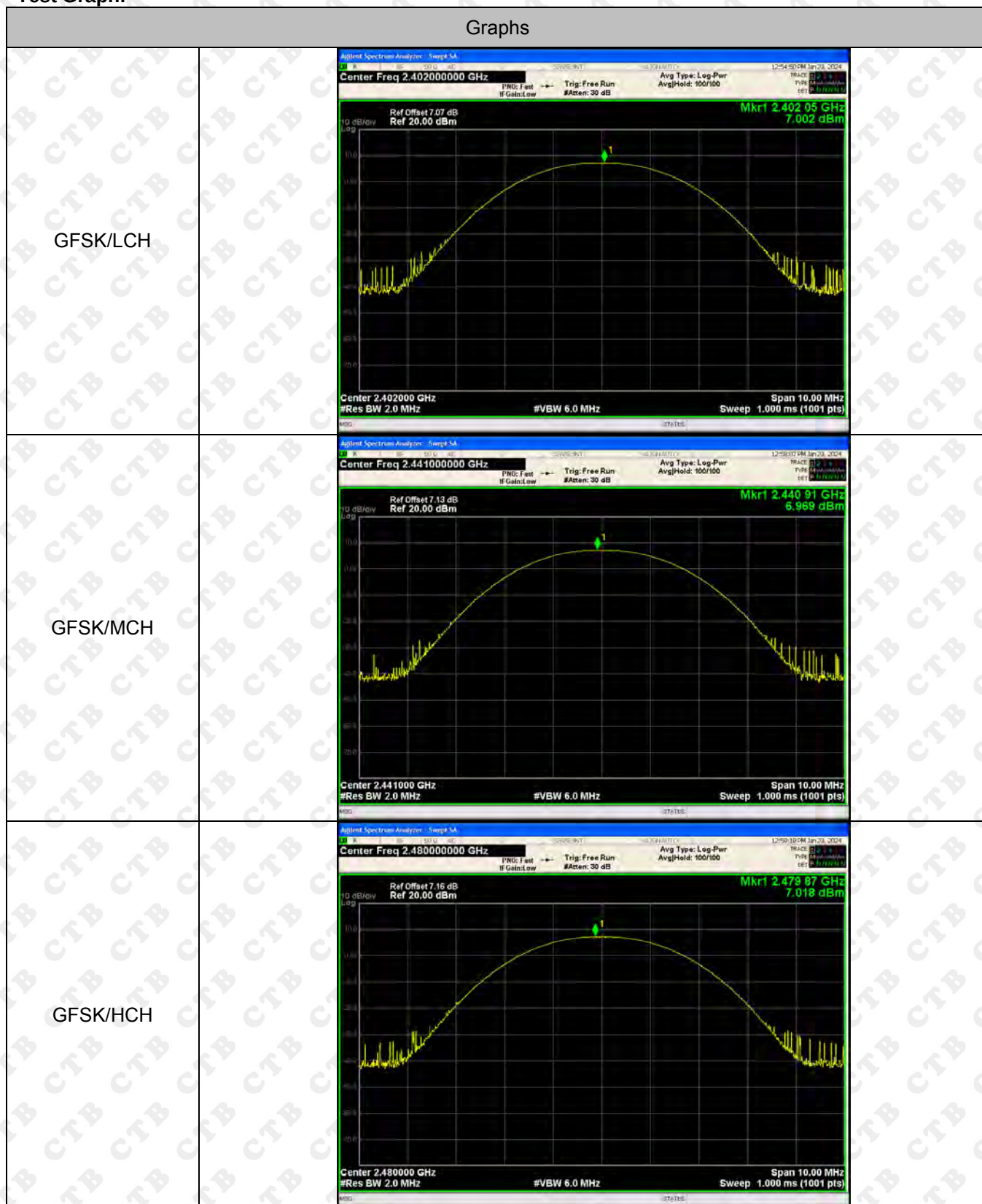


8DPSK/LCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq 2.40200000 GHz Ref Offset 7.07 dB Ref 20.00 dBm Mkr1 2.40188 GHz 5.455 dBm Center 2.402000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
8DPSK /MCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq 2.44100000 GHz Ref Offset 7.13 dB Ref 20.00 dBm Mkr1 2.44093 GHz 4.927 dBm Center 2.441000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
8DPSK /HCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq 2.48000000 GHz Ref Offset 7.15 dB Ref 20.00 dBm Mkr1 2.47976 GHz 3.889 dBm Center 2.480000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)

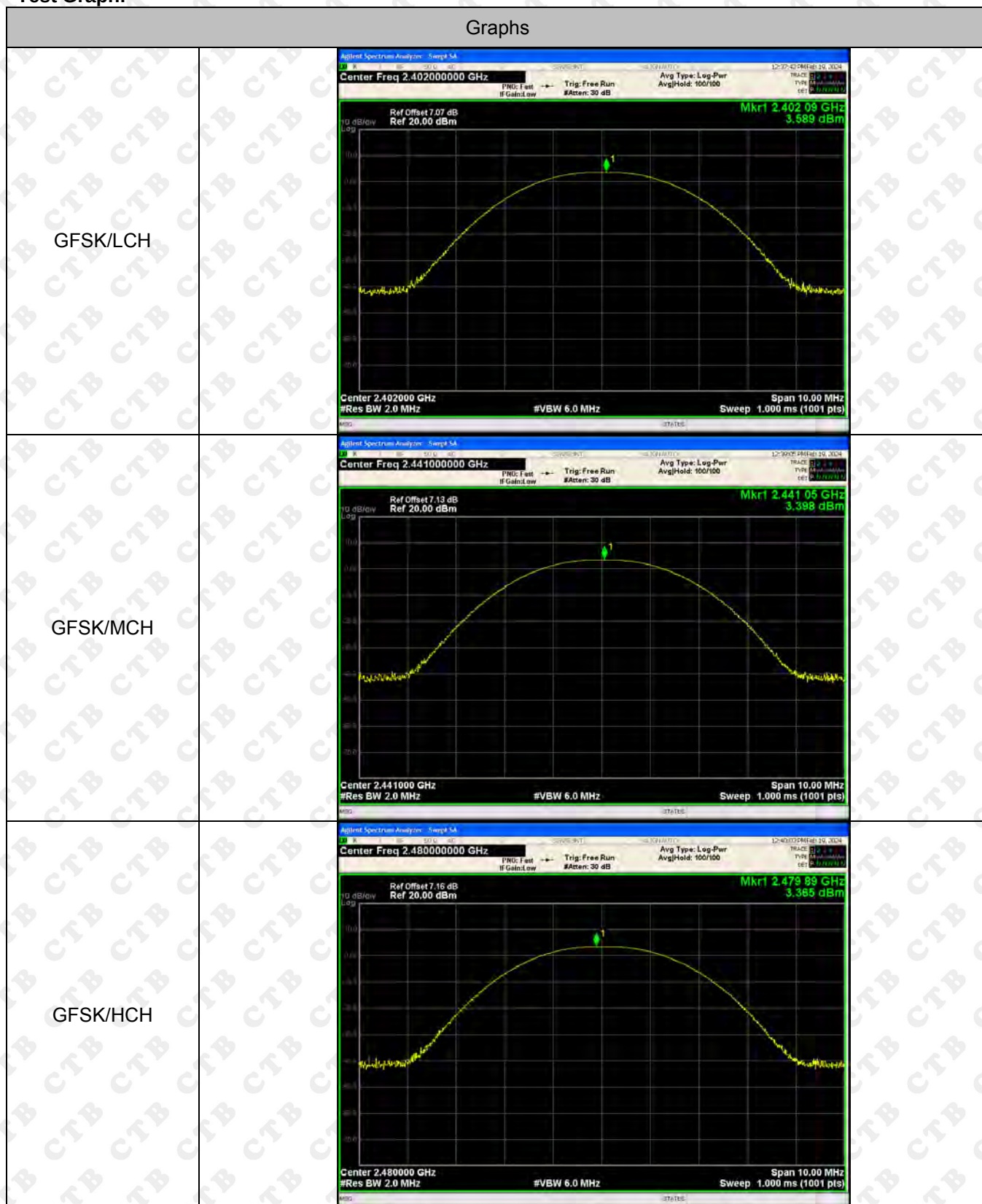
QW850-1 module:
Test Graph:



$\pi/4$ DQPSK/LCH	 Agilent Spectrum Analyzer - Sweep 5A Center Freq 2.40200000 GHz Ref Offset 7.07 dB Ref 20.00 dBm Mkr1 2.40207 GHz 4.654 dBm Center 2.402000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
$\pi/4$ DQPSK/MCH	 Agilent Spectrum Analyzer - Sweep 5A Center Freq 2.44100000 GHz Ref Offset 7.13 dB Ref 20.00 dBm Mkr1 2.44113 GHz 4.711 dBm Center 2.441000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
$\pi/4$ DQPSK/HCH	 Agilent Spectrum Analyzer - Sweep 5A Center Freq 2.48000000 GHz Ref Offset 7.16 dB Ref 20.00 dBm Mkr1 2.48015 GHz 4.537 dBm Center 2.480000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)

8DPSK/LCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq 2.40200000 GHz Ref Offset 7.07 dB Ref 20.00 dBm Mkr1 2.40193 GHz 5.218 dBm Center 2.402000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
8DPSK /MCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq 2.44100000 GHz Ref Offset 7.13 dB Ref 20.00 dBm Mkr1 2.44097 GHz 5.272 dBm Center 2.441000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
8DPSK /HCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq 2.48000000 GHz Ref Offset 7.15 dB Ref 20.00 dBm Mkr1 2.48001 GHz 5.215 dBm Center 2.480000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)

QW850-2 module:
Test Graph:

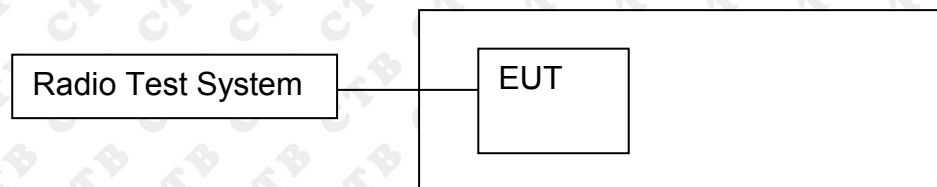


$\pi/4$ DQPSK/LCH	 Agilent Spectrum Analyzer - Sweep SA Center Freq 2.40200000 GHz Ref Offset 7.07 dB Ref 20.00 dBm Mkr1 2.402 14 GHz 4.365 dBm Center 2.402000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
$\pi/4$ DQPSK/MCH	 Agilent Spectrum Analyzer - Sweep SA Center Freq 2.44100000 GHz Ref Offset 7.13 dB Ref 20.00 dBm Mkr1 2.440 83 GHz 4.134 dBm Center 2.441000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)
$\pi/4$ DQPSK/HCH	 Agilent Spectrum Analyzer - Sweep SA Center Freq 2.48000000 GHz Ref Offset 7.16 dB Ref 20.00 dBm Mkr1 2.480 18 GHz 3.989 dBm Center 2.480000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1.000 ms (1001 pts)

8DPSK/LCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq: 2.40200000 GHz Ref Offset: 7.07 dB Ref: 20.00 dBm Mkr1: 2.40206 GHz 4.678 dBm Center: 2.402000 GHz #Res BW: 2.0 MHz #VBW: 6.0 MHz Span: 10.00 MHz Sweep: 1.000 ms (1001 pts)
8DPSK /MCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq: 2.44100000 GHz Ref Offset: 7.13 dB Ref: 20.00 dBm Mkr1: 2.44099 GHz 4.427 dBm Center: 2.441000 GHz #Res BW: 2.0 MHz #VBW: 6.0 MHz Span: 10.00 MHz Sweep: 1.000 ms (1001 pts)
8DPSK /HCH	 Agilent Spectrum Analyzer - Sweep 34 Center Freq: 2.48000000 GHz Ref Offset: 7.15 dB Ref: 20.00 dBm Mkr1: 2.47992 GHz 4.289 dBm Center: 2.480000 GHz #Res BW: 2.0 MHz #VBW: 6.0 MHz Span: 10.00 MHz Sweep: 1.000 ms (1001 pts)

10. 20DB OCCUPIED BANDWIDTH

10.1 Block Diagram Of Test Setup



10.2 Limit

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mw.

10.3 Test procedure

1. Rem1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

10.4 Test Result

BW121 module:

Test Mode	Frequency	20dB Bandwidth (MHz)	Result
GFSK	Low channel	0.987	PASS
	Mid channel	1.051	PASS
	High channel	0.824	PASS
$\pi/4$ DQPSK	Low channel	1.153	PASS
	Mid channel	1.247	PASS
	High channel	1.18	PASS
8DPSK	Low channel	1.238	PASS
	Mid channel	1.245	PASS
	High channel	1.252	PASS

QW850-1 module:

Test Mode	Frequency	20dB Bandwidth (MHz)	Result
GFSK	Low channel	0.945	PASS
	Mid channel	0.921	PASS
	High channel	0.93	PASS
$\pi/4$ DQPSK	Low channel	1.273	PASS
	Mid channel	1.344	PASS
	High channel	1.339	PASS
8DPSK	Low channel	1.301	PASS
	Mid channel	1.298	PASS
	High channel	1.351	PASS

QW850-2 module:

Test Mode	Frequency	20dB Bandwidth (MHz)	Result
GFSK	Low channel	0.858	PASS
	Mid channel	0.865	PASS
	High channel	0.905	PASS
$\pi/4$ DQPSK	Low channel	1.279	PASS
	Mid channel	1.333	PASS
	High channel	1.327	PASS
8DPSK	Low channel	1.351	PASS
	Mid channel	1.298	PASS
	High channel	1.33	PASS

Note: All modes of operation were Pre-scan and the worst-case emissions are reported.

