

## Appendix A

### RF Test Data for BLE V4.0 (Conducted Measurement)

**Product Name: MINI RGBW BT Mesh LED Controller**

**Trade Mark: N/A**

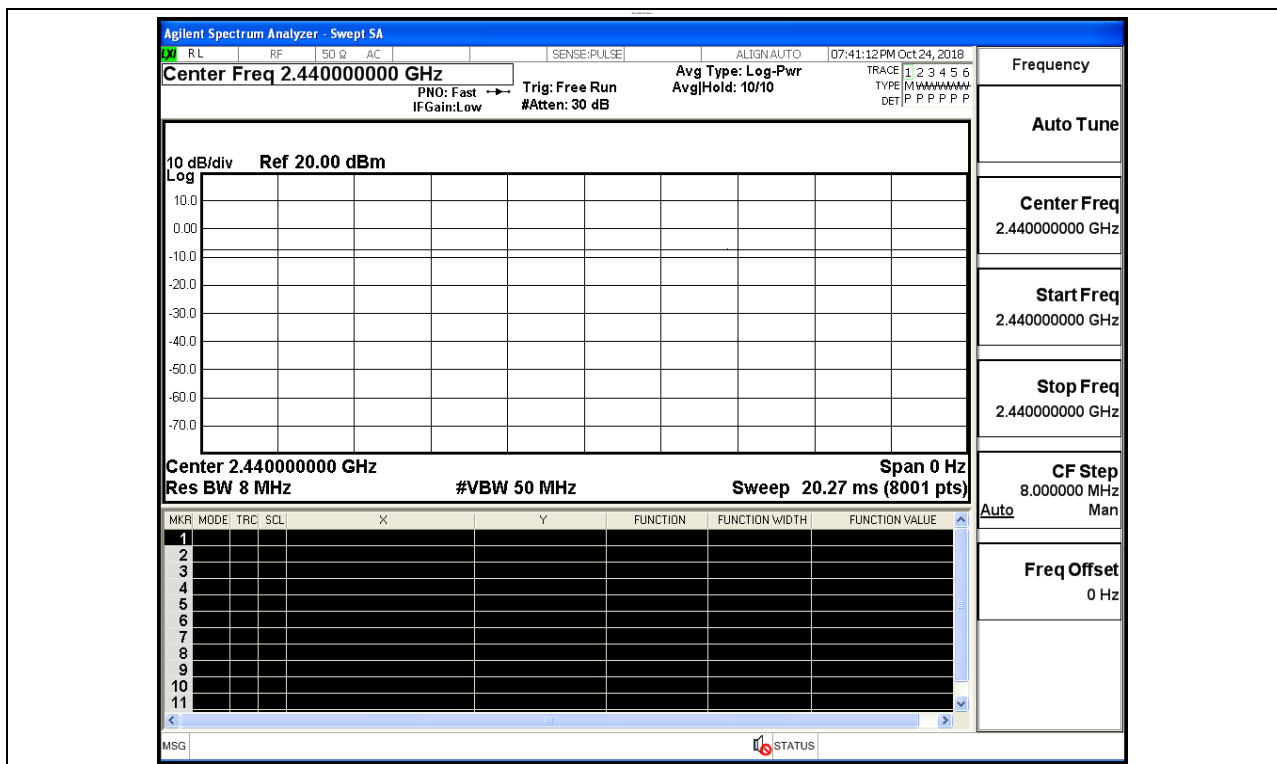
**Test Model: ZJ-MBM-RGBW**

#### Environmental Conditions

Temperature:	24.3 ° C
Relative Humidity:	52.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Mina.Xu
Supervised by:	Jayden.Zhuo

#### A.1 Duty Cycle

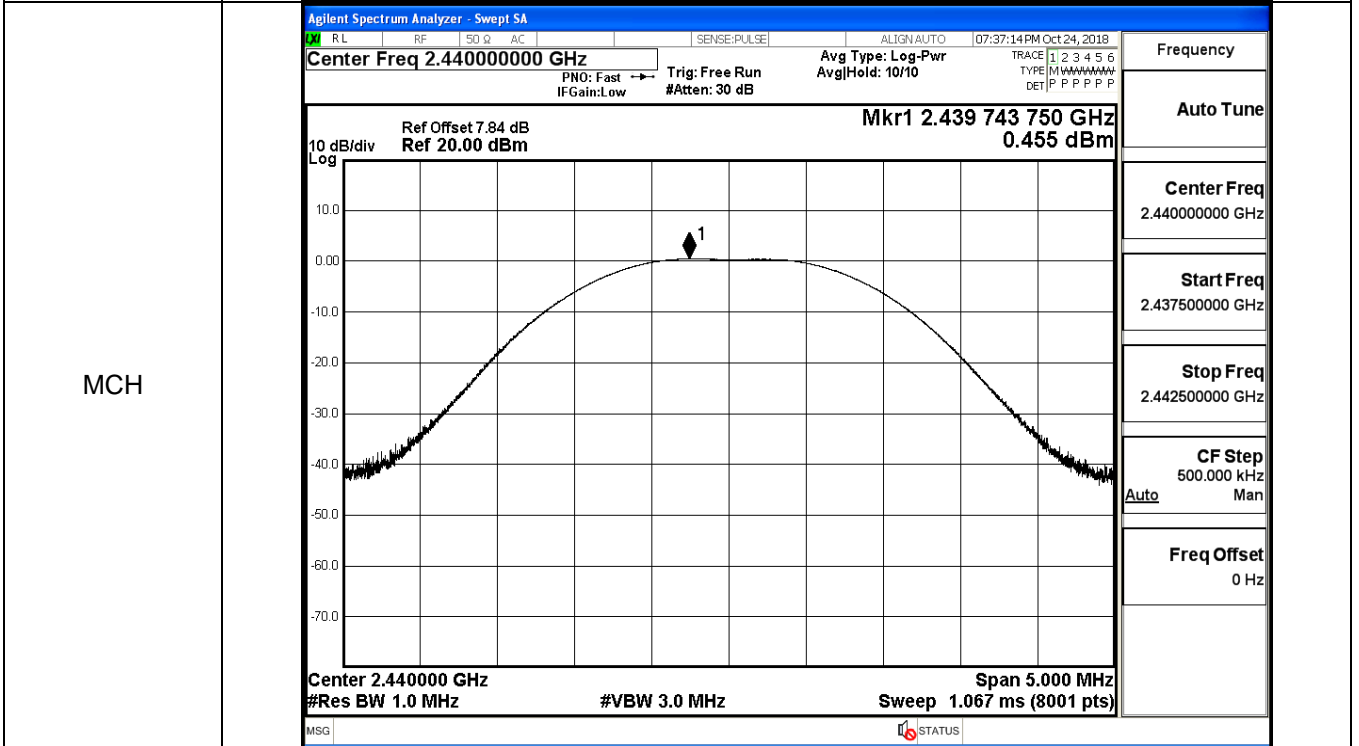
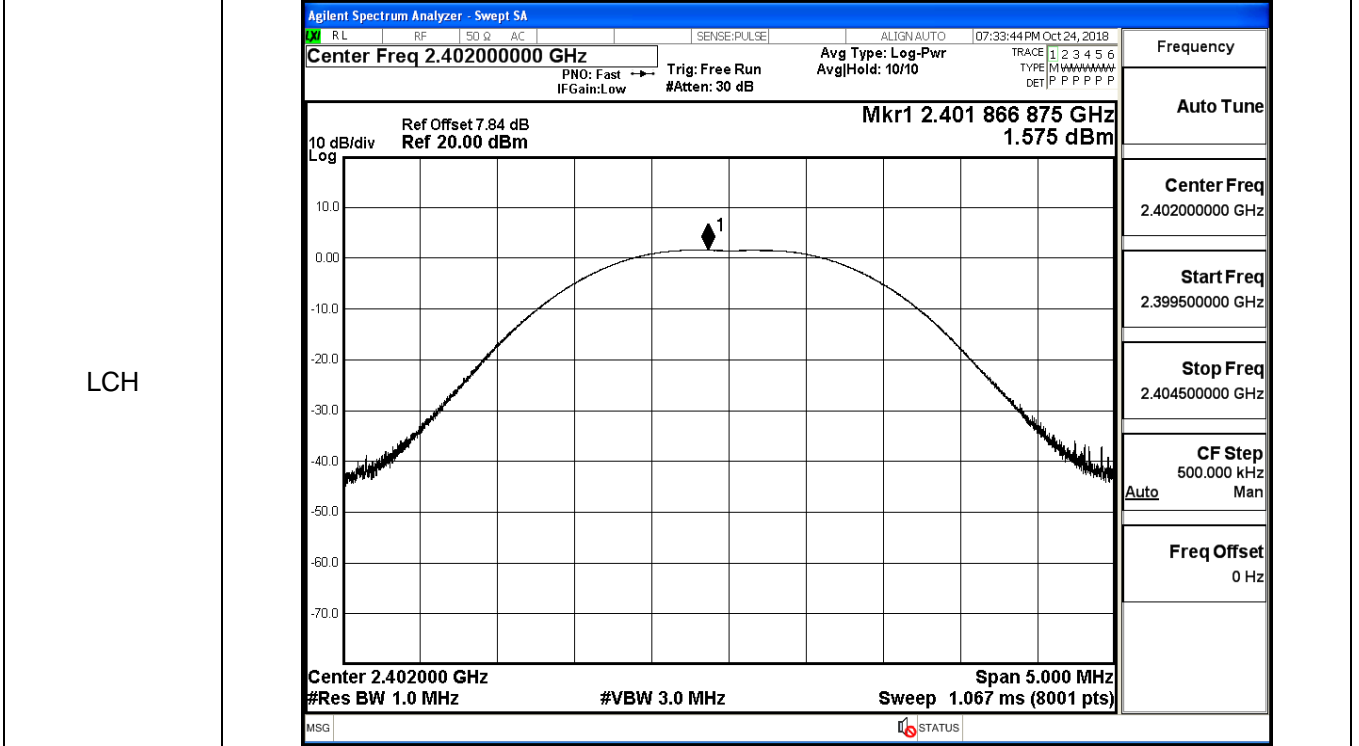
Test Mode	Test Channel	Ant	Duty Cycle[%]	Verdict
BT LE	2440	Ant1	100	PASS

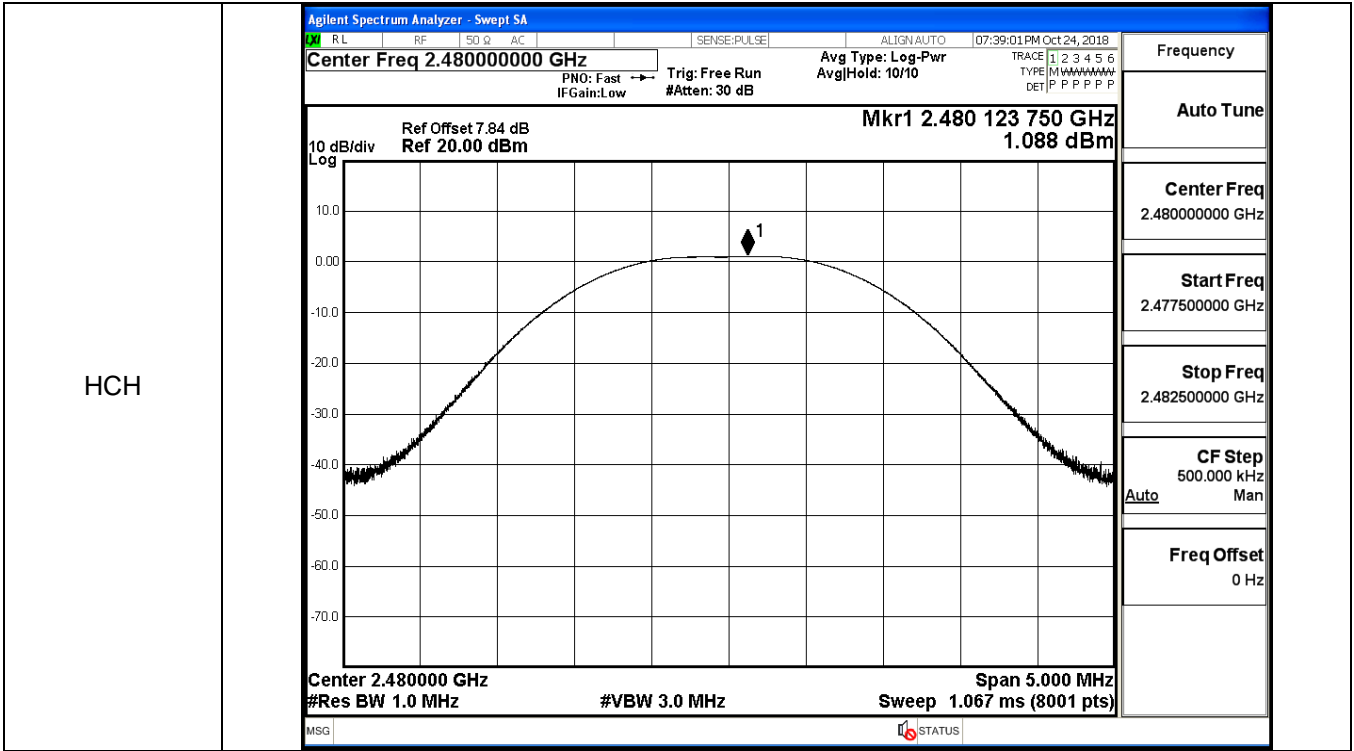


### A.2 Maximum Conducted Peak Output Power

Mode	Channel	Conduct Peak Power[dBm]	Limit [dBm]	Verdict
BT LE	LCH	1.575	30	PASS
BT LE	MCH	0.455	30	PASS
BT LE	HCH	1.088	30	PASS

#### Test Graphs

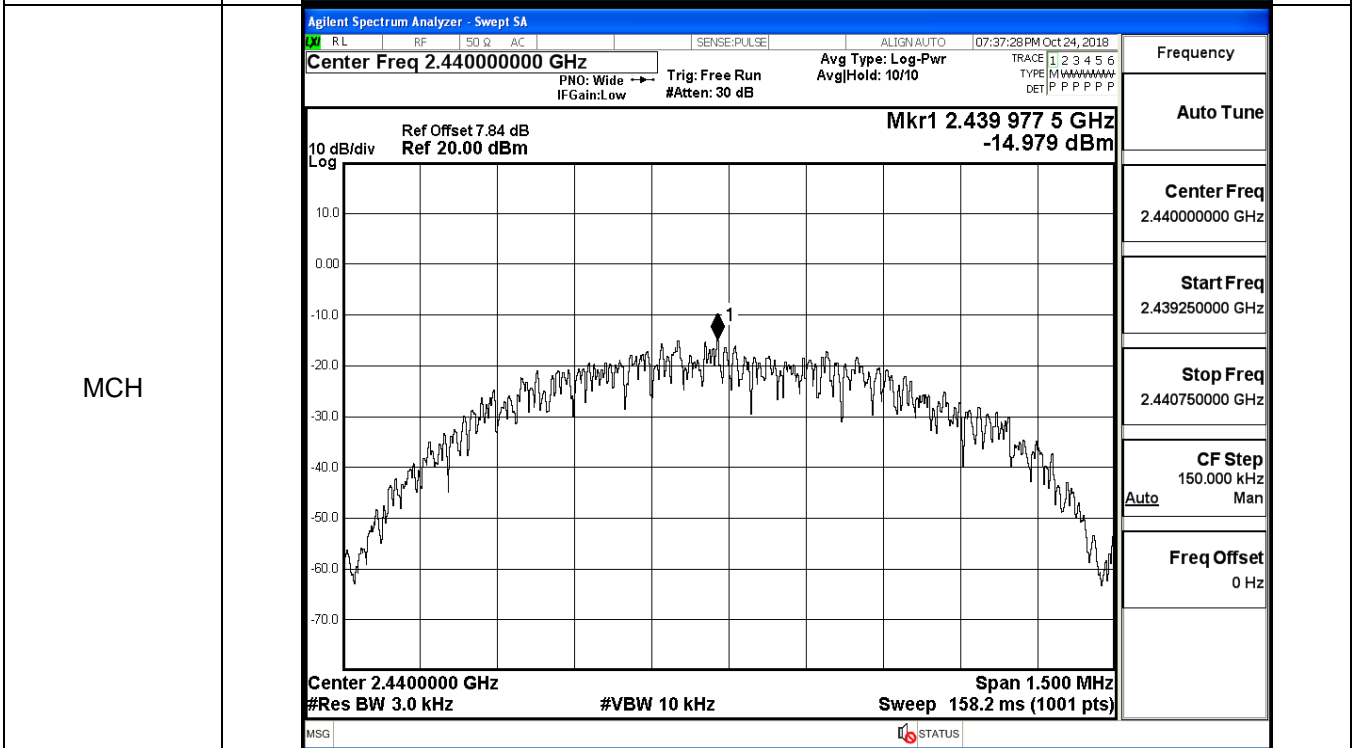
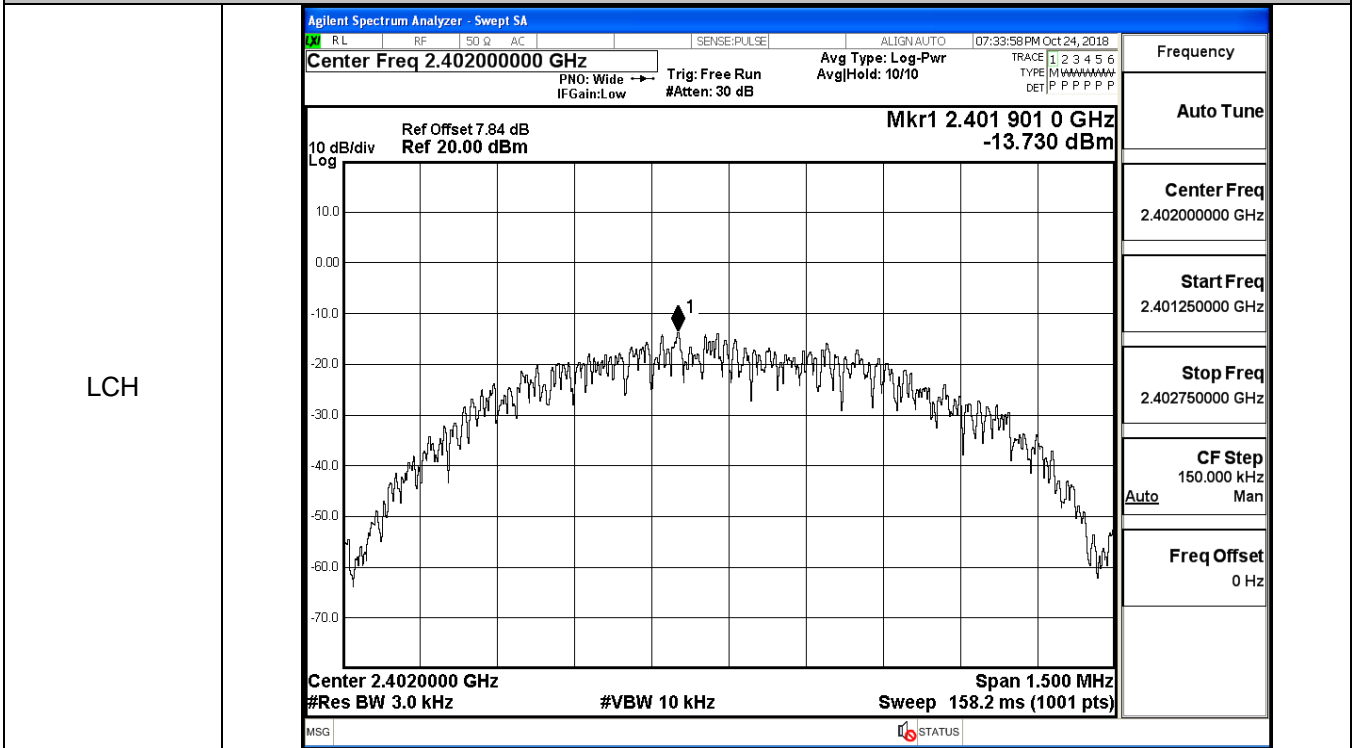


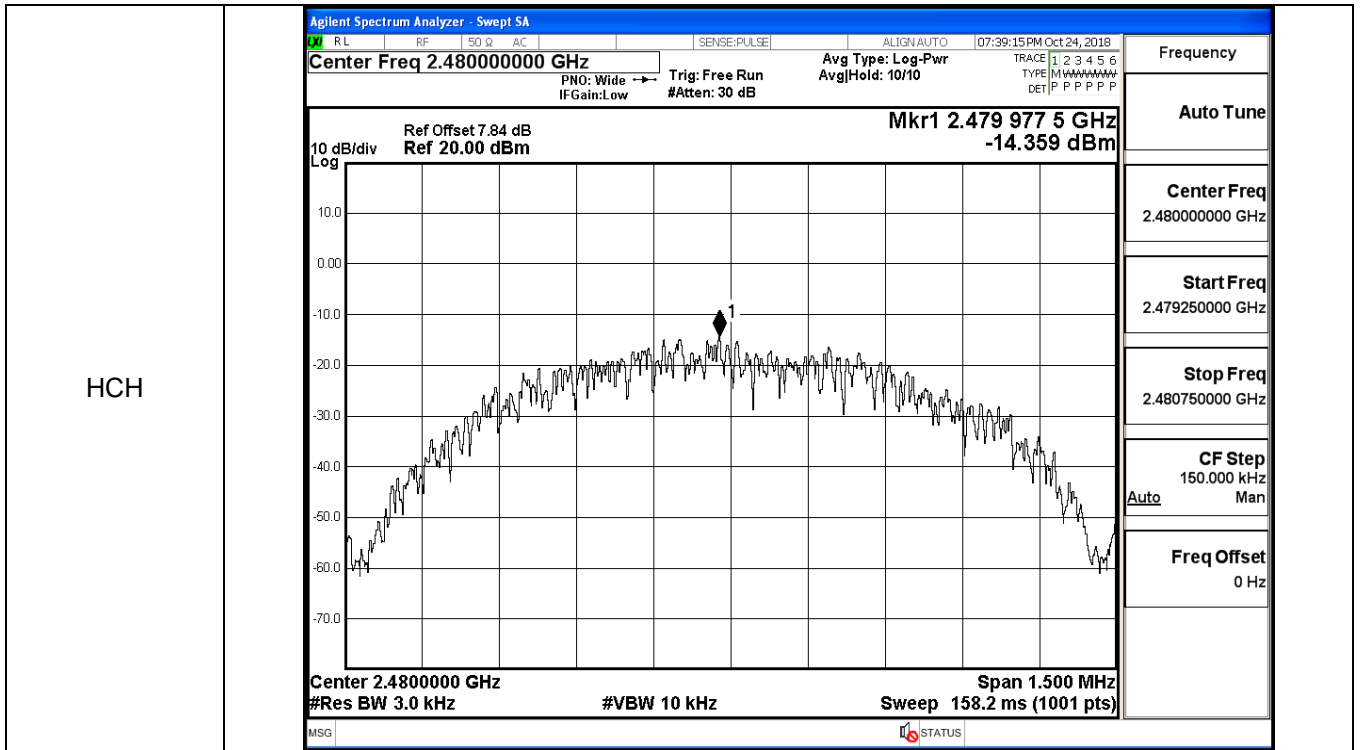


### A.3 Maximum Power Spectral Density

Mode	Channel	PSD [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
BT LE	LCH	-13.730	8	PASS
BT LE	MCH	-14.979	8	PASS
BT LE	HCH	-14.359	8	PASS

#### Test Graphs

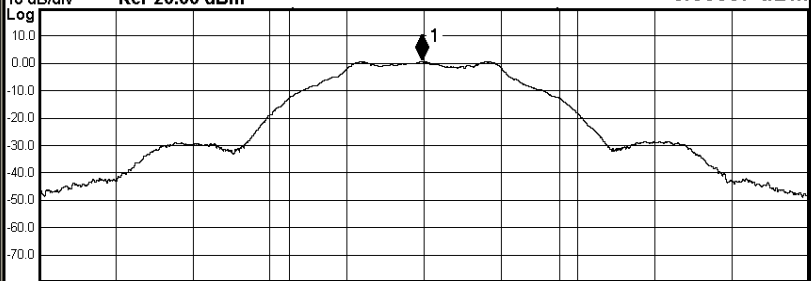





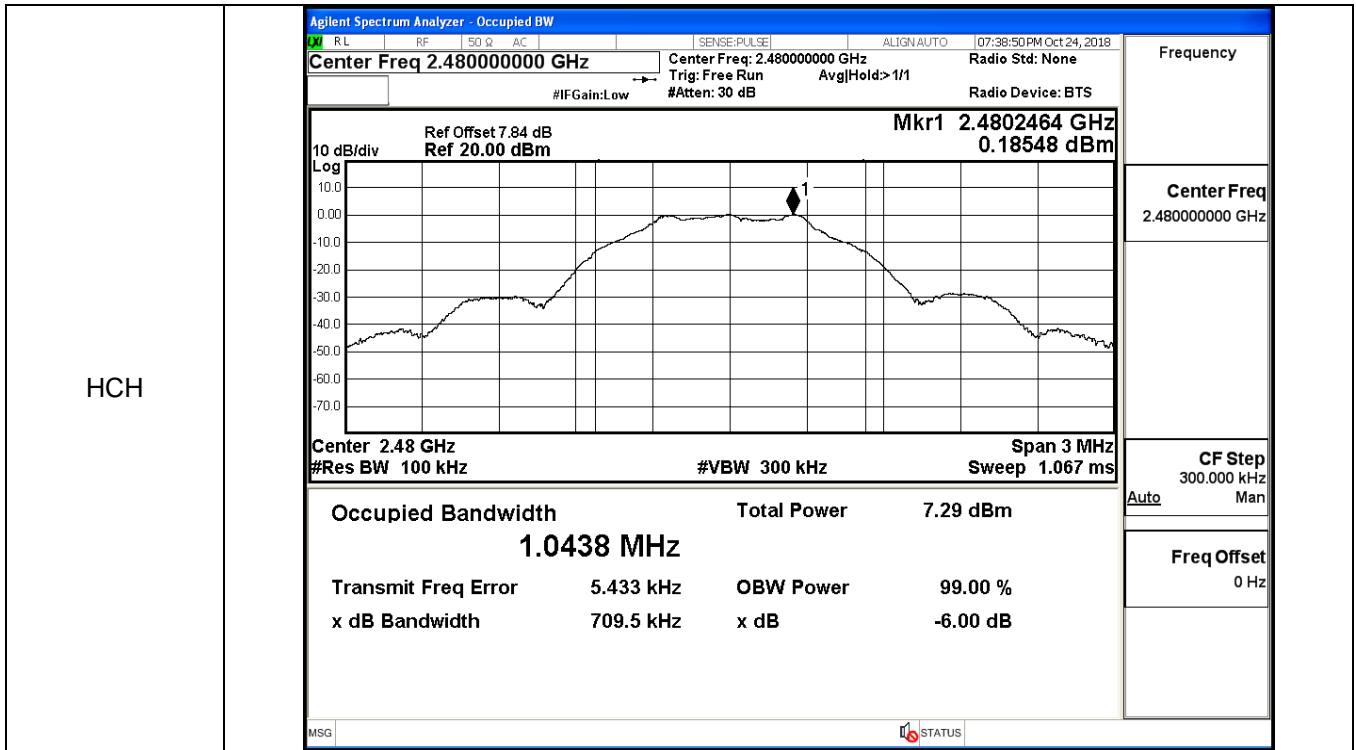
**A.4 6dB Bandwidth**

Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
BT LE	LCH	0.7020	≥0.5	PASS
BT LE	MCH	0.7077	≥0.5	PASS
BT LE	HCH	0.7095	≥0.5	PASS

**Test Graphs**

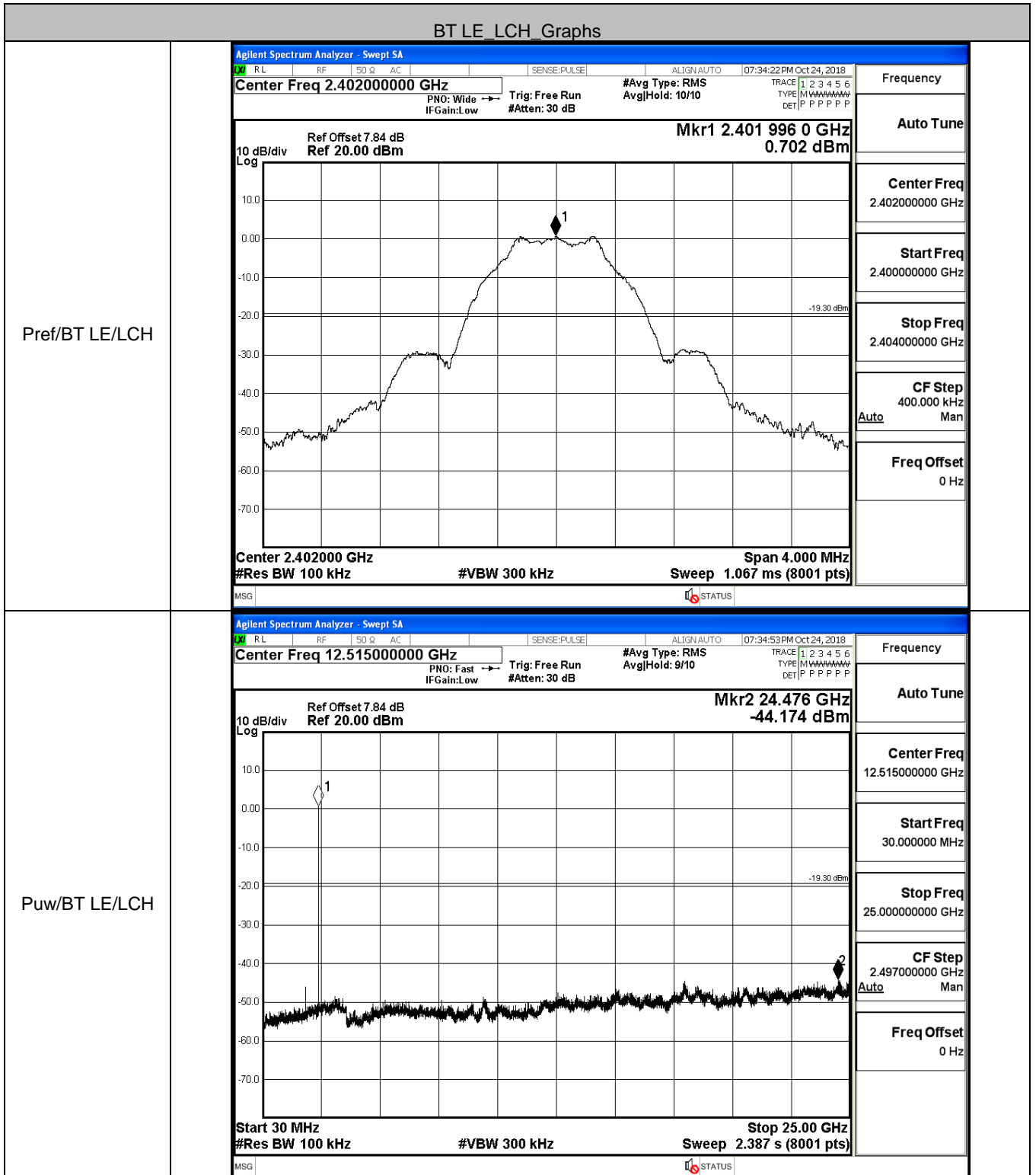
LCH	<p style="font-size: small; margin: 0;">Agilent Spectrum Analyzer - Occupied BW</p> <p style="font-size: x-small; margin: 0;">RL RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 07:33:33 PM Oct 24, 2018</p> <p style="font-size: small; margin: 0;">Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Radio Std: None</p> <p style="font-size: x-small; margin: 0;">Trig: Free Run AvgHold: 1/1</p> <p style="font-size: x-small; margin: 0;">#IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <div style="border: 1px solid black; padding: 2px;"> <p style="font-size: x-small; margin: 0;">10 dB/div Ref Offset 7.84 dB Mkr1 2.4019914 GHz</p> <p style="font-size: x-small; margin: 0;">Log Ref 20.00 dBm 0.68667 dBm</p>  </div> <p style="font-size: x-small; margin: 0;">Center 2.402 GHz Span 3 MHz</p> <p style="font-size: x-small; margin: 0;">#Res BW 100 kHz #VBW 300 kHz Sweep 1.067 ms</p> <table style="width: 100%; font-size: x-small; border-collapse: collapse;"> <tr> <td style="width: 33%;">Occupied Bandwidth</td> <td style="width: 33%;">Total Power</td> <td style="width: 33%;">7.86 dBm</td> </tr> <tr> <td style="text-align: center;"><b>1.0479 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>2.683 kHz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>702.0 kHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></td> <td>99.00 %</td> </tr> <tr> <td></td> <td></td> <td>-6.00 dB</td> </tr> </table> <p style="font-size: x-small; margin: 0;">MSG STATUS</p>	Occupied Bandwidth	Total Power	7.86 dBm	<b>1.0479 MHz</b>			Transmit Freq Error	2.683 kHz	OBW Power	x dB Bandwidth	702.0 kHz	x dB			99.00 %			-6.00 dB	<p style="font-size: x-small; margin: 0;">Frequency</p> <hr/> <p style="font-size: x-small; margin: 0;">Center Freq 2.402000000 GHz</p> <hr/> <p style="font-size: x-small; margin: 0;">CF Step 300.000 kHz</p> <p style="font-size: x-small; margin: 0;">Auto Man</p> <hr/> <p style="font-size: x-small; margin: 0;">Freq Offset 0 Hz</p>
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MCH	<p style="font-size: small; margin: 0;">Agilent Spectrum Analyzer - Occupied BW</p> <p style="font-size: x-small; margin: 0;">RL RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 07:37:03 PM Oct 24, 2018</p> <p style="font-size: small; margin: 0;">Center Freq 2.440000000 GHz Center Freq: 2.440000000 GHz Radio Std: None</p> <p style="font-size: x-small; margin: 0;">Trig: Free Run AvgHold: 1/1</p> <p style="font-size: x-small; margin: 0;">#IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <div style="border: 1px solid black; padding: 2px;"> <p style="font-size: x-small; margin: 0;">10 dB/div Ref Offset 7.84 dB Mkr1 2.4399951 GHz</p> <p style="font-size: x-small; margin: 0;">Log Ref 20.00 dBm -0.44078 dBm</p>  </div> <p style="font-size: x-small; margin: 0;">Center 2.44 GHz Span 3 MHz</p> <p style="font-size: x-small; margin: 0;">#Res BW 100 kHz #VBW 300 kHz Sweep 1.067 ms</p> <table style="width: 100%; font-size: x-small; border-collapse: collapse;"> <tr> <td style="width: 33%;">Occupied Bandwidth</td> <td style="width: 33%;">Total Power</td> <td style="width: 33%;">6.71 dBm</td> </tr> <tr> <td style="text-align: center;"><b>1.0503 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>3.003 kHz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>707.7 kHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></td> <td>99.00 %</td> </tr> <tr> <td></td> <td></td> <td>-6.00 dB</td> </tr> </table> <p style="font-size: x-small; margin: 0;">MSG STATUS</p>	Occupied Bandwidth	Total Power	6.71 dBm	<b>1.0503 MHz</b>			Transmit Freq Error	3.003 kHz	OBW Power	x dB Bandwidth	707.7 kHz	x dB			99.00 %			-6.00 dB	<p style="font-size: x-small; margin: 0;">Frequency</p> <hr/> <p style="font-size: x-small; margin: 0;">Center Freq 2.440000000 GHz</p> <hr/> <p style="font-size: x-small; margin: 0;">CF Step 300.000 kHz</p> <p style="font-size: x-small; margin: 0;">Auto Man</p> <hr/> <p style="font-size: x-small; margin: 0;">Freq Offset 0 Hz</p>
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### A.5 RF Conducted Spurious Emissions

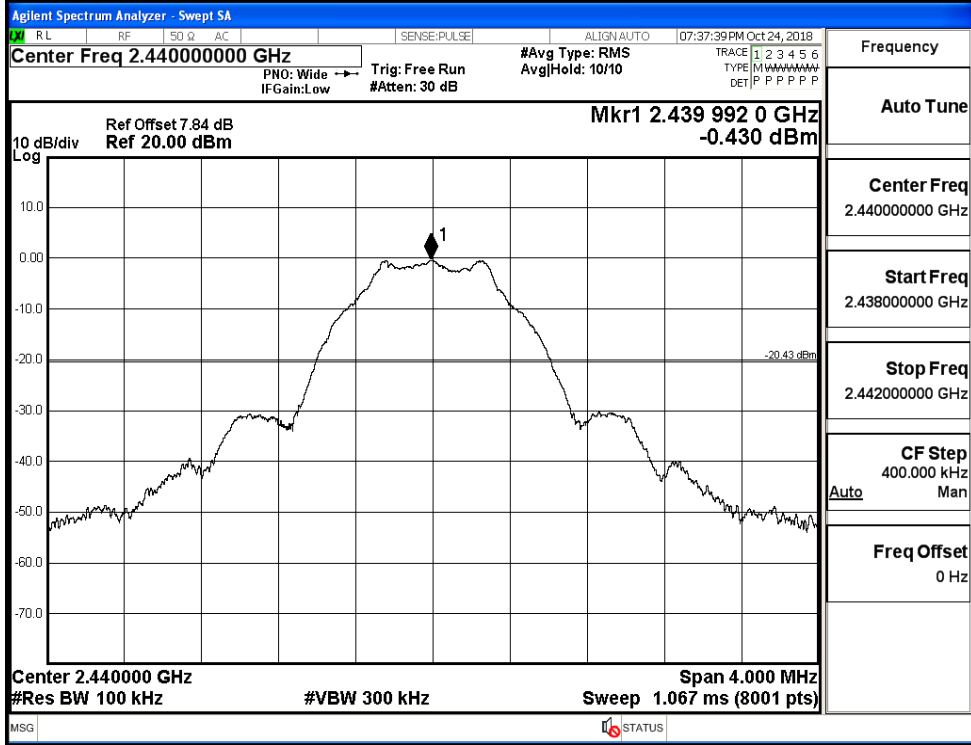
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
BT LE	LCH	0.702	-44.174	-19.298	PASS
BT LE	MCH	-0.43	-44.652	-20.430	PASS
BT LE	HCH	0.177	-44.521	-19.823	PASS



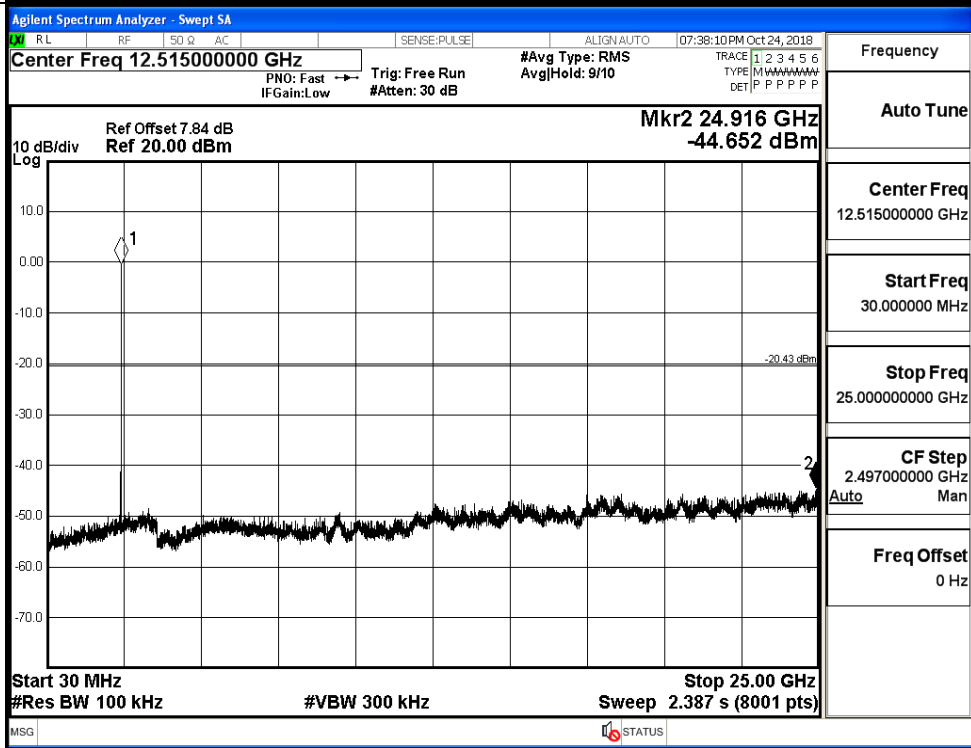


BT LE\_MCH\_Graphs

Pref/BT LE/MCH

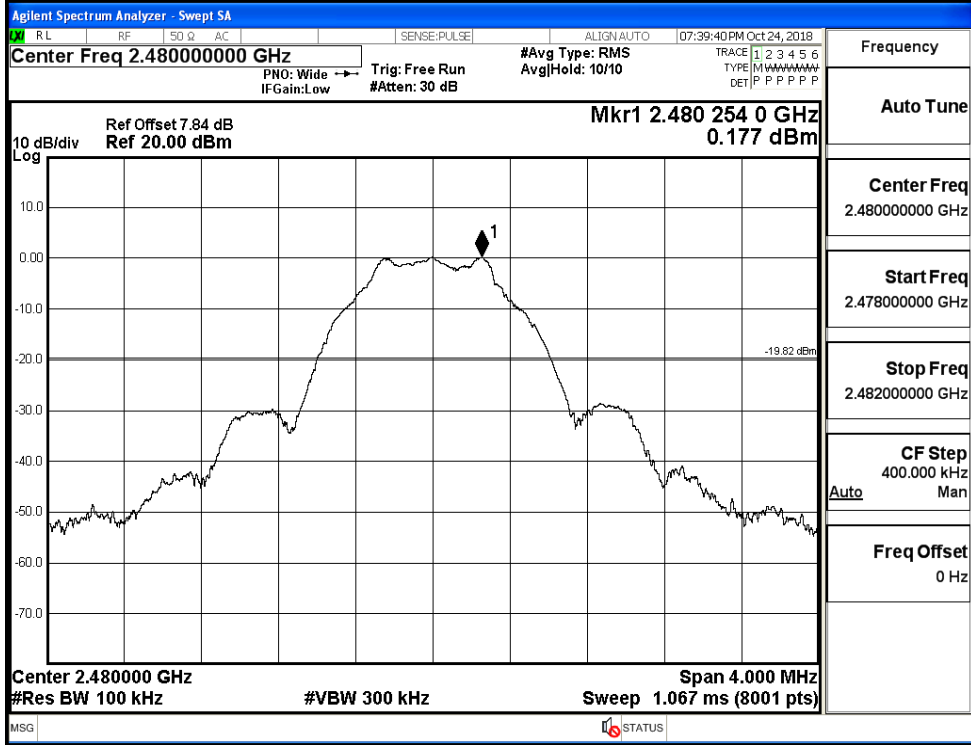


Puw/BT LE/MCH

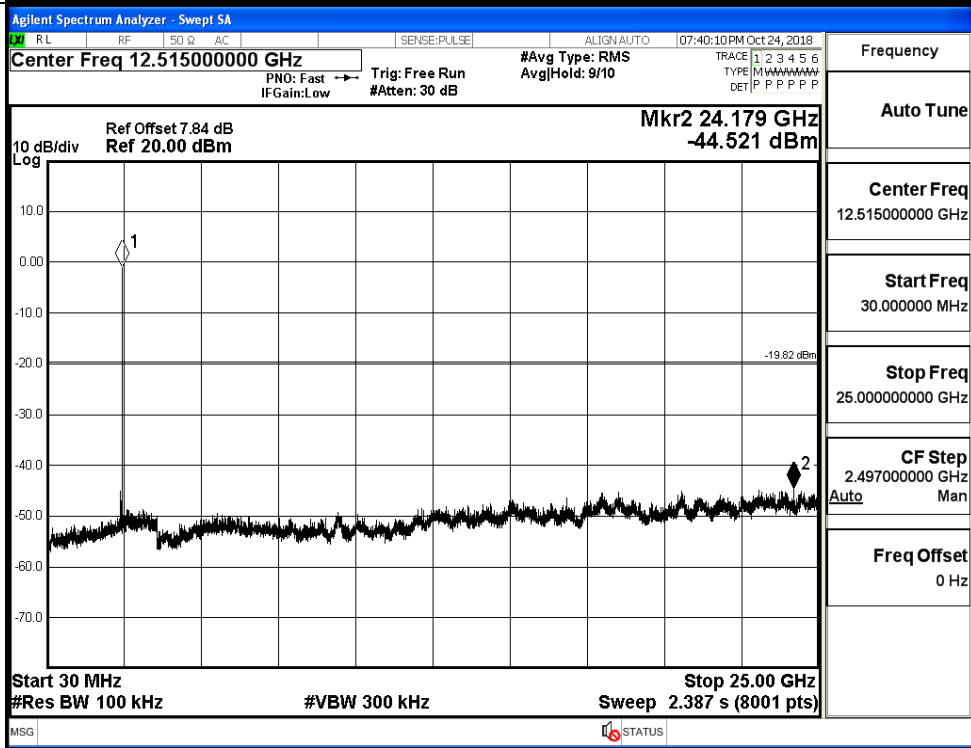


BT LE\_HCH\_Graphs

Pref/BT LE/HCH



Puw/BT LE/HCH



### A.6 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BT LE	LCH	0.860	-50.686	-19.14	PASS
BT LE	HCH	0.387	-49.746	-19.61	PASS

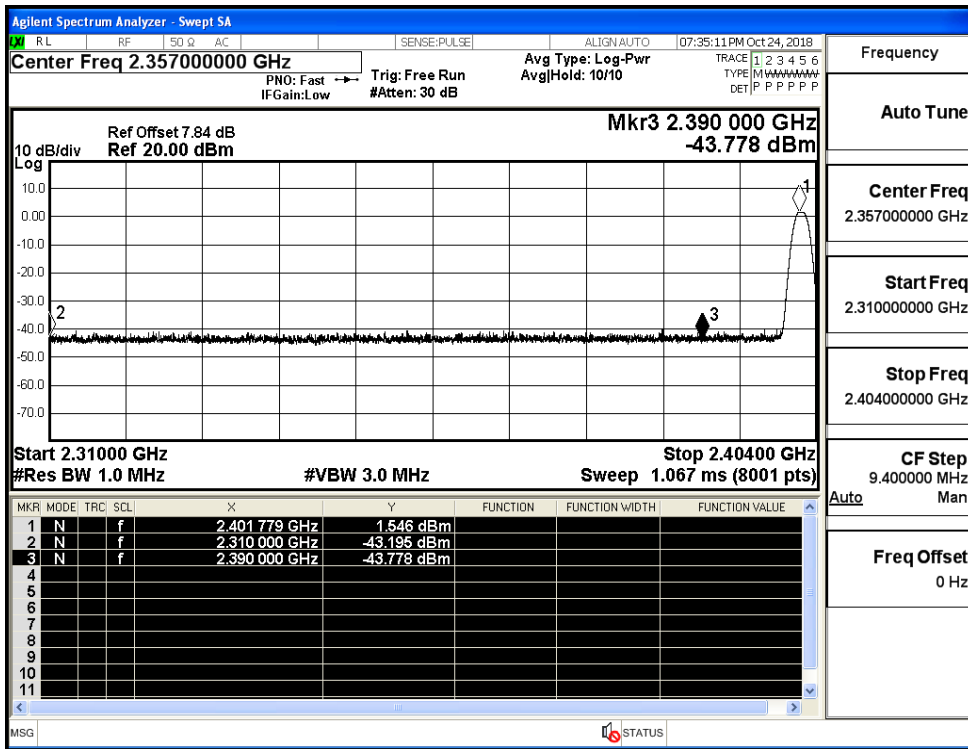
Test Graphs

LCH	<p>Agilent Spectrum Analyzer - Swept SA                  Center Freq 2.35700000 GHz                  Mkr4 2.377 739 GHz                  -50.686 dBm                  Start 2.31000 GHz Stop 2.40400 GHz                  #Res BW 100 kHz #VBW 300 kHz Sweep 9.067 ms (8001 pts)</p> <table border="1" style="font-size: small;"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>f</td><td></td><td>2.402 238 GHz</td><td>0.860 dBm</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>f</td><td></td><td>2.400 000 GHz</td><td>-53.090 dBm</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>f</td><td></td><td>2.390 000 GHz</td><td>-53.331 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.377 739 GHz</td><td>-50.686 dBm</td><td></td><td></td><td></td></tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	f		2.402 238 GHz	0.860 dBm				2	N	f		2.400 000 GHz	-53.090 dBm				3	N	f		2.390 000 GHz	-53.331 dBm				4	N	f		2.377 739 GHz	-50.686 dBm				Frequency Auto Tune Center Freq 2.35700000 GHz Start Freq 2.310000000 GHz Stop Freq 2.404000000 GHz CF Step 9.400000 MHz Freq Offset 0 Hz
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4	N	f		2.377 739 GHz	-50.686 dBm																																										
HCH	<p>Agilent Spectrum Analyzer - Swept SA                  Center Freq 2.489000000 GHz                  Mkr4 2.486 060 25 GHz                  -49.746 dBm                  Start 2.47800 GHz Stop 2.50000 GHz                  #Res BW 100 kHz #VBW 300 kHz Sweep 2.133 ms (8001 pts)</p> <table border="1" style="font-size: small;"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>f</td><td></td><td>2.480 262 25 GHz</td><td>0.387 dBm</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>f</td><td></td><td>2.483 500 00 GHz</td><td>-53.986 dBm</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>f</td><td></td><td>2.500 000 00 GHz</td><td>-54.904 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.486 060 25 GHz</td><td>-49.746 dBm</td><td></td><td></td><td></td></tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	f		2.480 262 25 GHz	0.387 dBm				2	N	f		2.483 500 00 GHz	-53.986 dBm				3	N	f		2.500 000 00 GHz	-54.904 dBm				4	N	f		2.486 060 25 GHz	-49.746 dBm				Frequency Auto Tune Center Freq 2.489000000 GHz Start Freq 2.478000000 GHz Stop Freq 2.500000000 GHz CF Step 2.200000 MHz Freq Offset 0 Hz
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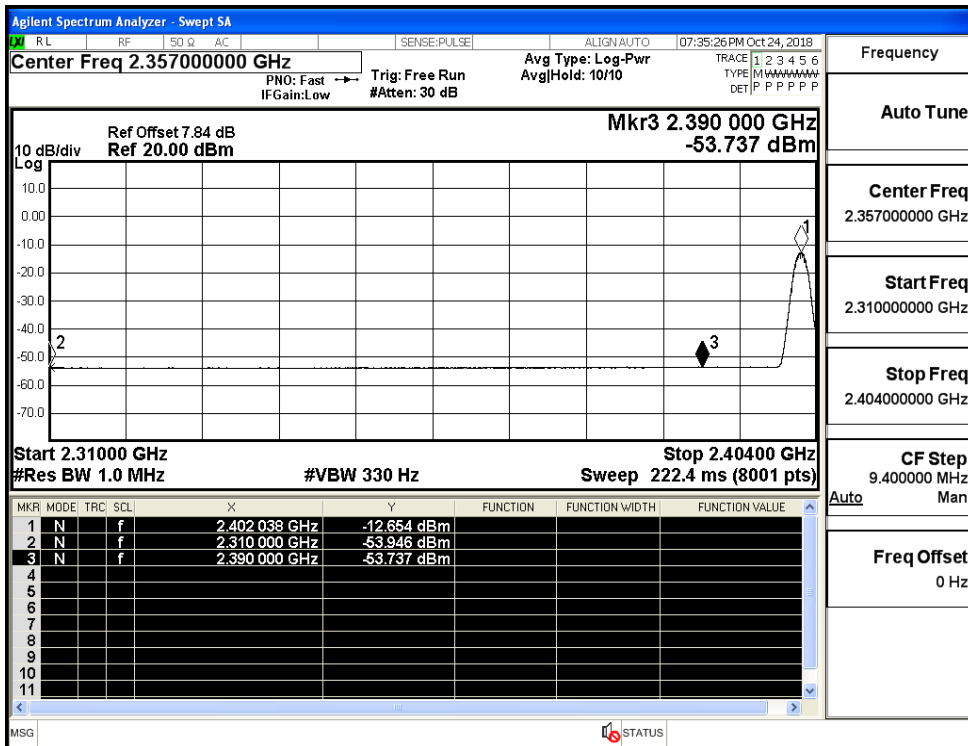
## A.7 Restrict-band band-edge measurements

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdi
BT LE	2402	Ant1	2310.0	-43.20	2.0	0	54.06	PEAK	74	PASS
		Ant1	2310.0	-53.95	2.0	0	43.31	AV	54	PASS
		Ant1	2390.0	-43.78	2.0	0	53.48	PEAK	74	PASS
		Ant1	2390.0	-53.74	2.0	0	43.52	AV	54	PASS
	2480	Ant1	2483.5	-43.21	2.0	0	54.05	PEAK	74	PASS
		Ant1	2483.5	-53.35	2.0	0	43.91	AV	54	PASS
		Ant1	2500.0	-43.60	2.0	0	53.66	PEAK	74	PASS
		Ant1	2500.0	-53.26	2.0	0	44.00	AV	54	PASS

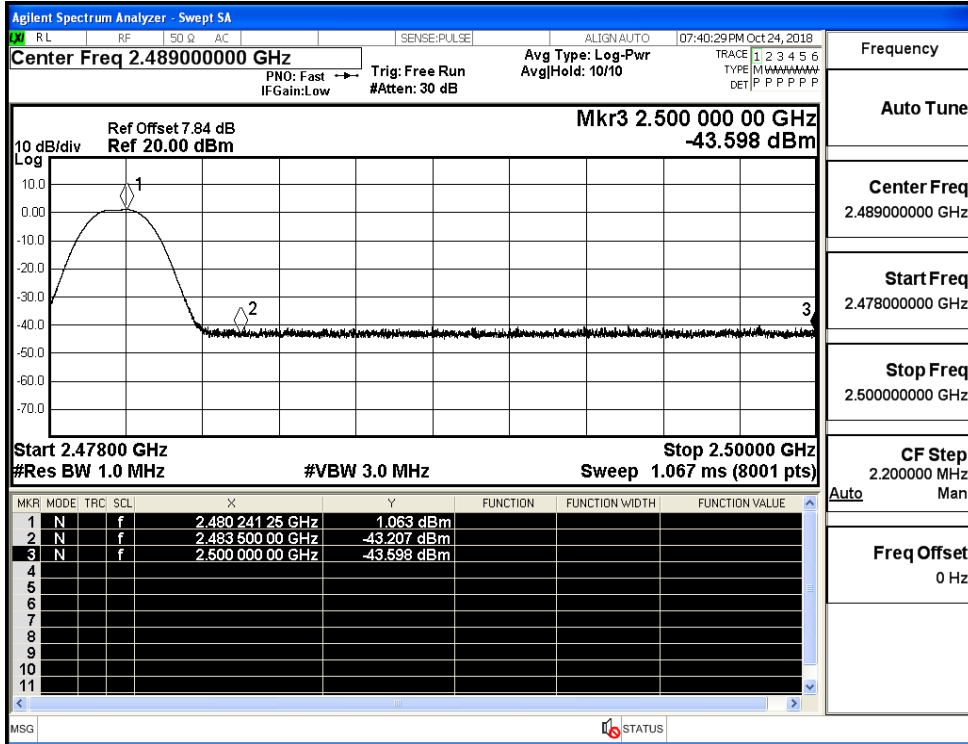
Restrict-band band-edge measurements\_BT LE\_2402\_Ant1\_PEAK



Restrict-band band-edge measurements\_BT LE\_2402\_Ant1\_AV



Restrict-band band-edge measurements\_BT LE\_2480\_Ant1\_PEAK



Restrict-band band-edge measurements\_BT LE\_2480\_Ant1\_AV

