FCC Test Report

Report No.: AGC08704170301FE08

FCC ID	:	ZBM-SDL1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Stages Dash
BRAND NAME	:	Stages Cycling LLC
MODEL NAME	:	SDL0, SDL1
CLIENT	:	Foundation Fitness LLC
DATE OF ISSUE	:	Mar. 15, 2017
STANDARD(S)	:	FCC Part 15.247 ANSI C63.10: 2013
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 15, 2017	Valid	Original Report

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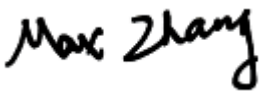
1. VERIFICATION OF COMPLIANCE

Applicant	Foundation Fitness LLC
Address	606 SE 9th Ave Portland, OR 97241
Manufacturer	Seveco Global Limited
Address	Room 1301-4 Kwong Kin Trade Center 5 Kin Fat Street Tuen Mun, Hong Kong (Headquarters)
Product Designation	Stages Dash
Brand Name	Stages Cycling LLC
Test Model	SDL0
Series Model	SDL1
Model Difference	SDL1 with the shield case covered the CPU and NFC module, but SDL0 without.
Date of test	Mar. 09, 2017 to Mar. 15, 2017
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BLE/RF (2013-03-01)

We hereby certify that:

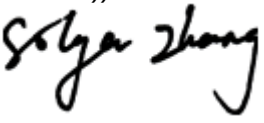
The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Tested by 

Max Zhang(Zhang Yi) Mar. 15, 2017

Reviewed by 

Bart Xie(Xie Xiaobin)) Mar. 15, 2017

Approved by 

Solger Zhang(Zhang Hongyi) Mar. 15, 2017

Authorized Officer

2.GENERAL INFORMATION

2.1PRODUCT DESCRIPTION

The EUT is “Stages Dash” designed as a “Communication Device”. It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	2.156dBm(Max)
Bluetooth Version	V4.2
Modulation	GFSK
Number of channels	40 Channel(37 Hopping Channel,3 advertising Channel)
Antenna Designation	PCB Antenna
Antenna Gain	0dBi
Hardware Version	V4
Software Version	V1.0
Power Supply	DC 5V by Micro-USB port or DC 3.7V by battery
Note: Only the test data of SDL0 (without shield) recorded in this report.	

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2404MHZ
	:	:
	38	2478 MHZ
	39	2480 MHZ

2.3 RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: ZBM-SDL1** filing to comply with Section 15.247of the FCC Part 15, Subpart C Rules.

2.4TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.5 SPECIAL ACCESSORIES

Refer to section 2.2.

2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 3.18dB
Radiated measurement: +/- 3.91dB

4. DESCRIPTION OF TEST MODES

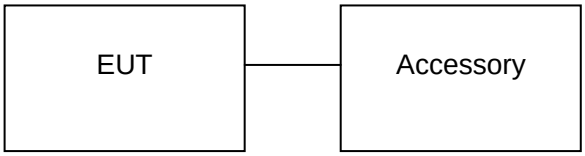
NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX

Note:
1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1 CONFIGURATION OF TESTED SYSTEM

Configuration:



5.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	STAGES DASH	SDL0	ZBM-SDL1	EUT
2	Adapter	HNSC050200UC	DC5V/2A	Support

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D, Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China.
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014.

ALL TEST EQUIPMENT LIST

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 3, 2016	June 2, 2017
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 3, 2016	June 2, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 3, 2016	June 2, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 3, 2016	June 2, 2017
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 3, 2016	June 2, 2017

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Artificial Mains Network	Narda	L2-16B	000WX31025	July 8, 2015	July 7, 2016
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 8, 2015	July 7, 2016
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2015	July 3, 2016
Shielded Room	CHENGYU	843	PTS-002	June 3, 2016	June 2, 2017

7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

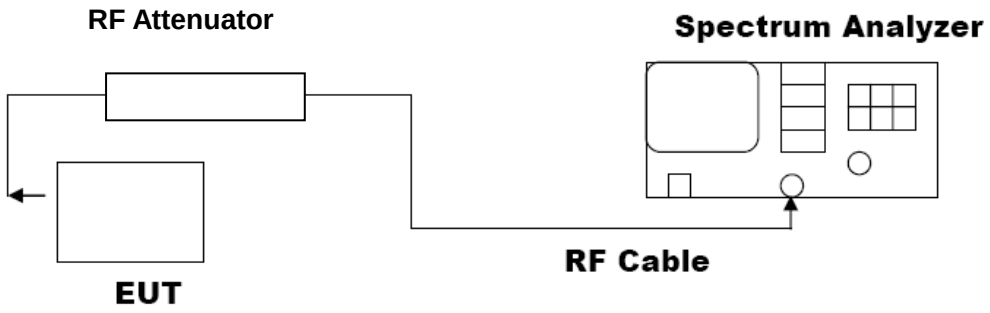
For peak power test:

1. Connect EUT RF output port(Antenna A) to the Spectrum Analyzer through an RF attenuator
2. RBW≥DTS bandwidth
3. VBW≥3*RBW.
4. SPAN≥VBW.
5. Sweep: Auto.
6. Detector function: Peak.
7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

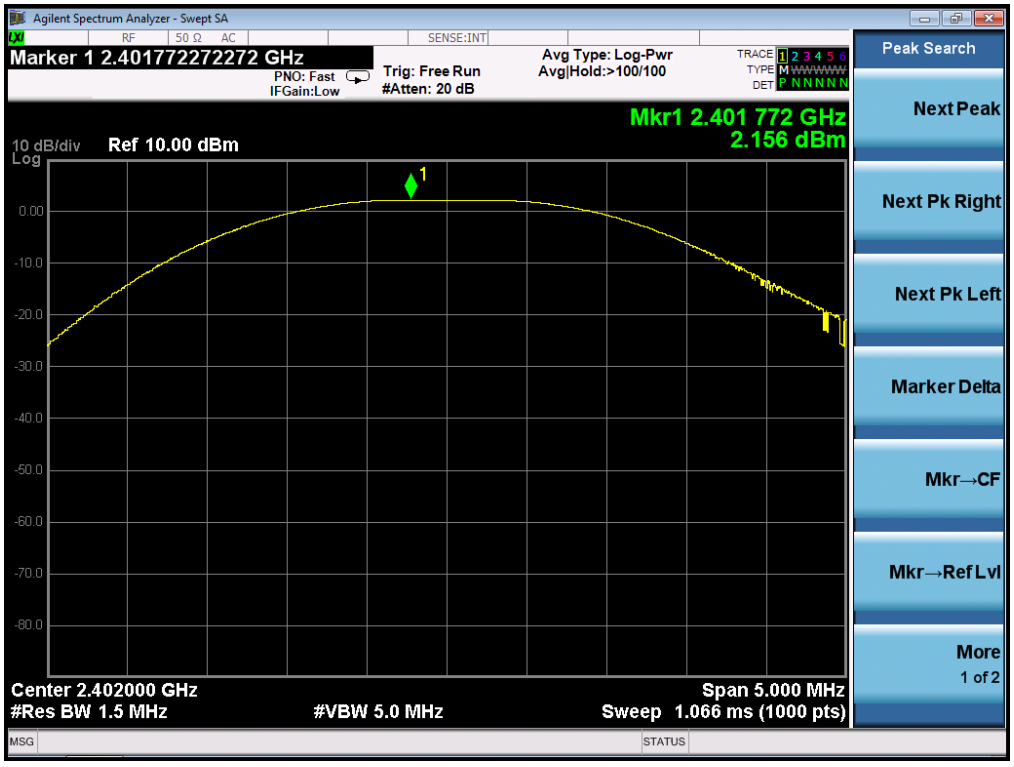
PEAK POWER TEST SETUP



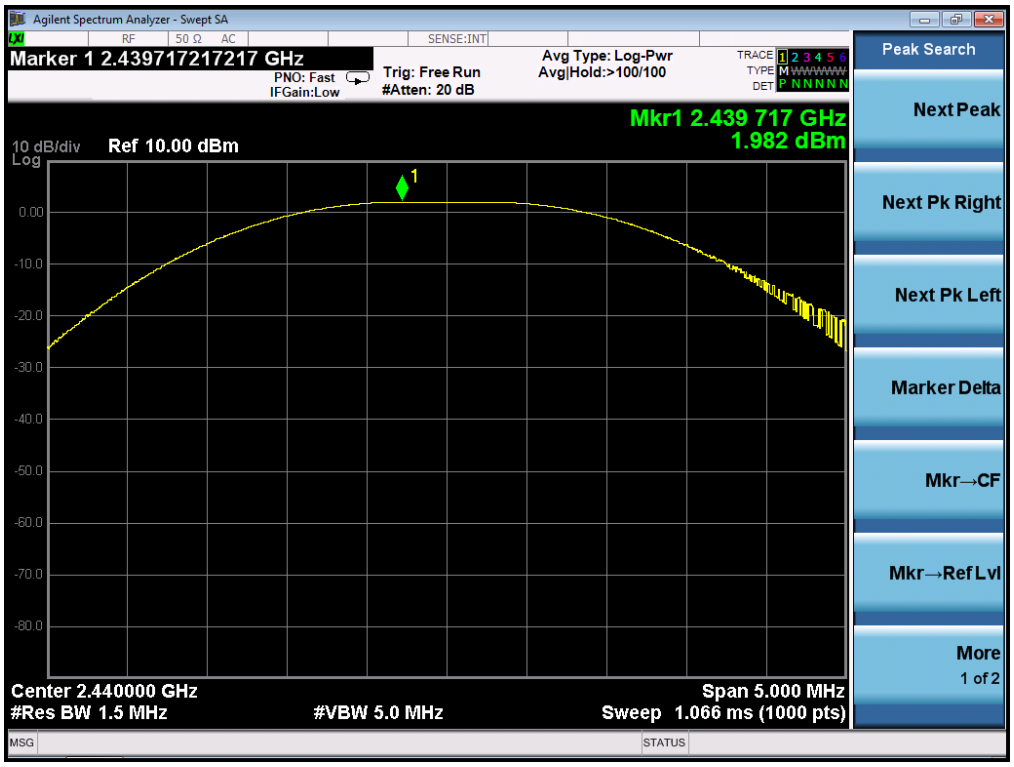
7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION			
Frequency (GHz)	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	2.156	30	Pass
2.441	1.982	30	Pass
2.480	1.828	30	Pass

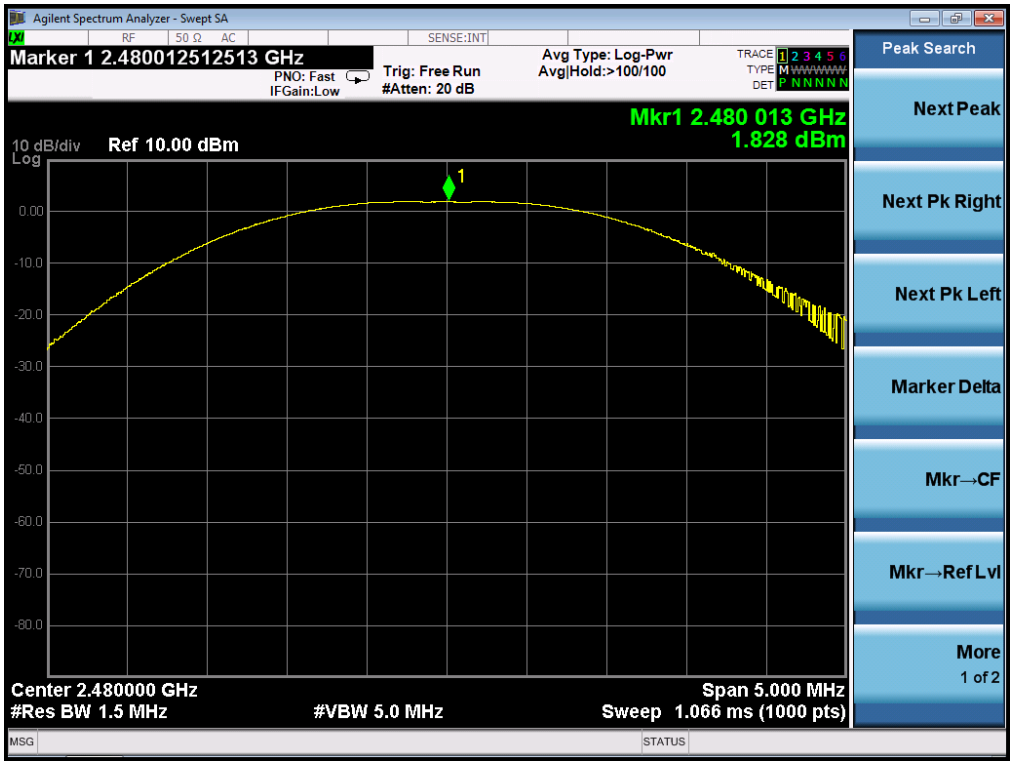
CH0



CH19


Agilent Spectrum Analyzer - Swept SA
Marker 1 2.439717217217 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.439 717 GHz
1.982 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 2.440000 GHz
#Res BW 1.5 MHz
#VBW 5.0 MHz
Span 5.000 MHz
Sweep 1.066 ms (1000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH39


Agilent Spectrum Analyzer - Swept SA
Marker 1 2.480012512513 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.480 013 GHz
1.828 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 2.480000 GHz
#Res BW 1.5 MHz
#VBW 5.0 MHz
Span 5.000 MHz
Sweep 1.066 ms (1000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

8. 6 DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port(Antenna A) to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW≥3×RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements.

