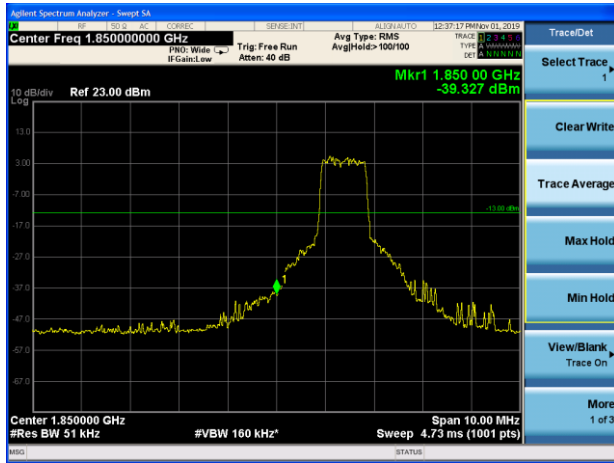
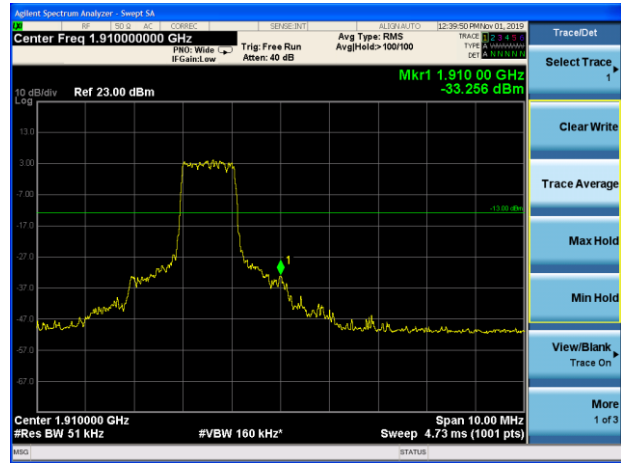




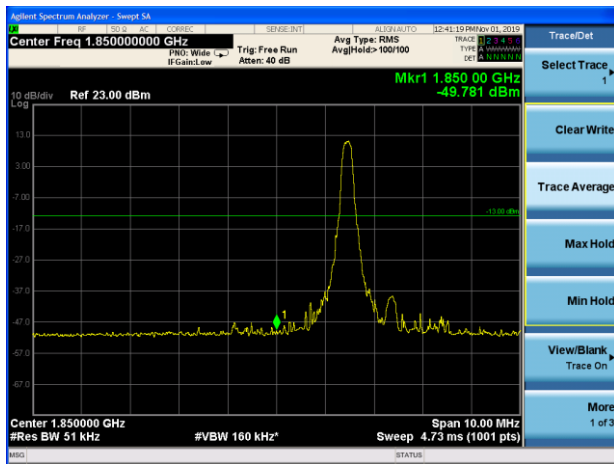
LTE Band 2 15MHz 16QAM 100%RB CH-Low



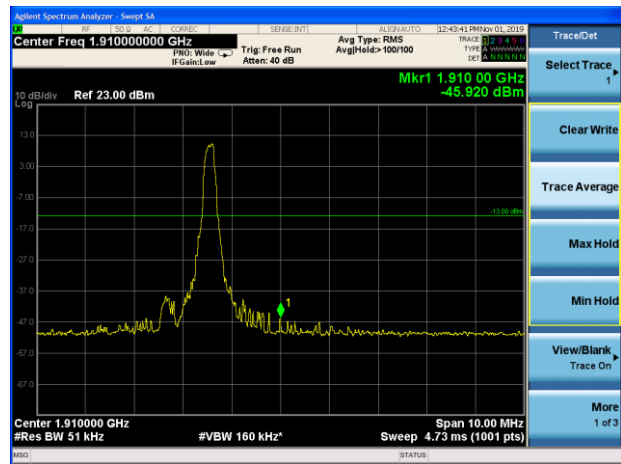
LTE Band 2 15MHz 16QAM 100%RB CH-High



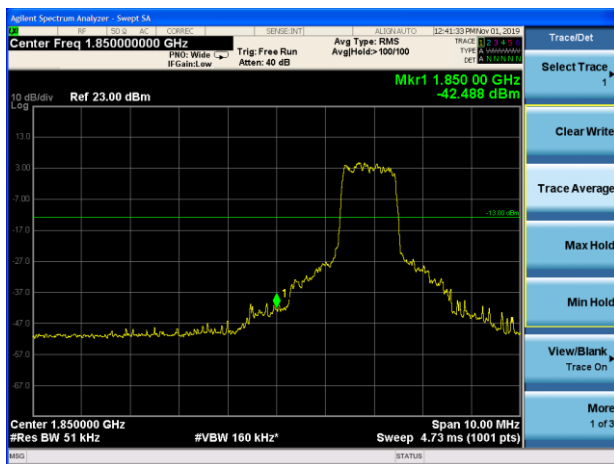
LTE Band 2 20MHz 16QAM 1RB CH-Low



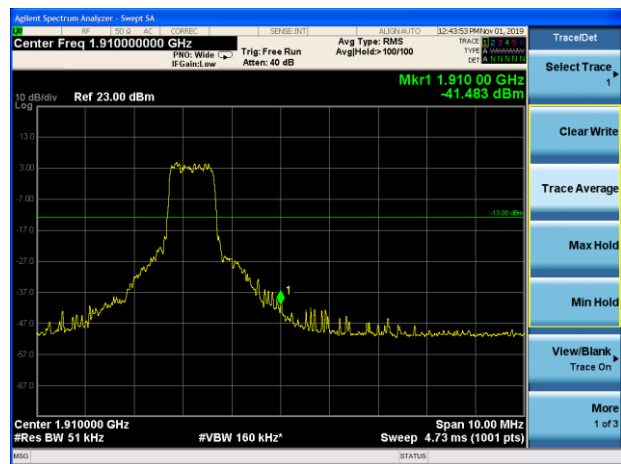
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LTE Band 2 20MHz 16QAM 100%RB CH-Low

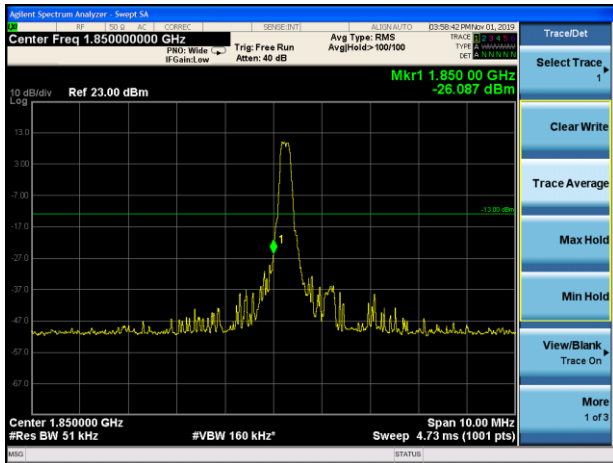


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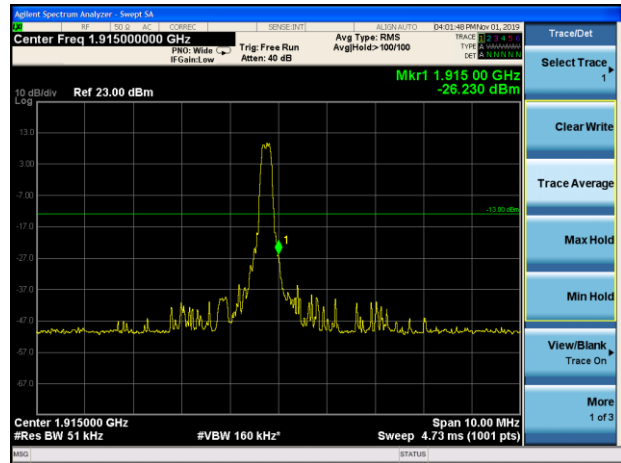




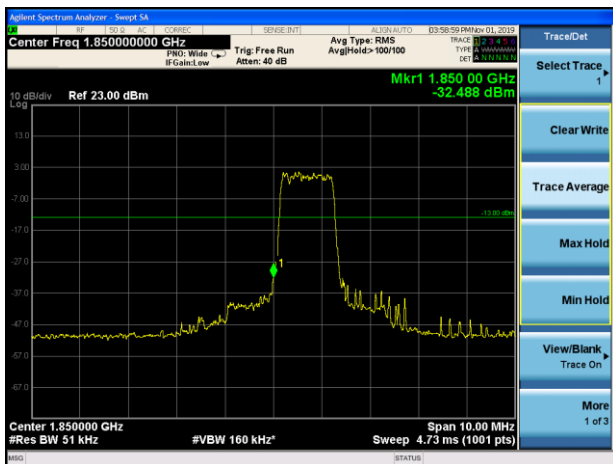
LTE Band 25 1.4MHz QPSK 1RB CH-Low



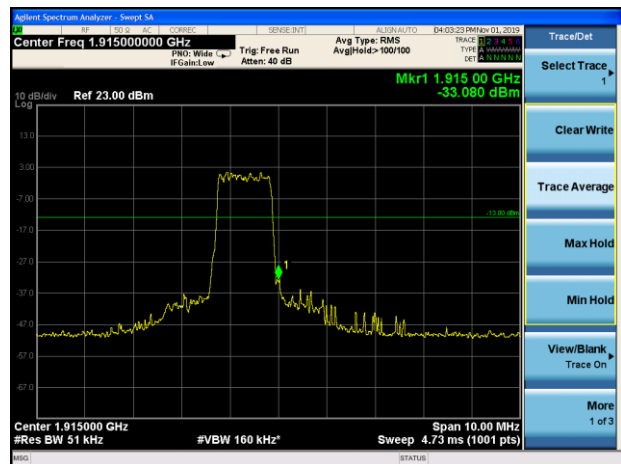
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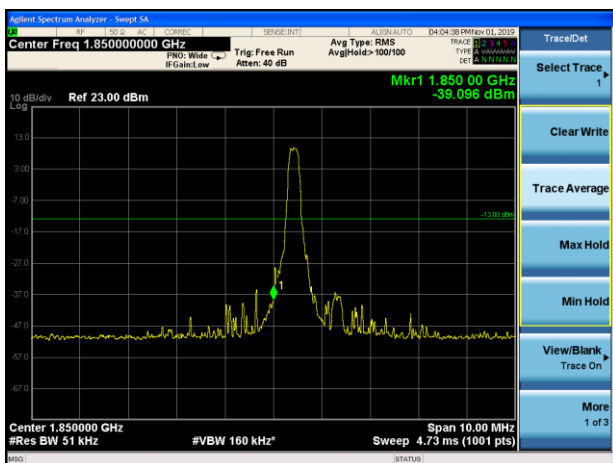
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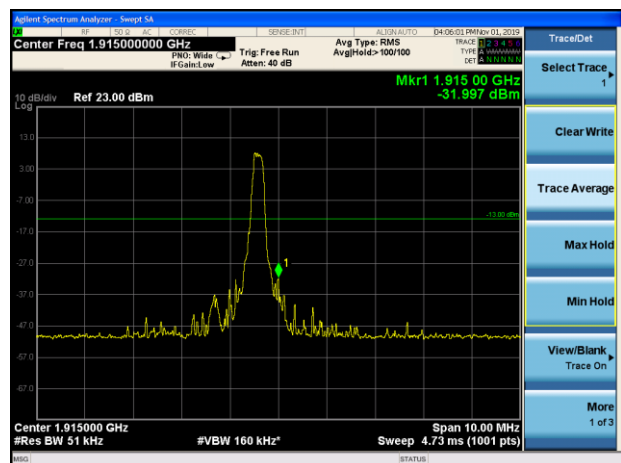
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LTE Band 25 3MHz QPSK 1RB CH-Low

