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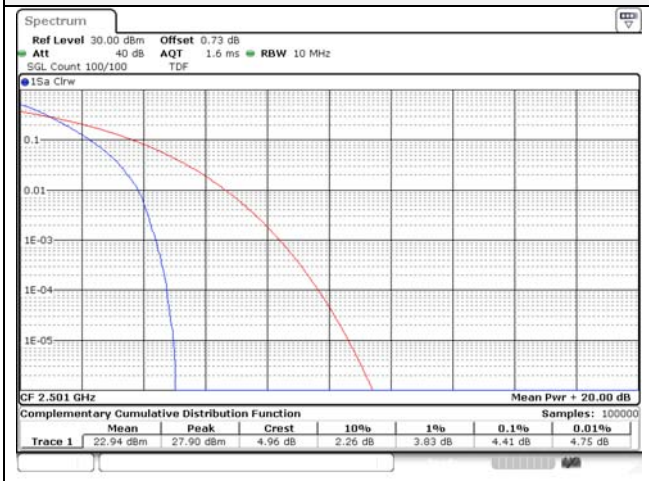
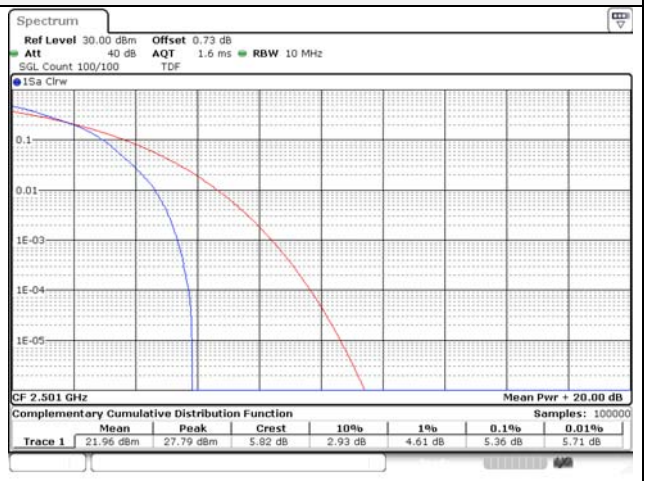


10M BW 16QAM Low ch.



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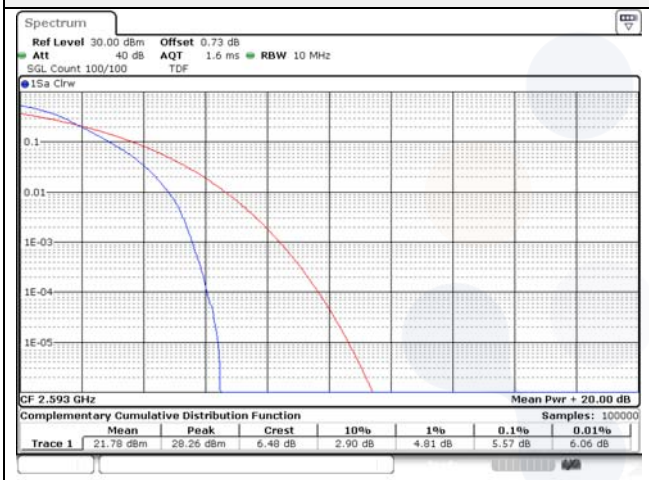

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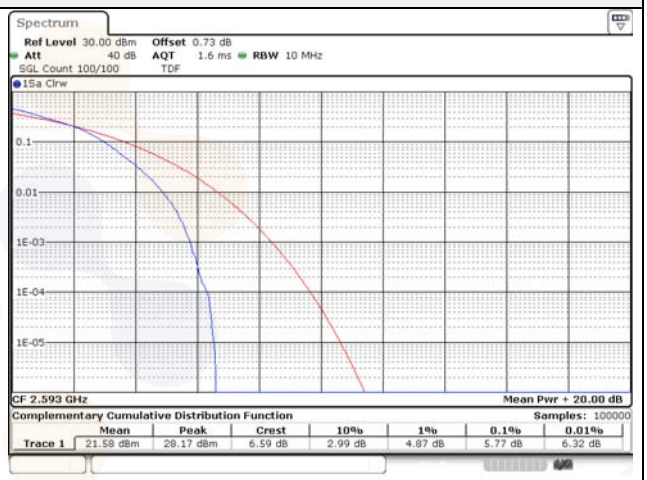

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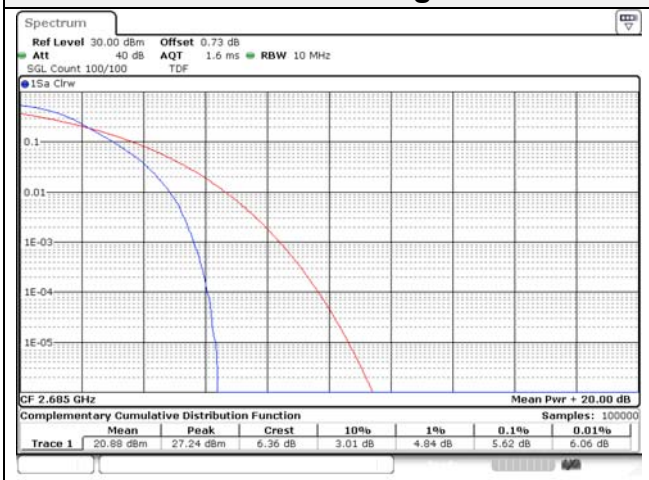

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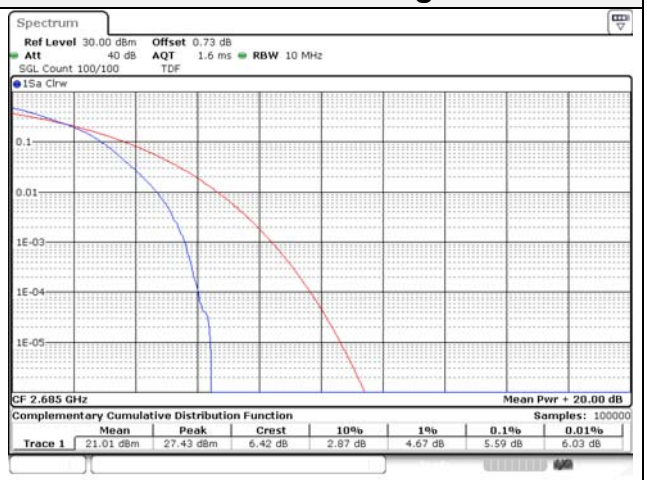
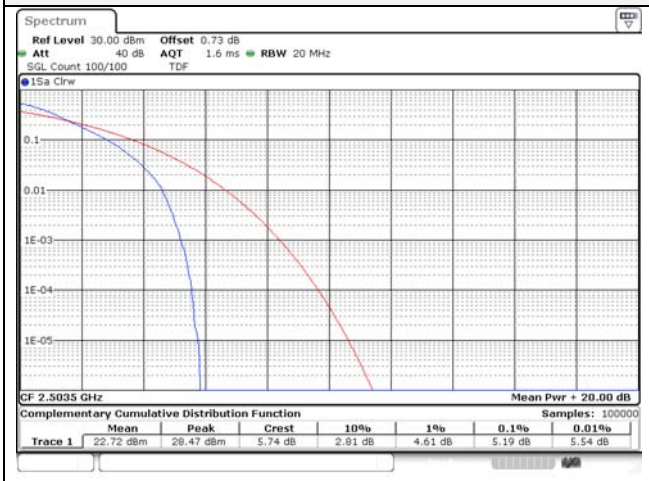
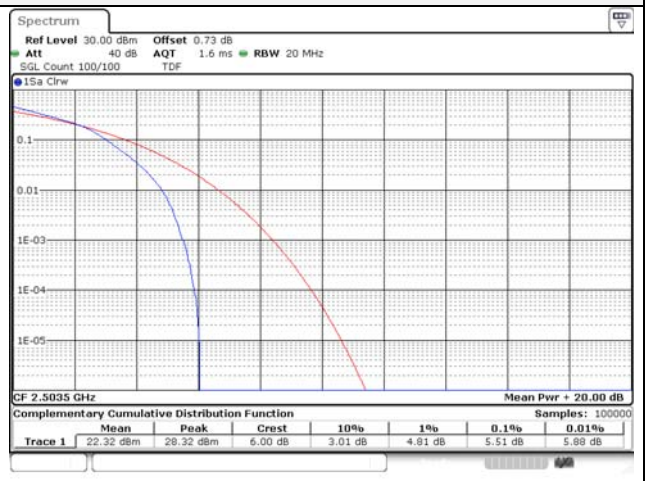


15M BW QPSK Low ch.	15M BW 16QAM Low ch.
	
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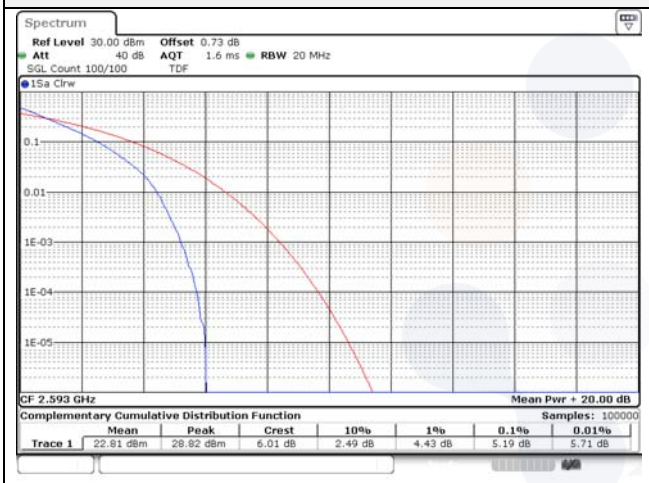	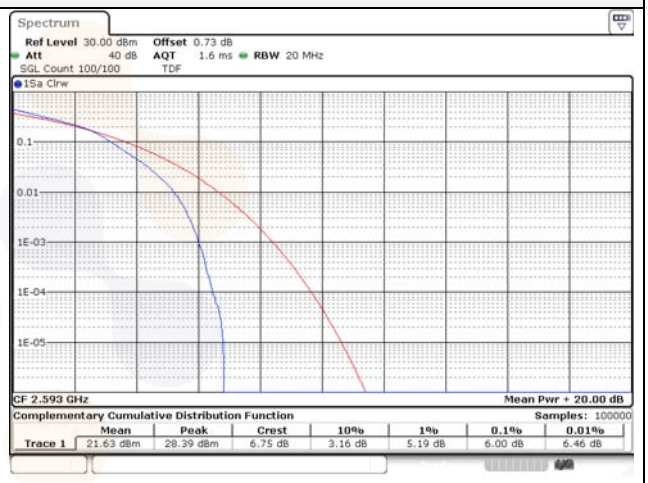
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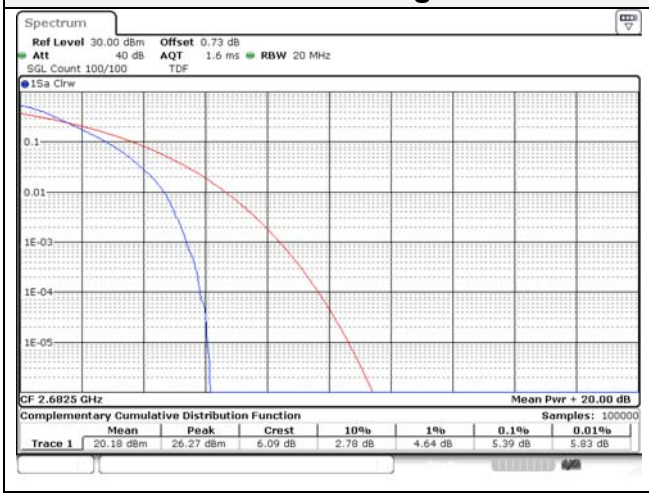	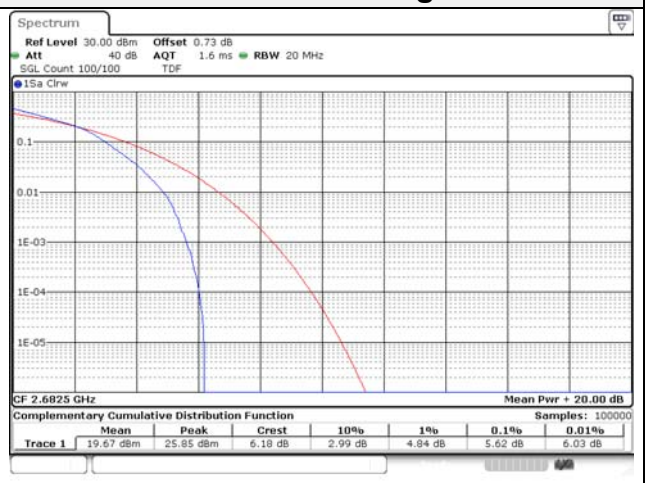

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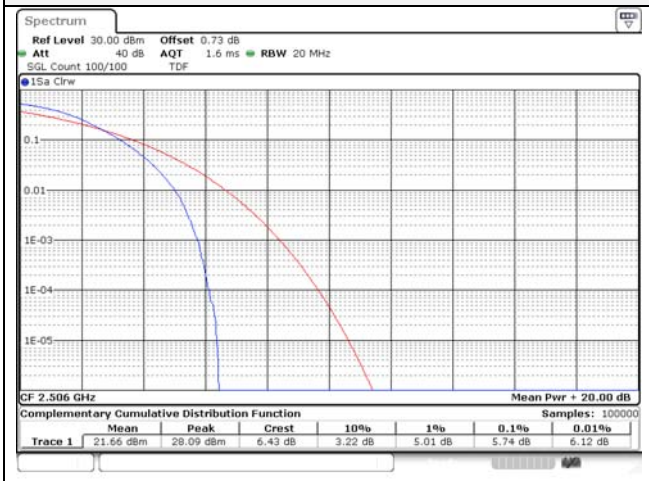

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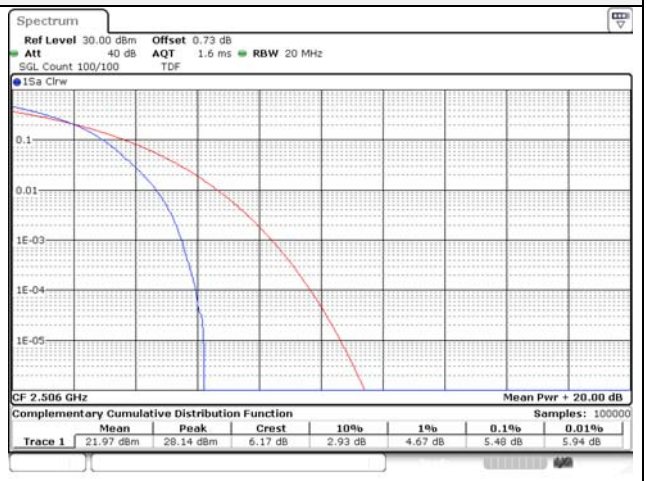

