

Appendix A

RF Test Data for Zigbee (Conducted Measurement)

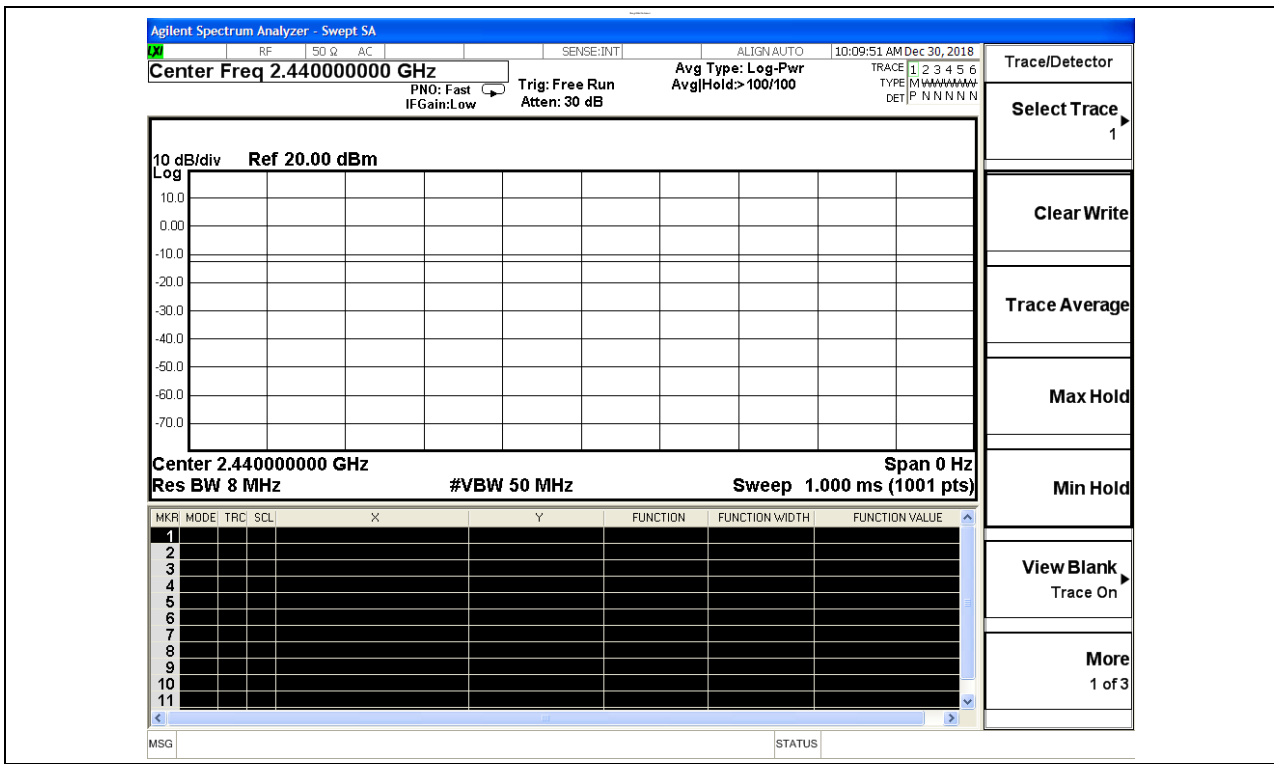
Product Name: Thermostat
Trade Mark: Smart Forced Air
Test Model: Thermostat

Environmental Conditions

Temperature:	23.8 ° C
Relative Humidity:	54.2%
ATM Pressure:	100.0 kPa
Test Engineer:	David Luo
Supervised by:	Jayden.Zhuo

