



TEST REPORT

Product Name: Portable reader
FCC ID: VUJ-AT909
Trademark: N/A
Model Number: AT909
Prepared For: ATID Co., Ltd
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Manufacturer: ATID Co., Ltd
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Sample Received Date: Jan. 21, 2025
Sample tested Date: Jan. 21, 2025 to Apr 22, 2025
Issue Date: Apr. 22, 2025
Report No.: CTB25012101303RF06
Test Standards: FCC Part 22H & 24E
Test Results: PASS
Remark: This is GSM radio test report.

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB25012101303RF06	Apr. 22, 2025	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

FCC Rules	Test method	Description of Test Item	Result
§1.1307, §2.1091	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	RF Exposure	Compliant
§22.913 (a), §24.232 (c)	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	RF Output Power	Compliant
§24.51	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	Peak-to-average Ratio(PAR) of Transmitter	Compliant
§22.917 (b), §24.238 (b)	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	Emission Bandwidth	Compliant
§22.917 (a), §24.238 (a)	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	Spurious Emissions at Antenna Terminal	Compliant
§22.917 (a), §24.238 (a)	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	Spurious Radiation Emissions	Compliant
§22.917 (a), §24.238 (a)	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	Out of Band Emissions	Compliant
§22.355, §24.235	TIA-603-E-2016 & KDB 971168 D01v03r01&ANSI C63.26	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℃
frequency	1×10 ⁻⁷

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	AT909
Model Description:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz WCDMA Band 2: 1850~1910MHz WCDMA Band 5: 824~849MHz
Max. RF output power:	GSM850: 32.51dBm GSM1900: 29.11dBm WCDMA Band 2: 21.03dBm WCDMA Band 5: 22.86dBm
Type of Modulation:	GMSK, BPSK
Antenna installation:	Internal antenna
Antenna Gain:	GSM850: -1.8dBi GSM1900: 1.92dBi WCDMA Band 2: 1.92dBi WCDMA Band 5: -1.8dBi
Ratings:	DC 5V charging from adapter DC 3.8V 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
1	Adapter	JYIN	JY-05100C	/	AE
2	Cable	ATID Co., Ltd	AT909	/	AE

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.

4.5 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
PCS 1900	GSM/GPRS/EDGE	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
WCDMA Band 2	WCDMA/HSDPA/HSUPA	1852.4 MHz	9262
		1880.0 MHz	9400
		1907.6 MHz	9538
Note: the transmitter has been tested on the communications mode of GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA compliance test and record the worst case.			

4.6 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	GSM 1900	Low, Middle, High Channels
TM5	GPRS 1900	Low, Middle, High Channels
TM6	EDGE 1900	Low, Middle, High Channels
TM7	WCDMA Band 5	Low, Middle, High Channels
TM8	HSDPA Band 5	Low, Middle, High Channels
TM9	HSUPA Band 5	Low, Middle, High Channels
TM10	WCDMA Band 2	Low, Middle, High Channels
TM11	HSDPA Band 2	Low, Middle, High Channels
TM12	HSUPA Band 2	Low, Middle, High Channels

4.7 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, Xinh 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
28	Horn Antenna	ETS	3117	00086197	/	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 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	31.55	1.5	0	H	1.5	-1.8	28.25	38.45
824.2	32.02	1.5	0	V	1.5	-1.8	28.72	38.45
Middle Channel								
836.6	31.36	1.5	0	H	1.5	-1.8	28.06	38.45
836.6	32.00	1.5	0	V	1.5	-1.8	28.70	38.45
High Channel								
848.8	32.12	1.5	0	H	1.5	-1.8	28.82	38.45
848.8	32.17	1.5	0	V	1.5	-1.8	28.87	38.45

EIRP For GSM 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	27.59	1.5	0	H	1.9	1.92	27.61	33
1850.2	27.88	1.5	0	V	1.9	1.92	27.90	33
Middle Channel								
1880	28.31	1.5	0	H	1.9	1.92	28.33	33
1880	28.05	1.5	0	V	1.9	1.92	28.07	33
High Channel								
1909.8	28.71	1.5	0	H	1.9	1.92	28.73	33
1909.8	28.95	1.5	0	V	1.9	1.92	28.97	33

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	31.71	1.5	0	H	1.5	-1.8	28.41	38.45
824.2	31.53	1.5	0	V	1.5	-1.8	28.23	38.45
Middle Channel								
836.6	30.73	1.5	0	H	1.5	-1.8	27.43	38.45
836.6	31.57	1.5	0	V	1.5	-1.8	28.27	38.45
High Channel								
848.8	28.35	1.5	0	H	1.5	-1.8	25.05	38.45
848.8	28.38	1.5	0	V	1.5	-1.8	25.08	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	27.91	1.5	0	H	1.9	1.92	27.93	33
1850.2	27.98	1.5	0	V	1.9	1.92	28.00	33
Middle Channel								
1880	27.39	1.5	0	H	1.9	1.92	27.41	33
1880	26.91	1.5	0	V	1.9	1.92	26.93	33
High Channel								
1909.8	25.41	1.5	0	H	1.9	1.92	25.43	33
1909.8	25.33	1.5	0	V	1.9	1.92	25.35	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	24.96	1.5	0	H	1.5	-1.8	21.66	38.45
824.2	25.36	1.5	0	V	1.5	-1.8	22.06	38.45
Middle Channel								
836.6	24.74	1.5	0	H	1.5	-1.8	21.44	38.45
836.6	24.40	1.5	0	V	1.5	-1.8	21.10	38.45
High Channel								
848.8	21.10	1.5	0	H	1.5	-1.8	17.80	38.45
848.8	21.07	1.5	0	V	1.5	-1.8	17.77	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	25.37	1.5	0	H	1.9	1.92	25.39	33
1850.2	25.72	1.5	0	V	1.9	1.92	25.74	33
Middle Channel								
1880	24.18	1.5	0	H	1.9	1.92	24.20	33
1880	24.35	1.5	0	V	1.9	1.92	24.37	33
High Channel								
1909.8	21.09	1.5	0	H	1.9	1.92	21.11	33
1909.8	20.98	1.5	0	V	1.9	1.92	21.00	33

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	21.53	1.5	0	H	1.5	-1.8	18.23	38.45
826.4	21.91	1.5	0	V	1.5	-1.8	18.61	38.45
Middle Channel								
836.6	22.24	1.5	0	H	1.5	-1.8	18.94	38.45
836.6	22.16	1.5	0	V	1.5	-1.8	18.86	38.45
High Channel								
846.6	22.17	1.5	0	H	1.5	-1.8	18.87	38.45
846.6	22.06	1.5	0	V	1.5	-1.8	18.76	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	21.71	1.5	0	H	1.5	-1.8	18.41	38.45
826.4	21.47	1.5	0	V	1.5	-1.8	18.17	38.45
Middle Channel								
836.6	22.56	1.5	0	H	1.5	-1.8	19.26	38.45
836.6	22.32	1.5	0	V	1.5	-1.8	19.02	38.45
High Channel								
846.6	21.85	1.5	0	H	1.5	-1.8	18.55	38.45
846.6	22.17	1.5	0	V	1.5	-1.8	18.87	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	22.05	1.5	0	H	1.5	-1.8	18.75	38.45
826.4	21.98	1.5	0	V	1.5	-1.8	18.68	38.45
Middle Channel								
836.6	22.78	1.5	0	H	1.5	-1.8	19.48	38.45
836.6	22.85	1.5	0	V	1.5	-1.8	19.55	38.45
High Channel								
846.6	21.88	1.5	0	H	1.5	-1.8	18.58	38.45
846.6	22.27	1.5	0	V	1.5	-1.8	18.97	38.45

EIRP For WCDMA Mode Band 2

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								
1852.4	21.20	1.5	0	H	1.9	1.92	21.22	33
1852.4	19.43	1.5	0	V	1.9	1.92	19.45	33
Middle Channel								
1880	20.71	1.5	0	H	1.9	1.92	20.73	33
1880	19.94	1.5	0	V	1.9	1.92	19.96	33
High Channel								
1907.6	21.57	1.5	0	H	1.9	1.92	21.59	33
1907.6	21.48	1.5	0	V	1.9	1.92	21.50	33

EIRP For HSDPA Mode Band 2

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								
1852.4	20.10	1.5	0	H	1.9	1.92	20.12	33
1852.4	20.33	1.5	0	V	1.9	1.92	20.35	33
Middle Channel								
1880	19.99	1.5	0	H	1.9	1.92	20.01	33
1880	20.12	1.5	0	V	1.9	1.92	20.14	33
High Channel								
1907.6	21.79	1.5	0	H	1.9	1.92	21.81	33
1907.6	20.63	1.5	0	V	1.9	1.92	20.65	33

EIRP For HSUPA Mode Band 2

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								
1852.4	19.38	1.5	0	H	1.9	1.92	19.40	33
1852.4	19.59	1.5	0	V	1.9	1.92	19.61	33
Middle Channel								
1880	21.08	1.5	0	H	1.9	1.92	21.10	33
1880	21.04	1.5	0	V	1.9	1.92	21.06	33
High Channel								
1907.6	20.51	1.5	0	H	1.9	1.92	20.53	33
1907.6	20.28	1.5	0	V	1.9	1.92	20.30	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)
GSM	Low Channel	824.2	32.02	38.45
	Middle Channel	836.6	32.12	38.45
	High Channel	848.8	32.46	38.45
GPRS(1 Slot)	Low Channel	824.2	32.04	38.45
	Middle Channel	836.6	32.16	38.45
	High Channel	848.8	32.51	38.45
EDGE(1 Slot)	Low Channel	824.2	25.83	38.45
	Middle Channel	836.6	25.77	38.45
	High Channel	848.8	25.98	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	28.38	33.0
	Middle Channel	1880.0	28.78	33.0
	High Channel	1909.8	29.11	33.0
GPRS(1 Slot)	Low Channel	1850.2	28.40	33.0
	Middle Channel	1880.0	28.77	33.0
	High Channel	1909.8	29.10	33.0
EDGE(1 Slot)	Low Channel	1850.2	26.16	33.0
	Middle Channel	1880.0	25.50	33.0
	High Channel	1909.8	24.96	33.0

For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.32	38.45
	Middle Channel	836.6	22.85	38.45
	High Channel	846.6	22.70	38.45
HSDPA	Low Channel	826.4	22.26	38.45
	Middle Channel	836.6	22.86	38.45
	High Channel	846.6	22.68	38.45
HSUPA	Low Channel	826.4	22.26	38.45
	Middle Channel	836.6	22.86	38.45
	High Channel	846.6	22.69	38.45

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
WCDMA	Low Channel	1852.4	20.41	33.00
	Middle Channel	1880.0	20.89	33.00
	High Channel	1907.6	21.03	33.00
HSDPA	Low Channel	1852.4	20.38	33.00
	Middle Channel	1880.0	20.88	33.00
	High Channel	1907.6	21.02	33.00
HSUPA	Low Channel	1852.4	20.37	33.00
	Middle Channel	1880.0	20.88	33.00
	High Channel	1907.6	21.01	33.00