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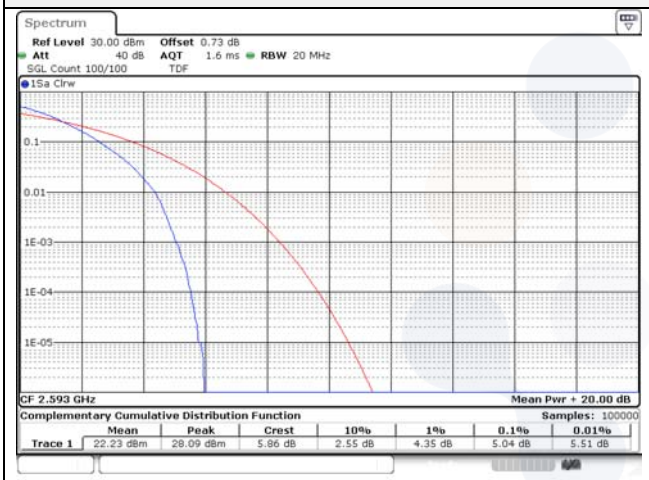

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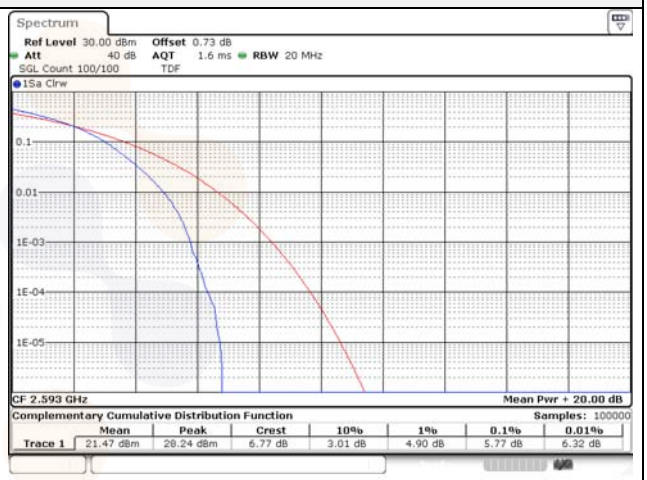

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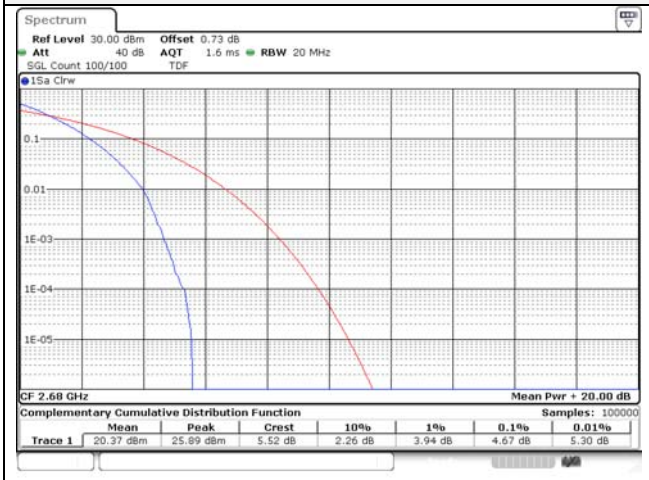

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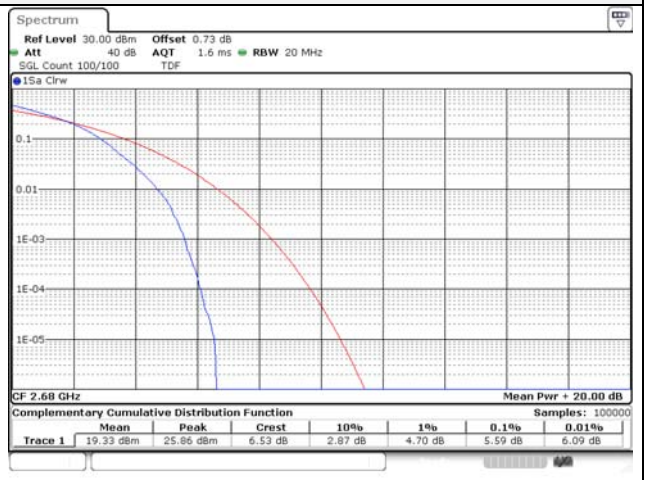
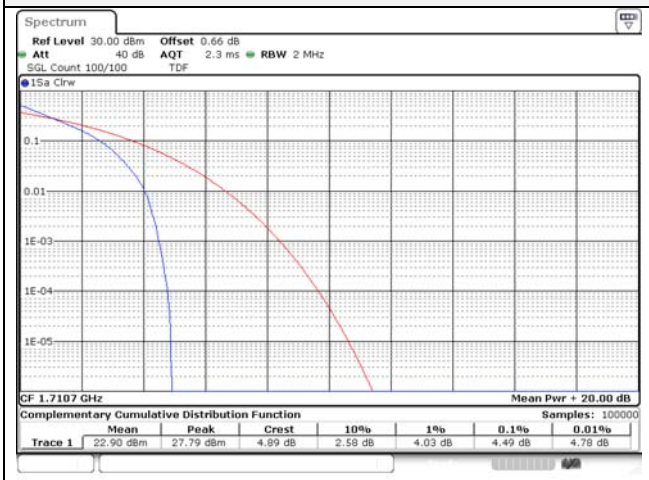


Test mode: LTE Band 66/4

1.4M BW QPSK Low ch.



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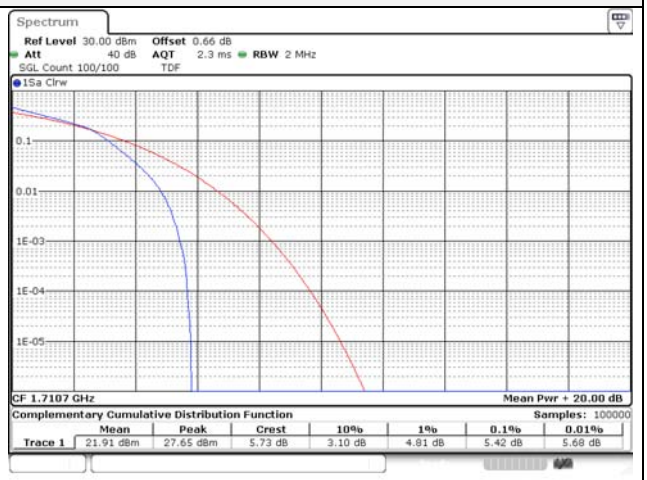

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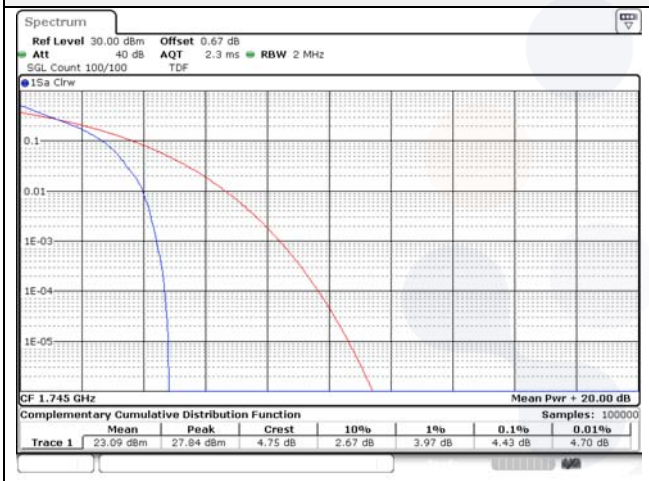

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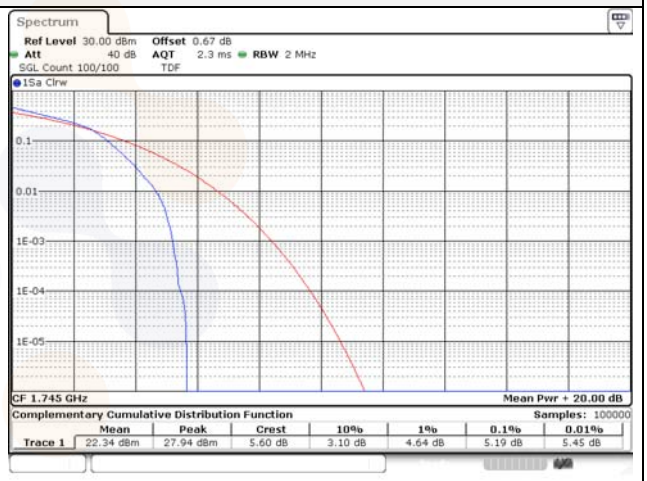

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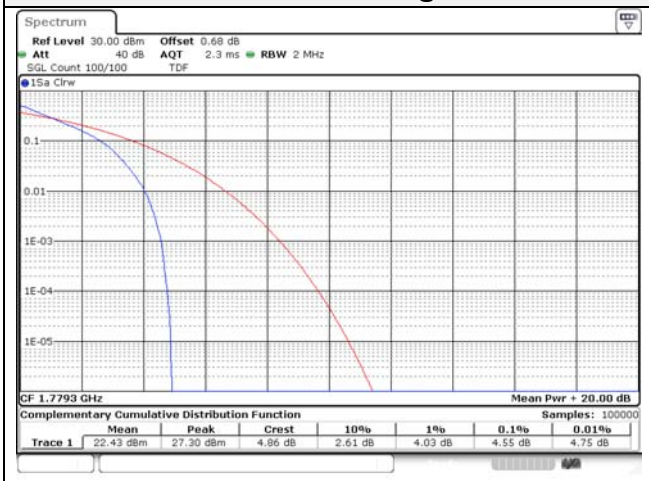

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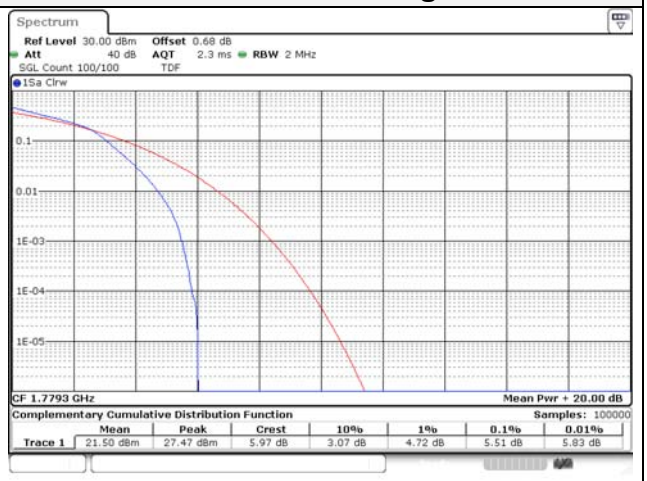
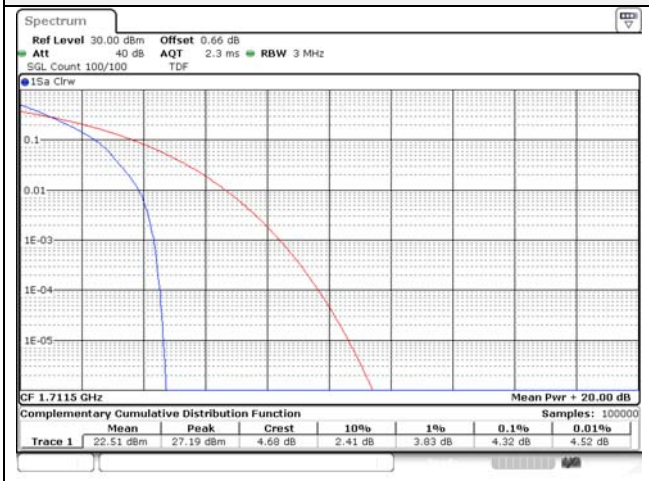
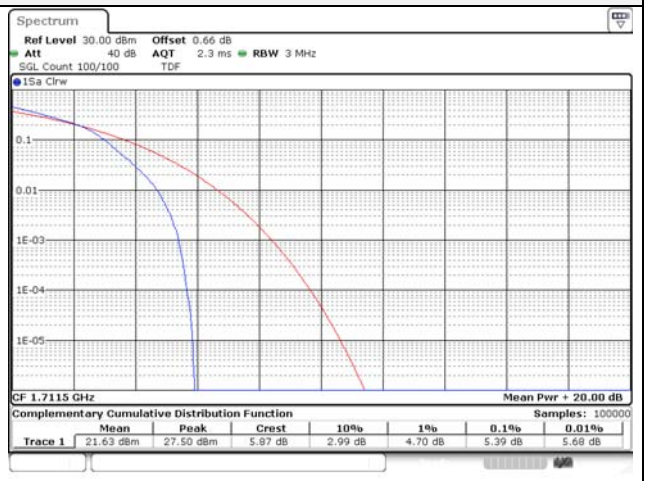


3M BW QPSK Low ch.



3M BW 16QAM Low ch.