A.1 Duty Cycle

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

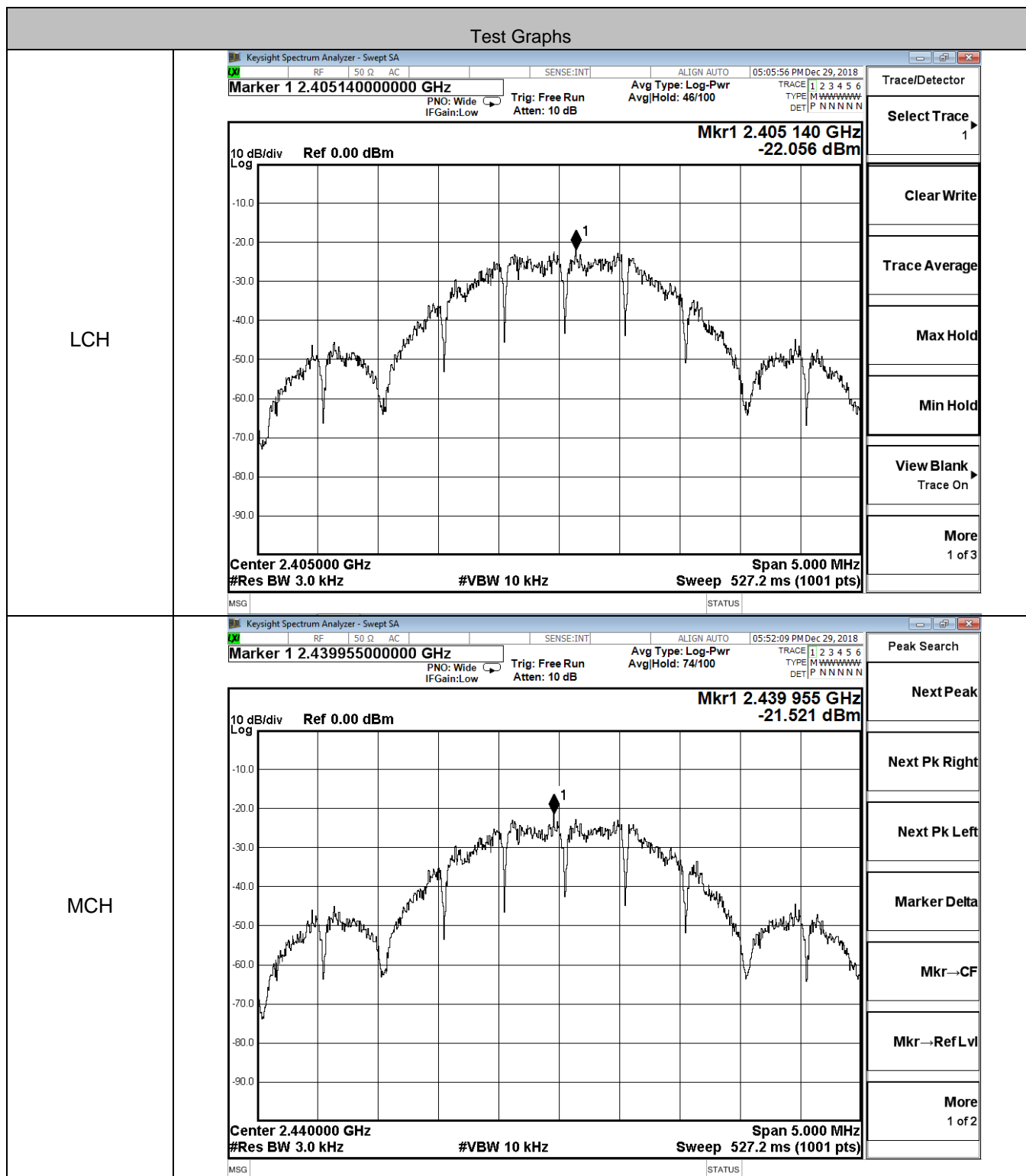


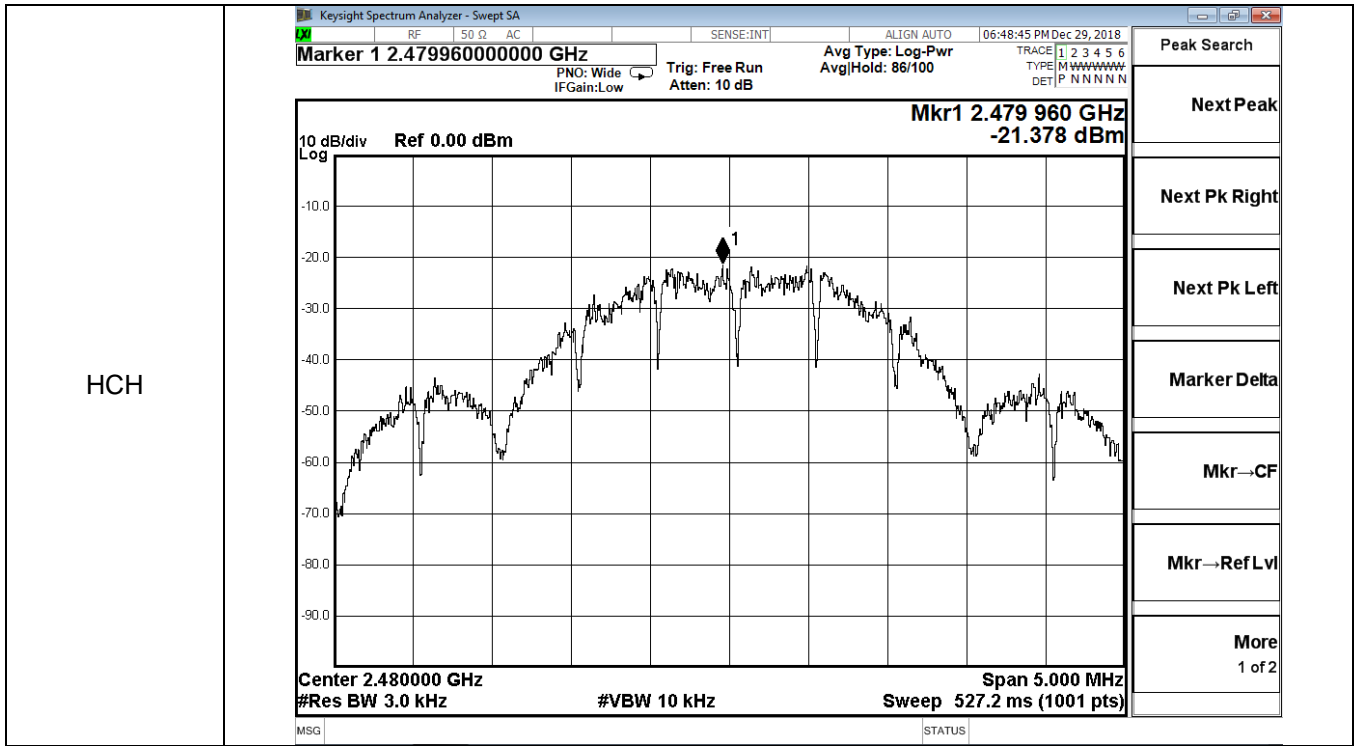
A.2 Maximum Conducted Peak Output Power

Mode	Channel	Conduct Peak Power[dBm]	Limit [dBm]	Verdict
ZigBee	LCH	-5.492	30	PASS
ZigBee	MCH	-5.153	30	PASS
ZigBee	HCH	-5.038	30	PASS

A.3 Maximum Power Spectral Density

Mode	Channel	PSD [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
ZigBee	LCH	-22.056	8	PASS
ZigBee	MCH	-21.521	8	PASS
ZigBee	HCH	-21.378	8	PASS





A.4 6dB Bandwidth

Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
ZigBee	LCH	1.530	≥0.5	PASS
ZigBee	MCH	1.536	≥0.5	PASS
ZigBee	HCH	1.598	≥0.5	PASS

Test Graphs

LCH	<p>Occupied Bandwidth Total Power 0.39 dBm</p> <p style="text-align: center; font-weight: bold;">2.3095 MHz</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Transmit Freq Error</td> <td style="width: 33%;">45.691 kHz</td> <td style="width: 33%;">OBW Power</td> <td style="width: 33%;">99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.530 MHz</td> <td>x dB</td> <td>-6.00 dB</td> </tr> </table>	Transmit Freq Error	45.691 kHz	OBW Power	99.00 %	x dB Bandwidth	1.530 MHz	x dB	-6.00 dB
