FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART H
FCC CFR47 PART 27 SUBPART L

WWAN

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Tablet + BT/BLE and DTS b/g/n

MODEL NUMBER : SM-T285M

FCC ID: A3LSMT285M

REPORT NUMBER: 16K22923-E4V1

ISSUE DATE: Mar 02, 2016

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by
UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	03/02/16	Initial issue	Junwhan Lee

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

TABLE OF CONTENTS

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Tablet + BT/BLE and DTS b/g/n
MODEL NUMBER:	SM-T285M
SERIAL NUMBER:	R32H1008CLH (RADIATED); R32H1008CQL (CONDUCTED)
DATE TESTED:	FEB 22, 2016 - FEB 29, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E, 27H and 27L	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:

CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-D, FCC CFR 47 Part 22, FCC CFR Part 24 and FCC CFR Part 27.

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

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at http://www.iasonline.org/PDF/TL/TL-637.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	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Tablet + BT/BLE and DTS b/g/n.

5.2. MAXIMUM OUTPUT POWER (GSM)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24						
Band	Frequency Range	Modulation	Conducted		Radiated	
	[MHz]	Peak	Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
GSM850	824~849	GMSK	32.90	1949.84		
		GPRS	32.90	1949.84	28.63	729.46
		EGPRS	26.60	457.09	23.24	210.86
GSM1900	1850~1910	GMSK	29.70	933.25		
		GPRS	29.80	954.99	30.00	1000.00
		EGPRS	26.00	398.11	26.59	456.04

5.3. MAXIMUM OUTPUT POWER (WCDMA)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24						
Band	Frequency Range	Modulation	Conducted		Radiated	
	[MHz]	Peak	Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824~849	REL99	24.02	252.35	17.05	50.70
		HSDPA	23.79	239.33	17.36	54.45
		HSUPA	23.45	221.31		
Band 4	1710~1755	REL99	23.41	219.28	22.45	175.79
		HSDPA	22.71	186.64	22.99	199.07
		HSUPA	21.82	152.05		
Band 2	1850~1910	REL99	23.46	221.82	23.26	211.84
		HSDPA	22.90	194.98	21.67	146.89
		HSUPA	21.89	154.53		

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

5.4. MAXIMUM OUTPUT POWER (LTE)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

LTE Band 17

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 17	704 ~ 716	10	QPSK	23.98	250.03	11.22	13.24
			16QAM	22.93	196.34	10.74	11.86
		5	QPSK	23.88	244.34	11.08	12.82
			16QAM	23.00	199.53	10.70	11.75

LTE Band 5

FCC Part 22							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824 ~ 849	10	QPSK	24.47	279.90	14.49	28.12
			16QAM	23.48	222.84	14.24	26.55
		5	QPSK	24.50	281.84	14.66	29.24
			16QAM	23.50	223.87	14.33	27.10
		3	QPSK	24.41	276.06	14.59	28.77
			16QAM	23.29	213.30	14.82	30.34
		1.4	QPSK	24.29	268.53	12.62	18.28
			16QAM	23.50	223.87	12.30	16.98

LTE Band 4

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 4	1710 ~ 1755	20	QPSK	24.50	281.84	19.87	97.05
			16QAM	23.50	223.87	19.50	89.13
		15	QPSK	24.50	281.84	19.76	94.62
			16QAM	23.50	223.87	19.49	88.92
		10	QPSK	24.50	281.84	19.95	98.86
			16QAM	23.50	223.87	19.63	91.83
		5	QPSK	24.50	281.84	20.07	101.62
			16QAM	23.48	222.84	19.73	93.97
		3	QPSK	24.50	281.84	20.16	103.75
			16QAM	23.50	223.87	19.80	95.50
		1.4	QPSK	24.50	281.84	17.73	59.29
			16QAM	23.50	223.87	17.38	54.70

LTE Band 2

FCC Part 24							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 2	1850 ~ 1910	20	QPSK	23.50	223.87	19.90	97.72
			16QAM	23.50	223.87	19.90	97.72
		15	QPSK	23.50	223.87	20.84	121.34
			16QAM	23.29	213.30	20.91	123.31
		10	QPSK	23.50	223.87	20.33	107.89
			16QAM	23.00	199.53	20.42	110.15
		5	QPSK	23.50	223.87	20.85	121.62
			16QAM	23.36	216.77	20.95	124.45
		3	QPSK	23.41	219.28	20.31	107.40
			16QAM	22.91	195.43	20.59	114.55
		1.4	QPSK	23.35	216.27	21.62	145.21
			16QAM	23.27	212.32	21.69	147.57

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
GSM850 / WCDMA Band 5 / LTE Band 5 824 ~ 849 MHz	-2.8
GSM1900 / WCDMA Band 2 / LTE Band 2 1850 ~ 1910 MHz	2.1
LTE Band 17 704 ~ 716 MHz	-14
WCDMA Band 4 / LTE Band 4 1710 ~ 1755 MHz	-1.9

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	ETA0U83EWE	DW1GB01PS/A-E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

I/O CABLES

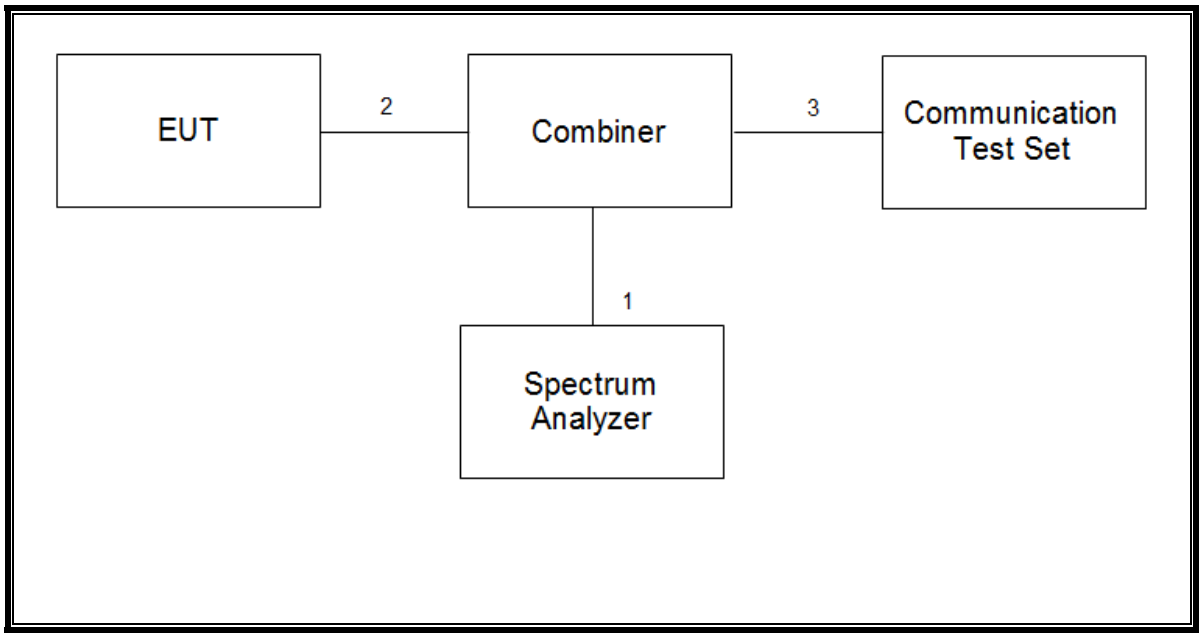
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Mini-USB	Shielded	0.8m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

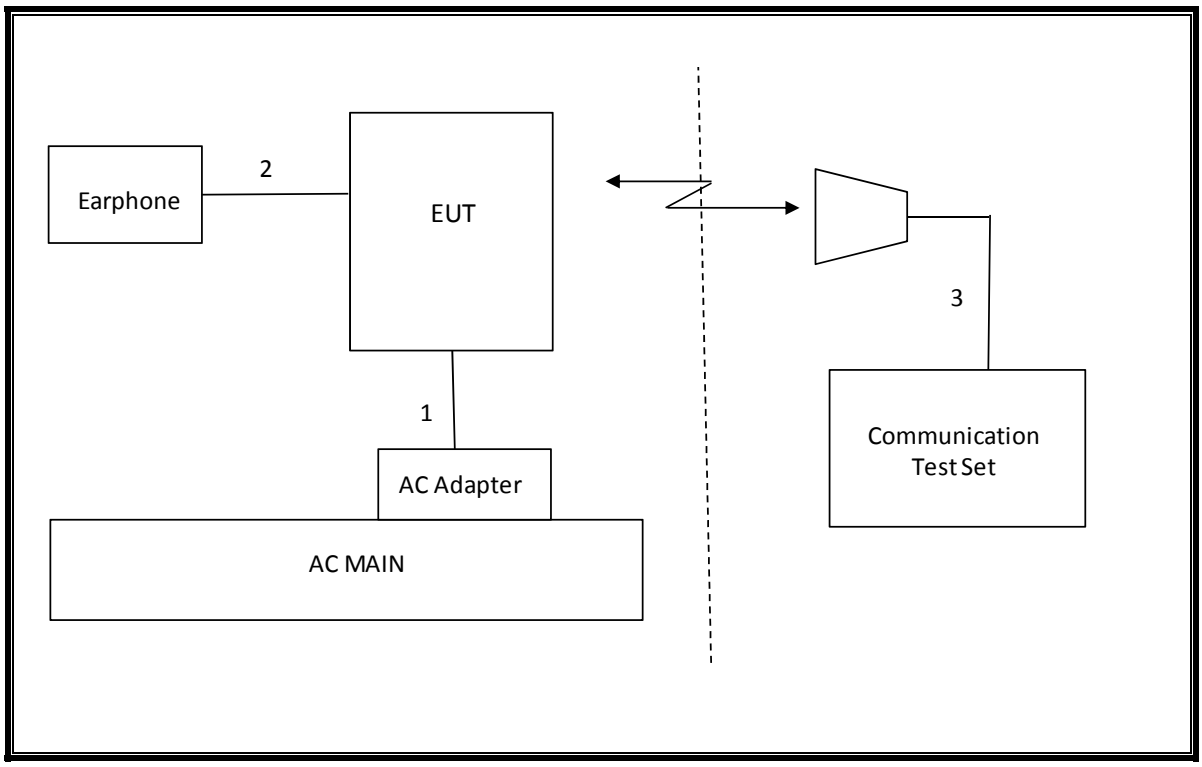
The EUT is continuously communicated to the call box during the tests.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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	07-28-16
Antenna, Horn, 40 GHz	ETS	3116C	00166155	09-23-16
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-24-17
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Combiner	WEINSCHEL	1575	2151	08-20-16
Communications Test Set	R&S	CMW500	150312	08-18-16
Communications Test Set	R&S	CMW500	115331	08-18-16
Communications Test Set	R&S	CMW500	102271	08-18-16
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-16
Average Power Sensor	R&S	NRZ-Z91	102681	08-18-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	016	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	015	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16

7. Summary Table

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Note
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass	17.999 MHz
22.917(a) 24.238(a) 27.53(g)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-14.033 dBm
2.1046	Conducted output power	N/A		Pass	32.9 dBm
22.355 24.235 27.54	Frequency Stability	2.5PPM		Pass	-0.007PPM
22.913(a)(2)	Effective Radiated Power	38 dBm	Radiated	Pass	28.63 dBm
27.50(c)(10)		34.77 dBm		Pass	11.22 dBm
24.232(c)	Equivalent Isotropic Radiated Power	33dBm		Pass	30.00 dBm
27.50(d)(4)		30dBm		Pass	22.99dBm
22.917(a) 24.238(a) 27.53(g)	Radiated Spurious Emission	-13dBm		Pass	-33.4 dBm

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

FCC Rule Part	Frequency Range [MHz]	Output Power [W]	Frequency Tolerance	Emission Designator	Emission Bandwidth [MHz]	Communication Type
GSM						
22H	824.2 - 848.8	0.729	2.5 ppm	248KGXW		GSM850
22H	824.2 - 848.8	0.211	2.5 ppm	246KG7W		EDGE850
24E	1850.2 - 1909.8	1.000	2.5 ppm	246KGXW		GSM1900
24E	1850.2 - 1909.8	0.456	2.5 ppm	244KG7W		EDGE1900
WCDMA						
22H	826.4 - 846.6	0.054	2.5 ppm	4M10F9W		WCDMA B5
27L	1712.4 - 1752.6	0.199	2.5 ppm	4M09F9W		WCDMA B4
24E	1852.4 - 1907.6	0.212	2.5 ppm	4M09F9W		WCDMA B2
LTE Band 2						
24E	1860.0 - 1900.0	0.098	2.5 ppm	18M0G7W	20	QPSK
24E	1860.0 - 1900.0	0.098	2.5 ppm	18M0D7W	20	16QAM
24E	1850.7 - 1909.3	0.145	2.5 ppm	1M10G7W	1.4	QPSK
24E	1850.7 - 1909.3	0.148	2.5 ppm	1M11D7W	1.4	16QAM
LTE Band 4						
27L	1720.0 - 1745.0	0.097	2.5 ppm	17M9G7W	20	QPSK
27L	1720.0 - 1745.0	0.089	2.5 ppm	17M9D7W	20	16QAM
27L	1711.5 - 1753.5	0.104	2.5 ppm	2M69G7W	3	QPSK
27L	1711.5 - 1753.5	0.096	2.5 ppm	2M69D7W	3	16QAM
LTE Band 5						
22H	829.0 - 844.0	0.028	2.5 ppm	8M99G7W	10	QPSK
22H	829.0 - 844.0	0.027	2.5 ppm	8M99D7W	10	16QAM
22H	826.5 - 846.5	0.029	2.5 ppm	4M50G7W	5	QPSK
22H	825.5 - 847.5	0.030	2.5 ppm	2M69D7W	3	16QAM
LTE Band 17						
27H	709.0 - 711.0	0.013	2.5 ppm	8M98G7W	10	QPSK
27H	709.0 - 711.0	0.012	2.5 ppm	8M98D7W	10	16QAM

8. RF POWER OUTPUT VERIFICATION

8.1. GSM/GPRS/EDGE

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
> 30 dBm for GPRS1800/1900
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 > CS4 (GPRS) and MCS5 ~ MCS9 (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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

8.1.1. GSM OUTPUT POWER RESULT

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. [MHz]	Max. Power	
						Burst Pwr [dBm]	Frame Pwr [dBm]
850	GSM (Voice)	CS1	1	128	824.2	32.80	23.77
				190	836.6	32.90	23.87
				251	848.8	32.90	23.87
	GPRS (GMSK)	CS1	1	128	824.2	32.80	23.77
				190	836.6	32.90	23.87
				251	848.8	32.80	23.77
			2	128	824.2	31.20	25.18
				190	836.6	31.30	25.28
				251	848.8	31.30	25.28
			3	128	824.2	29.40	25.14
				190	836.6	29.50	25.24
				251	848.8	29.50	25.24
			4	128	824.2	27.30	24.29
				190	836.6	27.40	24.39
				251	848.8	27.50	24.49
	EGPRS (8PSK)	MCS5	1	128	824.2	26.40	17.37
				190	836.6	26.60	17.57
				251	848.8	26.60	17.57
			2	128	824.2	24.50	18.48
				190	836.6	24.50	18.48
				251	848.8	24.60	18.58
			3	128	824.2	24.10	19.84
				190	836.6	24.20	19.94
				251	848.8	25.20	20.94
			4	128	824.2	23.20	20.19
				190	836.6	23.20	20.19
				251	848.8	23.20	20.19

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. [MHz]	Max. Power	
						Burst Pwr [dBm]	Frame Pwr [dBm]
1900	GSM (Voice)	CS1	1	512	1850.2	29.70	20.67
				661	1880.0	29.50	20.47
				810	1909.8	29.70	20.67
	GPRS (GMSK)	CS1	1	512	1850.2	29.80	20.77
				661	1880.0	29.50	20.47
				810	1909.8	29.80	20.77
			2	512	1850.2	27.30	21.28
				661	1880.0	27.50	21.48
				810	1909.8	27.50	21.48
			3	512	1850.2	26.10	21.84
				661	1880.0	26.30	22.04
				810	1909.8	26.20	21.94
			4	512	1850.2	24.00	20.99
				661	1880.0	24.20	21.19
				810	1909.8	24.10	21.09
	EGPRS (8PSK)	MCS5	1	512	1850.2	25.80	16.77
				661	1880.0	25.70	16.67
				810	1909.8	26.00	16.97
			2	512	1850.2	23.30	17.28
				661	1880.0	23.30	17.28
				810	1909.8	23.60	17.58
			3	512	1850.2	23.10	18.84
				661	1880.0	23.00	18.74
				810	1909.8	23.30	19.04
			4	512	1850.2	21.90	18.89
				661	1880.0	21.70	18.69
				810	1909.8	22.00	18.99

8.2. UMTS REL 99

Release 99 Setup Procedures used to establish the test signals

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 Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 7 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs=βhs/βc	30/15			

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	15/1
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15	56/75	47/15
	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	E-DPDCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
	Reference E-TFCI PO	27	27	27	27	27
	Maximum Channelisation Codes	2xSF2				SF4

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

DC-HSDPA Setup Procedures used to establish the test signals

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

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.		

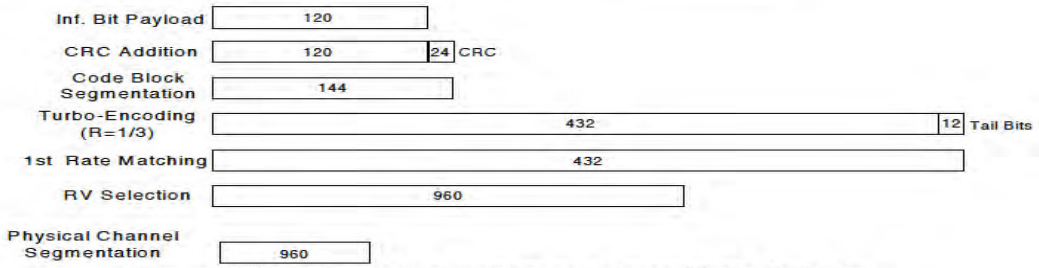


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	11/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

8.2.1. WCDMA OUTPUT POWER RESULT

WCDMA Band 5 Measured Results

Band	Mode		UL Ch No.	Freq. [MHz]	MPR [dB]	Avg Pwr [dBm]
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	0	23.86
			4183	836.6	0	24.02
			4233	846.6	0	23.99
	HSDPA	Subtest 1	4132	826.4	0	23.19
			4183	836.6	0	23.66
			4233	846.6	0	23.58
		Subtest 2	4132	826.4	0	23.49
			4183	836.6	0	23.73
			4233	846.6	0	23.72
		Subtest 3	4132	826.4	0.5	23.60
			4183	836.6	0.5	23.85
			4233	846.6	0.5	23.80
		Subtest 4	4132	826.4	0.5	23.53
			4183	836.6	0.5	23.79
			4233	846.6	0.5	23.77
	HSUPA	Subtest 1	4132	826.4	0	21.73
			4183	836.6	0	22.17
			4233	846.6	0	22.15
		Subtest 2	4132	826.4	2	19.79
			4183	836.6	2	20.22
			4233	846.6	2	20.19
		Subtest 3	4132	826.4	1	21.10
			4183	836.6	1	21.52
			4233	846.6	1	21.49
		Subtest 4	4132	826.4	2	20.64
			4183	836.6	2	21.05
			4233	846.6	2	21.01
		Subtest 5	4132	826.4	0	23.02
			4183	836.6	0	23.45
			4233	846.6	0	23.42

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA Band 4 Measured Results

Band	Mode		UL Ch No.	Freq. [MHz]	MPR [dB]	Avg Pwr [dBm]
W-CDMA Band IV	Rel 99	RMC, 12.2 kbps	1312	1712.4	0	23.09
			1413	1732.6	0	23.41
			1513	1752.6	0	23.36
	HSDPA	Subtest 1	1312	1712.4	0	22.00
			1413	1732.6	0	22.71
			1513	1752.6	0	22.24
		Subtest 2	1312	1712.4	0	21.81
			1413	1732.6	0	22.59
			1513	1752.6	0	22.02
		Subtest 3	1312	1712.4	0.5	21.77
			1413	1732.6	0.5	22.50
			1513	1752.6	0.5	22.08
		Subtest 4	1312	1712.4	0.5	21.73
			1413	1732.6	0.5	22.50
			1513	1752.6	0.5	22.06
	HSUPA	Subtest 1	1312	1712.4	0	20.50
			1413	1732.6	0	21.51
			1513	1752.6	0	20.92
		Subtest 2	1312	1712.4	2	18.74
			1413	1732.6	2	19.56
			1513	1752.6	2	19.01
		Subtest 3	1312	1712.4	1	20.03
			1413	1732.6	1	20.85
			1513	1752.6	1	20.29
		Subtest 4	1312	1712.4	2	19.53
			1413	1732.6	2	20.34
			1513	1752.6	2	19.80
		Subtest 5	1312	1712.4	0	20.98
			1413	1732.6	0	21.82
			1513	1752.6	0	21.18

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA Band 2 Measured Results

Band	Mode		UL Ch No.	Freq. [MHz]	MPR [dB]	Avg Pwr [dBm]
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	0	23.46
			9400	1880.0	0	23.20
			9538	1907.6	0	23.39
	HSDPA	Subtest 1	9262	1852.4	0	22.50
			9400	1880.0	0	22.80
			9538	1907.6	0	22.90
		Subtest 2	9262	1852.4	0	22.51
			9400	1880.0	0	22.65
			9538	1907.6	0	22.67
		Subtest 3	9262	1852.4	0.5	22.54
			9400	1880.0	0.5	22.66
			9538	1907.6	0.5	22.68
		Subtest 4	9262	1852.4	0.5	22.48
			9400	1880.0	0.5	22.66
			9538	1907.6	0.5	22.68
	HSUPA	Subtest 1	9262	1852.4	0	20.16
			9400	1880.0	0	20.64
			9538	1907.6	0	20.58
		Subtest 2	9262	1852.4	2	18.48
			9400	1880.0	2	18.82
			9538	1907.6	2	18.97
		Subtest 3	9262	1852.4	1	19.00
			9400	1880.0	1	19.16
			9538	1907.6	1	19.28
		Subtest 4	9262	1852.4	2	18.35
			9400	1880.0	2	18.69
			9538	1907.6	2	18.83
		Subtest 5	9262	1852.4	0	21.56
			9400	1880.0	0	21.82
			9538	1907.6	0	21.89

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

8.3. LTE OUTPUT VERIFICATION

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 3

Modulation	Channel bandwidth / Transmission bandwidth (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

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 Signalling Value of "NS_01".

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

Network Signalling value	Requirements (sub-clause)	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	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

8.3.1. LTE OUTPUT POWER RESULT

LTE Band 17 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm) 23790 710 MHz
10	QPSK	1	0	0	23.09
		1	25	0	23.98
		1	49	0	22.90
		25	0	1	22.02
		25	12	1	21.96
		25	25	1	22.03
		50	0	1	22.00
	16QAM	1	0	1	22.90
		1	25	1	22.93
		1	49	1	22.52
		25	0	2	21.56
		25	12	2	21.50
		25	25	2	21.58
		50	0	2	21.55
BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm) 23790 710 MHz
5	QPSK	1	0	0	23.31
		1	12	0	23.88
		1	24	0	23.25
		12	0	1	21.97
		12	7	1	22.00
		12	13	1	21.93
		25	0	1	21.90
	16QAM	1	0	1	23.00
		1	12	1	23.00
		1	24	1	23.00
		12	0	2	21.41
		12	7	2	21.42
		12	13	2	21.62
		25	0	2	21.67

LTE Band 5

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	24.31	24.31	24.09
			1	25	0	24.30	24.09	24.46
			1	49	0	24.38	24.47	24.21
			25	0	1	22.22	22.00	22.51
			25	12	1	22.25	22.14	22.44
			25	25	1	22.24	22.11	22.48
			50	0	1	22.09	21.90	22.35
		16QAM	1	0	1	23.27	23.16	23.08
			1	25	1	23.23	23.02	23.41
			1	49	1	23.23	23.48	23.16
			25	0	2	21.74	21.74	22.12
			25	12	2	21.79	21.71	22.12
			25	25	2	21.71	21.76	22.03
			50	0	2	21.89	21.62	22.21

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.19	24.09	24.50
			1	12	0	24.17	24.06	24.32
			1	24	0	24.23	24.08	24.24
			12	0	1	22.33	22.06	22.56
			12	7	1	22.22	22.11	22.19
			12	13	1	22.25	22.08	22.20
			25	0	1	22.28	21.97	22.17
		16QAM	1	0	1	23.09	23.30	23.50
			1	12	1	23.04	23.24	23.38
			1	24	1	23.01	23.26	23.37
			12	0	2	21.76	21.75	22.08
			12	7	2	21.62	21.68	21.85
			12	13	2	21.70	21.71	21.83
			25	0	2	21.94	21.71	21.69

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.11	24.31	24.29
			1	8	0	24.28	24.16	24.34
			1	14	0	24.32	24.33	24.41
			8	0	1	22.34	22.07	22.35
			8	4	1	22.43	22.14	22.27
			8	7	1	22.41	22.13	22.34
			15	0	1	22.43	22.22	22.34
		16QAM	1	0	1	23.22	23.09	23.21
			1	8	1	23.29	22.88	23.27
			1	14	1	23.27	22.85	23.27
			8	0	2	21.95	21.99	21.94
			8	4	2	22.00	22.06	21.97
			8	7	2	21.98	22.04	21.95
			15	0	2	21.96	21.79	21.89

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	24.16	24.03	24.25
			1	3	0	24.17	24.29	24.29
			1	5	0	24.24	24.05	24.27
			3	0	0	24.14	23.99	24.28
			3	1	0	24.14	23.99	24.28
			3	3	0	24.13	24.03	24.25
			6	0	1	22.32	22.18	22.17
		16QAM	1	0	1	23.49	23.48	23.22
			1	3	1	23.47	23.46	23.23
			1	5	1	23.48	23.39	23.29
			3	0	1	23.48	23.48	23.32
			3	1	1	23.44	23.46	23.31
			3	3	1	23.50	23.49	23.26
			6	0	2	22.27	21.66	22.07

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20050	20175	20300
						1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0	24.14	24.44	24.42
			1	49	0	24.21	24.45	24.36
			1	99	0	24.37	24.50	24.26
			50	0	1	21.79	21.94	22.00
			50	24	1	21.87	22.03	21.92
			50	50	1	21.87	21.91	21.89
			100	0	1	21.92	22.00	21.90
		16QAM	1	0	1	22.74	23.42	23.28
			1	49	1	22.90	23.50	23.13
			1	99	1	23.08	23.47	23.03
			50	0	2	21.55	21.64	21.67
			50	24	2	21.57	21.62	21.58
			50	50	2	21.57	21.62	21.65
			100	0	2	21.61	21.62	21.60
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20025	20175	20325
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	24.21	24.49	24.34
			1	37	0	24.27	24.48	24.31
			1	74	0	24.43	24.50	24.21
			36	0	1	21.72	21.95	21.92
			36	20	1	21.70	21.91	21.95
			36	39	1	21.78	22.06	21.87
			75	0	1	21.70	22.01	21.92
		16QAM	1	0	1	22.55	23.50	23.50
			1	37	1	22.58	23.50	23.47
			1	74	1	22.65	23.50	23.41
			36	0	2	21.48	21.68	21.57
			36	20	2	21.46	21.65	21.55
			36	39	2	21.55	21.80	21.55
			75	0	2	21.47	21.73	21.60
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20000	20175	20350
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	24.17	24.44	24.37
			1	25	0	24.26	24.50	24.32
			1	49	0	24.31	24.50	24.30
			25	0	1	21.67	21.91	21.95
			25	12	1	21.80	21.95	21.97
			25	25	1	21.75	22.09	21.90
			50	0	1	21.85	21.95	21.91
		16QAM	1	0	1	22.50	23.50	22.61
			1	25	1	22.59	23.40	22.56
			1	49	1	22.62	23.40	22.52
			25	0	2	21.35	21.56	21.68
			25	12	2	21.50	21.56	21.66
			25	25	2	21.43	21.70	21.69
			50	0	2	21.39	21.67	21.71

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						19975	20175	20375
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	24.21	24.42	24.50
			1	12	0	24.24	24.49	24.50
			1	24	0	24.25	24.50	24.50
			12	0	1	21.63	22.02	21.91
			12	7	1	21.59	22.07	21.84
			12	13	1	21.59	22.01	21.88
			25	0	1	21.63	21.97	21.87
		16QAM	1	0	1	23.34	23.03	23.41
			1	12	1	23.38	23.02	23.39
			1	24	1	23.48	23.14	23.42
			12	0	2	21.30	21.68	21.57
			12	7	2	21.30	21.72	21.54
			12	13	2	21.34	21.73	21.51
			25	0	2	21.21	21.73	21.54

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						19965	20175	20385
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	24.13	24.41	24.50
			1	8	0	24.25	24.49	24.50
			1	14	0	24.19	24.50	24.49
			8	0	1	21.66	22.02	21.94
			8	4	1	21.65	22.06	21.95
			8	7	1	21.70	22.09	21.89
			15	0	1	21.73	22.10	21.92
		16QAM	1	0	1	22.47	23.50	22.73
			1	8	1	22.55	23.50	22.56
			1	14	1	22.62	23.50	22.58
			8	0	2	21.32	21.66	21.78
			8	4	2	21.33	21.65	21.73
			8	7	2	21.26	21.69	21.70
			15	0	2	21.33	21.82	21.55

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						19957	20175	20393
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	24.29	24.50	24.49
			1	3	0	24.31	24.50	24.50
			1	5	0	24.34	24.50	24.50
			3	0	0	24.18	24.50	24.49
			3	1	0	24.17	24.50	24.50
			3	3	0	24.17	24.50	24.49
			6	0	1	21.67	22.10	22.02
		16QAM	1	0	1	23.02	23.50	22.67
			1	3	1	23.02	23.50	22.72
			1	5	1	23.04	23.50	22.75
			3	0	1	22.85	23.50	23.26
			3	1	1	22.83	23.50	23.27
			3	3	1	23.16	23.50	23.33
			6	0	2	21.38	21.64	22.12

LTE Band 2

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	23.40	23.22	22.93
			1	49	0	23.50	23.06	22.80
			1	99	0	23.25	23.12	23.07
			50	0	1	21.96	21.24	21.39
			50	24	1	21.91	21.12	21.41
			50	50	1	21.69	21.27	21.32
			100	0	1	21.92	21.19	21.45
		16QAM	1	0	0	23.16	23.00	23.50
			1	49	0	23.24	22.84	23.03
			1	99	0	23.06	22.90	23.48
			50	0	1	21.99	21.17	21.49
			50	24	1	21.86	21.22	21.46
			50	50	1	21.65	21.39	21.33
			100	0	1	21.89	21.28	21.52

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	23.40	23.17	23.00
			1	37	0	23.50	23.01	22.97
			1	74	0	23.36	23.09	23.21
			36	0	1	21.95	21.31	21.47
			36	20	1	21.84	21.13	21.35
			36	39	1	21.68	21.22	21.26
			75	0	1	21.79	21.28	21.40
		16QAM	1	0	0	22.96	23.09	23.24
			1	37	0	23.13	22.98	23.19
			1	74	0	22.92	23.04	23.29
			36	0	1	22.00	21.38	21.46
			36	20	1	21.91	21.28	21.37
			36	39	1	21.75	21.36	21.27
			75	0	1	21.94	21.31	21.37

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	23.33	23.05	23.06
			1	25	0	23.50	23.01	22.98
			1	49	0	23.46	23.06	23.18
			25	0	1	21.77	21.24	21.36
			25	12	1	21.92	21.15	21.23
			25	25	1	21.85	21.17	21.50
			50	0	1	21.92	21.17	21.25
		16QAM	1	0	0	22.95	22.99	22.71
			1	25	0	23.00	22.99	22.61
			1	49	0	23.00	23.00	22.88
			25	0	1	21.96	21.22	21.45
			25	12	1	22.00	21.16	21.39
			25	25	1	21.89	21.19	21.79
			50	0	1	22.00	21.16	21.36

LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	23.40	23.38	23.07
			1	12	0	23.45	23.33	23.33
			1	24	0	23.50	23.36	23.38
			12	0	1	21.70	21.27	21.58
			12	7	1	21.74	21.20	21.58
			12	13	1	21.72	21.31	21.48
			25	0	1	21.76	21.21	21.66
		16QAM	1	0	0	22.90	22.87	23.36
			1	12	0	22.93	22.87	23.20
			1	24	0	23.12	22.86	23.14
			12	0	1	21.77	21.40	21.68
			12	7	1	21.90	21.31	21.67
			12	13	1	21.95	21.40	21.41
			25	0	1	21.92	21.23	21.49

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	23.40	23.13	23.40
			1	8	0	23.41	23.12	23.34
			1	14	0	23.38	23.18	23.37
			8	0	1	21.73	21.24	21.57
			8	4	1	21.70	21.26	21.40
			8	7	1	21.73	21.26	21.45
			15	0	1	21.71	21.28	21.48
		16QAM	1	0	0	22.52	22.92	22.87
			1	8	0	22.60	22.84	22.71
			1	14	0	22.49	22.77	22.76
			8	0	1	21.59	21.22	21.79
			8	4	1	21.57	21.19	21.59
			8	7	1	21.58	21.25	21.60
			15	0	1	21.94	21.33	21.54

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	23.25	23.16	23.21
			1	3	0	23.35	23.21	23.26
			1	5	0	23.34	23.19	23.32
			3	0	0	23.20	23.02	23.27
			3	1	0	23.26	23.00	23.21
			3	3	0	23.23	22.97	23.28
			6	0	1	21.73	21.23	21.58
		16QAM	1	0	0	22.80	22.71	22.46
			1	3	0	22.82	22.69	22.44
			1	5	0	22.86	22.68	22.46
			3	0	0	23.05	23.00	23.13
			3	1	0	23.27	23.00	23.18
			3	3	0	23.22	23.00	23.20
			6	0	1	21.98	21.37	21.57

9. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r02;

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.

