Appendix B

RF Test Data for BT 5.0(BLE) (Conducted Measurement)

Product Name: Bluetooth earphone

Trade Mark: IVANTE

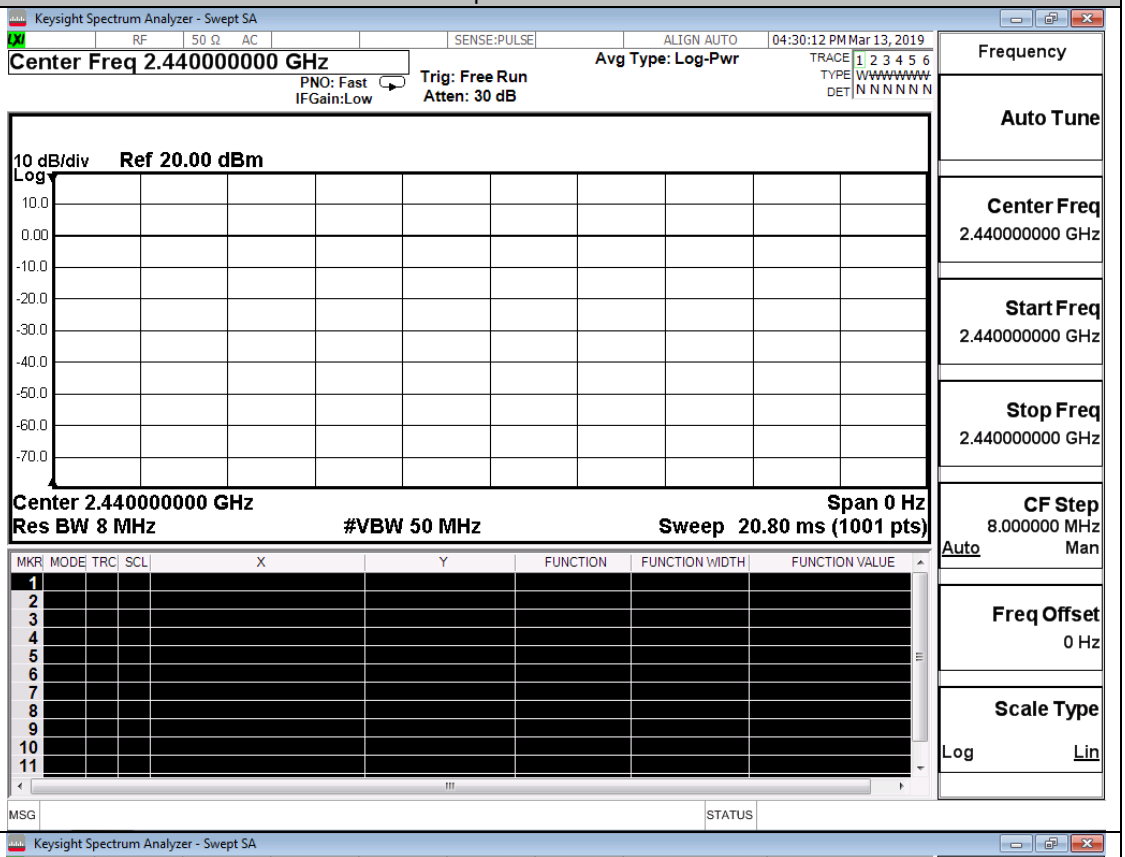
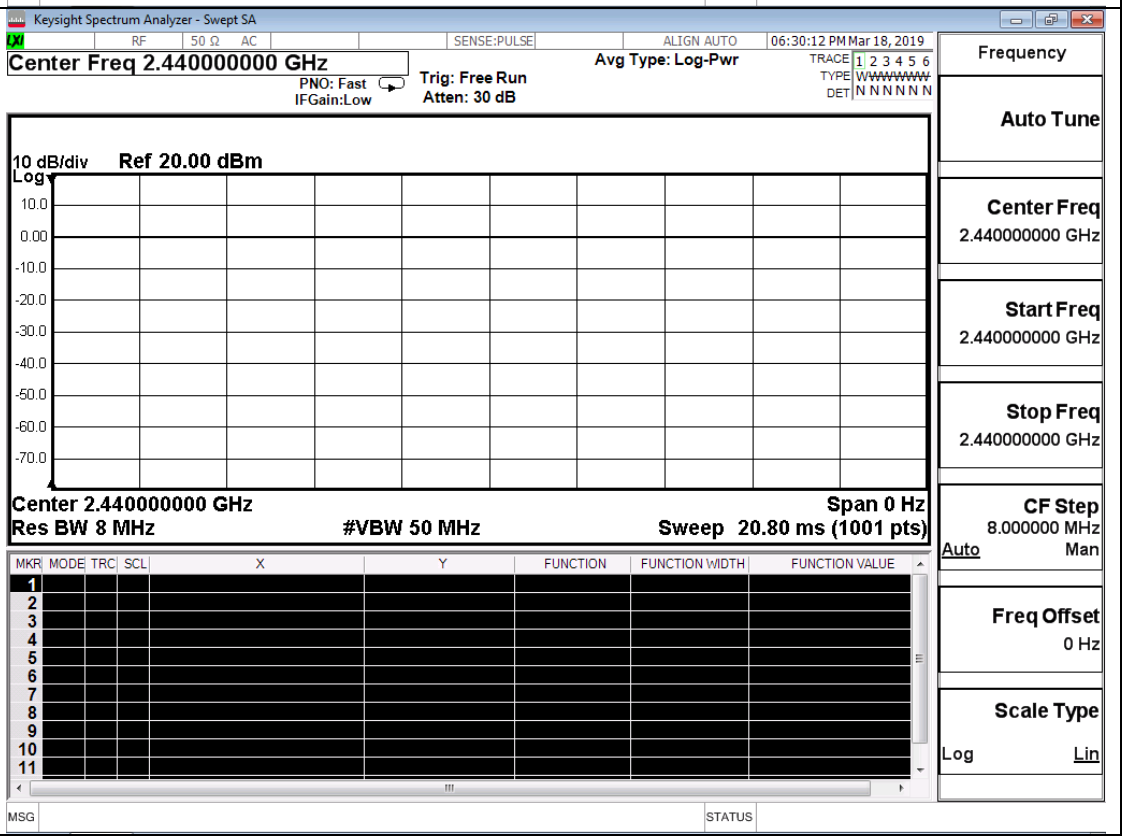
Test Model: S2

Environmental Conditions

Temperature:	23.4 ° C
Relative Humidity:	65%
ATM Pressure:	100.0 kPa
Test Engineer:	AKING JIN
Supervised by:	JAYDEN ZHUO

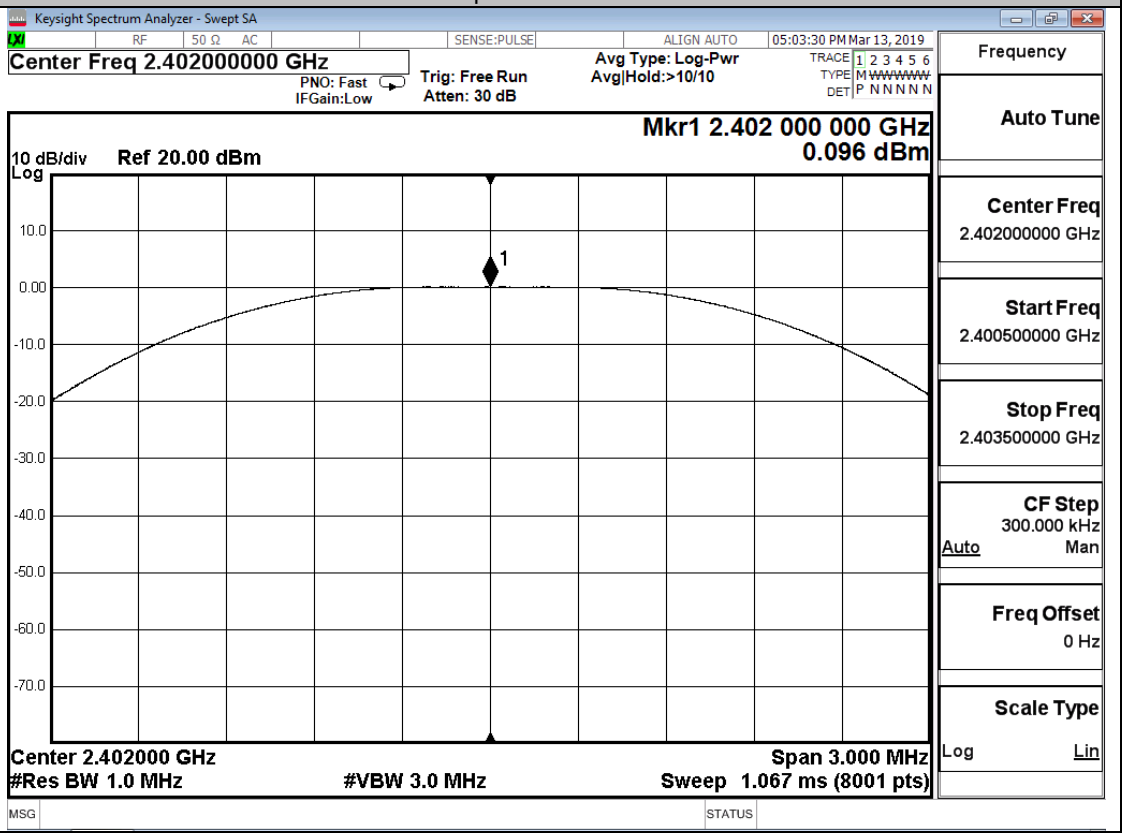
B.1 Duty Cycle

Test Mode	Test Channel	Ant	Duty Cycle[%]	Verdict
LE	2440	Ant1	100	PASS
2LE	2440	Ant1	100	PASS

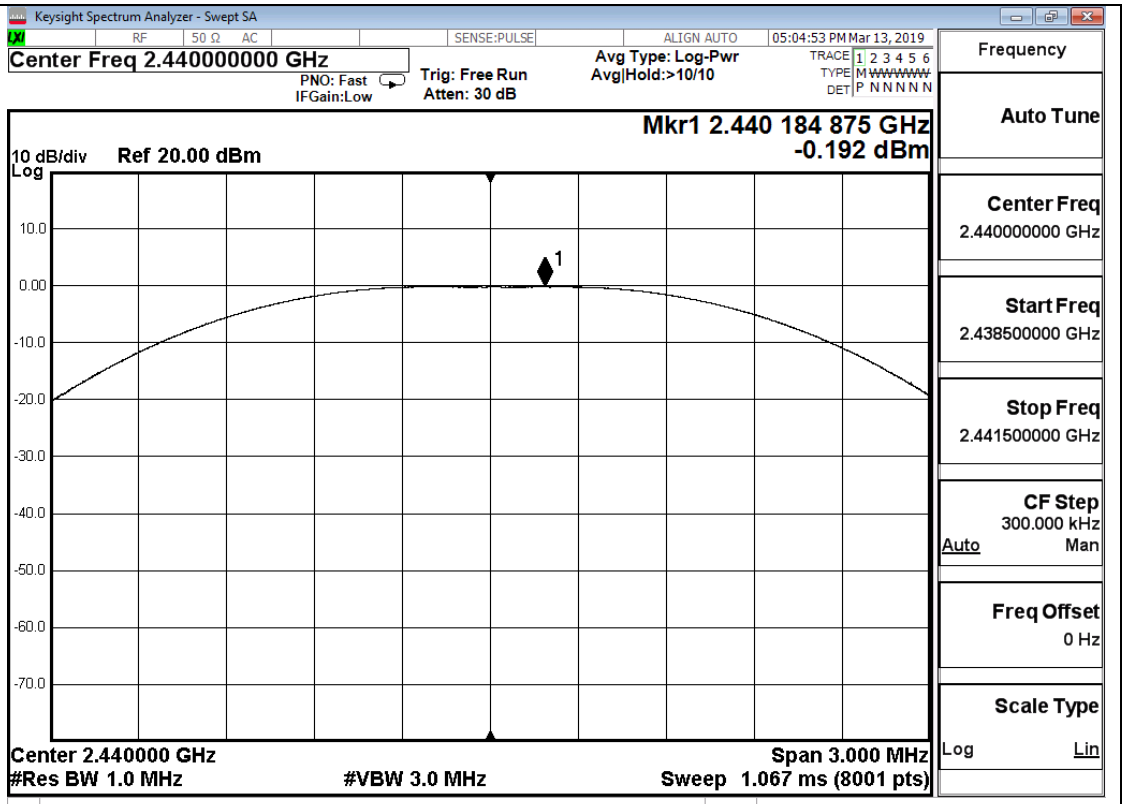
Test Graphs	
LE	
2LE	

B.2 Maximum Conducted Peak Output Power

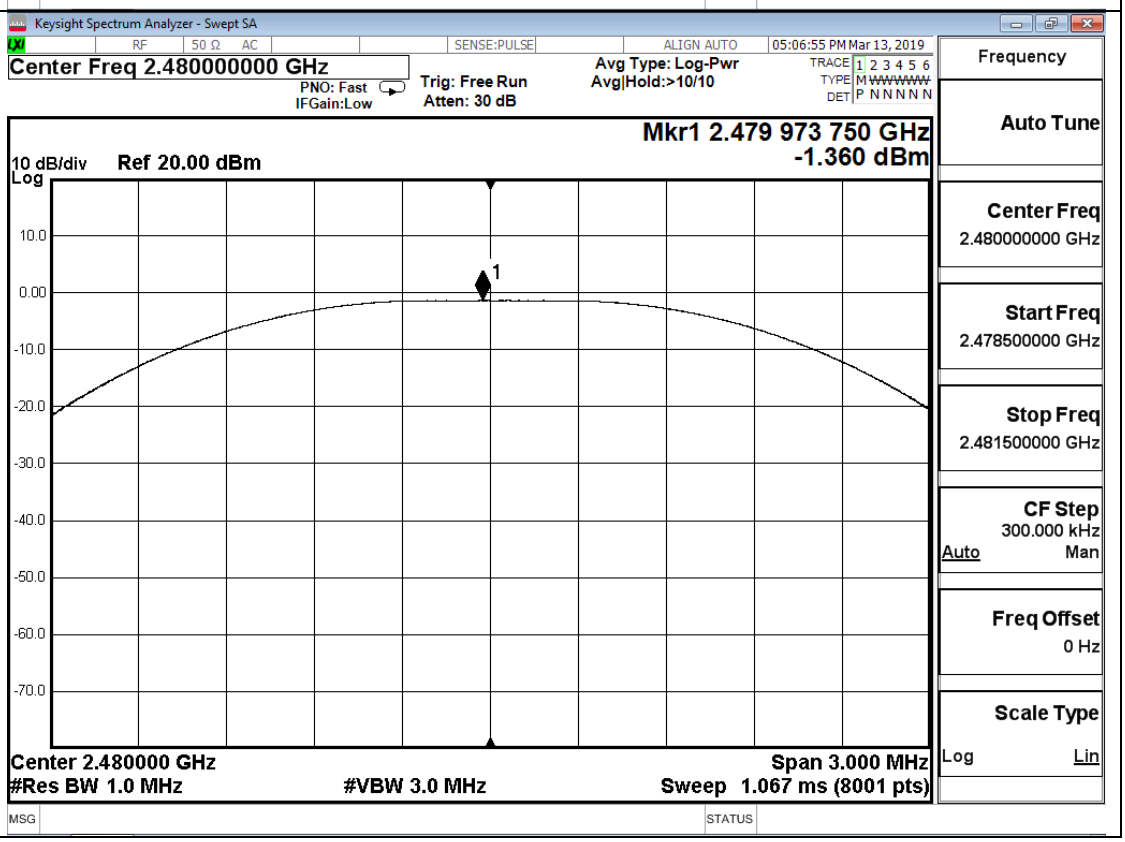
Mode	Channel	Conduct Peak Power[dBm]	Limit [dBm]	Verdict
LE	LCH	0.096	30	PASS
LE	MCH	-0.192	30	PASS
LE	HCH	-1.360	30	PASS
2LE	LCH	-0.491	30	PASS
2LE	MCH	-0.011	30	PASS
2LE	HCH	-0.230	30	PASS

