

# FCC TEST REPORT (PART 22)

**REPORT NO.:** RF150508C06

MODEL: WT1

FCC ID: A4R-WT1

**RECEIVED:** May 08, 2015

**TESTED:** May 25, 2015 ~ May 26, 2015

**ISSUED:** Jun. 17, 2015

**COMPANY NAME:** Google Inc.

ADDRESS: 1600 Amphitheatre Parkway Mountain View

California United States 94043

**ISSUED BY:** Bureau Veritas Consumer Products Services

(H.K.) Ltd., Taoyuan Branch

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# **RELEASE CONTROL RECORD**

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF150508C06	Original release	Jun. 17, 2015

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#### 1 CERTIFICATION

**PRODUCT NAME/DESCRIPTION:** Connectivity Bridge

MODEL: WT1

**BRAND**: Google

**COMPANY NAME:** Google Inc.

**TESTED:** May 25, 2015 ~ May 26, 2015

**TEST SAMPLE:** Identical Prototype

STANDARDS: FCC PART 22, Subpart H

The above equipment (model: WT1) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY: , DATE: Jun. 17, 2015

Gina Liu / Specialist

Sam Chen / Senior Project Engineer



# 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

	APPLIED STANDARD: FCC Part 22 & Part 2						
STANDARD SECTION	TEST TYPE	RESULT	REMARK				
2.1046 22.913 (a)	Effective Radiated Power		Meet the requirement of limit.				
2.1055 22.355 Frequency Stability  2.1049 Occupied Bandwidth		PASS	Meet the requirement of limit.				
		PASS	Meet the requirement of limit.				
22.917	22.917 Band Edge Measurements		Meet the requirement of limit.				
2.1051 22.917	Conducted Spurious Emissions	PASS	Meet the requirement of limit.				
2.1053 22.917	Radiated Spurious Emissions		Meet the requirement of limit. Minimum passing margin is -23.61dB at 2509.20MHz.				

# 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
	30MHz ~ 200MHz	2.93 dB
Dadiated emissions	200MHz ~1000MHz	2.95 dB
Radiated emissions	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



# 2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver Agilent	N9038A	MY51210203	Jan.21, 2015	Jan.21, 2016
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep.03, 2014	Sep.02, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2014	Dec. 26, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2014	Oct. 17, 2015
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Nov. 07, 2014	Nov. 06, 2015
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer	MT8820C	6201300640	Aug. 01, 2013	Jul. 31, 2015

**NOTE:** 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

- 2. The test was performed in HwaYa Chamber 10.
- 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 4. The FCC Site Registration No. is 690701.
- 5. The IC Site Registration No. is IC 7450F-10.



# **3 GENERAL INFORMATION**

# 3.1 GENERAL DESCRIPTION OF EUT

PRODUCT NAME/DESCRIPTION	Connectivity Bridge		
MODEL	WT1		
POWER SUPPLY	5Vdc (Adapter)		
	GSM/GPRS	GMSK	
MODULATION TYPE	EDGE	GMSK, 8PSK	
	WCDMA	BPSK	
FREQUENCY RANGE	GSM/GPRS/EDGE	824.2MHz ~ 848.8MHz	
PREQUENCY RANGE	WCDMA	826.4MHz ~ 846.6MHz	
	GSM	1507.30mW	
MAX. ERP POWER	EDGE	796.53mW	
	WCDMA	379.31mW	
ANTENNA TYPE	Fixed Internal Antenna		
I/O PORTS	Refer to users' manual		
DATA CABLE	Refer to NOTE as below		
ACCESSORY DEVICES	Refer to NOTE as below		

#### NOTE:

1. The EUT contains following accessory devices.

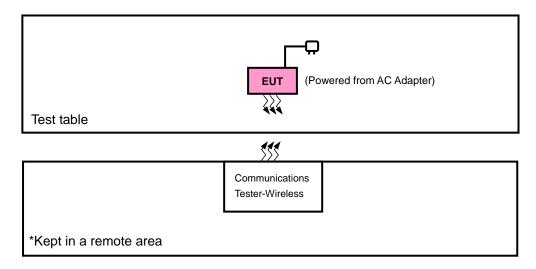
ITEM	BRAND	MODEL	SPECIFICATION
Adapter	TPT	MIIOEOSOO	I/P: 100-240Vac, 50/60Hz, 0.3A O/P: 5Vdc, 2A
WWAN Module	Telit	HE910D	
WLAN Module	BCM4354	AW-CM195NF	

2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

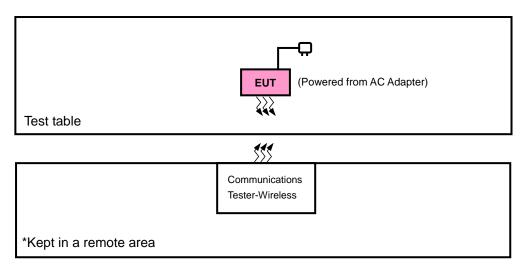


# 3.2 CONFIGURATION OF SYSTEM UNDER TEST

# FOR RADIATION EMISSION TEST



# FOR E.R.P. TEST





# 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

N	10.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
	1	Communications Tester-Wireless	Agilent	8960 Series 10	MY53201073	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

#### NOTE:

- 1. All power cords of the above support units are non shielded (1.8m).
- 2. Item 1 acted as communication partners to transfer data.



