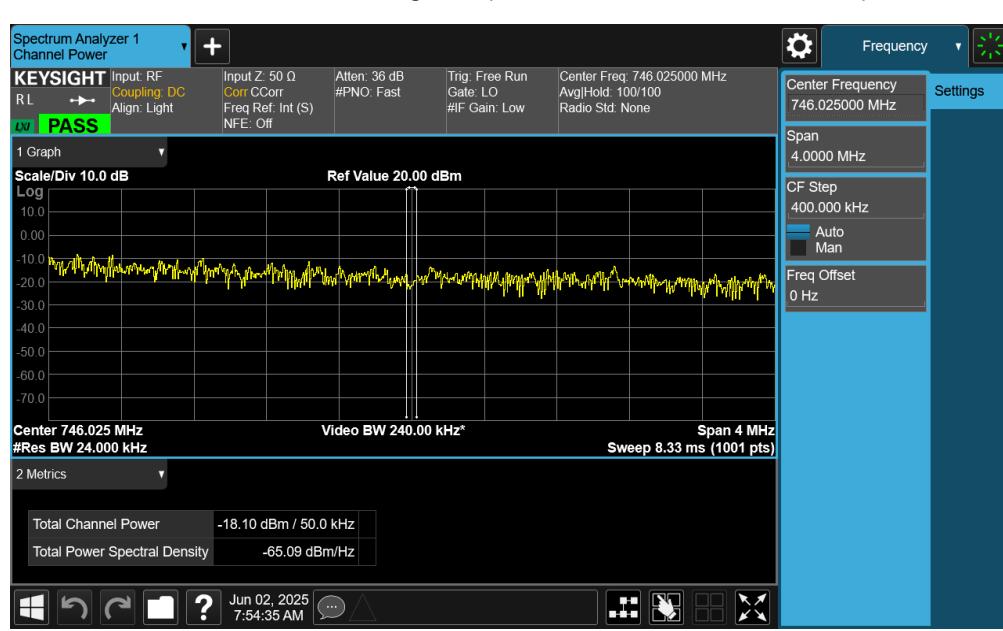
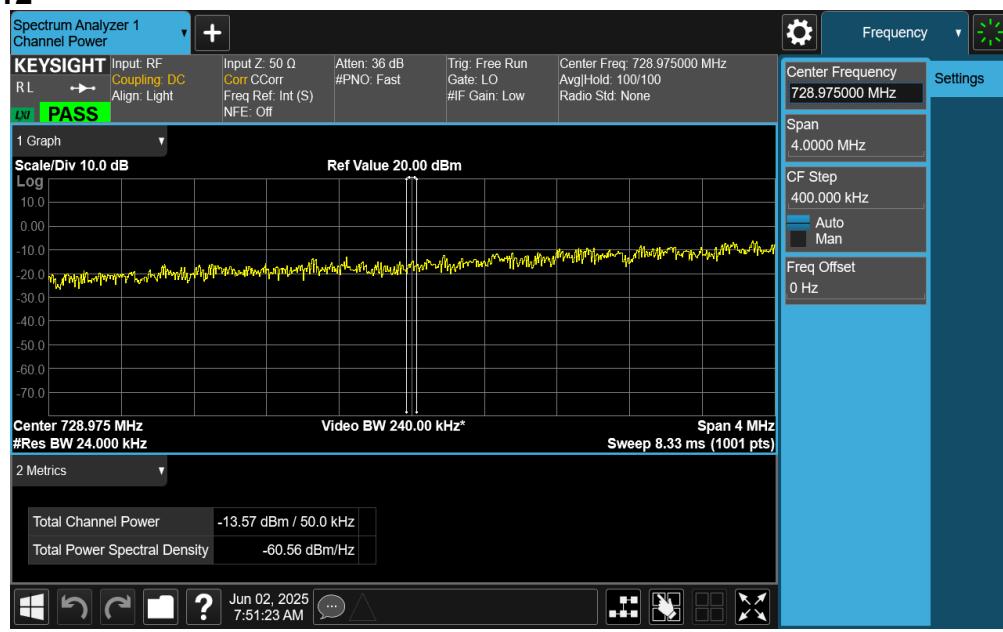
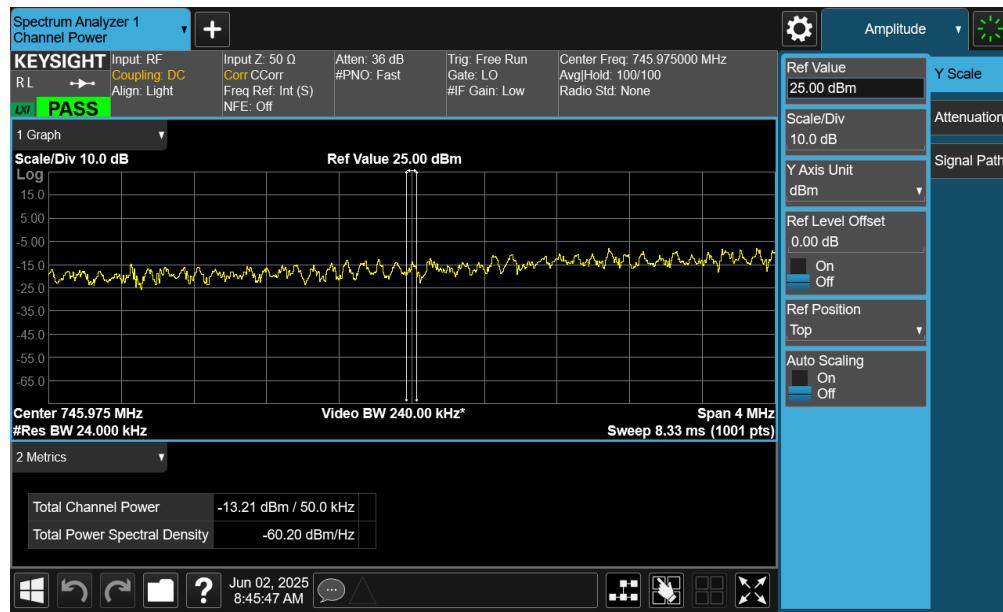


