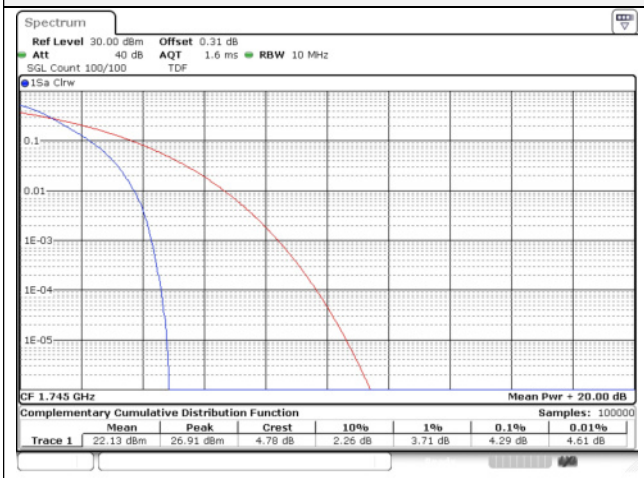
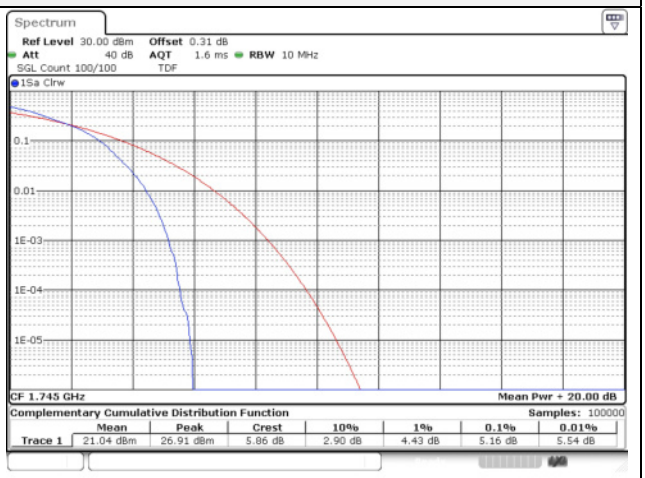
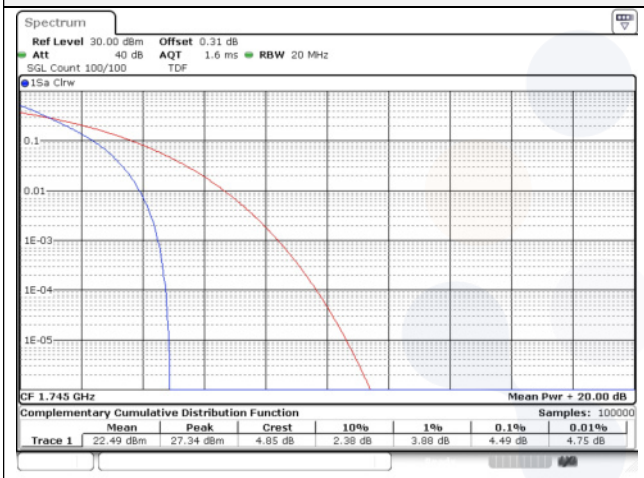
10M BW QPSK Mid ch.



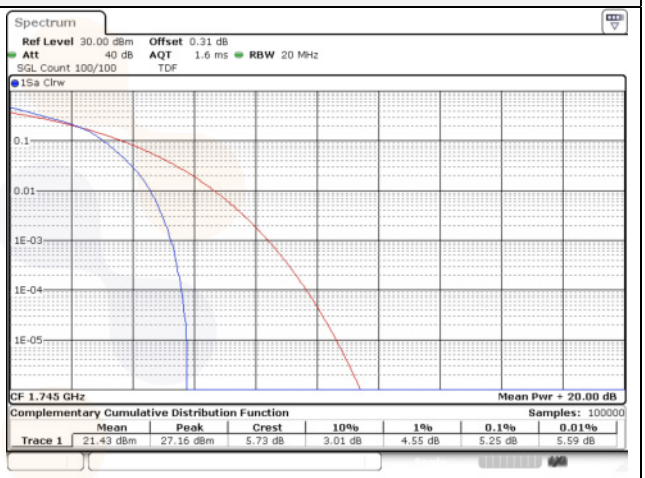
10M BW 16QAM Mid ch.



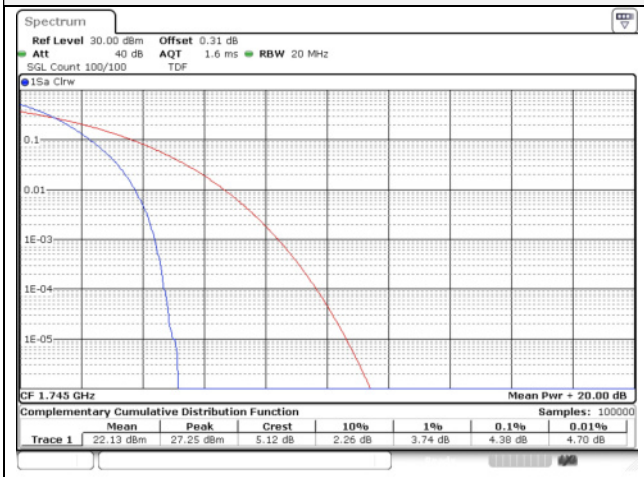
15M BW QPSK Mid ch.



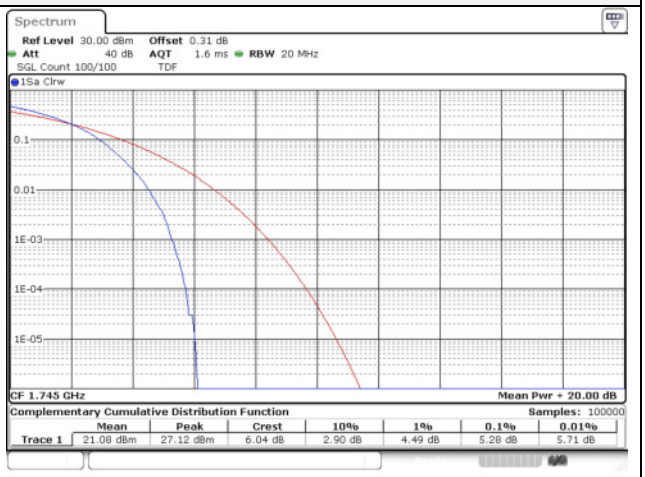
15M BW 16QAM Mid ch.



20M BW QPSK Mid ch.

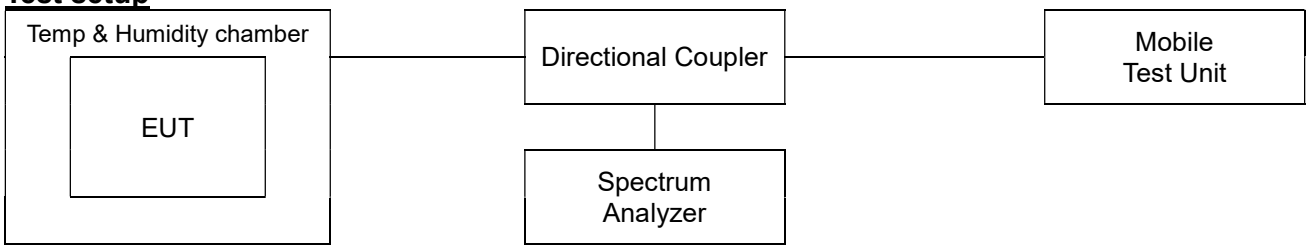


20M BW 16QAM Mid ch.



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 ISED, 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 ISED, 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-199(4.3)
For FCC&ISED, 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 ISED, 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.