9.1. CONDUCTED PEAK TO AVERAGE RESULT

GSM

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
GSM850	190	836.6	GPRS	2.81	13.00
			EGPRS	5.71	
GSM1900	661	1880.0	GPRS	2.85	
			EGPRS	5.89	

WCDMA

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 5	4183	836.6	REL99	3.08	13.00
			HSDPA	3.22	
Band 4	1413	1732.6	REL99	3.07	
			HSDPA	3.26	
Band 2	9400	1880.0	REL99	3.23	
			HSDPA	3.37	

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

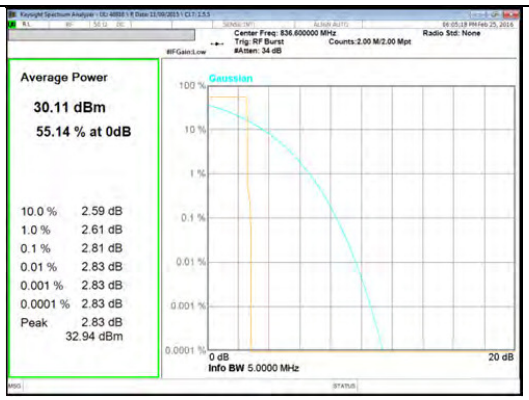
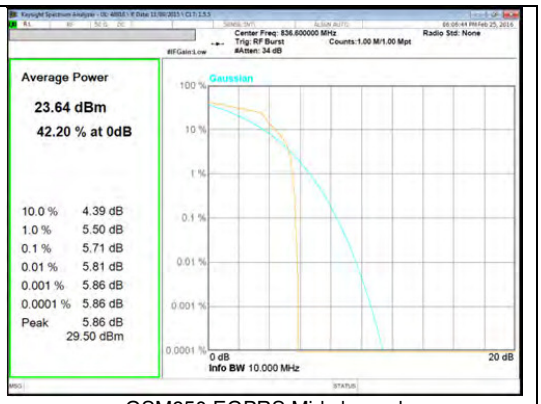
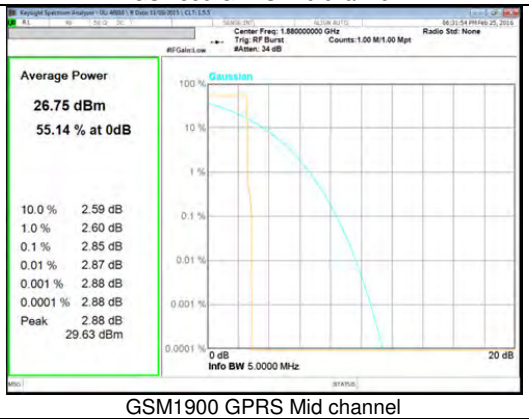
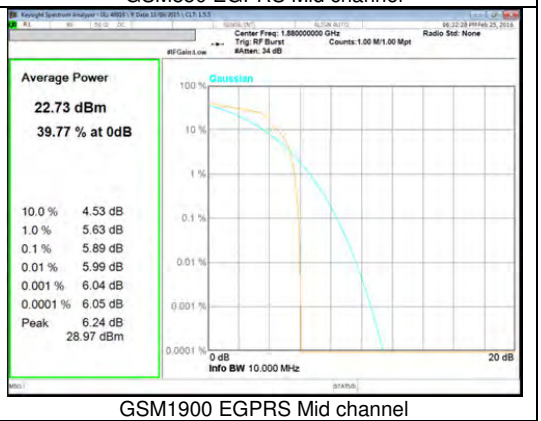
LTE

Band	BW [MHz]	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 17	10	23790	710	QPSK	4.69	13.00
				16QAM	5.82	
	5			QPSK	4.69	
				16QAM	5.82	
Band 5	10	20525	836.5	QPSK	4.81	
				16QAM	5.77	
	5			QPSK	4.70	
				16QAM	5.78	
	3			QPSK	4.75	
				16QAM	5.71	
	1.4			QPSK	4.93	
				16QAM	5.72	
Band 4	20	20174	1732.5	QPSK	4.82	
				16QAM	5.28	
	15			QPSK	4.88	
				16QAM	5.40	
	10			QPSK	4.88	
				16QAM	5.45	
	5			QPSK	4.74	
				16QAM	5.27	
	3			QPSK	4.84	
				16QAM	5.37	
	1.4			QPSK	4.79	
				16QAM	5.21	
Band 2	20	18900	1880.0	QPSK	5.31	
				16QAM	6.08	
	15			QPSK	5.31	
				16QAM	5.90	
	10			QPSK	5.32	
				16QAM	5.96	
	5			QPSK	5.14	
				16QAM	5.85	
	3			QPSK	5.31	
				16QAM	5.93	
	1.4			QPSK	5.49	
				16QAM	5.85	

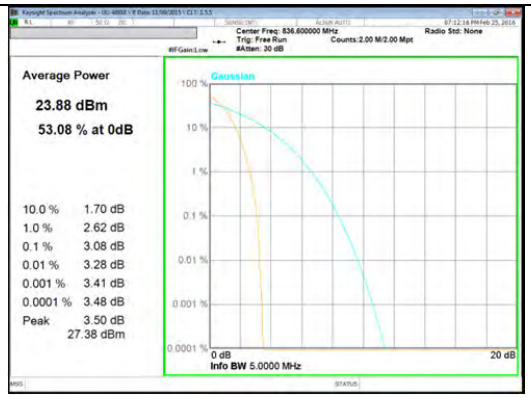
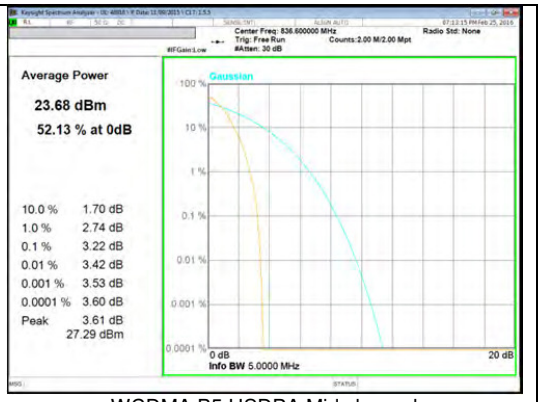
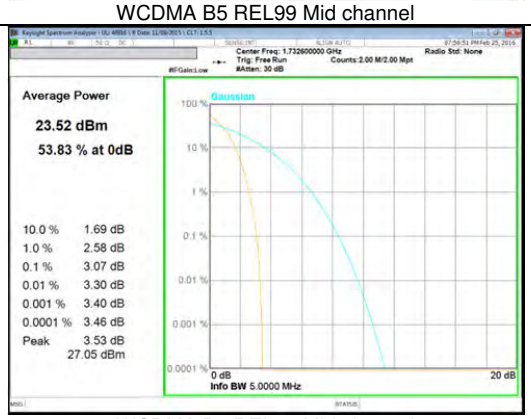
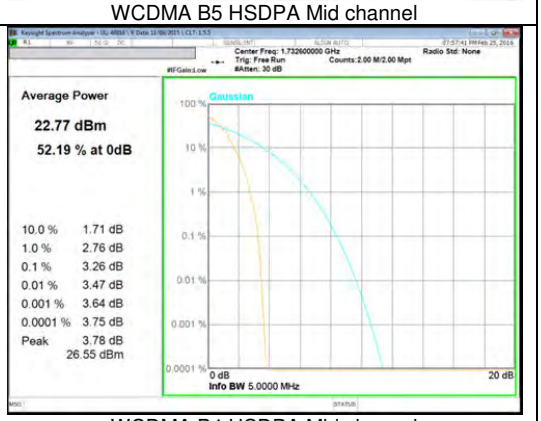
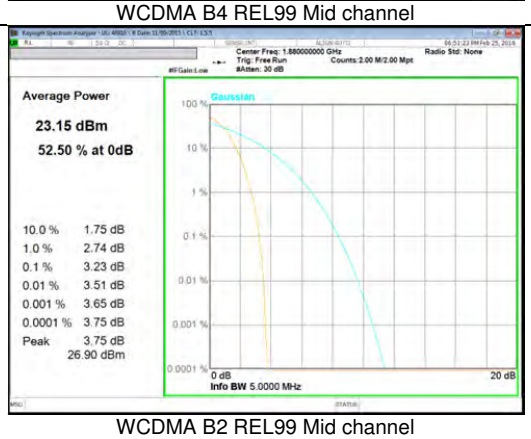
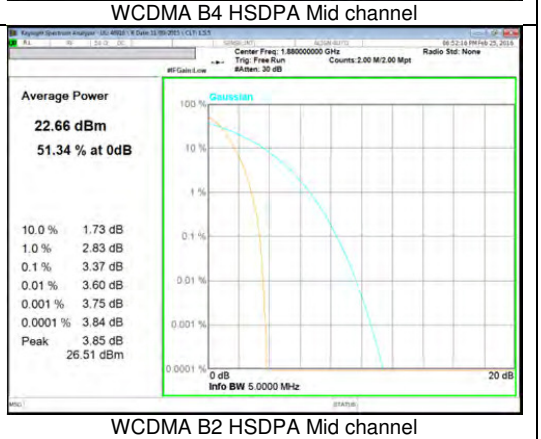
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

9.2. CONDUCTED PEAK TO AVERAGE PLOTS

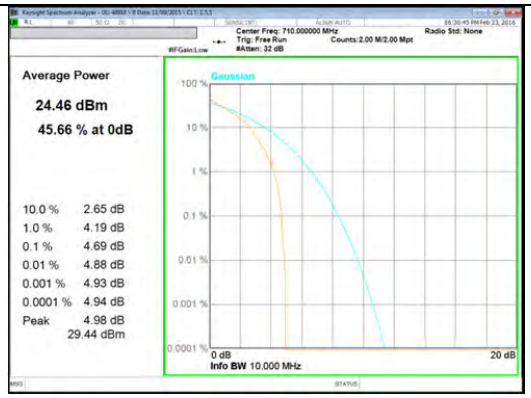
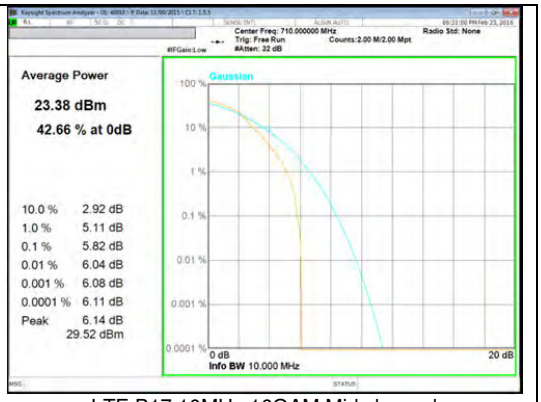
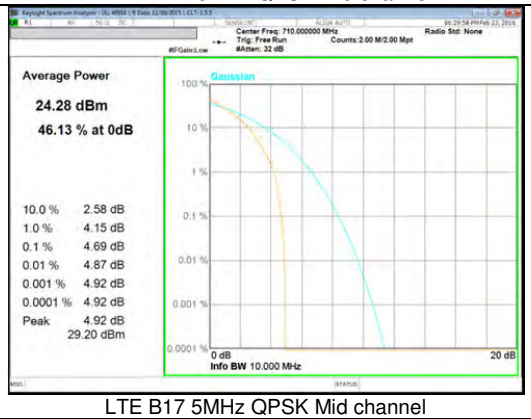
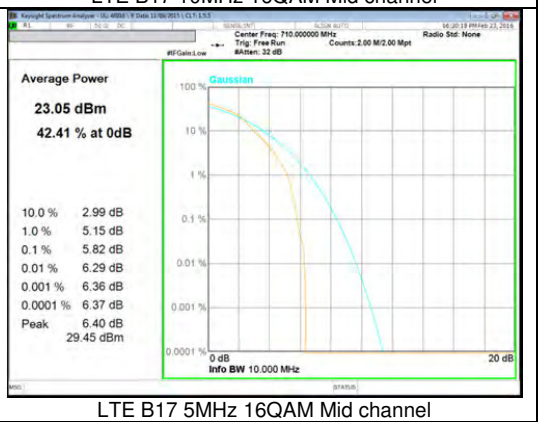
GSM

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

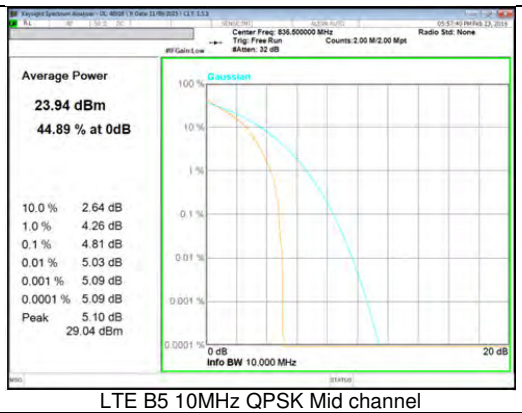
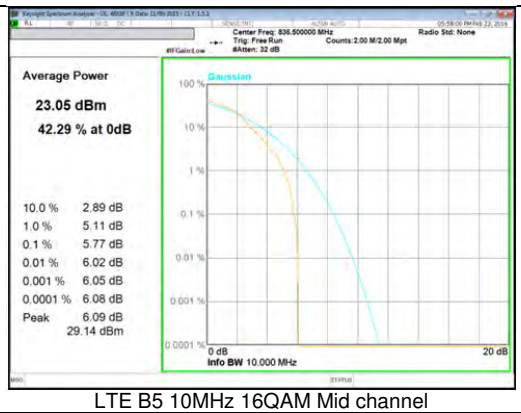
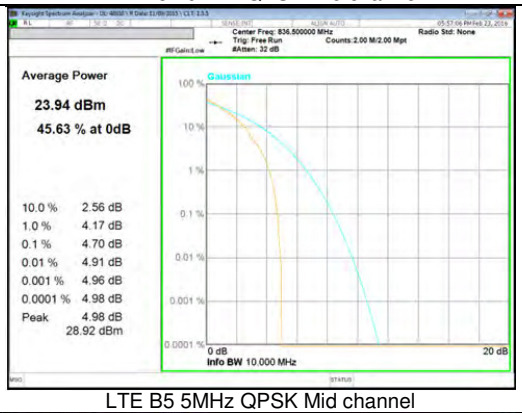
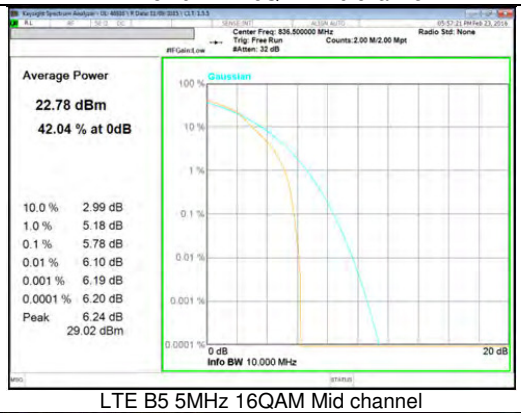
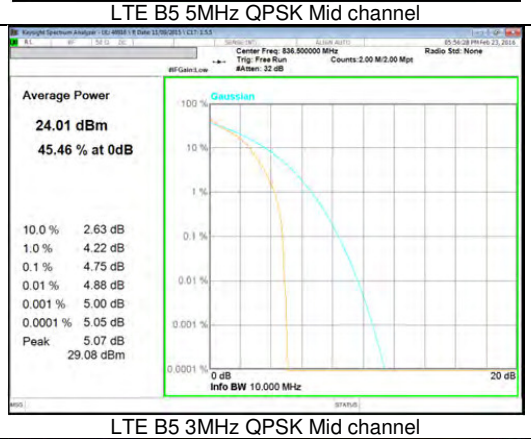
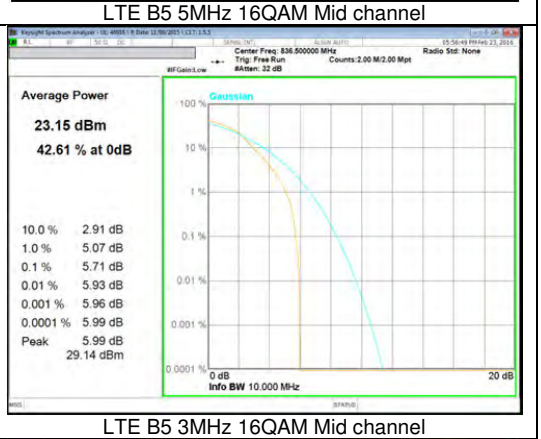
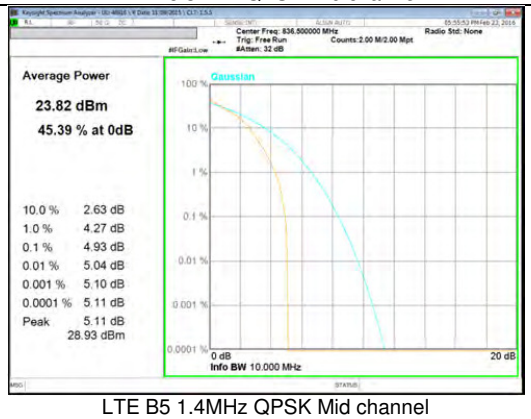
WCDMA

WCDMA Band 5	 WCDMA B5 REL99 Mid channel	 WCDMA B5 HSDPA Mid channel
WCDMA Band 4	 WCDMA B4 REL99 Mid channel	 WCDMA B4 HSDPA Mid channel
WCDMA Band 2	 WCDMA B2 REL99 Mid channel	 WCDMA B2 HSDPA Mid channel

LTE Band 17

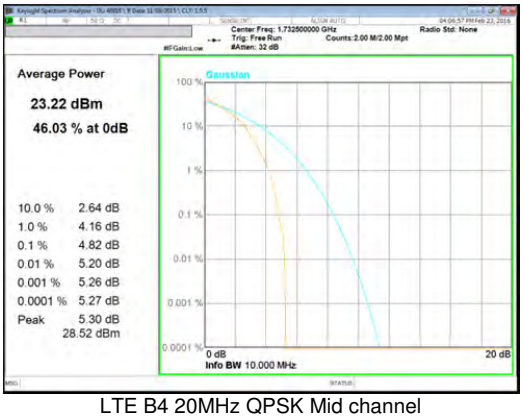
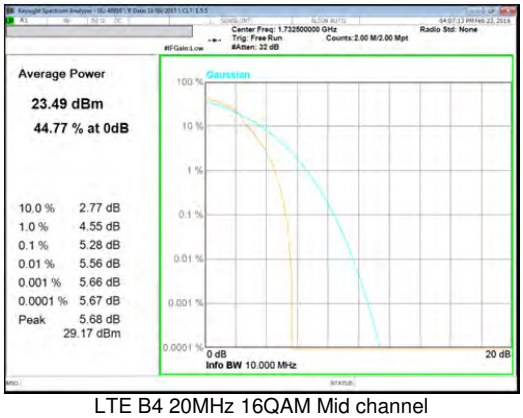
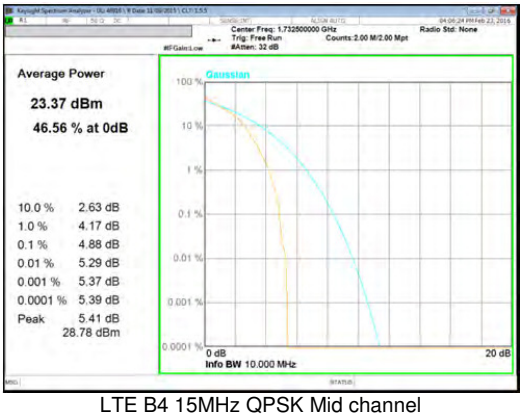
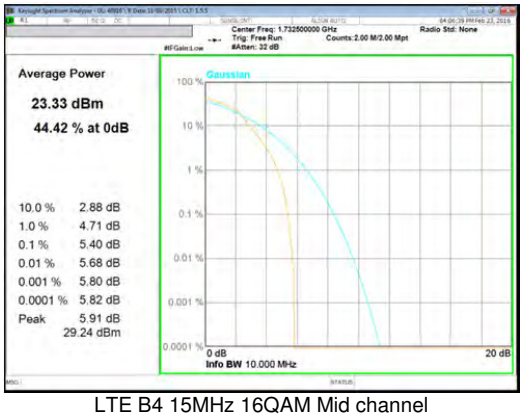
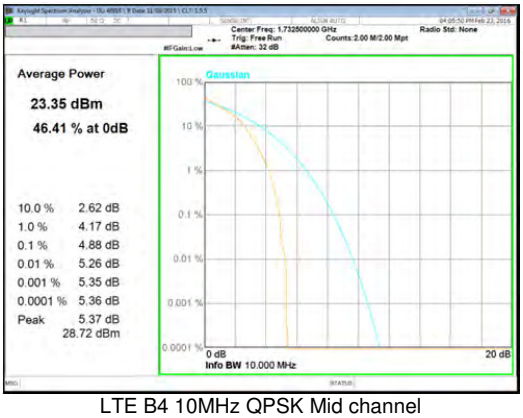
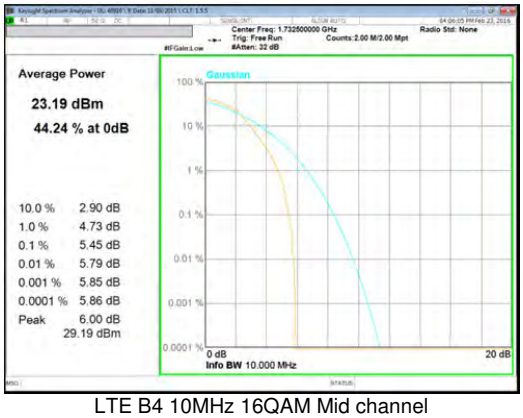
LTE Band 17 10 MHz	 LTE B17 10MHz QPSK Mid channel	 LTE B17 10MHz 16QAM Mid channel
LTE Band 17 5 MHz	 LTE B17 5MHz QPSK Mid channel	 LTE B17 5MHz 16QAM Mid channel

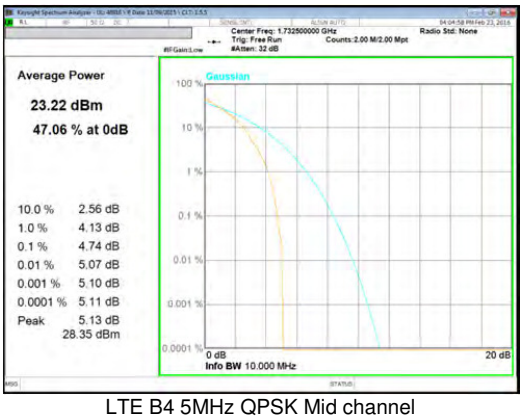
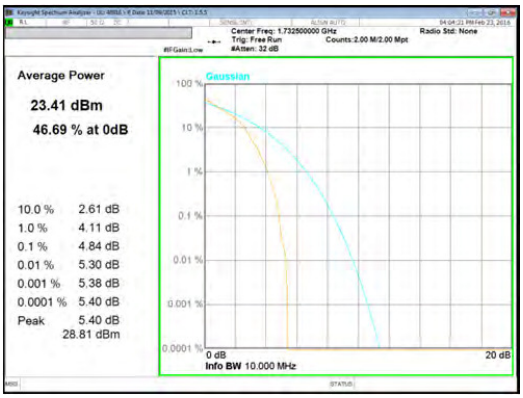
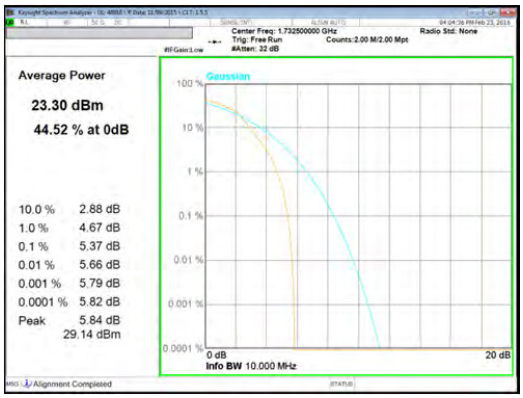
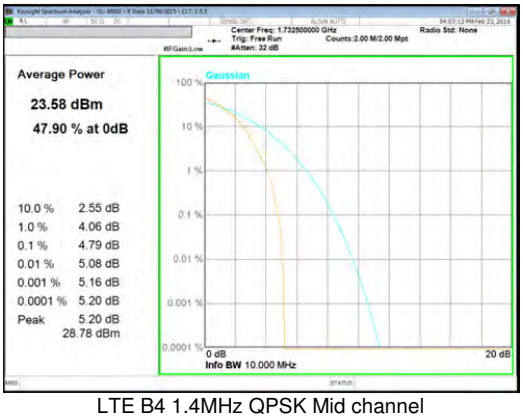
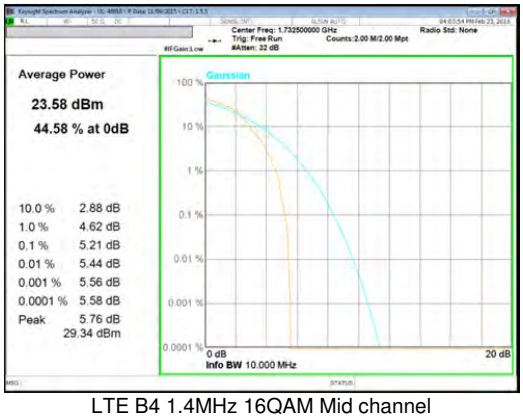
LTE Band 5

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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

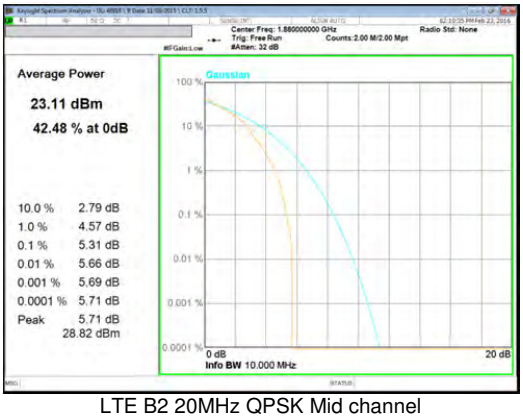
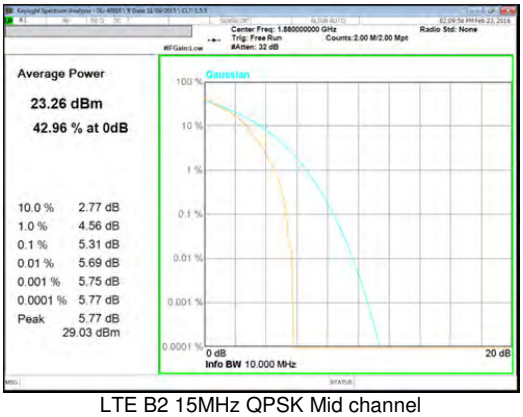
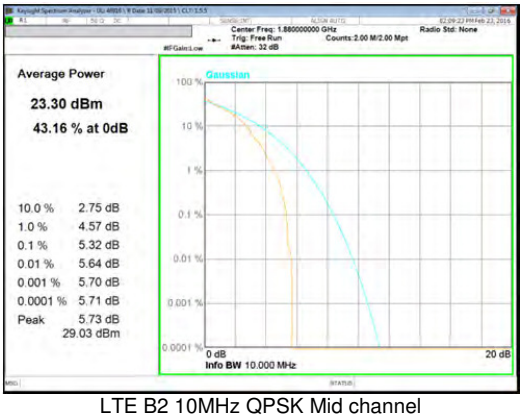
LTE Band 4

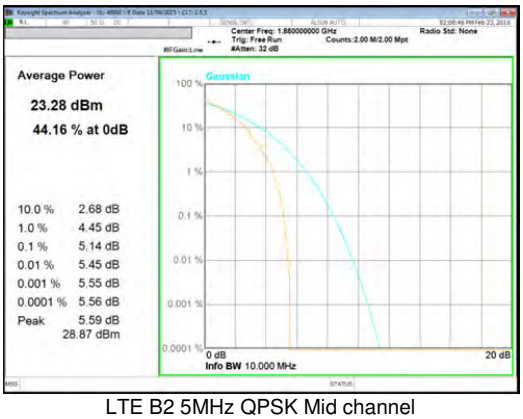
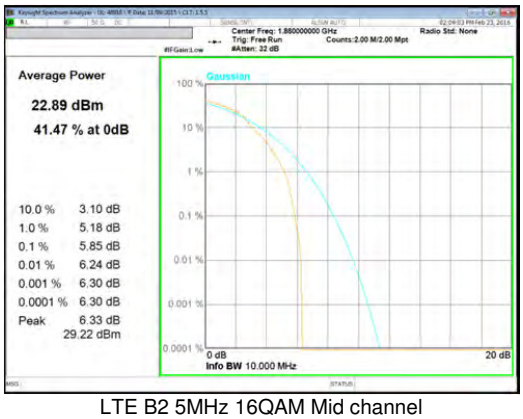
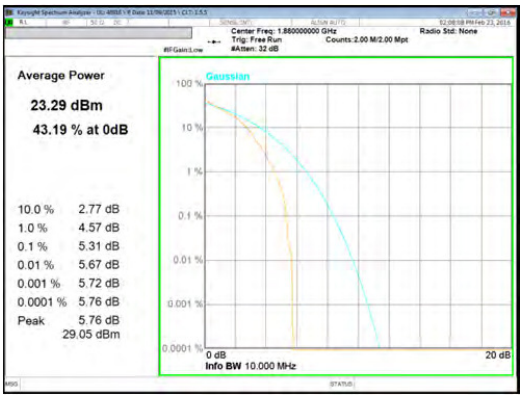
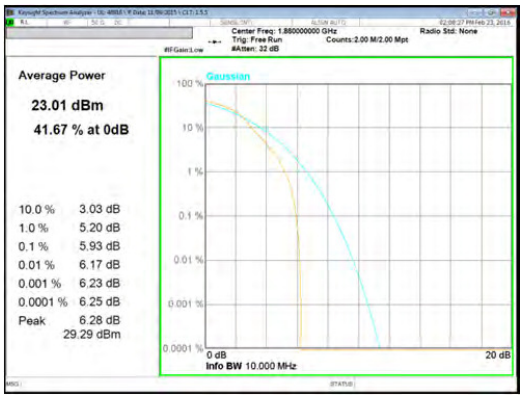
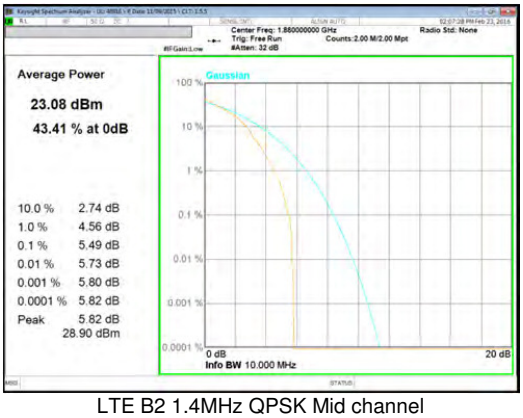
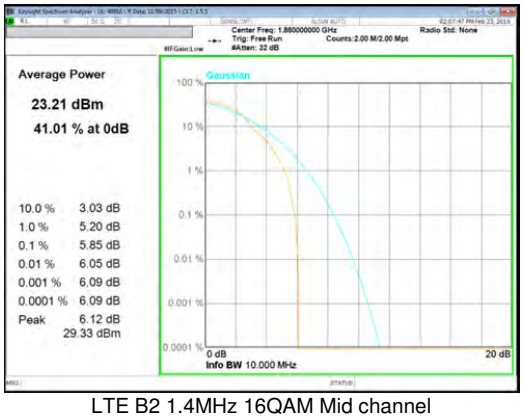
LTE Band 4 20 MHz	 LTE B4 20MHz QPSK Mid channel	 LTE B4 20MHz 16QAM Mid channel
LTE Band 4 15 MHz	 LTE B4 15MHz QPSK Mid channel	 LTE B4 15MHz 16QAM Mid channel
LTE Band 4 10 MHz	 LTE B4 10MHz QPSK Mid channel	 LTE B4 10MHz 16QAM Mid channel

LTE Band 4 5 MHz	 LTE B4 5MHz QPSK Mid channel	 LTE B4 5MHz 16QAM Mid channel
LTE Band 4 3 MHz	 LTE B4 3MHz QPSK Mid channel	 LTE B4 3MHz 16QAM Mid channel
LTE Band 4 1.4 MHz	 LTE B4 1.4MHz QPSK Mid channel	 LTE B4 1.4MHz 16QAM Mid channel

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

LTE Band 2

LTE Band 2 20 MHz	 LTE B2 20MHz QPSK Mid channel	 LTE B2 20MHz 16QAM Mid channel
LTE Band 2 15 MHz	 LTE B2 15MHz QPSK Mid channel	 LTE B2 15MHz 16QAM Mid channel
LTE Band 2 10 MHz	 LTE B2 10MHz QPSK Mid channel	 LTE B2 10MHz 16QAM Mid channel

LTE Band 2 5 MHz	 LTE B2 5MHz QPSK Mid channel	 LTE B2 5MHz 16QAM Mid channel
LTE Band 2 3 MHz	 LTE B2 3MHz QPSK Mid channel	 LTE B2 3MHz 16QAM Mid channel
LTE Band 2 1.4 MHz	 LTE B2 1.4MHz QPSK Mid channel	 LTE B2 1.4MHz 16QAM Mid channel

10. LIMITS AND CONDUCTED RESULTS

10.1. 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 low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v02r02)

10.1.1. OCCUPIED BANDWIDTH RESULTS

GSM

Band	Mode	Channel	f [MHz]	99% BW [KHz]	26dB BW [KHz]
GSM850	GPRS	128	824.2	247.69	323.7
		190	836.6	248.18	313.5
		251	848.8	246.34	313.1
	EGPRS	128	824.2	245.96	303.0
		190	836.6	242.83	306.0
		251	848.8	228.71	284.9
GSM1900	GPRS	512	1850.2	245.04	313.9
		661	1880.0	243.78	317.7
		810	1909.8	245.80	315.4
	EGPRS	512	1850.2	237.98	312.6
		661	1880.0	241.23	304.3
		810	1909.8	243.94	320.4