LTE Band 12

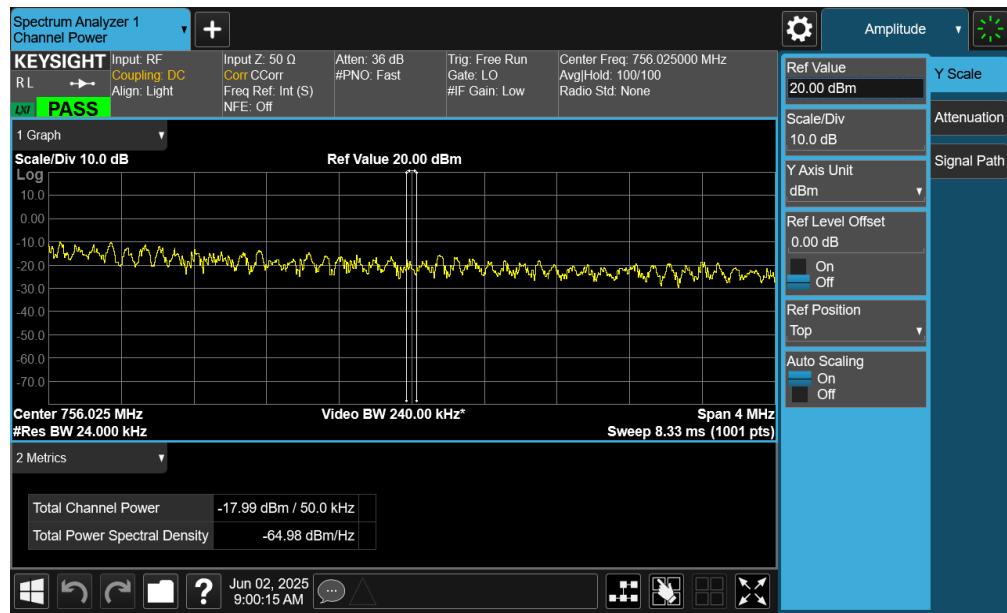


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LTE Band 13



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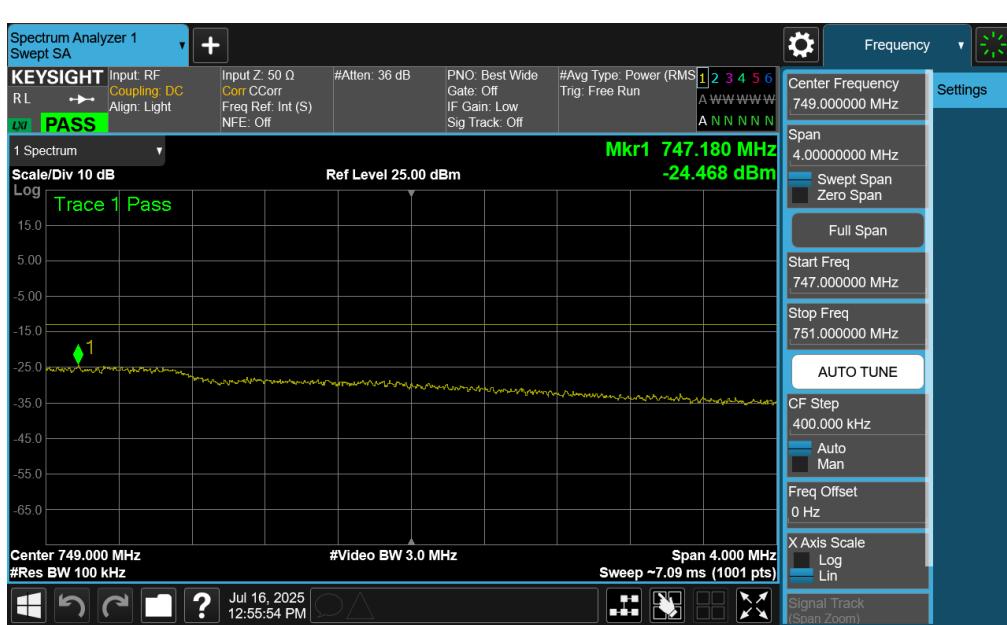


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WCDMA B12

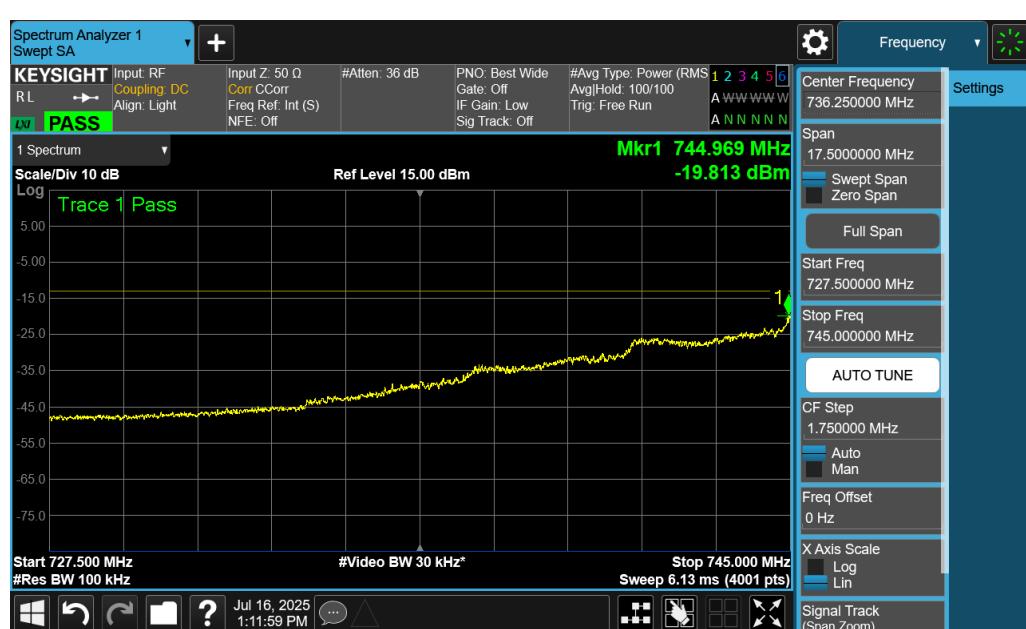


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WCDMA B13



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LTE Band 66/4



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Plot 7-66. Upper Band Edge Plot (LTE Band 4 - 5MHz QPSK – Full RB)

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7.6 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2.3.4

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW \geq OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal “RF Burst” trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the “on time” of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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



Figure 7-5. Test Instrument & Measurement Setup

Test Notes

None.