BW121 module:
Test Graph:

GFSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Ref Offset: 7.07 dB Ref: 27.07 dBm Mkr3: 2.402498 GHz -21.132 dBm Center: 2.402 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 907.02 kHz Total Power: 11.3 dBm Transmit Freq Error: 4.552 kHz OBW Power: 99.00 % x dB Bandwidth: 986.9 kHz x dB: -20.00 dB
GFSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.441000000 GHz Ref Offset: 7.13 dB Ref: 27.13 dBm Mkr3: 2.441562 GHz -27.679 dBm Center: 2.441 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 878.20 kHz Total Power: 11.1 dBm Transmit Freq Error: 36.223 kHz OBW Power: 99.00 % x dB Bandwidth: 1.051 MHz x dB: -20.00 dB
GFSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Ref Offset: 7.16 dB Ref: 27.16 dBm Mkr3: 2.480416 GHz -19.984 dBm Center: 2.48 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 852.04 kHz Total Power: 9.61 dBm Transmit Freq Error: 4.079 kHz OBW Power: 99.00 % x dB Bandwidth: 823.7 kHz x dB: -20.00 dB

$\pi/4$-DQPSK Low channel	
$\pi/4$-DQPSK Mid channel	
$\pi/4$-DQPSK High channel	

8DPSK Low channel	
8DPSK Mid channel	
8DPSK High channel	

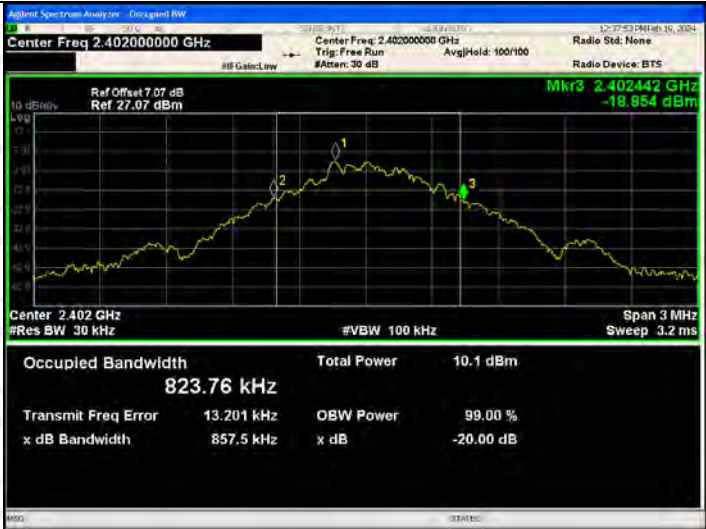
QW850-1 module:
Test Graph:

GFSK Low channel	
GFSK Mid channel	
GFSK High channel	

$\pi/4$-DQPSK Low channel	
$\pi/4$-DQPSK Mid channel	
$\pi/4$-DQPSK High channel	

8DPSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Ref Offset: 7.07 dB Ref: 27.07 dBm Mkr3: 2.402652 GHz -19.168 dBm Center: 2.402 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.1913 MHz Total Power: 9.27 dBm Transmit Freq Error: 1.285 kHz OBW Power: 99.00 % x dB Bandwidth: 1.301 MHz x dB: -20.00 dB
8DPSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.441000000 GHz Ref Offset: 7.13 dB Ref: 27.13 dBm Mkr3: 2.441649 GHz -20.085 dBm Center: 2.441 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.1994 MHz Total Power: 9.31 dBm Transmit Freq Error: 390 Hz OBW Power: 99.00 % x dB Bandwidth: 1.298 MHz x dB: -20.00 dB
8DPSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Ref Offset: 7.16 dB Ref: 27.16 dBm Mkr3: 2.480674 GHz -24.282 dBm Center: 2.48 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.2009 MHz Total Power: 8.94 dBm Transmit Freq Error: -1.420 kHz OBW Power: 99.00 % x dB Bandwidth: 1.351 MHz x dB: -20.00 dB

QW850-2 module:
Test Graph:

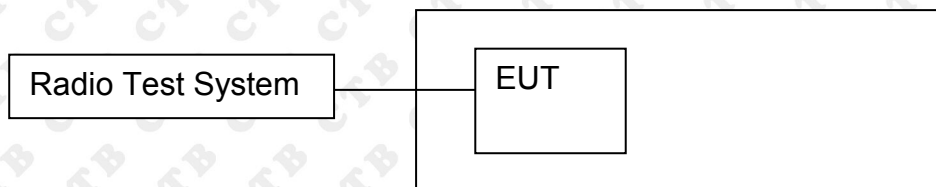
GFSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.40200000 GHz Center Freq: 2.40200000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref Offset: 7.07 dB Ref: 27.07 dBm Mkr3: 2.402442 GHz -18.954 dBm Center: 2.402 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 823.76 kHz Total Power: 10.1 dBm Transmit Freq Error: 13.201 kHz OBW Power: 99.00 % x dB Bandwidth: 857.5 kHz x dB: -20.00 dB
GFSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.44100000 GHz Center Freq: 2.44100000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref Offset: 7.13 dB Ref: 27.13 dBm Mkr3: 2.44145 GHz -17.780 dBm Center: 2.441 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 816.00 kHz Total Power: 9.99 dBm Transmit Freq Error: 17.265 kHz OBW Power: 99.00 % x dB Bandwidth: 865.4 kHz x dB: -20.00 dB
GFSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.48000000 GHz Center Freq: 2.48000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref Offset: 7.16 dB Ref: 27.16 dBm Mkr3: 2.480469 GHz -20.397 dBm Center: 2.48 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 860.84 kHz Total Power: 9.35 dBm Transmit Freq Error: 16.362 kHz OBW Power: 99.00 % x dB Bandwidth: 904.9 kHz x dB: -20.00 dB

$\pi/4$-DQPSK Low channel	
$\pi/4$-DQPSK Mid channel	
$\pi/4$-DQPSK High channel	

8DPSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Ref Offset: 7.07 dB Ref: 27.07 dBm Mkr3: 2.402891 GHz -21.504 dBm Center: 2.402 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.2134 MHz Total Power: 8.91 dBm Transmit Freq Error: 15.638 kHz OBW Power: -20.00 dB x dB Bandwidth: 1.351 MHz
8DPSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.441000000 GHz Ref Offset: 7.13 dB Ref: 27.13 dBm Mkr3: 2.441868 GHz -18.703 dBm Center: 2.441 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.1936 MHz Total Power: 9.65 dBm Transmit Freq Error: 18.436 kHz OBW Power: -20.00 dB x dB Bandwidth: 1.298 MHz
8DPSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Ref Offset: 7.16 dB Ref: 27.16 dBm Mkr3: 2.480892 GHz -21.567 dBm Center: 2.48 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.2068 MHz Total Power: 8.92 dBm Transmit Freq Error: 26.731 kHz OBW Power: -20.00 dB x dB Bandwidth: 1.330 MHz

11. CARRIER FREQUENCIES SEPARATION

11.1 Block Diagram Of Test Setup



11.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

11.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz , Span = 2MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.4 Test Result

BW121 module:

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit(2/3 of the 20dB bandwidth MHz)	Verdict
GFSK	LCH	0.992	0.658	PASS
GFSK	MCH	0.998	0.701	PASS
GFSK	HCH	1.004	0.549	PASS
$\pi/4$ DQPSK	LCH	1.006	0.769	PASS
$\pi/4$ DQPSK	MCH	1.008	0.831	PASS
$\pi/4$ DQPSK	HCH	0.994	0.787	PASS
8DPSK	LCH	1.004	0.825	PASS
8DPSK	MCH	0.996	0.830	PASS
8DPSK	HCH	1.006	0.835	PASS

QW850-1 module:

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit(2/3 of the 20dB bandwidth MHz)	Verdict
GFSK	LCH	0.998	0.630	PASS
GFSK	MCH	1.002	0.614	PASS
GFSK	HCH	0.992	0.620	PASS
$\pi/4$ DQPSK	LCH	1.002	0.849	PASS
$\pi/4$ DQPSK	MCH	1.004	0.896	PASS
$\pi/4$ DQPSK	HCH	1.004	0.893	PASS
8DPSK	LCH	1.006	0.867	PASS
8DPSK	MCH	1.008	0.865	PASS
8DPSK	HCH	1.006	0.901	PASS

QW850-2 module:

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit(2/3 of the 20dB bandwidth MHz)	Verdict
GFSK	LCH	1.000	0.572	PASS
GFSK	MCH	1.004	0.577	PASS
GFSK	HCH	0.996	0.603	PASS
$\pi/4$ DQPSK	LCH	0.996	0.853	PASS
$\pi/4$ DQPSK	MCH	1.000	0.889	PASS
$\pi/4$ DQPSK	HCH	0.998	0.885	PASS
8DPSK	LCH	0.998	0.901	PASS
8DPSK	MCH	1.004	0.865	PASS
8DPSK	HCH	0.994	0.887	PASS

BW121 module:
Test Graph

Graphs

GFSK/LCH

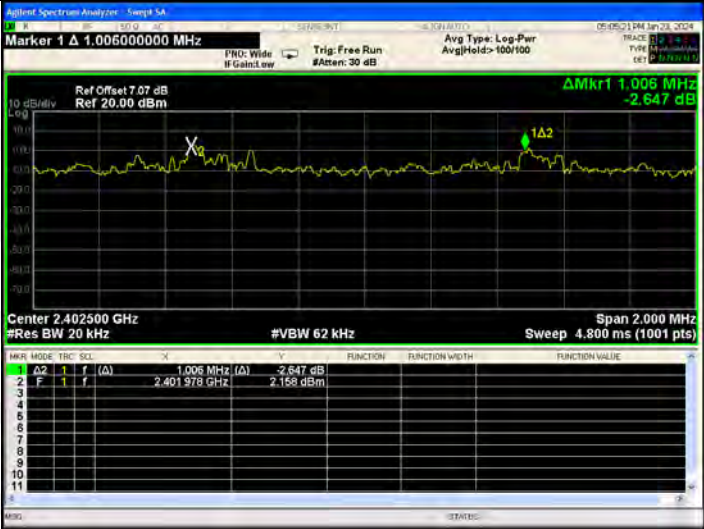


GFSK/MCH



GFSK/HCH



$\pi/4$ DQPSK/LCH	
$\pi/4$ DQPSK/MCH	
$\pi/4$ DQPSK/HCH	

8DPSK/LCH



8DPSK /MCH



8DPSK /HCH



QW850-1 module:
Test Graph

Graphs

GFSK/LCH

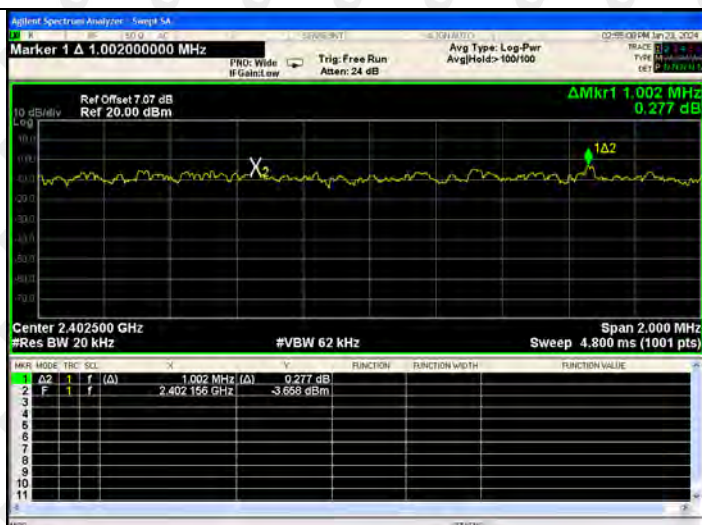
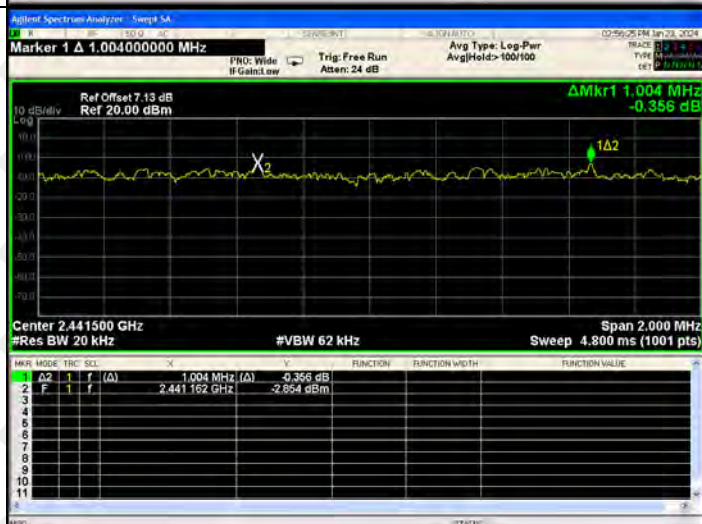
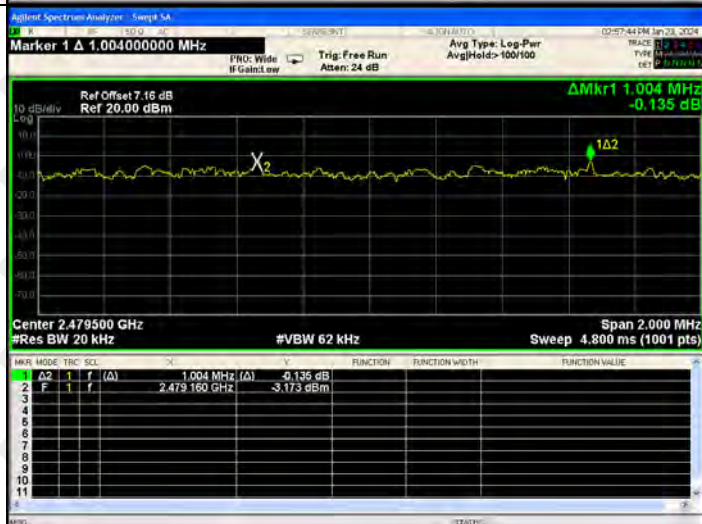


