China

FCC - TEST REPORT

Report Number	:	**709502301742-00E**	Date of Issue:	June 26, 2023

Model	:	Fotric P9, Fotric P8, Fotric P7, Fotric P6, Fotric P5, Fotric P4
Product Type	:	Infrared Thermal Camera
Applicant	:	FOTRIC INC.
Address	:	No. 14, Lane 2500, Xiupu Road, Pudong, 201201 Shanghai, PEOPLE'S REPUBLIC OF CHINA
Manufacturer	:	FOTRIC INC.
Address	:	No. 14, Lane 2500, Xiupu Road, Pudong, 201201 Shanghai, PEOPLE'S REPUBLIC OF CHINA

Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	80

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1 Table of Contents

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2 Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
No.16 Lane, 1951 Du Hui Road,
Shanghai 201108,
P.R. China

Test Firm FCC Registration Number: 820234

Designation number: CN1183

IC Company Number: 25988

CAB identifier: CN0101

Telephone: +86 21 6141 0123
Fax: +86 21 6140 8600

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3 Description of the Equipment Under Test

Product:	Infrared Thermal Camera
Model no.:	Fotric P9, Fotric P8, Fotric P7, Fotric P6, Fotric P5, Fotric P4
FCC ID:	2AZTCJAGUAR
Options and accessories:	Test harness
Rating:	DC 3.6V Li-ion Battery
RF Transmission Frequency:	2402~2480MHz for Bluetooth For 2.4G & 5G Wi-Fi For 802.11b/g/n-HT20: 2412~2462 MHz For 802.11n-HT40: 2422~2452 MHz 5180~5240 MHz (U-NII-1) 5260~5320 MHz (U-NII-2A) 5500~5720 MHz (U-NII-2C) 5745~5825 MHz (U-NII-3)
No. of Operated Channel:	79 channels for Bluetooth 4.2+EDR 40 channels for Bluetooth 4.2 BLE 2.4GHz WIFI: 11 for 802.11b/802.11g/802.11(H20); 7 for 802.11n(HT40) 5180~5240 MHz (U-NII-1): Channel 36 - 48 5260~5320 MHz (U-NII-2A): Channel 52 - 64 5500~5720 MHz (U-NII-2C): Channel 100 -144 5745~5825 MHz (U-NII-3): Channel 149 - 165
Modulation:	Bluetooth 4.2+EDR FHSS: GFSK, π/4 DQPSK, 8DPSK Bluetooth 4.2+BLE DHSS: GFSK For Wi-Fi: Direct Sequence Spread Spectrum (DSSS) for 802.11b Orthogonal Frequency Division Multiplexing (OFDM) for 802.11a/b/g/n/ac
Hardware Version:	0.6.2.4
Software Version:	V3.0.0
Data speed:	1. Bluetooth 4.2+EDR FHSS: 1Mbps, 2Mbps, 3Mbps 2. Bluetooth 4.2+BLE DHSS: 1Mbps 3. Wi-Fi: 11b 1 ~ 11Mbps, 11g/a 6 ~ 54Mbps, 11n HT20 6.5 ~ 72.2Mbps, 11n HT 40 13.5 ~ 150Mbps, 11ac VHT40 13.5 ~ 200Mbps, 11ac VHT80 29.3 ~ 433.3Mbps

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Antenna Type:	PIFA Antenna
Antenna Gain:	1.79dBi for 2.4GHz; 7.19dBi for 5GHz
Description of the EUT:	The Equipment Under Test (EUT) is an Infrared Thermal Camera with Bluetooth and Wi-Fi Module. The EUT support Bluetooth 4.2+EDR and support BLE function and Wi-Fi operated at 5GHz and 2.4GHz. Only Bluetooth 4.2+EDR included in this report.
Test sample no.:	SHA-716542-2

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000; KDB 558074 D01 15.247 Meas Guidance v05r02 and C63.10 (2013).

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5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition			Pages	Test Site	Test Result
§15.207		Conducted emission AC power port	13-17	Site 1	Pass
§15.247(b)(1)		Conducted peak output power	18-22	Site 1	Pass
§15.247(a)(2)		6dB bandwidth	---	---	N/A
§15.247(a)(1)		20dB bandwidth	23-27	Site 1	Pass
§15.247(a)(1)		Carrier frequency separation	28-30	Site 1	Pass
§15.247(a)(1)(iii)		Number of hopping frequencies	31-33	Site 1	Pass
§15.247(a)(1)(iii)		Dwell Time	34-37	Site 1	Pass
§15.247(e)		Power spectral density*	---	---	N/A
§15.247(d)		Spurious RF conducted emissions	38-56	Site 1	Pass
§15.247(d)		Band edge	57-69	Site 1	Pass
§15.247(d) & §15.209 &		Spurious radiated emissions for transmitter and receiver	70-76	Site 1	Pass
§15.203		Antenna requirement	See note 1		Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a PIFA antenna, which gain is 1.79dBi for 2.4GHz. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AZTCJAGUAR complies with Section 15.207,15.209,15.247 of the FCC Part 15, Subpart C Rules

This report in only for Bluetooth 4.2+EDR.
According to the client's declaration, all the models have the same electrical circuit board and mechanical structure, except schematic and hardware circuit, except pixel, lens or physical size differences., so we chose the Fotric P7 to perform all the tests.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	April 26, 2023
Testing Start Date:	April 27, 2023
Testing End Date:	June 25, 2023

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Reviewed by:	Prepared by:	Tested by:
Hui TONG	Jiaxi XU	Yiquan WANG
Review Engineer	Project Engineer	Test Engineer

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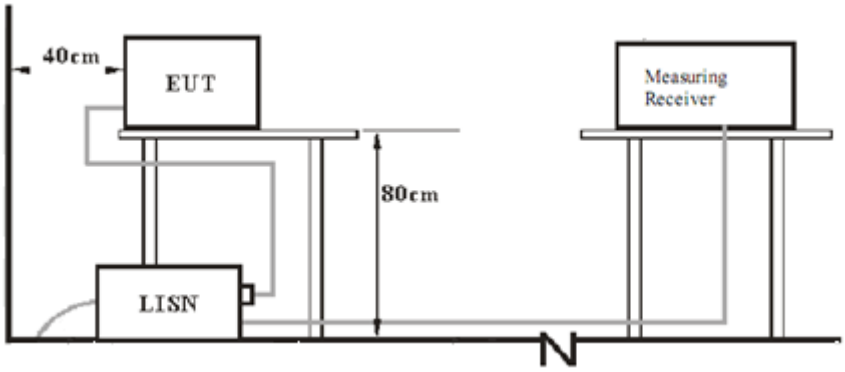
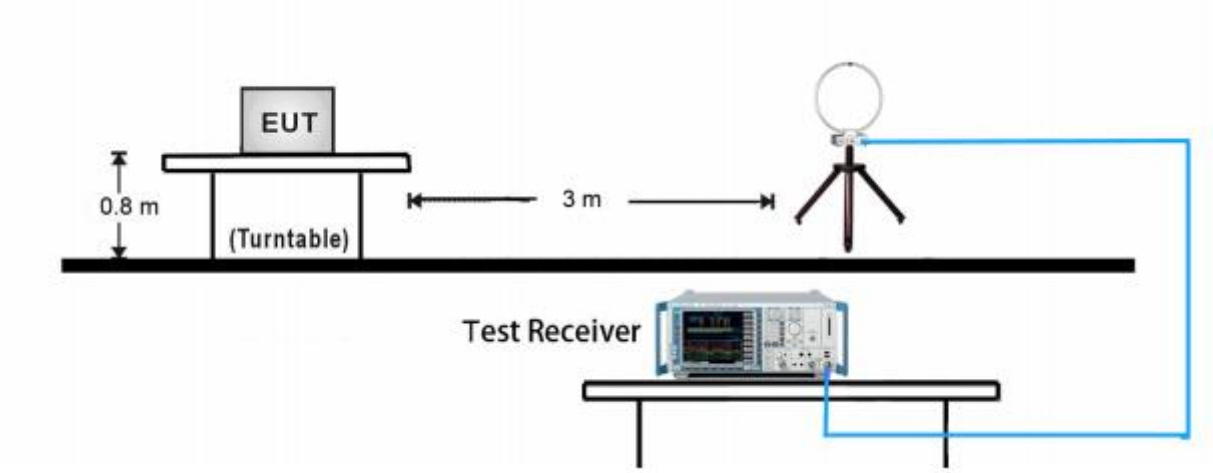
7 Test Setups

7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



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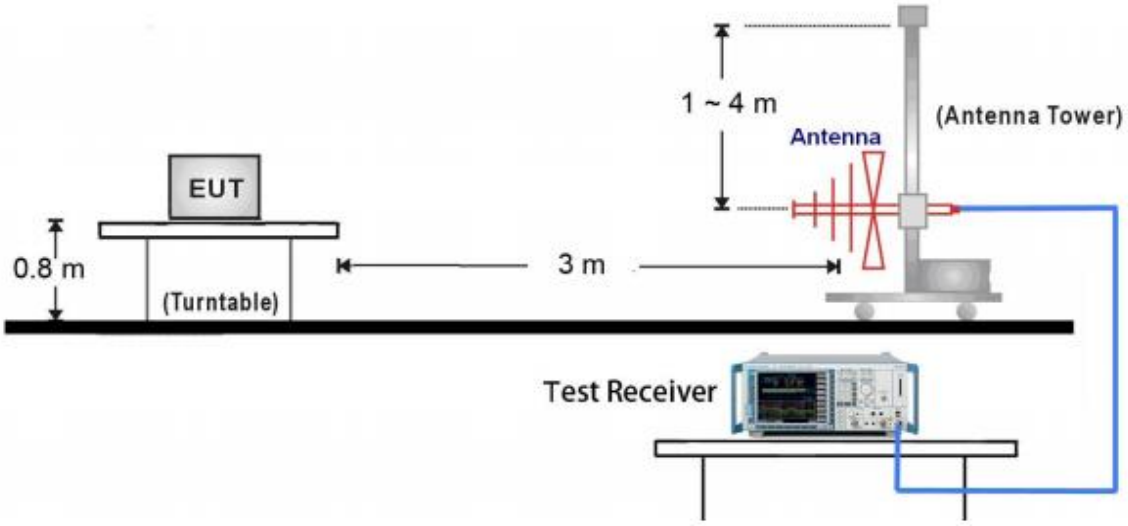
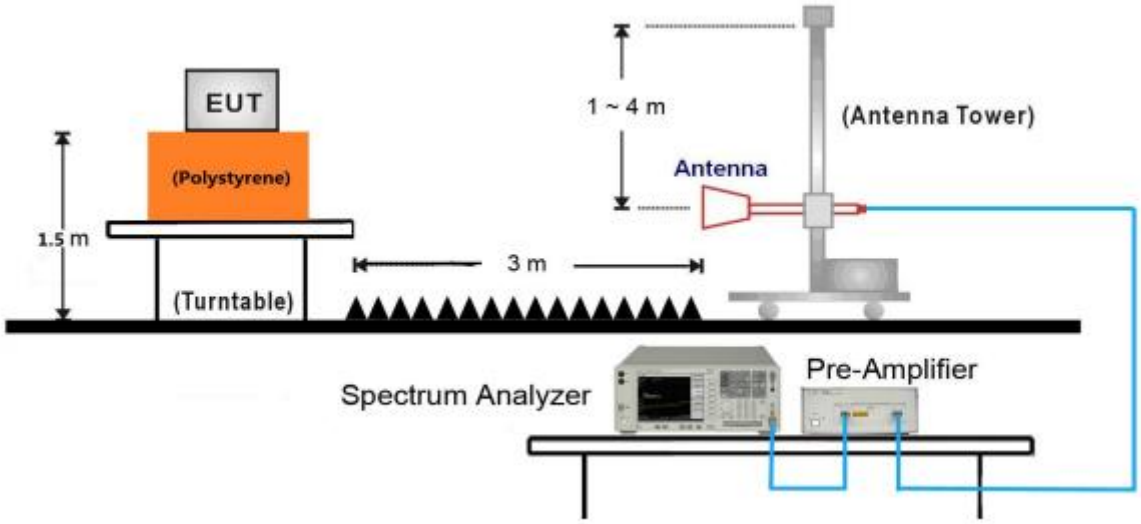
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



