CERTIFICATION TEST REPORT

Report Number. : 4789754188-E2V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SCG10
FCC ID	:	A3LSMG996JPN
EUT Description	:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT, UWB and NFC
Test Standard(s)	:	FCC CFR47 PART 22 SUBPART H FCC CFR47 PART 24 SUBPART E FCC CFR47 PART 27 SUBPART F,H,M

Date Of Issue:
February 18, 2021

Prepared by:
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IAS ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	02/05/21	Initial issue	Sungeun Lee
V2	02/18/21	Updated to address TCB's question	Sungeun Lee

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax WPT, UWB and NFC

MODEL NUMBER: SCG10

SERIAL NUMBER: R3CNA0BB86X (CONDUCTED); R3CNC02XC1F (RADIATED)

DATE TESTED: DEC 07, 2020 – JAN 29, 2021;

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E, 27F, H, M	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Sungeun Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 22.
3. FCC CFR 47 Part 24.
4. FCC CFR 47 Part 27.
5. FCC CFR 47 Part 90.
6. ANSI TIA-603-E, 2016
7. ANSI C63.26, 2015
8. KDB 971168 D01 Power Meas License Digital Systems v03r01
9. KDB 412172 D01 Determing ERP and EIRP v01r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1
☒ Chamber 2
☐ Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.01 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 dB
Radiated Disturbance, Above 18 GHz	5.49 dB

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

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT, UWB and NFC. This test report addresses the WWAN operational mode.

5.2. MAXIMUM OUTPUT POWER

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

Note : Conducted output power results were excerpted from RF exposure test report (4789754188-S1 FCC Report SAR).

GSM

FCC Part 22/24						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
GSM850	824.2~848.8	GPRS	**32.3**	**1693.8**	29.51	893.31
		EGPRS	27.1	514.9	24.02	252.35
GSM1900	1850.2~1909.8	GPRS	29.4	879.4	**30.26**	**1061.70**
		EGPRS	25.5	351.3	26.91	490.91

WCDMA

FCC Part 22/24						
Band	Frequency Range [MHz]	Modulation	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	826.4~846.6	Rel. 99	**24.4**	**274.6**	**20.93**	**123.88**
		HSDPA	22.3	171.6	18.51	70.96
		HSUPA	22.4	173.8		

LTE Band 5

FCC Part 22							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824 ~ 849	10	QPSK	24.6	290.6	21.97	157.40
			16QAM	23.5	226.1	20.90	123.03
			64QAM	22.8	189.9		
		5	QPSK	24.6	291.1	22.12	162.93
			16QAM	24.3	269.5	21.25	133.35
			64QAM	23.0	198.4		
		3	QPSK	**24.7**	**293.4**	22.27	168.66
			16QAM	24.1	258.5	21.24	133.05
			64QAM	22.8	191.3		
		1.4	QPSK	24.5	284.2	**22.31**	**170.22**
			16QAM	23.9	243.7	21.12	129.42
			64QAM	23.5	222.0		

LTE Band 12

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 12	699 ~ 716	10	QPSK	24.7	296.5	18.16	65.46
			16QAM	23.7	233.6	16.92	49.20
			64QAM	23.0	198.4		
		5	QPSK	**24.8**	**305.0**	**19.18**	**82.79**
			16QAM	24.2	265.5	17.56	57.02
			64QAM	23.1	202.9		
		3	QPSK	24.7	298.1	18.21	66.22
			16QAM	24.0	253.9	17.18	52.24
			64QAM	23.1	203.9		
		1.4	QPSK	24.7	294.3	18.37	68.71
			16QAM	24.1	257.6	17.52	56.49
			64QAM	23.1	204.9		

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LTE Band 13

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 13	777 ~ 787	10	QPSK	24.15	259.97	20.71	117.76
			16QAM	23.29	213.06	19.58	90.78
			64QAM	22.38	172.85		
		5	QPSK	**24.25**	**266.02**	**20.82**	**120.78**
			16QAM	23.30	213.83	19.87	97.05
			64QAM	22.59	181.49		

LTE Band 41

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 41	2496 ~ 2690	20	QPSK	24.3	271.0	22.80	190.55
			16QAM	23.5	223.0	22.71	186.64
			64QAM	22.6	182.6		
		15	QPSK	24.3	270.9	**23.66**	**232.27**
			16QAM	23.4	220.5	23.58	228.03
			64QAM	22.5	177.6		
		10	QPSK	24.3	269.4	23.52	224.91
			16QAM	23.4	220.7	23.10	204.17
			64QAM	22.5	177.6		
		5	QPSK	**24.4**	**274.2**	23.62	230.14
			16QAM	23.6	229.0	23.11	204.64
			64QAM	22.8	190.1		

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a internal antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
GSM 1900 1850 ~ 1910 MHz	-4.49
GSM 850 / WCDMA Band 5 / LTE Band 5 824 ~ 849 MHz	-9.55
LTE Band 12 699 ~ 716 MHz	-10.98
LTE Band 13 777 ~ 787 MHz	-9.57
LTE Band 41 2496 ~ 2690 MHz	-9.37

5.4. WORST-CASE ORIENTATION

Following modes should be considered as worst-case scenario for all other measurements.

- GSM GPRS/EGPRS
- UMTS REL 99/HSDPA

For all LTE Bands, 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, 16QAM and 64QAM modulations. It was found that QPSK and 16QAM results were worst case. All testing was performed using QPSK and 16QAM modulations to represent the worst case. However, the out of band emissions and spurious radiation were only performed on bandwidth and RB offset(with RB size 1) with the highest conducted power in QPSK.

Highest power setting for each bands				
LTE Band	**Frequency (MHz)**	**Bandwidth (MHz)**	**RB size**	**RB offset**
5	825.5	3	1	0
	836.5		1	14
	847.5		1	8
12	701.5	5	1	24
	707.5		1	12
	713.5		1	24
13	779.5	5	1	24
	782.0		1	12
	784.5		1	12
41	2506.0	20	1	0
	2593.0		1	0
	2680.0		1	0

The fundamental and radiated spurious emission were investigated in three orthogonal orientations X, Y and Z, it was determined that below orientation was worst-case orientation for each band.

Band	**ERP/EIRP**			**RSE**		
	X	**Y**	**Z**	**X**	**Y**	**Z**
GSM850	-	-	O	-	-	O
GSM1900	-	-	O	-	-	O
WCDMA B5	-	-	O	-	-	O
LTE B5	-	-	O	-	-	O
LTE B12	-	-	O	-	-	O
LTE B13	-	-	O	-	-	O
LTE B41	O	-	-	-	-	O

Note : For ERP/EIRP testing, the EUT didn't attached with travel adapter. But radiated spurious testing, the EUT attached with travel adapter for the worst case condition. The EUT is continuously communicated with the call box during the tests.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA200	N/A	N/A
Data Cable	SAMSUNG	EP-DR140AWE	N/A	N/A

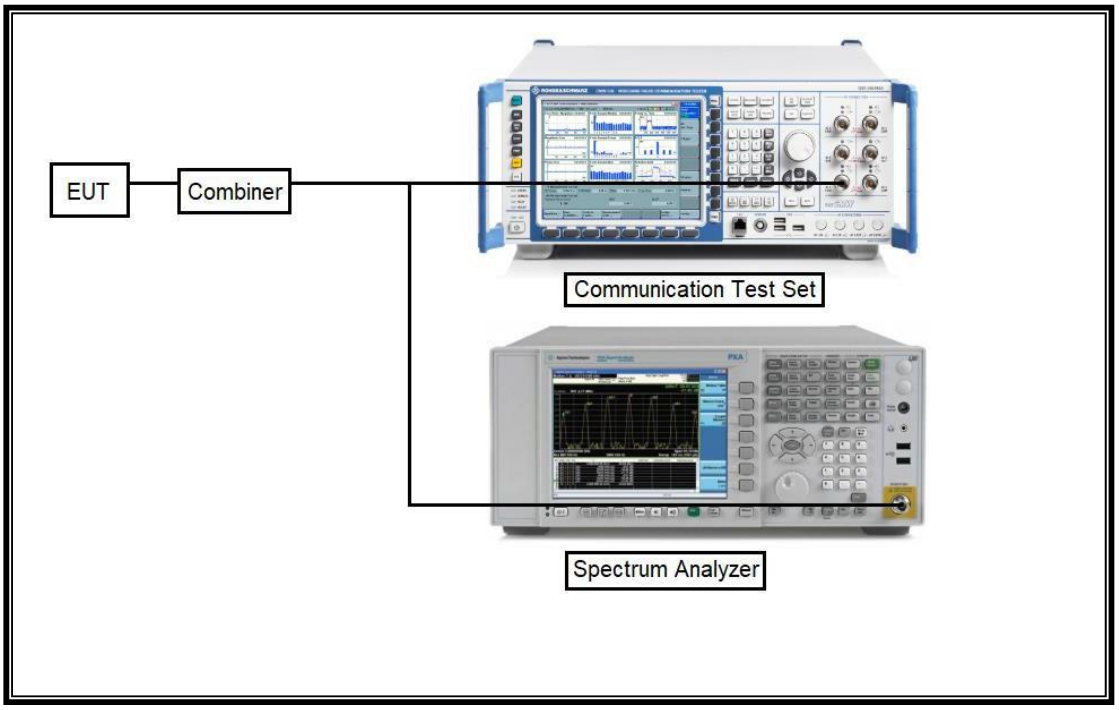
I/O CABLE

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	C Type	Shielded	1.0m	N/A

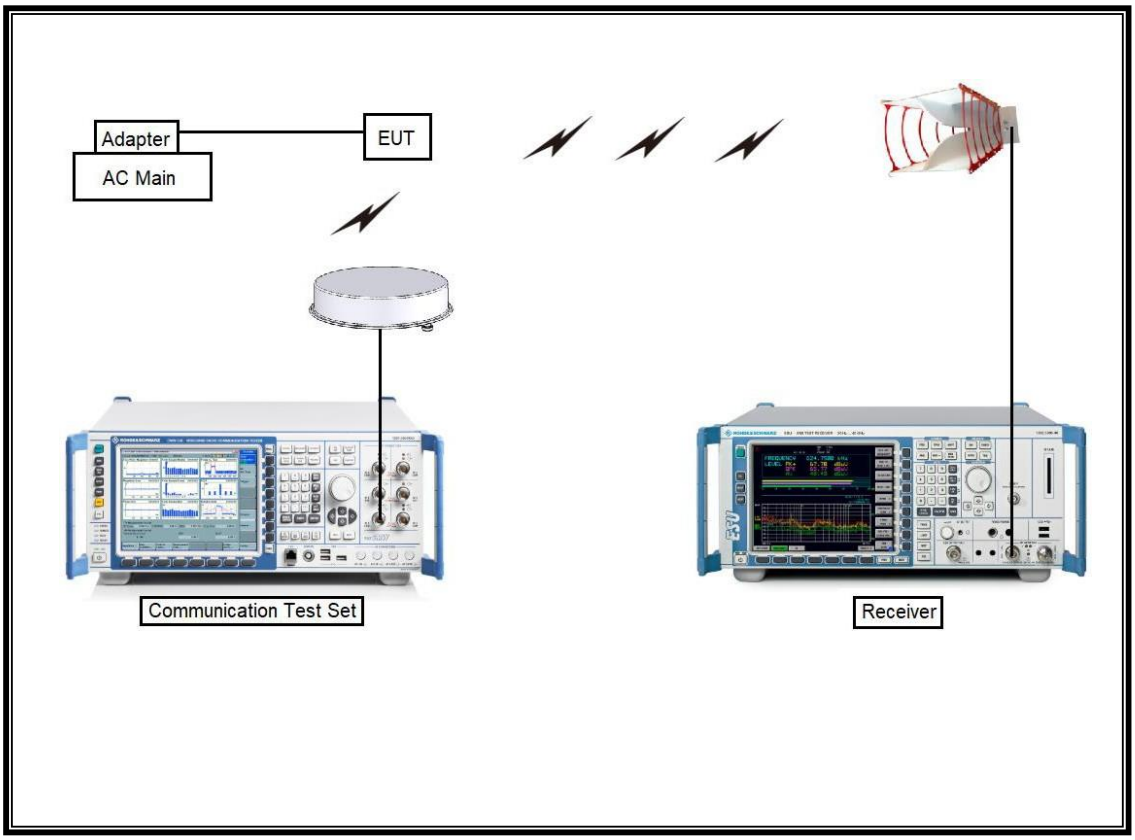
TEST SETUP

The EUT is continuously communicated with the call box during the tests.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. 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**	**S/N**	**Cal Due**
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121D DB4	00164753	01-31-21
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-04-22
Preamplifier	ETS	3116C-PA	00168841	08-06-21
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-19-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-13-22
Antenna, Horn, 18 GHz	ETS	3115	00167211	07-27-22
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-15-22
Antenna, Horn, 18 GHz	ETS	3117	00168724	07-27-22
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-15-22
Communications Test Set	R&S	CMW500	115331	08-03-21
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-05-21
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-04-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-03-21
Spectrum Analyzer	Agilent	N9030A	MY54170614	08-05-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-03-21
Direcitonal Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	08-05-21
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	08-05-21
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	08-05-21
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	08-05-21
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	08-05-21
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	08-05-21
Attenuator	PASTERNACK	PE7087-10	A009	08-05-21
Attenuator	PASTERNACK	PE7087-10	A001	08-03-21
Attenuator	PASTERNACK	PE7087-10	A008	08-03-21
Attenuator	PASTERNACK	PE7004-10	2	08-04-21
Attenuator	PASTERNACK	PE7395-10	A011	08-05-21
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
Temperature Chamber	ESPEC	SH-642	93001109	08-04-21
Power Splitter	MINI-CIRCUITS	WA1534	UL001	02-05-21
Power Splitter	MINI-CIRCUITS	WA1534	UL002	02-05-21
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Antenna port test software	UL	CLT	Ver 2.5	