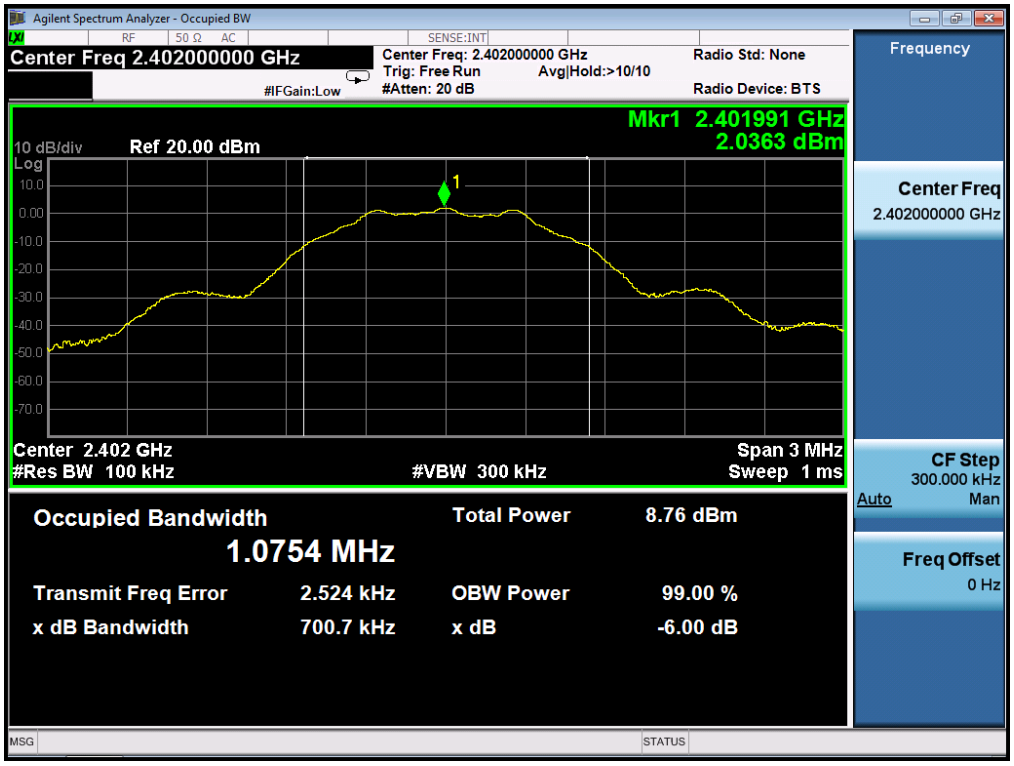
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

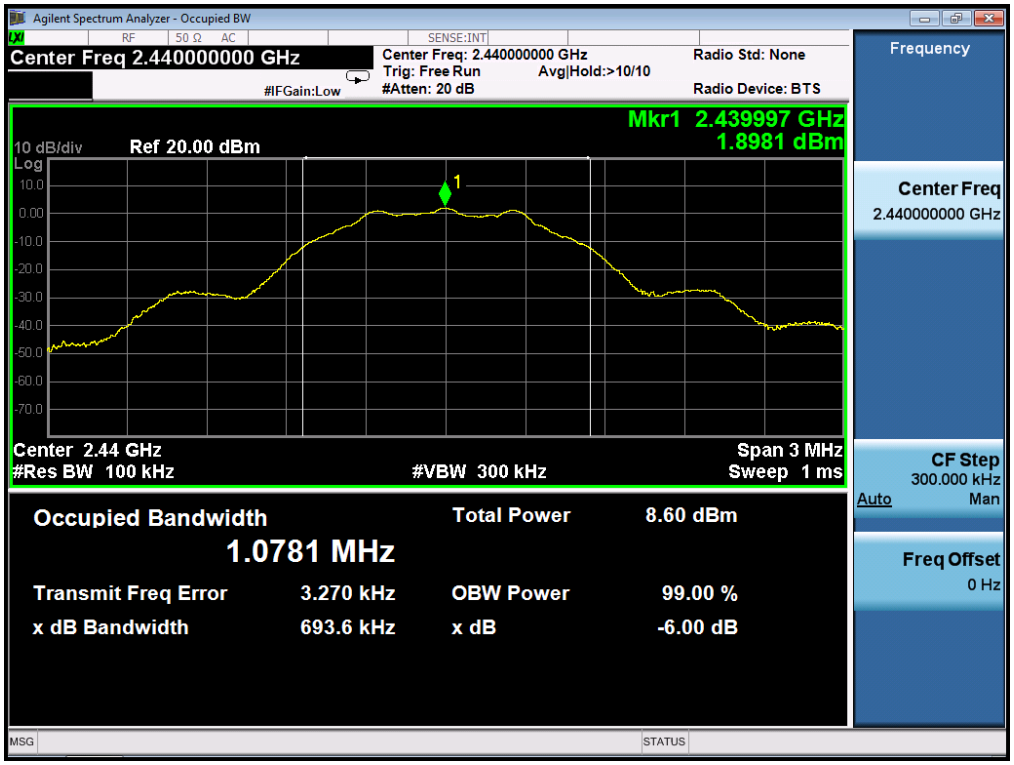
8.3. LIMITS AND MEASUREMENT RESULTS

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	**Applicable Limits**		
	Test Data (kHz)		**Criteria**
>500KHZ	Low Channel	700.7	PASS
	Middle Channel	693.6	PASS
	High Channel	707.0	PASS

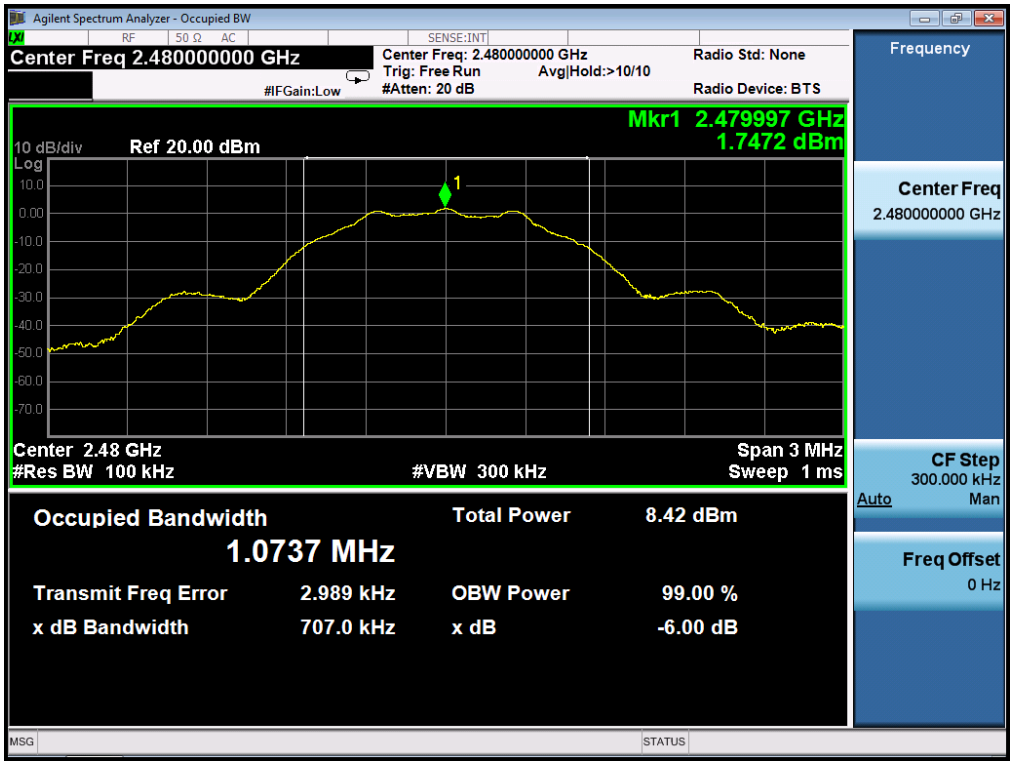
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port(Antenna A) to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

9.3. MEASUREMENT EQUIPMENT USED

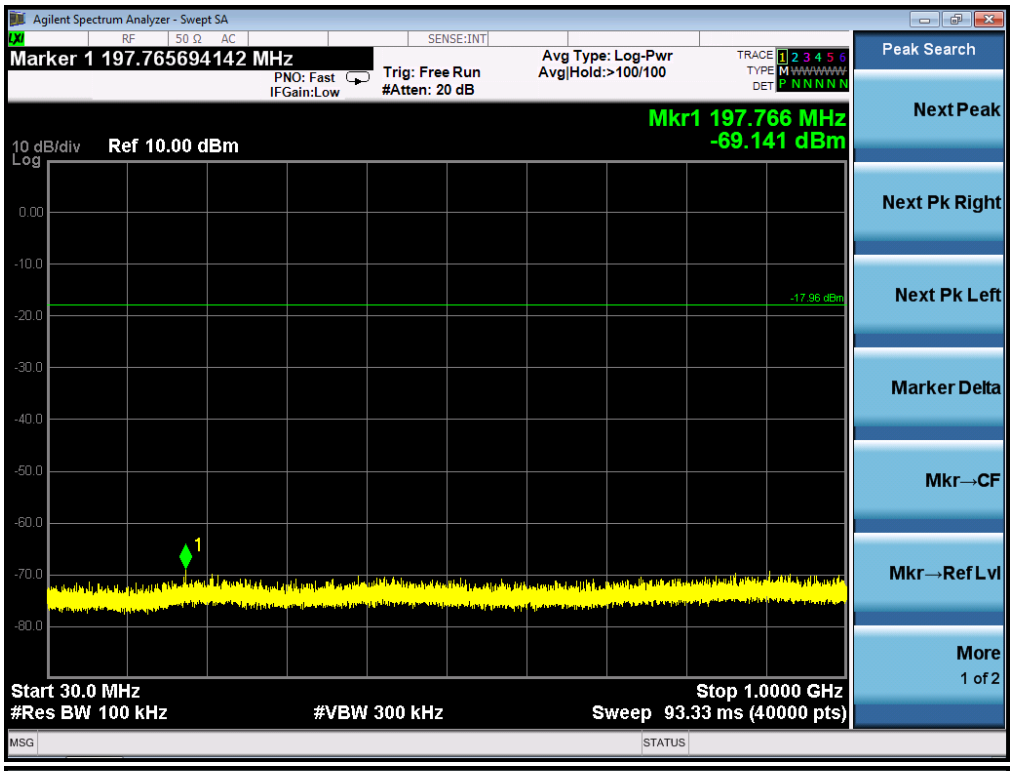
The same as described in section 6.

