

FCC Test Report

(PART 22)

Report No.: RF150508C06A

FCC ID: A4R-WT2

Test Model: WT2

Received Date: Jul. 13, 2016

Test Date: Jul. 24, 2016 ~ Aug. 05, 2016

Issued Date: Aug. 25, 2016

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)

Test Location: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.



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Table of Contents

Re	ase Control Record	3					
1	Certificate of Conformity 4						
2	2 Summary of Test Results						
	 Measurement Uncertainty Test Site and Instruments 						
3	eneral Information	7					
	 General Description of EUT	8 8 9 . 10					
4	est Types and Results	11					
	 Output Power Measurement	11 11 .12 .12 .16 .16 .16 .16 .16					
~							
5	ictures of Test Arrangements	. 23					



Release Control Record Description Issue No. Date Issued Original Release Aug. 25, 2016 RF150508C06A



1 Certificate of Conformity

Product Name/Description:	Connectivity Bridge
Brand:	Google
Test Model:	WT2
Sample Status:	Identical Prototype
Company Name:	Google Inc.
Test Date:	Jul. 24, 2016 ~ Aug. 05, 2016
Standards:	FCC Part 22, Subpart H

The above equipment 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 :

Evonne Lin

Date: Aug. 25, 2016

Date:

Aug. 25, 2016

Evonne Liu / Specialist

Stonley Whe

Approved by :

Stanley Wu / Assistant Manager



2 Summary of Test Results

	Applied Standard: FCC Part 22 & Part 2						
FCC Clause	Test Item	Result	Remarks				
2.1046 22.913 (a) Effective Radiated Power		Pass	Meet the requirement of limit.				
	Peak to Average Ratio		Refer to Note				
2.1055 22.355	Frequency Stability		Refer to Note				
2.1049	2.1049 Occupied Bandwidth		Refer to Note				
22.917	Band Edge Measurements	Not Applicable	Refer to Note				
2.1051 22.917 Conducted Spurious Emissions		Not Applicable	Refer to Note				
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -23.67 dB at 1672.80 MHz.				

NOTE: Only the test item for ERP Power and radiated emission had been tested for this addendum and the conducted data is referring to module report (Report No.: T140415W02-RP3/T140415W02-RP1).

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	Expended Uncertainty (k=2) (±)
Redicted Engineering to 4 Other	30 MHz ~ 200 MHz	2.93 dB
Radiated Emissions up to 1 GHz	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB



2.2 Test Site and Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
est Receiver N9038A gilent		MY51210203	Jan. 21, 2016	Jan. 20, 2017
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep. 03, 2015	Sep. 02, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2015	Dec. 16, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Jan. 04, 2016	Jan. 03, 2017
Double Ridge Guide Horn Antenna EMCO	3115	5619	Jan. 04, 2016	Jan. 03, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Jan. 07, 2016	Jan. 06, 2017
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Preamplifier EMCI	EMC 012645	980115	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 184045	980116	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 28, 2015	Dec. 27, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor Anritsu	MA2411B	1207325	Sep. 21, 2015	Sep. 20, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 12, 2015	Oct. 11, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 12, 2015	Oct. 11, 2016
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2015	Oct. 11, 2016
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. 10, 2015	Aug. 09, 2017

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 preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
- 4. The FCC Site Registration No. is 690701.
- 5. The IC Site Registration No. is IC7450F-10.



3 General Information

3.1 General Description of EUT

Product Name/Description	Connectivity Bridge			
Brand	Google			
Test Model	WT2			
Status of EUT	Identical Prototype			
Power Supply Rating	5.0 Vdc (adapter)			
	GSM/GPRS	GMSK		
Modulation Type	WCDMA	BPSK		
	LTE	QPSK, 16QAM		
	GSM/GPRS/EDGE	824.2 ~ 848.8 MHz		
	WCDMA	826.4 ~ 846.6 MHz		
Francisco Danas	LTE 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz		
Frequency Range	LTE 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz		
	LTE 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz		
	LTE 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz		
	GSM/GPRS	719.45 mW		
	WCDMA	157.40 mW		
Max. ERP Power	LTE 5 (Channel Bandwidth: 1.4 MHz)	103.51 mW		
Max. ERP Power	LTE 5 (Channel Bandwidth: 3 MHz)	106.41 mW		
	LTE 5 (Channel Bandwidth: 5 MHz)	110.15 mW		
	LTE 5 (Channel Bandwidth: 10 MHz)	113.50 mW		
Antenna Type	Fixed Internal Antenna			
Accessory Device	Refer to Note as below			
Data Cable Supplied	Refer to Note as below			