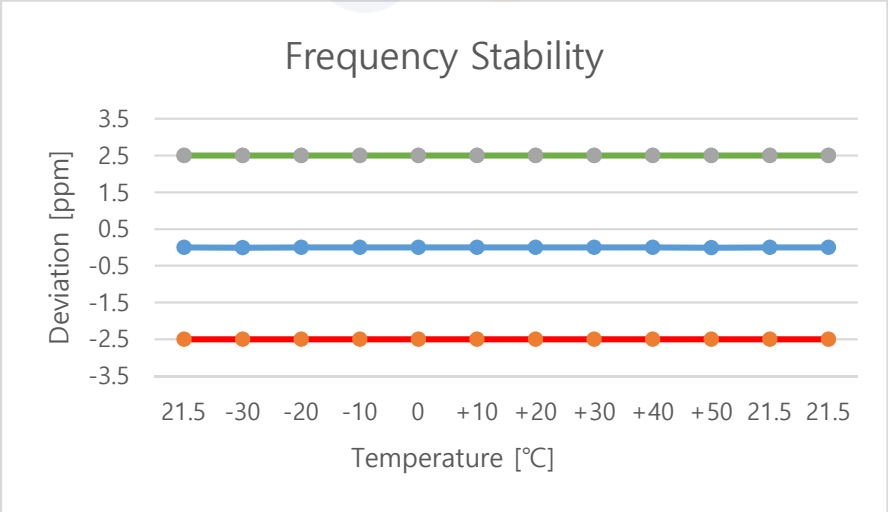
Test procedure
ANSI 63.26-2015 – Section 5.6

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 (Hz) : 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 (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	836,499,998	2.32	0.0	0.000000
		-30	836,499,995	4.65	0.0	-0.000001
		-20	836,499,998	2.31	0.0	0.000000
		-10	836,499,999	1.27	0.0	0.000000
		0	836,499,996	3.88	0.0	0.000000
		+10	836,499,996	4.06	0.0	0.000000
		+20	836,499,998	2.03	0.0	0.000000
		+30	836,499,997	3.38	0.0	0.000000
		+40	836,499,997	3.11	0.0	0.000000
		+50	836,499,994	5.91	0.0	-0.000001
115%	4.46	+21.5(Ref)	836,499,998	1.79	0.0	0.000000
End point	3.40	+21.5(Ref)	836,499,998	1.62	0.0	0.000000



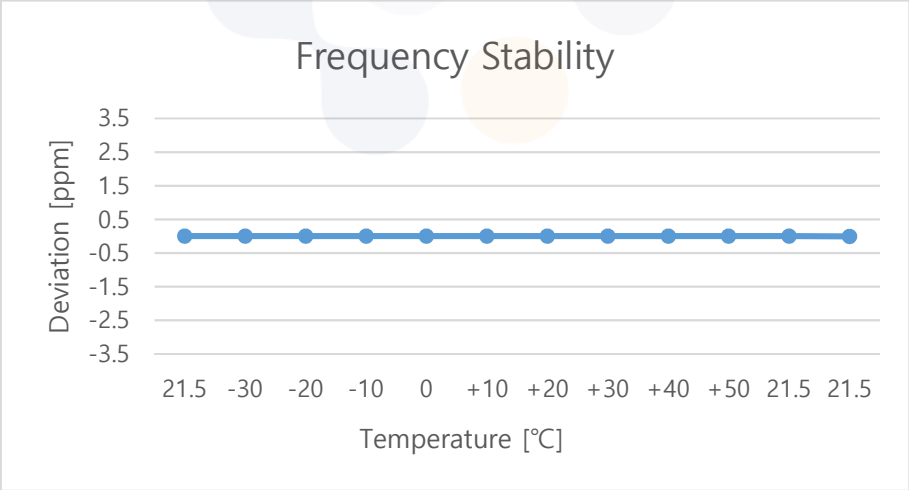
Test mode : LTE Band 7

Frequency (Hz) : 2 535 000 000

Channel : 21100

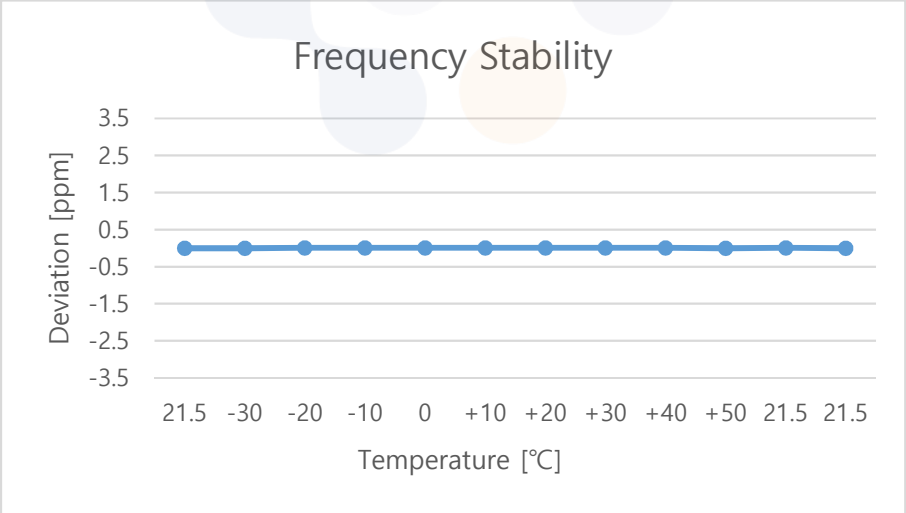
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	2,534,999,991	9.14	0.0	0.000000
		-30	2,534,999,990	10.35	0.0	0.000000
		-20	2,534,999,993	6.74	0.0	0.000000
		-10	2,534,999,992	8.32	0.0	0.000000
		0	2,534,999,993	7.38	0.0	0.000000
		+10	2,534,999,995	5.11	0.0	0.000000
		+20	2,534,999,989	11.28	0.0	0.000000
		+30	2,534,999,994	6.19	0.0	0.000000
		+40	2,534,999,992	8.39	0.0	0.000000
		+50	2,534,999,989	10.66	0.0	0.000000
115%	4.46	+21.5(Ref)	2,534,999,991	9.50	0.0	0.000000
End point	3.40	+21.5(Ref)	2,534,999,986	14.43	0.0	-0.000001



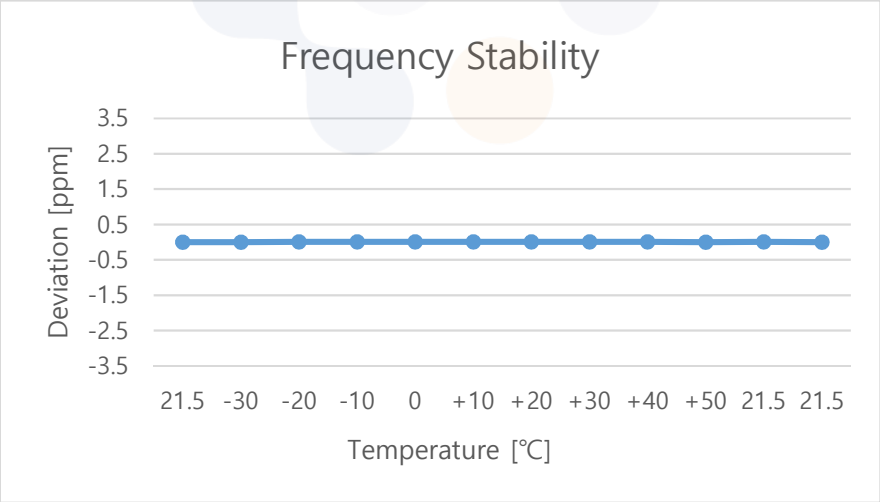
Test mode : LTE Band 12
Frequency (Hz) : 707 500 000
Channel : 23095
Deviation limit(FCC&IC) : The frequency stability shall be sufficient to ensure that the fundamental emission stay within the authorized bands of operation