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass
22.917(a) 24.238(a) 27.53(c),(g)	Band Edge / Conducted Spurious Emission	-13dBm		Pass
27.53(m)	Conducted Spurious Emission	-25 dBm		Pass
27.53(m)	Emission mask	Section 9.2.2		Pass
2.1046	Conducted output power	N/A		Pass
22.355 24.235 27.54	Frequency Stability	2.5PPM		Pass
22.913(a)(5)	Effective Radiated Power	38.5 dBm	Radiated	Pass
27.50(c)(10) 27.50(b)(10)		34.77 dBm		Pass
24.232©	Equivalent Isotropic Radiated Power	33dBm		Pass
27.50(d)(4)		30dBm		Pass
22.917(a) 24.238(a) 27.53 (c),(g)	Radiated Spurious Emission	-13dBm		Pass
27.53 (m)		-25dBm		Pass

8. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

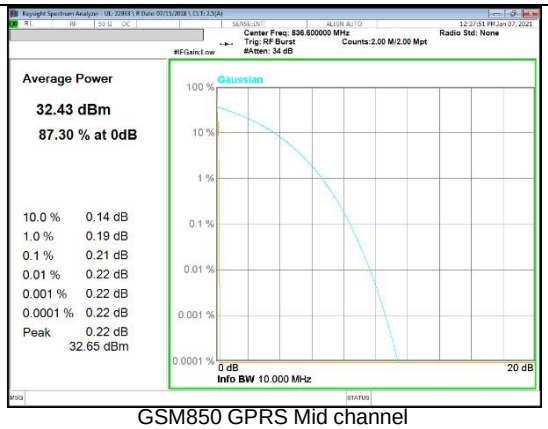
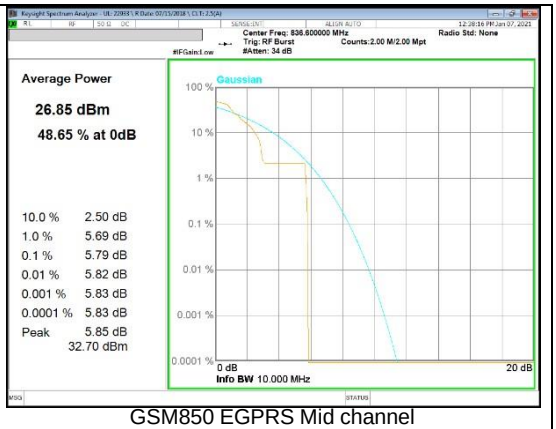
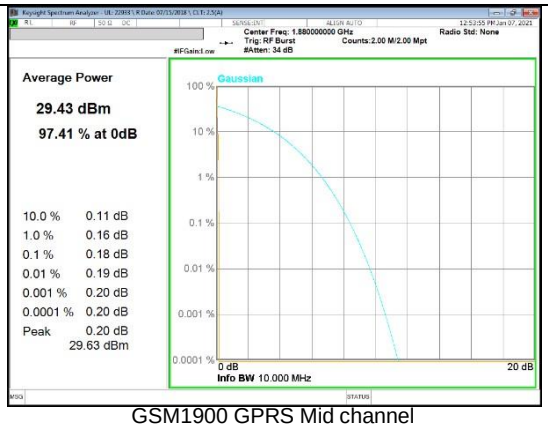
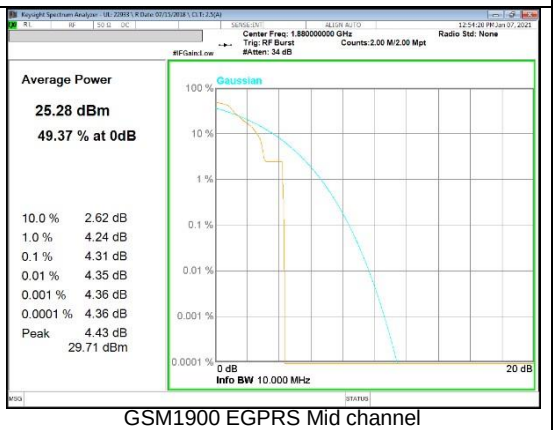
Note

The modulations (QPSK, 16QAM, 64QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

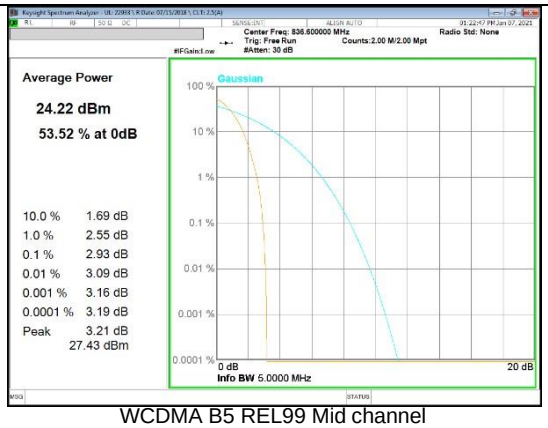
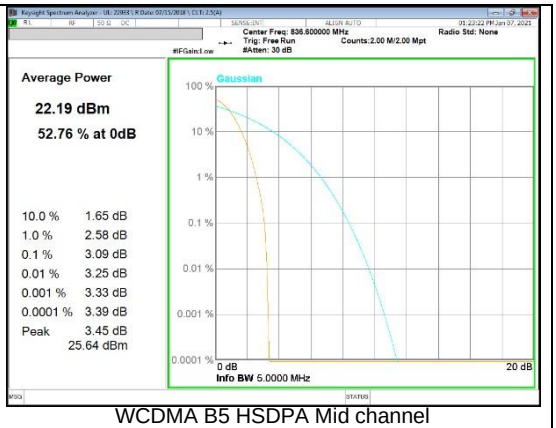
RESULTS

8.1. CONDUCTED PEAK TO AVERAGE RESULT

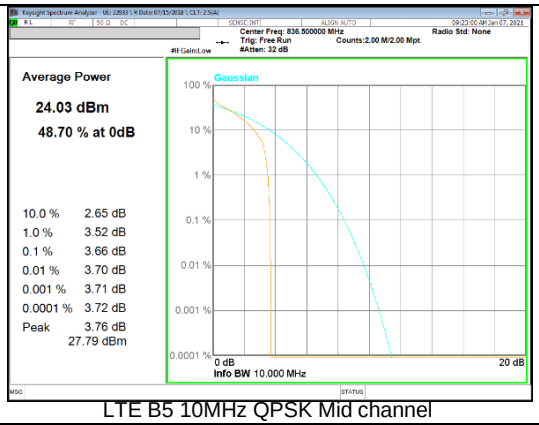
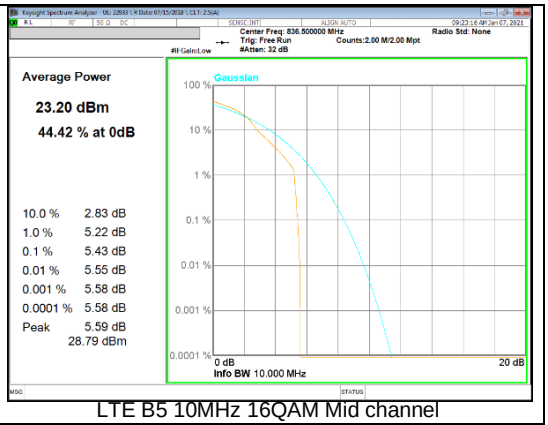
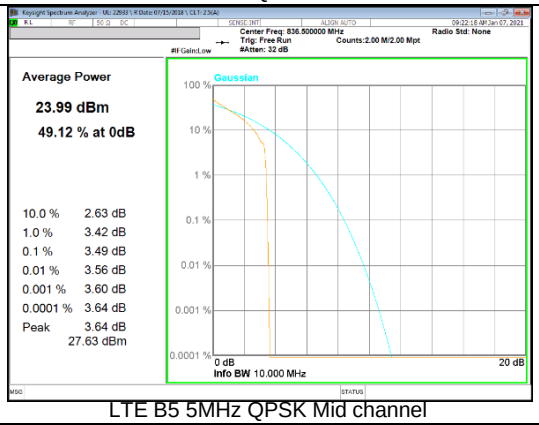
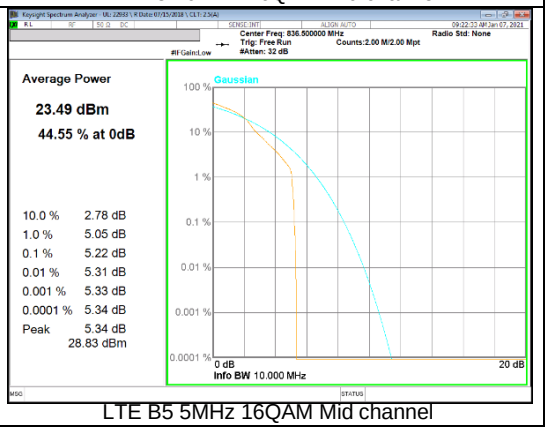
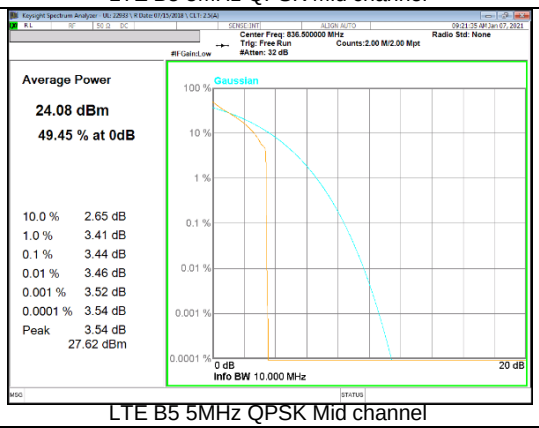
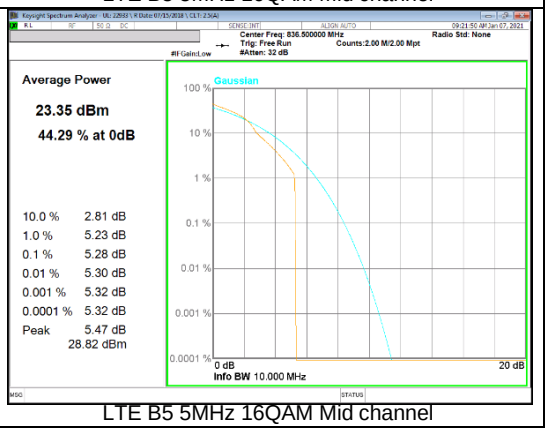
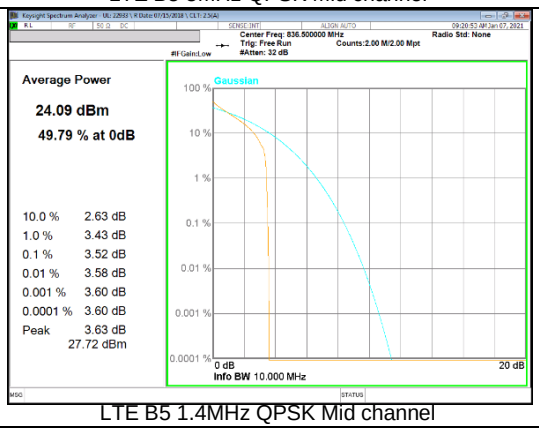
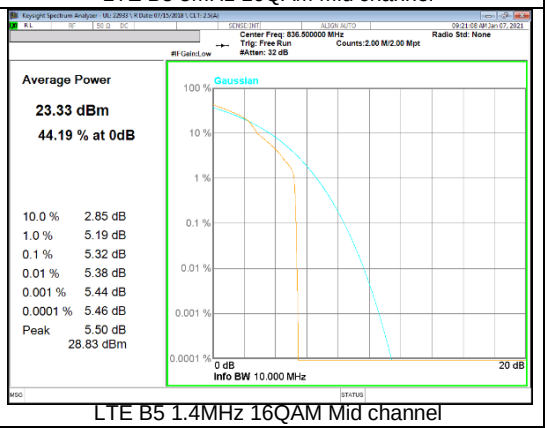
GSM

GSM 850	 GSM850 GPRS Mid channel	 GSM850 EGPRS Mid channel
GSM 1900	 GSM1900 GPRS Mid channel	 GSM1900 EGPRS Mid channel

