

**FCC/ISED - TEST REPORT**

Report Number : **709502501241-00B** Date of Issue: April 10, 2025

Model : IP8MDSCB1, IP8MDSCB2, IP8MDSCB3, IP8MDSCB4, IP8MDSCB1-64, IP8MDSCB2-64, IP8MDSCB3-64, IP8MDSCB4-64, EBIP8MDSCB2-128, EBIP8MDSCB1-128

Product Type : DEFENDER

Applicant : Empowerment Technologies Inc.

Address : Unit 2, 590 York Road, Niagara on the Lake, ON, Canada L0S 1J0

Manufacturer : Empowerment Technologies Inc.

Address : Unit 2, 590 York Road, Niagara on the Lake, ON, Canada L0S 1J0

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 120



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2 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
709502501241-00B	First Issue	04/10/2025

3 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
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FCC Registration No.: 820234

FCC Designation Number: CN1183

ISED CAB identifier CN0101

IC Registration No.: 31668



4 Description of the Equipment under Test

Product:	DEFENDER
Model no.:	IP8MDSCB1, IP8MDSCB2, IP8MDSCB3, IP8MDSCB4, IP8MDSCB1-64, IP8MDSCB2-64, IP8MDSCB3-64, IP8MDSCB4-64, EBIP8MDSCB2-128, EBIP8MDSCB1-128
Hardware Version Identification No. (HVIN)	IP8MDSCB1
Product Marketing Name (PMN)	IP8MDSCB1, IP8MDSCB2, IP8MDSCB3, IP8MDSCB4, IP8MDSCB1-64, IP8MDSCB2-64, IP8MDSCB3-64, IP8MDSCB4-64, EBIP8MDSCB2-128, EBIP8MDSCB1-128
FCC ID:	2AV6B-IP8DSCB1
IC:	26035-IP8DSCB1
Options and accessories:	NA
Rating:	100~240V, 50/60Hz
RF Transmission Frequency:	802.11b/g/n-HT20/ax-HE20: 2412~2462 MHz 802.11n-HT40/ax-HE40: 2422~2452 MHz
No. of Operated Channel:	11 for 802.11b/802.11g/802.11n(H20)/ 802.11ax(H20) 9 for 802.11n(HT20)/ 802.11ax(HE40)
Modulation:	Direct Sequence Spread Spectrum (DSSS) for 802.11b Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n Orthogonal Frequency-Division Multiple Access (OFDMA) for 802.11ax
Hardware Version:	V1.0
Software Version:	V1.0
Data speed:	11b 1-11Mbps 11g 6-54Mbps 11n(HT20) 6.5-72.2Mbps 11n(HT40) 13.5-150Mbps 11ax(HE20) 7.313 ~ 143.382Mbps 11ax(HE40) 14.625 ~ 286.765Mbps



Channel list:

802.11b/g/n(HT20)/ax(HT20)			
Ch	Fre(MHz)	Ch	Fre(MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

802.11n(HT40)/ax(HT40)			
Ch	Fre(MHz)	Ch	Fre(MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437		

Antenna Type: Dipole antenna

Antenna Gain: 1.8 dBi

Description of the EUT: The Equipment Under Test (EUT) is a DEFENDER with Wi-Fi Module. The EUT support Wi-Fi operated at 2.4GHz.

Test sample no.: SHA-891853-3 (Radiated sample)
SHA-891853-2 (Conducted sample)

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment, antenna gain or any information supplied.



5 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2023 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 April 2018 + Amendment 1 March 2019 + Amendment 2 February 2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 3 August 2023	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 Measurement Guidance and ANSI C63.10-2020.



