8. RF OUTPUT POWER VERIFICATION

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

8.1. GSM

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

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

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

RESULT

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8.1.1. GSM850

ID:	38206	Date:	2/18/19

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
850.0	128	824.2	33.9	30.7	28.4	27.4
	190	836.6	34.0	31.0	28.6	27.6
	251	848.8	33.9	30.6	28.7	26.9

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
850.0	128	824.2	26.9	24.5	23.2	21.4
	190	836.6	27.0	24.5	23.2	21.6
	251	848.8	26.9	24.5	23.0	21.4

8.1.2. GSM1900

ID:	38206	Date:	2/18/19

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
1900.0	512	1850.2	29.9	27.9	25.6	24.7
	661	1880.0	30.3	28.0	26.0	25.0
	810	1909.8	30.2	28.0	25.9	25.0

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
1900.0	512	1850.2	25.4	23.0	22.3	20.2
	661	1880.0	25.5	23.5	22.7	20.8
	810	1909.8	25.5	23.4	22.6	20.8

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8.2. WCDMA

TEST PROCEDURE

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

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

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

REL 99

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

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

HSDPA REL 5

The following 4 Sub-tests were completed according to Release 5 procedures in 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			
	Bc	2/15	12/15	15/15	15/15
	Bd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	Bhs	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			

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HSPA (HSDPA & HSUPA)

The following 5 Sub-tests were completed according to Release 9 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	-
	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	0
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	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 Channelization Codes	2xSF2				SF4

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

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.		

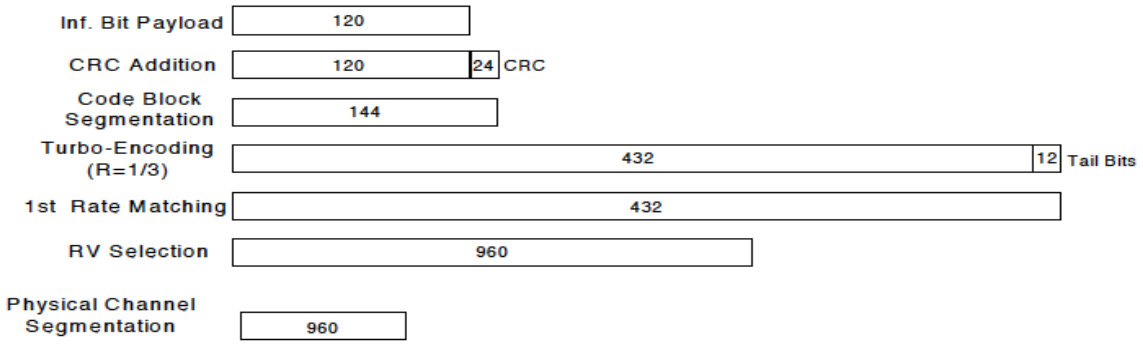

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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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	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	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

HSPA+

The following 1 Sub-test was completed according to Release 9 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

Table C.11.1.4: **β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM**

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	$\beta_{ed}1$: 30/15 $\beta_{ed}2$: 30/15	$\beta_{ed}3$: 24/15 $\beta_{ed}4$: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

RESULT

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8.2.1. WCDMA BAND5

ID:	38206	Date:	2/18/19

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Average (dBm)
W-CDMA Band 5 (850MHz)	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.7
			4183	836.6	N/A	24.7
			4233	846.6	N/A	24.7
	HSDPA	Subtest 1	4132	826.4	0	23.7
			4183	836.6	0	23.7
			4233	846.6	0	23.7
		Subtest 2	4132	826.4	0.5	23.7
			4183	836.6	0.5	23.7
			4233	846.6	0.5	23.7
		Subtest 3	4132	826.4	0.5	23.2
			4183	836.6	0.5	23.2
			4233	846.6	0.5	23.2
		Subtest 4	4132	826.4	0.5	23.2
			4183	836.6	0.5	23.2
			4233	846.6	0.5	23.2
	HSUPA	Subtest 1	4132	826.4	0.5	23.6
			4183	836.6	0.5	23.7
			4233	846.6	0.5	23.8
		Subtest 2	4132	826.4	1.5	21.6
			4183	836.6	1.5	21.7
			4233	846.6	1.5	21.7
		Subtest 3	4132	826.4	1.5	22.6
			4183	836.6	1.5	22.7
			4233	846.6	1.5	22.7
		Subtest 4	4132	826.4	1.5	21.7
			4183	836.6	1.5	21.6
			4233	846.6	1.5	21.7
		Subtest 5	4132	826.4	0.5	23.7
			4183	836.6	0.5	23.8
			4233	846.6	0.5	23.8
	DC-HSDPA	Subtest 1	4132	826.4	0.5	23.4
			4183	836.6	0.5	23.3
			4233	846.6	0.5	23.1
		Subtest 2	4132	826.4	1.5	23.4
			4183	836.6	1.5	23.3
			4233	846.6	1.5	23.1
		Subtest 3	4132	826.4	1.5	22.9
			4183	836.6	1.5	22.8
			4233	846.6	1.5	22.6
		Subtest 4	4132	826.4	1.5	22.9
			4183	836.6	1.5	22.8
			4233	846.6	1.5	22.6

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8.2.2. WCDMA BAND2

ID:	38206	Date:	2/18/19

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Average (dBm)
W-CDMA Band 2 (1900MHz)	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	24.5
			9400	1880.0	N/A	24.6
			9538	1907.6	N/A	24.3
	HSDPA	Subtest 1	9262	1852.4	0	23.5
			9400	1880.0	0	23.6
			9538	1907.6	0	23.3
		Subtest 2	9262	1852.4	0	23.6
			9400	1880.0	0	23.6
			9538	1907.6	0	23.3
		Subtest 3	9262	1852.4	0.5	23.0
			9400	1880.0	0.5	23.1
			9538	1907.6	0.5	22.8
		Subtest 4	9262	1852.4	0.5	23.0
			9400	1880.0	0.5	23.1
			9538	1907.6	0.5	22.8
	HSUPA	Subtest 1	9262	1852.4	0	23.5
			9400	1880.0	0	23.6
			9538	1907.6	0	23.3
		Subtest 2	9262	1852.4	2	21.5
			9400	1880.0	2	21.6
			9538	1907.6	2	21.3
		Subtest 3	9262	1852.4	1	22.5
			9400	1880.0	1	22.6
			9538	1907.6	1	22.3
		Subtest 4	9262	1852.4	2	21.5
			9400	1880.0	2	21.6
			9538	1907.6	2	21.3
		Subtest 5	9262	1852.4	1	23.5
			9400	1880.0	1	23.6
			9538	1907.6	1	23.7
	DC-HSDPA	Subtest 1	9262	1852.4	0	22.6
			9400	1880.0	0	22.8
			9538	1907.6	0	22.7
		Subtest 2	9262	1852.4	2	22.6
			9400	1880.0	2	22.8
			9538	1907.6	2	22.7
		Subtest 3	9262	1852.4	1	22.1
			9400	1880.0	1	22.3
			9538	1907.6	1	22.2
		Subtest 4	9262	1852.4	2	22.1
			9400	1880.0	2	22.3
			9538	1907.6	2	22.2

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8.3. LTE

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set.
The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.
UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

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

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

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

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.					

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MODES TESTED

- LTE 5
- LTE 41 (FCC)

RESULTS

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

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8.3.1. LTE 5

ID:	38206	Date:	2/18/19

OUTPUT POWER FOR LTE BAND 5 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20407	20525	20643
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	24.2	24.2	24.2
		1	2	24.2	24.3	24.3
		1	5	24.2	24.2	24.2
		3	0	24.0	24.2	24.2
		3	1	24.1	24.3	24.2
		3	2	24.1	24.3	24.3
		6	0	23.2	23.3	23.3
	16QAM	1	0	23.2	23.2	23.6
		1	2	23.2	23.3	23.6
		1	5	23.2	23.3	23.5
		3	0	23.2	23.4	23.4
		3	1	23.2	23.5	23.4
		3	2	23.2	23.5	23.4
		6	0	22.3	22.5	22.2
	64QAM	1	0	22.3	22.7	22.5
		1	2	22.4	22.8	22.5
		1	5	22.3	22.7	22.5
		3	0	22.3	22.6	22.3
		3	1	22.4	22.7	22.3
		3	2	22.4	22.7	22.4
		6	0	21.6	21.3	21.4

OUTPUT POWER FOR LTE BAND 5 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20415	20525	20635
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	24.2	24.3	24.4
		1	7	24.3	24.4	24.4
		1	14	24.2	24.3	24.3
		8	0	23.2	23.3	23.4
		8	4	23.2	23.3	23.4
		8	7	23.2	23.4	23.4
		15	0	23.2	23.3	23.4
	16QAM	1	0	23.6	23.2	23.4
		1	7	23.6	23.3	23.4
		1	14	23.5	23.2	23.3
		8	0	22.3	22.5	22.4
		8	4	22.3	22.5	22.5
		8	7	22.3	22.5	22.5
		15	0	22.3	22.4	22.4
	64QAM	1	0	22.4	22.7	22.6
		1	7	22.4	22.7	22.6
		1	14	22.3	22.7	22.5
		8	0	21.4	21.4	21.4
		8	4	21.4	21.5	21.4
		8	7	21.4	21.5	21.4
		15	0	21.3	21.4	21.5

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OUTPUT POWER FOR LTE BAND 5 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20425	20525	20625
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	24.2	24.5	24.5
		1	12	24.2	24.4	24.4
		1	24	24.3	24.4	24.2
		12	0	23.2	23.3	23.3
		12	6	23.3	23.3	23.3
		12	11	23.3	23.3	23.3
		25	0	23.3	23.4	23.3
	16QAM	1	0	23.7	23.5	23.4
		1	12	23.6	23.4	23.3
		1	24	23.7	23.5	23.3
		12	0	22.4	22.5	22.4
		12	6	22.5	22.5	22.4
		12	11	22.5	22.5	22.4
		25	0	22.4	22.4	22.3
	64QAM	1	0	22.6	22.3	22.7
		1	12	22.5	22.3	22.6
		1	24	22.6	22.3	22.6
		12	0	21.3	21.5	21.5
		12	6	21.4	21.5	21.5
		12	11	21.3	21.5	21.5
		25	0	21.4	21.5	21.5

