



Test Report No.: W7L-P21080006RF18

**CHANNEL BANDWIDTH: 10MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
-	-	-	-	-	-	-
27710	2310	21.42	1.17	22.59	181.55	0.25
-	-	-	-	-	-	-

**REMARKS:** ERP Output Power (dBm) = ERP (dBm) -2.15(dB).

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**CHANNEL BANDWIDTH: 1.4MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131979	1710.7	20.51	2.91	23.42	219.79	1
132322	1745	20.56	2.91	23.47	<b>222.33</b>	1
132665	1779.3	20.49	2.91	23.40	218.78	1

**CHANNEL BANDWIDTH: 1.4MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131979	1710.7	19.69	2.91	22.60	181.97	1
132322	1745	19.79	2.91	22.70	186.21	1
132665	1779.3	19.79	2.91	22.70	186.21	1

**CHANNEL BANDWIDTH: 1.4MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131979	1710.7	18.62	2.91	21.53	142.23	1
132322	1745	18.63	2.91	21.54	142.56	1
132665	1779.3	18.69	2.91	21.60	144.54	1

**CHANNEL BANDWIDTH: 3MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131987	1711.5	20.47	2.91	23.38	217.77	1
132322	1745	20.56	2.91	23.47	<b>222.33</b>	1
132657	1778.5	20.49	2.91	23.40	218.78	1

**CHANNEL BANDWIDTH: 3MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131987	1711.5	19.72	2.91	22.63	183.23	1
132322	1745	19.79	2.91	22.70	186.21	1
132657	1778.5	19.79	2.91	22.70	186.21	1

**CHANNEL BANDWIDTH: 3MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131987	1711.5	18.63	2.91	21.54	142.56	1
132322	1745	18.65	2.91	21.56	143.22	1
132657	1778.5	18.69	2.91	21.60	144.54	1

**CHANNEL BANDWIDTH: 5MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131997	1712.5	20.48	2.91	23.39	218.27	1
132322	1745	20.55	2.91	23.46	<b>221.82</b>	1
132647	1777.5	20.53	2.91	23.44	220.80	1

**CHANNEL BANDWIDTH: 5MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
C	1712.5	19.72	2.91	22.63	183.23	1
132322	1745	19.79	2.91	22.70	186.21	1
132647	1777.5	19.78	2.91	22.69	185.78	1

**CHANNEL BANDWIDTH: 5MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
C	1712.5	18.56	2.91	21.47	140.28	1
132322	1745	18.70	2.91	21.61	144.88	1
132647	1777.5	18.69	2.91	21.60	144.54	1

**CHANNEL BANDWIDTH: 10MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132022	1715	20.45	2.91	23.36	216.77	1
132322	1745	20.59	2.91	23.50	<b>223.87</b>	1
132622	1775	20.49	2.91	23.40	218.78	1

**CHANNEL BANDWIDTH: 10MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132022	1715	19.72	2.91	22.63	183.23	1
132322	1745	19.80	2.91	22.71	186.64	1
132622	1775	19.75	2.91	22.66	184.50	1

**CHANNEL BANDWIDTH: 10MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132022	1715	18.62	2.91	21.53	142.23	1
132322	1745	18.64	2.91	21.55	142.89	1
132622	1775	18.66	2.91	21.57	143.55	1

**CHANNEL BANDWIDTH: 15MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132047	1717.5	20.51	2.91	23.42	219.79	1
132322	1745	20.62	2.91	23.53	<b>225.42</b>	1
132597	1772.5	20.50	2.91	23.41	219.28	1

**CHANNEL BANDWIDTH: 15MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132047	1715	19.68	2.91	22.59	181.55	1
132322	1745	19.85	2.91	22.76	188.8	1
132622	1775	19.77	2.91	22.68	185.35	1

**CHANNEL BANDWIDTH: 15MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132047	1715	18.58	2.91	21.49	140.93	1
132322	1745	18.63	2.91	21.54	142.56	1
132622	1775	18.69	2.91	21.60	144.54	1

**CHANNEL BANDWIDTH: 20MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132072	1720	20.53	2.91	23.44	220.8	1
132322	1745	20.65	2.91	23.56	<b>226.99</b>	1
132572	1770	20.54	2.91	23.45	221.31	1