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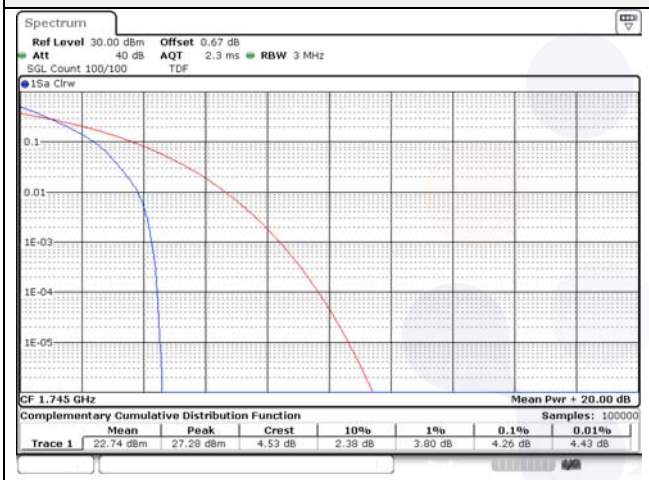

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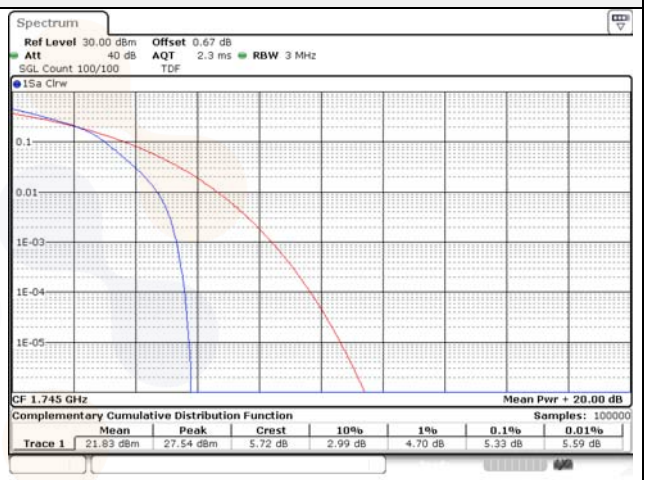

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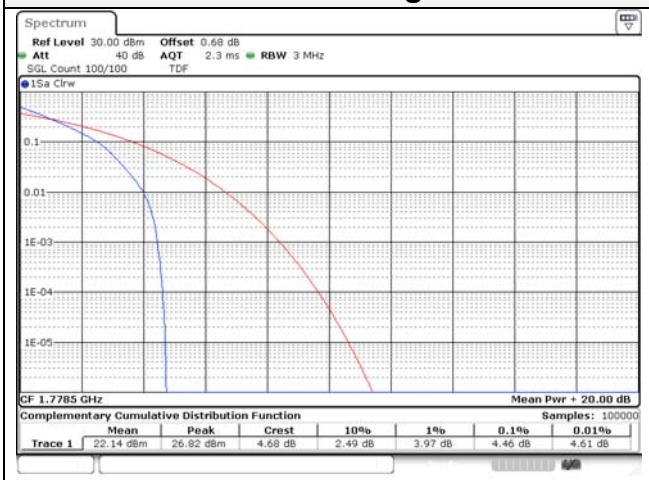

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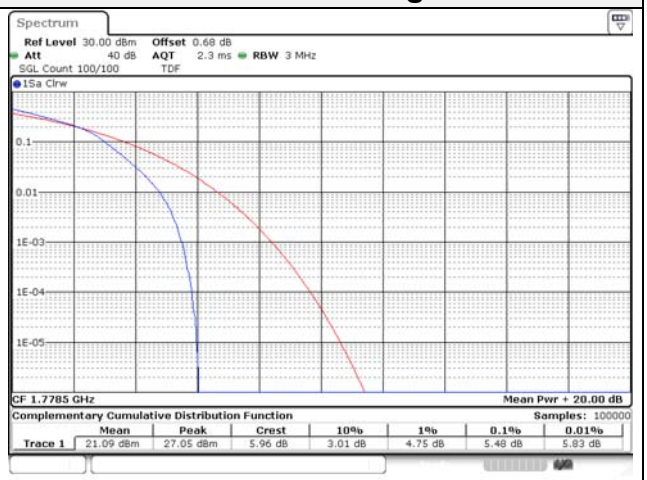

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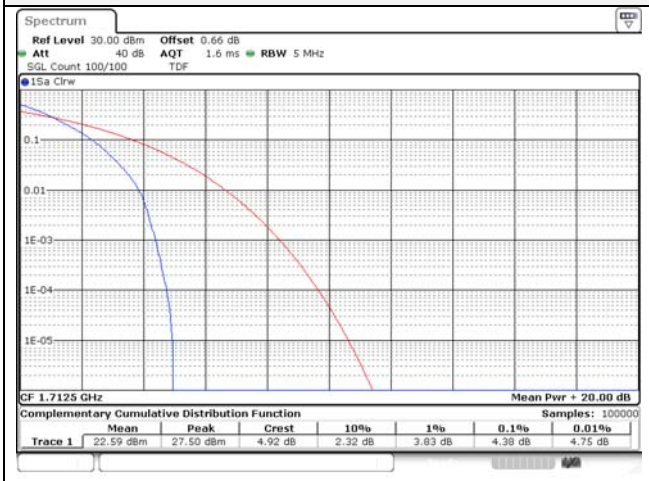

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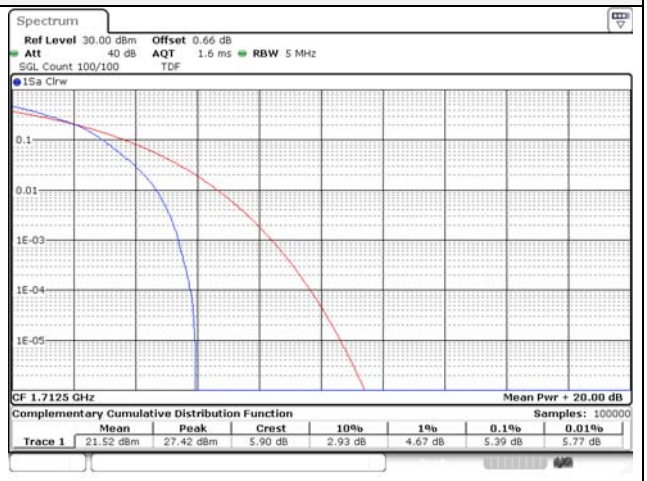

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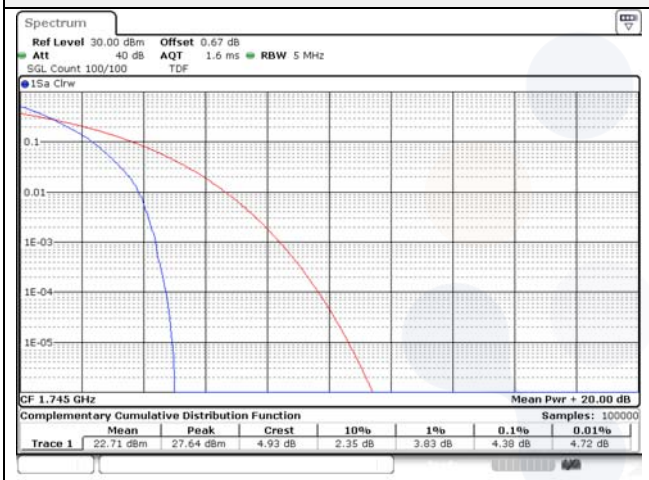

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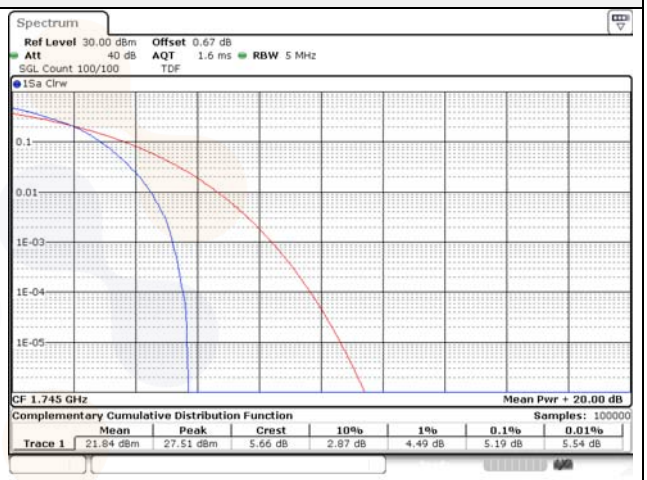

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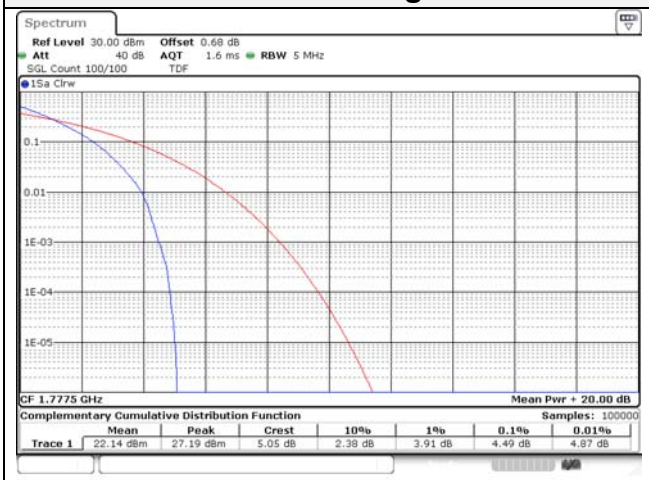

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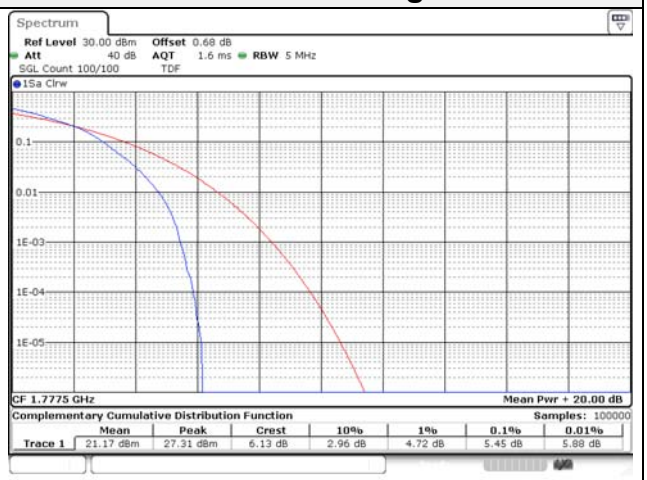

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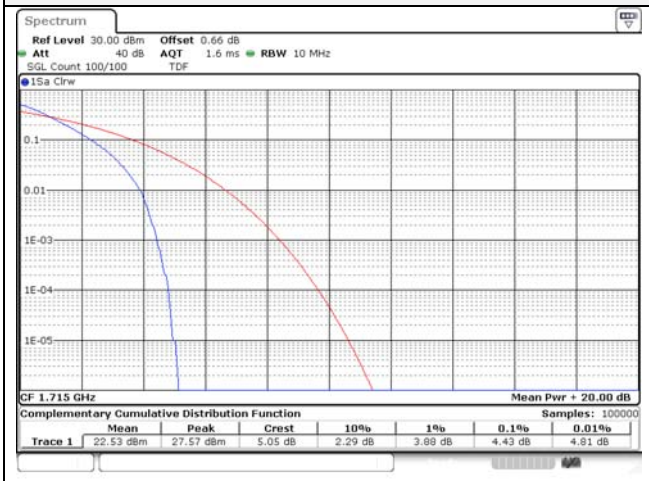

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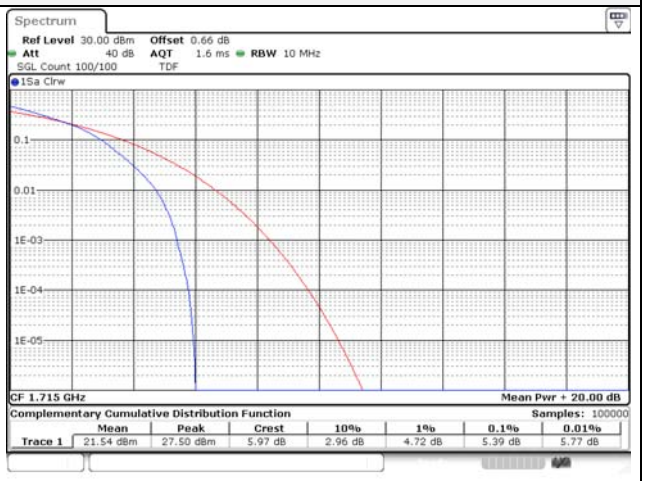

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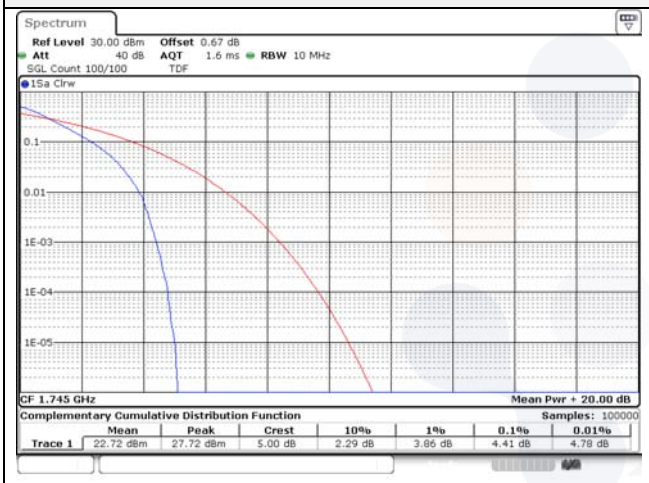

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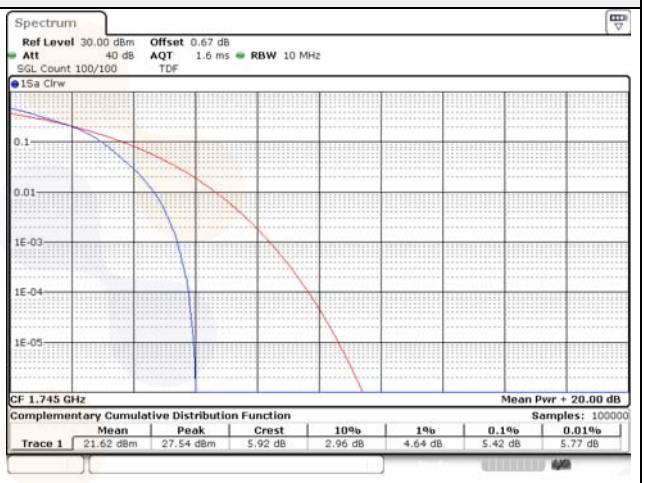

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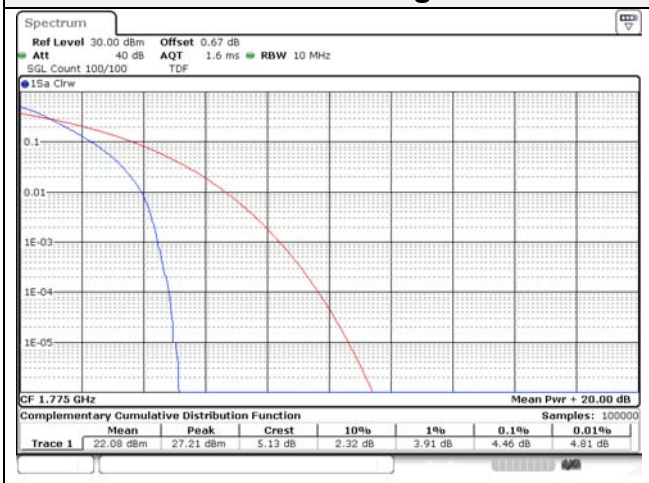

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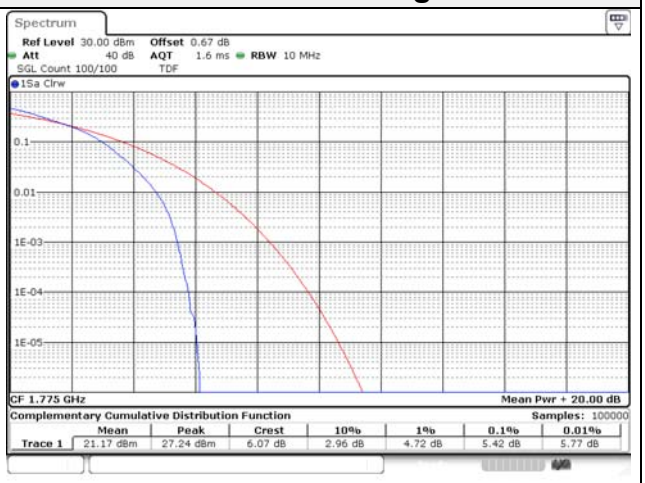

