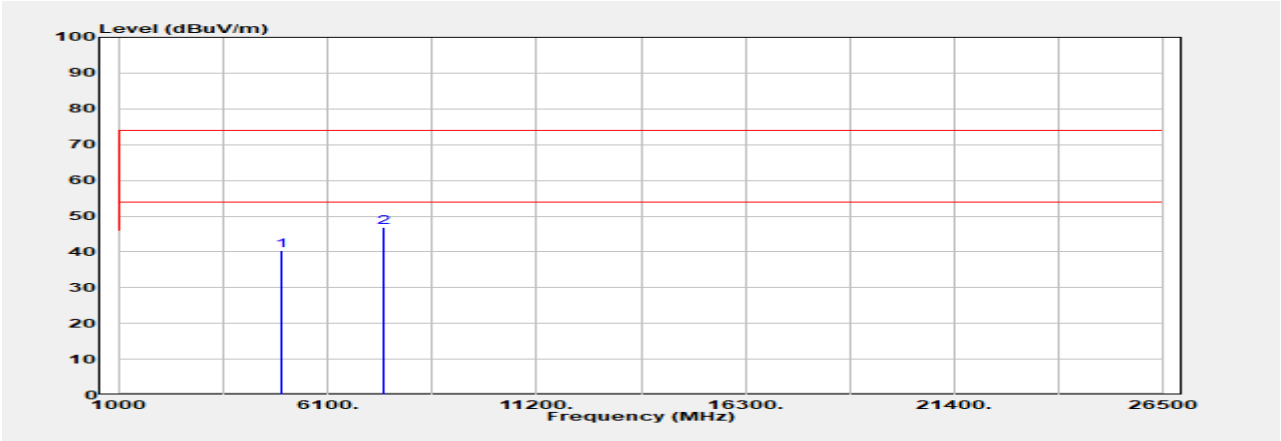
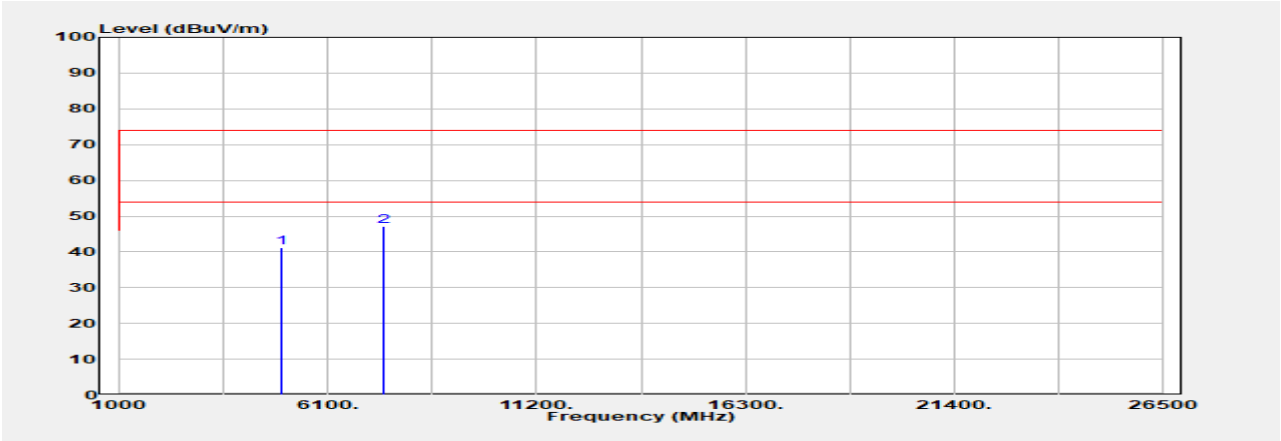
Report Number	:TERF2303000621E2	Test Site	:SAC G Chamber
Operation Mode	:EDR 3M	Test Date	:2023-04-21
Test Frequency	:2480 MHz	Temp./Humi.	:24.3°C / 63%
Test Mode	:Tx	Antenna Pol.	:Vertical
EUT Pol	:H Plane	Engineer	:Temo Chen



Freq. MHz	Detector Mode PK/QP	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.000	Peak	36.78	3.62	40.40	74.00	-33.60
7440.000	Peak	37.59	9.42	47.01	74.00	-26.99

