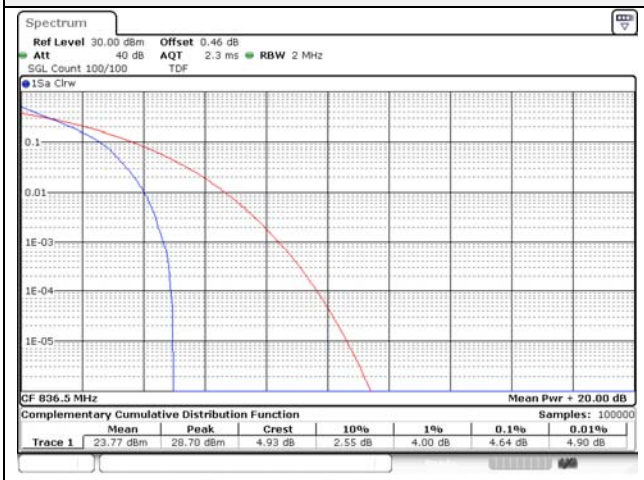
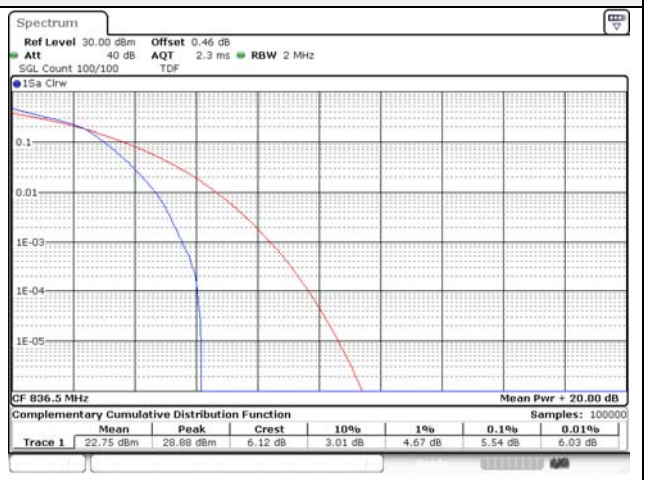
Test mode: LTE Band 5

1.4M BW QPSK Mid ch.

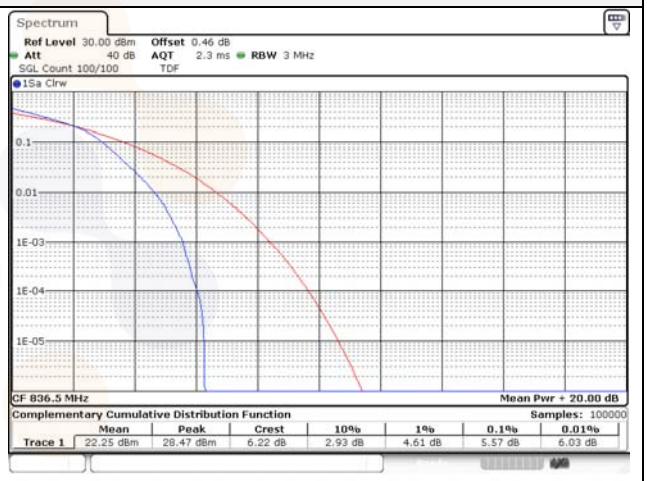


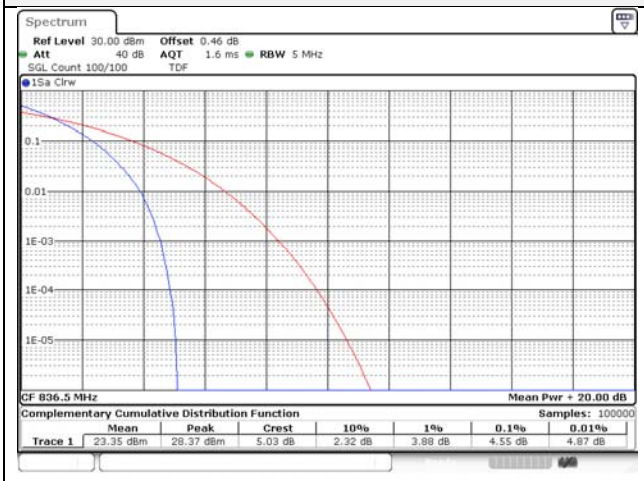
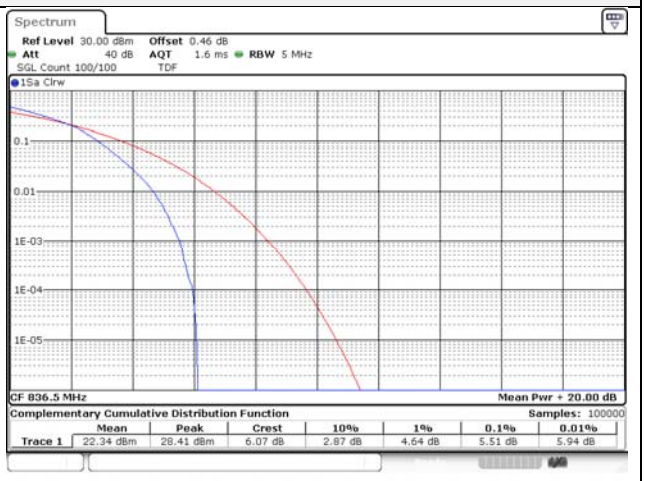
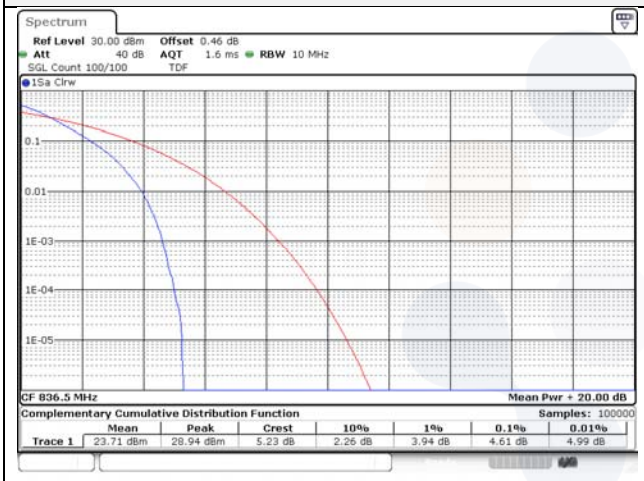
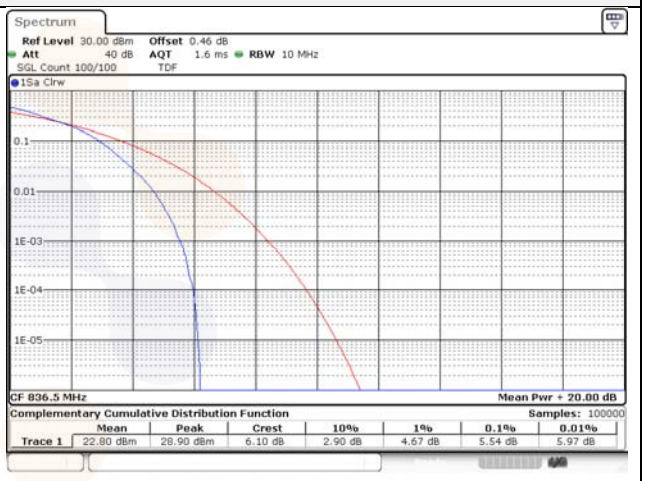
1.4M BW 16QAM Mid ch.



3M BW QPSK Mid ch.

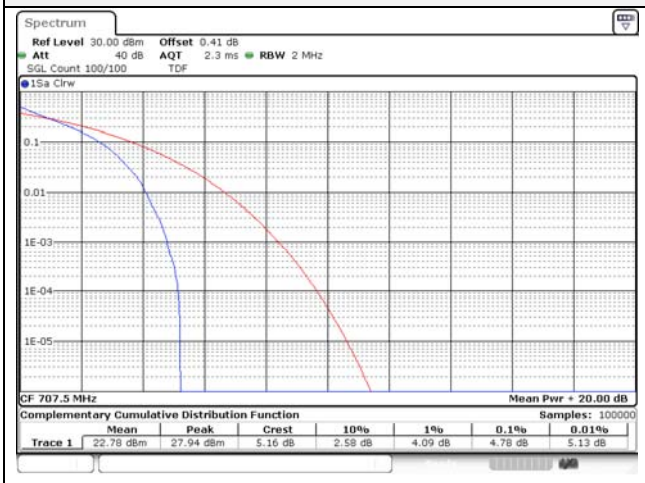
3M BW 16QAM Mid ch.



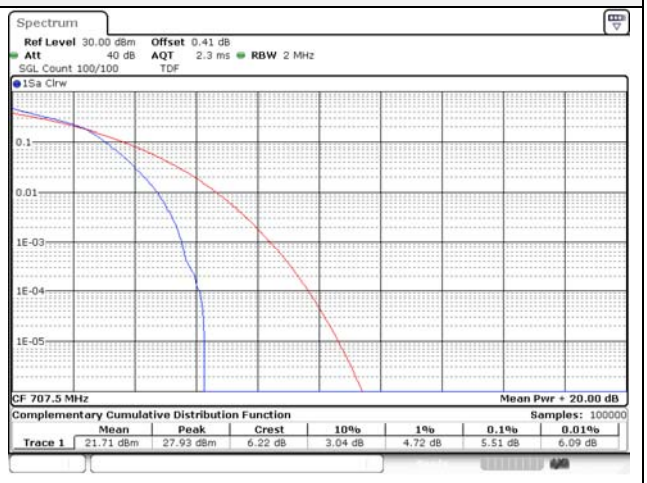
5M BW QPSK Mid ch.	5M BW 16QAM Mid ch.
	
10M BW QPSK Mid ch.	**10M BW 16QAM Mid ch.**
	

Test mode: LTE Band 12

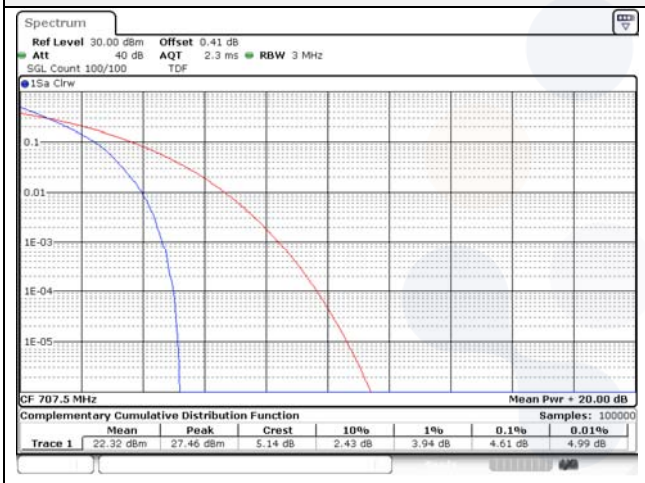
1.4M BW QPSK Mid ch.



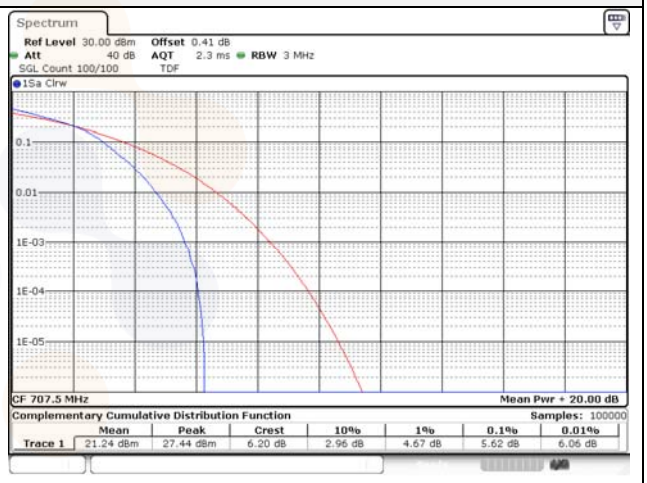
1.4M BW 16QAM Mid ch.



3M BW QPSK Mid ch.

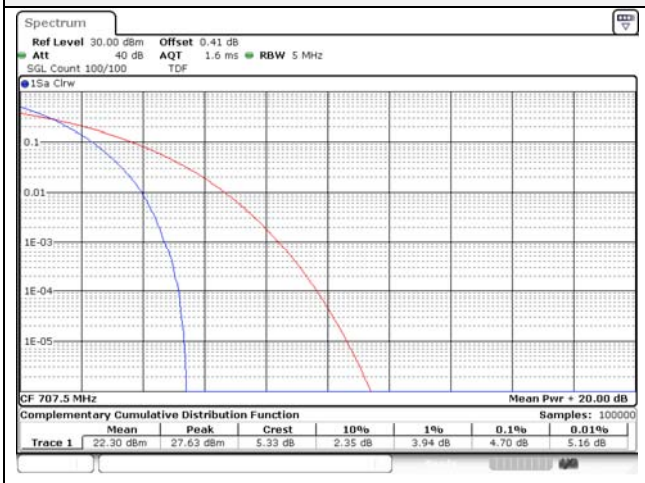


3M BW 16QAM Mid ch.