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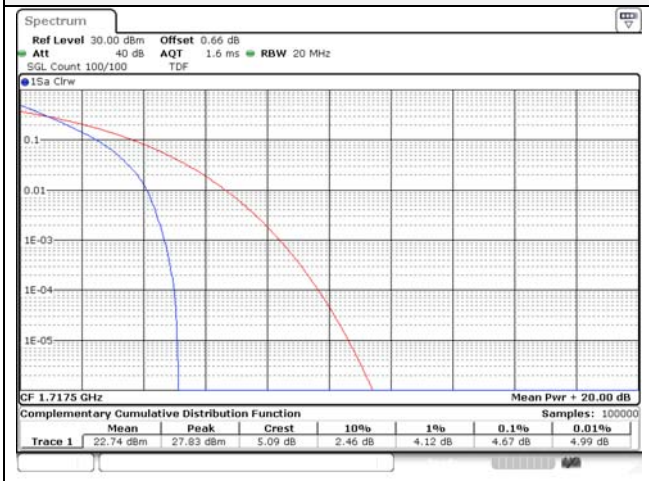

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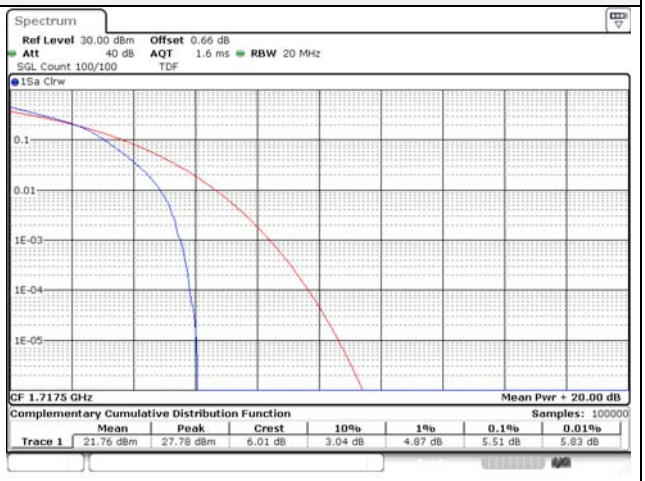

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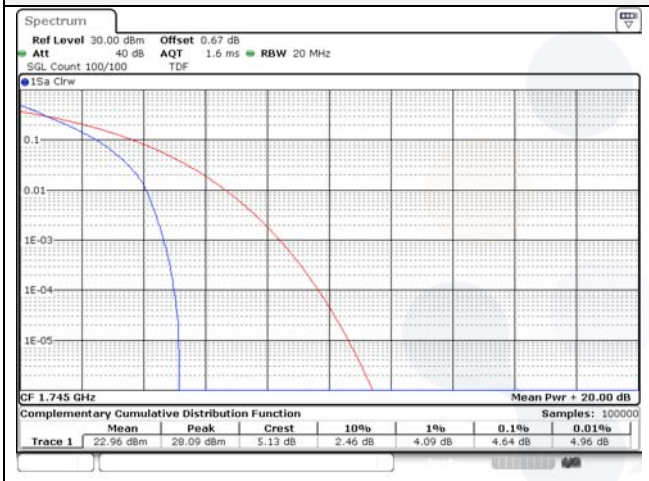

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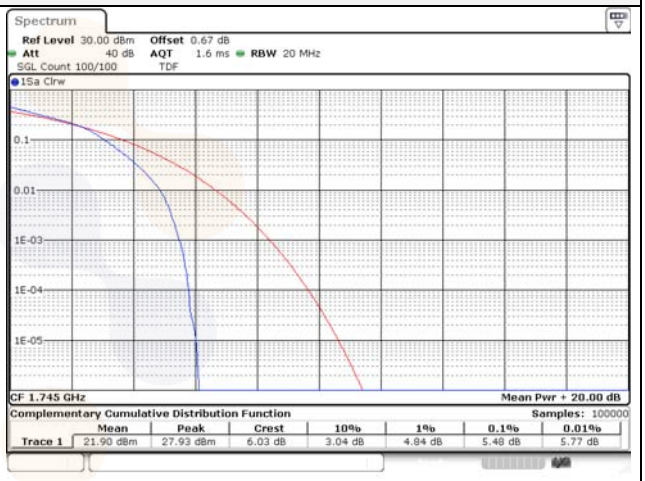

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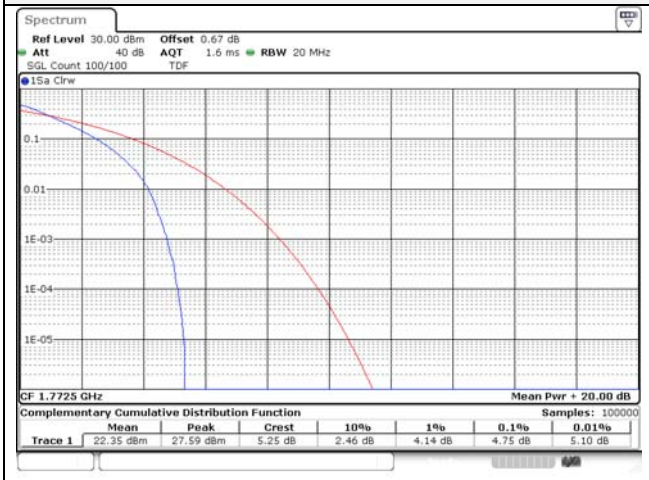

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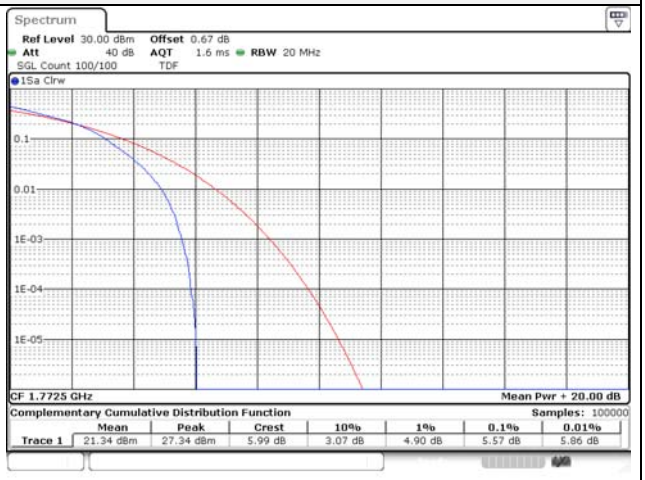

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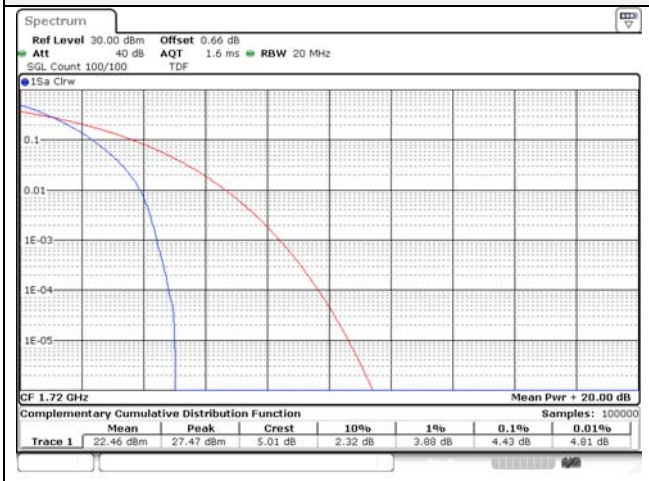

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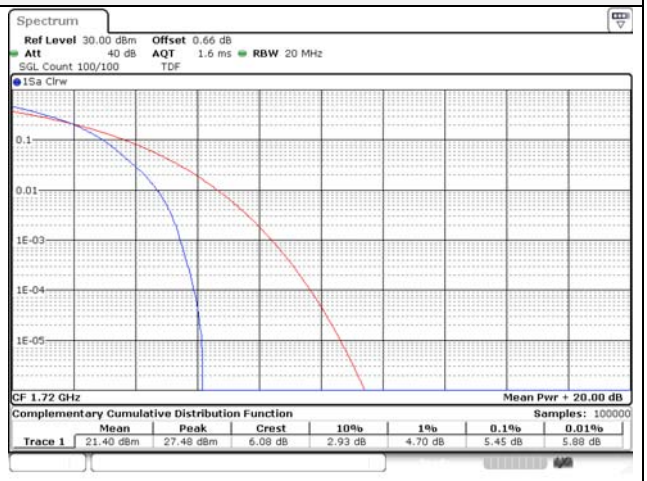

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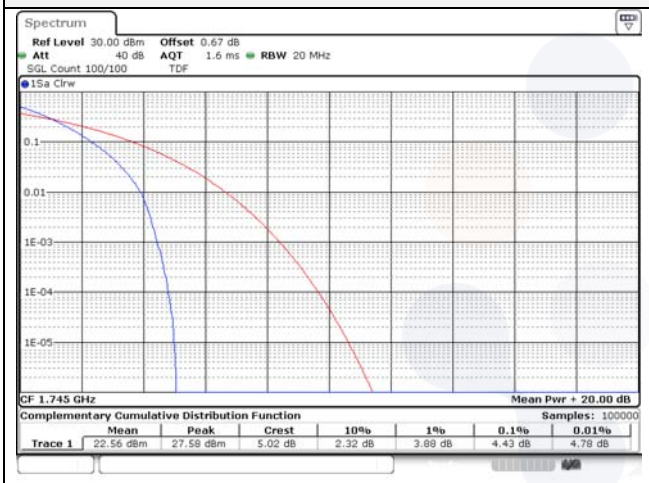

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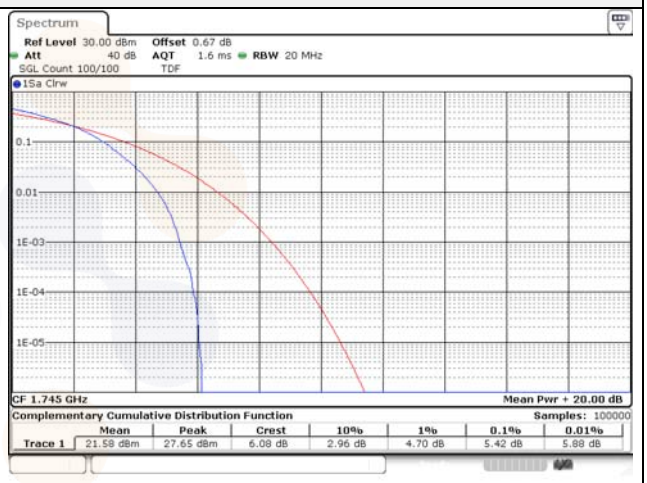

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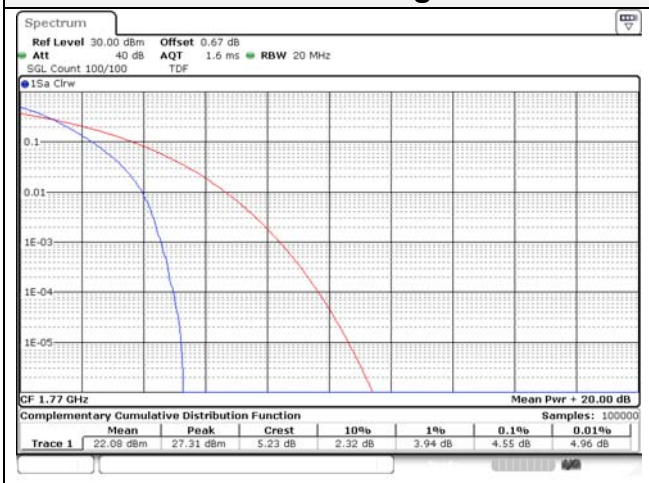
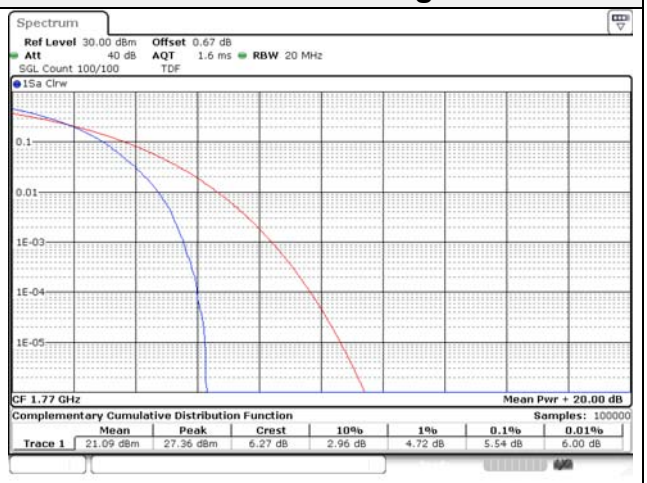
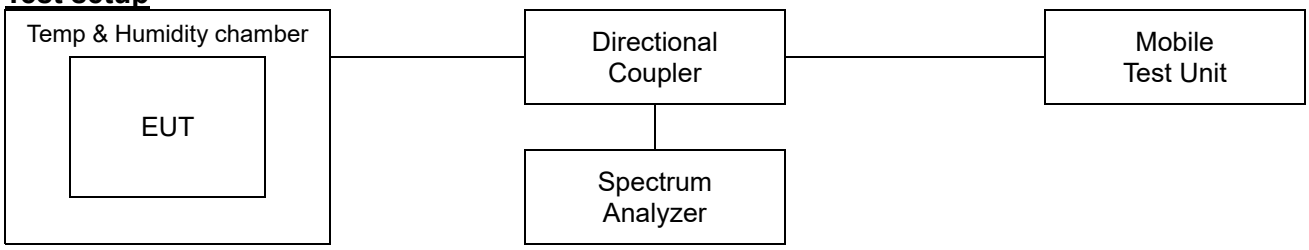


20M BW 16QAM High ch.



