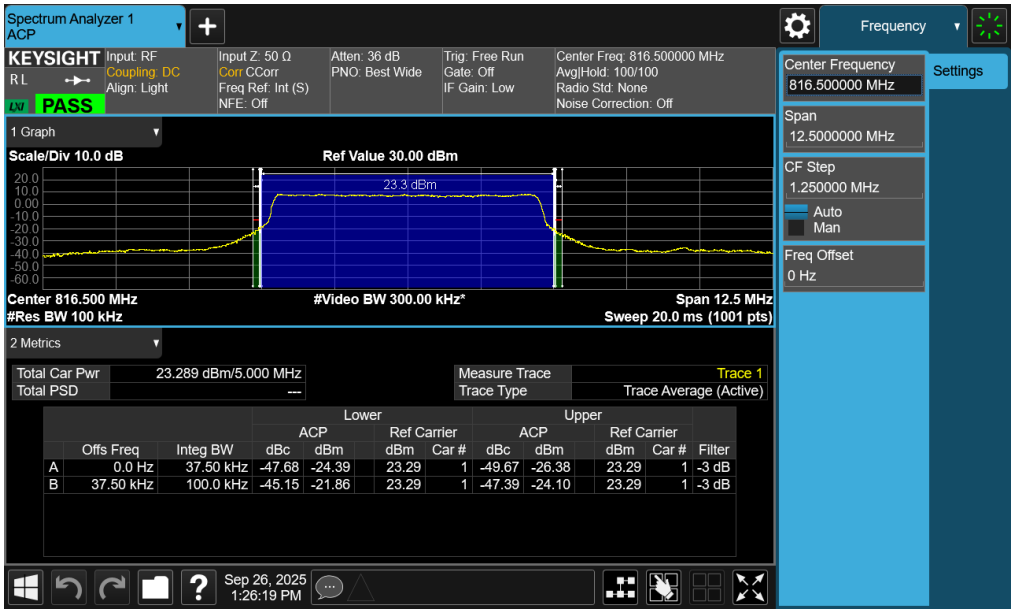
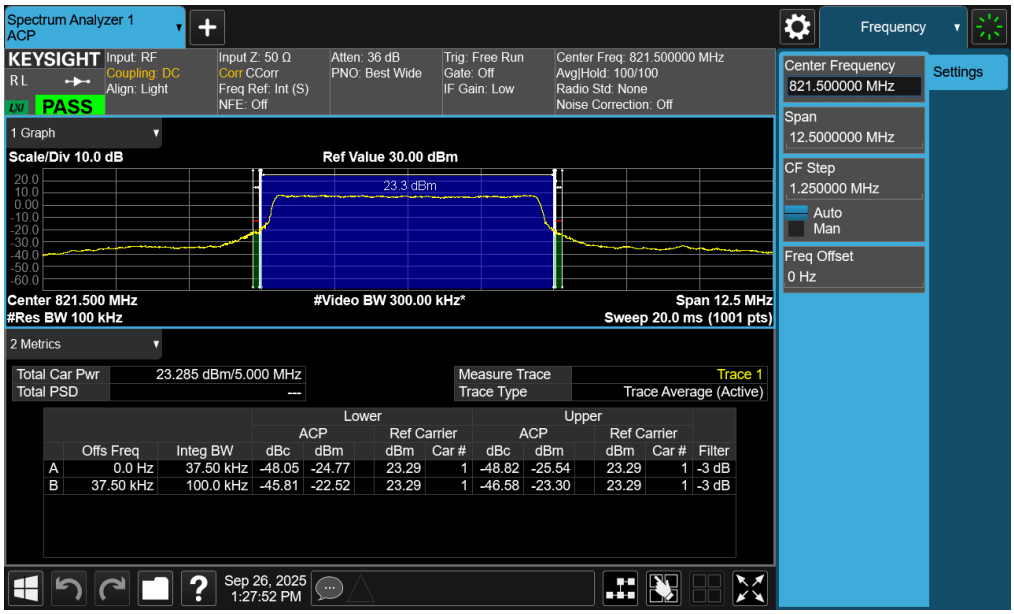
NR Band n26 - Ant 1



Plot 7-77. Channel Edge Plot (NR Band n26 - 5MHz BPSK - Low Channel)

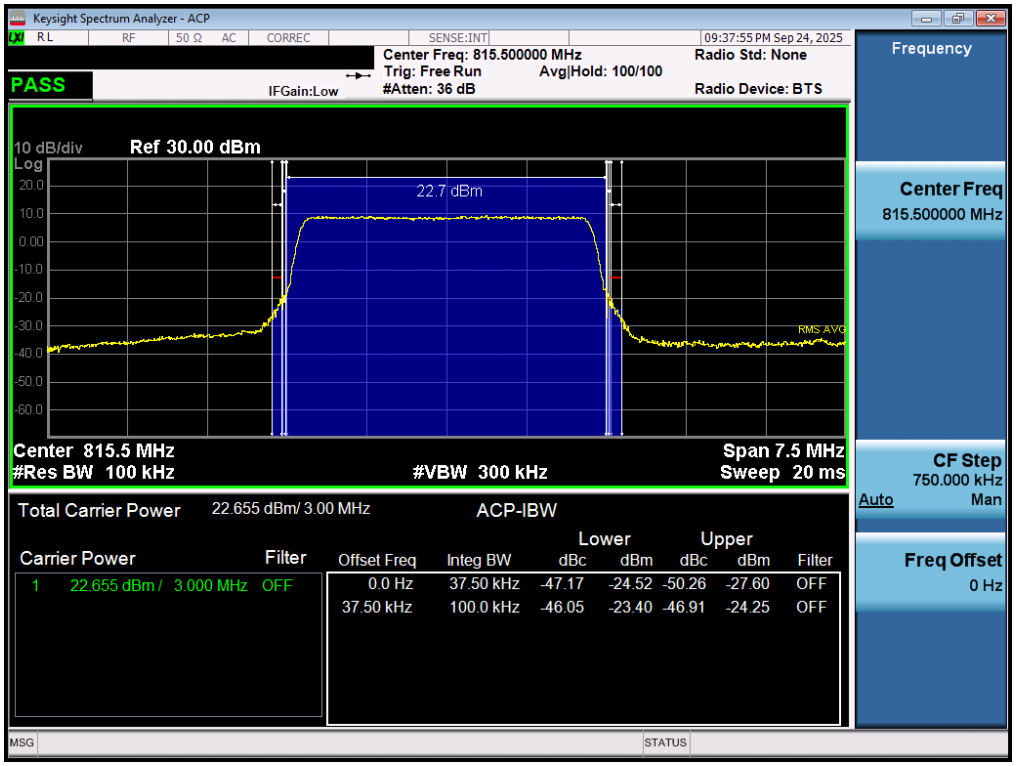


Plot 7-78. Channel Edge Plot (NR Band n26 - 5MHz BPSK - High Channel)

