TEST REPORT

Report No.	:	AY0041769(5)	Date :	Jul 28, 2019
Application No.	:	LY022378(0)		
Applicant	:	KONDOR LIMITED CHRISTCHURCH BUSINESS PARK, RADAR WAY, BH23 4FL. UK		

Sample Description :

Sample Description	Model No.
AIRLINE ADAPTOR 2	KSBTAP2

Date Received	:	Jul 05, 2019
Test Period	:	Jul 07, 2019 to Jul 24, 2019
Test Requested	:	FCC Certification for FCC Part 15, subpart C
Test Method	:	47 CFR Part 15 (10-1-18 Edition), ANSI C63.10 – 2013, ANSI C63.4 – 2014
Test Engineer	:	Mr. Leung Shu Kan, Ken
Conclusion	:	The submitted sample was found to comply with technical requirement of FCC Part 15 Subpart C, section 15.247.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____ Page 1 of 71

Mr. WONG Lap-pong, Andrew
Manager

FCC ID: 2ADFF-KSBTAP2

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RESULT SUMMARY

Test Item	FCC Requirement	Test Method	Result
Number of hopping frequency	§15.247(a)(1)(iii)	ANSI C63.10 §7.8.3	PASS
Band-edge	§15.247(d)	ANSI C63.10 §7.8.6 and 6.10	PASS
Carrier frequency separation	§15.247(a)	ANSI C63.10 §7.8.2	PASS
Time of occupancy (dwell time)	§15.247(a)	ANSI C63.10 §7.8.4	PASS
Output power	§15.247(b)(1)	ANSI C63.10 §7.8.5	PASS
Occupied bandwidth	§15.247(a)	ANSI C63.10 §7.8.7 and 6.9.2	PASS
Conducted spurious emission (Transmitter)	§15.247(d)	ANSI C63.10 §7.8.8, and §11.12.2.1	PASS
Radiated spurious emission (Transmitter)	§15.247(d)	ANSI C63.10 §6.4 – 6.6	PASS
Radiated spurious emission (Receiver)	§15.109(a)	ANSI C63.4 §8.3	PASS
Conducted emission on AC mains	§15.207(a)	ANSI C63.4 §7.3	PASS
Frequency Hopping System Requirement	§15.247(a)(1), (g), (h)	N/A	PASS

FCC ID: 2ADFF-KSBTAP2

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2
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1 Product Information

1.1 General Information

Product Descriptin:	Model:
AIRLINE ADAPTOR 2	KSBTAP2

Primary function	:	Transmit the audio signal through Bluetooth communication from a audio player
Power supply	:	DC 3.7V (Li-ion Rechargeable battery) DC 5.0V (micro-usb input)
RF related function	:	Bluetooth non-BLE communication
Electric Accessories sold with	:	Nil
Interconnection cable associated sold with	:	82mm length USB to micro-USB cable (head to head)
Operating condition	:	Not specified
Model difference	:	Not applicable
Remark	:	N/A

1.2 Technical Information

Operating Frequency	:	2402 – 2480MHz
Digital Modulation	:	FHSS
Modulation	:	GFSK, π/4DQPSK, 8DPSK
Number of Channel	:	79
Channel Bandwidth	:	1.0MHz
Occupied Bandwidth	:	1.20MHz
Signal Type	:	Data
Number of Antenna	:	One
Antenna Type	:	PCB Type
Antenna Gain	:	2.0dBi
Rated Input Voltage	:	DC3.7V (Li-ion rechargeable battery DC5.0V (micro-usb input)
RF Technology Used	:	Bluetooth 4.1+EDR (non BLE)
Simplex or Duplex	:	Half-duplex
Adaptivity	:	FHSS adaptivity

FCC ID: 2ADFF-KSBTAP2

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1.3 Associated Electric Accessories Information

N/A

1.4 Associated Cables

Cable Type	Length	Shielding	Ferrite attached
USB to micro USB cable	82mm	No	No

2.0 Equipment Units Tested (EUT)

Product Description	:	AIRLINE ADAPTOR
Model	:	KSBTAP2
Serial No.	:	Not labelled
Sample Type	:	Production sample and engineering sample
Sample No.	:	RY034755-003(5) and RY034755-0047(6)
Rationale of selection	:	Only one model model

3.0 Location of Test Facility

CMA Industrial Development Foundation Ltd.
Room 1302, Yan Hing Centre,
9-13 Wong Chuk Yeung,
Fo Tan, Shatin,
New Territories
Hong Kong.

FCC Accredited Lab (Designation Number: HK0004)

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4.0 List of test equipment, supporting equipment and cables

4.1 Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	Rohde & Schwarz	ESCS30	100001	29 Mar 2020	1Year
Spectrum Analyzer	R&S	FSV40	100964	11 Sep 2019	1Year
Spectrum Analyzer	Rohde & Schwarz	FSP30	100628	26 Mar 2020	1Year
Broadband Antenna	Schaffner	CBL6112B	2692	27 Mar 2021	2Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2020	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	21 Dec 2020	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	21 Dec 2020	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	01 Aug 2020	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	01 Aug 2020	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	16 May 2020	1Year
Coaxial Cable	Suhner	RG 214/U	N/A	16 May 2020	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	21 Dec 2019	1Year
LISN	Rohde & Schwarz	ENV216	101323	22 Jan 2020	1Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	23 Oct 2019	1Year
Rohde & Schwarz TS8997 Testing System					
Spectrum Analyzer	Rohde & Schwarz	FSV 40	101190	08 Aug 2019	1Year
OSP	Rohde & Schwarz	OSP	OSP120 V02	08 Aug 2019	1Year

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4.2 Supporting equipment

Equipment Name	Manufacturer	Model	Serial	Provided by
Control board*	CSR	CSR USB-SPI	Not labelled	Applicant
USB Charger	Apple	A1299	Not labelled	CMA

Remark: *only used for configure engineering mode

4.3 Cables

Cable Type	Length	Shielding	Ferrite used	Provided by
USB Cable*	1m	Not shielded	No	CMA

Remark: *only used for configure engineering mode

4.4 Software

Software Name	Version	Function	Provided by
CSR Bluesuite BlueTest3*	V2.6.8	Control the engineering mode of the device	Applicant

Remark: *only used for configure engineering mode

5.0 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Radiated emissions

Frequency	Uncertainty (U_{lab})
30MHz ~ 200MHz (Horizontal)	4.59dB
30MHz ~ 200MHz (Vertical)	4.49dB
200MHz ~1000MHz (Horizontal)	4.94dB
200MHz ~1000MHz (Vertical)	4.97dB
1GHz ~6GHz	4.52dB
6GHz ~18GHz	4.58dB
18GHz~40GHz	4.66dB

Line-conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz~30MHz	2.80dB

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6.0 Measurement

6.1 General Test condition

Temperature	:	28.9°C
Test Voltage	:	DC 3.7V and AC 120V
Humidity	:	48.2%
Atmosphere Pressure	:	100.2kPa

6.2 Number of hopping frequency

6.2.1 Measurement

Requirement	:	FCC Part 15 § 15.247(a)(1)(iii)
Measuring procedure	:	ANSI C63.10:2013, clause 7.8.3
Span	:	83.5MHz
RBW	:	300kHz
VBW	:	300kHz
Frequency range	:	2.4000 – 2.4835GHz
Modulation tested	:	GFSK
Packet Type tested	:	DH5
Additional measuring procedure	:	Nil

6.2.2 Final Result

No. of hopping channels measured	Limit	Result	Worst case mode
79	≥ 15	PASS	GFSK and DH5

Remark: Detail test result and equipment setting refer to appendix A, A4

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6.3 Band-edge measurement

6.3.1 Measurement

Requirement	:	FCC Part 15 §15.247(d)
Measuring procedure	:	ANSI C63.10:2013, section 7.8.6 and 6.10
Hopping mode	:	Enabled and Disable
RBW	:	100kHz
VBW	:	300kHz
Frequency range	:	2310 – 2400MHz and 2483.5 – 2500MHz
Modulation tested	:	GFSK, π/4DQPSK, 8DPSK
Packet Type tested	:	DH5, 2DH5, 3DH5
Channel tested for non-hopping mode	:	2402MHz for lowed band edge and 2480MHz for higher band edge
Additional measuring procedure	:	For lower band edge (2400MHz) 1. Using the "Measurement 1" setting shown below the scan plot within the frequency span from 2400 – 2483.5MHz to measure the maximum peak value of fundamental 2. Using the "Measurement 2" setting shown below the scan plot within the freqeunc y span from 2310 – 2400MHz to measure the bandedge reading 3. Compare that reading in procedure with the limit which equal to the measured maximum peak in procedure 1minus 20dB For Upper bandedge (2483.5MHz) 1. Using the "Measurement 1" setting shown below the scan plot within the frequency span from 2400 – 2483.5MHz to measure the maximum peak value of fundamental 2. Using the "Measurement 2" setting shown below the scan plot within the freqeunc y span from 2483.5 – 2500MHz to measure the bandedge reading 3. Compare that reading in procedure with the limit which equal to the measured maximum peak in procedure 1minus 20dB

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6.3.2 Final Result

Bandedge frequency for lower bandedge (Worst Case)	Worst case (dBc)[2]	Detector	Limit[1] (dBc)	Result	Worst case
2399.62500	41.8	Peak	≥20.0	PASS	GFSK and DH5
Bandedge frequency for higher bandedge (Worst Case)	Worst case in (dBc)[2]	Detector	Limit[1]	Result	Worst case
2483.525000	56.1	Peak	≥20.0	PASS	GFSK and DH5

Remark: 1) The limit is based on the transmitter demonstrated compliance with peak conducted power limit on section 6.4.2 of this report.
2) The Worst case dBc is the peak values measured in procedure 1 minus the worst case bandedge emission
3) Detail test result and equipment setting refer to appendix A, A5-8, A19-20, A35-36

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6.4 Carrier Frequency Separation

6.4.1 Measurement

Requirement	:	FCC Part 15 §15.247(a)
Measuring procedure	:	ANSI C63.10:2013, section 7.8.2
Hopping mode	:	Enabled
RBW	:	300kHz
VBW	:	300kHz
Frequency range	:	2401-2404MHz, 2440-2443MHz, 2478-2481MHz
Modulation tested	:	GFSK[2]
Packet Type tested	:	DH5[2]
Additional measuring procedure	:	Nil
Remark	:	1) Since the measured value is more than 1.5 times of limit, only middle channel is measured. 2) Since the modulation and packet type does not affect the channel separation, GFSK and DH5 are selected as represented modulation and data type

6.4.2 Final Result

Carrier Frequency Separation	Limit[1]	Result	Worst case mode
1.009900MHz	0.846667MHz	PASS	GFSK and DH5

Remark: 1) Limit is 2/3 of the 20dB bandwidth in section 6.7 and conducted peak power is less than 0.125W in section 6.6 of this report.
2) Detail test result and equipment setting refer to appendix A, A37-39

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6.5 Time of occupancy (dwell time)

6.5.1 Measurement

Requirement	:	FCC Part 15 §15.247(a)
Measuring procedure	:	ANSI C63.10:2013, section 7.8.4
Hopping mode	:	Disable
RBW	:	500kHz
VBW	:	1MHz
Modulation tested	:	GFSK[3]
Packet Type tested	:	DH1, DH3, DH5
Channel tested for non-hopping mode	:	2441MHz
Additional measuring procedure	:	1) Setup engineering sample to channel 2441MHz and DH1 packet size to perform the measurement according to ANSI C63.10, section 7.8.4 2) Find the worst case packet size 3) Repeat procedure1 with the worst case packet size for channel 2402MHz and 2480MHz
Remark	:	1) Since the modulation does not affect the dwell time, GFSK is selected as represented modulation.

6.5.2 Final Result

Dwell time (worst case)	Limit	Result	Worst case mode
313.000ms	≤400ms	PASS	GFSK and DH5

Remark: 1) Detail test result and equipment setting refer to appendix A, A9-11

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6.6 Output Power

6.6.1 Measurement

Requirement	:	FCC Part 15 §15.247(b) (1)
Measuring procedure	:	ANSI C63.10:2013, section 7.8.5
Hopping mode	:	Disable
Modulation tested	:	GFSK, π/4DQPSK, 8DPSK
Packet Type tested	:	DH5[1]
Channel tested for non-hopping mode	:	2402MHz, 2441MHz, 2480MHz
Additional measuring procedure	:	Nil
Remark	:	1) Since the packet size does not affect the output power, DH5 is selected as represented packet size.

6.6.2 Final Result

(a) Maximum peak conducted outputpwer

Maximum peak conducted output power	Limit(s)[1]	Result	Modulation
3.0dBm	≤21.0dBm	PASS	GFSK
3.0dBm	≤21.0dBm	PASS	π/4DQPSK
3.0dBm	≤21.0dBm	PASS	8DPSK

Remark: 1) 0.125W (21.0dBm) limit is used for 2/3 20dB bandwidth requirement for channel separation.
2) Detail test result and equipment setting refer to appendix A, A15, A24, A31

(b) Maximum peak e.i.r.p.

Maximum peak e.i.r.p.[1]	Limit(s)[2]	Result	Modulation
5.0dBm	≤27.0dBm	PASS	GFSK
5.0dBm	≤27.0dBm	PASS	π/4DQPSK
5.0dBm	≤27.0dBm	PASS	8DPSK

Remark: 1) Maximum peak e.i.r.p. = Maximum peak conducted output power + antenna gain (dBi)
2) Maximum peak e.i.r.p. limit = Maximum peak conducted ouput power limit + 6dBi
3) Detail test result and equipment setting refer to appendix A, A15, A24, A31

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6.7 Occupied Bandwidth

6.7.1 Measurement

Requirement	:	FCC Part 15 §15.247(a)
Measuring procedure	:	ANSI C63.10:2013, section 7.8.7 and 6.9.2
Hopping mode	:	Disable
Modulation tested	:	GFSK, π/4DQPSK, 8DPSK
Packet Type tested	:	DH5[1]
Channel tested for non-hopping mode	:	2402MHz, 2441MHz, 2480MHz
Additional measuring procedure	:	Nil
Remark	:	1) Since the packet size does not affect the bandwidth, DH5 is selected as represented packet size.

6.7.2 Final Result

20dB bandwidth	99% OBW	Modulation
960.0kHz	860.0kHz	GFSK
1250.0kHz	1190.0kHz	π/4DQPSK
1270.0kHz	1200.0kHz	8DPSK

Remark: 1) Detail test result and equipment setting refer to appendix A, A12-14, A16-18, A21-23, A25-30, A32-34.