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Plot 7-67. PAR Plot (WCDMA B12)

Plot 7-68. PAR Plot (WCDMA B13)

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Plot 7-71. PAR Plot (LTE Band 66/4)

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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 a 50 ohm termination. 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 $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

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

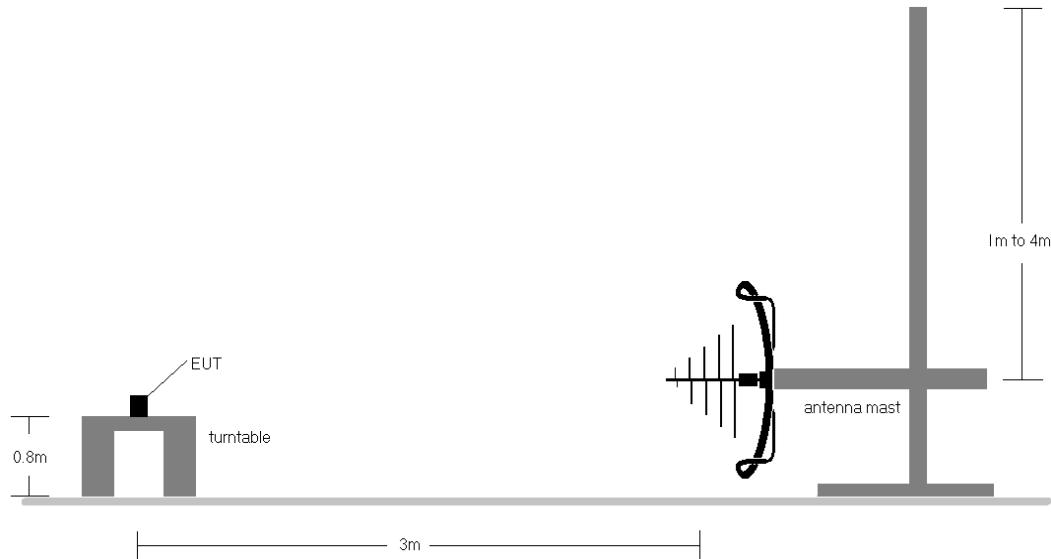


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

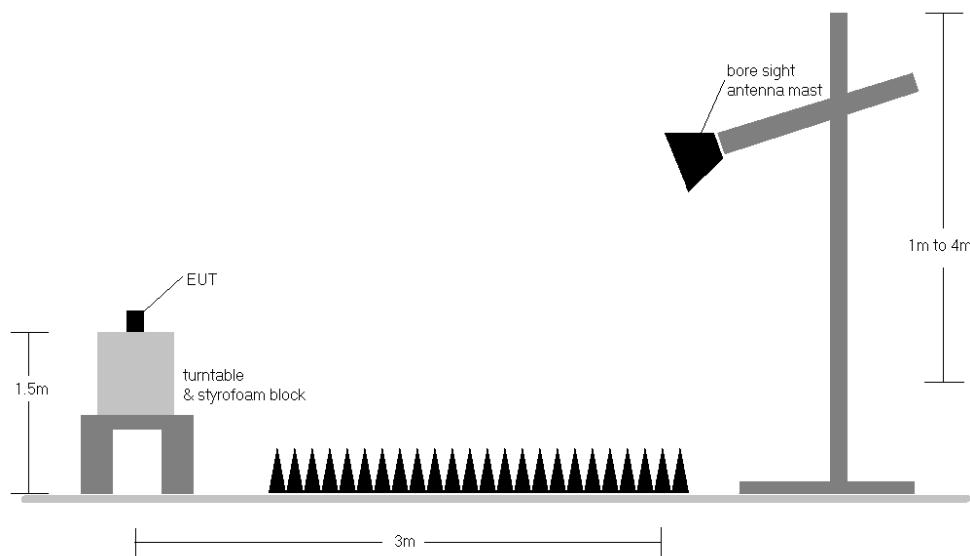


Figure 7-7. Test Instrument & Measurement Setup > 1GHz

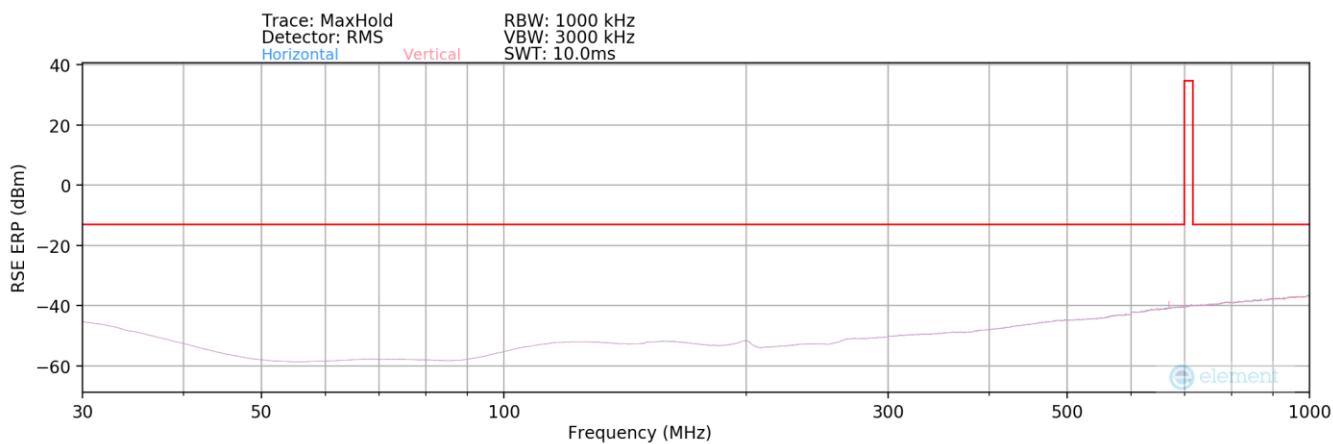
FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
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Test Notes

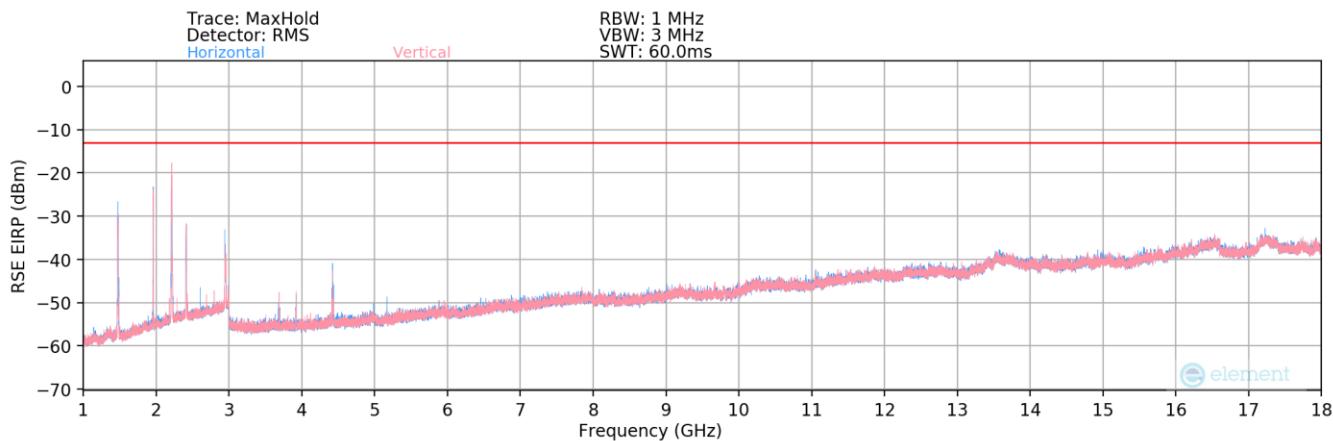
- 1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
 - a) $E(\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - b) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V}/\text{m}) + 20\log D - 104.8$; where D is the measurement distance in meters.
- 2) This unit was tested while powered by a DC power source.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 6) The 2.4GHz WiFi transmitter was active during licensed radiated emissions measurements.

