

Fundamental Substitution Measurement (Fc > 1GHz)
 UL LLC, Chamber N

Company: SOMC
 Project #: 16J23633Y
 Date: 08/29/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Standalone (LTE sample #1)
 Mode: LTE 41, 20M, QPSK

Test Equipment:
 Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2506.00	23.28	V	9.6	5.5	19.22	33.0	-13.8	Pk
2506.00	26.20	H	9.6	5.5	22.14	33.0	-10.9	Pk
Mid Ch								
2593.00	24.85	V	9.8	5.8	20.82	33.0	-12.2	Pk
2593.00	30.13	H	9.8	5.8	26.10	33.0	-6.9	Pk
High Ch								
2680.00	23.33	V	10.0	6.0	19.37	33.0	-13.6	Pk
2680.00	26.99	H	10.0	6.0	23.03	33.0	-10.0	Pk

Rev. 11.02.2015
 Note: For Band 4 EIRP limit is 30dBm

LTE B41 20MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
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Company: SOMC
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 Configuration: Standalone (LTE sample #1)
 Mode: LTE 41, 20M, 16QAM

Test Equipment:
 Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2506.00	23.22	V	9.6	5.5	19.16	33.0	-13.8	Pk
2506.00	26.08	H	9.6	5.5	22.02	33.0	-11.0	Pk
Mid Ch								
2593.00	24.68	V	9.8	5.8	20.65	33.0	-12.4	Pk
2593.00	29.91	H	9.8	5.8	25.88	33.0	-7.1	Pk
High Ch								
2680.00	23.27	V	10.0	6.0	19.31	33.0	-13.7	Pk
2680.00	26.91	H	10.0	6.0	22.95	33.0	-10.1	Pk

Rev. 11.02.2015
 Note: For Band 4 EIRP limit is 30dBm

LTE B41 20MHz 16QAM

10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, and §27.53.

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

Part 27: (m)(4) (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 than $43 + 10 \log (P)$ 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

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

High Frequency Substitution Measurement
UL RTP Radiated Chamber

Company: SOMC
 Project #: 16J23633Y
 Date: 08/31/2016
 Test Engineer: Brian Kievra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 12, 10MHz QPSK

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber		Pre-amplifier		Filter		Limit			
3m Chamber N-RTP	-	3m Chamber N-RTP	-	Filter	-	EIRP	-		
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta
Low Channel (704MHz)									
1.41	41.8	H	3.0	19.6	39.9	1.0	58.5	-13.0	45.5
2.11	41.0	H	3.0	15.0	40.1	1.0	54.1	-13.0	41.1
2.82	43.5	H	3.0	15.7	39.3	1.0	53.9	-13.0	40.9
1.41	41.8	V	3.0	18.4	39.9	1.0	57.3	-13.0	44.3
2.11	43.1	V	3.0	15.7	40.1	1.0	54.8	-13.0	41.8
2.82	43.5	V	3.0	14.4	39.3	1.0	52.7	-13.0	39.7
Mid Channel (707.5MHz)									
1.42	41.7	H	3.0	19.7	39.9	1.0	58.6	-13.0	45.6
2.12	41.6	H	3.0	11.5	40.1	1.0	56.6	-13.0	43.6
2.83	43.8	H	3.0	15.7	39.3	1.0	54.0	-13.0	41.0
1.42	43.0	V	3.0	19.5	39.9	1.0	58.4	-13.0	45.4
2.12	43.5	V	3.0	16.0	40.1	1.0	55.1	-13.0	42.1
2.83	43.5	V	3.0	14.4	39.3	1.0	52.7	-13.0	39.7
High Channel (711MHz)									
1.42	42.5	H	3.0	20.5	39.9	1.0	59.4	-13.0	46.4
2.13	41.0	H	3.0	14.9	40.1	1.0	54.0	-13.0	41.0
2.84	44.9	H	3.0	16.8	39.3	1.0	55.1	-13.0	42.1
1.42	42.5	V	3.0	19.0	39.9	1.0	57.9	-13.0	44.9
2.13	42.7	V	3.0	15.3	40.1	1.0	54.4	-13.0	41.4
2.84	44.7	V	3.0	15.4	39.3	1.0	53.7	-13.0	40.7

