TEST REPORT

Report Number. : 14586572-E1V4

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-A145M/DS, SM-A145M, SM-A145MB/DS AND SM-A145MB
FCC ID	:	A3LSMA145M
EUT Description	:	GSM/WCDMA/LTE Phone with BT/BLE, DTS/UNII a/b/g/n/ac
Test Standard(s)	:	FCC CFR47 PART 22 SUBPART H FCC CFR47 PART 24 SUBPART E FCC CFR47 PART 27 SUBPART F, H, L, and M FCC CFR47 PART 90 SUBPART S

Date Of Issue:
2023-02-02

Prepared by:
UL VERIFICATION SERVICES
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-01-13	Initial Issue	
V2	2023-01-26	Updated Section 6.2 and 10.1	Kiya Kedida
V3	2023-01-31	Updated Section 10.2	Kiya Kedida
V4	2023-02-02	Updated Section 5.2	Kiya Kedida

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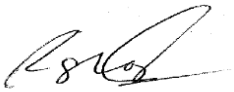
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	SM-A145M/DS, SM-A145M, SM-A145MB/DS AND SM-A145MB
FCC ID	A3LSMA145M
EUT Description	GSM/WCDMA/LTE PHONE WITH BT/BLE, DTS/UNII A/B/G/N/AC
Serial Number	CONDUCTED SN:R93TA000CZD , RADIATED SN:R93TA0007SM, R93TA0007TL
Date Tested	2022-11-30 TO 2023-01-12
Applicable Standards	FCC CFR 47 PART 22H, 24E, 27F,H,L, M and PART 90S
Test Results	COMPLIES

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released By:	Reviewed By:	Prepared By:
		
Dan Coronia Operations Leader UL Verification Services Inc.	Kiya Kedida Project Engineer UL Verification Services Inc.	Rolly Alegre Laboratory Engineer UL Verification Services Inc.

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

Requirement Description	Requirement Clause Number (FCC)	Result	Remarks
RF Conducted Output Power	2.1046 , 90.635 (b)	Complies	
Effective Radiated Power	22.913 (a)(5)	Complies	
	27.50 (c) (10)	Complies	
	27.50 (b) (10)	Complies	
Equivalent Isotropic Radiated Power	24.232 (c)	Complies	
	27.50 (d) (4)	Complies	
	27.50 (d) (4)	Complies	
	-	Complies	
	27.50 (a) (3)	Complies	
	27.50 (h) (2)	Complies	
	27.50 (c) (10)	Complies	
	96.41 (b), 27.50 (j) (3), (k) (3)	Complies	
Occupied Bandwidth	2.1049	Complies	
Band Edge and Emission Mask	2.1051, 22.917 (a), 24.238 (a), 27.53 (h), 27.53 (m)(4) & (m) (6), 27.53 (g), 27.53 (c) (f), 27.53(a), 27.53(l), 90.543 (e)(f), 90.691 (a),	Complies	
Out of Band Emissions	2.1051, 22.917 (a), 24.238 (a), 27.53 (h), 27.53 (m)(4) & (m) (6), 27.53 (g), 27.53 (c) (f), 27.53(a), 27.53(l), 90.543 (e)(f), 90.691 (a)	Complies	
Frequency Stability	2.1055, 22.355, 24.235, 27.54, 90.539, 90.213	Complies	
Peak-to-Average Ratio	22.913 (d), 24.232 (d), 27.50 (d) (5), 27.50 (j) (4)	Complies	
Field Strength of Spurious Radiation	2.1053, 22.917 (a), 24.238 (a), 27.53 (h), 27.53 (m)(4) & (m) (6), 27.53 (g), 27.53 (c) (f), 27.53(a), 27.53(l), 90.543 (e)(f), 90.691 (a)	Complies	

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- TIA-603-E
- FCC CFR 47 Part 2, Part 22, Part 24, Part 27 and Part 90S
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	FCC Registration
☒	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	550739
☐	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	550739
☒	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	550739

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
a) E (dBµV/m) = Measured amplitude level (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m).
b) E (dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).
c) E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.
d) EIRP (dBm) = E (dBµV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

So, from d), The measuring distance is usually at 3m, then 20*Log(3)=9.5424
Then, EIRP (dBm) = E (dBµV/m) + 9.5424 − 104.8 = E (dBµV/m) – 95.2576

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Power Spectral Density	2.47 dB
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)
Unwanted Emissions, Conducted	1.94 dB
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Time Domain Measurements	3.39%
Temperature	0.57˚C
Humidity	3.39%
DC Supply Voltages	0.57%

Uncertainty figures are valid to a confidence level of 95%.

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone with BT/BLE, DTS/UNII a/b/g/n/ac.

The model SM-A145M/DS was used for final testing and is representative of the test results in this report.

The models are electronically equivalent the only differences are as follows:

1) SM-A145M/DS : Dual SIM

2) SM-A145M : Single SIM

3) SM-A145MB/DS : Dual SIM with KNOX Security Platform

4) SM-A145MB : Single SIM with KNOX Security Platform

6.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

FCC: §2.1046, §22.913, §24.232, §27.50, §90.635, §90.541

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.8
KDB 412172 D01

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

The transmitter has a maximum average radiated ERP / EIRP output powers as follows:

GSM MODES

Part 22 850MHz					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
824.2-848.8	GPRS	29.95	0.9886	242.67	243KGXW
	EGPRS	26.01	0.3990	251.64	252KG7W
Part 24 1900MHz					
Frequency range (MHz)	Modulation	Radiated EIRP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
1850.2-1909.8	GPRS	29.77	0.9484	232.98	233KGXW
	EGPRS	26.20	0.4169	239.51	240KG7W

WCDMA MODES

Part 22 Band 5					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
826.4-846.6	REL 99	21.12	0.1294	4135	4M13F9W
	HSDPA	20.61	0.1151	4151	4M15F9W
Part 24 Band 2					
Frequency range (MHz)	Modulation	Radiated EIRP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
1852.4-1907.6	REL 99	21.94	0.1563	4157	4M16F9W
	HSDPA	21.03	0.1268	4165	4M17F9W
Part 27 Band 4					
Frequency range (MHz)	Modulation	Radiated EIRP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
1712.4-1752.6	REL 99	21.04	0.1271	4150	4M15F9W
	HSDPA	20.69	0.1172	4143	4M14F9W

LTE BAND 2

Part 24

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated EIRP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	1850.7	1909.3	21.15	0.1303	1088.1	1M09G7W
	16QAM			20.00	0.1000	1092.7	1M09D7W
3.0	QPSK	1851.5	1908.5	21.23	0.1327	2702.1	2M70G7W
	16QAM			20.08	0.1019	2708.6	2M71D7W
5.0	QPSK	1852.5	1907.5	21.26	0.1337	4510	4M51G7W
	16QAM			20.26	0.1062	4509.6	4M51D7W
10.0	QPSK	1855.0	1905.0	21.11	0.1291	8984.5	8M98G7W
	16QAM			19.93	0.0984	8983.1	8M98D7W
15.0	QPSK	1857.5	1902.5	21.36	0.1368	13478	13M5G7W
	16QAM			20.09	0.1021	13442	13M4D7W
20.0	QPSK	1860.0	1900.0	21.27	0.1340	17919	17M9G7W
	16QAM			20.22	0.1052	17948	17M9D7W

LTE BAND 5

Part 22H

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	824.7	848.3	21.54	0.1426	1094.8	1M09G7W
	16QAM			20.27	0.1064	1089	1M09D7W
3.0	QPSK	825.5	847.5	21.20	0.1318	2705.9	2M71G7W
	16QAM			19.48	0.0887	2703.1	2M70D7W
5.0	QPSK	826.5	846.5	21.50	0.1413	4508.1	4M51G7W
	16QAM			19.65	0.0923	4511.1	4M51D7W
10.0	QPSK	829.0	844.0	21.39	0.1377	8991.8	8M99G7W
	16QAM			19.93	0.0984	8977.7	8M98D7W

LTE BAND 12

Part 27							
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	699.7	715.3	19.49	0.0889	1084.8	1M08G7W
	16QAM			18.16	0.0655	1092	1M09D7W
3.0	QPSK	700.5	714.5	19.54	0.0899	2700.9	2M70G7W
	16QAM			18.21	0.0662	2708.1	2M71D7W
5.0	QPSK	701.5	713.5	19.07	0.0807	4524.4	4M52G7W
	16QAM			18.05	0.0638	4518.2	4M52D7W
10.0	QPSK	704.0	711.0	18.84	0.0766	9002.8	9M00G7W
	16QAM			17.82	0.0605	8996.5	8M00D7W

LTE BAND 13

Part 27							
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
5.0	QPSK	779.5	784.5	19.02	0.0798	4510.7	4M51G7W
	16QAM			18.08	0.0643	4520.9	4M52D7W
10.0	QPSK	782.0	782.0	18.57	0.0719	9001.4	9M00G7W
	16QAM			17.44	0.0555	8977.7	8M98D7W

LTE BAND 26 (FCC Part 90S)

Part 90S							
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	814.7	823.3	20.44	0.1107	1089.9	1M09G7W
	16QAM			19.24	0.0839	1094.3	1M09D7W
3.0	QPSK	815.5	822.5	20.49	0.1119	2702.3	2M70G7W
	16QAM			18.85	0.0767	2710.3	2M71D7W
5.0	QPSK	816.5	821.5	20.60	0.1148	4511.5	4M51G7W
	16QAM			19.13	0.0818	4510.8	4M51D7W
10.0	QPSK	819.0	819.0	20.55	0.1135	9005.8	8M97G7W
	16QAM			18.97	0.0789	8979.4	8M92D7W
15.0	QPSK	821.5	821.5	20.28	0.1067	13300.0	13M3G7W
	16QAM			18.48	0.0705	13358.0	13M4D7W

LTE BAND 26 (FCC Part 22)

Part 22

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	824.7	848.3	20.81	0.1205	1086.9	1M09G7W
	16QAM			19.15	0.0822	1093.6	1M09D7W
3.0	QPSK	825.5	847.5	20.83	0.1211	2704.4	2M70G7W
	16QAM			19.22	0.0836	2711.1	2M71D7W
5.0	QPSK	826.5	846.5	20.74	0.1186	4509.9	4M51G7W
	16QAM			19.14	0.0820	4506.7	4M51D7W
10.0	QPSK	829.0	844.0	20.91	0.1233	9011.0	9M01G7W
	16QAM			19.21	0.0834	8988.7	8M99D7W
15.0	QPSK	831.5	841.5	20.93	0.1239	13324.0	13M3G7W
	16QAM			19.11	0.0815	13455.0	13M5D7W

LTE BAND 41

Part 27

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated EIRP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
5.0	QPSK	2498.5	2687.5	19.24	0.0839	4511.8	4M51G7W
	16QAM			18.31	0.0678	4501.9	4M50D7W
10.0	QPSK	2501.0	2685.0	19.25	0.0841	8962.1	8M96G7W
	16QAM			18.31	0.0678	9011.6	9M01D7W
15.0	QPSK	2503.5	2682.5	18.31	0.0678	13425	13M4G7W
	16QAM			17.46	0.0557	13457	13M5D7W
20.0	QPSK	2506.0	2680.0	18.40	0.0692	17918	17M9G7W
	16QAM			17.77	0.0598	17942	17M9D7W

LTE BAND 66

Part 27

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	1710.7	1779.3	21.06	0.1276	1085.7	1M09G7W
	16QAM			19.66	0.0925	1089.3	1M09D7W
3.0	QPSK	1711.5	1778.5	21.10	0.1288	2702.3	2M70G7W
	16QAM			19.67	0.0927	2706	2M71D7W
5.0	QPSK	1712.5	1777.5	21.26	0.1337	4504.2	4M50G7W
	16QAM			19.81	0.0957	4497.5	4M50D7W
10.0	QPSK	1715.0	1775.0	21.08	0.1282	8978.2	8M98G7W
	16QAM			19.72	0.0938	8989.1	8M99D7W
15.0	QPSK	1717.5	1772.5	21.35	0.1365	13455	13M5G7W
	16QAM			19.95	0.0989	13460	13M5D7W
20.0	QPSK	1720.0	1770.0	21.54	0.1426	17922	17M9G7W
	16QAM			20.08	0.1019	17917	17M9D7W

6.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was A145M.001.

6.4. MAXIMUM ANTENNA GAIN

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

The radio utilizes an LDS antenna, with a maximum gain as follows:

Bands	Antenna Gain (dBi)
GSM850, 824-849MHz	-5.5
GSM1900, 1850-1910MHz	-6.8
WCDMA Band 2, 1850-1910 MHz	-2.9
WCDMA Band 4, 1710-1755 MHz	-2.9
WCDMA Band 5, 824-849 MHz	-6.0
LTE Band 2, 1850 – 1910 MHz	-2.9
LTE Band 5, 824 – 849 MHz	-6.0
LTE Band 12, 699 – 716 MHz	-4.9
LTE Band 13, 777 – 787 MHz	-5.2
LTE Band 26 PT90, 814 – 824 MHz	-3.5
LTE Band 26 PT22 , 824 – 849 MHz	-3.5
LTE Band 41, 2496 – 2690 MHz	-4.1
LTE Band 66, 1710 – 1780 MHz	-3.0

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of:
Band 2, Band 4, Band 5, Band 12, Band 13, Band 17, Band 26, Band 41 and Band 66.

The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK and 16QAM modulations. All testing was performed using QPSK, and 16QAM modulations to represent the worst case.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, & Z. It was determined that Y-Axis for 2500 MHz. And X-Axis for 700, 850, 1900, and 1700 MHz with AC/DC Adapter and headset was worst-case orientation.

All radios that can be transmitted simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

Radiated spurious emissions were investigated below 30MHz, 30MHz-1GHz, and above 1GHz. There were no emissions found below 30MHz and 30MHz-1GHz.

LTE Band 4 (1710-1755MHz, 1.4/3/5/10/15/20MHz bandwidth) is covered by LTE Band 66 (1710 -1780 MHz). Because it is a subset of LTE band 66 and they have same output power and channel bandwidth.

LTE Band 17 (704 - 716 MHz, 5/10 MHz bandwidth) is covered by LTE Band 12 (699 - 716 MHz). Because it is a subset of LTE band 12 and they have same output power and channel bandwidth.

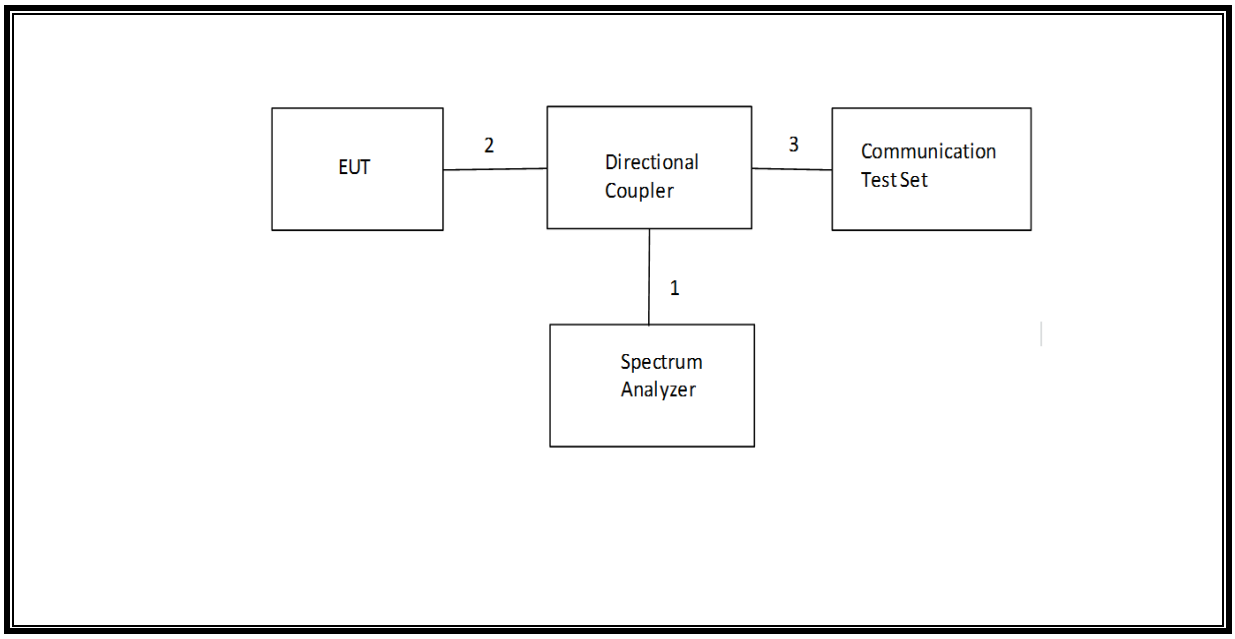
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Samsung	EP-TA800	R37MAMT21J2SE3	N/A
Earphone	Samsung	N/A	N/A	N/A

