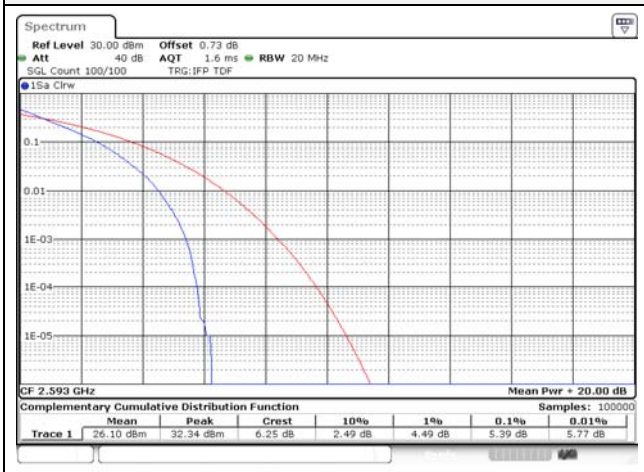
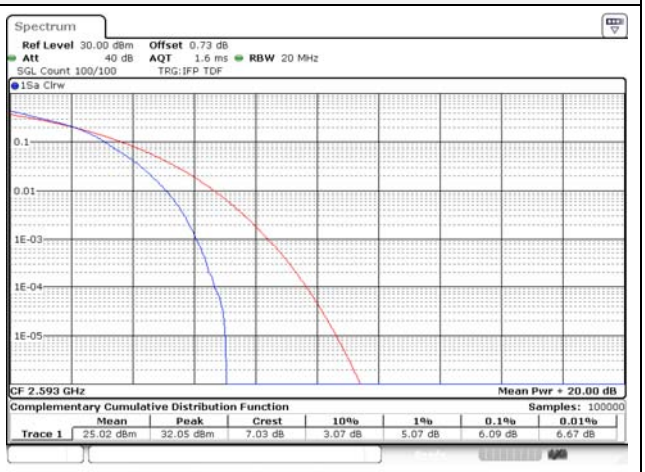
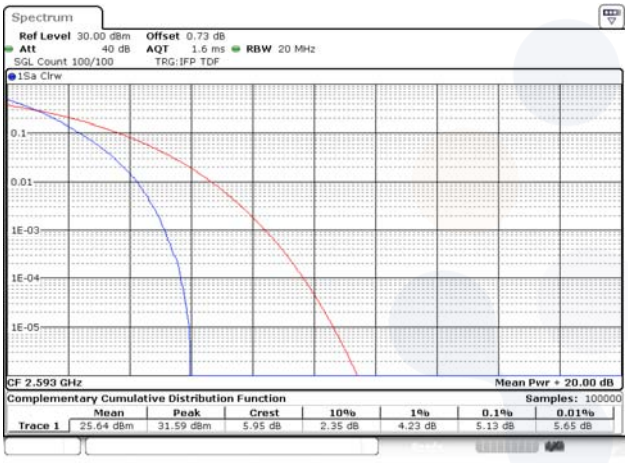
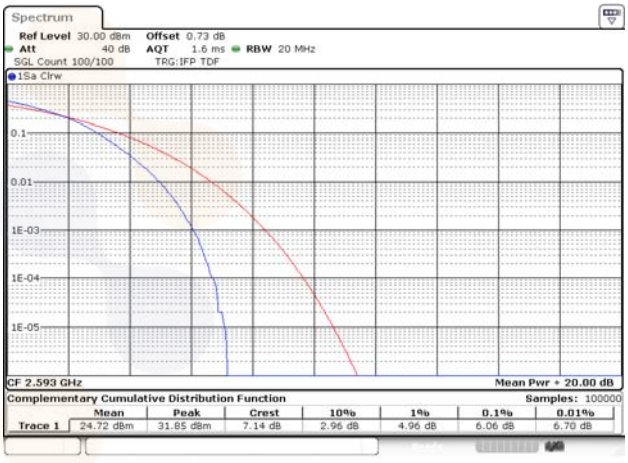
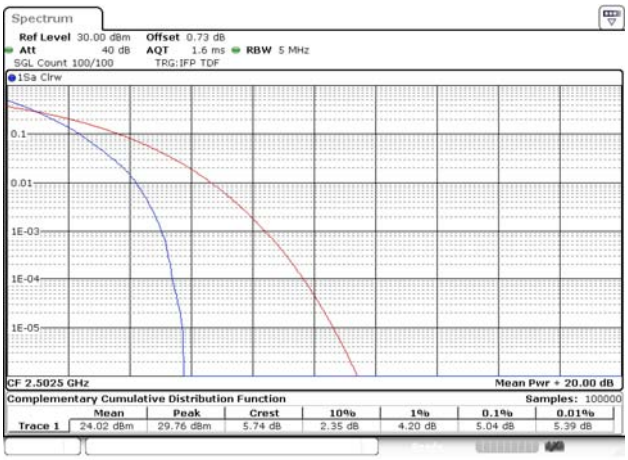
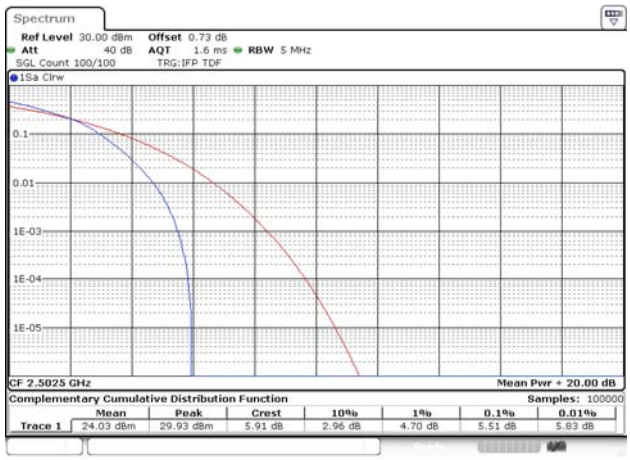
15M BW QPSK Mid ch.	15M BW 16QAM Mid ch.
	
20M BW QPSK Mid ch.	**20M BW 16QAM Mid ch.**
	

Test mode: LTE Band 41 (PC2 - IC)

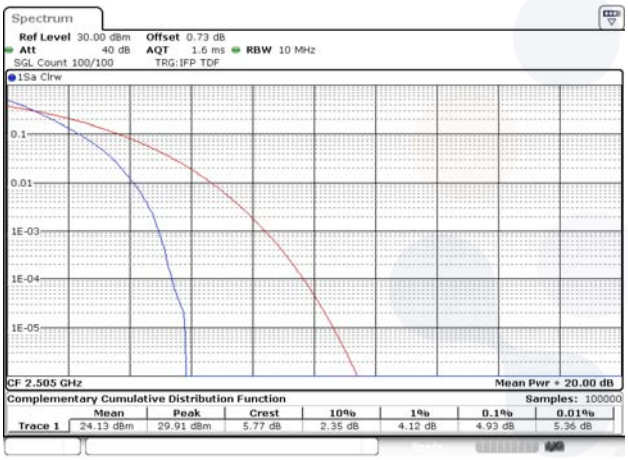
5M BW QPSK Low ch.



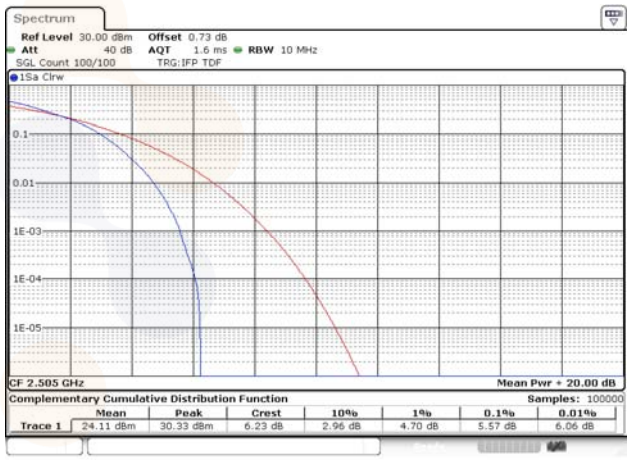
5M BW 16QAM Low ch.

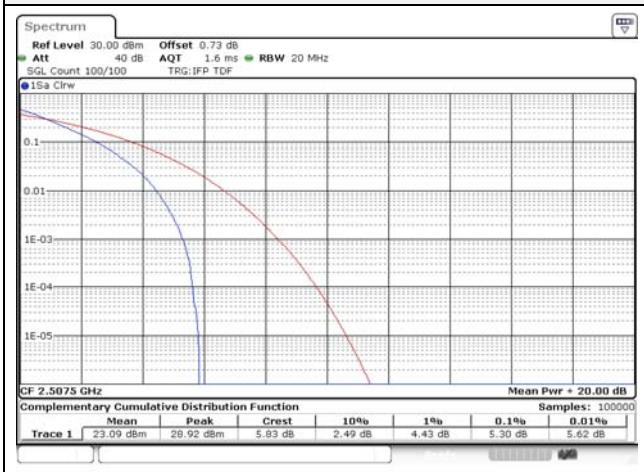
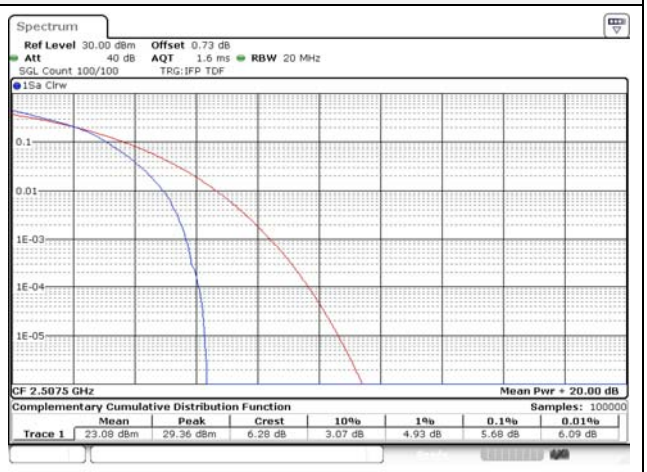
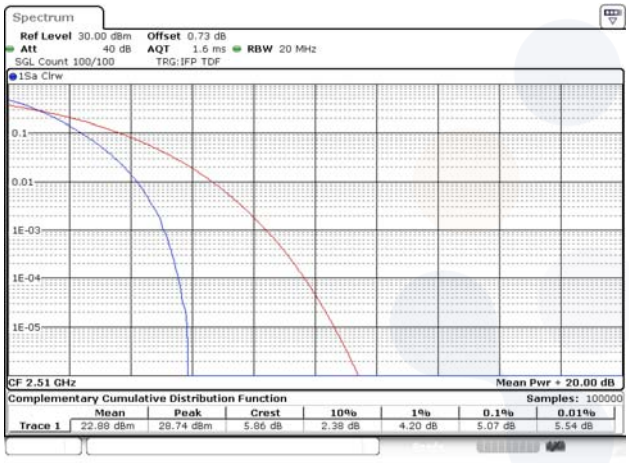
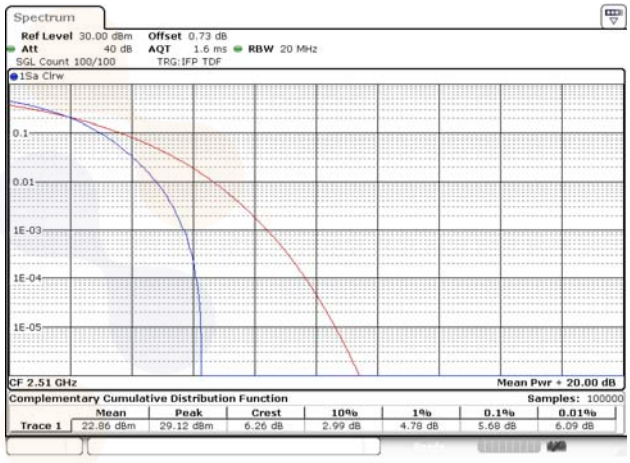


10M BW QPSK Low ch.



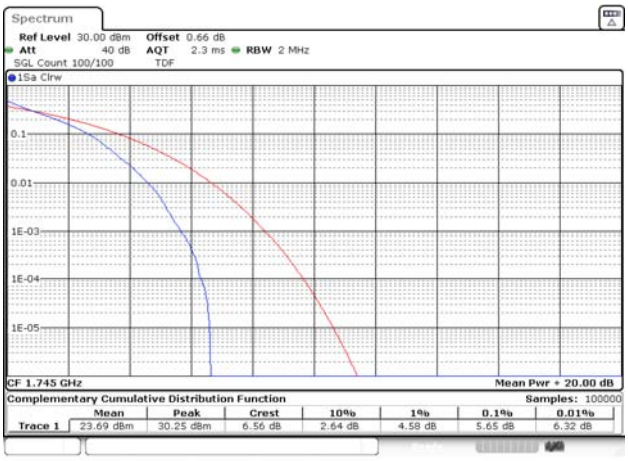
10M BW 16QAM Low ch.



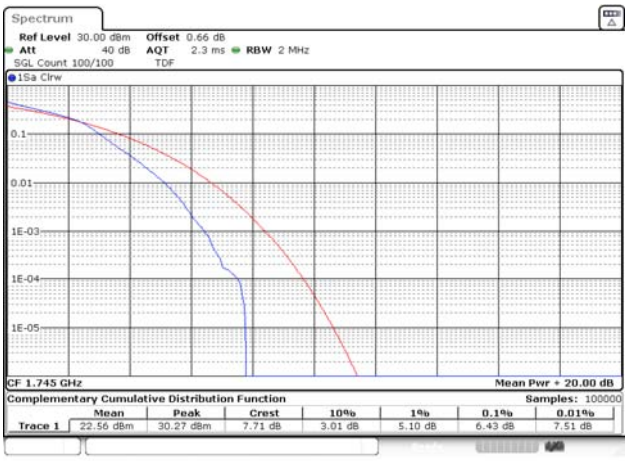
15M BW QPSK Low ch.	15M BW 16QAM Low ch.
	
20M BW QPSK Low ch.	**20M BW 16QAM Low ch.**
	

Test mode: LTE Band 66/4

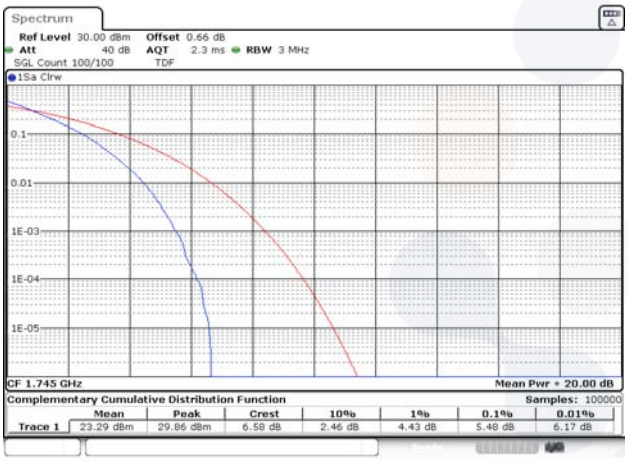
1.4M BW QPSK Mid ch.



