



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0056091(0) Date : 03 Jul 2020

Application No. : LW028506(0)

Applicant : CATEYE CO., LTD.
2-8-25 KUWAZU,
HIGASHI-SHIMIYOSHI-KU,
OSAKA 546-0041, JAPAN

Sample Description : One(1) item of submitted sample stated to be Sync Core
of Model No. HL-NW100
Rating : DC 3.6V Rechargeable battery
No. of submitted sample : Three (3) piece (s)

Date Received : 18 Jun 2020

Test Period : 22 Jun 2020 – 02 Jul 2020

Test Requested : FCC Certification for FCC Part 15, subpart C

Test Method : 47 CFR Part 15 (10-1-19 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 : _____


Mr. WONG Lap-pong, Andrew
Manager

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1 Product Information

1.1 General Information

Product Description:	Model:
Sync Core	HL-NW100

Primary function : Bluetooth communication
 Power supply : DC 3.6V
 RF related function : Bluetooth communication
 Electric Accessories sold : NIL
 with
 Interconnection cable : NIL
 associated sold with
 Operating condition : Not specified
 Model difference : Not applicable

1.2 Technical Information

Operating Frequency : 2402 – 2480MHz
 Digital Modulation : Widband modulation
 Modulation : GFSK
 Number of Channel : 3 (2402MHz, 2426MHz, 2480MHz)
 Channel Bandwidth : 2MHz
 Occupied Bandwidth : 740.594kHz
 Signal Type : Data
 Number of Antenna : One
 Antenna Type : PCB Type Antenna
 Antenna Gain : 0.0 dBi
 Rated Input Voltage : DC 3.6V
 RF Technology Used : BLE
 Simplex or Duplex : Half-duplex

1.3 Associated Electric Accessories Informatin

NIL

1.4 Associated Cables

NIL

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2.0 Equipment Units Tested (EUT)

Product Description : Sync Core
Model : HL-NW100
Serial No. : Not specified
Sample Type : Production Sample and engineering sample
Sample No. : RW029414-004
Rationale of selection : Only one model number

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	ESCI	100152	15 Jan 2021	1Year
Spectrum Analyzer	R&S	FSV40	100964	29 Oct 2020	1Year
Biconical Antenna	Rohde & Schwarz	HK116	837414/004	20 Oct 2020	2Years
Log Periodic Antenna	Teseq	UPA6109	43666	20 Oct 2020	2Years
Loop Antenna	EMCO	6502	00056620	29 Oct 2020	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	02 Feb 2023	3Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	02 Feb 2023	3Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	15 Sep 2021	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	12 Sep 2021	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	07 May 2021	1Year
Coaxial Cable	Suhner	RG 214/U	N/A	07 May 2021	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	14 Jan 2022	2Years
LISN	Rohde & Schwarz	ENV216	101323	12 Jan 2021	1Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	20 Oct 2020	1Year
Rohde & Schwarz TS8997 Testing System					
Spectrum Analyzer	Rohde & Schwarz	FSV 40	101190	30 Oct 2021	2Years
Generator	Rohde & Schwarz	SMB100A	103230	24 Oct 2020	2Years
OSP	Rohde & Schwarz	OSP	OSP120 V02	29 Jun 2021	2Years

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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

Line-conducted emissions

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

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6.0 Measurement

6.1 General Test condition

Temperature : 21°C
Test Voltage : DC 3.6V
Humidity : 60%
Atmosphere Pressure : 102.1kPa

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6.2 Output Power

6.2.1 Measurement

Requirement : FCC Part 15 §15.247(b) (1)
 Measuring procedure : ANSI C63.10:2013, section 11.9.1
 Hopping mode : Disable
 Modulation tested : GFSK
 Channel tested for non-hopping mode : 2402MHz, 2426MHz, 2480MHz
 Additional measuring procedure : Nil
 Remark : Nil

6.2.2 Final Result

Maximum peak conducted output power

Maximum peak conducted output power	Limit(s)	Result	Modulation
-1.0dBm	≤30.0dBm	PASS	GFSK

Remark: Detail test result and equipment setting refer to appendix A, A3, A10, A14.

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6.3 Power Spectral Density

6.3.1 Measurement

Requirement : FCC Part 15 §15.247(a)
 Measuring procedure : ANSI C63.10:2013, section 11.10
 Hopping mode : Disable
 Modulation tested : GFSK
 Channel tested for non-hopping mode : 2402MHz, 2426MHz, 2480MHz
 Additional measuring procedure : Nil
 Remark : Nil

6.3.2 Final Result

Maximum peak conducted output power

Maximum peak conducted output power	Limit(s)	Result	Modulation
-6.9dBm	≤8.0dBm	PASS	GFSK

Remark: 1) Detail test result and equipment setting refer to appendix A, A6, A13, A17.

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6.4 6dB Bandwidth

6.4.1 Measurement

Requirement : FCC Part 15 §15.247(a)
 Measuring procedure : ANSI C63.10:2013, section 11.8
 Hopping mode : Disable
 Modulation tested : GFSK
 Channel tested for non-hopping mode : 2402MHz, 2426MHz, 2480MHz
 Additional measuring procedure : Nil
 Remark : Nil

6.4.2 Final Result

Maximum peak conducted output power

6dB bandwidth	Limit(s) ¹	Result	Modulation
740.594kHz	≥500kHz	PASS	GFSK

Remark: 1) Detail test result and equipment setting refer to appendix A, A4, A5, A11, A12, A15, A16.

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6.5 Band-edge measurement

6.5.1 Measurement

Requirement : FCC Part 15 §15.247(d)
Measuring procedure : ANSI C63.10:2013, section 11.13 and 6.10
Hopping mode : Disable
RBW : 100kHz
VBW : 300kHz
Frequency range : 2310 – 2483.5MHz and 2400 – 2500MHz
Modulation tested : GFSK
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 frequency 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 1 minus 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 frequency 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 1 minus 20dB

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6.5.2 Final Result

Bandedge frequency for lower bandedge (Worst Case)	Worst case (dBc) ²	Detector	Limit ¹ (dBc)	Result	Worst case
2399.975000MHz	37.2	Peak	≥20.0	PASS	GFSK
Bandedge frequency for higher bandedge (Worst Case)	Worst case in (dBc) ²	Detector	Limit ¹	Result	Worst case
2483.525000MHz	46.9	Peak	≥20.0	PASS	GFSK

Remark: 1) The limit is based on the transmitter demonstrated compliance with peak conducted power limit on section 6.2.2 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, A7-9, A18-20.