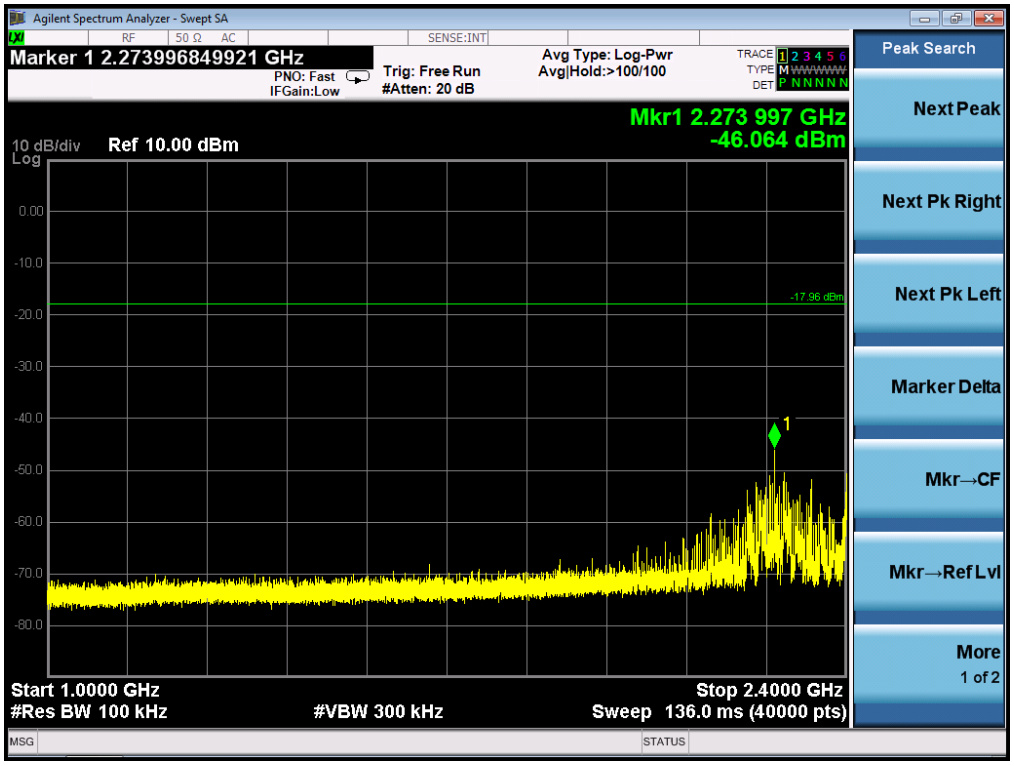
9.4. LIMITS AND MEASUREMENT RESULT

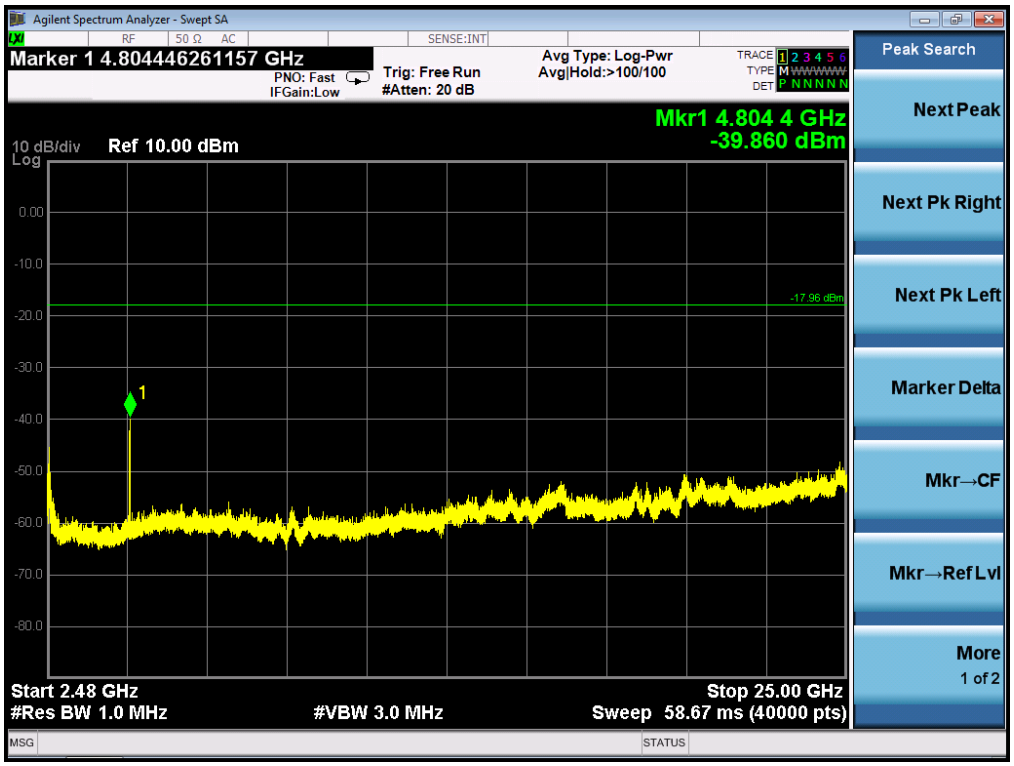
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS PASS

Note: The -20dBc limit line is calculated by the marker point of the bandwidth test plot.

