7. 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

7.1. 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			

HSPA REL 6 (HSDPA & HSUPA)

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	-
	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

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	Proces ses	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.		

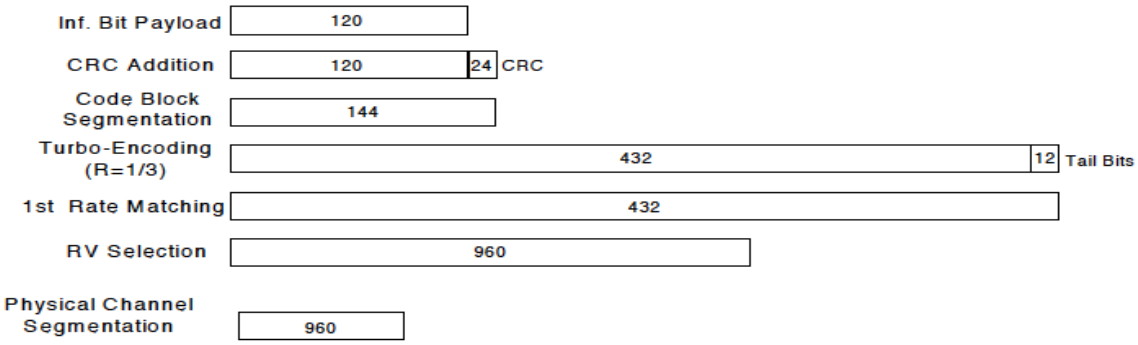


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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	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 7 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

7.1.1. WCDMA BAND5

ID:	38515	Date:	8/13/18

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	22.4
			4183	836.6	N/A	22.3
			4233	846.6	N/A	**22.5**
	HSDPA	Subtest 1	4132	826.4	0	22.4
			4183	836.6	0	22.3
			4233	846.6	0	22.5
		Subtest 2	4132	826.4	0	22.4
			4183	836.6	0	22.3
			4233	846.6	0	22.5
		Subtest 3	4132	826.4	0.5	22.4
			4183	836.6	0.5	22.3
			4233	846.6	0.5	22.5
		Subtest 4	4132	826.4	0.5	22.4
			4183	836.6	0.5	22.3
			4233	846.6	0.5	**22.5**
	HSPA (HSDPA & HSUPA)	Subtest 1	4132	826.4	0	21.3
			4183	836.6	0	21.2
			4233	846.6	0	21.4
		Subtest 2	4132	826.4	2	19.7
			4183	836.6	2	19.5
			4233	846.6	2	20.2
		Subtest 3	4132	826.4	1	21.3
			4183	836.6	1	21.2
			4233	846.6	1	21.4
		Subtest 4	4132	826.4	2	19.7
			4183	836.6	2	19.6
			4233	846.6	2	20.2
		Subtest 5	4132	826.4	0	22.4
			4183	836.6	0	22.2
			4233	846.6	0	22.5

7.1.2. WCDMA BAND2

ID:	38515	Date:	8/6/18

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	**23.4**
			9400	1880.0	N/A	23.2
			9538	1907.6	N/A	23.3
	HSDPA	Subtest 1	9262	1852.4	0	**23.2**
			9400	1880.0	0	23.1
			9538	1907.6	0	23.1
		Subtest 2	9262	1852.4	0	22.1
			9400	1880.0	0	21.7
			9538	1907.6	0	22.0
		Subtest 3	9262	1852.4	0.5	21.5
			9400	1880.0	0.5	21.4
			9538	1907.6	0.5	21.4
		Subtest 4	9262	1852.4	0.5	21.5
			9400	1880.0	0.5	21.4
			9538	1907.6	0.5	21.4
	HSPA (HSDPA & HSUPA)	Subtest 1	9262	1852.4	0	19.9
			9400	1880.0	0	19.8
			9538	1907.6	0	19.8
		Subtest 2	9262	1852.4	2	17.8
			9400	1880.0	2	17.7
			9538	1907.6	2	17.8
		Subtest 3	9262	1852.4	1	20.0
			9400	1880.0	1	19.9
			9538	1907.6	1	19.9
		Subtest 4	9262	1852.4	2	17.8
			9400	1880.0	2	17.7
			9538	1907.6	2	17.8
		Subtest 5	9262	1852.4	0	21.4
			9400	1880.0	0	21.2
			9538	1907.6	0	21.4

7.2. 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.					

MODES TESTED

- LTE 2
- LTE 5
- LTE 12
- LTE 14
- LTE 66

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:

7.2.1. LTE 2

ID:	38515	Date:	8/13/18

OUTPUT POWER FOR LTE BAND 2 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				18607	18900	19193
				1850.7 MHz	1880.0 MHz	1909.3 MHz
1.4	QPSK	1	0	23.1	23.3	23.5
		1	2	23.1	23.2	**23.5**
		1	5	23.1	23.2	23.5
		3	0	23.1	23.2	23.4
		3	1	23.1	23.2	23.4
		3	2	23.1	23.2	23.4
		6	0	22.1	22.2	22.4
	16QAM	1	0	21.9	22.1	22.3
		1	2	21.8	22.1	22.3
		1	5	21.8	22.1	22.3
		3	0	22.1	22.1	22.4
		3	1	22.1	22.1	**22.5**
		3	2	22.0	22.2	22.5
		6	0	21.1	21.3	21.4
	64QAM	1	0	21.1	21.5	21.4
		1	2	21.2	21.4	21.4
		1	5	21.1	21.4	21.4
		3	0	**21.5**	21.5	21.4
		3	1	21.5	21.5	21.4
		3	2	21.5	21.5	21.4
		6	0	20.5	20.5	20.4

OUTPUT POWER FOR LTE BAND 2 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				18615	18900	19185
				1851.5 MHz	1880.0 MHz	1908.5 MHz
3.0	QPSK	1	0	23.1	23.1	23.4
		1	7	23.1	23.2	**23.4**
		1	14	23.0	23.2	23.4
		8	0	22.1	22.2	22.4
		8	4	22.1	22.2	22.4
		8	7	22.1	22.2	22.4
		15	0	22.1	22.2	22.4
	16QAM	1	0	22.0	22.2	22.2
		1	7	22.0	22.1	22.2
		1	14	22.2	**22.3**	22.1
		8	0	21.1	21.3	21.3
		8	4	21.1	21.3	21.3
		8	7	21.1	21.3	21.3
		15	0	21.1	21.3	21.4
	64QAM	1	0	21.1	21.2	**21.5**
		1	7	21.1	21.2	21.4
		1	14	21.0	21.4	21.4
		8	0	20.4	20.4	20.4
		8	4	20.4	20.4	20.4
		8	7	20.4	20.4	20.4
		15	0	20.5	20.5	20.4

OUTPUT POWER FOR LTE BAND 2 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				18625	18900	19175
				1852.5 MHz	1880.0 MHz	1907.5 MHz
5.0	QPSK	1	0	23.0	23.2	**23.4**
		1	12	23.0	23.2	23.4
		1	24	23.0	23.2	23.3
		12	0	22.0	22.2	22.4
		12	6	22.0	22.2	22.4
		12	11	22.0	22.2	22.4
		25	0	22.0	22.2	22.4
	16QAM	1	0	21.9	22.1	**22.3**
		1	12	21.9	22.1	22.2
		1	24	21.9	22.1	22.2
		12	0	21.1	21.2	21.5
		12	6	21.0	21.2	21.4
		12	11	21.0	21.2	21.4
		25	0	21.1	21.2	21.4
	64QAM	1	0	21.3	21.4	21.2
		1	12	21.3	21.4	21.4
		1	24	21.3	**21.5**	21.4
		12	0	20.4	20.5	20.5
		12	6	20.4	20.4	20.4
		12	11	20.4	20.4	20.4
		25	0	20.5	20.4	20.5

OUTPUT POWER FOR LTE BAND 2 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				18650	18900	19150
				1855.0 MHz	1880.0 MHz	1905.0 MHz
10.0	QPSK	1	0	23.0	23.1	**23.4**
		1	24	23.0	23.2	23.4
		1	49	23.0	23.2	23.4
		25	0	22.0	22.2	22.4
		25	12	22.0	22.2	22.4
		25	24	22.0	22.2	22.3
		50	0	22.0	22.2	22.4
	16QAM	1	0	22.0	22.1	**22.2**
		1	24	22.0	22.0	22.2
		1	49	22.0	22.1	22.1
		25	0	21.1	21.2	21.5
		25	12	21.1	21.2	21.4
		25	24	21.1	21.2	21.4
		50	0	21.1	21.3	21.4
	64QAM	1	0	21.0	21.3	21.3
		1	24	21.0	21.3	21.2
		1	49	21.0	**21.3**	21.2
		25	0	20.4	20.5	20.3
		25	12	20.4	20.5	20.3
		25	24	20.4	20.5	20.3
		50	0	20.4	20.4	20.4

OUTPUT POWER FOR LTE BAND 2 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				18675	18900	19125
				1857.5 MHz	1880.0 MHz	1902.5 MHz
15.0	QPSK	1	0	23.0	23.2	**23.3**
		1	37	22.9	23.2	23.3
		1	74	22.9	23.2	23.3
		36	0	22.0	22.2	22.4
		36	16	22.0	22.2	22.4
		36	35	22.0	22.3	22.4
		75	0	22.0	22.2	22.4
	16QAM	1	0	22.0	22.2	**22.3**
		1	37	22.0	22.2	22.3
		1	74	22.0	22.2	22.2
		36	0	21.1	21.3	21.5
		36	16	21.1	21.3	21.5
		36	35	21.1	21.3	21.5
		75	0	21.1	21.3	21.5
	64QAM	1	0	21.2	21.2	**21.4**
		1	37	21.1	21.2	21.4
		1	74	21.1	21.3	21.3
		36	0	20.5	20.5	20.4
		36	16	20.5	20.5	20.5
		36	35	20.5	20.5	20.5
		75	0	20.4	20.5	20.5

OUTPUT POWER FOR LTE BAND 2 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				18700	18900	19100
				1860.0 MHz	1880.0 MHz	1900.0 MHz
20.0	QPSK	1	0	23.0	23.1	23.4
		1	49	23.0	23.1	**23.4**
		1	99	23.0	23.2	23.4
		50	0	22.0	22.2	22.4
		50	24	22.0	22.2	22.4
		50	49	22.1	22.2	22.4
		100	0	22.0	22.2	22.4
	16QAM	1	0	22.0	22.1	22.4
		1	49	22.0	22.2	22.4
		1	99	22.0	22.2	**22.4**
		50	0	21.1	21.3	21.5
		50	24	21.1	21.3	21.5
		50	49	21.1	21.3	21.4
		100	0	21.1	21.3	21.4
	64QAM	1	0	21.3	**21.5**	21.5
		1	49	21.3	21.5	21.3
		1	99	21.2	21.5	21.2
		50	0	20.4	20.5	20.5
		50	24	20.4	20.5	20.4
		50	49	20.4	20.5	20.4
		100	0	20.3	20.5	20.4

7.2.2. LTE 5

ID:	38515	Date:	8/13/18

OUTPUT POWER FOR LTE BAND 5 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				20407	20525	20643
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	22.5	22.5	22.6
		1	2	22.5	22.5	22.6
		1	5	22.6	22.5	**22.7**
		3	0	22.5	22.5	22.6
		3	1	22.6	22.5	22.6
		3	2	22.6	22.5	22.6
		6	0	21.6	21.5	21.7
	16QAM	1	0	21.3	21.3	21.3
		1	2	21.3	21.3	21.3
		1	5	21.3	21.3	21.4
		3	0	21.5	21.4	**21.6**
		3	1	21.4	21.4	21.6
		3	2	21.5	21.4	21.6
		6	0	20.5	20.4	20.7
	64QAM	1	0	20.4	20.6	20.1
		1	2	20.3	**20.6**	20.1
		1	5	20.4	20.5	20.1
		3	0	20.4	20.5	20.5
		3	1	20.4	20.5	20.4
		3	2	20.4	20.5	20.4
		6	0	19.5	19.5	19.7

OUTPUT POWER FOR LTE BAND 5 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				20415	20525	20635
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	22.5	22.5	**22.6**
		1	7	22.5	22.5	22.5
		1	14	22.5	22.6	22.6
		8	0	21.5	21.6	21.6
		8	4	21.6	21.5	21.6
		8	7	21.6	21.5	21.6
		15	0	21.6	21.6	21.7
	16QAM	1	0	21.2	21.6	21.6
		1	7	21.3	21.4	21.7
		1	14	21.1	21.4	**21.7**
		8	0	20.5	20.5	20.6
		8	4	20.5	20.5	20.6
		8	7	20.5	20.6	20.6
		15	0	20.5	20.5	20.7
	64QAM	1	0	20.4	20.3	20.3
		1	7	**20.6**	20.3	20.3
		1	14	20.4	20.3	20.4
		8	0	19.4	19.5	19.5
		8	4	19.4	19.4	19.5
		8	7	19.4	19.4	19.5
		15	0	19.6	19.5	19.7

OUTPUT POWER FOR LTE BAND 5 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				20425	20525	20625
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	22.4	22.5	**22.6**
		1	12	22.4	22.5	22.5
		1	24	22.5	22.5	22.6
		12	0	21.6	21.6	21.7
		12	6	21.6	21.5	21.7
		12	11	21.6	21.5	21.7
		25	0	21.6	21.5	21.7
	16QAM	1	0	**21.4**	21.3	21.4
		1	12	21.3	21.3	21.3
		1	24	21.4	21.3	21.4
		12	0	20.5	20.5	20.7
		12	6	20.6	20.5	20.7
		12	11	20.6	20.5	20.7
		25	0	20.6	20.6	20.7
	64QAM	1	0	20.4	**20.5**	20.3
		1	12	20.4	20.5	20.3
		1	24	20.5	20.5	20.3
		12	0	19.4	19.5	19.6
		12	6	19.4	19.5	19.6
		12	11	19.4	19.5	19.6
		25	0	19.6	19.5	19.6

OUTPUT POWER FOR LTE BAND 5 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				20450	20525	20600
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	**22.7**	22.6	22.5
		1	24	22.5	22.5	22.5
		1	49	22.6	22.5	22.5
		25	0	21.6	21.6	21.5
		25	12	21.5	21.6	21.6
		25	24	21.6	21.6	21.6
		50	0	21.6	21.6	21.6
	16QAM	1	0	21.6	21.4	21.2
		1	24	21.7	21.4	21.3
		1	49	**21.7**	21.3	21.1
		25	0	20.5	20.7	20.5
		25	12	20.6	20.7	20.5
		25	24	20.5	20.6	20.5
		50	0	20.7	20.6	20.5
	64QAM	1	0	20.3	20.4	20.4
		1	24	20.4	20.4	**20.6**
		1	49	20.4	20.4	20.4
		25	0	19.5	19.6	19.4
		25	12	19.5	19.6	19.4
		25	24	19.5	19.5	19.4
		50	0	19.7	19.6	19.6

7.2.3. LTE 12

ID:	38515	Date:	8/13/18

OUTPUT POWER FOR LTE BAND 12 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				23017	23095	23173
				699.7 MHz	707.5 MHz	715.3 MHz
1.4	QPSK	1	0	23.6	23.6	23.7
		1	2	23.5	23.5	23.7
		1	5	23.6	23.6	23.7
		3	0	23.6	23.5	23.7
		3	1	23.6	23.6	23.7
		3	2	23.6	23.6	**23.8**
		6	0	22.7	22.6	22.8
	16QAM	1	0	22.3	22.3	22.5
		1	2	22.2	22.4	22.5
		1	5	22.3	22.4	22.5
		3	0	22.5	22.5	**22.6**
		3	1	22.5	22.4	22.6
		3	2	22.5	22.5	22.6
		6	0	21.7	21.6	21.7
	64QAM	1	0	21.1	21.1	21.5
		1	2	21.1	21.3	21.4
		1	5	21.2	21.2	21.5
		3	0	21.6	21.6	**21.8**
		3	1	21.7	21.6	21.7
		3	2	21.6	21.6	21.7
		6	0	20.7	20.6	20.8

OUTPUT POWER FOR LTE BAND 12 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				23025	23095	23165
				700.5 MHz	707.5 MHz	714.5 MHz
3.0	QPSK	1	0	23.6	22.6	23.8
		1	7	23.6	23.5	23.8
		1	14	23.6	23.5	**23.8**
		8	0	22.6	22.6	22.8
		8	4	22.7	22.6	22.8
		8	7	22.6	22.6	22.8
		15	0	22.7	22.7	22.8
	16QAM	1	0	22.5	**22.7**	22.6
		1	7	22.6	22.7	22.7
		1	14	22.6	22.4	22.4
		8	0	21.7	21.6	21.9
		8	4	21.7	21.6	21.9
		8	7	21.7	21.6	21.8
		15	0	21.8	21.7	21.9
	64QAM	1	0	21.4	21.6	21.5
		1	7	21.5	21.5	21.5
		1	14	21.5	**21.6**	21.5
		8	0	20.6	20.5	20.8
		8	4	20.6	20.5	20.8
		8	7	20.7	20.5	20.8
		15	0	20.7	20.6	20.9

OUTPUT POWER FOR LTE BAND 12 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				23035	23095	23155
				701.5 MHz	707.5 MHz	713.5 MHz
5.0	QPSK	1	0	23.4	23.4	**23.6**
		1	12	23.4	23.4	23.6
		1	24	23.4	23.4	23.6
		12	0	22.6	22.5	22.7
		12	6	22.6	22.5	22.7
		12	11	22.6	22.4	22.7
		25	0	22.6	22.5	22.7
	16QAM	1	0	22.3	22.2	**22.5**
		1	12	22.3	22.2	22.5
		1	24	22.3	22.2	22.5
		12	0	21.6	21.5	21.7
		12	6	21.6	21.5	21.8
		12	11	21.6	21.5	21.7
		25	0	21.6	21.6	21.7
	64QAM	1	0	21.4	21.5	**21.9**
		1	12	21.3	21.5	21.8
		1	24	21.3	21.5	21.8
		12	0	20.7	20.7	20.8
		12	6	20.7	20.7	20.8
		12	11	20.7	20.7	20.8
		25	0	20.7	20.7	20.9

OUTPUT POWER FOR LTE BAND 12 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				23060	23095	23130
				704.0 MHz	707.5 MHz	711.0 MHz
10.0	QPSK	1	0	23.4	**23.5**	23.3
		1	24	23.4	23.5	23.3
		1	49	23.4	23.4	23.3
		25	0	22.5	22.5	22.5
		25	12	22.5	22.5	22.5
		25	24	22.4	22.5	22.5
		50	0	22.4	22.5	22.5
	16QAM	1	0	22.2	**22.3**	22.2
		1	24	22.2	22.3	22.2
		1	49	22.2	22.2	22.2
		25	0	21.5	21.6	21.5
		25	12	21.5	21.5	21.5
		25	24	21.5	21.5	21.5
		50	0	21.5	21.5	21.5
	64QAM	1	0	21.4	21.4	21.3
		1	24	21.4	21.4	21.2
		1	49	21.4	**21.5**	21.2
		25	0	20.7	20.7	20.6
		25	12	20.6	20.7	20.6
		25	24	20.6	20.7	20.6
		50	0	20.6	20.7	20.6

7.2.4. LTE 14

ID:	38515	Date:	8/13/18

OUTPUT POWER FOR LTE BAND 14 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1 Conducted Average		
				23305	23330	23355
				790.5	793.0	795.5
5.0	QPSK	1	0	23.6	**23.6**	23.5
		1	12	23.5	23.5	23.5
		1	24	23.5	23.6	23.5
		12	0	22.6	22.6	22.7
		12	6	22.6	22.6	22.7
		12	11	22.6	22.6	22.6
		25	0	22.6	22.7	22.7
	16QAM	1	0	22.5	22.5	22.6
		1	12	22.5	22.5	22.6
		1	24	22.5	**22.6**	22.5
		12	0	21.6	21.6	21.7
		12	6	21.6	21.7	21.6
		12	11	21.6	21.7	21.6
		25	0	21.7	21.7	21.7
	64QAM	1	0	21.6	**21.7**	21.7
		1	12	21.6	21.7	21.6
		1	24	21.1	21.1	21.2
		12	0	20.8	20.9	20.9
		12	6	20.8	20.8	20.8
		12	11	20.8	20.8	20.8
		25	0	20.8	20.8	20.8

OUTPUT POWER FOR LTE BAND 14 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1 Conducted Average		
				N/A	23330	N/A
				N/A	793.0	N/A
10.0	QPSK	1	0		**23.7**	
		1	24		23.6	
		1	49		23.7	
		25	0		22.7	
		25	12		22.6	
		25	24		22.7	
		50	0		22.7	
	16QAM	1	0		**22.5**	
		1	24		22.5	
		1	49		22.5	
		25	0		21.7	
		25	12		21.6	
		25	24		21.6	
		50	0		21.7	
	64QAM	1	0		21.6	
		1	24		21.6	
		1	49		**21.6**	
		25	0		20.9	
		25	12		20.9	
		25	24		20.9	
		50	0		20.9	

7.2.5. LTE 66

ID:	38515	Date:	8/14/18

OUTPUT POWER FOR LTE BAND 66 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				131979	132322	132665
				1710.7 MHz	1745.0 MHz	1779.3 MHz
1.4	QPSK	1	0	23.9	23.8	22.9
		1	2	24.0	23.8	24.0
		1	5	**24.0**	23.8	24.0
		3	0	23.7	23.9	24.0
		3	1	23.8	23.9	24.0
		3	2	23.9	23.9	24.0
		6	0	23.0	23.0	23.0
	16QAM	1	0	23.0	22.9	22.9
		1	2	**23.0**	22.9	22.9
		1	5	**23.0**	22.9	22.9
		3	0	23.0	22.8	**23.0**
		3	1	**23.0**	22.8	**23.0**
		3	2	**23.0**	22.8	**23.0**
		6	0	22.0	22.0	22.0
	64QAM	1	0	**22.0**	21.8	21.6
		1	2	**22.0**	21.8	21.7
		1	5	**22.0**	21.8	21.7
		3	0	21.9	21.7	22.0
		3	1	21.9	21.7	22.0
		3	2	21.9	21.7	22.0
		6	0	21.0	21.0	21.0