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6.6 Conducted Spurious emission (Transmitter)

6.6.1 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
Channel tested for non-hopping mode : 2402MHz, 2426MHz, 2480MHz
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 final 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 2426MHz and 2480MHz
Remark : Nil

6.6.2 Final Result

Table with 6 columns: Worst case spurious emission frequency, Worst case spurious emission power, Limit, Margin, Result, Worst case mode. Row 1: 4851.625000MHz, -42.6dBm, -21.7dBm, 20.9dB, PASS, GFSK

- Remark: 1) Spurious emission power = measured conducted power + antenna 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) + 4,7dB - 104.8dB 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, A21-26.



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6.7 Radiated Spurious emission (Transmitter)

6.7.1 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.

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6.7.2 Final Result

Test mode: Transmission mode

Table with 8 columns: Polarization, Frequency (MHz), Reading at 3m (dBµV), Transducer Factor (dB/m), Field Strength at 3m (dBµV/m), Limit at 3m (dBµV/m), Margin (dB), and Detector (PK/QP/AV). It contains 24 rows of test data.

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6.7.2 Final Result (Cont'd)

Test mode: Transmission mode

Table with 8 columns: Polarization, Frequency (MHz), Reading at 3m (dBµV), Transducer Factor (dB/m), Field Strength at 3m (dBµV/m), Limit at 3m (dBµV/m), Margin (dB), and Detector (PK/QP/AV). It contains 14 rows of test data.

- Remark: 1) Field Strength = Reading + transducer factor.
2) Other emission with more than 20dB margin are not reported in this report.
3) For emission above 1GHz, the Peak test data is compared with Average limit if the Peak measured is lower than Average limit.



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6.8 Radiated Spurious emission (Receiver)

6.8.1 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 receiving mode is selected for spurious radiated emission test from cabinet.

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6.8.2 Final Result

Test mode: Receiving mode (2402MHz)

Table with 8 columns: Polarization, Frequency (MHz), Reading at 3m (dBµV), Transducer Factor (dB/m), Field Strength at 3m (dBµV/m), Limit at 3m (dBµV/m), Margin (dB), Detector (PK/QP/AV). Rows show data for frequencies 68.705, 108.357, 153.329, 207.281, 244.100, 293.916, and 334.010.

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

Test mode: Receiving mode (2426MHz)

Table with 8 columns: Polarization, Frequency (MHz), Reading at 3m (dBµV), Transducer Factor (dB/m), Field Strength at 3m (dBµV/m), Limit at 3m (dBµV/m), Margin (dB), Detector (PK/QP/AV). Rows show data for frequencies 65.474, 114.941, 174.760, 221.099, 262.997, 299.694, and 339.182.

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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Test mode: Receiving mode (2480MHz)

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	65.156	4.3	10.0	14.3	40.0	-25.7	QP
H	102.725	8.8	11.2	20.0	43.5	-23.5	QP
H	155.928	6.0	13.5	19.5	43.5	-24.0	QP
H	213.582	3.7	14.5	18.2	43.5	-25.3	QP
H	251.530	7.6	14.5	22.1	46.0	-23.9	QP
H	285.018	9.4	14.0	23.4	46.0	-22.6	QP
H	319.130	7.8	16.9	24.7	46.0	-21.3	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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6.9 Conducted Emission

6.9.1 Measurement

Requirement : FCC Part 15 §15.207(a) and RSS-Gen, clause 8.8
 Measuring procedure : ANSI C63.4:2014, section 7.3
 Test mode : Charging mode
 RBW : 9kHz
 VBW : 30kHz
 Modulation tested : GFSK¹
 Additional measuring procedure : Nil
 Remark : Nil

6.9.2 Final Result

Worst case conducted emission frequency	Worst case conducted emission	Limit	Margin	Detector	Lines	Worst case mode	Result
17.4965MHz	47.88dBμV	60.00dBμV	-12.11dB	QP	N	Charging	PASS

Remark: 1) Detail test result and equipment setting refer to appendix A, A27, A28.

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APPENDIX A Test Result

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The conformity statement stated in Conclusion above is based on the decision rule agreed with applicant and listed in www.cmateesting.org/qac/statement-of-conformity.pdf
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CMA Industrial Development Foundation Limited

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FCC Part 47 §15.247 2400-2483.5 MHz 2016

DUT Information

Frequencies

2402 MHz (2402 MHz)	2426 MHz (2426 MHz)	2480 MHz (2480 MHz)
2426 MHz (2426 MHz)		

Bandwidths

1.1 MHz (1.1 MHz)

Power

0.000 dBm (0 dBm)

Beamforming Gain

0.000 dBm (0 dBm) 0 dB

Gain Tables

0.000 dBm (0 dBm) Port 1: ---;

DUT Settings

No. of transmission chains	1
Equipment Type	Other
Digital Modulation	Yes
Frequency Hopping	No

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

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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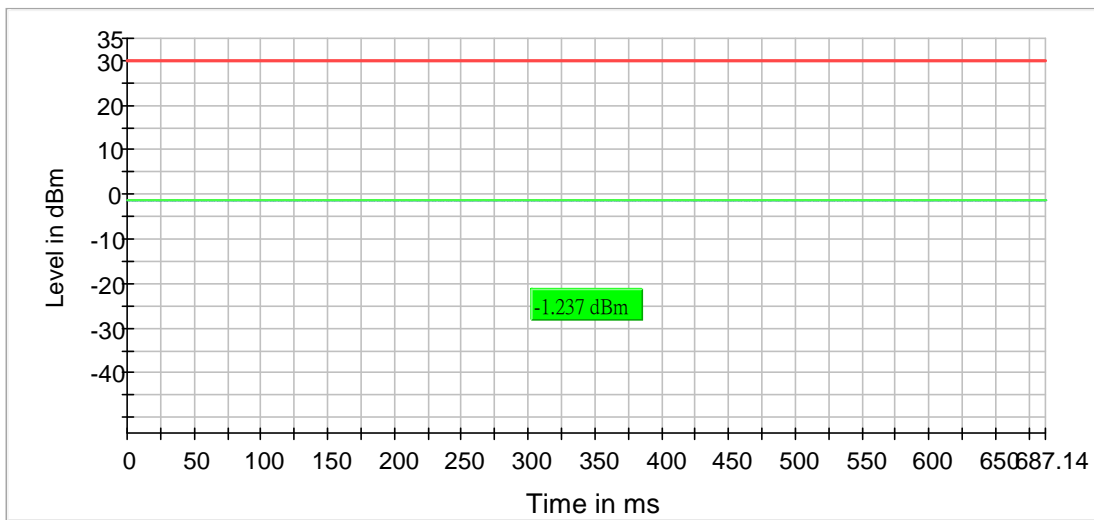
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RF output power (2402 MHz)

Result

DUT Frequency (MHz)	Gated EIRP (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2402.000000	-1.2	30.0	68.598	PASS