**CHANNEL BANDWIDTH: 20MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132072	1720	19.74	2.91	22.65	184.08	1
132322	1745	19.87	2.91	22.78	189.67	1
132572	1770	19.80	2.91	22.71	186.64	1

**CHANNEL BANDWIDTH: 20MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132072	1720	18.64	2.91	21.55	142.89	1
132322	1745	18.71	2.91	21.62	145.21	1
132572	1770	18.71	2.91	21.62	145.21	1

**REMARKS:** ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).



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#### CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133147	665.5	22.10	1	20.95	<b>124.45</b>	1
133247	675.5	22.07	1	20.92	123.59	1
133447	695.5	22.07	1	20.92	123.59	1

#### CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133147	665.5	21.24	1	20.09	102.09	1
133247	675.5	21.33	1	20.18	104.23	1
133447	695.5	21.24	1	20.09	102.09	1

#### CHANNEL BANDWIDTH: 5MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133147	665.5	20.26	1	19.11	81.47	1
133247	675.5	20.35	1	19.20	83.18	1
133447	695.5	20.25	1	19.10	81.28	1

#### CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133172	668	22.10	1	20.95	<b>124.45</b>	1
133272	678	22.07	1	20.92	123.59	1
133422	693	22.08	1	20.93	123.88	1

#### CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133172	668	21.29	1	20.14	103.28	1
133272	678	21.29	1	20.14	103.28	1
133422	693	21.27	1	20.12	102.80	1

**CHANNEL BANDWIDTH: 10MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133172	668	20.31	1	19.16	82.41	1
133272	678	20.31	1	19.16	82.41	1
133422	693	20.29	1	19.14	82.04	1

**CHANNEL BANDWIDTH: 15MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133197	670.5	22.08	1	20.93	123.88	1
133297	680.5	22.12	1	20.97	<b>125.03</b>	1
133397	690.5	22.03	1	20.88	122.46	1

**CHANNEL BANDWIDTH: 15MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133197	670.5	21.28	1	20.13	103.04	1
133297	680.5	21.30	1	20.15	103.51	1
133397	690.5	21.27	1	20.12	102.80	1

**CHANNEL BANDWIDTH: 15MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133197	670.5	20.32	1	19.17	82.60	1
133297	680.5	20.30	1	19.15	82.22	1
133397	690.5	20.26	1	19.11	81.47	1

**CHANNEL BANDWIDTH: 20MHz QPSK**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133222	673	22.12	1	20.97	125.03	1
133322	683	22.15	1	21.00	125.89	1
133372	688	22.09	1	20.94	124.17	1



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**CHANNEL BANDWIDTH: 20MHz 16QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133222	673	21.32	1	20.17	103.99	1
133322	683	21.35	1	20.20	104.71	1
133372	688	21.29	1	20.14	103.28	1

**CHANNEL BANDWIDTH: 20MHz 64QAM**

Channel	Frequency (MHz)	Conducted Power (dBm)	G <sub>T</sub> -L <sub>c</sub> (dB)	ERP (dBm)	ERP (mW)	Limit (W)
133222	673	20.34	1	19.19	82.99	1
133322	683	20.37	1	19.22	83.56	1
133372	688	20.31	1	19.16	82.41	1



### 3.2 FREQUENCY STABILITY MEASUREMENT

#### 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

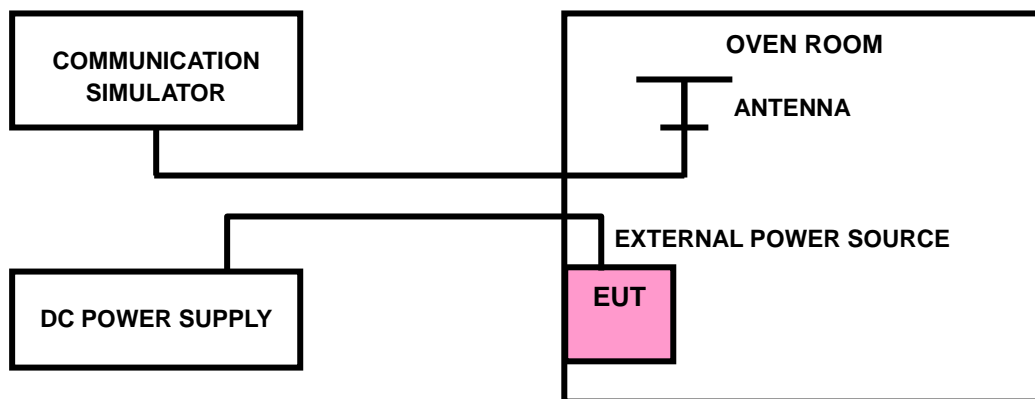
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

