

8.4.13. LTE BAND 71

ID:	44366	Date:	3/26/18
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QPSK, (20MHz BANDWIDTH)

Limit		663	698	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	663.7505	697.2739		
Extreme (50C)		663.7505	697.2739	19.4	0.028
Extreme (40C)		663.7505	697.2739	21.7	0.032
Extreme (30C)		663.7505	697.2739	15.6	0.023
Extreme (10C)		663.7505	697.2739	25.6	0.038
Extreme (0C)		663.7505	697.2739	20.0	0.029
Extreme (-10C)		663.7505	697.2739	6.4	0.009
Extreme (-20C)		663.7505	697.2739	3.7	0.005
Extreme (-30C)		663.7505	697.2739	20.2	0.030
20C		15%	663.7505	697.2739	20.4
	-15%	663.7505	697.2739	18.5	0.027
	End Point	663.7505	697.2739	21.3	0.031

8.5. PEAK-TO-AVERAGE POWER RATIO

LIMIT

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

MODES TESTED

- LTE Band 2
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66
- LTE Band 71

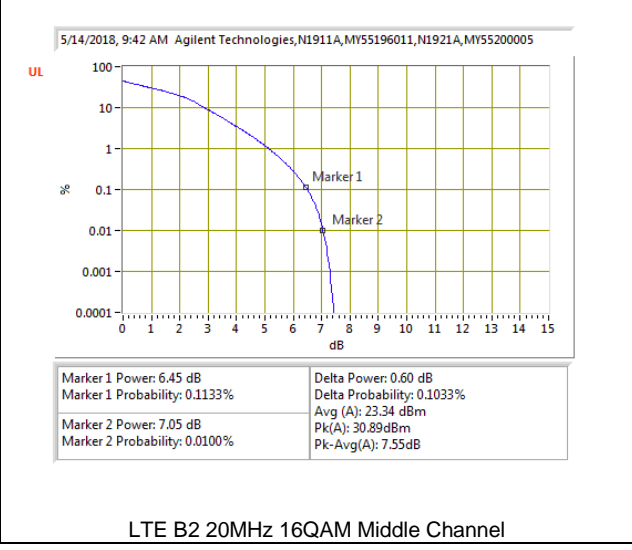
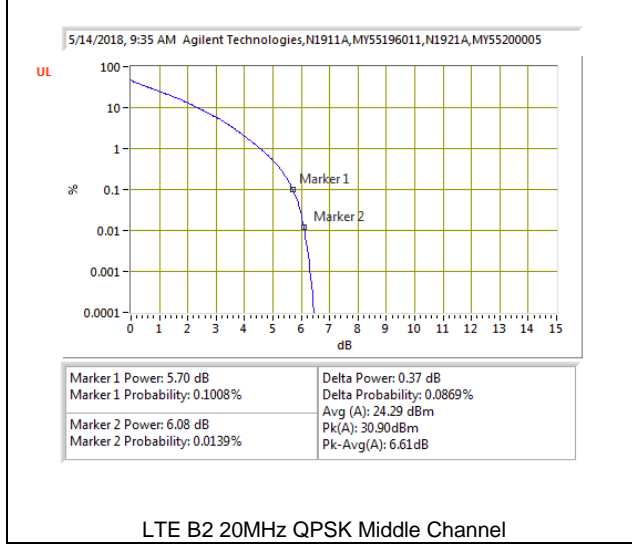
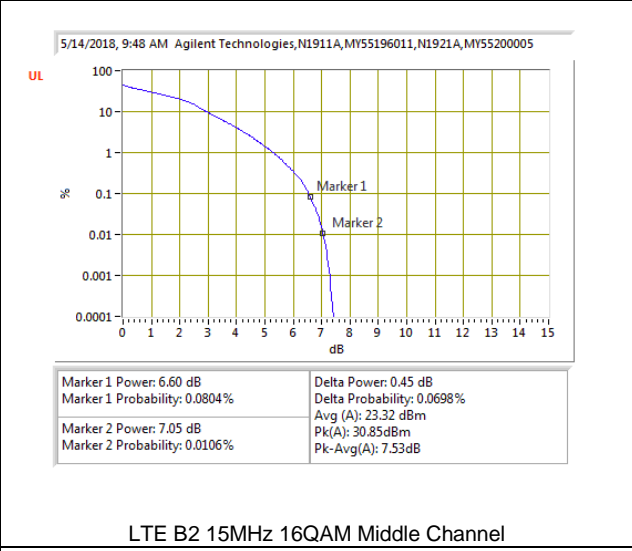
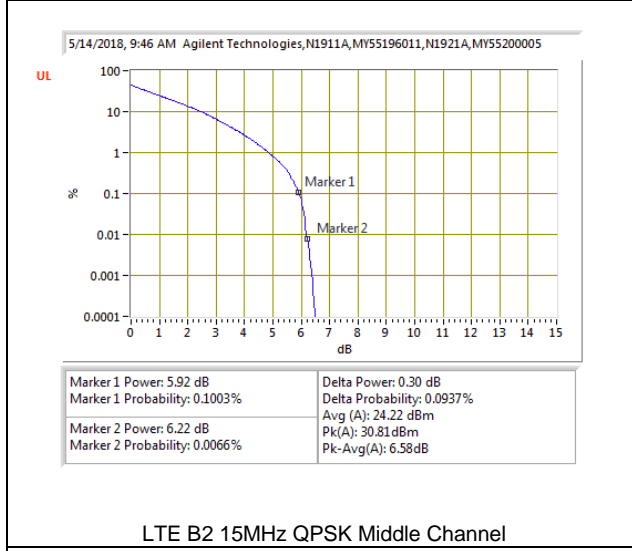
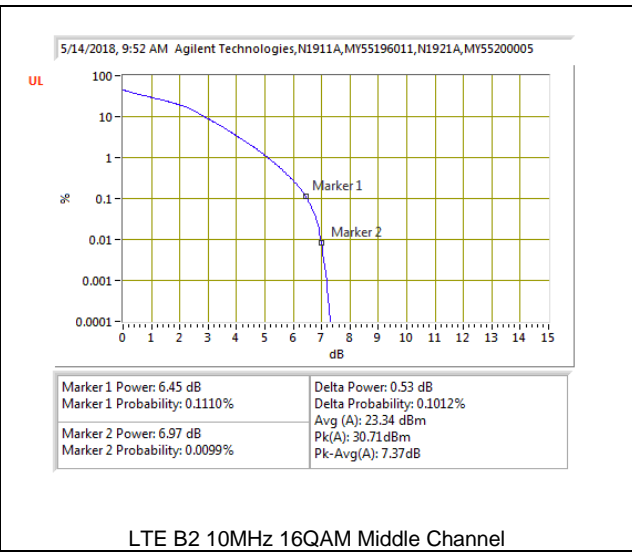
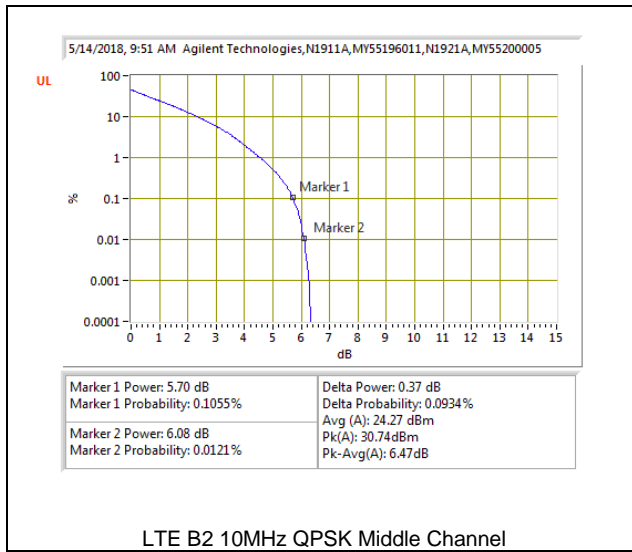
RESULT

Port A antenna was used to measure as the worst case; full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

ID:	38602	Date:	5/14/18
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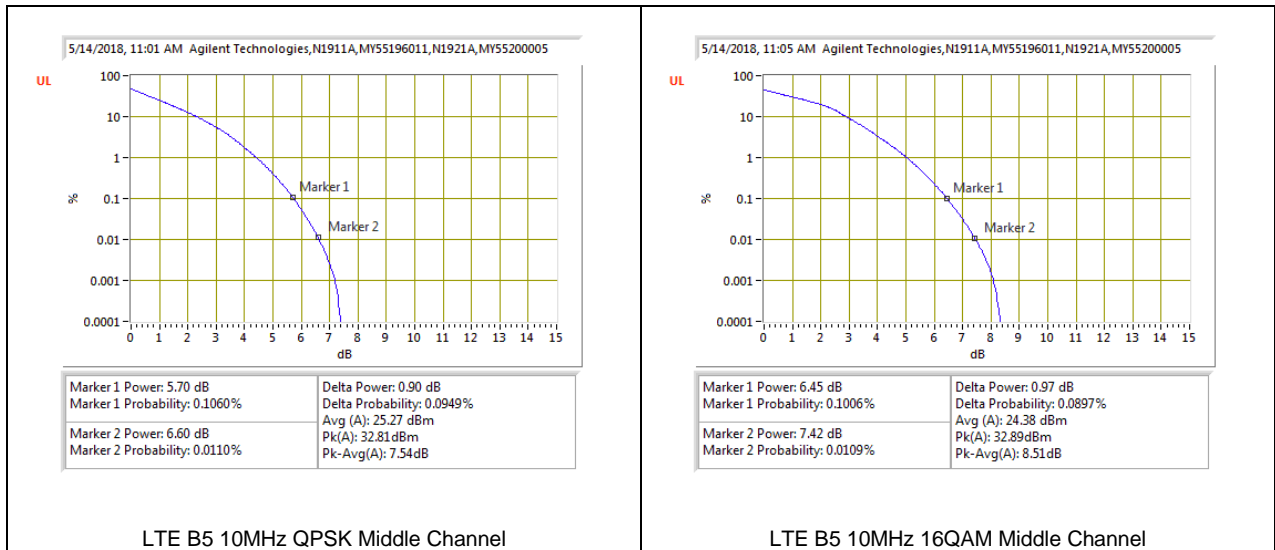
8.5.1. LTE BAND 2