OUTPUT POWER FOR LTE BAND 66 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				131987	132322	132657
				1711.5 MHz	1745.0 MHz	1778.5 MHz
3.0	QPSK	1	0	**24.0**	**24.0**	**24.0**
		1	7	**24.0**	**24.0**	**24.0**
		1	14	**24.0**	**24.0**	**24.0**
		8	0	23.0	23.0	23.0
		8	4	23.0	22.9	23.0
		8	7	23.0	22.9	23.0
		15	0	23.0	23.0	23.0
	16QAM	1	0	**23.0**	22.8	22.9
		1	7	**23.0**	22.9	22.8
		1	14	**23.0**	22.9	22.9
		8	0	22.0	21.8	21.9
		8	4	22.0	21.8	21.9
		8	7	22.0	21.8	21.9
		15	0	22.0	21.9	21.9
	64QAM	1	0	22.0	21.8	21.8
		1	7	**22.0**	21.8	21.7
		1	14	21.9	21.8	21.6
		8	0	21.0	20.8	21.0
		8	4	21.0	20.8	20.9
		8	7	21.0	20.8	21.0
		15	0	21.0	21.0	21.0

OUTPUT POWER FOR LTE BAND 66 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				131997	132322	132647
				1712.5 MHz	1745.0 MHz	1777.5 MHz
5.0	QPSK	1	0	23.9	23.8	23.6
		1	12	**23.9**	23.8	23.6
		1	24	23.9	23.8	23.6
		12	0	22.9	22.7	22.7
		12	6	22.9	22.7	22.7
		12	11	22.9	22.7	22.7
		25	0	23.0	22.7	22.7
	16QAM	1	0	22.8	22.5	22.6
		1	12	22.7	22.5	22.6
		1	24	**22.8**	22.6	22.6
		12	0	21.9	21.7	21.7
		12	6	21.9	21.7	21.7
		12	11	21.9	21.7	21.7
		25	0	21.9	21.7	21.8
	64QAM	1	0	21.9	21.5	21.6
		1	12	**21.9**	21.4	21.5
		1	24	21.9	21.5	21.6
		12	0	20.9	20.7	20.8
		12	6	20.9	20.7	20.8
		12	11	20.9	20.7	20.8
		25	0	21.0	20.8	20.7

OUTPUT POWER FOR LTE BAND 66 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				132022	132322	132622
				1715.0 MHz	1745.0 MHz	1775.0 MHz
10.0	QPSK	1	0	**24.0**	23.7	23.8
		1	24	23.9	23.7	23.8
		1	49	23.9	23.8	23.8
		25	0	23.0	22.7	22.7
		25	12	23.0	22.7	22.7
		25	24	23.0	22.7	22.7
		50	0	23.0	22.7	22.7
	16QAM	1	0	23.0	22.8	22.7
		1	24	23.0	22.8	22.7
		1	49	**23.0**	22.8	22.7
		25	0	21.9	21.7	21.8
		25	12	21.9	21.7	21.8
		25	24	21.9	21.7	21.7
		50	0	21.9	21.7	21.7
	64QAM	1	0	21.7	21.5	21.6
		1	24	21.7	21.5	21.6
		1	49	**21.7**	21.5	21.6
		25	0	20.8	20.8	20.7
		25	12	20.8	20.8	20.7
		25	24	20.9	20.8	20.8
		50	0	20.8	20.8	20.8

OUTPUT POWER FOR LTE BAND 66 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				132047	132322	132597
				1717.5 MHz	1745.0 MHz	1772.5 MHz
15.0	QPSK	1	0	23.9	23.8	23.7
		1	37	23.9	23.8	23.7
		1	74	**23.9**	23.7	23.7
		36	0	22.9	22.8	22.8
		36	16	23.0	22.8	22.8
		36	35	23.0	22.8	22.8
		75	0	23.0	22.8	22.8
	16QAM	1	0	**23.0**	22.6	22.8
		1	37	22.9	22.6	22.8
		1	74	22.9	22.6	22.8
		36	0	21.9	21.8	21.8
		36	16	21.9	21.8	21.8
		36	35	21.9	21.8	21.7
		75	0	21.9	21.8	21.8
	64QAM	1	0	21.7	**21.7**	21.7
		1	37	21.6	21.7	21.7
		1	74	21.6	21.7	21.7
		36	0	20.8	20.8	20.8
		36	16	20.8	20.8	20.8
		36	35	20.8	20.8	20.8
		75	0	20.8	20.8	20.8

OUTPUT POWER FOR LTE BAND 66 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1 Conducted Average (dBm)		
				132072	132322	132572
				1720.0 MHz	1745.0 MHz	1770.0 MHz
20.0	QPSK	1	0	23.9	23.8	23.7
		1	49	23.9	23.8	23.7
		1	99	**23.9**	23.7	23.7
		50	0	22.9	22.8	22.8
		50	24	23.0	22.8	22.8
		50	49	23.0	22.8	22.8
		100	0	23.0	22.8	22.8
	16QAM	1	0	**23.0**	22.6	22.8
		1	49	22.9	22.6	22.8
		1	99	22.9	22.6	22.8
		50	0	21.9	21.8	21.8
		50	24	21.9	21.8	21.8
		50	49	21.9	21.8	21.7
		100	0	21.9	21.8	21.8
	64QAM	1	0	21.7	**21.7**	21.7
		1	49	21.6	21.7	21.7
		1	99	21.6	21.7	21.7
		50	0	20.8	20.8	20.8
		50	24	20.8	20.8	20.8
		50	49	20.8	20.8	20.8
		100	0	20.8	20.8	20.8

8. CONDUCTED TEST RESULTS

8.1. 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

- WCDMA Band 5
- WCDMA Band 2
- LTE Band 2
- LTE Band 5
- LTE Band 12
- LTE Band 14
- LTE Band 66

RESULTS

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

WCDMA

Band	Modulation	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
BAND5	REL 99	4408	836.6	4.126	4.713
	HSDPA			4.147	4.706
BAND2	REL 99	9800	1880.0	4.147	4.737
	HSDPA			4.151	4.719

LTE2

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 2	1.4 MHz, QPSK	6/0	1880.0	1.09	1.31
	1.4 MHz, 16QAM			1.09	1.36
	3 MHz, QPSK	15/0		2.70	3.11
	3 MHz, 16QAM			2.70	3.10
	5 MHz, QPSK	25/0		4.51	5.22
	5 MHz, 16QAM			4.51	5.23
	10 MHz, QPSK	50/0		8.98	10.33
	10 MHz, 16QAM			8.96	10.24
	15 MHz, QPSK	75/0		13.44	15.25
	15 MHz, 16QAM			13.46	15.00
	20 MHz, QPSK	100/0		17.88	19.75
	20 MHz, 16QAM			17.90	19.64

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	1.09	1.31
	1.4 MHz, 16QAM			1.09	1.30
	3 MHz, QPSK	15/0		2.71	3.08
	3 MHz, 16QAM			2.70	3.10
	5 MHz, QPSK	25/0		4.51	5.27
	5 MHz, 16QAM			4.50	5.20
	10 MHz, QPSK	50/0		8.95	10.05
	10 MHz, 16QAM			8.96	10.37

LTE12

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 12	1.4 MHz, QPSK	6/0	707.5	1.10	1.31
	1.4 MHz, 16QAM			1.09	1.30
	3 MHz, QPSK	15/0		2.70	3.07
	3 MHz, 16QAM			2.70	3.06
	5 MHz, QPSK	25/0		4.50	5.27
	5 MHz, 16QAM			4.50	5.22
	10 MHz, QPSK	50/0		8.95	10.16
	10 MHz, 16QAM			8.96	10.06

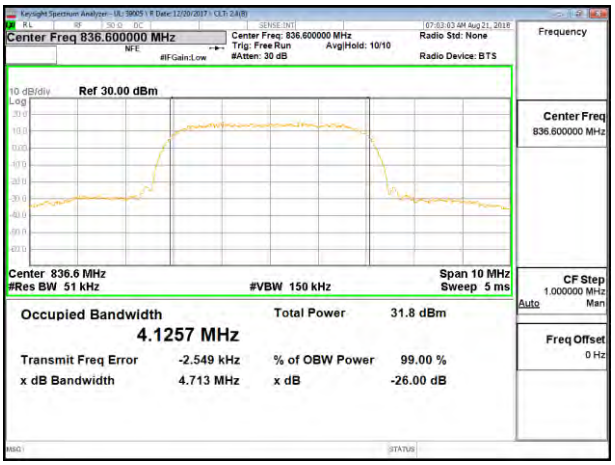
LTE14

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 14	5 MHz, QPSK	25/0	793	4.52	5.24
	5 MHz, 16QAM			4.52	5.28
	10 MHz, QPSK	50/0		8.95	10.23
	10 MHz, 16QAM			8.96	10.26

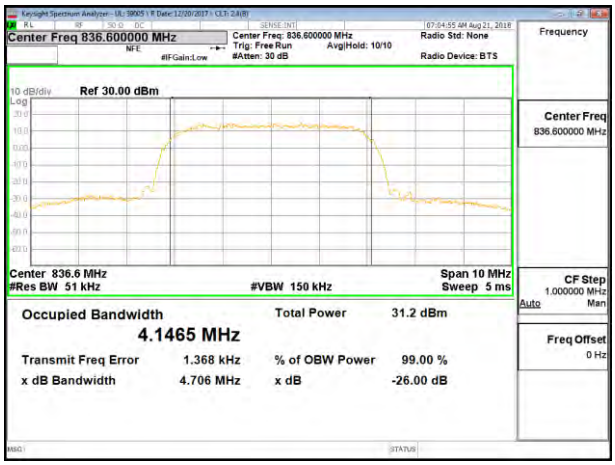
LTE66

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 66	1.4 MHz, QPSK	6/0	1745.0	1.08	1.27
	1.4 MHz, 16QAM			1.09	1.28
	3 MHz, QPSK	15/0		2.70	3.04
	3 MHz, 16QAM			2.70	3.06
	5 MHz, QPSK	25/0		4.50	5.26
	5 MHz, 16QAM			4.51	5.29
	10 MHz, QPSK	50/0		8.97	10.28
	10 MHz, 16QAM			8.97	10.27
	15 MHz, QPSK	75/0		13.45	15.11
	15 MHz, 16QAM			13.41	14.93
	20 MHz, QPSK	100/0		17.87	19.55
	20 MHz, 16QAM			17.87	19.62