Freq. MHz	Detector Mode AV	Peak Actual FS (dBµV/m)	Duty Cycle Factor (dB)	Average Value (dBuV/m)	Average Limit@3m (dBuV/m)	Margin (dB)
4960.000	Average	40.40	-21.21	19.19	54.00	-34.81
7440.000	Average	47.01	-21.21	25.80	54.00	-28.20

Report Number	:TERF2303000621E2	Test Site	:SAC G Chamber
Operation Mode	:EDR 3M	Test Date	:2023-04-21
Test Frequency	:2480 MHz	Temp./Humi.	:24.3°C / 63%
Test Mode	:Tx	Antenna Pol.	:Horizontal
EUT Pol	:H Plane	Engineer	:Temo Chen



Freq. MHz	Detector Mode PK/QP	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.000	Peak	37.58	3.62	41.19	74.00	-32.81
7440.000	Peak	37.69	9.42	47.11	74.00	-26.89

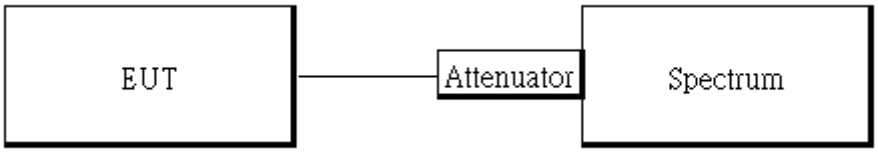
Freq. MHz	Detector Mode AV	Peak Actual FS (dBµV/m)	Duty Cycle Factor (dB)	Average Value (dBuV/m)	Average Limit@3m (dBuV/m)	Margin (dB)
4960.000	Average	41.19	-21.21	19.98	54.00	-34.02
7440.000	Average	47.11	-21.21	25.90	54.00	-28.10

12 FREQUENCY SEPARATION

12.1 Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

12.2 Test Setup



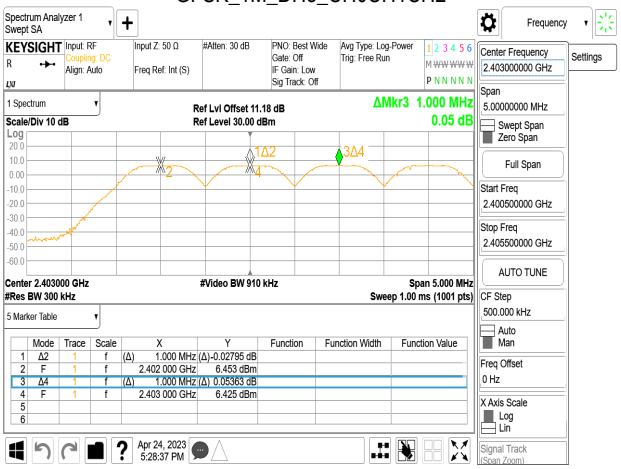
12.3 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10:2013.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set center frequency of spectrum analyzer = middle of hopping channel.
5. Set the RBW approximately 30% of the channel spacing, VBW ≥ RBW.
6. Adjust Span to Wide enough to capture the peaks of two adjacent channels.
7. Sweep = auto.
8. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

