TEST DATA

[TestMode: 8DPSK]

Remark: During the test, pre-scan the GFSK, Pi/4QPSK, 8-DPSK modulation, and found the 8-DPSK modulation which it is worse case.

Test channel:lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	44.77	-4.2	40.57	74	-33.43	Horizontal
2390	46.9	-3.88	43.02	74	-30.98	Horizontal
2310	47.15	-4.49	42.66	74	-31.34	Vertical
2390	47.57	-4.21	43.36	74	-30.64	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor(dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310	31.81	-4.2	27.61	54	-26.39	Horizontal
2390	32.46	-3.88	28.58	54	-25.42	Horizontal
2310	32.12	-4.49	27.63	54	-26.37	Vertical
2390	32.21	-4.21	28	54	-26	Vertical

Test channel:Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	67.29	-3.39	63.9	74	-10.1	Horizontal
2500	49.49	-3.3	46.19	74	-27.81	Horizontal
2483.5	63.34	-3.77	59.57	74	-14.43	Vertical
2500	51.29	-3.7	47.59	74	-26.41	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor(dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.5	40.25	-3.39	36.86	54	-17.14	Horizontal
2500	37.05	-3.3	33.75	54	-20.25	Horizontal
2483.5	37.86	-3.77	34.09	54	-19.91	Vertical

2500	37.49	-3.7	33.79	54	-20.21	Vertical
Test Result: Pass						

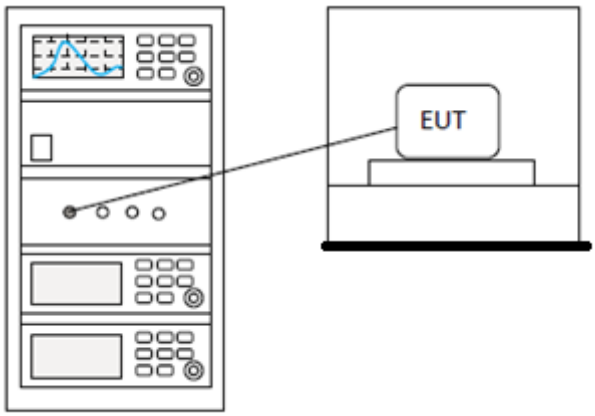
CONDUCTED BAND EDGES MEASUREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25℃
Humidity	60%

LIMITS

Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1, Section 10.6

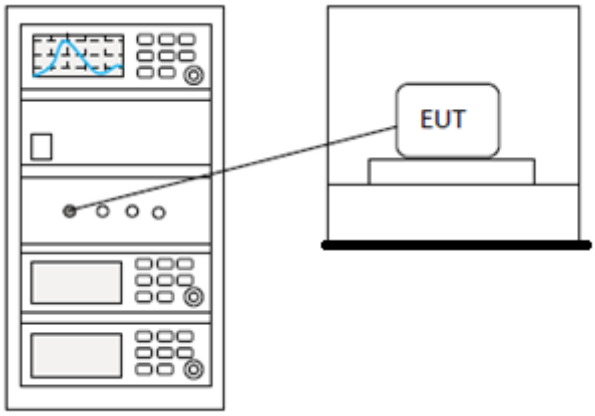
DWELL TIME

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 7.8.4
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25℃
Humidity	60%

LIMITS

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

BLOCK DIAGRAM OF TEST SETUP



TEST DATA

Pass: Please Refer To Appendix: Appendix1, Section 10.4

10 APPENDIX

Appendix1

10.1 APPENDIX: 20DBEMISSION BANDWIDTH

Test Result

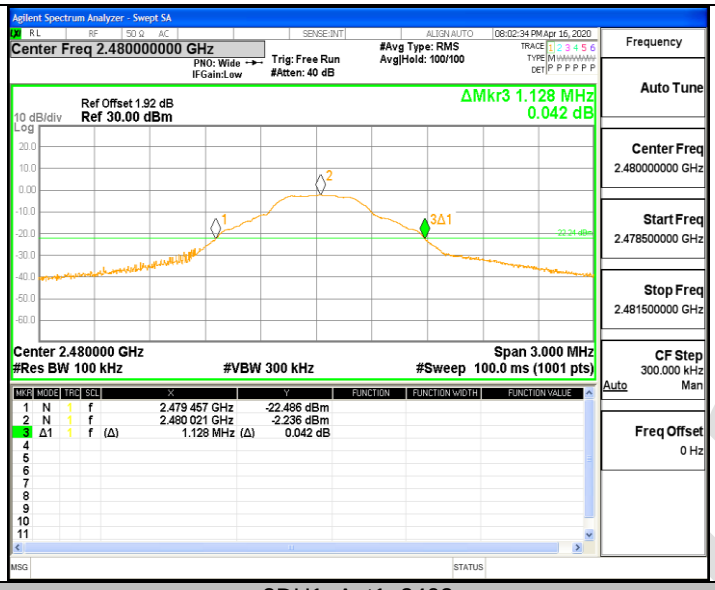
TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	1.128	2401.457	2402.585	---	PASS
		2441	1.134	2440.457	2441.591	---	PASS
		2480	1.128	2479.457	2480.585	---	PASS
2DH1	Ant1	2402	1.404	2401.316	2402.720	---	PASS
		2441	1.398	2440.319	2441.717	---	PASS
		2480	1.398	2479.319	2480.717	---	PASS
3DH1	Ant1	2402	1.458	2401.289	2402.747	---	PASS
		2441	1.446	2440.298	2441.744	---	PASS
		2480	1.416	2479.316	2480.732	---	PASS

