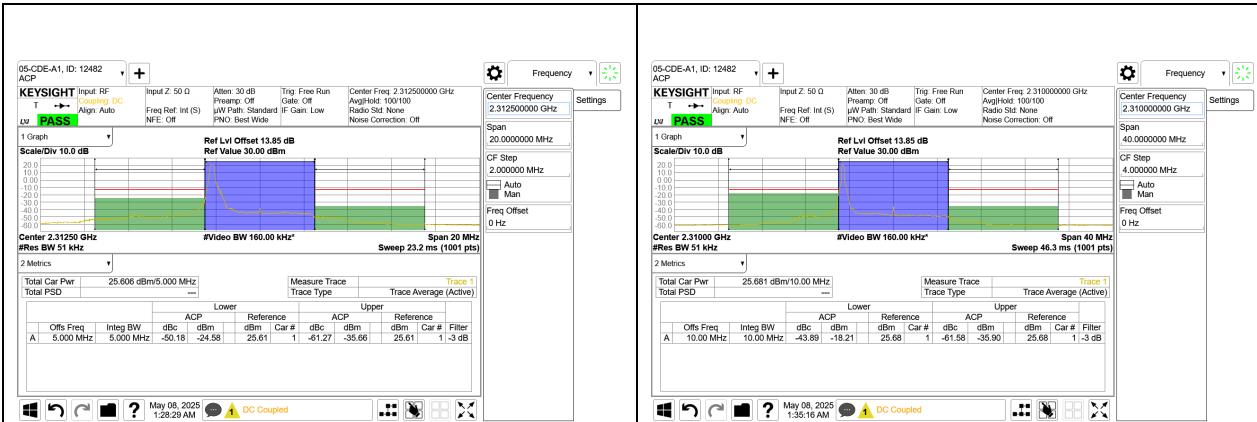




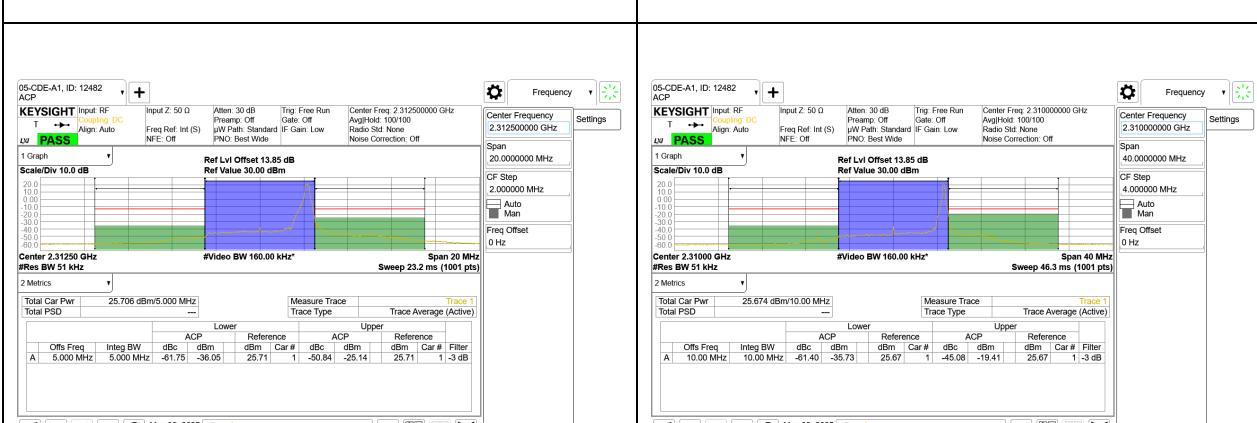


## 9.2.4. 5G NR n30 ADJACENT CHANNEL POWER

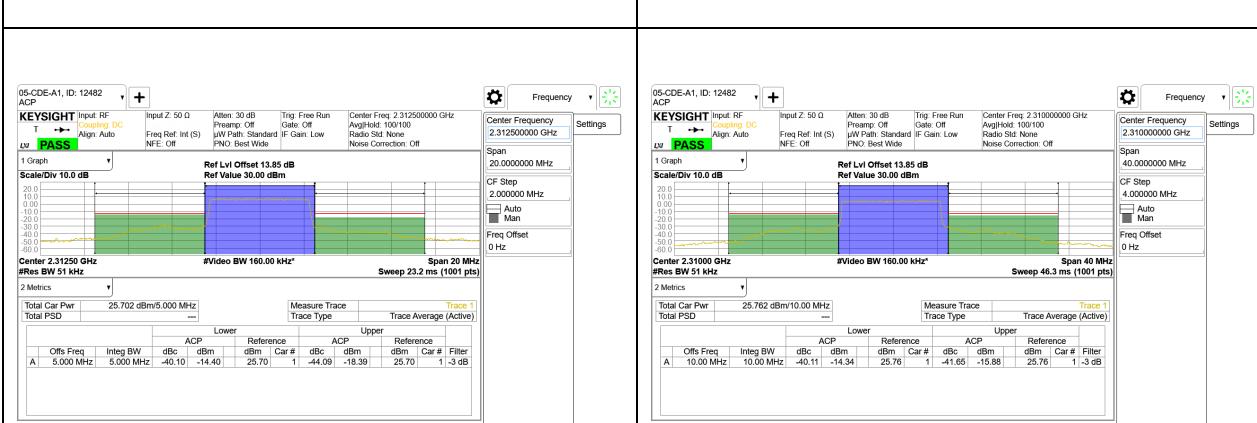




5G NR n30 5MHz BPSK High Channel RB1-0



5G NR n30 5MHz BPSK High Channel RB1-24



5G NR n30 5MHz BPSK High Channel PR25 0

## 9.3. OUT OF BAND EMISSIONS

### LIMITS

FCC: §27.53 (a)

The minimum permissible attenuation level of any spurious emissions is  $70 + 10 \log (P)$  dB where transmitting power (P) in Watts.

RSS195§5.6.2

The minimum permissible attenuation level of any spurious emissions is  $70 + 10 \log (P)$  dB where transmitting power (P) in Watts.

### TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at required limit.
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.  
(NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

### RESULTS

### 9.3.1. LTE BAND 30



### 9.3.2. 5G NR n30



## 9.4. FREQUENCY STABILITY

### LIMITS

FCC: §27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

ISED: RSS195§5.4

The applicant shall ensure frequency stability by showing that the occupied bandwidth is maintained within the range of the operating frequency blocks when testing under the temperature and supply voltage variations specified for the frequency stability measurement in RSS-Gen.