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 ㎒ 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,

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 ㎒ 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,
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,
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

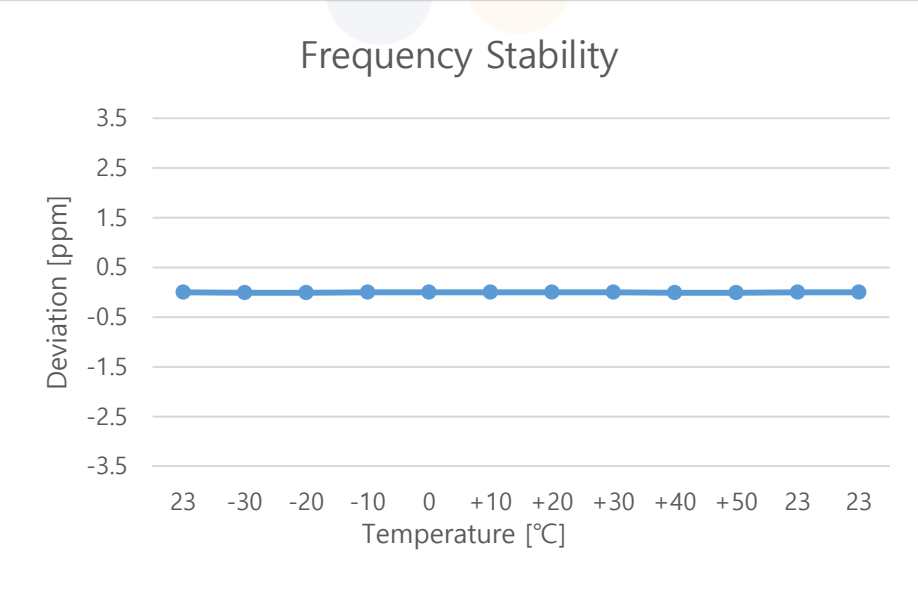
Test procedure
ANSI 63.26-2015 – Section 5.6

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

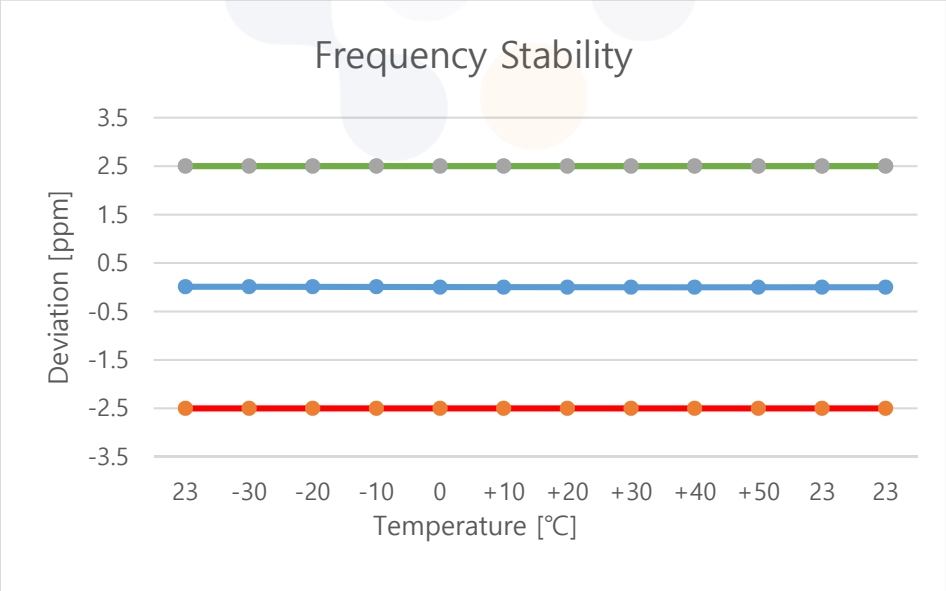
Test mode : LTE Band 2
Frequency (㎐) : 1 880 000 000
Channel : 18900
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	1,880,000,001	-1.49	0.0	0.000000
		30	1,880,000,004	-4.17	0.0	0.000000
		-20	1,880,000,004	-4.33	0.0	0.000000
		-10	1,880,000,002	-2.08	0.0	0.000000
		0	1,880,000,001	-1.39	0.0	0.000000
		+10	1,880,000,001	-1.05	0.0	0.000000
		+20	1,880,000,002	-2.11	0.0	0.000000
		+30	1,880,000,003	-2.69	0.0	0.000000
		+40	1,880,000,003	-3.38	0.0	0.000000
		+50	1,880,000,003	-3.46	0.0	0.000000
115%	8.88	+23(Ref)	1,880,000,002	-1.96	0.0	0.000000
End point	7.00	+23(Ref)	1,880,000,003	-3.08	0.0	0.000000



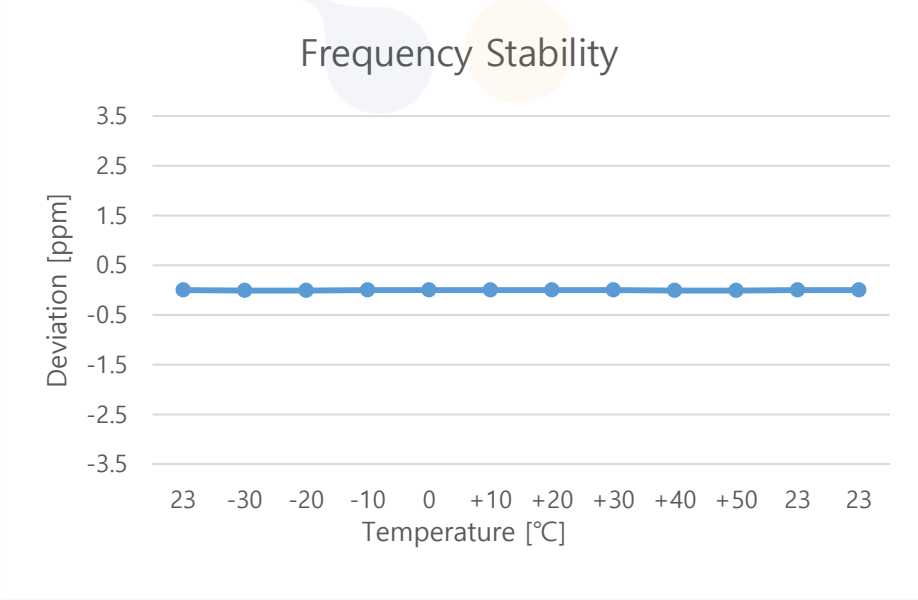
Test mode : LTE Band 5
Frequency (㎐) : 836 500 000
Channel : 20525
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	836,500,004	-4.43	0.0	0.000001
		30	836,500,005	-5.48	0.0	0.000001
		-20	836,500,004	-4.39	0.0	0.000001
		-10	836,500,005	-5.08	0.0	0.000001
		0	836,500,003	-2.64	0.0	0.000000
		+10	836,500,001	-1.11	0.0	0.000000
		+20	836,500,002	-2.25	0.0	0.000000
		+30	836,500,003	-3.08	0.0	0.000000
		+40	836,500,003	-3.31	0.0	0.000000
		+50	836,500,003	-3.18	0.0	0.000000
115%	8.88	+23(Ref)	836,500,002	-2.47	0.0	0.000000
End point	7.00	+23(Ref)	836,500,002	-1.95	0.0	0.000000



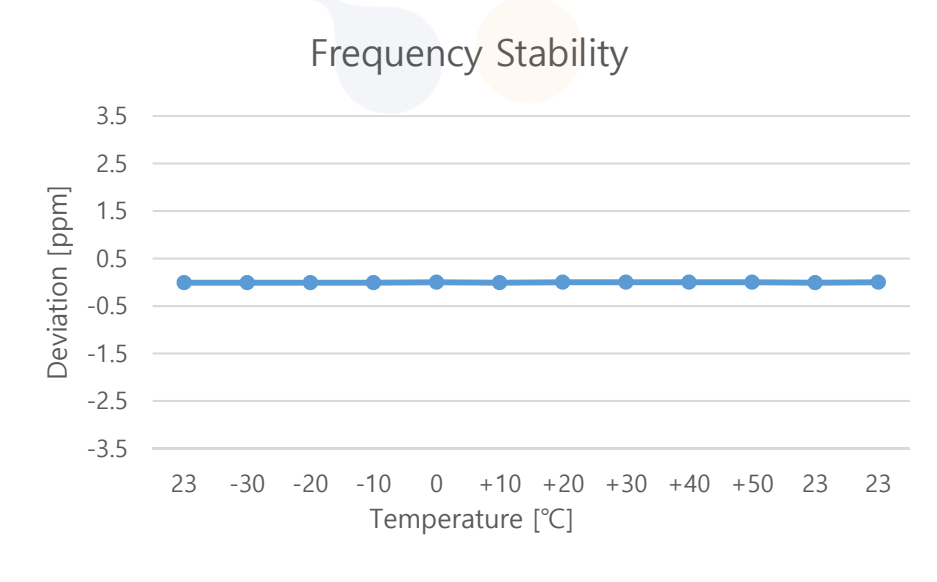
Test mode : LTE Band 12/17
Frequency (㎐) : 707 500 000
Channel : 23095
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	707,500,000	0.24	0.0	0.000000
		30	707,499,993	7.19	0.0	-0.000001
		-20	707,499,994	5.54	0.0	-0.000001
		-10	707,499,998	1.88	0.0	0.000000
		0	707,499,998	2.22	0.0	0.000000
		+10	707,499,998	2.09	0.0	0.000000
		+20	707,499,999	1.06	0.0	0.000000
		+30	707,499,998	2.44	0.0	0.000000
		+40	707,499,996	4.39	0.0	-0.000001
		+50	707,499,996	3.88	0.0	-0.000001
115%	8.88	+23(Ref)	707,499,999	0.93	0.0	0.000000
End point	7.00	+23(Ref)	707,499,998	1.89	0.0	0.000000



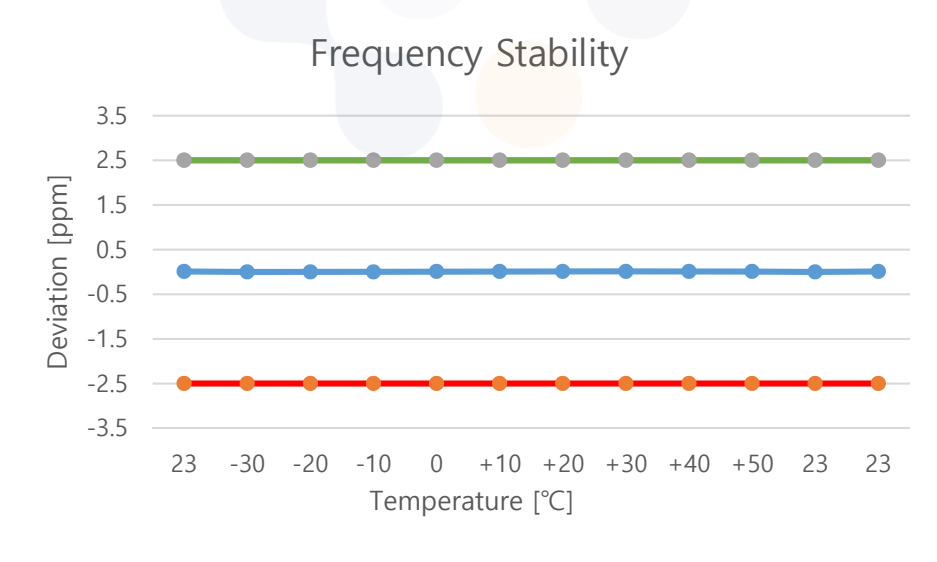
Test mode : LTE Band 13
Frequency (㎐) : 782 000 000
Channel : 23230
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	781,999,996	4.36	0.0	-0.000001
		30	781,999,992	8.01	0.0	-0.000001
		-20	781,999,992	7.69	0.0	-0.000001
		-10	781,999,994	5.78	0.0	-0.000001
		0	781,999,996	3.66	0.0	0.000000
		+10	781,999,995	4.58	0.0	-0.000001
		+20	781,999,996	3.67	0.0	0.000000
		+30	781,999,998	2.28	0.0	0.000000
		+40	781,999,997	3.03	0.0	0.000000
		+50	781,999,999	1.09	0.0	0.000000
115%	8.88	+23(Ref)	781,999,995	4.94	0.0	-0.000001
End point	7.00	+23(Ref)	781,999,997	3.00	0.0	0.000000



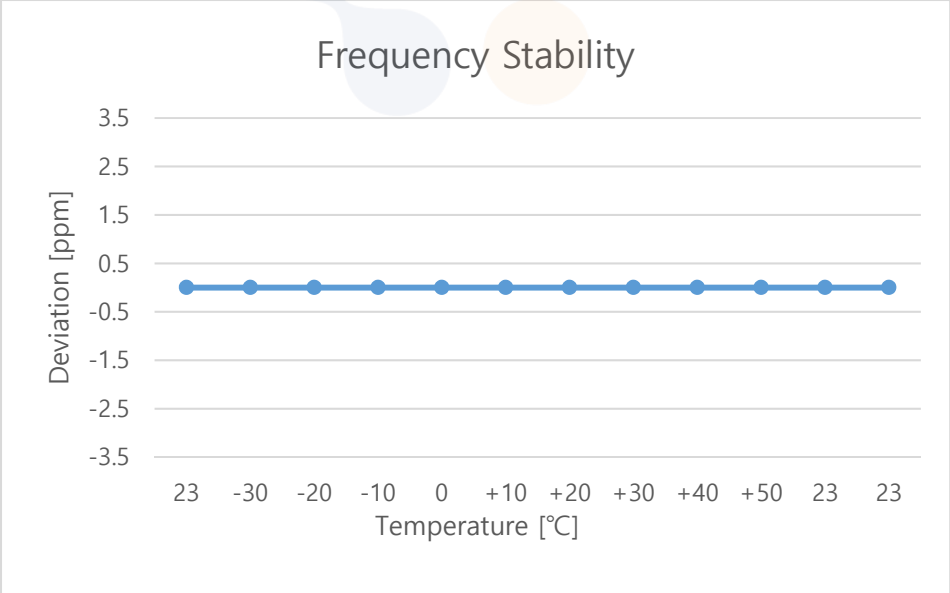
Test mode : LTE Band 26
Frequency (㎐) : 836 500 000
Channel : 26915
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	836,500,008	-7.50	0.0	0.000001
		30	836,500,003	-2.64	0.0	0.000000
		-20	836,500,001	-1.09	0.0	0.000000
		-10	836,500,003	-3.28	0.0	0.000000
		0	836,500,004	-4.44	0.0	0.000001
		+10	836,500,006	-5.58	0.0	0.000001
		+20	836,500,007	-6.66	0.0	0.000001
		+30	836,500,008	-8.09	0.0	0.000001
		+40	836,500,008	-8.19	0.0	0.000001
		+50	836,500,010	-10.08	0.0	0.000001
115%	8.88	+23(Ref)	836,500,004	-3.75	0.0	0.000000
End point	7.00	+23(Ref)	836,500,005	-5.48	0.0	0.000001



Test mode : LTE Band 41
Frequency (㎐) : 2 593 000 000
Channel : 40620
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	2,593,000,003	-3.35	0.0	0.000000
		30	2,593,000,010	-10.03	0.0	0.000000
		-20	2,593,000,008	-8.01	0.0	0.000000
		-10	2,593,000,006	-6.18	0.0	0.000000
		0	2,593,000,003	-3.44	0.0	0.000000
		+10	2,593,000,001	-1.19	0.0	0.000000
		+20	2,593,000,002	-2.09	0.0	0.000000
		+30	2,593,000,003	-2.55	0.0	0.000000
		+40	2,593,000,003	-3.49	0.0	0.000000
		+50	2,593,000,006	-5.50	0.0	0.000000
115%	8.88	+23(Ref)	2,593,000,001	-1.04	0.0	0.000000
End point	7.00	+23(Ref)	2,593,000,002	-1.82	0.0	0.000000