— Gated Trace — Overall — Limit

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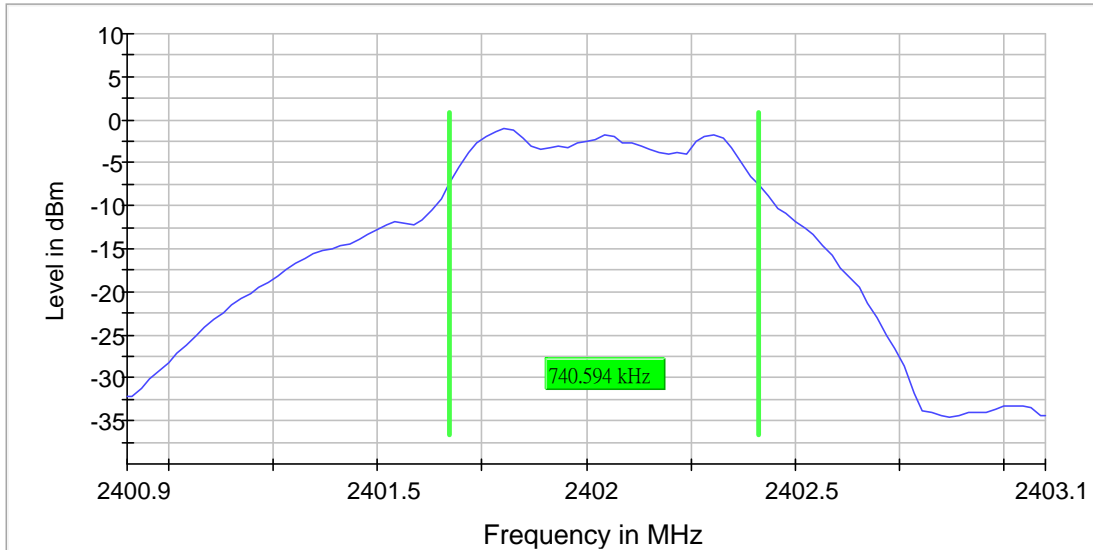
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Minimum Emission Bandwidth 6 dB

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.740594	0.500000	---	2401.673267	2402.413861

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	-1.1	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40090 GHz	2.40090 GHz
Stop Frequency	2.40310 GHz	2.40310 GHz
Span	2.200 MHz	2.200 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 22
SweepTime	19.009 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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

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Run	9 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.13 dB	0.50 dB

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TEST REPORT

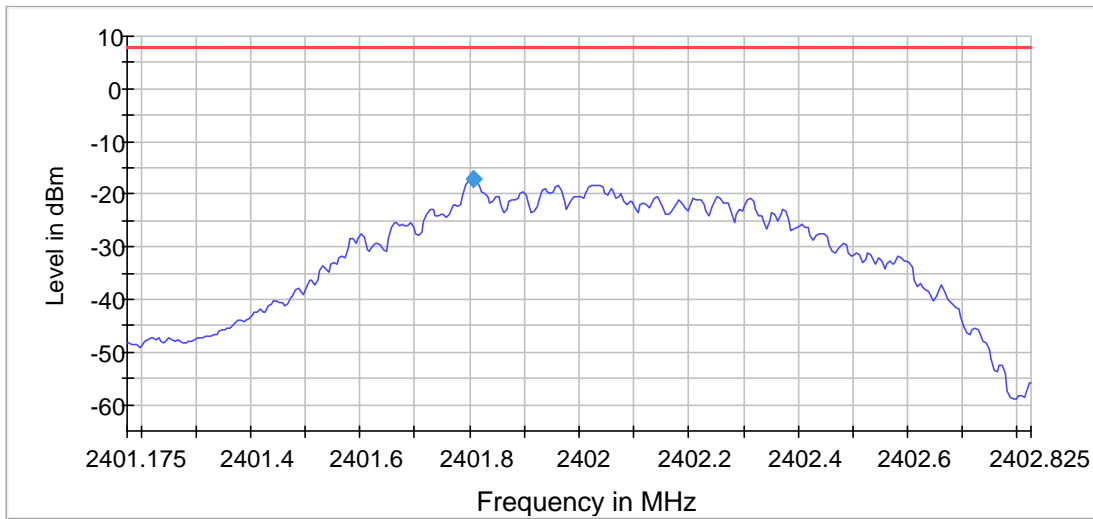
Report No. : AW0056091(0)

Date : 03 Jul 2020

Power Spectral Density (2402 MHz)

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2402.000000	2401.807500	-17.245	8.0	PASS



— Limit — Sum Level ◆ PSD

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40118 GHz	2.40118 GHz
Stop Frequency	2.40283 GHz	2.40283 GHz
Span	1.650 MHz	1.650 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	330	~ 330
SweepTime	1.650 s	1.650 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
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	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.26 dB	0.50 dB

FCC ID: ON5-HLW100



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TEST REPORT

Report No. : AW0056091(0)

Date : 03 Jul 2020

Band Edge low (2402 MHz)

Result

DUT Frequency (MHz)	Result
2402.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2401.825000	-4.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-41.5	17.1	-24.3	PASS
2399.925000	-41.8	17.5	-24.3	PASS
2399.875000	-41.9	17.6	-24.3	PASS
2399.825000	-42.3	18.0	-24.3	PASS
2399.775000	-42.7	18.4	-24.3	PASS
2399.725000	-42.9	18.6	-24.3	PASS
2399.675000	-43.5	19.1	-24.3	PASS
2399.625000	-43.5	19.2	-24.3	PASS
2399.575000	-43.7	19.3	-24.3	PASS
2399.525000	-44.0	19.7	-24.3	PASS
2399.475000	-44.4	20.0	-24.3	PASS
2399.425000	-44.9	20.5	-24.3	PASS
2399.375000	-45.0	20.7	-24.3	PASS
2399.325000	-45.5	21.2	-24.3	PASS
2399.275000	-45.7	21.3	-24.3	PASS