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	707,500,002	1.99	0.0	0.000000
		-30	707,500,006	6.10	0.0	0.000001
		-20	707,500,008	8.34	0.0	0.000001
		-10	707,500,003	2.64	0.0	0.000000
		0	707,500,002	1.88	0.0	0.000000
		+10	707,500,004	4.21	0.0	0.000001
		+20	707,500,003	2.55	0.0	0.000000
		+30	707,500,004	4.35	0.0	0.000001
		+40	707,500,005	5.08	0.0	0.000001
		+50	707,500,008	8.31	0.0	0.000001
115%	4.46	+21.5(Ref)	707,500,003	3.12	0.0	0.000000
End point	3.40	+21.5(Ref)	707,500,001	1.39	0.0	0.000000



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

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	782,000,003	3.25	0.0	0.000000
		-30	782,000,002	2.38	0.0	0.000000
		-20	782,000,008	8.11	0.0	0.000001
		-10	782,000,006	6.09	0.0	0.000001
		0	782,000,004	4.28	0.0	0.000001
		+10	782,000,005	5.31	0.0	0.000001
		+20	782,000,005	4.65	0.0	0.000001
		+30	782,000,006	6.01	0.0	0.000001
		+40	782,000,005	4.99	0.0	0.000001
		+50	782,000,002	2.29	0.0	0.000000
115%	4.46	+21.5(Ref)	782,000,004	3.95	0.0	0.000001
End point	3.40	+21.5(Ref)	782,000,004	3.88	0.0	0.000000



Test mode : LTE Band 25/2

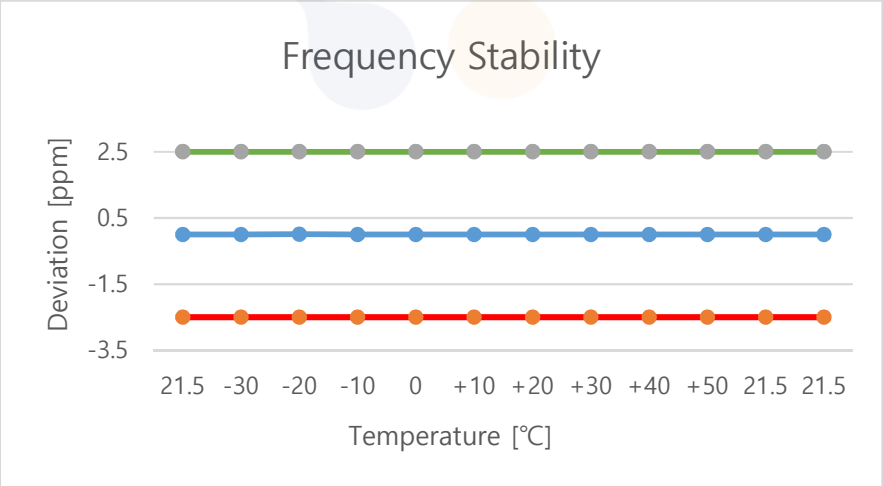
Frequency (Hz) : 1 882 500 000

Channel : 26365

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

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

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	1,882,500,007	7.07	0.0	0.000000
		-30	1,882,500,007	7.33	0.0	0.000000
		-20	1,882,500,011	11.25	0.0	0.000001
		-10	1,882,500,008	8.33	0.0	0.000000
		0	1,882,500,006	6.19	0.0	0.000000
		+10	1,882,500,005	5.38	0.0	0.000000
		+20	1,882,500,007	7.11	0.0	0.000000
		+30	1,882,500,005	5.26	0.0	0.000000
		+40	1,882,500,004	4.19	0.0	0.000000
		+50	1,882,500,002	2.05	0.0	0.000000
115%	4.46	+21.5(Ref)	1,882,500,005	4.58	0.0	0.000000
End point	3.40	+21.5(Ref)	1,882,500,006	6.35	0.0	0.000000



Test mode : LTE Band 26

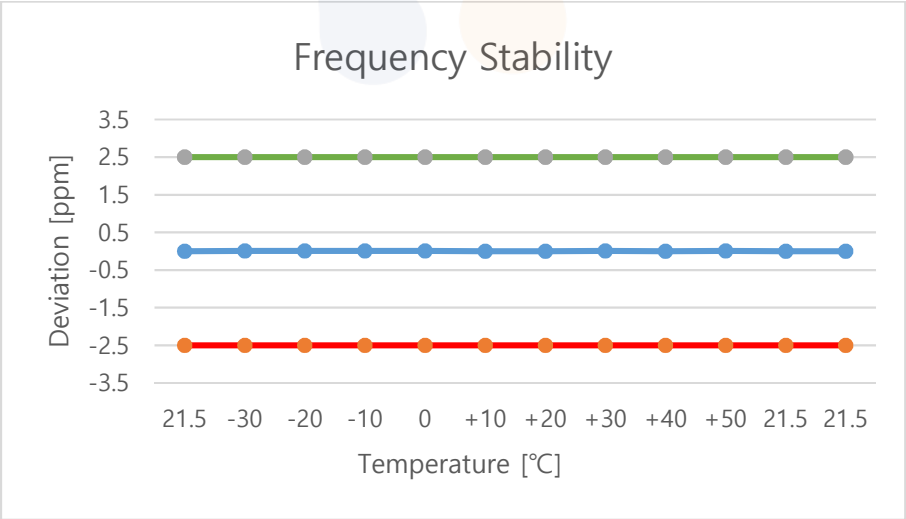
Frequency (Hz) : 836 500 000

Channel : 26915

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 (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	836,500,004	3.66	0.0	0.000000
		-30	836,500,006	5.50	0.0	0.000001
		-20	836,500,007	7.46	0.0	0.000001
		-10	836,500,004	4.30	0.0	0.000001
		0	836,500,005	5.14	0.0	0.000001
		+10	836,500,004	3.74	0.0	0.000000
		+20	836,500,004	4.01	0.0	0.000000
		+30	836,500,009	9.28	0.0	0.000001
		+40	836,500,003	3.31	0.0	0.000000
		+50	836,500,005	5.36	0.0	0.000001
115%	4.46	+21.5(Ref)	836,500,003	2.70	0.0	0.000000
End point	3.40	+21.5(Ref)	836,500,003	2.56	0.0	0.000000



