

KCTL Inc.

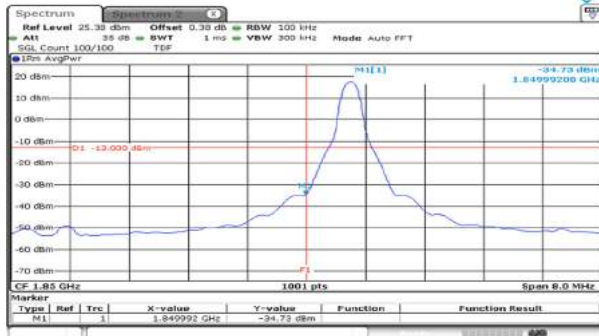
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR19-SRF0097-B

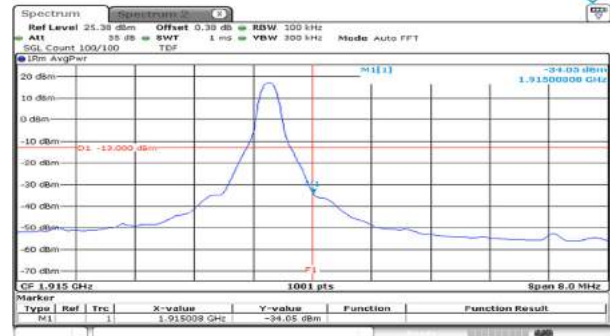
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10M BW / QPSK / Low ch. / 1RB



10M BW / QPSK / High ch. / 1RB



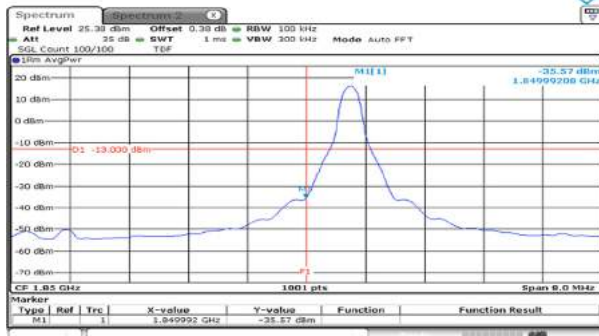
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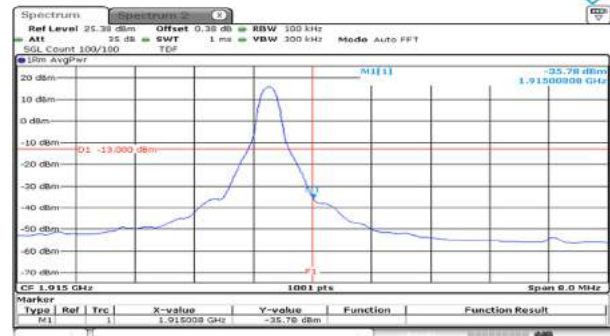
10M BW / QPSK / High ch. / FRB



10M BW / 16QAM / Low ch. / 1RB



10M BW / 16QAM / High ch. / 1RB



10M BW / 16QAM / Low ch. / FRB



10M BW / 16QAM / High ch. / FRB



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KCTL-TIR001-003/2

KCTL Inc.

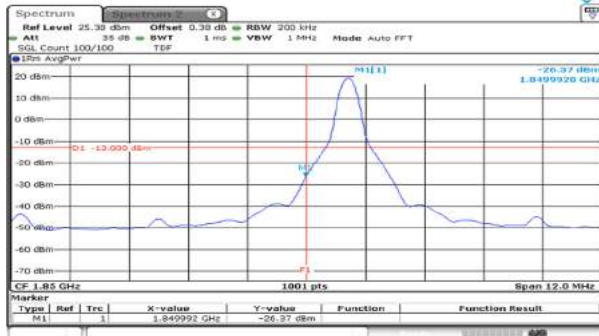
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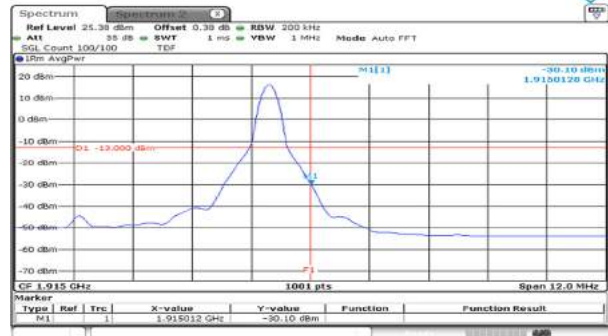
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15M BW / QPSK / Low ch. / 1RB



15M BW / QPSK / High ch. / 1RB



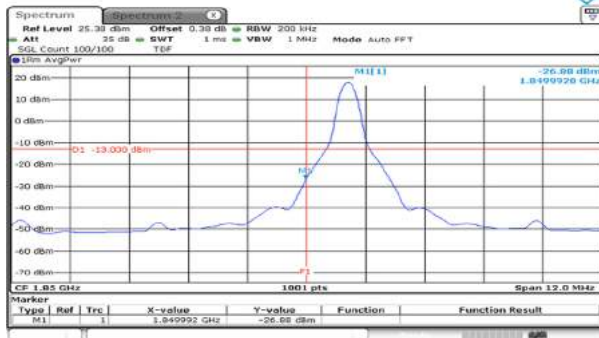
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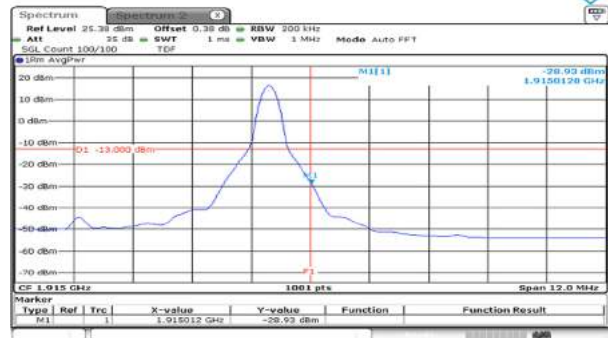
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15M BW / 16QAM / Low ch. / 1RB



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15M BW / 16QAM / Low ch. / FRB



15M BW / 16QAM / High ch. / FRB



KCTL Inc.

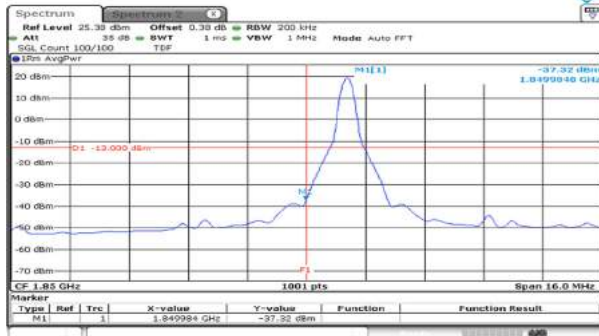
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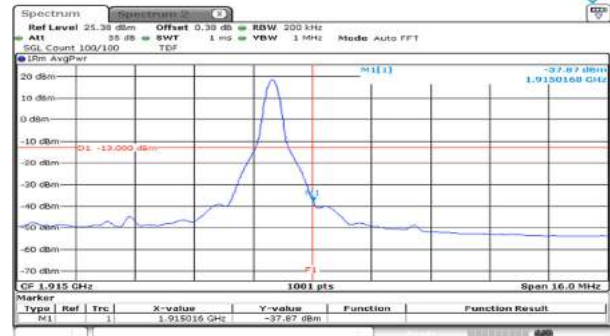
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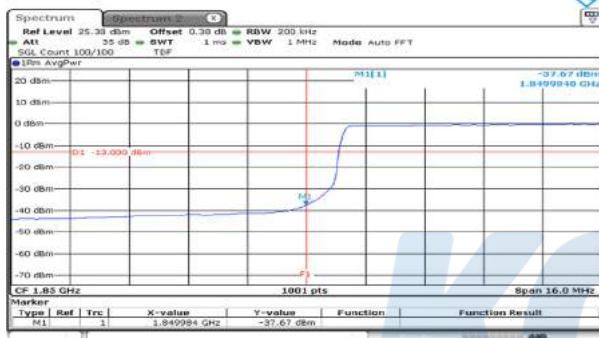
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20M BW / QPSK / High ch. / 1RB



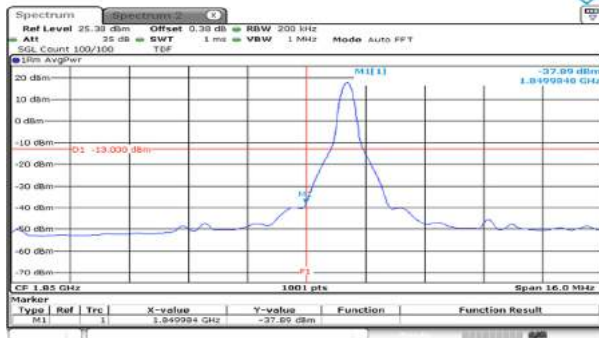
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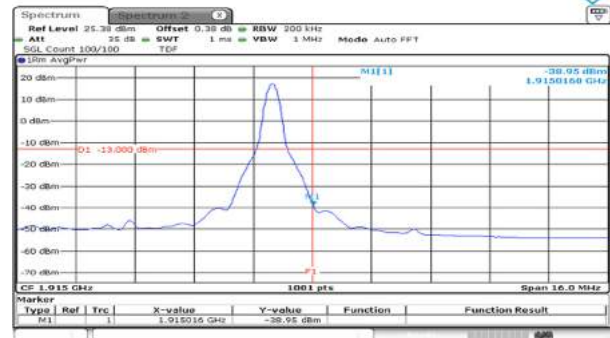
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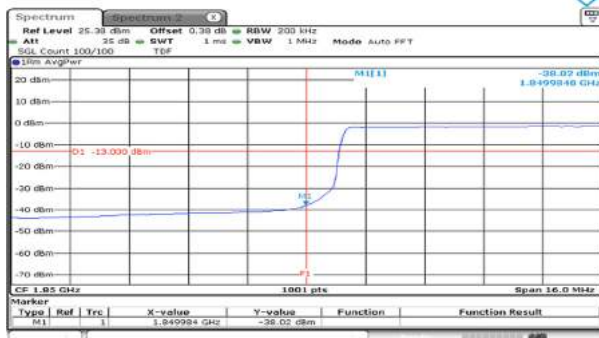
20M BW / 16QAM / Low ch. / 1RB



20M BW / 16QAM / High ch. / 1RB



20M BW / 16QAM / Low ch. / FRB



20M BW / 16QAM / High ch. / FRB

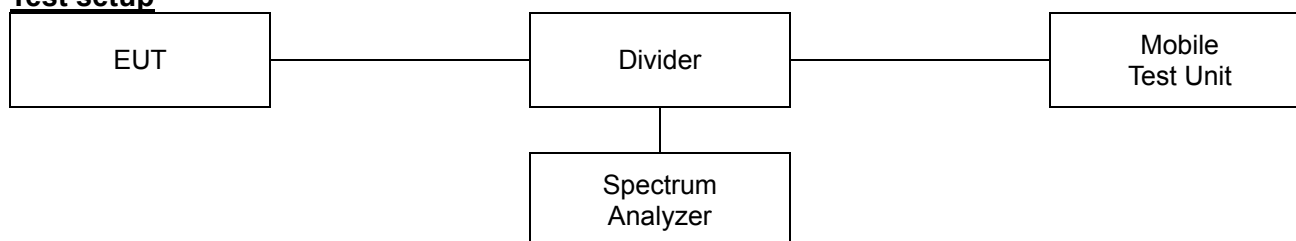


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KCTL-TIR001-003/2

7.5. Peak to Average Power Ratio (PAPR)

Test setup



Limit

According to §24.232(d), §27.50(d)(5) and RSS-130(4.6), RSS-132(5.4), RSS-133(6.4), RSS-139(6.5), the peak-to-average ratio(PAR) of the transmission must not exceed 13 dB.

Test procedure

971168 D01 v03r01 - Section 5.7.2

ANSI 63.26-2015 – Section 5.2.3.4

Test settings

5.2.3.4 Measurement of peak power in a broadband noise-like signal using CCDF

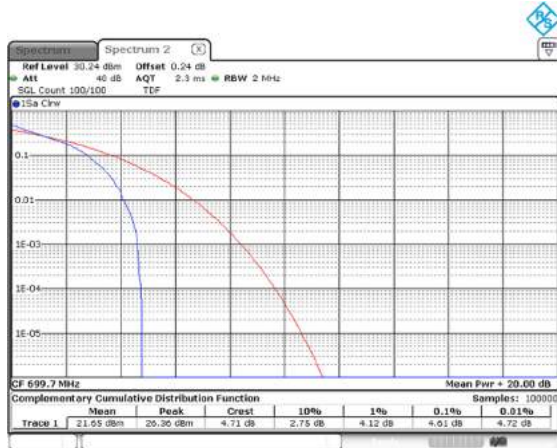
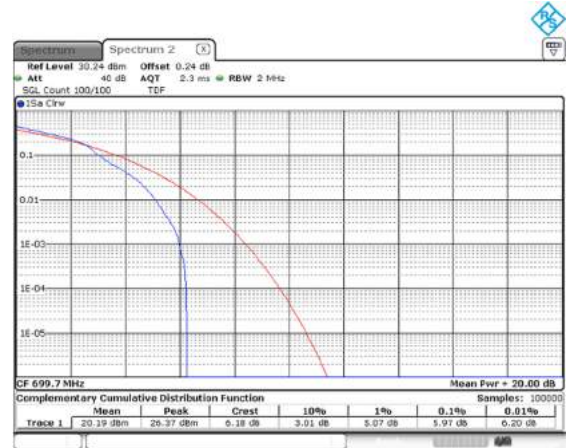
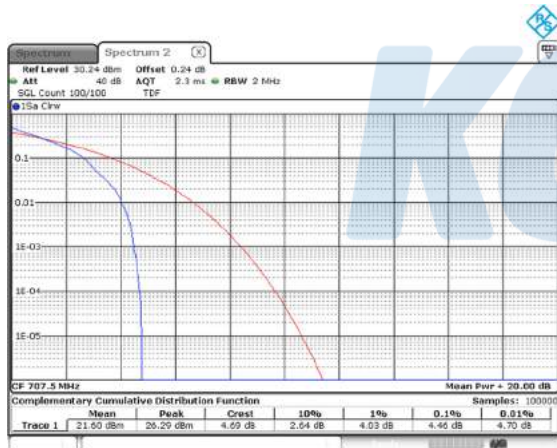
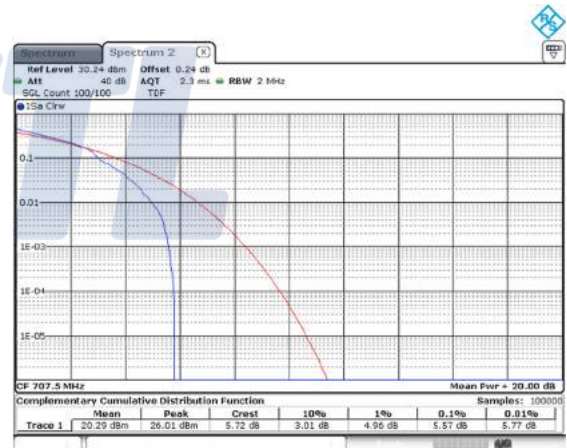
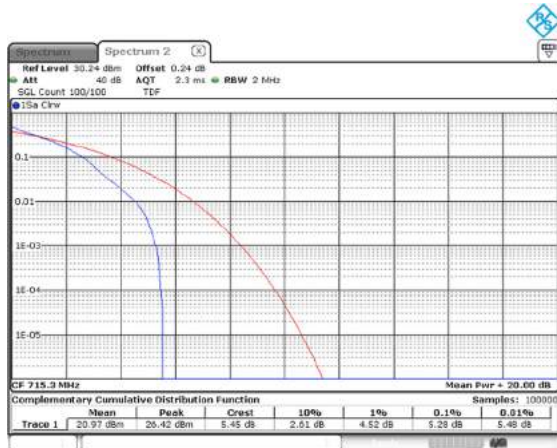
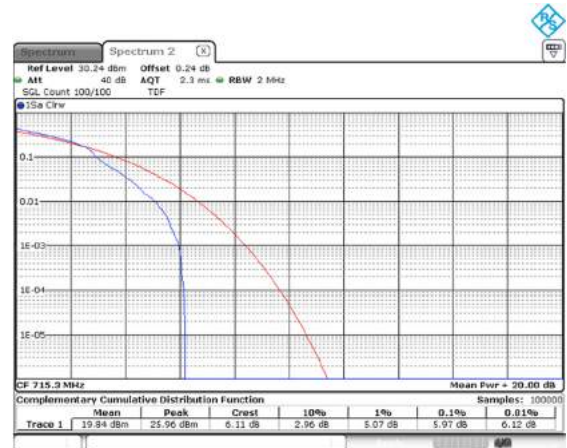
- 1) Set resolution/measurement bandwidth $\geq$ OBW or specified reference bandwidth
- 2) Set the number of counts to a value that stabilizes the measured CCDF curve.
- 3) Set the measurement interval as follows:
 - a) For continuous transmissions, set to the greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - b) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- 4) Record the maximum PAPR level associated with a probability of 0.1%

5.2.6 Peak-to-average power ratio

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{PK} .

Use one of the applicable procedure presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{AG} . Determine the P.A.P.R from:

$$PAPR(\text{dB}) = P_{PK}(\text{dBm or dBW}) - P_{AG}(\text{dBm or dBW})$$

Test results**Test mode: LTE Band 12****1.4M BW / QPSK / Low ch.****1.4M BW / 16QAM / Low ch.****1.4M BW / QPSK / Mid ch.****1.4M BW / 16QAM / Mid ch.****1.4M BW / QPSK / High ch.****1.4M BW / 16QAM / High ch.**

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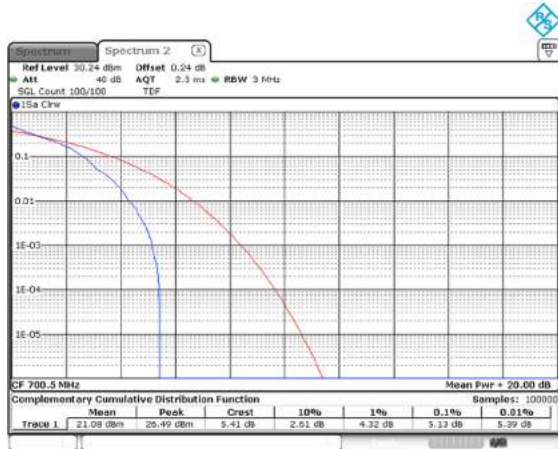
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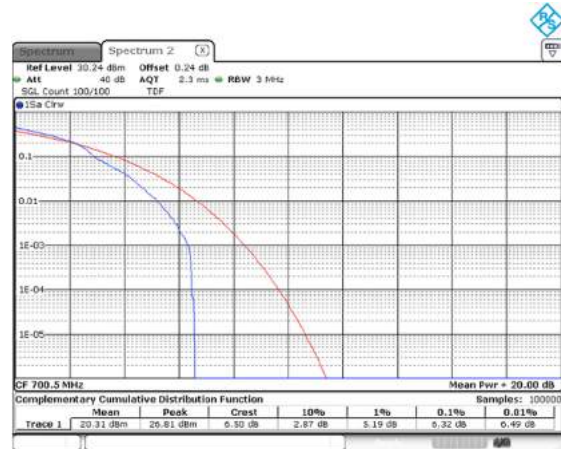
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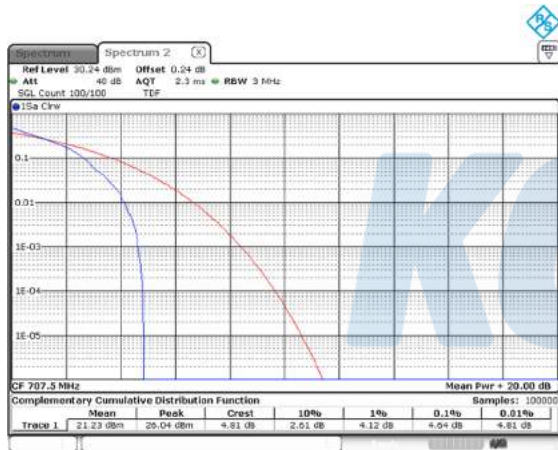
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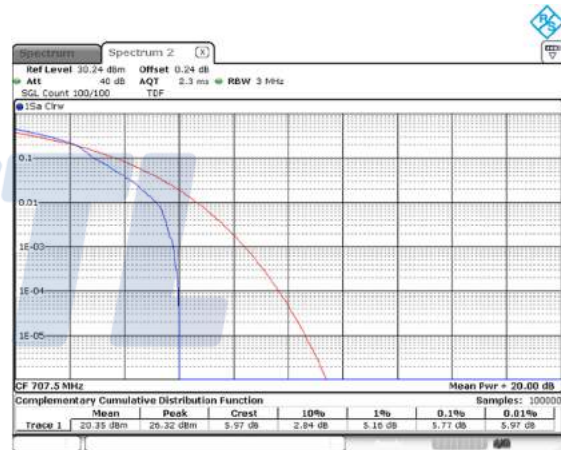
3M BW / 16QAM / Low ch.



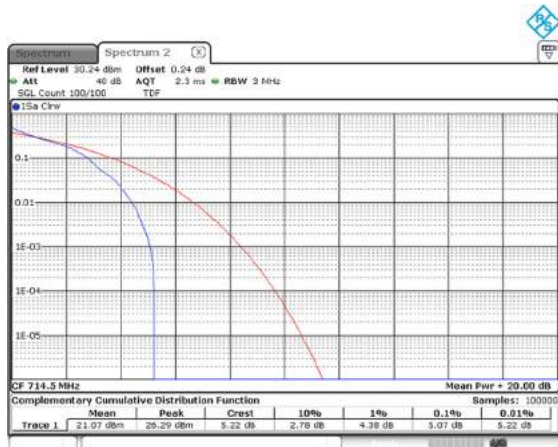
3M BW / QPSK / Mid ch.



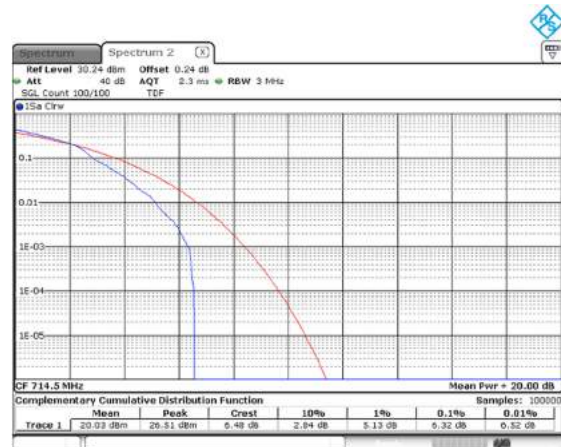
3M BW / 16QAM / Mid ch.



3M BW / QPSK / High ch.



3M BW / 16QAM / High ch.



KCTL Inc.

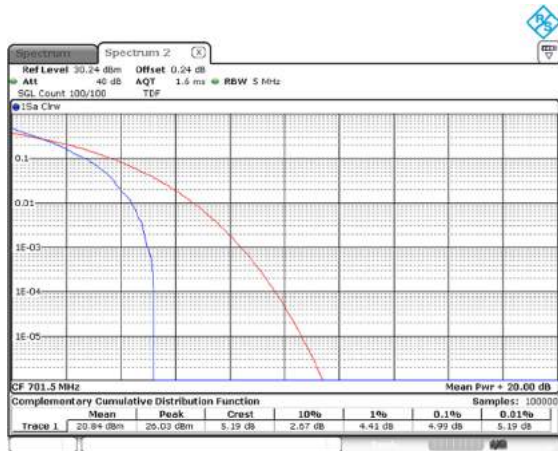
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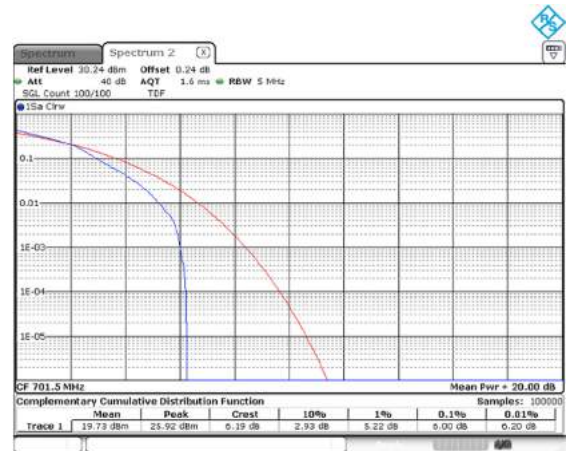
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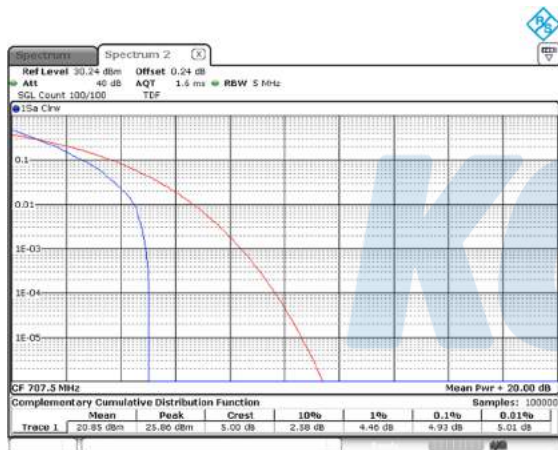
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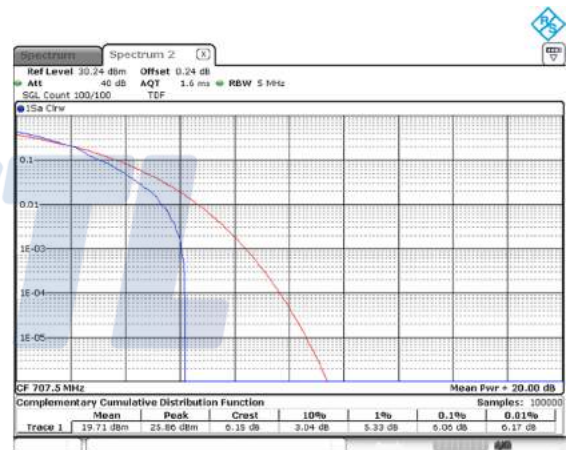
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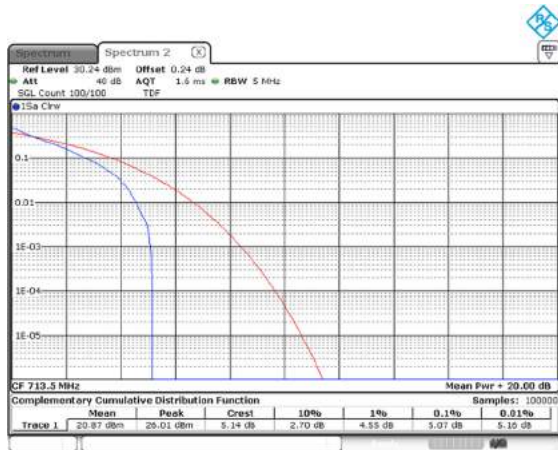
5M BW / QPSK / Mid ch.