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA

Band	Mode	Channel	f [MHz]	99% BW [MHz]	26dB BW [MHz]
Band 5	REL99	4132	826.4	4.0888	4.614
		4183	836.6	4.0710	4.618
		4233	846.6	4.0883	4.604
	HSDPA	4132	826.4	4.1000	4.623
		4183	836.6	4.0788	4.616
		4233	846.6	4.0737	4.612
Band 4	REL99	1312	1712.4	4.0853	4.622
		1413	1732.6	4.0898	4.615
		1513	1752.6	4.0826	4.616
	HSDPA	1312	1712.4	4.0940	4.617
		1413	1732.6	4.0833	4.590
		1513	1752.6	4.0855	4.599
Band 2	REL99	9262	1852.4	4.0825	4.625
		9400	1880.0	4.0945	4.604
		9538	1907.6	4.0876	4.616
	HSDPA	9262	1852.4	4.0784	4.586
		9400	1880.0	4.0863	4.598
		9538	1907.6	4.0807	4.617

LTE Band 17

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 17	10	23780	709.0	QPSK	8.9801	9.871
				16QAM	8.9419	10.02
		23790	710.0	QPSK	8.9632	9.849
				16QAM	8.9618	10.04
		23799	711.0	QPSK	8.9634	9.904
				16QAM	8.9820	10.05
	5	23755	706.5	QPSK	4.5033	5.204
				16QAM	4.5119	5.482
		23790	710.0	QPSK	4.4953	5.066
				16QAM	4.5008	5.151
		23824	713.5	QPSK	4.5037	5.169
				16QAM	4.5149	5.455

LTE Band 5

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 5	10	20450	829.0	QPSK	8.9904	9.810
				16QAM	8.9842	10.09
		20524	836.5	QPSK	8.9657	9.961
				16QAM	8.9533	9.949
		20599	844.0	QPSK	8.9781	10.07
				16QAM	8.9914	10.03
	5	20425	826.5	QPSK	4.4965	5.280
				16QAM	4.5169	5.424
		20524	836.5	QPSK	4.4954	5.101
				16QAM	4.5030	5.198
		20624	846.5	QPSK	4.4995	5.150
				16QAM	4.5132	5.488
	3	20415	825.5	QPSK	2.6893	3.098
				16QAM	2.6866	3.258
		20524	836.5	QPSK	2.6946	3.125
				16QAM	2.6921	3.166
		20634	847.5	QPSK	2.6847	3.120
				16QAM	2.6919	3.126
	1.4	20407	824.7	QPSK	1.0983	1.424
				16QAM	1.0962	1.593
		20524	836.5	QPSK	1.0999	1.567
				16QAM	1.1010	1.432
		20624	848.3	QPSK	1.0978	1.431
				16QAM	1.0950	1.579

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

LTE Band 4

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 4	20	20050	1720.0	QPSK	17.933	19.60
				16QAM	17.899	19.52
		20174	1732.5	QPSK	17.928	19.87
				16QAM	17.883	19.68
		20299	1745.0	QPSK	17.916	19.65
				16QAM	17.938	19.60
	15	20025	1717.5	QPSK	13.439	15.24
				16QAM	13.410	14.73
		20174	1732.5	QPSK	13.427	14.81
				16QAM	13.437	14.80
		20324	1747.5	QPSK	13.437	14.69
				16QAM	13.440	15.15
	10	20000	1715.0	QPSK	8.9839	9.903
				16QAM	8.9703	10.08
		20174	1732.5	QPSK	8.9707	10.10
				16QAM	8.9951	10.17
		20349	1750.0	QPSK	8.9879	9.983
				16QAM	8.9625	10.15
	5	19975	1712.5	QPSK	4.5035	5.153
				16QAM	4.5139	5.451
		20174	1732.5	QPSK	4.4921	5.301
				16QAM	4.5009	5.392
		20374	1752.5	QPSK	4.4976	5.064
				16QAM	4.5015	5.193
	3	19965	1711.5	QPSK	2.6944	3.104
				16QAM	2.6892	3.157
		20174	1732.5	QPSK	2.6882	3.155
				16QAM	2.6941	3.150
		20384	1753.5	QPSK	2.6925	3.088
				16QAM	2.6935	3.278
	1.4	19957	1710.7	QPSK	1.0961	1.429
				16QAM	1.0945	1.558
		20174	1732.5	QPSK	1.0919	1.484
				16QAM	1.0921	1.431
		20392	1754.3	QPSK	1.1006	1.580
				16QAM	1.0996	1.402

LTE Band 2

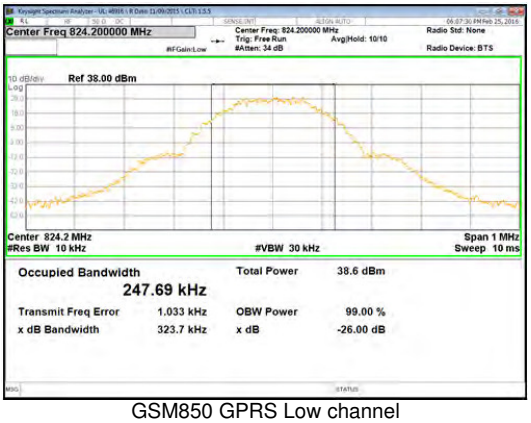
Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 2	20	18700	1860.0	QPSK	17.956	19.65
				16QAM	17.954	20.15
		18900	1880.0	QPSK	17.999	20.40
				16QAM	17.965	20.19
		19099	1900.0	QPSK	17.926	19.60
				16QAM	17.935	19.71
	15	18675	1857.5	QPSK	13.437	15.26
				16QAM	13.429	14.74
		18900	1880.0	QPSK	13.448	14.86
				16QAM	13.439	14.91
		19124	1902.5	QPSK	13.422	14.78
				16QAM	13.439	15.00
	10	18650	1955.0	QPSK	8.9834	10.02
				16QAM	8.9581	10.14
		18900	1880.0	QPSK	8.9765	10.14
				16QAM	8.9970	10.29
		19149	1905.0	QPSK	8.9832	9.914
				16QAM	8.9610	9.972
	5	18625	1852.5	QPSK	4.4999	5.214
				16QAM	4.5151	5.451
		18900	1880.0	QPSK	4.5046	5.290
				16QAM	4.5071	5.419
		18175	1907.5	QPSK	4.5026	5.077
				16QAM	4.5062	5.221
	3	18615	1815.5	QPSK	2.6910	3.192
				16QAM	2.6949	3.125
		18900	1880.0	QPSK	2.6907	3.065
				16QAM	2.6907	3.269
		19184	1908.5	QPSK	2.6926	3.113
				16QAM	2.6924	3.205
	1.4	18607	1850.7	QPSK	1.1017	1.606
				16QAM	1.1054	1.457
		18900	1880.0	QPSK	1.0992	1.464
				16QAM	1.0982	1.605
		19192	1909.3	QPSK	1.0937	1.509
				16QAM	1.0931	1.462

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

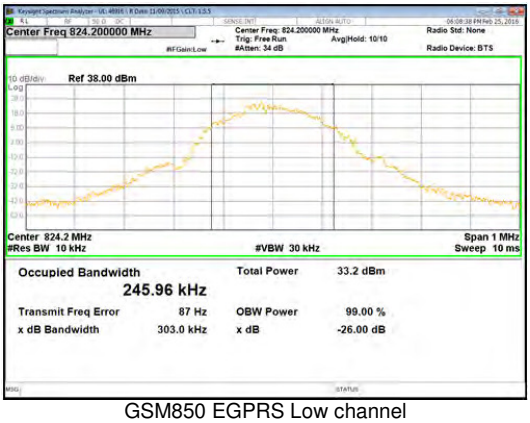
10.1.2. OCCUPIED BANDWIDTH PLOTS

GSM 850

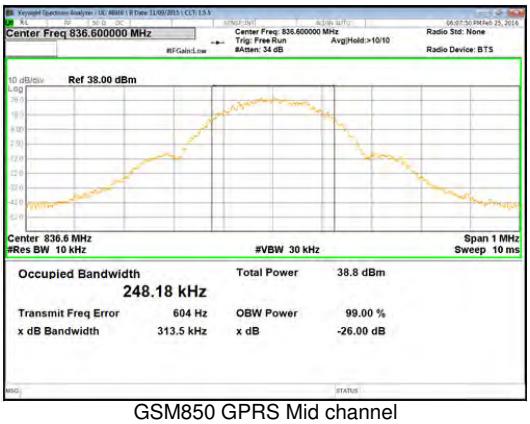
GSM 850



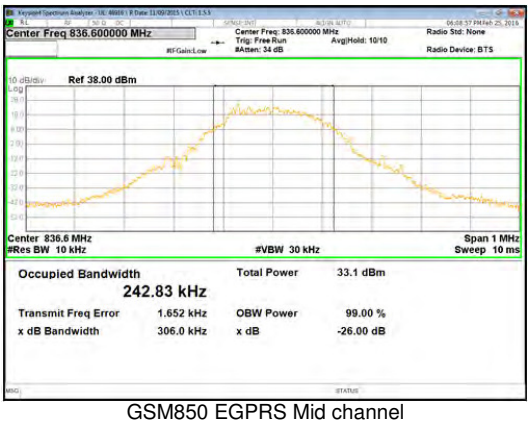
GSM850 GPRS Low channel



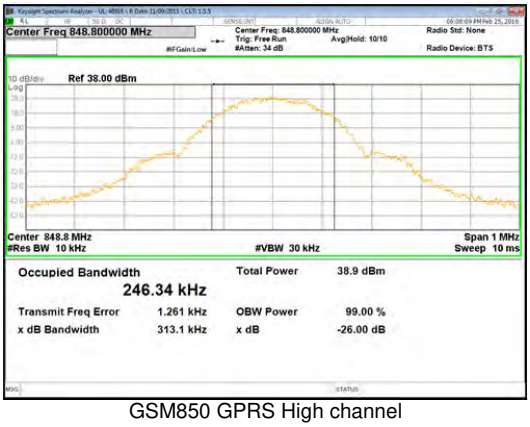
GSM850 EGPRS Low channel



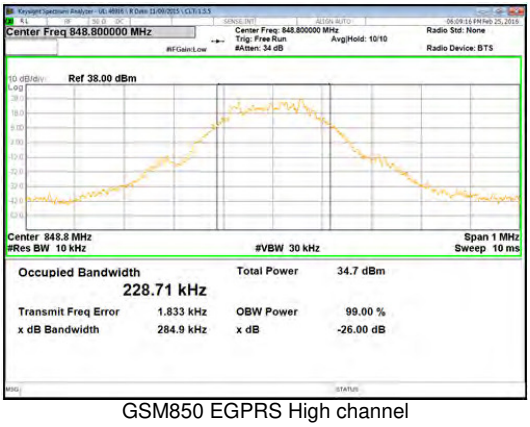
GSM850 GPRS Mid channel



GSM850 EGPRS Mid channel



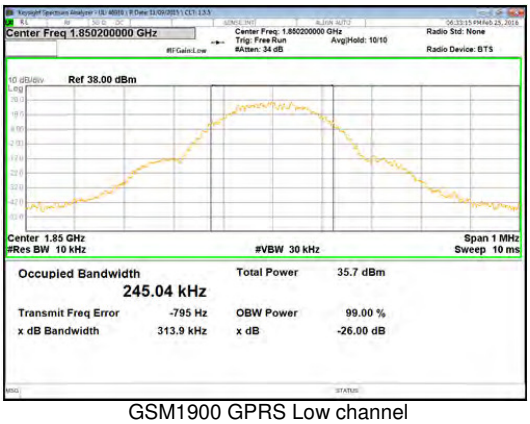
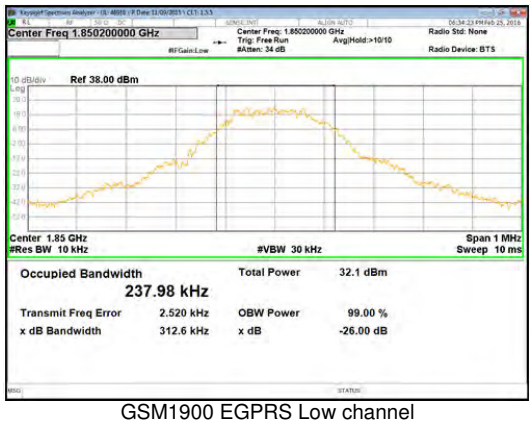
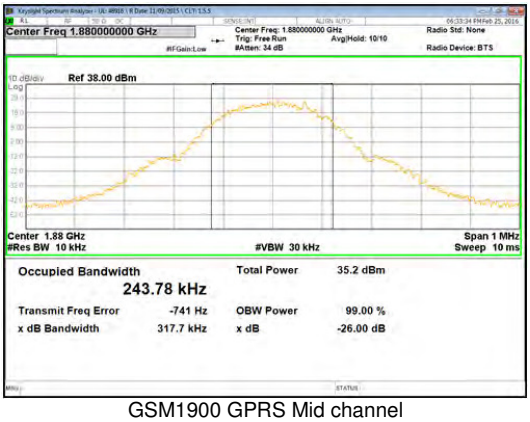
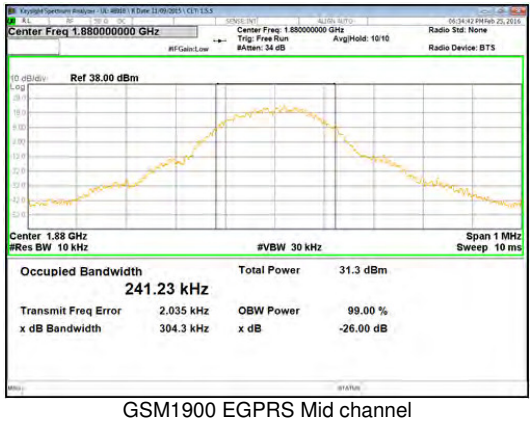
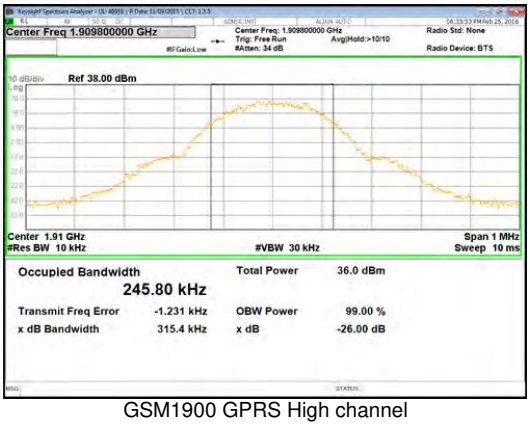
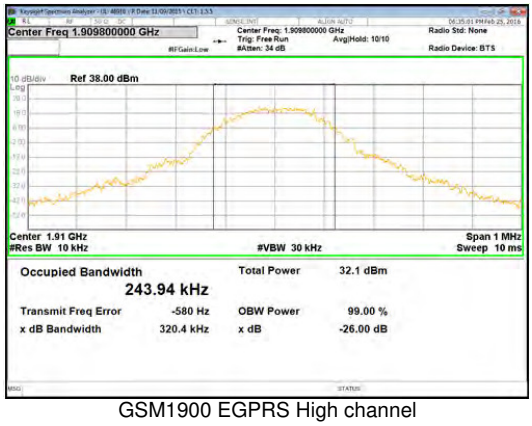
GSM850 GPRS High channel



GSM850 EGPRS High channel

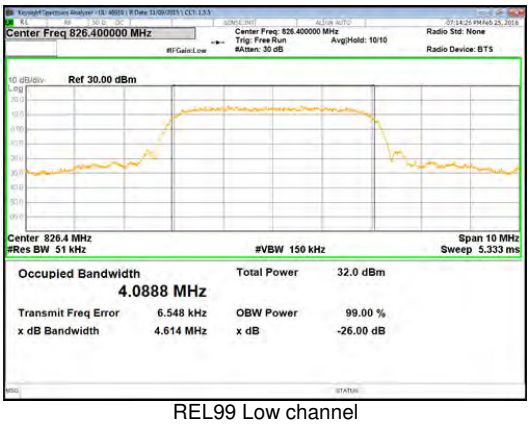
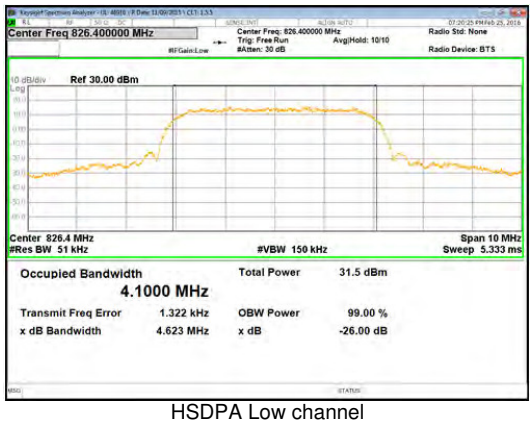
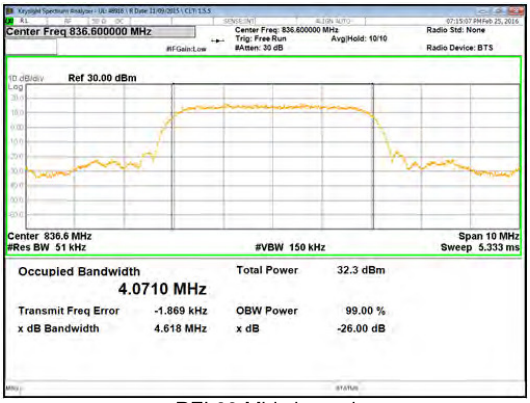
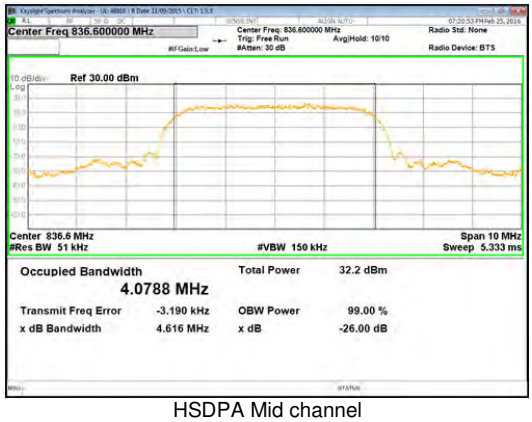
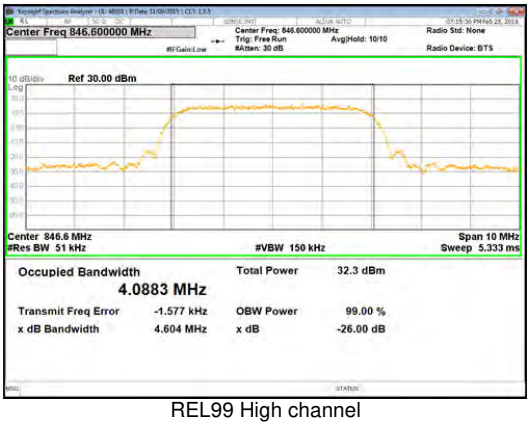
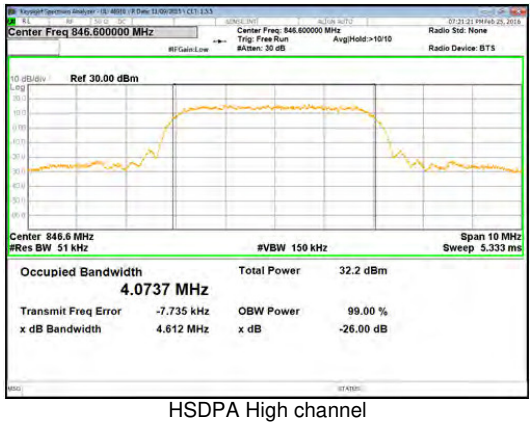
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

GSM 1900

GSM 1900	 GSM1900 GPRS Low channel	 GSM1900 EGPRS Low channel
	 GSM1900 GPRS Mid channel	 GSM1900 EGPRS Mid channel
	 GSM1900 GPRS High channel	 GSM1900 EGPRS High channel

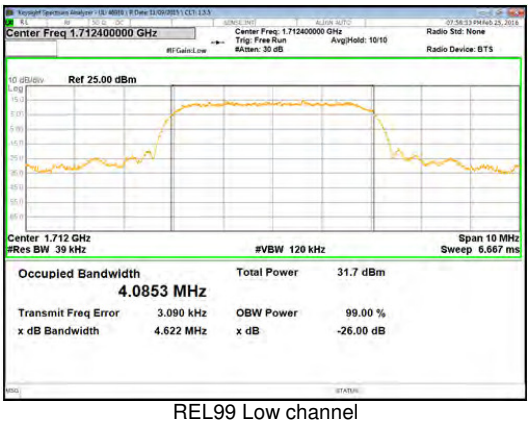
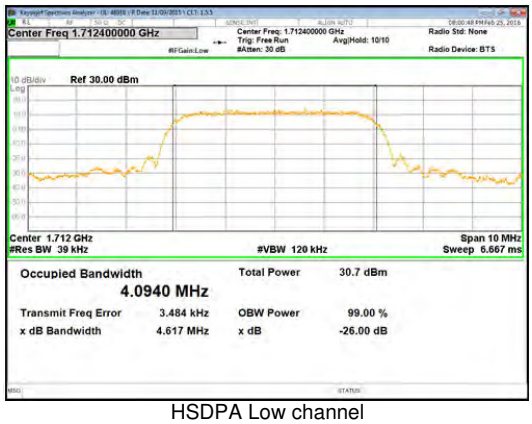
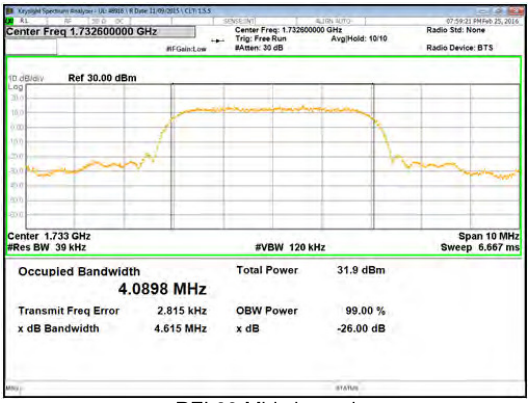
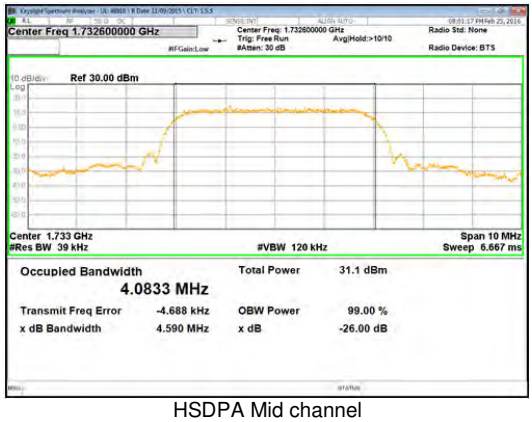
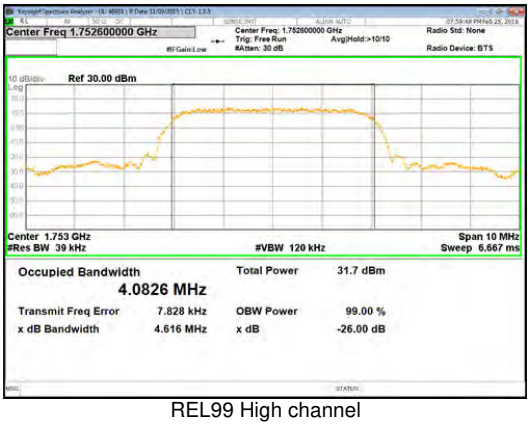
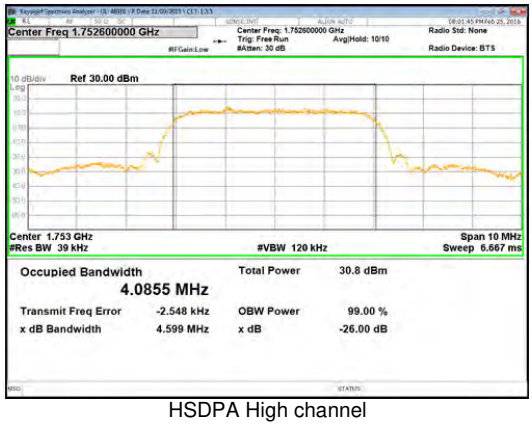
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA Band 5

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

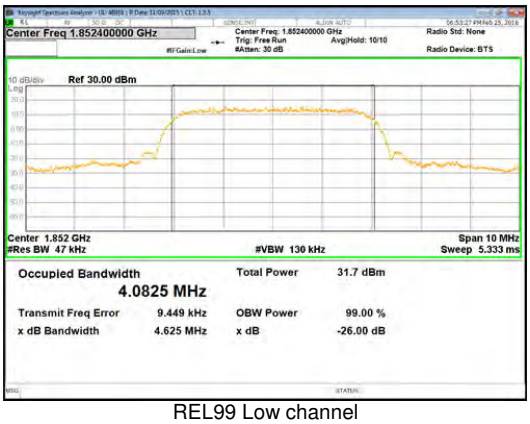
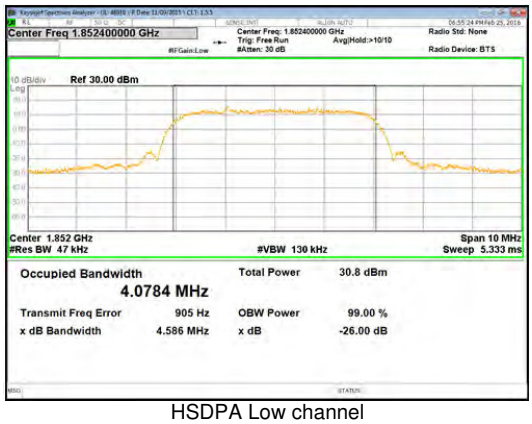
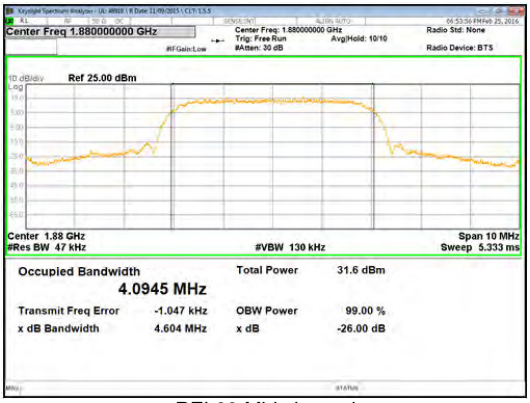
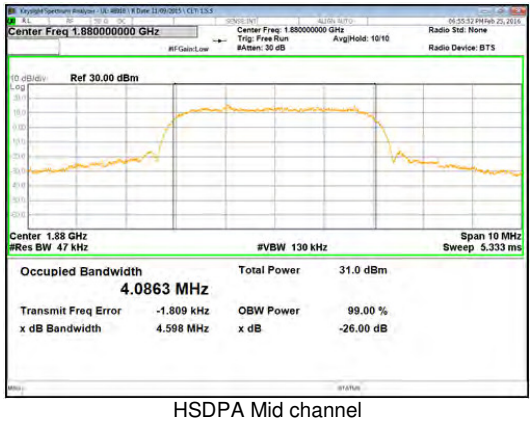
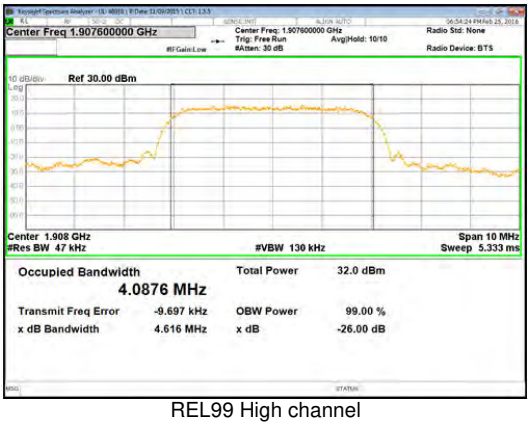
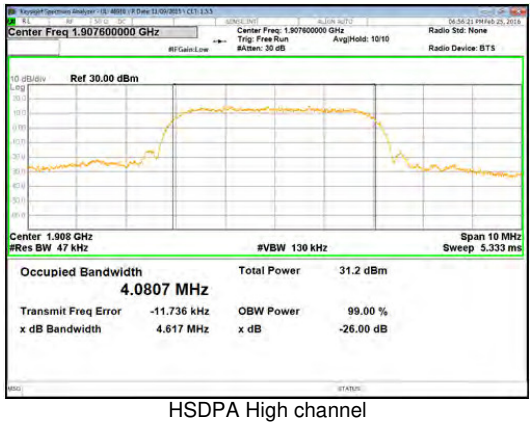
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA Band 4

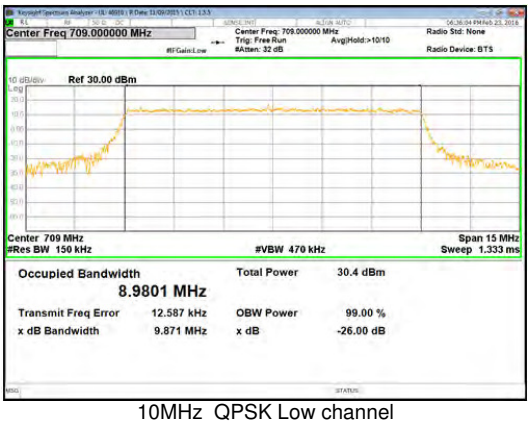
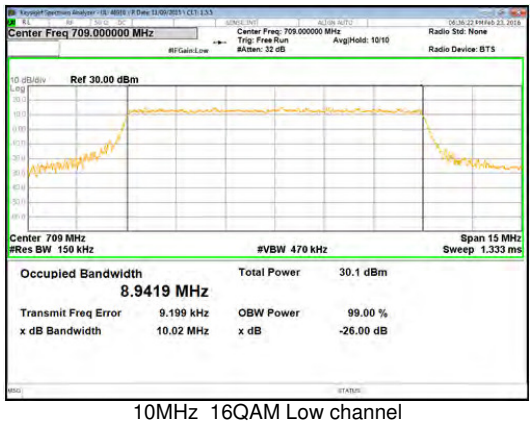
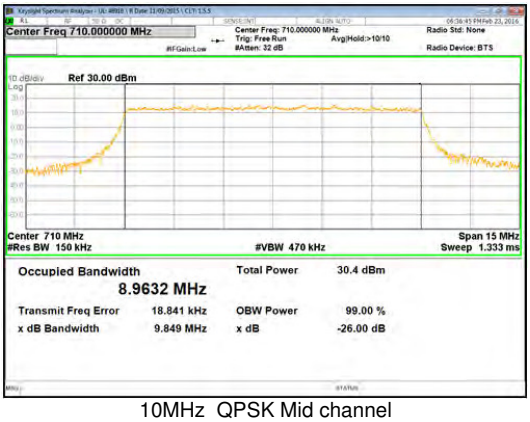
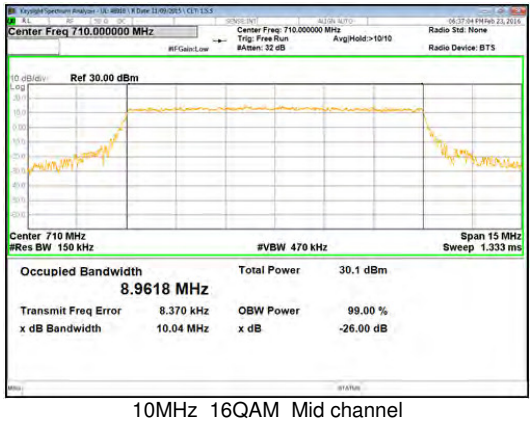
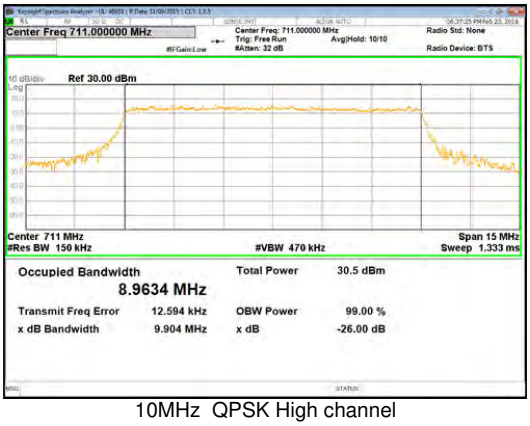
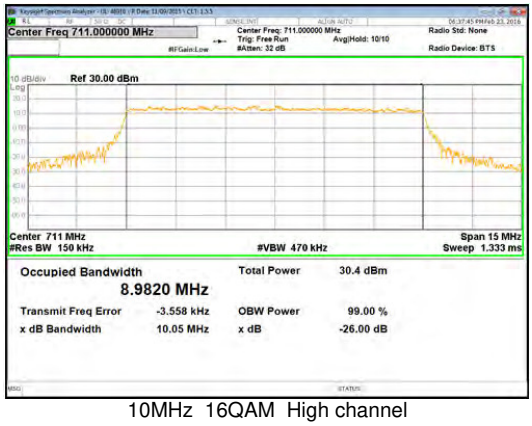
Band 4	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