Test Graphs

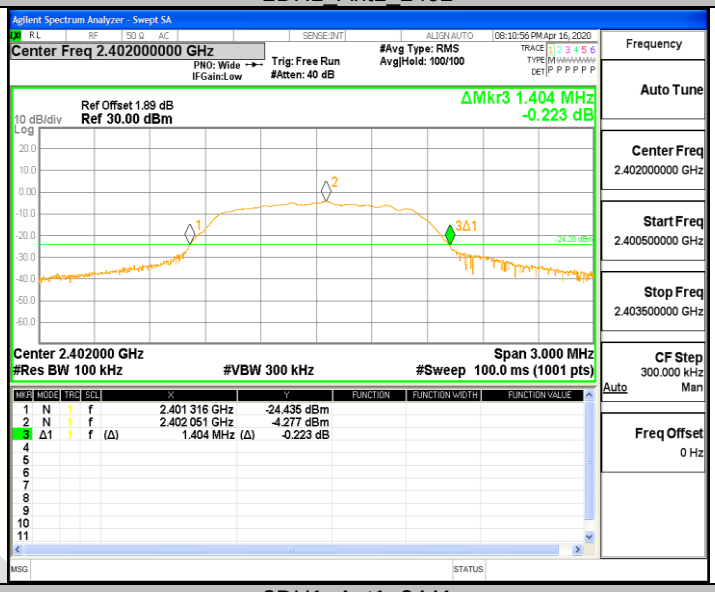
DH1_Ant1_2402

DH1_Ant1_2441

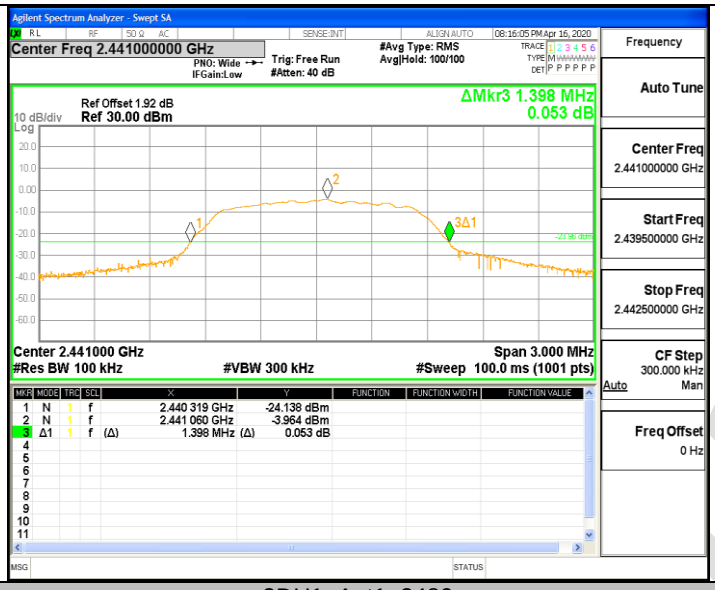
DH1_Ant1_2480



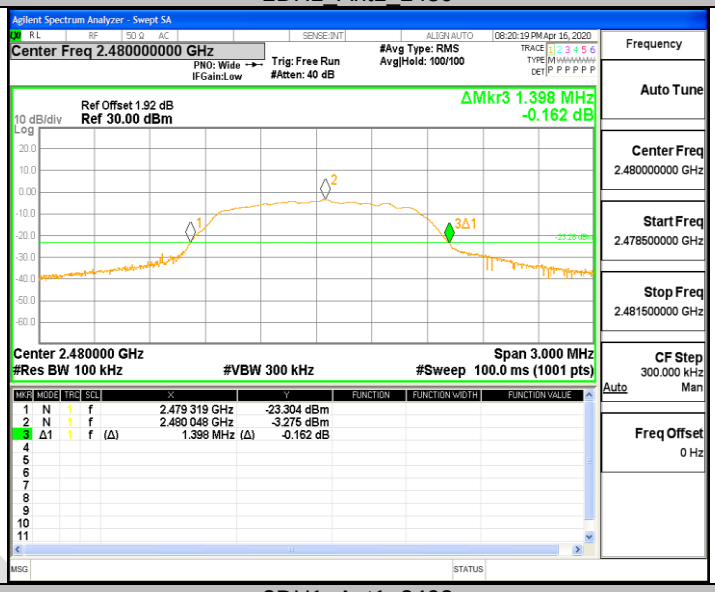
2DH1_Ant1_2402



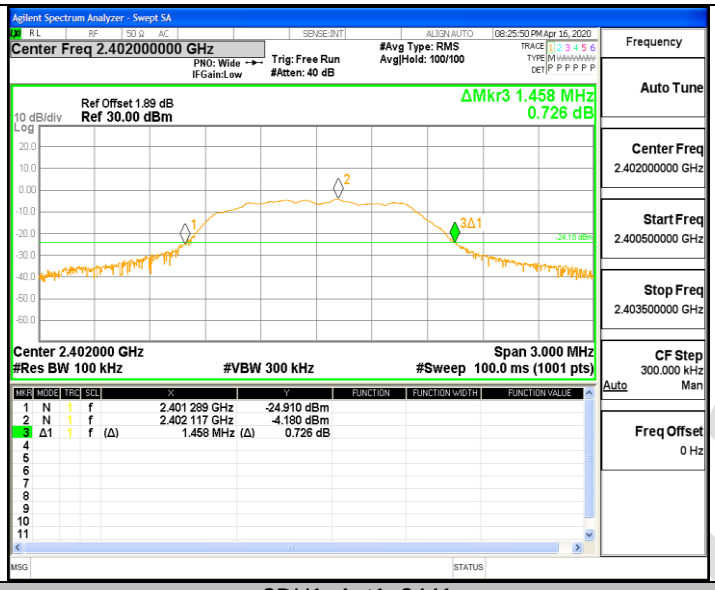
2DH1_Ant1_2441



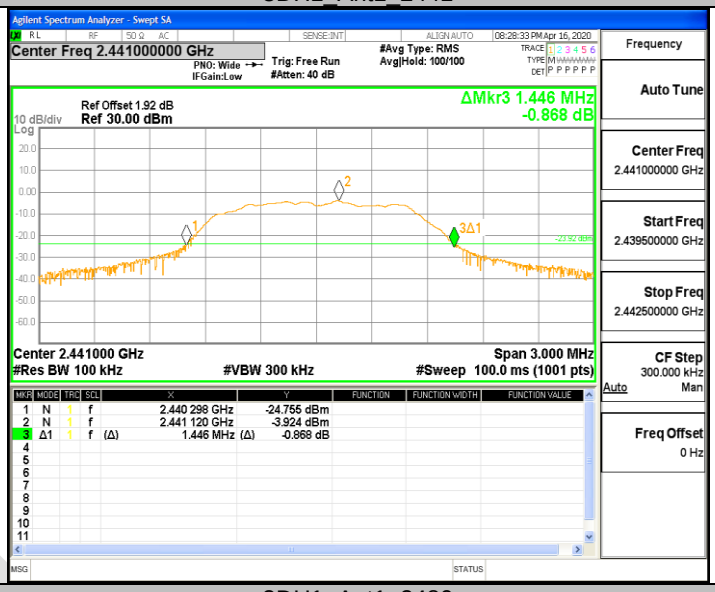
2DH1_Ant1_2480



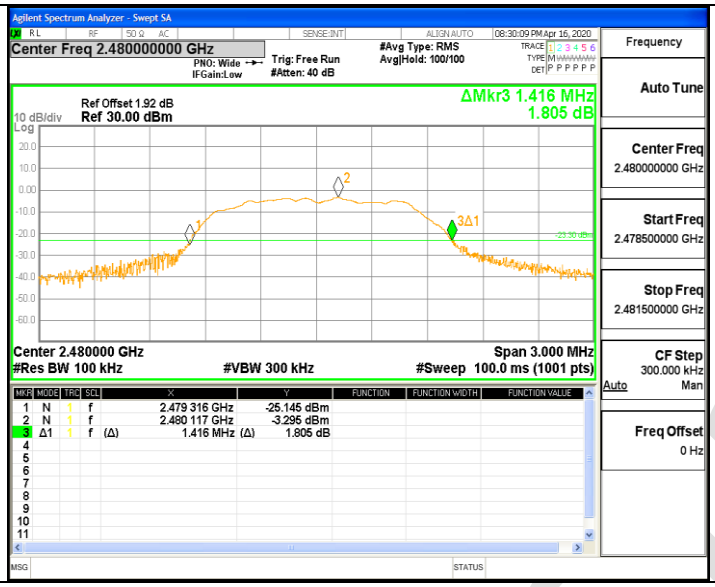
3DH1_Ant1_2402



3DH1_Ant1_2441



3DH1_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
08:30:09 PM Apr 16, 2020
Frequency
Auto Tune
ΔMkr3 1.416 MHz
1.805 dB
Ref Offset 1.92 dB
10 dB/div
Ref 30.00 dBm
Log
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
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
#Sweep 100.0 ms (1001 pts)
1 N 1 f 2.479 316 GHz -25.145 dBm
2 N 1 f 2.480 117 GHz -3.295 dBm
3 Δ1 1 f (Δ) 1.416 MHz (Δ) 1.805 dB
MSG
STATUS

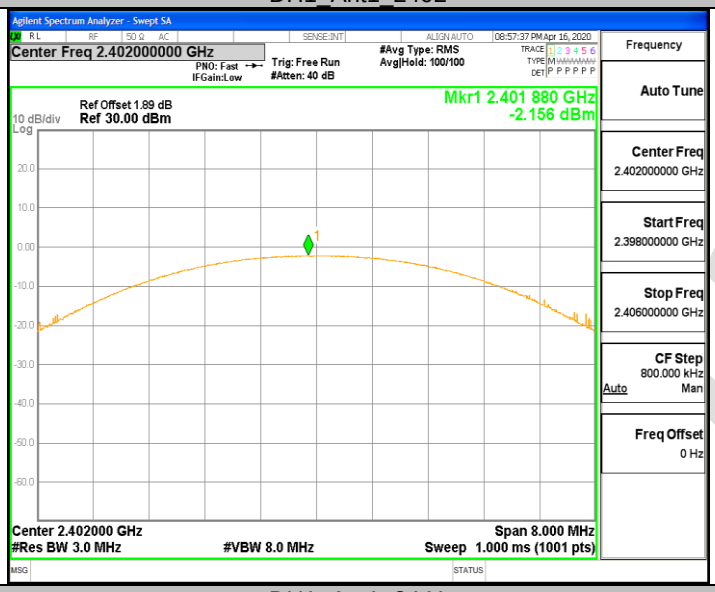
10.2 APPENDIX: MAXIMUM CONDUCTED OUTPUT POWER

Test Result

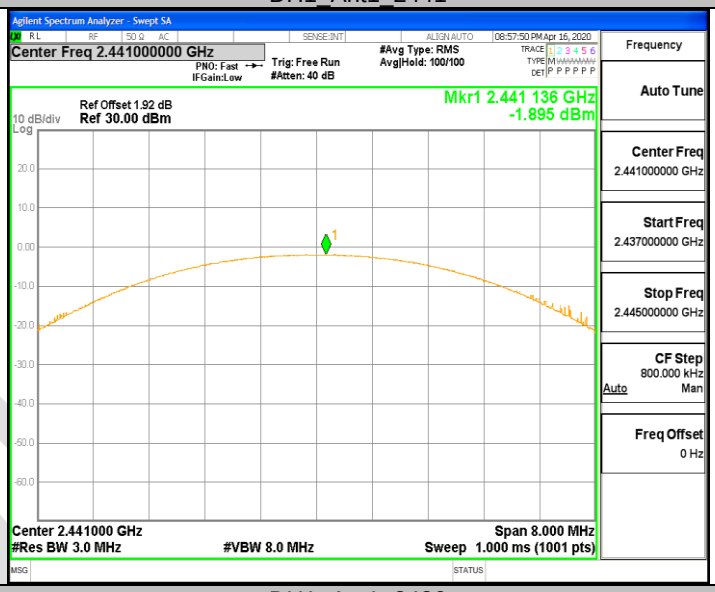
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH1	Ant1	2402	-2.16	<=20.97	PASS
		2441	-1.9	<=20.97	PASS
		2480	-1.35	<=20.97	PASS
2DH1	Ant1	2402	-0.04	<=20.97	PASS
		2441	0.31	<=20.97	PASS
		2480	0.82	<=20.97	PASS
3DH1	Ant1	2402	0.21	<=20.97	PASS
		2441	0.42	<=20.97	PASS
		2480	0.97	<=20.97	PASS