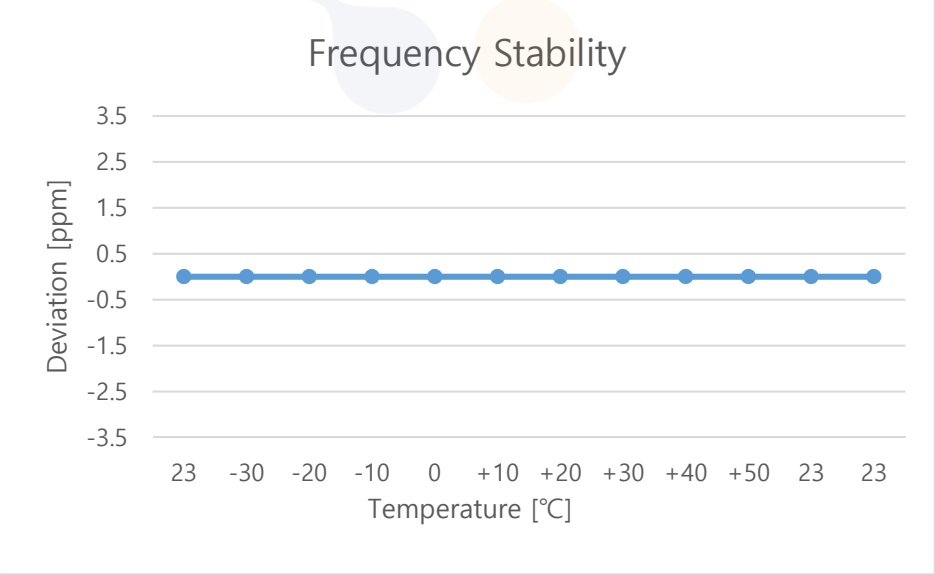
Test mode : LTE Band 66/4

Frequency (㎐) : 1 745 000 000

Channel : 132322

Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation.

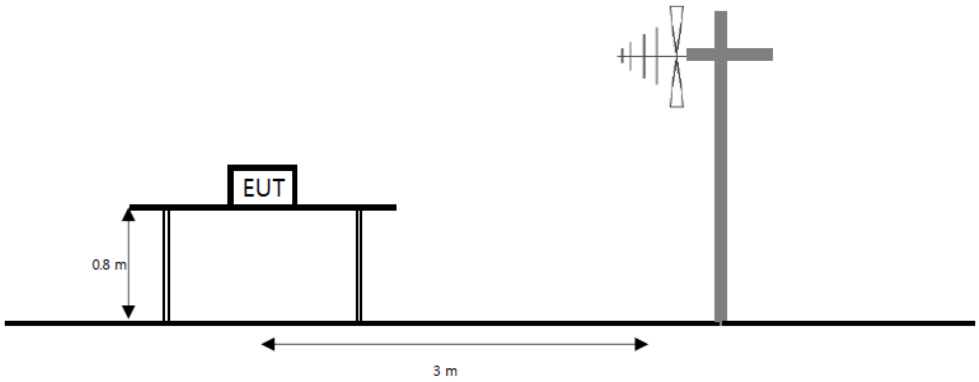
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	7.72	+23(Ref)	1,744,999,998	2.19	0.0	0.000000
		30	1,744,999,996	4.19	0.0	0.000000
		-20	1,744,999,995	5.44	0.0	0.000000
		-10	1,744,999,997	3.39	0.0	0.000000
		0	1,744,999,998	2.28	0.0	0.000000
		+10	1,744,999,999	1.37	0.0	0.000000
		+20	1,744,999,998	2.07	0.0	0.000000
		+30	1,744,999,997	3.11	0.0	0.000000
		+40	1,744,999,996	4.37	0.0	0.000000
		+50	1,744,999,995	4.66	0.0	0.000000
115%	8.88	+23(Ref)	1,744,999,998	2.26	0.0	0.000000
End point	7.00	+23(Ref)	1,744,999,999	1.42	0.0	0.000000



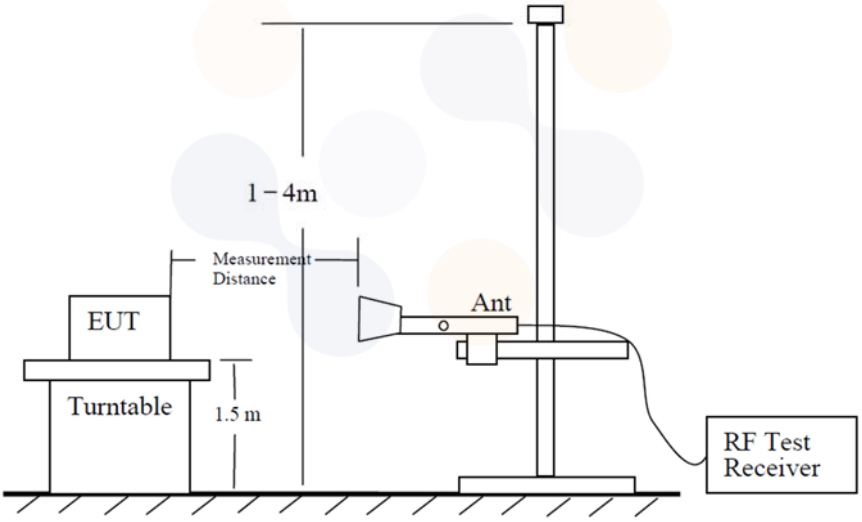
7.7. Radiated Power (ERP/EIRP)

Test setup

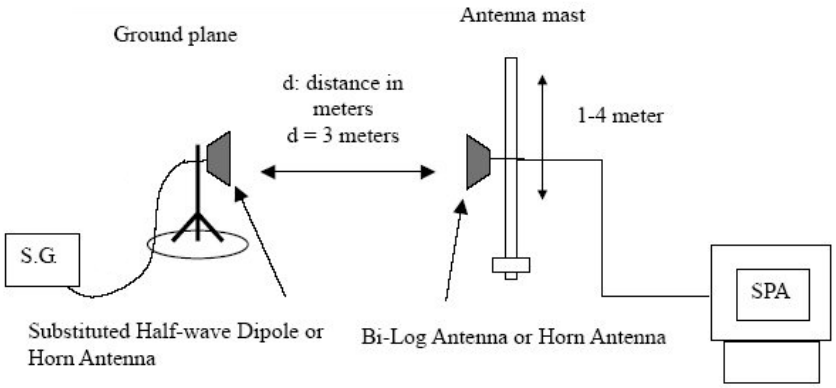
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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



The diagram below shows the test setup for substituted method.



Limit

According to §22.913(a)(5), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to §24.232(c), 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), Portable stations (hand-held devices) transmitting in the 746-757 ㎒, 776-788 ㎒, and 805-806 ㎒ bands are limited to 3 watts ERP.

According to §27.50(c)(10), Portable stations (hand-held devices) in the 600 ㎒ uplink band and the 698-746 ㎒ band, and fixed and mobile stations in the 600 ㎒ uplink band are limited to 3 watts ERP.

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

According to §27.50(h)(2), Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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 ≥ 3 × RBW.
3) SPAN = 2 × to 3 × the OBW.
4) Number of measurement points in sweep ≥ 2 × span / RBW.
5) Sweep time :
   1) Auto couple, or
   2) ≥ [10 × (number of points in sweep) × (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 or 1.5 m 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 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
   The power is calculated by the following formula;
   Pd(㏈m) = Pg(㏈m) – Cable loss (㏈) + Antenna gain (㏈)
   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 ㏈m, 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

Main Antenna
Test mode: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.7	H	5.02	7.14	25.62	23.50	0.224
		1 880.0	H	4.94	7.21	25.02	22.75	0.188
		1 909.3	H	4.85	7.31	24.88	22.42	0.175
	16QAM	1 850.7	H	5.02	7.14	24.62	22.50	0.178
		1 880.0	H	4.94	7.21	23.99	21.72	0.149
		1 909.3	H	4.85	7.31	23.94	21.48	0.141
3 M	QPSK	1 851.5	H	5.02	7.14	25.98	23.86	0.243
		1 880.0	H	4.94	7.21	25.84	23.57	0.228
		1 908.5	H	4.86	7.31	26.53	24.08	0.256
	16QAM	1 851.5	H	5.02	7.14	25.16	23.04	0.201
		1 880.0	H	4.94	7.21	24.90	22.63	0.183
		1 908.5	H	4.86	7.31	25.61	23.16	0.207
5 M	QPSK	1 852.5	H	5.01	7.14	25.73	23.60	0.229
		1 880.0	H	4.94	7.21	25.65	23.38	0.218
		1 907.5	H	4.86	7.31	25.92	23.47	0.222
	16QAM	1 852.5	H	5.01	7.14	24.86	22.73	0.187
		1 880.0	H	4.94	7.21	24.74	22.47	0.177
		1 907.5	H	4.86	7.31	25.27	22.82	0.191
10 M	QPSK	1 855.0	H	5.01	7.15	26.19	24.05	0.254
		1 880.0	H	4.94	7.21	25.56	23.29	0.213
		1 905.0	H	4.87	7.32	25.84	23.39	0.218
	16QAM	1 855.0	H	5.01	7.15	25.71	23.57	0.228
		1 880.0	H	4.94	7.21	24.80	22.53	0.179
		1 905.0	H	4.87	7.32	25.31	22.86	0.193
15 M	QPSK	1 857.5	H	5.00	7.17	25.83	23.66	0.232
		1 880.0	H	4.94	7.21	25.42	23.15	0.207
		1 902.5	H	4.87	7.31	25.99	23.55	0.226
	16QAM	1 857.5	H	5.00	7.17	25.21	23.04	0.201
		1 880.0	H	4.94	7.21	24.87	22.60	0.182
		1 902.5	H	4.87	7.31	25.28	22.84	0.192
20 M	QPSK	1 860.0	H	4.99	7.19	25.84	23.64	0.231
		1 880.0	H	4.94	7.21	25.24	22.97	0.198
		1 900.0	H	4.88	7.32	25.86	23.42	0.220
	16QAM	1 860.0	H	4.99	7.19	25.35	23.15	0.207
		1 880.0	H	4.94	7.21	24.65	22.38	0.173
		1 900.0	H	4.88	7.32	25.13	22.69	0.186

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	824.7	H	0.09	4.88	27.81	23.02	0.200
		836.5	H	-0.32	4.97	27.98	22.69	0.186
		848.3	H	-0.77	5.03	28.26	22.46	0.176
	16QAM	824.7	H	0.09	4.88	26.72	21.93	0.156
		836.5	H	-0.32	4.97	26.89	21.60	0.145
		848.3	H	-0.77	5.03	27.72	21.92	0.156
3 M	QPSK	825.5	H	0.11	4.88	27.56	22.79	0.190
		836.5	H	-0.32	4.97	27.86	22.57	0.181
		847.5	H	-0.75	5.03	28.23	22.45	0.176
	16QAM	825.5	H	0.11	4.88	26.55	21.78	0.151
		836.5	H	-0.32	4.97	26.91	21.62	0.145
		847.5	H	-0.75	5.03	27.63	21.85	0.153
5 M	QPSK	826.5	H	0.13	4.89	27.56	22.80	0.191
		836.5	H	-0.32	4.97	27.97	22.68	0.185
		846.5	H	-0.73	5.03	28.34	22.58	0.181
	16QAM	826.5	H	0.13	4.89	26.61	21.85	0.153
		836.5	H	-0.32	4.97	27.15	21.86	0.153
		846.5	H	-0.73	5.03	27.72	21.96	0.157
10 M	QPSK	829.0	H	0.18	4.91	27.69	22.96	0.198
		836.5	H	-0.32	4.97	27.77	22.48	0.177
		844.0	H	-0.68	5.03	28.06	22.35	0.172
	16QAM	829.0	H	0.18	4.91	27.07	22.34	0.171
		836.5	H	0.09	4.97	26.75	21.87	0.154
		844.0	H	-0.32	5.03	27.01	21.66	0.147

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

Test mode: LTE Band 12/17

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	699.7	H	-0.50	4.43	29.60	24.66	0.292
		707.5	H	-0.35	4.48	29.45	24.62	0.290
		715.3	H	-0.56	4.51	29.82	24.74	0.298
	16QAM	699.7	H	-0.50	4.43	28.86	23.92	0.247
		707.5	H	-0.35	4.48	28.73	23.90	0.245
		715.3	H	-0.56	4.51	29.06	23.98	0.250
3 M	QPSK	700.5	H	-0.49	4.44	29.81	24.88	0.308
		707.5	H	-0.35	4.48	29.63	24.80	0.302
		714.5	H	-0.53	4.51	30.11	25.07	0.321
	16QAM	700.5	H	-0.49	4.44	28.99	24.06	0.255
		707.5	H	-0.35	4.48	28.81	23.98	0.250
		714.5	H	-0.53	4.51	29.40	24.36	0.273
5 M	QPSK	701.5	H	-0.47	4.44	29.95	25.04	0.319
		707.5	H	-0.35	4.48	29.75	24.92	0.310
		713.5	H	-0.48	4.50	30.19	25.21	0.332
	16QAM	701.5	H	-0.47	4.44	29.26	24.35	0.272
		707.5	H	-0.35	4.48	28.92	24.09	0.256
		713.5	H	-0.48	4.50	29.55	24.57	0.286
10 M	QPSK	704.0	H	-0.42	4.46	29.75	24.87	0.307
		707.5	H	-0.35	4.48	29.49	24.66	0.292
		711.0	H	-0.35	4.49	29.84	25.00	0.316
	16QAM	704.0	H	-0.42	4.46	29.28	24.40	0.275
		707.5	H	-0.50	4.48	29.07	24.09	0.256
		711.0	H	-0.35	4.49	29.08	24.24	0.265

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 13

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	779.5	H	0.60	4.68	28.15	24.07	0.255
		782.0	H	0.56	4.70	28.25	24.11	0.258
		784.5	H	0.51	4.71	28.34	24.14	0.259
	16QAM	779.5	H	0.60	4.68	27.46	23.38	0.218
		782.0	H	0.56	4.70	27.41	23.27	0.212
		784.5	H	0.51	4.71	27.68	23.48	0.223
10 M	QPSK	782.0	H	0.56	4.70	28.29	24.15	0.260
	16QAM	782.0	H	0.56	4.70	27.54	23.40	0.219