6 Summary of Test Results

Technical Requirements							
FCC Part 15 Subpart C & RSS-247 Issue 3/RSS-Gen Issue 5							
Test Condition			Pages	Test Site	Test Result		
					Pass	Fail	N/A
§15.207	RSS-GEN 8.8	Conducted emission AC power port	14-16	Site 1	☒	☐	☐
§15.247 (b) (3)	RSS-247 5.4(d)	Conducted peak output power	17-18	Site 1	☒	☐	☐
	RSS-247 5.4(d)	Equivalent Isotropic Radiated Power	17-18	Site 1	☒	☐	☐
§15.247(a)(1)	RSS-247 5.1(a) & RSS-Gen 6.7	20dB bandwidth and 99% Occupied Bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	RSS-247 5.1(b)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	RSS-247 5.1(d)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	RSS-247 5.1(d)	Dwell Time - Average Time of Occupancy	---	---	☐	☐	☒
§15.247(a)(2)	RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth and 99% Occupied Bandwidth	19-31	Site 1	☒	☐	☐
§15.247(e)	RSS-247 5.2(b)	Power spectral density	32-39	Site 1	☒	☐	☐
§15.247(d)	RSS-247 5.5	Spurious RF conducted emissions	40-64	Site 1	☒	☐	☐
§15.247(d)	RSS-247 5.5	Band edge	65-73	Site 1	☒	☐	☐
§15.247(d) & §15.209 & §15.205	RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	74-115	Site 1	☒	☐	☐
§15.203	RSS-Gen 6.8	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a Dipole antenna, which gain is 1.8 dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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



jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi



7 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AV6B-IP8DSCB1, IC: 26035-IP8DSCB1, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-247, RSS-GEN.

According to the client's declaration, All models shared the same HVIN (IP8MDSCB1), they are identical in the same schematic and hardware circuit with the following exceptions:

No.	Model Name	Descriptions
1	IP8MDSCB1	A unit is sold separately.
2	IP8MDSCB2	With two same units inside of the package, sales together. Note: Each unit operates in standalone mode.
3	IP8MDSCB3	With three same units inside of the package, sales together. Note: Each unit operates in standalone mode.
4	IP8MDSCB4	With four same units inside of the package, sales together. Note: Each unit operates in standalone mode.
5	IP8MDSCB1-64	A unit with 64G SD card is sold separately.
6	IP8MDSCB2-64	Two same units with 64G SD card inside of the package, sales together. Note: Each unit operates in standalone mode.
7	IP8MDSCB3-64	Three same units with 64G SD card inside of the package, sales together. Note: Each unit operates in standalone mode.
8	IP8MDSCB4-64	Four same units with 64G SD card inside of the package, sales together. Note: Each unit operates in standalone mode.
9	EBIP8MDSCB2-128	Two same units with 128G SD card inside of the package, sales together. Note: Each unit operates in standalone mode.
10	EBIP8MDSCB1-128	A unit with 128G SD card inside of the package, sales together.

So model IP8MDSCB1 was chosen to perform all the tests.

We tested it and listed the worst data in this report.

SUMMARY:

All tests according to the regulations cited on page 6 were

■ - Performed

□ - Not Performed



The Equipment under Test

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

Sample Received Date: February 21, 2025

Testing Start Date: March 17, 2025

Testing End Date: April 10, 2025

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

Reviewed by:

Prepared by:

Tested by:



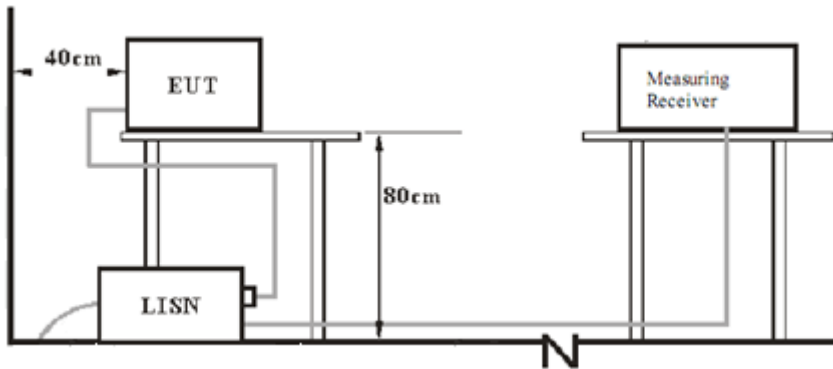
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Review Engineer