Transmit Freq Error	45.691 kHz	OBW Power	99.00 %						
x dB Bandwidth	1.530 MHz	x dB	-6.00 dB						
MCH	<p>Occupied Bandwidth Total Power 0.65 dBm</p> <p style="text-align: center; font-weight: bold;">2.3568 MHz</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Transmit Freq Error</td> <td style="width: 33%;">47.805 kHz</td> <td style="width: 33%;">OBW Power</td> <td style="width: 33%;">99.00 %</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.536 MHz</td> <td>x dB</td> <td>-6.00 dB</td> </tr> </table>	Transmit Freq Error	47.805 kHz	OBW Power	99.00 %	x dB Bandwidth	1.536 MHz	x dB	-6.00 dB
Transmit Freq Error	47.805 kHz	OBW Power	99.00 %						
x dB Bandwidth	1.536 MHz	x dB	-6.00 dB						

HCH

Keysight Spectrum Analyzer - Occupied BW

Center Freq: 2.480000000 GHz Radio Std: None

Trig: Free Run Avg|Hold:>10/10

#FGain:Low #Atten: 10 dB Radio Device: BTS

10 dB/div Ref 10.00 dBm

Center 2.48 GHz Span 5 MHz

#Res BW 100 kHz #VBW 300 kHz Sweep 1 ms

Occupied Bandwidth	Total Power	0.73 dBm
2.4195 MHz		
Transmit Freq Error	48.220 kHz	OBW Power
		99.00 %
x dB Bandwidth	1.598 MHz	x dB
		-6.00 dB