Test Graphs

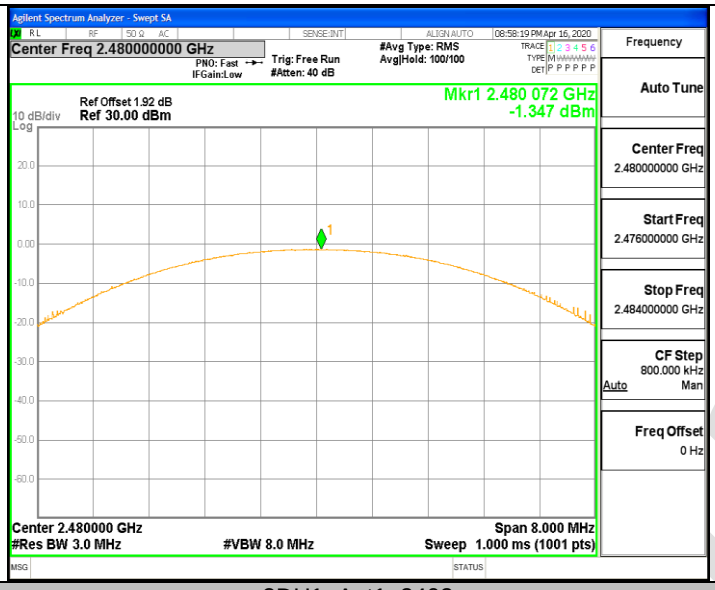
DH1_Ant1_2402



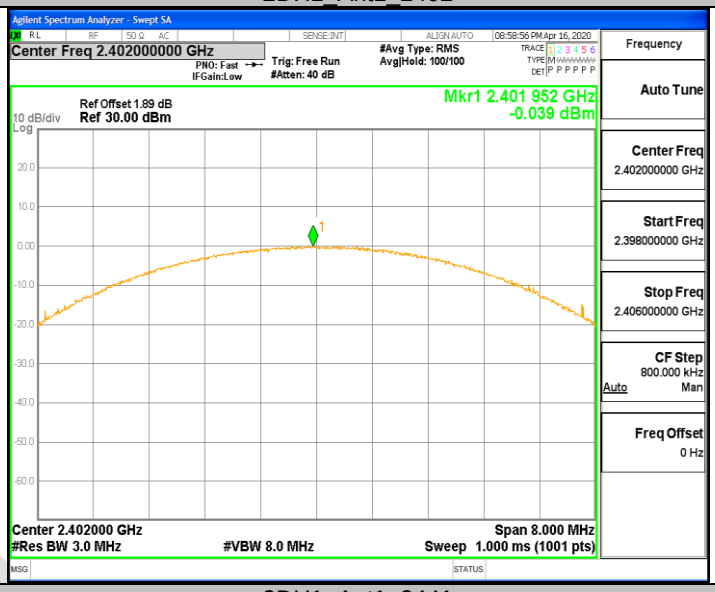
DH1_Ant1_2441



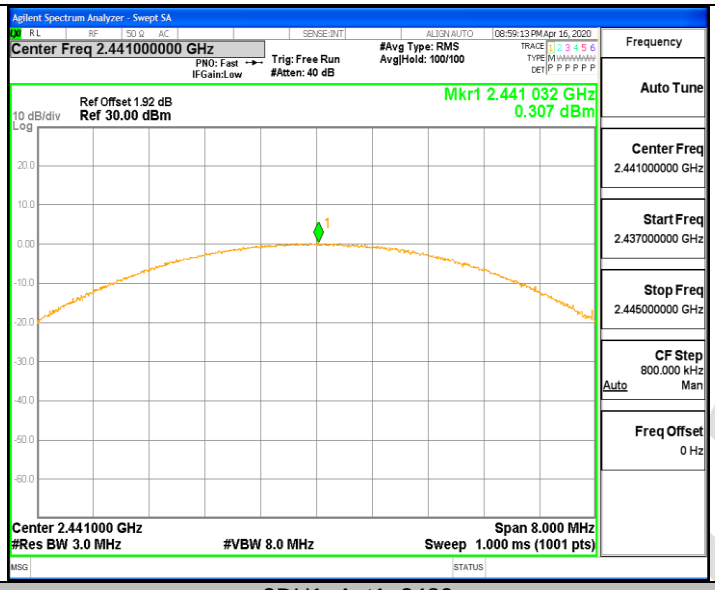
DH1_Ant1_2480



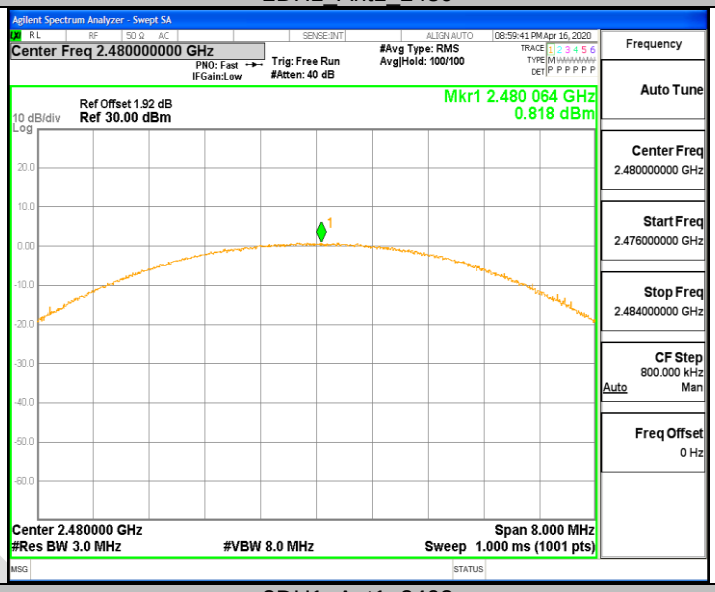
2DH1_Ant1_2402



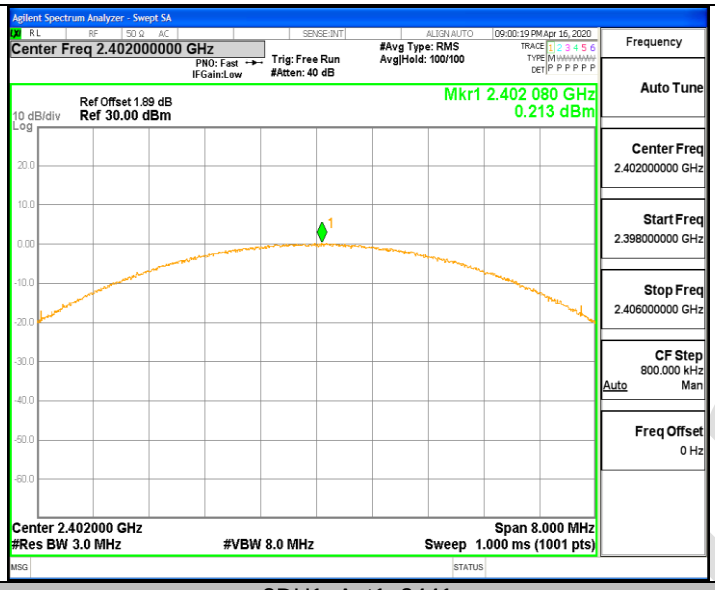
2DH1_Ant1_2441



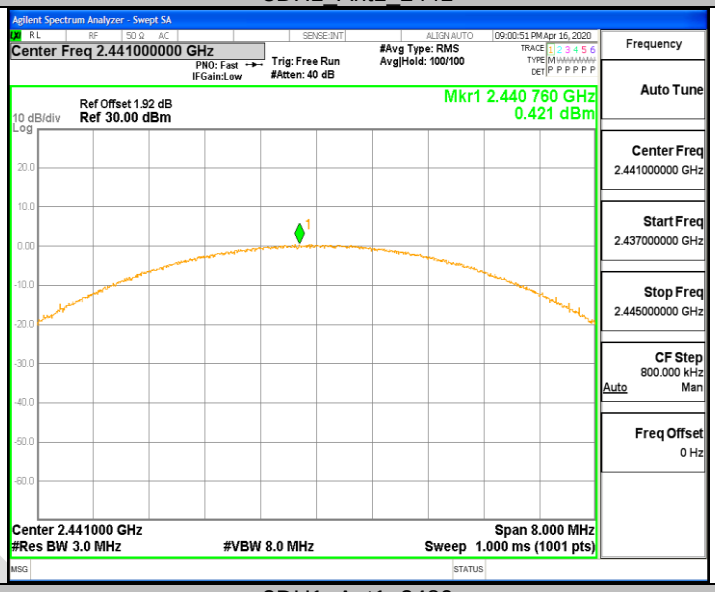
2DH1_Ant1_2480



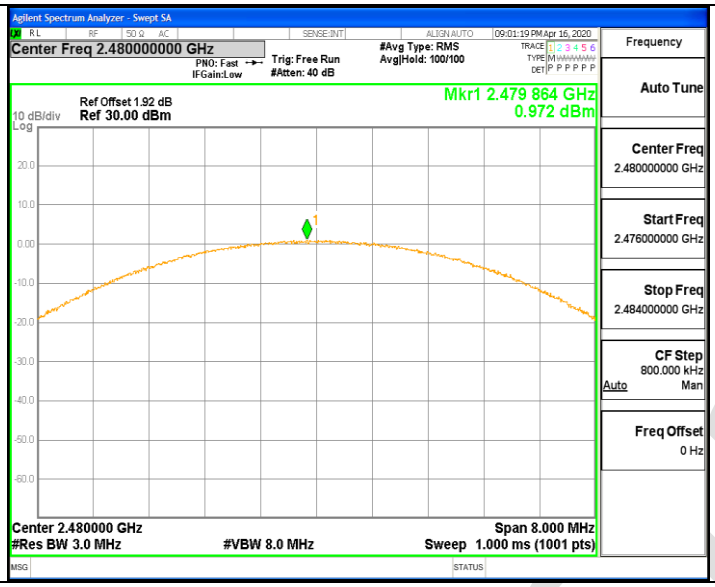
3DH1_Ant1_2402



3DH1_Ant1_2441



3DH1_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
09:01:19 PM Apr 16, 2020
Frequency
Auto Tune
Mkr1 2.479 864 GHz