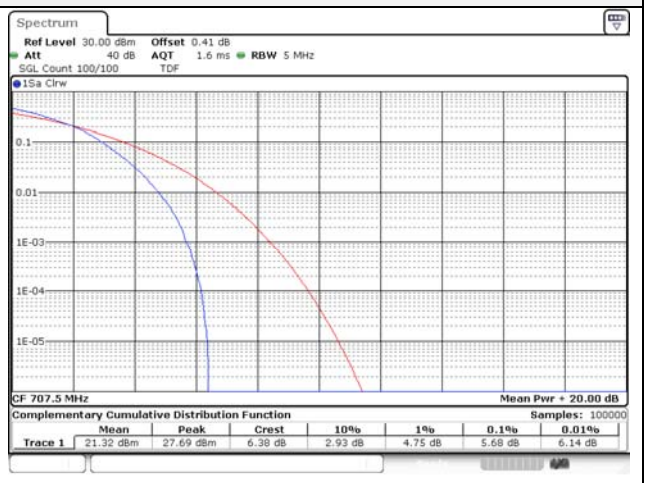


Test mode: LTE Band 12/17

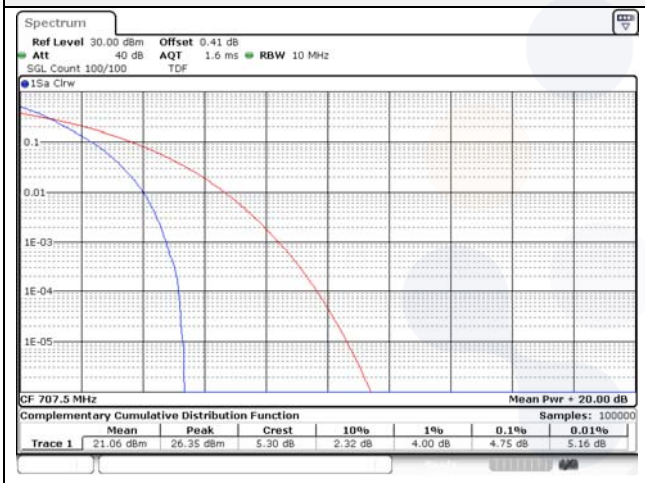
5M BW QPSK Mid ch.



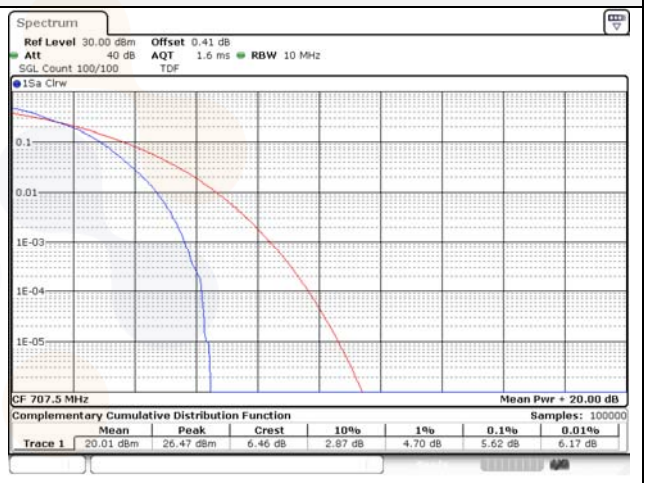
5M BW 16QAM Mid ch.



10M BW QPSK Mid ch.

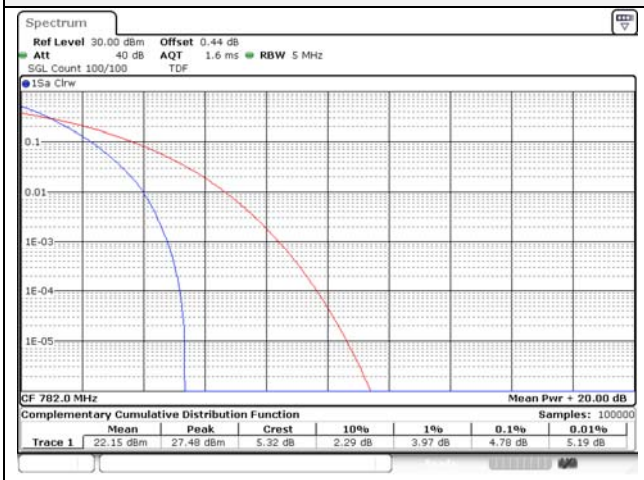


10M BW 16QAM Mid ch.

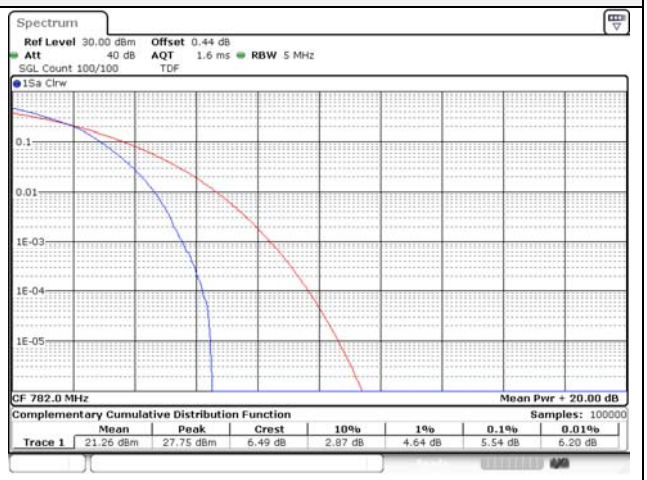


Test mode: LTE Band 13

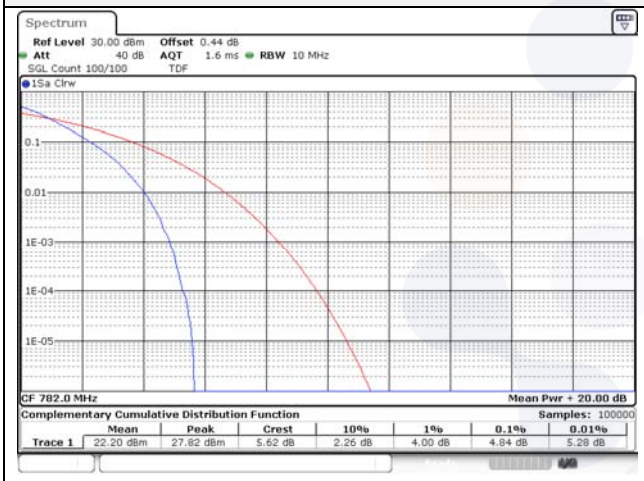
5M BW QPSK Mid ch.



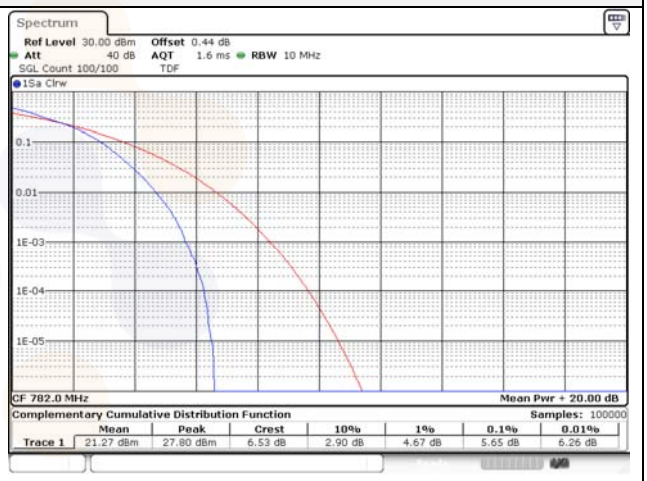
5M BW 16QAM Mid ch.



10M BW QPSK Mid ch.

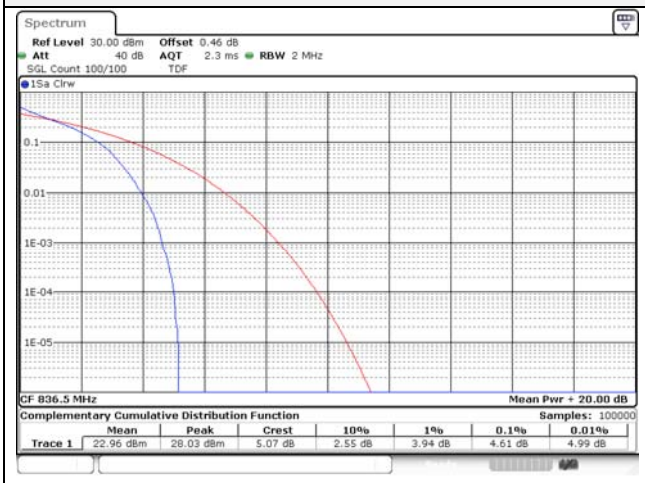


10M BW 16QAM Mid ch.

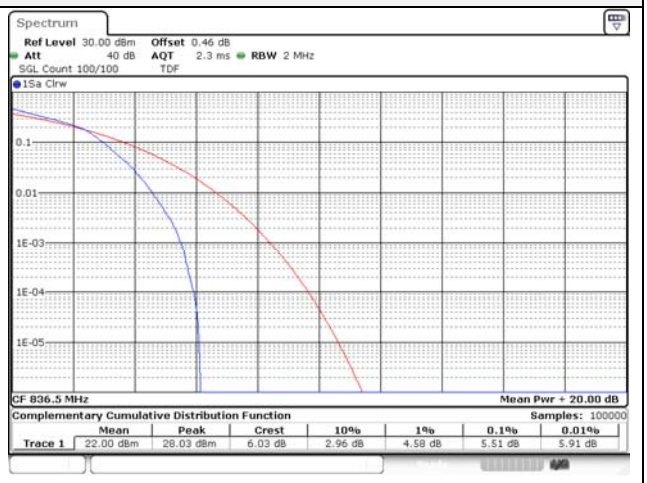


Test mode: LTE Band 26

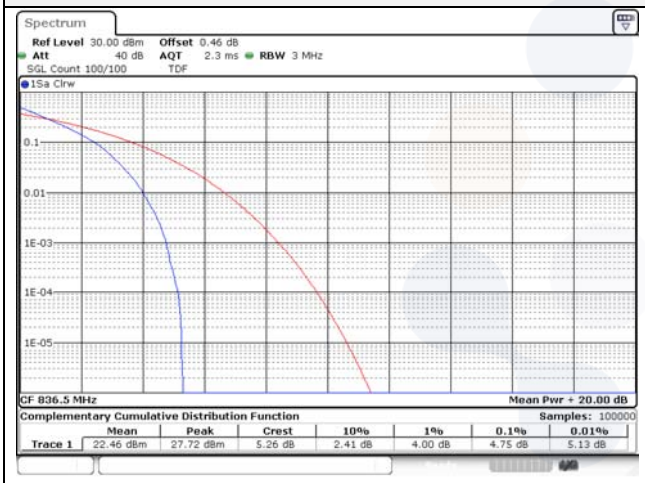
1.4M BW QPSK Mid ch.



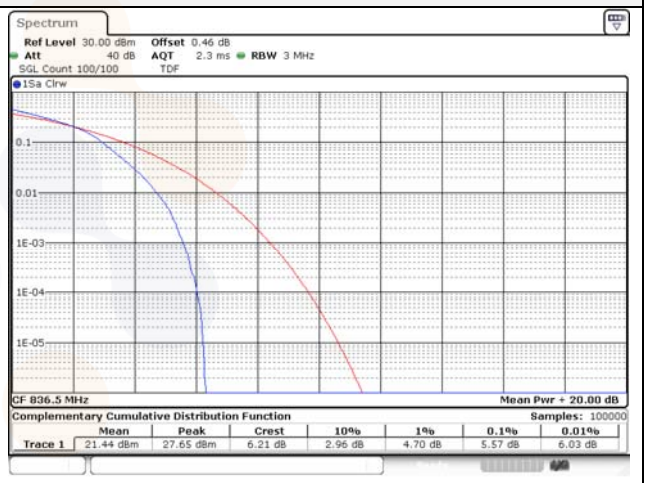
1.4M BW 16QAM Mid ch.



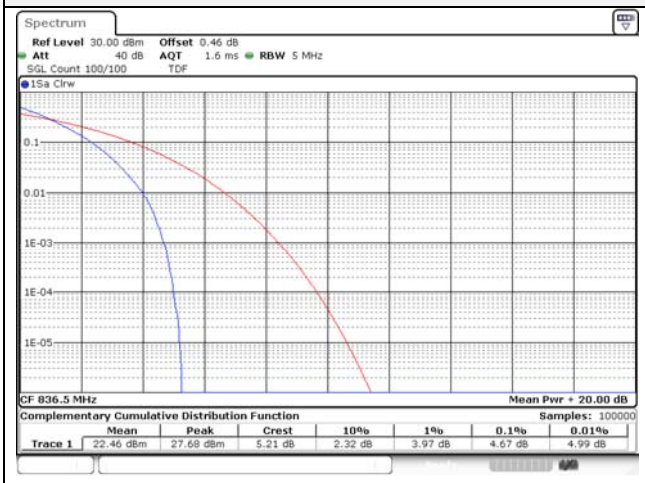
3M BW QPSK Mid ch.