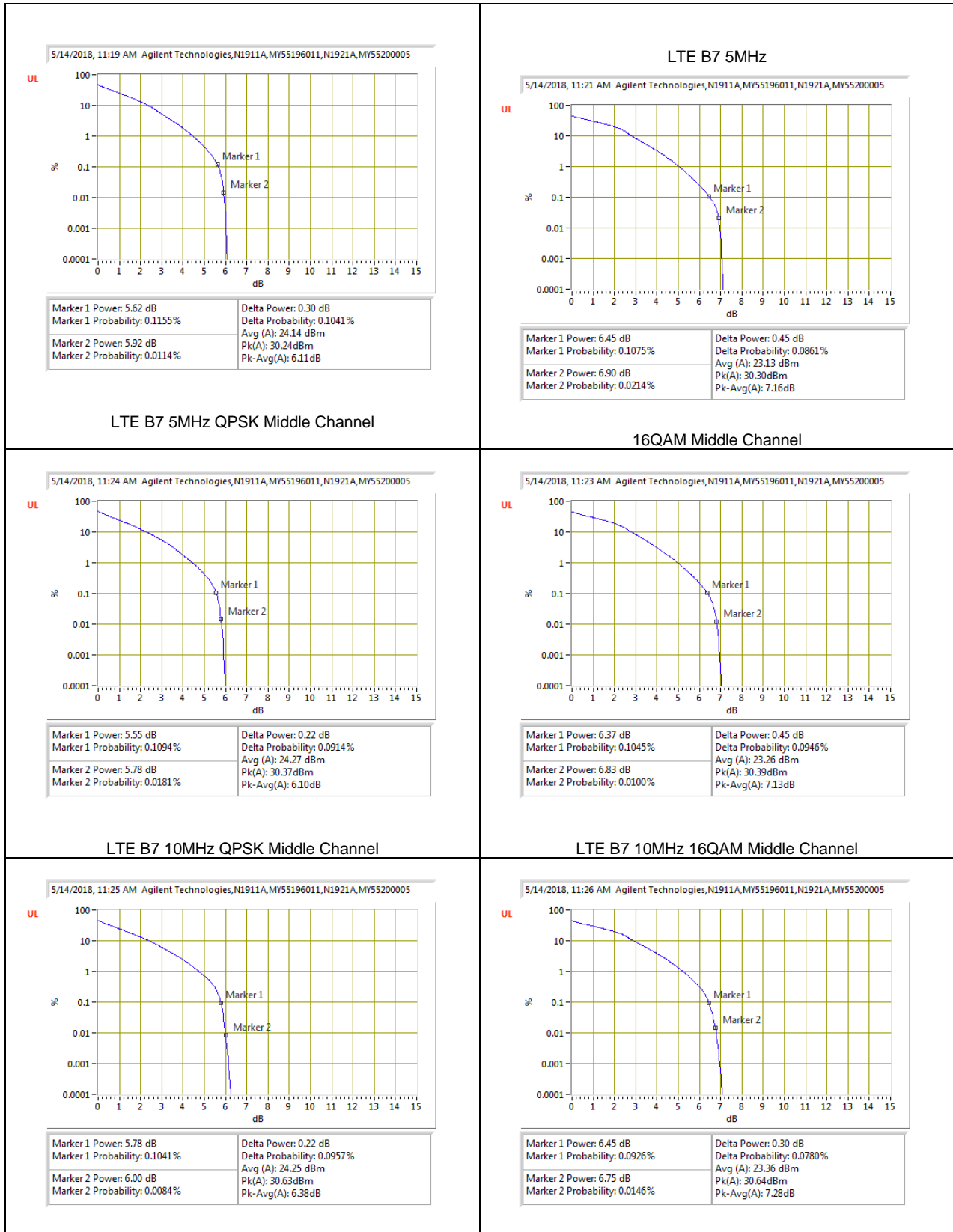


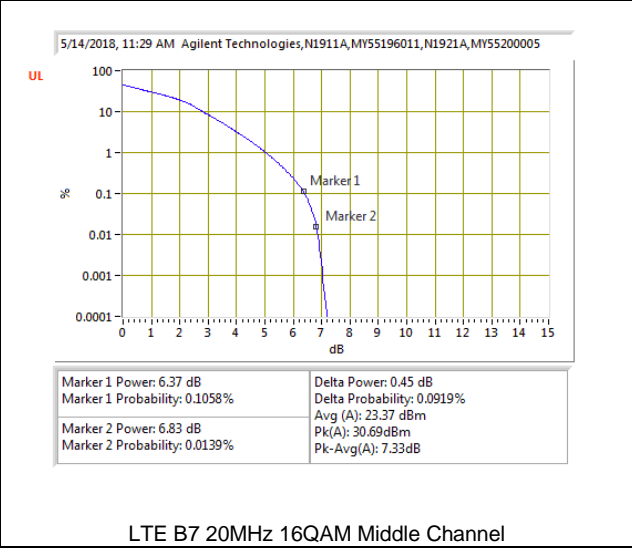
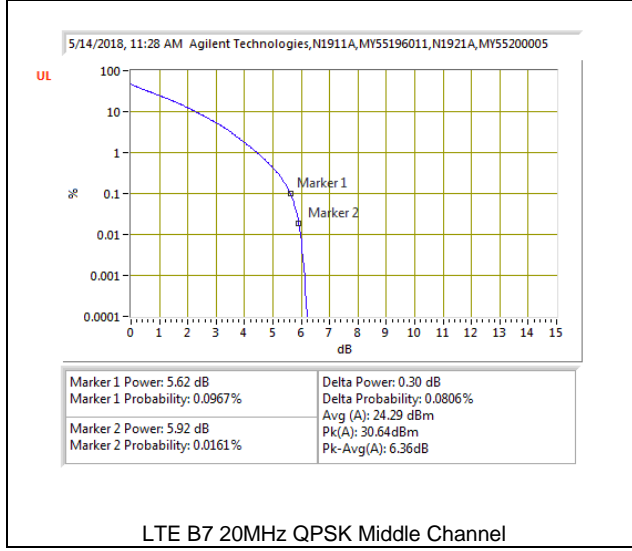
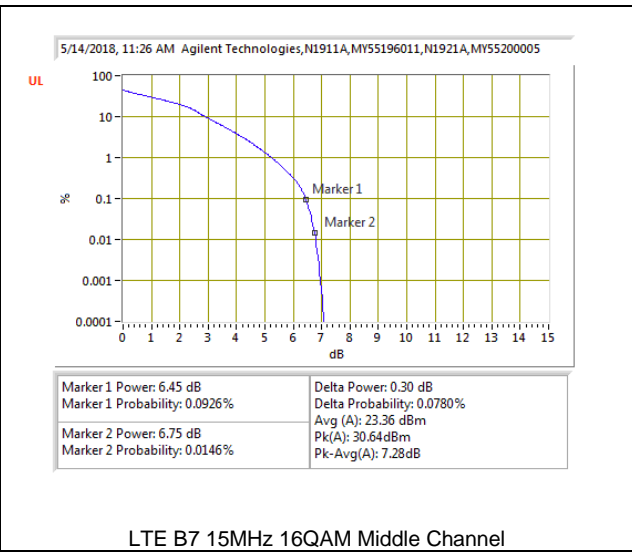
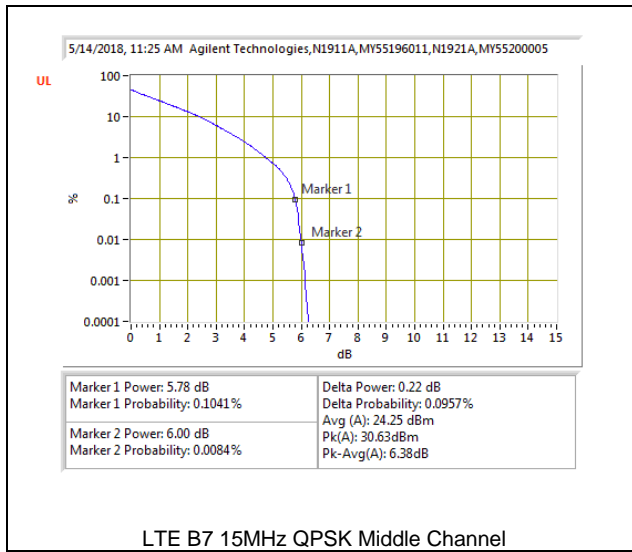
8.5.2. LTE BAND 5





