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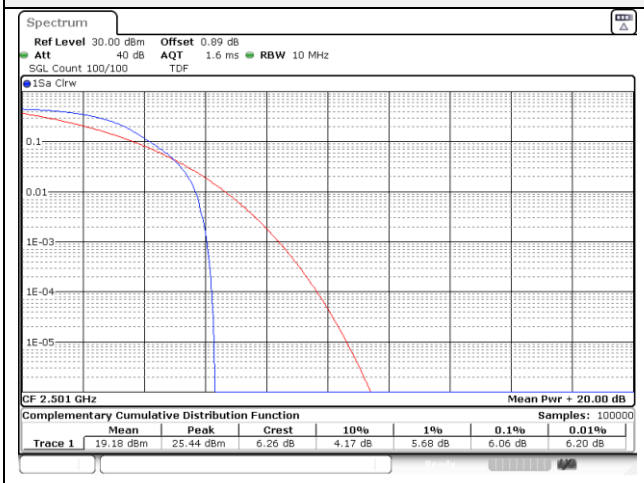

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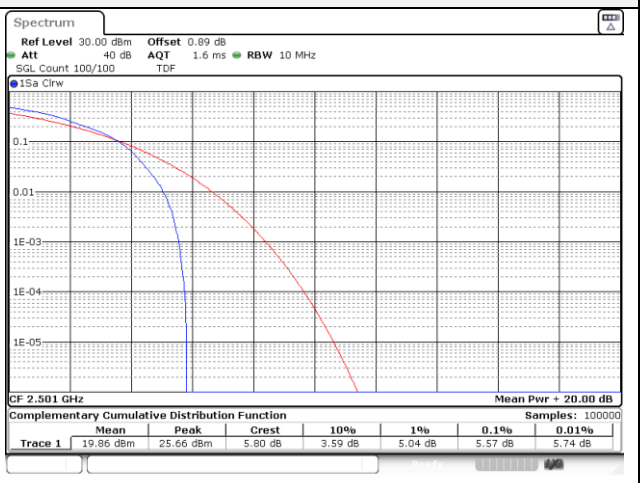

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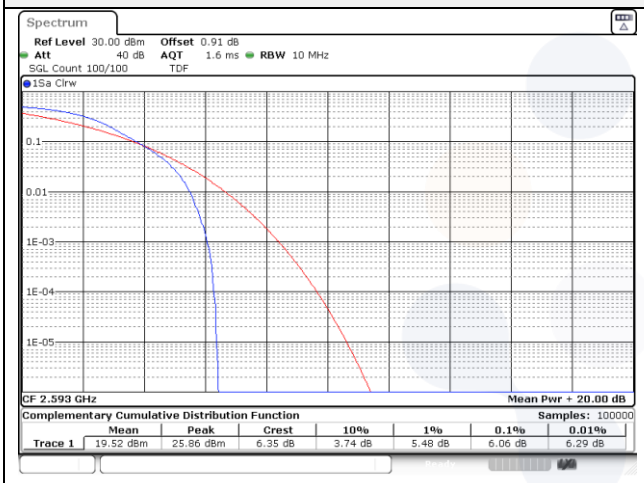

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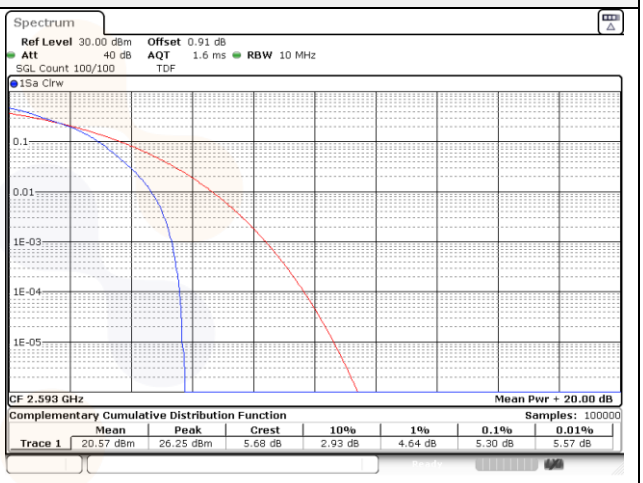

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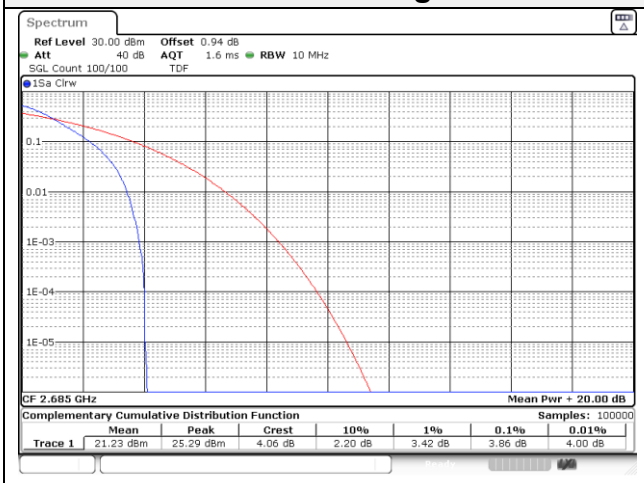

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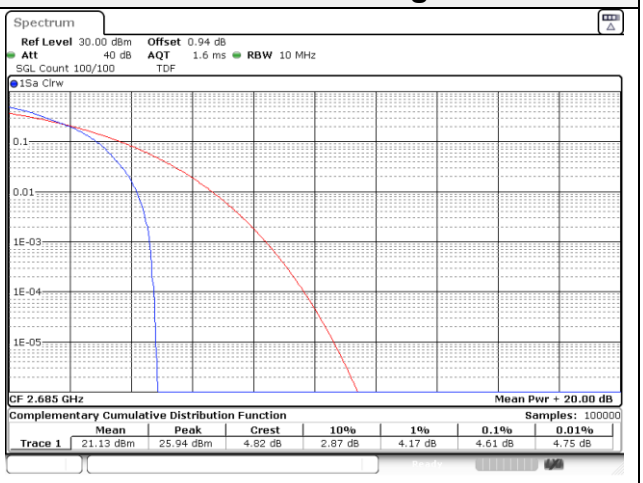

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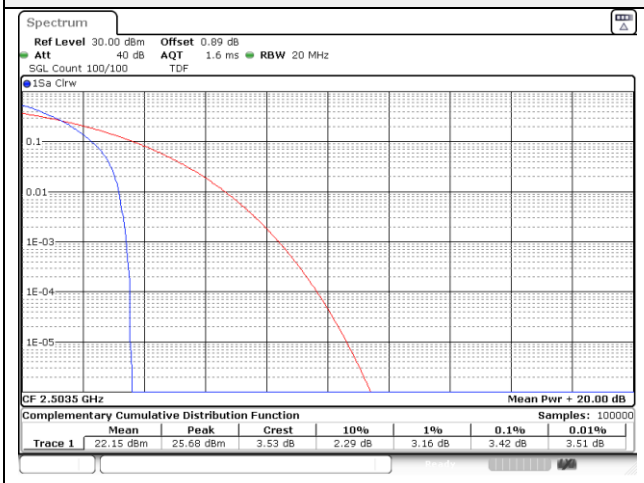

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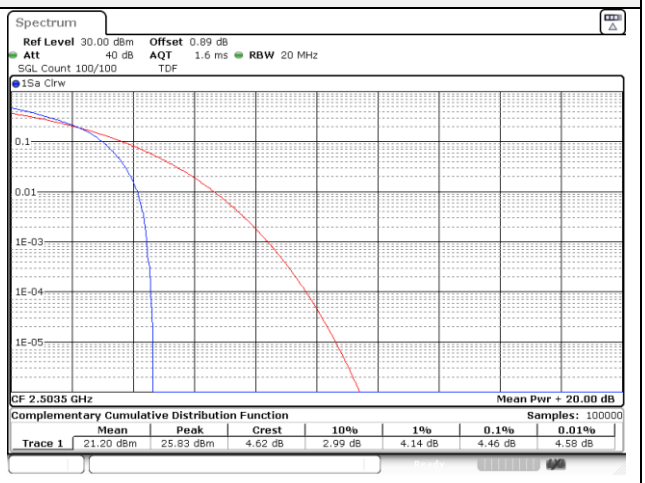

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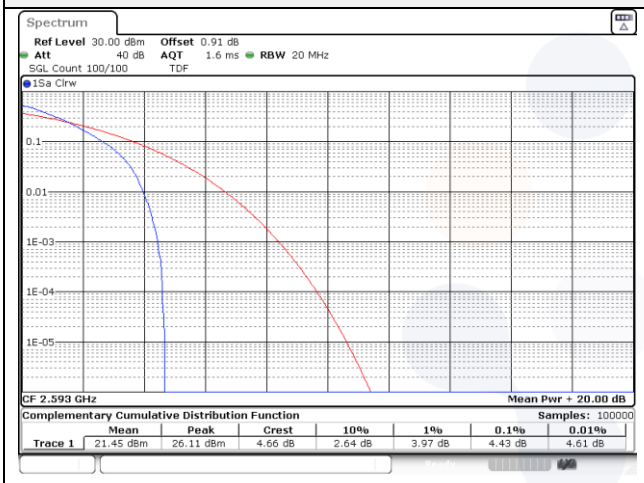

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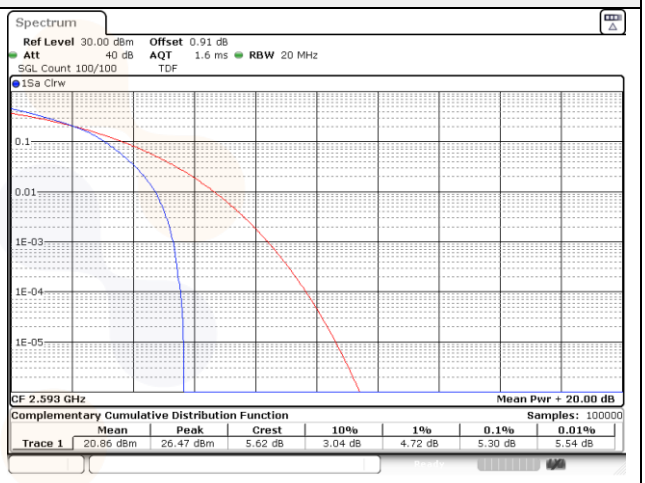

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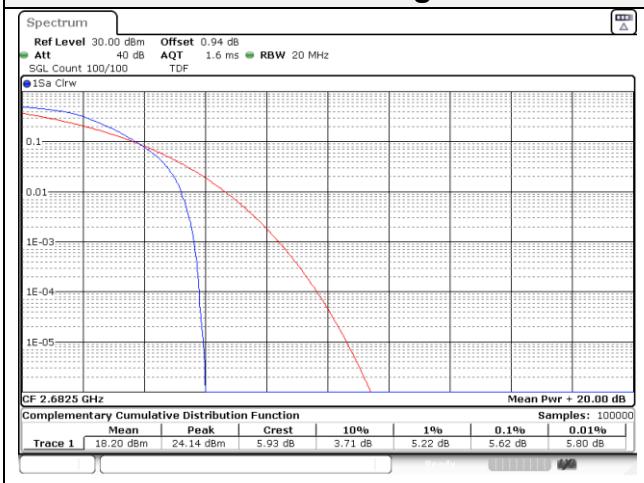

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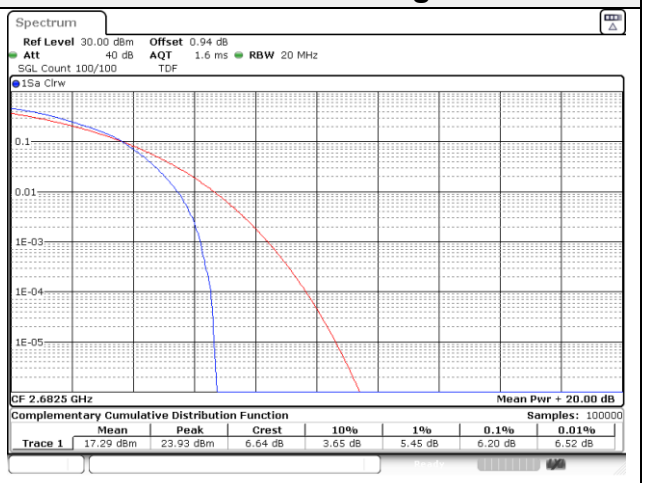