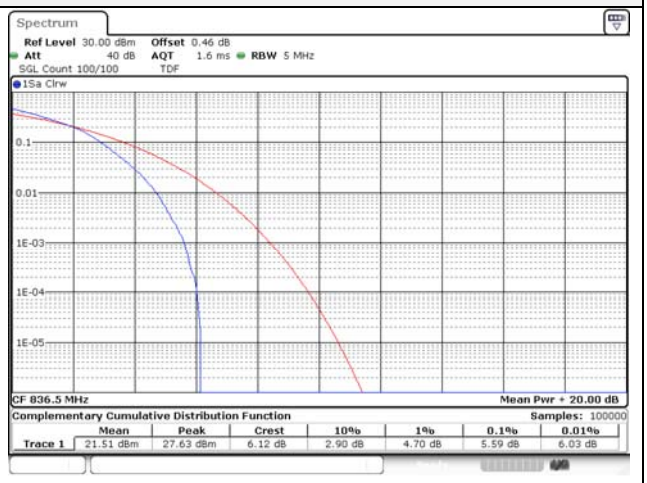
3M BW 16QAM Mid ch.

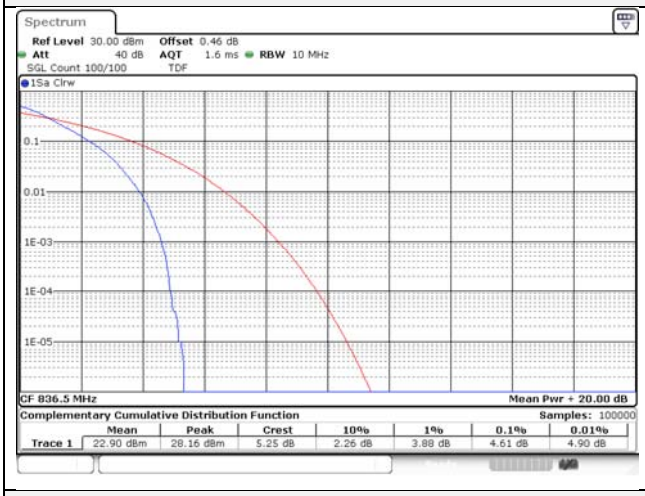
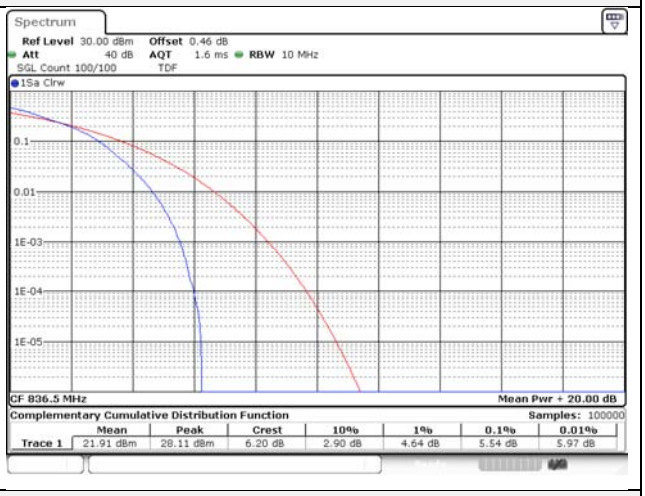
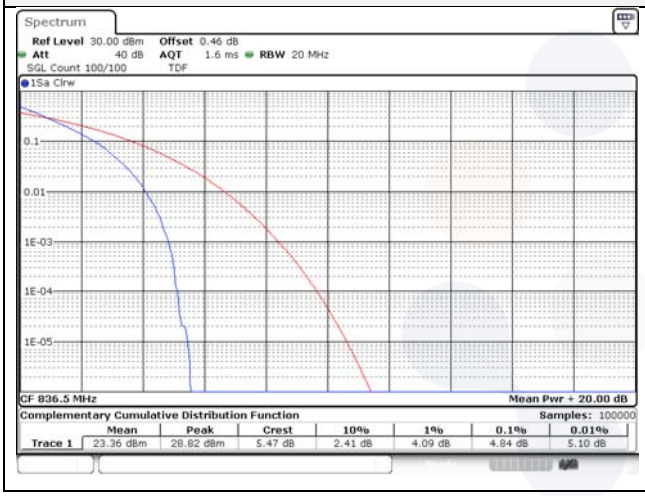
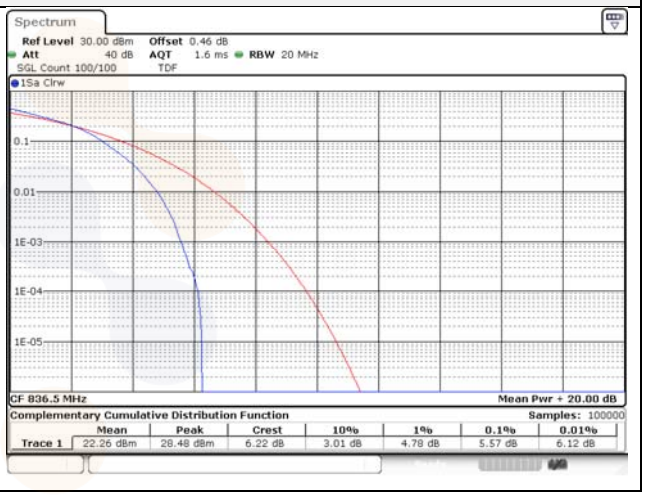


5M BW QPSK Mid ch.

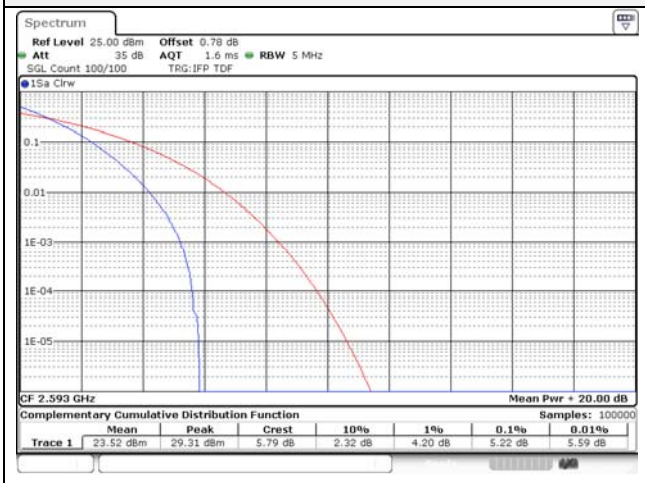
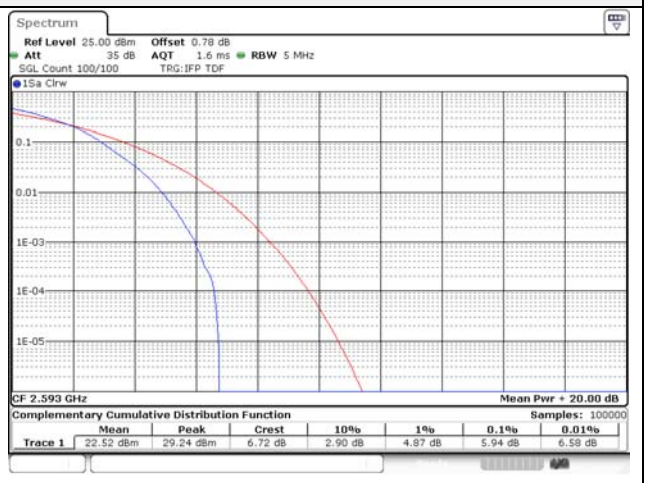
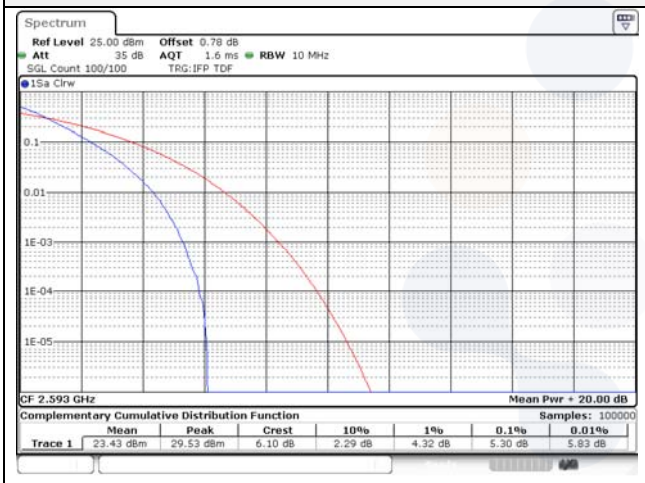
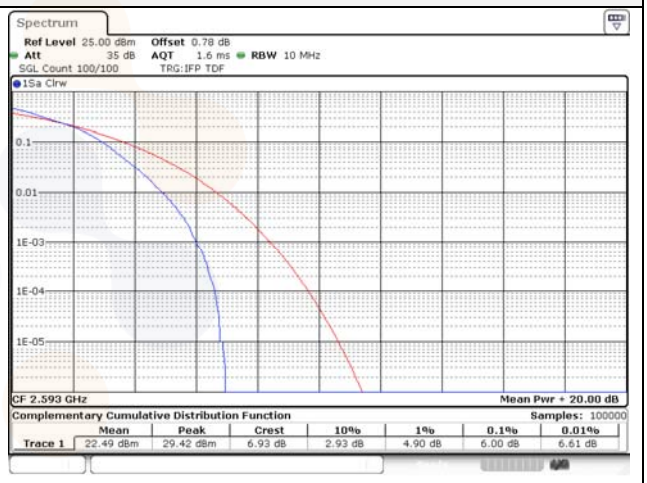


5M BW 16QAM Mid ch.

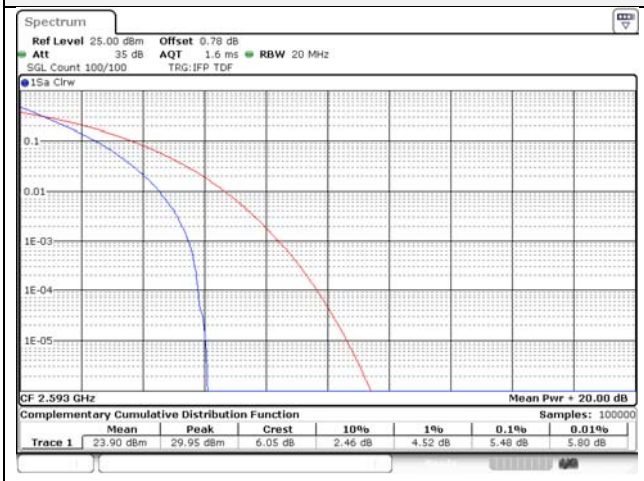


10M BW QPSK Mid ch.	10M BW 16QAM Mid ch.
	
15M BW QPSK Mid ch.	**15M BW 16QAM Mid ch.**
	

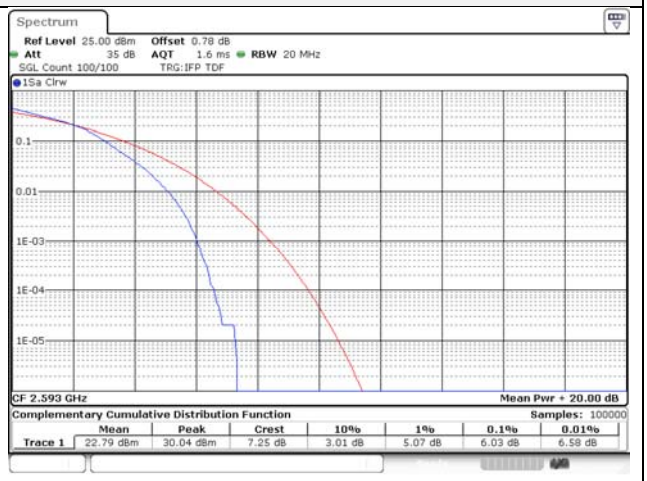
Test mode: LTE Band 41(PC2)

5M BW QPSK Mid ch.	5M BW 16QAM Mid ch.
	
10M BW QPSK Mid ch.	**10M BW 16QAM Mid ch.**
	

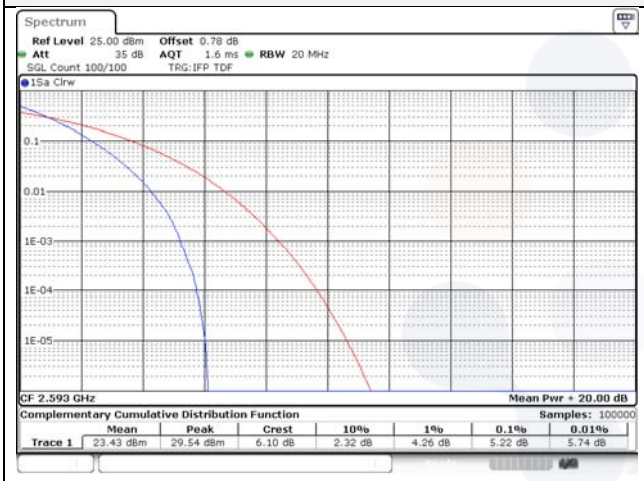
15M BW QPSK Mid ch.