FCC ID: ON5-HLW100



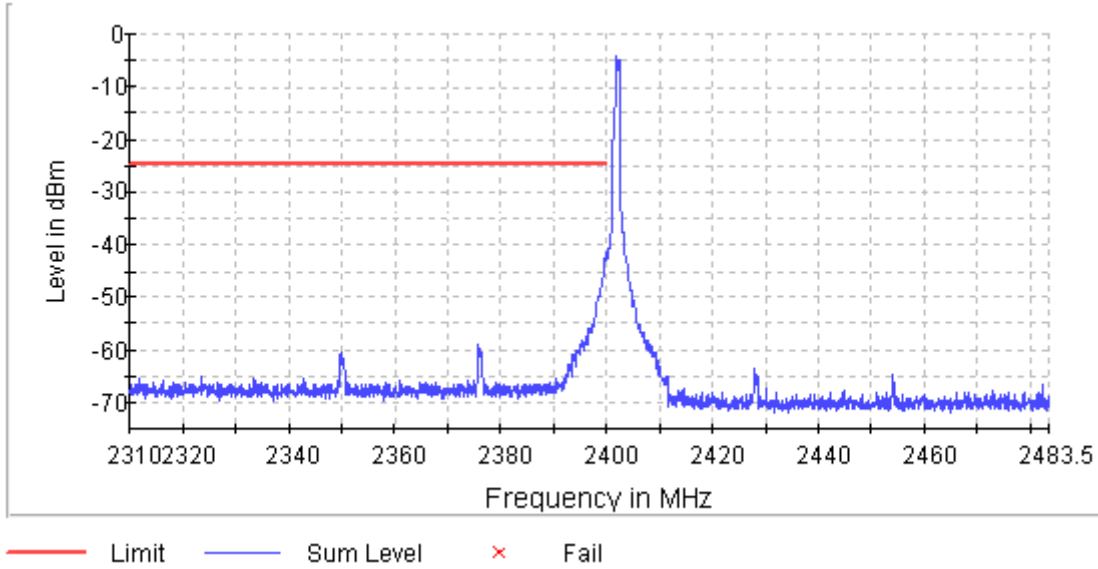
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Report No. : AW0056091(0)

Date : 03 Jul 2020



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	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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	16 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.09 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

FCC ID: ON5-HLNW100



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SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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	0.12 dB	0.50 dB

FCC ID: ON5-HLNW100

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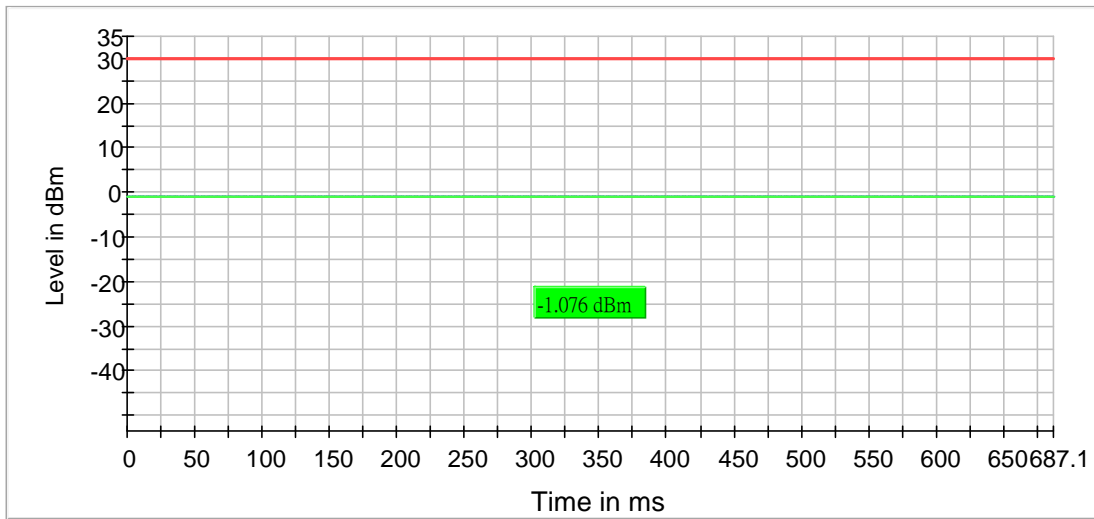
Report No. : AW0056091(0)

Date : 03 Jul 2020

RF output power (2426 MHz)

Result

DUT Frequency (MHz)	Gated EIRP (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2426.000000	-1.1	30.0	68.594	PASS



— Gated Trace — Overall — Limit

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TEST REPORT

Report No. : AW0056091(0)

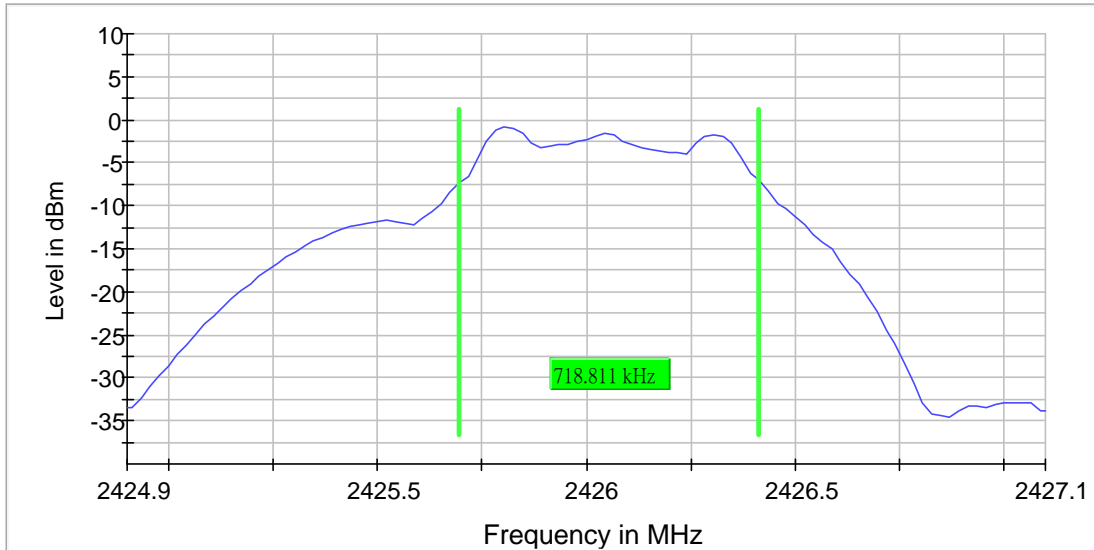
Date : 03 Jul 2020

Minimum Emission Bandwidth 6 dB

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2426.000000	0.718811	0.500000	---	2425.695050	2426.413861

DUT Frequency (MHz)	Max Level (dBm)	Result
2426.000000	-0.8	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.42490 GHz	2.42490 GHz
Stop Frequency	2.42710 GHz	2.42710 GHz
Span	2.200 MHz	2.200 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 22
SweepTime	19.009 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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

FCC ID: ON5-HLNW100



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Run	7 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.12 dB	0.50 dB

