.12	43.09	112.04	-68.95
Plane	0.09	PK	18.79	23.77	42.56	108.52	-65.96
Plane	0.10	QP	18.76	25.89	44.65	107.60	-62.95
Plane	0.13	PK	18.77	20.67	39.44	105.33	-65.89
Plane	0.15	PK	18.77	30.56	49.33	104.08	-54.75
Plane	0.51	QP	18.69	23.72	42.41	73.45	-31.04
Plane	0.69	QP	18.69	22.92	41.61	70.83	-29.22
Plane	1.28	QP	18.68	16.03	34.71	65.46	-30.75
Plane	1.88	QP	18.67	15.85	34.52	69.54	-35.02
Plane	2.06	QP	18.67	16.33	35.00	69.54	-34.54



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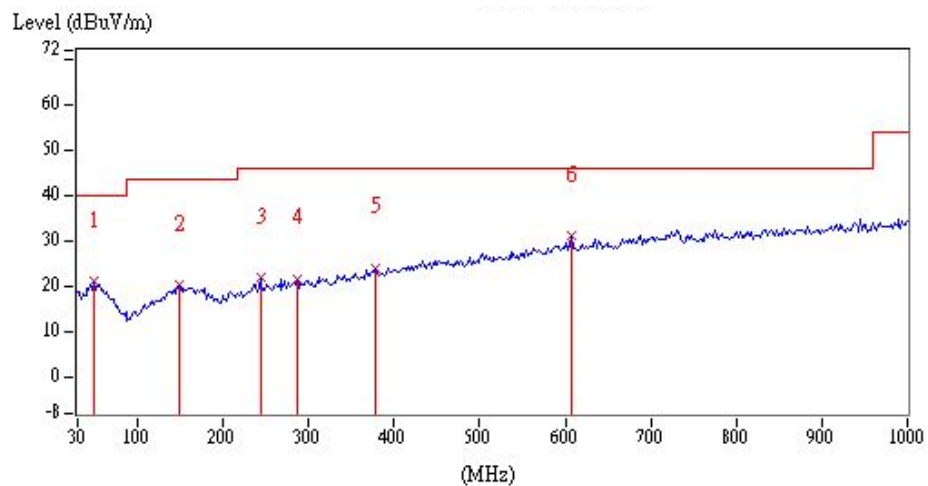
4.4.2 Measurement results: frequencies equal to or less than 1 GHz

The test was performed continuously transmitting mode. The worst case occurred at TX Channel 0

EUT: BSG01D
 Worst case: TX Channel 0

Ant. Pol. (H/V)	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	49.40	QP	20.48	0.59	21.07	40.00	-18.93
Vertical	148.34	QP	20.16	0.12	20.28	43.50	-23.22
Vertical	243.40	QP	20.22	1.76	21.98	46.00	-24.02
Vertical	286.08	QP	21.10	0.57	21.67	46.00	-24.33
Vertical	377.26	QP	23.38	0.62	24.00	46.00	-22.00
Vertical	608.12	QP	28.43	2.74	31.17	46.00	-14.83

Remark: Corr. Factor = Antenna Factor + Cable Loss

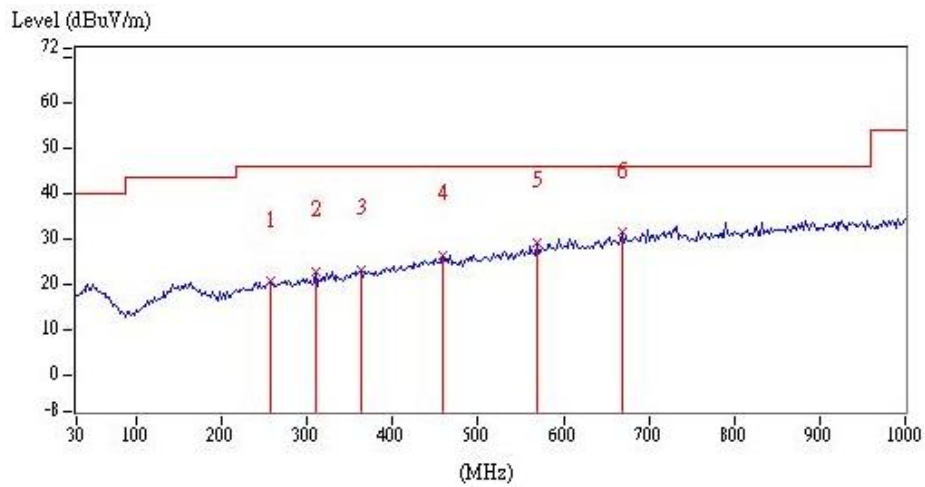


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EUT: BSG01D
 Worst case: TX Channel 0