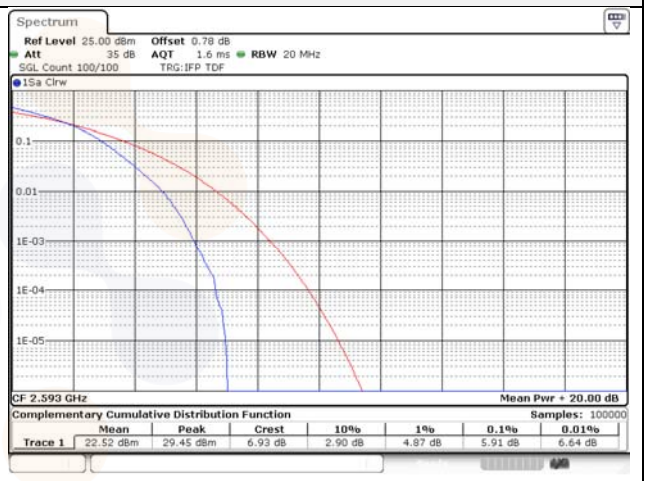
15M BW 16QAM Mid ch.



20M BW QPSK Mid ch.

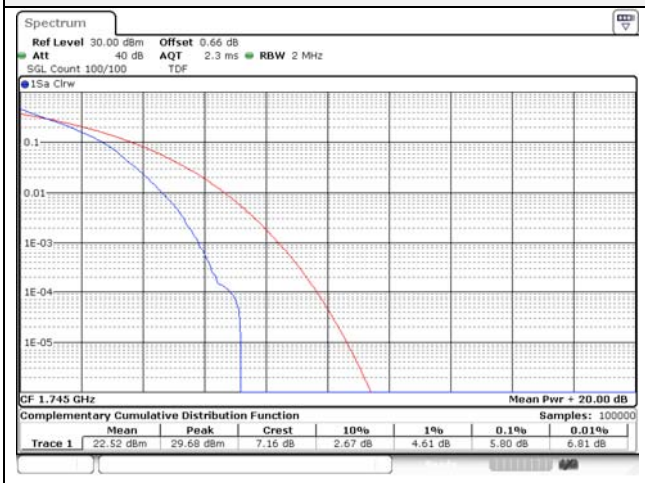


20M BW 16QAM Mid ch.

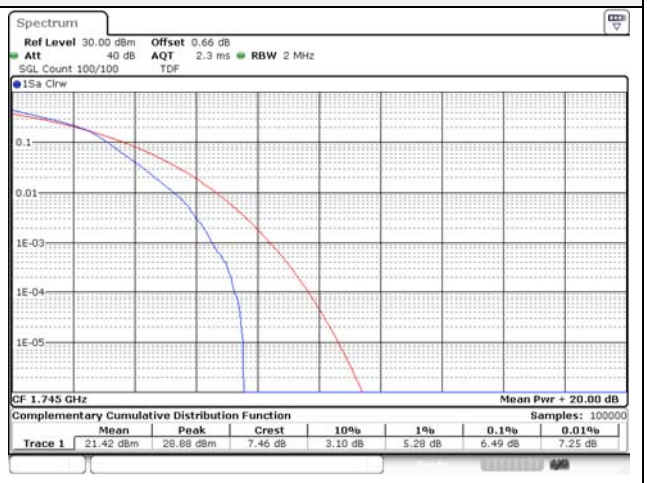


Test mode: LTE Band 66/4

1.4M BW QPSK Mid ch.

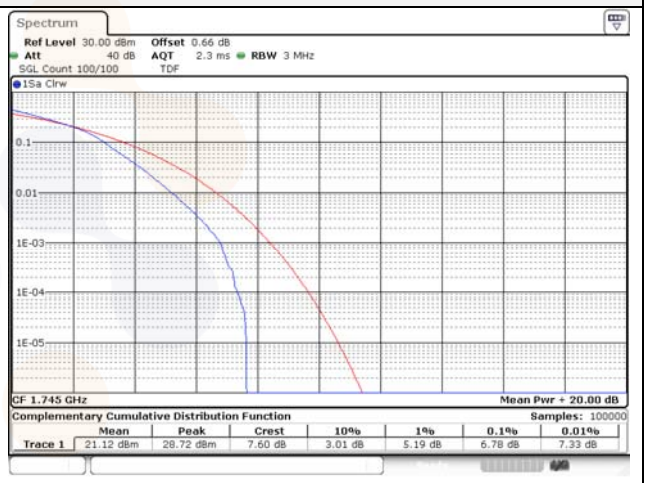


1.4M BW 16QAM Mid ch.

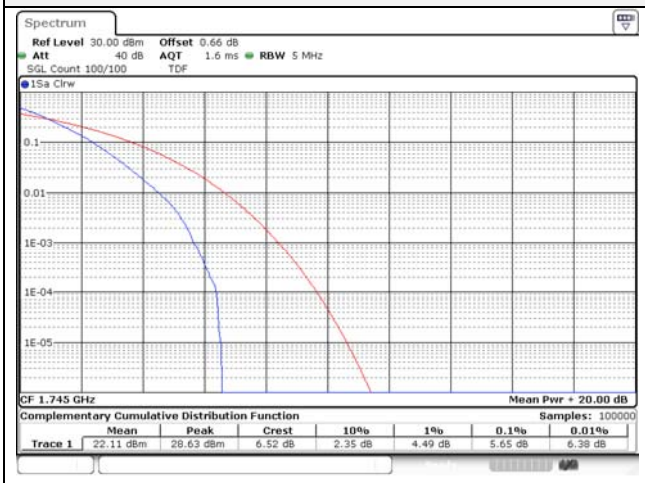


3M BW QPSK Mid ch.

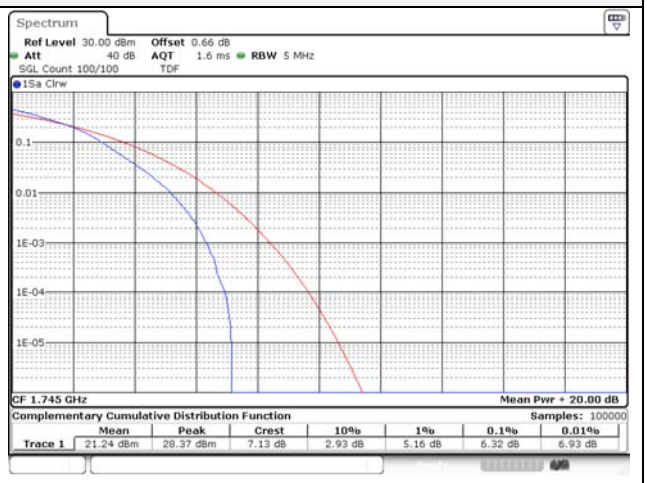
3M BW 16QAM Mid ch.



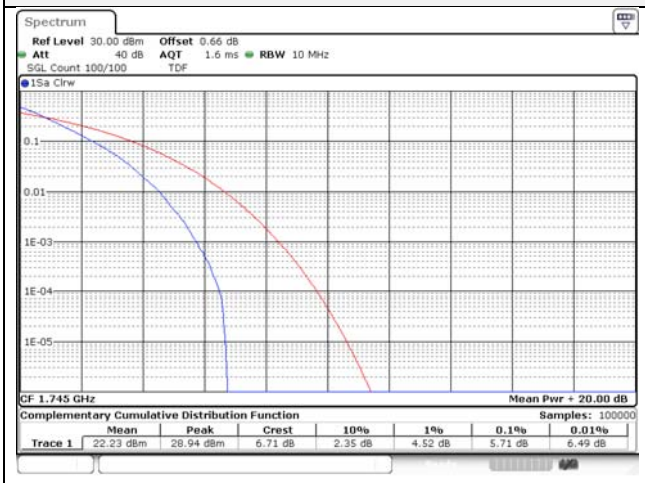
5M BW QPSK Mid ch.



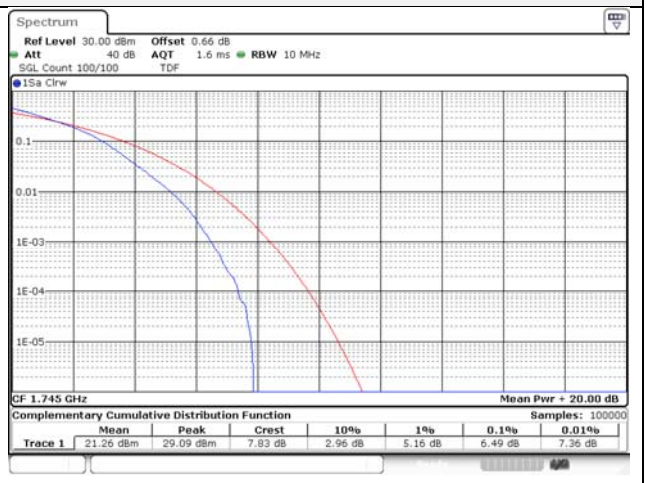
5M BW 16QAM Mid ch.



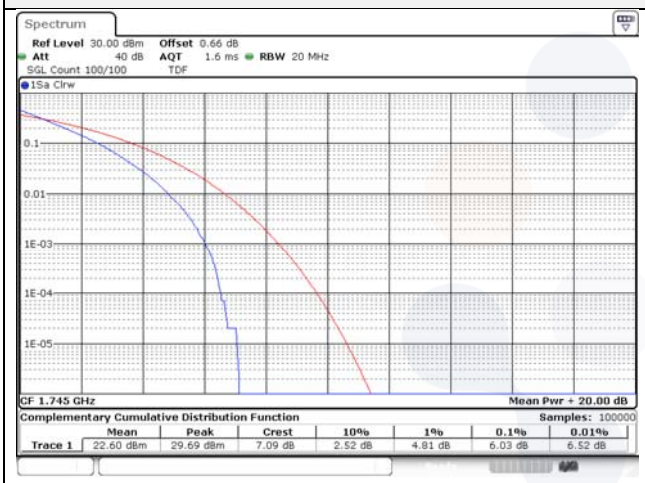
10M BW QPSK Mid ch.



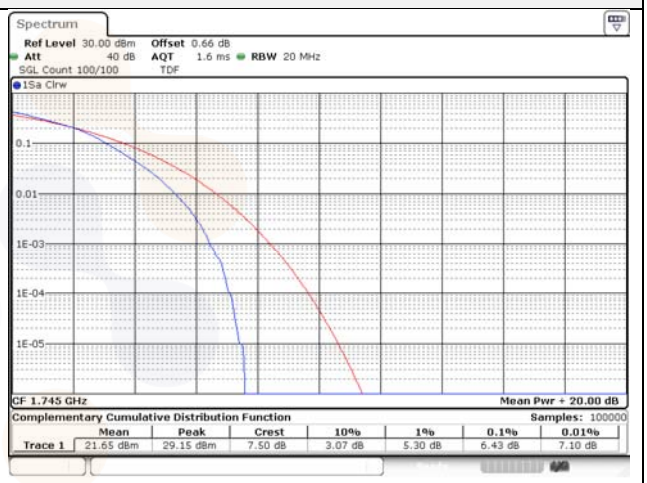
10M BW 16QAM Mid ch.



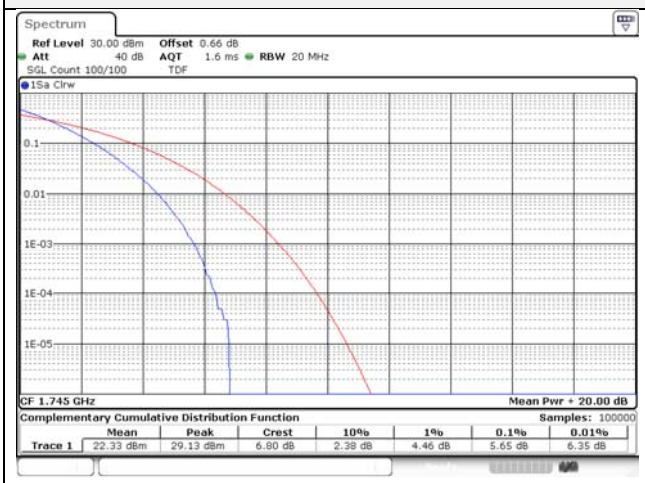
15M BW QPSK Mid ch.



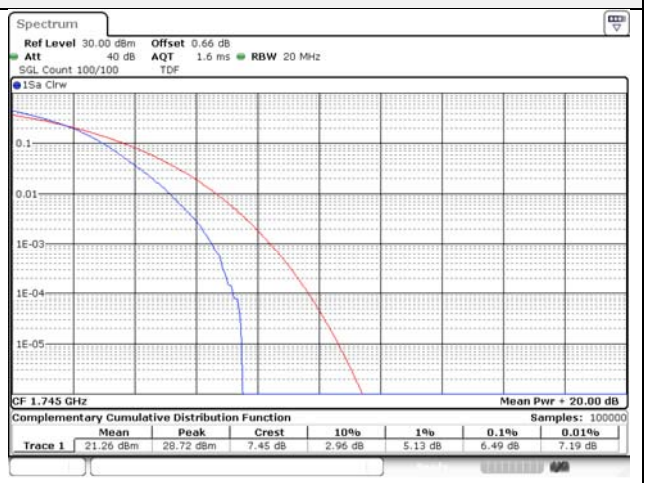
15M BW 16QAM Mid ch.



20M BW QPSK Mid ch.