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LTE Band 12 + UMTS B2 + WIFI



Plot 7-72. Radiated Spurious Plot – Below 1GHz



Plot 7-73. Radiated Spurious Plot – Above 1GHz

Mode:	LTE B12 + UMTS B2 + WIFI
Channel:	5095 / 9800 / 1
Frequency (MHz):	737.5 / 1960 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
285.00	H	-	-	-108.68	20.87	19.19	-78.22	-13.00	-65.22
452.00	H	-	-	-108.73	24.94	23.21	-74.20	-13.00	-61.20
770.00	H	-	-	-108.31	29.53	28.22	-69.19	-13.00	-56.19

Table 7-7. Radiated Spurious Data – Below 1GHz

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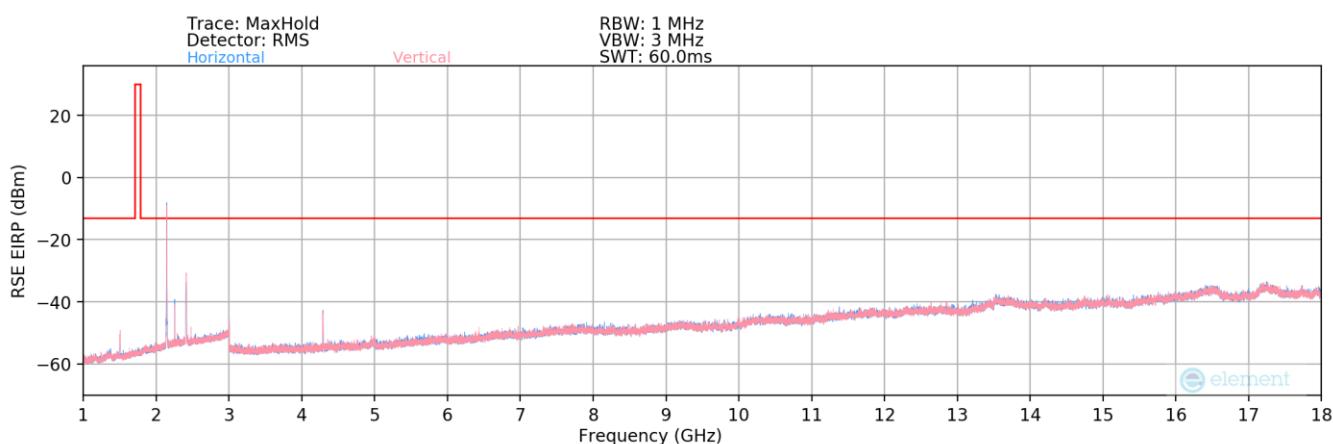
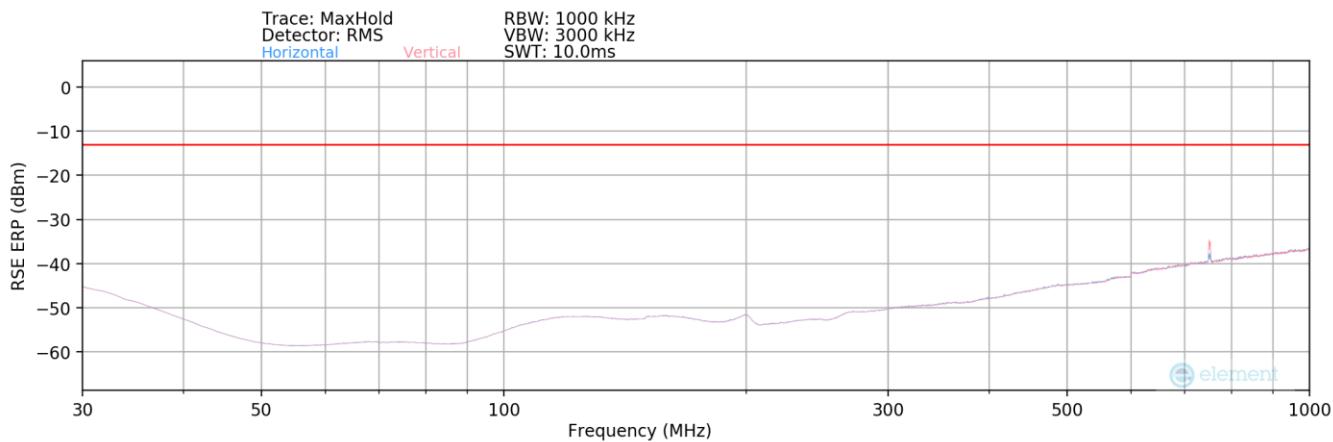
Mode:	LTE B12 + UMTS B2 + WIFI
Channel:	5095 / 9800 / 1
Frequency (MHz):	737.5 / 1960 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1476.00	H	152	29	-54.79	-0.32	51.89	-43.37	-13.00	-30.37
2212.00	H	130	146	-51.86	3.05	58.19	-37.07	-13.00	-24.07
2950.00	H	155	217	-66.73	5.31	45.58	-49.68	-13.00	-36.68
5104.00	H	-	-	-81.39	10.21	35.82	-59.44	-13.00	-46.44
7236.00	H	-	-	-82.41	14.87	39.46	-55.79	-13.00	-42.79
9657.00	H	-	-	-83.67	18.65	41.98	-53.28	-13.00	-40.28

Table 7-8. Radiated Spurious Data – Above 1GHz

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LTE Band 66/4 + UMTS B13 + WIFI



Mode:	LTE B66/4 + UMTS B13 + WIFI
Channel:	66786 / 4030 / 1
Frequency (MHz):	2145 / 751 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB _μ V/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
267.00	H	-	-	-109.06	20.52	18.46	-78.95	-13.00	-65.95
484.00	H	-	-	-108.85	25.73	23.88	-73.53	-13.00	-60.53
643.00	H	-	-	-108.44	28.07	26.63	-70.78	-13.00	-57.78