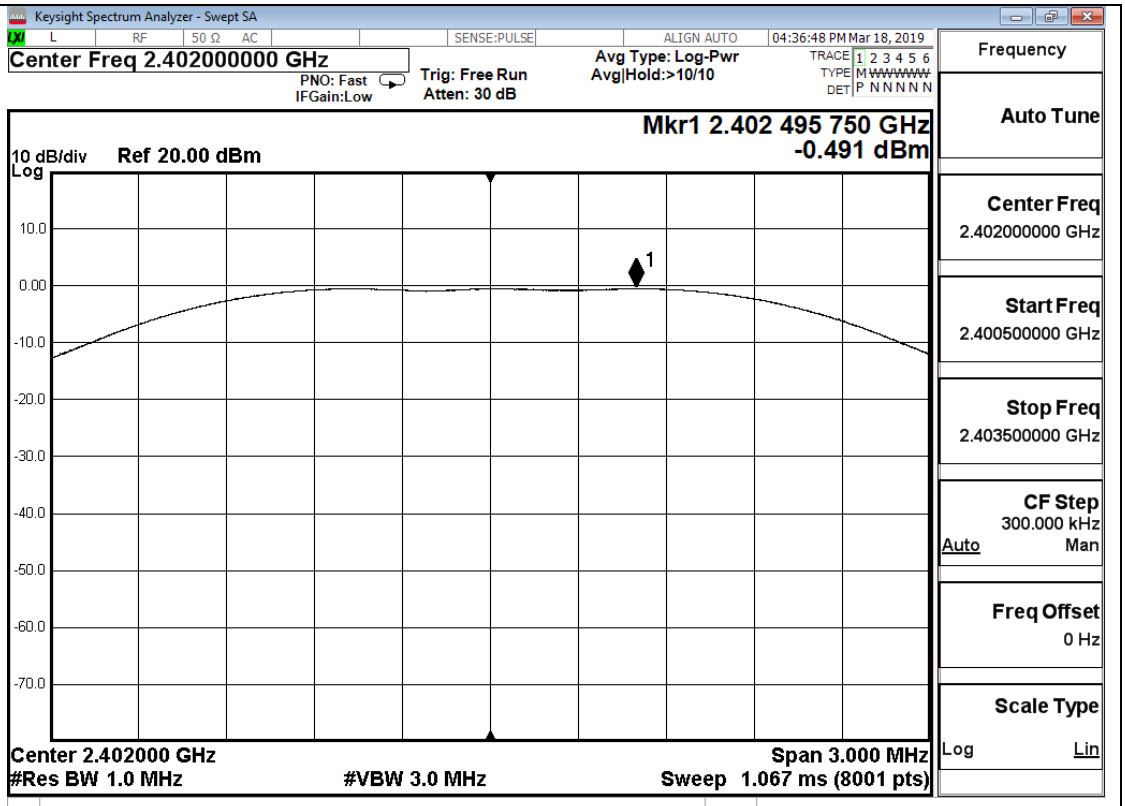
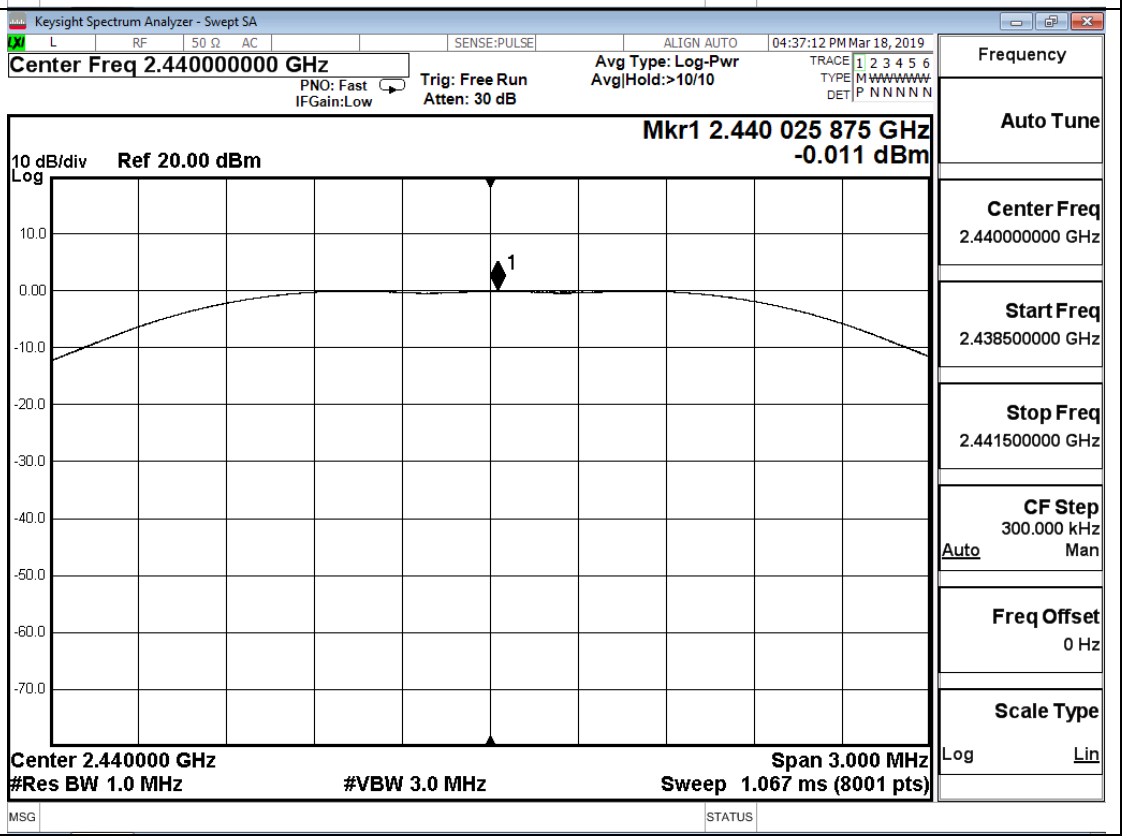
Test Graphs	
LE LCH	

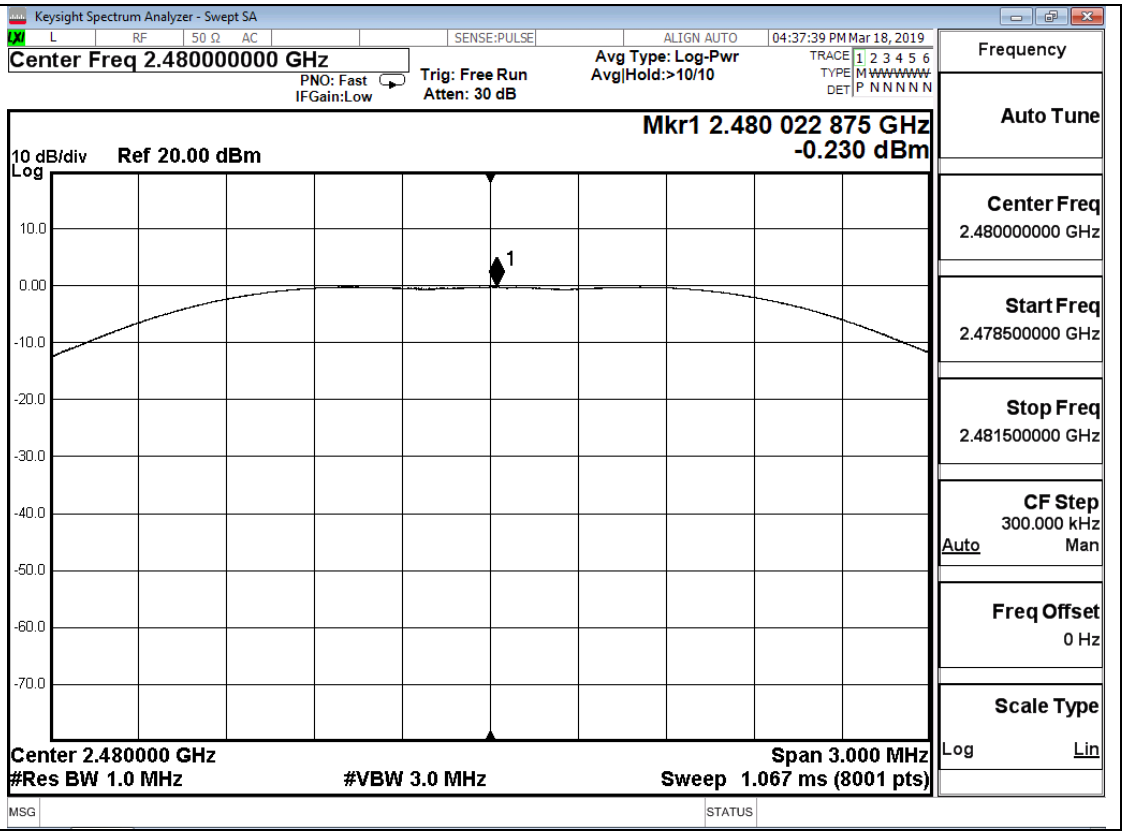
LE MCH


Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
05:04:53 PM Mar 13, 2019
Center Freq 2.440000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Mkr1 2.440 184 875 GHz
-0.192 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.440000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.067 ms (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.440000000 GHz
Start Freq
2.438500000 GHz
Stop Freq
2.441500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

LE HCH


Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
05:06:55 PM Mar 13, 2019
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Mkr1 2.479 973 750 GHz
-1.360 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.067 ms (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

2LE LCH	
2LE MCH	

2LE HCH	

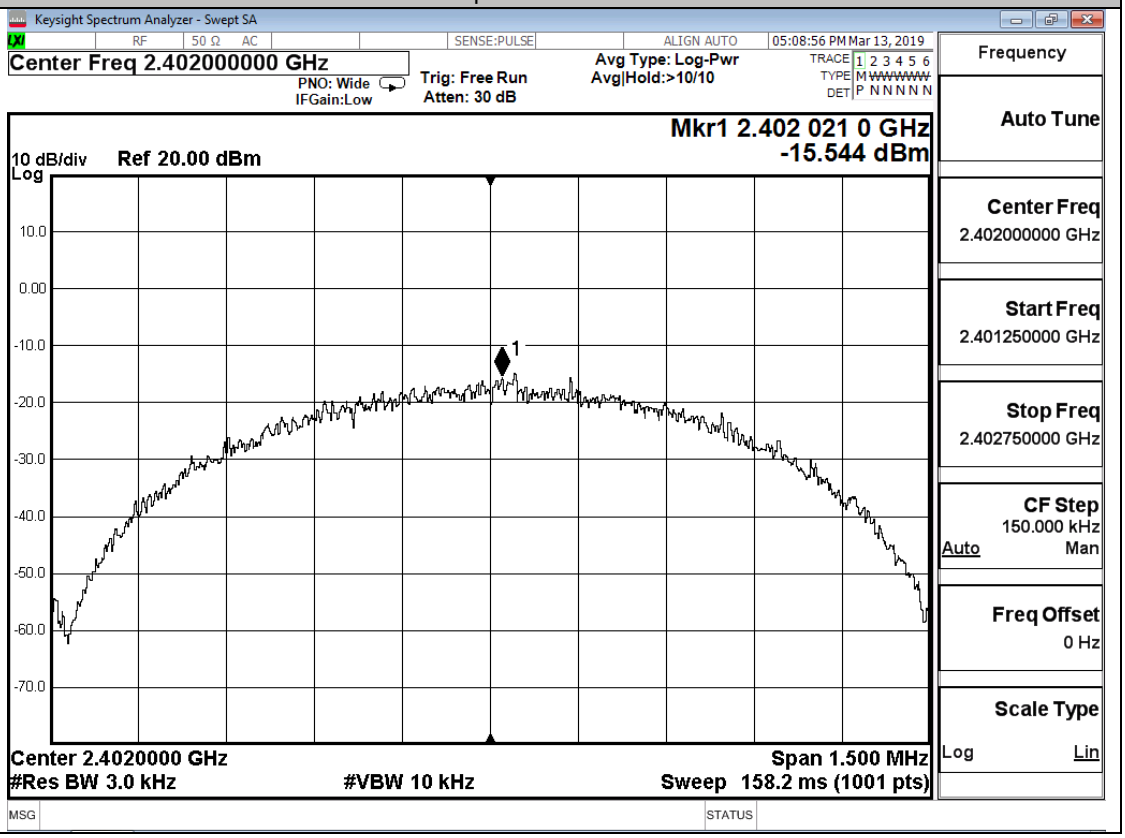
Keysight Spectrum Analyzer - Swept SA
L
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
04:37:39 PM Mar 18, 2019
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Mkr1 2.480 022 875 GHz
-0.230 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.067 ms (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

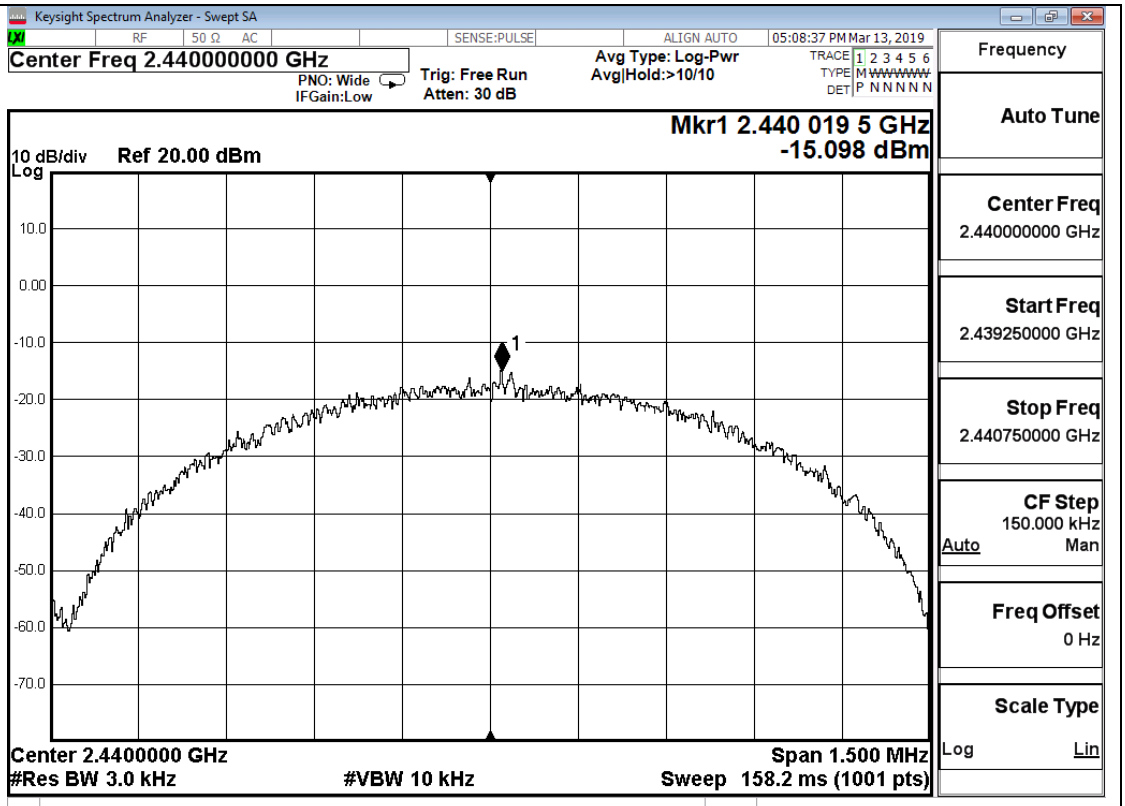
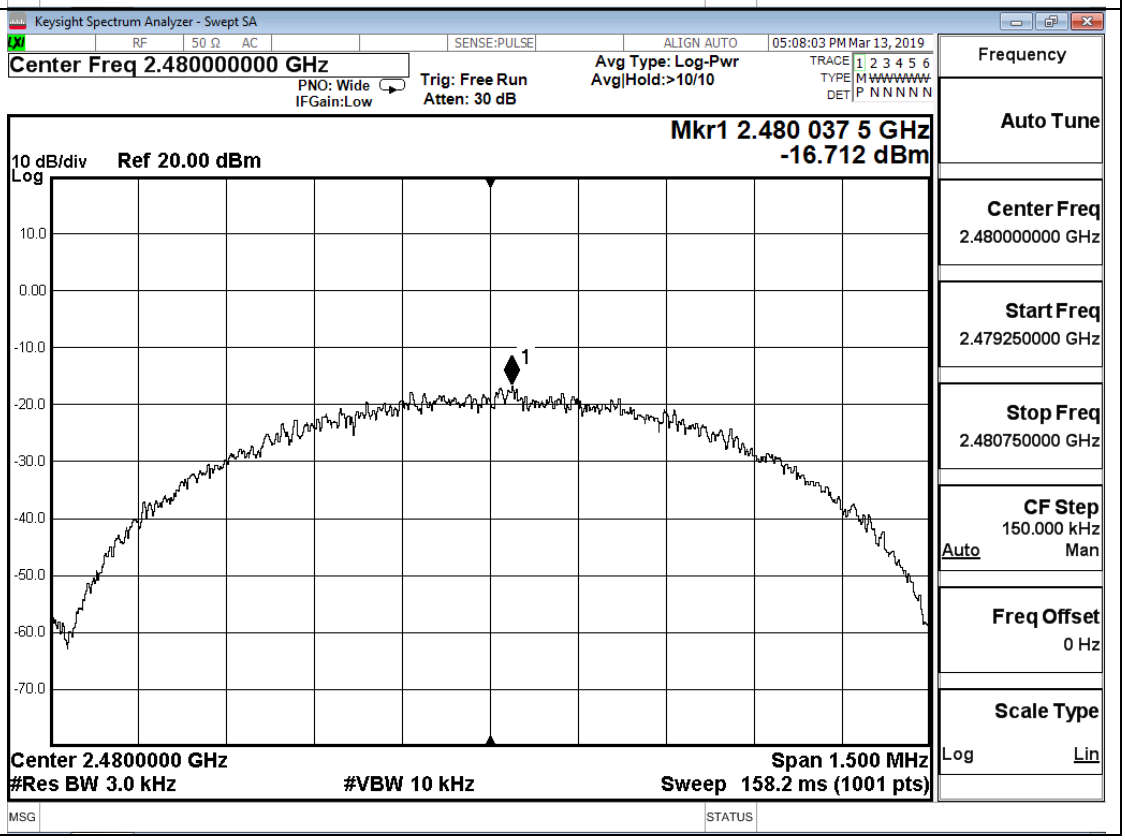
B.3 Maximum Power Spectral Density