OUTPUT POWER FOR LTE BAND 5 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20450	20525	20600
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	24.3	24.3	24.2
		1	24	24.3	24.3	24.2
		1	49	24.3	24.3	24.1
		25	0	23.4	23.4	23.3
		25	12	23.3	23.4	23.3
		25	24	23.4	23.3	23.2
		50	0	23.3	23.4	23.2
	16QAM	1	0	23.6	23.1	23.3
		1	24	23.6	23.2	23.2
		1	49	23.7	23.2	23.1
		25	0	21.9	22.0	21.9
		25	12	21.9	22.0	22.0
		25	24	21.9	21.9	21.9
		50	0	21.9	21.9	21.8
	64QAM	1	0	22.6	22.4	22.4
		1	24	22.6	22.5	22.4
		1	49	22.7	22.4	22.3
		25	0	21.9	22.0	21.8
		25	12	21.9	22.0	21.9
		25	24	22.0	22.0	21.8
		50	0	21.9	21.9	21.8

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8.3.2. LTE 41 (FCC)

ID:	38206	Date:	2/18/19

OUTPUT POWER FOR LTE BAND 41 (FCC) (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				39675	40620	41565
				2498.5 MHz	2593.0 MHz	2687.5 MHz
5.0	QPSK	1	0	23.6	23.8	23.6
		1	12	23.6	23.7	23.6
		1	24	23.6	23.7	23.6
		12	0	22.7	22.8	22.7
		12	6	22.7	22.8	22.7
		12	11	22.7	22.8	22.7
		25	0	22.7	22.8	22.7
	16QAM	1	0	22.6	22.8	22.8
		1	12	22.6	22.8	22.8
		1	24	22.6	22.7	22.8
		12	0	21.8	21.8	21.9
		12	6	21.8	21.8	21.9
		12	11	21.7	21.8	21.9
		25	0	21.7	21.9	21.8
	64QAM	1	0	21.5	22.0	21.9
		1	12	21.4	22.0	21.9
		1	24	21.4	21.9	21.9
		12	0	20.8	20.8	20.8
		12	6	20.8	20.8	20.8
		12	11	20.7	20.8	20.8
		25	0	20.8	20.8	20.8

OUTPUT POWER FOR LTE BAND 41 (FCC) (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				39700	40620	41540
				2501.0 MHz	2593.0 MHz	2685.0 MHz
10.0	QPSK	1	0	23.7	23.8	23.6
		1	24	23.6	23.7	23.5
		1	49	23.6	23.7	23.7
		25	0	22.2	22.3	22.2
		25	12	22.2	22.3	22.2
		25	24	22.2	22.3	22.2
		50	0	22.2	22.3	22.2
	16QAM	1	0	22.8	22.8	22.7
		1	24	22.8	22.8	22.7
		1	49	22.8	22.7	22.7
		25	0	21.8	21.9	21.9
		25	12	21.8	21.9	21.8
		25	24	21.7	21.9	21.9
		50	0	21.8	21.9	21.9
	64QAM	1	0	21.7	22.0	22.1
		1	24	21.7	22.0	22.1
		1	49	21.7	22.0	22.1
		25	0	20.7	20.9	20.9
		25	12	20.7	20.9	20.9
		25	24	20.7	20.8	20.9
		50	0	20.7	20.9	20.9

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OUTPUT POWER FOR LTE BAND 41 (FCC) (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				39725	40620	41515
				2503.5 MHz	2593.0 MHz	2682.5 MHz
15.0	QPSK	1	0	23.7	23.9	23.5
		1	37	23.6	23.8	23.6
		1	74	23.5	23.7	23.6
		36	0	22.7	22.9	22.6
		36	16	22.6	22.8	22.6
		36	35	22.6	22.8	22.6
		75	0	22.6	22.8	22.6
	16QAM	1	0	22.7	22.9	22.6
		1	37	22.7	22.8	22.6
		1	74	22.7	22.7	22.6
		36	0	21.7	21.9	21.7
		36	16	21.7	21.9	21.7
		36	35	21.7	21.8	21.7
		75	0	21.8	21.9	21.7
	64QAM	1	0	22.0	21.6	21.3
		1	37	21.9	21.4	21.3
		1	74	22.0	21.4	21.3
		36	0	20.9	21.0	20.8
		36	16	20.8	21.0	20.8
		36	35	20.8	20.9	20.8
		75	0	20.8	20.9	20.8

OUTPUT POWER FOR LTE BAND 41 (FCC) (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				39750	40620	41490
				2506.0 MHz	2593.0 MHz	2680.0 MHz
20.0	QPSK	1	0	23.8	24.0	23.7
		1	49	23.6	23.8	23.5
		1	99	23.5	23.7	23.5
		50	0	22.8	22.9	22.7
		50	24	22.7	22.9	22.6
		50	49	22.6	22.8	22.7
		100	0	22.7	22.8	22.7
	16QAM	1	0	22.8	23.0	22.6
		1	49	22.7	22.9	22.5
		1	99	22.6	22.9	22.4
		50	0	21.8	22.0	21.8
		50	24	21.8	22.0	21.8
		50	49	21.7	22.0	21.9
		100	0	21.8	21.9	21.8
	64QAM	1	0	22.0	22.0	22.0
		1	49	21.8	21.8	22.0
		1	99	21.7	21.7	22.0
		50	0	20.9	21.0	20.8
		50	24	20.8	20.9	20.8
		50	49	20.8	20.9	20.8
		100	0	20.8	21.0	20.8

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9. CONDUCTED TEST RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only.

TEST PROCEDURE

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

MODES TESTED

- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- LTE Band 5
- LTE Band 41

RESULTS

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

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GSM

Band	Modulation	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM850	GPRS	190	836.6	241.05	319.80
	EGPRS			229.05	302.60
GSM1900	GPRS	661	1880.0	245.13	319.50
	EGPRS			244.77	316.20

WCDMA

Band	Modulation	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
BAND5	REL 99	4408	836.6	4.12	4.71
	HSDPA			4.15	4.71
BAND2	REL 99	9800	1880.0	4.13	4.71
	HSDPA			4.13	4.70

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LTE5

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 5	1.4 MHz, QPSK	6/0	836.5	1.10	1.25
	1.4 MHz, 16QAM			1.08	1.29
	3 MHz, QPSK	15/0		2.70	3.00
	3 MHz, 16QAM			2.70	3.00
	5 MHz, QPSK	25/0		4.50	4.94
	5 MHz, 16QAM			4.50	4.95
	10 MHz, QPSK	50/0		8.96	9.85
	10 MHz, 16QAM			8.96	9.77

LTE41

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 41	5 MHz, QPSK	25/0	2593.0	4.49	4.91
	5 MHz, 16QAM			4.49	4.95
	10 MHz, QPSK	50/0		8.97	9.84
	10 MHz, 16QAM			8.95	9.80
	15 MHz, QPSK	75/0		13.42	14.45
	15 MHz, 16QAM			13.43	14.55
	20 MHz, QPSK	100/0		17.90	19.30
	20 MHz, 16QAM			17.87	19.22

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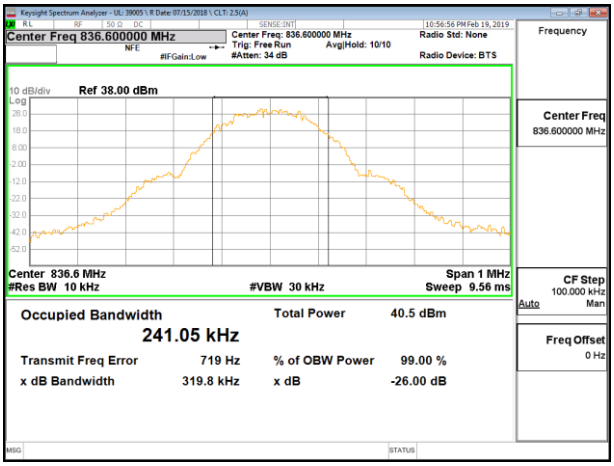
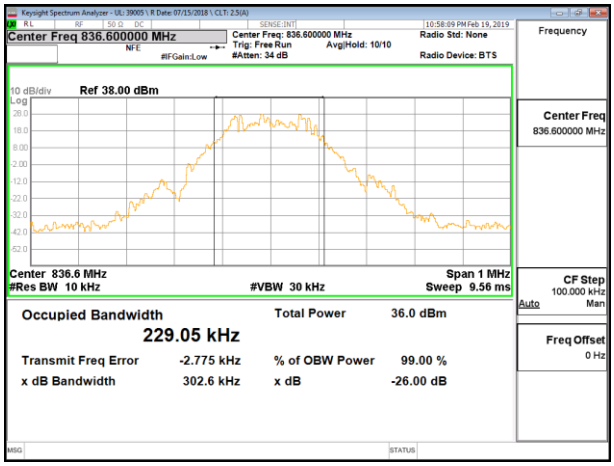
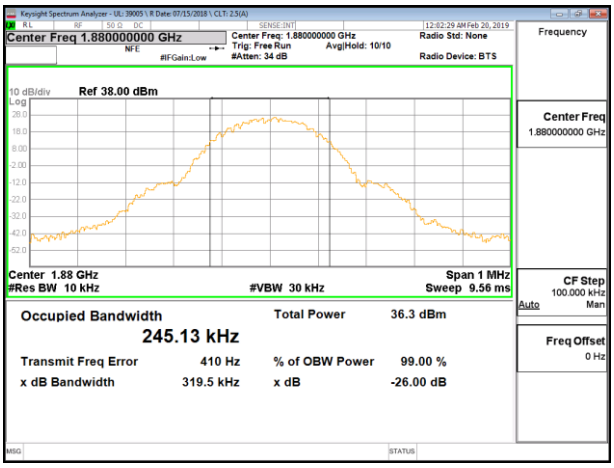
9.1.1. GSM