FCC ID: ON5-HLNW100

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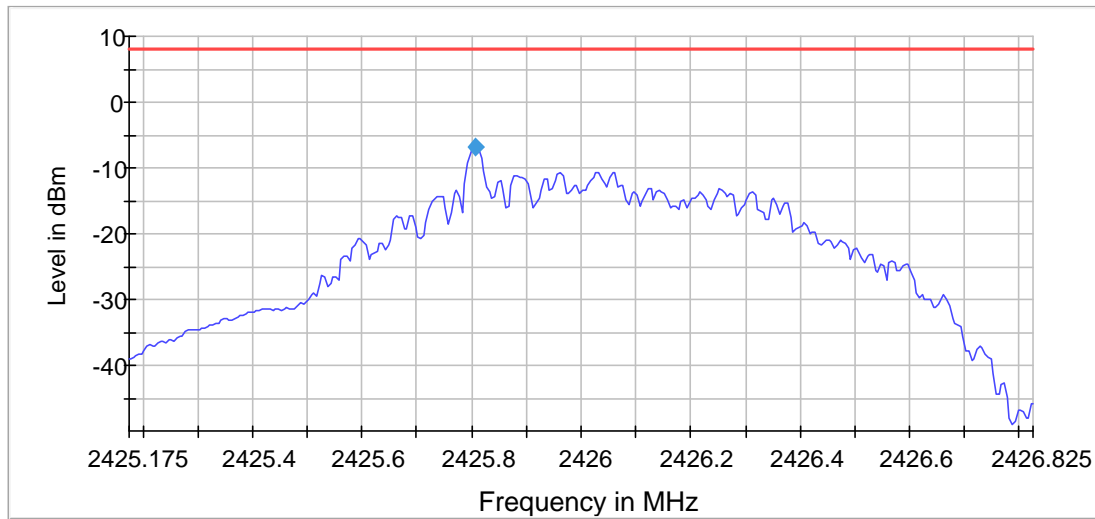
Report No. : AW0056091(0)

Date : 03 Jul 2020

Power Spectral Density (2426 MHz)

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2426.000000	2425.807500	-6.922	8.0	PASS



— Limit — Sum Level ◆ PSD

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.42518 GHz	2.42518 GHz
Stop Frequency	2.42683 GHz	2.42683 GHz
Span	1.650 MHz	1.650 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	330	~ 330
SweepTime	1.650 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
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	7 / max. 150	max. 150
Stable	2 / 2	2
Max Stable	0.17 dB	0.50 dB

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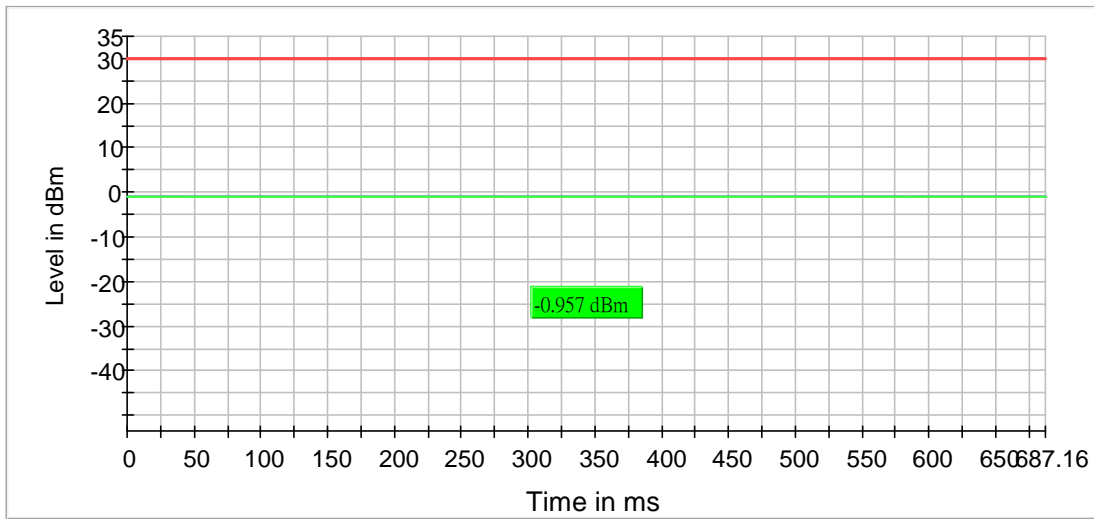
Report No. : AW0056091(0)

Date : 03 Jul 2020

RF output power (2480 MHz)

Result

DUT Frequency (MHz)	Gated EIRP (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2480.000000	-1.0	30.0	68.600	PASS



— Gated Trace
 — Overall
 — Limit

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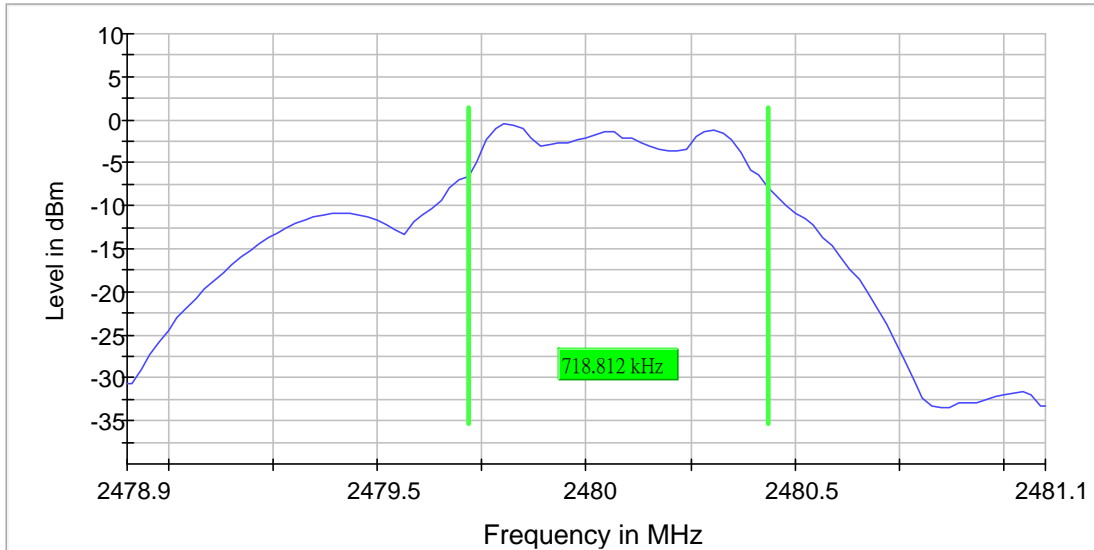
Date : 03 Jul 2020

Minimum Emission Bandwidth 6 dB

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.718812	0.500000	---	2479.716832	2480.435644

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	-0.5	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47890 GHz	2.47890 GHz
Stop Frequency	2.48110 GHz	2.48110 GHz
Span	2.200 MHz	2.200 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 22
SweepTime	19.009 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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

FCC ID: ON5-HLNW100



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Run	12 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.19 dB	0.50 dB