Ant. Pol. (H/V)	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
Horizontal	256.98	QP	20.47	0.18	20.65	46.00	-25.35
Horizontal	309.36	QP	21.67	1.17	22.84	46.00	-23.16
Horizontal	363.68	QP	23.00	0.34	23.34	46.00	-22.66
Horizontal	458.74	QP	25.50	0.91	26.41	46.00	-19.59
Horizontal	569.32	QP	27.51	1.88	29.39	46.00	-16.61
Horizontal	668.26	QP	29.27	2.24	31.51	46.00	-14.49

Remark: Corr. Factor = Antenna Factor + Cable Loss



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4.4.3 Measurement results: frequency above 1GHz

EUT: BSG01D

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
BLE_Ch0	4804	PK	V	2.45	56.59	59.04	74.00	-14.96
	4804	AV	V	2.45	31.48	33.93	54.00	-20.07
	7206	PK	V	11.10	37.06	48.16	74.00	-25.84
	9608	PK	V	15.94	32.72	48.66	74.00	-25.34
	4804	PK	H	2.45	54.82	57.27	74.00	-16.73
	4804	PK	H	2.45	31.10	33.55	74.00	-40.45
	7206	PK	H	11.10	39.34	50.44	74.00	-23.56
BLE_Ch19	2136	PK	V	34.41	12.86	47.27	74.00	-26.73
	2168	PK	V	34.40	11.11	45.51	74.00	-28.49
	2184	PK	V	34.40	10.98	45.38	74.00	-28.62
	2248	PK	V	34.39	11.57	45.96	74.00	-28.04
	2280	PK	V	34.39	12.25	46.64	74.00	-27.36
	2312	PK	V	34.38	12.11	46.49	74.00	-27.51
	4880	PK	V	2.83	58.42	61.25	74.00	-12.75
	4880	AV	V	2.83	32.19	35.02	54.00	-18.98
	7320	PK	V	11.69	40.36	52.05	74.00	-21.95
	9765	PK	V	16.14	32.60	48.74	74.00	-25.26
	4880	PK	H	2.83	52.70	55.53	74.00	-18.47
	4880	AV	H	2.83	30.80	33.63	54.00	-20.37
	7320	PK	H	11.69	41.47	53.16	74.00	-20.84
BLE_Ch39	2176	PK	V	34.40	14.22	48.62	74.00	-25.38
	2192	PK	V	34.40	16.47	50.87	74.00	-23.13
	2224	PK	V	34.39	13.74	48.13	74.00	-25.87
	2256	PK	V	34.39	13.97	48.36	74.00	-25.64
	2288	PK	V	34.38	13.84	48.22	74.00	-25.78
	2320	PK	V	34.38	13.15	47.53	74.00	-26.47
	4960	PK	V	3.23	57.36	60.59	74.00	-13.41
	4960	AV	V	3.23	30.85	34.08	54.00	-19.92
	7440	PK	V	12.31	38.49	50.80	74.00	-23.20
	9920	PK	V	16.33	36.35	52.68	74.00	-21.32
	4960	PK	H	3.23	50.69	53.92	74.00	-20.08
	4960	AV	H	3.23	29.12	32.35	54.00	-21.65
	7440	PK	H	12.31	41.31	53.62	74.00	-20.38

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

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4.4.4 Measurement results: Fundamental

EUT: BSG01D

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
BLE_Ch0	2402	PK	V	34.37	60.32	94.69	114.00	-19.31
	2402	AV	V	34.37	12.13	46.50	94.00	-47.50
	2402	PK	H	34.37	63.58	97.95	114.00	-16.05
	2402	AV	H	34.37	13.09	47.46	94.00	-46.54
BLE_Ch19	2440	PK	V	34.36	61.34	95.70	114.00	-18.30
	2440	AV	V	34.36	12.42	46.78	94.00	-47.22
	2440	PK	H	34.36	61.80	96.16	114.00	-17.84
	2440	AV	H	34.36	12.78	47.14	94.00	-46.86
BLE_Ch39	2480	PK	V	34.35	61.46	95.81	114.00	-18.19
	2480	AV	V	34.35	11.38	45.73	94.00	-48.27
	2480	PK	H	34.35	62.61	96.96	114.00	-17.04
	2480	AV	H	34.35	12.25	46.60	94.00	-47.40