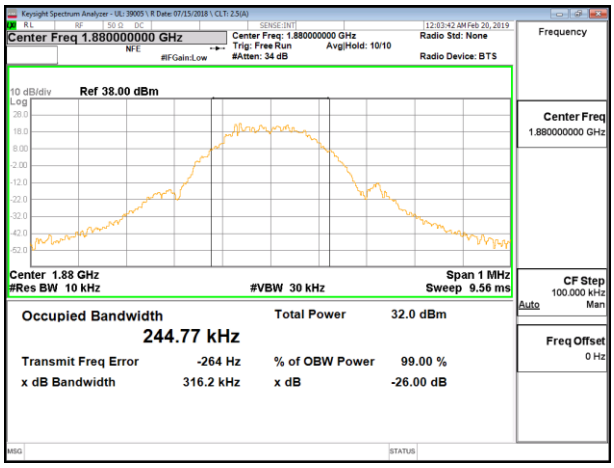
GSM 850MHz GPRS MID Channel



GSM 850MHz EGPRS MID Channel



GSM 1900MHz GPRS MID Channel



GSM 1900MHz EGPRS MID Channel

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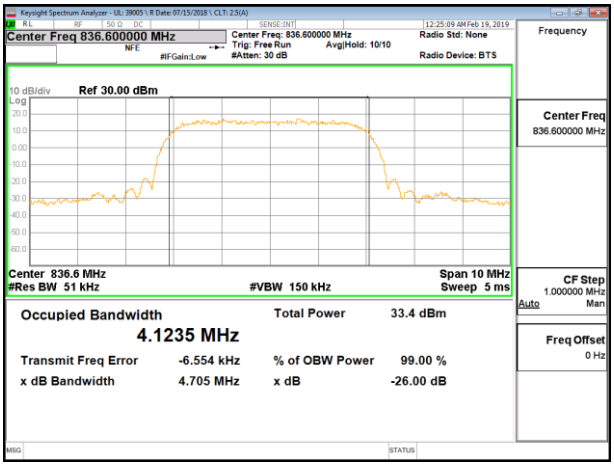
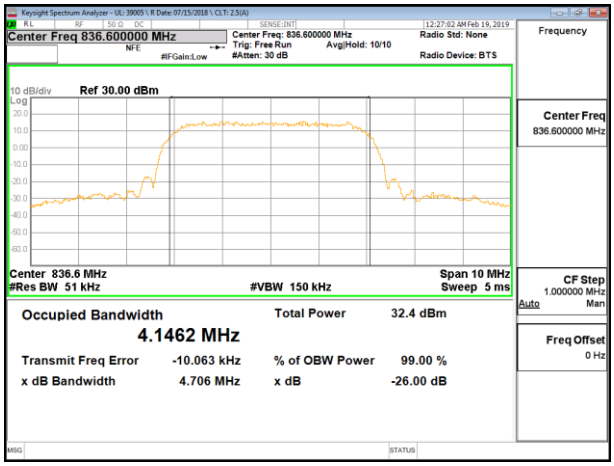
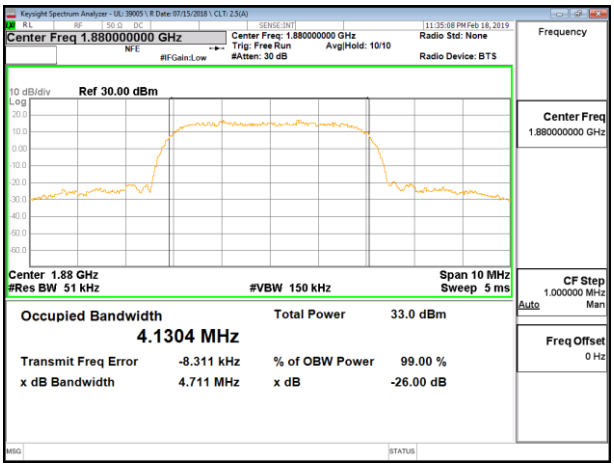
9.1.2. WCDMA



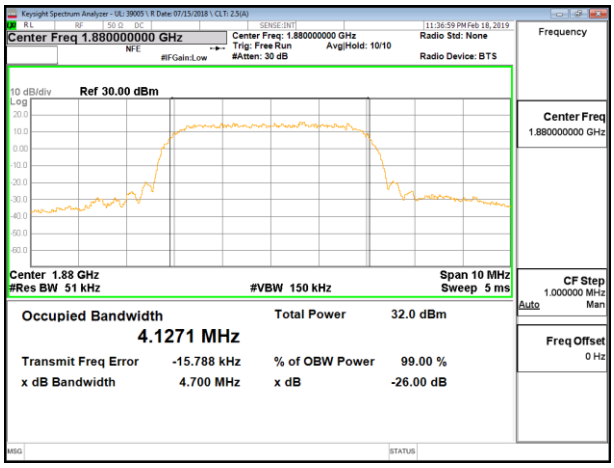
WCDMA BAND5 Rel99 MID Channel



WCDMA BAND5 HSDPA MID Channel



WCDMA BAND2 Rel99 MID Channel



WCDMA BAND2 HSDPA MID Channel

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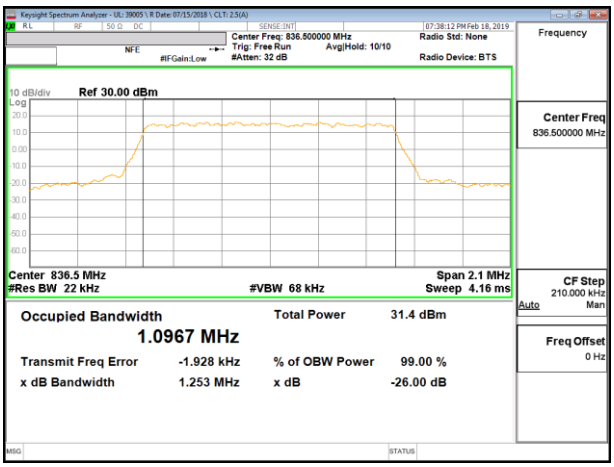
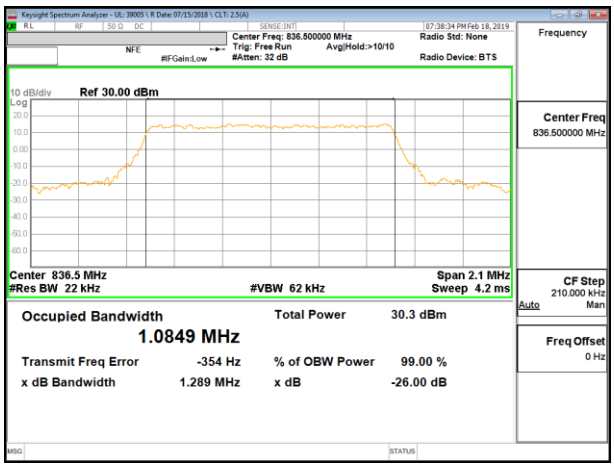
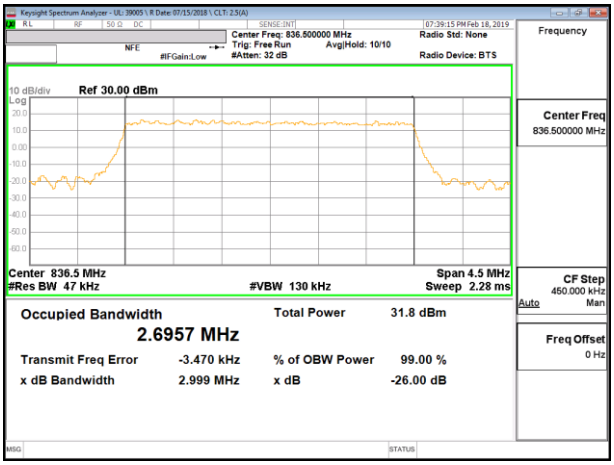
9.1.3. LTE BAND 5