Rev: 10.28.15

LTE B12 10MHz QPSK

High Frequency Substitution Measurement
UL RTP Radiated Chamber

Company: SOMC
 Project #: 16J23633Y
 Date: 08/31/2016
 Test Engineer: Brian Kievra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 12, 10MHz 16QAM

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber		Pre-amplifier		Filter		Limit			
3m Chamber N-RTP	-	3m Chamber N-RTP	-	Filter	-	EIRP	-		
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta
Low Channel (704MHz)									
1.41	41.8	H	3.0	19.8	39.9	1.0	58.8	-13.0	45.8
2.11	40.9	H	3.0	13.8	40.1	1.0	53.6	-13.0	40.6
2.82	43.5	H	3.0	15.6	39.3	1.0	53.8	-13.0	40.8
1.41	42.0	V	3.0	18.6	39.9	1.0	57.5	-13.0	44.5
2.11	43.1	V	3.0	15.8	40.1	1.0	54.7	-13.0	41.7
2.82	43.7	V	3.0	14.6	39.3	1.0	52.6	-13.0	39.6
Mid Channel (707.5MHz)									
1.42	41.4	H	3.0	19.4	39.9	1.0	58.3	-13.0	45.3
2.12	41.2	H	3.0	12.2	40.1	1.0	53.3	-13.0	40.3
2.83	43.9	H	3.0	15.9	39.3	1.0	54.1	-13.0	41.1
1.42	42.8	V	3.0	19.3	39.9	1.0	58.2	-13.0	45.2
2.12	43.6	V	3.0	16.1	40.1	1.0	55.2	-13.0	42.2
2.83	44.1	V	3.0	15.0	39.3	1.0	53.2	-13.0	40.2
High Channel (711MHz)									
1.42	43.0	H	3.0	21.1	39.9	1.0	59.9	-13.0	46.9
2.13	40.6	H	3.0	14.6	40.1	1.0	53.7	-13.0	40.7
2.84	44.1	H	3.0	16.1	39.3	1.0	54.3	-13.0	41.3
1.42	42.6	V	3.0	19.1	39.9	1.0	58.6	-13.0	45.6
2.13	43.2	V	3.0	15.7	40.1	1.0	54.8	-13.0	41.8
2.84	44.7	V	3.0	15.5	39.3	1.0	53.7	-13.0	40.7

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LTE B12 10MHz 16QAM

LTE BAND 17

**High Frequency Substitution Measurement
UL RTP Radiated Chamber**

Company: SOMC
 Project #: 16J23633Y
 Date: 08/30/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 17, 5MHz, QPSK

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber		Pre-amplifier		Filter		Limit			
3m Chamber N-RTP		3m Chamber N-RTP		Filter		EIRP			
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta
Low Channel (706.5MHz)									
1.41	61.9	H	3.0	-19.9	39.9	1.0	-58.8	-13.0	-45.8
2.12	-59.6	H	3.0	-13.6	40.1	1.0	-52.7	-13.0	-39.7
2.84	-63.6	H	3.0	-15.6	39.3	1.0	-53.9	-13.0	-40.0
Mid Channel (710MHz)									
1.41	60.6	H	3.0	-17.2	39.9	1.0	-56.1	-13.0	-43.1
2.12	-60.9	V	3.0	-13.4	40.1	1.0	-52.6	-13.0	-39.6
2.84	-63.7	V	3.0	-14.5	39.3	1.0	-52.6	-13.0	-39.8
High Channel (713.5)									
1.43	61.4	H	3.0	-19.4	39.9	1.0	-58.2	-13.0	-45.2
2.14	-59.0	H	3.0	-10.0	40.1	1.0	-49.0	-13.0	-36.0
2.85	-63.8	H	3.0	-15.7	39.3	1.0	-54.0	-13.0	-41.0

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LTE B17 5MHz QPSK

**High Frequency Substitution Measurement
UL RTP Radiated Chamber**

Company: SOMC
 Project #: 16J23633Y
 Date: 08/30/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 17, 5MHz, 16QAM