Mode	Channel	PSD [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
LE	LCH	-15.544	8	PASS
LE	MCH	-15.098	8	PASS
LE	HCH	-16.712	8	PASS
2LE	LCH	-18.803	8	PASS
2LE	MCH	-18.217	8	PASS
2LE	HCH	-18.692	8	PASS

Test Graphs

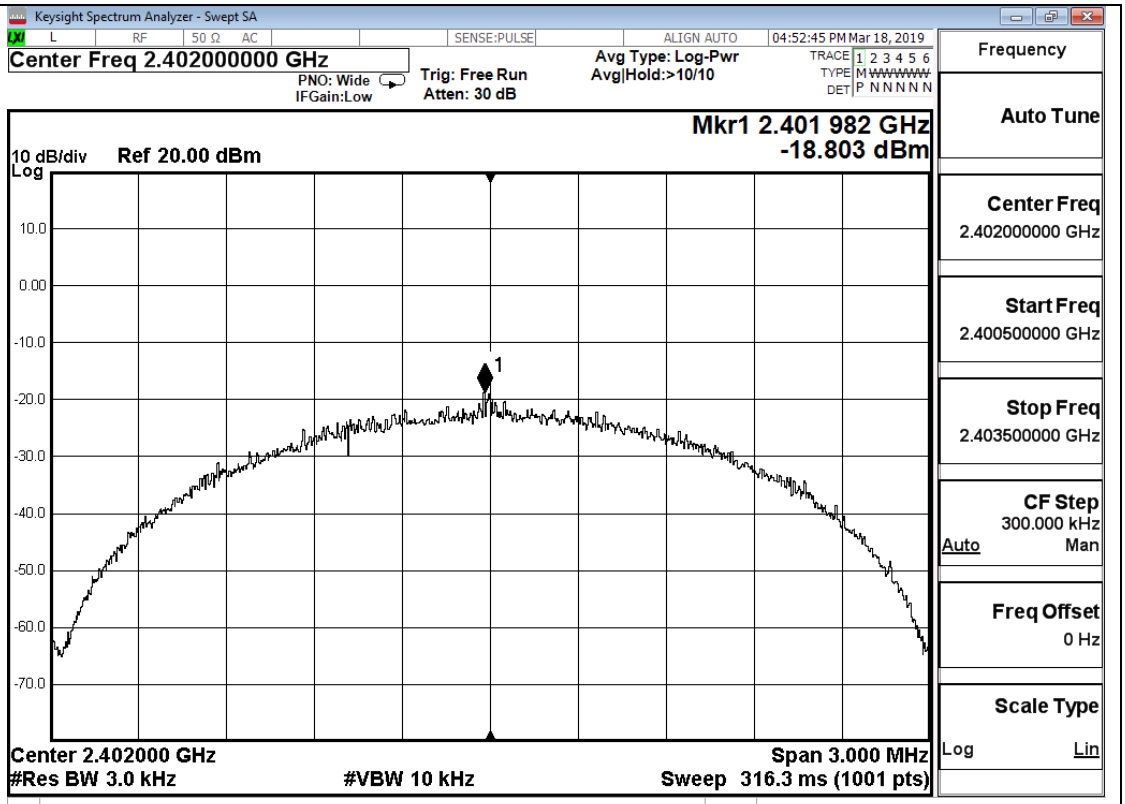
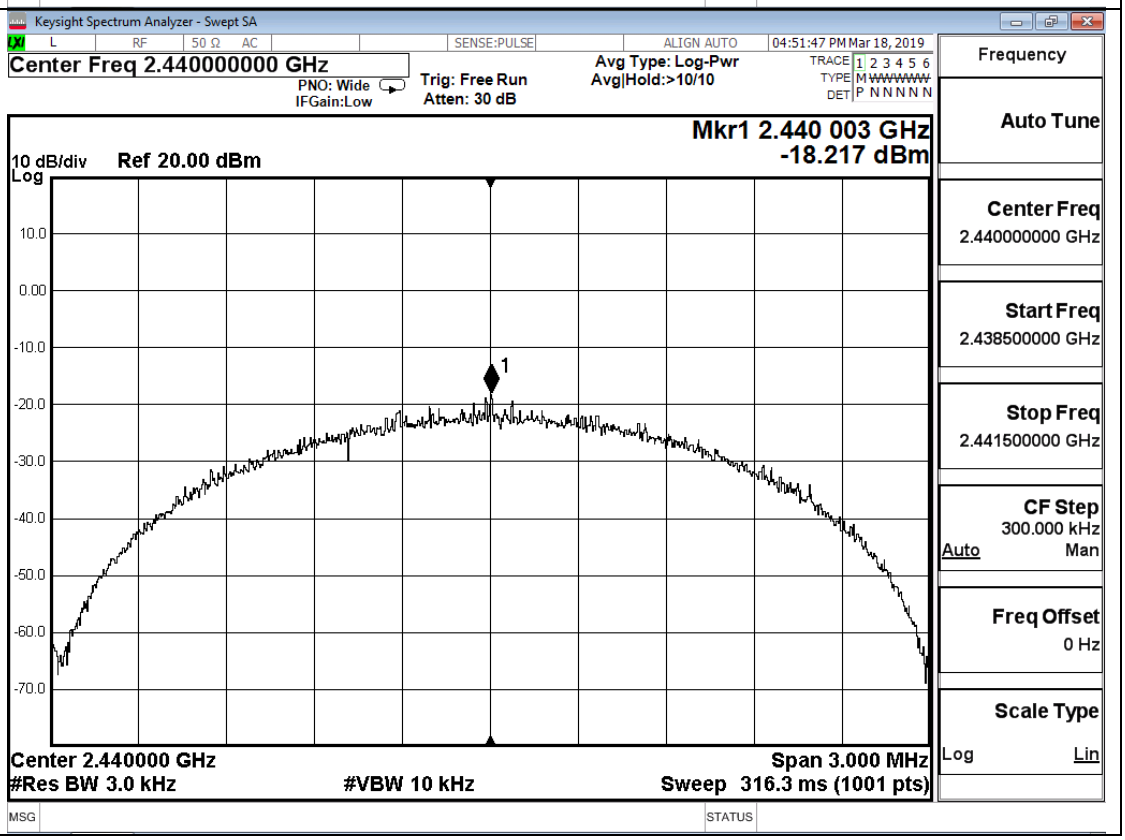
LE LCH

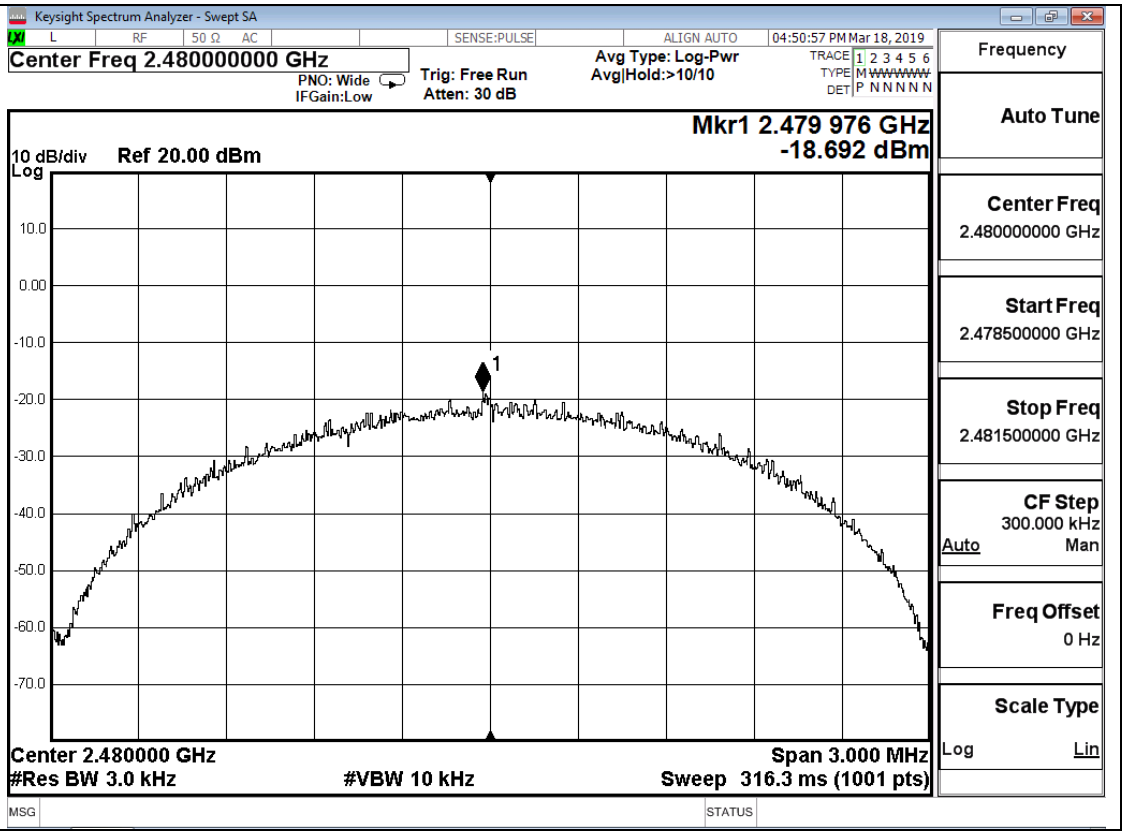


LE MCH	
LE HCH	

Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
05:08:37 PM Mar 13, 2019
Center Freq 2.440000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Mkr1 2.440 019 5 GHz
-15.098 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.4400000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.500 MHz
Sweep 158.2 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.440000000 GHz
Start Freq
2.439250000 GHz
Stop Freq
2.440750000 GHz
CF Step
150.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
05:08:03 PM Mar 13, 2019
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Mkr1 2.480 037 5 GHz
-16.712 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.500 MHz
Sweep 158.2 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479250000 GHz
Stop Freq
2.480750000 GHz
CF Step
150.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

2LE LCH	
2LE MCH	

2LE HCH	

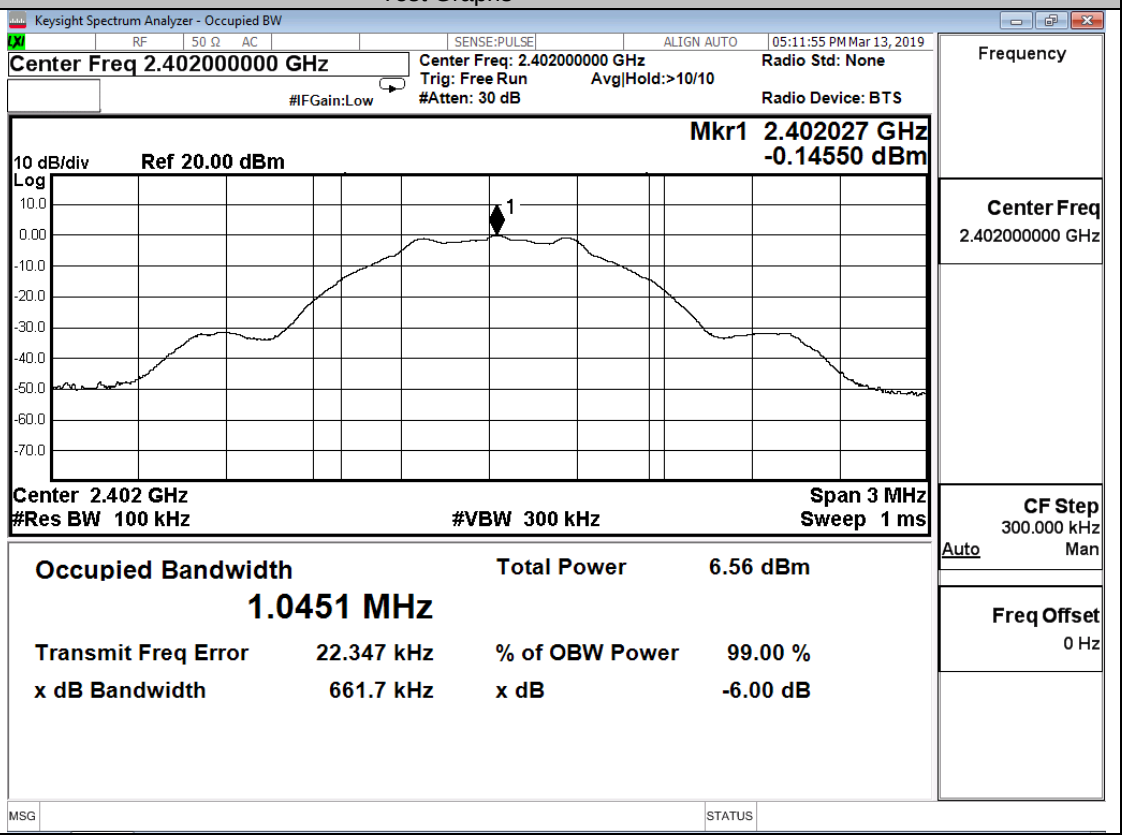
Keysight Spectrum Analyzer - Swept SA
L
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
04:50:57 PM Mar 18, 2019
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Mkr1 2.479 976 GHz
-18.692 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.480000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 3.000 MHz
Sweep 316.3 ms (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

B.4 6dB Bandwidth

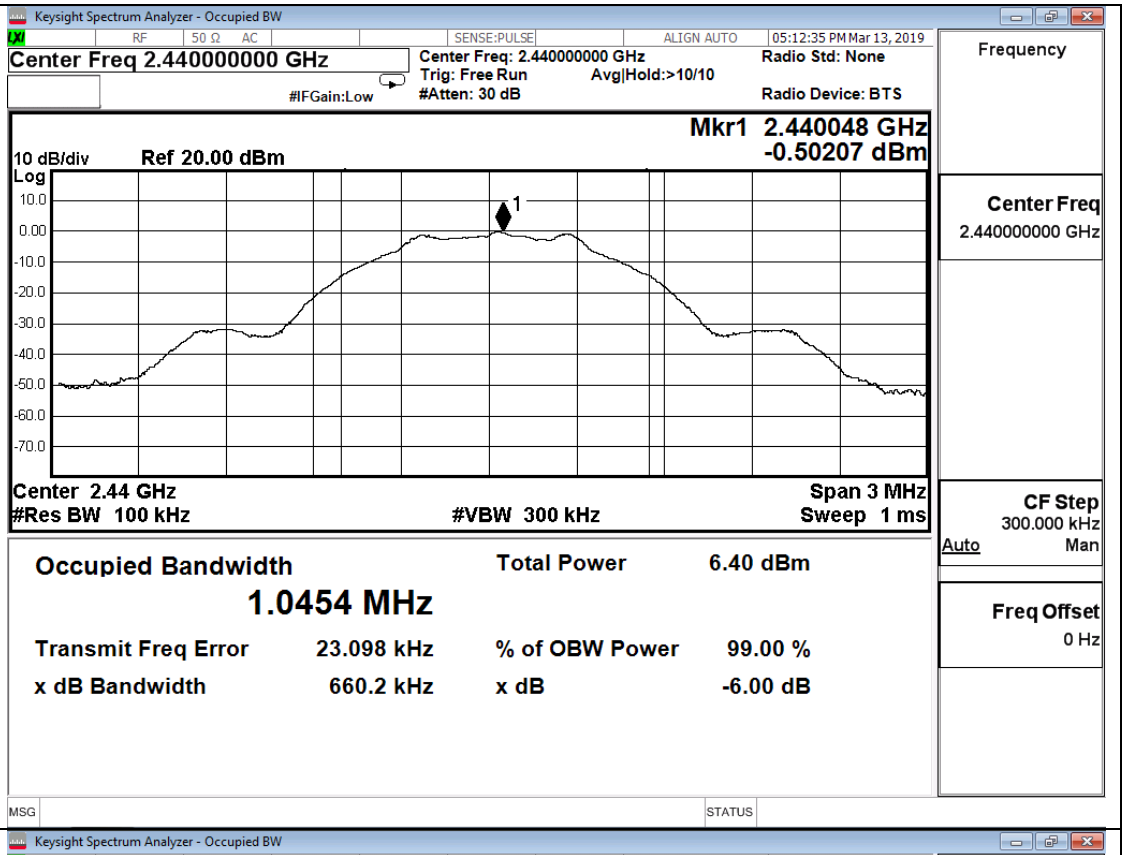
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
LE	LCH	0.6617	≥0.5	PASS
LE	MCH	0.6602	≥0.5	PASS
LE	HCH	0.6603	≥0.5	PASS
2LE	LCH	1.143	≥0.5	PASS
2LE	MCH	1.152	≥0.5	PASS
2LE	HCH	1.154	≥0.5	PASS

