



Maximum Permissible Exposure

Equipment : Nest Cam Outdoor
Brand Name : Nest Labs
Model No. : A0033
FCC ID : ZQANC21
Standard : IEEE C95.1
Applicant : Nest Labs Inc.
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Manufacturer : Chicony Electronics (Dong Guan) Co., Ltd.
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The product sample received on May 16, 2016 and completely tested on Jun. 02, 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
FA650917	Rev. 01	Initial issue of report	Jul. 05, 2016

1 Human Exposure Assessment

1.1 Maximum Permissible Exposure

1.1.1 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				

1.1.2 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)



1.1.3 Result of Maximum Permissible Exposure (2.4G)

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)	Tune-up Power (dBm)
2400-2483.5	11b	2412-2462	1-11 [11]	1	15.83	16.00
2400-2483.5	11g	2412-2462	1-11 [11]	1	14.76	15.00
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	13.81	14.00

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

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
11b	1	16.00	0.84	16.84	0.01166
Maximum Permissible Exposure Limit (mW/cm²)					1

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



1.1.4 Result of Maximum Permissible Exposure (Zigbee)

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)	Tune-up Power (dBm)
2400-2483.5	Zigbee	2405-2475	1-15 [15]	1	17.91	18.00
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.						

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
Zigbee	1	18.00	-0.08	17.92	0.01210
Maximum Permissible Exposure Limit (mW/cm ²)					1
Note 1: N _{TX} = Number of Transmit Chains					



1.1.5 Result of Maximum Permissible Exposure (Bluetooth)

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)	Tune-up Power (dBm)
2400-2483.5	v4.0 LE	2402-2480	0-39 [40]	1	8.67	9.00
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.						

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	Antenna Gain (dBi)	EIRP Power	PD (S) (mW/cm ²)
v4.0 LE	1	9.00	0.84	9.84	0.00233
Maximum Permissible Exposure Limit (mW/cm ²)					1
Note 1: N _{TX} = Number of Transmit Chains					



1.1.6 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)	Tune-up Power (dBm)
5150-5250	11a	5180-5240	36-48 [4]	1	14.05	14.50
5150-5250	n (HT20)	5180-5240	36-48 [4]	1	14.55	15.00
5150-5250	n (HT40)	5190-5230	38-46 [2]	1	15.62	16.00

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

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
n (HT40)	1	16.00	2.45	18.45	0.02448
Maximum Permissible Exposure Limit (mW/cm ²)					1

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



1.1.7 Result of Maximum Permissible Exposure (5.3G)

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)	Tune-up Power (dBm)
5250-5350	11a	5260-5320	52-64 [4]	1	14.92	15.00
5250-5350	n (HT20)	5260-5320	52-64 [4]	1	15.86	16.00
5250-5350	n (HT40)	5270-5310	54-62 [2]	1	15.75	16.00

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

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
n (HT20)	1	16.00	2.45	18.45	0.02448
Maximum Permissible Exposure Limit (mW/cm²)					1

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



1.1.8 Result of Maximum Permissible Exposure (5.6G)

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)	Tune-up Power (dBm)
5470-5725	11a	5500-5700	100-140 [8]	1	16.69	17.00
5470-5725	n (HT20)	5500-5700	100-140 [8]	1	17.19	17.50
5470-5725	n (HT40)	5510-5670	102-134 [3]	1	18.13	18.50

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

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
n (HT40)	1	18.50	2.45	20.95	0.04352
Maximum Permissible Exposure Limit (mW/cm²)					1

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



1.1.9 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)	Tune-up Power (dBm)
5725-5850	11a	5745-5825	149-165 [5]	1	16.15	16.50
5725-5850	n (HT20)	5745-5825	149-165 [5]	1	17.43	17.50
5725-5850	n (HT40)	5755-5795	151-159 [2]	1	17.79	18.00

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

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
n (HT40)	1	18.00	2.45	20.45	0.03879
Maximum Permissible Exposure Limit (mW/cm ²)					1

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



1.1.10 Result of Maximum Permissible Exposure (Co-Location)

Worst Maximum RF Tune-up Power Result					
Exposure Environment		General Population / Uncontrolled Exposure			
Separation Distance (cm)		20			
Condition		RF Tune-up Power (dBm)			
Modulation Mode	N _{TX}	Tune-up Power	DG (dBi)	EIRP Power	PD (S) (mW/cm ²)
5.6G n (HT40)	1	18.50	2.45	20.95	0.04352
Zigbee	1	18.00	-0.08	17.92	0.01210
Co-location Total					0.05562
Maximum Permissible Exposure Limit (mW/cm²)					1
Note 1: N _{TX} = Number of Transmit Chains					