Wenqiang LU
Project Engineer

Chengjie GUO
Test Engineer

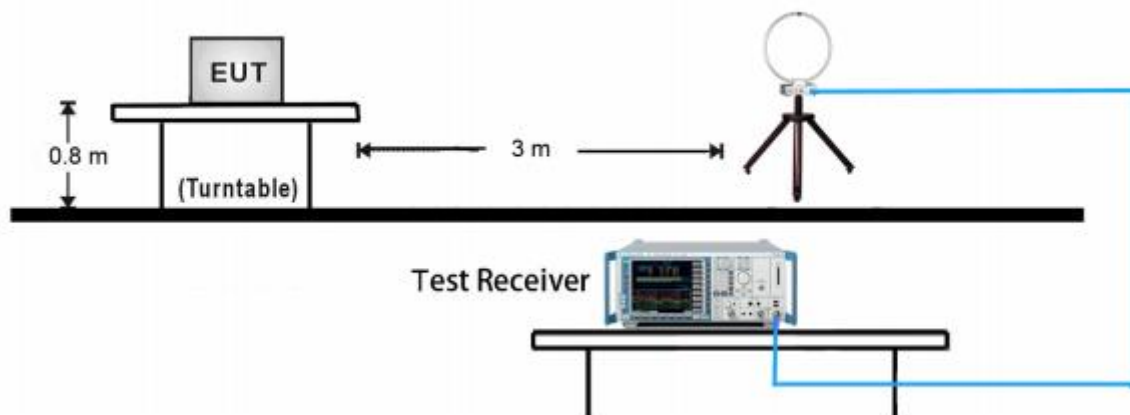
8 Test Setups

8.1 AC Power Line Conducted Emission test setups

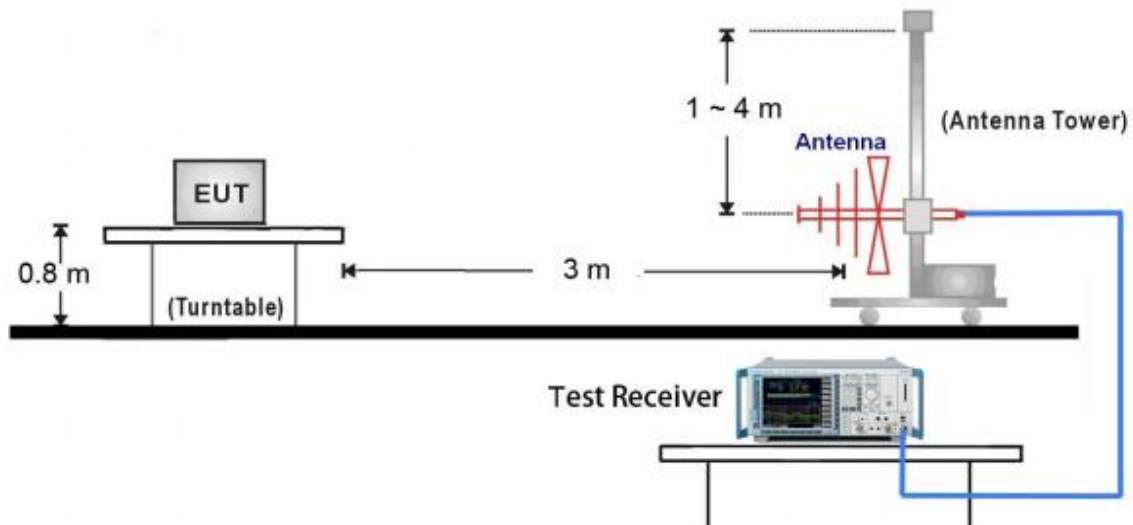


8.2 Radiated test setups