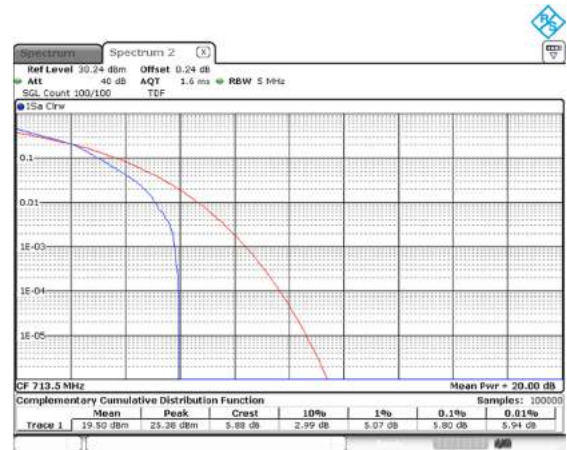
5M BW / 16QAM / Mid ch.



5M BW / QPSK / High ch.



5M BW / 16QAM / High ch.



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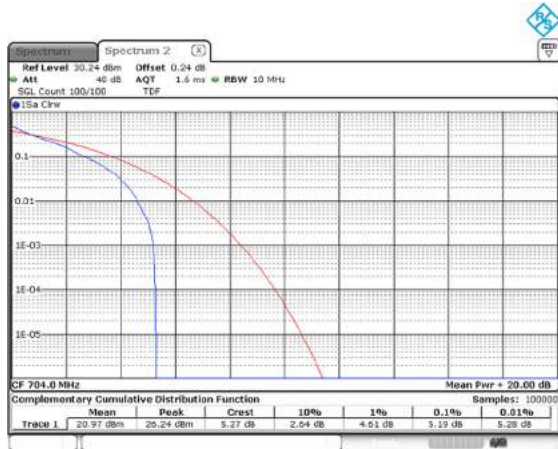
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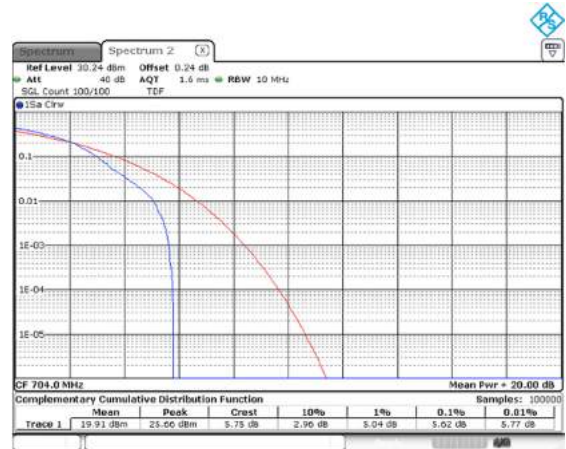
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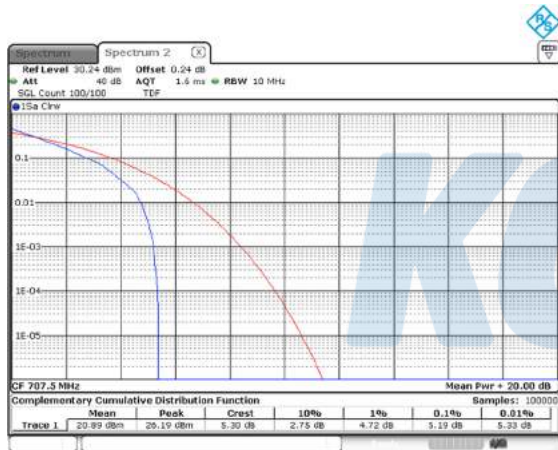
10M BW / QPSK / Low ch.



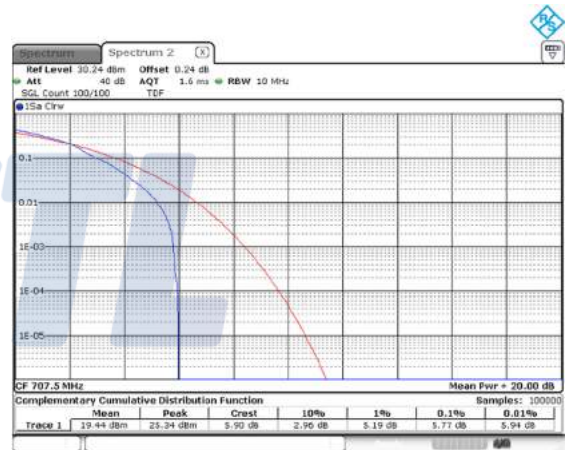
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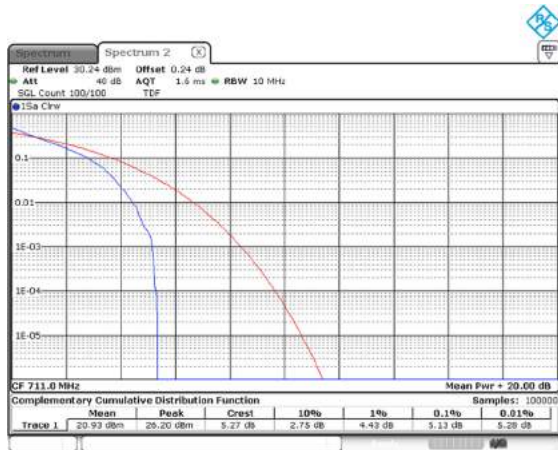
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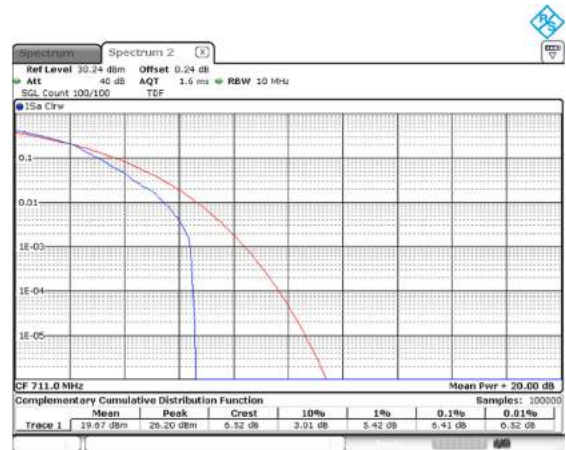
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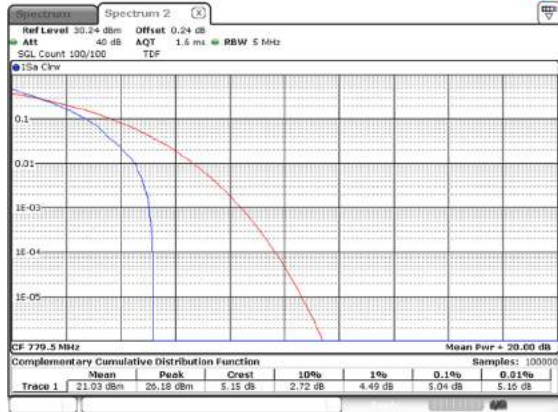
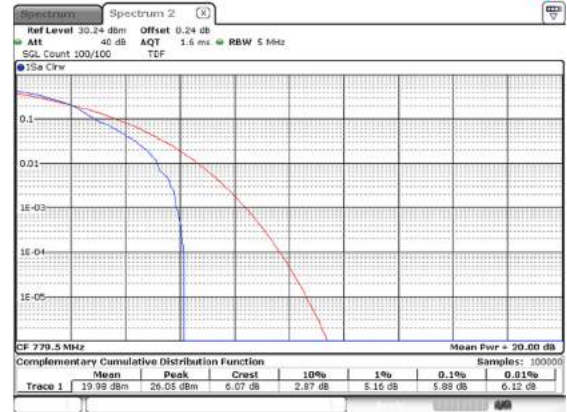
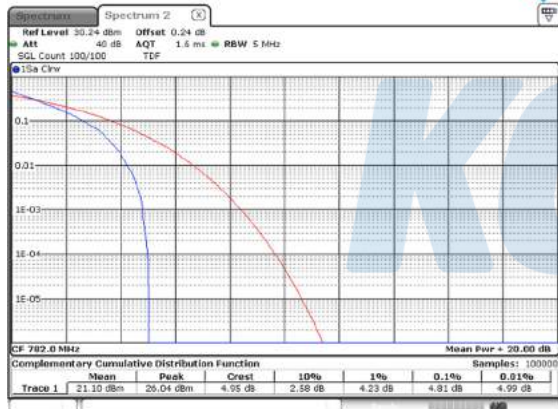
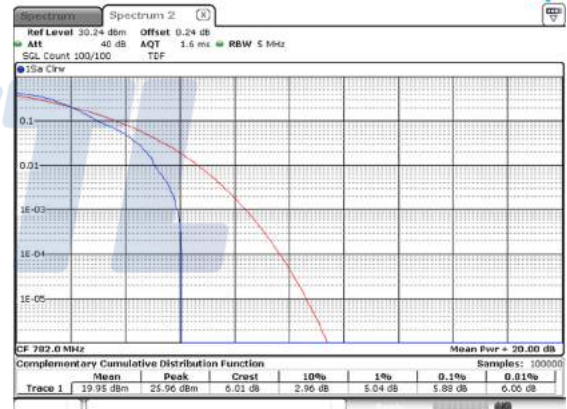
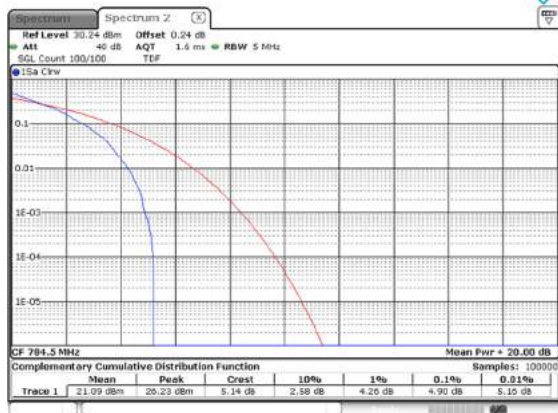
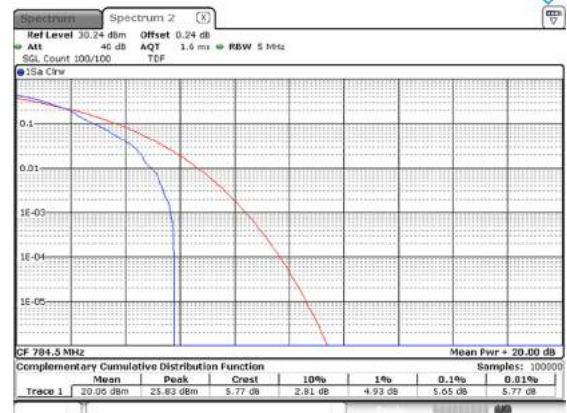


10M BW / QPSK / High ch.



10M BW / 16QAM / High ch.



Test mode: LTE Band 13**5M BW / QPSK / Low ch.****5M BW / 16QAM / Low ch.****5M BW / QPSK / Mid ch.****5M BW / 16QAM / Mid ch.****5M BW / QPSK / High ch.****5M BW / 16QAM / High ch.**

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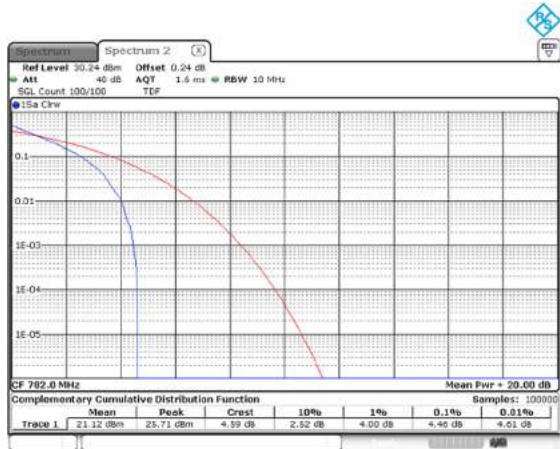
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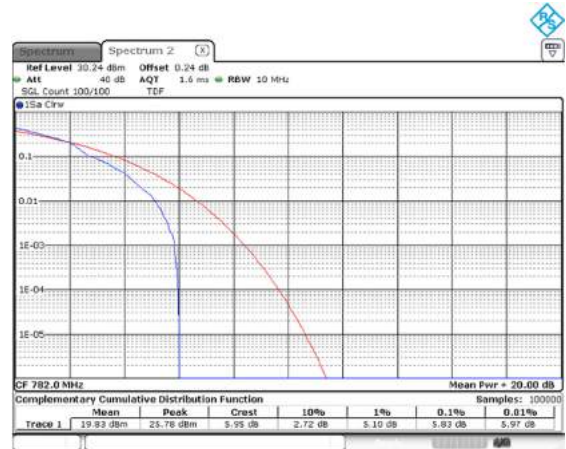
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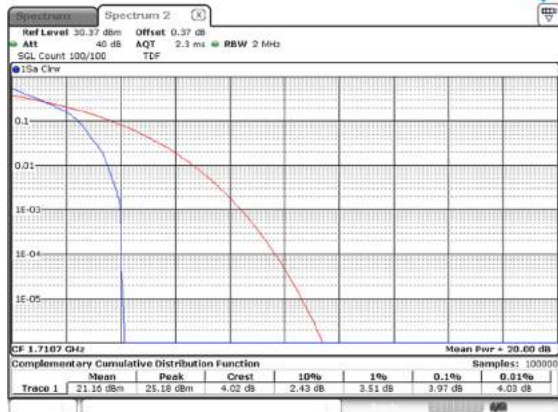
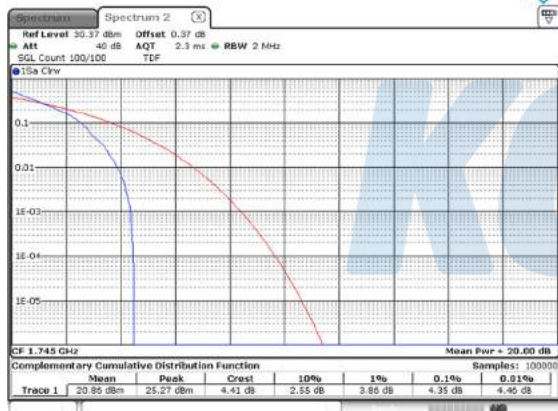
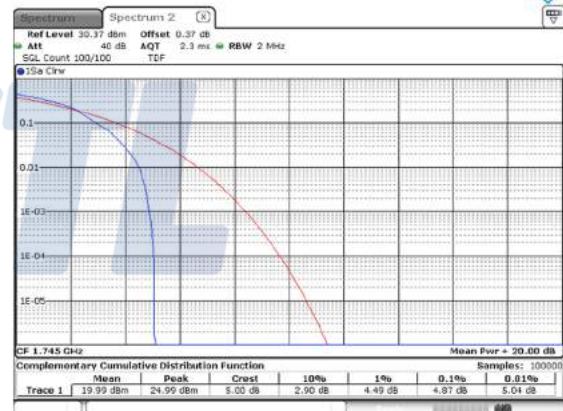
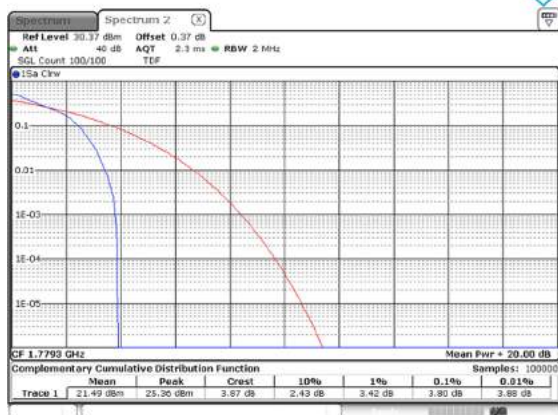
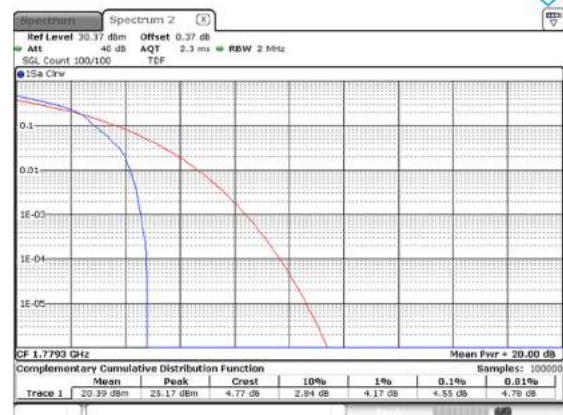
10M BW / QPSK / Mid ch.



10M BW / 16QAM / Mid ch.



KCTL

Test mode: LTE Band 4/66**1.4M BW / QPSK / Low ch.****1.4M BW / 16QAM / Low ch.****1.4M BW / QPSK / Mid ch.****1.4M BW / 16QAM / Mid ch.****1.4M BW / QPSK / High ch.****1.4M BW / 16QAM / High ch.**

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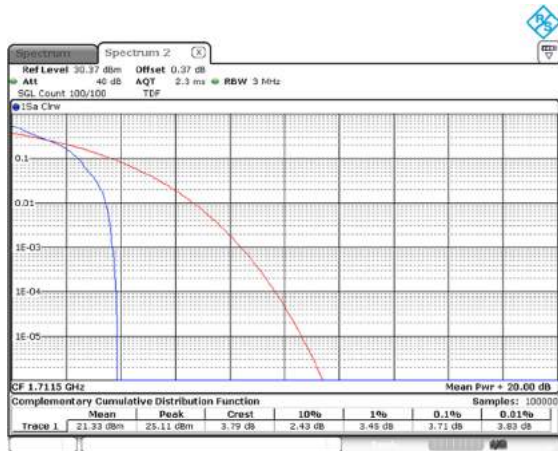
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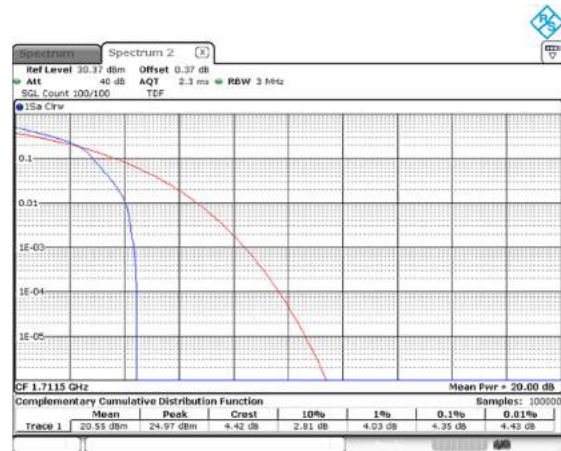
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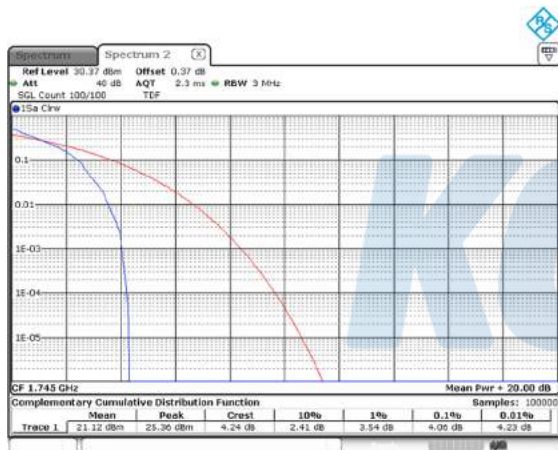
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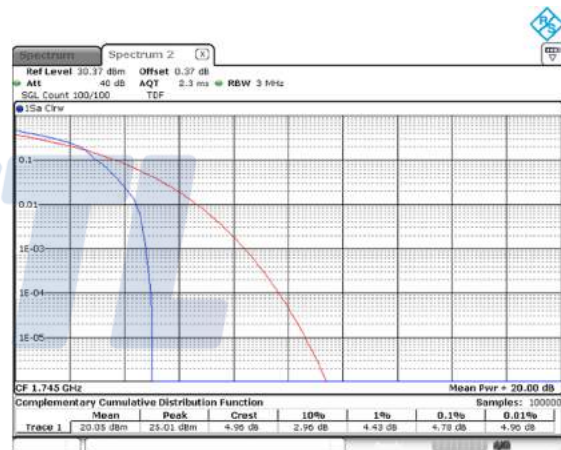
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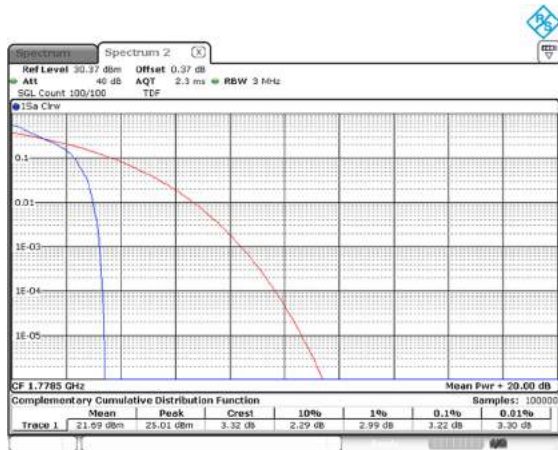
3M BW / QPSK / Mid ch.



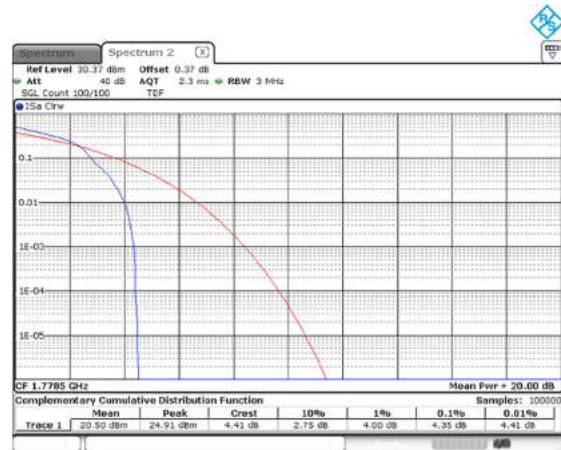
3M BW / 16QAM / Mid ch.



3M BW / QPSK / High ch.



3M BW / 16QAM / High ch.



KCTL Inc.