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6.8 Conducted Spurious emission (Transmitter)

6.8.1 Measurement

Requirement	:	FCC Part 15 §15.247(d)
Measuring procedure	:	ANSI C63.10:2013, section 5.5, 5.6, 7.8.8 and 11.12.2.1
Hopping mode	:	Disable
RBW	:	Refer to pre-measurement and final measurement setting
Detector	:	Refer to pre-measurement and final measurement setting
Modulation tested	:	GFSK[1]
Packet Type tested	:	DH5[2]
Channel tested for non-hopping mode	:	
Additional measuring procedure	:	1) Setup engineering sample to channel 2402MHz to perform the measurement according to ANSI C63.10, section 7.8.8 with pre-measurement setting 2) If the pre-measurement is over the limit, the final measurement is performed for the specific frequency according to fina measurement setting or restricted band frequency 3) For non-restricted band frequency, peak detector and 100kHz RBW will be used for final measurement. 4) Repeat the procedure 1 to 3 for channel frequency of 2441MHz and 2480MHz
Remark	:	1) Since the GFSK generates a higher SPD with power level, GFSK is selected as represented modulation for testing. 2) Since DH5 generates a higher dwell time, DH5 is selected as respresentative packet size for testing

6.8.2 Final Result

Worst case spurious emission frequency	Worst case spurious emission power[1]	Limit[2]	Margin	Result	Worst case mode
2399.945000MHz	-38.5dBm	-23.2dBm	-15.3dB	PASS	GFSK and DH5

Remark: 1) Spurious emission power = measured conducted power + antnenna gain(dBi) +ground reflection factor according to ANSI C63.10 section 11.12.2.2 for restricted band emission.
2) For restricted band emission, limit = restricted band field strength limit (dBuV/m) – 9.54 + 104.75dB according to ANSI C63.10 section 11.12.2.2 For non-restricted band , limit = SPD/100kHz – 20dB.
3) Detail test result and equipment setting refer to appendix A, A40-45

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6.9 Radiated Spurious emission (Transmitter)

6.9.1 Measurement

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 0.4m and 0.8m high above the ground for below 1GHz measurement and 1.5m high above the ground for above 1GHz measurement. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 300MHz, biconical antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground. Same procedure for frequency 300MHz to 1000MHz but Log-periodic antenna is used for final measurements.

For above 1GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three X, Y, Z orthogonal to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

The Frequencies from fundamental up to the tenth harmonics were investigated, and emissions more 20dB below limit were not reported.

Bluetooth hopping + charging mode with GFSK modulation and DH5 packet type are selected as worst case mode for spurious radiated emission test from cabinet.

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6.9.2 Final Result

a) Test mode: Bluetooth + charging mode

Polarization	Frequency (MHz)	Reading at 3m (dBμV)	Transducer Factor (dB/m)	Field Strength at 3m[1] (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector (PK/ QP/AV)
V	77.559	9.9	9.8	19.7	40.0	-20.3	QP
H	123.206	11.6	12.6	24.2	43.5	-19.3	QP
V	134.617	11.3	12.6	23.9	43.5	-19.6	QP
H	203.069	8.8	14.5	23.3	43.5	-20.2	QP
H	247.936	11.6	14.5	26.1	46.0	-19.9	QP
H	341.684	17.6	16.9	34.5	46.0	-11.5	QP
V	342.540	16.0	16.9	32.9	46.0	-13.1	QP
H	2400.000	64.0	-4.7	59.3	74.0	-14.7	Peak
H	2400.000	32.5	-4.7	27.8	54.0	-26.2	Average
H	2483.500	64.2	-4.7	59.5	74.0	-14.5	Peak
H	2483.500	31.1	-4.7	26.4	54.0	-27.6	Average
V	4803.865	58.3	2.3	60.6	74.0	-13.4	Peak
V	4803.889	27.9	2.3	30.2	54.0	-23.8	Average
H	4882.019	58.6	2.3	60.9	74.0	-13.1	Peak
H	4882.135	25.8	2.3	28.1	54.0	-25.9	Average
H	4959.808	61.0	2.8	63.8	74.0	-10.2	Peak
H	4960.213	30.0	2.8	32.8	54.0	-21.2	Average
V	7205.842	46.3	9.6	55.9	74.0	-18.1	Peak
V	7206.152	22.0	9.6	31.6	54.0	-22.4	Average
H	7323.017	52.9	9.6	62.5	74.0	-11.5	Peak
H	7323.228	26.3	9.6	35.9	54.0	-18.1	Average
H	7440.100	53.1	9.6	62.7	74.0	-11.3	Peak
H	7440.102	22.9	9.6	32.5	54.0	-21.5	Average

Remark: 1) Field Strength = Reading + transducer factor.
2) Other emission with more than 20dB margin are not reported in this report.

FCC ID: 2ADFF-KSBTAP2

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2
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6.10 Radiated Spurious emission (other mode)

6.10.1 Measurement

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 0.4m and 0.8m high above the ground for below 1GHz measurement and 1.5m high above the ground for above 1GHz measurement. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 300MHz, biconical antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground. Same procedure for frequency 300MHz to 1000MHz but Log-periodic antenna is used for final measurements.

For above 1GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three X, Y, Z orthogonal to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

The Frequencies from fundamental up to the tenth harmonics were investigated, and emissions more 20dB below limit were not reported.

Receiving mode are selected for spurious radiated emission test from cabinet.

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6.10.2 Final Result

Test mode: Receiving mode

Polarization	Frequency (MHz)	Reading at 3m (dBμV)	Transducer Factor (dB/m)	Field Strength at 3m[1] (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector (PK/ QP/AV)
H	56.192	14.2	10.4	24.6	40.0	-15.4	QP
V	90.909	16.8	10.2	27.0	43.5	-16.5	QP
H	111.510	19.3	11.2	30.5	43.5	-13.0	QP
V	149.624	16.0	13.5	29.5	43.5	-14.0	QP
V	182.763	13.3	15.3	28.6	43.5	-14.9	QP
H	216.091	14.6	14.5	29.1	46.0	-16.9	QP
H	248.047	18.5	14.5	33.0	46.0	-13.0	QP

Remark: 1) Field Strength = Reading + transducer factor.
2) Other emission with more than 20dB margin are not reported in this report.

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6.11 Conducted Emission

6.11.1 Measurement

Requirement	:	FCC Part 15 §15.207(a)
Measuring procedure	:	ANSI C63.4:2014, section 7.3
Test mode	:	Bluetooth+charging
RBW	:	9kHz
VBW	:	30kHz
Modulation tested	:	GFSK
Packet Type tested	:	DH5
Additional measuring procedure	:	Nil
Remark	:	Nil

6.11.2 Final Result

Worst case conducted emission frequency	Worst case conducted emission	Limit	Margin	Detector	Lines	Worst case mode	Result
17.4965MHz	39.53dBµV	50.00dBµV	-10.47dB	AV	N	Bluetooth +charging	PASS

Remark: 1) Detail test result and equipment setting refer to appendix A, A46-47

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7.0 Frequency Hopping System Requirement

Test Requirement: Section 15.247(a)(1), (g), (h)

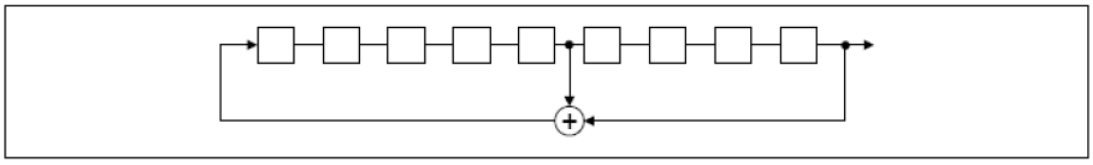
The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom order list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmssions bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1)
According to Bluetooth Core Specification, 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 stage: 9
- Length of pseudorandom sequence: 2^9-1=511 bits
- Longest sequence of zero: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

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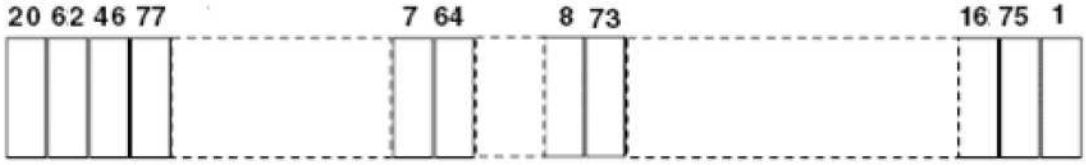
An example of Pseudorandom Frequency Hopping Sequence as following:



Each frequency used equally on the average by each transmitter.
According to Bluetooth Core Specification, Bluetooth receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any Bluetooth transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g)
According to Bluetooth Core Specification, the Bluetooth system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short brust transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h)
According to Bluetooth Core specification, the Bluetooth system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

According to the Bluetooth Core specification, the Bluetooth system is designed not have the ability to coordinate with other FHSS System in effort to avoid the simultaneous occupancy of the individual hopping frequencies by multiple transmitter.

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8.0 External photo, Internal Photo and Test configuration Photo

The External Photo, Internal Photo and Test Configuration Photo associated with this report for the tested product are saved in separated pdf file listed in the following

File content	File name
External Photo	2AFF-KSBTAP2 External photo.pdf
Internal Photo	2AFF-KSBTAP2 Internal photo.pdf
Test Configuration Photo	2AFF-KSBTAP2 Test setpu photo.pdf

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APPENDIX A Test Result

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FCC Part 47 §15.247 2400-2483.5 MHz 2016

DUT Information

Frequencies

BT CH 0 (2402 MHz)	BT CH 1 (2403 MHz)	BT CH 2 (2404 MHz)
BT CH 3 (2405 MHz)	BT CH 4 (2406 MHz)	BT CH 5 (2407 MHz)
BT CH 6 (2408 MHz)	BT CH 7 (2409 MHz)	BT CH 8 (2410 MHz)
BT CH 9 (2411 MHz)	BT CH 10 (2412 MHz)	BT CH 11 (2413 MHz)
BT CH 12 (2414 MHz)	BT CH 13 (2415 MHz)	BT CH 14 (2416 MHz)
BT CH 15 (2417 MHz)	BT CH 16 (2418 MHz)	BT CH 17 (2419 MHz)
BT CH 18 (2420 MHz)	BT CH 19 (2421 MHz)	BT CH 20 (2422 MHz)
BT CH 21 (2423 MHz)	BT CH 22 (2424 MHz)	BT CH 23 (2425 MHz)
BT CH 24 (2426 MHz)	BT CH 25 (2427 MHz)	BT CH 26 (2428 MHz)
BT CH 27 (2429 MHz)	BT CH 28 (2430 MHz)	BT CH 29 (2431 MHz)
BT CH 30 (2432 MHz)	BT CH 31 (2433 MHz)	BT CH 32 (2434 MHz)
BT CH 33 (2435 MHz)	BT CH 34 (2436 MHz)	BT CH 35 (2437 MHz)
BT CH 36 (2438 MHz)	BT CH 37 (2439 MHz)	BT CH 38 (2440 MHz)
BT CH 39 (2441 MHz)	BT CH 40 (2442 MHz)	BT CH 41 (2443 MHz)
BT CH 42 (2444 MHz)	BT CH 43 (2445 MHz)	BT CH 44 (2446 MHz)
BT CH 45 (2447 MHz)	BT CH 46 (2448 MHz)	BT CH 47 (2449 MHz)
BT CH 48 (2450 MHz)	BT CH 49 (2451 MHz)	BT CH 50 (2452 MHz)
BT CH 51 (2453 MHz)	BT CH 52 (2454 MHz)	BT CH 53 (2455 MHz)
BT CH 54 (2456 MHz)	BT CH 55 (2457 MHz)	BT CH 56 (2458 MHz)
BT CH 57 (2459 MHz)	BT CH 58 (2460 MHz)	BT CH 59 (2461 MHz)
BT CH 60 (2462 MHz)	BT CH 61 (2463 MHz)	BT CH 62 (2464 MHz)
BT CH 63 (2465 MHz)	BT CH 64 (2466 MHz)	BT CH 65 (2467 MHz)
BT CH 66 (2468 MHz)	BT CH 67 (2469 MHz)	BT CH 68 (2470 MHz)
BT CH 69 (2471 MHz)	BT CH 70 (2472 MHz)	BT CH 71 (2473 MHz)
BT CH 72 (2474 MHz)	BT CH 73 (2475 MHz)	BT CH 74 (2476 MHz)
BT CH 75 (2477 MHz)	BT CH 76 (2478 MHz)	BT CH 77 (2479 MHz)
BT CH 78 (2480 MHz)		

Hardware Setup: WMS Measurements\TS8997

Spectrum Analyzer:	SA FSV 40 (SA FSV 40) @ VISA (ADR TCPIP::192.168.48.148::inst0::instr), SN 1321.3008K39/101190, FW 2.30 SP4
Vector Generator:	VG SMBV100A (VG SMBV100A) @ VISA (ADR TCPIP::192.168.48.149::inst0::instr), SN 262024, FW 3.1.19.8-3.20.281.28.7
Generator:	SMB100A (SMB100A) @ VISA (ADR TCPIP::192.168.48.152::inst0::instr), SN 103230, FW 3.20.390.24 / Drv:Rev 2.21.0, 07/2016, CVI 2015

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OSP: OSP-B157W (OSP-B157W) @ VISA (ADR TCPIP::192.168.48.157::inst0::instr), SN 1527.1144.03 / 101057, FW 1.23.0.2

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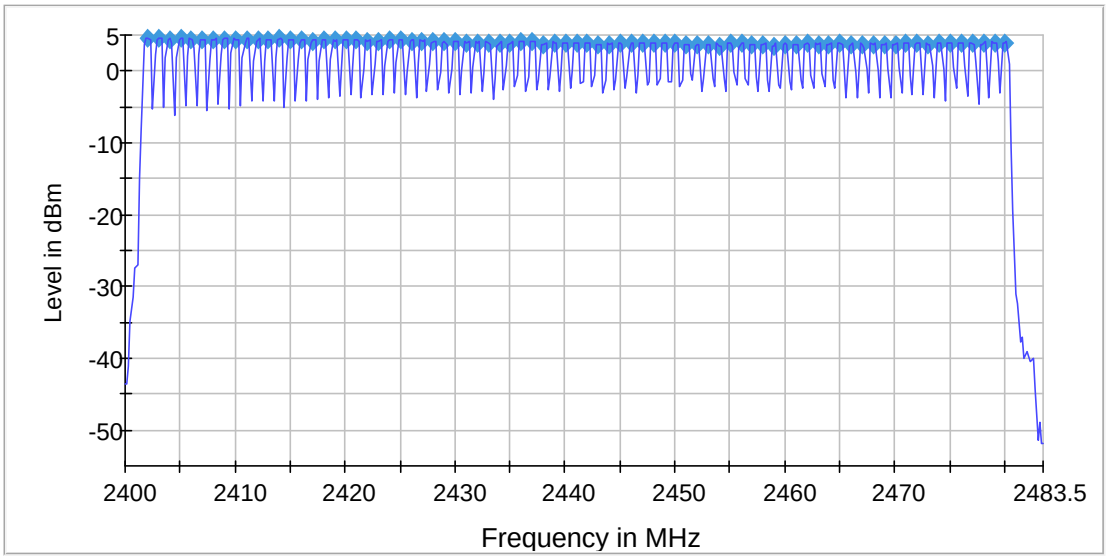
Hopping Frequencies (Hopping; GFSK, DH5)

Channels

Channels	Limit Min	Limit Max	Result
79	15	---	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	200.000 kHz	<= 299.000 kHz
VBW	200.000 kHz	>= 200.000 kHz
SweepPoints	418	~ 418
Sweeptime	1.060 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	71 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.50 dB