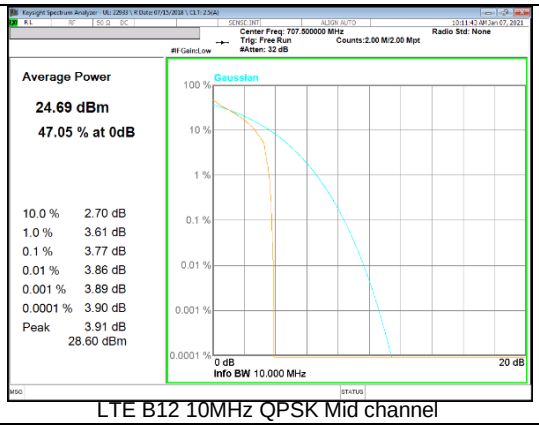
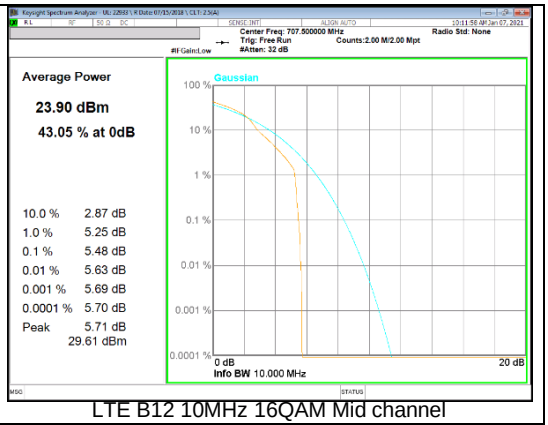
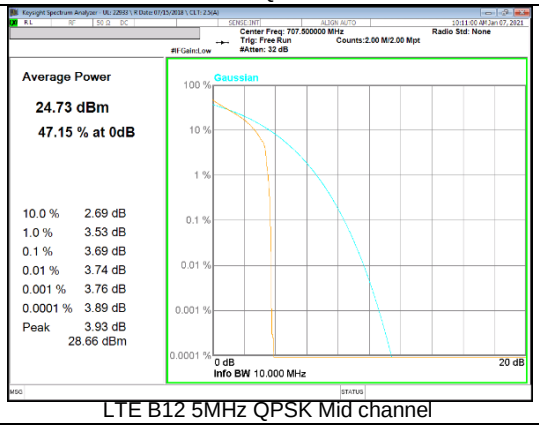
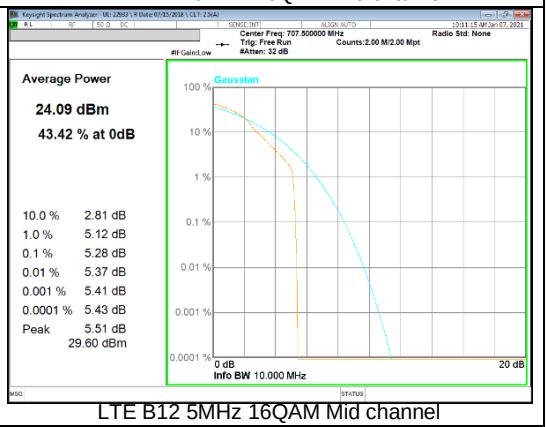
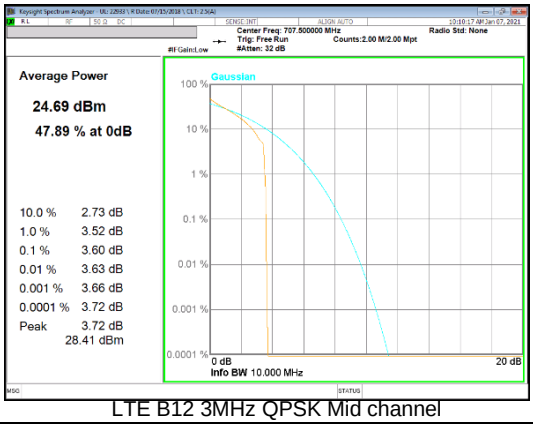
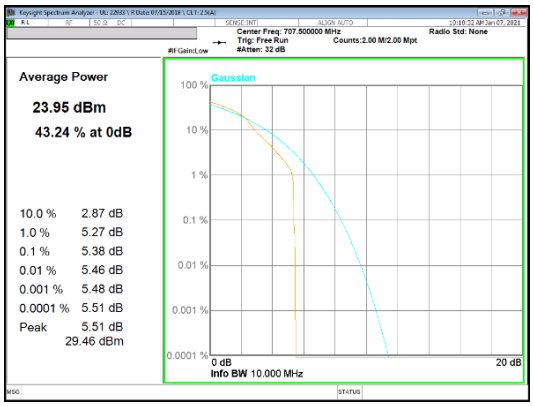
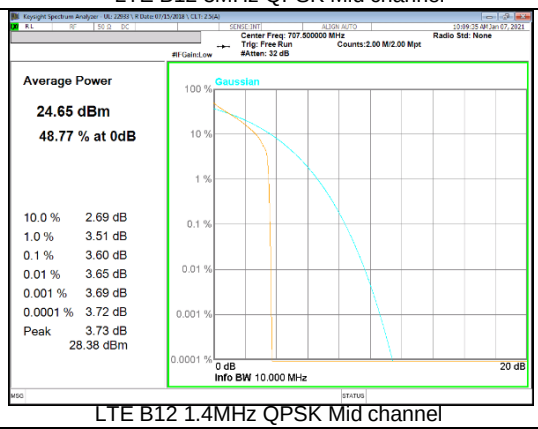
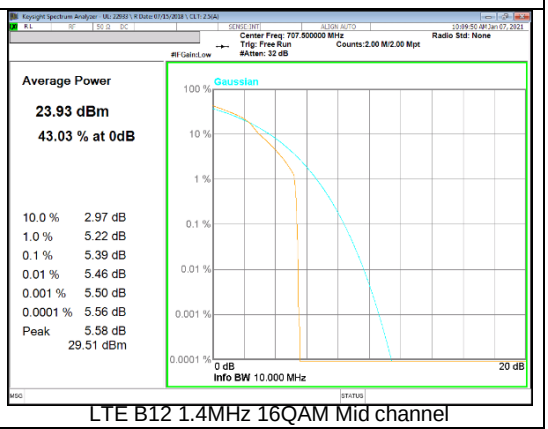
WCDMA

WCDMA Band 5	 WCDMA B5 REL99 Mid channel	 WCDMA B5 HSDPA Mid channel

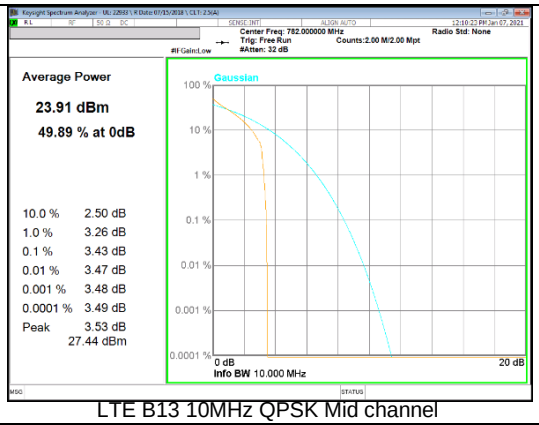
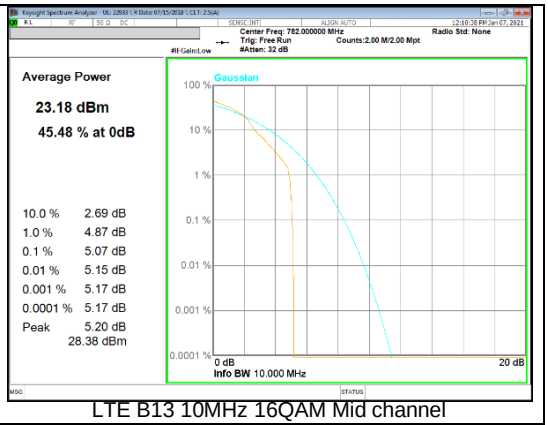
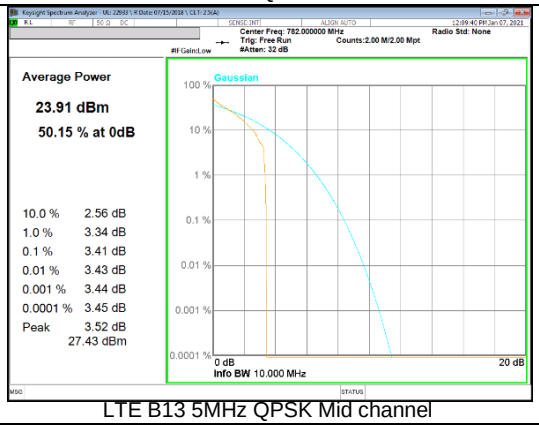
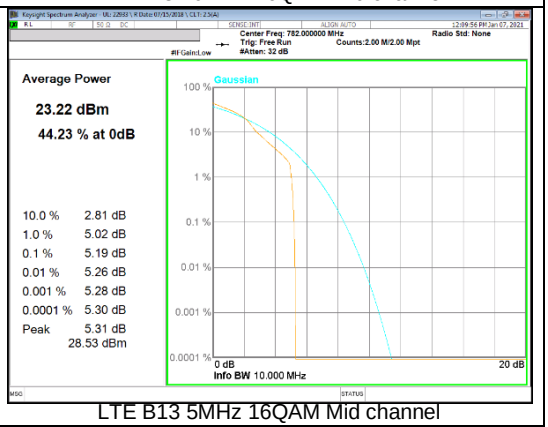
LTE Band5

LTE Band 5 10 MHz	 LTE B5 10MHz QPSK Mid channel	 LTE B5 10MHz 16QAM Mid channel
LTE Band 5 5 MHz	 LTE B5 5MHz QPSK Mid channel	 LTE B5 5MHz 16QAM Mid channel
LTE Band 5 3 MHz	 LTE B5 5MHz QPSK Mid channel	 LTE B5 5MHz 16QAM Mid channel
LTE Band 5 1.4 MHz	 LTE B5 1.4MHz QPSK Mid channel	 LTE B5 1.4MHz 16QAM Mid channel

