



TEST REPORT

Product Name: GPS Tamper Evident Cable Seal-GPS module
FCC ID: 2AZ63-GPS
Trademark: HM
Model Number: HM-GPS-Mod
Prepared For: SHENZHEN WINS ELECTRONIC TECHNOLOGY CO., LTD
Address: 2F Building A1, XinBaoji Industrial Park, Tiezai Road, Gongle Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
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Sample Received Date: Jul. 25, 2024
Sample tested Date: Jul. 25, 2024 to Aug. 09, 2024
Issue Date: Aug. 09, 2024
Report No.: CTB240809001RFX
Test Standards: FCC Part 22H & 24E
Test Results: PASS
Remark: This is GSM radio test report.

Compiled by:

Zhou kui

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Reviewed by:

Arron Liu

Arron Liu

Approved by:

Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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(NOTE: N/A MEANS NOT APPLICABLE)



1. VERSION

Report No.	Issue Date	Description	Approved
CTB240809001RFX	Aug. 09, 2024	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

FCC Rules	Description of Test Item	Result
§1.1307, §2.1091	RF Exposure	Compliant
§22.913 (a), §24.232 (c)	RF Output Power	Compliant
§24.51	Peak-to-average Ratio(PAR) of Transmitter	Compliant
§22.917 (b), §24.238 (b)	Emission Bandwidth	Compliant
§22.917 (a), §24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§22.917 (a), §24.238 (a)	Spurious Radiation Emissions	Compliant
§22.917 (a), §24.238 (a)	Out of Band Emissions	Compliant
§22.355, §24.235	Frequency Stability	Compliant

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m camber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
Receiver Reference Sensitivity level	1.9dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63°C
frequency	1×10 ⁻⁷

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	HM-GPS-Mod
Model Description:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	GPRS/EDGE 850: 824~849MHz GPRS/EDGE 1900: 1850~1910MHz
Max. RF output power:	GSM850: 31.61dBm GSM1900: 28.63dBm
Type of Modulation:	GMSK, BPSK
Antenna installation:	FPC antenna
Antenna Gain:	GSM850: -4.6dBi GSM1900: 2.1dBi
Ratings:	DC 3.8V

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
/	/	/	/	/	/

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GPRS/EDGE	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GPRS/EDGE	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
Note: the transmitter has been tested on the communications mode of GPRS, EDGE compliance test and record the worst case.			

4.5 Test Mode

Test Mode List		
Test Mode	Description	Remark
TM1	GPRS 850	Low, Middle, High Channels
TM2	EDGE 850	Low, Middle, High Channels
TM3	GPRS 1900	Low, Middle, High Channels
TM4	EDGE 1900	Low, Middle, High Channels

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	3.8V
Normal Temperature(°C)	23
Low Temperature(°C)	0
High Temperature(°C)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at 1&2F., Building A, No. 26, Xinhua Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

No.	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	A.14.16	2025/6/28
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2025/6/28
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2025/6/28
4	Communication test set	R&S	CMW500	108058	V3.5.80	2025/6/28
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2025/6/28
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2025/6/28
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2025/6/28
9	2.4 GHz Filter	Shenxiang	MSF2400-24 83.5MS-1154	20181015001	/	2025/6/30
10	5 GHz Filter	Shenxiang	MSF5150-58 50MS-1155	20181015001	/	2025/6/30
11	Filter	Xingbo	XBLBQ-DZA 120	190821-1-1	/	2025/6/30
12	BT&WI-FI Automatic test software	Microwave	MTS8310	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2025/6/28
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2025/6/28
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2027/6/21
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
18	Amplifier	HP	8447E	2945A02747	/	2025/6/28
19	Amplifier	Agilent	8449B	3008A01838	/	2025/6/28
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/28
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2025/6/28

22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/28
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2025/6/28
26	Amplifier	AEROFLEX	Aeroflex	097	/	2025/6/28
27	Power Metter	KEYSIGHT	N1912AP	N/A	A.05.00	2025/6/28

6. RF OUTPUT POWER

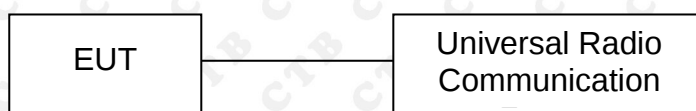
6.1 Standard Applicable

According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

6.2 Test Procedure

Conducted output power test method:



Radiated power test method:

- 1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
- 2.The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
- 3.The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 4.Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

6.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

6.4 Summary of Test Results/Plots

Max. Radiated Power

ERP For GPRS Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	31.08	1.5	0	H	1.5	-4.6	24.98	38.45
824.2	30.67	1.5	0	V	1.5	-4.6	24.57	38.45
Middle Channel								
836.6	30.74	1.5	0	H	1.5	-4.6	24.64	38.45
836.6	30.79	1.5	0	V	1.5	-4.6	24.69	38.45
High Channel								
848.8	31.04	1.5	0	H	1.5	-4.6	24.94	38.45
848.8	30.75	1.5	0	V	1.5	-4.6	24.65	38.45

EIRP For GPRS Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	28.26	1.5	0	H	1.9	2.1	28.46	33
1850.2	28.52	1.5	0	V	1.9	2.1	28.72	33
Middle Channel								
1880	28.08	1.5	0	H	1.9	2.1	28.28	33
1880	28.09	1.5	0	V	1.9	2.1	28.29	33
High Channel								
1909.8	28.19	1.5	0	H	1.9	2.1	28.39	33
1909.8	27.92	1.5	0	V	1.9	2.1	28.12	33

ERP For EDGE Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	24.53	1.5	0	H	1.5	-4.6	18.43	38.45
824.2	24.70	1.5	0	V	1.5	-4.6	18.60	38.45
Middle Channel								
836.6	24.66	1.5	0	H	1.5	-4.6	18.56	38.45
836.6	25.19	1.5	0	V	1.5	-4.6	19.09	38.45
High Channel								
848.8	24.56	1.5	0	H	1.5	-4.6	18.46	38.45
848.8	24.56	1.5	0	V	1.5	-4.6	18.46	38.45

EIRP For EDGE Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	24.06	1.5	0	H	1.9	2.1	24.26	33
1850.2	24.23	1.5	0	V	1.9	2.1	24.43	33
Middle Channel								
1880	24.49	1.5	0	H	1.9	2.1	24.69	33
1880	23.87	1.5	0	V	1.9	2.1	24.07	33
High Channel								
1909.8	23.45	1.5	0	H	1.9	2.1	23.65	33
1909.8	24.24	1.5	0	V	1.9	2.1	24.44	33

Note: Result = Substitute - Cable loss + Antenna Gain

Max. Conducted Output Power
For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GPRS(1 Slot)	Low Channel	824.2	31.52	38.45
	Middle Channel	836.6	31.61	38.45
	High Channel	848.8	31.33	38.45
EDGE(1 Slot)	Low Channel	824.2	24.95	38.45
	Middle Channel	836.6	25.23	38.45
	High Channel	848.8	24.94	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GPRS(1 Slot)	Low Channel	1850.2	28.63	33.0
	Middle Channel	1880.0	28.41	33.0
	High Channel	1909.8	28.22	33.0
EDGE(1 Slot)	Low Channel	1850.2	24.45	33.0
	Middle Channel	1880.0	24.87	33.0
	High Channel	1909.8	24.29	33.0

7. PEAK-TO-AVERAGE RATIO(PAR) OF TRANSMITTER

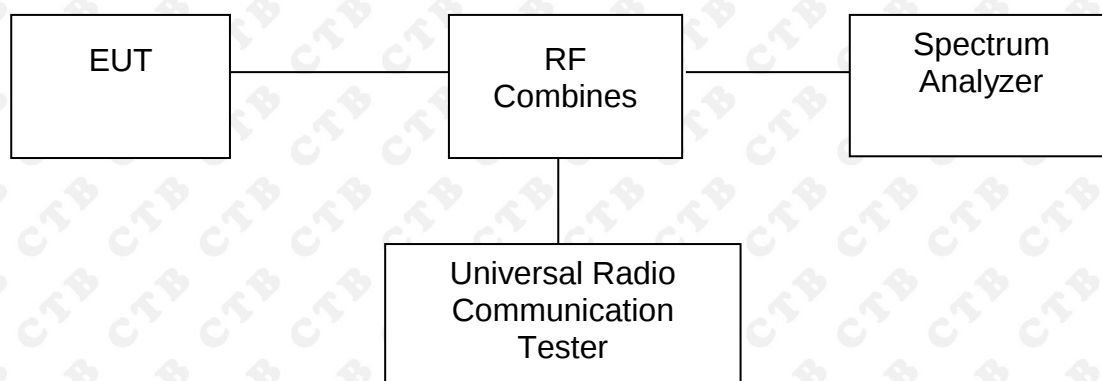
7.1 Standard Applicable

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

7.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded. Record the maximum PAPR level associated with a probability of 0.1%.