Note:

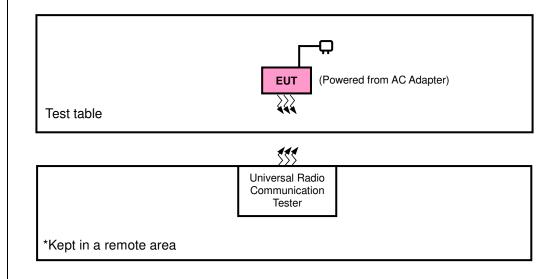
1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	TPT	N/0050200	I/P: 100-240Vac, 50-60Hz, 0.3A O/P: 5Vdc, 2A
WWAN Module	Telit	LE910-NAG	
WiFi Module	AzureWave	AW-CM389NF	

2. The above EUT information is 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



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.



3.3 Test Mode Applicability and Tested Channel Detail

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 as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	ERP	Radiated Emission
GSM	Z-plane	Z-axis
WCDMA	Z-plane	Z-axis
LTE Band 5	X-plane	X-axis

GSM

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

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	

LTE Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
	ERP	20407 to 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	1 RB / 2 RB Offset
		20415 to 20635	20415, 20525, 20635	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
-		20425 to 20625	20425, 20525, 20625	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		20450 to 20600	20450, 20525, 20600	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
-	Radiated Emission	20450 to 20600	20525	10 MHz	QPSK	1 RB / 24 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Test Item Environmental Conditions		Tested By
ERP	25 deg. C, 65 % RH	5 Vdc	Getaz Yang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang



3.4 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.

3.5 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 KDB 971168 D01 Power Meas License Digital Systems v02r02 ANSI/TIA/EIA-603-D 2010

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 1 MHz for GSM, GPRS & EDGE, and 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m 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 1 m to 4 m 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.P.R power 2.15 dBi.

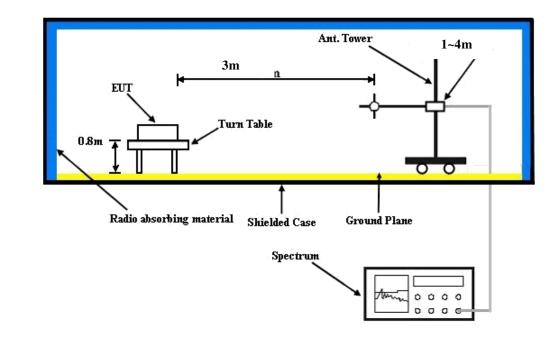
Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and 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.



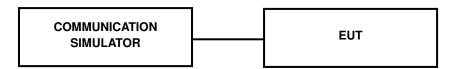
4.1.3 Test Setup

EIRP / ERP Measurement:



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

Conducted Power Measurement:



4.1.4 Test Results

ERP Power (dBm)

GSM									
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)		
	128	824.2	-2.12	32.62	28.35	683.91			
	189	836.4	-1.80	32.52	28.57	719.45	н		
Z	251	848.8	-2.34	32.65	28.16	654.64			
	128	824.2	-10.58	32.76	20.03	100.69			
	189	836.4	-10.09	32.39	20.15	103.51	V		
	251	848.8	-10.32	32.54	20.07	101.62			



WCDMA									
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)		
	4132	826.4	-8.63	32.62	21.84	152.76			
	4182	836.4	-8.40	32.52	21.97	157.40	н		
Z	4233	846.6	-8.99	32.65	21.51	141.58			
2	4132	826.4	-18.42	32.76	12.19	16.56			
	4182	836.4	-18.11	32.39	12.13	16.33	V		
	4233	846.6	-18.57	32.54	11.82	15.21			