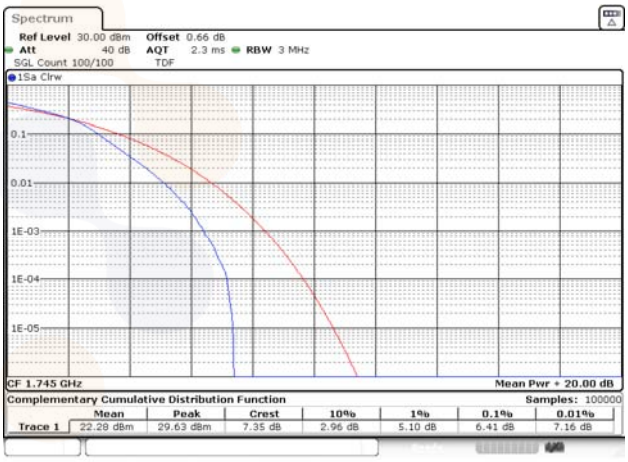
1.4M BW 16QAM Mid ch.



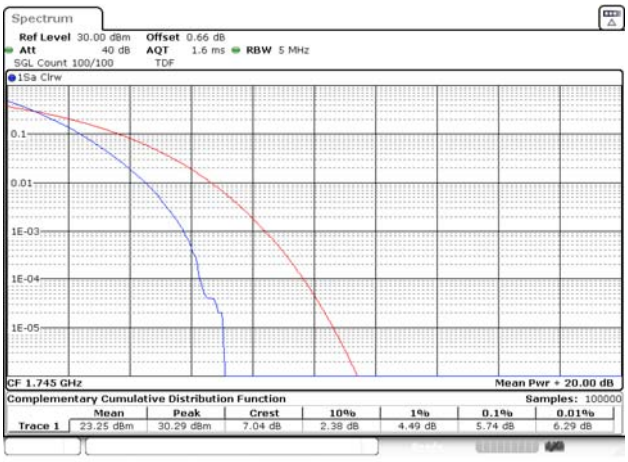
3M BW QPSK Mid ch.



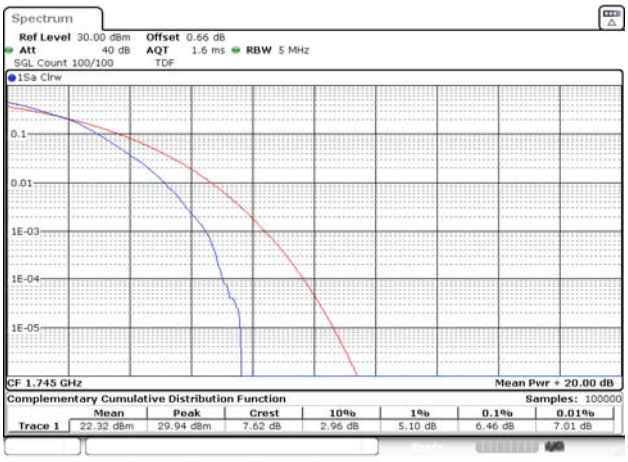
3M BW 16QAM Mid ch.



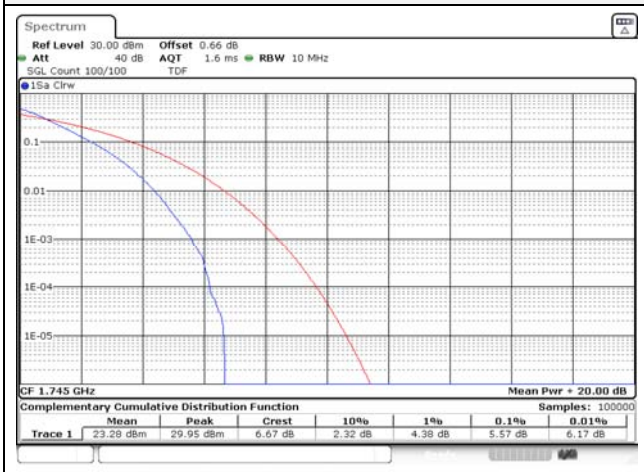
5M BW QPSK Mid ch.



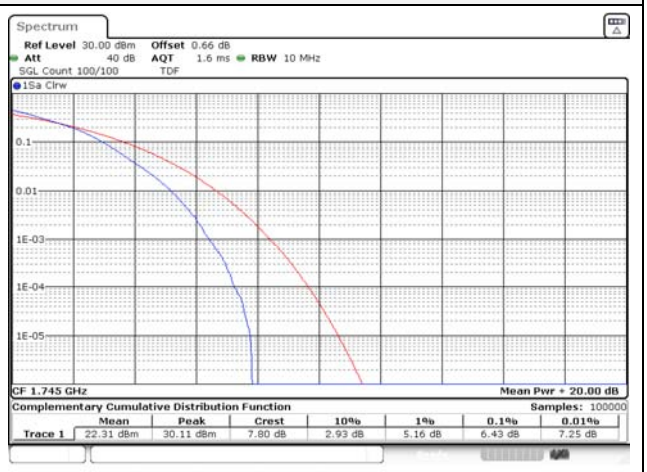
5M BW 16QAM Mid ch.



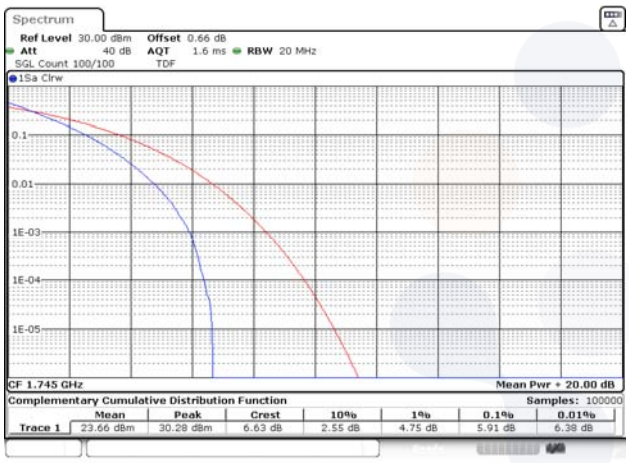
10M BW QPSK Mid ch.



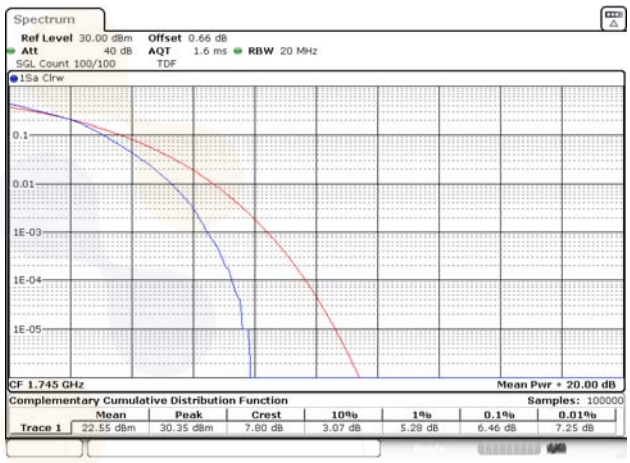
10M BW 16QAM Mid ch.



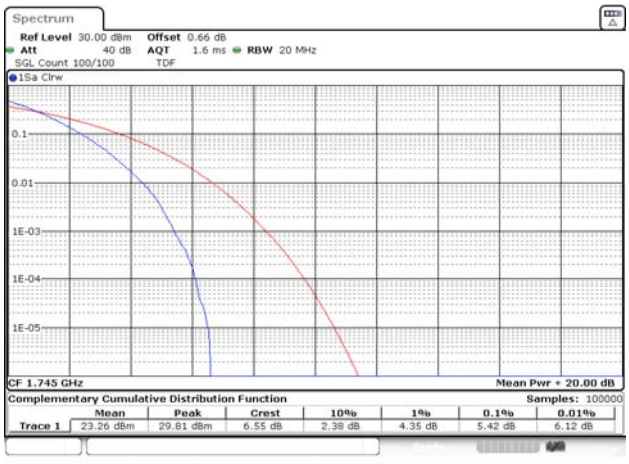
15M BW QPSK Mid ch.



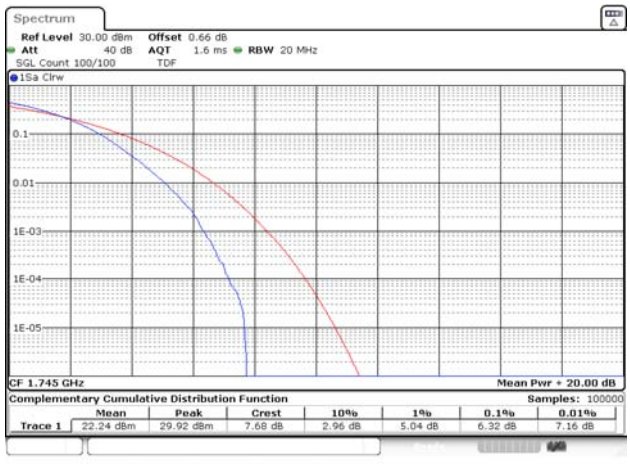
15M BW 16QAM Mid ch.



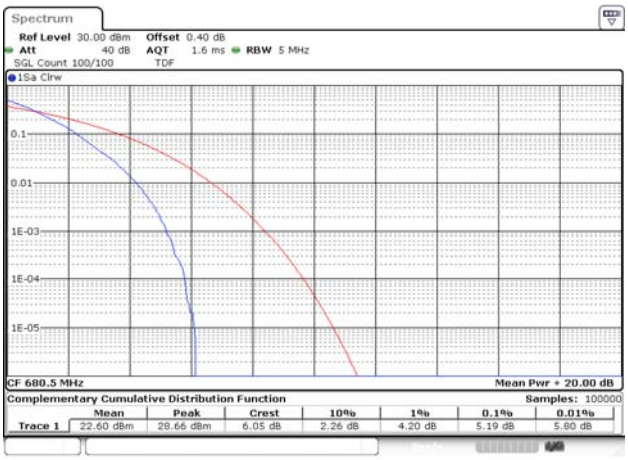
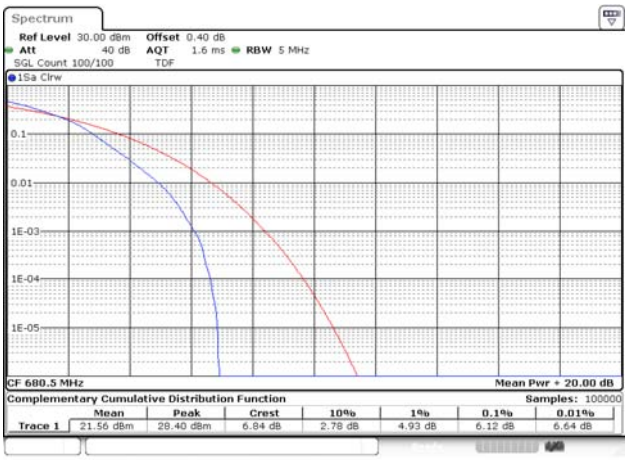
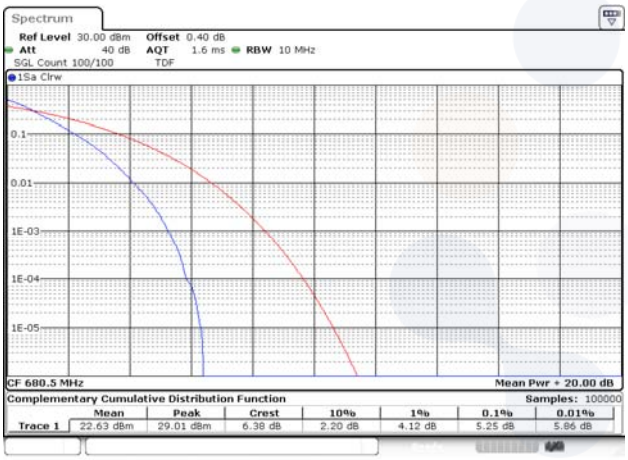
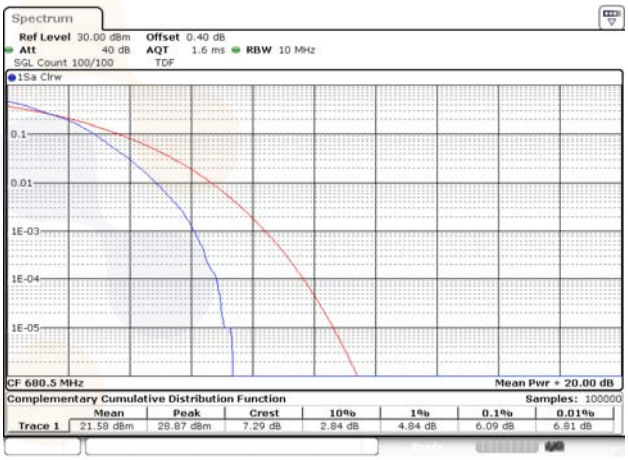
20M BW QPSK Mid ch.

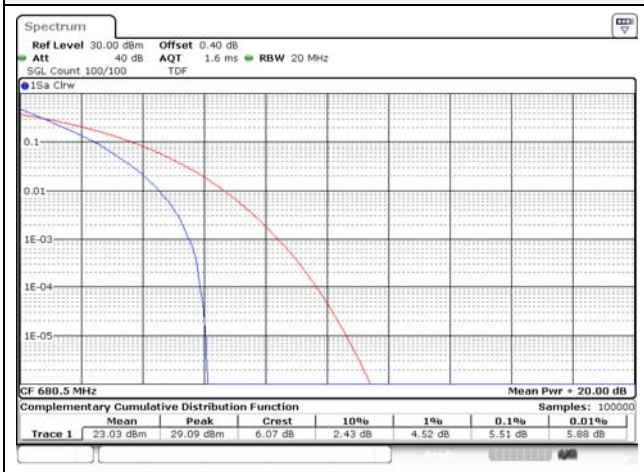
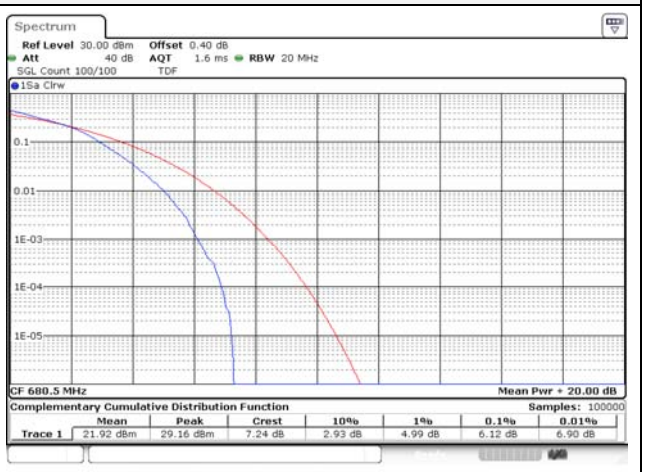
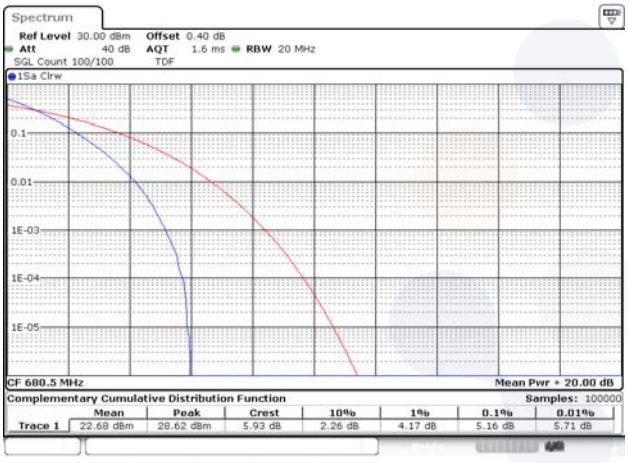
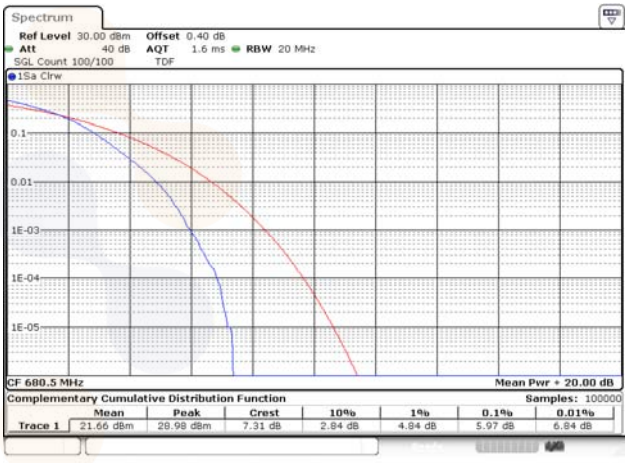


20M BW 16QAM Mid ch.