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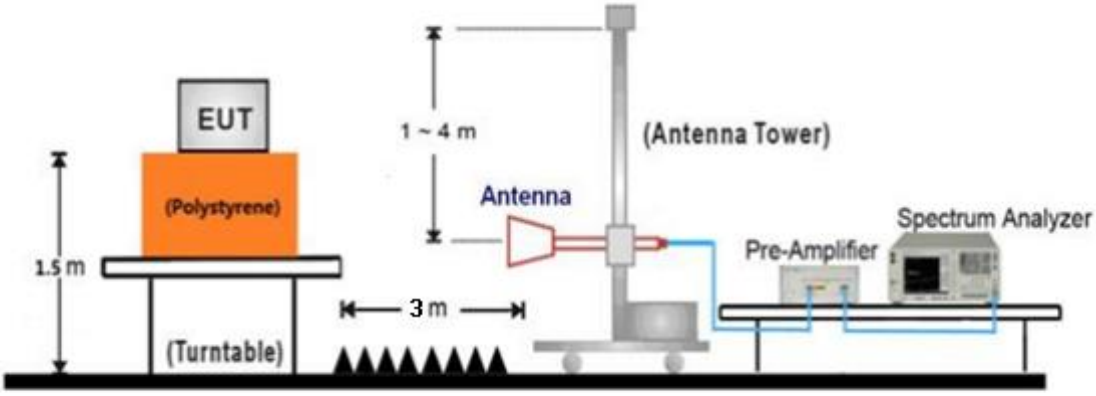
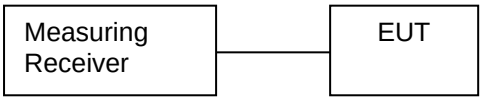
18GHz ~ 25GHz Test Setup:



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenove	E470	PF-OU5TS7 17/09

Test software: QRCT.exe

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

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Conducted Emission

150k-30MHz Conducted Emission Test

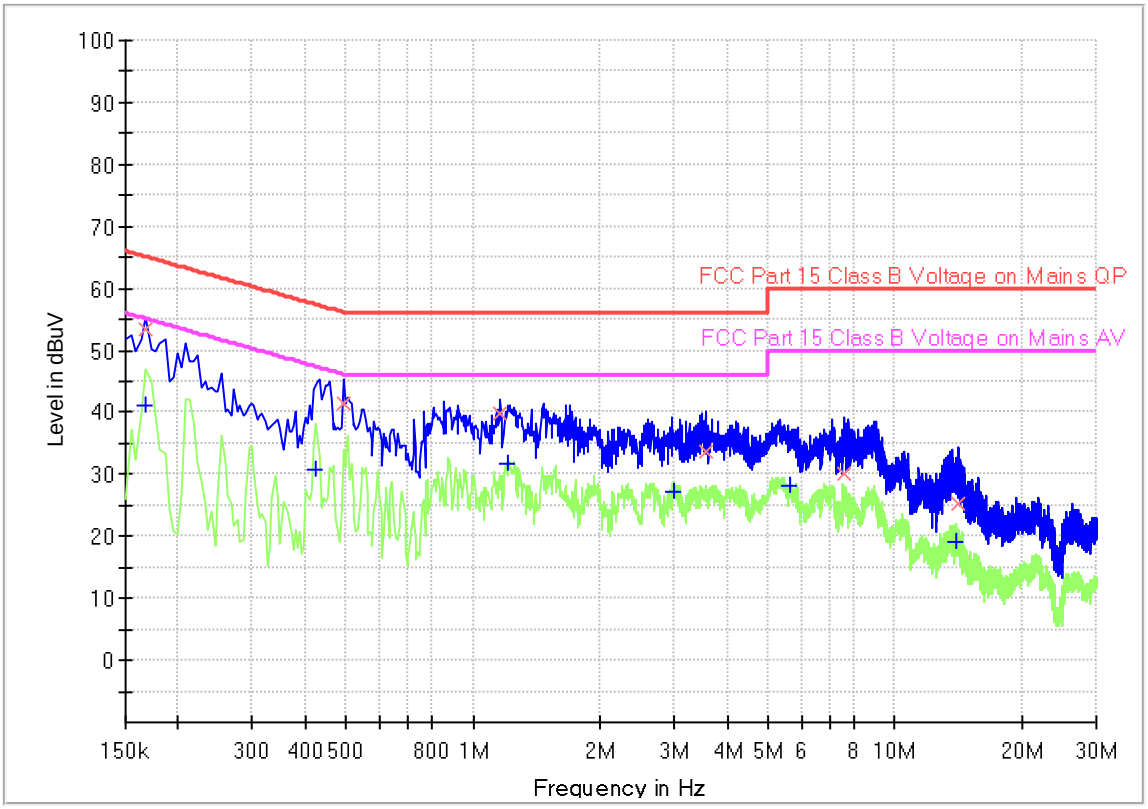
EUT Information

EUT Name:	Infrared Thermal Camera
Model	Fotric P7
Client:	FOTRIC INC.
Op Cond	Power on, TX_2441MHz,2DH5, AC 230/50Hz, T21.3, H56.3%, P100.6kPa
Operator:	Wang Yiquan
Standard	FCC part 15.207(a)
Comment:	Phase L
Sample No.:	SHA-716542-2

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup:	Voltage with 2-Line-LISN
Receiver:	[ESR 3]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



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Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.168000	---	41.09	55.06	13.97	1000.0	9.000	L1	19.6
0.168000	53.53	---	65.06	11.53	1000.0	9.000	L1	19.6
0.424500	---	30.82	47.36	16.54	1000.0	9.000	L1	19.6
0.492000	41.36	---	56.13	14.77	1000.0	9.000	L1	19.6
1.162500	39.80	---	56.00	16.20	1000.0	9.000	L1	19.6
1.212000	---	31.62	46.00	14.38	1000.0	9.000	L1	19.6
2.998500	---	27.09	46.00	18.91	1000.0	9.000	L1	19.6
3.556500	33.71	---	56.00	22.29	1000.0	9.000	L1	19.6
5.649000	---	28.31	50.00	21.69	1000.0	9.000	L1	19.6
7.543500	30.16	---	60.00	29.84	1000.0	9.000	L1	19.7
13.911000	---	19.16	50.00	30.84	1000.0	9.000	L1	19.8
14.167500	25.25	---	60.00	34.75	1000.0	9.000	L1	19.8

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150k-30MHz Conducted Emission Test

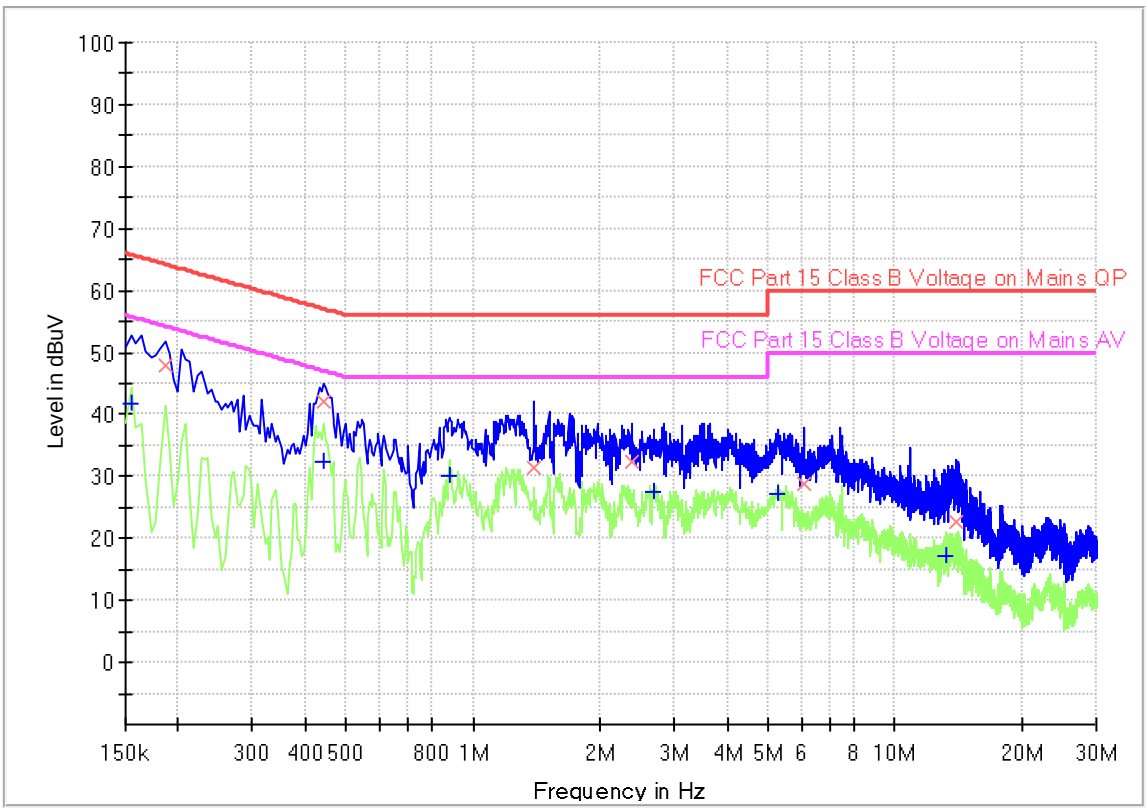
EUT Information

EUT Name:	Infrared Thermal Camera
Model	Fotric P7
Client:	FOTRIC INC.
Op Cond	Power on, TX_2441MHz,2DH5 AC 230/50Hz, T21.3, H56.3%, P100.6kPa
Operator:	Wang Yiquan
Standard	FCC part 15.207(a)
Comment:	Phase N
Sample No.:	SHA-716542-2