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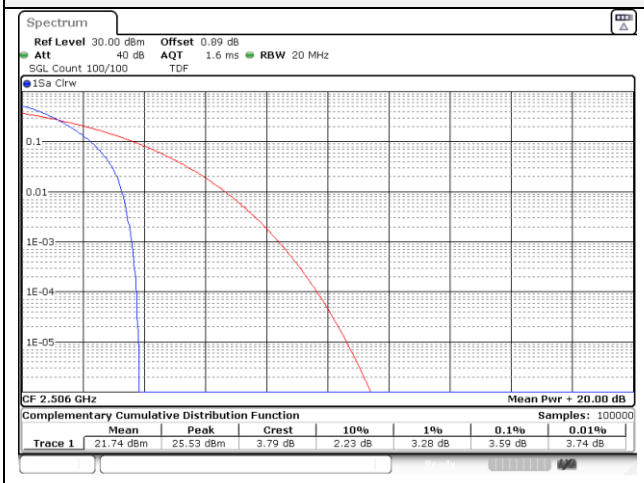

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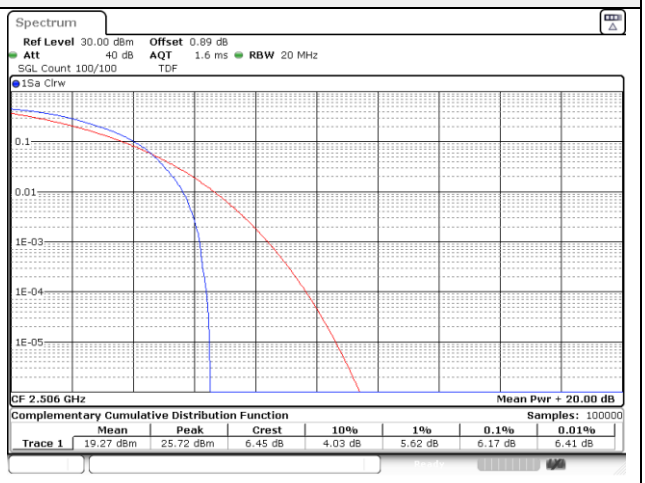

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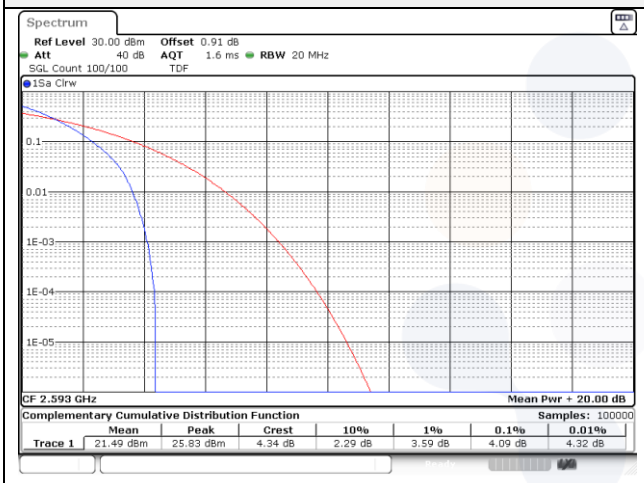

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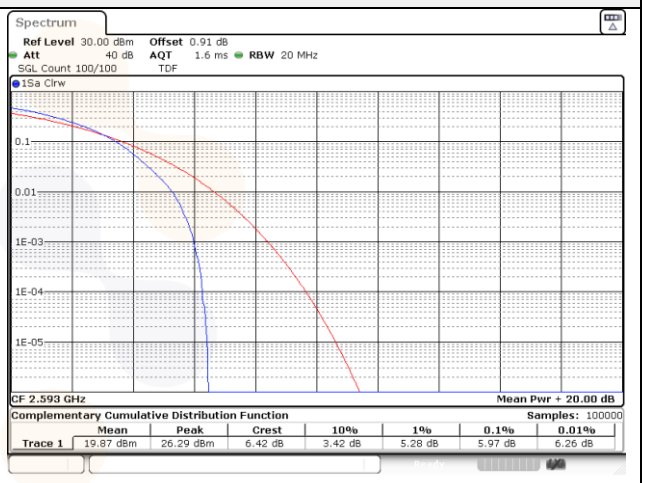

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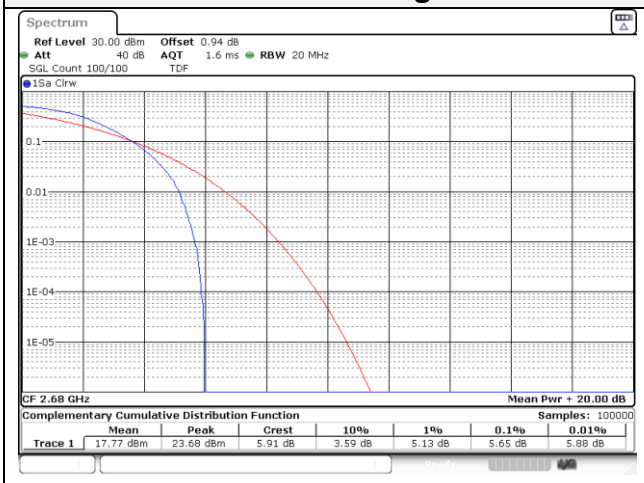

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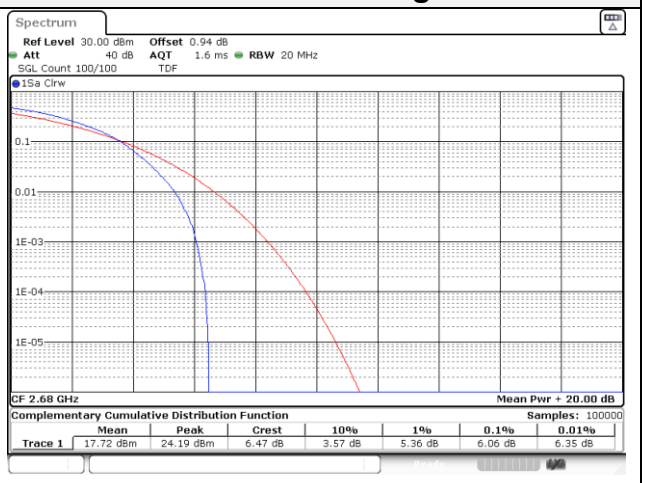
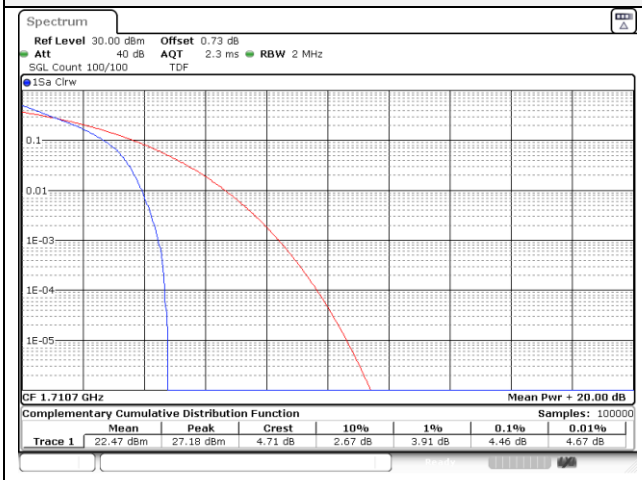


Test mode: LTE Band 66/4

1.4M BW QPSK Low ch.



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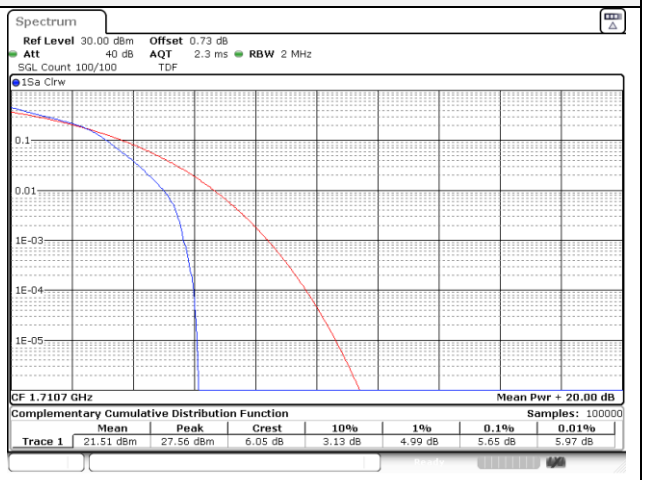

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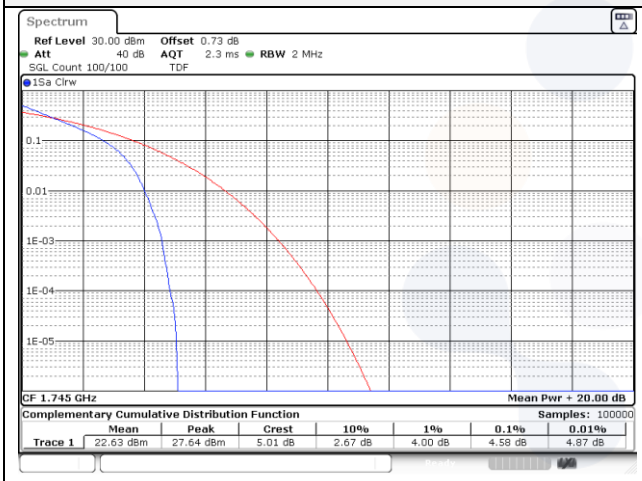

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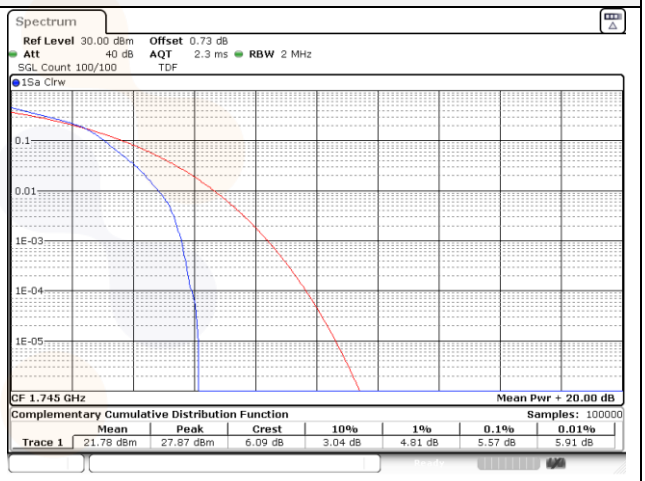

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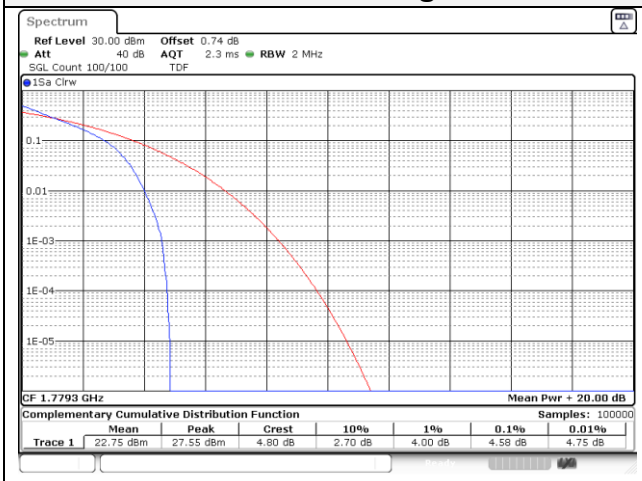