#### 3.2.2 TEST PROCEDURE

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

#### 3.2.3 TEST SETUP



### 3.2.4 TEST RESULTS

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##### FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.002	0.0024	2.5
V <sub>min</sub>	-0.0031	-0.003	2.5
V <sub>max</sub>	0.0021	0.002	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

##### FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0082	-0.0084	2.5
0	-0.0074	-0.0072	2.5
10	-0.005	-0.0052	2.5
20	-0.004	-0.004	2.5
30	-0.0031	-0.0027	2.5
40	-0.002	-0.0015	2.5
55	-0.0004	-0.0006	2.5

##### FREQUENCY ERROR VS. VOLTAGE



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VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0021	0.0021	2.5
V <sub>min</sub>	-0.0021	-0.0025	2.5
V <sub>max</sub>	0.0018	0.0017	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0083	-0.0079	2.5
0	-0.0076	-0.0076	2.5
10	-0.0056	-0.0047	2.5
20	-0.004	-0.0043	2.5
30	-0.0033	-0.0035	2.5
40	-0.0023	-0.0017	2.5
55	-0.0004	-0.0005	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0021	0.0023	2.5
V <sub>min</sub>	-0.0024	-0.003	2.5
V <sub>max</sub>	0.0021	0.0021	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0086	-0.0083	2.5
0	-0.0076	-0.0076	2.5
10	-0.005	-0.0052	2.5
20	-0.0041	-0.0042	2.5
30	-0.0027	-0.0026	2.5
40	-0.0022	-0.0017	2.5
55	-0.0002	-0.0003	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0026	0.0024	2.5
V <sub>min</sub>	-0.0031	-0.003	2.5
V <sub>max</sub>	0.0025	0.0026	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0086	-0.008	2.5
0	-0.0076	-0.0074	2.5
10	-0.005	-0.0044	2.5
20	-0.0043	-0.0042	2.5
30	-0.0029	-0.0038	2.5
40	-0.0021	-0.0021	2.5
55	-0.0002	-0.0004	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0026	0.0024	2.5
V <sub>min</sub>	-0.0031	-0.003	2.5
V <sub>max</sub>	0.0024	0.0026	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0086	-0.0084	2.5
0	-0.0073	-0.0074	2.5
10	-0.0046	-0.0052	2.5
20	-0.0038	-0.0041	2.5
30	-0.0041	-0.004	2.5
40	-0.0022	-0.0019	2.5
55	-0.0003	-0.0005	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0025	0.0024	2.5
V <sub>min</sub>	-0.0031	-0.003	2.5
V <sub>max</sub>	0.0026	0.0025	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0086	-0.0084	2.5
0	-0.0073	-0.0074	2.5
10	-0.0046	-0.0052	2.5
20	-0.0038	-0.0041	2.5
30	-0.0041	-0.004	2.5
40	-0.0022	-0.0019	2.5
55	-0.0003	-0.0005	2.5

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**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
$V_{nor}$	0.0026	0.003	2.5
$V_{min}$	-0.0036	-0.0036	2.5
$V_{max}$	0.0025	0.0025	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from  $V_{min}$  Vdc to  $V_{max}$  Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0097	-0.01	2.5
0	-0.0088	-0.0087	2.5
10	-0.0056	-0.0052	2.5
20	-0.0051	-0.0049	2.5
30	-0.0032	-0.0031	2.5
40	-0.0023	-0.0019	2.5
55	-0.0003	-0.0006	2.5



**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0025	0.0024	2.5
V <sub>min</sub>	-0.0025	-0.003	2.5
V <sub>max</sub>	0.0021	0.0021	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0097	-0.0096	2.5
0	-0.0091	-0.0088	2.5
10	-0.0065	-0.0059	2.5
20	-0.0045	-0.005	2.5
30	-0.0047	-0.0035	2.5
40	-0.0017	-0.0025	2.5
55	-0.0004	-0.0003	2.5