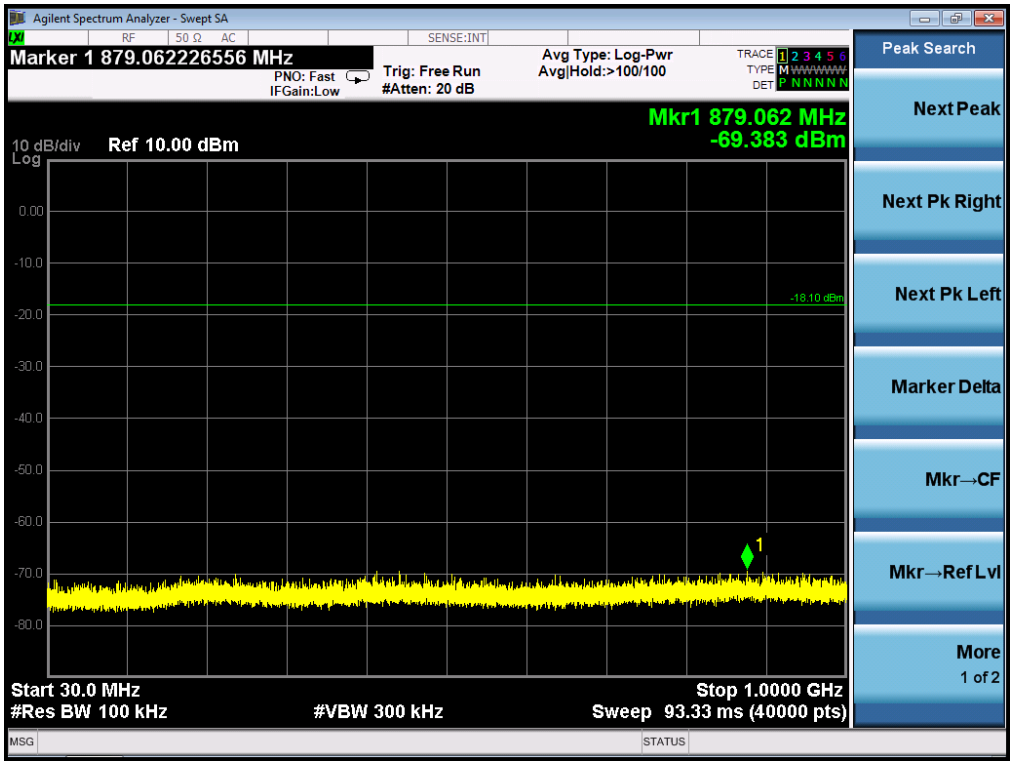
GFSK MODULATION IN LOW CHANNEL

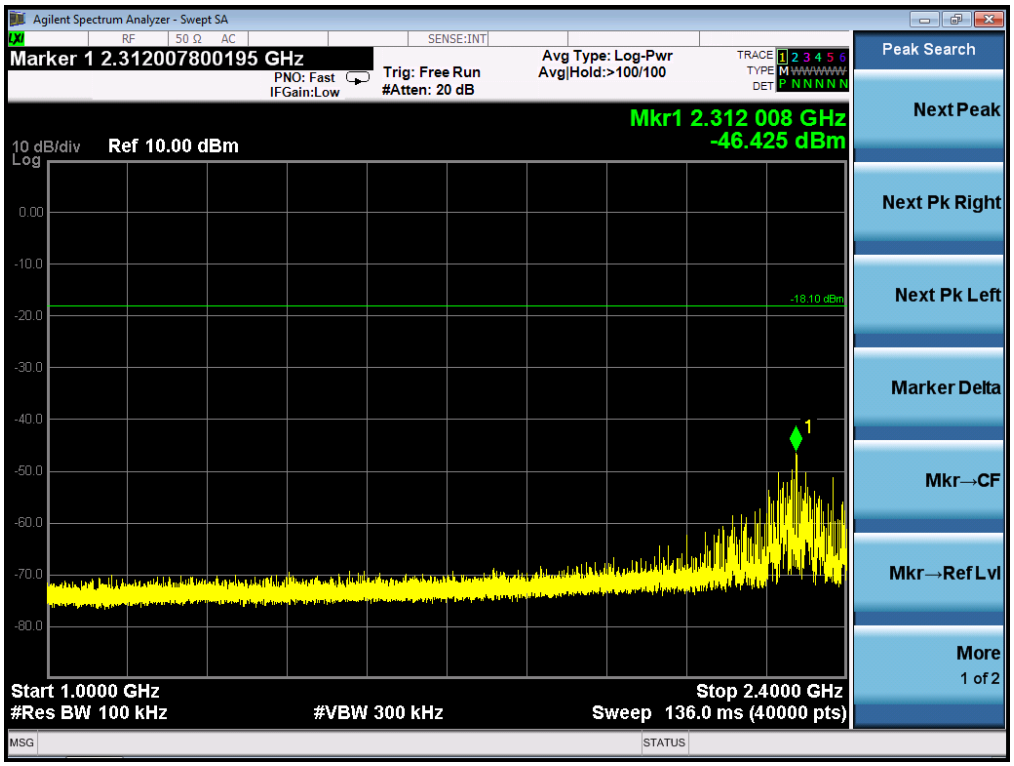


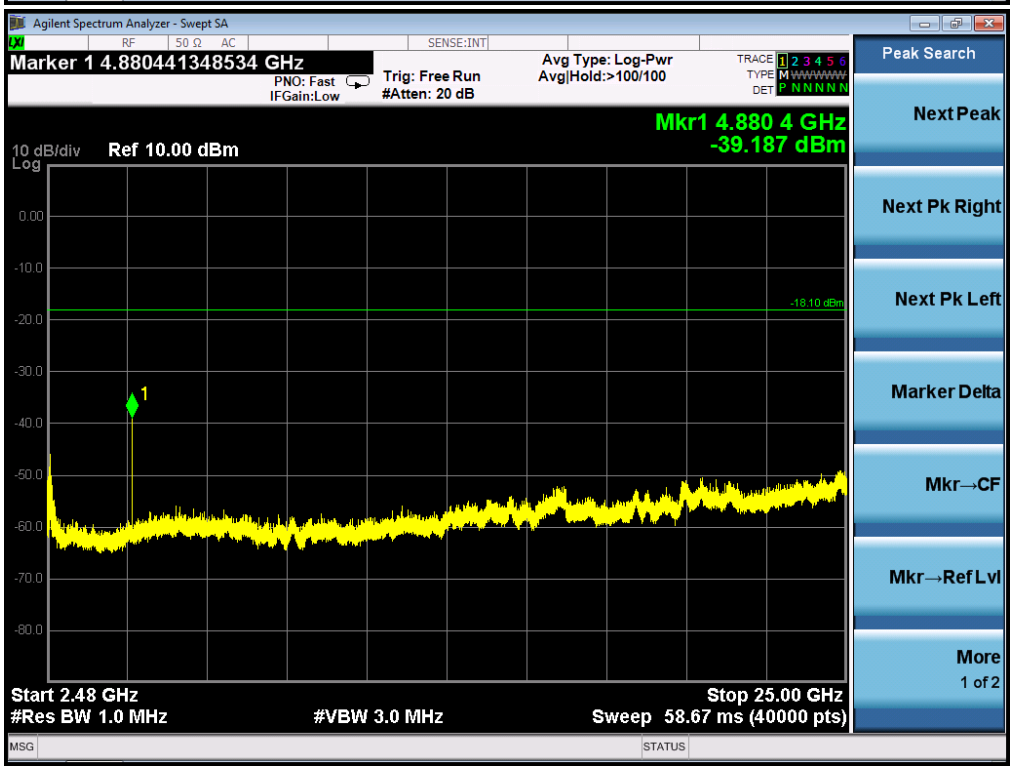




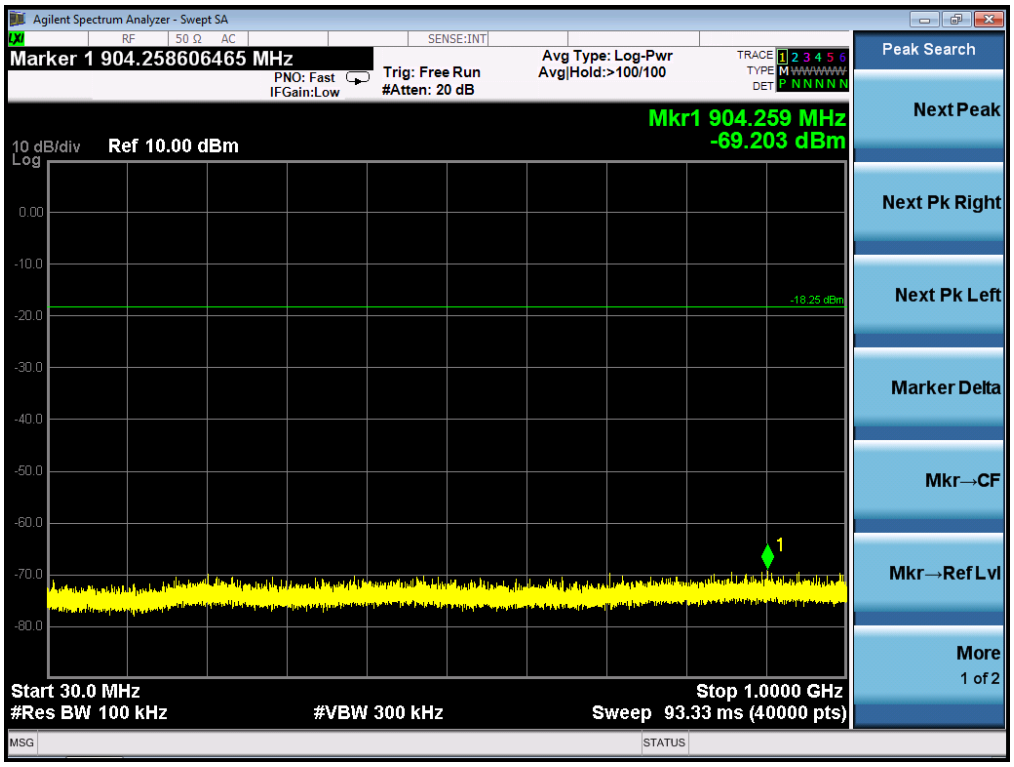
GFSK MODULATION IN MIDDLE CHANNEL

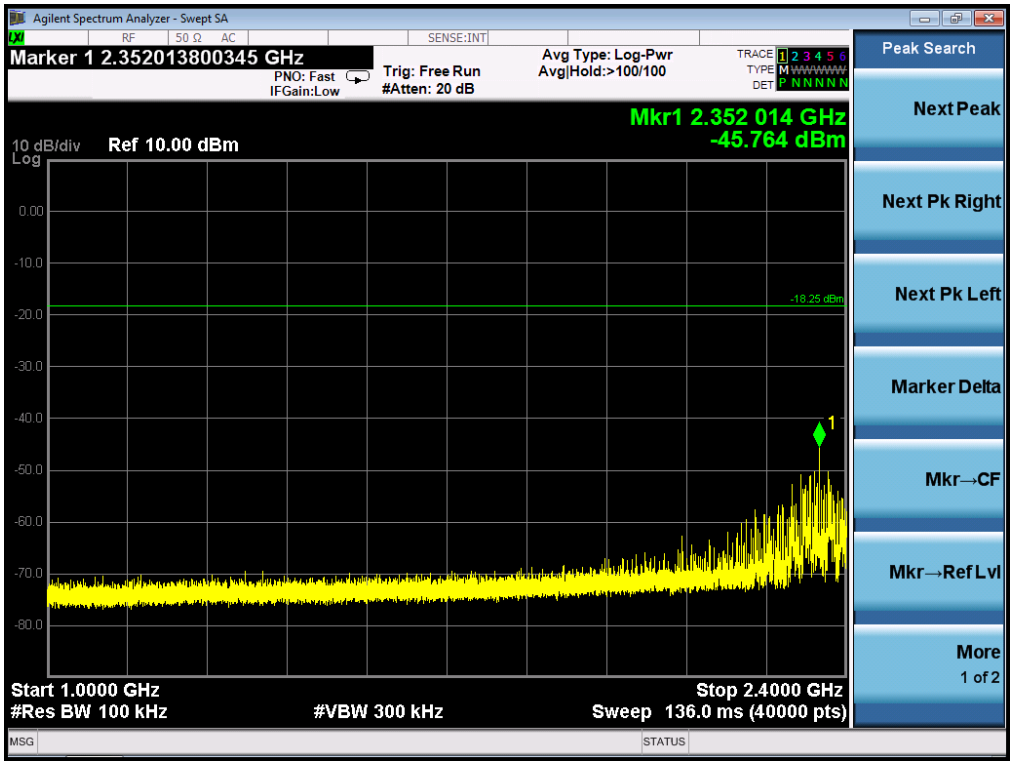


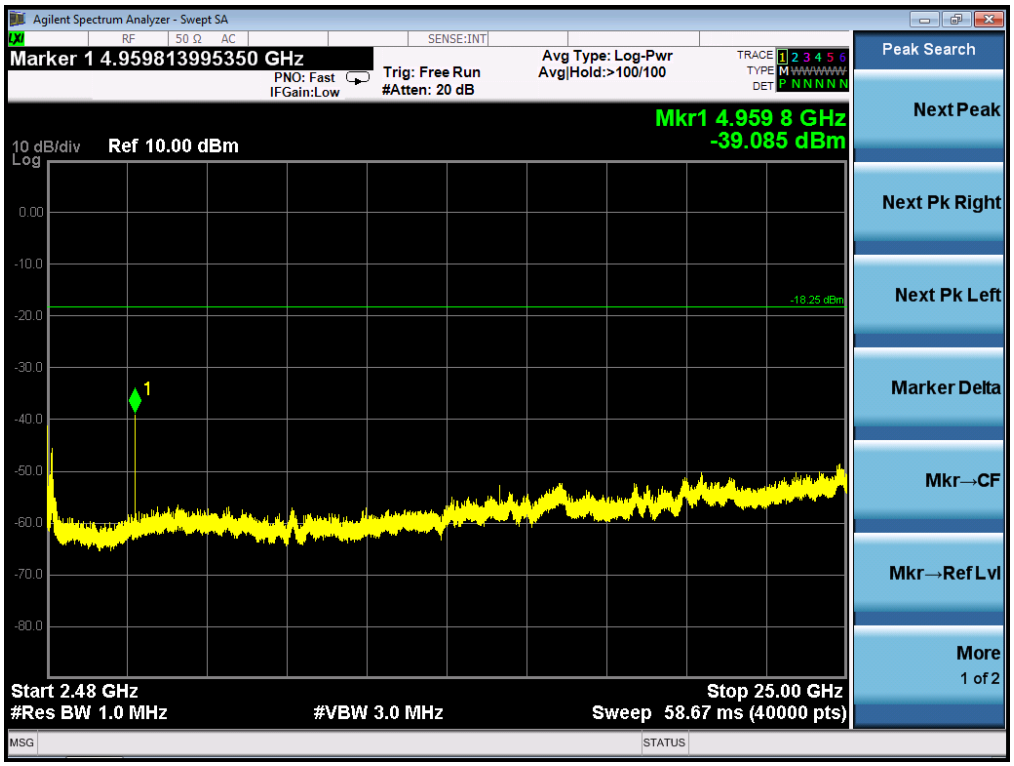

Agilent Spectrum Analyzer - Swept SA
Marker 1 2.312007800195 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.312 008 GHz
-46.425 dBm
10 dB/div
Log
Ref 10.00 dBm
-18.10 dBm
Start 1.0000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.4000 GHz
Sweep 136.0 ms (40000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 4.880441348534 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 4.880 4 GHz
-39.187 dBm
10 dB/div
Log
Ref 10.00 dBm
-18.10 dBm
Start 2.48 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 25.00 GHz
Sweep 58.67 ms (40000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

GFSK MODULATION IN HIGH CHANNEL







Note:

The 100kHz RBW used in the conducted spurious test from 2.4835GHz to 25GHz may result in long measuring times, To avoid such long measuring times, the 1MHz RBW can be used for pre-test. If the emission level exceeded the limit at one or more frequencies, the 100kHz RBW would be used for final test at the special frequency.

10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

(1). Connect EUT RF output port(Antenna A) to the Spectrum Analyzer through an RF attenuator

(2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.

(3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the ANSI C63.10 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 7.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

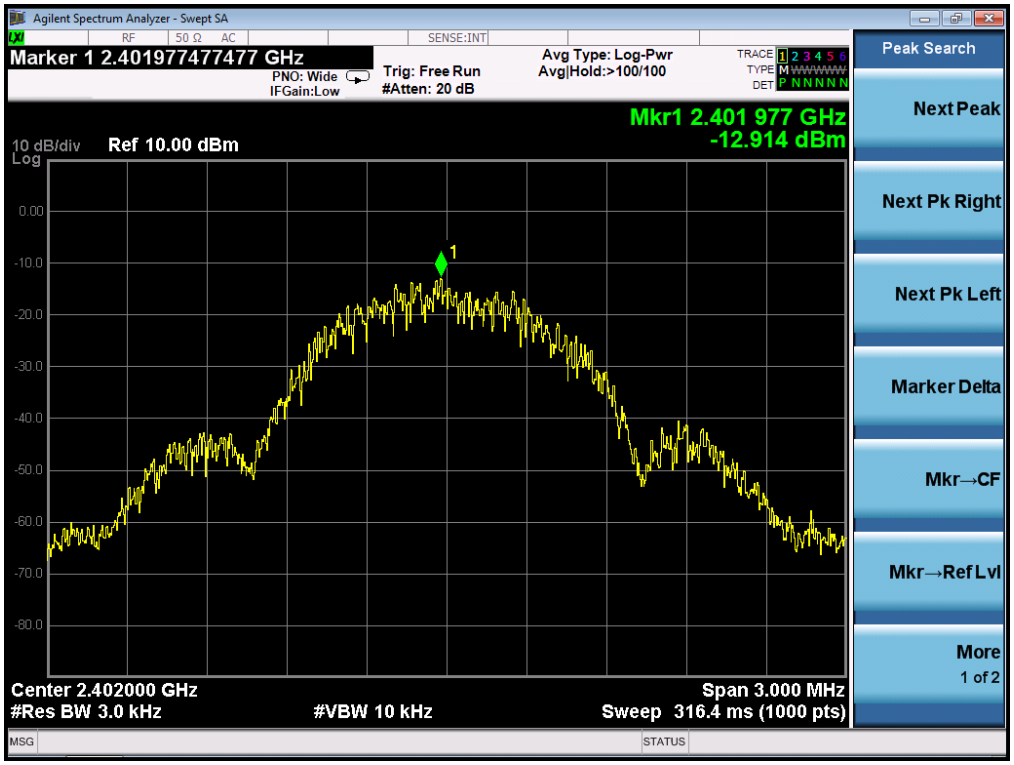
10.4 LIMITS AND MEASUREMENT RESULT

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-13.330	8	Pass
Middle Channel	-13.140	8	Pass
High Channel	-12.914	8	Pass