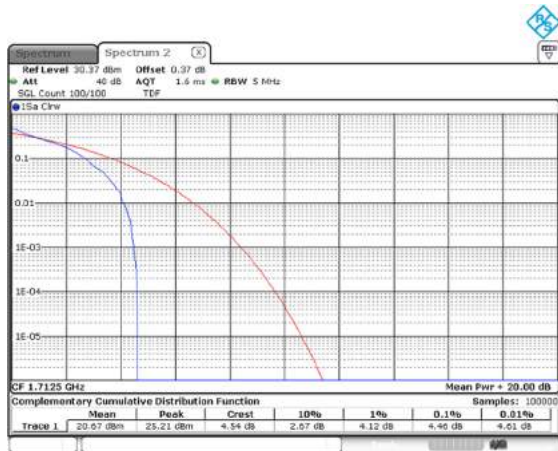
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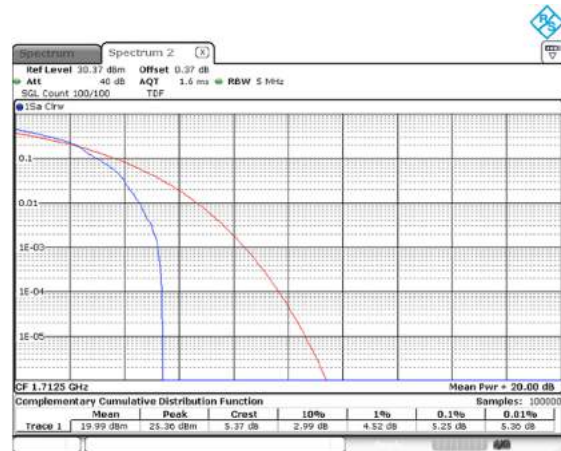
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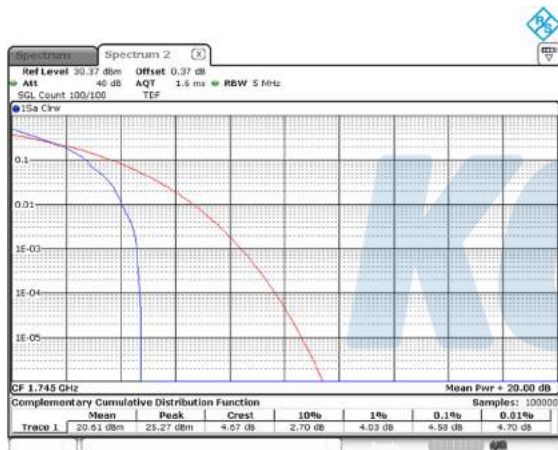
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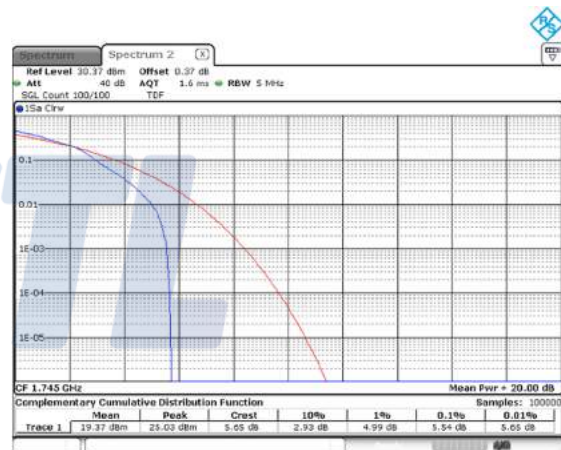
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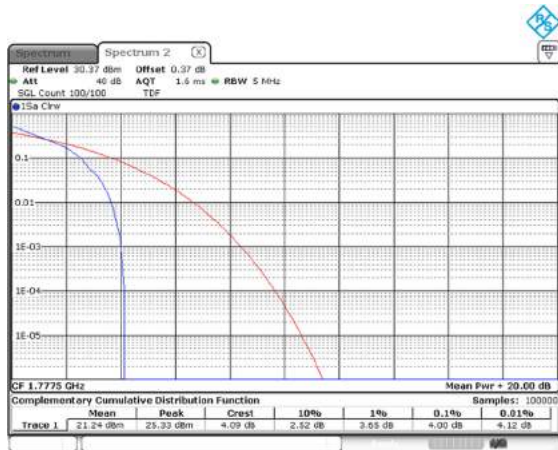
5M BW / QPSK / Mid ch.



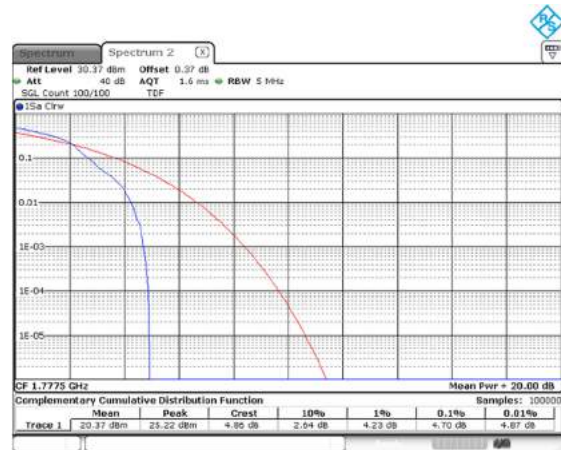
5M BW / 16QAM / Mid ch.



5M BW / QPSK / High ch.



5M BW / 16QAM / High ch.



KCTL Inc.

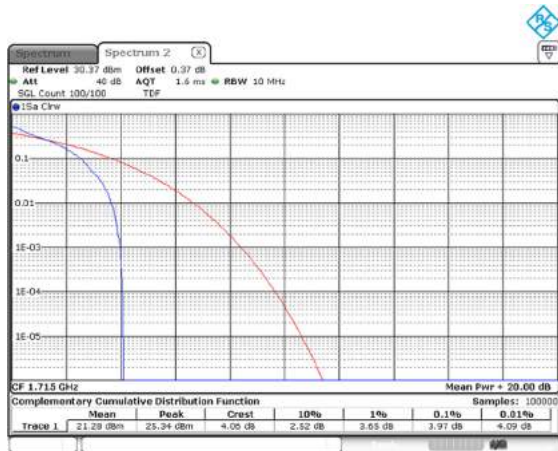
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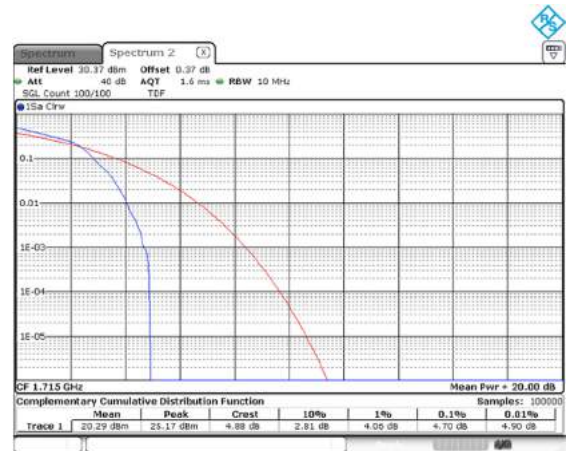
Page (137) of (184)

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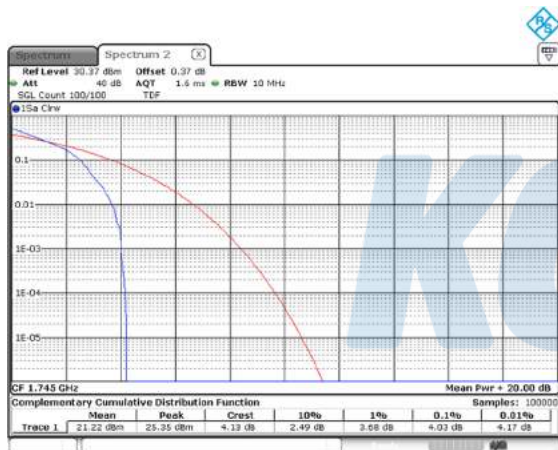
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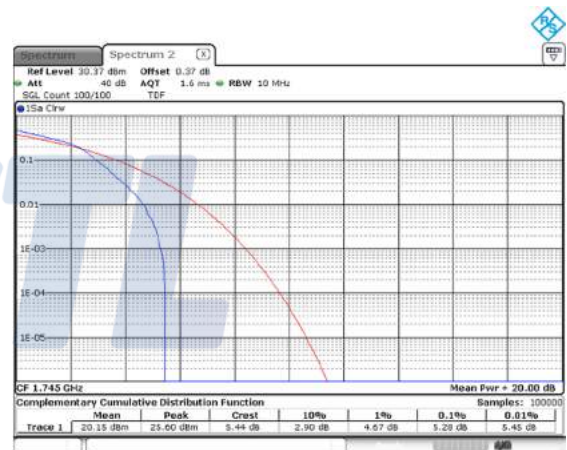
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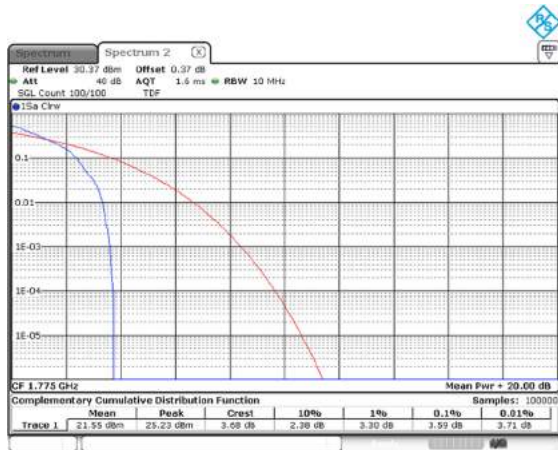
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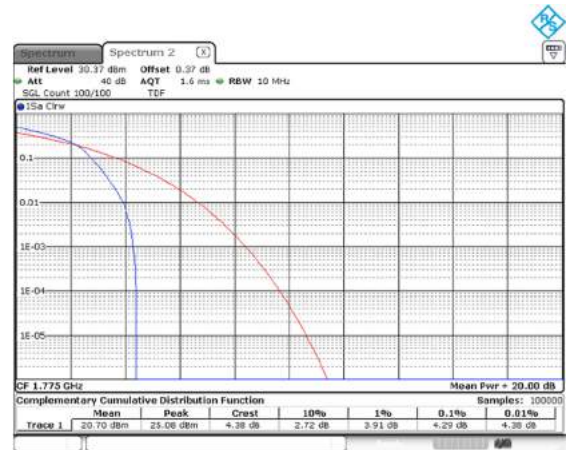
10M BW / 16QAM / Mid ch.



10M BW / QPSK / High ch.



10M BW / 16QAM / High ch.



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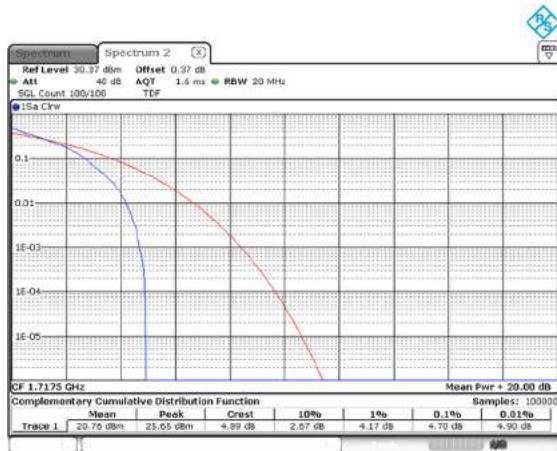
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TEL: 82-31-285-0894 FAX: 82-505-299-8311
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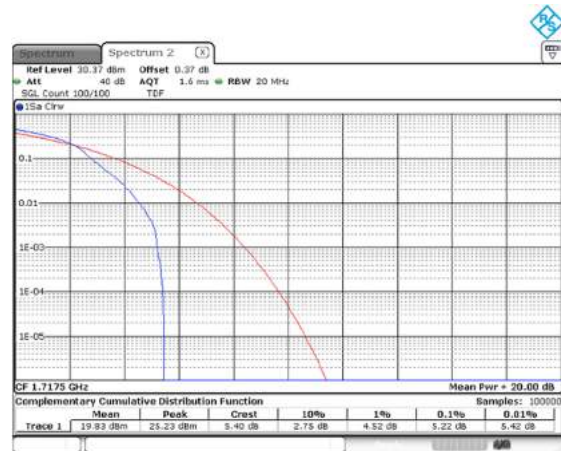
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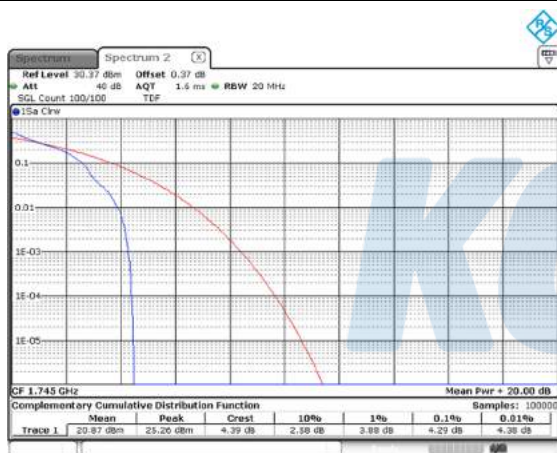
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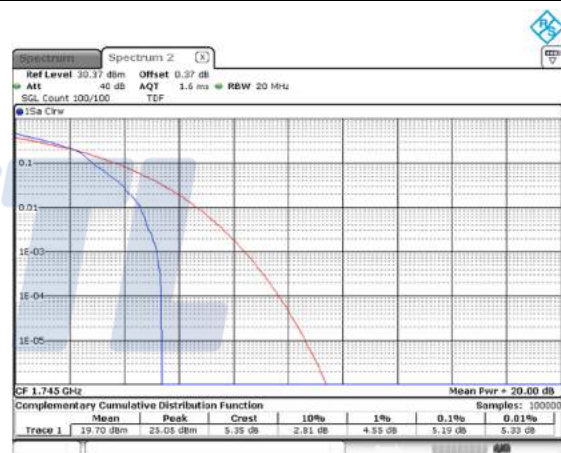
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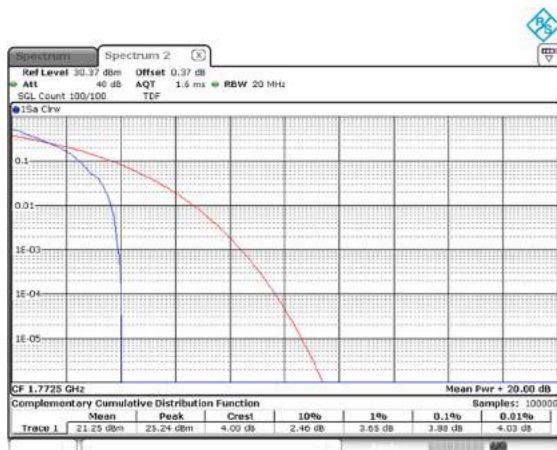
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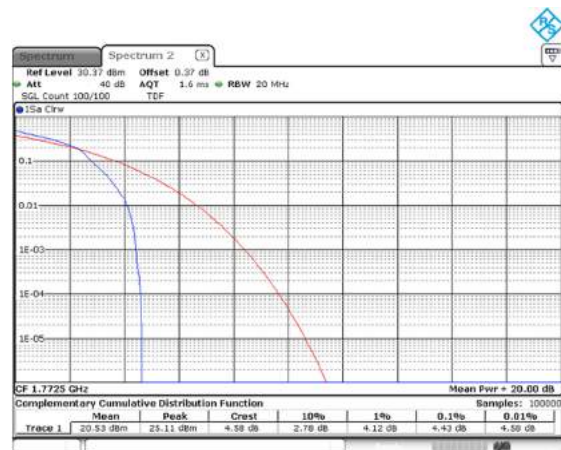
15M BW / 16QAM / Mid ch.



15M BW / QPSK / High ch.



15M BW / 16QAM / High ch.



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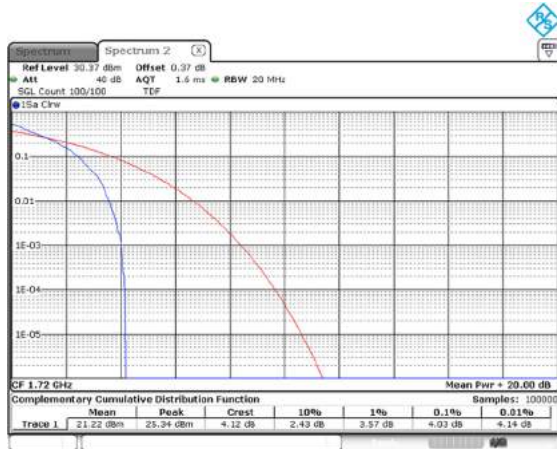
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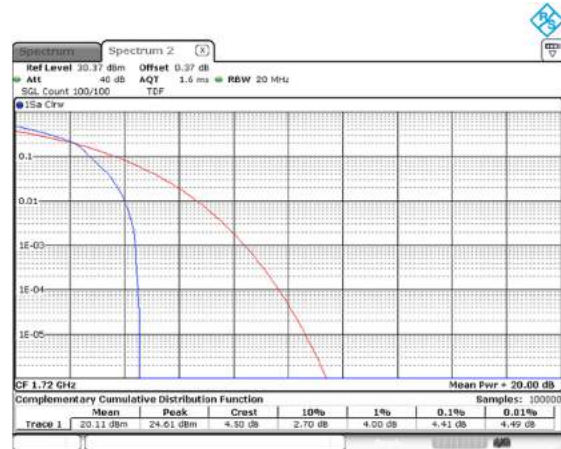
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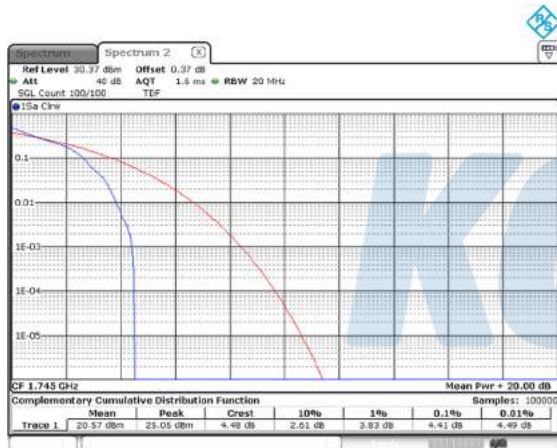
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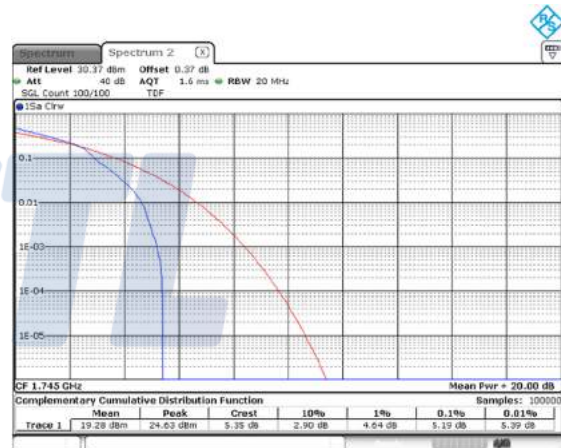
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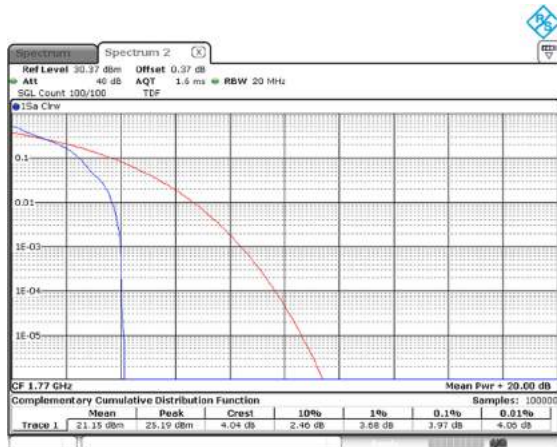
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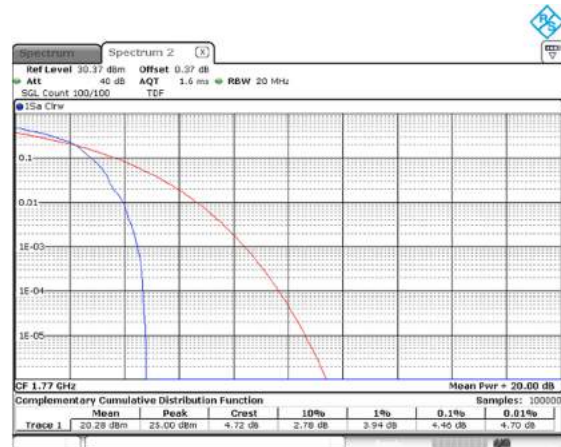
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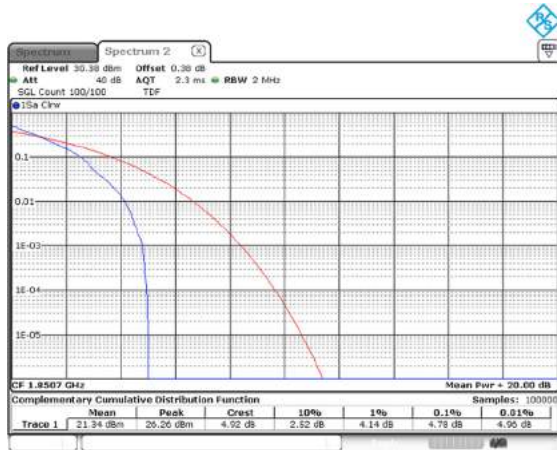
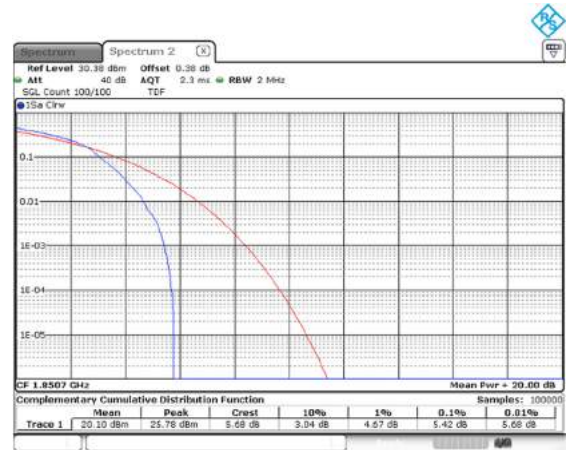
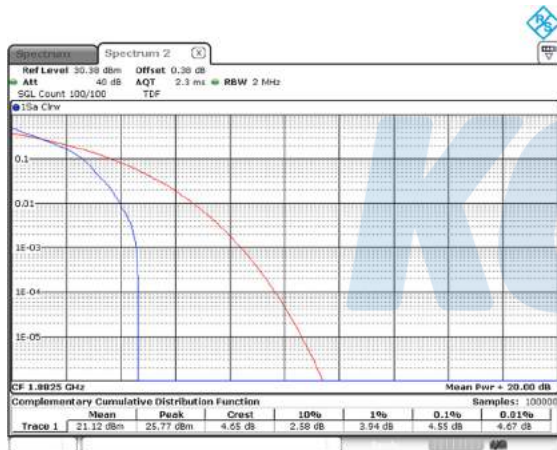
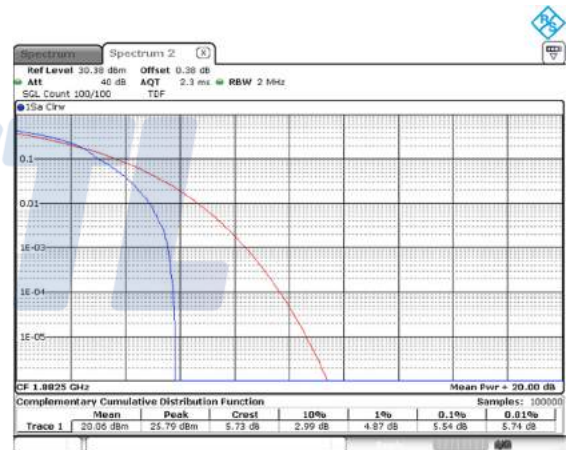
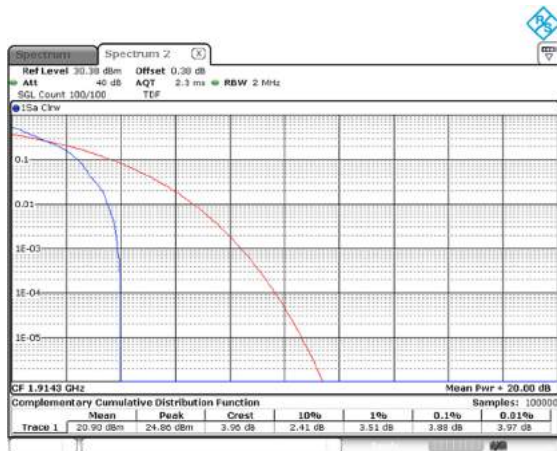
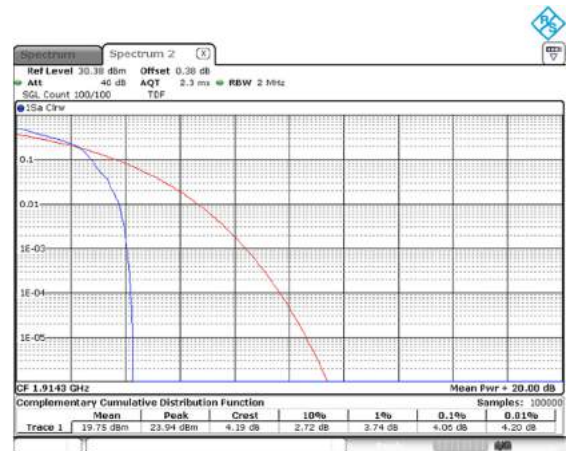


20M BW / QPSK / High ch.



20M BW / 16QAM / High ch.