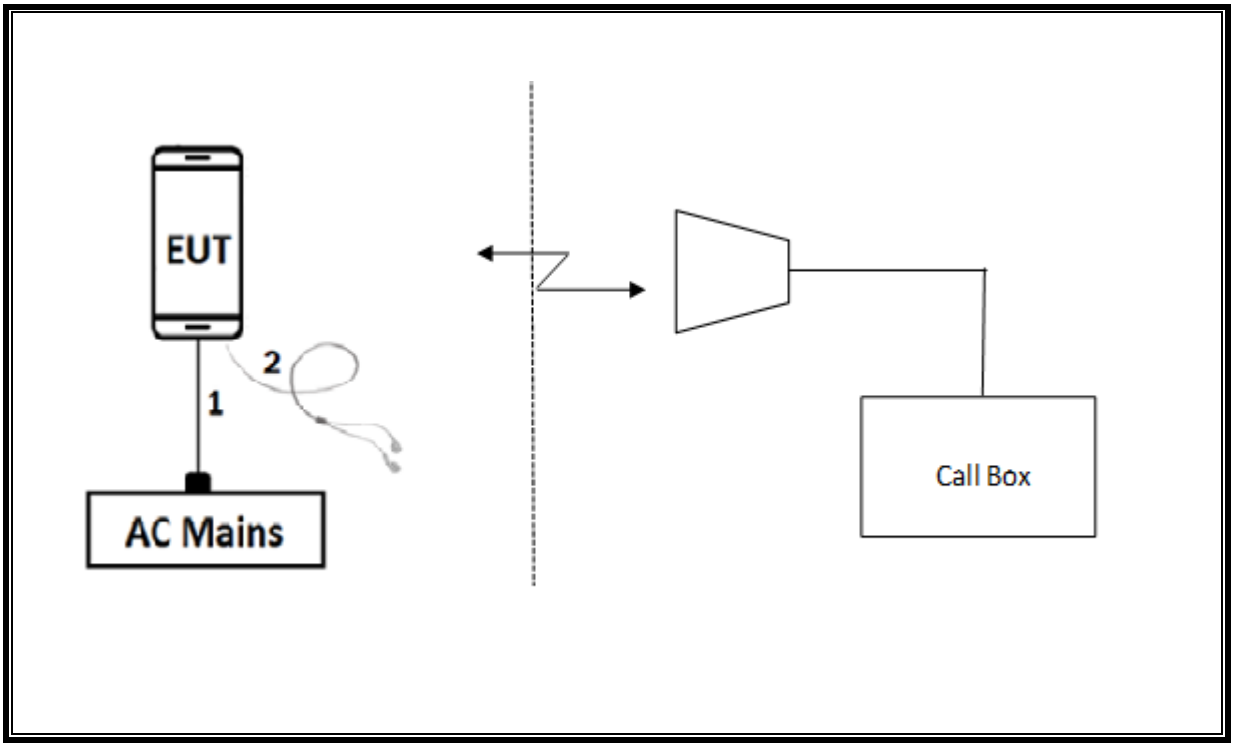
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	RF Out	1	Spectrum Analyzer	Shielded	None	N/A
2	Antenna Port	1	EUT	Shielded	0.1m	N/A
3	RF In/Out	1	Communication Test Set	Shielded	1m	N/A

I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	Shielded	1	N/A
2	Earphone	1	3.5mm	Un-shielded	1	N/A

CONDUCTED SETUP



RADIATED SETUP



7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
Highpass Filter, 2.7 - 18 GHz	Micro-Tronics	HPM20552	204773	2023-12-08	2022-15-08
Highpass Filter, 1.2 GHz	Micro-Tronics	HPM18129	204788	2023-06-27	2022-06-27
Highpass Filter, 2GHz	Micro-Tronics	HPM50110	207302	2023-06-27	2022-06-27
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	223083	2023-07-05	2022-07-05
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	206806	2023-07-28	2022-07-28
Dipole Antenna	Keysight	17025/Z540.1	89477	2023-01-24	2022-01-24
Antenna, Horn 1-12GHz	L3 narda ATM	MWH-1826/B	PRE0181256	2023-07-07	2022-07-07
Hybrid Antenna	Sunol Sciences Corp.	JB1	80293	2023-09-08	2022-09-08
Hybrid Antenna	Sunol Sciences Corp.	JB1	80813	2023-08-06	2022-08-06
RF Amplifier	AMPLICAL	197920	PRE0210426	2023-04-19	2022-04-19
RF Amplifier	AMPLICAL	N/A	171013	2023-06-24	2022-06-24
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	175953	2023-02-03	2022-02-08
RF Amplifier 10KHz – 1GHz	SONOMA INSTR	310	29654	2023-04-24	2022-04-24
Directional Coupler	KRYTAR	198816	PRE0211471	2023-09-19	2022-09-19
Wideband Communication Test Set, Call Box	R&S	CMW500	85710	2023-02-22	2022-02-22
Wideband Communication Test Set, Call Box	R&S	CMW500	80105	2023-02-21	2022-02-21
Wideband Communication Test Set, Call Box	R&S	CMW500	81814	2023-02-16	2022-02-16
Chamber, Environmental	Thermotron	79361	T80	2023-04-30	2022-10-31
Spectrum Analyzer	Agilent (Keysight) Technologies	E4440A	80386	2023-03-02	2022-03-02
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2023-02-13	2022-02-13
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169937	2023-02-20	2022-02-20
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	80396	2023-02-01	2022-02-01
DC power supply	Agilent / HP	08M3592V	PRE0074757	N/A	N/A
DC power supply 15V	Sorensen	XT15-4	T465	N/A	N/A
Power Meter	Keysight	N1911A	90719	2023-01-24	2022-01-24
Power Sensor	Keysight	N1921A	81319	2023-01-24	2022-01-24

UL AUTOMATION SOFTWARE			
CLT Software	UL	UL RF	Ver 4.2.5, October 26, 2022
CLT Software	UL	UL RF	Ver 4.0, January 15, 2021
Power Measurement Software	UL	UL RF	Ver 4.0.7, November 01, 2022
Radiated test software	UL	UL RF	Ver 9.5 December 12, 2022

NOTES:

*Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

8. RF OUTPUT POWER VERIFICATION

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows:

8.1. GSM

Using CMW500 Communication Test Set
Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press **Connection control** to choose the different menus
Press **RESET** > choose all to reset all settings

Connection	Press **Signal Off** to turn off the signal and change settings Network Support > GSM+GPRS or GSM+EGPRS Main Service > Packet Data Service selection > Test Mode A – Auto Slot Config. off	
MS Signal	Press Slot Config bottom on the right twice to select and change the number of time slots and power setting	
	> Slot configuration	> Uplink/Gamma > 33 dBm for GPRS 850/900 > 27 dBm for EGPRS 850/900 > 30 dBm for GPRS1800/1900 > 26 dBm for EGPRS1800/1900
BS Signal	Enter the same channel number for TCH channel (test channel) and BCCH channel	
	Frequency Offset >	+ 0 Hz
	Mode >	BCCH and TCH
	BCCH Level >	-85 dBm (May need to adjust if link is not stable)
	BCCH Channel >	choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
	Channel Type >	Off
	P0>	4 dB
	Slot Config >	Unchanged (if already set under MS Signal)
	TCH >	choose desired test channel
	Hopping >	Off
	Main Timeslot >	3 (Default)
Network	Coding Scheme >	CS 4 (GPRS) and MCS5 (EGPRS)
	Bit Stream >	2E9-1PSR Bit Pattern
AF/RF	Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input	
Connection	Press **Signal On** to turn on the signal and change settings	

RESULT

8.1.1. GSM 850

Test Engineer ID:	20794	Test Date:	12/5/2022

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Conducted Average Power (dBm)
GPRS (GMSK)	CS1	1	128	824.2	**32.3**
			190	836.6	**32.3**
			251	848.8	**32.3**
		2	128	824.2	30.6
			190	836.6	30.3
			251	848.8	30.0
EGPRS (8PSK)	MCS5	1	128	824.2	**26.4**
			190	836.6	26.2
			251	848.8	26.1
		2	128	824.2	24.7
			190	836.6	24.5
			251	848.8	24.3

8.1.2. GSM 1900

Test Engineer ID:	20794	Test Date:	11/30/2022

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Conducted Average Power (dBm)
GPRS (GMSK)	CS1	1	512	1850.2	**31.4**
			661	1880	30.9
			810	1909.8	31.1
		2	512	1850.2	28.1
			661	1880	28.4
			810	1909.8	28.4
EGPRS (8PSK)	MCS5	1	512	1850.2	25.2
			661	1880	25.3
			810	1909.8	**25.6**
		2	512	1850.2	23.8
			661	1880	23.9
			810	1909.8	23.8

8.2. WCDMA

TEST PROCEDURE

The transmitter output was connected to the input terminal of Directional Coupler via calibrated coaxial cable. The output coupling terminal of the Directional Coupler was directly connected to a spectrum analyzer while the output through terminal connected to the communication test set via calibrated coaxial cable.

The output power was measured with the spectrum analyzer at the low, middle and high channel in each band.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW ≥ RBW.≥ 26dB BW, typically 5MHz.
- Set a marker to point the corresponding peak value.

REL 99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

HSDPA REL 5

The following 4 Sub-tests were completed according to Release 5 procedures in table C.10.1.4 of 3GPP TS 34.121-1

A summary of these settings are illustrated below:

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 24/15 with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

HSPA REL 6 (HSDPA & HSUPA)

The following 5 Sub-tests were completed according to Release 6 procedures in table C.11.1.3 of 3GPP TS 34.121-1. A summary of these settings are illustrated below:

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c . For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

DUAL CARRIER HSDPA (DC-HSDPA (REL 8, CAT 24)

The following 4 Sub-tests for DC-HSDPA were completed according to Release 8 procedures in table C08.1.12 of 3GPP TS 34.121-1. A summary of subtest settings are illustrated below:

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK

Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.

Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.

RESULT

8.2.1. WCDMA BAND 5

Test Engineer ID:	20794	Test Date:	11/30/2022

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Conducted Average Power (dBm)
W-CDMA Band 5 (850MHz)	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.2
			4183	836.6	N/A	**24.3**
			4233	846.6	N/A	24.3
	HSDPA	Subtest 1	4132	826.4	0	22.1
			4183	836.6	0	22.4
			4233	846.6	0	22.4
		Subtest 2	4132	826.4	0	22.1
			4183	836.6	0	**22.4**
			4233	846.6	0	22.4
		Subtest 3	4132	826.4	0.5	21.2
			4183	836.6	0.5	21.6
			4233	846.6	0.5	21.5
		Subtest 4	4132	826.4	0.5	21.5
			4183	836.6	0.5	22.0
			4233	846.6	0.5	21.8
	HSPA (HSDPA & HSUPA)	Subtest 1	4132	826.4	0	21.8
			4183	836.6	0	22.1
			4233	846.6	0	22.1
		Subtest 2	4132	826.4	2	19.5
			4183	836.6	2	19.8
			4233	846.6	2	19.9
		Subtest 3	4132	826.4	1	20.7
			4183	836.6	1	21.1
			4233	846.6	1	21.1
		Subtest 4	4132	826.4	2	19.5
			4183	836.6	2	19.9
			4233	846.6	2	19.9
		Subtest 5	4132	826.4	0	21.7
			4183	836.6	0	22.0
			4233	846.6	0	22.0
	DC-HSDPA	Subtest 1	4132	826.4	0	22.2
			4183	836.6	0	22.2
			4233	846.6	0	22.1
		Subtest 2	4132	826.4	0	22.2
			4183	836.6	0	22.3
			4233	846.6	0	22.2
		Subtest 3	4132	826.4	0.5	20.7
			4183	836.6	0.5	20.8
			4233	846.6	0.5	20.7
		Subtest 4	4132	826.4	0.5	21.6
			4183	836.6	0.5	21.6
			4233	846.6	0.5	21.5

8.2.2. WCDMA BAND 2

Test Engineer ID:	20794	Test Date:	12/5/2022

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Conducted Average Power (dBm)
W-CDMA Band 2 (1900MHz)	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	**25.0**
			9400	1880.0	N/A	24.8
			9538	1907.6	N/A	24.8
	HSDPA	Subtest 1	9262	1852.4	0	23.5
			9400	1880.0	0	23.3
			9538	1907.6	0	23.4
		Subtest 2	9262	1852.4	0	**23.6**
			9400	1880.0	0	23.3
			9538	1907.6	0	23.4
		Subtest 3	9262	1852.4	0.5	22.5
			9400	1880.0	0.5	22.2
			9538	1907.6	0.5	22.3
		Subtest 4	9262	1852.4	0.5	22.9
			9400	1880.0	0.5	22.5
			9538	1907.6	0.5	22.6
	HSPA (HSDPA & HSUPA)	Subtest 1	9262	1852.4	0	22.4
			9400	1880.0	0	22.1
			9538	1907.6	0	22.3
		Subtest 2	9262	1852.4	2	20.5
			9400	1880.0	2	20.1
			9538	1907.6	2	20.2
		Subtest 3	9262	1852.4	1	21.5
			9400	1880.0	1	21.2
			9538	1907.6	1	21.3
		Subtest 4	9262	1852.4	2	20.5
			9400	1880.0	2	20.1
			9538	1907.6	2	20.2
		Subtest 5	9262	1852.4	0	22.3
			9400	1880.0	0	22.2
			9538	1907.6	0	22.3
	DC-HSDPA	Subtest 1	9262	1852.4	0	23.4
			9400	1880.0	0	23.3
			9538	1907.6	0	23.5
		Subtest 2	9262	1852.4	0	23.5
			9400	1880.0	0	23.3
			9538	1907.6	0	23.5
		Subtest 3	9262	1852.4	0.5	21.9
			9400	1880.0	0.5	21.8
			9538	1907.6	0.5	22.0
		Subtest 4	9262	1852.4	0.5	22.7
			9400	1880.0	0.5	22.5
			9538	1907.6	0.5	22.7

8.2.3. WCDMA BAND 4

Test Engineer ID:	20794	Test Date:	12/5/2022

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Conducted Average Power (dBm)
W-CDMA Band 4 (1700MHz)	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	24.5
			1413	1732.6	N/A	24.5
			1513	1752.6	N/A	**24.5**
	HSDPA	Subtest 1	1312	1712.4	0	22.6
			1413	1732.6	0	22.4
			1513	1752.6	0	22.6
		Subtest 2	1312	1712.4	0	22.6
			1413	1732.6	0	22.4
			1513	1752.6	0	**22.6**
		Subtest 3	1312	1712.4	0.5	21.7
			1413	1732.6	0.5	21.6
			1513	1752.6	0.5	21.6
		Subtest 4	1312	1712.4	0.5	21.8
			1413	1732.6	0.5	21.6
			1513	1752.6	0.5	21.8
	HSPA (HSDPA & HSUPA)	Subtest 1	1312	1712.4	0	21.5
			1413	1732.6	0	21.4
			1513	1752.6	0	21.5
		Subtest 2	1312	1712.4	2	19.5
			1413	1732.6	2	19.5
			1513	1752.6	2	19.5
		Subtest 3	1312	1712.4	1	21.1
			1413	1732.6	1	21.0
			1513	1752.6	1	21.0
		Subtest 4	1312	1712.4	2	19.5
			1413	1732.6	2	19.5
			1513	1752.6	2	19.5
		Subtest 5	1312	1712.4	0	21.9
			1413	1732.6	0	21.9
			1513	1752.6	0	21.9
	DC-HSDPA	Subtest 1	1312	1712.4	0	22.4
			1413	1732.6	0	22.3
			1513	1752.6	0	22.4
		Subtest 2	1312	1712.4	0	22.5
			1413	1732.6	0	22.3
			1513	1752.6	0	22.4
		Subtest 3	1312	1712.4	0.5	21.1
			1413	1732.6	0.5	21.4
			1513	1752.6	0.5	21.3
		Subtest 4	1312	1712.4	0.5	21.7
			1413	1732.6	0.5	21.6
			1513	1752.6	0.5	21.7

8.3. LTE

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of “NS_01”.