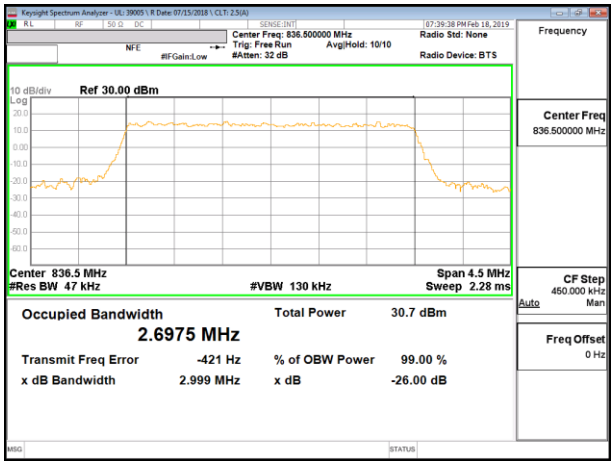
LTE B5 1.4MHz QPSK Mid Channel RB6-0



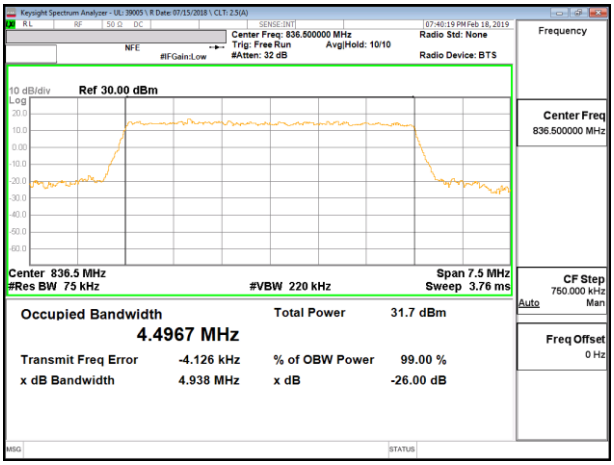
LTE B5 1.4MHz 16QAM Mid Channel RB6-0



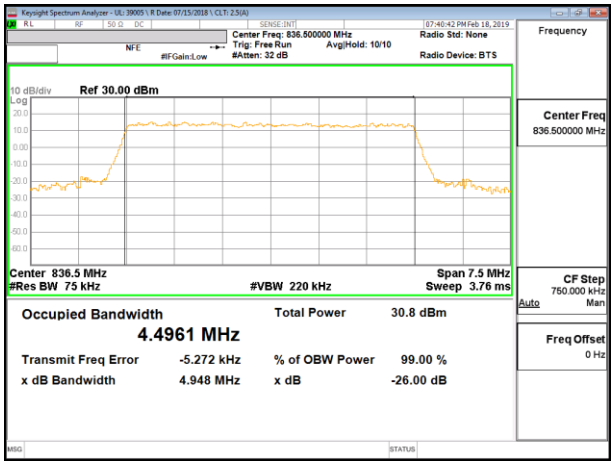
LTE B5 3MHz QPSK Mid Channel RB15-0



LTE B5 3MHz 16QAM Mid Channel RB15-0



LTE B5 5MHz QPSK Mid Channel RB25-0



LTE B5 5MHz 16QAM Mid Channel RB25-0

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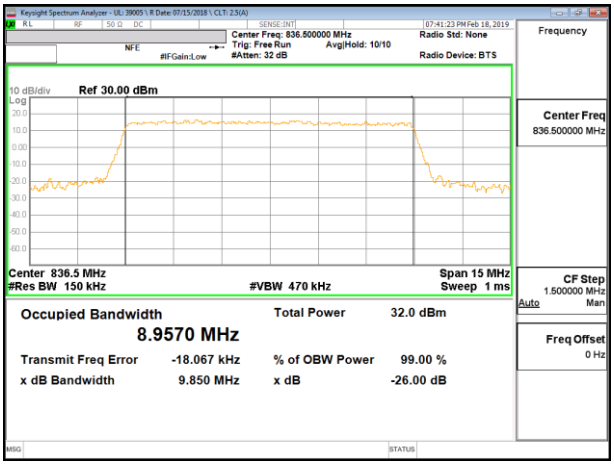
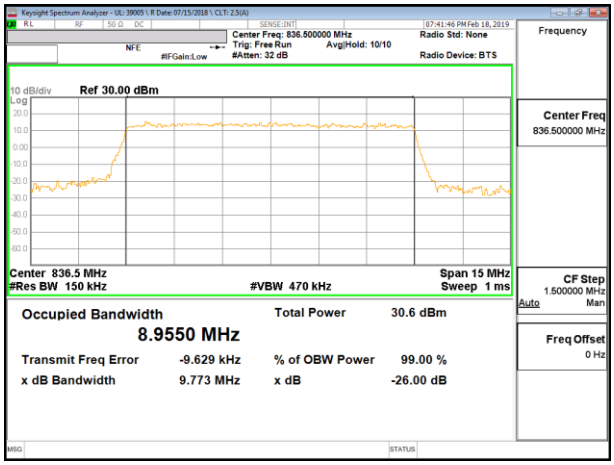


LTE B5 10MHz QPSK Mid Channel RB50-0



LTE B5 10MHz 16QAM Mid Channel RB50-0

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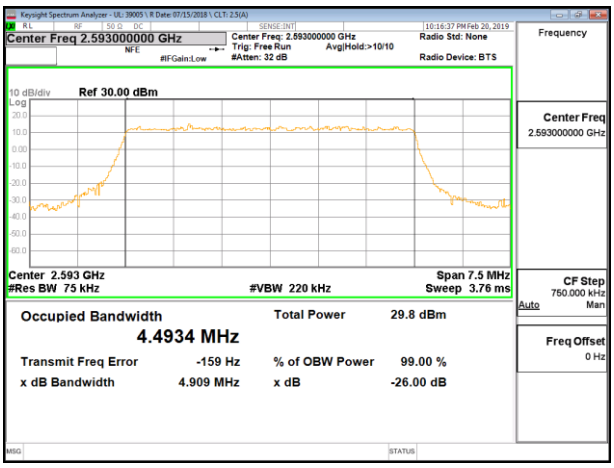
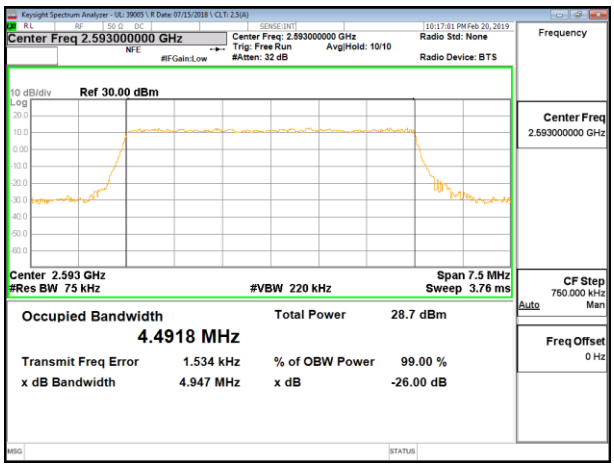
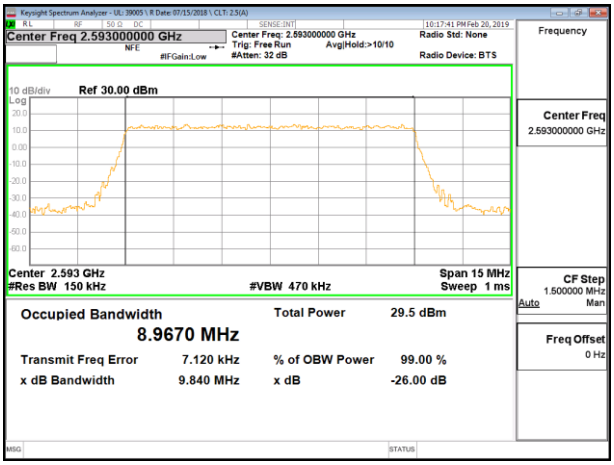
9.1.4. LTE BAND 41



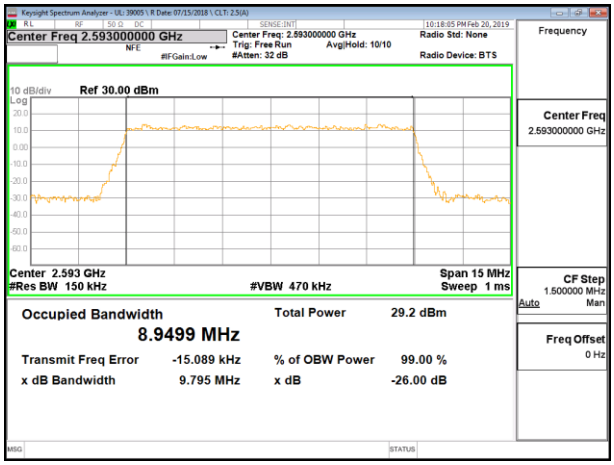
LTE B41 5MHz QPSK Mid Channel RB25-0



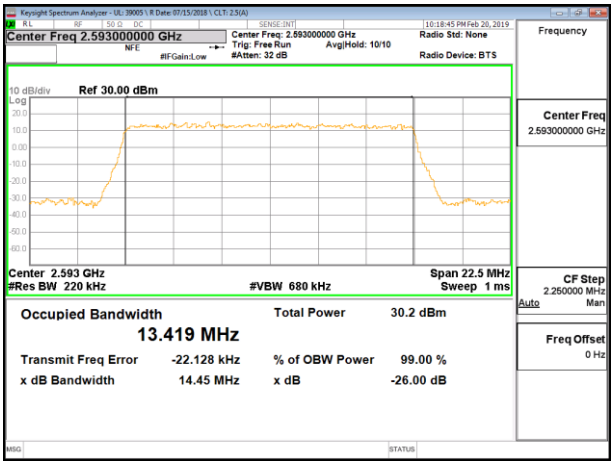
LTE B41 5MHz 16QAM Mid Channel RB25-0



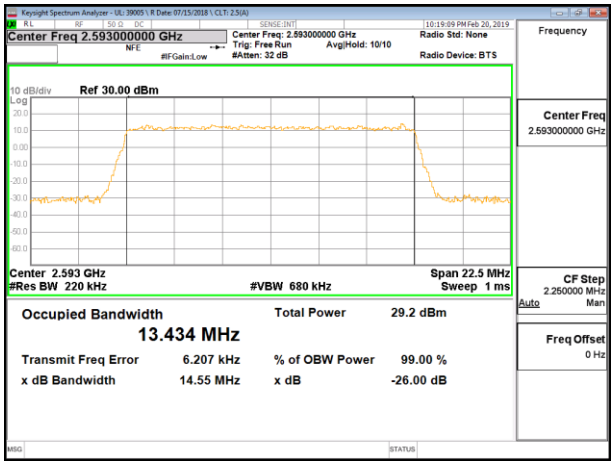
LTE B41 10MHz QPSK Mid Channel RB50-0



LTE B41 10MHz 16QAM Mid Channel RB50-0



LTE B41 15MHz QPSK Mid Channel RB75-0



LTE B41 15MHz 16QAM Mid Channel RB75-0

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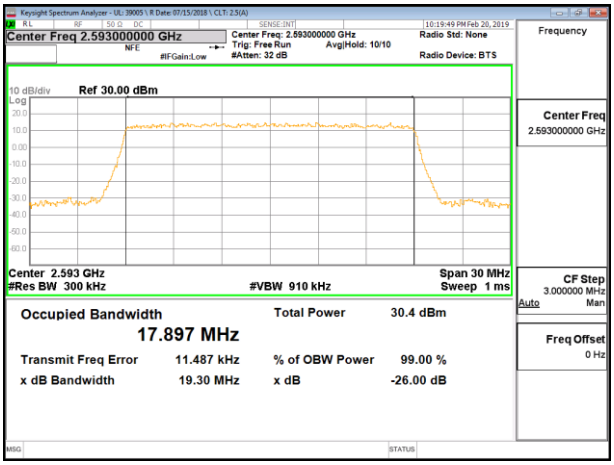
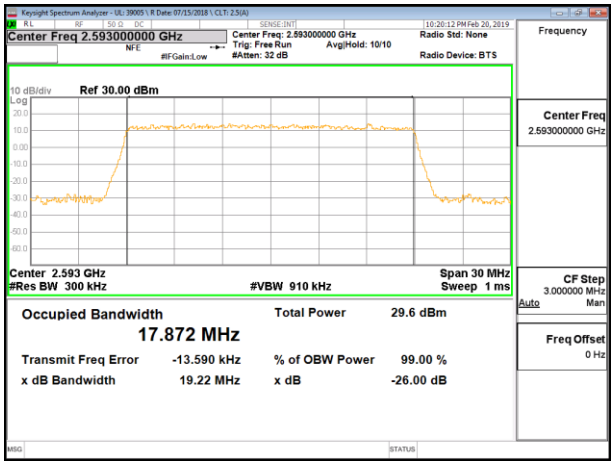


LTE B41 20MHz QPSK Mid Channel RB100-0



LTE B41 20MHz 16QAM Mid Channel RB100-0

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9.2. BAND EDGE AND EMISSION MASK

RULE PART(S)
FCC: §2.1051, §22.917, §24.238, and §27.53

LIMITS
FCC: §22.917, §24.238, §27.53
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.

