

Prüfbericht-Nr.: <i>Test report No.:</i>	50176425 001	Auftrags-Nr.: <i>Order No.:</i>	174083384	Seite 1 von 27 <i>Page 1 of 27</i>	
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date.:</i>	11.06.2018		
Auftraggeber: <i>Client:</i>	Seikaku Technical Group Limited Offshore Chambers P. O. Box 217 Apia, Samoa				
Prüfgegenstand: <i>Test item:</i>	Active Speaker				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	FORZA 15A, FORZA 12A SH 15A.800, SH 12A.800				
Auftrags-Inhalt: <i>Order content:</i>	FCC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 2: Section 2.1091				
Wareneingangsdatum: <i>Date of receipt:</i>	06.11.2018				
Prüfmuster-Nr.: <i>Test sample No.:</i>	174083384-001				
Prüfzeitraum: <i>Testing period:</i>	Refer to test report				
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Guangdong) Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Guangdong) Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by:		kontrolliert von / reviewed by:			
27.11.2018 Arthur Liu / Project Manager		27.11.2018 Storm Shu / Technical Certifier			
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other: FCC ID: H38FORZA15A					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

V04

Test Summary

5.1.1 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER***RESULT: Pass***5.1.3 CONDUCTED POWER SPECTRAL DENSITY***RESULT: Pass***5.1.4 6dB BANDWIDTH***RESULT: Pass***5.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH***RESULT: Pass***5.1.6 RADIATED SPURIOUS EMISSION***RESULT: Pass***5.1.7 20dB BANDWIDTH***RESULT: Pass***5.1.8 CARRIER FREQUENCY SEPARATION***RESULT: Pass***5.1.9 NUMBER OF HOPPING FREQUENCY***RESULT: Pass***5.1.10 TIME OF OCCUPANCY***RESULT: Pass***5.1.11 CONDUCTED EMISSION ON AC MAINS***RESULT: Pass***6.1.1 ELECTROMAGNETIC FIELDS***RESULT: Pass*

Contents

1	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS	5
2	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	6
2.3	TRACEABILITY	6
2.4	CALIBRATION	6
2.5	MEASUREMENT UNCERTAINTY.....	6
2.6	LOCATION OF ORIGINAL DATA.....	6
2.7	STATUS OF FACILITY USED FOR TESTING.....	7
3	GENERAL PRODUCT INFORMATION	8
3.1	PRODUCT FUNCTION AND INTENDED USE.....	8
3.2	RATINGS AND SYSTEM DETAILS	8
3.3	INDEPENDENT OPERATION MODES	11
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	11
3.5	SUBMITTED DOCUMENTS.....	11
4	TEST SET-UP AND OPERATION MODES	12
4.1	PRINCIPLE OF CONFIGURATION SELECTION	12
4.2	TEST OPERATION AND TEST SOFTWARE.....	12
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	12
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	12
4.5	TEST SETUP DIAGRAM	13
5	TEST RESULTS	15
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	15
5.1.1	<i>Antenna Requirement</i>	<i>15</i>
5.1.2	<i>Maximum Peak Conducted Output Power.....</i>	<i>16</i>
5.1.3	<i>Conducted Power Spectral Density</i>	<i>17</i>
5.1.4	<i>6dB Bandwidth</i>	<i>18</i>
5.1.5	<i>Conducted Spurious Emissions Measured in 100 kHz Bandwidth</i>	<i>19</i>
5.1.6	<i>Radiated Spurious Emission</i>	<i>20</i>
5.1.7	<i>20dB Bandwidth</i>	<i>21</i>
5.1.8	<i>Carrier Frequency Separation.....</i>	<i>22</i>
5.1.9	<i>Number of Hopping Frequency.....</i>	<i>23</i>
5.1.10	<i>Time of Occupancy.....</i>	<i>24</i>
5.1.11	<i>Conducted Emission on AC Mains</i>	<i>25</i>
6	SAFETY HUMAN EXPOSURE	26
6.1	RADIO FREQUENCY EXPOSURE COMPLIANCE	26
6.1.1	<i>Electromagnetic Fields.....</i>	<i>26</i>
7	PHOTOGRAPHS OF THE TEST SET-UP	27

8	LIST OF TABLES.....	27
---	---------------------	----

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory

No.102, 1F of Southwest and No.205, 2F of West Warehouse Building, No.767 Tianyuan Road, Tianhe District, Guangzhou, Guangdong, P.R. China

FCC Accreditation Designation No.: CN1207

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For the measurement Equipment list, refer to the appendix B.

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Item		Extended Uncertainty
Conducted Emission		± 2.68 dB
Radiated Emission (9kHz-30MHz)	Field strength (dB μ V/m)	U=3.08dB, k=2, σ =95%
Radiated Emission (30-1000MHz)	Field strength (dB μ V/m)	U=5.16dB, k=2, σ =95%
Radiated Emission (above 1000MHz)	Field strength (dB μ V/m)	U=3.08dB, k=2, σ =95%
Radio Spectrum		± 0.60 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Guangdong) Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory
No.102, 1F of Southwest and No.205, 2F of West Warehouse Building, No.767 Tianyuan Road, Tianhe District, Guangzhou, Guangdong, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements

3 General Product Information

3.1 Product Function and Intended Use

The EUTs SH 15A.800, SH 12A.800, FORZA 15A and FORZA 12A are Active Speakers for indoor use. The unit supports BT4.2 wireless technologies.

Model difference:

FORZA 15A is identical to FORZA 12A except size of speaker box.

SH 15A.800 is identical to FORZA 15A except type number and trade mark.

SH 12A.800 is identical to FORZA 12A except type number and trade mark.

According to the above information, all applicable tests have been performed on FORZA 15A.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Active Speaker
Type Designation	FORZA 15A, FORZA 12A, SH 15A.800, SH 12A.800
FCC ID	H38FORZA15A
Operating Voltage	AC110-120V,50/60Hz AC220-240V,50/60Hz
Testing Voltage	AC120V,60Hz
Technical Specification of Bluetooth 4.2 (double mode)	
Operating Frequency	2402 - 2480 MHz
Type of Modulation	GFSK, $\pi/4$ DQPSK
Channel Number	79 Channels(for FHSS) 40 Channels(for DSSS)
Channel Separation	1 MHz (for FHSS) 2 MHz (for DSSS)
Antenna Type	Integral Antenna
Gain	0 dBi

Table 3: RF Channel and Frequency of General 2.4GHz

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402.00	20	2422.00	40	2442.00	60	2462.00
1	2403.00	21	2423.00	41	2443.00	61	2463.00
2	2404.00	22	2424.00	42	2444.00	62	2464.00
3	2405.00	23	2425.00	43	2445.00	63	2465.00
4	2406.00	24	2426.00	44	2446.00	64	2466.00
5	2407.00	25	2427.00	45	2447.00	65	2467.00
6	2408.00	26	2428.00	46	2448.00	66	2468.00
7	2409.00	27	2429.00	47	2449.00	67	2469.00
8	2410.00	28	2430.00	48	2450.00	68	2470.00
9	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	78	2480.00
19	2421.00	39	2441.00	59	2461.00	/	/

Table 4: RF Channel and Frequency of Bluetooth Low Energy

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	2402.00	10	2422.00	20	2442.00	30	2462.00
01	2404.00	11	2424.00	21	2444.00	31	2464.00
02	2406.00	12	2426.00	22	2446.00	32	2466.00
03	2408.00	13	2428.00	23	2448.00	33	2468.00
04	2410.00	14	2430.00	24	2450.00	34	2470.00
05	2412.00	15	2432.00	25	2452.00	35	2472.00
06	2414.00	16	2434.00	26	2454.00	36	2474.00
07	2416.00	17	2436.00	27	2456.00	37	2476.00
08	2418.00	18	2438.00	28	2458.00	38	2478.00
09	2420.00	19	2440.00	29	2460.00	39	2480.00

Test frequencies are lowest channel: 2402 MHz, middle channel: 2441 MHz and highest channel: 2480 MHz.

Table 5: Frequency Hopping Information

Technical Specification	Description
Hopping Range	Hereby we declare that the frequency range of this device is: 2402-2480MHz. This is according the Bluetooth Core Specification V4.2 (double mode) for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04-E).
Hopping Sequence	Example of a 79 hopping sequence in data mode: 33,04,21,44,23,42,53,46,55,48,40,59,72,29,76,31,08,73,07,75,09,45,60,39,58,13,47,11,77,52,35,50,65,54,67,56,69,62,71,64, 7,25,27,66,57,70,74,61,78,63,10,41,05,43,15,44,64,68,02,70,06,01,51,03,55,05,03,66,53,49,36,47,
Receiver input bandwidth	The input bandwidth of the receiver is 1MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packer has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

3.3 Independent Operation Modes

The basic operation modes are:

- A. On
 - 1. Traditional Bluetooth (BDR & EDR mode)
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
 - 2. Low Energy mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, Traditional Bluetooth on Hopping channel
- C. On, Normal operation mode
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|----------------------------------|------------------|
| - Application Form | - Photo Document |
| - Block Diagram | - Schematics |
| - FCC/IC Label and Location Info | - User Manual |
| - Operation Description | |

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model FORZA 15A in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 6: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Notebook	Lenovo	E46A	EB24320428	N/A
iPhone	Apple	A1586	/	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