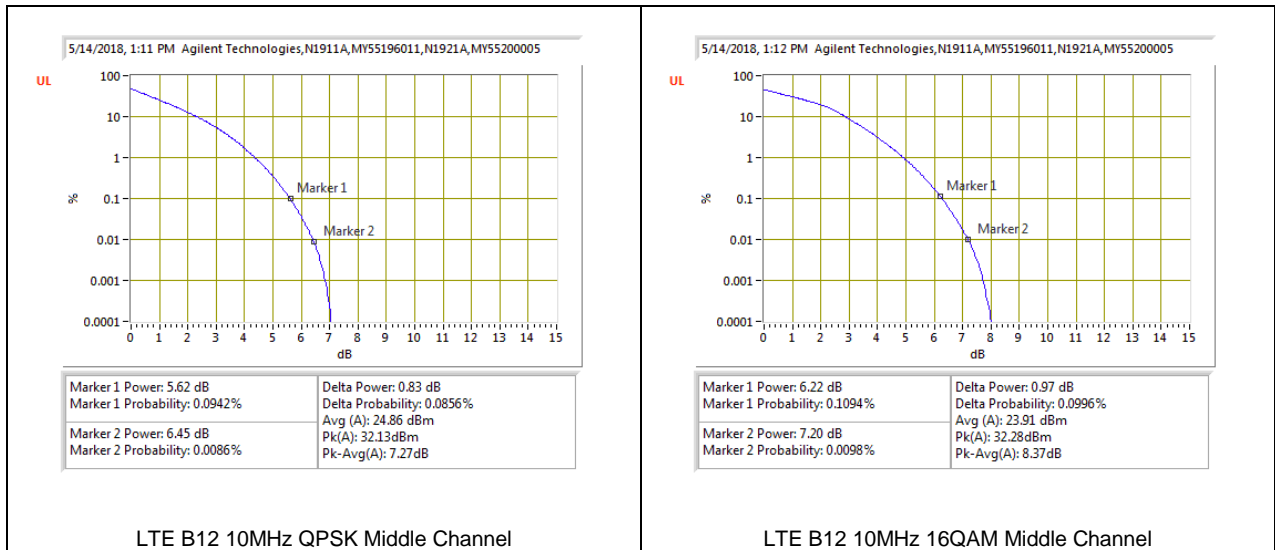
8.5.3. LTE BAND 7



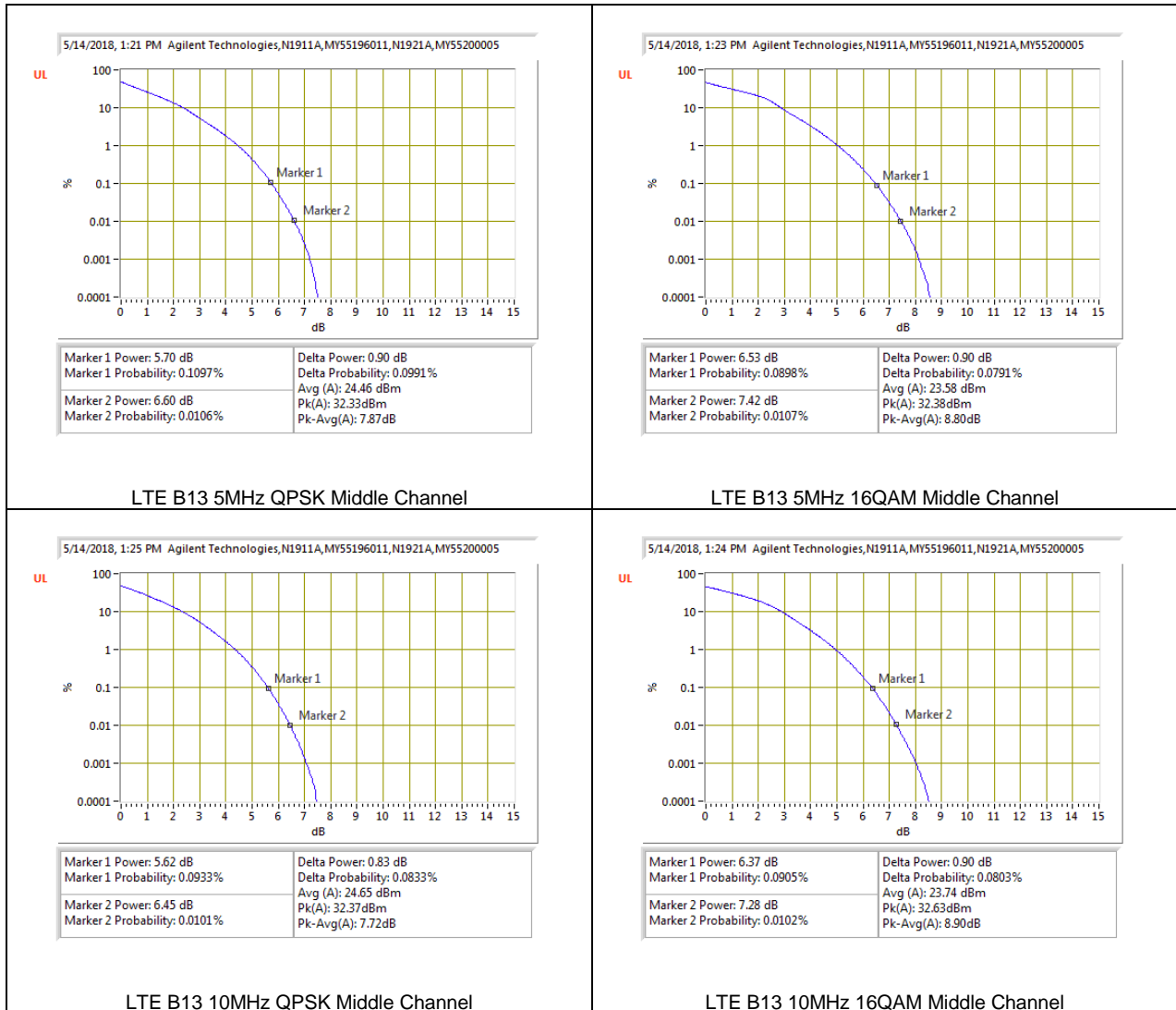


8.5.4. LTE BAND 12

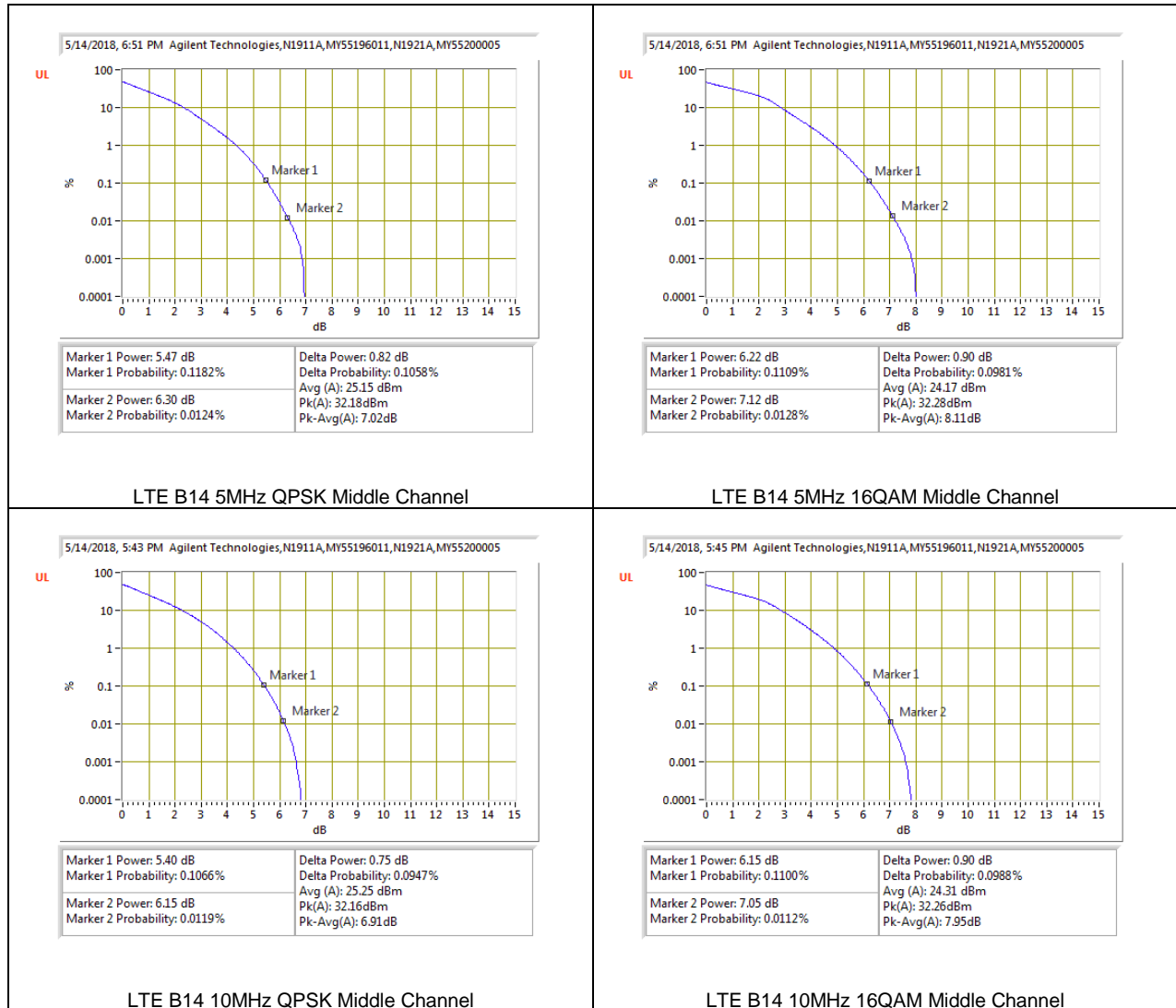




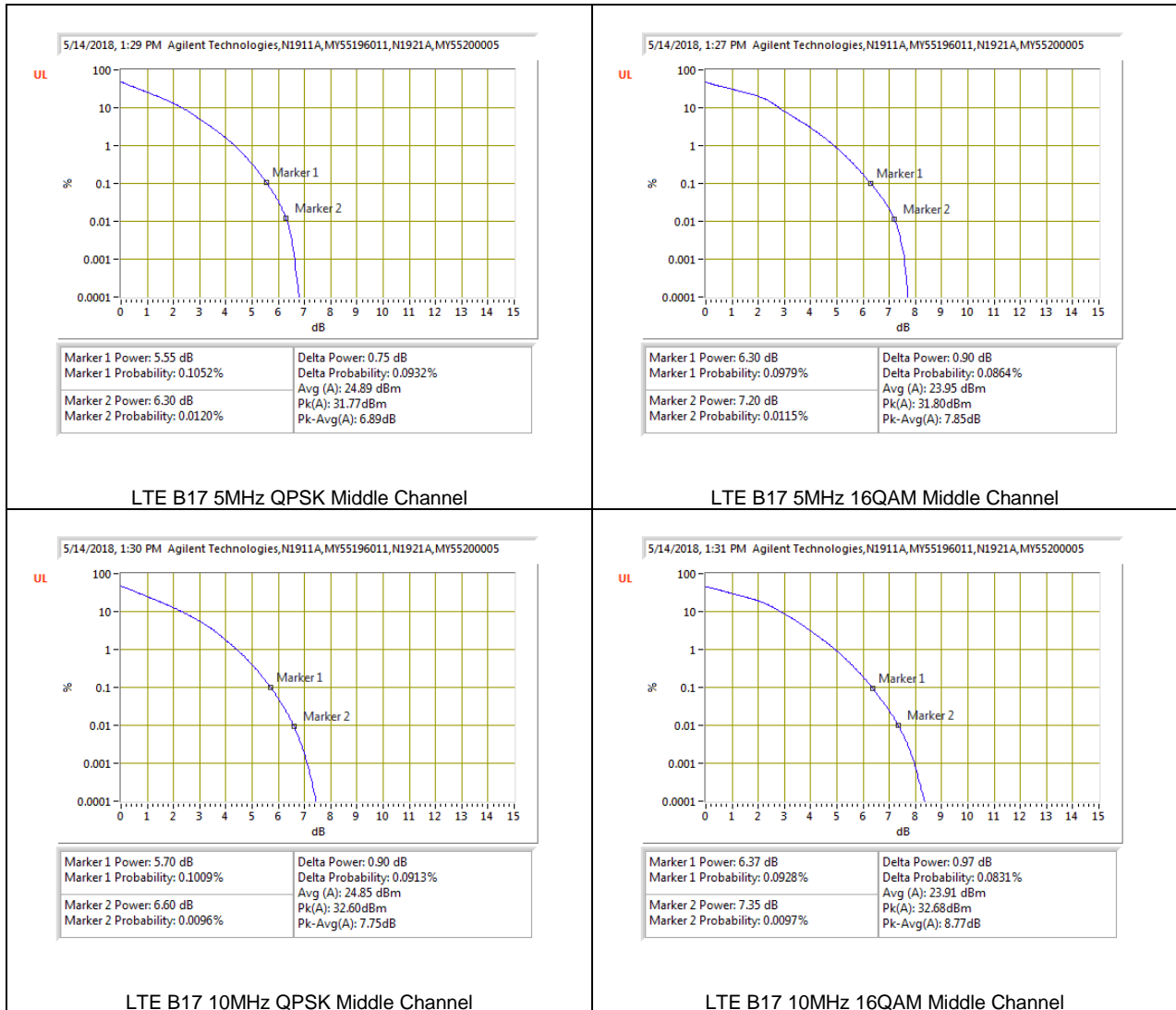
8.5.5. LTE BAND 13



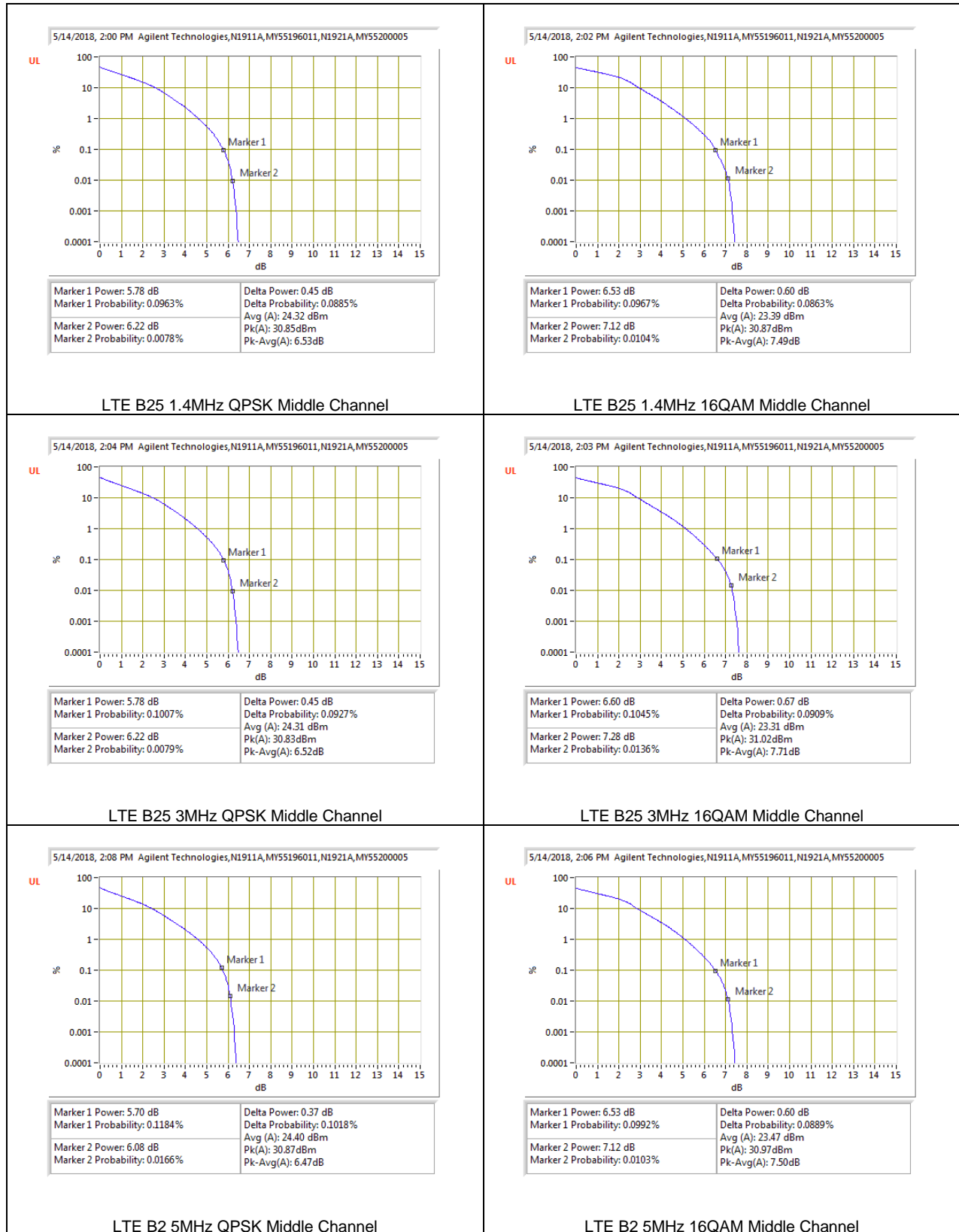
8.5.6. LTE BAND 14

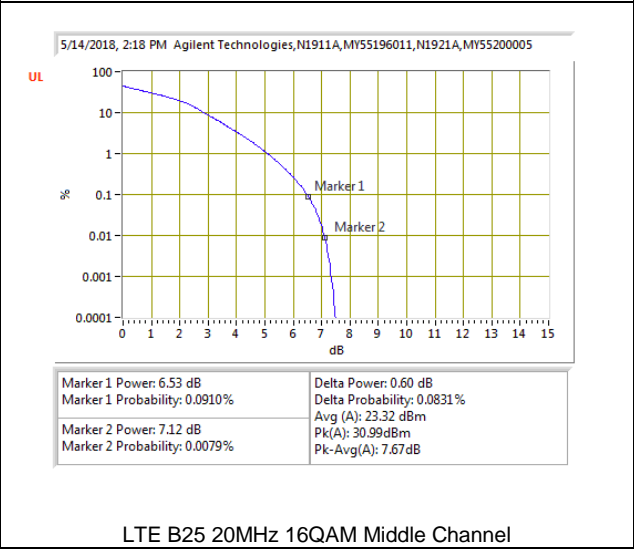
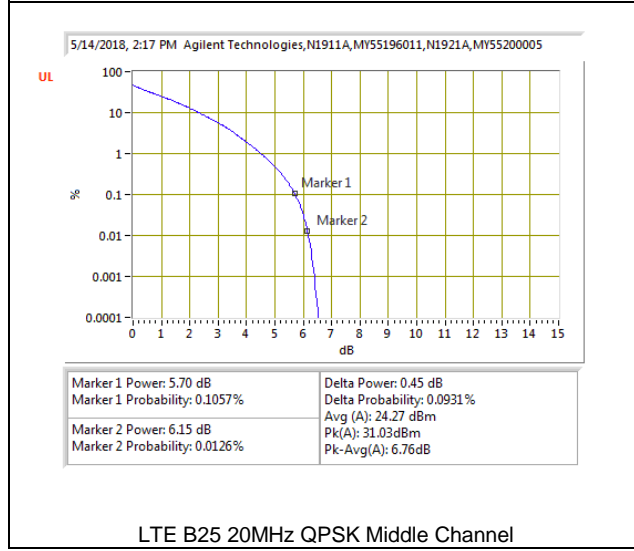
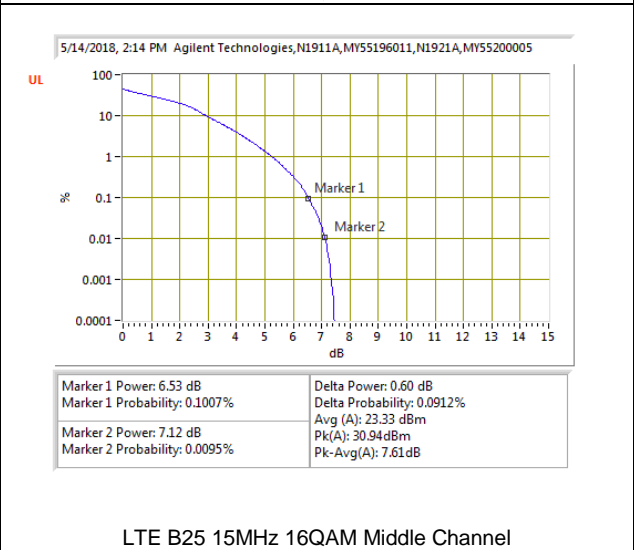
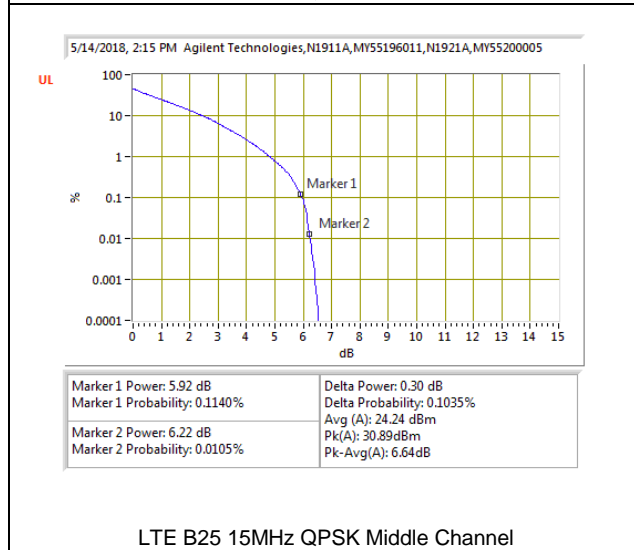
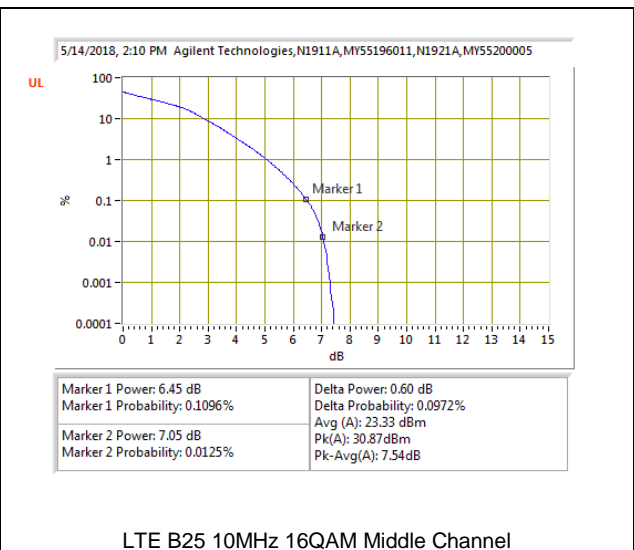
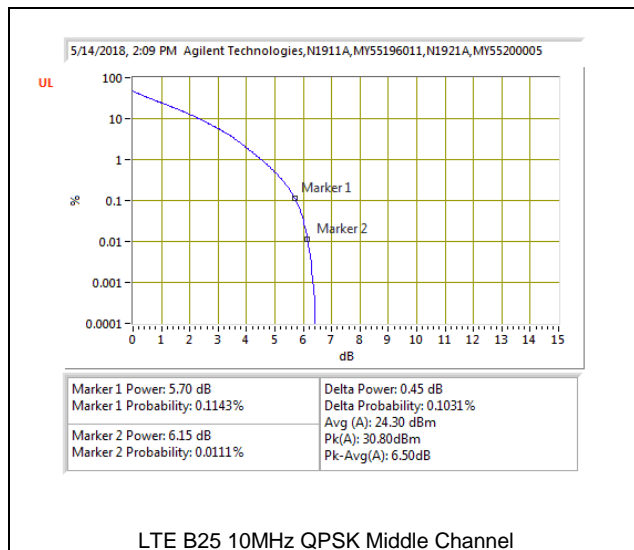


8.5.7. LTE BAND 17



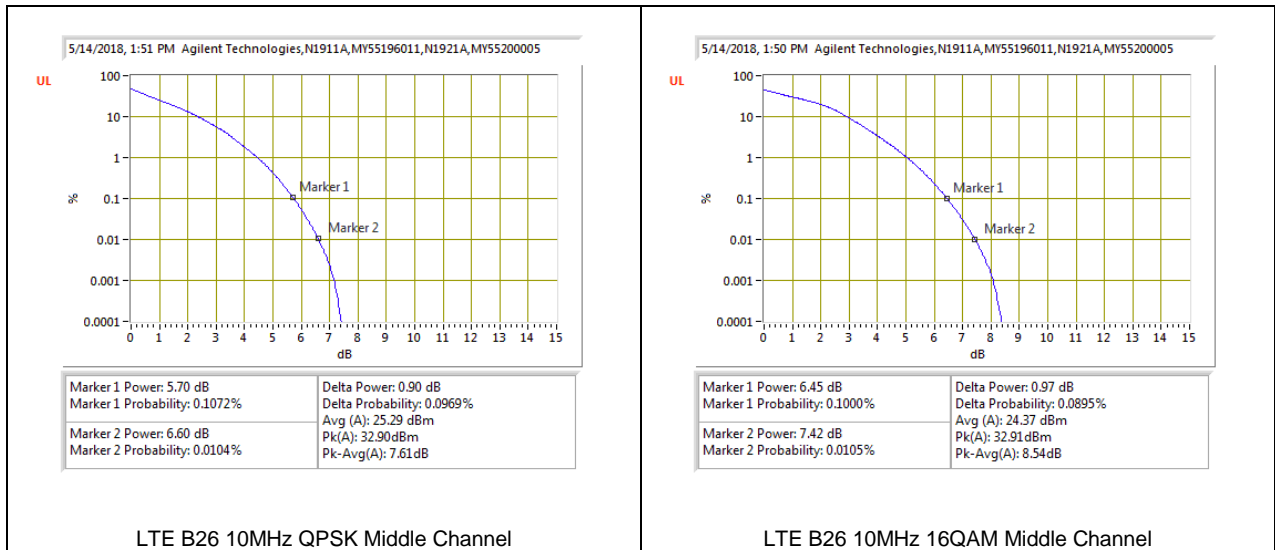
8.5.8. LTE BAND 25





8.5.9. LTE BAND 26 (PART 90S)