**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0025	0.0029	2.5
V <sub>min</sub>	-0.0027	-0.0036	2.5
V <sub>max</sub>	0.0025	0.0025	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0097	-0.0096	2.5
0	-0.0091	-0.0088	2.5
10	-0.0065	-0.0059	2.5
20	-0.0045	-0.005	2.5
30	-0.0047	-0.0035	2.5
40	-0.0017	-0.0025	2.5
55	-0.0004	-0.0003	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0029	0.0029	2.5
V <sub>min</sub>	-0.0037	-0.0036	2.5
V <sub>max</sub>	0.003	0.0029	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.01	-0.0096	2.5
0	-0.0088	-0.0088	2.5
10	-0.0053	-0.0059	2.5
20	-0.0045	-0.005	2.5
30	-0.0032	-0.0035	2.5
40	-0.0022	-0.0025	2.5
55	-0.0005	-0.0003	2.5



LTE BAND 13

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0022	0.0025	2.5
V <sub>min</sub>	-0.0025	-0.0033	2.5
V <sub>max</sub>	0.0022	0.0023	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0091	-0.0085	2.5
0	-0.0081	-0.0081	2.5
10	-0.0056	-0.0059	2.5
20	-0.0045	-0.0042	2.5
30	-0.0042	-0.0038	2.5
40	-0.0019	-0.002	2.5
55	-0.0006	-0.0004	2.5



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**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Mid Channel	
V <sub>nor</sub>	0.0028	2.5
V <sub>min</sub>	-0.0033	2.5
V <sub>max</sub>	0.0028	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Mid Channel	
-10	-0.0089	2.5
0	-0.0078	2.5
10	-0.0056	2.5
20	-0.0042	2.5
30	-0.0042	2.5
40	-0.0023	2.5
55	-0.0002	2.5



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LTE BAND 14

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0022	0.0026	2.5
V <sub>min</sub>	-0.0024	-0.0032	2.5
V <sub>max</sub>	0.0022	0.0022	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0089	-0.0088	2.5
0	-0.008	-0.0078	2.5
10	-0.0056	-0.0047	2.5
20	-0.004	-0.0042	2.5
30	-0.0033	-0.0037	2.5
40	-0.0016	-0.002	2.5
55	-0.0006	-0.0003	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Mid Channel	
V <sub>nor</sub>	0.0028	2.5
V <sub>min</sub>	-0.0032	2.5
V <sub>max</sub>	0.0026	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Mid Channel	
-10	-0.0087	2.5
0	-0.0081	2.5
10	-0.0058	2.5
20	-0.0042	2.5
30	-0.0041	2.5
40	-0.0017	2.5
55	-0.0005	2.5

**LTE BAND 17**

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0025	0.0028	2.5
V <sub>min</sub>	-0.0027	-0.0035	2.5
V <sub>max</sub>	0.0025	0.0025	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0098	-0.0098	2.5
0	-0.0089	-0.0089	2.5
10	-0.0059	-0.0064	2.5
20	-0.0045	-0.0049	2.5
30	-0.0034	-0.0038	2.5
40	-0.0027	-0.0017	2.5
55	-0.0003	-0.0005	2.5



**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.003	0.0029	2.5
V <sub>min</sub>	-0.0036	-0.0036	2.5
V <sub>max</sub>	0.0029	0.0029	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0099	-0.0097	2.5
0	-0.0091	-0.009	2.5
10	-0.0065	-0.0059	2.5
20	-0.0044	-0.0044	2.5
30	-0.0029	-0.0031	2.5
40	-0.0026	-0.0022	2.5
55	-0.0005	-0.0004	2.5

