

TEST REPORT

Product Name: Tablet
FCC ID: 2BCNP-BS-PAD
Trademark: BLACK SHARK
Model Number: BSA1, BSA2, BSA3, BSA4, BSA5, BSA6, BSA7, BSA8, BSA9, BSA10, BSA11, BSA12, BSA13, BSA14, BSA15, BSA16, BSA17, BSA18, BSA19, BSA20, BSA21, BSA22, BSA23, BSA24, BSA25, BSA26, BSA27, BSA28, BSA29, BSA30, BSA31, BSA32, BSA33, BSA34, BSA35, BSA36, BSA37, BSA38, BSA39, BSA40.
Prepared For: Blackshark Technologies (Nanchang) Co., Ltd
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Manufacturer: Blackshark Technologies (Nanchang) Co., Ltd
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Sample Received Date: May. 14, 2024
Sample tested Date: May. 14, 2024 to Jun. 11, 2024
Issue Date: Jun. 11, 2024
Report No.: CTB240611026RF
Test Standards: FCC Part 22H & 24E
Test Results: PASS
Remark: This is GSM radio test report.

Compiled by:

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Reviewed by:

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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.

TABLE OF CONTENT

Test Report Declaration	Page
1. VERSION	4
2. TEST SUMMARY	5
3. MEASUREMENT UNCERTAINTY	6
4. PRODUCT INFORMATION AND TEST SETUP	7
4.1 Product Information	7
4.2 Test Setup Configuration	8
4.3 Support Equipment	8
4.4 Channel List	9
4.5 Test Mode	9
4.6 Test Environment	9
5. TEST FACILITY AND TEST INSTRUMENT USED	10
5.1 Test Facility	10
5.2 Test Instrument Used	10
6. RF OUTPUT POWER	12
6.1 Standard Applicable	12
6.2 Test Procedure	12
6.3 Environmental Conditions	12
6.4 Summary of Test Results/Plots	13
7. PEAK-TO-AVERAGE RATIO(PAR) OF TRANSMITTER	16
7.1 Standard Applicable	16
7.2 Test Procedure	16
7.3 Environmental Conditions	16
7.4 Summary of Test Results	17
8. EMISSION BANDWIDTH	19
8.1 Standard Applicable	19
8.2 Test Procedure	19
8.3 Environmental Conditions	19
8.4 Summary of Test Results/Plots	20
9. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL	27
9.1 Standard Applicable	27
9.2 Test Procedure	27
9.3 Environmental Conditions	27
9.4 Summary of Test Results/Plots	28
10. SPURIOUS RADIATED EMISSIONS	40
10.1 Standard Applicable	40
10.2 Test Procedure	40
10.3 Environmental Conditions	40
10.4 Summary of Test Results/Plots	41
11. FREQUENCY STABILITY	43
11.1 Standard Applicable	43
11.2 Test Procedure	43



11.3	Environmental Conditions	43
11.4	Summary of Test Results/Plots	44
12.	EUT TEST PHOTO	49

(Note: N/A means not applicable)



1. **VERSION**

Report No.	Issue Date	Description	Approved
CTB240611026RF	Jun. 11, 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 chamber 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):	BSA1, BSA2, BSA3, BSA4, BSA5, BSA6, BSA7, BSA8, BSA9, BSA10, BSA11, BSA12, BSA13, BSA14, BSA15, BSA16, BSA17, BSA18, BSA19, BSA20, BSA21, BSA22, BSA23, BSA24, BSA25, BSA26, BSA27, BSA28, BSA29, BSA30, BSA31, BSA32, BSA33, BSA34, BSA35, BSA36, BSA37, BSA38, BSA39, BSA40.
Model Description:	All the model are the same circuit and RF module, only different for model name .Test sample model: BSA1
Hardware Version:	P30-T616-V2.0-230703-L1
Software Version:	ussi_arm64_full_release-w23.07.1-p1-20240430
Operation Frequency:	GSM/GPRS/EDGE 850: 824~849MHz WCDMA Band 5: 824~849MHz
Max. RF output power:	GSM850: 32.98dBm WCDMA Band 5: 22.83dBm
Type of Modulation:	GMSK, BPSK
Antenna installation:	Internal antenna
Antenna Gain:	GSM850: -4.32dBi, WCDMA Band 5: -4.32dBi
Ratings:	Input: 100-240V~, 50/60Hz, 0.5A USB-C Output: 5.0V□3.0A, 9.0V□2.22A, 12.0V□1.67A DC 3.85V by battery



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

Item	Equipment	Mfr/Brand	Model/Type No.	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	GSM/GPRS/EDGE	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
Note: the transmitter has been tested on the communications mode of GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA compliance test and record the worst case.			

4.5 Test Mode

Test Mode List		
Test Mode	Description	Remark
TM1	GSM 850	Low, Middle, High Channels
TM2	GPRS 850	Low, Middle, High Channels
TM3	EDGE 850	Low, Middle, High Channels
TM4	WCDMA Band 5	Low, Middle, High Channels
TM5	HSDPA Band 5	Low, Middle, High Channels
TM6	HSUPA Band 5	Low, Middle, High Channels

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	3.85V
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, Xinghe 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	2024.07.05
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2024.07.05
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2024.07.05
4	Communication test set	R&S	CMW500	108058	V3.5.80	2024.07.05
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2024.07.05
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2024.07.05
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2024.07.05
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2024.07.06
9	2.4 GHz Filter	Shenxiang	MSF2400-24 83.5MS-1154	20181015001	/	2024.07.05
10	5 GHz Filter	Shenxiang	MSF5150-58 50MS-1155	20181015001	/	2024.07.06
11	Filter	Xingbo	XBLBQ-DZA 120	190821-1-1	/	2024.07.06
12	BT&WI-FI Automatic test software	Microwave	MTS8000	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2024.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2024.07.05
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2024.08.11
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2024.07.05
18	Amplifier	HP	8447E	2945A02747	/	2024.07.05
19	Amplifier	Agilent	8449B	3008A01838	/	2024.07.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2024.07.08



21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2024.07.08
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2024.07.08
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2024.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	/	2024.07.05

6. RF OUTPUT POWER

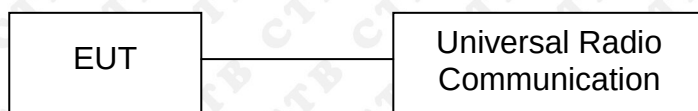
6.1 Standard Applicable

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 GSM 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	32.04	1.5	0	H	1.5	-4.32	26.22	38.45
824.2	32.85	1.5	0	V	1.5	-4.32	27.03	38.45
Middle Channel								
836.6	32.29	1.5	0	H	1.5	-4.32	26.47	38.45
836.6	32.33	1.5	0	V	1.5	-4.32	26.51	38.45
High Channel								
848.8	31.88	1.5	0	H	1.5	-4.32	26.06	38.45
848.8	32.50	1.5	0	V	1.5	-4.32	26.68	38.45

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	32.40	1.5	0	H	1.5	-4.32	26.58	38.45
824.2	32.59	1.5	0	V	1.5	-4.32	26.77	38.45
Middle Channel								
836.6	32.88	1.5	0	H	1.5	-4.32	27.06	38.45
836.6	32.08	1.5	0	V	1.5	-4.32	26.26	38.45
High Channel								
848.8	31.68	1.5	0	H	1.5	-4.32	25.86	38.45
848.8	32.48	1.5	0	V	1.5	-4.32	26.66	38.45

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	24.68	1.5	0	H	1.5	-4.32	18.86	38.45
824.2	24.60	1.5	0	V	1.5	-4.32	18.78	38.45
Middle Channel								
836.6	24.63	1.5	0	H	1.5	-4.32	18.81	38.45
836.6	24.45	1.5	0	V	1.5	-4.32	18.63	38.45
High Channel								
848.8	24.68	1.5	0	H	1.5	-4.32	18.86	38.45
848.8	24.77	1.5	0	V	1.5	-4.32	18.95	38.45

ERP For WCDMA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	22.26	1.5	0	H	1.5	-4.32	16.44	38.45
826.4	22.84	1.5	0	V	1.5	-4.32	17.02	38.45
Middle Channel								
836.6	21.97	1.5	0	H	1.5	-4.32	16.15	38.45
836.6	22.00	1.5	0	V	1.5	-4.32	16.18	38.45
High Channel								
846.6	21.63	1.5	0	H	1.5	-4.32	15.81	38.45
846.6	21.97	1.5	0	V	1.5	-4.32	16.15	38.45

ERP For HSDPA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	21.60	1.5	0	H	1.5	-4.32	15.78	38.45
826.4	21.21	1.5	0	V	1.5	-4.32	15.39	38.45
Middle Channel								
836.6	21.15	1.5	0	H	1.5	-4.32	15.33	38.45
836.6	20.90	1.5	0	V	1.5	-4.32	15.08	38.45
High Channel								
846.6	21.22	1.5	0	H	1.5	-4.32	15.40	38.45
846.6	21.55	1.5	0	V	1.5	-4.32	15.73	38.45

ERP For HSUPA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	21.45	1.5	0	H	1.5	-4.32	15.63	38.45
826.4	21.77	1.5	0	V	1.5	-4.32	15.95	38.45
Middle Channel								
836.6	20.86	1.5	0	H	1.5	-4.32	15.04	38.45
836.6	21.30	1.5	0	V	1.5	-4.32	15.48	38.45
High Channel								
846.6	21.55	1.5	0	H	1.5	-4.32	15.73	38.45
846.6	21.96	1.5	0	V	1.5	-4.32	16.14	38.45

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)
GSM	Low Channel	824.2	32.98	38.45
	Middle Channel	836.6	32.97	38.45
	High Channel	848.8	32.63	38.45
GPRS(1 Slot)	Low Channel	824.2	32.97	38.45
	Middle Channel	836.6	32.96	38.45
	High Channel	848.8	32.62	38.45
EDGE(1 Slot)	Low Channel	824.2	24.86	38.45
	Middle Channel	836.6	25.10	38.45
	High Channel	848.8	25.24	38.45