Test Configuration for the emission bandwidth testing:



7.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

7.4 Summary of Test Results

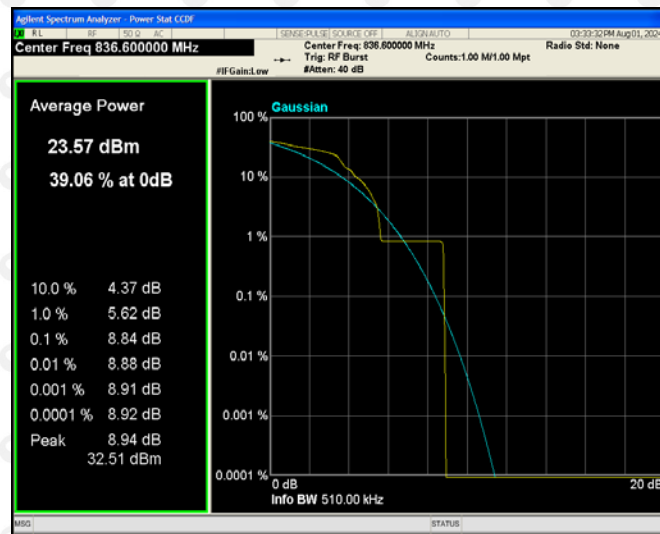
Only the worst case was selected to record
For GSM850

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS(1 Slot)	190	836.6	2.69	13
EDGE(1 Slot)	190	836.6	8.84	13

For PCS 1900

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS(1 Slot)	512	1850.2	2.72	13
EDGE(1 Slot)	512	1850.2	6.56	13

EDGE:



8. EMISSION BANDWIDTH

8.1 Standard Applicable

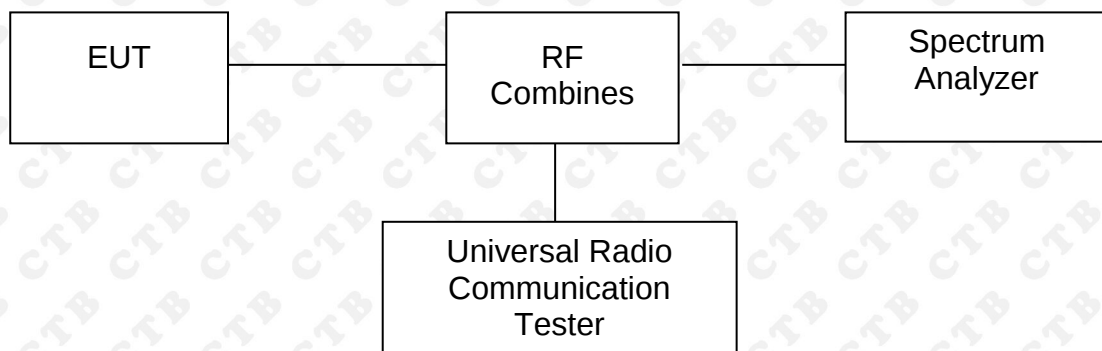
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



8.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

8.4 Summary of Test Results/Plots

For Cellular Band

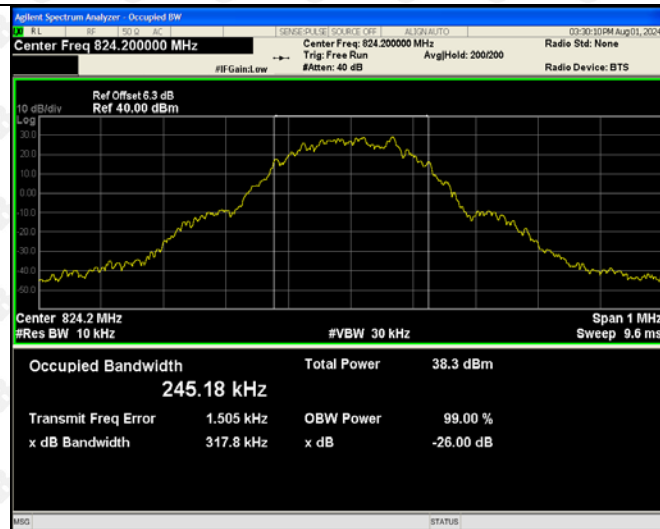
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	128	824.2	245.178	317.773
	190	836.6	246.125	305.313
	251	848.8	241.894	302.229
EDGE	128	824.2	244.302	299.910
	190	836.6	240.713	295.983
	251	848.8	238.518	303.302

For PCS Band

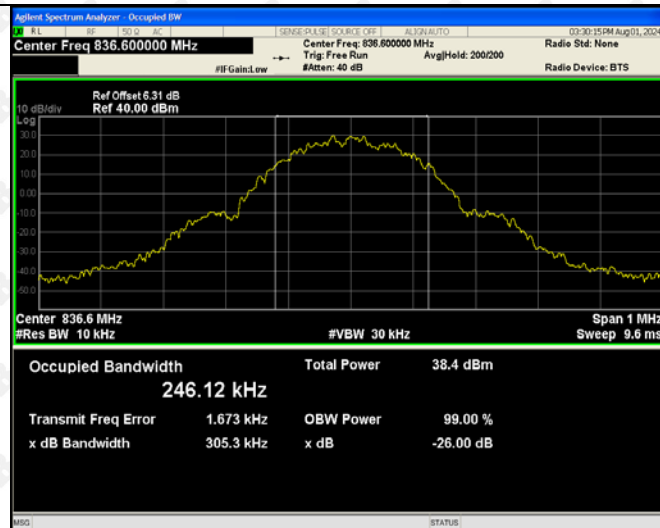
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	512	1850.2	243.810	320.644
	661	1880.0	248.552	320.945
	810	1909.8	248.564	320.029
EDGE	512	1850.2	250.812	336.154
	661	1880.0	254.547	324.726
	810	1909.8	245.294	305.294