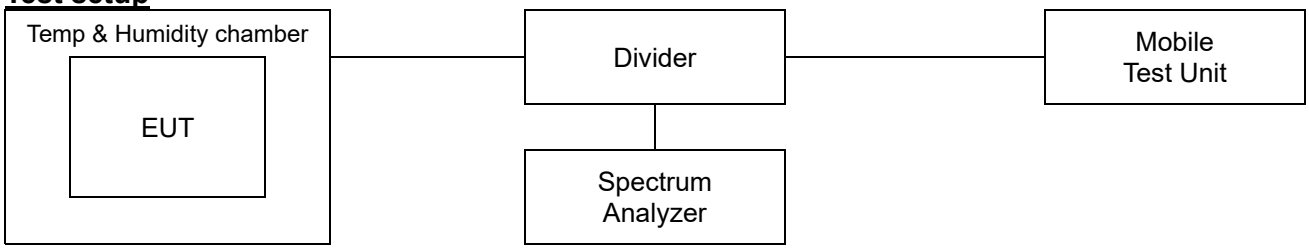
Test mode: LTE Band 71

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 and RSS-132(5.3)

For FCC, 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.

For IC, the frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen

According to §24.235 and RSS-133(6.3),
For FCC, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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

According to §27.54 and RSS-130(4.5), RSS-195(5.4), RSS-199(5.4)
For FCC&IC, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §27.54 and RSS-139(5.4),
For FCC, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

For IC, the frequency stability shall be sufficient to ensure that the occupied bandwidth stay within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

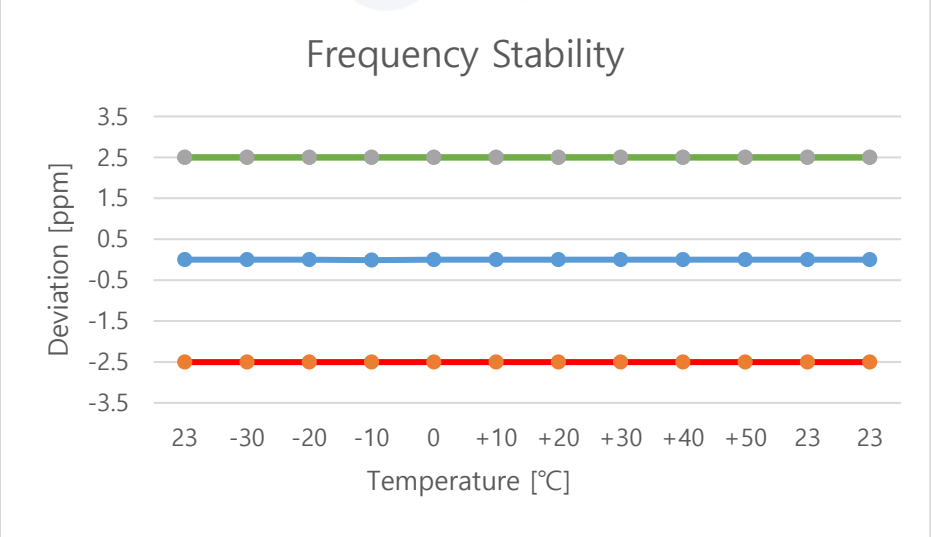
Test procedure
ANSI 63.26-2015 – Section 5.6

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 5
Frequency (㎐) : 836 500 000
Channel : 20525
Deviation limit(FCC) : ±0.00025% or 2.5ppm
Deviation limit(IC) : The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,500,002	1.65	0.0	0.000 000
		-30	836,500,002	2.06	0.0	0.000 000
		-20	836,500,003	3.48	0.0	0.000 000
		-10	836,500,005	5.16	0.0	0.000 001
		0	836,500,001	0.77	0.0	0.000 000
		+10	836,500,001	1.14	0.0	0.000 000
		+20	836,500,003	2.55	0.0	0.000 000
		+30	836,500,004	4.16	0.0	0.000 000
		+40	836,500,002	1.97	0.0	0.000 000
		+50	836,500,003	3.34	0.0	0.000 000
115%	4.43	+23(Ref)	836,500,002	2.03	0.0	0.000 000
End point	3.40	+23(Ref)	836,500,001	0.93	0.0	0.000 000



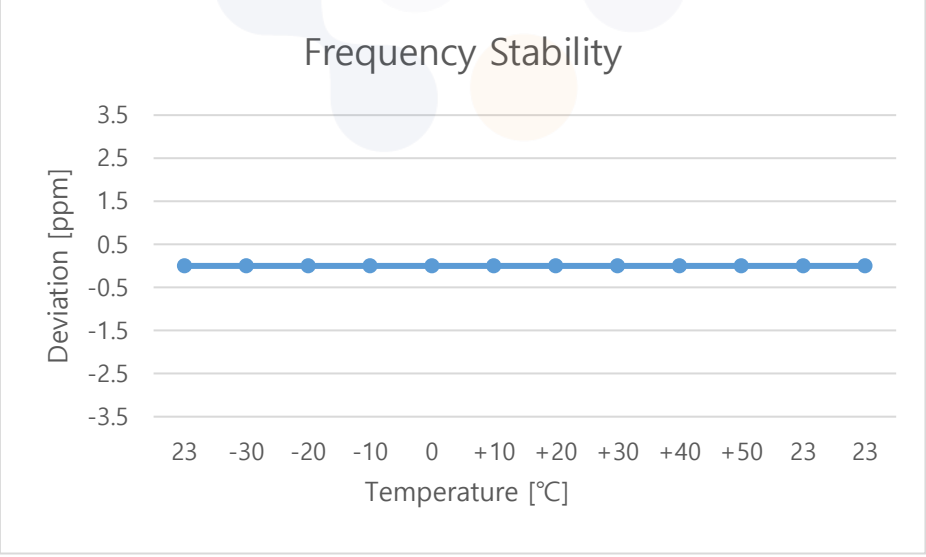
Test mode : LTE Band 7

Frequency (㎐) : 2 535 000 000

Channel : 21100

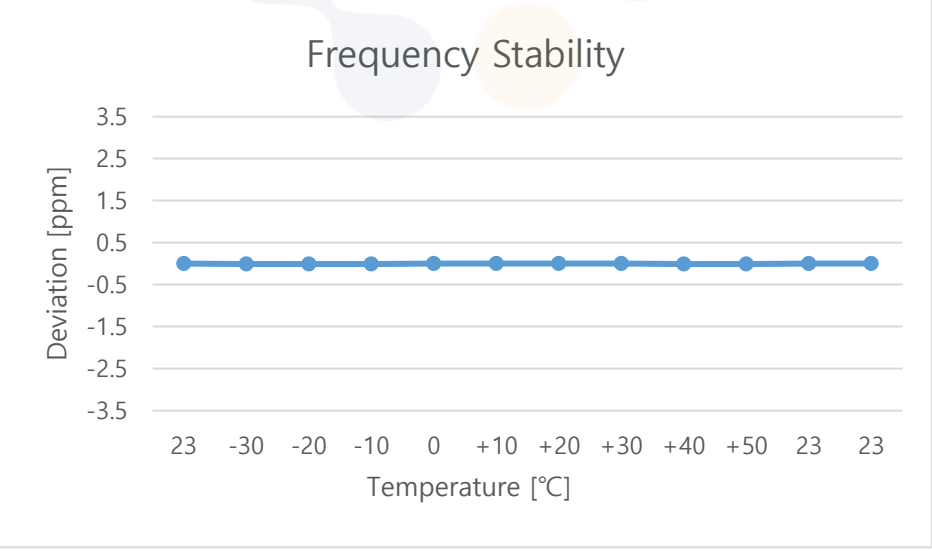
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.88	+23(Ref)	2,535,000,001	1.13	0.0	0.000 000
		-30	2,535,000,010	10.33	0.0	0.000 000
		-20	2,535,000,008	8.05	0.0	0.000 000
		-10	2,535,000,003	2.69	0.0	0.000 000
		0	2,535,000,006	6.45	0.0	0.000 000
		+10	2,535,000,008	7.55	0.0	0.000 000
		+20	2,535,000,004	4.02	0.0	0.000 000
		+30	2,535,000,003	3.33	0.0	0.000 000
		+40	2,535,000,004	4.01	0.0	0.000 000
		+50	2,535,000,001	1.25	0.0	0.000 000
115%	4.46	+23(Ref)	2,535,000,002	2.15	0.0	0.000 000
End point	3.40	+23(Ref)	2,535,000,003	3.29	0.0	0.000 000



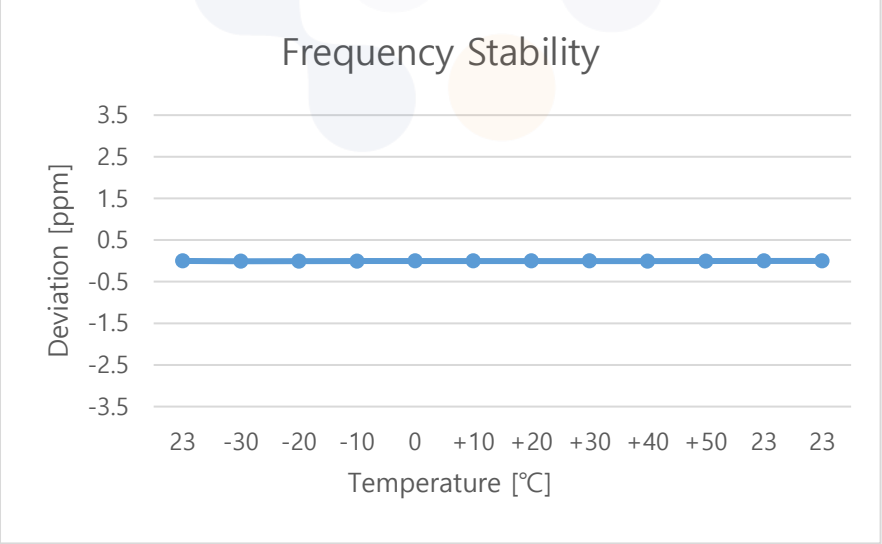
Test mode : LTE Band 12
Frequency (㎐) : 707 500 000
Channel : 23095
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	707,499,999	-1.47	0.0	0.000 000
		-30	707,500,002	2.21	0.0	0.000 000
		-20	707,500,003	3.33	0.0	0.000 000
		-10	707,500,005	5.05	0.0	0.000 001
		0	707,500,005	4.95	0.0	0.000 001
		+10	707,500,003	2.66	0.0	0.000 000
		+20	707,500,002	1.55	0.0	0.000 000
		+30	707,500,003	3.05	0.0	0.000 000
		+40	707,500,002	2.19	0.0	0.000 000
		+50	707,500,004	4.08	0.0	0.000 001
115%	4.43	+23(Ref)	707,500,000	0.39	0.0	0.000 000
End point	3.40	+23(Ref)	707,499,999	-0.60	0.0	0.000 000



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

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	781,999,997	-3.35	0.0	0.000 000
		-30	781,999,996	-4.41	0.0	-0.000 001
		-20	781,999,993	-6.85	0.0	-0.000 001
		-10	781,999,995	-5.06	0.0	-0.000 001
		0	781,999,998	-2.38	0.0	0.000 000
		+10	781,999,999	-1.06	0.0	0.000 000
		+20	781,999,998	-2.05	0.0	0.000 000
		+30	781,999,997	-3.16	0.0	0.000 000
		+40	781,999,995	-4.58	0.0	-0.000 001
		+50	781,999,994	-5.54	0.0	-0.000 001
115%	4.43	+23(Ref)	781,999,999	-1.14	0.0	0.000 000
End point	3.40	+23(Ref)	781,999,998	-1.66	0.0	0.000 000



