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

WWAN

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+

MODEL NUMBER : SM-G1600

FCC ID: A3LSMG1600

REPORT NUMBER: 16K23557-E4V2

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Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/23/16	Initial issue	Junwhan Lee
V2	06/28/16	Revised section 5.6	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+
MODEL NUMBER:	SM-G1600
SERIAL NUMBER:	R38H50RX02E (RADIATED); R38H50RX0EN (CONDUCTED)
DATE TESTED:	JUN 10, 2016 - JUN 22, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E, 27	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.

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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 Phone + Bluetooth/BLE, DTS b/g/n and ANT+.

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	32.63	1832.31		
		GPRS	32.63	1832.31	30.36	1086.43
		EGPRS	26.33	429.54	24.52	283.14
GSM1900	1850~1910	GMSK	29.80	954.99		
		GPRS	29.78	950.60	31.81	1517.05
		EGPRS	24.88	307.61	27.17	521.19

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	23.16	207.01	20.78	119.67
		HSDPA	22.13	163.31	19.92	98.17
		HSUPA	22.22	166.72		
		DC-HSDPA	22.09	161.81		
Band 2	1850~1910	REL99	21.32	135.52	25.06	320.63
		HSDPA	20.37	108.89	24.14	259.42
		HSUPA	20.32	107.65		
		DC-HSDPA	20.35	108.39		

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5.4. MAXIMUM OUTPUT POWER (LTE)

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

LTE Band 41

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 41	2555~2655	20	QPSK	23.38	217.77	22.04	159.96
			16QAM	22.2	165.96	20.73	118.30
		15	QPSK	23.33	215.28	20.99	125.60
			16QAM	21.72	148.59	19.99	99.77
		10	QPSK	23.25	211.35	21.14	130.02
			16QAM	21.70	147.91	20.23	105.44
		5	QPSK	23.37	217.27	23.02	200.45
			16QAM	22.18	165.20	21.58	143.88

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	23.36	216.77	18.18	65.77
			16QAM	22.39	173.38	17.82	60.53
		5	QPSK	23.68	233.35	16.61	45.81
			16QAM	22.29	169.43	15.56	35.97
		3	QPSK	23.44	220.80	18.84	76.56
			16QAM	22.46	176.20	17.77	59.84
		1.4	QPSK	23.43	220.29	15.65	36.73
			16QAM	22.50	177.83	14.44	27.80

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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	-6.79
GSM1900 / WCDMA Band 2 1850 ~ 1910 MHz	-3.58
LTE Band 41 2555 ~ 2655 MHz	-4.00

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U83CBC	DK2H506HS/A	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS64UCFBE	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.

Worst-case configuration

Test results of flip cover open configuration were more worst cases in comparison with test results of flip cover closed configuration. Therefore, all radiated and power line conducted tests were conducted in the condition of flip cover open configuration.

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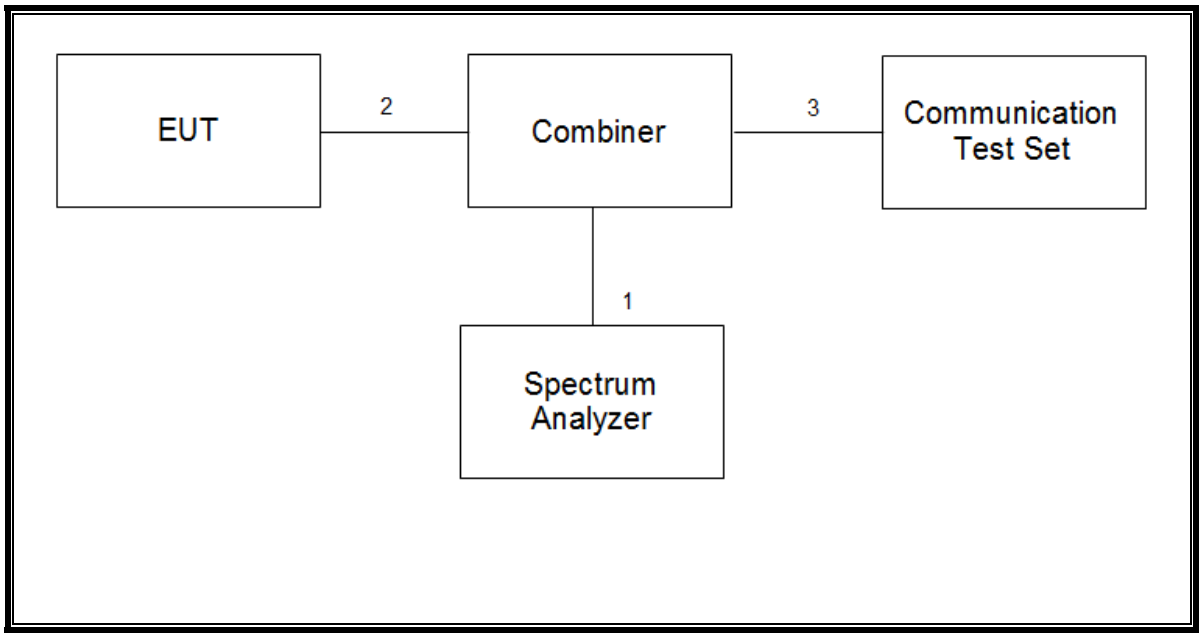
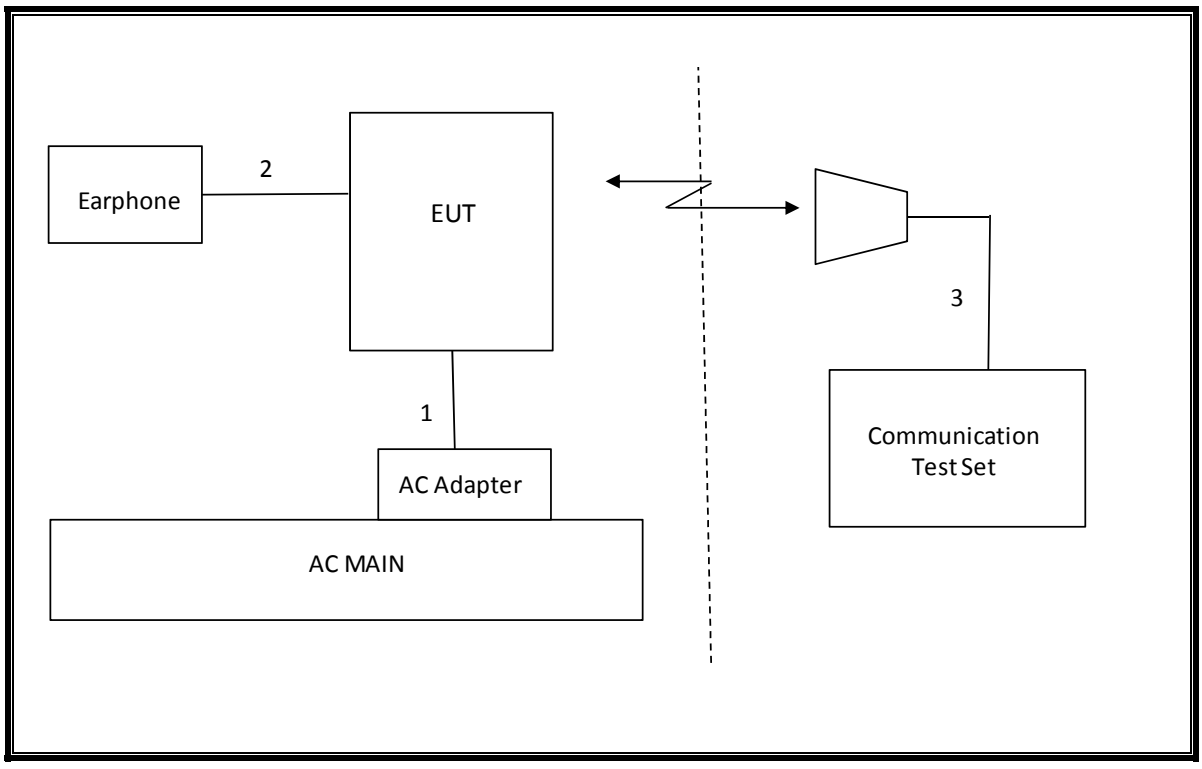
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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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	2154	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
Attenuator	PASTERNACK	PE7087-10	A009	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	17.875 MHz
22.917(a) 24.238(a)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-15.768 dBm
27.53(m)	Conducted Spurious Emission	-25dBm		Pass	-32.36 dBm
27.53(m)	Emission Mask	-10dBm		Pass	-17.26 dBm
2.1046	Conducted output power	N/A		Pass	32.63 dBm
22.355 24.235 27.54	Frequency Stability	2.5PPM		Pass	0.006PPM
22.913(a)(2)	Effective Radiated Power	38.5 dBm	Radiated	Pass	30.36 dBm
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power	33dBm		Pass	31.81 dBm
22.917(a) 24.238(a)	Radiated Spurious Emission	-13dBm		Pass	-25.8 dBm
27.53(m)	Radiated Spurious Emission	-25dBm		Pass	-34.2 dBm

FCC Rule Part	Frequency Range [MHz]	Output Power [W]	Frequency Tolerance	Emission Designator	Emission Bandwidth [MHz]	Communication Type
GSM						
22H	824.2 - 848.8	1.086	2.5 ppm	245KGXW		GSM850
22H	824.2 - 848.8	0.283	2.5 ppm	248KG7W		EDGE850
24E	1850.2 - 1909.8	1.517	2.5 ppm	245KGXW		GSM1900
24E	1850.2 - 1909.8	0.521	2.5 ppm	245KG7W		EDGE1900
WCDMA						
22H	826.4 - 846.6	0.120	2.5 ppm	4M13F9W		WCDMA
24E	1852.4 - 1907.6	0.321	2.5 ppm	4M13F9W		WCDMA
LTE Band 5						
22H	829.0 - 844.0	0.066	2.5 ppm	8M95G7W	10	QPSK
22H	829.0 - 844.0	0.061	2.5 ppm	8M96D7W	10	16QAM
22H	825.5 - 847.5	0.077	2.5 ppm	2M70G7W	3	QPSK
LTE Band 41						
27M	2565.0 - 2645.0	0.160	2.5 ppm	17M9G7W	20	QPSK
27M	2565.0 - 2645.0	0.118	2.5 ppm	17M9D7W	20	16QAM
27M	2557.5 - 2652.5	0.200	2.5 ppm	4M49G7W	5	QPSK
27M	2557.5 - 2652.5	0.144	2.5 ppm	4M49D7W	5	16QAM

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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

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	32.43	23.40
				190	836.6	32.63	23.60
				251	848.8	32.44	23.41
	GPRS (GMSK)	CS1	1	128	824.2	32.45	23.42
				190	836.6	32.63	23.60
				251	848.8	32.46	23.43
			2	128	824.2	31.15	25.13
				190	836.6	31.32	25.29
				251	848.8	31.08	25.06
			3	128	824.2	29.53	25.27
				190	836.6	29.59	25.33
				251	848.8	29.33	25.07
			4	128	824.2	27.44	24.43
				190	836.6	27.35	24.34
				251	848.8	27.30	24.29
	EGPRS (8PSK)	MCS5	1	128	824.2	26.33	17.30
				190	836.6	26.32	17.29
				251	848.8	26.22	17.18
			2	128	824.2	24.65	18.63
				190	836.6	24.63	18.61
				251	848.8	24.52	18.50
			3	128	824.2	22.74	18.48
				190	836.6	22.70	18.44
				251	848.8	22.59	18.33
			4	128	824.2	21.95	18.94
				190	836.6	22.06	19.05
				251	848.8	21.90	18.89

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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	29.36	20.33
				661	1880.0	29.37	20.34
				810	1909.8	29.80	20.77
	GPRS (GMSK)	CS1	1	512	1850.2	29.35	20.32
				661	1880.0	29.35	20.32
				810	1909.8	29.78	20.75
			2	512	1850.2	29.00	22.98
				661	1880.0	28.98	22.96
				810	1909.8	29.00	22.98
			3	512	1850.2	25.66	21.40
				661	1880.0	25.71	21.45
				810	1909.8	25.78	21.52
			4	512	1850.2	24.32	21.31
				661	1880.0	24.27	21.26
				810	1909.8	24.33	21.32
	EGPRS (8PSK)	MCS5	1	512	1850.2	24.81	15.78
				661	1880.0	24.72	15.69
				810	1909.8	24.88	15.85
			2	512	1850.2	23.79	17.77
				661	1880.0	23.68	17.66
				810	1909.8	23.81	17.79
			3	512	1850.2	21.85	17.59
				661	1880.0	21.73	17.47
				810	1909.8	21.86	17.60
			4	512	1850.2	20.48	17.47
				661	1880.0	20.35	17.34
				810	1909.8	20.47	17.46

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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			

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

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.		