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 26

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	824.7	H	0.09	4.87	28.05	23.27	0.212
		836.5	H	-0.32	4.97	28.41	23.12	0.205
		848.3	H	-0.77	5.03	28.89	23.09	0.204
	16QAM	824.7	H	0.09	4.87	27.12	22.34	0.171
		836.5	H	-0.32	4.97	27.52	22.23	0.167
		848.3	H	-0.77	5.03	28.01	22.21	0.166
3 M	QPSK	825.5	H	0.11	4.88	28.25	23.48	0.223
		836.5	H	-0.32	4.97	28.48	23.19	0.208
		847.5	H	-0.75	5.03	28.80	23.02	0.200
	16QAM	825.5	H	0.11	4.88	27.28	22.51	0.178
		836.5	H	-0.32	4.97	27.85	22.56	0.180
		847.5	H	-0.75	5.03	28.03	22.25	0.168
5 M	QPSK	826.5	H	0.13	4.89	28.03	23.27	0.212
		836.5	H	-0.32	4.97	28.53	23.24	0.211
		846.5	H	-0.73	5.03	28.76	23.00	0.200
	16QAM	826.5	H	0.13	4.89	27.16	22.40	0.174
		836.5	H	-0.32	4.97	27.59	22.30	0.170
		846.5	H	-0.73	5.03	28.12	22.36	0.172
10 M	QPSK	829.0	H	0.18	4.91	28.22	23.49	0.223
		836.5	H	-0.32	4.97	28.45	23.16	0.207
		844.0	H	-0.68	5.03	28.46	22.75	0.188
	16QAM	829.0	H	0.18	4.91	27.40	22.67	0.185
		836.5	H	-0.32	4.97	27.61	22.32	0.171
		844.0	H	-0.68	5.03	27.81	22.10	0.162
15 M	QPSK	831.5	H	0.08	4.92	28.03	23.19	0.208
		836.5	H	-0.32	4.97	28.68	23.39	0.218
		841.5	H	-0.63	5.02	28.46	22.81	0.191
	16QAM	831.5	H	0.08	4.92	27.53	22.69	0.186
		836.5	H	-0.32	4.97	28.00	22.71	0.187
		841.5	H	-0.63	5.02	28.24	22.59	0.182

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

Test mode: LTE Band 41

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 498.5	H	6.10	8.36	26.37	24.11	0.258
		2 593.0	H	6.29	8.51	26.92	24.70	0.295
		2 687.5	H	6.48	8.76	22.91	20.62	0.115
	16QAM	2 498.5	H	6.10	8.36	24.71	22.45	0.176
		2 593.0	H	6.29	8.51	25.55	23.33	0.215
		2 687.5	H	6.48	8.76	22.07	19.78	0.095
10 M	QPSK	2 501.0	H	6.10	8.35	26.82	24.57	0.286
		2 593.0	H	6.29	8.51	26.16	23.94	0.248
		2 685.0	H	6.47	8.74	22.44	20.17	0.104
	16QAM	2 501.0	H	6.10	8.35	24.18	21.93	0.156
		2 593.0	H	6.29	8.51	23.85	21.63	0.146
		2 685.0	H	6.47	8.74	21.46	19.19	0.083
15 M	QPSK	2 503.5	H	6.11	8.35	26.40	24.16	0.261
		2 593.0	H	6.29	8.51	26.76	24.54	0.284
		2 682.5	H	6.47	8.74	23.25	20.97	0.125
	16QAM	2 503.5	H	6.11	8.35	25.17	22.93	0.196
		2 593.0	H	6.29	8.51	23.93	21.71	0.148
		2 682.5	H	6.47	8.74	22.32	20.04	0.101
20 M	QPSK	2 506.0	H	6.11	8.36	26.17	23.92	0.247
		2 593.0	H	6.29	8.51	26.99	24.77	0.300
		2 680.0	H	6.46	8.75	23.93	21.64	0.146
	16QAM	2 506.0	H	6.11	8.36	25.60	23.35	0.216
		2 593.0	H	6.29	8.51	25.95	23.73	0.236
		2 680.0	H	6.46	8.75	23.11	20.82	0.121

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

Test mode: LTE Band 66/4

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.70	H	5.41	6.88	25.72	24.25	0.266
		1 745.00	H	5.31	6.93	22.58	20.96	0.125
		1 779.30	H	5.22	7.02	25.89	24.09	0.256
	16QAM	1 710.70	H	5.41	6.88	24.98	23.51	0.224
		1 745.00	H	5.31	6.93	21.71	20.09	0.102
		1 779.30	H	5.22	7.02	24.96	23.16	0.207
3 M	QPSK	1 711.50	H	5.41	6.88	25.40	23.93	0.247
		1 745.00	H	5.31	6.93	22.79	21.17	0.131
		1 778.50	H	5.22	7.02	25.76	23.96	0.249
	16QAM	1 711.50	H	5.41	6.88	24.60	23.13	0.206
		1 745.00	H	5.31	6.93	21.77	20.15	0.104
		1 778.50	H	5.22	7.02	24.94	23.14	0.206
5 M	QPSK	1 712.50	H	5.41	6.88	25.16	23.68	0.233
		1 745.00	H	5.31	6.93	22.72	21.10	0.129
		1 777.50	H	5.22	7.02	25.96	24.16	0.261
	16QAM	1 712.50	H	5.41	6.88	24.45	22.97	0.198
		1 745.00	H	5.31	6.93	21.95	20.33	0.108
		1 777.50	H	5.22	7.02	25.07	23.27	0.212
10 M	QPSK	1 715.00	H	5.40	6.87	25.07	23.60	0.229
		1 745.00	H	5.31	6.93	22.64	21.02	0.126
		1 775.00	H	5.23	7.00	25.40	23.63	0.231
	16QAM	1 715.00	H	5.40	6.87	24.36	22.89	0.195
		1 745.00	H	5.31	6.93	21.73	20.11	0.103
		1 775.00	H	5.23	7.00	24.71	22.94	0.197
15 M	QPSK	1 717.50	H	5.39	6.89	25.31	23.81	0.240
		1 745.00	H	5.31	6.93	22.44	20.82	0.121
		1 772.50	H	5.24	7.00	25.05	23.29	0.213
	16QAM	1 717.50	H	5.39	6.89	24.45	22.95	0.197
		1 745.00	H	5.31	6.93	21.73	20.11	0.103
		1 772.50	H	5.24	7.00	24.32	22.56	0.180
20 M	QPSK	1 720.00	H	5.38	6.89	24.69	23.18	0.208
		1 745.00	H	5.31	6.93	22.41	20.79	0.120
		1 770.00	H	5.24	7.00	25.23	23.47	0.222
	16QAM	1 720.00	H	5.38	6.89	23.82	22.31	0.170
		1 745.00	H	5.31	6.93	21.64	20.02	0.100
		1 770.00	H	5.24	7.00	24.35	22.59	0.182

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

Sub Antenna
Test mode: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.7	H	5.02	7.14	24.20	22.08	0.161
		1 880.0	H	4.94	7.21	24.57	22.30	0.170
		1 909.3	H	4.85	7.31	24.96	22.50	0.178
	16QAM	1 850.7	H	5.02	7.14	23.71	21.59	0.144
		1 880.0	H	4.94	7.21	24.06	21.79	0.151
		1 909.3	H	4.85	7.31	24.59	22.13	0.163
3 M	QPSK	1 851.5	H	5.02	7.14	24.34	22.22	0.167
		1 880.0	H	4.94	7.21	24.80	22.53	0.179
		1 908.5	H	4.86	7.31	25.94	23.49	0.223
	16QAM	1 851.5	H	5.02	7.14	23.90	21.78	0.151
		1 880.0	H	4.94	7.21	24.05	21.78	0.151
		1 908.5	H	4.86	7.31	25.26	22.81	0.191
5 M	QPSK	1 852.5	H	5.01	7.14	24.22	22.09	0.162
		1 880.0	H	4.94	7.21	24.59	22.32	0.171
		1 907.5	H	4.86	7.31	25.07	22.62	0.183
	16QAM	1 852.5	H	5.01	7.14	23.57	21.44	0.139
		1 880.0	H	4.94	7.21	24.14	21.87	0.154
		1 907.5	H	4.86	7.31	24.28	21.83	0.152
10 M	QPSK	1 855.0	H	5.01	7.15	24.88	22.74	0.188
		1 880.0	H	4.94	7.21	24.77	22.50	0.178
		1 905.0	H	4.87	7.32	25.13	22.68	0.185
	16QAM	1 855.0	H	5.01	7.15	23.95	21.81	0.152
		1 880.0	H	4.94	7.21	23.81	21.54	0.143
		1 905.0	H	4.87	7.32	24.60	22.15	0.164
15 M	QPSK	1 857.5	H	5.00	7.17	24.88	22.71	0.187
		1 880.0	H	4.94	7.21	24.78	22.51	0.178
		1 902.5	H	4.87	7.31	25.21	22.77	0.189
	16QAM	1 857.5	H	5.00	7.17	24.07	21.90	0.155
		1 880.0	H	4.94	7.21	24.23	21.96	0.157
		1 902.5	H	4.87	7.31	24.57	22.13	0.163
20 M	QPSK	1 860.0	H	4.99	7.19	24.98	22.78	0.190
		1 880.0	H	4.94	7.21	24.47	22.20	0.166
		1 900.0	H	4.88	7.32	25.28	22.84	0.192
	16QAM	1 860.0	H	4.99	7.19	24.24	22.04	0.160
		1 880.0	H	4.94	7.21	23.89	21.62	0.145
		1 900.0	H	4.88	7.32	24.78	22.34	0.171

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

Test mode: LTE Band 66

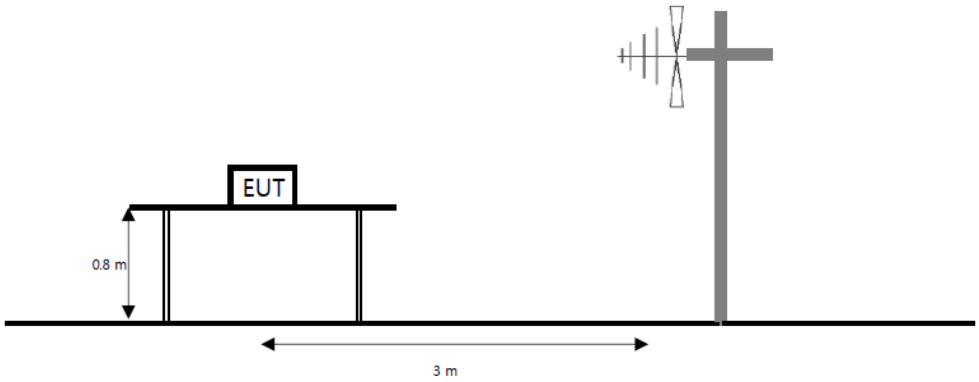
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.70	H	5.41	6.88	20.17	18.70	0.074
		1 745.00	H	5.31	6.93	16.66	15.04	0.032
		1 779.30	H	5.22	7.02	21.35	19.55	0.090
	16QAM	1 710.70	H	5.41	6.88	19.38	17.91	0.062
		1 745.00	H	5.31	6.93	15.97	14.35	0.027
		1 779.30	H	5.22	7.02	20.61	18.81	0.076
3 M	QPSK	1 711.50	H	5.41	6.88	20.33	18.86	0.077
		1 745.00	H	5.31	6.93	16.60	14.98	0.031
		1 778.50	H	5.22	7.02	20.95	19.15	0.082
	16QAM	1 711.50	H	5.41	6.88	19.43	17.96	0.063
		1 745.00	H	5.31	6.93	15.82	14.20	0.026
		1 778.50	H	5.22	7.02	20.45	18.65	0.073
5 M	QPSK	1 712.50	H	5.41	6.88	19.78	18.30	0.068
		1 745.00	H	5.31	6.93	16.59	14.97	0.031
		1 777.50	H	5.22	7.02	21.14	19.34	0.086
	16QAM	1 712.50	H	5.41	6.88	19.30	17.82	0.061
		1 745.00	H	5.31	6.93	16.11	14.49	0.028
		1 777.50	H	5.22	7.02	20.72	18.92	0.078
10 M	QPSK	1 715.00	H	5.40	6.87	19.65	18.18	0.066
		1 745.00	H	5.31	6.93	16.60	14.98	0.031
		1 775.00	H	5.23	7.00	20.64	18.87	0.077
	16QAM	1 715.00	H	5.40	6.87	19.17	17.70	0.059
		1 745.00	H	5.31	6.93	15.87	14.25	0.027
		1 775.00	H	5.23	7.00	19.99	18.22	0.066
15 M	QPSK	1 717.50	H	5.39	6.89	19.89	18.39	0.069
		1 745.00	H	5.31	6.93	17.08	15.46	0.035
		1 772.50	H	5.24	7.00	20.70	18.94	0.078
	16QAM	1 717.50	H	5.39	6.89	19.52	18.02	0.063
		1 745.00	H	5.31	6.93	16.70	15.08	0.032
		1 772.50	H	5.24	7.00	20.20	18.44	0.070
20 M	QPSK	1 720.00	H	5.38	6.89	19.35	17.84	0.061
		1 745.00	H	5.31	6.93	16.96	15.34	0.034
		1 770.00	H	5.24	7.00	20.89	19.13	0.082
	16QAM	1 720.00	H	5.38	6.89	18.88	17.37	0.055
		1 745.00	H	5.31	6.93	16.36	14.74	0.030
		1 770.00	H	5.24	7.00	20.42	18.66	0.073

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

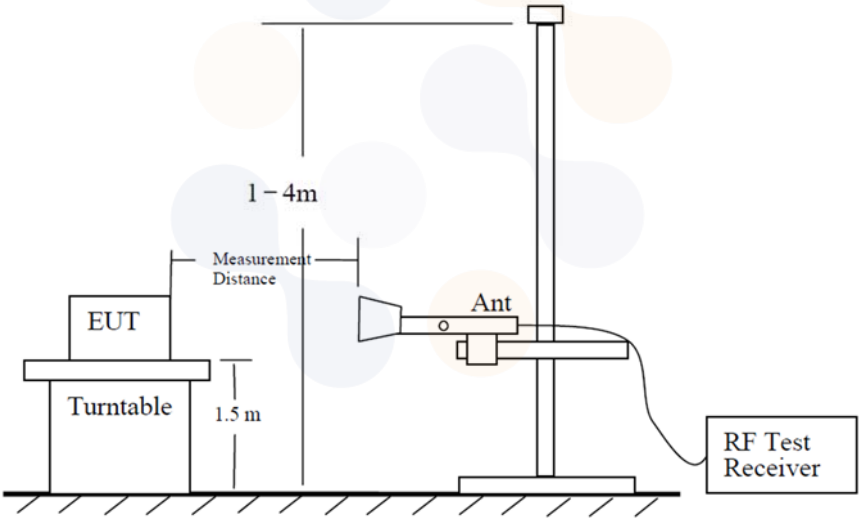
7.8. Radiated Spurious Emissions

Test setup

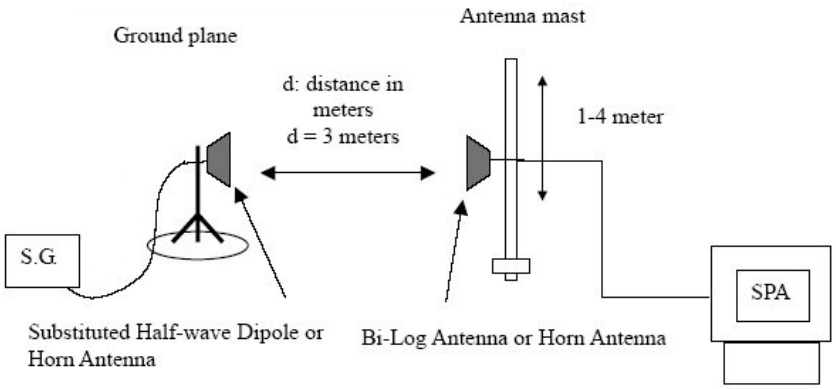
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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



The diagram below shows the test setup for substituted method.



