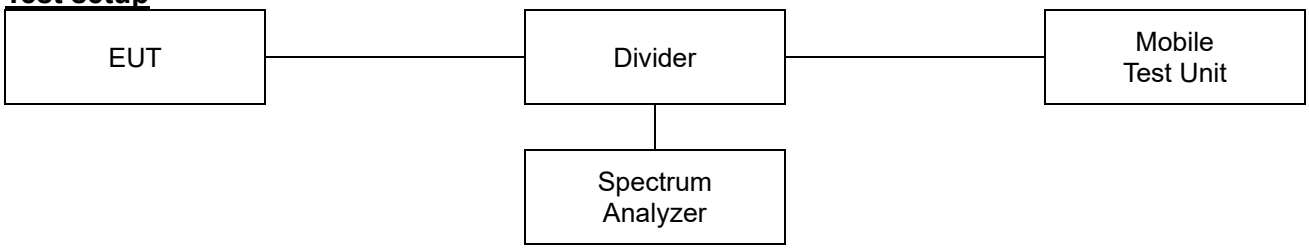
7.4. Spurious Emissions at Antenna Terminal

Test setup



Limit

According to §22.917(a),

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

Test procedure

971168 D01 v03r01 - Section 6
ANSI 63.26-2015 – Section 5.7

Test settings

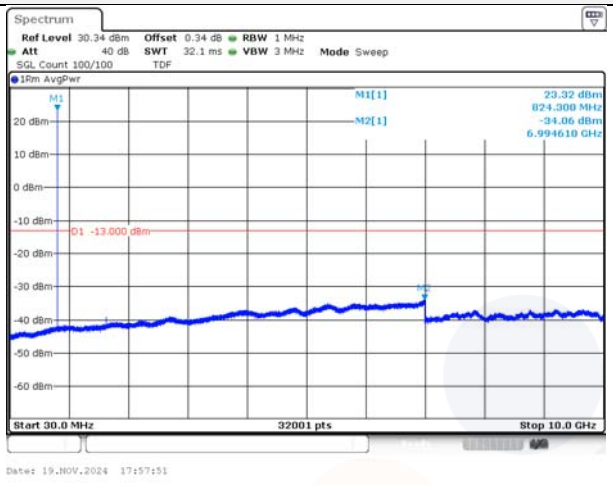
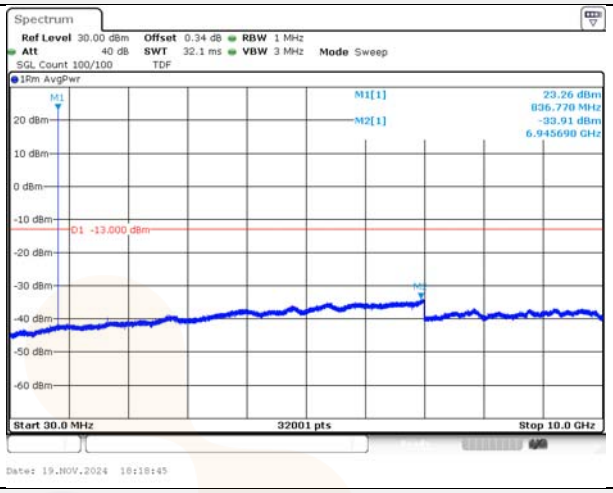
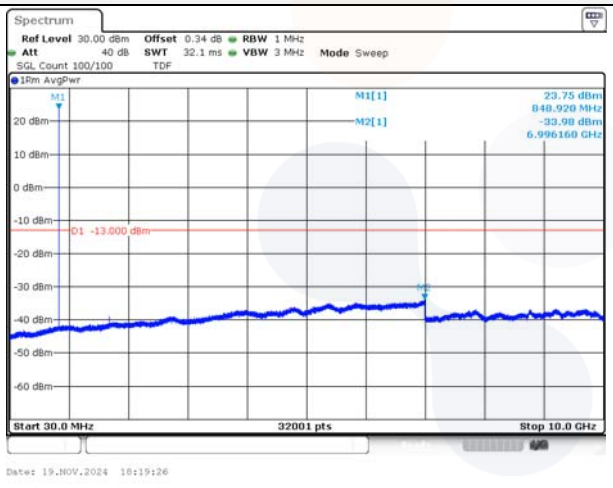
1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Detector = RMS
3) Sweep time = auto couple.
4) Trace mode = trace average
5) Allow trace to fully stabilize.
6) Please see test notes below RBW and VBW settings.

Notes:

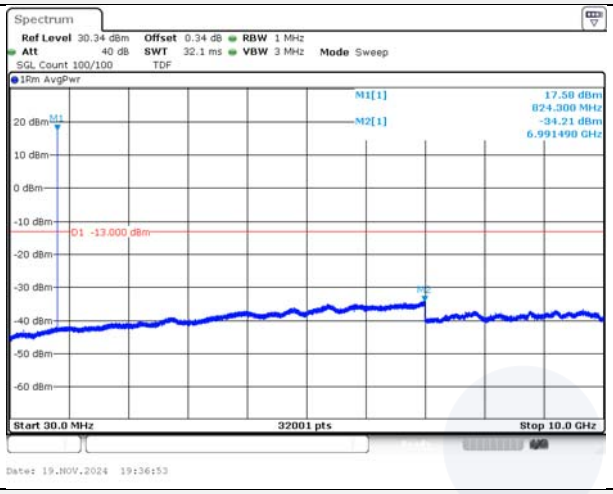
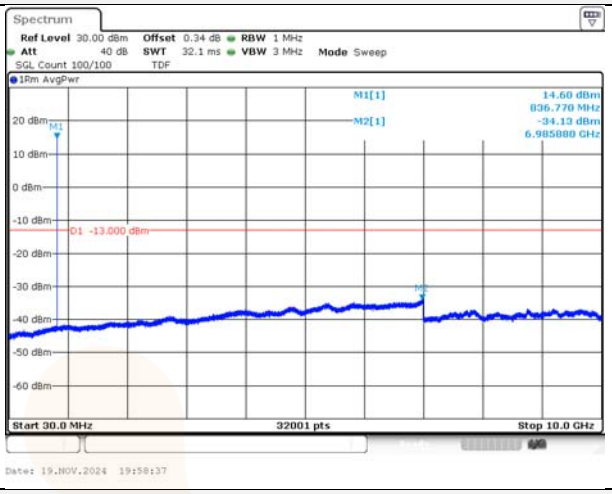
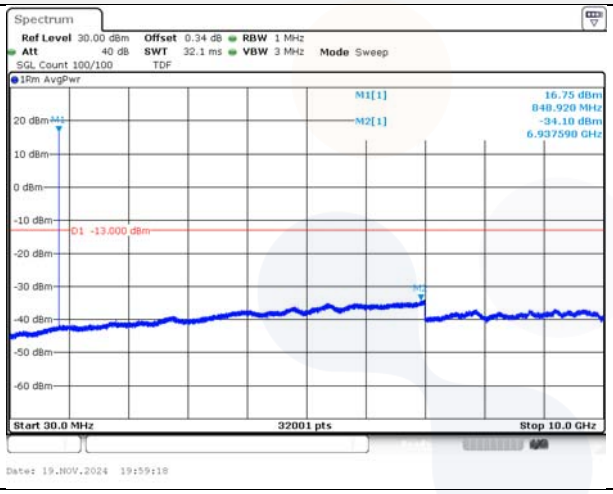
1. Per 22.917(b), compliance with these provisions is based on the use of measurement instrumentation employing a resolution Bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and 1 ㎒ or greater for frequencies greater than 1 ㎓. The emission Bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.
2. All modes of operation were investigated and the worst-case configuration results are reported.

Test results

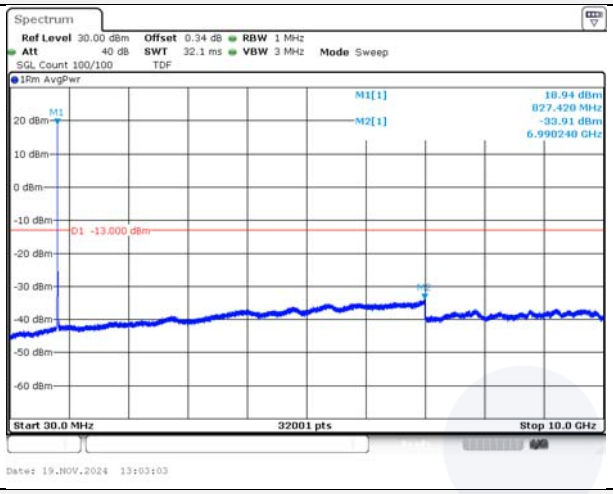
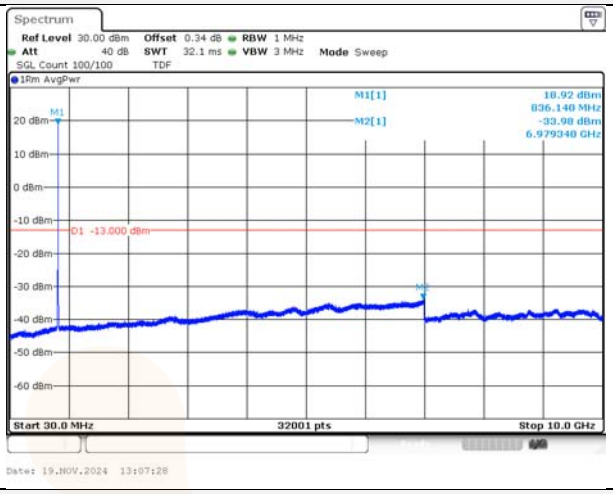
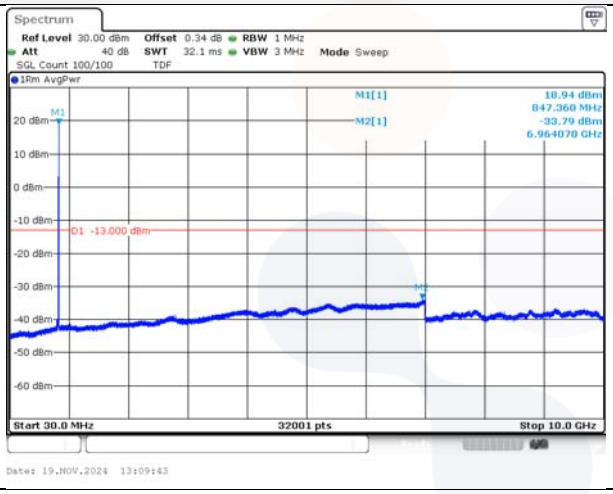
Test mode: GSM 850

Voice(GPRS)	
Low channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**-**
	Blank

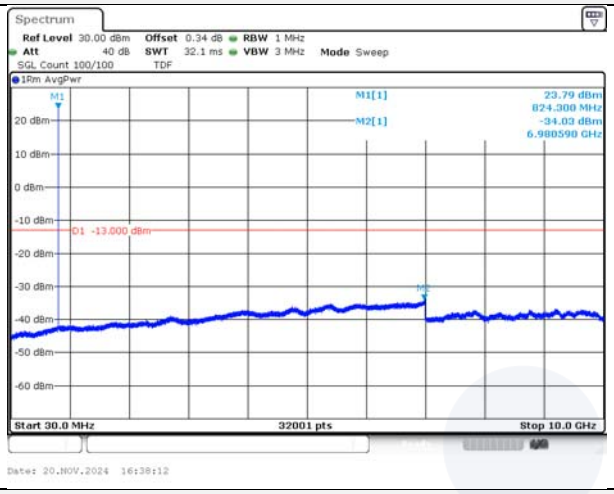
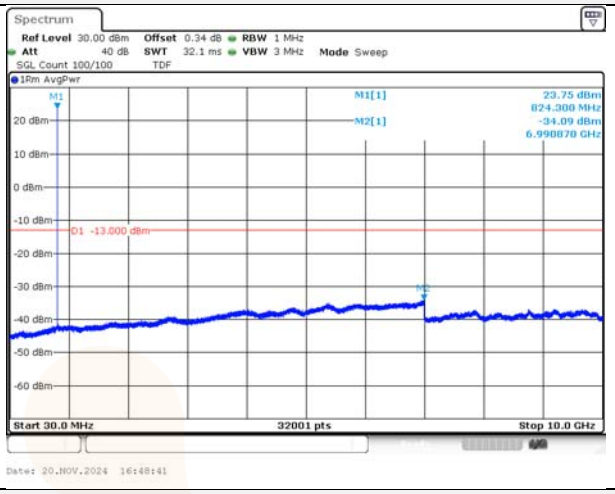
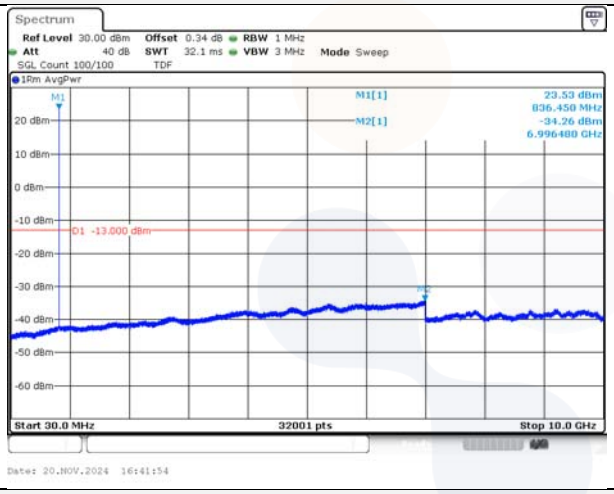
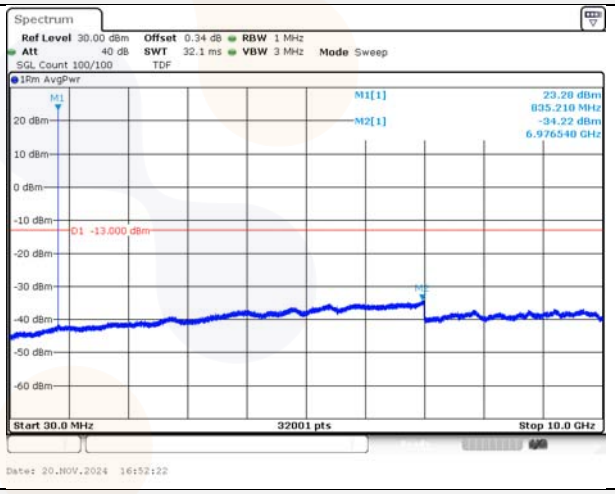
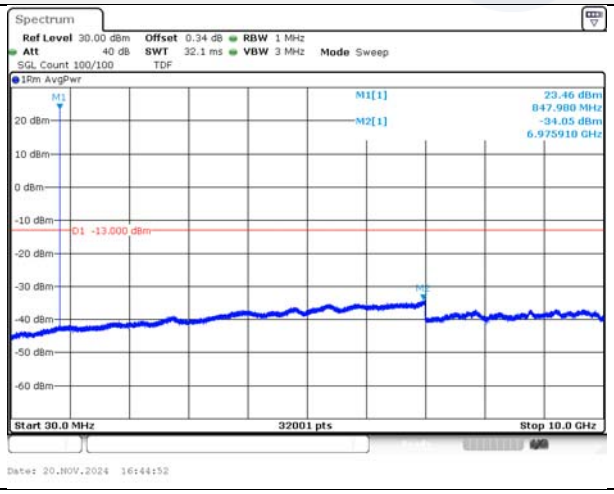
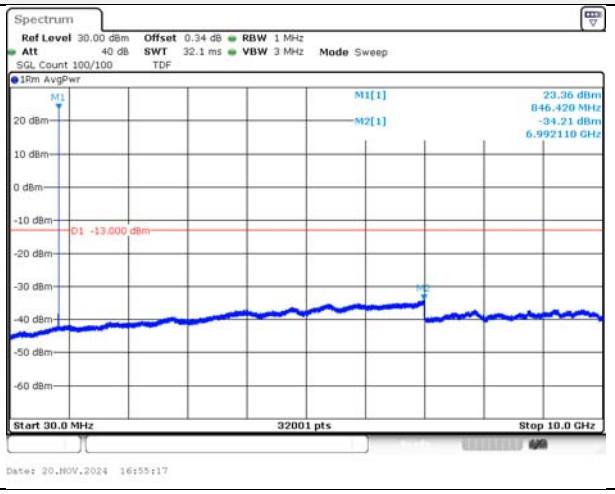
Test mode: GSM 850