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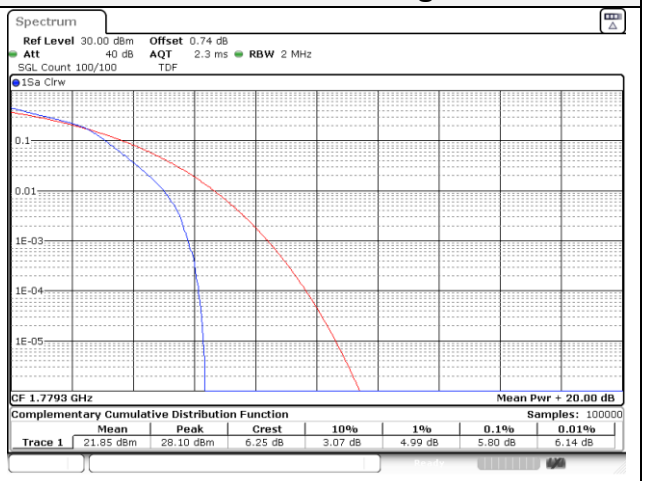
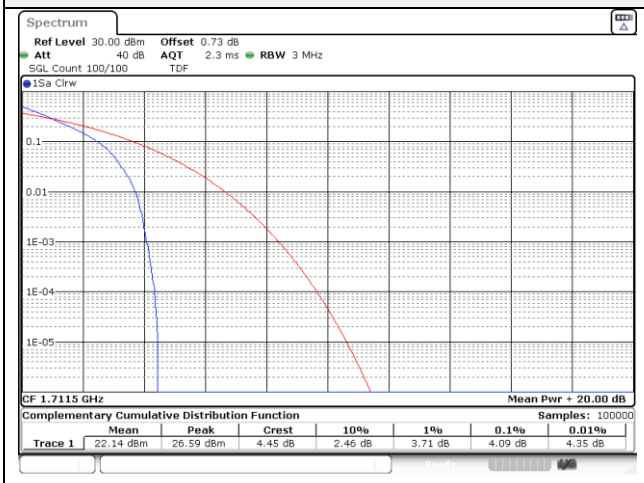
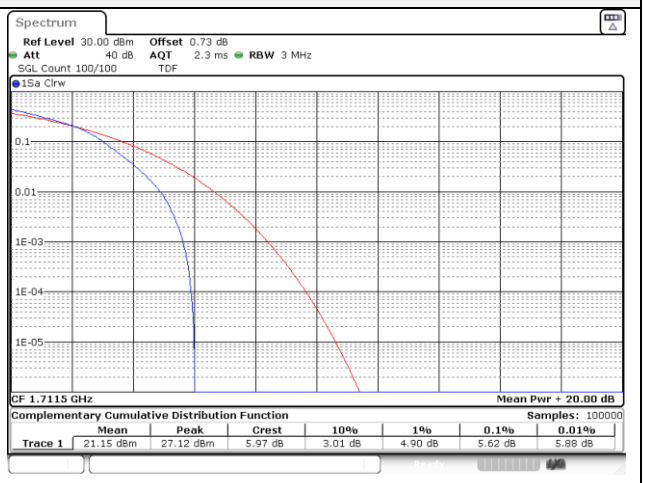


3M BW QPSK Low ch.



3M BW 16QAM Low ch.



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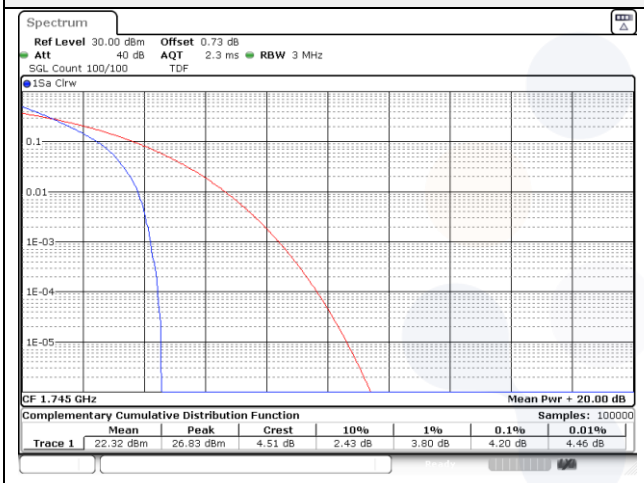

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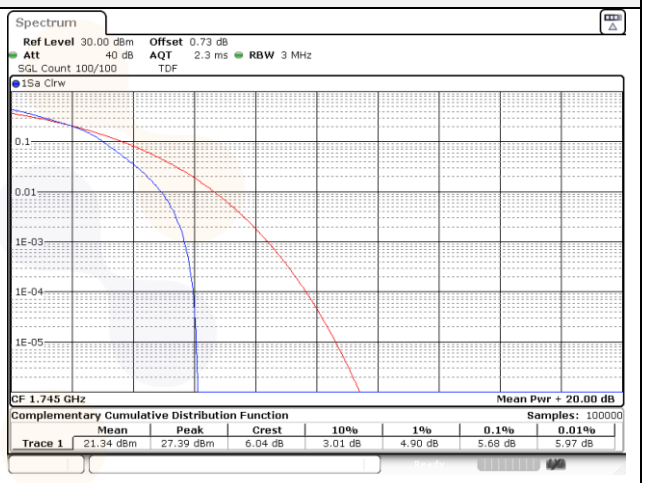

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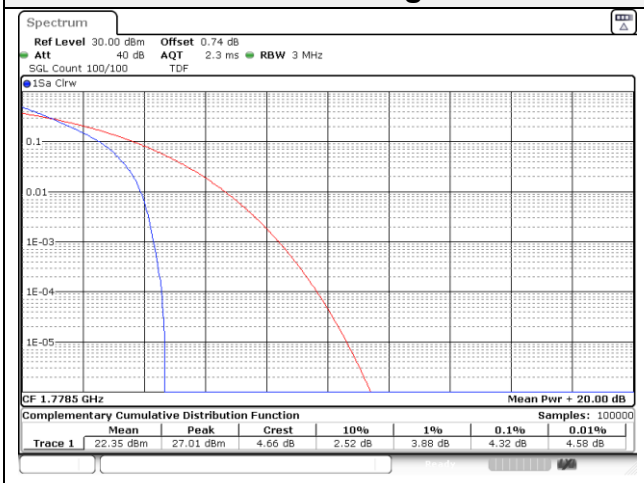

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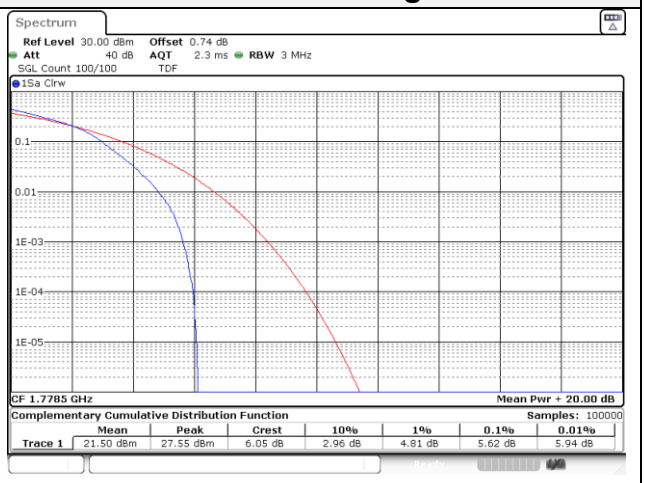

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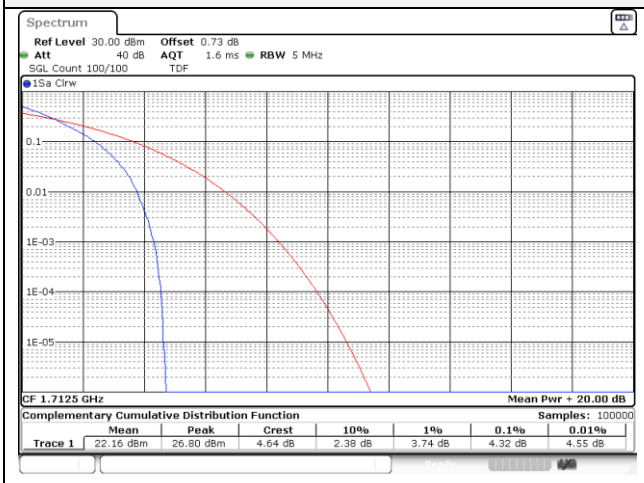

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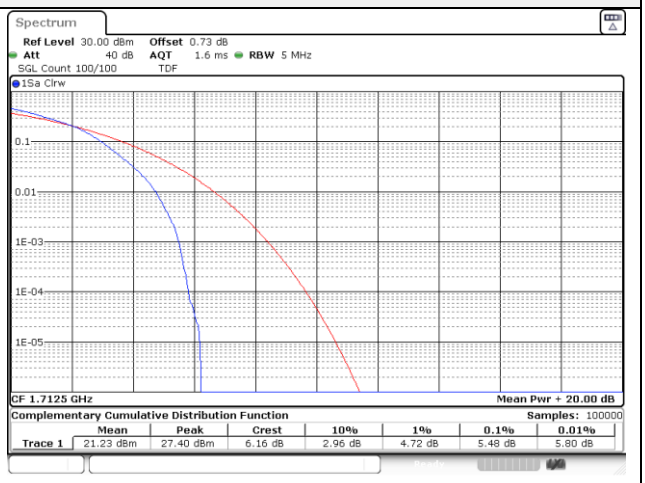

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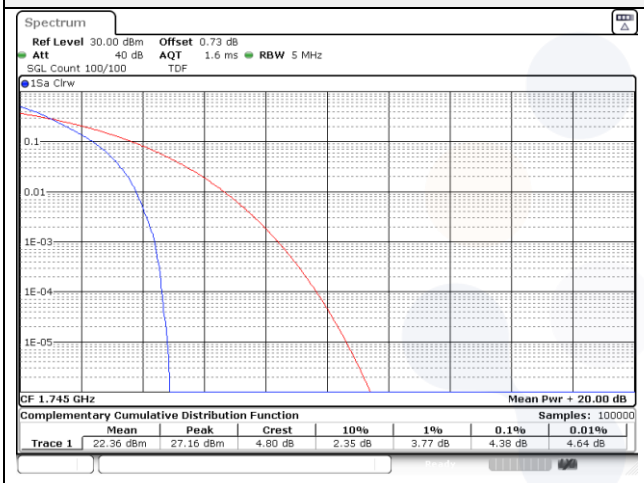

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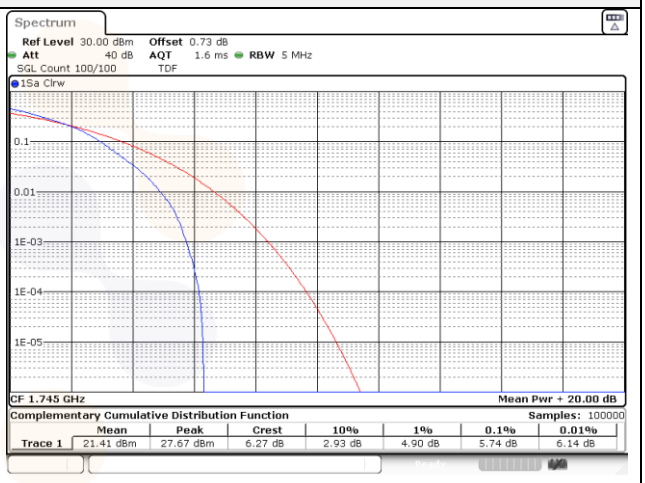

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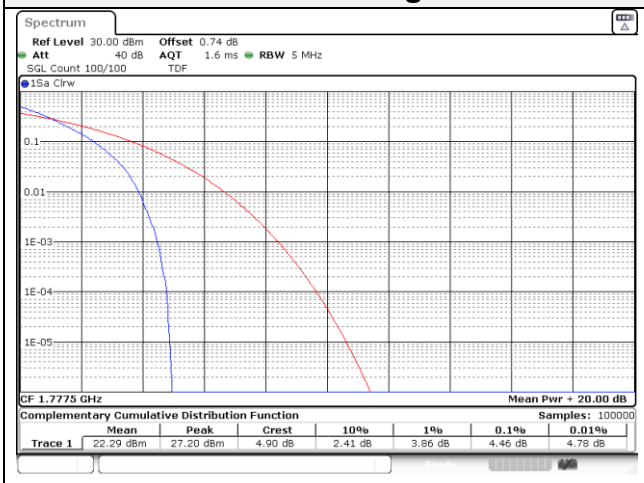