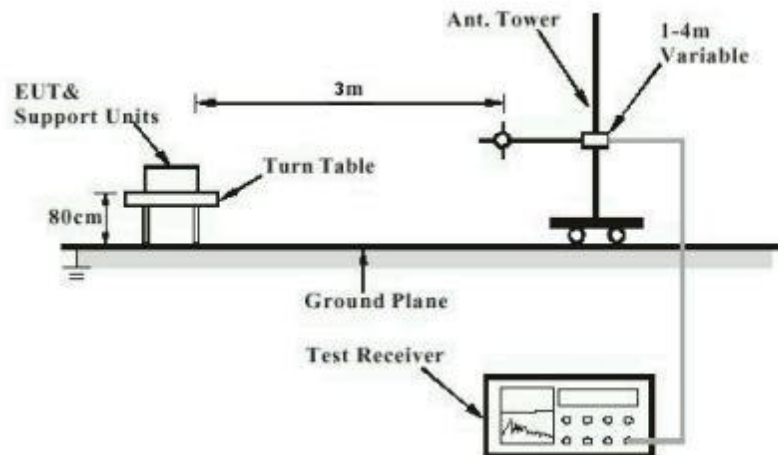


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

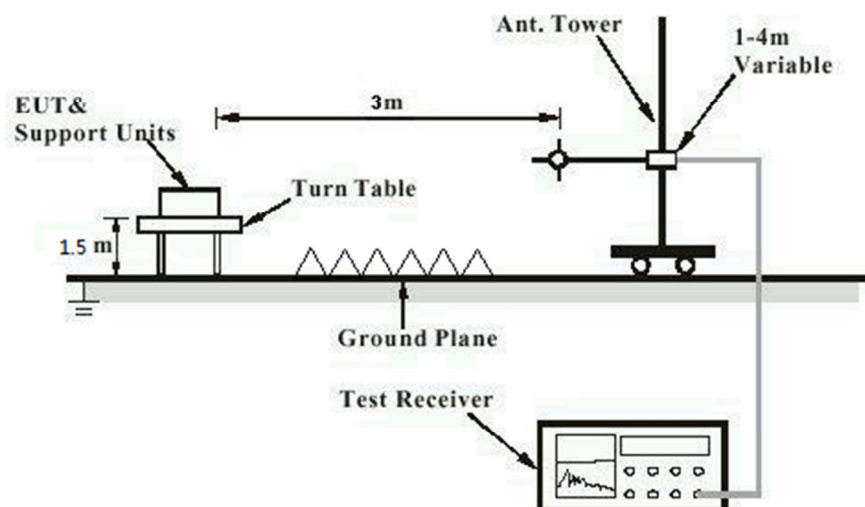


Diagram of Measurement Configuration for Mains Conduction Measurement

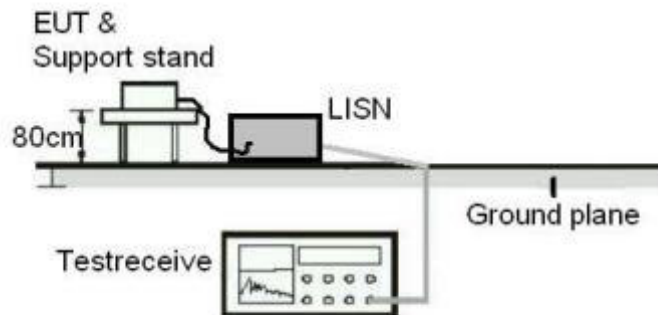
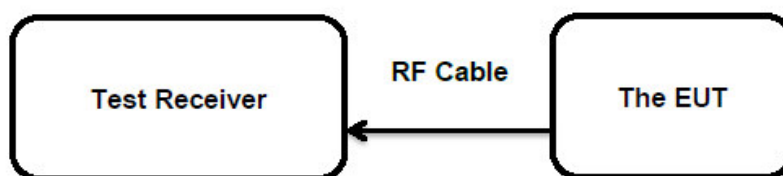


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has one internal antenna, the directional gain of antenna is 0dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT:
Pass
Test Specification

Test standard	: FCC Part 15.247(b)(1)&(3)
Basic standard	: ANSI C63.10: 2013
Limits	: FHSS < 0.125 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 16.06.2018
Input voltage	: AC110V,60Hz
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For details refer to following test result.

Table 7: Test Result of Maximum Peak Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
BDR	2402	-4.48	0.356	< 0.125
	2441	-3.76	0.421	
	2480	-3.46	0.451	
Maximum Measured Value		-3.46	0.451	

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
EDR	2402	-4.09	0.390	< 0.125
	2441	-3.42	0.455	
	2480	-3.28	0.470	
Maximum Measured Value		-3.28	0.470	

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
Low Energy	2402	2.13	1.633	< 1.0
	2440	2.05	1.603	
	2480	1.37	1.370	
Maximum Measured Value		2.13	1.633	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G) of FHSS: 0dBi,

The Maximum peak conducted output power (e.i.r.p.)= $P_{(Peak\ power)} + G$, which is far below the 4 W

5.1.3 Conducted Power Spectral Density

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(e)
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 16.06.2018
Input voltage : AC110V,60Hz
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 24 °C
Relative humidity : 50 %
Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 8: Test Result of Power Spectral Density, Low Energy

Test Mode	Test Channel (MHz)	Power Spectrum Density(dBm/3kHz)	Limit (dBm/3kHz)
Low Energy	2402	-19.640	< 8.0
	2440	-17.636	
	2480	-16.131	
Maximum Measured Value		-16.131	

5.1.4 6dB Bandwidth

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(a)(2)
Basic standard : ANSI C63.10: 2013
Limits : More than 500 KHz
Kind of test site : Shielded Room

Test Setup

Date of testing : 16.06.2018
Input voltage : AC 120V 60Hz
Operation mode : A.2
Test channel : Low / Middle / High
Ambient temperature : 24 °C
Relative humidity : 50 %
Atmospheric pressure : 101 kPa

Table 9: Test Result of 6dB Bandwidth, Low Energy

Test Mode	Test Channel (MHz)	-6dB Bandwidth (kHz)	Limit (kHz)
Low Energy	2402	671.5	> 500
	2440	673.7	
	2480	676.0	
Minimum Measured Value		671.5	

5.1.5 Conducted Spurious Emissions Measured in 100 kHz Bandwidth**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d)
Basic standard	: ANSI C63.10: 2013
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: Refer to test result
Input voltage	: AC110V,60Hz
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

5.1.6 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(d) & FCC Part 15.205
Basic standard : ANSI C63.10: 2013
Limits : Refer to 15.209(a) of FCC part 15.247(d)

Kind of test site : 3m Semi-anechoic Chamber

Test Setup

Date of testing : Refer to test result
Input voltage : AC110V,60Hz
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 22 °C
Relative humidity : 53 %
Atmospheric pressure : 101 kPa

Remark:

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

5.1.7 20dB Bandwidth

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(a)(1)
 Basic standard : ANSI C63.10: 2013
 Kind of test site : Shielded Room

Test Setup

Date of testing : 16.06.2018
 Input voltage : AC110V,60Hz
 Operation mode : A
 Test channel : Low / Middle / High
 Ambient temperature : 24 °C
 Relative humidity : 50 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 10: Test Result of 20dB Bandwidth, General 2.4GHz

Test Mode	Test Channel (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
BDR	2402	844.3	562.8	/
	2441	799.7	533.1	
	2480	840.4	560.3	
Maximum Measured Value		844.3	562.8	

Test Mode	Test Channel (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
EDR	2402	1157.5	771.7	/
	2441	1158.8	772.6	
	2480	1158.9	772.6	
Maximum Measured Value		1158.9	772.6	

5.1.8 Carrier Frequency Separation

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(a)(1)
 Basic standard : ANSI C63.10: 2013
 Limits : $\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth, whichever is greater
 Kind of test site : Shielded Room

Test Setup

Date of testing : 16.06.2018
 Input voltage : AC110V,60Hz
 Operation mode : C
 Test channel : Low / Middle / High
 Ambient temperature : 24 °C
 Relative humidity : 50 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 11: Test Result of Carrier Frequency Separation, General 2.4GHz

Test Mode	Test Channel	Test Channel (MHz)	Measured Channel Separation (KHz)	Limit (kHz)
FHSS	Low Channel	2402	999	≥ 25kHz or 2/3 of 20dB bandwidth
	Adjacency Channel	2403		
	Middle Channel	2441	1002	
	Adjacency Channel	2442		
	High Channel	2480	999	
	Adjacency Channel	2479		

Note: The limit is maximum 2/3 of the 20 dB bandwidth: 772.6 KHz.

5.1.9 Number of Hopping Frequency

RESULT:**Pass****Test Specification**

Test standard : FCC part 15.247(a)(1)(iii)
Basic standard : ANSI C63.10: 2013
Limits : ≥ 15 non-overlapping channels
Kind of test site : Shielded Room

Test Setup

Date of testing : 16.06.2018
Input voltage : AC110V,60Hz
Operation mode : C
Ambient temperature : 24 °C
Relative humidity : 50 %
Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 12: Test Result of Number of Hopping Frequency, General 2.4GHz

Test Mode	Frequency Range	Measured Quantity of Hopping Channel	Limit
FHSS	2402 - 2480 MHz	79	≥ 15

5.1.10 Time of Occupancy

RESULT:
Pass
Test Specification

Test standard : FCC part 15.247(a)(1)(iii)
 Basic standard : ANSI C63.10: 2013
 Limits : < 0.4s
 Kind of test site : Shielded Room

Test Setup

Date of testing : 16.06.2018
 Input voltage : AC110V,60Hz
 Operation mode : B
 Test channel : Low / Middle / High
 Ambient temperature : 24 °C
 Relative humidity : 50 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 13: Test Result of Time of Occupancy

Test Mode	Test Channel (MHz)	Pulse Width(ms)	Number of Channels	Measured Dwell Time(s)	Limit (s)
BDR	2402	2.926	106	0.312	0.4s
	2441	2.923	106	0.312	
	2480	2.928	106	0.312	

Test Mode	Test Channel (MHz)	Pulse Width(ms)	Number of Channels	Measured Dwell Time(s)	Limit (s)
EDR	2402	2.925	106	0.312	0.4s
	2441	2.929	106	0.312	
	2480	2.929	106	0.312	

Note:

Dwell time = Pulse width x Number of channels in Period

Period = 0.4 (seconds/ channel) x 79 (channel) = 31.6 seconds

5.1.11 Conducted Emission on AC Mains**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.207(a)
Basic standard	: ANSI C63.10: 2013
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.207(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: Refer to test result
Input voltage	: AC110V,60Hz
Operation mode	: C
Earthing	: Not connected
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:**Pass****Test Specification**

Test standard : CFR47 FCC Part 2: Section 2.1091
CFR47 FCC Part 1: Section 1.1310
FCC KDB Publication 447498 D01 v06

The minimum distance for the EUT is less than 5mm.
Since maximum peak output power of the transmitter is 1.63 mW <10 mW.

Hence the EUT is excluded from SAR evaluation according to FCC KDB Publication 447498 D01 General RF Exposure Guidance v06.

The maximum peak output power of the transmitter is 2.13dBm (1.63 mW), which is far below the SAR exclusion threshold level 4 mW $\approx$ 6.02 dBm.