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A

RESULTS

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows:

8.3.1. LTE BAND 2

Test Engineer ID:	20794	Test Date:	12/5/2022

OUTPUT POWER FOR LTE BAND 2 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				18607	18900	19193
				1850.7 MHz	1880.0 MHz	1909.3 MHz
1.4	QPSK	1	0	24.3	24.4	24.4
		1	2	24.3	24.4	24.4
		1	5	24.3	24.4	24.4
		3	0	24.3	24.4	24.4
		3	1	24.3	24.4	**24.4**
		3	2	24.3	24.4	24.4
		6	0	23.4	23.4	23.4
	16QAM	1	0	23.3	23.1	23.3
		1	2	23.3	23.1	23.3
		1	5	23.4	23.1	23.3
		3	0	23.4	**23.5**	23.4
		3	1	23.3	23.4	23.4
		3	2	23.3	23.4	23.4
		6	0	22.2	22.3	22.3

OUTPUT POWER FOR LTE BAND 2 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				18615	18900	19185
				1851.5 MHz	1880.0 MHz	1908.5 MHz
3.0	QPSK	1	0	24.3	24.5	24.5
		1	7	24.3	24.5	24.5
		1	14	24.3	**24.5**	24.5
		8	0	23.3	23.4	23.4
		8	4	23.3	23.4	23.4
		8	7	23.3	23.4	23.4
		15	0	23.3	23.5	23.4
	16QAM	1	0	23.0	23.4	23.4
		1	7	23.0	**23.4**	23.3
		1	14	23.0	23.4	23.3
		8	0	22.3	22.3	22.3
		8	4	22.3	22.3	22.3
		8	7	22.3	22.3	22.3
		15	0	22.2	22.4	22.4

OUTPUT POWER FOR LTE BAND 2 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				18625	18900	19175
				1852.5 MHz	1880.0 MHz	1907.5 MHz
5.0	QPSK	1	0	24.3	24.4	**24.5**
		1	12	24.2	24.4	24.5
		1	24	24.3	24.5	**24.5**
		12	0	23.3	23.4	23.5
		12	6	23.3	23.4	23.5
		12	11	23.4	23.4	23.5
		25	0	23.4	23.4	23.5
	16QAM	1	0	23.4	23.3	23.5
		1	12	23.4	23.3	23.5
		1	24	23.5	23.3	**23.5**
		12	0	22.3	22.4	22.5
		12	6	22.3	22.3	22.5
		12	11	22.3	22.4	22.5
		25	0	22.4	22.4	22.4

OUTPUT POWER FOR LTE BAND 2 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				18650	18900	19150
				1855.0 MHz	1880.0 MHz	1905.0 MHz
10.0	QPSK	1	0	24.3	24.5	24.5
		1	24	24.4	24.5	24.5
		1	49	24.4	24.6	**24.6**
		25	0	23.4	23.4	23.4
		25	12	23.4	23.4	23.5
		25	24	23.4	23.5	23.5
		50	0	23.4	23.5	23.5
	16QAM	1	0	23.0	23.3	23.3
		1	24	23.0	23.3	23.3
		1	49	23.1	**23.3**	**23.3**
		25	0	22.3	22.5	22.5
		25	12	22.3	22.4	22.4
		25	24	22.3	22.5	22.5
		50	0	22.4	22.4	22.5

OUTPUT POWER FOR LTE BAND 2 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				18675	18900	19125
				1857.5 MHz	1880.0 MHz	1902.5 MHz
15.0	QPSK	1	0	24.3	24.5	24.5
		1	37	24.4	24.6	24.6
		1	74	24.4	24.6	**24.6**
		36	0	23.4	23.4	23.5
		36	16	23.4	23.5	23.5
		36	35	23.4	23.5	23.5
		75	0	23.4	23.5	23.5
	16QAM	1	0	23.2	23.3	23.4
		1	37	23.2	23.4	23.4
		1	74	23.3	23.4	**23.5**
		36	0	22.3	22.4	22.3
		36	16	22.3	22.4	22.4
		36	35	22.3	22.5	22.4
		75	0	22.4	22.4	22.4

OUTPUT POWER FOR LTE BAND 2 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				18700	18900	19100
				1860.0 MHz	1880.0 MHz	1900.0 MHz
20.0	QPSK	1	0	24.3	24.5	24.6
		1	49	24.4	24.5	24.6
		1	99	24.4	24.6	**24.7**
		50	0	23.4	23.4	23.5
		50	24	23.4	23.4	23.6
		50	49	23.5	23.5	23.6
		100	0	23.4	23.5	23.6
	16QAM	1	0	23.0	23.2	23.2
		1	49	23.1	23.2	23.3
		1	99	23.2	23.3	**23.3**
		50	0	22.3	22.4	22.5
		50	24	22.4	22.4	22.5
		50	49	22.4	22.4	22.5
		100	0	22.4	22.5	22.5

8.3.2. LTE BAND 5

Test Engineer ID:	20794	Test Date:	12/1/2022

OUTPUT POWER FOR LTE BAND 5 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				20407	20525	20643
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	25.0	24.9	24.9
		1	2	25.0	24.9	24.9
		1	5	**25.0**	24.9	24.9
		3	0	24.9	24.9	24.8
		3	1	24.9	24.9	24.8
		3	2	24.9	24.9	24.8
		6	0	23.9	23.9	23.9
	16QAM	1	0	23.9	23.9	23.9
		1	2	23.8	23.9	23.9
		1	5	23.9	23.9	23.9
		3	0	24.0	24.0	23.8
		3	1	**24.0**	24.0	23.8
		3	2	24.0	24.0	23.8
		6	0	23.0	22.8	22.9

OUTPUT POWER FOR LTE BAND 5 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				20415	20525	20635
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	24.9	24.8	24.9
		1	7	24.9	24.8	**25.0**
		1	14	24.9	24.9	25.0
		8	0	23.9	23.9	23.8
		8	4	23.9	23.9	23.8
		8	7	23.9	23.9	23.8
		15	0	23.9	23.9	23.9
	16QAM	1	0	23.7	23.7	**24.0**
		1	7	23.5	23.8	23.8
		1	14	23.7	23.7	23.6
		8	0	22.8	22.9	22.9
		8	4	22.8	22.9	22.8
		8	7	22.8	22.9	22.9
		15	0	22.8	22.9	22.9

OUTPUT POWER FOR LTE BAND 5 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				20425	20525	20625
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	24.9	**24.9**	**24.9**
		1	12	24.9	24.9	24.9
		1	24	24.9	24.9	24.8
		12	0	23.9	23.9	23.9
		12	6	23.9	23.9	23.9
		12	11	23.9	23.9	23.9
		25	0	23.9	23.9	23.9
	16QAM	1	0	23.5	23.6	23.5
		1	12	23.5	23.6	23.5
		1	24	23.5	**23.6**	23.5
		12	0	22.9	22.9	22.9
		12	6	22.9	22.9	22.9
		12	11	22.9	22.9	22.9
		25	0	22.9	22.8	22.9

OUTPUT POWER FOR LTE BAND 5 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				20450	20525	20600
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	**25.0**	25.0	25.0
		1	24	25.0	24.9	24.9
		1	49	25.0	24.9	24.9
		25	0	24.0	23.9	23.9
		25	12	24.0	23.9	23.9
		25	24	24.0	23.9	23.9
		50	0	24.0	23.9	23.9
	16QAM	1	0	**23.6**	23.6	23.6
		1	24	23.6	23.6	23.6
		1	49	23.6	23.6	23.5
		25	0	23.0	22.9	23.0
		25	12	22.9	22.9	22.9
		25	24	23.0	22.9	22.9
		50	0	23.0	22.8	22.9

8.3.3. LTE BAND 12

Test Engineer ID:	20794	Test Date:	12/1/2022

OUTPUT POWER FOR LTE BAND 12 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				23017	23095	23173
				699.7 MHz	707.5 MHz	715.3 MHz
1.4	QPSK	1	0	**24.5**	24.5	24.4
		1	2	24.5	24.5	24.4
		1	5	24.5	24.5	24.4
		3	0	24.5	24.4	24.3
		3	1	24.5	24.4	24.4
		3	2	24.5	24.4	24.4
		6	0	23.5	23.4	23.4
	16QAM	1	0	**23.4**	23.4	23.2
		1	2	**23.4**	23.3	23.2
		1	5	23.4	23.3	23.2
		3	0	23.4	23.3	23.3
		3	1	23.4	23.4	23.3
		3	2	23.4	23.3	23.3
		6	0	22.4	22.3	22.3

OUTPUT POWER FOR LTE BAND 12 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				23025	23095	23165
				700.5 MHz	707.5 MHz	714.5 MHz
3.0	QPSK	1	0	24.5	**24.5**	24.5
		1	7	24.5	24.5	24.5
		1	14	24.4	24.5	24.4
		8	0	23.4	23.4	23.4
		8	4	23.4	23.4	23.4
		8	7	23.4	23.4	23.4
		15	0	23.4	23.4	23.4
	16QAM	1	0	23.1	**23.2**	23.2
		1	7	23.1	**23.2**	23.2
		1	14	23.0	23.2	23.1
		8	0	22.4	22.4	22.4
		8	4	22.4	22.4	22.4
		8	7	22.4	22.4	22.4
		15	0	22.4	22.4	22.3

OUTPUT POWER FOR LTE BAND 12 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				23035	23095	23155
				701.5 MHz	707.5 MHz	713.5 MHz
5.0	QPSK	1	0	**24.6**	24.6	24.5
		1	12	24.6	24.5	24.5
		1	24	24.6	24.5	24.5
		12	0	23.6	23.4	23.5
		12	6	23.6	23.5	23.5
		12	11	23.6	23.5	23.5
		25	0	23.6	23.4	23.5
	16QAM	1	0	**23.4**	23.3	23.0
		1	12	23.4	23.3	23.1
		1	24	23.4	23.3	23.1
		12	0	22.6	22.4	22.5
		12	6	22.5	22.4	22.6
		12	11	22.5	22.5	22.5
		25	0	22.5	22.5	22.5

OUTPUT POWER FOR LTE BAND 12 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				23060	23095	23130
				704.0 MHz	707.5 MHz	711.0 MHz
10.0	QPSK	1	0	23.7	24.4	23.8
		1	24	23.6	**24.4**	23.8
		1	49	23.6	24.4	23.7
		25	0	22.6	23.5	22.6
		25	12	22.6	23.5	22.6
		25	24	22.6	23.5	22.6
		50	0	22.6	23.5	22.6
	16QAM	1	0	22.2	**23.0**	22.4
		1	24	22.1	23.0	22.4
		1	49	22.1	23.0	22.3
		25	0	21.1	22.4	21.1
		25	12	21.1	22.4	21.1
		25	24	21.1	22.5	21.1
		50	0	21.0	22.5	21.1

8.3.4. LTE BAND 13

Test Engineer ID:	38515	Test Date:	12/5/2022

OUTPUT POWER FOR LTE BAND 13 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				23205	23230	23255
				779.5 MHz	782.0 MHz	784.5 MHz
5.0	QPSK	1	0	**24.2**	24.2	24.1
		1	12	24.2	24.2	24.1
		1	24	**24.2**	24.2	24.1
		12	0	23.2	23.2	23.1
		12	6	23.2	23.1	23.1
		12	11	23.2	23.2	23.1
		25	0	23.2	23.2	23.1
	16QAM	1	0	23.0	23.0	23.1
		1	12	23.0	23.0	**23.1**
		1	24	23.0	23.0	23.1
		12	0	22.1	22.1	22.2
		12	6	22.1	22.1	22.2
		12	11	22.1	22.1	22.2
		25	0	22.2	22.2	22.1

OUTPUT POWER FOR LTE BAND 13 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				N/A	23230	N/A
				N/A	782.0 MHz	N/A
10.0	QPSK	1	0		24.1	
		1	24		**24.2**	
		1	49		24.2	
		25	0		23.1	
		25	12		23.1	
		25	24		23.1	
		50	0		23.2	
	16QAM	1	0		**23.1**	
		1	24		23.1	
		1	49		23.1	
		25	0		22.2	
		25	12		22.2	
		25	24		22.2	
		50	0		22.2	

8.3.5. LTE BAND 26 (FCC Part 90S)

Test Engineer ID:	39005	Test Date:	12/9/2022

OUTPUT POWER FOR LTE BAND 26 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26697	26740	26783
				814.7 MHz	819.0	823.3 MHz
1.4	QPSK	1	0	**24.5**	24.3	24.3
		1	2	24.5	24.3	24.3
		1	5	24.5	24.3	24.3
		3	0	24.5	24.2	24.2
		3	1	24.5	24.2	24.2
		3	2	24.4	24.2	24.2
		6	0	23.5	23.2	23.2
	16QAM	1	0	23.2	23.0	23.1
		1	2	23.2	23.1	23.1
		1	5	23.2	23.1	23.2
		3	0	23.5	23.2	23.0
		3	1	**23.5**	23.2	23.0
		3	2	**23.5**	23.2	23.0
		6	0	22.6	22.2	22.3

OUTPUT POWER FOR LTE BAND 26 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26705	26740	26775
				815.5 MHz	819.0	822.5 MHz
3.0	QPSK	1	0	**24.5**	24.4	24.2
		1	7	24.5	24.3	24.3
		1	14	24.5	24.3	24.2
		8	0	23.5	24.1	24.2
		8	4	23.4	24.2	24.2
		8	7	23.5	24.2	24.2
		15	0	23.4	23.2	23.2
	16QAM	1	0	**23.4**	23.1	23.2
		1	7	23.4	23.1	23.2
		1	14	23.4	23.1	23.2
		8	0	22.5	23.2	23.1
		8	4	22.5	23.2	23.0
		8	7	22.5	23.2	23.0
		15	0	22.5	22.2	22.3

OUTPUT POWER FOR LTE BAND 26 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26715	26740	26765
				816.5 MHz	819.0	821.5 MHz
5.0	QPSK	1	0	**24.4**	24.2	24.4
		1	12	24.4	24.2	24.4
		1	24	24.4	24.2	24.3
		12	0	23.5	23.3	23.2
		12	6	23.5	23.3	23.2
		12	11	23.4	23.2	23.2
		25	0	23.4	23.2	23.2
	16QAM	1	0	**23.3**	23.3	23.2
		1	12	23.2	23.1	23.2
		1	24	23.2	23.1	**23.3**
		12	0	22.4	22.2	22.3
		12	6	22.4	22.1	22.3
		12	11	22.4	22.2	22.3
		25	0	22.4	22.2	22.3

OUTPUT POWER FOR LTE BAND 26 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				N/A	26740	N/A
				N/A	819.0	N/A
10.0	QPSK	1	0		**24.6**	
		1	24		24.5	
		1	49		24.5	
		25	0		23.5	
		25	12		23.5	
		25	24		23.4	
		50	0		23.5	
	16QAM	1	0		**23.4**	
		1	24		23.4	
		1	49		23.3	
		25	0		22.6	
		25	12		22.5	
		25	24		22.5	
		50	0		22.5	

OUTPUT POWER FOR LTE BAND 26 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				N/A	26765	N/A
				N/A	821.5 MHz	N/A
15.0	QPSK	1	0		**24.1**	
		1	24		**24.1**	
		1	49		23.6	
		25	0		23.2	
		25	12		23.2	
		25	24		23.3	
		50	0		23.2	
	16QAM	1	0		**23.0**	
		1	24		**23.0**	
		1	49		23.0	
		25	0		22.2	
		25	12		22.2	
		25	24		22.2	
		50	0		22.2	

8.3.6. LTE BAND 26 (FCC Part 22)

Test Engineer ID:	39005	Test Date:	12/9/2022

OUTPUT POWER FOR LTE BAND 26 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26797	26915	27033
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	24.3	24.3	**24.4**
		1	2	24.3	24.2	**24.4**
		1	5	24.3	24.3	**24.4**
		3	0	24.2	24.2	24.3
		3	1	24.2	24.2	24.3
		3	2	24.1	24.2	24.3
		6	0	23.1	23.1	23.3
	16QAM	1	0	23.0	23.0	23.3
		1	2	23.0	23.0	23.3
		1	5	23.0	23.0	23.3
		3	0	23.1	23.1	**23.3**
		3	1	23.1	23.2	23.3
		3	2	23.1	23.2	23.3
		6	0	22.1	22.1	22.3

OUTPUT POWER FOR LTE BAND 26 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26805	26915	27025
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	24.2	24.2	**24.4**
		1	7	24.2	24.3	24.4
		1	14	24.2	24.3	24.3
		8	0	23.3	23.1	23.3
		8	4	23.3	23.1	23.3
		8	7	23.2	23.1	23.3
		15	0	23.3	23.2	23.3
	16QAM	1	0	**23.4**	23.3	23.4
		1	7	23.4	23.2	23.4
		1	14	23.4	23.0	23.3
		8	0	22.4	22.2	22.3
		8	4	22.4	22.2	22.3
		8	7	22.4	22.2	22.3
		15	0	22.3	22.2	22.3

OUTPUT POWER FOR LTE BAND 26 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26815	26915	27015
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	24.4	24.3	**24.4**
		1	12	24.3	24.3	24.3
		1	24	24.3	24.3	24.3
		12	0	23.4	23.3	23.3
		12	6	23.3	23.3	23.3
		12	11	23.2	23.2	23.3
		25	0	23.3	23.3	23.3
	16QAM	1	0	23.3	23.2	**23.3**
		1	12	23.3	23.2	23.3
		1	24	23.0	23.0	23.3
		12	0	22.3	22.3	22.4
		12	6	22.2	22.2	22.4
		12	11	22.2	22.2	22.4
		25	0	22.3	22.2	22.3

OUTPUT POWER FOR LTE BAND 26 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26840	26915	26990
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	24.3	**24.4**	24.3
		1	24	24.3	24.3	24.3
		1	49	24.3	24.3	24.2
		25	0	23.3	23.3	23.3
		25	12	23.3	23.4	23.3
		25	24	23.3	23.3	23.2
		50	0	23.3	23.3	23.3
	16QAM	1	0	23.1	23.2	**23.3**
		1	24	23.2	23.2	23.2
		1	49	23.1	23.2	23.1
		25	0	22.3	22.3	22.3
		25	12	22.2	22.3	22.3
		25	24	22.3	22.3	22.3
		50	0	22.3	22.2	22.2

OUTPUT POWER FOR LTE BAND 26 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				26865	26915	26965
				831.5 MHz	836.5 MHz	841.5 MHz
15.0	QPSK	1	0	24.1	24.1	24.0
		1	37	**24.2**	24.1	24.0
		1	74	23.5	23.4	23.4
		36	0	23.2	23.2	23.0
		36	16	23.2	23.2	23.1
		36	35	23.2	23.2	22.8
		75	0	23.2	23.1	22.7
	16QAM	1	0	23.1	23.0	23.0
		1	37	23.0	23.0	**23.3**
		1	74	23.0	23.0	21.9
		36	0	22.2	22.3	22.0
		36	16	22.2	22.3	22.3
		36	35	22.2	22.2	22.0
		75	0	22.2	22.2	22.0

8.3.7. LTE BAND 41

Test Engineer ID:	39005	Test Date:	12/12/2022

OUTPUT POWER FOR LTE BAND 41 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39675	40620	41565
				2498.5 MHz	2593.0 MHz	2687.5 MHz
5.0	QPSK	1	0	23.5	23.4	**23.6**
		1	12	23.5	23.4	23.5
		1	24	23.5	23.3	23.6
		12	0	22.5	22.4	22.6
		12	6	22.5	22.4	22.6
		12	11	22.5	22.4	22.6
		25	0	22.4	22.4	22.5
	16QAM	1	0	**22.5**	22.2	22.4
		1	12	22.4	22.3	22.4
		1	24	22.4	22.3	22.4
		12	0	21.4	21.3	21.5
		12	6	21.4	21.3	21.5
		12	11	21.4	21.3	21.6
		25	0	21.5	21.4	21.6