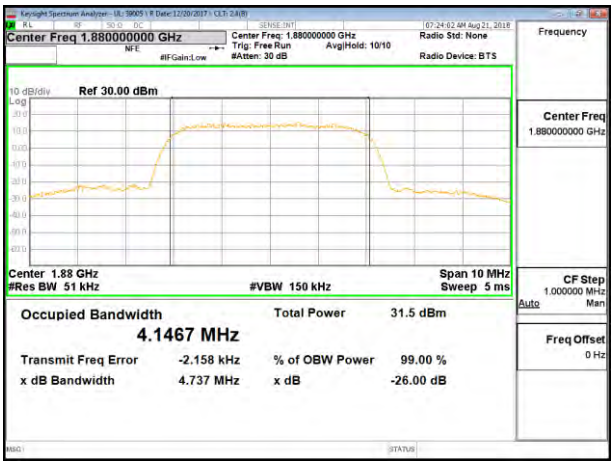
8.1.1. WCDMA



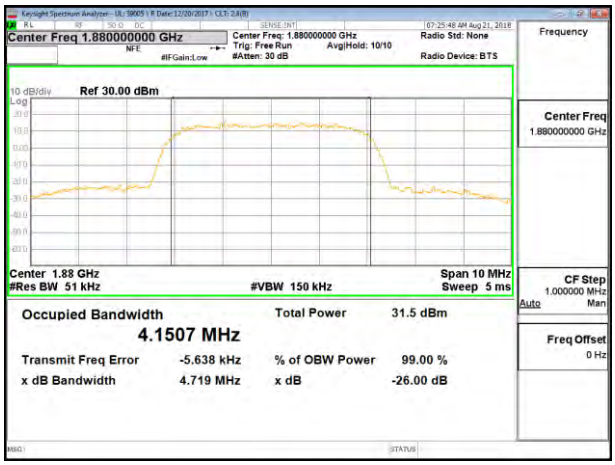
WCDMA BAND5 Rel99 MID Channel



WCDMA BAND5 HSDPA MID Channel

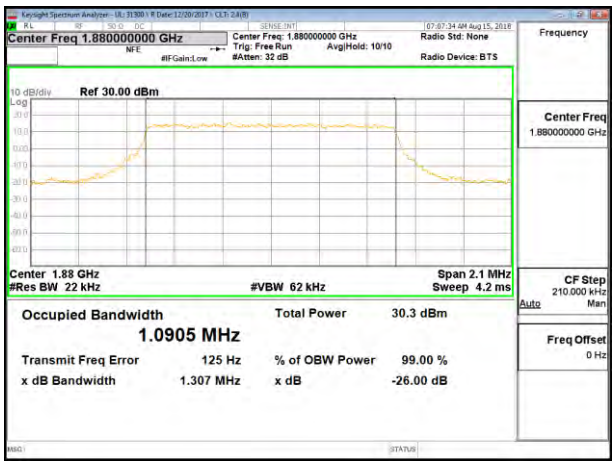


WCDMA BAND2 Rel99 MID Channel

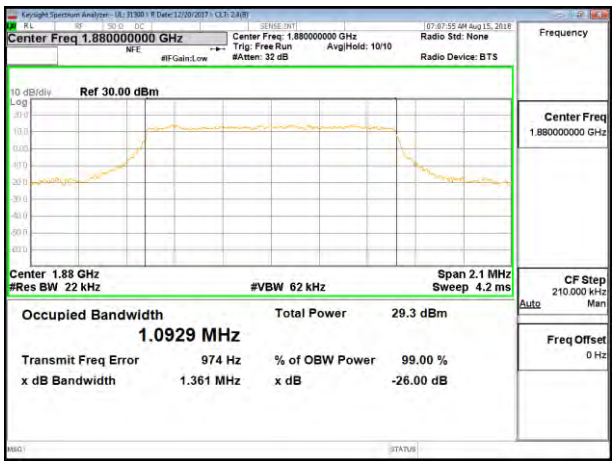


WCDMA BAND2 HSDPA MID Channel

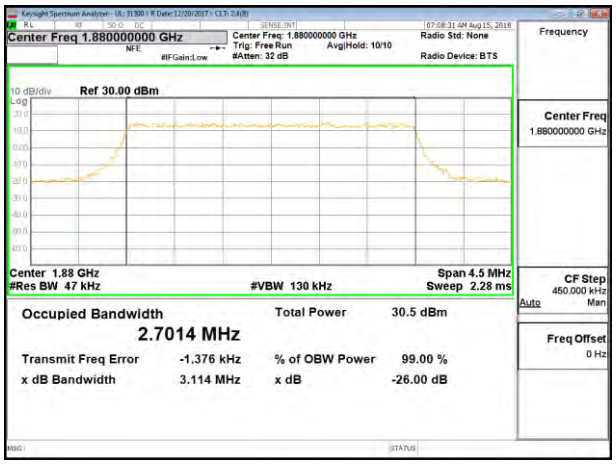
8.1.2. LTE BAND 2



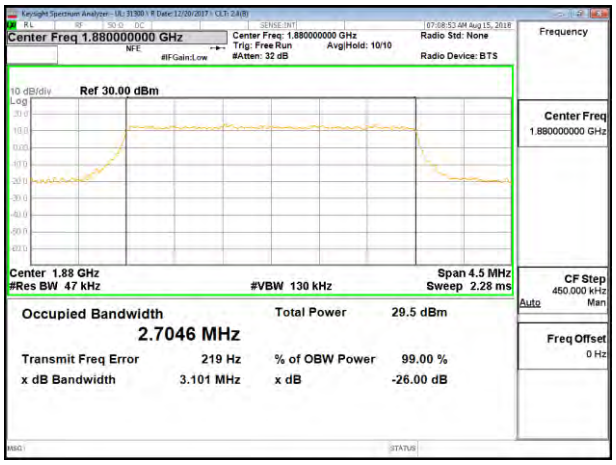
LTE B2 1.4MHz QPSK Mid Channel RB6-0



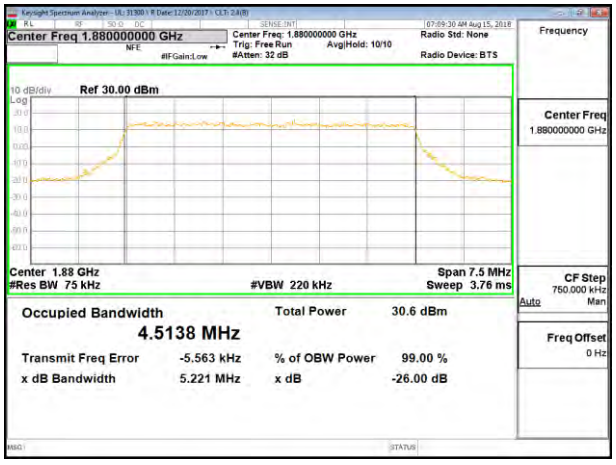
LTE B2 1.4MHz 16QAM Mid Channel RB6-0



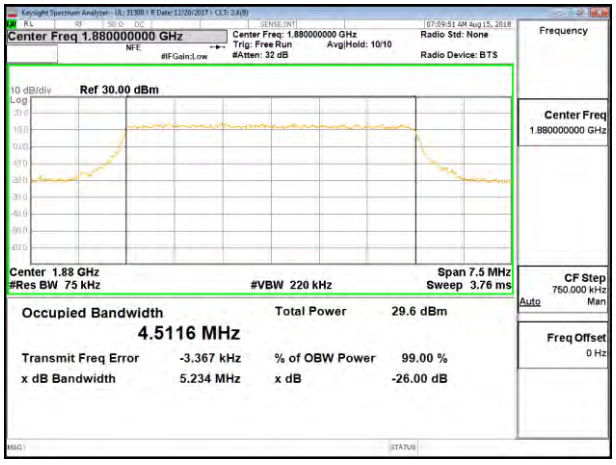
LTE B2 3MHz QPSK Mid Channel RB15-0



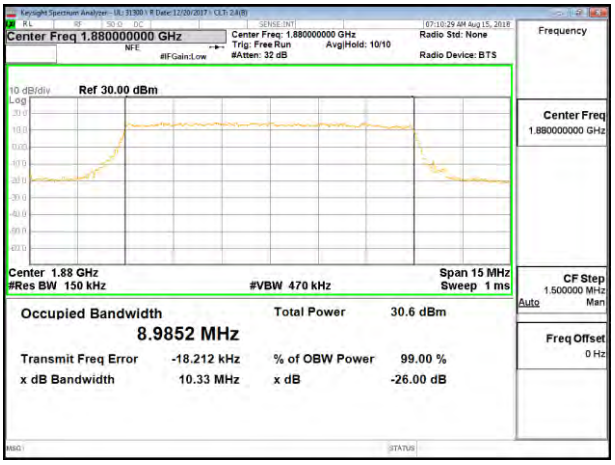
LTE B2 3MHz 16QAM Mid Channel RB15-0



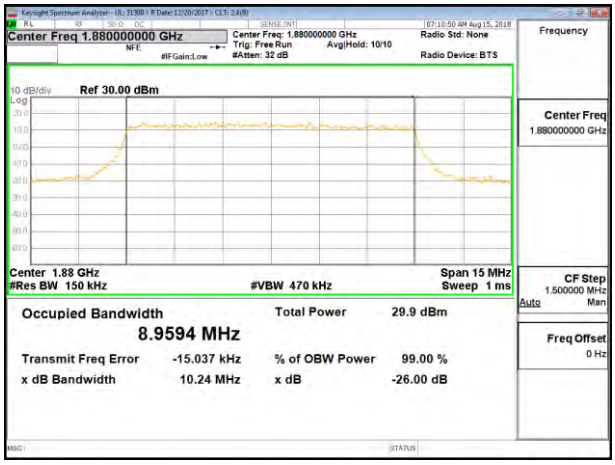
LTE B2 5MHz QPSK Mid Channel RB25-0



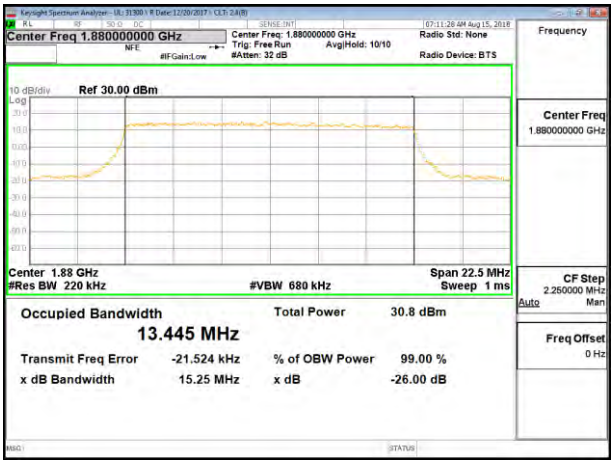
LTE B2 5MHz 16QAM Mid Channel RB25-0



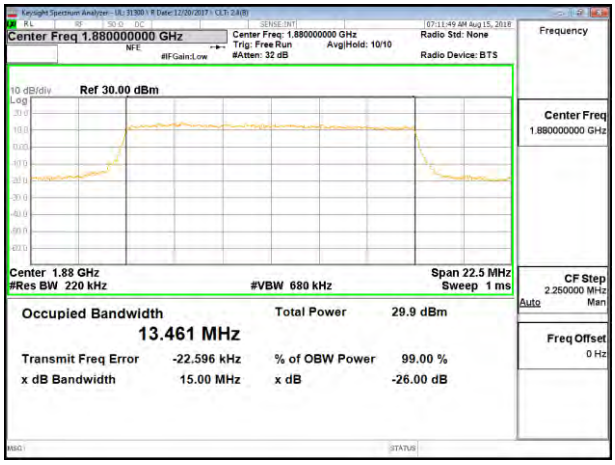
LTE B2 10MHz QPSK Mid Channel RB50-0



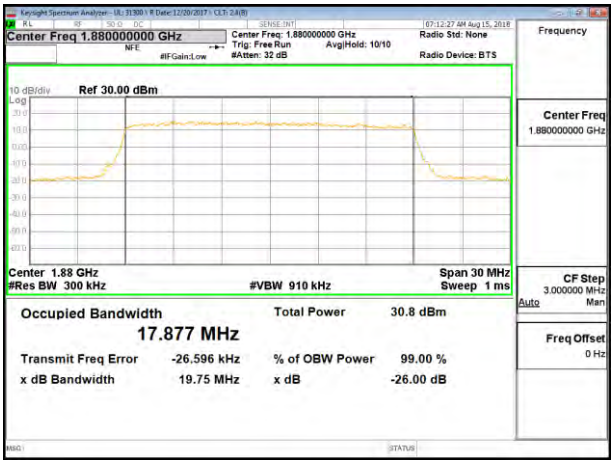
LTE B2 10MHz 16QAM Mid Channel RB50-0



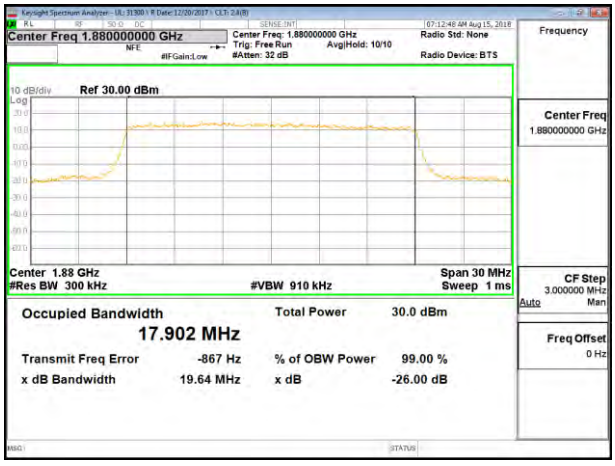
LTE B2 15MHz QPSK Mid Channel RB75-0



LTE B2 15MHz 16QAM Mid Channel RB75-0

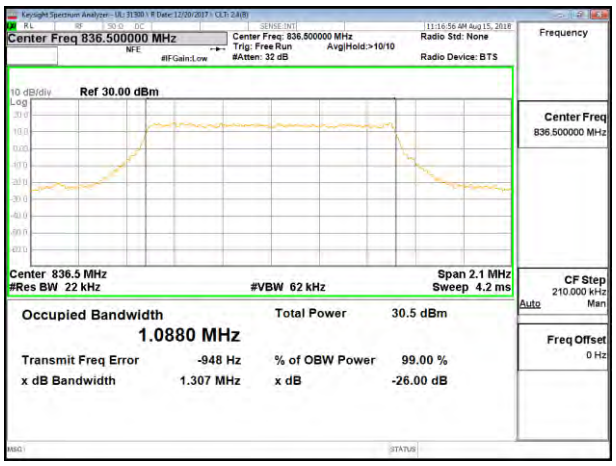


LTE B2 20MHz QPSK Mid Channel RB100-0

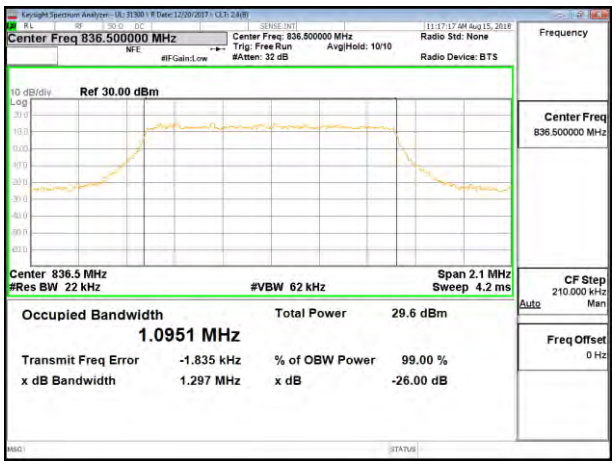


LTE B2 20MHz 16QAM Mid Channel RB100-0

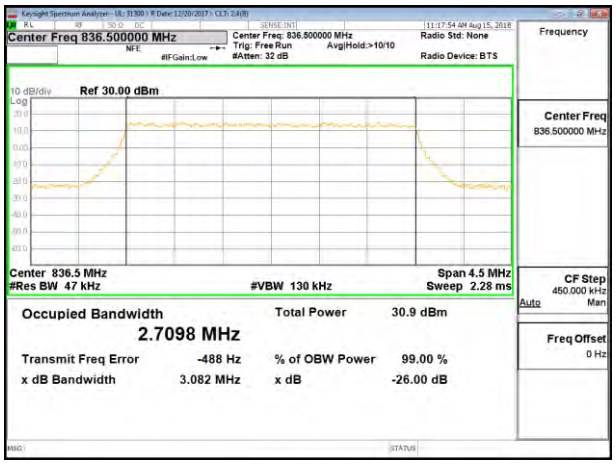
8.1.3. LTE BAND 5



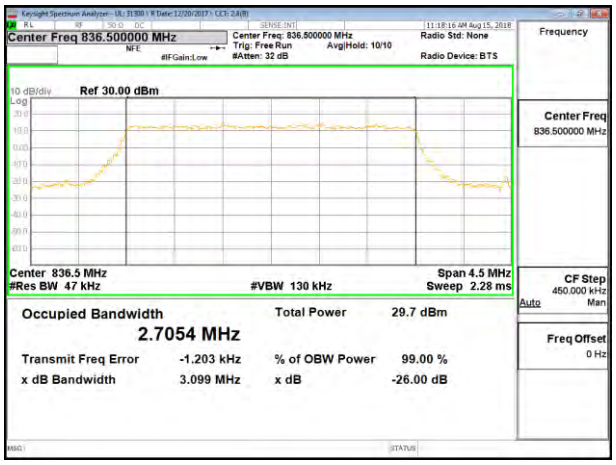
LTE B5 1.4MHz QPSK Mid Channel RB6-0



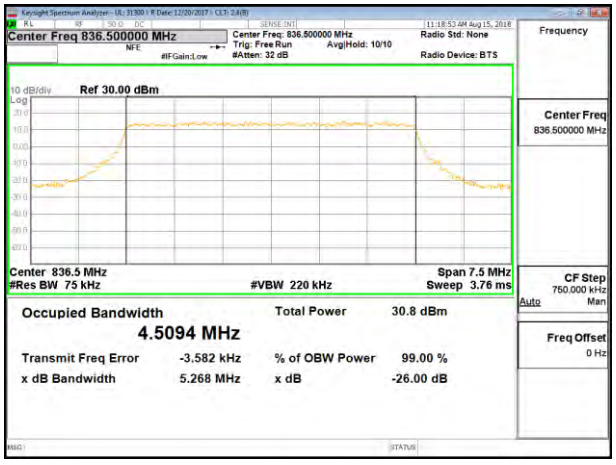
LTE B5 1.4MHz 16QAM Mid Channel RB6-0



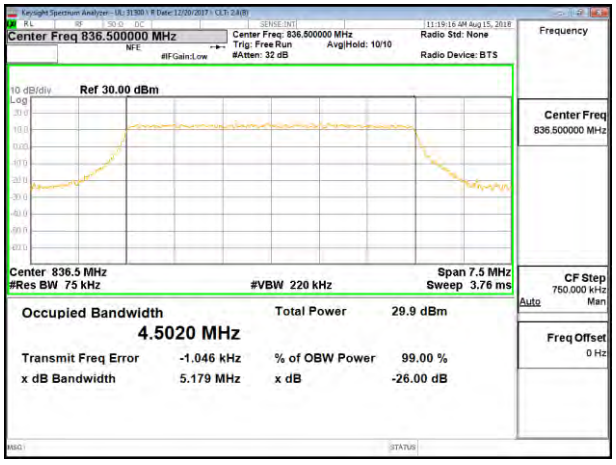
LTE B5 3MHz QPSK Mid Channel RB15-0



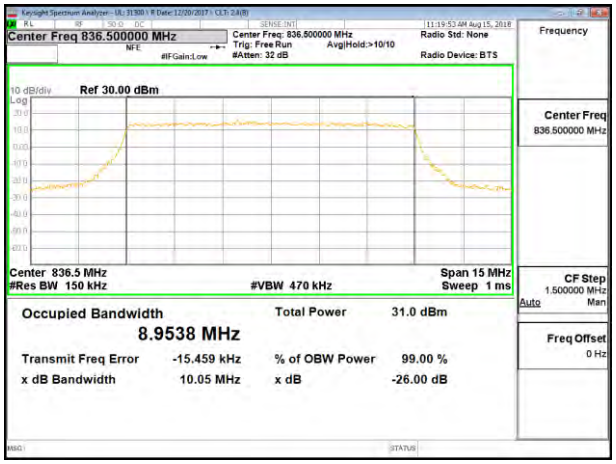
LTE B5 3MHz 16QAM Mid Channel RB15-0



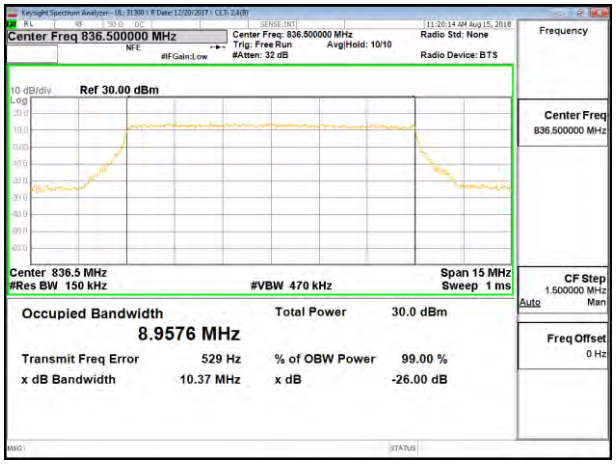
LTE B5 5MHz QPSK Mid Channel RB25-0



LTE B5 5MHz 16QAM Mid Channel RB25-0

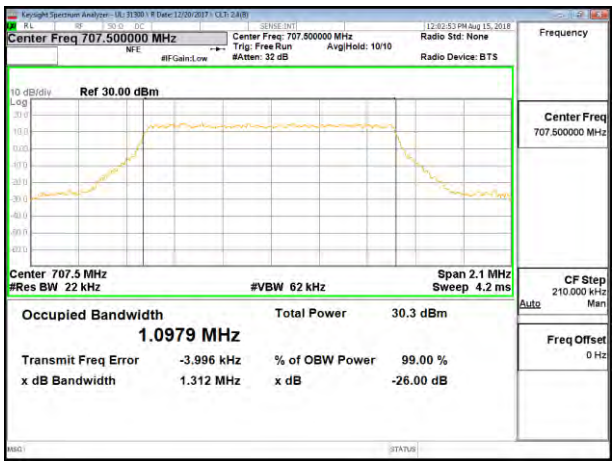


LTE B5 10MHz QPSK Mid Channel RB50-0

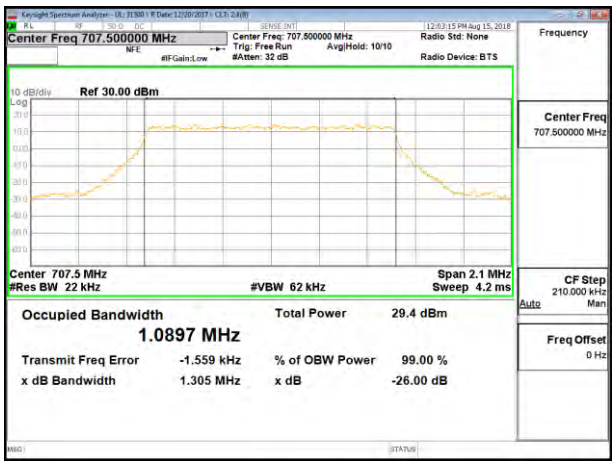


LTE B5 10MHz 16QAM Mid Channel RB50-0

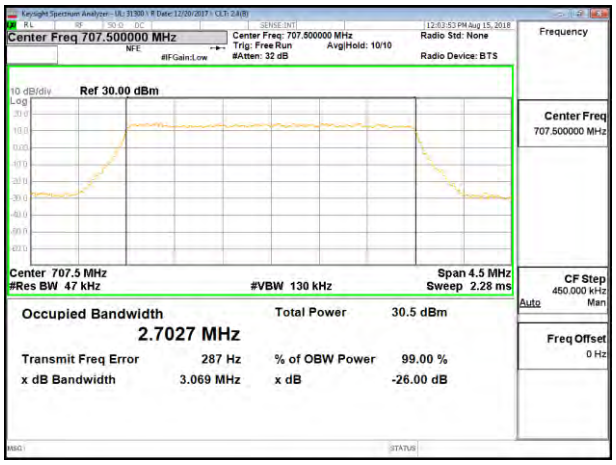
8.1.4. LTE BAND 12



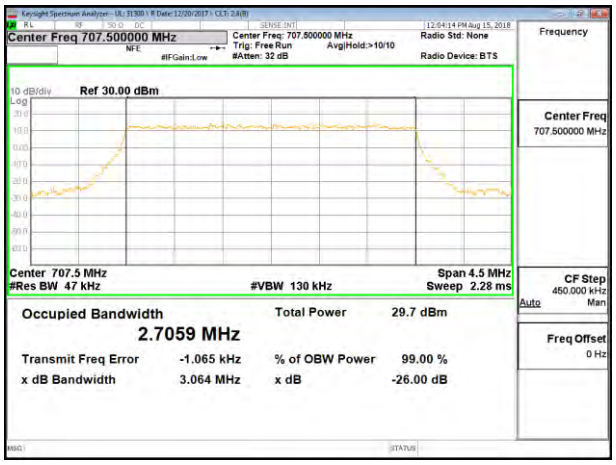
LTE B12 1.4MHz QPSK Mid Channel RB6-0



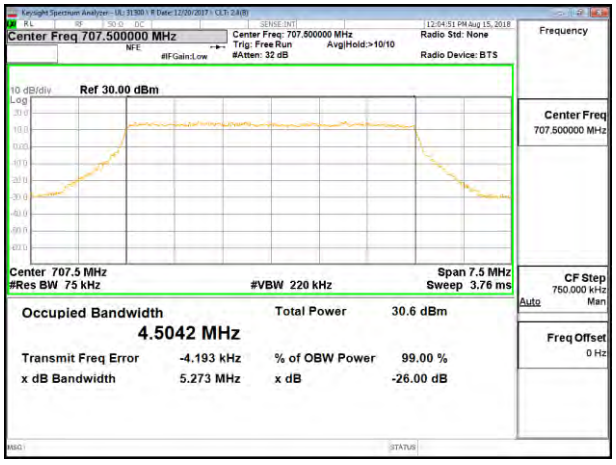
LTE B12 1.4MHz 16QAM Mid Channel RB6-0



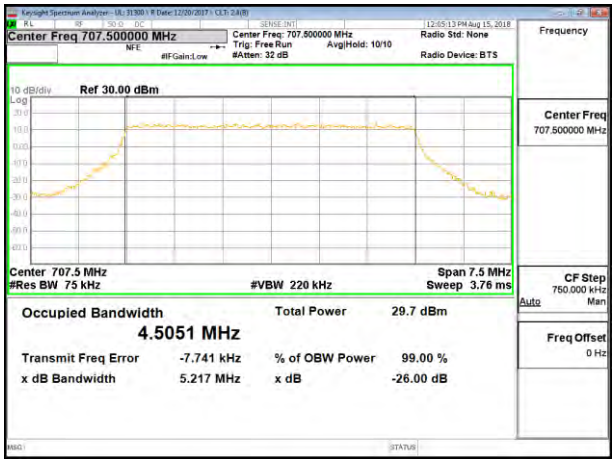
LTE B12 3MHz QPSK Mid Channel RB15-0



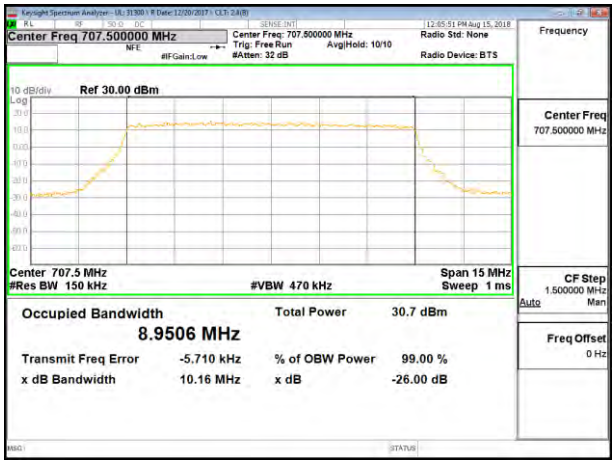
LTE B12 3MHz 16QAM Mid Channel RB15-0



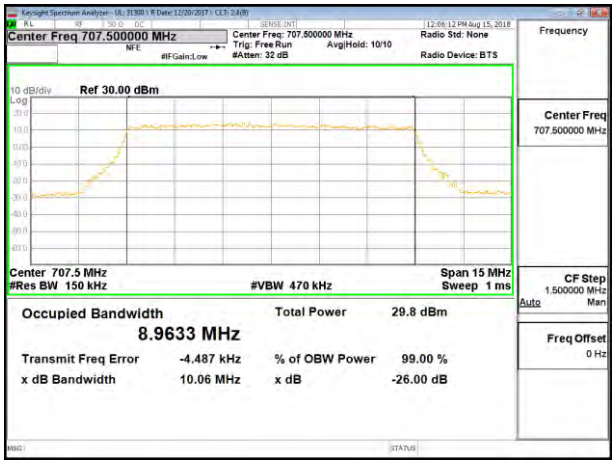
LTE B12 5MHz QPSK Mid Channel RB25-0



LTE B12 5MHz 16QAM Mid Channel RB25-0

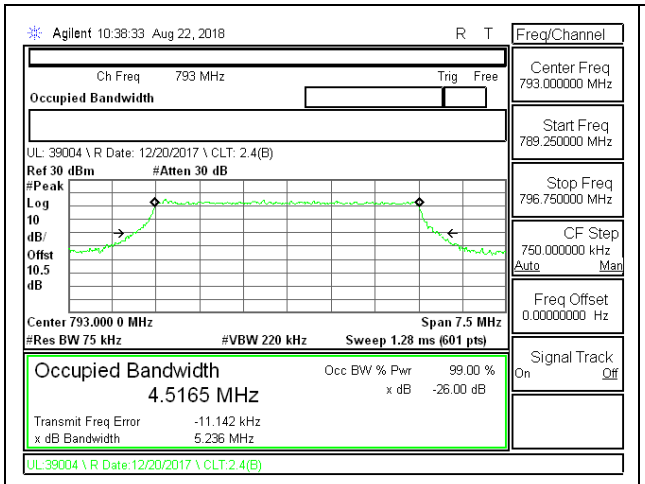


LTE B12 10MHz QPSK Mid Channel RB50-0

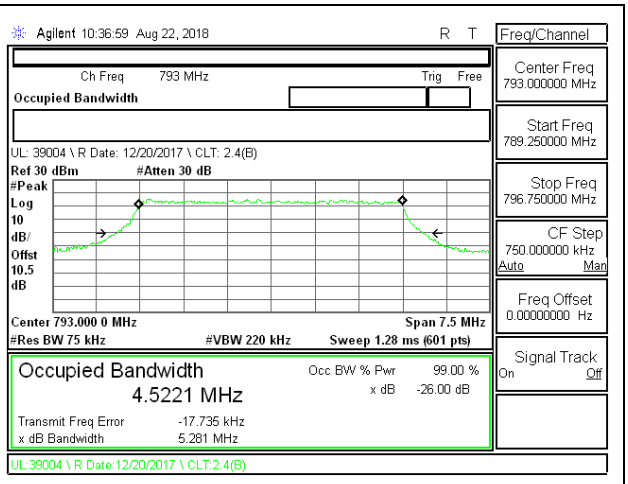