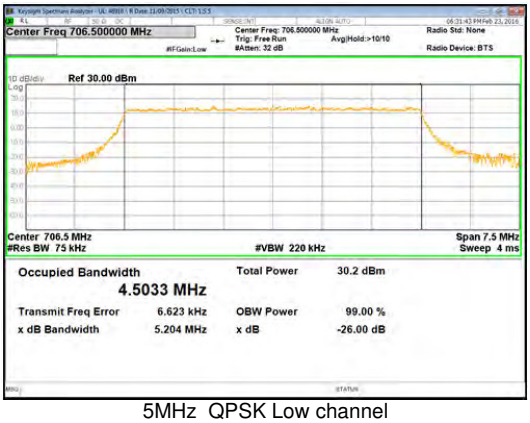
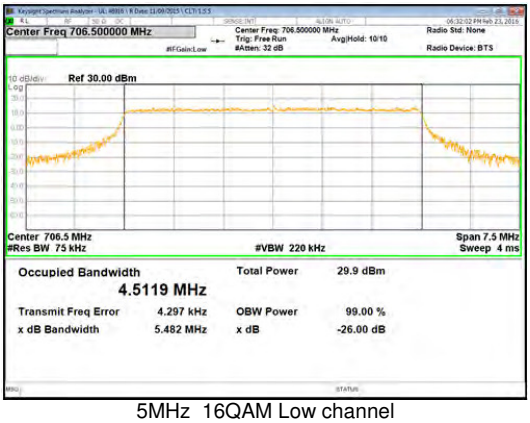
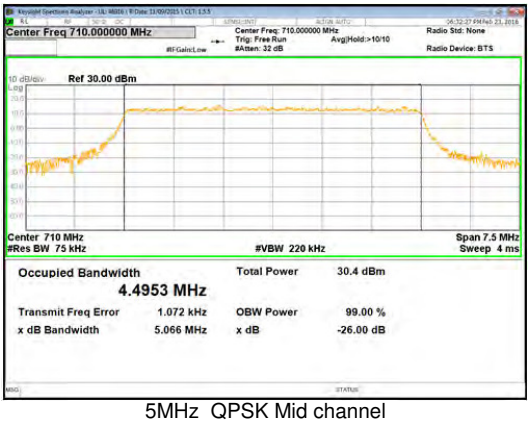
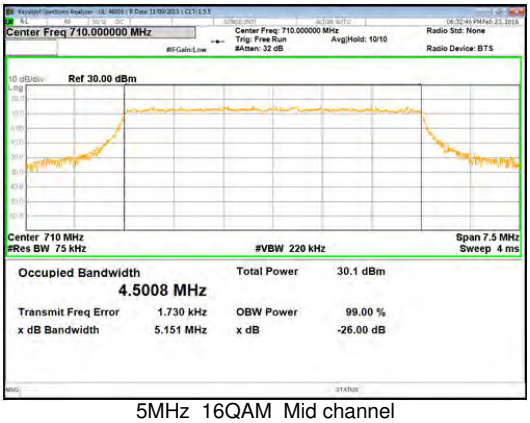
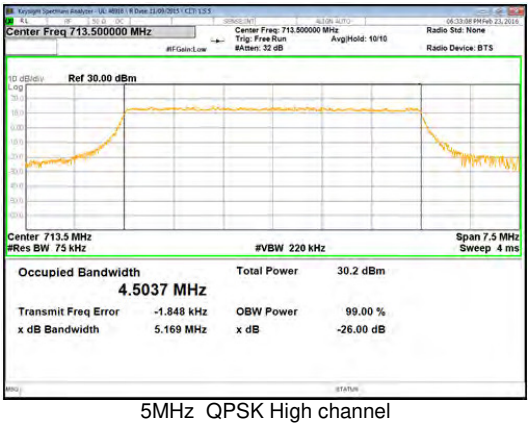
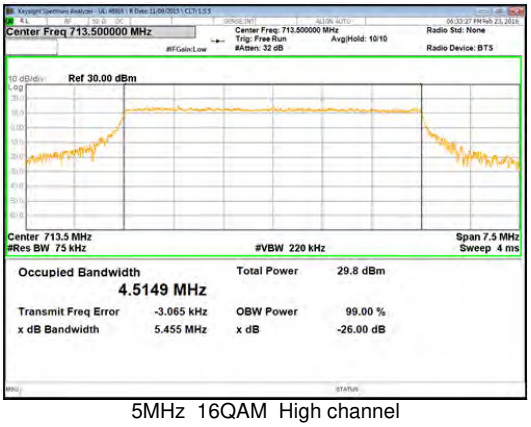
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA Band 2

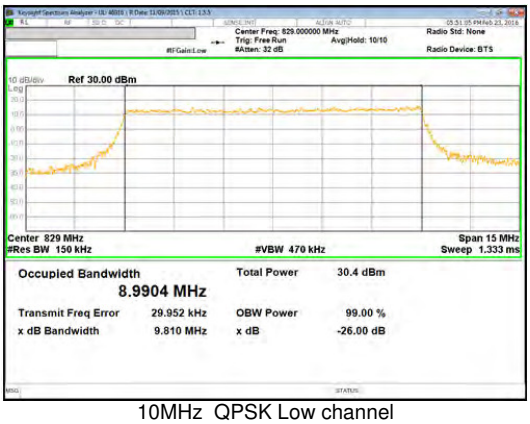
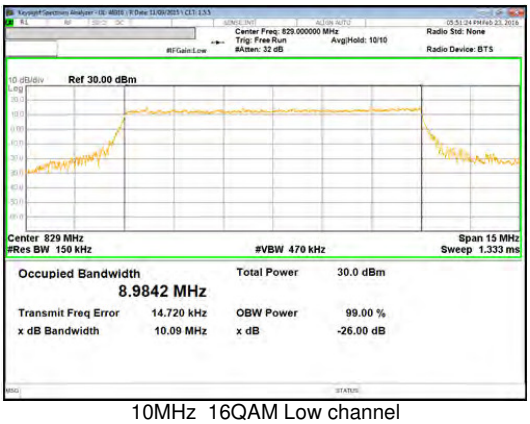
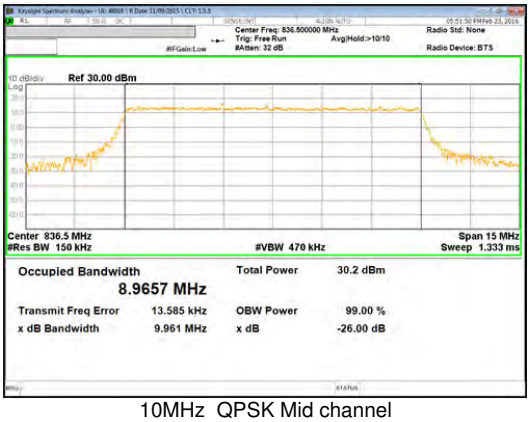
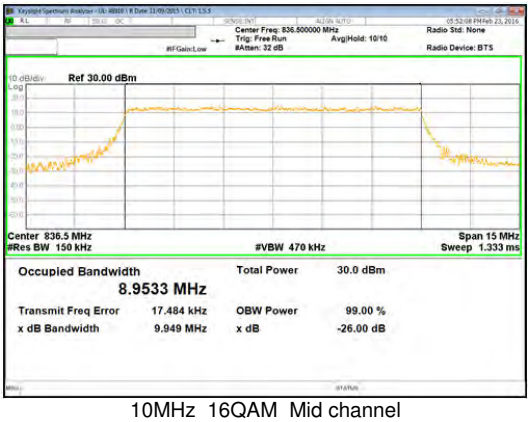
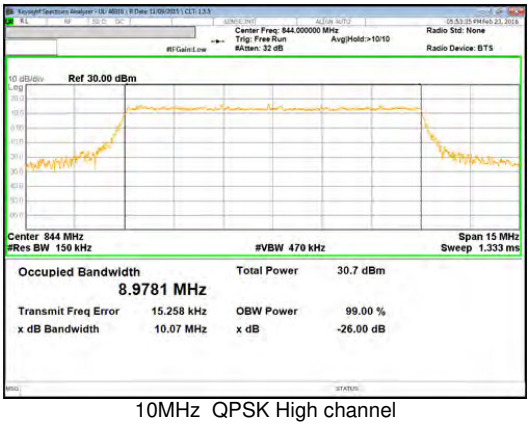
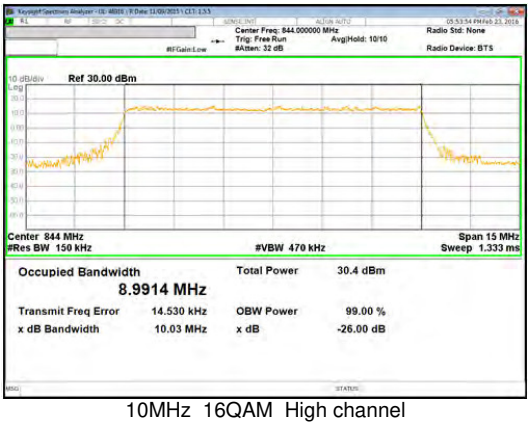
Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

LTE Band 17

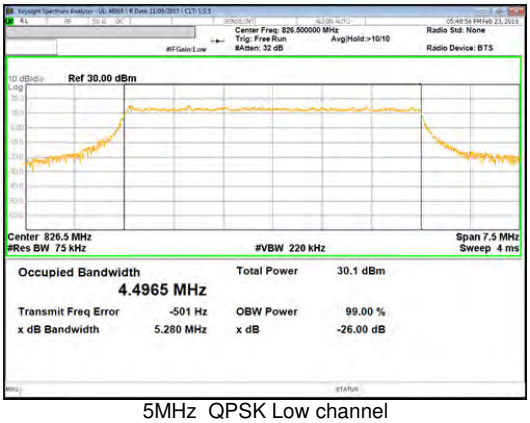
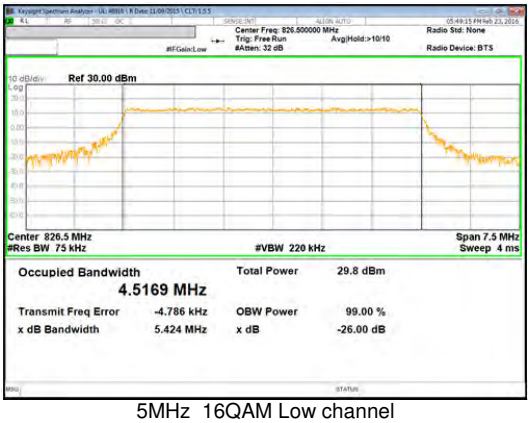
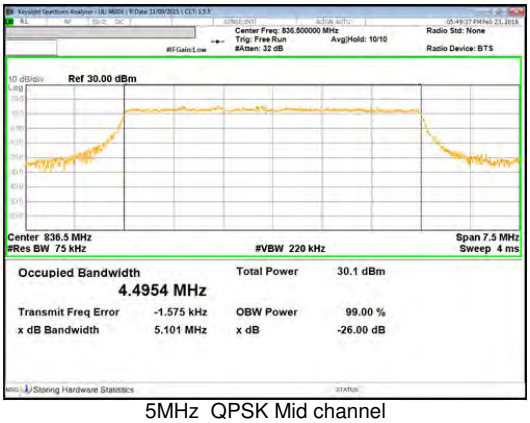
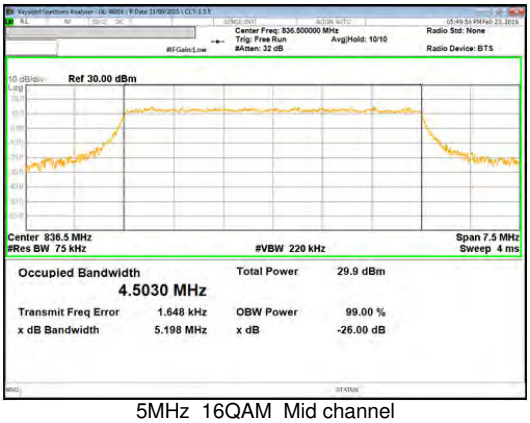
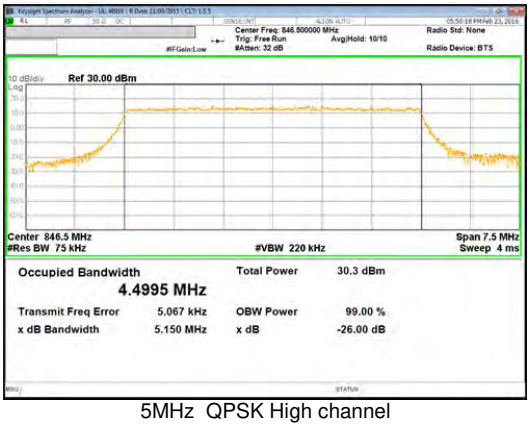
Band 17 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel
	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
	 10MHz QPSK High channel	 10MHz 16QAM High channel

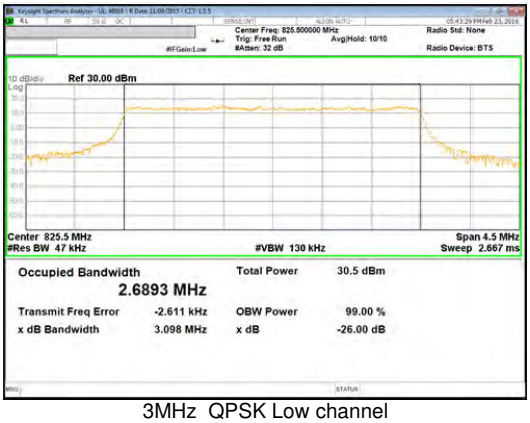
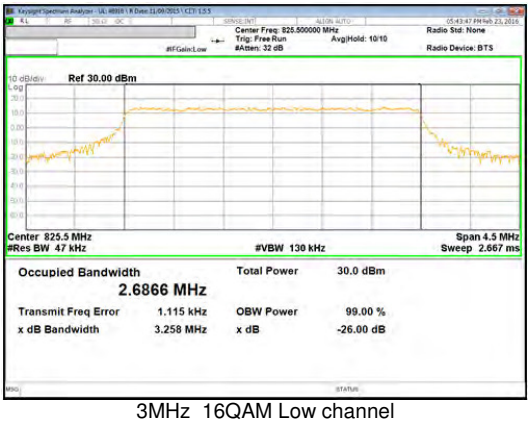
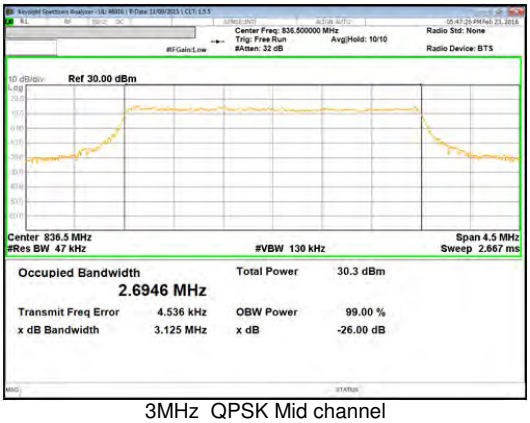
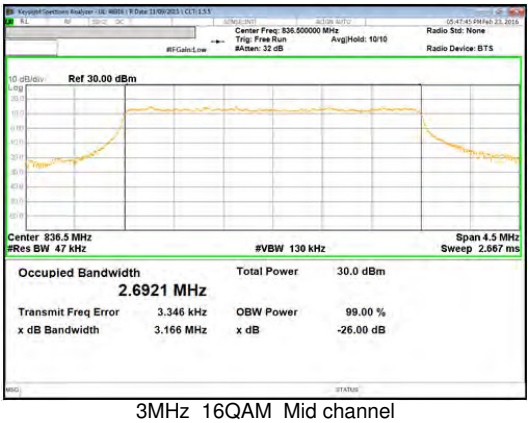
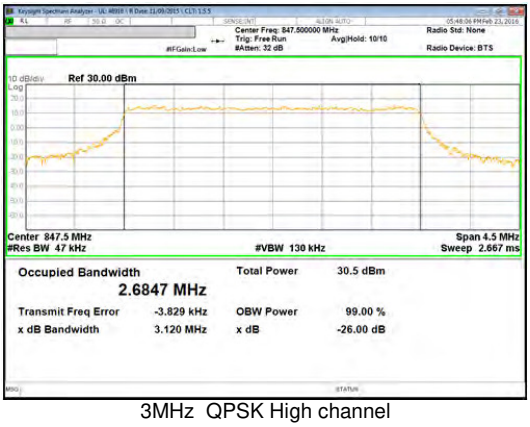
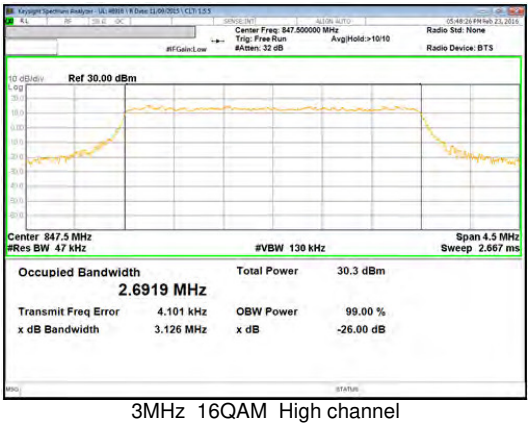
Band 17 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

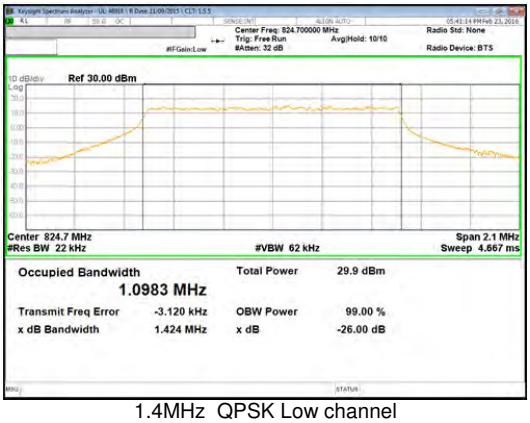
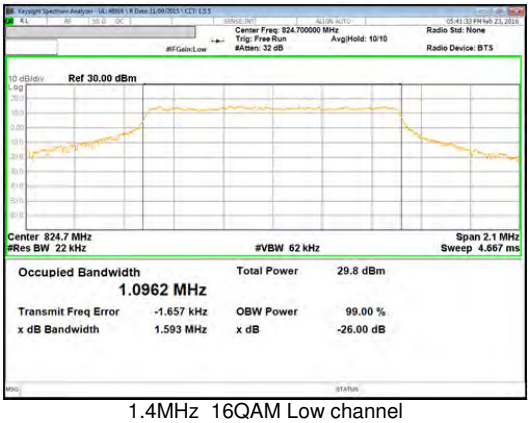
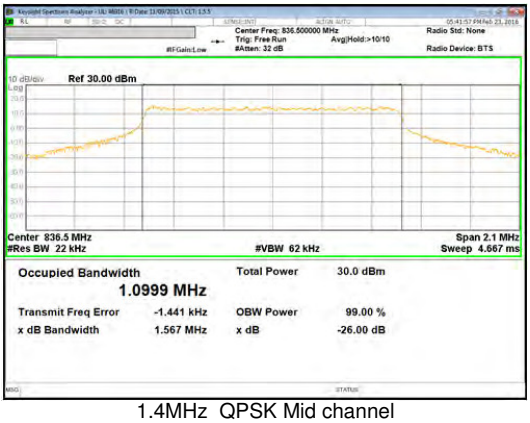
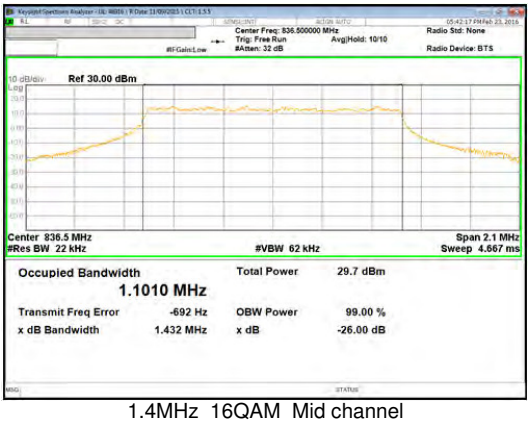
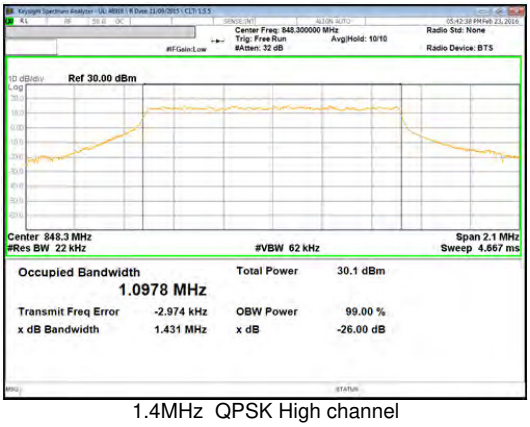
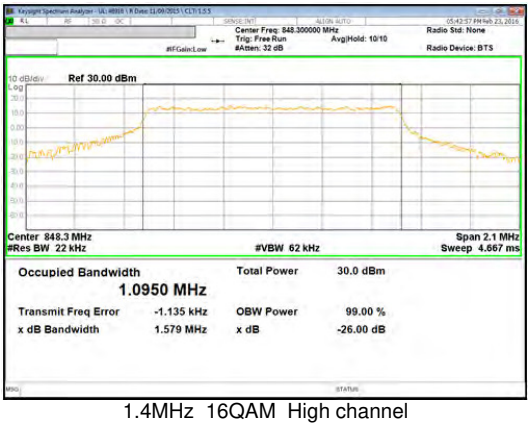
LTE Band 5

Band 5 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel
	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
	 10MHz QPSK High channel	 10MHz 16QAM High channel

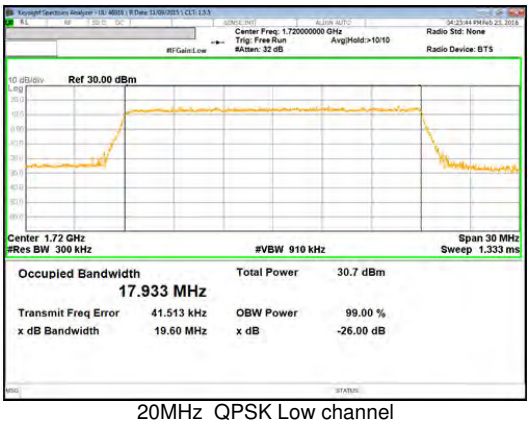
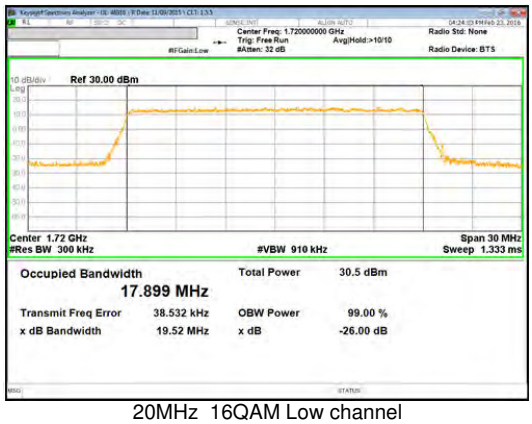
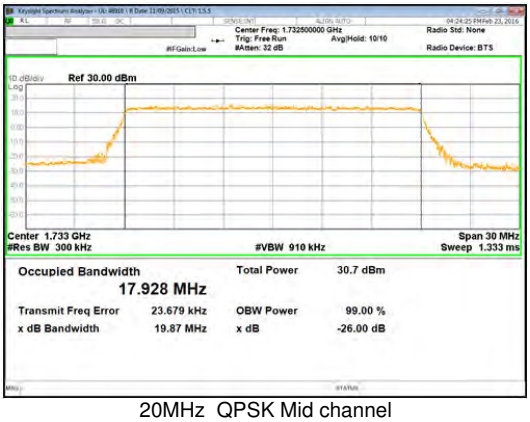
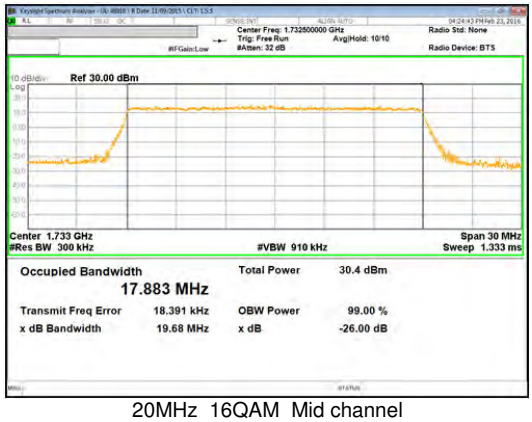
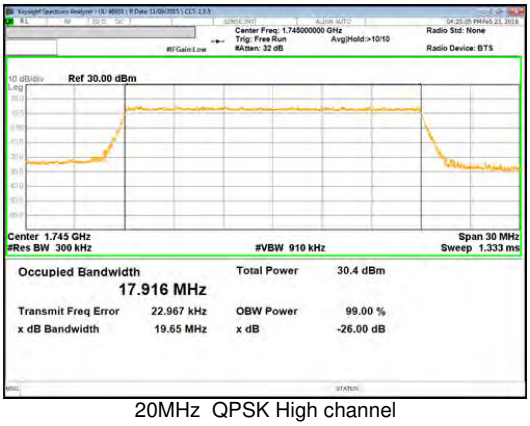
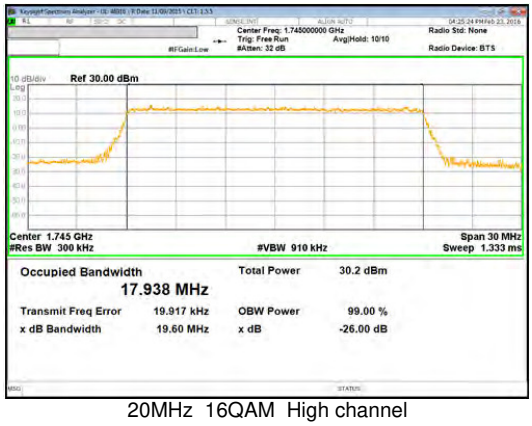
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

Band 5 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

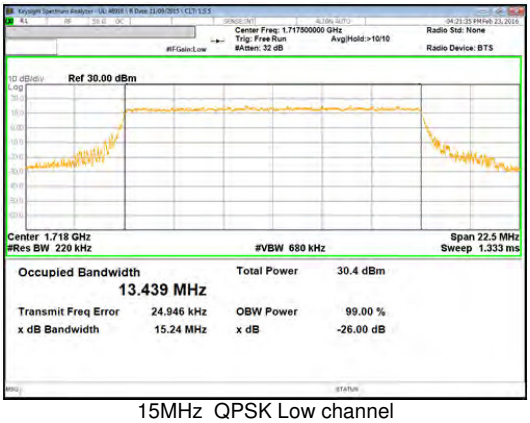
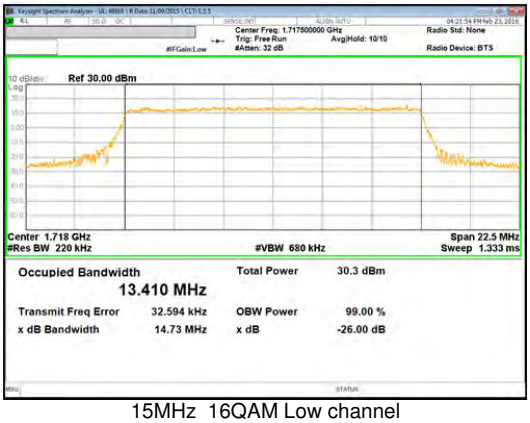
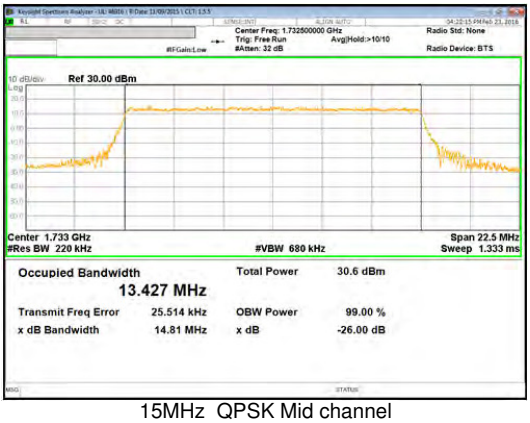
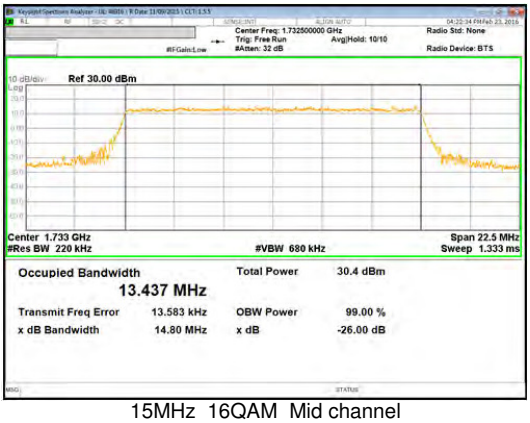
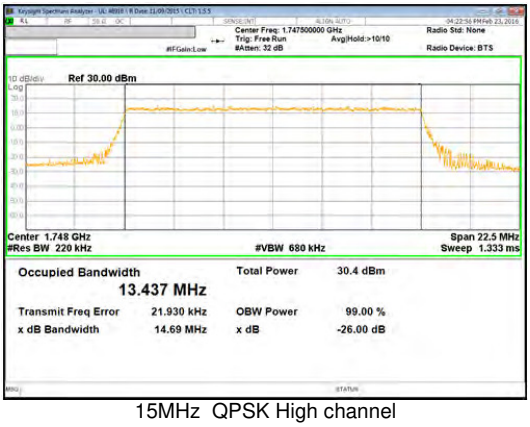
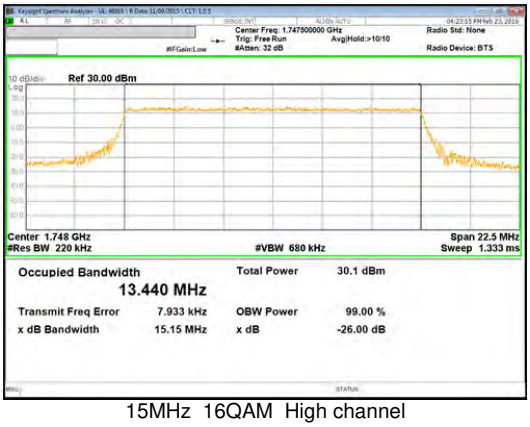
Band 5 3MHz	 3MHz QPSK Low channel	 3MHz 16QAM Low channel
	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
	 3MHz QPSK High channel	 3MHz 16QAM High channel

Band 5 1.4MHz	 1.4MHz QPSK Low channel	 1.4MHz 16QAM Low channel
	 1.4MHz QPSK Mid channel	 1.4MHz 16QAM Mid channel
	 1.4MHz QPSK High channel	 1.4MHz 16QAM High channel

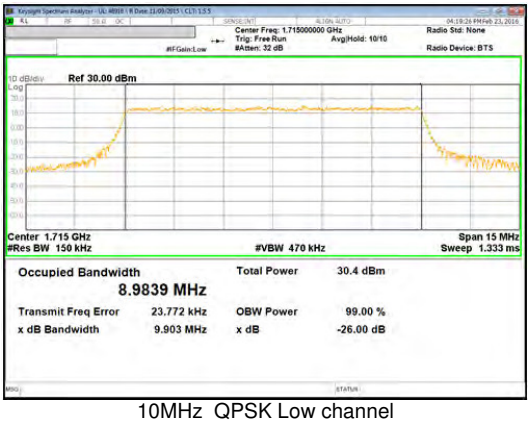
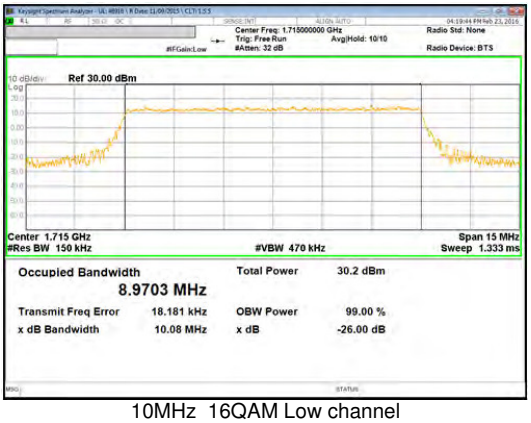
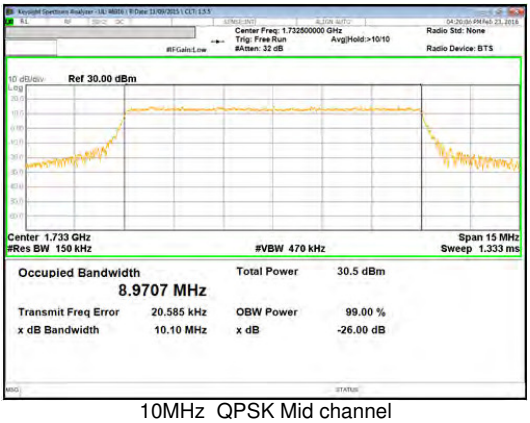
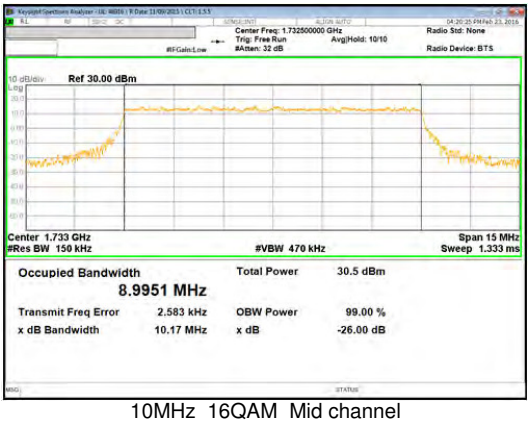
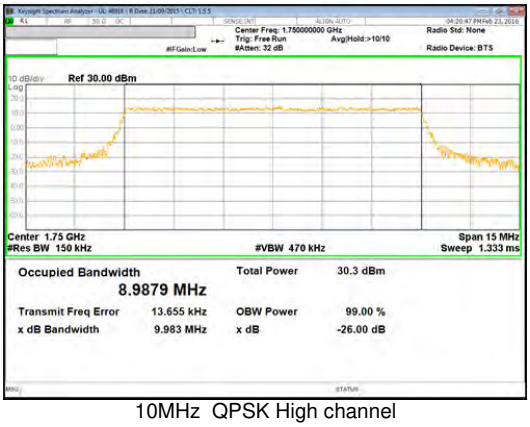
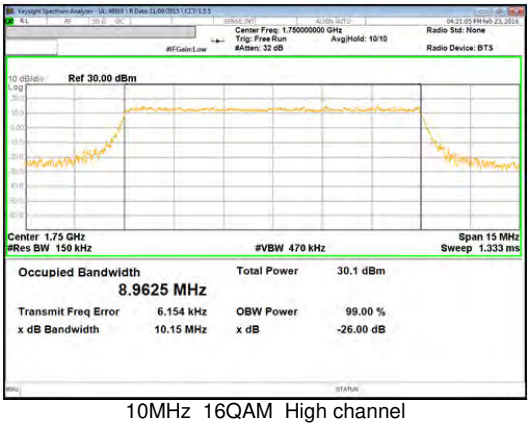
LTE Band 4