	LTE Band 5									
Channel Bandwidth: 1.4 MHz / QPSK										
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)			
	20407	824.7	-10.38	32.62	20.09	102.09				
	20525	836.5	-10.22	32.52	20.15	103.51	Н			
x	20643	848.3	-10.41	32.65	20.09	102.09				
^	20407	824.7	-19.92	32.76	10.69	11.72				
	20525	836.5	-19.53	32.39	10.71	11.78	V			
	20643	848.3	-19.78	32.54	10.61	11.51				
		C	hannel Ban	dwidth: 1.4 MHz	/ 16QAM					
	20407	824.7	-11.42	32.62	19.05	80.35				
	20525	836.5	-11.29	32.52	19.08	80.91	Н			
v	20643	848.3	-11.43	32.65	19.07	80.72				
Х	20407	824.7	-20.99	32.76	9.62	9.16				
	20525	836.5	-20.55	32.39	9.69	9.31	V			
	20643	848.3	-20.82	32.54	9.57	9.06				



				LTE Band 5					
Channel Bandwidth: 3 MHz / QPSK									
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)		
	20415	825.5	-10.24	32.62	20.23	105.44			
	20525	836.5	-10.10	32.52	20.27	106.41	Н		
х	20635	847.5	-10.29	32.65	20.21	104.95			
^	20415	825.5	-19.88	32.76	10.73	11.83			
	20525	836.5	-19.49	32.39	10.75	11.89	V		
	20635	847.5	-19.67	32.54	10.72	11.80			
	-		Channel Ba	ndwidth: 3 MHz	/ 16QAM				
	20415	825.5	-11.31	32.62	19.16	82.41			
	20525	836.5	-11.17	32.52	19.20	83.18	Н		
v	20635	847.5	-11.32	32.65	19.18	82.79			
Х	20415	825.5	-20.87	32.76	9.74	9.42			
	20525	836.5	-20.44	32.39	9.80	9.55	V		
	20635	847.5	-20.70	32.54	9.69	9.31			

	LTE Band 5									
Channel Bandwidth: 5 MHz / QPSK										
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)			
	20425	826.5	-10.12	32.62	20.35	108.39				
	20525	836.5	-9.95	32.52	20.42	110.15	Н			
х	20625	846.5	-10.16	32.65	20.34	108.14				
^	20425	826.5	-19.80	32.76	10.81	12.05				
	20525	836.5	-19.34	32.39	10.90	12.30	V			
	20625	846.5	-19.57	32.54	10.82	12.08				
			Channel Ba	ndwidth: 5 MHz /	/ 16QAM					
	20425	826.5	-11.19	32.62	19.28	84.72				
	20525	836.5	-11.05	32.52	19.32	85.51	Н			
V	20625	846.5	-11.21	32.65	19.29	84.92				
Х	20425	826.5	-20.76	32.76	9.85	9.66				
	20525	836.5	-20.32	32.39	9.92	9.82	V			
	20625	846.5	-20.58	32.54	9.81	9.57				



	LTE Band 5										
Channel Bandwidth: 10 MHz / QPSK											
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)				
	20450	829.0	-10.01	32.62	20.46	111.17					
	20525	836.5	-9.82	32.52	20.55	113.50	Н				
x	20600	844.0	-9.99	32.65	20.51	112.46					
~	20450	829.0	-19.69	32.76	10.92	12.36					
	20525	836.5	-19.22	32.39	11.02	12.65	V				
	20600	844.0	-19.43	32.54	10.96	12.47					
		C	Channel Bar	ndwidth: 10 MHz	/ 16QAM						
	20450	829.0	-11.08	32.62	19.39	86.90					
	20525	836.5	-10.92	32.52	19.45	88.10	Н				
v	20600	844.0	-11.13	32.65	19.37	86.50					
Х	20450	829.0	-20.61	32.76	10.00	10.00					
	20525	836.5	-20.16	32.39	10.08	10.19	V				
	20600	844.0	-20.43	32.54	9.96	9.91					



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 -13 dBm.

