



Radio Exposure Evaluation Report

FCC ID : LDKIG21
Equipment : Cisco Industrial Gateway
Brand Name : Cisco
Model Name : IG21-VZ-B-K9, IG21-NA-B-K9
Applicant : Cisco Systems, Inc.
125 West Tasman Drive, San Jose,
California, United States, 95134-1706
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 Jun. 23, 2020, and testing was started from Jun. 23, 2020 and completed on Jun. 25, 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.)



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Photographs of EUT V01



History of this test report

Report No.	Version	Description	Issued Date
FA082548	01	Initial issue of report	Oct. 06, 2020
FA082548	02	Revise Manufacturer address (This report is the latest version replacing for the report issued on Oct. 06, 2020)	Nov. 11, 2020



Summary of Test Result

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

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None.

Reviewed by: Sam Tsai

Report Producer: Ann Hou



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
IG21-VZ-B-K9	All the models are identical, only contains difference WWAN module for served as a marketing strategy.
IG21-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 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

(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 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: 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/cm2)	S Limit (mW/cm2)
2.4G;G1D	3.74	20.67	24.41	0.50	24.91	0.30974	20	0.06162	1.00000
2.4G;D1D	3.74	20.42	24.16	0.50	24.66	0.29242	20	0.05818	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/cm2)	S Limit (mW/cm2)
2.4G;D1D	6.75	17.35	24.11	0.50	24.61	0.28907	20	0.05751	1.00000

WCDMA

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm2)	S Limit (mW/cm2)
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/cm2)	S Limit (mW/cm2)
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/cm2)	S Limit (mW/cm2)	Ratio (S/Limit)
2.4G;G1D	3.74	20.67	24.41	0.50	24.91	0.30974	20	0.06162	1.00000	0.06162
05;WCDMA	-1.30	23.00	21.70	0.50	22.20	0.16596	20	0.03302	0.55767	0.05920
									Sum Ratio	0.12082
									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/cm2)	S Limit (mW/cm2)	Ratio (S/Limit)
2.4G;G1D	3.74	20.67	24.41	0.50	24.91	0.30974	20	0.06162	1.00000	0.06162
05;LTE	-1.30	23.00	21.70	0.50	22.20	0.16596	20	0.03302	0.55767	0.05920
									Sum Ratio	0.12082
									Ratio Limit	1

—————THE END—————