### TEST PROCEDURE

Use base station simulator with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$
- Voltage = (85% - 115%)

Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.  
End Voltage, 3.2VDC.

#### **Frequency Stability vs Temperature:**

The EUT is place inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

#### **Frequency Stability vs Voltage:**

The peak frequency error is recorded (worst-case).

### RESULTS

See the following pages.

#### 9.4.1. LTE BAND 30 (QPSK 10MHz BANDWIDTH)

Test Engineer ID:	32546	Test Date:	2025-05-02
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Band	30	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2305	2315		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage	Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)			
Normal (20°C)	Normal	2305.5224	2314.4768	Frequency Error Reading (Hz)	0.003	Yes
Extreme (50°C)		2305.5224	2314.4768		7.8	Yes
Extreme (40°C)		2305.5225	2314.4768		10.1	Yes
Extreme (30°C)		2305.5225	2314.4768		9.4	Yes
Extreme (10°C)		2305.5224	2314.4768		8.2	Yes
Extreme (0°C)		2305.5224	2314.4768		-8.4	Yes
Extreme (-10°C)		2305.5224	2314.4768		8.1	Yes
Extreme (-20°C)		2305.5224	2314.4768		8.7	Yes
Extreme (-30°C)		2305.5225	2314.4768		11.4	Yes
20°C		15%	2305.5225	11.3	0.005	Yes
		-15%	2305.5225	10.3	0.004	Yes
		End Point Voltage	2305.5225	10.6	0.005	Yes