For Cellular Band

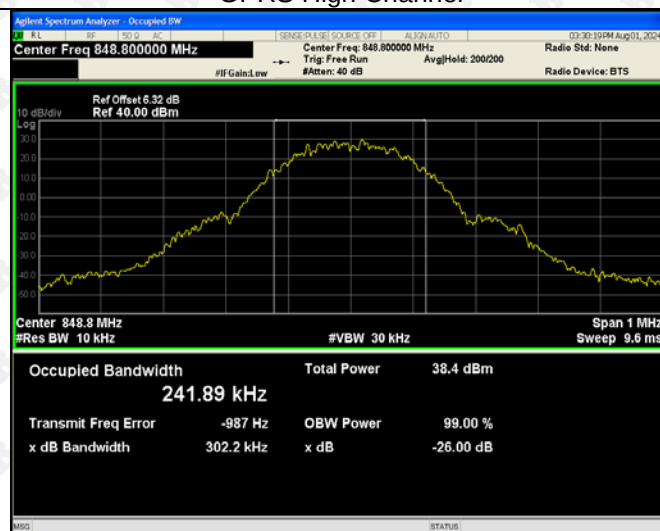
GPRS Low Channel



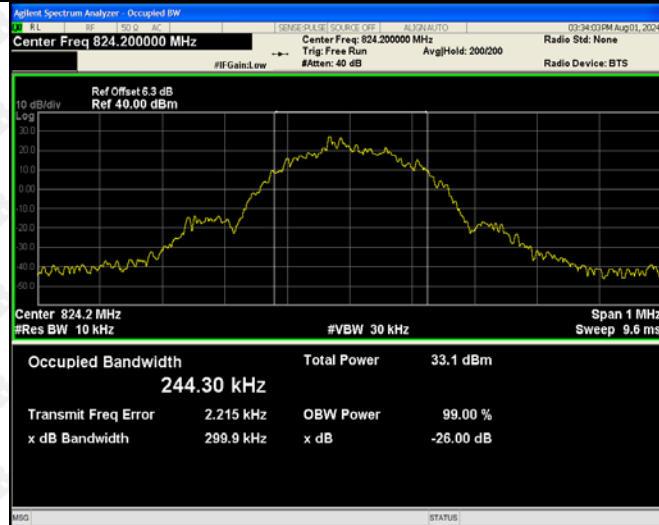
GPRS Middle Channel



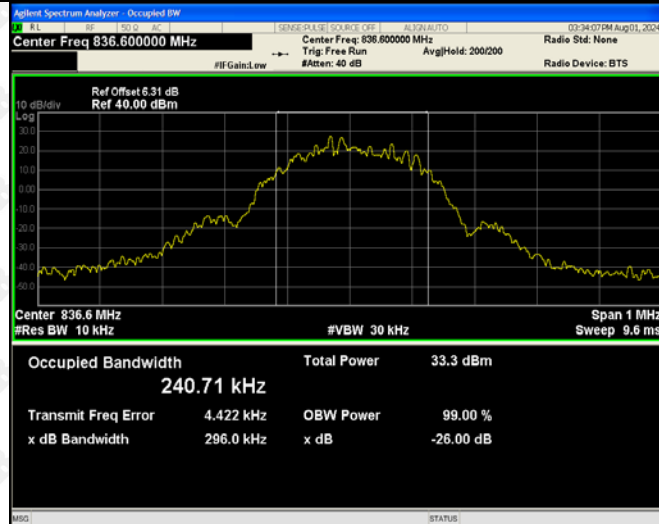
GPRS High Channel



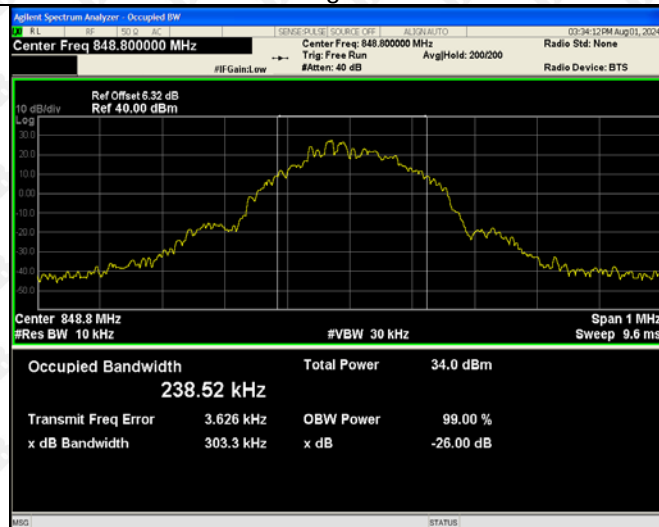
EDGE Low Channel



EDGE Middle Channel

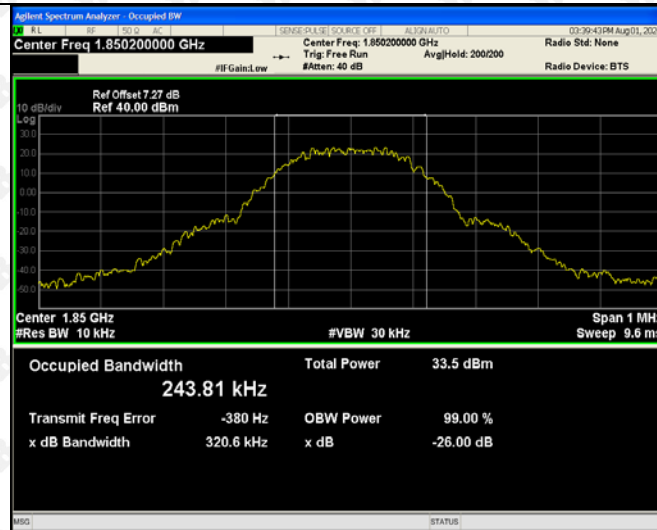


EDGE High Channel

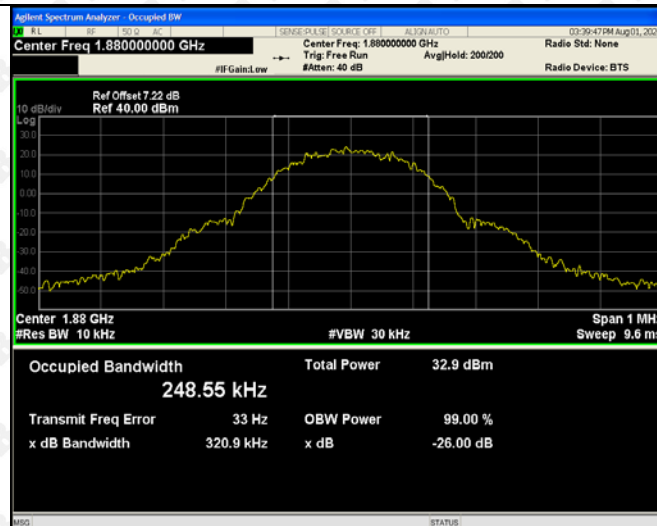


For PCS Band

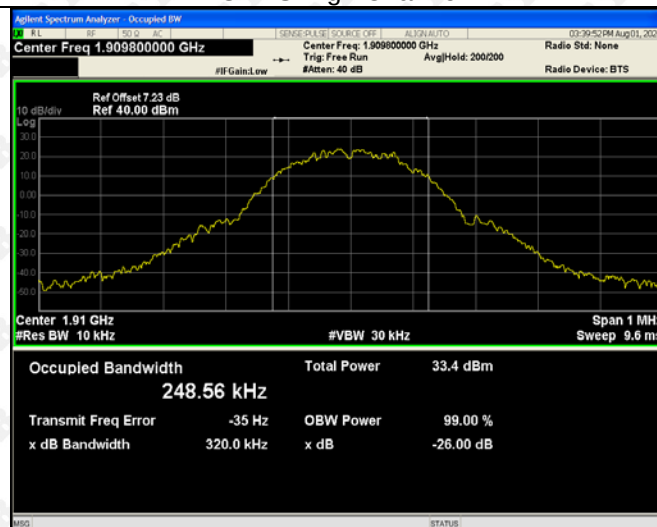
GPRS Low Channel



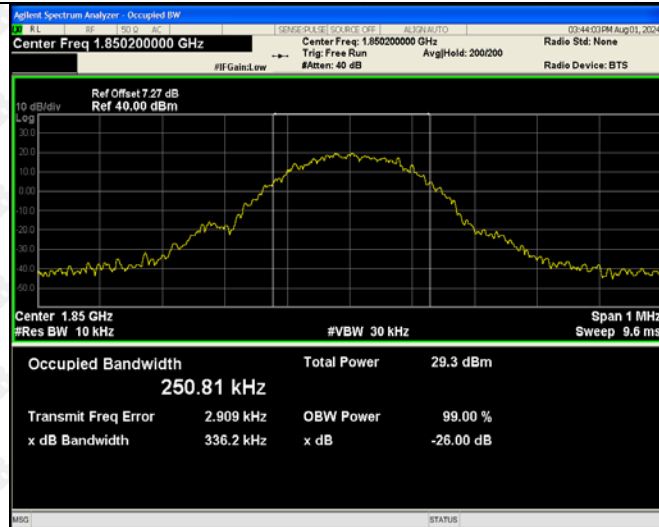
GPRS Middle Channel



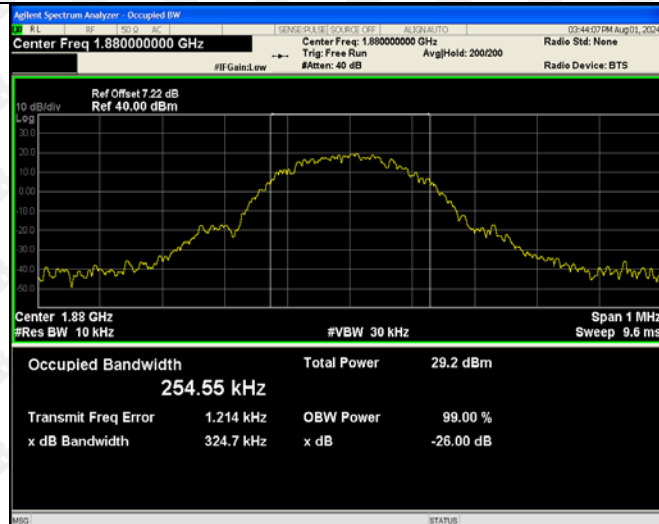
GPRS High Channel



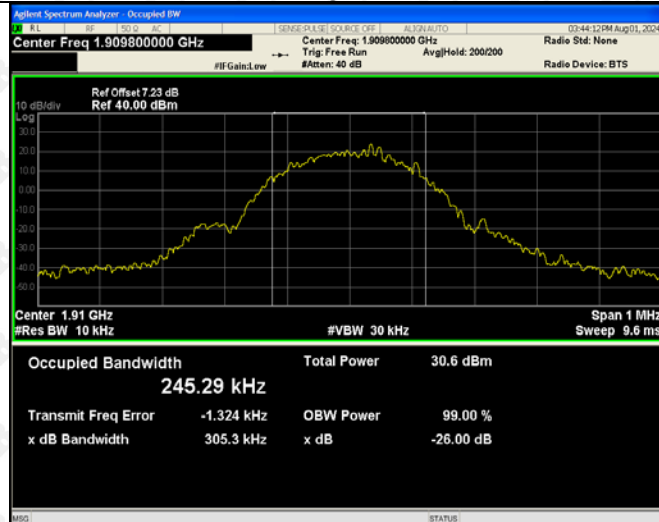
EDGE Low Channel



EDGE Middle Channel



EDGE High Channel



9. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL

9.1 Standard Applicable

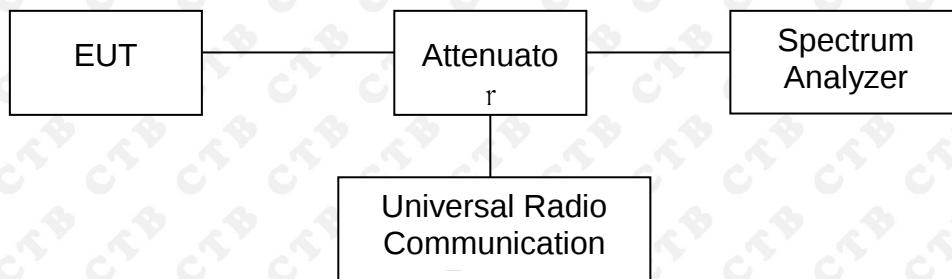
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

9.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



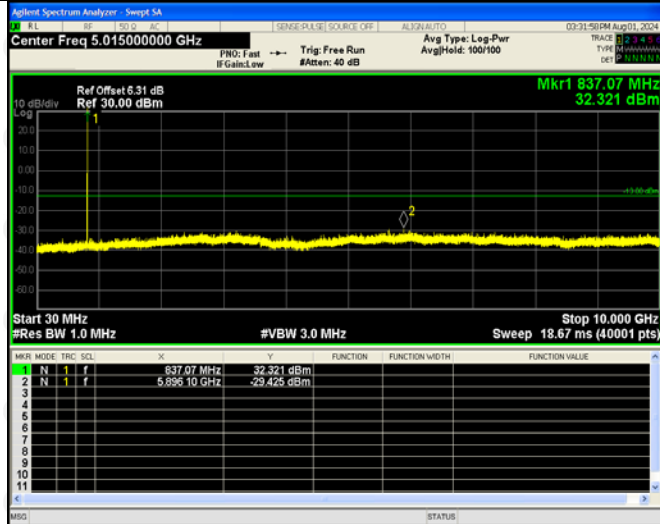
9.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	1010 mbar