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

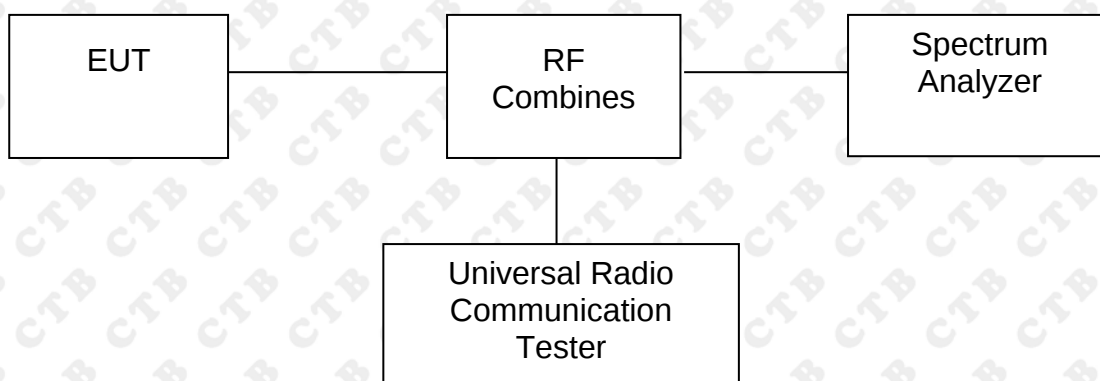
7.1 Standard Applicable

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	2.67	13
GPRS(1 Slot)	190	836.6	2.70	13
EDGE(1 Slot)	190	836.6	8.87	13

For PCS 1900

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	661	1880	2.70	13
GPRS(1 Slot)	661	1880	2.75	13
EDGE(1 Slot)	661	1880	5.65	13

For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
RMC	4182	836.4	3.05	13
HSDPA	4182	836.4	3.04	13
HSUPA	4182	836.4	3.04	13

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
RMC	9400	1852.4	3.01	13
HSDPA	9400	1852.4	3.04	13
HSUPA	9400	1852.4	3.07	13

GSM850-EDGE(1 Slot) :



GSM1900-EDGE(1 Slot) :



WCDMA Band 2 HSUPA:



WCDMA Band 5 RMC:



8. EMISSION BANDWIDTH

8.1 Standard Applicable

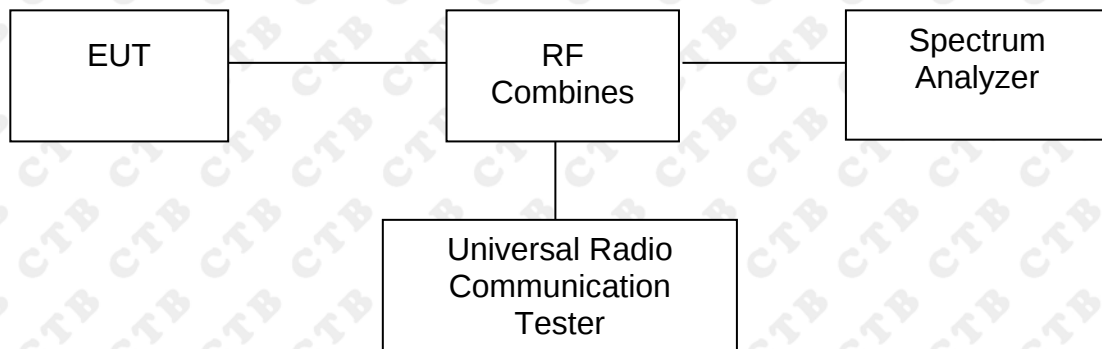
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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	245.609	315.395
	190	836.6	249.712	319.146
	251	848.8	247.868	320.903
GPRS	128	824.2	243.715	315.956
	190	836.6	242.101	316.819
	251	848.8	240.702	305.325
EDGE	128	824.2	237.085	289.312
	190	836.6	249.627	313.526
	251	848.8	246.482	313.844

For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	247.573	316.904
	661	1880.0	244.490	316.712
	810	1909.8	248.193	320.313
GPRS	512	1850.2	246.854	318.578
	661	1880.0	242.633	312.231
	810	1909.8	246.048	323.452
EDGE	512	1850.2	247.672	316.407
	661	1880.0	255.802	318.436
	810	1909.8	249.479	319.033

For Band 5

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
WCDMA	4132	826.4	4183.146	4706.597
	4183	836.6	4168.694	4693.738
	4233	846.6	4171.842	4685.329
HSDPA	4132	826.4	4164.925	4684.428
	4183	836.6	4176.040	4709.538
	4233	846.6	4185.400	4717.389
HSUPA	4132	826.4	4175.046	4711.813
	4183	836.6	4192.421	4684.359
	4233	846.6	4187.221	4712.549

For Band 2

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
WCDMA	9262	1852.4	4184.906	4709.166
	9400	1880.0	4161.499	4725.476
	9538	1907.6	4174.498	4694.132
HSDPA	9262	1852.4	4161.214	4701.197
	9400	1880.0	4184.249	4803.254
	9538	1907.6	4165.873	4680.460
HSUPA	9262	1852.4	4178.287	4735.343
	9400	1880.0	4174.685	4707.982
	9538	1907.6	4174.545	4728.577