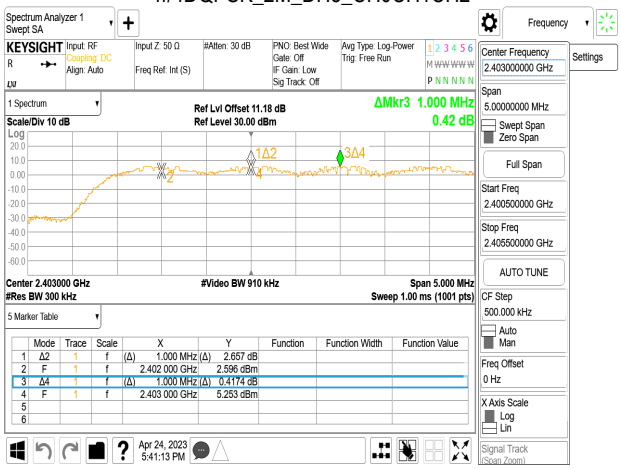
12.4 Measurement Result

Channel separation (MHz)	Limit	Result
1	≧25 kHz or 2/3 times 20dB bandwidth	PASS

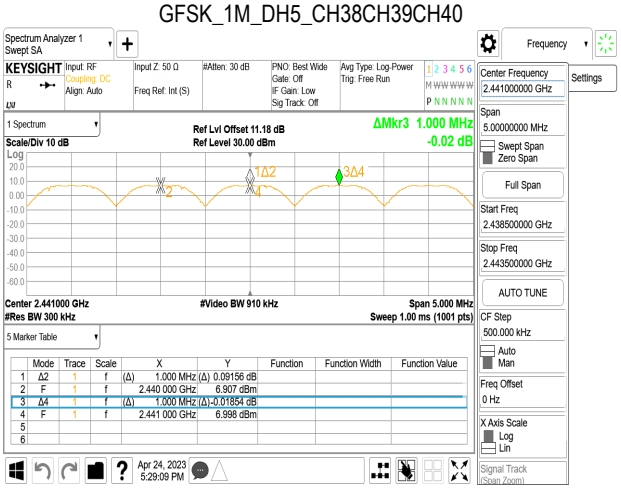
GFSK_1M_DH5_CH0CH1CH2



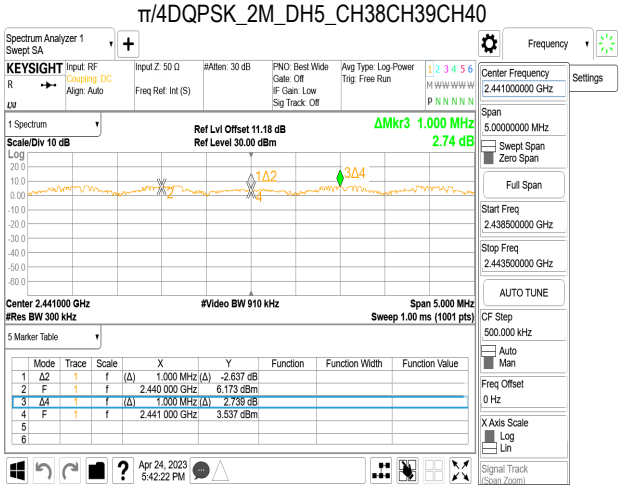
π/4DQPSK_2M_DH5_CH0CH1CH2



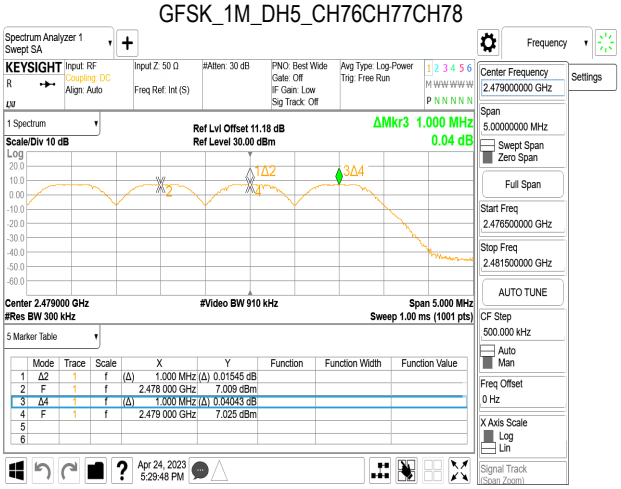
GFSK_1M_DH5_CH38CH39CH40



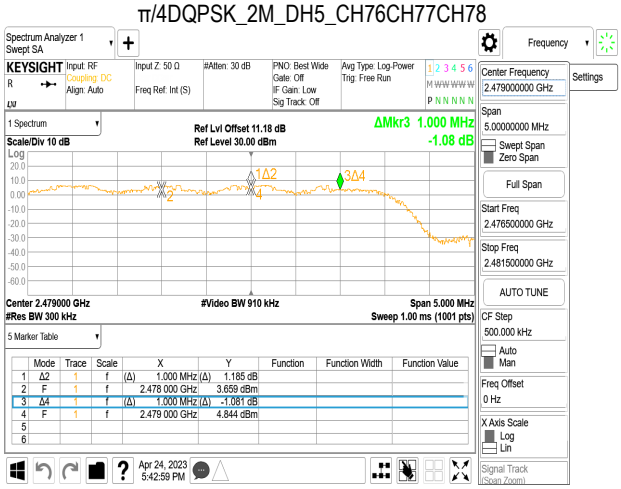
π/4DQPSK_2M_DH5_CH38CH39CH40



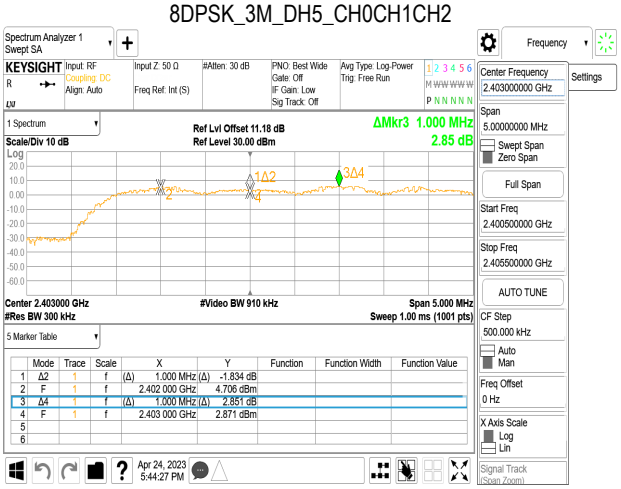