For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.84	38.45
	Middle Channel	836.6	22.74	38.45
	High Channel	846.6	22.63	38.45
HSDPA	Low Channel	826.4	21.98	38.45
	Middle Channel	836.6	21.84	38.45
	High Channel	846.6	22.02	38.45
HSUPA	Low Channel	826.4	22.09	38.45
	Middle Channel	836.6	21.66	38.45
	High Channel	846.6	21.97	38.45

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

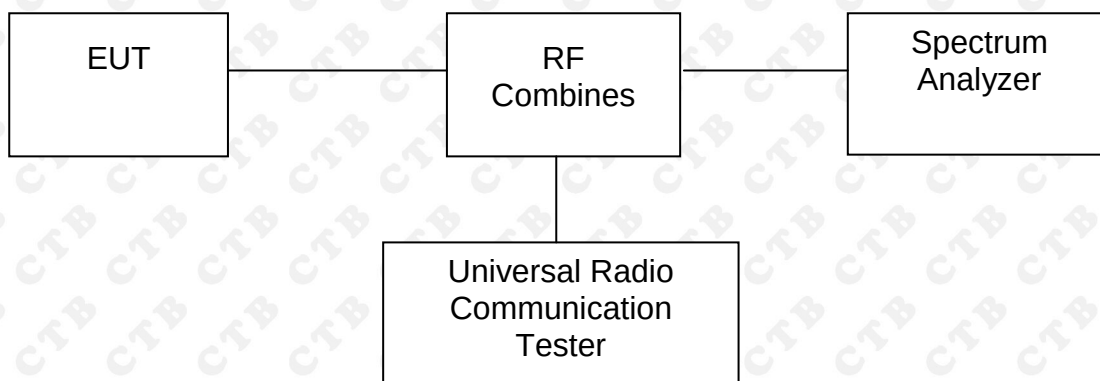
7.1 Standard Applicable

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

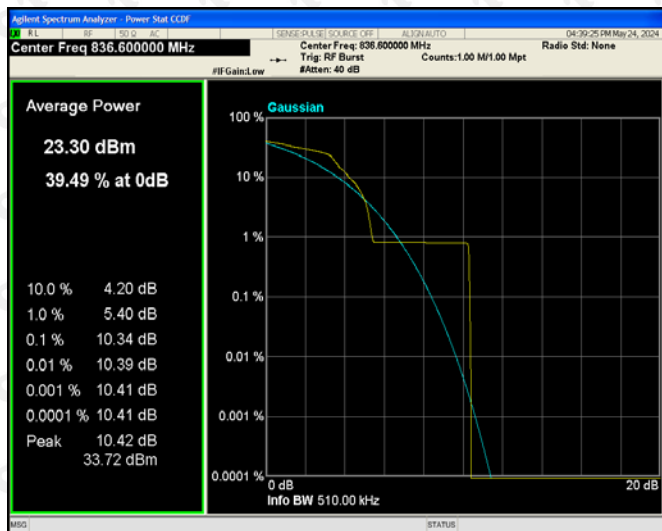
Only the worst case was selected to record
For GSM850

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	190	836.6	2.68	13
GPRS(1 Slot)	190	836.6	2.71	13
EDGE(1 Slot)	190	836.6	10.33	13

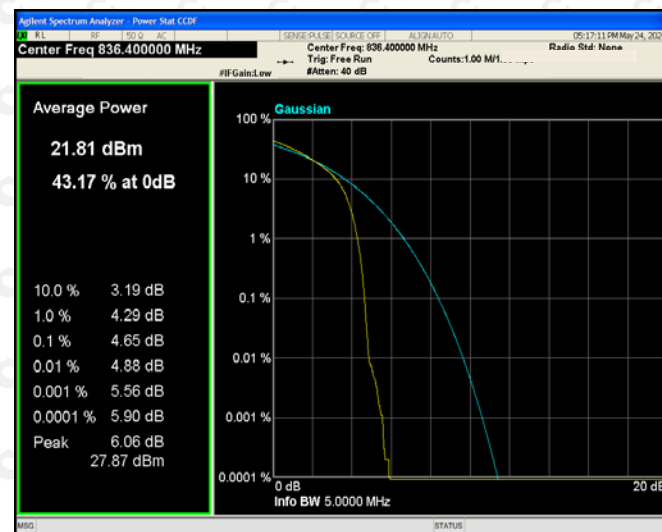
For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	4182	836.4	3.11	13
HSDPA	4182	836.4	4.65	13
HSUPA	4182	836.4	4.26	13

GSM :



WCDMA:



8. EMISSION BANDWIDTH

8.1 Standard Applicable

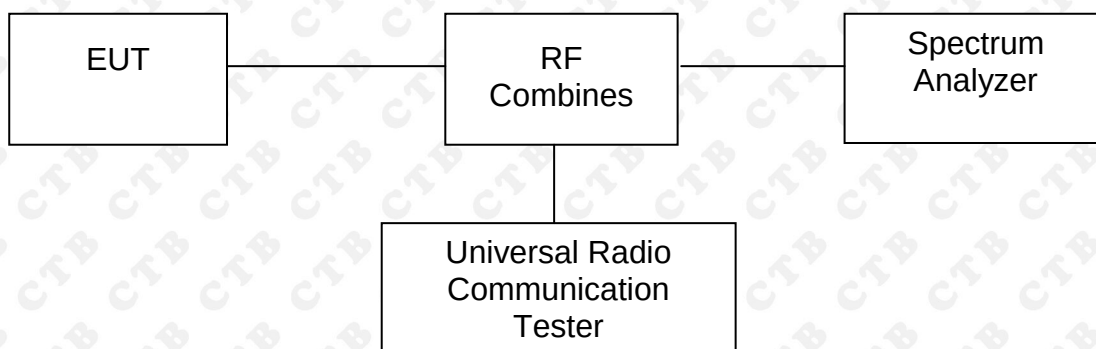
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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

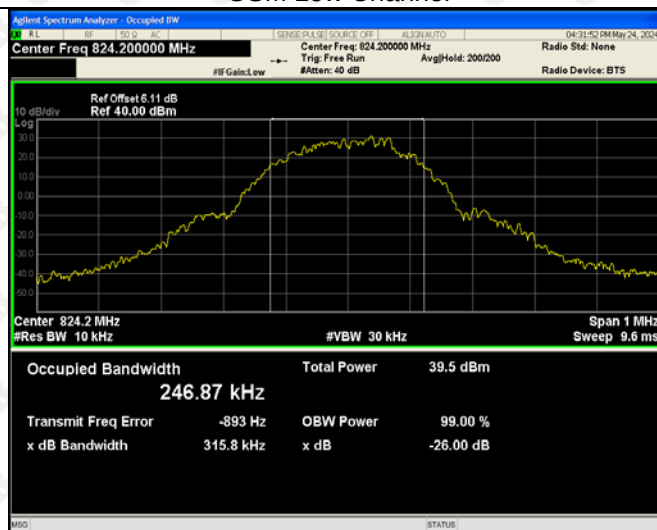
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	128	824.2	246.875	315.807
	190	836.6	252.068	320.685
	251	848.8	251.008	318.536
GPRS	128	824.2	248.846	320.676
	190	836.6	240.576	310.274
	251	848.8	241.673	319.536
EDGE	128	824.2	243.094	283.849
	190	836.6	221.656	269.422
	251	848.8	238.431	301.802

For Band 5

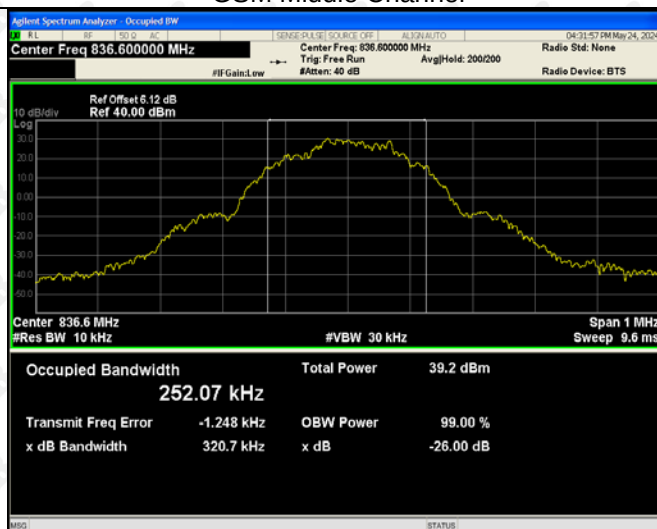
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
WCDMA	4132	826.4	4172.719	4688.630
	4183	836.6	4150.262	4666.525
	4233	846.6	4145.822	4658.654
HSDPA	4132	826.4	4155.466	4667.558
	4183	836.6	4171.387	4645.256
	4233	846.6	4142.918	4644.564
HSUPA	4132	826.4	4153.243	4678.143
	4183	836.6	4174.484	4676.674
	4233	846.6	4149.278	4666.867