Test mode : LTE Band 25/2

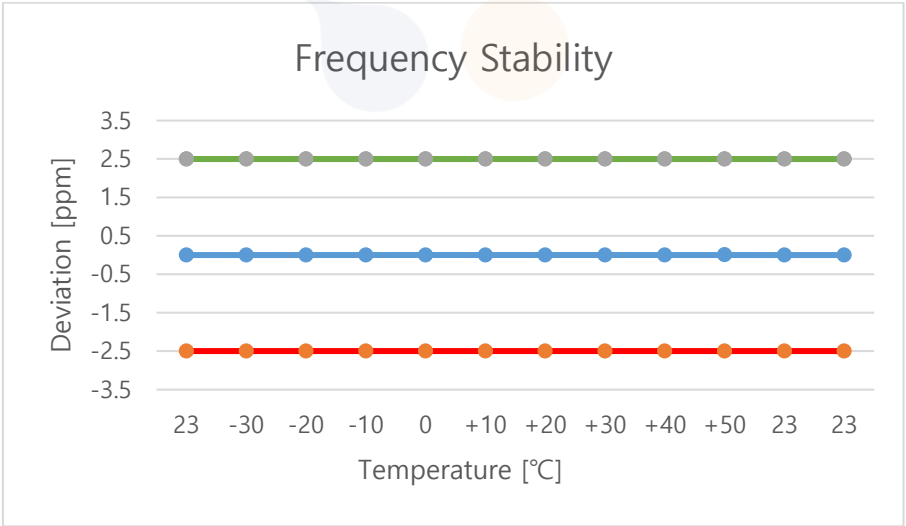
Frequency (㎐) : 1 882 500 000

Channel : 26365

Deviation limit(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

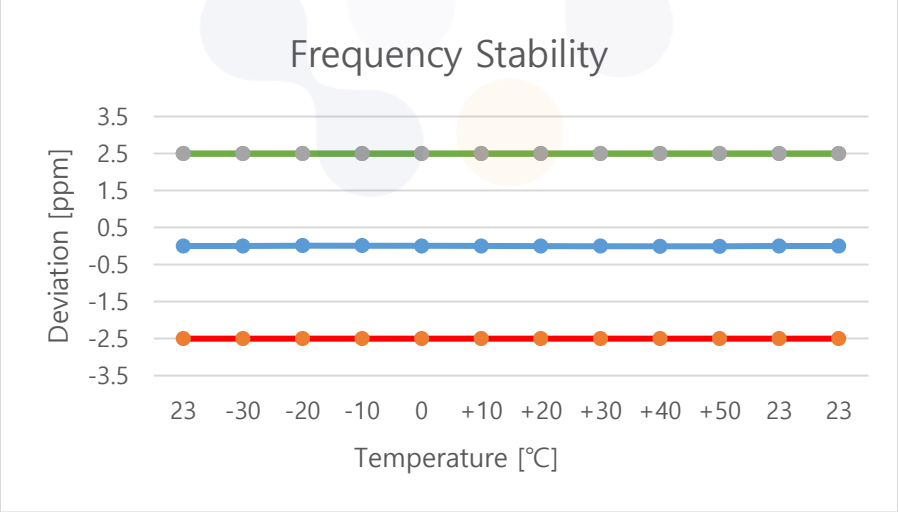
Deviation limit(IC) : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.88	+23(Ref)	1,882,500,001	1.36	0.0	0.000 000
		-30	1,882,499,994	-5.55	0.0	0.000 000
		-20	1,882,499,996	-4.36	0.0	0.000 000
		-10	1,882,499,999	-1.36	0.0	0.000 000
		0	1,882,500,003	3.01	0.0	0.000 000
		+10	1,882,500,006	6.45	0.0	0.000 000
		+20	1,882,500,002	2.06	0.0	0.000 000
		+30	1,882,500,005	5.09	0.0	0.000 000
		+40	1,882,500,008	8.44	0.0	0.000 000
		+50	1,882,500,011	10.64	0.0	0.000 001
115%	4.46	+23(Ref)	1,882,500,002	1.95	0.0	0.000 000
End point	3.40	+23(Ref)	1,882,500,001	0.57	0.0	0.000 000



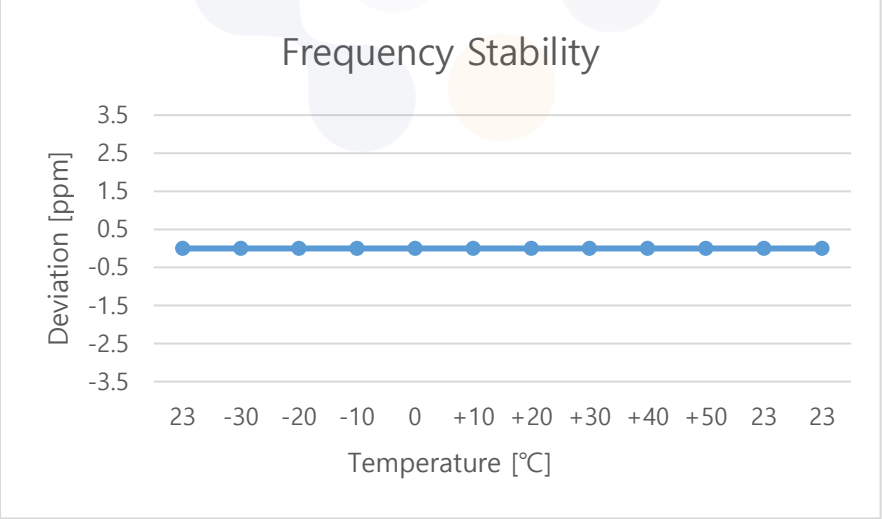
Test mode : LTE Band 26
Frequency (㎐) : 836 500 000
Channel : 26915
Deviation limit(FCC) : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.88	+23(Ref)	836,499,998	-2.25	0.0	0.000 000
		-30	836,500,003	3.13	0.0	0.000 000
		-20	836,500,005	5.10	0.0	0.000 001
		-10	836,500,006	6.28	0.0	0.000 001
		0	836,500,001	1.44	0.0	0.000 000
		+10	836,500,002	2.16	0.0	0.000 000
		+20	836,499,998	-1.68	0.0	0.000 000
		+30	836,499,998	-2.44	0.0	0.000 000
		+40	836,499,995	-5.08	0.0	-0.000 001
		+50	836,499,995	-4.69	0.0	-0.000 001
115%	4.46	+23(Ref)	836,499,997	-3.49	0.0	0.000 000
End point	3.40	+23(Ref)	836,499,998	-2.29	0.0	0.000 000



Test mode : LTE Band 30
Frequency (㎐) : 2 310 000 000
Channel : 27710
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	2,310,000,004	4.05	0.0	0.000 000
		-30	2,310,000,010	9.64	0.0	0.000 000
		-20	2,310,000,010	10.18	0.0	0.000 000
		-10	2,310,000,009	8.55	0.0	0.000 000
		0	2,310,000,008	8.16	0.0	0.000 000
		+10	2,310,000,004	4.19	0.0	0.000 000
		+20	2,310,000,003	2.69	0.0	0.000 000
		+30	2,310,000,001	1.48	0.0	0.000 000
		+40	2,310,000,003	2.88	0.0	0.000 000
		+50	2,310,000,005	5.09	0.0	0.000 000
115%	4.43	+23(Ref)	2,310,000,003	3.30	0.0	0.000 000
End point	3.40	+23(Ref)	2,310,000,001	1.03	0.0	0.000 000



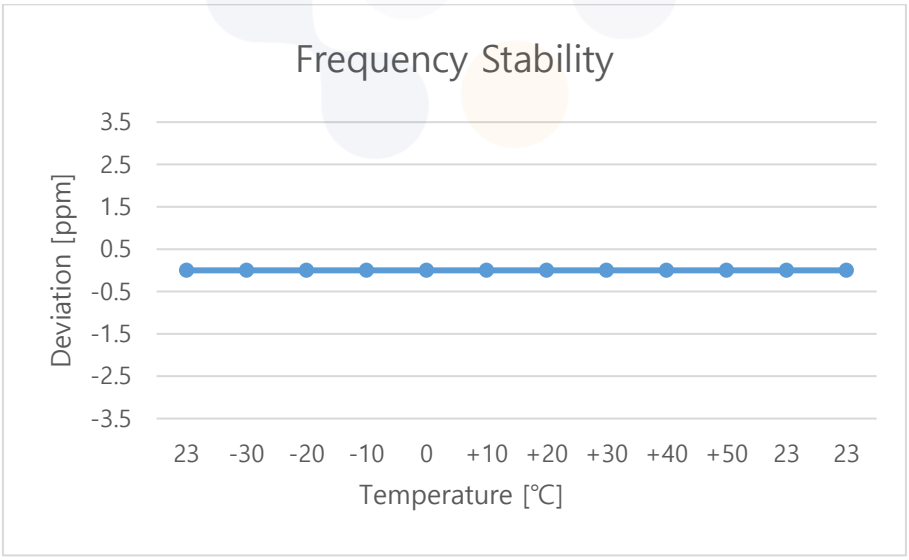
Test mode : LTE Band 40(L)

Frequency (㎐) : 2 310 000 000

Channel : 38750

Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	2,310,000,006	5.72	0.0	0.000 000
		-30	2,309,999,997	-3.16	0.0	0.000 000
		-20	2,309,999,995	-5.47	0.0	0.000 000
		-10	2,309,999,997	-2.88	0.0	0.000 000
		0	2,310,000,004	4.05	0.0	0.000 000
		+10	2,310,000,006	5.78	0.0	0.000 000
		+20	2,310,000,004	4.12	0.0	0.000 000
		+30	2,310,000,002	2.08	0.0	0.000 000
		+40	2,310,000,002	1.66	0.0	0.000 000
		+50	2,310,000,004	4.39	0.0	0.000 000
115%	4.43	+23(Ref)	2,310,000,003	3.35	0.0	0.000 000
End point	3.40	+23(Ref)	2,310,000,003	3.03	0.0	0.000 000



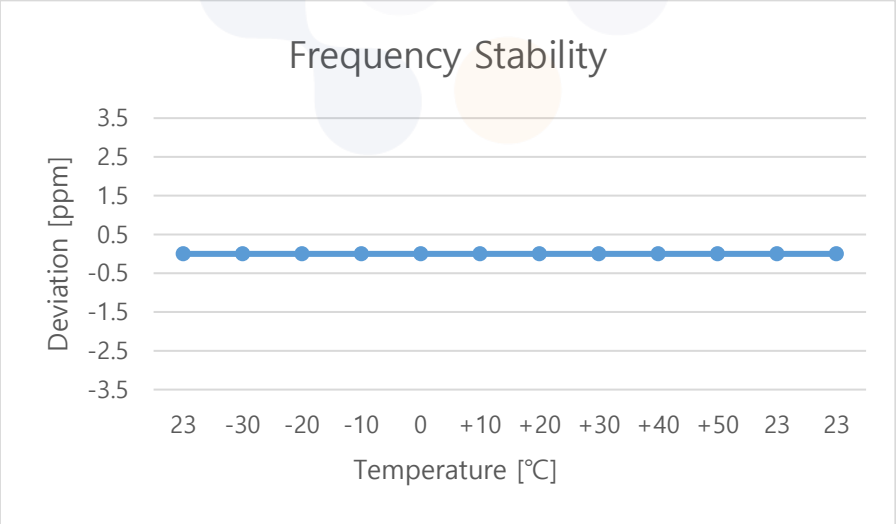
Test mode : LTE Band 40(U)

Frequency (㎐) : 2 310 000 000

Channel : 38750

Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	2,355,000,005	5.42	0.0	0.000 000
		-30	2,355,000,002	2.06	0.0	0.000 000
		-20	2,355,000,007	7.41	0.0	0.000 000
		-10	2,355,000,008	8.04	0.0	0.000 000
		0	2,355,000,005	4.69	0.0	0.000 000
		+10	2,355,000,003	2.85	0.0	0.000 000
		+20	2,355,000,007	6.66	0.0	0.000 000
		+30	2,355,000,004	4.18	0.0	0.000 000
		+40	2,355,000,005	5.30	0.0	0.000 000
		+50	2,355,000,001	1.08	0.0	0.000 000
115%	4.43	+23(Ref)	2,355,000,008	8.25	0.0	0.000 000
End point	3.40	+23(Ref)	2,355,000,004	3.96	0.0	0.000 000



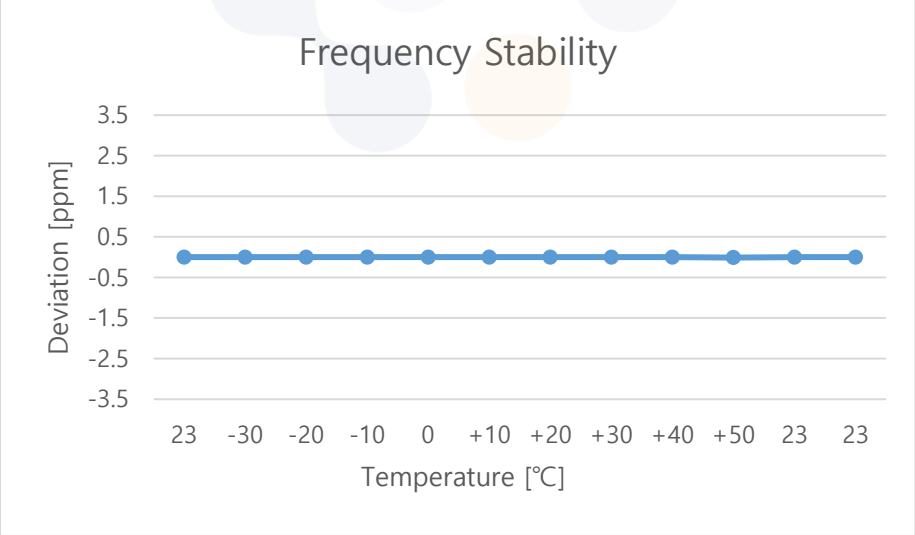
Test mode : LTE Band 41(PC2)

Frequency (㎐) : 2 593 000 000

Channel : 40620

Deviation limit(FCC&IC) : 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	+23(Ref)	2,592,999,992	-8.11	0.0	0.000 000
		-30	2,592,999,994	-6.48	0.0	0.000 000
		-20	2,592,999,995	-5.41	0.0	0.000 000
		-10	2,592,999,990	-10.06	0.0	0.000 000
		0	2,592,999,993	-7.06	0.0	0.000 000
		+10	2,592,999,994	-5.58	0.0	0.000 000
		+20	2,592,999,994	-6.48	0.0	0.000 000
		+30	2,592,999,992	-8.05	0.0	0.000 000
		+40	2,592,999,990	-10.11	0.0	0.000 000
		+50	2,592,999,986	-13.68	0.0	-0.000 001
115%	4.43	+23(Ref)	2,592,999,993	-7.37	0.0	0.000 000
End point	3.40	+23(Ref)	2,592,999,991	-9.40	0.0	0.000 000



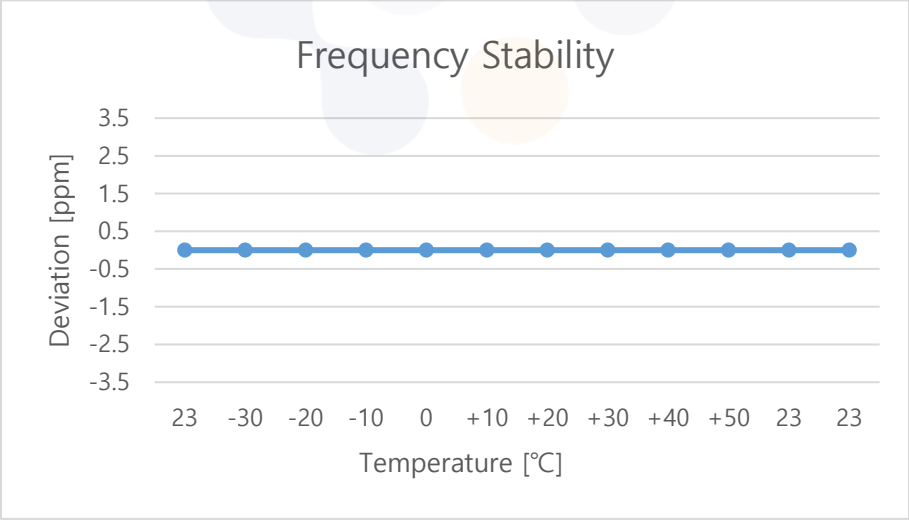
Test mode : LTE Band 66/4

Frequency (㎐) : 1 745 000 000

Channel : 132322

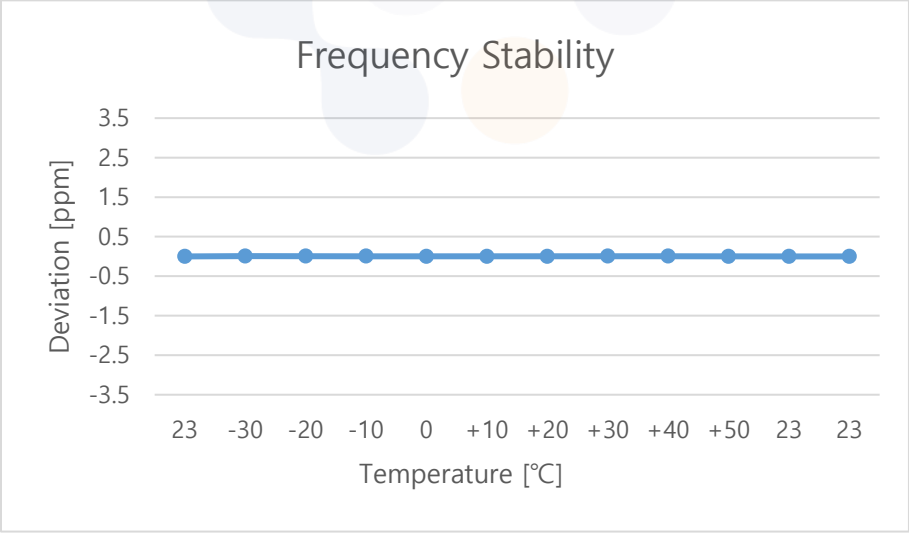
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation.