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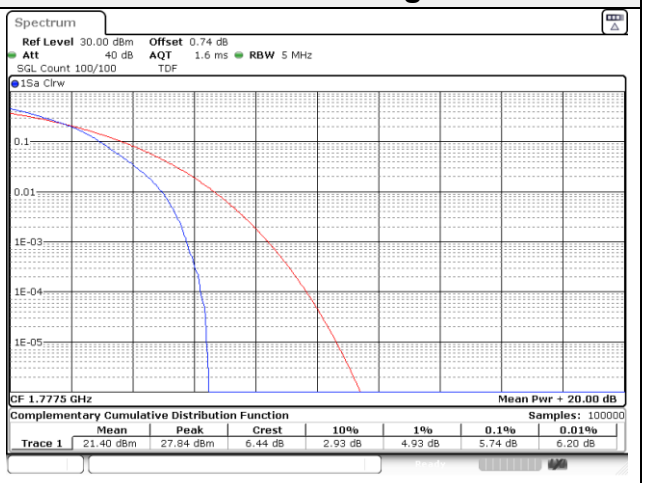

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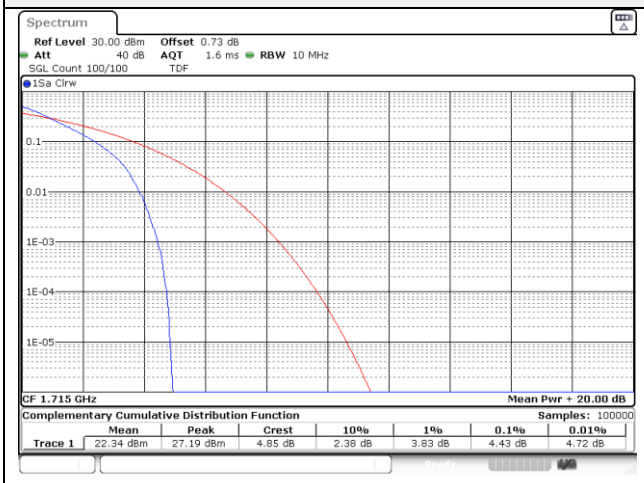

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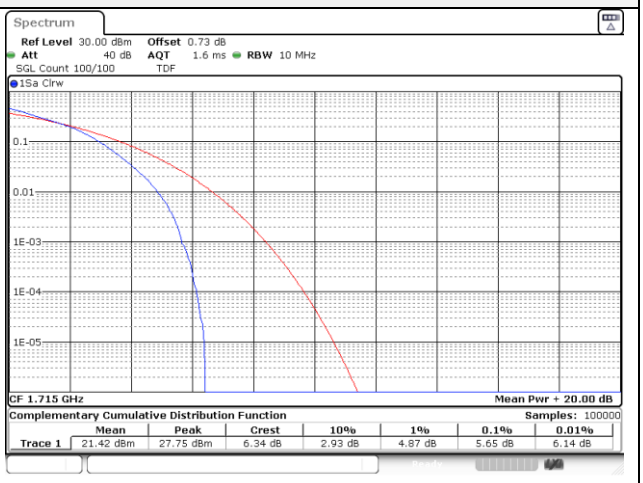

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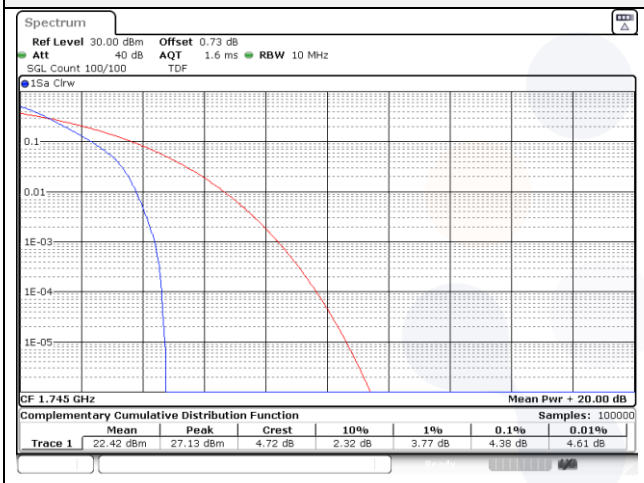

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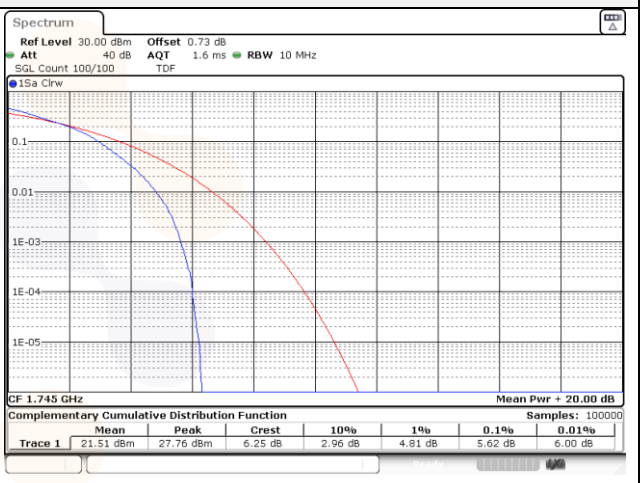

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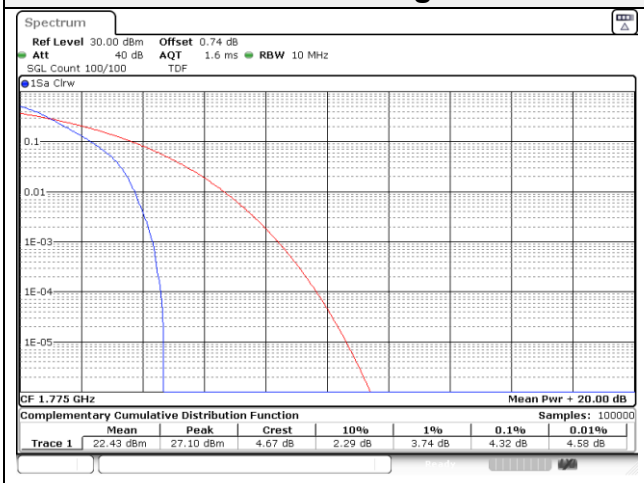

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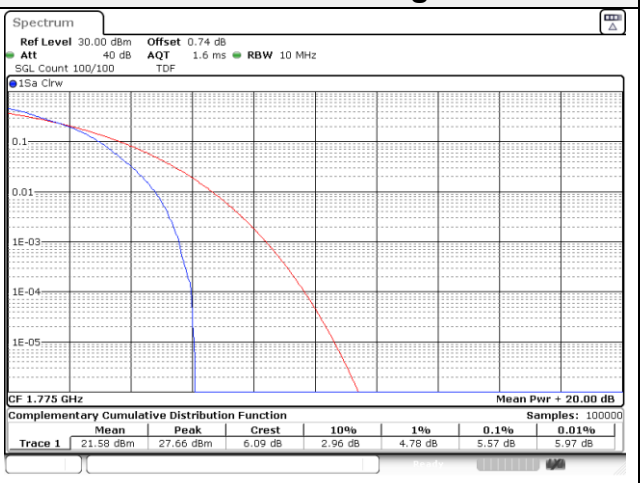

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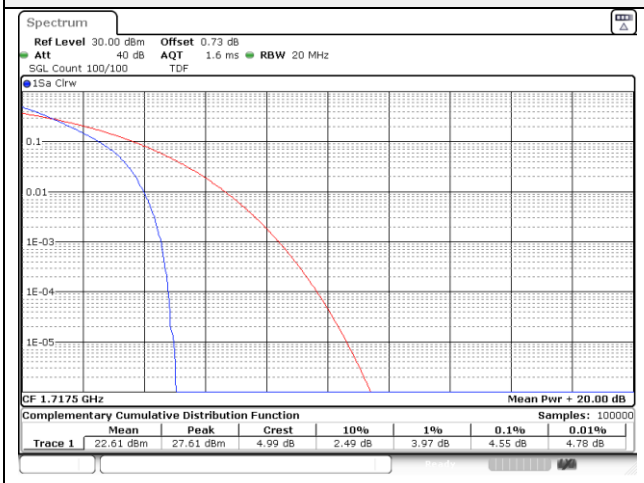

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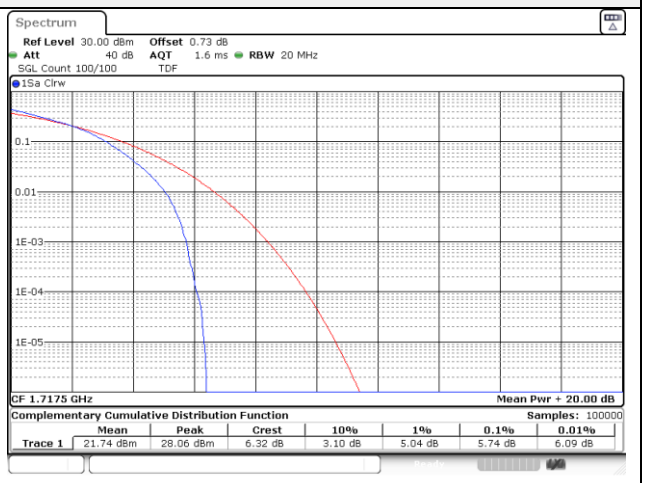

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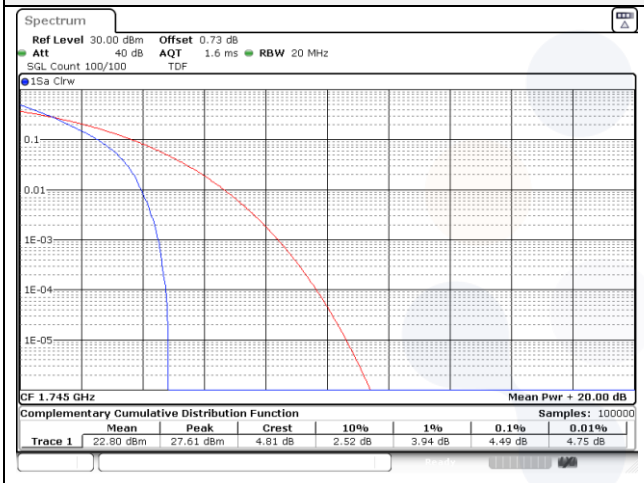

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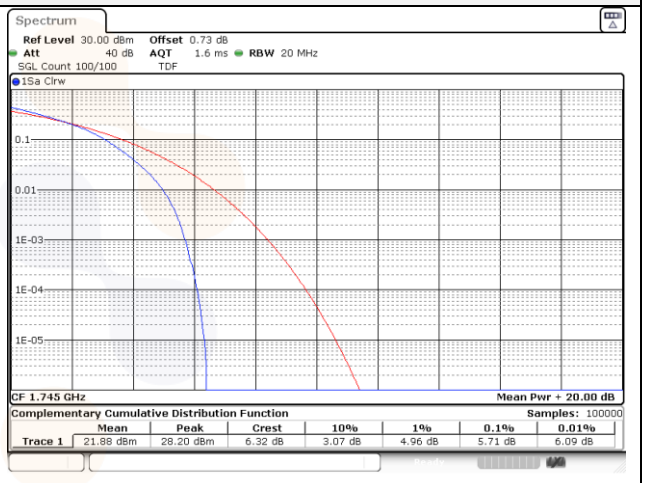

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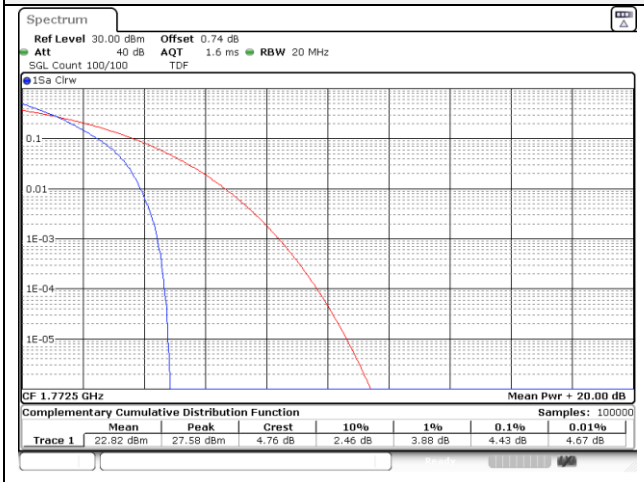