8.5.10. LTE BAND 30

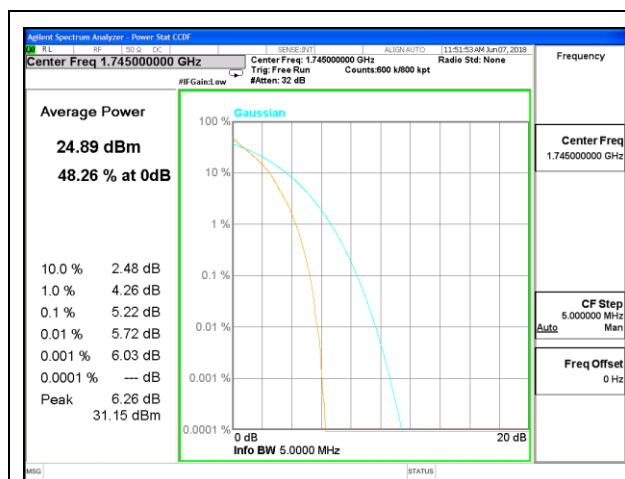


8.5.11. LTE BAND 41

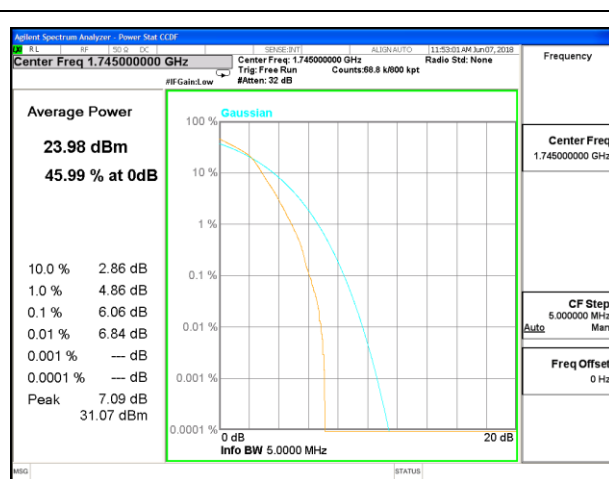
ID:	10643	Date:	5/15/18
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Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
Band 41	5MHz	2593.0	25	0	QPSK	32.61	19.61	6.01
					16QAM	32.59	18.62	6.98
	10MHz		50	0	QPSK	32.57	19.63	5.95
					16QAM	32.56	18.69	6.88
	15MHz		75	0	QPSK	32.48	19.58	5.91
					16QAM	32.45	18.62	6.84
	20MHz		100	0	QPSK	32.20	19.56	5.65
					16QAM	32.25	18.60	6.66
Duty Cycle Correction Factor (dB) =			6.99					
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor								