Table 7-9. Radiated Spurious Data – Below 1GHz

FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT				Approved by: Technical Manager
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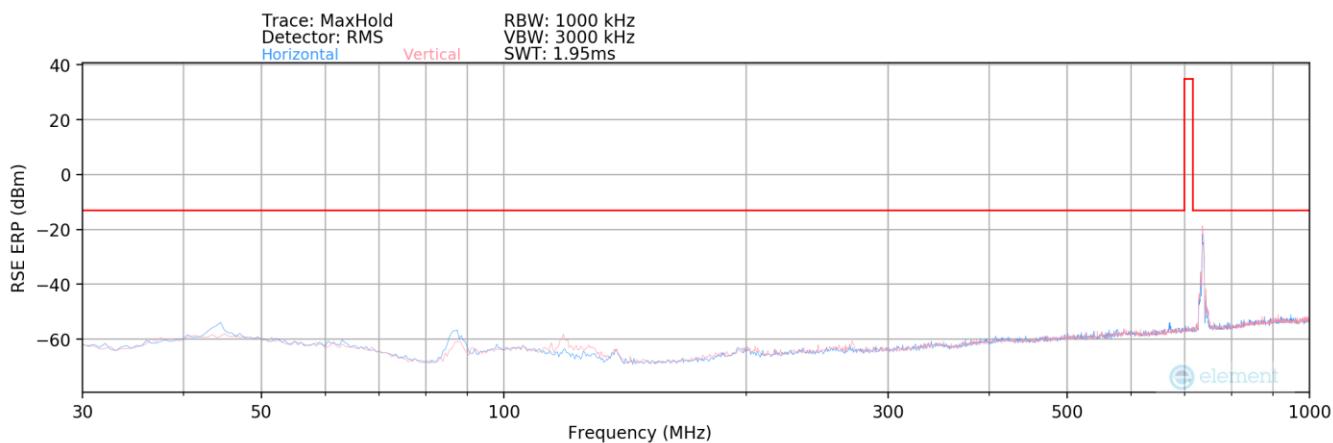
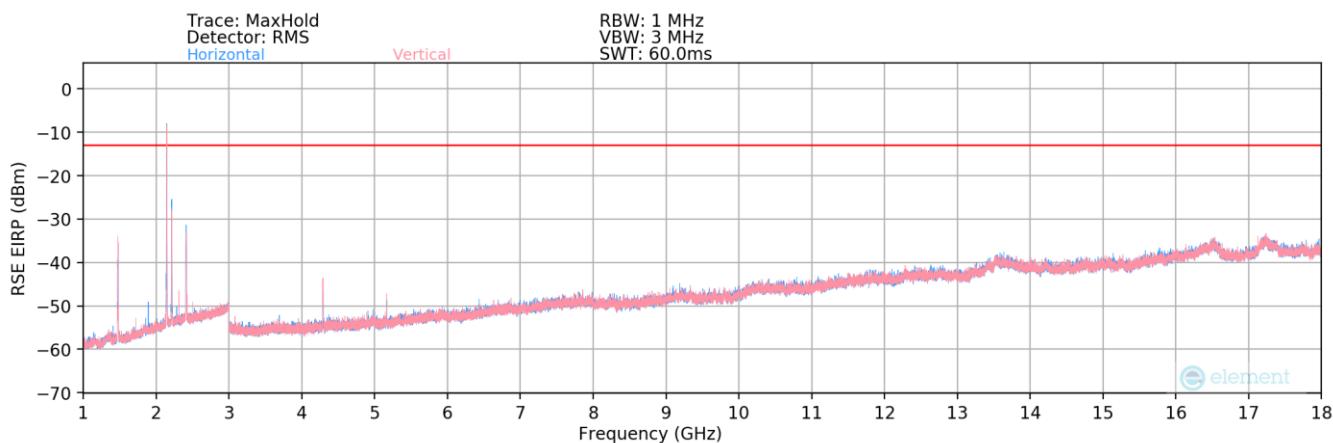


Mode:	LTE B66/4 + UMTS B13 + WIFI
Channel:	66786 / 4030 / 1
Frequency (MHz):	2145 / 751 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1505.00	V	252	187	-70.80	-0.30	35.90	-59.36	-13.00	-46.36
2256.00	H	146	213	-59.20	3.03	50.83	-44.43	-13.00	-31.43
4290.00	H	148	148	-71.60	8.00	43.40	-51.85	-13.00	-38.85
4992.00	H	-	-	-80.87	10.19	36.32	-58.94	-13.00	-45.94
6434.00	H	-	-	-80.57	12.84	39.27	-55.99	-13.00	-42.99
7226.00	H	-	-	-82.00	14.71	39.71	-55.55	-13.00	-42.55

Table 7-10. Radiated Spurious Data – Above 1GHz

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WCDMA B12 + LTE B66 + WIFI

Plot 7-76. Radiated Spurious Plot – Below 1GHz

Plot 7-77. Radiated Spurious Plot – Above 1GHz

Mode:	UMTS B12 + LTE B66 + WIFI
Channel:	3873 / 66786 / 1
Frequency (MHz):	737.6 / 2145 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
125.00	H	-	-	-91.35	20.52	36.17	-61.24	-13.00	-48.24
271.00	H	-	-	-90.99	20.74	36.75	-60.66	-13.00	-47.66
462.00	H	-	-	-89.63	25.17	42.54	-54.87	-13.00	-41.87