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Band Edge low (Hopping; GFSK; DH5)

Result

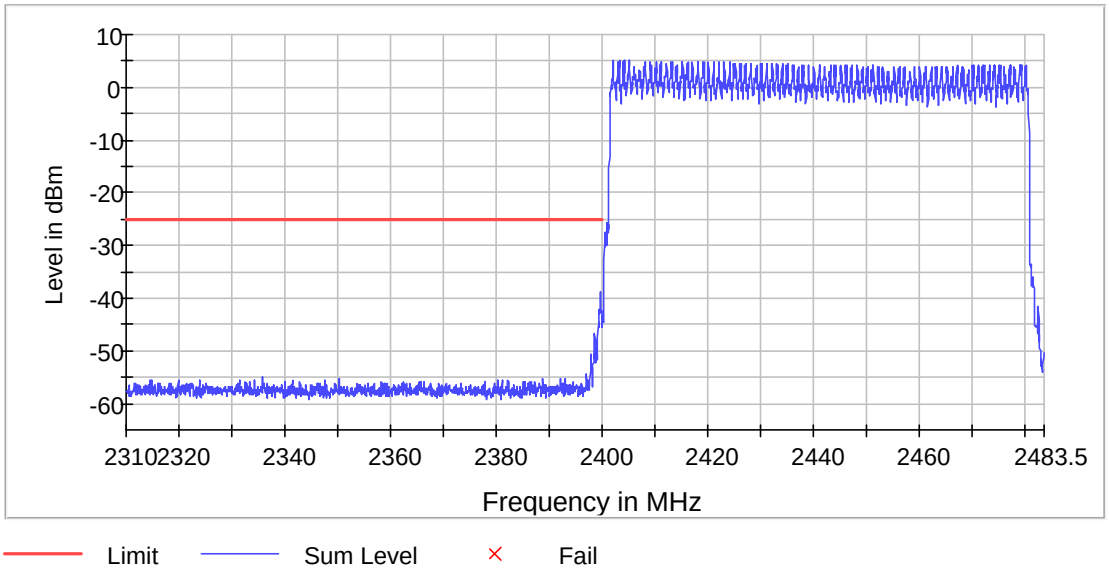
DUT Frequency (MHz)	Result
hopping	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2404.025000	5.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.625000	-38.7	13.7	-25.0	PASS
2399.675000	-38.9	14.0	-25.0	PASS
2399.575000	-39.6	14.6	-25.0	PASS
2399.725000	-41.2	16.2	-25.0	PASS
2399.375000	-42.2	17.2	-25.0	PASS
2399.775000	-42.2	17.3	-25.0	PASS
2399.825000	-42.4	17.4	-25.0	PASS
2399.525000	-42.6	17.6	-25.0	PASS
2399.475000	-43.0	18.1	-25.0	PASS
2399.425000	-43.1	18.2	-25.0	PASS
2399.325000	-43.1	18.2	-25.0	PASS
2399.175000	-44.6	19.6	-25.0	PASS
2399.225000	-44.6	19.6	-25.0	PASS
2399.925000	-44.8	19.9	-25.0	PASS
2399.975000	-45.2	20.3	-25.0	PASS



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TEST REPORT

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Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	1.800 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	15 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	141 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Band Edge high (Hopping; GFSK; DH5)

Result

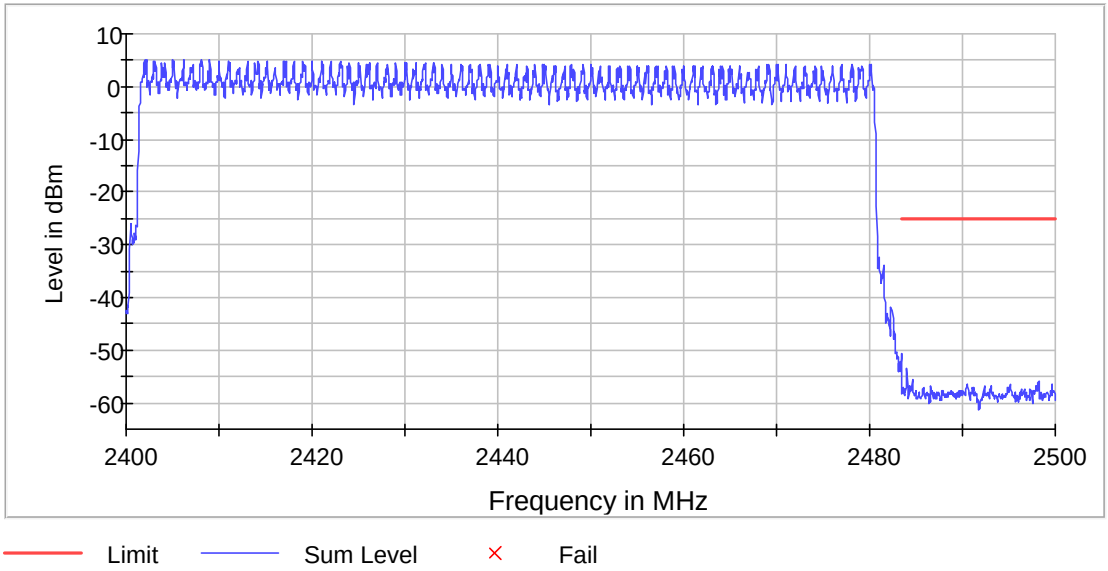
DUT Frequency (MHz)	Result
hopping	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2405.025000	5.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.025000	-53.5	28.6	-25.0	PASS
2483.975000	-53.6	28.6	-25.0	PASS
2484.575000	-55.4	30.5	-25.0	PASS
2484.625000	-55.5	30.5	-25.0	PASS
2498.225000	-56.0	31.0	-25.0	PASS
2498.175000	-56.3	31.3	-25.0	PASS
2484.675000	-56.3	31.3	-25.0	PASS
2499.675000	-56.4	31.4	-25.0	PASS
2490.525000	-56.4	31.5	-25.0	PASS
2495.125000	-56.5	31.6	-25.0	PASS
2495.175000	-56.6	31.6	-25.0	PASS
2499.625000	-56.6	31.6	-25.0	PASS
2498.275000	-56.7	31.7	-25.0	PASS
2490.575000	-56.7	31.7	-25.0	PASS
2486.625000	-56.8	31.8	-25.0	PASS



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TEST REPORT

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Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	135 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
Sweeptime	37.969 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

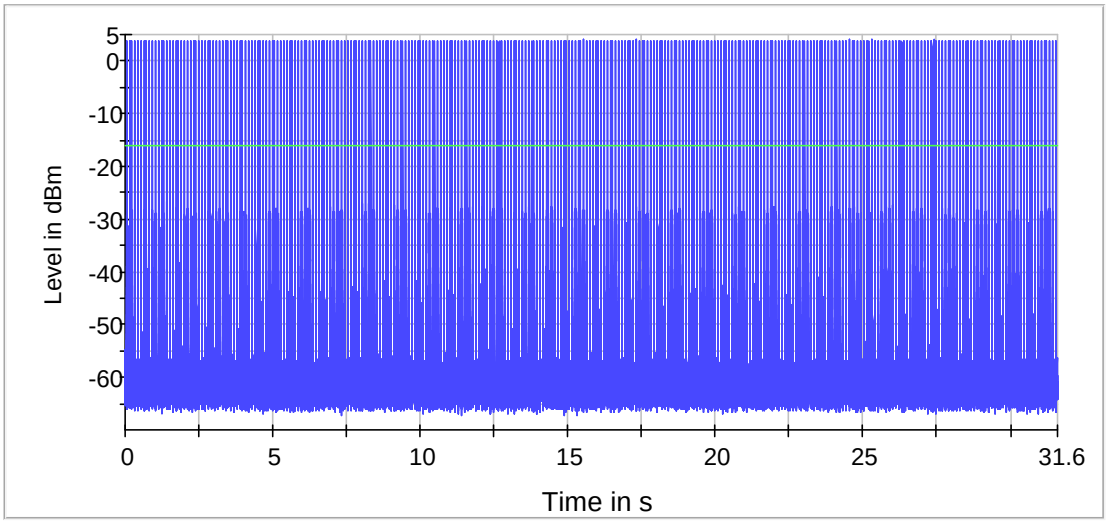
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Time of Channel Occupancy (2441 MHz; GFSK; DH1)

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	319	134.820	-16.0



Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 650.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
Sweeptime	31.600 s	31.600 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

OSP

Setting	Instrument Value	Target Value
Measurement Time	31.600 s	31.600 s
Tracepoints	31600000	31600000
Time resolution	1.000 µs	1.000 µs
Detector	RMS	RMS

FCC ID: 2ADFF-KSBTAP2

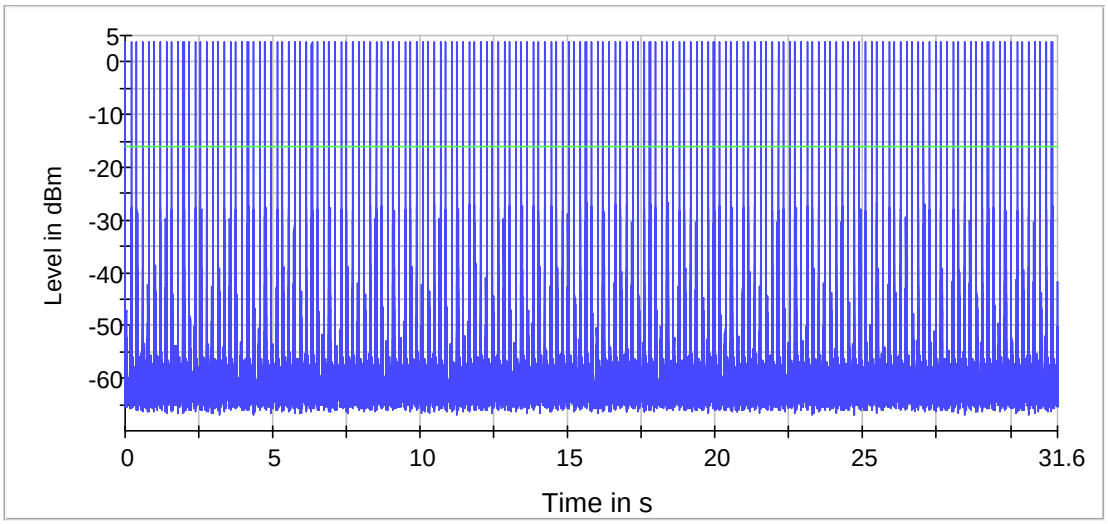
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Time of Channel Occupancy(2) (2441 MHz; GFSK;DH3)

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	159	268.340	-16.0



Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 650.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
Sweeptime	31.600 s	31.600 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

OSP

Setting	Instrument Value	Target Value
Measurement Time	31.600 s	31.600 s
Tracepoints	31600000	31600000
Time resolution	1.000 µs	1.000 µs
Detector	RMS	RMS

FCC ID: 2ADFF-KSBTAP2

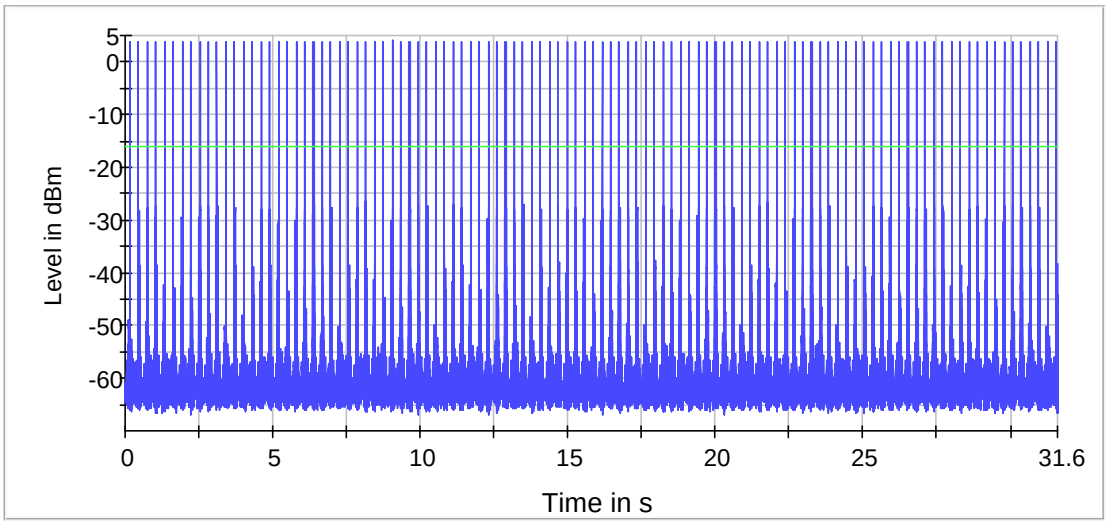
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Time of Channel Occupancy(3) (2441 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	106	313.000	-16.0



Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 650.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
Sweeptime	31.600 s	31.600 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

OSP

Setting	Instrument Value	Target Value
Measurement Time	31.600 s	31.600 s
Tracepoints	31600000	31600000
Time resolution	1.000 µs	1.000 µs
Detector	RMS	RMS

FCC ID: 2ADFF-KSBTAP2

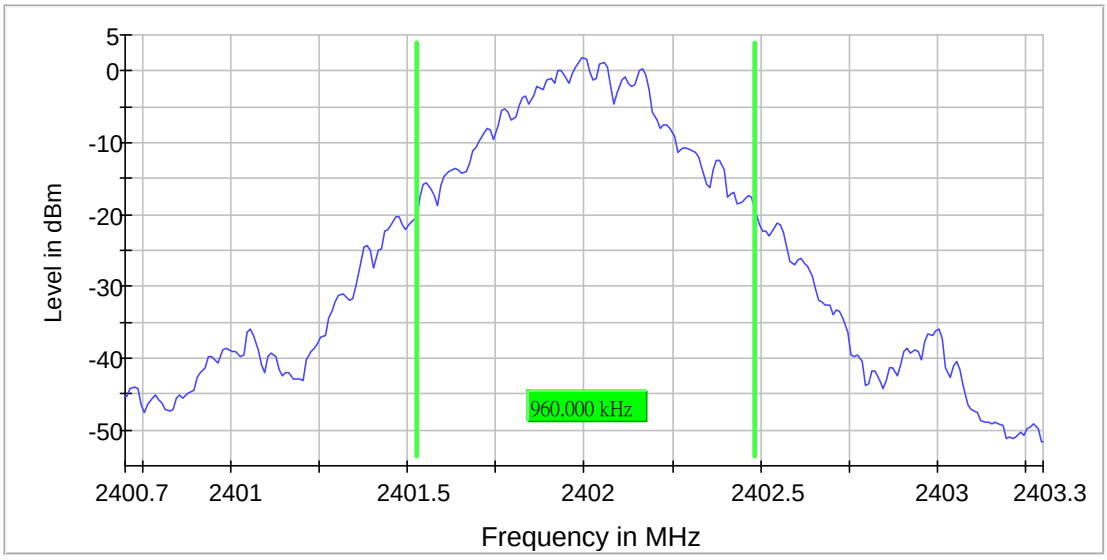
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB (2402 MHz; GFSK, DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.960000	---	---	2401.525000	2402.485000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	13 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.38 dB	0.50 dB

