

Partial FCC Test Report

(PART 22)

Report No.: RF171226C11

FCC ID: KA2WP902A1

Test Model: DWP-902

Received Date: Dec. 26, 2017

Test Date: Jan. 20, 2018 ~ Jan. 24, 2018

Issued Date: Feb. 02, 2018

Applicant: D-Link Corporation

Address: 289 Xinhu 3rd RD Neihu district Taipei Taiwan

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 (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan

Hsien 333, Taiwan, R.O.C.

Test Location (2): No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan,

R.O.C

FCC Registration /

427177 / TW0011

Designation Number:





This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies



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Release Control Record

Issue No.	Description	Date Issued
RF171226C11	Original Release	Feb. 02, 2018



1 Certificate of Conformity

Product: LTE Router

Brand: D-Link Corporation

Test Model: DWP-902

Sample Status: Identical Prototype

Applicant: D-Link Corporation

Test Date: Jan. 20, 2018 ~ Jan. 24, 2018

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 RF characteristics under the conditions specified in this report.

Vera Huang

Prepared by: ______, Date: ______, Feb. 02, 2018

Vera Huang / Specialist

Dylan Chiou / Project Engineer



2 Summary of Test Results

	Applied Standard: F	CC 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	Occupied Bandwidth	N/A	Refer to Note
22.917	Band Edge Measurements	N/A	Refer to Note
2.1051 22.917	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -38.35 dB at 200.37 MHz.

Note:

Only test items for Radiated Emissions and Effective Radiated Power tests were performed for this report. For other test data, please refer to TTL Report No.: B15W50341-FCC-RF-Rev1 for module (Name: Wireless Modules, Model: EM7455).

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) (±)
Padiated Emissions up to 1 CHz	30 MHz ~ 200 MHz	2.0153 dB
Radiated Emissions up to 1 GHz	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
Radiated Emissions above 1 GHz	18 GHz ~ 40 GHz	1.1508 dB



2.2 Test Site and Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Jul. 05, 2017	Jul. 04, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna ETS-Lindgren	3117	00143293	Jun. 26, 2017	Jun. 25, 2018
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 07, 2017	Jul. 06, 2018
Bluetooth Tester	CBT	100980	Jun. 28, 2017	Jun. 27, 2019
Loop Antenna MXG Vector signal generator Agilent	EM-6879 N5182B	269 MY53050430	Aug. 11, 2017 Oct. 24, 2017	Aug. 10, 2018 Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 23, 2017	Jun. 22, 2018
Preamplifier Agilent	83017A	MY39501357	Jun. 23, 2017	Jun. 22, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 26, 2017	Jun. 25, 2018
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 26, 2017	Jun. 25, 2018
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 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 HsinTien Chamber 1.
 - 3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
 - 4. The IC Site Registration No. is IC7450I-1.



3 General Information

3.1 General Description of EUT

Product	LTE Router						
Brand	D-Link Corporation						
Test Model	DWP-902						
Status of EUT	Identical Prototype						
Power Supply Rating	54 Vdc (Adapter or POE)						
Modulation Type	LTE	QPSK, 16QAM					
	LTE 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz					
Eraguanay Banga	LTE 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz					
Frequency Range	LTE 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz					
	LTE 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz					
	LTE 5 (Channel Bandwidth: 1.4 MHz)	801.31 mW					
Max. ERP Power	LTE 5 (Channel Bandwidth: 3 MHz)	812.46 mW					
Wax. ERP Power	LTE 5 (Channel Bandwidth: 5 MHz)	807.24 mW					
	LTE 5 (Channel Bandwidth: 10 MHz)	823.76 mW					
Antenna Type	Internal PCB Antenna						
Accessory Device	Refer to Note as below						
Data Cable Supplied	Refer to Note as below						

Note:

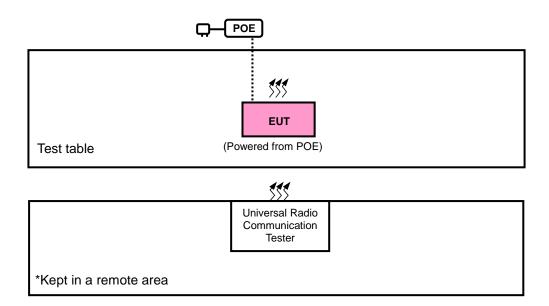
1. The EUT contains following accessory devices.