**LTE BAND 30**

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0008	0.0016	2.5
V <sub>min</sub>	-0.0008	-0.002	2.5
V <sub>max</sub>	0.0008	0.0013	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.003	-0.003	2.5
0	-0.0027	-0.0027	2.5
10	-0.0019	-0.0018	2.5
20	-0.0014	-0.0014	2.5
30	-0.001	-0.0014	2.5
40	-0.0006	-0.0008	2.5
55	-0.0001	-0.0002	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Middle Channel	
V <sub>nor</sub>	0.0009	2.5
V <sub>min</sub>	-0.0011	2.5
V <sub>max</sub>	0.0009	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Middle Channel	
-10	-0.0029	2.5
0	-0.0027	2.5
10	-0.002	2.5
20	-0.0014	2.5
30	-0.0015	2.5
40	-0.0006	2.5
55	-0.0002	2.5

**LTE BAND 66**

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.001	0.0011	2.5
V <sub>min</sub>	-0.0015	-0.0014	2.5
V <sub>max</sub>	0.001	0.001	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0041	-0.004	2.5
0	-0.0037	-0.0036	2.5
10	-0.0027	-0.0023	2.5
20	-0.002	-0.002	2.5
30	-0.0013	-0.0016	2.5
40	-0.0008	-0.001	2.5
55	-0.0003	-0.0003	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.001	0.001	2.5
V <sub>min</sub>	-0.001	-0.0012	2.5
V <sub>max</sub>	0.0008	0.0008	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0041	-0.0039	2.5
0	-0.0036	-0.0036	2.5
10	-0.0022	-0.0024	2.5
20	-0.0021	-0.0018	2.5
30	-0.0019	-0.0019	2.5
40	-0.0007	-0.0007	2.5
55	-0.0002	-0.0002	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.001	0.0011	c
V <sub>min</sub>	-0.0011	-0.0015	2.5
V <sub>max</sub>	0.001	0.001	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0041	-0.0039	2.5
0	-0.0037	-0.0035	2.5
10	-0.0025	-0.0021	2.5
20	-0.0018	-0.0019	2.5
30	-0.0017	-0.0018	2.5
40	-0.0009	-0.0009	2.5
55	-0.0001	-0.0002	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0013	0.0011	2.5
V <sub>min</sub>	-0.0015	-0.0015	2.5
V <sub>max</sub>	0.0012	0.0012	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.004	-0.0038	2.5
0	-0.0036	-0.0036	2.5
10	-0.0025	-0.0025	2.5
20	-0.002	-0.0018	2.5
30	-0.0018	-0.0012	2.5
40	-0.0008	-0.001	2.5
55	-0.0001	-0.0002	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0012	0.0011	2.5
V <sub>min</sub>	-0.0015	-0.0015	2.5
V <sub>max</sub>	0.0013	0.0012	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0041	-0.0038	2.5
0	-0.0036	-0.0035	2.5
10	-0.0025	-0.0021	2.5
20	-0.002	-0.0021	2.5
30	-0.0014	-0.0012	2.5
40	-0.0008	-0.0009	2.5
55	-0.0001	-0.0002	2.5



**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0012	0.0012	2.5
V <sub>min</sub>	-0.0015	-0.0014	2.5
V <sub>max</sub>	0.0013	0.0012	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.004	-0.004	2.5
0	-0.0036	-0.0036	2.5
10	-0.0027	-0.0022	2.5
20	-0.0019	-0.002	2.5
30	-0.0015	-0.0016	2.5
40	-0.0008	-0.001	2.5
55	-0.0001	-0.0002	2.5

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**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0026	0.003	2.5
V <sub>min</sub>	-0.0029	-0.0037	2.5
V <sub>max</sub>	0.0026	0.0025	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0105	-0.0097	2.5
0	-0.0092	-0.0088	2.5
10	-0.0057	-0.0065	2.5
20	-0.0049	-0.0047	2.5
30	-0.0051	-0.0043	2.5
40	-0.0025	-0.0024	2.5
55	-0.0003	-0.0003	2.5



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**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0033	0.0032	2.5
V <sub>min</sub>	-0.0038	-0.0037	2.5
V <sub>max</sub>	0.0033	0.003	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0104	-0.0102	2.5
0	-0.0094	-0.0091	2.5
10	-0.0057	-0.0054	2.5
20	-0.0047	-0.0047	2.5
30	-0.0053	-0.0047	2.5
40	-0.0026	-0.0023	2.5
55	-0.0004	-0.0005	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0032	0.0031	2.5
V <sub>min</sub>	-0.0038	-0.0038	2.5
V <sub>max</sub>	0.0032	0.0029	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