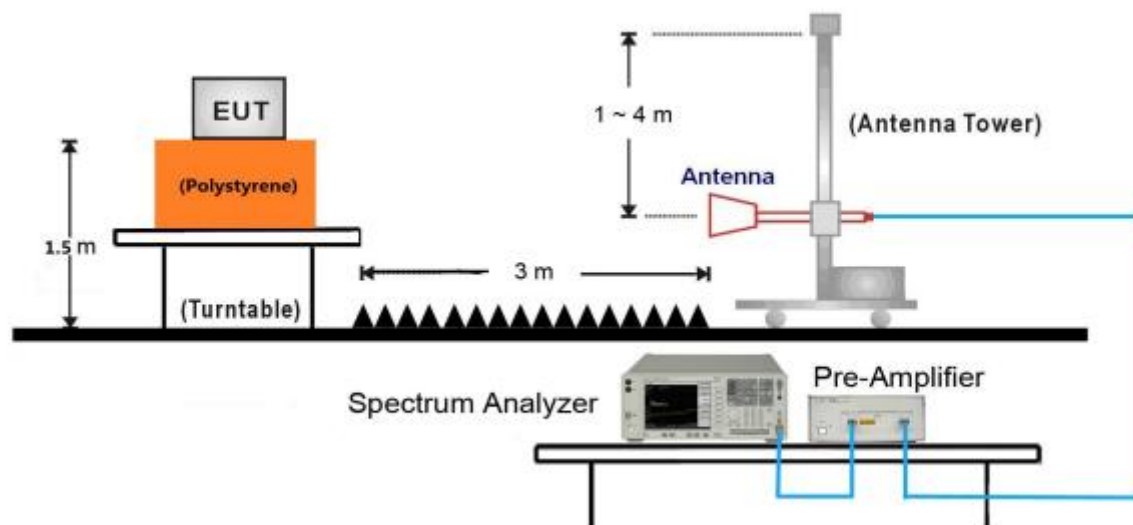
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:

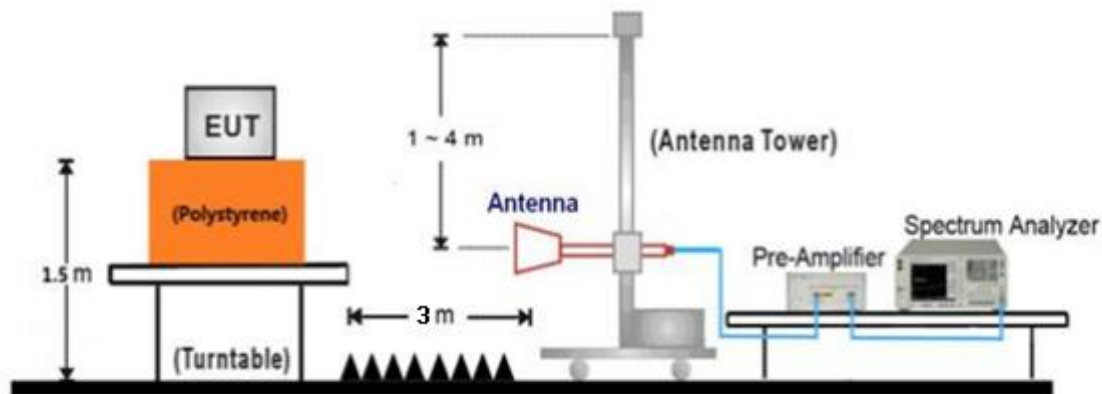


1GHz ~ 18GHz Test Setup:



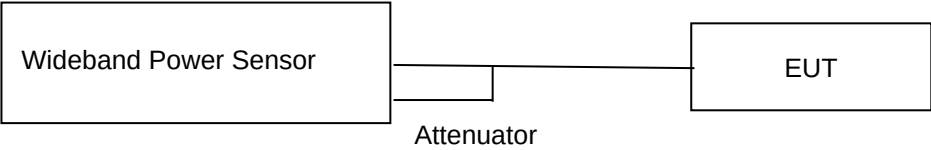


18GHz ~ 25GHz Test Setup:

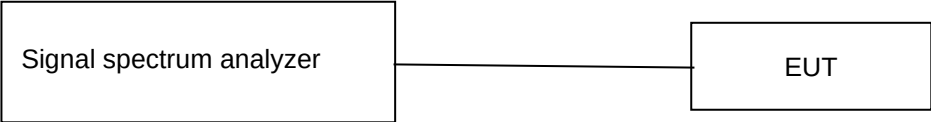


8.3 Conducted RF test setups

For Conducted peak output power



For other test items



9 Systems test configuration

Auxiliary Equipment Used during Test:

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

Test software: SecureCRT.exe, which used to control the EUT in continues transmitting mode.

The system was configured to 802.11b/g/n-HT20/ax-HE20 channel 1(2412MHz), 6(2437MHz), and 11(2462MHz) and 802.11n-HT40/ax-HE40 channel 3(2422MHz), 6(2437MHz), and 9(2452MHz).

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate (Mbps)	Modulation	Index Value (Power level setting)
802.11b	1	1	CCK	default
	6	1	CCK	default
	11	1	CCK	default
802.11g	1	6	OFDM	12
	6	6	OFDM	12
	11	6	OFDM	12
802.11n HT20	1	MCS0 (6.5Mbps)	OFDM	6
	6	MCS0 (6.5Mbps)	OFDM	6
	11	MCS0 (6.5Mbps)	OFDM	6
802.11n HT40	3	MCS0 (13.5Mbps)	OFDM	6
	6	MCS0 (13.5Mbps)	OFDM	6
	9	MCS0 (13.5Mbps)	OFDM	6
802.11ax HT20	1	11ax 7.313Mbps	OFDMA	6
	6	11ax 7.313Mbps	OFDMA	6
	11	11ax 7.313Mbps	OFDMA	6
802.11ax HT40	3	11ax 14.625Mbps	OFDMA	6
	6	11ax 14.625Mbps	OFDMA	6
	9	11ax 14.625Mbps	OFDMA	6

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

10 Technical Requirement

10.1 Conducted Emission

Test Method

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

Limit

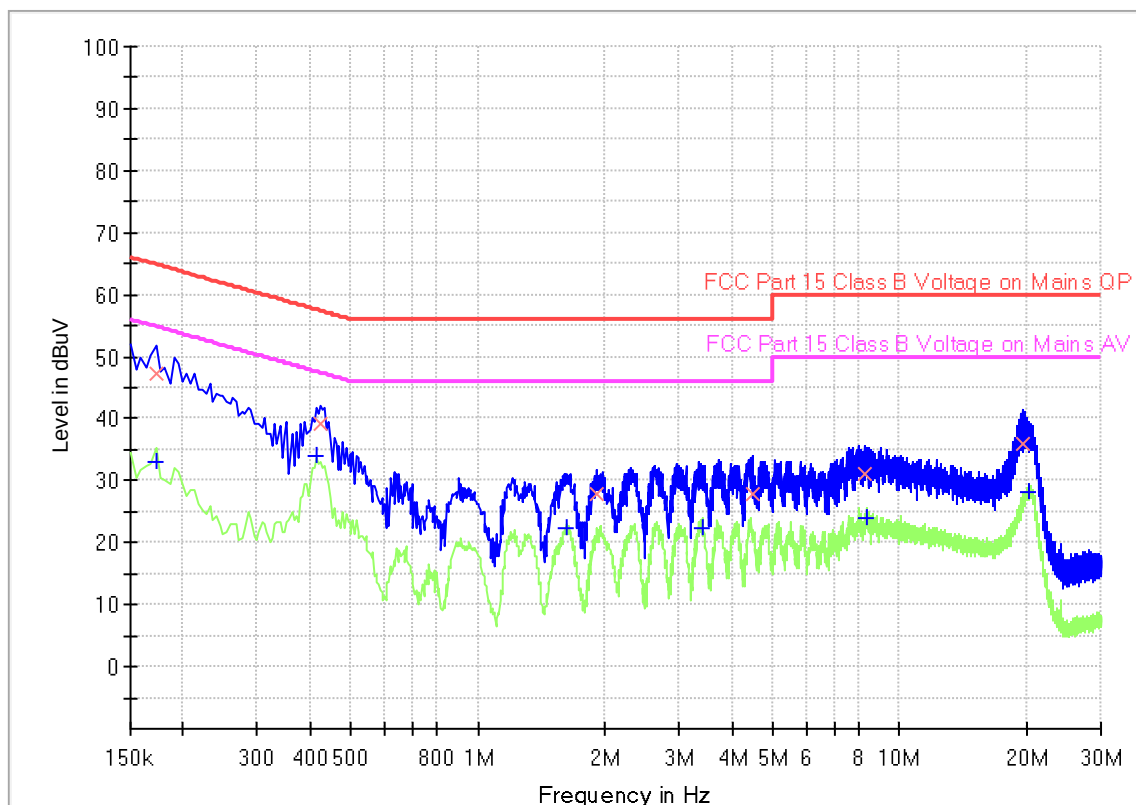
According to §15.207 & RSS-GEN 8.8, conducted emissions limit as below:

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

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : DEFENDER
 M/N : IP8MDSCB1
 Operating Condition : Transmit mode, 802.11g Tx_2462MHz (worst case)
 Test Specification : L-line
 Comment : 120V~, 60Hz

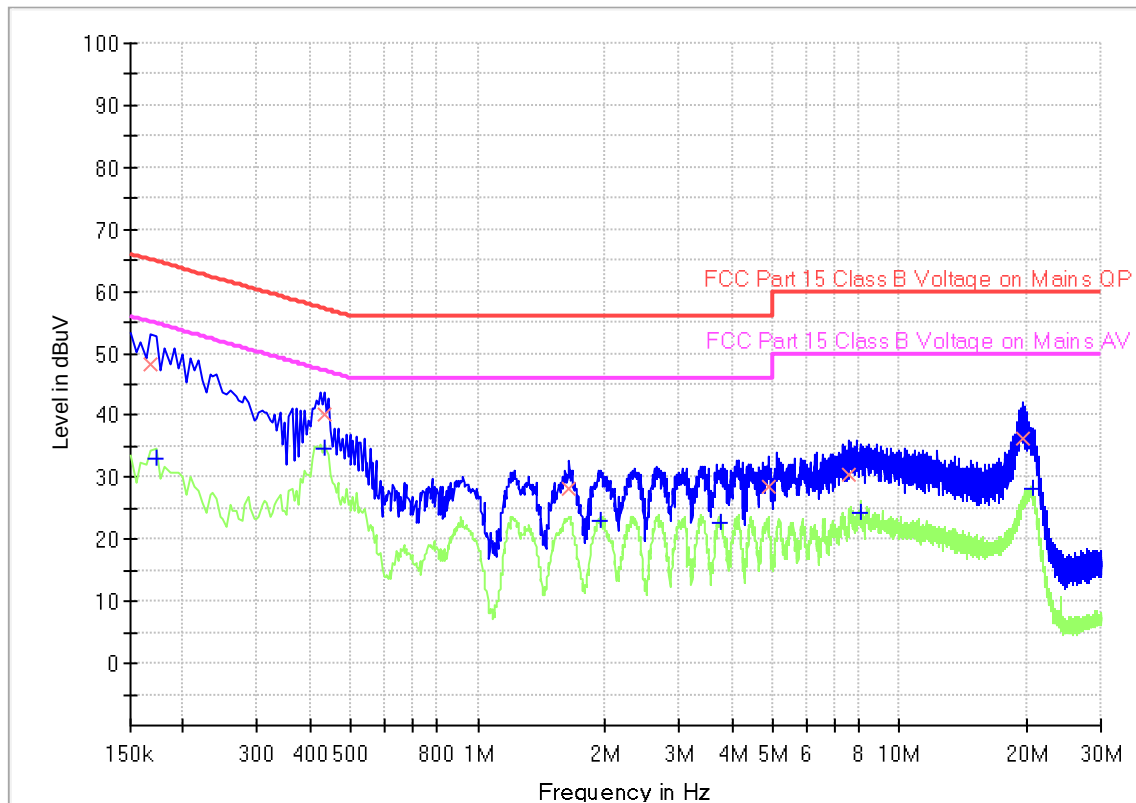


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.172500	---	33.03	54.84	21.81	1000.0	9.000	L1	19.5
0.172500	47.34	---	64.84	17.50	1000.0	9.000	L1	19.5
0.415500	---	33.92	47.54	13.62	1000.0	9.000	L1	19.5
0.424500	39.25	---	57.36	18.11	1000.0	9.000	L1	19.5
1.621500	---	22.29	46.00	23.71	1000.0	9.000	L1	19.5
1.914000	27.99	---	56.00	28.01	1000.0	9.000	L1	19.5
3.408000	---	22.49	46.00	23.51	1000.0	9.000	L1	19.5
4.470000	27.78	---	56.00	28.22	1000.0	9.000	L1	19.6
8.268000	31.05	---	60.00	28.95	1000.0	9.000	L1	19.7
8.344500	---	23.81	50.00	26.19	1000.0	9.000	L1	19.7
19.518000	35.82	---	60.00	24.18	1000.0	9.000	L1	20.4
20.242500	---	28.22	50.00	21.78	1000.0	9.000	L1	20.4

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

Product Type : DEFENDER
 M/N : IP8MDSCB1
 Operating Condition : Transmit mode, 802.11g Tx_2462MHz (worst case)
 Test Specification : N-line