GFSK/MCH

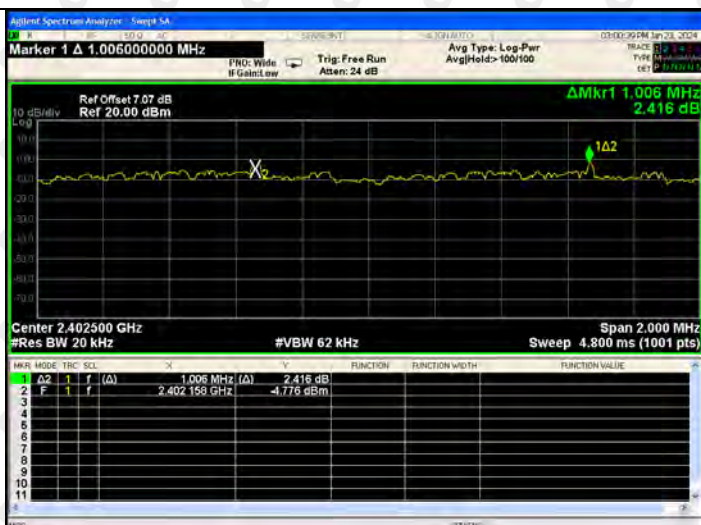


GFSK/HCH



$\pi/4$ DQPSK/LCH

 $\pi/4$ DQPSK/MCH

 $\pi/4$ DQPSK/HCH


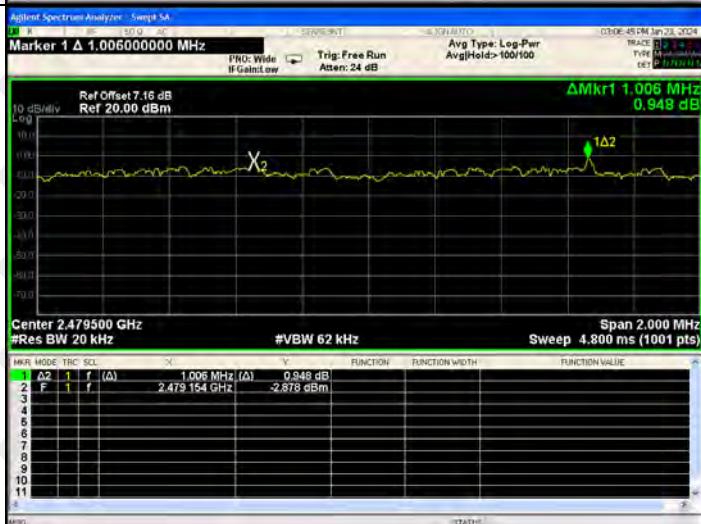
8DPSK/LCH



8DPSK /MCH



8DPSK /HCH



QW850-2 module: Test Graph

Graphs

GFSK/LCH



GFSK/MCH



GFSK/HCH



$\pi/4$ DQPSK/LCH

 $\pi/4$ DQPSK/MCH

 $\pi/4$ DQPSK/HCH


8DPSK/LCH



8DPSK /MCH

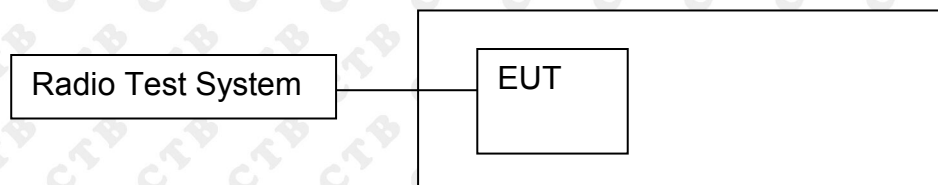


8DPSK /HCH



12. HOPPING CHANNEL NUMBER

12.1 Block Diagram Of Test Setup



12.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

12.4 Test Result

BW121 module:

Mode	Channel.	Number of Hopping Channel	Limit	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

QW850-1 module:

Mode	Channel.	Number of Hopping Channel	Limit	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

QW850-2 module:

Mode	Channel.	Number of Hopping Channel	Limit	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