GFSK_1M_DH5_CH76CH77CH78



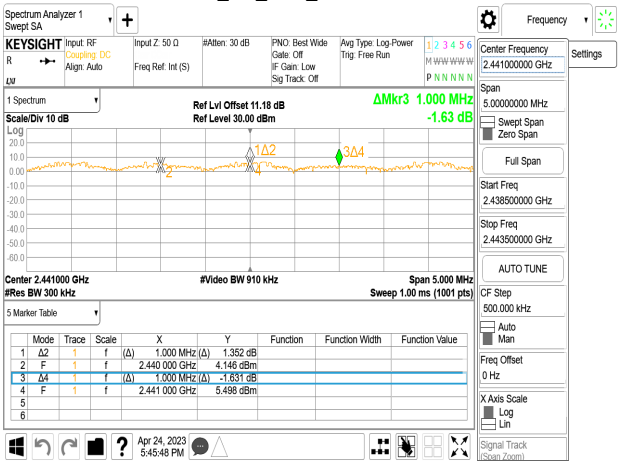
π/4DQPSK_2M_DH5_CH76CH77CH78



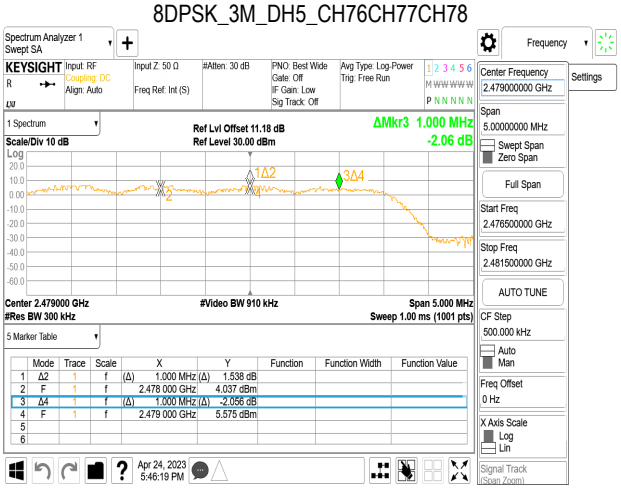
8DPSK_3M_DH5_CH0CH1CH2



8DPSK_3M_DH5_CH38CH39CH40



8DPSK_3M_DH5_CH76CH77CH78

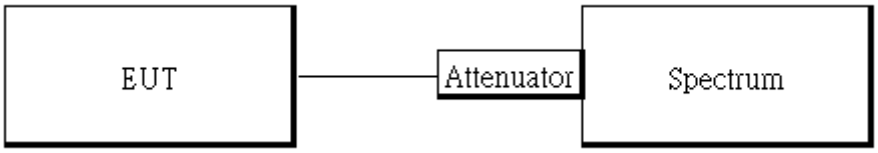


13 NUMBER OF HOPPING FREQUENCY

13.1 Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

13.2 Test Setup



13.3 Measurement Procedure

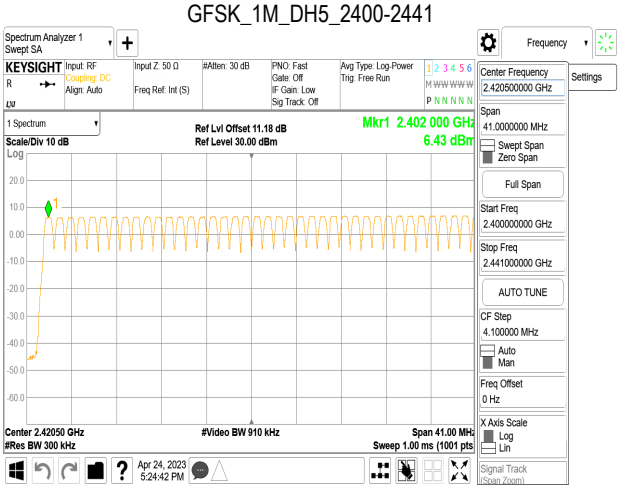