Test Graphs

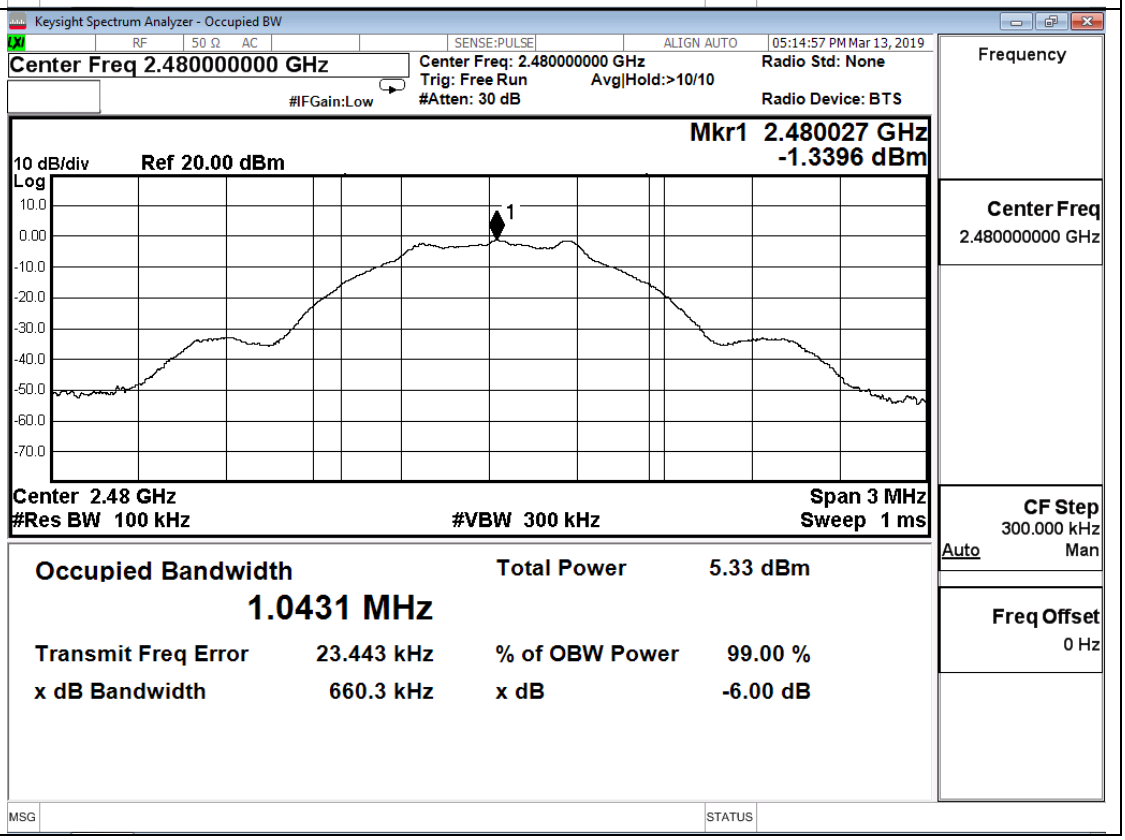
LE LCH



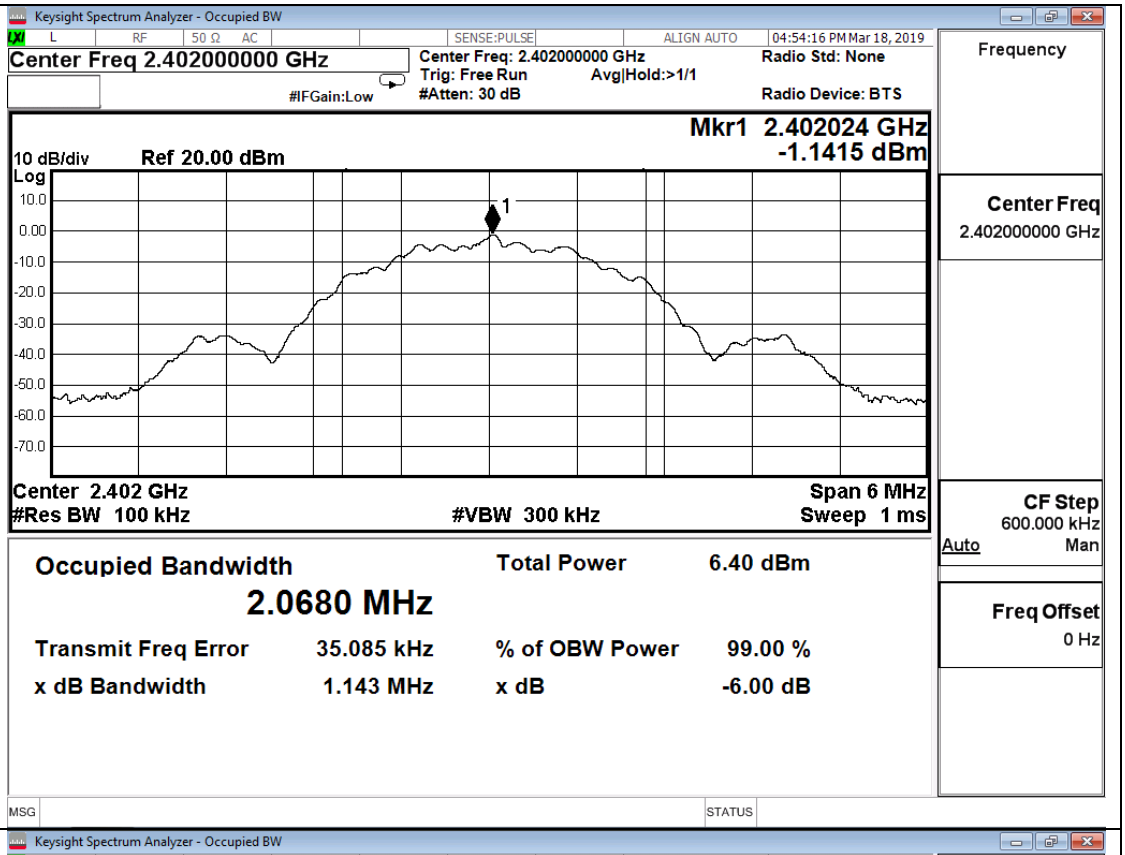
LE MCH


Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
05:12:35 PM Mar 13, 2019
Center Freq 2.440000000 GHz
Center Freq: 2.440000000 GHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Mkr1 2.440048 GHz
-0.50207 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.440000000 GHz
Center 2.44 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto Man
Occupied Bandwidth
1.0454 MHz
Total Power 6.40 dBm
Transmit Freq Error 23.098 kHz
% of OBW Power 99.00 %
x dB Bandwidth 660.2 kHz
x dB -6.00 dB
Freq Offset
0 Hz
MSG
STATUS

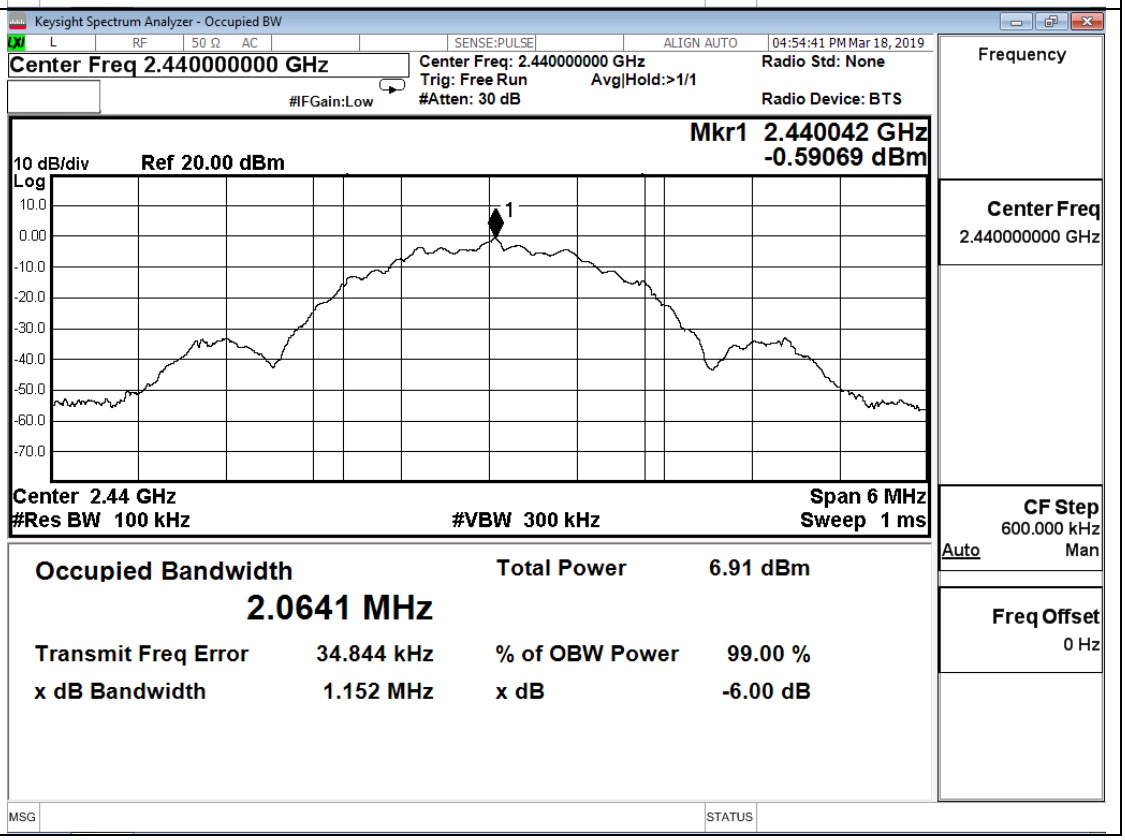
LE HCH

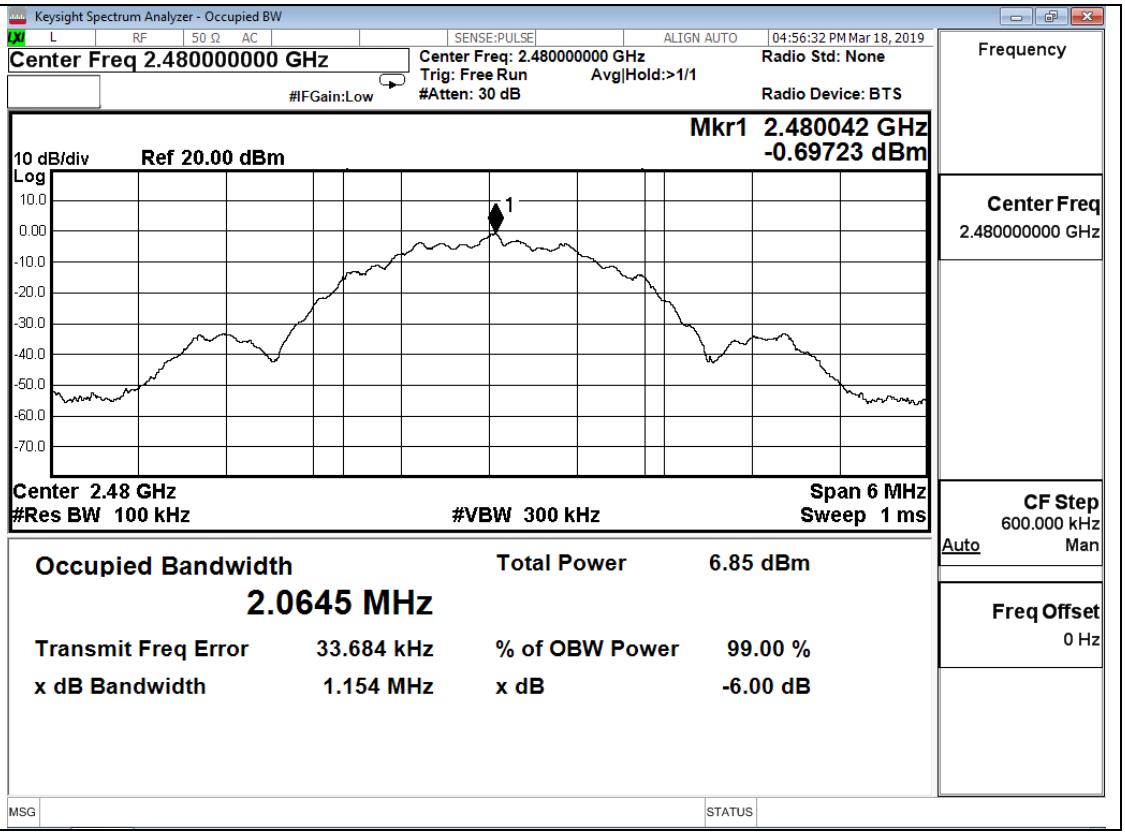

Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:PULSE
ALIGN AUTO
05:14:57 PM Mar 13, 2019
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Mkr1 2.480027 GHz
-1.3396 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto Man
Occupied Bandwidth
1.0431 MHz
Total Power 5.33 dBm
Transmit Freq Error 23.443 kHz
% of OBW Power 99.00 %
x dB Bandwidth 660.3 kHz
x dB -6.00 dB
Freq Offset
0 Hz
MSG
STATUS

2LE LCH



2LE MCH

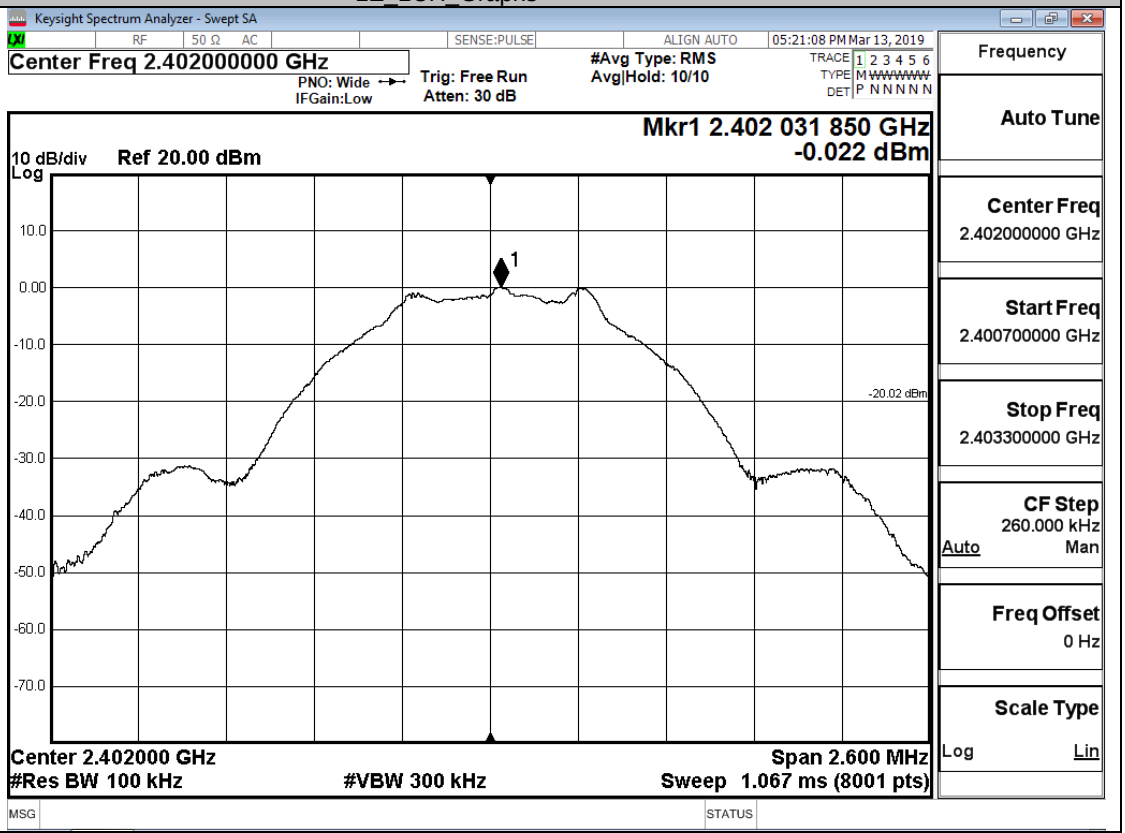
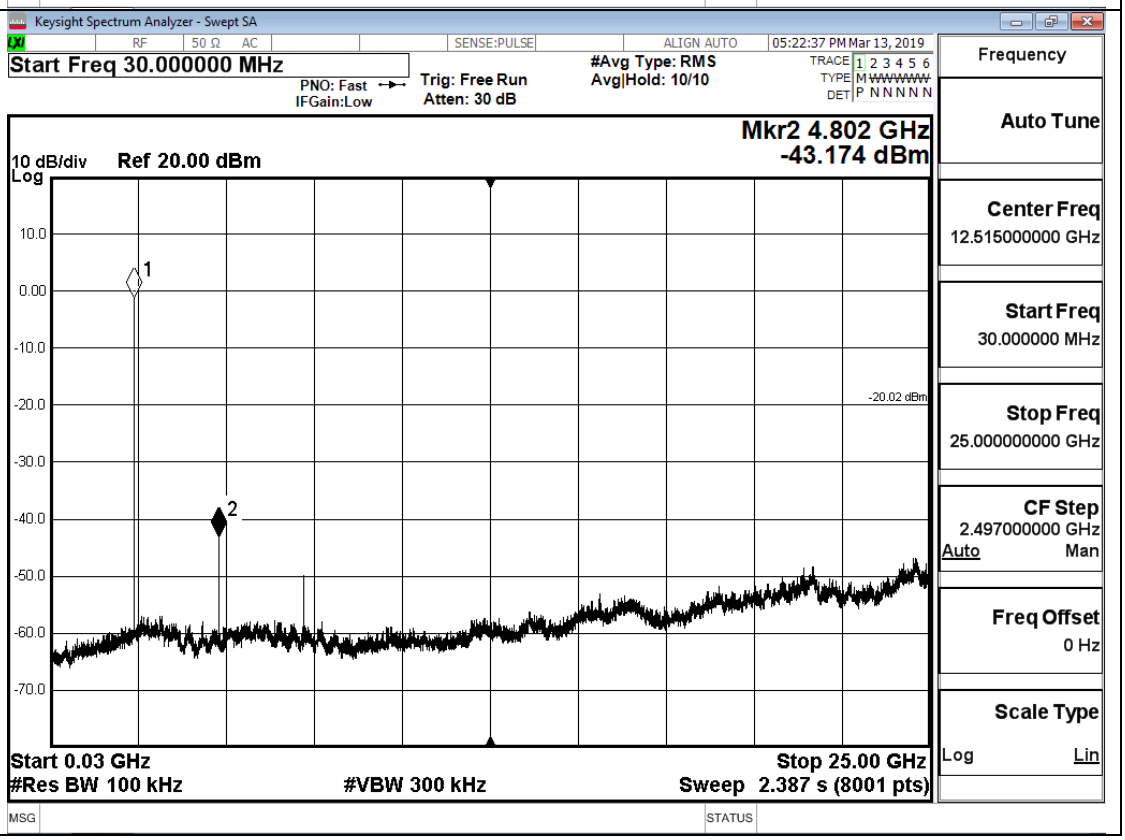