FCC ID: ON5-HLNW100

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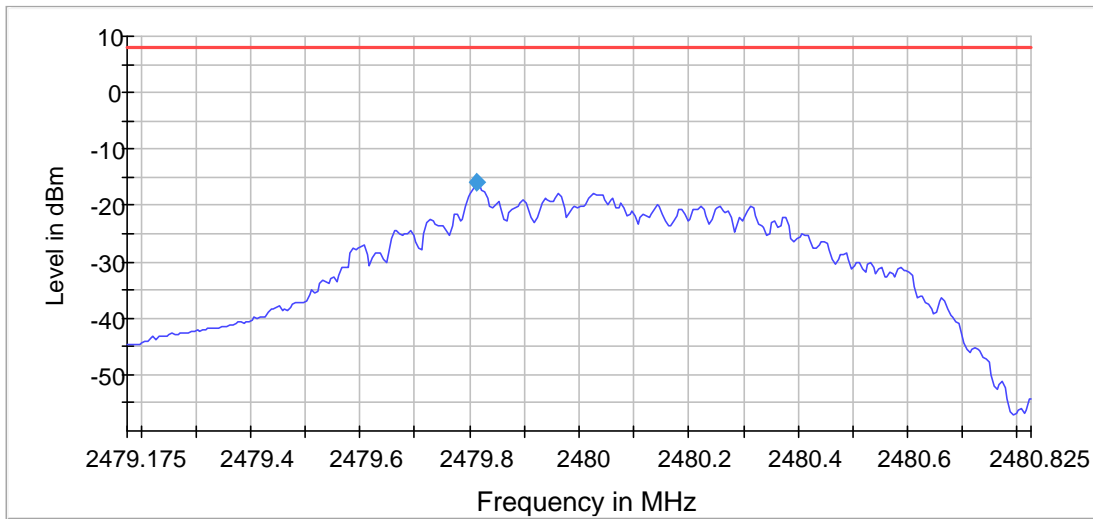
Report No. : AW0056091(0)

Date : 03 Jul 2020

Power Spectral Density (2480 MHz)

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2480.000000	2479.812500	-16.000	8.0	PASS



— Limit — Sum Level ◆ PSD

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47918 GHz	2.47918 GHz
Stop Frequency	2.48083 GHz	2.48083 GHz
Span	1.650 MHz	1.650 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	330	~ 330
SweepTime	1.650 s	1.650 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
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	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.13 dB	0.50 dB

FCC ID: ON5-HLW100



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TEST REPORT

Report No. : AW0056091(0)

Date : 03 Jul 2020

Band Edge high (2480 MHz)

Result

DUT Frequency (MHz)	Result
2480.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2479.825000	-4.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-50.9	26.9	-24.0	PASS
2483.575000	-51.3	27.3	-24.0	PASS
2483.625000	-51.4	27.3	-24.0	PASS
2483.675000	-51.4	27.3	-24.0	PASS
2483.725000	-51.6	27.5	-24.0	PASS
2483.775000	-51.9	27.9	-24.0	PASS
2483.825000	-52.2	28.2	-24.0	PASS
2483.875000	-52.7	28.6	-24.0	PASS
2483.925000	-53.3	29.3	-24.0	PASS
2483.975000	-53.7	29.6	-24.0	PASS
2484.025000	-53.9	29.9	-24.0	PASS
2484.075000	-53.9	29.9	-24.0	PASS
2484.125000	-54.1	30.0	-24.0	PASS
2484.175000	-54.7	30.7	-24.0	PASS
2484.225000	-55.2	31.2	-24.0	PASS

FCC ID: ON5-HLNW100



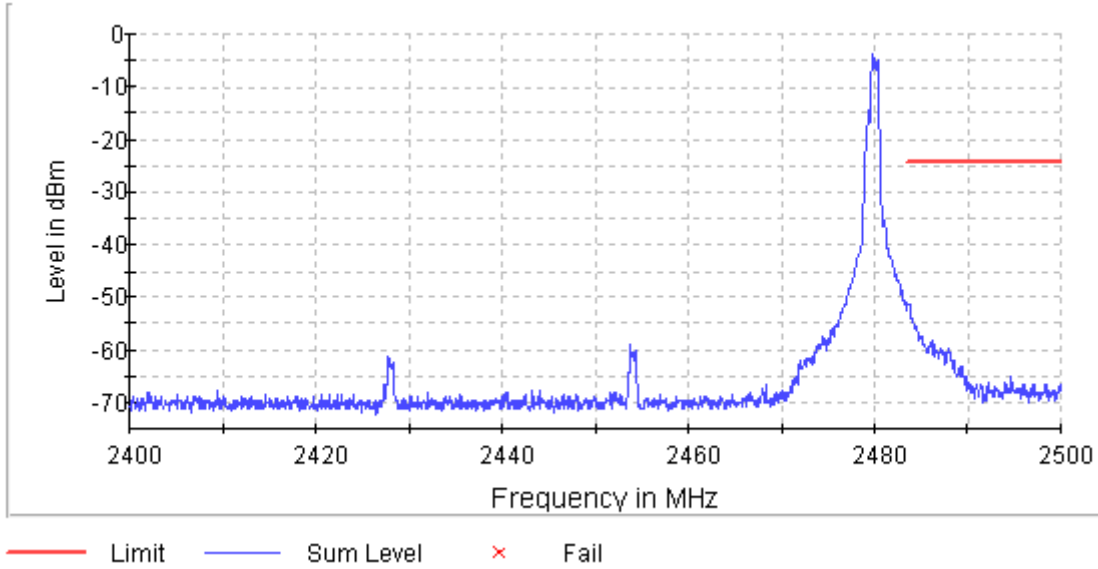
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Date : 03 Jul 2020



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	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.33 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

FCC ID: ON5-HLNW100



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SweepPoints	330	~ 330
SweepTime	37.969 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 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	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

FCC ID: ON5-HLNW100

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TEST REPORT

Report No. : AW0056091(0)

Date : 03 Jul 2020

Tx Spurious Emission (2402 MHz)

Result Inband Peak

Frequency (MHz)	Level (dBm)
2402.000	-1.8

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	-38.8	17.0	-21.8
2399.925000	-39.3	17.5	-21.8
2399.875000	-40.3	18.5	-21.8
2399.825000	-41.8	20.0	-21.8
2399.525000	-42.4	20.6	-21.8
2399.475000	-42.5	20.7	-21.8
2399.425000	-42.6	20.8	-21.8
4803.625000	-42.6	20.8	-21.8
2399.575000	-42.7	20.9	-21.8
4803.575000	-43.0	21.1	-21.8
2399.375000	-43.7	21.9	-21.8
2399.225000	-43.8	22.0	-21.8
2399.275000	-43.9	22.1	-21.8
4803.675000	-43.9	22.1	-21.8
2399.625000	-44.1	22.2	-21.8