7 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

8 List of Tables

Table 1: List of Test and Measurement Equipment.....	6
Table 2: Technical Specification of EUT	8
Table 3: RF Channel and Frequency of General 2.4GHz	9
Table 4: RF Channel and Frequency of Bluetooth Low Energy	9
Table 5: Frequency Hopping Information.....	10
Table 6: List of Accessories and Auxiliary Equipment.....	12
Table 7: Test Result of Maximum Peak Conducted Output Power.....	16
Table 8: Test Result of Power Spectral Density, Low Energy	17
Table 9: Test Result of 6dB Bandwidth, Low Energy	18
Table 10: Test Result of 20dB Bandwidth, General 2.4GHz	21
Table 11: Test Result of Carrier Frequency Separation, General 2.4GHz.....	22
Table 12: Test Result of Number of Hopping Frequency, General 2.4GHz.....	23
Table 13: Test Result of Time of Occupancy	24

Appendix B: Test Results

APPENDIX B: TEST RESULTS	1
APPENDIX B.1: MEASUREMENT EQUIPMENT LIST.....	2
APPENDIX B.2: CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH.....	3
<i>Low Channel of BDR mode.....</i>	<i>3</i>
.....	3
<i>Middle Channel of BDR mode.....</i>	<i>3</i>
.....	3
<i>High Channel of BDR mode.....</i>	<i>4</i>
.....	4
<i>Low Channel of EDR mode.....</i>	<i>4</i>
.....	4
<i>Middle Channel of EDR mode</i>	<i>5</i>
.....	5
<i>Band Edge, Low Channel of BDR mode.....</i>	<i>7</i>
.....	7
<i>Band Edge, Low Channel of BLE mode.....</i>	<i>8</i>
.....	8
<i>Band Edge, High Channel of BLE mode.....</i>	<i>9</i>
.....	9
<i>Band Edge, Low Channel of BDR hopping mode.....</i>	<i>9</i>
.....	9
<i>Band Edge, Low Channel of EDR mode</i>	<i>10</i>
.....	10
<i>Band Edge, Low Channel of EDR hopping mode.....</i>	<i>11</i>
.....	11
APPENDIX B.2: TEST RESULTS OF RADIATED SPURIOUS EMISSIONS	13
30MHz - 1GHz	13
.....	13
1GHz - 18GHz.....	31
APPENDIX B.5: TEST RESULTS OF CONDUCTED EMISSION ON AC MAINS.....	49

Appendix B.1: Measurement Equipment List



Measurement Equipment List

Testing Start Date 01.06.2018
Testing end date 01.09.2018

Project Manager Arthur Liu
Cost Center 41
Test Report Number 50176425 001
Order Item Number 0174083384A00180

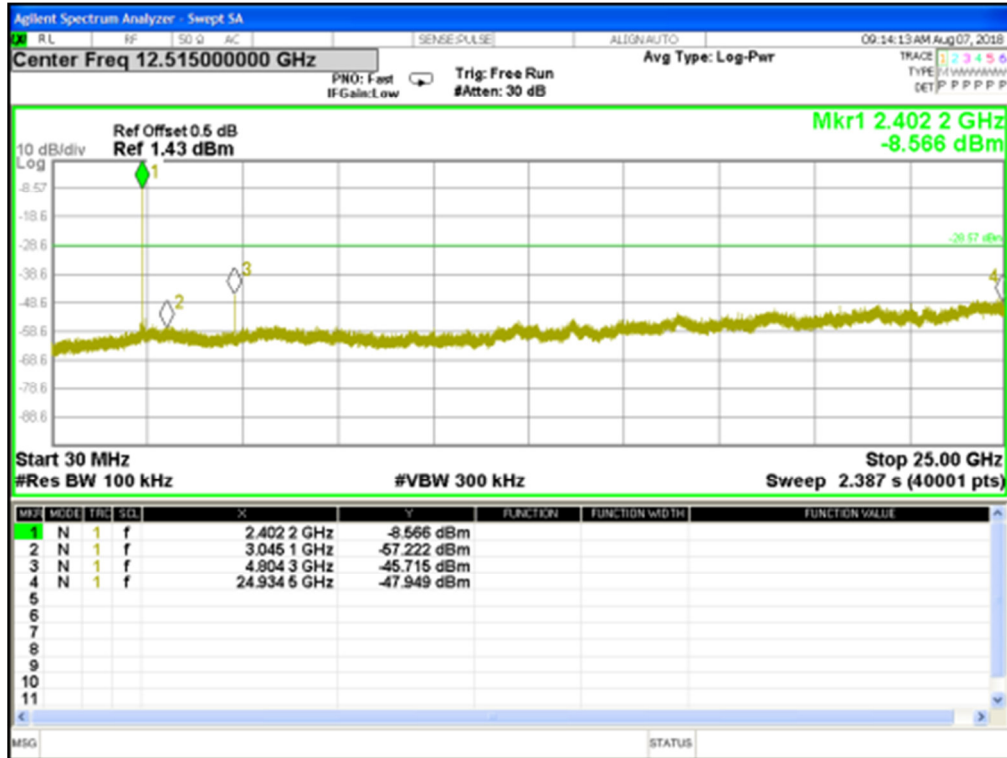
Customer Seikaku Technical Group Limited
Product Name Active Speaker
Comment

Page 1 of 1

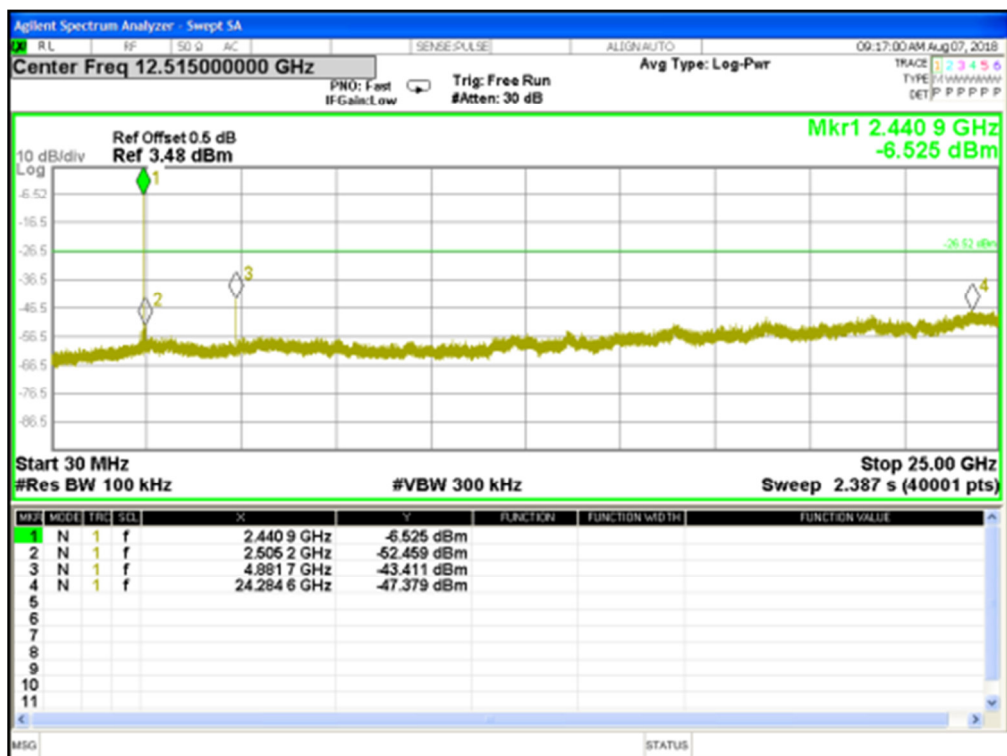
Old ID	Equip.	Description	Model	Manufacturer	Inte. (mon)	Due Date
1.887	1813944	EMI Test Receiver	ESCI	Rohde & Schwarz	12	16.03.2019
1.886	1813943	Two-Line V-Network	ENV216	Rohde & Schwarz	12	11.06.2019
1.807	1813832	EMI Test Receiver	ESCI	Rohde & Schwarz	12	23.08.2019
1.805	1813829	FSP30 Spectrum Analyzer	FSP30	Rohde & Schwarz	12	22.08.2019
1.921B	1814142	Trilog Broadband Antenna	VULB9168(6dB)	SCHWARZBECK	24	20.09.2019
1.822	1813850	Loop Antenna	HFH2-Z2	Rohde & Schwarz	24	20.09.2019
1.808	1813833	Horn Antenna	3160-09	EMCO	60	20.09.2019
1.889C	1814199	Double-Ridged Horn Antenna	HF907(3s)	Rohde & Schwarz	24	23.10.2020
1.819C	1814068	Pre-Amplifier	A44-00101800-25-10P-	MITEQ	12	16.03.2019
1.819A	1813846	Band Reject Filter	BRM50702	Micro-Tronics	24	04.07.2020
1.808A	1813834	Pre-Amplifier	A33-18002650-30-8P-4	MITEQ	24	04.07.2020
1.666	1813697	SAC	N/A	Albatross Project	36	27.11.2021
1.913	1814012	Shielding Room	9x4x3.4	Changzhou Yuanping	60	27.11.2021

Appendix B.2: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Low Channel of BDR mode