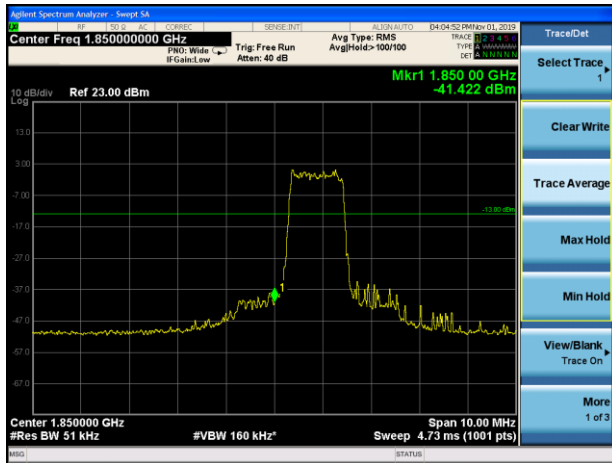


LTE Band 25 3MHz QPSK 1RB CH-High

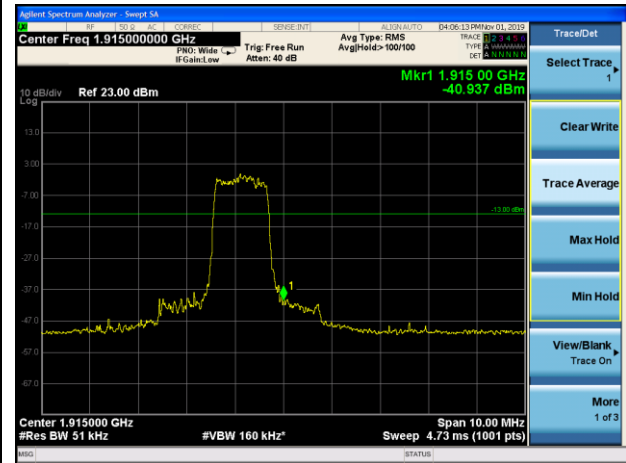




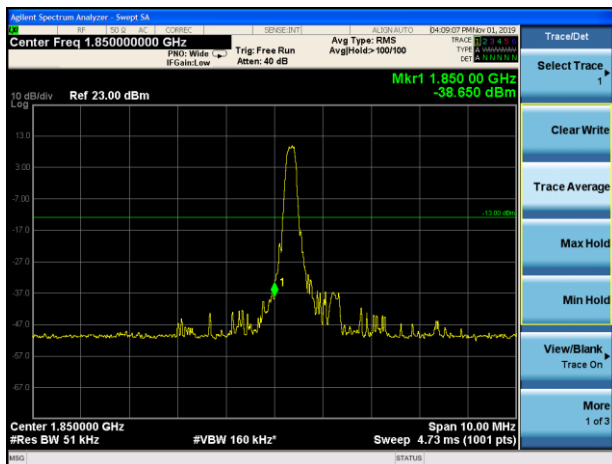
LTE Band 25 3MHz QPSK 100%RB CH-Low



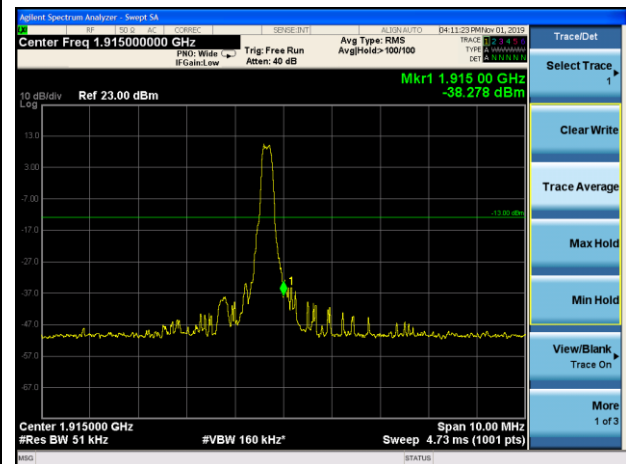
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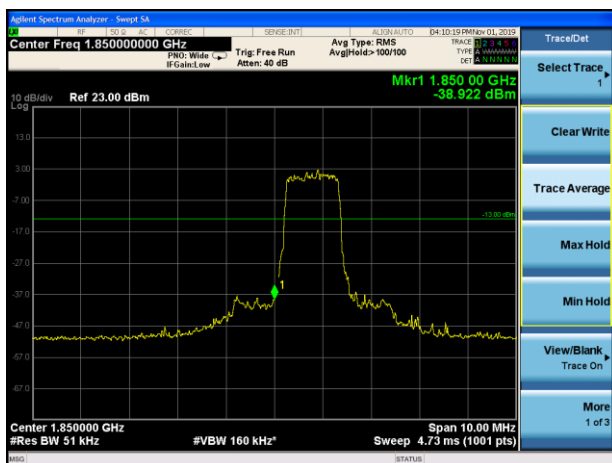
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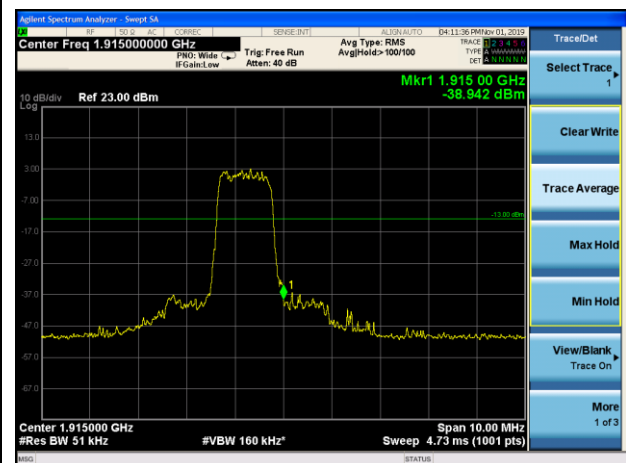
LTE Band 25 5MHz QPSK 1RB CH-High