TEMP. (°C)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0103	-0.0103	2.5
0	-0.0095	-0.0088	2.5
10	-0.0069	-0.0054	2.5
20	-0.0052	-0.0051	2.5
30	-0.004	-0.0044	2.5
40	-0.0028	-0.0021	2.5
55	-0.0007	-0.0003	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V <sub>nor</sub>	0.0031	0.0029	2.5
V <sub>min</sub>	-0.0038	-0.0037	2.5
V <sub>max</sub>	0.003	0.0029	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from V<sub>min</sub> Vdc to V<sub>max</sub> Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

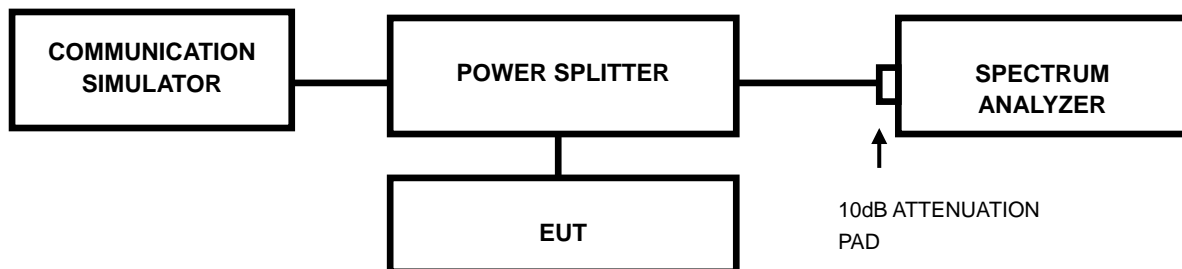
TEMP. (°C)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-10	-0.0106	-0.0097	2.5
0	-0.0093	-0.0093	2.5
10	-0.0059	-0.0067	2.5
20	-0.0048	-0.0047	2.5
30	-0.0047	-0.003	2.5
40	-0.0018	-0.0021	2.5
55	-0.0004	-0.0006	2.5