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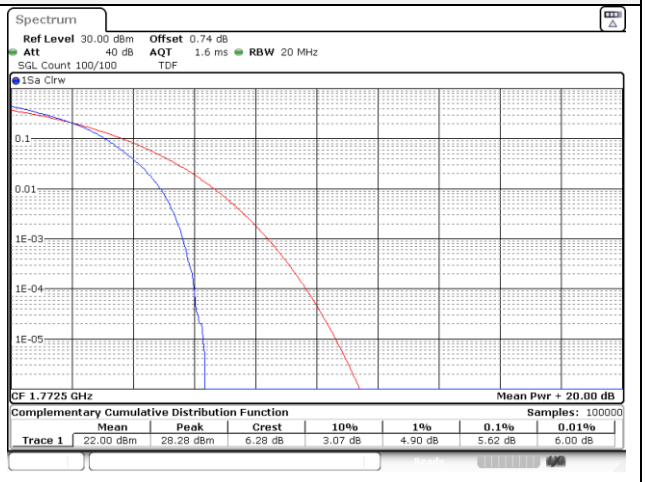

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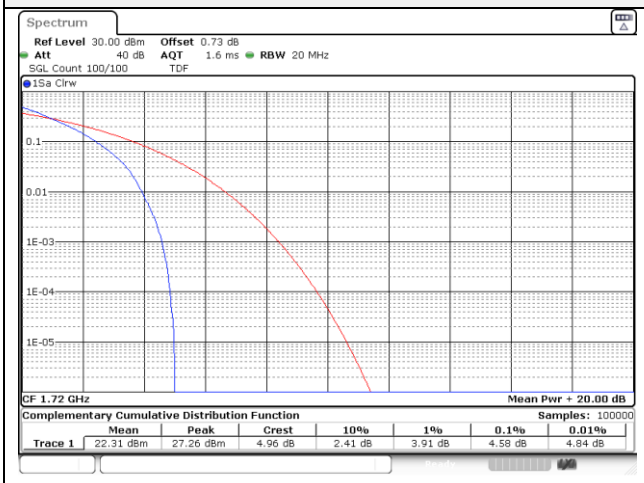

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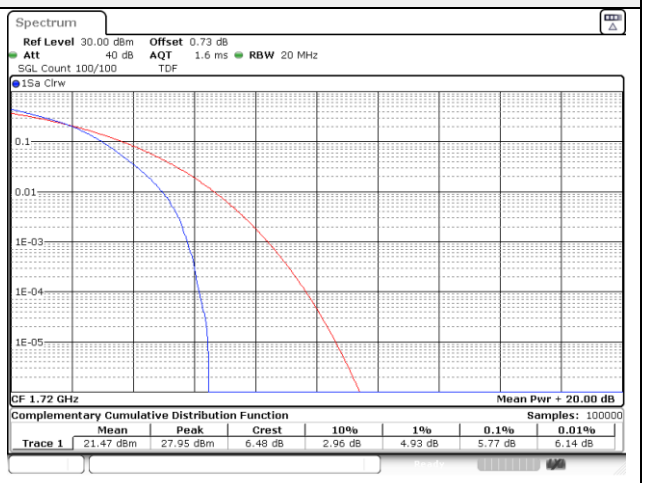

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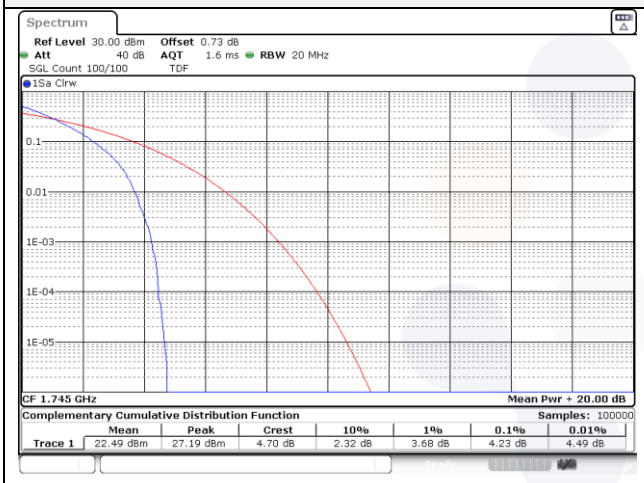

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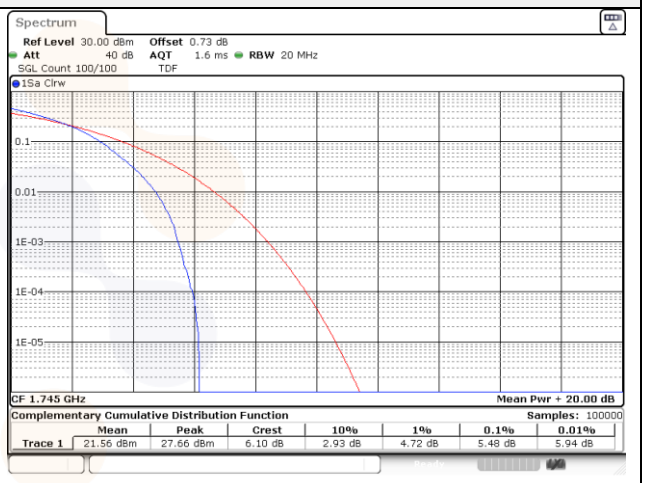

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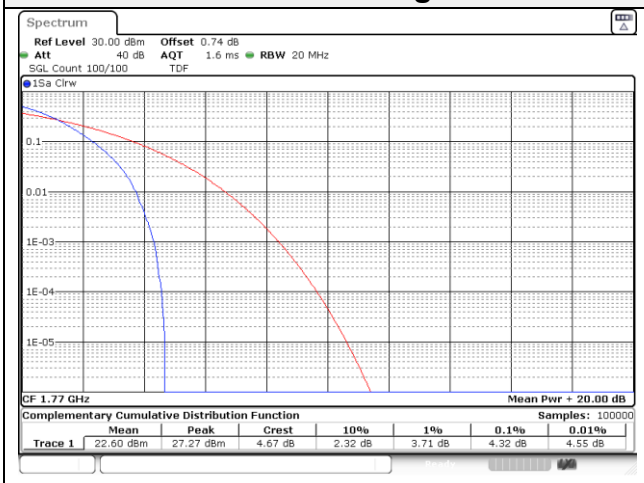
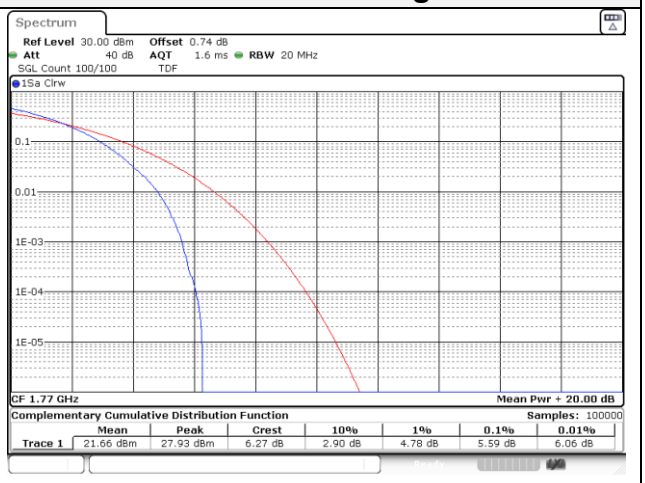
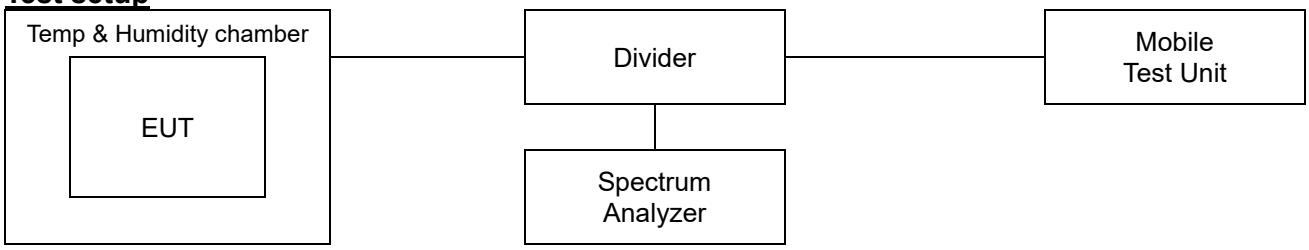


20M BW 16QAM High ch.



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 (bands of operation).

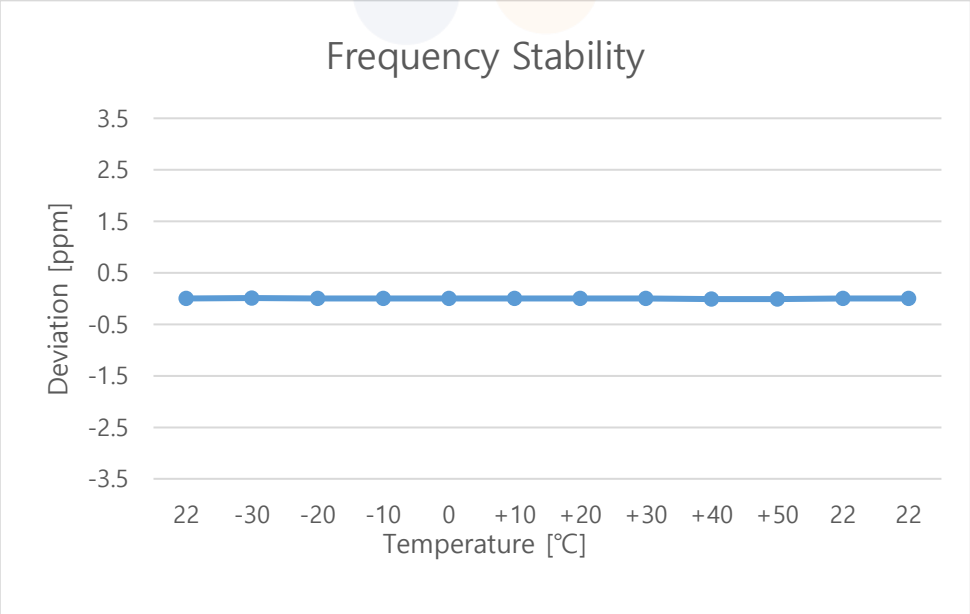
Test procedure
ANSI 63.26-2015 – Section 5.6