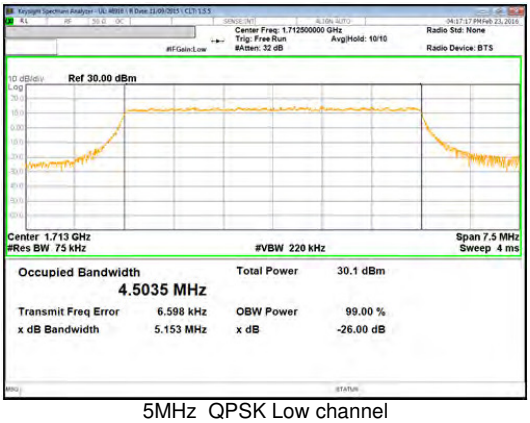
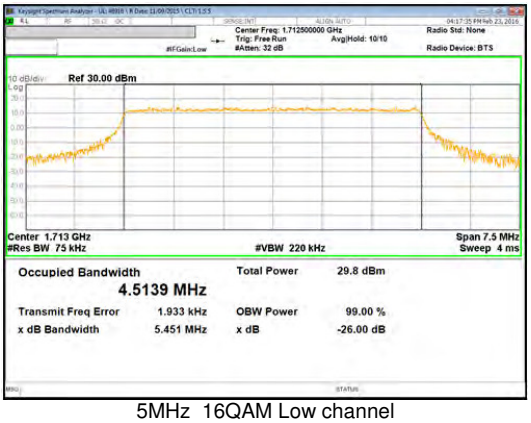
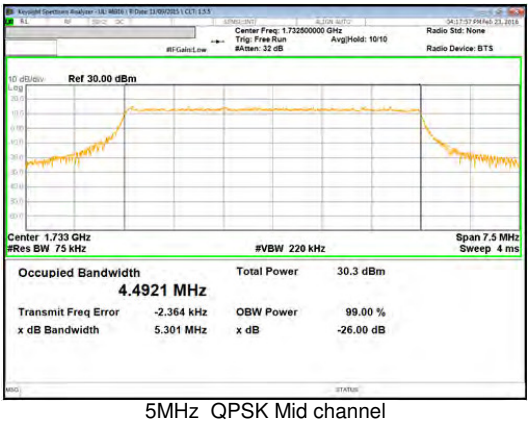
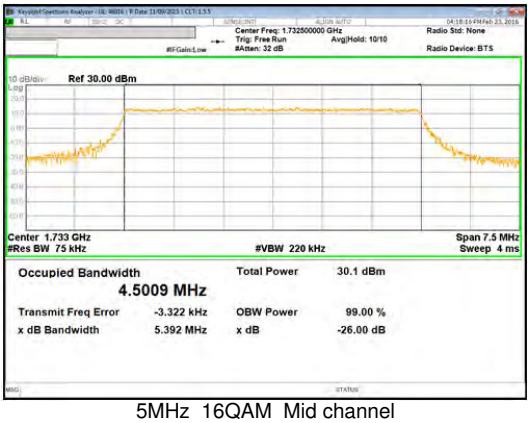
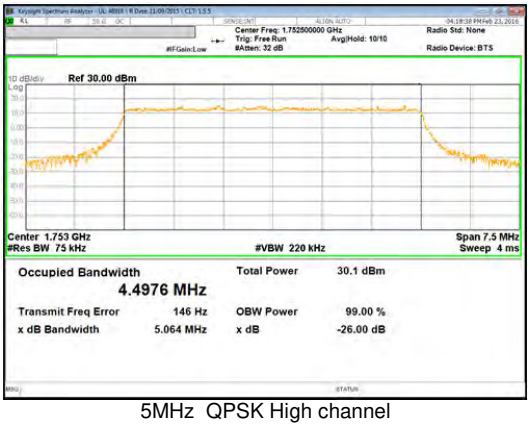
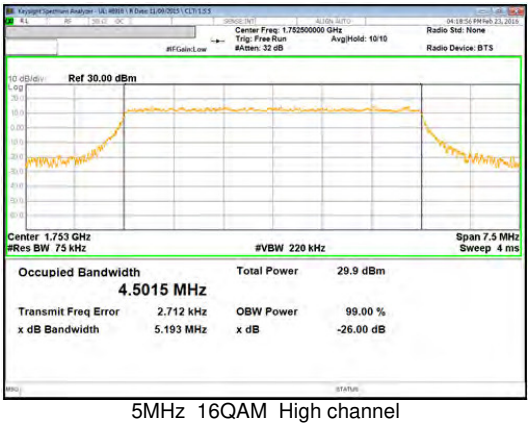
Band 4 20MHz	 20MHz QPSK Low channel	 20MHz 16QAM Low channel
	 20MHz QPSK Mid channel	 20MHz 16QAM Mid channel
	 20MHz QPSK High channel	 20MHz 16QAM High channel

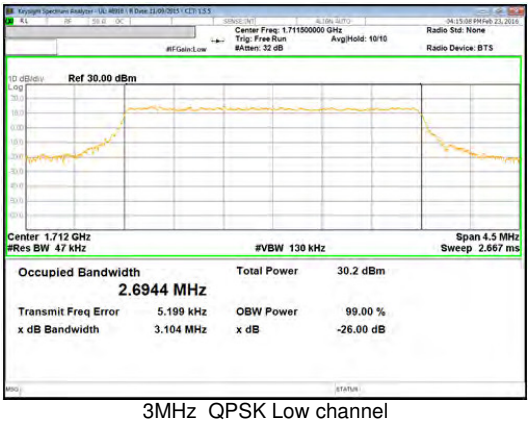
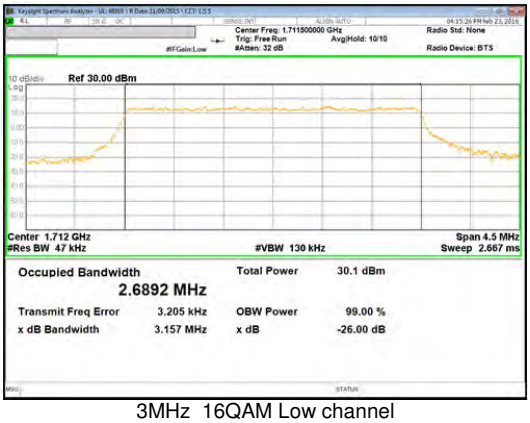
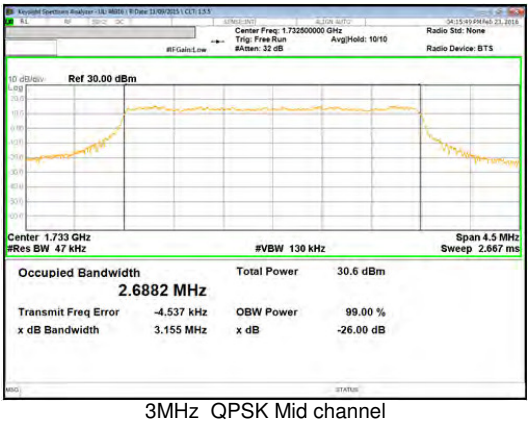
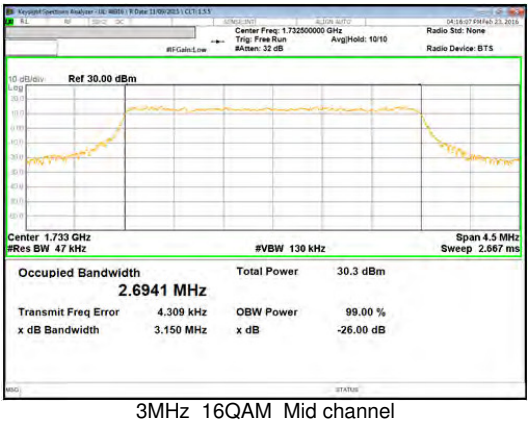
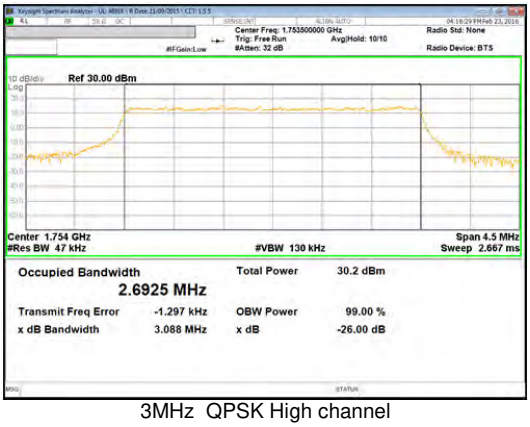
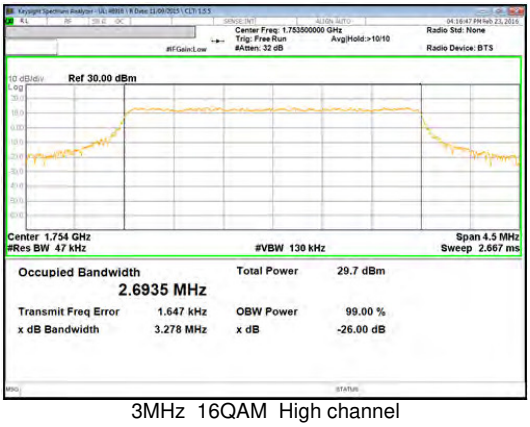
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

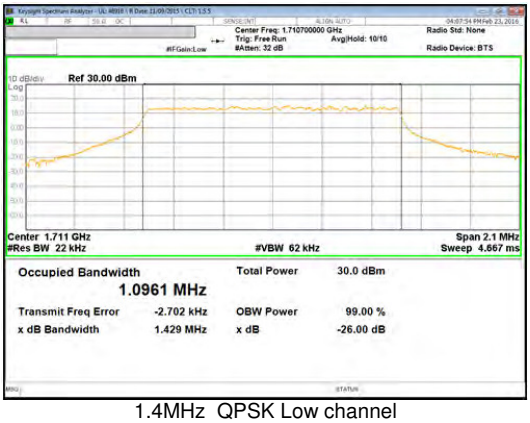
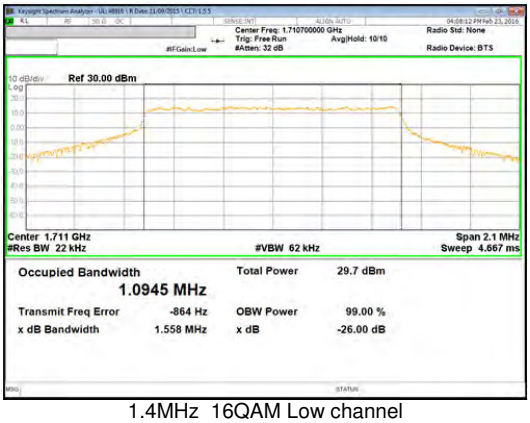
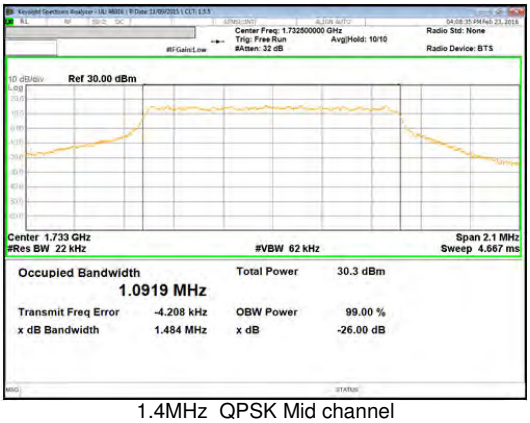
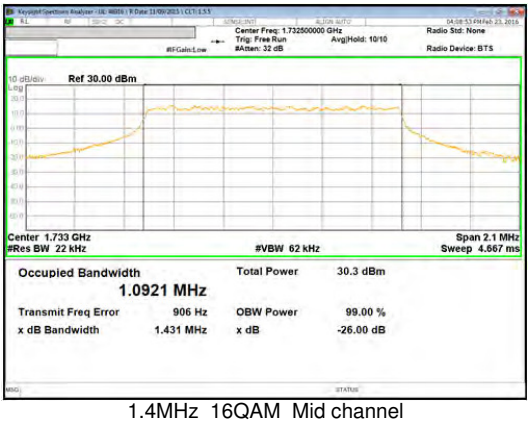
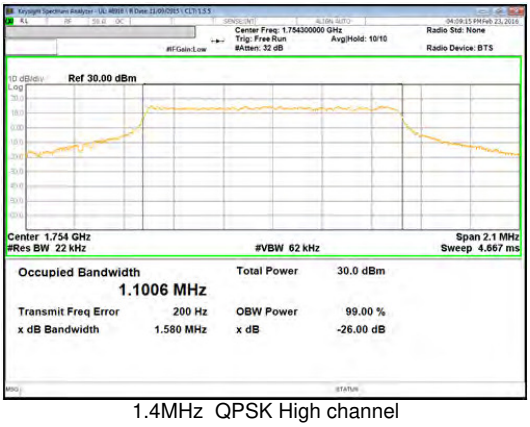
Band 4 15MHz	 15MHz QPSK Low channel	 15MHz 16QAM Low channel
	 15MHz QPSK Mid channel	 15MHz 16QAM Mid channel
	 15MHz QPSK High channel	 15MHz 16QAM High channel

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

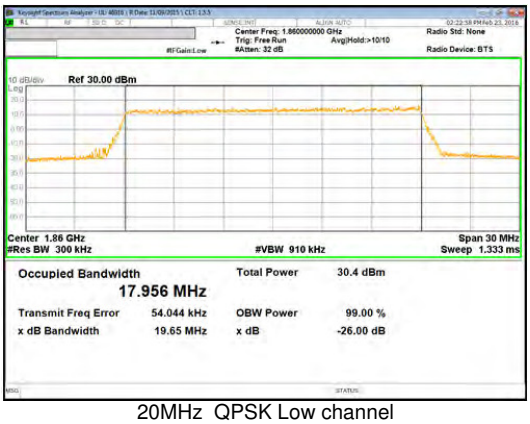
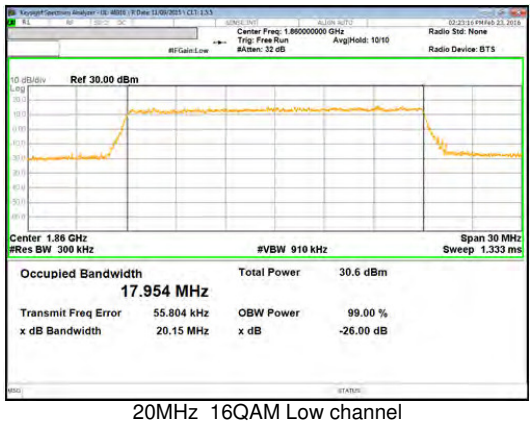
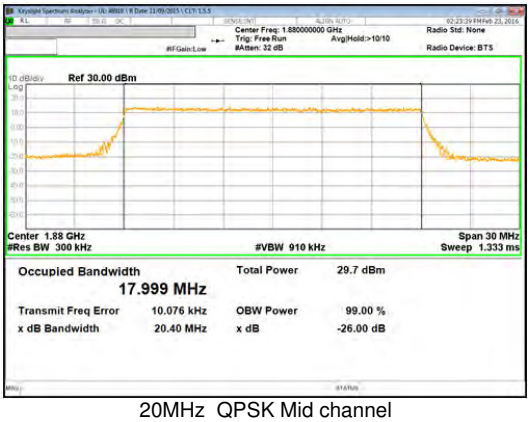
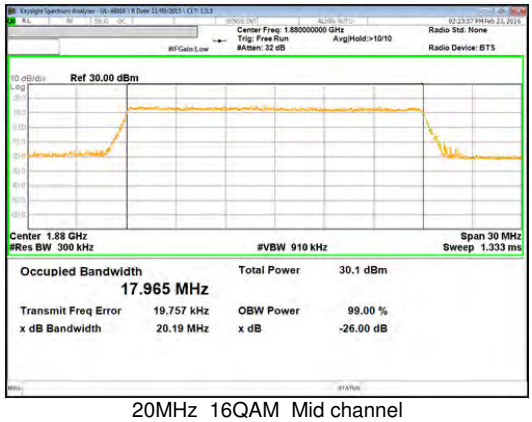
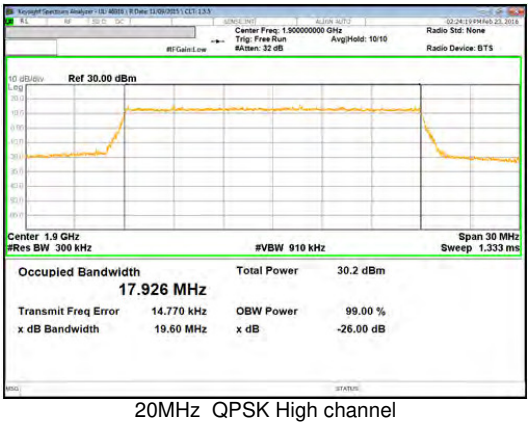
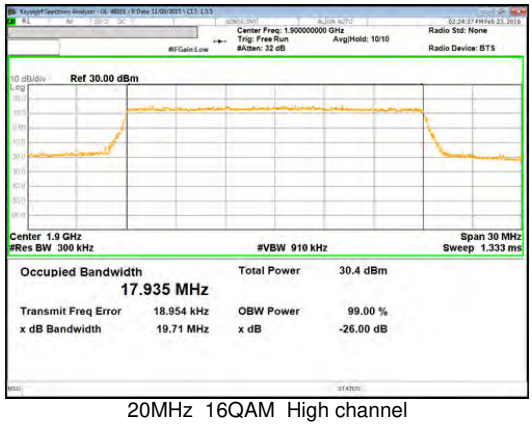
Band 4 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel
	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
	 10MHz QPSK High channel	 10MHz 16QAM High channel

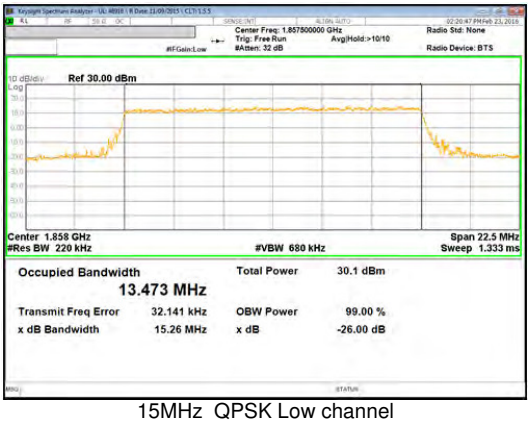
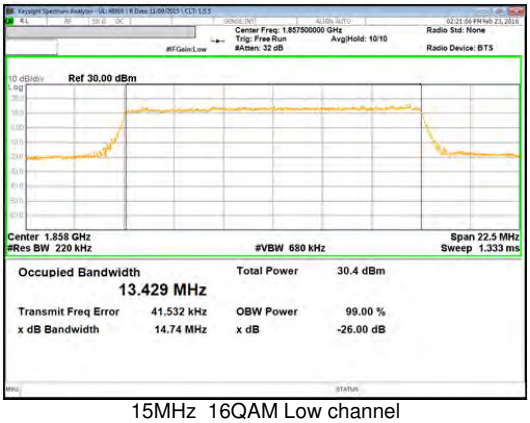
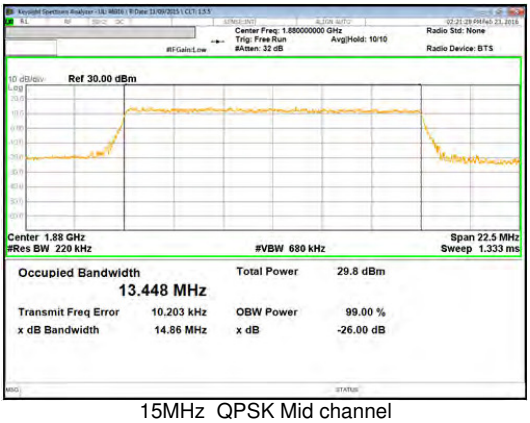
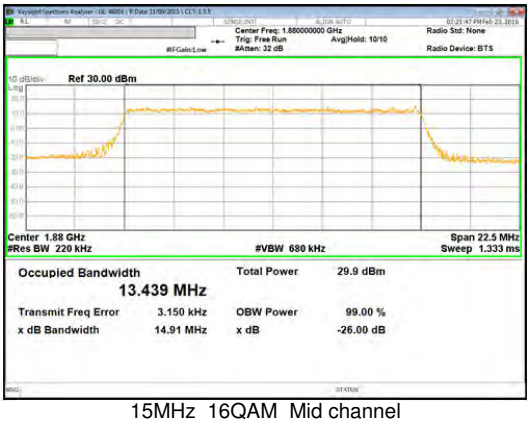
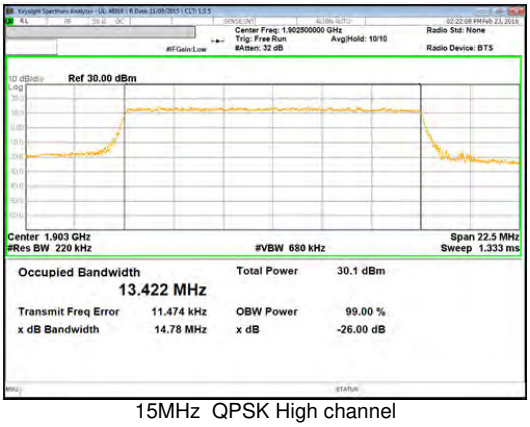
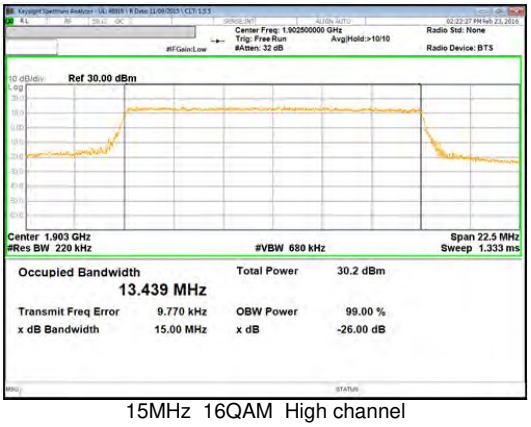
Band 4 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

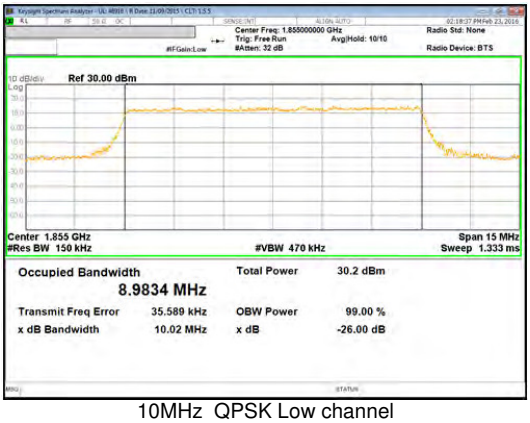
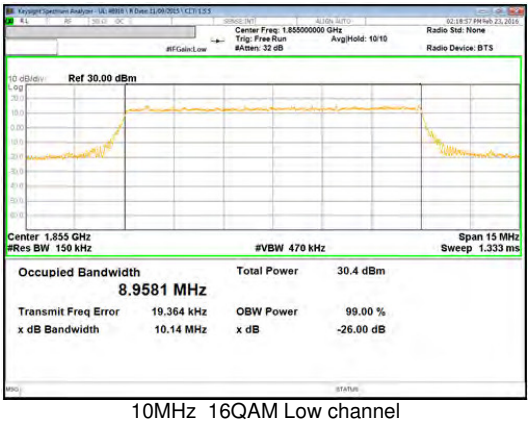
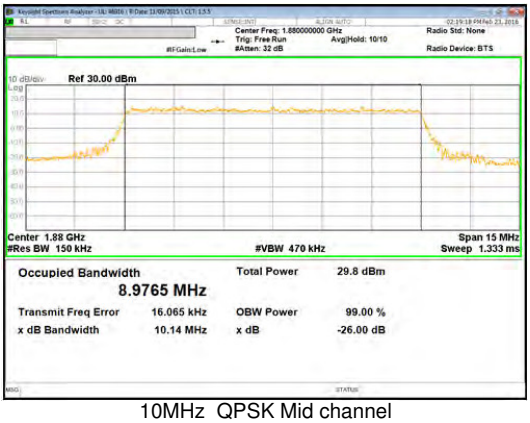
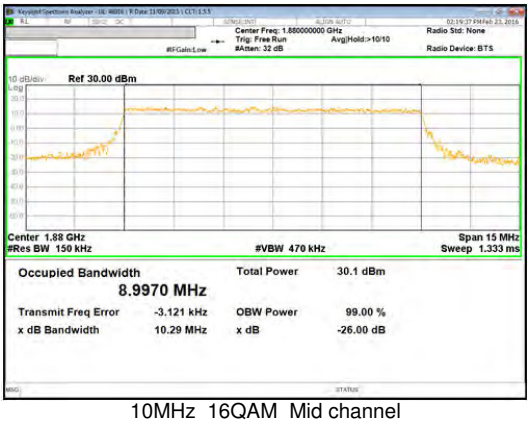
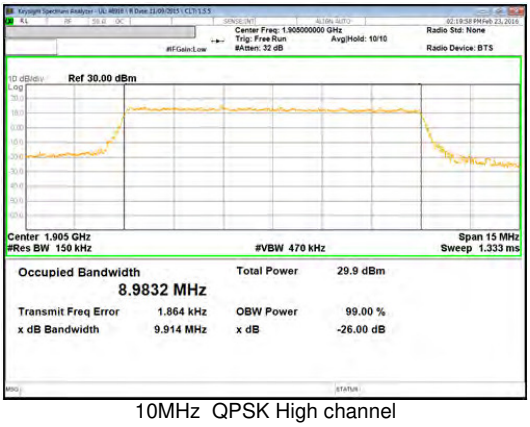
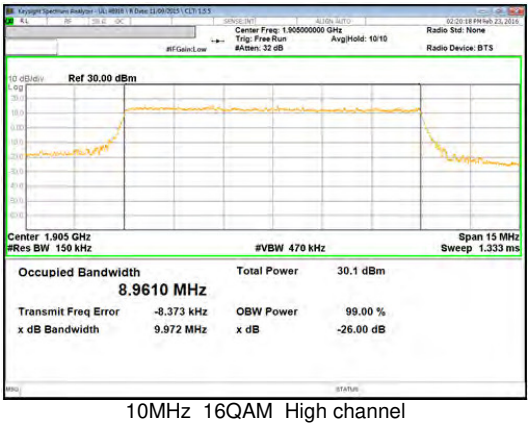
Band 4 3MHz	 3MHz QPSK Low channel	 3MHz 16QAM Low channel
	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
	 3MHz QPSK High channel	 3MHz 16QAM High channel

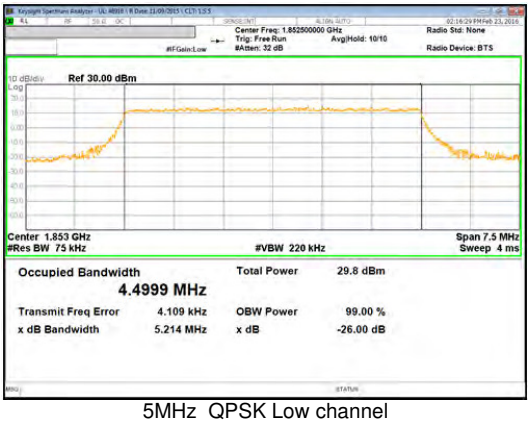
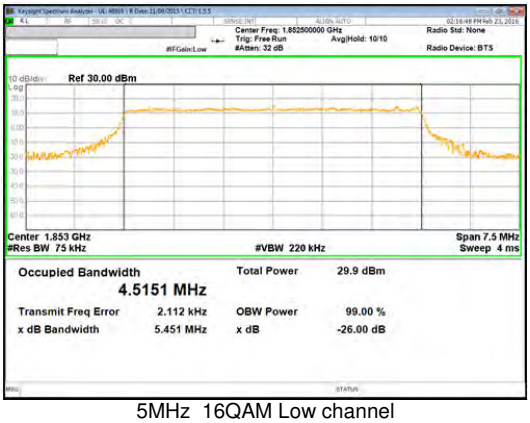
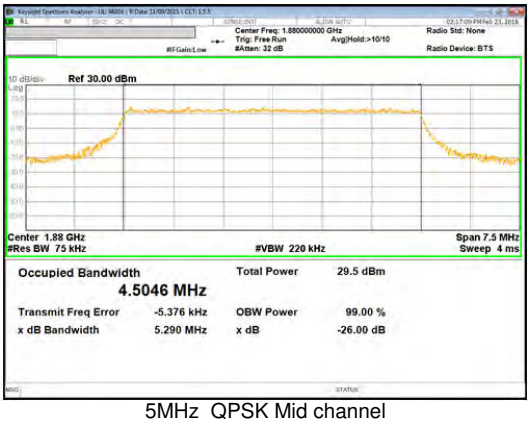
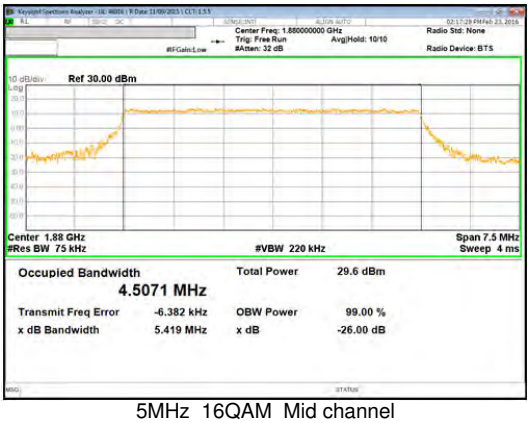
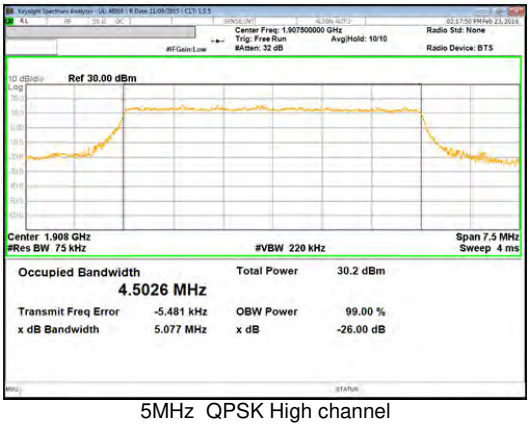
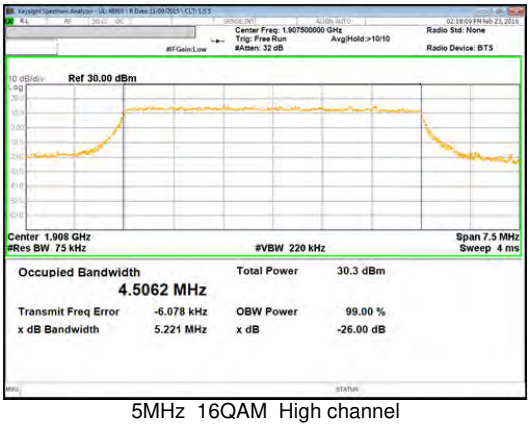
Band 4 1.4MHz	 1.4MHz QPSK Low channel	 1.4MHz 16QAM Low channel
	 1.4MHz QPSK Mid channel	 1.4MHz 16QAM Mid channel
	 1.4MHz QPSK High channel	 1.4MHz 16QAM High channel