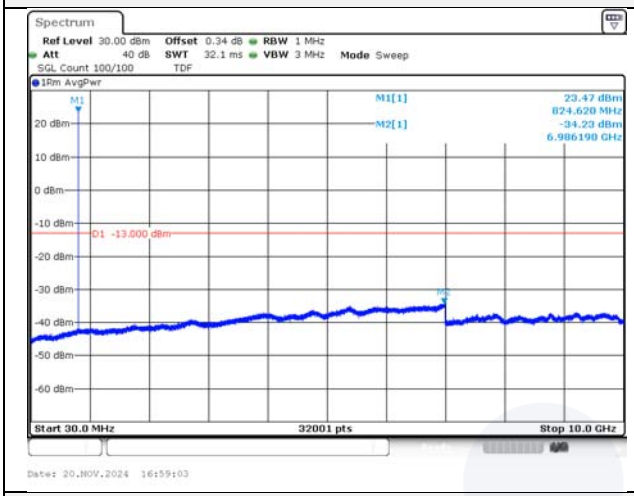
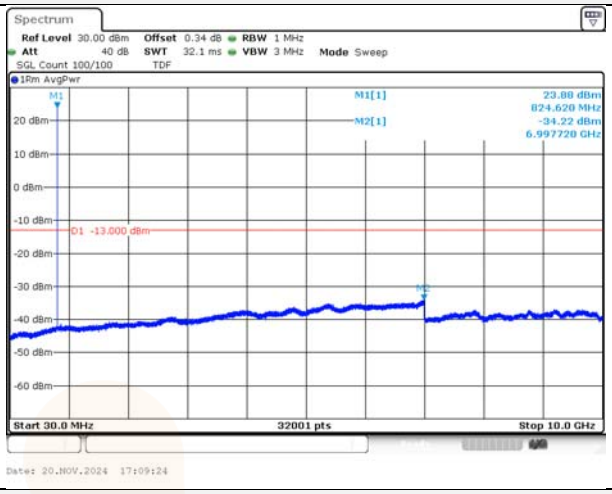
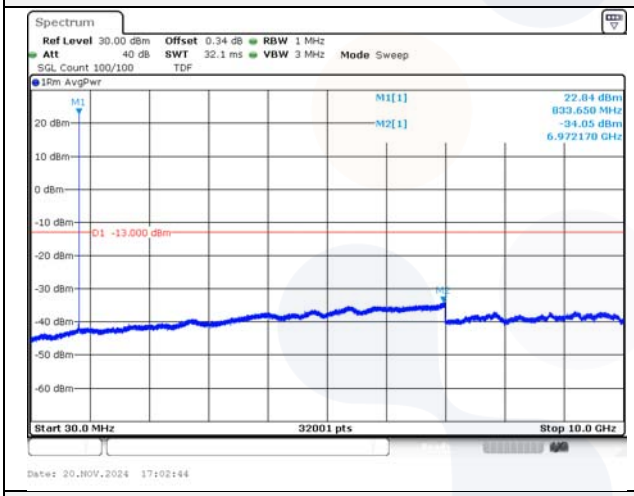
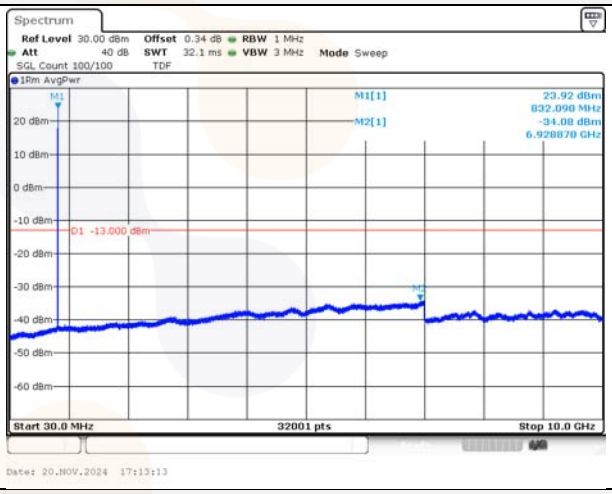
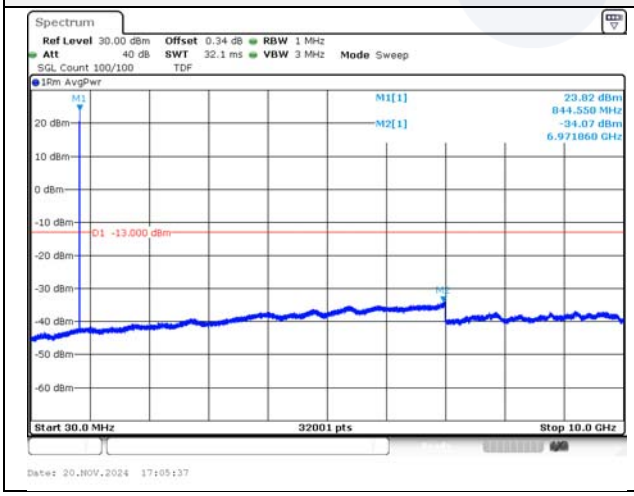
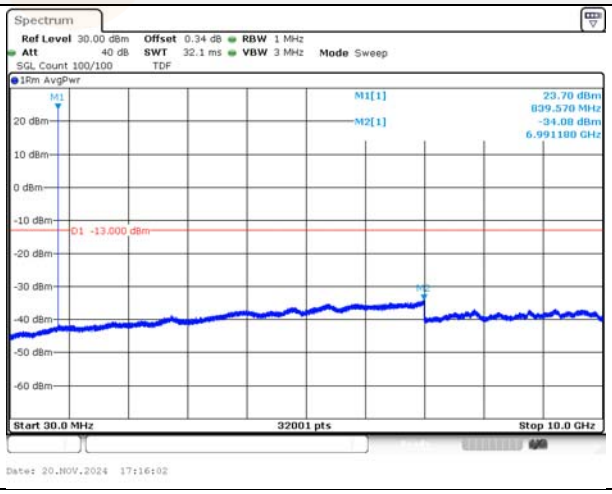
EDGE	
Low channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**-**
	Blank

Test mode: WCDMA 850

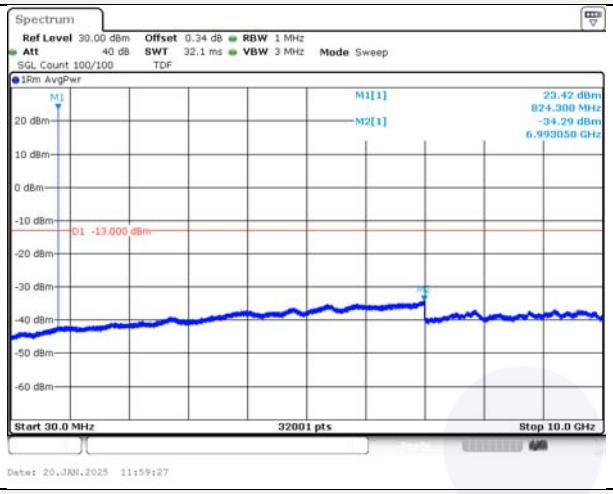
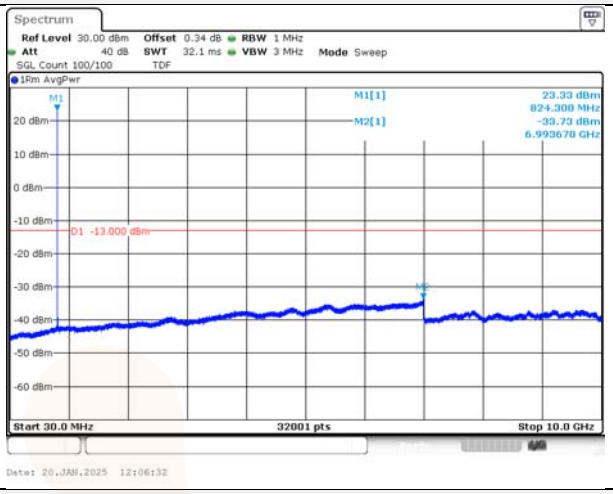
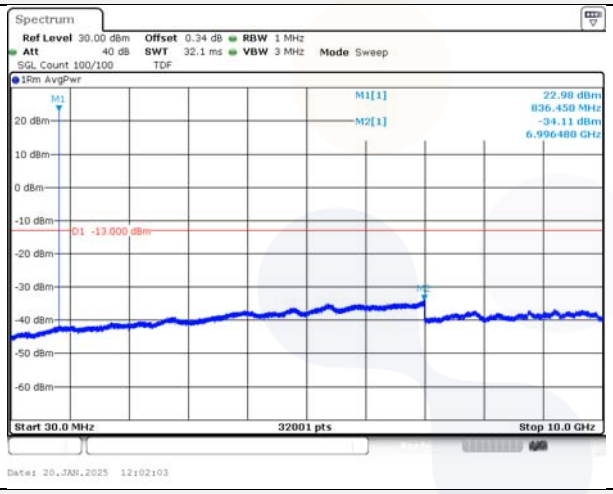
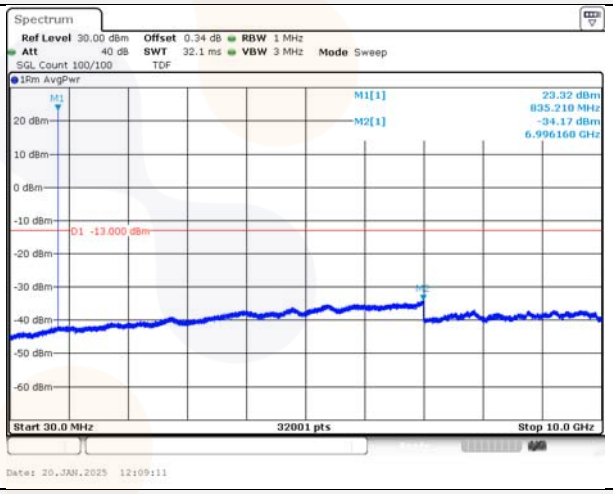
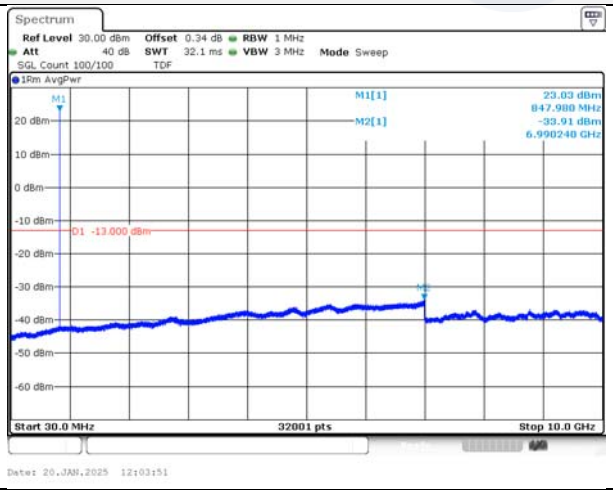
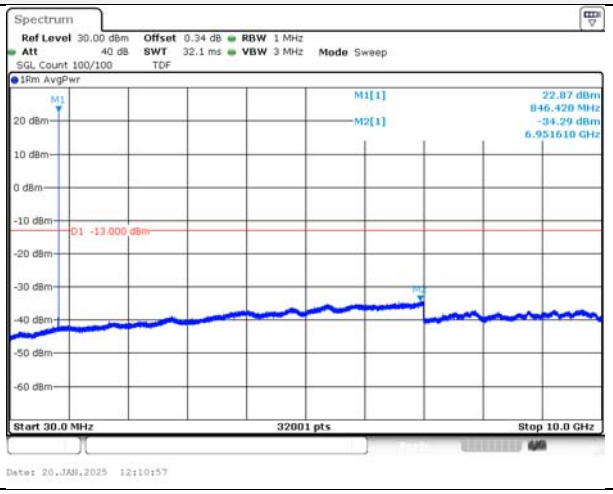
RMC	
Low channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**-**
	Blank

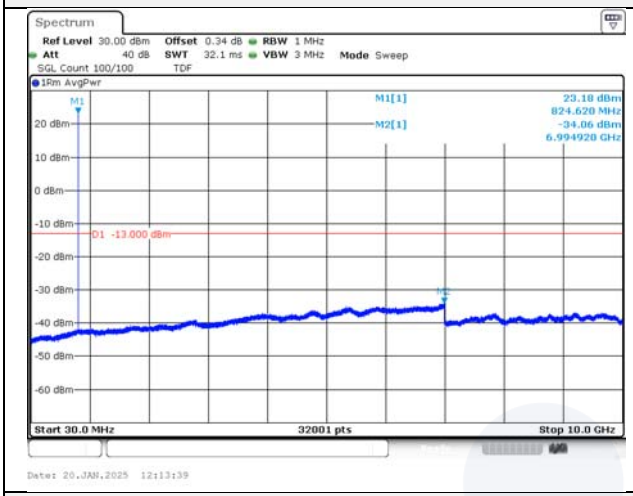
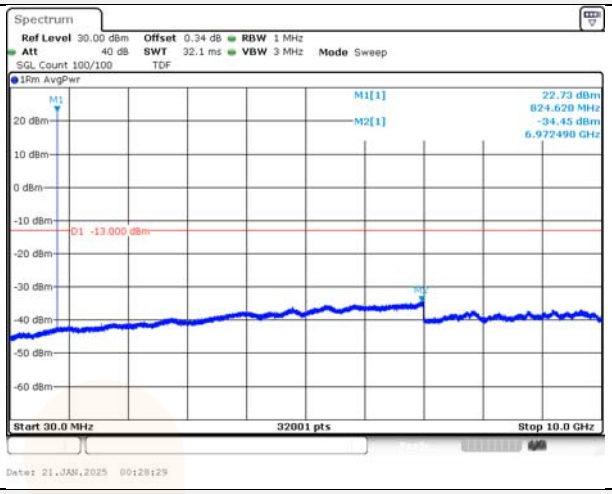
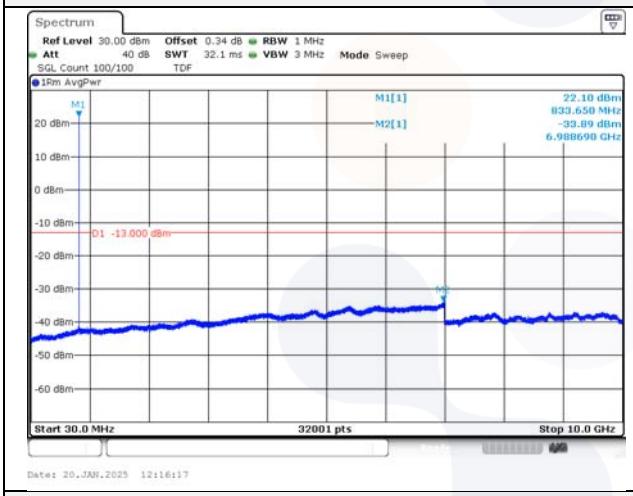
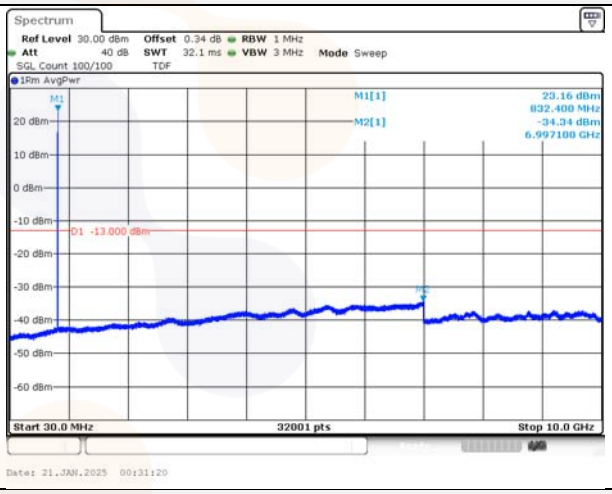
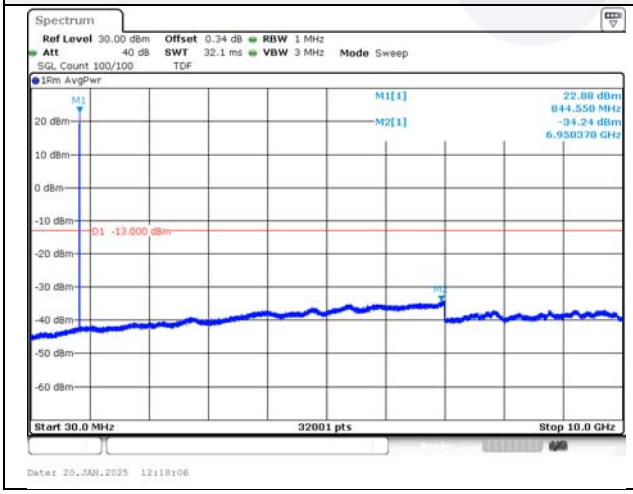
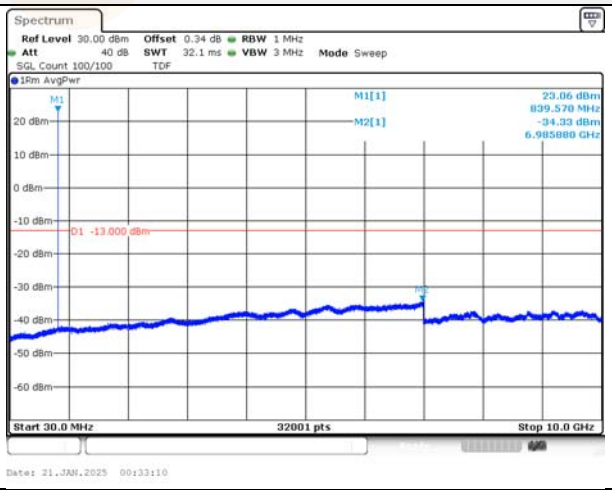
Test mode: LTE B5

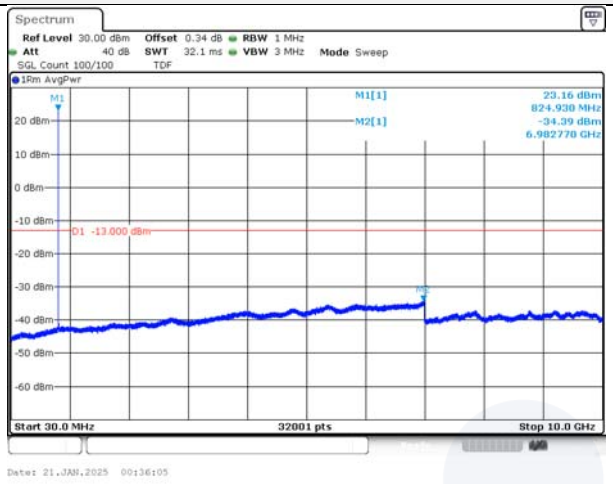
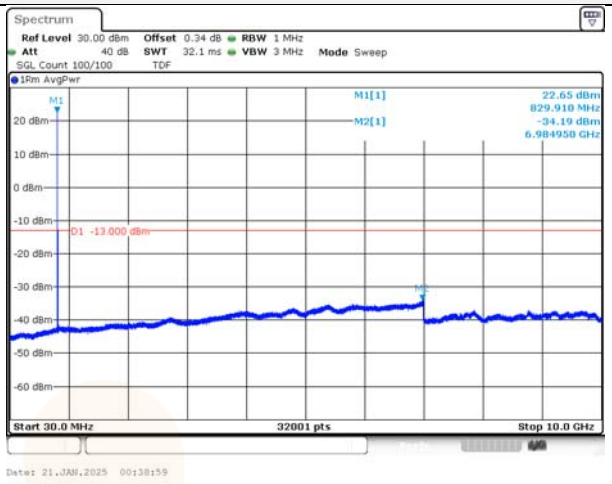
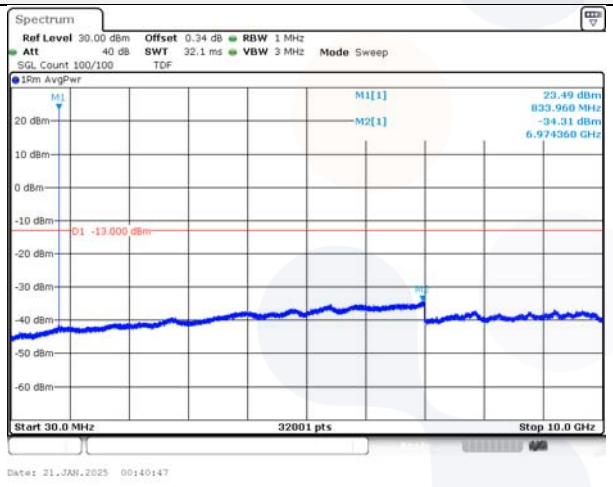
1.4M BW QPSK	3M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