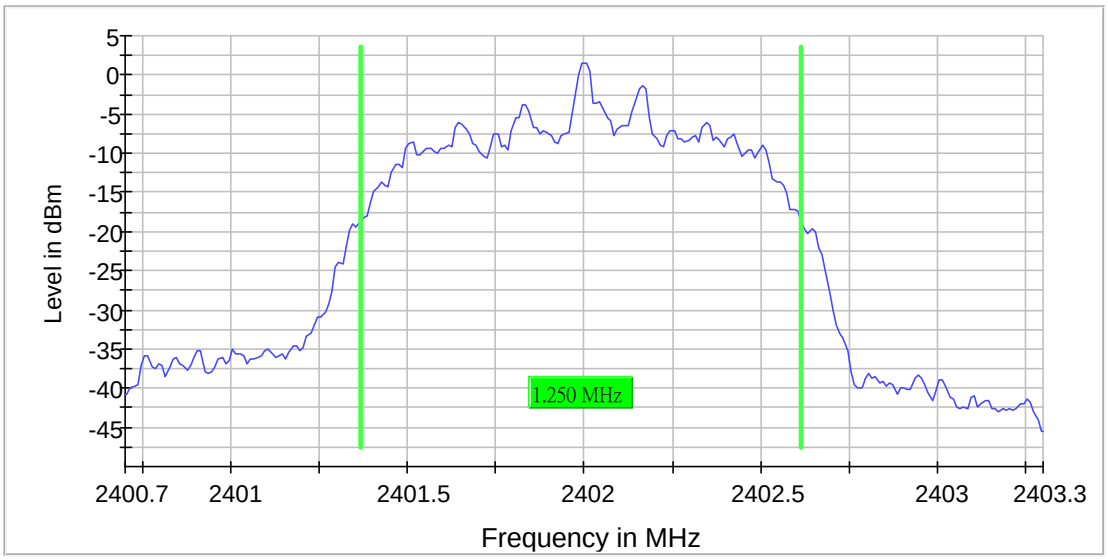
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB(2) (2402 MHz; π/4DQPSK; 2DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.250000	---	---	2401.365000	2402.615000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	22 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.50 dB

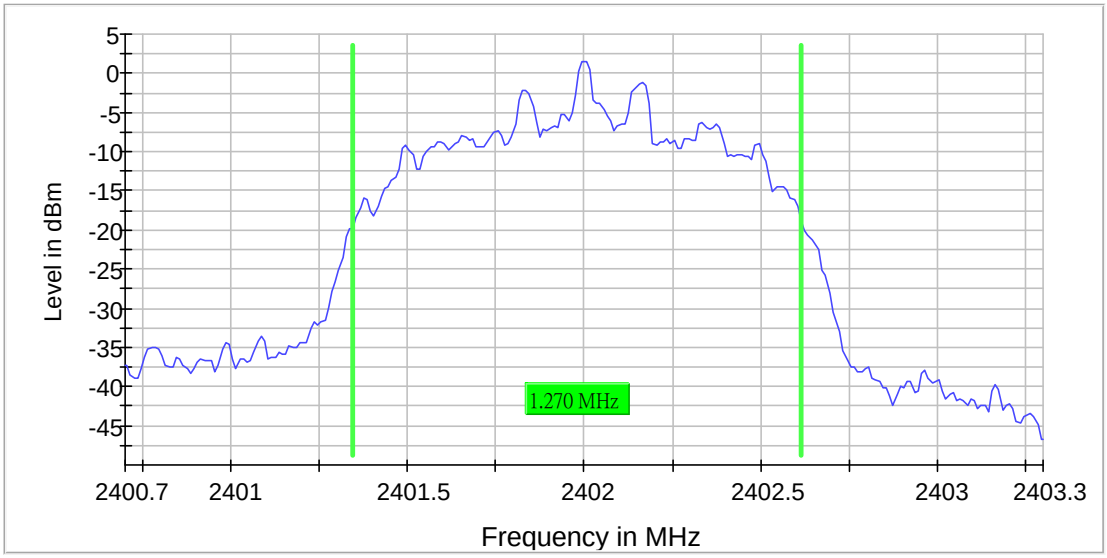
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB(3) (2402 MHz; 8DPSK; 3DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.270000	---	---	2401.345000	2402.615000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.39 dB	0.50 dB

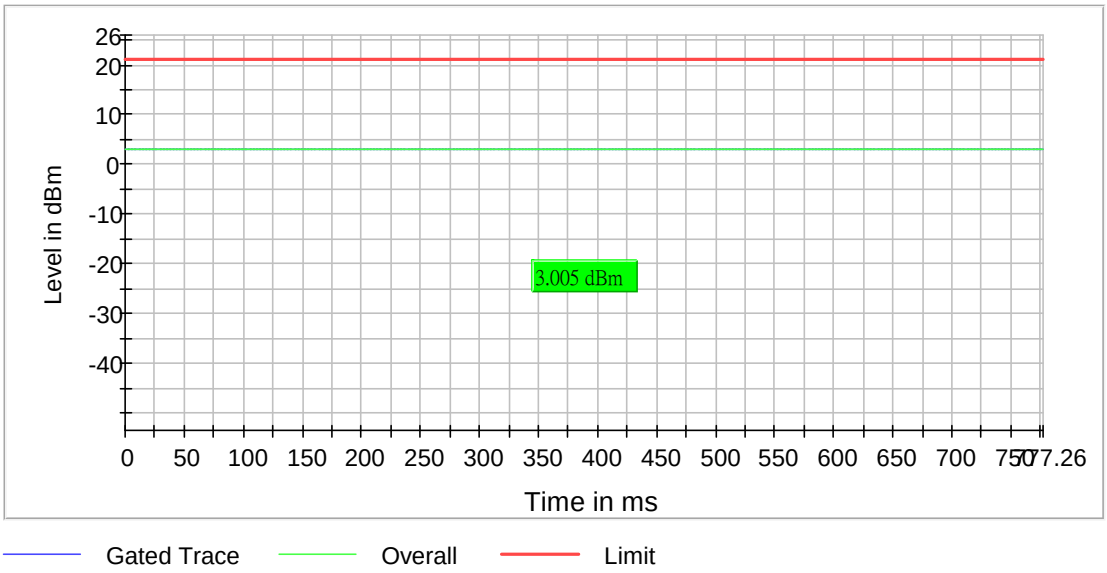
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

RF output power (2402 MHz; GFSK, DH5)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2402.000000	3.0	21.0	3.0	77.894	PASS



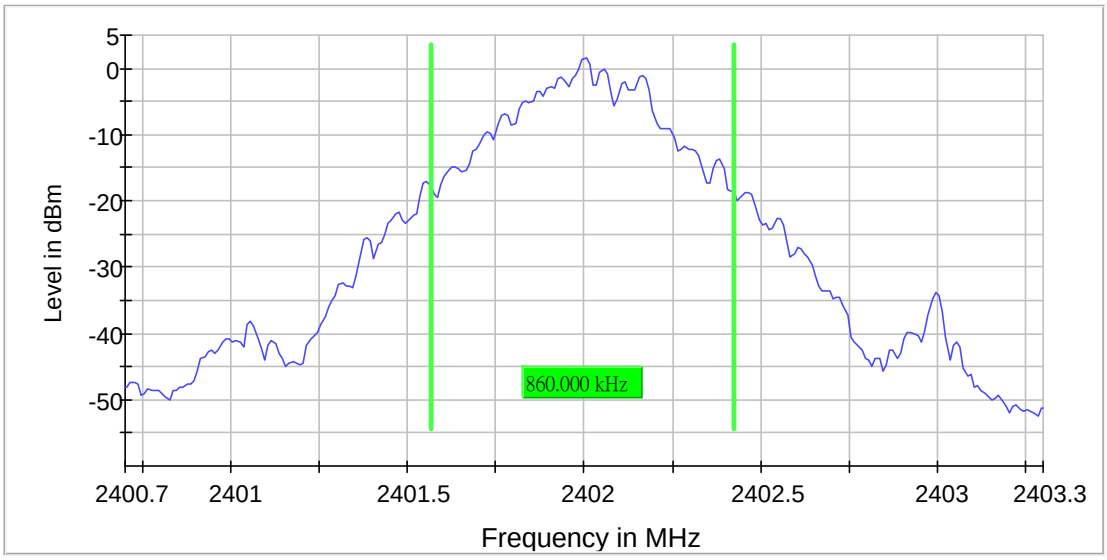
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99% (2402 MHz; GFSK; DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.860000	---	---	2401.565000	2402.425000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	14 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.19 dB	0.30 dB

TEST REPORT

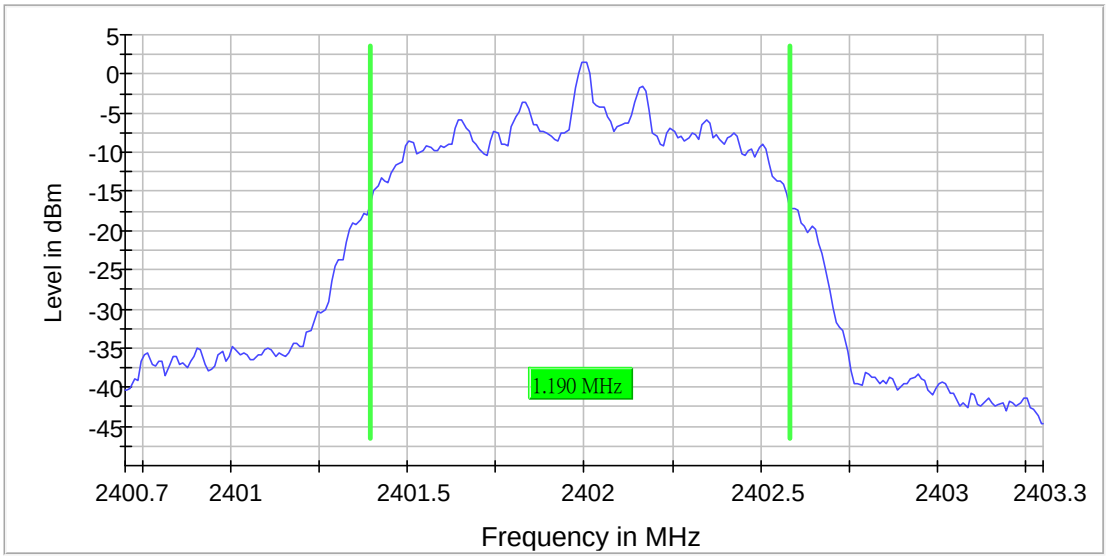
Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99%(2) (2402 MHz; π/4DQPSK; 2DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.190000	---	---	2401.395000	2402.585000

(



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	17 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.12 dB	0.30 dB

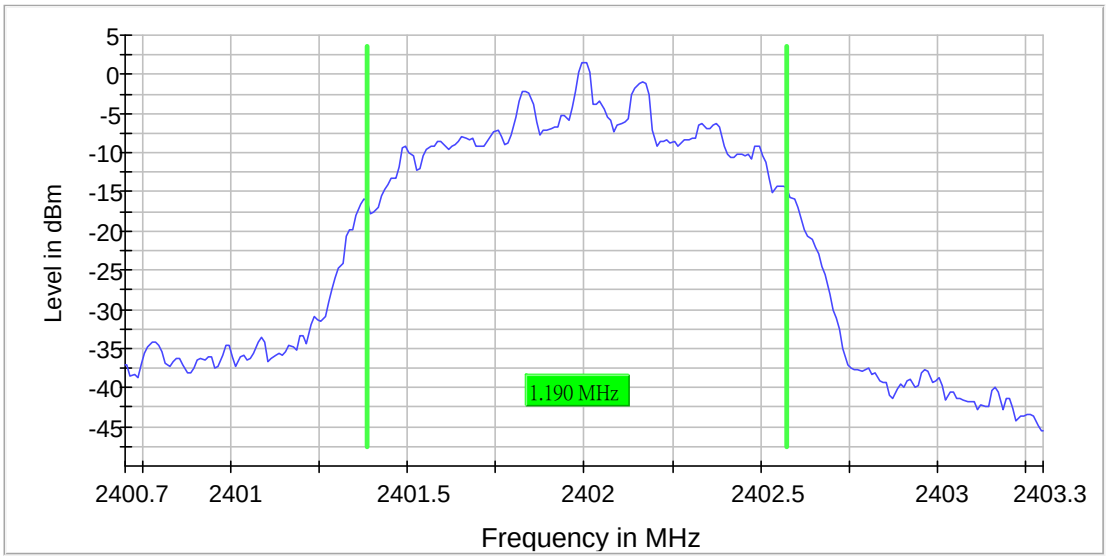
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99%(3) (2402 MHz; 8DPSK; 3DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.190000	---	---	2401.385000	2402.575000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	17 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.30 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Band Edge low (2402 MHz; GFSK; DH5)

Result

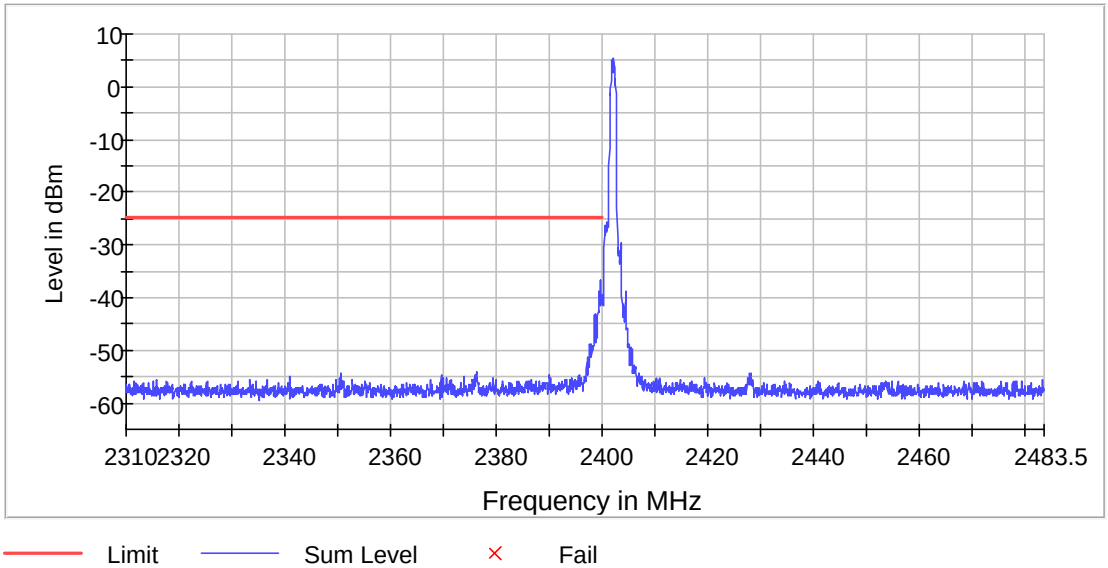
DUT Frequency (MHz)	Result
2402.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2402.025000	5.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.625000	-36.5	11.8	-24.7	PASS
2399.675000	-37.0	12.3	-24.7	PASS
2399.575000	-37.9	13.2	-24.7	PASS
2399.725000	-38.5	13.8	-24.7	PASS
2399.425000	-38.7	13.9	-24.7	PASS
2399.375000	-38.8	14.1	-24.7	PASS
2399.875000	-39.2	14.5	-24.7	PASS
2399.925000	-39.5	14.8	-24.7	PASS
2399.475000	-39.5	14.8	-24.7	PASS
2399.825000	-40.3	15.6	-24.7	PASS
2399.525000	-40.4	15.7	-24.7	PASS
2399.325000	-40.6	15.9	-24.7	PASS
2399.975000	-41.3	16.6	-24.7	PASS
2399.775000	-41.5	16.7	-24.7	PASS
2399.225000	-42.5	17.8	-24.7	PASS