Test mode : LTE Band 66/4

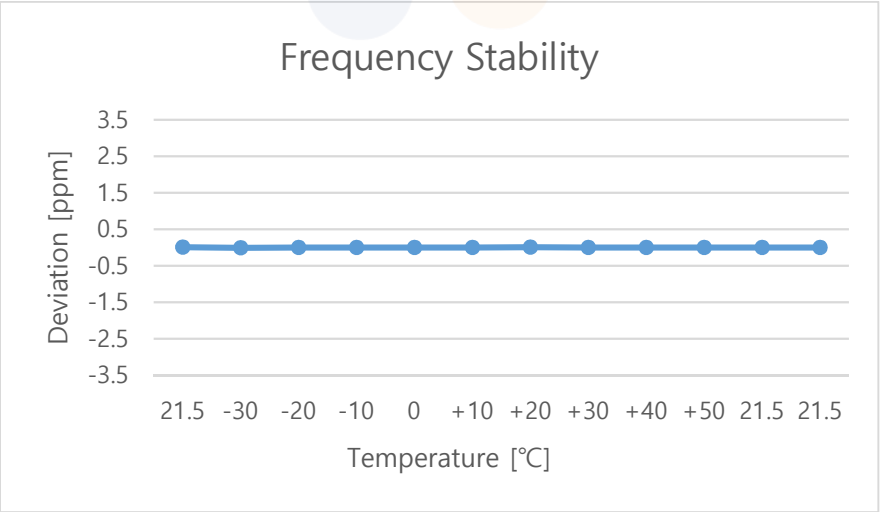
Frequency (Hz) : 1 745 000 000

Channel : 132322

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

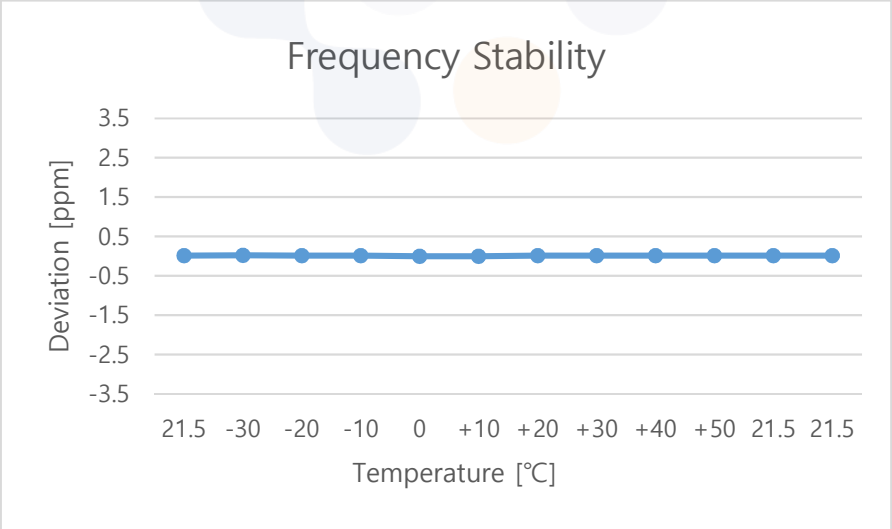
Deviation limit(IC) : The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	1,745,000,010	9.61	0.0	0.000001
		-30	1,744,999,990	-10.19	0.0	-0.000001
		-20	1,744,999,994	-6.23	0.0	0.000000
		-10	1,744,999,996	-4.19	0.0	0.000000
		0	1,745,000,002	1.73	0.0	0.000000
		+10	1,745,000,005	4.98	0.0	0.000000
		+20	1,745,000,009	9.41	0.0	0.000001
		+30	1,745,000,005	5.19	0.0	0.000000
		+40	1,744,999,998	-2.38	0.0	0.000000
		+50	1,744,999,992	-8.11	0.0	0.000000
115%	4.46	+21.5(Ref)	1,745,000,009	8.70	0.0	0.000000
End point	3.40	+21.5(Ref)	1,745,000,008	8.25	0.0	0.000000



Test mode : LTE Band 71
Frequency (Hz) : 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.

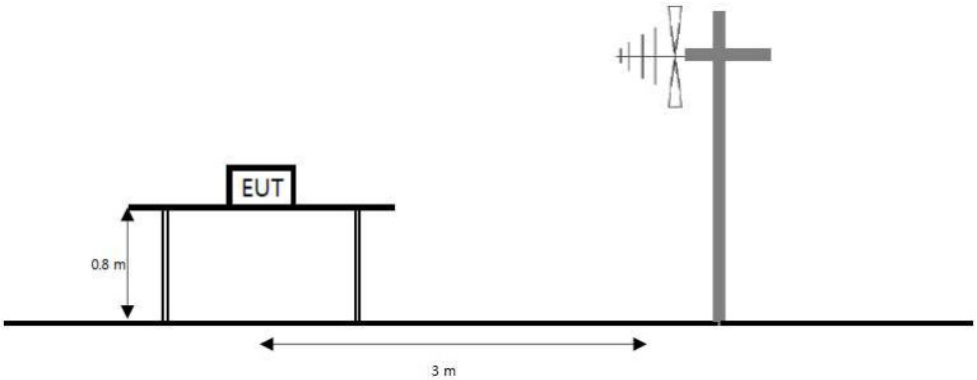
Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	680,500,006	5.92	0.0	0.000001
		-30	680,500,013	13.08	0.0	0.000002
		-20	680,500,008	7.71	0.0	0.000001
		-10	680,500,005	4.63	0.0	0.000001
		0	680,500,003	3.11	0.0	0.000000
		+10	680,500,002	2.28	0.0	0.000000
		+20	680,500,004	3.97	0.0	0.000001
		+30	680,500,004	4.23	0.0	0.000001
		+40	680,500,005	5.16	0.0	0.000001
		+50	680,500,006	6.08	0.0	0.000001
115%	4.46	+21.5(Ref)	680,500,004	4.45	0.0	0.000001
End point	3.40	+21.5(Ref)	680,500,003	3.43	0.0	0.000001



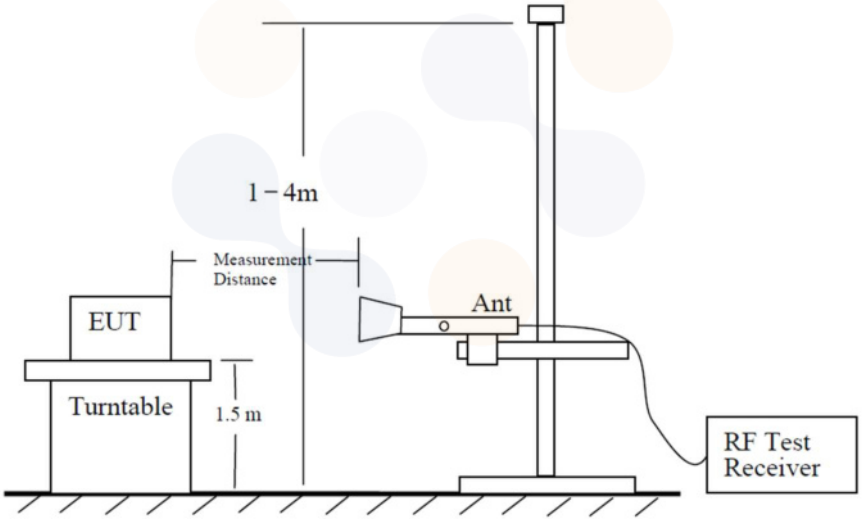
7.7. Radiated Power (ERP/EIRP)

Test setup

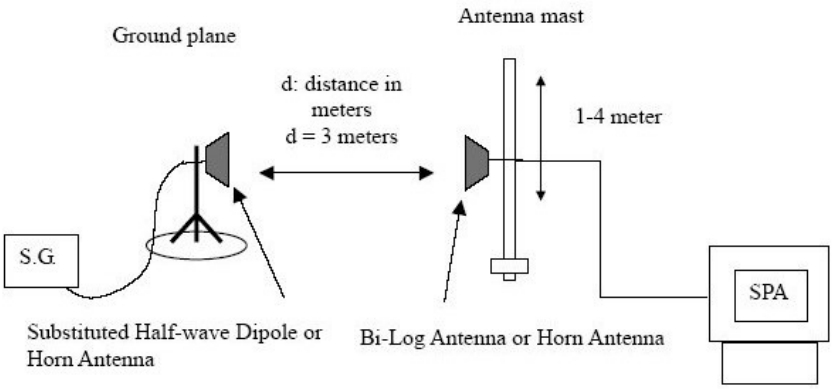
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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(b)(10), 27.50(c)(10) and RSS-130(4.6), Portable stations (hand-held devices) in the 698 -746 ㎒, 746-757 ㎒, 776-788 ㎒, and 805-806 ㎒ bands are limited 3 watts ERP.