 Comment : 120V~, 60Hz



Final Result

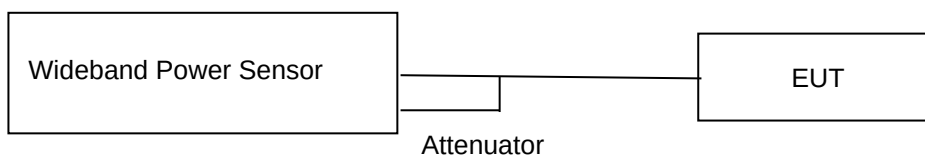
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.168000	48.34	---	65.06	16.72	1000.0	9.000	N	19.5
0.172500	---	32.90	54.84	21.94	1000.0	9.000	N	19.5
0.433500	---	34.71	47.19	12.48	1000.0	9.000	N	19.5
0.433500	40.12	---	57.19	17.07	1000.0	9.000	N	19.5
1.648500	28.23	---	56.00	27.77	1000.0	9.000	N	19.5
1.954500	---	23.15	46.00	22.85	1000.0	9.000	N	19.5
3.763500	---	22.81	46.00	23.19	1000.0	9.000	N	19.6
4.875000	28.35	---	56.00	27.65	1000.0	9.000	N	19.6
7.584000	30.52	---	60.00	29.48	1000.0	9.000	N	19.6
8.065500	---	24.35	50.00	25.65	1000.0	9.000	N	19.6
19.639500	36.25	---	60.00	23.75	1000.0	9.000	N	20.2
20.719500	---	28.29	50.00	21.71	1000.0	9.000	N	20.3

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

10.2 Conducted peak output power

Test Method

- 1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
- 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
- 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- 4) Measure the peak power of the transmitter. This measurement is a peak over both the ON and OFF periods of the transmitter.