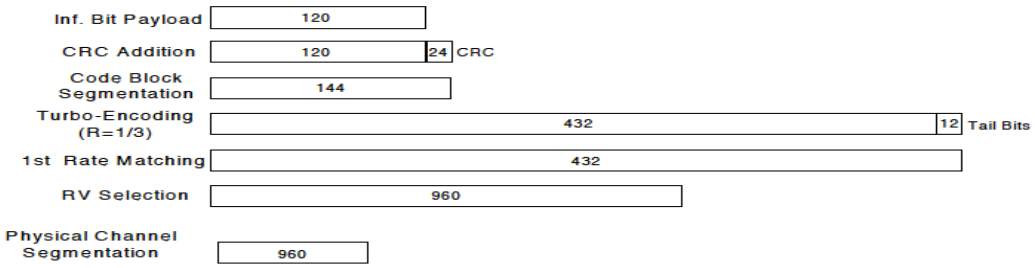

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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.

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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	23.09
			4183	836.6	0	23.08
			4233	846.6	0	23.16
	HSDPA	Subtest 1	4132	826.4	0	21.97
			4183	836.6	0	21.95
			4233	846.6	0	22.13
		Subtest 2	4132	826.4	0	21.64
			4183	836.6	0	21.57
			4233	846.6	0	21.79
		Subtest 3	4132	826.4	0.5	21.39
			4183	836.6	0.5	21.32
			4233	846.6	0.5	21.63
		Subtest 4	4132	826.4	0.5	21.50
			4183	836.6	0.5	21.40
			4233	846.6	0.5	21.69
	HSUPA	Subtest 1	4132	826.4	0	21.60
			4183	836.6	0	21.73
			4233	846.6	0	22.06
		Subtest 2	4132	826.4	2	20.40
			4183	836.6	2	20.49
			4233	846.6	2	20.67
		Subtest 3	4132	826.4	1	20.80
			4183	836.6	1	20.30
			4233	846.6	1	20.39
		Subtest 4	4132	826.4	2	21.30
			4183	836.6	2	21.30
			4233	846.6	2	21.06
		Subtest 5	4132	826.4	0	21.98
			4183	836.6	0	22.03
			4233	846.6	0	22.22
	DC-HSDPA	Subtest 1	4132	826.4	0	22.00
			4183	836.6	0	21.92
			4233	846.6	0	22.09
		Subtest 2	4132	826.4	0	21.67
			4183	836.6	0	21.65
			4233	846.6	0	21.87
		Subtest 3	4132	826.4	0.5	21.49
			4183	836.6	0.5	21.44
			4233	846.6	0.5	21.66
		Subtest 4	4132	826.4	0.5	21.51
			4183	836.6	0.5	21.43
			4233	846.6	0.5	21.66

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	21.32
			9400	1880.0	0	21.13
			9538	1907.6	0	21.19
	HSDPA	Subtest 1	9262	1852.4	0	20.37
			9400	1880.0	0	20.20
			9538	1907.6	0	20.13
		Subtest 2	9262	1852.4	0	19.95
			9400	1880.0	0	19.83
			9538	1907.6	0	19.80
		Subtest 3	9262	1852.4	0.5	19.90
			9400	1880.0	0.5	19.63
			9538	1907.6	0.5	19.70
		Subtest 4	9262	1852.4	0.5	19.85
			9400	1880.0	0.5	19.70
			9538	1907.6	0.5	19.71
	HSUPA	Subtest 1	9262	1852.4	0	20.24
			9400	1880.0	0	19.70
			9538	1907.6	0	19.84
		Subtest 2	9262	1852.4	2	18.94
			9400	1880.0	2	19.15
			9538	1907.6	2	18.58
		Subtest 3	9262	1852.4	1	19.11
			9400	1880.0	1	19.16
			9538	1907.6	1	18.94
		Subtest 4	9262	1852.4	2	19.34
			9400	1880.0	2	19.42
			9538	1907.6	2	18.92
		Subtest 5	9262	1852.4	0	20.32
			9400	1880.0	0	20.21
			9538	1907.6	0	20.13
	DC-HSDPA	Subtest 1	9262	1852.4	0	20.35
			9400	1880.0	0	20.21
			9538	1907.6	0	20.10
		Subtest 2	9262	1852.4	0	19.99
			9400	1880.0	0	19.87
			9538	1907.6	0	19.81
		Subtest 3	9262	1852.4	0.5	19.99
			9400	1880.0	0.5	19.78
			9538	1907.6	0.5	19.81
		Subtest 4	9262	1852.4	0.5	20.01
			9400	1880.0	0.5	19.79
			9538	1907.6	0.5	19.81

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.					

8.3.1. LTE OUTPUT POWER RESULT

LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						2565 MHz	2605 MHz	2645 MHz
LTE Band 41	20	QPSK	1	0	0	22.76	22.65	23.38
			1	49	0	22.67	23.23	23.32
			1	99	0	22.49	23.21	22.09
			50	0	1	21.58	22.11	22.19
			50	24	1	21.47	22.20	22.03
			50	50	1	21.42	22.26	21.53
			100	0	1	21.61	22.14	21.88
		16QAM	1	0	1	21.10	21.25	22.20
			1	49	1	21.02	21.61	22.16
			1	99	1	20.76	21.45	20.97
			50	0	2	20.50	20.94	21.32
			50	24	2	20.54	21.16	21.10
			50	50	2	20.41	21.23	20.56
			100	0	2	20.40	21.07	20.76
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						2562.5 MHz	2605 MHz	2647.5 MHz
LTE Band 41	15	QPSK	1	0	0	22.69	22.89	23.02
			1	37	0	22.62	23.33	22.89
			1	74	0	22.31	23.32	21.72
			36	0	1	21.64	22.01	21.96
			36	20	1	21.60	22.12	21.69
			36	39	1	21.40	22.22	21.47
			75	0	1	21.48	22.13	21.56
		16QAM	1	0	1	21.24	21.48	21.72
			1	37	1	21.15	21.42	21.30
			1	74	1	20.83	21.34	21.29
			36	0	2	20.63	21.03	20.88
			36	20	2	20.71	21.09	20.64
			36	39	2	20.53	21.19	20.28
			75	0	2	20.49	21.10	20.65
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						2560 MHz	2605 MHz	2650 MHz
LTE Band 41	10	QPSK	1	0	0	22.78	22.90	22.89
			1	25	0	22.57	23.25	22.40
			1	49	0	22.49	23.20	21.85
			25	0	1	20.74	21.06	20.74
			25	12	1	20.71	21.14	20.50
			25	25	1	20.71	21.20	20.40
			50	0	1	20.54	20.99	20.51
		16QAM	1	0	1	21.18	20.94	21.24
			1	25	1	21.22	21.38	20.98
			1	49	1	20.98	21.17	21.70
			25	0	2	19.76	19.92	19.80
			25	12	2	19.79	20.10	19.54
			25	25	2	19.73	19.96	19.40
			50	0	2	19.72	20.09	19.51
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm] Max. Power		
						2557.5 MHz	2605 MHz	2652.5 MHz
LTE Band 41	5	QPSK	1	0	0	22.80	22.94	22.13
			1	12	0	23.03	23.37	22.31
			1	24	0	22.59	23.15	21.70
			12	0	1	21.76	22.01	21.21
			12	7	1	21.79	22.12	21.17
			12	13	1	21.70	22.07	21.05
			25	0	1	21.75	22.06	21.16
		16QAM	1	0	1	21.65	21.85	20.74
			1	12	1	21.76	22.18	20.66
			1	24	1	21.47	22.07	21.75
			12	0	2	20.90	21.28	20.31
			12	7	2	20.89	21.34	20.23
			12	13	2	20.91	21.32	20.11
			25	0	2	20.84	21.15	20.14

LTE Band 5 Measured Results

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		23.68	
			1	25	0		23.69	
			1	49	0		23.60	
			25	0	1		22.41	
			25	12	1		22.41	
			25	25	1		22.40	
			50	0	1		22.39	
		16QAM	1	0	1		22.39	
			1	25	1		22.39	
			1	49	1		22.38	
			25	0	2		21.38	
			25	12	2		21.44	
			25	25	2		21.47	
			50	0	2		21.30	

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	23.29	23.44	23.40
			1	12	0	23.42	23.68	23.49
			1	24	0	23.43	23.24	23.36
			12	0	1	22.36	22.58	22.47
			12	7	1	22.50	22.50	22.50
			12	13	1	22.57	22.38	22.37
			25	0	1	22.47	22.47	22.37
		16QAM	1	0	1	21.79	21.76	22.24
			1	12	1	22.04	22.19	22.29
			1	24	1	21.92	21.92	21.78
			12	0	2	21.25	21.28	21.28
			12	7	2	21.29	21.49	21.35
			12	13	2	21.46	21.35	21.27
			25	0	2	21.50	21.43	21.19

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	23.41	23.36	23.30
			1	8	0	23.28	23.23	23.33
			1	14	0	23.44	23.40	23.14
			8	0	1	22.34	22.47	22.43
			8	4	1	22.37	22.43	22.50
			8	7	1	22.32	22.42	22.36
			15	0	1	22.37	22.39	22.36
		16QAM	1	0	1	22.35	22.40	22.14
			1	8	1	22.46	22.30	22.11
			1	14	1	22.27	22.24	21.81
			8	0	2	21.47	21.09	21.48
			8	4	2	21.41	21.23	21.45
			8	7	2	21.36	21.15	21.40
			15	0	2	21.35	21.38	21.09

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	23.27	23.27	23.21
			1	3	0	23.22	23.14	23.16
			1	5	0	23.35	23.30	23.36
			3	0	1	23.23	23.34	23.43
			3	1	1	23.28	23.36	23.42
			3	3	1	23.29	23.35	23.39
			6	0	1	22.29	22.38	22.35
		16QAM	1	0	1	22.11	22.24	22.25
			1	3	1	22.28	22.25	22.47
			1	5	1	22.14	22.16	22.35
			3	0	2	21.96	22.21	22.50
			3	1	2	22.02	22.10	22.43
			3	3	2	22.13	22.38	22.50
			6	0	2	21.31	21.09	21.26

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	2.76	13.00
			EGPRS	5.66	
GSM1900	661	1880.0	GPRS	2.70	
			EGPRS	5.69	

WCDMA

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 5	4183	836.6	REL99	2.74	13.00
			HSDPA	3.01	
Band 2	9400	1880.0	REL99	2.94	
			HSDPA	3.13	

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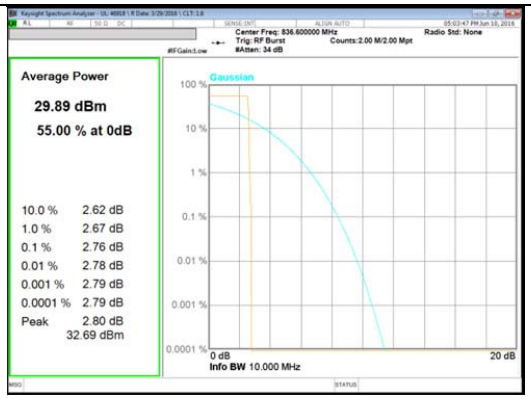
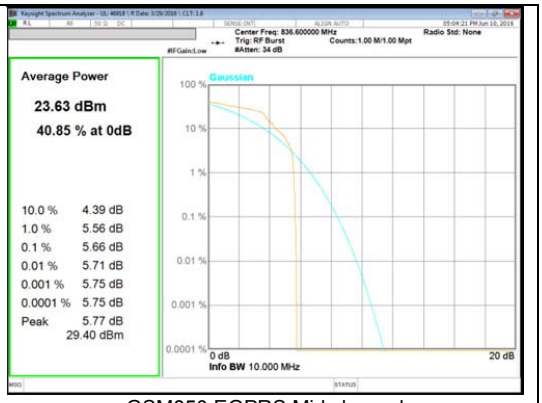
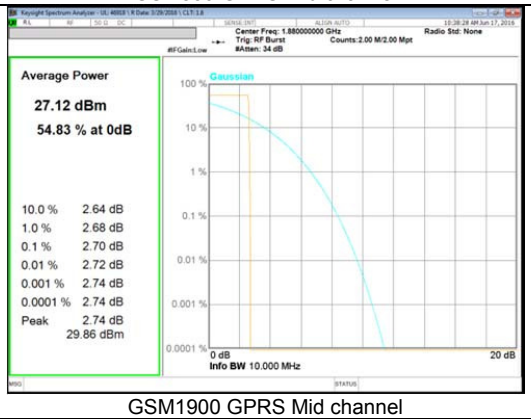
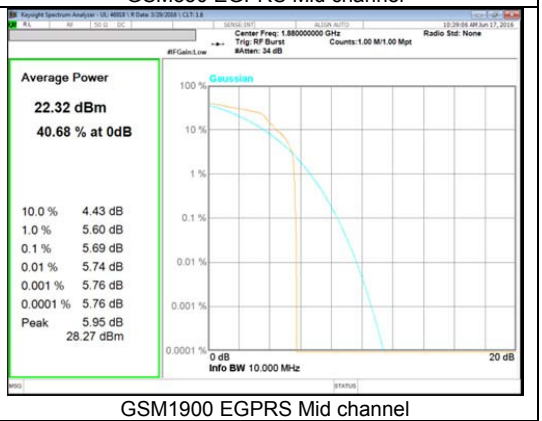
LTE