#### 9.4.2. 5G NR n30 (BPSK 10MHz BANDWIDTH)

Test Engineer ID:	32546	Test Date:	2025-04-28
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Band	30	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2305	2315		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage	Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)			
Normal (20°C)	Normal	2305.3281	2314.2869	Frequency Error Reading (Hz)	0.003	Yes
Extreme (50°C)		2305.3281	2314.2869		-5.8	Yes
Extreme (40°C)		2305.3281	2314.2869		-5.2	Yes
Extreme (30°C)		2305.3281	2314.2869		-5.8	Yes
Extreme (10°C)		2305.3281	2314.2869		-5.5	Yes
Extreme (0°C)		2305.3281	2314.2869		-4.6	Yes
Extreme (-10°C)		2305.3281	2314.2869		-5.6	Yes
Extreme (-20°C)		2305.3281	2314.2869		-5.1	Yes
Extreme (-30°C)		2305.3281	2314.2869		-5.5	Yes
20°C		15%	2305.3281	-6.5	-0.003	Yes
		-15%	2305.3281	-5.2	-0.002	Yes
		End Point Voltage	2305.3281	-5.5	-0.002	Yes

## 9.5. PEAK-TO-AVERAGE POWER RATIO

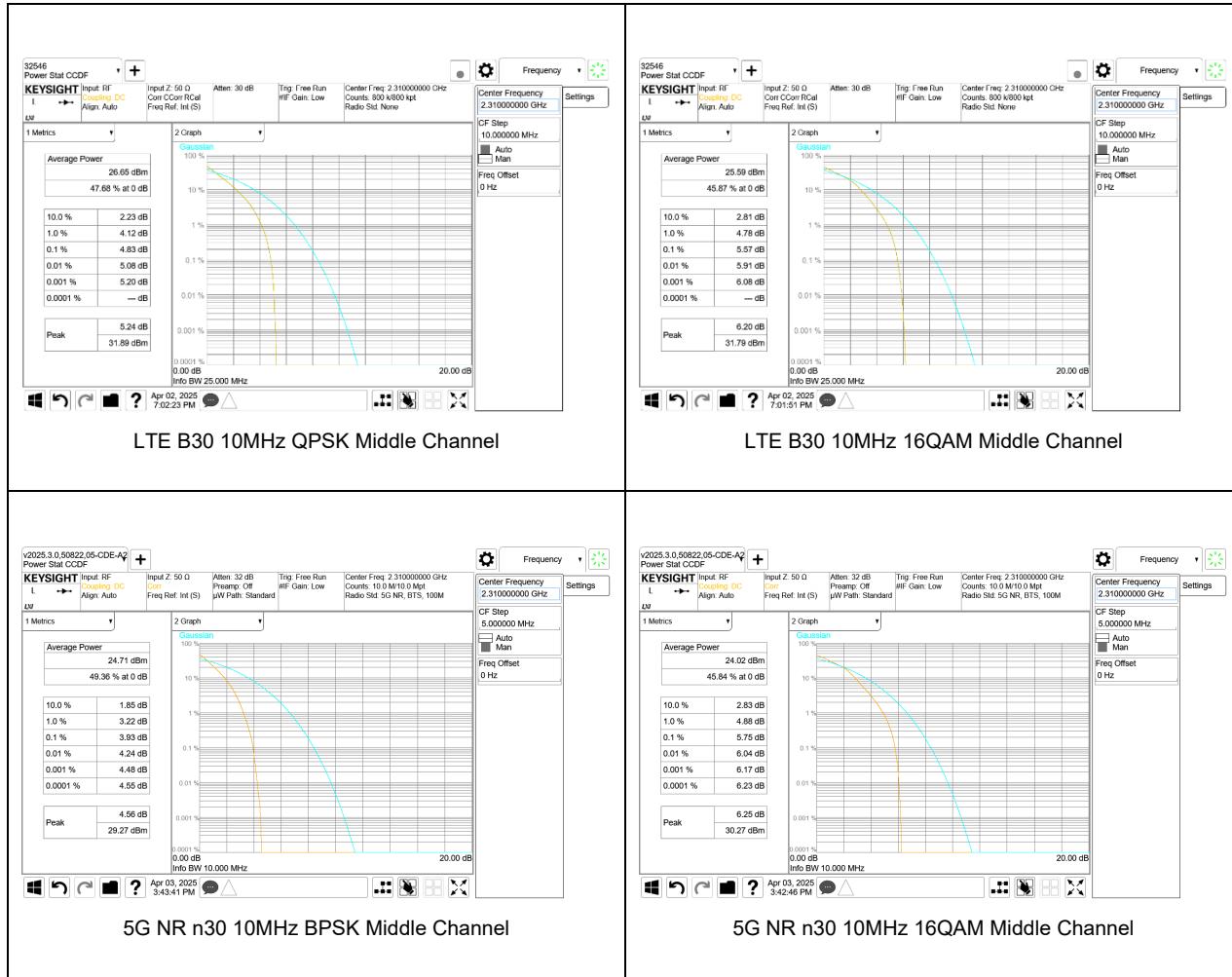
### LIMIT

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

### RESULT

Antenna 2 was used to measure as the worst case; full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

### Example Plots: FULL RB



### 9.5.1. LTE BAND 30

Test Engineer ID:	32546	Test Date:	2025-04-02
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Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
LTE Band 30	5MHz	2310.0	25	0	QPSK	31.84	26.65	5.19
					16QAM	31.76	25.59	6.17
	10MHz		50	0	QPSK	31.89	26.65	5.24
					16QAM	31.79	25.59	6.20

Duty Cycle Correction Factor (dB) = 0.00

Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor

### 9.5.2. 5G NR n30

Test Engineer ID:	50822	Test Date:	2025-04-03
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Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
5G NR n30	5MHz	2310.0	25	0	BPSK	29.37	24.64	4.73
					16QAM	29.99	23.70	6.29
	10MHz		50	0	BPSK	29.27	24.71	4.56
					16QAM	30.27	24.02	6.25

Duty Cycle Correction Factor (dB) = 0.00

Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor

## 10. RADIATED TEST RESULTS

### LIMITS

FCC: §27.53 (a)

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

RSS195§5.6

The transmitter unwanted emissions shall be measured with a resolution bandwidth of 1 MHz. A smaller resolution bandwidth is permitted provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz. However, in the 1 MHz bands immediately adjacent to the edges of the frequency range(s) in which the equipment is allowed to operate, a resolution bandwidth of as close as possible to, without being less than 1% of the occupied bandwidth, shall be employed provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz.

RSS195§5.6.2 Mobile, Portable and Low-Power Fixed Subscriber Equipment

The power of any emission outside the frequency range(s) in which the equipment operates shall be attenuated below the transmitter power,  $P(\text{dBW})$ , by the amount indicated in Table 2 and graphically represented in Figure 2, where  $p$  is the transmitter output power measured in watts.

### **Radiated measurement using the Field Strength Method**

Using the test configuration shown in Figure 6 below, the radiated emissions is measured directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement.