Test mode: LTE Band 2/25**1.4M BW / QPSK / Low ch.****1.4M BW / 16QAM / Low ch.****1.4M BW / QPSK / Mid ch.****1.4M BW / 16QAM / Mid ch.****1.4M BW / QPSK / High ch.****1.4M BW / 16QAM / High ch.**

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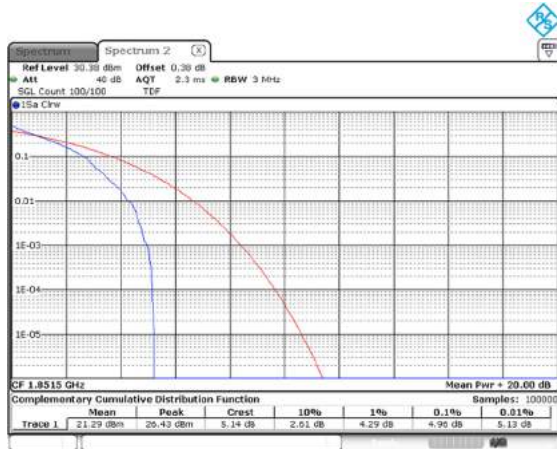
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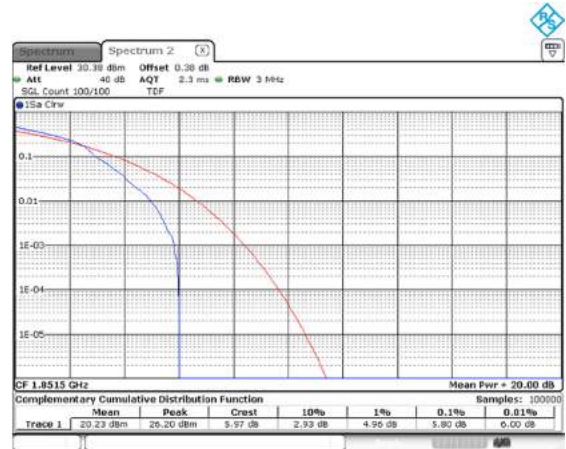
Page (141) of (184)

KCTL

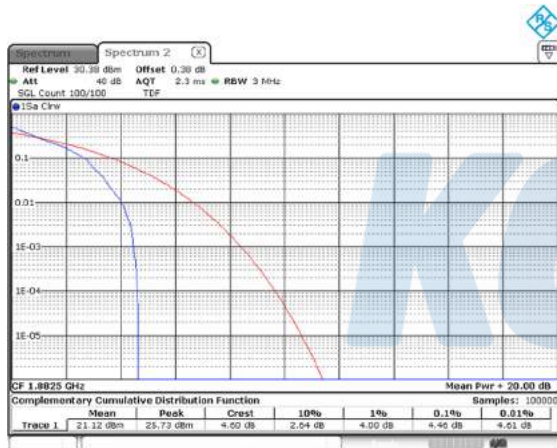
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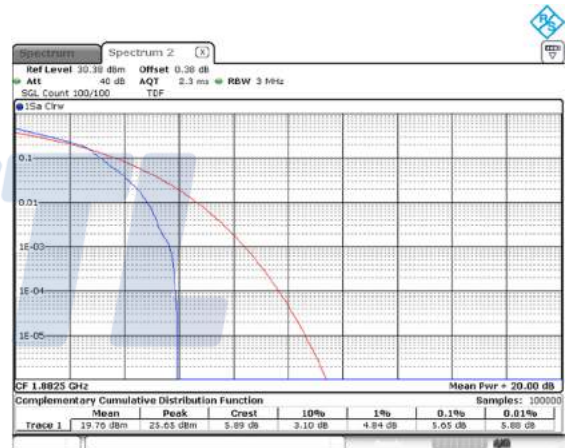
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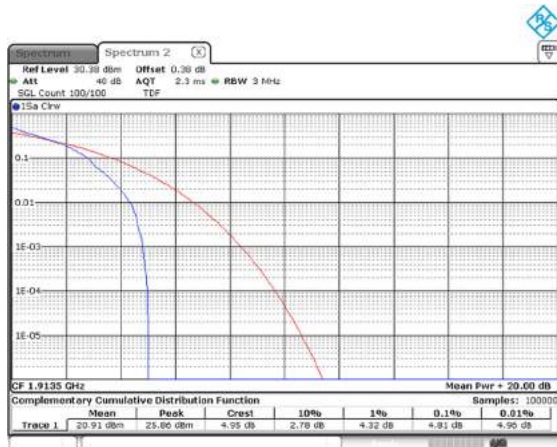
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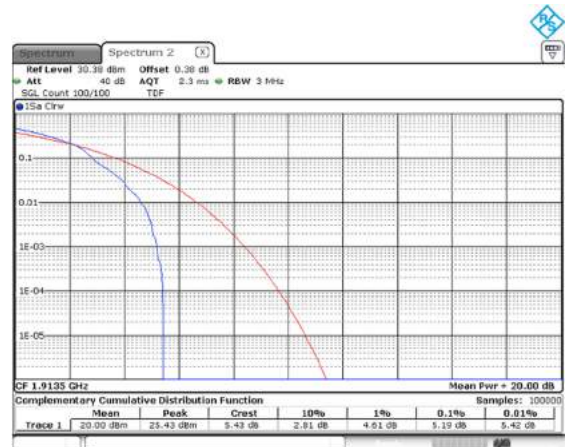
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3M BW / QPSK / High ch.



3M BW / 16QAM / High ch.



KCTL Inc.

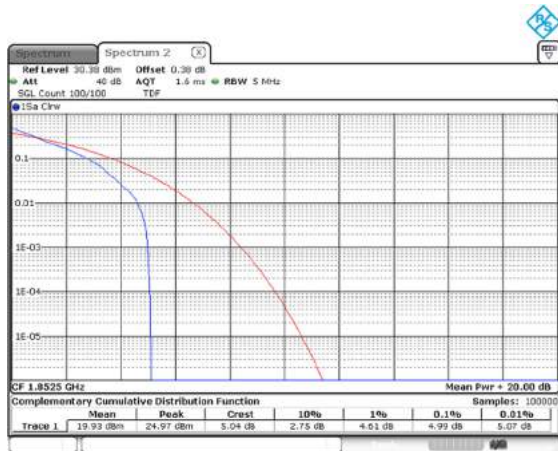
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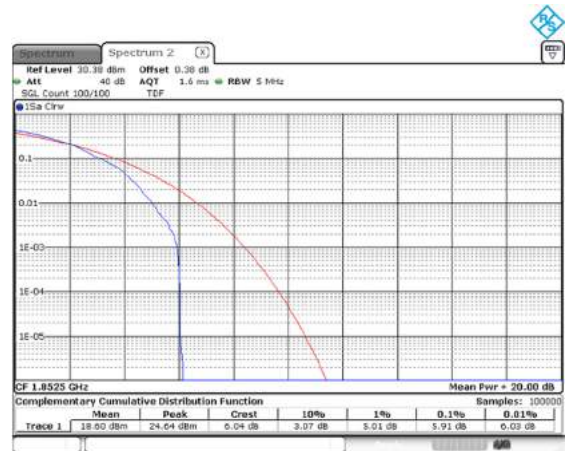
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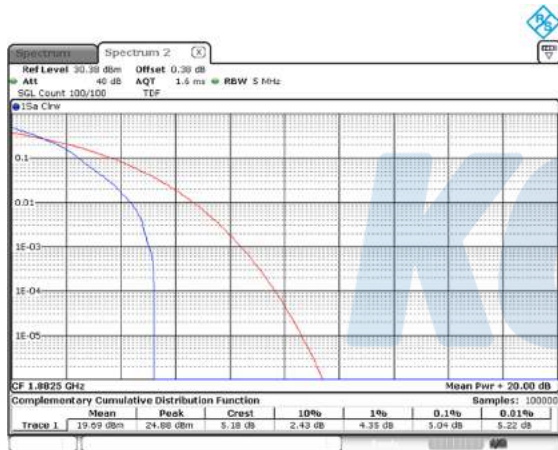
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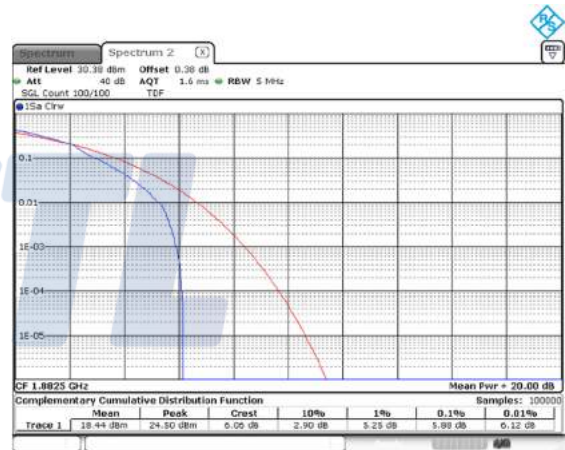
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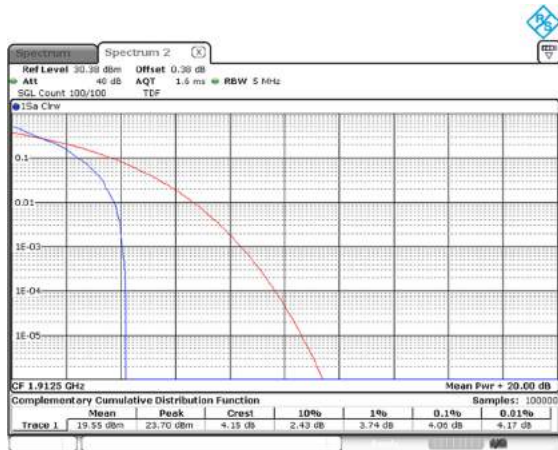
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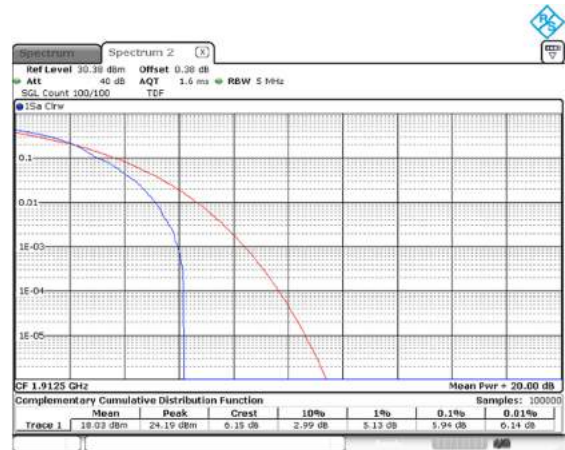
5M BW / 16QAM / Mid ch.



5M BW / QPSK / High ch.



5M BW / 16QAM / High ch.



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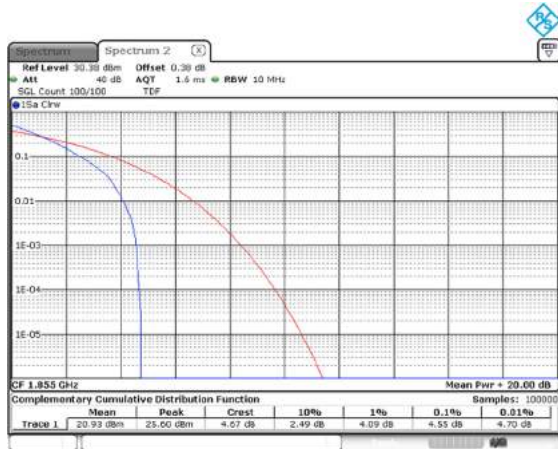
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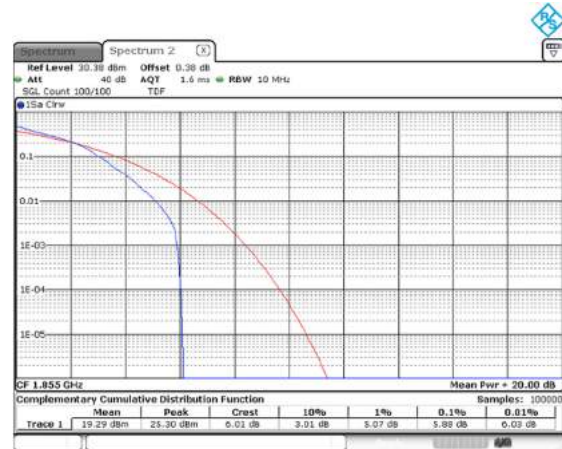
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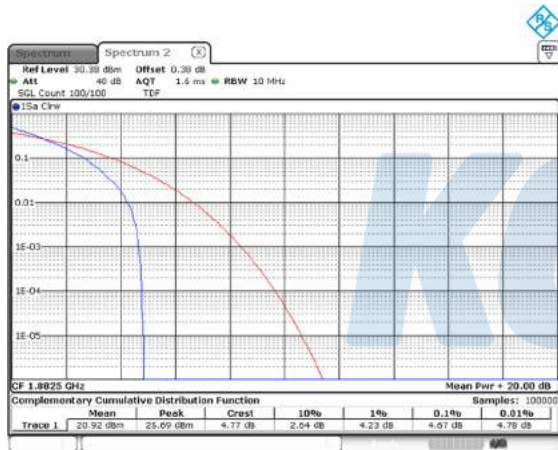
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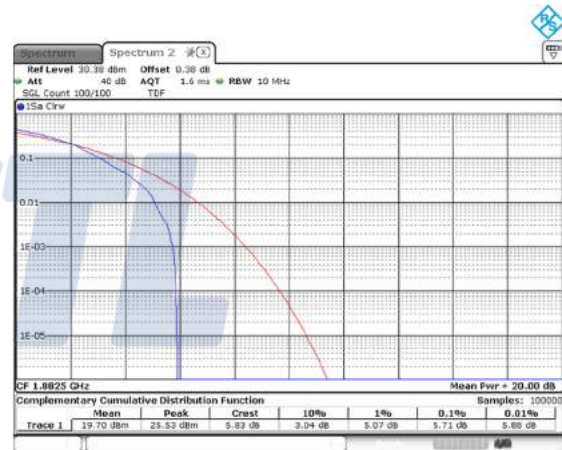
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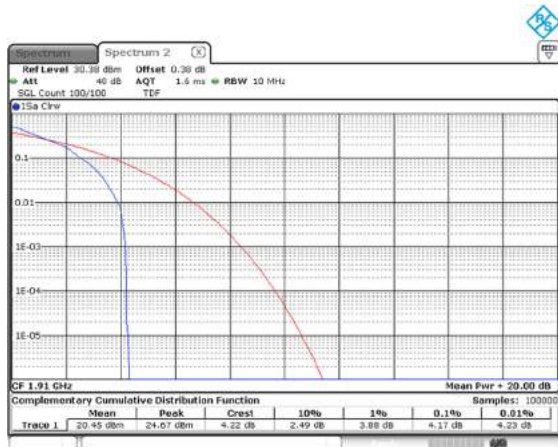
10M BW / QPSK / Mid ch.



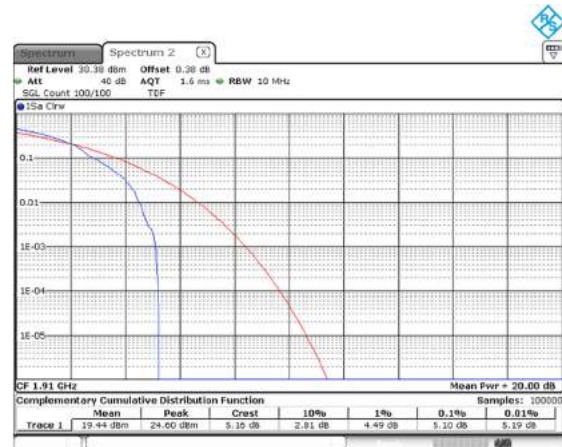
10M BW / 16QAM / Mid ch.



10M BW / QPSK / High ch.



10M BW / 16QAM / High ch.



KCTL Inc.

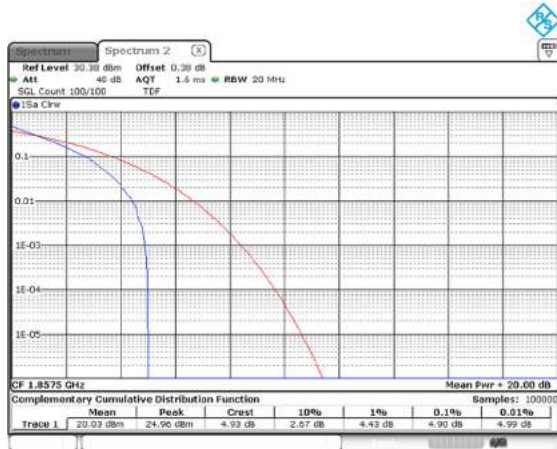
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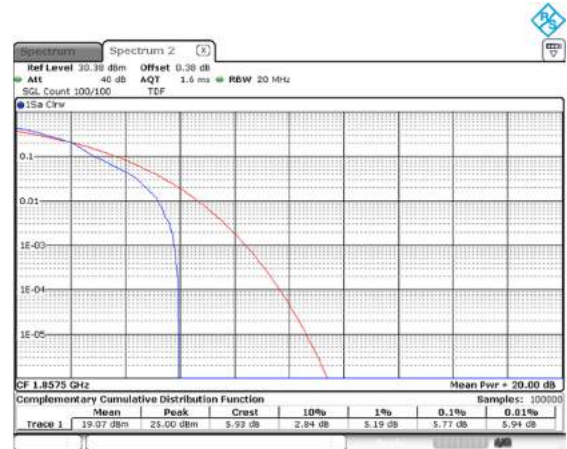
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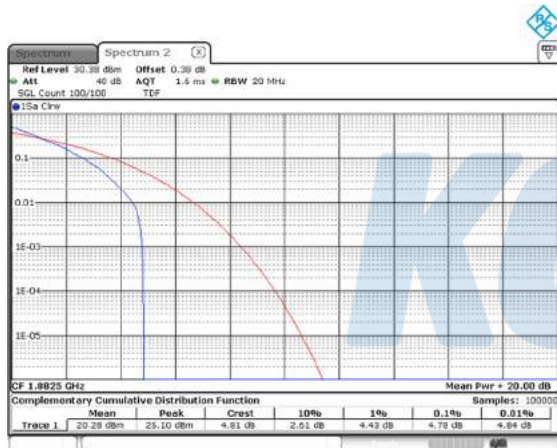
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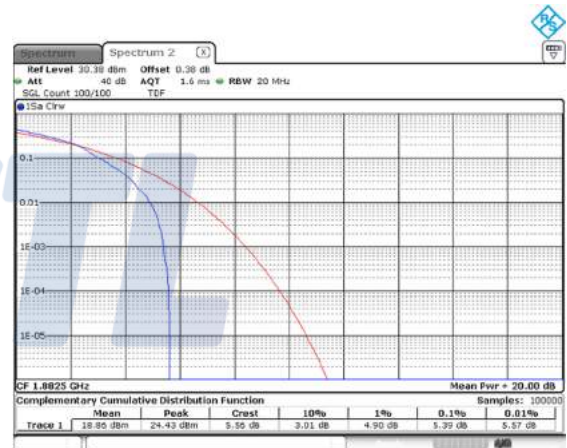
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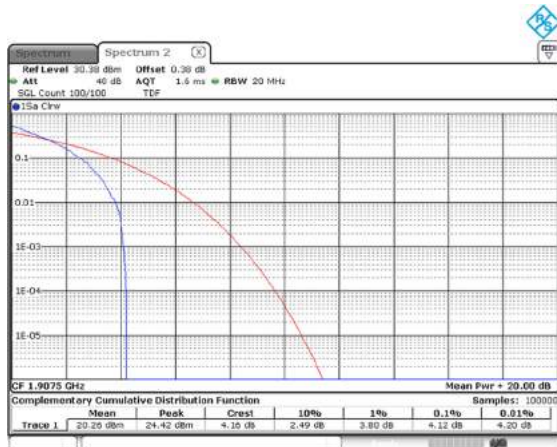
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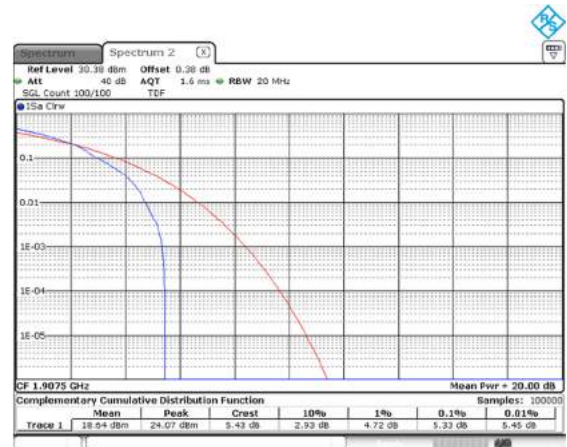
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15M BW / QPSK / High ch.



15M BW / 16QAM / High ch.



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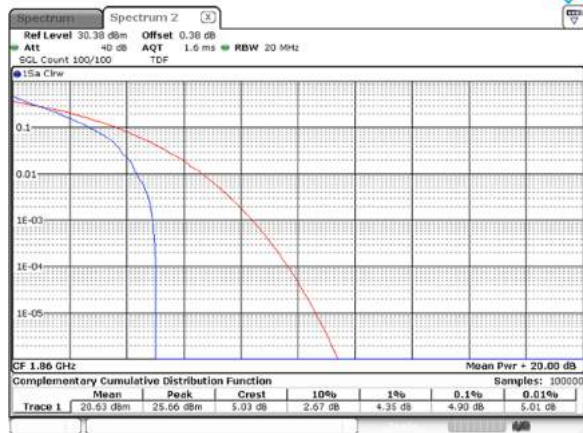
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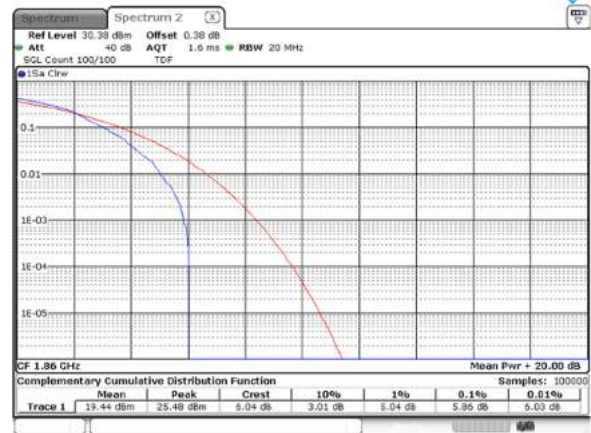
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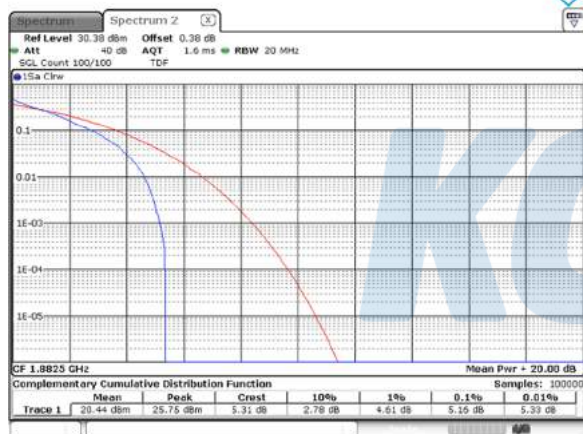
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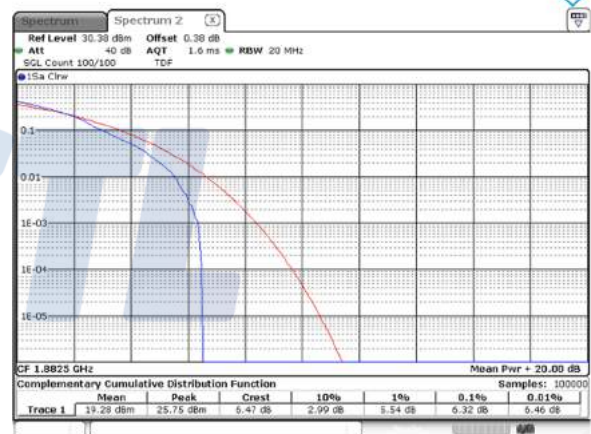
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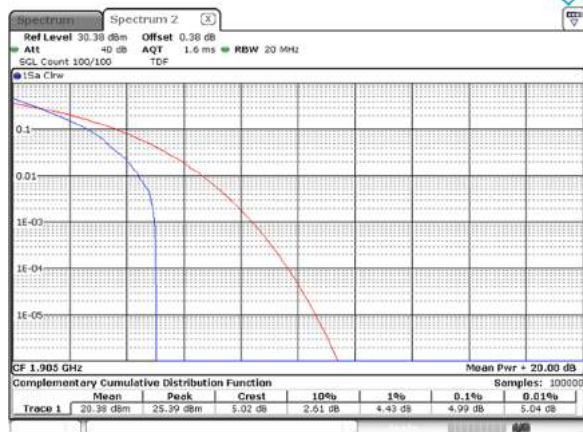
20M BW / QPSK / Mid ch.



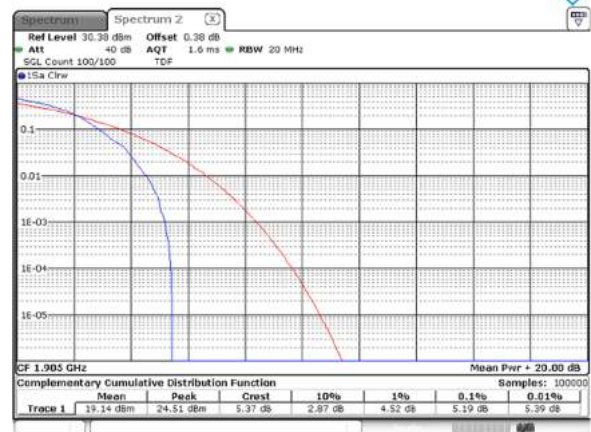
20M BW / 16QAM / Mid ch.



20M BW / QPSK / High ch.