LTE Band 25 5MHz QPSK 100%RB CH-Low

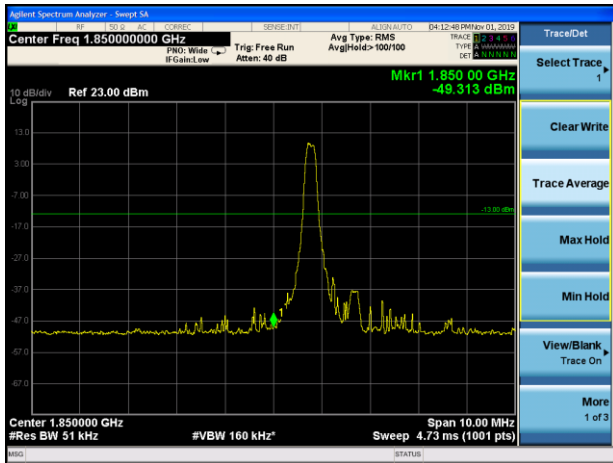


LTE Band 25 5MHz QPSK 100%RB CH-High

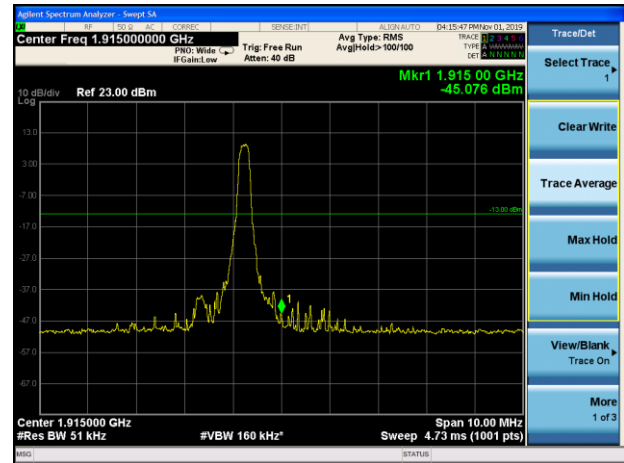




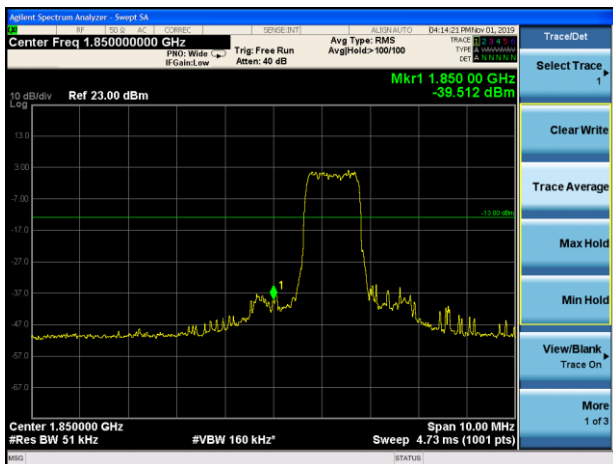
LTE Band 25 10MHz QPSK 1RB CH-Low



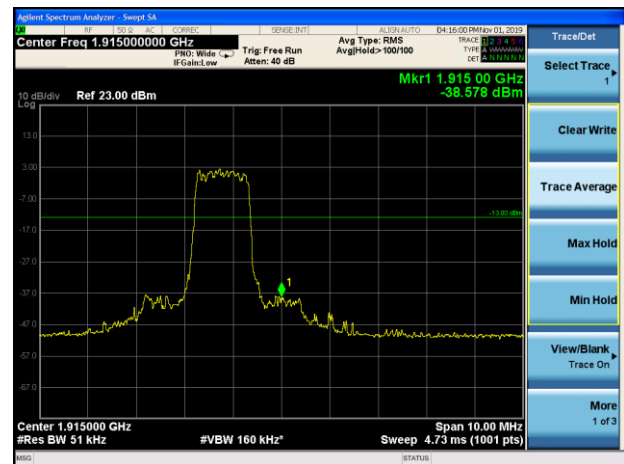
LTE Band 25 10MHz QPSK 1RB CH-High



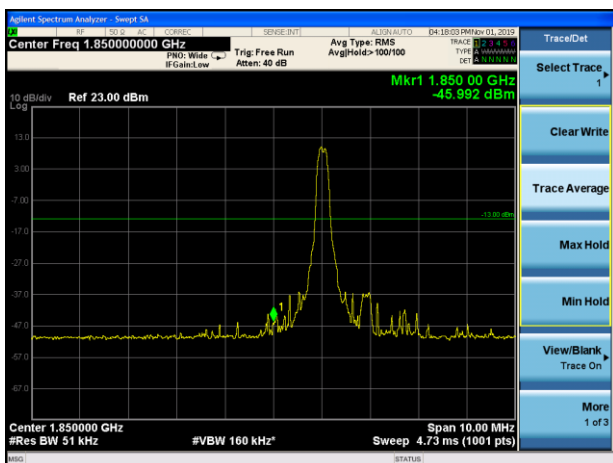
LTE Band 25 10MHz QPSK 100%RB CH-Low



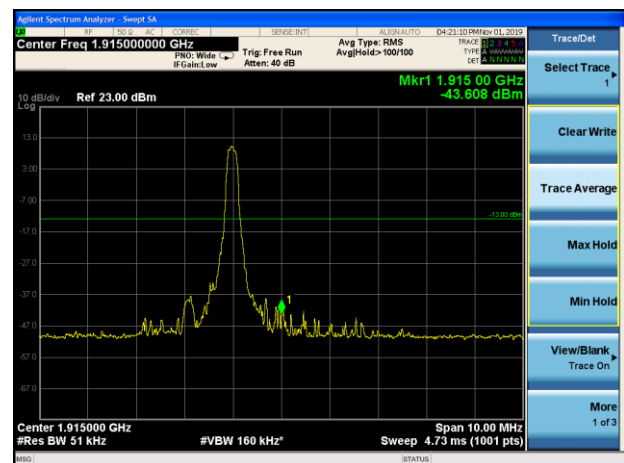
LTE Band 25 10MHz QPSK 100%RB CH-High



LTE Band 25 15MHz QPSK 1RB CH-Low

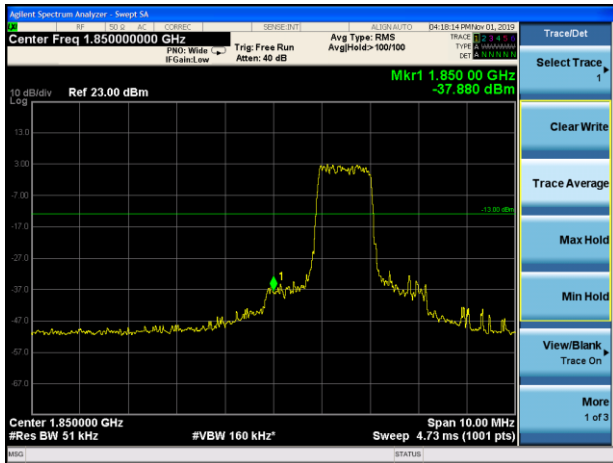


LTE Band 25 15MHz QPSK 1RB CH-High

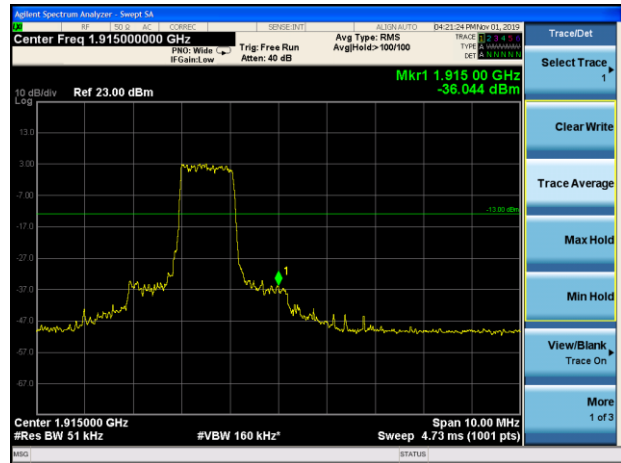




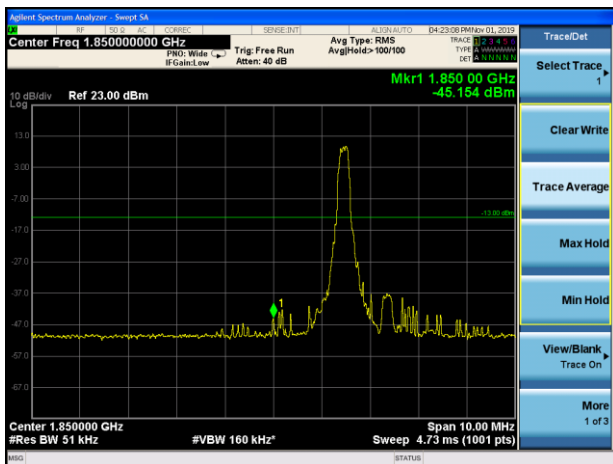
LTE Band 25 15MHz QPSK 100%RB CH-Low



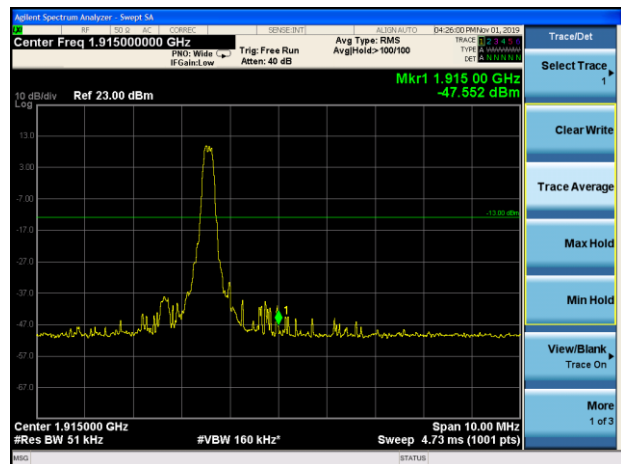
LTE Band 25 15MHz QPSK 100%RB CH-High



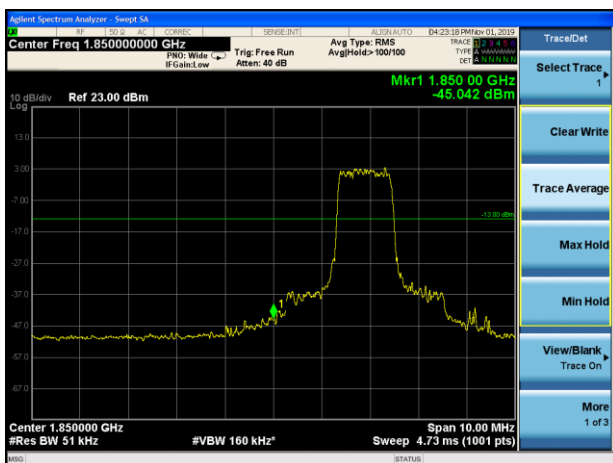
LTE Band 25 20MHz QPSK 1RB CH-Low



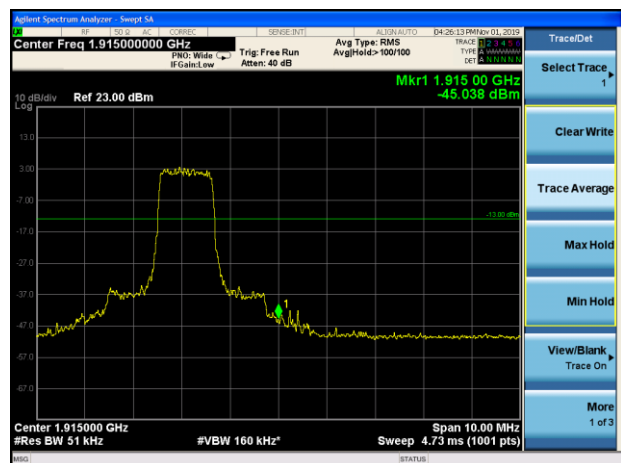
LTE Band 25 20MHz QPSK 1RB CH-High



LTE Band 25 20MHz QPSK 100%RB CH-Low

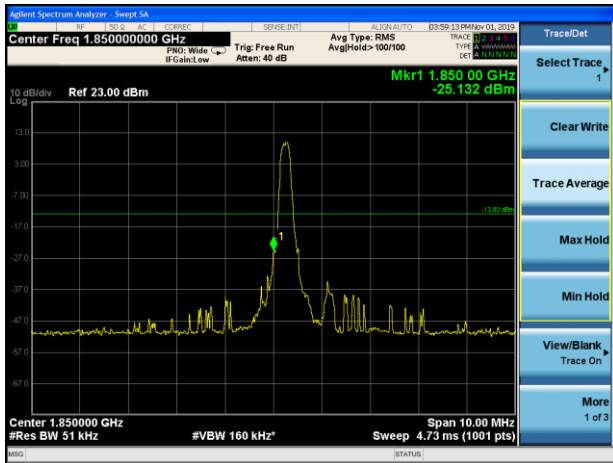


LTE Band 25 20MHz QPSK 100%RB CH-High

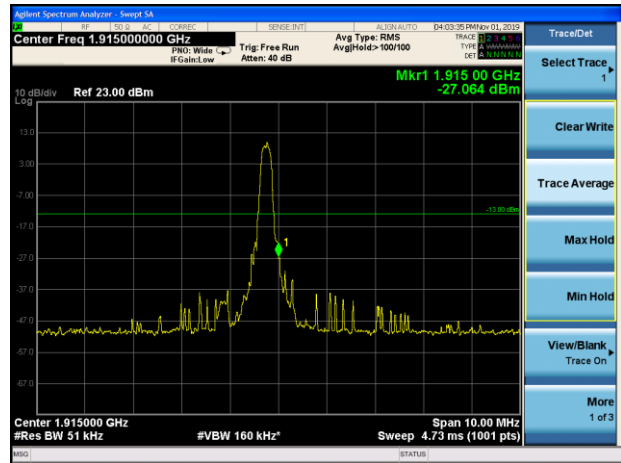




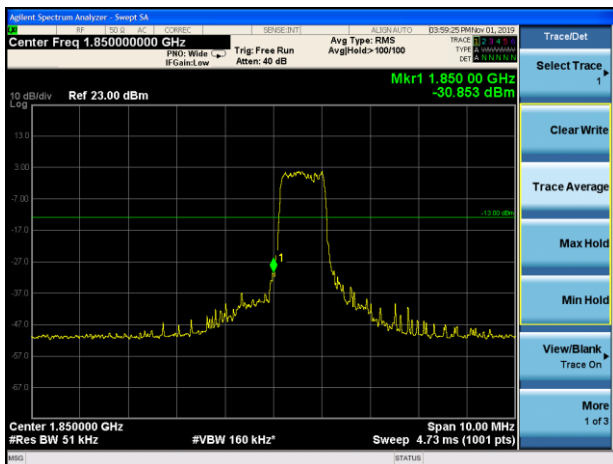
LTE Band 25 1.4MHz 16QAM 1RB CH-Low



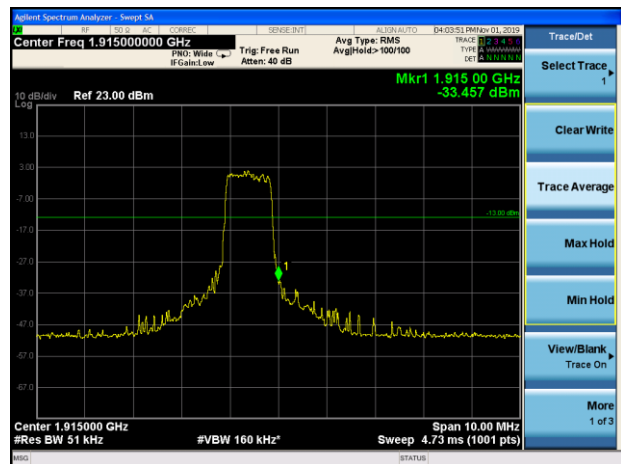
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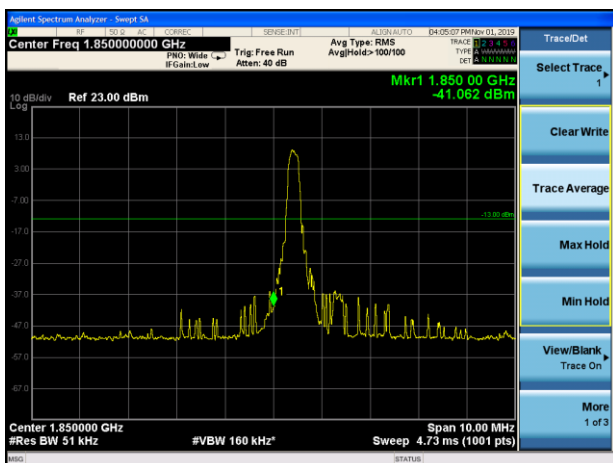
LTE Band 25 1.4MHz 16QAM 100%RB CH-Low



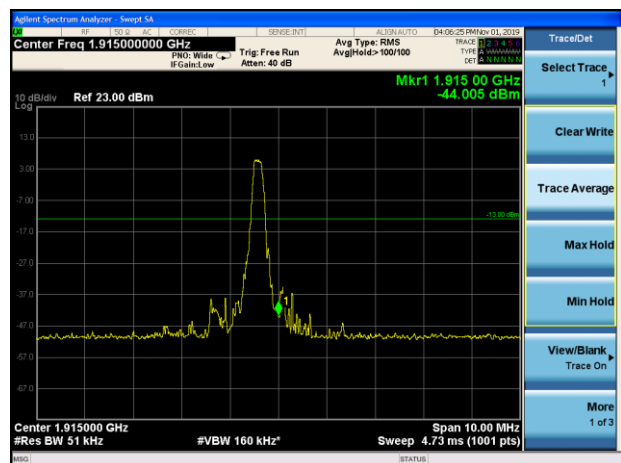
LTE Band 25 1.4MHz 16QAM 100%RB CH-High



LTE Band 25 3MHz 16QAM 1RB CH-Low

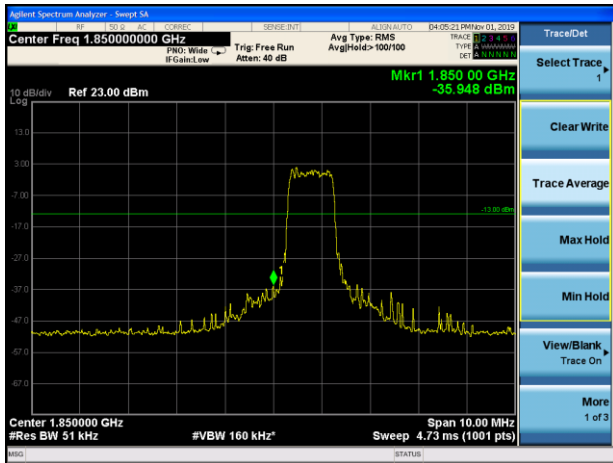


LTE Band 25 3MHz 16QAM 1RB CH-High

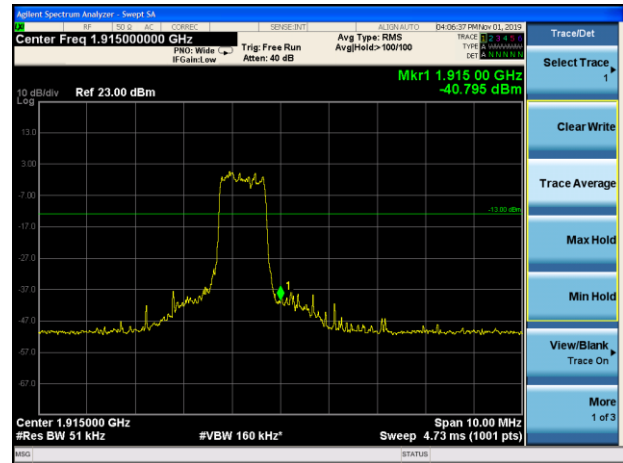




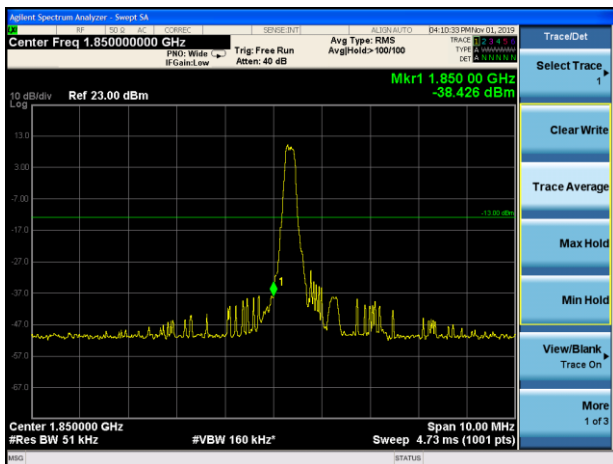
LTE Band 25 3MHz 16QAM 100%RB CH-Low



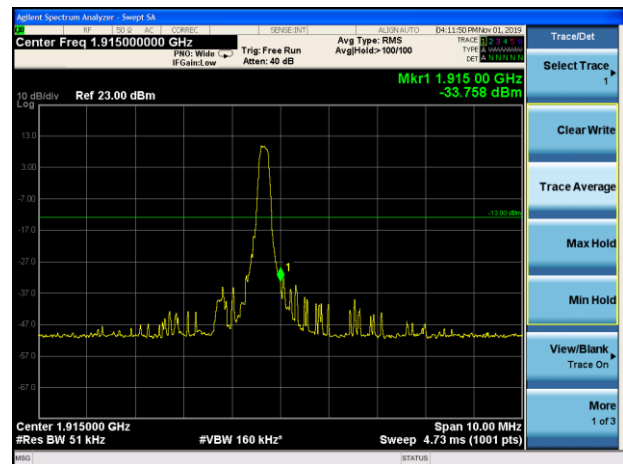
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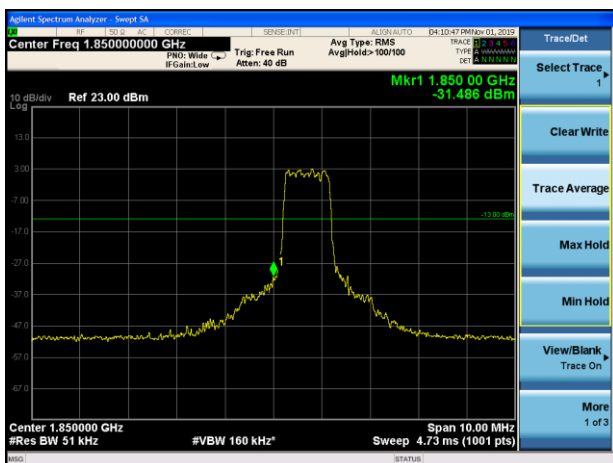
LTE Band 25 5MHz 16QAM 1RB CH-Low