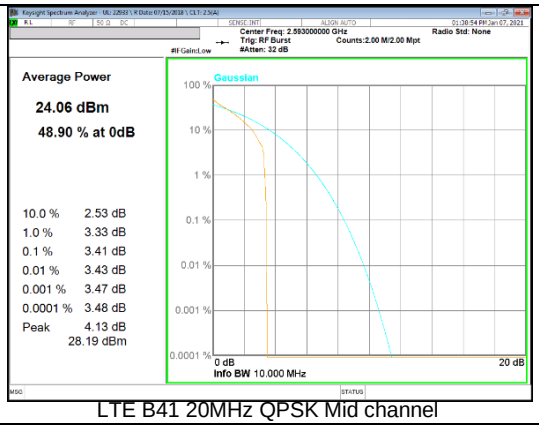
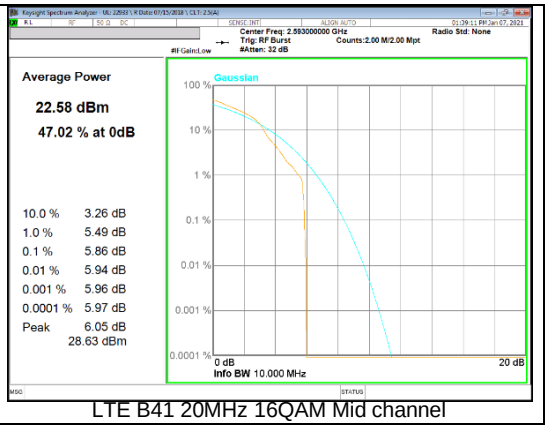
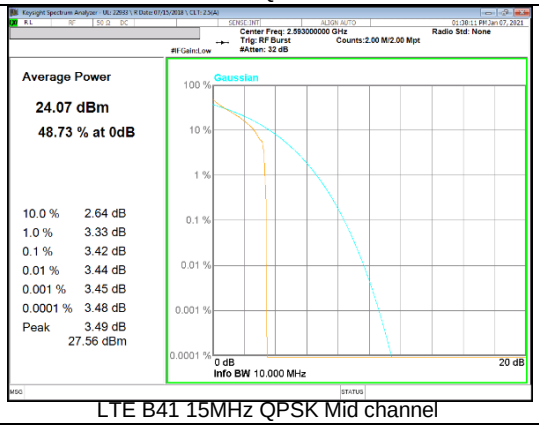
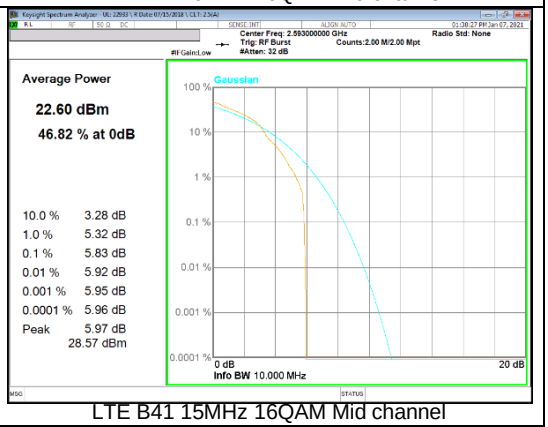
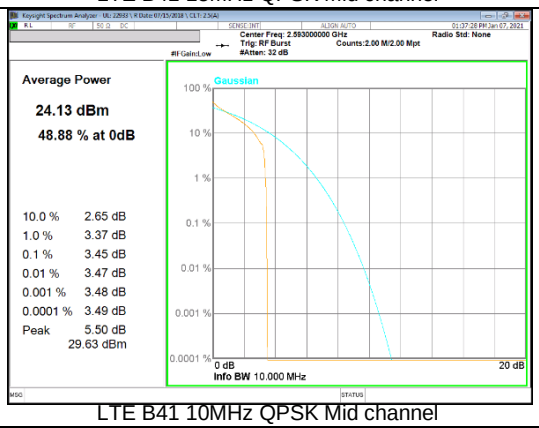
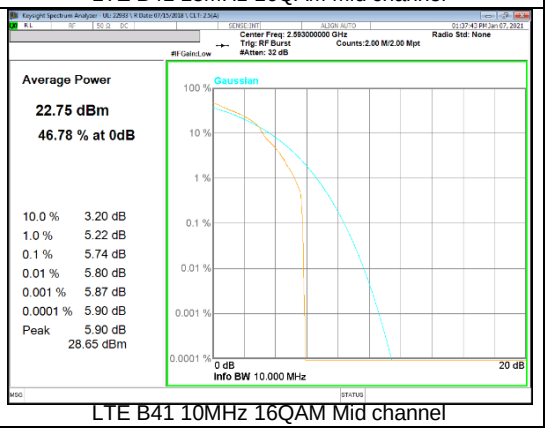
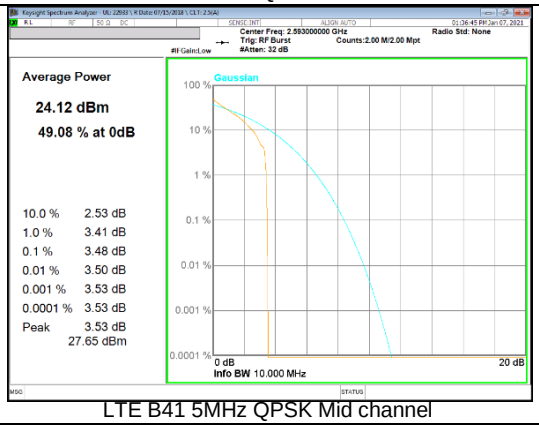
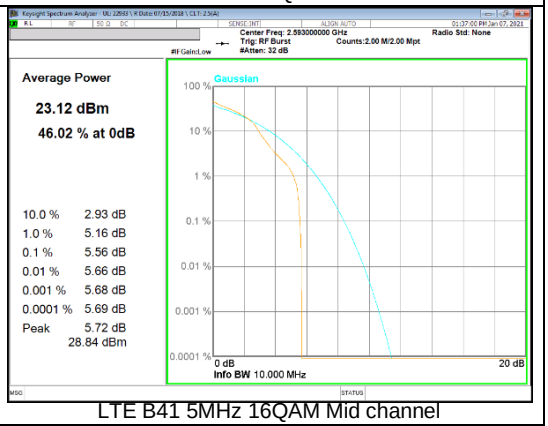
LTE Band 12

LTE Band 12 10 MHz	 LTE B12 10MHz QPSK Mid channel	 LTE B12 10MHz 16QAM Mid channel
LTE Band 12 5 MHz	 LTE B12 5MHz QPSK Mid channel	 LTE B12 5MHz 16QAM Mid channel
LTE Band 12 3 MHz	 LTE B12 3MHz QPSK Mid channel	 LTE B12 3MHz 16QAM Mid channel
LTE Band 12 1.4 MHz	 LTE B12 1.4MHz QPSK Mid channel	 LTE B12 1.4MHz 16QAM Mid channel

LTE Band 13

LTE Band 13 10 MHz	 LTE B13 10MHz QPSK Mid channel	 LTE B13 10MHz 16QAM Mid channel
LTE Band 13 5 MHz	 LTE B13 5MHz QPSK Mid channel	 LTE B13 5MHz 16QAM Mid channel

LTE Band 41

LTE Band 41 20 MHz	 LTE B41 20MHz QPSK Mid channel	 LTE B41 20MHz 16QAM Mid channel
LTE Band 41 15 MHz	 LTE B41 15MHz QPSK Mid channel	 LTE B41 15MHz 16QAM Mid channel
LTE Band 41 10 MHz	 LTE B41 10MHz QPSK Mid channel	 LTE B41 10MHz 16QAM Mid channel
LTE Band 41 5 MHz	 LTE B41 5MHz QPSK Mid channel	 LTE B41 5MHz 16QAM Mid channel

9. LIMITS AND CONDUCTED 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 -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v03r01)

RESULTS

See the following pages.

- **GSM**

Band	Modulation	Channel	f [MHz]	99% BW (kHz)	-26dB BW (kHz)
GSM850	GPRS	190	836.6	243.57	317.10
	EGPRS			243.74	306.80
GSM1900	GPRS	661	1880.0	244.99	319.50
	EGPRS			241.64	307.10

- **WCDMA**

Band	Modulation	Channel	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
WCDMAB5	Rel. 99	4183	836.6	4.134	4.678
	HSDPA			4.152	4.687

- LTE Band 5

Band	BW	Modulation	Channel	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B5	10M	QPSK	23095	836.5	8.946	9.688
		16QAM			8.928	9.677
	5M	QPSK	23095	836.5	4.488	4.957
		16QAM			4.490	4.957
	3M	QPSK	23095	836.5	2.689	2.977
		16QAM			2.695	3.004
	1.4M	QPSK	23095	836.5	1.084	1.214
		16QAM			1.090	1.232

- LTE Band 12

Band	BW	Modulation	Channel	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B12	10M	QPSK	23095	707.5	8.928	9.831
		16QAM			8.926	9.726
	5M	QPSK	23095	707.5	4.483	4.932
		16QAM			4.480	4.928
	3M	QPSK	23095	707.5	2.690	2.974
		16QAM			2.686	2.972
	1.4M	QPSK	23095	707.5	1.082	1.221
		16QAM			1.087	1.230

- LTE Band 13

Band	BW	Modulation	Channel	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B13	10M	QPSK	23095	782.0	8.927	9.642
		16QAM			8.904	9.721
	5M	QPSK	23095	782.0	4.492	4.909
		16QAM			4.470	4.876

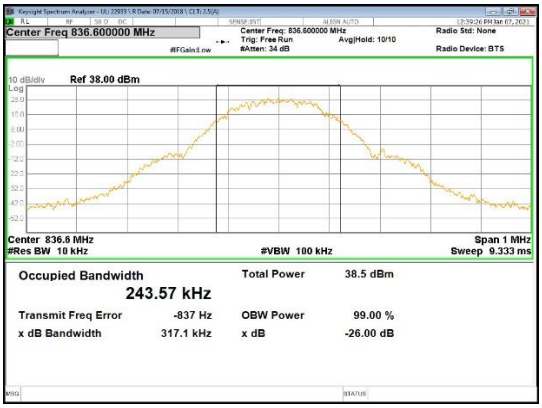
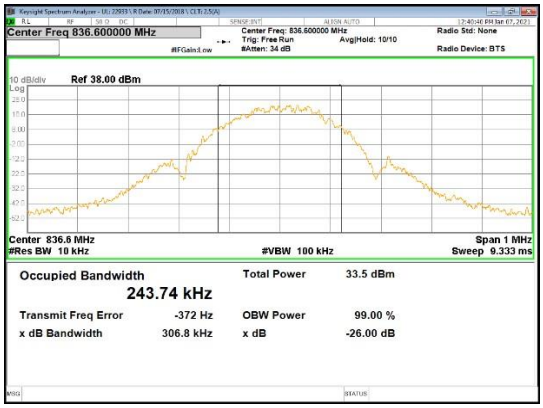
- LTE Band 41

Band	BW	Modulation	Channel	f [MHz]	99% BW (MHz)	-26dB BW (MHz)
LTE B41	20M	QPSK	40620	2593.0	17.847	19.190
		16QAM			17.851	19.130
	15M	QPSK	40620	2593.0	13.395	14.410
		16QAM			13.423	14.590
	10M	QPSK	40620	2593.0	8.935	9.743
		16QAM			8.948	9.635
	5M	QPSK	40620	2593.0	4.492	4.897
		16QAM			4.480	4.911

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

9.1.1. OCCUPIED BANDWIDTH RESULTS

GSM 850

GSM 850		
	GSM850 GPRS Mid channel	GSM850 EGPRS Mid channel

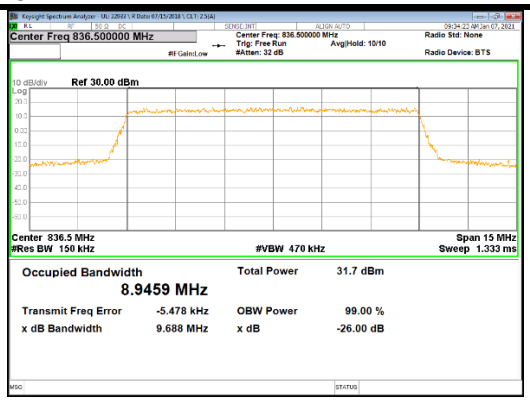
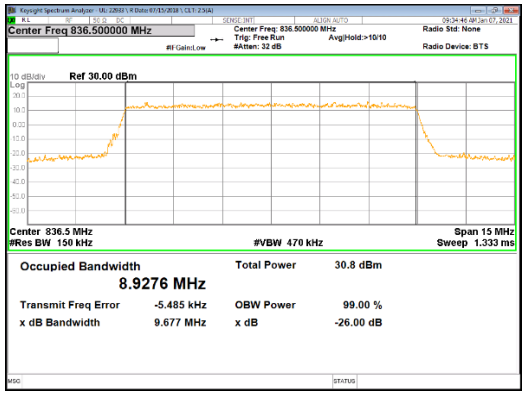
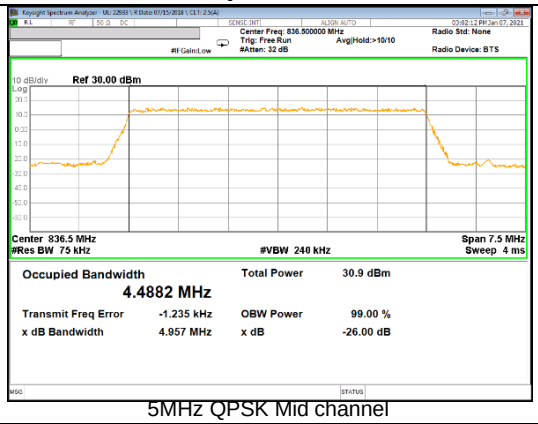
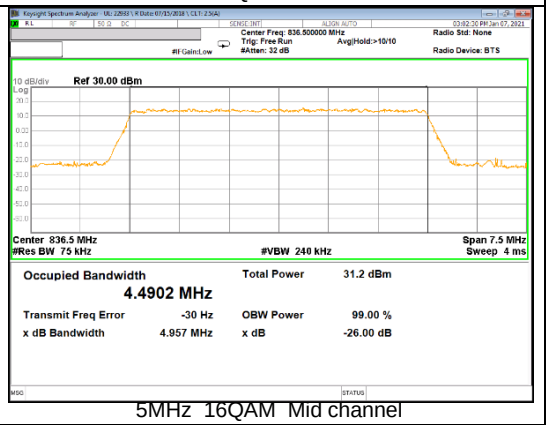
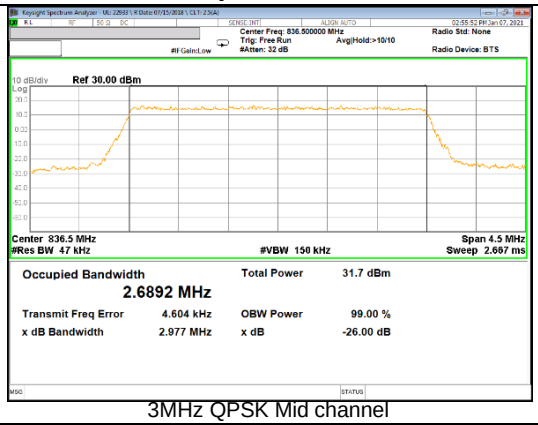
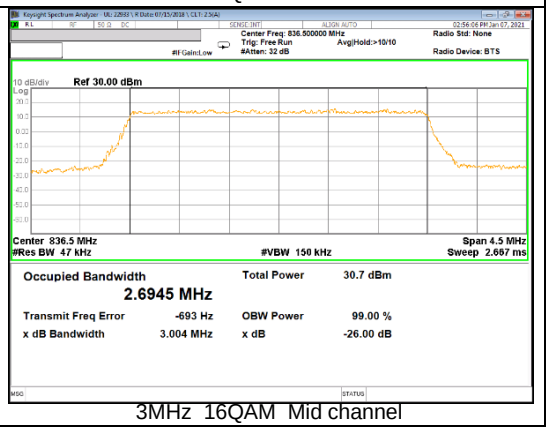
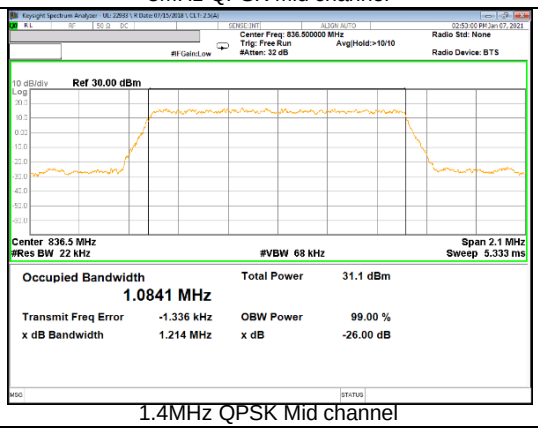
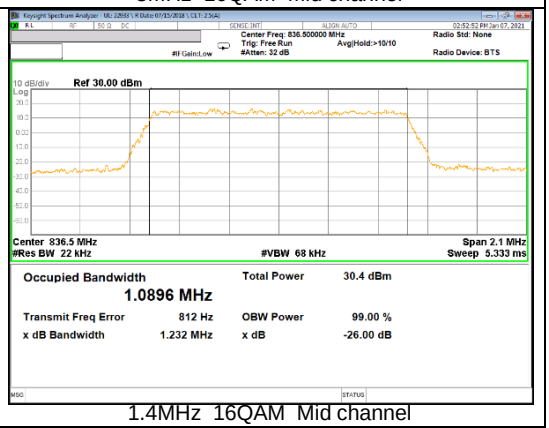
GSM 1900