LTE B12 10MHz 16QAM Mid Channel RB50-0

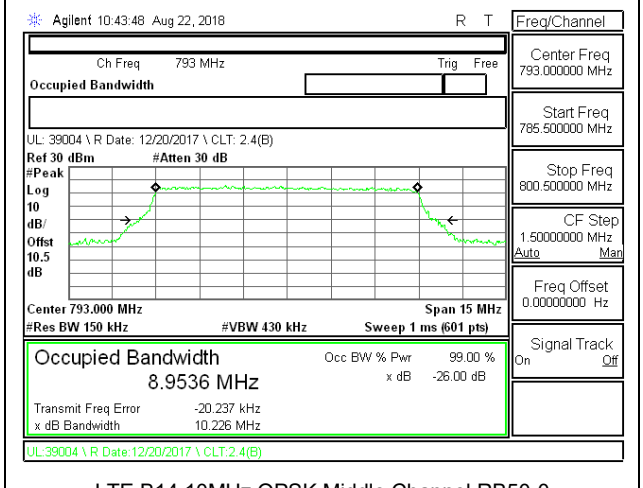
8.1.5. LTE BAND 14



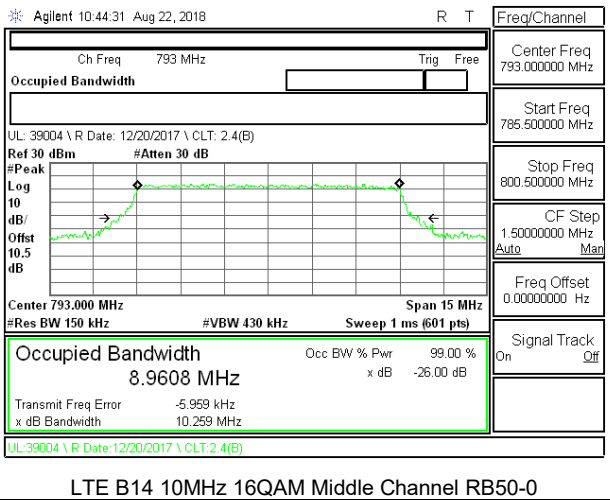
LTE B14 5MHz QPSK Middle Channel RB25-0



LTE B14 5MHz 16QAM Middle Channel RB25-0

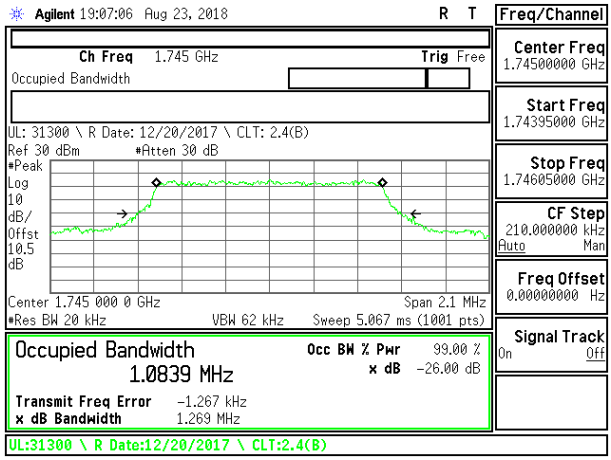


LTE B14 10MHz QPSK Middle Channel RB50-0

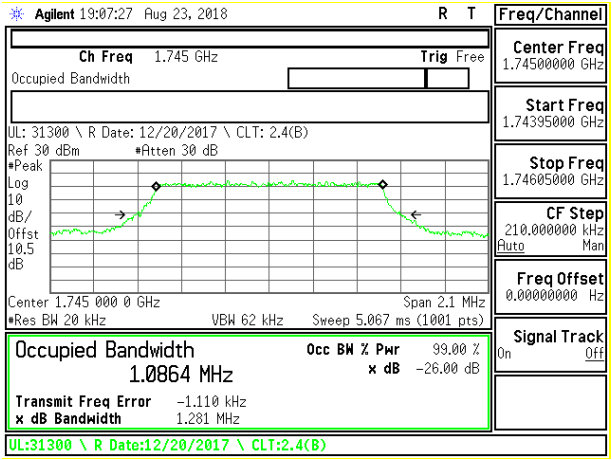


LTE B14 10MHz 16QAM Middle Channel RB50-0

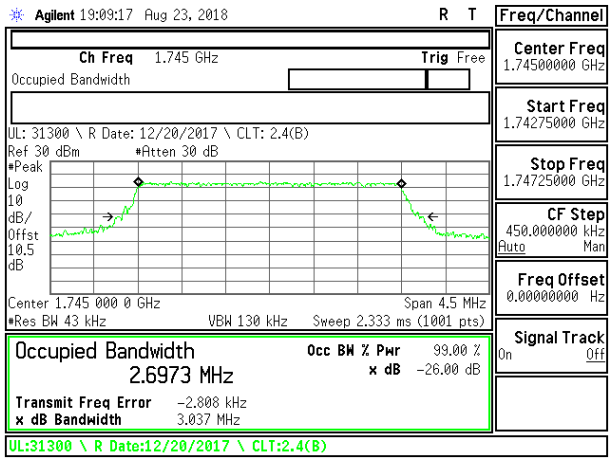
8.1.6. LTE BAND 66



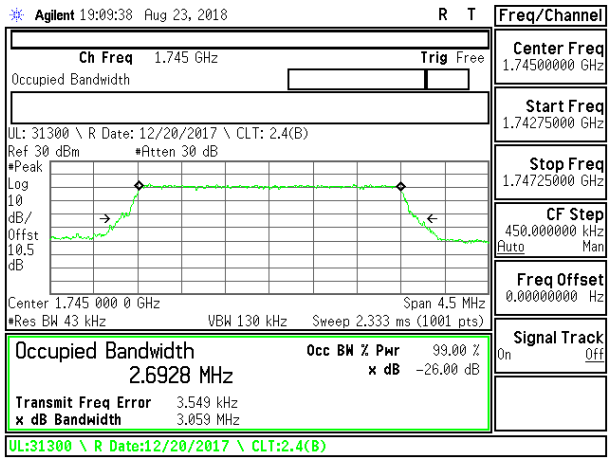
LTE B66 1.4MHz QPSK Mid Channel RB6-0



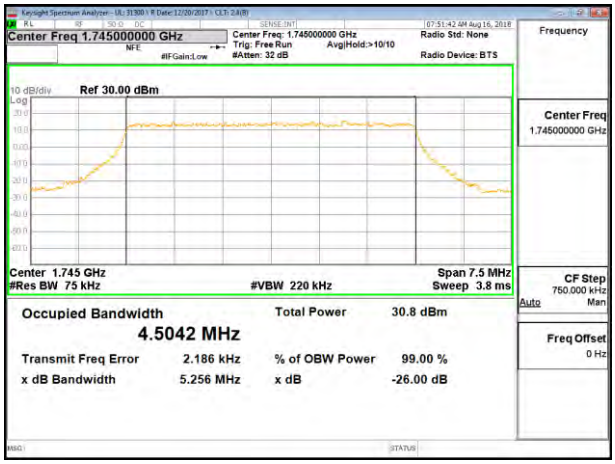
LTE B66 1.4MHz 16QAM Mid Channel RB6-0



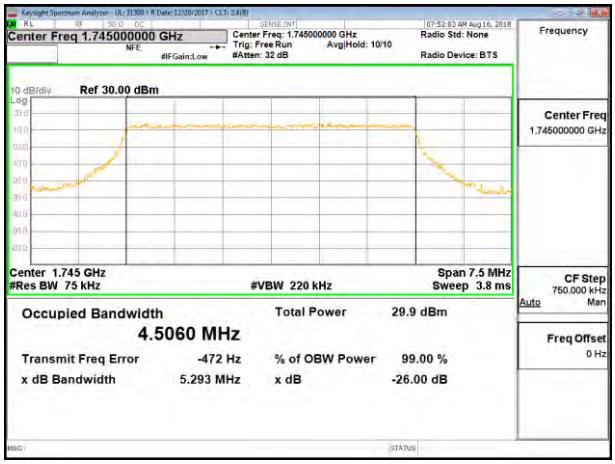
LTE B66 3MHz QPSK Mid Channel RB15-0



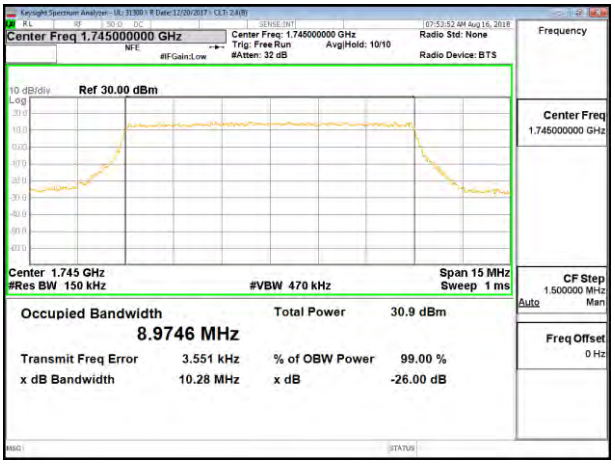
LTE B66 3MHz 16QAM Mid Channel RB15-0



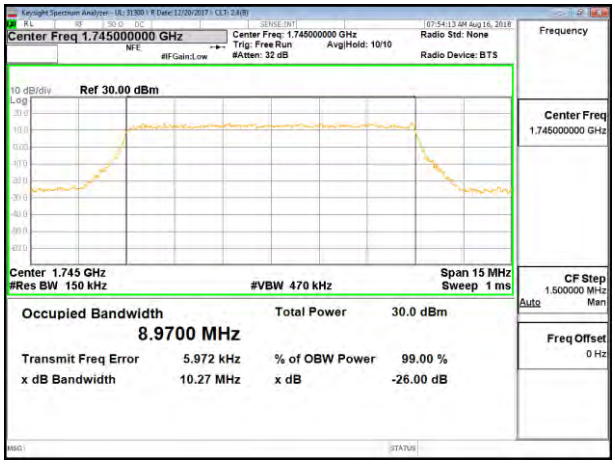
LTE B66 5MHz QPSK Mid Channel RB25-0



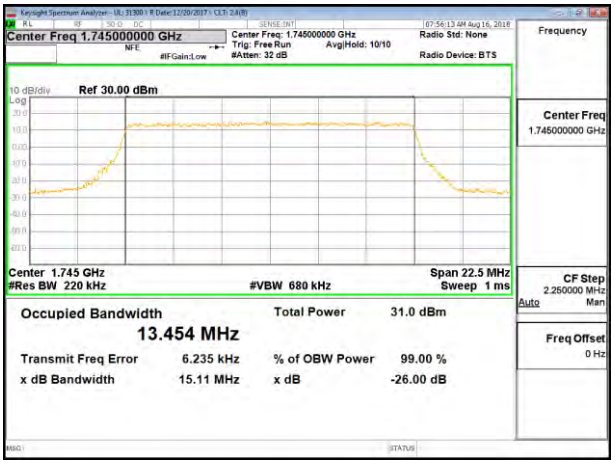
LTE B66 5MHz 16QAM Mid Channel RB25-0



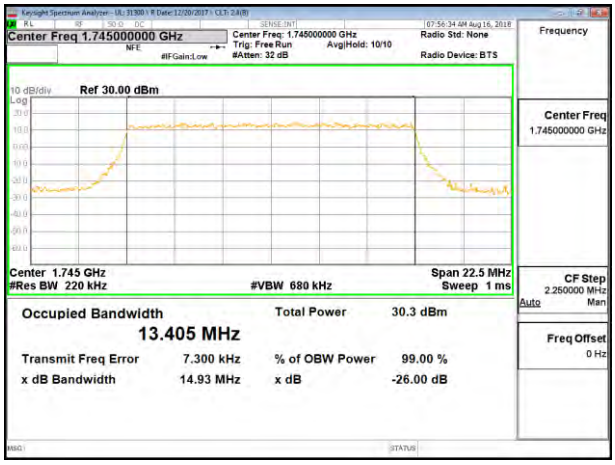
LTE B66 10MHz QPSK Mid Channel RB50-0



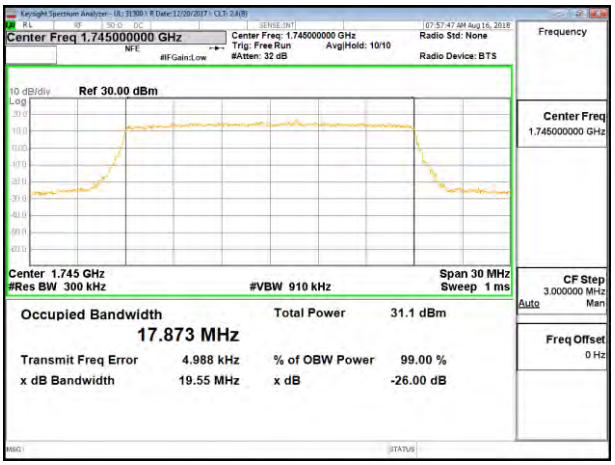
LTE B66 10MHz 16QAM Mid Channel RB50-0



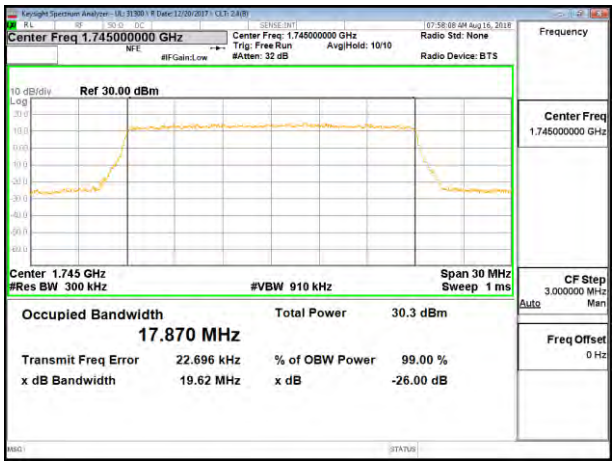
LTE B66 15MHz QPSK Mid Channel RB75-0



LTE B66 15MHz 16QAM Mid Channel RB75-0



LTE B66 20MHz QPSK Mid Channel RB100-0



LTE B66 20MHz 16QAM Mid Channel RB100-0

8.2. BAND EDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53 and §90.543

LIMITS

FCC: §22.917, §24.238, §27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

FCC: §90.543 Emission Limitations. (Band 14)
(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

(f) For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC: §27.53 (Band 12)
(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC: §27.53 (Band 30)
(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

TEST PROCEDURE

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

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

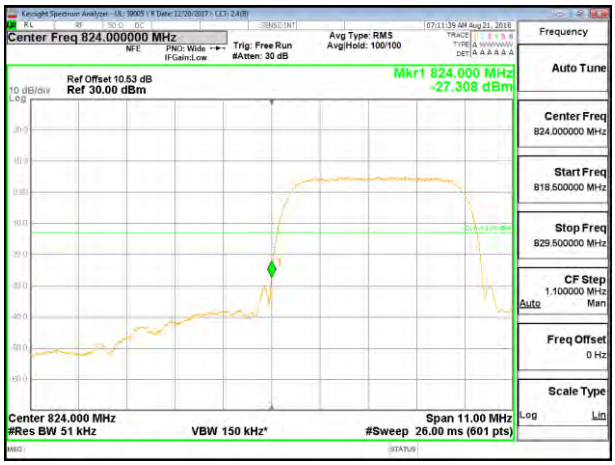
MODES TESTED

- WCDM Band 5
- WCDM Band 2
- LTE Band 2
- LTE Band 5
- LTE Band 12
- LTE Band 14
- LTE Band 66
-

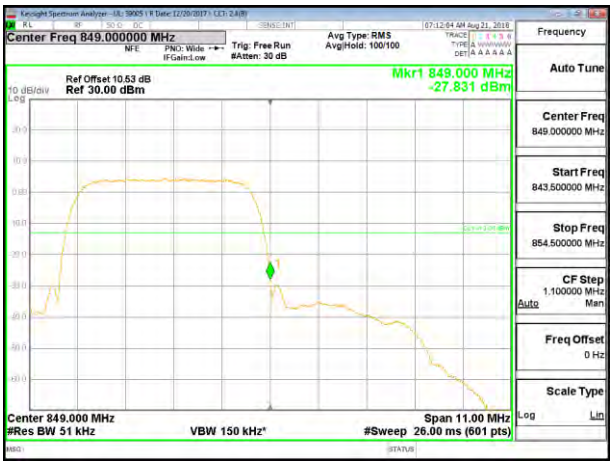
RESULTS

8.2.1. WCDMA BAND5

Rel99

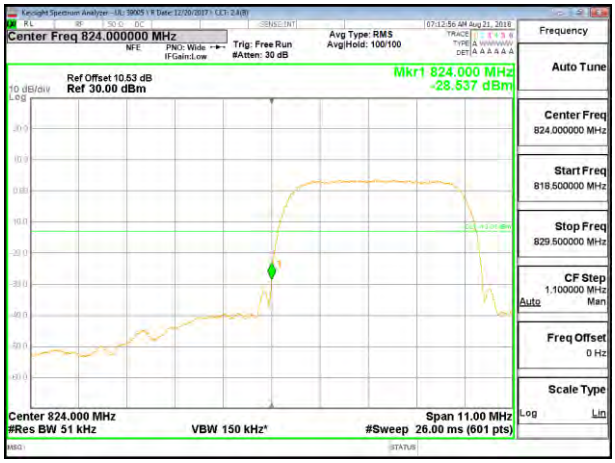


BAND5 Rel99 LOW Channel



BAND5 Rel99 HIGH Channel

HSDPA



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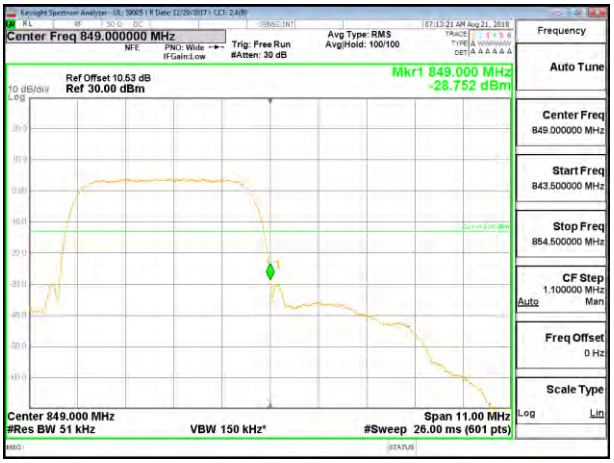

BAND5 HSDPA HIGH Channel

8.2.2. WCDMA BAND2

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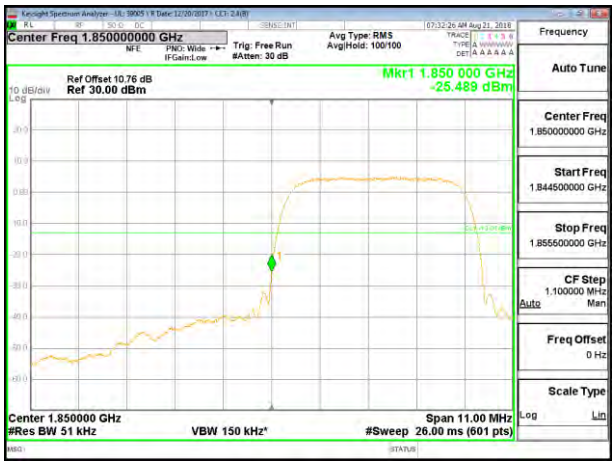
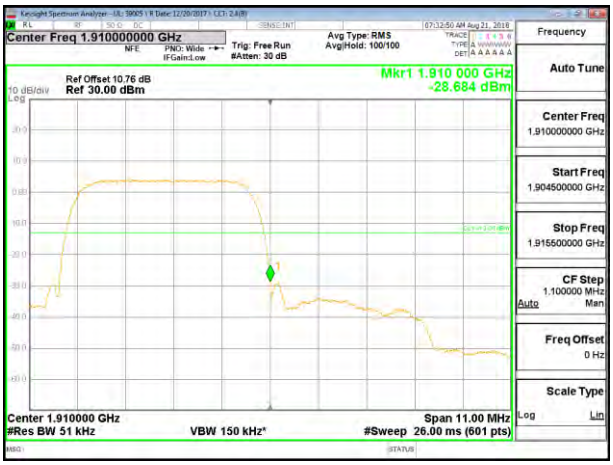
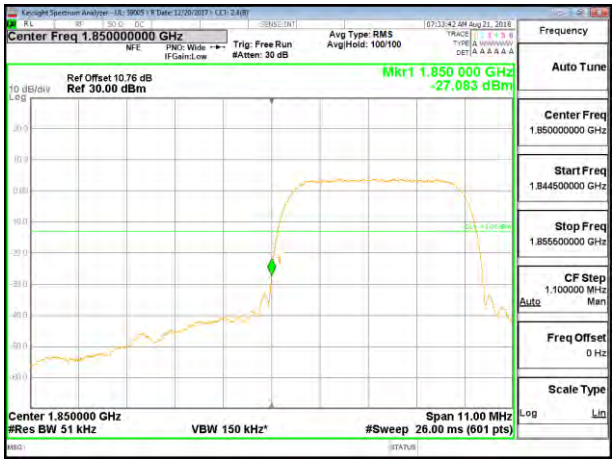