5M BW QPSK	10M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

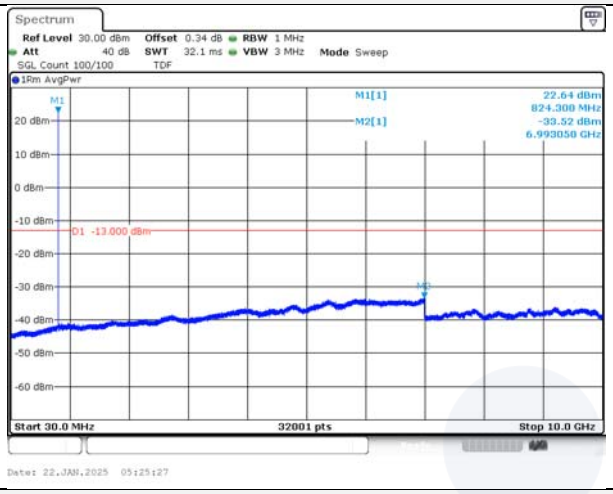
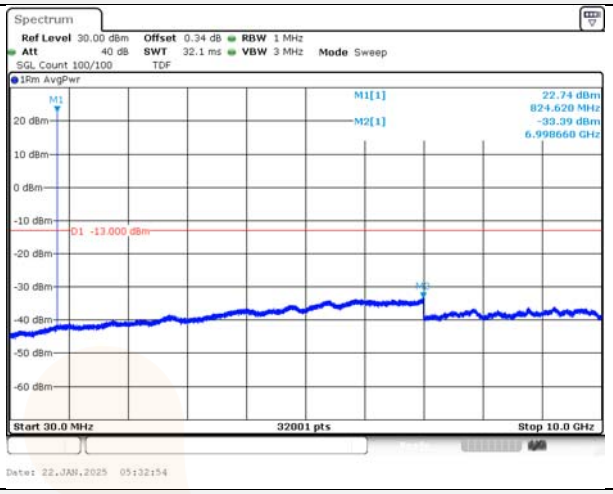
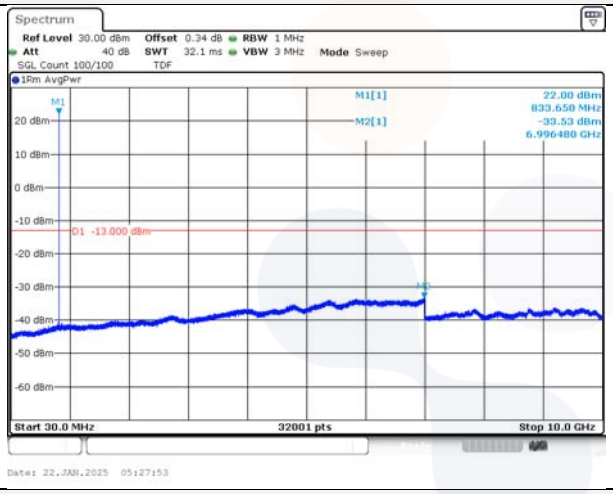
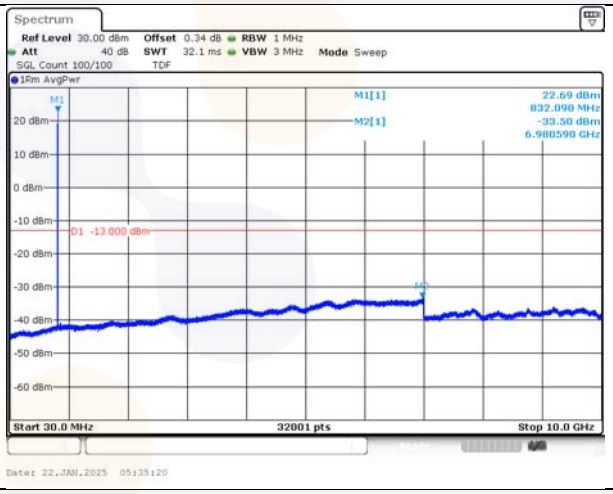
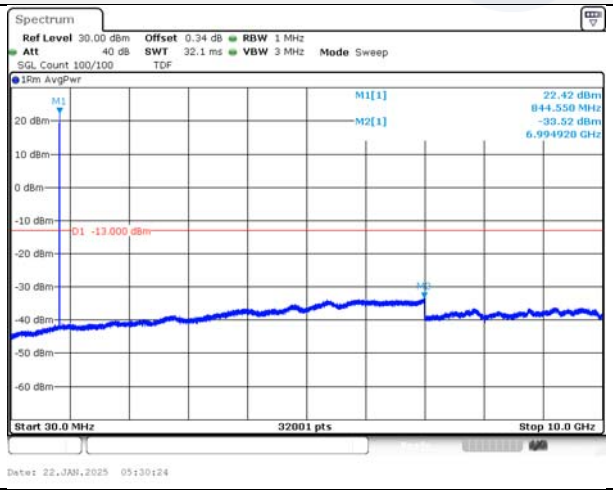
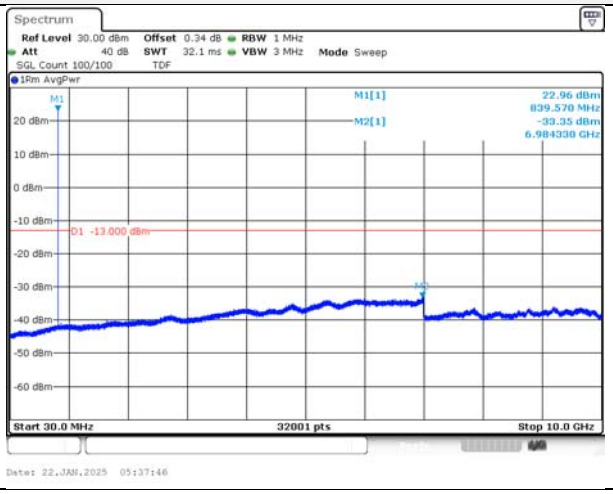
Test mode: LTE B26

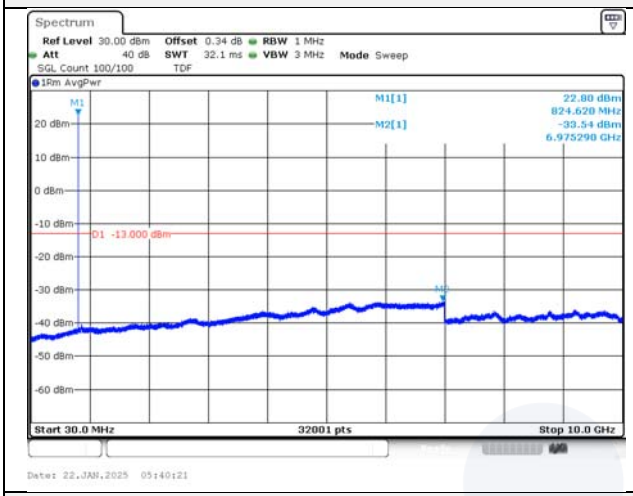
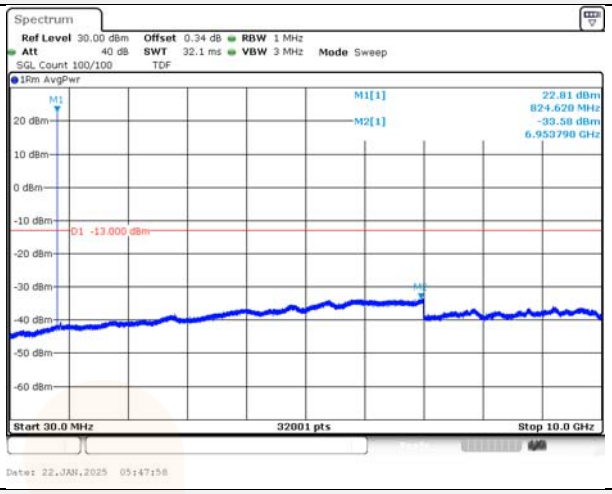
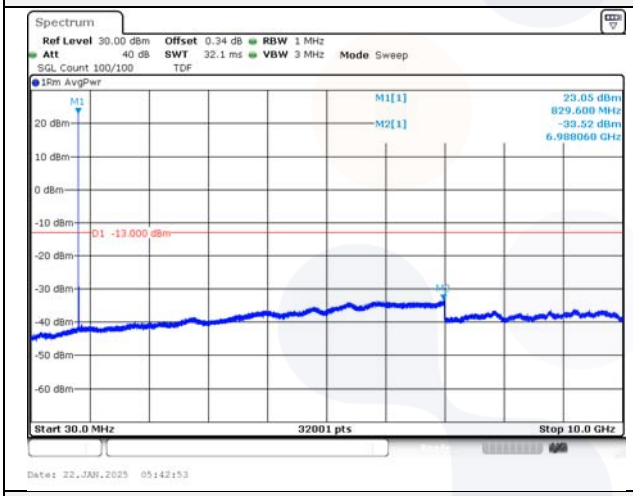
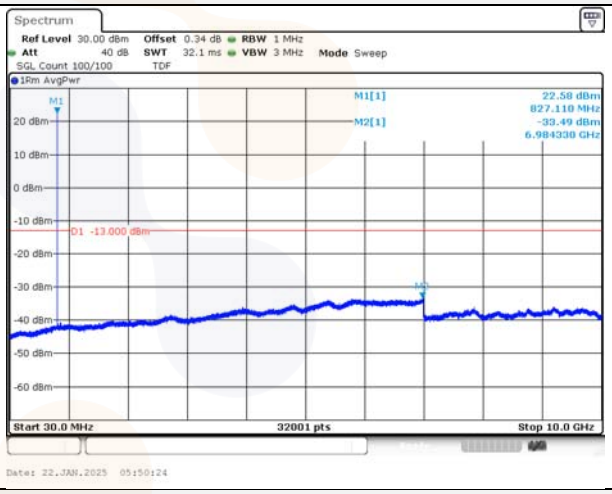
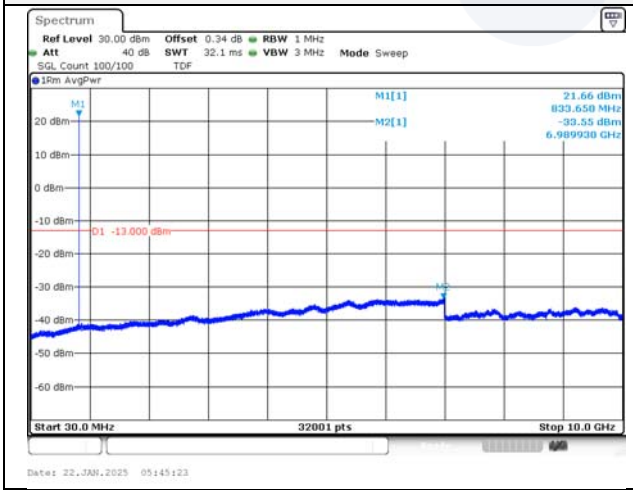
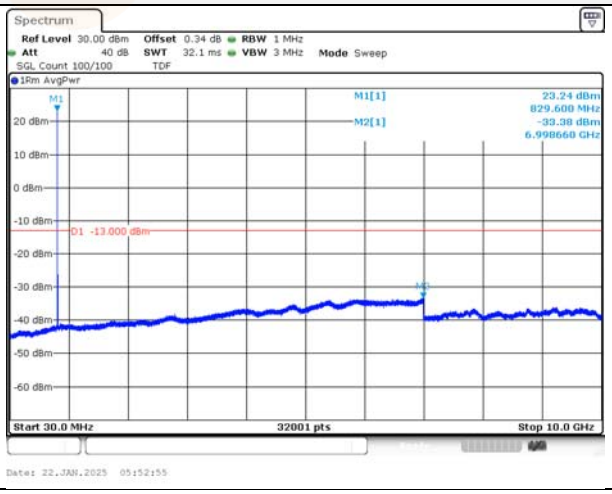
1.4M BW QPSK	3M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

5M BW QPSK	10M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

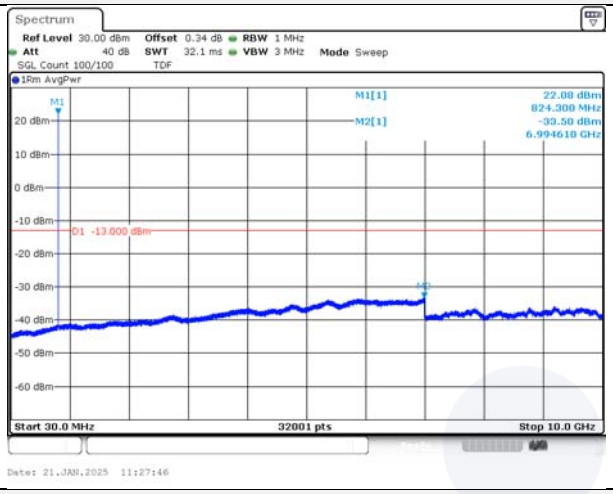
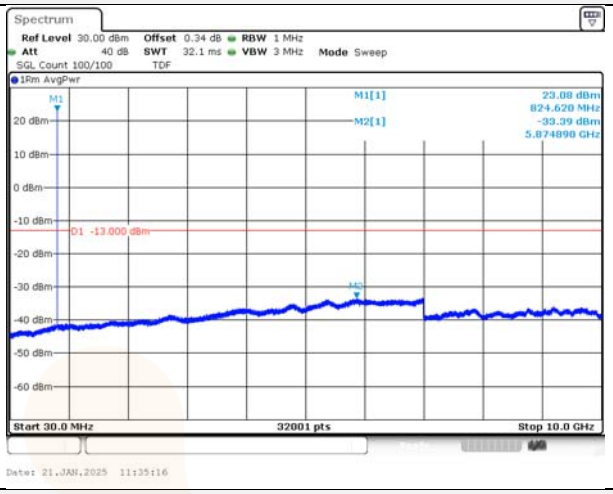
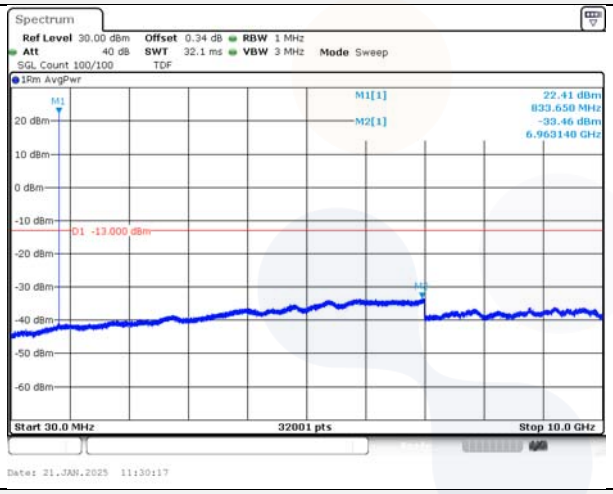
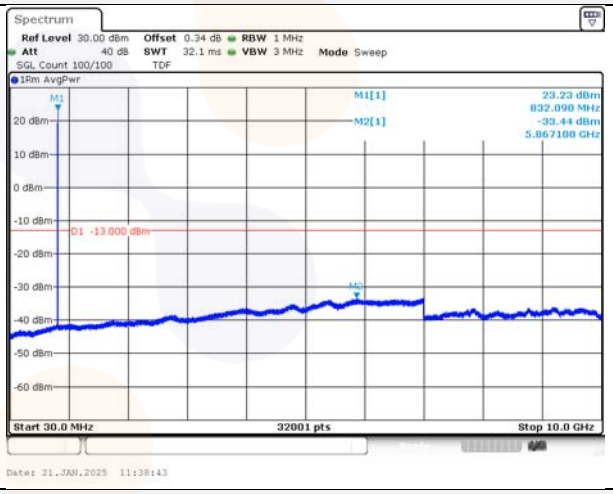
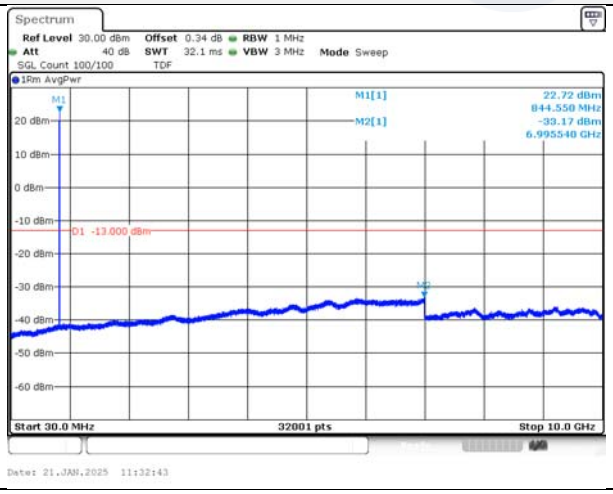
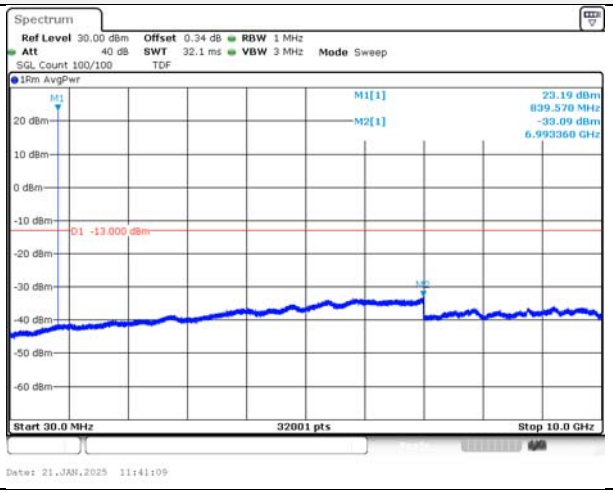
15M BW QPSK	
Low channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**-**
	Blank