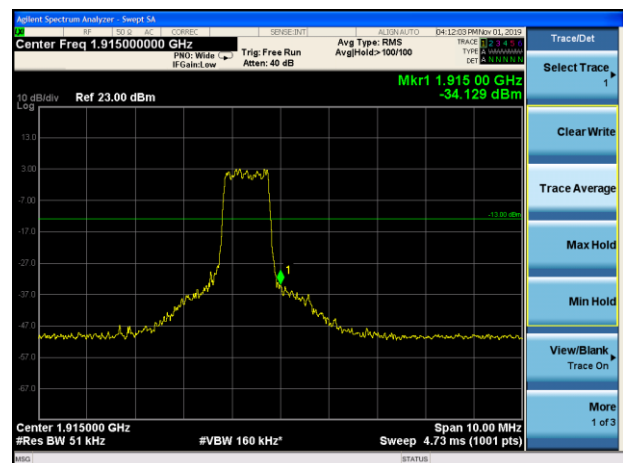
LTE Band 25 5MHz 16QAM 1RB CH-High



LTE Band 25 5MHz 16QAM 100%RB CH-Low

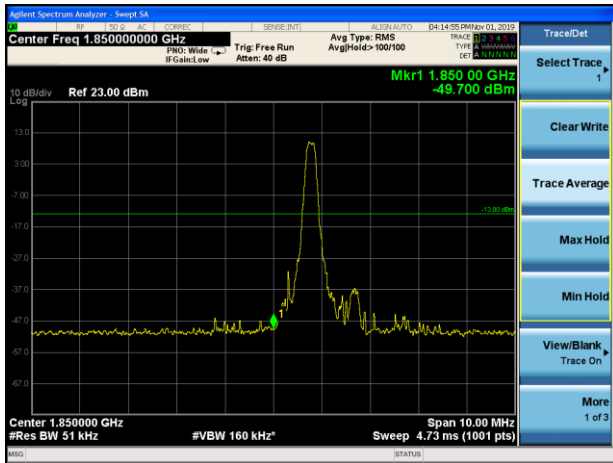


LTE Band 25 5MHz 16QAM 100%RB CH-High

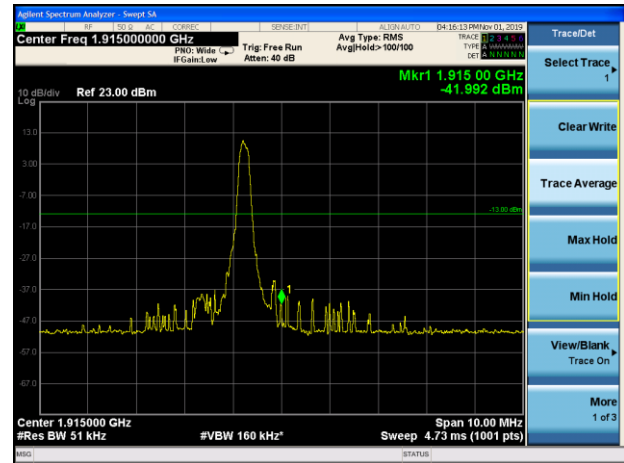




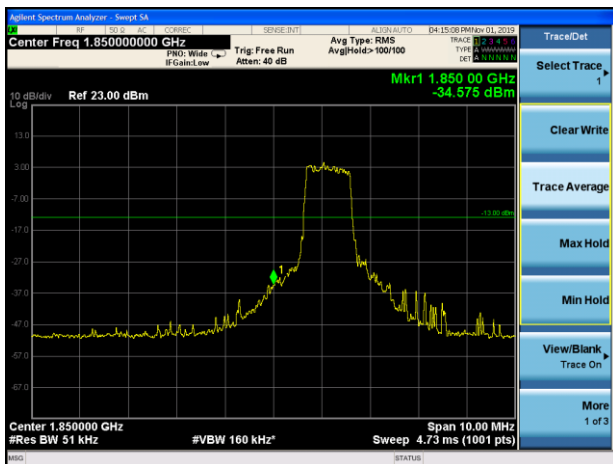
LTE Band 25 10MHz 16QAM 1RB CH-Low



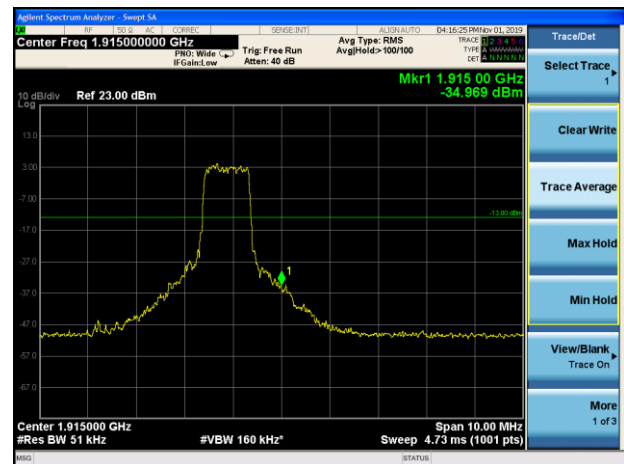
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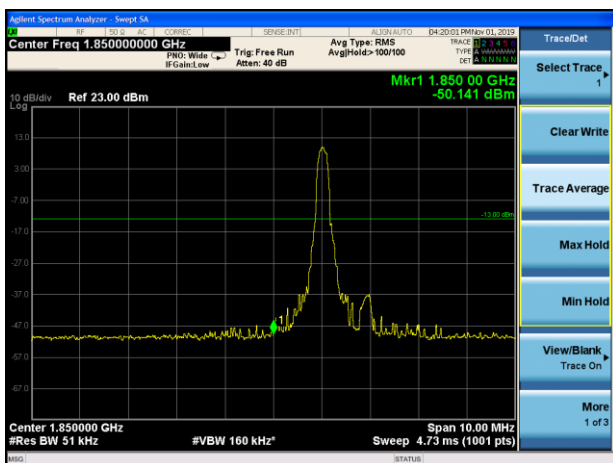
LTE Band 25 10MHz 16QAM 100%RB CH-Low



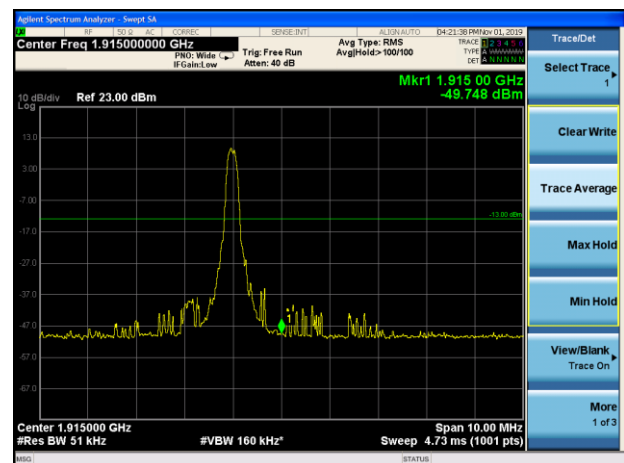
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LTE Band 25 15MHz 16QAM 1RB CH-Low

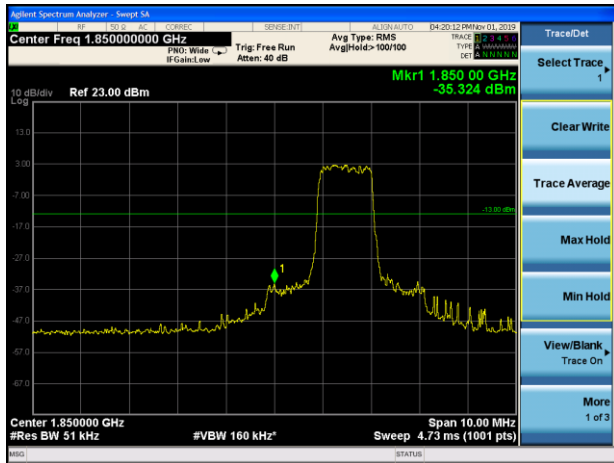


LTE Band 25 15MHz 16QAM 1RB CH-High

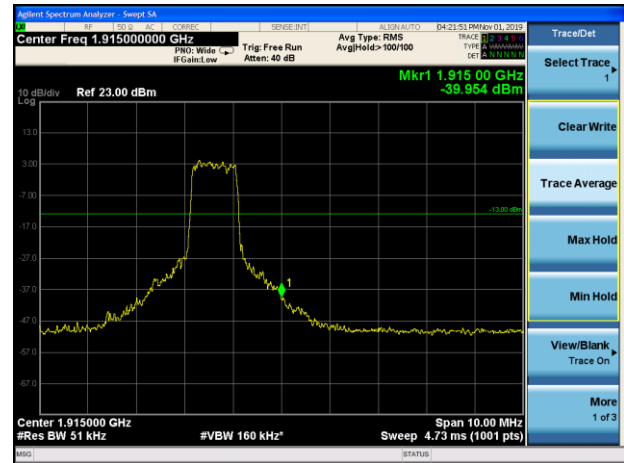




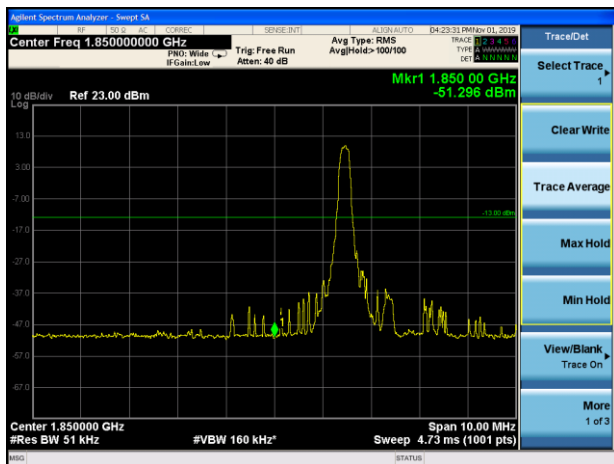
LTE Band 25 15MHz 16QAM 100%RB CH-Low



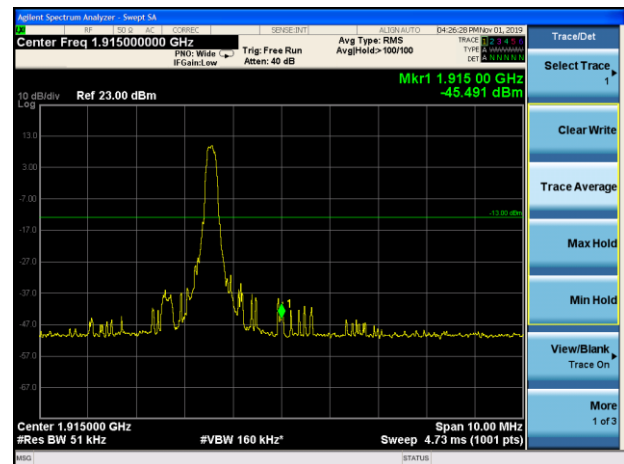
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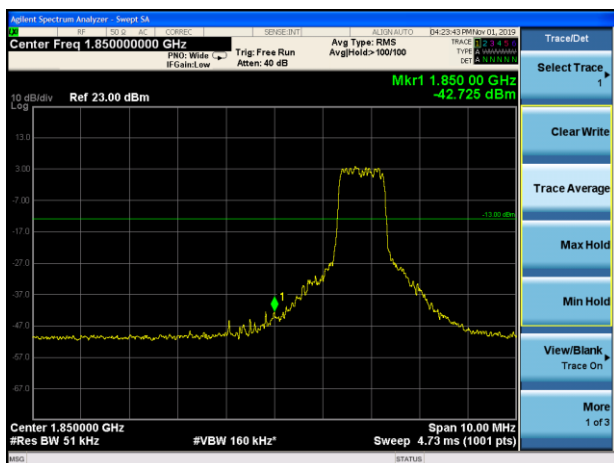
LTE Band 25 20MHz 16QAM 1RB CH-Low



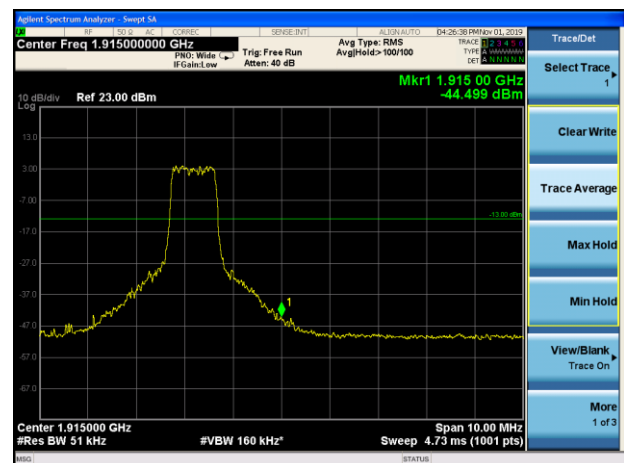
LTE Band 25 20MHz 16QAM 1RB CH-High



LTE Band 25 20MHz 16QAM 100%RB CH-Low



LTE Band 25 20MHz 16QAM 100%RB CH-High



5.6. Peak-to-Average Power Ratio (PAPR)

Ambient condition

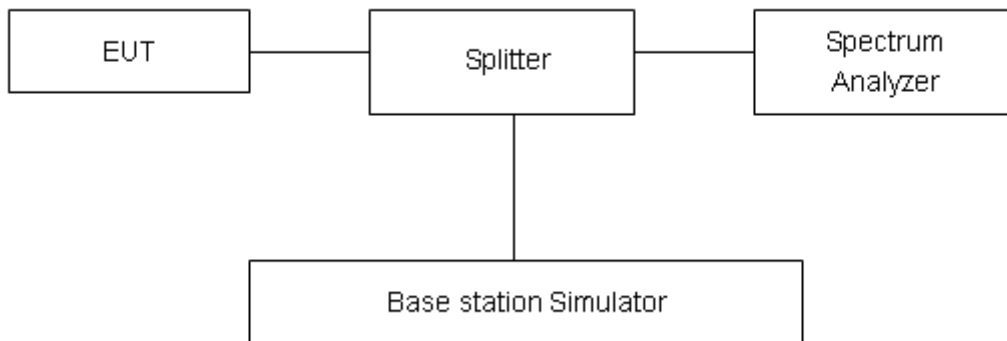
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$PAPR (dB) = PPk (dBm) - PAvg (dBm).$$

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB in 24.232(d).

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.



Test Results

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak (dBm)	Avg (dBm)	PAPR (dB)		
Band2	1.4MHz	QPSK	18900/1880	24.10	14.18	9.92	≤13	PASS
		16QAM	18900/1880	24.74	14.41	10.33	≤13	PASS
	3MHz	QPSK	18900/1880	24.00	13.96	10.04	≤13	PASS
		16QAM	18900/1880	24.69	14.10	10.59	≤13	PASS
	5MHz	QPSK	18900/1880	24.76	15.02	9.74	≤13	PASS
		16QAM	18900/1880	25.35	14.76	10.59	≤13	PASS
	10MHz	QPSK	18900/1880	24.74	15.50	9.24	≤13	PASS
		16QAM	18900/1880	25.86	16.62	9.24	≤13	PASS
	15MHz	QPSK	18900/1880	25.28	15.10	10.18	≤13	PASS
		16QAM	18900/1880	25.83	16.40	9.43	≤13	PASS
	20MHz	QPSK	18900/1880	25.30	15.83	9.47	≤13	PASS
		16QAM	18900/1880	25.82	16.35	9.47	≤13	PASS

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak (dBm)	Avg (dBm)	PAPR (dB)		
Ban25	1.4MHz	QPSK	26365/1882.5	24.00	12.91	11.09	≤13	PASS
		16QAM	26365/1882.5	24.91	13.21	11.70	≤13	PASS
	3MHz	QPSK	26365/1882.5	23.96	12.68	11.28	≤13	PASS
		16QAM	26365/1882.5	24.77	13.35	11.42	≤13	PASS
	5MHz	QPSK	26365/1882.5	24.90	15.89	9.01	≤13	PASS
		16QAM	26365/1882.5	25.43	15.43	10.00	≤13	PASS
	10MHz	QPSK	26365/1882.5	24.80	15.29	9.51	≤13	PASS
		16QAM	26365/1882.5	25.82	16.31	9.51	≤13	PASS
	15MHz	QPSK	26365/1882.5	25.35	16.04	9.31	≤13	PASS
		16QAM	26365/1882.5	25.78	14.98	10.80	≤13	PASS
	20MHz	QPSK	26365/1882.5	25.26	15.14	10.12	≤13	PASS
		16QAM	26365/1882.5	25.76	15.16	10.60	≤13	PASS

5.7. Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size,

(1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

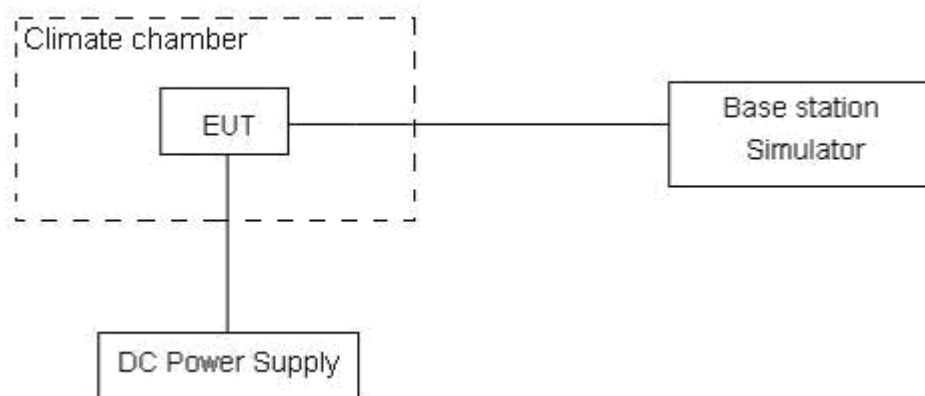
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 2.6 V and 4.8V, with a nominal voltage of 3.3V.