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10:2013.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
5. Set the spectrum analyzer as RBW = 30% of the channel spacing, VBW ≥ RBW., Detector = Peak
6. Max hold, view and count how many channel in the band.

13.4 Measurement Result

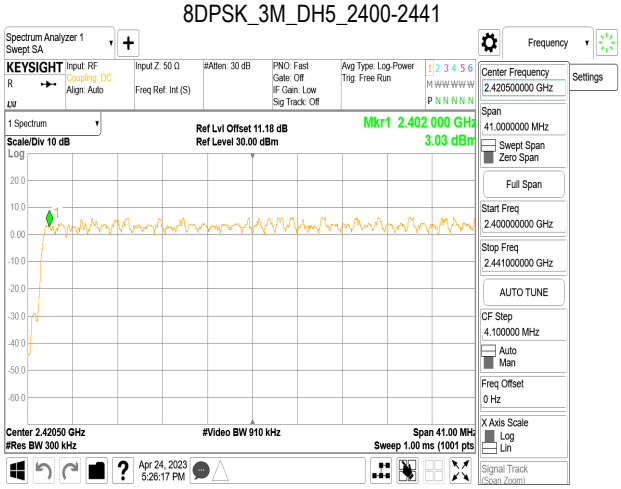
Tabular Data of Total Channel Number

	Channel Number	**Limit**
2.4 GHz – 2.441 GHz	**40**	**>15**
2.441 GHz – 2.4835 GHz	**39**	
2.4 GHz ~2.4835 GHz	**(40+39) = 79**	