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber		Pre-amplifier		Filter		Limit			
3m Chamber N-RTP		3m Chamber N-RTP		Filter		EIRP			
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta
Low Channel (706.5MHz)									
1.41	62.1	H	3.0	-20.1	39.9	1.0	-59.0	-13.0	-46.0
2.12	-59.4	H	3.0	-13.3	40.1	1.0	-52.4	-13.0	-39.4
2.84	-63.7	H	3.0	-15.7	39.3	1.0	-54.0	-13.0	-41.0
Mid Channel (710MHz)									
1.41	60.1	H	3.0	-16.7	39.9	1.0	-56.6	-13.0	-42.6
2.12	-60.6	V	3.0	-13.1	40.1	1.0	-52.2	-13.0	-39.2
2.84	-63.9	V	3.0	-14.7	39.3	1.0	-53.0	-13.0	-40.0
High Channel (713.5)									
1.43	60.8	H	3.0	-18.8	39.9	1.0	-57.6	-13.0	-44.6
2.14	-58.0	H	3.0	-10.5	40.1	1.0	-49.0	-13.0	-36.0
2.85	-63.7	H	3.0	-15.7	39.3	1.0	-54.0	-13.0	-40.0

Rev. 10.28.15

LTE B17 5MHz 16QAM

**High Frequency Substitution Measurement
UL RTP Radiated Chamber**

Company: SOMC
 Project #: 16J23633Y
 Date: 08/30/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 17, 10MHz, QPSK

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber		Pre-amplifier		Filter		Limit			
3m Chamber N-RTP		3m Chamber N-RTP		Filter		EIRP			
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta
Mid Channel (710MHz)									
1.42	61.5	H	3.0	-19.5	39.9	1.0	-58.4	-13.0	-45.4
2.13	-59.1	H	3.0	-9.1	40.1	1.0	-48.2	-13.0	-35.2
2.84	-63.2	H	3.0	-15.1	39.3	1.0	-53.4	-13.0	-40.4
High Channel (713.5)									
1.43	61.4	H	3.0	-17.9	39.9	1.0	-56.7	-13.0	-43.7
2.13	-58.9	V	3.0	-11.4	40.1	1.0	-50.5	-13.0	-37.5
2.84	-63.1	V	3.0	-13.9	39.3	1.0	-52.2	-13.0	-39.2

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LTE B17 10MHz QPSK

**High Frequency Substitution Measurement
UL RTP Radiated Chamber**

Company: SOMC
 Project #: 16J23633Y
 Date: 08/30/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 17, 10MHz, 16QAM

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber		Pre-amplifier		Filter		Limit			
3m Chamber N-RTP		3m Chamber N-RTP		Filter		EIRP			
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta
Mid Channel (710MHz)									
1.42	60.9	H	3.0	-19.0	39.9	1.0	-57.8	-13.0	-44.8
2.13	-55.3	H	3.0	-9.2	40.1	1.0	-48.3	-13.0	-35.3
2.84	-63.3	H	3.0	-15.2	39.3	1.0	-53.5	-13.0	-40.3
High Channel (713.5)									
1.43	61.0	V	3.0	-17.4	39.9	1.0	-56.3	-13.0	-43.3
2.14	-58.5	V	3.0	-12.0	40.1	1.0	-52.1	-13.0	-39.1
2.85	-63.7	V	3.0	-14.4	39.3	1.0	-52.7	-13.0	-39.7

Rev. 10.28.15

LTE B17 10MHz 16QAM

High Frequency Substitution Measurement
UL RTP Radiated Chamber

Company: SOMC
 Project #: 16J23633Y
 Date: 09/01/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 41, 20MHz QPSK