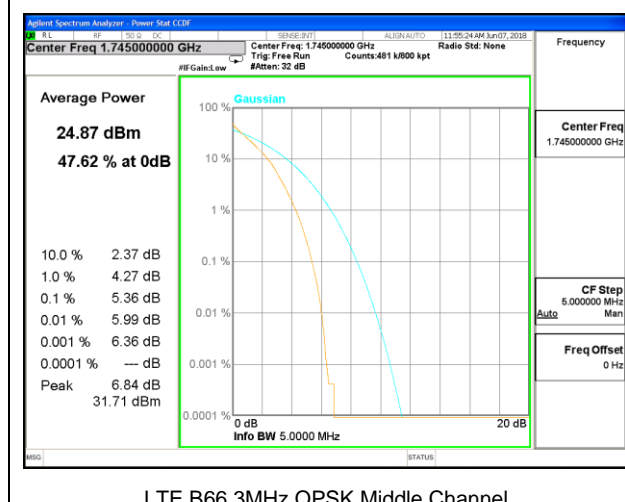
8.5.12. LTE BAND 66



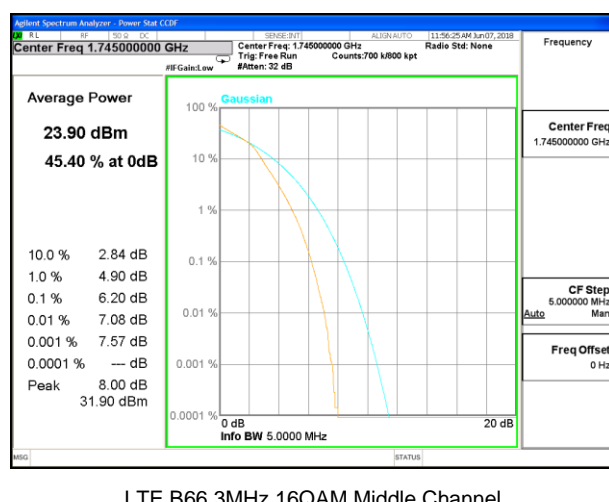
LTE B66 1.4MHz QPSK Middle Channel



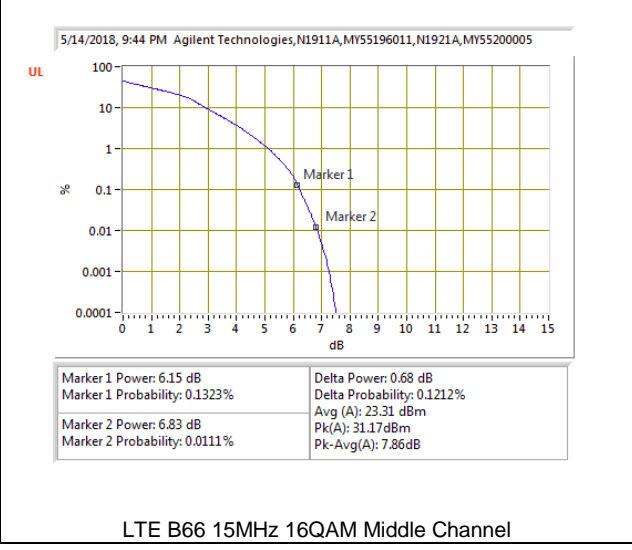
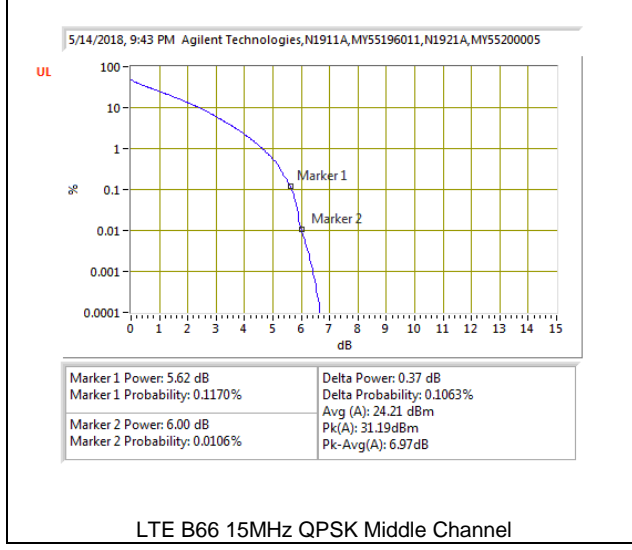
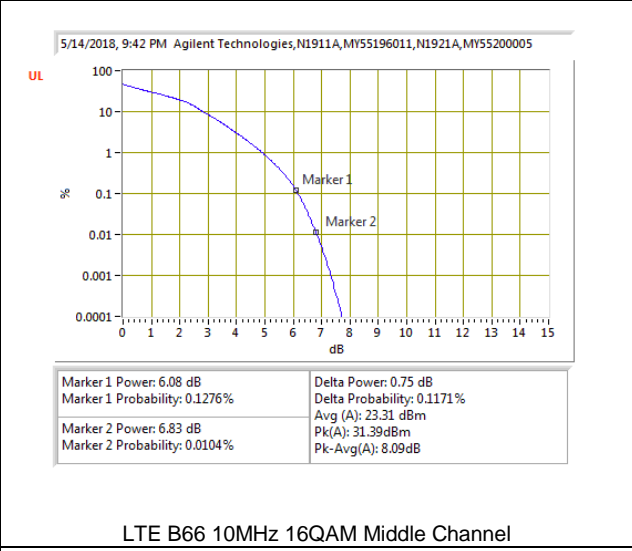
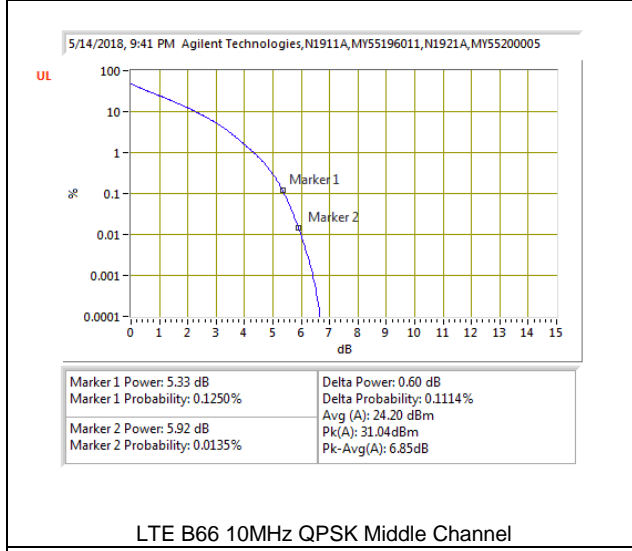
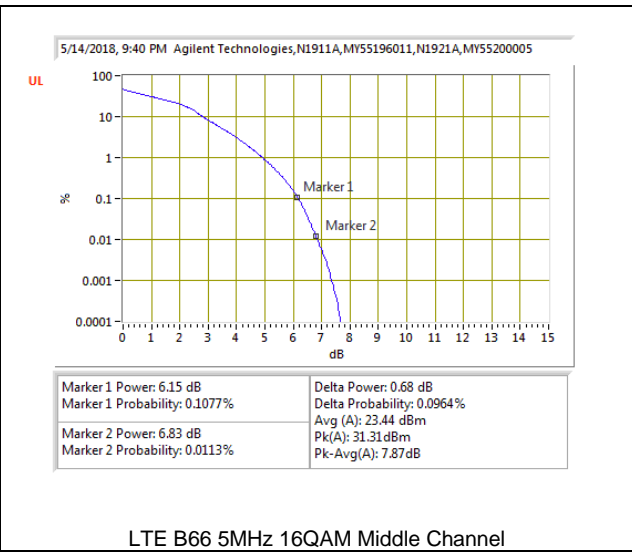
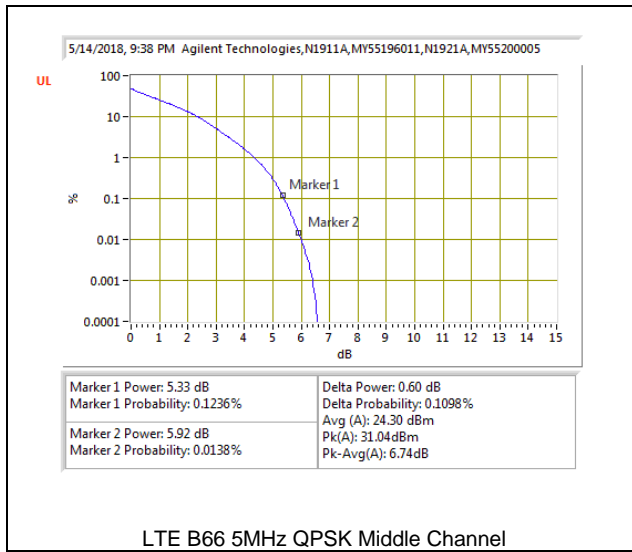
LTE B66 1.4MHz 16QAM Middle Channel