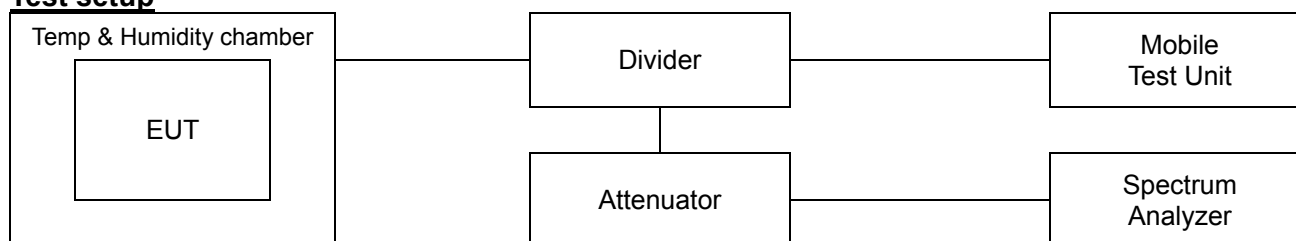


20M BW / 16QAM / High ch.



7.6. Frequency stability

Test setup



Limit

According to §2.1055(a),

The frequency stability shall be measured with variation of ambient temperature as follows:

- 1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
- 2) From -20° to + 50° centigrade for equipment to be licensed for use in the maritime services under part 80 of this chapter, except for class A, B, and S emergency position indicating radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the local television transmission service and point-to-point microwave radio service under part 21 of this chapter, equipment licensed for use aboard aircraft in the aviation services under part 87 of this chapter, and equipment authorized for use in the family radio service under part 95 of this chapter.
- 3) From 0° to + 50° centigrade for equipment to be licensed for use in the radio broadcast Services under part 73 of this chapter.

According to §2.1055(d),

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 and point which shall be specified by the manufacturer.
- 3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

According to §22.355 and RSS-132(5.3),

The carrier frequency of each transmitter in the public mobile services must be maintained within the tolerances given in Table of this section.

For mobile devices operating in the 824 to 849 MHz band at a power level than or equal to 3 Watts, the limit specified in Table C-1 is ± 2.5 ppm.

According to §24.235 and RSS-133(6.3),

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

The carrier frequency shall not depart from the reference frequency, in excess of ± 2.5 ppm for mobile stations and ± 1.0 ppm for base stations.

According to §27.54 and RSS-130(4.5),

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

According to §27.54 and RSS-139(6.4),

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the Authorized bands of operation.

Test procedure

ANSI 63.26-2015 – Section 5.6

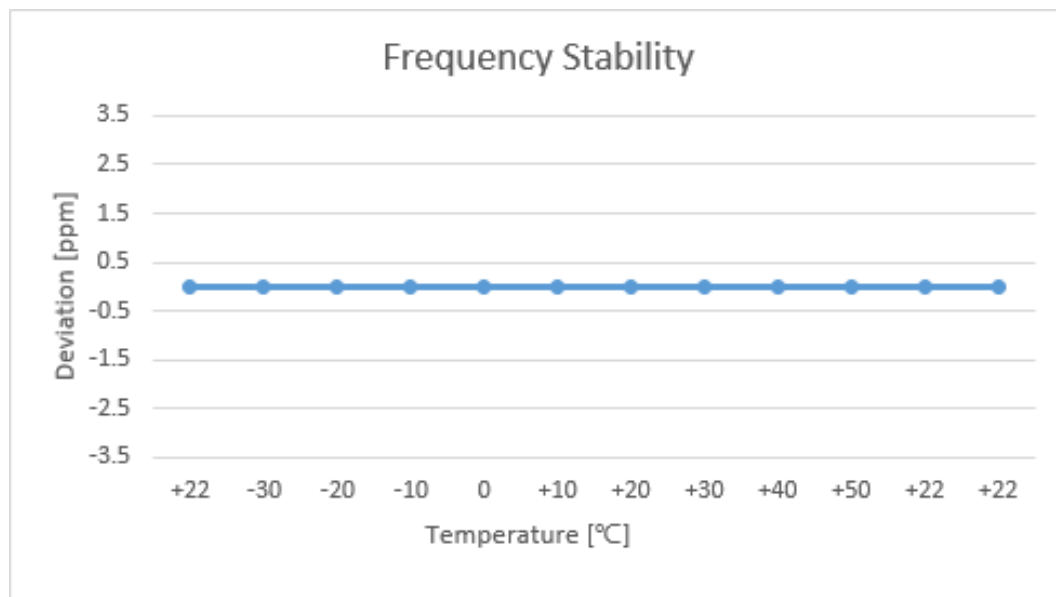
Test settings

- 1) The carrier frequency of the transmitter is measured at room temperature.
(20°C to provide a reference)
- 2) The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3) Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C.
A period of at least one half-hour is provided to allow stabilization of the equipment at each Temperature level.

Test results

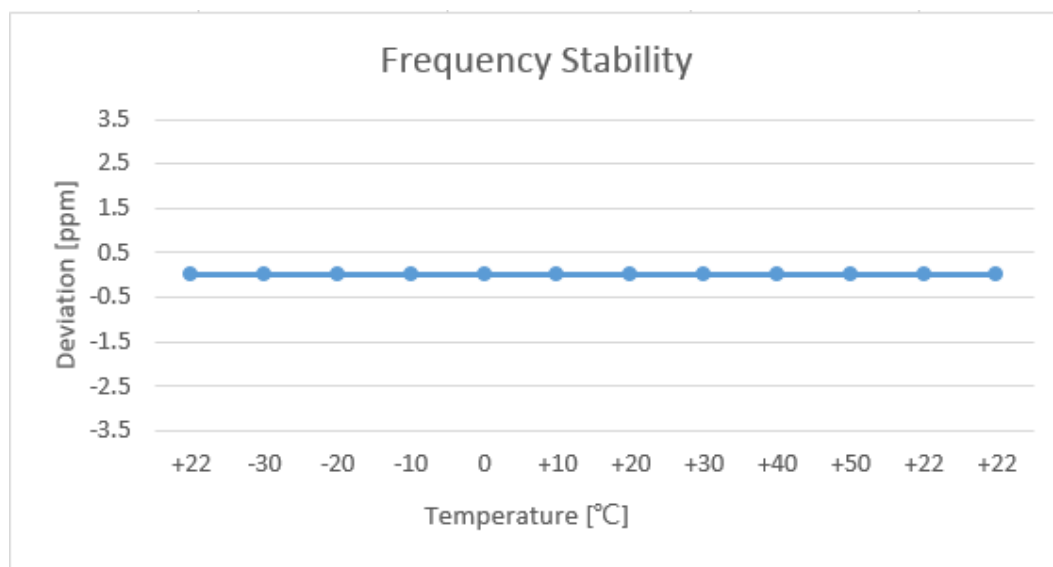
Test mode : LTE Band 12
 Frequency (Hz) : 707 500 000
 Channel : 23095
 Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	707,499,999	-1.37	0.0	0.000000
		-30	707,499,999	-0.89	0.0	0.000000
		-20	707,499,997	-2.6	0.0	0.000000
		-10	707,499,998	-2.37	0.0	0.000000
		0	707,499,998	-2.33	0.0	0.000000
		+10	707,499,999	-1.42	0.0	0.000000
		+20	707,499,997	-3.05	0.0	0.000000
		+30	707,499,998	-2.13	0.0	0.000000
		+40	707,499,998	-2.29	0.0	0.000000
		+50	707,499,998	-1.96	0.0	0.000000
115%	4.43	+22(Ref)	707,500,000	-0.11	0.0	0.000000
End point	3.55	+22(Ref)	707,499,999	-0.63	0.0	0.000000



Test mode : LTE Band 13
 Frequency (Hz) : 782 000 000
 Channel : 23230
 Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	781,999,998	-1.93	0.0	0.000000
		-30	781,999,999	-1.16	0.0	0.000000
		-20	781,999,999	-1.12	0.0	0.000000
		-10	781,999,999	-0.92	0.0	0.000000
		0	781,999,998	-1.76	0.0	0.000000
		+10	781,999,999	-1.34	0.0	0.000000
		+20	781,999,997	-2.76	0.0	0.000000
		+30	781,999,998	-2.07	0.0	0.000000
		+40	781,999,998	-1.75	0.0	0.000000
		+50	781,999,999	-0.82	0.0	0.000000
115%	4.43	+22(Ref)	781,999,999	-0.92	0.0	0.000000
End point	3.55	+22(Ref)	781,999,998	-2.3	0.0	0.000000



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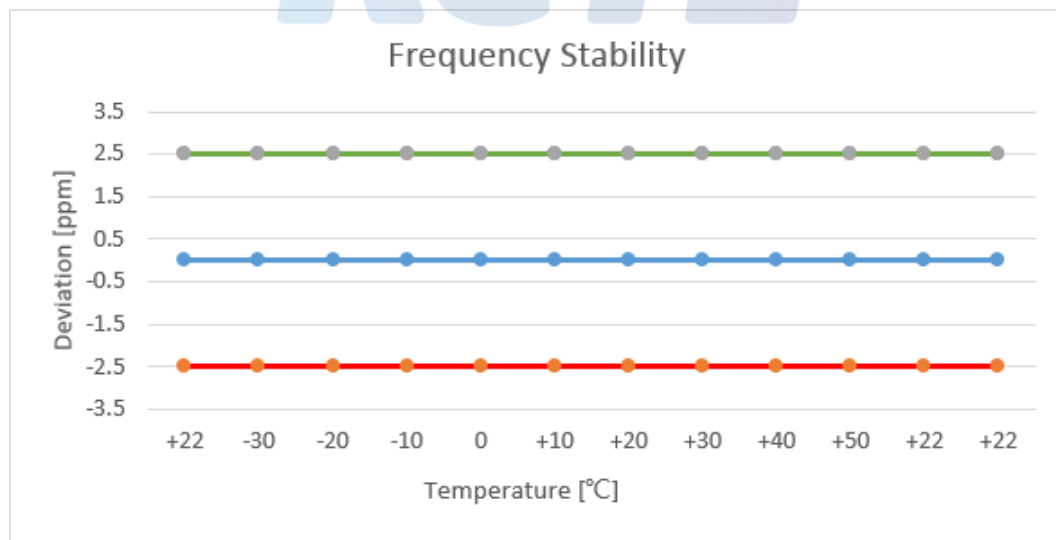
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Test mode : LTE Band 5/26
Frequency (Hz) : 836 500 000
Channel : 26915
Deviation limit(FCC&IC) : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	836,500,000	-0.44	0.0	0.000000
		-30	836,499,999	-1.27	0.0	0.000000
		-20	836,500,000	-0.37	0.0	0.000000
		-10	836,499,998	-2.47	0.0	0.000000
		0	836,499,997	-2.56	0.0	0.000000
		+10	836,499,998	-1.87	0.0	0.000000
		+20	836,499,999	-1.46	0.0	0.000000
		+30	836,499,998	-1.9	0.0	0.000000
		+40	836,499,998	-1.59	0.0	0.000000
		+50	836,499,998	-2.05	0.0	0.000000
115%	4.43	+22(Ref)	836,499,998	-1.67	0.0	0.000000
End point	3.55	+22(Ref)	836,499,999	-0.6	0.0	0.000000



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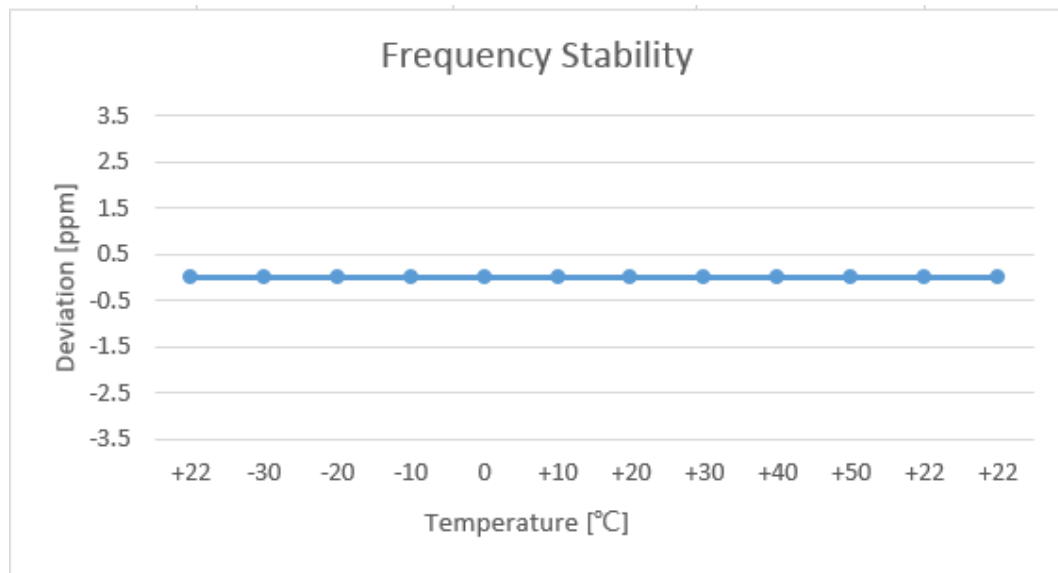
Report No.:
KR19-SRF0097-B

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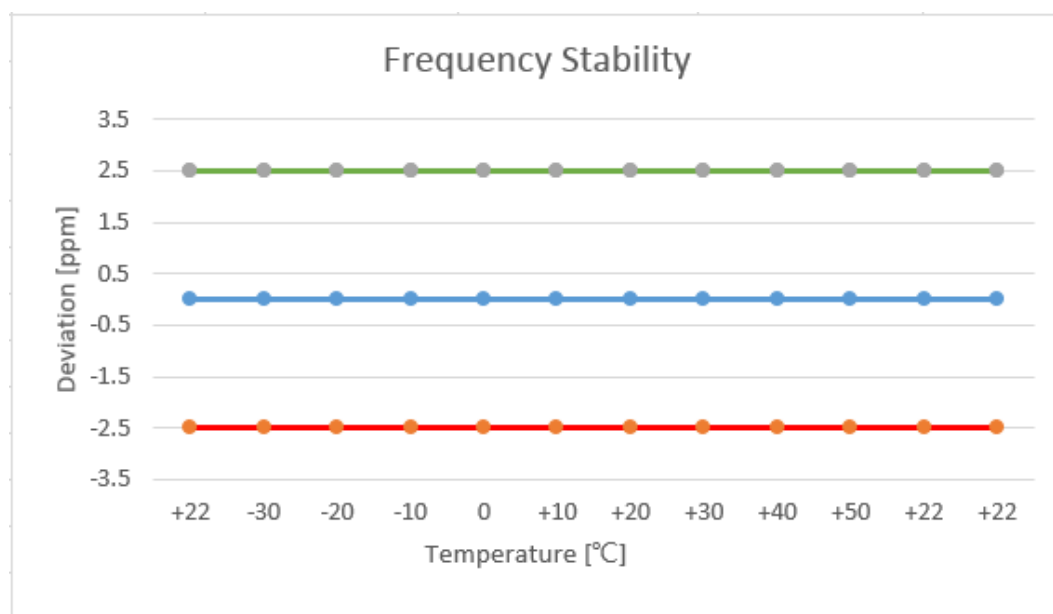
Test mode : LTE Band 4/66
Frequency (Hz) : 1 745 000 000
Channel : 132322
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	1,744,999,999	-1.39	0.0	0.000000
		-30	1,744,999,997	-2.89	0.0	0.000000
		-20	1,744,999,998	-1.79	0.0	0.000000
		-10	1,744,999,997	-3.3	0.0	0.000000
		0	1,744,999,997	-2.83	0.0	0.000000
		+10	1,744,999,995	-4.66	0.0	0.000000
		+20	1,744,999,996	-3.56	0.0	0.000000
		+30	1,744,999,996	-4.26	0.0	0.000000
		+40	1,744,999,997	-2.8	0.0	0.000000
		+50	1,744,999,998	-1.95	0.0	0.000000
115%	4.43	+22(Ref)	1,744,999,998	-1.54	0.0	0.000000
End point	3.55	+22(Ref)	1,745,000,002	1.9	0.0	0.000000



Test mode : LTE Band 2/25
 Frequency (Hz) : 1 882 500 000
 Channel : 26365
 Deviation limit(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
 Deviation limit(IC) : $\pm 0.00025\%$ or 2.5ppm

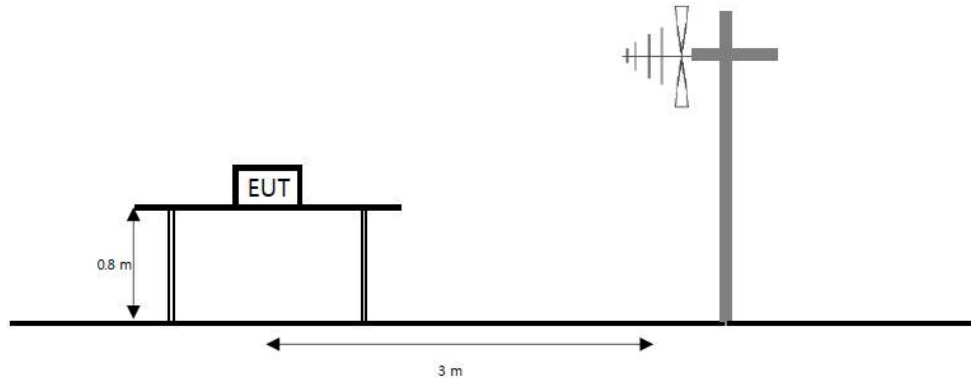
Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	1,882,499,998	-1.59	0.0	0.000000
		-30	1,882,499,996	-4.18	0.0	0.000000
		-20	1,882,499,995	-4.82	0.0	0.000000
		-10	1,882,499,997	-3.19	0.0	0.000000
		0	1,882,499,998	-2.05	0.0	0.000000
		+10	1,882,499,997	-3.1	0.0	0.000000
		+20	1,882,499,997	-2.53	0.0	0.000000
		+30	1,882,499,993	-6.92	0.0	0.000000
		+40	1,882,499,998	-2.36	0.0	0.000000
		+50	1,882,499,998	-2.36	0.0	0.000000
115%	4.43	+22(Ref)	1,882,499,999	-1.3	0.0	0.000000
End point	3.55	+22(Ref)	1,882,499,999	-0.76	0.0	0.000000



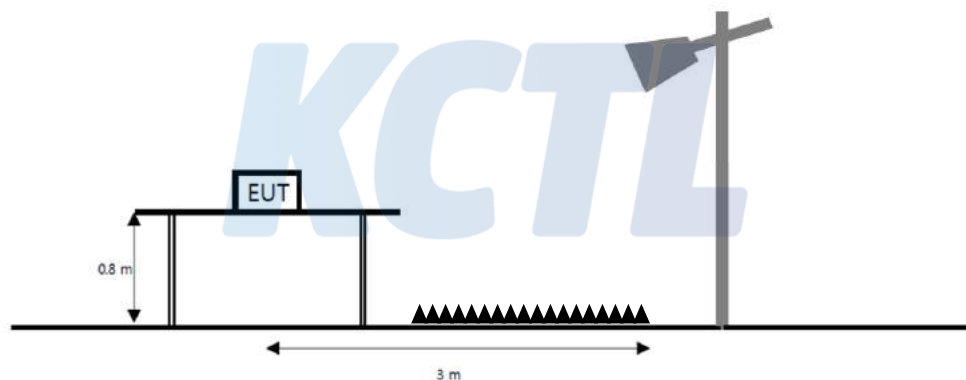
7.7. Radiated Power (ERP/EIRP)

Test setup

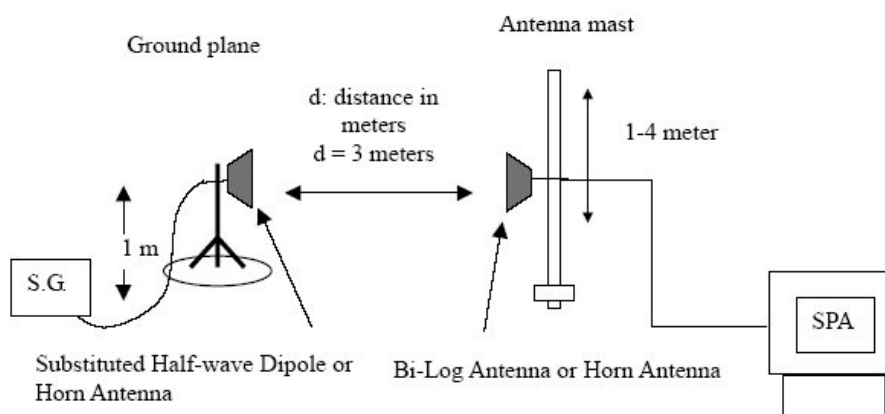
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

According to §22.913(a)(5), the ERP of transmitters in the cellular radiotelephone service must not exceed the limits in this section. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to RSS-132(5.4), the equivalent isotropically radiated power (e.i.r.p) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base stations e.i.r.p limits.

According to §24.232(c) and RSS-133(6.4), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(b)(10), 27.50(c)(10) and RSS-130(6.5), Portable stations (hand-held devices) in the 698 -746MHz, 746-757MHz, 776-788MHz, and 805-806 MHz bands are limited 3 watts ERP.

According to §27.50(d)(4) and RSS-139(6.5), fixed, mobile, and portable (hand-held) stations operating in the 1710~1755 MHz band and mobile and portable stations operating in the 1695~1710 MHz and 1755~1780 MHz bands are 1 watt EIRP.

Test procedure

971168 D01 v03r01 - Section 5.2 and 5.8, 412172 D01 v01r01

ANSI 63.26-2015 – Section 5.2

ANSI/TIA-603-E-2016 - Section 2.2.17

Test settings

- 1) RBW = 1 % to 5 % of the OBW.
- 2) VBW $\geq 3 \times$ RBW.
- 3) SPAN = 2 $\times$ to 3 $\times$ the OBW.
- 4) Number of measurement points in sweep $\geq 2 \times$ span / RBW.
- 5) Sweep time :
 - 1) Auto couple, or
 - 2) $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
- 6) Detector = RMS
- 7) If the EUT can be configured to transmit continuously, then set the trigger to free run.
- 8) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
- 9) Trace mode = trace averaging (RMS) over 100 sweeps.
- 10) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- 11) Allow trace to fully stabilize.

Notes:

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close To normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
The power is calculated by the following formula;
$$Pd(dBm) = Pg(dBm) - \text{Cable loss (dB)} + \text{Antenna gain (dB)}$$

Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.
11. The relevant equation for determining the ERP or EIRP from the co

Test results

Test mode: LTE Band 12

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	699.7	H	-0.60	3.17	10.53	6.76	0.005
		707.5	H	-0.70	3.19	11.42	7.53	0.006
		715.3	H	-0.80	3.22	13.46	9.44	0.009
	16QAM	699.7	H	-0.60	3.17	9.16	5.39	0.003
		707.5	H	-0.70	3.19	10.61	6.72	0.005
		715.3	H	-0.80	3.22	12.07	8.05	0.006
3 M	QPSK	700.5	H	-0.70	3.17	10.29	6.42	0.004
		707.5	H	-0.70	3.19	11.71	7.82	0.006
		714.5	H	-0.80	3.22	13.29	9.27	0.008
	16QAM	700.5	H	-0.70	3.17	9.05	5.18	0.003
		707.5	H	-0.70	3.19	10.57	6.68	0.005
		714.5	H	-0.80	3.22	11.74	7.72	0.006
5 M	QPSK	701.5	H	-0.70	3.17	10.09	6.22	0.004
		707.5	H	-0.70	3.19	12.92	9.03	0.008
		713.5	H	-0.80	3.22	13.98	9.96	0.010
	16QAM	701.5	H	-0.70	3.17	9.41	5.54	0.004
		707.5	H	-0.70	3.19	12.08	8.19	0.007
		713.5	H	-0.80	3.22	12.80	8.78	0.008
10 M	QPSK	704.0	H	-0.70	3.17	12.34	8.47	0.007
		707.5	H	-0.70	3.19	12.94	9.05	0.008
		711.0	H	-0.80	3.22	13.61	9.59	0.009
	16QAM	704.0	H	-0.70	3.17	11.34	7.47	0.006
		707.5	H	-0.70	3.19	11.77	7.88	0.006
		711.0	H	-0.80	3.22	12.47	8.45	0.007

Test mode: LTE Band 13

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	779.5	H	0.00	3.39	17.73	14.34	0.027
		782.0	H	0.10	3.40	17.63	14.33	0.027
		784.5	H	0.10	3.40	17.06	13.76	0.024
	16QAM	779.5	H	0.00	3.39	16.49	13.10	0.020
		782.0	H	0.10	3.40	16.37	13.07	0.020
		784.5	H	0.10	3.40	16.29	12.99	0.020
10 M	QPSK	782.0	H	0.10	3.39	17.98	14.69	0.029
	16QAM	782.0	H	0.10	3.39	16.76	13.47	0.022

Note.