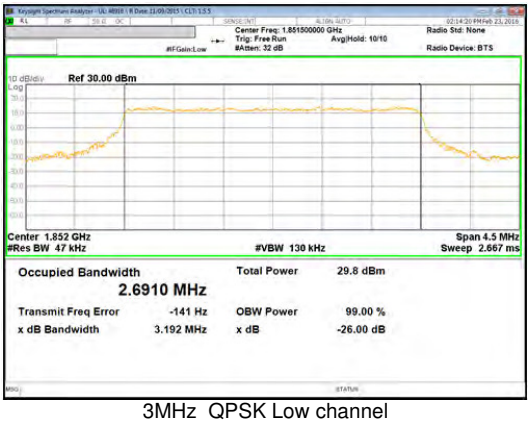
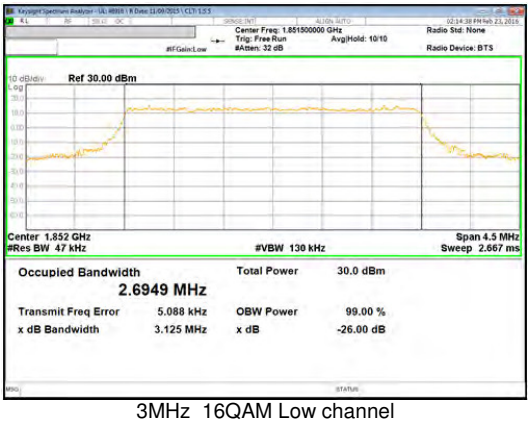
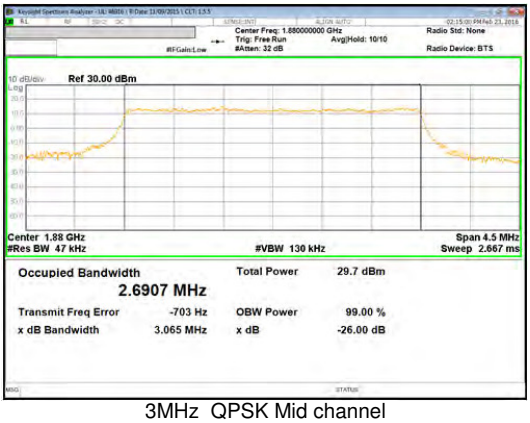
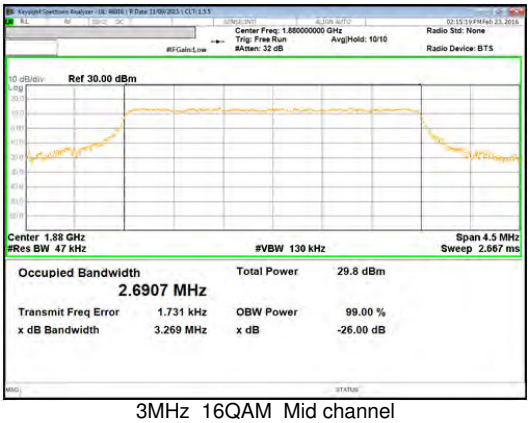
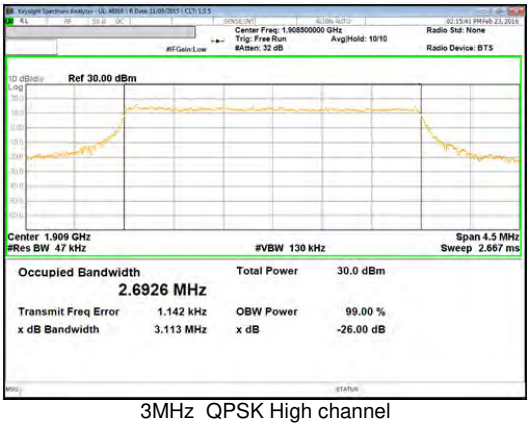
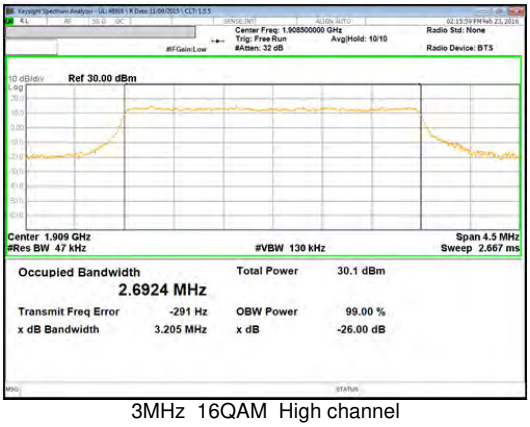
LTE Band 2

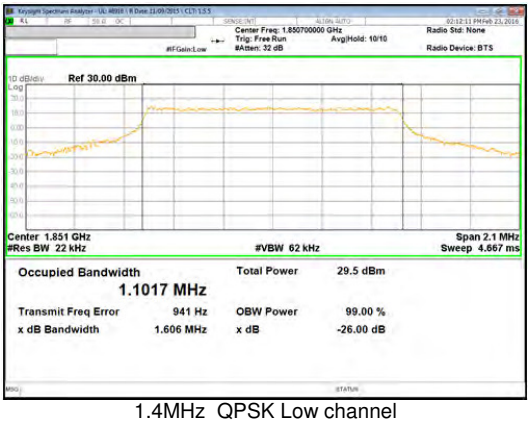
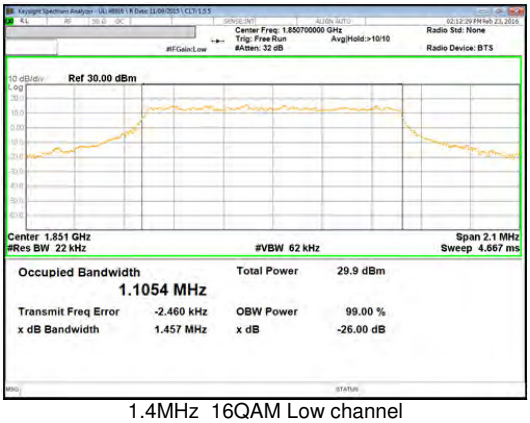
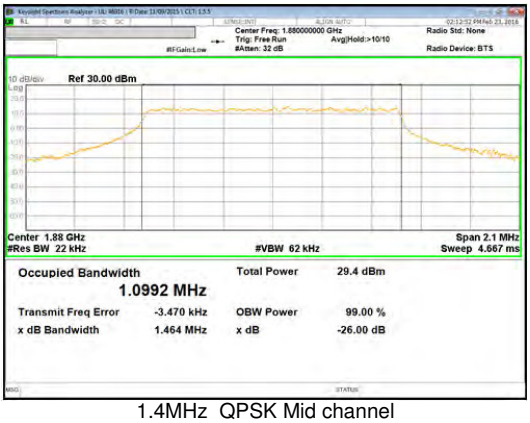
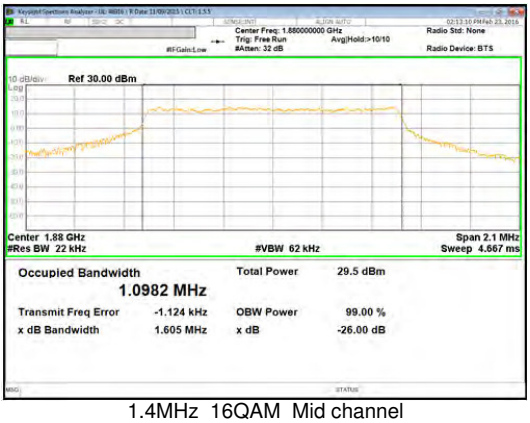
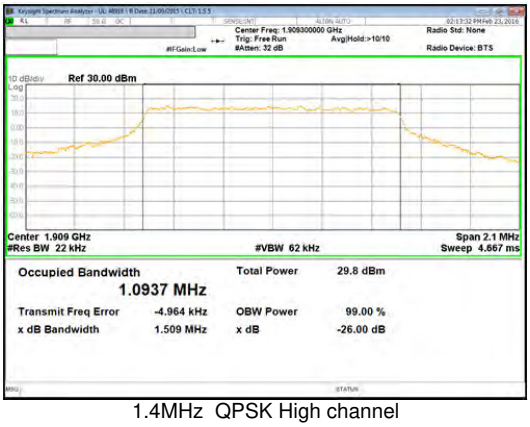
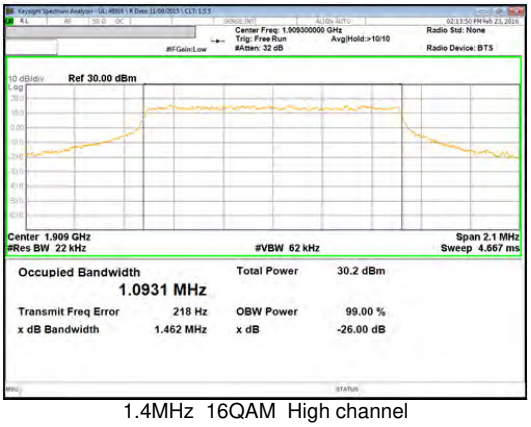
Band 2 20MHz	 20MHz QPSK Low channel	 20MHz 16QAM Low channel
	 20MHz QPSK Mid channel	 20MHz 16QAM Mid channel
	 20MHz QPSK High channel	 20MHz 16QAM High channel

Band 2 15MHz	 15MHz QPSK Low channel	 15MHz 16QAM Low channel
	 15MHz QPSK Mid channel	 15MHz 16QAM Mid channel
	 15MHz QPSK High channel	 15MHz 16QAM High channel

Band 2 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel
	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
	 10MHz QPSK High channel	 10MHz 16QAM High channel

Band 2 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

Band 2 3MHz	 3MHz QPSK Low channel	 3MHz 16QAM Low channel
	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
	 3MHz QPSK High channel	 3MHz 16QAM High channel

Band 2 1.4MHz	 1.4MHz QPSK Low channel	 1.4MHz 16QAM Low channel
	 1.4MHz QPSK Mid channel	 1.4MHz 16QAM Mid channel
	 1.4MHz QPSK High channel	 1.4MHz 16QAM High channel

10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238 and §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.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r02
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.

RESULTS

GSM

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
GSM850	GPRS	Lower	823.982	-15.944	-13.00
		Upper	849.023	-15.790	
	EGPRS	Lower	823.987	-23.463	
		Upper	849.003	-20.303	
GSM1900	GPRS	Lower	1849.982	-18.149	
		Upper	1910.023	-17.817	
	EGPRS	Lower	1849.992	-20.404	
		Upper	1910.003	-18.665	

WCDMA

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
Band 5	REL99	Lower	824.000	-28.875	-13.00
		Upper	849.000	-30.921	
	HSDPA	Lower	824.000	-29.283	
		Upper	849.000	-29.799	
Band 4	REL99	Lower	1710.000	-29.793	
		Upper	1755.000	-29.944	
	HSDPA	Lower	1710.000	-33.815	
		Upper	1755.000	-31.697	
Band 2	REL99	Lower	1850.000	-28.646	
		Upper	1910.000	-31.177	
	HSDPA	Lower	1850.000	-29.781	
		Upper	1910.000	-31.268	

LTE 17

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	704.000	-25.176	-13.00
			FRB	704.000	-33.308	
		Upper	1RB	716.000	-23.135	
			FRB	716.000	-32.225	
	16QAM	Lower	1RB	704.000	-16.967	
			FRB	704.000	-35.776	
		Upper	1RB	716.000	-19.267	
			FRB	716.000	-31.415	
5 MHz	QPSK	Lower	1RB	704.000	-14.725	
			FRB	704.000	-26.064	
		Upper	1RB	716.000	-14.394	
			FRB	716.000	-27.271	
	16QAM	Lower	1RB	704.000	-15.407	
			FRB	704.000	-25.052	
		Upper	1RB	716.000	-16.659	
			FRB	716.000	-25.808	

LTE 5

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	824.000	-28.488	-13.00
			FRB	824.000	-33.564	
		Upper	1RB	849.000	-19.051	
			FRB	849.000	-30.819	
	16QAM	Lower	1RB	824.000	-26.639	
			FRB	824.000	-35.189	
		Upper	1RB	849.000	-24.989	
			FRB	849.000	-30.574	
5 MHz	QPSK	Lower	1RB	824.000	-14.326	
			FRB	824.000	-27.262	
		Upper	1RB	849.000	-15.442	
			FRB	849.000	-26.196	
	16QAM	Lower	1RB	824.000	-15.350	
			FRB	824.000	-24.343	
		Upper	1RB	849.000	-14.315	
			FRB	849.000	-26.145	
3 MHz	QPSK	Lower	1RB	824.000	-14.033	
			FRB	824.000	-26.175	
		Upper	1RB	849.000	-14.287	
			FRB	849.000	-23.699	
	16QAM	Lower	1RB	824.000	-15.908	
			FRB	824.000	-25.215	
		Upper	1RB	849.000	-14.509	
			FRB	849.000	-25.747	
1.4 MHz	QPSK	Lower	1RB	824.000	-14.311	
			FRB	824.000	-22.493	
		Upper	1RB	849.000	-14.038	
			FRB	849.000	-21.888	
	16QAM	Lower	1RB	824.000	-14.922	
			FRB	824.000	-21.724	
		Upper	1RB	849.000	-15.539	
			FRB	849.000	-22.109	

LTE 4

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
20 MHz	QPSK	Lower	1RB	1710.000	-25.933	-13.00
			FRB	1710.000	-32.940	
		Upper	1RB	1755.000	-24.897	
			FRB	1755.000	-34.572	
	16QAM	Lower	1RB	1710.000	-26.295	
			FRB	1710.000	-34.019	
		Upper	1RB	1755.000	-22.177	
			FRB	1755.000	-35.163	
15 MHz	QPSK	Lower	1RB	1710.000	-31.231	
			FRB	1710.000	-35.636	
		Upper	1RB	1755.000	-21.446	
			FRB	1755.000	-35.415	
	16QAM	Lower	1RB	1710.000	-29.277	
			FRB	1710.000	-35.904	
		Upper	1RB	1755.000	-28.398	
			FRB	1755.000	-35.572	
10 MHz	QPSK	Lower	1RB	1710.000	-26.089	
			FRB	1710.000	-34.421	
		Upper	1RB	1755.000	-22.810	
			FRB	1755.000	-36.274	
	16QAM	Lower	1RB	1710.000	-22.292	
			FRB	1710.000	-32.196	
		Upper	1RB	1755.000	-19.968	
			FRB	1755.000	-33.624	
5 MHz	QPSK	Lower	1RB	1710.000	-14.332	
			FRB	1710.000	-27.387	
		Upper	1RB	1755.000	-15.885	
			FRB	1755.000	-26.619	
	16QAM	Lower	1RB	1710.000	-15.237	
			FRB	1710.000	-26.094	
		Upper	1RB	1755.000	-14.671	
			FRB	1755.000	-26.210	

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
3 MHz	QPSK	Lower	1RB	1710.000	-15.057	-13.00
			FRB	1710.000	-25.945	
		Upper	1RB	1755.000	-14.878	
			FRB	1755.000	-25.867	
	16QAM	Lower	1RB	1710.000	-14.643	
			FRB	1710.000	-26.134	
		Upper	1RB	1755.000	-15.553	
			FRB	1755.000	-25.800	
1.4 MHz	QPSK	Lower	1RB	1710.000	-15.329	
			FRB	1710.000	-22.128	
		Upper	1RB	1755.000	-14.927	
			FRB	1755.000	-22.613	
	16QAM	Lower	1RB	1710.000	-14.878	
			FRB	1710.000	-22.388	
		Upper	1RB	1755.000	-15.616	
			FRB	1755.000	-22.653	

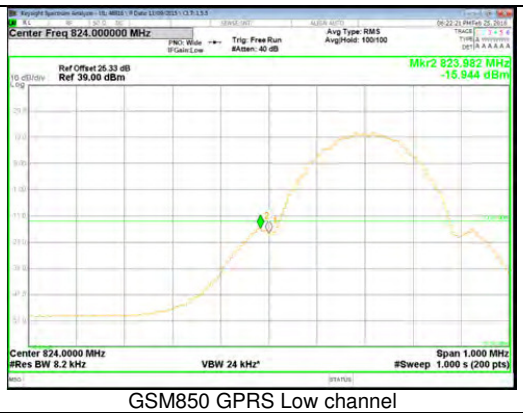
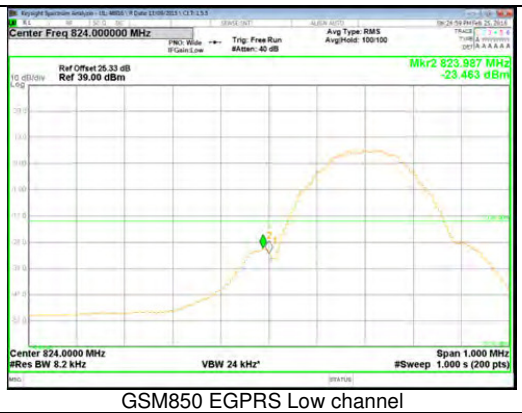
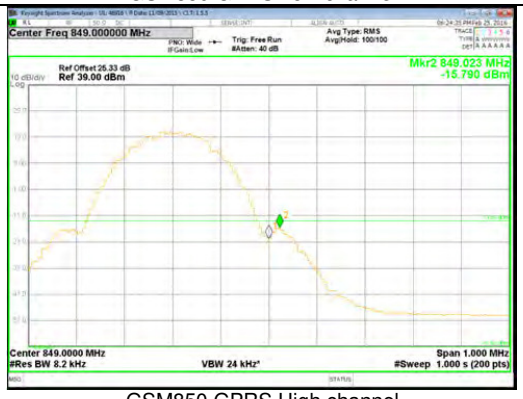
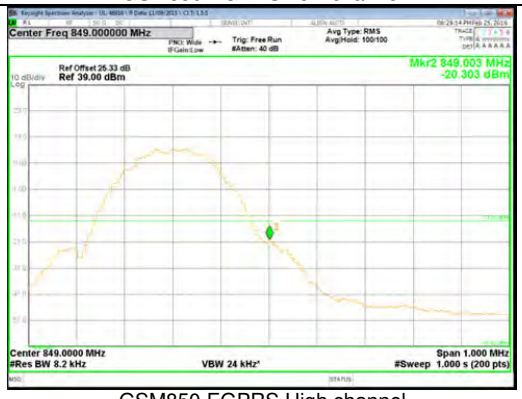
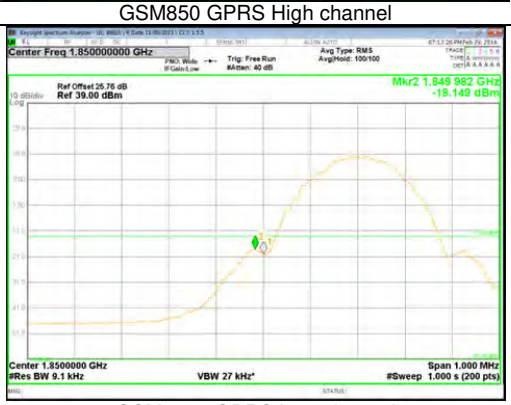
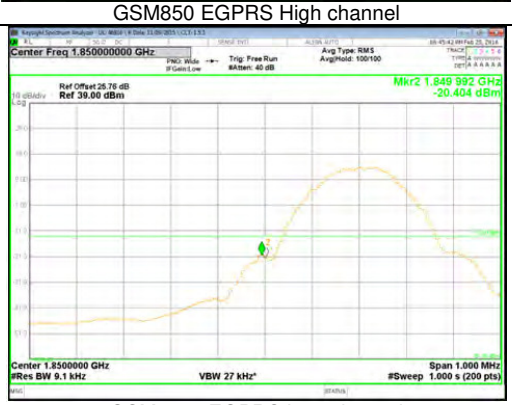
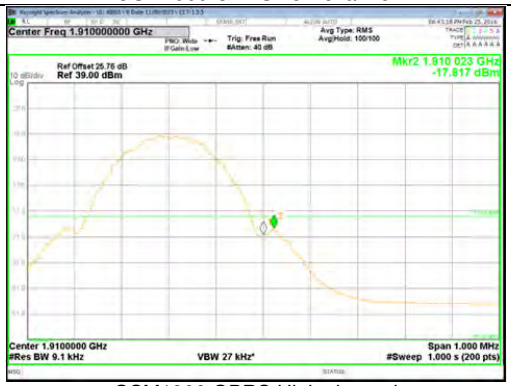
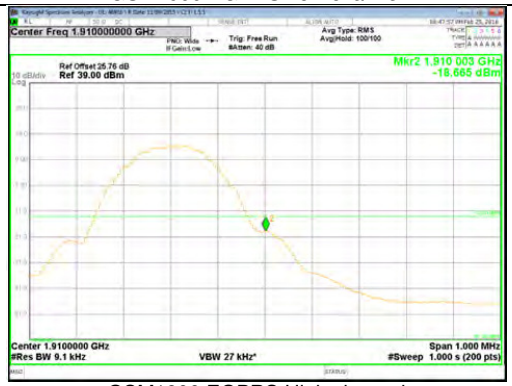
LTE 2

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
20 MHz	QPSK	Lower	1RB	1850.000	-23.633	-13.00
			FRB	1850.000	-27.487	
		Upper	1RB	1910.000	-25.662	
			FRB	1910.000	-28.558	
	16QAM	Lower	1RB	1850.000	-23.716	
			FRB	1850.000	-29.787	
		Upper	1RB	1910.000	-25.197	
			FRB	1910.000	-28.427	
15 MHz	QPSK	Lower	1RB	1850.000	-20.282	
			FRB	1850.000	-29.406	
		Upper	1RB	1910.000	-25.009	
			FRB	1910.000	-29.361	
	16QAM	Lower	1RB	1850.000	-20.914	
			FRB	1850.000	-29.649	
		Upper	1RB	1910.000	-27.831	
			FRB	1910.000	-30.543	

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	1850.000	-25.383	-13.00
			FRB	1850.000	-28.118	
		Upper	1RB	1910.000	-20.797	
			FRB	1910.000	-30.511	
	16QAM	Lower	1RB	1850.000	-24.834	
			FRB	1850.000	-28.308	
		Upper	1RB	1910.000	-20.539	
			FRB	1910.000	-29.481	
5 MHz	QPSK	Lower	1RB	1850.000	-15.728	
			FRB	1850.000	-25.092	
		Upper	1RB	1910.000	-15.515	
			FRB	1910.000	-25.305	
	16QAM	Lower	1RB	1850.000	-14.537	
			FRB	1850.000	-23.889	
		Upper	1RB	1910.000	-14.439	
			FRB	1910.000	-23.952	
3 MHz	QPSK	Lower	1RB	1850.000	-15.761	
			FRB	1850.000	-25.324	
		Upper	1RB	1910.000	-14.521	
			FRB	1910.000	-26.197	
	16QAM	Lower	1RB	1850.000	-14.472	
			FRB	1850.000	-23.531	
		Upper	1RB	1910.000	-14.769	
			FRB	1910.000	-24.797	
1.4 MHz	QPSK	Lower	1RB	1850.000	-14.906	
			FRB	1850.000	-20.930	
		Upper	1RB	1910.000	-14.791	
			FRB	1910.000	-23.152	
	16QAM	Lower	1RB	1850.000	-15.769	
			FRB	1850.000	-20.706	
		Upper	1RB	1910.000	-15.085	
			FRB	1910.000	-21.662	

10.2.1. BAND EDGE PLOTS

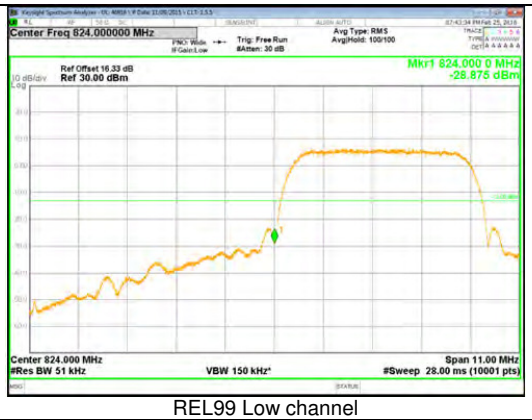
GSM

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

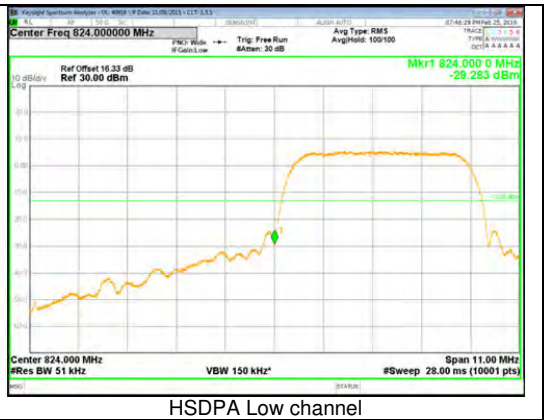
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA

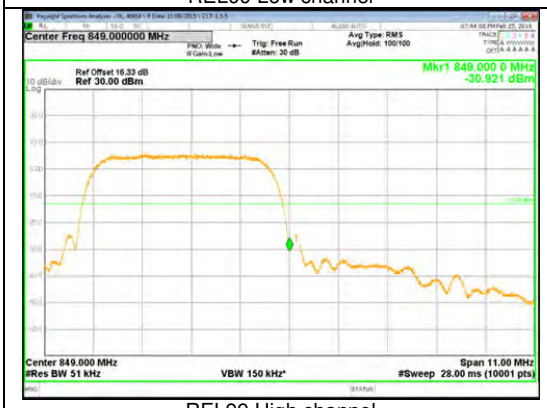
Band 5



REL99 Low channel



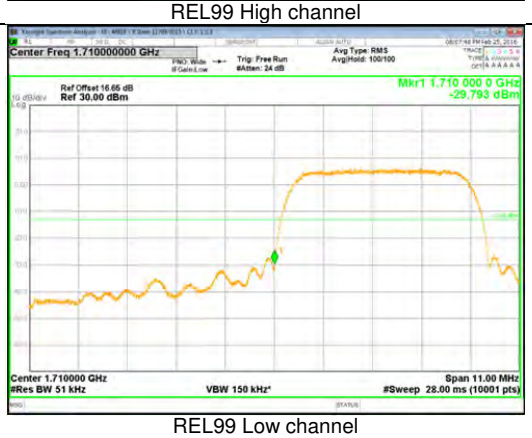
HSDPA Low channel



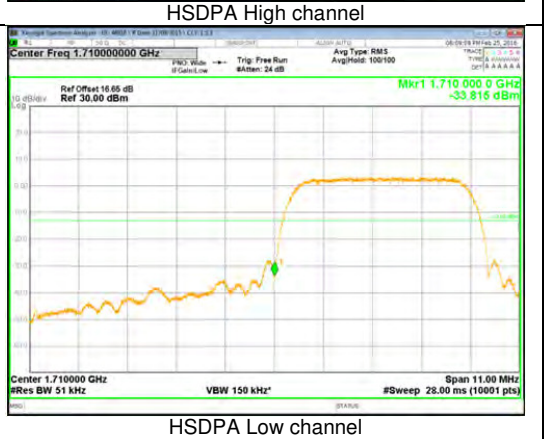
REL99 High channel

HSDPA High channel

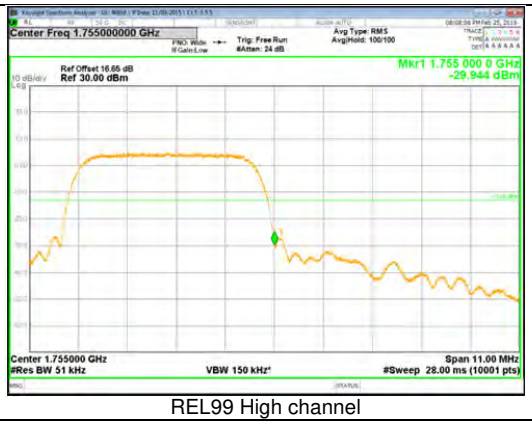
Band 4



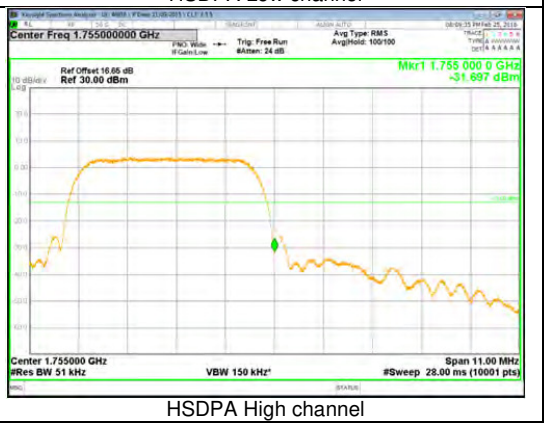
REL99 Low channel



HSDPA Low channel



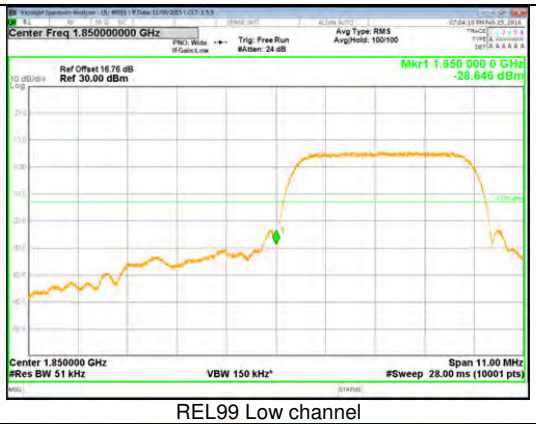
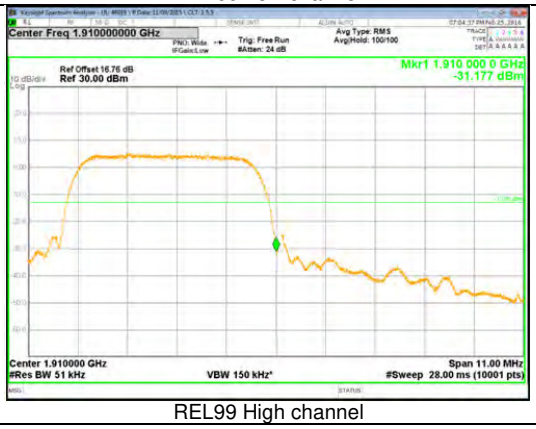
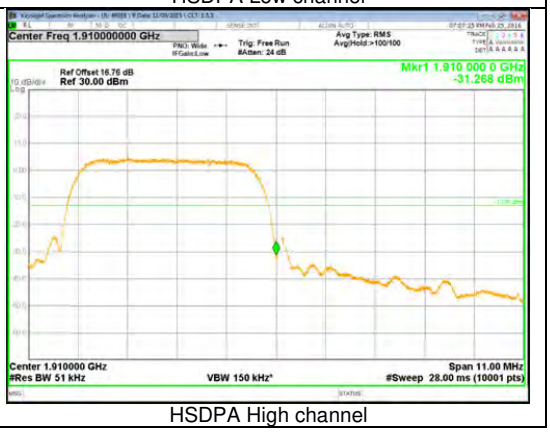
REL99 High channel



HSDPA High channel

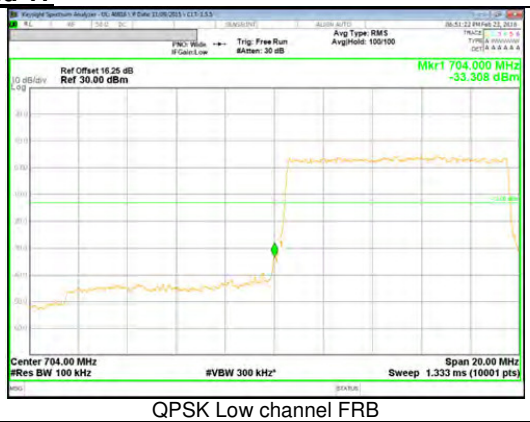
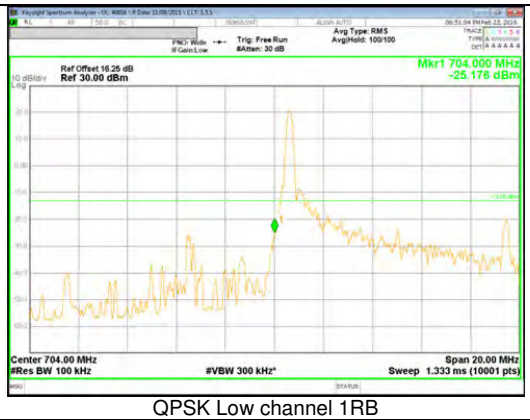
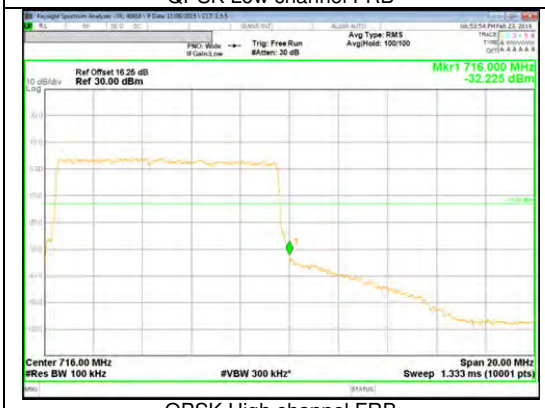
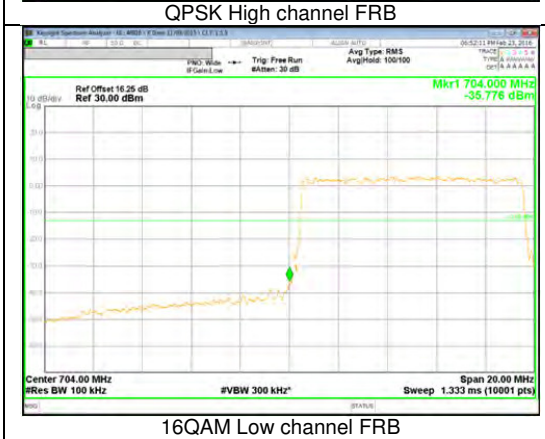
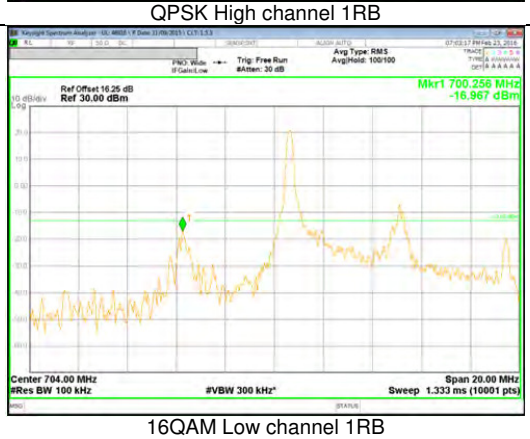
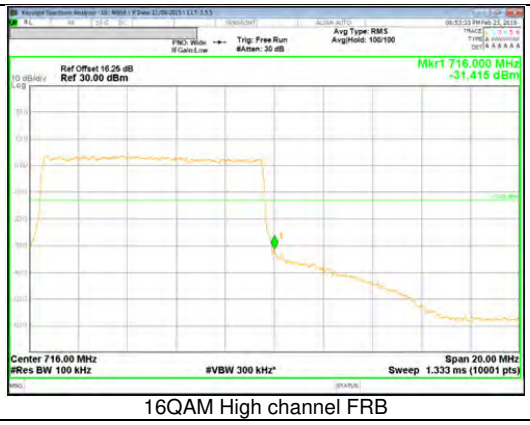
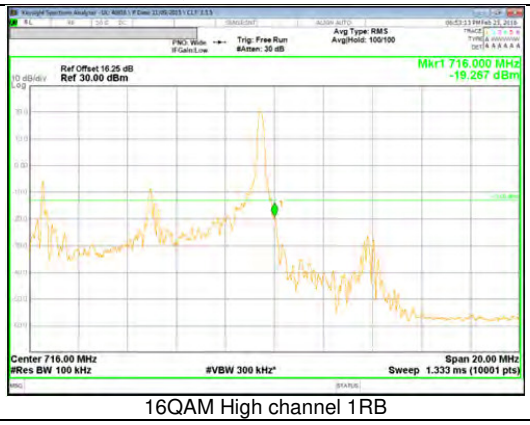
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