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	1,745,000,003	2.92	0.0	0.000 000
		-30	1,744,999,997	-3.30	0.0	0.000 000
		-20	1,744,999,996	-4.39	0.0	0.000 000
		-10	1,744,999,995	-5.46	0.0	0.000 000
		0	1,744,999,999	-1.25	0.0	0.000 000
		+10	1,745,000,004	4.19	0.0	0.000 000
		+20	1,745,000,002	2.06	0.0	0.000 000
		+30	1,745,000,004	3.94	0.0	0.000 000
		+40	1,745,000,005	5.04	0.0	0.000 000
		+50	1,745,000,001	1.09	0.0	0.000 000
115%	4.43	+23(Ref)	1,745,000,004	4.33	0.0	0.000 000
End point	3.40	+23(Ref)	1,745,000,002	1.75	0.0	0.000 000



Test mode : LTE Band 71
Frequency (㎐) : 680 500 000
Channel : 133297
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

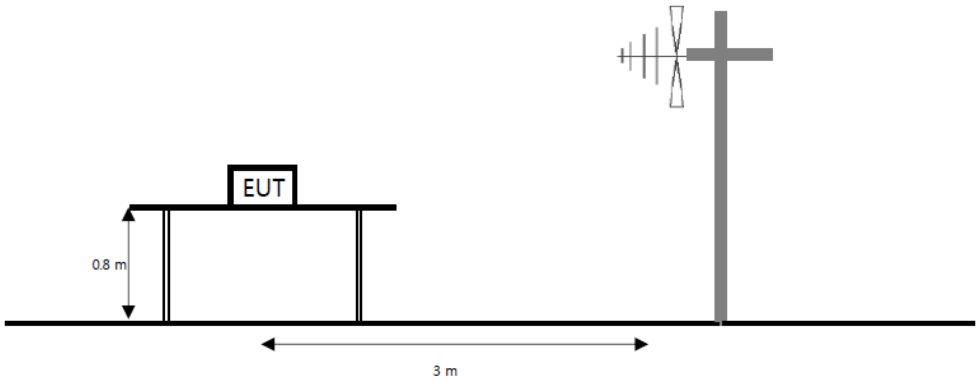
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	680,500,002	1.99	0.0	0.000 000
		-30	680,500,004	4.10	0.0	0.000 001
		-20	680,500,007	7.11	0.0	0.000 001
		-10	680,500,008	8.09	0.0	0.000 001
		0	680,500,003	3.28	0.0	0.000 000
		+10	680,500,001	1.15	0.0	0.000 000
		+20	680,500,002	2.16	0.0	0.000 000
		+30	680,500,004	4.39	0.0	0.000 001
		+40	680,500,007	7.05	0.0	0.000 001
		+50	680,500,003	3.34	0.0	0.000 000
115%	4.43	+23(Ref)	680,500,003	2.99	0.0	0.000 000
End point	3.40	+23(Ref)	680,500,002	1.93	0.0	0.000 000



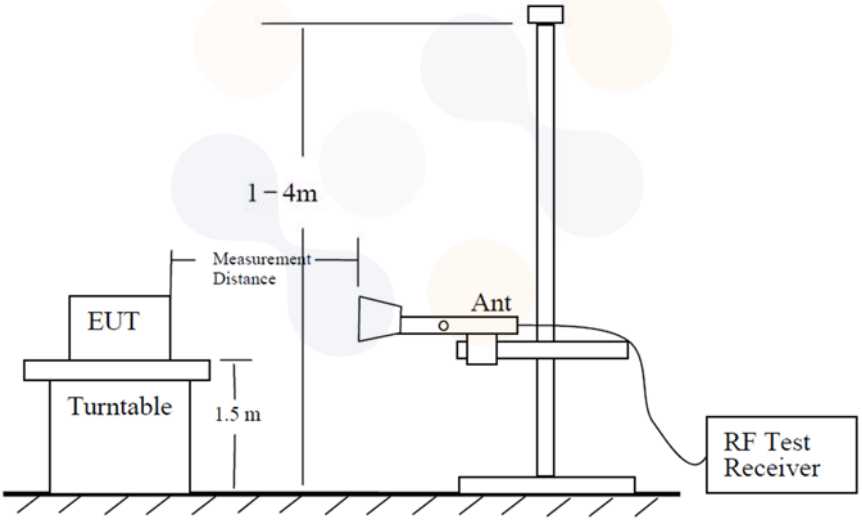
7.7. Radiated Power (ERP/EIRP)

Test setup

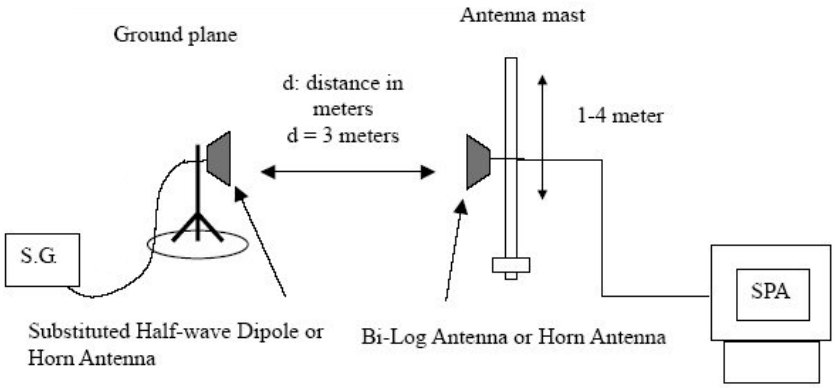
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 transmitters in the cellular radiotelephone service must not exceed the limits in this section. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to RSS-132(5.4),
the equivalent radiated power (e.r.p.) shall not exceed 7 watts for mobile equipment and 3 watts for portable equipment.

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

According to §27.50(a),
The following power limits and related requirements apply to stations transmitting in the 2305-2320 ㎒ band or the 2345-2360 ㎒ band.

(3) Mobile and portable stations.

(i) For mobile and portable stations transmitting in the 2305–2315 ㎒ band or the 2350–2360 ㎒ band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305–2315 ㎒ and 2350–2360 ㎒ bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305–2315 ㎒ band. Power averaging shall not include intervals in which the transmitter is off.

According to RSS-195(5.5),
The e.i.r.p of mobile or portable equipment transmitting in the band 2305-2315 ㎒ or the band 2350-2360 ㎒, employing 3GPP LTE (Third Generation Partnership Project Long Term Evolution) standards, shall not exceed 250 ㎽ within any 5 ㎒ bandwidth. For other technologies, the e.i.r.p. shall not exceed 50 ㎽ within any 1 ㎒ bandwidth.

According to §27.50(b)(10) and RSS-130(4.6)
Portable stations (hand-held devices) in the 746-757 ㎒, 776-788 ㎒, and 805-806 ㎒ bands are limited to 3 watts ERP.

According to §27.50(c)(10) and RSS-130(4.6)
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 RSS-139(5.5),
the equivalent isotropically radiated power (e.i.r.p.) for mobile and
portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 ㎒ shall not exceed one watt(30 dBm e.i.r.p./channel bandwidth).

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

According to RSS-199(5.5),
Subscriber equipment other than fixed subscriber equipment shall not exceed an e.i.r.p. of 2W per channel bandwidth.

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 raIC 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 raIC and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

Test results

Main antenna

Test mode: LTE Band 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	3.40	6.12	24.23	21.51	0.142
		836.50	H	3.45	6.22	25.86	23.09	0.204
		848.30	H	3.20	6.27	25.51	22.44	0.175
	16QAM	824.70	H	3.40	6.12	23.44	20.72	0.118
		836.50	H	3.45	6.22	24.85	22.08	0.161
		848.30	H	3.20	6.27	24.37	21.30	0.135
3 M	QPSK	825.50	H	3.41	6.12	24.01	21.29	0.135
		836.50	H	3.45	6.22	25.95	23.18	0.208
		847.50	H	3.23	6.26	25.26	22.22	0.167
	16QAM	825.50	H	3.41	6.12	23.00	20.28	0.107
		836.50	H	3.45	6.22	24.99	22.22	0.167
		847.50	H	3.23	6.26	24.41	21.37	0.137
5 M	QPSK	826.50	H	3.42	6.13	24.05	21.33	0.136
		836.50	H	3.45	6.22	25.93	23.16	0.207
		846.50	H	3.26	6.24	25.39	22.40	0.174
	16QAM	826.50	H	3.42	6.13	22.96	20.24	0.106
		836.50	H	3.45	6.22	25.07	22.30	0.170
		846.50	H	3.26	6.24	24.47	21.48	0.141
10 M	QPSK	829.00	H	3.44	6.13	23.90	21.21	0.132
		836.50	H	3.45	6.22	25.97	23.20	0.209
		844.00	H	3.33	6.22	25.70	22.81	0.191
	16QAM	829.00	H	3.44	6.13	22.97	20.28	0.107
		836.50	H	3.45	6.22	25.14	22.37	0.173
		844.00	H	3.33	6.22	24.82	21.93	0.156

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

Test mode: LTE Band 7

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 502.50	H	6.01	10.88	26.98	22.11	0.163
		2 535.00	H	6.09	10.94	26.90	22.05	0.160
		2 567.50	H	6.18	10.98	26.77	21.97	0.157
	16QAM	2 502.50	H	6.01	10.88	26.07	21.20	0.132
		2 535.00	H	6.09	10.94	26.02	21.17	0.131
		2 567.50	H	6.18	10.98	26.17	21.37	0.137
10 M	QPSK	2 505.00	H	6.01	10.88	27.43	22.56	0.180
		2 535.00	H	6.09	10.94	27.34	22.49	0.177
		2 565.00	H	6.17	10.96	27.71	22.92	0.196
	16QAM	2 505.00	H	6.01	10.88	26.54	21.67	0.147
		2 535.00	H	6.09	10.94	26.57	21.72	0.149
		2 565.00	H	6.17	10.96	26.68	21.89	0.155
15 M	QPSK	2 507.50	H	6.02	10.87	28.02	23.17	0.207
		2 535.00	H	6.09	10.94	28.32	23.47	0.222
		2 562.50	H	6.16	10.96	28.24	23.44	0.221
	16QAM	2 507.50	H	6.02	10.87	27.40	22.55	0.180
		2 535.00	H	6.09	10.94	27.66	22.81	0.191
		2 562.50	H	6.16	10.96	27.42	22.62	0.183
20 M	QPSK	2 510.00	H	6.03	10.88	28.03	23.18	0.208
		2 535.00	H	6.09	10.94	27.15	22.30	0.170
		2 560.00	H	6.16	10.96	28.04	23.24	0.211
	16QAM	2 510.00	H	6.03	10.88	27.17	22.32	0.171
		2 535.00	H	6.09	10.94	26.48	21.63	0.146
		2 560.00	H	6.16	10.96	26.95	22.15	0.164

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

Test mode: LTE Band 12

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	2.55	5.62	24.11	21.04	0.127
		707.50	H	2.63	5.65	24.75	21.72	0.149
		715.30	H	2.60	5.68	25.87	22.79	0.190
	16QAM	699.70	H	2.55	5.62	23.06	19.99	0.100
		707.50	H	2.63	5.65	23.62	20.59	0.115
		715.30	H	2.60	5.68	24.82	21.74	0.149
3 M	QPSK	700.50	H	2.56	5.63	24.19	21.11	0.129
		707.50	H	2.63	5.65	24.85	21.82	0.152
		714.50	H	2.61	5.68	25.69	22.61	0.182
	16QAM	700.50	H	2.56	5.63	23.28	20.20	0.105
		707.50	H	2.63	5.65	23.83	20.80	0.120
		714.50	H	2.61	5.68	24.62	21.54	0.143
5 M	QPSK	701.50	H	2.57	5.64	24.67	21.59	0.144
		707.50	H	2.63	5.65	24.56	21.53	0.142
		713.50	H	2.62	5.67	25.60	22.54	0.179
	16QAM	701.50	H	2.57	5.64	23.37	20.29	0.107
		707.50	H	2.63	5.65	23.65	20.62	0.115
		713.50	H	2.62	5.67	24.62	21.56	0.143
10 M	QPSK	704.00	H	2.59	5.65	24.51	21.45	0.140
		707.50	H	2.63	5.65	24.81	21.78	0.151
		711.00	H	2.64	5.65	25.26	22.25	0.168
	16QAM	704.00	H	2.59	5.65	23.47	20.41	0.110
		707.50	H	2.63	5.65	23.77	20.74	0.119
		711.00	H	2.64	5.65	24.29	21.28	0.134

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	3.35	5.92	26.05	23.48	0.223
		782.00	H	3.31	5.91	26.41	23.81	0.240
		784.50	H	3.26	5.90	26.20	23.56	0.227
	16QAM	779.50	H	3.35	5.92	25.01	22.44	0.175
		782.00	H	3.31	5.91	25.58	22.98	0.199
		784.50	H	3.26	5.90	25.41	22.77	0.189
10 M	QPSK	782.00	H	3.31	5.91	26.64	24.04	0.254
	16QAM	782.00	H	3.31	5.91	25.61	23.01	0.200