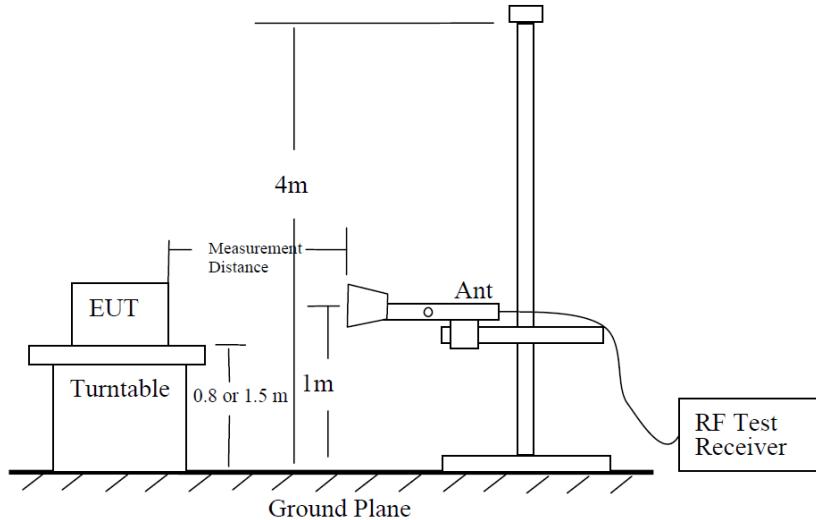


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

### **Radiated Power Measurement Calculation According to ANSI C63.26-2015**

- a)  $E (\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level } (\text{dB}\mu\text{V}) + \text{Cable Loss } (\text{dB}) + \text{Antenna Factor } (\text{dB}/\text{m})$ .
- b)  $E (\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level } (\text{dBm}) + 107 + \text{Cable Loss } (\text{dB}) + \text{Antenna Factor } (\text{dB}/\text{m})$ .
- c)  $E (\text{dB}\mu\text{V}/\text{m}) = \text{EIRP } (\text{dBm}) - 20\log(D) + 104.8$ ; where D is the measurement distance (in the far field region) in m.
- d)  $\text{EIRP } (\text{dBm}) = E (\text{dB}\mu\text{V}/\text{m}) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.

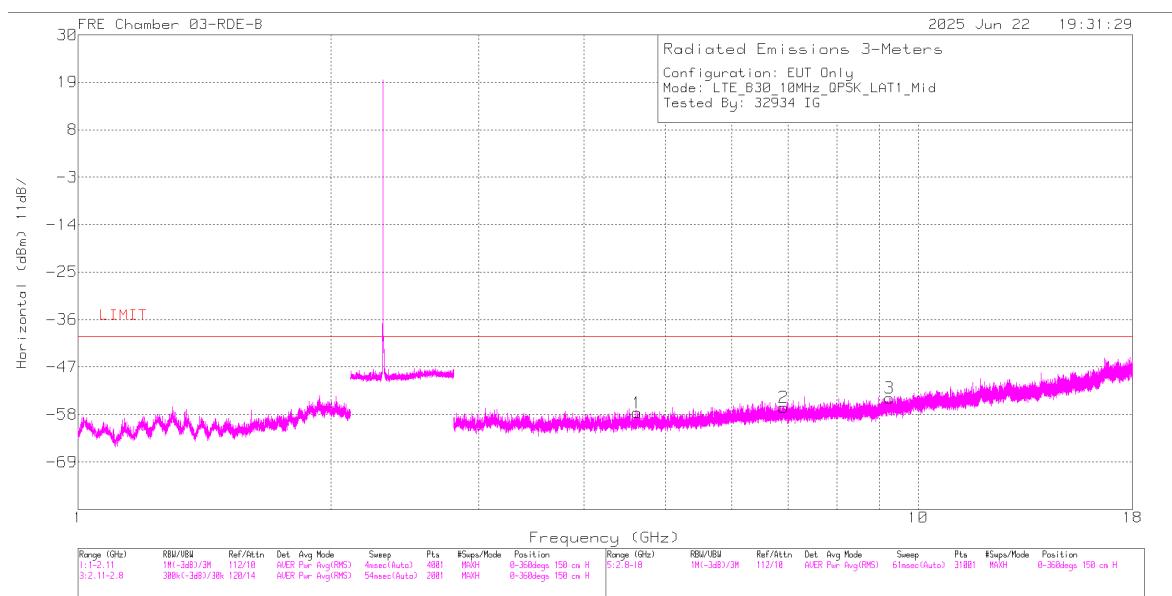
So, from d)