BAND2 Rel99 LOW Channel

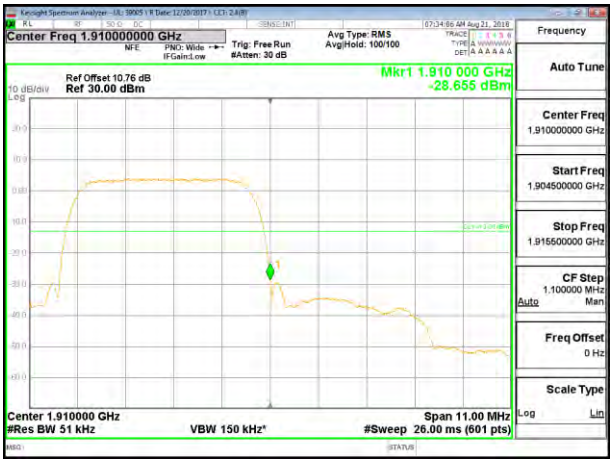


BAND2 Rel99 HIGH Channel

HSDPA

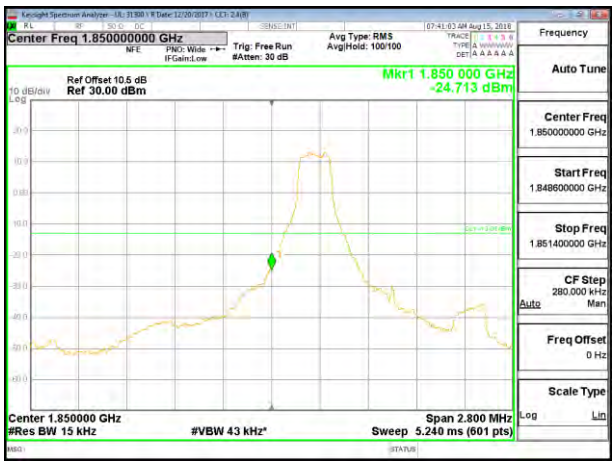


BAND2 HSDPA LOW Channel

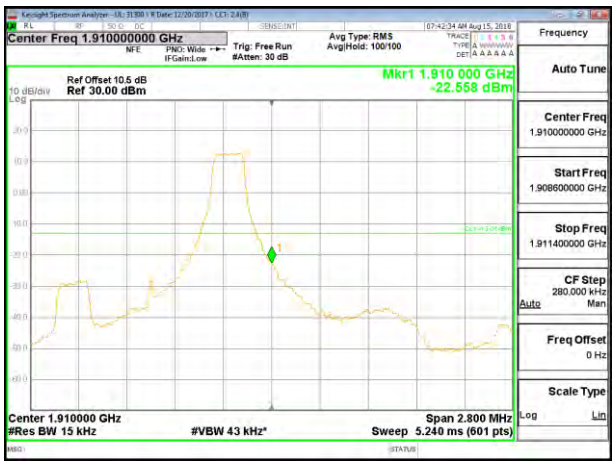


BAND2 HSDPA HIGH Channel

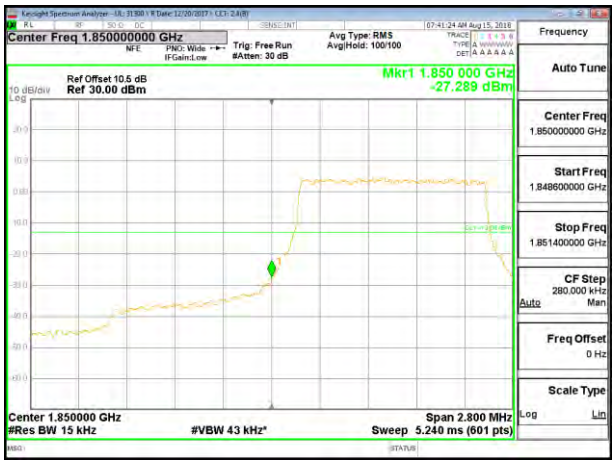
8.2.3. LTE BAND 2 BANDEDGE



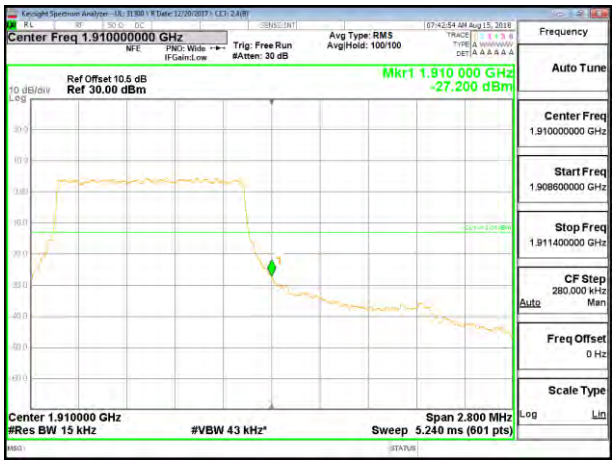
LTE B2 1.4MHz QPSK Low Channel RB1-0



LTE B2 1.4MHz QPSK High Channel RB1-0



LTE B2 1.4MHz QPSK Low Channel RB6-0

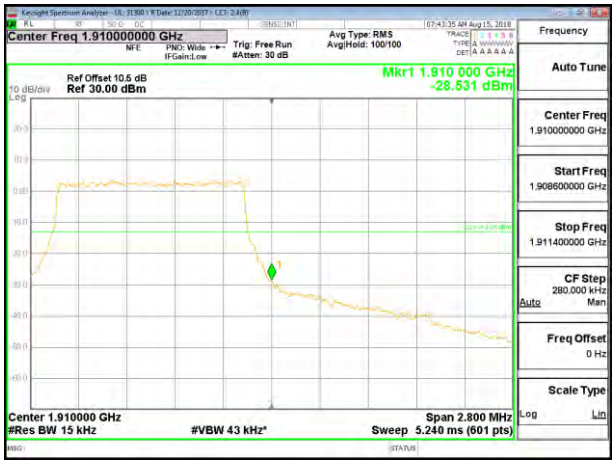


LTE B2 1.4MHz QPSK High Channel RB6-0

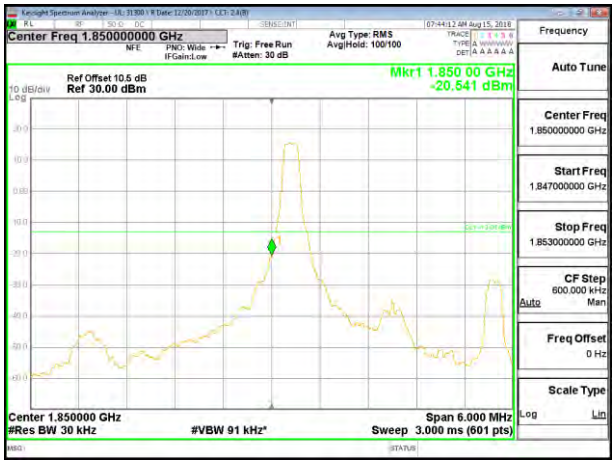
LTE B2 1.4MHz 16QAM Low Channel RB1-0

LTE B2 1.4MHz 16QAM High Channel RB1-0

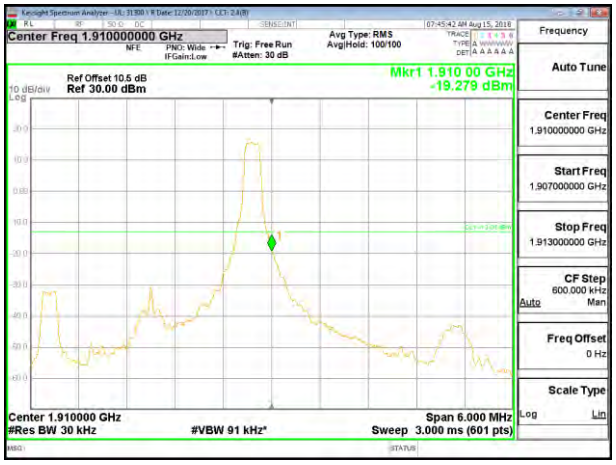
LTE B2 1.4MHz 16QAM Low Channel RB6-0



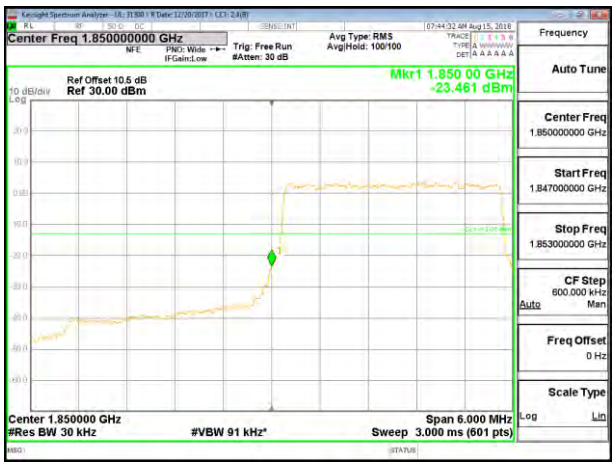
LTE B2 1.4MHz 16QAM High Channel RB6-0



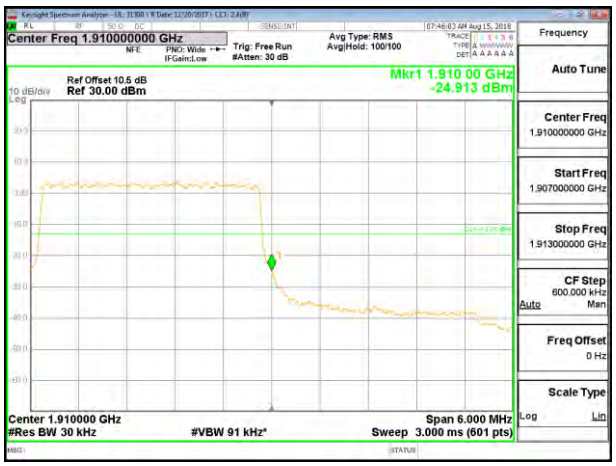
LTE B2 3MHz QPSK Low Channel RB1-0



LTE B2 3MHz QPSK High Channel RB1-0



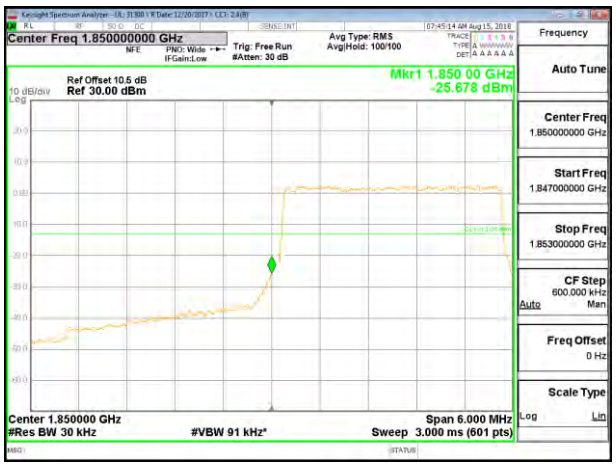
LTE B2 3MHz QPSK Low Channel RB15-0



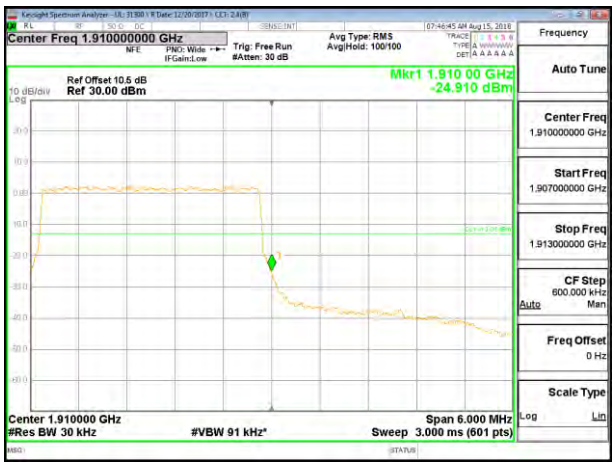
LTE B2 3MHz QPSK High Channel RB15-0

LTE B2 3MHz 16QAM Low Channel RB1-0

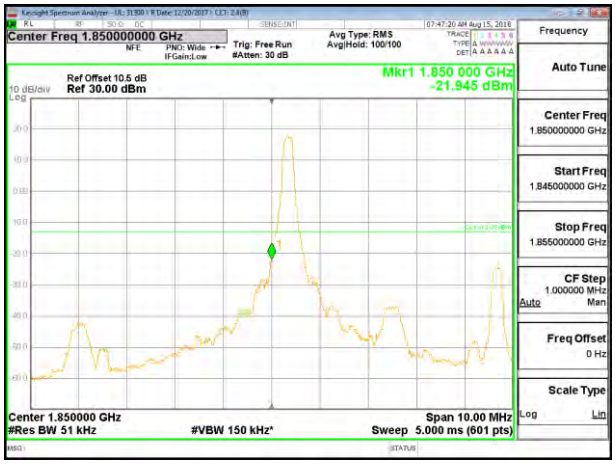
LTE B2 3MHz 16QAM High Channel RB1-0



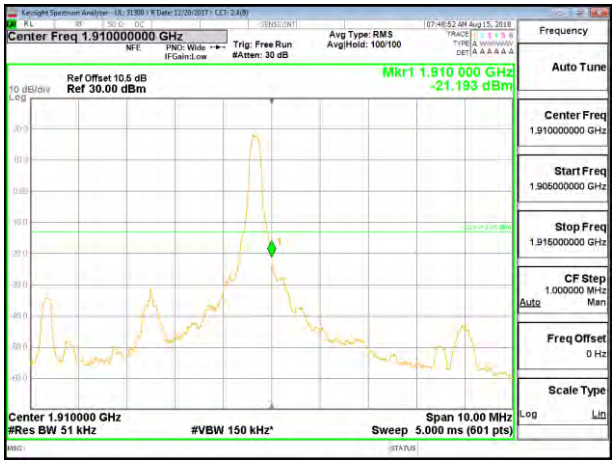
LTE B2 3MHz 16QAM Low Channel RB15-0



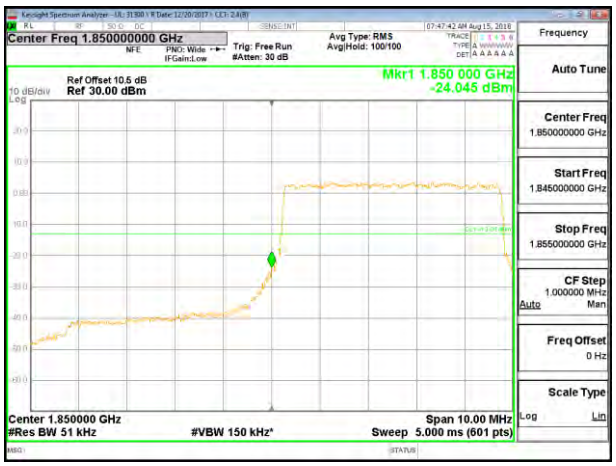
LTE B2 3MHz 16QAM High Channel RB15-0



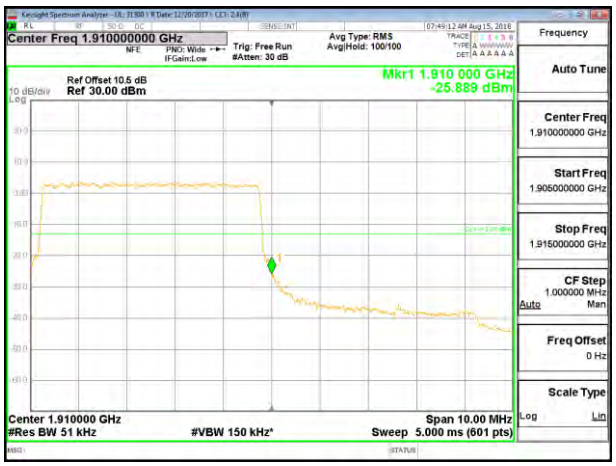
LTE B2 5MHz QPSK Low Channel RB1-0



LTE B2 5MHz QPSK High Channel RB1-0



LTE B2 5MHz QPSK Low Channel RB25-0



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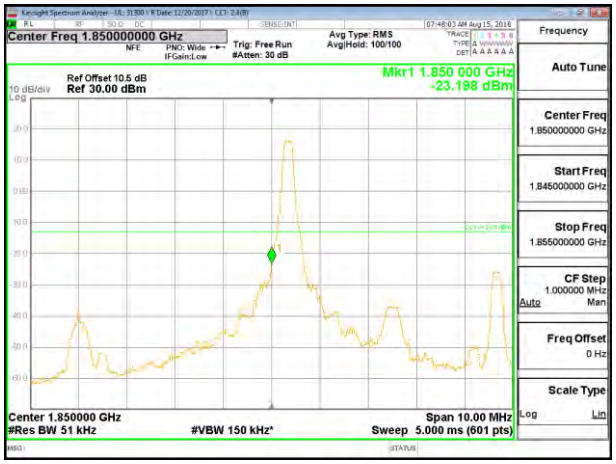
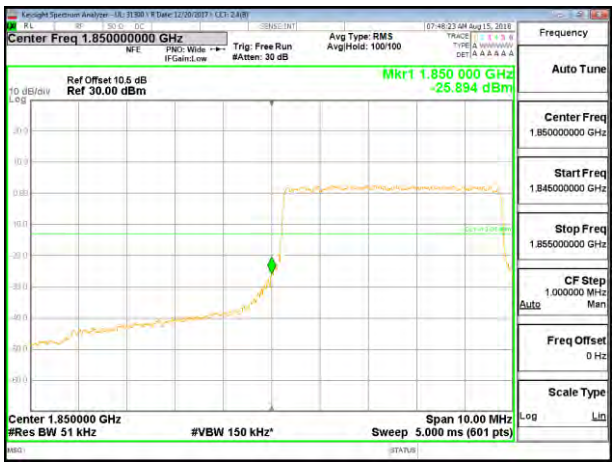


LTE B2 5MHz 16QAM Low Channel RB1-0

LTE B2 5MHz 16QAM High Channel RB1-0



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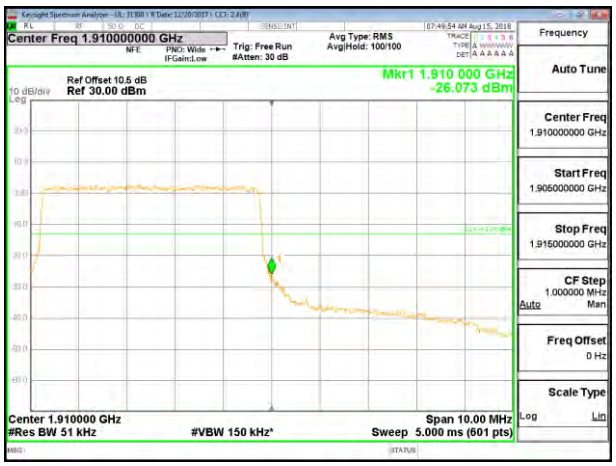
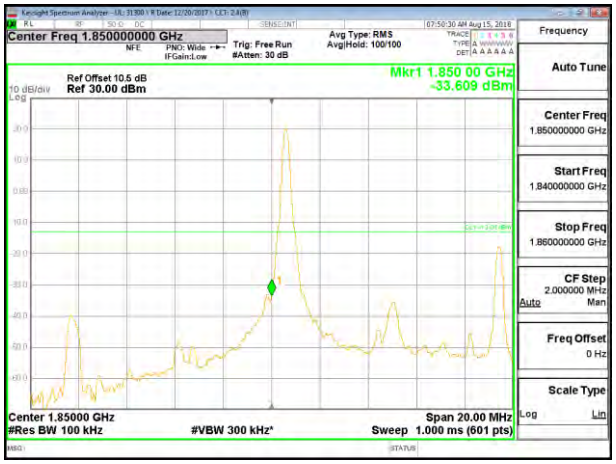
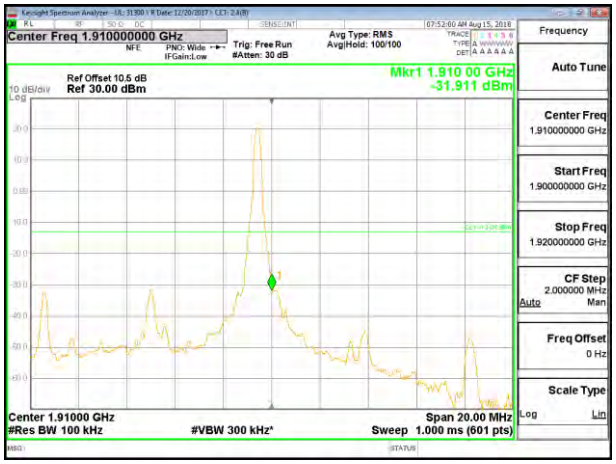


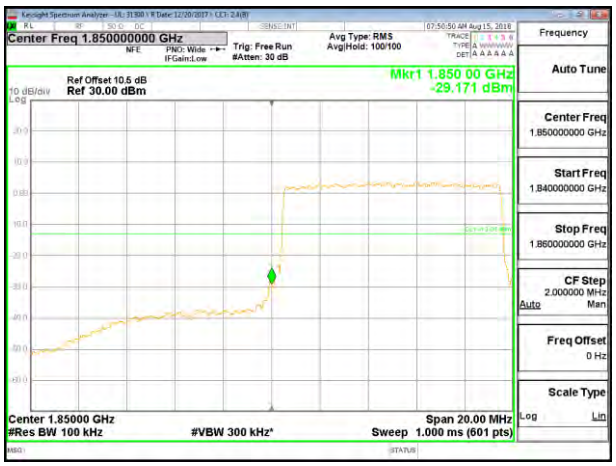
LTE B2 5MHz 16QAM High Channel RB25-0



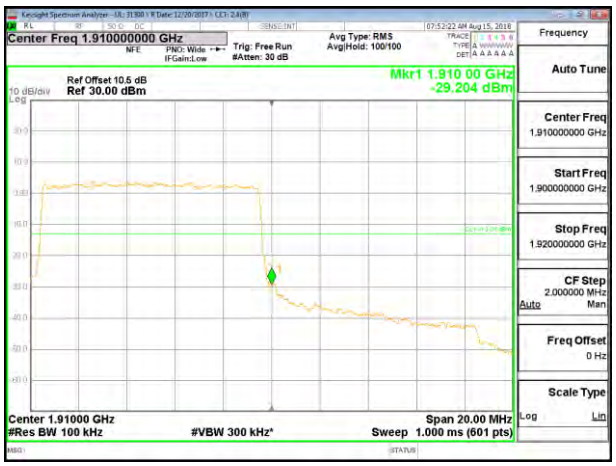
LTE B2 10MHz QPSK Low Channel RB1-0



LTE B2 10MHz QPSK High Channel RB1-0



LTE B2 10MHz QPSK Low Channel RB50-0



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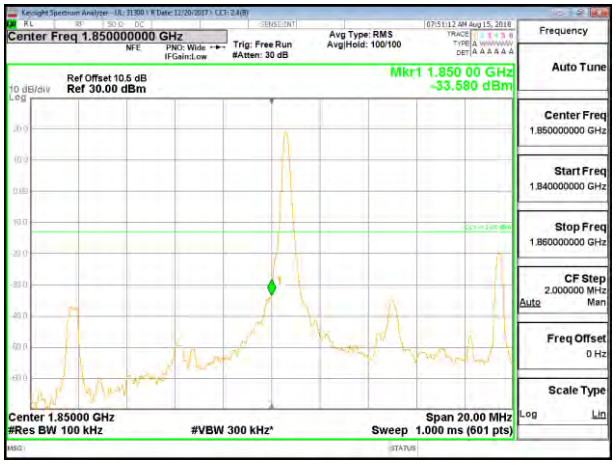
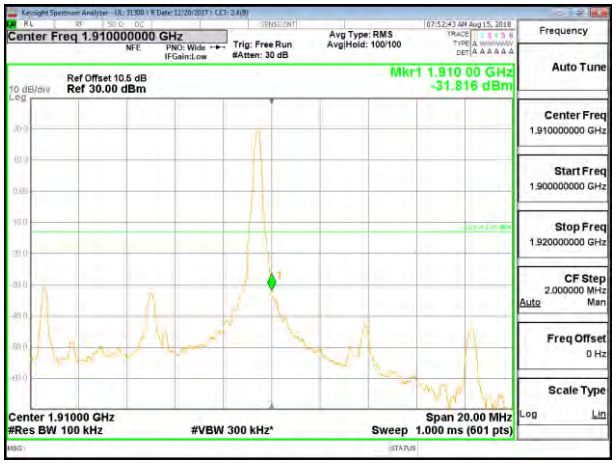
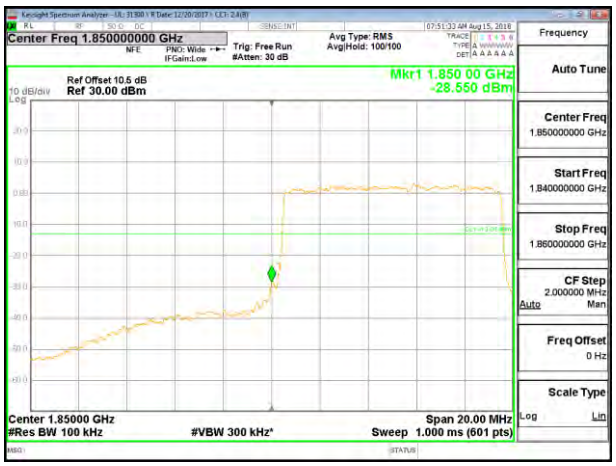