0.972 dBm
Ref Offset 1.92 dB
10 dB/div
Log
Ref 30.00 dBm
Center Freq
2.480000000 GHz
Start Freq
2.476000000 GHz
Stop Freq
2.484000000 GHz
CF Step
800.000 kHz
Auto
Man
Freq Offset
0 Hz
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 8.000 MHz
Sweep 1.000 ms (1001 pts)

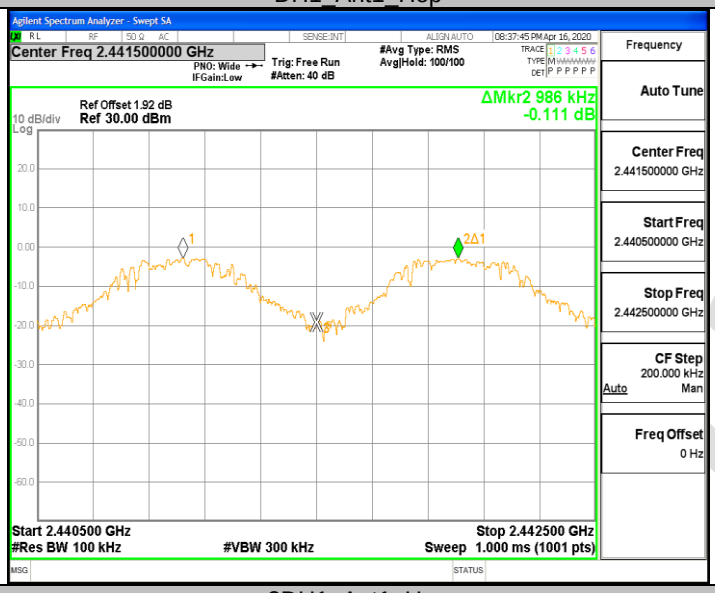
10.3 APPENDIX: CARRIER FREQUENCY SEPARATION

Test Result

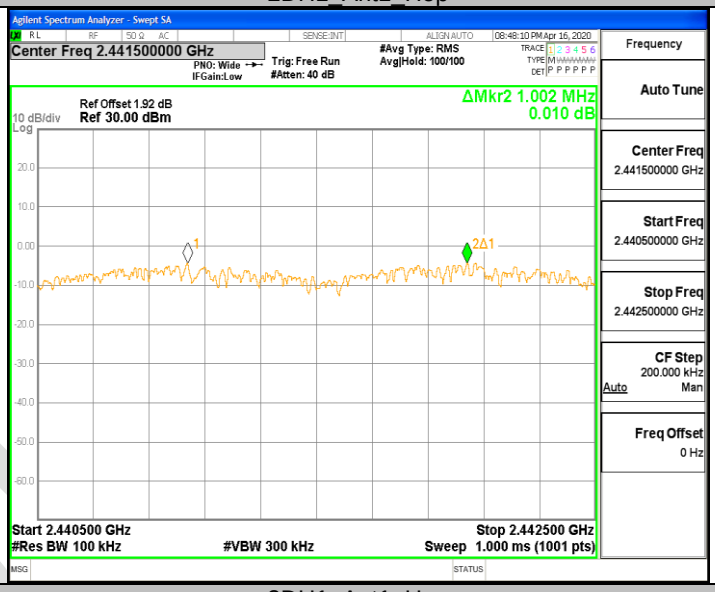
TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH1	Ant1	Hop	0.986	>=0.756	PASS
2DH1	Ant1	Hop	1.002	>=0.936	PASS
3DH1	Ant1	Hop	0.98	>=0.972	PASS