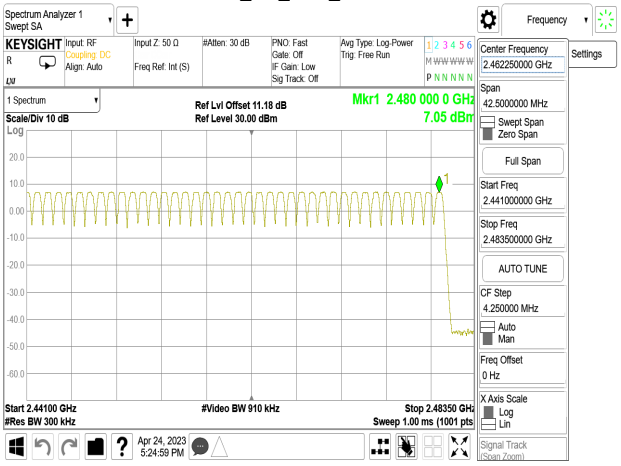
GFSK_1M_DH5_2400-2441



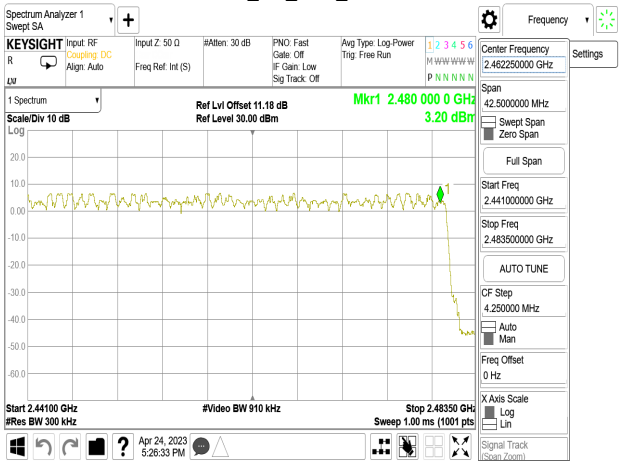
8DPSK_3M_DH5_2400-2441



GFSK_1M_DH5_2441-2480



8DPSK_3M_DH5_2441-2480

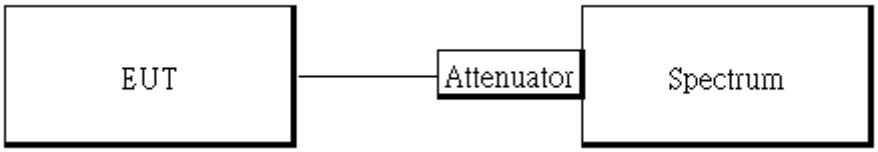


14 TIME OF OCCUPANCY (DWELL TIME)

14.1 Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

14.2 Test Setup



14.3 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows ANSI C63.10:2013.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set center frequency of spectrum analyzer = operating frequency.
5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz , Detector = Peak, Adjust Sweep = 2~8ms.
6. Repeat above procedures until all frequency of the interest measured were complete.

Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels.

Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2

DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4

DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

Note: the result of the complete test default channel at 1Mbps is recorded on the test report, 2Mbps, and 3Mbps only records the measurement result at middle channel that reveals no much deviation.

14.4 Measurement Result

GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
Mid	DH1	121.60	400ms
	DH3	262.40	400ms
	DH5	307.20	400ms

π/4 DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
Mid	2DH1	124.80	400ms
	2DH3	262.40	400ms
	2DH5	307.20	400ms

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
Mid	3DH1	124.80	400ms
	3DH3	260.80	400ms
	3DH5	307.20	400ms

GFSK (1Mbps):

CH Mid	DH1 time slot	=	0.380	*	(1600/2/79)	*	31.6	=	121.60 (ms)
	DH3 time slot	=	1.640	*	(1600/4/79)	*	31.6	=	262.40 (ms)
	DH5 time slot	=	2.880	*	(1600/6/79)	*	31.6	=	307.20 (ms)

π/4 -DQPSK (2Mbps):

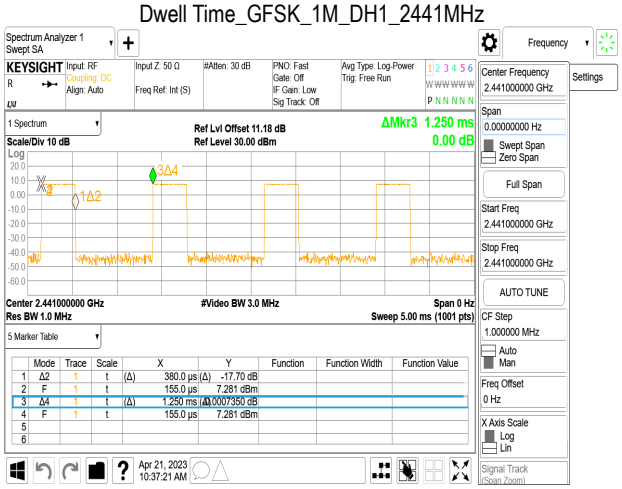
CH Mid	2DH1 time slo	=	0.390	*	(1600/2/79)	*	31.6	=	124.80 (ms)
	2DH3 time slo	=	1.640	*	(1600/4/79)	*	31.6	=	262.40 (ms)
	2DH5 time slo	=	2.880	*	(1600/6/79)	*	31.6	=	307.20 (ms)

8-DPSK (3Mbps):

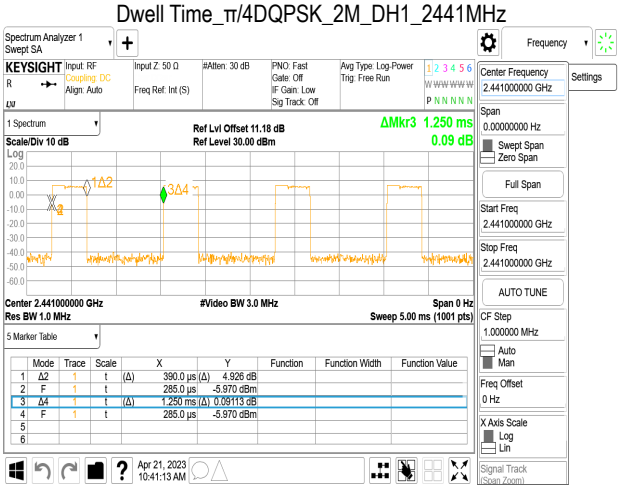
CH Mid	3DH1 time slo	=	0.390	*	(1600/2/79)	*	31.6	=	124.80 (ms)
	3DH3 time slo	=	1.630	*	(1600/4/79)	*	31.6	=	260.80 (ms)
	3DH5 time slo	=	2.880	*	(1600/6/79)	*	31.6	=	307.20 (ms)