Test setup



Limits

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 3$, $U = 0.01\text{ppm}$.

Test Result

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz	16QAM	QPSK	16QAM	QPSK	
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	3.80	16.47	0.00202	0.00876	PASS
Extreme (85°C)		4.81	8.98	0.00256	0.00478	PASS
Extreme (80°C)		2.26	2.83	0.00120	0.00150	PASS
Extreme (70°C)		10.31	12.05	0.00549	0.00641	PASS
Extreme (60°C)		13.01	12.99	0.00692	0.00691	PASS
Extreme (50°C)		17.11	13.82	0.00910	0.00735	PASS
Extreme (40°C)		9.35	7.06	0.00497	0.00376	PASS
Extreme (30°C)		7.63	13.50	0.00406	0.00718	PASS
Extreme (20°C)		1.53	3.88	0.00081	0.00206	PASS
Extreme (10°C)		2.60	13.29	0.00138	0.00707	PASS
Extreme (0°C)		17.51	15.96	0.00931	0.00849	PASS
Extreme (-10°C)		1.02	17.40	0.00054	0.00925	PASS
Extreme (-20°C)		3.88	5.48	0.00206	0.00291	PASS
Extreme (-30°C)		14.75	13.92	0.00785	0.00740	PASS
Extreme (-40°C)		1.23	7.50	0.00065	0.00399	PASS
25°C	LV	9.50	11.44	0.00505	0.00609	PASS
	HV	9.55	2.58	0.00508	0.00137	PASS

LTE Band 25						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	4.80	9.39	0.00255	0.00499	PASS
Extreme (85°C)		4.47	4.39	0.00238	0.00233	PASS
Extreme (80°C)		15.15	12.65	0.00806	0.00673	PASS
Extreme (70°C)		3.16	7.96	0.00168	0.00424	PASS
Extreme (60°C)		8.05	1.67	0.00428	0.00089	PASS
Extreme (50°C)		5.50	1.86	0.00293	0.00099	PASS
Extreme (40°C)		15.34	4.92	0.00816	0.00261	PASS
Extreme (30°C)		16.78	4.86	0.00893	0.00259	PASS
Extreme (20°C)		12.70	3.98	0.00676	0.00212	PASS
Extreme (10°C)		7.73	7.21	0.00411	0.00384	PASS
Extreme (0°C)		16.92	12.52	0.00900	0.00666	PASS
Extreme (-10°C)		12.31	10.24	0.00655	0.00545	PASS
Extreme (-20°C)		10.62	4.66	0.00565	0.00248	PASS
Extreme (-30°C)		3.04	17.39	0.00162	0.00925	PASS
Extreme (-40°C)		12.29	13.40	0.00654	0.00713	PASS
25°C	LV	7.24	9.20	0.00385	0.00489	PASS
	HV	13.29	12.31	0.00707	0.00655	PASS

5.8. Spurious Emissions at Antenna Terminals

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

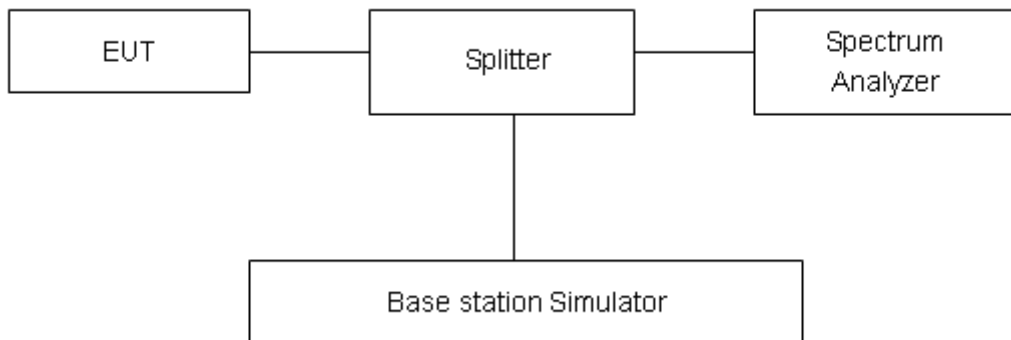
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz

RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.

The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log₁₀ (P) dB.”

Limit	-13 dBm
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Measurement Uncertainty

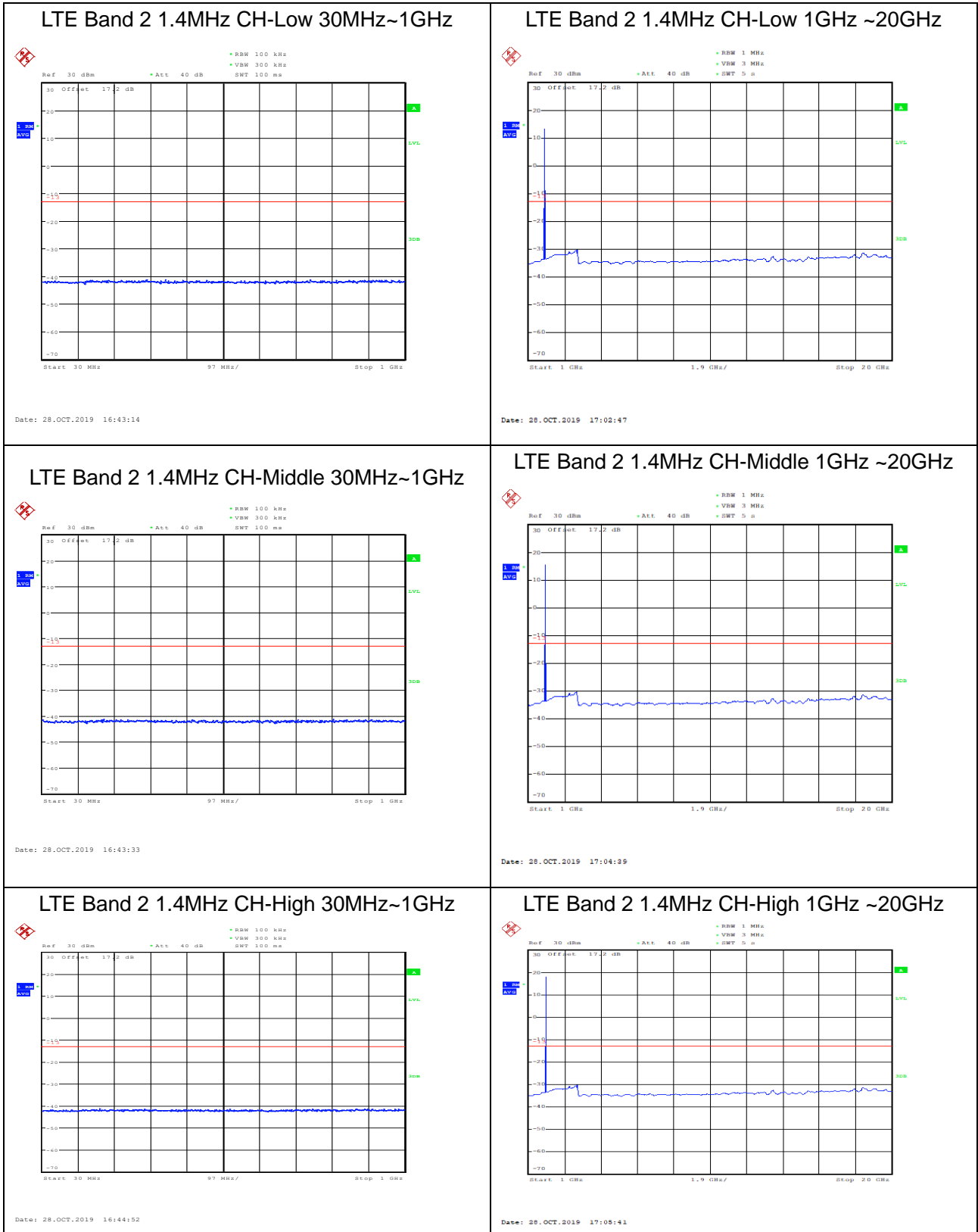
The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

Test Result

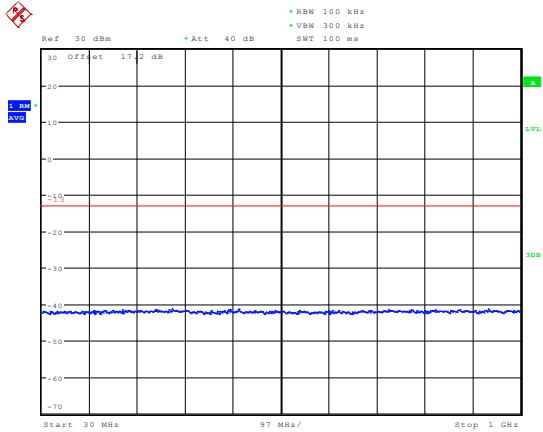
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.



