

Maximum Permissible Exposure

Equipment : GPON ONT
Brand Name : **ADTRAN**
Model No. : 424RG3
Contained FCC ID : HDC424RG350X
HDC414RG24X
Standard : IEEE C95.1
Applicant : Adtran
901 Explorer Blvd., Huntsville, AL 35806, US
Manufacturer : XAVi Technologies Corporation
9F, No.129, Hsing Te Rd., Sanchung Dist.,
New Taipei City 241, Taiwan, R.O.C.

The product sample received on Mar. 16, 2016 and completely tested on Mar. 18, 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in IEEE C95.1 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:


Kevin Liang, Assistant Manager





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Revision History

Report No.	Version	Description	Issued Date
FA630718	Rev. 01	Initial issue of report	Sep. 29, 2016



1 Human Exposure Assessment

1.1 Information

Contained ID	1. HDC424RG350X for 5G Module 2. HDC414RG24X for 2.4G Module
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1.2 Maximum Permissible Exposure

1.2.1 Limit of Maximum Permissible Exposure

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	F/300	6
1500-100,000	-	-	5	6
Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	F/1500	30
1500-100,000	-	-	1.0	30

Note 1: f = frequency in MHz ; *Plane-wave equivalent power density
Note 2: For the applicable limit, see FCC 1.1310

1.2.2 MPE Calculation Method

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)



1.2.3 Result of Maximum Permissible Exposure

RF General Information 2400 MHz – 2483.5 MHz					
Frequency Range (MHz)	IEEE Std. 802.11 Protocol	Ch. Frequency (MHz)	Channel Number	Number of Transmit Chains (N _{TX})	RF Output Power (dBm)
2400-2483.5	b	2412-2462	1-11 [11]	1	23.69
2400-2483.5	g	2412-2462	1-11 [11]	1	19.70
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	19.79
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	19.57

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

Worst Maximum RF Output Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Output Power (dBm)			
Modulation Mode	N _{TX}	RF Output Power (dBm)	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
11b	1	23.69	2.00	25.69	0.07374
Maximum Permissible Exposure Limit (mW/cm ²)					1

Note 1: N_{TX} = Number of Transmit Chains



1.2.4 Result of Maximum Permissible Exposure (5.2G)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11 Protocol	Ch. Frequency (MHz)	Channel Number	Number of Transmit Chains (N _{TX})	RF Output Power (dBm)
5150-5250	a	5180-5240	36-48 [4]	1	22.73
5150-5250	n (HT20)	5180-5240	36-48 [4]	3	23.55
5150-5250	n (HT40)	5190-5230	38-46 [2]	3	23.41
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	3	23.69
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	3	23.48
5150-5250	ac (VHT80)	5210	42 [1]	3	18.18
5150-5250	ac (VHT20) (TxBF)	5180-5240	36-48 [4]	3	20.60
5150-5250	ac (VHT40) (TxBF)	5190-5230	38-46 [2]	3	20.66
5150-5250	ac (VHT80) (TxBF)	5210	42 [1]	3	16.39

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

Worst Maximum RF Output Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Output Power (dBm)			
Modulation Mode	N _{TX}	RF Output Power (dBm)	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
ac (VHT40) (TxBF)	3	20.66	8.47	29.13	0.16283
Maximum Permissible Exposure Limit (mW/cm²)					1

Note 1: N_{TX} = Number of Transmit Chains



1.2.5 Result of Maximum Permissible Exposure (5.8G)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11 Protocol	Ch. Frequency (MHz)	Channel Number	Number of Transmit Chains (N _{TX})	RF Output Power (dBm) Co-location
5725-5850	a	5745-5825	149-165 [5]	1	23.92
5725-5850	n (HT20)	5745-5825	149-165 [5]	3	23.42
5725-5850	n (HT40)	5755-5795	151-159 [2]	3	24.26
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	3	23.56
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	3	24.39
5725-5850	ac (VHT80)	5775	155 [1]	3	23.76
5725-5850	ac (VHT20)(TxBF)	5745-5825	149-165 [5]	3	19.76
5725-5850	ac (VHT40) (TxBF)	5755-5795	151-159 [2]	3	22.99
5725-5850	ac (VHT80) (TxBF)	5775	155 [1]	3	19.41

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

Worst Maximum RF Output Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Output Power (dBm)			
Modulation Mode	N _{TX}	RF Output Power (dBm)	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
ac (VHT40) (TxBF)	3	22.99	8.47	31.46	0.27844
Maximum Permissible Exposure Limit (mW/cm²)					1

Note 1: N_{TX} = Number of Transmit Chains



1.2.6 Result of Maximum Permissible Exposure (Co-location)

Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		20					
Condition		RF Output Power (dBm)					
Modulation Mode	N _{TX}	Sum Chain RF Output Power (dBm)	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)	Limit (mW/cm ²)	Ratio
2.4G - b	1	23.69	2.00	25.69	0.07374	1	0.07374
5.8G - ac (VHT40) (TxBF)	3	22.99	8.47	31.46	0.27844	1	0.27844
Co-location Total							0.35218
Maximum Permissible Exposure Limit							1
<p>Note 1: NTX = Number of Transmit Chains.</p> <p>Note.2: Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:</p> <p style="padding-left: 40px;">$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$</p> <p style="padding-left: 40px;">CPD = Calculation power density</p> <p style="padding-left: 40px;">LPD = Limit of power density</p> <p>Note 3: Refer to KDB 865664 D02 RF Exposure Reporting v01r02 for MPE Calculation Colocation.</p>							