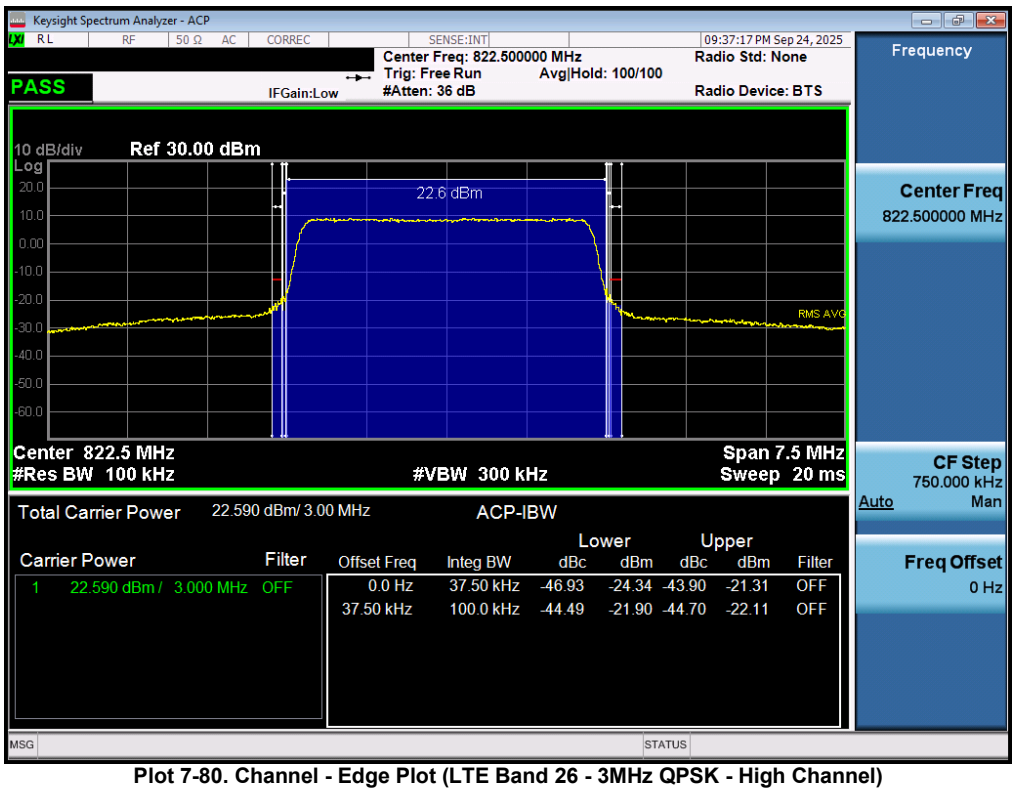
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
LTE-B26	15 MHz	Mid	Band Edge	-37.13	-20	-17.13
	10 MHz	Mid	Band Edge	-31.62	-20	-11.62
	5 MHz	Low	Band Edge	-26.06	-20	-6.06
		High	Band Edge	-25.27	-20	-5.27
	3 MHz	Low	Band Edge	-24.52	-20	-4.52
		High	Band Edge	-21.31	-20	-1.31
	1.4 MHz	Low	Band Edge	-22.27	-20	-2.27
		High	Band Edge	-23.92	-20	-3.92
NR-n26	20 MHz	Mid	Band Edge	-35.81	-20	-15.81
	15 MHz	Mid	Band Edge	-35.31	-20	-15.31
	10 MHz	Mid	Band Edge	-30.31	-20	-10.31
	5 MHz	Low	Band Edge	-24.34	-20	-4.34
		High	Band Edge	-24.86	-20	-4.86

Table 7-11. Band Edge Test Results – Ant 2

LTE Band 26 – Ant 2

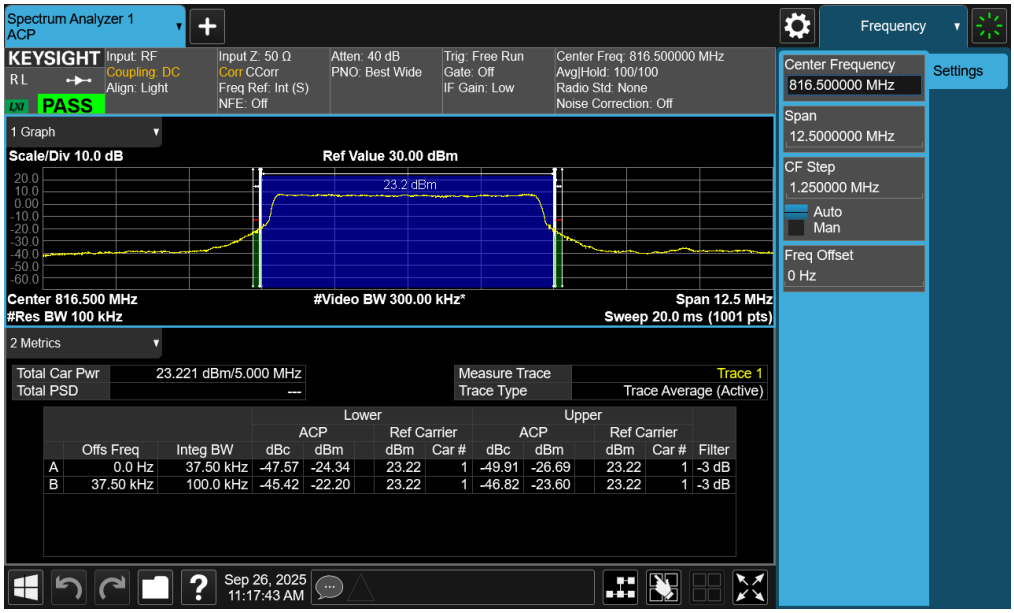


Plot 7-79. Channel - Edge Plot (LTE Band 26 - 3MHz QPSK - Low Channel)