Trace/Detector

Clear Write

Average

Max Hold

Min Hold

Detector
Average ▶
Auto Man

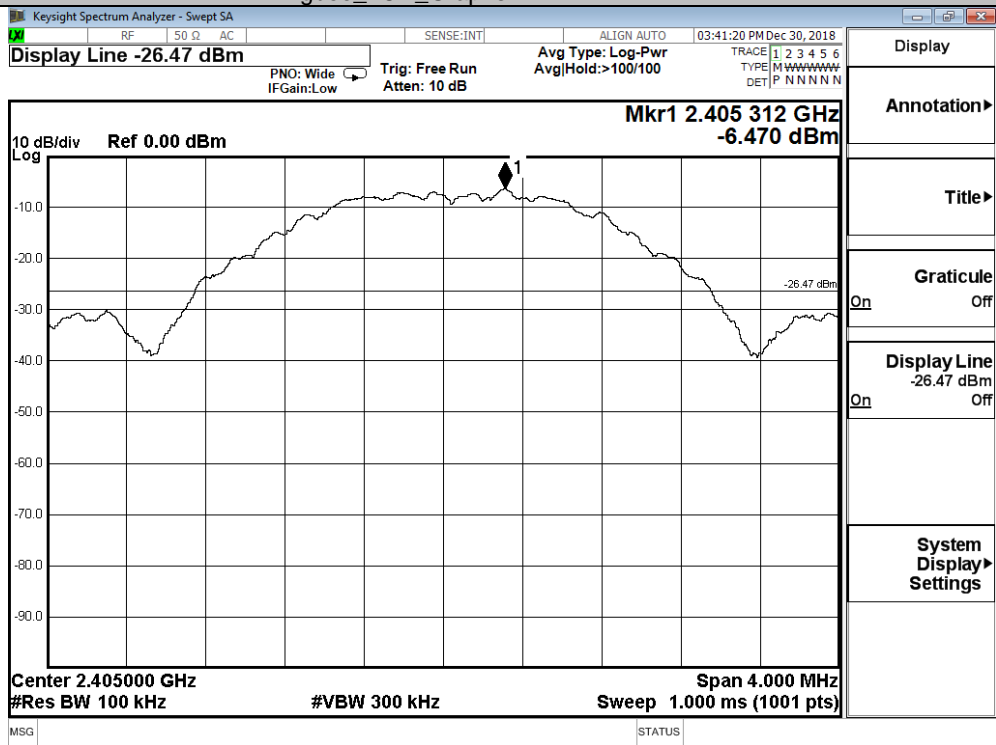
MSG
STATUS

A.5 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
ZigBee	LCH	-6.470	-49.841	-26.470	PASS
ZigBee	MCH	-6.577	-49.289	-26.577	PASS
ZigBee	HCH	-6.763	-51.434	-26.763	PASS