GSM 1900		
	GSM1900 GPRS Mid channel	GSM1900 EGPRS Mid channel

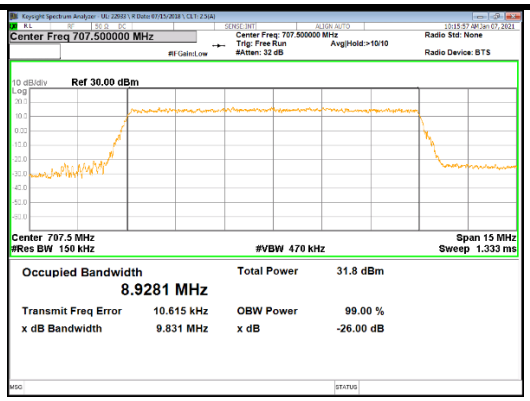
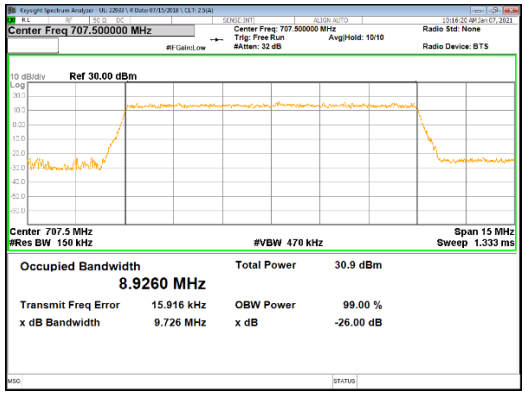
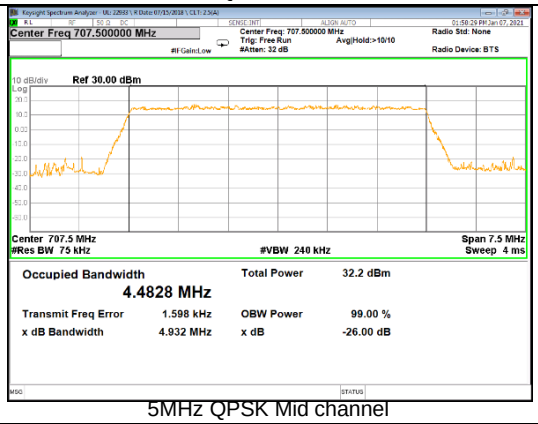
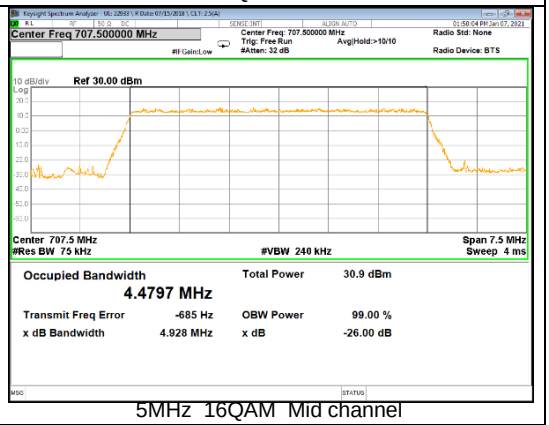
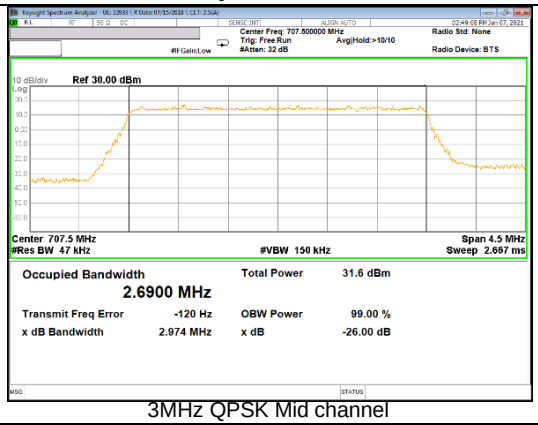
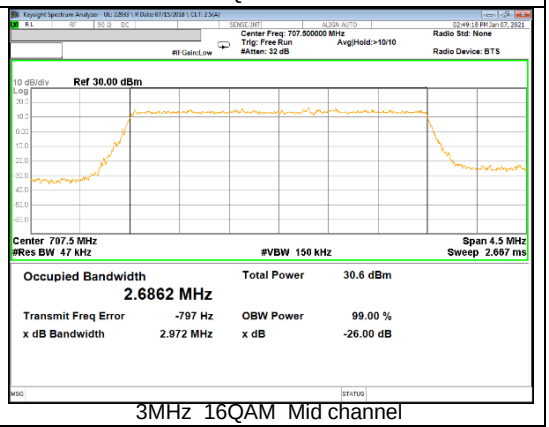
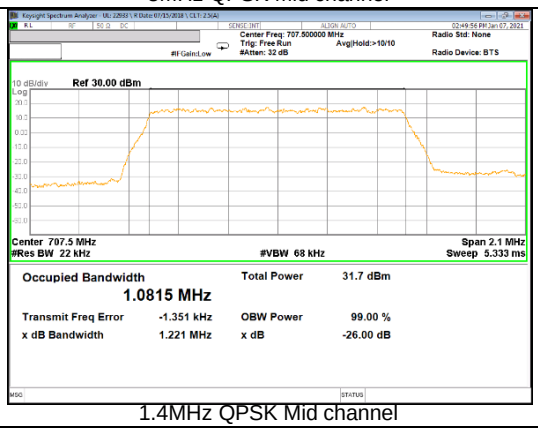
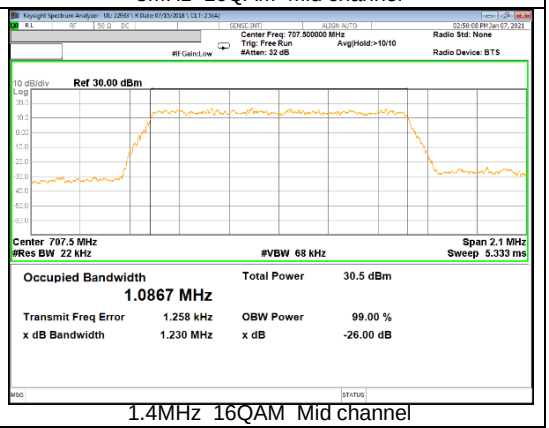
WCDMA Band 5

Band 5		
	REL99 Mid channel	HSDPA Mid channel

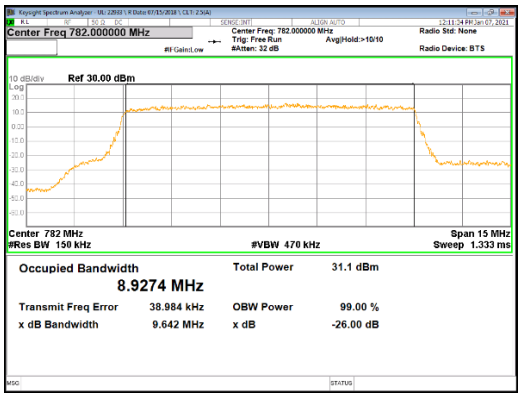
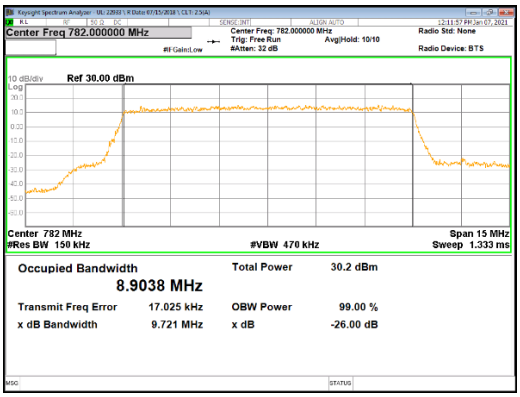
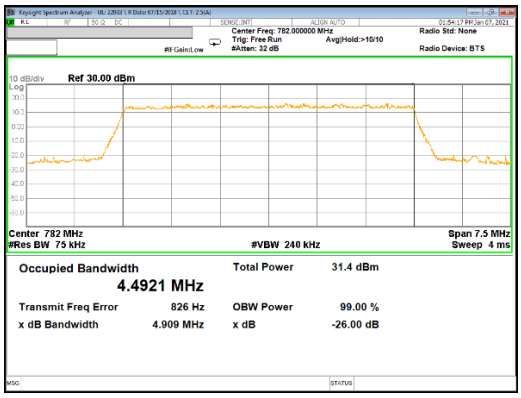
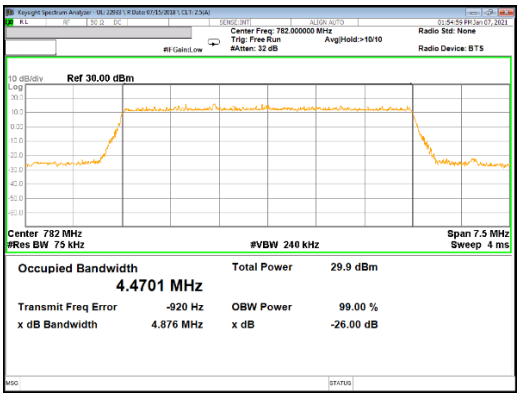
LTE Band 5

Band 5 10MHz	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
Band 5 5MHz	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
Band 5 3MHz	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
Band 5 1.4MHz	 1.4MHz QPSK Mid channel	 1.4MHz 16QAM Mid channel