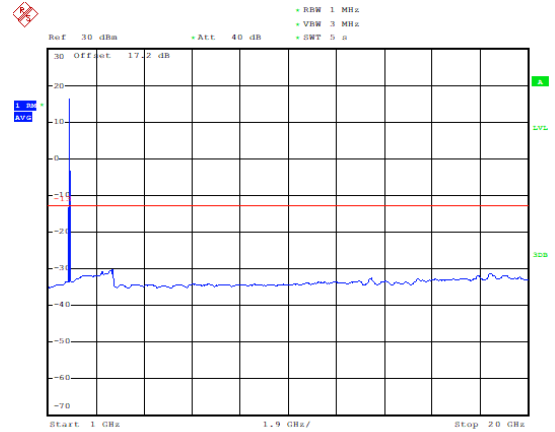


LTE Band 2 3MHz CH-Low 30MHz~1GHz



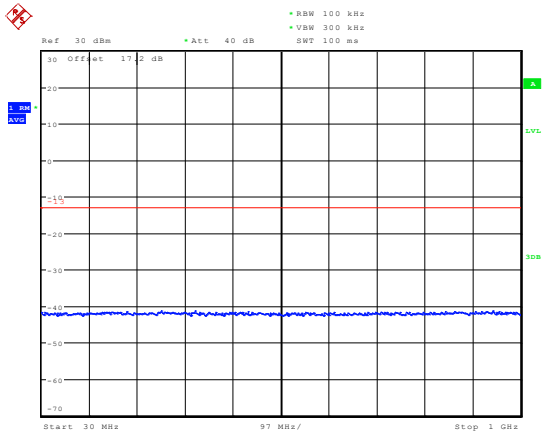
Date: 28.OCT.2019 16:45:57

LTE Band 2 3MHz CH-Low 1GHz ~20GHz



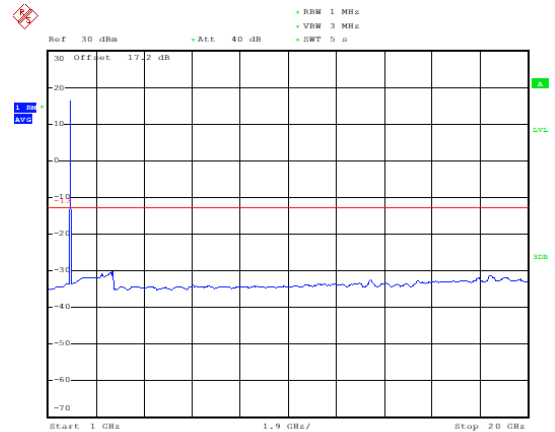
Date: 28.OCT.2019 17:06:59

LTE Band 2 3MHz CH-Middle 30MHz~1GHz



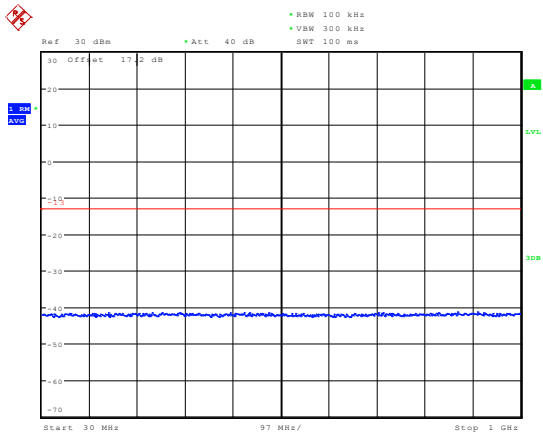
Date: 28.OCT.2019 16:46:17

LTE Band 2 3MHz CH-Middle 1GHz ~20GHz



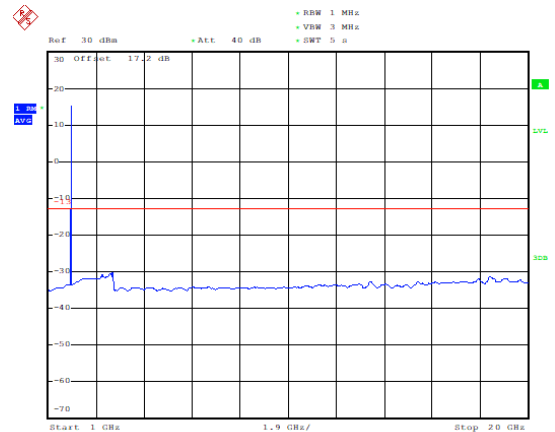
Date: 28.OCT.2019 17:08:28

LTE Band 2 3MHz CH-High 30MHz~1GHz



Date: 28.OCT.2019 16:47:14

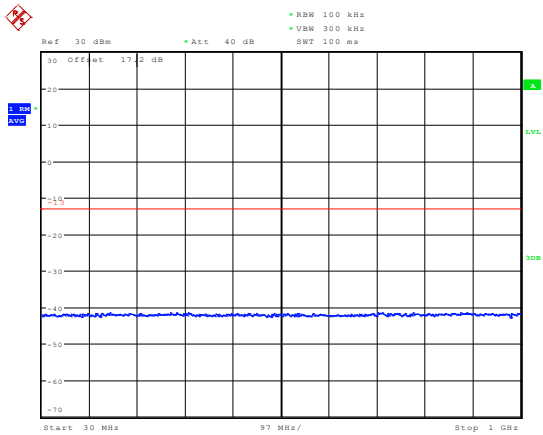
LTE Band 2 3MHz CH-High 1GHz ~20GHz



Date: 28.OCT.2019 17:09:14

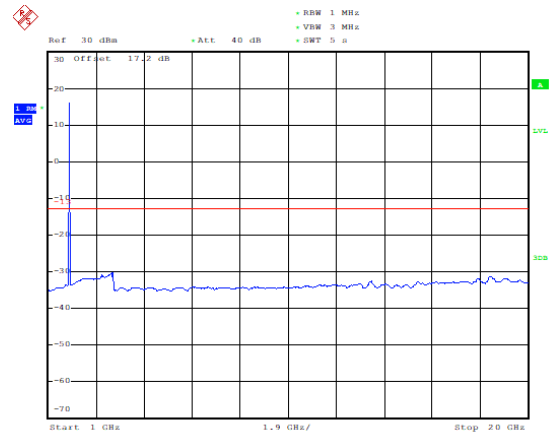


LTE Band 2 5MHz CH-Low 30MHz~1GHz



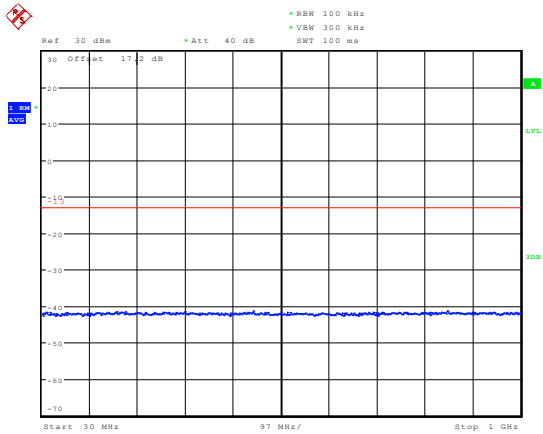
Date: 28.OCT.2019 16:48:04

LTE Band 2 5MHz CH-Low 1GHz ~20GHz



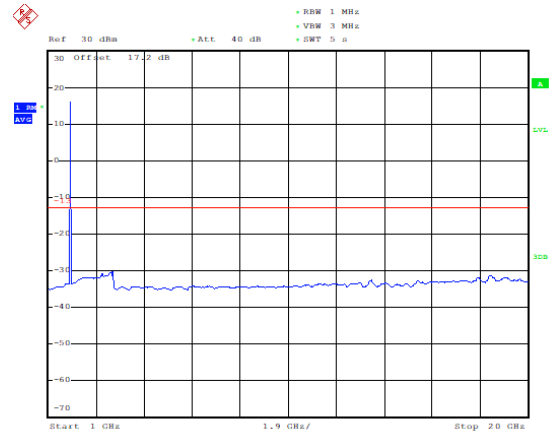
Date: 28.OCT.2019 17:10:19

LTE Band 2 5MHz CH-Middle 30MHz~1GHz



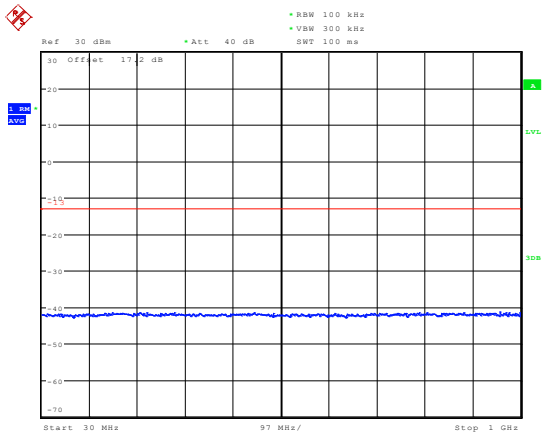
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LTE Band 2 5MHz CH-Middle 1GHz ~20GHz