FCC ID: 2ADFF-KSBTAP2

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	1.800 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	12 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.50 dB

Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	12 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.29 dB	0.50 dB

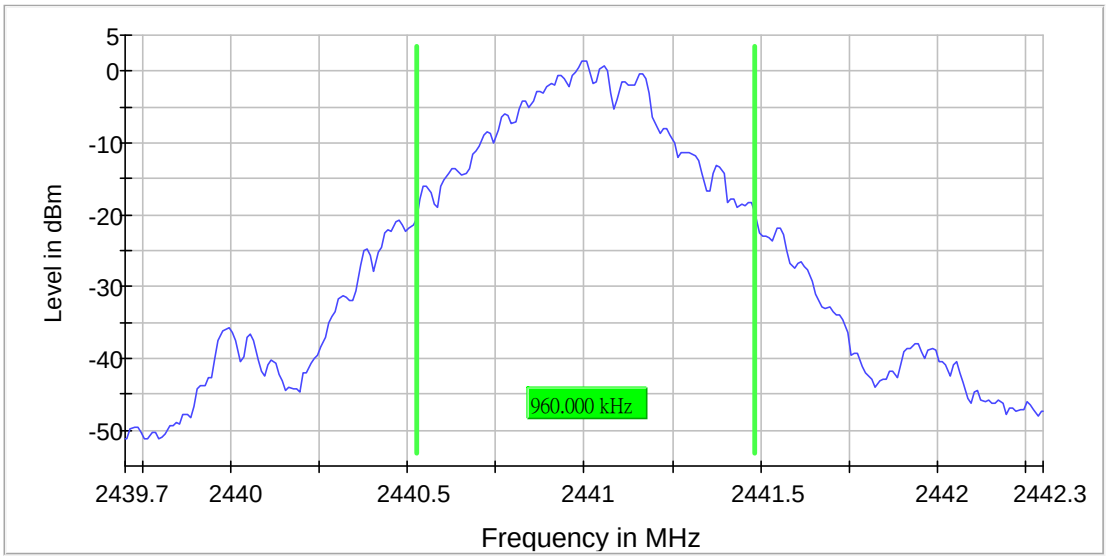
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB (2441 MHz; GFSK; DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.960000	---	---	2440.525000	2441.485000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	12 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.31 dB	0.50 dB

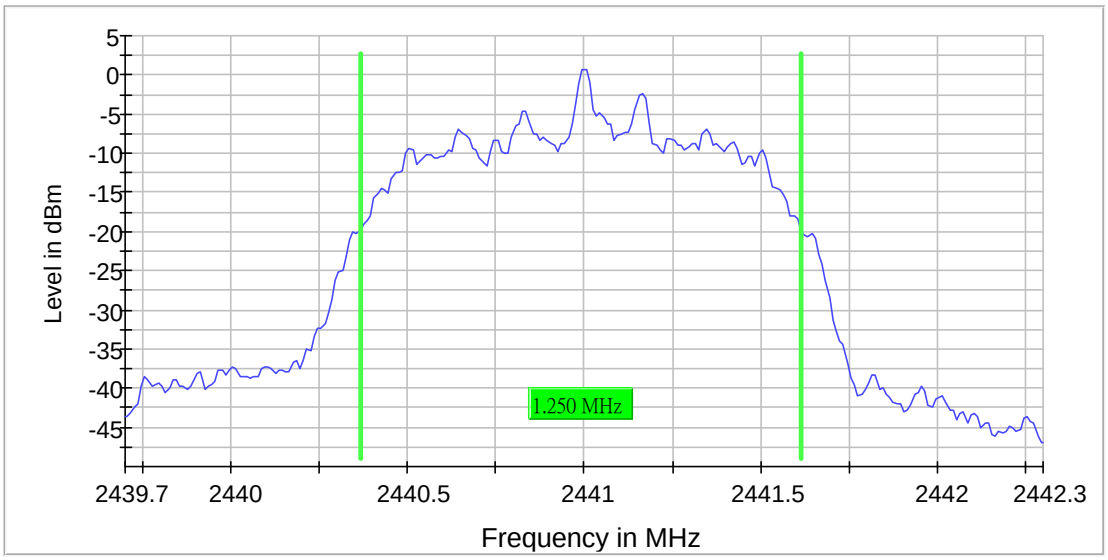
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB(2) (2441 MHz; π/4DQPSK; 2DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.250000	---	---	2440.365000	2441.615000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.24 dB	0.50 dB

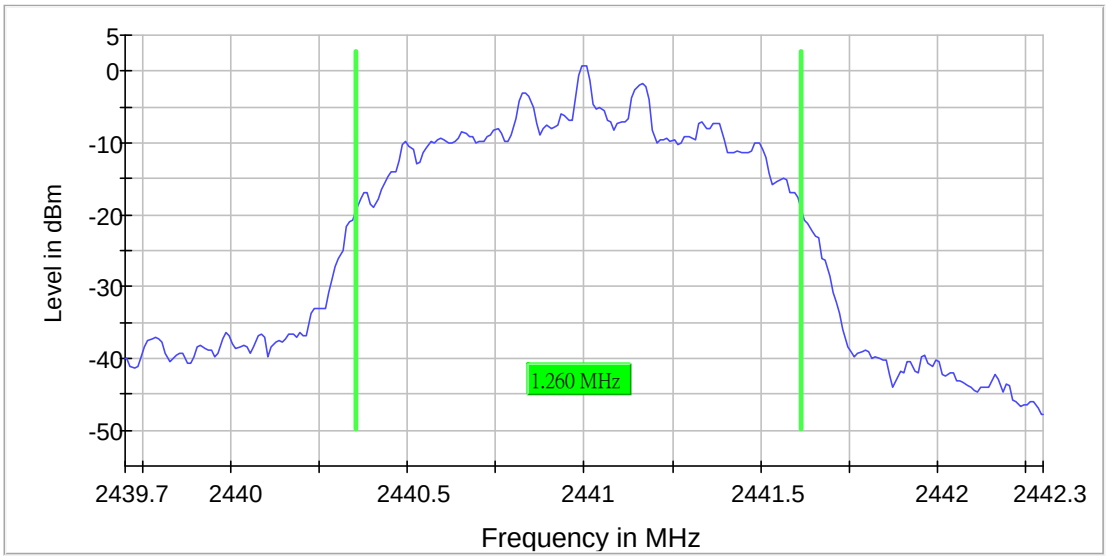
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB(3) (2441 MHz; 8DPSK; 3DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.260000	---	---	2440.355000	2441.615000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	16 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.34 dB	0.50 dB

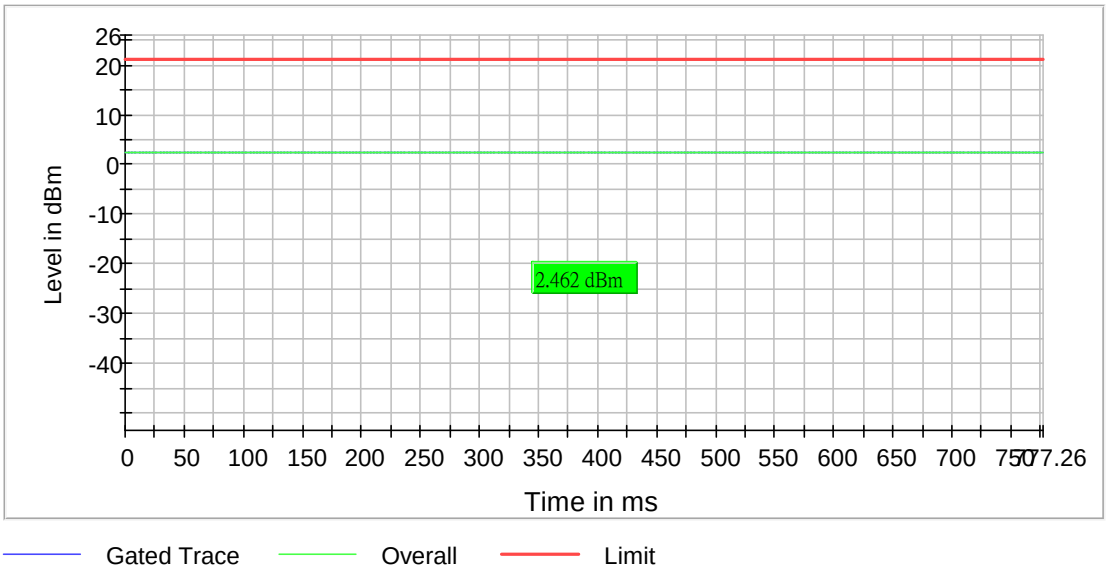
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

RF output power (2441 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2441.000000	2.5	21.0	2.5	77.894	PASS



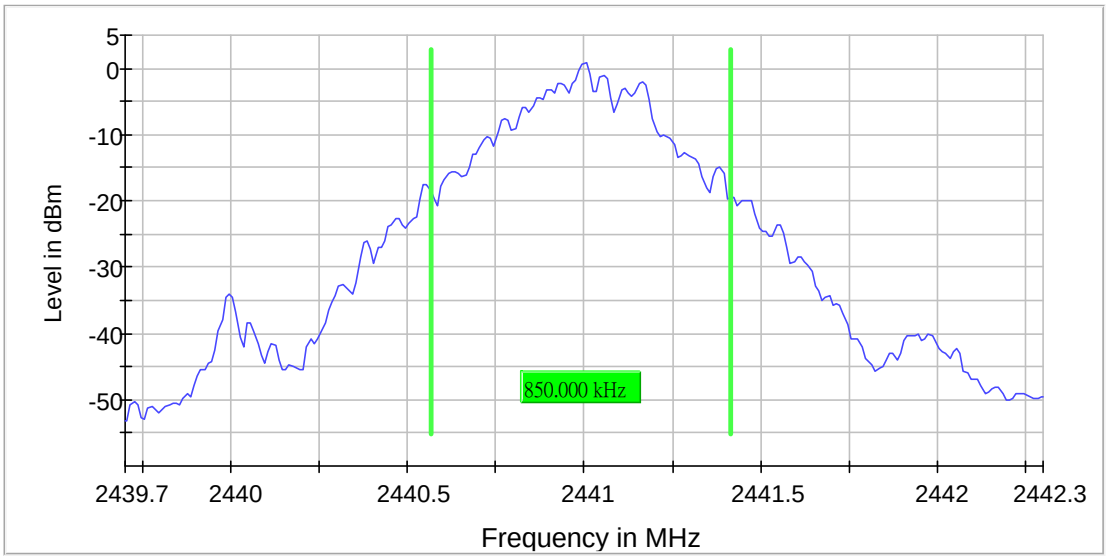
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99% (2441 MHz; GFSK; DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.850000	---	---	2440.565000	2441.415000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	12 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.13 dB	0.30 dB

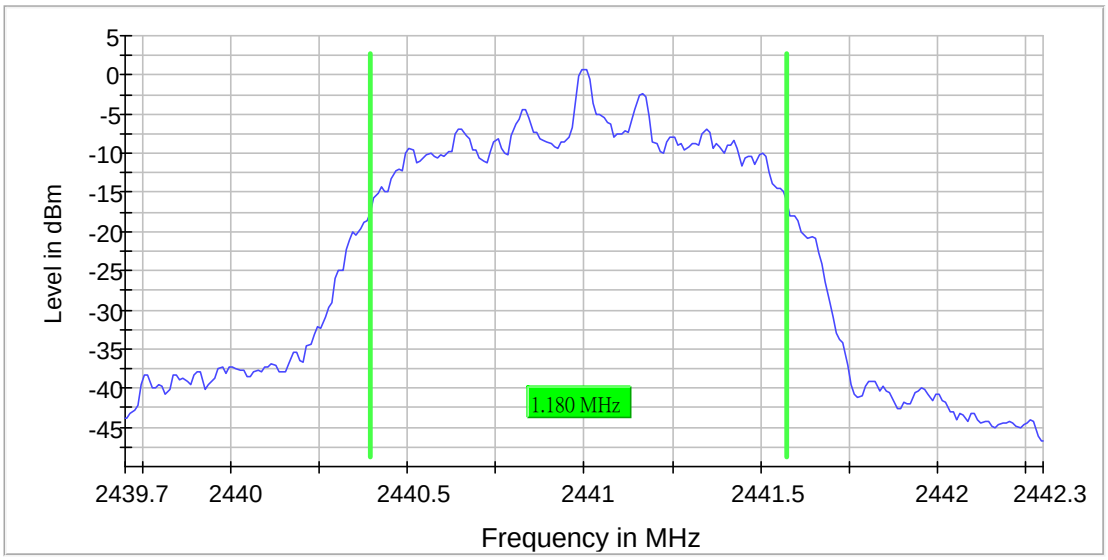
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99%(2) (2441 MHz; π/4DQPSK; 2DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.180000	---	---	2440.395000	2441.575000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.23 dB	0.30 dB

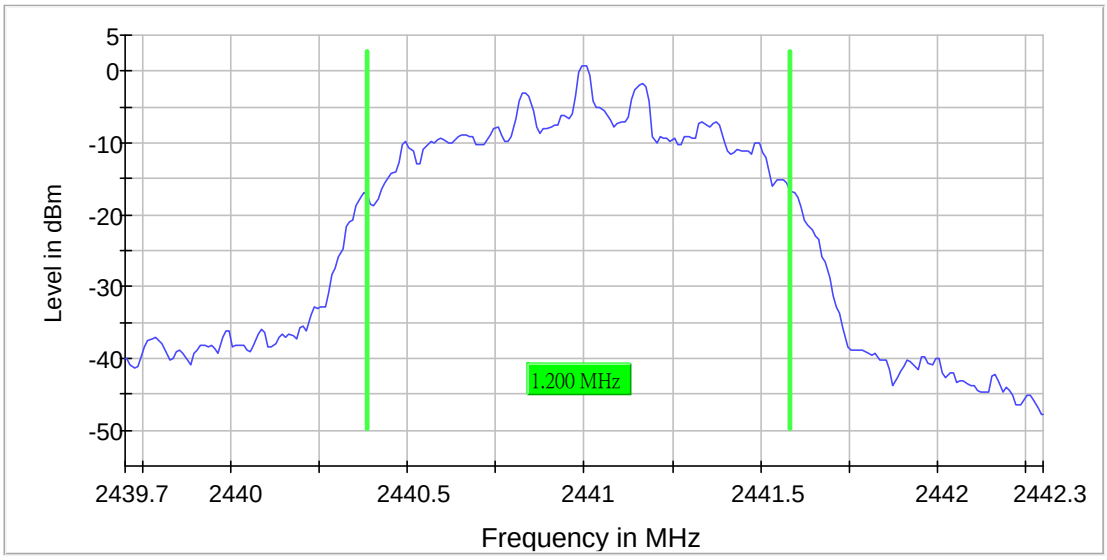
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99%(3) (2441 MHz; 8DPSK; 3DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.200000	---	---	2440.385000	2441.585000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	11 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.30 dB