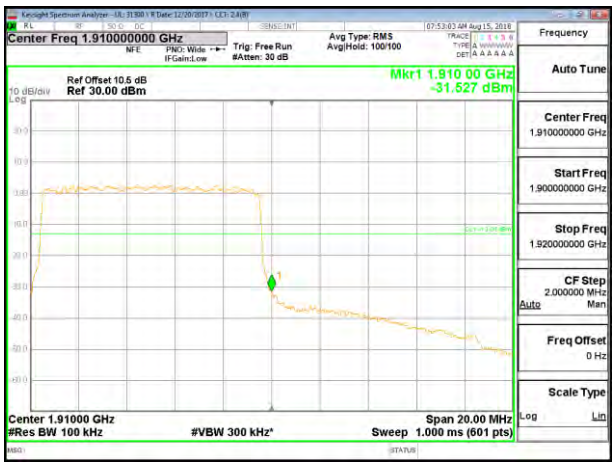
LTE B2 10MHz 16QAM Low Channel RB1-0



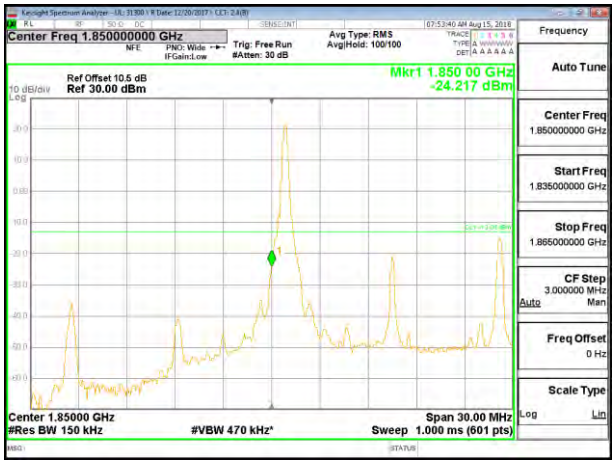
LTE B2 10MHz 16QAM High Channel RB1-0



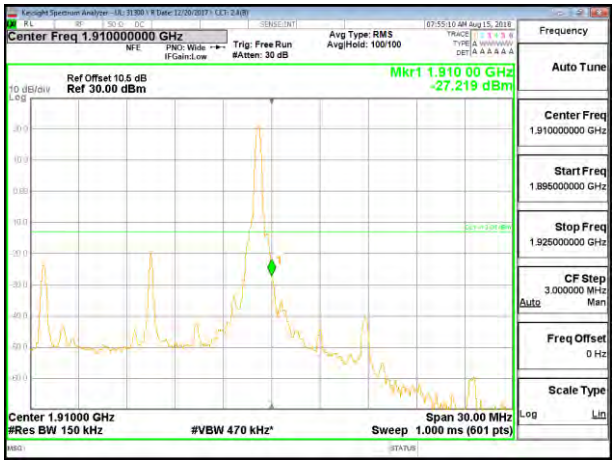
LTE B2 10MHz 16QAM Low Channel RB50-0



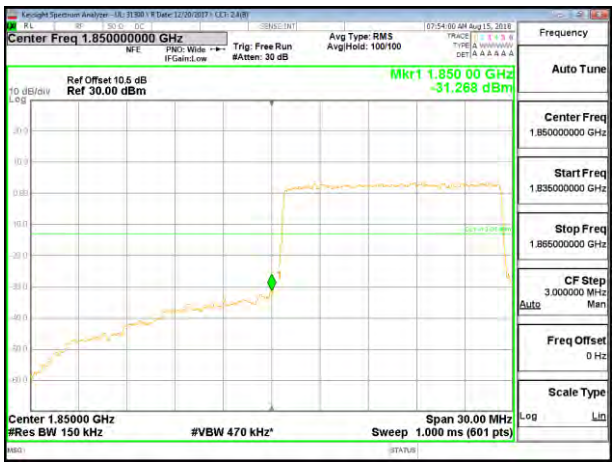
LTE B2 10MHz 16QAM High Channel RB50-0



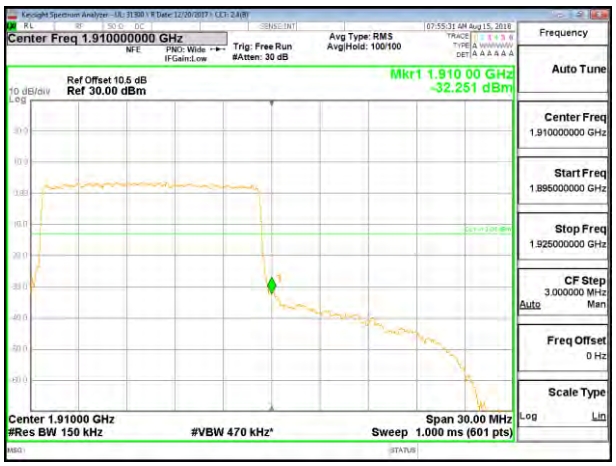
LTE B2 15MHz QPSK Low Channel RB1-0



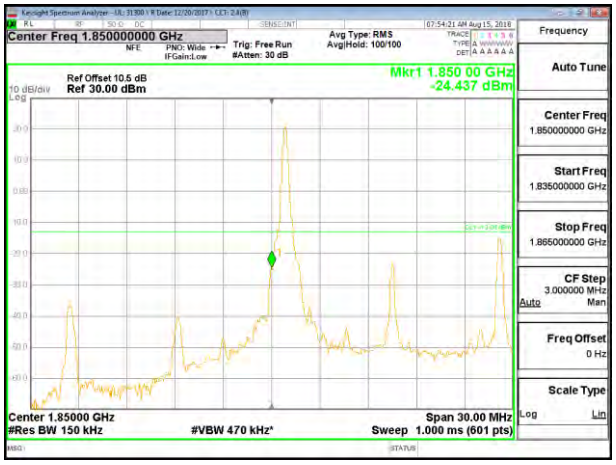
LTE B2 15MHz QPSK High Channel RB1-0



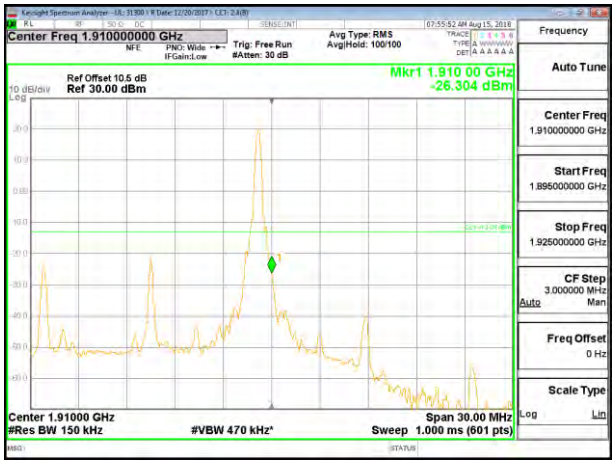
LTE B2 15MHz QPSK Low Channel RB75-0



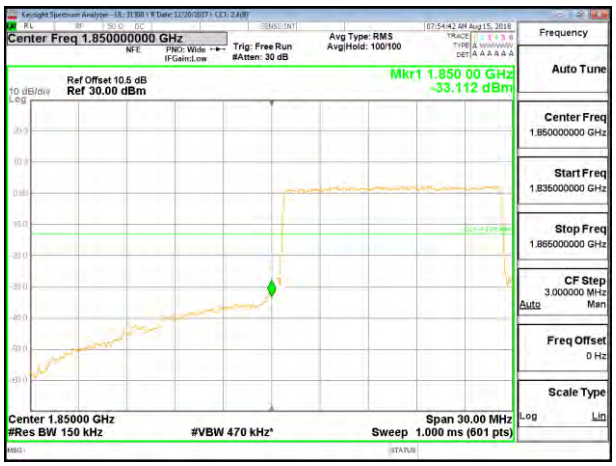
LTE B2 15MHz QPSK High Channel RB75-0



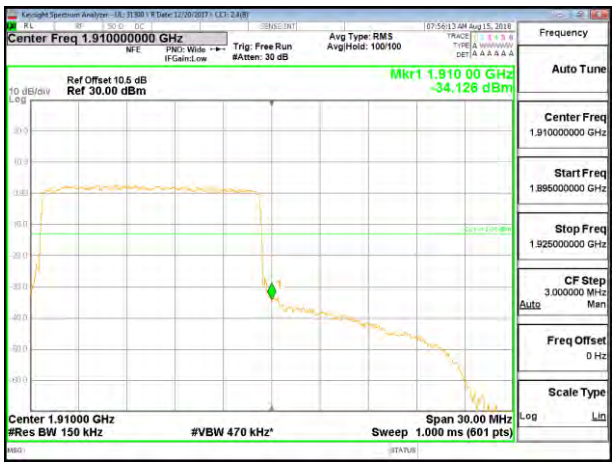
LTE B2 15MHz 16QAM Low Channel RB1-0



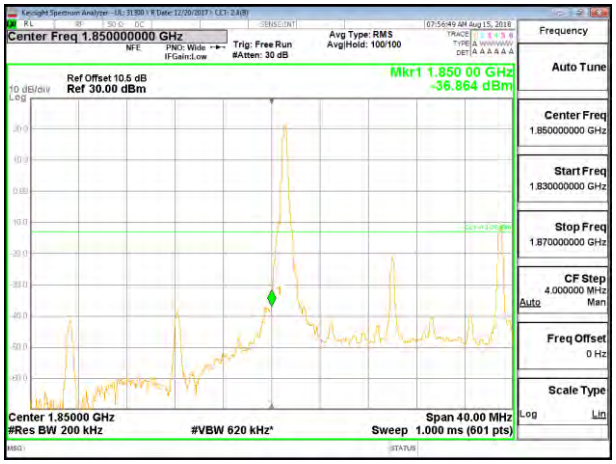
LTE B2 15MHz 16QAM High Channel RB1-0



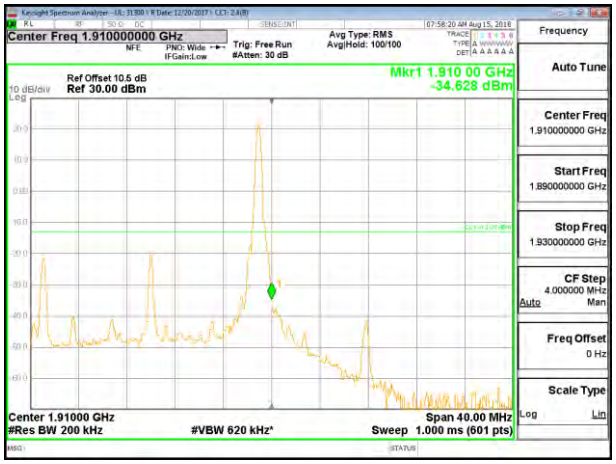
LTE B2 15MHz 16QAM Low Channel RB75-0



LTE B2 15MHz 16QAM High Channel RB75-0



LTE B2 20MHz QPSK Low Channel RB1-0



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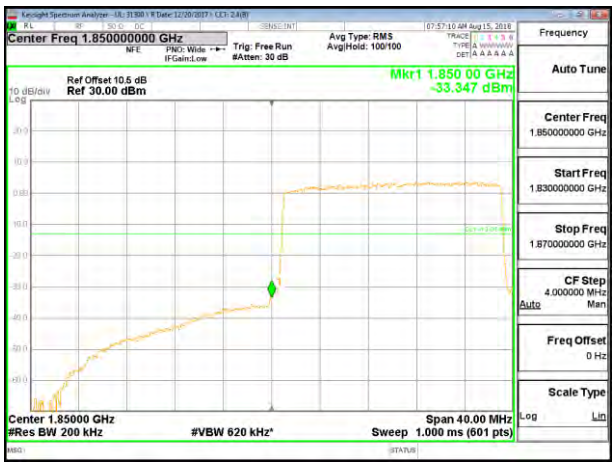
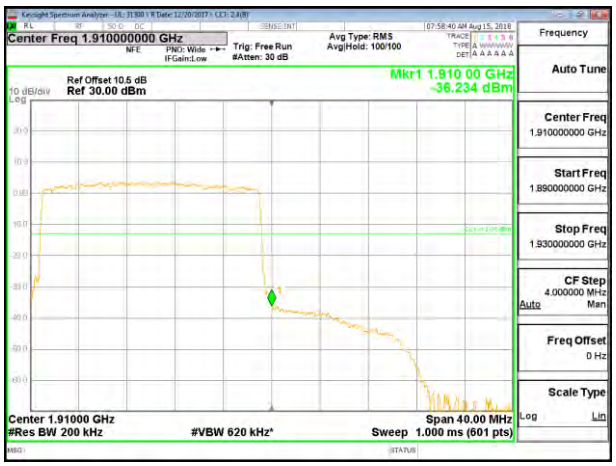
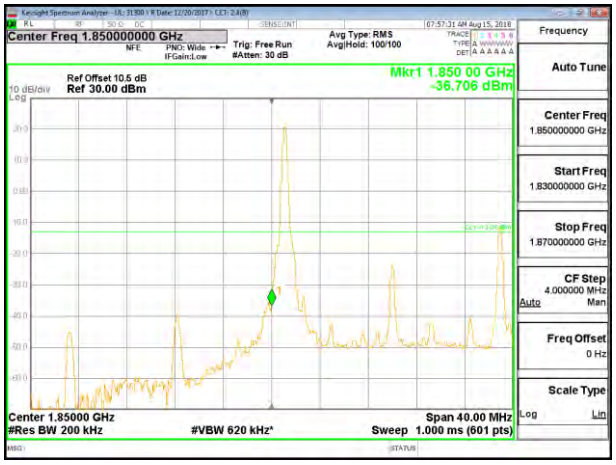