OUTPUT POWER FOR LTE BAND 41 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39700	40620	41540
				2501.0 MHz	2593.0 MHz	2685.0 MHz
10.0	QPSK	1	0	23.5	23.4	**23.5**
		1	24	23.5	23.4	23.5
		1	49	23.5	23.4	23.5
		25	0	22.5	22.4	22.4
		25	12	22.5	22.4	22.5
		25	24	22.5	22.4	22.5
		50	0	22.5	22.4	22.5
	16QAM	1	0	22.4	22.3	**22.4**
		1	24	22.4	22.2	**22.4**
		1	49	22.4	22.2	**22.4**
		25	0	21.5	21.5	21.5
		25	12	21.5	21.4	21.5
		25	24	21.5	21.4	21.5
		50	0	21.6	21.4	21.5

OUTPUT POWER FOR LTE BAND 41 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39725	40620	41515
				2503.5 MHz	2593.0 MHz	2682.5 MHz
15.0	QPSK	1	0	23.5	**23.5**	23.5
		1	37	23.5	23.5	23.5
		1	74	23.5	23.4	23.5
		36	0	22.6	22.5	22.7
		36	16	22.6	22.5	22.6
		36	35	22.6	22.4	22.6
		75	0	22.6	22.5	22.7
	16QAM	1	0	22.3	22.1	22.3
		1	37	22.3	21.9	22.3
		1	74	**22.3**	22.1	22.2
		36	0	21.6	21.4	21.6
		36	16	21.6	21.4	21.6
		36	35	21.6	21.4	21.6
		75	0	21.4	21.4	21.7

OUTPUT POWER FOR LTE BAND 41 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39750	40620	41490
				2506.0 MHz	2593.0 MHz	2680.0 MHz
20.0	QPSK	1	0	23.7	23.4	**23.7**
		1	49	23.6	23.4	23.7
		1	99	23.5	23.3	23.6
		50	0	22.6	22.4	22.6
		50	24	22.6	22.4	22.6
		50	49	22.6	22.4	22.6
		100	0	22.6	22.4	22.6
	16QAM	1	0	22.6	22.4	22.4
		1	49	22.5	22.3	**22.6**
		1	99	22.4	21.8	22.5
		50	0	21.6	21.4	21.6
		50	24	21.6	21.4	21.6
		50	49	21.6	21.4	21.6
		100	0	21.5	21.4	21.6

8.3.8. LTE BAND 66

Test Engineer ID:	38515	Test Date:	12/5/2022

OUTPUT POWER FOR LTE BAND 66 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				131979	132322	132665
				1710.7 MHz	1745.0 MHz	1779.3 MHz
1.4	QPSK	1	0	24.0	24.0	24.2
		1	2	24.0	24.0	24.2
		1	5	24.1	24.0	**24.3**
		3	0	24.0	24.0	24.1
		3	1	24.0	24.0	24.1
		3	2	24.0	24.0	24.2
		6	0	23.0	23.0	23.2
	16QAM	1	0	22.7	23.0	23.0
		1	2	22.7	23.0	23.0
		1	5	22.7	23.1	23.1
		3	0	23.1	23.1	23.1
		3	1	23.1	23.1	**23.1**
		3	2	23.1	23.1	**23.1**
		6	0	21.8	21.9	22.0

OUTPUT POWER FOR LTE BAND 66 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				131987	132322	132657
				1711.5 MHz	1745.0 MHz	1778.5 MHz
3.0	QPSK	1	0	24.0	24.1	24.2
		1	7	24.0	24.1	24.2
		1	14	24.0	24.2	**24.2**
		8	0	23.0	23.0	23.1
		8	4	23.0	23.0	23.1
		8	7	22.9	23.0	23.1
		15	0	23.0	23.1	23.1
	16QAM	1	0	22.9	22.8	23.0
		1	7	22.9	22.8	23.0
		1	14	22.9	22.8	**23.0**
		8	0	21.9	21.9	22.1
		8	4	21.8	21.9	22.1
		8	7	21.8	21.9	22.1
		15	0	21.9	22.0	22.1

OUTPUT POWER FOR LTE BAND 66 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				131997	132322	132647
				1712.5 MHz	1745.0 MHz	1777.5 MHz
5.0	QPSK	1	0	24.0	24.0	24.1
		1	12	23.9	23.9	24.1
		1	24	24.0	23.9	**24.2**
		12	0	23.0	23.1	23.1
		12	6	23.0	23.1	23.1
		12	11	23.0	23.1	23.1
		25	0	23.0	23.1	23.1
	16QAM	1	0	22.8	22.8	23.0
		1	12	22.7	22.8	22.9
		1	24	22.8	22.8	**23.0**
		12	0	21.9	21.9	22.0
		12	6	21.9	21.9	22.0
		12	11	21.9	21.9	22.0
		25	0	21.8	22.0	22.0

OUTPUT POWER FOR LTE BAND 66 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				132022	132322	132622
				1715.0 MHz	1745.0 MHz	1775.0 MHz
10.0	QPSK	1	0	24.0	24.1	24.3
		1	24	24.0	24.1	24.3
		1	49	24.0	24.1	**24.3**
		25	0	23.0	23.0	23.1
		25	12	23.0	23.1	23.1
		25	24	23.0	23.0	23.1
		50	0	23.0	23.0	23.1
	16QAM	1	0	22.6	22.7	23.0
		1	24	22.6	22.7	23.0
		1	49	22.6	22.7	**23.0**
		25	0	21.9	21.9	22.0
		25	12	21.9	21.9	22.1
		25	24	21.9	21.9	22.1
		50	0	21.9	21.9	22.1

OUTPUT POWER FOR LTE BAND 66 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				132047	132322	132597
				1717.5 MHz	1745.0 MHz	1772.5 MHz
15.0	QPSK	1	0	24.0	24.1	24.1
		1	37	24.0	24.1	24.1
		1	74	24.0	24.1	**24.2**
		36	0	23.0	23.1	23.2
		36	16	23.0	23.1	23.2
		36	35	23.0	23.1	23.2
		75	0	23.0	23.1	23.2
	16QAM	1	0	22.8	22.7	22.8
		1	37	22.8	22.7	22.8
		1	74	22.8	22.8	**22.9**
		36	0	21.8	21.9	22.0
		36	16	21.8	21.9	22.0
		36	35	21.8	21.9	22.0
		75	0	21.8	22.0	22.0

OUTPUT POWER FOR LTE BAND 66 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				132072	132322	132572
				1720.0 MHz	1745.0 MHz	1770.0 MHz
20.0	QPSK	1	0	24.0	24.2	24.2
		1	49	24.0	24.1	24.2
		1	99	24.0	24.2	**24.3**
		50	0	23.0	23.1	23.1
		50	24	23.0	23.1	23.1
		50	49	23.0	23.1	23.1
		100	0	22.9	23.1	23.1
	16QAM	1	0	22.7	22.9	22.9
		1	49	22.7	22.9	**23.0**
		1	99	22.8	22.9	22.9
		50	0	21.9	22.0	22.0
		50	24	21.8	22.0	22.0
		50	49	21.8	22.0	22.0
		100	0	21.9	22.0	22.0

9. CONDUCTED TEST RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

RESULTS

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested. Worst-case plots (highest bandwidth) are reported only.

GSM

Band	Modulation	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
850	GPRS	190	836.6	242.67	307.8
	EGPRS			251.64	327.0
1900	GPRS	661	1880.0	232.98	300.8
	EGPRS			239.51	308.1

WCDMA

Band	Modulation	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
BAND 5	REL 99	4408	836.6	4.1346	4.703
	HSDPA			4.1510	4.710
BAND 2	REL 99	9800	1880.0	4.1572	4.743
	HSDPA			4.1653	4.714
BAND 4	REL 99	1638	1732.6	4.1504	4.728
	HSDPA			4.1433	4.717

LTE BAND 2

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 2	1.4MHz, QPSK	6/0	1880.0	1.0881	1.319
	1.4MHz,16QAM			1.0927	1.289
	3MHz, QPSK	15/0		2.7021	3.060
	3MHz, 16QAM			2.7086	3.082
	5MHz, QPSK	25/0		4.5100	5.288
	5MHz, 16QAM			4.5096	5.324
	10MHz, QPSK	50/0		8.9845	10.33
	10MHz, 16QAM			8.9831	10.17
	15MHz, QPSK	75/0		13.478	15.05
	15MHz, 16QAM			13.442	15.09
	20MHz, QPSK	100/0		17.919	19.95
	20MHz, 16QAM			17.948	19.70

LTE BAND 5

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 5	1.4MHz, QPSK	6/0	836.5	1.0948	1.302
	1.4MHz,16QAM			1.0890	1.303
	3MHz, QPSK	15/0		2.7059	3.095
	3MHz, 16QAM			2.7031	3.062
	5MHz, QPSK	25/0		4.5081	5.212
	5MHz, 16QAM			4.5111	5.244
	10MHz, QPSK	50/0		8.9918	10.18
	10MHz, 16QAM			8.9777	10.23

LTE BAND 12

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 12	1.4 MHz, QPSK	6/0	707.5	1.0848	1.288
	1.4 MHz,16QAM			1.0920	1.347
	3 MHz, QPSK	15/0		2.7009	3.063
	3 MHz, 16QAM			2.7081	3.128
	5 MHz, QPSK	25/0		4.5244	5.349
	5 MHz, 16QAM			4.5182	5.269
	10 MHz, QPSK	50/0		9.0028	10.38
	10 MHz, 16QAM			8.9965	10.16

LTE BAND 13

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 13	5 MHz, QPSK	25/0	782.0	4.5107	5.367
	5 MHz, 16QAM			4.5209	5.397
	10 MHz, QPSK	50/0		9.0014	10.57
	10 MHz, 16QAM			8.9777	10.27

LTE BAND 26(FCC PART 90S)

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 26	1.4 MHz, QPSK	6/0	819.0	1.0899	1.304
	1.4 MHz,16QAM			1.0943	1.378
	3 MHz, QPSK	15/0		2.7023	3.114
	3 MHz, 16QAM			2.7103	3.135
	5 MHz, QPSK	25/0		4.5115	5.275
	5 MHz, 16QAM			4.5108	5.321
	10 MHz, QPSK	50/0		9.0058	10.23
	10 MHz, 16QAM			8.9794	10.10
	15 MHz, QPSK	75/0	821.5	13.300	14.25
	15 MHz, 16QAM			13.358	14.12

LTE BAND 26 (FCC PART 22)

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 26	1.4 MHz, QPSK	6/0	836.5	1.0869	1.319
	1.4 MHz,16QAM			1.0936	1.347
	3 MHz, QPSK	15/0		2.7044	3.089
	3 MHz, 16QAM			2.7111	3.090
	5 MHz, QPSK	25/0		4.5099	5.277
	5 MHz, 16QAM			4.5067	5.404
	10 MHz, QPSK	50/0		9.0110	10.28
	10 MHz, 16QAM			8.9887	10.22
	15 MHz, QPSK	75/0		13.324	14.76
	15 MHz, 16QAM			13.455	15.20

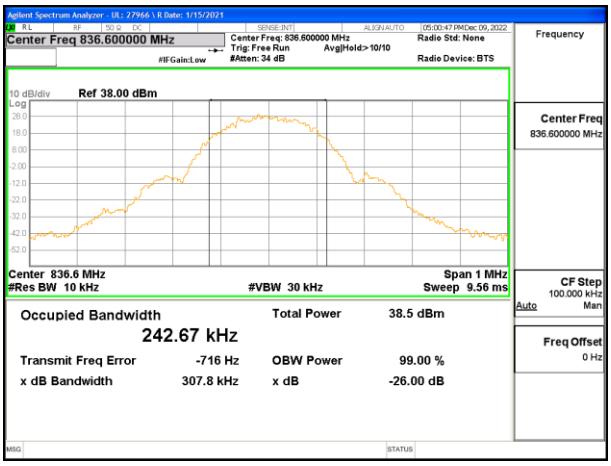
LTE BAND 41

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 41	5MHz, QPSK	25/0	2593.0	4.5118	5.328
	5MHz, 16QAM			4.5019	5.234
	10MHz, QPSK	50/0		8.9621	10.15
	10MHz, 16QAM			9.0116	10.16
	15MHz, QPSK	75/0		13.425	14.91
	15MHz, 16QAM			13.457	15.13
	20MHz, QPSK	100/0		17.918	19.54
	20MHz, 16QAM			17.942	19.90

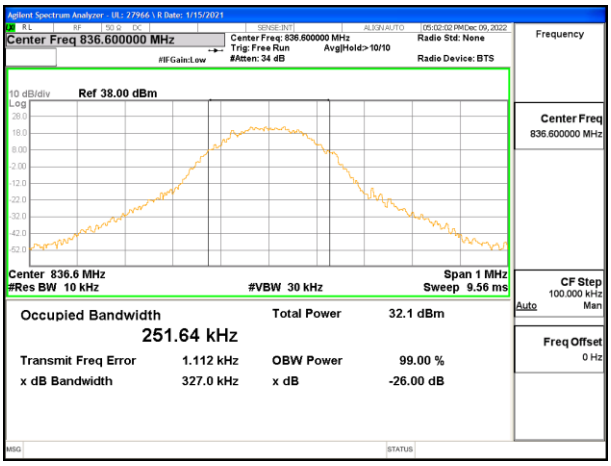
LTE BAND 66

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 66	1.4MHz, QPSK	6/0	1745.0	1.0857	1.304
	1.4MHz,16QAM			1.0893	1.316
	3MHz, QPSK	15/0		2.7023	3.072
	3MHz, 16QAM			2.7060	3.089
	5MHz, QPSK	25/0		4.5042	5.297
	5MHz, 16QAM			4.4975	5.323
	10MHz, QPSK	50/0		8.9782	10.29
	10MHz, 16QAM			8.9891	10.17
	15MHz, QPSK	75/0		13.455	15.19
	15MHz, 16QAM			13.460	15.05
	20MHz, QPSK	100/0		17.922	19.72
	20MHz, 16QAM			17.917	19.62