### 3.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

#### 3.3.2 TEST SETUP



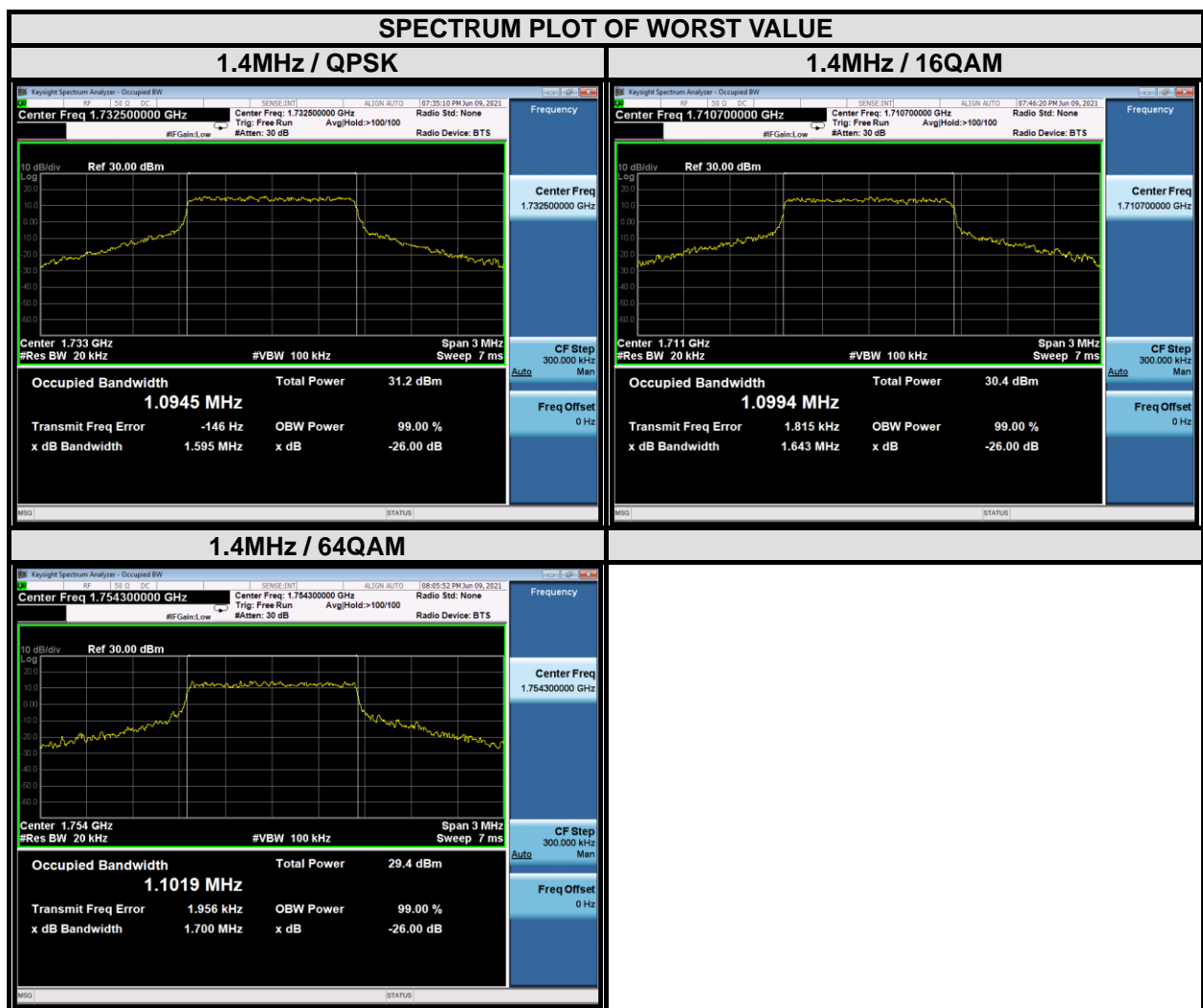
#### 3.3.3 TEST PROCEDURES

- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

### 3.3.4 TEST RESULTS

#### LTE BAND 4

CHANNEL BANDWIDTH: 1.4MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
19957	1710.7	1.10	1.10	1.09	1.56	1.64	1.56
20175	1732.5	1.95	1.10	1.10	1.60	1.60	1.59
20393	1754.3	1.10	1.10	1.10	1.61	1.57	1.70



CHANNEL BANDWIDTH: 3MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
19965	1711.5	2.71	2.69	2.69	3.36	3.02	2.98
20175	1732.5	2.69	2.69	2.68	2.98	2.96	2.97
20385	1753.5	2.70	2.69	2.69	3.32	2.95	2.98





CHANNEL BANDWIDTH: 5MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
19975	1712.5	4.49	4.48	4.49	6.55	6.10	6.30
20175	1732.5	4.48	4.47	4.47	4.97	4.86	4.94
20375	1752.5	4.47	4.48	4.48	5.02	5.17	4.94



CHANNEL BANDWIDTH: 10MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20000	1715	9.00	8.99	8.98	12.89	13.36	12.35
20175	1732.5	8.96	8.94	8.95	9.76	9.61	9.68
20350	1750	8.98	8.96	8.96	12.47	10.67	10.74



CHANNEL BANDWIDTH: 15MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20025	1717.5	13.42	13.43	13.44	14.43	14.48	14.49
20175	1732.5	13.40	13.44	13.42	14.48	14.31	14.34
20325	1747.5	13.41	13.41	13.42	14.52	14.46	14.38