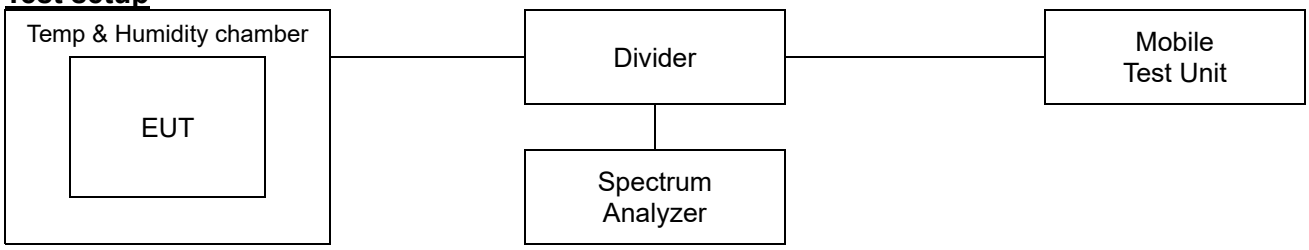


20M BW 16QAM Mid ch.



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 radio beacons (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.

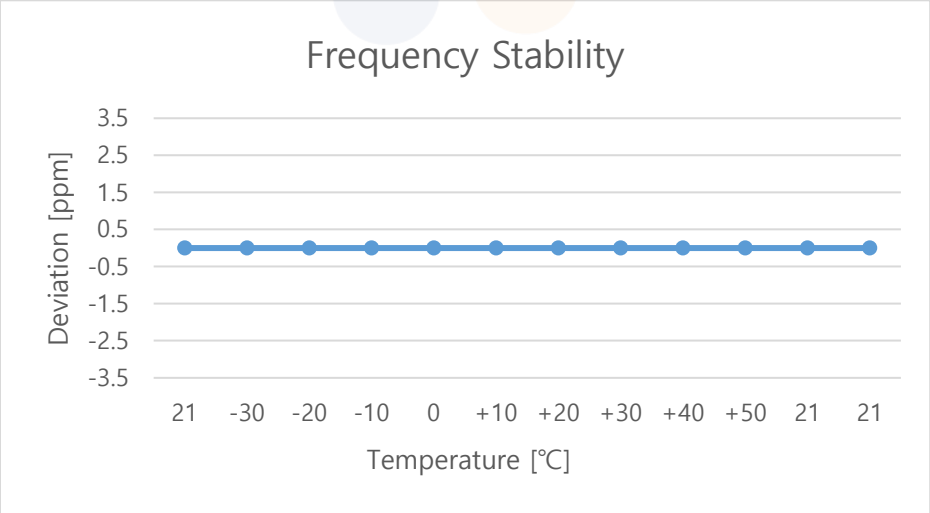
Test procedure
ANSI 63.26-2015 – Section 5.6

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

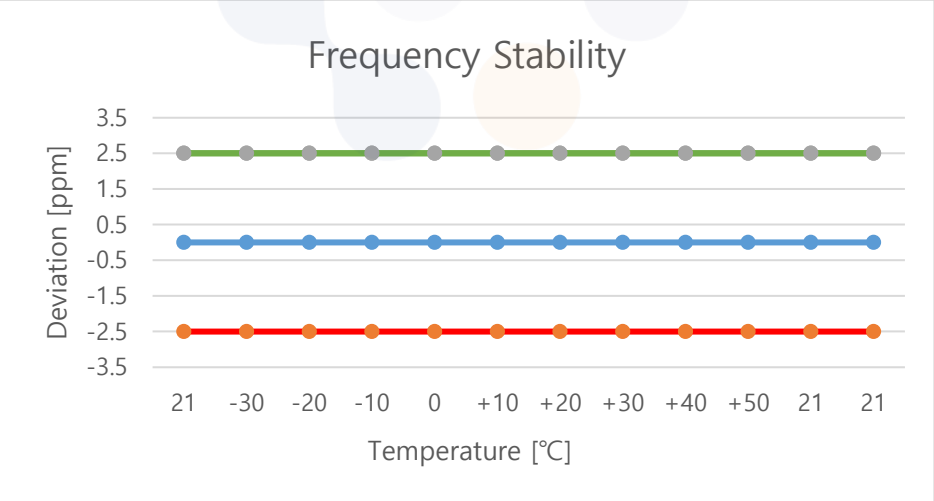
Test mode : LTE Band 2
Frequency (㎐) : 1 880 000 000
Channel : 18900
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+21(Ref)	1,880,000,002	1.72	0.0	0.000 000
		-30	1,879,999,997	-3.09	0.0	0.000 000
		-20	1,879,999,998	-2.00	0.0	0.000 000
		-10	1,879,999,998	-1.73	0.0	0.000 000
		0	1,879,999,999	-1.19	0.0	0.000 000
		+10	1,879,999,998	-1.66	0.0	0.000 000
		+20	1,880,000,003	2.89	0.0	0.000 000
		+30	1,880,000,004	3.63	0.0	0.000 000
		+40	1,880,000,005	5.34	0.0	0.000 000
		+50	1,880,000,003	3.39	0.0	0.000 000
115%	4.43	+21(Ref)	1,880,000,001	1.43	0.0	0.000 000
End point	3.40	+21(Ref)	1,880,000,001	1.00	0.0	0.000 000



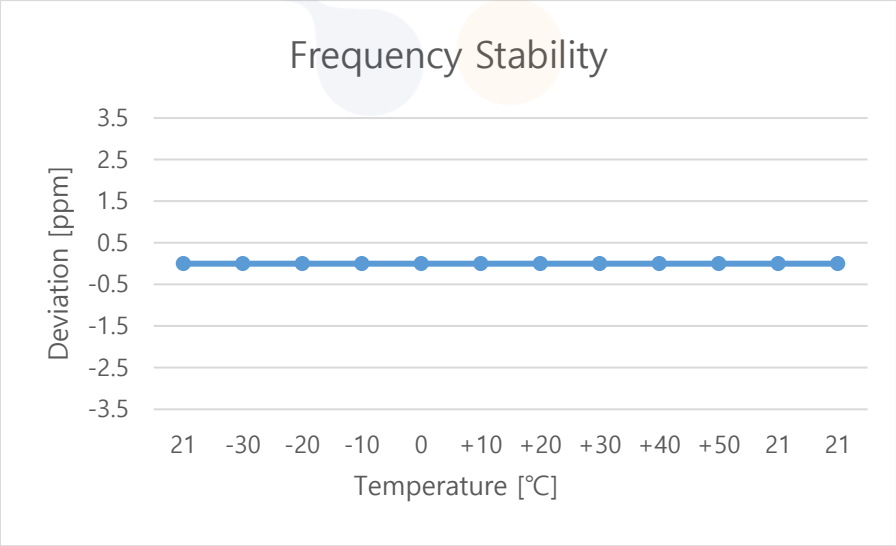
Test mode : LTE Band 5
Frequency (㎐) : 836 500 000
Channel : 20525
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+21(Ref)	836,500,000	-0.41	0.0	0.000 000
		-30	836,500,004	-3.76	0.0	0.000 000
		-20	836,500,003	-2.95	0.0	0.000 000
		-10	836,500,002	-1.70	0.0	0.000 000
		0	836,500,002	-2.13	0.0	0.000 000
		+10	836,500,002	-1.86	0.0	0.000 000
		+20	836,500,001	-0.93	0.0	0.000 000
		+30	836,499,999	1.13	0.0	0.000 000
		+40	836,499,998	2.19	0.0	0.000 000
		+50	836,499,997	3.30	0.0	0.000 000
115%	4.43	+21(Ref)	836,500,001	-0.64	0.0	0.000 000
End point	3.40	+21(Ref)	836,500,001	-0.62	0.0	0.000 000



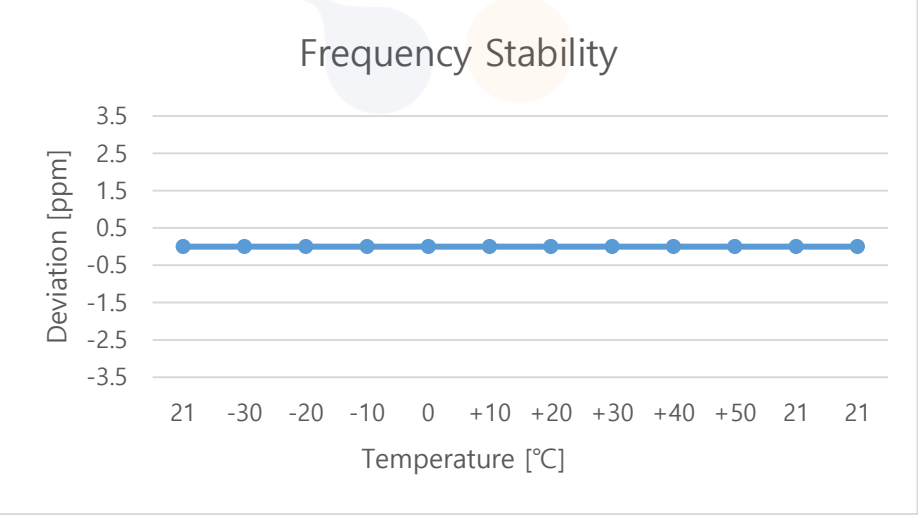
Test mode : LTE Band 12/17
Frequency (㎐) : 707 500 000
Channel : 23095
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+21(Ref)	707,500,001	0.54	0.0	0.000 000
		-30	707,499,998	-1.97	0.0	0.000 000
		-20	707,499,998	-1.83	0.0	0.000 000
		-10	707,499,999	-1.22	0.0	0.000 000
		0	707,499,999	-1.10	0.0	0.000 000
		+10	707,499,999	-0.93	0.0	0.000 000
		+20	707,500,001	0.73	0.0	0.000 000
		+30	707,500,001	0.62	0.0	0.000 000
		+40	707,500,001	1.23	0.0	0.000 000
		+50	707,500,002	1.56	0.0	0.000 000
115%	4.43	+21(Ref)	707,500,001	0.97	0.0	0.000 000
End point	3.40	+21(Ref)	707,500,001	1.03	0.0	0.000 000



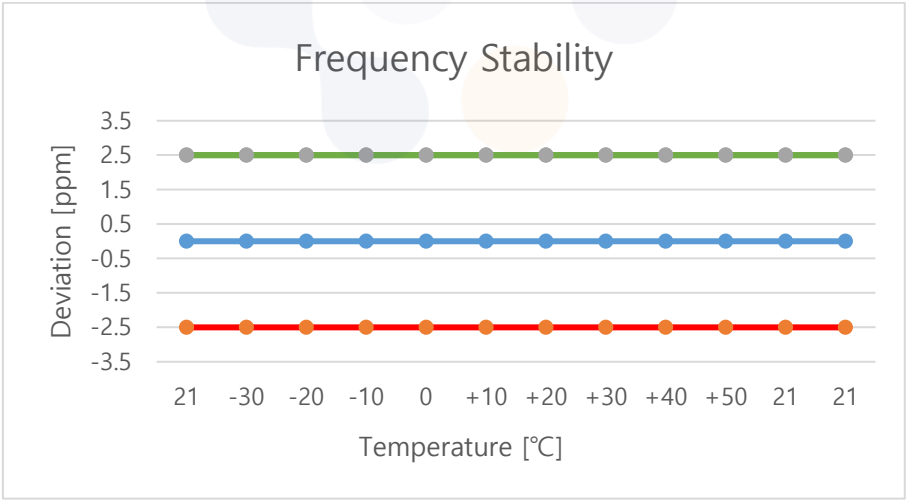
Test mode : LTE Band 13
Frequency (㎐) : 782 000 000
Channel : 23230
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+21(Ref)	781,999,999	-1.04	0.0	0.000 000
		-30	782,000,001	1.44	0.0	0.000 000
		-20	782,000,001	0.93	0.0	0.000 000
		-10	782,000,001	1.46	0.0	0.000 000
		0	782,000,001	1.24	0.0	0.000 000
		+10	781,999,999	-0.92	0.0	0.000 000
		+20	781,999,999	-1.19	0.0	0.000 000
		+30	781,999,998	-2.00	0.0	0.000 000
		+40	781,999,998	-1.83	0.0	0.000 000
		+50	781,999,998	-2.13	0.0	0.000 000
115%	4.43	+21(Ref)	781,999,999	-1.20	0.0	0.000 000
End point	3.40	+21(Ref)	781,999,999	-1.49	0.0	0.000 000



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%	3.85	+21(Ref)	836,500,001	0.54	0.0	0.000 000
		-30	836,499,998	-2.40	0.0	0.000 000
		-20	836,499,998	-1.62	0.0	0.000 000
		-10	836,499,998	-1.53	0.0	0.000 000
		0	836,499,999	-1.02	0.0	0.000 000
		+10	836,500,000	0.34	0.0	0.000 000
		+20	836,500,001	0.92	0.0	0.000 000
		+30	836,500,001	0.64	0.0	0.000 000
		+40	836,500,001	1.17	0.0	0.000 000
		+50	836,500,001	1.40	0.0	0.000 000
115%	4.43	+21(Ref)	836,500,000	0.13	0.0	0.000 000
End point	3.40	+21(Ref)	836,500,000	0.40	0.0	0.000 000