Test Graphs

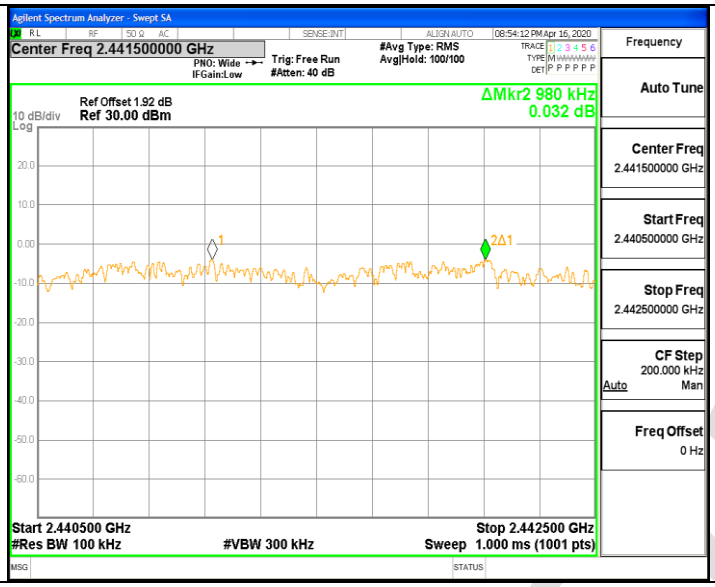
DH1_Ant1_Hop



2DH1_Ant1_Hop



3DH1_Ant1_Hop

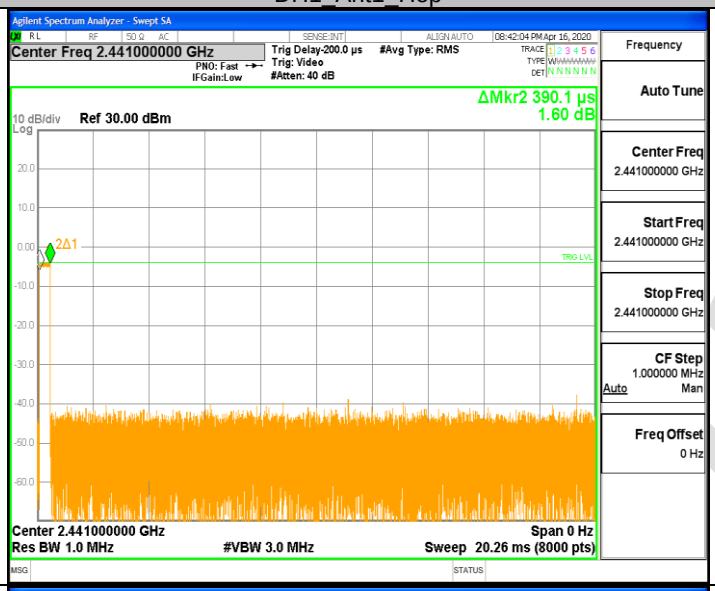
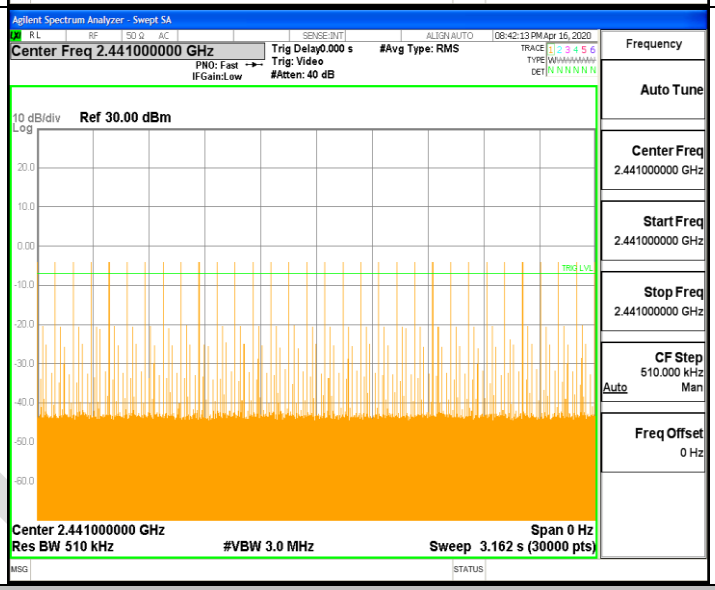

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
08:54:12 PM Apr 16, 2020
Ref Offset 1.92 dB
10 dB/div
Log
Ref 30.00 dBm
ΔMkr2 980 kHz
0.032 dB
Start 2.440500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.442500 GHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

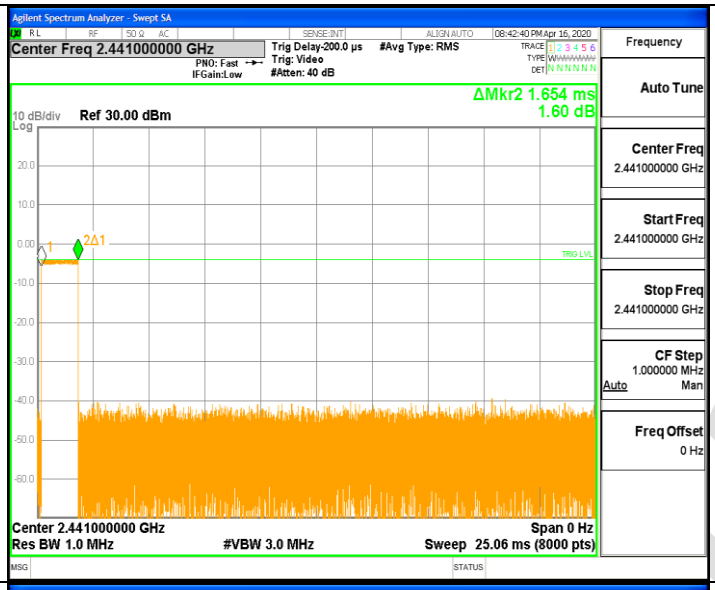
10.4 APPENDIX: DWELL TIME

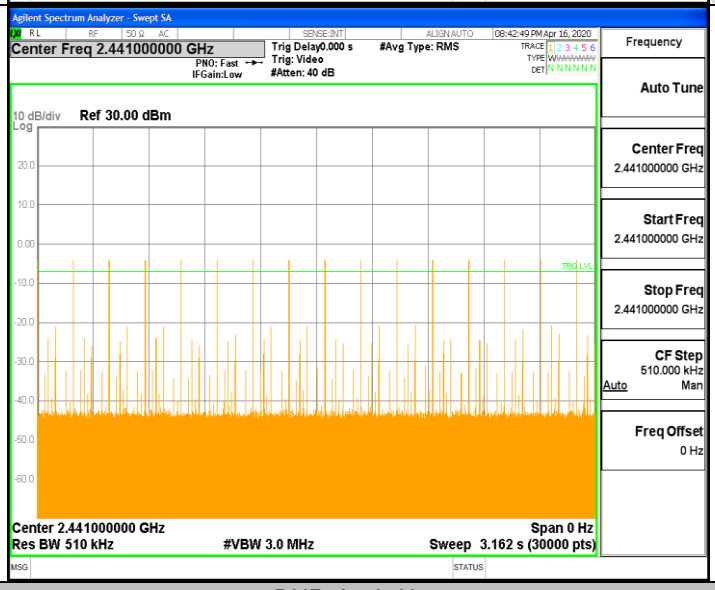
Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.39	320	0.125	<=0.4	PASS
DH3	Ant1	Hop	1.65	160	0.265	<=0.4	PASS
DH5	Ant1	Hop	2.92	110	0.321	<=0.4	PASS

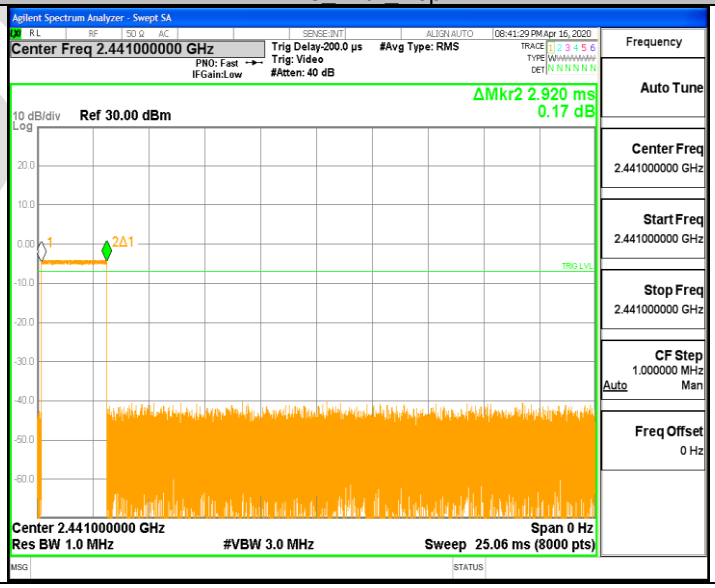
Test Graphs

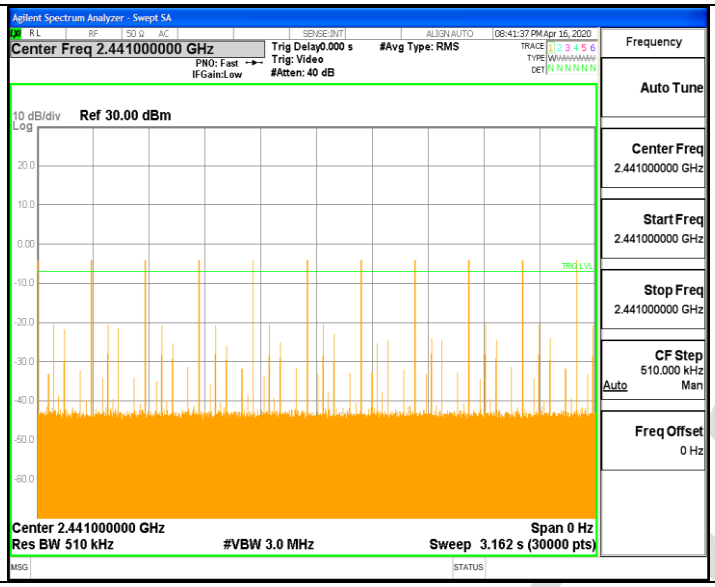
DH1_Ant1_Hop


DH3_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-200.0 µs
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
08:42:40 PM Apr 16, 2020
ΔMkr2 1.654 ms
1.60 dB
10 dB/div
Log
Ref 30.00 dBm
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 25.06 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
08:42:49 PM Apr 16, 2020
10 dB/div
Log
Ref 30.00 dBm
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-200.0 µs
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
08:41:29 PM Apr 16, 2020
ΔMkr2 2.920 ms
0.17 dB
10 dB/div
Log
Ref 30.00 dBm
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 25.06 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Atten: 40 dB
#Avg Type: RMS
08:41:37 PM Apr 16, 2020
10 dB/div
Log
Ref 30.00 dBm
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