For Cellular Band

GSM Low Channel



GSM Middle Channel



GSM 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



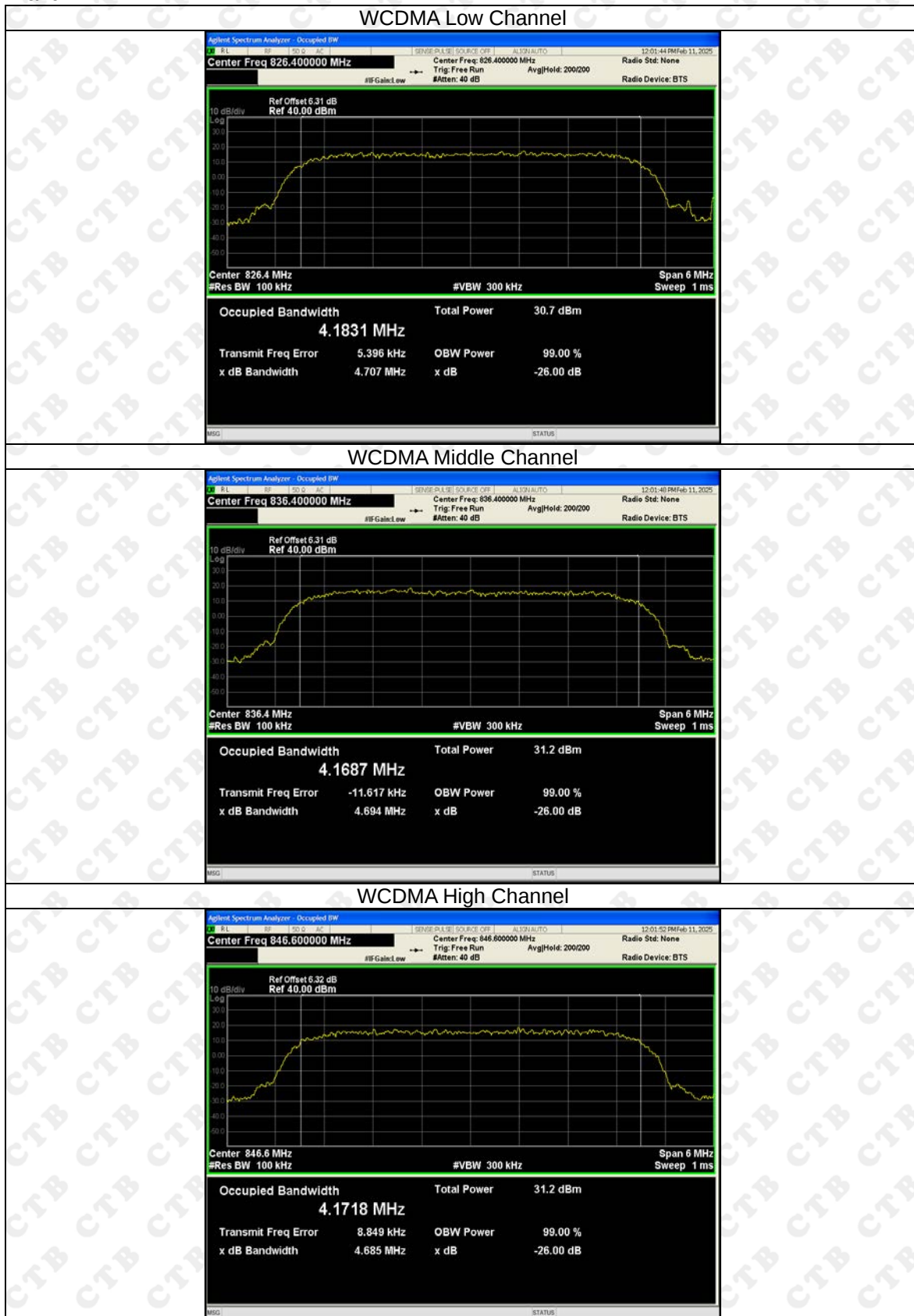
EDGE Middle Channel



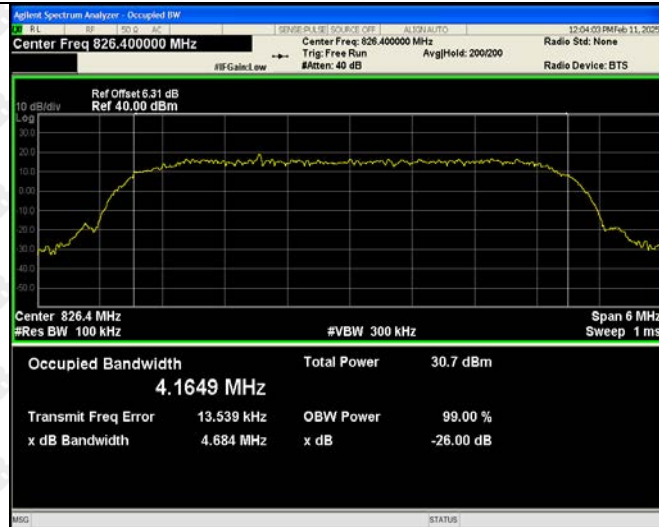
EDGE High Channel



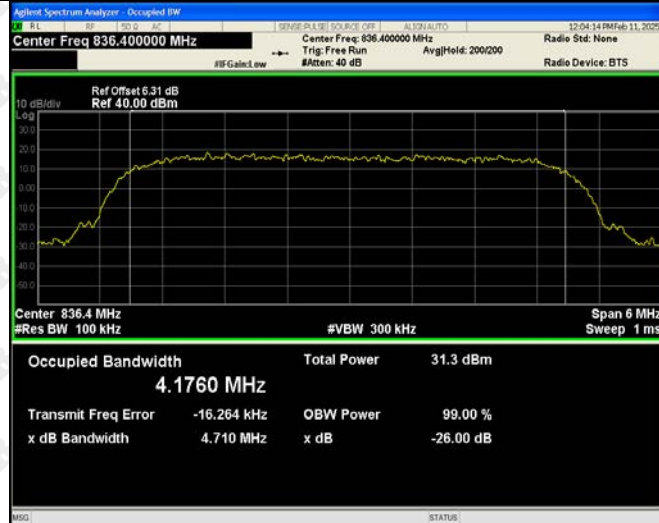
For Band V



HSDPA Low Channel



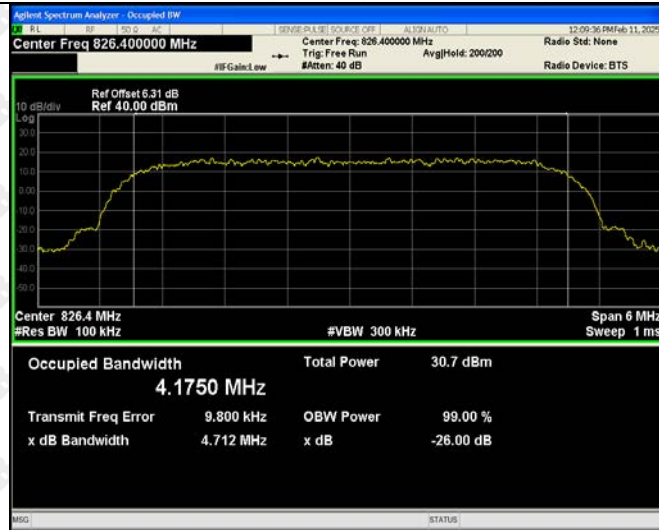
HSDPA Middle Channel



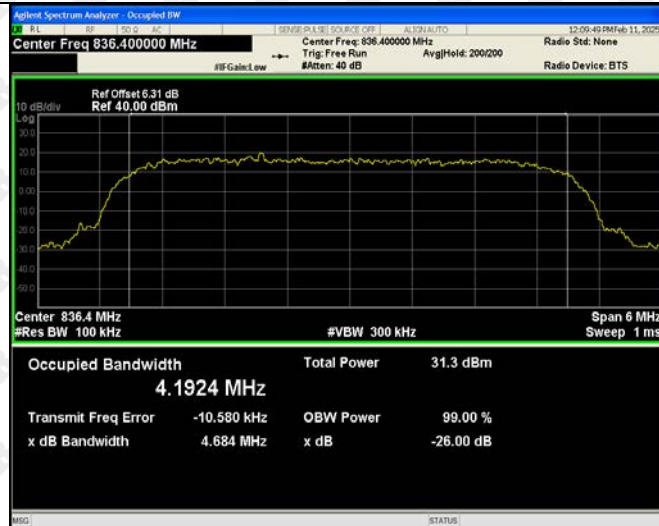
HSDPA High Channel



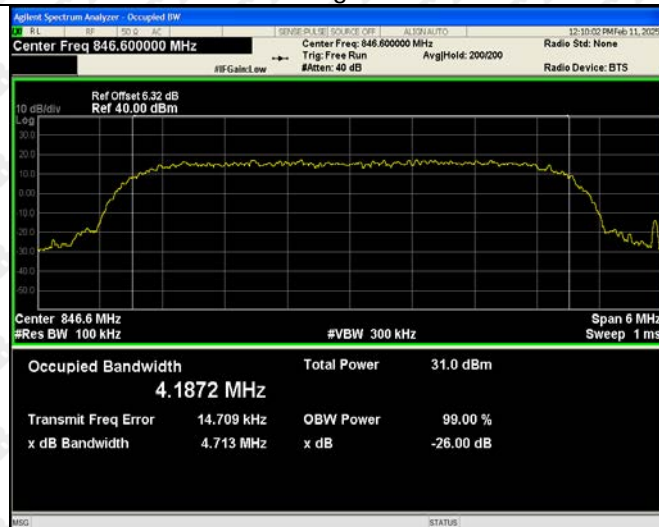
HSUPA Low Channel



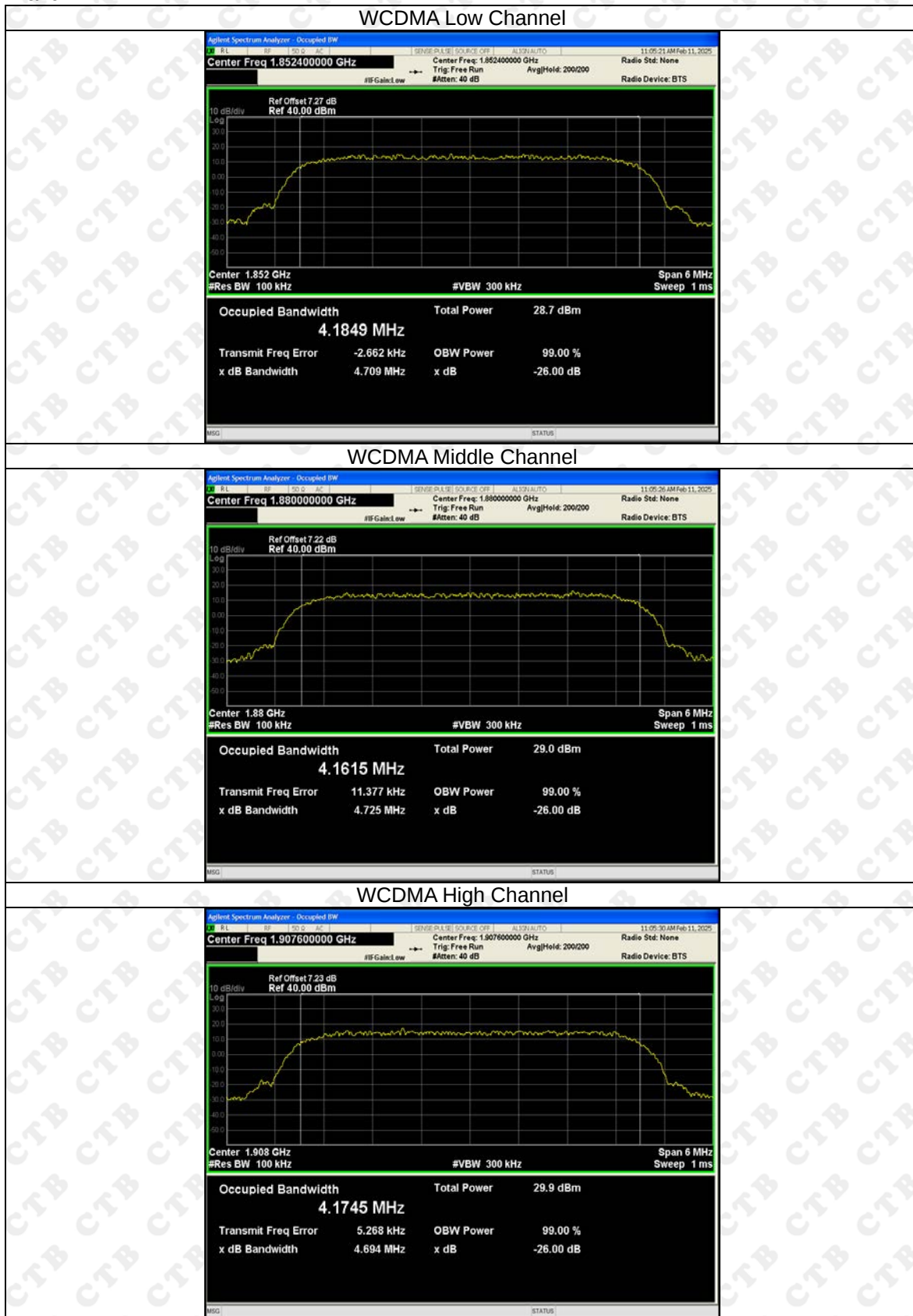
HSUPA Middle Channel



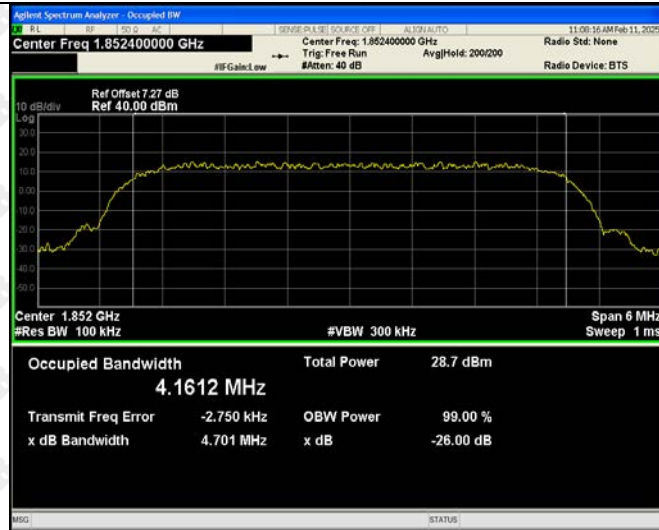
HSUPA High Channel



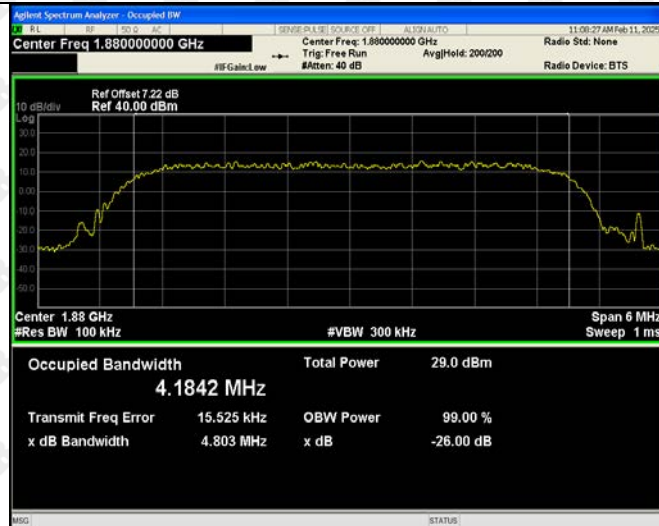
For Band II



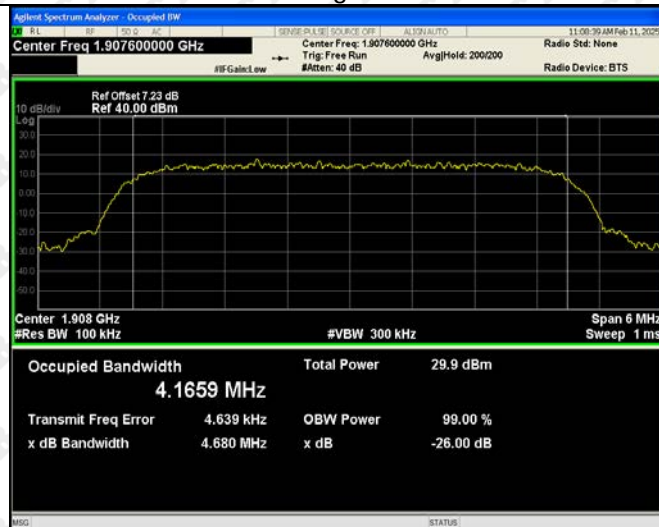
HSDPA Low Channel



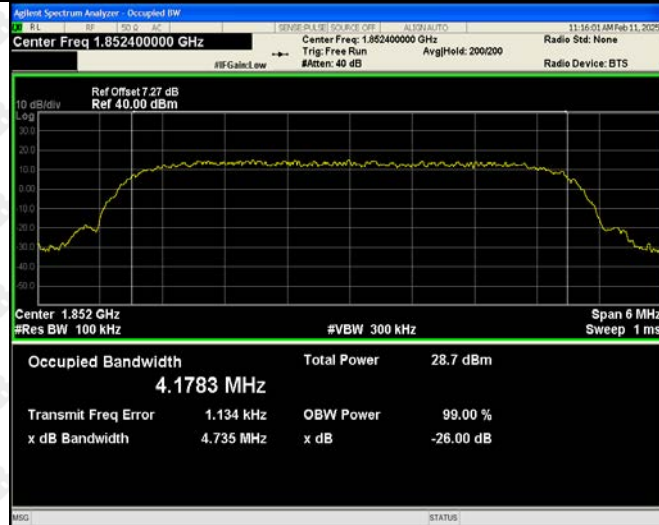
HSDPA Middle Channel



HSDPA High Channel



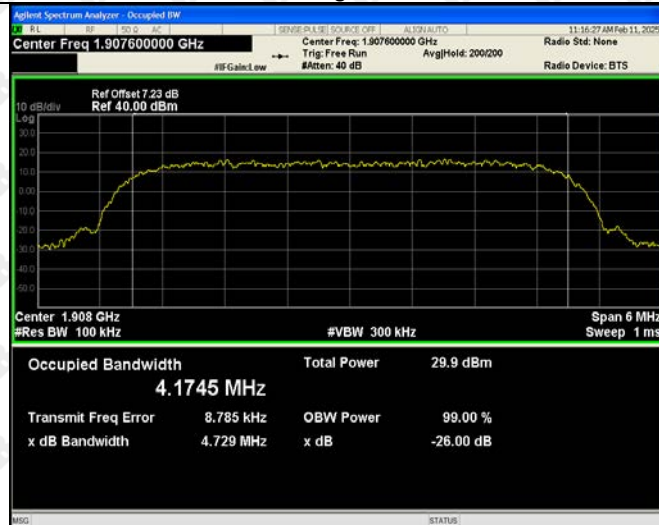
HSUPA Low Channel



HSUPA Middle Channel



HSUPA High Channel



9. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL

9.1 Standard Applicable

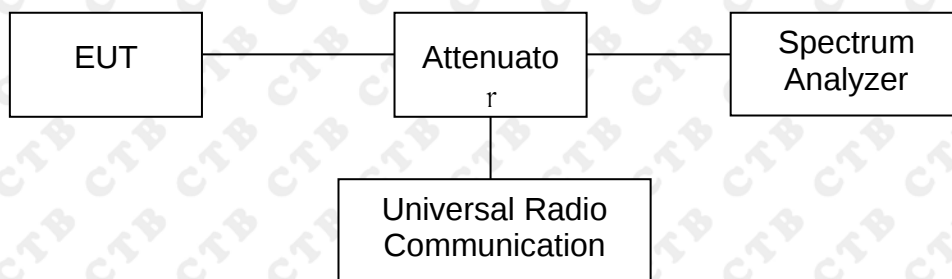
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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 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