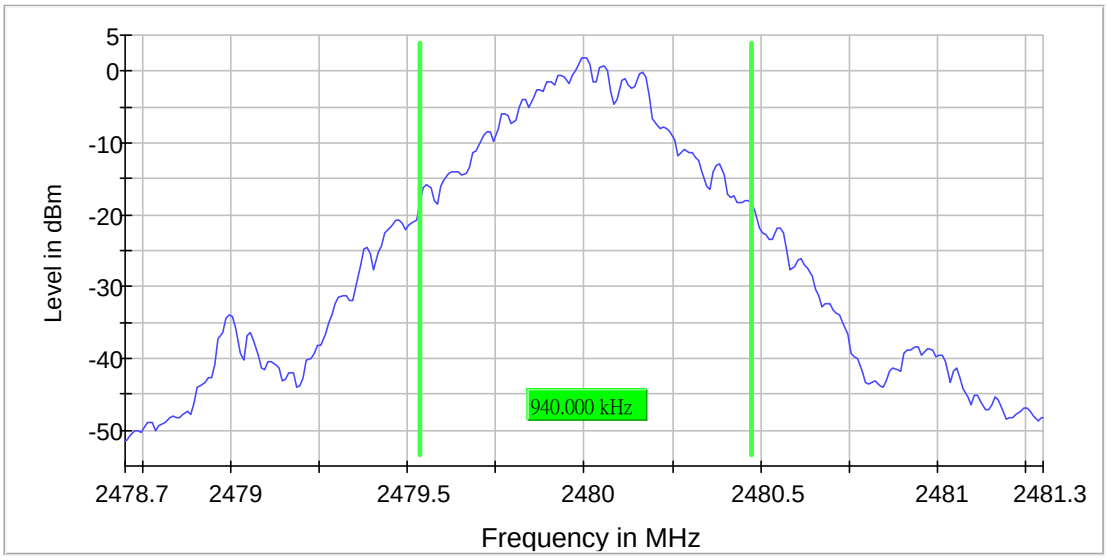
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB (2480 MHz; GFSK; DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.940000	---	---	2479.535000	2480.475000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	20 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

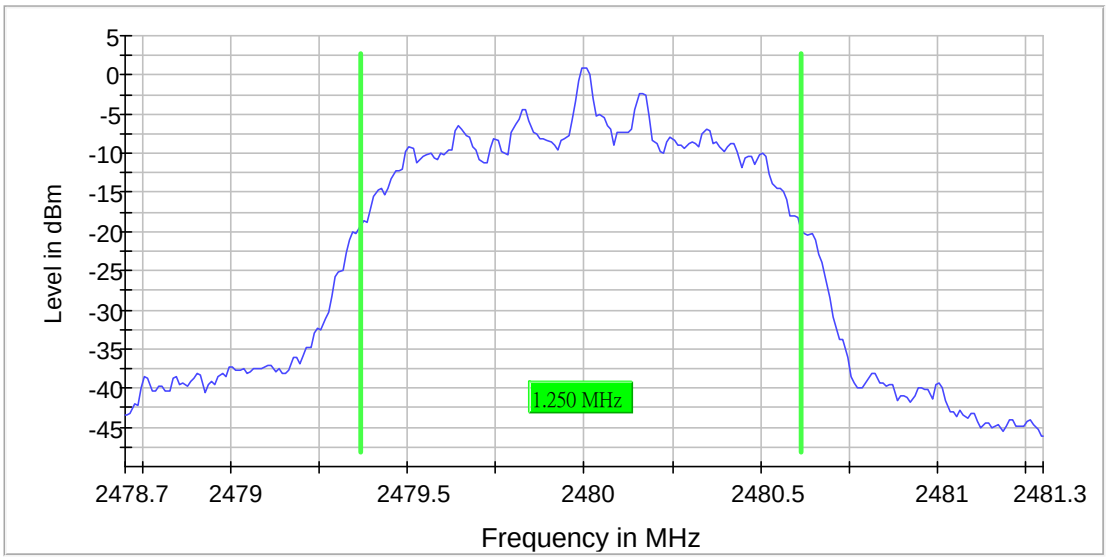
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB(2) (2480 MHz; π/4DQPSK; 2DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.250000	---	---	2479.365000	2480.615000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	21 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB

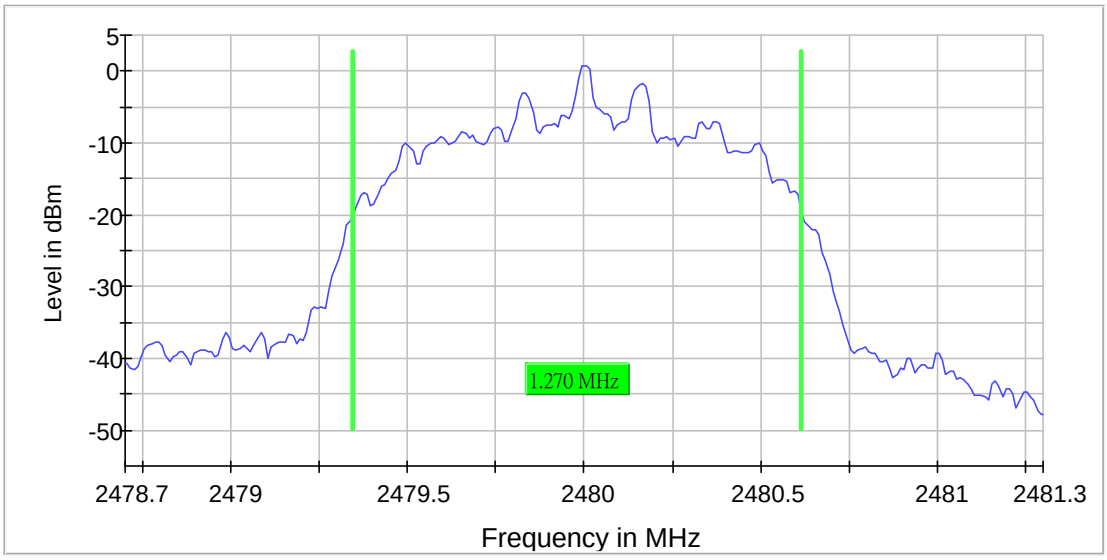
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Emission Bandwidth 20 dB(3) (2480 MHz; 8DPSK; 3DH5)

20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.270000	---	---	2479.345000	2480.615000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	13 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.20 dB	0.50 dB

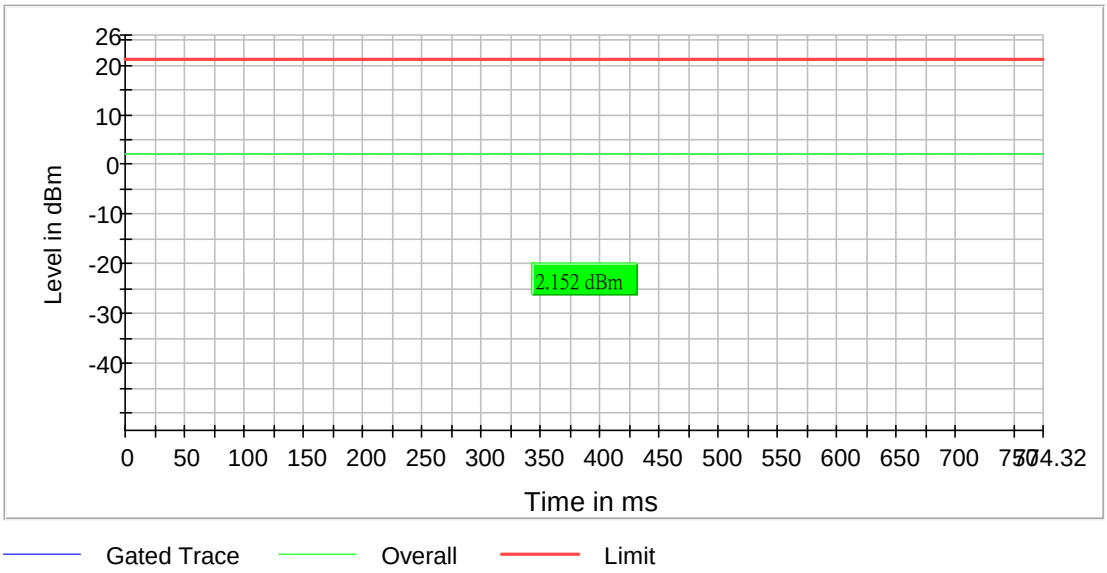
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

RF output power (2480 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2480.000000	2.2	21.0	2.2	77.893	PASS



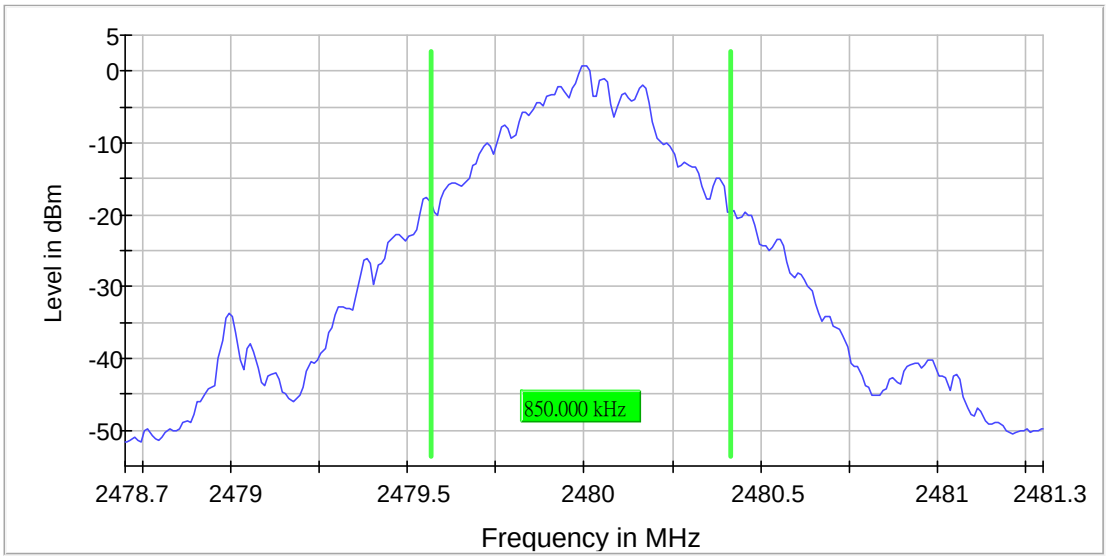
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99% (2480 MHz; GFSK; DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.850000	---	---	2479.565000	2480.415000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	21 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.03 dB	0.30 dB

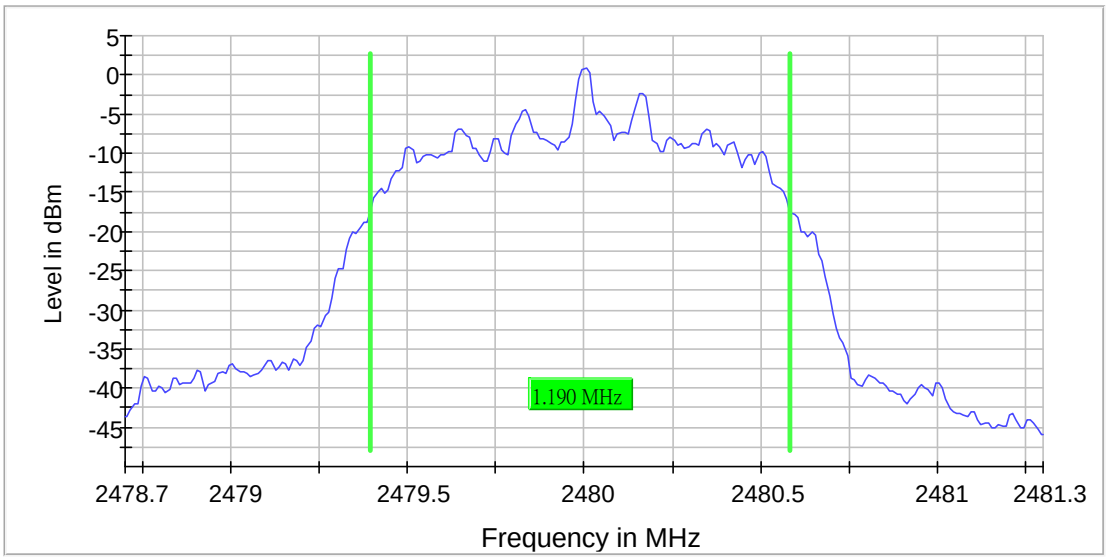
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99%(2) (2480 MHz; π/4DQPSK; 2DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.190000	---	---	2479.395000	2480.585000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	15 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.30 dB

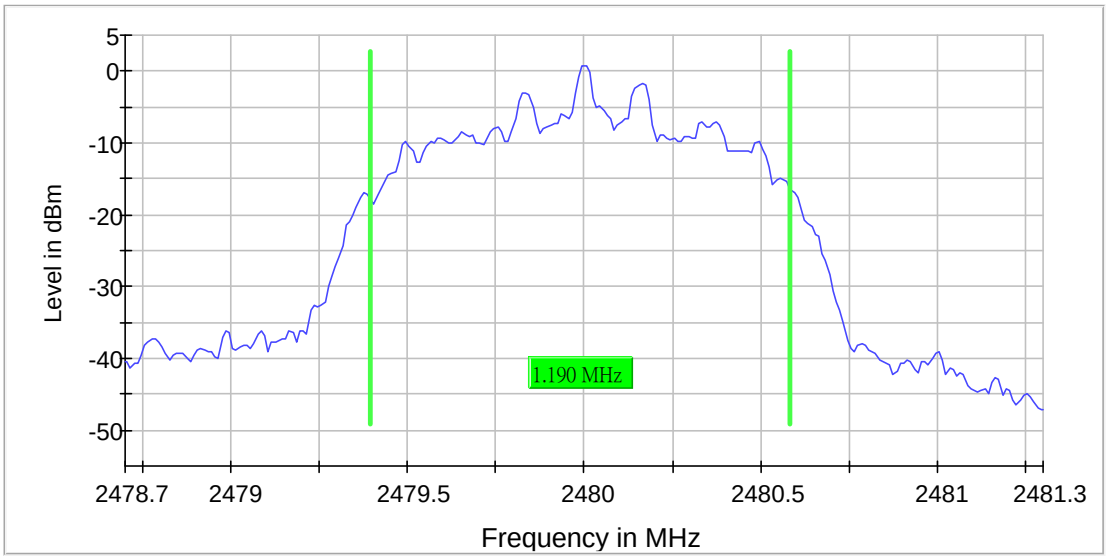
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Occupied Channel Bandwidth 99%(3) (2480 MHz; 8DPSK; 3DH5)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.190000	---	---	2479.395000	2480.585000