For Cellular Band

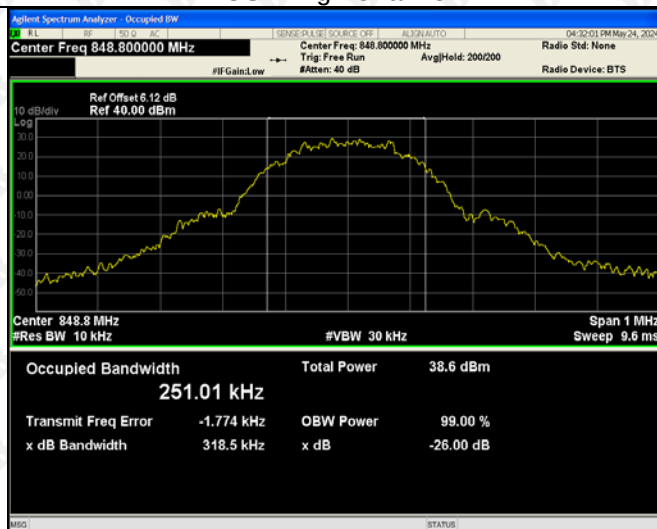
GSM Low Channel



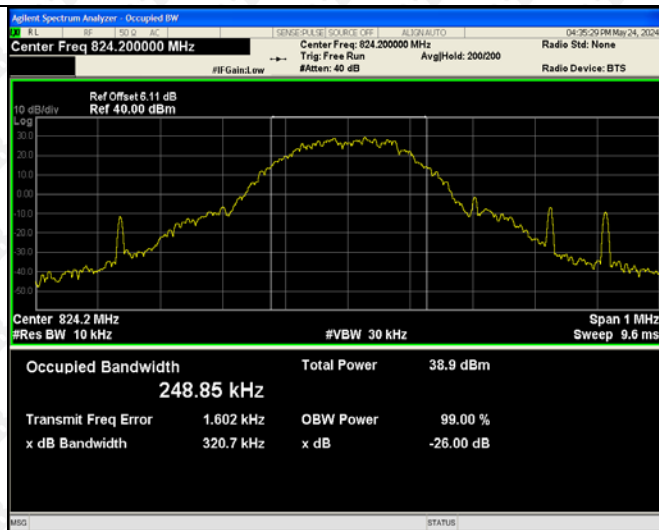
GSM Middle Channel



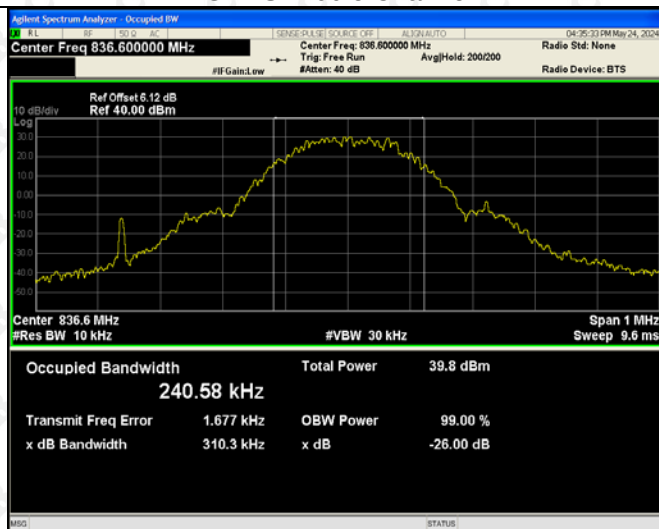
GSM High Channel



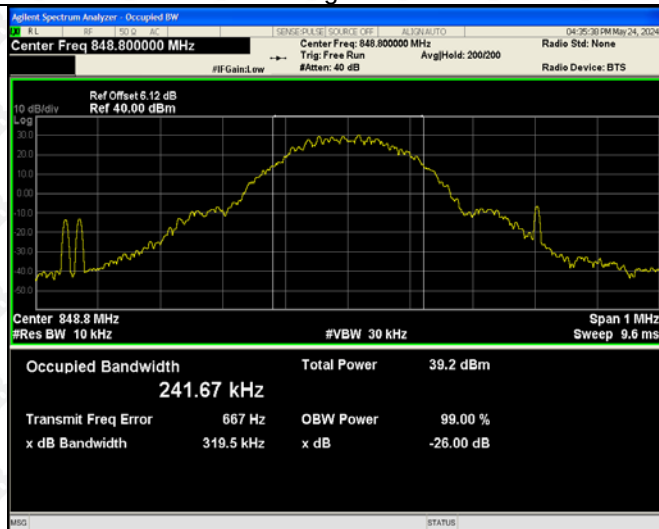
GPRS Low Channel



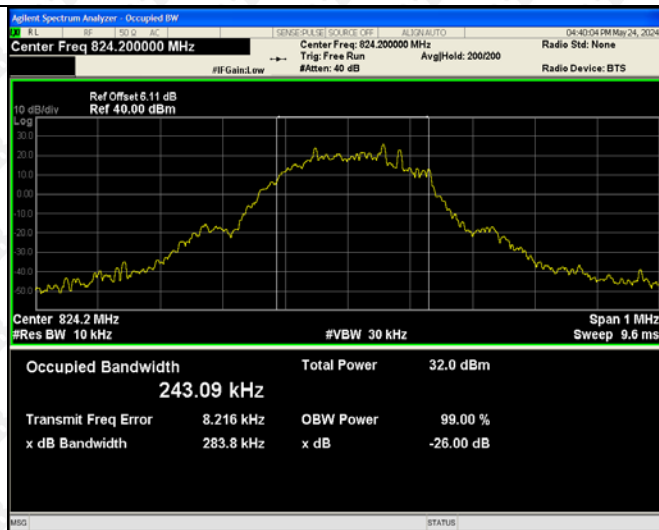
GPRS Middle Channel



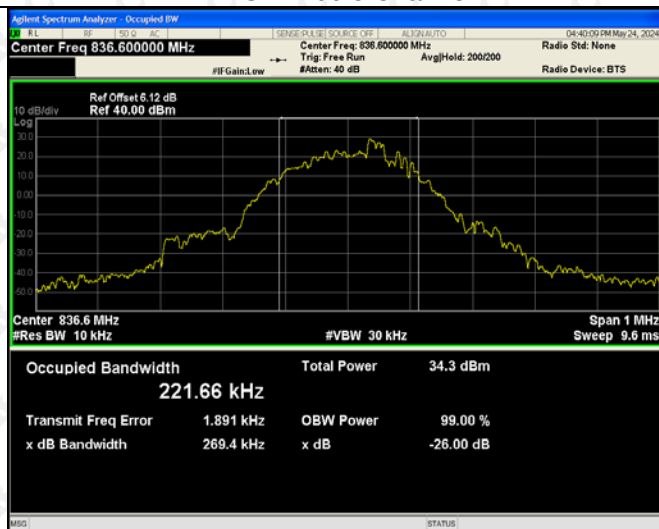
GPRS High Channel



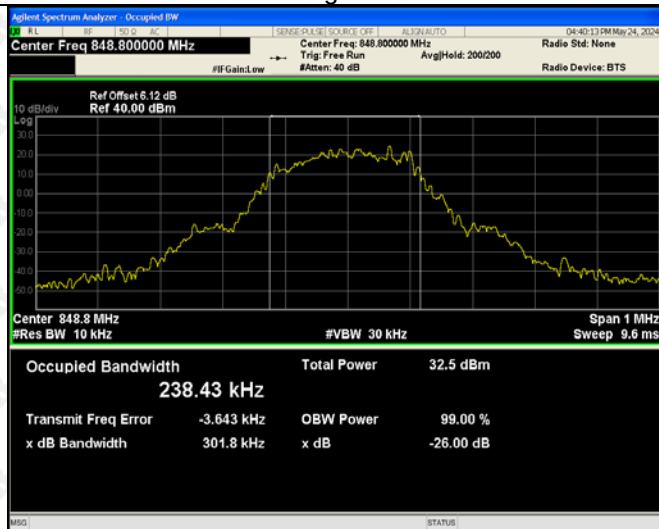
EDGE Low Channel



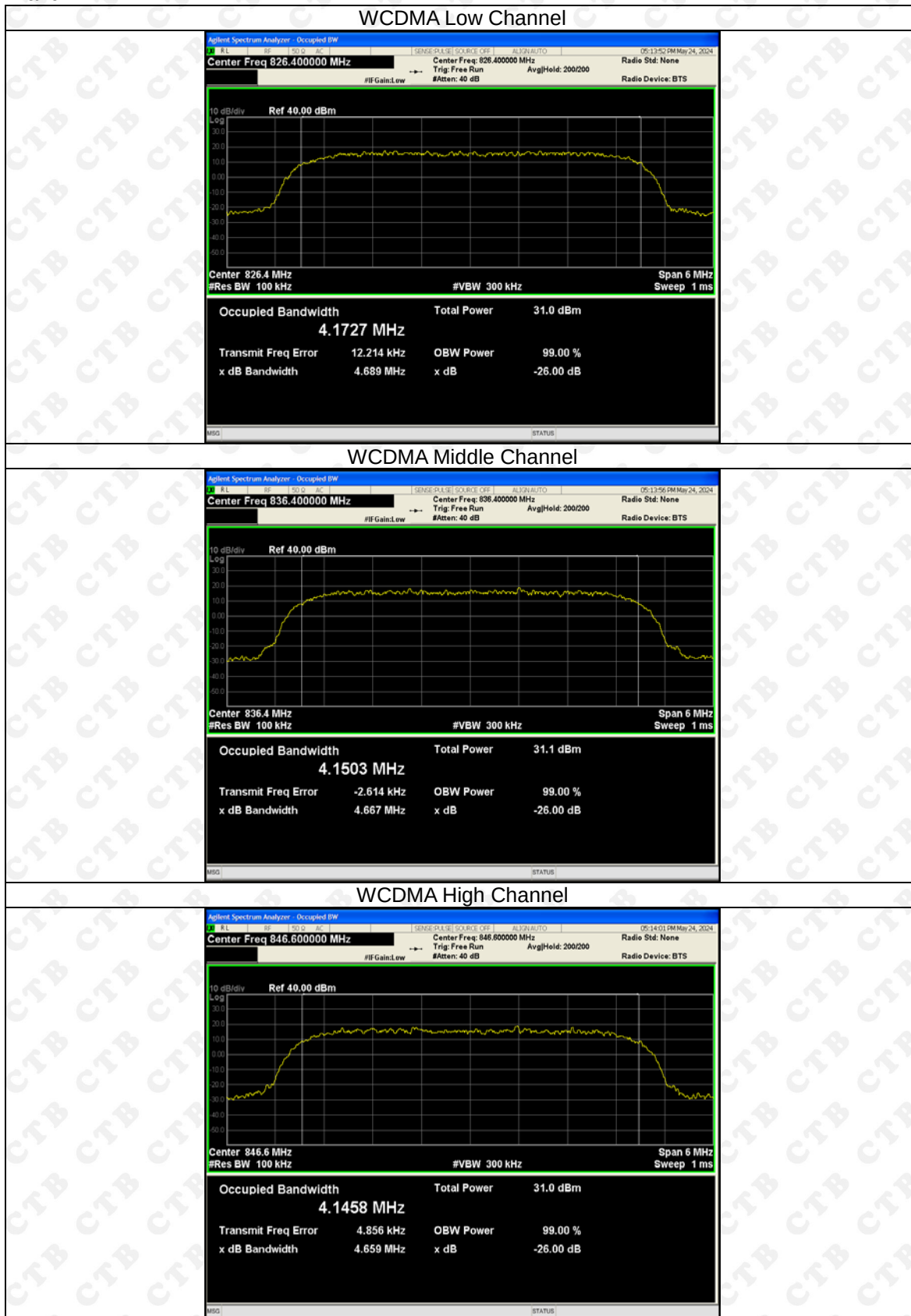
EDGE Middle Channel



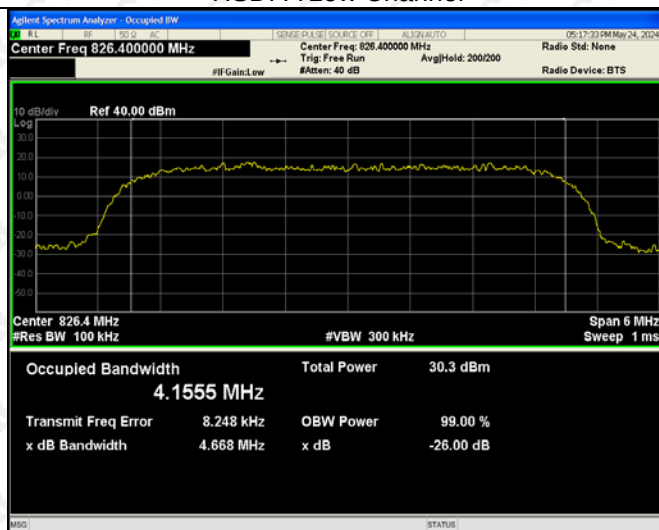
EDGE High Channel



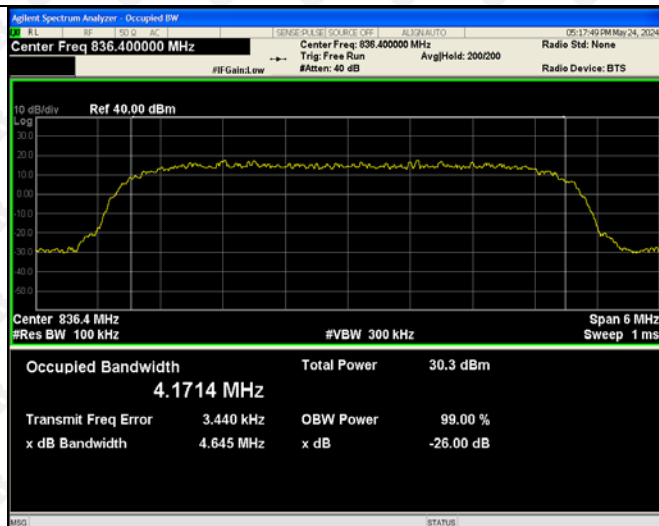