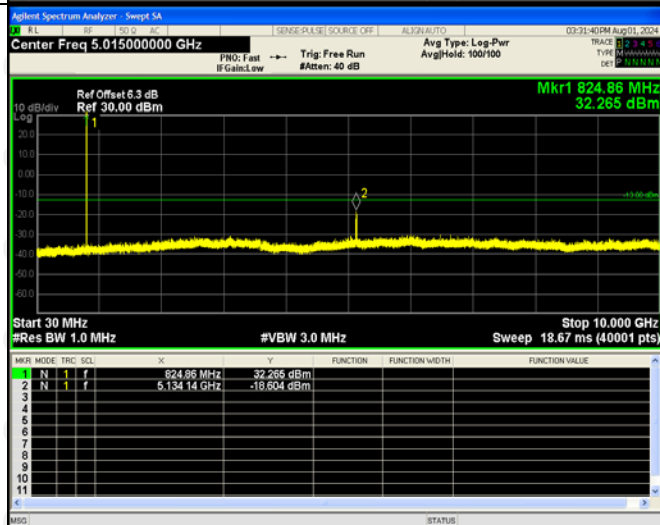
9.4 Summary of Test Results/Plots

Please refer to the following test plots
For Cellular Band

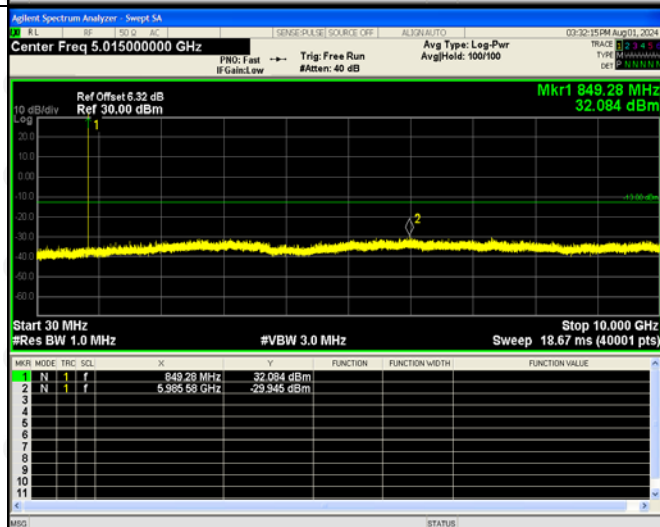
GPRS
Low
Channel



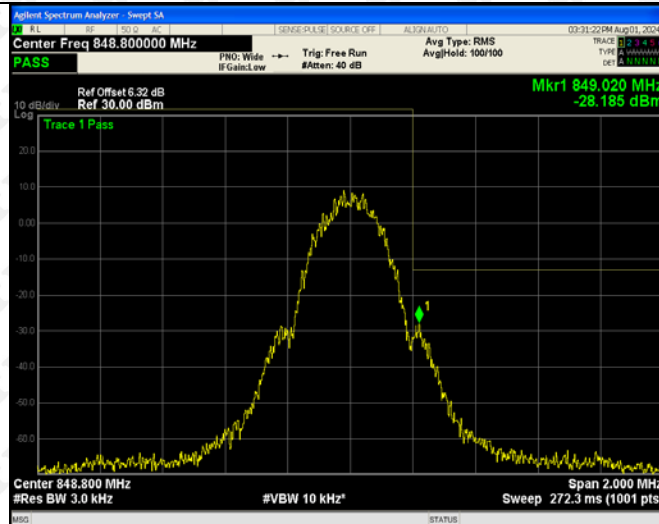
GPRS
Middle
Channel



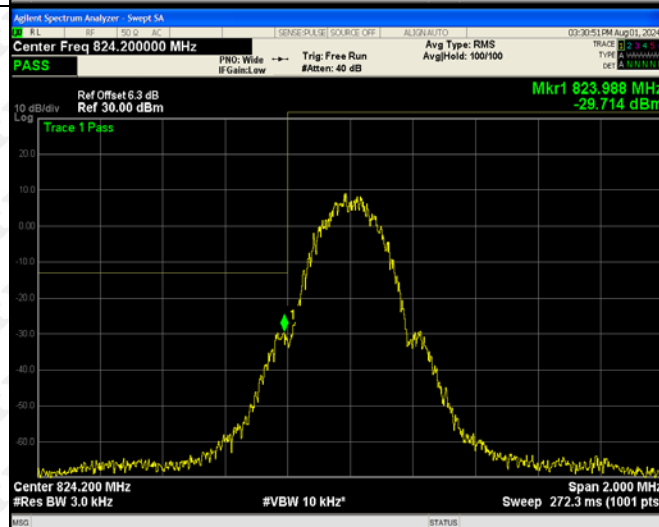
GPRS
High
Channel

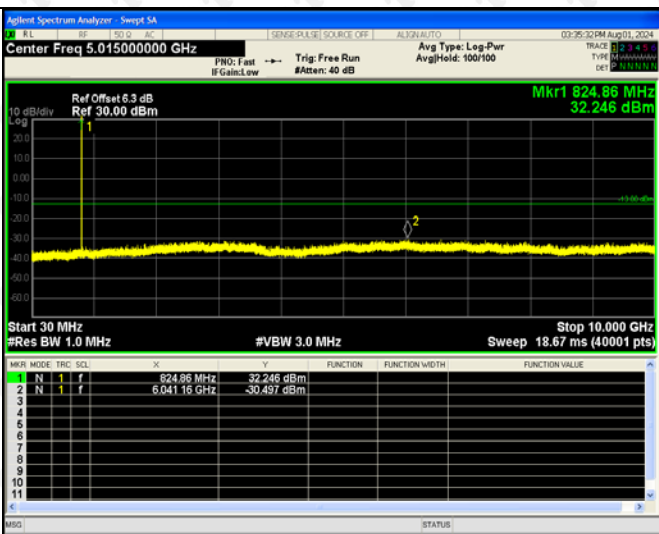
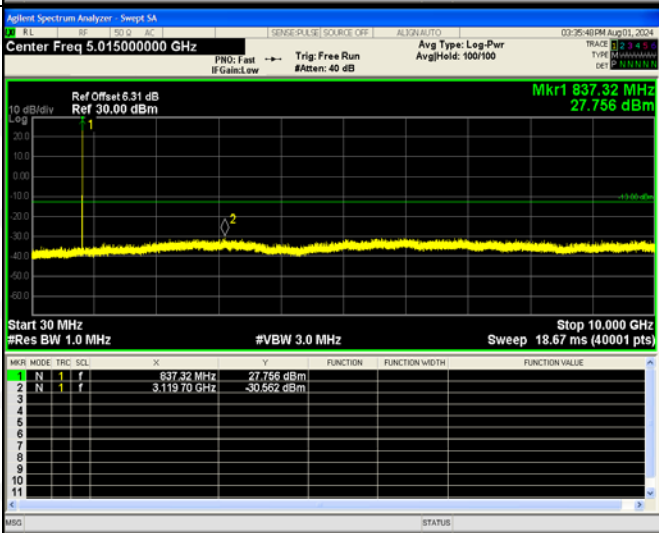
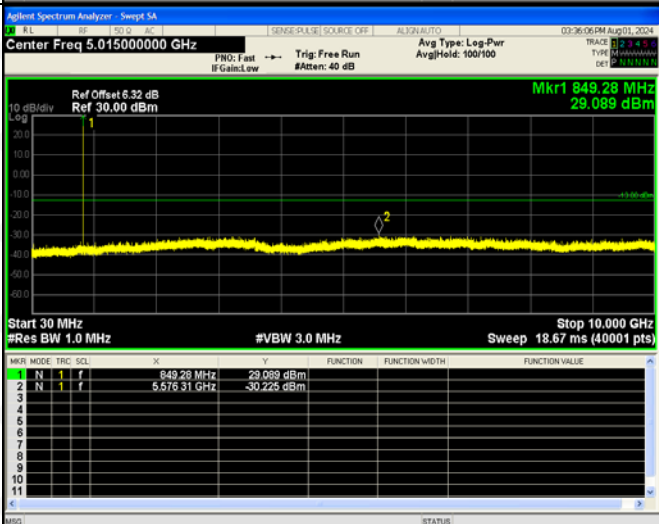