According to §27.50(d)(4), Fixed, mobile and portable (hand-held) stations operating in the 1710-1755 ㎒ and 1755-1780 ㎒ bands are limited to 1 watt EIRP.
According to 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 §27.57(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(4.4), for mobile subscriber equipment, the e.i.r.p. shall not exceed 2 W.

Test procedure

971168 D01 v03r01 - Section 5.2 and 5.8, 412172 D01 v01r01
ANSI 63.26-2015 – Section 5.2
ANSI/TIA-603-E-2016 - Section 2.2.17

Test settings

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

set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

11) Allow trace to fully stabilize.

Notes:

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
   The power is calculated by the following formula;
   Pd(㏈m) = Pg(㏈m) – Cable loss (㏈) + Antenna gain (㏈)
   Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

Test results

Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	824.70	H	5.24	2.66	12.17	14.75	0.030
		836.50	H	5.40	2.58	11.98	14.80	0.030
		848.30	H	5.48	2.39	11.33	14.42	0.028
	16QAM	824.70	H	5.24	2.66	10.98	13.56	0.023
		836.50	H	5.40	2.58	10.80	13.62	0.023
		848.30	H	5.48	2.39	10.18	13.27	0.021
3 M	QPSK	825.50	H	5.27	2.67	12.10	14.69	0.029
		836.50	H	5.40	2.58	11.98	14.80	0.030
		847.50	H	5.48	2.58	11.27	14.16	0.026
	16QAM	825.50	H	5.27	2.67	10.90	13.49	0.022
		836.50	H	5.40	2.58	10.94	13.76	0.024
		847.50	H	5.48	2.58	10.18	13.07	0.020
5 M	QPSK	826.50	H	5.30	2.78	12.09	14.60	0.029
		836.50	H	5.40	2.58	11.82	14.64	0.029
		846.50	H	5.47	2.16	11.39	14.69	0.029
	16QAM	826.50	H	5.30	2.78	10.90	13.41	0.022
		836.50	H	5.40	2.58	10.63	13.45	0.022
		846.50	H	5.47	2.16	10.33	13.63	0.023
10 M	QPSK	829.00	H	5.37	2.57	12.63	15.43	0.035
		836.50	H	5.40	2.58	12.15	14.97	0.031
		844.00	H	5.44	2.78	11.75	14.41	0.028
	16QAM	829.00	H	5.37	2.57	11.37	14.17	0.026
		836.50	H	5.40	2.58	11.08	13.90	0.025
		844.00	H	5.44	2.78	10.52	13.18	0.021

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 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	V	6.20	5.91	13.82	14.11	0.026
		2 535.00	V	6.24	5.98	12.22	12.47	0.018
		2 567.50	V	6.27	6.20	12.56	12.63	0.018
	16QAM	2 502.50	V	6.20	5.91	12.91	13.20	0.021
		2 535.00	V	6.24	5.98	11.35	11.60	0.014
		2 567.50	V	6.27	6.20	11.58	11.65	0.015
10 M	QPSK	2 505.00	V	6.21	5.95	13.41	13.66	0.023
		2 535.00	V	6.24	5.98	11.90	12.15	0.016
		2 565.00	V	6.27	6.19	11.99	12.06	0.016
	16QAM	2 505.00	V	6.21	5.95	12.31	12.56	0.018
		2 535.00	V	6.24	5.98	11.05	11.30	0.013
		2 565.00	V	6.27	6.19	11.15	11.22	0.013
15 M	QPSK	2 507.50	V	6.21	5.97	12.97	13.21	0.021
		2 535.00	V	6.24	5.98	11.87	12.12	0.016
		2 562.50	V	6.26	6.19	11.57	11.64	0.015
	16QAM	2 507.50	V	6.21	5.97	12.08	12.32	0.017
		2 535.00	V	6.24	5.98	11.17	11.42	0.014
		2 562.50	V	6.26	6.19	10.75	10.82	0.012
20 M	QPSK	2 510.00	V	6.21	5.98	12.21	12.44	0.018
		2 535.00	V	6.24	5.98	11.49	11.74	0.015
		2 560.00	V	6.26	6.19	11.03	11.10	0.013
	16QAM	2 510.00	V	6.21	5.98	11.52	11.75	0.015
		2 535.00	V	6.24	5.98	10.53	10.78	0.012
		2 560.00	V	6.26	6.19	10.24	10.31	0.011

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	4.50	2.45	10.98	13.03	0.020
		707.50	H	4.65	2.29	11.26	13.62	0.023
		715.30	H	4.65	2.37	11.31	13.59	0.023
	16QAM	699.70	H	4.50	2.45	9.85	11.90	0.015
		707.50	H	4.65	2.29	10.23	12.59	0.018
		715.30	H	4.65	2.37	10.31	12.59	0.018
3 M	QPSK	700.50	H	4.51	2.69	10.79	12.61	0.018
		707.50	H	4.65	2.29	11.03	13.39	0.022
		714.50	H	4.66	2.42	11.31	13.54	0.023
	16QAM	700.50	H	4.51	2.69	9.63	11.45	0.014
		707.50	H	4.65	2.29	10.04	12.40	0.017
		714.50	H	4.66	2.42	10.14	12.37	0.017
5 M	QPSK	701.50	H	4.53	2.50	11.00	13.03	0.020
		707.50	H	4.65	2.29	11.14	13.50	0.022
		713.50	H	4.67	2.15	11.87	14.38	0.027
	16QAM	701.50	H	4.53	2.50	9.82	11.85	0.015
		707.50	H	4.65	2.29	10.26	12.62	0.018
		713.50	H	4.67	2.15	10.70	13.21	0.021
10 M	QPSK	704.00	H	4.58	2.73	11.42	13.27	0.021
		707.50	H	4.65	2.29	11.32	13.68	0.023
		711.00	H	4.69	2.46	11.48	13.71	0.023
	16QAM	704.00	H	4.58	2.73	10.22	12.07	0.016
		707.50	H	4.65	2.29	10.13	12.49	0.018
		711.00	H	4.69	2.46	10.27	12.50	0.018

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	5.30	2.78	9.91	12.43	0.017
		782.00	H	5.30	2.64	10.64	13.30	0.021
		784.50	H	5.30	2.63	10.59	13.26	0.021
	16QAM	779.50	H	5.30	2.78	9.11	11.63	0.015
		782.00	H	5.30	2.64	9.73	12.39	0.017
		784.50	H	5.30	2.63	9.66	12.33	0.017
10 M	QPSK	782.00	H	5.30	2.64	10.89	13.55	0.023
	16QAM	782.00	H	5.30	2.64	9.58	12.24	0.017