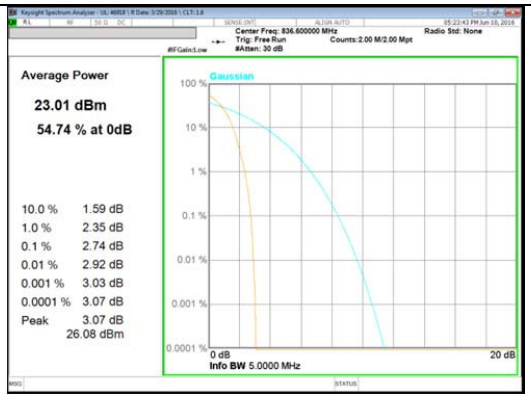
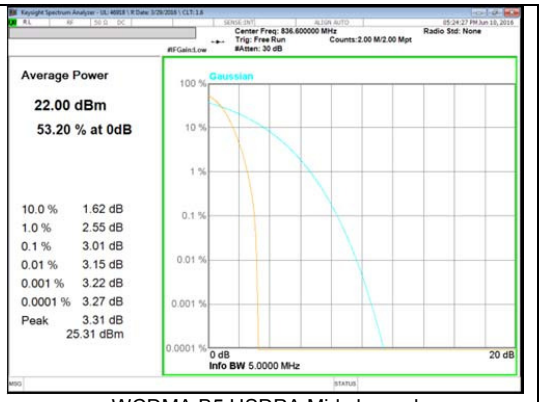
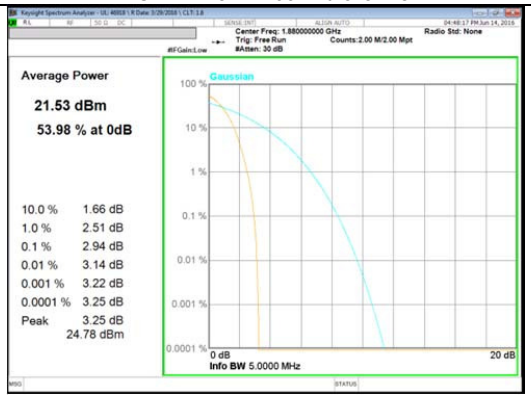
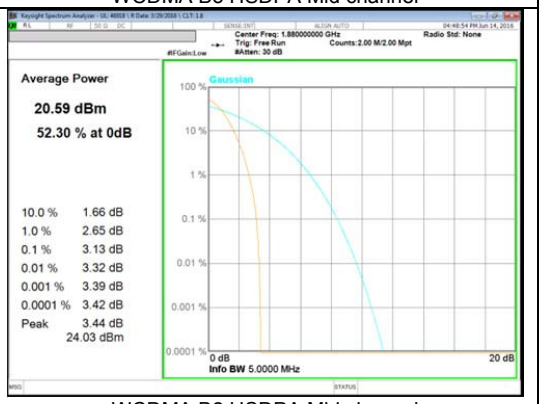
Band	BW [MHz]	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 41	20	40740	2605.0	QPSK	4.64	13.00
				16QAM	5.82	
	15			QPSK	4.90	
				16QAM	5.81	
	10			QPSK	4.67	
				16QAM	5.65	
	5			QPSK	4.66	
				16QAM	5.95	
Band 5	10	20525	836.5	QPSK	3.57	13.00
				16QAM	4.37	
	5			QPSK	3.60	
				16QAM	4.41	
	3			QPSK	3.73	
				16QAM	4.37	
	1.4			QPSK	3.56	
				16QAM	4.42	

9.2. CONDUCTED PEAK TO AVERAGE PLOTS

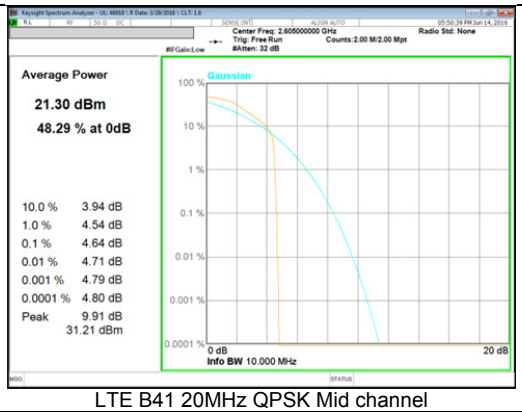
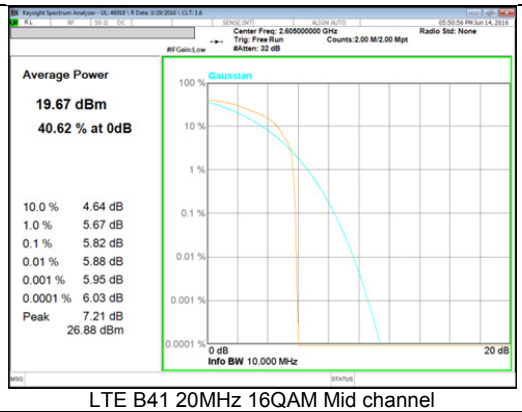
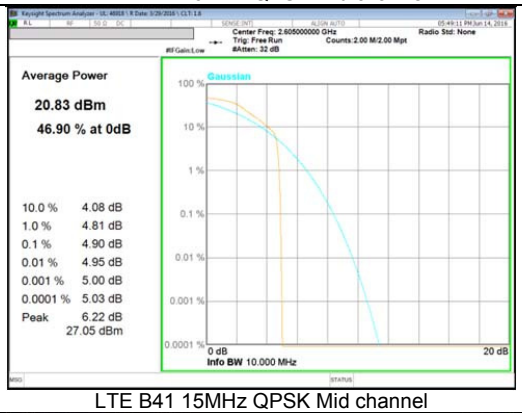
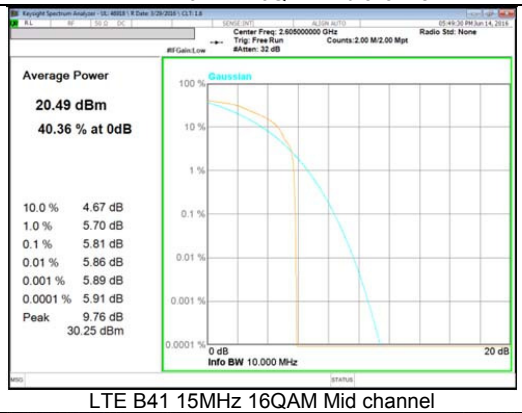
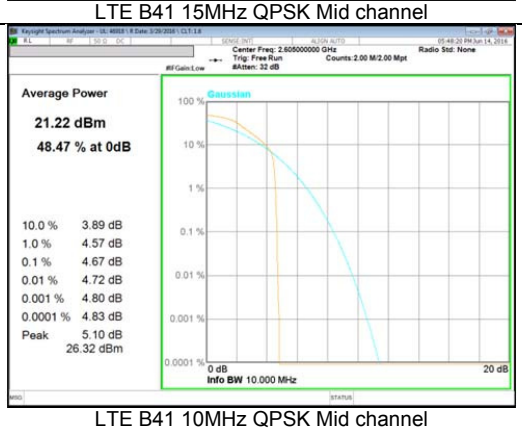
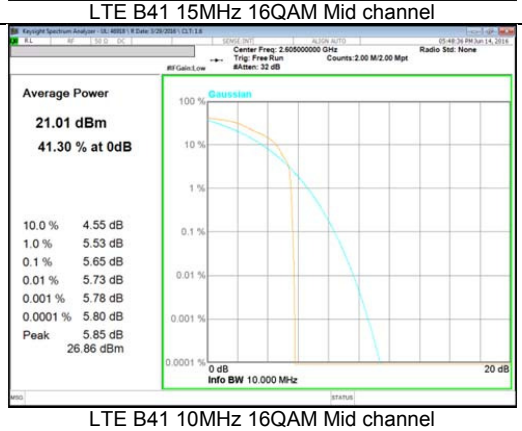
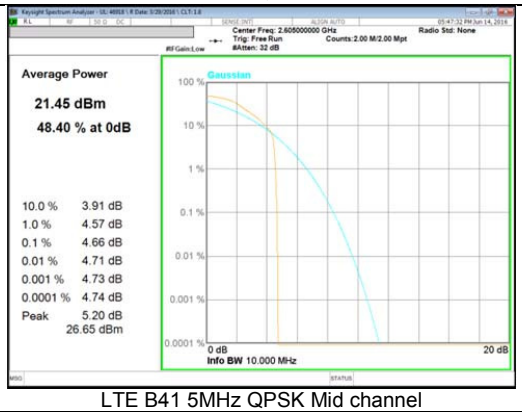
GSM

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

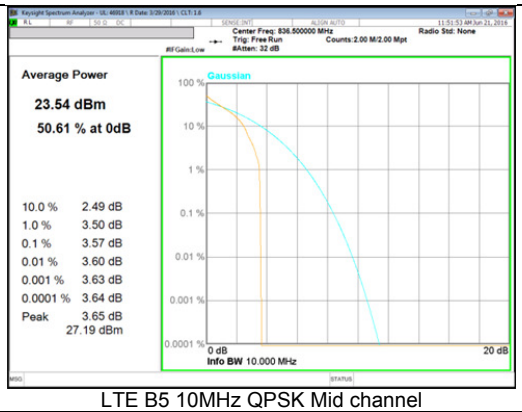
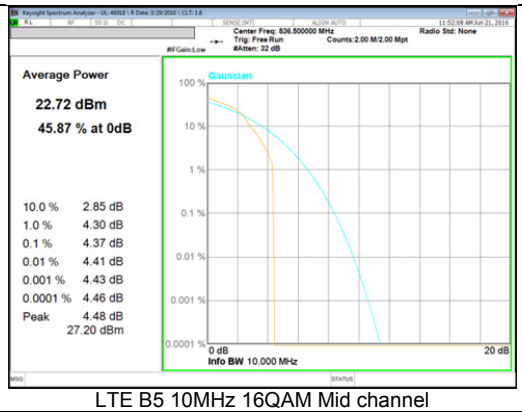
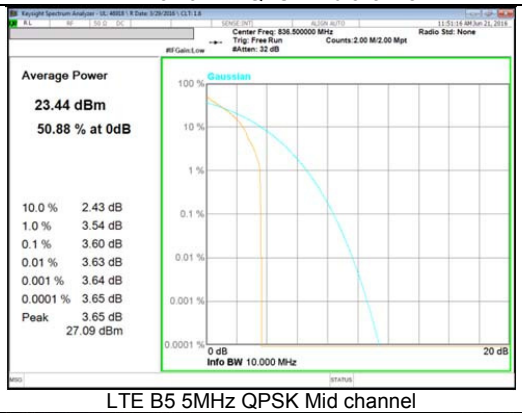
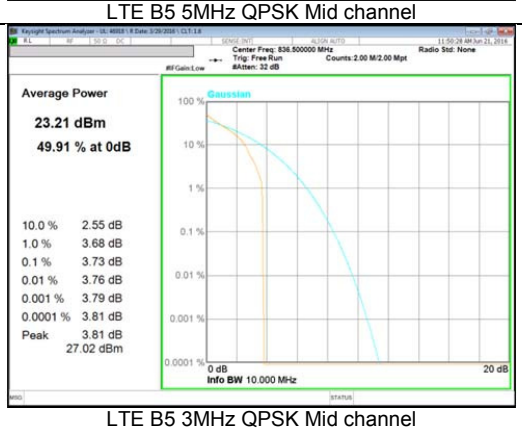
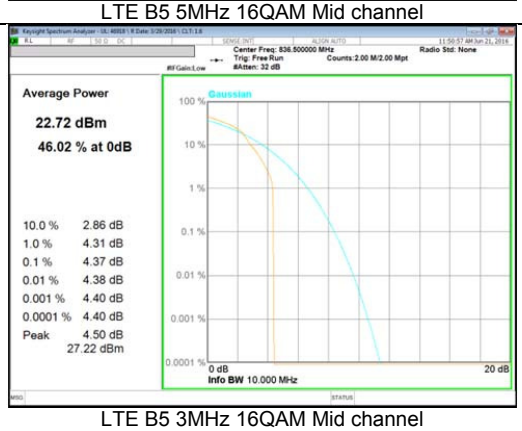
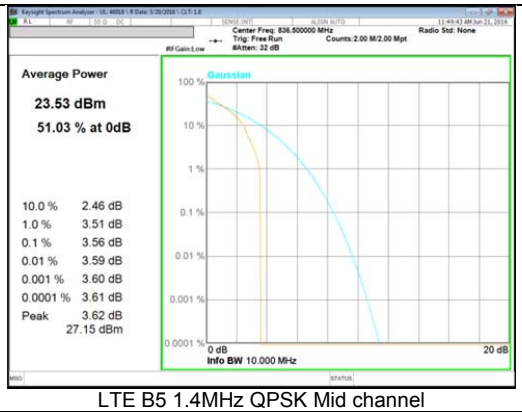
WCDMA

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

LTE Band 41

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

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

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	244.99	311.9
		190	836.6	242.13	318.3
		251	848.8	238.75	312.6
	EGPRS	128	824.2	247.80	313.3
		190	836.6	246.93	322.3
		251	848.8	242.50	310.0
GSM1900	GPRS	512	1850.2	243.70	321.2
		661	1880.0	244.89	316.7
		810	1909.8	244.85	318.9
	EGPRS	512	1850.2	237.33	282.7
		661	1880.0	244.93	313.3
		810	1909.8	232.81	301.3