#### 3.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on X-plane for ERP and radiated emission. Following channel(s) was (were) selected for the final test as listed below:

#### **GSM MODE**

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	ERP	128 to 251	128, 189, 251	GSM, EDGE
-	RADIATED EMISSION	128 to 251	189	GSM, EDGE

#### **WCDMA MODE**

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	ERP	4132 to 4233	4132, 4182, 4233	WCDMA
-	RADIATED EMISSION	4132 to 4233	4182	WCDMA

# **TEST CONDITION:**

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	26deg. C, 58%RH	120Vac, 60Hz	Howard Kao
RADIATED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Hwa Chiang



#### 3.5 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

# 3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2 FCC 47 CFR Part 22 ANSI/TIA/EIA-603-C 2004

**NOTE:** All test items have been performed and recorded as per the above standards.



#### 4 TEST TYPES AND RESULTS

#### 4.1 OUTPUT POWER MEASUREMENT

#### 4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

#### **4.1.2 TEST PROCEDURES**

#### **EIRP / ERP MEASUREMENT:**

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM, GPRS & EDGE, 5MHz for WCDMA & CDMA, and 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power 2.15dBi.

#### **CONDUCTED POWER MEASUREMENT:**

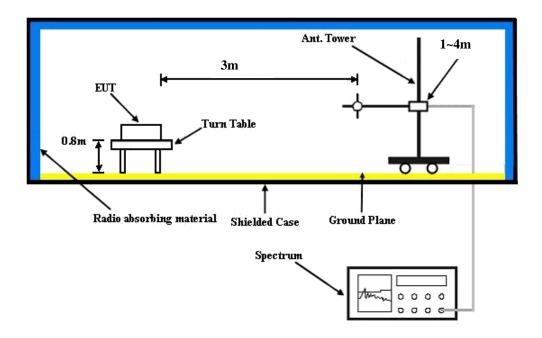
The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA & CDMA & LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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#### 4.1.3 TEST SETUP

#### **EIRP / ERP MEASUREMENT:**



#### **CONDUCTED POWER MEASUREMENT:**





# 4.1.4 TEST RESULTS

# **CONDUCTED OUTPUT POWER (dBm)**

Band	GSM850				
Channel	128	189	251		
Frequency (MHz)	824.2	836.4	848.8		
GSM (1 Uplink)	32.70	32.60	32.60		
GPRS 8 (GMSK, 1 slot)	33.00	32.90	32.90		
GPRS 10 (GMSK, 2 slot)	32.40	32.40	32.40		
GPRS 11 (GMSK, 3 slot)	31.90	31.80	31.90		
GPRS 12 (GMSK, 4 slot)	30.80	30.70	30.80		
EDGE 8 (GMSK, 1 Uplink)	29.90	29.80	29.80		
EDGE 10 (GMSK, 2 Uplink)	29.50	29.70	29.70		
EDGE 11 (GMSK, 3 Uplink)	28.90	28.90	29.00		
EDGE 12 (GMSK, 4 Uplink)	28.40	28.40	28.50		

Band	WCDMA V			
Channel	4132 4182 4233			
Frequency (MHz)	826.4	836.4	846.6	
RMC 12.2K	26.63	26.43	26.47	



ERP POWER (dBm)

	GSM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	
	128	824.2	2.42	31.208	31.48	1405.40	Н	
	189	836.4	2.22	31.3	31.37	1370.88	Н	
x	251	848.8	2.71	31.222	31.78	1507.30	Н	
^	128	824.2	-8.48	31.504	20.87	122.29	V	
	189	836.4	-8.33	31.117	20.64	115.80	V	
	251	848.8	-8.94	31.922	20.83	121.12	V	

	EDGE								
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)		
	128	824.2	-0.81	31.208	28.25	668.04	Н		
	189	836.4	-0.24	31.3	28.91	778.04	Н		
x	251	848.8	-0.06	31.222	29.01	796.53	Н		
^	128	824.2	-11.47	31.504	17.88	61.43	V		
	189	836.4	-11.60	31.117	17.37	54.54	V		
	251	848.8	-11.84	31.922	17.93	62.12	V		

WCDMA									
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)		
	4132	826.4	-3.47	31.208	25.59	362.08	Н		
	4182	836.4	-3.36	31.3	25.79	379.31	Н		
x	4233	846.6	-3.99	31.222	25.08	322.26	Н		
^	4132	826.4	-14.56	31.504	14.79	30.16	V		
	4182	836.4	-14.23	31.117	14.74	29.76	V		
	4233	846.6	-15.42	31.922	14.35	27.24	V		



#### 4.2 RADIATED EMISSION MEASUREMENT

#### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to -13dBm.