1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP		EIRP Note.1	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]	[dBm]	[W]
1.4 M	QPSK	824.7	H	-0.60	3.55	14.73	10.58	0.011	12.73	0.019
		836.5	H	-0.50	3.63	14.24	10.11	0.010	12.26	0.017
		848.3	H	-0.50	3.65	13.68	9.53	0.009	11.68	0.015
	16QAM	824.7	H	-0.60	3.55	13.50	9.35	0.009	11.50	0.014
		836.5	H	-0.50	3.63	13.20	9.07	0.008	11.22	0.013
		848.3	H	-0.50	3.65	12.60	8.45	0.007	10.60	0.011
3 M	QPSK	825.5	H	-0.60	3.55	12.34	8.19	0.007	10.34	0.011
		836.5	H	-0.50	3.63	12.91	8.78	0.008	10.93	0.012
		847.5	H	-0.50	3.65	11.95	7.80	0.006	9.95	0.010
	16QAM	825.5	H	-0.60	3.55	11.10	6.95	0.005	9.10	0.008
		836.5	H	-0.50	3.63	12.02	7.89	0.006	10.04	0.010
		847.5	H	-0.50	3.65	11.16	7.01	0.005	9.16	0.008
5 M	QPSK	826.5	H	-0.60	3.56	13.01	8.85	0.008	11.00	0.013
		836.5	H	-0.50	3.63	12.66	8.53	0.007	10.68	0.012
		846.5	H	-0.50	3.66	12.03	7.87	0.006	10.02	0.010
	16QAM	826.5	H	-0.60	3.56	11.99	7.83	0.006	9.98	0.010
		836.5	H	-0.50	3.63	11.67	7.54	0.006	9.69	0.009
		846.5	H	-0.50	3.66	11.06	6.90	0.005	9.05	0.008
10 M	QPSK	829.0	H	-0.60	3.59	13.18	8.99	0.008	11.14	0.013
		836.5	H	-0.50	3.63	13.06	8.93	0.008	11.08	0.013
		844.0	H	-0.50	3.66	13.00	8.84	0.008	10.99	0.013
	16QAM	829.0	H	-0.60	3.59	12.18	7.99	0.006	10.14	0.010
		836.5	H	-0.50	3.63	11.78	7.65	0.006	9.80	0.010
		844.0	H	-0.50	3.66	11.10	6.94	0.005	9.09	0.008

Note.

1. The E.I.R.P conversion formula for IC : E.I.R.P result(dBm)

= E.R.P result (dBm) + 2.15 (dB)

2. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode: LTE Band 26

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP		EIRP Note.1	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]	[dBm]	[W]
1.4 M	QPSK	824.7	H	-0.60	3.55	16.01	11.86	0.015	14.01	0.025
		836.5	H	-0.50	3.63	14.93	10.80	0.012	12.95	0.020
		848.3	H	-0.50	3.65	14.78	10.63	0.012	12.78	0.019
	16QAM	824.7	H	-0.60	3.55	13.91	9.76	0.009	11.91	0.016
		836.5	H	-0.50	3.63	13.57	9.44	0.009	11.59	0.014
		848.3	H	-0.50	3.65	13.54	9.39	0.009	11.54	0.014
3 M	QPSK	825.5	H	-0.60	3.55	15.27	11.12	0.013	13.27	0.021
		836.5	H	-0.50	3.63	14.93	10.80	0.012	12.95	0.020
		847.5	H	-0.50	3.65	13.81	9.66	0.009	11.81	0.015
	16QAM	825.5	H	-0.60	3.55	13.97	9.82	0.010	11.97	0.016
		836.5	H	-0.50	3.63	13.63	9.50	0.009	11.65	0.015
		847.5	H	-0.50	3.65	12.53	8.38	0.007	10.53	0.011
5 M	QPSK	826.5	H	-0.60	3.56	13.02	8.86	0.008	11.01	0.013
		836.5	H	-0.50	3.63	13.54	9.41	0.009	11.56	0.014
		846.5	H	-0.50	3.66	13.91	9.75	0.009	11.9	0.015
	16QAM	826.5	H	-0.60	3.56	11.85	7.69	0.006	9.84	0.010
		836.5	H	-0.50	3.63	12.26	8.13	0.007	10.28	0.011
		846.5	H	-0.50	3.66	12.57	8.41	0.007	10.56	0.011
10 M	QPSK	829.0	H	-0.60	3.59	13.18	8.99	0.008	11.14	0.013
		836.5	H	-0.50	3.63	13.54	9.41	0.009	11.56	0.014
		844.0	H	-0.50	3.66	13.88	9.72	0.009	11.87	0.015
	16QAM	829.0	H	-0.60	3.59	12.17	7.98	0.006	10.13	0.010
		836.5	H	-0.50	3.63	12.22	8.09	0.006	10.24	0.011
		844.0	H	-0.50	3.66	12.58	8.42	0.007	10.57	0.011
15 M	QPSK	831.5	H	-0.50	3.59	13.26	9.17	0.008	11.32	0.014
		841.5	H	-0.50	3.65	13.58	9.43	0.009	11.58	0.014
	16QAM	831.5	H	-0.50	3.59	11.93	7.84	0.006	9.99	0.010
		841.5	H	-0.50	3.65	12.50	8.35	0.007	10.5	0.011

Note.

1. The E.I.R.P conversion formula for IC : E.I.R.P result(dBm)

$$= \text{E.R.P result (dBm)} + 2.15 \text{ (dB)}$$

2. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode: LTE Band 4

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	V	4.00	5.11	15.08	13.97	0.025
		1 732.5	V	3.80	5.13	16.19	14.86	0.031
		1 754.3	V	3.90	5.18	15.99	14.71	0.030
	16QAM	1 710.7	V	4.00	5.11	13.72	12.61	0.018
		1 732.5	V	3.80	5.13	14.79	13.46	0.022
		1 754.3	V	3.90	5.18	14.67	13.39	0.022
3 M	QPSK	1 711.5	V	4.00	5.11	16.64	15.53	0.036
		1 732.5	V	3.80	5.13	16.48	15.15	0.033
		1 753.5	V	3.90	5.18	16.26	14.98	0.031
	16QAM	1 711.5	V	4.00	5.11	15.11	14.00	0.025
		1 732.5	V	3.80	5.13	14.90	13.57	0.023
		1 753.5	V	3.90	5.18	15.49	14.21	0.026
5 M	QPSK	1 712.5	V	4.00	5.11	16.60	15.49	0.035
		1 732.5	V	3.80	5.13	16.55	15.22	0.033
		1 752.5	V	3.90	5.18	16.39	15.11	0.032
	16QAM	1 712.5	V	4.00	5.11	15.45	14.34	0.027
		1 732.5	V	3.80	5.13	15.00	13.67	0.023
		1 752.5	V	3.90	5.18	14.98	13.70	0.023
10 M	QPSK	1 715.0	V	4.00	5.11	16.46	15.35	0.034
		1 732.5	V	3.80	5.13	16.60	15.27	0.034
		1 750.0	V	3.90	5.18	16.43	15.15	0.033
	16QAM	1 715.0	V	4.00	5.11	15.01	13.90	0.025
		1 732.5	V	3.80	5.13	15.30	13.97	0.025
		1 750.0	V	3.90	5.18	15.03	13.75	0.024
15 M	QPSK	1 717.5	V	4.00	5.11	16.39	15.28	0.034
		1 732.5	V	3.80	5.15	16.38	15.03	0.032
		1 747.5	V	3.90	5.15	16.09	14.84	0.030
	16QAM	1 717.5	V	4.00	5.11	14.84	13.73	0.024
		1 732.5	V	3.80	5.15	14.91	13.56	0.023
		1 747.5	V	3.90	5.15	14.72	13.47	0.022
20 M	QPSK	1 720.0	V	3.90	5.11	16.27	15.06	0.032
		1 732.5	V	3.80	5.15	16.26	14.91	0.031
		1 745.0	V	3.90	5.15	16.26	15.01	0.032
	16QAM	1 720.0	V	3.90	5.11	14.73	13.52	0.022
		1 732.5	V	3.80	5.15	14.85	13.50	0.022
		1 745.0	V	3.90	5.15	14.72	13.47	0.022

Note.

1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode: LTE Band 66

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	V	4.00	5.11	14.98	13.87	0.024
		1 745.0	V	3.90	5.15	15.89	14.64	0.029
		1 779.3	V	4.10	5.22	15.40	14.28	0.027
	16QAM	1 710.7	V	4.00	5.11	13.83	12.72	0.019
		1 745.0	V	3.90	5.15	15.10	13.85	0.024
		1 779.3	V	4.10	5.22	14.37	13.25	0.021
3 M	QPSK	1 711.5	V	4.00	5.11	16.27	15.16	0.033
		1 745.0	V	3.90	5.15	16.28	15.03	0.032
		1 778.5	V	4.10	5.22	15.74	14.62	0.029
	16QAM	1 711.5	V	4.00	5.11	15.41	14.30	0.027
		1 745.0	V	3.90	5.15	14.98	13.73	0.024
		1 778.5	V	4.10	5.22	14.38	13.26	0.021
5 M	QPSK	1 712.5	V	4.00	5.11	16.30	15.19	0.033
		1 745.0	V	3.90	5.15	16.20	14.95	0.031
		1 777.5	V	4.10	5.22	15.98	14.86	0.031
	16QAM	1 712.5	V	4.00	5.11	15.04	13.93	0.025
		1 745.0	V	3.90	5.15	15.16	13.91	0.025
		1 777.5	V	4.10	5.22	14.88	13.76	0.024
10 M	QPSK	1 715.0	V	4.00	5.11	14.27	13.16	0.021
		1 745.0	V	3.90	5.15	14.91	13.66	0.023
		1 775.0	V	4.10	5.22	14.27	13.15	0.021
	16QAM	1 715.0	V	4.00	5.11	13.13	12.02	0.016
		1 745.0	V	3.90	5.15	13.78	12.53	0.018
		1 775.0	V	4.10	5.22	13.37	12.25	0.017
15 M	QPSK	1 717.5	V	4.00	5.11	15.83	14.72	0.030
		1 745.0	V	3.90	5.15	16.27	15.02	0.032
		1 772.5	V	4.10	5.20	15.89	14.79	0.030
	16QAM	1 717.5	V	4.00	5.11	14.93	13.82	0.024
		1 745.0	V	3.90	5.15	15.14	13.89	0.024
		1 772.5	V	4.10	5.20	14.83	13.73	0.024
20 M	QPSK	1 720.0	V	3.90	5.11	16.21	15.00	0.032
		1 745.0	V	3.90	5.15	16.07	14.82	0.030
		1 770.0	V	4.10	5.20	15.89	14.79	0.030
	16QAM	1 720.0	V	3.90	5.11	14.84	13.63	0.023
		1 745.0	V	3.90	5.15	14.98	13.73	0.024
		1 770.0	V	4.10	5.20	14.88	13.78	0.024

Note.

1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.7	H	4.60	5.36	17.87	17.11	0.051
		1 880.0	H	4.90	5.40	19.86	19.36	0.086
		1 909.3	H	4.90	5.45	21.27	20.72	0.118
	16QAM	1 850.7	H	4.60	5.36	16.79	16.03	0.040
		1 880.0	H	4.90	5.40	19.30	18.80	0.076
		1 909.3	H	4.90	5.45	19.24	18.69	0.074
3 M	QPSK	1 851.5	H	4.60	5.36	18.69	17.93	0.062
		1 880.0	H	4.90	5.40	20.13	19.63	0.092
		1 908.5	H	4.90	5.45	20.95	20.40	0.110
	16QAM	1 851.5	H	4.60	5.36	17.23	16.47	0.044
		1 880.0	H	4.90	5.40	18.53	18.03	0.064
		1 908.5	H	4.90	5.45	19.91	19.36	0.086
5 M	QPSK	1 852.5	H	4.60	5.36	19.46	18.70	0.074
		1 880.0	H	4.90	5.40	19.87	19.37	0.086
		1 907.5	H	4.90	5.45	20.61	20.06	0.101
	16QAM	1 852.5	H	4.60	5.36	17.71	16.95	0.050
		1 880.0	H	4.90	5.40	18.80	18.30	0.068
		1 907.5	H	4.90	5.45	19.41	18.86	0.077
10 M	QPSK	1 855.0	H	4.60	5.36	18.78	18.02	0.063
		1 880.0	H	4.90	5.40	20.03	19.53	0.090
		1 905.0	H	4.90	5.45	20.99	20.44	0.111
	16QAM	1 855.0	H	4.60	5.36	17.27	16.51	0.045
		1 880.0	H	4.90	5.40	18.41	17.91	0.062
		1 905.0	H	4.90	5.45	19.67	19.12	0.082
15 M	QPSK	1 857.5	H	4.60	5.36	18.46	17.70	0.059
		1 880.0	H	4.90	5.40	19.63	19.13	0.082
		1 902.5	H	4.90	5.45	20.70	20.15	0.104
	16QAM	1 857.5	H	4.60	5.36	17.48	16.72	0.047
		1 880.0	H	4.90	5.40	18.36	17.86	0.061
		1 902.5	H	4.90	5.45	19.42	18.87	0.077
20 M	QPSK	1 860.0	H	4.60	5.36	19.04	18.28	0.067
		1 880.0	H	4.90	5.40	19.48	18.98	0.079
		1 900.0	H	4.90	5.45	20.64	20.09	0.102
	16QAM	1 860.0	H	4.60	5.36	17.86	17.10	0.051
		1 880.0	H	4.90	5.40	18.20	17.70	0.059
		1 900.0	H	4.90	5.45	19.55	19.00	0.079

Note.

1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test mode: LTE Band 25

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.7	H	4.60	5.36	18.97	18.21	0.066
		1 882.5	H	4.90	5.40	20.01	19.51	0.089
		1 914.3	H	5.00	5.47	19.97	19.50	0.089
	16QAM	1 850.7	H	4.60	5.36	17.63	16.87	0.049
		1 882.5	H	4.90	5.40	19.19	18.69	0.074
		1 914.3	H	5.00	5.47	18.66	18.19	0.066
3 M	QPSK	1 851.5	H	4.60	5.36	19.98	19.22	0.084
		1 882.5	H	4.90	5.40	20.20	19.70	0.093
		1 913.5	H	5.00	5.47	20.06	19.59	0.091
	16QAM	1 851.5	H	4.60	5.36	18.36	17.60	0.058
		1 882.5	H	4.90	5.40	18.13	17.63	0.058
		1 913.5	H	5.00	5.47	18.70	18.23	0.067
5 M	QPSK	1 852.5	H	4.60	5.36	19.58	18.82	0.076
		1 882.5	H	4.90	5.40	19.39	18.89	0.077
		1 912.5	H	5.00	5.47	18.33	17.86	0.061
	16QAM	1 852.5	H	4.60	5.36	18.53	17.77	0.060
		1 882.5	H	4.90	5.40	18.61	18.11	0.065
		1 912.5	H	5.00	5.47	17.44	16.97	0.050
10 M	QPSK	1 855.0	H	4.60	5.36	19.47	18.71	0.074
		1 882.5	H	4.90	5.40	20.24	19.74	0.094
		1 910.0	H	5.00	5.47	19.72	19.25	0.084
	16QAM	1 855.0	H	4.60	5.36	18.35	17.59	0.057
		1 882.5	H	4.90	5.40	18.76	18.26	0.067
		1 910.0	H	5.00	5.47	18.78	18.31	0.068
15 M	QPSK	1 857.5	H	4.60	5.36	18.79	18.03	0.064
		1 882.5	H	4.90	5.40	18.65	18.15	0.065
		1 907.5	H	4.90	5.45	18.52	17.97	0.063
	16QAM	1 857.5	H	4.60	5.36	17.57	16.81	0.048
		1 882.5	H	4.90	5.40	17.23	16.73	0.047
		1 907.5	H	4.90	5.45	17.72	17.17	0.052
20 M	QPSK	1 860.0	H	4.60	5.38	20.08	19.30	0.085
		1 882.5	H	4.90	5.40	20.30	19.80	0.095
		1 905.0	H	4.90	5.45	20.56	20.01	0.100
	16QAM	1 860.0	H	4.60	5.38	18.67	17.89	0.062
		1 882.5	H	4.90	5.40	19.26	18.76	0.075
		1 905.0	H	4.90	5.45	19.38	18.83	0.076

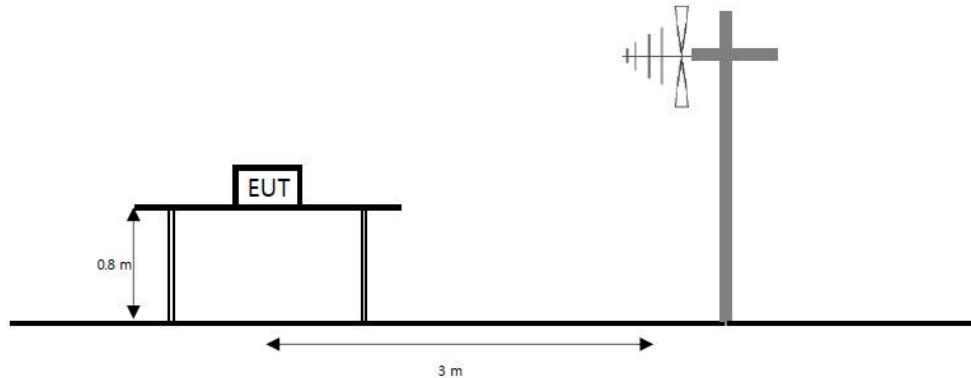
Note.

1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

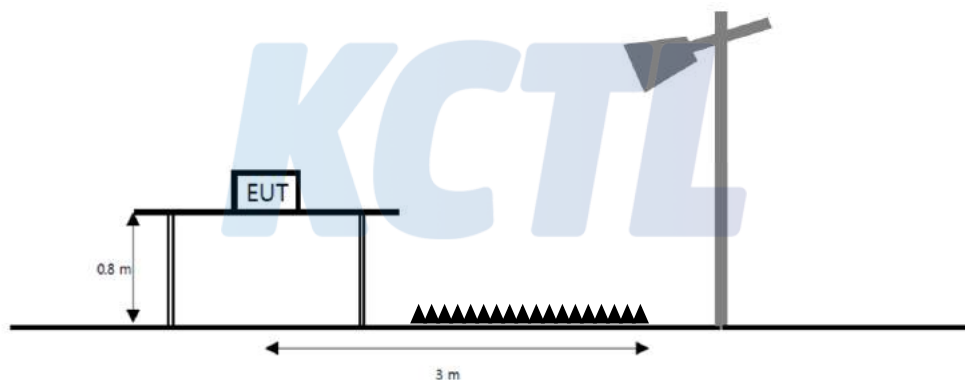
7.8. Radiated Spurious Emissions

Test setup

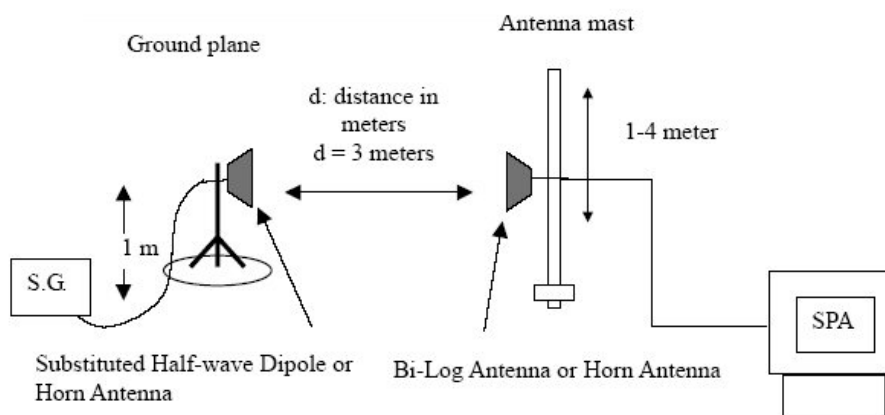
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

According to §22.917(a), §24.238(a) and RSS-132(5.5), RSS-133(6.5), 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 $43 + 10\log(P_{\text{[Watts]}})$ dB.

According to §27.53(c)(2) and RSS-130(4.7), on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10\log(P_{\text{[Watts]}})$ dB and 27.53(f), for operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions 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.

According to §27.53(g) and RSS-130(4.7), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10\log(P_{\text{[Watts]}})$ dB.

According to §27.53(h) and RSS-139(6.6), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log(P_{\text{[Watts]}})$ dB.

Test procedure

971168 D01 v03r01 - Section 6.2

ANSI 63.26-2015 – Section 5.5

ANSI/TIA-603-E-2016 - Section 2.2.12

Test settings

- 1) RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz.
- 2) VBW $\geq 3 \times$ RBW.
- 3) Detector = RMS
- 4) Trace mode = Max hold
- 5) Sweep time = Auto couple
- 6) Number of sweep points $\geq 2 \times$ span / RBW
- 7) Allow trace to fully stabilize.

For the narrowband spurious settings:

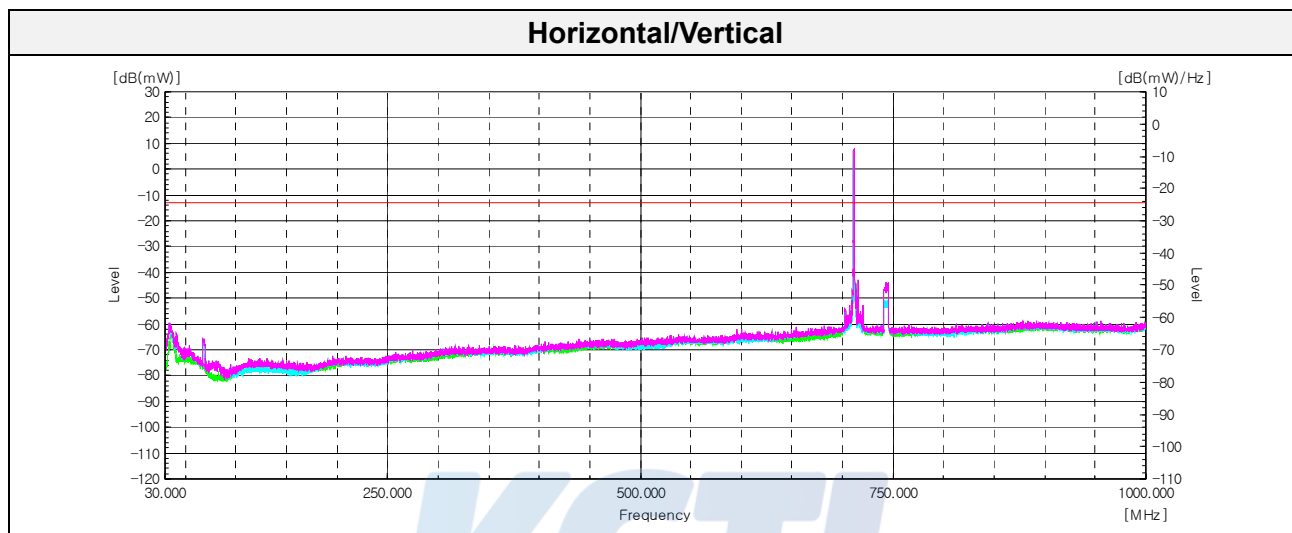
- 1) RBW = 1 kHz
- 2) VBW = 3 kHz
- 3) Detector = RMS
- 4) Trace mode = Max hold
- 5) Sweep speed slow enough to maintain measurement calibration.