WCDMA

Band	Mode	Channel	f [MHz]	99% BW [MHz]	26dB BW [MHz]
Band 5	REL99	4132	826.4	4.1228	4.693
		4183	836.6	4.1178	4.703
		4233	846.6	4.1308	4.686
	HSDPA	4132	826.4	4.1120	4.664
		4183	836.6	4.1303	4.673
		4233	846.6	4.1154	4.661
Band 2	REL99	9262	1852.4	4.1211	4.662
		9400	1880.0	4.1292	4.689
		9538	1907.6	4.1115	4.677
	HSDPA	9262	1852.4	4.1312	4.663
		9400	1880.0	4.1199	4.657
		9538	1907.6	4.1183	4.656

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LTE Band 41

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 41	20	40340	2565.0	QPSK	17.822	19.17
				16QAM	17.816	19.35
		40740	2605.0	QPSK	17.826	19.20
				16QAM	17.863	19.75
		41140	2645.0	QPSK	17.875	19.18
				16QAM	17.862	19.38
	15	40315	2562.5	QPSK	13.380	14.45
				16QAM	13.378	14.69
		40740	2605.0	QPSK	13.394	14.48
				16QAM	13.407	14.49
		41165	2647.5	QPSK	13.399	14.67
				16QAM	13.392	15.15
	10	40290	2560.0	QPSK	8.9412	9.764
				16QAM	8.9269	9.935
		40740	2605.0	QPSK	8.9363	9.850
				16QAM	8.9652	9.727
		41190	2650.0	QPSK	8.9225	9.587
				16QAM	8.9421	9.706
	5	40265	2557.5	QPSK	4.4892	4.979
				16QAM	4.4808	4.925
		40740	2605.0	QPSK	4.4918	4.990
				16QAM	4.4860	5.062
		41215	2652.5	QPSK	4.4812	5.090
				16QAM	4.4882	4.969

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LTE Band 5

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 5	10	20450	829.0	QPSK	8.9455	9.783
				16QAM	8.9520	9.728
		20524	836.5	QPSK	8.9398	9.687
				16QAM	8.9293	9.741
		20599	844.0	QPSK	8.9303	9.820
				16QAM	8.9599	9.743
	5	20425	826.5	QPSK	4.4912	4.941
				16QAM	4.4908	4.958
		20524	836.5	QPSK	4.4877	4.967
				16QAM	4.4970	4.981
		20624	846.5	QPSK	4.4816	4.937
				16QAM	4.4941	4.971
	3	20415	825.5	QPSK	2.6878	2.965
				16QAM	2.6973	2.988
		20524	836.5	QPSK	2.6951	2.961
				16QAM	2.6911	2.972
		20634	847.5	QPSK	2.6949	2.977
				16QAM	2.6872	2.974
	1.4	20407	824.7	QPSK	1.0844	1.267
				16QAM	1.0837	1.290
		20524	836.5	QPSK	1.0783	1.271
				16QAM	1.0838	1.295
		20624	848.3	QPSK	1.0846	1.280
				16QAM	1.0931	1.304

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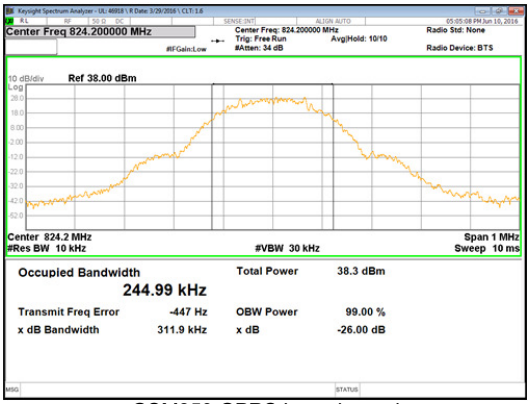
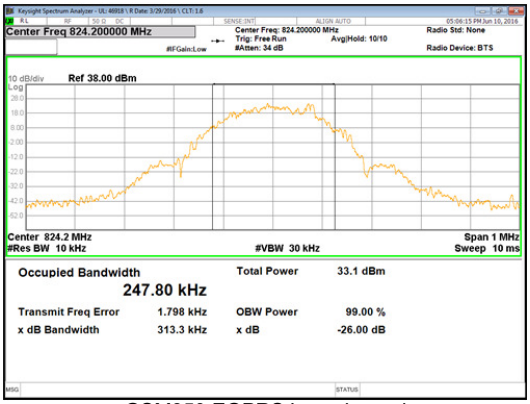
10.1.2. OCCUPIED BANDWIDTH PLOTS

GSM 850

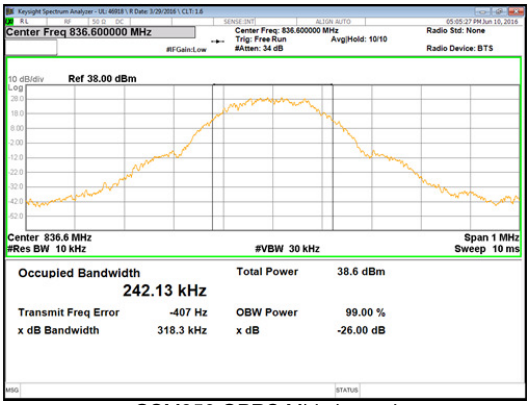
GSM 850



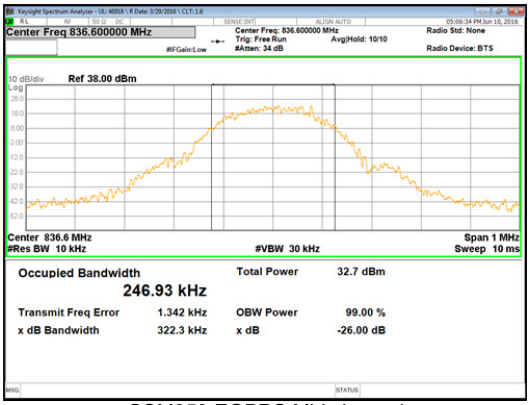
GSM850 GPRS Low channel



GSM850 EGPRS Low channel



GSM850 GPRS Mid channel



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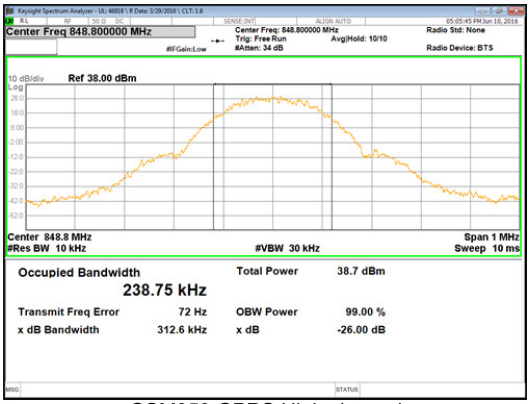
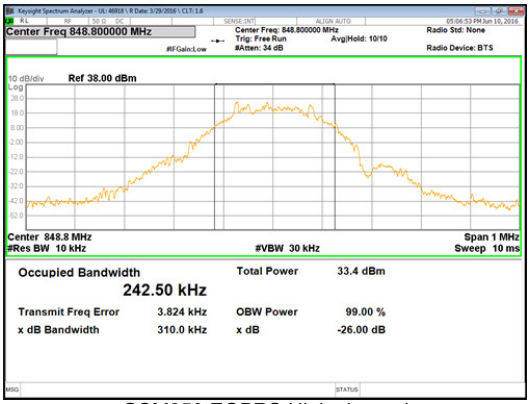
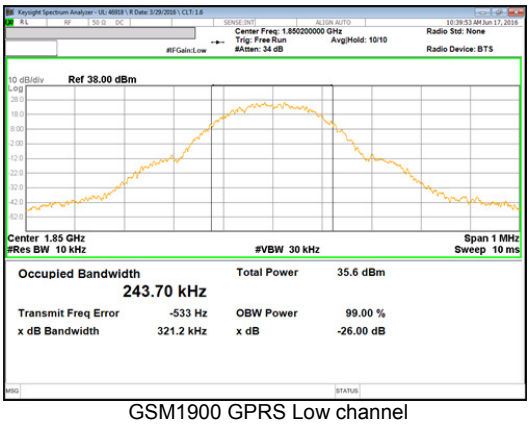
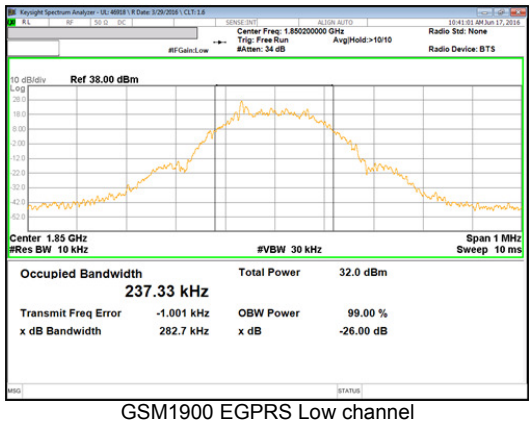
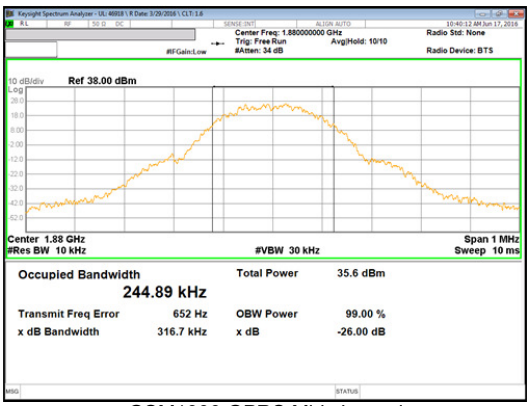
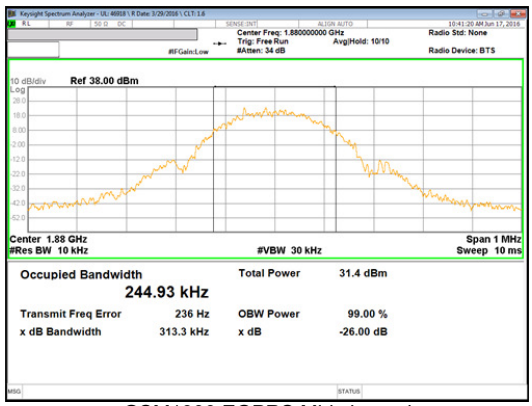
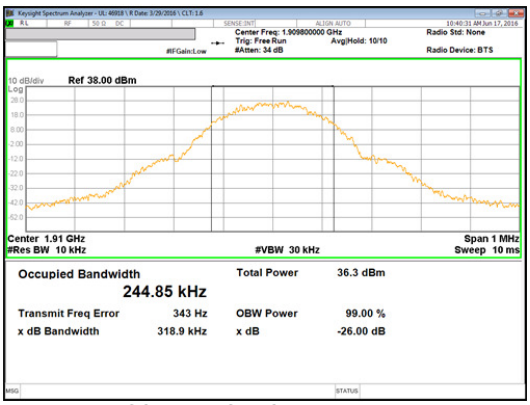
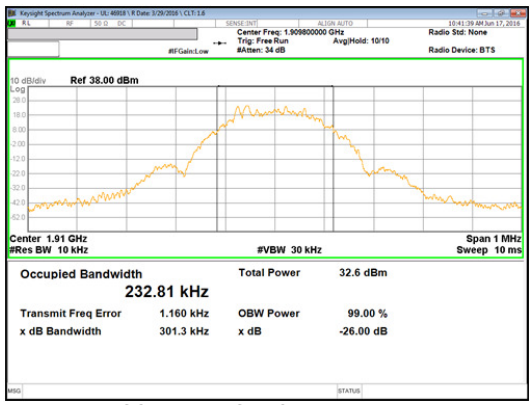