Zigbee_LCH_Graphs

Pref/Zigbee/LCH



Display

Annotation

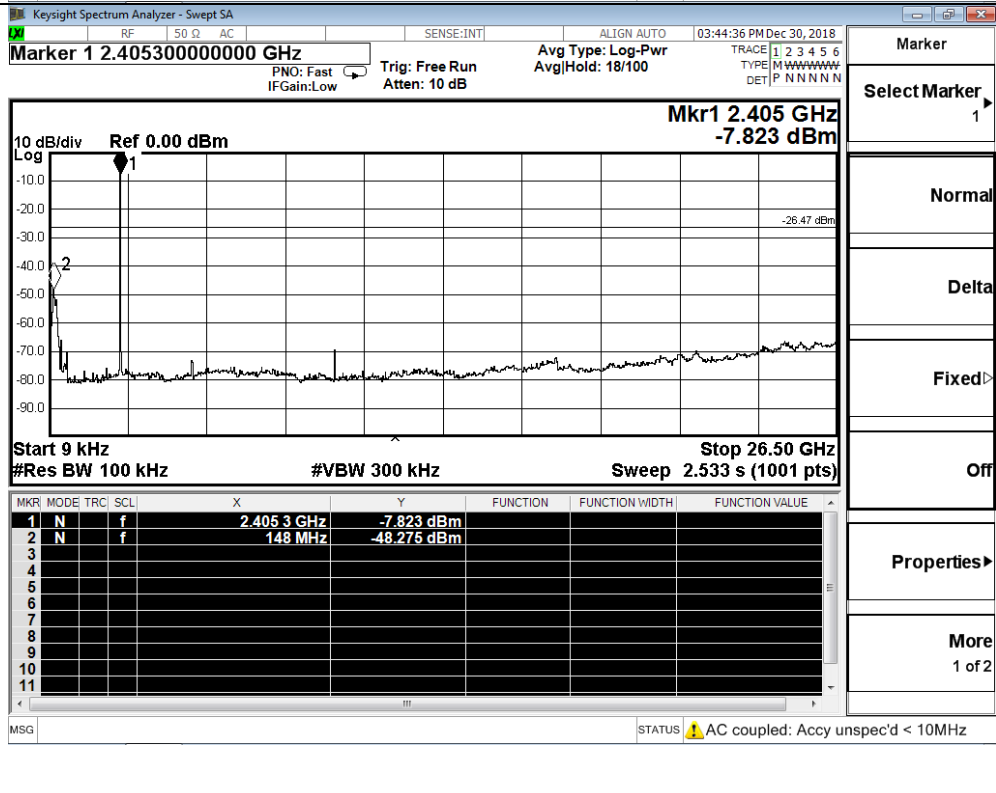
Title

Graticule
On Off

Display Line
On Off
-26.47 dBm

System Display Settings

Puw/Zigbee/LCH



Marker

Select Marker
1

Normal

Delta

Fixed

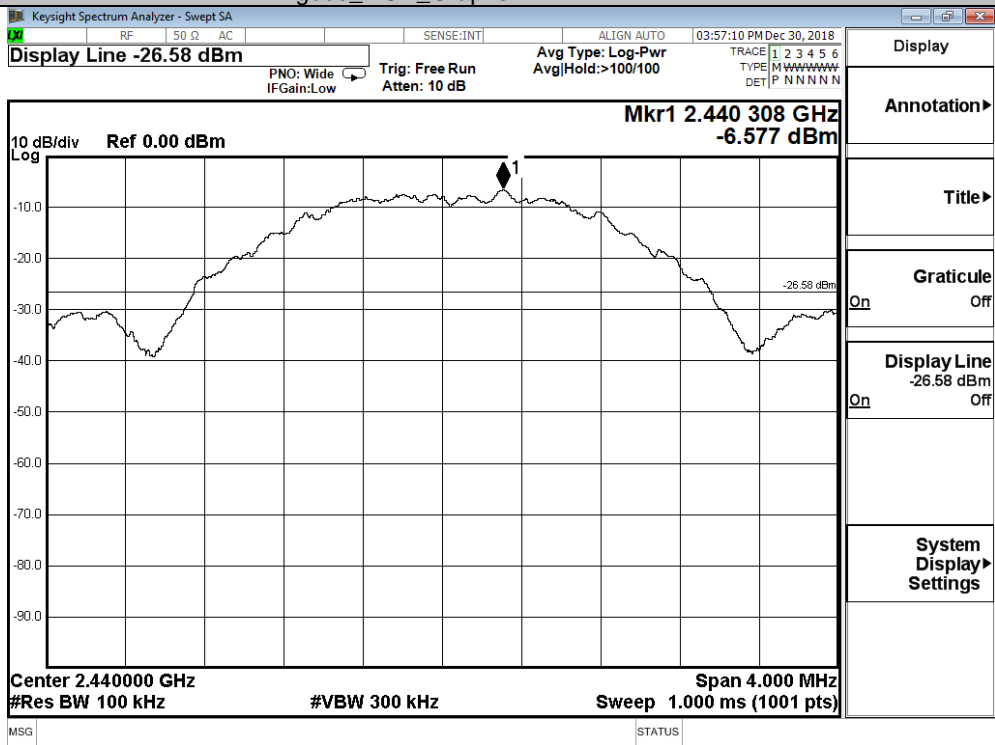
Off

Properties

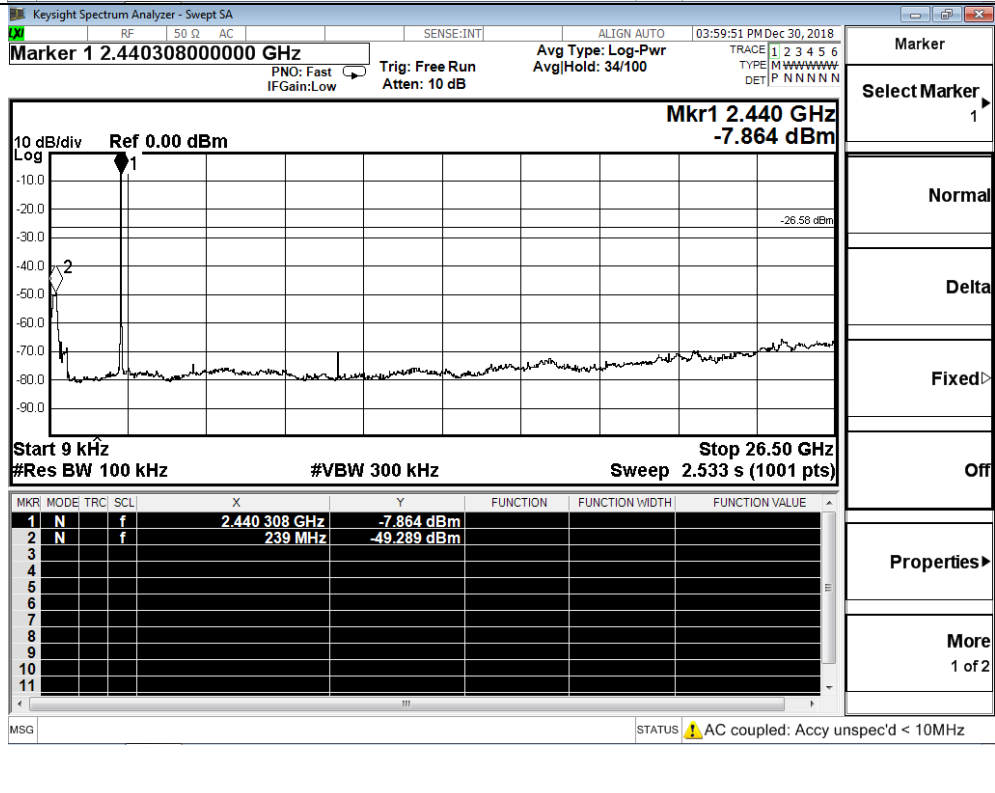
More
1 of 2

Zigbee_MCH_Graphs

Pref/Zigbee/MCH

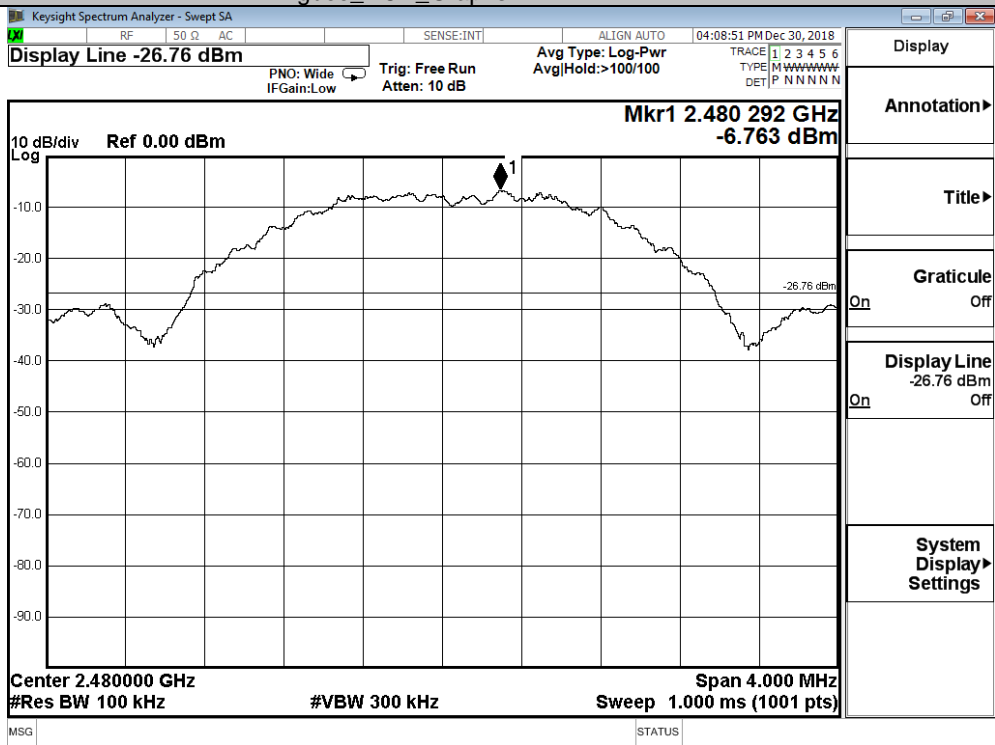