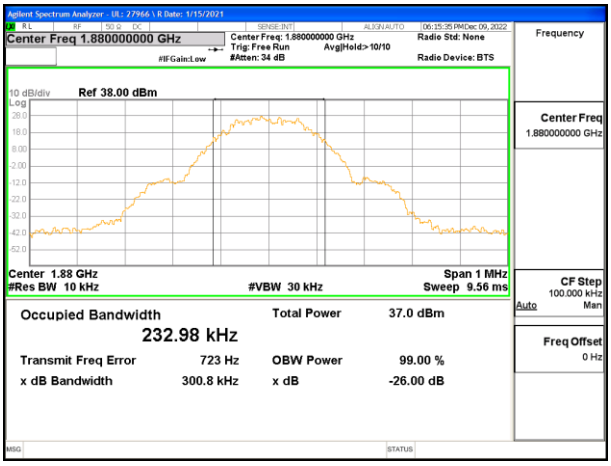
9.1.1. GSM



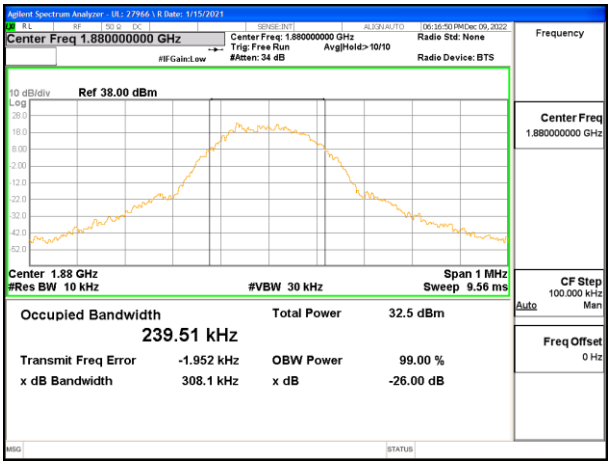
GSM 850 GPRS Middle Channel



GSM 850 EGPRS Middle Channel

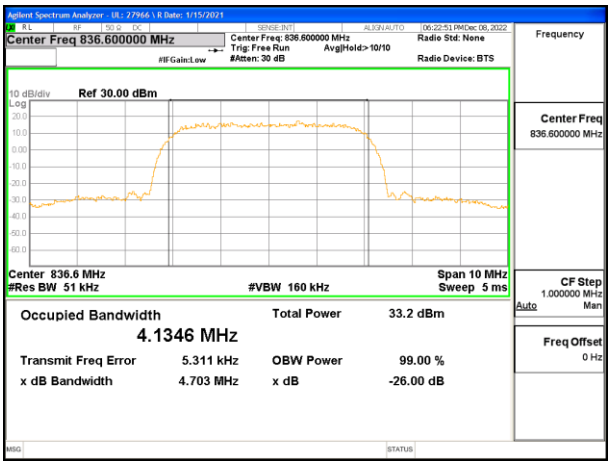


GSM 1900 GPRS Middle Channel

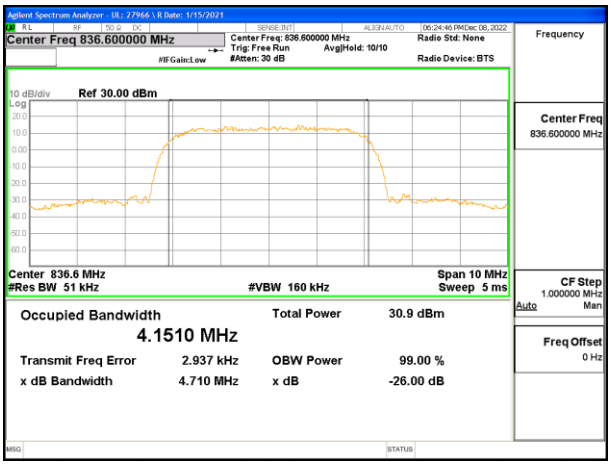


GSM 1900 EGPRS Middle Channel

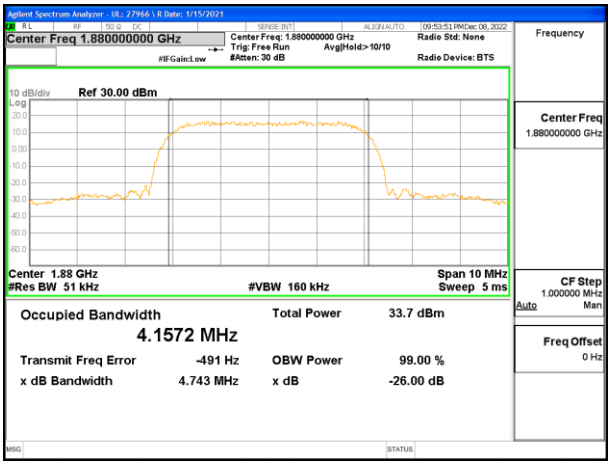
9.1.2. WCDMA



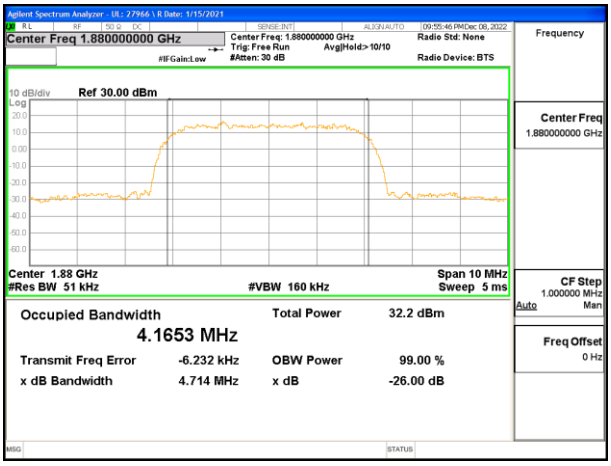
WCDMA Band 5 Rel 99 Middle Channel



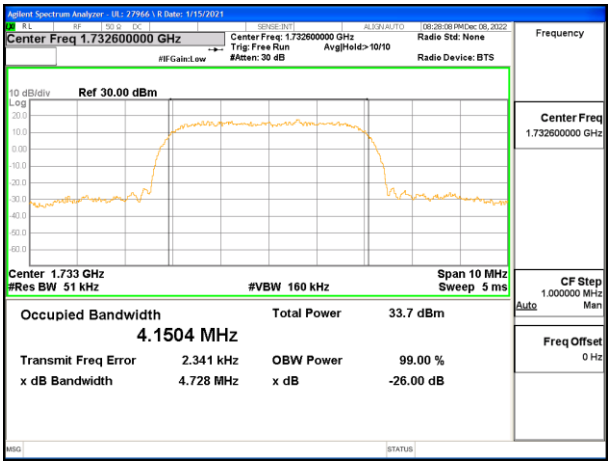
WCDMA Band 5 HSDPA Middle Channel



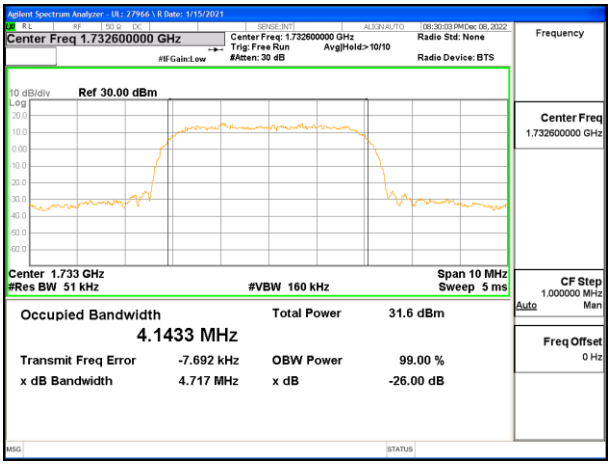
WCDMA Band 2 Rel 99 Middle Channel



WCDMA Band 2 HSDPA Middle Channel

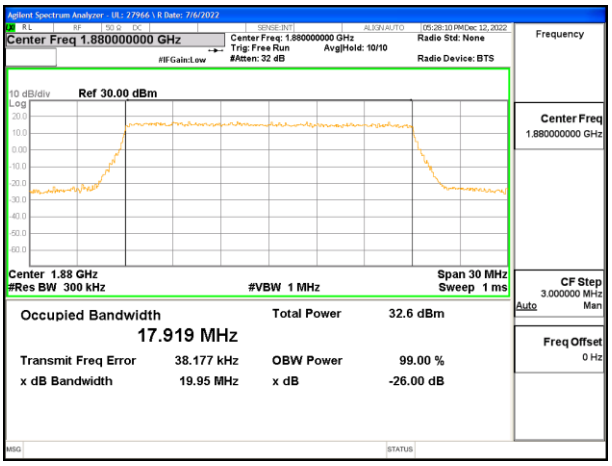


WCDMA Band 4 Rel 99 Middle Channel

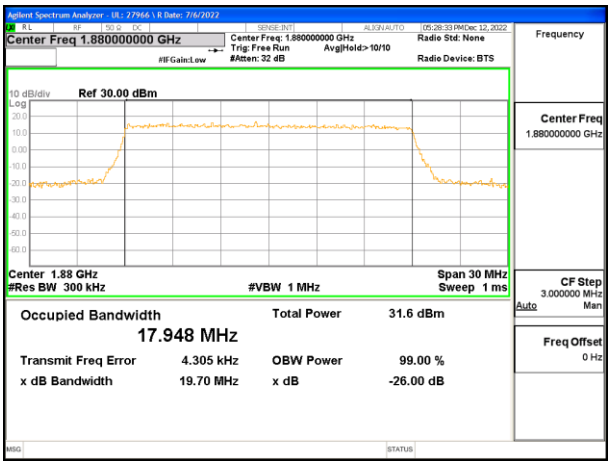


WCDMA Band 4 HSDPA Middle Channel

9.1.3. LTE BAND 2

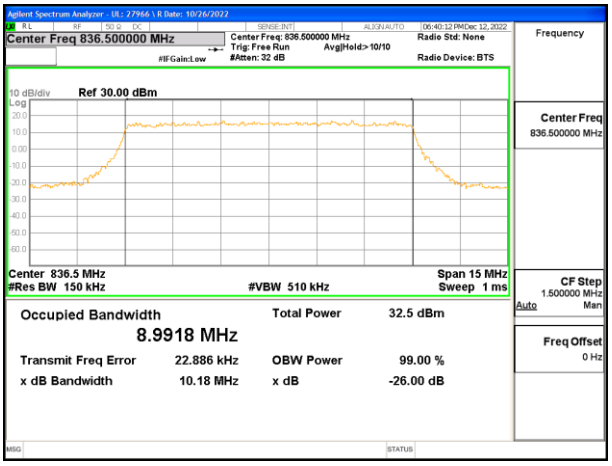


LTE B2 20MHz QPSK Middle Channel RB100-0

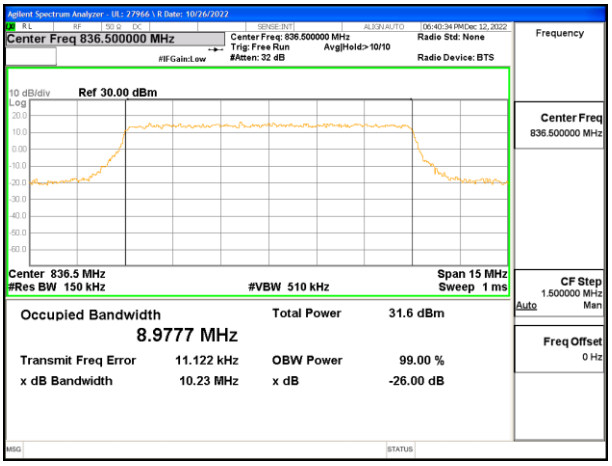


LTE B2 20MHz 16QAM Middle Channel RB100-0

9.1.4. LTE BAND 5

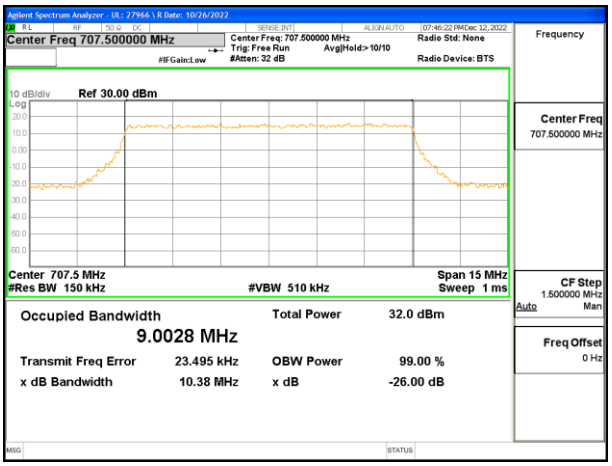


LTE B5 10MHz QPSK Middle Channel RB50-0

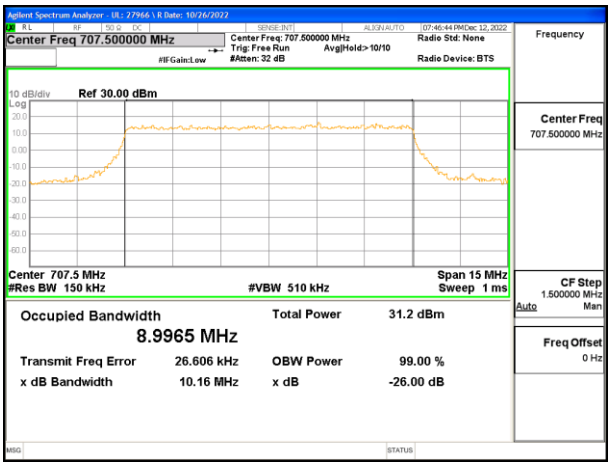


LTE B5 10MHz 16QAM Middle Channel RB50-0

9.1.5. LTE BAND 12

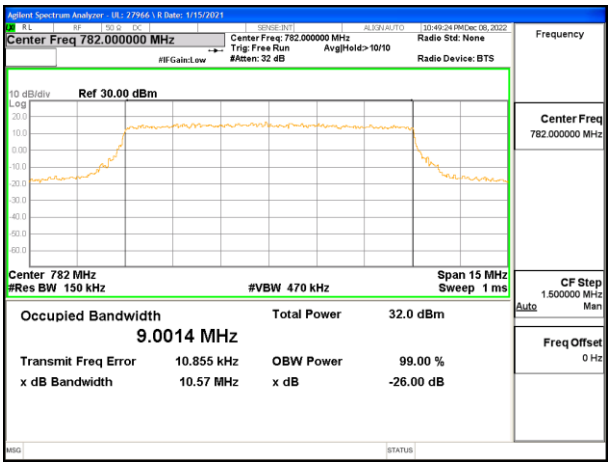


LTE B12 10MHz QPSK Middle Channel RB50-0

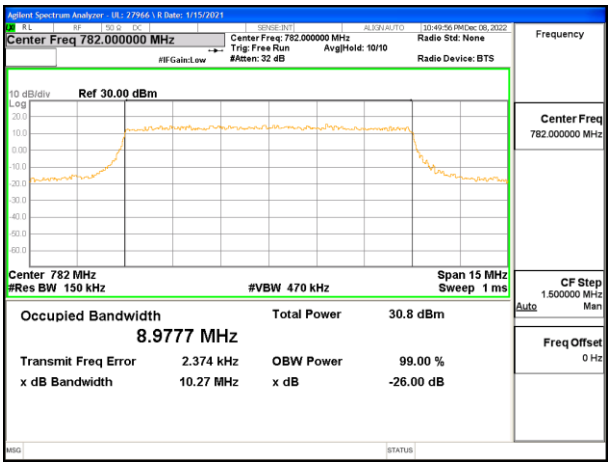


LTE B12 10MHz 16QAM Middle Channel RB50-0

9.1.6. LTE BAND 13

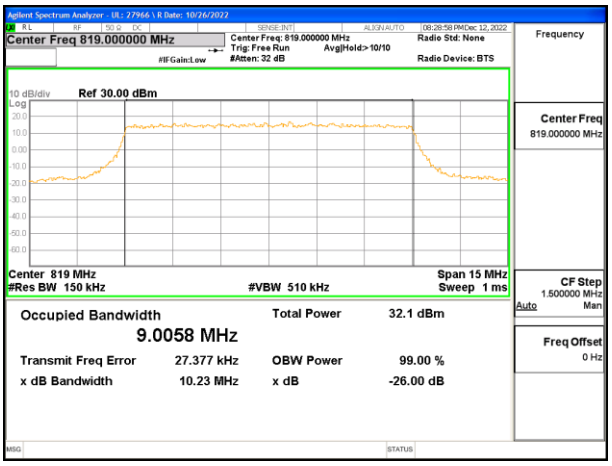


LTE B13 10MHz QPSK Middle Channel RB50-0

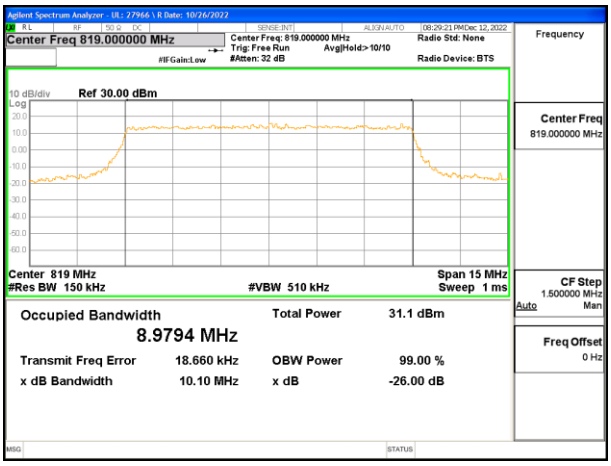


LTE B13 10MHz 16QAM Middle Channel RB50-0

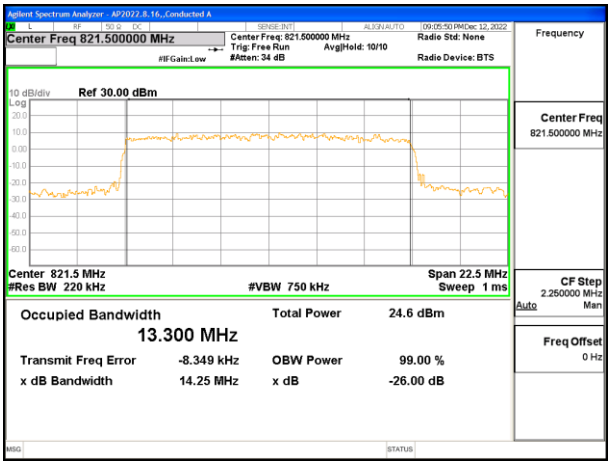
9.1.7. LTE BAND 26 (FCC PART 90S)



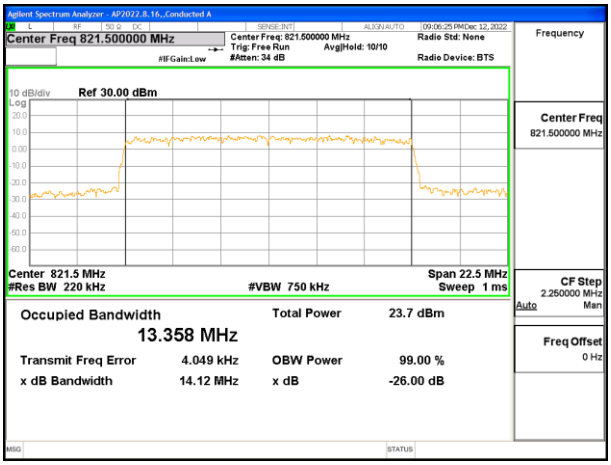
LTE B26 10MHz QPSK Middle Channel RB50-0