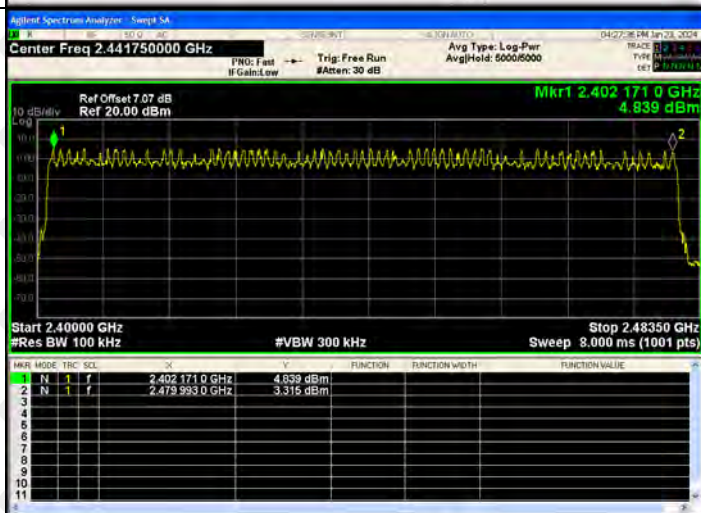
BW121 module: Test Graph

Graphs

GFSK/Hop



$\pi/4$ DQPSK/Hop



8DPSK/Hop



QW850-1 module:
Test Graph

Graphs

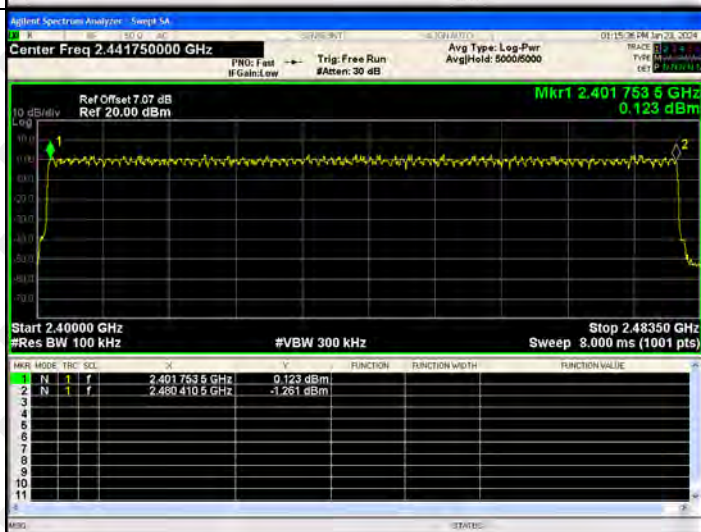
GFSK/Hop



$\pi/4$ DQPSK/Hop



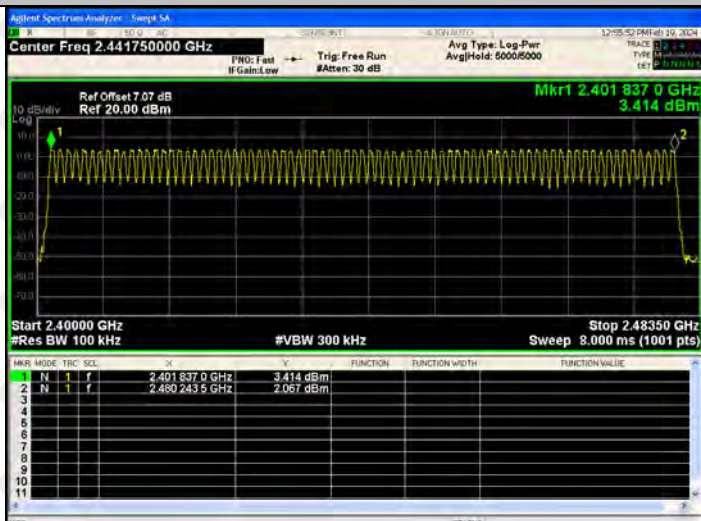
8DPSK/Hop



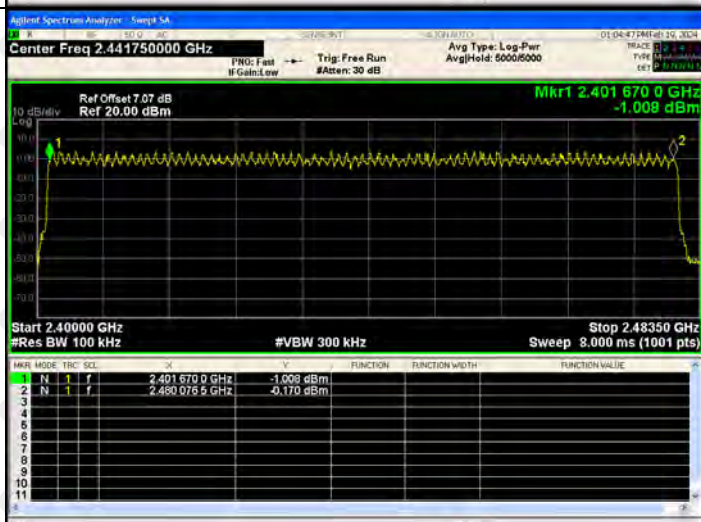
QW850-2 module:
Test Graph

Graphs

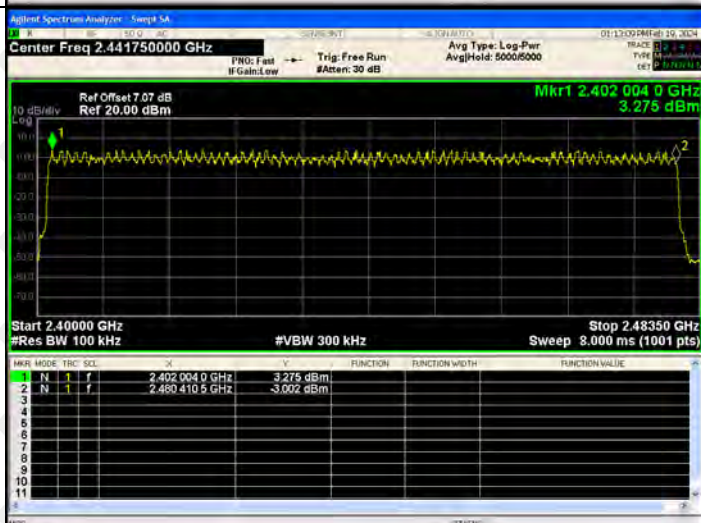
GFSK/Hop



$\pi/4$ DQPSK/Hop

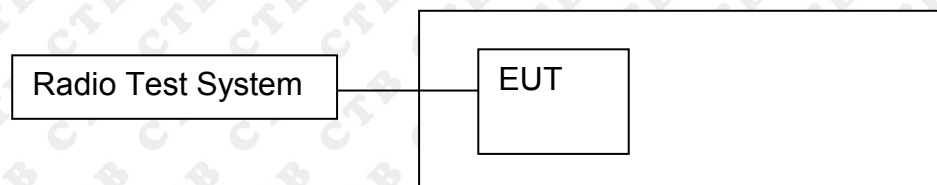


8DPSK/Hop



13. DWELL TIME

13.1 Block Diagram Of Test Setup



13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

13.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate, modulation format, etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

13.4 Test Result

BW121 module:

Worst case-GFSK:

Mode	Packet	Channel	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Verdict
GFSK	DH1	LCH	0.389	124.48	400	PASS
	DH1	MCH	0.389	124.48	400	PASS
	DH1	HCH	0.394	126.08	400	PASS
	DH3	LCH	1.647	263.52	400	PASS
	DH3	MCH	1.647	263.52	400	PASS
	DH3	HCH	1.654	264.64	400	PASS
	DH5	LCH	2.901	309.44	400	PASS
	DH5	MCH	2.899	309.227	400	PASS
	DH5	HCH	2.899	309.227	400	PASS

QW850-1 module:

Worst case-GFSK:

Mode	Packet	Channel	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Verdict
GFSK	DH1	LCH	0.382	122.24	400	PASS
	DH1	MCH	0.382	122.24	400	PASS
	DH1	HCH	0.382	122.24	400	PASS
	DH3	LCH	1.631	260.96	400	PASS
	DH3	MCH	1.632	261.12	400	PASS
	DH3	HCH	1.637	261.92	400	PASS
	DH5	LCH	2.887	307.947	400	PASS
	DH5	MCH	2.886	307.84	400	PASS
	DH5	HCH	2.886	307.84	400	PASS

QW850-2 module:

Worst case-GFSK:

Mode	Packet	Channel	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Verdict
GFSK	DH1	LCH	0.382	122.24	400	PASS
	DH1	MCH	0.382	122.24	400	PASS
	DH1	HCH	0.382	122.24	400	PASS
	DH3	LCH	1.631	260.96	400	PASS
	DH3	MCH	1.632	261.12	400	PASS
	DH3	HCH	1.637	261.92	400	PASS
	DH5	LCH	2.887	307.947	400	PASS
	DH5	MCH	2.886	307.84	400	PASS
	DH5	HCH	2.886	307.84	400	PASS

Remark: DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

DH1 Packet permit maximum 1600 / 79 / 2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:



DH5:1600/79/6*0.4*79*(MkrDelta)/1000

DH3:1600/79/4*0.4*79*(MkrDelta)/1000

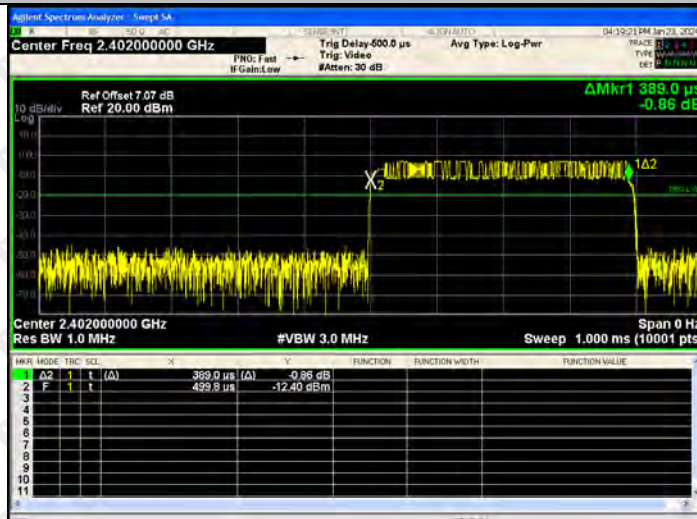
DH1:1600/79/2*0.4*79*(MkrDelta)/1000

Remark: Mkr Delta is once pulse time.