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



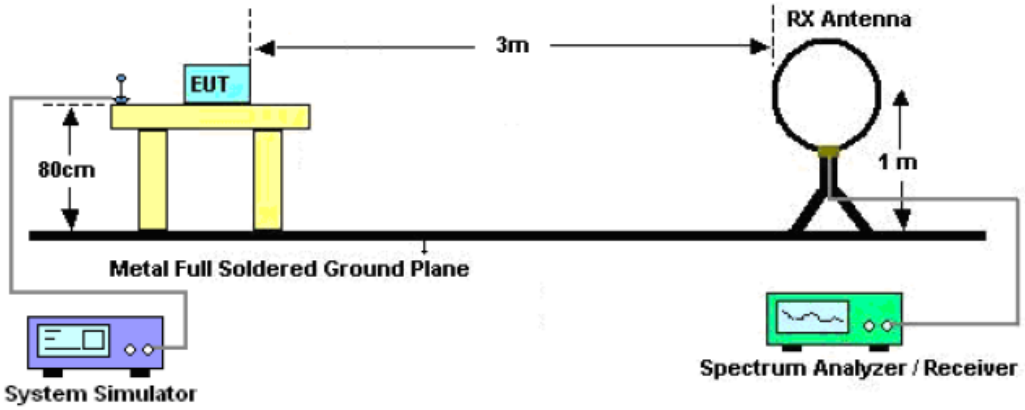
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

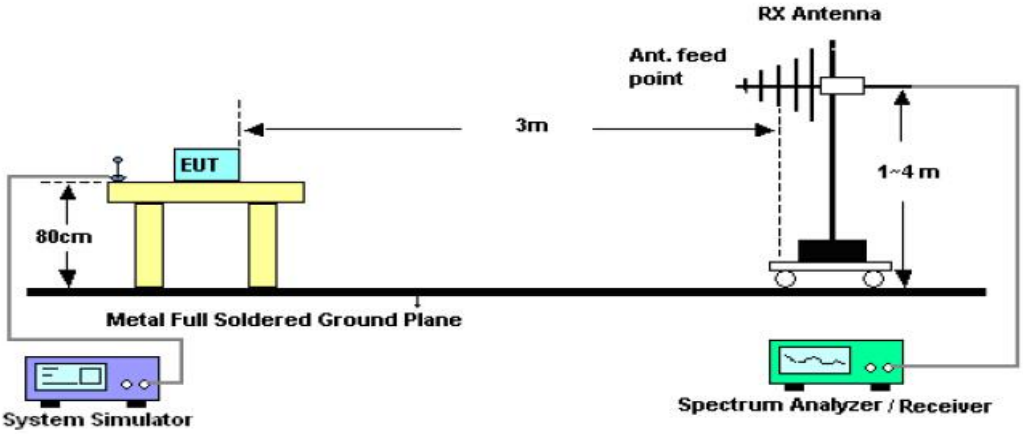
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

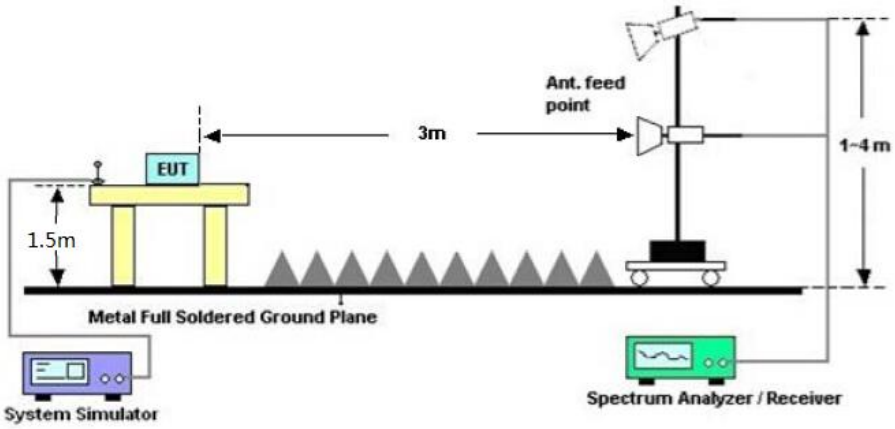
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

For Radiated Emission, 3axis were chosen for testing for each applicable mode.

All modes were tested For restricted band radiated emission, the test records reported below are the worst result compared to other modes.

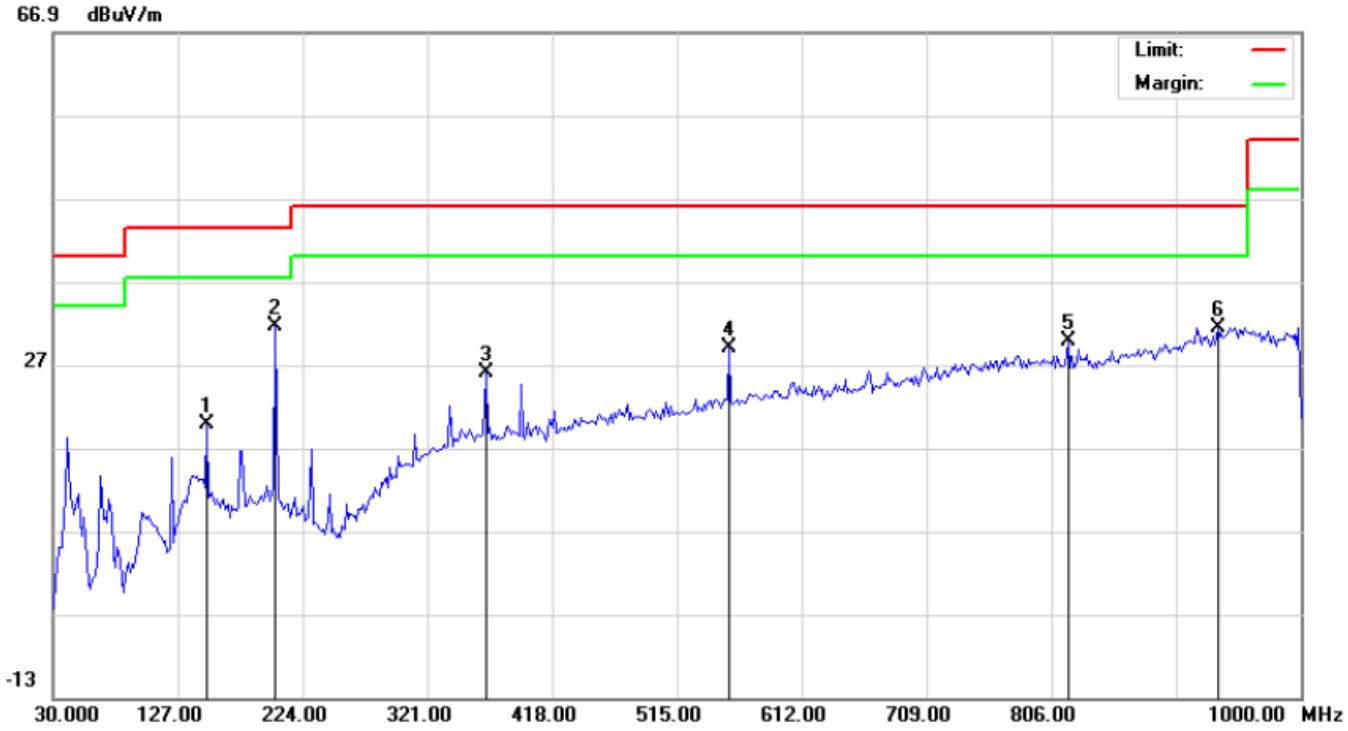
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

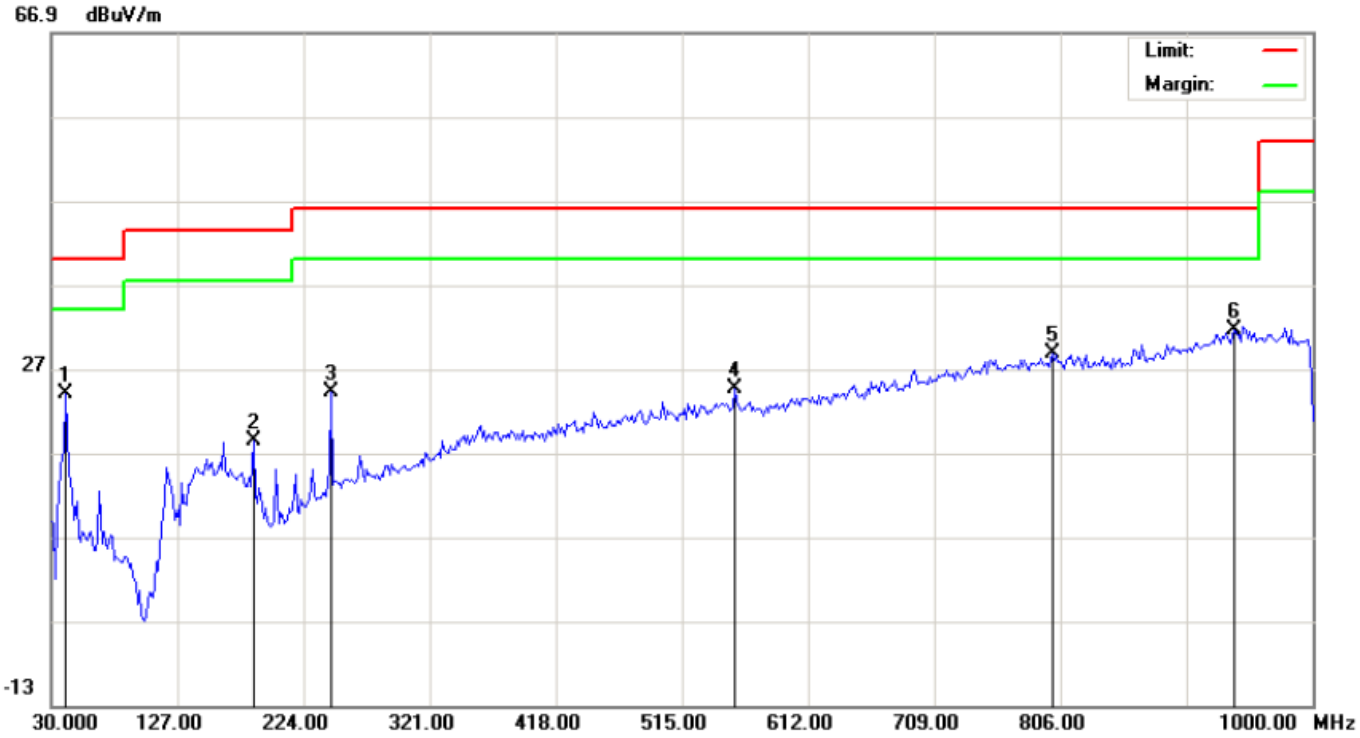
EUT	STAGES DASH	**Model Name**	SDL0
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Horizontal



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		149.6333	6.90	12.85	19.75	43.50	-23.75	peak			
2	*	202.9832	19.93	11.70	31.63	43.50	-11.87	peak			
3		366.2667	7.08	18.85	25.93	46.00	-20.07	peak			
4		555.4167	6.38	22.62	29.00	46.00	-17.00	peak			
5		818.9333	2.55	27.32	29.87	46.00	-16.13	peak			
6		935.3333	1.85	29.59	31.44	46.00	-14.56	peak			

RESULT: PASS

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		41.3167	15.15	8.81	23.96	40.00	-16.04	peak			
2		185.2000	5.59	12.75	18.34	43.50	-25.16	peak			
3		245.0167	10.75	13.41	24.16	46.00	-21.84	peak			
4		555.4167	2.01	22.51	24.52	46.00	-21.48	peak			
5		799.5333	1.56	27.31	28.87	46.00	-17.13	peak			
6	*	940.1833	1.90	29.73	31.63	46.00	-14.37	peak			

RESULT: PASS
Note:
1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. All test modes had been tested. The mode 1 is the worst case and recorded in the report.