Puw/Zigbee/MCH



Zigbee_HCH_Graphs

Pref/Zigbee/HCH



Display

Annotation

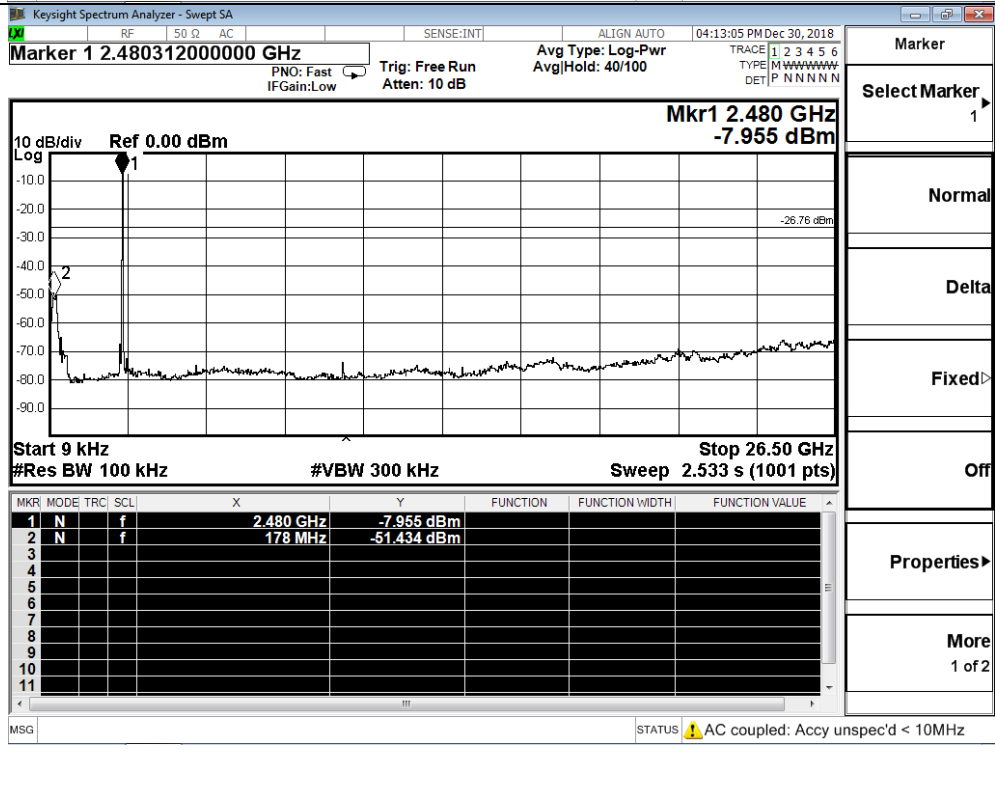
Title

Graticule
On
Off

Display Line
On
-26.76 dBm
Off

System Display Settings

Puw/Zigbee/HCH



Marker

Select Marker
1

Normal

Delta

Fixed

Off

Properties

More
1 of 2

A.6 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
ZigBee	LCH	-6.468	-47.560	-26.470	PASS
ZigBee	HCH	-6.614	-51.349	-26.763	PASS