GPRS
Low
Band
Emission

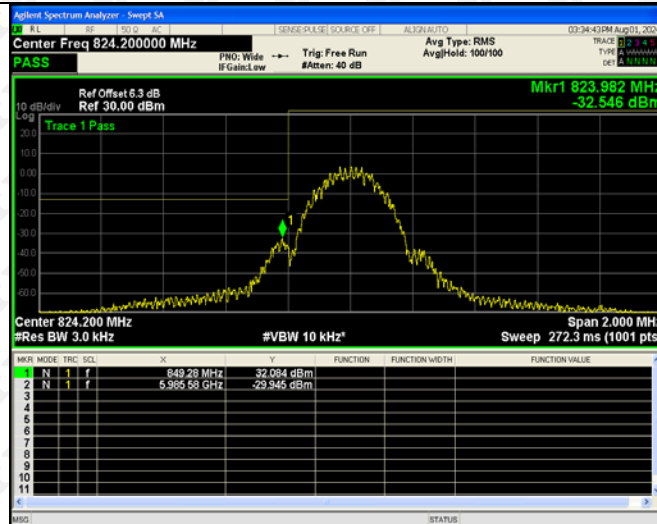


GPRS
High
Band
Emission

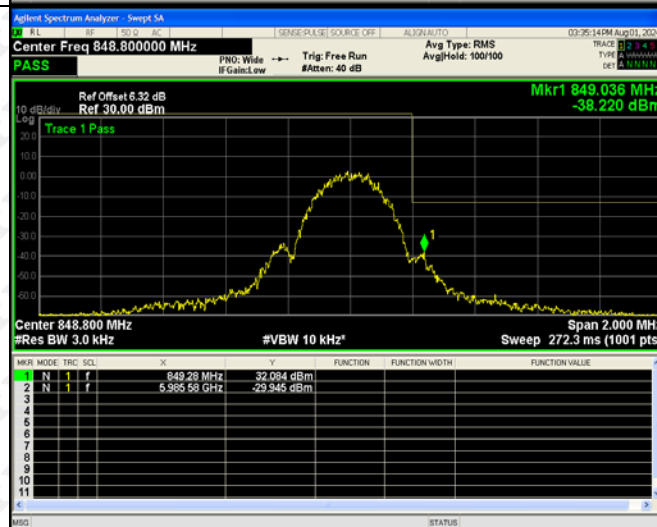


EDGE Low Channel	 Agilent Spectrum Analyzer - Swept SA Center Freq 5.015000000 GHz Ref Offset 6.3 dB Ref 30.00 dBm Mkr1 824.86 MHz 32.246 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><tr><th>MNR</th><th>MODE</th><th>TRG</th><th>SCL</th><th>F</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>824.86 MHz</td><td></td><td></td><td>32.246 dBm</td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>6.04116 GHz</td><td></td><td></td><td>-30.497 dBm</td></tr></table>	MNR	MODE	TRG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	824.86 MHz			32.246 dBm	2	N	1	f	6.04116 GHz			-30.497 dBm
MNR	MODE	TRG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	824.86 MHz			32.246 dBm																		
2	N	1	f	6.04116 GHz			-30.497 dBm																		
EDGE Middle Channel	 Agilent Spectrum Analyzer - Swept SA Center Freq 5.015000000 GHz Ref Offset 6.31 dB Ref 30.00 dBm Mkr1 837.32 MHz 27.756 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><tr><th>MNR</th><th>MODE</th><th>TRG</th><th>SCL</th><th>F</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>837.32 MHz</td><td></td><td></td><td>27.756 dBm</td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>3.11970 GHz</td><td></td><td></td><td>-30.562 dBm</td></tr></table>	MNR	MODE	TRG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	837.32 MHz			27.756 dBm	2	N	1	f	3.11970 GHz			-30.562 dBm
MNR	MODE	TRG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	837.32 MHz			27.756 dBm																		
2	N	1	f	3.11970 GHz			-30.562 dBm																		
EDGE High Channel	 Agilent Spectrum Analyzer - Swept SA Center Freq 5.015000000 GHz Ref Offset 6.32 dB Ref 30.00 dBm Mkr1 849.28 MHz 29.089 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><tr><th>MNR</th><th>MODE</th><th>TRG</th><th>SCL</th><th>F</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>849.28 MHz</td><td></td><td></td><td>29.089 dBm</td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>5.57631 GHz</td><td></td><td></td><td>-30.226 dBm</td></tr></table>	MNR	MODE	TRG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	849.28 MHz			29.089 dBm	2	N	1	f	5.57631 GHz			-30.226 dBm
MNR	MODE	TRG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	849.28 MHz			29.089 dBm																		
2	N	1	f	5.57631 GHz			-30.226 dBm																		