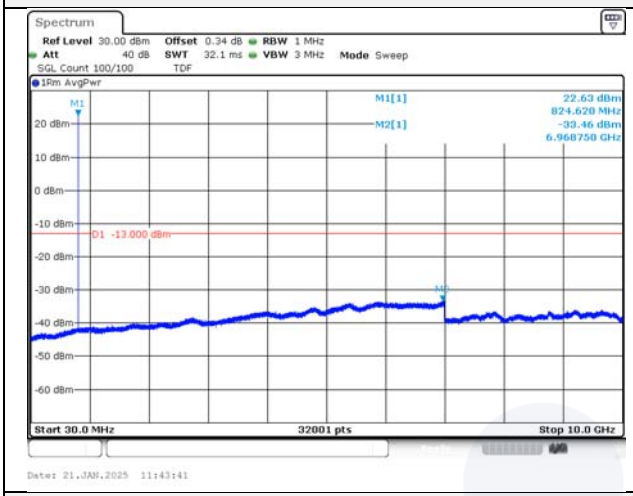
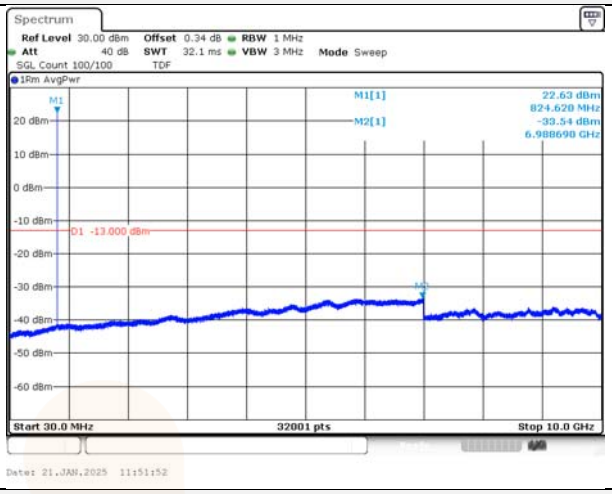
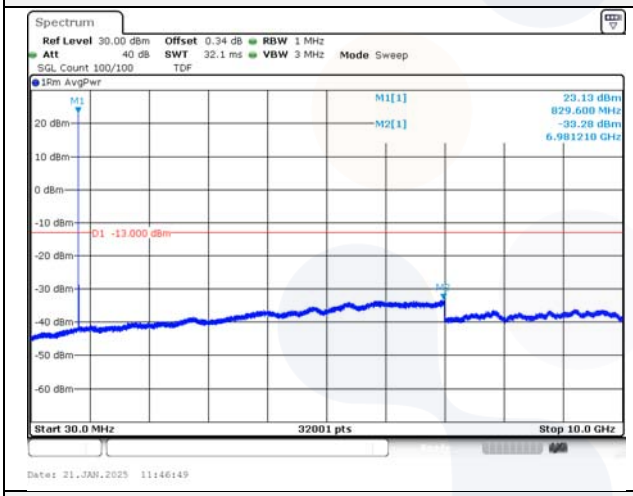
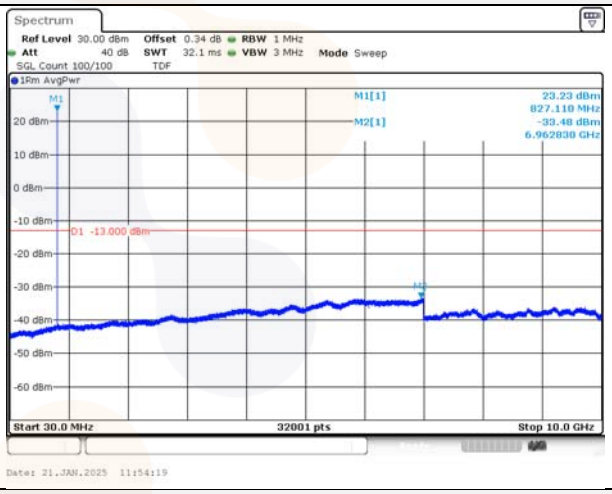
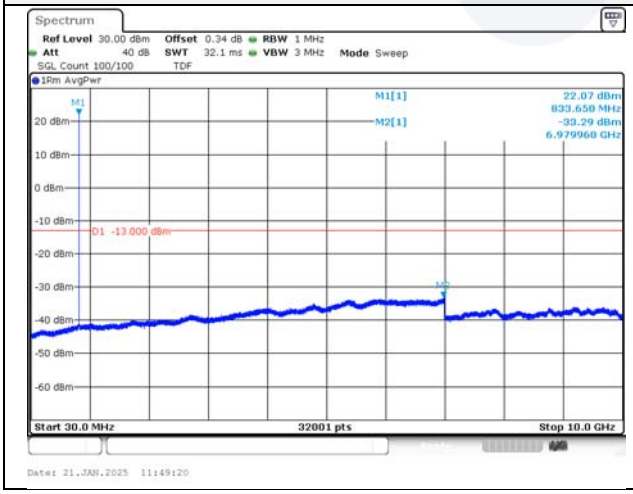
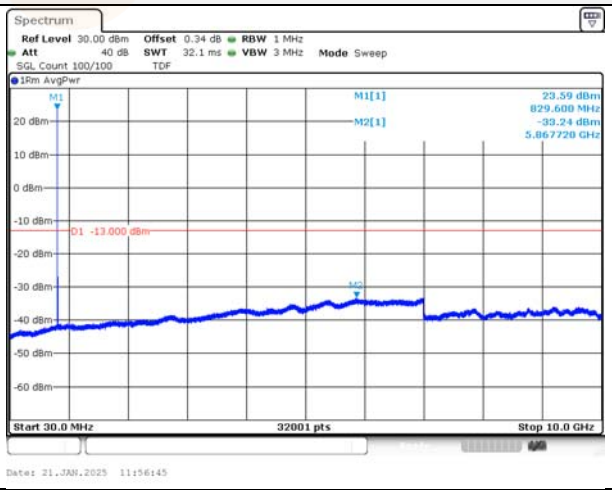
Test mode: 5G NR n5 DFT-s OFDM

5M BW QPSK	10M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

15M BW QPSK	20M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

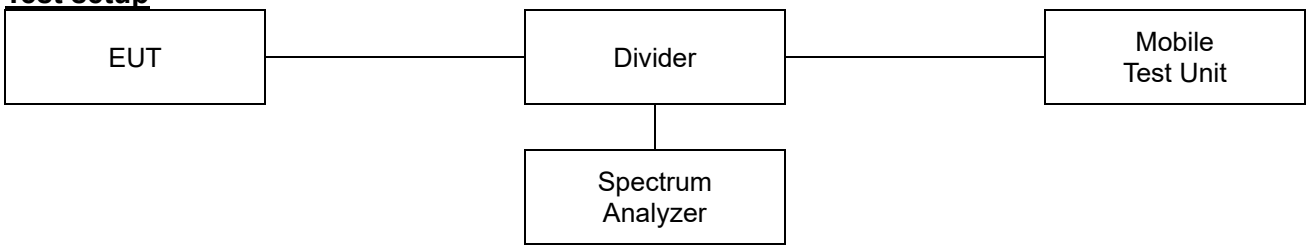
Test mode: 5G NR n26 DFT-s OFDM

5M BW QPSK	10M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

15M BW QPSK	20M BW QPSK
Low channel (30 ㎒ ~ 10 ㎓)	**Low channel (30 ㎒ ~ 10 ㎓)**
	
Middle channel (30 ㎒ ~ 10 ㎓)	**Middle channel (30 ㎒ ~ 10 ㎓)**
	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (30 ㎒ ~ 10 ㎓)**
	

7.5. Peak to Average Power Ratio (PAPR)

Test setup



Limit

The peak-to-average ratio(PAR) of the transmission must not exceed 13 dB.

Test procedure

971168 D01 v03r01 - Section 5.7.2 or 5.7.3
971168 D02 v02r02 – Section VII
ANSI 63.26-2015 – Section 5.2.3.4 or 5.2.6

Test settings

5.2.3.4 Measurement of peak power in a broadband noise-like signal using CCDF

1) Set resolution/measurement Bandwidth ≥ OBW or specified reference Bandwidth
2) Set the number of counts to a value that stabilizes the measured CCDF curve.
3) Set the measurement interval as follows:
   a) For continuous transmissions, set to the greater of [10 x (number of points in sweep) x (transmission symbol period)] or 1 ms.
   b) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement internal to a time that is less than or equal to the burst duration.
   c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
4) Record the maximum PAPR level associated with a probability of 0.1%

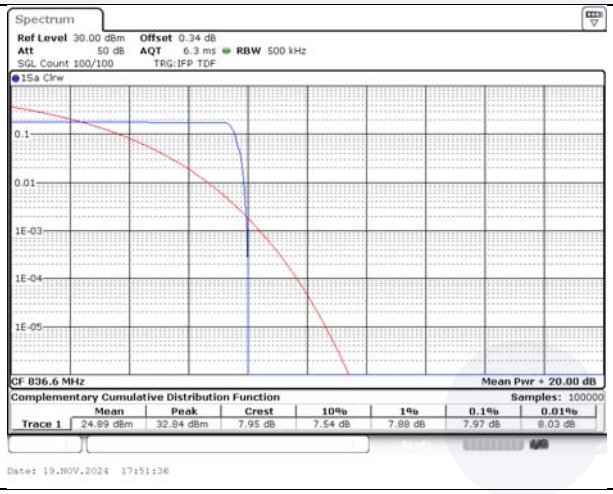
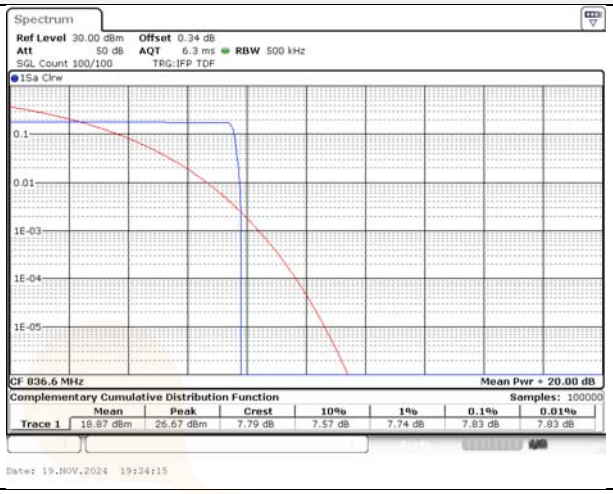
5.2.6 Peak-to-average power ratio

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{PK}.
Use one of the applicable procedure presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{AG}. Determine the P.A.P.R from:

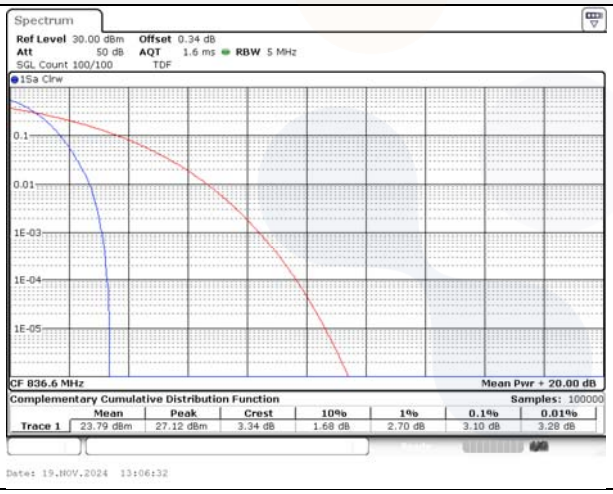
$$PAPR(dB) = P_{PK}(dBm \text{ or } dBW) - P_{AG}(dBm \text{ or } dBW)$$

Test results

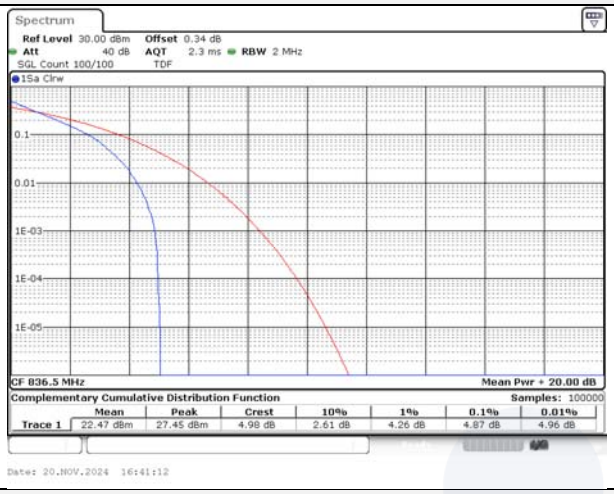
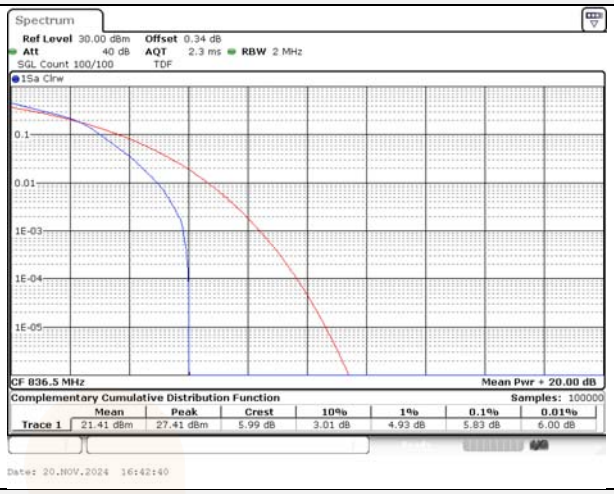
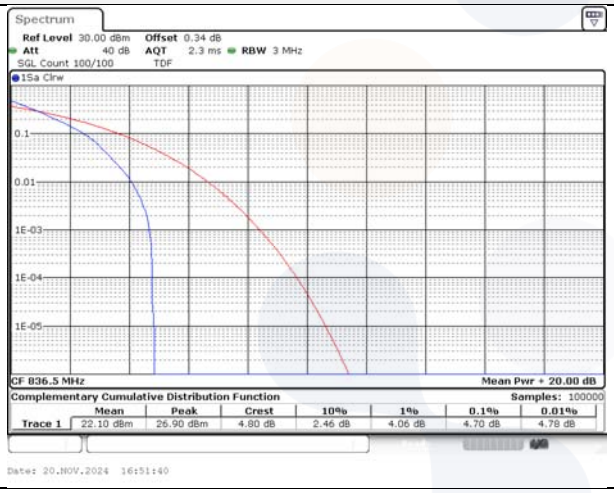
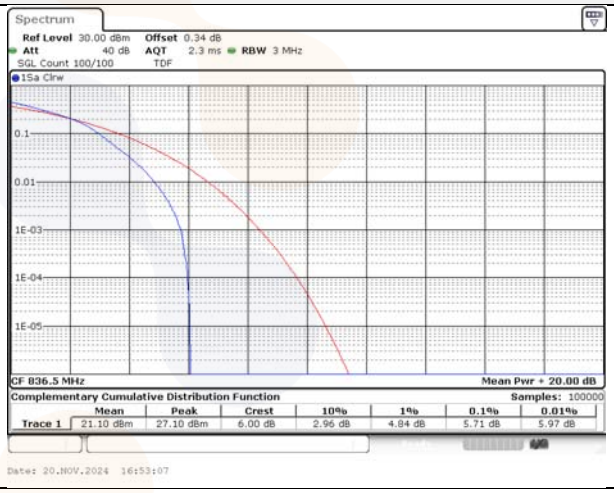
Test mode: GSM 850

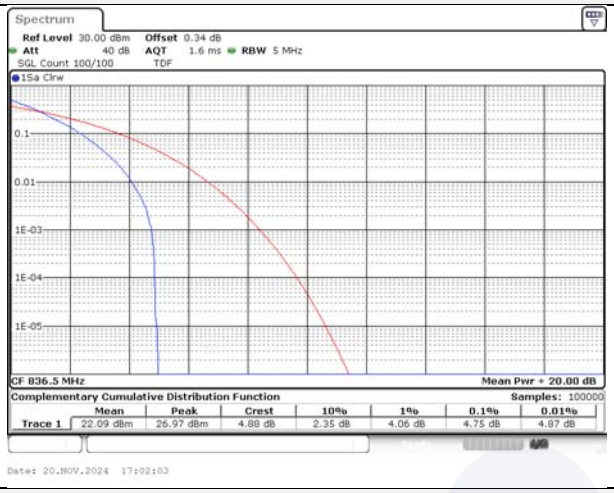
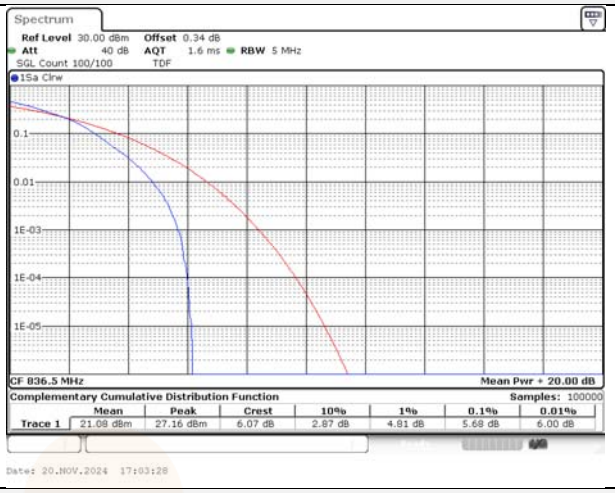
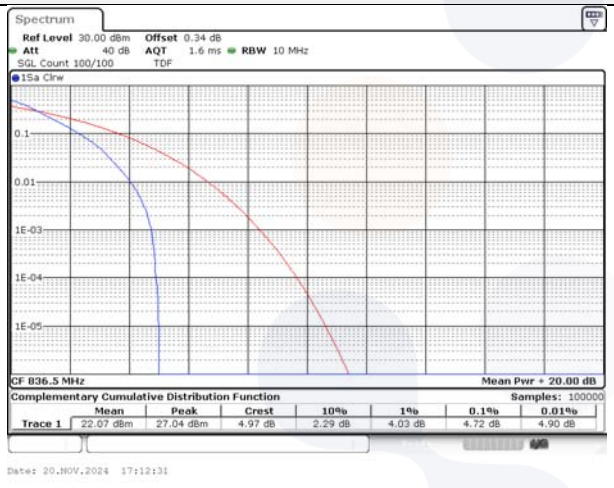
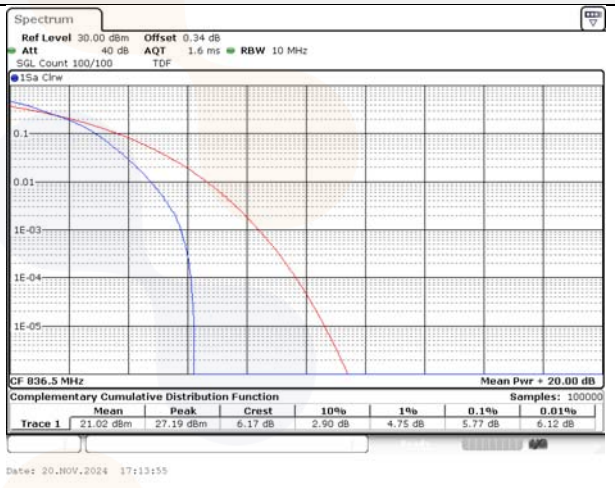
Voice(GPRS) Middle channel	EDGE Middle channel
	