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

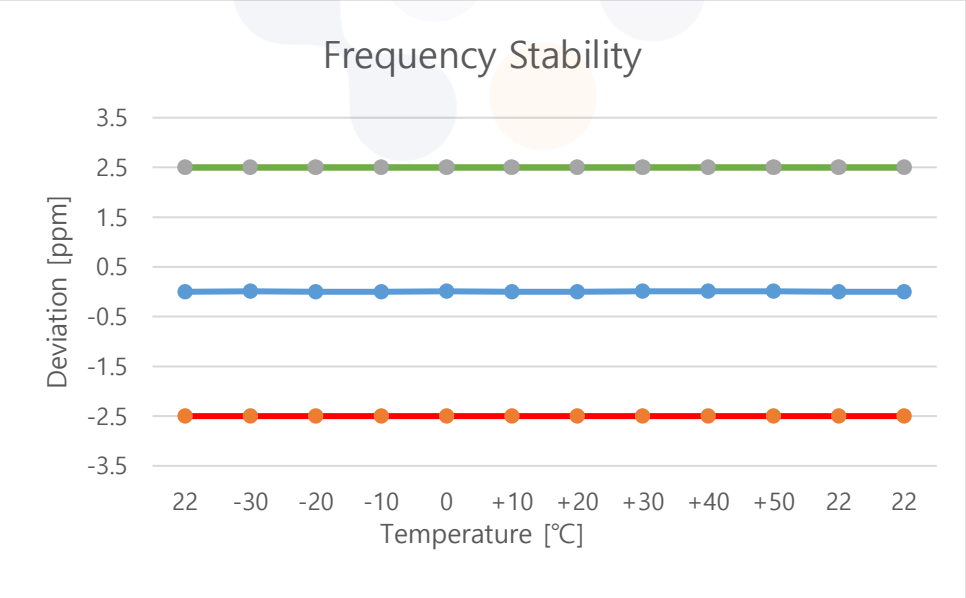
Test mode : LTE Band 2
Frequency (㎐) : 1 880 000 000
Channel : 18900
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	1,879,999,998	2.30	0.0	0.000000
		30	1,880,000,012	-11.84	0.0	0.000001
		-20	1,880,000,008	-7.92	0.0	0.000000
		-10	1,880,000,004	-4.25	0.0	0.000000
		0	1,880,000,006	-5.79	0.0	0.000000
		+10	1,880,000,001	-0.56	0.0	0.000000
		+20	1,879,999,998	2.45	0.0	0.000000
		+30	1,879,999,996	4.33	0.0	0.000000
		+40	1,879,999,989	11.27	0.0	-0.000001
		+50	1,879,999,986	14.32	0.0	-0.000001
115%	4.43	+22(Ref)	1,879,999,996	3.92	0.0	0.000000
End point	3.65	+22(Ref)	1,879,999,997	3.41	0.0	0.000000



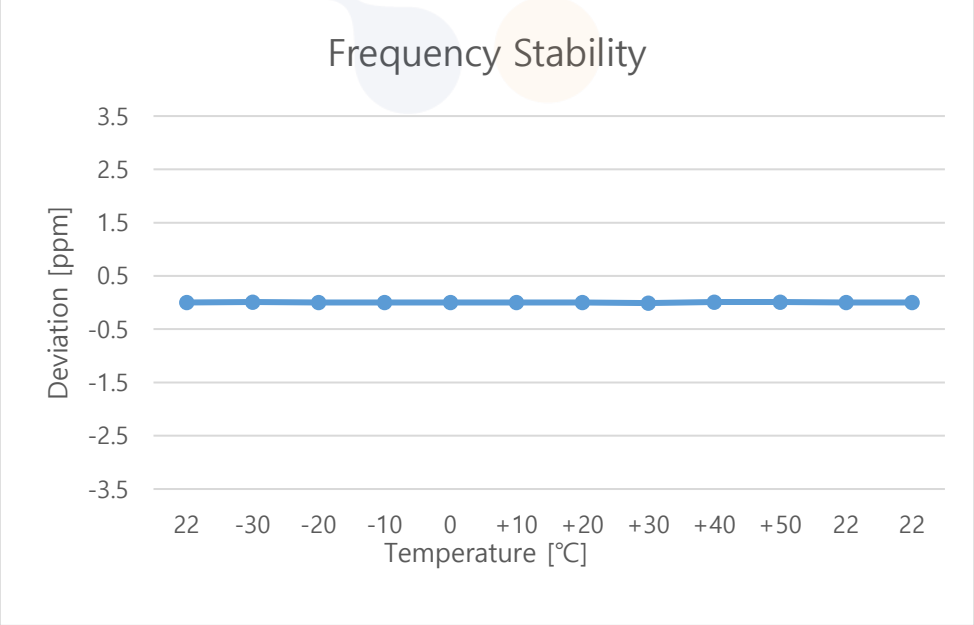
Test mode : LTE Band 5
Frequency (㎐) : 836 500 000
Channel : 20525
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	836,500,002	-2.07	0.0	0.000000
		30	836,500,007	-6.64	0.0	0.000001
		-20	836,500,004	-3.82	0.0	0.000000
		-10	836,500,003	-2.62	0.0	0.000000
		0	836,500,005	-4.65	0.0	0.000001
		+10	836,499,999	0.66	0.0	0.000000
		+20	836,500,002	-1.63	0.0	0.000000
		+30	836,500,010	-9.83	0.0	0.000001
		+40	836,500,005	-5.36	0.0	0.000001
		+50	836,500,006	-6.02	0.0	0.000001
115%	4.43	+22(Ref)	836,500,004	-3.99	0.0	0.000000
End point	3.65	+22(Ref)	836,500,003	-3.25	0.0	0.000000



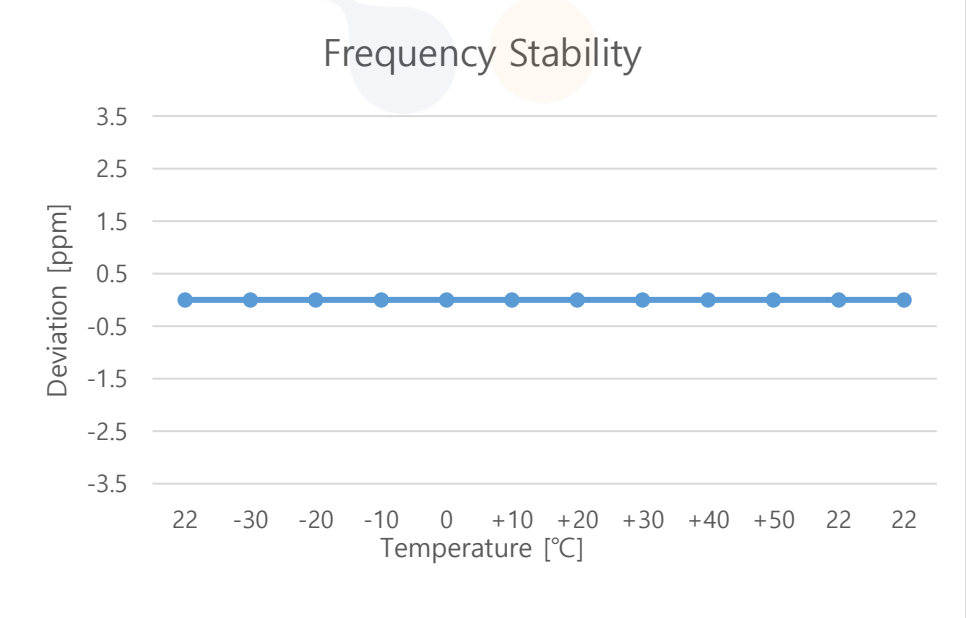
Test mode : LTE Band 12/17
Frequency (㎐) : 707 500 000
Channel : 23095
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	707,500,002	-1.85	0.0	0.000000
		30	707,500,004	-3.95	0.0	0.000001
		-20	707,500,003	-3.19	0.0	0.000000
		-10	707,500,003	-2.56	0.0	0.000000
		0	707,500,000	-0.19	0.0	0.000000
		+10	707,500,001	-1.09	0.0	0.000000
		+20	707,500,002	-2.27	0.0	0.000000
		+30	707,499,996	3.96	0.0	-0.000001
		+40	707,500,004	-4.16	0.0	0.000001
		+50	707,500,006	-5.62	0.0	0.000001
115%	4.43	+22(Ref)	707,500,002	-2.06	0.0	0.000000
End point	3.65	+22(Ref)	707,500,002	-2.29	0.0	0.000000



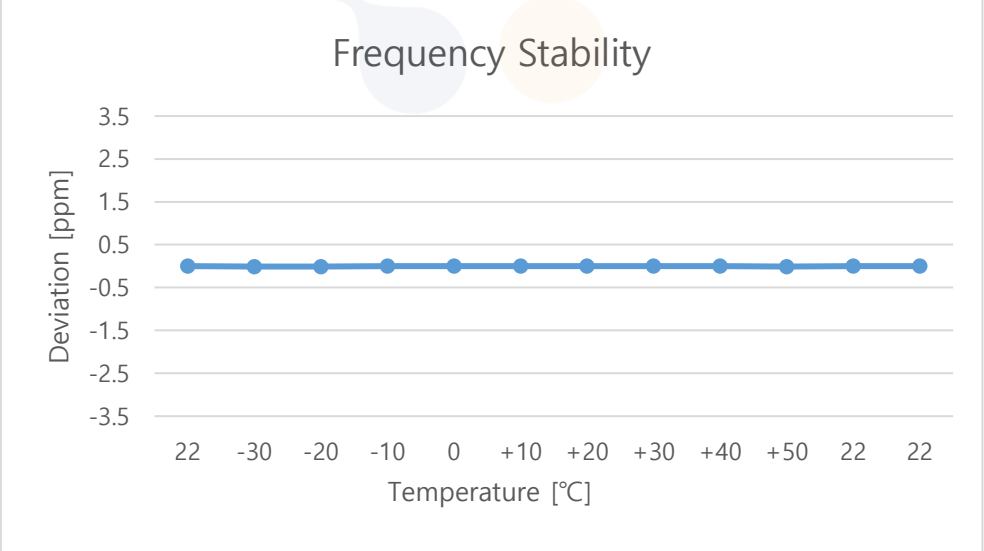
Test mode : LTE Band 41
Frequency (㎐) : 2 593 000 000
Channel : 40620
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	2,592,999,997	3.38	0.0	0.000000
			2,592,999,993	7.17	0.0	0.000000
		-20	2,592,999,993	6.91	0.0	0.000000
		-10	2,592,999,995	4.53	0.0	0.000000
		0	2,592,999,997	2.56	0.0	0.000000
		+10	2,592,999,992	7.71	0.0	0.000000
		+20	2,592,999,997	2.86	0.0	0.000000
		+30	2,592,999,991	8.94	0.0	0.000000
		+40	2,592,999,992	7.90	0.0	0.000000
		+50	2,592,999,988	12.16	0.0	0.000000
115%	4.43	+22	2,592,999,997	2.96	0.0	0.000000
End point	3.65	+22	2,592,999,996	3.92	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.

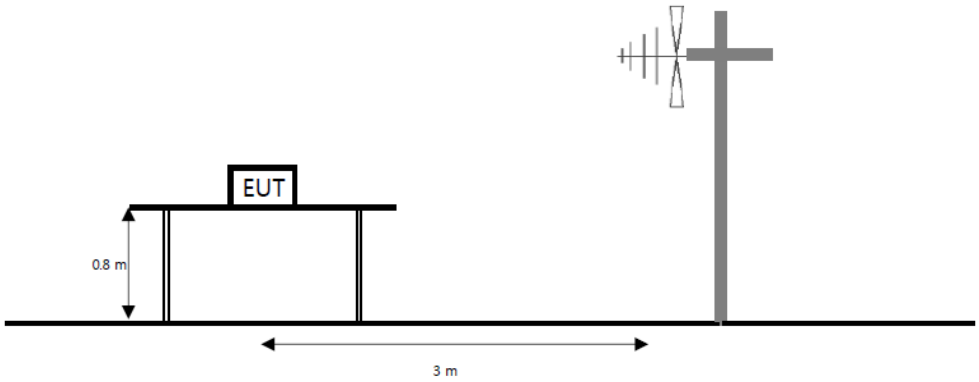
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+22(Ref)	1,745,000,002	-2.15	0.0	0.000000
		-30	1,744,999,989	10.87	0.0	-0.000001
		-20	1,744,999,990	9.91	0.0	-0.000001
		-10	1,744,999,991	8.63	0.0	0.000000
		0	1,744,999,994	5.84	0.0	0.000000
		+10	1,745,000,004	-3.75	0.0	0.000000
		+20	1,745,000,003	-2.50	0.0	0.000000
		+30	1,744,999,996	4.11	0.0	0.000000
		+40	1,744,999,993	7.05	0.0	0.000000
		+50	1,744,999,988	12.03	0.0	-0.000001
115%	4.43	+22(Ref)	1,745,000,004	-3.84	0.0	0.000000
End point	3.65	+22(Ref)	1,745,000,004	-3.76	0.0	0.000000