A period time = 0.4 (s) * 79 = 31.6 (s)

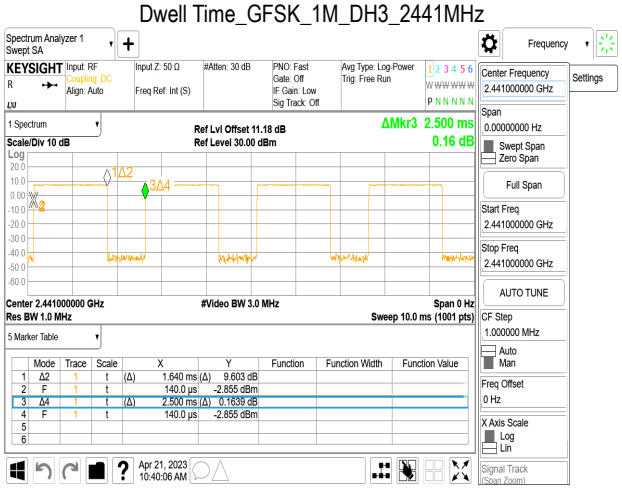
Dwell Time_GFSK_1M_DH1_2441MHz



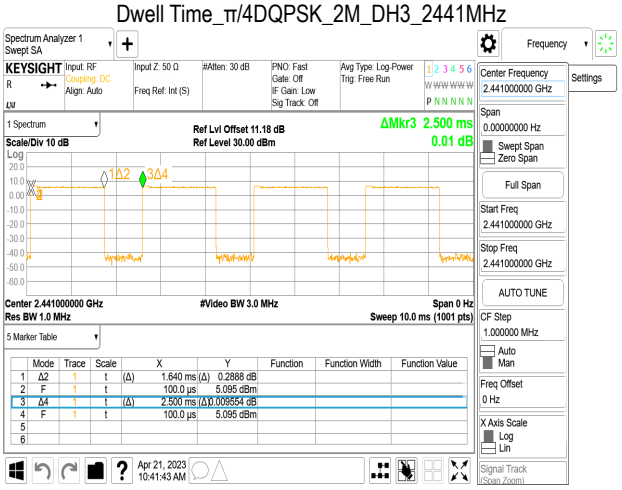
Dwell Time_π/4DQPSK_2M_DH1_2441MHz



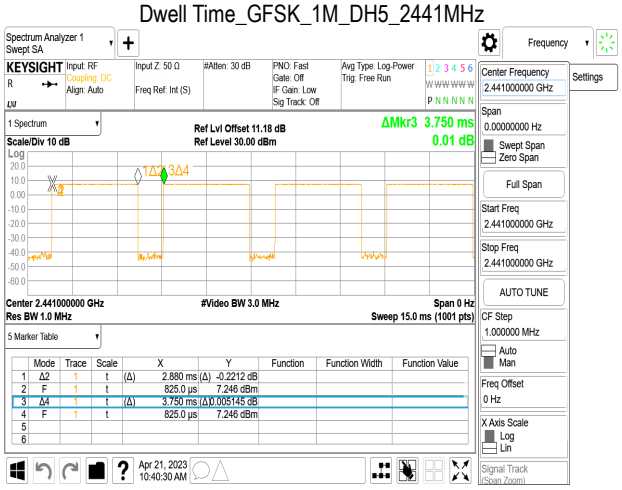
Dwell Time_GFSK_1M_DH3_2441MHz



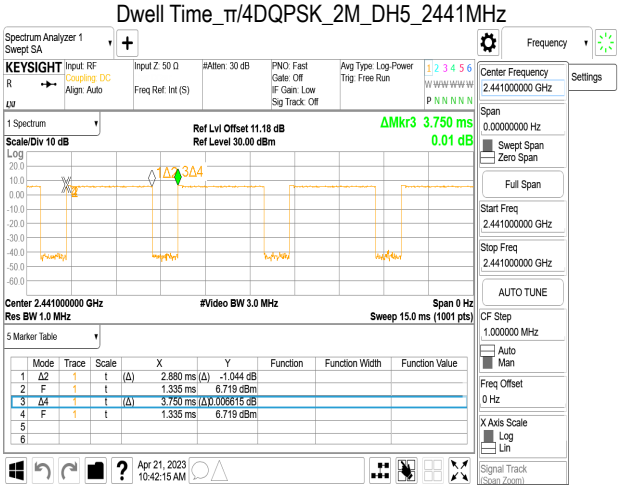
Dwell Time_π/4DQPSK_2M_DH3_2441MHz



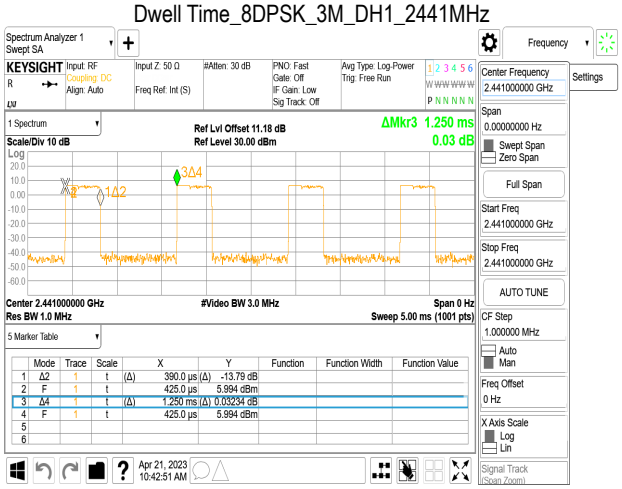
Dwell Time_GFSK_1M_DH5_2441MHz



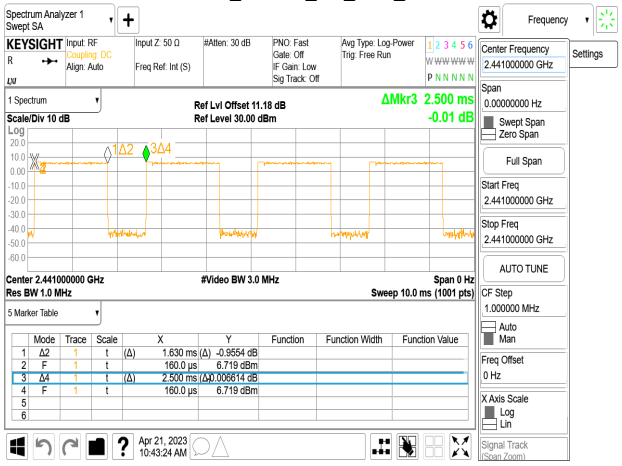