GSM850 GPRS High channel

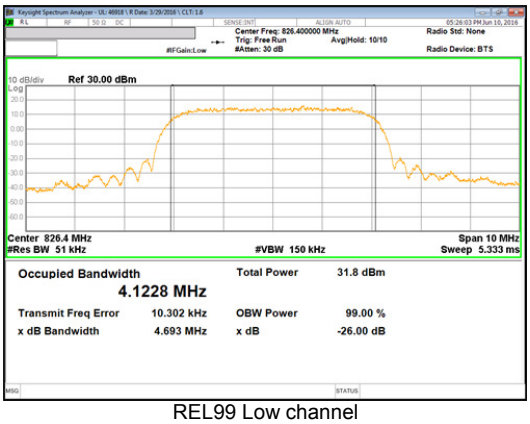
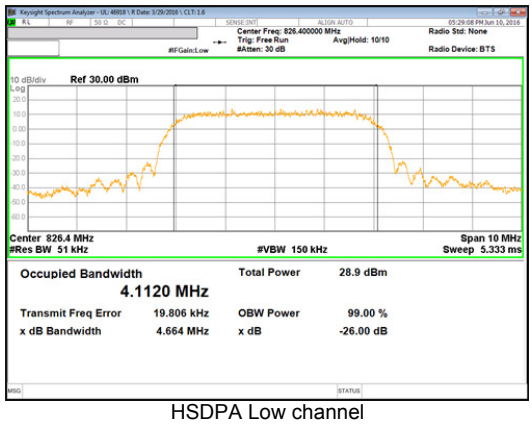
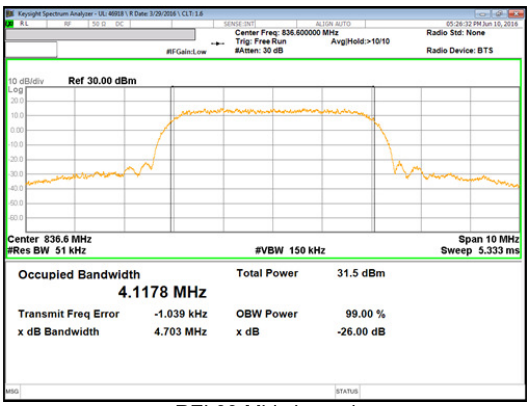
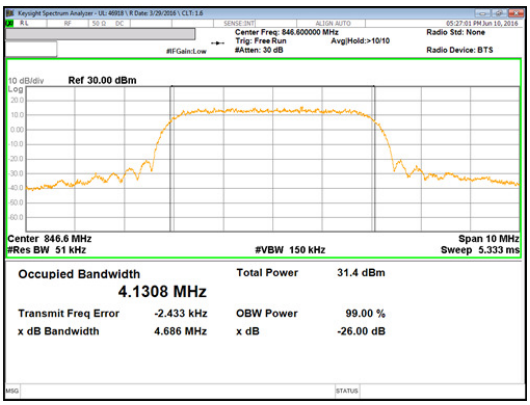
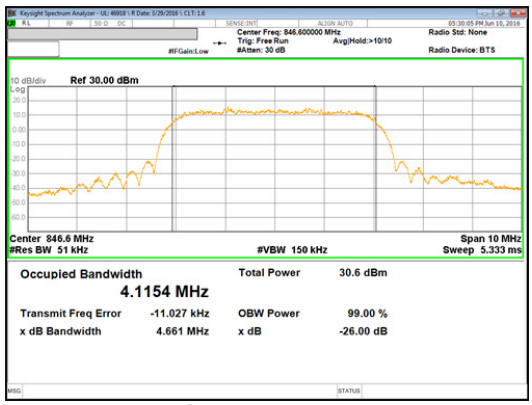


GSM850 EGPRS High channel

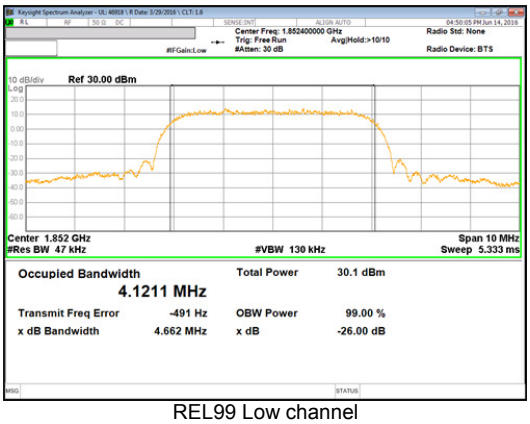
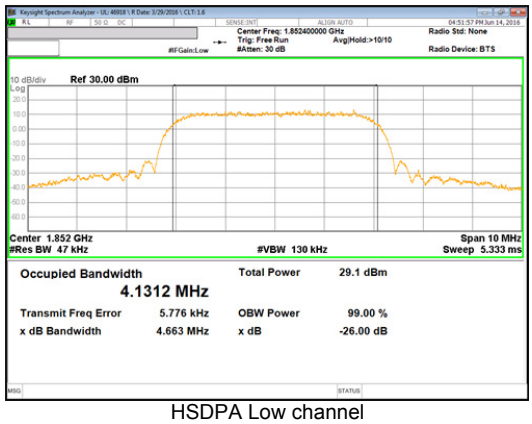
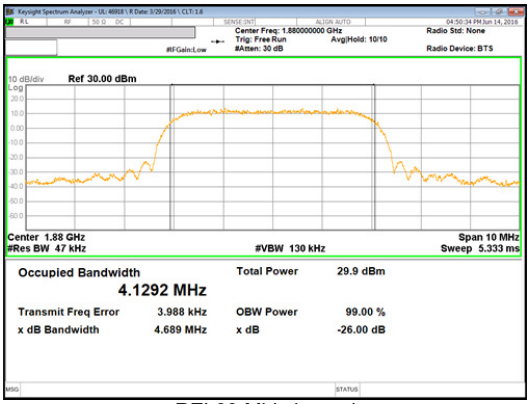
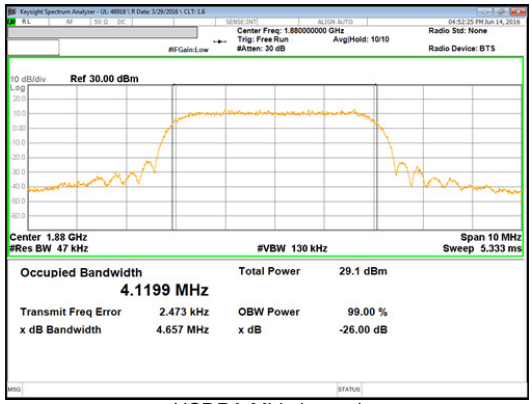
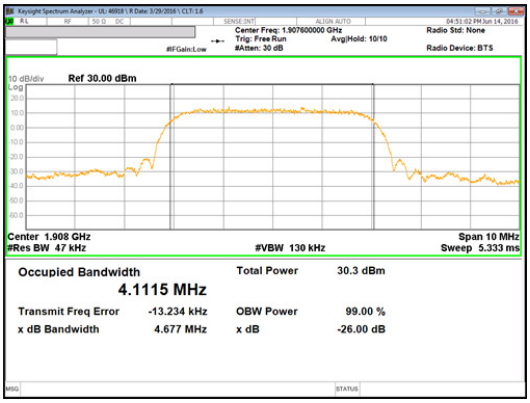
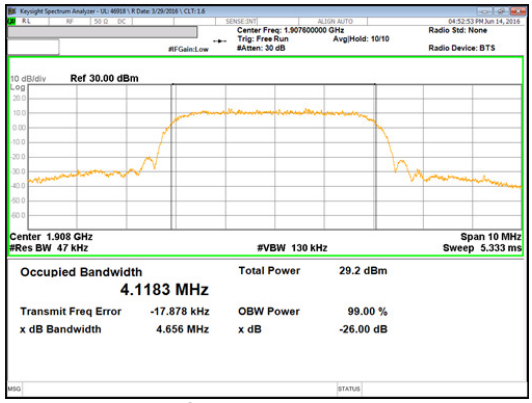
GSM 1900

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

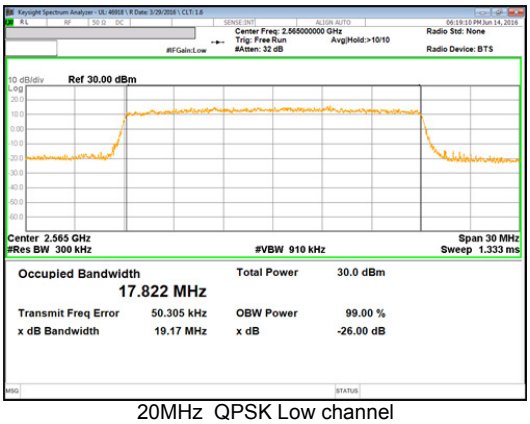
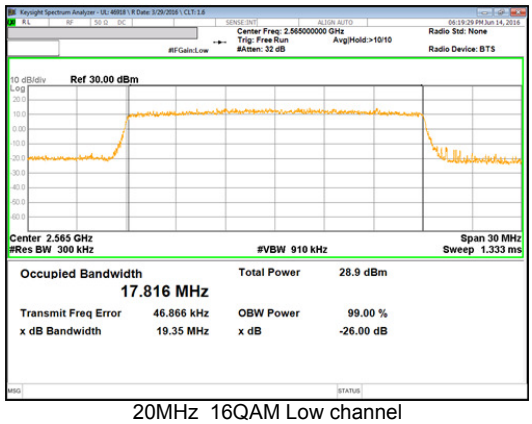
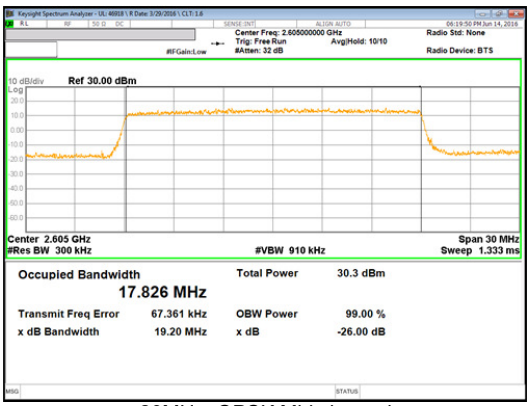
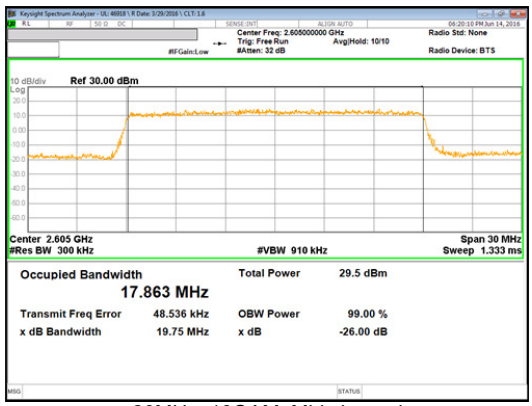
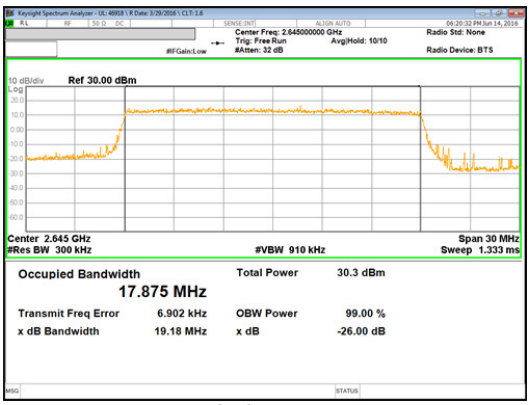
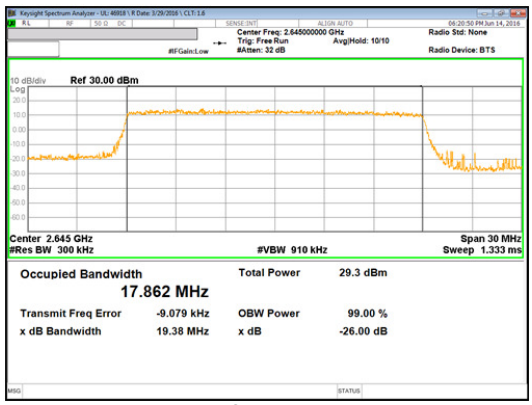
WCDMA Band 5

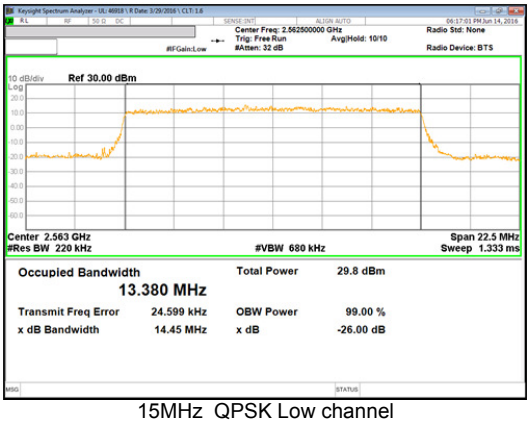
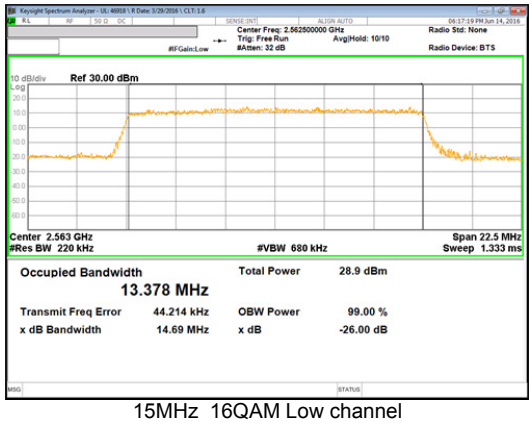
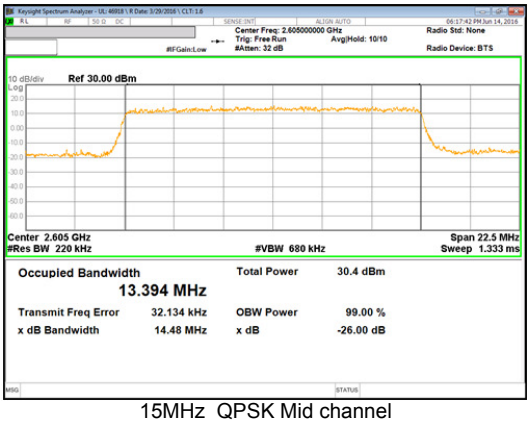
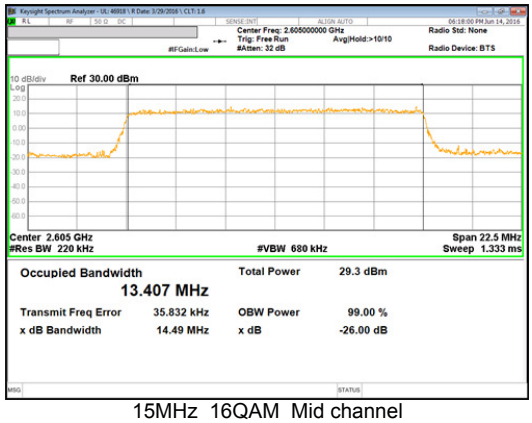
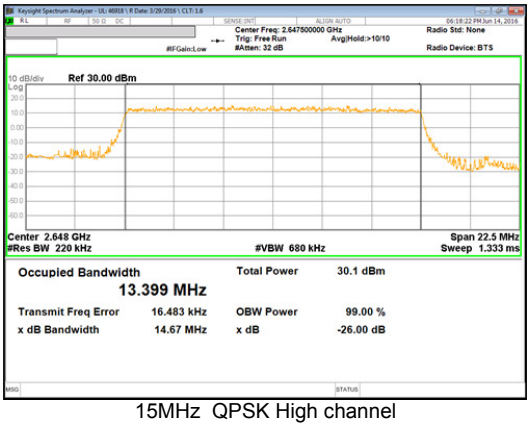
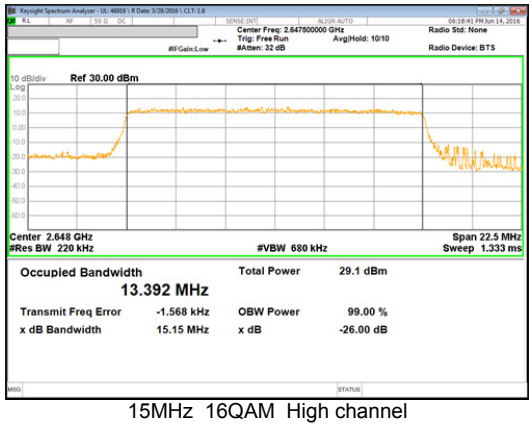
Band 5	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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 41