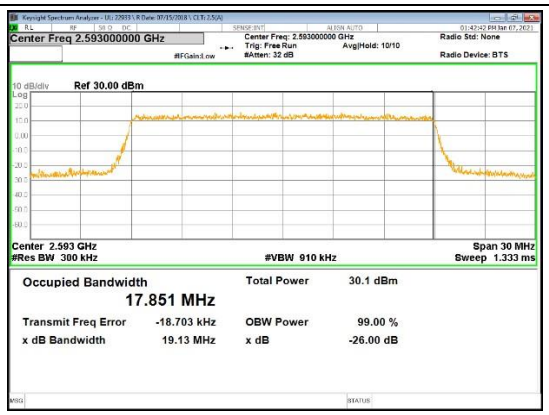
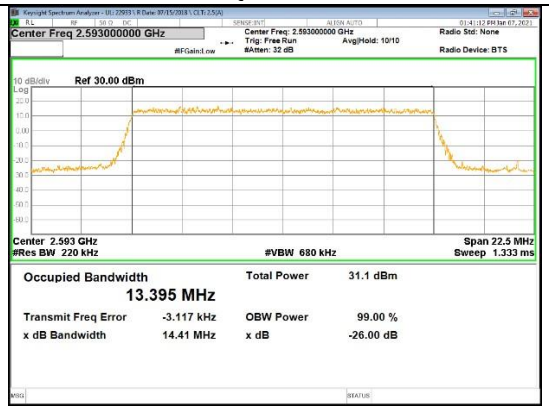
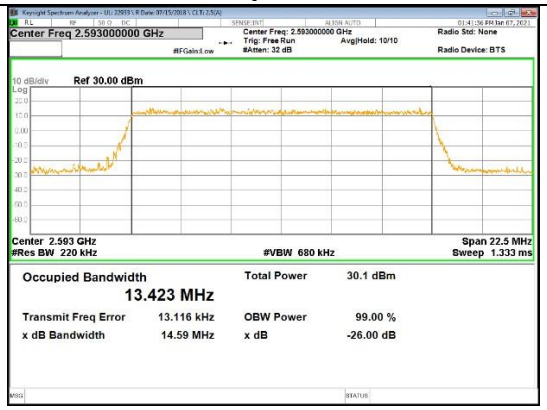
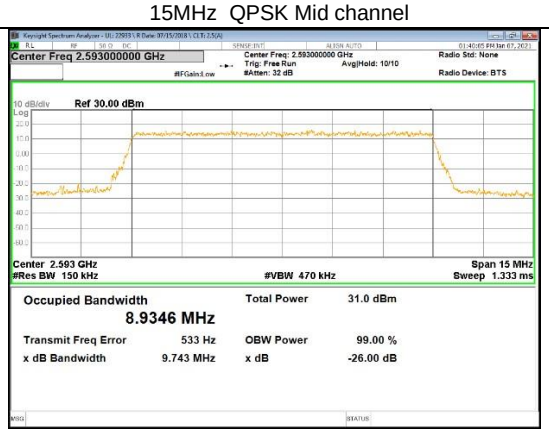
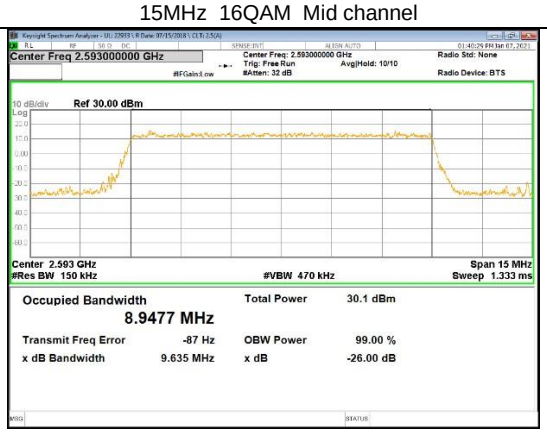
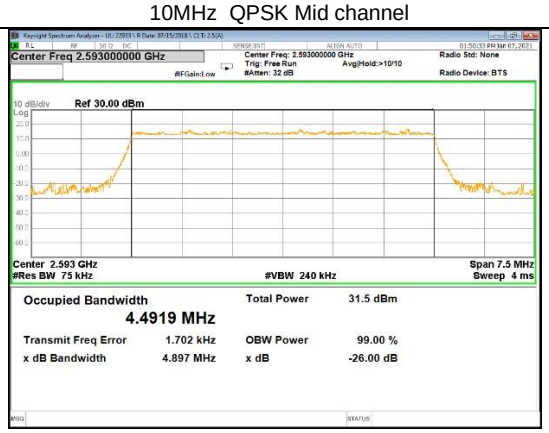
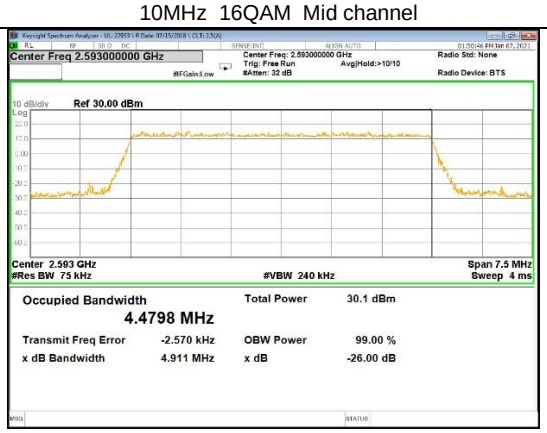
LTE Band 12

Band 12 10MHz	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
Band 12 5MHz	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
Band 12 3MHz	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
Band 12 1.4MHz	 1.4MHz QPSK Mid channel	 1.4MHz 16QAM Mid channel

LTE Band 13

Band 13 10MHz	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
Band 13 5MHz	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel

LTE Band 41

Band 41 20MHz	 20MHz QPSK Mid channel	 20MHz 16QAM Mid channel
Band 41 15MHz	 15MHz QPSK Mid channel	 15MHz 16QAM Mid channel
Band 41 10MHz	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
Band 41 5MHz	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel

9.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §22.917, §24.238, §27. 53

LIMITS

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.

Part 27.53:
(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(4) On all frequencies between 763-775 MHz and 793-806 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01
The transmitter output was connected to a CMW500 Test 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.

GSM

a) Set the RBW = 1 ~ 5% of OBW(GSM850 – 8.2KHz, GSM1900 – 9.1KHz)
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 1.5 times the OBW;
d) Sweep time = 1S ;
e) Detector = RMS;
f) Ensure that the number of measurement points ≥ 2*Span/RBW;
g) Trace mode = Average(100);
h) Add duty cycle correction factor (9dB)

WCDMA/LTE

a) Set the RBW = 1 ~ 1.5 % of OBW(Typically limited to a minimum RBW of 1% of the OBW)
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 1.5 times the OBW;
d) Sweep time ≥ Auto;
e) Detector = RMS;
f) Ensure that the number of measurement points ≥ 2*Span/RBW;
g) Trace mode = Average (100);

NOTE1: For frequency range of 763-775 MHz and 793-806 MHz.(LTE Band 13)

a) Set the RBW = 6.2kHz

b) Set VBW ≥ 3 × RBW;

c) Sweep time = 1 second ;

d) Detector = RMS;

e) Ensure that the number of measurement points ≥ 2*Span/RBW;

f) Trace mode = Average;

NOTE2

Note that the spurious emissions outside of the channel include narrowband signals. These signals are all below the -13dBm / -25dBm limits. Although the measurement bandwidth is less than the reference bandwidth of 1MHz no additional correction is applied as ANSI C63.26 section 4.2.3 only requires the correction to be applied when the OBW of the emission being measured is wider than the measurement bandwidth (Where the OBW of the signal under measurement is less than the RBW of the measuring instrument, no bandwidth correction or integration will be required.) Plots for low and high channels show the level of the emission measured with the reduced bandwidth and the level of the same emission measured using the integration method over the 1MHz reference bandwidth are very close, indicating the emissions are narrowband.

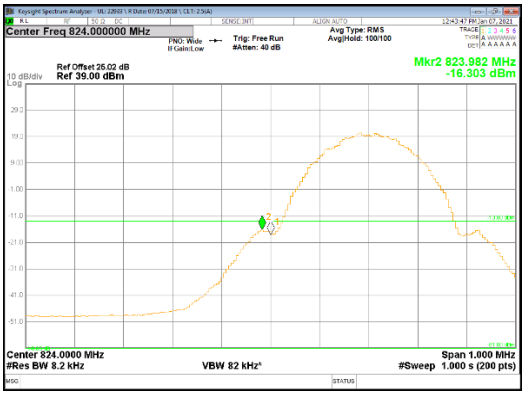
RESULTS

See the following pages.

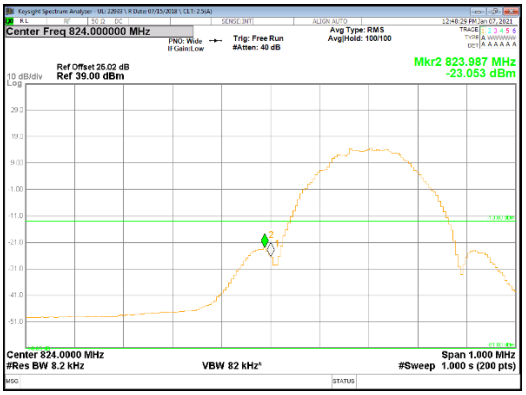
9.2.1. BAND EDGE RESULT

GSM

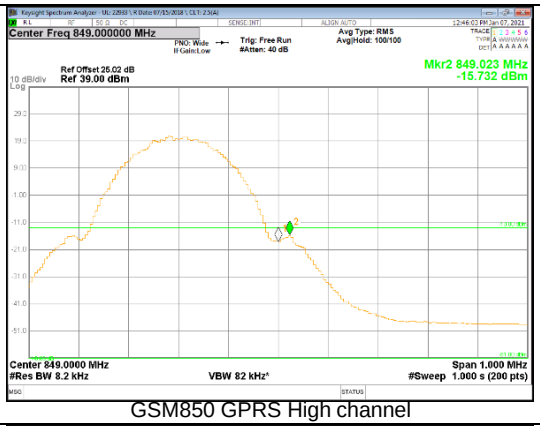
GSM 850



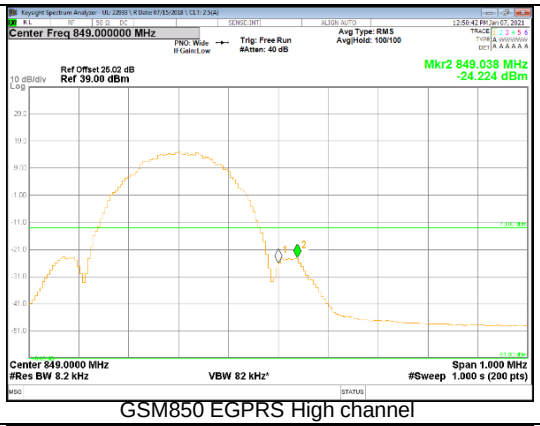
GSM850 GPRS Low channel



GSM850 EGPRS Low channel

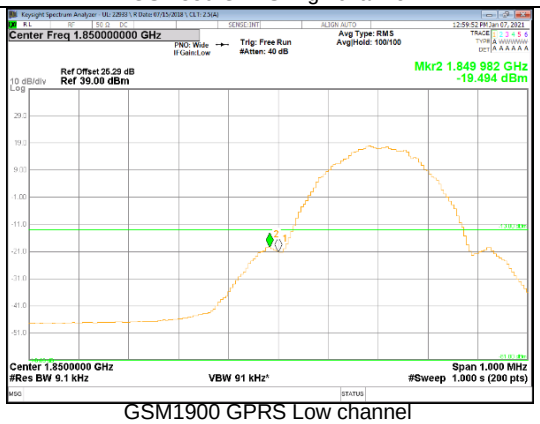


GSM850 GPRS High channel

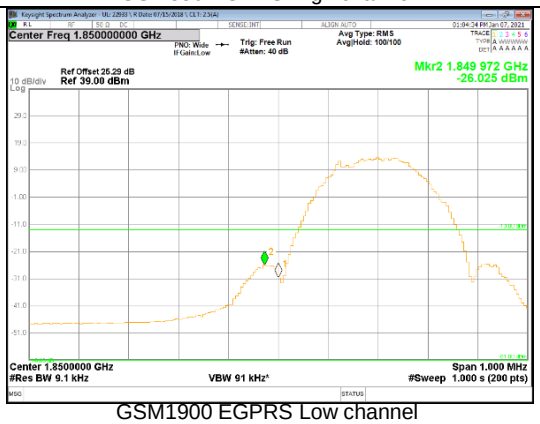


GSM850 EGPRS High channel

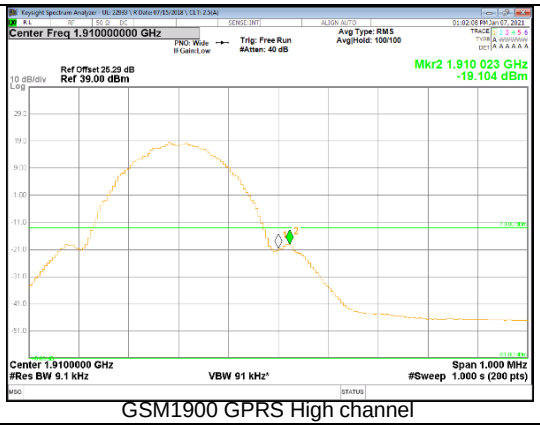
GSM 1900



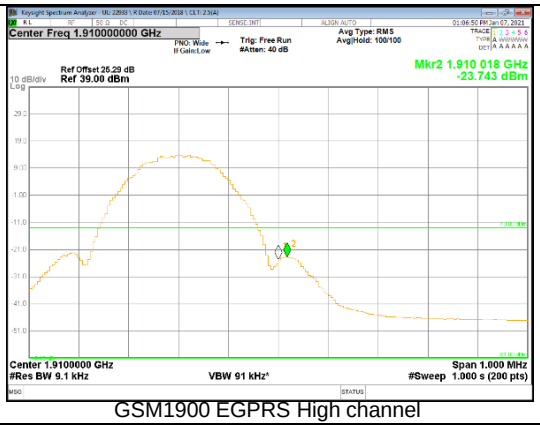
GSM1900 GPRS Low channel



GSM1900 EGPRS Low channel

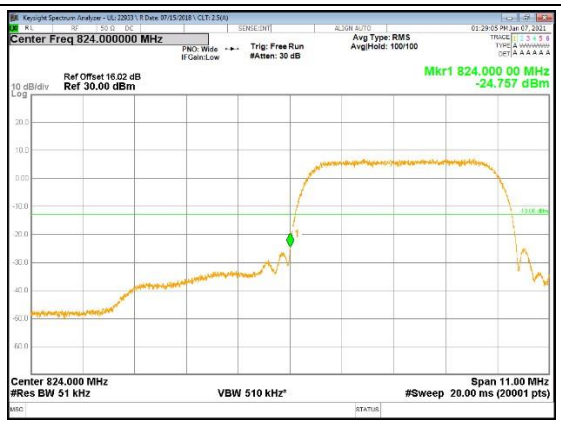
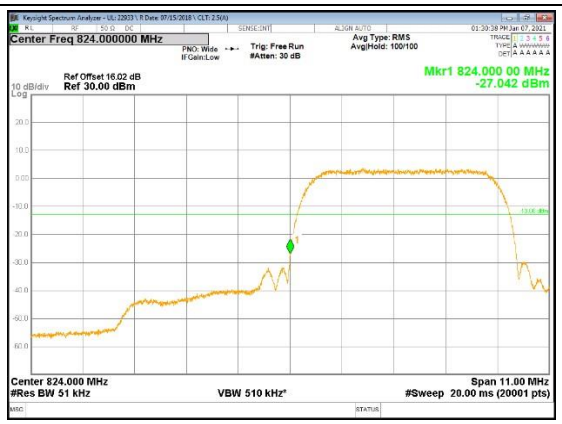
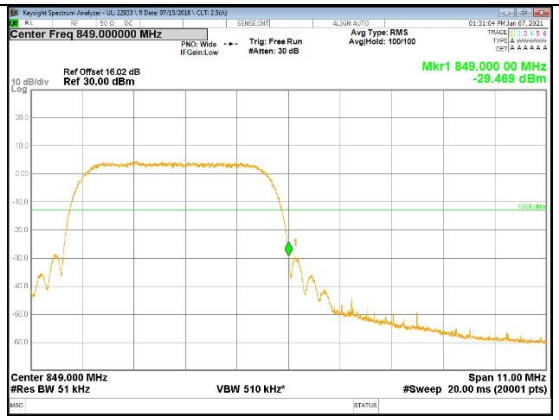