LTE B2 20MHz QPSK Low Channel RB100-0

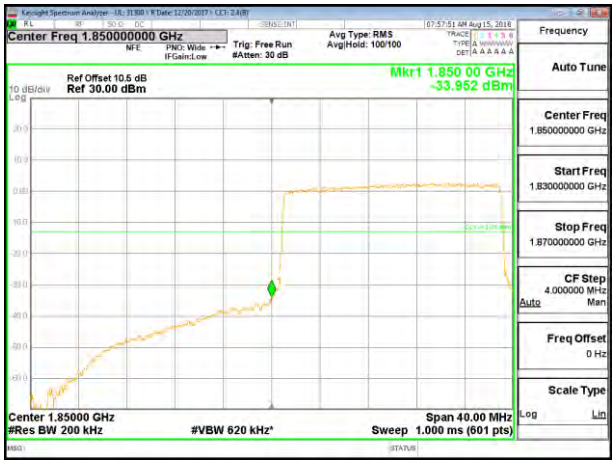


LTE B2 20MHz QPSK High Channel RB100-0

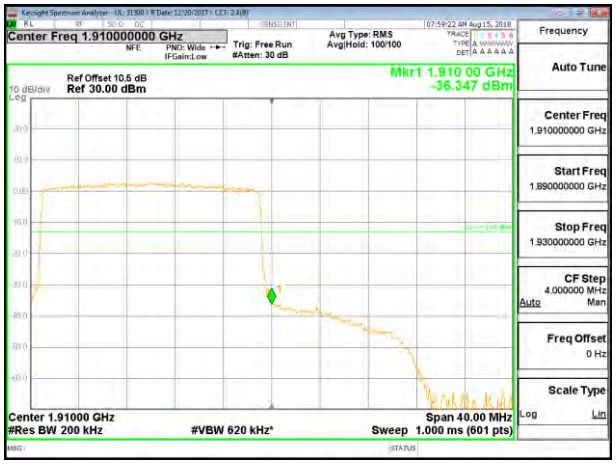


LTE B2 20MHz 16QAM Low Channel RB1-0

LTE B2 20MHz 16QAM High Channel RB1-0

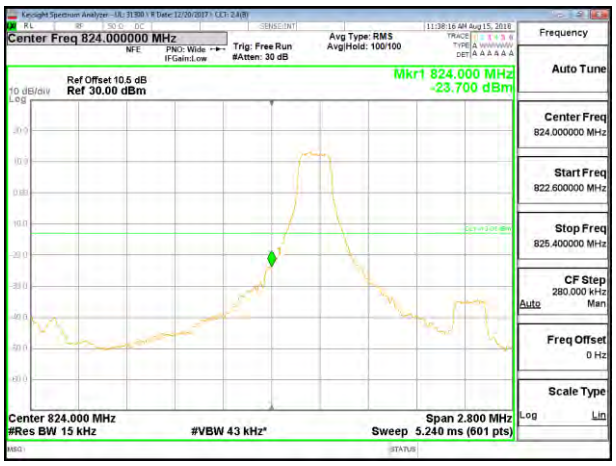


LTE B2 20MHz 16QAM Low Channel RB100-0

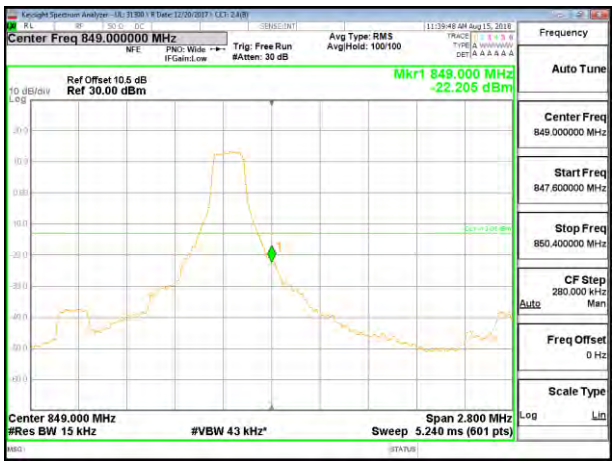


LTE B2 20MHz 16QAM High Channel RB100-0

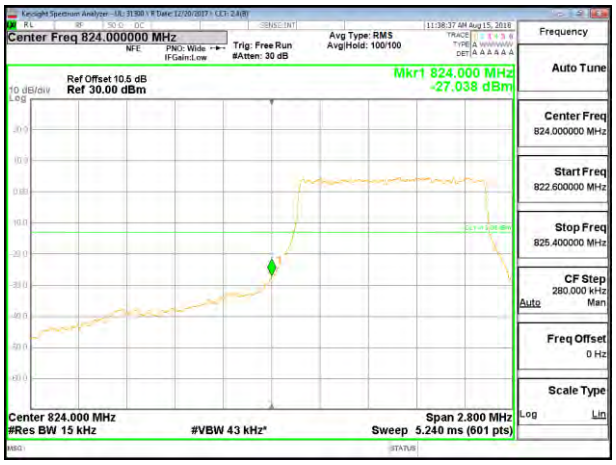
8.2.4. LTE BAND 5 BANDEDGE



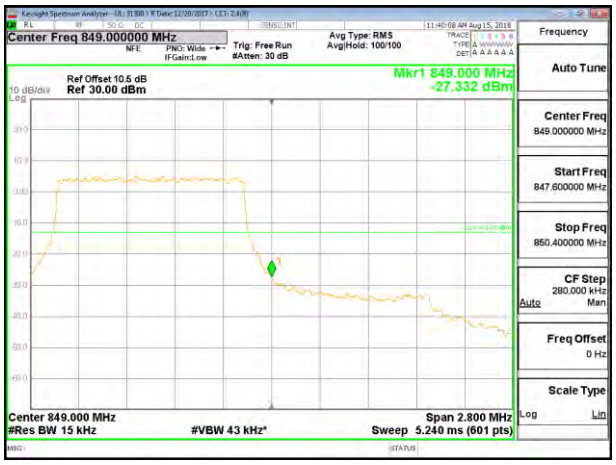
LTE B5 1.4MHz QPSK Low Channel RB1-0



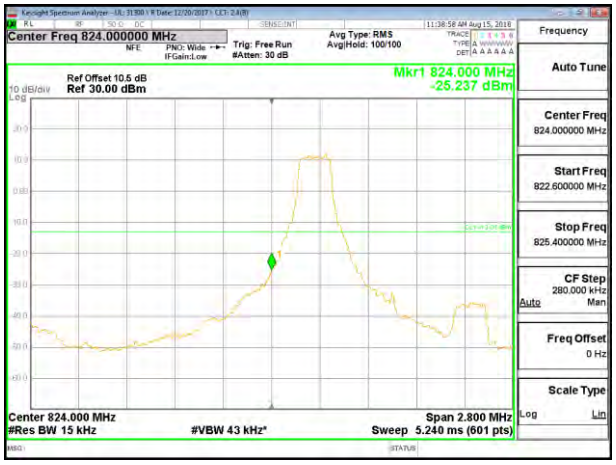
LTE B5 1.4MHz QPSK High Channel RB1-0



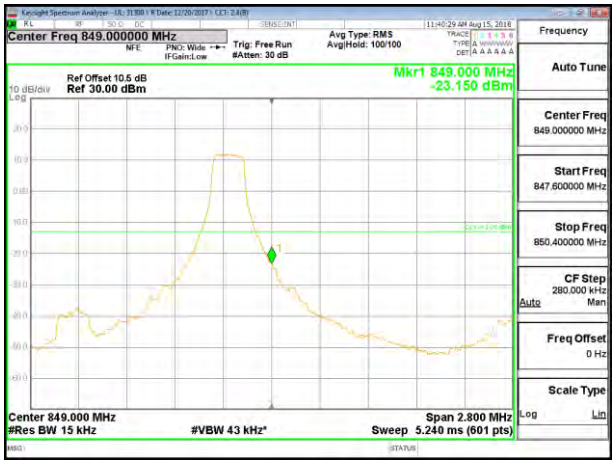
LTE B5 1.4MHz QPSK Low Channel RB6-0



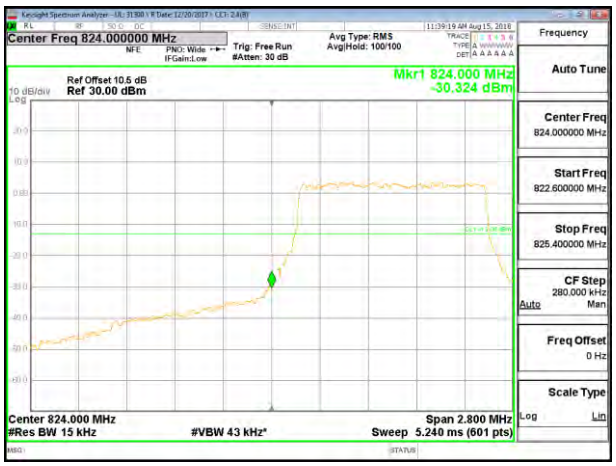
LTE B5 1.4MHz QPSK High Channel RB6-0



LTE B5 1.4MHz 16QAM Low Channel RB1-0

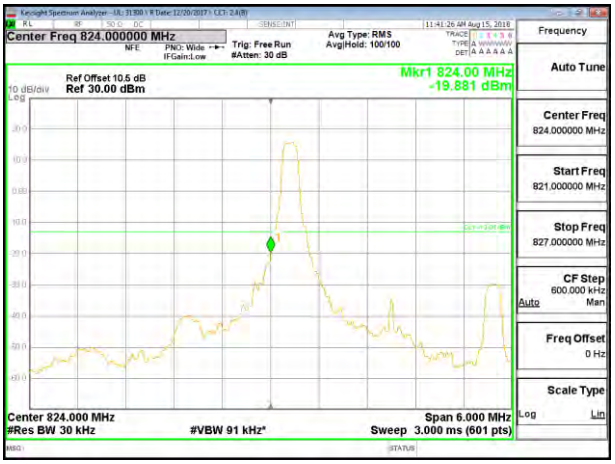


LTE B5 1.4MHz 16QAM High Channel RB1-0



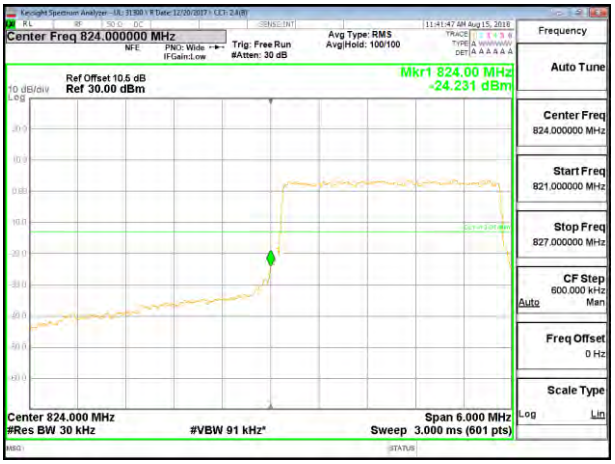
LTE B5 1.4MHz 16QAM Low Channel RB6-0

LTE B5 1.4MHz 16QAM High Channel RB6-0

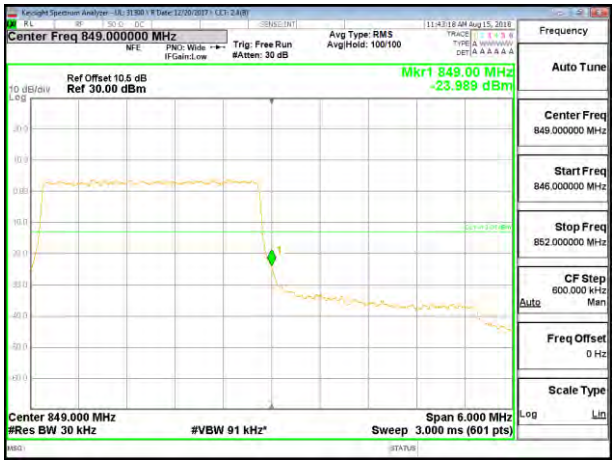


LTE B5 3MHz QPSK Low Channel RB1-0

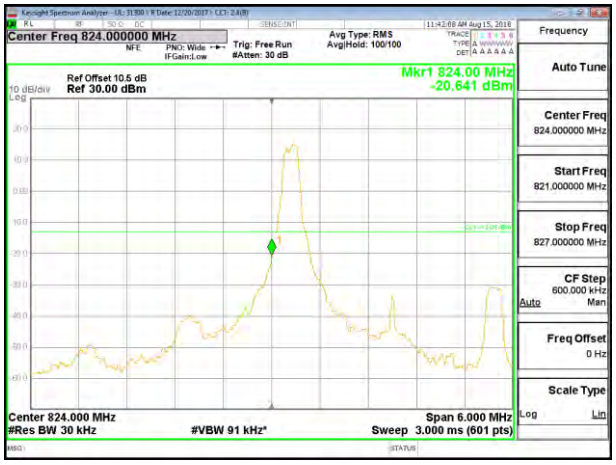
LTE B5 3MHz QPSK High Channel RB1-0



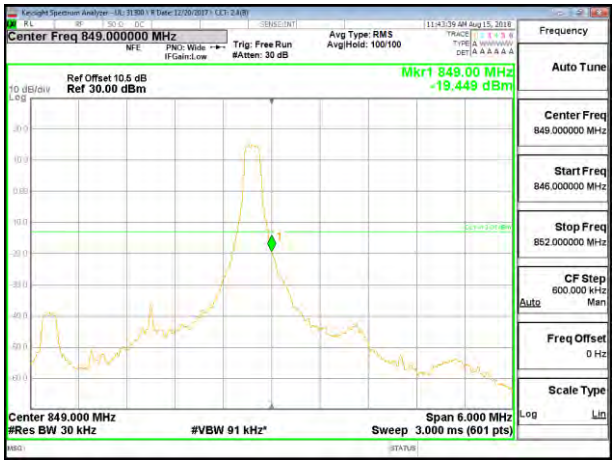
LTE B5 3MHz QPSK Low Channel RB15-0



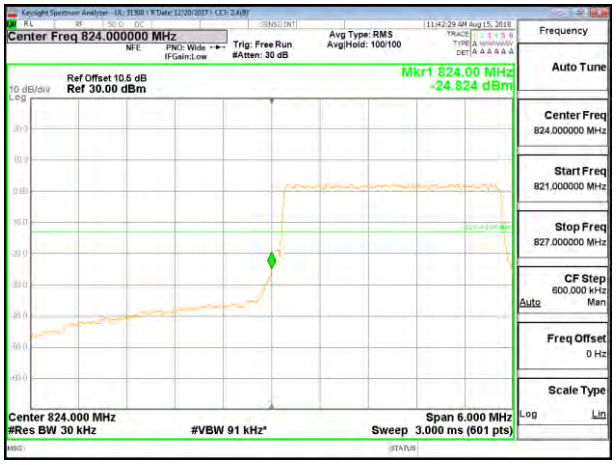
LTE B5 3MHz QPSK High Channel RB15-0



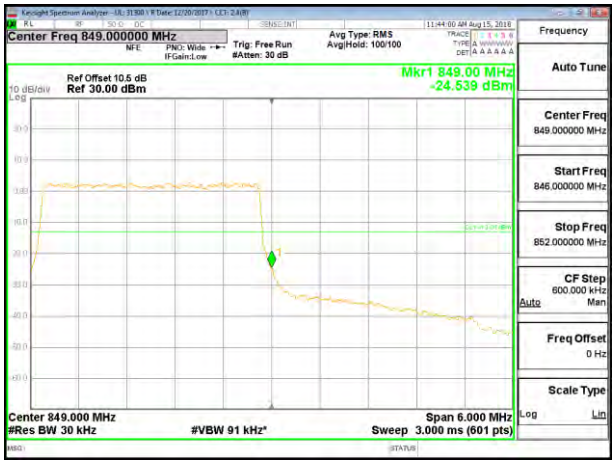
LTE B5 3MHz 16QAM Low Channel RB1-0



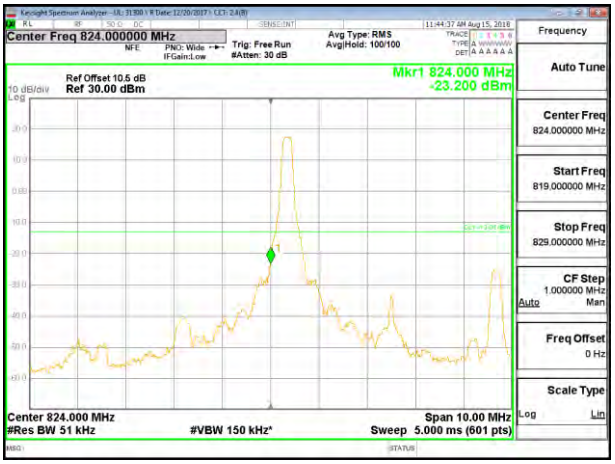
LTE B5 3MHz 16QAM High Channel RB1-0



LTE B5 3MHz 16QAM Low Channel RB15-0

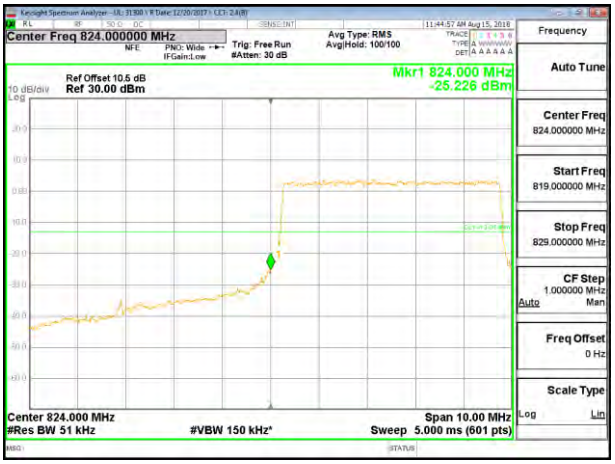


LTE B5 3MHz 16QAM High Channel RB15-0



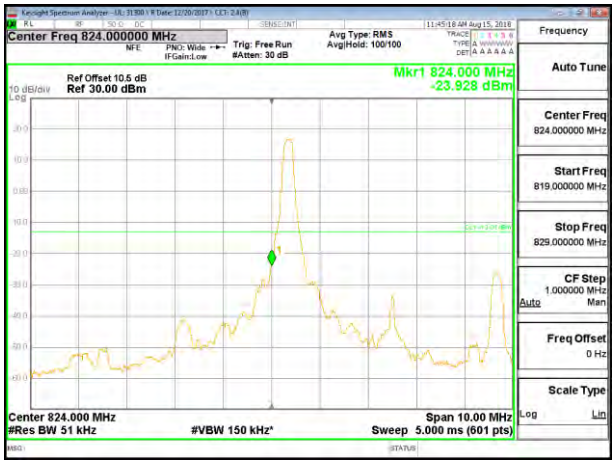
LTE B5 5MHz QPSK Low Channel RB1-0

LTE B5 5MHz QPSK High Channel RB1-0

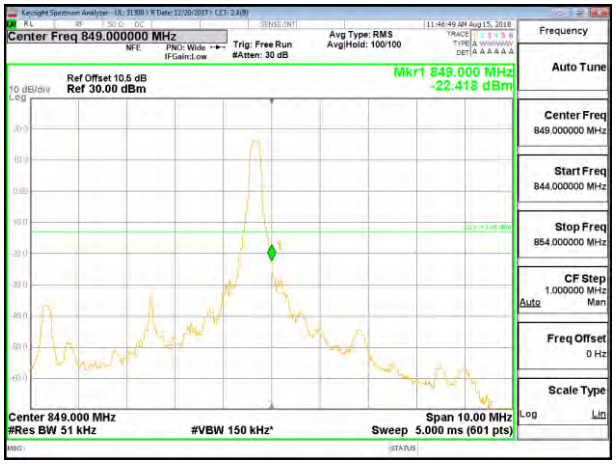


LTE B5 5MHz QPSK Low Channel RB25-0

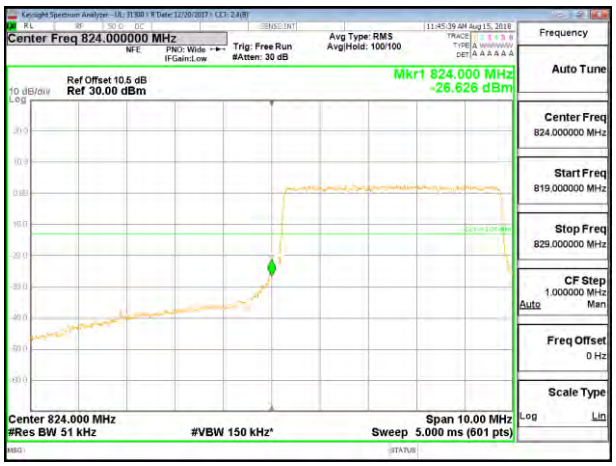
LTE B5 5MHz QPSK High Channel RB25-0



LTE B5 5MHz 16QAM Low Channel RB1-0



LTE B5 5MHz 16QAM High Channel RB1-0



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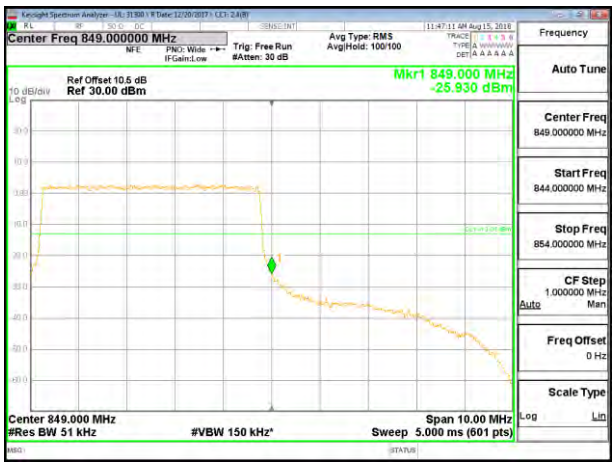
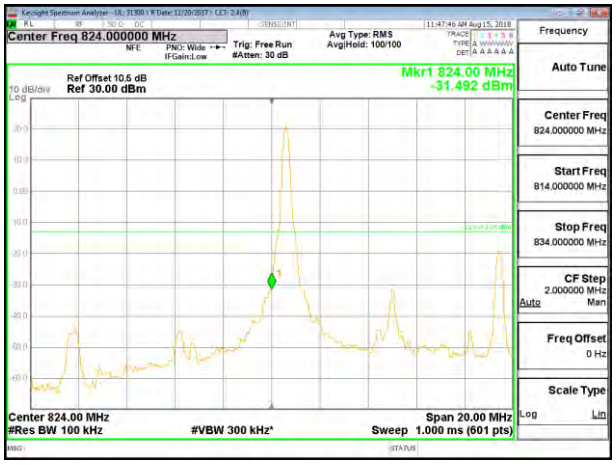
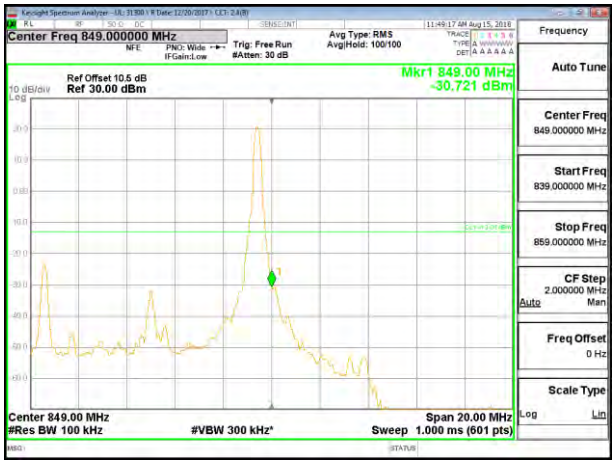