Scan Setup: Voltage with 2-Line-LISN pre [EMI conducted]

Hardware Setup:	Voltage with 2-Line-LISN
Receiver:	[ESR 3]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	100 Hz	PK+	200 Hz	0.02 s	0 dB
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0.01 s	0 dB



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Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154500	---	41.88	55.75	13.87	1000.0	9.000	N	19.6
0.186000	47.75	---	64.21	16.46	1000.0	9.000	N	19.6
0.442500	---	32.28	47.01	14.73	1000.0	9.000	N	19.6
0.442500	42.10	---	57.01	14.91	1000.0	9.000	N	19.6
0.879000	---	30.25	46.00	15.75	1000.0	9.000	N	19.6
1.392000	31.56	---	56.00	24.44	1000.0	9.000	N	19.6
2.377500	32.23	---	56.00	23.77	1000.0	9.000	N	19.6
2.674500	---	27.51	46.00	18.49	1000.0	9.000	N	19.6
5.275500	---	27.20	50.00	22.80	1000.0	9.000	N	19.7
6.085500	28.91	---	60.00	31.09	1000.0	9.000	N	19.7
13.290000	---	17.23	50.00	32.77	1000.0	9.000	N	19.9
13.996500	22.75	---	60.00	37.25	1000.0	9.000	N	19.9

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	<0.125	<21

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Conducted peak output power

Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.05	Pass
Middle channel 2441MHz	4.34	Pass
High channel 2480MHz	3.05	Pass

Bluetooth Mode π/4-DQPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.59	Pass
Middle channel 2441MHz	4.65	Pass
High channel 2480MHz	3.08	Pass

Bluetooth Mode 8DPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	3.41	Pass
Middle channel 2441MHz	4.43	Pass
High channel 2480MHz	3.15	Pass

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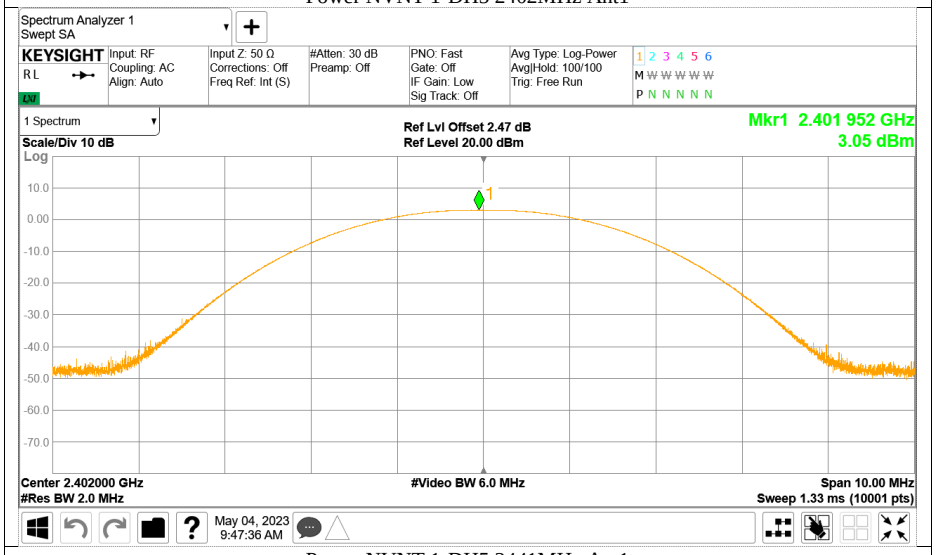
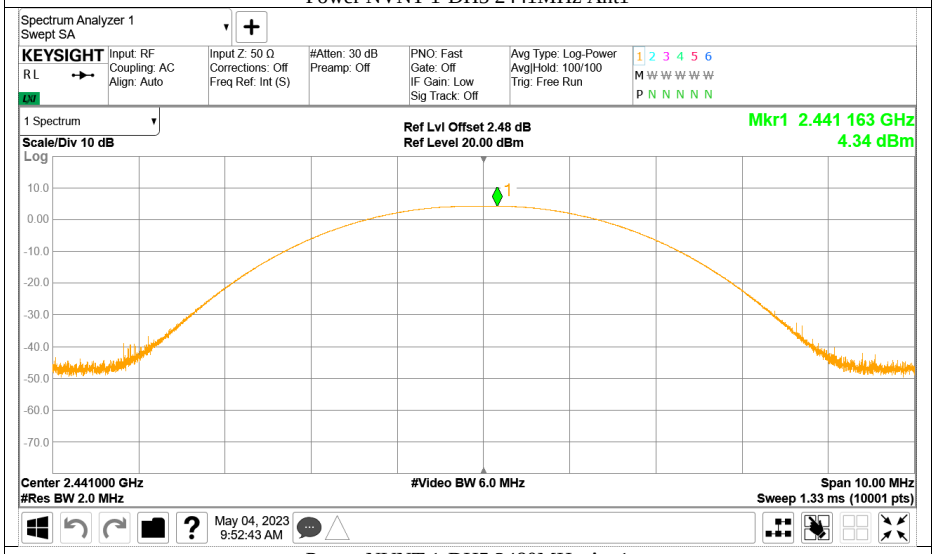
GFSK

Test Graphs

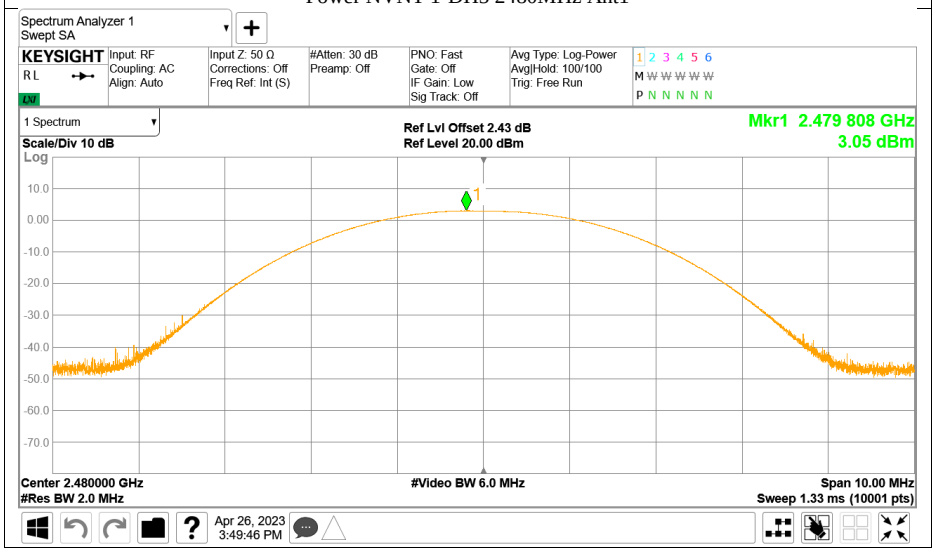
Power NVNT 1-DH5 2402MHz Ant1



Power NVNT 1-DH5 2441MHz Ant1



Power NVNT 1-DH5 2480MHz Ant1



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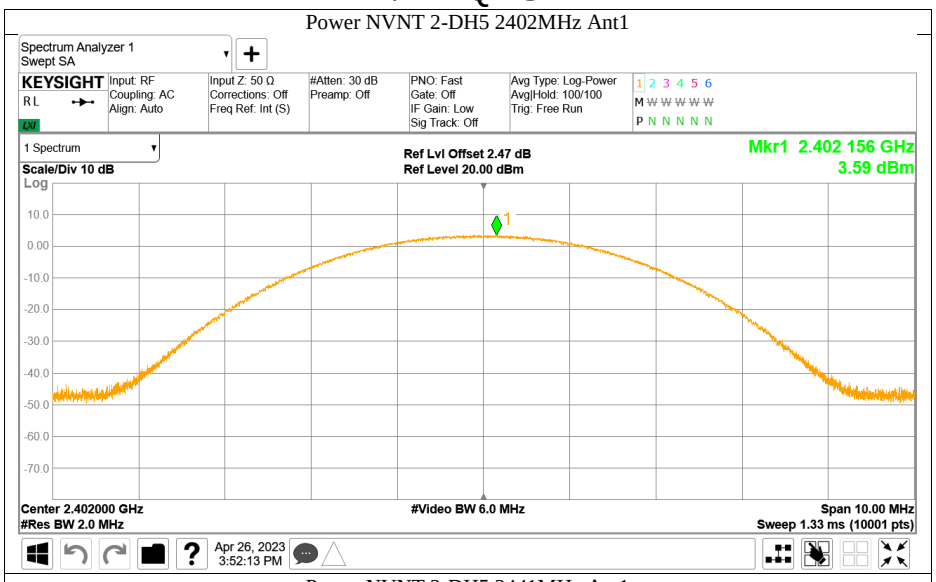
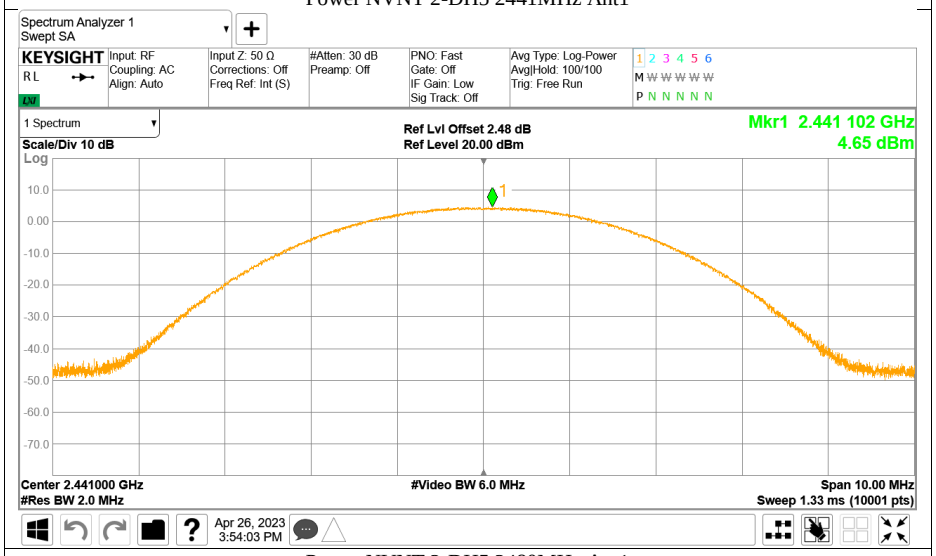
π/4-DQPSK

