



# Radio Exposure Evaluation Report

**FCC ID** : LDKIG31R  
**Equipment** : Cisco Industrial Gateway  
**Brand Name** : Cisco  
**Model Name** : IG31R-VZ-B-K9, IG31R-NA-B-K9  
**Applicant** : Cisco Systems, Inc.  
125 West Tasman Dr. Bldg. P  
San Jose CA 95134 United States Of America  
**Manufacturer** : Cisco Systems, Inc.  
125 West Tasman Dr. Bldg. P  
San Jose CA 95134 United States Of America  
**Standard** : 47 CFR Part 2.1091

The product was received on Nov. 18, 2020, and testing was started from Nov. 30, 2020 and completed on Nov. 30, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 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. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Allen Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



## Table of Contents

**HISTORY OF THIS TEST REPORT .....3**

**1 GENERAL DESCRIPTION .....5**

1.1 EUT General Information .....5

1.2 Table for Multiple Listing .....6

1.3 Testing Location .....6

**2 MAXIMUM PERMISSIBLE EXPOSURE .....7**

2.1 Limit of Maximum Permissible Exposure .....7

2.2 MPE Calculation Method .....7

2.3 Calculated Result and Limit .....8

**Photographs of EUT V01**



**History of this test report**

<b>Report No.</b>	<b>Version</b>	<b>Description</b>	<b>Issued Date</b>
FA0N1331	01	Initial issue of report	Jan. 11, 2021



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

<b>Declaration of Conformity:</b>
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
<b>Comments and Explanations:</b>
None.

Reviewed by: Sam Tsai

Report Producer: Jenny Yang



# 1 General Description

## 1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)

RF General Information				
Evaluation Mode	Bandwidth (MHz)	TX Frequency (MHz)	RX Frequency (MHz)	Modulation Type
WCDMA Band V	5	826.4 - 846.6	871.4 - 891.6	HSDPA: QPSK/16QAM
WCDMA Band II	5	1852.4 - 1907.6	1932.4 - 1987.6	
WCDMA Band IV	5	1712.4 - 1752.6	2112.4 - 2152.6	
LTE Band 2	1.4	1850.7 - 1909.3	1930.7 - 1989.3	QPSK / 16 QAM
	3	1851.5 - 1908.5	1931.5 - 1988.5	
	5	1852.5 - 1907.5	1932.5 - 1987.5	
	10	1855.0 - 1905.0	1935.0 - 1985.0	
	15	1857.5 - 1902.5	1937.5 - 1982.5	
	20	1860.0 - 1900.0	1940.0 - 1980.0	
LTE Band 4	1.4	1710.7 - 1754.3	1.4	
	3	1711.5 - 1753.5	3	
	5	1712.5 - 1752.5	5	
	10	1715.0 - 1750.0	10	
	15	1717.5 - 1747.5	15	
	20	1720.0 - 1745.0	20	
LTE Band 5	1.4	824.7 - 848.3	869.7 - 893.3	
	3	825.5 - 847.5	870.5 - 892.5	
	5	826.5 - 846.5	871.5 - 891.5	
	10	829.0 - 844.0	874.0 - 889.0	
LTE Band 12	1.4	699.7 - 715.3	729.7 - 745.3	
	3	700.5 - 714.5	730.5 - 744.5	
	5	701.5 - 713.5	731.5 - 743.5	
	10	704.0 - 711.0	734.0 - 741.0	
LTE Band 13	5	779.5 - 784.5	748.5 - 753.5	
	10	782.0	751.0	

## 1.2 Table for Multiple Listing

Model Name	Description
IG31R-VZ-B-K9	All the models are identical, only contains difference LTE module for served as a marketing strategy.
IG31R-NA-B-K9	

## 1.3 Testing Location

Testing Location			
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
<input type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 with FCC.			

## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(A) 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> 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

(B) 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> 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
30-300	27.5	0.073	0.2	30
300-1500	-	-	F/1500	30
1500-100,000	-	-	1.0	30

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

### 2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



### 2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

#### WLAN 2.4GHz\_Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;G1D	4.00	17.06	21.06	0.50	21.56	0.14322	20	0.02849	1.00000
2.4G;D1D	4.00	22.20	26.20	0.50	26.70	0.46774	20	0.09305	1.00000

#### WLAN 2.4GHz\_Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D	7.01	19.19	26.20	0.50	26.70	0.46774	20	0.09305	1.00000

#### WCDMA

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
02;WCDMA	-1.80	23.00	21.20	0.50	21.70	0.14791	20	0.02943	1.00000
04;WCDMA	-2.10	23.00	20.90	0.50	21.40	0.13804	20	0.02746	1.00000
05;WCDMA	-1.30	23.00	21.70	0.50	22.20	0.16596	20	0.03302	0.55767

#### LTE

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
02;LTE	-1.80	23.00	21.20	0.50	21.70	0.14791	20	0.02943	1.00000
04;LTE	-2.10	23.00	20.90	0.50	21.40	0.13804	20	0.02746	1.00000
05;LTE	-1.30	23.00	21.70	0.50	22.20	0.16596	20	0.03302	0.55767
12;LTE	-2.70	23.00	20.30	0.50	20.80	0.12023	20	0.02392	0.47167





**Co-location (WLAN 2.4GHz+ WCDMA)**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D	4.00	22.20	26.20	0.50	26.70	0.46774	20	0.09305	1.00000	0.09305
05;WCDMA	-1.30	23.00	21.70	0.50	22.20	0.16596	20	0.03302	0.55767	0.05920
									Sum Ratio	0.15225
									Ratio Limit	1

**Co-location (WLAN 2.4GHz+LTE)**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D	4.00	22.20	26.20	0.50	26.70	0.46774	20	0.09305	1.00000	0.09305
05;LTE	-1.30	23.00	21.70	0.50	22.20	0.16596	20	0.03302	0.55767	0.05920
									Sum Ratio	0.15225
									Ratio Limit	1

————THE END————