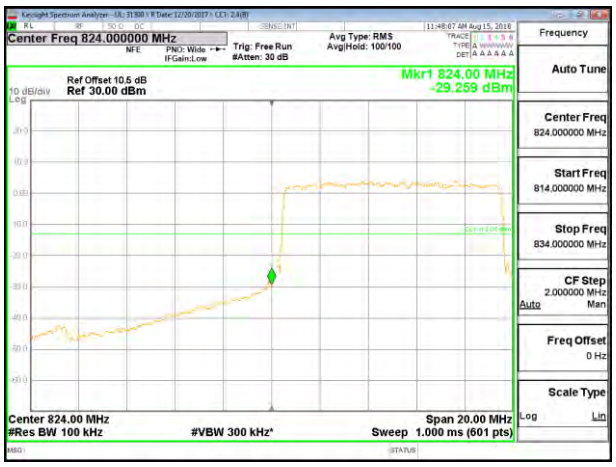
LTE B5 5MHz 16QAM High Channel RB25-0



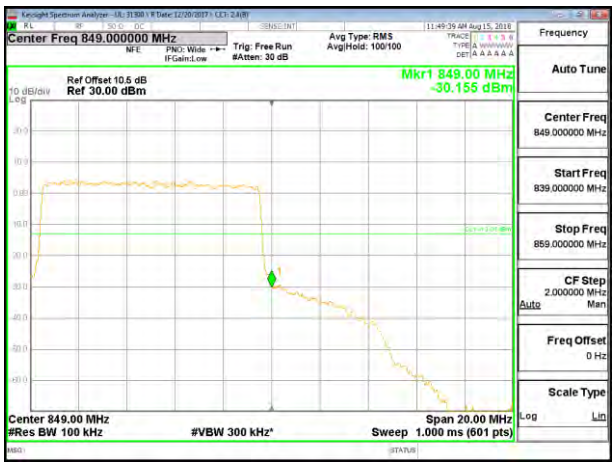
LTE B5 10MHz QPSK Low Channel RB1-0



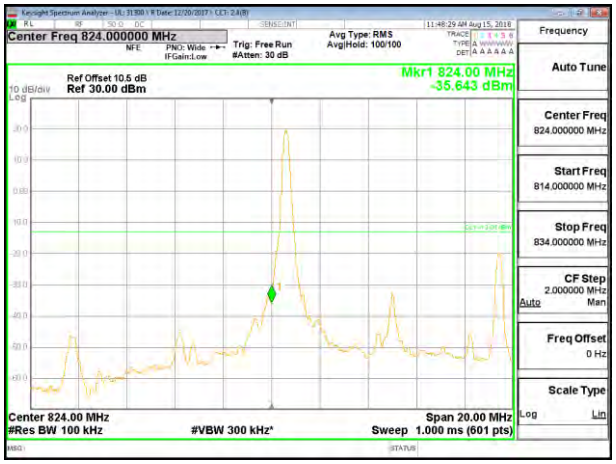
LTE B5 10MHz QPSK High Channel RB1-0



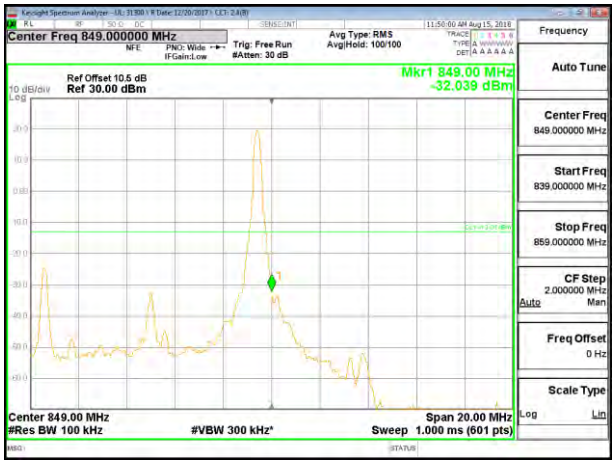
LTE B5 10MHz QPSK Low Channel RB50-0



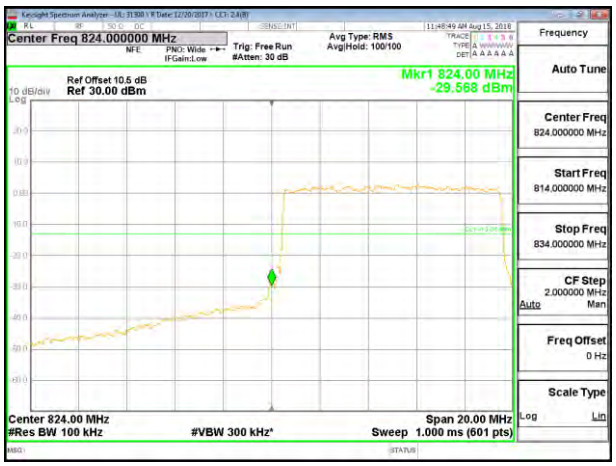
LTE B5 10MHz QPSK High Channel RB50-0



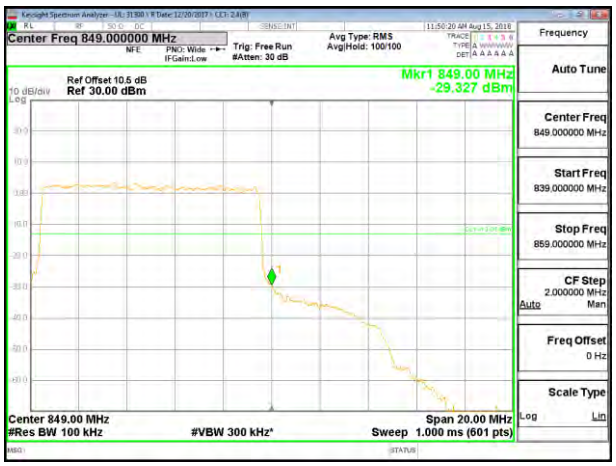
LTE B5 10MHz 16QAM Low Channel RB1-0



LTE B5 10MHz 16QAM High Channel RB1-0

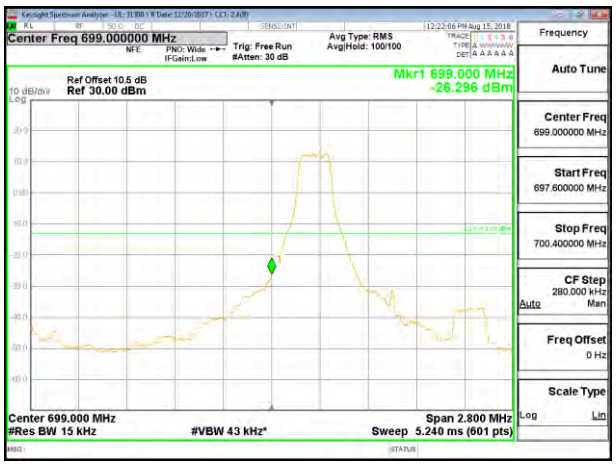


LTE B5 10MHz 16QAM Low Channel RB50-0

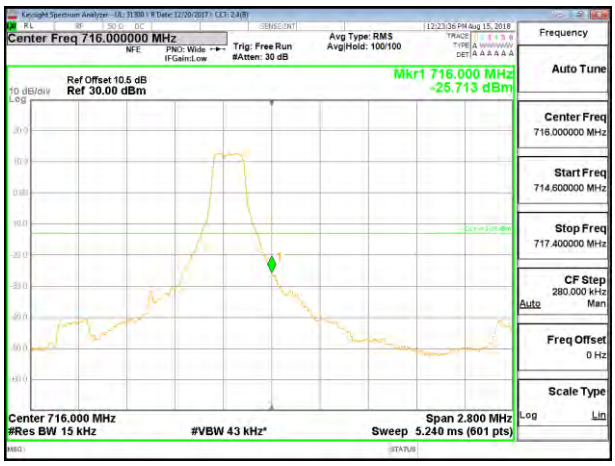


LTE B5 10MHz 16QAM High Channel RB50-0

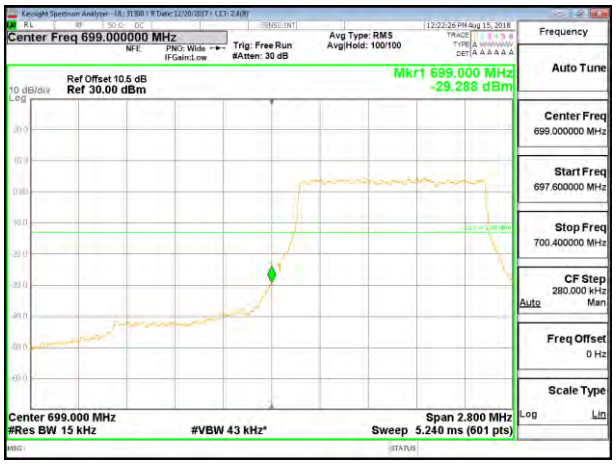
8.2.5. LTE BAND 12 BANDEDGE



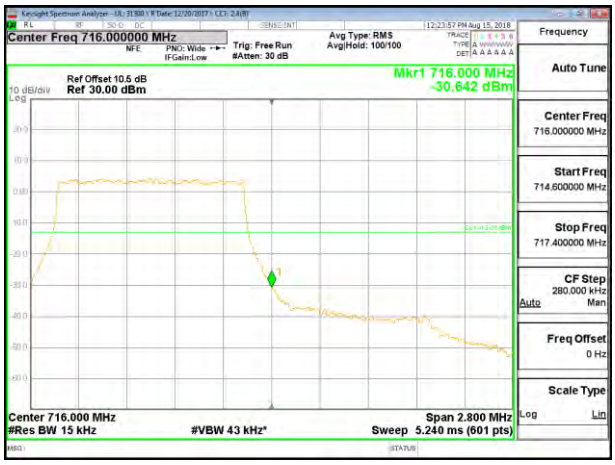
LTE B12 1.4MHz QPSK Low Channel RB1-0



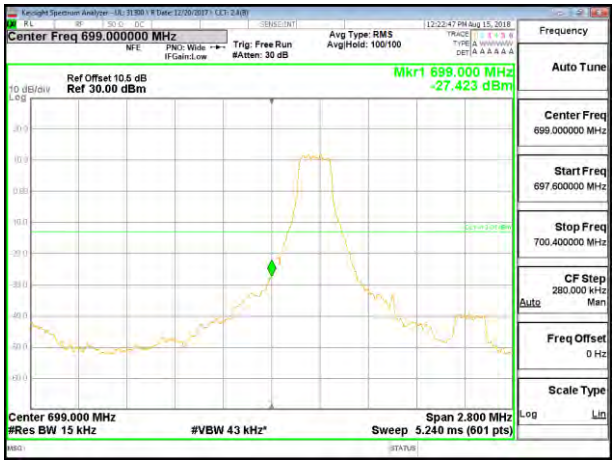
LTE B12 1.4MHz QPSK High Channel RB1-0



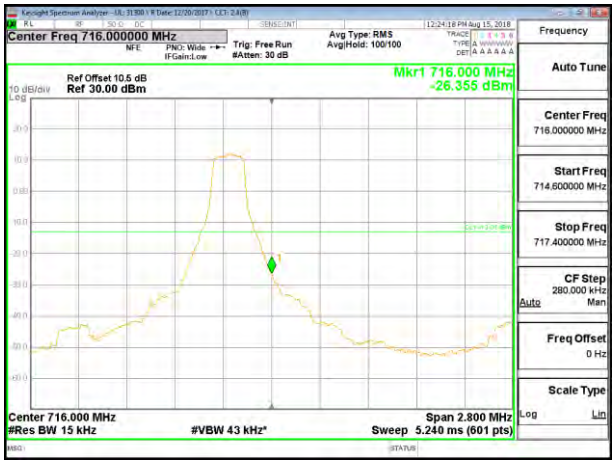
LTE B12 1.4MHz QPSK Low Channel RB6-0



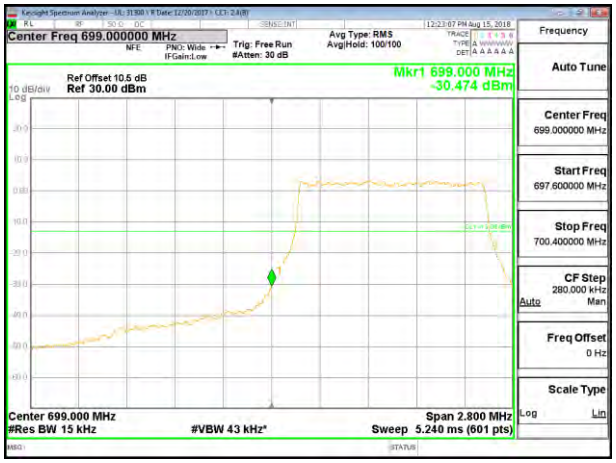
LTE B12 1.4MHz QPSK High Channel RB6-0



LTE B12 1.4MHz 16QAM Low Channel RB1-0

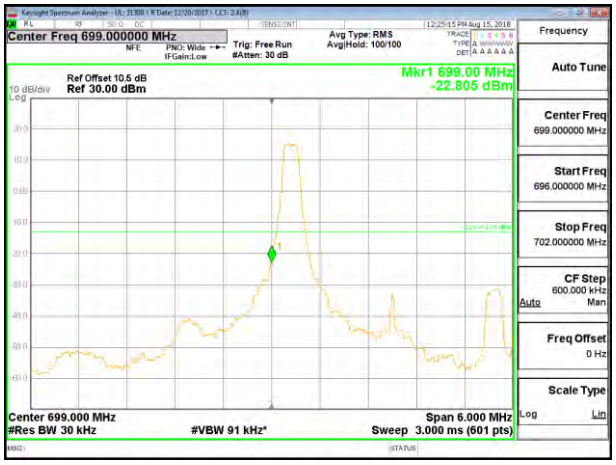


LTE B12 1.4MHz 16QAM High Channel RB1-0



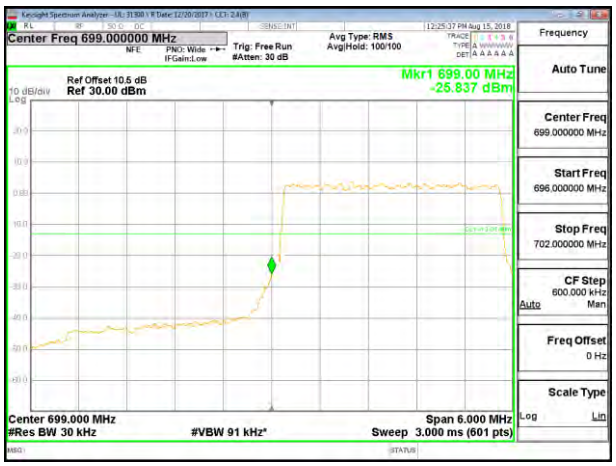
LTE B12 1.4MHz 16QAM Low Channel RB6-0

LTE B12 1.4MHz 16QAM High Channel RB6-0

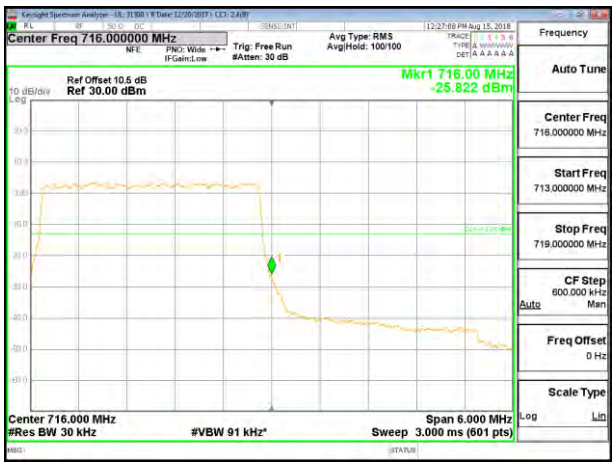


LTE B12 3MHz QPSK Low Channel RB1-0

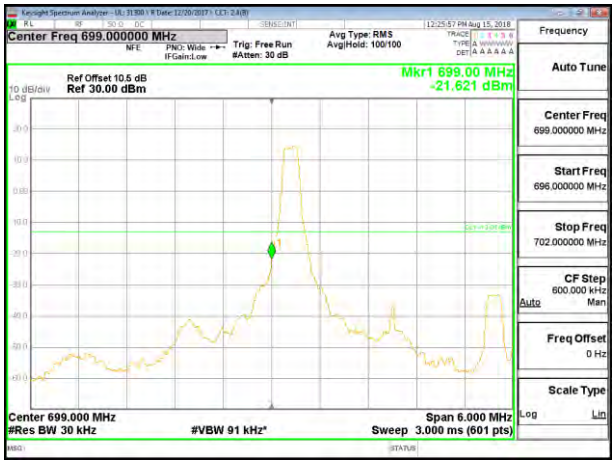
LTE B12 3MHz QPSK High Channel RB1-0



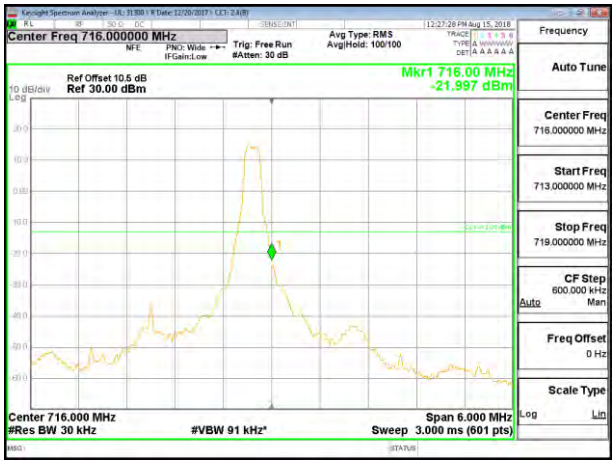
LTE B12 3MHz QPSK Low Channel RB15-0



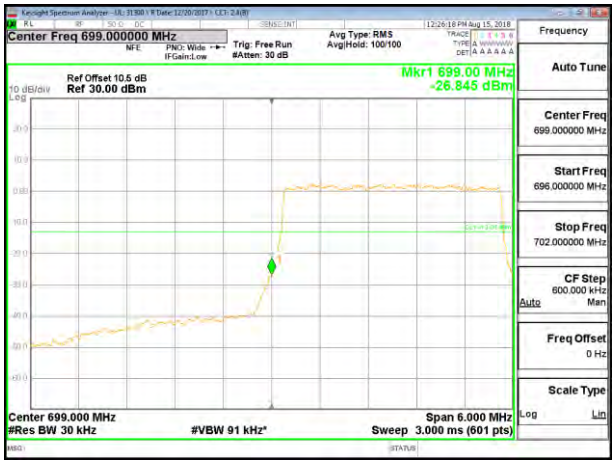
LTE B12 3MHz QPSK High Channel RB15-0



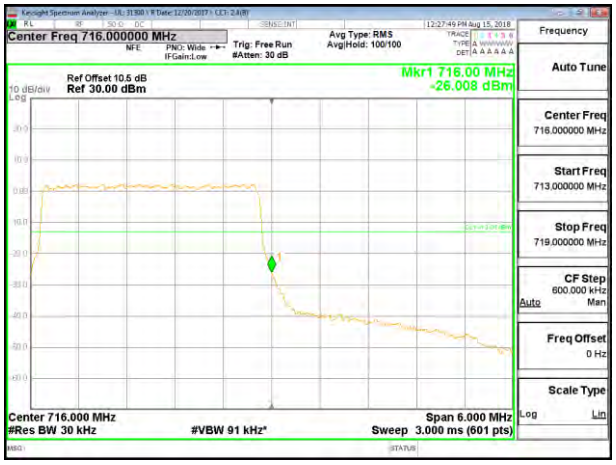
LTE B12 3MHz 16QAM Low Channel RB1-0



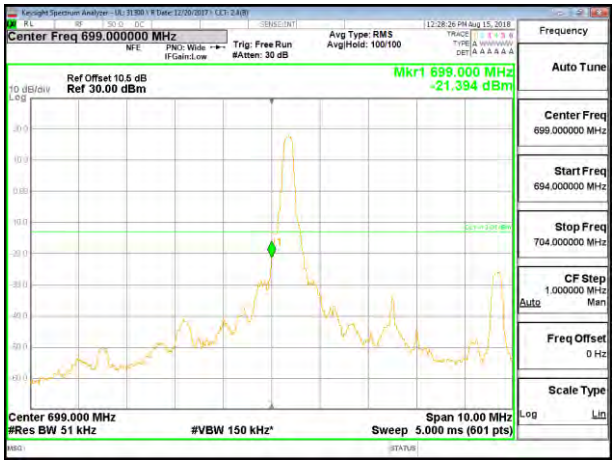
LTE B12 3MHz 16QAM High Channel RB1-0



LTE B12 3MHz 16QAM Low Channel RB15-0

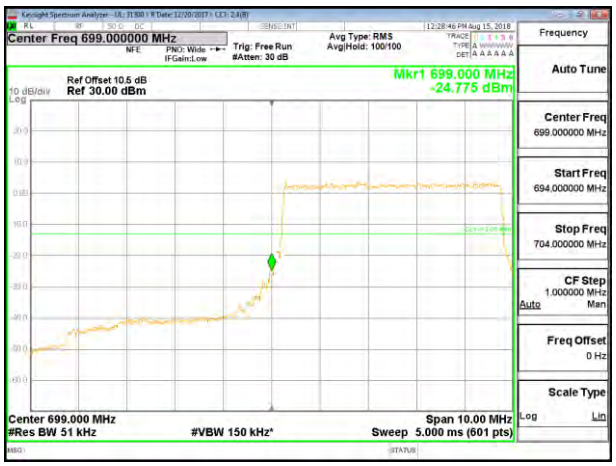


LTE B12 3MHz 16QAM High Channel RB15-0

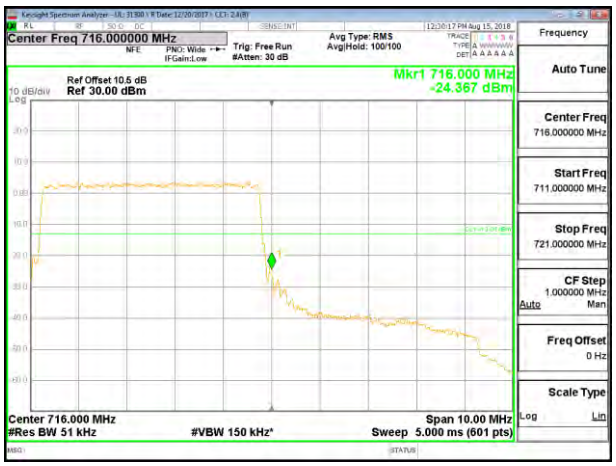


LTE B12 5MHz QPSK Low Channel RB1-0

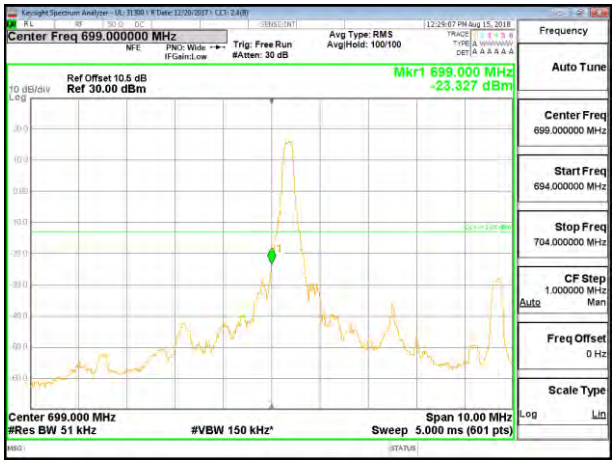
LTE B12 5MHz QPSK High Channel RB1-0



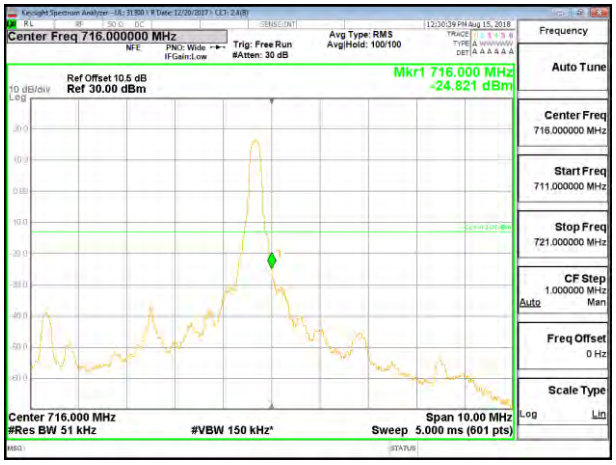
LTE B12 5MHz QPSK Low Channel RB25-0



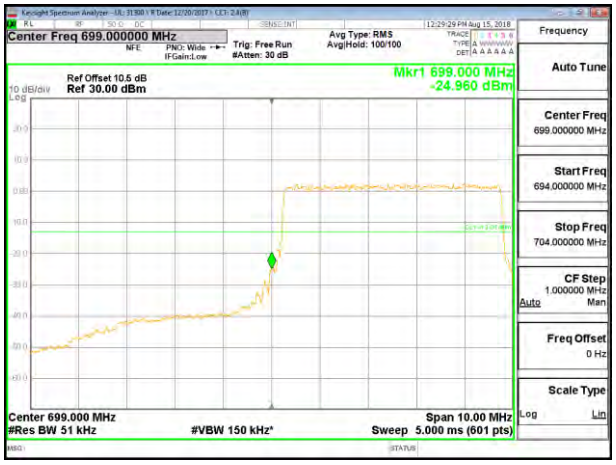
LTE B12 5MHz QPSK High Channel RB25-0



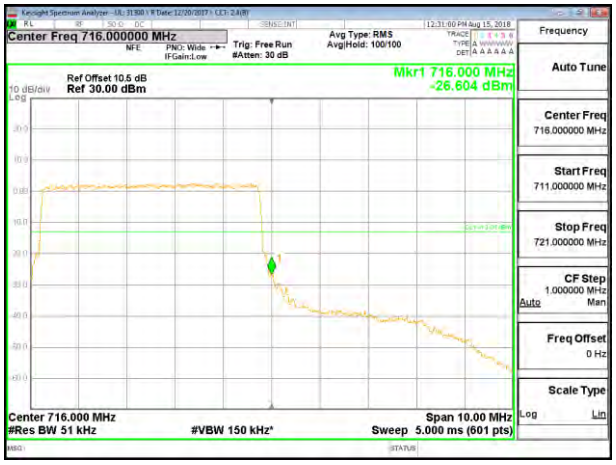
LTE B12 5MHz 16QAM Low Channel RB1-0



LTE B12 5MHz 16QAM High Channel RB1-0



LTE B12 5MHz 16QAM Low Channel RB25-0



LTE B12 5MHz 16QAM High Channel RB25-0