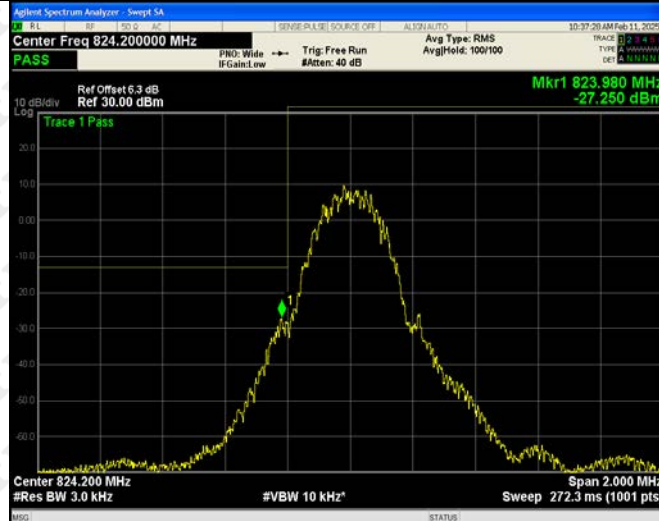
9.4 Summary of Test Results/Plots

Please refer to the following test plots

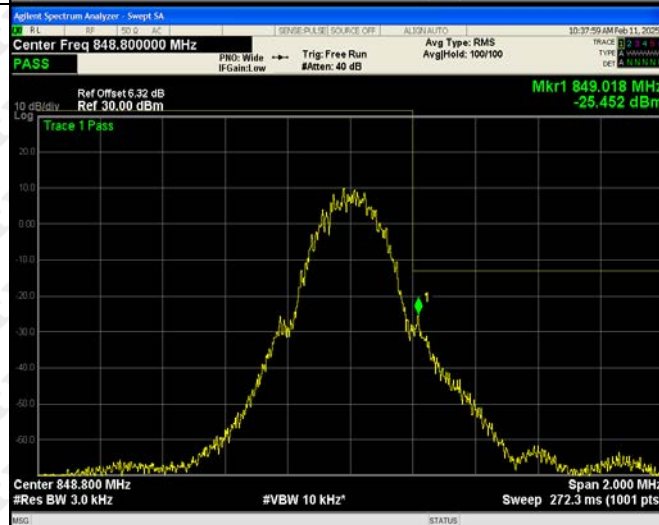
For Cellular Band

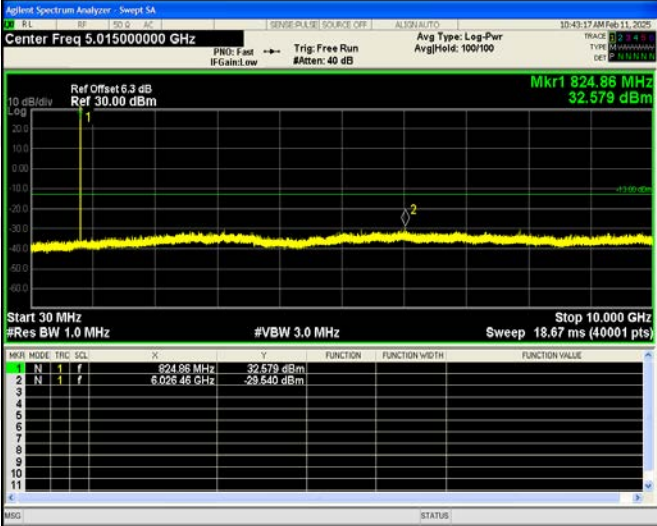
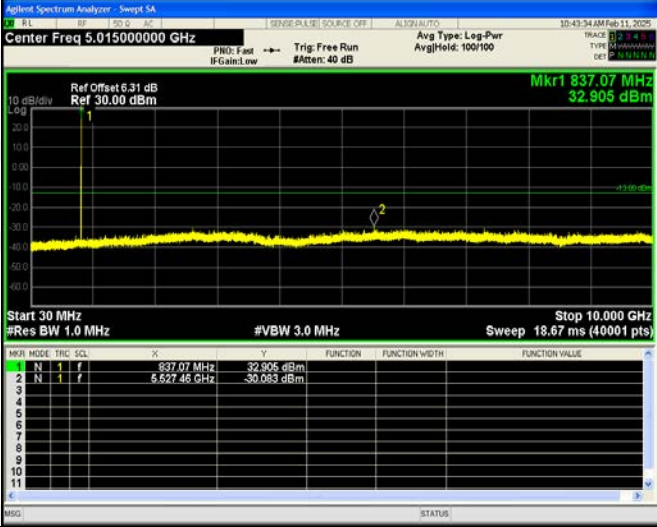
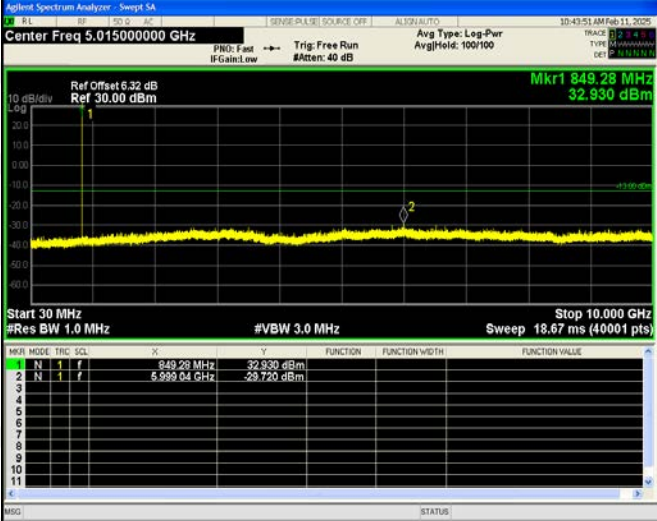
GSM Low Channel		
GSM Middle Channel		
GSM High Channel		

GSM
Low
Band
Emission

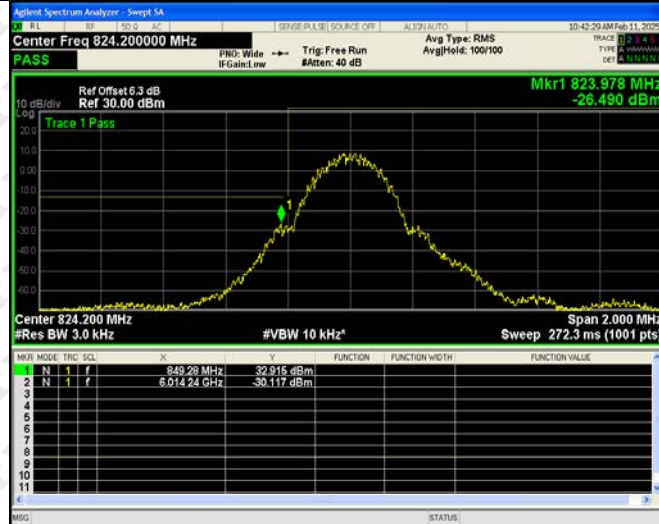


GSM
High
Band
Emission

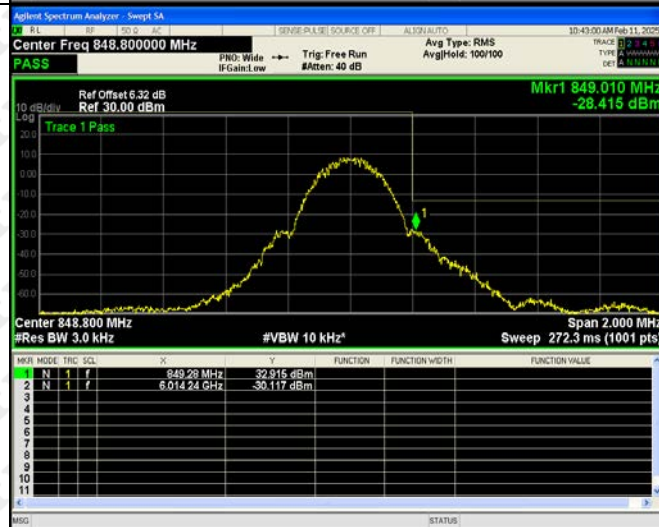


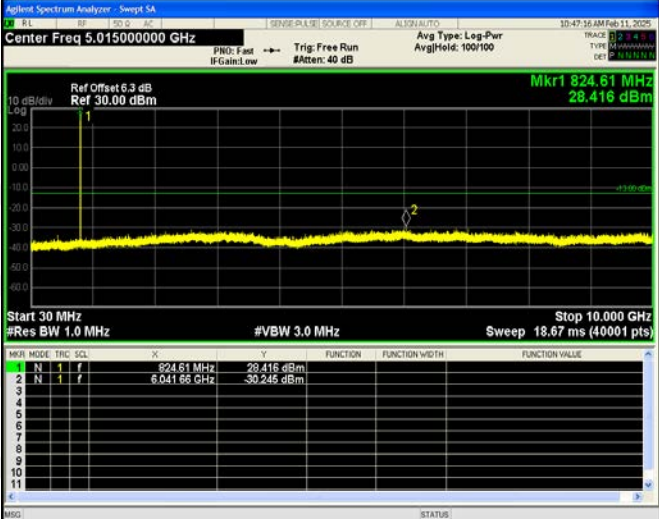
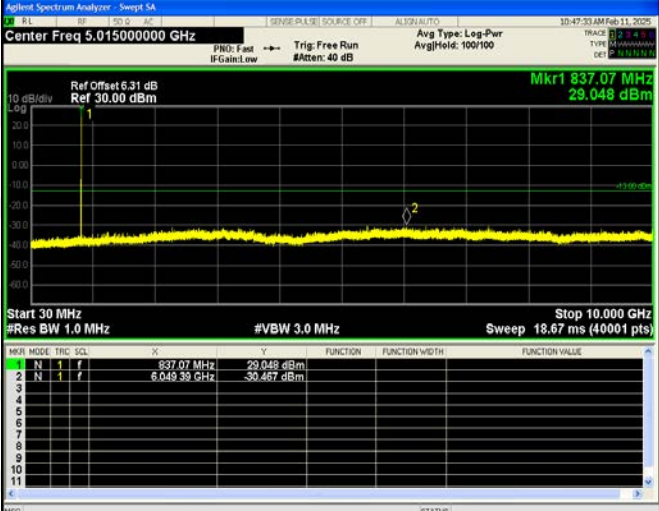
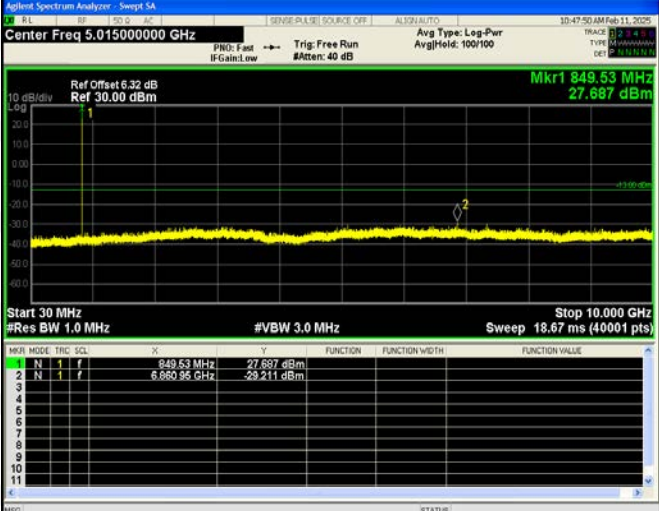
GPRS Low Channel	
GPRS Middle Channel	
GPRS High Channel	