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈i&㏈d) - 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	V	5.60	5.17	16.50	16.93	0.049
		1 882.50	V	5.54	5.08	17.06	17.51	0.056
		1 914.30	V	5.47	5.29	14.91	15.09	0.032
	16QAM	1 850.70	V	5.60	5.17	15.38	15.81	0.038
		1 882.50	V	5.54	5.08	16.19	16.64	0.046
		1 914.30	V	5.47	5.29	14.00	14.18	0.026
3 M	QPSK	1 851.50	V	5.60	5.18	16.02	16.44	0.044
		1 882.50	V	5.54	5.08	17.33	17.78	0.060
		1 913.50	V	5.47	5.29	14.88	15.06	0.032
	16QAM	1 851.50	V	5.60	5.18	15.10	15.52	0.036
		1 882.50	V	5.54	5.08	16.35	16.80	0.048
		1 913.50	V	5.47	5.29	14.00	14.18	0.026
5 M	QPSK	1 852.50	V	5.60	5.18	15.99	16.40	0.044
		1 882.50	V	5.54	5.08	17.29	17.74	0.059
		1 912.50	V	5.48	5.21	15.24	15.50	0.035
	16QAM	1 852.50	V	5.60	5.18	14.75	15.16	0.033
		1 882.50	V	5.54	5.08	16.30	16.75	0.047
		1 912.50	V	5.48	5.21	14.17	14.43	0.028
10 M	QPSK	1 855.00	V	5.59	5.19	17.11	17.51	0.056
		1 882.50	V	5.54	5.08	18.49	18.94	0.078
		1 910.00	V	5.48	5.24	18.88	19.12	0.082
	16QAM	1 855.00	V	5.59	5.19	16.00	16.40	0.044
		1 882.50	V	5.54	5.08	17.51	17.96	0.063
		1 910.00	V	5.48	5.24	17.92	18.16	0.065
15 M	QPSK	1 857.50	V	5.59	5.21	17.33	17.70	0.059
		1 882.50	V	5.54	5.08	18.43	18.88	0.077
		1 907.50	V	5.49	5.31	18.39	18.56	0.072
	16QAM	1 857.50	V	5.59	5.21	16.07	16.44	0.044
		1 882.50	V	5.54	5.08	17.52	17.97	0.063
		1 907.50	V	5.49	5.31	17.17	17.34	0.054
20 M	QPSK	1 860.00	V	5.58	5.17	17.11	17.52	0.056
		1 882.50	V	5.54	5.08	18.77	19.22	0.084
		1 905.00	V	5.49	5.26	17.90	18.13	0.065
	16QAM	1 860.00	V	5.58	5.17	16.04	16.45	0.044
		1 882.50	V	5.54	5.08	17.46	17.91	0.062
		1 905.00	V	5.49	5.26	16.90	17.13	0.052

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	5.24	2.66	12.08	14.66	0.029
		836.50	H	5.40	2.58	11.78	14.60	0.029
		848.30	H	5.48	2.39	11.47	14.56	0.029
	16QAM	824.70	H	5.24	2.66	11.18	13.76	0.024
		836.50	H	5.40	2.58	10.77	13.59	0.023
		848.30	H	5.48	2.39	10.52	13.61	0.023
3 M	QPSK	825.50	H	5.27	2.67	12.10	14.69	0.029
		836.50	H	5.40	2.58	11.88	14.70	0.030
		847.50	H	5.48	2.58	11.48	14.37	0.027
	16QAM	825.50	H	5.27	2.67	10.85	13.44	0.022
		836.50	H	5.40	2.58	10.69	13.51	0.022
		847.50	H	5.48	2.58	10.41	13.30	0.021
5 M	QPSK	826.50	H	5.30	2.78	12.28	14.79	0.030
		836.50	H	5.40	2.58	12.14	14.96	0.031
		846.50	H	5.47	2.16	11.44	14.74	0.030
	16QAM	826.50	H	5.30	2.78	10.98	13.49	0.022
		836.50	H	5.40	2.58	11.11	13.93	0.025
		846.50	H	5.47	2.16	10.42	13.72	0.024
10 M	QPSK	829.00	H	5.37	2.57	12.53	15.33	0.034
		836.50	H	5.40	2.58	12.13	14.95	0.031
		844.00	H	5.44	2.78	11.79	14.45	0.028
	16QAM	829.00	H	5.37	2.57	11.68	14.48	0.028
		836.50	H	5.40	2.58	11.19	14.01	0.025
		844.00	H	5.44	2.78	10.69	13.35	0.022
15 M	QPSK	831.50	H	5.40	2.52	12.63	15.51	0.036
		836.50	H	5.40	2.58	12.36	15.18	0.033
		841.50	H	5.42	2.75	12.29	14.95	0.031
	16QAM	831.50	H	5.40	2.52	11.54	14.42	0.028
		836.50	H	5.40	2.58	11.24	14.06	0.025
		841.50	H	5.42	2.75	11.17	13.83	0.024

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

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	V	5.88	5.20	17.21	17.89	0.062
		1 745.00	V	5.81	5.21	17.88	18.48	0.070
		1 779.30	V	5.74	5.26	18.28	18.76	0.075
	16QAM	1 710.70	V	5.88	5.20	16.28	16.96	0.050
		1 745.00	V	5.81	5.21	16.82	17.42	0.055
		1 779.30	V	5.74	5.26	17.34	17.82	0.061
3 M	QPSK	1 711.50	V	5.88	5.19	18.13	18.82	0.076
		1 745.00	V	5.81	5.21	18.17	18.77	0.075
		1 778.50	V	5.74	5.26	18.20	18.68	0.074
	16QAM	1 711.50	V	5.88	5.19	17.12	17.81	0.060
		1 745.00	V	5.81	5.21	17.03	17.63	0.058
		1 778.50	V	5.74	5.26	17.26	17.74	0.059
5 M	QPSK	1 712.50	V	5.88	5.16	18.26	18.97	0.079
		1 745.00	V	5.81	5.21	18.26	18.86	0.077
		1 777.50	V	5.75	5.28	18.32	18.78	0.076
	16QAM	1 712.50	V	5.88	5.16	17.42	18.13	0.065
		1 745.00	V	5.81	5.21	17.07	17.67	0.058
		1 777.50	V	5.75	5.28	17.35	17.81	0.060
10 M	QPSK	1 715.00	V	5.87	5.08	18.75	19.54	0.090
		1 745.00	V	5.81	5.21	18.44	19.04	0.080
		1 775.00	V	5.75	5.23	18.74	19.26	0.084
	16QAM	1 715.00	V	5.87	5.08	17.59	18.38	0.069
		1 745.00	V	5.81	5.21	17.70	18.30	0.068
		1 775.00	V	5.75	5.23	17.83	18.35	0.068
15 M	QPSK	1 717.50	V	5.87	5.17	18.82	19.51	0.089
		1 745.00	V	5.81	5.21	18.40	19.00	0.079
		1 772.50	V	5.76	5.26	18.07	18.56	0.072
	16QAM	1 717.50	V	5.87	5.17	17.84	18.53	0.071
		1 745.00	V	5.81	5.21	17.45	18.05	0.064
		1 772.50	V	5.76	5.26	17.06	17.55	0.057
20 M	QPSK	1 720.00	V	5.86	5.19	18.87	19.54	0.090
		1 745.00	V	5.81	5.21	17.88	18.48	0.070
		1 770.00	V	5.76	5.29	18.10	18.57	0.072
	16QAM	1 720.00	V	5.86	5.19	17.89	18.56	0.072
		1 745.00	V	5.81	5.21	16.91	17.51	0.056
		1 770.00	V	5.76	5.29	17.17	17.64	0.058