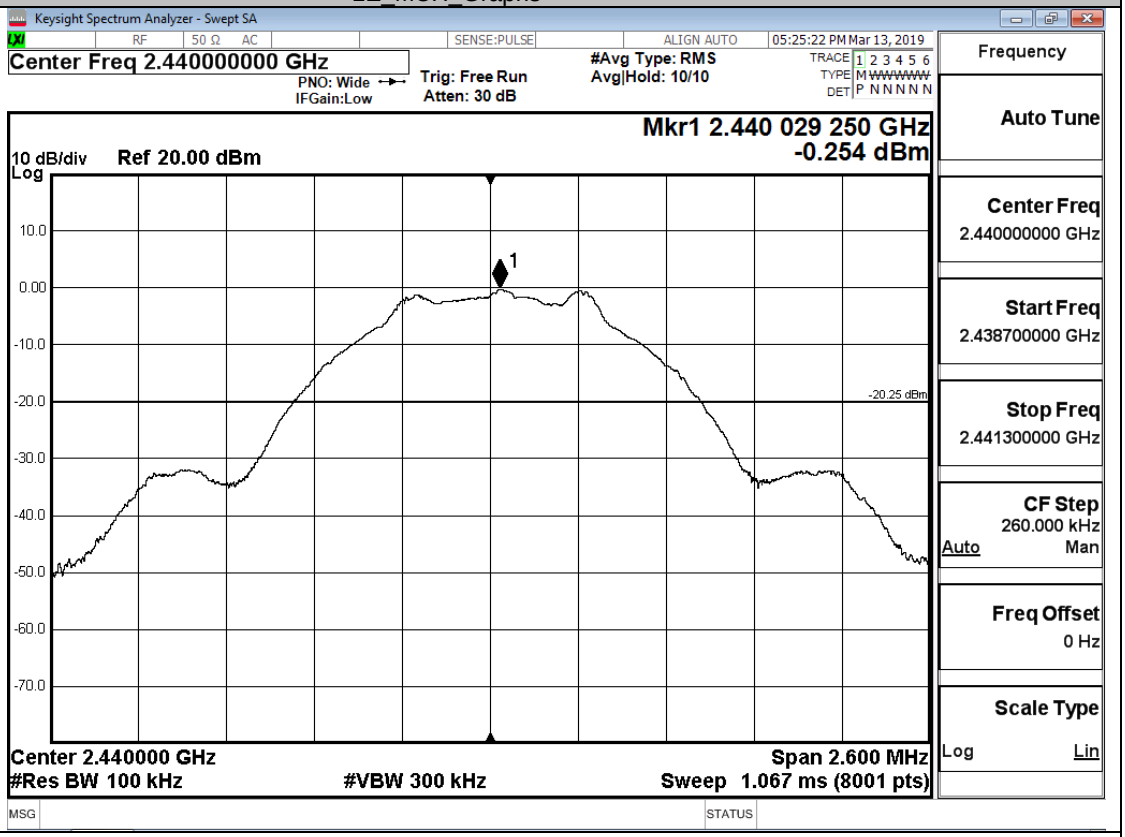
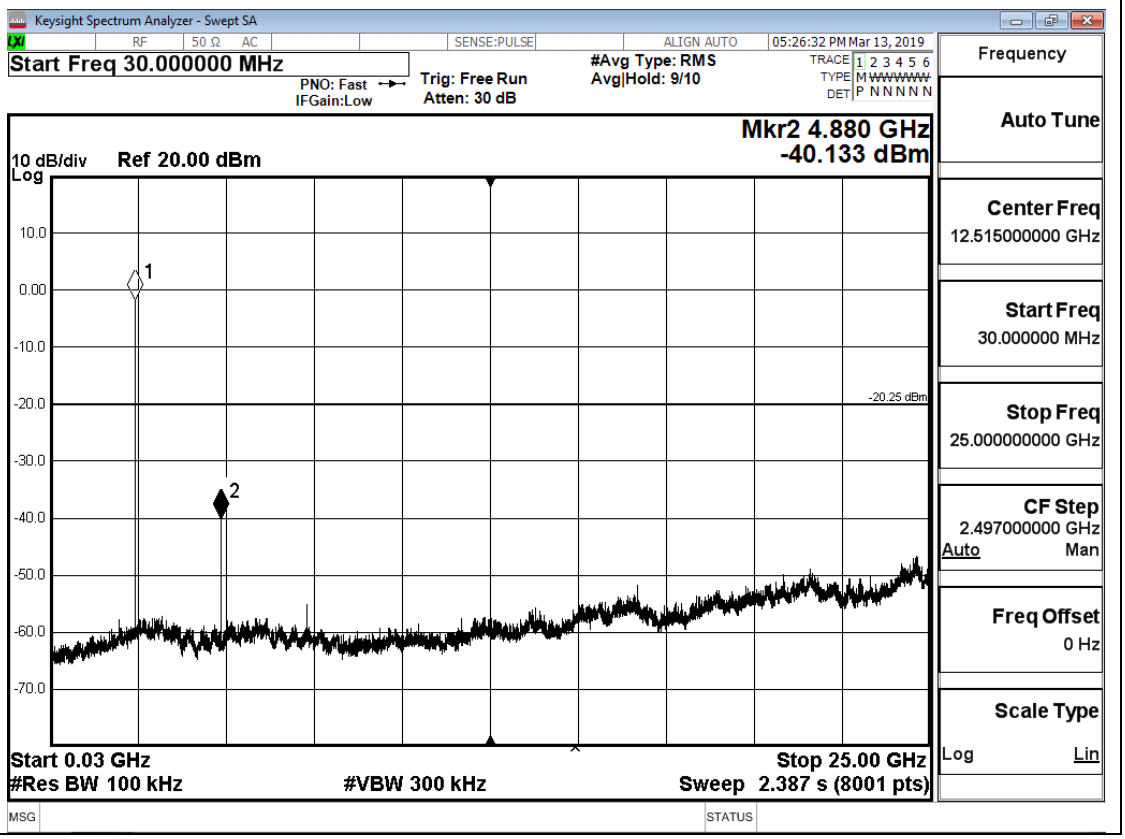
2LE HCH	

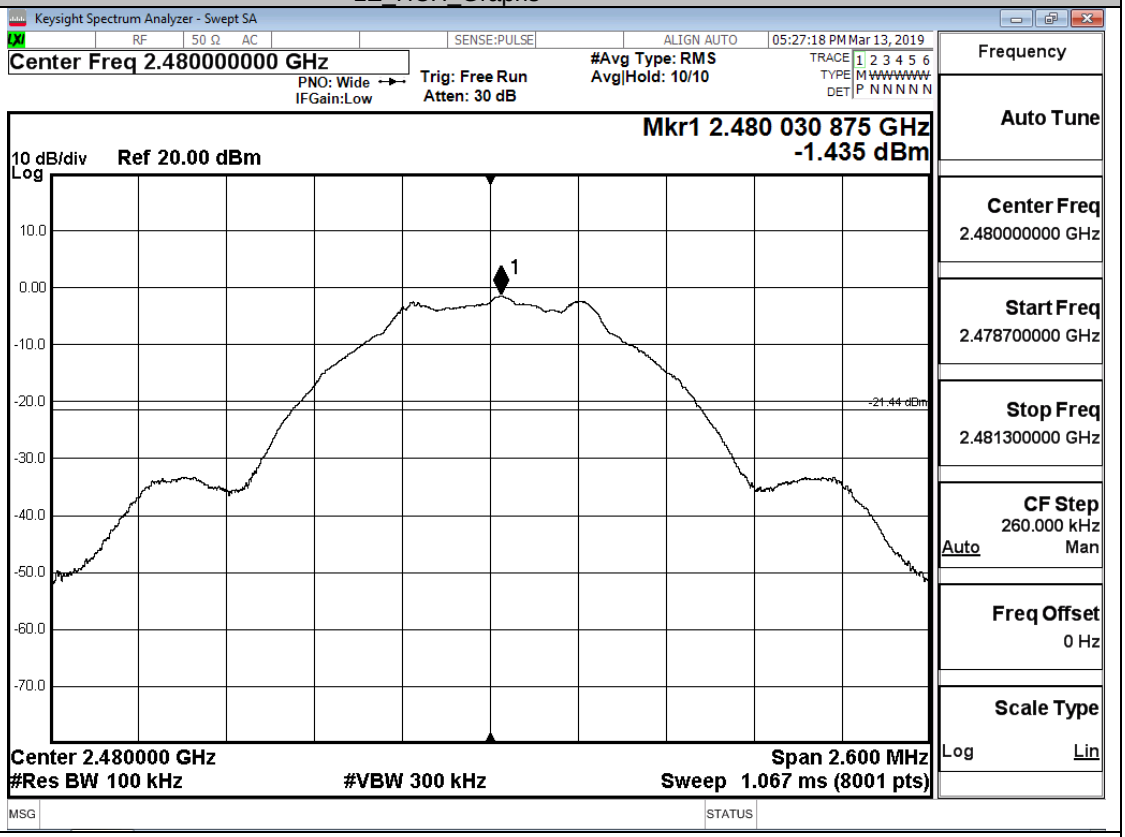
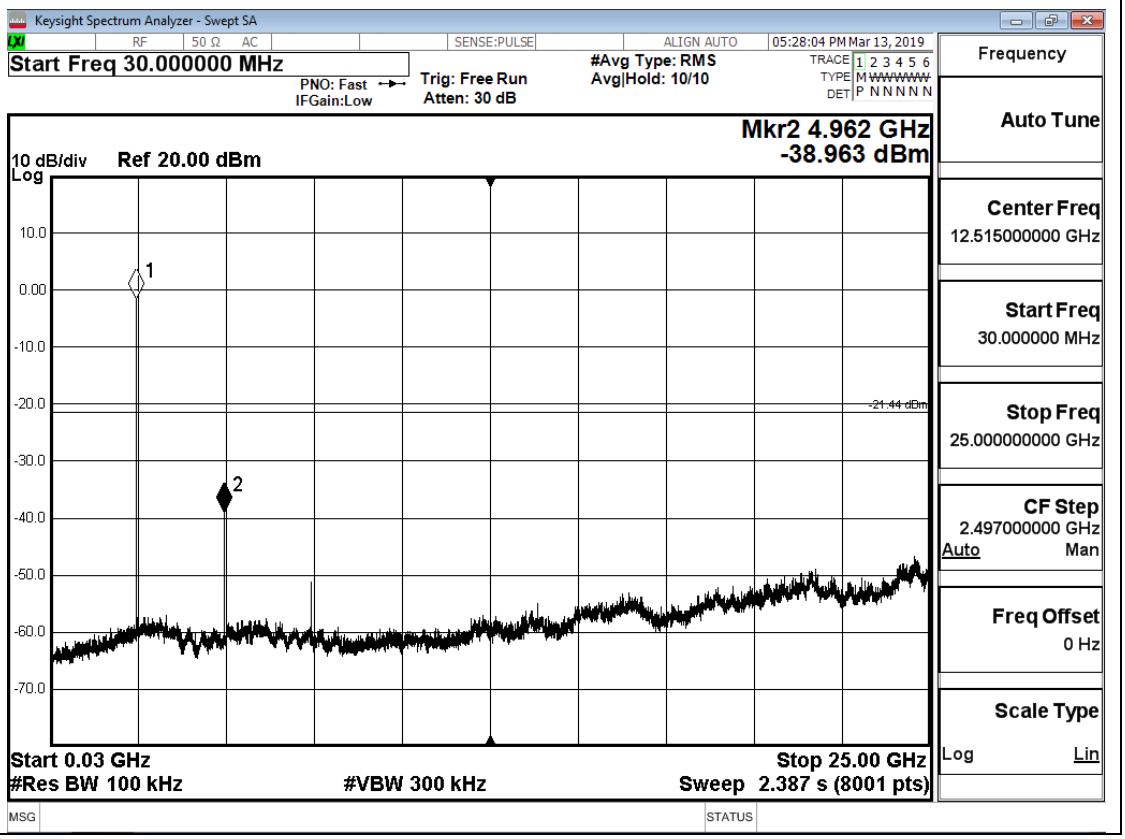
Keysight Spectrum Analyzer - Occupied BW
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
04:56:32 PM Mar 18, 2019
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>1/1
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Mkr1 2.480042 GHz
-0.69723 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 6 MHz
Sweep 1 ms
Occupied Bandwidth
2.0645 MHz
Total Power 6.85 dBm
Transmit Freq Error 33.684 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.154 MHz
x dB -6.00 dB
MSG
STATUS
Frequency
Center Freq
2.480000000 GHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz

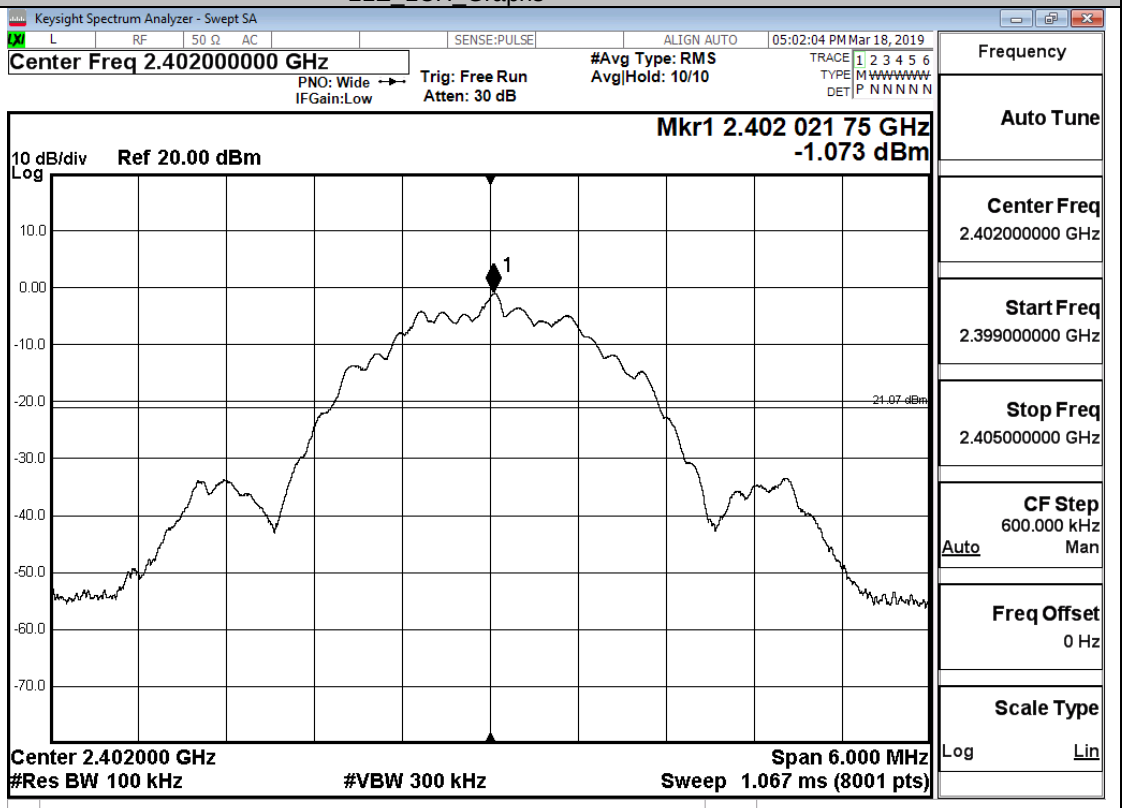
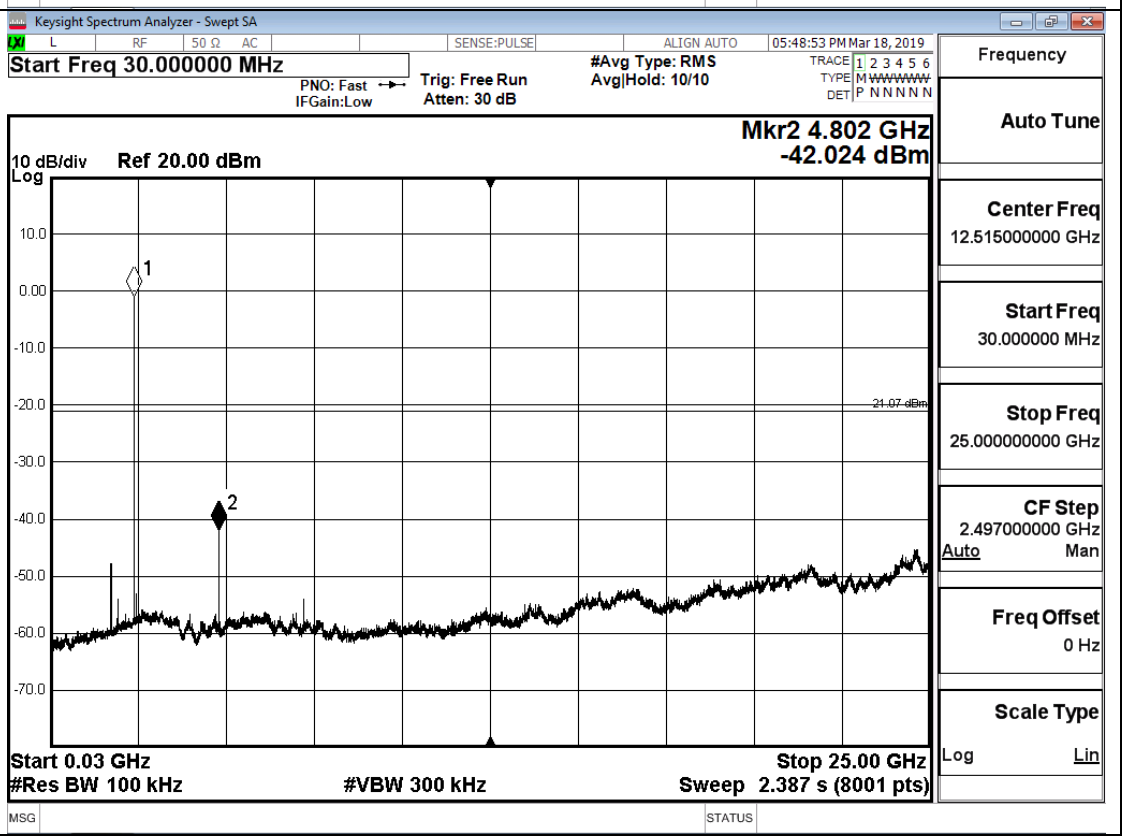
B.5 RF Conducted Spurious Emissions

