

# **Maximum Permissible Exposure**

Equipment : WiFi abgn module

Brand Name : TSC

Model No. : RF-WRN

FCC ID : VTV-RFWRN

Standard : IEEE C95.1

Applicant / : TSC Auto ID Technology Co., Ltd.

Manufacturer No. 35, Sec. 2, Ligong 1st Rd., Wujie Town,

I-Lan County 26841, TAIWAN

The product sample received on Aug. 22, 2015 and completely tested on Oct. 14, 2015. 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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Festing Laborator

Report No.: FA581906-02



## Maximum Permissible Exposure

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# **Revision History**

Report No.: FA581906-02

Report No.	Version	Description	Issued Date
FA581906	Rev. 02	Initial issue of report	Oct. 15, 2015
FA581906-02	Rev. 01	Two PIFA antennas are added. Copy original report data of Project no. 581906.	Sep. 05, 2016

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# 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/ cm²)	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 <sup>2</sup> )*	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/ cm²)	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 <sup>2</sup> )*	30					

0.073

Note 1: f = frequency in MHz; \*Plane-wave equivalent power density

27.5

Note 2: For the applicable limit, see FCC 1.1310

#### 1.1.2 MPE Calculation Method

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

30-300

300-1500

1500-100,000

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

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)

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F/1500

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# 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 <sub>TX</sub> )	RF Output Power (dBm)		
2400-2483.5	b	2412-2462	1-11 [11]	1	16.89		
2400-2483.5	g	2412-2462	1-11 [11]	1	16.38		
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	16.86		
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.							

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Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		20	20				
Modulation Mode	N <sub>TX</sub>	RF Output Power (dBm)	Ant. (dBi)	EIRP Power (dBm)	PD (S) (mW/cm²)		
802.11b	1	16.89	2	18.89	0.0154		
Maximum Permissible Exposure Limit (mW/cm²)							
Note 1: $N_{TX}$ = Number of 7	rans	mit Chains					

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## 1.1.4 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 <sub>TX</sub> )	RF Output Power (dBm)		
5150-5250	а	5180-5240	36-48 [4]	1	12.27		
5150-5250	n (HT20)	5180-5240	36-48 [4]	1	11.20		

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

Worst Maximum RF Output Power Result							
Exposure Environment Separation Distance (cm)		General Population / Uncontrolled Exposure					
		20					
Modulation Mode	N <sub>TX</sub>	RF Output Power (dBm)	Ant. (dBi)	EIRP Power (dBm)	PD (S) (mW/cm²)		
802.11a	1	12.27	4.42	16.69	0.0093		
Maximum Permissible Exposure Limit (mW/cm²) 1							
Note 1: N <sub>TX</sub> = Number of T	rans	mit Chains			•		

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## 1.1.5 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 <sub>TX</sub> )	RF Output Power (dBm) Co-location		
5725-5850	а	5745-5825	149-165 [5]	1	10.85		
5725-5850	n (HT20)	5745-5825	149-165 [5]	1	10.88		

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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					
Modulation Mode	N <sub>TX</sub>	RF Output Power (dBm)	Ant. (dBi)	EIRP Power (dBm)	PD (S) (mW/cm²)		
802.11n (HT20)	1	10.88	4.42	15.30	0.0067		
Maximum Permissible Exposure Limit (mW/cm²) 1							
Note 1: N <sub>TX</sub> = Number of 7	Note 1: N <sub>TX</sub> = Number of Transmit Chains						

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