Test Graphs

LCH

Keysight Spectrum Analyzer - Swept SA
 Marker 1 2.405300000000 GHz
 Avg Type: Log-Pwr
 AvgHold:>100/100
 PNO: Fast IFGain:Low
 Trig: Free Run Atten: 10 dB
 03:43:10 PM Dec 30, 2018
 Mkr1 2.405 3 GHz -6.468 dBm
 10 dB/div Ref 0.00 dBm
 Start 2.31000 GHz Stop 2.41000 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 9.600 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.405 3 GHz	-6.468 dBm			
2	N		f	2.400 0 GHz	-47.560 dBm			
3	N		f	2.390 0 GHz	-65.198 dBm			

Marker

Select Marker 1

Normal

Delta

Fixed

Off

Properties

More 1 of 2

HCH

Keysight Spectrum Analyzer - Swept SA
 Marker 1 2.480312000000 GHz
 Avg Type: Log-Pwr
 AvgHold:>100/100
 PNO: Fast IFGain:Low
 Trig: Free Run Atten: 10 dB
 04:10:43 PM Dec 30, 2018
 Mkr1 2.480 312 GHz -6.614 dBm
 10 dB/div Ref 0.00 dBm
 Start 2.47700 GHz Stop 2.50000 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.200 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.480 312 GHz	-6.614 dBm			
2	N		f	2.483 500 GHz	-51.349 dBm			