#### **4.2.2 TEST PROCEDURES**

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power 2.15dBi.

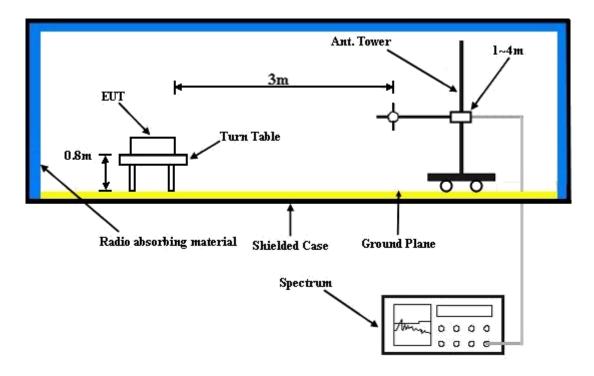
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

#### 4.2.3 DEVIATION FROM TEST STANDARD

No deviation



# 4.2.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

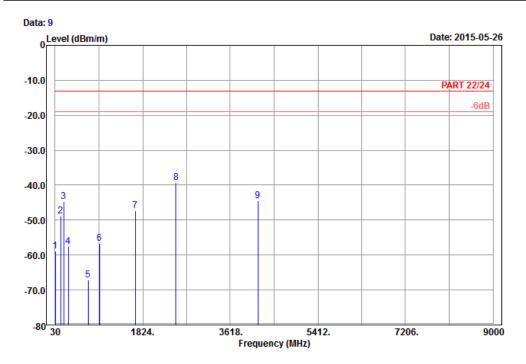


#### 4.2.5 TEST RESULTS

#### GSM:



# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 3m Horizontal Remark : GPRS 850\_Link\_CH189

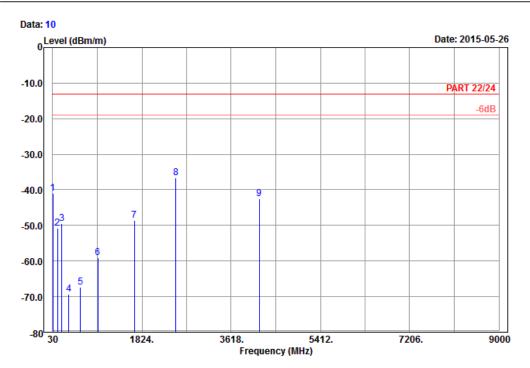
Tested by: Hwa Chiang

	-,		8				
			Read	Limit	0ver		
	Freq	Level	Level	Line	Limit	Factor	Remark
_							
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	31.35	-58.89	-48.24	-13.00	-45.89	-10.65	Peak
2	139.89	-48.81	-41.12	-13.00	-35.81	-7.69	Peak
3	209.28	-44.65	-38.60	-13.00	-31.65	-6.05	Peak
4	300.00	-57.63	-51.67	-13.00	-44.63	-5.96	Peak
5	707.40	-67.06	-66.55	-13.00	-54.06	-0.51	Peak
6	940.50	-56.69	-61.40	-13.00	-43.69	4.71	Peak
7	1672.80	-47.40	-55.31	-13.00	-34.40	7.91	Peak
8 pp	2509.20	-39.18	-50.46	-13.00	-26.18	11.28	Peak
9	4182.00	-44.40	-61.53	-13.00	-31.40	17.13	Peak





# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 3m Vertical Remark : GPRS 850\_Link\_CH189

Tested by: Hwa Chiang

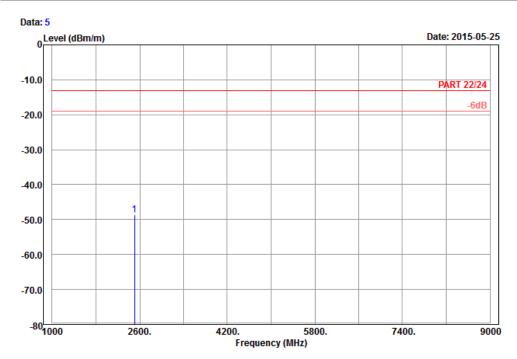
			Read	Limit	0ver		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
		•		•		•	
1	31.62	-40.88	-30.12	-13.00	-27.88	-10.76	Peak
2	130.98	-50.80	-43.15	-13.00	-37.80	-7.65	Peak
3	215.22	-49.50	-43.52	-13.00	-36.50	-5.98	Peak
4	351.10	-69.33	-64.00	-13.00	-56.33	-5.33	Peak
5	590.50	-67.43	-67.46	-13.00	-54.43	0.03	Peak
6	940.50	-59.09	-63.80	-13.00	-46.09	4.71	Peak
7	1672.80	-48.66	-56.57	-13.00	-35.66	7.91	Peak
8 pp	2509.20	-36.61	-47.89	-13.00	-23.61	11.28	Peak
9	4182.00	-42.52	-59.65	-13.00	-29.52	17.13	Peak



