

Appendix A

RF Test Data for BT V4.1(BTLE) (Conducted Measurement)

Product Name: LevelMatePRO Plus

Trade Mark: Command Electronics

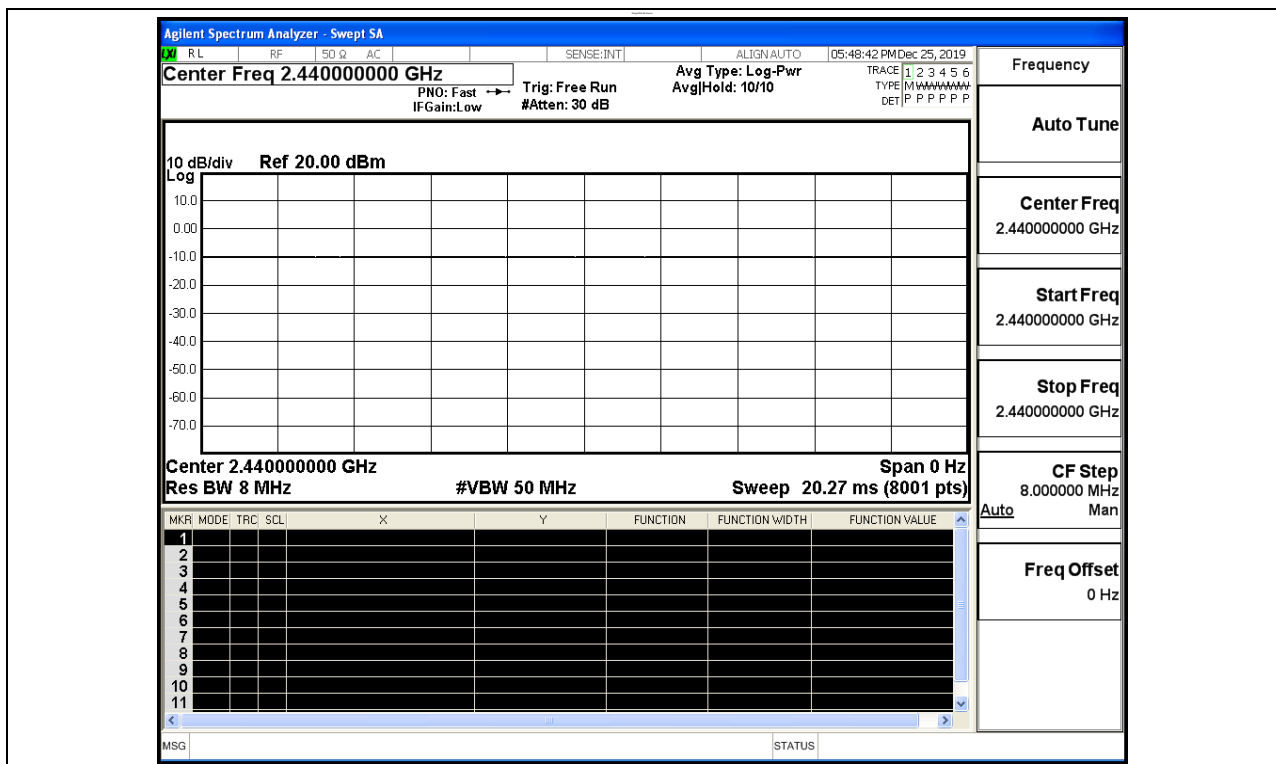
Test Model: LevelMatePRO Plus

Environmental Conditions

Temperature:	24.5 ° C
Relative Humidity:	52.9%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond Lu
Supervised by:	Wang Chuang

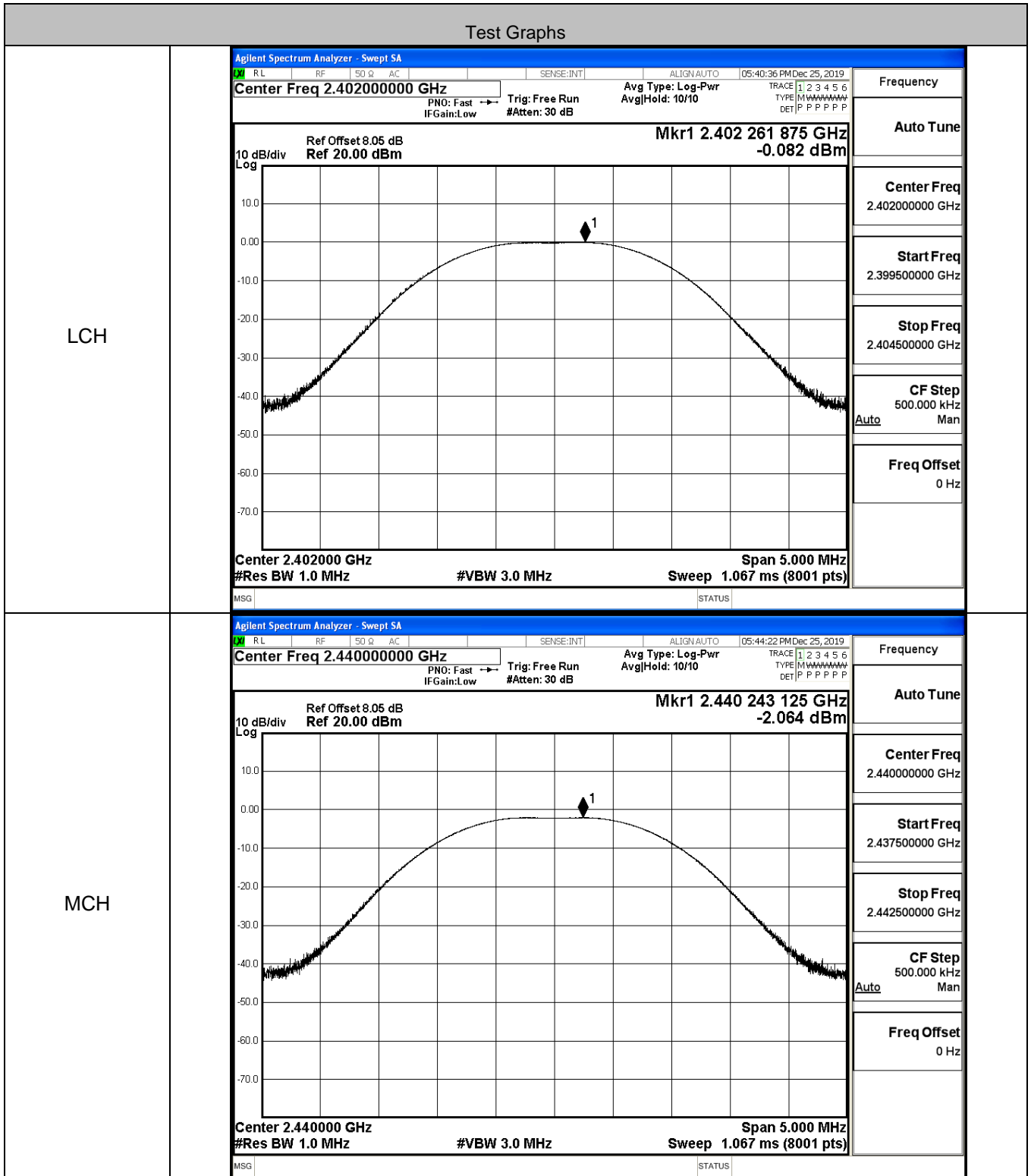
A.1 Duty Cycle

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



A.2 Maximum Conducted Peak Output Power

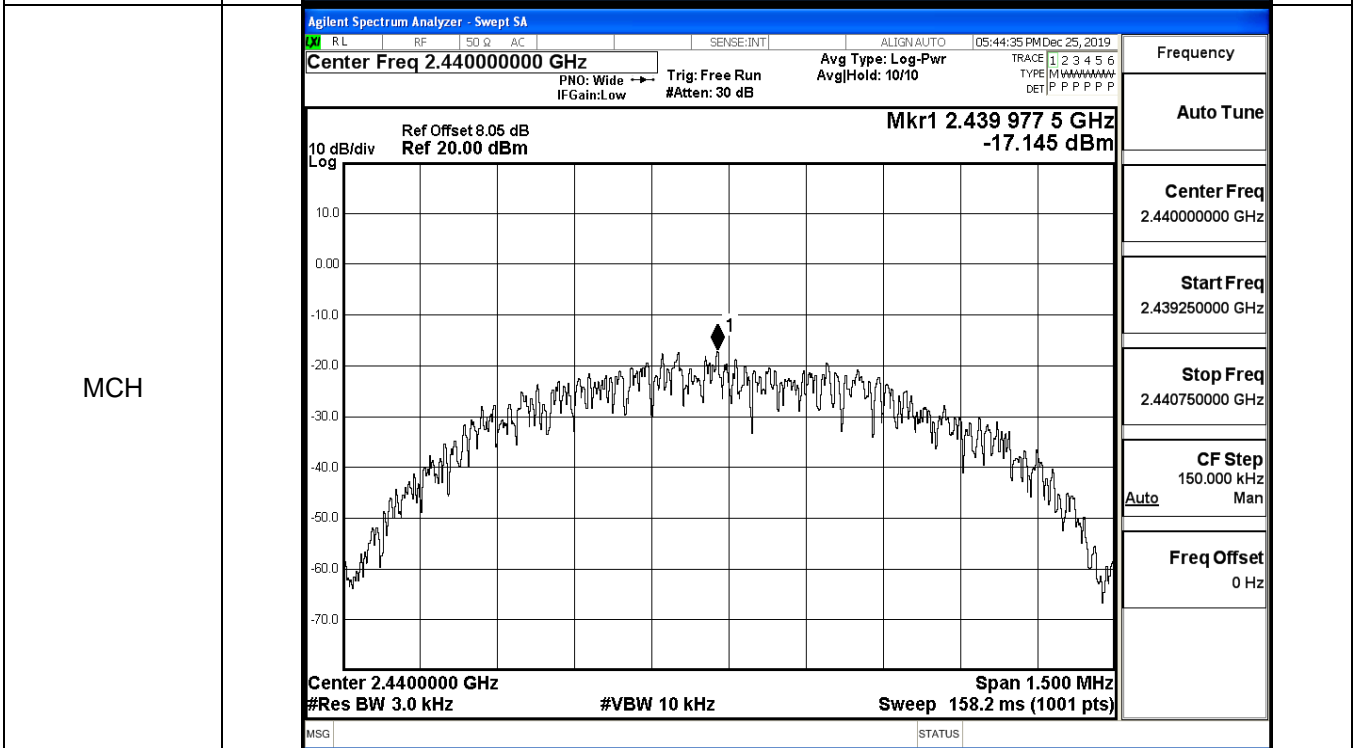
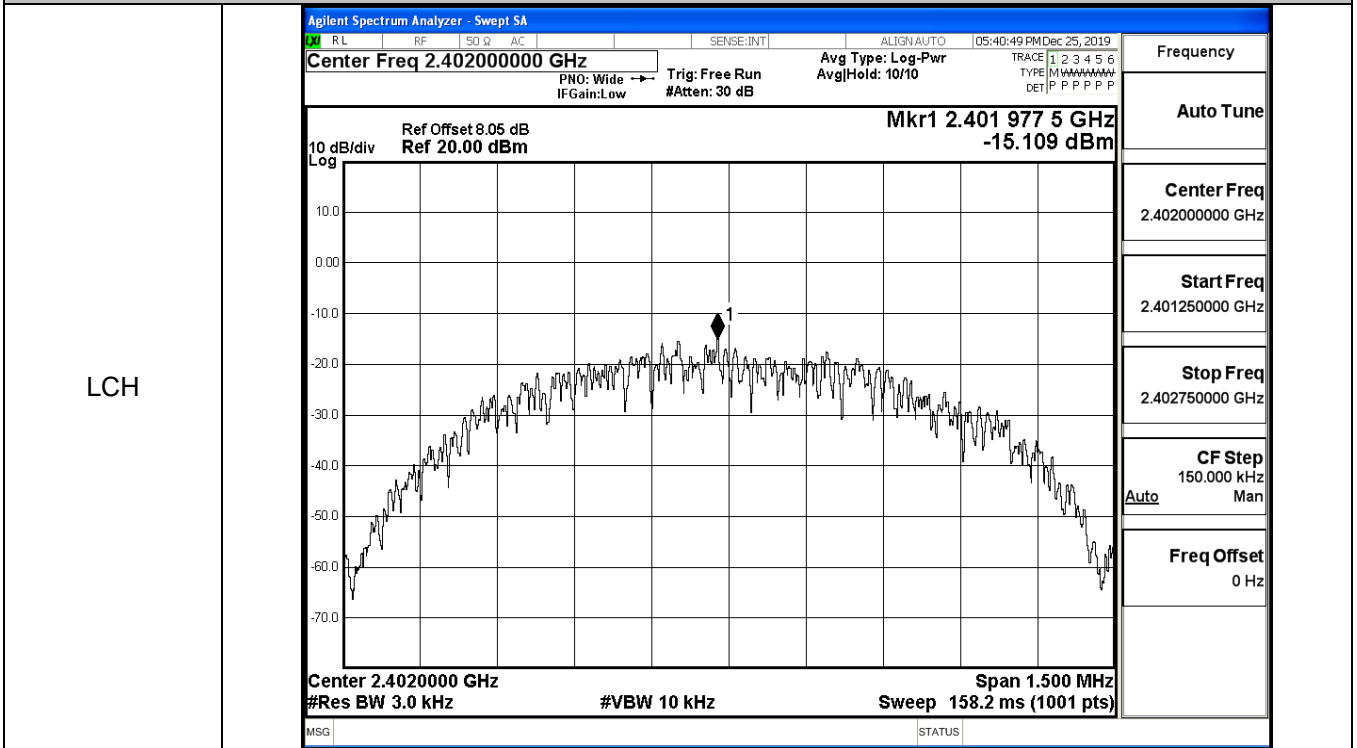
Mode	Channel	Conduct Peak Power[dBm]	Limit [dBm]	Verdict
BT LE	LCH	-0.082	30	PASS
BT LE	MCH	-2.064	30	PASS
BT LE	HCH	-0.801	30	PASS



A.3 Maximum Power Spectral Density

Mode	Channel	PSD [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
BT LE	LCH	-15.109	8	PASS
BT LE	MCH	-17.145	8	PASS
BT LE	HCH	-15.787	8	PASS

Test Graphs



A.4 6dB Bandwidth

Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
BT LE	LCH	0.7015	≥0.5	PASS
BT LE	MCH	0.6995	≥0.5	PASS
BT LE	HCH	0.6995	≥0.5	PASS

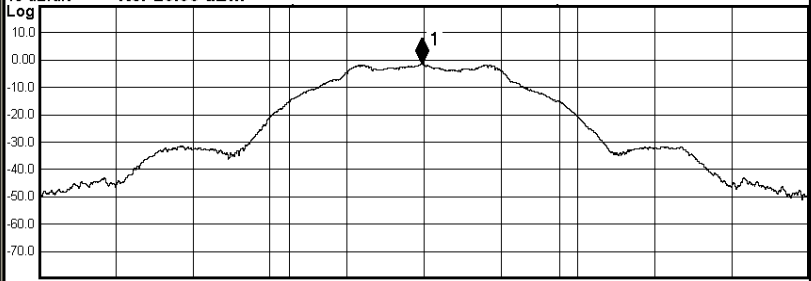
Test Graphs																	
LCH	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Agilent Spectrum Analyzer - Occupied BW</p> <p style="font-size: small; margin: 0;">RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 05:40:24 PM Dec 25, 2019</p> <p style="margin: 0;">Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Radio Std: None Trig: Free Run AvgHold: >1/1 #IFGain: Low #Atten: 30 dB Radio Device: BTS</p> <div style="display: flex; justify-content: space-between;"> <div style="font-size: x-small;">10 dB/div Log</div> <div style="text-align: right;">Mkr1 2.4020004 GHz -0.94094 dBm</div> </div> <div style="display: flex; justify-content: space-between; font-size: x-small;"> <div>Center 2.402 GHz #Res BW 100 kHz</div> <div>#VBW 300 kHz</div> <div>Span 3 MHz Sweep 1.067 ms</div> </div> <table style="width: 100%; font-size: x-small; margin-top: 5px;"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td colspan="2">6.11 dBm</td> </tr> <tr> <td colspan="4" style="text-align: center;">1.0517 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>6.122 kHz</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>701.5 kHz</td> <td>x dB</td> <td>-6.00 dB</td> </tr> </table> <p style="font-size: x-small; margin-top: 5px;">MSG STATUS</p> </div>	Occupied Bandwidth	Total Power	6.11 dBm		1.0517 MHz				Transmit Freq Error	6.122 kHz	OBW Power	99.00 %	x dB Bandwidth	701.5 kHz	x dB	-6.00 dB
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HCH

Agilent Spectrum Analyzer - Occupied BW

<input type="checkbox"/> RL	<input type="checkbox"/> RF	<input type="checkbox"/> 50 Ω	<input type="checkbox"/> AC	<input type="checkbox"/> SENSE:INT	<input type="checkbox"/> ALIGN:AUTO	05:45:45 PM Dec 25, 2019
Center Freq 2.480000000 GHz				Center Freq: 2.480000000 GHz	Radio Std: None	Frequency
				Trig: Free Run	AvgJHold: 1/1	
				#IFGain:Low	#Atten: 30 dB	Radio Device: BTS

10 dB/div	Ref Offset 8.05 dB	Mkr1 2.479994 GHz
Log	Ref 20.00 dBm	-1.5698 dBm



Center 2.48 GHz Span 3 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 1.067 ms

Occupied Bandwidth	Total Power	5.45 dBm
1.0483 MHz		
Transmit Freq Error	2.592 kHz	OBW Power
x dB Bandwidth	699.5 kHz	x dB
		99.00 %
		-6.00 dB

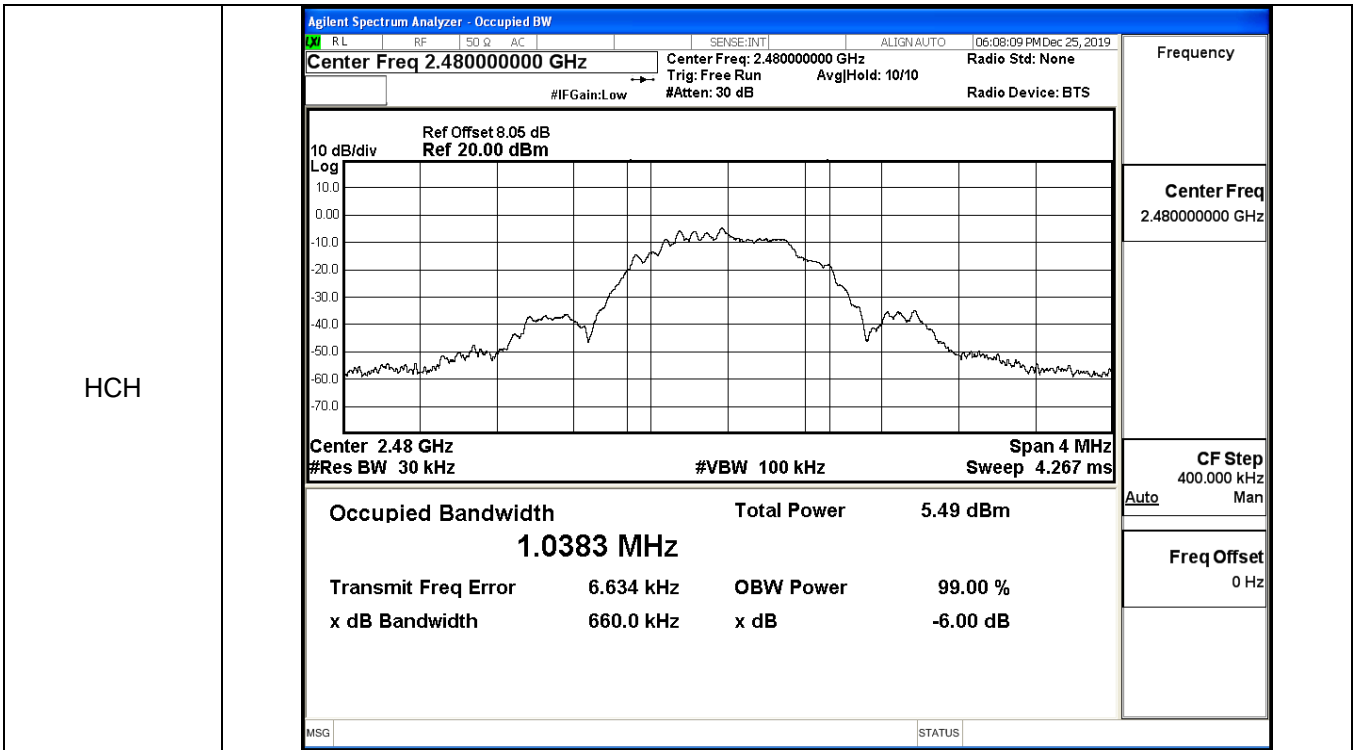
Center Freq 2.480000000 GHz	
CF Step 300.000 kHz Auto Man	
Freq Offset 0 Hz	

A.5 Occupied Bandwidth

Mode	Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
BT LE	LCH	1.0403	≥0.5	PASS
BT LE	MCH	1.0418	≥0.5	PASS
BT LE	HCH	1.0383	≥0.5	PASS

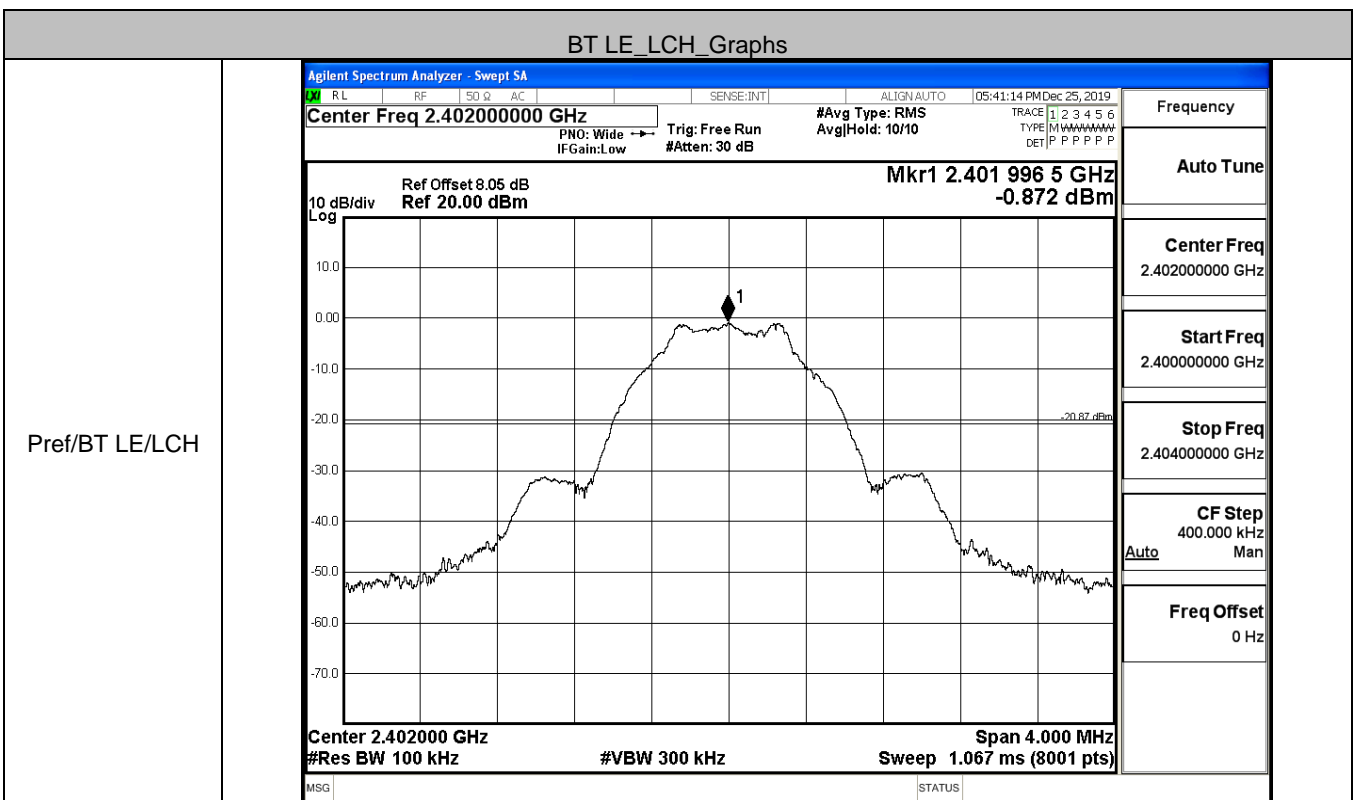
Test Graphs

LCH	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.40200000 GHz</p> <p>Center Freq: 2.40200000 GHz Trig: Free Run #Atten: 30 dB</p> <p>Radio Std: None AvgHold: >10/10 Radio Device: BTS</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm</p> <p>10 dB/div Log</p> <p>Center 2.402 GHz #Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 4 MHz Sweep 4.267 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>6.19 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">1.0403 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>8.610 kHz</td> <td>OBW Power 99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>661.0 kHz</td> <td>x dB -6.00 dB</td> </tr> </table> <p>MSG STATUS</p>	Occupied Bandwidth	Total Power	6.19 dBm	1.0403 MHz			Transmit Freq Error	8.610 kHz	OBW Power 99.00 %	x dB Bandwidth	661.0 kHz	x dB -6.00 dB	<p>Frequency</p> <p>Center Freq 2.40200000 GHz</p> <p>CF Step 400.000 kHz Auto Man</p> <p>Freq Offset 0 Hz</p>
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1.0403 MHz														
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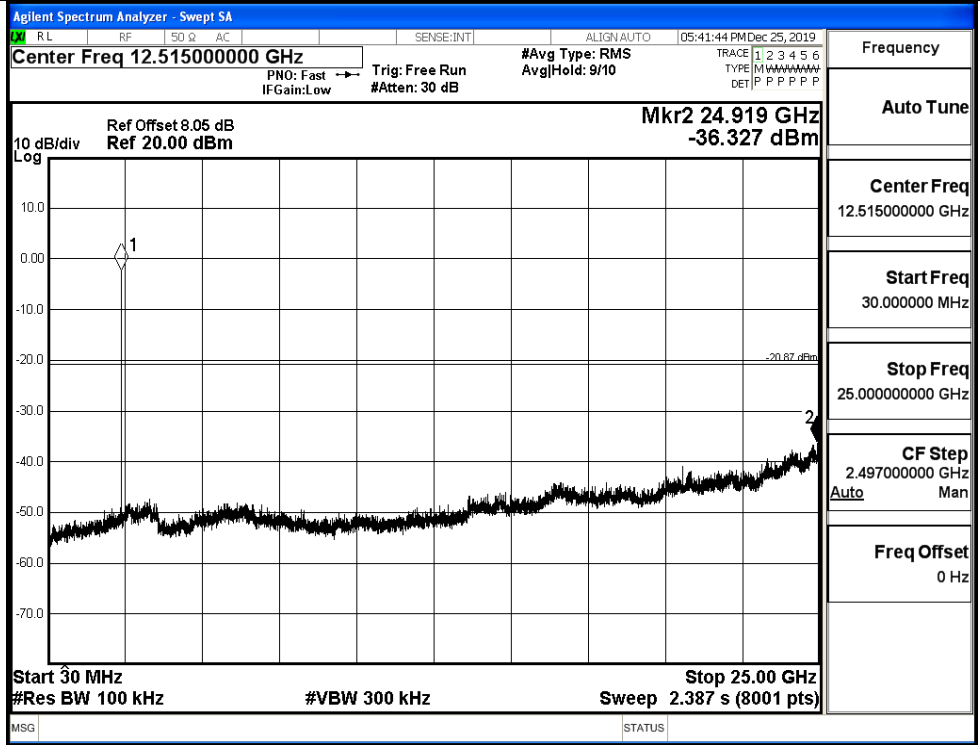


A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
BT LE	LCH	-0.872	-36.327	-20.872	PASS
BT LE	MCH	-2.85	-36.231	-22.850	PASS
BT LE	HCH	-1.592	-37.227	-21.592	PASS

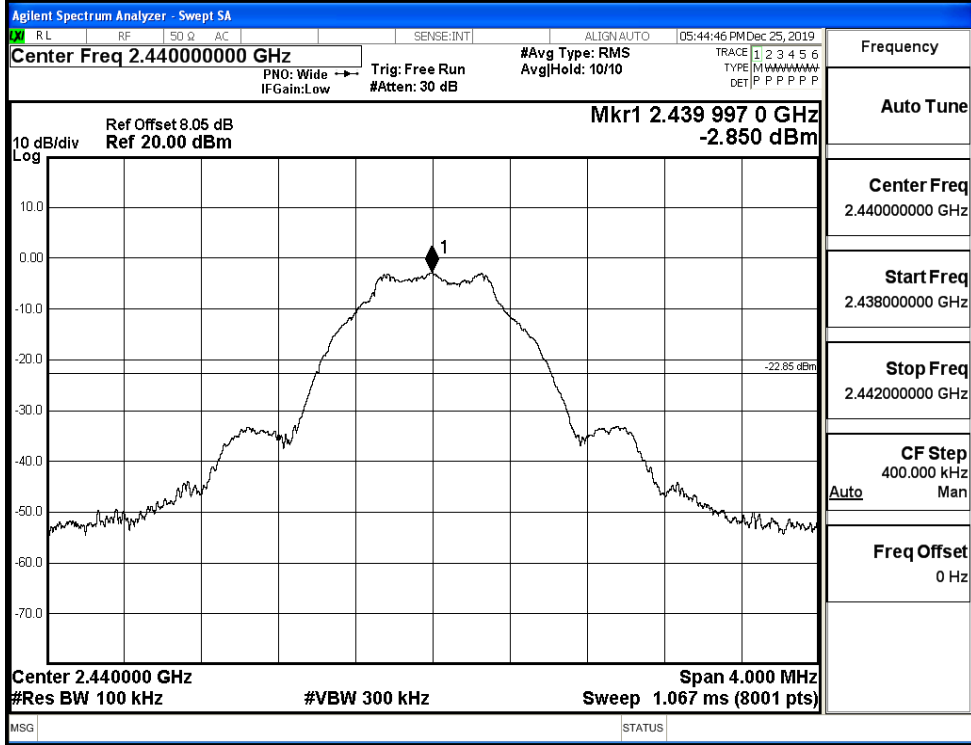


Puw/BT LE/LCH

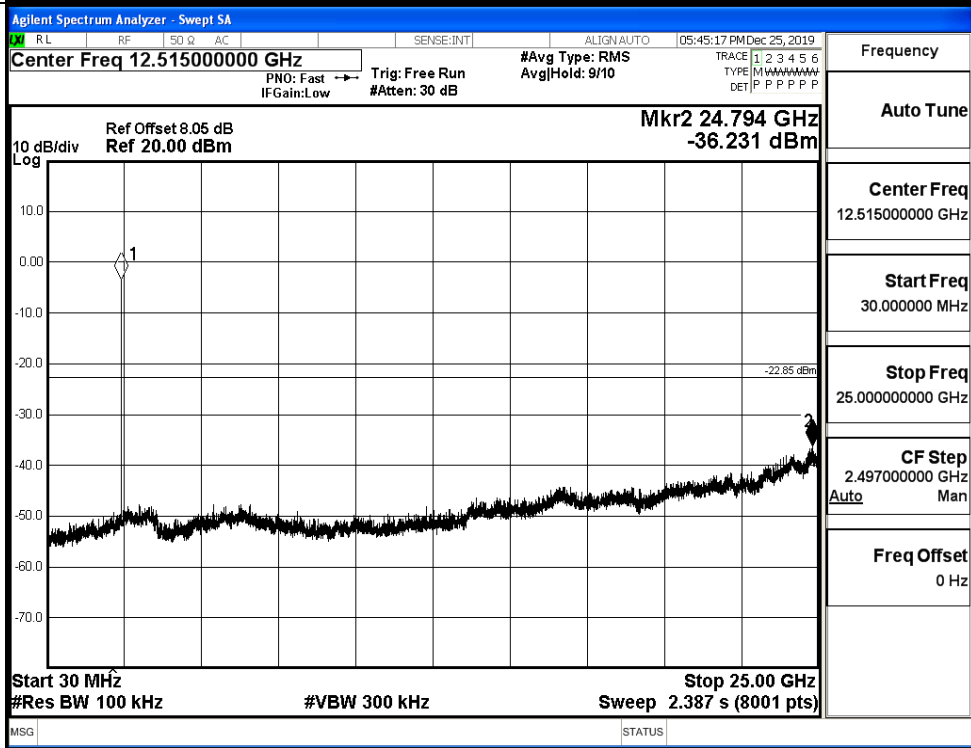


BT LE_MCH_Graphs

Pref/BT LE/MCH

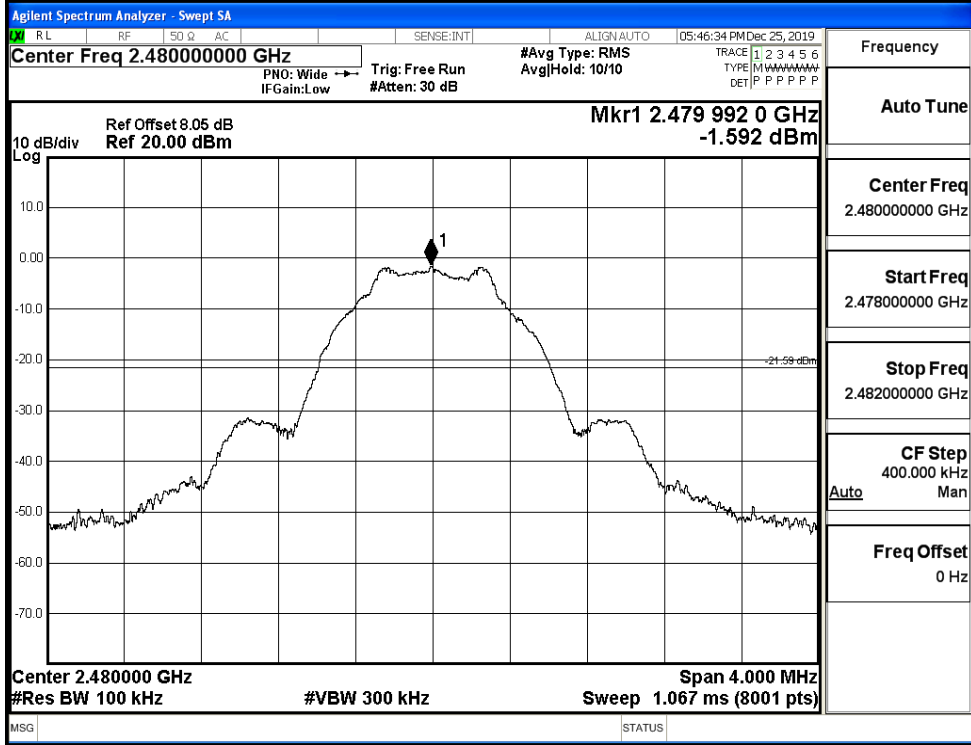


Puw/BT LE/MCH

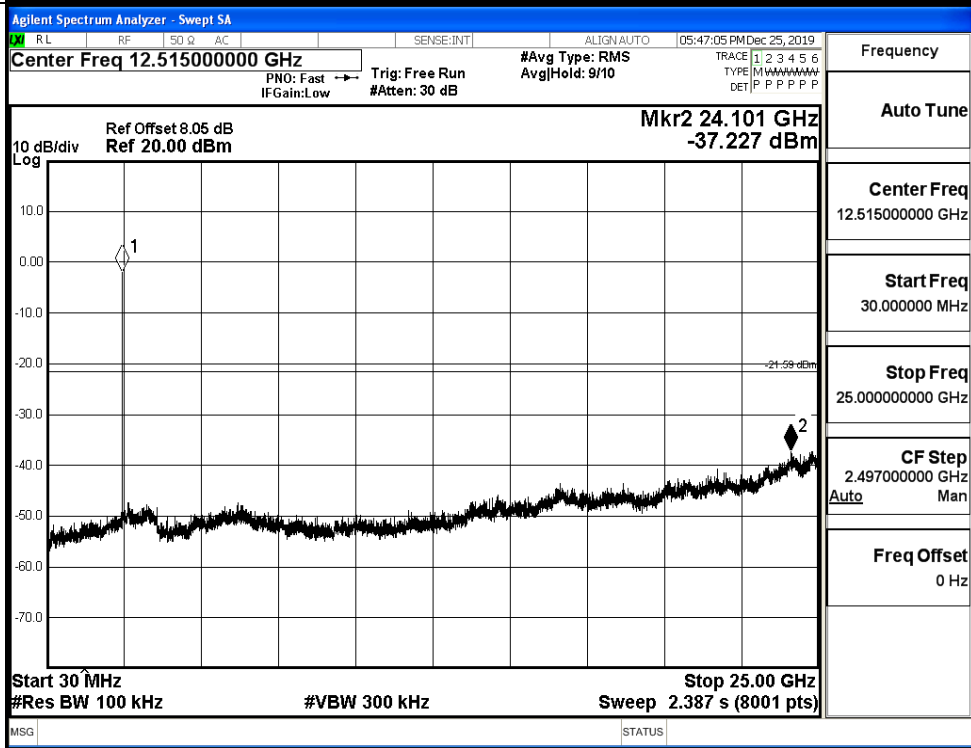


BT LE_HCH_Graphs

Pref/BT LE/HCH



Puw/BT LE/HCH



A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BT LE	LCH	-0.732	-50.047	-20.73	PASS
BT LE	HCH	-1.356	-49.030	-21.36	PASS

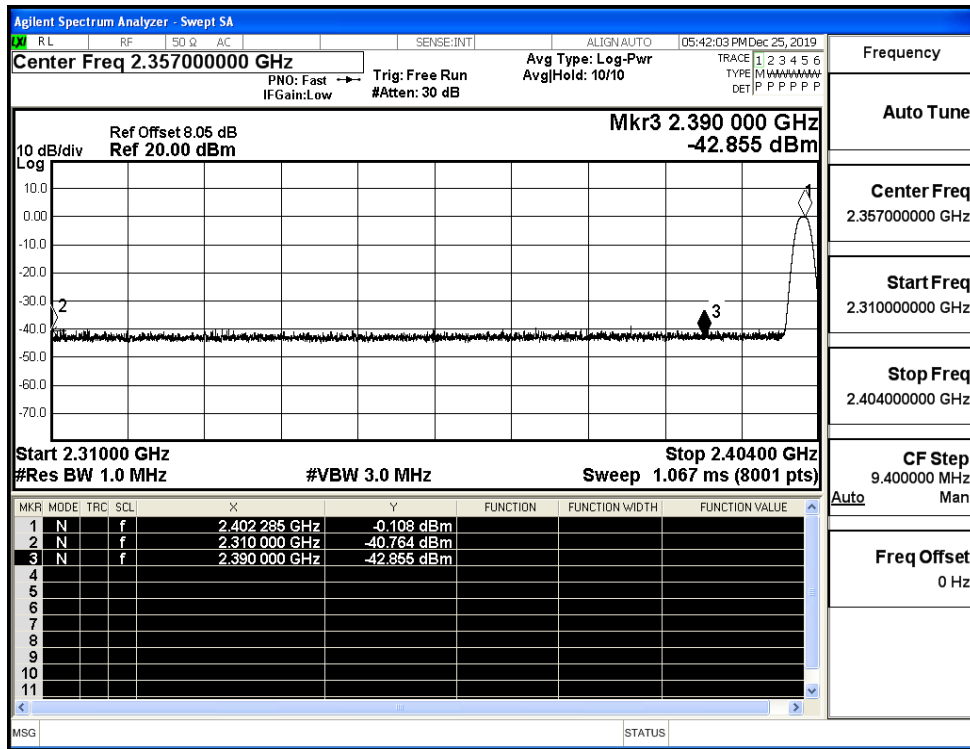
Test Graphs

LCH	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.35700000 GHz Ref Offset 8.05 dB, Ref 20.00 dBm Mkr4 2.387 632 GHz -50.047 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="width: 100%; border-collapse: collapse; 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>2.402 249 GHz</td><td>-0.732 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>-53.435 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>-52.217 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.387 632 GHz</td><td>-50.047 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		2.402 249 GHz	-0.732 dBm				2	N	f		2.400 000 GHz	-53.435 dBm				3	N	f		2.390 000 GHz	-52.217 dBm				4	N	f		2.387 632 GHz	-50.047 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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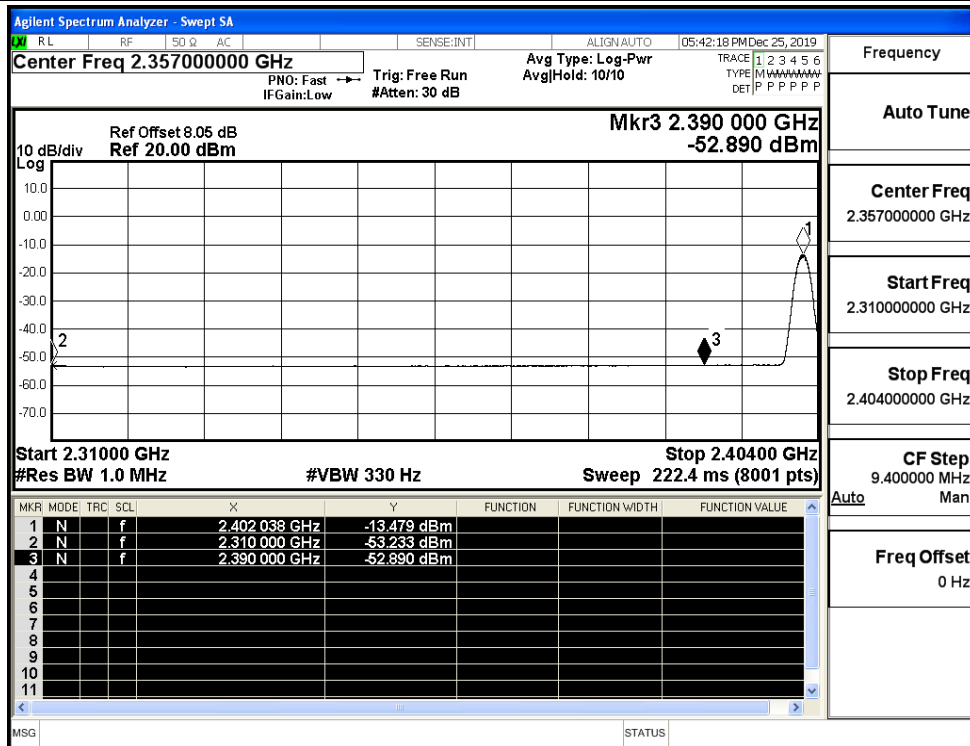
A.8 Restrict-band band-edge measurements

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	-40.76	2.0	0	56.49	PEAK	74	PASS
		Ant1	2310.0	-53.23	2.0	0	44.02	AV	54	PASS
		Ant1	2390.0	-42.86	2.0	0	54.40	PEAK	74	PASS
		Ant1	2390.0	-52.89	2.0	0	44.37	AV	54	PASS
	2480	Ant1	2483.5	-42.19	2.0	0	55.07	PEAK	74	PASS
		Ant1	2483.5	-52.47	2.0	0	44.78	AV	54	PASS
		Ant1	2500.0	-42.44	2.0	0	54.82	PEAK	74	PASS
		Ant1	2500.0	-52.34	2.0	0	44.92	AV	54	PASS

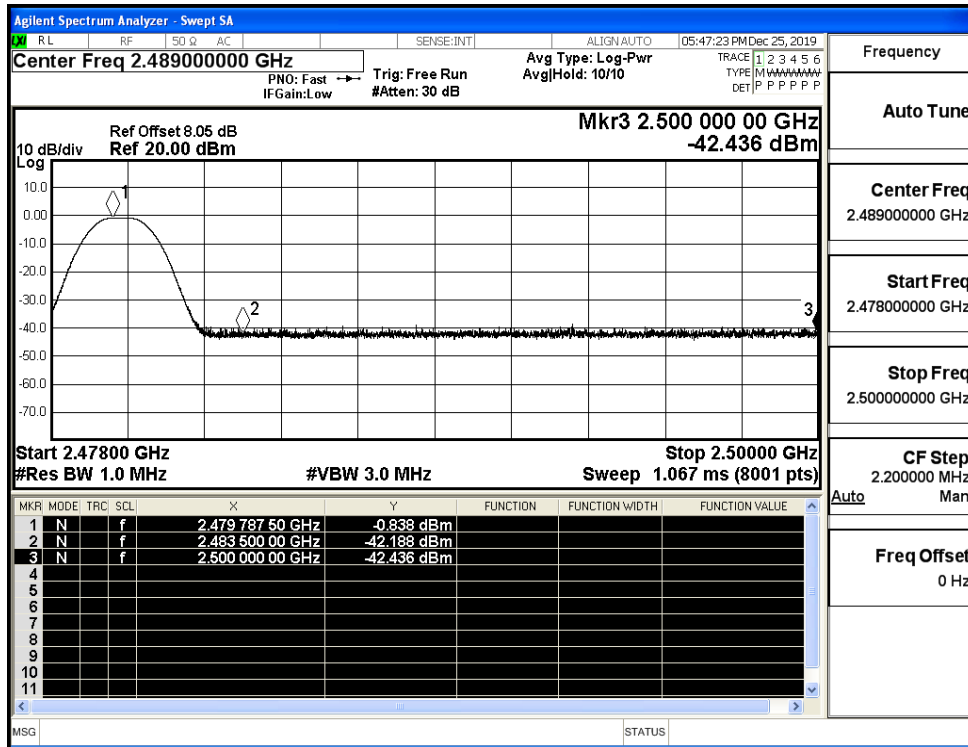
Restrict-band band-edge measurements_BT LE_2402_Ant1_PEAK



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