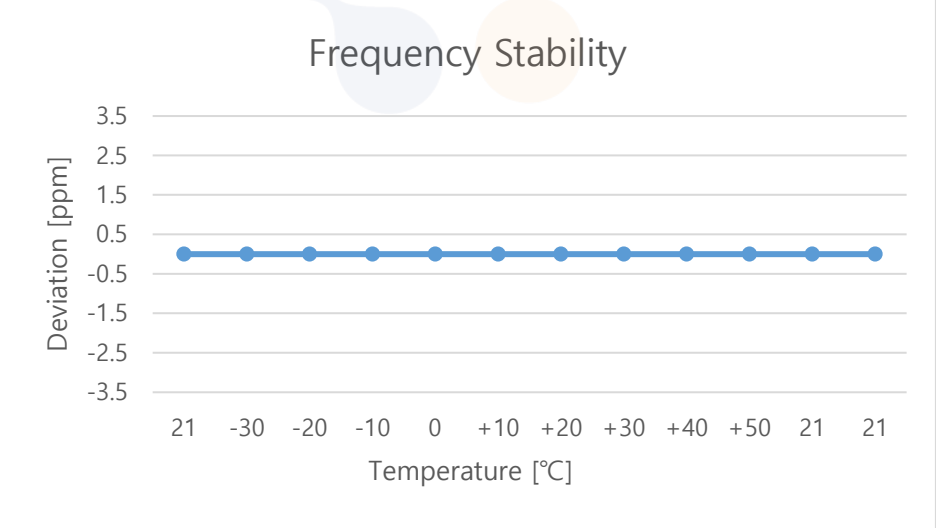
Test mode : LTE Band 41(PC2)

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	+21(Ref)	2,593,000,001	0.86	0.0	0.000 000
		-30	2,592,999,996	-3.57	0.0	0.000 000
		-20	2,592,999,998	-2.46	0.0	0.000 000
		-10	2,592,999,999	-1.07	0.0	0.000 000
		0	2,592,999,999	-0.60	0.0	0.000 000
		+10	2,593,000,000	-0.29	0.0	0.000 000
		+20	2,593,000,001	0.90	0.0	0.000 000
		+30	2,593,000,001	1.09	0.0	0.000 000
		+40	2,593,000,003	3.20	0.0	0.000 000
		+50	2,593,000,006	5.52	0.0	0.000 000
115%	4.43	+21(Ref)	2,593,000,001	0.87	0.0	0.000 000
End point	3.40	+21(Ref)	2,593,000,001	0.79	0.0	0.000 000



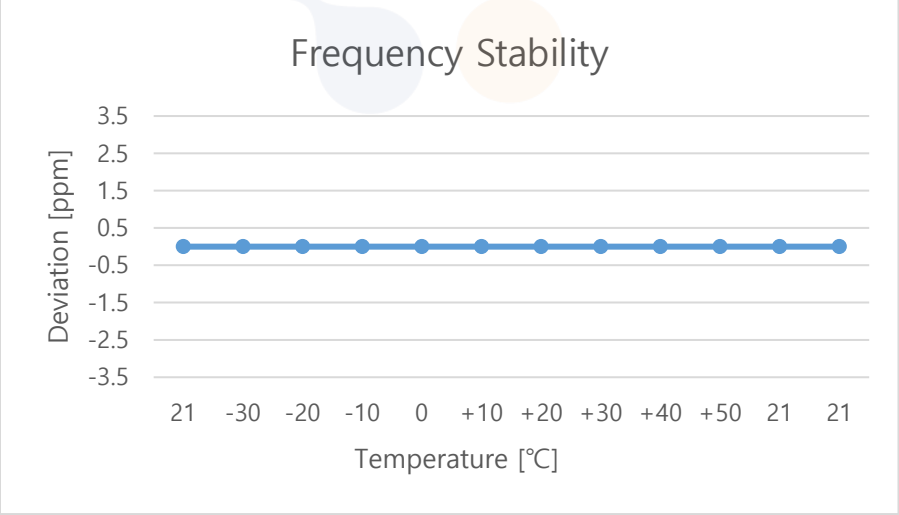
Test mode : LTE Band 66/4

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.

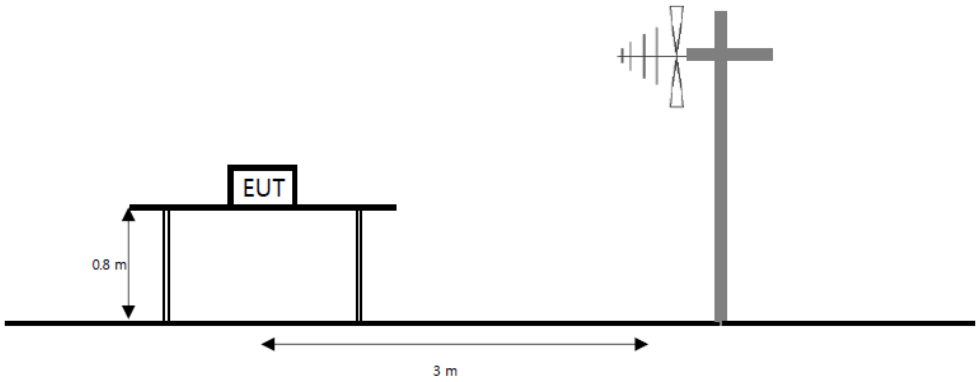
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+21(Ref)	1,745,000,001	0.82	0.0	0.000 000
		-30	1,744,999,997	-3.38	0.0	0.000 000
		-20	1,744,999,998	-2.26	0.0	0.000 000
		-10	1,744,999,998	-2.12	0.0	0.000 000
		0	1,744,999,998	-1.67	0.0	0.000 000
		+10	1,744,999,999	-0.73	0.0	0.000 000
		+20	1,745,000,000	0.43	0.0	0.000 000
		+30	1,745,000,001	1.43	0.0	0.000 000
		+40	1,745,000,002	2.05	0.0	0.000 000
		+50	1,745,000,003	2.85	0.0	0.000 000
115%	4.43	+21(Ref)	1,745,000,001	0.79	0.0	0.000 000
End point	3.40	+21(Ref)	1,745,000,001	0.57	0.0	0.000 000



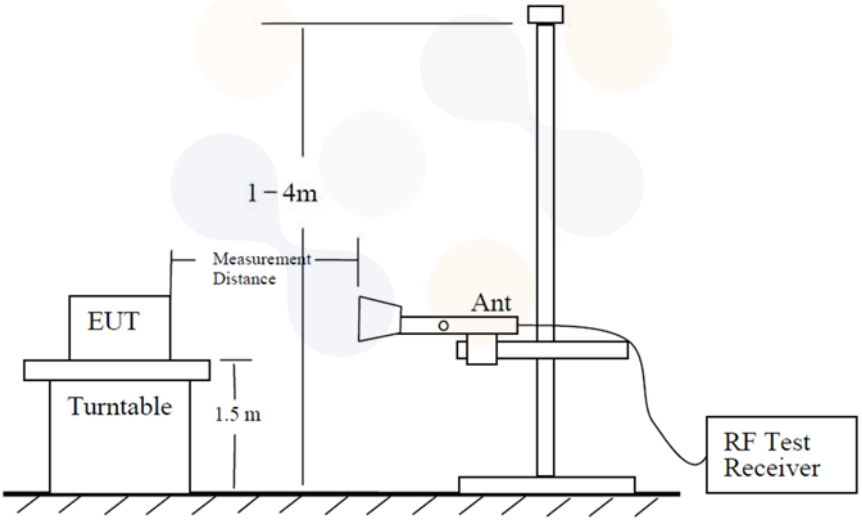
7.7. Radiated Power (ERP/EIRP)

Test setup

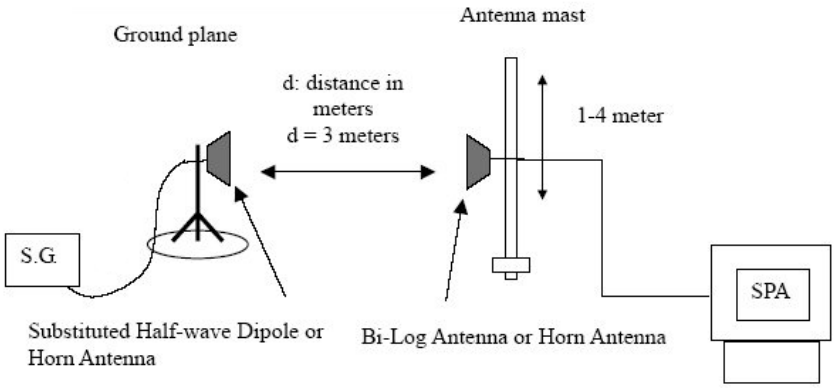
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 1
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	1 850.70	H	5.15	9.23	29.25	25.17	0.329
		1 880.00	H	5.06	9.32	28.18	23.92	0.247
		1 909.30	H	4.97	9.37	27.45	23.05	0.202
	16QAM	1 850.70	H	5.15	9.23	28.38	24.30	0.269
		1 880.00	H	5.06	9.32	27.25	22.99	0.199
		1 909.30	H	4.97	9.37	26.50	22.10	0.162
3 M	QPSK	1 851.50	H	5.15	9.23	29.43	25.35	0.343
		1 880.00	H	5.06	9.32	28.26	24.00	0.251
		1 908.50	H	4.97	9.36	27.53	23.14	0.206
	16QAM	1 851.50	H	5.15	9.23	28.39	24.31	0.270
		1 880.00	H	5.06	9.32	27.27	23.01	0.200
		1 908.50	H	4.97	9.36	26.75	22.36	0.172
5 M	QPSK	1 852.50	H	5.14	9.23	29.41	25.32	0.340
		1 880.00	H	5.06	9.32	28.29	24.03	0.253
		1907.50	H	4.98	9.36	27.62	23.24	0.211
	16QAM	1 852.50	H	5.14	9.23	28.54	24.45	0.279
		1 880.00	H	5.06	9.32	27.33	23.07	0.203
		1 907.50	H	4.98	9.36	26.80	22.42	0.175
10 M	QPSK	1 855.00	H	5.14	9.24	29.58	25.47	0.352
		1 880.00	H	5.06	9.32	28.37	24.11	0.258
		1 905.00	H	4.99	9.34	28.18	23.82	0.241
	16QAM	1 855.00	H	5.14	9.24	28.74	24.63	0.290
		1 880.00	H	5.06	9.32	27.50	23.24	0.211
		1 905.00	H	4.99	9.34	27.17	22.81	0.191
15 M	QPSK	1 857.50	H	5.13	9.25	29.50	25.38	0.345
		1 880.00	H	5.06	9.32	28.33	24.07	0.255
		1 902.50	H	4.99	9.35	28.04	23.68	0.233
	16QAM	1 857.50	H	5.13	9.25	28.54	24.42	0.277
		1 880.00	H	5.06	9.32	27.56	23.30	0.214
		1 902.50	H	4.99	9.35	27.02	22.66	0.185
20 M	QPSK	1 860.00	H	5.12	9.27	29.32	25.17	0.329
		1 880.00	H	5.06	9.32	28.42	24.16	0.261
		1 900.00	H	5.00	9.36	27.44	23.08	0.203
	16QAM	1 860.00	H	5.12	9.27	28.33	24.18	0.262
		1 880.00	H	5.06	9.32	27.58	23.32	0.215
		1 900.00	H	5.00	9.36	26.49	22.13	0.163

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	824.70	H	5.55	6.12	24.39	23.82	0.241
		836.50	H	5.60	6.22	23.52	22.90	0.195
		848.30	H	5.35	6.27	23.95	23.03	0.201
	16QAM	824.70	H	5.55	6.12	23.28	22.71	0.187
		836.50	H	5.60	6.22	22.51	21.89	0.155
		848.30	H	5.35	6.27	22.79	21.87	0.154
3 M	QPSK	825.50	H	5.56	6.12	24.36	23.79	0.239
		836.50	H	5.60	6.22	23.72	23.10	0.204
		847.50	H	5.38	6.26	24.14	23.25	0.211
	16QAM	825.50	H	5.56	6.12	23.47	22.90	0.195
		836.50	H	5.60	6.22	22.68	22.06	0.161
		847.50	H	5.38	6.26	23.16	22.27	0.169
5 M	QPSK	826.50	H	5.57	6.13	24.29	23.72	0.236
		836.50	H	5.60	6.22	23.86	23.24	0.211
		846.50	H	5.41	6.24	24.22	23.38	0.218
	16QAM	826.50	H	5.57	6.13	23.38	22.81	0.191
		836.50	H	5.60	6.22	22.70	22.08	0.161
		846.50	H	5.41	6.24	23.43	22.59	0.182
10 M	QPSK	829.00	H	5.59	6.13	24.38	23.84	0.242
		836.50	H	5.60	6.22	24.23	23.61	0.230
		844.00	H	5.48	6.22	24.62	23.88	0.244
	16QAM	829.00	H	5.59	6.13	23.45	22.91	0.195
		836.50	H	5.60	6.22	23.42	22.80	0.191
		844.00	H	5.48	6.22	23.59	22.85	0.193