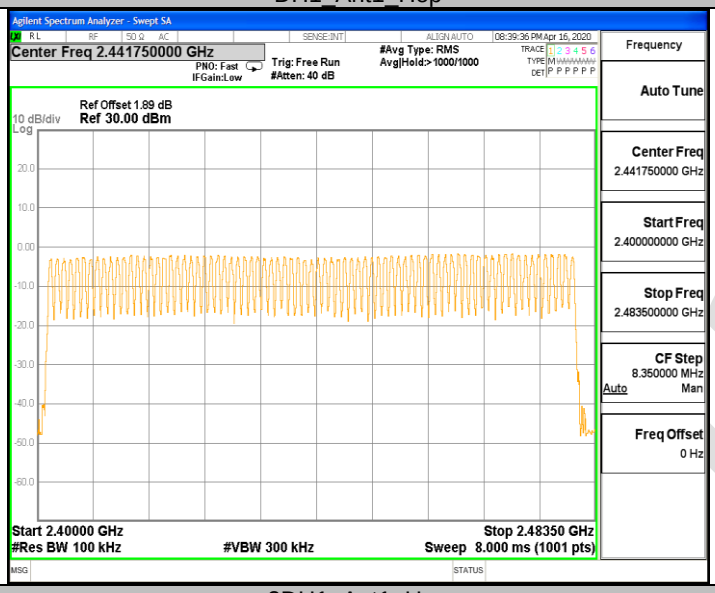
10.5 APPENDIX: NUMBER OF HOPPING CHANNELS

Test Result

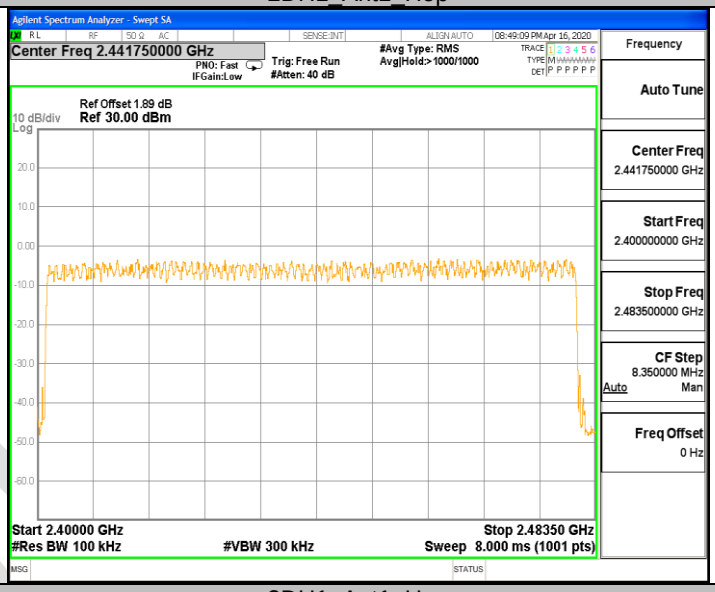
TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH1	Ant1	Hop	79	>=15	PASS
2DH1	Ant1	Hop	79	>=15	PASS
3DH1	Ant1	Hop	79	>=15	PASS

Test Graphs

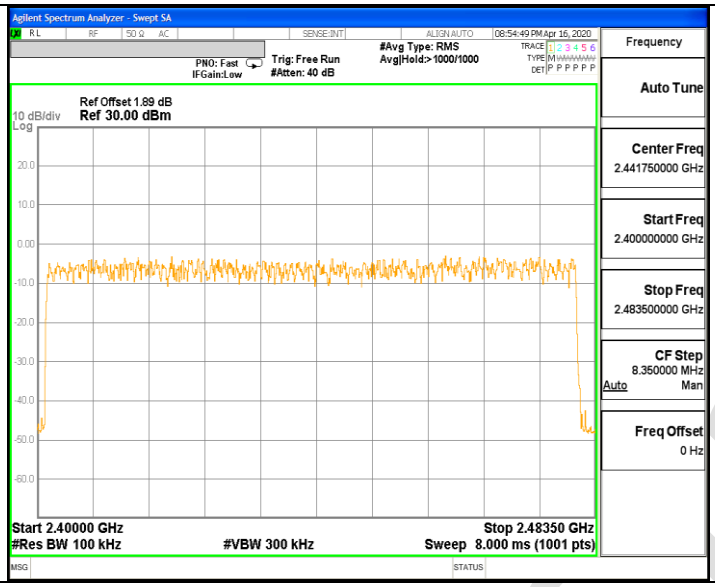
DH1_Ant1_Hop



2DH1_Ant1_Hop



3DH1_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω
AC
SENSE:INT
ALIGN AUTO
08:54:49 PM Apr 16, 2020
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold:>1000/1000
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 1.89 dB
10 dB/div
Ref 30.00 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz

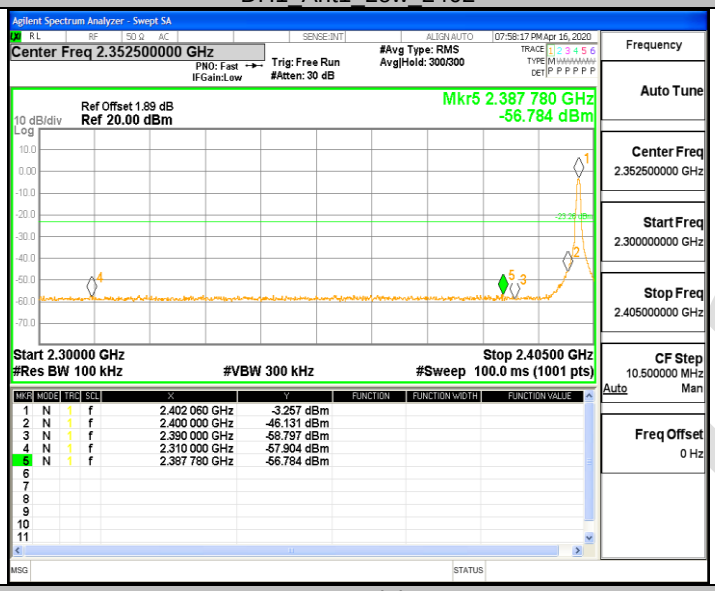
10.6 APPENDIX:BAND EDGE MEASUREMENTS

Test Result

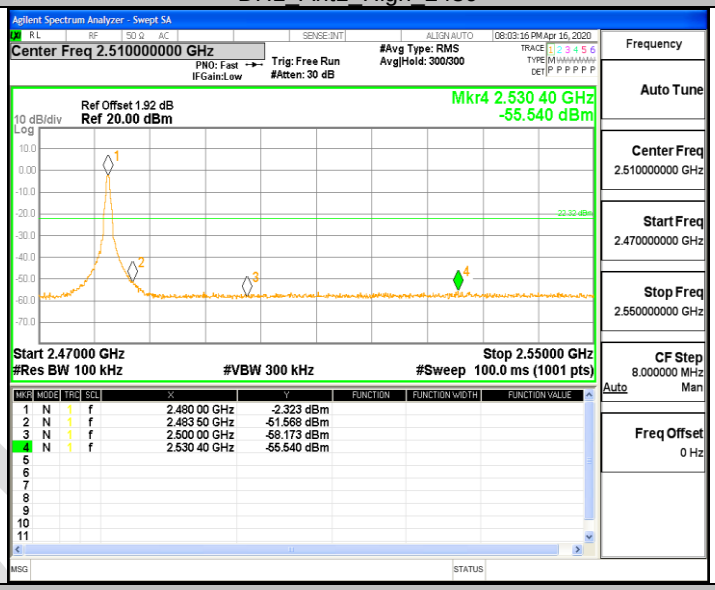
TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	Low	2402	-3.26	-56.78	<=-23.26	PASS
		High	2480	-2.32	-55.54	<=-22.32	PASS
		Low	Hop_2402	-3.15	-56.04	-23.15	PASS
		High	Hop_2480	-2.15	-55.09	-22.15	PASS
2DH1	Ant1	Low	2402	-4.43	-56.19	<=-24.43	PASS
		High	2480	-3.48	-55.25	<=-23.48	PASS
		Low	Hop_2402	-5.46	-55.95	-25.46	PASS
		High	Hop_2480	-3.40	-54.45	-23.4	PASS
3DH1	Ant1	Low	2402	-4.32	-56.23	<=-24.32	PASS
		High	2480	-3.30	-55.53	<=-23.3	PASS
		Low	Hop_2402	-4.45	-56	-24.45	PASS
		High	Hop_2480	-3.10	-55.07	-23.1	PASS