GSM1900 GPRS High channel

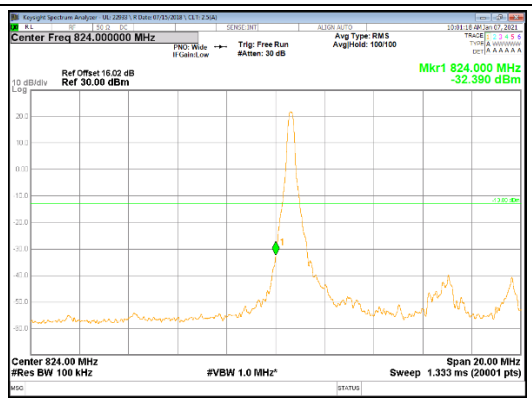
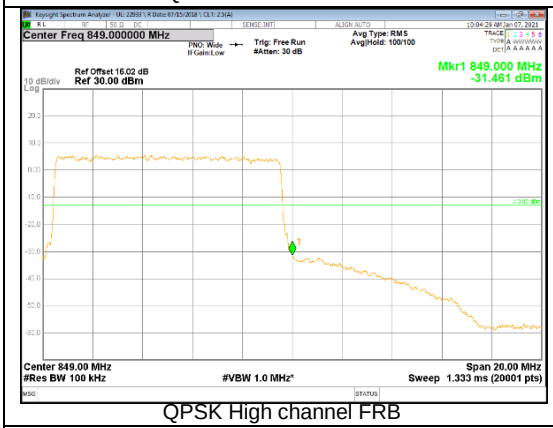
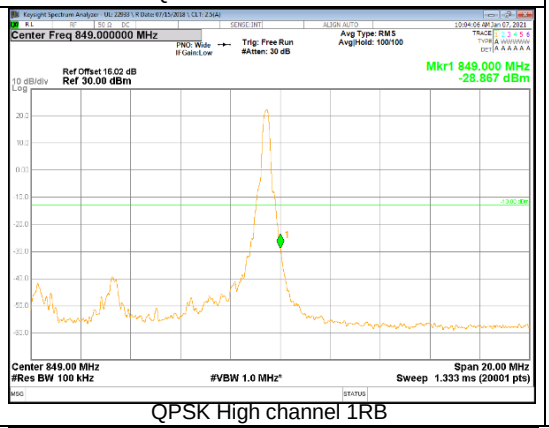
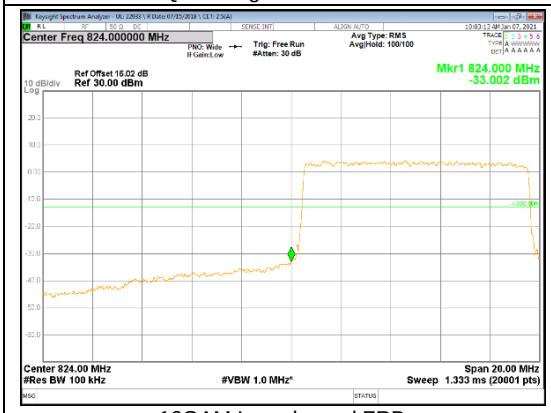
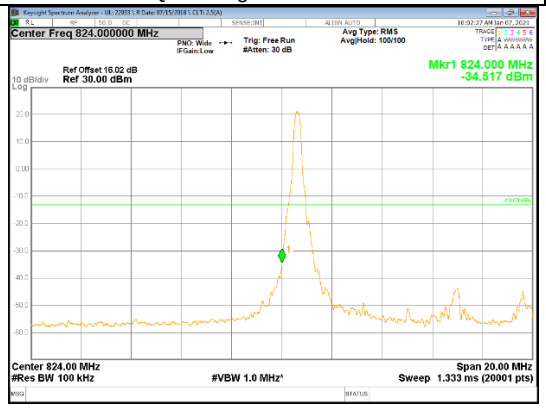
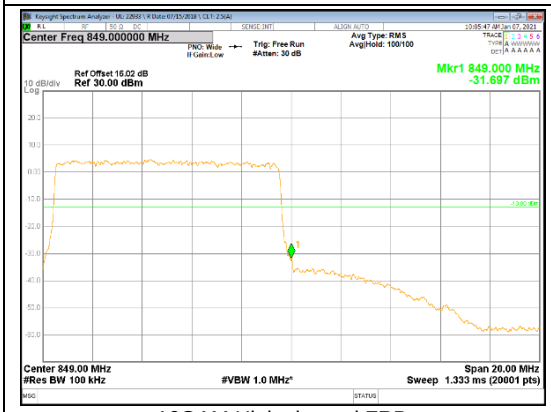
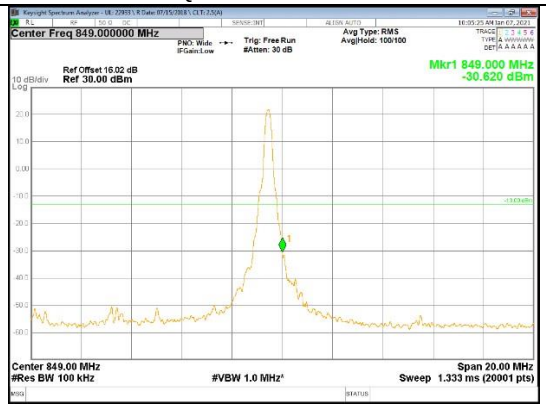


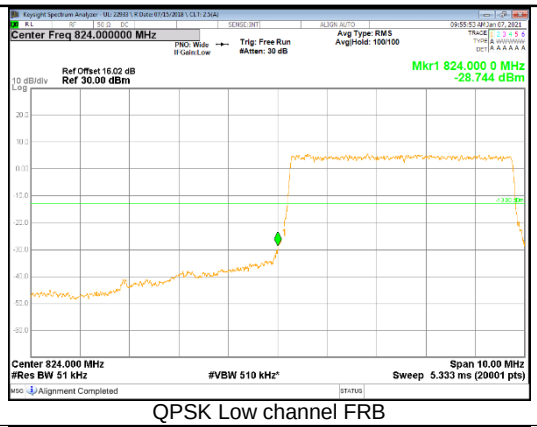
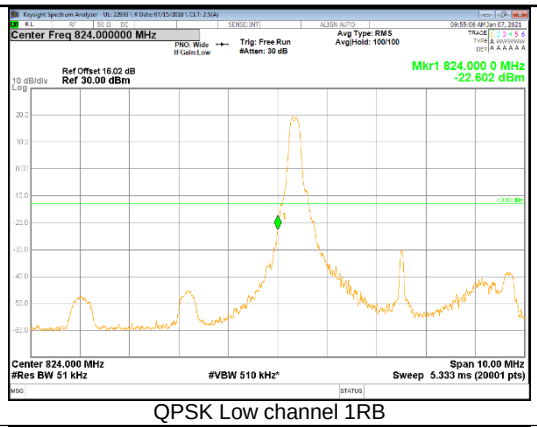
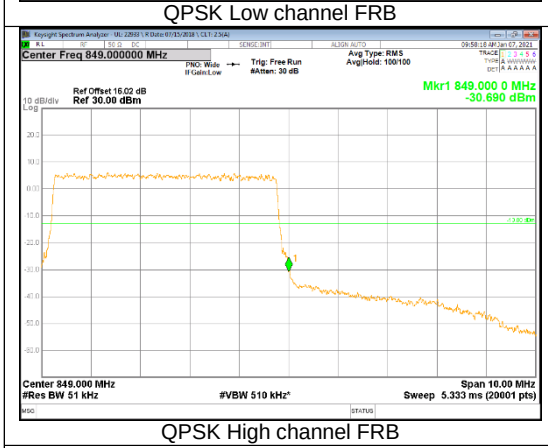
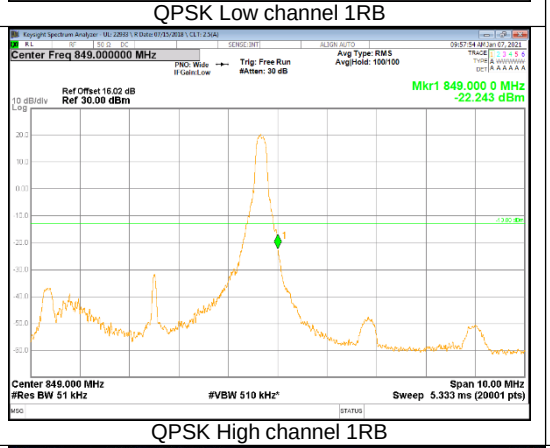
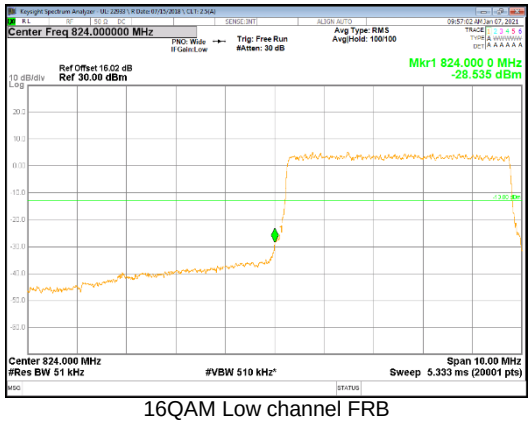
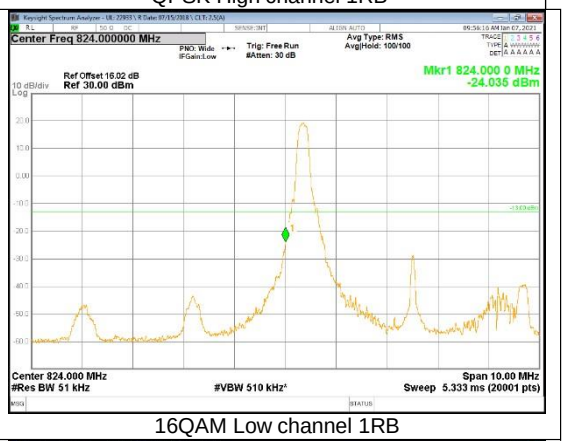
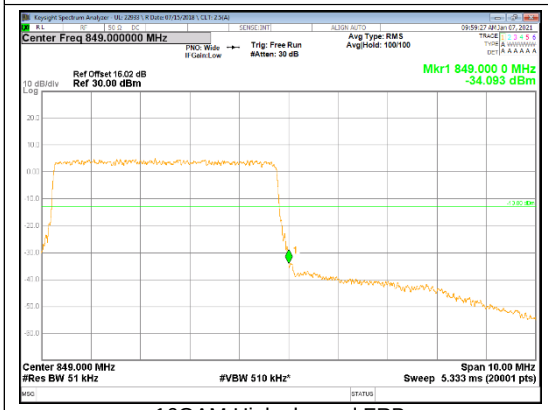
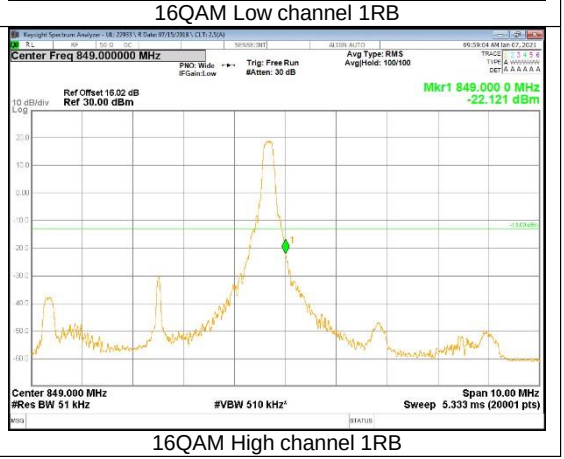
GSM1900 EGPRS High channel