Table 7-11. Radiated Spurious Data – Below 1GHz

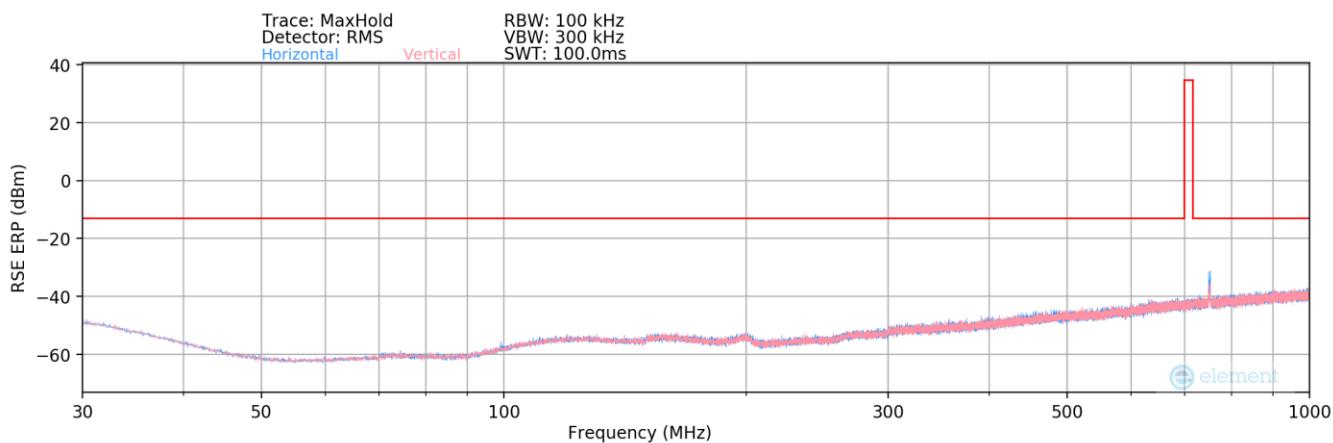
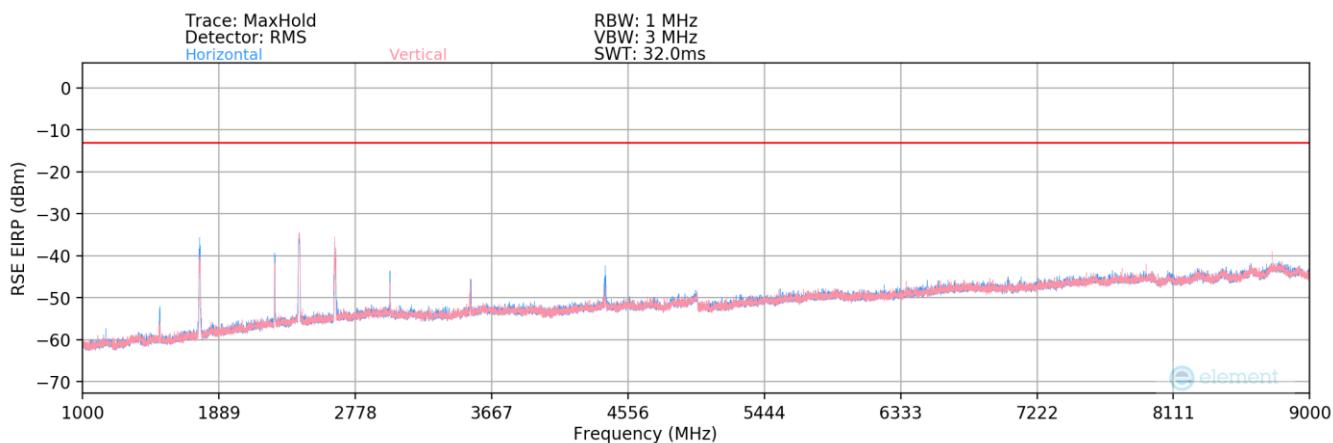
FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT				Approved by: Technical Manager
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Mode:	UMTS B12 + LTE B66 + WIFI
Channel:	3873 / 66786 / 1
Frequency (MHz):	737.6 / 2145 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1475.00	H	285	34	-54.79	-2.84	49.37	-45.89	-13.00	-32.89
2212.00	H	108	50	-46.11	0.88	61.77	-33.49	-13.00	-20.49
4289.00	H	121	290	-74.26	6.12	38.86	-56.40	-13.00	-43.40
6435.00	H	-	-	-81.61	10.25	35.64	-59.61	-13.00	-46.61
7236.00	H	-	-	-82.38	11.84	36.46	-58.79	-13.00	-45.79
8570.00	H	-	-	-83.43	12.47	36.04	-59.21	-13.00	-46.21

Table 7-12. Radiated Spurious Data – Above 1GHz

FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT			Approved by: Technical Manager
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WCDMA B13 + LTE B5 + WIFI

Plot 7-78. Radiated Spurious Plot – Below 1GHz

Plot 7-79. Radiated Spurious Plot – Above 1GHz

Mode:	UMTS B13 + LTE B5 + WIFI
Channel:	4030 / 8915 / 1
Frequency (MHz):	751 / 881.5 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
99.00	H	124	33	-108.24	17.00	15.76	-81.64	-13.00	-68.64
129.00	H	296	245	-106.43	20.43	21.00	-76.40	-13.00	-63.40
490.00	H	-	-	-108.67	25.84	24.17	-73.24	-13.00	-60.24
620.00	H	-	-	-108.41	27.26	25.85	-71.56	-13.00	-58.56
910.00	H	-	-	-108.32	31.46	30.14	-67.27	-13.00	-54.27

Table 7-13. Radiated Spurious Data – Below 1GHz

FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT				Approved by: Technical Manager
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Mode:	UMTS B13 + LTE B5 + WIFI
Channel:	4030 / 8915 / 1
Frequency (MHz):	751 / 881.5 / 2412

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1502.00	H	130	355	-72.15	-2.25	32.60	-62.65	-13.00	-49.65
2254.00	H	172	235	-58.83	0.68	48.85	-46.41	-13.00	-33.41
3003.00	H	127	219	-71.27	3.02	38.75	-56.50	-13.00	-43.50
4824.00	H	-	-	-81.27	6.78	32.51	-62.75	-13.00	-49.75
5289.00	H	-	-	-81.35	7.35	33.00	-62.26	-13.00	-49.26
7236.00	H	-	-	-82.51	11.84	36.33	-58.92	-13.00	-45.92

Table 7-14. Radiated Spurious Data – Above 1GHz

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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.

For Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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

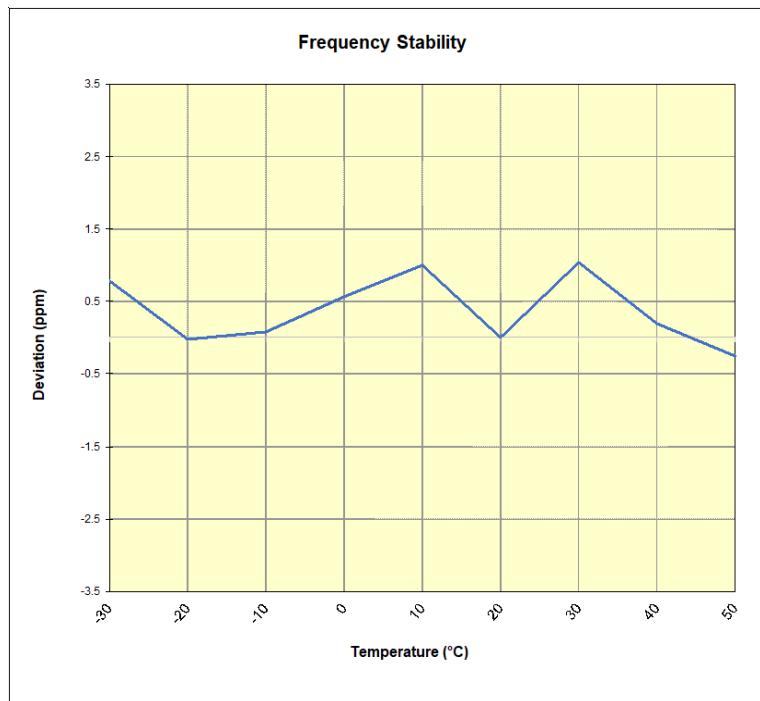
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LTE Band 12