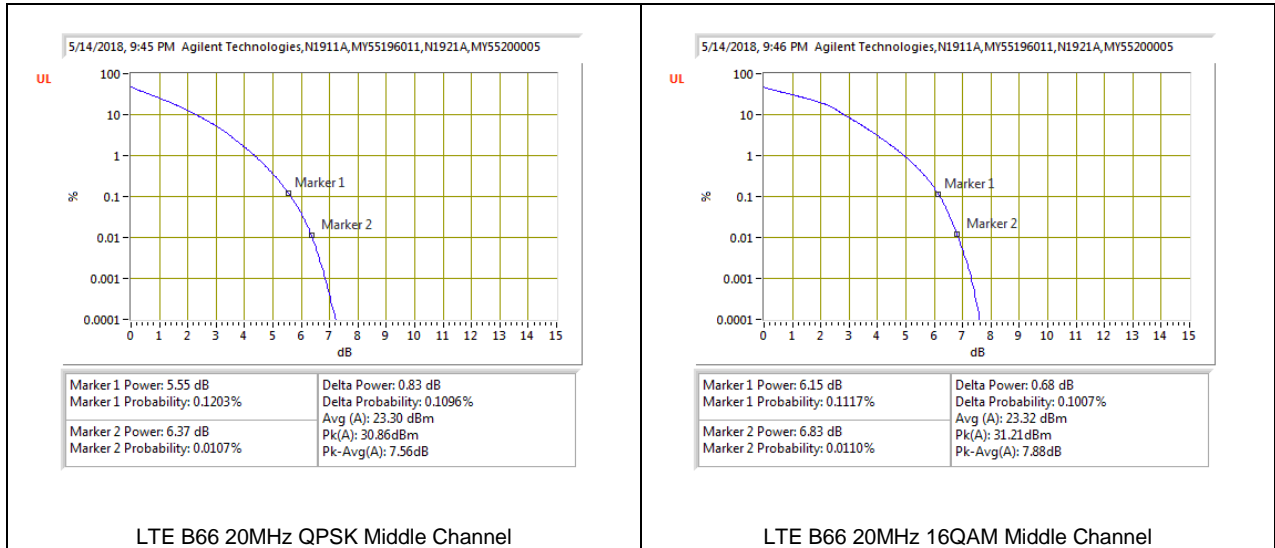


LTE B66 3MHz QPSK Middle Channel

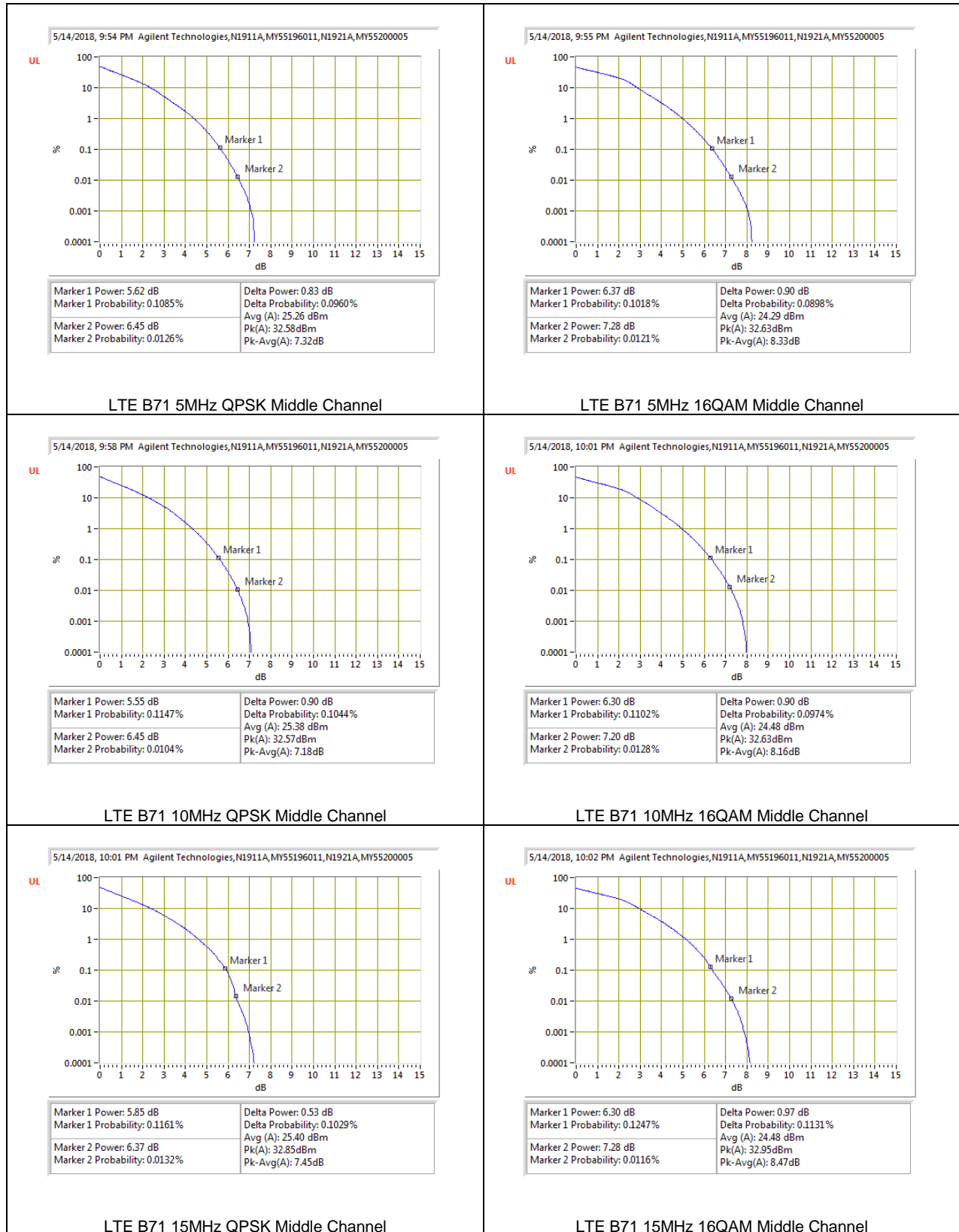


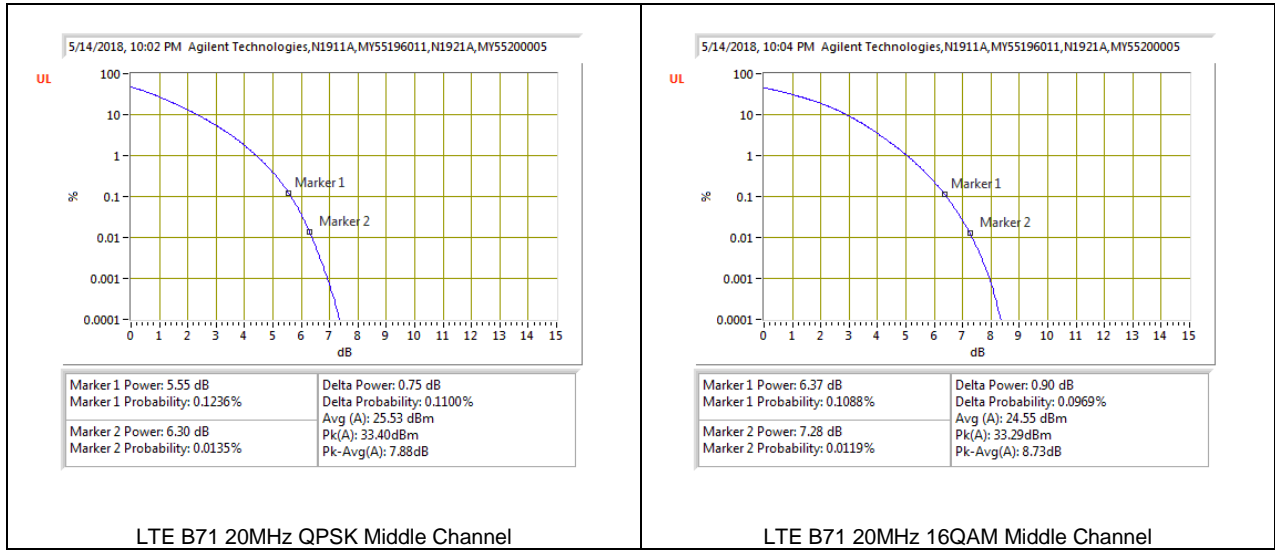
LTE B66 3MHz 16QAM Middle Channel





8.5.13. LTE BAND 71





9. RADIATED TEST RESULTS

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53, §90.691 and §90.543

LIMIT

FCC: §22.917(a), §24.238(a), §27.53 (g), (h), §90.691

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 13)

(c) 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.

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40 dBm/MHz).

FCC: §90.543(Band 14)

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

(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 (a) (Band 30, Band 40)

For mobile and portable stations operating in the 2305-2315 MHz: 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.

FCC: §27.53 (m) (Band 7, 41)

At least $55 + 10 \log (P)$ 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.

TEST PROCEDURE

KDB 971168 v03r01/ D02 v02r01

MODES

- LTE Band 2
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66
- LTE Band 71

RESULTS

9.1. FIELD STRENGTH OF SPURIOUS RADIATION (ANT1)

9.1.1. LTE BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: [Redacted]
 Project #: [Redacted]
 Date: 4/9/2018
 Test Engineer: 12492
 Configuration: EUT
 Mode: LTE Band 2, 20MHz QPSK

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber: 3m Chamber H
 Pre-amplifier: 3m Chamber H
 Filter: Filter
 Limit: EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (150MHz)										
3.72	-56.1	H	3.0	-8.2	37.4	1.0	-44.6	-13.0	-31.6	
5.98	-59.1	H	3.0	-8.1	36.7	1.0	-43.8	-13.0	-30.8	
7.44	-61.5	H	3.0	-7.8	36.0	1.0	-42.8	-13.0	-29.8	
3.72	-56.2	V	3.0	-8.4	37.4	1.0	-44.8	-13.0	-31.8	
5.98	-60.3	V	3.0	-9.2	36.7	1.0	-45.0	-13.0	-32.0	
7.44	-61.5	V	3.0	-8.0	36.0	1.0	-42.9	-13.0	-29.9	
Mid Channel (180MHz)										
3.76	-55.5	H	3.0	-7.5	37.4	1.0	-43.8	-13.0	-30.8	
5.64	-57.8	H	3.0	-6.7	36.7	1.0	-42.4	-13.0	-29.4	
7.52	-61.0	H	3.0	-7.1	35.9	1.0	-42.1	-13.0	-29.1	
3.76	-57.0	V	3.0	-9.2	37.4	1.0	-45.5	-13.0	-32.5	
5.64	-59.2	V	3.0	-8.1	36.7	1.0	-43.8	-13.0	-30.8	
7.52	-61.5	V	3.0	-8.0	35.9	1.0	-43.0	-13.0	-30.0	
High Channel (900MHz)										
3.80	-56.4	H	3.0	-8.4	37.3	1.0	-44.7	-13.0	-31.7	
5.70	-58.6	H	3.0	-7.4	36.7	1.0	-43.2	-13.0	-30.2	
7.60	-60.5	H	3.0	-6.5	36.0	1.0	-41.5	-13.0	-28.5	
3.80	-56.1	V	3.0	-8.2	37.3	1.0	-44.5	-13.0	-31.5	
5.70	-58.4	V	3.0	-7.1	36.7	1.0	-42.8	-13.0	-29.8	
7.60	-60.0	V	3.0	-6.3	36.0	1.0	-41.1	-13.0	-28.1	

Rev. 05.21.15

LTE B2 20MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: [Redacted]
 Project #: [Redacted]
 Date: 04/09/18
 Test Engineer: 12492
 Configuration: EUT
 Mode: LTE Band 2, 20MHz 16QAM

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber: 3m Chamber H
 Pre-amplifier: 3m Chamber H
 Filter: Filter
 Limit: EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (150MHz)										
3.72	-56.2	H	3.0	-8.2	37.4	1.0	-44.6	-13.0	-31.6	
5.98	-58.7	H	3.0	-7.7	36.7	1.0	-43.4	-13.0	-30.4	
7.44	-61.0	H	3.0	-7.3	36.0	1.0	-42.2	-13.0	-29.2	
3.72	-56.5	V	3.0	-8.8	37.4	1.0	-45.2	-13.0	-32.2	
5.98	-58.3	V	3.0	-7.2	36.7	1.0	-43.0	-13.0	-30.0	
7.44	-60.5	V	3.0	-7.8	36.0	1.0	-42.0	-13.0	-29.0	
Mid Channel (180MHz)										
3.76	-55.7	H	3.0	-7.8	37.4	1.0	-44.1	-13.0	-31.1	
5.64	-59.5	H	3.0	-8.4	36.7	1.0	-44.2	-13.0	-31.2	
7.52	-60.9	H	3.0	-7.1	35.9	1.0	-42.0	-13.0	-29.0	
3.76	-55.4	V	3.0	-7.5	37.4	1.0	-43.9	-13.0	-30.9	
5.64	-58.7	V	3.0	-7.5	36.7	1.0	-43.2	-13.0	-30.2	
7.52	-60.5	V	3.0	-6.9	35.9	1.0	-41.8	-13.0	-28.8	
High Channel (900MHz)										
3.80	-56.1	H	3.0	-8.1	37.3	1.0	-44.4	-13.0	-31.4	
5.70	-58.1	H	3.0	-6.9	36.7	1.0	-42.6	-13.0	-29.6	
7.60	-60.7	H	3.0	-6.7	36.0	1.0	-41.6	-13.0	-28.6	
3.80	-55.5	V	3.0	-7.6	37.3	1.0	-43.9	-13.0	-30.9	
5.70	-58.7	V	3.0	-7.5	36.7	1.0	-43.2	-13.0	-30.2	
7.60	-61.0	V	3.0	-7.3	36.0	1.0	-42.1	-13.0	-29.1	

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LTE B2 20MHz 16QAM

9.1.2. LTE BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: [Redacted]
 Project #: [Redacted]
 Date: 04/09/18
 Test Engineer: 12492
 Configuration: EUT
 Mode: LTE Band 5, 10MHz QPSK

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber: 3m Chamber H
 Pre-amplifier: 3m Chamber H
 Filter: Filter
 Limit: EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (80MHz)										
1.66	-58.3	H	3.0	-17.8	37.7	1.0	-54.6	-13.0	-41.6	
2.49	-58.3	H	3.0	-14.2	37.1	1.0	-50.3	-13.0	-37.3	
3.32	-56.4	H	3.0	-8.6	37.8	1.0	-45.4	-13.0	-32.4	
1.66	-57.5	V	3.0	-16.8	37.7	1.0	-53.5	-13.0	-40.5	
2.49	-58.6	V	3.0	-14.5	37.1	1.0	-50.5	-13.0	-37.5	
3.32	-56.9	V	3.0	-10.0	37.8	1.0	-46.9	-13.0	-33.9	
Mid Channel (83.5MHz)										
1.67	-57.1	H	3.0	-16.5	37.8	1.0	-53.3	-13.0	-40.3	
2.51	-58.3	H	3.0	-14.6	37.1	1.0	-50.7	-13.0	-37.7	
3.35	-55.7	H	3.0	-7.9	37.8	1.0	-44.7	-13.0	-31.7	
1.67	-58.6	V	3.0	-17.8	37.8	1.0	-54.6	-13.0	-41.6	
2.51	-58.5	V	3.0	-14.3	37.1	1.0	-50.4	-13.0	-37.4	
3.35	-57.1	V	3.0	-10.2	37.8	1.0	-47.0	-13.0	-34.0	
High Channel (84MHz)										
1.69	-57.4	H	3.0	-16.7	37.8	1.0	-53.4	-13.0	-40.4	
2.53	-58.6	H	3.0	-14.3	37.1	1.0	-50.4	-13.0	-37.4	
3.38	-54.8	H	3.0	-6.9	37.8	1.0	-43.7	-13.0	-30.7	
1.69	-57.7	V	3.0	-16.8	37.8	1.0	-53.6	-13.0	-40.6	
2.53	-58.8	V	3.0	-14.6	37.1	1.0	-50.7	-13.0	-37.7	
3.38	-56.3	V	3.0	-9.3	37.8	1.0	-46.1	-13.0	-33.1	

Rev. 05.21.15

LTE B5 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: [Redacted]
 Project #: [Redacted]
 Date: 04/09/18
 Test Engineer: 12492
 Configuration: EUT
 Mode: LTE Band 5, 10MHz 16QAM