FCC: §27.53 (Band 41)
(m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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

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

MODES TESTED

- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- LTE Band 5
- LTE Band 41

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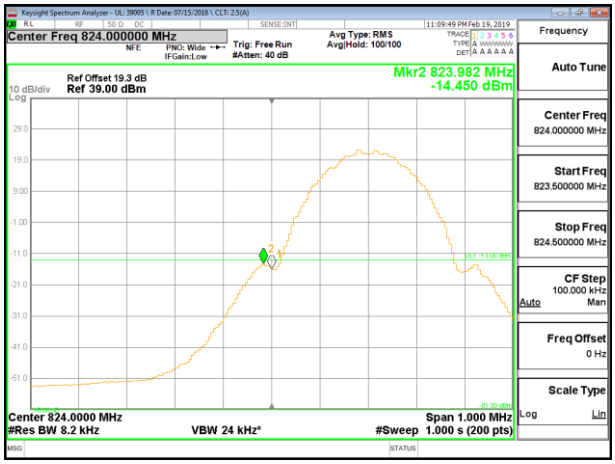
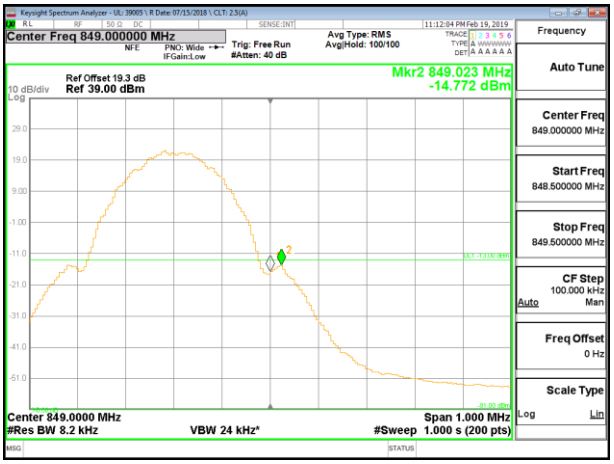
RESULTS

9.2.1. GSM850

GPRS

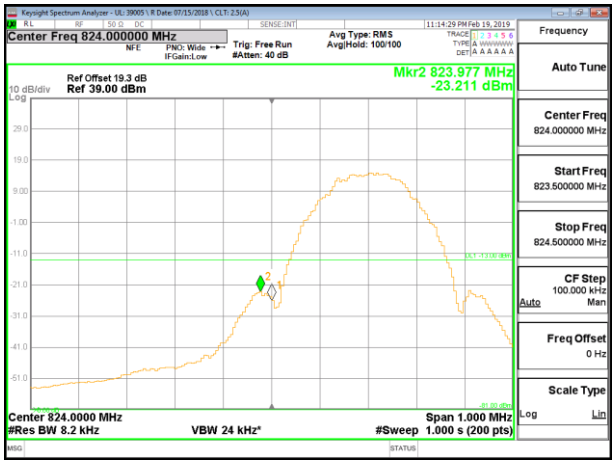


GSM850 GPRS LOW Channel

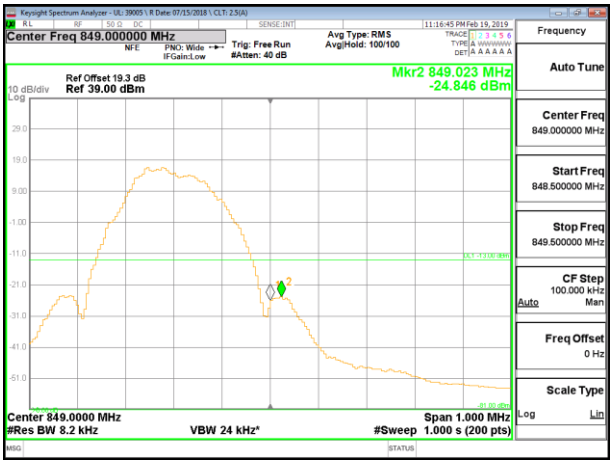


GSM850 GPRS HIGH Channel

EGPRS



GSM850 EGPRS LOW Channel



GSM850 EGPRS HIGH Channel

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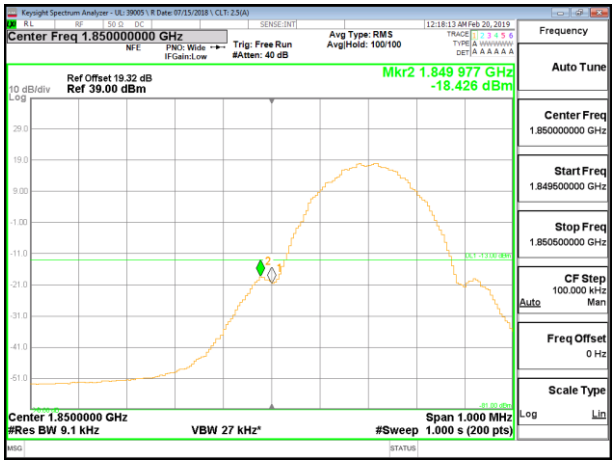
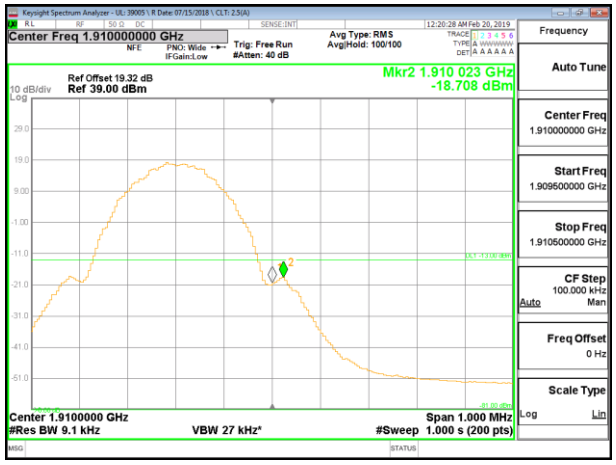
9.2.1. GSM GSM1900

GPRS

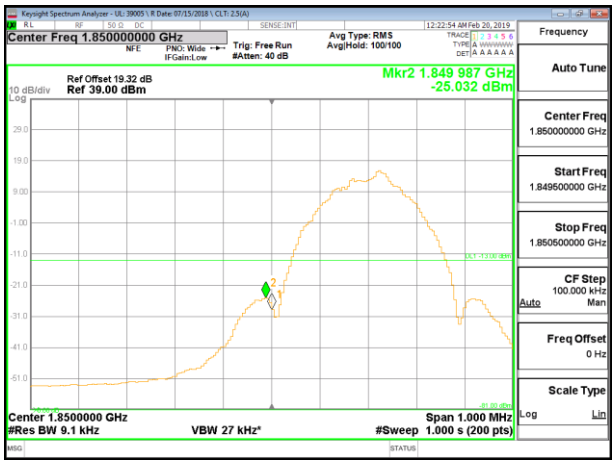


GSM1900 GPRS LOW Channel



GSM1900 GPRS HIGH Channel

EGPRS



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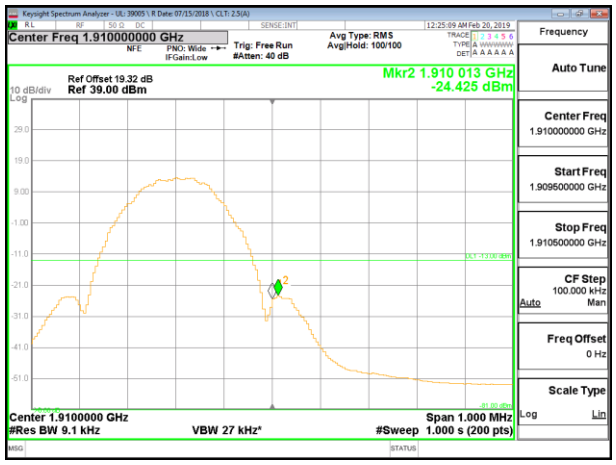

GSM1900 EGPRS HIGH Channel

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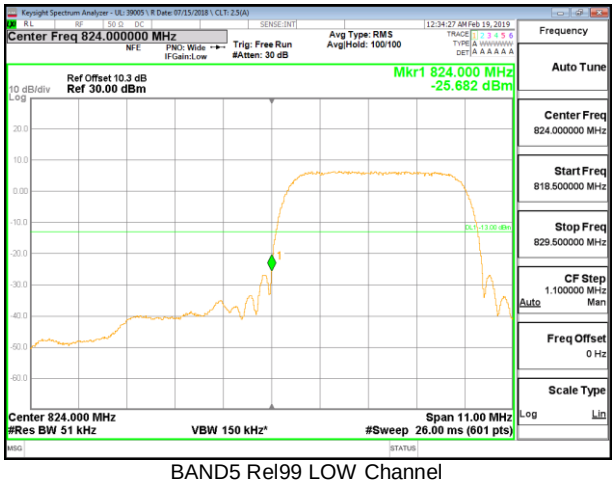
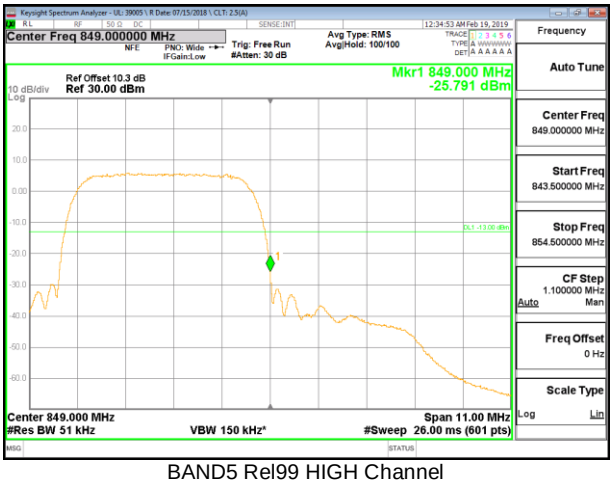
9.2.2. WCDMA BAND5