LTE B26 10MHz 16QAM Middle Channel RB50-0

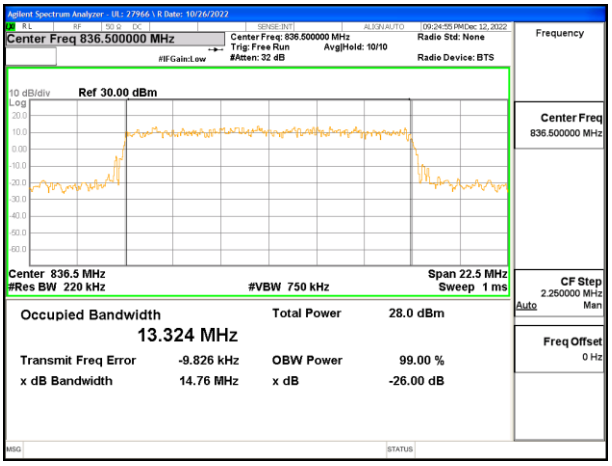


LTE B26 15MHz QPSK Middle Channel RB75-0

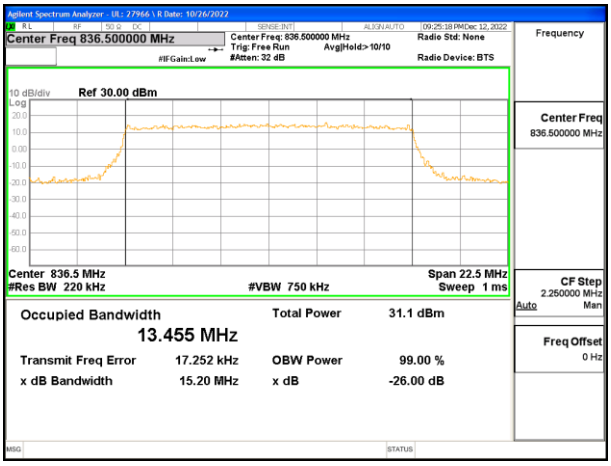


LTE B26 15MHz 16QAM Middle Channel RB75-0

9.1.8. LTE BAND 26 (FCC PART 22)

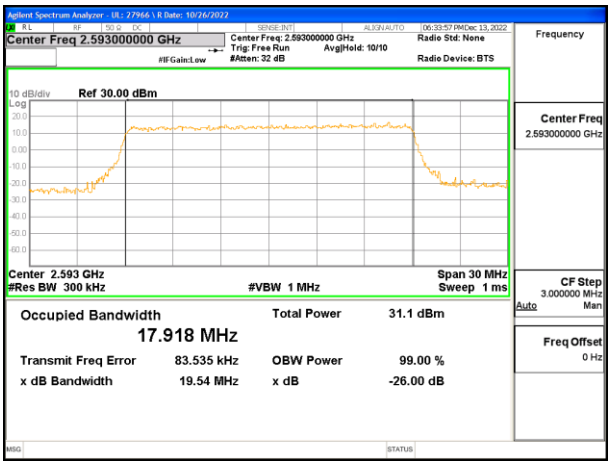


LTE B26 15MHz QPSK Middle Channel RB75-0

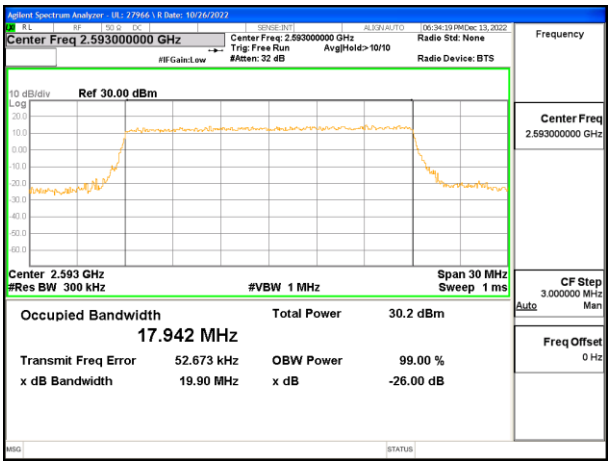


LTE B26 15MHz 16QAM Middle Channel RB75-0

9.1.9. LTE BAND 41

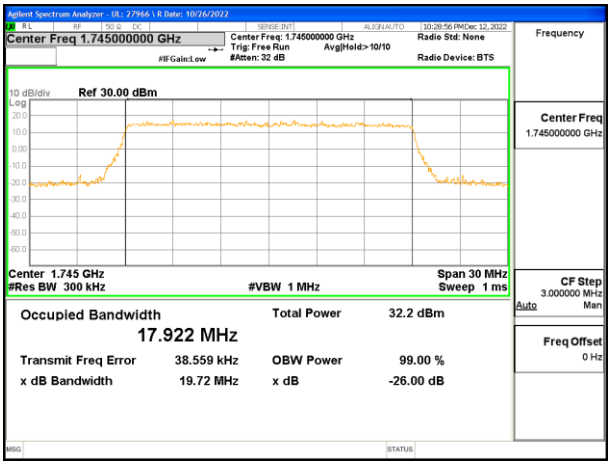


LTE B41 20MHz QPSK Middle Channel RB100-0

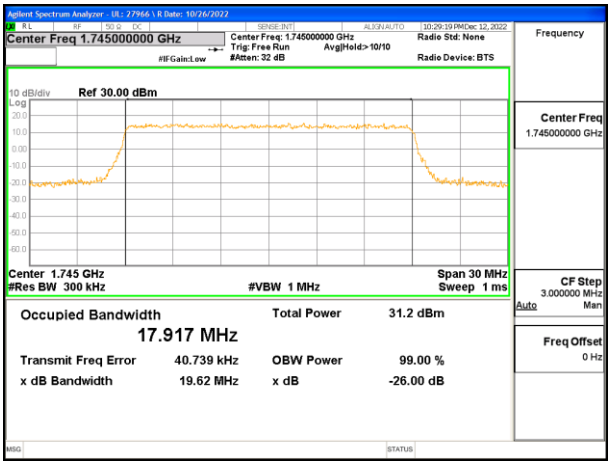


LTE B41 20MHz 16QAM Middle Channel RB100-0

9.1.10. LTE BAND 66



LTE B66 20MHz QPSK Middle Channel RB100-0



LTE B66 20MHz 16QAM Middle Channel RB100-0

9.2. BAND EDGE AND EMISSION MASK

For Spectrum Emission Mask plots, the Keysight PXA N9030A is configured to sweep with a moving integration window, the width of which can be adjusted to different sizes across the sweep. The window width is configured to be greater than or equal to the required reference bandwidth. The center frequencies of the integration window for the different integration windows was set such that the upper and lower edges of the windows are aligned with the transition points in the reference bandwidths. This is achieved by setting the start / stop frequencies of the window with an offset equal to the reference bandwidth / 2 from the transition point.

TEST PROCEDURE

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

1. Set the spectrum analyzer span to include the block edge frequency.
2. Set a marker to point the corresponding band edge frequency in each test case.
3. Set display line at -13 dBm
4. Set resolution bandwidth to at least 1% of emission bandwidth.

TEST PROCEDURE (FCC LTE BAND 41)

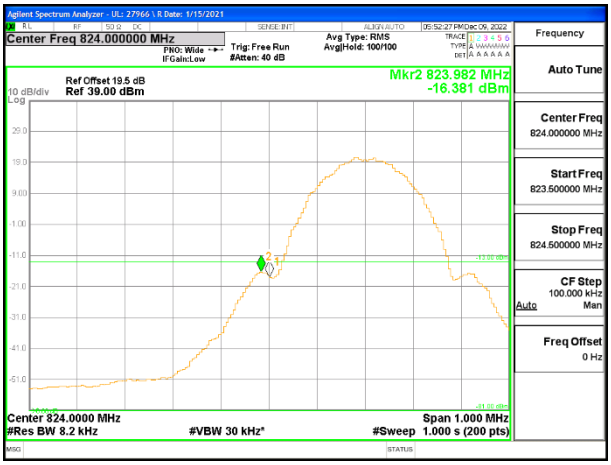
(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). 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. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

RESULTS

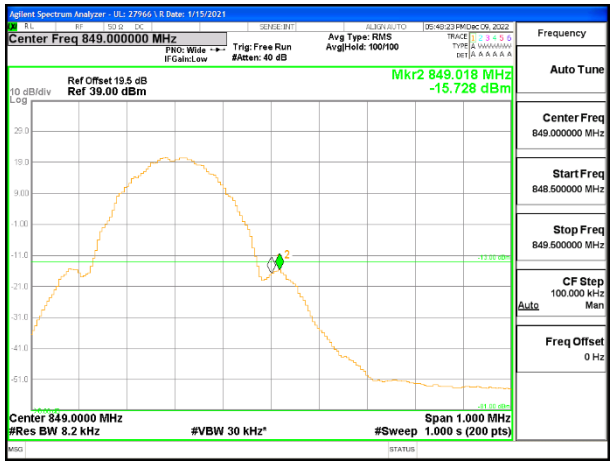
9.2.1. GSM 850

LIMITS

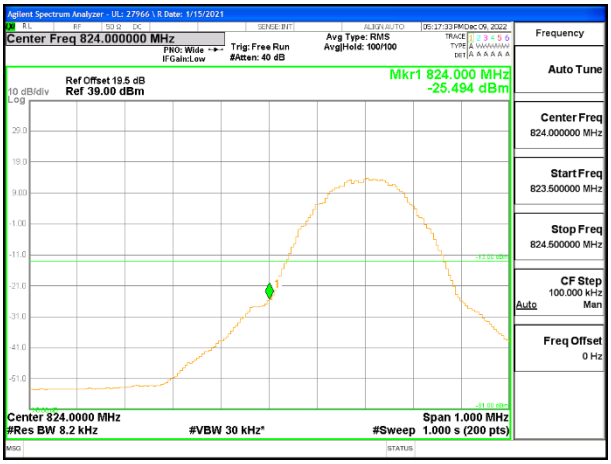
FCC: §22.917
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



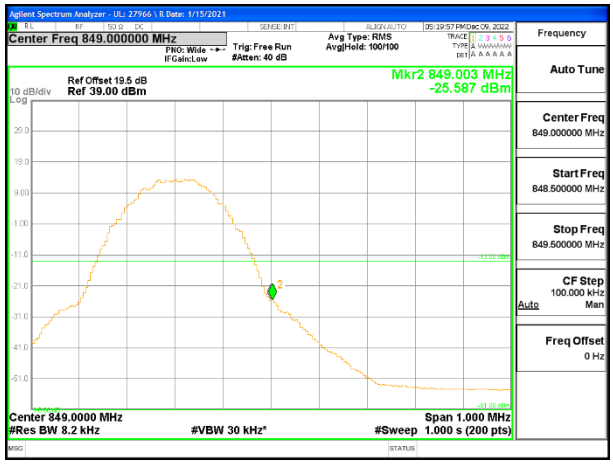
GSM 850 GPRS Low Channel



GSM 850 GPRS High Channel



GSM 850 EGPRS Low Channel

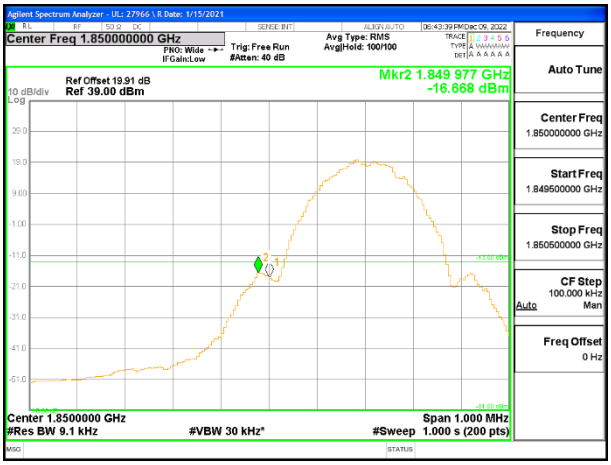


GSM 850 EGPRS High Channel

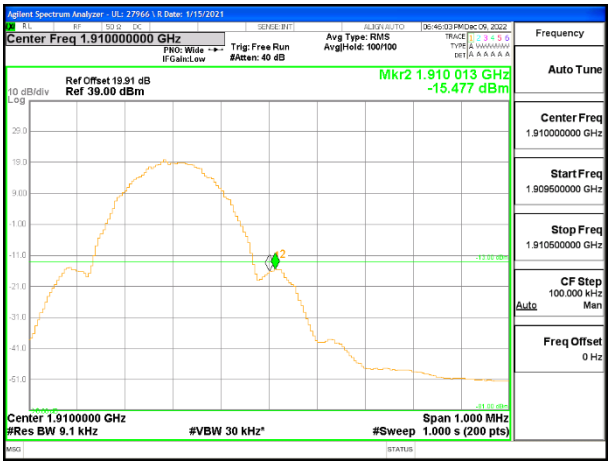
9.2.2. GSM 1900

LIMITS

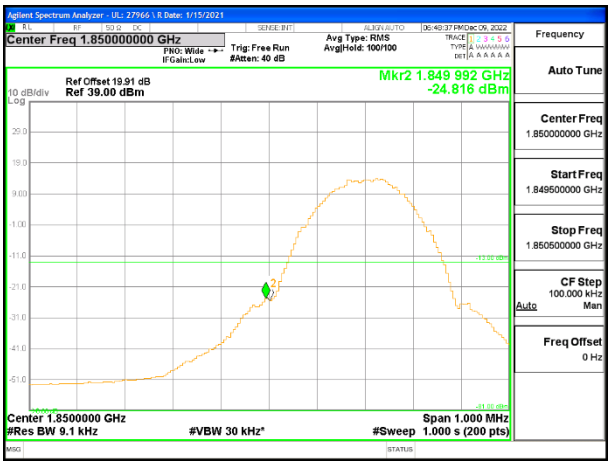
FCC: §24.238
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



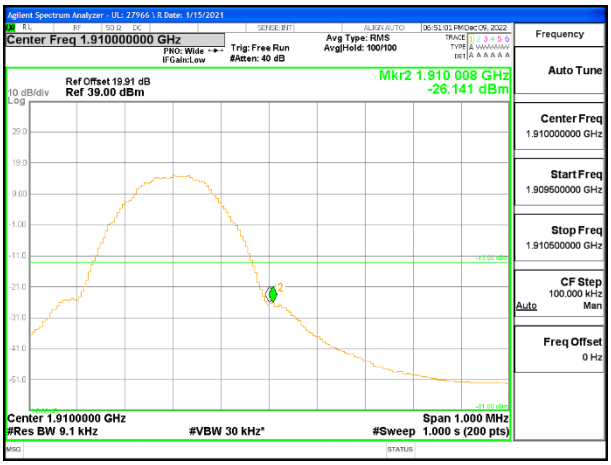
GSM 1900 GPRS Low Channel



GSM 1900 GPRS High Channel



GSM 1900 EGPRS Low Channel

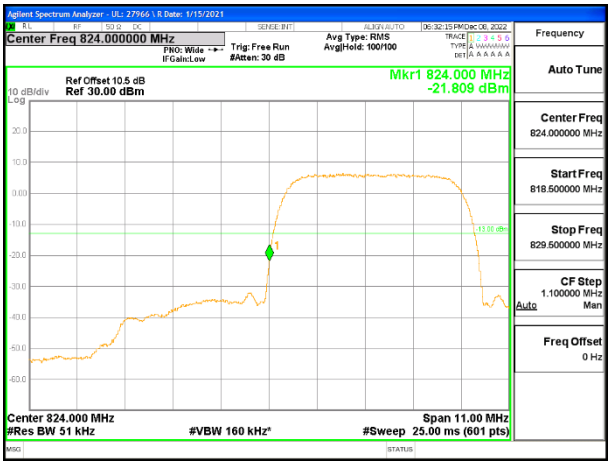


GSM 1900 EGPRS High Channel

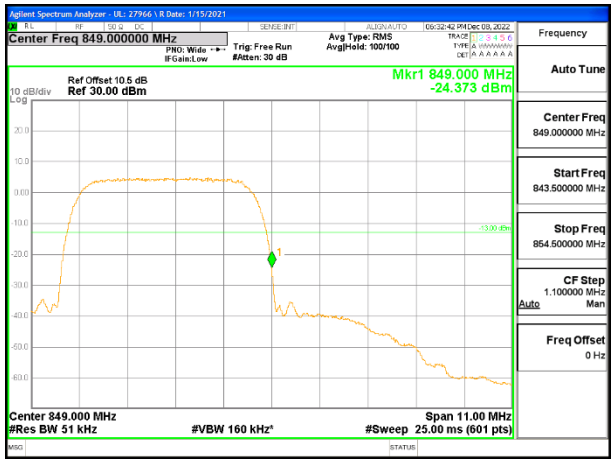
9.2.3. WCDMA BAND 5

LIMITS

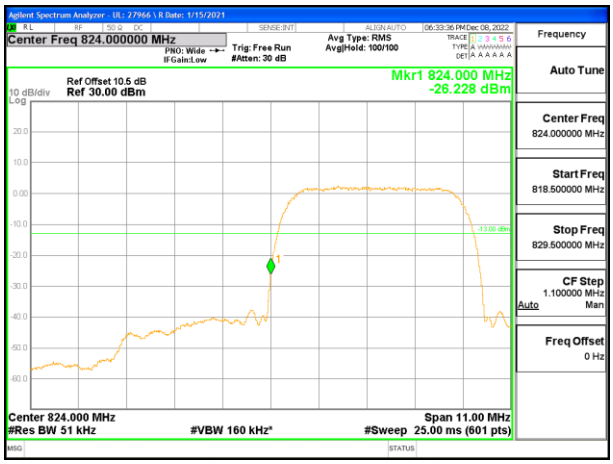
FCC: §22.917
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