Test mode: WCDMA 850

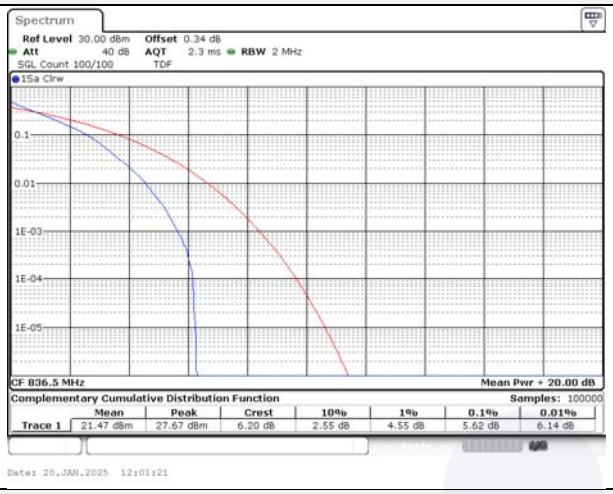
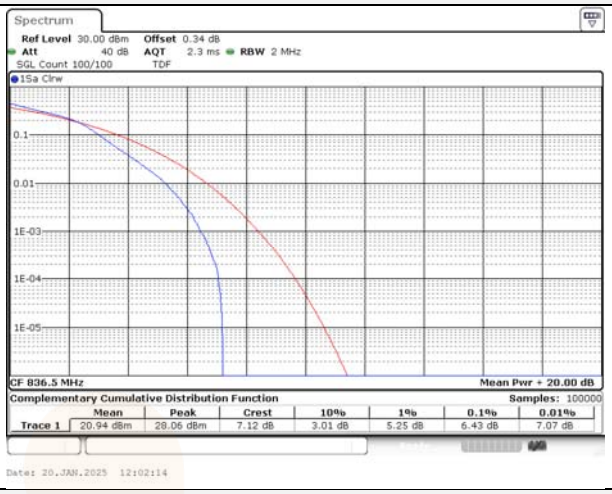
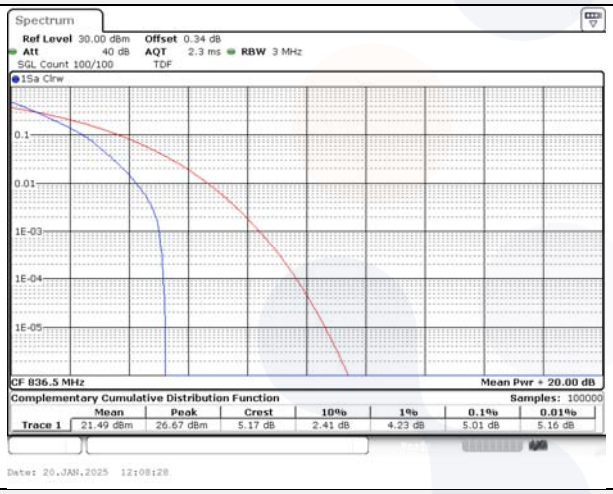
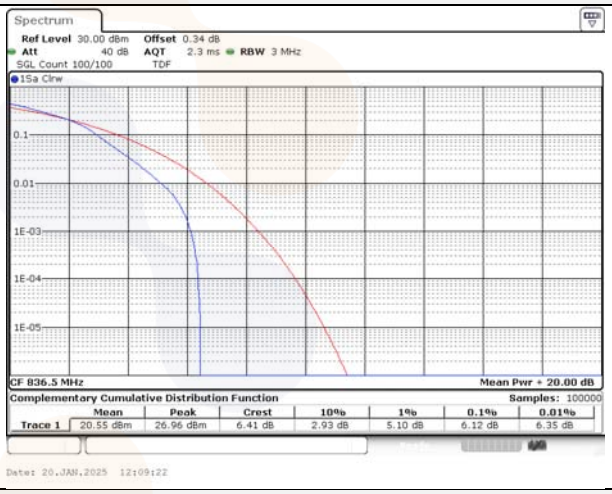
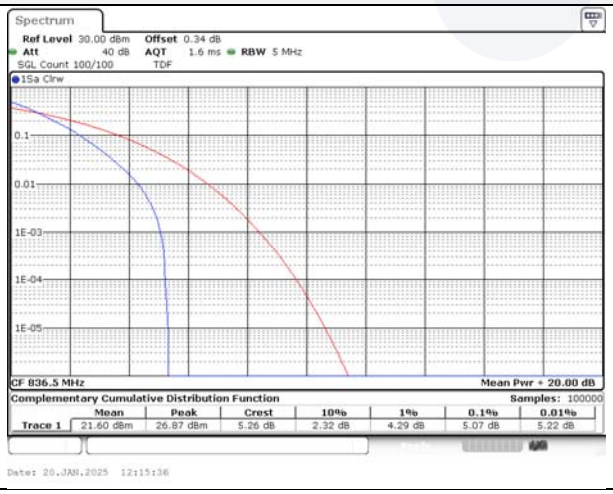
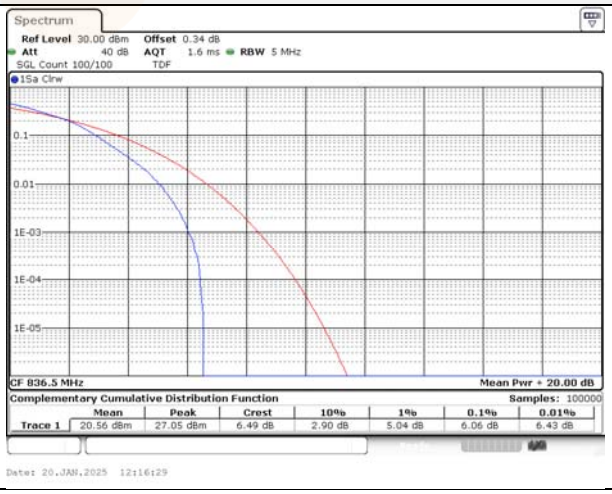
RMC Middle channel	-
	Blank

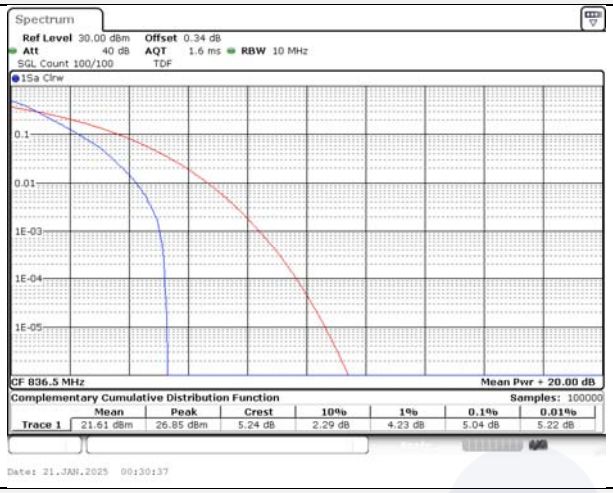
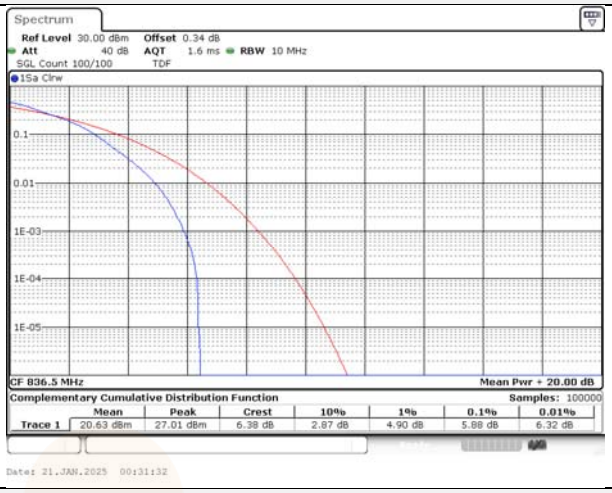
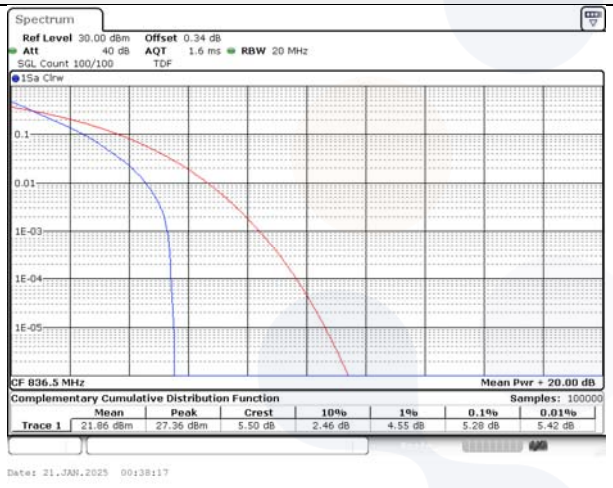
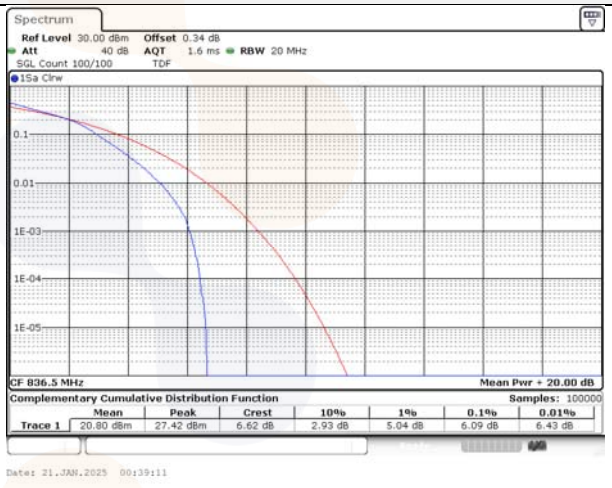
Test mode: LTE B5

1.4M BW QPSK Middle channel	1.4M BW 16QAM Middle channel
	
3M BW QPSK Middle channel	**3M BW 16QAM Middle channel**
	

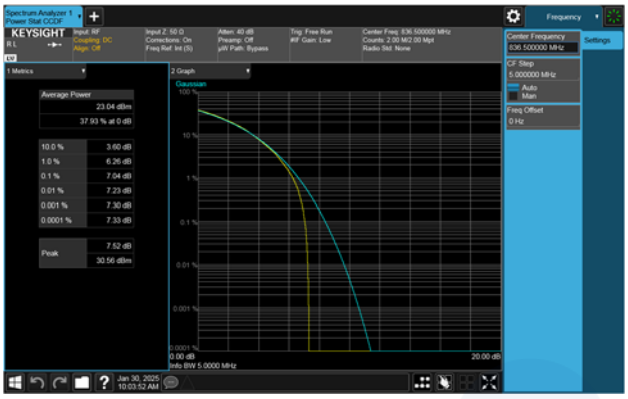
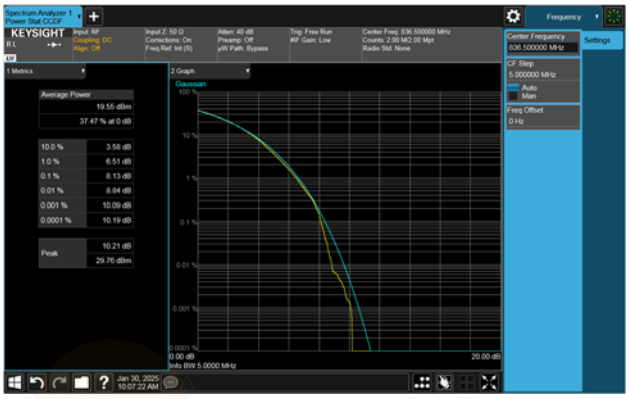
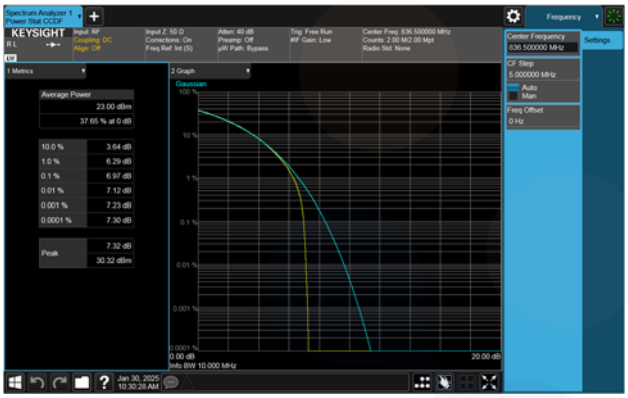
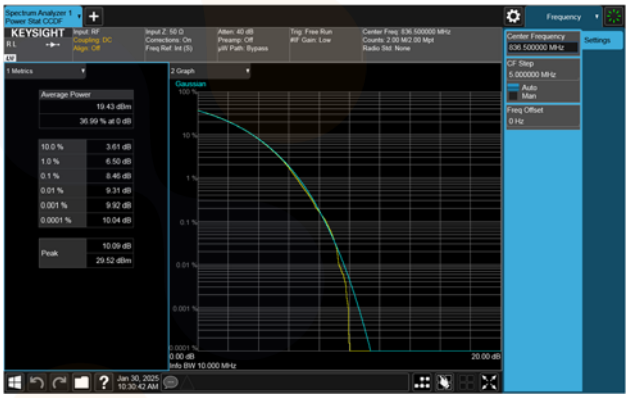
5M BW QPSK Middle channel	5M BW 16QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 16QAM Middle channel**
	

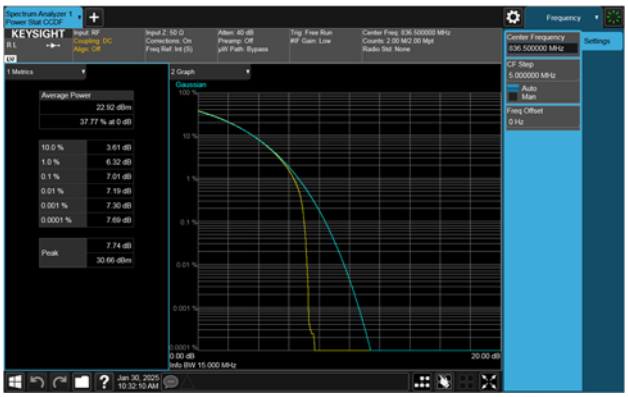
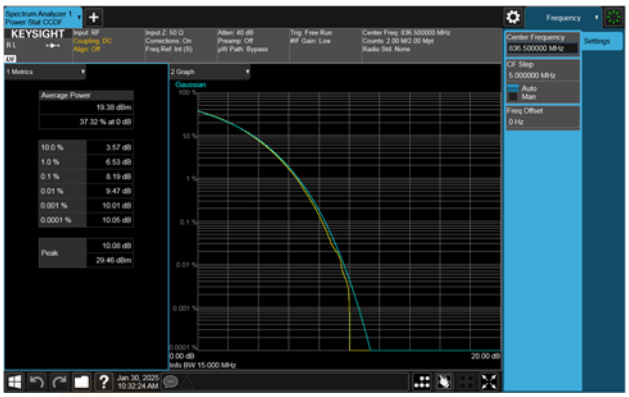
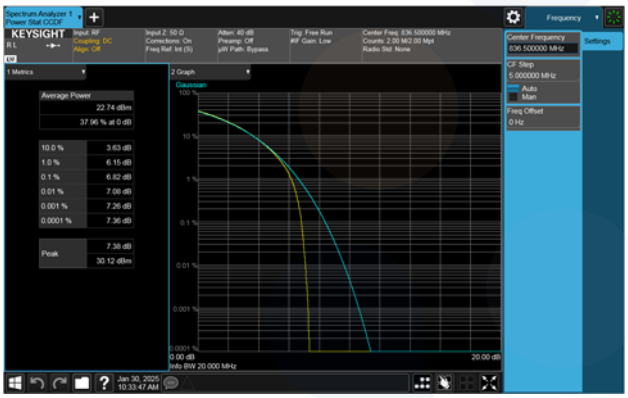
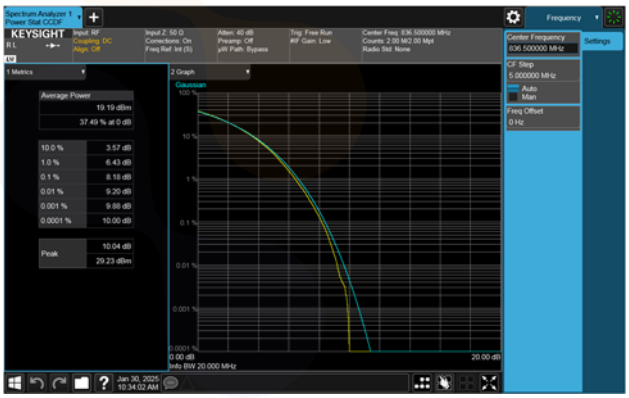
Test mode: LTE B26