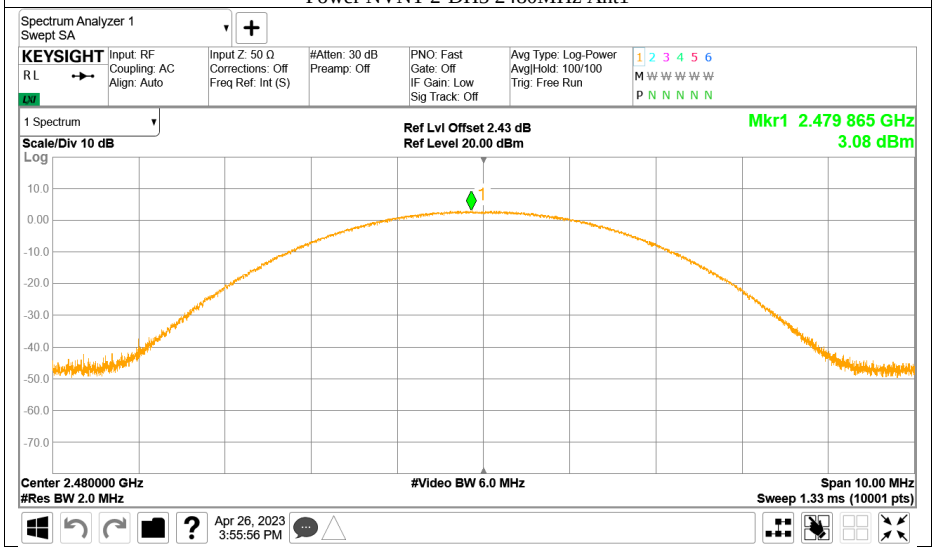
Power NVNT 2-DH5 2402MHz Ant1



Power NVNT 2-DH5 2441MHz Ant1



Power NVNT 2-DH5 2480MHz Ant1



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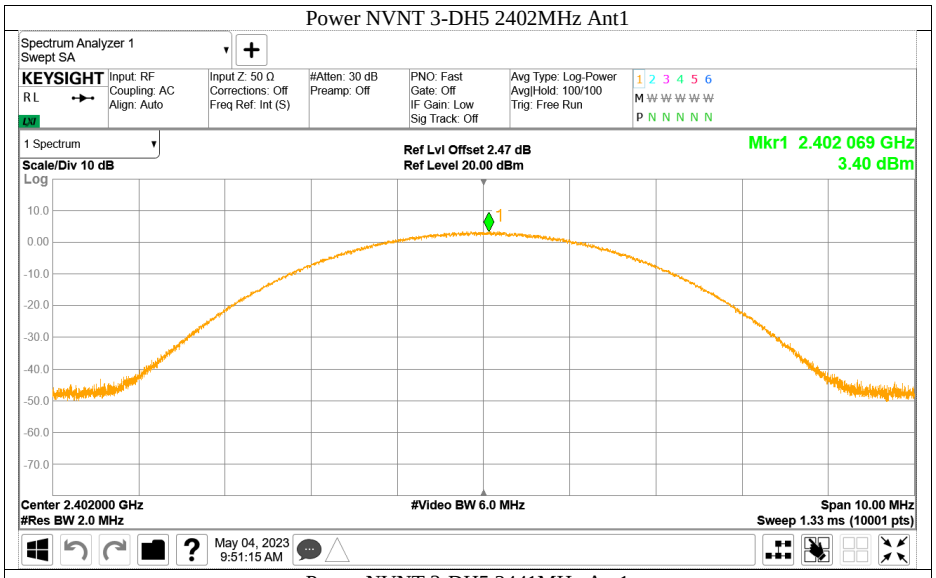
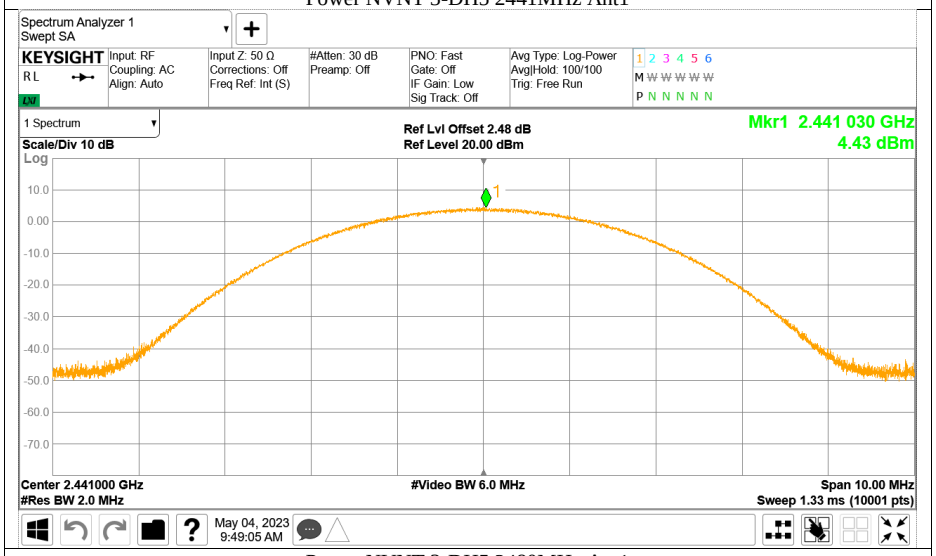
8DPSK

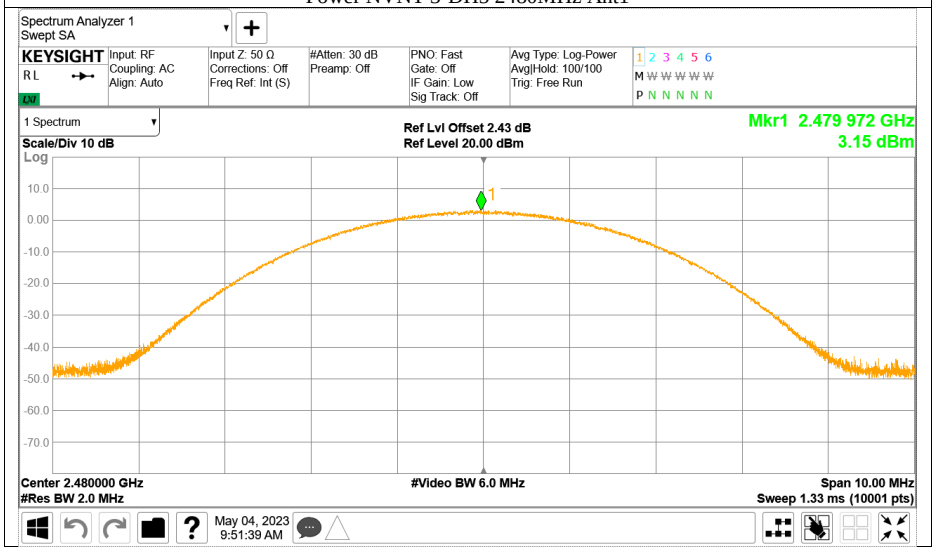
Power NVNT 3-DH5 2402MHz Ant1



Power NVNT 3-DH5 2441MHz Ant1



Power NVNT 3-DH5 2480MHz Ant1



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9.3 20 dB bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]
N/A

20 dB bandwidth

Bluetooth Mode GFSK Modulation test result

Frequency MHz	20 dB Bandwidth MHz	Limit kHz	Result
2402	0.955	--	Pass
2441	0.951	--	Pass
2480	0.945	--	Pass

Bluetooth Mode π/4-DQPSK Modulation test result

Frequency MHz	20 dB Bandwidth MHz	Limit kHz	Result
2402	1.28	--	Pass
2441	1.283	--	Pass
2480	1.273	--	Pass

Bluetooth Mode 8DPSK Modulation test result

Frequency MHz	20 dB Bandwidth MHz	Limit kHz	Result
2402	1.281	--	Pass
2441	1.299	--	Pass
2480	1.269	--	Pass