Rel99

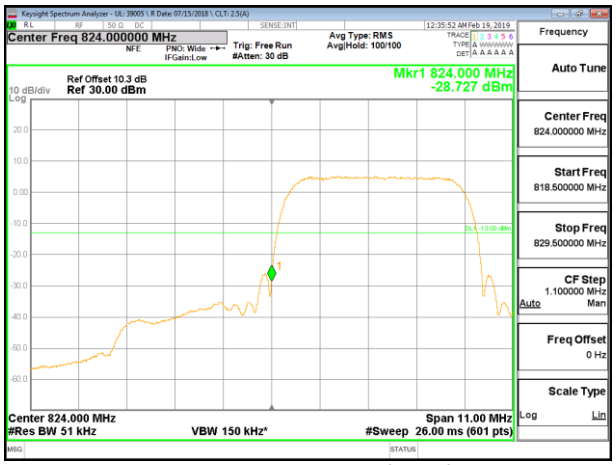


BAND5 Rel99 LOW Channel

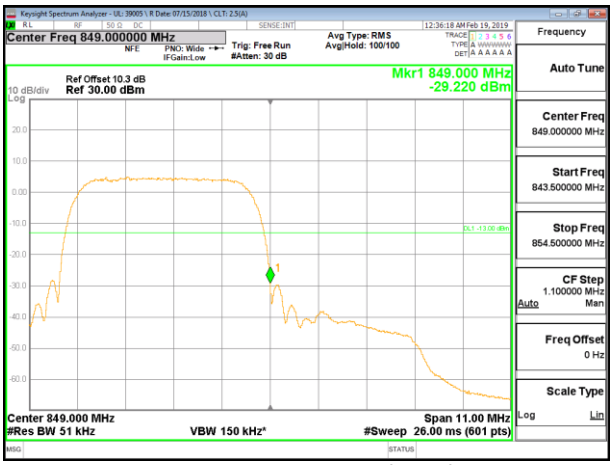


BAND5 Rel99 HIGH Channel

HSDPA



BAND5 HSDPA LOW Channel



BAND5 HSDPA HIGH Channel

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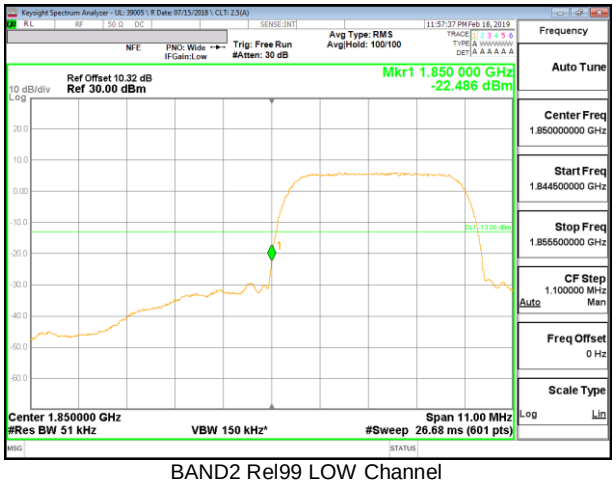
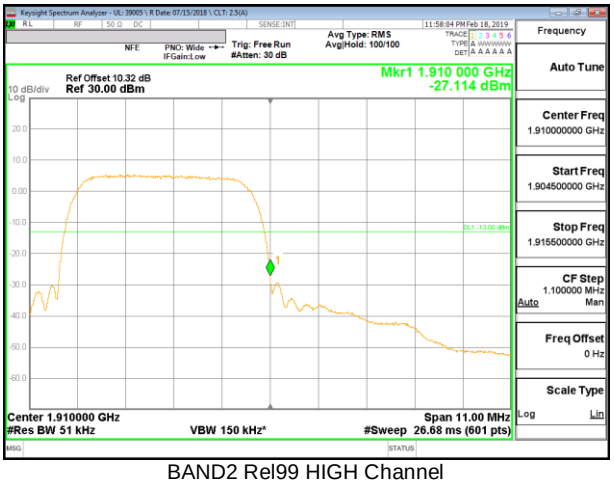
9.2.3. WCDMA BAND2

Rel99

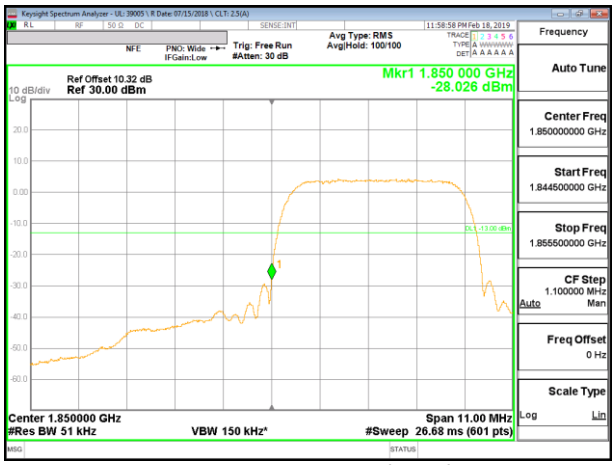


BAND2 Rel99 LOW Channel

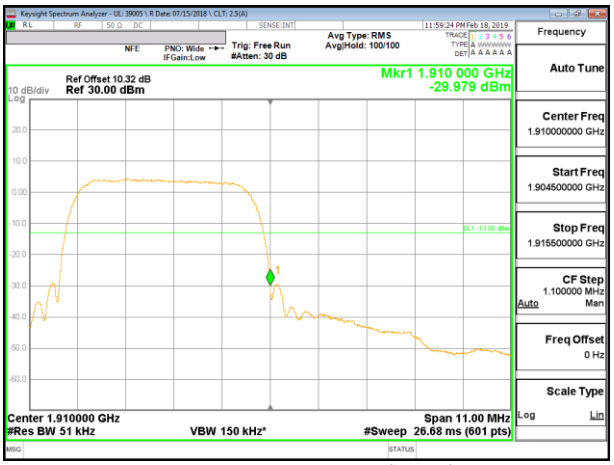


BAND2 Rel99 HIGH Channel

HSDPA



BAND2 HSDPA LOW Channel



BAND2 HSDPA HIGH Channel

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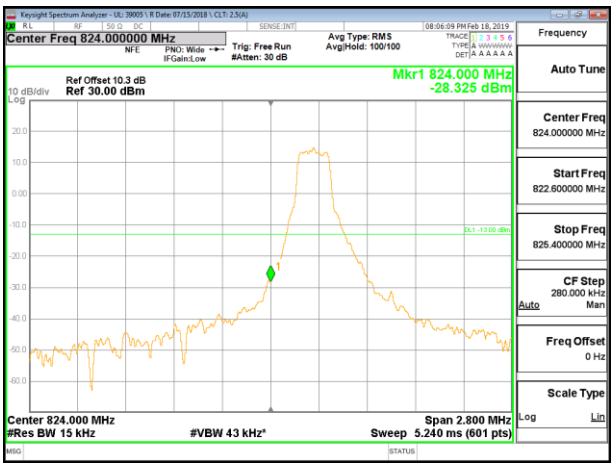
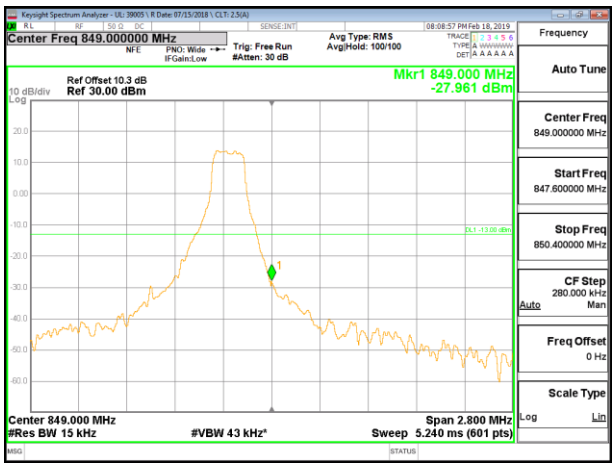
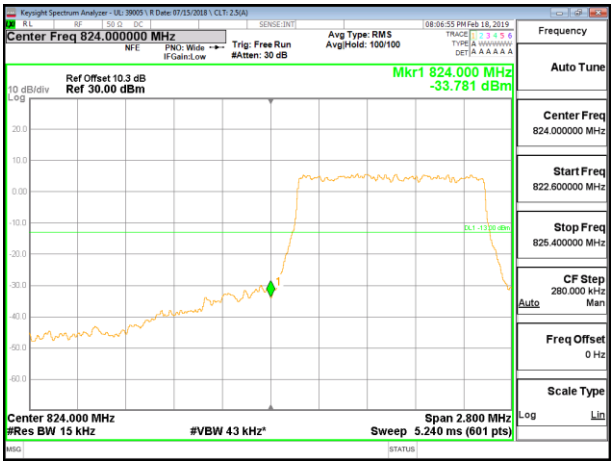
9.2.4. LTE BAND 5 BANDEDGE