For Band V



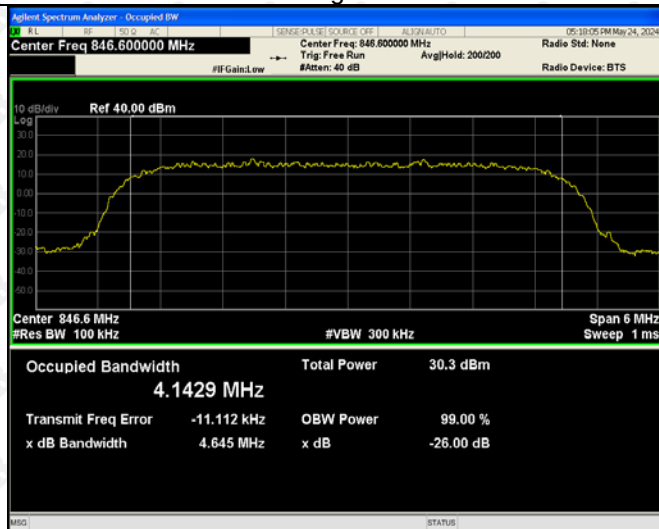
HSDPA Low Channel



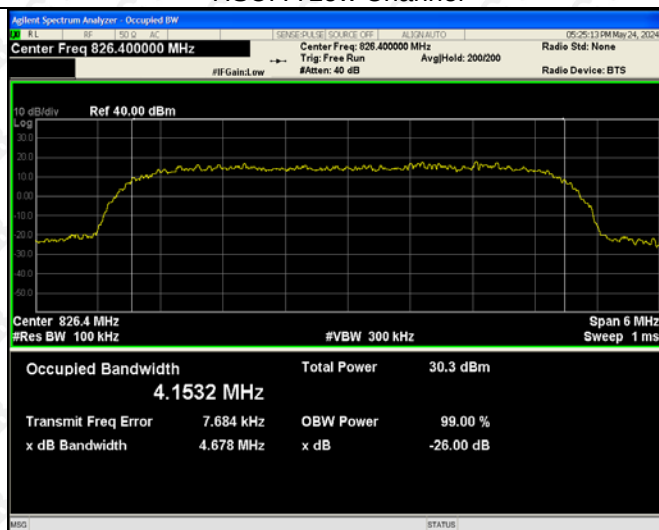
HSDPA Middle Channel



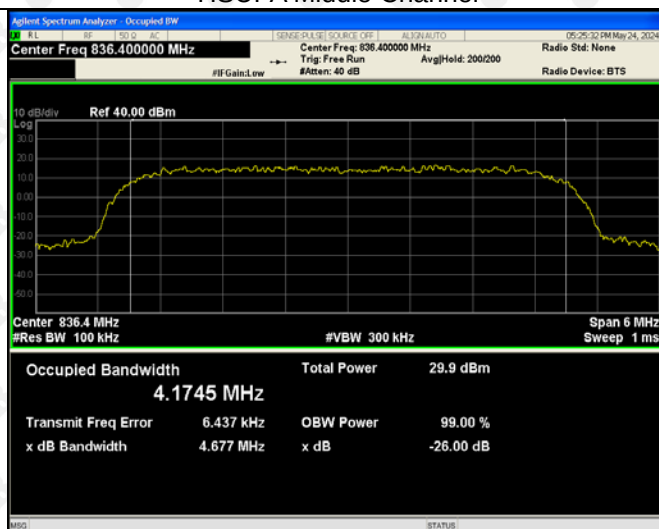
HSDPA High Channel



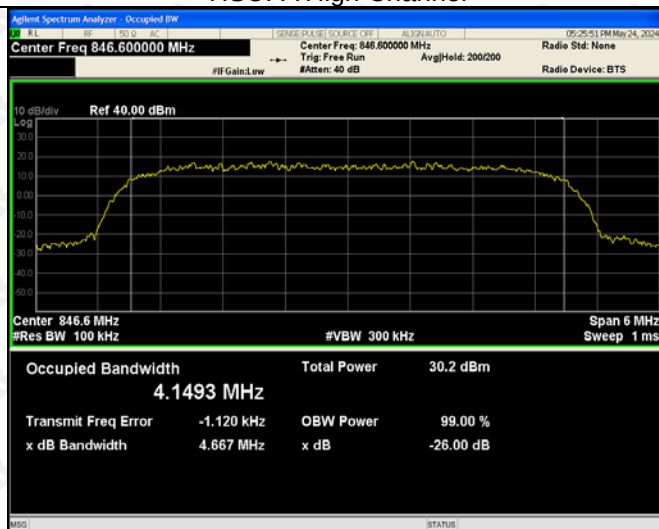
HSUPA Low Channel



HSUPA Middle Channel



HSUPA High Channel



9. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL

9.1 Standard Applicable

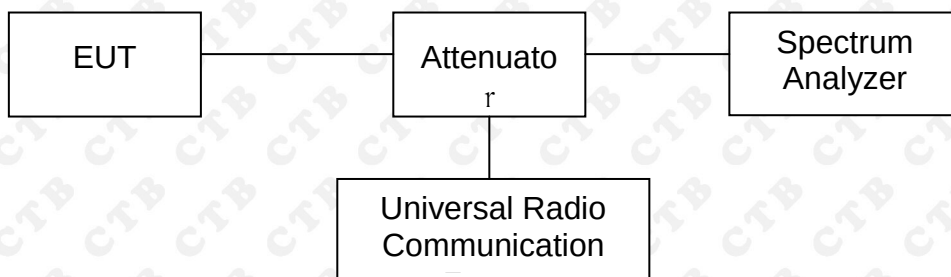
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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 10^{th} harmonic.

Test Configuration for the out of band emissions testing:



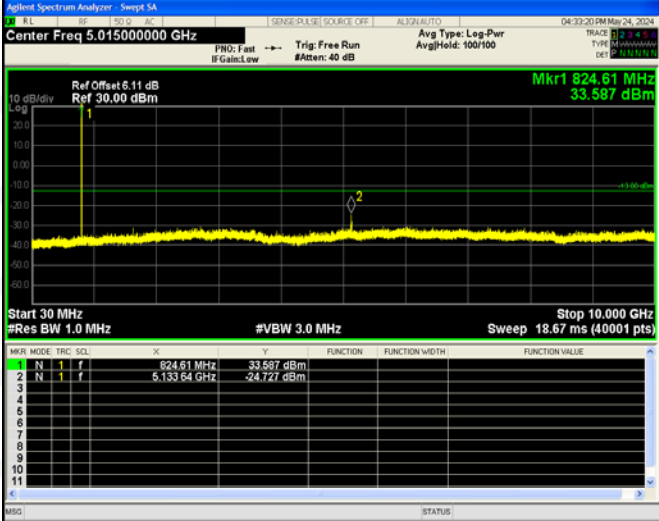
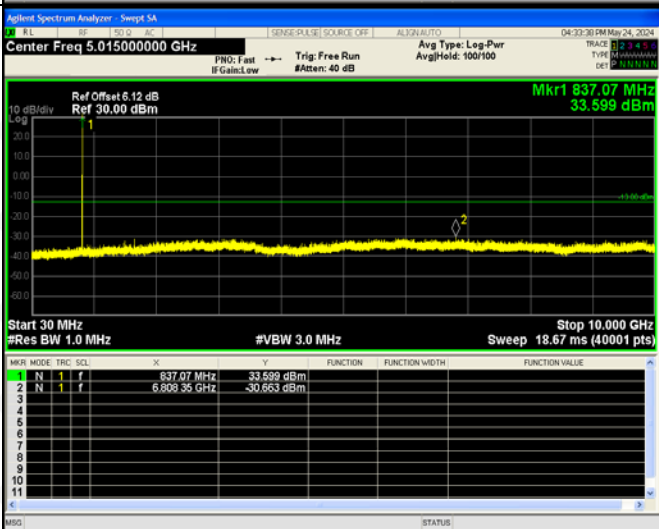
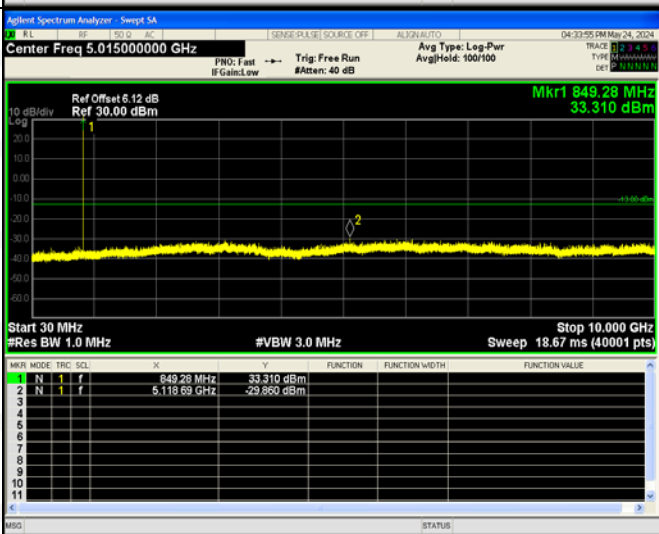
9.3 Environmental Conditions

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

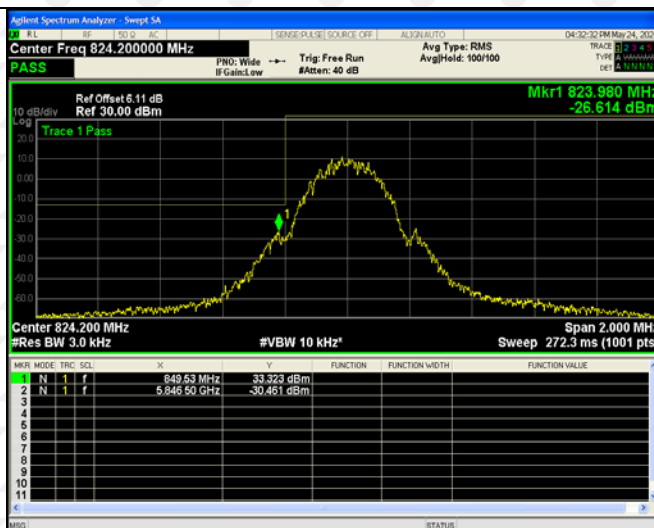
9.4 Summary of Test Results/Plots

Please refer to the following test plots

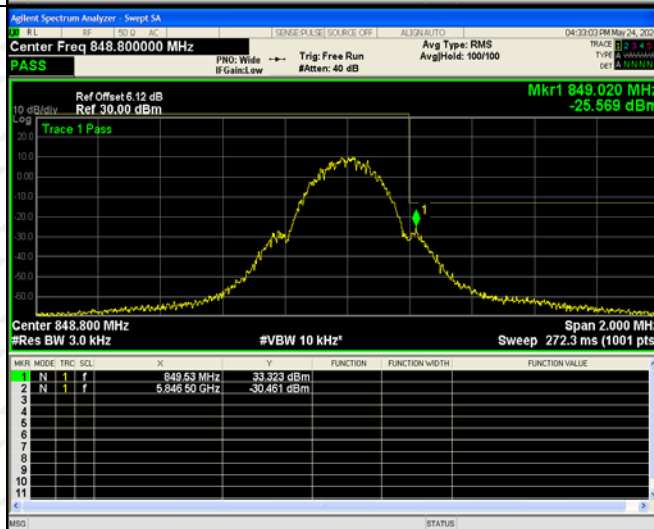
For Cellular Band

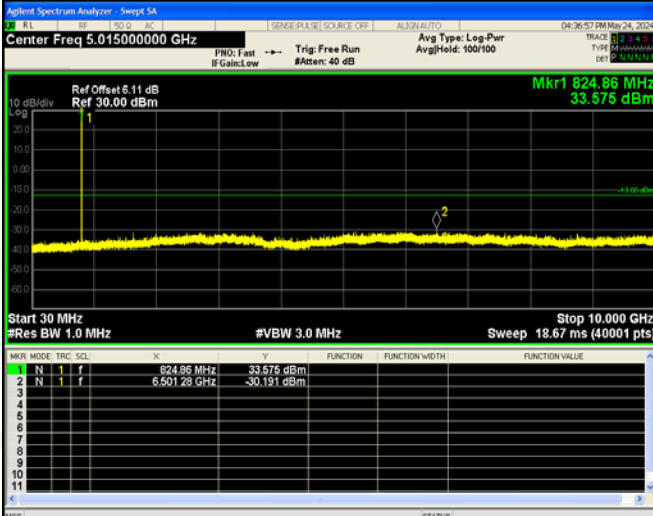
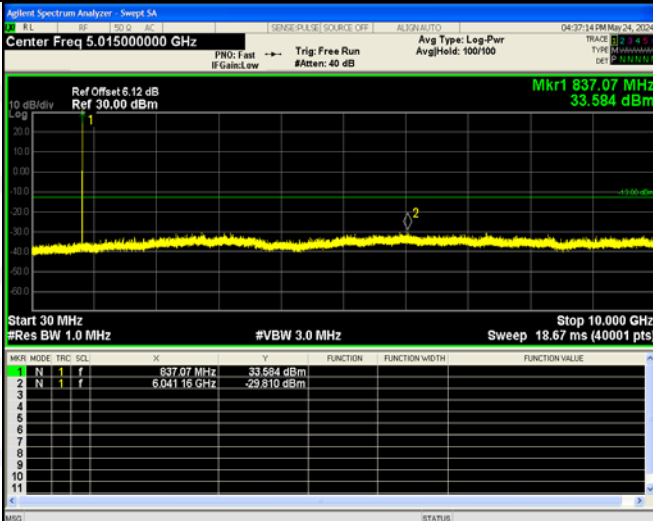
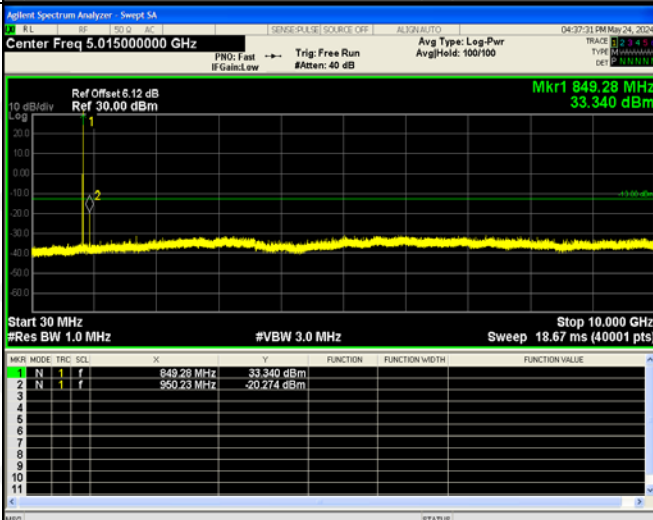
GSM Low Channel	
GSM Middle Channel	
GSM High Channel	