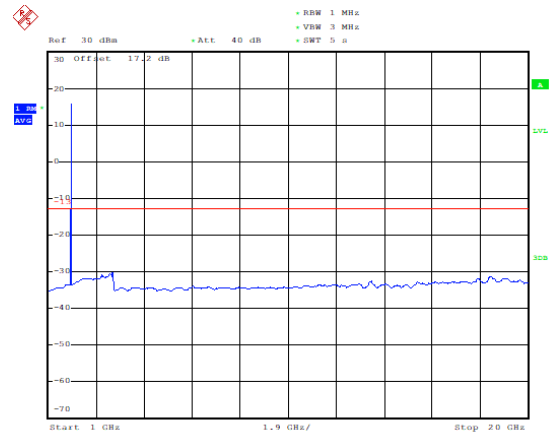
Date: 28.OCT.2019 17:10:46

LTE Band 2 5MHz CH-High 30MHz~1GHz



Date: 28.OCT.2019 16:49:37

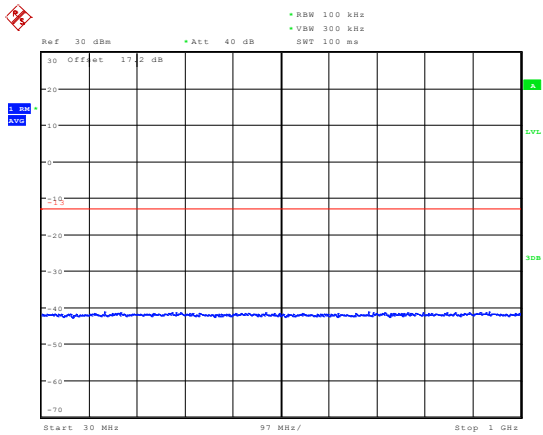
LTE Band 2 5MHz CH-High 1GHz ~20GHz



Date: 28.OCT.2019 17:12:09

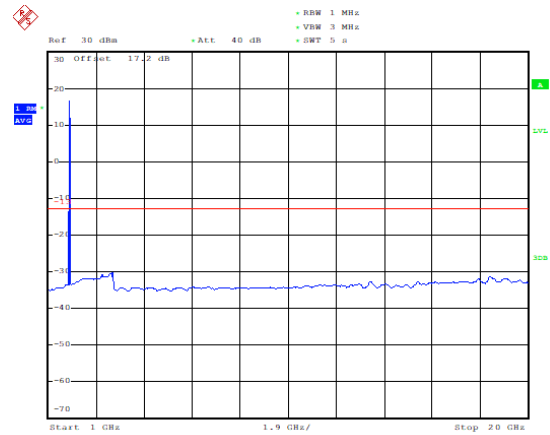


LTE Band 2 10MHz CH-Low 30MHz~1GHz



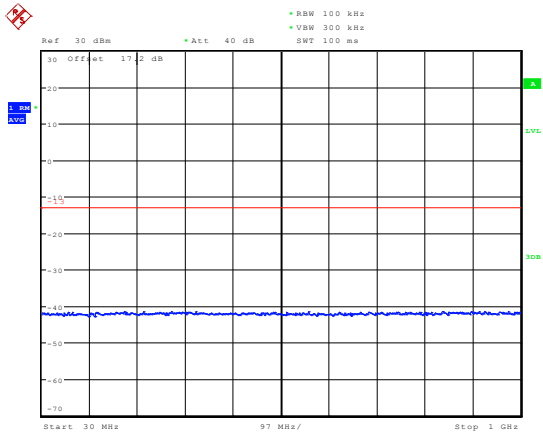
Date: 28.OCT.2019 16:50:17

LTE Band 2 10MHz CH-Low 1GHz ~20GHz



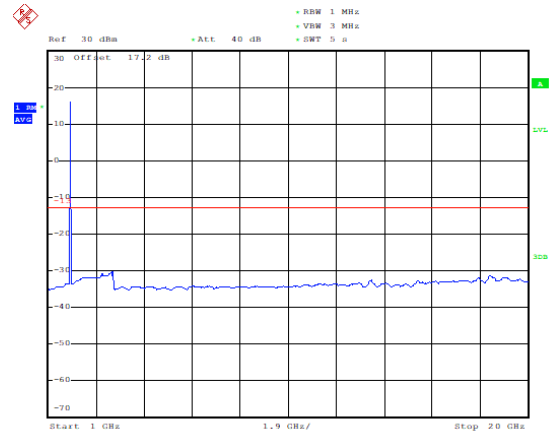
Date: 28.OCT.2019 17:19:35

LTE Band 2 10MHz CH-Middle 30MHz~1GHz



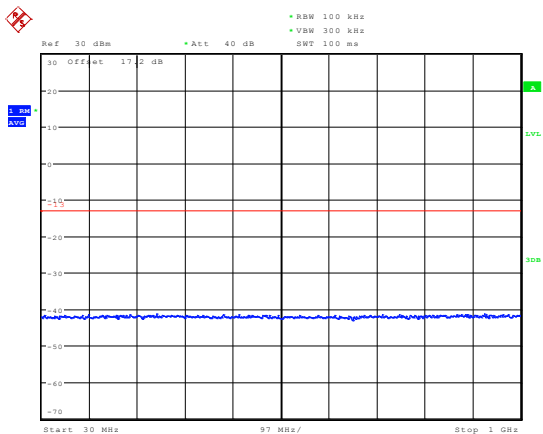
Date: 28.OCT.2019 16:50:43

LTE Band 2 10MHz CH-Middle 1GHz ~20GHz



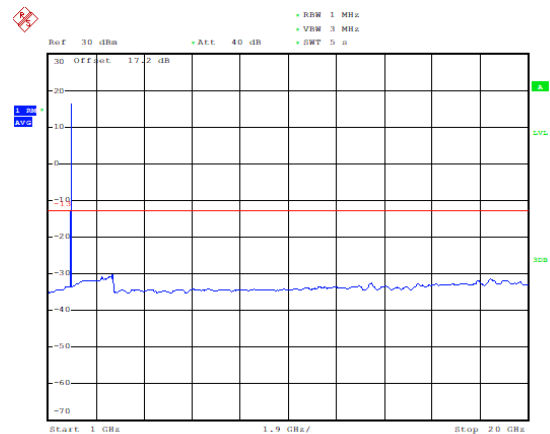
Date: 28.OCT.2019 17:14:07

LTE Band 2 10MHz CH-High 30MHz~1GHz



Date: 28.OCT.2019 16:52:31

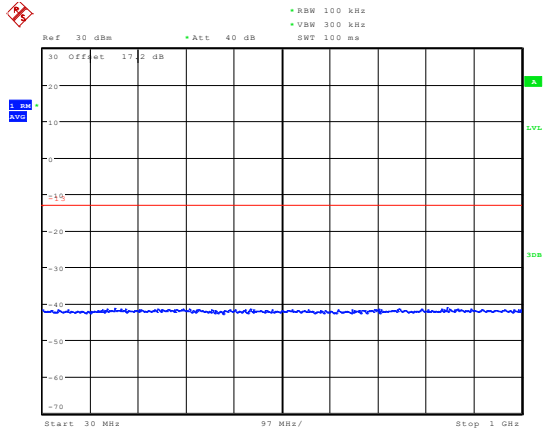
LTE Band 2 10MHz CH-High 1GHz ~20GHz



Date: 28.OCT.2019 17:15:52

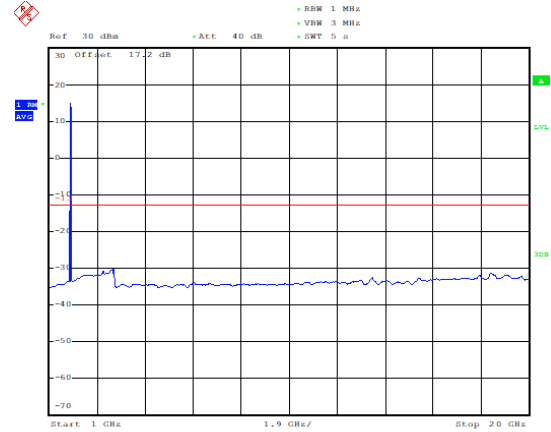


LTE Band 2 15MHz CH-Low 30MHz~1GHz



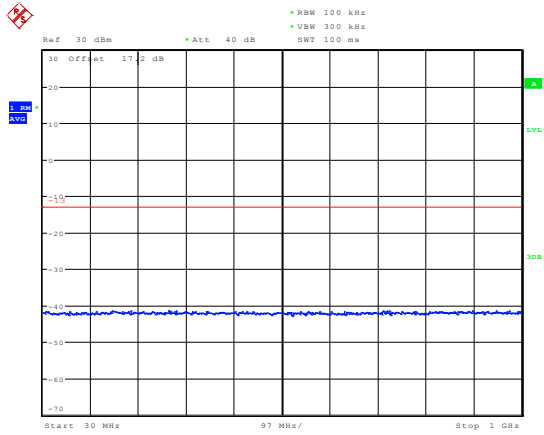
Date: 28.OCT.2019 16:53:08

LTE Band 2 15MHz CH-Low 1GHz ~20GHz



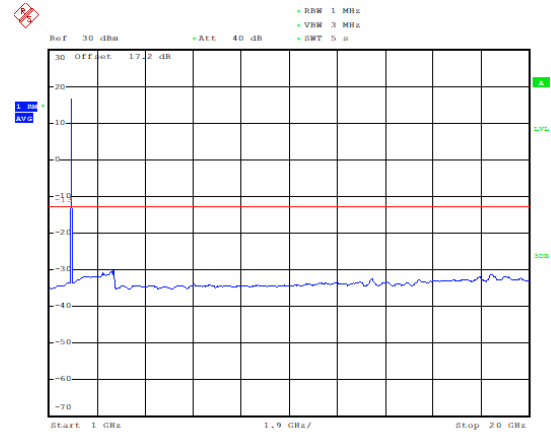
Date: 28.OCT.2019 17:16:33

LTE Band 2 15MHz CH-Middle 30MHz~1GHz



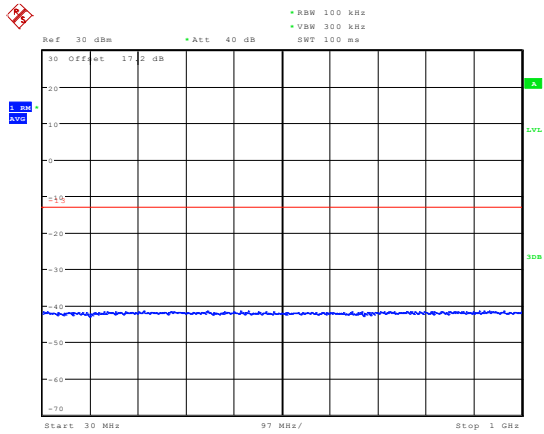
Date: 28.OCT.2019 16:53:29

LTE Band 2 15MHz CH-Middle 1GHz ~20GHz



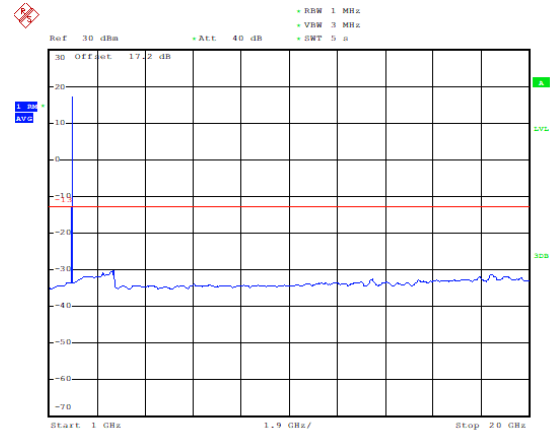
Date: 28.OCT.2019 17:17:05

LTE Band 2 15MHz CH-High 30MHz~1GHz



Date: 28.OCT.2019 16:54:59

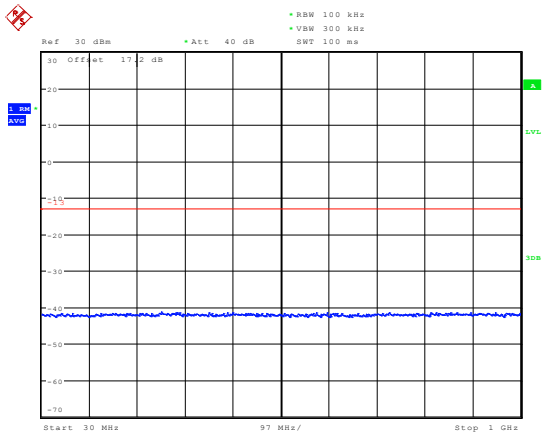
LTE Band 2 15MHz CH-High 1GHz ~20GHz



Date: 28.OCT.2019 17:17:28

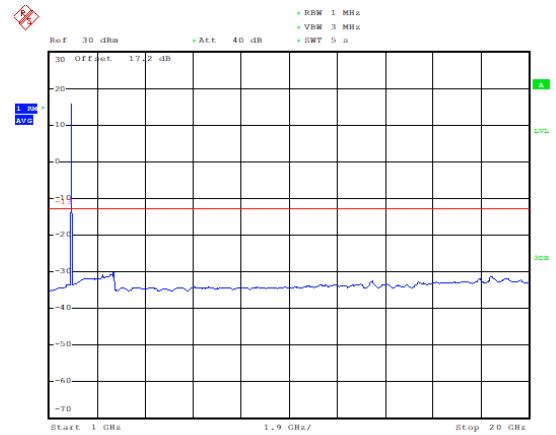


LTE Band 2 20MHz CH-Low 30MHz~1GHz



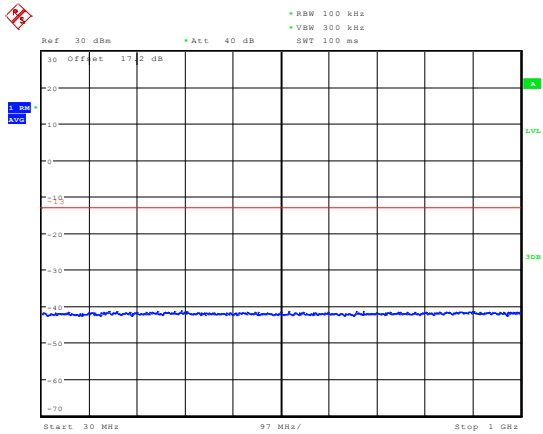
Date: 28.OCT.2019 16:55:26

LTE Band 2 20MHz CH-Low 1GHz ~20GHz



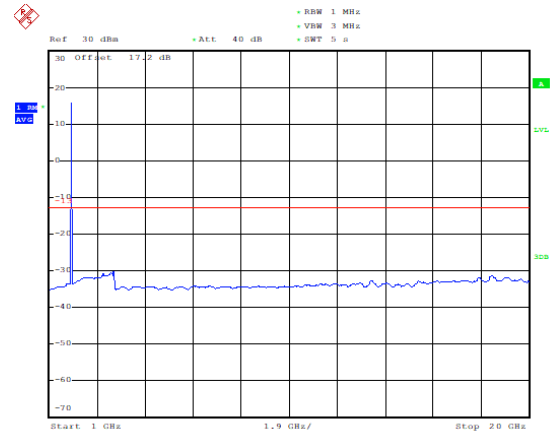
Date: 28.OCT.2019 17:19:10

LTE Band 2 20MHz CH-Middle 30MHz~1GHz



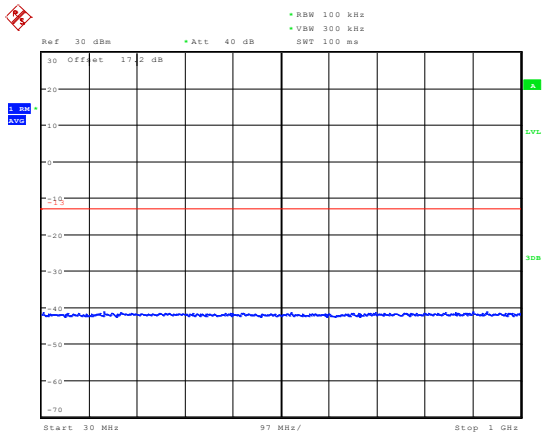
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LTE Band 2 20MHz CH-Middle 1GHz ~20GHz