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

FCC ID: ON5-HLW100



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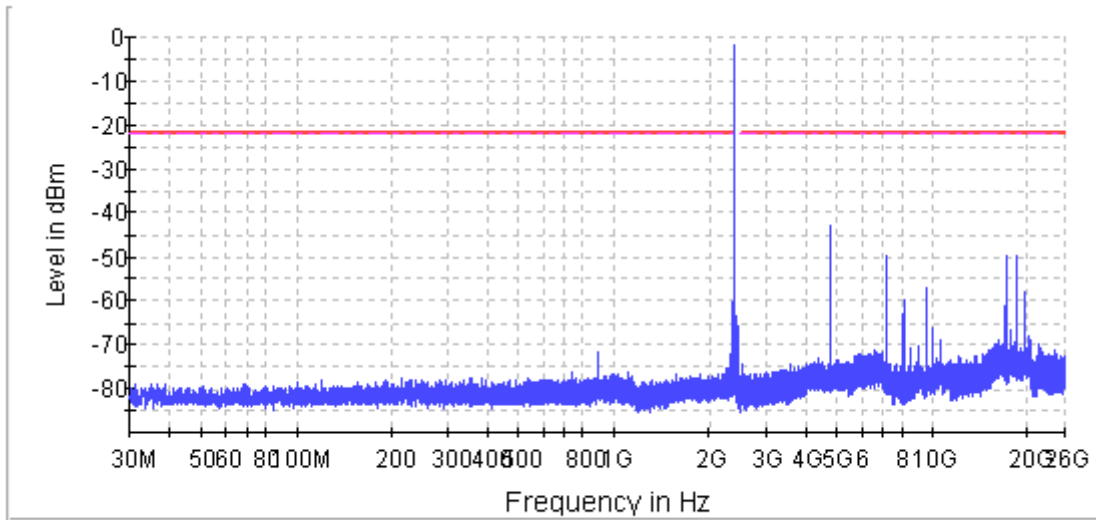
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Date : 03 Jul 2020

21983.500000	23483.500000	1	1
23483.500000	24983.500000	1	1
24983.500000	26000.000000	1	1



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	3 / max. 40	max. 40
Stable	1 / 1	1
Max Stable Difference	0.00 dB	1.00 dB

FCC ID: ON5-HLW100



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TEST REPORT

Report No. : AW0056091(0)

Date : 03 Jul 2020

Tx Spurious Emission (2426 MHz)

Result Inband Peak

Frequency (MHz)	Level (dBm)
2426.000	-1.7

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)
4851.625000	-42.6	20.9	-21.7
4851.675000	-43.1	21.4	-21.7
4851.575000	-43.5	21.8	-21.7
4852.625000	-43.8	22.1	-21.7
4852.675000	-44.1	22.4	-21.7
4852.575000	-44.5	22.8	-21.7
4852.075000	-45.0	23.3	-21.7
4852.125000	-45.0	23.3	-21.7
4851.725000	-45.9	24.2	-21.7
4851.525000	-46.5	24.9	-21.7
4852.525000	-47.2	25.5	-21.7
4852.175000	-47.4	25.7	-21.7
4852.725000	-48.0	26.3	-21.7
4851.775000	-48.2	26.6	-21.7
4852.225000	-48.3	26.6	-21.7

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

FCC ID: ON5-HLW100



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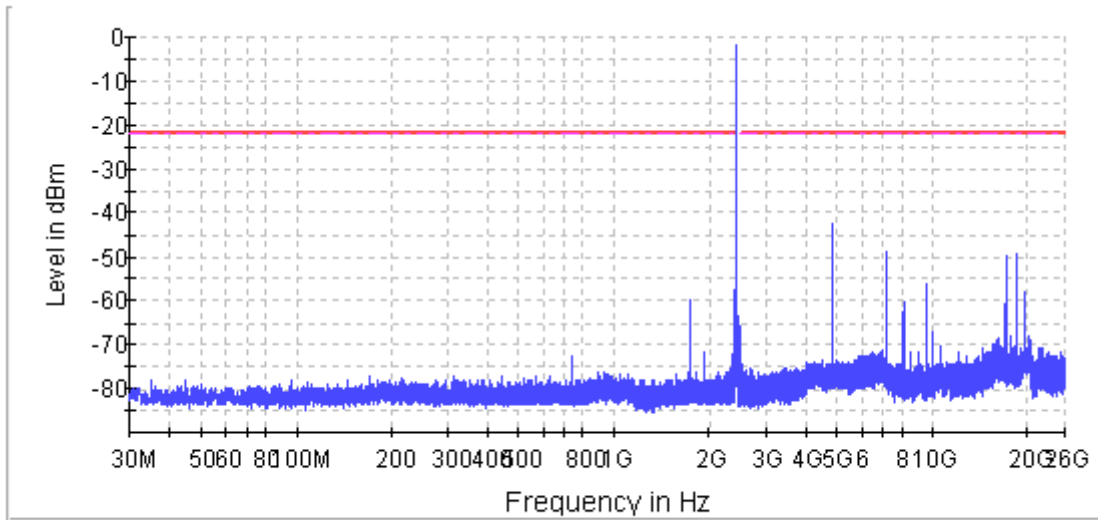
廠商會檢定中心

TEST REPORT

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21983.500000	23483.500000	1	1
23483.500000	24983.500000	1	1
24983.500000	26000.000000	1	1



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	3 / max. 40	max. 40
Stable	1 / 1	1
Max Stable Difference	0.00 dB	1.00 dB

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Tx Spurious Emission (2480 MHz)

Result Inband Peak

Frequency (MHz)	Level (dBm)
2480.000	-1.8

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)
4959.625000	-43.5	21.7	-21.8
4959.675000	-43.9	22.1	-21.8
4960.625000	-44.5	22.7	-21.8
4959.575000	-44.8	23.0	-21.8
4960.675000	-45.1	23.3	-21.8
4960.575000	-45.2	23.4	-21.8
4959.725000	-46.0	24.2	-21.8
4960.125000	-46.2	24.4	-21.8
4960.075000	-46.5	24.7	-21.8
4960.175000	-47.4	25.6	-21.8
4960.725000	-48.8	27.0	-21.8
2483.575000	-49.0	27.2	-21.8
2483.625000	-49.1	27.3	-21.8
4960.225000	-49.2	27.4	-21.8
18634.375000	-49.3	27.5	-21.8