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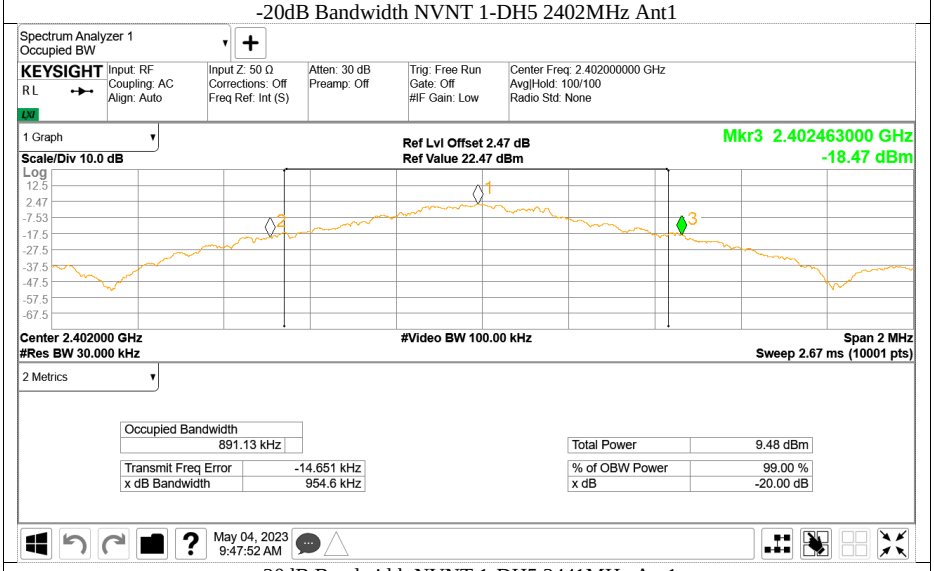
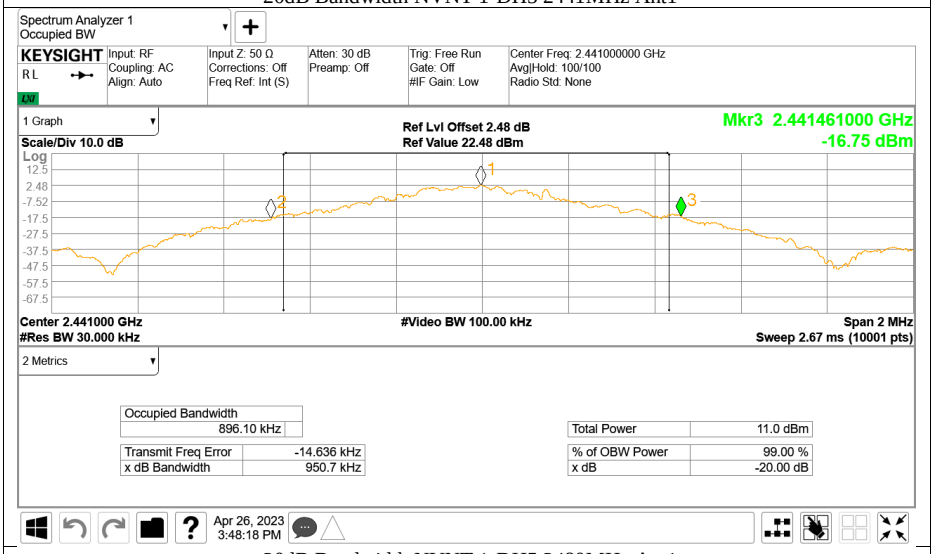
GFSK

Test Graphs

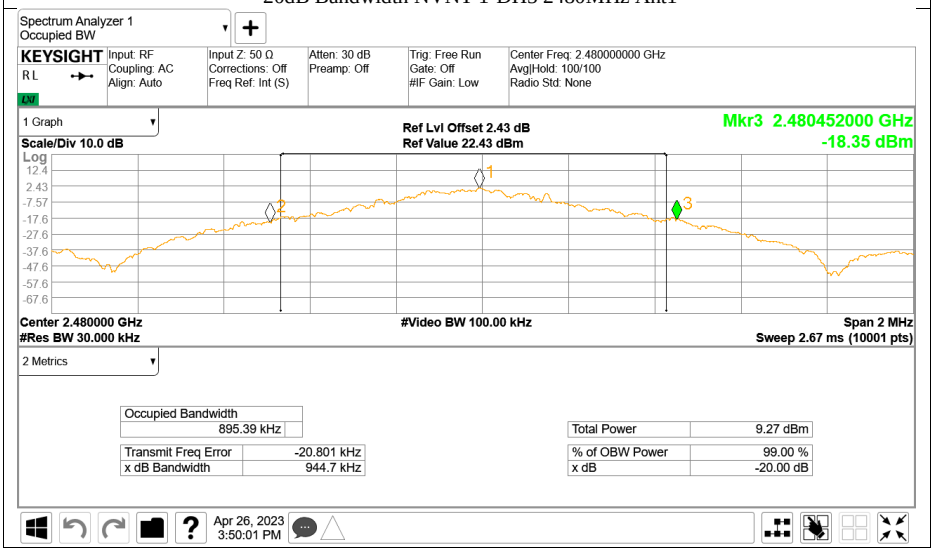
-20dB Bandwidth NVNT 1-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 1-DH5 2441MHz Ant1



-20dB Bandwidth NVNT 1-DH5 2480MHz Ant1



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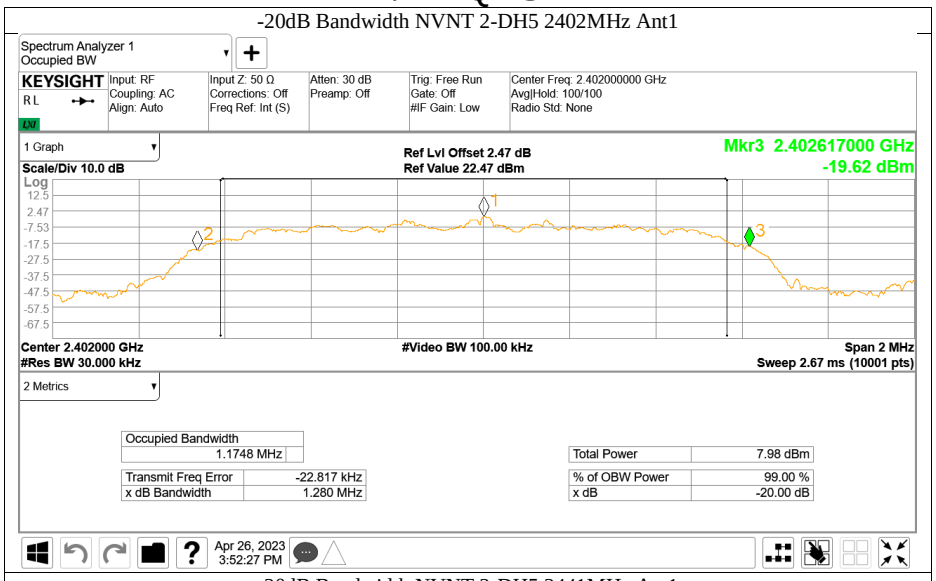
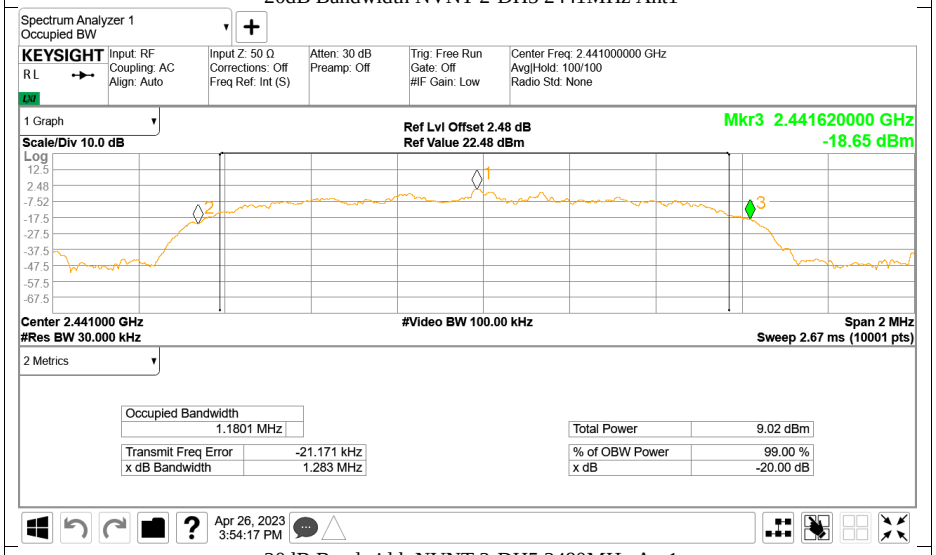
π/4-DQPSK

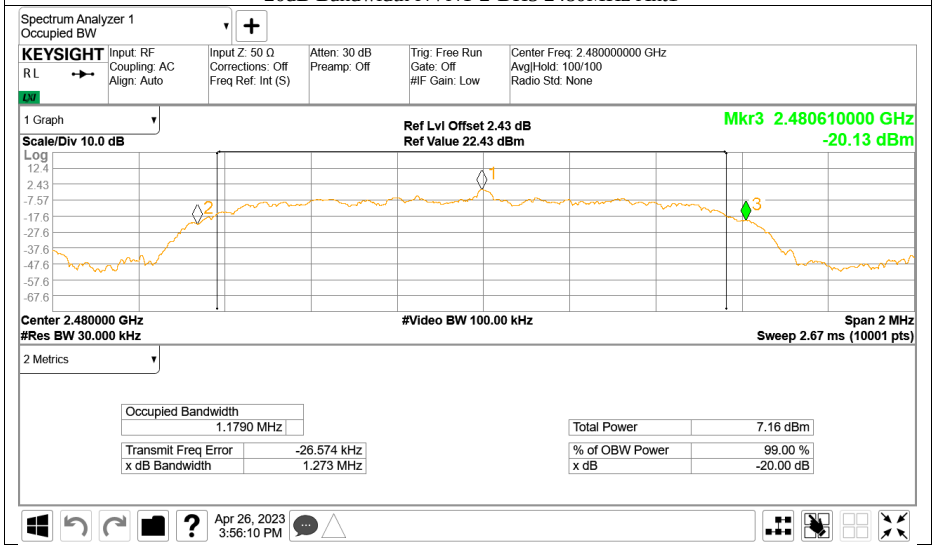
-20dB Bandwidth NVNT 2-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 2-DH5 2441MHz Ant1