EDGE
Low
Band
Emission

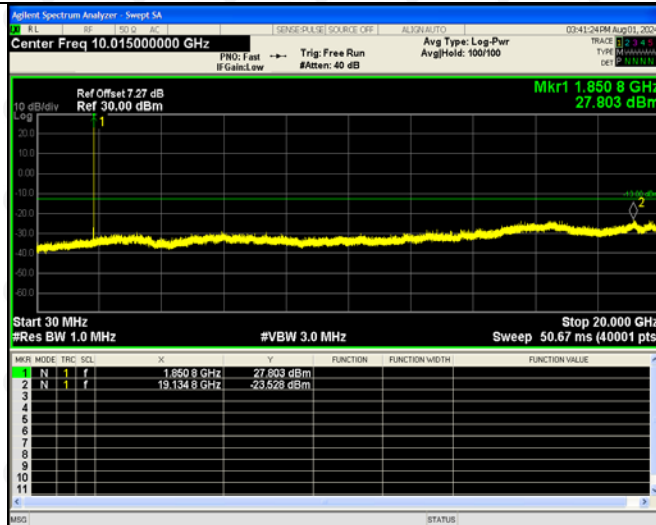


EDGE
High
Band
Emission

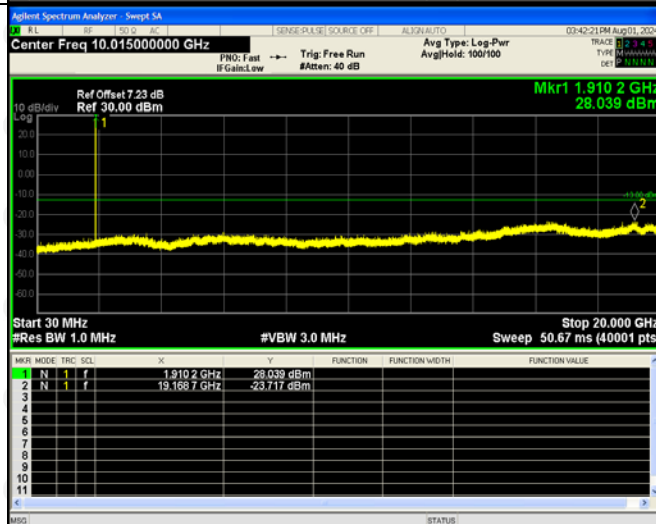


For PCS Band

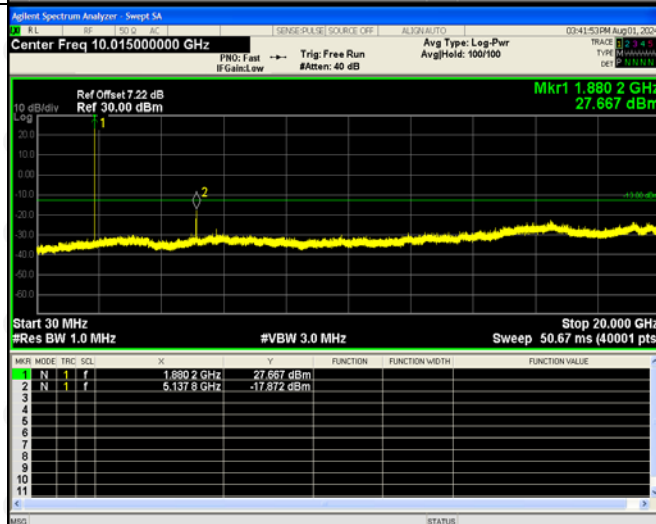
GPRS
Low
Channel



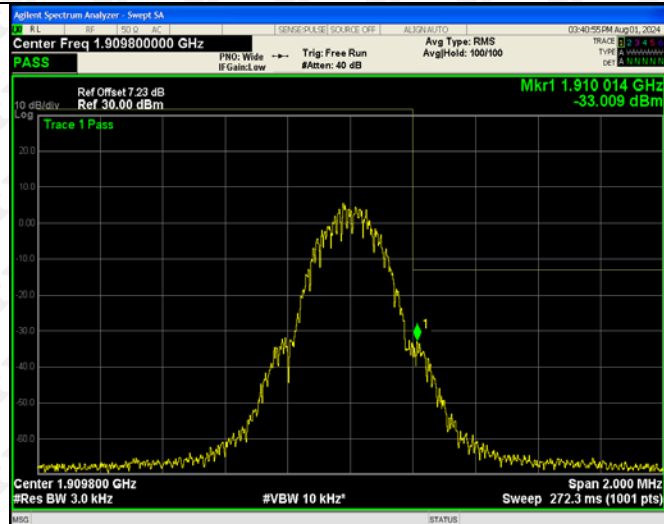
GPRS
Middle
Channel



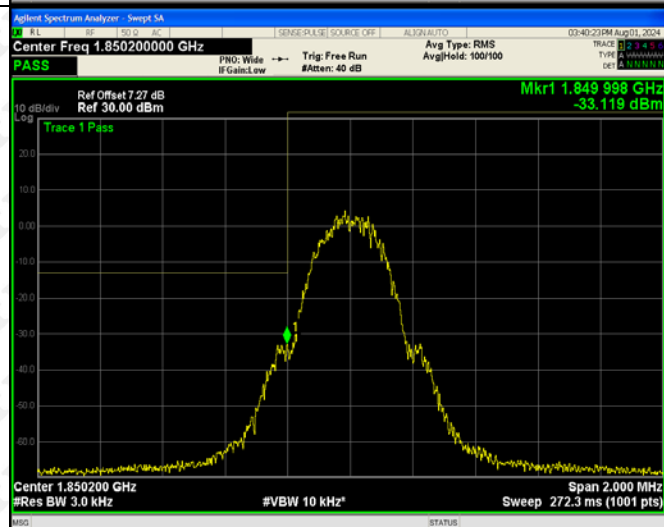
GPRS
High
Channel

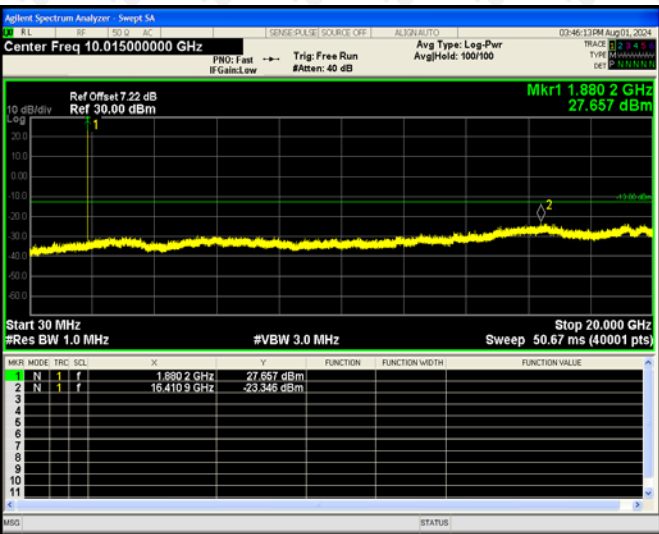
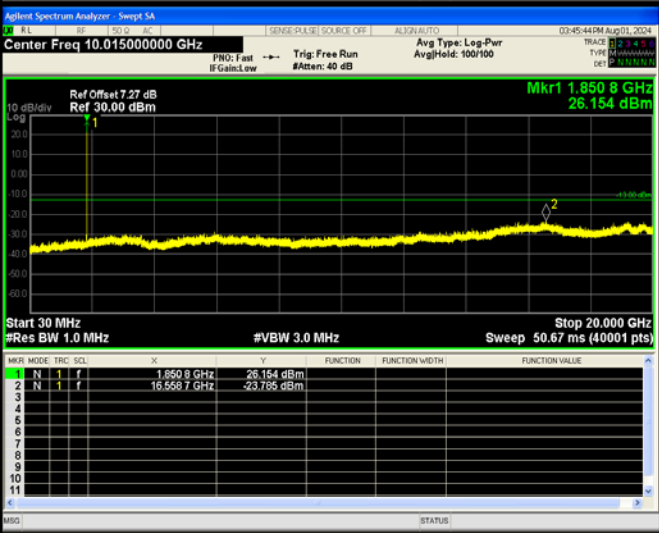
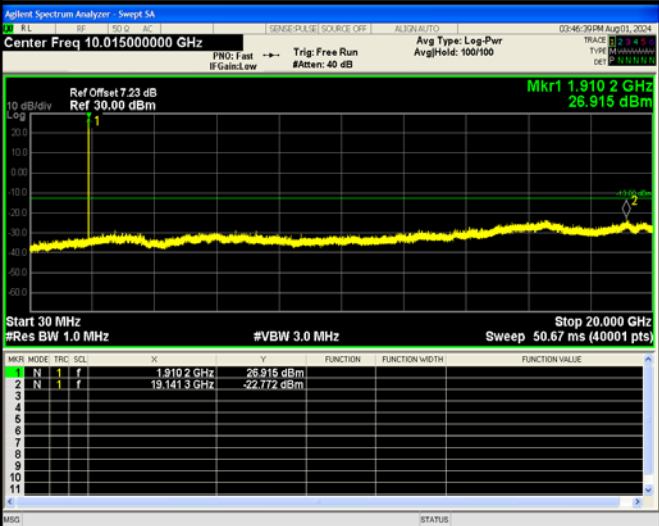


GPRS
Low
Band
Emission

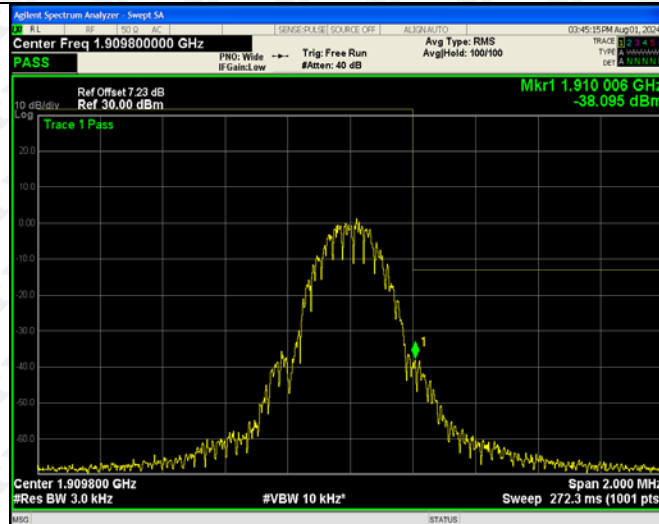


GPRS
High
Band
Emission

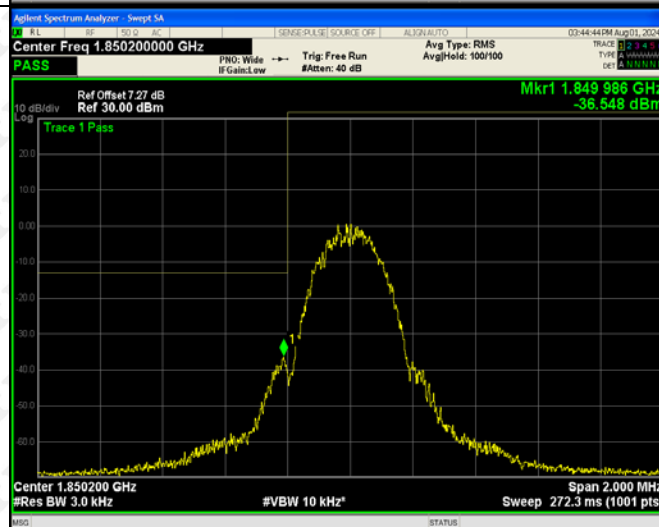


EDGE Low Channel		
EDGE Middle Channel		
EDGE High Channel		

EDGE
Low
Band
Emission



EDGE
High
Band
Emission



10. SPURIOUS RADIATED EMISSIONS

10.1 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

10.2 Test Procedure

- 1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
- 2.The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
- 3.The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 4.Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB = $43 + 10 \log_{10}(\text{power out in Watts})$

10.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	101 kPa