4.2.2 Test Procedure

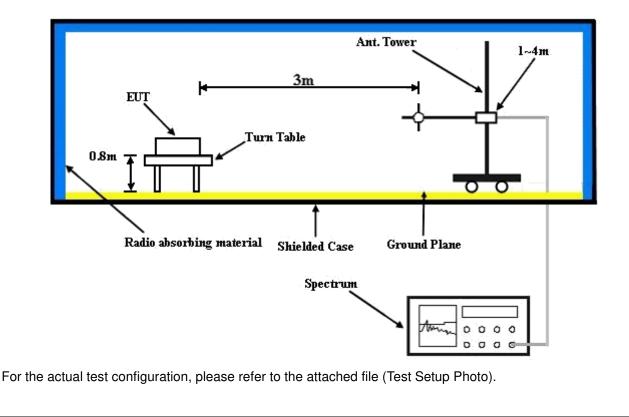
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m 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.P.R power 2.15 dBi.

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

4.2.3 Deviation from Test Standard

No deviation.

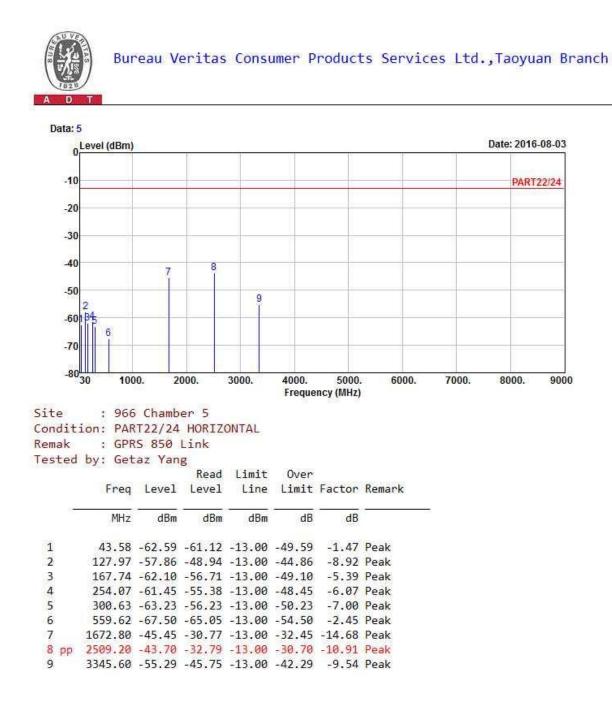
4.2.4 Test Setup





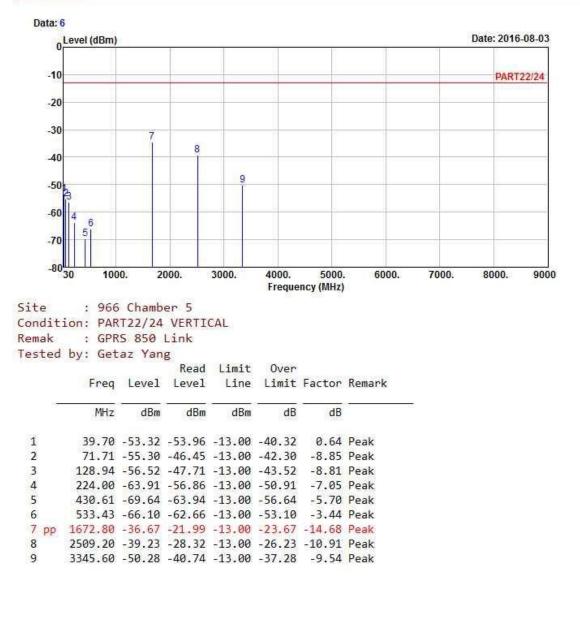
4.2.5 Test Results

GSM:





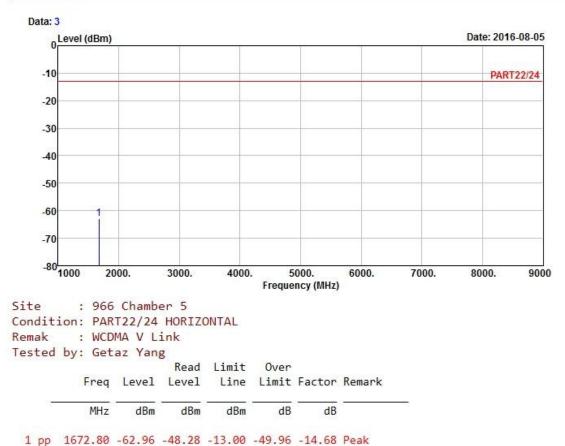






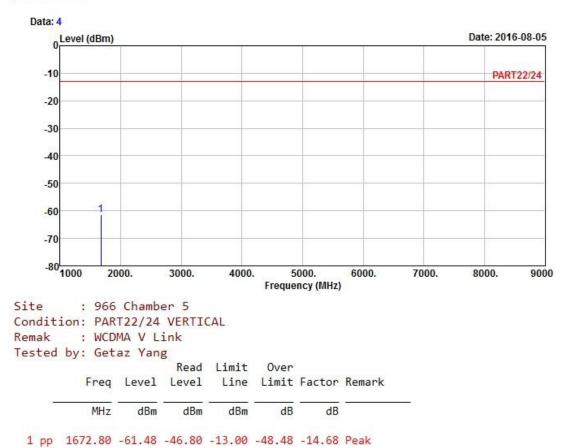
WCDMA:





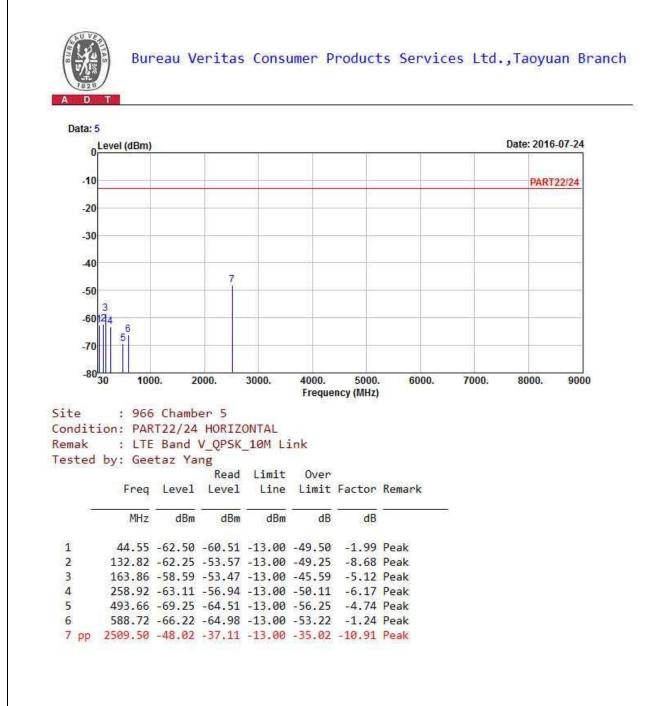






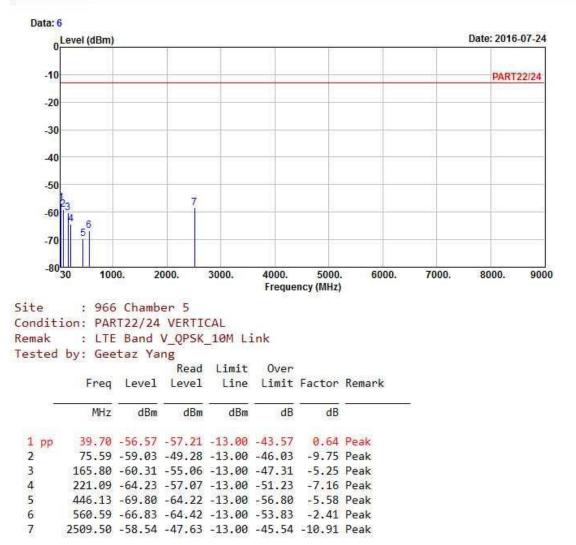


LTE Band 5 Channel Bandwidth: 10 MHz / QPSK











5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).



Appendix – 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 Tel: 886-2-26052180 Fax: 886-2-26051924 Hsin Chu EMC/RF/Telecom Lab Tel: 886-3-6668565 Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Tel: 886-3-3183232 Fax: 886-3-3270892

Email: <u>service.adt@tw.bureauveritas.com</u> Web Site: <u>www.bureauveritas-adt.com</u>

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

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