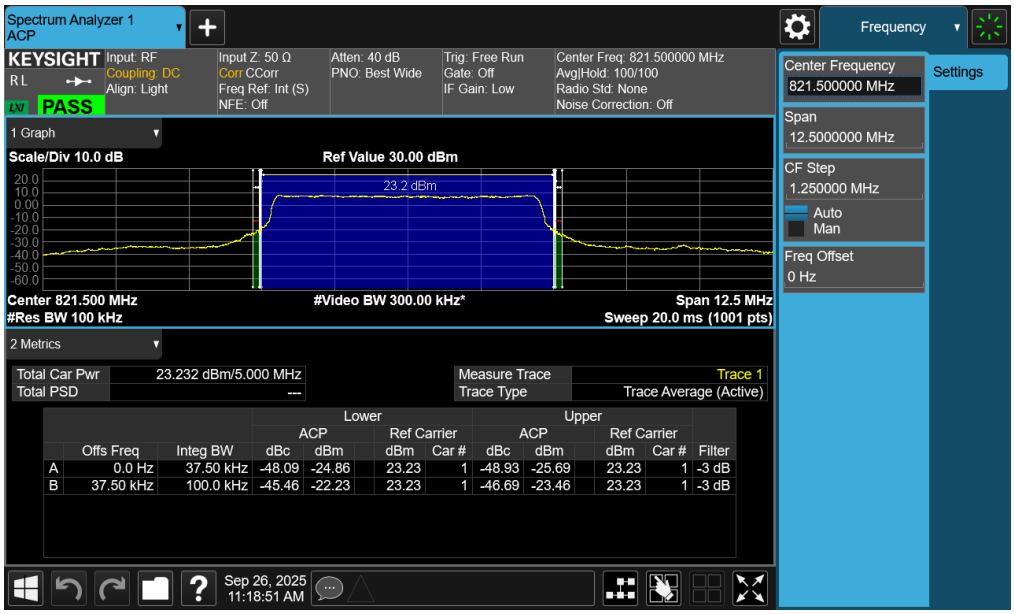


Plot 7-80. Channel - Edge Plot (LTE Band 26 - 3MHz QPSK - High Channel)

NR Band n26 - Ant 2



Plot 7-81. Channel Edge Plot (NR Band n26 - 5MHz BPSK - Low Channel)



Plot 7-82. Channel Edge Plot (NR Band n26 - 5MHz BPSK - High Channel)

7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.2.4.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

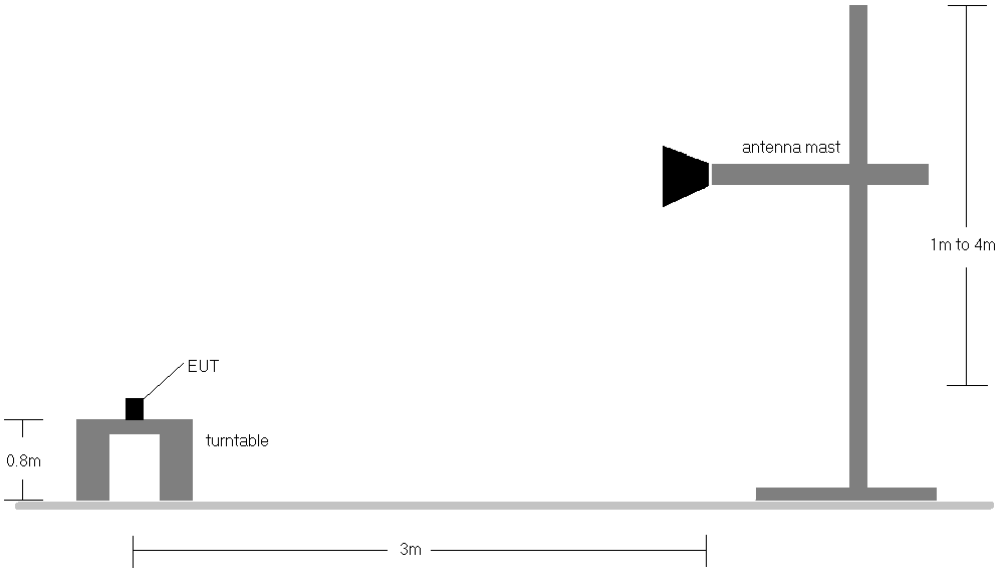


Figure 7-5. Radiated Test Setup <1GHz

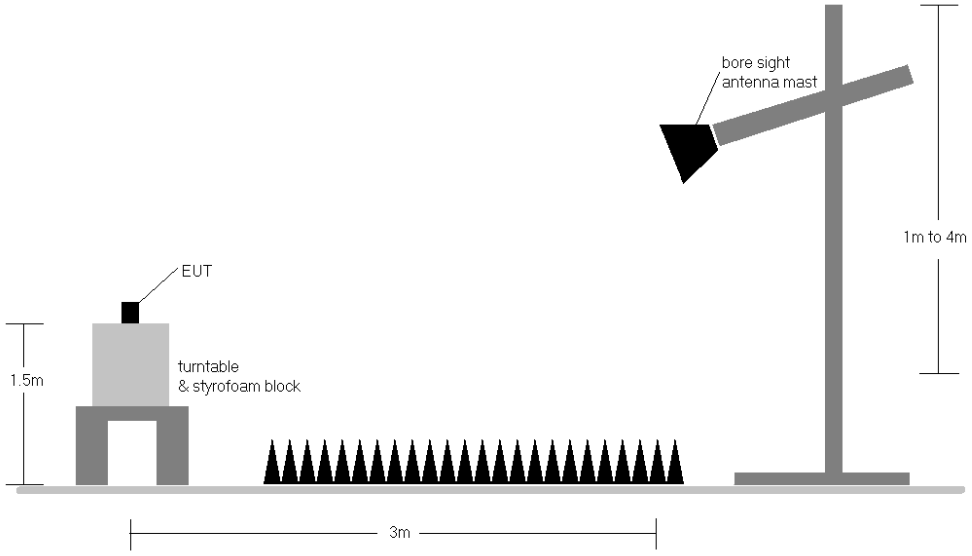


Figure 7-6. Radiated Test Setup > 1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
15 MHz	QPSK	821.50	H	390	280	1.24	1 / 74	17.98	**17.07**	0.051	38.45	-21.38	19.22	0.084	40.61	-21.39
	16-QAM	821.50	H	390	280	1.24	1 / 74	16.83	15.92	0.039	38.45	-22.53	18.07	0.064	40.61	-22.54
15 MHz	QPSK	816.50	V	130	229	1.24	1 / 74	16.63	15.72	0.037	38.45	-22.73	17.87	0.061	40.61	-22.74
	QPSK (WCP)	821.50	H	395	281	1.24	1 / 74	16.76	15.85	0.038	38.45	-22.60	18.00	0.063	40.61	-22.61