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

Test mode: LTE Band 71

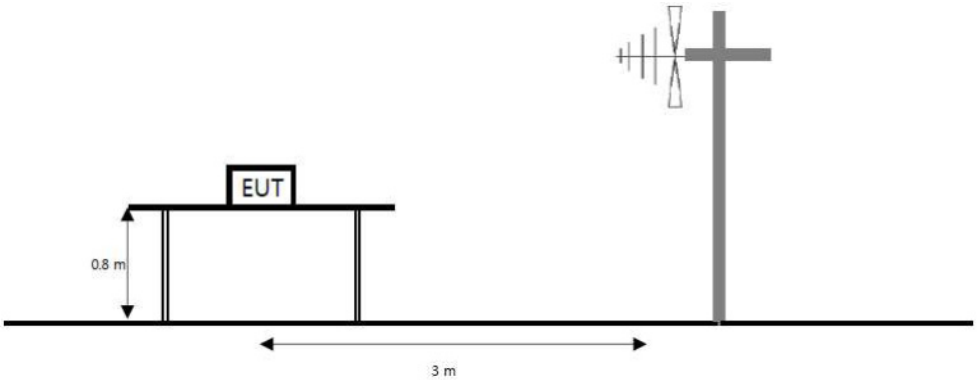
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	665.50	H	4.84	2.48	7.31	9.66	0.009
		680.50	H	4.51	2.43	7.95	10.02	0.010
		695.50	H	4.55	2.67	9.93	11.80	0.015
	16QAM	665.50	H	4.84	2.48	6.37	8.72	0.007
		680.50	H	4.51	2.43	6.99	9.06	0.008
		695.50	H	4.55	2.67	8.73	10.60	0.011
10 M	QPSK	668.00	H	4.76	2.52	7.56	9.80	0.010
		680.50	H	4.51	2.43	8.32	10.39	0.011
		693.00	H	4.57	2.51	9.74	11.80	0.015
	16QAM	668.00	H	4.76	2.52	6.54	8.78	0.008
		680.50	H	4.51	2.43	7.27	9.34	0.009
		693.00	H	4.57	2.51	8.56	10.62	0.012
15 M	QPSK	670.50	H	4.69	2.42	7.65	9.92	0.010
		680.50	H	4.51	2.43	8.51	10.58	0.011
		690.50	H	4.60	2.58	9.52	11.53	0.014
	16QAM	670.50	H	4.69	2.42	6.57	8.84	0.008
		680.50	H	4.51	2.43	7.57	9.64	0.009
		690.50	H	4.60	2.58	8.58	10.59	0.011
20 M	QPSK	673.00	H	4.64	2.58	7.92	9.98	0.010
		680.50	H	4.51	2.43	9.00	11.07	0.013
		688.00	H	4.58	2.58	9.88	11.88	0.015
	16QAM	673.00	H	4.64	2.58	7.01	9.07	0.008
		680.50	H	4.51	2.43	8.00	10.07	0.010
		688.00	H	4.58	2.58	8.57	10.57	0.011

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

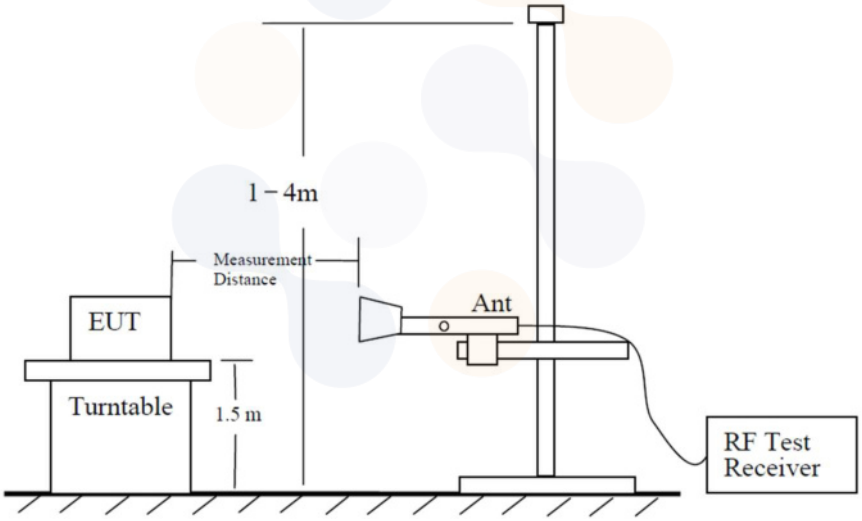
7.8. Radiated Spurious Emissions

Test setup

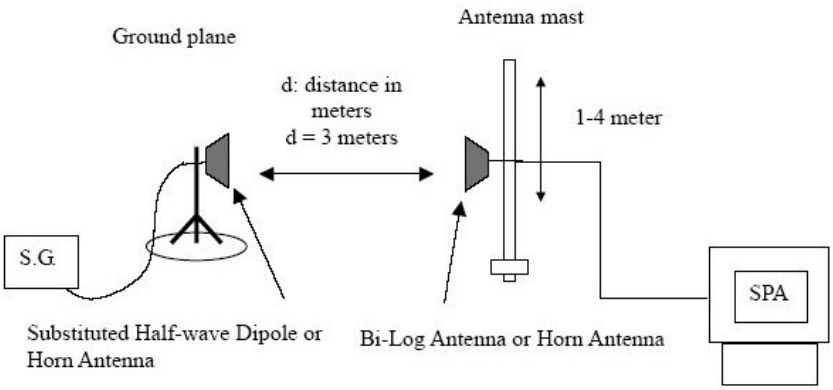
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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) 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(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) and RSS-130(4.7), 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 raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Test results (Above 1 000 ㎒)

Test mode : LTE Band 5
Frequency(㎒) : 829
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	1 649.20	H	6.00	5.02	-55.98	-55.00	-13.00	42.00
	2 470.80	H	6.15	6.00	-57.05	-56.90	-13.00	43.90
	3 296.40	V	7.65	6.75	-55.70	-54.80	-13.00	41.80
	4 120.40	H	9.00	7.38	-54.92	-53.30	-13.00	40.30

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	1 664.80	H	5.97	5.11	-59.36	-58.50	-13.00	45.50
	2 492.80	V	6.19	6.05	-56.24	-56.10	-13.00	43.10
	3 328.40	H	7.75	6.78	-55.07	-54.10	-13.00	41.10
	4 156.80	H	9.03	7.28	-55.45	-53.70	-13.00	40.70

Test mode : LTE Band 5
Frequency(㎒) : 844
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	5.94	5.14	-59.20	-58.40	-13.00	45.40
	2 513.20	H	6.21	5.98	-55.43	-55.20	-13.00	42.20
	3 353.20	H	7.83	6.80	-54.33	-53.30	-13.00	40.30
	4 196.40	V	9.06	7.32	-55.14	-53.40	-13.00	40.40

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(㎒) : 2 502.5
Channel : 20775
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 000.25	V	10.20	8.32	-45.18	-43.30	-25.00	18.30
	7 497.00	V	12.10	9.38	-52.52	-49.80	-25.00	24.80
	10 000.50	V	13.10	10.56	-49.54	-47.00	-25.00	22.00
	12 497.25	H	13.20	11.57	-46.93	-45.30	-25.00	20.30

Test mode : LTE Band 7
Frequency(㎒) : 2 535.0
Channel : 21100
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 065.50	V	10.24	8.38	-43.16	-41.30	-25.00	16.30
	7 593.75	V	12.18	9.44	-54.14	-51.40	-25.00	26.40
	10 131.00	H	13.13	10.47	-49.96	-47.30	-25.00	22.30
	12 664.50	V	13.30	10.78	-48.72	-46.20	-25.00	21.20

Test mode : LTE Band 7
Frequency(㎒) : 2 567.5
Channel : 21425
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 139.00	V	10.28	8.40	-48.18	-46.30	-25.00	21.30
	7 708.50	H	12.27	9.94	-52.23	-49.90	-25.00	24.90
	10 282.50	V	13.16	10.47	-50.29	-47.60	-25.00	22.60
	12 849.75	V	13.41	11.87	-48.04	-46.50	-25.00	21.50

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(㎒) : 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	1 407.20	V	5.61	4.45	-62.46	-61.30	-13.00	48.30
	2 112.80	V	5.50	5.36	-57.44	-57.30	-13.00	44.30
	2 819.60	H	6.52	6.32	-55.40	-55.20	-13.00	42.20
	3 522.40	H	8.33	6.96	-56.27	-54.90	-13.00	41.90

