

RF Exposure Report

Report No.: SA170731C10

FCC ID: QXO-AP3917E

Test Model: AP3917e

Series Model: AP7662

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Applicant: Extreme Networks, Inc.

Address: 6480 VIA DEL ORO SAN JOSE CA 95119 USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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Release Control Record

Issue No.	Description	Date Issued
SA170731C10	Original release.	Nov. 06, 2017

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
300-1500	F/1500	30
1500-100,000	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 35cm away from the body of the user. So, this device is classified as Mobile Device.

3 Calculation Result of Maximum Conducted Power

Function	Frequency Band (MHz)	Mode	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN	ML-2499-HPA8-01						
	2412~2462	CDD	27.39	11.01	35	0.449	1
		Beamforming	27.08	11.01	35	0.418	1
	ML-5299-FHPA6-01R						
	5180~5240 (Outdoor)	CDD	15.26	11.26	35	0.029	1
		Beamforming	12.25	11.26	35	0.015	1
	5180~5240 (Indoor)	CDD	25.84	11.26	35	0.333	1
		Beamforming	22.83	11.26	35	0.167	1
	5745~5825	CDD	26.28	11.26	35	0.369	1
		Beamforming	23.21	11.26	35	0.182	1
	ML-2452-PNA5-01R						
	2412~2462	CDD	27.33	7.51	35	0.198	1
		Beamforming	27.08	7.51	35	0.187	1
	5180~5240 (Outdoor)	CDD	15.78	8.01	35	0.016	1
		Beamforming	12.77	8.01	35	0.008	1
	5180~5240 (Indoor)	CDD	26.13	8.01	35	0.169	1
		Beamforming	23.02	8.01	35	0.082	1
	5745~5825	CDD	24.79	8.01	35	0.124	1
		Beamforming	21.78	8.01	35	0.062	1
	ML-2452-PNA7-01R						
	2412~2462	CDD	18.81	10.81	35	0.060	1
		Beamforming	26.65	10.81	35	0.362	1
	5180~5240 (Outdoor)	CDD	13.52	13.71	35	0.034	1
		Beamforming	10.51	13.71	35	0.017	1
	5180~5240 (Indoor)	CDD	23.33	13.71	35	0.329	1
		Beamforming	20.32	13.71	35	0.164	1
	5745~5825	CDD	25.21	13.71	35	0.507	1
		Beamforming	22.20	13.71	35	0.253	1
	ML-2452-PNL6M4-N36						
	2412~2462	CDD	27.39	8.61	35	0.259	1
		Beamforming	27.08	8.61	35	0.241	1
	5180~5240 (Outdoor)	CDD	18.62	9.71	35	0.044	1
		Beamforming	15.61	9.71	35	0.022	1
	5180~5240 (Indoor)	CDD	26.13	9.71	35	0.249	1
		Beamforming	23.02	9.71	35	0.122	1
	5745~5825	CDD	24.40	9.71	35	0.167	1
		Beamforming	21.39	9.71	35	0.084	1
	ML-2452-PNL9M3-N36						
	2412~2462	CDD	24.72	14.01	35	0.485	1
		Beamforming	24.57	14.01	35	0.468	1
	5180~5240 (Outdoor)	CDD	13.52	13.71	35	0.034	1
		Beamforming	10.51	13.71	35	0.017	1
	5180~5240 (Indoor)	CDD	24.77	13.71	35	0.458	1
		Beamforming	21.76	13.71	35	0.229	1
	5745~5825	CDD	25.17	13.71	35	0.502	1
		Beamforming	22.16	13.71	35	0.251	1

Function	Frequency Band (MHz)	Mode	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
BT LE	ML-2499-HPA8-01						
	2402~2480	-	0.97	8	35	0.001	1
	ML-2452-PNA7-01R						
Zigbee	2402~2480	-	1.02	7.8	35	0.001	1
	ML-2499-HPA8-01						
	2405~2480	-	2.96	8	35	0.001	1
4.9GHz	ML-2452-PNA7-01R						
	2405~2480	-	2.96	7.8	35	0.001	1
	ML-5299-FHPA6-01R						
	4942.5~4987.5	-	22.27	11.26	35	0.146	1

Note:

2.4GHz:

ML-2499-HPA8-01 max. directional gain = 8dBi + 10log(2) = 11.01dBi

ML-2452-PNA5-01R max. directional gain = 4.5dBi + 10log(2) = 7.51dBi

ML-2452-PNA7-01R max. directional gain = 7.8dBi + 10log(2) = 10.81dBi

ML-2452-PNL6M4-N36 max. directional gain = 5.6dBi + 10log(2) = 8.61dBi

ML-2452-PNL9M3-N36 max. directional gain = 11dBi + 10log(2) = 14.01dBi

5GHz:

ML-5299-FHPA6-01R max. directional gain = 8.25dBi + 10log(2) = 11.26dBi

ML-2452-PNA5-01R max. directional gain = 5dBi + 10log(2) = 8.01dBi

ML-2452-PNA7-01R max. directional gain = 10.7dBi + 10log(2) = 13.71dBi

ML-2452-PNL6M4-N36 max. directional gain = 6.7dBi + 10log(2) = 9.71dBi

ML-2452-PNL9M3-N36 max. directional gain = 10.7dBi + 10log(2) = 13.71dBi

BT LE & Zigbee:

ML-2499-HPA8-01 gain = 8dBi

ML-2452-PNA7-01R gain = 7.8dBi

4.9GHz:

ML-5299-FHPA6-01R directional gain = 8.25dBi + 10log(2) = 11.26dBi

Frequency Band	Max Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	WLAN	BT LE	Zigbee		
2.4GHz	27.39	1.02	-	27.40	30
	27.39	-	2.96	27.41	30

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 +etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Max.: WLAN 2.4GHz + WLAN 5GHz + BT LE = 0.485 + 0.507 + 0.001 = 0.993 < 1

Max.: WLAN 2.4GHz + WLAN 5GHz + Zigbee = 0.485 + 0.507 + 0.001 = 0.993 < 1

Max.: WLAN 2.4GHz + WLAN 4.9GHz + BT LE = 0.485 + 0.146 + 0.001 = 0.632 < 1

Max.: WLAN 2.4GHz + WLAN 4.9GHz + Zigbee = 0.485 + 0.146 + 0.001 = 0.632 < 1

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