Table 7-12. ERP Data (LTE Band 26 – Ant 1)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	824.00	V	133	231	1.09	1 / 104	19.24	18.18	0.066	38.45	-20.27	20.33	0.108	40.61	-20.28
	QPSK	824.00	V	133	231	1.09	1 / 104	19.18	18.12	0.065	38.45	-20.33	20.27	0.106	40.61	-20.34
	16-QAM	824.00	V	133	231	1.09	1 / 104	18.05	16.99	0.050	38.45	-21.46	19.14	0.082	40.61	-21.47
15 MHz	π/2 BPSK	821.50	V	221	238	1.04	1 / 39	19.24	18.13	0.065	38.45	-20.32	20.28	0.107	40.61	-20.33
	QPSK	821.50	V	221	238	1.04	1 / 39	19.16	18.04	0.064	38.45	-20.41	20.19	0.105	40.61	-20.41
	16-QAM	821.50	V	221	238	1.04	1 / 39	18.03	16.91	0.049	38.45	-21.54	19.06	0.081	40.61	-21.54
20 MHz	QPSK (CP-OFDM)	824.00	V	230	234	1.34	1 / 104	17.85	17.04	0.051	38.45	-21.41	19.19	0.083	40.61	-21.42
	QPSK (Opp. Pol.)	824.00	H	128	238	1.34	1 / 104	18.48	17.67	0.058	38.45	-20.78	19.82	0.096	40.61	-20.79
	QPSK (WCP)	824.00	V	229	237	1.34	1 / 104	15.81	15.00	0.032	38.45	-23.45	17.15	0.052	40.61	-23.46

Table 7-13. ERP Data (NR Band n26 – Ant 1)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
15 MHz	QPSK	821.50	H	218	231	1.30	1 / 74	23.45	**22.60**	0.182	38.45	-15.85	24.75	0.298	40.61	-15.86
	16-QAM	821.50	H	218	231	1.30	1 / 74	22.69	21.84	0.153	38.45	-16.61	23.99	0.250	40.61	-16.62
15 MHz	QPSK	816.50	V	126	284	1.04	1/74	19.69	18.58	0.072	38.45	-19.87	20.73	0.118	40.61	-19.88
	QPSK (WCP)	821.50	H	218	237	1.30	1/74	22.78	21.93	0.156	38.45	-16.52	24.08	0.256	40.61	-16.53

Table 7-14. ERP Data (LTE Band 26 – Ant 2)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	824.00	V	130	231	1.09	1 / 104	20.77	19.71	0.094	38.45	-18.74	21.86	0.153	40.61	-18.75
	QPSK	824.00	V	130	231	1.09	1 / 104	20.67	19.61	0.091	38.45	-18.84	21.76	0.150	40.61	-18.85
	16-QAM	824.00	V	130	231	1.09	1 / 104	19.76	18.70	0.074	38.45	-19.75	20.85	0.122	40.61	-19.76
15 MHz	π/2 BPSK	821.50	V	130	231	1.04	1 / 1	20.90	**19.79**	0.095	38.45	-18.66	21.94	0.156	40.61	-18.67
	QPSK	821.50	V	130	231	1.04	1 / 1	20.49	19.38	0.087	38.45	-19.07	21.53	0.142	40.61	-19.08
	16-QAM	821.50	V	130	231	1.04	1 / 1	19.73	18.61	0.073	38.45	-19.84	20.76	0.119	40.61	-19.84
20 MHz	QPSK (CP-OFDM)	824.00	V	127	231	1.09	1 / 104	19.28	18.22	0.066	38.45	-20.23	20.37	0.109	40.61	-20.24
	QPSK (Opp. Pol.)	824.00	H	222	279	1.34	1 / 53	20.15	19.34	0.086	38.45	-19.11	21.49	0.141	40.61	-19.12
	QPSK (WCP)	824.00	V	130	226	1.09	1 / 104	18.08	17.02	0.050	38.45	-21.43	19.17	0.083	40.61	-21.44

Table 7-15. ERP Data (NR Band n26 – Ant 2)

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

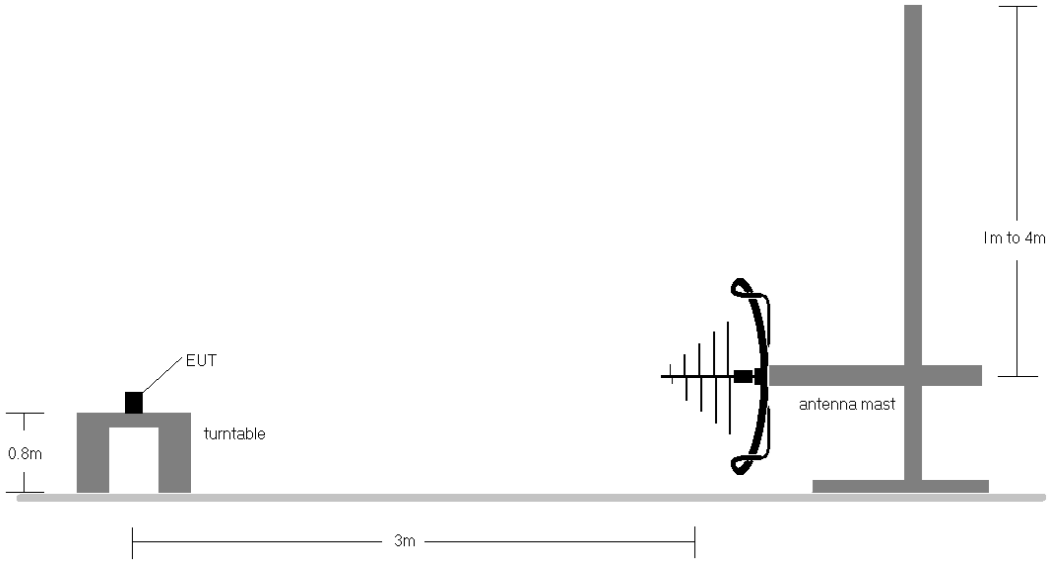


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

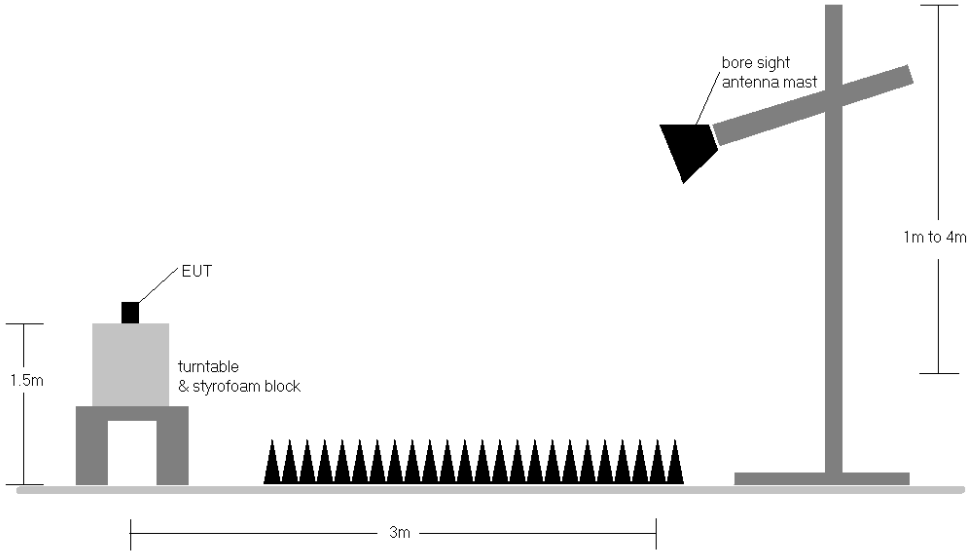


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

3) This unit was tested with its standard battery.