1.4M BW QPSK Middle channel	1.4M BW 16QAM Middle channel
	
3M BW QPSK Middle channel	**3M BW 16QAM Middle channel**
	
5M BW QPSK Middle channel	**5M BW 16QAM Middle channel**
	

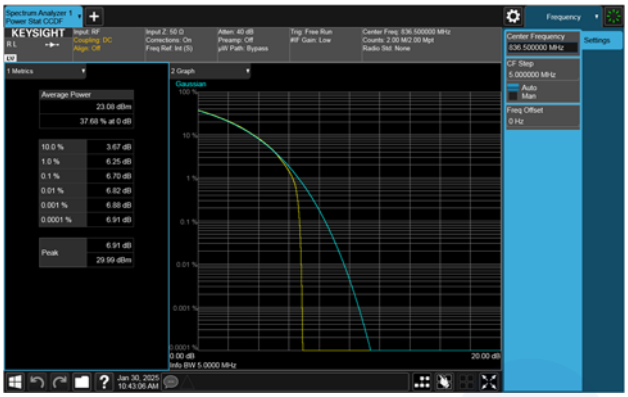
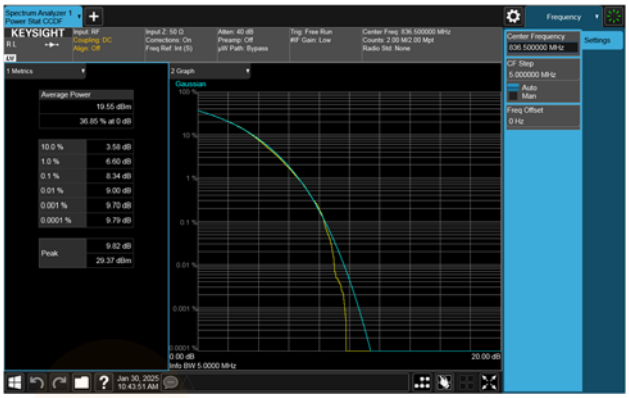
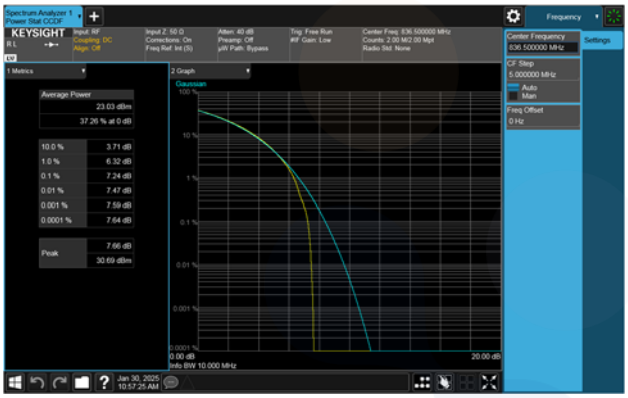
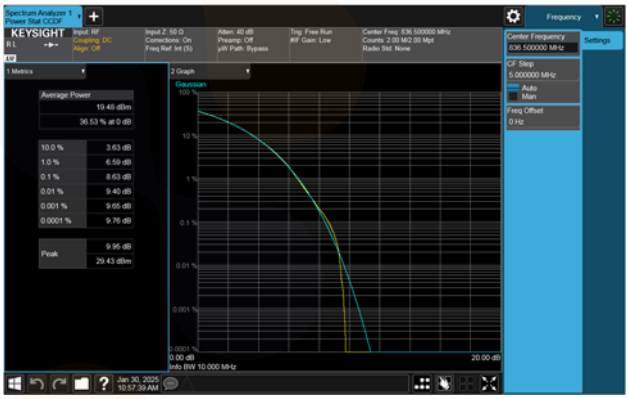
10M BW QPSK Middle channel	10M BW 16QAM Middle channel
	
15M BW QPSK Middle channel	**15M BW 16QAM Middle channel**
	

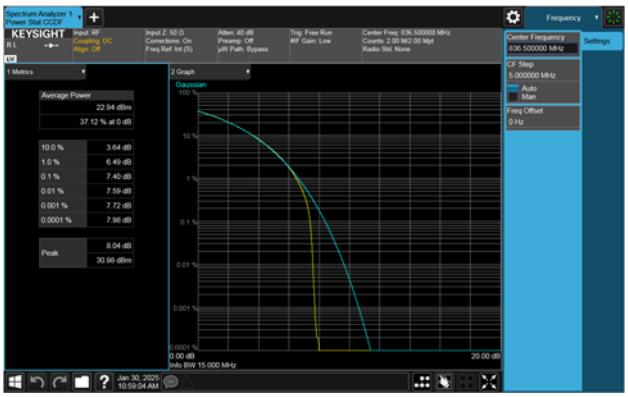
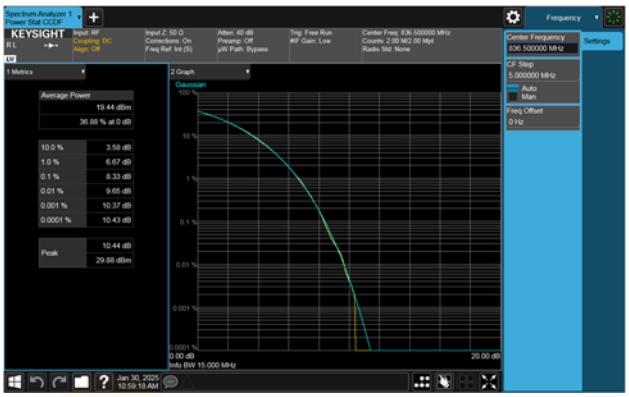
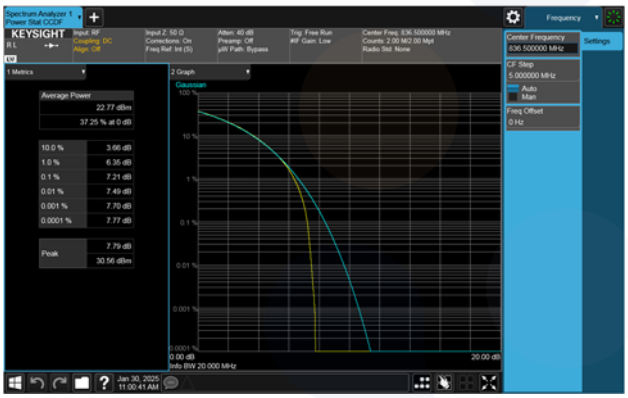
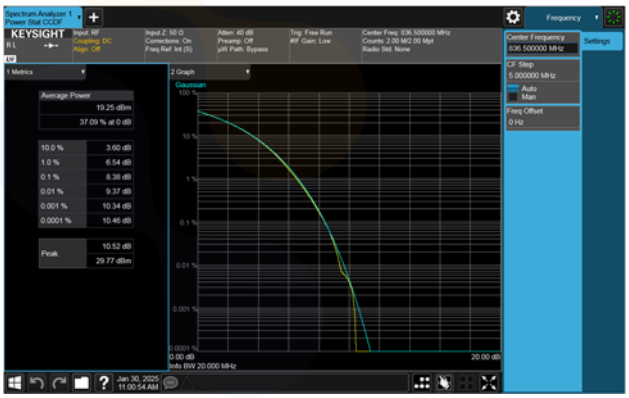
Test mode: 5G NR n5 CP OFDM

5M BW QPSK Middle channel	5M BW 256QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 256QAM Middle channel**
	

15M BW QPSK Middle channel	15M BW 256QAM Middle channel
	
20M BW QPSK Middle channel	**20M BW 256QAM Middle channel**
	

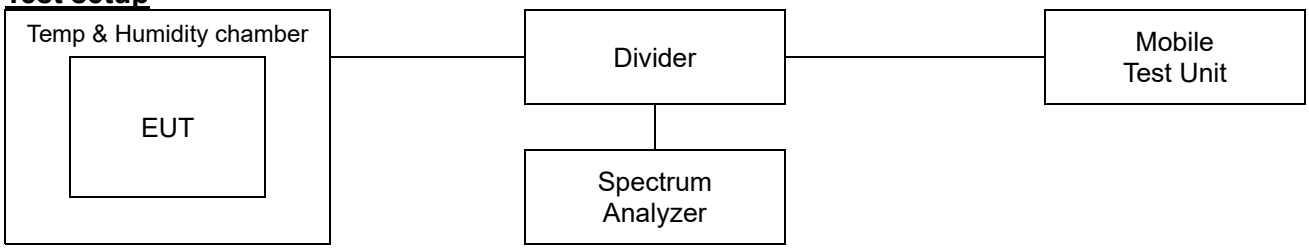
Test mode: 5G NR n26 CP OFDM

5M BW QPSK Middle channel	5M BW 256QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 256QAM Middle channel**
	

15M BW QPSK Middle channel	15M BW 256QAM Middle channel
	
20M BW QPSK Middle channel	**20M BW 256QAM Middle channel**
	

7.6. Frequency stability

Test setup



Limit

According to §2.1055(a),

The frequency stability shall be measured with variation of ambient temperature as follows:

1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
2) From -20° to + 50° centigrade for equipment to be licensed for use in the maritime services under part 80 of this chapter, except for class A, B, and S emergency position indicating radiobeacons (EPIRBS), and equipment to be licensed for use above 952 ㎒ at operational fixed stations in all services, stations in the local television transmission service and point-to-point microwave radio service under part 21 of this chapter, equipment licensed for use aboard aircraft in the aviation services under part 87 of this chapter, and equipment authorized for use in the family radio service under part 95 of this chapter.
3) From 0° to + 50° centigrade for equipment to be licensed for use in the radio broadcast Services under part 73 of this chapter.

According to §2.1055(d),

The frequency stability shall be measured with variation of primary supply Voltage as follows:

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacturer.
3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

According to §22.355,

The carrier frequency of each transmitter in the public mobile services must be maintained within the tolerances given in Table of this section.

For mobile devices operating in the 824 to 849 ㎒ B at a power level than or equal to 3 Watts, the limit specified in Table C-1 is ±2.5 ppm.

Test procedure

ANSI 63.26-2015 – Section 5.6

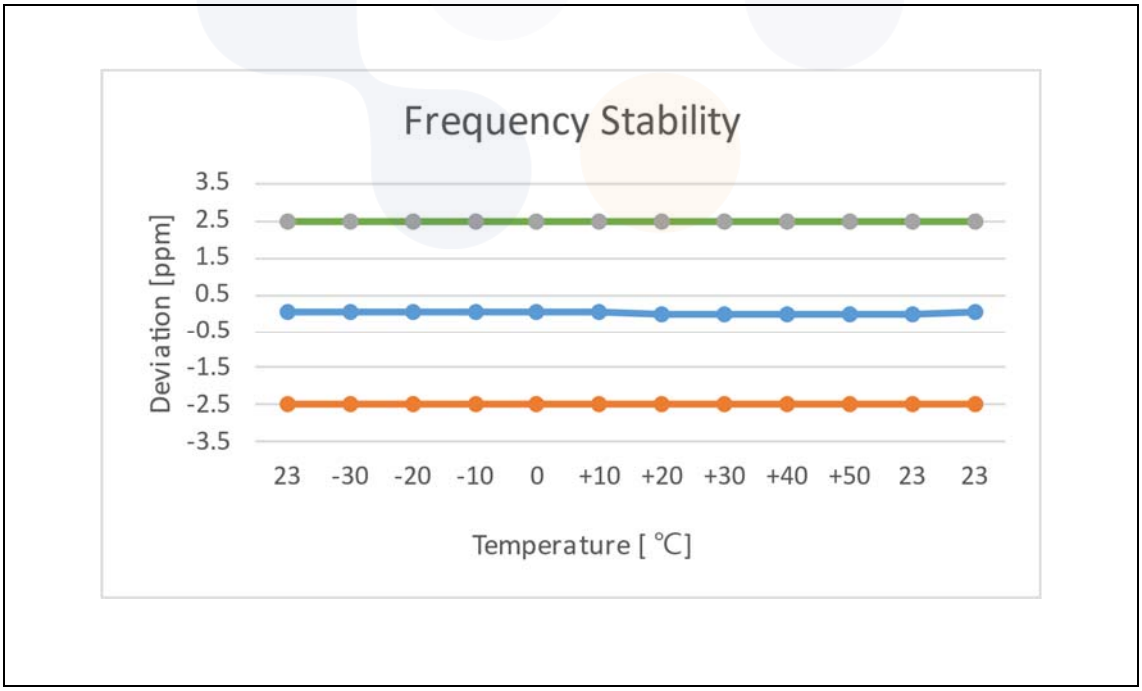
Test settings

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

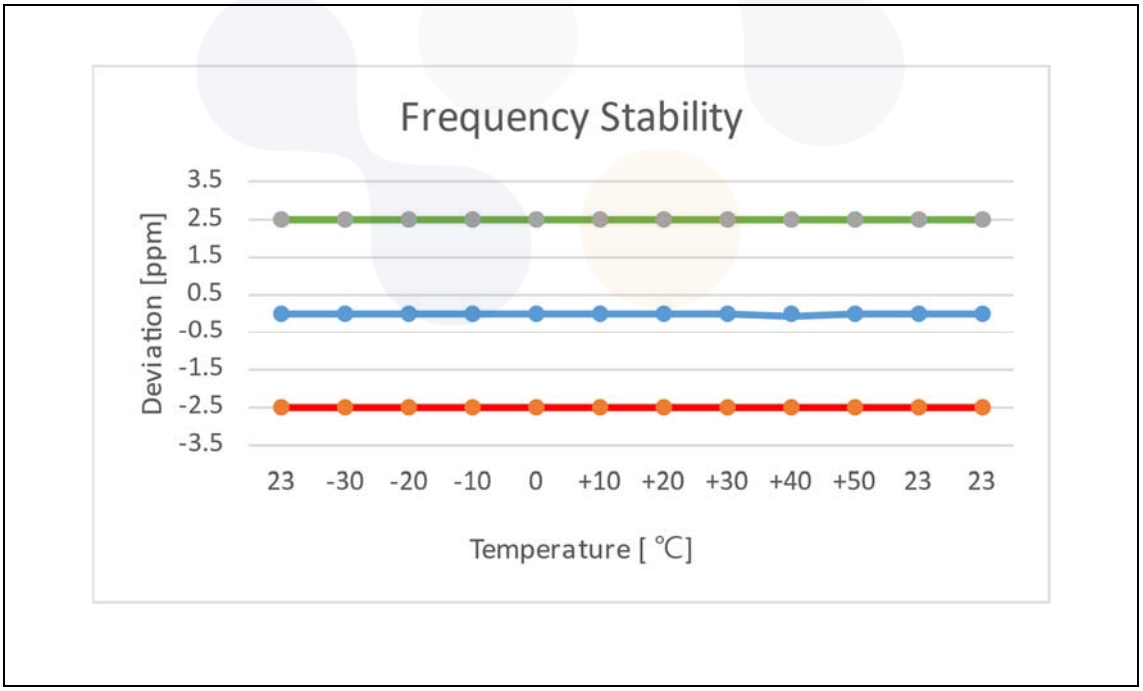
Test mode : GSM 850
Frequency (㎐) : 836 600 000
Channel : 190
Deviation limit : ±0.000 25% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,600,007	7.01	0.0	0.000001
		-30	836,600,005	4.97	0.0	0.000001
		-20	836,600,005	5.10	0.0	0.000001
		-10	836,600,008	7.69	0.0	0.000001
		0	836,600,006	6.48	0.0	0.000001
		+10	836,600,005	5.25	0.0	0.000001
		+20	836,600,002	2.24	0.0	0.000000
		+30	836,600,001	1.11	0.0	0.000000
		+40	836,600,004	3.64	0.0	0.000000
		+50	836,599,997	-3.44	0.0	0.000000
115%	4.43	+23(Ref)	836,600,003	3.26	0.0	0.000000
End point	2.75	+23(Ref)	836,600,009	8.88	0.0	0.000001



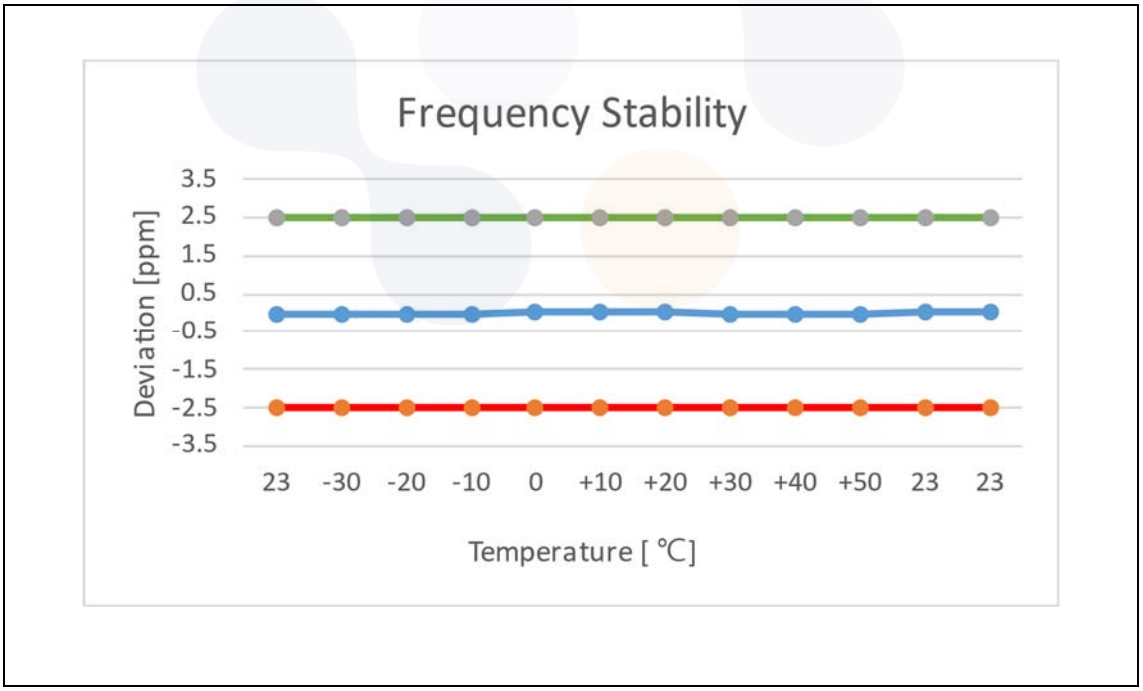
Test mode : WCDMA 850
Frequency (㎐) : 836 600 000
Channel : 4183
Deviation limit : ±0.000 25% or 2.5 ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,599,999	-1.32	0.0	0.000000
		-30	836,600,002	2.11	0.0	0.000000
		-20	836,600,004	4.01	0.0	0.000000
		-10	836,600,003	3.44	0.0	0.000000
		0	836,600,002	2.08	0.0	0.000000
		+10	836,600,001	1.19	0.0	0.000000
		+20	836,599,999	-0.85	0.0	0.000000
		+30	836,599,997	-2.64	0.0	0.000000
		+40	836,599,995	-5.04	0.0	-0.000001
		+50	836,599,997	-3.33	0.0	0.000000
115%	4.43	+23(Ref)	836,600,000	-0.25	0.0	0.000000
End point	2.75	+23(Ref)	836,599,999	-0.59	0.0	0.000000