Wideband Power Sensor conducted test setup

Limits

According to §15.247 (b) (3) & RSS-247 5.4(d), conducted peak output power limit as below:

	Frequency Range	Limit	Limit
	MHz	W	dBm
Conducted peak output power	2400-2483.5	≤1	≤30
e.i.r.p.	2400-2483.5	≤4	≤36

Test result (conducted peak) as below table

802.11b: Antenna gain= 1.8 dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	12.63	≤30	Pass	14.43	≤36	Pass
2437MHz	11.85	≤30	Pass	13.65	≤36	Pass
2462MHz	11.39	≤30	Pass	13.19	≤36	Pass

802.11g: Antenna gain= 1.8 dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	18.01	≤30	Pass	19.81	≤36	Pass
2437MHz	17.81	≤30	Pass	19.61	≤36	Pass
2462MHz	18.81	≤30	Pass	20.61	≤36	Pass



802.11n(HT20): Antenna gain= 1.8 dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	14.23	≤30	Pass	16.03	≤36	Pass
2437MHz	14.15	≤30	Pass	15.95	≤36	Pass
2462MHz	11.62	≤30	Pass	13.42	≤36	Pass

802.11n(HT40): Antenna gain= 1.8 dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2422MHz	14.13	≤30	Pass	15.93	≤36	Pass
2437MHz	14.55	≤30	Pass	16.35	≤36	Pass
2452MHz	12.46	≤30	Pass	14.26	≤36	Pass

802.11ax(HE20): Antenna gain= 1.8 dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2412MHz	15.64	≤30	Pass	17.44	≤36	Pass
2437MHz	14.54	≤30	Pass	16.34	≤36	Pass
2462MHz	14.41	≤30	Pass	16.21	≤36	Pass

802.11ax(HE40): Antenna gain= 1.8 dBi						
Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)			e.i.r.p. (dBm) RSS-247 5.4(d)		
	Result	limit	Verdict	Result	limit	Verdict
2422MHz	14.28	≤30	Pass	16.08	≤36	Pass
2437MHz	14.38	≤30	Pass	16.18	≤36	Pass
2452MHz	12.19	≤30	Pass	13.99	≤36	Pass

10.36dB bandwidth and 99% Occupied Bandwidth

Test Method for 6 dB Bandwidth

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. RBW=1% to 5% of the occupied bandwidth but not less than 100kHz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
5. Use the automatic bandwidth measurement capability of an instrument, use the X dB bandwidth mode with X set to 6 dB.
6. Allow the trace to stabilize, record the 6 dB Bandwidth value.

Test Method for 99 % Bandwidth

1. Connect EUT test port to spectrum analyzer.
Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW $\geq$ 3RBW, Sweep = auto,
Detector function = peak, Trace = max hold
2. Use the occupied bandwidth measurement capability of test receiver.
3. Allow the trace to stabilize, record the occupied bandwidth value.

Limit

6dB bandwidth Limit [kHz]	99% bandwidth Limit [kHz]
≥ 500	--

Test Result

Test Mode	Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
		result	limit	verdict	
802.11b	2412	10.237	≥ 0.5	Pass	14.996
	2437	9.134	≥ 0.5	Pass	14.995
	2462	9.147	≥ 0.5	Pass	15.025
802.11g	2412	16.534	≥ 0.5	Pass	16.651
	2437	16.712	≥ 0.5	Pass	16.678
	2462	16.585	≥ 0.5	Pass	16.726
802.11n(HT20)	2412	17.858	≥ 0.5	Pass	17.897
	2437	17.917	≥ 0.5	Pass	17.855
	2462	17.72	≥ 0.5	Pass	17.904
802.11n(HT40)	2422	36.242	≥ 0.5	Pass	36.316
	2437	36.309	≥ 0.5	Pass	36.312
	2452	36.385	≥ 0.5	Pass	36.364
802.11ax(HE20)	2412	18.986	≥ 0.5	Pass	19.049
	2437	19.098	≥ 0.5	Pass	19.044
	2462	19.025	≥ 0.5	Pass	19.031
802.11ax(HE40)	2422	37.813	≥ 0.5	Pass	37.766
	2437	37.443	≥ 0.5	Pass	37.767
	2452	36.44	≥ 0.5	Pass	36.354