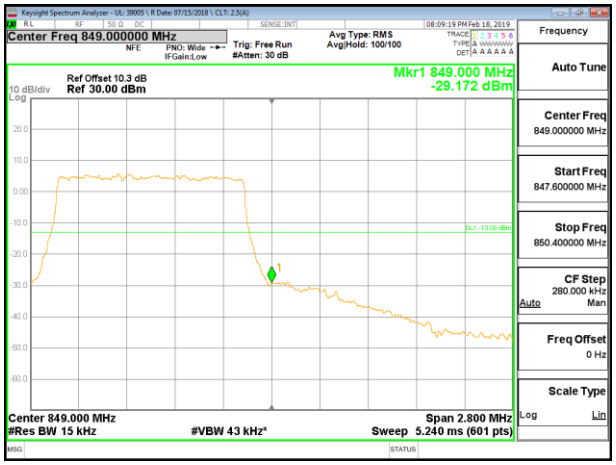
LTE B5 1.4MHz QPSK Low Channel RB1-0



LTE B5 1.4MHz QPSK High Channel RB1-5



LTE B5 1.4MHz QPSK Low Channel RB6-0



LTE B5 1.4MHz QPSK High Channel RB6-0

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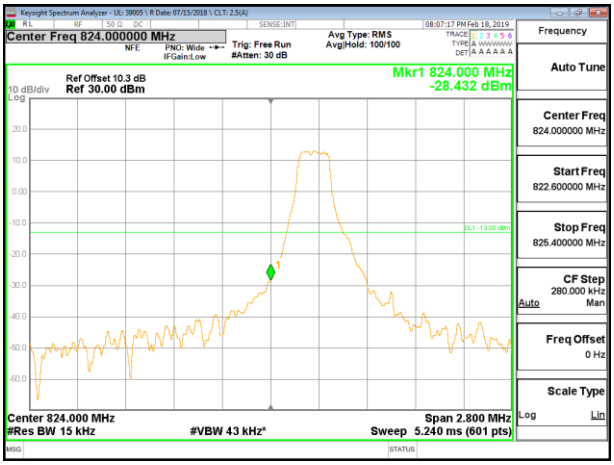
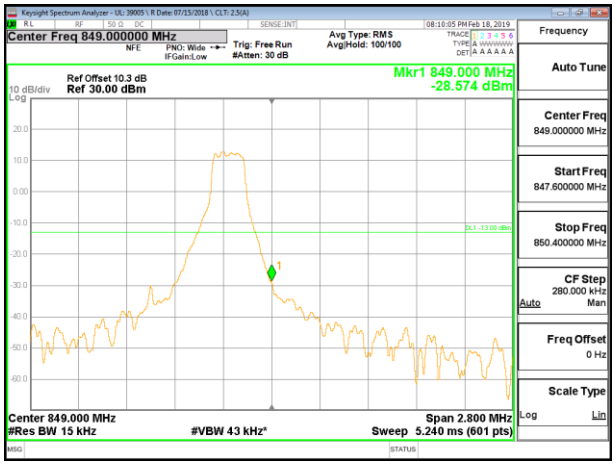
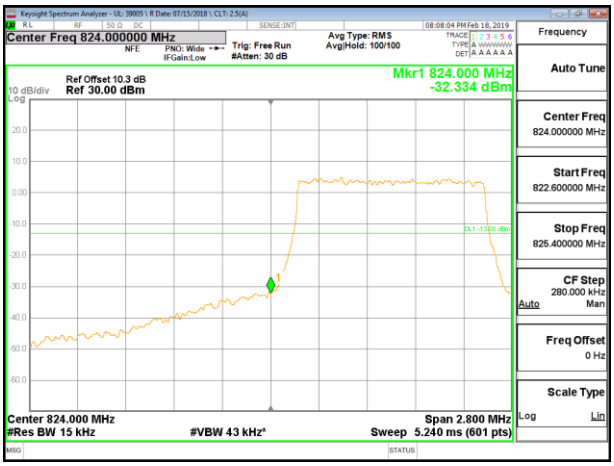


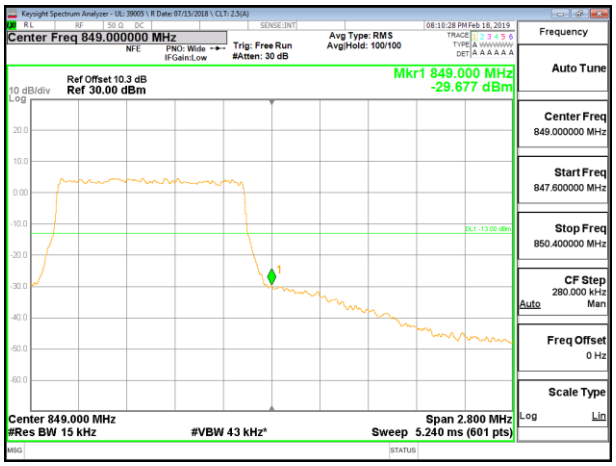
LTE B5 1.4MHz 16QAM Low Channel RB1-0



LTE B5 1.4MHz 16QAM High Channel RB1-5



LTE B5 1.4MHz 16QAM Low Channel RB6-0



LTE B5 1.4MHz 16QAM High Channel RB6-0

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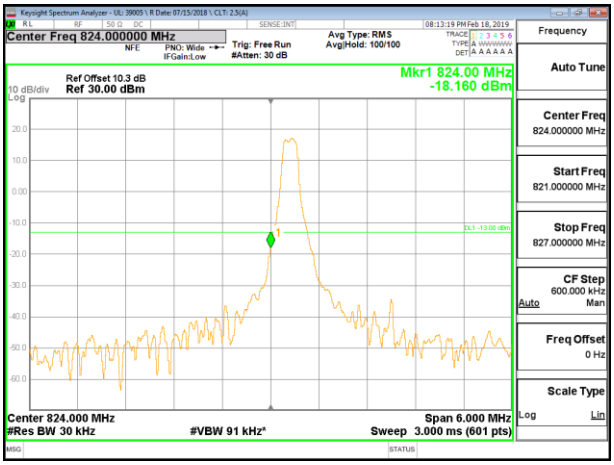
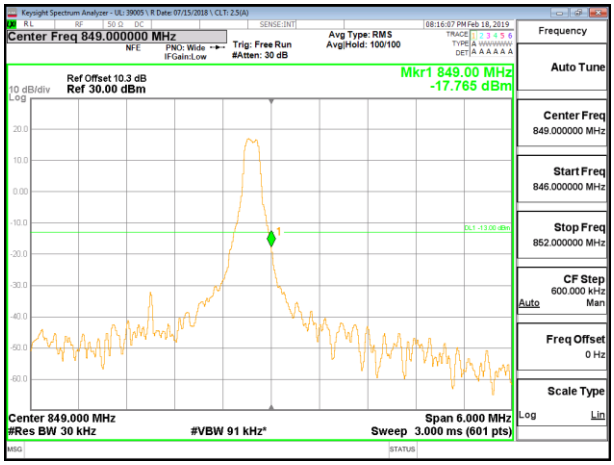
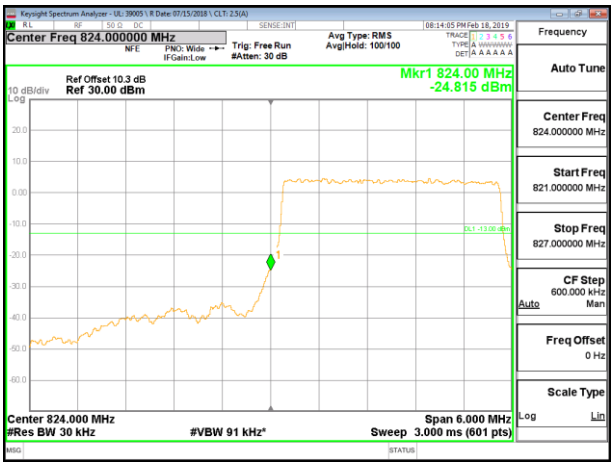


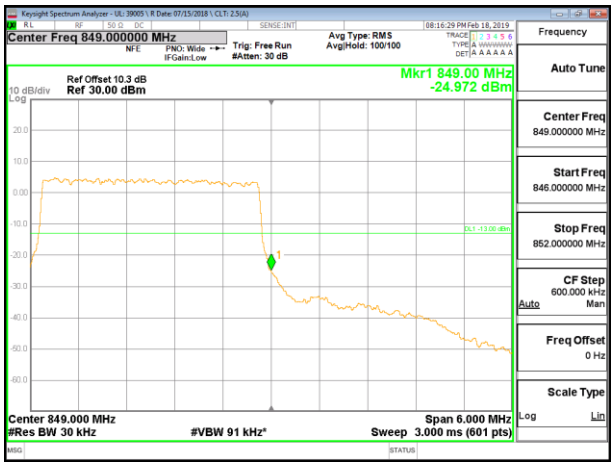
LTE B5 3MHz QPSK Low Channel RB1-0



LTE B5 3MHz QPSK High Channel RB1-14



LTE B5 3MHz QPSK Low Channel RB15-0



LTE B5 3MHz QPSK High Channel RB15-0

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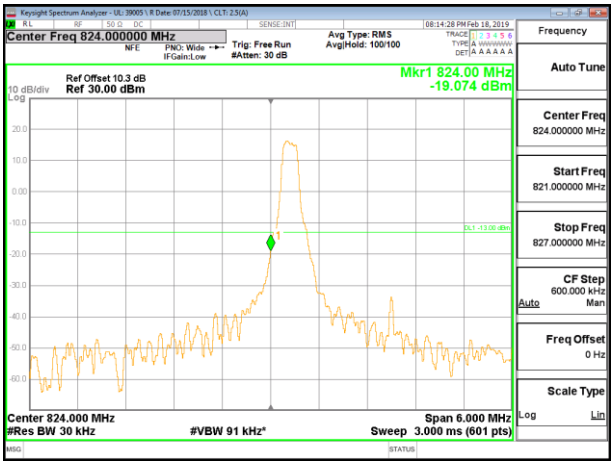
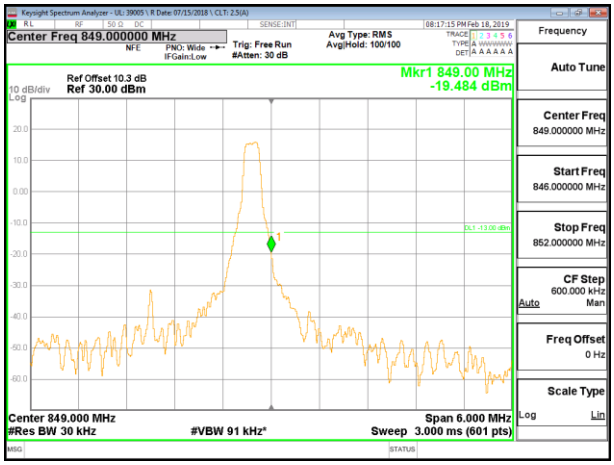
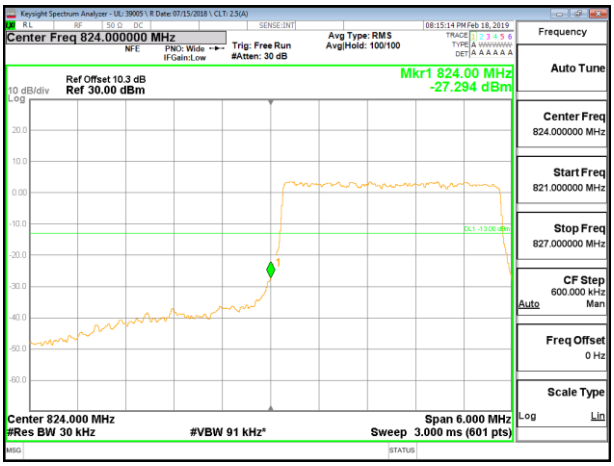