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

Test mode: LTE Band 25/2

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	27.36	23.28	0.213
		1 882.50	H	5.05	9.33	26.13	21.85	0.153
		1 914.30	H	4.96	9.40	25.74	21.30	0.135
	16QAM	1 850.70	H	5.15	9.23	26.33	22.25	0.168
		1 882.50	H	5.05	9.33	25.32	21.04	0.127
		1 914.30	H	4.96	9.40	24.79	20.35	0.108
3 M	QPSK	1 851.50	H	5.15	9.23	27.87	23.79	0.239
		1 882.50	H	5.05	9.33	26.10	21.82	0.152
		1 913.50	H	4.96	9.40	25.75	21.31	0.135
	16QAM	1 851.50	H	5.15	9.23	26.81	22.73	0.187
		1 882.50	H	5.05	9.33	25.06	20.78	0.120
		1 913.50	H	4.96	9.40	24.84	20.40	0.110
5 M	QPSK	1 852.50	H	5.14	9.23	27.66	23.57	0.228
		1 882.50	H	5.05	9.33	26.16	21.88	0.154
		1 912.50	H	4.96	9.40	26.06	21.62	0.145
	16QAM	1 852.50	H	5.14	9.23	26.88	22.79	0.190
		1 882.50	H	5.05	9.33	25.47	21.19	0.132
		1 912.50	H	4.96	9.40	25.13	20.69	0.117
10 M	QPSK	1 855.00	H	5.14	9.24	28.00	23.89	0.245
		1 882.50	H	5.05	9.33	26.69	22.41	0.174
		1 910.00	H	4.97	9.38	26.71	22.30	0.170
	16QAM	1 855.00	H	5.14	9.24	27.07	22.96	0.198
		1 882.50	H	5.05	9.33	25.98	21.70	0.148
		1 910.00	H	4.97	9.38	25.85	21.44	0.139
15 M	QPSK	1 857.50	H	5.13	9.25	27.72	23.60	0.229
		1 882.50	H	5.05	9.33	26.99	22.71	0.187
		1 907.50	H	4.98	9.36	26.96	22.58	0.181
	16QAM	1 857.50	H	5.13	9.25	26.98	22.86	0.193
		1 882.50	H	5.05	9.33	26.30	22.02	0.159
		1 907.50	H	4.98	9.36	26.11	21.73	0.149
20 M	QPSK	1 860.00	H	5.12	9.27	27.54	23.39	0.218
		1 882.50	H	5.05	9.33	27.37	23.09	0.204
		1 905.00	H	4.99	9.34	27.07	22.71	0.187
	16QAM	1 860.00	H	5.12	9.27	26.88	22.73	0.187
		1 882.50	H	5.05	9.33	26.53	22.25	0.168
		1 905.00	H	4.99	9.34	26.36	22.00	0.158

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

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	3.40	6.12	23.64	20.92	0.124
		836.50	H	3.45	6.22	23.12	20.35	0.108
		848.30	H	3.20	6.27	25.21	22.14	0.164
	16QAM	824.70	H	3.40	6.12	22.64	19.92	0.098
		836.50	H	3.45	6.22	22.03	19.26	0.084
		848.30	H	3.20	6.27	24.28	21.21	0.132
3 M	QPSK	825.50	H	3.41	6.12	23.66	20.94	0.124
		836.50	H	3.45	6.22	23.19	20.42	0.110
		847.50	H	3.23	6.26	25.46	22.42	0.175
	16QAM	825.50	H	3.41	6.12	22.67	19.95	0.099
		836.50	H	3.45	6.22	22.38	19.61	0.091
		847.50	H	3.23	6.26	24.57	21.53	0.142
5 M	QPSK	826.50	H	3.42	6.13	23.60	20.88	0.122
		836.50	H	3.45	6.22	23.30	20.53	0.113
		846.50	H	3.26	6.24	25.52	22.53	0.179
	16QAM	826.50	H	3.42	6.13	22.78	20.06	0.101
		836.50	H	3.45	6.22	22.27	19.50	0.089
		846.50	H	3.26	6.24	24.64	21.65	0.146
10 M	QPSK	829.00	H	3.44	6.13	23.77	21.08	0.128
		836.50	H	3.45	6.22	23.89	21.12	0.129
		844.00	H	3.33	6.22	25.67	22.78	0.190
	16QAM	829.00	H	3.44	6.13	22.80	20.11	0.103
		836.50	H	3.45	6.22	22.95	20.18	0.104
		844.00	H	3.33	6.22	24.77	21.88	0.154
15 M	QPSK	831.50	H	3.45	6.14	23.60	20.91	0.123
		836.50	H	3.45	6.22	23.88	21.11	0.129
		841.50	H	3.41	6.24	26.05	23.21	0.209
	16QAM	831.50	H	3.45	6.14	22.83	20.14	0.103
		836.50	H	3.45	6.22	22.83	20.06	0.101
		841.50	H	3.41	6.24	24.93	22.09	0.162

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

Test mode: LTE Band 30

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 307.50	H	5.50	10.47	26.92	21.95	0.157
		2 310.00	H	5.51	10.50	27.26	22.27	0.169
		2 312.50	H	5.51	10.47	27.25	22.29	0.169
	16QAM	2 307.50	H	5.50	10.47	26.03	21.06	0.128
		2 310.00	H	5.51	10.50	26.40	21.41	0.138
		2 312.50	H	5.51	10.47	26.39	21.43	0.139
10 M	QPSK	2 310.00	H	5.51	10.50	27.41	22.42	0.175
	16QAM	2 310.00	H	5.51	10.50	26.50	21.51	0.142

Test mode: LTE Band 40(L)

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 307.50	H	5.50	10.47	28.20	23.23	0.210
		2 310.00	H	5.51	10.50	28.37	23.38	0.218
		2 312.50	H	5.51	10.47	27.94	22.98	0.199
	16QAM	2 307.50	H	5.50	10.47	26.59	21.62	0.145
		2 310.00	H	5.51	10.50	27.63	22.64	0.184
		2 312.50	H	5.51	10.47	26.39	21.43	0.139
10 M	QPSK	2 310.00	H	5.51	10.50	28.32	23.33	0.215
	16QAM	2 310.00	H	5.51	10.50	27.02	22.03	0.160

Test mode: LTE Band 40(U)

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 352.50	H	5.62	10.55	27.95	23.02	0.200
		2 355.00	H	5.62	10.55	27.60	22.67	0.185
		2 357.50	H	5.63	10.56	27.73	22.80	0.191
	16QAM	2 352.50	H	5.62	10.55	26.71	21.78	0.151
		2 355.00	H	5.62	10.55	26.36	21.43	0.139
		2 357.50	H	5.63	10.56	26.13	21.20	0.132
10 M	QPSK	2 355.00	H	5.62	10.55	27.61	22.68	0.185
	16QAM	2355.00	H	5.62	10.55	26.70	21.77	0.150

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

Test mode: LTE Band 41 (PC2 - FCC)

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	31.45	26.59	0.456
		2 593.00	H	6.24	11.13	30.03	25.14	0.327
		2 687.50	H	6.49	11.26	28.32	23.55	0.226
	16QAM	2 498.50	H	6.00	10.86	31.27	26.41	0.438
		2 593.00	H	6.24	11.13	29.95	25.06	0.321
		2 687.50	H	6.49	11.26	28.23	23.46	0.222
10 M	QPSK	2 501.00	H	6.00	10.87	31.71	26.84	0.483
		2 593.00	H	6.24	11.13	29.55	24.66	0.292
		2 685.00	H	6.48	11.25	28.82	24.05	0.254
	16QAM	2 501.00	H	6.00	10.87	31.59	26.72	0.470
		2 593.00	H	6.24	11.13	29.73	24.84	0.305
		2 685.00	H	6.48	11.25	28.28	23.51	0.224
15 M	QPSK	2 503.50	H	6.01	10.88	31.40	26.53	0.450
		2 593.00	H	6.24	11.13	30.11	25.22	0.333
		2 682.50	H	6.47	11.25	27.71	22.93	0.196
	16QAM	2 503.50	H	6.01	10.88	31.15	26.28	0.425
		2 593.00	H	6.24	11.13	30.13	25.24	0.334
		2 682.50	H	6.47	11.25	28.02	23.24	0.211
20 M	QPSK	2 506.00	H	6.02	10.89	31.95	27.08	0.511
		2 593.00	H	6.24	11.13	29.47	24.58	0.287
		2 680.00	H	6.47	11.24	28.92	24.15	0.260
	16QAM	2 506.00	H	6.02	10.89	31.40	26.53	0.450
		2 593.00	H	6.24	11.13	29.92	25.03	0.318
		2 680.00	H	6.47	11.24	28.96	24.19	0.262

Test mode: LTE Band 41 (PC2 - IC)

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 502.50	H	6.01	10.88	31.39	26.52	0.449
	16QAM	2 502.50	H	6.01	10.88	31.30	26.43	0.440
10 M	QPSK	2 505.00	H	6.01	10.88	32.07	27.20	0.525
	16QAM	2 505.00	H	6.01	10.88	32.43	27.56	0.570
15 M	QPSK	2 507.50	H	6.02	10.87	33.09	28.24	0.667
	16QAM	2 507.50	H	6.02	10.87	32.90	28.05	0.638
20 M	QPSK	2 510.00	H	6.03	10.88	32.69	27.84	0.608
	16QAM	2 510.00	H	6.03	10.88	32.82	27.97	0.627

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	27.43	24.15	0.260
		1 745.00	H	5.47	8.93	27.31	23.84	0.242
		1 779.30	H	5.36	9.11	26.88	23.13	0.206
	16QAM	1 710.70	H	5.57	8.85	26.27	22.99	0.199
		1 745.00	H	5.47	8.93	26.33	22.86	0.193
		1 779.30	H	5.36	9.11	25.90	22.15	0.164
3 M	QPSK	1 711.50	H	5.57	8.86	26.53	23.24	0.211
		1 745.00	H	5.47	8.93	27.40	23.93	0.247
		1 778.50	H	5.36	9.11	26.95	23.20	0.209
	16QAM	1 711.50	H	5.57	8.86	25.63	22.34	0.171
		1 745.00	H	5.47	8.93	26.51	23.04	0.201
		1 778.50	H	5.36	9.11	26.14	22.39	0.173
5 M	QPSK	1 712.50	H	5.56	8.86	26.52	23.22	0.210
		1 745.00	H	5.47	8.93	27.45	23.98	0.250
		1 777.50	H	5.37	9.11	27.05	23.31	0.214
	16QAM	1 712.50	H	5.56	8.86	25.42	22.12	0.163
		1 745.00	H	5.47	8.93	26.48	23.01	0.200
		1 777.50	H	5.37	9.11	26.00	22.26	0.168
10 M	QPSK	1 715.00	H	5.56	8.87	26.16	22.84	0.192
		1 745.00	H	5.47	8.93	27.35	23.88	0.244
		1 775.00	H	5.38	9.08	27.12	23.41	0.219
	16QAM	1 715.00	H	5.56	8.87	25.58	22.26	0.168
		1 745.00	H	5.47	8.93	26.45	22.98	0.199
		1 775.00	H	5.38	9.08	26.23	22.52	0.179
15 M	QPSK	1 717.50	H	5.55	8.88	26.62	23.29	0.213
		1 745.00	H	5.47	8.93	27.22	23.75	0.237
		1 772.50	H	5.38	9.07	27.46	23.77	0.238
	16QAM	1 717.50	H	5.55	8.88	25.74	22.41	0.174
		1 745.00	H	5.47	8.93	26.53	23.06	0.202
		1 772.50	H	5.38	9.07	26.65	22.96	0.198
20 M	QPSK	1 720.00	H	5.54	8.88	27.05	23.71	0.235
		1 745.00	H	5.47	8.93	27.45	23.98	0.250
		1 770.00	H	5.39	9.07	29.20	25.52	0.356
	16QAM	1 720.00	H	5.54	8.88	25.94	22.60	0.182
		1 745.00	H	5.47	8.93	26.75	23.28	0.213
		1 770.00	H	5.39	9.07	27.18	23.50	0.224

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

Test mode: LTE Band 71

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	665.50	H	3.14	5.50	22.46	20.10	0.102
		680.50	H	2.84	5.53	22.88	20.18	0.104
		695.50	H	2.55	5.59	23.12	20.08	0.102
	16QAM	665.50	H	3.14	5.50	21.43	19.07	0.081
		680.50	H	2.84	5.53	21.86	19.16	0.082
		695.50	H	2.55	5.59	22.04	19.00	0.079
10 M	QPSK	668.00	H	3.09	5.51	22.29	19.87	0.097
		680.50	H	2.84	5.53	23.83	21.13	0.130
		693.00	H	2.55	5.60	22.70	19.65	0.092
	16QAM	668.00	H	3.09	5.51	21.08	18.66	0.073
		680.50	H	2.84	5.53	22.68	19.98	0.100
		693.00	H	2.55	5.60	21.94	18.89	0.077
15 M	QPSK	670.50	H	3.04	5.51	23.34	20.87	0.122
		680.50	H	2.84	5.53	24.18	21.48	0.141
		690.50	H	2.55	5.59	22.85	19.81	0.096
	16QAM	670.50	H	3.04	5.51	21.76	19.29	0.085
		680.50	H	2.84	5.53	23.03	20.33	0.108
		690.50	H	2.55	5.59	22.27	19.23	0.084
20 M	QPSK	673.00	H	2.99	5.52	22.73	20.20	0.105
		680.50	H	2.84	5.53	23.65	20.95	0.124
		688.00	H	2.61	5.58	24.56	21.59	0.144
	16QAM	673.00	H	2.99	5.52	21.37	18.84	0.077
		680.50	H	2.84	5.53	22.57	19.87	0.097
		688.00	H	2.61	5.58	23.06	20.09	0.102

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

Sub antenna

Test mode: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.70	H	5.15	9.23	23.55	19.47	0.089
		1 880.00	H	5.06	9.32	25.19	20.93	0.124
		1 909.30	H	4.97	9.37	26.65	22.25	0.168
	16QAM	1 850.70	H	5.15	9.23	22.54	18.46	0.070
		1 880.00	H	5.06	9.32	24.25	19.99	0.100
		1 909.30	H	4.97	9.37	25.74	21.34	0.136
3 M	QPSK	1 851.50	H	5.15	9.23	23.93	19.85	0.097
		1 880.00	H	5.06	9.32	25.48	21.22	0.132
		1 908.50	H	4.97	9.36	26.63	22.24	0.167
	16QAM	1 851.50	H	5.15	9.23	22.85	18.77	0.075
		1 880.00	H	5.06	9.32	24.50	20.24	0.106
		1 908.50	H	4.97	9.36	25.59	21.20	0.132
5 M	QPSK	1 852.50	H	5.14	9.23	23.78	19.69	0.093
		1 880.00	H	5.06	9.32	25.52	21.26	0.134
		1 907.50	H	4.98	9.36	26.65	22.27	0.169
	16QAM	1 852.50	H	5.14	9.23	22.76	18.67	0.074
		1 880.00	H	5.06	9.32	24.65	20.39	0.109
		1 907.50	H	4.98	9.36	25.85	21.47	0.140
10 M	QPSK	1 855.00	H	5.14	9.24	24.53	20.42	0.110
		1 880.00	H	5.06	9.32	25.47	21.21	0.132
		1 905.00	H	4.99	9.34	27.24	22.88	0.194
	16QAM	1 855.00	H	5.14	9.24	23.63	19.52	0.090
		1 880.00	H	5.06	9.32	24.58	20.32	0.108
		1 905.00	H	4.99	9.34	26.37	22.01	0.159
15 M	QPSK	1 857.50	H	5.13	9.25	23.86	19.74	0.094
		1 880.00	H	5.06	9.32	26.04	21.78	0.151
		1 902.50	H	4.99	9.35	26.28	21.92	0.156
	16QAM	1 857.50	H	5.13	9.25	23.05	18.93	0.078
		1 880.00	H	5.06	9.32	25.18	20.92	0.124
		1 902.50	H	4.99	9.35	25.25	20.89	0.123
20 M	QPSK	1 860.00	H	5.12	9.27	24.27	20.12	0.103
		1 880.00	H	5.06	9.32	25.87	21.61	0.145
		1 900.00	H	5.00	9.36	25.25	20.89	0.123
	16QAM	1 860.00	H	5.12	9.27	23.44	19.29	0.085
		1 880.00	H	5.06	9.32	24.97	20.71	0.118
		1 900.00	H	5.00	9.36	24.40	20.04	0.101