Product	Product Brand		Description
Adapter	Gospell Digital Technology Co. Ltd.	G0753-540-060	I/P: 100-240 Vac, 50/60 Hz, 0.75 A O/P: 54 Vdc, 0.6 A 1.2 m non-shielded cable w/o core
POE	D-Link	DPE-301GI	54 Vdc, 0.6 A
WWAN Module	Sierra	EM7455	

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
LTE Band 5	X-plane	X-axis

LTE Band 5

EUT Configure Mode	e Test Item Available Channel		Tested Channel	Channel Bandwidth	Modulation	Mode
		20407 to 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	ERP	20415 to 20635	20415, 20525, 20635	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	ERP	20425 to 20625	20425, 20525, 20625	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Radiated Emission	20450 to 20600	20450, 20525, 20600	10 MHz	QPSK	1 RB / 0 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	Environmental Conditions	Input Power	Tested By	
ERP	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee	
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee	

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-E 2016
ANSI 63,26-2015

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:

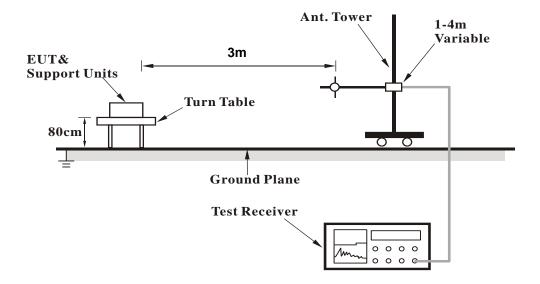
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, and 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) 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.



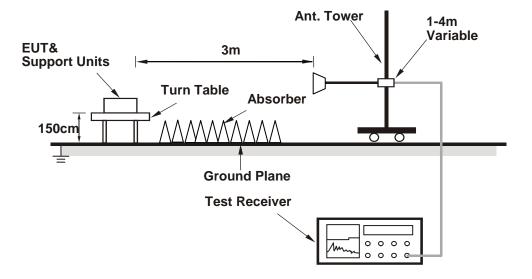
4.1.3 Test Setup

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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



4.1.4 Test Results

ERP Power (dBm)

	LTE Band 5										
	Channel Bandwidth: 1.4 MHz / QPSK										
Plane Channel F		Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)				
	20407	824.7	-0.02	31.208	29.04	801.31					
	20525	836.5	-0.14	31.3	29.01	796.16	Н				
X	20643	848.3	-0.05	31.222	29.02	798.36					
^	20407	824.7	-5.32	31.504	24.03	253.16					
	20525	836.5	-4.95	31.117	24.02	252.17	V				
	20643	848.3	-5.71	31.922	24.06	254.80					
		C	hannel Ban	dwidth: 1.4 MHz	/ 16QAM						
	20407	824.7	-1.04	31.208	28.02	633.58					
	20525	836.5	-1.13	31.3	28.02	633.87	Н				
V	20643	848.3	-1.05	31.222	28.02	634.16					
X	20407	824.7	-6.31	31.504	23.04	201.56					
	20525	836.5	-5.90	31.117	23.07	202.63	V				
	20643	848.3	-6.68	31.922	23.09	203.80					

	LTE Band 5									
Channel Bandwidth: 3 MHz / QPSK										
Plane	Plane Channel Frequency (MHz) LVL Correction Factor (dBm) ERP (dBm) ERP		ERP (mW)	Polarization (H/V)						
	20415	825.5	0.04	31.208	29.10	812.46				
	20525	836.5	-0.06	31.3	29.09	810.96	Н			
l x	20635	847.5	-0.02	31.222	29.05	803.90				
^	20415	825.5	-5.31	31.504	24.04	253.75				
	20525	836.5	-4.94	31.117	24.03	252.76	V			
	20635	847.5	-5.75	31.922	24.02	252.46				
			Channel Ba	ndwidth: 3 MHz	/ 16QAM					
	20415	825.5	-0.94	31.208	28.12	648.34				
	20525	836.5	-1.05	31.3	28.10	645.65	Н			
	20635	847.5	-1.04	31.222	28.03	635.62				
Х	20415	825.5	-6.26	31.504	23.09	203.89				
	20525	836.5	-5.95	31.117	23.02	200.31	V			
	20635	847.5	-6.71	31.922	23.06	202.40				



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	-0.05	31.208	29.01	795.79			
	20525	836.5	-0.08	31.3	29.07	807.24	Н		
Х	20625	846.5	-0.04	31.222	29.03	800.20			
	20425	826.5	-5.32	31.504	24.03	253.16			
	20525	836.5	-4.91	31.117	24.06	254.51	V		
	20625	846.5	-5.70	31.922	24.07	255.39			
Channel Bandwidth: 5 MHz / 16QAM									
х	20425	826.5	-1.02	31.208	28.04	636.50			
	20525	836.5	-1.04	31.3	28.11	647.14	Н		
	20625	846.5	-1.01	31.222	28.06	640.03			
	20425	826.5	-6.31	31.504	23.04	201.56			
	20525	836.5	-5.95	31.117	23.02	200.31	V		
	20625	846.5	-6.75	31.922	23.02	200.54			