GPRS
Low
Band
Emission

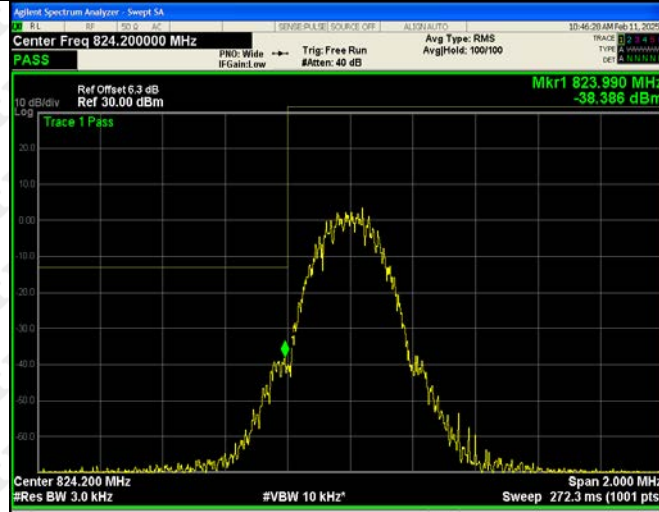


GPRS
High
Band
Emission



EDGE Low Channel	
EDGE Middle Channel	
EDGE High Channel	

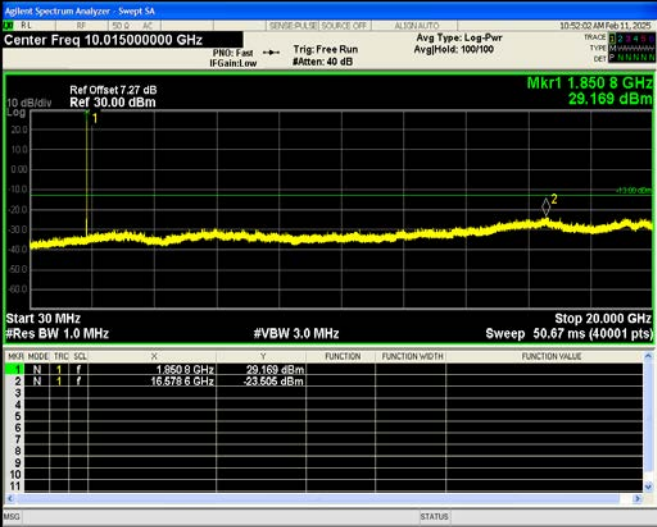
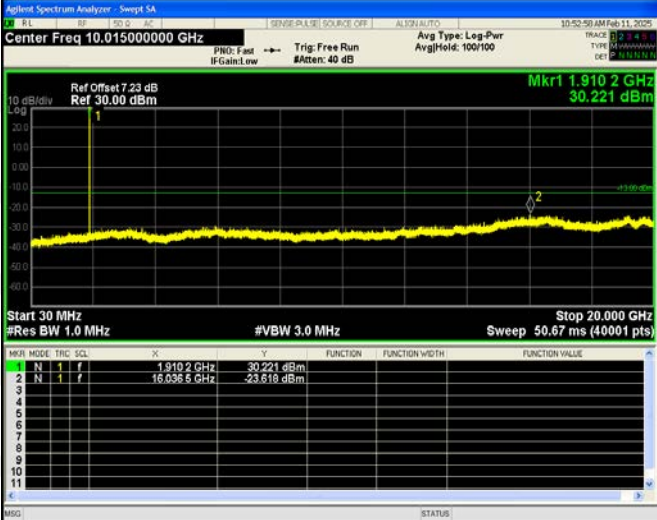
EDGE
Low
Band
Emission

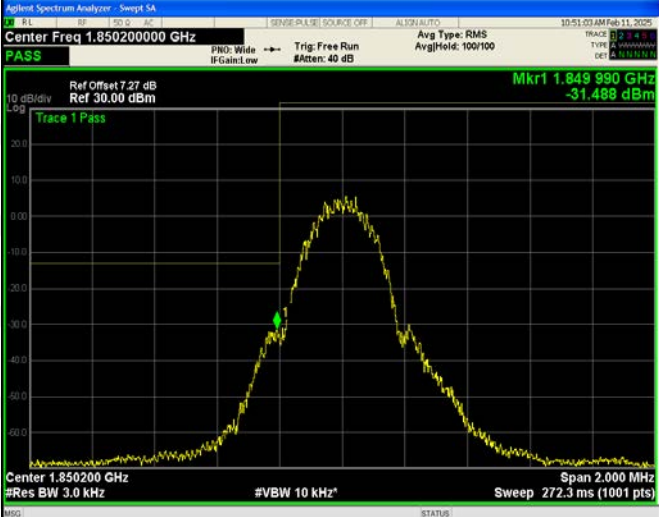


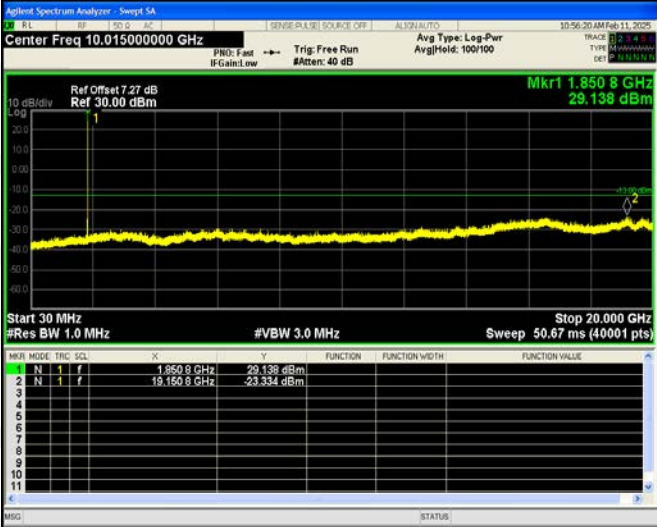
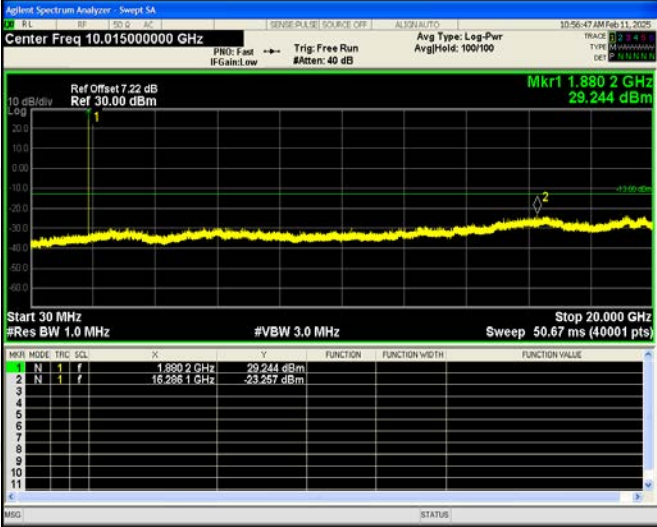
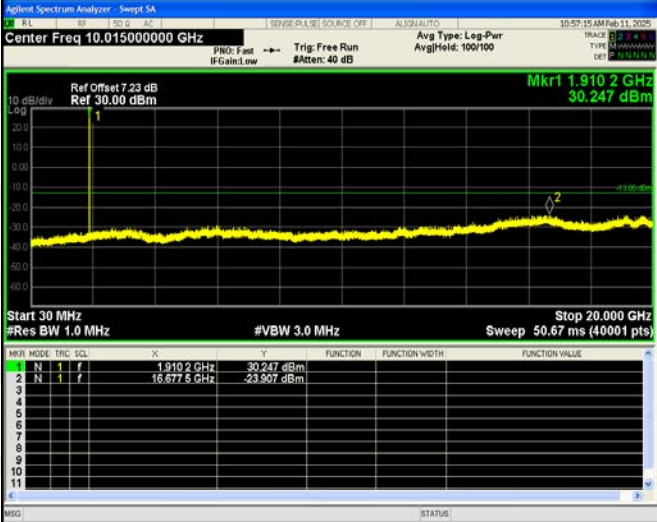
EDGE
High
Band
Emission

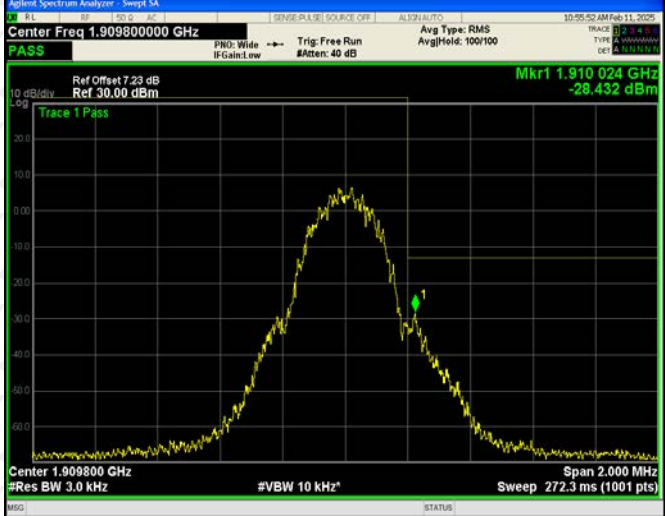


For PCS Band

GSM Low Channel	
GSM Middle Channel	
GSM High Channel	

GSM Low Band Emission	
GSM High Band Emission	

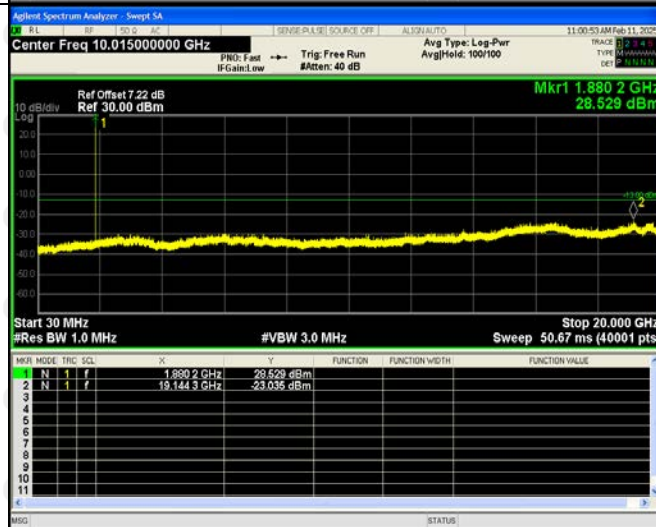
GPRS Low Channel		
GPRS Middle Channel		
GPRS High Channel		