WCDMA

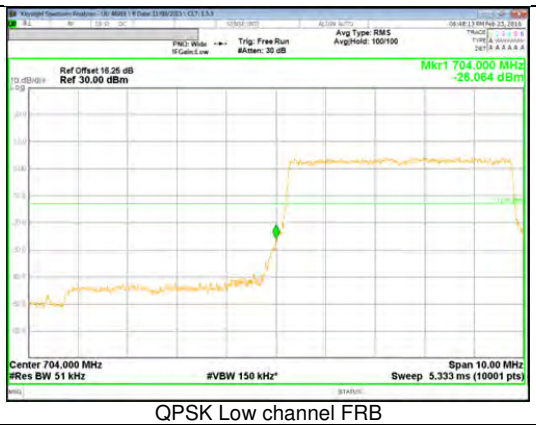
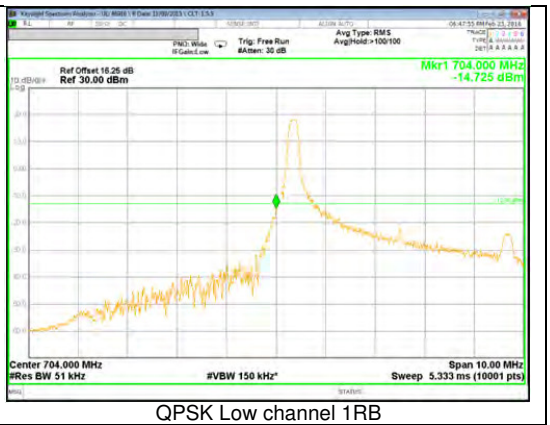
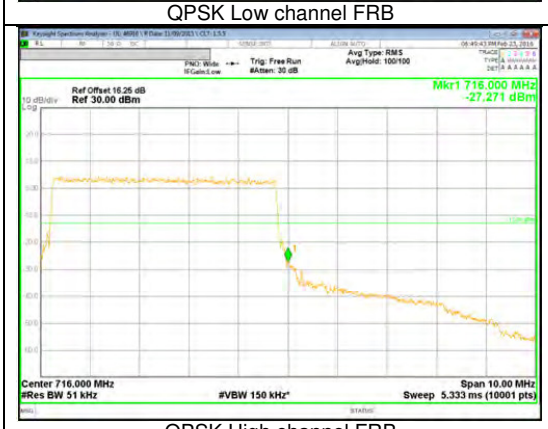
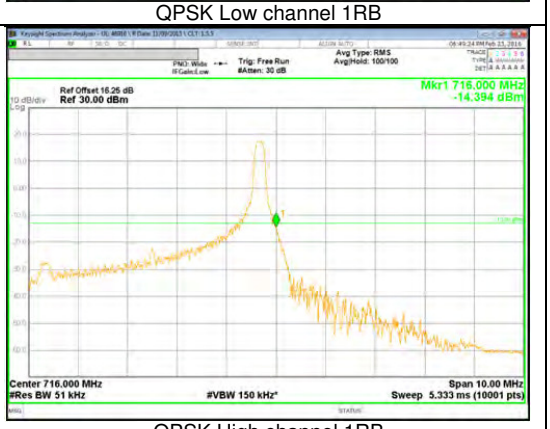
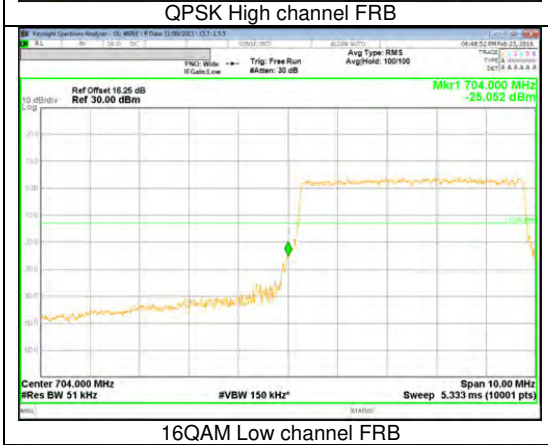
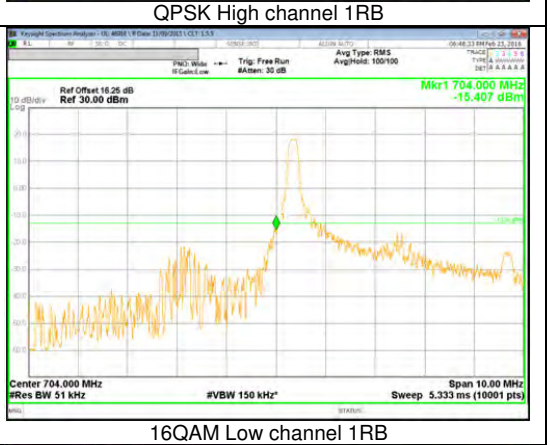
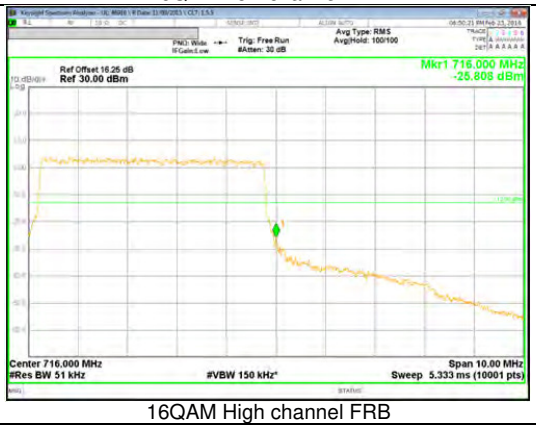
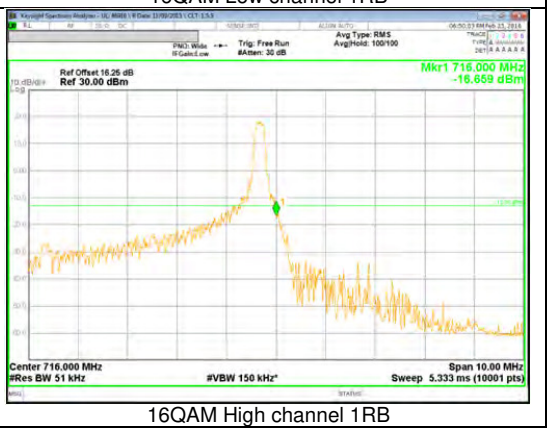
Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 High channel	 HSDPA High channel

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

LTE Band 17

Band 17 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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

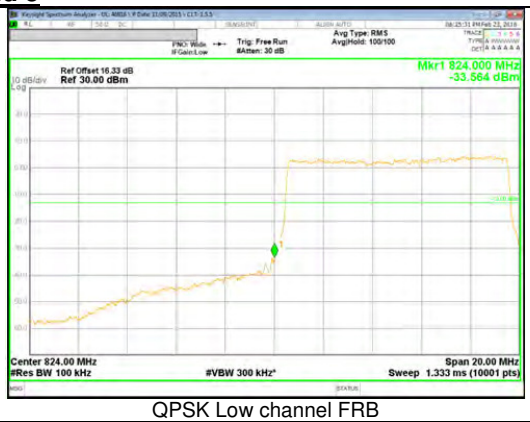
Band 17 5MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

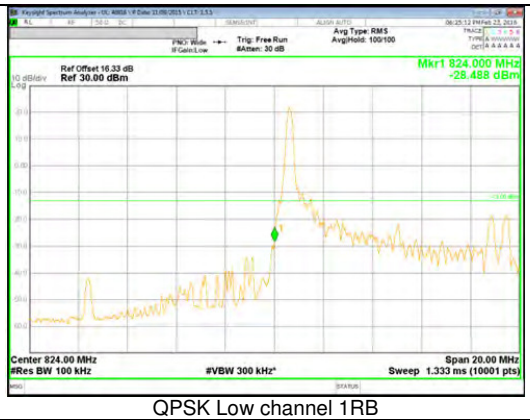
LTE Band 5

Band 5

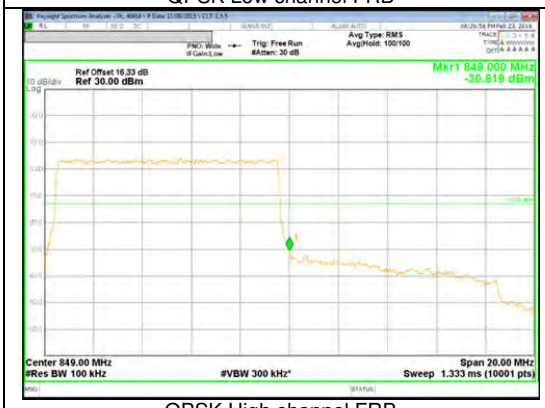
10MHz



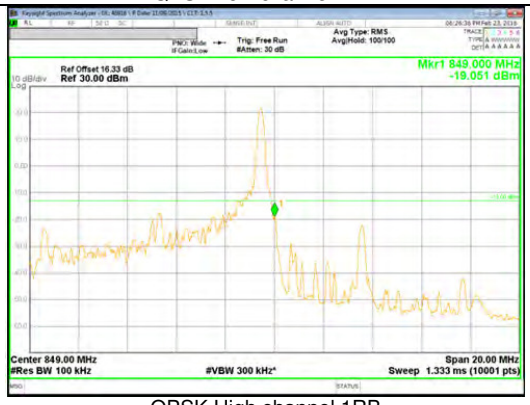
QPSK Low channel FRB



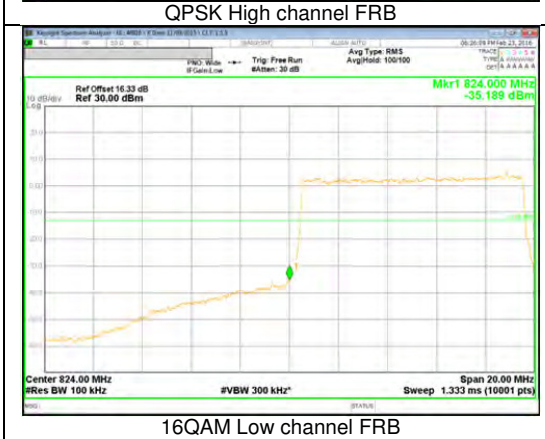
QPSK Low channel 1RB



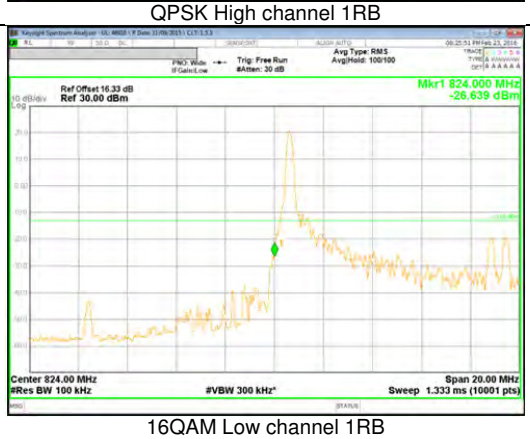
QPSK High channel FRB



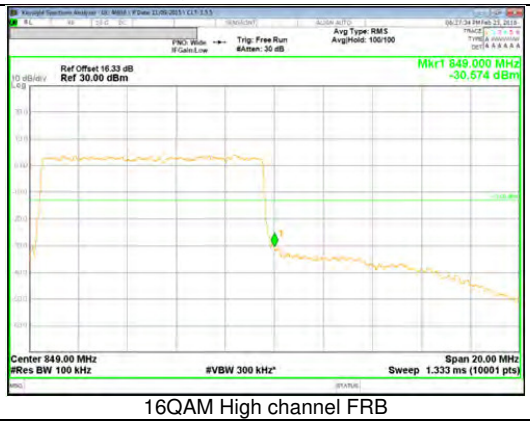
QPSK High channel 1RB



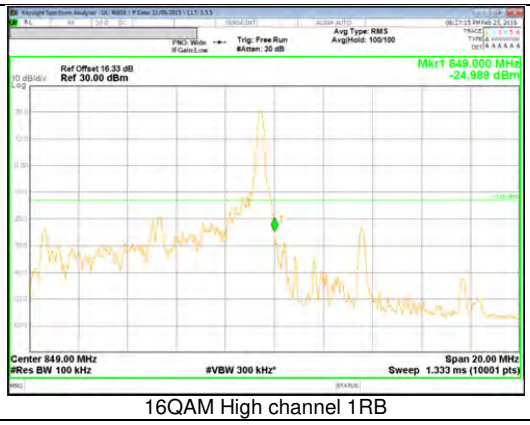
16QAM Low channel FRB



16QAM Low channel 1RB

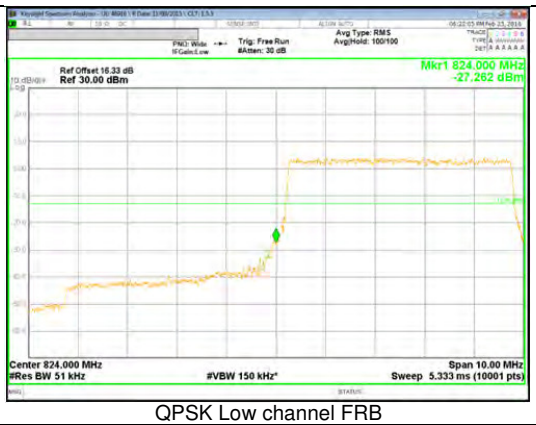
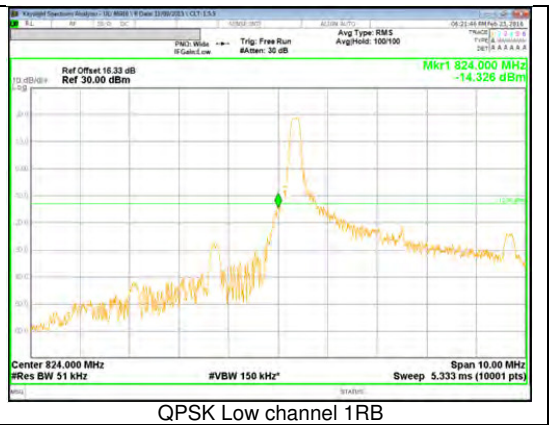
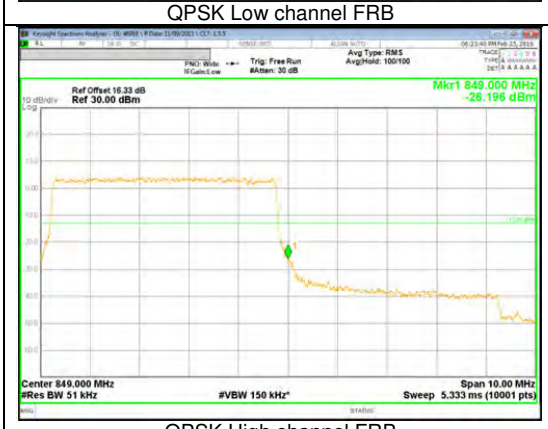
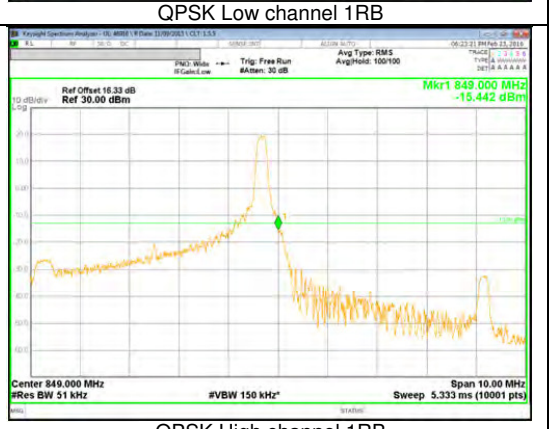
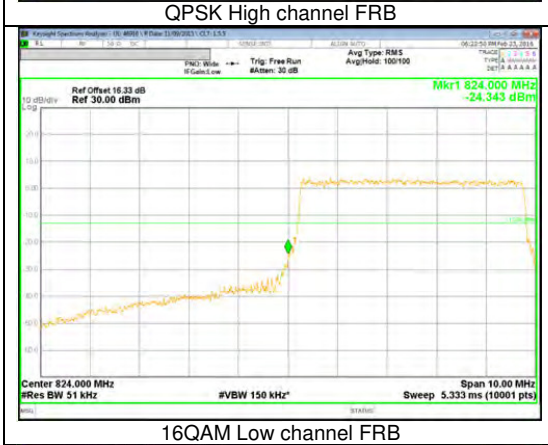
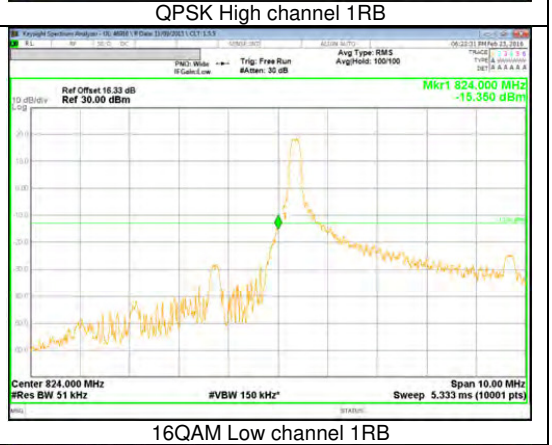
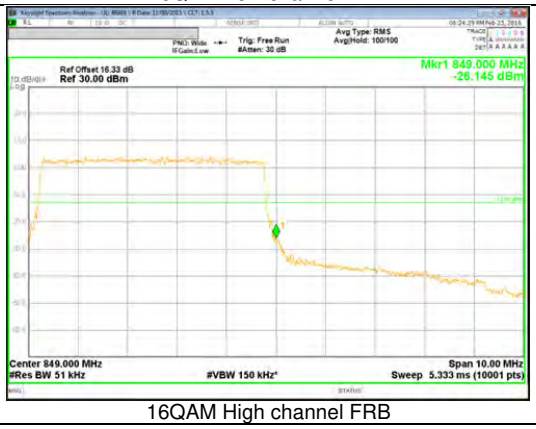
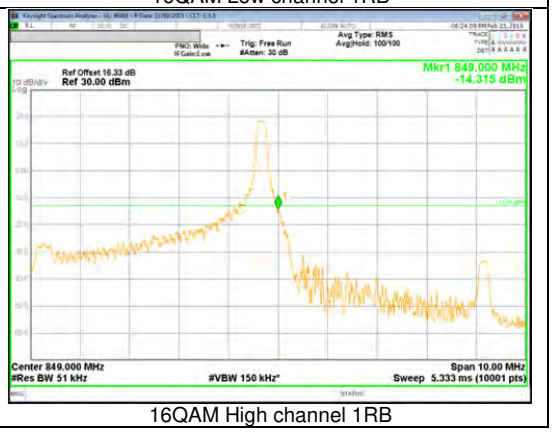


16QAM High channel FRB

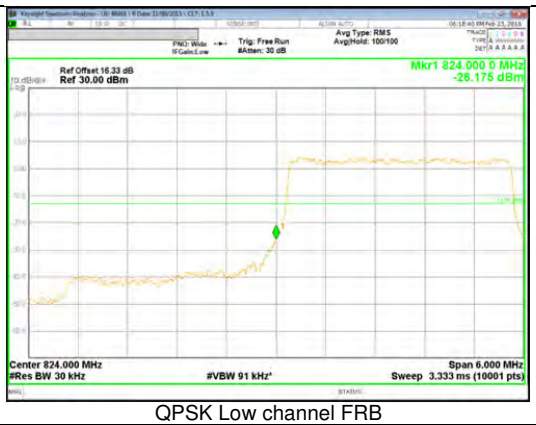
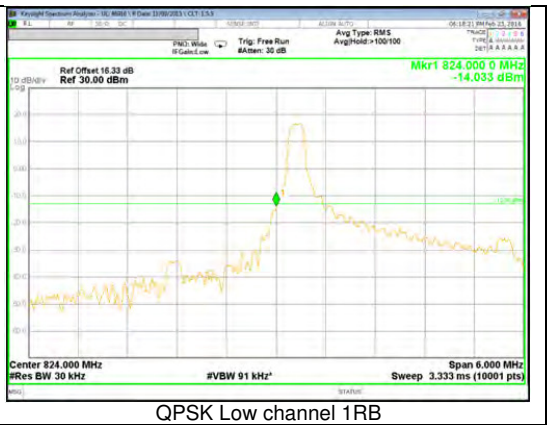
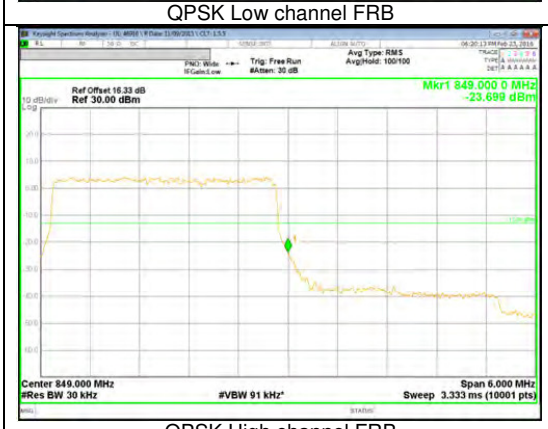
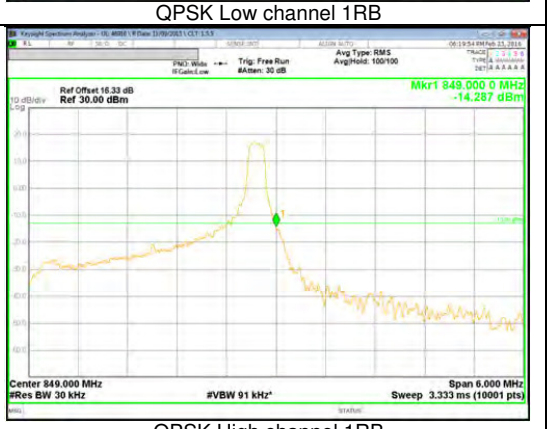
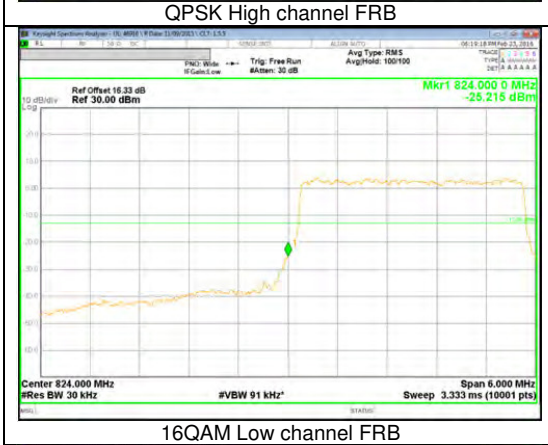
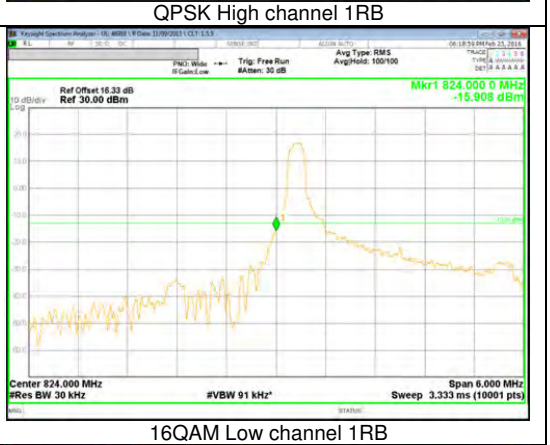
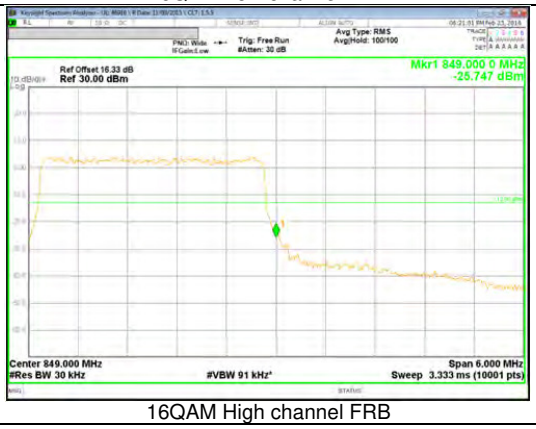
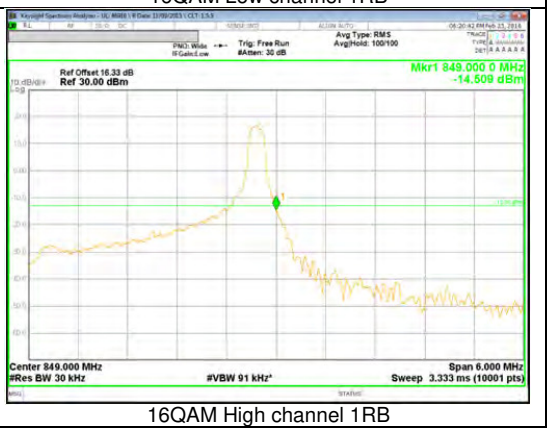


16QAM High channel 1RB

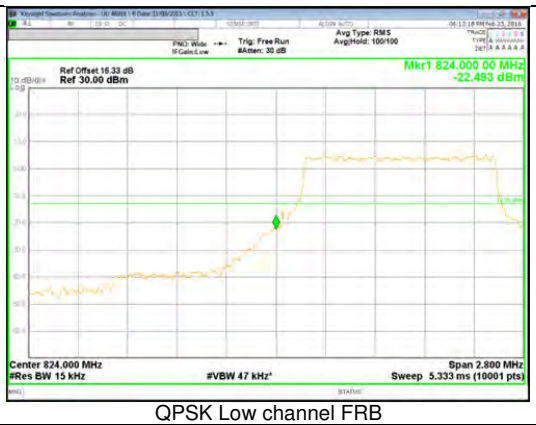
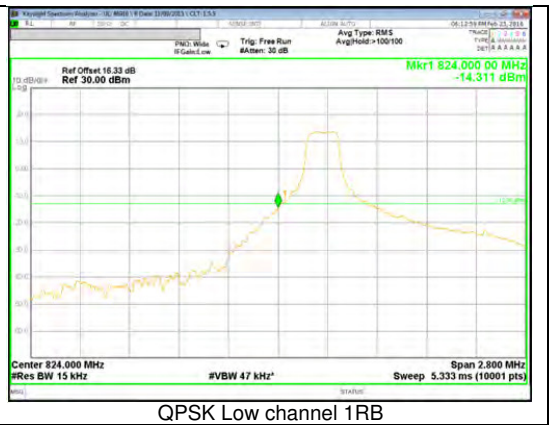
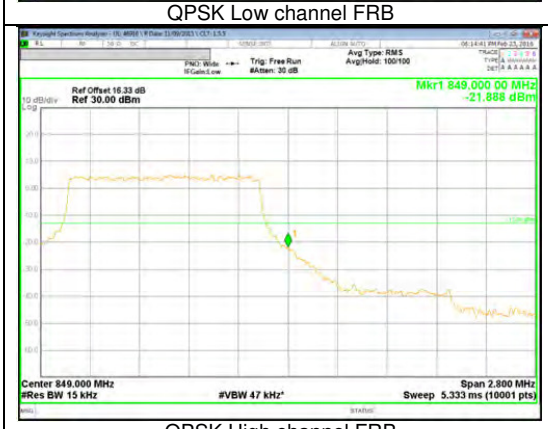
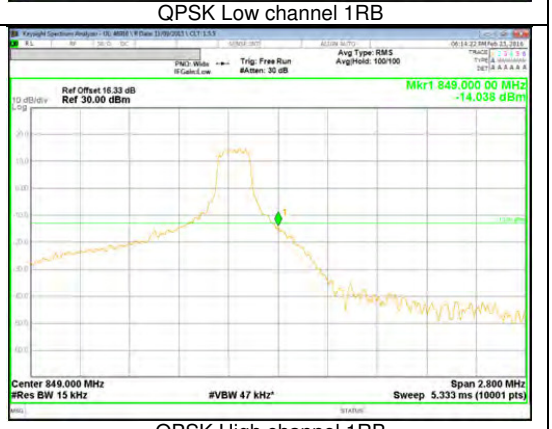
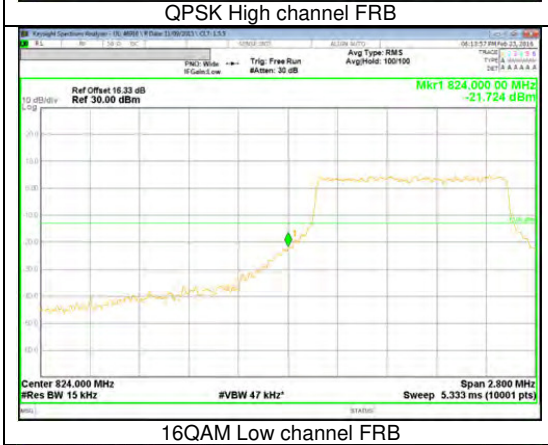
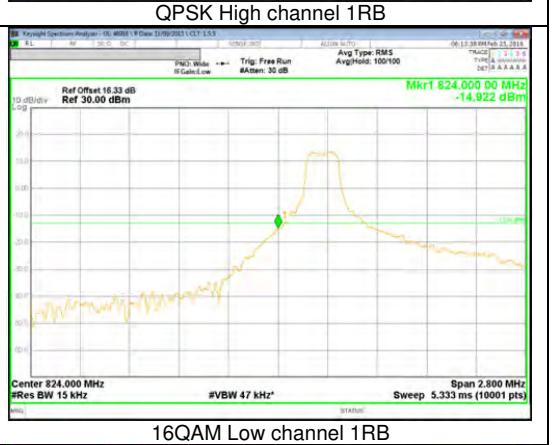
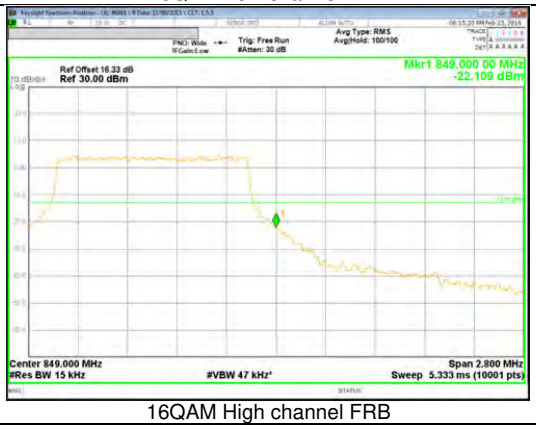
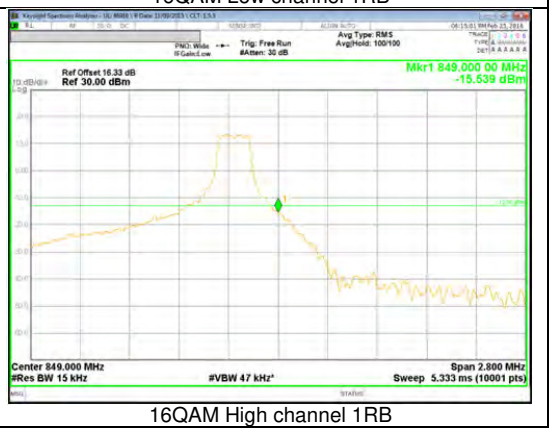
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

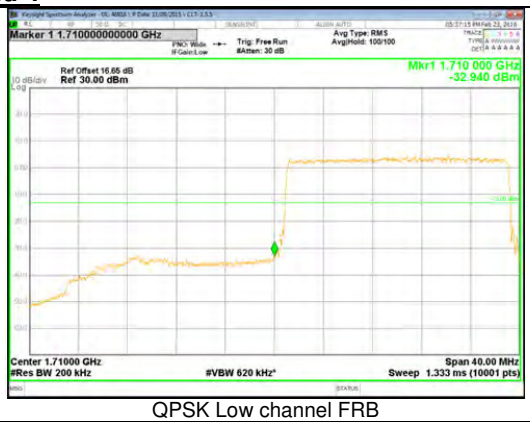
Band 5 1.4MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