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.026	45.12	3.74	48.86	74	-25.14	peak
4804.026	40.33	3.74	44.07	54	-9.93	AVG
7206.026	43.45	8.14	51.59	74	-22.41	peak
7206.026	38.31	8.14	46.45	54	-7.55	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.026	43.72	3.74	47.46	74	-26.54	peak
4804.026	38.61	3.74	42.35	54	-11.65	AVG
7206.026	42.42	8.14	50.56	74	-23.44	peak
7206.026	37.07	8.14	45.21	54	-8.79	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.026	46.17	3.76	49.93	74	-24.07	peak
4880.026	41.05	3.76	44.81	54	-9.19	AVG
7320.039	40.62	8.17	48.79	74	-25.21	peak
7320.039	34.53	8.17	42.7	54	-11.3	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.026	44.68	3.76	48.44	74	-25.56	peak
4880.026	39.05	3.76	42.81	54	-11.19	AVG
7320.039	40.47	8.17	48.64	74	-25.36	peak
7320.039	33.53	8.17	41.7	54	-12.3	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.026	46.07	3.83	49.9	74	-24.1	peak
4960.026	40.85	3.83	44.68	54	-9.32	AVG
7440.039	42.68	8.21	50.89	74	-23.11	peak
7440.039	37.51	8.21	45.72	54	-8.28	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.026	45.27	3.83	49.1	74	-24.9	peak
4960.026	39.48	3.83	43.31	54	-10.69	AVG
7440.039	41.75	8.21	49.96	74	-24.04	peak
7440.039	36.92	8.21	45.13	54	-8.87	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note:

Other emissions from 1G to 25 GHz are considered as ambient noise. No recording in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The GFSK modulation is the worst case and recorded in the report.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

12.2. TEST SET-UP

same as 11.2

Note:

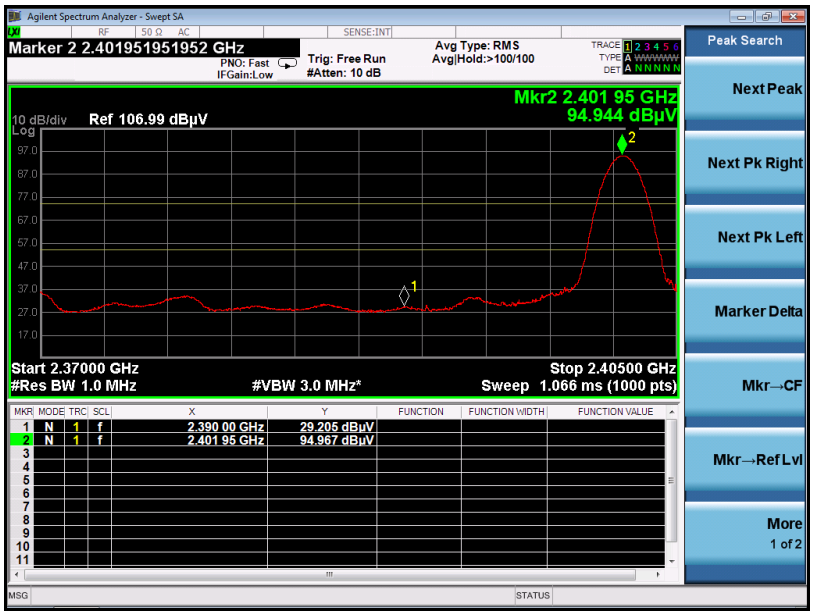
1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.
3. The antenna A was the worst case and only the data of the worst case record in the test report.

12.3. TEST RESULT

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

PK

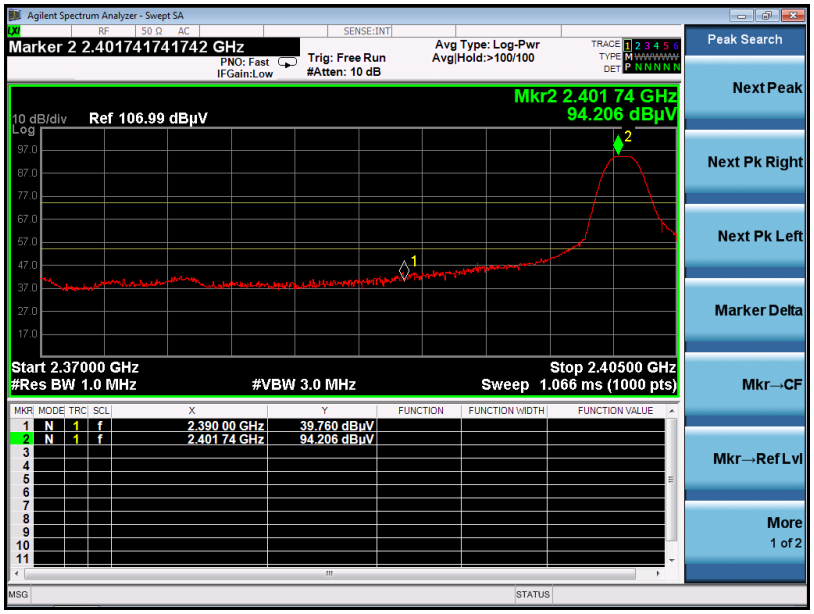
AV



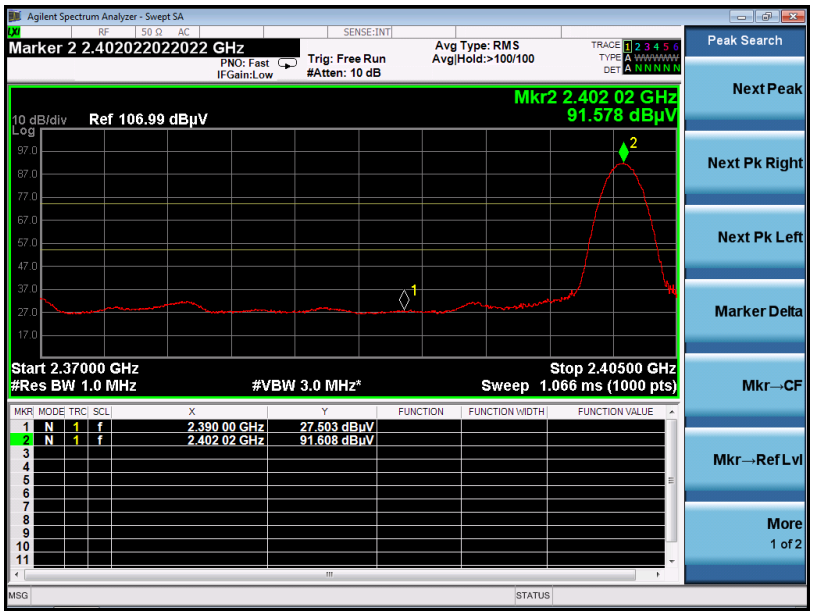
RESULT: PASS

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

PK



AV



RESULT: PASS

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

PK

AV

RESULT: PASS

EUT	STAGES DASH	Model Name	SDL0
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

PK

AV

RESULT: PASS

13. FCC LINE CONDUCTED EMISSION TEST

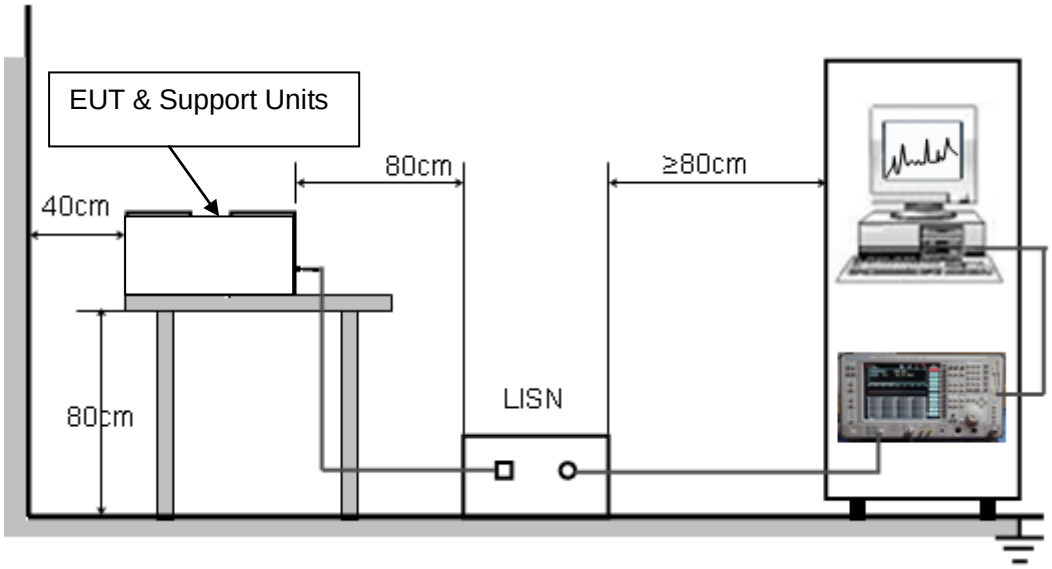
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

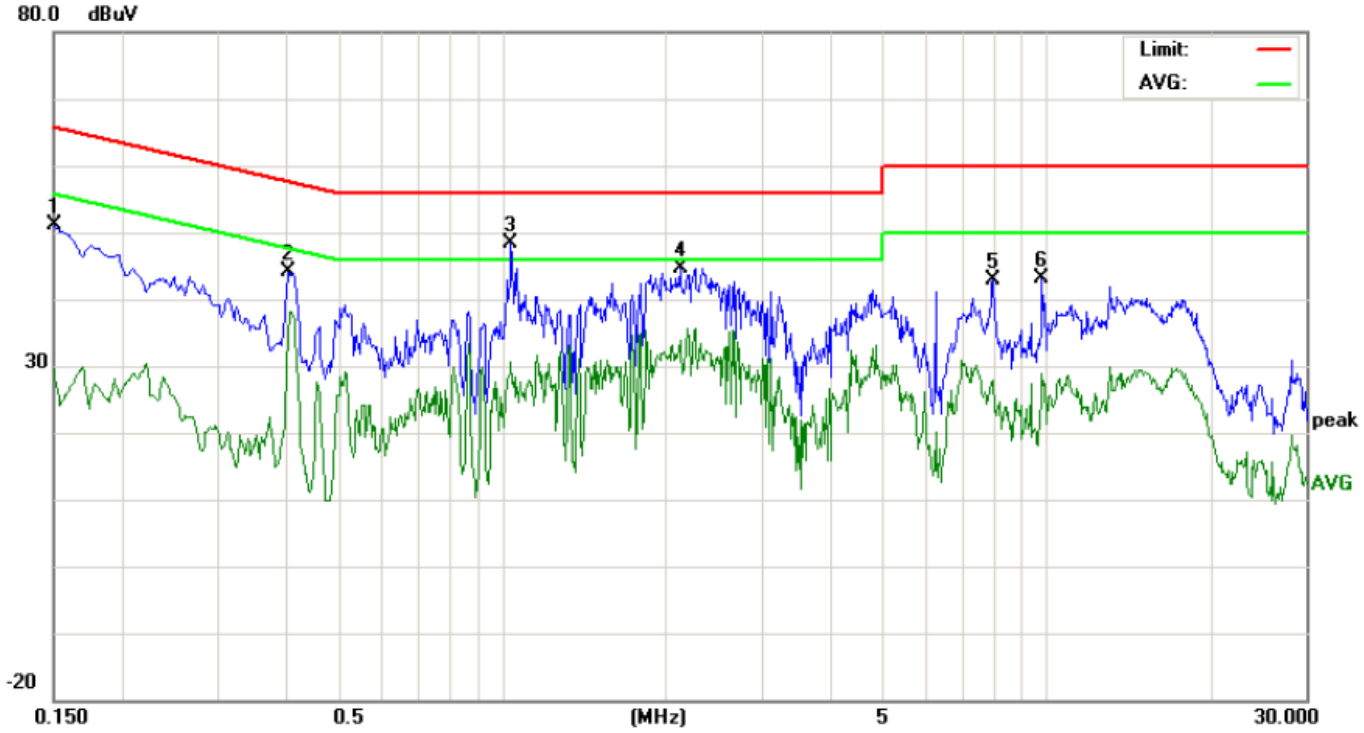
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