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	699.70	H	4.70	5.62	24.76	23.84	0.242
		707.50	H	4.78	5.65	24.62	23.74	0.237
		715.30	H	4.75	5.68	25.29	24.36	0.273
	16QAM	699.70	H	4.70	5.62	23.84	22.92	0.196
		707.50	H	4.78	5.65	23.61	22.73	0.187
		715.30	H	4.75	5.68	24.33	23.40	0.219
3 M	QPSK	700.50	H	4.71	5.63	24.94	24.01	0.252
		707.50	H	4.78	5.65	24.68	23.80	0.240
		714.50	H	4.76	5.68	25.05	24.12	0.258
	16QAM	700.50	H	4.71	5.63	23.86	22.93	0.196
		707.50	H	4.78	5.65	23.86	22.98	0.199
		714.50	H	4.76	5.68	24.13	23.20	0.209
5 M	QPSK	701.50	H	4.72	5.64	25.06	24.13	0.259
		707.50	H	4.78	5.65	24.89	24.01	0.252
		713.50	H	4.77	5.67	25.32	24.41	0.276
	16QAM	701.50	H	4.72	5.64	24.21	23.28	0.213
		707.50	H	4.78	5.65	23.91	23.03	0.201
		713.50	H	4.77	5.67	24.21	23.30	0.214
10 M	QPSK	704.00	H	4.74	5.65	24.85	23.94	0.248
		707.50	H	4.78	5.65	24.85	23.97	0.249
		711.00	H	4.79	5.65	24.98	24.12	0.258
	16QAM	704.00	H	4.74	5.65	23.93	23.02	0.200
		707.50	H	4.78	5.65	23.85	22.97	0.198
		711.00	H	4.79	5.65	24.02	23.16	0.207

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	779.50	H	5.50	5.92	24.53	24.11	0.258
		782.00	H	5.46	5.91	25.07	24.62	0.290
		784.50	H	5.41	5.90	24.88	24.39	0.275
	16QAM	779.50	H	5.50	5.92	23.47	23.05	0.202
		782.00	H	5.46	5.91	24.00	23.55	0.226
		784.50	H	5.41	5.90	24.19	23.70	0.234
10 M	QPSK	782.00	H	5.46	5.91	24.98	24.53	0.284
	16QAM	782.00	H	5.46	5.91	23.94	23.49	0.223

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	824.70	H	5.55	6.12	24.41	23.84	0.242
		836.50	H	5.60	6.22	23.71	23.09	0.204
		848.30	H	5.35	6.27	24.34	23.42	0.220
	16QAM	824.70	H	5.55	6.12	23.45	22.88	0.194
		836.50	H	5.60	6.22	22.69	22.07	0.161
		848.30	H	5.35	6.27	23.31	22.39	0.173
3 M	QPSK	825.50	H	5.56	6.12	24.43	23.86	0.243
		836.50	H	5.60	6.22	23.96	23.34	0.216
		847.50	H	5.38	6.26	24.36	23.47	0.222
	16QAM	825.50	H	5.56	6.12	23.47	22.90	0.195
		836.50	H	5.60	6.22	23.01	22.39	0.173
		847.50	H	5.38	6.26	23.46	22.57	0.181
5 M	QPSK	826.50	H	5.57	6.13	24.33	23.76	0.238
		836.50	H	5.60	6.22	23.98	23.36	0.217
		846.50	H	5.41	6.24	24.75	23.91	0.246
	16QAM	826.50	H	5.57	6.13	23.60	23.03	0.201
		836.50	H	5.60	6.22	23.19	22.57	0.181
		846.50	H	5.41	6.24	23.72	22.88	0.194
10 M	QPSK	829.00	H	5.59	6.13	24.47	23.93	0.247
		836.50	H	5.60	6.22	24.38	23.76	0.238
		844.00	H	5.48	6.22	24.88	24.14	0.259
	16QAM	829.00	H	5.59	6.13	23.61	23.07	0.203
		836.50	H	5.60	6.22	23.44	22.82	0.191
		844.00	H	5.48	6.22	23.90	23.16	0.207
15 M	QPSK	831.50	H	5.60	6.14	24.42	23.88	0.244
		836.50	H	5.60	6.22	24.40	23.78	0.239
		841.50	H	5.56	6.24	24.66	23.97	0.249
	16QAM	831.50	H	5.60	6.14	23.42	22.88	0.194
		836.50	H	5.60	6.22	23.68	23.06	0.202
		841.50	H	5.56	6.24	23.71	23.02	0.200

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(PC2)

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 498.50	H	6.00	10.86	31.38	26.52	0.449
		2 593.00	H	6.24	11.13	30.81	25.92	0.391
		2 687.50	H	6.49	11.26	29.43	24.66	0.292
	16QAM	2 498.50	H	6.00	10.86	30.49	25.63	0.366
		2 593.00	H	6.24	11.13	30.15	25.26	0.336
		2 687.50	H	6.49	11.26	28.37	23.60	0.229
10 M	QPSK	2 501.00	H	6.00	10.87	30.83	25.96	0.394
		2 593.00	H	6.24	11.13	30.84	25.95	0.394
		2 685.00	H	6.48	11.25	29.50	24.73	0.297
	16QAM	2 501.00	H	6.00	10.87	29.96	25.09	0.323
		2 593.00	H	6.24	11.13	30.05	25.16	0.328
		2 685.00	H	6.48	11.25	28.74	23.97	0.249
15 M	QPSK	2 503.50	H	6.01	10.88	30.71	25.84	0.384
		2 593.00	H	6.24	11.13	30.90	26.01	0.399
		2 682.50	H	6.47	11.25	30.53	25.75	0.376
	16QAM	2 503.50	H	6.01	10.88	30.17	25.30	0.339
		2 593.00	H	6.24	11.13	30.02	25.13	0.326
		2 682.50	H	6.47	11.25	29.77	24.99	0.316
20 M	QPSK	2 506.00	H	6.02	10.89	31.58	26.71	0.469
		2 593.00	H	6.24	11.13	30.65	25.76	0.377
		2 680.00	H	6.47	11.24	30.92	26.15	0.412
	16QAM	2 506.00	H	6.02	10.89	30.74	25.87	0.386
		2 593.00	H	6.24	11.13	30.03	25.14	0.327
		2 680.00	H	6.47	11.24	30.23	25.46	0.352

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	5.57	8.85	27.94	24.66	0.292
		1 745.00	H	5.47	8.93	26.43	22.96	0.198
		1 779.30	H	5.36	9.11	28.39	24.64	0.291
	16QAM	1 710.70	H	5.57	8.85	26.91	23.63	0.231
		1 745.00	H	5.47	8.93	25.49	22.02	0.159
		1 779.30	H	5.36	9.11	27.35	23.60	0.229
3 M	QPSK	1 711.50	H	5.57	8.86	27.60	24.31	0.270
		1 745.00	H	5.47	8.93	26.66	23.19	0.208
		1 778.50	H	5.36	9.11	28.55	24.80	0.302
	16QAM	1 711.50	H	5.57	8.86	26.75	23.46	0.222
		1 745.00	H	5.47	8.93	25.82	22.35	0.172
		1 778.50	H	5.36	9.11	27.74	23.99	0.251
5 M	QPSK	1 712.50	H	5.56	8.86	27.88	24.58	0.287
		1 745.00	H	5.47	8.93	26.69	23.22	0.210
		1 777.50	H	5.37	9.11	28.49	24.75	0.299
	16QAM	1 712.50	H	5.56	8.86	27.09	23.79	0.239
		1 745.00	H	5.47	8.93	25.67	22.20	0.166
		1 777.50	H	5.37	9.11	27.67	23.93	0.247
10 M	QPSK	1 715.00	H	5.56	8.87	28.01	24.69	0.294
		1 745.00	H	5.47	8.93	26.82	23.35	0.216
		1 775.00	H	5.38	9.08	28.97	25.26	0.336
	16QAM	1 715.00	H	5.56	8.87	26.97	23.65	0.232
		1 745.00	H	5.47	8.93	25.68	22.21	0.166
		1 775.00	H	5.38	9.08	28.10	24.39	0.275
15 M	QPSK	1 717.50	H	5.55	8.88	28.37	25.04	0.319
		1 745.00	H	5.47	8.93	26.95	23.48	0.223
		1 772.50	H	5.38	9.07	29.56	25.87	0.386
	16QAM	1 717.50	H	5.55	8.88	27.29	23.96	0.249
		1 745.00	H	5.47	8.93	26.07	22.60	0.182
		1 772.50	H	5.38	9.07	28.50	24.81	0.303
20 M	QPSK	1 720.00	H	5.54	8.88	28.39	25.05	0.320
		1 745.00	H	5.47	8.93	27.11	23.64	0.231
		1 770.00	H	5.39	9.07	29.66	25.98	0.396
	16QAM	1 720.00	H	5.54	8.88	27.50	24.16	0.261
		1 745.00	H	5.47	8.93	26.10	22.63	0.183
		1 770.00	H	5.39	9.07	28.59	24.91	0.310

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

Sub Antenna 1
Test mode: LTE Band 2

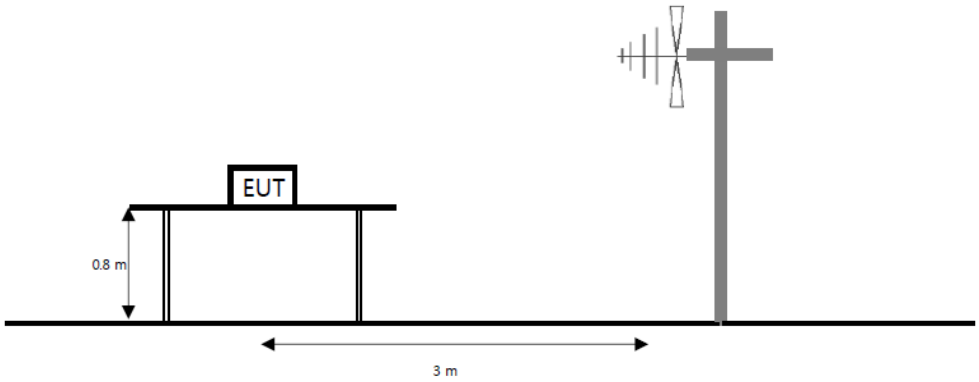
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.70	H	5.15	9.23	26.07	21.99	0.158
		1 880.00	H	5.06	9.32	26.30	22.04	0.160
		1 909.30	H	4.97	9.37	27.66	23.26	0.212
	16QAM	1 850.70	H	5.15	9.23	25.09	21.01	0.126
		1 880.00	H	5.06	9.32	25.63	21.37	0.137
		1 909.30	H	4.97	9.37	26.75	22.35	0.172
3 M	QPSK	1 851.50	H	5.15	9.23	25.69	21.61	0.145
		1 880.00	H	5.06	9.32	26.28	22.02	0.159
		1 908.50	H	4.97	9.36	27.61	23.22	0.210
	16QAM	1 851.50	H	5.15	9.23	24.95	20.87	0.122
		1 880.00	H	5.06	9.32	25.63	21.37	0.137
		1 908.50	H	4.97	9.36	26.85	22.46	0.176
5 M	QPSK	1 852.50	H	5.14	9.23	25.82	21.73	0.149
		1 880.00	H	5.06	9.32	26.56	22.30	0.170
		1907.50	H	4.98	9.36	27.63	23.25	0.211
	16QAM	1 852.50	H	5.14	9.23	25.00	20.91	0.123
		1 880.00	H	5.06	9.32	25.52	21.26	0.134
		1 907.50	H	4.98	9.36	26.68	22.30	0.170
10 M	QPSK	1 855.00	H	5.14	9.24	25.79	21.68	0.147
		1 880.00	H	5.06	9.32	26.38	22.12	0.163
		1 905.00	H	4.99	9.34	27.01	22.65	0.184
	16QAM	1 855.00	H	5.14	9.24	25.10	20.99	0.126
		1 880.00	H	5.06	9.32	25.59	21.33	0.136
		1 905.00	H	4.99	9.34	26.23	21.87	0.154
15 M	QPSK	1 857.50	H	5.13	9.25	26.34	22.22	0.167
		1 880.00	H	5.06	9.32	27.21	22.95	0.197
		1 902.50	H	4.99	9.35	27.75	23.39	0.218
	16QAM	1 857.50	H	5.13	9.25	25.52	21.40	0.138
		1 880.00	H	5.06	9.32	26.43	22.17	0.165
		1 902.50	H	4.99	9.35	26.88	22.52	0.179
20 M	QPSK	1 860.00	H	5.12	9.27	26.02	21.87	0.154
		1 880.00	H	5.06	9.32	27.70	23.44	0.221
		1 900.00	H	5.00	9.36	27.24	22.88	0.194
	16QAM	1 860.00	H	5.12	9.27	25.28	21.13	0.130
		1 880.00	H	5.06	9.32	26.78	22.52	0.179
		1 900.00	H	5.00	9.36	26.48	22.12	0.163