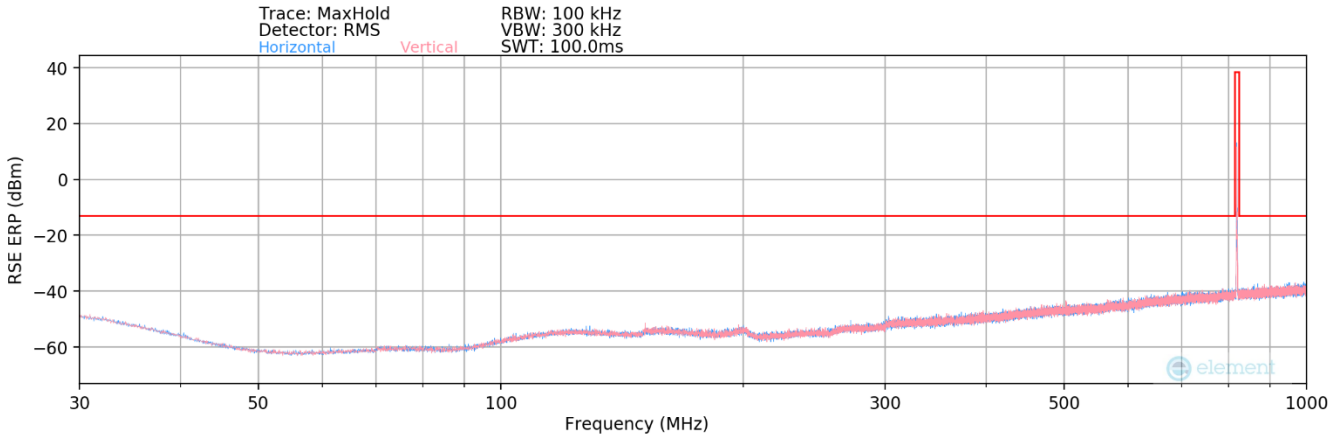
4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.

6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

7) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

LTE Band 26 – Ant 1

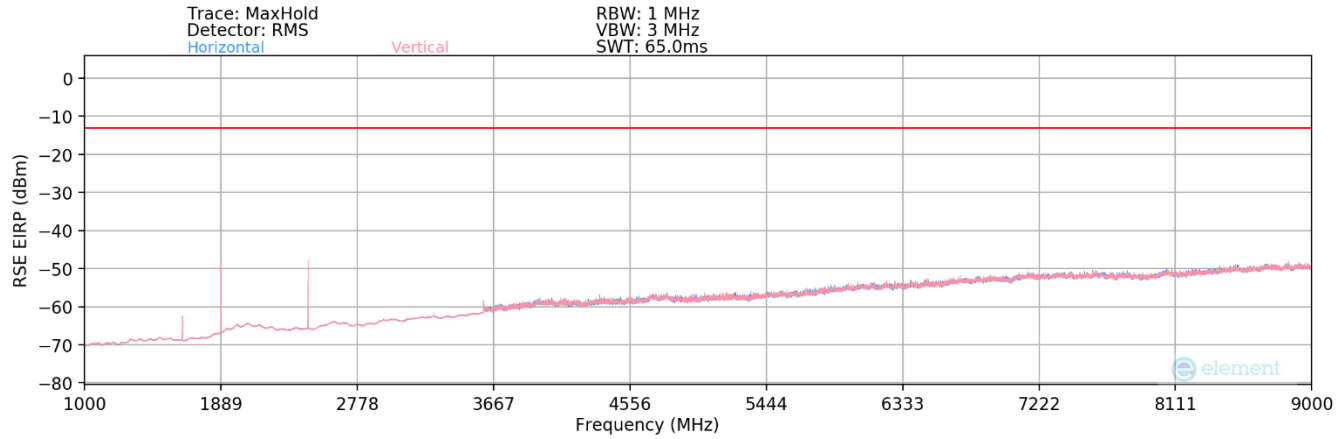


Plot 7-83. Radiated Spurious Plot Below 1GHz (LTE Band 26)

Bandwidth (MHz):	10
Frequency (MHz):	819
RB Config (Size / Offset):	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
160.00	V	-	-	-91.55	19.87	35.32	-62.09	-13.00	-49.09
395.00	V	-	-	-91.37	23.30	38.93	-58.48	-13.00	-45.48
505.00	V	-	-	-91.00	25.97	41.97	-55.44	-13.00	-42.44

Table 7-16. Radiated Spurious Data (LTE Band 26)



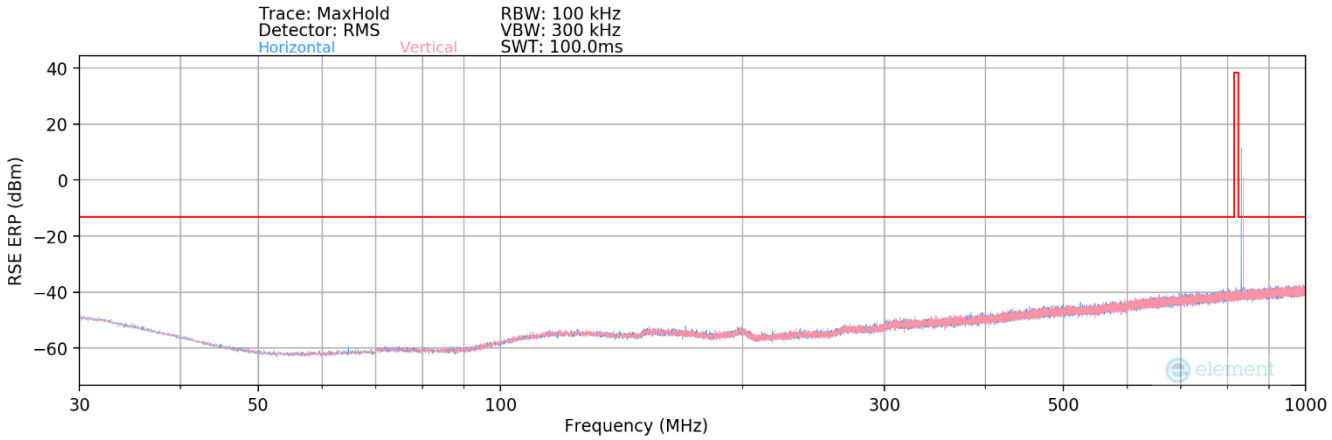
Plot 7-84. Radiated Spurious Plot Above 1GHz (LTE Band 26)