GPRS Low Band Emission	 Agilent Spectrum Analyzer - Sweep SA Center Freq 1.85020000 GHz PASS Ref Offset 7.27 dB Ref 30.00 dBm Mkr1 1.849 978 GHz -31.015 dBm Center 1.850200 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 2.000 MHz Sweep 272.3 ms (1001 pts)
GPRS High Band Emission	 Agilent Spectrum Analyzer - Sweep SA Center Freq 1.90980000 GHz PASS Ref Offset 7.23 dB Ref 30.00 dBm Mkr1 1.910 024 GHz -28.432 dBm Center 1.909800 GHz #Res BW 3.0 kHz #VBW 10 kHz* Span 2.000 MHz Sweep 272.3 ms (1001 pts)

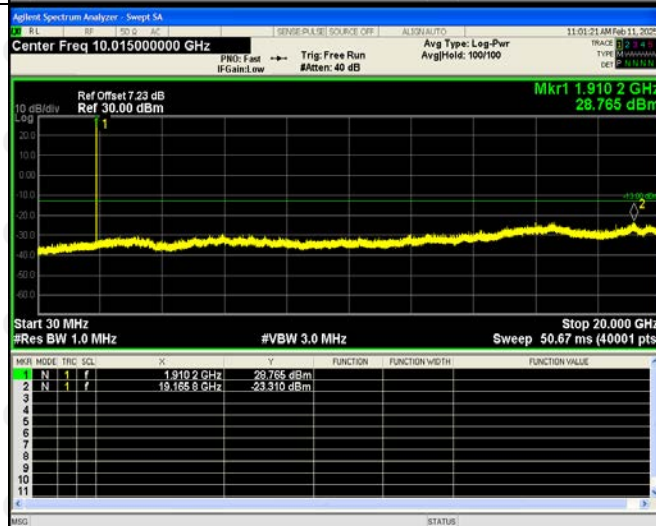
EDGE
Low
Channel



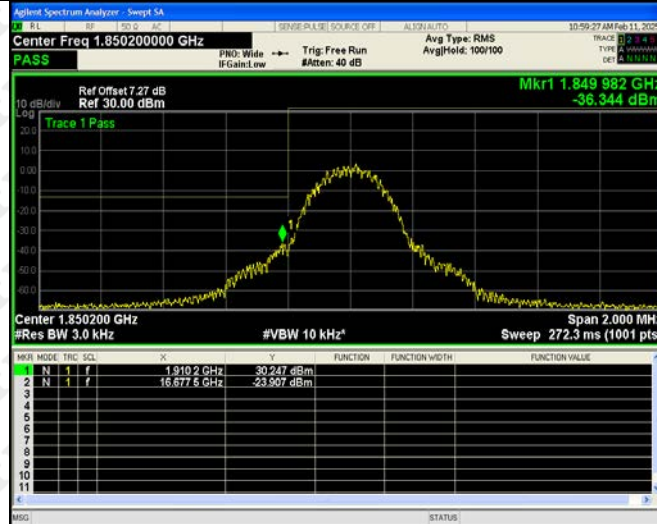
EDGE
Middle
Channel



EDGE
High
Channel



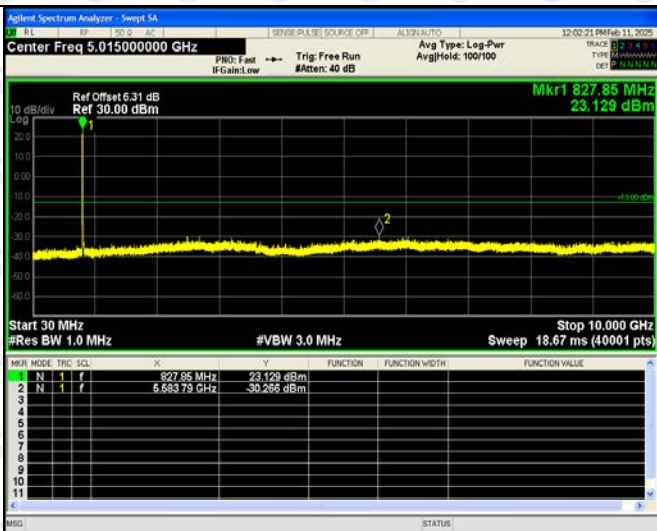
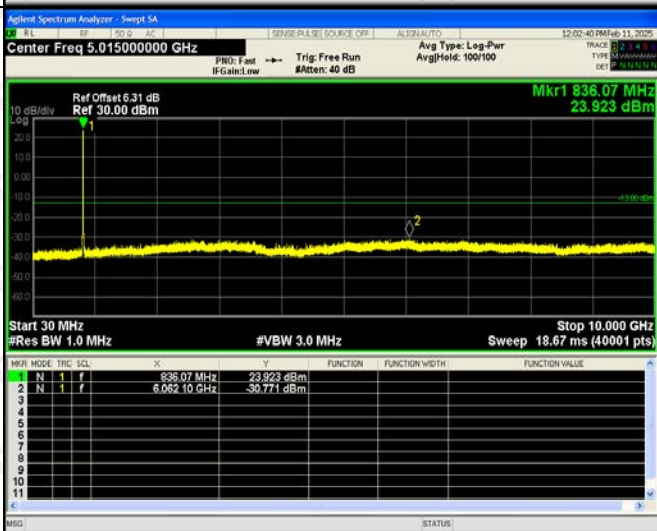
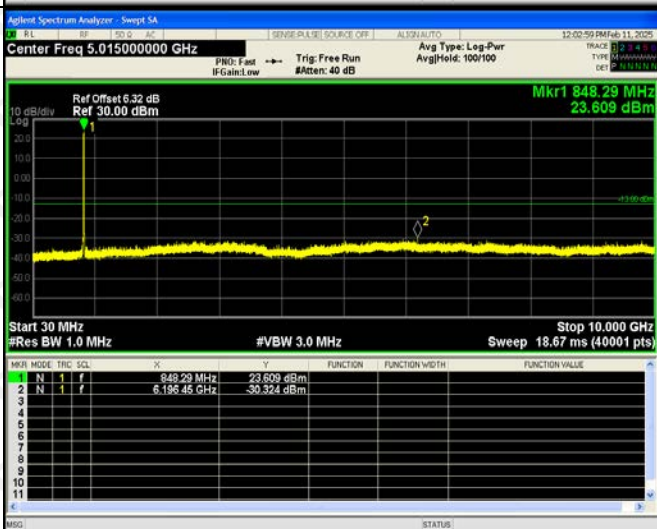
EDGE
Low
Band
Emission



EDGE
High
Band
Emission



For Band V

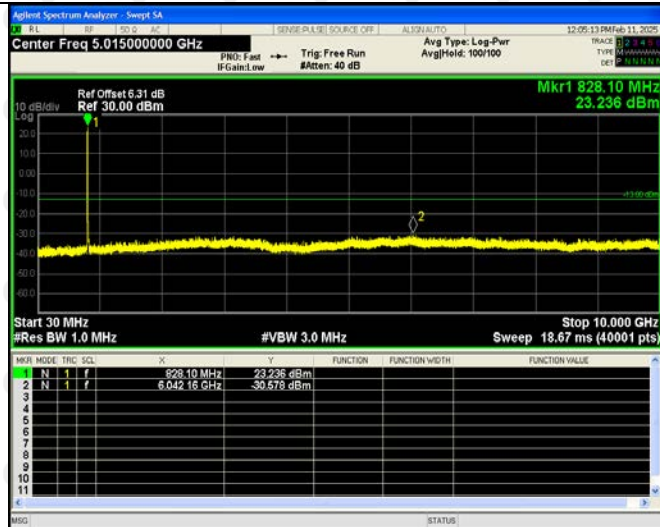
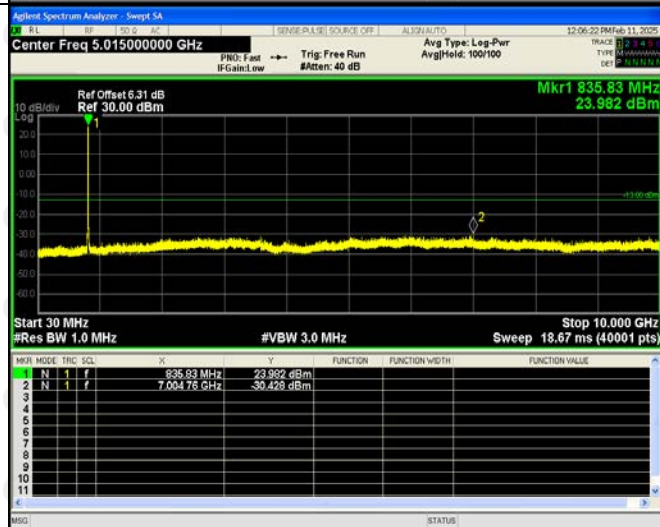
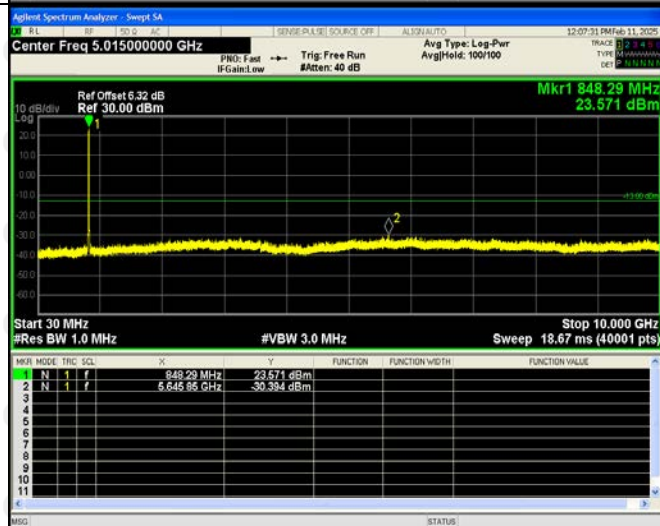
WCDMA Low Channel	 Agilent Spectrum Analyzer - Sweep SA Center Freq 5.015000000 GHz Ref Offset 5.31 dB Ref 30.00 dBm Mkr1 827.85 MHz 23.129 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 10.000 GHz Sweep 18.67 ms (40001 pts) <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SOL</th><th>F</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>827.85 MHz</td><td></td><td></td><td>23.129 dBm</td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>5.58379 GHz</td><td></td><td></td><td>-30.286 dBm</td></tr></table>	MNR	MODE	TRC	SOL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	827.85 MHz			23.129 dBm	2	N	1	f	5.58379 GHz			-30.286 dBm
MNR	MODE	TRC	SOL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	827.85 MHz			23.129 dBm																		
2	N	1	f	5.58379 GHz			-30.286 dBm																		
WCDMA Middle Channel	 Agilent Spectrum Analyzer - Sweep SA Center Freq 5.015000000 GHz Ref Offset 5.31 dB Ref 30.00 dBm Mkr1 836.07 MHz 23.923 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>TRC</th><th>SOL</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>836.07 MHz</td><td></td><td></td><td>23.923 dBm</td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>6.06210 GHz</td><td></td><td></td><td>-30.771 dBm</td></tr></table>	MNR	MODE	TRC	SOL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	836.07 MHz			23.923 dBm	2	N	1	f	6.06210 GHz			-30.771 dBm
MNR	MODE	TRC	SOL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	836.07 MHz			23.923 dBm																		
2	N	1	f	6.06210 GHz			-30.771 dBm																		
WCDMA High Channel	 Agilent Spectrum Analyzer - Sweep SA Center Freq 5.015000000 GHz Ref Offset 5.32 dB Ref 30.00 dBm Mkr1 848.29 MHz 23.609 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>TRC</th><th>SOL</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>848.29 MHz</td><td></td><td></td><td>23.609 dBm</td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>6.18646 GHz</td><td></td><td></td><td>-30.324 dBm</td></tr></table>	MNR	MODE	TRC	SOL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	848.29 MHz			23.609 dBm	2	N	1	f	6.18646 GHz			-30.324 dBm
MNR	MODE	TRC	SOL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	848.29 MHz			23.609 dBm																		
2	N	1	f	6.18646 GHz			-30.324 dBm																		