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

Test mode: LTE Band 7

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	2 502.50	H	6.01	10.88	25.41	20.54	0.113
		2 535.00	H	6.09	10.94	23.74	18.89	0.077
		2 567.50	H	6.18	10.98	24.67	19.87	0.097
	16QAM	2 502.50	H	6.01	10.88	24.74	19.87	0.097
		2 535.00	H	6.09	10.94	23.07	18.22	0.066
		2 567.50	H	6.18	10.98	24.14	19.34	0.086
10 M	QPSK	2 505.00	H	6.01	10.88	25.07	20.20	0.105
		2 535.00	H	6.09	10.94	25.16	20.31	0.107
		2 565.00	H	6.17	10.96	25.43	20.64	0.116
	16QAM	2 505.00	H	6.01	10.88	24.26	19.39	0.087
		2 535.00	H	6.09	10.94	24.36	19.51	0.089
		2 565.00	H	6.17	10.96	24.23	19.44	0.088
15 M	QPSK	2 507.50	H	6.02	10.87	25.57	20.72	0.118
		2535.00	H	6.09	10.94	25.72	20.87	0.122
		2 562.50	H	6.16	10.96	25.35	20.55	0.114
	16QAM	2 507.50	H	6.02	10.87	24.87	20.02	0.100
		2 535.00	H	6.09	10.94	24.83	19.98	0.100
		2 562.50	H	6.16	10.96	24.66	19.86	0.097
20 M	QPSK	2 510.00	H	6.03	10.88	26.17	21.32	0.136
		2 535.00	H	6.09	10.94	25.88	21.03	0.127
		2 560.00	H	6.16	10.96	25.36	20.56	0.114
	16QAM	2 510.00	H	6.03	10.88	25.25	20.40	0.110
		2 535.00	H	6.09	10.94	24.95	20.10	0.102
		2 560.00	H	6.16	10.96	24.61	19.81	0.096

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

Test mode: LTE Band 66/4

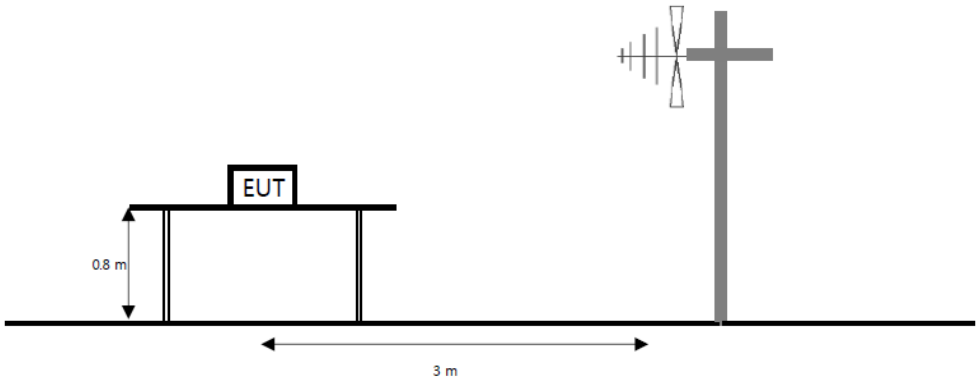
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.70	H	5.57	8.85	24.11	20.83	0.121
		1 745.00	H	5.47	8.93	24.70	21.23	0.133
		1 779.30	H	5.36	9.11	27.13	23.38	0.218
	16QAM	1 710.70	H	5.57	8.85	23.09	19.81	0.096
		1 745.00	H	5.47	8.93	23.92	20.45	0.111
		1 779.30	H	5.36	9.11	26.39	22.64	0.184
3 M	QPSK	1 711.50	H	5.57	8.86	24.42	21.13	0.130
		1 745.00	H	5.47	8.93	25.21	21.74	0.149
		1 778.50	H	5.36	9.11	27.58	23.83	0.242
	16QAM	1 711.50	H	5.57	8.86	23.61	20.32	0.108
		1 745.00	H	5.47	8.93	24.34	20.87	0.122
		1 778.50	H	5.36	9.11	26.45	22.70	0.186
5 M	QPSK	1 712.50	H	5.56	8.86	24.87	21.57	0.144
		1 745.00	H	5.47	8.93	25.25	21.78	0.151
		1 777.50	H	5.37	9.11	27.64	23.90	0.245
	16QAM	1 712.50	H	5.56	8.86	23.95	20.65	0.116
		1 745.00	H	5.47	8.93	24.57	21.10	0.129
		1 777.50	H	5.37	9.11	26.80	23.06	0.202
10 M	QPSK	1 715.00	H	5.56	8.87	24.39	21.07	0.128
		1 745.00	H	5.47	8.93	25.15	21.68	0.147
		1 775.00	H	5.38	9.08	27.79	24.08	0.256
	16QAM	1 715.00	H	5.56	8.87	23.33	20.01	0.100
		1 745.00	H	5.47	8.93	24.18	20.71	0.118
		1 775.00	H	5.38	9.08	26.87	23.16	0.207
15 M	QPSK	1 717.50	H	5.55	8.88	24.68	21.35	0.136
		1 745.00	H	5.47	8.93	24.94	21.47	0.140
		1 772.50	H	5.38	9.07	28.37	24.68	0.294
	16QAM	1 717.50	H	5.55	8.88	23.85	20.52	0.113
		1 745.00	H	5.47	8.93	24.14	20.67	0.117
		1 772.50	H	5.38	9.07	27.56	23.87	0.244
20 M	QPSK	1 720.00	H	5.54	8.88	25.50	22.16	0.164
		1 745.00	H	5.47	8.93	25.37	21.90	0.155
		1 770.00	H	5.39	9.07	28.47	24.79	0.301
	16QAM	1 720.00	H	5.54	8.88	24.65	21.31	0.135
		1 745.00	H	5.47	8.93	24.35	20.88	0.122
		1 770.00	H	5.39	9.07	27.57	23.89	0.245

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

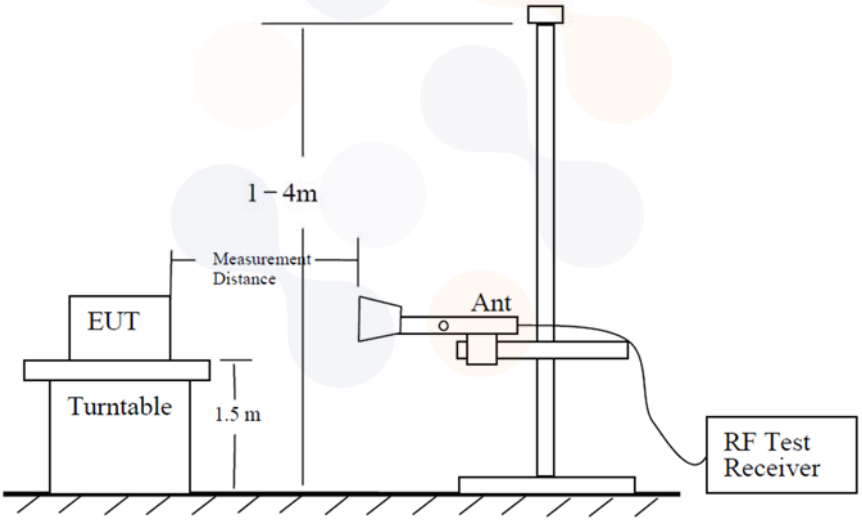
7.8. Radiated Spurious Emissions

Test setup

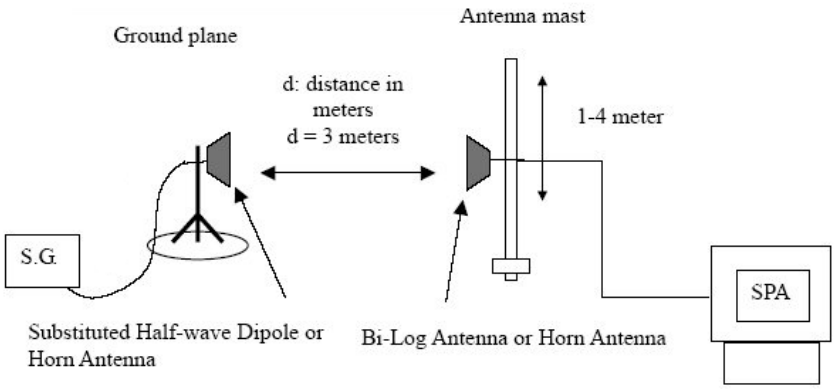
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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) and RSS-132(5.5), RSS-133(6.5),

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log($P_{[Watts]}$) ㏈.

According to §27.53(a),

By a factor of not less than 43 + 10 log (P) ㏈ on all frequencies between 2360 and 2365 ㎒, and not less than 70 + 10 log (P) ㏈ above 2365 ㎒.

According to RSS-195(5.6),

Table2 – Unwanted Emissions for Mobile, Portable and Low-Power Fixed Subscriber Equipment

Frequency (㎒)	Attenuation (㏈)
< 2200	43 + 10 log (p)
2200 – 2288	70 + 10 log (p)
2288 -2292	67 + 10 log (p)
2292 - 2296	61 + 10 log (p)
2296 – 2300	55 + 10 log (p)
2300 – 2305	43 + 10 log (p)
2305 – 2320	43 + 10 log (p)
2320 – 2324	55 + 10 log (p)
2324 – 2328	61 + 10 log (p)
2328 – 2337	67 + 10 log (p)
2337 - 2341	61 + 10 log (p)
2341 – 2345	55 + 10 log (p)
2345 – 2360	43 + 10 log (p)
2360 – 2365	43 + 10 log (p)
2365 – 2395	70 + 10 log (p)
> 2395	43 + 10 log (p)

According to §27.53(c)(2) and RSS-130(4.7),

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 + 10log($P_{[Watts]}$) ㏈.

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) and RSS-130(4.7),

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) and RSS-139(5.6),

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10log($P_{[Watts]}$) ㏈.

According to §27.53(m) and RSS-199(4.5),

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 raIC 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 raIC and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Test results (Above 1 000 ㎒)

Main antenna

Test mode : LTE Band 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	1 648.80	H	5.75	8.70	-57.05	-60.00	-13.00	47.00
	2 473.60	H	5.93	10.79	-50.04	-54.90	-13.00	41.90
	3 293.20	V	7.89	11.98	-50.71	-54.80	-13.00	41.80
	4 123.60	V	9.30	13.42	-47.38	-51.50	-13.00	38.50

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	1 663.60	H	5.71	8.68	-58.03	-61.00	-13.00	48.00
	2 494.80	H	5.99	10.83	-50.76	-55.60	-13.00	42.60
	3 326.80	V	7.95	12.02	-51.13	-55.20	-13.00	42.20
	4 159.20	V	9.33	13.09	-48.24	-52.00	-13.00	39.00

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	1 679.20	H	5.66	8.73	-58.93	-62.00	-13.00	49.00
	2 517.20	H	6.04	10.90	-51.94	-56.80	-13.00	43.80
	3 358.80	V	8.02	12.06	-50.66	-54.70	-13.00	41.70
	4 197.60	H	9.36	13.24	-48.72	-52.60	-13.00	39.60

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

Test mode : LTE Band 7
Frequency(㎒) : 2 507.5
Channel : 20825
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 001.00	V	10.30	14.88	-47.42	-52.00	-25.00	27.00
	7 504.50	V	12.10	19.45	-41.95	-49.30	-25.00	24.30
	10 002.75	V	13.10	23.21	-27.09	-37.20	-25.00	12.20
	12 499.50	H	13.20	27.02	-32.88	-46.70	-25.00	21.70

Test mode : LTE Band 7
Frequency(㎒) : 2 535.0
Channel : 21100
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 055.75	V	10.33	14.97	-46.76	-51.40	-25.00	26.40
	7 581.75	H	12.17	19.56	-43.31	-50.70	-25.00	25.70
	10 113.00	V	13.12	23.59	-22.93	-33.40	-25.00	8.40
	12 638.25	V	13.26	26.87	-29.99	-43.60	-25.00	18.60

Test mode : LTE Band 7
Frequency(㎒) : 2 562.5
Channel : 21375
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 109.75	V	10.37	15.44	-46.03	-51.10	-25.00	26.10
	7 666.50	H	12.23	20.01	-41.72	-49.50	-25.00	24.50
	10 222.50	V	13.14	23.79	-26.65	-37.30	-25.00	12.30
	12 774.75	V	13.31	27.09	-33.72	-47.50	-25.00	22.50

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

Test mode : LTE Band 12
Frequency(㎒) : 699.7
Channel : 23017
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 398.40	H	5.49	7.99	-56.00	-58.50	-13.00	45.50
	2 098.80	H	4.96	9.87	-52.29	-57.20	-13.00	44.20
	2 795.60	V	6.77	11.39	-52.88	-57.50	-13.00	44.50
	3 497.20	V	8.29	12.23	-49.76	-53.70	-13.00	40.70

Test mode : LTE Band 12
Frequency(㎒) : 707.5
Channel : 23095
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 414.40	H	5.60	8.05	-56.55	-59.00	-13.00	46.00
	2 118.80	H	5.01	9.92	-51.59	-56.50	-13.00	43.50
	2 827.20	H	6.85	11.43	-52.12	-56.70	-13.00	43.70
	3 531.60	V	8.36	12.27	-48.89	-52.80	-13.00	39.80

Test mode : LTE Band 12
Frequency(㎒) : 715.3
Channel : 23173
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 431.20	H	5.72	8.09	-57.83	-60.20	-13.00	47.20
	2 147.20	H	5.08	9.99	-51.39	-56.30	-13.00	43.30
	2 862.80	V	6.94	11.47	-52.07	-56.60	-13.00	43.60
	3 581.20	V	8.45	12.90	-49.85	-54.30	-13.00	41.30

Note.
1. 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
Channel : 23230
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 554.40	V	6.04	8.42	-58.02	-60.40	-13.00	47.40
	2 332.80	H	5.57	10.51	-35.86	-40.80	-13.00	27.80
	3 109.20	H	7.52	11.76	-50.06	-54.30	-13.00	41.30
	3 883.60	H	8.99	13.06	-47.83	-51.90	-13.00	38.90