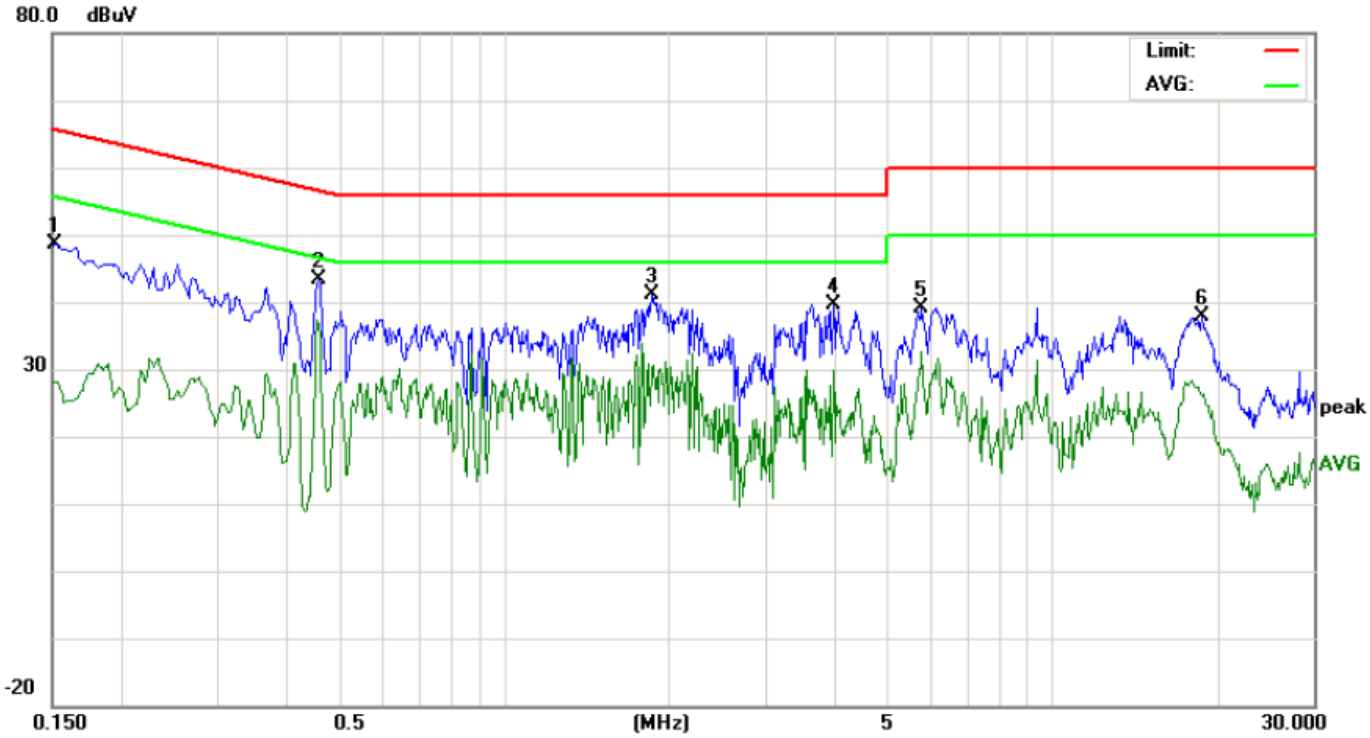
LINE CONDUCTED EMISSION TEST LINE 1-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1499	40.86		19.41	10.16	51.02		29.57	66.00	56.00	-14.98	-26.43	P	
2	0.4060	33.68		25.91	10.33	44.01		36.24	57.73	47.73	-13.72	-11.49	P	
3	1.0420	38.03		20.29	10.37	48.40		30.66	56.00	46.00	-7.60	-15.34	P	
4	2.1220	34.48		23.54	10.27	44.75		33.81	56.00	46.00	-11.25	-12.19	P	
5	7.9819	32.64		17.60	10.35	42.99		27.95	60.00	50.00	-17.01	-22.05	P	
6	9.8099	33.02		18.62	10.20	43.22		28.82	60.00	50.00	-16.78	-21.18	P	

RESULT: PASS

Line Conducted Emission Test Line 2-N

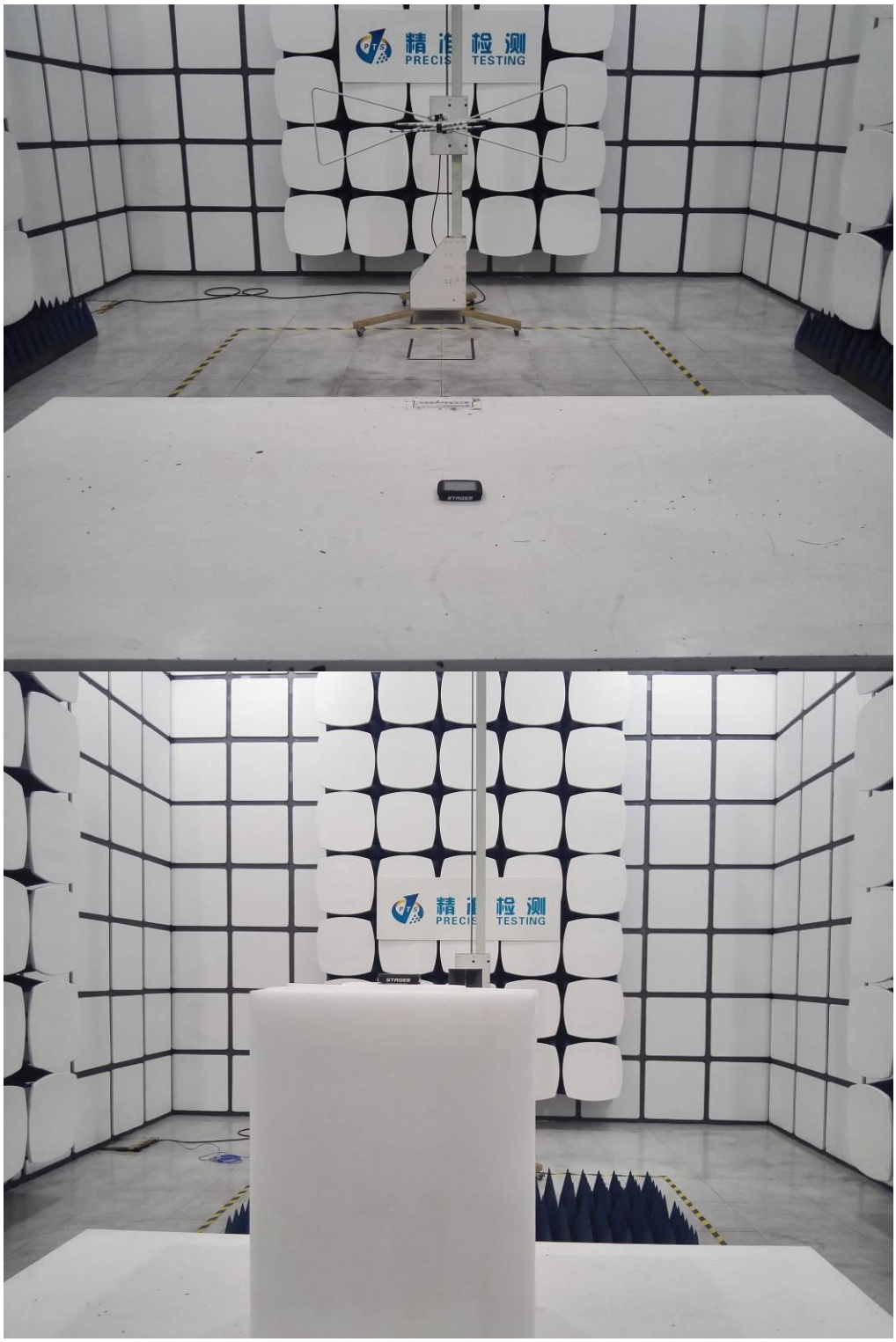


No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1516	38.59		17.84	10.16	48.75		28.00	65.91	55.91	-17.16	-27.91	P	
2	0.4587	32.92		26.40	10.37	43.29		36.77	56.72	46.72	-13.43	-9.95	P	
3	1.8660	30.95		20.12	10.26	41.21		30.38	56.00	46.00	-14.79	-15.62	P	
4	3.9980	29.26		19.41	10.43	39.69		29.84	56.00	46.00	-16.31	-16.16	P	
5	5.7859	28.77		22.43	10.27	39.04		32.70	60.00	50.00	-20.96	-17.30	P	
6	18.7979	27.64		16.04	10.12	37.76		26.16	60.00	50.00	-22.24	-23.84	P	