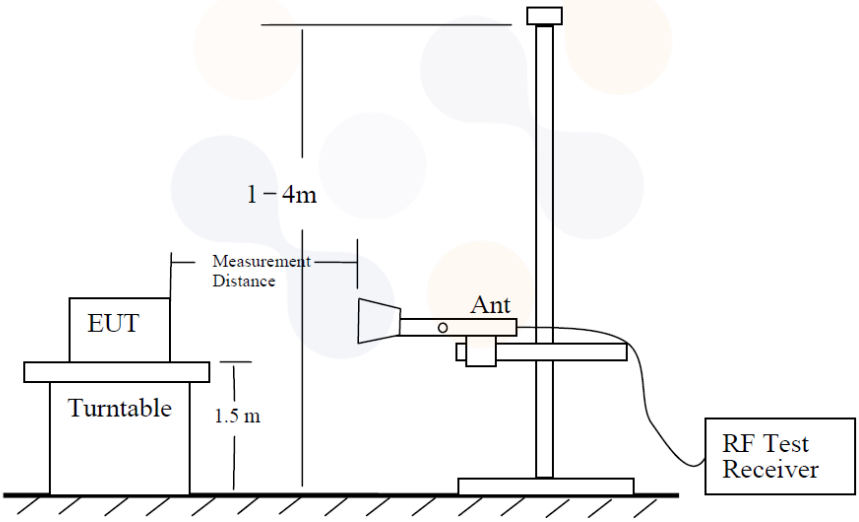
7.7. Radiated Power (ERP/EIRP)

Test setup

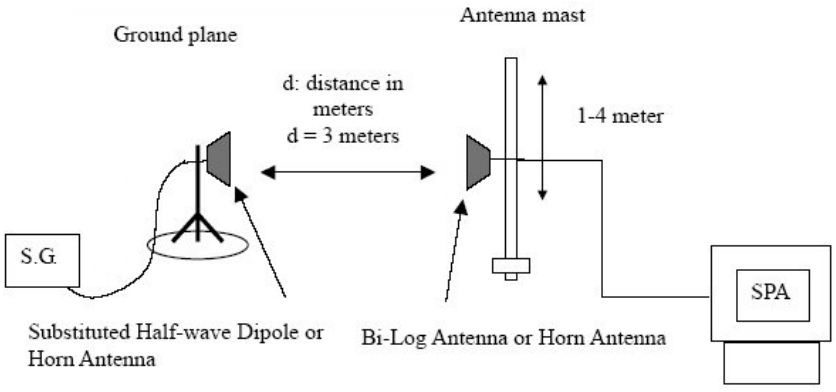
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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

According to §27.50(d)(4), Fixed, mobile and portable (hand-held) stations operating in the 1710-1755 ㎒ 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

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	5.46	7.66	26.45	24.25	0.266
		1 880.0	H	5.39	7.76	27.57	25.20	0.331
		1 909.3	H	5.32	7.84	26.92	24.40	0.275
	16QAM	1 850.7	H	5.46	7.66	25.67	23.47	0.222
		1 880.0	H	5.39	7.76	26.68	24.31	0.270
		1 909.3	H	5.32	7.84	25.88	23.36	0.217
3 M	QPSK	1 851.5	H	5.46	7.66	26.47	24.27	0.267
		1 880.0	H	5.39	7.76	27.58	25.21	0.332
		1 908.5	H	5.32	7.84	27.11	24.59	0.288
	16QAM	1 851.5	H	5.46	7.66	25.68	23.48	0.223
		1 880.0	H	5.39	7.76	26.56	24.19	0.262
		1 908.5	H	5.32	7.84	26.21	23.69	0.234
5 M	QPSK	1 852.5	H	5.45	7.66	26.45	24.24	0.265
		1 880.0	H	5.39	7.76	27.66	25.29	0.338
		1 907.5	H	5.32	7.84	27.01	24.49	0.281
	16QAM	1 852.5	H	5.45	7.66	25.64	23.43	0.220
		1 880.0	H	5.39	7.76	26.91	24.54	0.284
		1 907.5	H	5.32	7.84	26.52	24.00	0.251
10 M	QPSK	1 855.0	H	5.45	7.66	26.37	24.16	0.261
		1 880.0	H	5.39	7.76	27.61	25.24	0.334
		1 905.0	H	5.33	7.84	26.77	24.26	0.267
	16QAM	1 855.0	H	5.45	7.66	25.57	23.36	0.217
		1 880.0	H	5.39	7.76	27.01	24.64	0.291
		1 905.0	H	5.33	7.84	25.91	23.40	0.219
15 M	QPSK	1 857.5	H	5.44	7.69	26.16	23.91	0.246
		1 880.0	H	5.39	7.76	27.67	25.30	0.339
		1 902.5	H	5.33	7.84	27.07	24.56	0.286
	16QAM	1 857.5	H	5.44	7.69	25.33	23.08	0.203
		1 880.0	H	5.39	7.76	26.82	24.45	0.279
		1 902.5	H	5.33	7.84	26.46	23.95	0.248
20 M	QPSK	1 860.0	H	5.44	7.70	26.62	24.36	0.273
		1 880.0	H	5.39	7.76	27.40	25.03	0.318
		1 900.0	H	5.34	7.86	27.04	24.52	0.283
	16QAM	1 860.0	H	5.44	7.70	25.96	23.70	0.234
		1 880.0	H	5.39	7.76	26.48	24.11	0.258
		1 900.0	H	5.34	7.86	26.25	23.73	0.236

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	-1.98	5.03	27.15	20.14	0.103
		836.5	H	-2.43	5.13	27.89	20.33	0.108
		848.3	H	-2.78	5.18	27.79	19.83	0.096
	16QAM	824.7	H	-1.98	5.03	26.29	19.28	0.085
		836.5	H	-2.43	5.13	26.93	19.37	0.086
		848.3	H	-2.78	5.18	26.89	18.93	0.078
3 M	QPSK	825.5	H	-1.90	5.04	27.60	20.66	0.116
		836.5	H	-2.43	5.13	28.10	20.54	0.113
		847.5	H	-2.80	5.18	27.69	19.71	0.094
	16QAM	825.5	H	-1.90	5.04	26.64	19.70	0.093
		836.5	H	-2.43	5.13	27.14	19.58	0.091
		847.5	H	-2.80	5.18	26.55	18.57	0.072
5 M	QPSK	826.5	H	-1.80	5.05	27.79	20.94	0.124
		836.5	H	-2.43	5.13	28.04	20.48	0.112
		846.5	H	-2.82	5.17	27.78	19.79	0.095
	16QAM	826.5	H	-1.80	5.05	26.82	19.97	0.099
		836.5	H	-2.43	5.13	27.13	19.57	0.091
		846.5	H	-2.82	5.17	26.94	18.95	0.079
10 M	QPSK	829.0	H	-1.55	5.07	28.19	21.57	0.144
		836.5	H	-2.43	5.13	28.21	20.65	0.116
		844.0	H	-2.87	5.16	27.44	20.55	0.114
	16QAM	829.0	H	-1.55	5.07	27.09	20.47	0.111
		836.5	H	-2.43	5.13	27.32	19.76	0.095
		844.0	H	-2.87	5.16	26.48	19.74	0.094

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

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	-2.85	4.56	23.77	16.36	0.043
		707.5	H	-2.55	4.60	23.67	16.52	0.045
		715.3	H	-2.66	4.63	23.97	16.68	0.047
	16QAM	699.7	H	-2.85	4.56	22.66	15.25	0.033
		707.5	H	-2.55	4.60	22.83	15.68	0.037
		715.3	H	-2.66	4.63	22.84	15.55	0.036
3 M	QPSK	700.5	H	-2.83	4.56	23.96	16.57	0.045
		707.5	H	-2.55	4.60	23.82	16.67	0.046
		714.5	H	-2.63	4.62	24.16	16.91	0.049
	16QAM	700.5	H	-2.83	4.56	22.82	15.43	0.035
		707.5	H	-2.55	4.60	23.00	15.85	0.038
		714.5	H	-2.63	4.62	23.35	16.10	0.041
5 M	QPSK	701.5	H	-2.79	4.57	23.97	16.61	0.046
		707.5	H	-2.55	4.60	23.93	16.78	0.048
		713.5	H	-2.59	4.62	24.25	17.04	0.051
	16QAM	701.5	H	-2.79	4.57	23.12	15.76	0.038
		707.5	H	-2.55	4.60	22.96	15.81	0.038
		713.5	H	-2.59	4.62	23.43	16.22	0.042
10 M	QPSK	704.0	H	-2.69	4.59	23.81	16.53	0.045
		707.5	H	-2.55	4.60	23.86	16.71	0.047
		711.0	H	-2.49	4.62	24.16	17.05	0.051
	16QAM	704.0	H	-2.69	4.59	22.98	15.70	0.037
		707.5	H	-2.55	4.60	22.83	15.68	0.037
		711.0	H	-2.49	4.62	23.22	16.11	0.041

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 41

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 498.5	H	6.20	8.92	20.77	18.05	0.064
		2 593.0	H	6.33	9.09	23.93	21.17	0.131
		2 687.5	H	6.46	9.32	19.24	16.38	0.043
	16QAM	2 498.5	H	6.20	8.92	20.10	17.38	0.055
		2 693.0	H	6.33	9.09	22.78	20.02	0.100
		2 687.5	H	6.46	9.32	16.73	13.87	0.024
10 M	QPSK	2 501.0	H	6.20	8.91	20.23	17.52	0.056
		2 593.0	H	6.33	9.09	22.61	19.85	0.097
		2 685.0	H	6.46	9.32	17.13	14.27	0.027
	16QAM	2 501.0	H	6.20	8.91	18.49	15.78	0.038
		2 593.0	H	6.33	9.09	21.74	18.98	0.079
		2 685.0	H	6.46	9.32	16.89	14.03	0.025
15 M	QPSK	2 503.5	H	6.20	8.93	20.48	17.75	0.060
		2 593.0	H	6.33	9.09	21.12	18.36	0.069
		2 682.5	H	6.46	9.31	19.43	16.58	0.045
	16QAM	2 503.5	H	6.20	8.93	18.47	15.74	0.037
		2 593.0	H	6.33	9.09	20.53	17.77	0.060
		2 682.5	H	6.46	9.31	19.10	16.25	0.042
20 M	QPSK	2 506.0	H	6.21	8.92	21.48	18.77	0.075
		2 593.0	H	6.33	9.09	20.98	18.22	0.066
		2 680.0	H	6.45	9.31	18.04	15.18	0.033
	16QAM	2 506.0	H	6.21	8.92	20.23	17.52	0.056
		2 593.0	H	6.33	9.09	19.25	16.49	0.045
		2 680.0	H	6.45	9.31	17.63	14.77	0.030