GSM
Low
Band
Emission

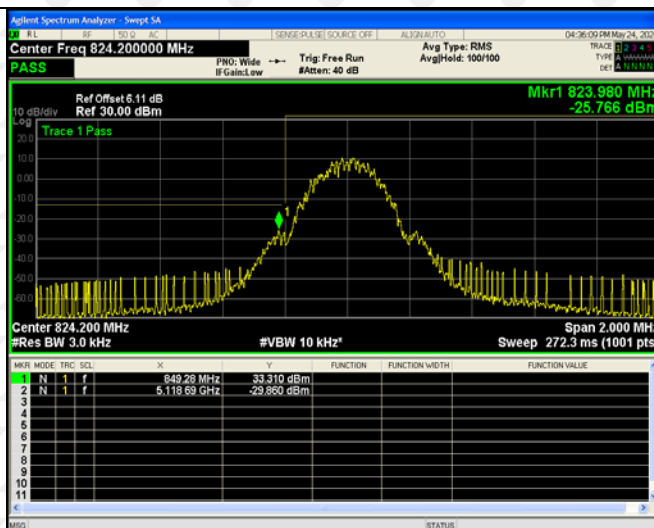


GSM
High
Band
Emission

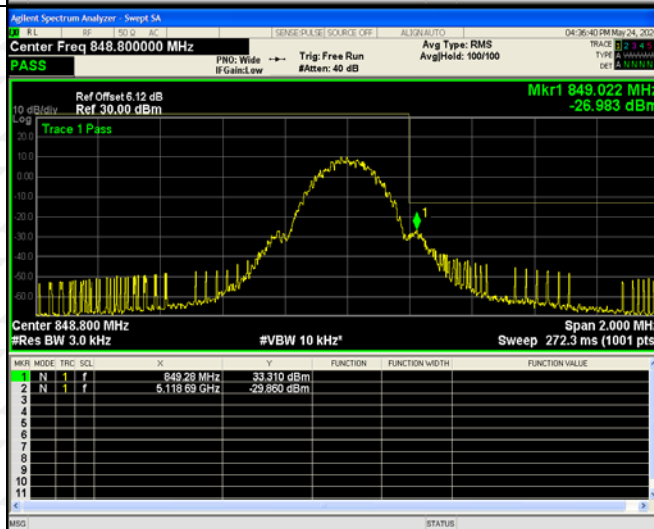


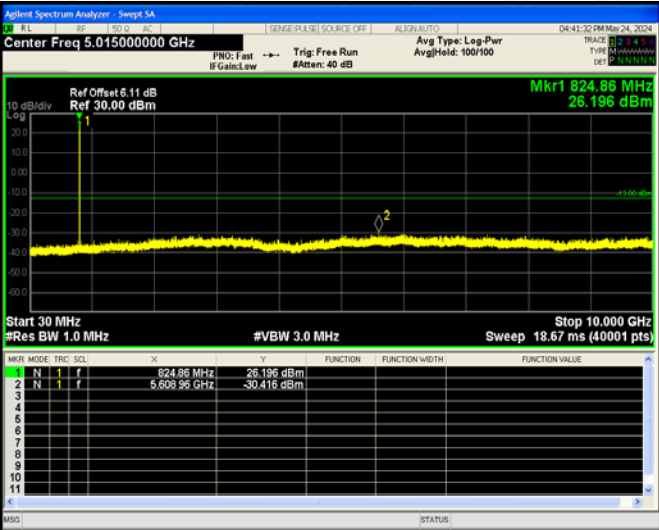
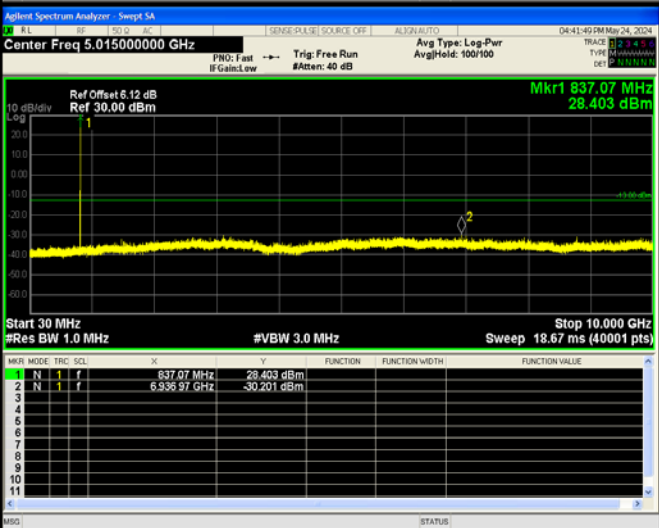
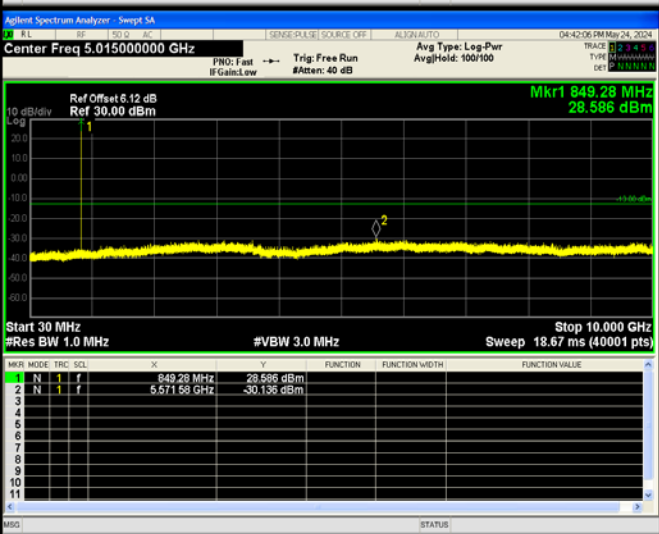
GPRS Low Channel	 Agilent Spectrum Analyzer - Sweep SA Center Freq 5.015000000 GHz Ref Offset 6.11 dB Ref 30.00 dBm Mkr1 824.86 MHz 33.575 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><thead><tr><th>MARK</th><th>MODE</th><th>TRIG</th><th>SOL</th><th>F</th><th>P</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>824.86 MHz</td><td>33.575 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>6.50128 GHz</td><td>-30.191 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MARK	MODE	TRIG	SOL	F	P	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	824.86 MHz	33.575 dBm				2	N	1	f	6.50128 GHz	-30.191 dBm				
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2	N	1	f	6.50128 GHz	-30.191 dBm																								
GPRS Middle Channel	 Agilent Spectrum Analyzer - Sweep SA Center Freq 5.015000000 GHz Ref Offset 6.12 dB Ref 30.00 dBm Mkr1 837.07 MHz 33.584 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><thead><tr><th>MARK</th><th>MODE</th><th>TRIG</th><th>SOL</th><th>F</th><th>P</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>837.07 MHz</td><td>33.584 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>6.04116 GHz</td><td>-29.810 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MARK	MODE	TRIG	SOL	F	P	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	837.07 MHz	33.584 dBm				2	N	1	f	6.04116 GHz	-29.810 dBm				
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2	N	1	f	6.04116 GHz	-29.810 dBm																								
GPRS High Channel	 Agilent Spectrum Analyzer - Sweep SA Center Freq 5.015000000 GHz Ref Offset 6.12 dB Ref 30.00 dBm Mkr1 849.28 MHz 33.340 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><thead><tr><th>MARK</th><th>MODE</th><th>TRIG</th><th>SOL</th><th>F</th><th>P</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>849.28 MHz</td><td>33.340 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>9.50233 MHz</td><td>-20.274 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MARK	MODE	TRIG	SOL	F	P	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	849.28 MHz	33.340 dBm				2	N	1	f	9.50233 MHz	-20.274 dBm				
MARK	MODE	TRIG	SOL	F	P	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	N	1	f	849.28 MHz	33.340 dBm																								
2	N	1	f	9.50233 MHz	-20.274 dBm																								

GPRS
Low
Band
Emission

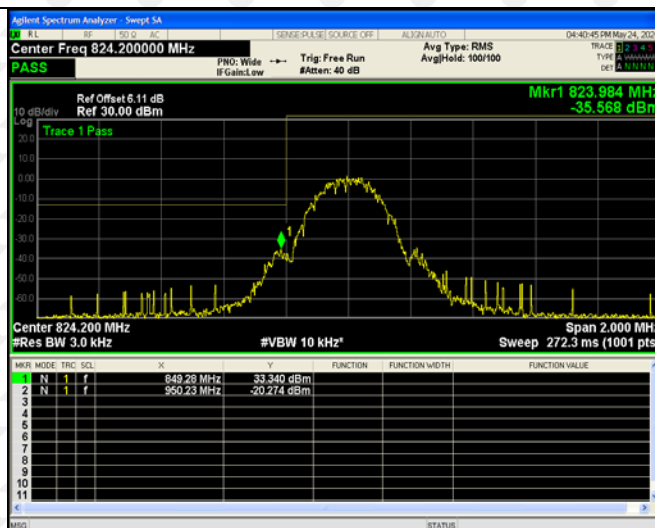


GPRS
High
Band
Emission

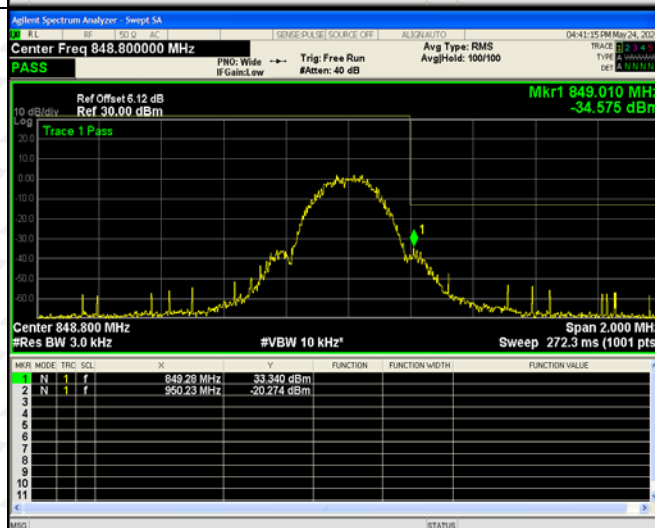


EDGE Low Channel	
EDGE Middle Channel	
EDGE High Channel	

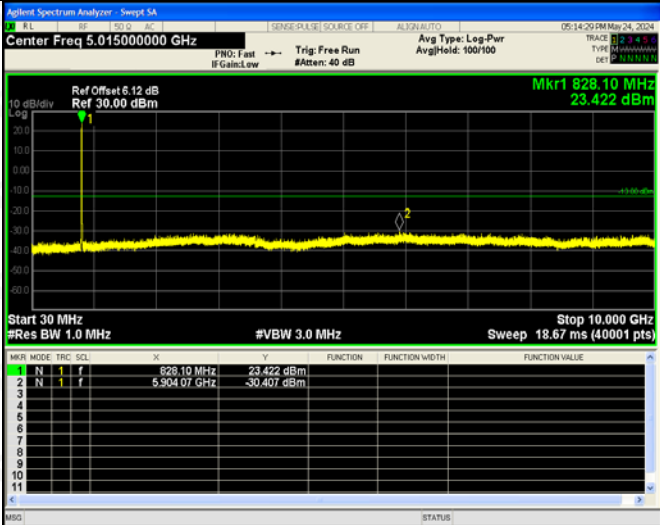
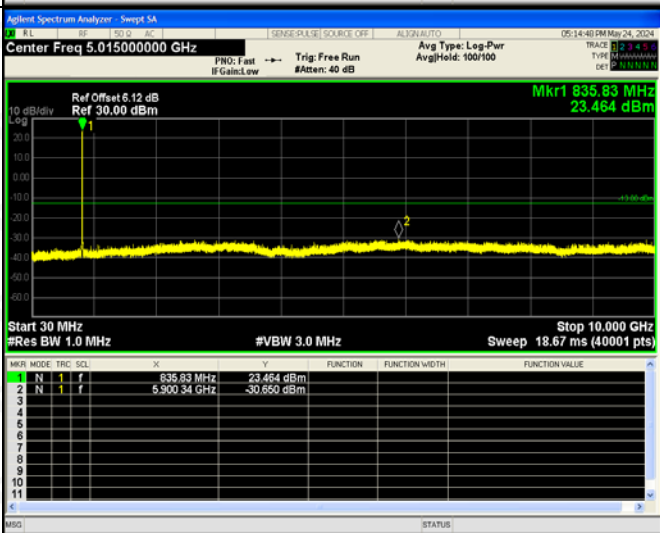
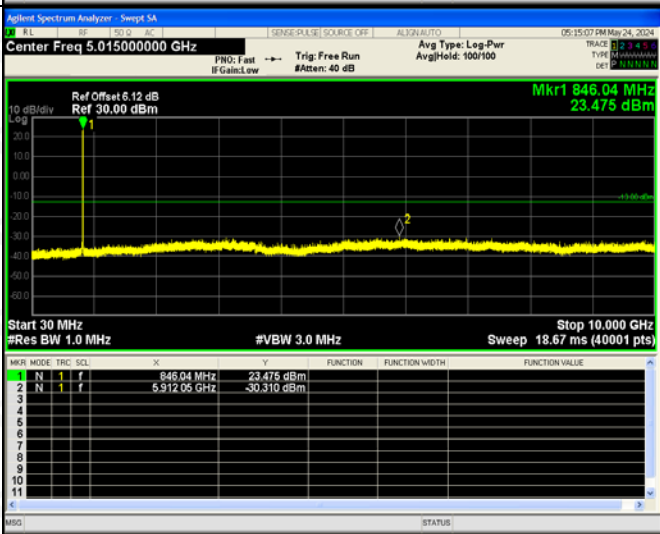
EDGE
Low
Band
Emission