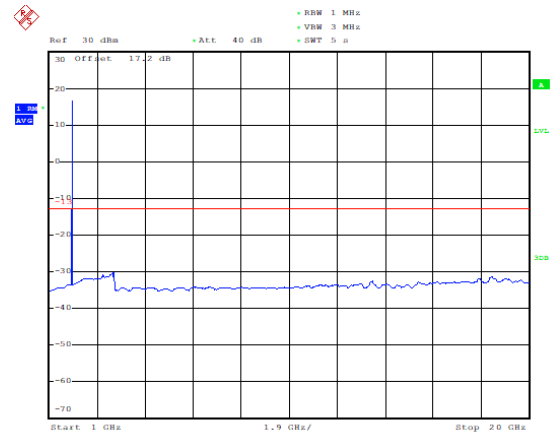
Date: 28.OCT.2019 17:20:24

LTE Band 2 20MHz CH-High 30MHz~1GHz



Date: 28.OCT.2019 16:57:24

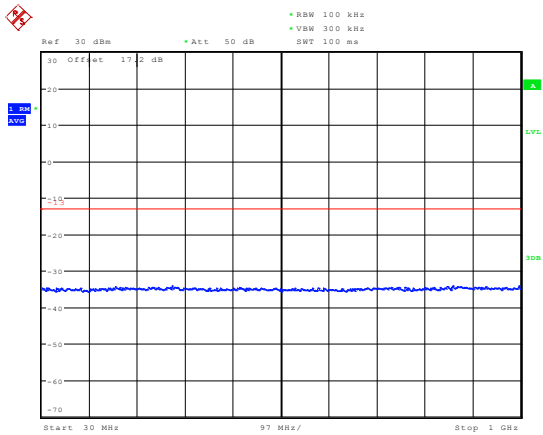
LTE Band 2 20MHz CH-High 1GHz ~20GHz



Date: 28.OCT.2019 17:20:50

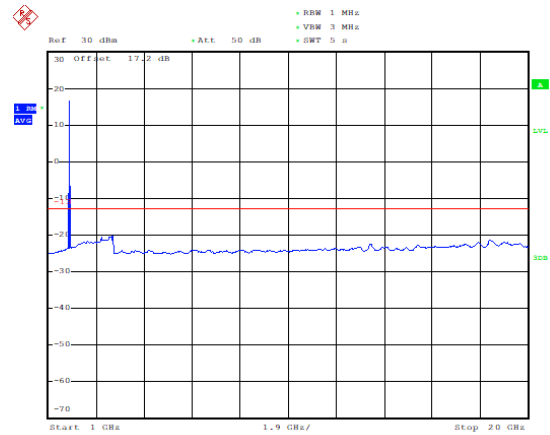


LTE Band 25 1.4MHz CH-Low 30MHz~1GHz



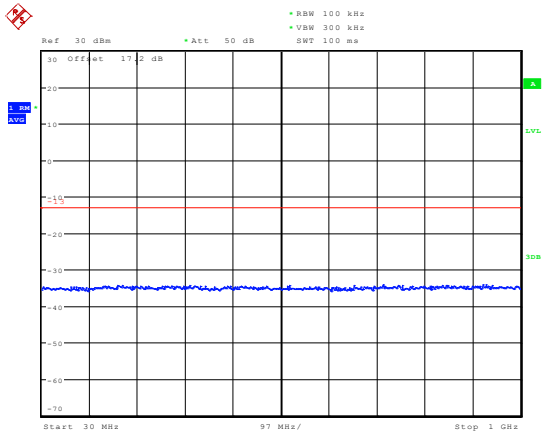
Date: 29.OCT.2019 13:55:22

LTE Band 25 1.4MHz CH-Low 1GHz ~20GHz



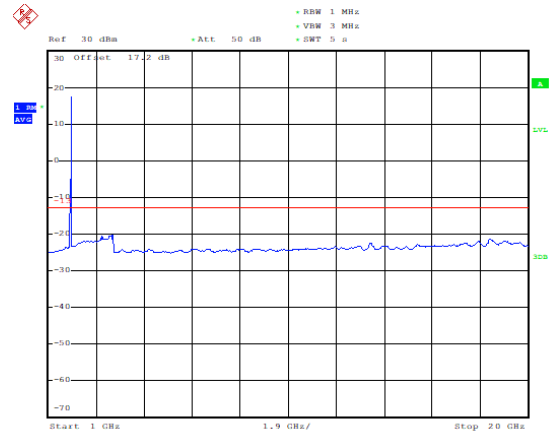
Date: 29.OCT.2019 14:37:51

LTE Band 25 1.4MHz CH-Middle 30MHz~1GHz



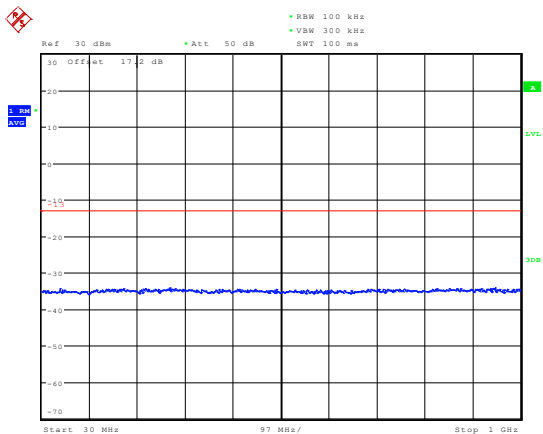
Date: 29.OCT.2019 13:57:25

LTE Band 25 1.4MHz CH-Middle 1GHz ~20GHz



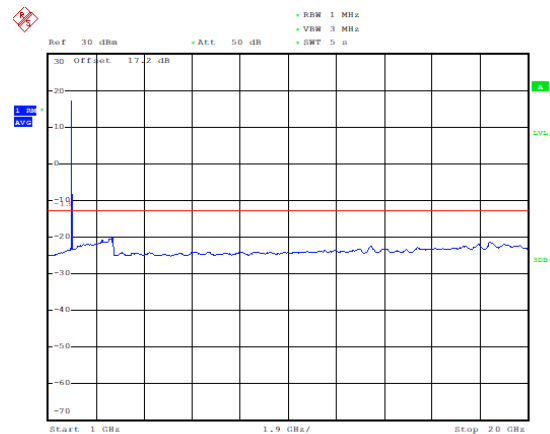
Date: 29.OCT.2019 14:39:40

LTE Band 25 1.4MHz CH-High 30MHz~1GHz



Date: 29.OCT.2019 14:01:38

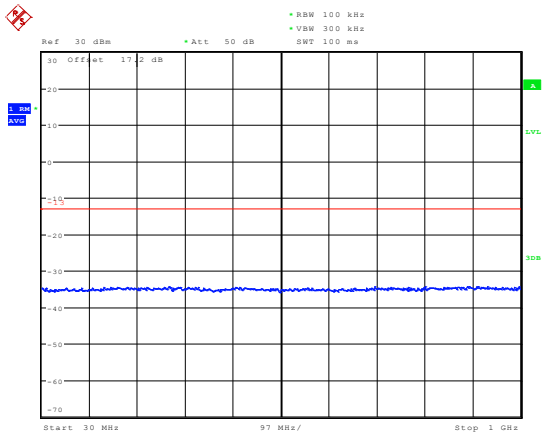
LTE Band 25 1.4MHz CH-High 1GHz ~20GHz



Date: 29.OCT.2019 14:41:27

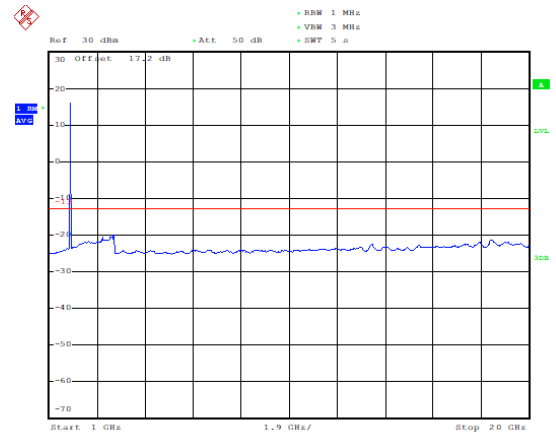


LTE Band 25 3MHz CH-Low 30MHz~1GHz



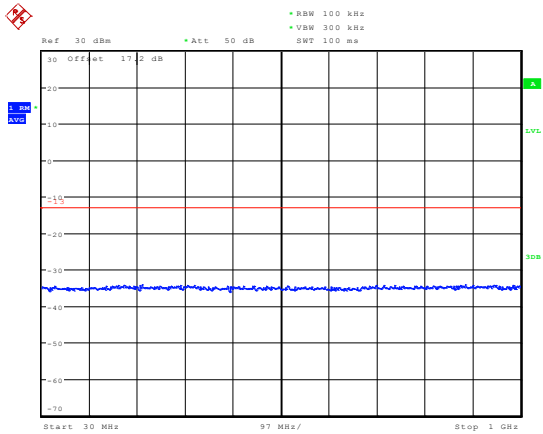
Date: 29.OCT.2019 14:02:03

LTE Band 25 3MHz CH-Low 1GHz ~20GHz



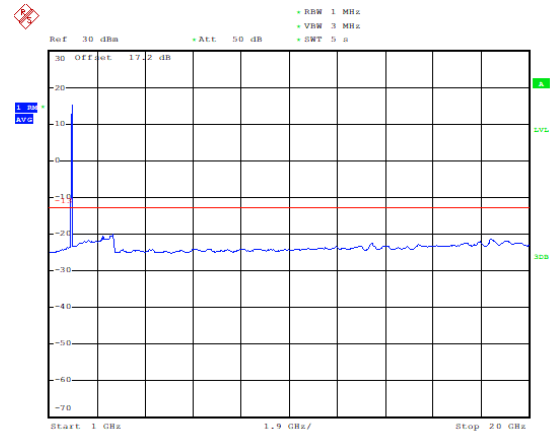
Date: 29.OCT.2019 14:41:57

LTE Band 25 3MHz CH-Middle 30MHz~1GHz



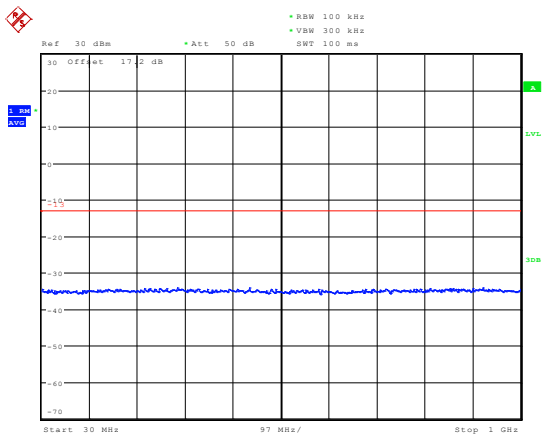
Date: 29.OCT.2019 14:02:22

LTE Band 25 3MHz CH-Middle 1GHz ~20GHz



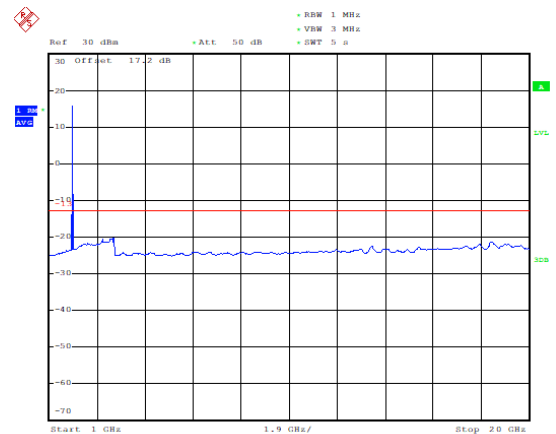
Date: 29.OCT.2019 14:42:19

LTE Band 25 3MHz CH-High 30MHz~1GHz



Date: 29.OCT.2019 14:04:26

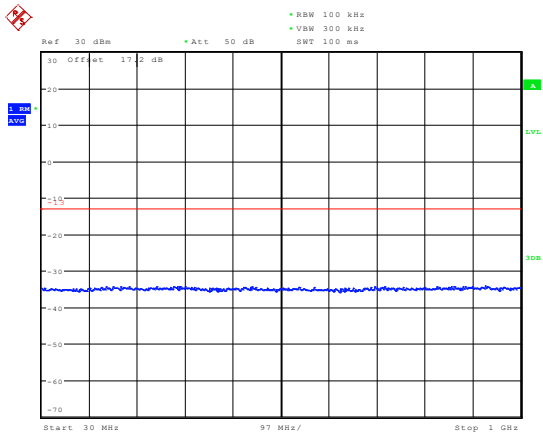
LTE Band 25 3MHz CH-High 1GHz ~20GHz



Date: 29.OCT.2019 14:42:49

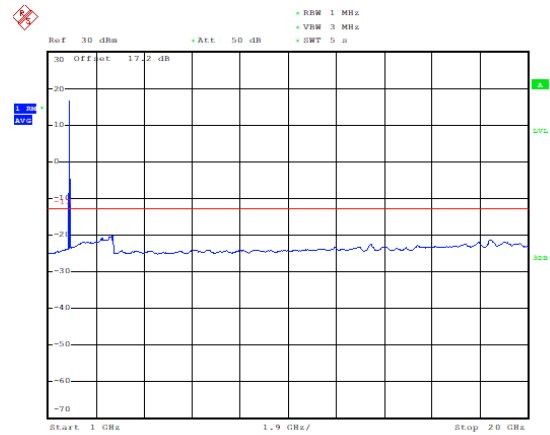


LTE Band 25 5MHz CH-Low 30MHz~1GHz



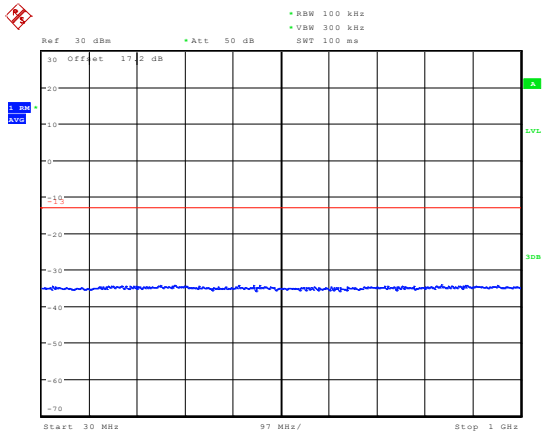
Date: 29.OCT.2019 14:05:26

LTE Band 25 5MHz CH-Low 1GHz ~20GHz



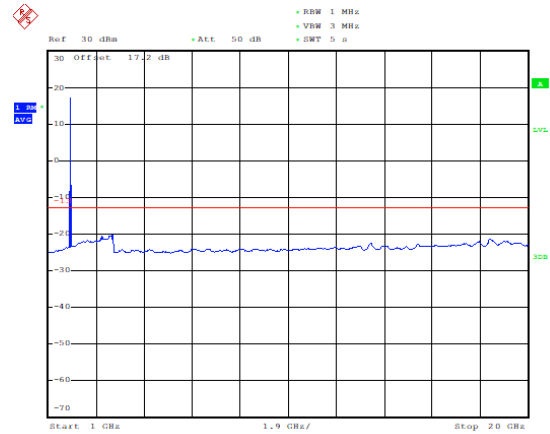
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LTE Band 25 5MHz CH-Middle 30MHz~1GHz



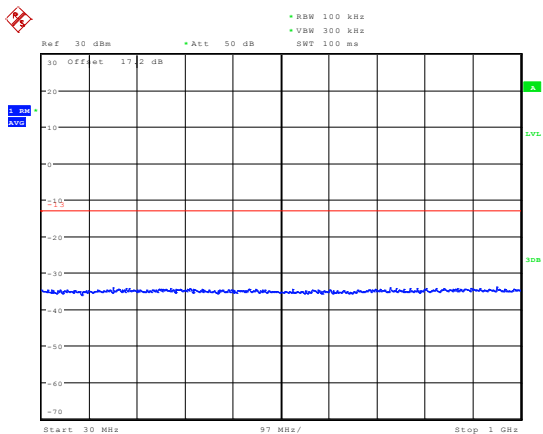
Date: 29.OCT.2019 14:06:34

LTE Band 25 5MHz CH-Middle 1GHz ~20GHz



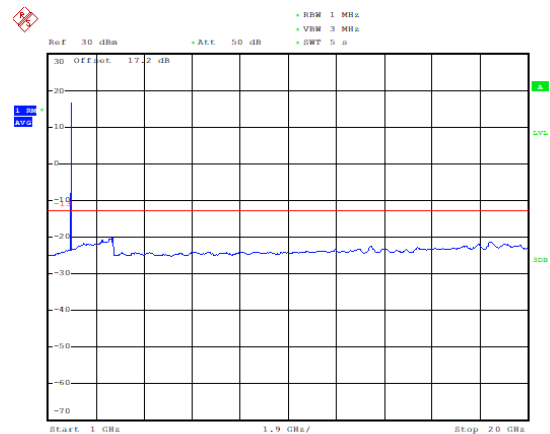
Date: 29.OCT.2019 14:44:10

LTE Band 25 5MHz CH-High 30MHz~1GHz



Date: 29.OCT.2019 14:07:50

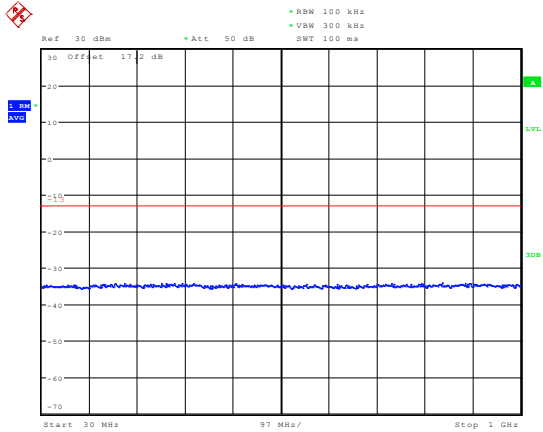
LTE Band 25 5MHz CH-High 1GHz ~20GHz



Date: 29.OCT.2019 14:44:33

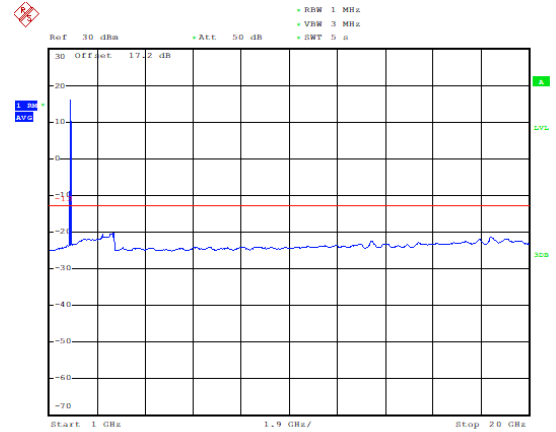


LTE Band 25 10MHz CH-Low 30MHz~1GHz



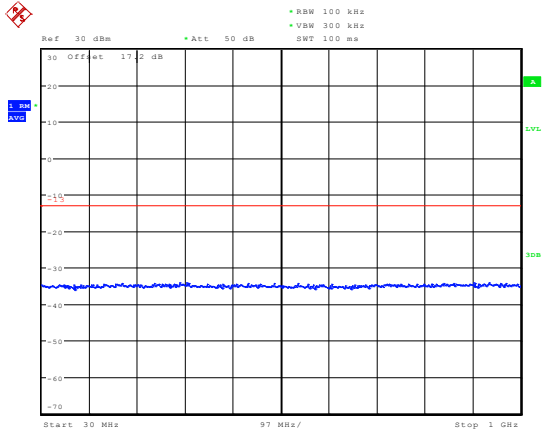
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LTE Band 25 10MHz CH-Low 1GHz ~20GHz



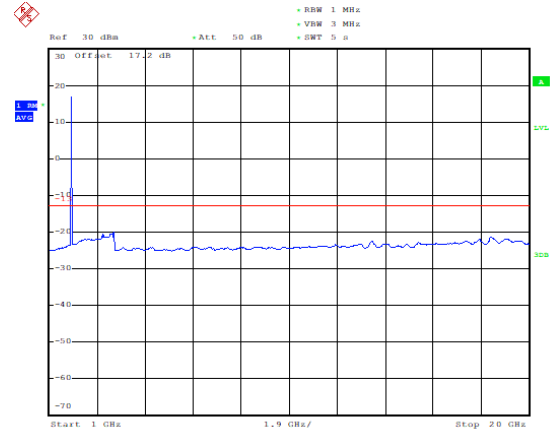
Date: 29.OCT.2019 14:44:59

LTE Band 25 10MHz CH-Middle 30MHz~1GHz



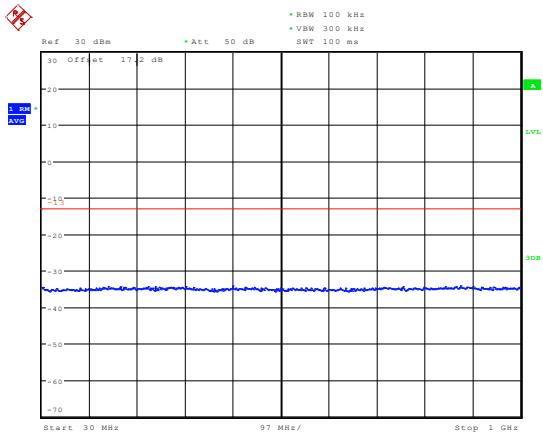
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LTE Band 25 10MHz CH-Middle 1GHz ~20GHz



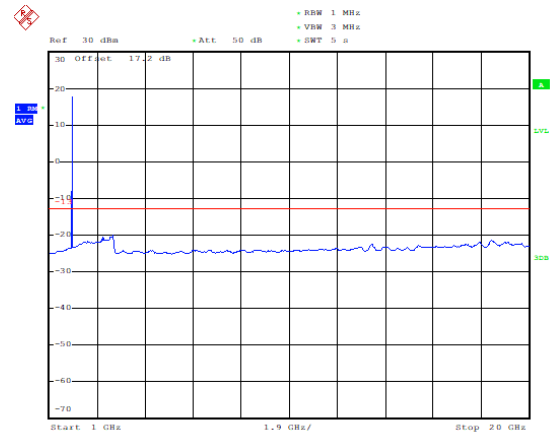
Date: 29.OCT.2019 14:45:22

LTE Band 25 10MHz CH-High 30MHz~1GHz



Date: 29.OCT.2019 14:15:44

LTE Band 25 10MHz CH-High 1GHz ~20GHz



Date: 29.OCT.2019 14:45:51