Notes:

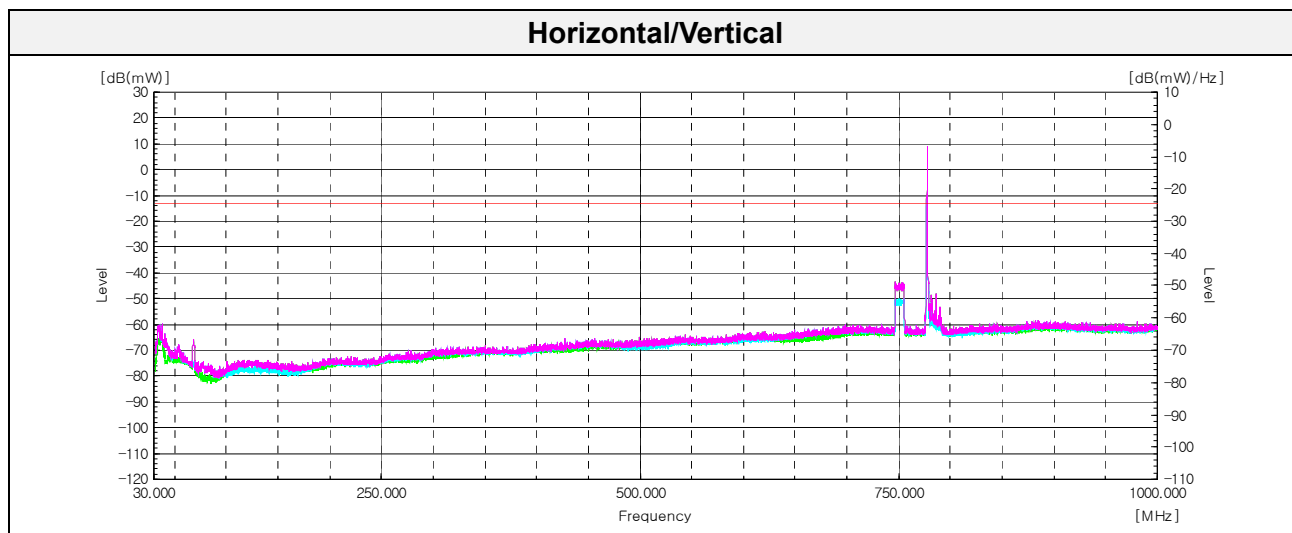
1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring receiver.
9. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Test results (Below 1 000 MHz) – Worst case

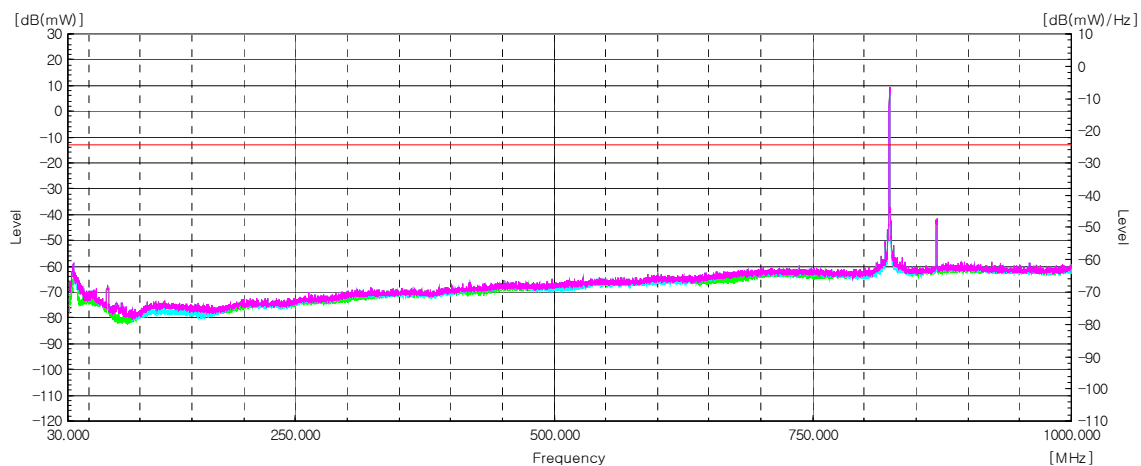
Test mode : LTE Band 12
Frequency (MHz) : 713.5
Channel : 23155
Bandwidth (MHz) : 5



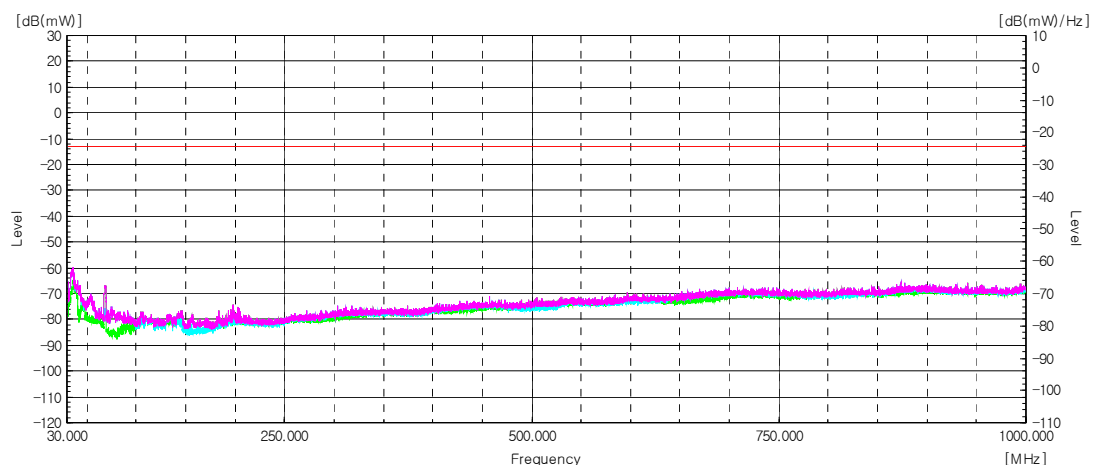
Test mode : LTE Band 13
Frequency (MHz) : 782.0
Channel : 23230
Bandwidth (MHz) : 10



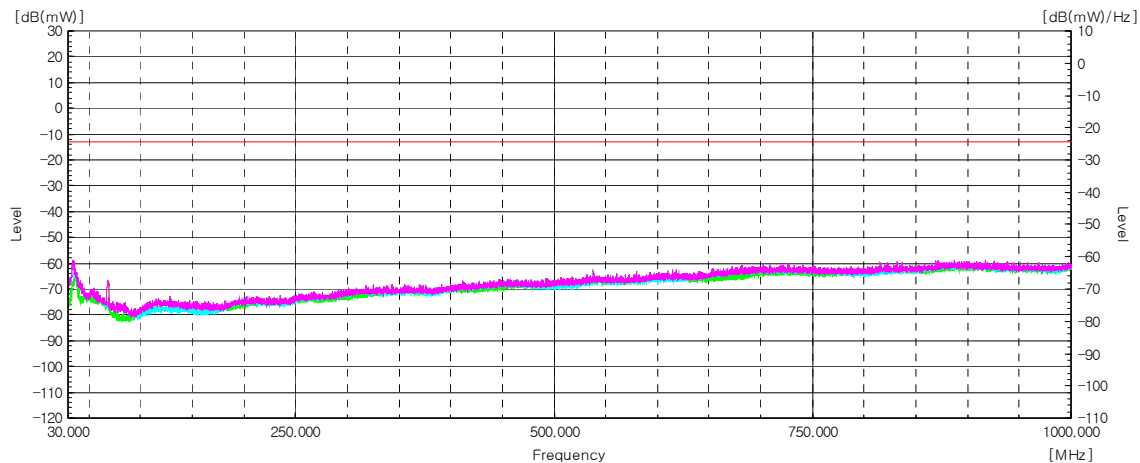
Test mode : LTE Band 5/26
Frequency (MHz) : 824.7
Channel : 20407
Bandwidth (MHz) : 1.4

Horizontal/Vertical

Test mode : LTE Band 4/66
Frequency (MHz) : 1 711.5
Channel : 19965
Bandwidth (MHz) : 3

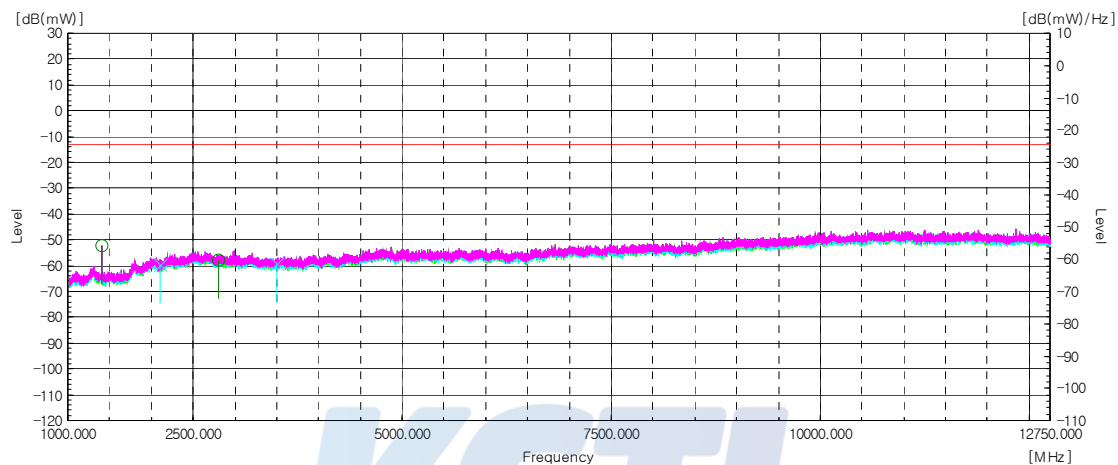
Horizontal/Vertical

Test mode : LTE Band 2/25
Frequency (MHz) : 1 882.5
Channel : 26365
Bandwidth (MHz) : 1.4

Horizontal/Vertical

Note.

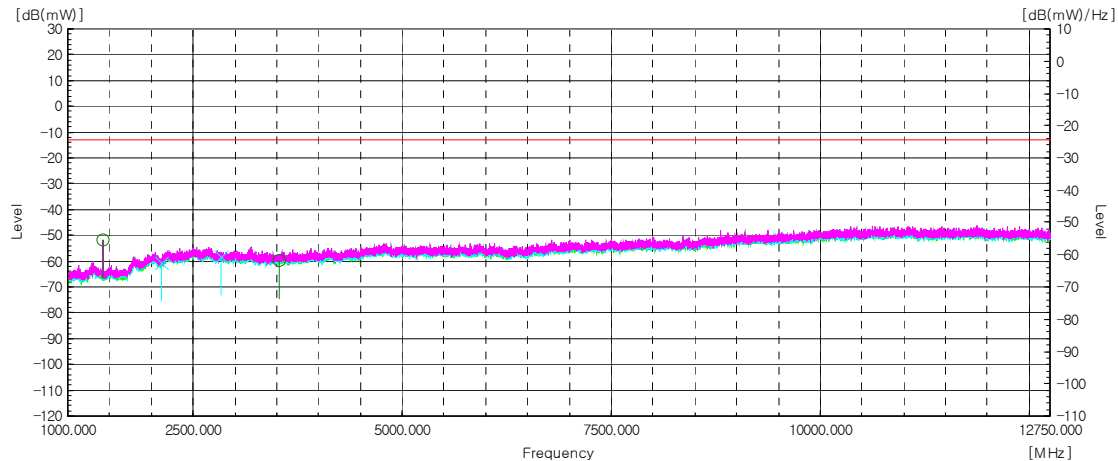
1. No spurious emission were detected below 1 000 MHz.

Test results (Above 1 000 MHz)Test mode : LTE Band 12Frequency(MHz) : 701.5Channel : 23035Bandwidth(MHz) : 5**Horizontal/Vertical**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 407.52	H	4.80	4.57	-52.43	-52.20	-13.00	39.20
	2 104.55	V	5.50	5.76	-59.34	-59.60	-13.00	46.60
	2 806.08	H	7.00	6.60	-58.30	-57.90	-13.00	44.90
	3 507.11	V	8.00	7.55	-59.65	-59.20	-13.00	46.20

Note.

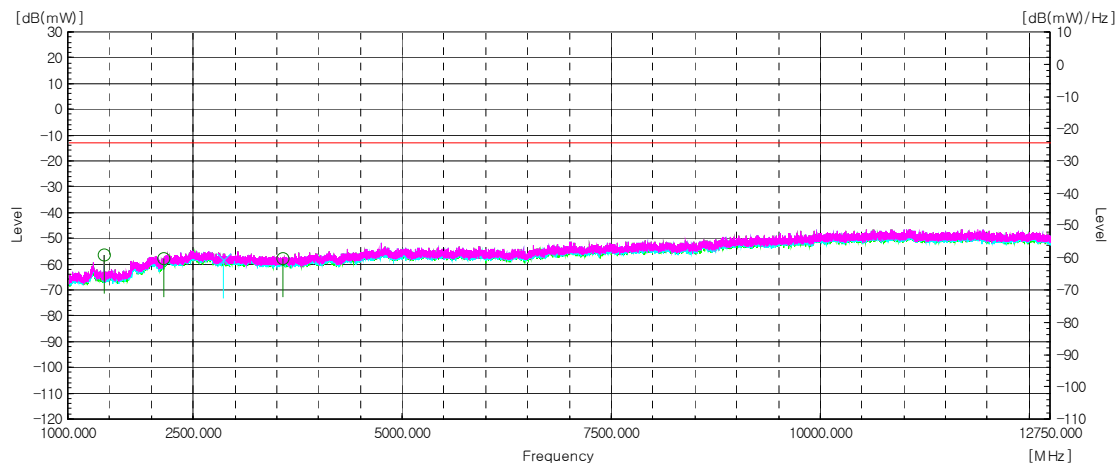
1. Limit Calculation(dBm)= 43 + 10log(P_{Watts})

Test mode : LTE Band 12Frequency(MHz) : 707.5Channel : 23095Bandwidth(MHz) : 5**Horizontal/Vertical**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 419.02	H	4.80	4.59	-52.01	-51.80	-13.00	38.80
	2 123.55	V	5.40	5.77	-60.13	-60.50	-13.00	47.50
	2 830.08	V	7.10	6.64	-58.66	-58.20	-13.00	45.20
	3 537.11	H	8.20	7.99	-59.81	-59.60	-13.00	46.60

Note.

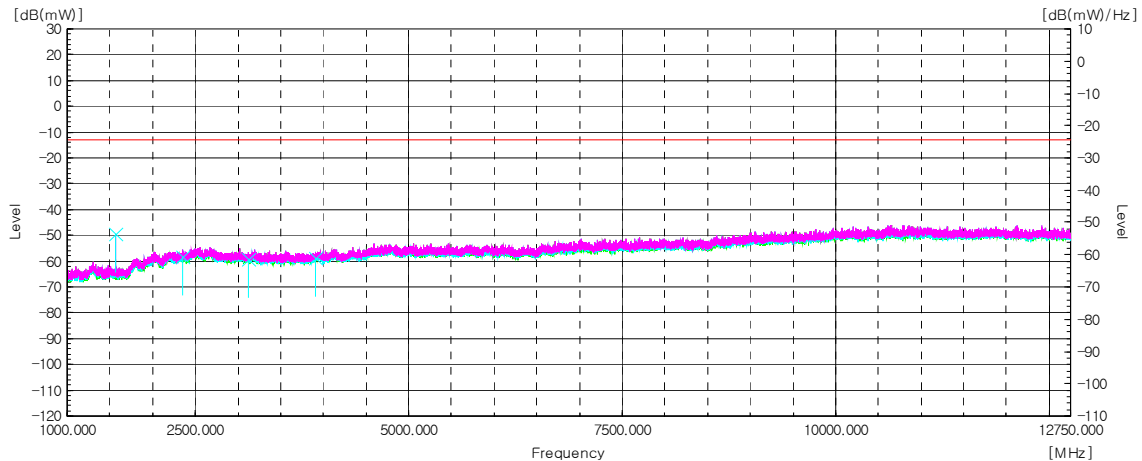
1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 12Frequency(MHz) : 713.5Channel : 23155Bandwidth(MHz) : 5**Horizontal/Vertical**

Mode	Frequency [MHz]	Pol. [V/H]	Antenna Gain [dBi]	Cable loss [dB]	Substitute Level [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]
QPSK	1 431.02	H	5.20	4.61	-56.99	-56.40	-13.00	43.40
	2 142.05	H	5.30	5.79	-57.41	-57.90	-13.00	44.90
	2 854.58	V	7.20	6.68	-58.92	-58.40	-13.00	45.40
	3 567.11	H	8.20	8.65	-57.55	-58.00	-13.00	45.00

Note.

1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

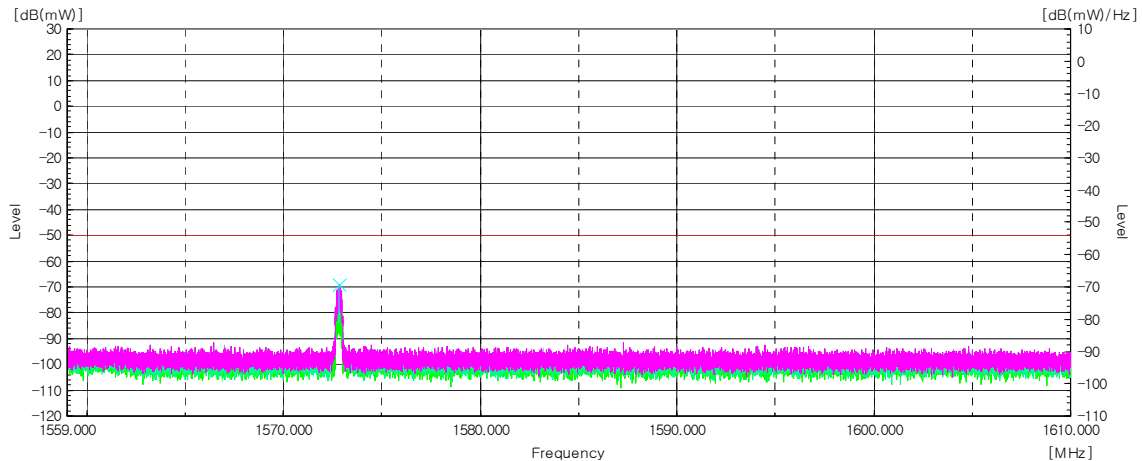
Test mode : LTE Band 13Frequency(MHz) : 782.0Channel : 23230Bandwidth(MHz) : 10**Horizontal/Vertical**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 573.02	V	6.20	4.85	-50.55	-49.20	-13.00	36.20
	2 346.06	V	5.90	6.09	-57.91	-58.10	-13.00	45.10
	3 128.59	V	7.30	7.06	-59.54	-59.30	-13.00	46.30
	3 910.12	V	8.60	9.19	-58.21	-58.80	-13.00	45.80

Note.

1. Limit Calculation(dBm)= 43 + 10log(P_{Watts})

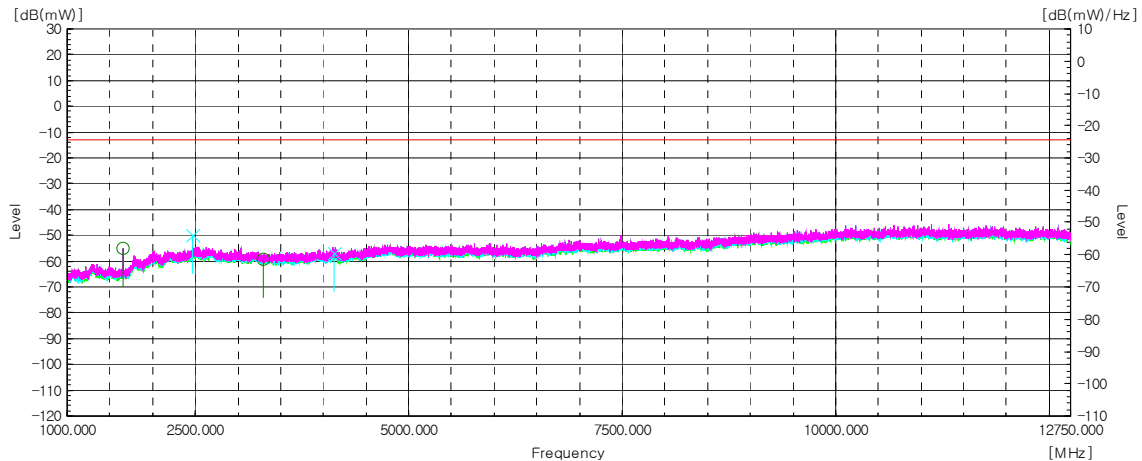
Test mode : LTE Band 13
Frequency(MHz) : 782.0 (1 559 - 1 610 MHz)
Channel : 23230
Bandwidth(MHz) : 10

Horizontal/Vertical

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 572.84	V	6.20	4.87	-70.13	-68.80	-50.00	18.80

Note.

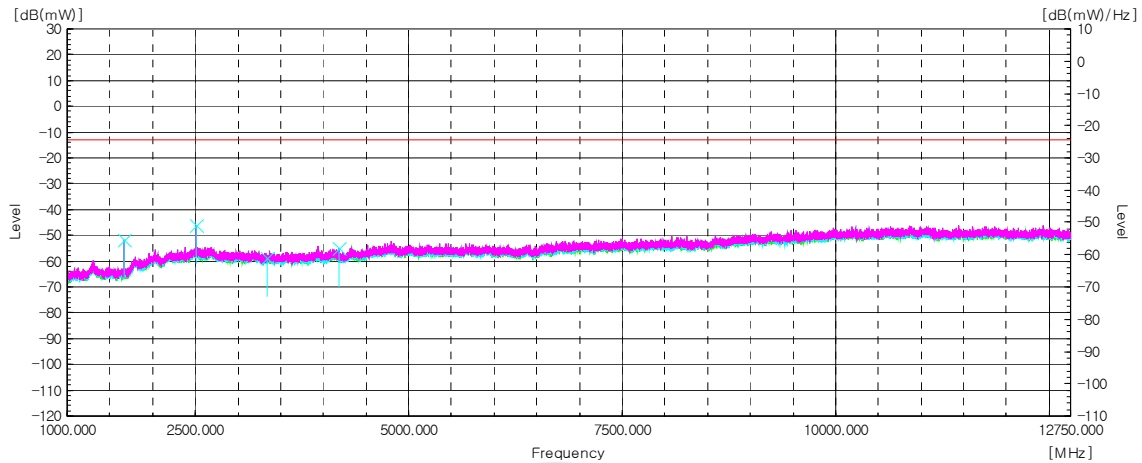
1. Limit Calculation of wide-band (dBm/MHz) = -70 dBW/MHz (-40 dBm/MHz)
2. Limit Calculation of narrow-band (dBm) = -80 dBW (-50 dBm)

Test mode : LTE Band 5/26Frequency(MHz) : 824.7Channel : 20407Bandwidth(MHz) : 1.4**Horizontal/Vertical**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 649.53	H	5.90	4.98	-55.72	-54.80	-13.00	41.80
	2 474.06	V	6.20	6.24	-49.76	-49.80	-13.00	36.80
	3 298.10	H	7.60	7.27	-59.53	-59.20	-13.00	46.20
	4 123.63	V	8.70	9.54	-56.06	-56.90	-13.00	43.90

Note.

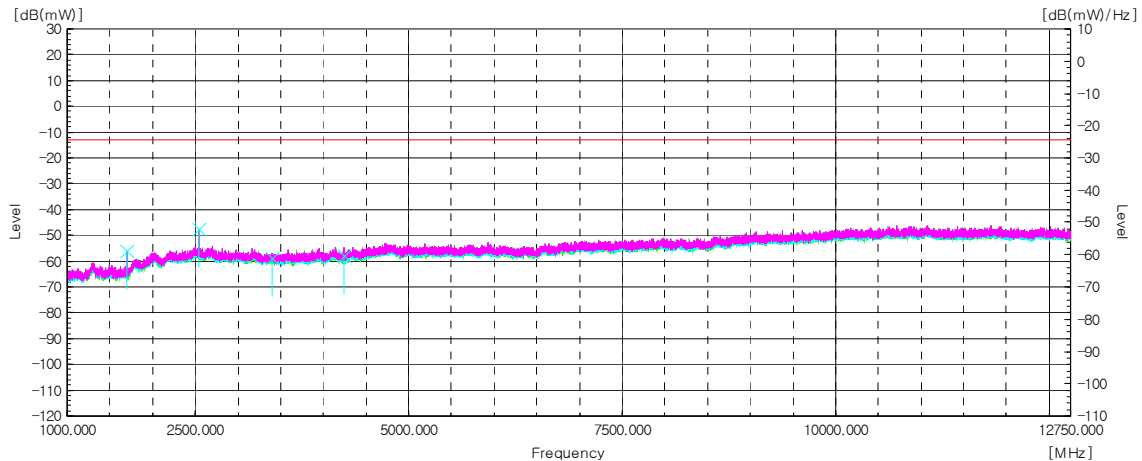
1. Limit Calculation(dBm)= 43 + 10log(P_{Watts})

Test mode : LTE Band 5/26Frequency(MHz) : 836.5Channel : 26915Bandwidth(MHz) : 1.4**Horizontal/Vertical**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 673.03	V	5.10	5.02	-51.98	-51.90	-13.00	38.90
	2 509.56	V	6.30	6.29	-46.11	-46.10	-13.00	33.10
	3 346.10	V	7.70	7.34	-59.36	-59.00	-13.00	46.00
	4 182.64	V	9.00	9.71	-54.49	-55.20	-13.00	42.20

Note.

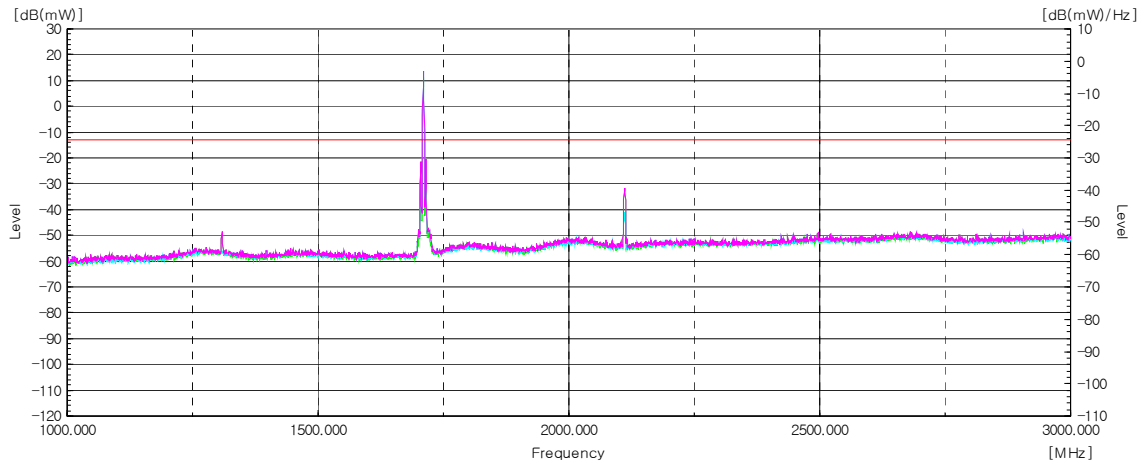
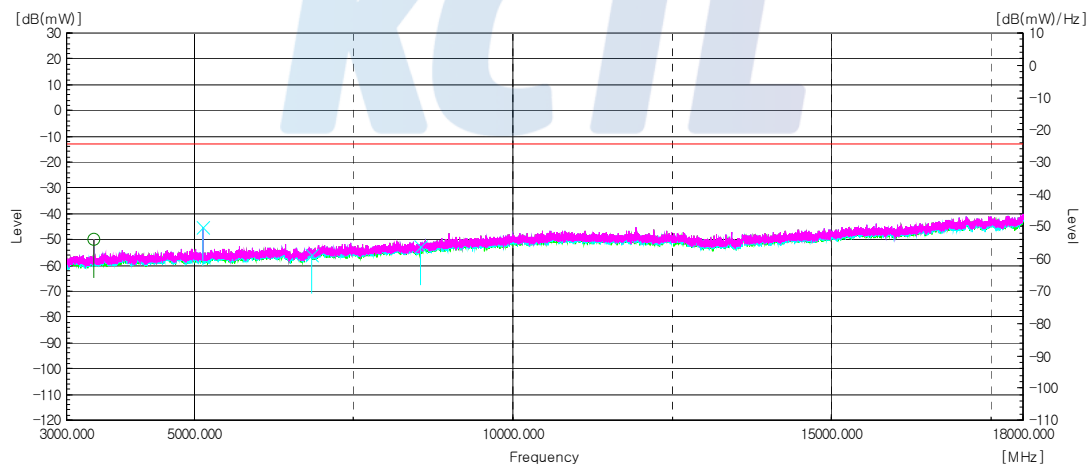
1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 5/26Frequency(MHz) : 848.3Channel : 27033Bandwidth(MHz) : 1.4**Horizontal/Vertical**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 696.53	V	4.60	5.07	-55.53	-56.00	-13.00	43.00
	2 545.07	V	6.40	6.34	-47.46	-47.40	-13.00	34.40
	3 393.10	V	7.90	7.40	-59.10	-58.60	-13.00	45.60
	4 241.14	V	9.20	9.83	-57.37	-58.00	-13.00	45.00

Note.