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

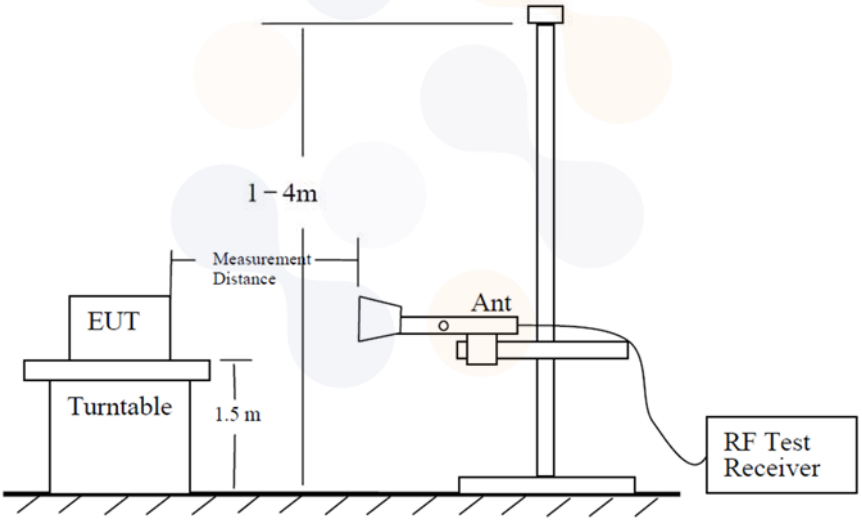
7.8. Radiated Spurious Emissions

Test setup

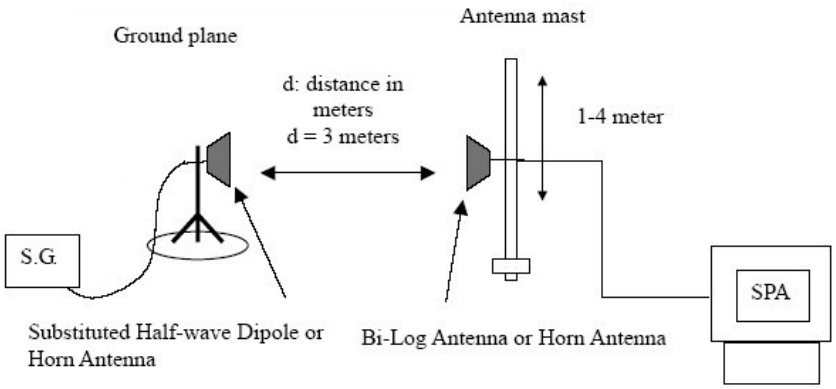
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 55 + 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 1

Test mode : LTE Band 2
Frequency(㎒) : 1 855.0
Channel : 18650
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 699.60	H	8.66	12.47	-48.99	-52.80	-13.00	39.80
	5 553.30	V	10.61	16.17	-44.94	-50.50	-13.00	37.50
	7 396.14	V	11.95	19.44	-39.71	-47.20	-13.00	34.20
	9 249.84	H	13.20	22.19	-40.11	-49.10	-13.00	36.10

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 751.95	V	8.75	12.23	-48.52	-52.00	-13.00	39.00
	5 629.90	V	10.63	16.16	-47.47	-53.00	-13.00	40.00
	7 504.66	V	12.10	19.45	-42.15	-49.50	-13.00	36.50
	9 373.68	H	13.20	22.35	-39.15	-48.30	-13.00	35.30

Test mode : LTE Band 2
Frequency(㎒) : 1 905.0
Channel : 19150
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 801.10	V	8.84	12.53	-49.81	-53.50	-13.00	40.50
	5 699.48	H	10.64	16.29	-44.95	-50.60	-13.00	37.60
	7 600.41	H	12.18	19.94	-41.64	-49.40	-13.00	36.40
	9 501.98	H	13.20	22.39	-37.81	-47.00	-13.00	34.00

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	1 645.78	V	5.76	8.69	-56.67	-59.60	-13.00	46.60
	2 469.61	V	5.92	10.78	-50.34	-55.20	-13.00	42.20
	3 296.32	V	7.89	11.99	-49.90	-54.00	-13.00	41.00
	4 120.98	V	9.30	13.41	-45.39	-49.50	-13.00	36.50

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	1 664.24	H	5.71	8.68	-56.03	-59.00	-13.00	46.00
	2 495.87	H	5.99	10.83	-49.66	-54.50	-13.00	41.50
	3 325.04	H	7.95	12.02	-49.83	-53.90	-13.00	40.90
	4 159.55	V	9.33	13.09	-45.74	-49.50	-13.00	36.50

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	1 679.01	H	5.66	8.73	-54.83	-57.90	-13.00	44.90
	2 519.67	H	6.05	10.90	-50.35	-55.20	-13.00	42.20
	3 357.86	V	8.02	12.06	-47.76	-51.80	-13.00	38.80
	4 192.78	V	9.35	13.22	-46.33	-50.20	-13.00	37.20

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

Test mode : LTE Band 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	1 407.41	H	5.55	8.03	-55.62	-58.10	-13.00	45.10
	2 115.13	H	5.00	9.91	-50.79	-55.70	-13.00	42.70
	2 816.30	H	6.82	11.41	-50.01	-54.60	-13.00	41.60
	3 518.69	H	8.33	12.25	-47.88	-51.80	-13.00	38.80

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	1 419.30	H	5.64	8.06	-57.98	-60.40	-13.00	47.40
	2 133.19	H	5.05	9.96	-49.59	-54.50	-13.00	41.50
	2 843.38	H	6.89	11.45	-50.14	-54.70	-13.00	41.70
	3 551.52	H	8.39	12.29	-48.10	-52.00	-13.00	39.00

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	1 429.97	H	5.71	8.09	-57.32	-59.70	-13.00	46.70
	2 140.16	H	5.06	9.97	-50.49	-55.40	-13.00	42.40
	2 856.51	H	6.93	11.46	-50.57	-55.10	-13.00	42.10
	3 566.29	V	8.42	12.92	-46.40	-50.90	-13.00	37.90

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

Test mode : LTE Band 13
Frequency(㎒) : 779.5
Channel : 23205
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 564.13	H	6.01	8.45	-57.06	-59.50	-13.00	46.50
	2 346.53	H	5.60	10.54	-50.66	-55.60	-13.00	42.60
	3 128.52	H	7.56	11.79	-48.87	-53.10	-13.00	40.10
	3 910.10	V	9.04	12.67	-43.17	-46.80	-13.00	33.80

Test mode : LTE Band 13
Frequency(㎒) : 782.0
Channel : 23230
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 564.13	H	6.01	8.45	-57.16	-59.60	-13.00	46.60
	2 346.94	V	5.60	10.54	-50.26	-55.20	-13.00	42.20
	3 128.52	H	7.56	11.79	-47.67	-51.90	-13.00	38.90
	3 908.87	H	9.04	12.67	-44.77	-48.40	-13.00	35.40

Test mode : LTE Band 13
Frequency(㎒) : 784.5
Channel : 23225
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 563.31	H	6.01	8.45	-58.16	-60.60	-13.00	47.60
	2 346.53	V	5.60	10.54	-50.06	-55.00	-13.00	42.00
	3 126.88	H	7.55	11.79	-48.56	-52.80	-13.00	39.80
	3 909.69	H	9.04	12.67	-44.27	-47.90	-13.00	34.90

Note.
1. Limit Calculation(㏈m)= 43 + 10log($P_{[Watts]}$)
2. E.R.P & E.I.R.P(㏈ m) = Substitute Level(㏈) + Antenna gain(㏈ i&㏈ d) - C.L(Cable loss) (㏈)

Test mode : LTE Band 13

Frequency(㎒) : 782.0 (1 559 – 1 610 ㎒)

Channel : 23230

Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 584.54	H	5.95	8.51	-54.84	-57.40	-40.00	17.40

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	1 647.42	H	5.76	8.70	-56.86	-59.80	-13.00	46.80
	2 472.08	V	5.93	10.79	-49.64	-54.50	-13.00	41.50
	3 295.91	H	7.89	11.99	-48.10	-52.20	-13.00	39.20
	4 120.16	H	9.30	13.41	-45.09	-49.20	-13.00	36.20

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	1 664.24	H	5.71	8.68	-57.23	-60.20	-13.00	47.20
	2 492.59	H	5.98	10.83	-49.25	-54.10	-13.00	41.10
	3 325.04	V	7.95	12.02	-49.13	-53.20	-13.00	40.20
	4 128.78	V	9.30	13.43	-45.37	-49.50	-13.00	36.50

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	1 679.01	H	5.66	8.73	-56.23	-59.30	-13.00	46.30
	2 518.03	V	6.05	10.90	-50.15	-55.00	-13.00	42.00
	3 354.17	V	8.01	12.06	-47.25	-51.30	-13.00	38.30
	4 195.65	H	9.36	13.24	-46.32	-50.20	-13.00	37.20

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

Test mode : LTE Band 41(PC2)
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	5 012.00	V	10.31	14.90	-45.31	-49.90	-25.00	24.90
	7 518.06	V	12.11	19.47	-42.84	-50.20	-25.00	25.20
	10 024.13	V	13.10	23.24	-30.16	-40.30	-25.00	15.30
	12 527.64	H	13.21	26.47	-33.04	-46.30	-25.00	21.30

Test mode : LTE Band 41(PC2)
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	5 167.75	V	10.40	15.54	-43.76	-48.90	-25.00	23.90
	7 749.14	H	12.30	19.92	-42.38	-50.00	-25.00	25.00
	10 331.16	H	13.17	23.71	-35.46	-46.00	-25.00	21.00
	12 914.46	V	13.37	27.20	-32.77	-46.60	-25.00	21.60

Test mode : LTE Band 41(PC2)
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	5 342.65	V	10.51	15.97	-45.14	-50.60	-25.00	25.60
	8 011.49	V	12.51	20.06	-40.05	-47.60	-25.00	22.60
	10 684.16	V	13.20	24.28	-26.52	-37.60	-25.00	12.60
	13 335.76	V	13.87	27.66	-31.61	-45.40	-25.00	20.40

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(㎒) : 1 720.0
Channel : 132072
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 440.44	H	8.18	12.16	-48.42	-52.40	-13.00	39.40
	5 160.09	V	10.40	15.52	-45.68	-50.80	-13.00	37.80
	6 878.46	V	11.30	18.35	-42.75	-49.80	-13.00	36.80
	8 600.03	H	13.04	20.97	-38.77	-46.70	-13.00	33.70

Test mode : LTE Band 66/4
Frequency(㎒) : 1 745.0
Channel : 132322
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 472.36	H	8.24	12.20	-49.54	-53.50	-13.00	40.50
	5 204.78	H	10.42	15.33	-45.99	-50.90	-13.00	37.90
	6 943.57	H	11.35	18.69	-41.16	-48.50	-13.00	35.50
	8 677.26	H	13.07	21.13	-40.14	-48.20	-13.00	35.20

Test mode : LTE Band 66/4
Frequency(㎒) : 1 770.0
Channel : 132572
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 556.62	V	8.40	12.93	-50.57	-55.10	-13.00	42.10
	7 121.03	V	11.57	19.11	-41.56	-49.10	-13.00	36.10
	5 335.63	H	10.50	15.95	-47.05	-52.50	-13.00	39.50
	8 900.04	V	13.16	21.59	-38.27	-46.70	-13.00	33.70

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

Sub Antenna 1

Test mode : LTE Band 2
Frequency(㎒) : 1 860.0
Channel : 18700
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 720.00	H	8.70	12.50	-44.60	-48.40	-13.00	35.40
	5 581.50	H	10.62	16.23	-42.69	-48.30	-13.00	35.30
	7 440.00	V	12.02	19.65	-39.57	-47.20	-13.00	34.20
	9 291.75	H	13.20	22.26	-33.24	-42.30	-13.00	29.30

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 741.75	H	8.74	12.54	-43.50	-47.30	-13.00	34.30
	5 610.75	V	10.62	16.13	-43.09	-48.60	-13.00	35.60
	7 482.75	H	12.08	19.71	-37.47	-45.10	-13.00	32.10
	9 354.00	H	13.20	22.32	-33.08	-42.20	-13.00	29.20

Test mode : LTE Band 2
Frequency(㎒) : 1 900.0
Channel : 19100
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 817.50	H	8.87	12.57	-43.80	-47.50	-13.00	34.50
	5 731.50	V	10.65	16.54	-43.11	-49.00	-13.00	36.00
	7 638.00	H	12.21	19.98	-39.03	-46.80	-13.00	33.80
	9 547.50	V	13.19	22.48	-33.91	-43.20	-13.00	30.20

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	FSVA40	101578	23.11.28
PXA Signal Analyzer	KEYSIGHT	N9040B	US55230151	24.07.03
DC Power Supply	AGILENT	E3632A	KR73001026	24.01.19
Divider	Marki Microwave, Inc.	PD-0040	D0003	24.07.04
Radio Communication Analyzer	ANRITSU	MT8000A	6262093278	24.04.26
Wideband Radio Communication Tester	R&S	CMW500	141780	24.01.19
Temp & Humid Chamber	Daejin Engineering	DJ-THR11000	10041	24.01.19
Vector Signal Generator	R&S	SMBV100A	257566	24.07.04
Signal Generator	R&S	SMB100A	176206	24.01.19
Bilog Antenna	Teseq GmbH	CBL 6112D	62027	24.11.17
Bilog Antenna	ETS.LINDGREN	'3143B	228420	25.07.20
Horn Antenna	ETS-LINDGREN	3117	251528	24.02.02
Horn Antenna	ETS.LINDGREN	3117	227509	24.07.12
Horn Antenna	ETS-Lindgren	3116	00086635	24.03.20
Horn Antenna	ETS-LINDGREN	3116C	251516	24.02.02
Amplifier	SONOMA INSTRUMENT	310N	421822	24.10.12*
Amplifier	C&K Technologies, Inc.	BZRT-00504000-481055-382525	26299-27735	24.07.04
Amplifier	C&K Technologies, Inc.	BZR-00504000-551028-252525	27736	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	24.07.04
High Pass Filter	QOTANA TECHNOLOGIES	DBHF0508004000A	20070100016	24.07.04
Antenna Mast	innco systems GmbH	MA4640-XP-ET	N/A	-
Controller	innco systems GmbH	CO3000	1175/45850319/P	-

*This equipment was calibrated during the test period, and was used before calibration.

End of test report