Operating Frequency (Hz):	737,500,000
Ref. Voltage (VDC):	28
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	28	- 30	737,182,782	583	0.0000791
		- 20	737,182,184	-15	-0.0000020
		- 10	737,182,260	61	0.0000083
		0	737,182,615	416	0.0000564
		+ 10	737,182,940	741	0.0001005
		+ 20 (Ref)	737,182,199	0	0.0000000
		+ 30	737,182,967	768	0.0001042
		+ 40	737,182,342	143	0.0000194
		+ 50	737,182,015	-184	-0.0000250
		85 %	737,182,275	76	0.0000103
		110 %	737,182,910	711	0.0000964

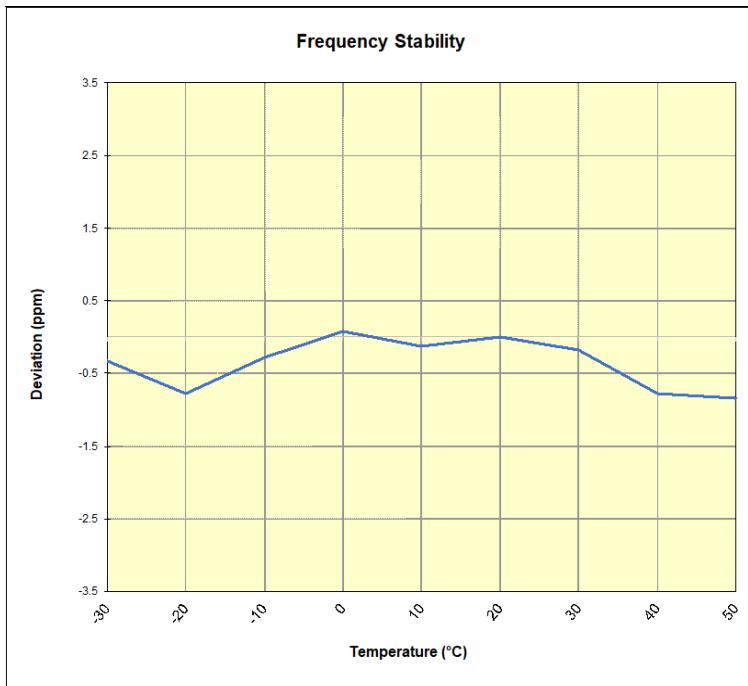
Table 7-15. LTE Band 12 Frequency Stability Data

Plot 7-80. LTE Band 12 Frequency Stability Chart

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LTE Band 13

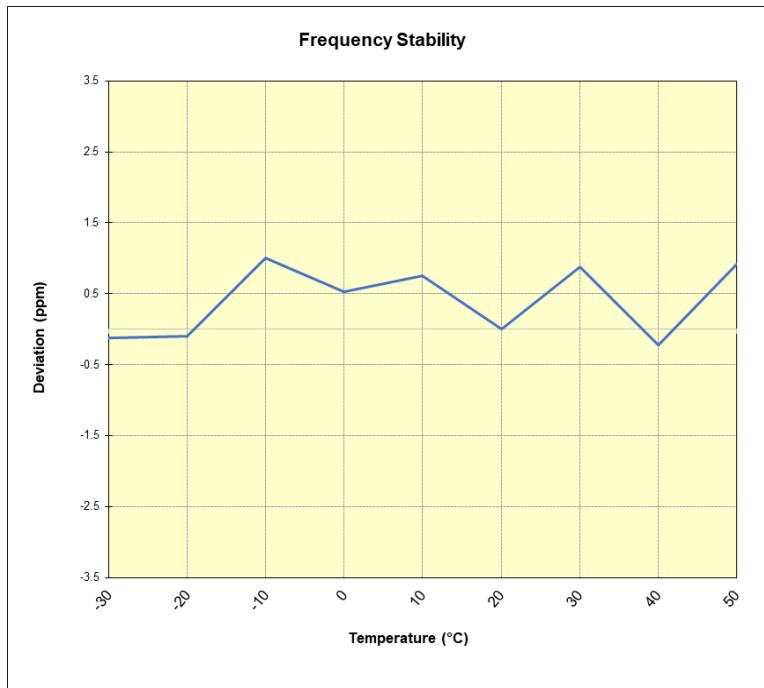
Operating Frequency (Hz):	751,000,000
Ref. Voltage (VDC):	28
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	28	- 30	751,027,672	-245	-0.0000326
		- 20	751,027,332	-585	-0.0000779
		- 10	751,027,708	-209	-0.0000278
		0	751,027,981	64	0.0000085
		+ 10	751,027,827	-90	-0.0000120
		+ 20 (Ref)	751,027,917	0	0.0000000
		+ 30	751,027,789	-128	-0.0000170
		+ 40	751,027,330	-587	-0.0000782
		+ 50	751,027,291	-626	-0.0000834
85 %	23.80	+ 20	751,027,351	-566	-0.0000754
110 %	32.20	+ 20	751,027,250	-667	-0.0000888