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

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 591.09	H	5.93	8.52	-54.61	-57.20	-40.00	17.20

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 25/2
Frequency(㎒) : 1 855.0
Channel : 26090
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 708.00	V	8.67	12.48	-48.49	-52.30	-13.00	39.30
	5 565.00	V	10.61	16.19	-44.92	-50.50	-13.00	37.50
	7 420.50	H	11.99	19.62	-44.87	-52.50	-13.00	39.50
	9 273.75	V	13.20	22.23	-38.07	-47.10	-13.00	34.10

Test mode : LTE Band 25/2
Frequency(㎒) : 1 882.5
Channel : 26365
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 776.25	V	8.80	12.30	-49.90	-53.40	-13.00	40.40
	5 664.00	H	10.63	16.22	-46.91	-52.50	-13.00	39.50
	7 549.50	V	12.14	19.51	-43.43	-50.80	-13.00	37.80
	9 438.00	H	13.20	22.72	-39.28	-48.80	-13.00	35.80

Test mode : LTE Band 25/2
Frequency(㎒) : 1 910.0
Channel : 26640
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 811.50	V	8.86	12.56	-48.40	-52.10	-13.00	39.10
	5 714.25	V	10.64	16.51	-44.73	-50.60	-13.00	37.60
	7 620.75	V	12.20	19.96	-43.94	-51.70	-13.00	38.70
	9 523.50	V	13.20	22.43	-37.37	-46.60	-13.00	33.60

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

Test mode : LTE Band 26
Frequency(㎒) : 831.5
Channel : 26865
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 646.40	V	5.76	8.70	-57.46	-60.40	-13.00	47.40
	2 472.80	H	5.93	10.79	-51.44	-56.30	-13.00	43.30
	3 303.20	V	7.91	12.00	-49.51	-53.60	-13.00	40.60
	4 124.80	V	9.30	13.42	-47.58	-51.70	-13.00	38.70

Test mode : LTE Band 26
Frequency(㎒) : 836.5
Channel : 26915
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 658.40	H	5.72	8.67	-57.45	-60.40	-13.00	47.40
	2 488.80	H	5.97	10.82	-50.45	-55.30	-13.00	42.30
	3 316.00	V	7.93	12.01	-50.42	-54.50	-13.00	41.50
	4 141.60	H	9.31	13.45	-47.36	-51.50	-13.00	38.50

Test mode : LTE Band 26
Frequency(㎒) : 841.5
Channel : 26965
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 668.80	H	5.69	8.70	-58.49	-61.50	-13.00	48.50
	2 502.40	H	6.01	10.87	-51.34	-56.20	-13.00	43.20
	3 338.00	H	7.98	12.04	-50.24	-54.30	-13.00	41.30
	4 174.00	H	9.34	13.15	-47.59	-51.40	-13.00	38.40

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

Test mode : LTE Band 30
Frequency(㎒) : 2 310.0
Channel : 27710
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 610.85	H	9.76	14.35	-49.01	-53.60	-40.00	13.60
	6 914.82	H	11.33	18.65	-48.08	-55.40	-40.00	15.40
	9 221.86	V	13.20	22.15	-37.85	-46.80	-40.00	6.80
	11 525.82	H	13.29	24.94	-38.05	-49.70	-40.00	9.70

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

Test mode : LTE Band 40(L)
Frequency(㎒) : 2 307.5
Channel : 38725
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 614.75	V	9.76	14.35	-52.11	-56.70	-40.00	16.70
	6 922.50	V	11.34	18.66	-38.68	-46.00	-40.00	6.00
	9 230.25	V	13.20	22.16	-40.24	-49.20	-40.00	9.20
	11 537.25	V	13.29	24.96	-38.13	-49.80	-40.00	9.80

Test mode : LTE Band 40(L)
Frequency(㎒) : 2 310.0
Channel : 38750
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 623.75	H	9.77	14.37	-49.70	-54.30	-40.00	14.30
	6 938.25	V	11.35	18.69	-45.56	-52.90	-40.00	12.90
	9 248.25	V	13.20	22.19	-37.21	-46.20	-40.00	6.20
	11 562.75	V	13.27	25.00	-39.77	-51.50	-40.00	11.50

Test mode : LTE Band 40(L)
Frequency(㎒) : 2 312.5
Channel : 38775
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 619.25	H	9.77	14.36	-50.91	-55.50	-40.00	15.50
	6 930.75	H	11.34	18.67	-45.67	-53.00	-40.00	13.00
	9 240.75	V	13.20	22.18	-41.62	-50.60	-40.00	10.60
	11 550.00	H	13.28	24.98	-38.60	-50.30	-40.00	10.30

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

Test mode : LTE Band 40(U)
Frequency(㎒) : 2 352.5
Channel : 39175
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 702.50	V	9.88	14.80	-50.68	-55.60	-40.00	15.60
	7 053.00	H	11.47	18.60	-44.77	-51.90	-40.00	11.90
	9 398.25	H	13.20	22.38	-42.72	-51.90	-40.00	11.90
	11 750.25	H	13.20	25.69	-38.91	-51.40	-40.00	11.40

Test mode : LTE Band 40(U)
Frequency(㎒) : 2 355.0
Channel : 39200
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 705.50	V	9.89	14.81	-50.38	-55.30	-40.00	15.30
	7 059.00	H	11.48	18.61	-45.47	-52.60	-40.00	12.60
	9 410.25	V	13.20	22.68	-43.72	-53.20	-40.00	13.20
	11 762.25	H	13.20	25.70	-37.80	-50.30	-40.00	10.30

Test mode : LTE Band 40(U)
Frequency(㎒) : 2 357.5
Channel : 39225
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 715.25	V	9.90	14.82	-51.18	-56.10	-40.00	16.10
	7 072.50	V	11.50	18.63	-45.77	-52.90	-40.00	12.90
	9 431.25	V	13.20	22.71	-43.19	-52.70	-40.00	12.70
	11 787.00	H	13.19	25.73	-36.06	-48.60	-40.00	8.60

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

Test mode : LTE Band 41 (PC2 - FCC)
Frequency(㎒) : 2 503.5
Channel : 39725
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 008.50	V	10.31	14.89	-46.12	-50.70	-25.00	25.70
	7 510.50	V	12.11	19.46	-42.55	-49.90	-25.00	24.90
	10 014.00	V	13.10	23.23	-26.07	-36.20	-25.00	11.20
	12 516.00	H	13.21	26.45	-31.16	-44.40	-25.00	19.40

Test mode : LTE Band 41(PC2 - FCC)
Frequency(㎒) : 2 593.0
Channel : 40620
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 174.25	H	10.40	15.55	-44.85	-50.00	-25.00	25.00
	7 758.00	V	12.31	19.93	-41.28	-48.90	-25.00	23.90
	10 344.75	V	13.17	23.72	-25.75	-36.30	-25.00	11.30
	12 932.25	H	13.37	27.23	-31.04	-44.90	-25.00	19.90

Test mode : LTE Band 41(PC2 - FCC)
Frequency(㎒) : 2 682.5
Channel : 41515
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 351.25	V	10.51	15.98	-46.23	-51.70	-25.00	26.70
	8 022.00	H	12.52	20.07	-41.05	-48.60	-25.00	23.60
	10 703.25	V	13.20	24.29	-24.51	-35.60	-25.00	10.60
	13 375.50	H	13.93	27.72	-30.91	-44.70	-25.00	19.70

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 - IC)

Frequency(㎒) : 2 507.5

Channel : 39765

Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 015.25	V	10.31	14.91	-45.10	-49.70	-25.00	24.70
	7 522.50	V	12.12	19.47	-41.15	-48.50	-25.00	23.50
	10 030.50	V	13.11	23.25	-25.36	-35.50	-25.00	10.50
	12 534.75	V	13.21	26.49	-33.12	-46.40	-25.00	21.40

Note.

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

Test mode : LTE Band 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	3 460.02	H	8.22	12.18	-54.54	-58.50	-13.00	45.50
	5 186.27	H	10.41	15.57	-37.24	-42.40	-13.00	29.40
	6 920.20	V	11.34	18.66	-42.18	-49.50	-13.00	36.50
	8 647.98	H	13.06	21.07	-40.79	-48.80	-13.00	35.80

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	3 471.56	H	8.24	12.20	-50.54	-54.50	-13.00	41.50
	5 207.81	H	10.42	15.33	-38.29	-43.20	-13.00	30.20
	6 939.43	H	11.35	18.69	-45.36	-52.70	-13.00	39.70
	8 676.44	H	13.07	21.13	-39.14	-47.20	-13.00	34.20

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	3 560.80	H	8.41	12.92	-51.59	-56.10	-13.00	43.10
	5 336.27	H	10.50	15.96	-34.94	-40.40	-13.00	27.40
	7 120.21	V	11.57	19.11	-42.96	-50.50	-13.00	37.50
	8 898.76	H	13.16	21.12	-39.24	-47.20	-13.00	34.20

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

Test mode : LTE Band 71
Frequency(㎒) : 673.0
Channel : 133222
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 324.94	H	4.97	7.82	-59.25	-62.10	-13.00	49.10
	1 988.77	H	4.73	9.60	-53.63	-58.50	-13.00	45.50
	2 653.42	H	6.40	11.21	-51.49	-56.30	-13.00	43.30
	3 350.48	H	8.00	12.05	-51.45	-55.50	-13.00	42.50

Test mode : LTE Band 71
Frequency(㎒) : 680.5
Channel : 133297
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 361.04	H	5.23	7.89	-52.84	-55.50	-13.00	42.50
	2 043.34	V	4.81	9.74	-55.07	-60.00	-13.00	47.00
	2 721.93	V	6.58	11.30	-51.38	-56.10	-13.00	43.10
	3 401.35	H	8.10	12.11	-51.29	-55.30	-13.00	42.30

Test mode : LTE Band 71
Frequency(㎒) : 688.0
Channel : 133372
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 358.17	H	5.21	7.88	-52.53	-55.20	-13.00	42.20
	2 035.13	V	4.79	9.72	-52.77	-57.70	-13.00	44.70
	2 712.09	H	6.55	11.29	-51.76	-56.50	-13.00	43.50
	3 390.28	V	8.08	12.10	-52.58	-56.60	-13.00	43.60

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

Sub antenna

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	3 718.50	H	8.69	12.50	-44.89	-48.70	-13.00	35.70
	5 579.36	V	10.62	16.22	-46.70	-52.30	-13.00	39.30
	7 439.46	H	12.02	19.65	-41.67	-49.30	-13.00	36.30
	9 299.55	V	13.20	22.27	-38.93	-48.00	-13.00	35.00

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	3 750.81	H	8.75	12.22	-45.83	-49.30	-13.00	36.30
	5 626.29	V	10.63	16.16	-46.57	-52.10	-13.00	39.10
	7 500.23	H	12.10	19.44	-41.56	-48.90	-13.00	35.90
	9 373.40	V	13.20	22.34	-39.36	-48.50	-13.00	35.50

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	3 800.81	H	8.84	12.53	-44.31	-48.00	-13.00	35.00
	5 699.37	V	10.64	16.29	-45.95	-51.60	-13.00	38.60
	7 597.93	H	12.18	19.59	-43.29	-50.70	-13.00	37.70
	9 501.10	H	13.20	22.39	-39.01	-48.20	-13.00	35.20

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

Test mode : LTE Band 7
Frequency(㎒) : 2 510.0
Channel : 20850
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 998.00	V	10.30	15.08	-46.02	-50.80	-25.00	25.80
	7 501.50	H	12.10	19.44	-42.46	-49.80	-25.00	24.80
	10 004.25	V	13.10	23.22	-34.48	-44.60	-25.00	19.60
	12 500.25	V	13.20	26.42	-31.18	-44.40	-25.00	19.40

Test mode : LTE Band 7
Frequency(㎒) : 2 535.0
Channel : 21100
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 046.00	V	10.33	14.96	-45.97	-50.60	-25.00	25.60
	7 572.00	V	12.16	19.55	-40.31	-47.70	-25.00	22.70
	10 104.00	V	13.12	23.58	-29.44	-39.90	-25.00	14.90
	12 624.75	H	13.25	26.86	-32.59	-46.20	-25.00	21.20

Test mode : LTE Band 7
Frequency(㎒) : 2 560.0
Channel : 21350
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 101.50	V	10.36	15.42	-45.14	-50.20	-25.00	25.20
	7 651.50	V	12.22	19.99	-43.33	-51.10	-25.00	26.10
	10 203.75	H	13.14	23.76	-33.68	-44.30	-25.00	19.30
	12 752.25	H	13.30	27.05	-31.75	-45.50	-25.00	20.50

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

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	3 421.56	H	8.14	12.14	-36.10	-40.10	-13.00	27.10
	5 133.19	V	10.38	15.48	-38.50	-43.60	-13.00	30.60
	6 839.43	V	11.27	18.28	-43.59	-50.60	-13.00	37.60
	8 554.90	H	13.02	21.03	-39.19	-47.20	-13.00	34.20

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	3 471.56	H	8.24	12.20	-38.04	-42.00	-13.00	29.00
	5 207.81	V	10.42	15.33	-37.79	-42.70	-13.00	29.70
	6 937.13	V	11.35	18.68	-45.37	-52.70	-13.00	39.70
	8 674.91	H	13.07	21.13	-40.74	-48.80	-13.00	35.80

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	3 557.72	H	8.40	12.93	-41.07	-45.60	-13.00	32.60
	5 336.27	H	10.50	15.96	-43.84	-49.30	-13.00	36.30
	7 122.52	V	11.57	19.11	-42.56	-50.10	-13.00	37.10
	8 901.84	V	13.16	21.59	-39.17	-47.60	-13.00	34.60

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

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40-N	101462	24.10.12*
Spectrum Analyzer	AGILENT	N9040B	US55230151	24.07.03
Vector Signal Generator	R&S	SMBV100A	257566	24.07.04
Signal Generator	R&S	SMB100A	176206	24.01.19
Divider	Marki Microwave, Inc.	PD-0040	D0002	24.07.04
Wideband Radio Communication Tester	R&S	CMW500	141780	24.01.19
Wideband Radio Communication Tester	R&S	CMW500	132120	24.04.25
Temp & Humid Chamber	ESPEC CORP.	SH-642	93016978	24.01.19
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	Wainwright Instruments GmbH	WHNX10-4050-4500-26500-40CC	SN3	24.10.16*
High Pass Filter	QOTANA TECHNOLOGIES	DBHF0508004000A	20070100016	24.07.04
Band Reject Filter	Wainwright Instruments GmbH	WRCTG12+16-2290-2300-2400-2410-75SS	SN1	24.10.12*
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.	BZR-00504000-551028-252525	27736	24.07.04
Amplifier	C&K Technologies, Inc.	BZRT-00504000-481055-382525	26299-27735	24.07.04
Antenna Mast	innco systems GmbH	MA4640-XP-ET	N/A	-
Controller	innco systems GmbH	CO3000	1175/4585031 9/P	-

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

End of test report