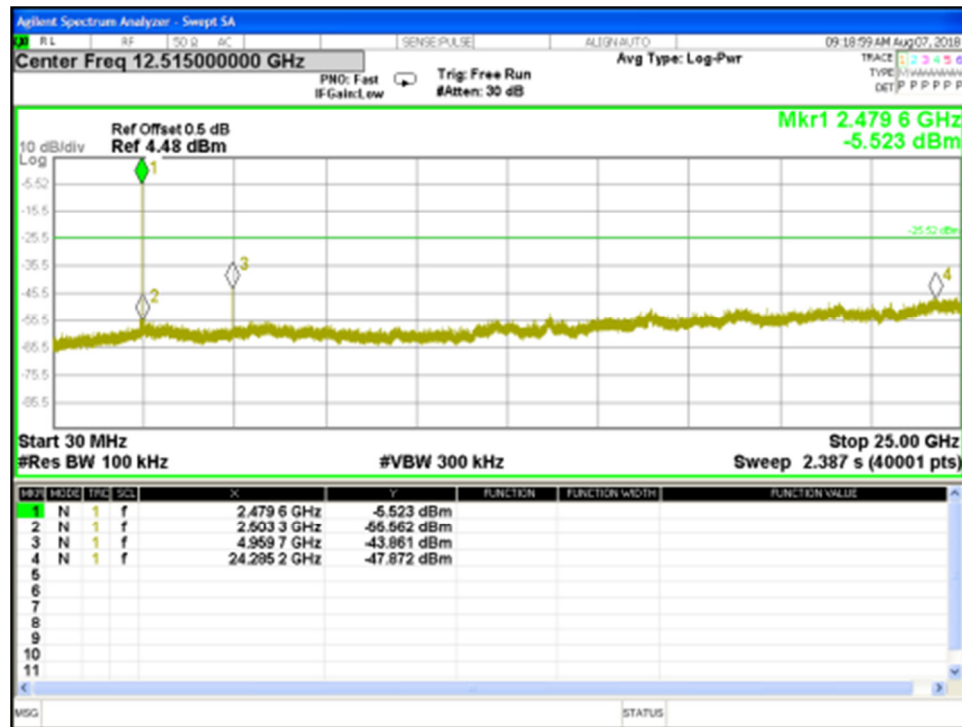


Middle Channel of BDR mode



Produkte
Products

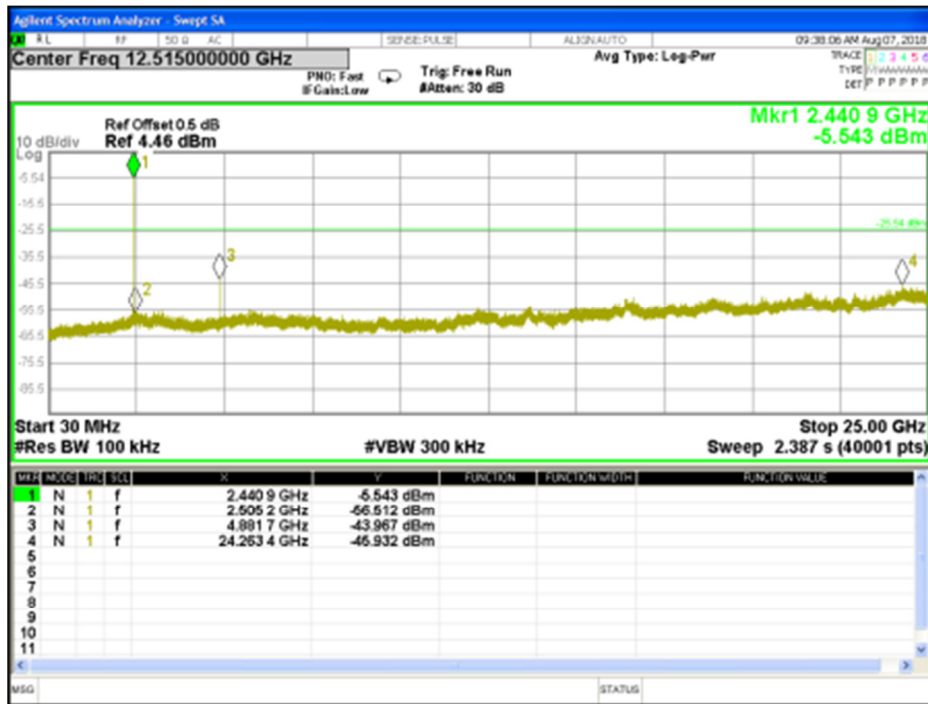
High Channel of BDR mode



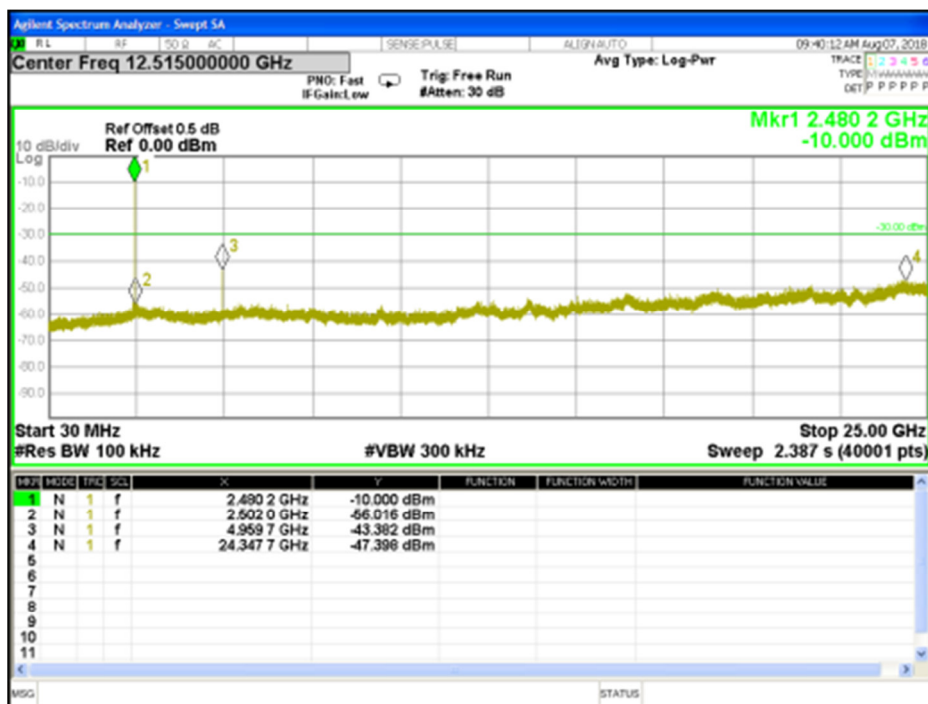
Low Channel of EDR mode



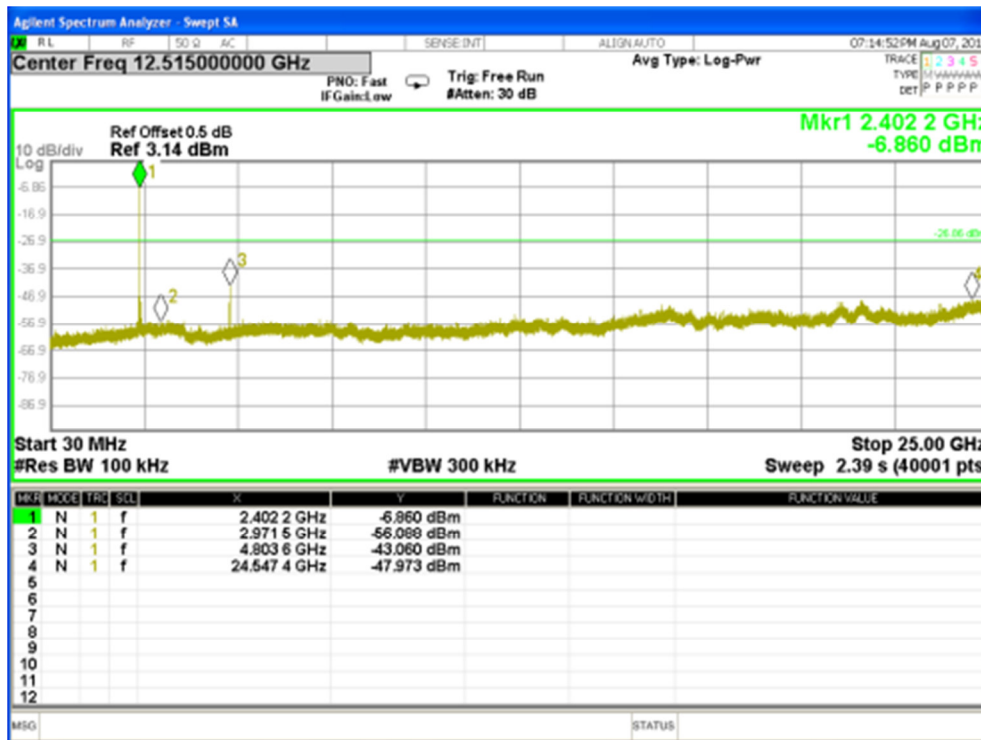
Middle Channel of EDR mode



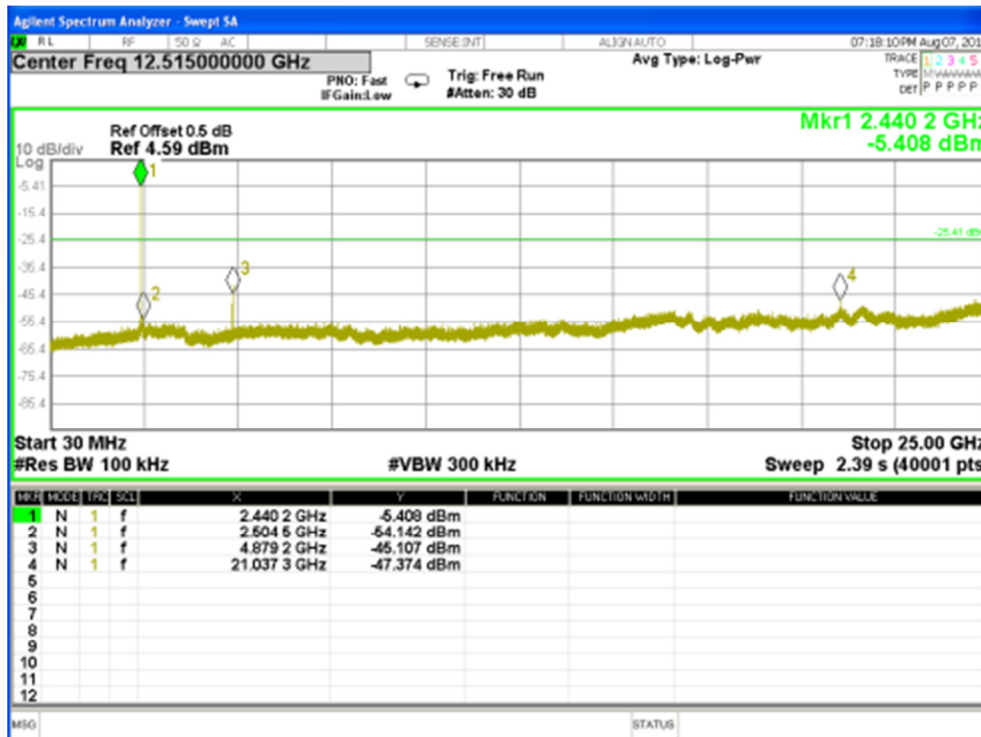
High Channel of EDR mode