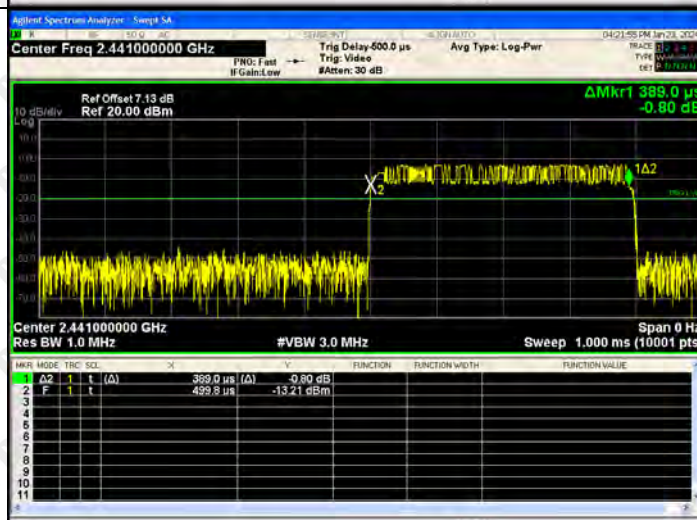
BW121 module: Test Graph

Graphs

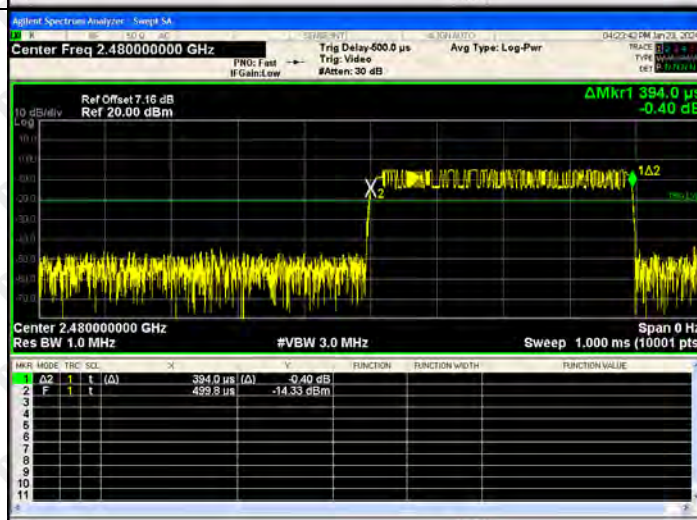
GFSK_DH1/LCH



GFSK_DH1/MCH



GFSK_DH1/HCH



GFSK_DH3/LCH



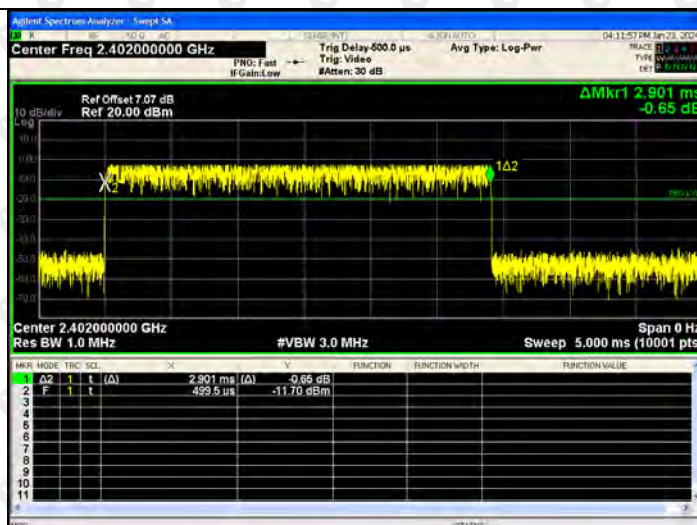
GFSK_DH3/MCH



GFSK_DH3/HCH



GFSK_DH5/LCH



GFSK_DH5/MCH



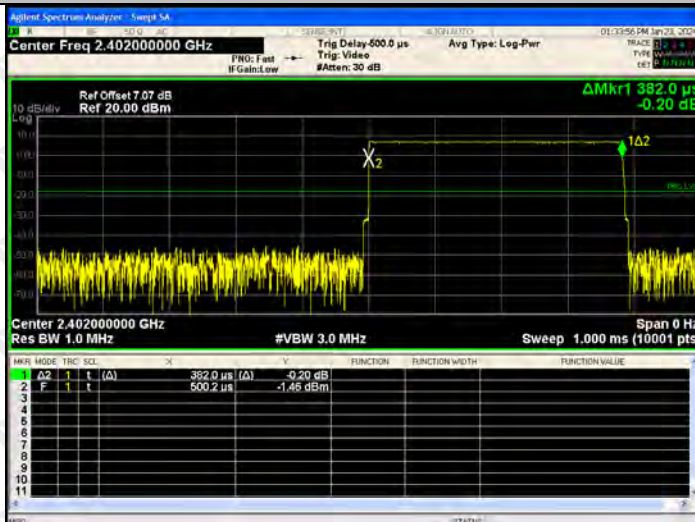
GFSK_DH5/HCH



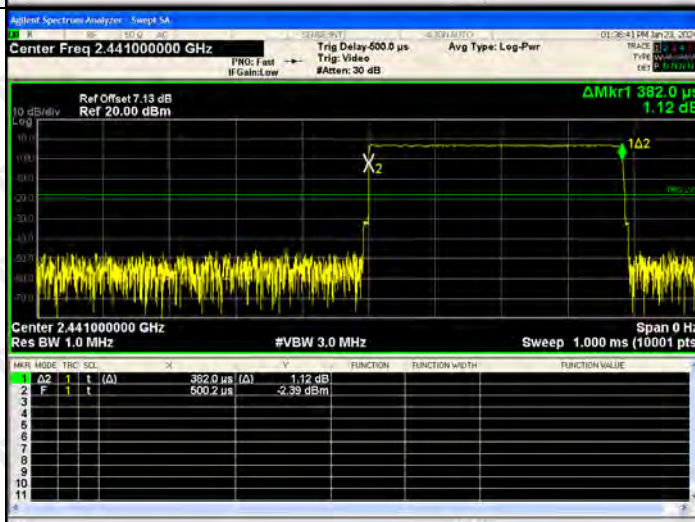
QW850-1 module:
Test Graph

Graphs

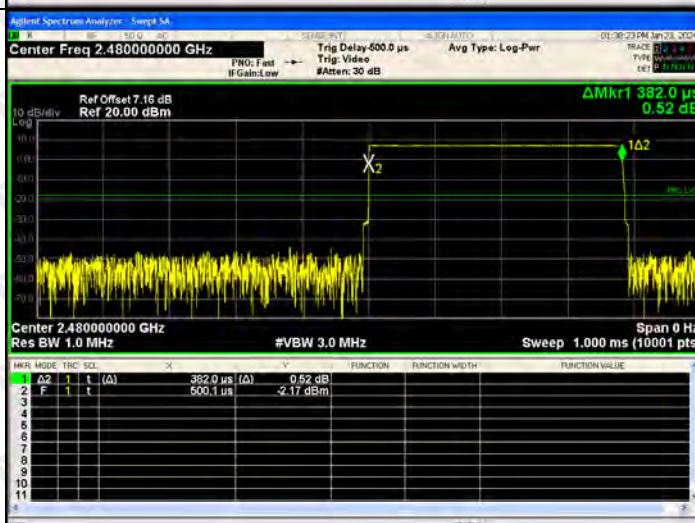
GFSK_DH1/LCH



GFSK_DH1/MCH



GFSK_DH1/HCH



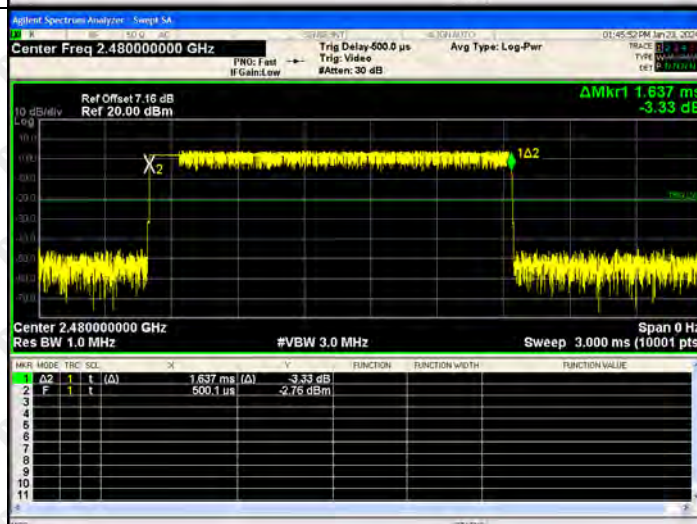
GFSK_DH3/LCH



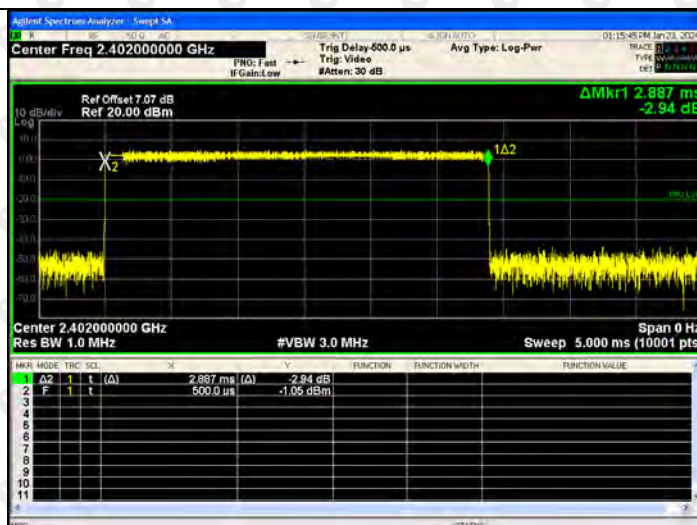
GFSK_DH3/MCH



GFSK_DH3/HCH



GFSK_DH5/LCH



GFSK_DH5/MCH



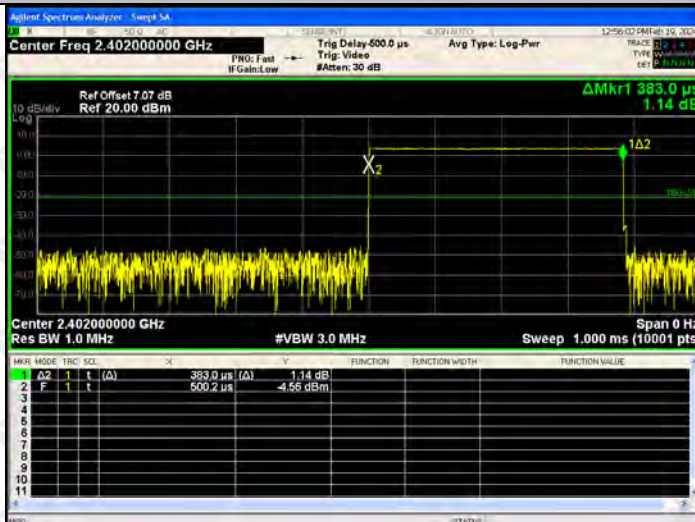
GFSK_DH5/HCH



QW850-2 module: Test Graph

Graphs

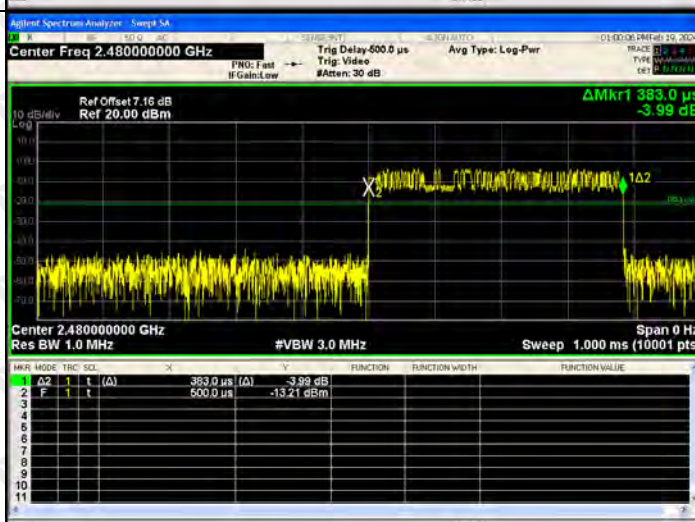
GFSK_DH1/LCH



GFSK_DH1/MCH



GFSK_DH1/HCH



GFSK_DH3/LCH



GFSK_DH3/MCH



GFSK_DH3/HCH