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber: 3m Chamber H
 Pre-amplifier: 3m Chamber H
 Filter: Filter
 Limit: EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (80MHz)										
1.66	-57.9	H	3.0	-16.4	37.7	1.0	-53.2	-13.0	-40.2	
2.49	-57.8	H	3.0	-14.7	37.1	1.0	-50.7	-13.0	-37.7	
3.32	-56.5	H	3.0	-10.6	37.8	1.0	-47.4	-13.0	-34.4	
1.66	-58.2	V	3.0	-16.5	37.7	1.0	-53.2	-13.0	-40.2	
2.49	-57.9	V	3.0	-13.8	37.1	1.0	-48.8	-13.0	-35.8	
3.32	-57.2	V	3.0	-11.2	37.8	1.0	-48.1	-13.0	-35.1	
Mid Channel (83.5MHz)										
1.67	-58.0	H	3.0	-16.5	37.8	1.0	-53.2	-13.0	-40.2	
2.51	-58.8	H	3.0	-15.6	37.1	1.0	-51.7	-13.0	-38.7	
3.35	-56.5	H	3.0	-10.5	37.8	1.0	-47.2	-13.0	-34.2	
1.67	-57.6	V	3.0	-15.8	37.8	1.0	-52.6	-13.0	-39.6	
2.51	-58.5	V	3.0	-14.3	37.1	1.0	-50.4	-13.0	-37.4	
3.35	-56.8	V	3.0	-10.7	37.8	1.0	-47.5	-13.0	-34.5	
High Channel (84MHz)										
1.69	-58.2	H	3.0	-16.7	37.8	1.0	-53.5	-13.0	-40.5	
2.53	-58.8	H	3.0	-14.6	37.1	1.0	-50.8	-13.0	-37.8	
3.38	-56.4	H	3.0	-10.3	37.8	1.0	-47.1	-13.0	-34.1	
1.69	-57.7	V	3.0	-15.9	37.8	1.0	-52.7	-13.0	-39.7	
2.53	-58.9	V	3.0	-14.8	37.1	1.0	-50.9	-13.0	-37.9	
3.38	-56.3	V	3.0	-10.1	37.8	1.0	-46.9	-13.0	-33.9	

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LTE B5 10MHz 16QAM

9.1.4. LTE BAND 12

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/09/18
 Test Engineer: 31300
 Configuration: EUT Only
 Mode: LTE Band 12, 10MHz QPSK

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (70MHz)										
1.41	64.5	H	3.0	25.6	37.4	1.0	-62.8	-13.0	-48.0	
2.11	62.1	H	3.0	19.6	37.7	1.0	-56.3	-13.0	-43.3	
2.82	61.3	H	3.0	15.0	37.8	1.0	-51.7	-13.0	-38.7	
1.41	64.0	V	3.0	24.7	37.4	1.0	-61.1	-13.0	-46.1	
2.11	62.5	V	3.0	19.5	37.7	1.0	-56.2	-13.0	-43.2	
2.82	60.3	V	3.0	14.8	37.8	1.0	-51.6	-13.0	-38.6	
Mid Channel (70.5MHz)										
1.42	64.1	H	3.0	25.1	37.4	1.0	-61.5	-13.0	-48.5	
2.12	63.3	H	3.0	20.1	37.7	1.0	-56.8	-13.0	-43.8	
2.83	60.9	H	3.0	14.4	37.8	1.0	-51.3	-13.0	-38.3	
1.42	63.7	V	3.0	24.4	37.4	1.0	-60.8	-13.0	-47.8	
2.12	63.4	V	3.0	20.4	37.7	1.0	-57.0	-13.0	-44.0	
2.83	61.1	V	3.0	15.7	37.8	1.0	-52.5	-13.0	-39.5	
High Channel (71MHz)										
1.42	64.0	H	3.0	25.1	37.4	1.0	-61.5	-13.0	-48.5	
2.13	63.4	H	3.0	20.2	37.6	1.0	-56.9	-13.0	-43.9	
2.84	61.3	H	3.0	14.7	37.8	1.0	-51.6	-13.0	-38.6	
1.42	64.2	V	3.0	24.9	37.4	1.0	-61.3	-13.0	-48.3	
2.13	63.4	V	3.0	20.3	37.6	1.0	-56.9	-13.0	-43.9	
2.84	60.5	V	3.0	14.9	37.8	1.0	-51.8	-13.0	-38.8	

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LTE B12 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/09/18
 Test Engineer: 31300
 Configuration: EUT Only
 Mode: LTE Band 12, 10MHz 16QAM

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (70MHz)										
1.41	64.3	H	3.0	25.4	37.4	1.0	-61.8	-13.0	-48.8	
2.11	62.9	H	3.0	19.8	37.7	1.0	-56.5	-13.0	-43.5	
2.82	61.8	H	3.0	15.4	37.8	1.0	-52.2	-13.0	-39.2	
1.41	64.9	V	3.0	25.7	37.4	1.0	-62.0	-13.0	-49.0	
2.11	64.3	V	3.0	21.2	37.7	1.0	-57.9	-13.0	-44.9	
2.82	60.1	V	3.0	14.7	37.8	1.0	-51.5	-13.0	-38.5	
Mid Channel (70.5MHz)										
1.42	63.3	H	3.0	24.3	37.4	1.0	-60.7	-13.0	-47.7	
2.12	63.4	H	3.0	20.2	37.7	1.0	-56.9	-13.0	-43.9	
2.83	60.1	H	3.0	13.7	37.8	1.0	-50.5	-13.0	-37.5	
1.42	64.4	V	3.0	24.9	37.4	1.0	-61.1	-13.0	-48.1	
2.12	63.3	V	3.0	20.2	37.7	1.0	-57.0	-13.0	-44.0	
2.83	60.0	V	3.0	14.5	37.8	1.0	-51.3	-13.0	-38.3	
High Channel (71MHz)										
1.42	65.1	H	3.0	26.1	37.4	1.0	-62.5	-13.0	-49.5	
2.13	63.3	H	3.0	20.1	37.6	1.0	-56.7	-13.0	-43.7	
2.84	60.9	H	3.0	14.4	37.8	1.0	-51.2	-13.0	-38.2	
1.42	64.0	V	3.0	24.7	37.4	1.0	-61.1	-13.0	-48.1	
2.13	63.8	V	3.0	20.7	37.6	1.0	-57.3	-13.0	-44.3	
2.84	60.9	V	3.0	15.4	37.8	1.0	-52.2	-13.0	-39.2	

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LTE B12 10MHz 16QAM

9.1.5. LTE BAND 13

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/01/18
 Test Engineer: 12500
 Configuration: EUT Only
 Mode: LTE Band 13, 10MHz QPSK

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter LTE B13

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (70MHz)										
1.56	66.6	H	3.0	26.8	37.7	1.0	-63.5	-40.0	-23.5	
2.35	67.2	H	3.0	25.5	37.1	1.0	-59.6	-13.0	-46.6	
3.13	64.9	H	3.0	17.2	38.0	1.0	-54.2	-13.0	-41.2	
1.56	61.7	V	3.0	21.5	37.7	1.0	-58.2	-40.0	-18.2	
2.35	67.8	V	3.0	23.2	37.1	1.0	-59.3	-13.0	-46.3	
3.13	65.8	V	3.0	19.4	38.0	1.0	-56.4	-13.0	-43.4	

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LTE B13 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/09/18
 Test Engineer: 31300
 Configuration: EUT Only
 Mode: LTE Band 13, 10MHz 16QAM

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter LTE B13

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (70MHz)										
1.56	64.1	H	3.0	24.3	37.7	1.0	-61.0	-40.0	-21.0	
2.35	61.1	H	3.0	17.5	37.1	1.0	-51.6	-13.0	-40.6	
3.13	64.7	H	3.0	17.0	38.0	1.0	-54.0	-13.0	-41.0	
1.56	63.4	V	3.0	23.3	37.7	1.0	-60.0	-40.0	-20.0	
2.35	62.0	V	3.0	18.1	37.1	1.0	-54.2	-13.0	-41.2	
3.13	63.2	V	3.0	16.8	38.0	1.0	-53.8	-13.0	-40.8	

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LTE B13 10MHz 16QAM

9.1.6. LTE BAND 14

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/17/18
 Test Engineer: 12500
 Configuration: EUT only
 Mode: LTE Band 14, 10MHz QPSK

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber F 3m Chamber F Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (753MHz) [BW 10MHz]										
1.69	-66.3	H	3.0	-25.6	33.8	1.0	-58.3	-40.0	-18.3	
2.38	-68.2	H	3.0	-22.3	34.2	1.0	-55.4	-13.0	-42.4	
3.17	-66.6	H	3.0	-18.8	34.7	1.0	-52.4	-13.0	-39.4	
1.69	-68.6	V	3.0	-16.2	33.8	1.0	-49.0	-40.0	-9.0	
2.38	-67.3	V	3.0	-22.7	34.2	1.0	-55.9	-13.0	-42.8	
3.17	-66.0	V	3.0	-18.9	34.7	1.0	-51.7	-13.0	-38.7	

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LTE B14 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/17/18
 Test Engineer: 12500
 Configuration: EUT only
 Mode: LTE Band 14, 10MHz 16QAM

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber F 3m Chamber F Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (753MHz) [BW 10MHz]										
1.69	-66.7	H	3.0	-26.9	33.8	1.0	-58.7	-49.0	-18.7	
2.38	-67.0	H	3.0	-23.1	34.2	1.0	-56.2	-13.0	-43.2	
3.17	-66.1	H	3.0	-19.3	34.7	1.0	-52.1	-13.0	-39.1	
1.69	-67.3	V	3.0	-13.9	33.8	1.0	-46.7	-49.0	-6.7	
2.38	-66.5	V	3.0	-21.9	34.2	1.0	-55.9	-13.0	-42.9	
3.17	-65.5	V	3.0	-17.6	34.7	1.0	-51.2	-13.0	-38.2	

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LTE B14 10MHz 16QAM

9.1.7. LTE BAND 17

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/09/18
 Test Engineer: 31300
 Configuration: EUT Only
 Mode: LTE Band 17, 10MHz QPSK

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (710MHz)										
1.42	-63.6	H	3.0	-24.0	37.4	1.0	-60.4	-13.0	-47.4	
2.13	-62.9	H	3.0	-19.7	37.6	1.0	-56.3	-13.0	-43.3	
2.84	-66.4	H	3.0	-13.9	37.8	1.0	-56.7	-13.0	-37.7	
1.42	-63.6	V	3.0	-24.2	37.4	1.0	-60.7	-13.0	-47.7	
2.13	-63.3	V	3.0	-20.2	37.6	1.0	-56.8	-13.0	-43.8	
2.84	-61.6	V	3.0	-16.1	37.8	1.0	-53.0	-13.0	-40.0	

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LTE B17 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #:
 Date: 04/09/18
 Test Engineer: 31300
 Configuration: EUT Only
 Mode: LTE Band 17, 10MHz 16QAM

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (710MHz)										
1.42	-64.1	H	3.0	-25.1	37.4	1.0	-61.6	-13.0	-48.6	
2.13	-62.9	H	3.0	-19.8	37.6	1.0	-56.4	-13.0	-43.4	
2.84	-66.4	H	3.0	-13.9	37.8	1.0	-56.7	-13.0	-37.7	
1.42	-64.4	V	3.0	-25.1	37.4	1.0	-61.5	-13.0	-48.5	
2.13	-63.6	V	3.0	-20.5	37.6	1.0	-57.2	-13.0	-44.2	
2.84	-61.2	V	3.0	-15.7	37.8	1.0	-52.6	-13.0	-39.6	