#### **EDGE**:



# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 3m Horizontal Remark : EDGE 850\_Link\_CH189

Tested by: Hwa Chiang

Read Limit Over

Freq Level Level Line Limit Factor Remark

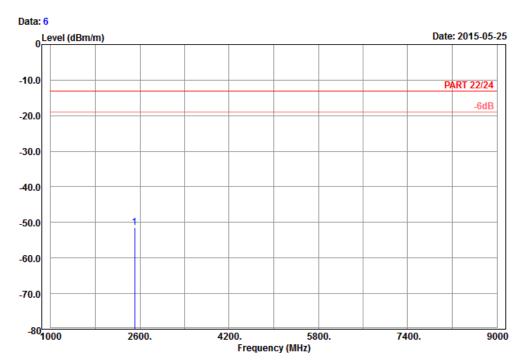
MHz dBm/m dBm dBm/m dB dB/m

1 pp 2509.20 -48.60 -59.88 -13.00 -35.60 11.28 Peak





# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 3m Vertical Remark : EDGE 850\_Link\_CH189

Tested by: Hwa Chiang

Read Limit Over

Freq Level Level Line Limit Factor Remark

MHz dBm/m dBm dBm/m dB dB/m

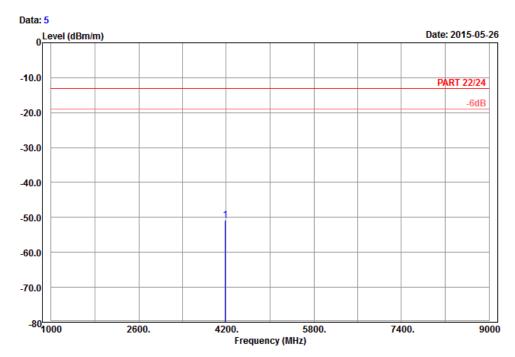
1 pp 2509.20 -51.48 -62.76 -13.00 -38.48 11.28 Peak



# WCDMA:



# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 3m Horizontal

Remark : Band V\_Link\_CH4182

Tested by: Hwa Chiang

Read Limit Over

Freq Level Line Limit Factor Remark

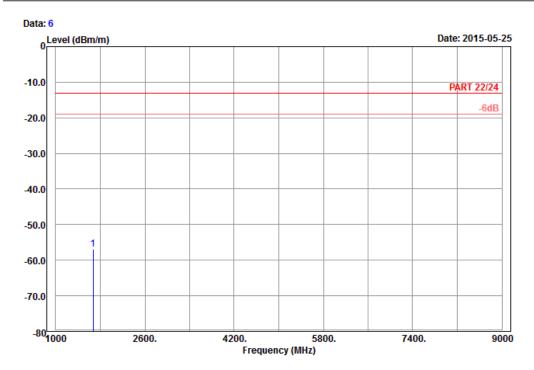
MHz dBm/m dBm dBm/m dB dB/m

1 pp 4182.00 -50.79 -67.92 -13.00 -37.79 17.13 Peak





# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 3m Vertical Remark : Band V\_Link\_CH4182

Tested by: Hwa Chiang

Read Limit Over

Freq Level Level Line Limit Factor Remark

MHz dBm/m dBm dBm/m dB dB/m

1 pp 1672.80 -56.98 -64.89 -13.00 -43.98 7.91 Peak



# PHOTOGRAPHS OF THE TEST CONFIGURATION Please refer to the attached file (Test Setup Photo).

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# 6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab: Hsin Chu EMC/RF/Telecom Lab:

Tel: 886-2-26052180 Tel: 886-3-5935343 Fax: 886-2-26051924 Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:

Tel: 886-3-3183232 Fax: 886-3-3270892

**Email:** <a href="mailto:service.adt@tw.bureauveritas.com">service.adt@tw.bureauveritas.com</a> **Web Site:** <a href="mailto:www.bureauveritas-adt.com">www.bureauveritas-adt.com</a>

The address and road map of all our labs can be found in our web site also.

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7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB
No any modifications were made to the EUT by the lab during the test.
END

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