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

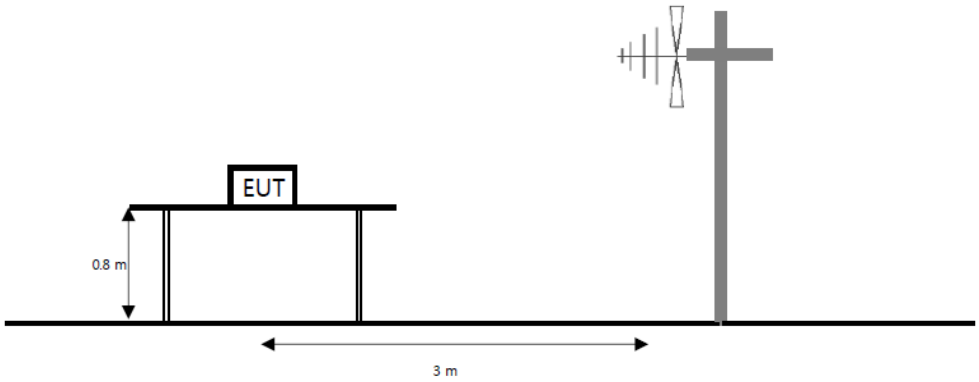
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	V	5.79	7.39	23.23	21.63	0.15
		1 745.0	V	5.74	7.40	21.31	19.65	0.09
		1 779.3	V	5.69	7.45	22.47	20.71	0.12
	16QAM	1 710.7	V	5.79	7.39	22.27	20.67	0.12
		1 745.0	V	5.74	7.40	20.36	18.70	0.07
		1 779.3	V	5.69	7.45	21.59	19.83	0.10
3 M	QPSK	1 711.5	V	5.79	7.38	23.70	22.11	0.16
		1 745.0	V	5.74	7.40	21.22	19.56	0.09
		1 778.5	V	5.69	7.45	22.33	20.57	0.11
	16QAM	1 711.5	V	5.79	7.38	22.73	21.14	0.13
		1 745.0	V	5.74	7.40	20.12	18.46	0.07
		1 778.5	V	5.69	7.45	21.69	19.93	0.10
5 M	QPSK	1 712.5	V	5.79	7.39	23.39	21.79	0.15
		1 745.0	V	5.74	7.40	21.33	19.67	0.09
		1 777.5	V	5.69	7.44	22.79	21.04	0.13
	16QAM	1 712.5	V	5.79	7.39	22.54	20.94	0.12
		1 745.0	V	5.74	7.40	20.54	18.88	0.08
		1 777.5	V	5.69	7.44	22.17	20.42	0.11
10 M	QPSK	1 715.0	V	5.78	7.39	23.13	21.52	0.14
		1 745.0	V	5.74	7.40	21.43	19.77	0.09
		1 775.0	V	5.70	7.44	23.02	21.28	0.13
	16QAM	1 715.0	V	5.78	7.39	22.48	20.87	0.12
		1 745.0	V	5.74	7.40	20.74	19.08	0.08
		1 775.0	V	5.70	7.44	22.11	20.37	0.11
15 M	QPSK	1 717.5	V	5.78	7.39	23.21	21.60	0.14
		1 745.0	V	5.74	7.40	23.31	21.65	0.15
		1 772.5	V	5.71	7.42	22.62	20.91	0.12
	16QAM	1 717.5	V	5.78	7.39	22.76	21.15	0.13
		1 745.0	V	5.74	7.40	22.66	21.00	0.13
		1 772.5	V	5.71	7.42	21.82	20.11	0.10
20 M	QPSK	1 720.0	V	5.77	7.40	23.41	21.78	0.15
		1 745.0	V	5.74	7.40	23.11	21.45	0.14
		1 770.0	V	5.71	7.42	22.75	21.04	0.13
	16QAM	1 720.0	V	5.77	7.40	22.76	21.13	0.13
		1 745.0	V	5.74	7.40	22.35	20.69	0.12
		1 770.0	V	5.71	7.42	21.86	20.15	0.10

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

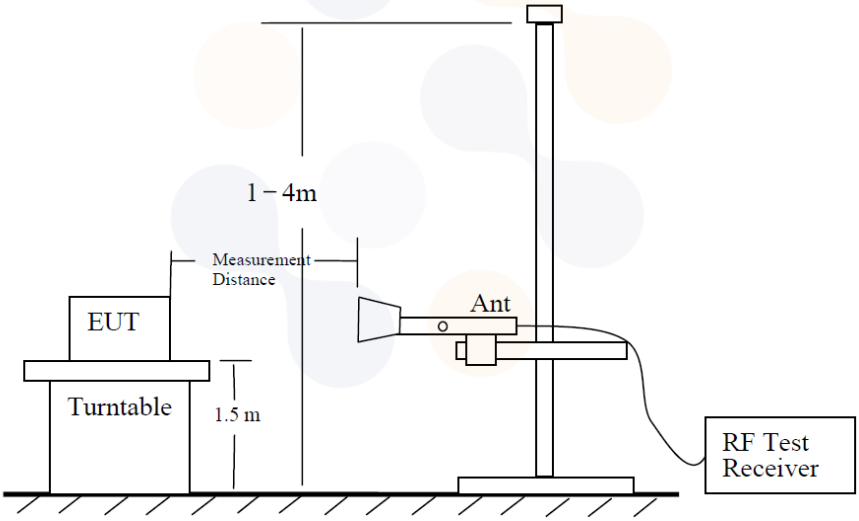
7.8. Radiated Spurious Emissions

Test setup

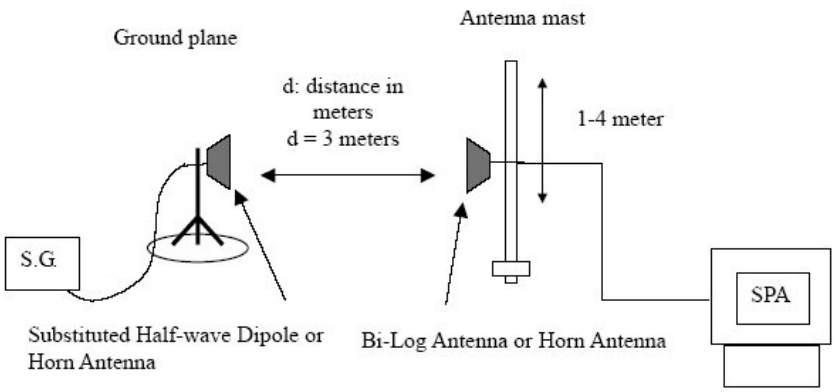
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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(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 ㎒)

Test mode : LTE Band 2
Frequency(㎒) : 1 857.5
Channel : 18675
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 733.44	H	8.58	11.39	-54.89	-57.70	-13.00	44.70
	5 594.79	V	10.52	13.92	-51.80	-55.20	-13.00	42.20
	7 461.89	V	12.05	16.08	-50.67	-54.70	-13.00	41.70
	9 327.72	H	13.20	18.30	-48.30	-53.40	-13.00	40.40

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 774.93	V	8.63	11.28	-56.05	-58.70	-13.00	45.70
	5 663.73	V	10.53	13.87	-52.36	-55.70	-13.00	42.70
	7 553.17	H	12.14	16.21	-49.63	-53.70	-13.00	40.70
	9 440.06	V	13.20	18.09	-47.51	-52.40	-13.00	39.40

Test mode : LTE Band 2
Frequency(㎒) : 1 902.5
Channel : 19125
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 790.25	V	8.65	11.30	-56.45	-59.10	-13.00	46.10
	5 686.07	H	10.54	13.91	-51.83	-55.20	-13.00	42.20
	7 578.07	H	12.16	16.24	-50.12	-54.20	-13.00	41.20
	9 473.89	V	13.20	18.13	-48.07	-53.00	-13.00	40.00

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

Test mode : LTE Band 5
Frequency(㎒) : 829.0
Channel : 20450
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 668.75	H	5.89	7.23	-59.86	-61.20	-13.00	48.20
	2 505.31	V	6.21	8.92	-55.39	-58.10	-13.00	45.10
	3 334.89	V	7.84	10.62	-55.42	-58.20	-13.00	45.20
	4 169.80	V	8.80	11.74	-53.76	-56.70	-13.00	43.70

Test mode : LTE Band 5
Frequency(㎒) : 836.5
Channel : 20525
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 682.29	V	5.86	7.27	-60.59	-62.00	-13.00	49.00
	2 522.95	H	6.23	8.96	-55.27	-58.00	-13.00	45.00
	3 363.61	V	7.92	10.68	-50.24	-53.00	-13.00	40.00
	4 208.78	V	8.77	11.80	-54.57	-57.60	-13.00	44.60

Test mode : LTE Band 5
Frequency(㎒) : 844.0
Channel : 20600
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 686.80	V	5.85	7.28	-59.67	-61.10	-13.00	48.10
	2 535.26	V	6.25	8.99	-54.26	-57.00	-13.00	44.00
	3 376.33	V	7.95	10.71	-50.94	-53.70	-13.00	40.70
	4 221.09	V	8.77	11.83	-53.74	-56.80	-13.00	43.80

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

Test mode : LTE Band 12/17
Frequency(㎒) : 704.0
Channel : 23060
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 416.84	H	5.75	6.70	-61.55	-62.50	-13.00	49.50
	2 129.08	V	5.38	8.22	-55.16	-58.00	-13.00	45.00
	2 833.53	H	6.67	9.61	-54.56	-57.50	-13.00	44.50
	3 544.95	H	8.35	11.05	-55.60	-58.30	-13.00	45.30

Test mode : LTE Band 12/17
Frequency(㎒) : 707.5
Channel : 23095
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 414.79	H	5.74	6.69	-62.15	-63.10	-13.00	50.10
	2 120.06	V	5.36	8.20	-54.96	-57.80	-13.00	44.80
	2 830.25	H	6.66	9.61	-54.45	-57.40	-13.00	44.40
	3 538.39	H	8.35	11.03	-54.32	-57.00	-13.00	44.00

Test mode : LTE Band 12/17
Frequency(㎒) : 711.0
Channel : 23130
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 430.79	H	5.84	6.73	-61.31	-62.20	-13.00	49.20
	2 148.78	H	5.43	8.25	-56.08	-58.90	-13.00	45.90
	2 865.12	V	6.71	9.68	-53.93	-56.90	-13.00	43.90
	3 579.41	H	8.40	10.78	-54.92	-57.30	-13.00	44.30

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
Frequency(㎒) : 2 498.5
Channel : 39675
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 004.98	H	10.10	13.16	-52.94	-56.00	-25.00	31.00
	7 502.11	V	12.10	16.15	-47.95	-52.00	-25.00	27.00
	10 002.43	V	13.10	18.57	-46.93	-52.40	-25.00	27.40
	12 502.74	V	13.20	21.09	-42.51	-50.40	-25.00	25.40

Test mode : LTE Band 41
Frequency(㎒) : 2 593.0
Channel : 40620
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 190.09	V	10.25	13.55	-51.70	-55.00	-25.00	30.00
	7 784.88	V	12.33	16.48	-49.35	-53.50	-25.00	28.50
	10 380.95	V	13.10	19.07	-44.83	-50.80	-25.00	25.80
	12 978.93	V	13.49	21.42	-42.57	-50.50	-25.00	25.50

Test mode : LTE Band 41
Frequency(㎒) : 2 687.5
Channel : 41565
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 378.40	H	10.40	13.66	-53.34	-56.60	-25.00	31.60
	8 068.94	V	12.57	17.08	-44.09	-48.60	-25.00	23.60
	10 758.84	V	13.15	19.41	-40.94	-47.20	-25.00	22.20
	13 447.46	V	14.04	21.94	-42.30	-50.20	-25.00	25.20

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(㎒) : 1 711.5
Channel : 131987
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 425.13	V	8.09	10.81	-56.28	-59.00	-13.00	46.00
	5 135.84	V	10.21	13.49	-53.02	-56.30	-13.00	43.30
	6 848.46	V	11.22	15.52	-49.30	-53.60	-13.00	40.60
	8 556.62	H	13.02	17.40	-50.22	-54.60	-13.00	41.60

Test mode : LTE Band 66/4
Frequency(㎒) : 1 745.0
Channel : 132322
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 491.51	V	8.28	10.94	-56.44	-59.10	-13.00	46.10
	5 237.33	H	10.29	13.39	-53.40	-56.50	-13.00	43.50
	6 982.51	V	11.38	15.64	-50.34	-54.60	-13.00	41.60
	8 727.05	H	13.09	17.75	-48.84	-53.50	-13.00	40.50

Test mode : LTE Band 66/4
Frequency(㎒) : 1 778.5
Channel : 132657
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 559.81	H	8.37	10.74	-55.53	-57.90	-13.00	44.90
	5 333.08	H	10.37	13.61	-52.86	-56.10	-13.00	43.10
	7 115.28	H	11.56	15.68	-49.88	-54.00	-13.00	41.00
	8 894.29	H	13.16	17.62	-48.94	-53.40	-13.00	40.40

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

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40-N	101462	23.01.06
Power Divider	Aeroflex/ Weinschel,Inc	1580-1	NX380	22.07.29
Vector Signal Generator	R&S	SMBV100A	257566	22.07.09
Signal Generator	R&S	SMB100A	176206	23.01.19
DC Power Supply	AGILENT	E3632A	MY40007371	22.05.10
Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-1	22.12.21
Wideband Radio Communication Tester	R&S	CMW500	168683	23.03.10
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	22.05.11
Horn Antenna	ETS.LINDGREN	3117	00227509	22.09.27
Horn Antenna	ETS.lindgren	3116	00086632	23.01.25
Horn Antenna	ETS.lindgren	3116	00086635	22.05.17
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	22.08.20
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	22.08.20
Broadband Amplifier	SONOMA INSTRUMENT	315	300314	23.01.19
Amplifier	LTC MICROWAVE	LLA01185522Q-B	139	22.07.19
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	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	N/A
Antenna Stand	innco systems GmbH	AS1500-EP-10kg	N/A	N/A
Compact Table	innco systems GmbH	CT1000	N/A	N/A

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

End of test report