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	0.10	31.208	29.16	823.76			
x	20525	836.5	0.00	31.3	29.15	822.24	Н		
	20600	844.0	0.00	31.222	29.07	807.61			
	20450	829.0	-5.16	31.504	24.19	262.66			
	20525	836.5	-4.86	31.117	24.11	257.45	V		
	20600	844.0	-5.68	31.922	24.09	256.57			
Channel Bandwidth: 10 MHz / 16QAM									
X	20425	826.5	-0.90	31.208	28.16	654.33			
	20525	836.5	-0.98	31.3	28.17	656.15	Н		
	20625	846.5	-1.03	31.222	28.04	637.09			
	20425	826.5	-6.19	31.504	23.16	207.20			
	20525	836.5	-5.85	31.117	23.12	204.97	V		
	20625	846.5	-6.70	31.922	23.07	202.86			



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 (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) 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.

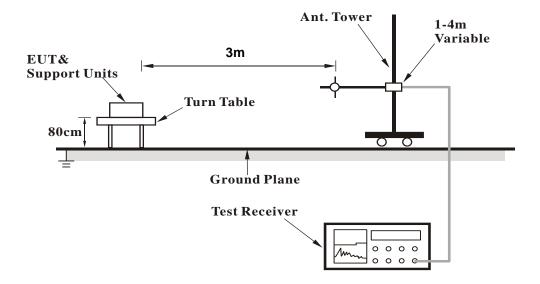
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.2.3 Deviation from Test Standard No deviation.

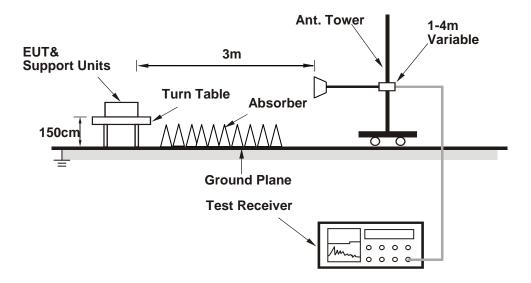


4.2.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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



4.2.5 Test Results

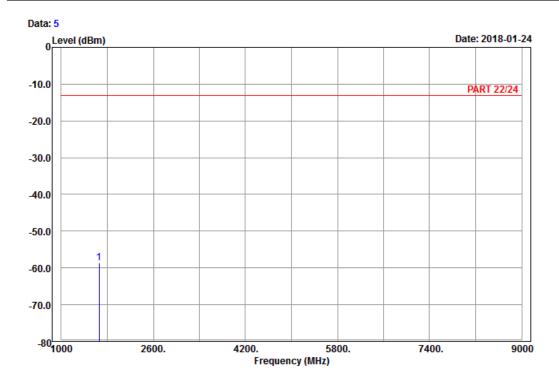
LTE Band 5

Channel Bandwidth: 10 MHz / QPSK

Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 Horizontal Remark : LTE_Band 5_Link_CH20450

Tested by: Karl Lee

Read Limit Over
Freq Level Level Line Limit Factor Remark

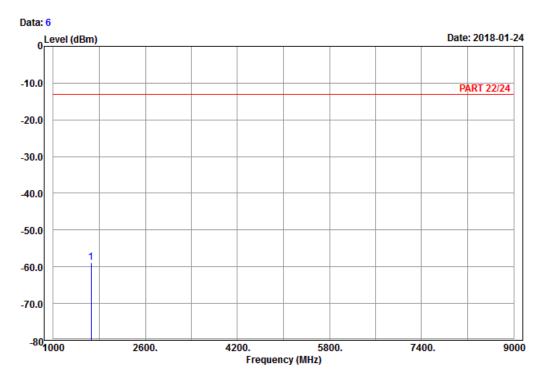
MHz dBm dBm dBm dB dB

1 pp 1658.00 -58.74 -66.65 -13.00 -45.74 7.91 Peak





Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1 Condition: PART 22/24 Vertical Remark : LTE_Band 5_Link_CH20450

Tested by: Karl Lee

Read Limit Over Freq Level Level Limit Factor Remark

MHz dBm dBm dB dB

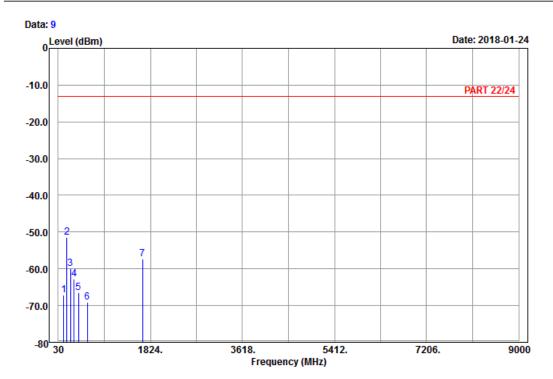
1 pp 1658.00 -58.78 -66.69 -13.00 -45.78 7.91 Peak



Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 Horizontal Remark : LTE_Band 5_Link_CH20525

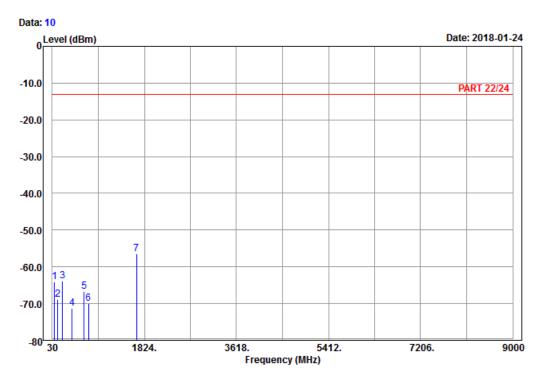
Tested by: Karl Lee

			Read	Limit	0ver		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	133.14	-67.19	-59.53	-13.00	-54.19	-7.66	Peak
2 pp	200.37	-51.35	-45.18	-13.00	-38.35	-6.17	Peak
3	268.41	-59.95	-54.27	-13.00	-46.95	-5.68	Peak
4	334.30	-62.78	-57.22	-13.00	-49.78	-5.56	Peak
5	420.40	-66.38	-63.19	-13.00	-53.38	-3.19	Peak
6	596.80	-69.17	-69.44	-13.00	-56.17	0.27	Peak
7	1673.00	-57.30	-65.21	-13.00	-44.30	7.91	Peak





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Site : 966 chamber 1 Condition: PART 22/24 Vertical Remark : LTE_Band 5_Link_CH20525

Tested by: Karl Lee

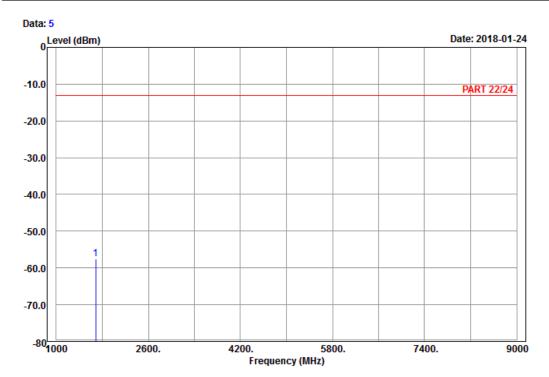
	-,						
			Read	Limit	0ver		
	Freq	Level	Level	Line	Limit	Factor	Remark
_							
	MHz	dBm	dBm	dBm	dB	dB	
1	76.17	-63.99	-51.89	-13.00	-50.99	-12.10	Peak
2	139.08	-68.83	-61.14	-13.00	-55.83	-7.69	Peak
3	228.99	-63.79	-58.00	-13.00	-50.79	-5.79	Peak
4	416.20	-71.33	-68.23	-13.00	-58.33	-3.10	Peak
5	650.00	-66.75	-66.62	-13.00	-53.75	-0.13	Peak
6	738.90	-69.97	-68.86	-13.00	-56.97	-1.11	Peak
7 pp	1673.00	-56.46	-64.37	-13.00	-43.46	7.91	Peak



High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 22/24 Horizontal Remark : LTE_Band 5_Link_CH20600

Tested by: Karl Lee

Read Limit Over
Freq Level Level Line Limit Factor Remark

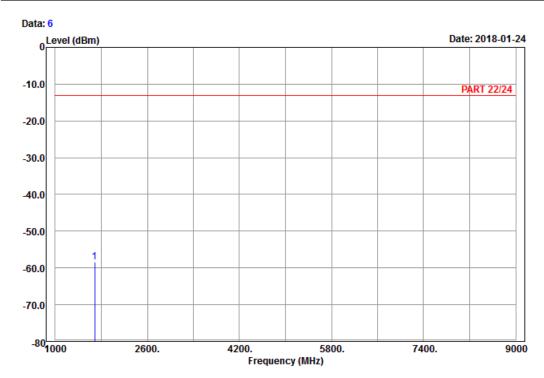
MHz dBm dBm dBm dB dB

1 pp 1688.00 -57.64 -65.66 -13.00 -44.64 8.02 Peak





Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1 Condition: PART 22/24 Vertical Remark : LTE_Band 5_Link_CH20600

Tested by: Karl Lee

Read Limit Over
Freq Level Level Line Limit Factor Remark

MHz dBm dBm dBm dB dB

1 pp 1688.00 -58.32 -66.34 -13.00 -45.32 8.02 Peak



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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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

Hwa Ya EMC/RF/Safety

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

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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