Table 7-16. LTE Band 13 Frequency Stability Data

Plot 7-81. LTE Band 13 Frequency Stability Chart

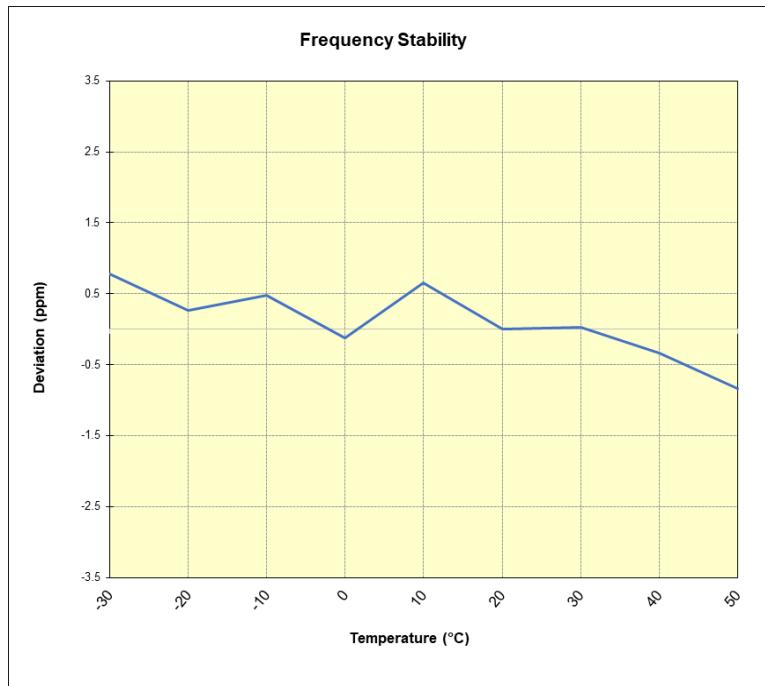
FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT			Approved by: Technical Manager
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WCDMA B12											
<table border="1"> <tr> <td>Operating Frequency (Hz):</td><td>737,600,000</td></tr> <tr> <td>Ref. Voltage (VDC):</td><td>28</td></tr> <tr> <td>Deviation Limit:</td><td>$\pm 0.00025\%$ or 2.5 ppm</td></tr> </table>						Operating Frequency (Hz):	737,600,000	Ref. Voltage (VDC):	28	Deviation Limit:	$\pm 0.00025\%$ or 2.5 ppm
Operating Frequency (Hz):	737,600,000										
Ref. Voltage (VDC):	28										
Deviation Limit:	$\pm 0.00025\%$ or 2.5 ppm										
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)						
100 %	28	- 30	737,420,108	-91	-0.0000123						
		- 20	737,420,130	-69	-0.0000094						
		- 10	737,420,940	741	0.0001005						
		0	737,420,589	390	0.0000529						
		+ 10	737,420,758	559	0.0000758						
		+ 20 (Ref)	737,420,199	0	0.0000000						
		+ 30	737,420,849	650	0.0000881						
		+ 40	737,420,040	-159	-0.0000216						
		+ 50	737,420,876	677	0.0000918						
		85 %	23.80	+ 20	737,420,457						
		110 %	32.20	+ 20	737,420,932						
					733						
					0.0000994						

Table 7-17. WCDMA B12 Frequency Stability Data

Plot 7-82. WCDMA B12 Frequency Stability Chart

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WCDMA B13											
<table border="1"> <tr> <td>Operating Frequency (Hz):</td><td>751,000,000</td></tr> <tr> <td>Ref. Voltage (VDC):</td><td>28</td></tr> <tr> <td>Deviation Limit:</td><td>$\pm 0.00025\%$ or 2.5 ppm</td></tr> </table>						Operating Frequency (Hz):	751,000,000	Ref. Voltage (VDC):	28	Deviation Limit:	$\pm 0.00025\%$ or 2.5 ppm
Operating Frequency (Hz):	751,000,000										
Ref. Voltage (VDC):	28										
Deviation Limit:	$\pm 0.00025\%$ or 2.5 ppm										
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)						
100 %	28	- 30	751,033,781	583	0.0000776						
		- 20	751,033,401	203	0.0000270						
		- 10	751,033,562	364	0.0000485						
		0	751,033,111	-87	-0.0000116						
		+ 10	751,033,690	492	0.0000655						
		+ 20 (Ref)	751,033,198	0	0.0000000						
		+ 30	751,033,220	22	0.0000029						
		+ 40	751,032,947	-251	-0.0000334						
		+ 50	751,032,571	-627	-0.0000835						
		85 %	751,033,686	488	0.0000650						
110 %	32.20	+ 20	751,033,887	689	0.0000917						

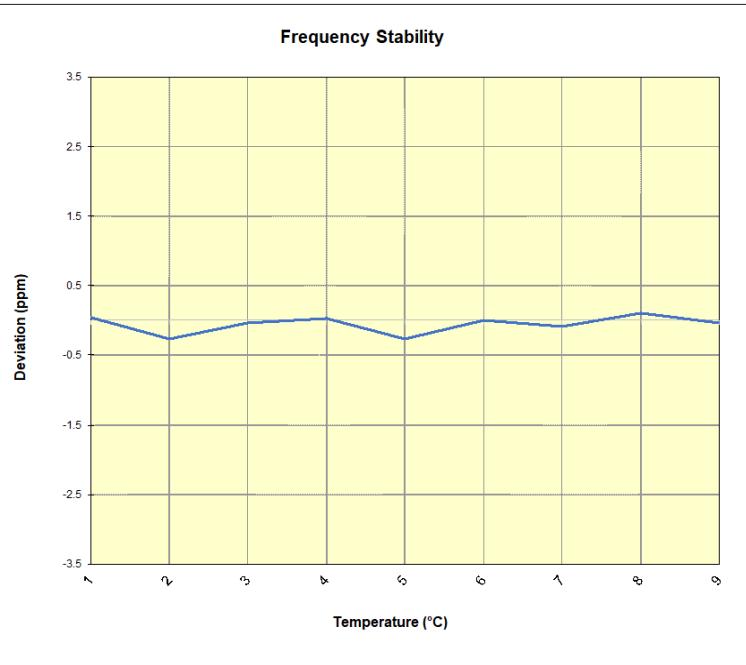
Table 7-18. WCDMA B13 Frequency Stability Data

Plot 7-83. WCDMA B13 Frequency Stability Chart

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LTE Band 66/4

Operating Frequency (Hz):	2,145,000,000
Ref. Voltage (VDC):	28
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	28	- 30	2,145,149,669	80	0.000037
		- 20	2,145,149,012	-577	-0.0000269
		- 10	2,145,149,507	-82	-0.000038
		0	2,145,149,661	72	0.000034
		+ 10	2,145,149,031	-558	-0.0000260
		+ 20 (Ref)	2,145,149,589	0	0.0000000
		+ 30	2,145,149,401	-188	-0.0000088
		+ 40	2,145,149,830	241	0.0000112
		+ 50	2,145,149,521	-68	-0.0000032
		85 %	2,145,149,868	279	0.0000130
		110 %	2,145,149,025	-564	-0.0000263

Table 7-19. LTE Band 66/4 Frequency Stability Data

Plot 7-84. LTE Band 66/4 Frequency Stability Chart

FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT			Approved by: Technical Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Centum Geolocation System** **FCC ID: 2A93U-58530** complies with all the requirements of Part 27 of the FCC rules.

FCC ID: 2A93U-58530	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2505200051-03.2A93U	Test Dates: 04/22 - 07/15/2025	EUT Type: Geolocation System	Page 77 of 77