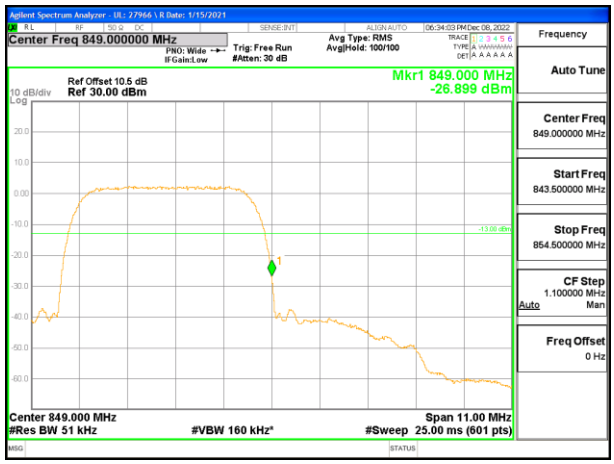
WCDMA Band 5 Rel 99 Low Channel



WCDMA Band 5 Rel 99 High Channel



WCDMA Band 5 HSDPA Low Channel

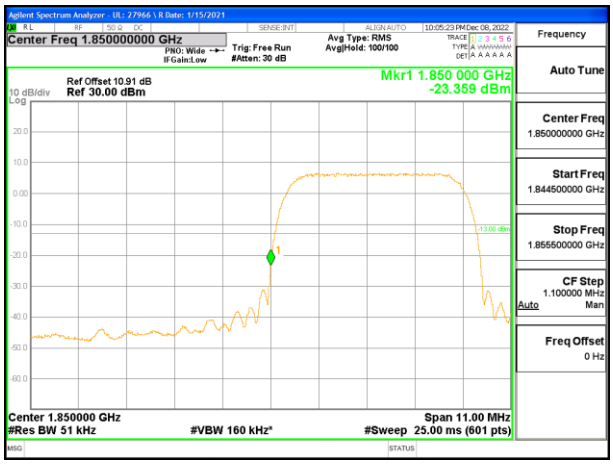


WCDMA Band 5 HSDPA High Channel

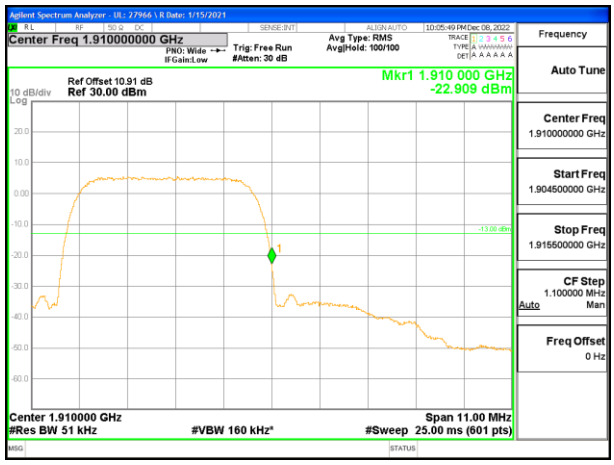
9.2.4. WCDMA BAND 2

LIMITS

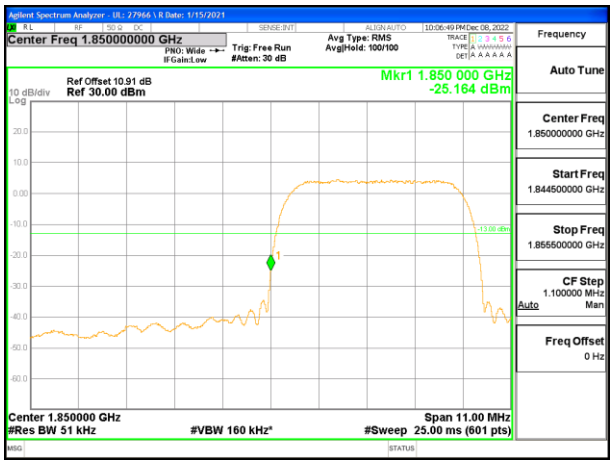
FCC: §24.238
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



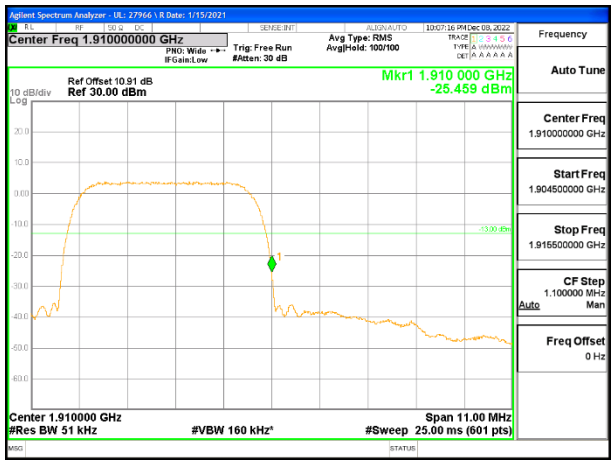
WCDMA Band 2 Rel 99 Low Channel



WCDMA Band 2 Rel 99 High Channel



WCDMA Band 2 HSDPA Low Channel

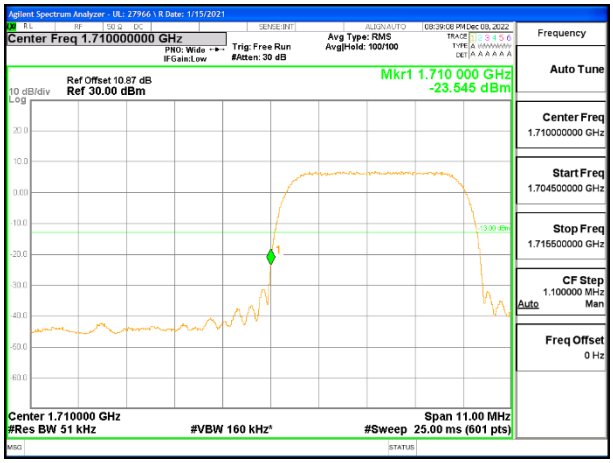


WCDMA Band 2 HSDPA High Channel

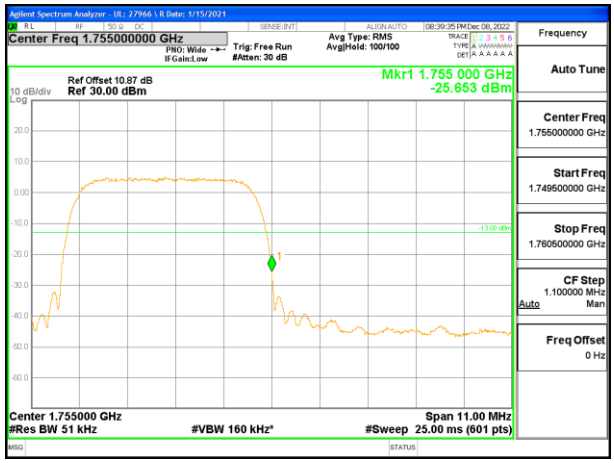
9.2.5. WCDMA BAND 4

LIMITS

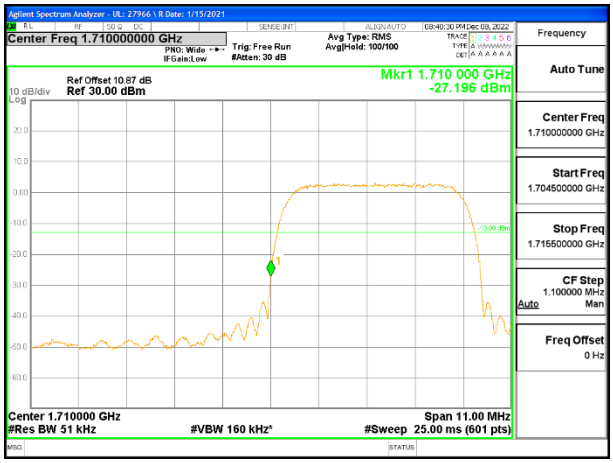
FCC: §27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



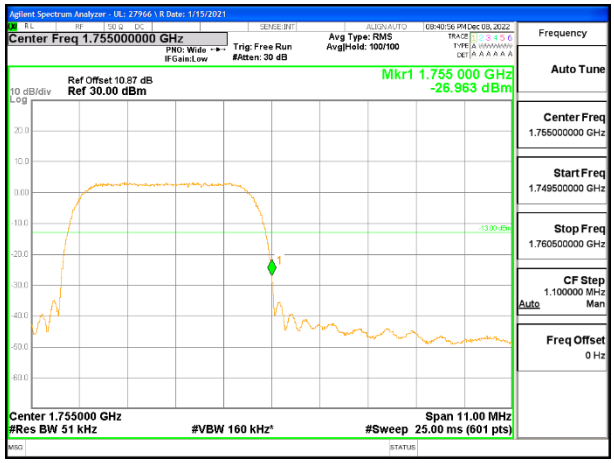
WCDMA Band 4 Rel 99 Low Channel



WCDMA Band 4 Rel 99 High Channel



WCDMA Band 4 HSDPA Low Channel

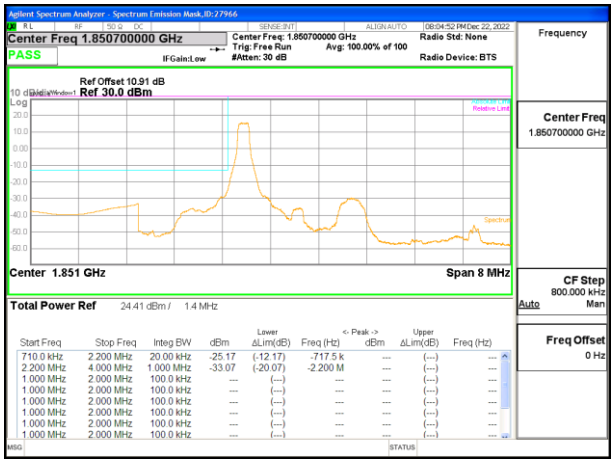


WCDMA Band 4 HSDPA High Channel

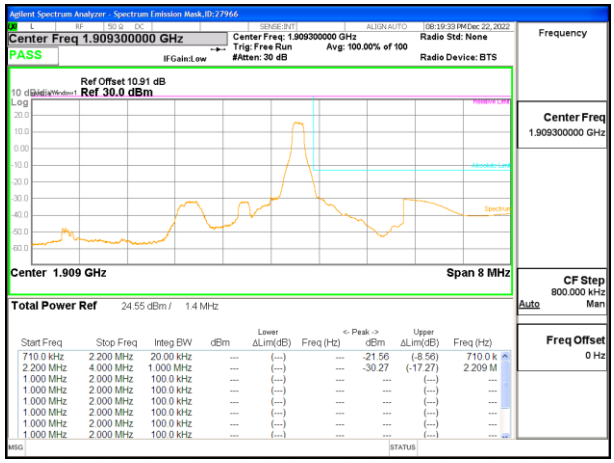
9.2.6. LTE BAND 2 BANDEDGE

LIMITS

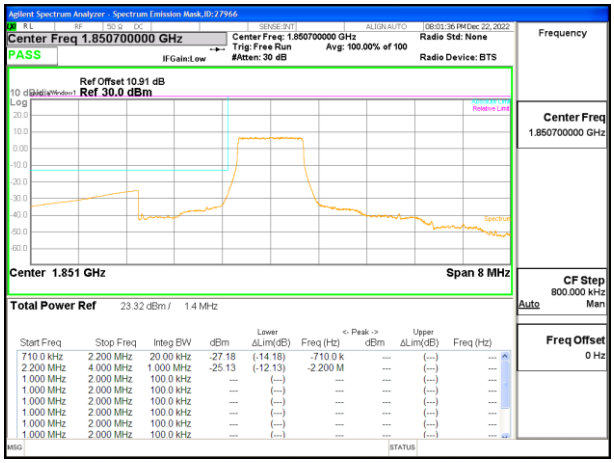
FCC: §24.238
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.