WCDMA
Low
Band
Spurious
Emission



WCDMA
High
Band
Spurious
Emission



HSDPA
Low
Channel

HSDPA
Middle
Channel

HSDPA
High
Channel


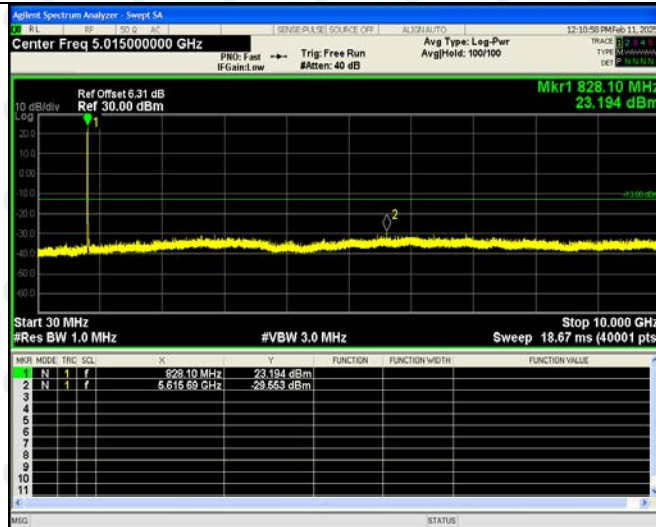
HSDPA
Low
Band
Spurious
Emission



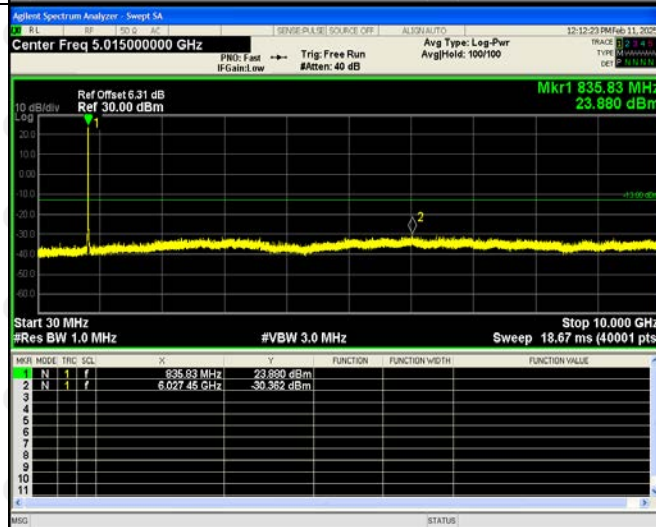
HSDPA
High
Band
Spurious
Emission



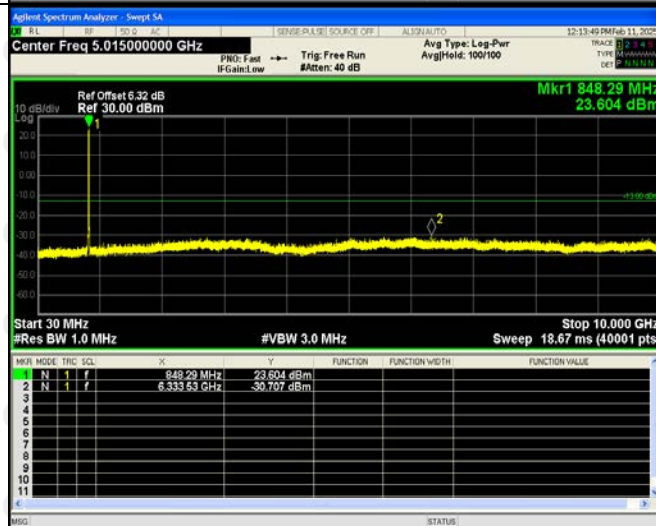
HSUPA
Low
Channel



HSUPA
Middle
Channel



HSUPA
High
Channel



HSUPA
Low
Band
Spurious
Emission



HSUPA
High
Band
Spurious
Emission



For Band II

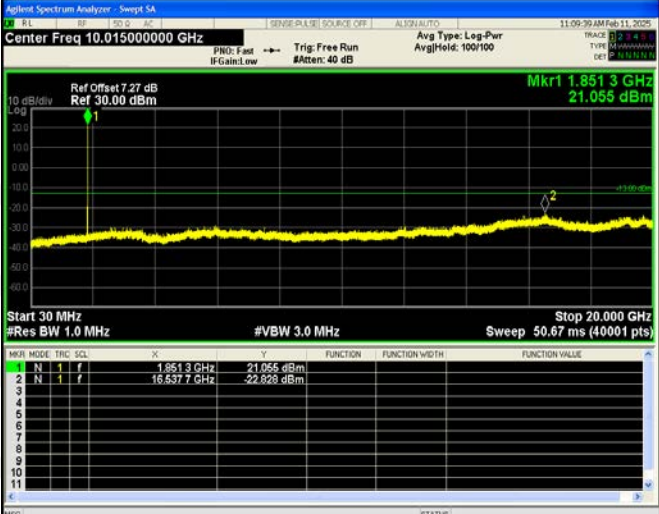
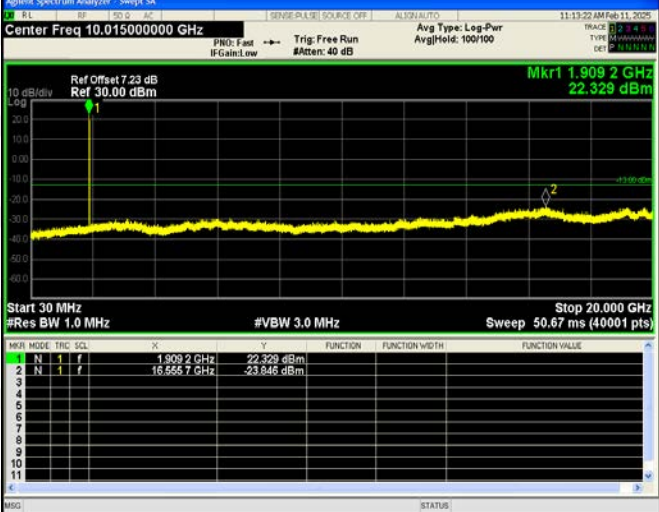
WCDMA Low Channel	Agilent Spectrum Analyzer - Sweep SA Center Freq 10.01500000 GHz Ref Offset 7.27 dB Ref 30.00 dBm Mkr1 1.8518 GHz 21.217 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 20.000 GHz Sweep 50.67 ms (40001 pts) <table><thead><tr><th>MR</th><th>MODE</th><th>TRIG</th><th>SGL</th><th>F</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>1.8518 GHz</td><td>21.217 dBm</td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>16.3645 GHz</td><td>-23.760 dBm</td><td></td><td></td></tr></tbody></table>	MR	MODE	TRIG	SGL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	1.8518 GHz	21.217 dBm			2	N	1	f	16.3645 GHz	-23.760 dBm		
MR	MODE	TRIG	SGL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	1.8518 GHz	21.217 dBm																				
2	N	1	f	16.3645 GHz	-23.760 dBm																				
WCDMA Middle Channel	Agilent Spectrum Analyzer - Sweep SA Center Freq 10.01500000 GHz Ref Offset 7.22 dB Ref 30.00 dBm Mkr1 1.8817 GHz 21.589 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 20.000 GHz Sweep 50.67 ms (40001 pts) <table><thead><tr><th>MR</th><th>MODE</th><th>TRIG</th><th>SGL</th><th>F</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>1.8817 GHz</td><td>21.589 dBm</td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>19.1323 GHz</td><td>-23.722 dBm</td><td></td><td></td></tr></tbody></table>	MR	MODE	TRIG	SGL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	1.8817 GHz	21.589 dBm			2	N	1	f	19.1323 GHz	-23.722 dBm		
MR	MODE	TRIG	SGL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																		
1	N	1	f	1.8817 GHz	21.589 dBm																				
2	N	1	f	19.1323 GHz	-23.722 dBm																				
WCDMA High Channel	Agilent Spectrum Analyzer - Sweep SA Center Freq 10.01500000 GHz Ref Offset 7.23 dB Ref 30.00 dBm Mkr1 1.9092 GHz 22.398 dBm Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 20.000 GHz Sweep 50.67 ms (40001 pts) <table><thead><tr><th>MR</th><th>MODE</th><th>TRIG</th><th>SGL</th><th>F</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>1.9092 GHz</td><td>22.398 dBm</td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>19.5582 GHz</td><td>-23.915 dBm</td><td></td><td></td></tr></tbody></table>	MR	MODE	TRIG	SGL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	1.9092 GHz	22.398 dBm			2	N	1	f	19.5582 GHz	-23.915 dBm		
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WCDMA
Low
Band
Spurious
Emission



WCDMA
High
Band
Spurious
Emission



HSDPA Low Channel	
HSDPA Middle Channel	
HSDPA High Channel	

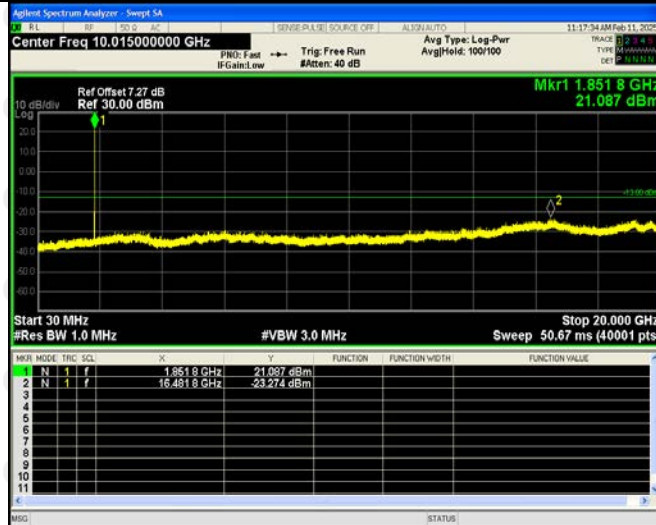
HSDPA
Low
Band
Spurious
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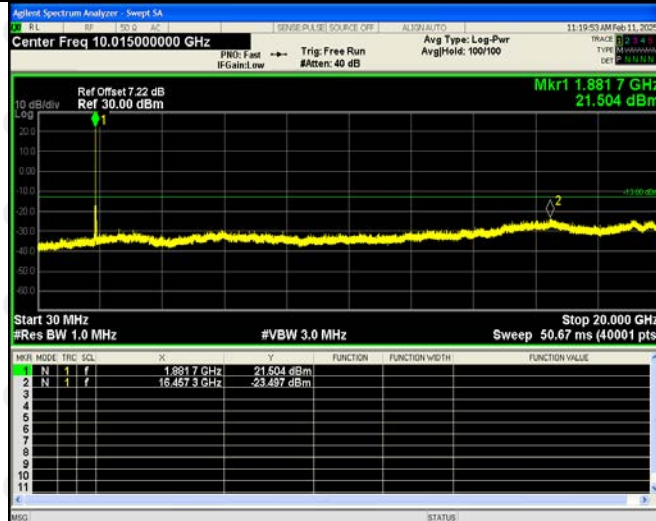
HSDPA
High
Band
Spurious
Emission