The measuring distance is usually at 3m, then  $20\log(3) = 9.5424$

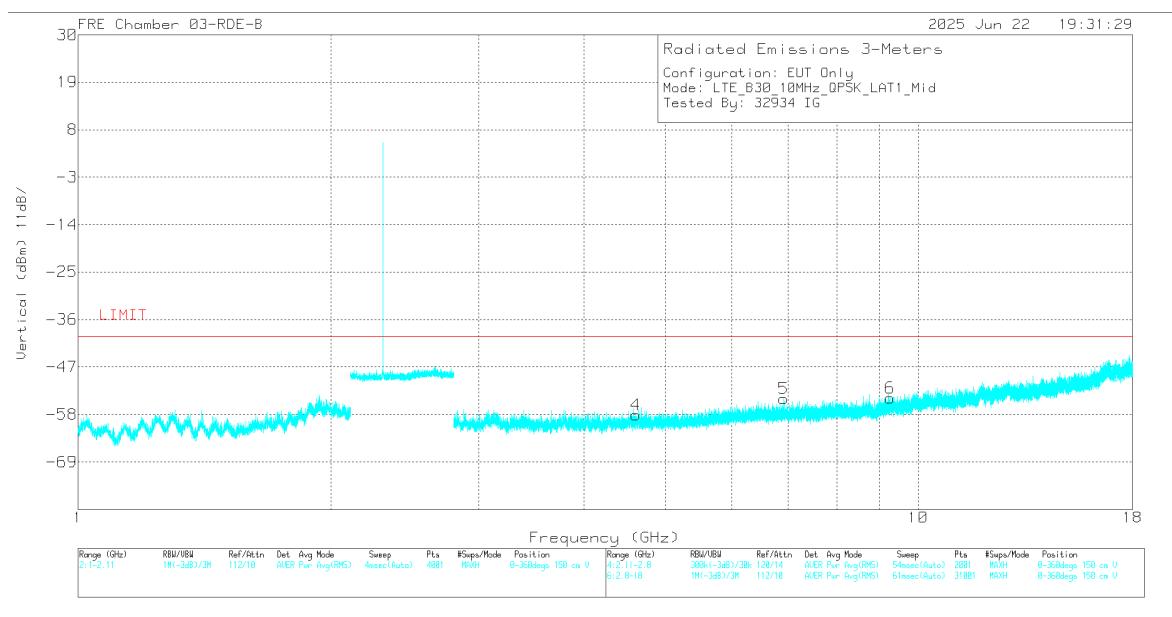
Then,  $\text{EIRP } (\text{dBm}) = E (\text{dB}\mu\text{V}/\text{m}) + 9.5424 - 104.8 = E (\text{dB}\mu\text{V}/\text{m}) - 95.2576$

Note: Confidence check of each chamber is performed daily to see if any degradation from expected/normal reading reference data. Ambient check of each chamber is performed monthly.

## Example Plot



## Horizontal Polarity



## Vertical Polarity

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
1	4.626944	52.70	RMS	33.9	-95.2	-49.00	-57.6	-40	-17.60	H
4	4.610273	52.29	RMS	33.8	-95.2	-49.00	-58.11	-40	-18.11	V
5	6.916752	52.48	RMS	35.6	-95.2	-47.20	-54.32	-40	-14.32	V
2	6.920674	50.45	RMS	35.6	-95.2	-47.20	-56.35	-40	-16.35	H
3	9.253631	51.25	RMS	36.4	-95.2	-46.60	-54.15	-40	-14.15	H
6	9.259025	51.27	RMS	36.4	-95.2	-46.70	-54.23	-40	-14.23	V