-20dB Bandwidth NVNT 2-DH5 2480MHz Ant1



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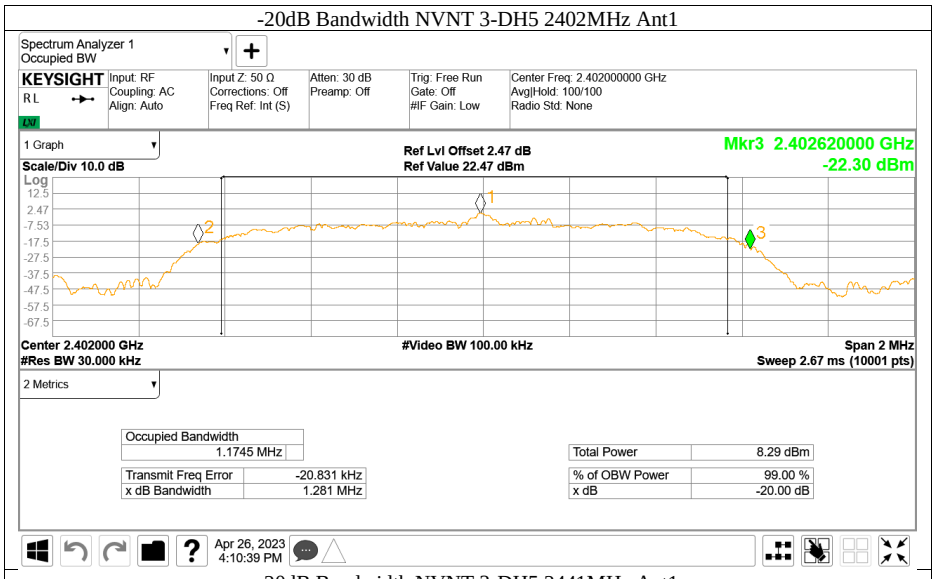
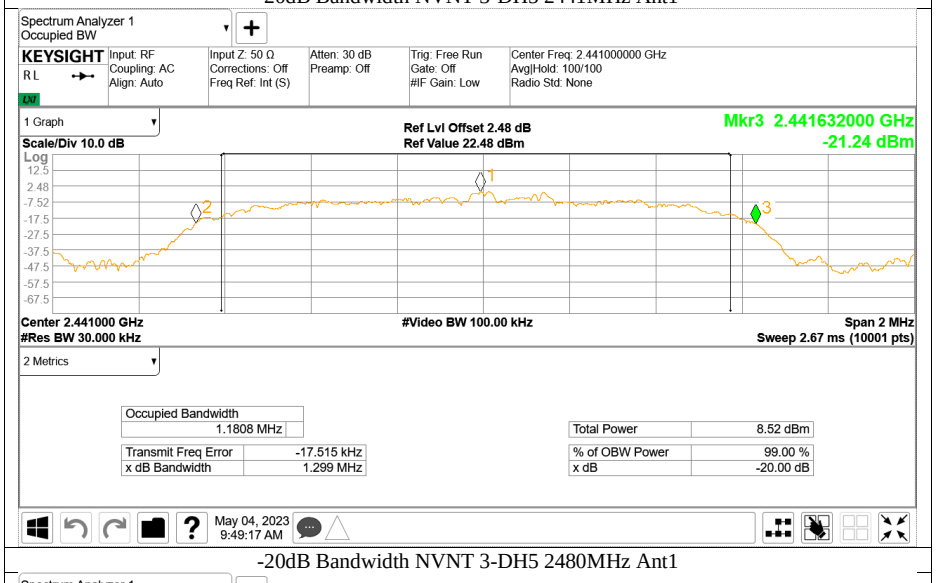
8DPSK

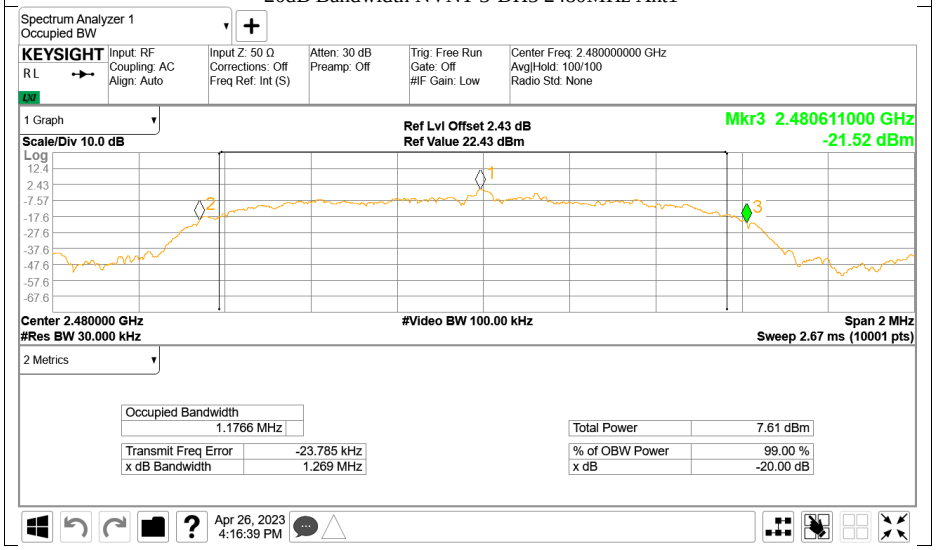
-20dB Bandwidth NVNT 3-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 3-DH5 2441MHz Ant1



-20dB Bandwidth NVNT 3-DH5 2480MHz Ant1



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9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
⩾25KHz or 2/3 of the 20 dB bandwidth which is greater

Limit

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	635 (GFSK)
2441	855(π/4-DQPSK)
2402	857(8DPSK)

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Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here GFSK, π/4-DQPSK and 8DPSK modulation mode (mid channel) was used to show compliance.

Modulation	Frequency	Carrier Frequency Separation	Result
	MHz	kHz	
GFSK	2441	952	Pass
π/4-DQPSK	2441	994	Pass
8DPSK	2441	1000	Pass

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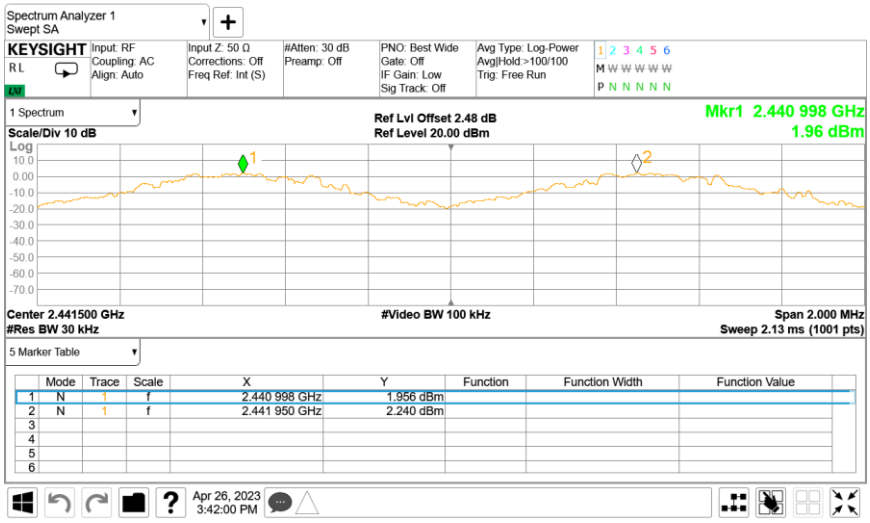
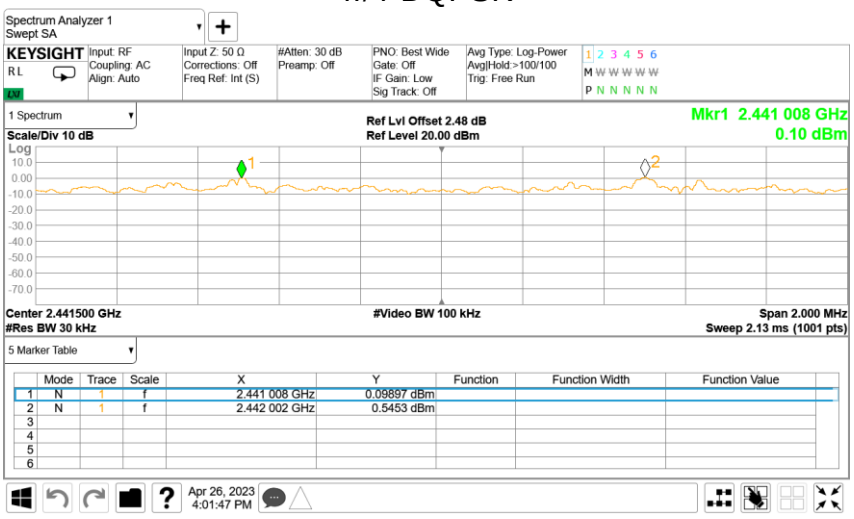
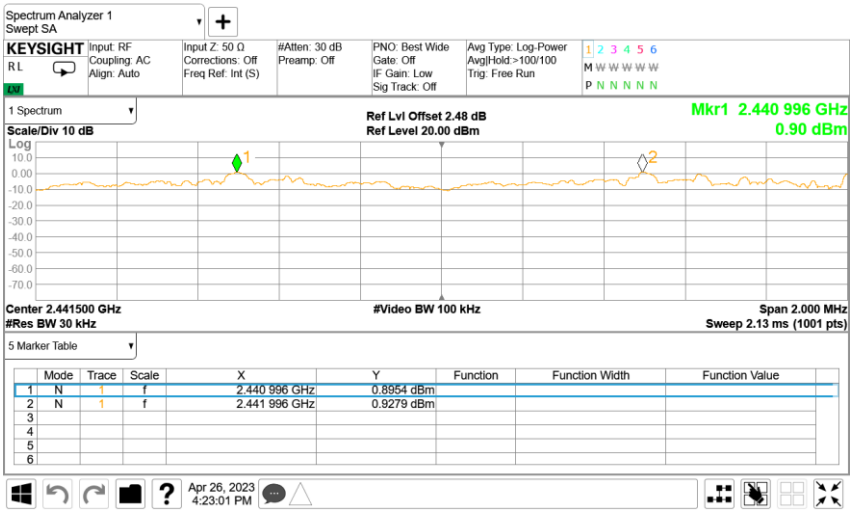
GFSK



π/4-DQPSK



8DPSK



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9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
⩾ 15

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Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
79	Pass