EDGE
High
Band
Emission



For Band V

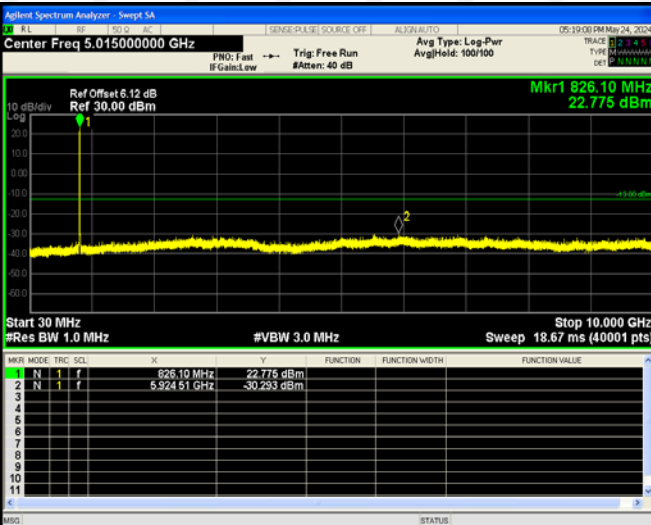
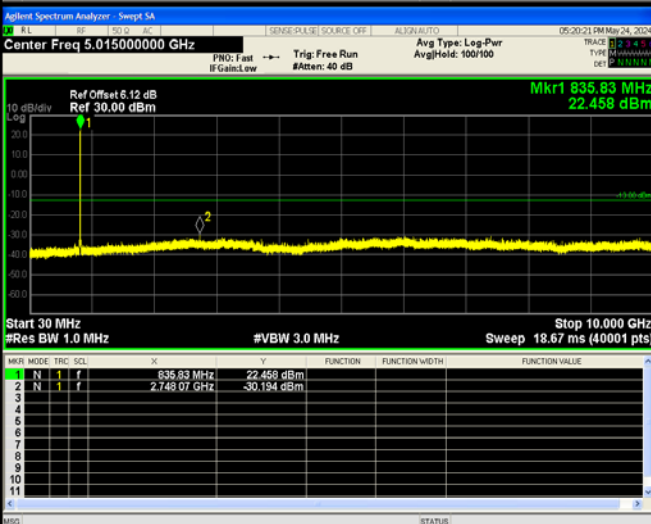
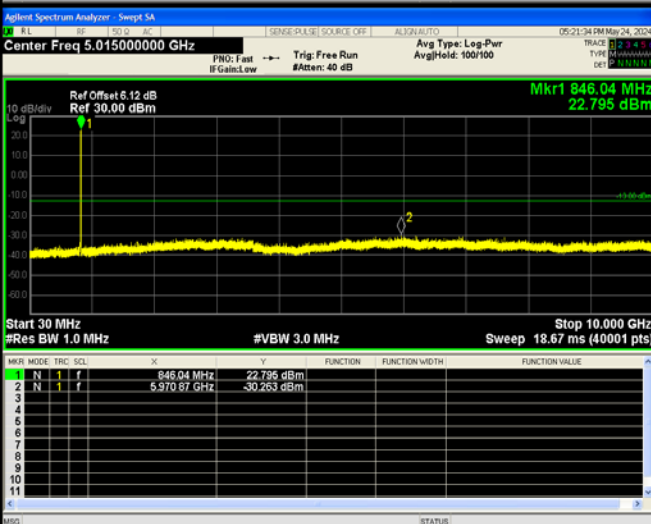
WCDMA Low Channel		
WCDMA Middle Channel		
WCDMA High Channel		

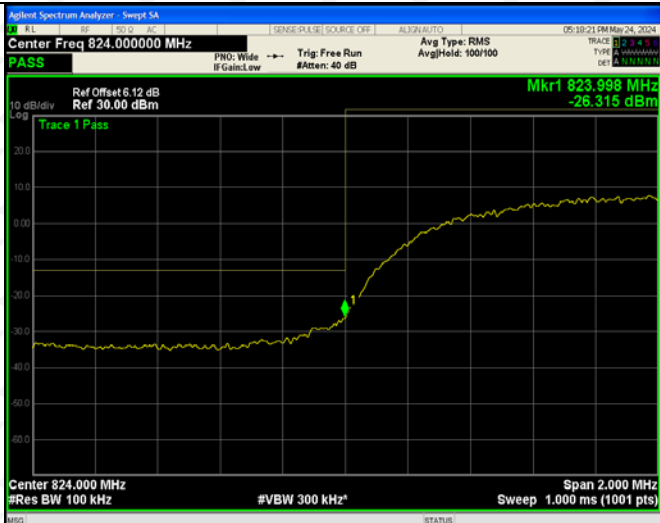
WCDMA
Low
Band
Spurious
Emission

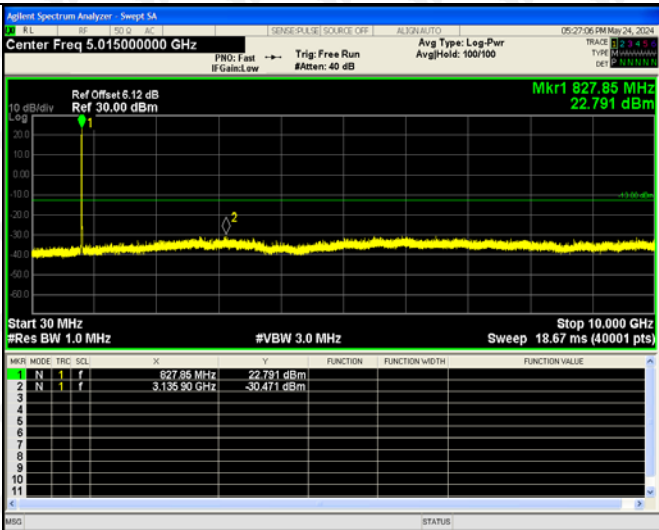
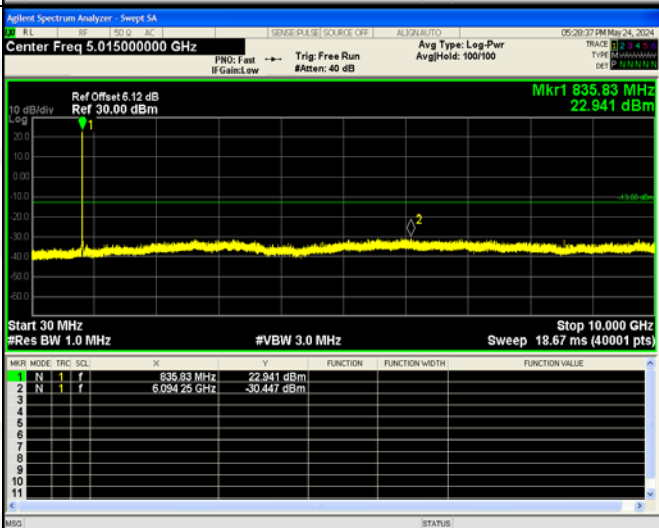
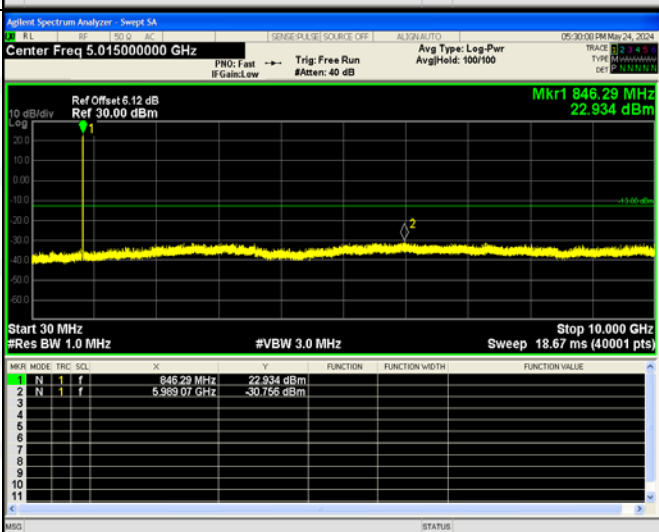