1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 4/66Frequency(MHz) : 1 711.5Channel : 19965Bandwidth(MHz) : 3**Horizontal/Vertical for 1 GHz ~ 3 GHz****Horizontal/Vertical for 3 GHz ~ 18 GHz**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 423.21	H	7.90	7.43	-50.57	-50.10	-13.00	37.10
	5 135.20	V	9.30	10.83	-43.77	-45.30	-13.00	32.30
	6 846.55	V	11.10	12.75	-54.45	-56.10	-13.00	43.10
	8 557.90	V	13.00	14.12	-51.48	-52.60	-13.00	39.60

Note.

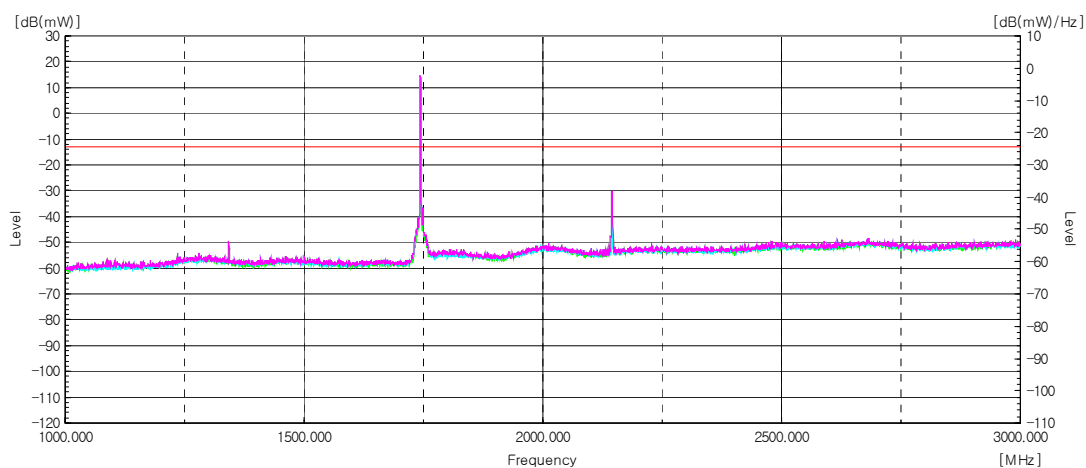
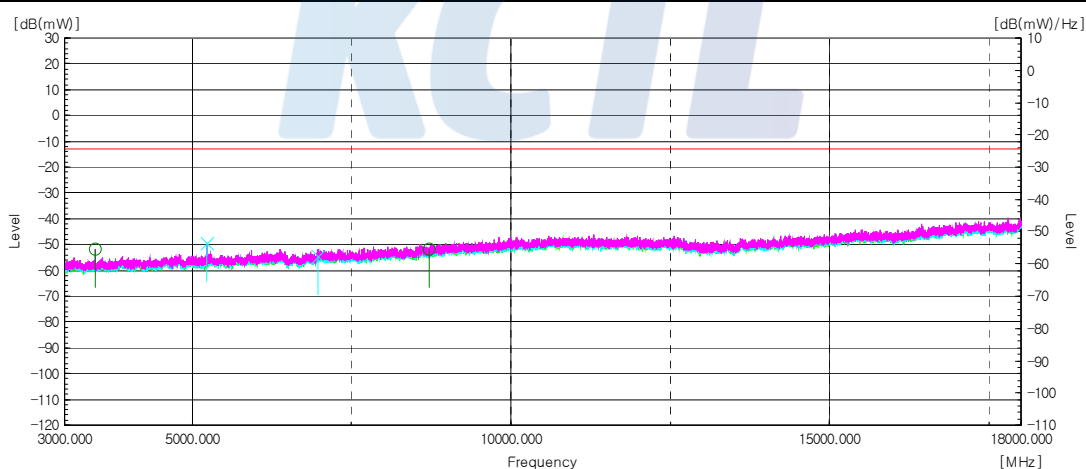
1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 4/66

Frequency(MHz) : 1 745.0

Channel : 132322

Bandwidth(MHz) : 3

Horizontal/Vertical for 1 GHz ~ 3 GHz**Horizontal/Vertical for 3 GHz ~ 18 GHz**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 490.23	H	8.00	7.53	-52.47	-52.00	-13.00	39.00
	5 235.41	V	9.50	10.90	-48.30	-49.70	-13.00	36.70
	6 980.60	V	10.80	13.01	-52.29	-54.50	-13.00	41.50
	8 725.78	H	12.90	14.46	-50.04	-51.60	-13.00	38.60

Note.

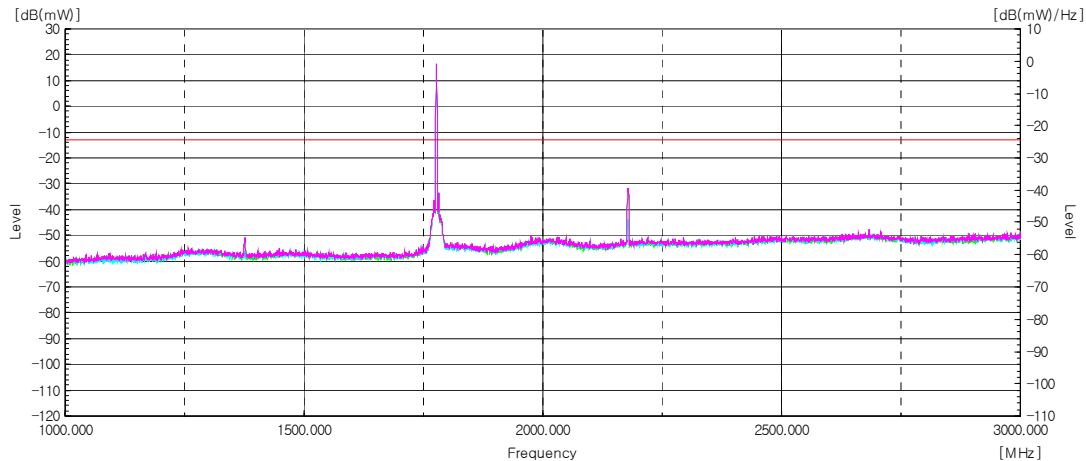
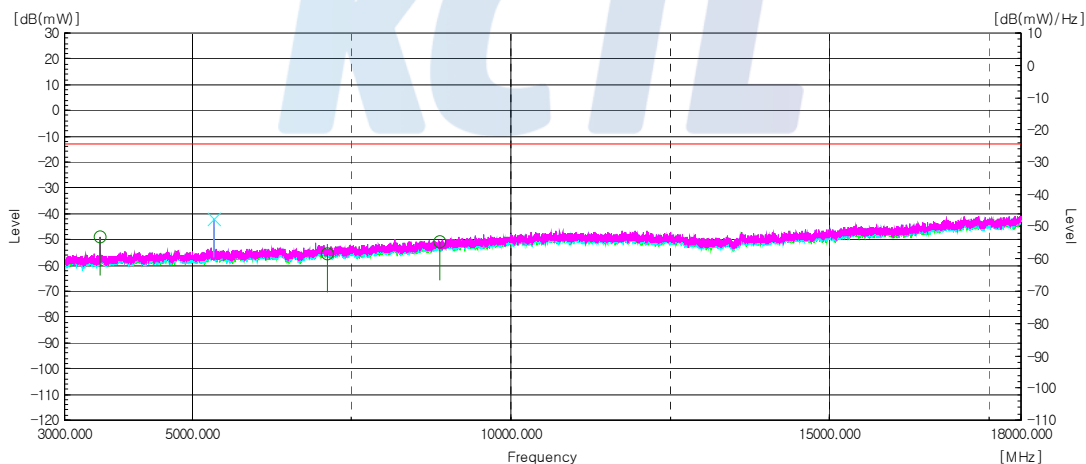
1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 4/66

Frequency(MHz) : 1 778.5

Channel : 132657

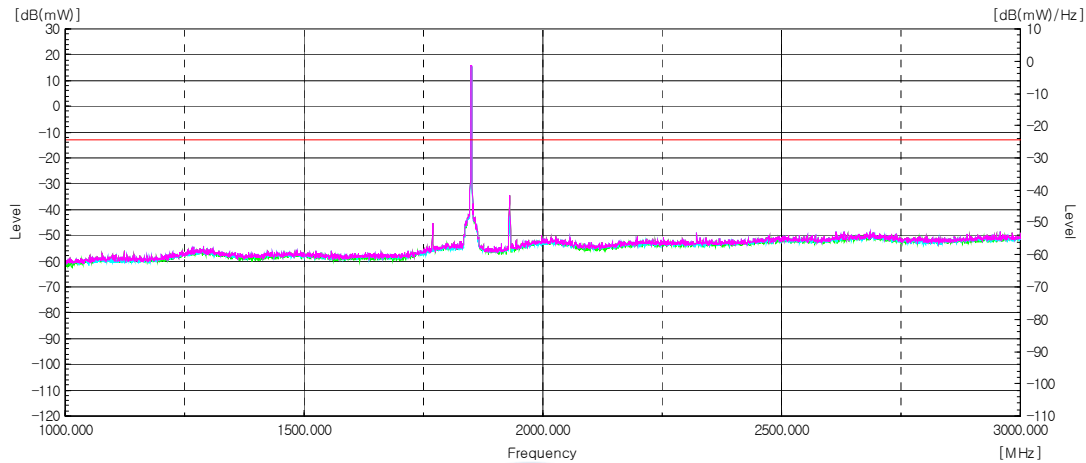
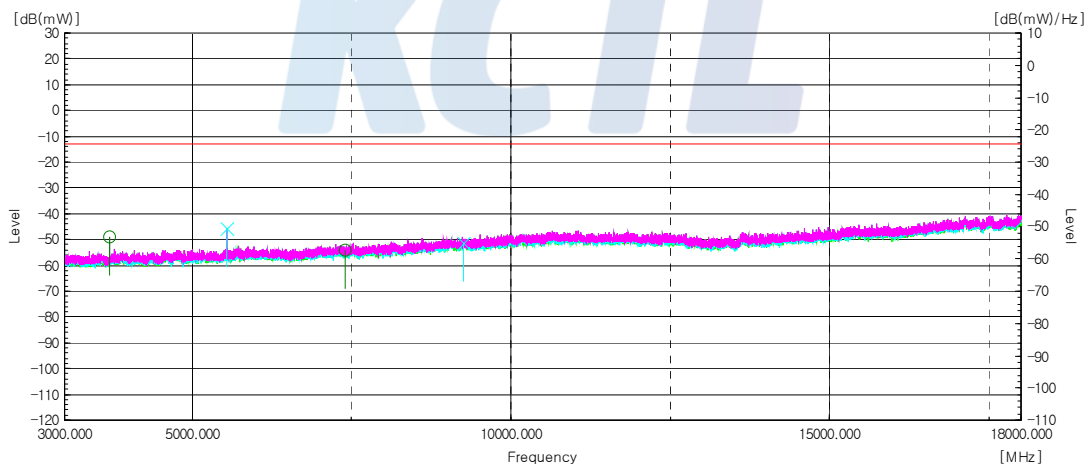
Bandwidth(MHz) : 3

Horizontal/Vertical for 1 GHz ~ 3 GHz**Horizontal/Vertical for 3 GHz ~ 18 GHz**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 557.26	H	8.20	8.41	-48.69	-48.90	-13.00	35.90
	5 335.63	V	10.00	11.17	-40.93	-42.10	-13.00	29.10
	7 114.64	H	10.80	13.45	-52.95	-55.60	-13.00	42.60
	8 891.74	H	12.90	14.61	-49.29	-51.00	-13.00	38.00

Note.

1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 2/25Frequency(MHz) : 1 850.7Channel : 18607Bandwidth(MHz) : 1.4**Horizontal/Vertical for 1 GHz ~ 3 GHz****Horizontal/Vertical for 3 GHz ~ 18 GHz**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 700.24	H	8.30	9.19	-48.11	-49.00	-13.00	36.00
	5 550.75	V	10.30	11.50	-44.60	-45.80	-13.00	32.80
	7 402.53	H	11.80	13.59	-52.51	-54.30	-13.00	41.30
	9 253.67	V	13.00	14.59	-49.91	-51.50	-13.00	38.50

Note.

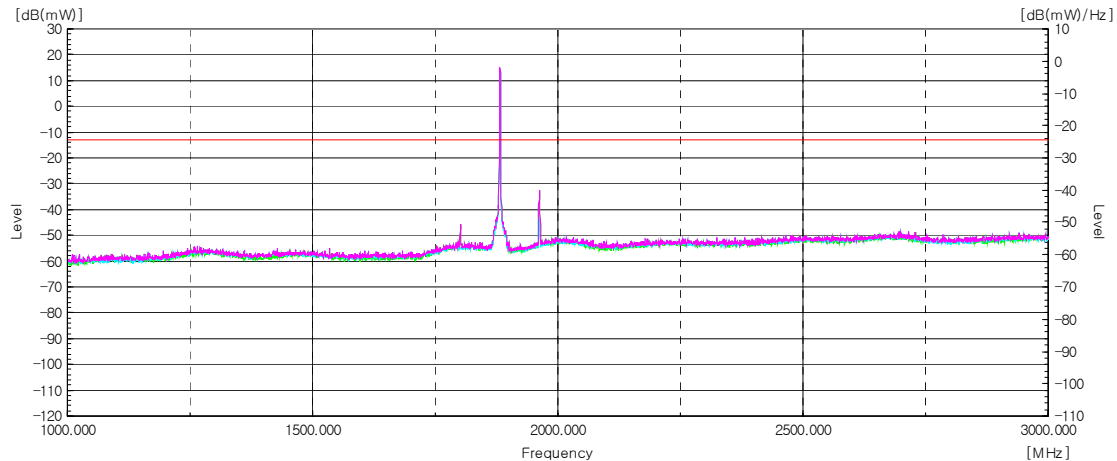
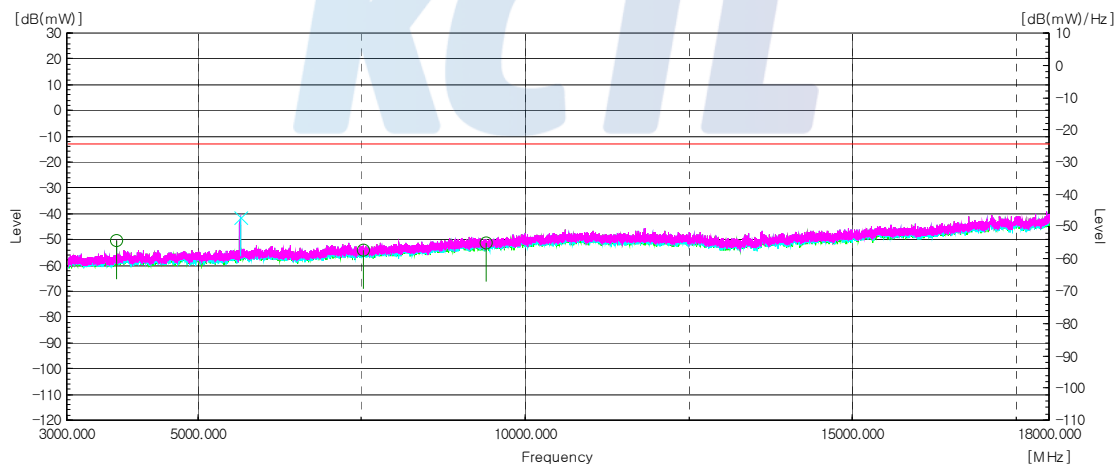
1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 2/25

Frequency(MHz) : 1 882.5

Channel : 26365

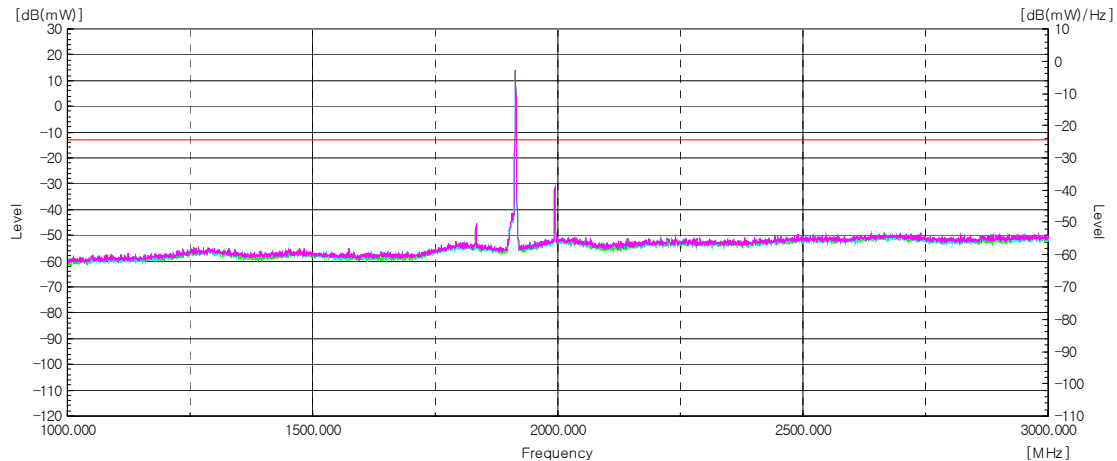
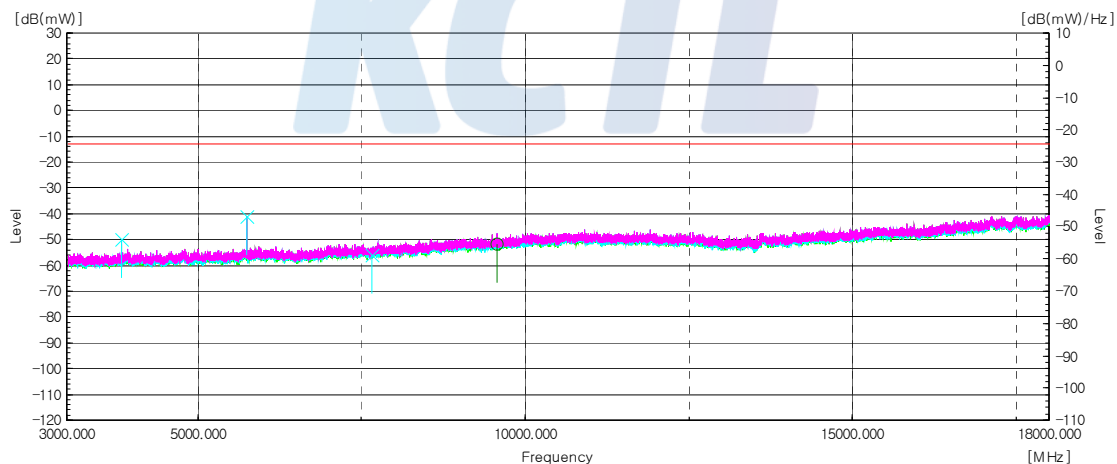
Bandwidth(MHz) : 1.4

Horizontal/Vertical for 1 GHz ~ 3 GHz**Horizontal/Vertical for 3 GHz ~ 18 GHz**

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 764.08	H	8.10	9.21	-49.39	-50.50	-13.00	37.50
	5 645.86	V	10.40	11.49	-40.51	-41.60	-13.00	28.60
	7 530.83	H	12.00	13.59	-52.51	-54.10	-13.00	41.10
	9 412.61	H	13.00	14.69	-49.51	-51.20	-13.00	38.20

Note.

1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test mode : LTE Band 2/25Frequency(MHz) : 1 914.3Channel : 26683Bandwidth(MHz) : 1.4**Horizontal/Vertical for 1 GHz ~ 3 GHz****Horizontal/Vertical for 3 GHz ~ 18 GHz**

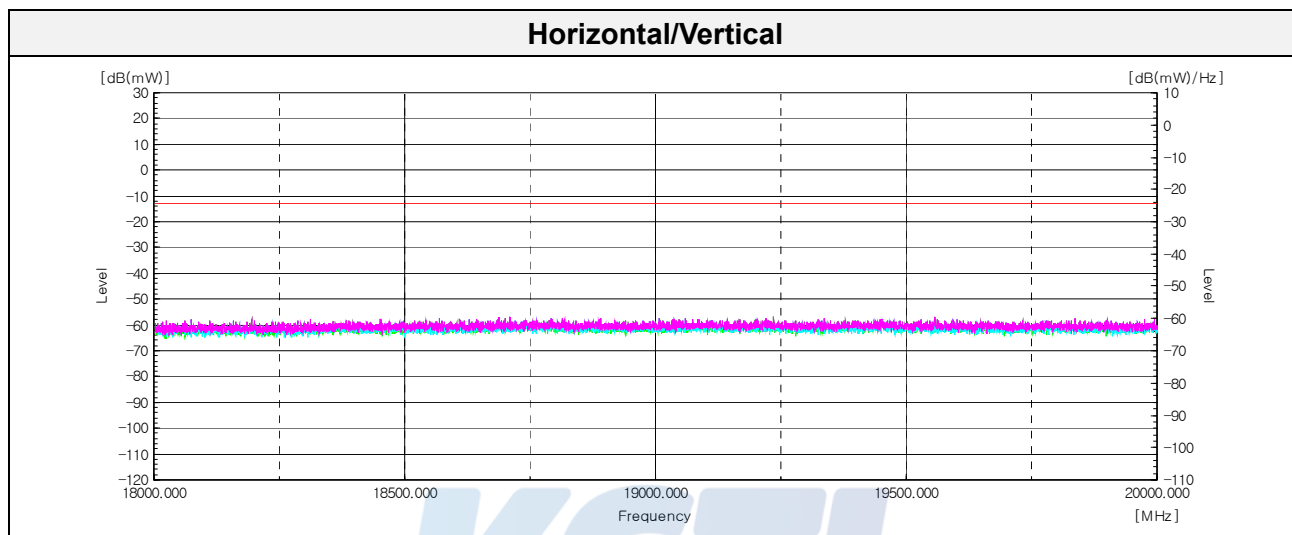
Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 827.27	V	9.10	9.21	-49.69	-49.80	-13.00	36.80
	5 741.61	V	10.40	11.54	-40.06	-41.20	-13.00	28.20
	7 657.22	V	12.10	13.56	-54.34	-55.80	-13.00	42.80
	9 571.56	H	12.90	14.94	-49.76	-51.80	-13.00	38.80

Note.

1. Limit Calculation(dBm)= 43 + 10log(P_[Watts])

Test results (Above 18 GHz to 20 GHz) – Worst case

Test mode : LTE Band 2/25
Frequency (MHz) : 1882.5
Channel : 26365
Bandwidth(MHz) : 1.4

**Note.**

1. No spurious emissions were detected above 18GHz.

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R & S	FSV30	100810	19.08.01
Spectrum Analyzer	AGILENT	N9040B	MY57010132	19.10.12
Signal Generator	R&S	SMB100A	176206	20.01.25
Power Divider	Aeroflex/ Weinschel, Inc.	1580-1	NX380	20.08.01*
DC Power Supply	Agilent	E3632A	MY40018781	20.05.13
Wideband Radio Communication Tester	R & S	CMW500	141780	20.01.25
Radio Communication Analyzer	Anritsu	MT8820C	6201010005	20.07.31*
High pass Filter	Wainwright Instruments GmbH	WHKX3.0/18G- 12SS	44	20.01.25
High pass Filter	Wainwright Instruments GmbH	WHKX1.0/1.5S- 10SS	14	20.01.25
Attenuator	Weinschel ENGINEERING	10	AJ1239	20.05.14
Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA9117	275	20.04.13
Horn Antenna	ETS.lindgren	3117	00161083	19.09.19
Horn Antenna	ETS.lindgren	3116	00086635	20.05.09
Horn Antenna	ETS.lindgren	3116	00086632	20.02.15
Horn Antenna	ETS.lindgren	3117	161225	20.05.22
Bilog Antenna	Teseq GmbH	CBL 6143A	35039	21.05.21
Amplifier	SONOMA INSTRUMENT	317	321041	20.01.04
Amplifier	L-3 Narda-MITEQ	AFS5-00101800-25- S-5	2054571	20.02.21
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33- 8P	2000997	20.08.01*
Antenna Mast	MATURO	EAS 1.5	042/8941211	N/A
Antenna Mast	MATURO	EAS 1.5	043/8941211	N/A
Turn Table	MATURO	TT 0.8 PF	041/8941211	N/A
Cable Assembly	Radiall	R286303620	1649.241	N/A
Cable Assembly	Radiall	TESTPRO 3	N/A	N/A

*The equipment was used after finished calibration.

End of test report