GFSK_DH5/LCH



GFSK_DH5/MCH



GFSK_DH5/HCH



14. PSEUDORANDOM FREQUENCY

14.1 Limit

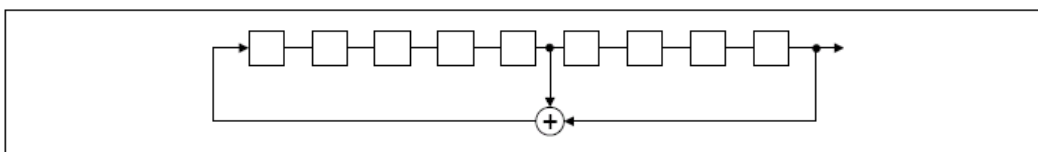
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

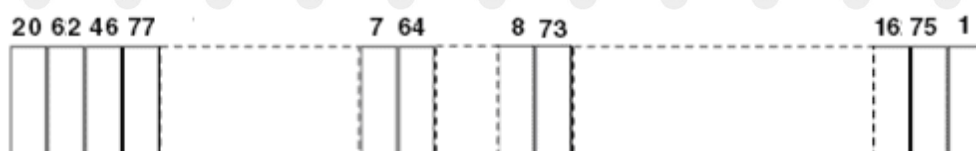
14.2 Test procedure

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: $2^9 - 1 = 511$ bits
- Longest sequence of zeros: 8 (non-inverted signal)



An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

14.3 Test Result

The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

15. ANTENNA REQUIREMENT

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

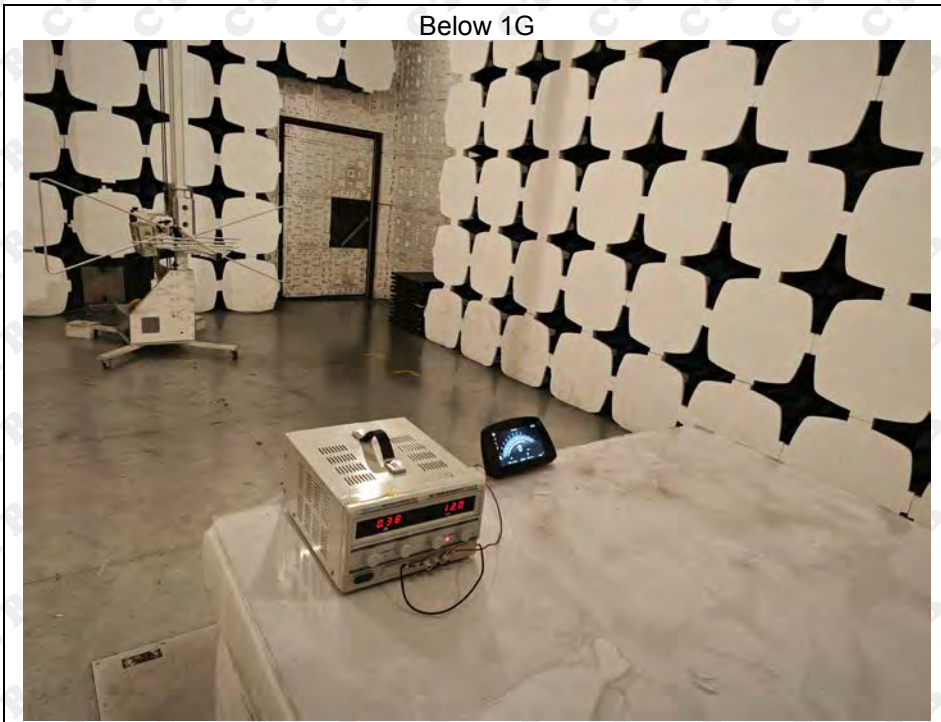
EUT Antenna:

The antenna is Internal antenna. The best case gain of the antenna is BW121 module: 1.95dBi, QW850-1 module: 4.98dBi, QW850-2 module: 3.45dBi

16. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission

Below 1G



Above 1G



***** END OF REPORT *****