Band 41 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 41 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

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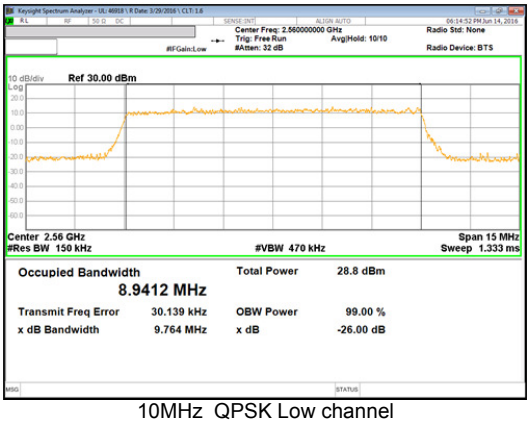
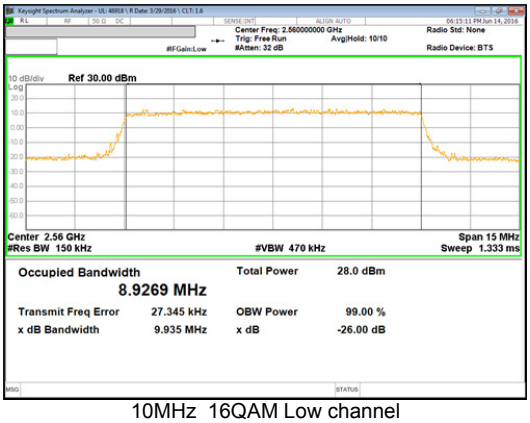
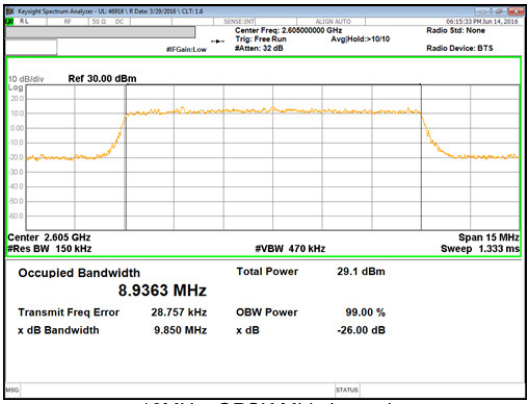
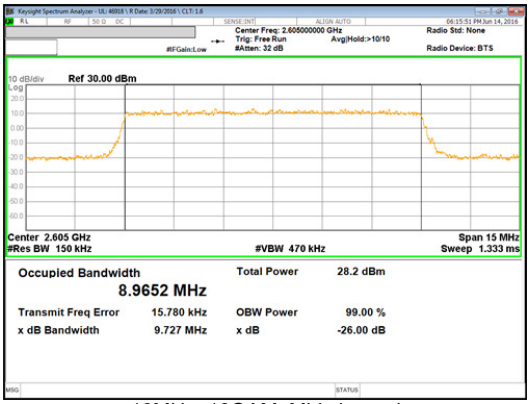
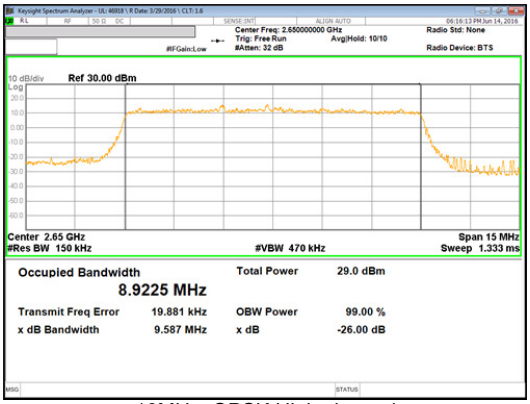
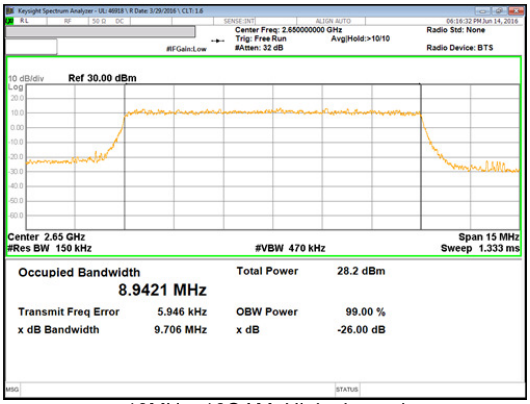
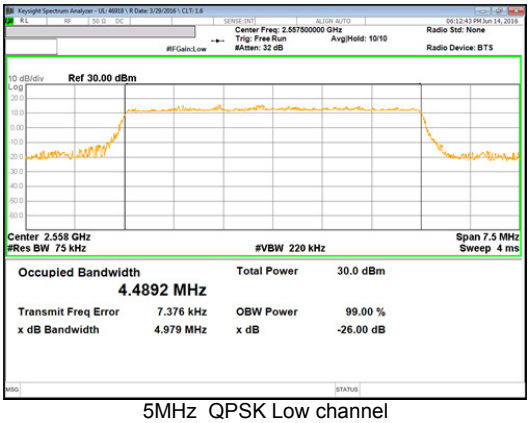
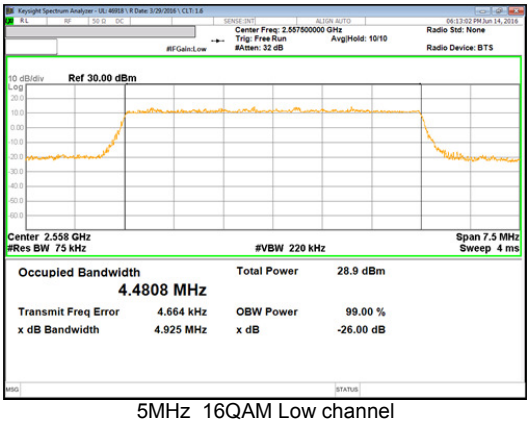
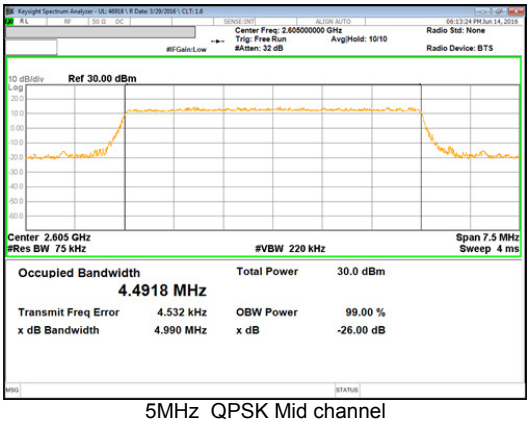
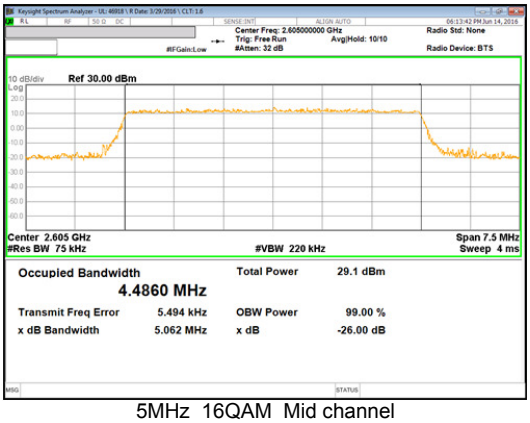
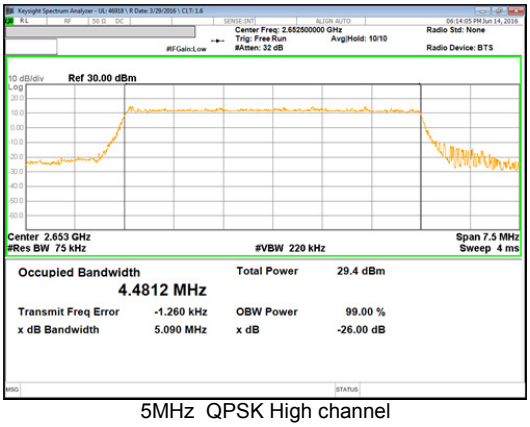
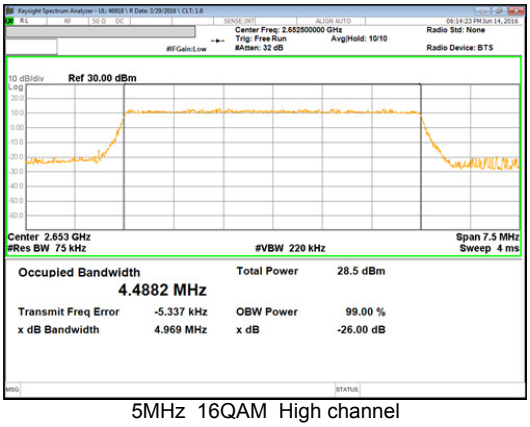
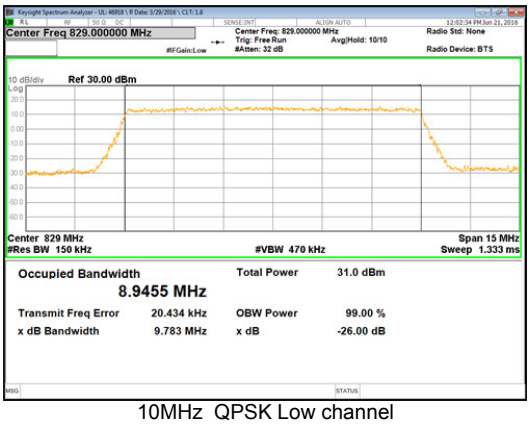
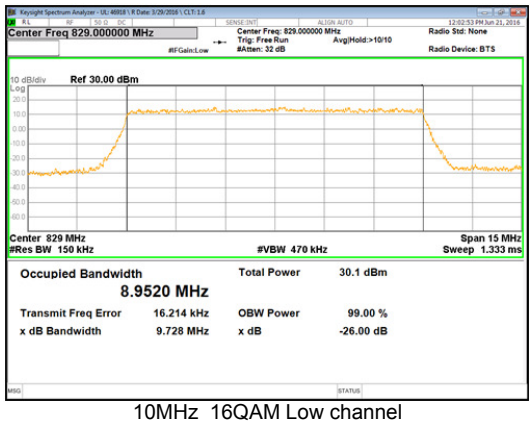
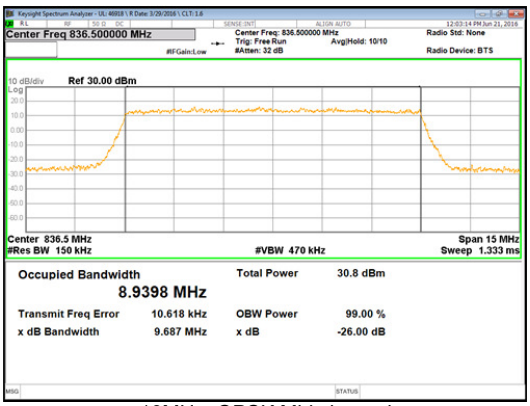