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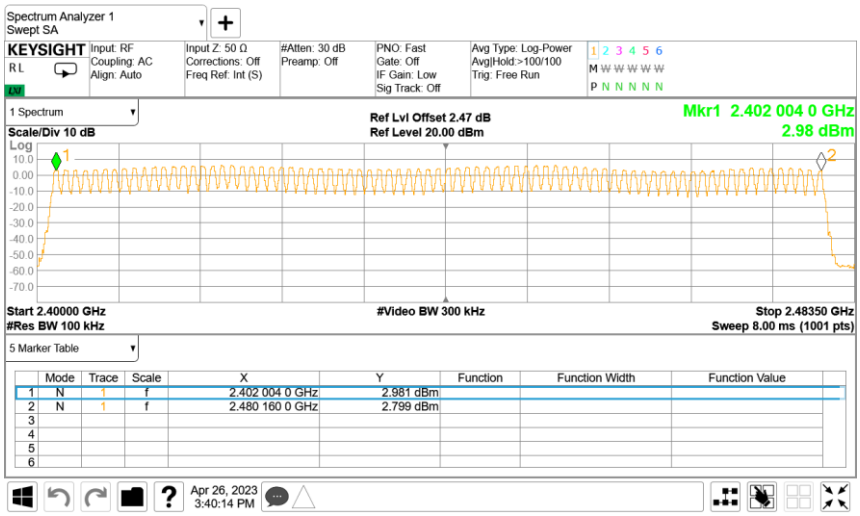
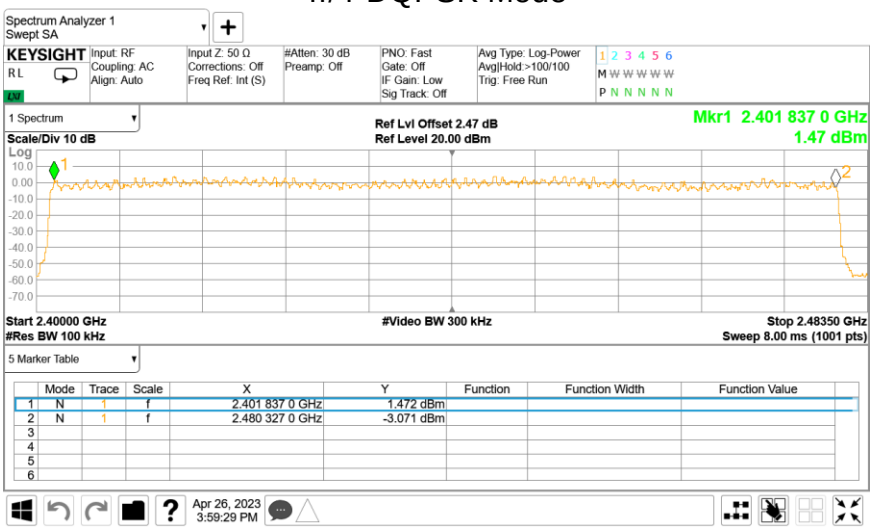
Test graph

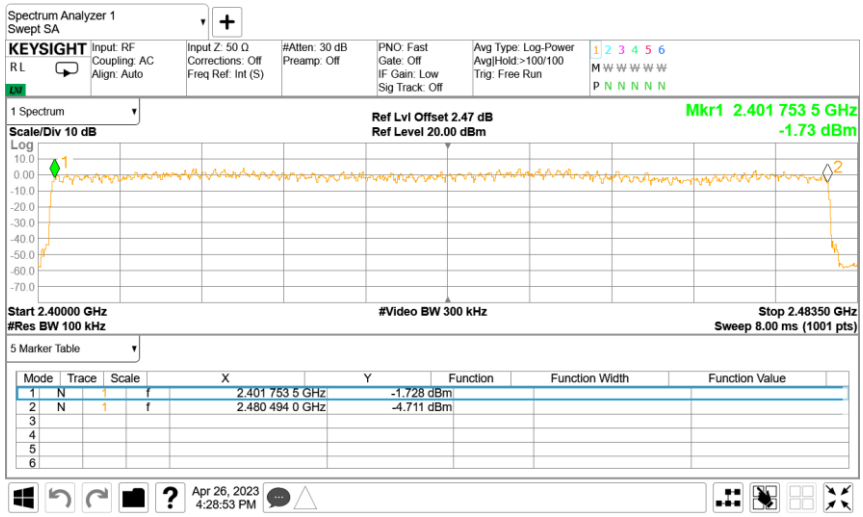
GFSK



π/4-DQPSK Mode



8DPSK Mode



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9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable. Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

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Dwell Time

The maximum dwell time shall be 0,4 s.
According to the Bluetooth Core Specification, the worse result (DH5 mode) was reported to show compliance.

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

Test Result

Modulation	Mode	Reading (ms)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	DH5	2.885	102	294.27	< 400	Pass
π/4-DQPSK	2DH5	2.887	109	314.68	< 400	Pass
8-DPSK	3DH5	2.889	111	320.68	< 400	Pass

GFSK Modulation

DH5

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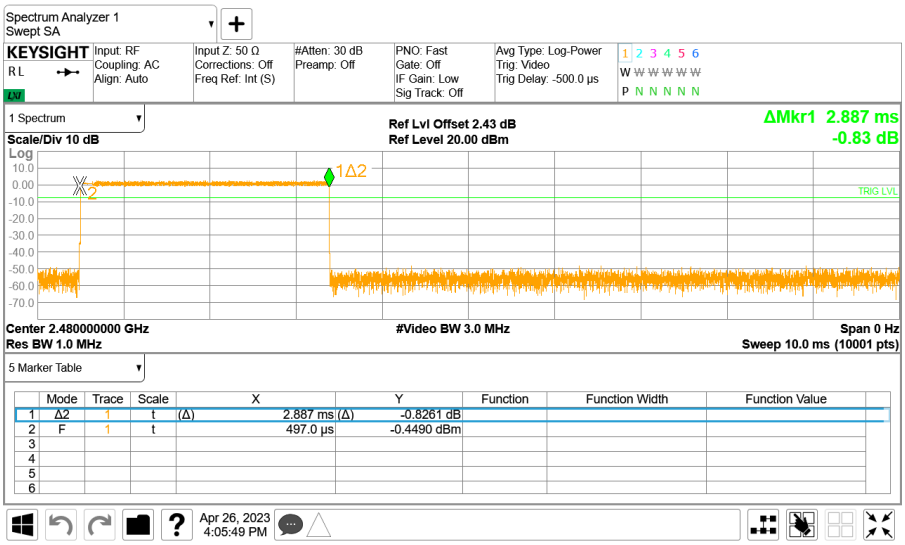
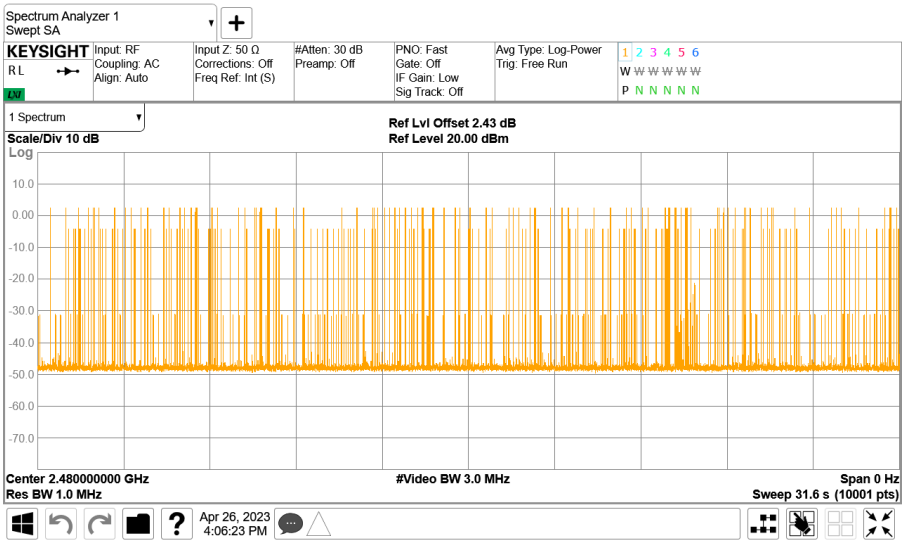
π/4-DQPSK Modulation