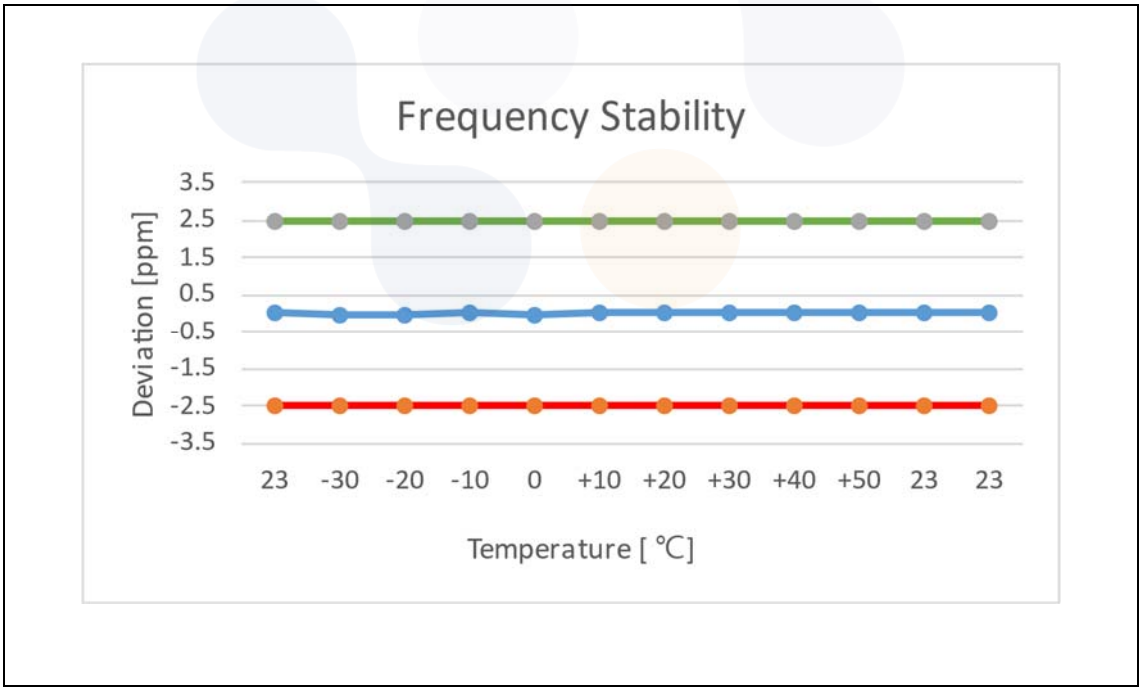
Test mode : LTE B5
Frequency (㎐) : 836 500 000
Channel : 20525
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,499,995	-5.09	0.0	-0.000001
		-30	836,499,992	-7.74	0.0	-0.000001
		-20	836,499,990	-10.09	0.0	-0.000001
		-10	836,499,995	-5.18	0.0	-0.000001
		0	836,499,998	-2.48	0.0	0.000000
		+10	836,499,999	-1.10	0.0	0.000000
		+20	836,499,997	-3.10	0.0	0.000000
		+30	836,499,995	-5.22	0.0	-0.000001
		+40	836,499,992	-8.10	0.0	-0.000001
		+50	836,499,994	-6.44	0.0	-0.000001
115%	4.43	+23(Ref)	836,499,997	-3.49	0.0	0.000000
End point	2.75	+23(Ref)	836,499,997	-2.88	0.0	0.000000



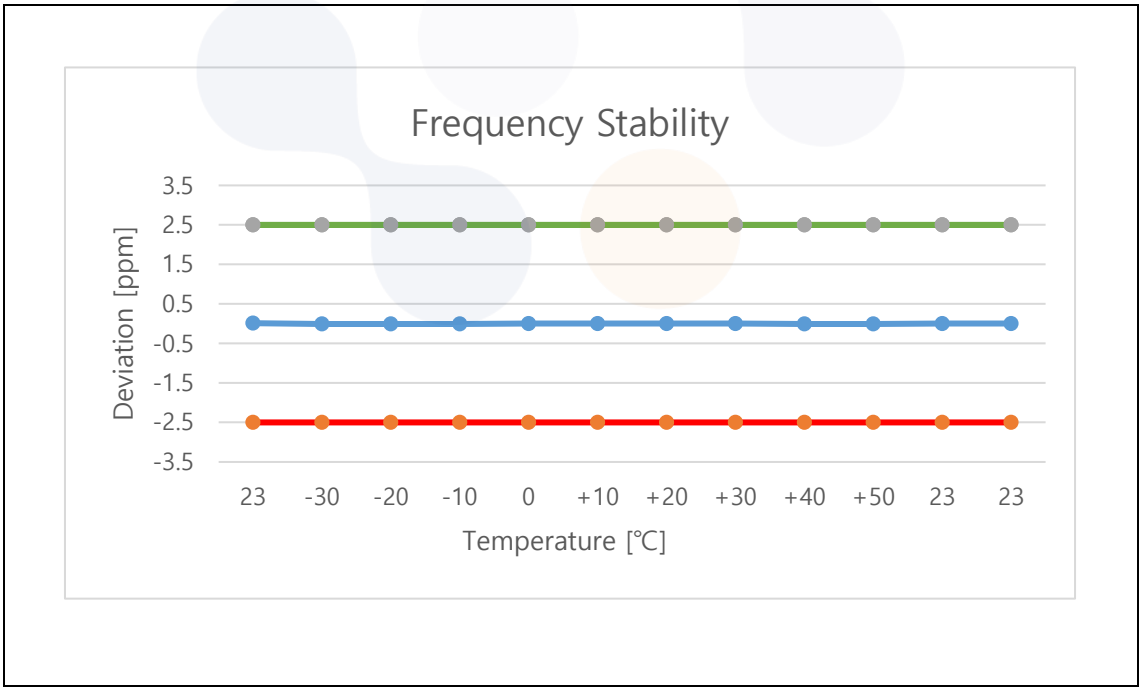
Test mode : LTE B26
Frequency (㎐) : 836 500 000
Channel : 26915
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,500,003	2.55	0.0	0.000000
		-30	836,499,992	-7.77	0.0	-0.000001
		-20	836,499,992	-8.10	0.0	-0.000001
		-10	836,499,997	-3.08	0.0	0.000000
		0	836,499,995	-5.16	0.0	-0.000001
		+10	836,500,002	1.69	0.0	0.000000
		+20	836,500,003	3.01	0.0	0.000000
		+30	836,500,005	5.31	0.0	0.000001
		+40	836,500,006	6.06	0.0	0.000001
		+50	836,500,006	5.51	0.0	0.000001
115%	4.43	+23(Ref)	836,500,000	-0.20	0.0	0.000000
End point	2.75	+23(Ref)	836,500,001	0.82	0.0	0.000000



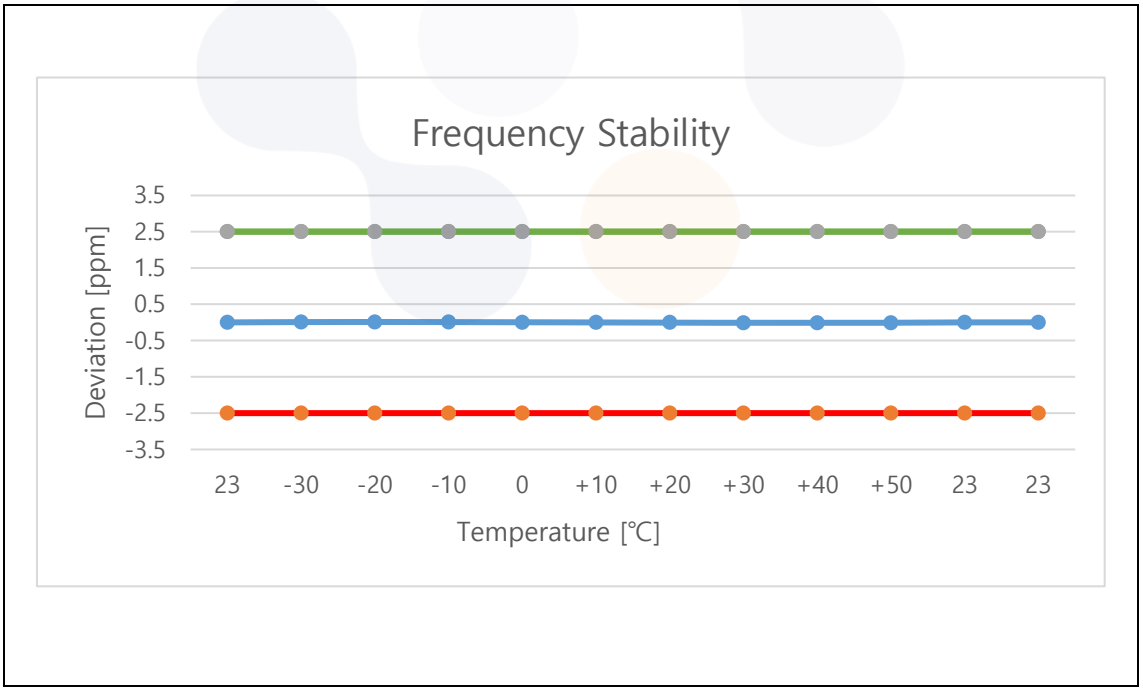
Test mode : 5G NR n5 DFT-s OFDM
Frequency (㎐) : 836 500 000
Channel : 167300
Deviation limit : ±0.00025% or 2.5ppm

Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,500,006	-5.80	0.0	0.000001
		-30	836,499,995	5.10	0.0	-0.000001
		-20	836,499,992	7.60	0.0	-0.000001
		-10	836,499,992	8.20	0.0	-0.000001
		0	836,499,997	3.30	0.0	0.000000
		+10	836,499,998	1.60	0.0	0.000000
		+20	836,500,004	-3.80	0.0	0.000000
		+30	836,500,002	-1.90	0.0	0.000000
		+40	836,499,993	7.50	0.0	-0.000001
		+50	836,499,990	10.30	0.0	-0.000001
115%	4.43	+23(Ref)	836,500,002	-2.10	0.0	0.000000
End point	2.75	+23(Ref)	836,500,003	-2.60	0.0	0.000000



Test mode : 5G NR n26 DFT-s OFDM
Frequency (㎐) : 836 500 000
Channel : 167300
Deviation limit : ±0.00025% or 2.5ppm

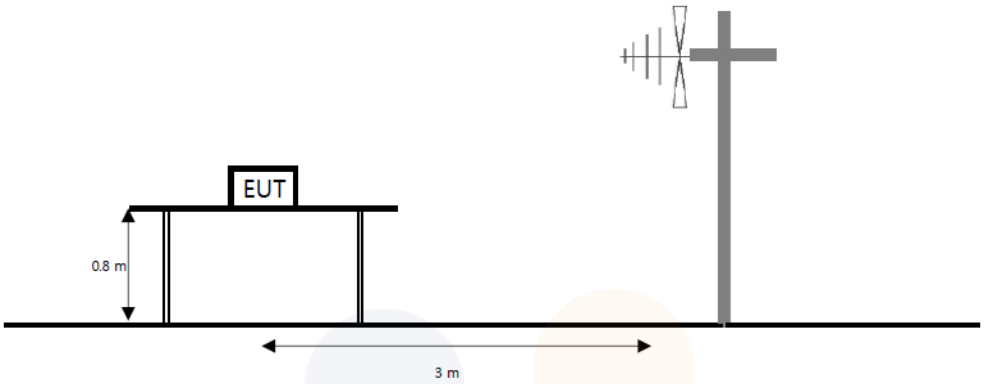
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.85	+23(Ref)	836,500,001	1.40	0.0	0.000000
		-30	836,500,011	11.30	0.0	0.000001
		-20	836,500,005	4.90	0.0	0.000001
		-10	836,500,008	8.30	0.0	0.000001
		0	836,500,004	4.10	0.0	0.000000
		+10	836,500,004	3.60	0.0	0.000000
		+20	836,499,999	-1.50	0.0	0.000000
		+30	836,499,994	-5.90	0.0	-0.000001
		+40	836,499,995	-4.70	0.0	-0.000001
		+50	836,499,992	-8.20	0.0	-0.000001
115%	4.43	+23(Ref)	836,499,997	-3.30	0.0	0.000000
End point	2.75	+23(Ref)	836,499,997	-3.00	0.0	0.000000



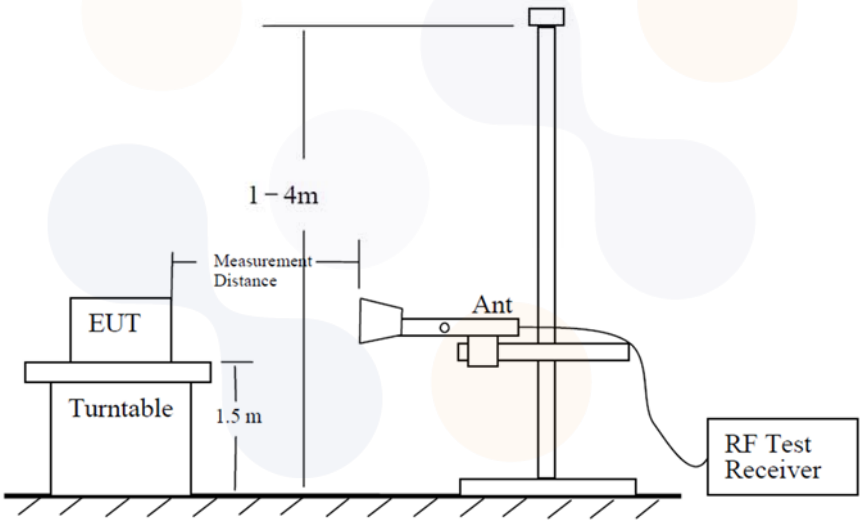
7.7. Radiated Power (ERP)

Test setup

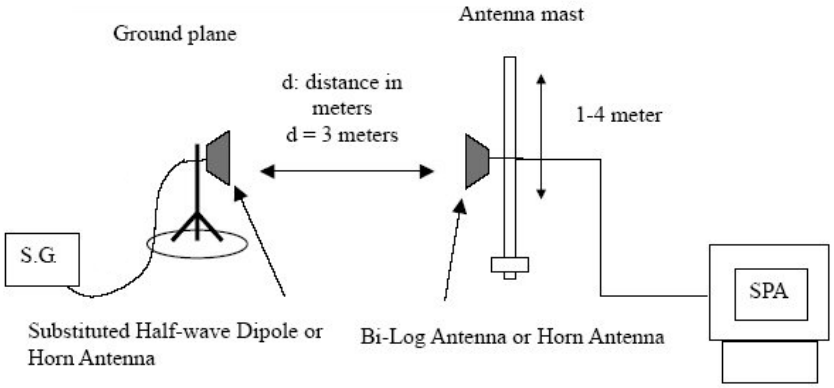
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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.

Test procedure

412172 D01 v01r01
971168 D01 v03r01 - Section 5.2 and 5.8
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 B or channel power measurement function, with the B/channel limits set equal to the OBW B edges. If the instrument does not have a B or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11) Allow trace to fully stabilize.

Notes:

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

Test results

Main Antenna

Test mode: GSM 850

Mode	Channel	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[V/H]	[dBd]	[dB]	[dB m]	[dB m]	[W]
Voice	Low	H	3.39	6.08	32.01	29.32	0.855
	Middle	H	3.45	6.20	32.41	29.66	0.925
	High	H	3.19	6.26	33.38	30.31	1.074
EDGE	Low	H	3.39	6.08	27.05	24.36	0.273
	Middle	H	3.45	6.20	27.46	24.71	0.296
	High	H	3.19	6.26	28.71	25.64	0.366

Test mode: WCDMA 850

Mode	Channel	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[V/H]	[dBd]	[dB]	[dB m]	[dB m]	[W]
RMC	Low	H	3.41	6.10	24.77	22.08	0.161
	Middle	H	3.45	6.20	25.51	22.76	0.189
	High	H	3.25	6.26	25.47	22.46	0.176

Note.

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

Test mode: LTE B5

Bandwidth [㎒]	Modulation	Channel	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
			[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4	QPSK	Low	H	3.40	6.08	25.20	22.52	0.178
		Middle	H	3.45	6.21	25.09	22.33	0.171
		High	H	3.20	6.26	24.74	21.68	0.147
	16QAM	Low	H	3.40	6.08	24.25	21.57	0.143
		Middle	H	3.45	6.21	24.26	21.50	0.141
		High	H	3.20	6.26	23.75	20.69	0.117
3	QPSK	Low	H	3.41	6.09	25.31	22.63	0.183
		Middle	H	3.45	6.21	24.93	22.17	0.165
		High	H	3.23	6.26	24.78	21.74	0.149
	16QAM	Low	H	3.41	6.09	24.27	21.59	0.144
		Middle	H	3.45	6.21	24.00	21.24	0.133
		High	H	3.23	6.26	23.77	20.73	0.118
5	QPSK	Low	H	3.42	6.11	25.26	22.56	0.180
		Middle	H	3.45	6.21	25.11	22.35	0.172
		High	H	3.26	6.26	24.82	21.81	0.152
	16QAM	Low	H	3.42	6.11	24.39	21.70	0.148
		Middle	H	3.45	6.21	24.15	21.39	0.138
		High	H	3.26	6.26	23.90	20.90	0.123
10	QPSK	Low	H	3.44	6.11	25.05	22.38	0.173
		Middle	H	3.45	6.21	25.22	22.46	0.176
		High	H	3.33	6.21	25.33	22.45	0.176
	16QAM	Low	H	3.44	6.11	24.20	21.53	0.142
		Middle	H	3.45	6.21	24.25	21.49	0.141
		High	H	3.33	6.21	24.27	21.39	0.138

Note.

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

Test mode: LTE B26

Bandwidth [㎒]	Modulation	Channel	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
			[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4	QPSK	Low	H	3.40	6.08	24.41	21.72	0.149
		Middle	H	3.45	6.21	23.92	21.16	0.131
		High	H	3.20	6.26	23.72	20.67	0.117
	16QAM	Low	H	3.40	6.08	23.54	20.86	0.122
		Middle	H	3.45	6.21	23.24	20.48	0.112
		High	H	3.20	6.26	22.77	19.71	0.094
3	QPSK	Low	H	3.41	6.09	24.35	21.67	0.147
		Middle	H	3.45	6.21	23.97	21.21	0.132
		High	H	3.23	6.26	23.74	20.71	0.118
	16QAM	Low	H	3.41	6.09	23.53	20.85	0.121
		Middle	H	3.45	6.21	23.32	20.56	0.114
		High	H	3.23	6.26	23.00	19.96	0.099
5	QPSK	Low	H	3.42	6.11	24.44	21.74	0.149
		Middle	H	3.45	6.21	24.16	21.40	0.138
		High	H	3.26	6.26	23.72	20.71	0.118
	16QAM	Low	H	3.42	6.11	23.61	20.92	0.123
		Middle	H	3.45	6.21	23.45	20.69	0.117
		High	H	3.26	6.26	22.99	19.98	0.100
10	QPSK	Low	H	3.44	6.11	24.10	21.43	0.139
		Middle	H	3.45	6.21	24.19	21.43	0.139
		High	H	3.33	6.21	24.21	21.33	0.136
	16QAM	Low	H	3.44	6.11	23.38	20.71	0.118
		Middle	H	3.45	6.21	23.44	20.68	0.117
		High	H	3.33	6.21	23.50	20.62	0.115
15	QPSK	Low	H	3.45	6.13	23.94	21.26	0.134
		Middle	H	3.45	6.21	24.11	21.35	0.136
		High	H	3.41	6.17	24.29	21.53	0.142
	16QAM	Low	H	3.45	6.13	23.28	20.60	0.115
		Middle	H	3.45	6.21	23.38	20.62	0.115
		High	H	3.41	6.17	23.38	20.61	0.115

Note.