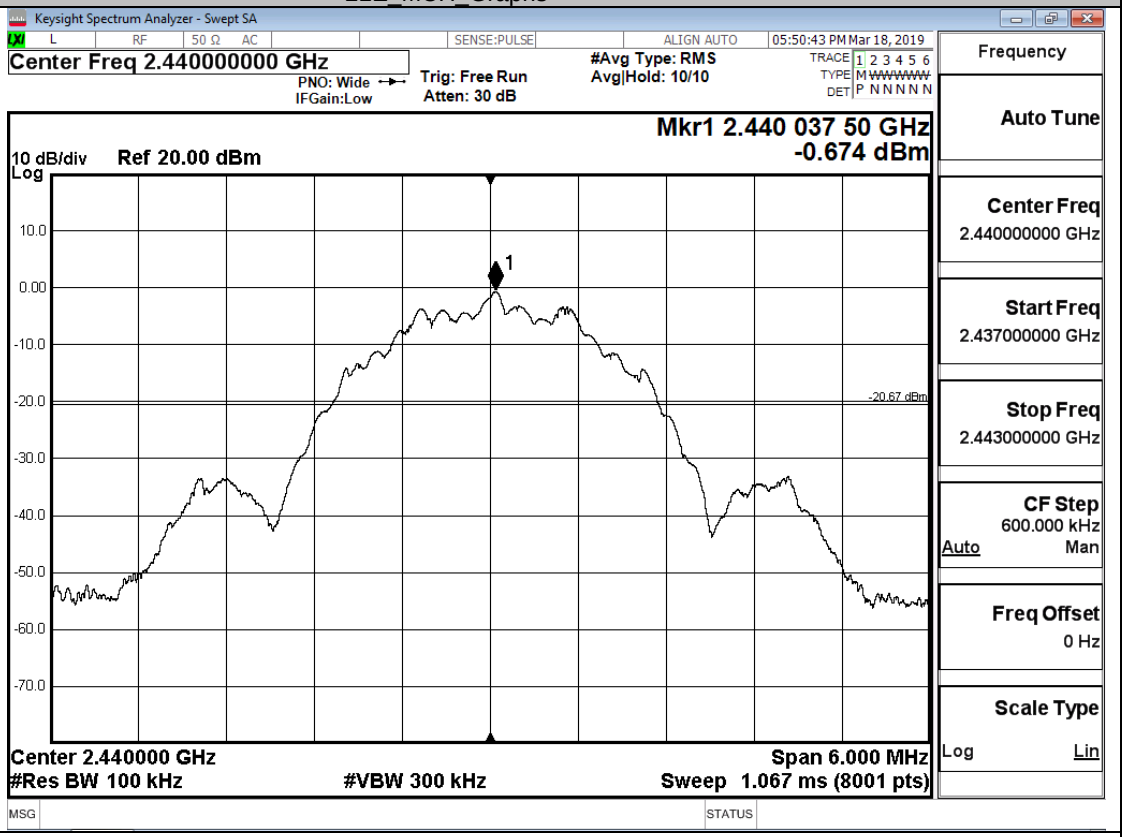
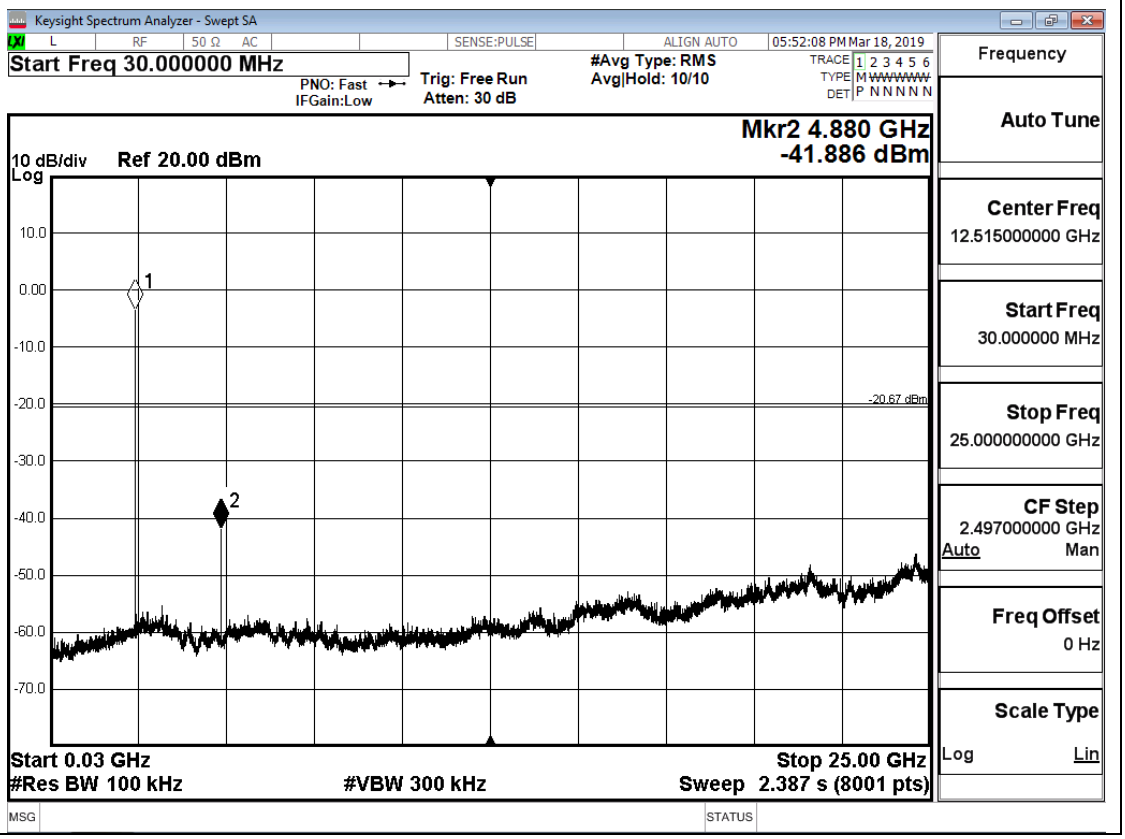
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
LE	LCH	-0.022	-43.174	-20.02	PASS
LE	MCH	-0.254	-40.133	-20.25	PASS
LE	HCH	-1.435	-38.963	-21.44	PASS
2LE	LCH	-1.073	-42.024	-21.07	PASS
2LE	MCH	-0.674	-41.886	-20.67	PASS
2LE	HCH	-0.708	-42.744	-20.71	PASS

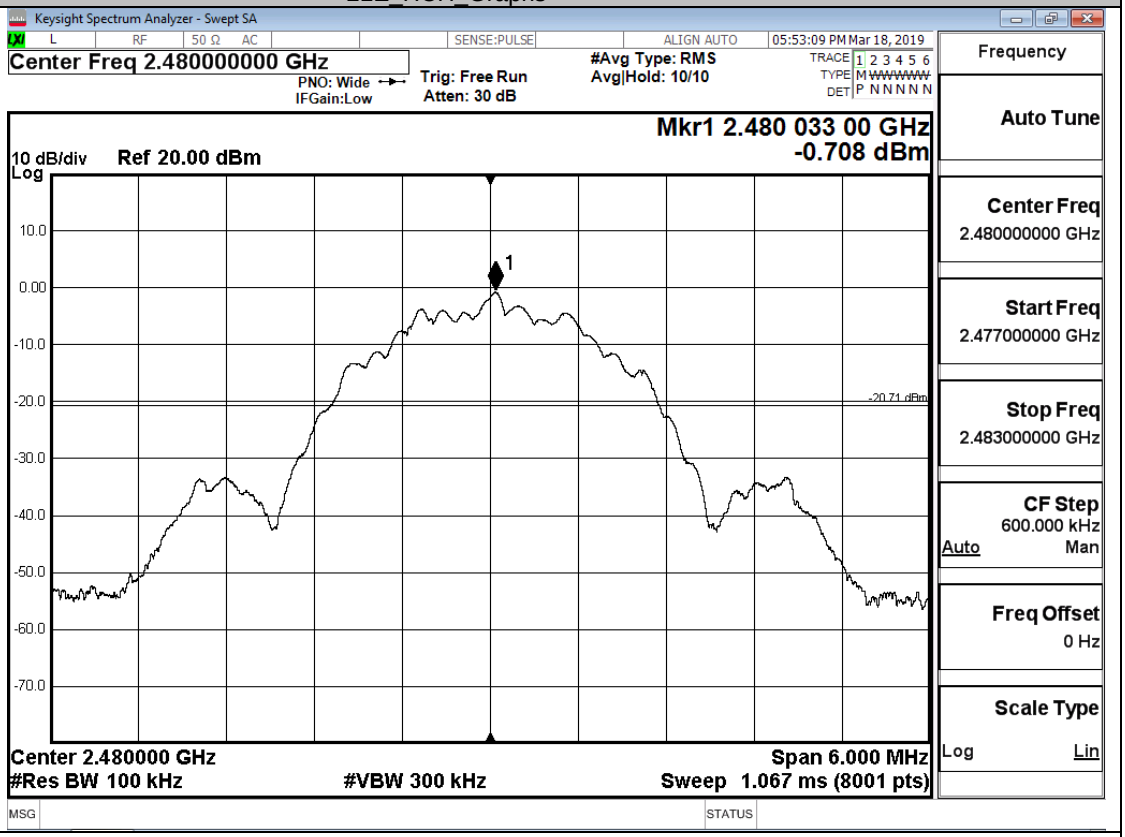
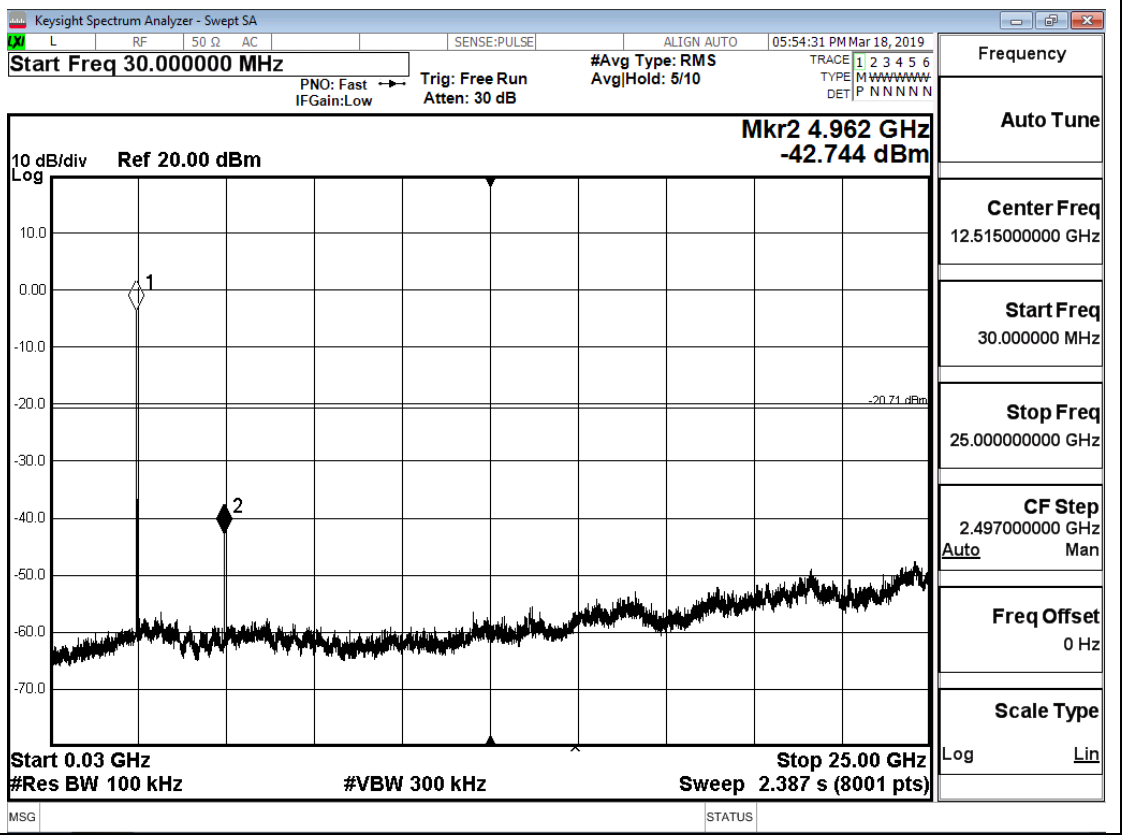
LE_LCH_Graphs	
Pref/ LE/LCH	
Puw/ LE/LCH	

LE_MCH_Graphs	
Pref/ LE/MCH	
Puw/ LE/MCH	

LE_HCH_Graphs	
Pref/ LE/HCH	
Puw/ LE/HCH	

2LE_LCH_Graphs	
Pref/2LE/LCH	
Puw/2LE/LCH	

2LE_MCH_Graphs	
Pref/2LE/MCH	
Puw/2LE/MCH	

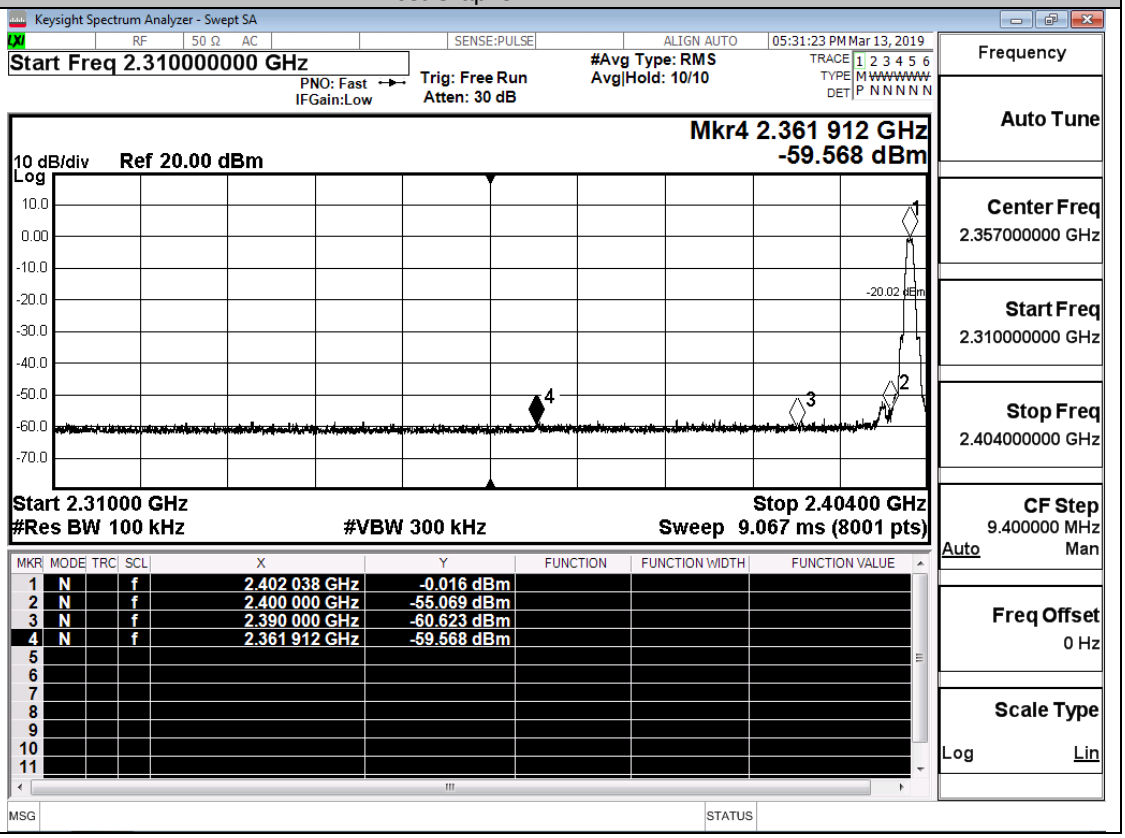
2LE_HCH_Graphs	
Pref/2LE/HCH	
Puw/2LE/HCH	