RESULT: PASS

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP

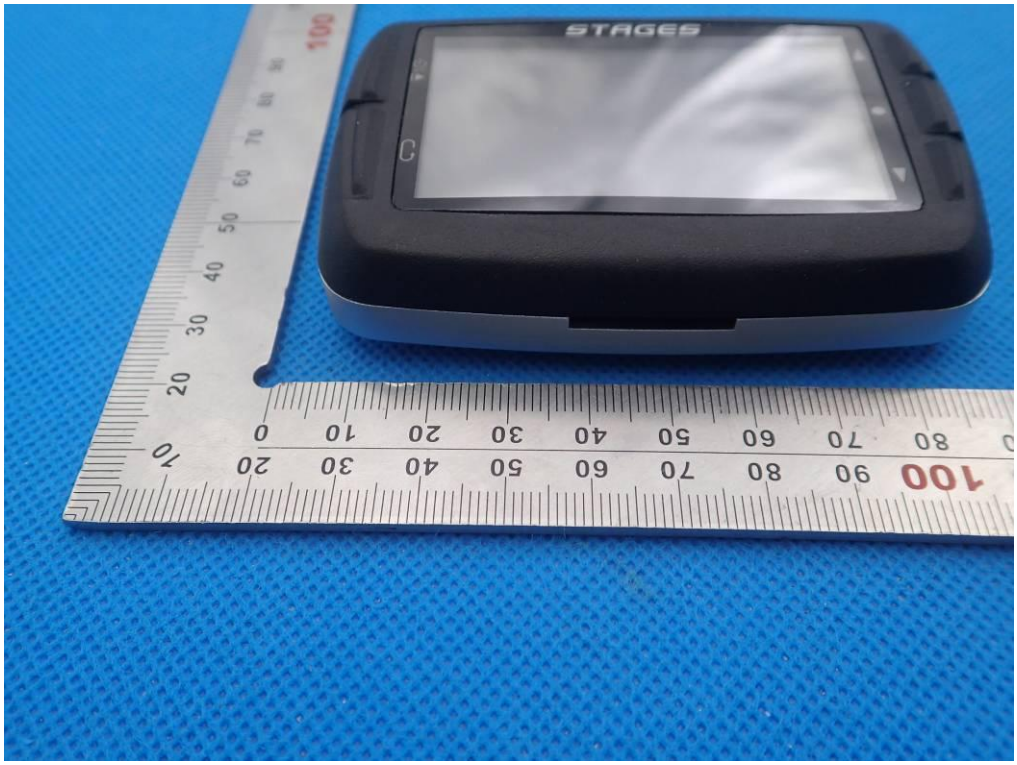


FCC LINE CONDUCTED EMISSION TEST SETUP

APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

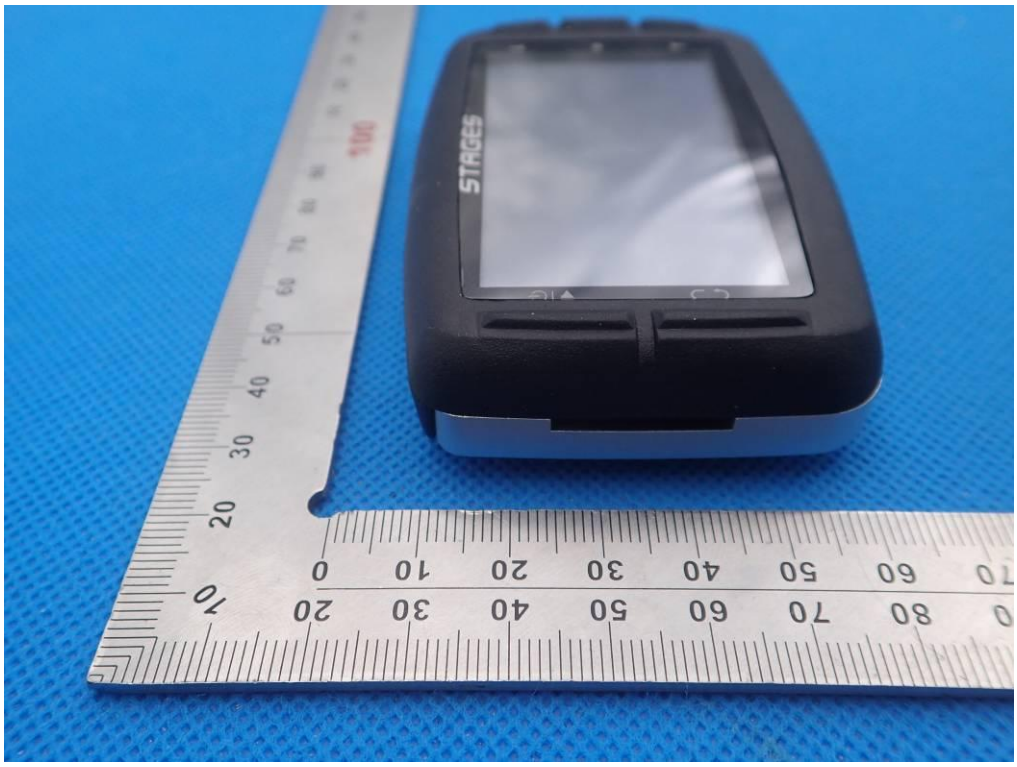
BOTTOM VIEW OF EUT



FRONT VIEW OF EUT

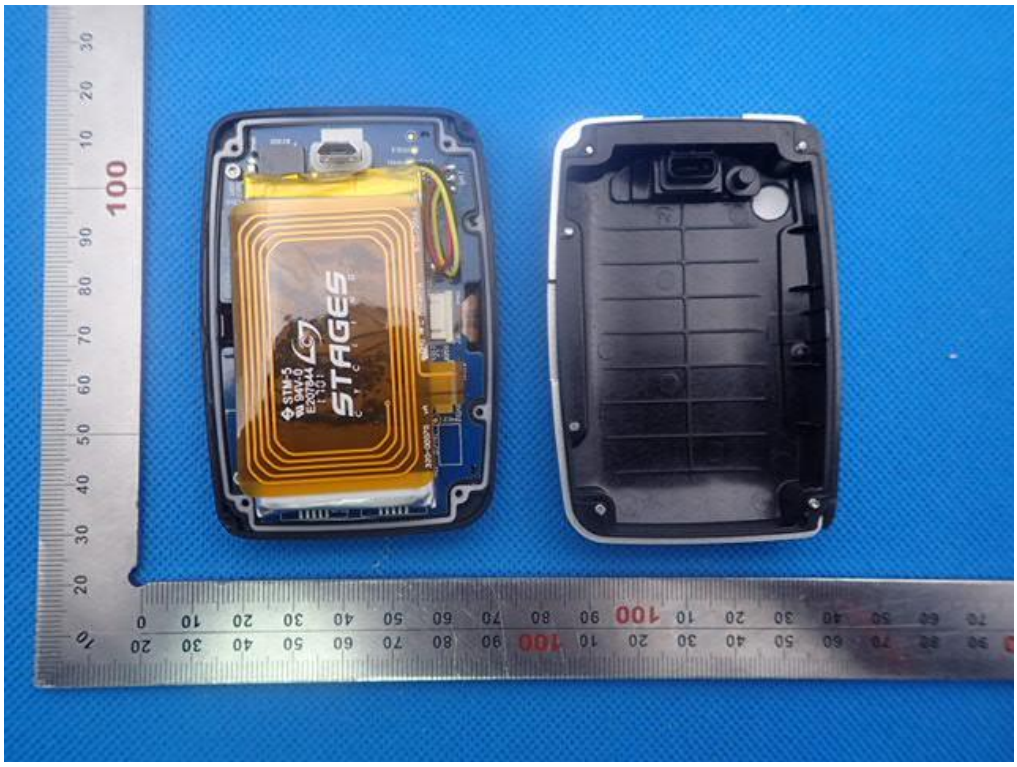
BACK VIEW OF EUT

LEFT VIEW OF EUT

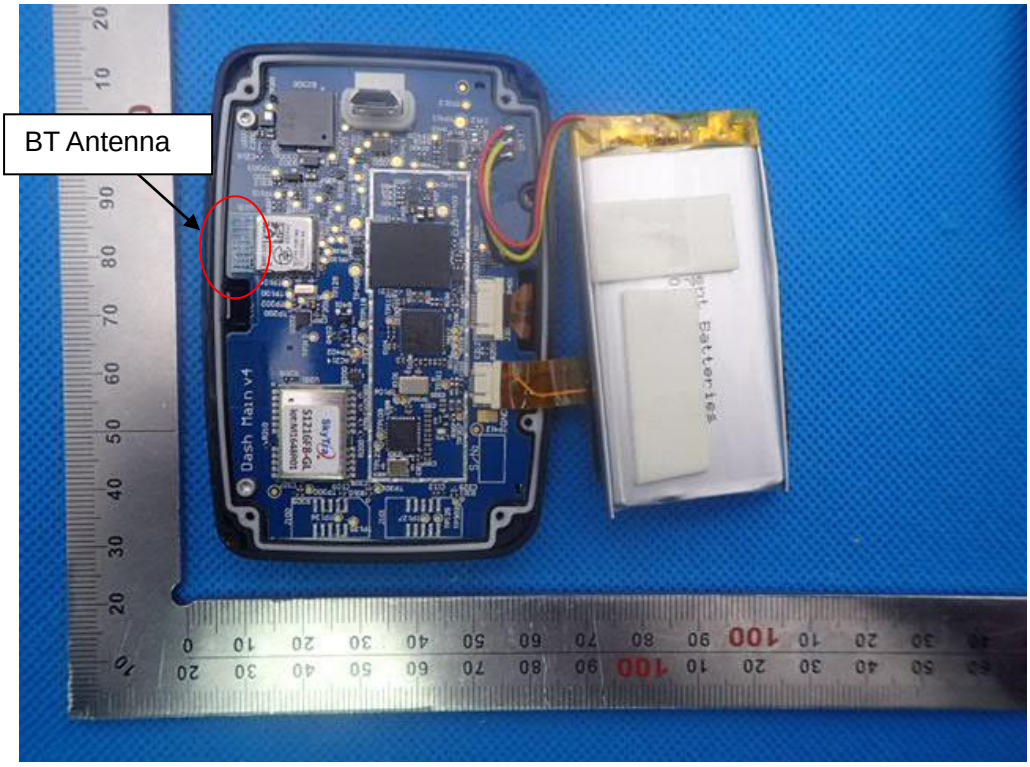


RIGHT VIEW OF EUT

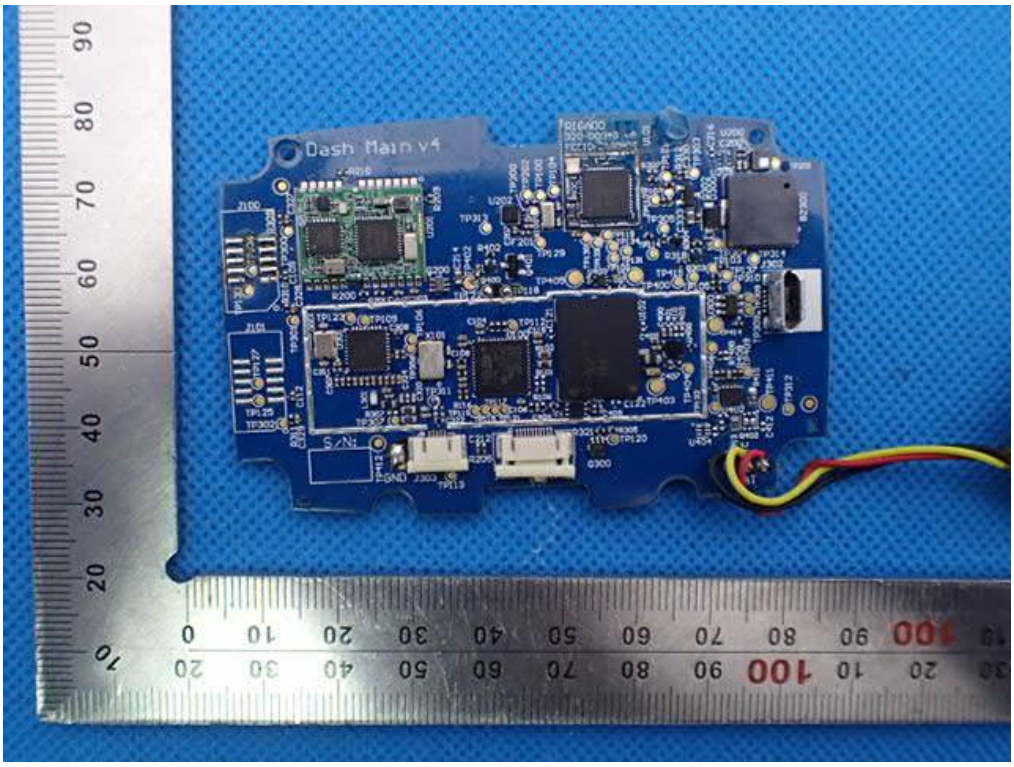
OPEN VIEW OF EUT



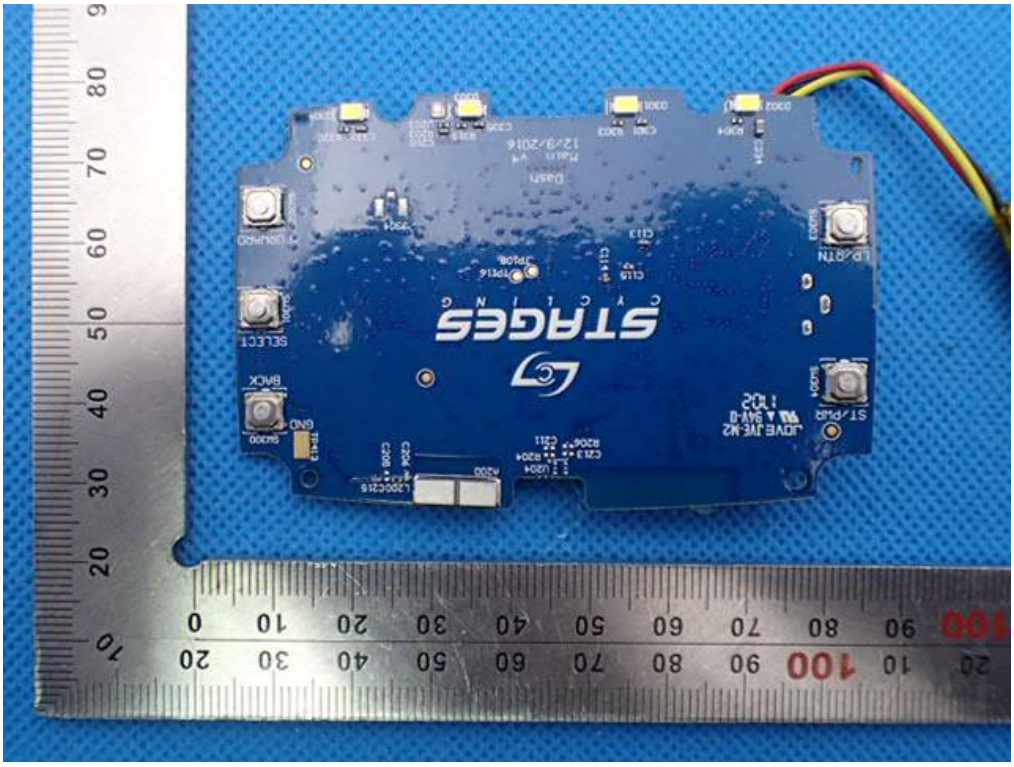
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



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