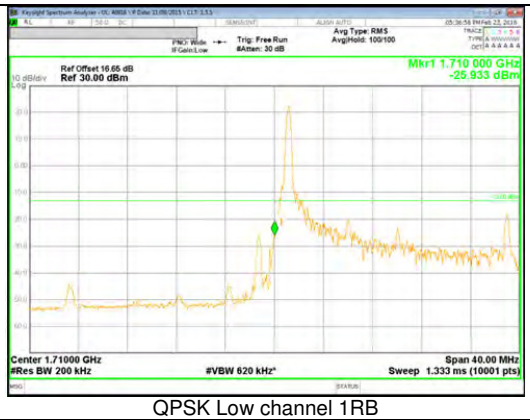
LTE Band 4

Band 4

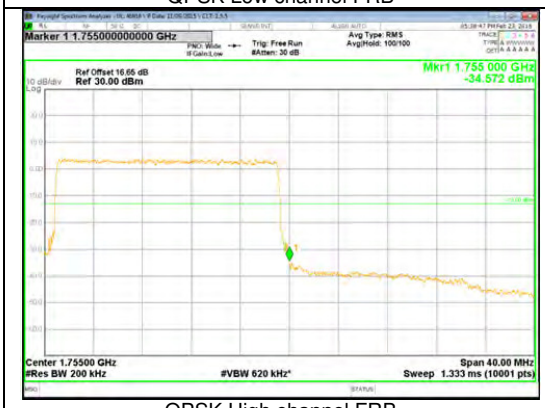
20MHz



QPSK Low channel FRB

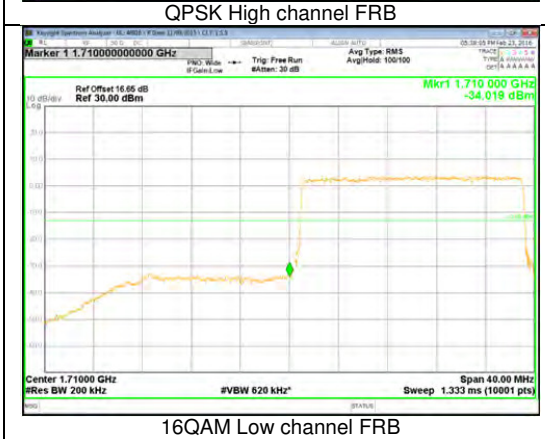


QPSK Low channel 1RB

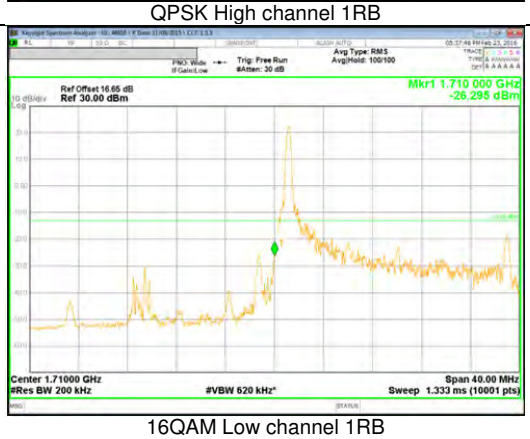


QPSK High channel FRB

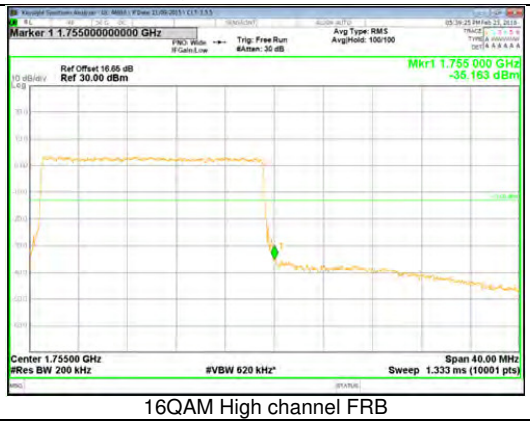
QPSK High channel 1RB



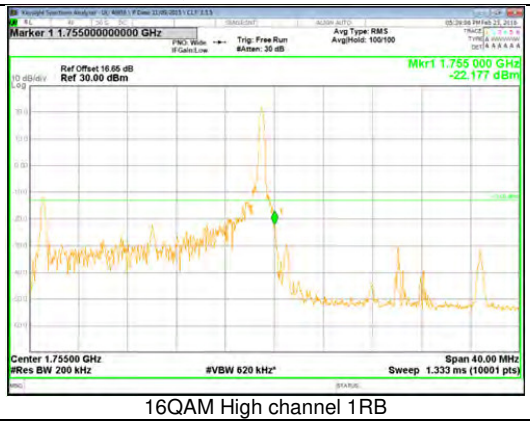
16QAM Low channel FRB



16QAM Low channel 1RB

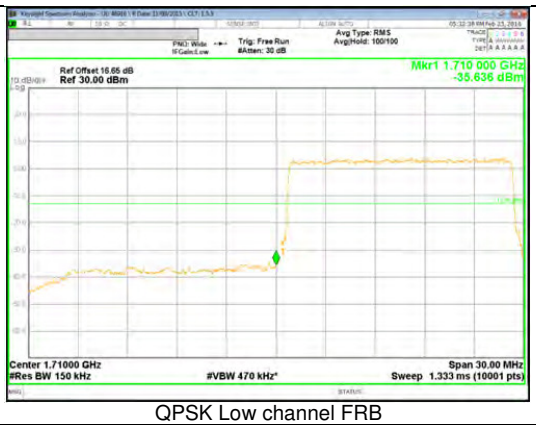
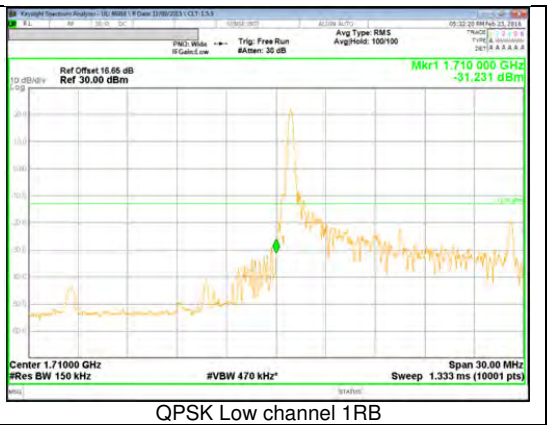
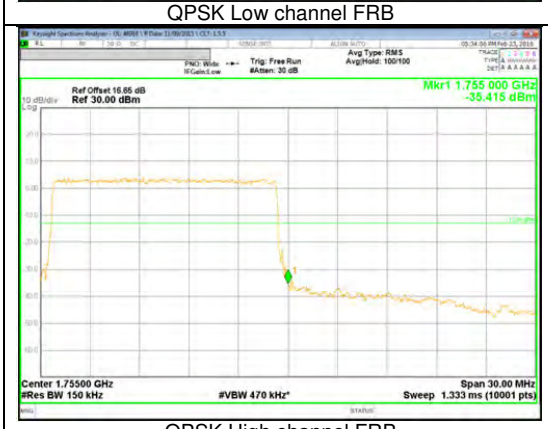
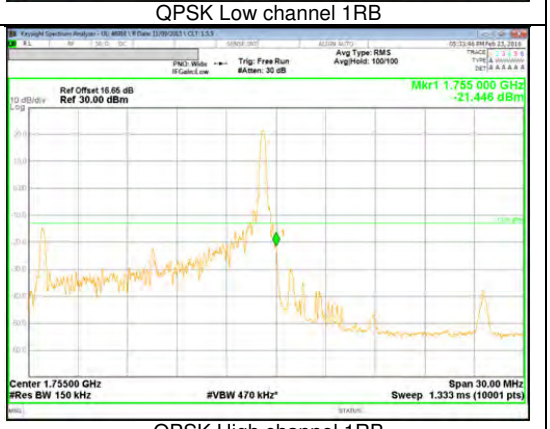
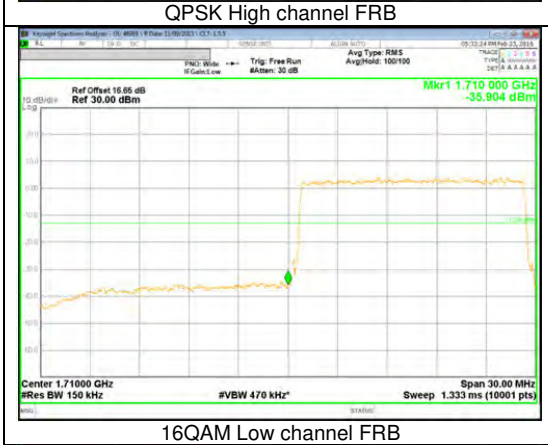
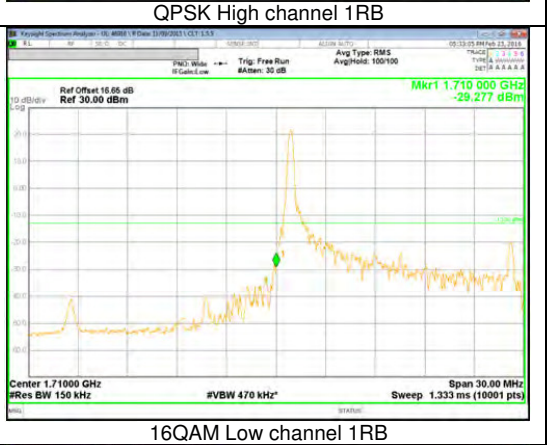
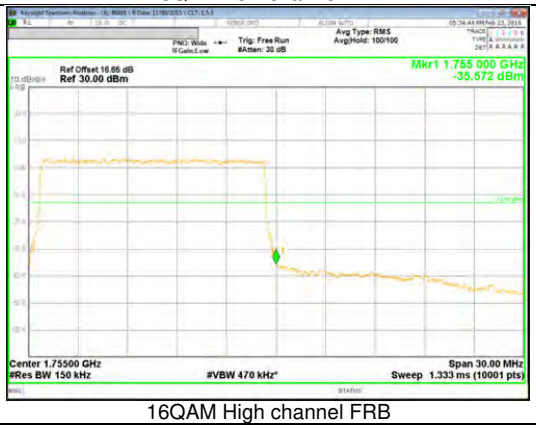
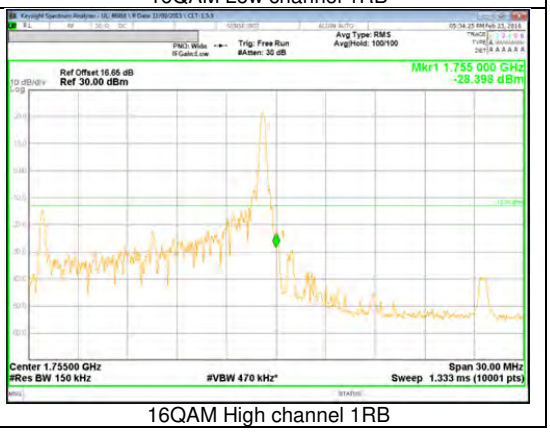


16QAM High channel FRB

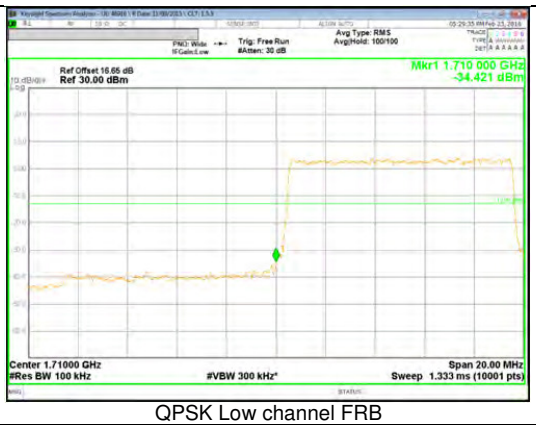
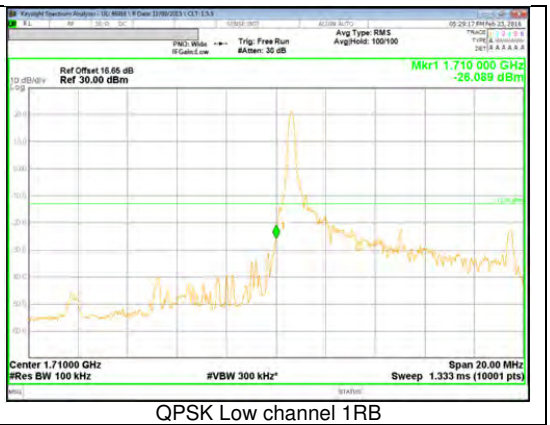
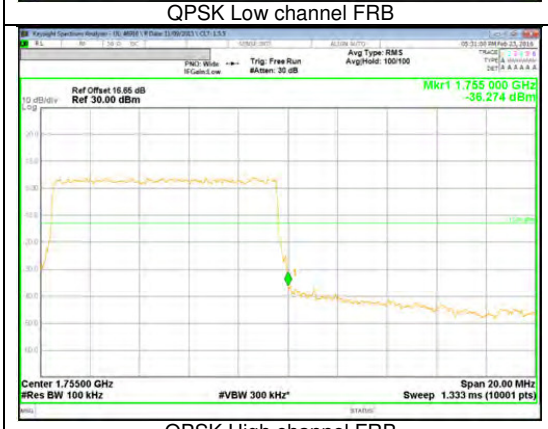
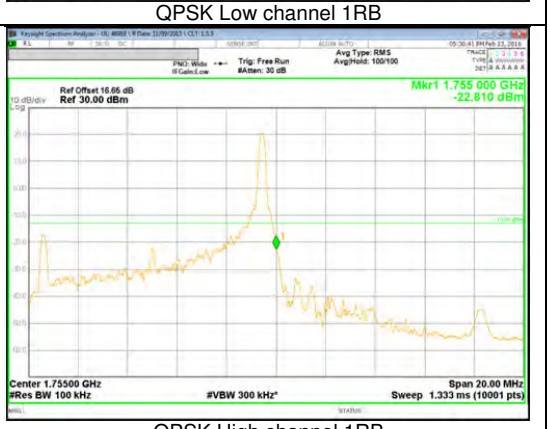
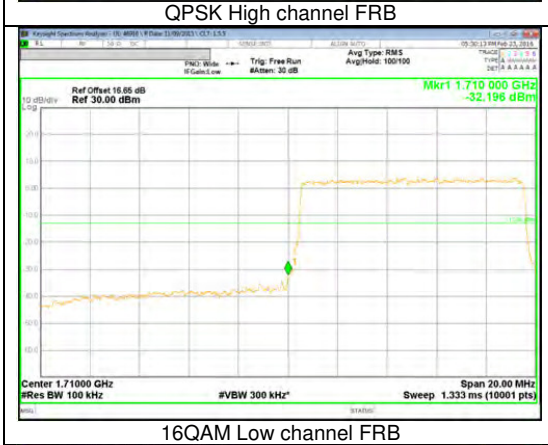
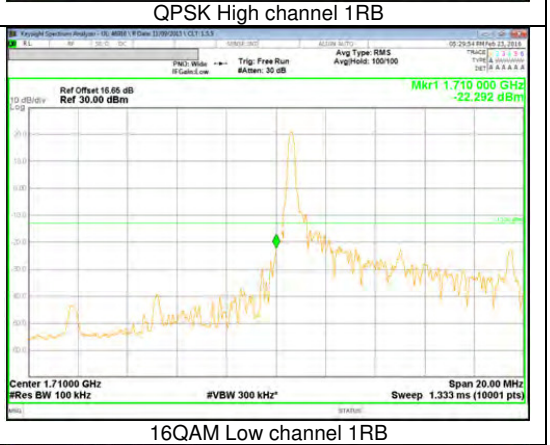
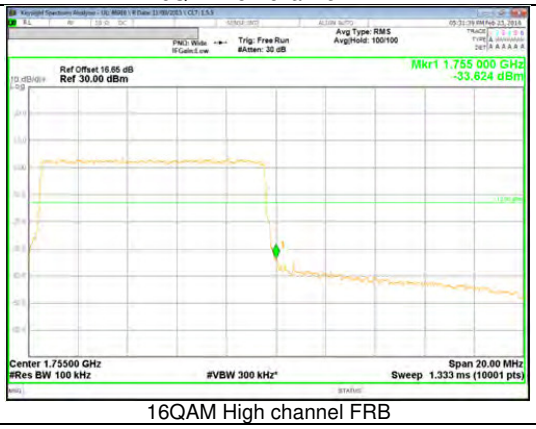
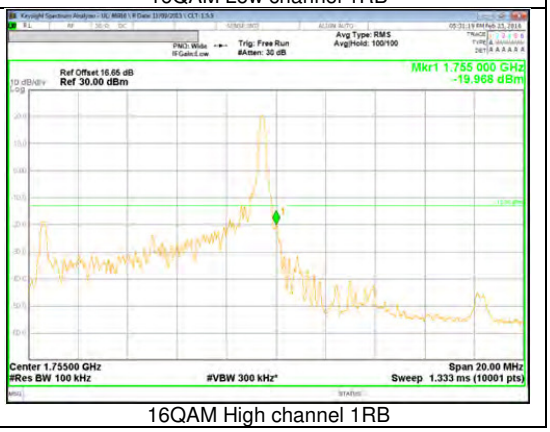


16QAM High channel 1RB

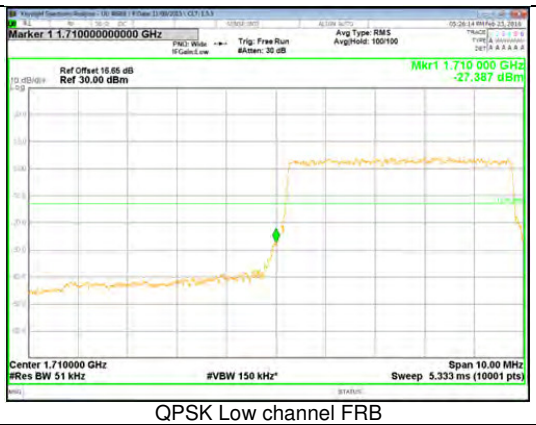
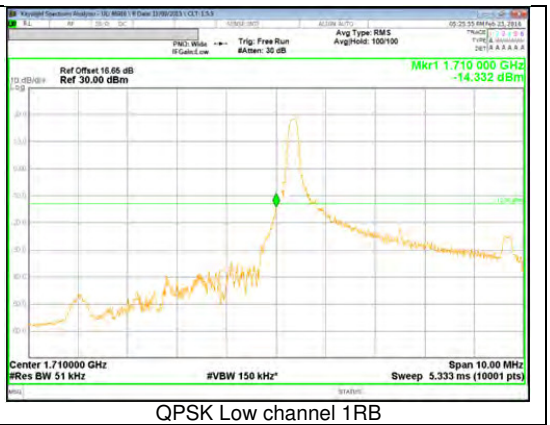
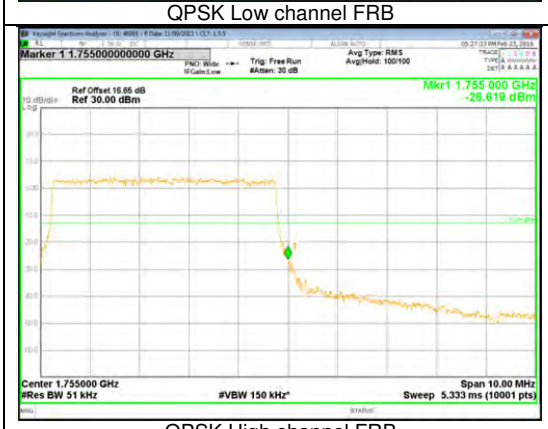
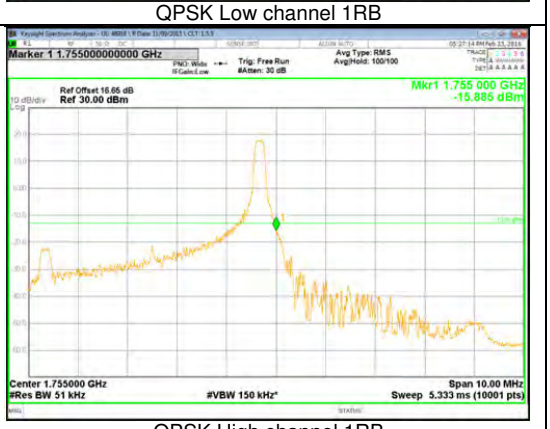
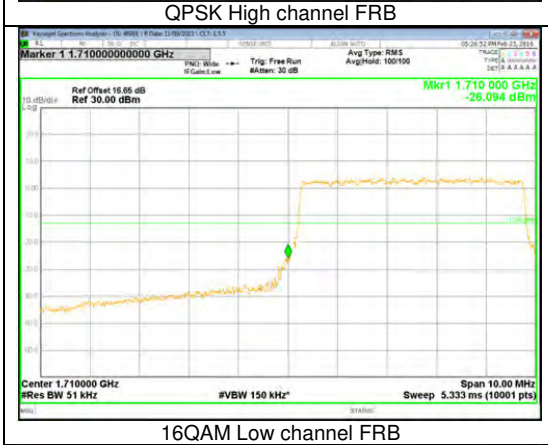
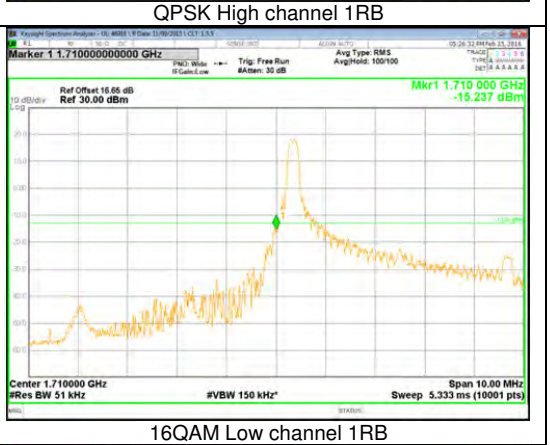
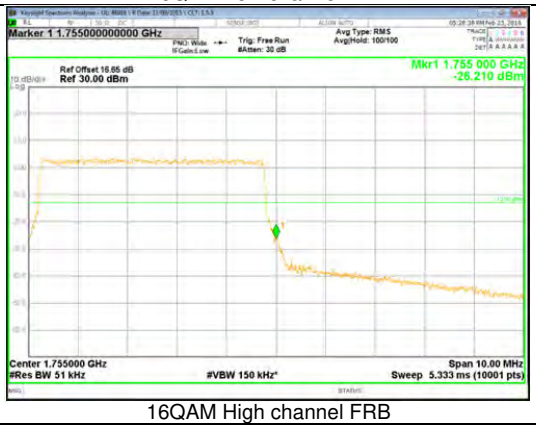
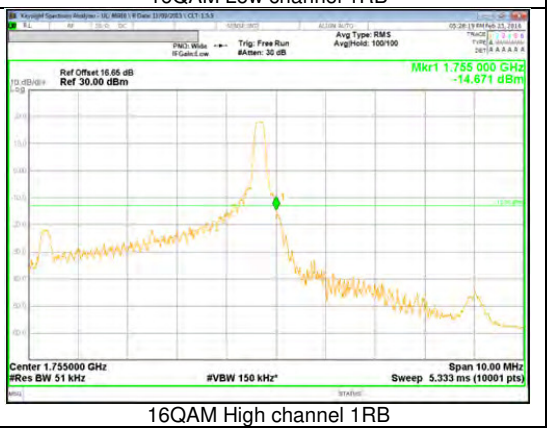
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

Band 4 15MHz	 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

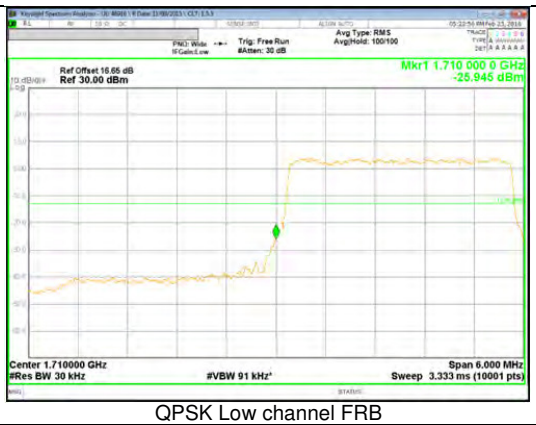
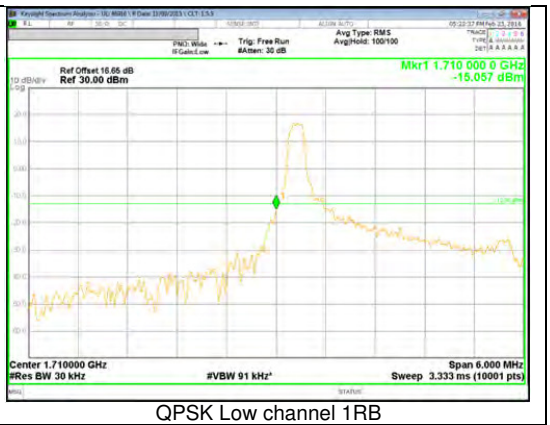
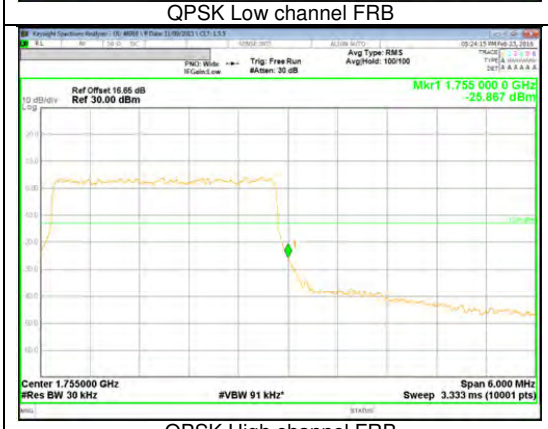
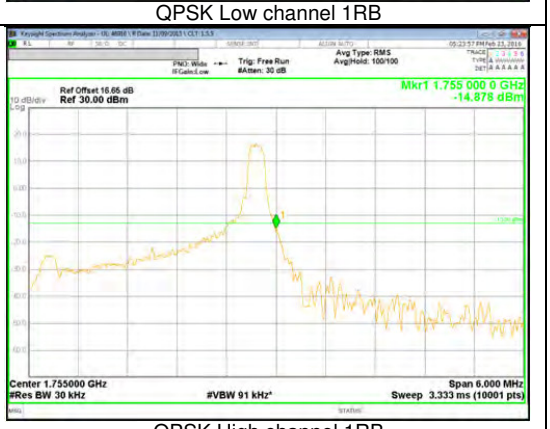
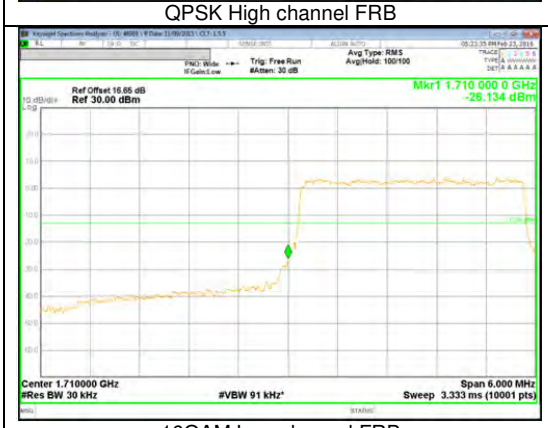
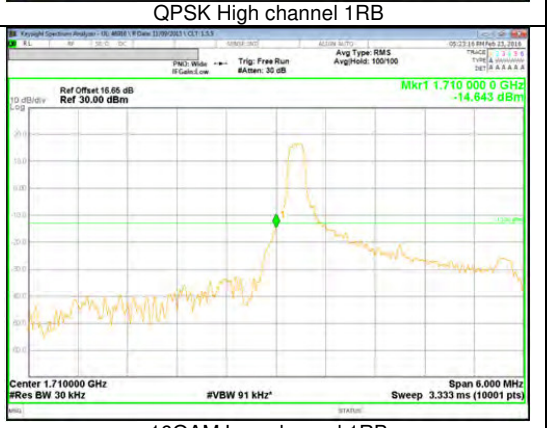
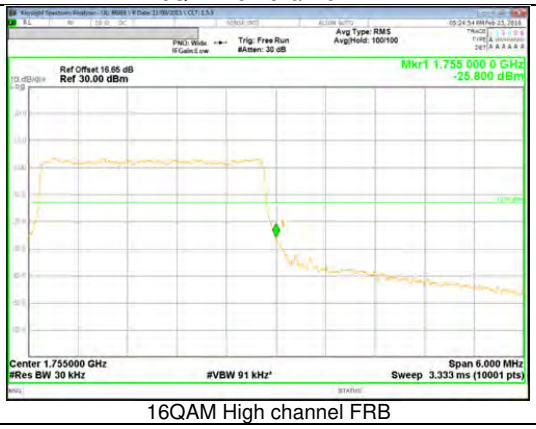
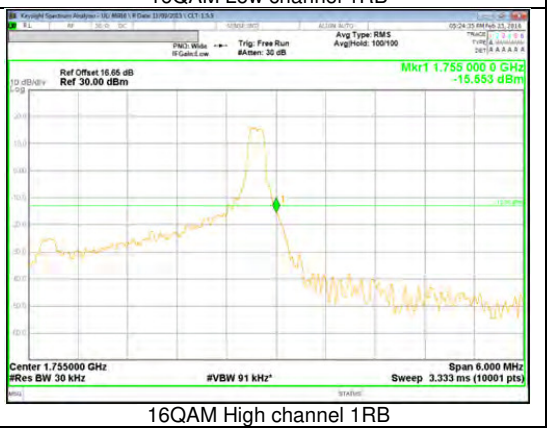
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

Band 4 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

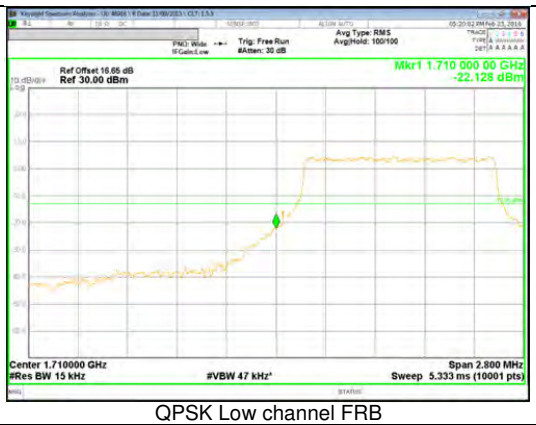
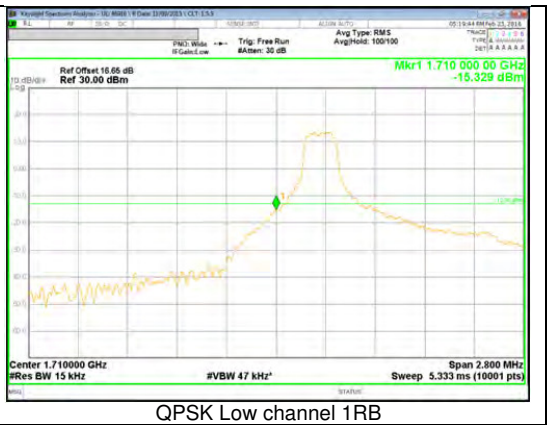
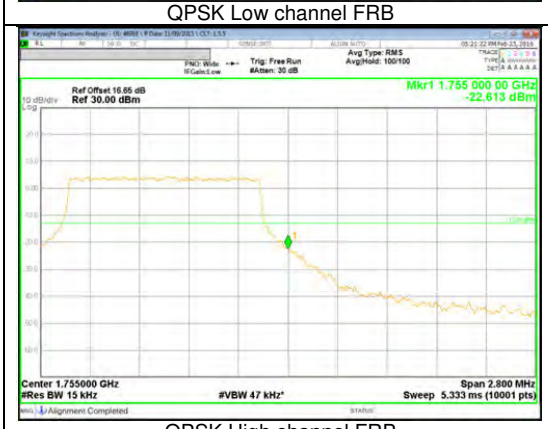
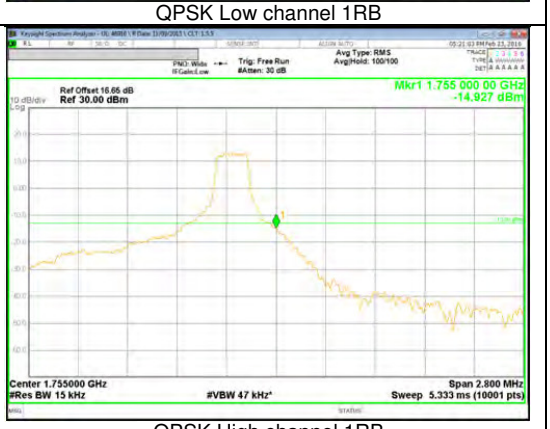
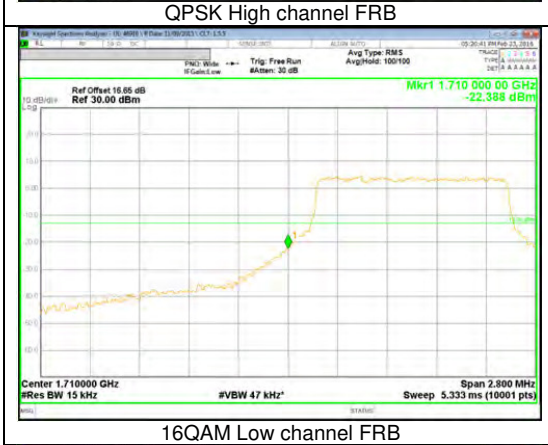
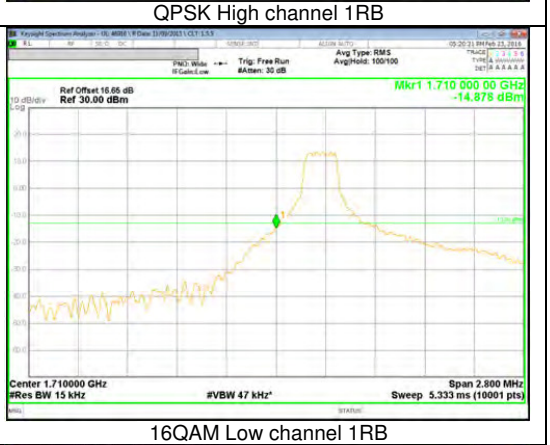
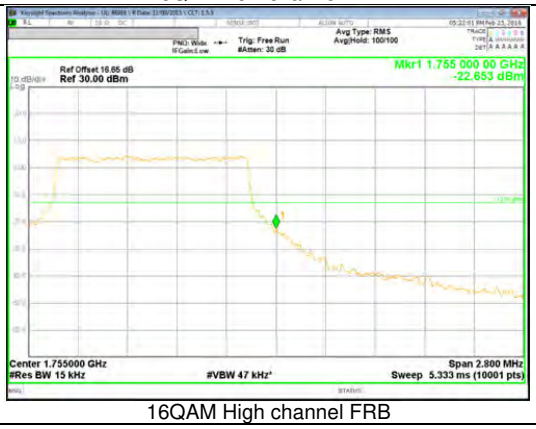
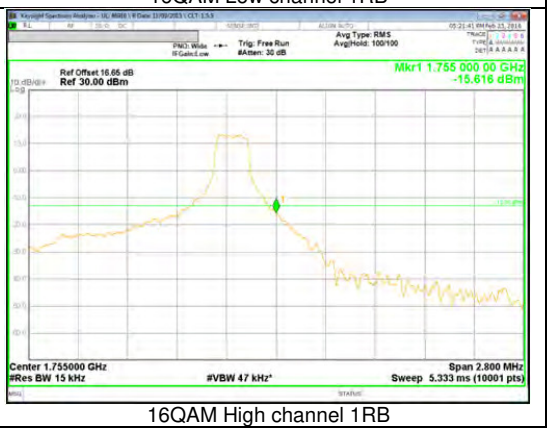
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

Band 4 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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

Band 4 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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

Band 4 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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea TEL: (031) 337-9902 FAX: (031) 213-5433