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

FCC ID: ON5-HLNW100



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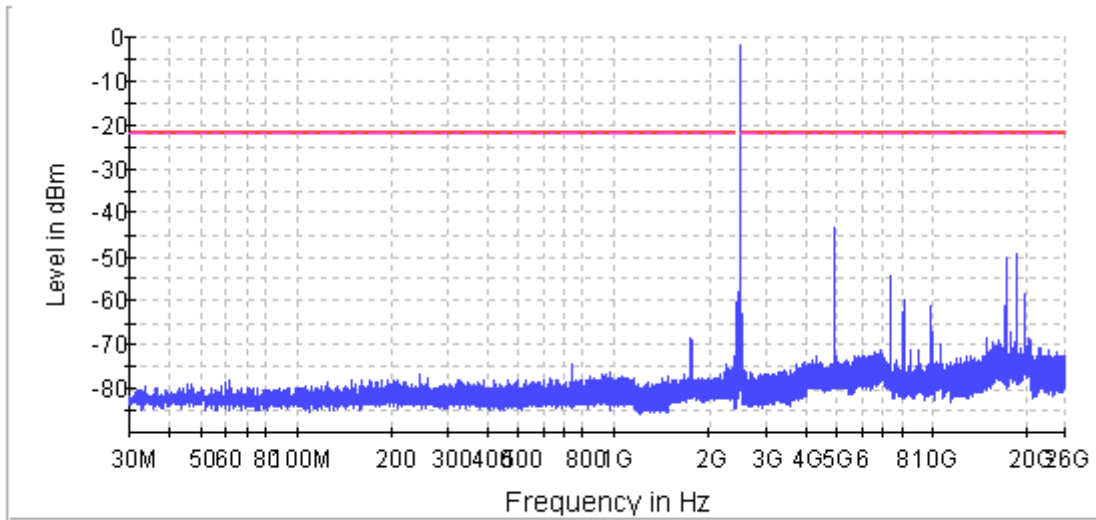
廠商會檢定中心

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21983.500000	23483.500000	1	1
23483.500000	24983.500000	1	1
24983.500000	26000.000000	1	1



— 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	2 / max. 40	max. 40
Stable	1 / 1	1
Max Stable Difference	0.00 dB	1.00 dB

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TEST REPORT

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Date : 03 Jul 2020

Conducted Emission

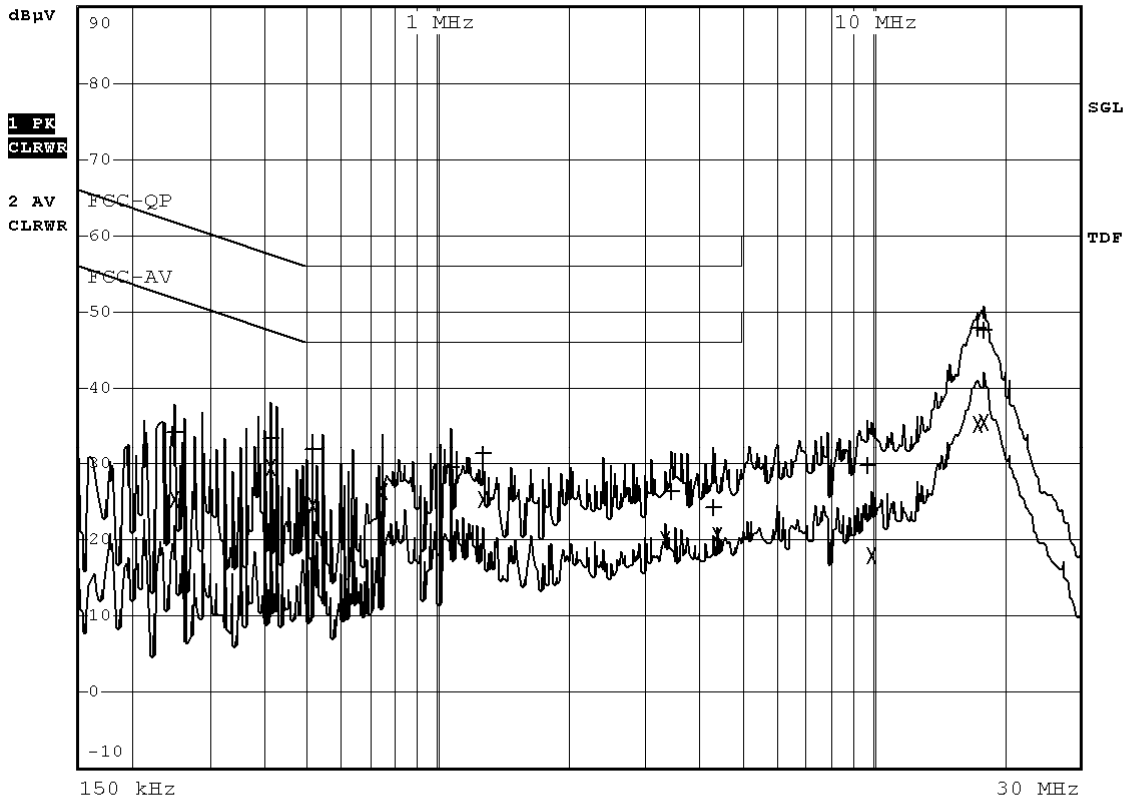
Charging mode



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF



FCC ID: ON5-HLNW100



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廠商會檢定中心

TEST REPORT

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Date : 03 Jul 2020

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC-QP			
Trace2:	FCC-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1 Quasi Peak	249 kHz	34.24	L1 gnd	-27.54
2 Average	249 kHz	25.31	N gnd	-26.47
1 Quasi Peak	415.5 kHz	33.46	N gnd	-24.07
2 Average	415.5 kHz	29.63	N gnd	-17.90
1 Quasi Peak	513.5 kHz	31.94	L1 gnd	-24.05
2 Average	513.5 kHz	24.61	N gnd	-21.38
2 Average	747.5 kHz	26.45	N gnd	-19.54
1 Quasi Peak	1.067 MHz	29.48	N gnd	-26.51
1 Quasi Peak	1.265 MHz	31.23	N gnd	-24.76
2 Average	1.265 MHz	25.25	N gnd	-20.74
2 Average	3.326 MHz	19.97	N gnd	-26.02
1 Quasi Peak	3.443 MHz	26.45	N gnd	-29.54
1 Quasi Peak	4.3115 MHz	24.32	N gnd	-31.67
2 Average	4.406 MHz	20.45	N gnd	-25.54
1 Quasi Peak	9.7655 MHz	29.81	N gnd	-30.18
2 Average	9.977 MHz	17.87	L1 gnd	-32.12
2 Average	17.483 MHz	35.31	N gnd	-14.68
1 Quasi Peak	17.4965 MHz	47.88	N gnd	-12.11
1 Quasi Peak	18.014 MHz	47.69	N gnd	-12.30
2 Average	18.014 MHz	35.47	N gnd	-14.52

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

FCC ID: ON5-HLNW100