Test Graphs

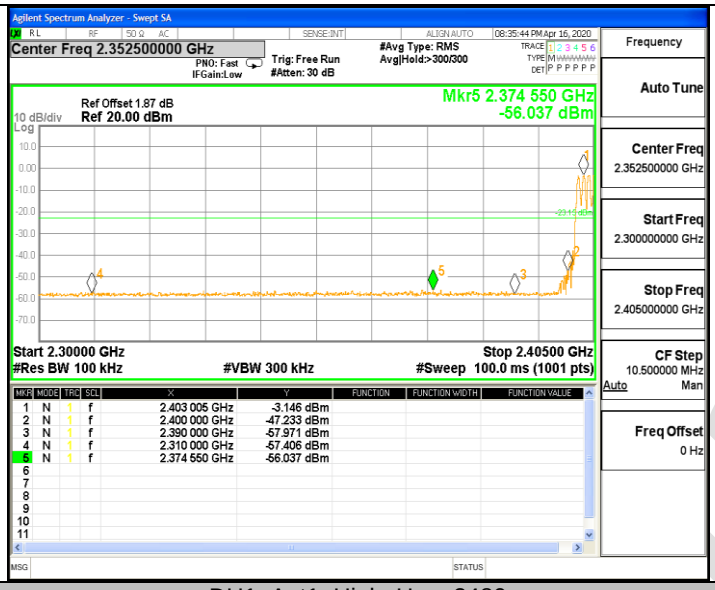
DH1_Ant1_Low_2402



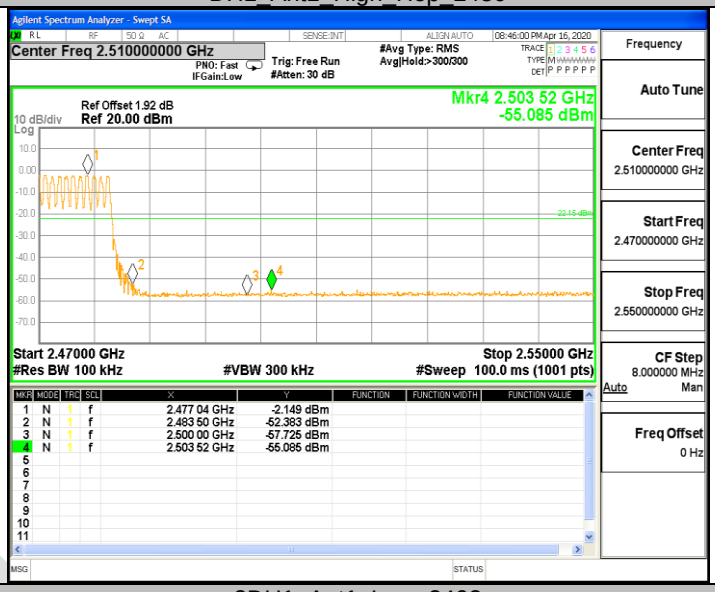
DH1_Ant1_High_2480



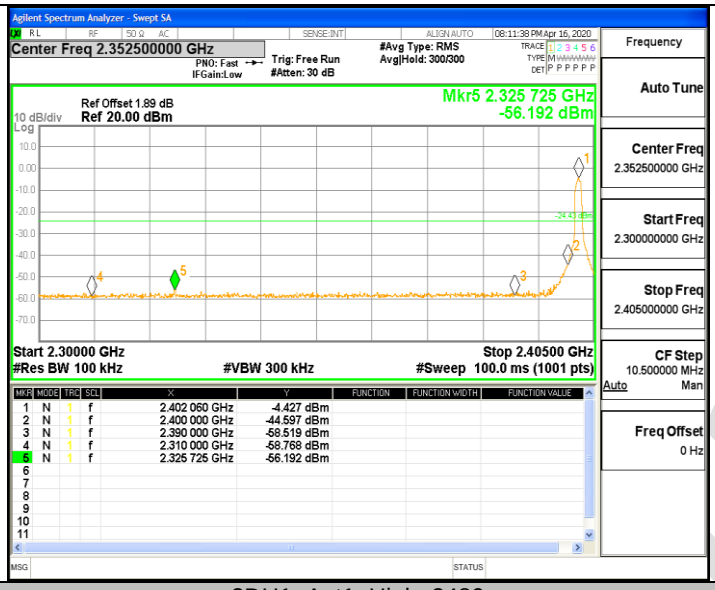
DH1_Ant1_Low_Hop_2402



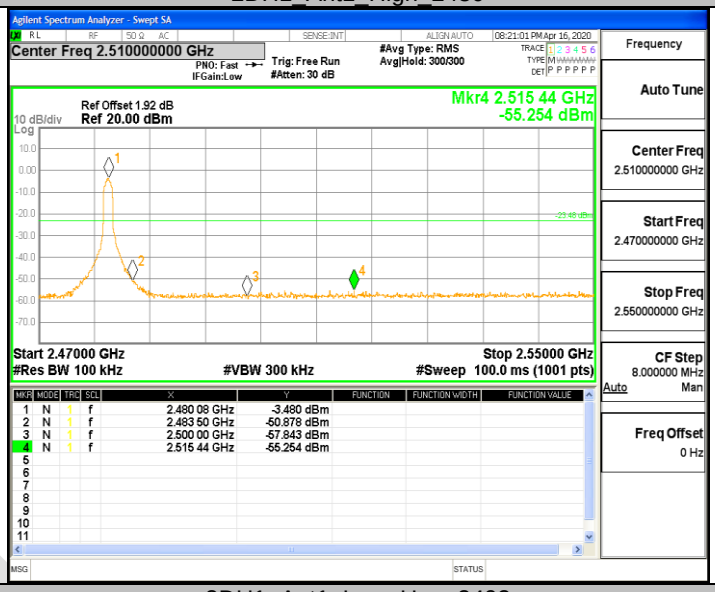
DH1_Ant1_High_Hop_2480



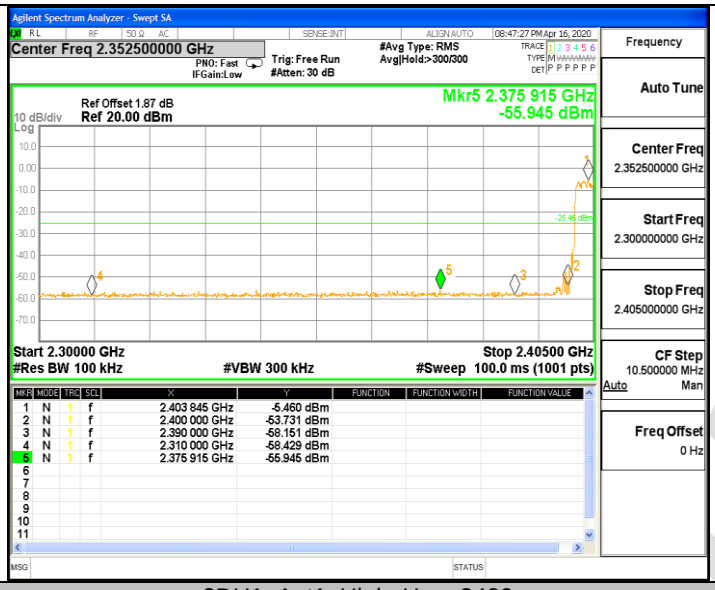
2DH1_Ant1_Low_2402



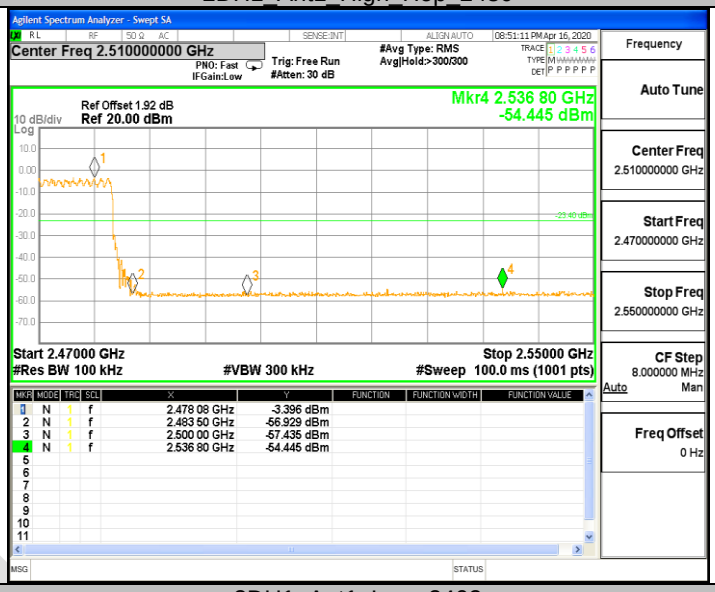
2DH1_Ant1_High_2480



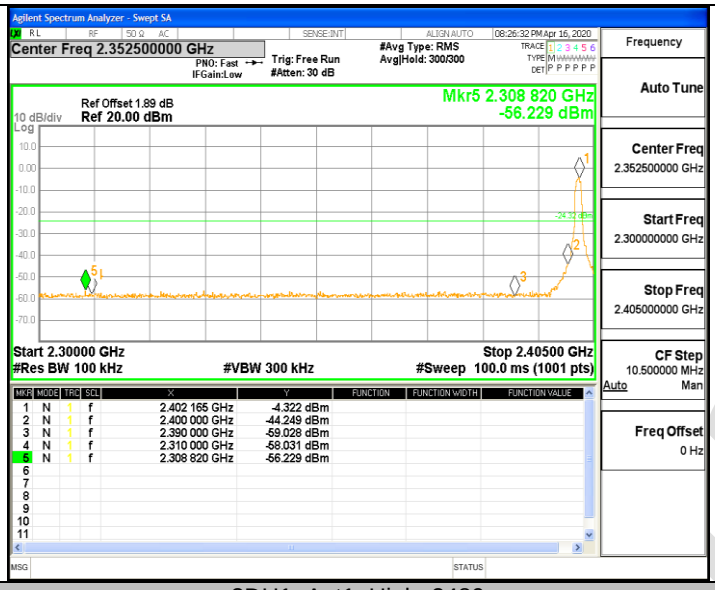
2DH1_Ant1_Low_Hop_2402



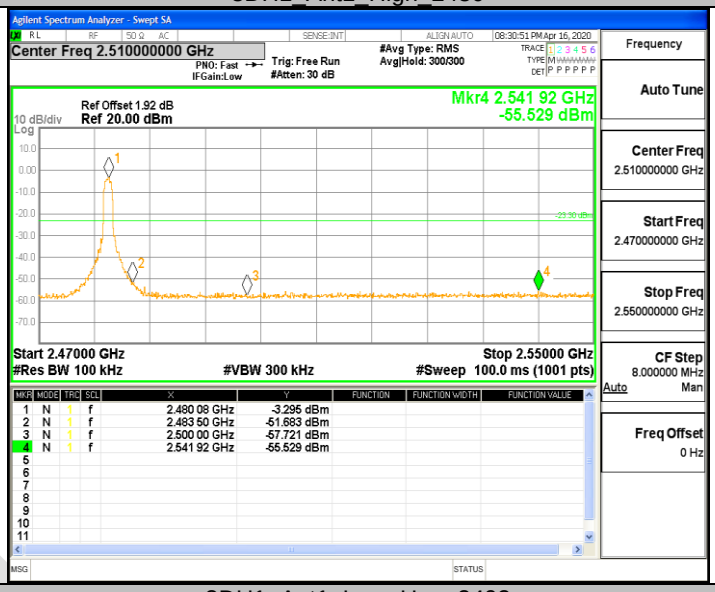
2DH1_Ant1_High_Hop_2480



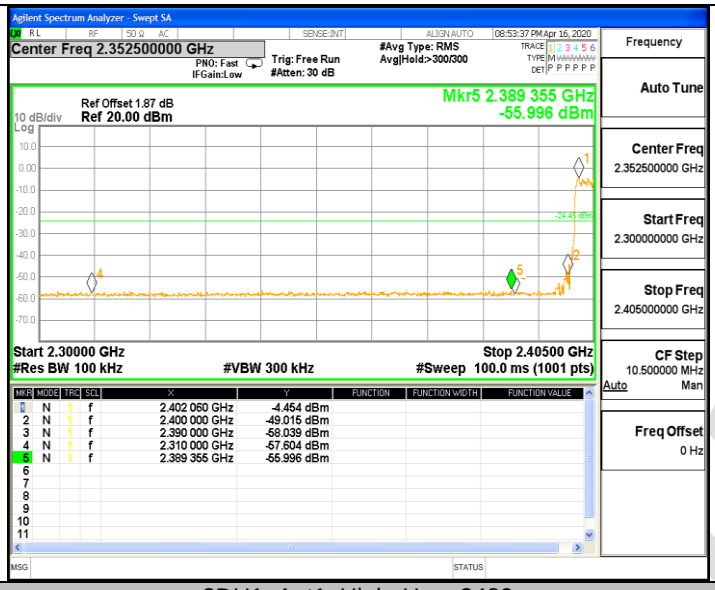
3DH1_Ant1_Low_2402



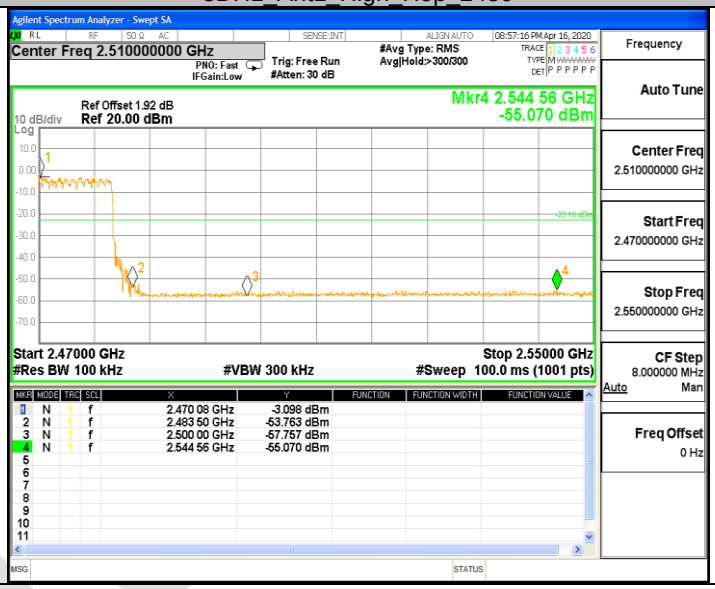
3DH1_Ant1_High_2480



3DH1_Ant1_Low_Hop_2402



3DH1_Ant1_High_Hop_2480



10.7 APPENDIX:CONDUCTED SPURIOUSEMISSION

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	2402	Reference	-3.35	-3.35	---	PASS
			30~1000	30~1000	-64.612	<=-23.347	PASS
			1000~26500	1000~26500	-47.447	<=-23.347	PASS
		2441	Reference	-2.95	-2.95	---	PASS