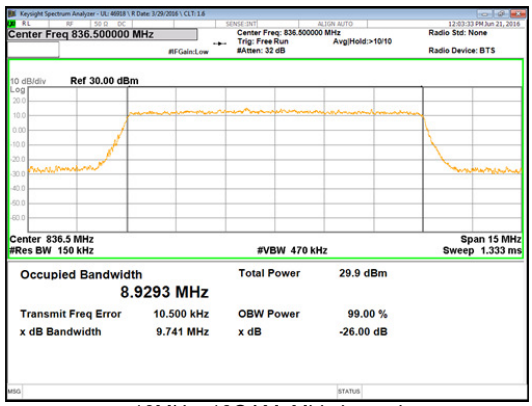
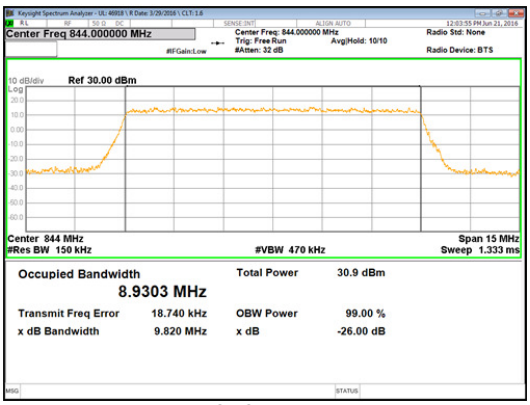
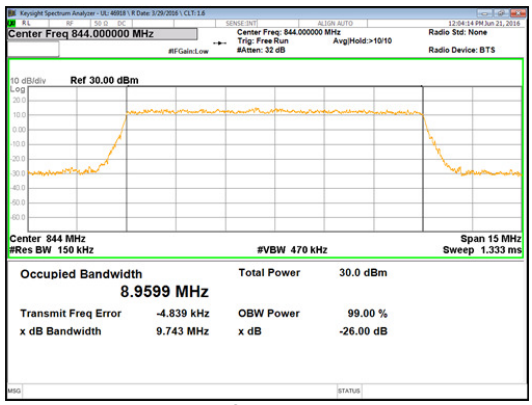
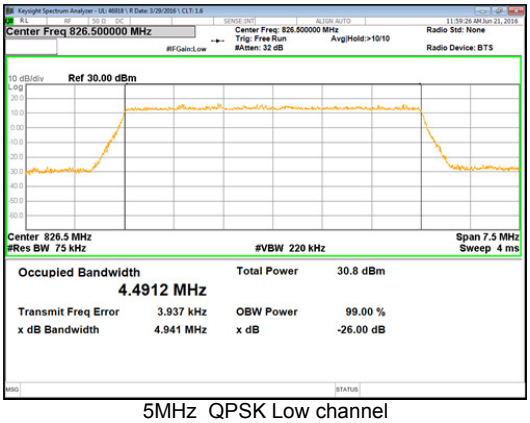
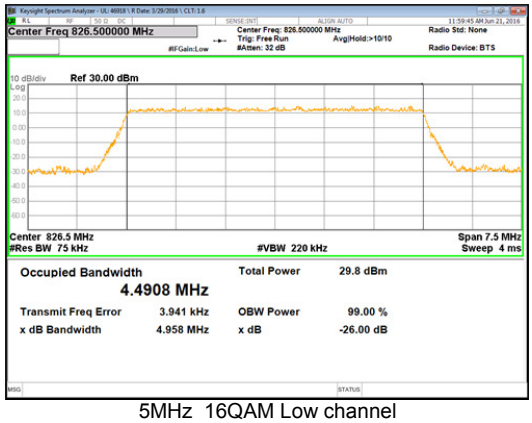
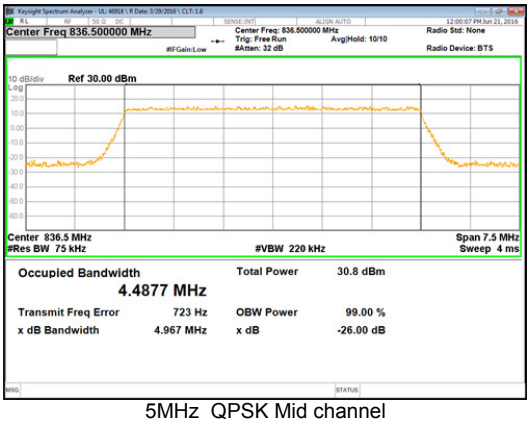
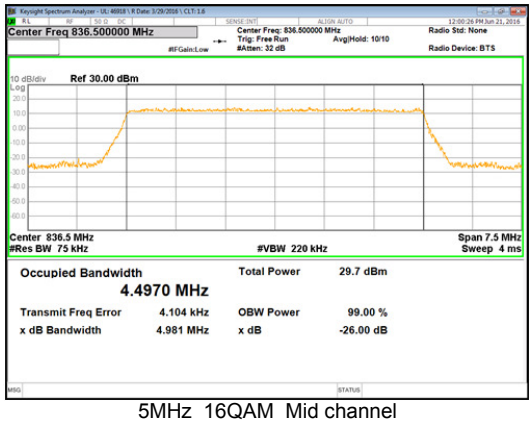
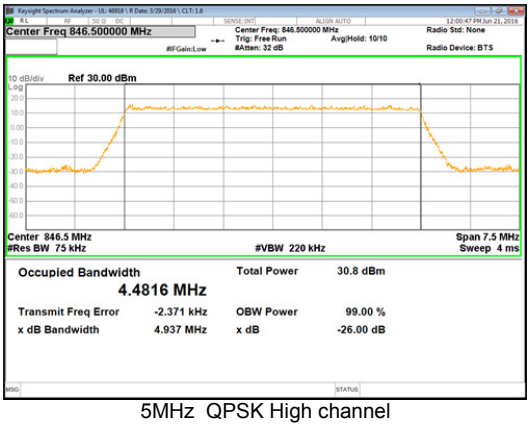
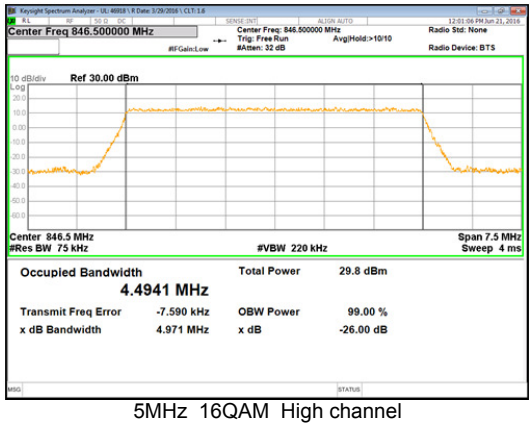
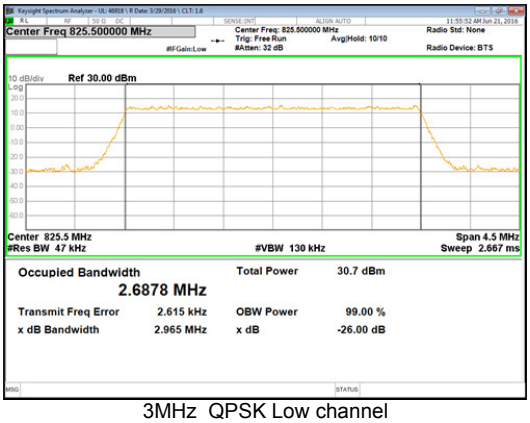
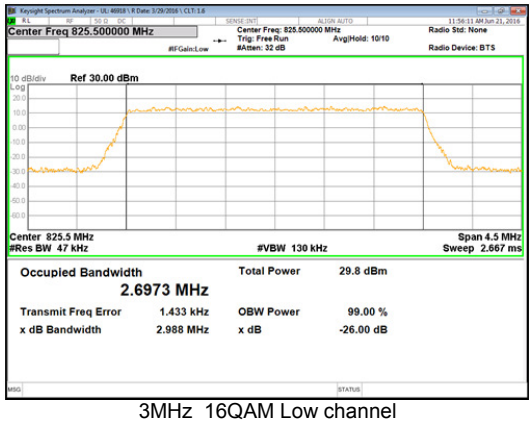
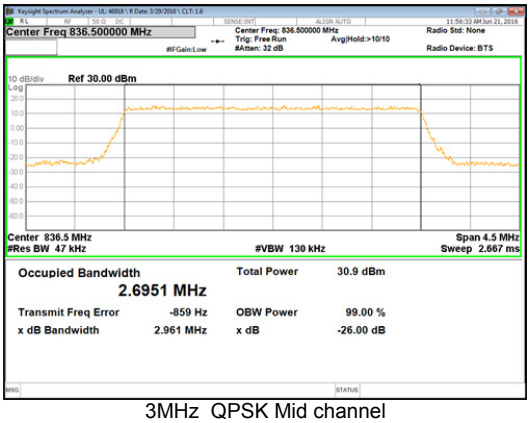
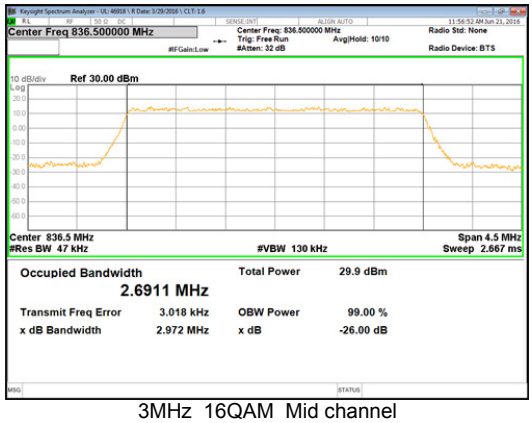
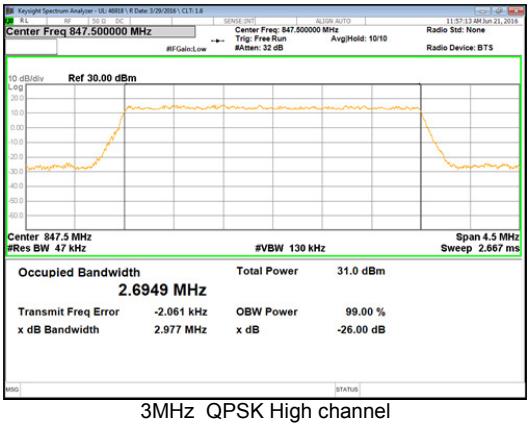
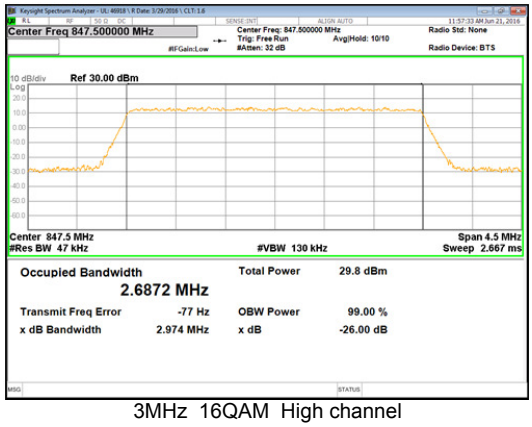
Band 41 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel
	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
	 10MHz QPSK High channel	 10MHz 16QAM High channel