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	17 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.30 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Band Edge high (2480 MHz; GFSK; DH5)

Result

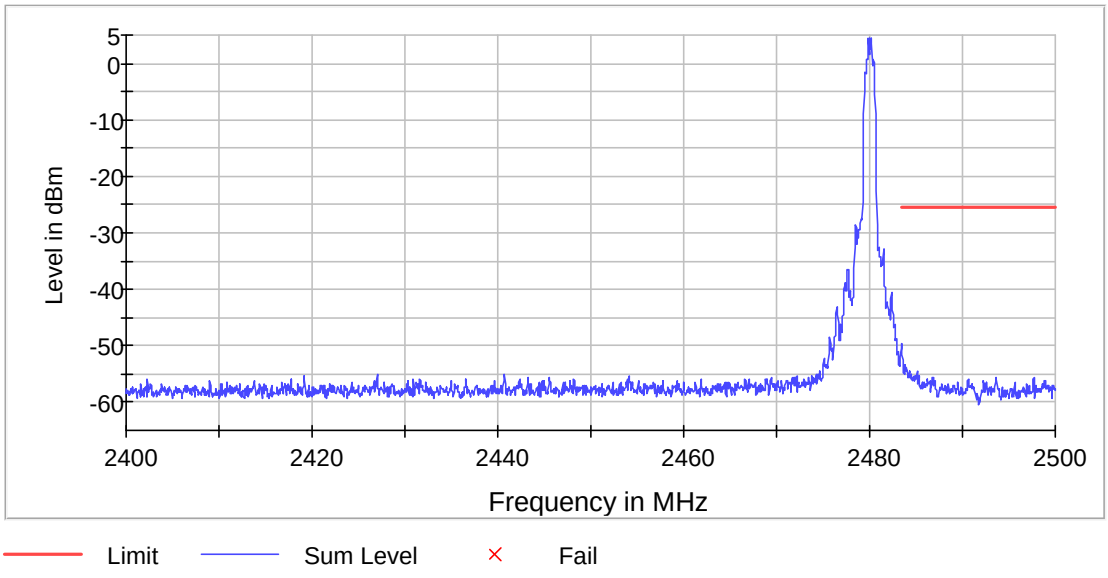
DUT Frequency (MHz)	Result
2480.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2480.025000	4.4

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-51.7	26.1	-25.6	PASS
2483.575000	-52.6	27.0	-25.6	PASS
2483.625000	-52.8	27.3	-25.6	PASS
2483.825000	-53.4	27.9	-25.6	PASS
2483.875000	-53.5	27.9	-25.6	PASS
2483.925000	-54.0	28.4	-25.6	PASS
2484.025000	-54.3	28.8	-25.6	PASS
2483.975000	-54.4	28.8	-25.6	PASS
2484.325000	-54.5	28.9	-25.6	PASS
2483.775000	-54.5	28.9	-25.6	PASS
2485.125000	-54.5	28.9	-25.6	PASS
2483.675000	-54.6	29.1	-25.6	PASS
2485.175000	-54.6	29.1	-25.6	PASS
2484.225000	-54.7	29.1	-25.6	PASS
2484.275000	-54.7	29.2	-25.6	PASS



FCC ID: 2ADFF-KSBTAP2

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.03 dB	0.50 dB

Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
Sweeptime	37.969 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

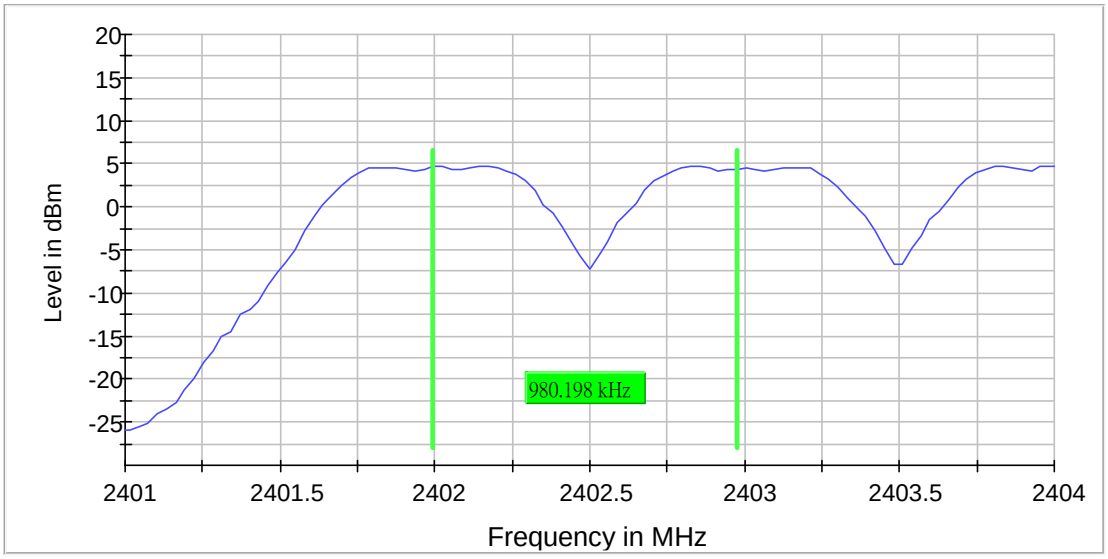
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Carrier Frequency Separation (2402 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit Min (MHz)	Limit Max (MHz)	Center Frequency low Channel (MHz)	Center Frequency high Channel (MHz)
2402.000000	0.980198	0.846667	---	2401.995050	2402.975248



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40400 GHz	2.40400 GHz
Span	3.000 MHz	3.000 MHz
RBW	300.000 kHz	<= 300.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 10
Sweeptime	1.000 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	17 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.47 dB	0.50 dB

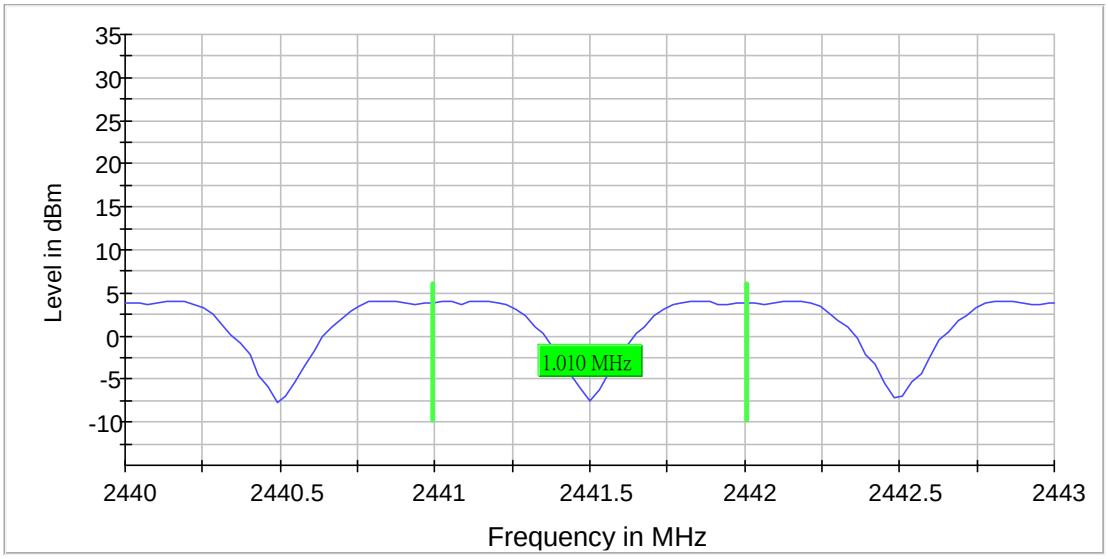
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Carrier Frequency Separation (2441 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit Min (MHz)	Limit Max (MHz)	Center Frequency low Channel (MHz)	Center Frequency high Channel (MHz)
2441.000000	1.009900	0.840000	---	2440.995050	2442.004950



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44000 GHz	2.44000 GHz
Stop Frequency	2.44300 GHz	2.44300 GHz
Span	3.000 MHz	3.000 MHz
RBW	300.000 kHz	<= 300.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 10
Sweeptime	1.000 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.00 dB	0.50 dB

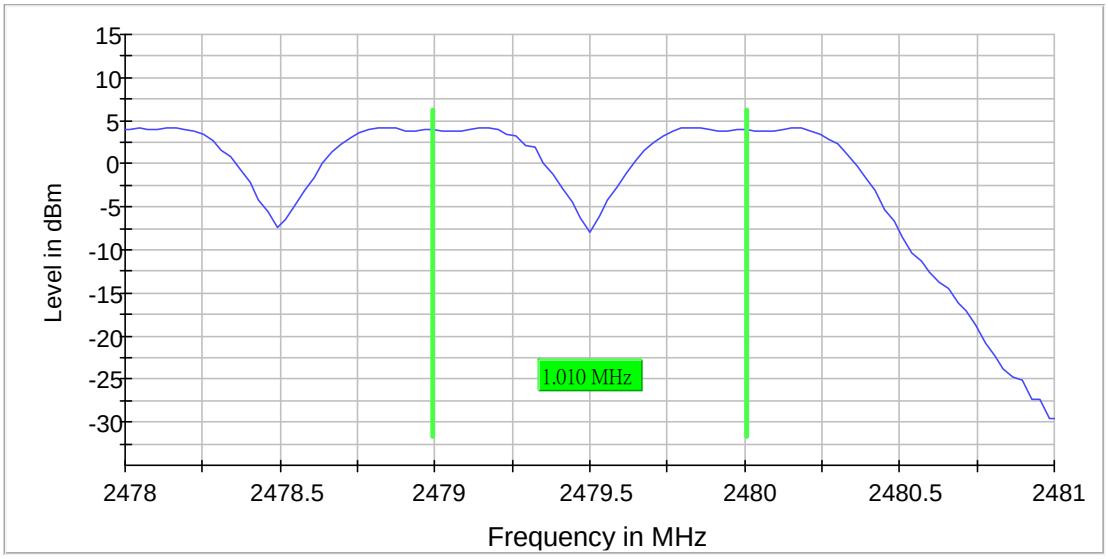
TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Carrier Frequency Separation (2479 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit Min (MHz)	Limit Max (MHz)	Center Frequency low Channel (MHz)	Center Frequency high Channel (MHz)
2479.000000	1.009900	0.846667	---	2478.995050	2480.004950



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47800 GHz	2.47800 GHz
Stop Frequency	2.48100 GHz	2.48100 GHz
Span	3.000 MHz	3.000 MHz
RBW	300.000 kHz	<= 300.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 10
Sweeptime	1.000 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	27 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.02 dB	0.50 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Tx Spurious Emission (2402 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Result
2402.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2405.025000	6.8

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

Pre Measurements

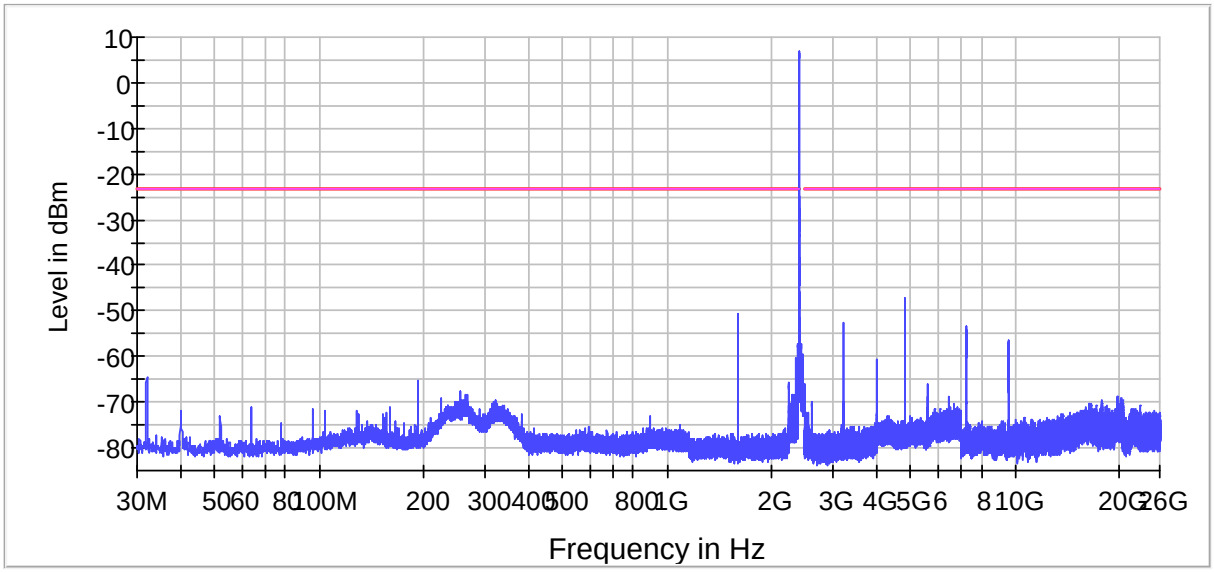
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2399.975000	-38.5	15.2	-23.2
2399.525000	-38.9	15.7	-23.2
2399.575000	-39.5	16.3	-23.2
2399.475000	-40.0	16.7	-23.2
2399.625000	-42.6	19.4	-23.2
2399.925000	-42.9	19.7	-23.2
2399.875000	-43.0	19.7	-23.2
2399.675000	-43.2	19.9	-23.2
2399.425000	-43.4	20.2	-23.2
2399.825000	-43.5	20.3	-23.2
2399.725000	-43.6	20.3	-23.2
2399.775000	-43.7	20.4	-23.2
2399.375000	-45.4	22.2	-23.2
4803.975000	-47.1	23.9	-23.2
2399.325000	-47.2	24.0	-23.2

Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	1500.000000	1	1
1500.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	3983.500000	1	1
3983.500000	5483.500000	1	1
5483.500000	6983.500000	1	1
6983.500000	8483.500000	1	1
8483.500000	9983.500000	1	1
9983.500000	11483.500000	1	1
11483.500000	12983.500000	1	1
12983.500000	14483.500000	1	1
14483.500000	15983.500000	1	1
15983.500000	17483.500000	1	1
17483.500000	18983.500000	1	1
18983.500000	20483.500000	1	1
20483.500000	21983.500000	1	1
21983.500000	23483.500000	1	1
23483.500000	24983.500000	1	1

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019



Limit Sum Level Threshold Critical Final Critical

Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	29400	~ 29400
Sweeptime	29.400 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	1.00 dB	1.00 dB
Run	11 / max. 40	max. 40
Stable	1 / 1	1
Max Stable Difference	0.00 dB	1.00 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Tx Spurious Emission (2441 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Result
2441.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2405.025000	6.5

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
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Pre Measurements