Test Voltage	DC 3.8V

10.4 Summary of Test Results/Plots

According to the data below, the FCC Part22.917 and 24.238 standards, and had the worst margin of:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

All test modes are performed, but only the worst case is recorded in this report.

For Cellular Band GSM850 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (824.2MHz)						
45.36	-68.13	3.9	-64.23	-13	-51.23	H
1641.00	-52.66	4.83	-47.83	-13	-34.83	H
2464.90	-55.45	8.08	-47.37	-13	-34.37	H
39.88	-74.63	4.02	-70.61	-13	-57.61	V
1638.73	-55.22	4.48	-50.74	-13	-37.74	V
2470.08	-52.12	8.2	-43.92	-13	-30.92	V
Middle Channel (836.6MHz)						
42.34	-71.73	3.84	-67.89	-13	-54.89	H
1667.28	-54.27	4.62	-49.65	-13	-36.65	H
2509.53	-49.86	8.25	-41.61	-13	-28.61	H
38.34	-73.34	4.25	-69.09	-13	-56.09	V
1671.20	-48.52	4.54	-43.98	-13	-30.98	V
2504.10	-52.21	8.35	-43.86	-13	-29.75	V
High Channel (848.8MHz)						
43.56	-74.88	4.22	-79.10	-13	-66.10	H
1693.71	-54.25	4.87	-59.12	-13	-46.12	H
2537.80	-50.46	8.38	-58.84	-13	-45.84	H
41.41	-68.08	4.02	-72.10	-13	-59.10	V
1688.09	-50.84	4.56	-55.40	-13	-42.40	V
2536.70	-53.73	8.41	-62.14	-13	-49.14	V