Bandwidth (MHz):	10
Frequency (MHz):	819
RB Config (Size / Offset):	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1638.00	V	181	69	-67.78	-7.28	31.94	-63.31	-13.00	-50.31
2457.00	V	139	328	-54.46	-4.33	48.21	-47.04	-13.00	-34.04
3276.00	V	312	27	-73.94	-0.91	32.15	-63.11	-13.00	-50.11
4095.00	V	-	-	-78.23	1.64	30.41	-64.85	-13.00	-51.85
4914.00	V	-	-	-77.95	2.35	31.40	-63.86	-13.00	-50.86
5733.00	V	-	-	-78.89	4.64	32.75	-62.51	-13.00	-49.51

Table 7-17. Radiated Spurious Data (LTE Band 26 – Mid Channel)

NR Band n26 – Ant 1

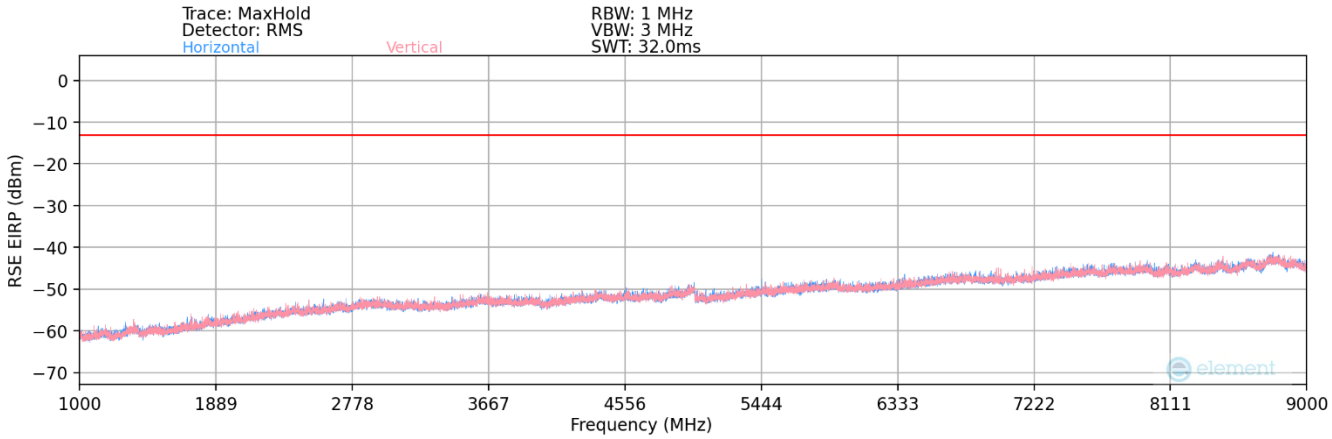


Plot 7-85. Radiated Spurious Plot Below 1GHz (NR Band n26)

Bandwidth (MHz):	20
Frequency (MHz):	824
RB / Offset:	1/50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
290.00	V	-	-	-74.90	-11.24	20.86	-76.55	-13.00	-63.55

Table 7-18. Radiated Spurious Data (NR Band n26 – Mid Channel)



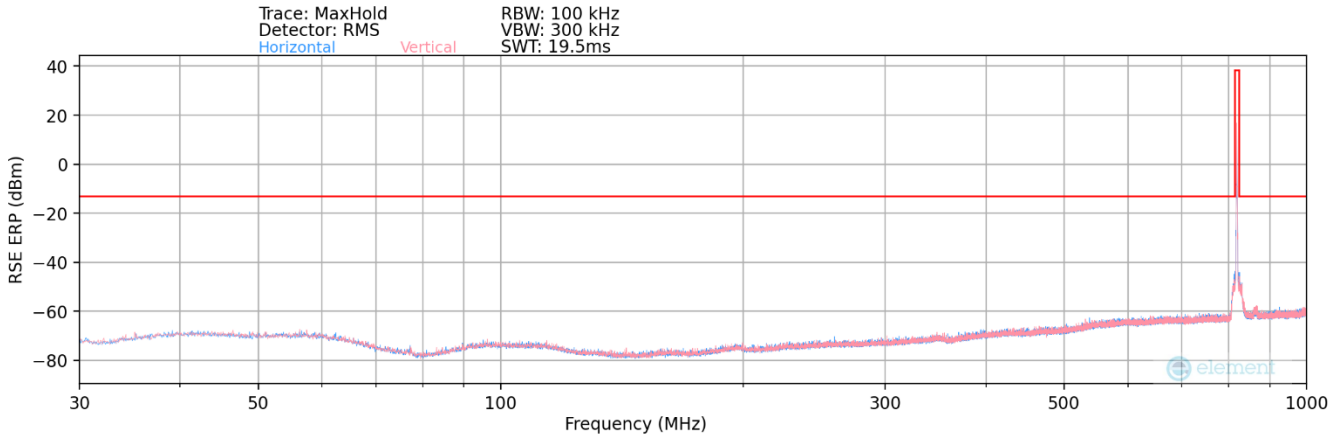
Plot 7-86. Radiated Spurious Plot Above 1GHz (NR Band n26)

Bandwidth (MHz):	30
Frequency (MHz):	829
RB / Offset:	1 / 80

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.00	V	-	-	-78.90	0.06	28.16	-67.10	-13.00	-54.10
2487.00	V	-	-	-80.75	4.10	30.35	-64.91	-13.00	-51.91
3316.00	V	-	-	-81.66	7.00	32.34	-62.92	-13.00	-49.92
4145.00	V	-	-	-81.74	8.36	33.62	-61.64	-13.00	-48.64

Table 7-19. Radiated Spurious Data (NR Band n26 – Mid Channel)