B.6 Band-edge for RF Conducted Emissions

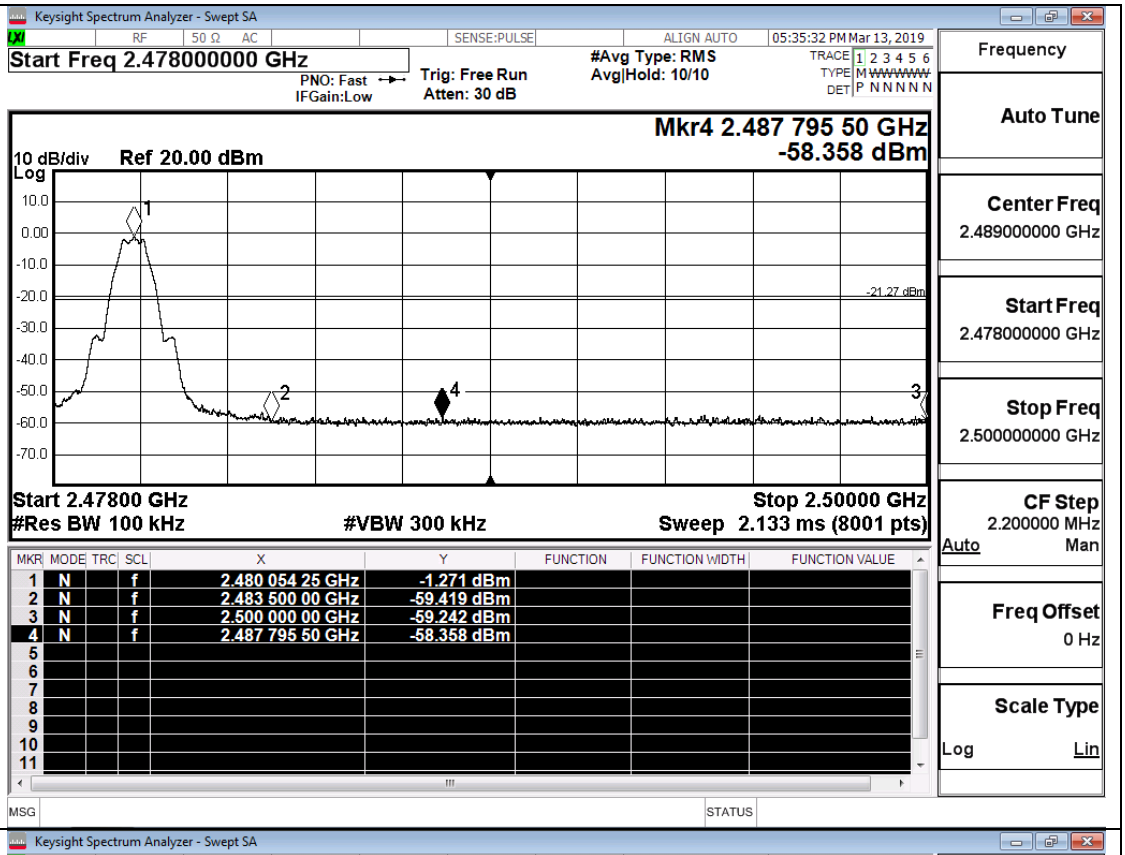
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
LE	LCH	-0.016	-55.069	-20.016	PASS
LE	HCH	-1.271	-58.358	-21.271	PASS
2LE	LCH	-0.927	-33.844	-20.927	PASS
2LE	HCH	-0.499	-57.270	-20.499	PASS

Test Graphs

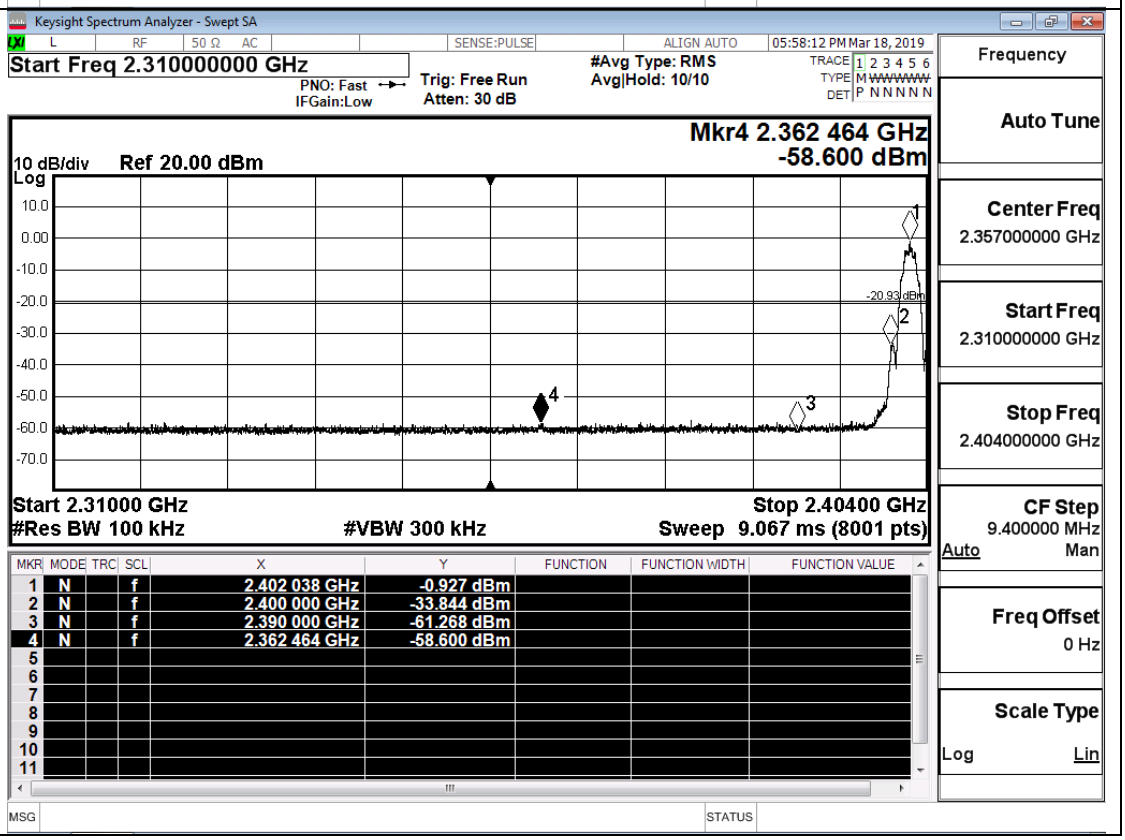
LE LCH



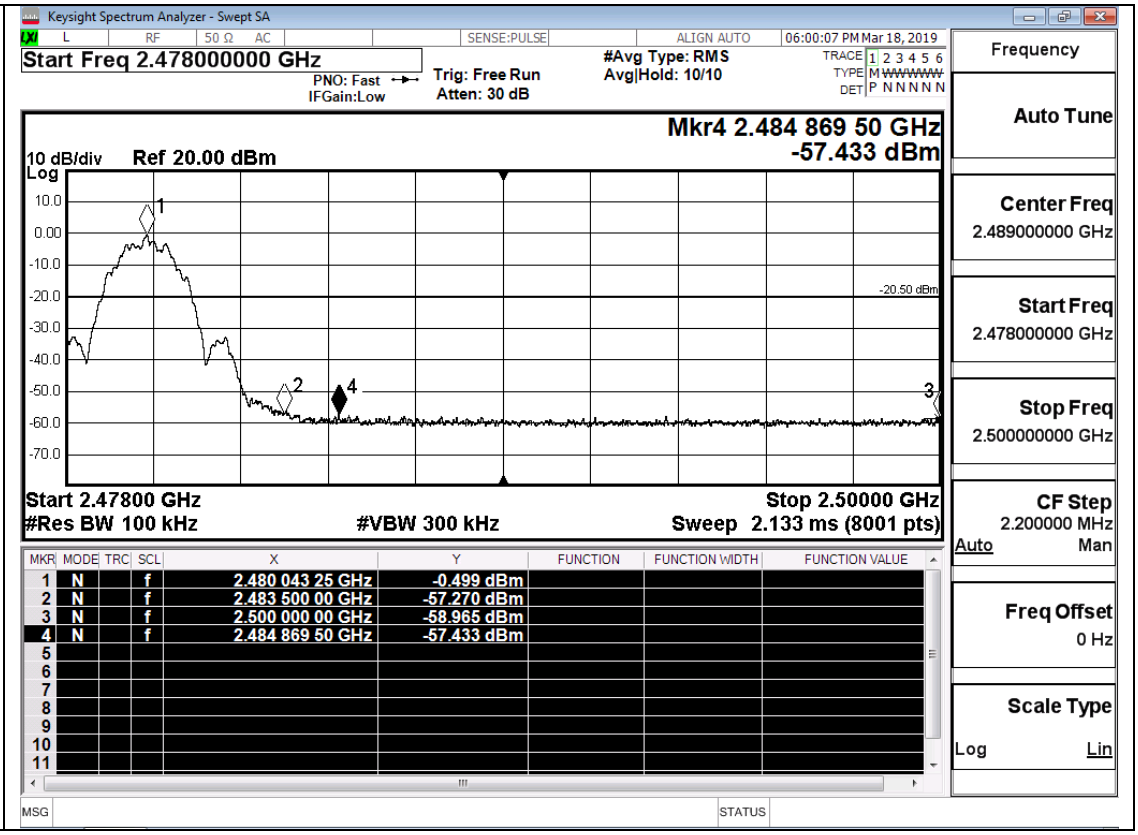
LE HCH



2LE LCH



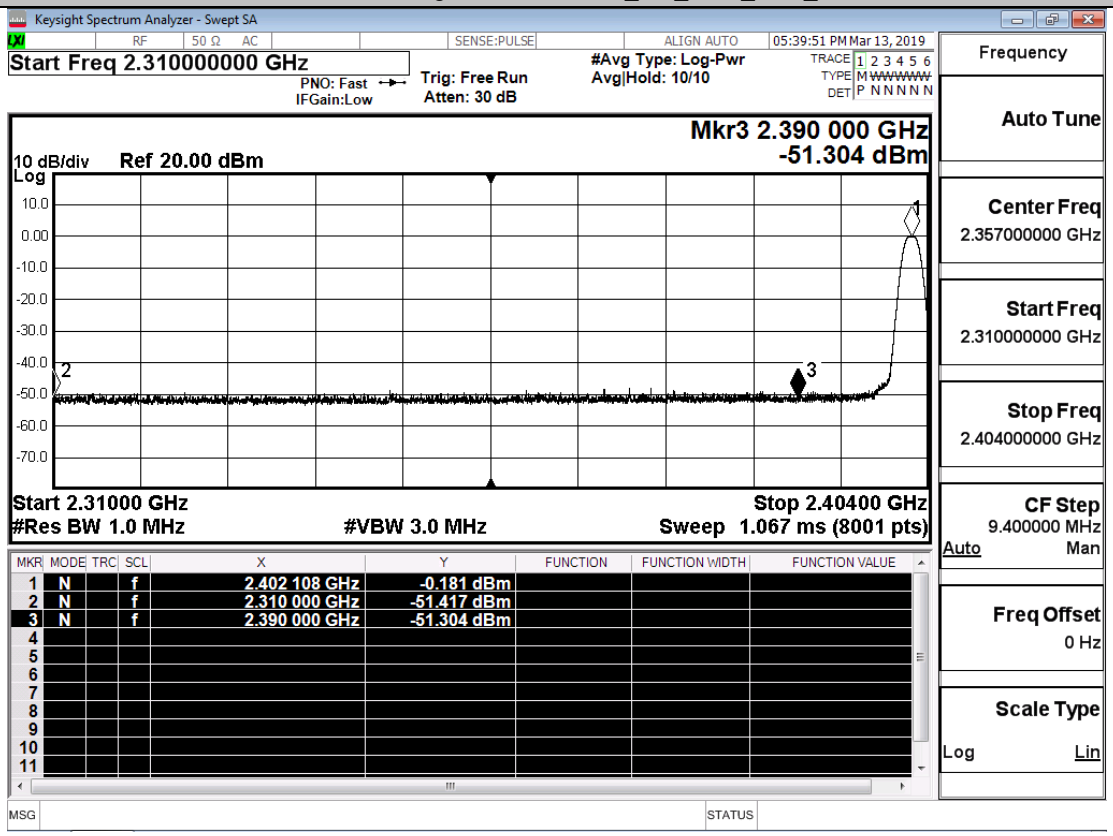
2LE HCH


Keysight Spectrum Analyzer - Swept SA
Start Freq 2.478000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
06:00:07 PM Mar 18, 2019
Mkr4 2.484 869 50 GHz
-57.433 dBm
10 dB/div
Log
Ref 20.00 dBm
-20.50 dBm
Start 2.47800 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 2.133 ms (8001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N f 2.480 043 25 GHz -0.499 dBm
2 N f 2.483 500 00 GHz -57.270 dBm
3 N f 2.500 000 00 GHz -58.965 dBm
4 N f 2.484 869 50 GHz -57.433 dBm
Frequency
Auto Tune
Center Freq
2.489000000 GHz
Start Freq
2.478000000 GHz
Stop Freq
2.500000000 GHz
CF Step
2.200000 MHz
Auto Man
Freq Offset
0 Hz
Scale Type
Log Lin
MSG
STATUS

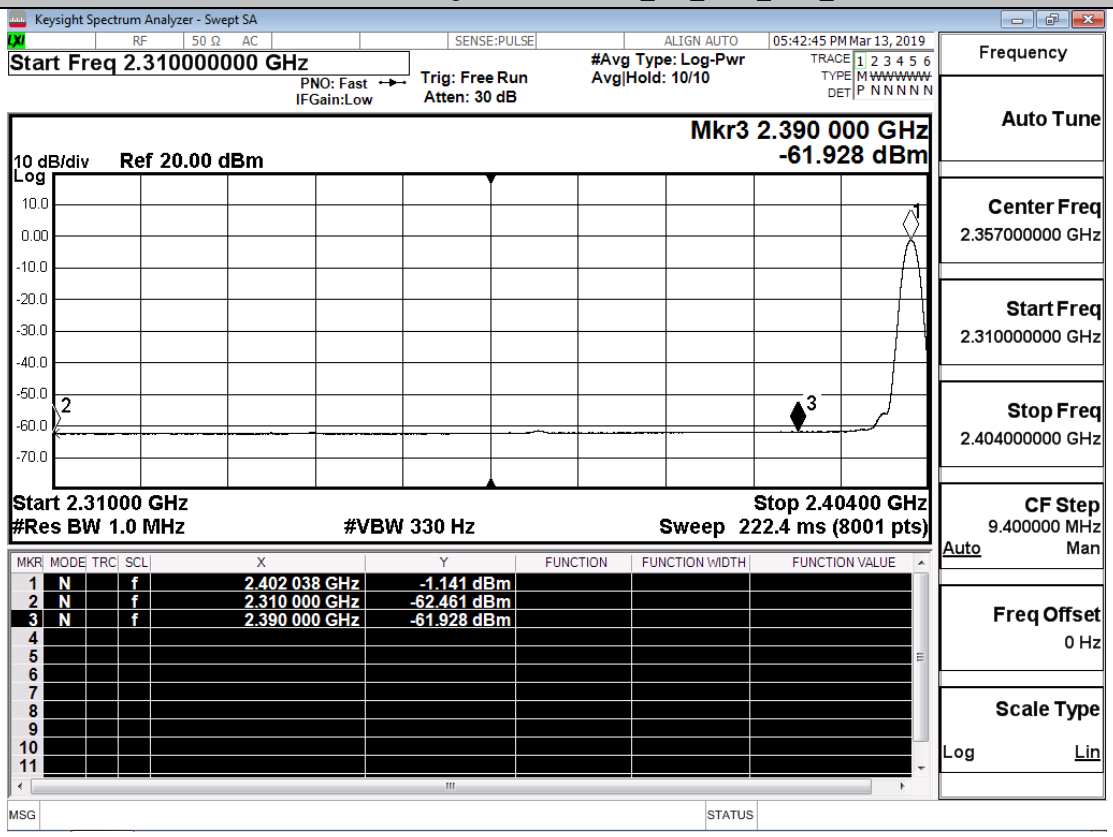
B.7 Restrict-band band-edge measurements