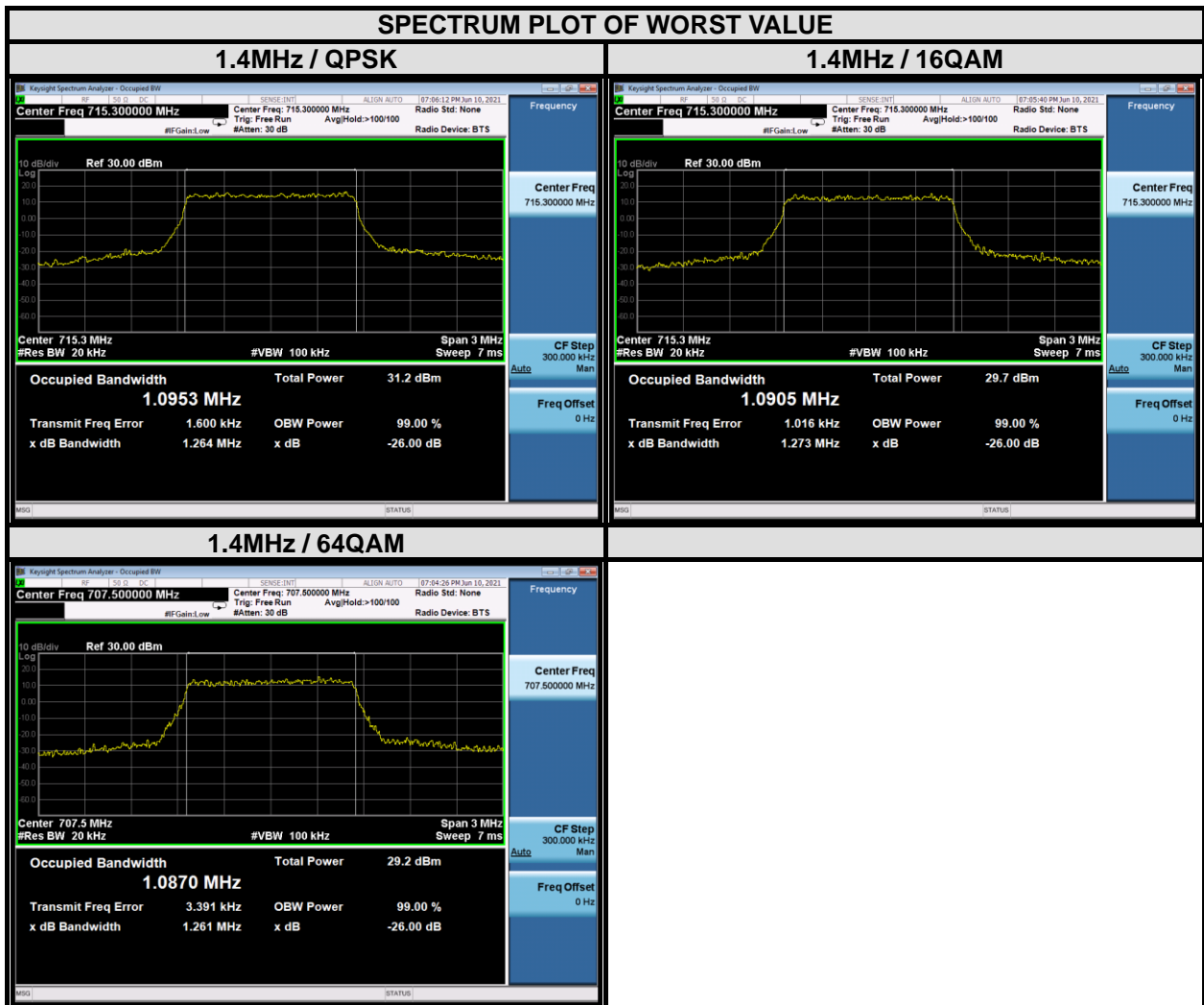


CHANNEL BANDWIDTH: 20MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20050	1720	17.86	17.83	17.80	19.30	19.15	19.05
20175	1732.5	17.87	17.92	17.87	19.02	19.18	19.06
20300	1745	17.93	17.92	17.89	19.19	19.13	19.19



LTE BAND 12

CHANNEL BANDWIDTH: 1.4MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
23017	699.7	1.09	1.08	1.09	1.259	1.238	1.25
23095	707.5	1.08	1.09	1.09	1.256	1.289	1.26
23173	715.3	1.10	1.09	1.09	1.264	1.273	1.27



CHANNEL BANDWIDTH: 3MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
23025	700.5	2.69	2.68	2.68	2.91	2.93	2.92
23095	707.5	2.68	2.68	2.68	2.90	2.91	2.92
23165	714.5	2.69	2.69	2.69	2.96	2.93	2.96



CHANNEL BANDWIDTH: 5MHz							
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)			26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
23035	701.5	4.48	4.49	4.48	4.86	4.89	4.88
23095	707.5	4.48	4.46	4.45	4.88	4.89	4.91
23155	713.5	4.48	4.49	4.48	4.90	4.94	4.92