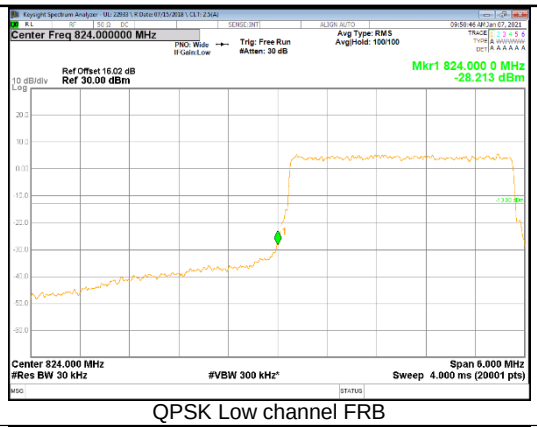
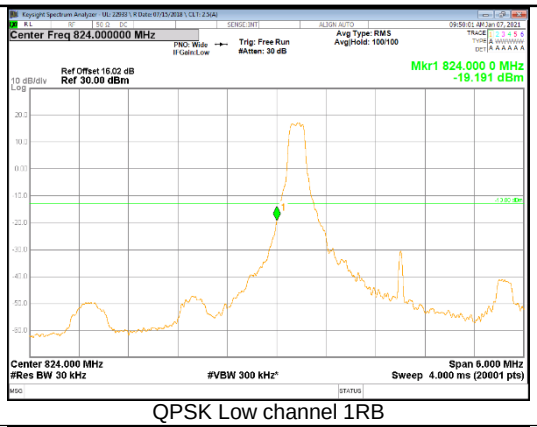
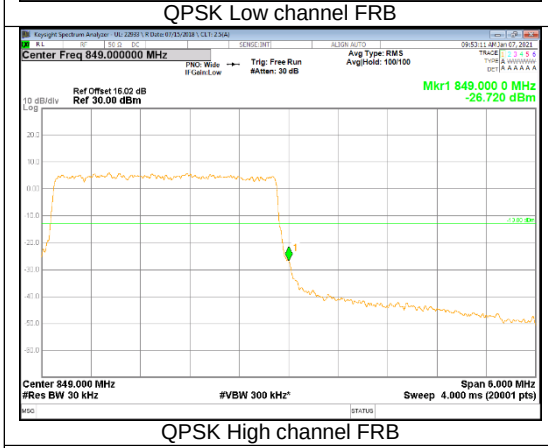
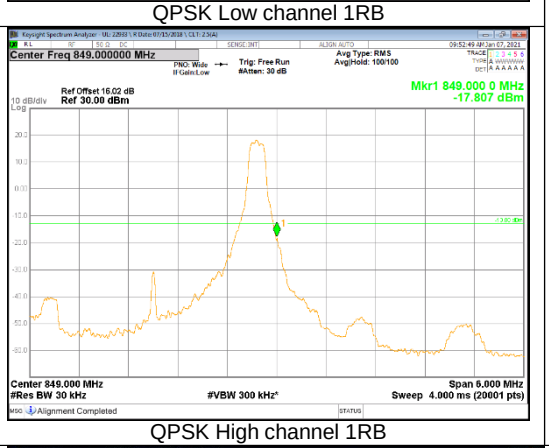
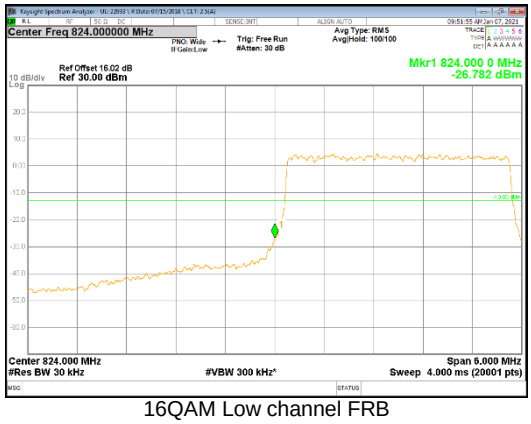
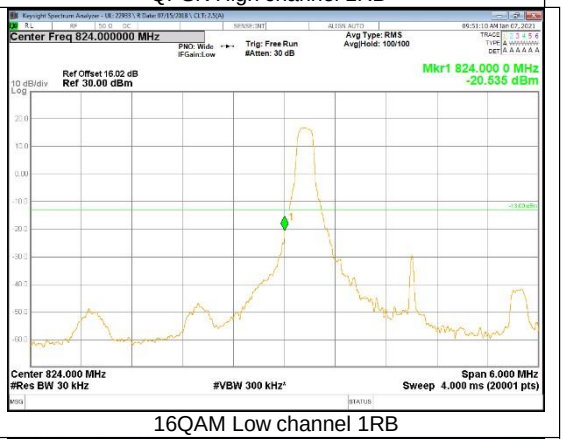
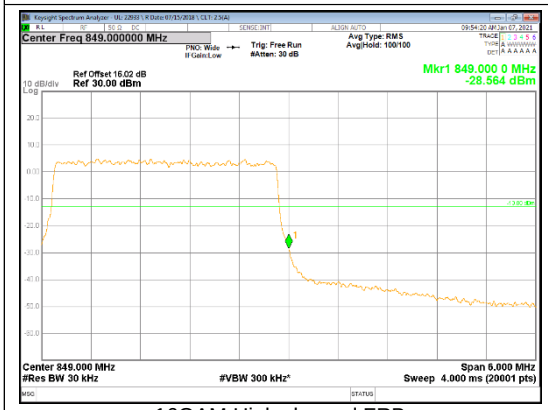
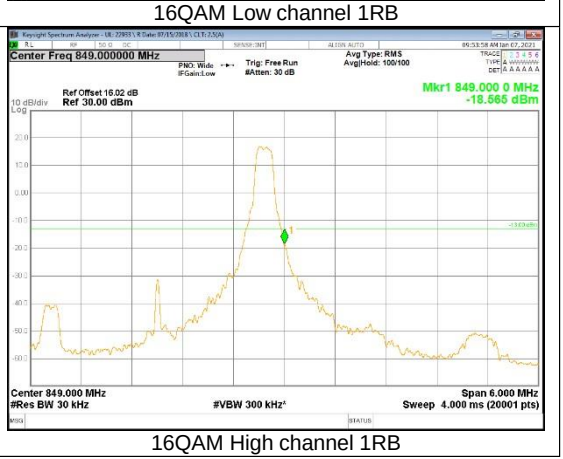
WCDMA

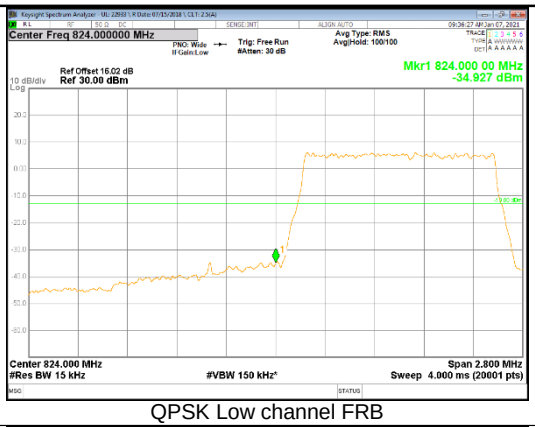
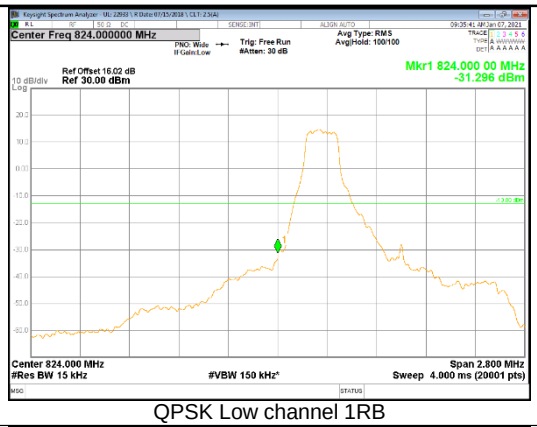
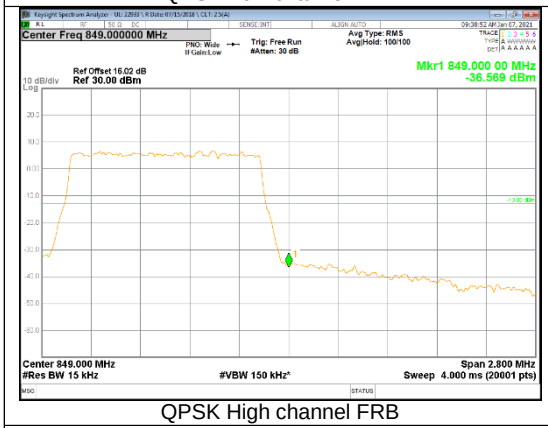
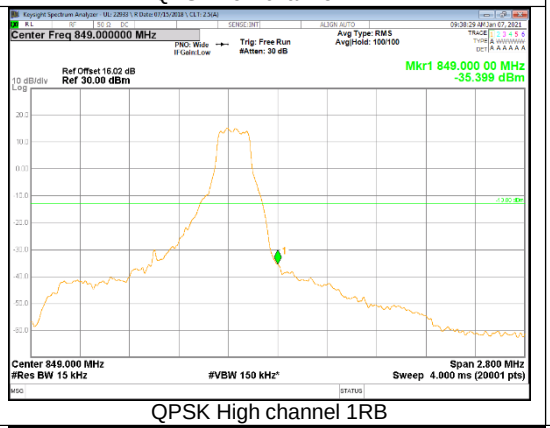
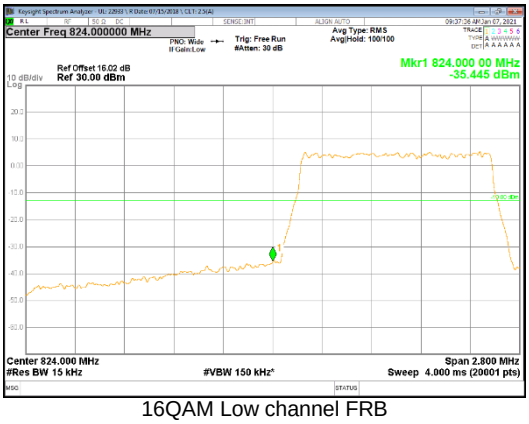
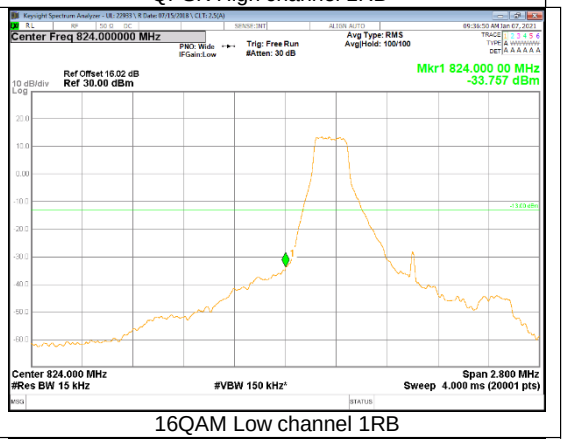
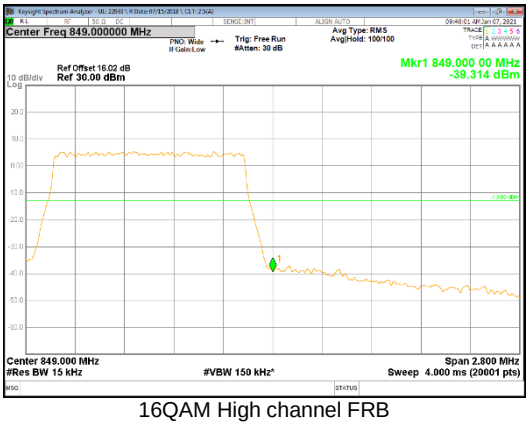
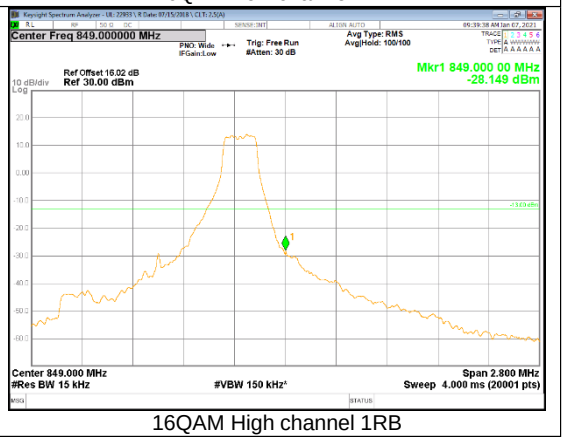
Band 5	 REL99 Low channel	 HSDPA Low channel
	 REL99 High channel	 HSDPA High channel

LTE Band 5

Band 5 10MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

Band 5 5MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

Band 5 3MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

Band 5 1.4MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB