

Appendix B

RF Test Data for BT LE V5.0(DTS) (Conducted Measurement)

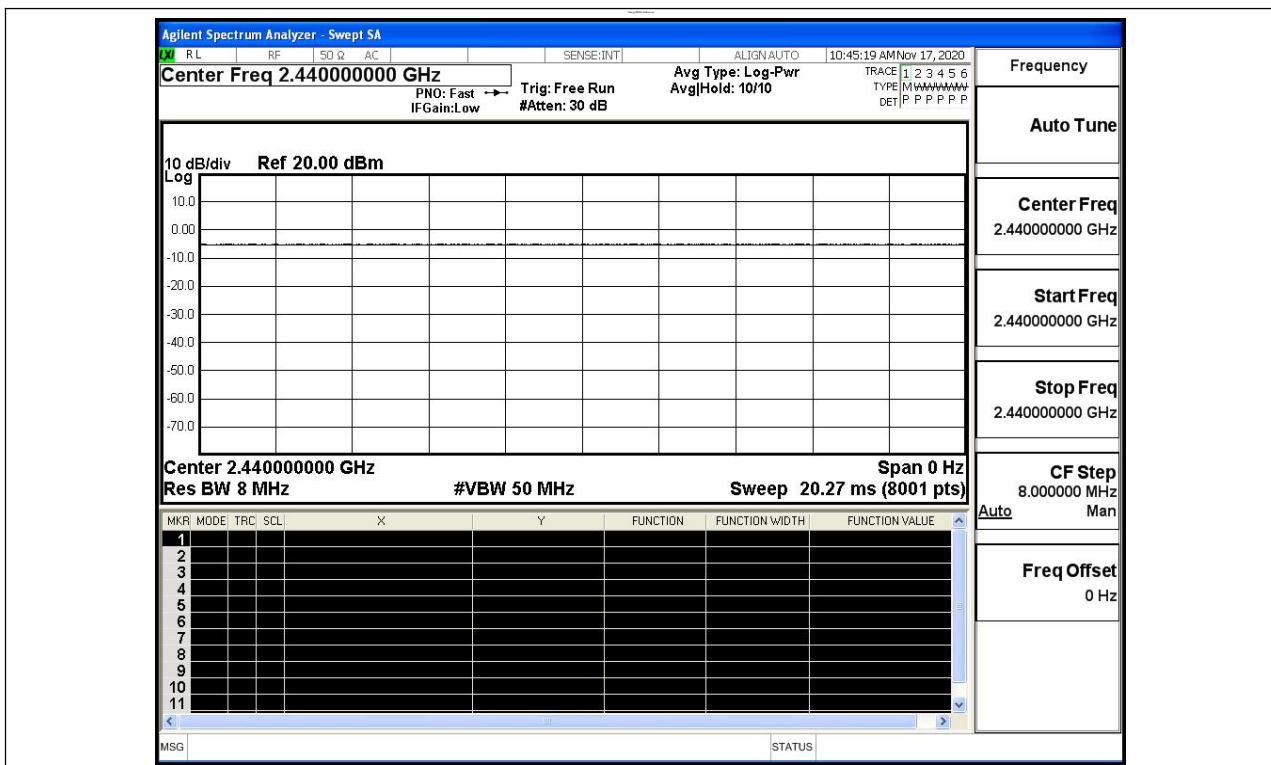
Product Name: Smart Door Lock
Trade Mark: Kaadas, Alfred
Test Model: ML2

Environmental Conditions

Temperature:	25.3° C
Relative Humidity:	54.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Kay Hu
Supervised by:	Li Huan

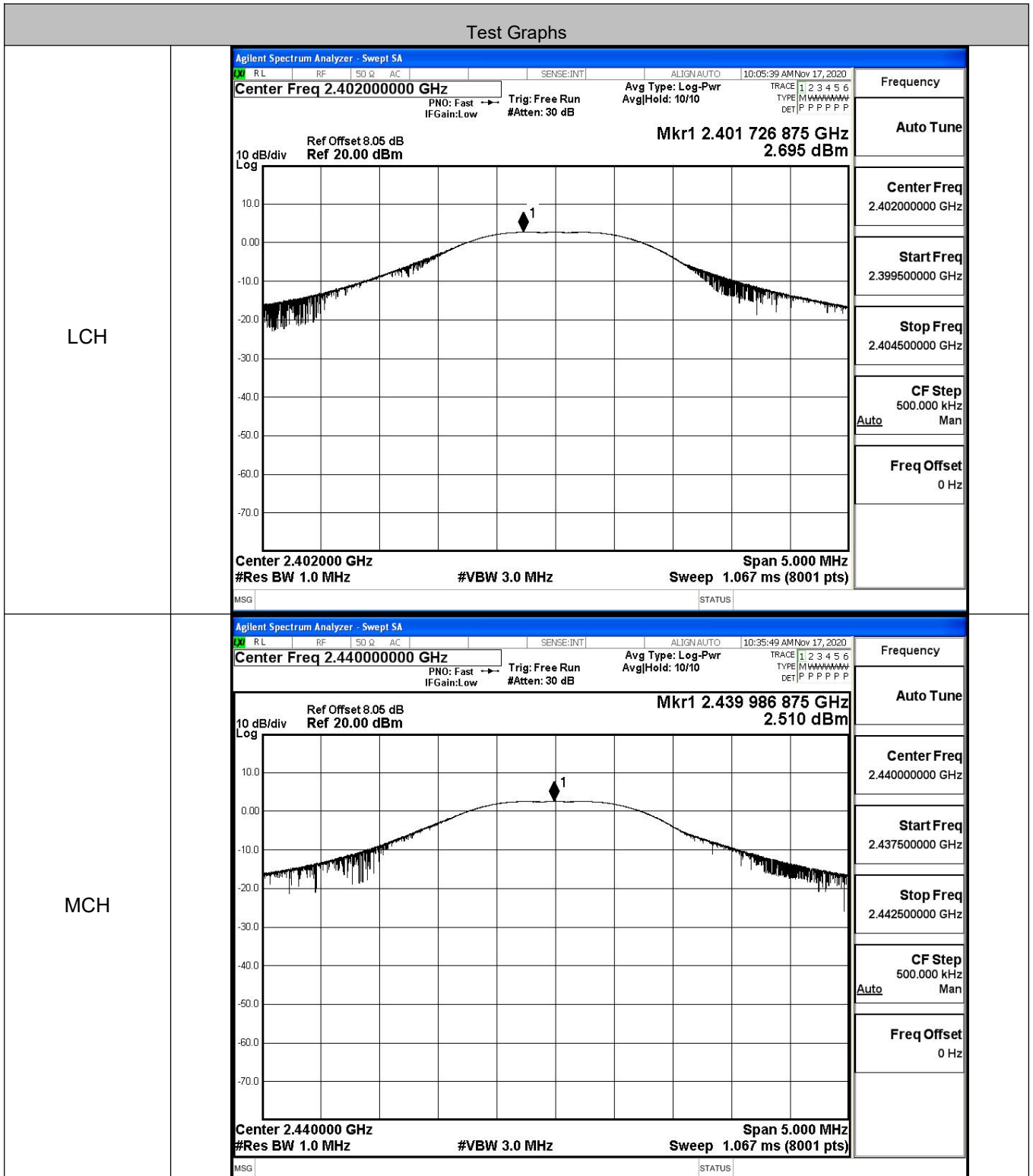
B.1 Duty Cycle

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

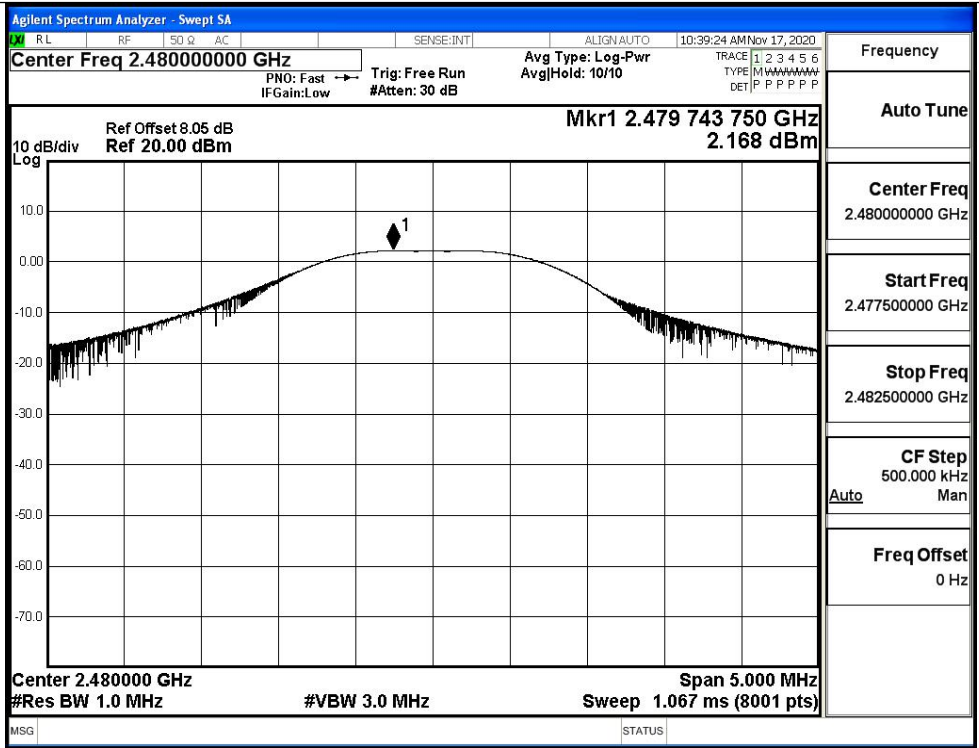


B.2 Maximum Conducted Peak Output Power

Mode	Channel	Conduct Peak Power[dBm]	Limit [dBm]	Verdict
BT LE	LCH	2.695	30	PASS
BT LE	MCH	2.51	30	PASS
BT LE	HCH	2.168	30	PASS



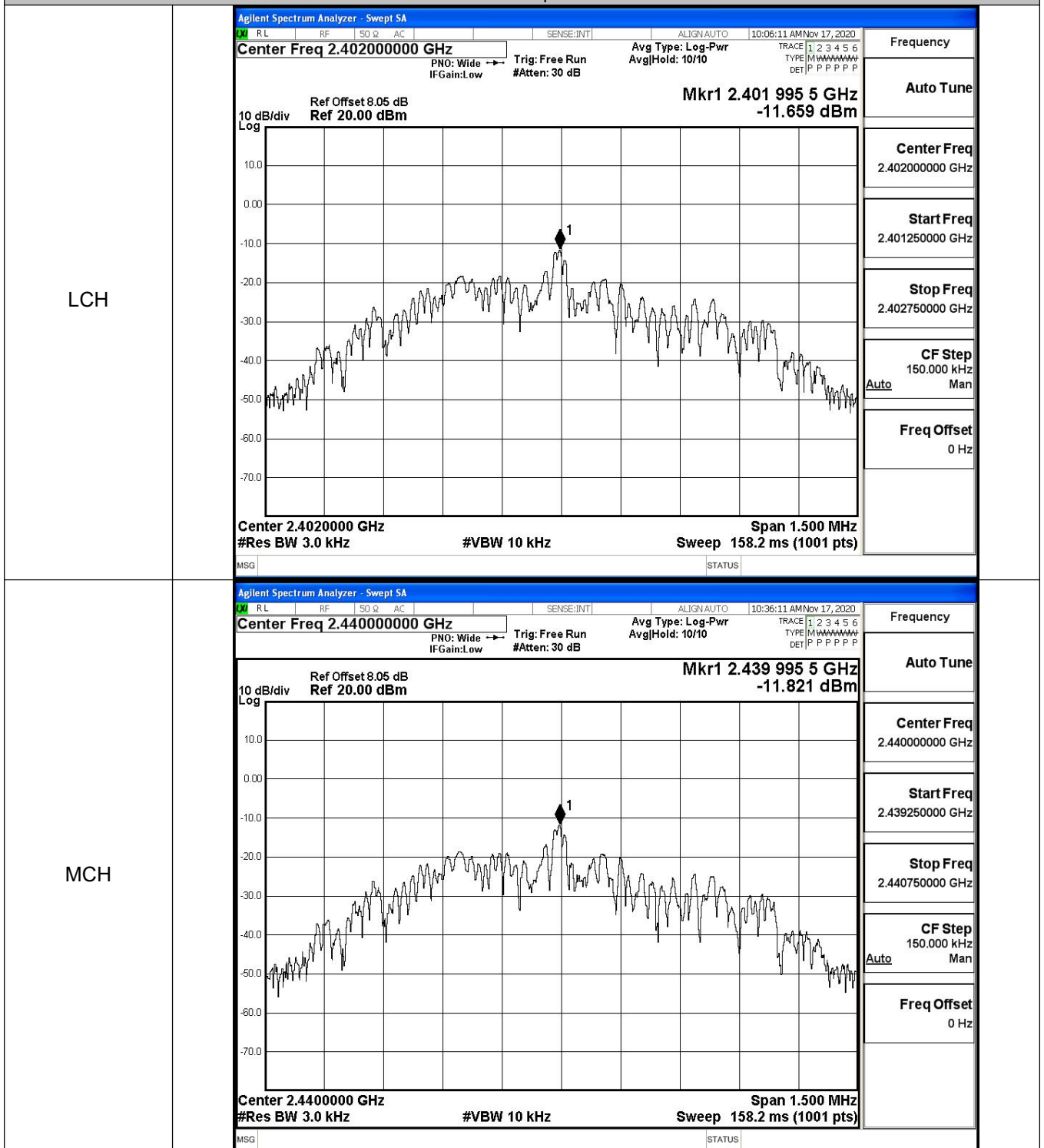
HCH



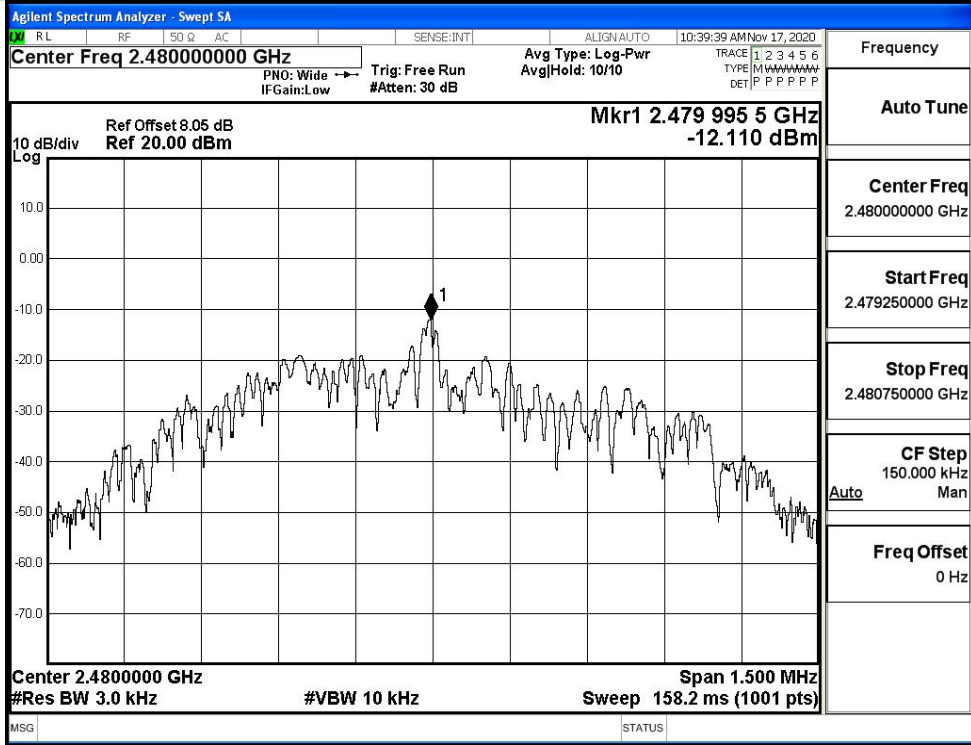
B.3 Maximum Power Spectral Density

Mode	Channel	PSD [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
BT LE	LCH	-11.659	8	PASS
BT LE	MCH	-11.821	8	PASS
BT LE	HCH	-12.110	8	PASS

Test Graphs

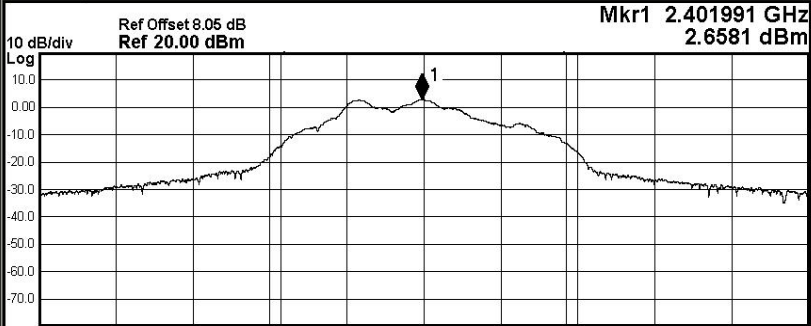
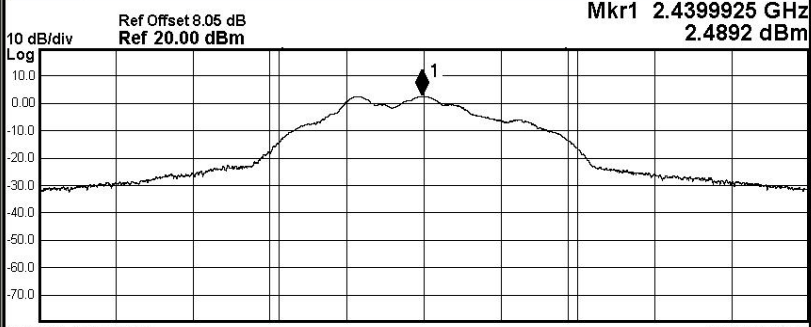


HCH

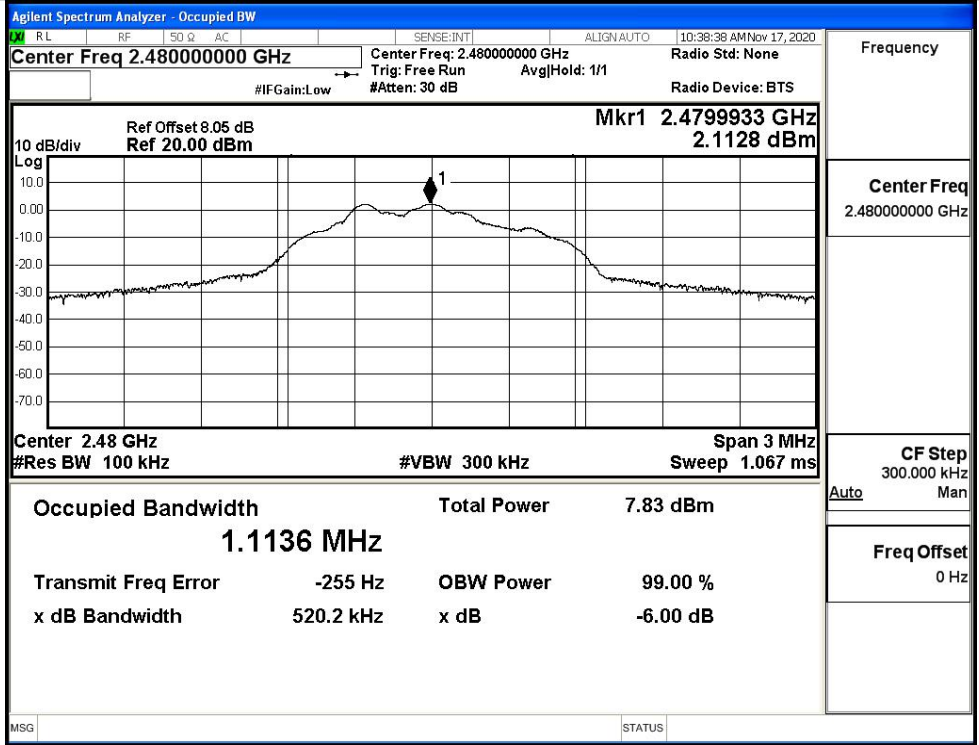


B.4 6dB Bandwidth

Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
BT LE	LCH	0.5136	≥0.5	PASS
BT LE	MCH	0.5229	≥0.5	PASS
BT LE	HCH	0.5202	≥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 10:04:37 AM Nov 17, 2020</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 Ref Offset 8.05 dB Ref 20.00 dBm </div> <div style="text-align: right;"> Mkr1 2.401991 GHz 2.6581 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>8.37 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">1.1088 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>622 Hz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>513.6 kHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></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	8.37 dBm	1.1088 MHz			Transmit Freq Error	622 Hz	OBW Power	x dB Bandwidth	513.6 kHz	x dB			-6.00 dB
Occupied Bandwidth	Total Power	8.37 dBm														
1.1088 MHz																
Transmit Freq Error	622 Hz	OBW Power														
x dB Bandwidth	513.6 kHz	x dB														
		-6.00 dB														
MCH	<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 10:35:03 AM Nov 17, 2020</p> <p style="margin: 0;">Center Freq 2.440000000 GHz Center Freq: 2.440000000 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 Ref Offset 8.05 dB Ref 20.00 dBm </div> <div style="text-align: right;"> Mkr1 2.4399925 GHz 2.4892 dBm </div> </div>  <div style="display: flex; justify-content: space-between; font-size: x-small;"> <div>Center 2.44 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>8.25 dBm</td> </tr> <tr> <td colspan="3" style="text-align: center;">1.1207 MHz</td> </tr> <tr> <td>Transmit Freq Error</td> <td>431 Hz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>522.9 kHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></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	8.25 dBm	1.1207 MHz			Transmit Freq Error	431 Hz	OBW Power	x dB Bandwidth	522.9 kHz	x dB			-6.00 dB
Occupied Bandwidth	Total Power	8.25 dBm														
1.1207 MHz																
Transmit Freq Error	431 Hz	OBW Power														
x dB Bandwidth	522.9 kHz	x dB														
		-6.00 dB														

HCH



Frequency	Center Freq 2.48000000 GHz
CF Step	300.000 kHz Auto Man
Freq Offset	0 Hz

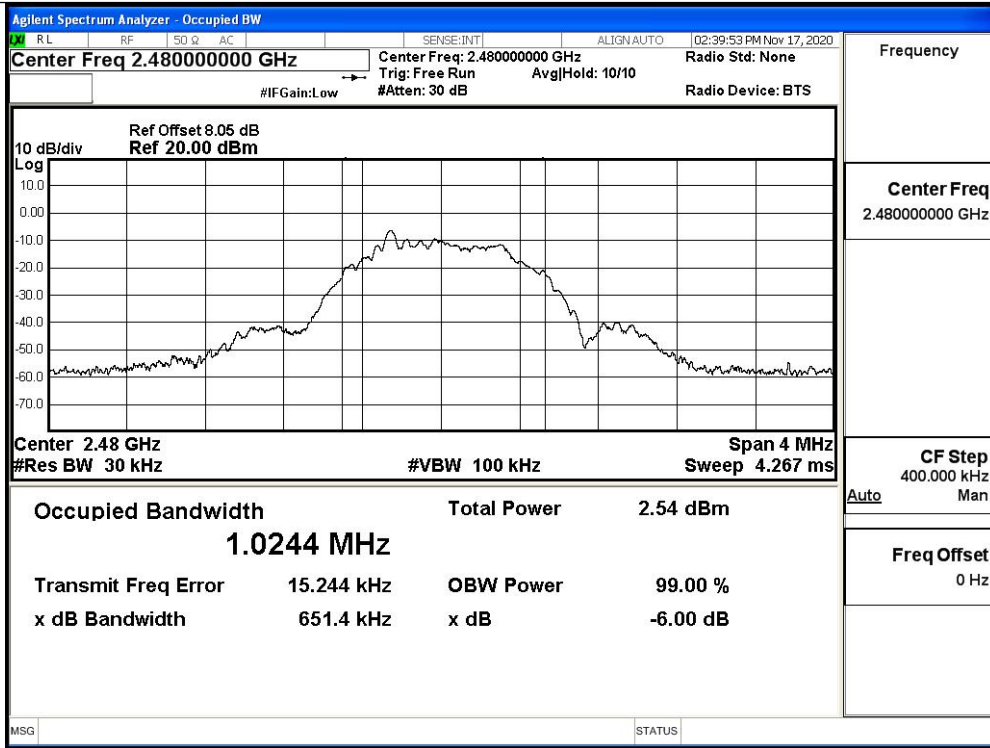
B.5 Occupied Bandwidth

Mode	Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
BT LE	LCH	1.0243	≥0.5	PASS
BT LE	MCH	1.0249	≥0.5	PASS
BT LE	HCH	1.0244	≥0.5	PASS

Test Graphs

LCH	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.40200000 GHz Center Freq: 2.402000000 GHz Radio Std: None</p> <p>Trig: Free Run Avg/Hold: 10/10</p> <p>#IFGain:Low #Atten: 30 dB 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 Span 4 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 4.267 ms</p> <p>Occupied Bandwidth Total Power 2.23 dBm 1.0243 MHz</p> <p>Transmit Freq Error 14.987 kHz OBW Power 99.00 % x dB Bandwidth 649.6 kHz x dB -6.00 dB</p> <p>MSG STATUS</p>	<p>Frequency</p> <p>Center Freq 2.402000000 GHz</p> <p>CF Step 400.000 kHz Auto Man</p> <p>Freq Offset 0 Hz</p>
	MCH	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.44000000 GHz Center Freq: 2.440000000 GHz Radio Std: None</p> <p>Trig: Free Run Avg/Hold: 10/10</p> <p>#IFGain:Low #Atten: 30 dB Radio Device: BTS</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm</p> <p>10 dB/div Log</p> <p>Center 2.44 GHz Span 4 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 4.267 ms</p> <p>Occupied Bandwidth Total Power 2.81 dBm 1.0249 MHz</p> <p>Transmit Freq Error 15.077 kHz OBW Power 99.00 % x dB Bandwidth 652.0 kHz x dB -6.00 dB</p> <p>MSG STATUS</p>

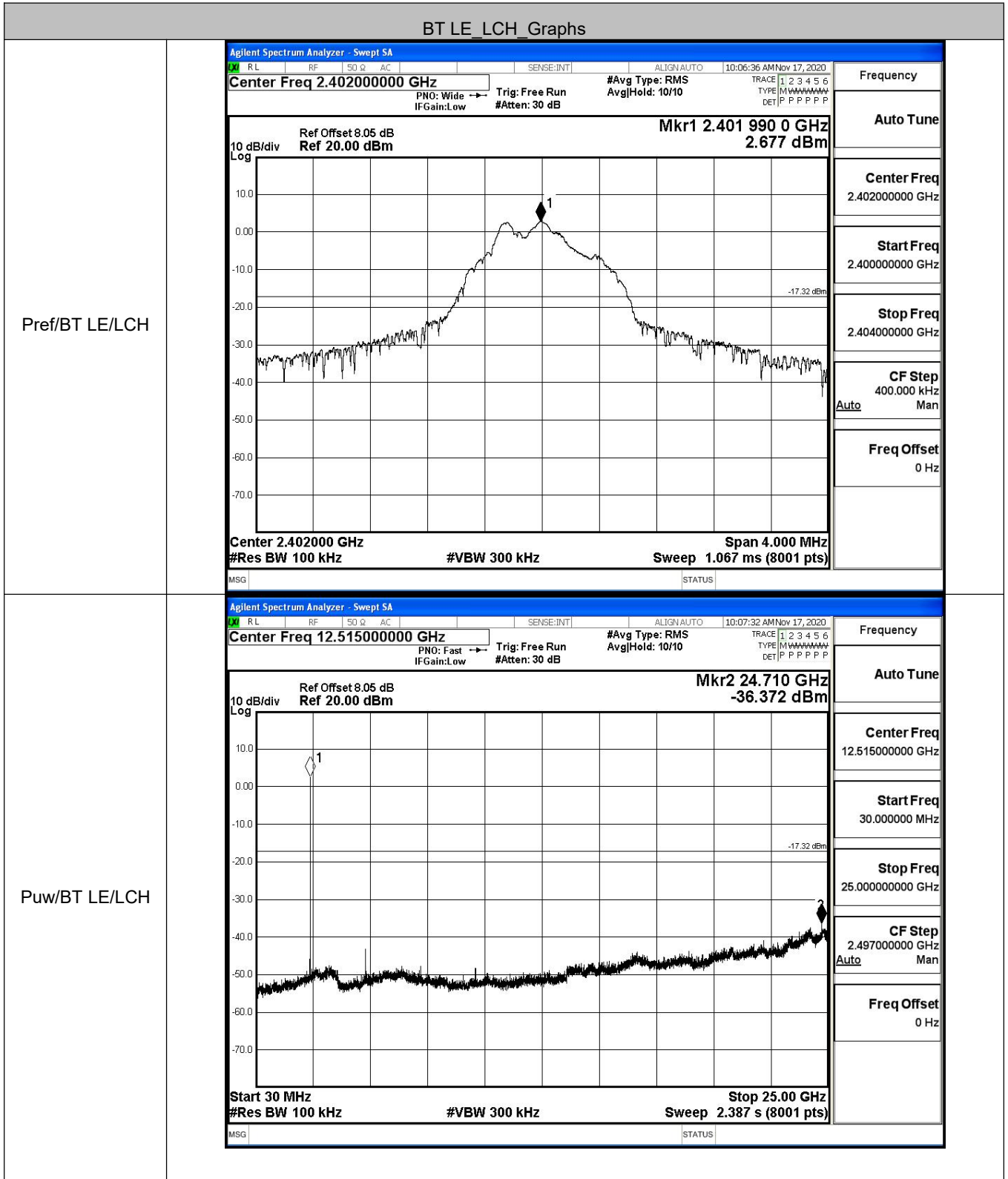
HCH



B.6 RF Conducted Spurious Emissions

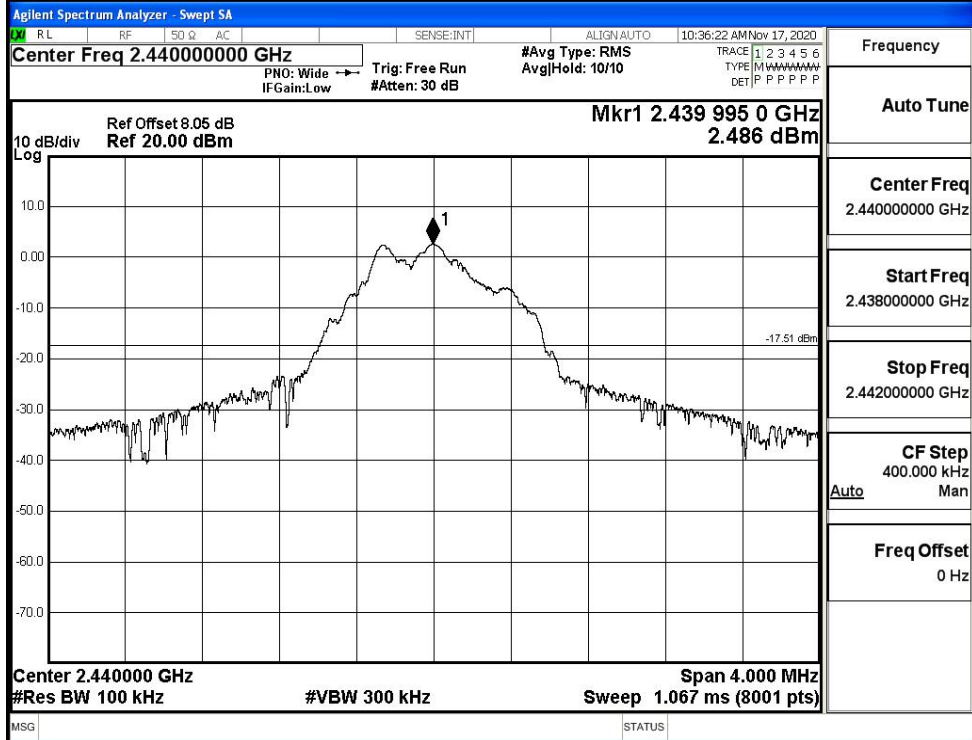
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
BT LE	LCH	2.677	-36.372	-17.323	PASS
BT LE	MCH	2.486	-37.692	-17.514	PASS
BT LE	HCH	2.07	-37.090	-17.930	PASS

BT LE_LCH_Graphs

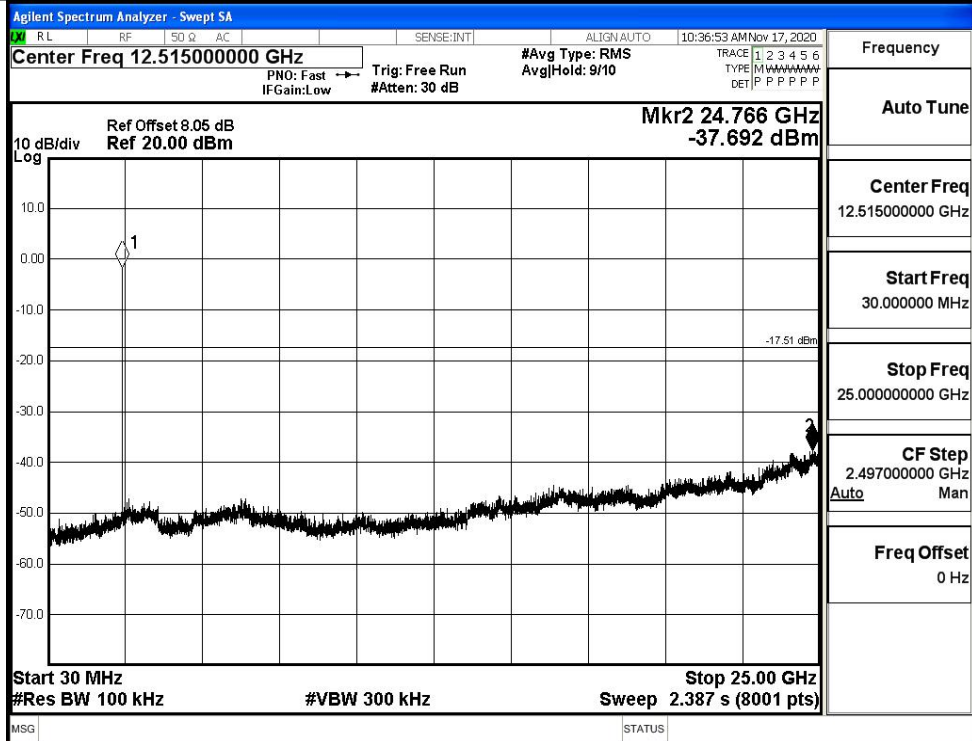


BT LE MCH Graphs

Pref/BT LE/MCH

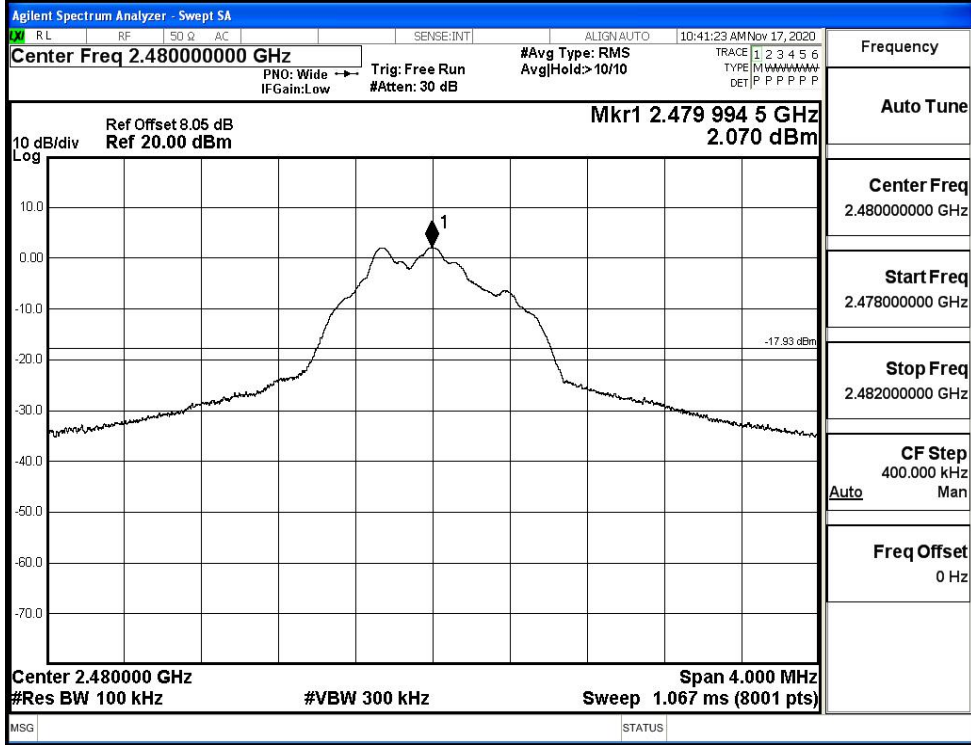


Puw/BT LE/MCH

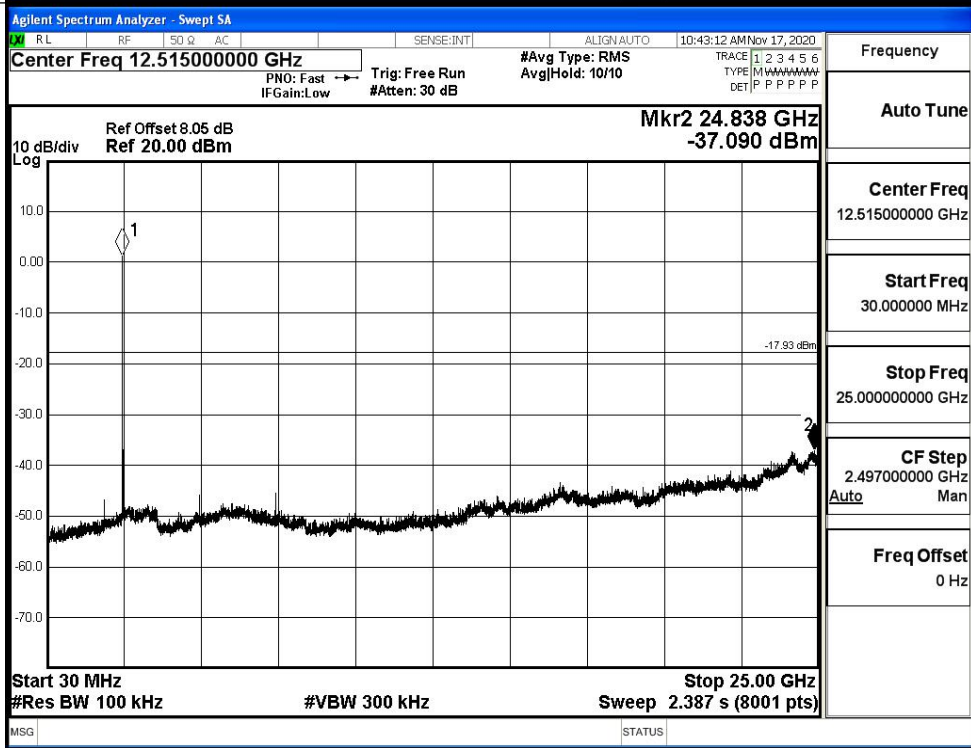


BT LE HCH Graphs

Pref/BT LE/HCH



Puw/BT LE/HCH



B.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BT LE	LCH	2.780	-47.758	-17.22	PASS
BT LE	HCH	2.179	-40.511	-17.82	PASS

Test Graphs

LCH

Agilent Spectrum Analyzer - Swept SA
 Center Freq 2.35700000 GHz
 Mkr4 2.387 080 GHz
 -47.758 dBm
 Start 2.31000 GHz Stop 2.40400 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 9.067 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.402 003 GHz	2.780 dBm			
2	N	f		2.400 000 GHz	-33.982 dBm			
3	N	f		2.390 000 GHz	-48.341 dBm			
4	N	f		2.387 080 GHz	-47.758 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

HCH

Agilent Spectrum Analyzer - Swept SA
 Center Freq 2.489000000 GHz
 Mkr4 2.483 544 00 GHz
 -40.511 dBm
 Start 2.47800 GHz Stop 2.50000 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.133 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.480 007 50 GHz	2.179 dBm			
2	N	f		2.483 500 00 GHz	-40.587 dBm			
3	N	f		2.500 000 00 GHz	-51.111 dBm			
4	N	f		2.483 544 00 GHz	-40.511 dBm			