Dwell Time_π/4DQPSK_2M_DH5_2441MHz



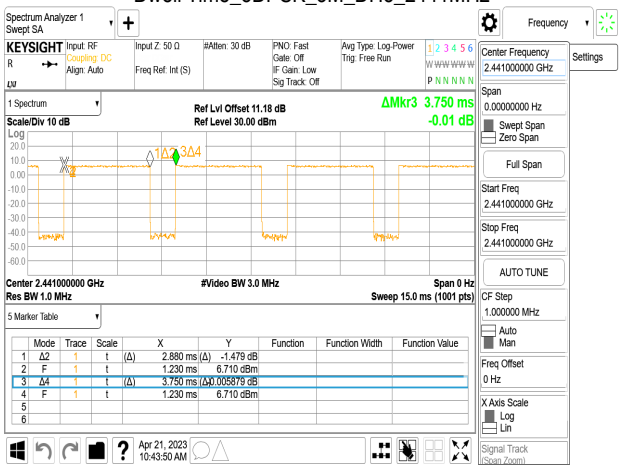
Dwell Time_8DPSK_3M_DH1_2441MHz



Dwell Time_8DPSK_3M_DH3_2441MHz



Dwell Time_8DPSK_3M_DH5_2441MHz



15 ANTENNA REQUIREMENT

15.1 Standard Applicable

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

15.2 Antenna Connected Construction

The antenna complies with this requirement and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~