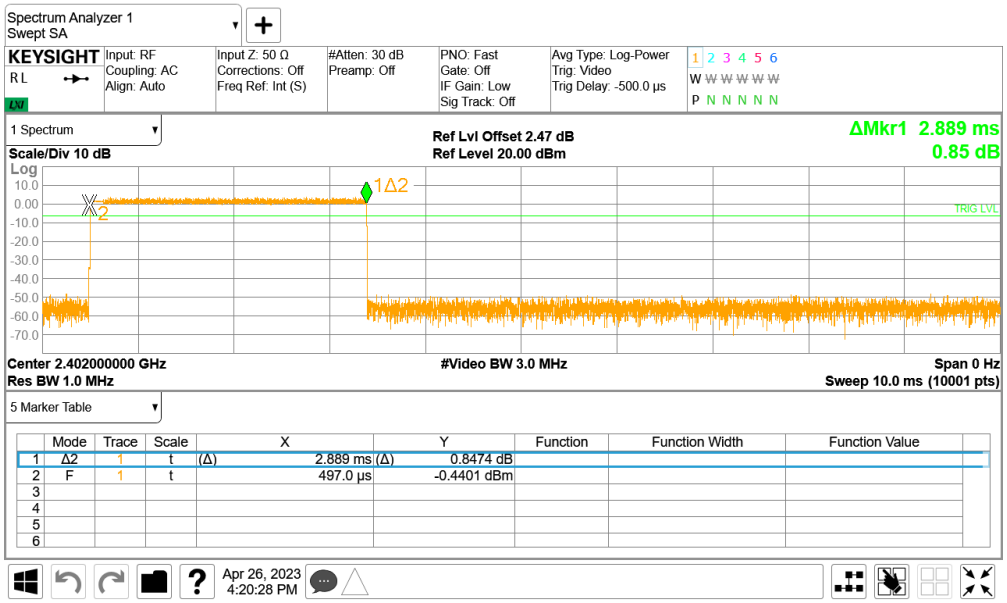
2DH5

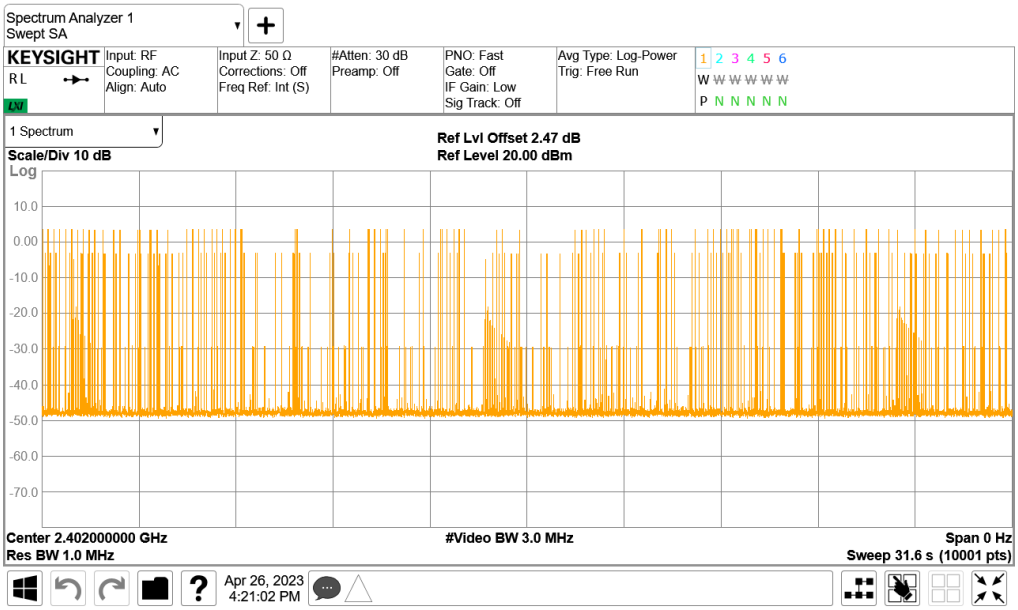




8-DPSK Modulation

3DH5





9.7 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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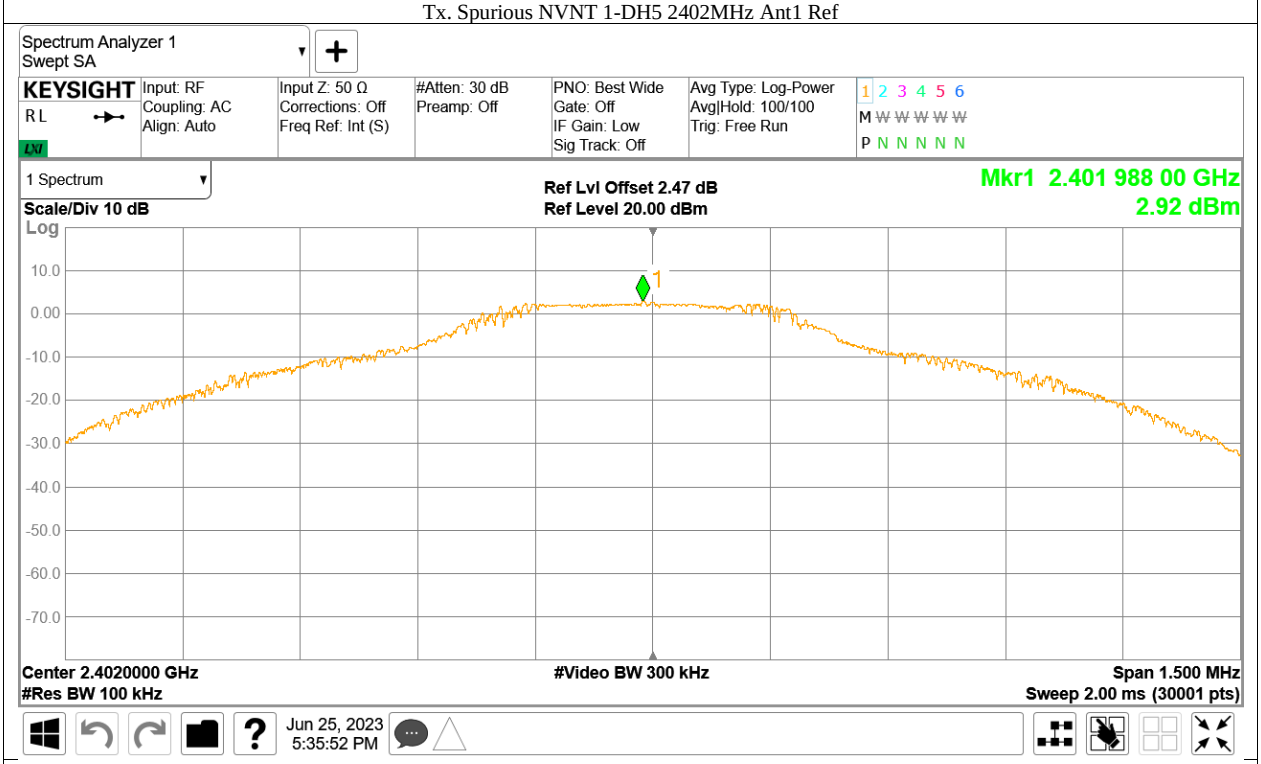
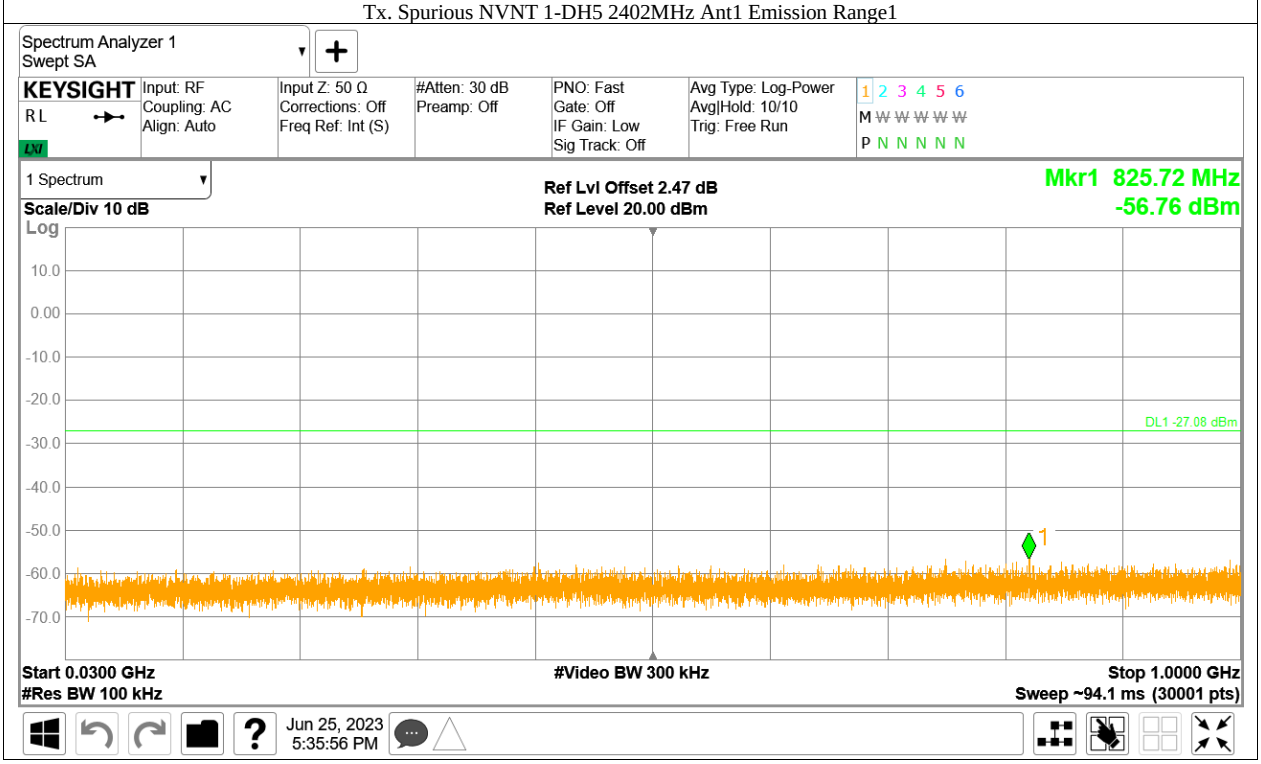
Spurious RF conducted emissions

Test Graphs

Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref



Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission Range1



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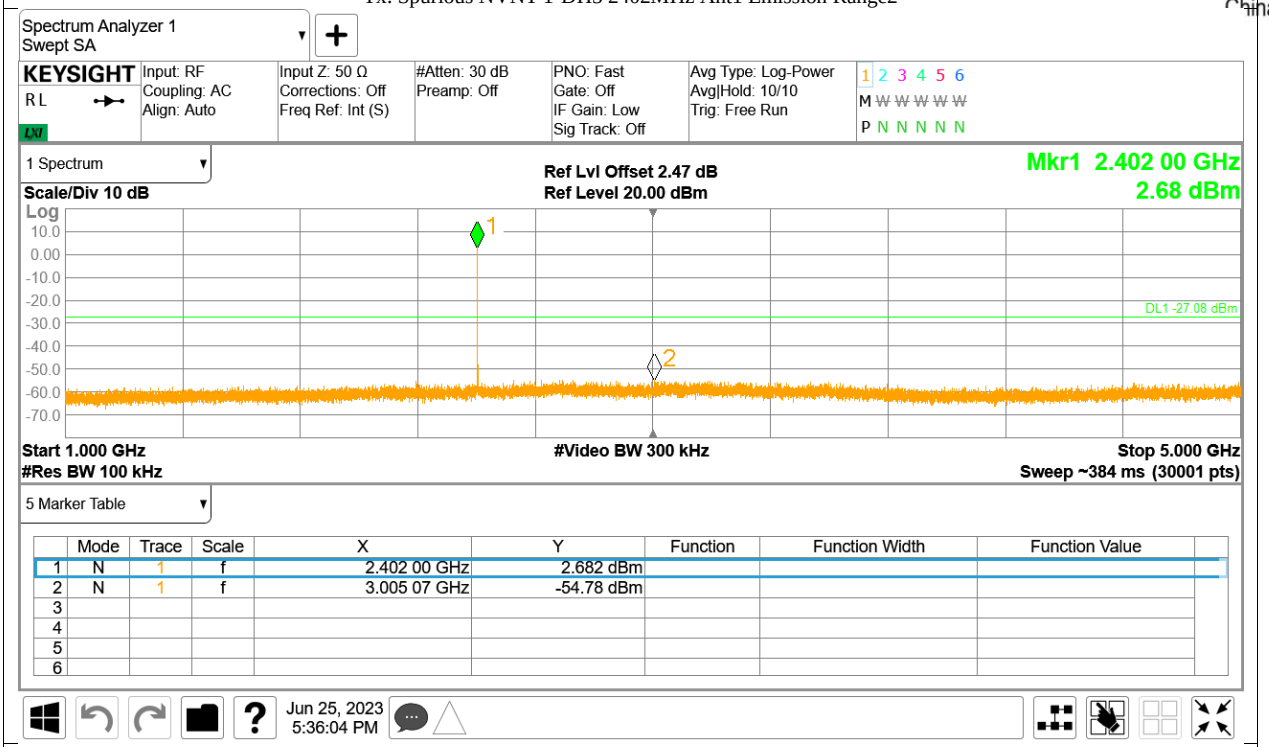
Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission Range2



Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission Range3