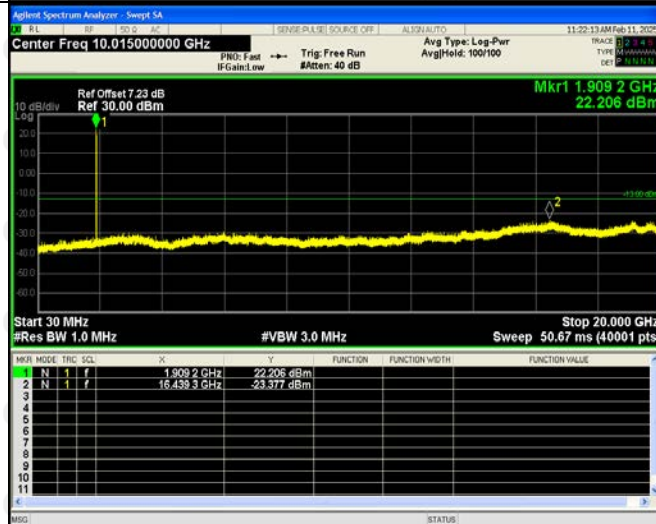
HSUPA
Low
Channel



HSUPA
Middle
Channel



HSUPA
High
Channel



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	DC3.8V

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)						
42.21	-75.45	3.9	-71.55	-13	-58.55	H
1647.28	-52.48	4.83	-47.65	-13	-34.65	H
2469.93	-50.09	8.08	-42.01	-13	-29.01	H
44.45	-66.18	4.02	-62.16	-13	-49.16	V
1646.60	-50.12	4.48	-45.64	-13	-32.64	V
2463.35	-52.45	8.2	-44.25	-13	-31.25	V
Middle Channel (836.6MHz)						
44.64	-72.22	3.84	-68.38	-13	-55.38	H
1664.46	-52.22	4.62	-47.60	-13	-34.60	H
2509.21	-49.50	8.25	-41.25	-13	-28.25	H
42.60	-67.00	4.25	-62.75	-13	-49.75	V
1665.82	-54.79	4.54	-50.25	-13	-37.25	V
2500.47	-48.14	8.35	-39.79	-13	-29.75	V
High Channel (848.8MHz)						
43.67	-67.00	4.22	-71.22	-13	-58.22	H
1688.66	-55.22	4.87	-60.09	-13	-47.09	H
2545.48	-57.17	8.38	-65.55	-13	-52.55	H
42.46	-69.75	4.02	-73.77	-13	-60.77	V
1694.61	-55.72	4.56	-60.28	-13	-47.28	V
2540.00	-53.78	8.41	-62.19	-13	-49.19	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)						
36.60	-70.01	4.34	-65.67	-13	-52.67	H
3690.46	-58.49	10.54	-47.95	-13	-34.95	H
5543.76	-53.34	13.37	-39.97	-13	-26.97	H
36.83	-66.86	4.34	-62.52	-13	-49.52	V
3694.22	-57.81	10.54	-47.27	-13	-34.27	V
5543.81	-56.97	13.37	-43.60	-13	-30.60	V
Middle Channel (1880MHz)						
42.68	-68.52	4.02	-64.50	-13	-51.50	H
3759.75	-51.37	10.71	-40.66	-13	-27.66	H
5636.92	-61.91	13.73	-48.18	-13	-35.18	H
38.93	-66.88	4.14	-62.74	-13	-49.74	V
3752.07	-51.48	10.22	-41.26	-13	-28.26	V
5632.13	-52.67	13.16	-39.51	-13	-26.51	V
High Channel (1909.8MHz)						
43.38	-74.15	4.02	-70.13	-13	-57.13	H
3815.69	-54.95	4.9	-50.05	-13	-37.05	H
5725.88	-48.19	8.09	-40.10	-13	-27.10	H
36.65	-57.73	4.25	-53.48	-13	-40.48	V
3818.79	-58.93	4.93	-54.00	-13	-41.00	V
5727.56	-60.96	8.43	-52.53	-13	-39.53	V

For Band 5 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (826.4MHz)						
40.68	-75.11	3.91	-71.20	-13	-58.20	H
1648.38	-56.03	10.56	-45.47	-13	-32.47	H
2469.33	-53.68	13.5	-40.18	-13	-27.18	H
38.60	-70.93	3.93	-67.00	-13	-54.00	V
1643.64	-56.38	10.41	-45.97	-13	-32.97	V
2470.21	-61.38	13.16	-48.22	-13	-35.22	V
Middle Channel (836.6MHz)						
38.88	-71.93	4.02	-67.91	-13	-54.91	H
1667.30	-56.99	4.66	-52.33	-13	-39.33	H
2506.02	-47.18	8.34	-38.84	-13	-25.84	H
37.14	-57.25	4.17	-53.08	-13	-40.08	V
1669.00	-57.06	4.94	-52.12	-13	-39.12	V
2503.59	-63.50	8.19	-55.31	-13	-42.31	V
High Channel (846.6MHz)						
41.92	-71.81	3.87	-67.94	-13	-54.94	H
1685.63	-54.58	4.89	-49.69	-13	-36.69	H
2535.61	-44.02	8.42	-35.60	-13	-22.60	H
39.24	-54.88	3.95	-50.93	-13	-37.93	V
1684.40	-64.34	4.99	-59.35	-13	-46.35	V
2534.79	-59.27	8.12	-51.15	-13	-38.15	V

For Band 2 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1852.4MHz)						
40.28	-76.06	3.91	-72.15	-13	-59.15	H
1646.42	-49.41	10.56	-38.85	-13	-25.85	H
2464.90	-59.23	13.5	-45.73	-13	-32.73	H
29.23	-67.29	3.93	-63.36	-13	-50.36	V
1644.11	-53.09	10.41	-42.68	-13	-29.68	V
2464.86	-63.17	13.16	-50.01	-13	-37.01	V
Middle Channel (1880MHz)						
34.54	-67.22	4.02	-63.20	-13	-50.20	H
1664.33	-50.65	4.66	-45.99	-13	-32.99	H
2498.03	-49.64	8.34	-41.30	-13	-28.30	H
31.11	-59.63	4.17	-55.46	-13	-42.46	V
1656.40	-67.86	4.94	-62.92	-13	-49.92	V
2499.01	-63.12	8.19	-54.93	-13	-41.93	V
High Channel (1907.6MHz)						
40.57	-70.42	3.87	-66.55	-13	-53.55	H
1684.36	-53.56	4.89	-48.67	-13	-35.67	H
2526.26	-44.31	8.42	-35.89	-13	-22.89	H
35.29	-68.89	3.95	-64.94	-13	-51.94	V
1686.57	-66.25	4.99	-61.26	-13	-48.26	V
2523.30	-68.46	8.12	-60.34	-13	-47.34	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	8.80	0.01051
40	NV	9.29	0.01110
30	NV	9.22	0.01102
20	NV	9.92	0.01186
10	NV	9.60	0.01147
0	NV	10.79	0.01290
-10	NV	9.88	0.01181
-20	NV	11.08	0.01325
-30	NV	10.78	0.01289

For PCS Band GSM 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	12.89	0.00686
40	NV	13.00	0.00691
30	NV	12.80	0.00681
20	NV	12.62	0.00671
10	NV	13.21	0.00703
0	NV	13.47	0.00716
-10	NV	14.44	0.00768
-20	NV	14.27	0.00759
-30	NV	14.04	0.00747

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	9.20	0.01100
40	NV	8.92	0.01066
30	NV	9.57	0.01144
20	NV	9.20	0.01100
10	NV	10.04	0.01200
0	NV	9.86	0.01178
-10	NV	9.99	0.01194
-20	NV	10.88	0.01301
-30	NV	10.91	0.01304

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	12.08	0.00643
40	NV	12.98	0.00691
30	NV	12.89	0.00686
20	NV	12.95	0.00689
10	NV	13.16	0.00700
0	NV	13.37	0.00711
-10	NV	14.28	0.00760
-20	NV	14.20	0.00755
-30	NV	14.20	0.00755

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	10.84	0.01296
40	NV	11.41	0.01364
30	NV	11.83	0.01413
20	NV	11.38	0.01360
10	NV	11.83	0.01414
0	NV	11.30	0.01351
-10	NV	11.76	0.01405
-20	NV	12.07	0.01442
-30	NV	12.42	0.01484

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	-10.27	-0.00546
40	NV	-9.92	-0.00528
30	NV	-9.91	-0.00527
20	NV	-9.53	-0.00507
10	NV	-8.88	-0.00472
0	NV	-9.02	-0.00480
-10	NV	-8.50	-0.00452
-20	NV	-8.27	-0.00440
-30	NV	-7.84	-0.00417

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	-0.47	-0.00056
40	NV	-0.14	-0.00017
30	NV	0.72	0.00086
20	NV	0.78	0.00093
10	NV	0.78	0.00093
0	NV	1.05	0.00125
-10	NV	1.16	0.00138
-20	NV	0.73	0.00087
-30	NV	1.01	0.00121

For WCDMA Band 2 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	-0.02	-0.00001
40	NV	0.27	0.00014
30	NV	0.70	0.00037
20	NV	0.21	0.00011
10	NV	0.80	0.00043
0	NV	1.00	0.00053
-10	NV	1.13	0.00060
-20	NV	1.25	0.00067
-30	NV	1.02	0.00054

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	0.06	0.00007
40	NV	-0.24	-0.00029
30	NV	-0.12	-0.00014
20	NV	0.64	0.00076
10	NV	0.87	0.00103
0	NV	1.37	0.00164
-10	NV	0.56	0.00066
-20	NV	1.16	0.00139
-30	NV	2.12	0.00253

For HSDPA Band 2 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	-0.51	-0.00027
40	NV	-0.24	-0.00013
30	NV	0.49	0.00026
20	NV	0.16	0.00008
10	NV	0.37	0.00020
0	NV	0.45	0.00024
-10	NV	0.97	0.00052
-20	NV	1.62	0.00086
-30	NV	2.04	0.00108

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	0.31	0.00037
40	NV	1.17	0.00140
30	NV	1.28	0.00153
20	NV	1.21	0.00145
10	NV	1.29	0.00154
0	NV	1.53	0.00183
-10	NV	1.67	0.00199
-20	NV	1.95	0.00232
-30	NV	2.61	0.00312

For HSUPA Band 2 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	4.38	0.00233
40	NV	5.08	0.00270
30	NV	4.86	0.00259
20	NV	6.30	0.00335
10	NV	6.28	0.00334
0	NV	5.93	0.00316
-10	NV	6.12	0.00326
-20	NV	7.14	0.00380
-30	NV	6.76	0.00360

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	10.71	0.01281
	NV	11.58	0.01384
	HV	11.96	0.01430
Reference Frequency(Middle Channel): GSM 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	14.87	0.00791
	NV	15.06	0.00801
	HV	14.64	0.00779
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	10.53	0.01258
	NV	11.72	0.01401
	HV	11.78	0.01409
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	14.95	0.00795
	NV	14.66	0.00780
	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	13.30	0.01591
	NV	13.21	0.01581
	HV	13.37	0.01599
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	-7.70	-0.00409
	NV	-7.89	-0.00420
	HV	-7.69	-0.00409

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	1.04	0.00124
	NV	1.49	0.00178
	HV	1.20	0.00143
Reference Frequency(Middle Channel): WCDMA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	1.15	0.00066
	NV	0.48	0.00028
	HV	1.23	0.00071
Reference Frequency(Middle Channel): WCDMA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	2.69	0.00143
	NV	2.23	0.00266
	HV	2.71	0.00324

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	2.14	0.00256
	NV	2.33	0.00278
	HV	2.23	0.00267
Reference Frequency(Middle Channel): HSDPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	5.71	0.00330
	NV	6.25	0.00361
	HV	6.72	0.00388
Reference Frequency(Middle Channel): HSDPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	7.11	0.00378
	NV	7.20	0.00383
	HV	7.28	0.00387

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	2.05	0.00245
	NV	2.63	0.00315
	HV	3.32	0.00397
Reference Frequency(Middle Channel): HSUPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	5.41	0.00312
	NV	5.53	0.00319
	HV	6.08	0.00351
Reference Frequency(Middle Channel): HSUPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	LV	8.98	0.00478
	NV	8.86	0.00471
	HV	9.06	0.00482

12. EUT TEST PHOTO

Radiated Emissions

Below 1G



Above 1G



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