## 10.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz

### TEST PROCEDURE

KDB 971168 D01 /D02

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz

### RESULTS

## 10.1.1. LTE BAND 30

### LTE BAND 30 (QPSK 10.0MHZ BANDWIDTH, ANT 3)

Project #:	15496282
Date:	2025-06-21
Test Engineer:	111411
Configuration:	EUT Only
Mode	LTE B30 QPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
Mid Channel, 2310MHz									
4.645576	53.42	RMS	33.9	-95.2	-49.10	-56.98	-40	-16.98	H
4.624492	51.96	RMS	33.9	-95.2	-49.10	-58.44	-40	-18.44	V
9.198225	50.57	RMS	36.3	-95.2	-45.90	-54.23	-40	-14.23	V
6.979023	50.95	RMS	35.6	-95.2	-47.70	-56.35	-40	-16.35	H
6.986868	50.56	RMS	35.6	-95.2	-47.70	-56.74	-40	-16.74	V
9.266380	51.29	RMS	36.4	-95.2	-46.66	-54.17	-40	-14.17	H

### LTE BAND 30 (QPSK 10.0MHZ BANDWIDTH, ANT 2)

Project #:	15496282
Date:	2025-06-21
Test Engineer:	111411
Configuration:	EUT Only
Mode	LTE B30 QPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
Mid Channel, 2310MHz									
4.642634	52.60	RMS	33.9	-95.2	-49.10	-57.80	-40	-17.80	H
4.619098	52.85	RMS	33.8	-95.2	-49.09	-57.64	-40	-17.64	V
6.92852	50.51	RMS	35.6	-95.2	-47.25	-56.34	-40	-16.34	H
6.937345	50.32	RMS	35.6	-95.2	-47.40	-56.68	-40	-16.68	V
9.225193	50.17	RMS	36.3	-95.2	-46.20	-54.93	-40	-14.93	V
9.228135	51.06	RMS	36.4	-95.2	-46.30	-54.04	-40	-14.04	H

**LTE BAND 30 (QPSK 10.0MHZ BANDWIDTH, ANT 1)**

Project #:	15496282
Date:	2025-06-22
Test Engineer:	32934
Configuration:	EUT Only
Mode	LTE B30 QPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT (dB/m)	Margin (dB)	Polarity
<b>Mid Channel, 2310MHz</b>									
4.626944	52.70	RMS	33.9	-95.2	-49.00	-57.6	-40	-17.60	H
4.610273	52.29	RMS	33.8	-95.2	-49.00	-58.11	-40	-18.11	V
6.916752	52.48	RMS	35.6	-95.2	-47.20	-54.32	-40	-14.32	V
6.920674	50.45	RMS	35.6	-95.2	-47.20	-56.35	-40	-16.35	H
9.253631	51.25	RMS	36.4	-95.2	-46.60	-54.15	-40	-14.15	H
9.259025	51.27	RMS	36.4	-95.2	-46.70	-54.23	-40	-14.23	V

**LTE BAND 30 (QPSK 10.0MHZ BANDWIDTH, ANT 4)**

Project #:	15496282
Date:	2025-06-21
Test Engineer:	111411
Configuration:	EUT Only
Mode	LTE B30 QPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
<b>Mid Channel, 2310MHz</b>									
4.639692	52.68	RMS	33.9	-95.2	-49.5	-58.12	-40	-18.12	H
4.655873	52.24	RMS	33.9	-95.2	-49.5	-58.56	-40	-18.56	V
6.954997	51.35	RMS	35.6	-95.2	-47.8	-56.05	-40	-16.05	V
6.975591	51.38	RMS	35.6	-95.2	-47.9	-56.12	-40	-16.12	H
9.256083	51.21	RMS	36.4	-95.2	-46.8	-54.39	-40	-14.39	H
9.297270	50.94	RMS	36.4	-95.2	-47.2	-55.06	-40	-15.06	V