Remark: Correction Factor = Antenna Factor + Cable Loss

5. Radiated emission on the band edge FCC 15.249(d)

5.1 Operating environment

Temperature:	25	°C
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa

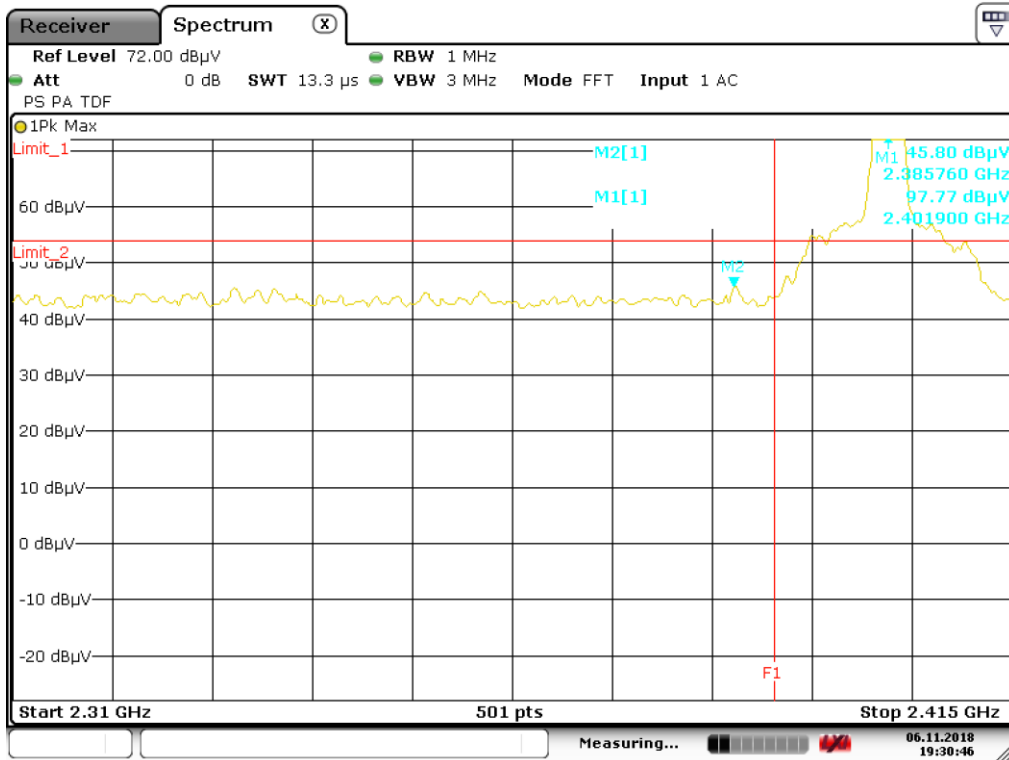
5.2 Radiated emission on the band edge test data

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (2470MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
BLE	2385.76	PK	V	34.37	11.43	45.80	74	-28.20	2310~2390
	2385.97	AV	V	34.37	-1.66	32.71	54	-21.29	
	2483.79	PK	V	34.35	21.58	55.93	74	-18.07	2483.5~2500
	2483.50	AV	V	34.35	0.31	34.66	54	-19.34	