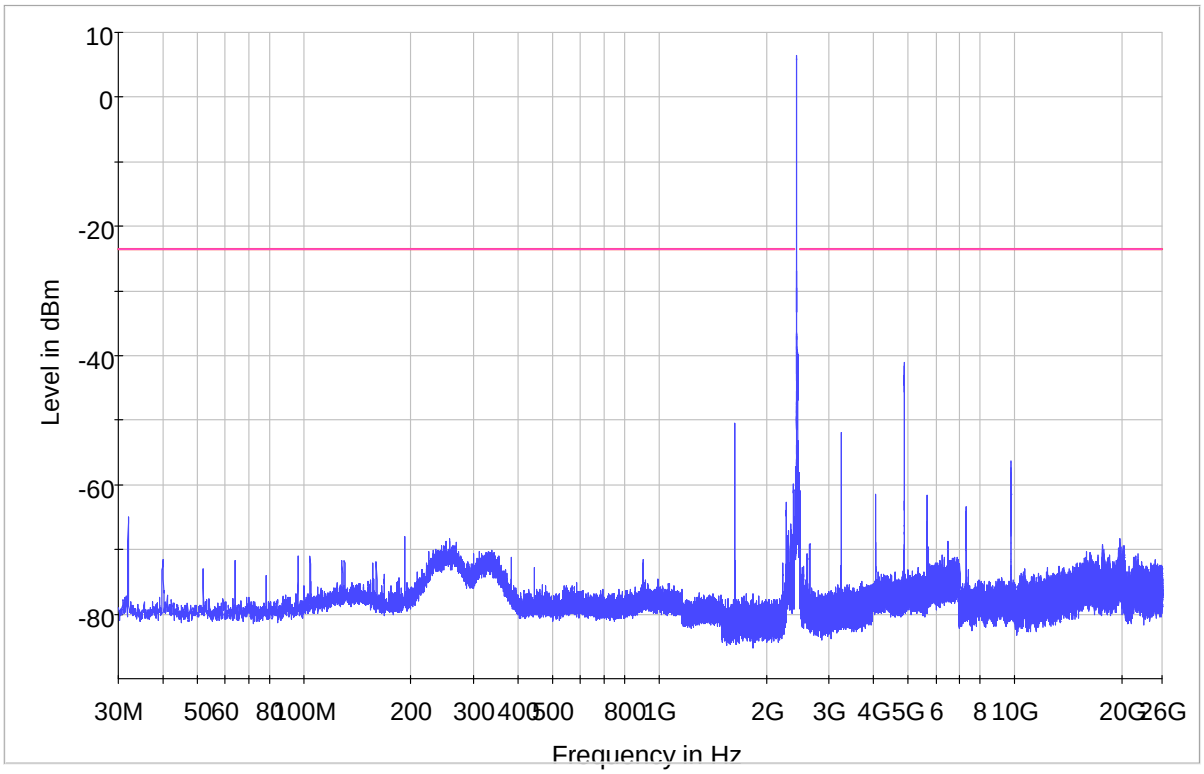
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4882.075000	-41.0	17.5	-23.5
4882.025000	-41.1	17.6	-23.5
4881.975000	-41.5	18.1	-23.5
4881.675000	-41.6	18.1	-23.5
4881.625000	-42.3	18.8	-23.5
4881.725000	-42.5	19.1	-23.5
4882.325000	-43.0	19.5	-23.5
4882.375000	-43.1	19.6	-23.5
4882.275000	-43.6	20.1	-23.5
4881.925000	-43.7	20.2	-23.5
4881.775000	-43.8	20.3	-23.5
4881.875000	-44.3	20.9	-23.5
4882.175000	-44.5	21.0	-23.5
4882.125000	-44.5	21.0	-23.5
4881.825000	-44.7	21.2	-23.5

Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	1500.000000	1	1
1500.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	3983.500000	1	1
3983.500000	5483.500000	1	1
5483.500000	6983.500000	1	1
6983.500000	8483.500000	1	1
8483.500000	9983.500000	1	1
9983.500000	11483.500000	1	1
11483.500000	12983.500000	1	1
12983.500000	14483.500000	1	1
14483.500000	15983.500000	1	1
15983.500000	17483.500000	1	1
17483.500000	18983.500000	1	1
18983.500000	20483.500000	1	1
20483.500000	21983.500000	1	1
21983.500000	23483.500000	1	1
23483.500000	24983.500000	1	1

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019



Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	29400	~ 29400
Sweeptime	29.400 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	1.00 dB	1.00 dB
Run	21 / max. 40	max. 40
Stable	1 / 1	1
Max Stable Difference	0.82 dB	1.00 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Tx Spurious Emission (2480 MHz; GFSK; DH5)

Result

DUT Frequency (MHz)	Result
2480.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2405.025000	6.3

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4959.675000	-39.7	16.0	-23.7
4960.025000	-39.7	16.0	-23.7
4959.975000	-40.1	16.4	-23.7
4959.625000	-40.2	16.5	-23.7
4959.725000	-40.5	16.8	-23.7
4960.075000	-40.7	17.0	-23.7
4960.325000	-40.9	17.2	-23.7
4960.375000	-41.0	17.2	-23.7
4959.925000	-41.2	17.5	-23.7
4960.275000	-41.7	18.0	-23.7
4959.775000	-41.7	18.0	-23.7
4960.125000	-42.3	18.6	-23.7
4959.825000	-42.4	18.7	-23.7
4960.175000	-42.8	19.0	-23.7
4960.425000	-42.9	19.1	-23.7

Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	1500.000000	1	1
1500.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	3983.500000	1	1
3983.500000	5483.500000	1	1
5483.500000	6983.500000	1	1
6983.500000	8483.500000	1	1
8483.500000	9983.500000	1	1
9983.500000	11483.500000	1	1
11483.500000	12983.500000	1	1
12983.500000	14483.500000	1	1
14483.500000	15983.500000	1	1
15983.500000	17483.500000	1	1
17483.500000	18983.500000	1	1
18983.500000	20483.500000	1	1
20483.500000	21983.500000	1	1
21983.500000	23483.500000	1	1
23483.500000	24983.500000	1	1

FCC ID: 2ADFF-KSBTAP2

TEST REPORT

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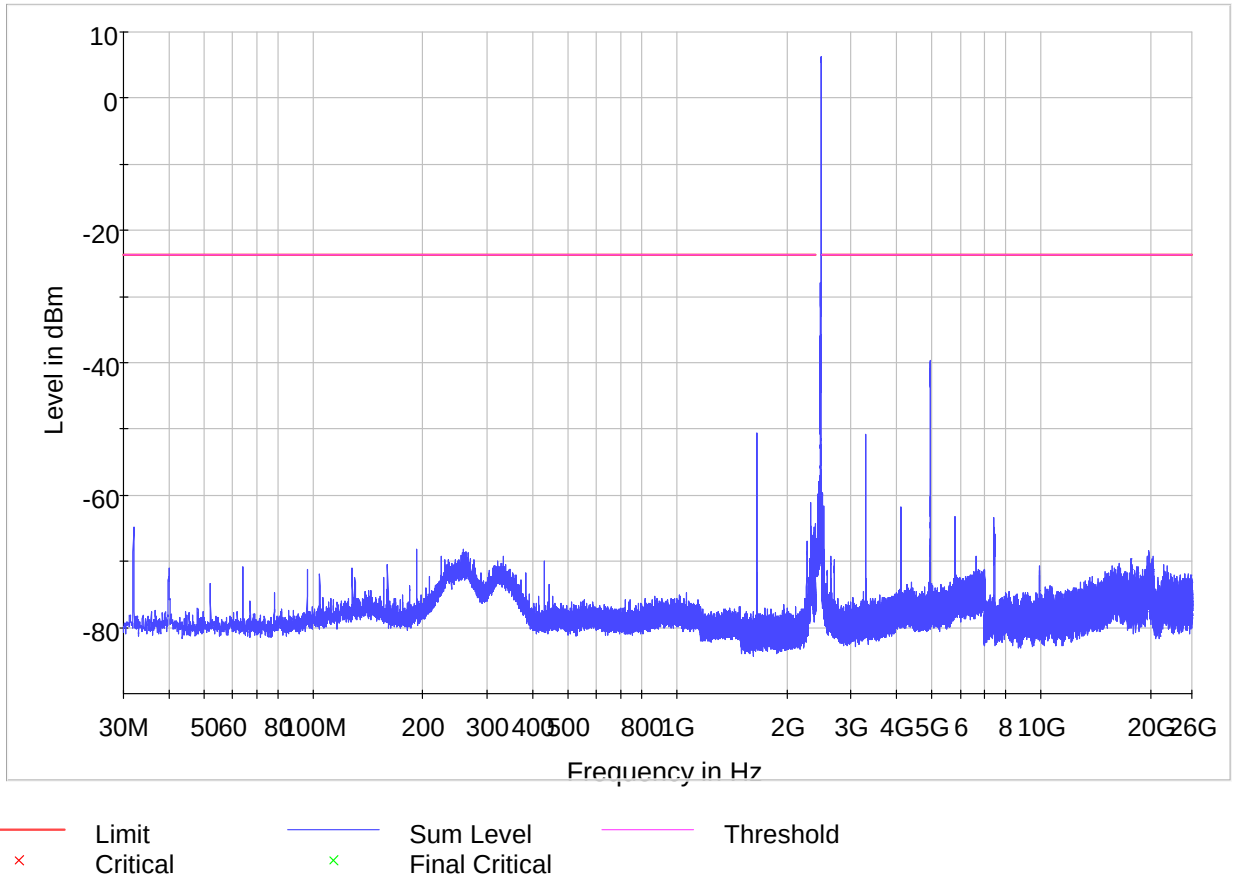


Pre Measurement 1

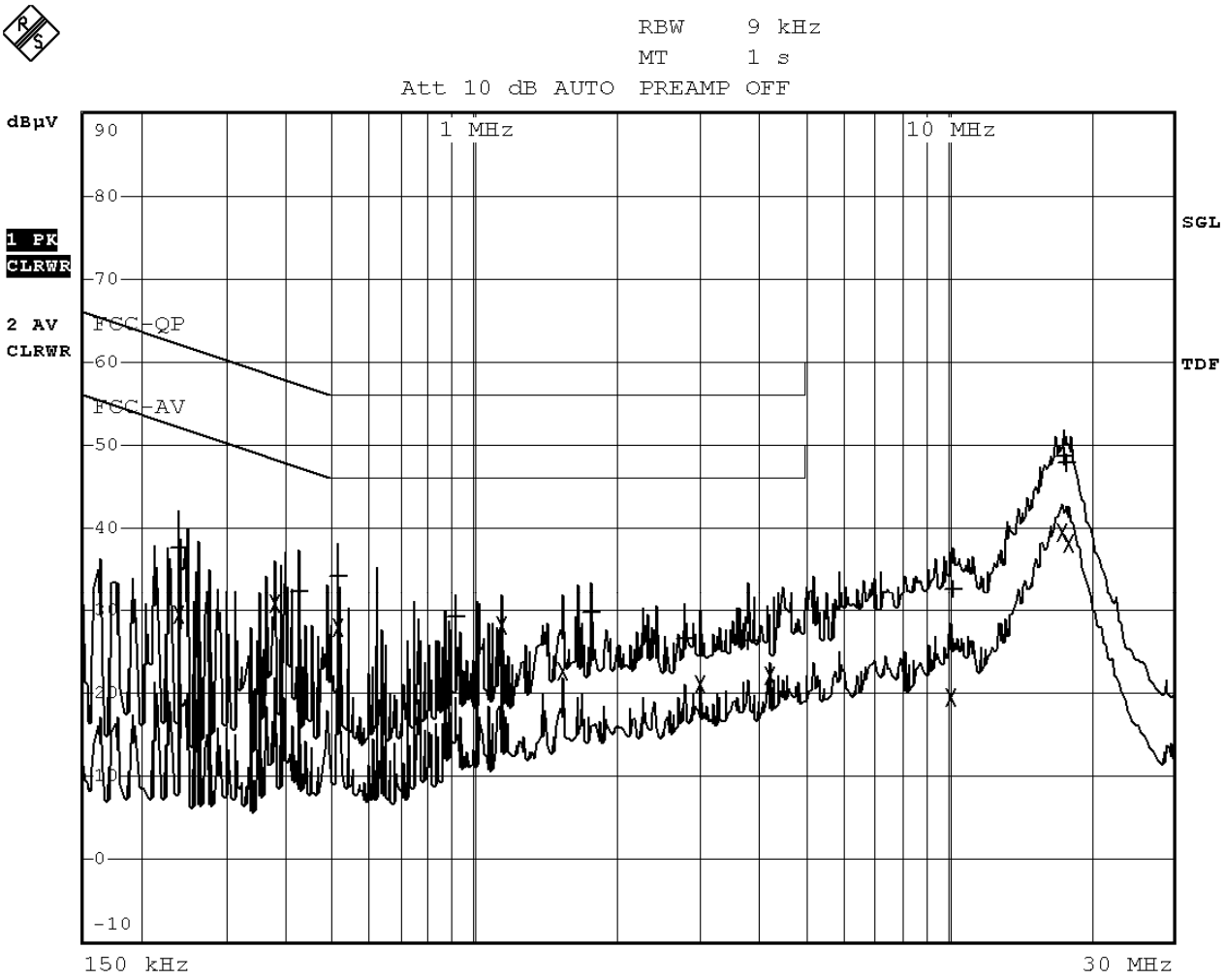
Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	29400	~ 29400
Sweeptime	29.400 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	1.00 dB	1.00 dB
Run	17 / max. 40	max. 40
Stable	1 / 1	1
Max Stable Difference	0.00 dB	1.00 dB

TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

Conducted Emission

Test mode: Bluetooth + charging



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TEST REPORT

Report No. : AY0041769(5) Date : Jul 28, 2019

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC-QP		
Trace2:	FCC-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	240 kHz	37.71 N gnd	-24.38
2 Average	240 kHz	29.49 N gnd	-22.60
2 Average	379.5 kHz	30.75 N gnd	-17.53
1 Quasi Peak	429 kHz	32.49 N gnd	-24.78
1 Quasi Peak	513.5 kHz	34.09 L1 gnd	-21.90
2 Average	513.5 kHz	27.97 N gnd	-18.02
1 Quasi Peak	909.5 kHz	29.28 N gnd	-26.71
2 Average	1.148 MHz	28.16 N gnd	-17.83
2 Average	1.535 MHz	22.64 N gnd	-23.35
1 Quasi Peak	1.769 MHz	29.67 N gnd	-26.32
1 Quasi Peak	2.786 MHz	26.55 N gnd	-29.44
2 Average	2.9975 MHz	21.02 N gnd	-24.97
1 Quasi Peak	3.794 MHz	26.48 N gnd	-29.52
2 Average	4.226 MHz	22.22 N gnd	-23.77
2 Average	10.2155 MHz	19.53 L1 gnd	-30.46
1 Quasi Peak	10.2965 MHz	32.71 N gnd	-27.28
2 Average	17.4965 MHz	39.53 N gnd	-10.46
1 Quasi Peak	17.609 MHz	48.67 N gnd	-11.32
1 Quasi Peak	17.9105 MHz	47.86 N gnd	-12.13
2 Average	18.122 MHz	38.22 N gnd	-11.77

***** End of Report *****