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

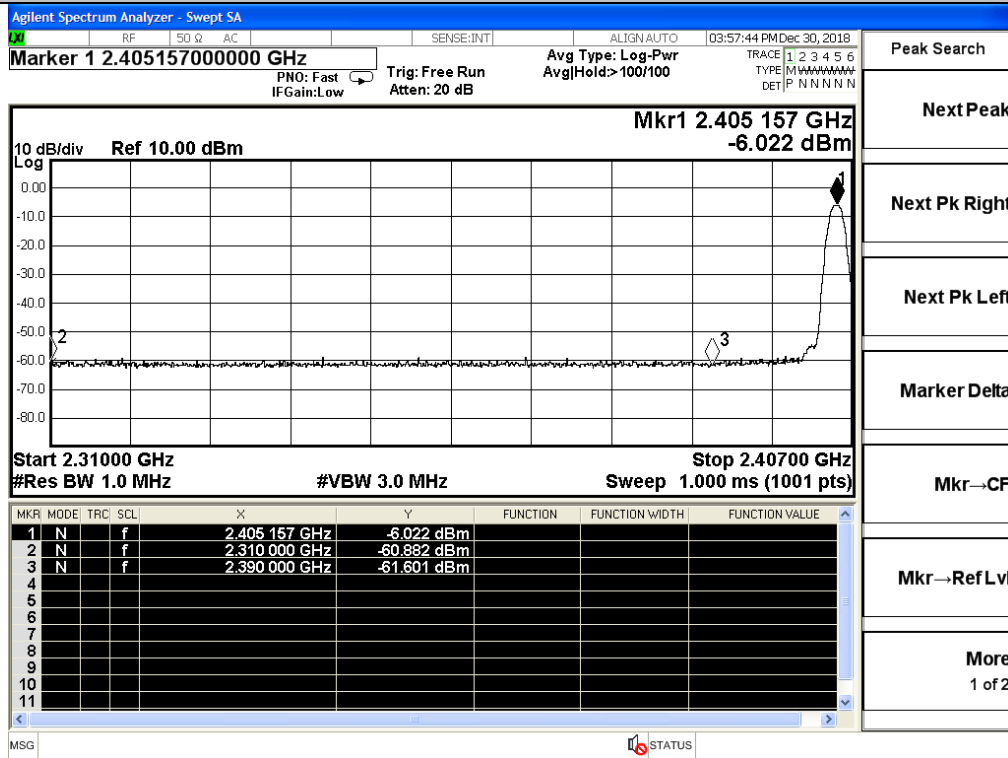
Mkr→Ref Lvl

More 1 of 2

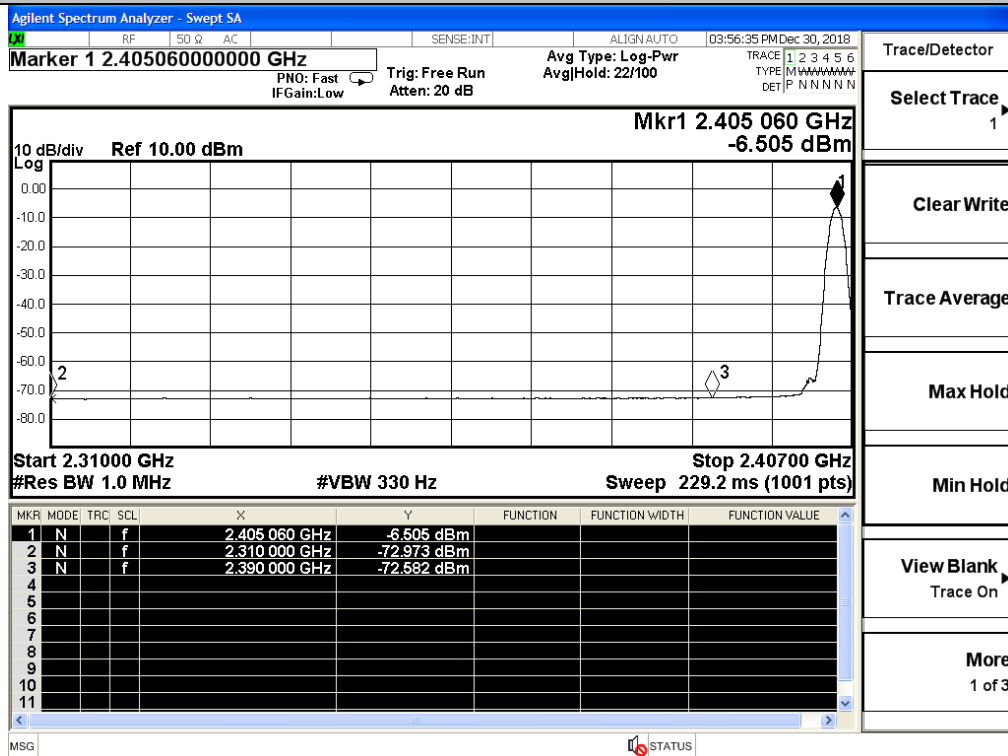
A.7 Restrict-band band-edge measurements

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdi
ZigBee	2405	Ant1	2310.0	-60.882	2.0	0	34.348	PEAK	74	PASS
		Ant1	2310.0	-72.973	2.0	0	22.257	AV	54	PASS
		Ant1	2390.0	-61.601	2.0	0	33.629	PEAK	74	PASS
		Ant1	2390.0	-72.582	2.0	0	22.648	AV	54	PASS
	2480	Ant1	2483.5	-59.969	2.0	0	35.261	PEAK	74	PASS
		Ant1	2483.5	-70.740	2.0	0	24.490	AV	54	PASS
		Ant1	2500.0	-60.689	2.0	0	34.541	PEAK	74	PASS
		Ant1	2500.0	-72.493	2.0	0	22.737	AV	54	PASS

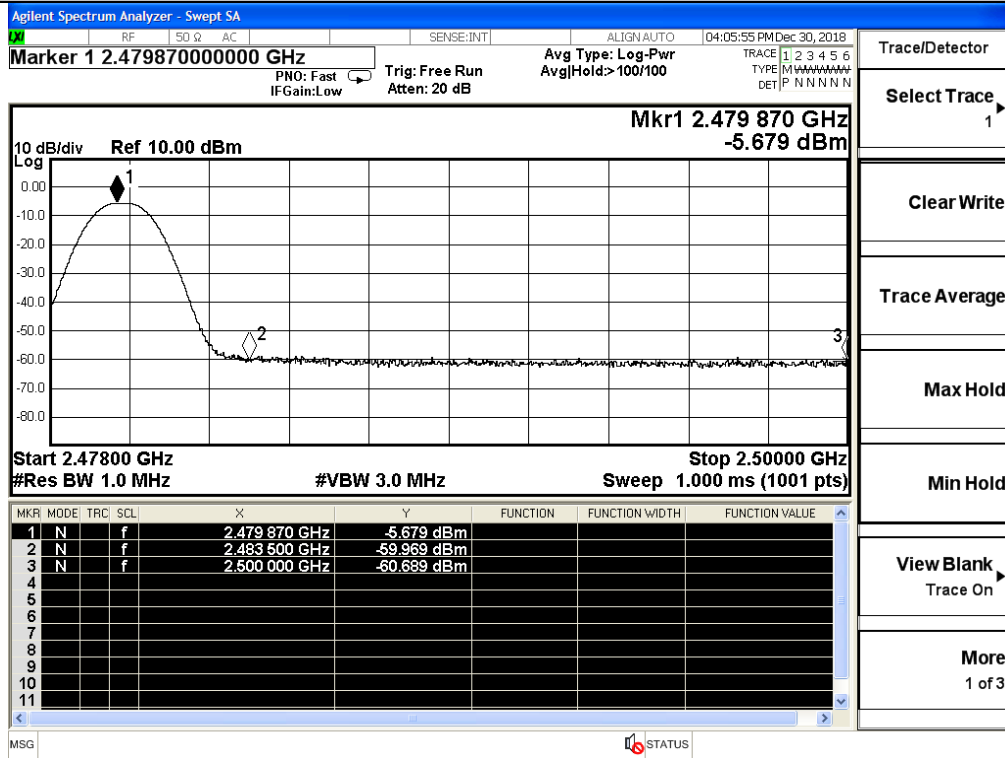
Restrict-band band-edge measurements_Zigbee_2405_Ant1_PEAK



Restrict-band band-edge measurements_Zigbee_2405_Ant1_AV



Restrict-band band-edge measurements_Zigbee_2480_Ant1_PEAK



Restrict-band band-edge measurements_Zigbee_2480_Ant1_AV