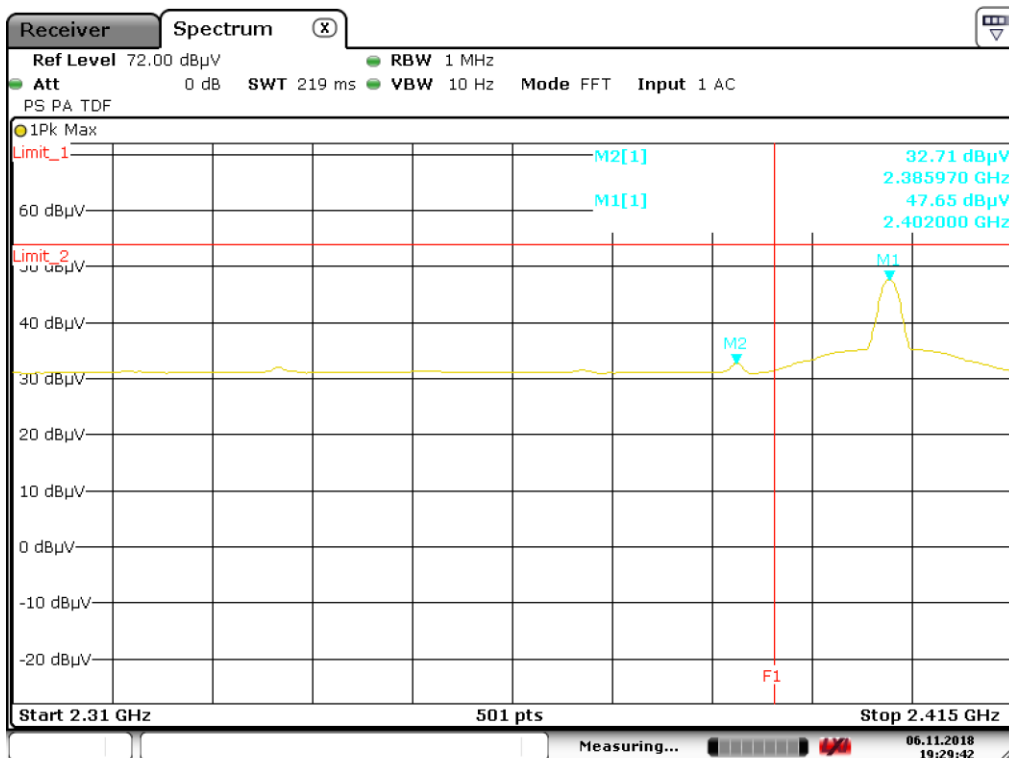
Remark: Correction Factor = Antenna Factor + Cable Loss

Bandedge @ mode BLE Ch0 Peak



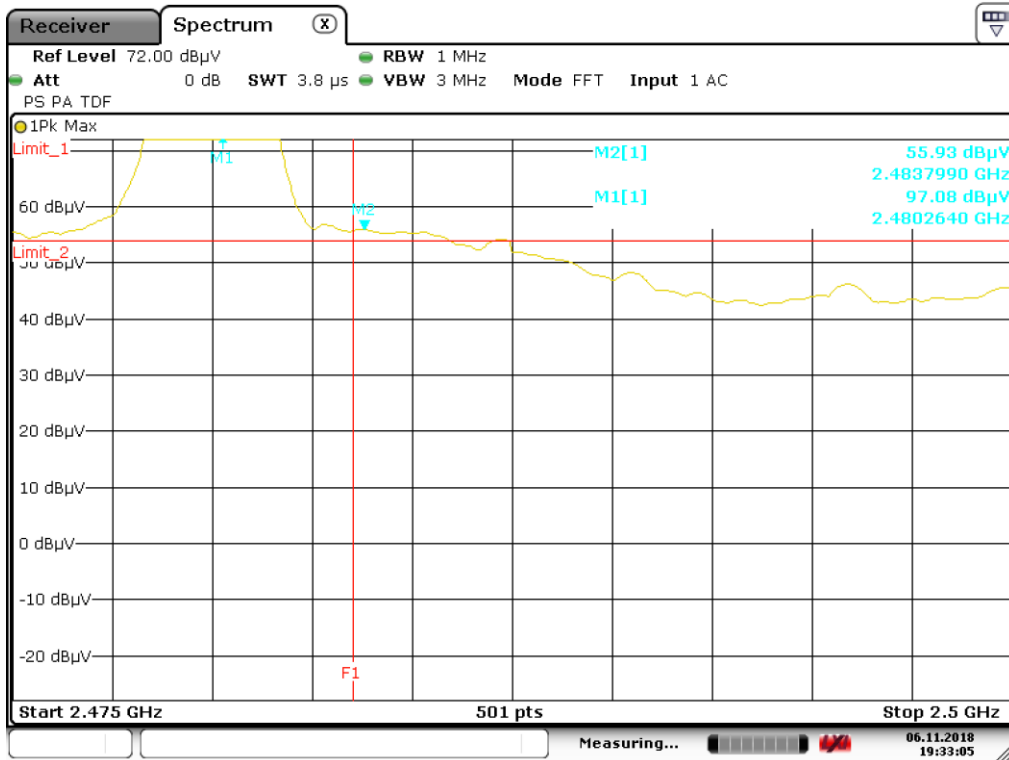
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Bandedge @ mode BLE Ch0 Average