## 10.1.2. 5G NR n30

### 5G NR n30 (BPSK 10.0MHZ BANDWIDTH, ANT 3)

Project #:	15496282
Date:	2025-06-21
Test Engineer:	111411
Configuration:	EUT Only
Mode	5G NR n30 BPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
<b>Mid Channel, 2310MHz</b>									
4.625473	53.06	RMS	33.9	-95.2	-49.05	-57.29	-40	-17.29	H
4.648027	51.99	RMS	34.0	-95.2	-49.20	-58.41	-40	-18.41	V
9.190870	50.42	RMS	36.3	-95.2	-46.11	-54.59	-40	-14.59	V
6.899100	50.76	RMS	35.6	-95.2	-47.11	-55.95	-40	-15.95	V
6.925087	50.89	RMS	35.6	-95.2	-47.20	-55.91	-40	-15.91	H
9.203128	50.23	RMS	36.3	-95.2	-46.20	-54.87	-40	-14.87	H

### 5G NR n30 (BPSK 10.0MHZ BANDWIDTH, ANT 2)

Project #:	15496282
Date:	2025-06-21
Test Engineer:	32934
Configuration:	EUT Only
Mode	5G NR n30 BPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
<b>Mid Channel, 2310MHz</b>									
4.651950	53.95	RMS	34.0	-95.2	-49.21	-56.46	-40	-16.46	H
4.644595	52.54	RMS	33.9	-95.2	-49.10	-57.86	-40	-17.86	V
9.195283	50.19	RMS	36.3	-95.2	-45.90	-54.61	-40	-14.61	V
6.961862	50.37	RMS	35.6	-95.2	-47.59	-56.82	-40	-16.82	H
6.967746	51.35	RMS	35.6	-95.2	-47.60	-55.85	-40	-15.85	V
9.237941	51.09	RMS	36.4	-95.2	-46.50	-54.21	-40	-14.21	H

**5G NR n30 (BPSK 10.0MHZ BANDWIDTH, ANT 1)**

Project #:	15496282
Date:	2025-06-21
Test Engineer:	111411
Configuration:	EUT Only
Mode	5G NR n30 BPSK 10MHz
Chamber #:	03-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	223084 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
<b>Mid Channel, 2310MHz</b>									
4.604879	52.72	RMS	33.8	-95.2	-49.01	-57.69	-40	-17.69	H
4.584285	52.64	RMS	33.8	-95.2	-48.90	-57.66	-40	-17.66	V
6.942249	51.53	RMS	35.6	-95.2	-47.40	-55.47	-40	-15.47	H
6.955487	50.80	RMS	35.6	-95.2	-47.50	-56.30	-40	-16.30	V
9.239412	50.36	RMS	36.4	-95.2	-46.46	-54.90	-40	-14.90	V
9.254122	51.20	RMS	36.4	-95.2	-46.59	-54.19	-40	-14.19	H

**5G NR n30 (BPSK 10.0MHZ BANDWIDTH, ANT 4)**

Project #:	15496282
Date:	2025-06-21
Test Engineer:	111411
Configuration:	EUT Only
Mode	5G NR n30 BPSK 10MHz
Chamber #:	05-RDE-B

Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT(dB/m)	Margin (dB)	Polarity
<b>Mid Channel, 2310MHz</b>									
4.594582	53.45	RMS	33.8	-95.2	-49.00	-56.95	-40	-16.95	H
4.586737	52.02	RMS	33.8	-95.2	-48.97	-58.35	-40	-18.35	V
6.891745	51.61	RMS	35.6	-95.2	-47.27	-55.26	-40	-15.26	V
6.918223	51.10	RMS	35.6	-95.2	-47.20	-55.70	-40	-15.70	H
9.238431	50.34	RMS	36.4	-95.2	-46.50	-54.96	-40	-14.96	V
9.264418	51.92	RMS	36.4	-95.2	-46.80	-53.68	-40	-13.68	H

## 11. SETUP PHOTOS

Refer to 15496282-EP1V1 for setup photos.

**END OF REPORT**