WCDMA
High
Band
Spurious
Emission

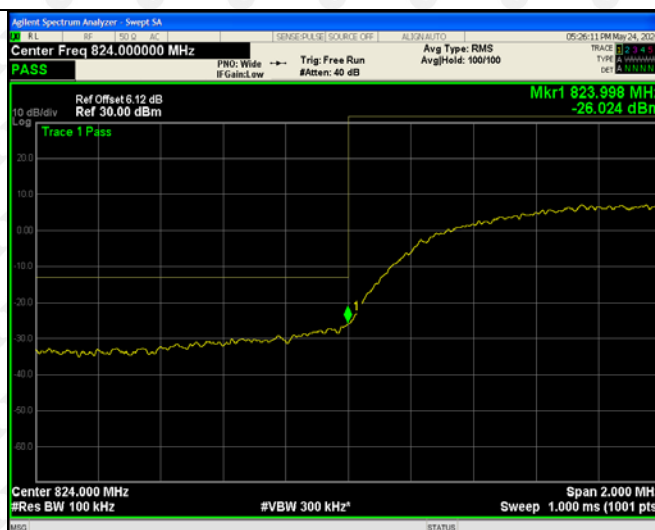


HSDPA Low Channel		
HSDPA Middle Channel		
HSDPA High Channel		
HSDPA Low Band Spurious Emission		

	
HSDPA High Band Spurious Emission	

HSUPA Low Channel	 <table><tr><th>Mkr</th><th>Mode</th><th>Trig</th><th>SOL</th><th>X</th><th>Y</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>827.85 MHz</td><td>22.791 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>3.13590 GHz</td><td>-30.471 dBm</td><td></td><td></td><td></td></tr></table>	Mkr	Mode	Trig	SOL	X	Y	Function	Function Width	Function Value	1	N	1	f	827.85 MHz	22.791 dBm				2	N	1	f	3.13590 GHz	-30.471 dBm			
Mkr	Mode	Trig	SOL	X	Y	Function	Function Width	Function Value																				
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HSUPA Middle Channel	 <table><tr><th>Mkr</th><th>Mode</th><th>Trig</th><th>SOL</th><th>X</th><th>Y</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>835.83 MHz</td><td>22.941 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>6.09425 GHz</td><td>-30.447 dBm</td><td></td><td></td><td></td></tr></table>	Mkr	Mode	Trig	SOL	X	Y	Function	Function Width	Function Value	1	N	1	f	835.83 MHz	22.941 dBm				2	N	1	f	6.09425 GHz	-30.447 dBm			
Mkr	Mode	Trig	SOL	X	Y	Function	Function Width	Function Value																				
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Mkr	Mode	Trig	SOL	X	Y	Function	Function Width	Function Value																				
1	N	1	f	846.28 MHz	22.934 dBm																							
2	N	1	f	5.98907 GHz	-30.756 dBm																							

HSUPA
Low
Band
Spurious
Emission



HSUPA
High
Band
Spurious
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 = $43 + 10 \log_{10}$ (power out in Watts)

10.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	54%
ATM Pressure:	101 kPa
Test Voltage	DC6.4V

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)						
39.35	-74.58	3.9	-70.68	-13	-57.68	H
1645.28	-55.41	4.83	-50.58	-13	-37.58	H
2464.77	-55.38	8.08	-47.30	-13	-34.30	H
38.74	-70.59	4.02	-66.57	-13	-53.57	V
1641.01	-56.21	4.48	-51.73	-13	-38.73	V
2463.73	-48.85	8.2	-40.65	-13	-27.65	V
Middle Channel (836.6MHz)						
40.76	-74.31	3.84	-70.47	-13	-57.47	H
1663.86	-52.07	4.62	-47.45	-13	-34.45	H
2509.24	-49.34	8.25	-41.09	-13	-28.09	H
41.59	-74.92	4.25	-70.67	-13	-57.67	V
1666.81	-55.33	4.54	-50.79	-13	-37.79	V
2502.71	-53.35	8.35	-45.00	-13	-29.75	V
High Channel (848.8MHz)						
44.25	-70.41	4.22	-74.63	-13	-61.63	H
1693.16	-54.44	4.87	-59.31	-13	-46.31	H
2540.72	-51.52	8.38	-59.90	-13	-46.90	H
44.05	-69.83	4.02	-73.85	-13	-60.85	V
1692.66	-51.05	4.56	-55.61	-13	-42.61	V
2540.51	-51.19	8.41	-59.60	-13	-46.60	V

For Band 5 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (826.4MHz)						
41.53	-71.78	3.91	-67.87	-13	-54.87	H
1645.87	-54.08	10.56	-43.52	-13	-30.52	H
2479.06	-55.29	13.5	-41.79	-13	-28.79	H
39.91	-65.94	3.93	-62.01	-13	-49.01	V
1650.46	-58.40	10.41	-47.99	-13	-34.99	V
2476.06	-61.26	13.16	-48.10	-13	-35.10	V
Middle Channel (836.6MHz)						
44.18	-65.70	4.02	-61.68	-13	-48.68	H
1664.33	-61.36	4.66	-56.70	-13	-43.70	H
2503.68	-44.43	8.34	-36.09	-13	-23.09	H
41.53	-59.30	4.17	-55.13	-13	-42.13	V
1666.10	-63.74	4.94	-58.80	-13	-45.80	V
2507.14	-62.52	8.19	-54.33	-13	-41.33	V
High Channel (846.6MHz)						
45.23	-71.27	3.87	-67.40	-13	-54.40	H
1689.63	-61.74	4.89	-56.85	-13	-43.85	H
2536.13	-47.09	8.42	-38.67	-13	-25.67	H
39.83	-62.59	3.95	-58.64	-13	-45.64	V
1683.30	-55.20	4.99	-50.21	-13	-37.21	V
2536.47	-61.45	8.12	-53.33	-13	-40.33	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 GSM 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	8.73	0.01044
40	NV	9.09	0.01086
30	NV	8.97	0.01072
20	NV	9.17	0.01096
10	NV	10.02	0.01198
0	NV	10.52	0.01258
-10	NV	10.79	0.01290
-20	NV	10.76	0.01286
-30	NV	11.39	0.01362

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	7.87	0.00941
40	NV	8.45	0.01010
30	NV	9.53	0.01139
20	NV	9.72	0.01162
10	NV	9.45	0.01130
0	NV	9.52	0.01137
-10	NV	9.72	0.01162
-20	NV	10.45	0.01249
-30	NV	10.86	0.01298

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	10.60	0.01267
40	NV	11.24	0.01344
30	NV	10.82	0.01293
20	NV	11.34	0.01356
10	NV	11.46	0.01369
0	NV	11.56	0.01381
-10	NV	11.49	0.01373
-20	NV	12.27	0.01467
-30	NV	12.99	0.01553

For WCDMA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	0.24	0.00028
40	NV	-0.58	-0.00069
30	NV	-0.94	-0.00112
20	NV	-0.57	-0.00069
10	NV	0.18	0.00022
0	NV	-0.41	-0.00049
-10	NV	0.60	0.00072
-20	NV	0.78	0.00093
-30	NV	1.14	0.00137

For HSDPA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	-0.34	-0.00040
40	NV	0.52	0.00062
30	NV	0.25	0.00030
20	NV	0.28	0.00033
10	NV	0.59	0.00071
0	NV	1.69	0.00202
-10	NV	1.09	0.00130
-20	NV	1.45	0.00173
-30	NV	2.17	0.00260

For HSUPA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	NV	-0.02	-0.00002
40	NV	-0.24	-0.00028
30	NV	-0.22	-0.00026
20	NV	0.18	0.00021
10	NV	0.81	0.00097
0	NV	1.65	0.00197
-10	NV	1.38	0.00165
-20	NV	1.79	0.00214
-30	NV	2.64	0.00316

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GSM 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	10.85	0.01297
	NV	11.40	0.01363
	HV	11.87	0.01418

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	11.26	0.01346
	NV	10.90	0.01302
	HV	11.48	0.01372

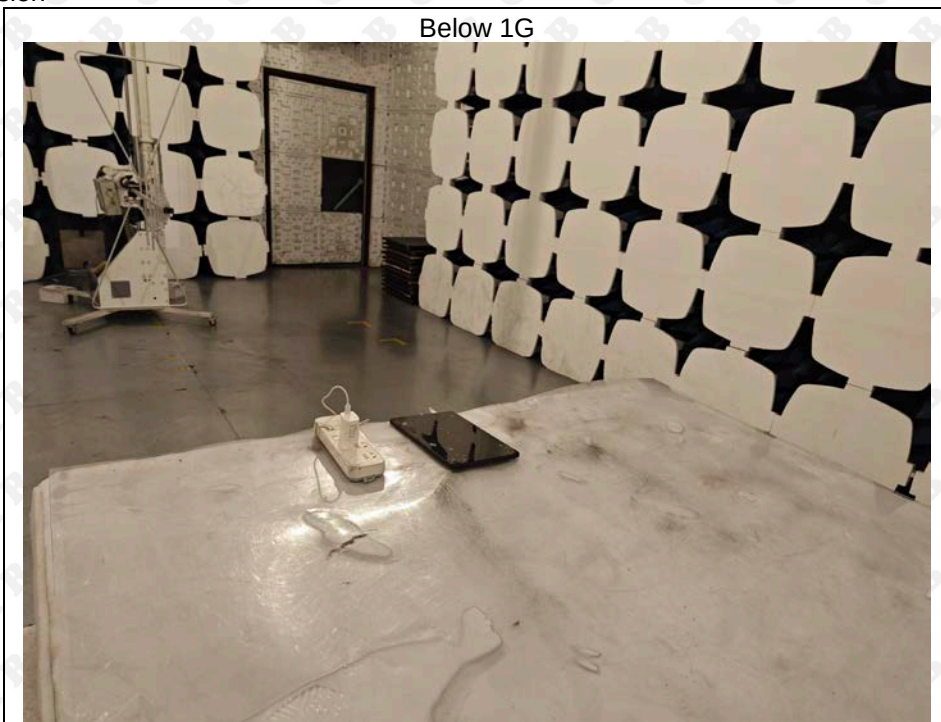
Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	12.73	0.01522
	NV	12.74	0.01522
	HV	13.78	0.01648

Reference Frequency(Middle Channel): WCDMA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	1.49	0.00178
	NV	1.79	0.00214
	HV	1.39	0.00167
Reference Frequency(Middle Channel): HSDPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	1.52	0.00182
	NV	2.18	0.00260
	HV	2.26	0.00270
Reference Frequency(Middle Channel): HSUPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	2.00	0.00239
	NV	3.35	0.00400
	HV	3.24	0.00387

12. EUT TEST PHOTO

Radiated Emission

Below 1G



Above 1G



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