Limit

According to §22.917(a), §24.238(a), 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 + 10log($P_{[Watts]}$) ㏈.

According to §27.53(c)(2), on any frequency outside the 776-788 ㎒ band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log ($P_{[Watts]}$) ㏈.

According to §27.53(f), for operations in the 746-758 ㎒, 775-788 , and 805-806 bands, emissions in the band 1559-1610 shall be limited to −70 ㏈W/㎒ equivalent isotropically radiated power (EIRP) for wideband signals, and −80 ㏈W EIRP for discrete emissions of less than 700 ㎐ 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), for operations in the 600 ㎒ band and the 698-746 ㎒ 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 + 10log($P_{[Watts]}$) ㏈.

According to §27.53(h), 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 + 10log($P_{[Watts]}$) ㏈.

According to §27.53(m)(4), the minimum permissible attenuation level of any spurious emission is 53 + 10log($P_{[Watts]}$) ㏈.

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

Notes:

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m 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 ㎓ below) or horn antenna (1 ㎓ 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 ㏈m, 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 (Above 1 000 ㎒)

Main Antenna

Test mode : LTE Band 2
Frequency(㎒) : 1 851.5
Channel : 18615
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 700.50	V	8.42	11.01	-53.71	-56.30	-13.00	43.30
	5 553.75	V	10.32	13.52	-52.30	-55.50	-13.00	42.50
	7 406.25	V	11.68	15.76	-45.32	-49.40	-13.00	36.40
	9 257.25	V	12.95	17.45	-48.60	-53.10	-13.00	40.10

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 758.25	V	8.51	10.84	-53.77	-56.10	-13.00	43.10
	5 640.00	V	10.36	13.53	-48.23	-51.40	-13.00	38.40
	7 520.25	V	11.73	15.83	-48.50	-52.60	-13.00	39.60
	9 397.50	V	12.98	17.81	-48.07	-52.90	-13.00	39.90

Test mode : LTE Band 2
Frequency(㎒) : 1 908.5
Channel : 19185
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 816.00	H	8.61	11.34	-54.27	-57.00	-13.00	44.00
	5 720.25	V	10.39	13.42	-50.97	-54.00	-13.00	41.00
	7 629.00	V	11.91	16.10	-51.21	-55.40	-13.00	42.40
	9 537.75	H	12.99	17.84	-48.55	-53.40	-13.00	40.40

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

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

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 649.47	V	5.58	6.76	-59.42	-60.60	-13.00	47.60
	2 473.72	H	6.02	8.34	-52.48	-54.80	-13.00	41.80
	3 297.96	H	7.70	10.12	-54.48	-56.90	-13.00	43.90
	4 125.08	V	8.98	11.61	-54.37	-57.00	-13.00	44.00

Test mode : LTE Band 5
Frequency(㎒) : 836.5
Channel : 20525
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 674.09	V	5.51	6.73	-55.88	-57.10	-13.00	44.10
	2 507.77	V	6.12	8.37	-53.55	-55.80	-13.00	42.80
	3 345.56	V	7.79	10.22	-53.57	-56.00	-13.00	43.00
	4 181.29	V	9.01	11.43	-53.88	-56.30	-13.00	43.30

Test mode : LTE Band 5
Frequency(㎒) : 848.3
Channel : 20643
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 694.19	V	5.46	6.79	-56.67	-58.00	-13.00	45.00
	2 543.46	V	6.19	8.46	-52.53	-54.80	-13.00	41.80
	3 394.79	V	7.89	10.33	-53.36	-55.80	-13.00	42.80
	4 242.83	V	9.05	11.63	-52.62	-55.20	-13.00	42.20

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

Test mode : LTE Band 12/17
Frequency(㎒) : 701.5
Channel : 23035
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 401.20	H	5.37	6.17	-61.30	-62.10	-13.00	49.10
	2 105.20	V	4.92	7.66	-56.36	-59.10	-13.00	46.10
	2 803.20	V	6.71	9.02	-54.89	-57.20	-13.00	44.20
	3 509.20	H	8.11	10.59	-53.62	-56.10	-13.00	43.10

Test mode : LTE Band 12/17
Frequency(㎒) : 707.5
Channel : 23095
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 411.60	V	5.43	6.20	-61.83	-62.60	-13.00	49.60
	2 122.40	V	4.97	7.69	-54.68	-57.40	-13.00	44.40
	2 829.60	V	6.76	9.08	-55.18	-57.50	-13.00	44.50
	3 538.00	H	8.16	10.65	-52.41	-54.90	-13.00	41.90

Test mode : LTE Band 12/17
Frequency(㎒) : 713.5
Channel : 23155
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 429.20	V	5.55	6.24	-62.01	-62.70	-13.00	49.70
	2 139.60	V	5.02	7.72	-55.90	-58.60	-13.00	45.60
	2 857.20	V	6.81	9.14	-53.57	-55.90	-13.00	42.90
	3 566.80	V	8.21	10.15	-54.26	-56.20	-13.00	43.20

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

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

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 554.40	V	5.85	6.46	-60.79	-61.40	-13.00	48.40
	2 330.00	H	5.59	8.03	-54.36	-56.80	-13.00	43.80
	3 106.40	V	7.31	9.69	-52.82	-55.20	-13.00	42.20
	3 885.20	H	8.72	11.09	-53.73	-56.10	-13.00	43.10

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

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 602.47	H	5.71	6.68	-56.30	-56.30	-40.00	16.30

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)
   Limit Calculation of wide-band (dBm/㎒) = -70dBW/㎒ (-40 dBm/㎒)
   Limit Calculation of narrow-band (dBm) = -80dBW (-50dBm)
2. E.R.P & E.I.R.P(dB m) = Substitute Level(dB) + Antenna gain(dB i&dB d) - C.L(Cable loss) (dB)

Test mode : LTE Band 26
Frequency(㎒) : 829.0
Channel : 26840
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 648.80	V	5.58	6.76	-57.72	-58.90	-13.00	45.90
	2 473.20	V	6.02	8.33	-54.29	-56.60	-13.00	43.60
	3 295.60	H	7.69	10.11	-53.38	-55.80	-13.00	42.80
	4 120.80	V	8.97	11.61	-52.76	-55.40	-13.00	42.40

Test mode : LTE Band 26
Frequency(㎒) : 836.5
Channel : 26915
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 671.20	V	5.52	6.72	-57.20	-58.40	-13.00	45.40
	2 506.80	V	6.11	8.36	-52.35	-54.60	-13.00	41.60
	3 345.60	H	7.79	10.22	-54.17	-56.60	-13.00	43.60
	4 184.80	H	9.01	11.43	-53.18	-55.60	-13.00	42.60

Test mode : LTE Band 26
Frequency(㎒) : 844.0
Channel : 26990
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 696.40	V	5.45	6.79	-55.86	-57.20	-13.00	44.20
	2 547.60	V	6.20	8.47	-53.33	-55.60	-13.00	42.60
	3 396.00	V	7.89	10.33	-53.66	-56.10	-13.00	43.10
	4 245.20	H	9.05	11.63	-52.02	-54.60	-13.00	41.60

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

Test mode : LTE Band 41
Frequency(㎒) : 2 506.0
Channel : 39750
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 013.28	H	9.81	12.83	-51.38	-54.40	-25.00	29.40
	7 516.15	V	11.73	15.83	-47.90	-52.00	-25.00	27.00
	10 022.21	H	12.90	18.15	-44.45	-49.70	-25.00	24.70
	12 530.83	H	13.10	20.67	-43.13	-50.70	-25.00	25.70

Test mode : LTE Band 41
Frequency(㎒) : 2 593.0
Channel : 40620
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 166.48	V	9.97	13.14	-51.13	-54.30	-25.00	29.30
	7 749.78	V	12.10	16.11	-49.89	-53.90	-25.00	28.90
	10 331.16	V	12.90	18.62	-46.58	-52.30	-25.00	27.30
	12 915.10	H	13.10	20.94	-41.36	-49.20	-25.00	24.20

Test mode : LTE Band 41
Frequency(㎒) : 2 680.0
Channel : 41490
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 342.01	V	10.14	13.27	-51.77	-54.90	-25.00	29.90
	8 010.85	V	12.51	16.47	-49.44	-53.40	-25.00	28.40
	10 679.69	V	12.94	18.91	-46.53	-52.50	-25.00	27.50
	13 350.44	H	13.45	21.02	-42.43	-50.00	-25.00	25.00

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

Test mode : LTE Band 66/4
Frequency(㎒) : 1 710.7
Channel : 131979
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 422.25	V	7.94	10.39	-56.15	-58.60	-13.00	45.60
	5 130.75	H	9.93	13.09	-50.74	-53.90	-13.00	40.90
	6 842.25	V	11.44	15.26	-49.38	-53.20	-13.00	40.20
	8 553.00	H	12.90	16.90	-49.60	-53.60	-13.00	40.60

Test mode : LTE Band 66/4
Frequency(㎒) : 1 745.0
Channel : 132322
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 492.75	V	8.09	10.55	-54.04	-56.50	-13.00	43.50
	5 236.50	V	10.04	13.05	-51.79	-54.80	-13.00	41.80
	6 980.25	V	11.58	15.34	-48.24	-52.00	-13.00	39.00
	8 724.75	H	12.90	17.31	-49.99	-54.40	-13.00	41.40

Test mode : LTE Band 66/4
Frequency(㎒) : 1 779.3
Channel : 132665
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 559.50	H	8.20	10.13	-53.57	-55.50	-13.00	42.50
	5 340.75	V	10.14	13.27	-50.97	-54.10	-13.00	41.10
	7 118.25	V	11.62	15.34	-44.38	-48.10	-13.00	35.10
	8 900.25	V	12.90	17.26	-48.04	-52.40	-13.00	39.40

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

Sub Antenna

Test mode : LTE Band 2
Frequency(㎒) : 1 851.5
Channel : 18615
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 700.50	V	8.42	11.01	-53.71	-56.30	-13.00	43.30
	5 553.75	V	10.32	13.52	-52.30	-55.50	-13.00	42.50
	7 406.25	V	11.68	15.76	-45.32	-49.40	-13.00	36.40
	9 257.25	V	12.95	17.45	-48.60	-53.10	-13.00	40.10

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 759.75	H	8.52	10.85	-52.57	-54.90	-13.00	41.90
	5 640.00	V	10.36	13.53	-43.33	-46.50	-13.00	33.50
	7 521.75	H	11.73	15.83	-49.70	-53.80	-13.00	40.80
	9 400.50	H	12.98	17.59	-47.89	-52.50	-13.00	39.50

Test mode : LTE Band 2
Frequency(㎒) : 1 908.5
Channel : 19185
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 813.75	H	8.60	11.33	-52.57	-55.30	-13.00	42.30
	5 721.00	H	10.39	13.42	-46.37	-49.40	-13.00	36.40
	7 629.75	V	11.91	16.10	-50.21	-54.40	-13.00	41.40
	9 535.50	H	12.99	17.84	-41.65	-46.50	-13.00	33.50

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

Test mode : LTE Band 66
Frequency(㎒) : 1 710.7
Channel : 131979
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 422.25	H	7.94	10.39	-55.35	-57.80	-13.00	44.80
	5 132.25	H	9.93	13.10	-52.33	-55.50	-13.00	42.50
	6 843.00	H	11.44	15.26	-49.68	-53.50	-13.00	40.50
	8 553.75	H	12.90	16.90	-49.40	-53.40	-13.00	40.40

Test mode : LTE Band 66
Frequency(㎒) : 1 745.0
Channel : 132322
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 489.75	V	8.08	10.54	-54.84	-57.30	-13.00	44.30
	5 235.00	V	10.04	13.05	-51.09	-54.10	-13.00	41.10
	6 978.75	H	11.58	15.34	-50.94	-54.70	-13.00	41.70
	8 724.75	V	12.90	17.31	-48.49	-52.90	-13.00	39.90

Test mode : LTE Band 66
Frequency(㎒) : 1 779.3
Channel : 132665
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 557.25	V	8.19	10.14	-55.35	-57.30	-13.00	44.30
	5 335.50	H	10.14	13.26	-51.68	-54.80	-13.00	41.80
	7 114.50	H	11.62	15.34	-49.18	-52.90	-13.00	39.90
	8 889.75	V	12.90	17.04	-47.76	-51.90	-13.00	38.90

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

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA9117	275	24.03.30
Bilog Antenna	ETS.LINDGREN	'3143B	00228420	23.09.28*
Horn Antenna	ETS.LINDGREN	3117	161225	23.05.04
Horn Antenna	ETS.LINDGREN	3117	00227509	23.09.20*
Horn Antenna	ETS.lindgren	3116	00086632	23.01.25
Horn Antenna	ETS.lindgren	3116	00086635	23.05.04
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	23.08.10
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	23.08.10
Broadband Amplifier	SONOMA INSTRUMENT	310N	185799	23.01.19
Amplifier	LTC MICROWAVE	LLA01185522Q-B	142	23.05.20
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	23.01.21
Vector Signal Generator	R&S	SMBV100A	257566	23.07.04
Signal Generator	R&S	SMB100A	176206	23.01.19
Spectrum Analyzer	AGILENT	N9040B	MY57010132	22.12.31
Wideband Radio Communication Tester	R & S	CMW500	141780	23.03.28
Antenna Stand	innco systems GmbH	AS1500-EP-10kg	N/A	-
Antenna Stand	innco systems GmbH	AS1500-EP-10kg	N/A	-
Compact Table	innco systems GmbH	CT1000	N/A	-
Spectrum Analyzer	R&S	FSV40-N	101462	23.01.16
DC Power Supply	AGILENT	E3632A	MY40018781	23.05.02
Directional Coupler	Marki Microwave, Inc.	CBR17-0026	0001	23.08.10
Temp & Humid Chamber	ESPEC CORP.	SH-642	93016978	23.03.02

* Tests related to this equipment were progressed before the calibration was completed.

End of test report