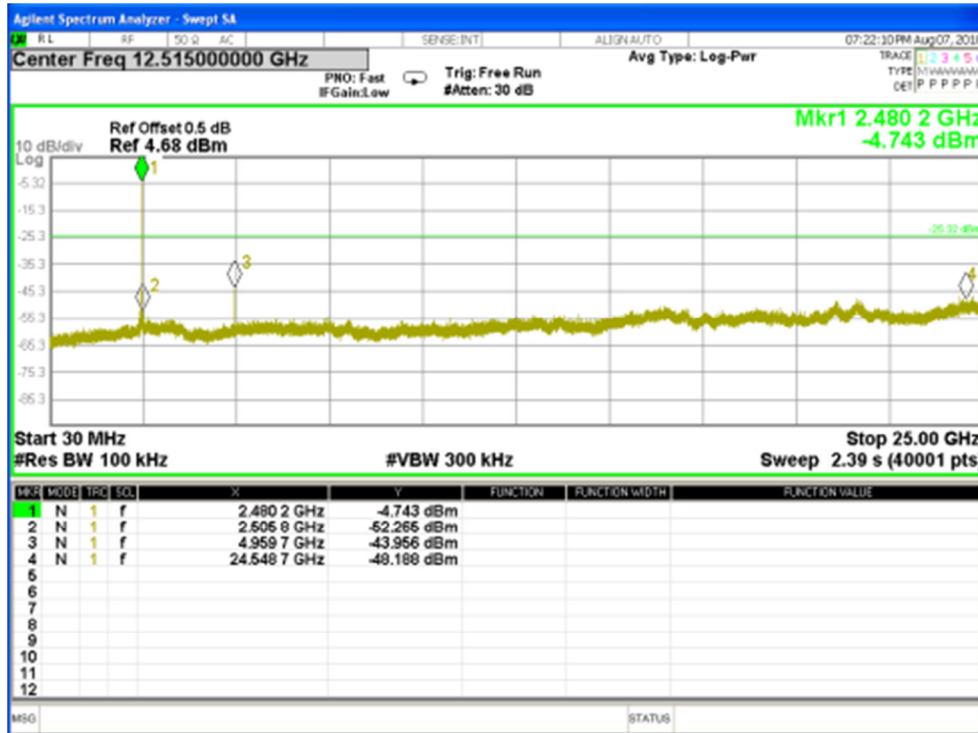
Low Channel of BLE mode



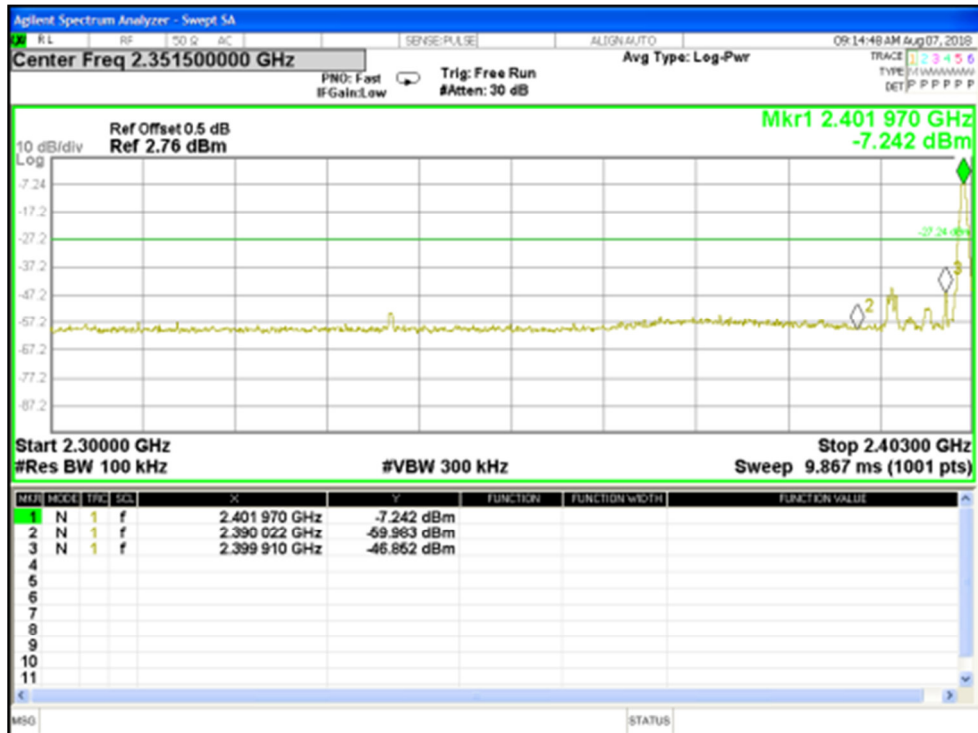
Middle Channel of BLE mode



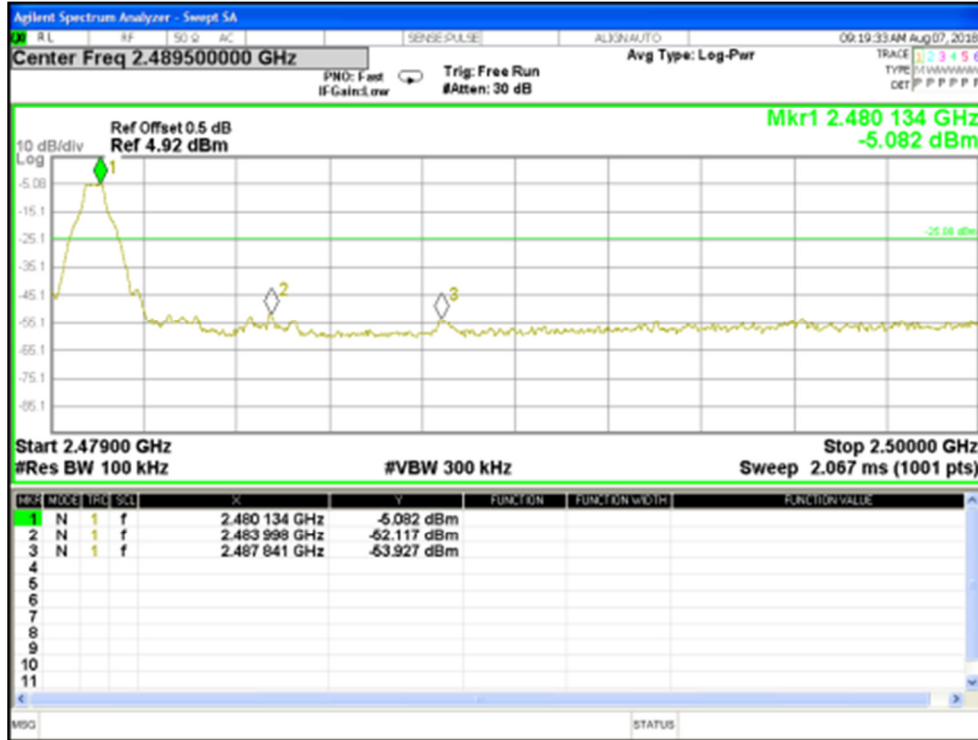
High Channel of BLE mode



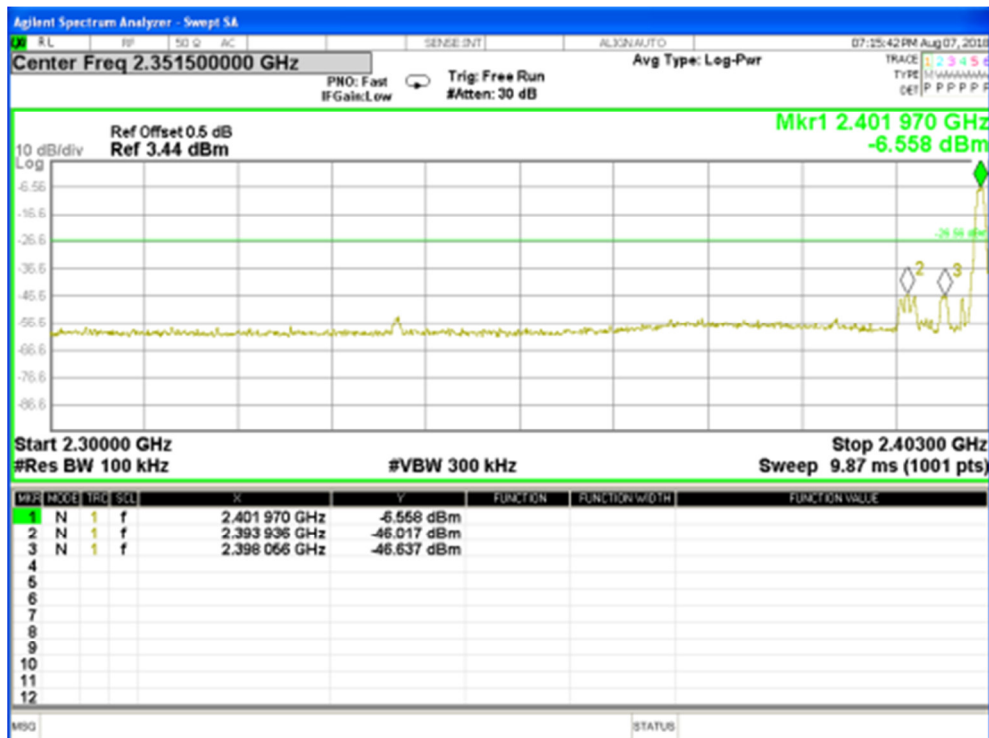
Band Edge, Low Channel of BDR mode



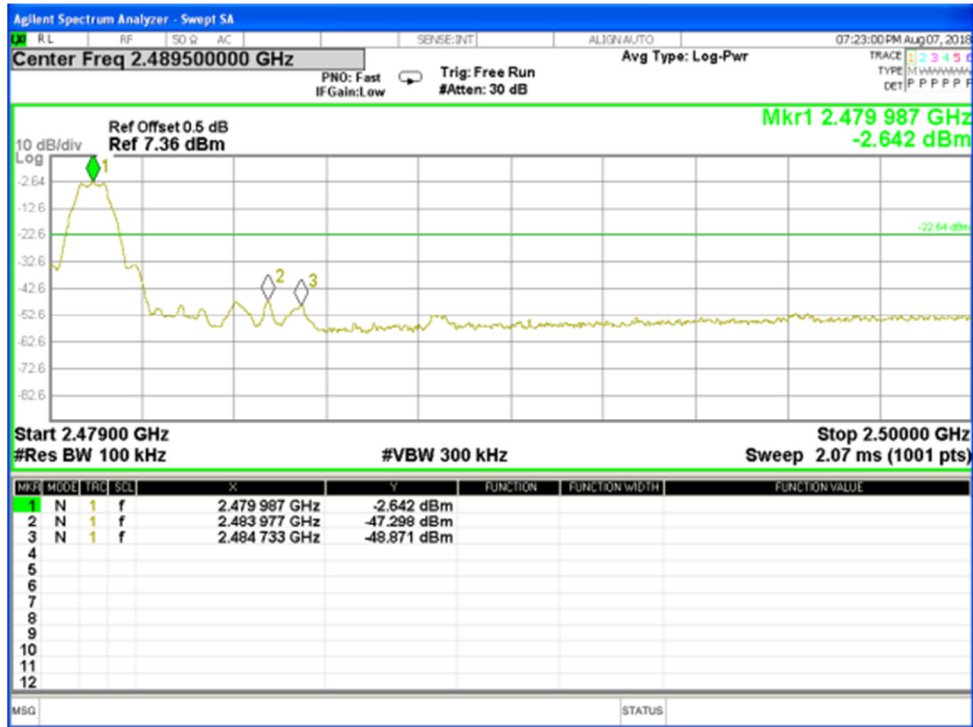