LTE Band 26 – Ant 2

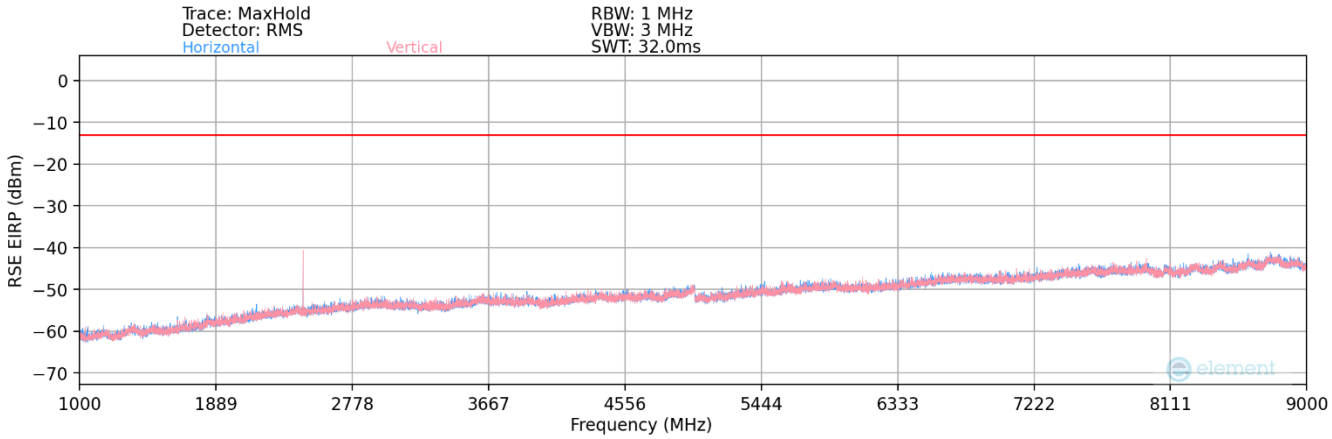


Plot 7-87. Radiated Spurious Plot Below 1GHz (LTE Band 26)

Bandwidth (MHz):	15
Frequency (MHz):	819
RB Config (Size / Offset):	1 / 37

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
270.00	H	-	-	-73.84	-11.65	21.51	-75.90	-13.00	-62.90

Table 7-20. Radiated Spurious Data (LTE Band 26)



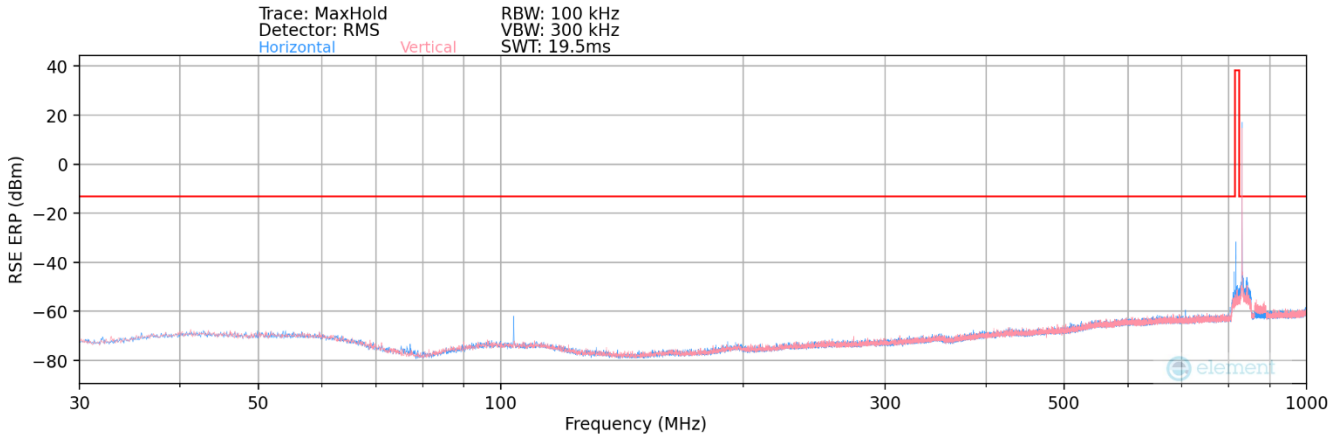
Plot 7-88. Radiated Spurious Plot Above 1GHz (LTE Band 26)

Bandwidth (MHz):	10
Frequency (MHz):	819
RB Config (Size / Offset):	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1638.00	H	110	344	-74.63	-0.36	32.01	-63.25	-13.00	-50.25
2457.00	H	126	232	-66.91	3.79	43.88	-51.38	-13.00	-38.38
3276.00	H	-	-	-79.42	6.49	34.07	-61.18	-13.00	-48.18
4095.00	H	-	-	-79.98	8.35	35.37	-59.89	-13.00	-46.89
4914.00	H	-	-	-80.58	9.77	36.19	-59.06	-13.00	-46.06

Table 7-21. Radiated Spurious Data (LTE Band 26 – Mid Channel)

NR Band n26 – Ant 2

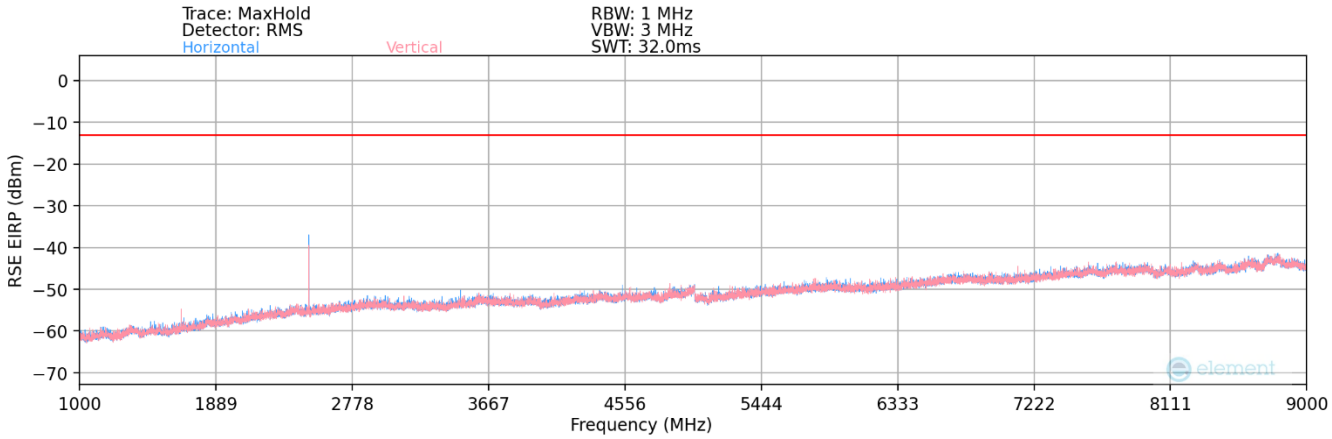


Plot 7-89. Radiated Spurious Plot Below 1GHz (NR Band n26)

Bandwidth (MHz):	20
Frequency (MHz):	824
RB / Offset:	1/50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
110.00	H	116	284	-69.08	-13.74	24.18	-73.23	-13.00	-60.23

Table 7-22. Radiated Spurious Data (NR Band n26 – Mid Channel)



Plot 7-90. Radiated Spurious Plot Above 1GHz (NR Band n26)