			30~1000	30~1000	-65.575	<=-22.954	PASS
			1000~26500	1000~26500	-49.145	<=-22.954	PASS
		2480	Reference	-2.30	-2.30	---	PASS
			30~1000	30~1000	-65.153	<=-22.297	PASS
			1000~26500	1000~26500	-52.41	<=-22.297	PASS
2DH1	Ant1	2402	Reference	-4.49	-4.49	---	PASS
			30~1000	30~1000	-66.532	<=-24.494	PASS
			1000~26500	1000~26500	-47.391	<=-24.494	PASS
		2441	Reference	-4.25	-4.25	---	PASS
			30~1000	30~1000	-66.356	<=-24.254	PASS
			1000~26500	1000~26500	-50.014	<=-24.254	PASS
		2480	Reference	-3.75	-3.75	---	PASS
			30~1000	30~1000	-64.641	<=-23.75	PASS
			1000~26500	1000~26500	-52.525	<=-23.75	PASS
3DH1	Ant1	2402	Reference	-4.38	-4.38	---	PASS
			30~1000	30~1000	-66.363	<=-24.383	PASS
			1000~26500	1000~26500	-47.632	<=-24.383	PASS
		2441	Reference	-4.10	-4.10	---	PASS
			30~1000	30~1000	-66.749	<=-24.098	PASS
			1000~26500	1000~26500	-49.126	<=-24.098	PASS
		2480	Reference	-3.97	-3.97	---	PASS
			30~1000	30~1000	-67.431	<=-23.966	PASS
			1000~26500	1000~26500	-52.422	<=-23.966	PASS