Band Edge, High Channel of BDR mode



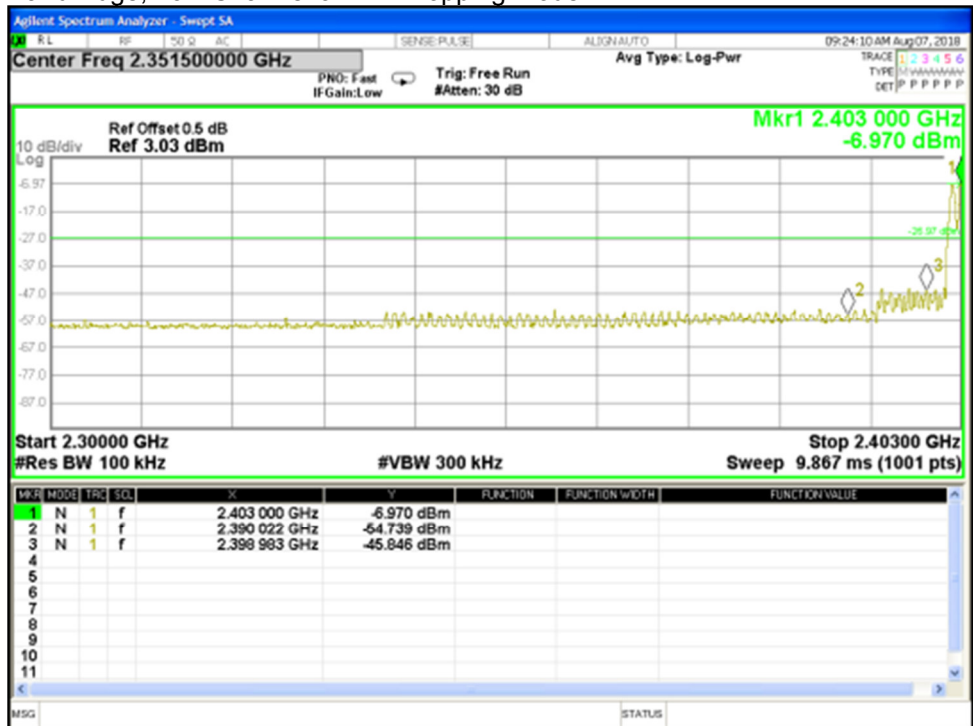
Band Edge, Low Channel of BLE mode



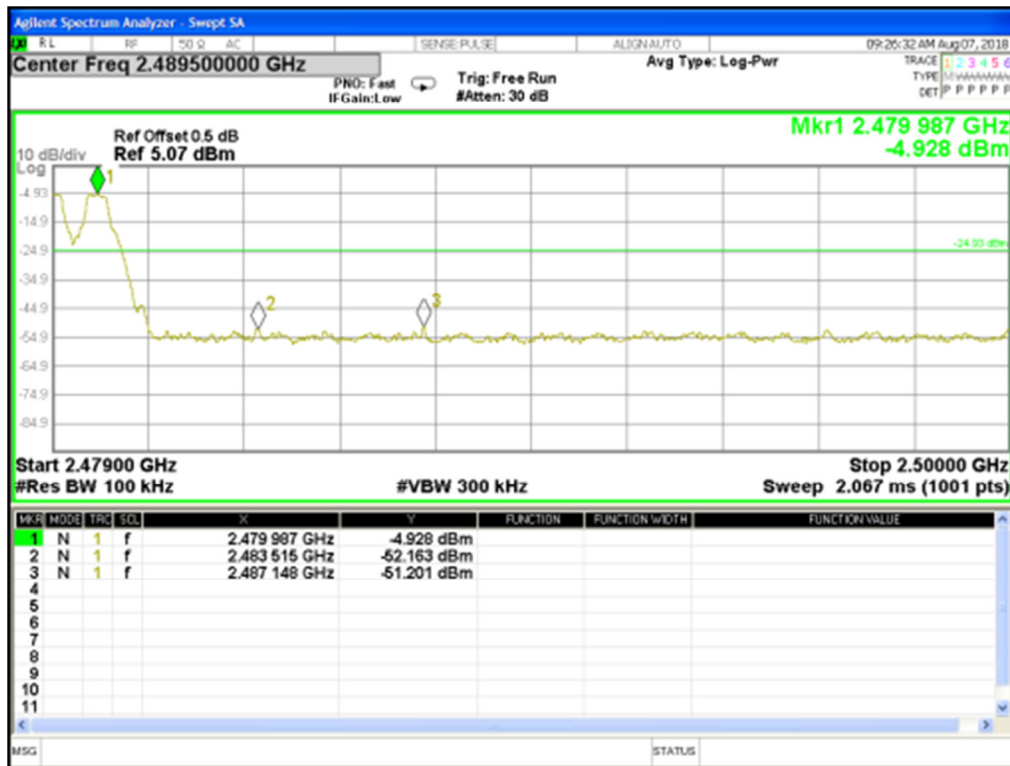
Band Edge, High Channel of BLE mode



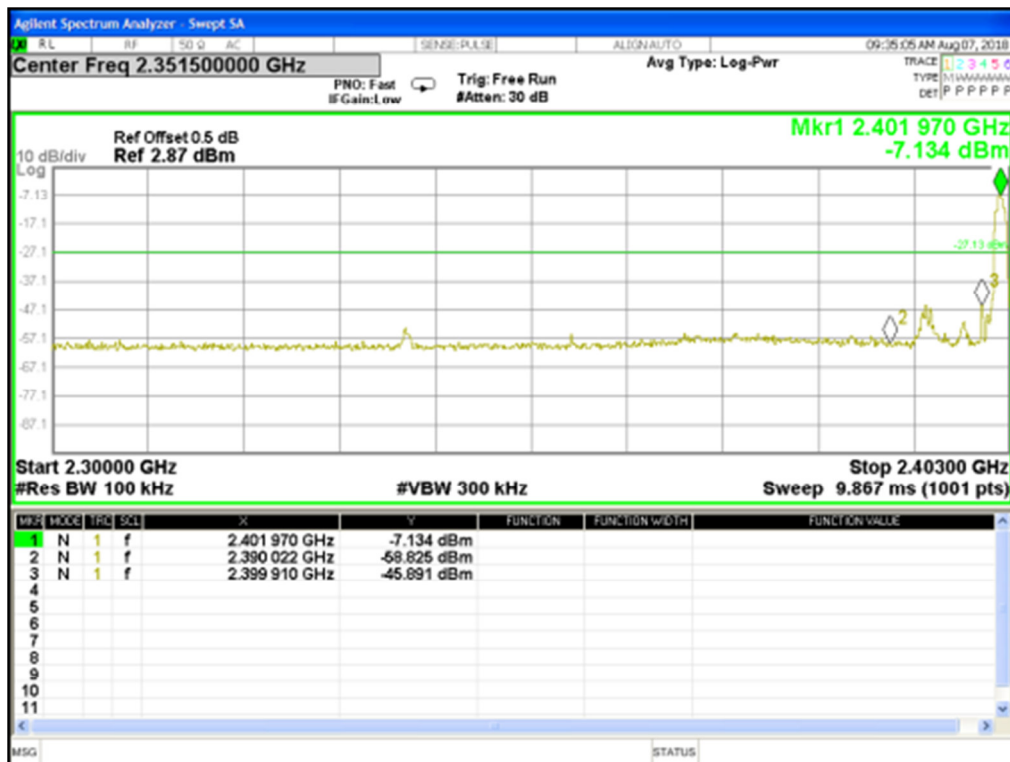
Band Edge, Low Channel of BDR hopping mode



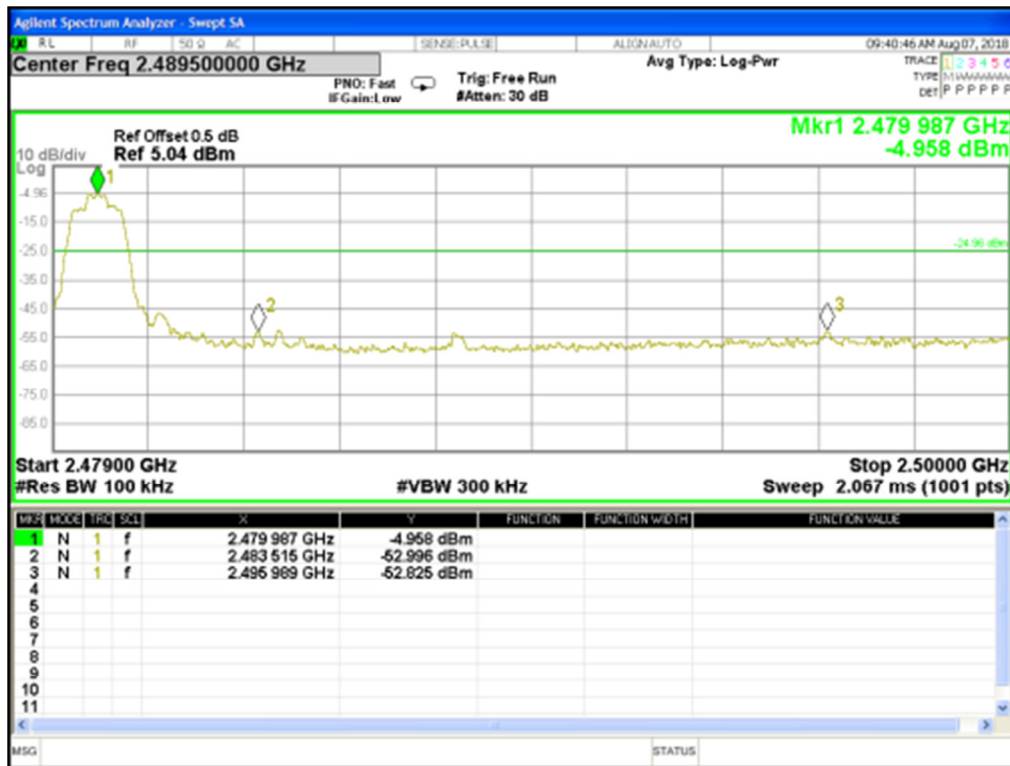
Band Edge, High Channel of BDR hopping mode