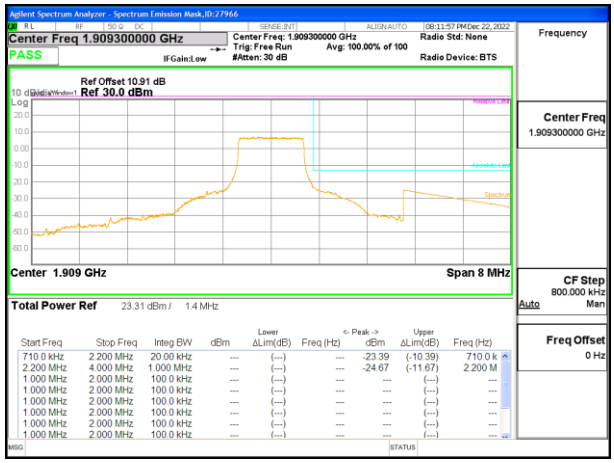
LTE B2 1.4MHz QPSK Low Channel RB1-0



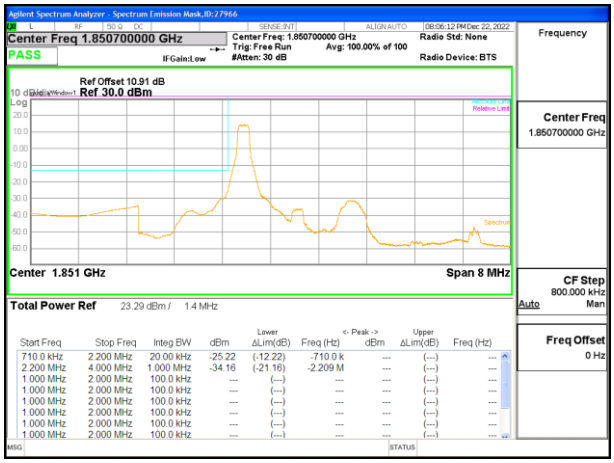
LTE B2 1.4MHz QPSK High Channel RB1-5



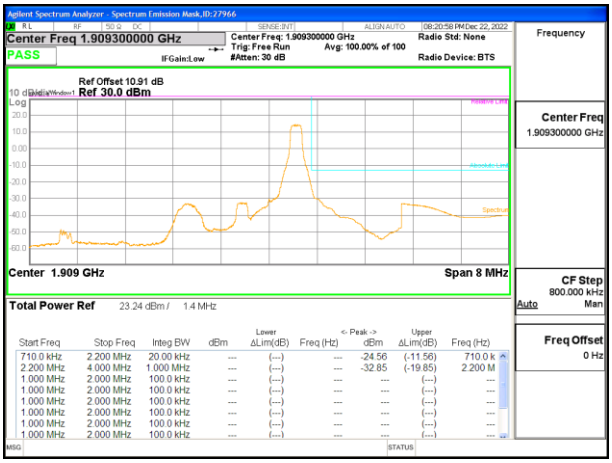
LTE B2 1.4MHz QPSK Low Channel RB6-0



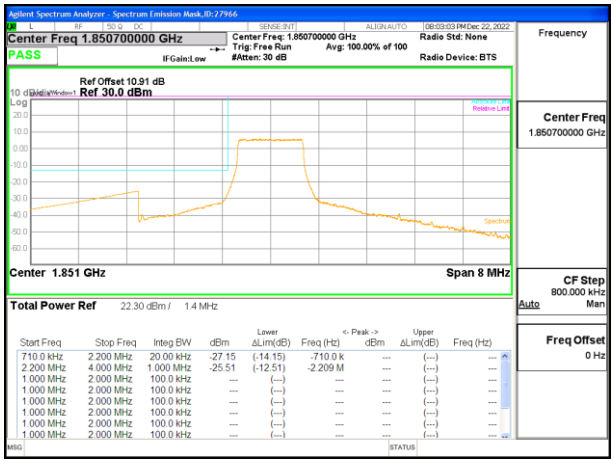
LTE B2 1.4MHz QPSK High Channel RB6-0



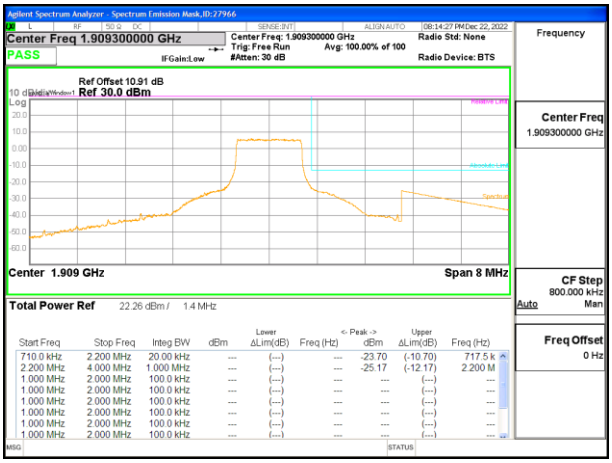
LTE B2 1.4MHz 16QAM Low Channel RB1-0



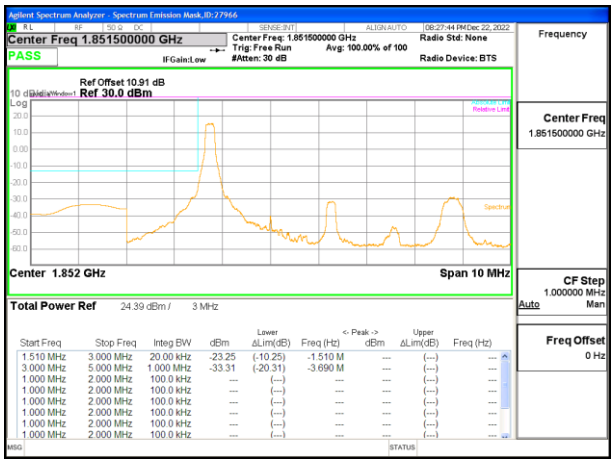
LTE B2 1.4MHz 16QAM High Channel RB1-5



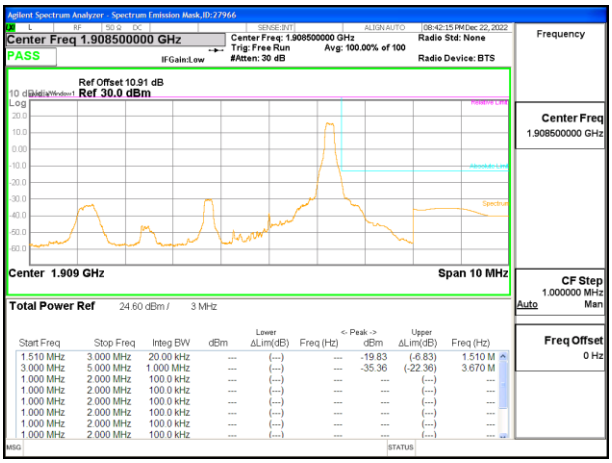
LTE B2 1.4MHz 16QAM Low Channel RB6-0



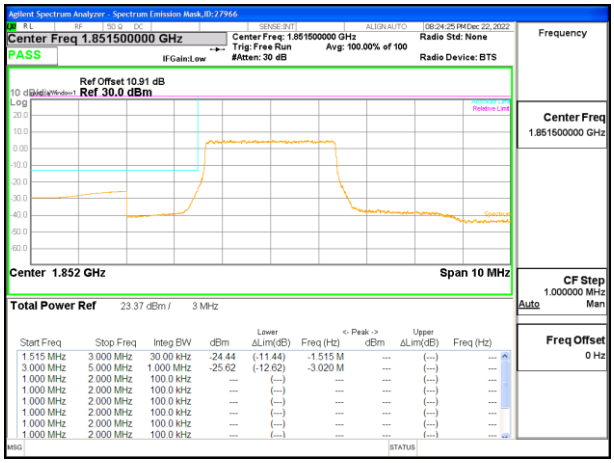
LTE B2 1.4MHz 16QAM High Channel RB6-0



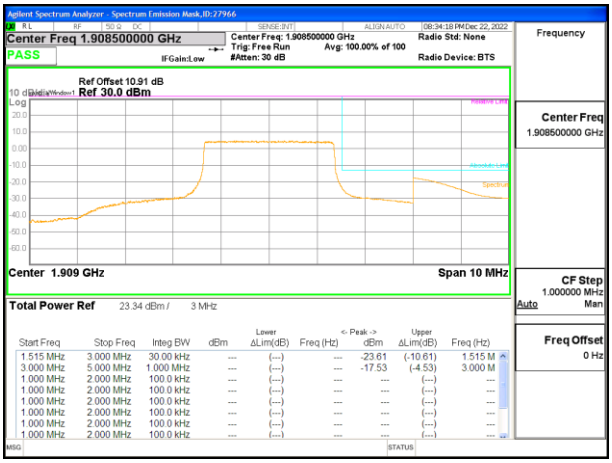
LTE B2 3MHz QPSK Low Channel RB1-0



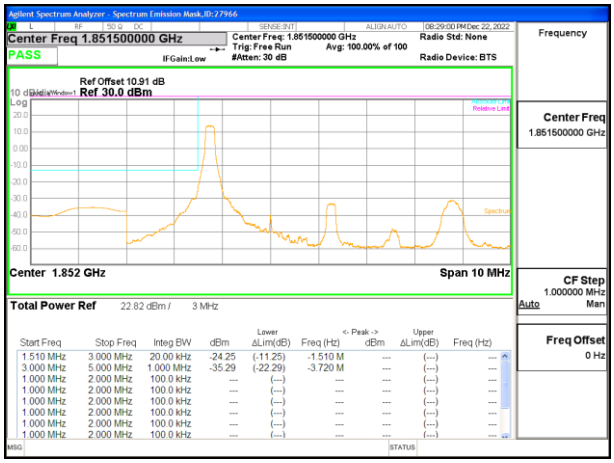
LTE B2 3MHz QPSK High Channel RB1-14



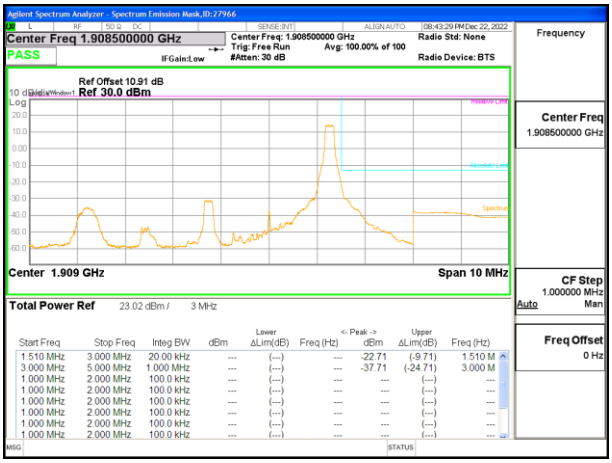
LTE B2 3MHz QPSK Low Channel RB15-0



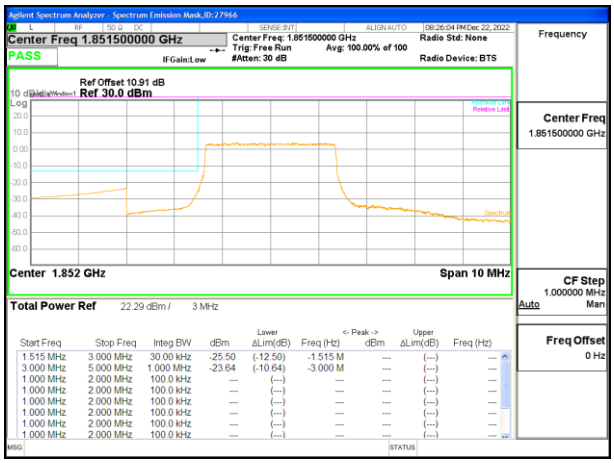
LTE B2 3MHz QPSK High Channel RB15-0



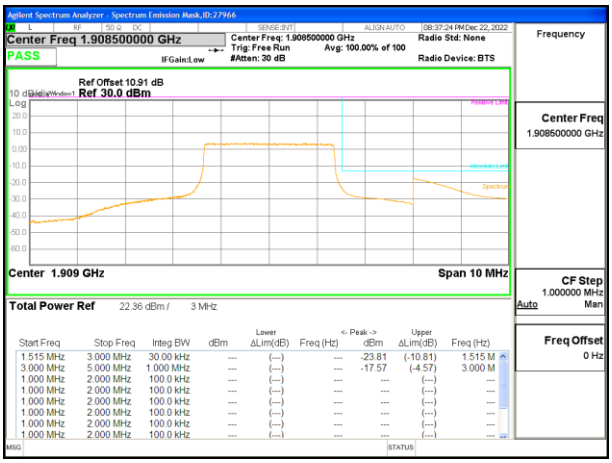
LTE B2 3MHz 16QAM Low Channel RB1-0



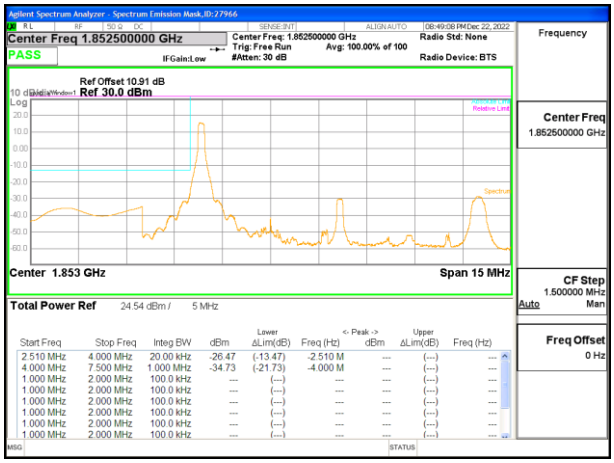
LTE B2 3MHz 16QAM High Channel RB1-14



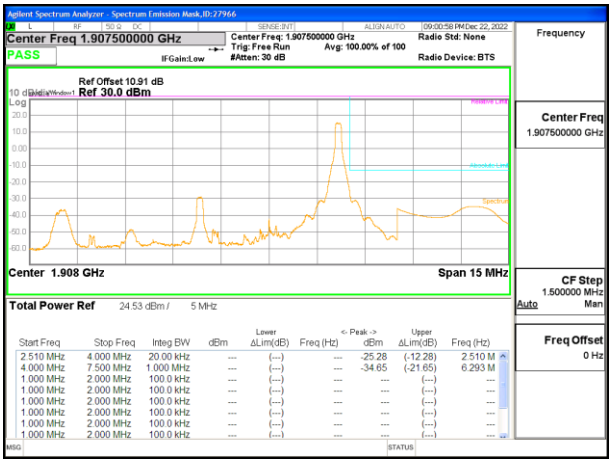
LTE B2 3MHz 16QAM Low Channel RB15-0



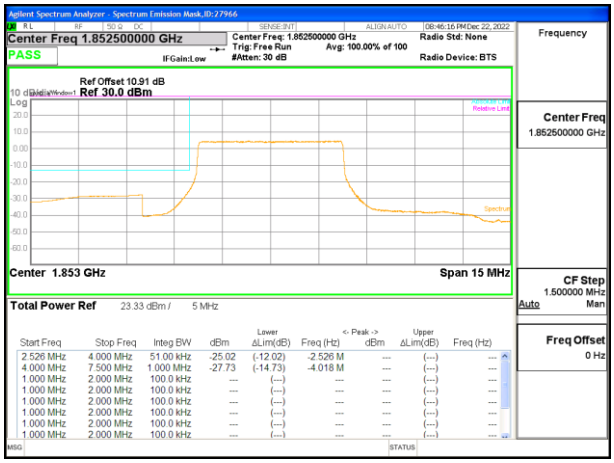
LTE B2 3MHz 16QAM High Channel RB15-0



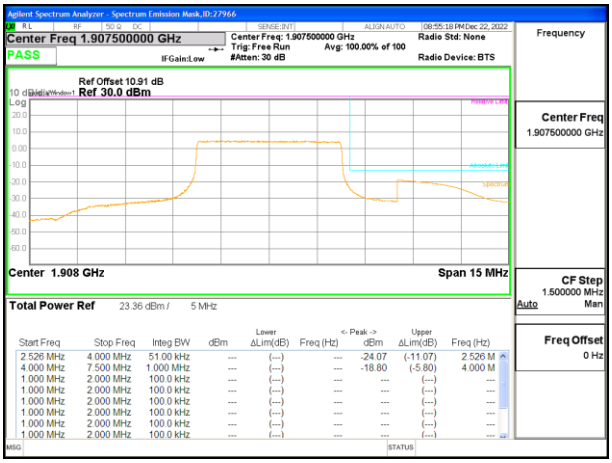
LTE B2 5MHz QPSK Low Channel RB1-0



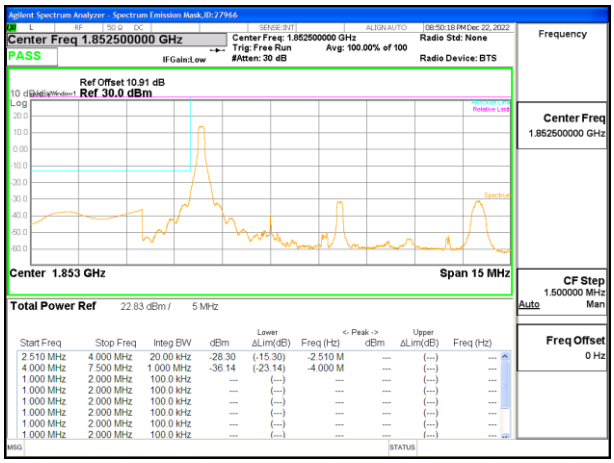
LTE B2 5MHz QPSK High Channel RB1-24



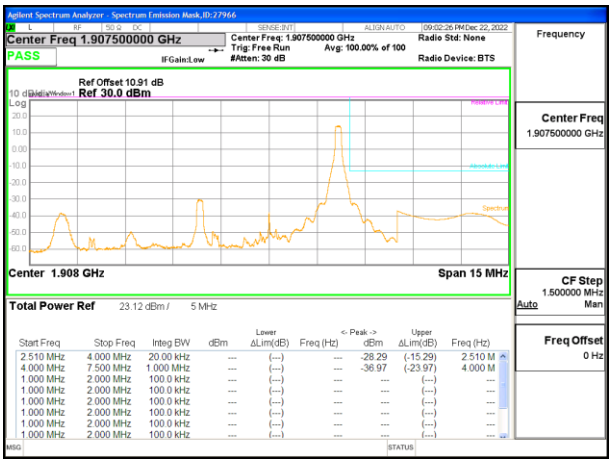
LTE B2 5MHz QPSK Low Channel RB25-0



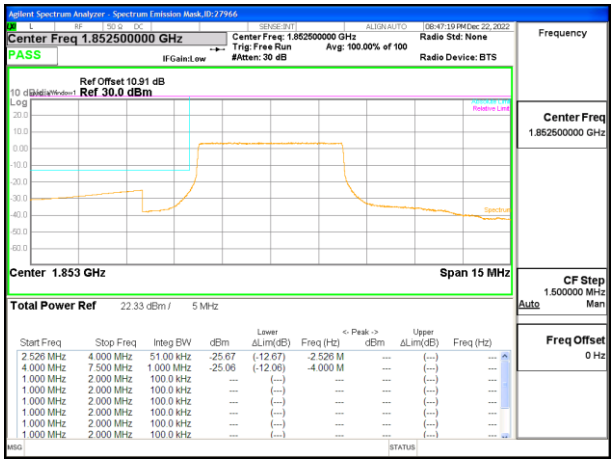
LTE B2 5MHz QPSK High Channel RB25-0



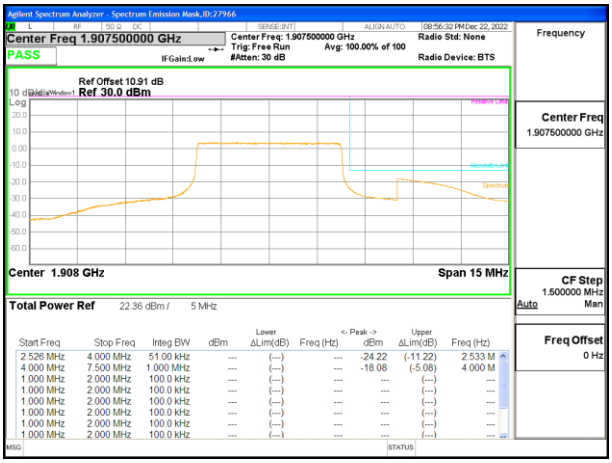
LTE B2 5MHz 16QAM Low Channel RB1-0



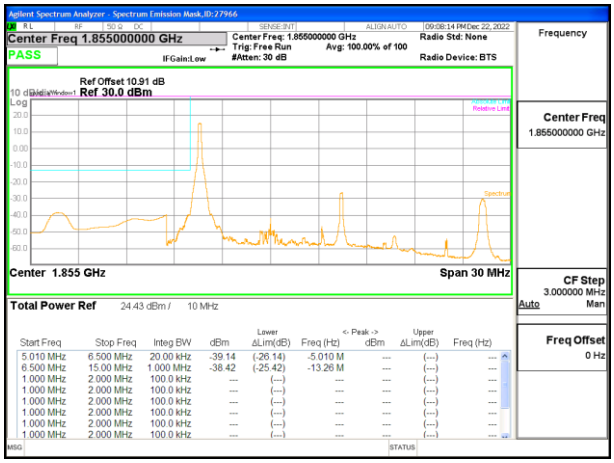
LTE B2 5MHz 16QAM High Channel RB1-24



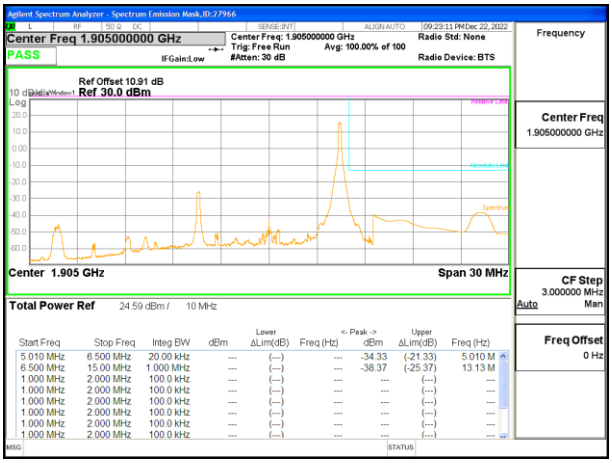
LTE B2 5MHz 16QAM Low Channel RB25-0



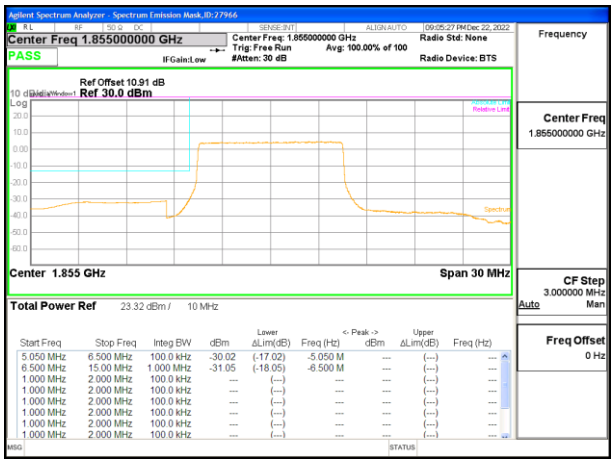
LTE B2 5MHz 16QAM High Channel RB25-0



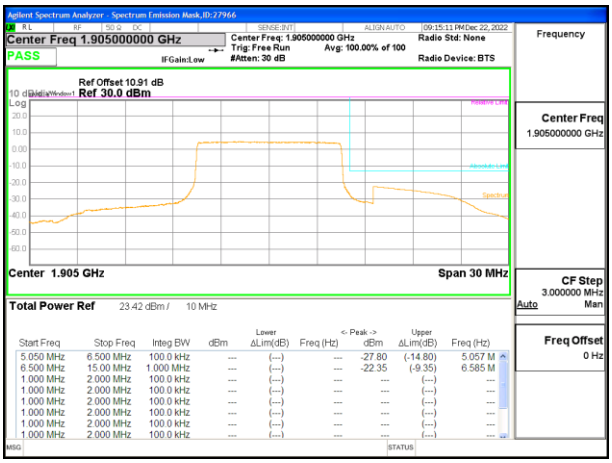
LTE B2 10MHz QPSK Low Channel RB1-0



LTE B2 10MHz QPSK High Channel RB1-49



LTE B2 10MHz QPSK Low Channel RB50-0



LTE B2 10MHz QPSK High Channel RB50-0