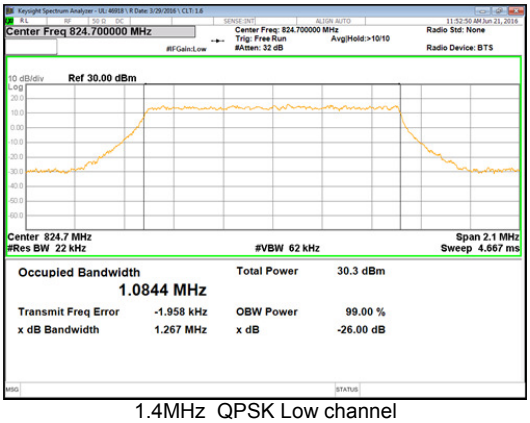
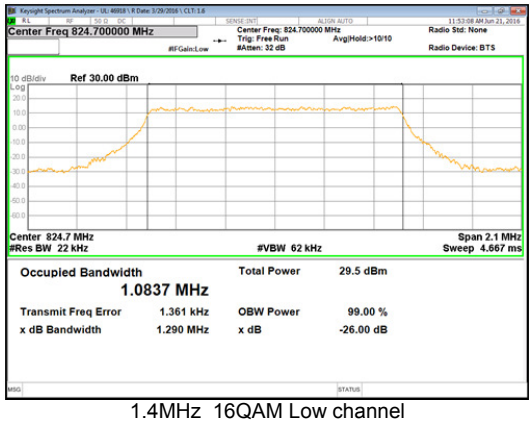
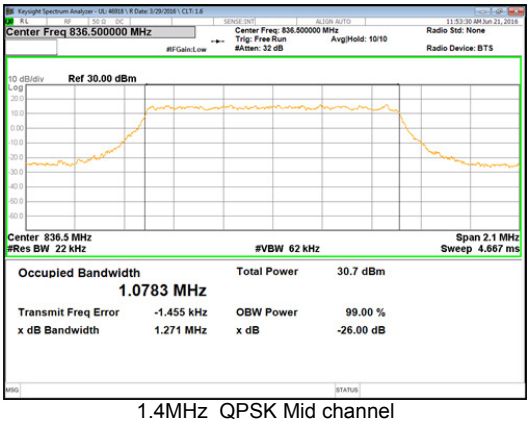
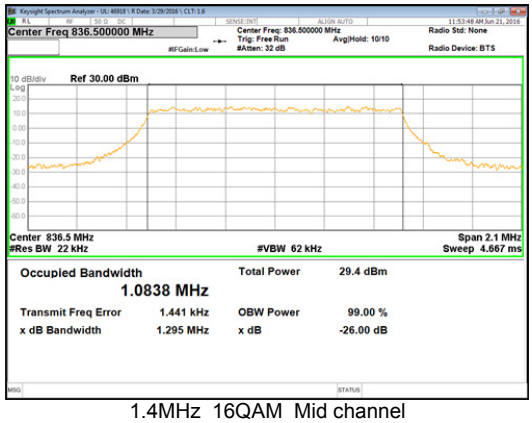
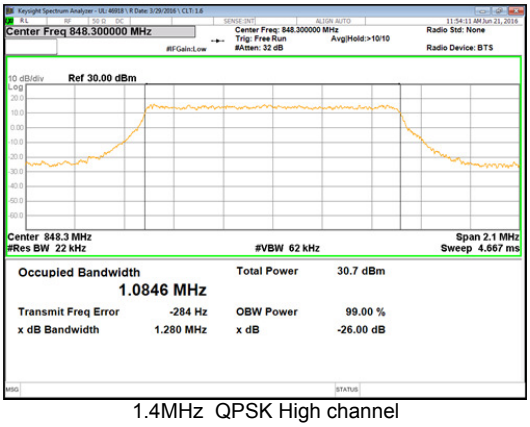
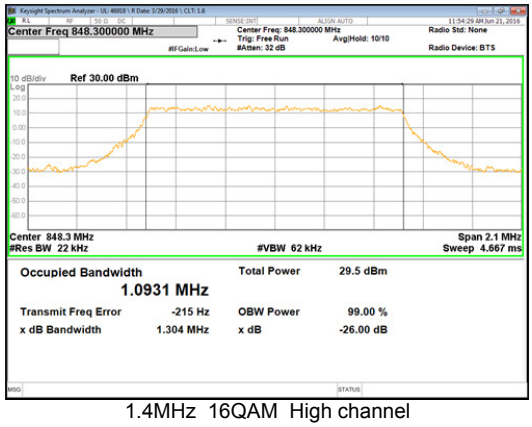
Band 41 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

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

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

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.

Part 27.53(m) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems 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.

NOTE

LTE 41 - Duty cycle factor 2.22dB already applied.

RESULTS

GSM

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
GSM850	GPRS	Lower	823.982	-16.619	-13.00
		Upper	849.023	-15.840	
	EGPRS	Lower	823.987	-23.433	
		Upper	849.033	-25.171	
GSM1900	GPRS	Lower	1849.977	-18.440	
		Upper	1910.023	-18.247	
	EGPRS	Lower	1849.982	-23.984	
		Upper	1910.013	-25.268	

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WCDMA

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
Band 5	REL99	Lower	824	-27.275	-13.00
		Upper	849	-27.991	
	HSDPA	Lower	824	-30.593	
		Upper	849	-29.514	
Band 2	REL99	Lower	1850	-29.583	
		Upper	1910	-31.733	
	HSDPA	Lower	1850	-32.339	
		Upper	1910	-32.934	

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LTE 5

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	824.000	-27.851	-13.00
			FRB	824.000	-28.660	
		Upper	1RB	849.000	-25.745	
			FRB	849.000	-30.136	
	16QAM	Lower	1RB	824.000	-29.060	
			FRB	824.000	-33.705	
		Upper	1RB	849.000	-27.325	
			FRB	849.000	-31.342	
5 MHz	QPSK	Lower	1RB	824.000	-17.723	
			FRB	824.000	-30.012	
		Upper	1RB	849.000	-18.443	
			FRB	849.000	-26.899	
	16QAM	Lower	1RB	824.000	-18.643	
			FRB	824.000	-30.183	
		Upper	1RB	849.000	-21.486	
			FRB	849.000	-28.025	
3 MHz	QPSK	Lower	1RB	824.000	-18.686	
			FRB	824.000	-26.289	
		Upper	1RB	849.000	-15.768	
			FRB	849.000	-25.273	
	16QAM	Lower	1RB	824.000	-19.154	
			FRB	824.000	-25.905	
		Upper	1RB	849.000	-17.918	
			FRB	849.000	-25.798	
1.4 MHz	QPSK	Lower	1RB	824.000	-22.284	
			FRB	824.000	-27.207	
		Upper	1RB	849.000	-20.355	
			FRB	849.000	-27.796	
	16QAM	Lower	1RB	824.000	-24.065	
			FRB	824.000	-30.329	
		Upper	1RB	849.000	-22.595	
			FRB	849.000	-27.520	

LTE 41

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
20 MHz	QPSK	2565.0	1RB	Lower Trace 1	-28.04	-10.00
				Lower Trace 2	-28.31	-13.00
				Lower Trace 3	-44.33	-25.00
			FRB	Lower Trace 1	-23.68	-10.00
				Lower Trace 2	-24.37	-13.00
				Lower Trace 3	-41.79	-25.00
		2645.0	1RB	Upper Trace 1	-28.80	-10.00
				Upper Trace 2	-31.84	-13.00
				Upper Trace 3	-44.34	-25.00
			FRB	Upper Trace 1	-26.91	-10.00
				Upper Trace 2	-28.69	-13.00
				Upper Trace 3	-43.35	-25.00
	16QAM	2565.0	1RB	Lower Trace 1	-29.67	-10.00
				Lower Trace 2	-28.21	-13.00
				Lower Trace 3	-44.27	-25.00
			FRB	Lower Trace 1	-23.78	-10.00
				Lower Trace 2	-24.00	-13.00
				Lower Trace 3	-41.68	-25.00
		2645.0	1RB	Upper Trace 1	-29.20	-10.00
				Upper Trace 2	-32.90	-13.00
				Upper Trace 3	-44.27	-25.00
			FRB	Upper Trace 1	-27.28	-10.00
				Upper Trace 2	-29.56	-13.00
				Upper Trace 3	-43.13	-25.00

LTE 41 (Continue)

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
15 MHz	QPSK	2562.5	1RB	Lower Trace 1	-26.61	-10.00
				Lower Trace 2	-26.75	-13.00
				Lower Trace 3	-44.08	-25.00
			FRB	Lower Trace 1	-21.00	-10.00
				Lower Trace 2	-21.81	-13.00
				Lower Trace 3	-31.89	-25.00
		2647.5	1RB	Upper Trace 1	-26.45	-10.00
				Upper Trace 2	-31.11	-13.00
				Upper Trace 3	-44.27	-25.00
			FRB	Upper Trace 1	-23.74	-10.00
				Upper Trace 2	-27.86	-13.00
				Upper Trace 3	-39.78	-25.00
	16QAM	2562.5	1RB	Lower Trace 1	-26.75	-10.00
				Lower Trace 2	-26.85	-13.00
				Lower Trace 3	-44.10	-25.00
			FRB	Lower Trace 1	-21.73	-10.00
				Lower Trace 2	-21.74	-13.00
				Lower Trace 3	-31.93	-25.00
		2647.5	1RB	Upper Trace 1	-26.34	-10.00
				Upper Trace 2	-31.89	-13.00
				Upper Trace 3	-44.30	-25.00
			FRB	Upper Trace 1	-25.70	-10.00
				Upper Trace 2	-28.93	-13.00
				Upper Trace 3	-39.28	-25.00

LTE 41 (Continue)

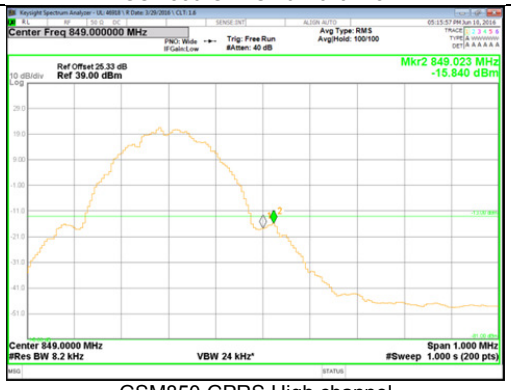
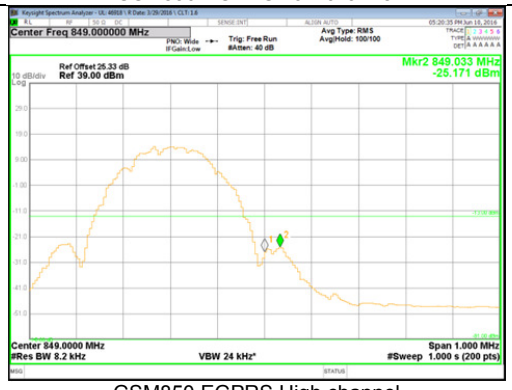
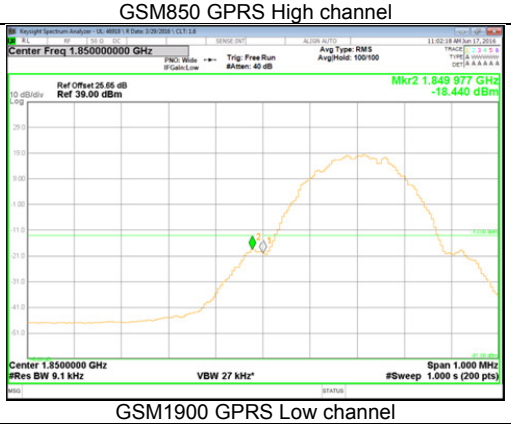
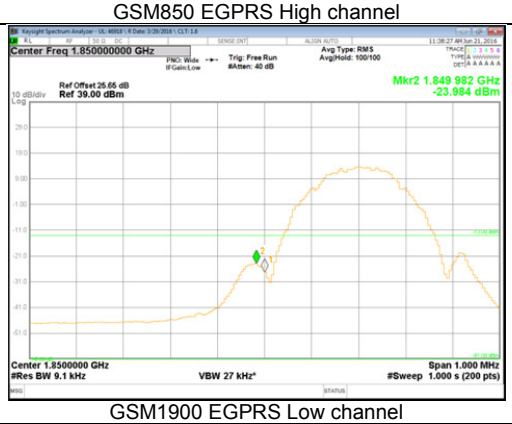
Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
10 MHz	QPSK	2560.0	1RB	Lower Trace 1	-27.22	-10.00
				Lower Trace 2	-25.71	-13.00
				Lower Trace 3	-43.54	-25.00
			FRB	Lower Trace 1	-21.37	-10.00
				Lower Trace 2	-24.68	-13.00
				Lower Trace 3	-38.67	-25.00
		2650.0	1RB	Upper Trace 1	-26.12	-10.00
				Upper Trace 2	-30.07	-13.00
				Upper Trace 3	-43.71	-25.00
			FRB	Upper Trace 1	-24.27	-10.00
				Upper Trace 2	-31.60	-13.00
				Upper Trace 3	-38.62	-25.00
	16QAM	2560.0	1RB	Lower Trace 1	-27.06	-10.00
				Lower Trace 2	-25.45	-13.00
				Lower Trace 3	-43.79	-25.00
			FRB	Lower Trace 1	-21.40	-10.00
				Lower Trace 2	-24.32	-13.00
				Lower Trace 3	-39.23	-25.00
		2650.0	1RB	Upper Trace 1	-25.74	-10.00
				Upper Trace 2	-29.28	-13.00
				Upper Trace 3	-43.78	-25.00
			FRB	Upper Trace 1	-25.46	-10.00
				Upper Trace 2	-30.81	-13.00
				Upper Trace 3	-38.47	-25.00

LTE 41 (Continue)

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
5 MHz	QPSK	2557.5	1RB	Lower Trace 1	-20.20	-10.00
				Lower Trace 2	-43.15	-13.00
				Lower Trace 3	-43.56	-25.00
			FRB	Lower Trace 1	-18.09	-10.00
				Lower Trace 2	-34.09	-13.00
				Lower Trace 3	-35.94	-25.00
		2652.5	1RB	Upper Trace 1	-20.08	-10.00
				Upper Trace 2	-43.04	-13.00
				Upper Trace 3	-43.86	-25.00
			FRB	Upper Trace 1	-19.47	-10.00
				Upper Trace 2	-33.03	-13.00
				Upper Trace 3	-33.30	-25.00
	16QAM	2557.5	1RB	Lower Trace 1	-21.14	-10.00
				Lower Trace 2	-43.45	-13.00
				Lower Trace 3	-43.88	-25.00
			FRB	Lower Trace 1	-17.26	-10.00
				Lower Trace 2	-33.26	-13.00
				Lower Trace 3	-35.91	-25.00
		2652.5	1RB	Upper Trace 1	-19.43	-10.00
				Upper Trace 2	-42.05	-13.00
				Upper Trace 3	-43.81	-25.00
			FRB	Upper Trace 1	-22.01	-10.00
				Upper Trace 2	-33.18	-13.00
				Upper Trace 3	-35.17	-25.00

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