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

Test mode: 5G NR n5 DFT-s OFDM

Bandwidth [㎒]	Modulation	Channel	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
			[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5	QPSK	Low	H	3.42	6.11	25.06	22.37	0.172
		Middle	H	3.45	6.21	24.76	22.00	0.158
		High	H	3.26	6.26	24.36	21.35	0.137
	16QAM	Low	H	3.42	6.11	24.02	21.32	0.136
		Middle	H	3.45	6.21	23.81	21.05	0.127
		High	H	3.26	6.26	23.49	20.48	0.112
10	QPSK	Low	H	3.44	6.11	24.96	22.29	0.169
		Middle	H	3.45	6.21	25.24	22.48	0.177
		High	H	3.33	6.21	25.04	22.16	0.165
	16QAM	Low	H	3.44	6.11	24.29	21.62	0.145
		Middle	H	3.45	6.21	24.23	21.47	0.140
		High	H	3.33	6.21	24.19	21.31	0.135
15	QPSK	Low	H	3.45	6.13	25.46	22.78	0.190
		Middle	H	3.45	6.21	25.69	22.93	0.196
		High	H	3.41	6.17	25.62	22.86	0.193
	16QAM	Low	H	3.45	6.13	24.40	21.72	0.149
		Middle	H	3.45	6.21	24.78	22.02	0.159
		High	H	3.41	6.17	24.63	21.87	0.154
20	QPSK	Low	H	3.45	6.19	25.51	22.77	0.189
		Middle	H	3.45	6.21	25.47	22.71	0.187
		High	H	3.45	6.16	25.44	22.73	0.187
	16QAM	Low	H	3.45	6.19	24.68	21.94	0.156
		Middle	H	3.45	6.21	24.73	21.97	0.157
		High	H	3.45	6.16	24.60	21.89	0.154

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

Test mode: 5G NR n26 DFT-s OFDM

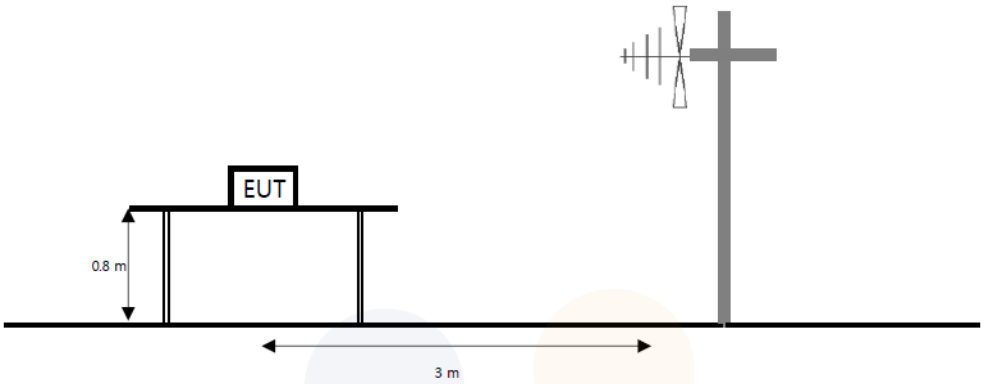
Bandwidth [㎒]	Modulation	Channel	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
			[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5	QPSK	Low	H	3.42	6.11	25.12	22.42	0.175
		Middle	H	3.45	6.21	24.99	22.23	0.167
		High	H	3.26	6.26	24.12	21.11	0.129
	16QAM	Low	H	3.42	6.11	24.10	21.40	0.138
		Middle	H	3.45	6.21	24.30	21.54	0.142
		High	H	3.26	6.26	23.26	20.26	0.106
10	QPSK	Low	H	3.44	6.11	25.03	22.36	0.172
		Middle	H	3.45	6.21	24.99	22.23	0.167
		High	H	3.33	6.21	24.98	22.10	0.162
	16QAM	Low	H	3.44	6.11	24.20	21.53	0.142
		Middle	H	3.45	6.21	24.49	21.73	0.149
		High	H	3.33	6.21	24.15	21.27	0.134
15	QPSK	Low	H	3.45	6.13	25.15	22.47	0.177
		Middle	H	3.45	6.21	25.59	22.83	0.192
		High	H	3.41	6.17	25.47	22.71	0.187
	16QAM	Low	H	3.45	6.13	24.20	21.52	0.142
		Middle	H	3.45	6.21	24.59	21.83	0.153
		High	H	3.41	6.17	24.54	21.77	0.150
20	QPSK	Low	H	3.45	6.19	25.30	22.56	0.180
		Middle	H	3.45	6.21	25.30	22.54	0.179
		High	H	3.45	6.16	25.24	22.53	0.179
	16QAM	Low	H	3.45	6.19	24.49	21.75	0.150
		Middle	H	3.45	6.21	24.53	21.77	0.150
		High	H	3.45	6.16	24.31	21.60	0.145

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

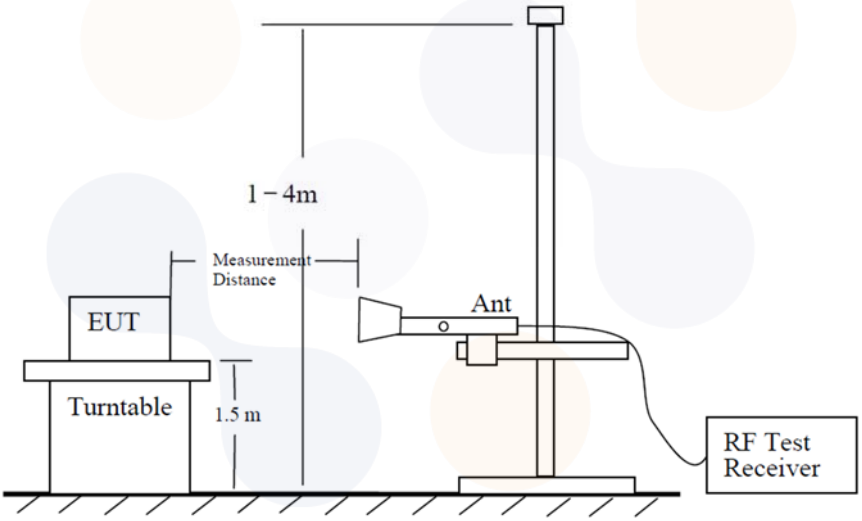
7.8. Radiated Spurious Emissions

Test setup

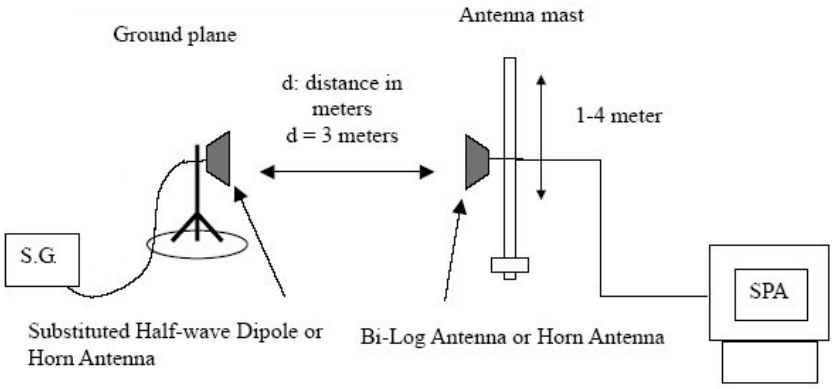
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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),

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) ㏈.

Test procedure

971168 D01 v03r01 - Section 6.2
ANSI 63.26-2015 – Section 5.5
ANSI/TIA-603-E-2016 - Section 2.2.12

Test settings

1) RBW = 100 ㎑ for below 1 ㎓ and 1 ㎒ for above 1 ㎓.
2) VBW ≥ 3 × RBW.
3) Detector = RMS
4) Trace mode = Max hold
5) Sweep time = Auto couple
6) Number of sweep points ≥ 2 × span / RBW
7) Allow trace to fully stabilize.

Notes:

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

Test results (Above 1 000 ㎒)

Main Antenna

Test mode : GSM 850
Frequency(㎒) : 824.2
Channel : 128

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
Voice	1 648.24	H	6.08	8.66	-55.42	-58.00	-13.00	45.00
	2 474.54	V	5.83	10.65	-48.38	-53.20	-13.00	40.20
	3 295.09	V	7.69	12.47	-47.22	-52.00	-13.00	39.00
	4 120.57	V	8.87	14.09	-45.88	-51.10	-13.00	38.10

Test mode : GSM 850
Frequency(㎒) : 836.6
Channel : 190

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
Voice	1 673.27	H	5.97	8.66	-54.31	-57.00	-13.00	44.00
	2 509.00	H	5.92	10.74	-49.88	-54.70	-13.00	41.70
	3 345.56	H	7.79	12.58	-47.71	-52.50	-13.00	39.50
	4 182.93	V	8.96	13.99	-45.77	-50.80	-13.00	37.80

Test mode : GSM 850
Frequency(㎒) : 848.8
Channel : 251

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
Voice	1 697.47	H	5.87	8.73	-51.34	-54.20	-13.00	41.20
	2 545.93	H	6.01	10.80	-49.11	-53.90	-13.00	40.90
	3 394.79	H	7.89	12.68	-48.31	-53.10	-13.00	40.10
	4 244.06	V	9.04	14.16	-45.88	-51.00	-13.00	38.00

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

Test mode : WCDMA 850
Frequency(㎒) : 826.4
Channel : 4132

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 651.11	H	6.07	8.60	-57.87	-60.40	-13.00	47.40
	2 479.87	H	5.85	10.66	-50.49	-55.30	-13.00	42.30
	3 304.94	H	7.71	12.49	-47.72	-52.50	-13.00	39.50
	4 130.83	H	8.88	14.11	-44.17	-49.40	-13.00	36.40

Test mode : WCDMA 850
Frequency(㎒) : 836.6
Channel : 4183

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 673.27	V	5.97	8.66	-56.91	-59.60	-13.00	46.60
	2 509.41	H	5.92	10.74	-48.98	-53.80	-13.00	40.80
	3 346.38	H	7.79	12.58	-46.71	-51.50	-13.00	38.50
	4 183.75	H	8.96	13.99	-44.77	-49.80	-13.00	36.80

Test mode : WCDMA 850
Frequency(㎒) : 846.6
Channel : 4233

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 692.55	V	5.89	8.72	-57.17	-60.00	-13.00	47.00
	2 539.77	H	6.00	10.79	-50.41	-55.20	-13.00	42.20
	3 386.99	H	7.87	12.67	-48.60	-53.40	-13.00	40.40
	4 233.40	H	9.03	14.13	-46.40	-51.50	-13.00	38.50

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 B5
Frequency(㎒) : 825.5
Channel : 20415
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 647.01	H	6.08	8.66	-60.12	-62.70	-13.00	49.70
	2 470.43	H	5.82	10.65	-50.07	-54.90	-13.00	41.90
	3 298.37	H	7.70	12.47	-48.63	-53.40	-13.00	40.40
	4 120.57	H	8.87	14.09	-45.48	-50.70	-13.00	37.70

Test mode : LTE B5
Frequency(㎒) : 836.5
Channel : 20525
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 669.57	V	5.99	8.65	-58.94	-61.60	-13.00	48.60
	2 507.36	H	5.92	10.75	-51.87	-56.70	-13.00	43.70
	3 338.99	H	7.78	12.56	-49.02	-53.80	-13.00	40.80
	4 175.14	H	8.95	13.97	-46.28	-51.30	-13.00	38.30

Test mode : LTE B5
Frequency(㎒) : 847.5
Channel : 20635
Bandwidth(㎒) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 690.91	H	5.90	8.71	-60.29	-63.10	-13.00	50.10
	2 539.77	H	6.00	10.79	-50.41	-55.20	-13.00	42.20
	3 381.25	V	7.86	12.65	-49.11	-53.90	-13.00	40.90
	4 232.99	H	9.03	14.13	-48.20	-53.30	-13.00	40.30

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 B26
Frequency(㎒) : 826.5
Channel : 26815
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 647.83	V	6.08	8.66	-59.42	-62.00	-13.00	49.00
	2 470.85	H	5.82	10.65	-50.87	-55.70	-13.00	42.70
	3 297.14	H	7.69	12.47	-48.12	-52.90	-13.00	39.90
	4 120.16	V	8.87	14.09	-44.98	-50.20	-13.00	37.20

Test mode : LTE B26
Frequency(㎒) : 836.5
Channel : 26915
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 669.16	H	5.99	8.65	-60.14	-62.80	-13.00	49.80
	2 502.44	V	5.91	10.78	-51.93	-56.80	-13.00	43.80
	3 336.53	H	7.77	12.56	-48.11	-52.90	-13.00	39.90
	4 167.34	H	8.93	13.95	-44.88	-49.90	-13.00	36.90

Test mode : LTE B26
Frequency(㎒) : 846.5
Channel : 27015
Bandwidth(㎒) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 688.04	H	5.91	8.71	-59.40	-62.20	-13.00	49.20
	2 532.80	H	5.98	10.80	-51.28	-56.10	-13.00	43.10
	3 376.33	V	7.85	12.64	-48.41	-53.20	-13.00	40.20
	4 219.86	V	9.01	14.10	-47.11	-52.20	-13.00	39.20

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

Test mode : 5G NR n5 DFT-s OFDM
Frequency(㎒) : 831.5
Channel : 166300
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 648.24	V	6.08	8.66	-51.92	-54.50	-13.00	41.50
	2 474.54	V	5.83	10.65	-40.08	-44.90	-13.00	31.90
	3 297.96	H	7.70	12.47	-38.93	-43.70	-13.00	30.70
	4 121.80	V	8.87	14.09	-35.48	-40.70	-13.00	27.70

Test mode : 5G NR n5 DFT-s OFDM
Frequency(㎒) : 836.5
Channel : 167300
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 656.44	H	6.04	8.62	-50.12	-52.70	-13.00	39.70
	2 485.62	H	5.86	10.67	-40.79	-45.60	-13.00	32.60
	3 317.66	H	7.74	12.52	-38.52	-43.30	-13.00	30.30
	4 145.19	V	8.90	14.13	-34.57	-39.80	-13.00	26.80

Test mode : 5G NR n5 DFT-s OFDM
Frequency(㎒) : 841.5
Channel : 168300
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 671.62	V	5.98	8.66	-50.82	-53.50	-13.00	40.50
	2 501.62	H	5.90	10.78	-41.02	-45.90	-13.00	32.90
	3 338.17	H	7.78	12.56	-38.62	-43.40	-13.00	30.40
	4 171.44	H	8.94	13.96	-34.98	-40.00	-13.00	27.00

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

Test mode : 5G NR n26 DFT-s OFDM
Frequency(㎒) : 831.5
Channel : 166300
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 649.47	H	6.07	8.66	-51.51	-54.10	-13.00	41.10
	2 470.85	H	5.82	10.65	-40.87	-45.70	-13.00	32.70
	3 296.32	V	7.69	12.47	-38.32	-43.10	-13.00	30.10
	4 117.70	V	8.86	14.08	-35.68	-40.90	-13.00	27.90

Test mode : 5G NR n26 DFT-s OFDM
Frequency(㎒) : 836.5
Channel : 167300
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 658.50	V	6.03	8.62	-50.81	-53.40	-13.00	40.40
	2 485.62	V	5.86	10.67	-41.19	-46.00	-13.00	33.00
	3 313.97	H	7.73	12.51	-38.62	-43.40	-13.00	30.40
	4 148.06	V	8.91	14.14	-34.07	-39.30	-13.00	26.30

Test mode : 5G NR n26 DFT-s OFDM
Frequency(㎒) : 841.5
Channel : 168300
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 667.52	V	6.00	8.65	-49.85	-52.50	-13.00	39.50
	2 501.21	H	5.90	10.78	-41.62	-46.50	-13.00	33.50
	3 339.81	H	7.78	12.56	-38.72	-43.50	-13.00	30.50
	4 167.75	V	8.93	13.95	-35.88	-40.90	-13.00	27.90

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

EN-DC Mode (Worst case) DFT-s-OFDM

Test mode	:	66A-n5A
Frequency(㎒)	:	836.5
Channel	:	167300
Bandwidth(㎒)	:	10 (LTE), 15 (NR)
RB Size/Offset		1/0 (LTE), 1/1 (NR)

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 658.00	V	6.04	8.62	-50.42	-53.00	-13.00	40.00
	2 488.30	H	5.87	10.68	-38.39	-43.20	-13.00	30.20
	3 315.84	H	7.73	12.51	-38.22	-43.00	-13.00	30.00
	4 147.71	V	8.91	14.14	-33.17	-38.40	-13.00	25.40

Note.

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

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	Agilent	N9040B	US55230151	25.07.01
Spectrum Analyzer	Agilent	N9040B	US56050101	25.12.03
Spectrum Analyzer	R&S	FSV30	100810	25.07.01
Vector Signal Generator	R&S	SMBV100A	257566	25.07.01
Signal Generator	R&S	SMB100A	176206	26.01.17*
Divider	Marki Microwave, Inc.	PD-0040	D0006	25.06.24
DC Power Supply	AGILENT	E3632A	MY40004791	25.07.01
Radio Communication Analyzer	ANRITSU	MT8000A	6261923085	25.04.25
Radio Communication Analyzer	ANRITSU	MT8821C	6261806768	26.01.16*
Wideband Radio Communication Tester	R&S	CMW500	141780	26.01.16*
Wideband Radio Communication Tester	R&S	CMW500	132423	26.02.10*
Temp & Humid Chamber	ESPEC	SH-642	93016978	26.01.16*
Bi-log Antenna	Teseq GmbH	CBL 6112D	62027	26.10.17
Bi-log Antenna	ETS-LINDGREN	3143B	00228420	25.07.20
Horn Antenna	ETS-LINDGREN	3117	00251528	26.01.21*
Horn Antenna	ETS-LINDGREN	3117	00227509	25.06.28
Horn Antenna	ETS-LINDGREN	3116C	00251516	26.01.20*
Horn Antenna	ETS-LINDGREN	3116	00086635	26.01.21*
Amplifier	SONOMA INSTRUMENT	310N	421822	25.10.10
Amplifier	B&Z Technologies	BZRT-00504000-481055-382525	26299-27735	25.06.24
Amplifier	B&Z Technologies	BZR-0050400-551028-252525	27736	25.06.24
High pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	25.07.01

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

End of test report