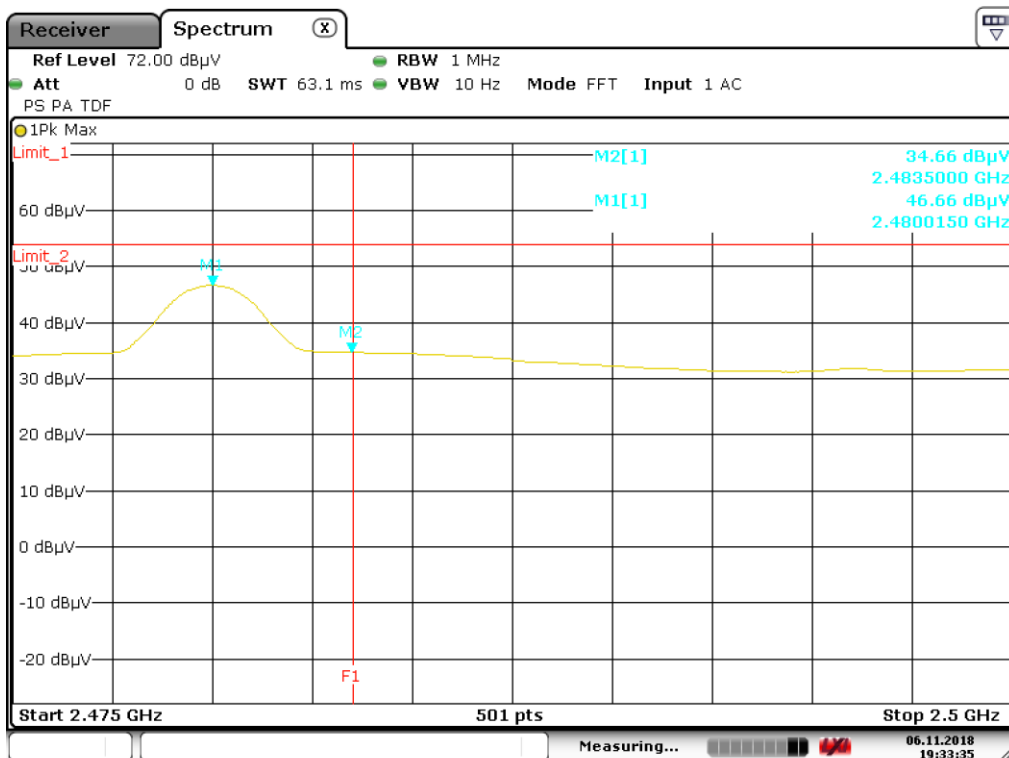
Date: 6.NOV.2018 19:29:42

Bandedge @ mode BLE Ch39 Peak



Date: 6.NOV.2018 19:33:06

Bandedge @ mode BLE Ch39 Average



Date: 6.NOV.2018 19:33:35

6. AC Power Line Conducted Emission

Since the EUT is not connected to AC source, therefore, the test can be waived.

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2017/11/21	2018/11/20
Spectrum Analyzer	Rohde & Schwarz	FSP30	100245	2018/02/23	2019/02/22
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2018/01/23	2019/01/22
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2017/09/04	2020/09/02
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2018/04/23	2019/04/22
Pre-Amplifier	EMC Co.	EMC12635SE	980205	2017/11/28	2018/11/27
Pre-Amplifier	MITEQ	JS4-26004000--2 7-8A	828825	2018/08/28	2019/08/27
Power Meter	Anritsu	ML2495A	0844001	2018/10/29	2019/10/28
Power Sensor	Anritsu	MA2411B	0738452	2018/10/29	2019/10/28
Signal Analyzer	Agilent	N9030A	MY51380492	2018/08/24	2019/08/23
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2018/08/07	2019/08/06
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 104P	CB0005	2018/08/07	2019/08/06
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2018/05/03	2019/05/02
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2018/03/05	2019/03/04
High Pass Filter	Wainwright	WHKX3.0/ 18G-12SS	N/A	2018/06/01	2019/05/31
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2018/04/17	2019/04/16
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	124781	2018/09/21	2019/09/20

Note: No Calibration Required (NCR)

Appendix B: Measurement Uncertainty

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

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.14 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.22 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.54 dB
Emission on the Band Edge Test	3.64 dB
20dB Bandwidth	1.22 dB
AC Power Line Conducted Emission	2.48 dB