Test mode : LTE Band 12
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	1 419.20	H	5.70	4.47	-63.63	-62.40	-13.00	49.40
	2 127.60	H	5.53	5.39	-58.54	-58.40	-13.00	45.40
	2 840.80	H	6.54	6.34	-56.70	-56.50	-13.00	43.50
	3 554.40	V	8.37	6.97	-56.50	-55.10	-13.00	42.10

Test mode : LTE Band 12
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	1 431.60	H	5.79	4.50	-62.29	-61.00	-13.00	48.00
	2 146.00	V	5.56	5.41	-58.25	-58.10	-13.00	45.10
	2 862.80	H	6.56	6.36	-56.30	-56.10	-13.00	43.10
	3 577.20	H	8.39	7.10	-55.29	-54.00	-13.00	41.00

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	1 550.00	H	6.20	4.87	-59.03	-57.70	-13.00	44.70
	2 330.40	H	5.89	5.71	-56.78	-56.60	-13.00	43.60
	3 108.00	H	7.05	6.58	-54.87	-54.40	-13.00	41.40
	3 884.80	H	8.76	7.26	-55.50	-54.00	-13.00	41.00

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	1 561.61	H	6.18	4.89	-57.69	-56.40	-40.00	16.40

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 25/2
Frequency(㎒) : 1 860
Channel : 26140
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 737.25	V	8.58	7.13	-52.65	-51.20	-13.00	38.20
	5 611.50	V	10.54	8.62	-55.32	-53.40	-13.00	40.40
	7 482.75	V	12.08	9.37	-51.51	-48.80	-13.00	35.80
	9 348.75	H	13.30	10.14	-52.56	-49.40	-13.00	36.40

Test mode : LTE Band 25/2
Frequency(㎒) : 1 882.5
Channel : 26365
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 765.75	H	8.62	6.96	-56.66	-55.00	-13.00	42.00
	5 648.25	H	10.56	8.67	-55.29	-53.40	-13.00	40.40
	7 533.75	H	12.13	9.45	-53.08	-50.40	-13.00	37.40
	9 410.25	V	13.30	10.24	-51.36	-48.30	-13.00	35.30

Test mode : LTE Band 25/2
Frequency(㎒) : 1 905
Channel : 26590
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 834.00	H	8.70	7.04	-58.46	-56.80	-13.00	43.80
	5 741.25	H	10.60	8.68	-55.02	-53.10	-13.00	40.10
	7 660.50	V	12.23	9.64	-52.79	-50.20	-13.00	37.20
	9 573.00	H	13.27	10.69	-50.28	-47.70	-13.00	34.70

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	1 649.60	H	6.00	5.02	-52.68	-51.70	-13.00	38.70
	2 472.80	H	6.15	6.01	-56.64	-56.50	-13.00	43.50
	3 297.20	H	7.65	6.75	-56.80	-55.90	-13.00	42.90
	4 122.40	H	9.00	7.38	-54.12	-52.50	-13.00	39.50

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	1 659.60	H	5.98	5.10	-57.18	-56.30	-13.00	43.30
	2 488.80	V	6.18	6.04	-55.94	-55.80	-13.00	42.80
	3 316.80	H	7.71	6.77	-56.04	-55.10	-13.00	42.10
	4 146.40	V	9.02	7.41	-53.41	-51.80	-13.00	38.80

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	1 669.60	V	5.96	5.12	-57.04	-56.20	-13.00	43.20
	2 500.80	H	6.20	5.91	-56.39	-56.10	-13.00	43.10
	3 335.20	H	7.77	6.79	-56.98	-56.00	-13.00	43.00
	4 168.40	H	9.03	7.29	-56.54	-54.80	-13.00	41.80

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
Frequency(㎒) : 1 715
Channel : 132022
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 428.25	H	8.07	6.87	-57.80	-56.60	-13.00	43.60
	5 142.75	V	10.29	8.40	-56.19	-54.30	-13.00	41.30
	6 856.50	H	11.33	10.36	-52.57	-51.60	-13.00	38.60
	8 579.25	H	13.13	9.43	-52.30	-48.60	-13.00	35.60

Test mode : LTE Band 66/4
Frequency(㎒) : 1 745.0
Channel : 132322
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 480.75	H	8.24	6.92	-57.62	-56.30	-13.00	43.30
	5 220.75	H	10.33	8.50	-55.03	-53.20	-13.00	40.20
	6 961.50	H	11.45	10.11	-50.84	-49.50	-13.00	36.50
	8 700.00	V	13.18	9.68	-52.90	-49.40	-13.00	36.40

Test mode : LTE Band 66/4
Frequency(㎒) : 1 775.0
Channel : 132622
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 558.75	H	8.37	7.05	-56.62	-55.30	-13.00	42.30
	5 340.00	V	10.40	8.56	-56.34	-54.50	-13.00	41.50
	7 121.25	H	11.65	9.72	-52.43	-50.50	-13.00	37.50
	8 900.25	H	13.26	9.54	-51.62	-47.90	-13.00	34.90

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

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	1 367.60	V	5.32	4.44	-60.88	-60.00	-13.00	47.00
	2 049.60	H	5.39	5.27	-58.22	-58.10	-13.00	45.10
	2 731.60	H	6.43	6.24	-56.09	-55.90	-13.00	42.90
	3 415.60	H	8.03	6.86	-57.27	-56.10	-13.00	43.10

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	1 380.80	V	5.42	4.47	-63.35	-62.40	-13.00	49.40
	2 071.20	H	5.43	5.30	-58.03	-57.90	-13.00	44.90
	2 760.00	V	6.46	6.27	-56.49	-56.30	-13.00	43.30
	3 451.20	H	8.14	6.89	-56.65	-55.40	-13.00	42.40

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	1 395.60	H	5.53	4.50	-63.73	-62.70	-13.00	49.70
	2 093.60	V	5.47	5.33	-57.64	-57.50	-13.00	44.50
	2 791.60	H	6.49	6.29	-55.60	-55.40	-13.00	42.40
	3 489.60	V	8.27	6.93	-55.64	-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) (㏈)

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	100810	23.07.12
Spectrum Analyzer	AGILENT	N9040B	MY57010132	23.10.14
Signal Generator	R&S	SMB100A	176206	24.01.19
DC Power Supply	AGILENT	E3632A	KR73001026	24.01.19
Directional Coupler	AAMCS	AAMCS-UDC-0.5G-18G-10dB-SF	399	24.01.19
Directional Coupler	Marki Microwave, Inc.	CBR17-0026	0001	23.08.10
Wideband Radio Communication Tester	R&S	CMW500	106840	24.01.19
Wideband Radio Communication Tester	R&S	CMW500	168683	24.02.09
Wideband Radio Communication Tester	R&S	CMW500	141780	24.01.19
Temp & Humid Chamber	Daejin Engineering	DJ-THR11000	10041	24.01.19
Bi-log Antenna	Teseq GmbH	CBL 6112D	62027	24.11.17
Bi-log Antenna	ETS.LINDGREN	3143B	228420	23.09.28
Horn Antenna	ETS-LINDGREN	3117	251528	24.02.02
Horn Antenna	ETS.LINDGREN	3117	227509	23.09.20
Horn Antenna	ETS-Lindgren	3116	00086632	24.01.25
Horn Antenna	ETS-LINDGREN	3116C	251516	24.02.02
Amplifier	SONOMA INSTRUMENT	310N	421822	23.12.14
Amplifier	C&K Technologies, Inc.	BZRT-00504000-481055-382525	26299-27735	23.09.19
Amplifier	C&K Technologies, Inc.	BZR-00504000-551028-252525	27736	23.09.19
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	23.08.10
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	23.08.10
Antenna Mast	innco systems GmbH	MA4640-XP-ET	N/A	-
Controller	Innco Systems	CO3000	1175/45850319/P	-

End of test report