Frequency

Auto Tune

Center Freq
2.489000000 GHz

Start Freq
2.478000000 GHz

Stop Freq
2.500000000 GHz

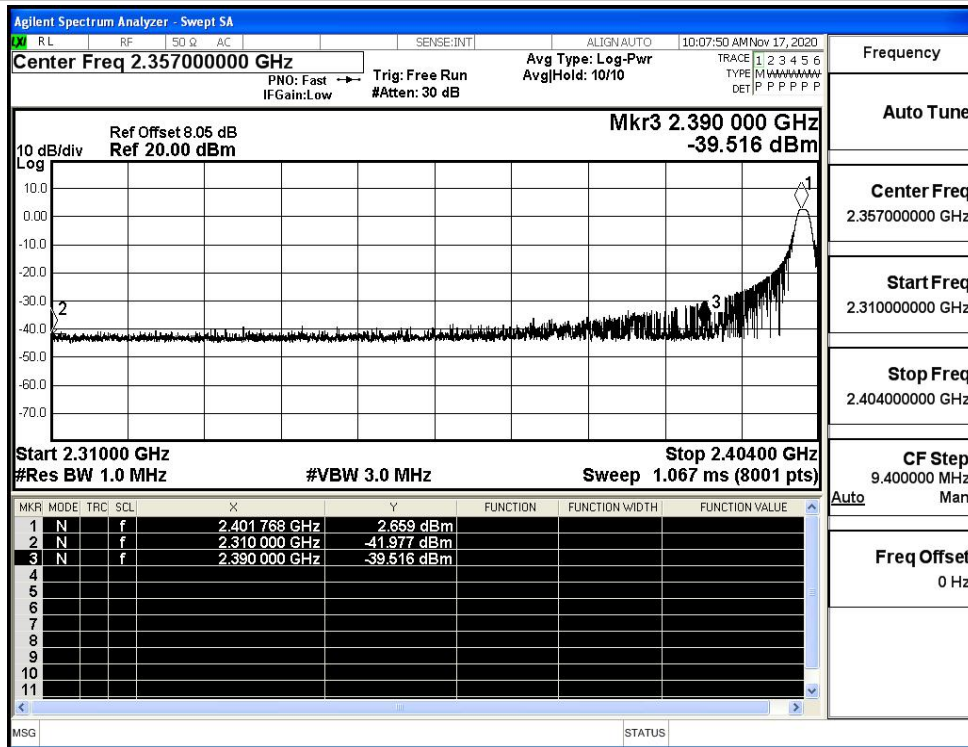
CF Step
2.200000 MHz

Freq Offset
0 Hz

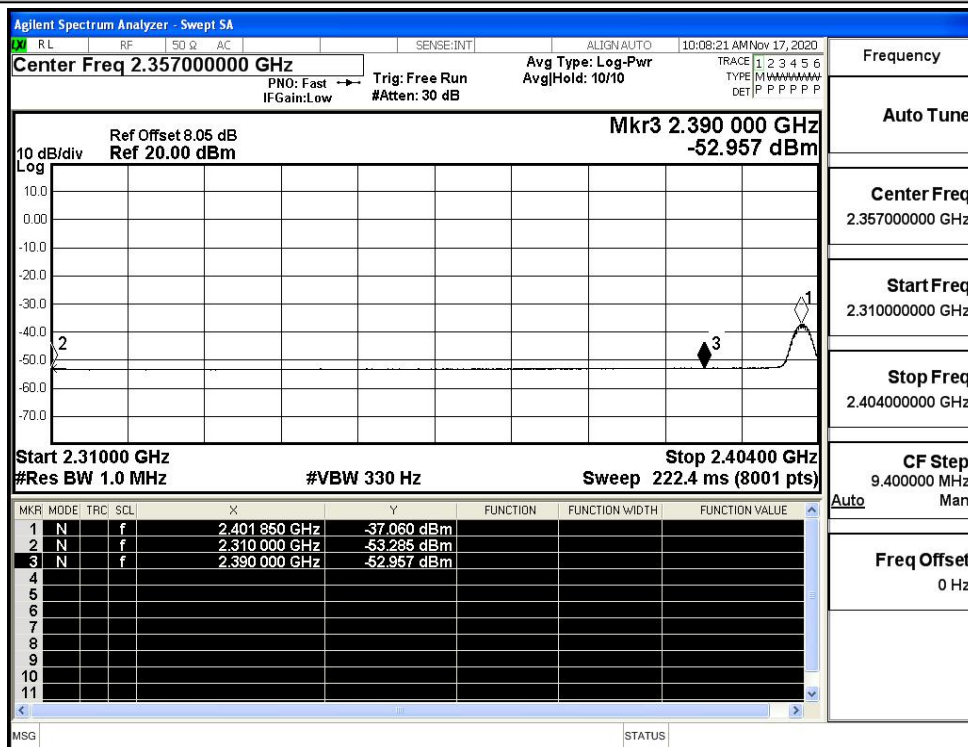
B.8 Restrict-band band-edge measurements

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	-41.98	2.0	0	55.28	PEAK	74	PASS
		Ant1	2310.0	-53.29	2.0	0	43.97	AV	54	PASS
		Ant1	2390.0	-39.52	2.0	0	57.74	PEAK	74	PASS
		Ant1	2390.0	-52.96	2.0	0	44.3	AV	54	PASS
	2480	Ant1	2483.5	-41.80	2.0	0	55.46	PEAK	74	PASS
		Ant1	2483.5	-52.60	2.0	0	44.66	AV	54	PASS
		Ant1	2500.0	-41.55	2.0	0	55.71	PEAK	74	PASS
		Ant1	2500.0	-52.41	2.0	0	44.84	AV	54	PASS

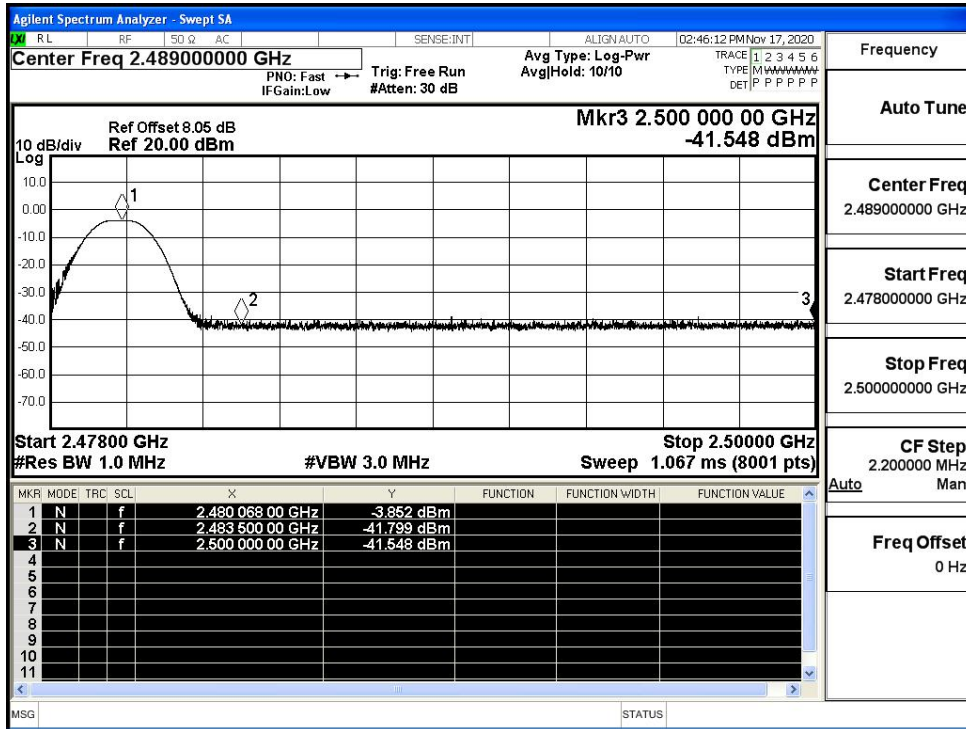
Restrict-band band-edge measurements_BT LE_2402_Ant1_PEAK



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