Bandwidth (MHz):	30
Frequency (MHz):	829
RB / Offset:	1 / 80

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.00	H	156	333	-70.90	0.06	36.16	-59.10	-13.00	-46.10
2487.00	H	105	237	-66.16	4.10	44.94	-50.32	-13.00	-37.32
3316.00	H	-	-	-79.42	7.00	34.58	-60.68	-13.00	-47.68
4145.00	H	-	-	-80.18	8.36	35.18	-60.08	-13.00	-47.08
4974.00	H	-	-	-80.59	10.13	36.54	-58.71	-13.00	-45.71

Table 7-23. Radiated Spurious Data (NR Band n26 – Mid Channel)

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

Test Procedure Used

ANSI C63.26-2015 – 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 fifteen minutes 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 Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

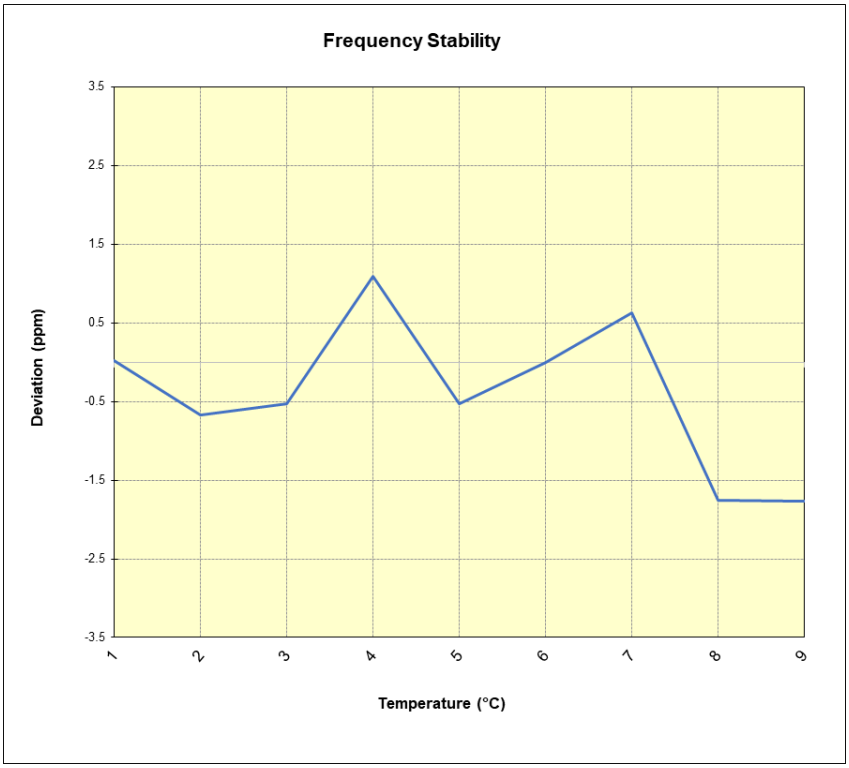
None

LTE Band 26

Operating Frequency (Hz):	819,000,000
Ref. Voltage (VDC):	4.435
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.435	- 30	819,000,493	14	0.0000017
		- 20	818,999,926	-553	-0.0000675
		- 10	819,000,041	-438	-0.0000535
		0	819,001,374	895	0.0001093
		+ 10	819,000,041	-438	-0.0000535
		+ 20 (Ref)	819,000,479	0	0.0000000
		+ 30	819,000,994	515	0.0000629
		+ 40	818,999,041	-1,438	-0.0001756
		+ 50	818,999,036	-1,443	-0.0001762
Battery Endpoint	3.297	+ 20	818,998,517	-1,962	-0.0002396

Table 7-24. LTE Band 26 Frequency Stability Data



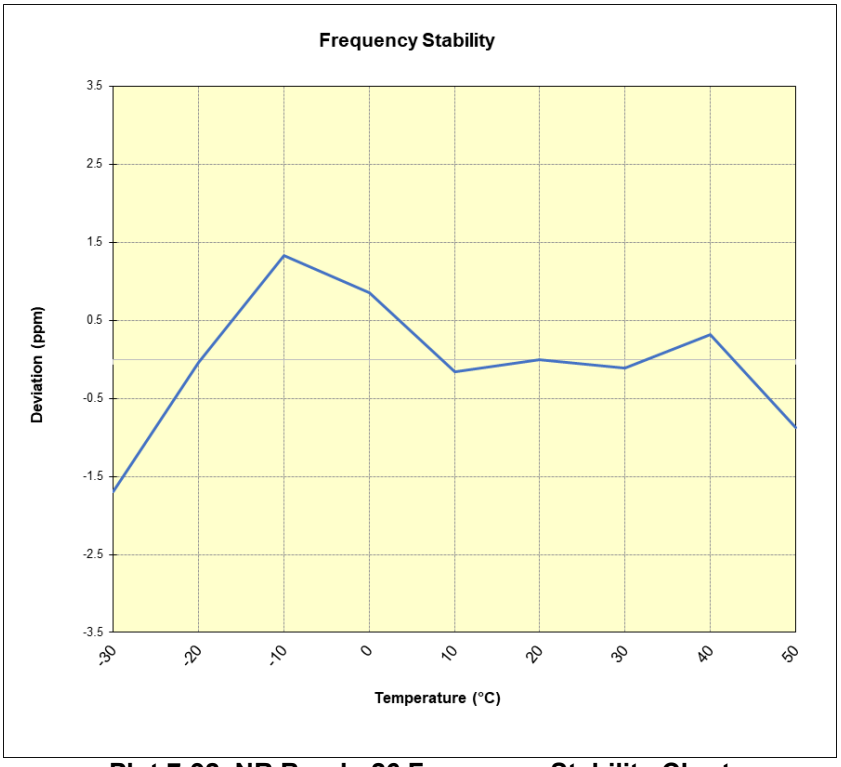
Plot 7-91. LTE Band 26 Frequency Stability Chart

NR Band n26

Operating Frequency (Hz):	819,000,000
Ref. Voltage (VDC):	4.435
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.435	- 30	819,033,356	-1,393	-0.0001701
		- 20	819,034,717	-32	-0.0000039
		- 10	819,035,839	1,090	0.0001331
		0	819,035,449	700	0.0000855
		+ 10	819,034,622	-127	-0.0000155
		+ 20 (Ref)	819,034,749	0	0.0000000
		+ 30	819,034,654	-95	-0.0000116
		+ 40	819,035,004	255	0.0000311
		+ 50	819,034,028	-721	-0.0000880
Battery Endpoint	3.297	+ 20	819,035,959	1,210	0.0001477

Table 7-25. NR Band n26 Frequency Stability Data



Plot 7-92. NR Band n26 Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS942B** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

- END OF TEST REPORT -