For PCS Band GSM1900 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1850.2MHz)						
38.57	-70.57	4.34	-66.23	-13	-53.23	H
3697.77	-59.06	10.54	-48.52	-13	-35.52	H
5541.31	-62.23	13.37	-48.86	-13	-35.86	H
41.67	-64.68	4.34	-60.34	-13	-47.34	V
3693.30	-57.75	10.54	-47.21	-13	-34.21	V
5542.17	-58.64	13.37	-45.27	-13	-32.27	V
Middle Channel (1880MHz)						
40.72	-71.12	4.02	-67.10	-13	-54.10	H
3754.54	-57.38	10.71	-46.67	-13	-33.67	H
5632.13	-57.48	13.73	-43.75	-13	-30.75	H
44.62	-73.55	4.14	-69.41	-13	-56.41	V
3757.15	-55.16	10.22	-44.94	-13	-31.94	V
5636.81	-59.57	13.16	-46.41	-13	-33.41	V
High Channel (1909.8MHz)						
43.77	-74.92	4.02	-70.90	-13	-57.90	H
3812.30	-54.97	4.9	-50.07	-13	-37.07	H
5725.49	-45.69	8.09	-37.60	-13	-24.60	H
38.79	-62.29	4.25	-58.04	-13	-45.04	V
3813.83	-61.49	4.93	-56.56	-13	-43.56	V
5726.79	-57.47	8.43	-49.04	-13	-36.04	V

Note: Result=Reading+ Correct, Margin= Result- Limit

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

11. FREQUENCY STABILITY

11.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

11.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

11.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	101kPa

11.4 Summary of Test Results/Plots

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	8.60	0.01028
40	NV	9.37	0.01120
30	NV	9.55	0.01142
20	NV	9.31	0.01113
10	NV	10.19	0.01219
0	NV	10.64	0.01272
-10	NV	10.49	0.01253
-20	NV	11.13	0.01331
-30	NV	11.23	0.01342

For PCS Band GPRS Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	12.39	0.00659
40	NV	12.56	0.00668
30	NV	12.86	0.00684
20	NV	12.32	0.00655
10	NV	13.35	0.00710
0	NV	13.20	0.00702
-10	NV	14.06	0.00748
-20	NV	14.44	0.00768
-30	NV	14.78	0.00786

For Cellular Band EDGE Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	11.05	0.01321
40	NV	11.10	0.01327
30	NV	11.19	0.01337
20	NV	11.44	0.01368
10	NV	12.30	0.01470
0	NV	12.24	0.01463
-10	NV	12.50	0.01494
-20	NV	12.79	0.01529
-30	NV	12.95	0.01548

For PCS Band EDGE Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	-10.58	-0.00563
40	NV	-9.84	-0.00523
30	NV	-10.15	-0.00540
20	NV	-9.42	-0.00501
10	NV	-8.72	-0.00464
0	NV	-9.18	-0.00488
-10	NV	-8.17	-0.00435
-20	NV	-8.22	-0.00437
-30	NV	-8.08	-0.00430

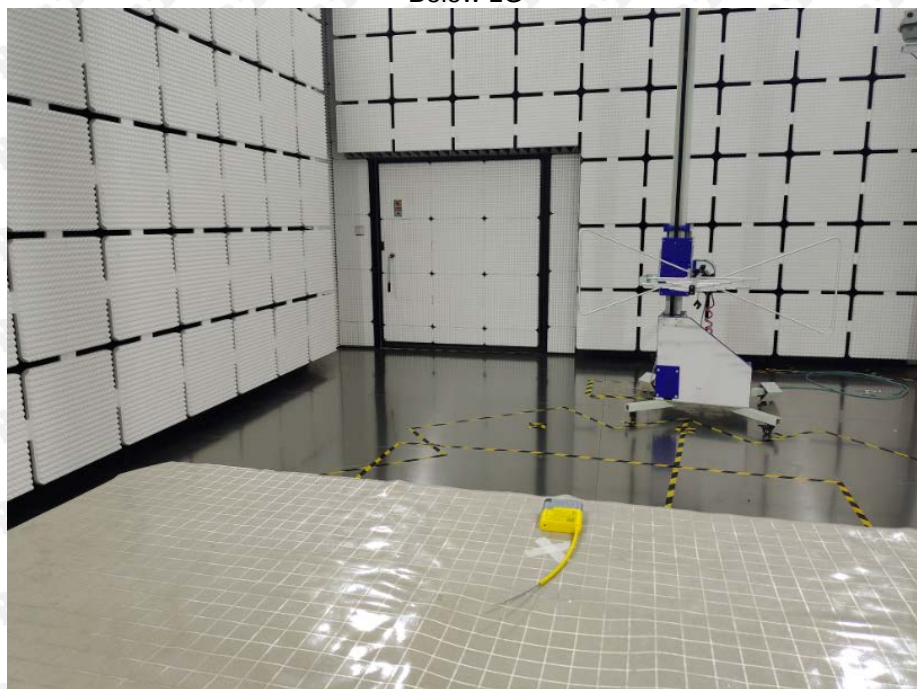
So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GPRS 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	10.66	0.01274
	NV	11.22	0.01342
	HV	11.67	0.01394
Reference Frequency(Middle Channel): GPRS 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	14.47	0.00770
	NV	14.88	0.00791
	HV	14.54	0.00773
Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	13.32	0.01592
	NV	12.83	0.01534
	HV	13.77	0.01646
Reference Frequency(Middle Channel): EDGE 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	-8.44	-0.00449
	NV	-7.87	-0.00418
	HV	-6.84	-0.00364
	HV	-8.44	-0.00449

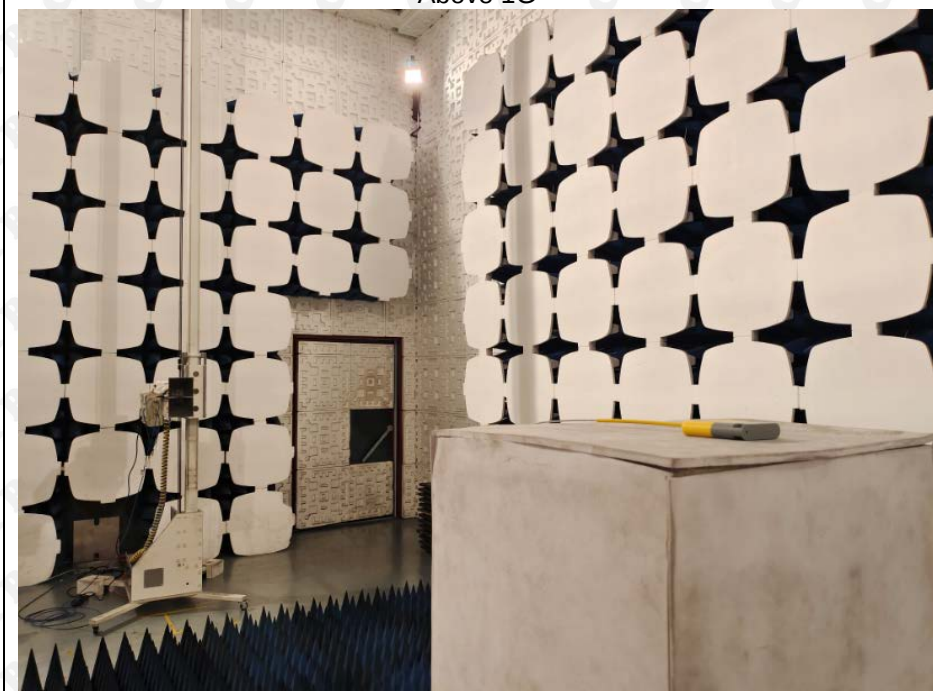
12. EUT TEST PHOTO

Radiated Emission

Below 1G



Above 1G



***** END OF REPORT *****