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
LE	2402	Ant1	2310.0	-51.417	2.000	0	45.81	PEAK	74	PASS
		Ant1	2310.0	-62.461	2.000	0	34.77	AV	54	PASS
		Ant1	2390.0	-51.304	2.000	0	45.93	PEAK	74	PASS
		Ant1	2390.0	-61.928	2.000	0	35.30	AV	54	PASS
	2480	Ant1	2483.5	-49.925	2.000	0	47.31	PEAK	74	PASS
		Ant1	2483.5	-59.825	2.000	0	37.41	AV	54	PASS
		Ant1	2500.0	-51.355	2.000	0	45.88	PEAK	74	PASS
		Ant1	2500.0	-61.655	2.000	0	35.58	AV	54	PASS
2LE	2402	Ant1	2310.0	-51.358	2.000	0	45.87	PEAK	74	PASS
		Ant1	2310.0	-62.446	2.000	0	34.78	AV	54	PASS
		Ant1	2390.0	-50.350	2.000	0	46.88	PEAK	74	PASS
		Ant1	2390.0	-61.761	2.000	0	35.47	AV	54	PASS
	2480	Ant1	2483.5	-45.617	2.000	0	51.61	PEAK	74	PASS
		Ant1	2483.5	-57.593	2.000	0	39.64	AV	54	PASS
		Ant1	2500.0	-50.857	2.000	0	46.37	PEAK	74	PASS
		Ant1	2500.0	-61.577	2.000	0	35.65	AV	54	PASS

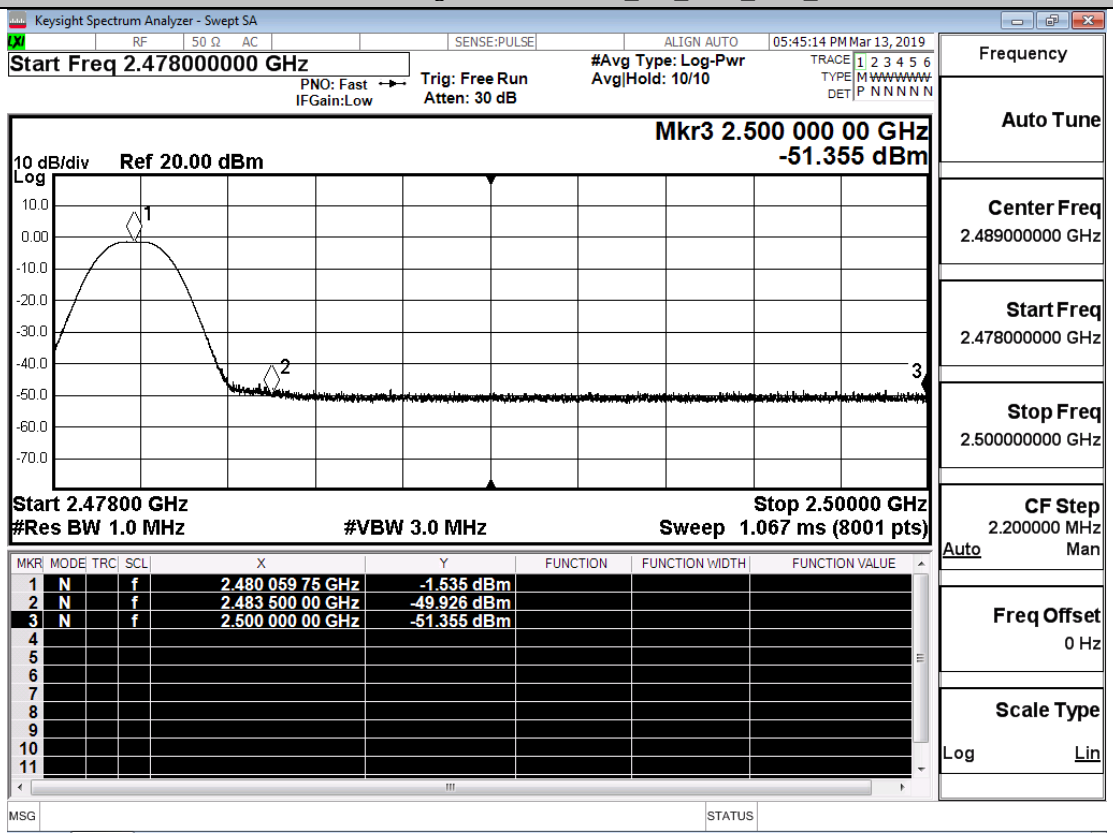
Restrict-band band-edge measurements_ LE_2402_Ant1_PEAK



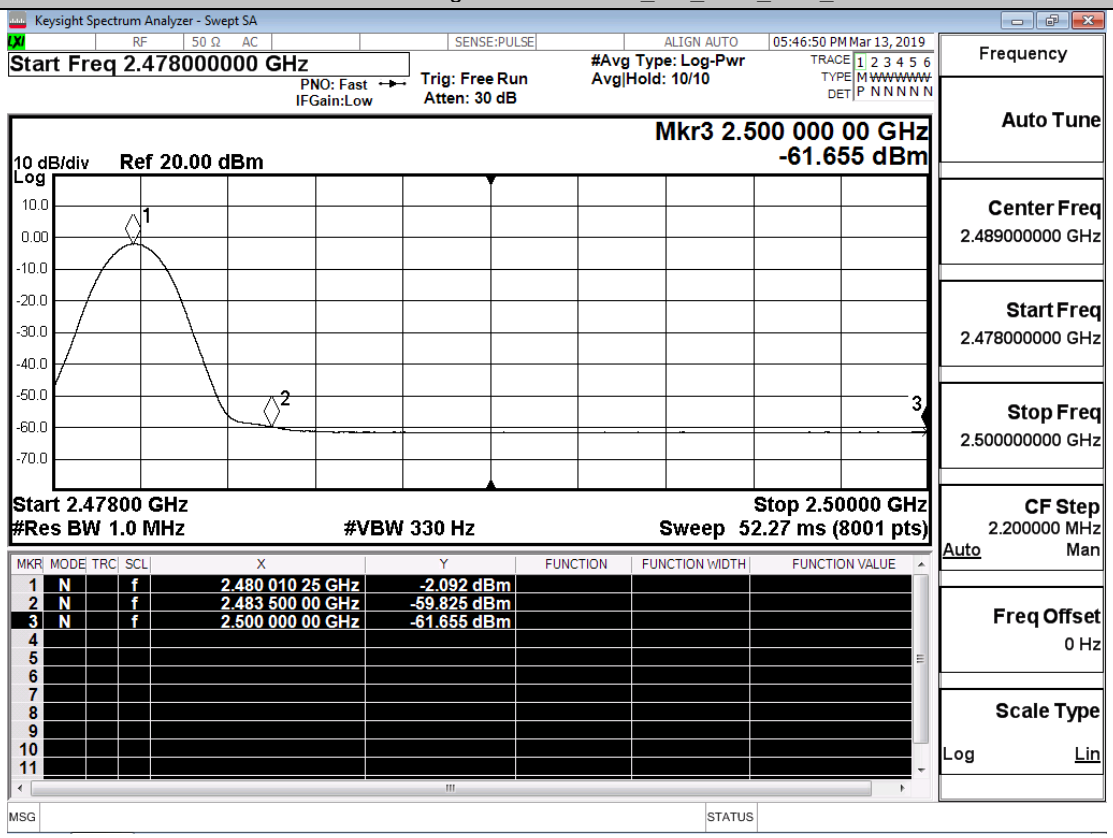
Restrict-band band-edge measurements_ LE_2402_Ant1_AV



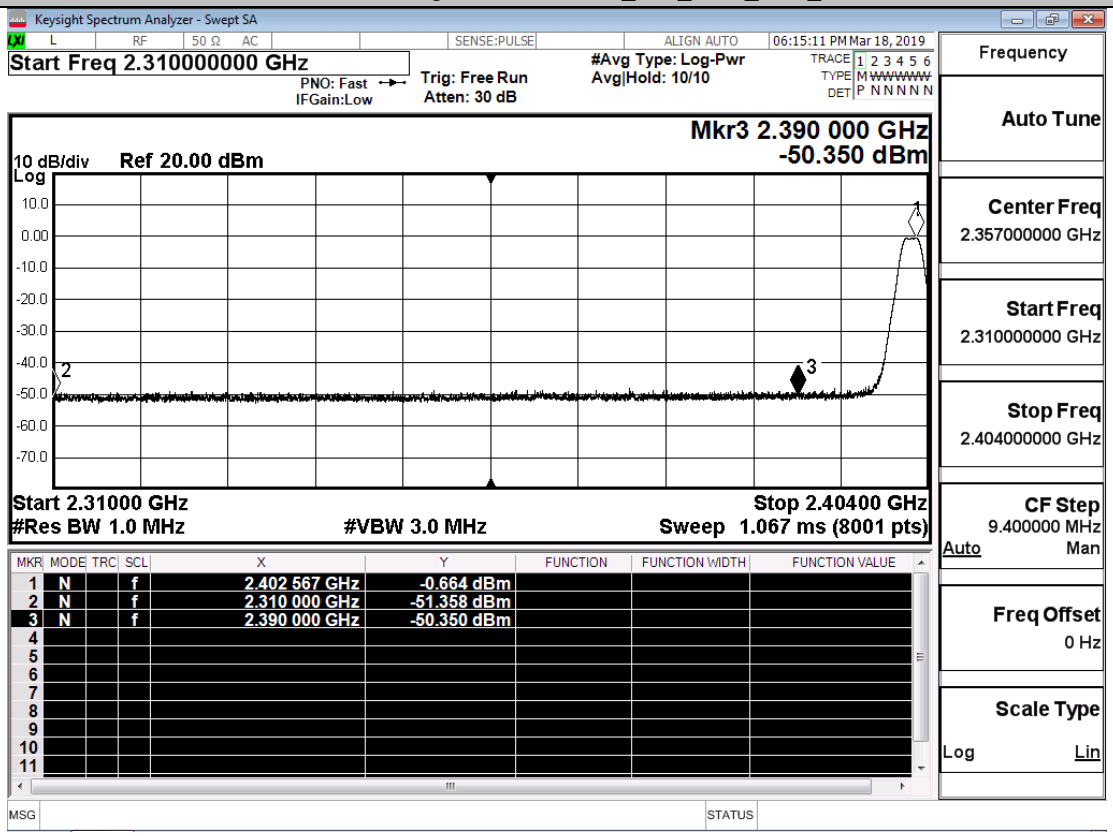
Restrict-band band-edge measurements_ LE_2480_Ant1_PEAK



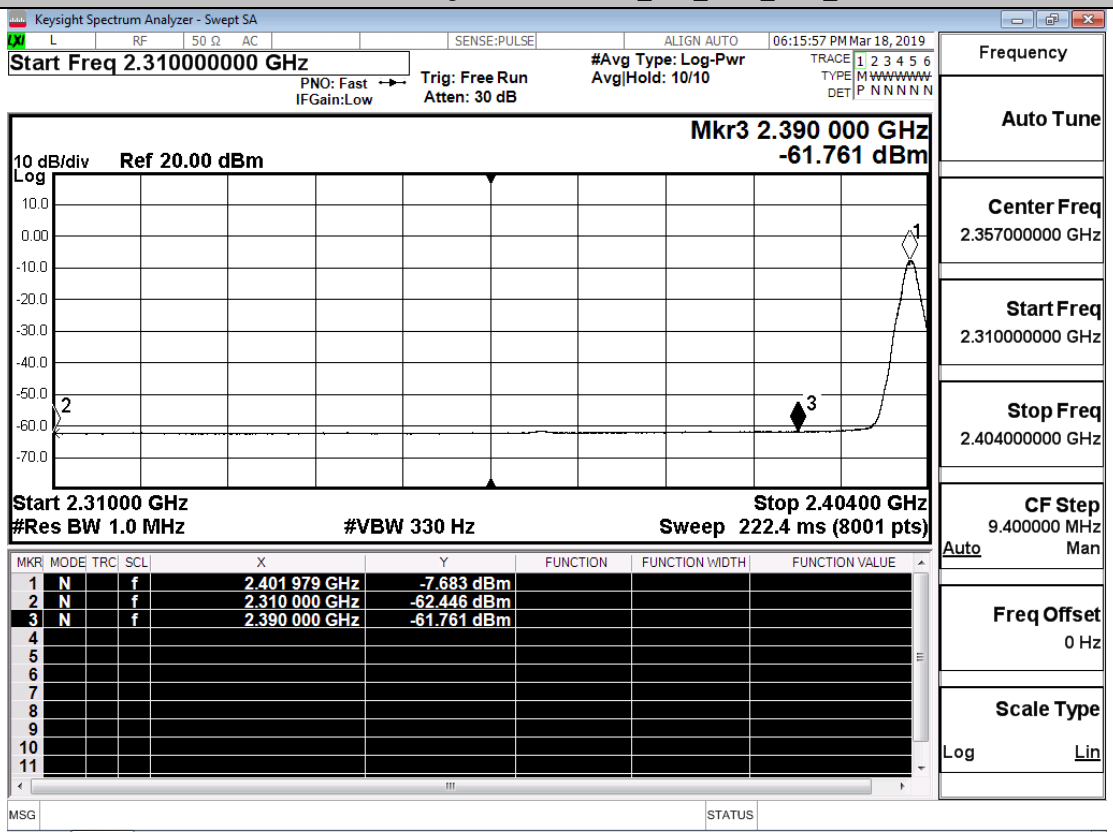
Restrict-band band-edge measurements_ LE_2480_Ant1_AV



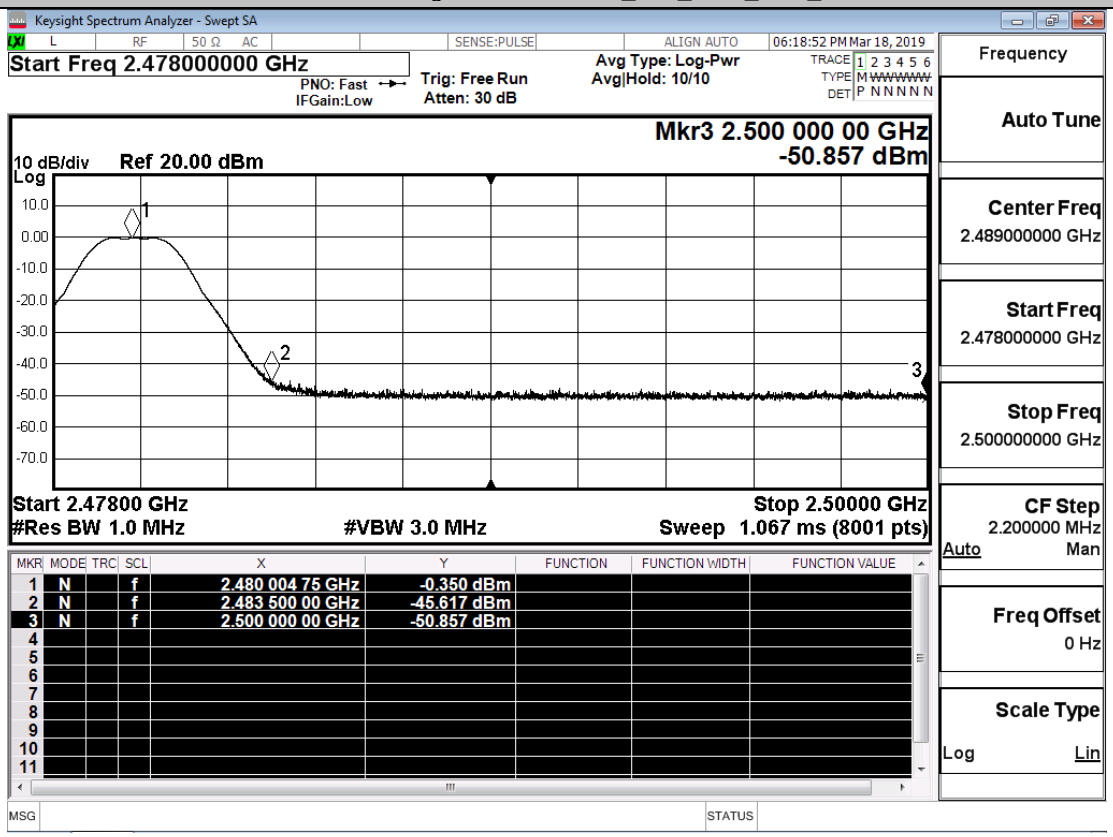
Restrict-band band-edge measurements_2LE_2402_Ant1_PEAK



Restrict-band band-edge measurements_2LE_2402_Ant1_AV



Restrict-band band-edge measurements_2LE_2480_Ant1_PEAK



Restrict-band band-edge measurements_2LE_2480_Ant1_AV