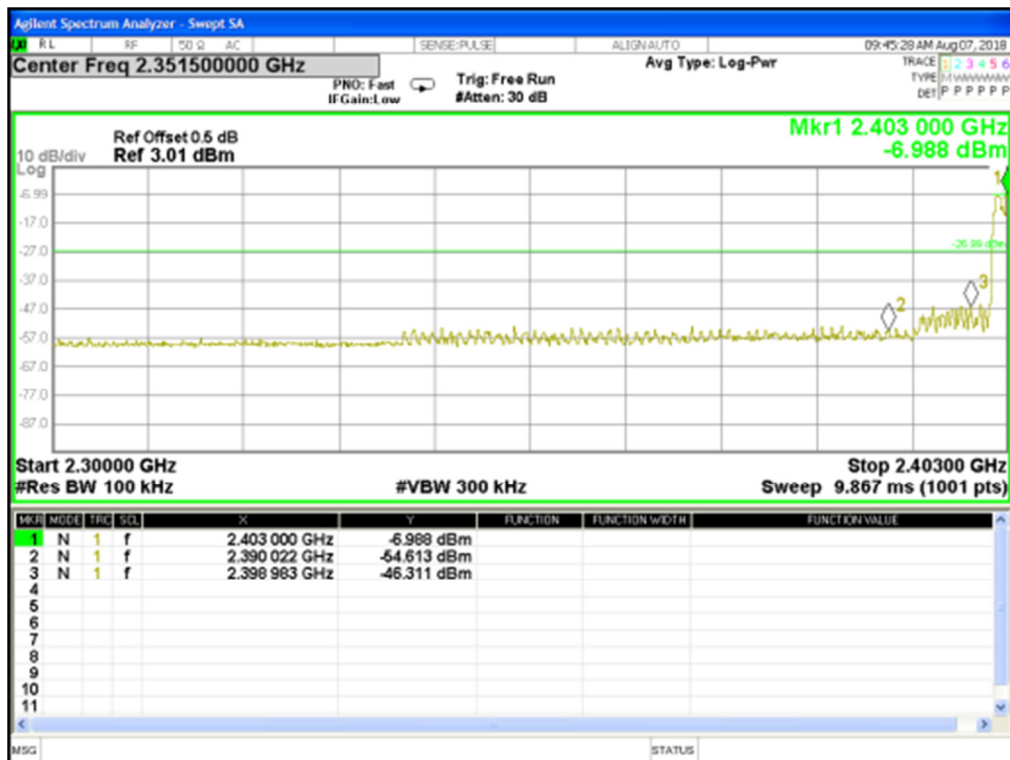
Band Edge, Low Channel of EDR mode



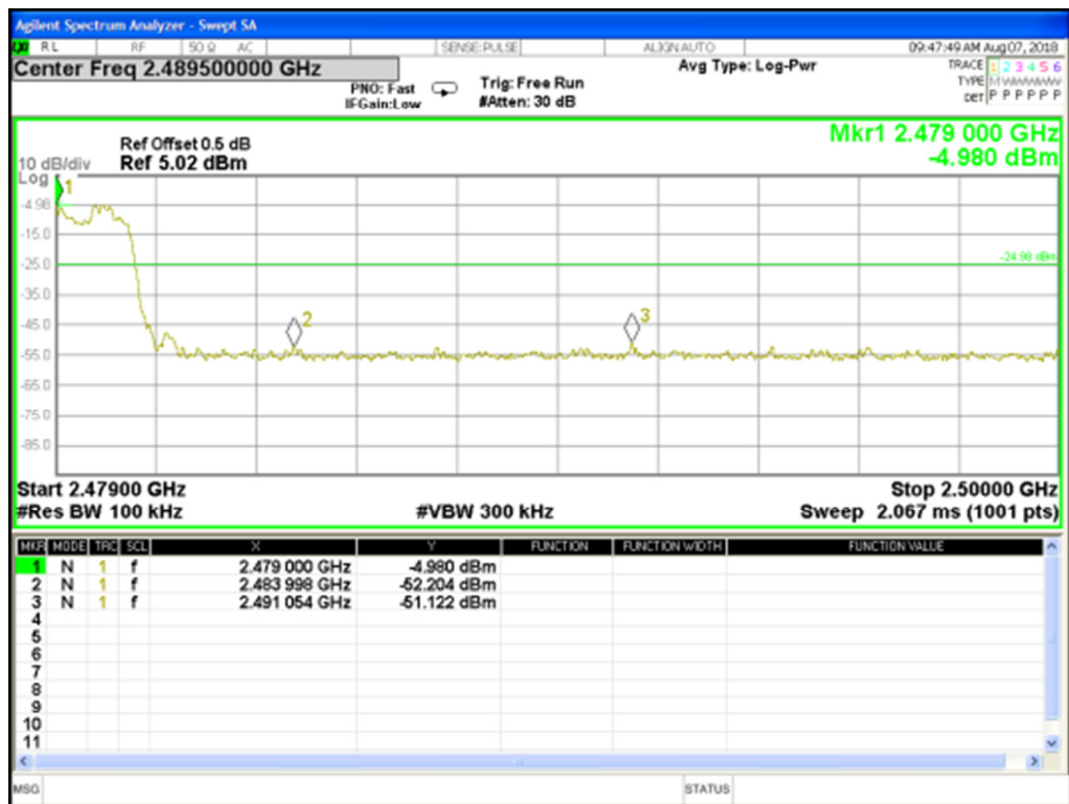
Band Edge, High Channel of EDR mode



Band Edge, Low Channel of EDR hopping mode



Band Edge, Low Channel of EDR hopping mode

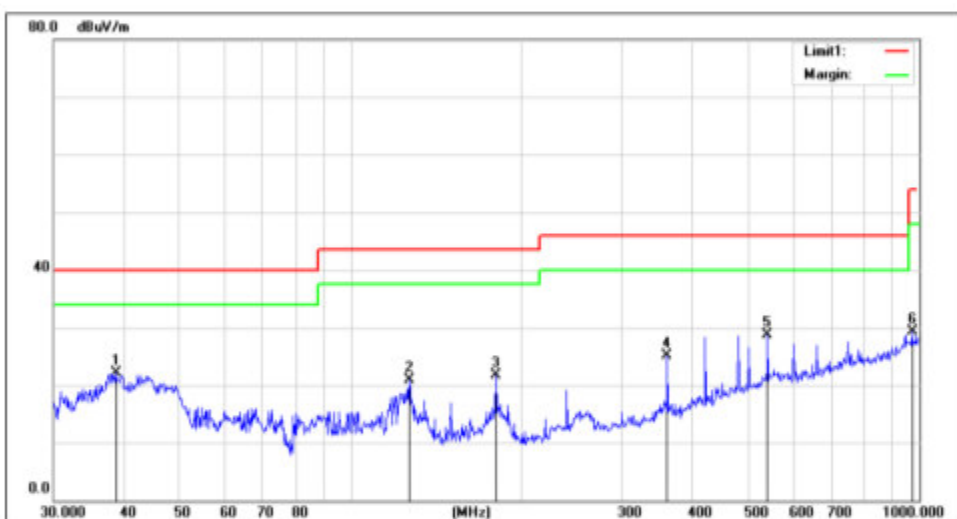


Note: Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz -26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

Appendix B.3: Test Results of Radiated Spurious Emissions

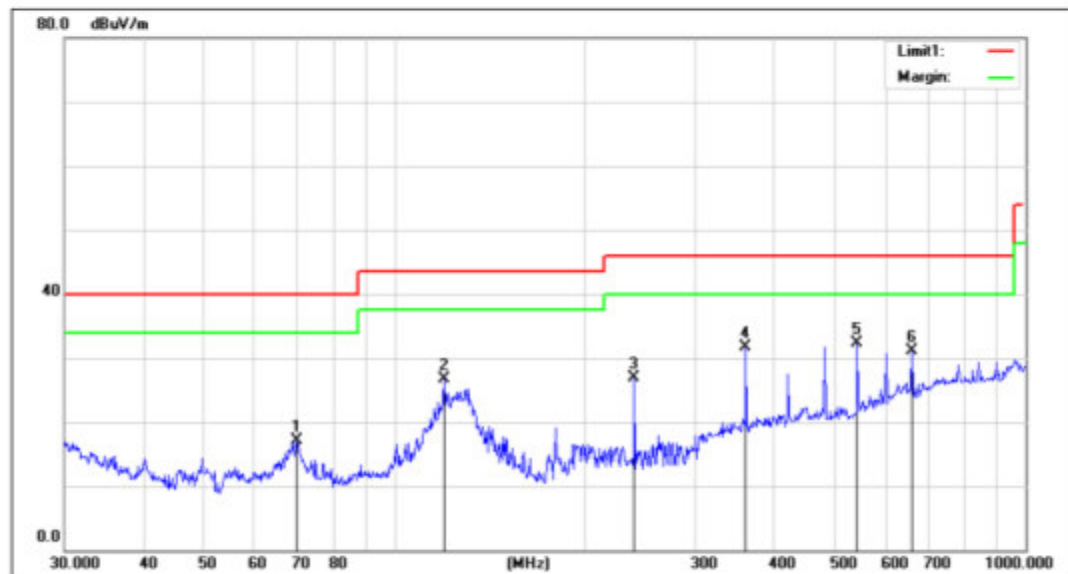
30MHz - 1GHz

Job No.:	STS1807059	Ant.Polar.:	Vertical
Standard:	FCC_PART15_C_03m_QP	Date:2018/8/7	Time:22:43:27
Test item:	Radiated Emission	Distance:	3m
Company:	WIRELESS RECEIVER AND TRANSMITTER	Temp.(C)/Hum.(%RH):	27.4(C)/62%RH
Model:	FORZA 15A	Power:	AC 120V/60Hz
Mode:	G-H	Test By:	
Description:			



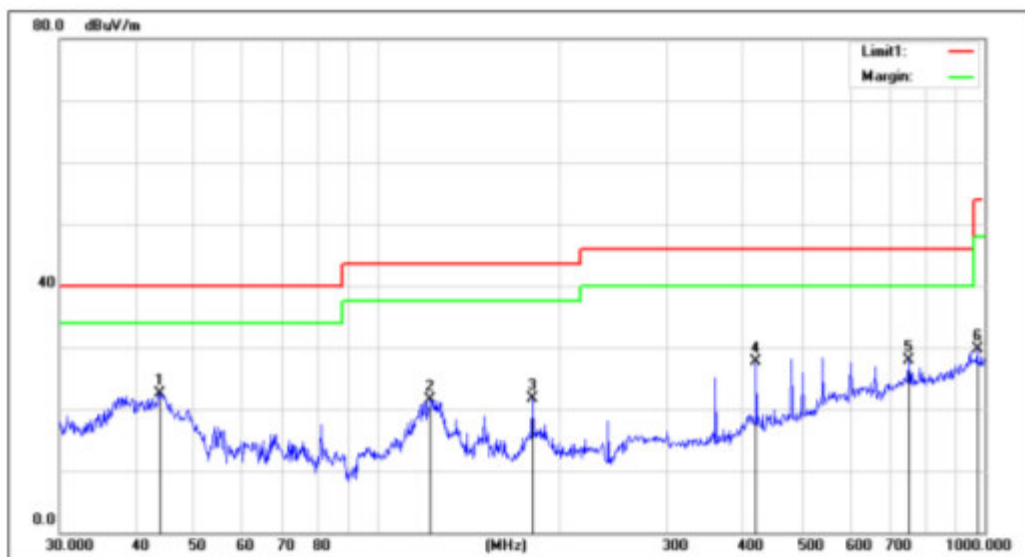
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	38.6160	37.75	-15.61	22.14	40.00	-17.86			QP
2	126.7723	38.45	-17.59	20.86	43.50	-22.64			QP
3	180.0165	41.11	-19.44	21.67	43.50	-21.83			QP
4	360.4476	38.20	-13.12	25.08	46.00	-20.92			QP
5	541.3721	35.68	-6.97	28.71	46.00	-17.29			QP
6	972.3374	29.38	-0.14	29.24	54.00	-24.76			QP