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber	Pre-amplifier	Filter	Limit
3m Chamber N-RTP	3m Chamber N-RTP	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	ERP @ TX Ant End (dBm)	Preamp	Attenuator	ERP	Limit	Delta
Low Channel (2500MHz)									
5.01	63.9	H	3.0	10.9	40.3	1.0	50.2	25.0	25.2
7.52	66.4	H	3.0	9.7	38.0	1.0	47.7	25.0	22.7
10.02	67.5	H	3.0	8.3	38.3	1.0	45.6	25.0	20.6
5.01	63.2	V	3.0	10.9	40.3	1.0	50.2	25.0	25.2
7.52	66.1	V	3.0	10.1	38.0	1.0	48.0	25.0	23.0
10.02	67.2	V	3.0	7.9	38.3	1.0	45.3	25.0	20.3
Mid Channel (2500MHz)									
5.19	61.5	H	3.0	10.6	40.3	1.0	49.9	25.0	24.9
7.70	66.0	H	3.0	9.3	38.0	1.0	47.1	25.0	22.1
10.37	66.8	H	3.0	7.2	38.3	1.0	44.5	25.0	19.5
5.19	62.7	V	3.0	9.9	40.3	1.0	49.2	25.0	24.2
7.70	66.0	V	3.0	8.5	38.0	1.0	47.3	25.0	22.3
10.37	67.2	V	3.0	7.6	38.3	1.0	44.9	25.0	19.9
High Channel (2600MHz)									
5.36	61.0	H	3.0	11.8	40.2	1.0	51.0	25.0	26.0
8.04	67.0	H	3.0	7.9	38.8	1.0	47.7	25.0	22.7
10.72	68.0	H	3.0	7.9	38.3	1.0	45.7	25.0	20.7
5.36	63.9	V	3.0	10.8	40.2	1.0	50.0	25.0	25.0
8.04	66.1	V	3.0	9.3	38.8	1.0	47.3	25.0	22.3
10.72	67.6	V	3.0	7.7	38.3	1.0	45.0	25.0	20.0

Rev: 10.28.15

LTE B41 20MHz QPSK

High Frequency Substitution Measurement
UL RTP Radiated Chamber

Company: SOMC
 Project #: 16J23633Y
 Date: 09/01/2016
 Test Engineer: Brian Kiewra / John Manser
 Configuration: Unit with ear-buds and charger (LTE #1)
 Mode: LTE Band 41, 20MHz 16QAM

Test Equipment:
 Substitution: Horn AT0078 Substitution, and CBL010 SMA Cable

Chamber	Pre-amplifier	Filter	Limit
3m Chamber N-RTP	3m Chamber N-RTP	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	ERP @ TX Ant End (dBm)	Preamp	Attenuator	ERP	Limit	Delta
Low Channel (2500MHz)									
5.01	63.9	H	3.0	11.2	40.3	1.0	50.5	25.0	25.5
7.52	66.4	H	3.0	9.9	38.0	1.0	47.8	25.0	22.8
10.02	67.3	H	3.0	8.1	38.3	1.0	45.4	25.0	20.4
5.01	63.2	V	3.0	10.6	40.3	1.0	49.9	25.0	24.9
7.52	66.1	V	3.0	9.9	38.0	1.0	47.8	25.0	22.8
10.02	67.2	V	3.0	8.0	38.3	1.0	45.3	25.0	20.3
Mid Channel (2500MHz)									
5.19	61.5	H	3.0	10.5	40.3	1.0	49.8	25.0	24.8
7.70	66.1	H	3.0	8.4	38.0	1.0	46.2	25.0	21.2
10.37	66.9	H	3.0	7.3	38.3	1.0	44.6	25.0	19.6
5.19	62.8	V	3.0	10.0	40.3	1.0	49.4	25.0	24.4
7.70	66.0	V	3.0	9.5	38.0	1.0	47.3	25.0	22.3
10.37	67.4	V	3.0	7.8	38.3	1.0	45.1	25.0	20.1
High Channel (2600MHz)									
5.36	61.0	H	3.0	11.7	40.2	1.0	50.9	25.0	25.9
8.04	66.5	H	3.0	9.4	38.8	1.0	47.2	25.0	22.2
10.72	67.7	H	3.0	7.6	38.3	1.0	44.9	25.0	19.9
5.36	63.9	V	3.0	10.8	40.2	1.0	50.0	25.0	25.0
8.04	66.1	V	3.0	9.3	38.8	1.0	47.1	25.0	22.1
10.72	68.4	V	3.0	8.5	38.3	1.0	45.8	25.0	20.8

Rev: 10.28.15

LTE B41 20MHz 16QAM