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LTE B17 10MHz 16QAM

9.1.8. LTE BAND 25

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: Project #: Date: 04/09/18 31300
 Test Engineer: EUT Only
 Configuration: LTE Band 25, 20MHz QPSK
 Mode:
 Test Equipment: Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1805MHz)										
3.72	-82.3	H	3.0	-14.8	37.4	1.0	-51.3	-13.0	-38.3	
6.68	-82.6	H	3.0	-11.6	36.7	1.0	-47.3	-13.0	-34.3	
7.44	-87.6	H	3.0	-13.8	36.0	1.0	-48.8	-13.0	-35.8	
3.72	-83.6	V	3.0	-16.8	37.4	1.0	-52.3	-13.0	-39.3	
6.68	-83.1	V	3.0	-12.1	36.7	1.0	-47.8	-13.0	-34.8	
7.44	-86.7	V	3.0	-13.2	36.0	1.0	-48.2	-13.0	-35.2	
Mid Channel (1882.5MHz)										
3.77	-82.7	H	3.0	-14.8	37.3	1.0	-51.1	-13.0	-38.1	
6.66	-84.0	H	3.0	-12.8	36.7	1.0	-48.7	-13.0	-35.7	
7.63	-86.1	H	3.0	-12.2	35.9	1.0	-47.1	-13.0	-34.1	
3.77	-82.4	V	3.0	-14.6	37.3	1.0	-50.9	-13.0	-37.9	
6.66	-83.9	V	3.0	-12.7	36.7	1.0	-48.4	-13.0	-35.4	
7.63	-85.9	V	3.0	-12.3	35.9	1.0	-47.2	-13.0	-34.2	
High Channel (1905MHz)										
3.81	-82.6	H	3.0	-14.6	37.3	1.0	-50.8	-13.0	-37.8	
6.72	-84.6	H	3.0	-12.4	36.7	1.0	-48.1	-13.0	-35.1	
7.62	-85.1	H	3.0	-11.1	35.8	1.0	-45.9	-13.0	-32.9	
3.81	-82.7	V	3.0	-14.7	37.3	1.0	-51.0	-13.0	-38.0	
6.72	-84.8	V	3.0	-13.6	36.7	1.0	-49.3	-13.0	-36.3	
7.62	-85.2	V	3.0	-11.4	35.8	1.0	-48.3	-13.0	-35.3	

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LTE B25 20MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: Project #: Date: 04/09/18 31300
 Test Engineer: EUT Only
 Configuration: LTE Band 25, 20MHz 16QAM
 Mode:
 Test Equipment: Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1805MHz)										
3.72	-83.2	H	3.0	-15.3	37.4	1.0	-51.7	-13.0	-38.7	
5.58	-83.1	H	3.0	-12.1	36.7	1.0	-47.8	-13.0	-34.8	
7.44	-87.5	H	3.0	-13.8	36.0	1.0	-48.7	-13.0	-35.7	
3.72	-83.3	V	3.0	-15.6	37.4	1.0	-52.0	-13.0	-39.0	
5.58	-82.7	V	3.0	-11.6	36.7	1.0	-47.4	-13.0	-34.4	
7.44	-87.1	V	3.0	-13.6	36.0	1.0	-48.6	-13.0	-35.6	
Mid Channel (1882.5MHz)										
3.77	-83.7	H	3.0	-15.7	37.3	1.0	-52.0	-13.0	-39.0	
5.65	-83.1	H	3.0	-12.8	36.7	1.0	-47.7	-13.0	-34.7	
7.53	-86.8	H	3.0	-12.9	35.9	1.0	-47.8	-13.0	-34.8	
3.77	-82.7	V	3.0	-14.8	37.3	1.0	-51.2	-13.0	-38.2	
5.65	-82.3	V	3.0	-11.1	36.7	1.0	-46.8	-13.0	-33.8	
7.53	-86.4	V	3.0	-12.8	35.9	1.0	-47.7	-13.0	-34.7	
High Channel (1905MHz)										
3.81	-82.8	H	3.0	-14.8	37.3	1.0	-51.1	-13.0	-38.1	
5.72	-85.0	H	3.0	-13.8	36.7	1.0	-48.5	-13.0	-35.5	
7.62	-85.6	H	3.0	-11.7	35.8	1.0	-46.5	-13.0	-33.5	
3.81	-82.5	V	3.0	-14.6	37.3	1.0	-50.9	-13.0	-37.9	
5.72	-84.9	V	3.0	-13.7	36.7	1.0	-48.4	-13.0	-35.4	
7.62	-85.1	V	3.0	-11.4	35.8	1.0	-46.2	-13.0	-33.2	

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LTE B25 20MHz 16QAM

9.1.9. LTE BAND 26 (PART 90S)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: Project #: Date: 04/09/18 31300
 Test Engineer: EUT Only
 Configuration: LTE Band 26 (90S), 15MHz QPSK
 Mode:
 Test Equipment: Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (831.5MHz)										
1.86	-82.3	H	3.0	-21.8	37.7	1.0	-58.6	-13.0	-45.6	
2.49	-83.5	H	3.0	-19.5	37.1	1.0	-55.5	-13.0	-42.5	
3.33	-81.8	H	3.0	-14.0	37.8	1.0	-50.8	-13.0	-37.8	
1.86	-82.6	V	3.0	-21.9	37.7	1.0	-58.6	-13.0	-45.6	
2.49	-82.5	V	3.0	-18.4	37.1	1.0	-54.4	-13.0	-41.4	
3.33	-81.5	V	3.0	-14.6	37.8	1.0	-51.5	-13.0	-38.5	

Rev: 05.21.15

LTE B26 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company: Project #: Date: 04/09/18 31300
 Test Engineer: EUT Only
 Configuration: LTE Band 26 (90S), 15MHz 16QAM
 Mode:
 Test Equipment: Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (831.5MHz)										
1.86	-82.2	H	3.0	-21.7	37.7	1.0	-58.4	-13.0	-45.4	
2.49	-83.5	H	3.0	-19.4	37.1	1.0	-55.5	-13.0	-42.5	
3.33	-81.7	H	3.0	-13.8	37.8	1.0	-50.7	-13.0	-37.7	
1.86	-82.4	V	3.0	-21.7	37.7	1.0	-58.4	-13.0	-45.4	
2.49	-83.5	V	3.0	-19.3	37.1	1.0	-55.4	-13.0	-42.4	
3.33	-82.9	V	3.0	-18.1	37.8	1.0	-52.0	-13.0	-39.0	

Rev: 05.21.15

LTE B26 10MHz 16QAM

9.1.10. LTE BAND 30

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #: 04/09/18
 Date: 31300
 Test Engineer: EUT only
 Configuration: LTE Band 30, 10MHz QPSK
 Mode:

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter LTE B30

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (2310MHz)										
4.62	-62.8	H	3.0	-9.0	37.9	1.0	-46.0	-40.0	-6.0	
6.93	-66.0	H	3.0	-7.4	36.5	1.0	-42.8	-40.0	-2.8	
9.24	-69.8	H	3.0	-8.3	34.9	1.0	-42.1	-40.0	-2.1	
4.62	-63.4	V	3.0	-8.7	37.9	1.0	-46.6	-40.0	-6.6	
6.93	-65.5	V	3.0	-8.1	36.5	1.0	-41.5	-40.0	-1.5	
9.24	-69.7	V	3.0	-8.0	34.9	1.0	-41.8	-40.0	-1.8	

LTE B30 10MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #: 04/09/18
 Date: 31300
 Test Engineer: EUT only
 Configuration: LTE Band 30, 10MHz 16QAM
 Mode:

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter LTE B30

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Mid Channel (2310MHz)										
4.62	-62.4	H	3.0	-7.8	37.9	1.0	-45.5	-40.0	-5.5	
6.93	-66.6	H	3.0	-7.8	36.5	1.0	-43.3	-40.0	-3.3	
9.24	-69.5	H	3.0	-8.0	34.9	1.0	-41.8	-40.0	-1.8	
4.62	-62.8	V	3.0	-9.1	37.9	1.0	-46.0	-40.0	-6.0	
6.93	-66.6	V	3.0	-8.0	36.5	1.0	-41.5	-40.0	-1.5	
9.24	-69.8	V	3.0	-7.8	34.9	1.0	-41.7	-40.0	-1.7	

LTE B30 10MHz 16QAM

9.1.11. LTE BAND 41

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #: 04/09/18
 Date: 31300
 Test Engineer: EUT Only
 Configuration: LTE Band 41, 20MHz QPSK
 Mode:

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2060MHz)										
5.01	-61.7	H	3.0	-11.7	36.9	1.0	-47.6	-25.0	-22.6	
7.52	-66.2	H	3.0	-12.4	35.9	1.0	-47.3	-25.0	-22.3	
10.02	-67.1	H	3.0	-10.6	33.7	1.0	-43.2	-25.0	-18.2	
5.01	-61.7	V	3.0	-11.5	36.9	1.0	-47.4	-25.0	-22.4	
7.52	-66.3	V	3.0	-12.7	35.9	1.0	-47.6	-25.0	-22.6	
10.02	-67.3	V	3.0	-11.2	33.7	1.0	-43.8	-25.0	-18.8	
Mid Channel (2593MHz)										
5.19	-63.8	H	3.0	-12.6	36.8	1.0	-48.5	-25.0	-23.5	
7.78	-65.4	H	3.0	-11.3	35.7	1.0	-45.9	-25.0	-20.9	
10.37	-66.4	H	3.0	-9.7	33.7	1.0	-42.4	-25.0	-17.4	
5.19	-63.9	V	3.0	-13.4	36.8	1.0	-49.2	-25.0	-24.2	
7.78	-65.8	V	3.0	-11.1	35.7	1.0	-45.8	-25.0	-20.8	
10.37	-66.4	V	3.0	-10.1	33.7	1.0	-42.8	-25.0	-17.8	
High Channel (2680MHz)										
5.36	-66.3	H	3.0	-15.7	36.8	1.0	-51.5	-25.0	-26.5	
8.04	-66.8	H	3.0	-11.6	35.4	1.0	-45.1	-25.0	-21.1	
10.72	-67.8	H	3.0	-10.1	33.7	1.0	-42.9	-25.0	-17.9	
5.36	-66.3	V	3.0	-15.5	36.8	1.0	-51.3	-25.0	-26.3	
8.04	-65.7	V	3.0	-11.5	35.4	1.0	-46.0	-25.0	-21.0	
10.72	-66.6	V	3.0	-10.1	33.7	1.0	-42.9	-25.0	-17.9	

LTE B41 20MHz QPSK

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
 Project #: 04/09/18
 Date: 31300
 Test Engineer: EUT Only
 Configuration: LTE Band 41, 20MHz 16QAM
 Mode:

Test Equipment:
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber Pre-amplifier Filter Limit
3m Chamber H 3m Chamber H Filter LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (HV)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2060MHz)										
5.01	-61.1	H	3.0	-11.0	36.9	1.0	-46.9	-25.0	-21.9	
7.52	-66.7	H	3.0	-12.9	35.9	1.0	-47.8	-25.0	-22.8	
10.02	-67.7	H	3.0	-11.2	33.7	1.0	-43.9	-25.0	-18.9	
5.01	-61.9	V	3.0	-11.7	36.9	1.0	-47.6	-25.0	-22.6	
7.52	-66.0	V	3.0	-12.4	35.9	1.0	-47.3	-25.0	-22.3	
10.02	-66.4	V	3.0	-10.2	33.7	1.0	-42.9	-25.0	-17.9	
Mid Channel (2593MHz)										
5.19	-64.3	H	3.0	-13.9	36.8	1.0	-49.7	-25.0	-24.7	
7.78	-64.5	H	3.0	-10.3	35.7	1.0	-45.0	-25.0	-20.0	
10.37	-66.5	H	3.0	-9.8	33.7	1.0	-42.5	-25.0	-17.5	
5.19	-63.2	V	3.0	-12.7	36.8	1.0	-48.5	-25.0	-23.5	
7.78	-65.3	V	3.0	-11.4	35.7	1.0	-46.1	-25.0	-21.1	
10.37	-65.3	V	3.0	-9.8	33.7	1.0	-41.7	-25.0	-16.7	
High Channel (2680MHz)										
5.36	-66.3	H	3.0	-15.6	36.8	1.0	-51.4	-25.0	-26.4	
8.04	-65.9	H	3.0	-11.5	35.4	1.0	-45.0	-25.0	-20.0	
10.72	-66.9	H	3.0	-10.0	33.7	1.0	-42.7	-25.0	-17.7	
5.36	-66.6	V	3.0	-15.8	36.8	1.0	-51.6	-25.0	-26.6	
8.04	-65.9	V	3.0	-11.8	35.4	1.0	-46.2	-25.0	-21.2	
10.72	-66.8	V	3.0	-10.3	33.7	1.0	-43.1	-25.0	-18.1	

LTE B41 20MHz 16QAM