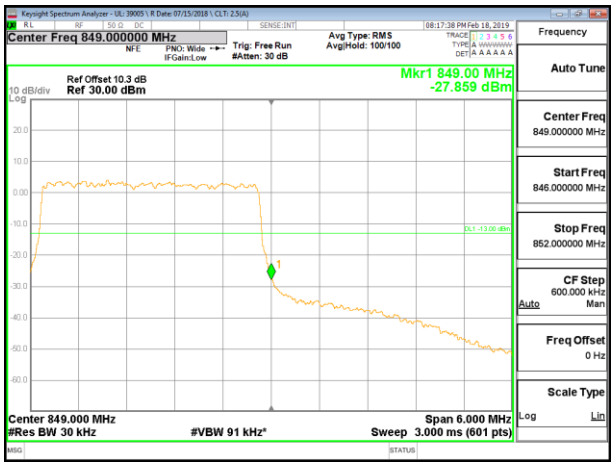
LTE B5 3MHz 16QAM Low Channel RB1-0



LTE B5 3MHz 16QAM High Channel RB1-14



LTE B5 3MHz 16QAM Low Channel RB15-0



LTE B5 3MHz 16QAM High Channel RB15-0

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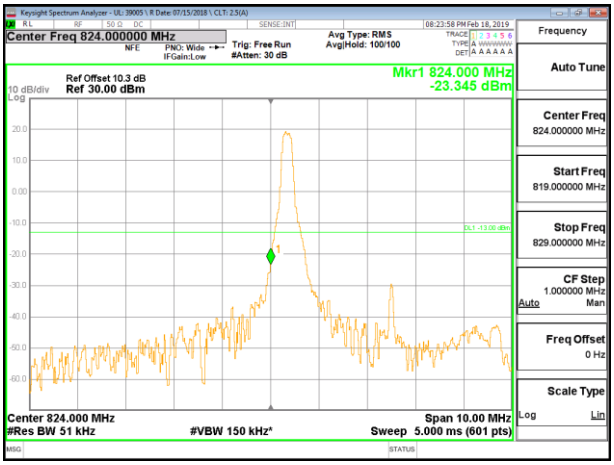
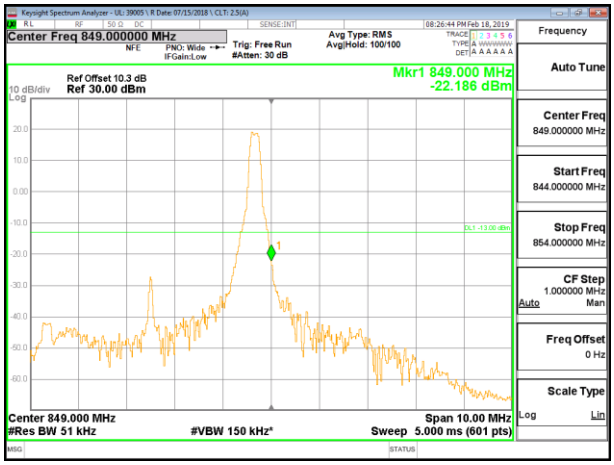
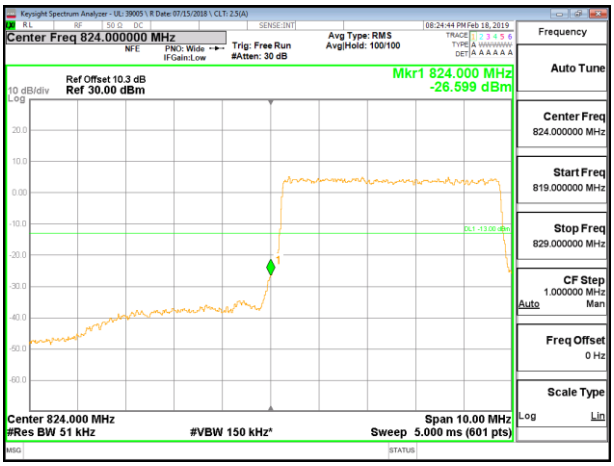


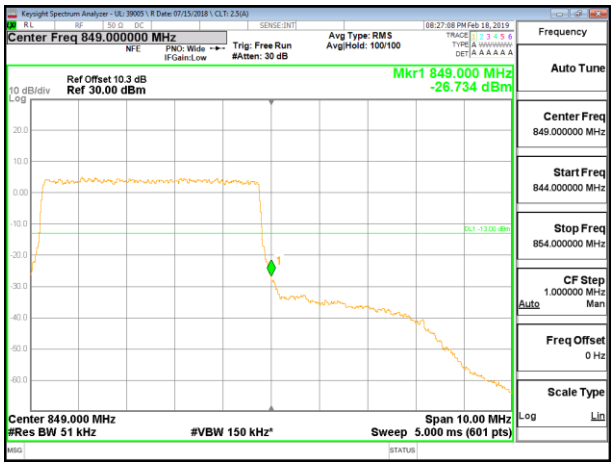
LTE B5 5MHz QPSK Low Channel RB1-0



LTE B5 5MHz QPSK High Channel RB1-24



LTE B5 5MHz QPSK Low Channel RB25-0



LTE B5 5MHz QPSK High Channel RB25-0

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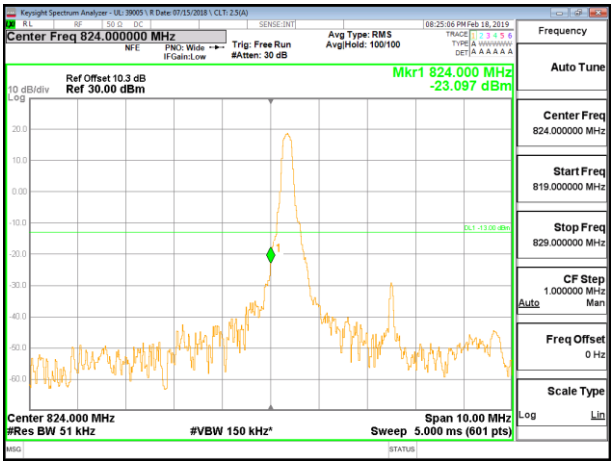
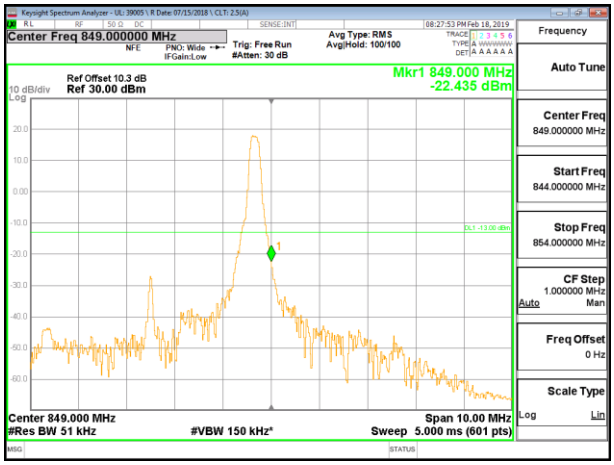
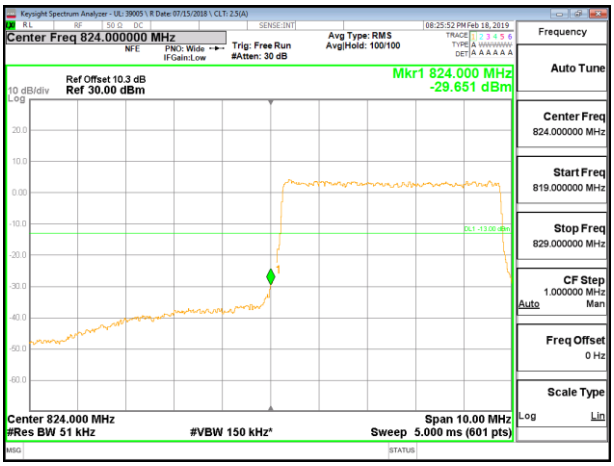


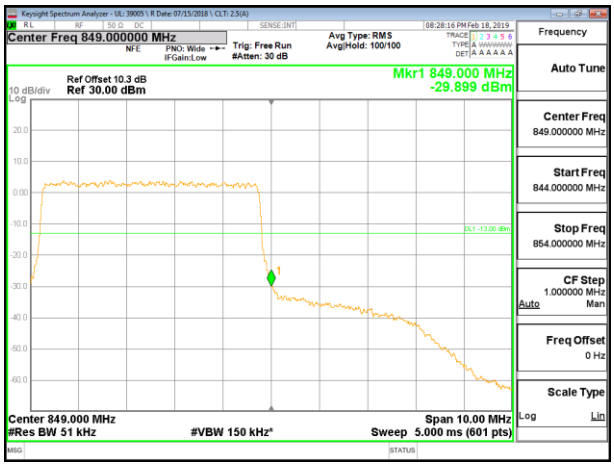
LTE B5 5MHz 16QAM Low Channel RB1-0



LTE B5 5MHz 16QAM High Channel RB1-24



LTE B5 5MHz 16QAM Low Channel RB25-0



LTE B5 5MHz 16QAM High Channel RB25-0

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