Job No.:	STS1807059	Ant.Polar.:	Horizontal
Standard:	FCC_PART15_C_03m_QP	Date:2018/8/7	Time:22:44:49
Test item:	Radiated Emission	Distance:	3m
Company:	WIRELESS RECEIVER AND TRANSMITTER	Temp.(C)/Hum.(%RH):	27.4(C)/62%RH
Model:	FORZA 15A	Power:	AC 120V/60Hz
Mode:	G-H	Test By:	
Description:			



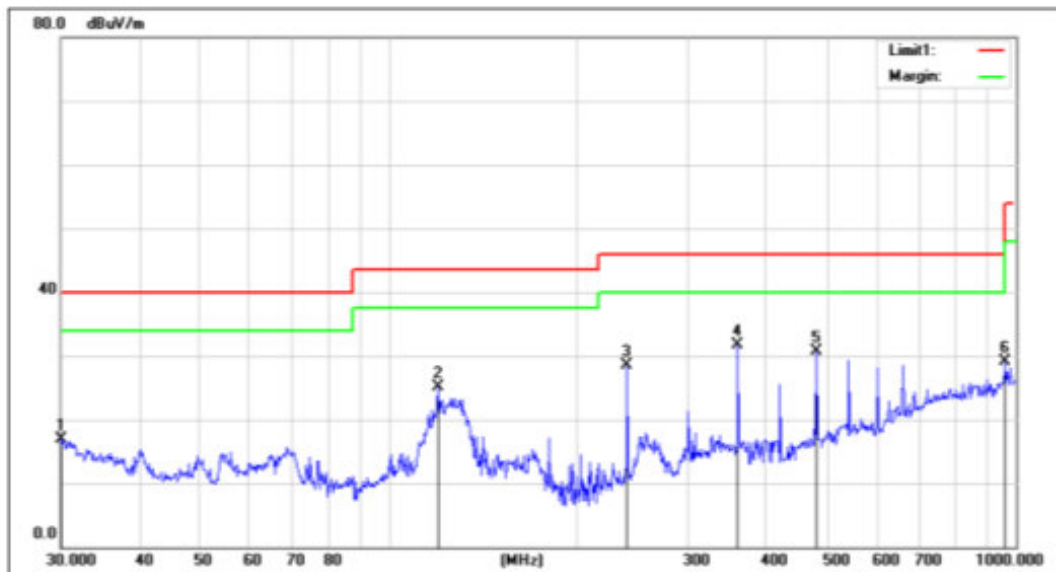
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	70.0901	41.14	-24.09	17.05	40.00	-22.95			QP
2	119.8555	44.35	-17.70	26.65	43.50	-16.85			QP
3	239.9873	44.70	-17.76	26.94	46.00	-19.06			QP
4	360.4476	44.74	-13.12	31.62	46.00	-14.38			QP
5	541.3721	39.31	-6.97	32.34	46.00	-13.66			QP
6	661.1503	37.30	-6.23	31.07	46.00	-14.93			QP

Job No.:	STS1807059	Ant.Polar.:	Vertical
Standard:	FCC_PART15_C_03m_QP	Date:2018/8/7	Time:22:43:27
Test item:	Radiated Emission	Distance:	3m
Company:	WIRELESS RECEIVER AND TRANSMITTER	Temp.(C)/Hum.(%RH):	27.4(C)/62%RH
Model:	FORZA 15A	Power:	AC 120V/60Hz
Mode:	G-M	Test By:	
Description:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	43.8120	40.87	-18.29	22.58	40.00	-17.42			QP
2	122.4040	39.21	-17.66	21.55	43.50	-21.95			QP
3	180.0165	41.11	-19.44	21.67	43.50	-21.83			QP
4	420.5803	38.64	-10.90	27.74	46.00	-18.26			QP
5	750.1082	31.56	-3.56	28.00	46.00	-18.00			QP
6	972.3374	29.88	-0.14	29.74	54.00	-24.26			QP

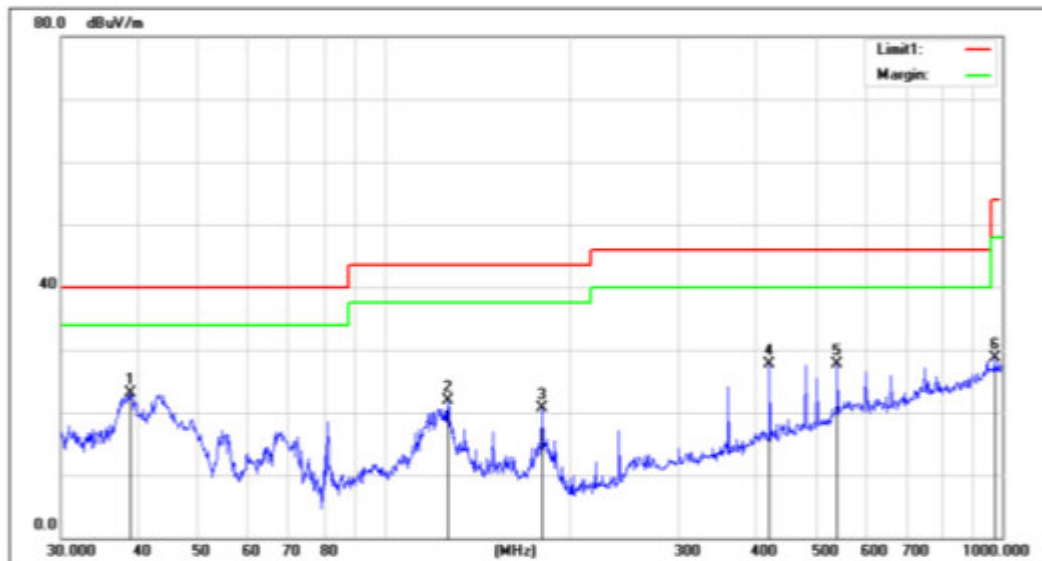
Job No.:	STS1807059	Ant.Polar.:	Horizontal
Standard:	FCC_PART15_C_03m_QP	Date:	2018/8/7
Test item:	Radiated Emission	Distance:	3m
Company:	WIRELESS RECEIVER AND TRANSMITTER	Temp.(C)/Hum.(%RH):	27.4(C)/62%RH
Model:	FORZA 15A	Power:	AC 120V/60Hz
Mode:	G-M	Test By:	
Description:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	30.0000	28.02	-11.19	16.83	40.00	-23.17			QP
2	119.8555	42.85	-17.70	25.15	43.50	-18.35			QP
3	239.9873	46.20	-17.76	28.44	46.00	-17.56			QP
4	360.4476	44.74	-13.12	31.62	46.00	-14.38			QP
5	480.5276	40.12	-9.38	30.74	46.00	-15.26			QP
6	962.1621	29.26	-0.12	29.14	54.00	-24.86			QP

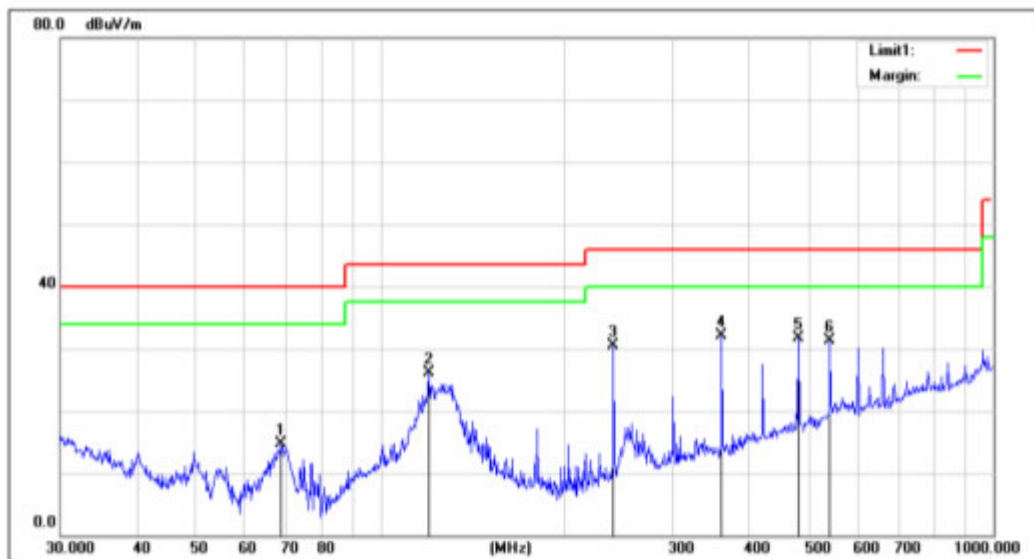
Produkte
Products

Job No.:	STS1807059	Ant.Polar.:	Vertical
Standard:	FCC_PART15_C_03m_QP	Date:2018/8/7	Time:22:43:27
Test item:	Radiated Emission	Distance:	3m
Company:	WIRELESS RECEIVER AND TRANSMITTER	Temp.(C)/Hum.(%RH):	27.4(C)/62%RH
Model:	FORZA 15A	Power:	AC 120V/60Hz
Mode:	G-L	Test By:	
Description:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	38.8878	38.82	-15.75	23.07	40.00	-16.93			QP
2	126.7723	39.45	-17.59	21.86	43.50	-21.64			QP
3	180.0165	40.11	-19.44	20.67	43.50	-22.83			QP
4	420.5803	38.64	-10.90	27.74	46.00	-18.26			QP
5	541.3725	34.68	-6.97	27.71	46.00	-18.29			QP
6	972.3374	28.88	-0.14	28.74	54.00	-25.26			QP

Job No.:	STS1807059	Ant.Polar.:	Horizontal
Standard:	FCC_PART15_C_03m_QP	Date:2018/8/7	Time:22:44:49
Test item:	Radiated Emission	Distance:	3m
Company:	WIRELESS RECEIVER AND TRANSMITTER	Temp.(C)/Hum. (%RH):	27.4(C)/62%RH
Model:	FORZA 15A	Power:	AC 120V/60Hz
Mode:	G-L	Test By:	
Description:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	68.8721	38.86	-24.13	14.73	40.00	-25.27			QP
2	119.8556	43.85	-17.70	26.15	43.50	-17.35			QP
3	239.9873	48.20	-17.76	30.44	46.00	-15.56			QP
4	360.4476	45.24	-13.12	32.12	46.00	-13.88			QP
5	480.5276	41.12	-9.38	31.74	46.00	-14.26			QP
6	541.3725	38.31	-6.97	31.34	46.00	-14.66			QP