FCC Test Report
(Part 27)

Report No.:	RF180523C10-2 R1
FCC ID:	2AJOTTA-1082
Test Model:	TA-1082
Received Date:	May 23, 2018
Test Date:	Jun. 29, 2018 (For all test data except LTE Band 41) Sep. 04, 2018 (For LTE Band 41)
Issued Date:	Oct. 24, 2018
Applicant:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
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 Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RF180523C10-2	Original release	Jul. 02, 2018
RF180523C10-2 R1	1. Modified Band 41 bandwidth and test data 2. Revised applicant's address	Oct. 24, 2018

1 Certificate of Conformity

Product:	Smart Phone
Brand:	NOKIA
Test Model:	TA-1082
Sample Status:	Production Unit
Applicant:	HMD Global Oy
Test Date:	Jun. 29, 2018 (For all test data except LTE Band 41) Sep. 04, 2018 (For LTE Band 41)
Standards:	FCC Part 27, Subpart C, D, L, H, F, M

This report is issued as a supplementary report to BV CPS report no.: RF180523C09-2 R1. This report shall be used by combining with its original report.

Prepared by : Pettie Chen , **Date:** Oct. 24, 2018

Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Oct. 24, 2018

Bruce Chen / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2										
FCC Clause								Test Item	Result	Remarks
WCDMA Band 4 / LTE Band 4	LTE Band 7	LTE Band 12	LTE Band 13	LTE Band 17	LTE Band 38	LTE Band 41	LTE Band 66			
2.1046 27.50 (d)(4)	2.1046 27.50(h)	2.1046 27.50 (b)(10)	2.1046 27.50 (b)(10)	2.1046 27.50 (c)(10)	2.1046 27.50(h)	2.1046 27.50 (h)(2)	2.1046 27.50 (d)(4)	Equivalent Isotropically Radiated Power	N/A	Refer to Note
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2.1055 27.54	2.1055 27.54	2.1055 27.54	2.1055 27.54	2.1055 27.54	2.1055 27.54	2.1055 27.54	2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	N/A	Refer to Note
2.1049 27.53 (m)(6)	2.1049 27.53 (h)	2.1049 27.53 (m)(6)	2.1049 27.53 (m)(6)	2.1049 27.53 (m)(6)	2.1049 27.53 (h)	2.1049 27.53 (m)(6)	2.1049 27.53 (m)(6)	Emission Bandwidth	N/A	Refer to Note
2.1051 27.53(h)	2.1051 27.53(m)	2.1051 27.53(c)	2.1051 27.53(c)	2.1051 27.53(g)	2.1051 27.53(m)	2.1051 27.53(m) (4)(6)	2.1051 27.53(h)	Band Edge Measurements	N/A	Refer to Note
2.1051 27.53(h)	2.1051 27.53(m)	2.1051 27.53(c)	2.1051 27.53(c)	2.1051 27.53(g)	2.1051 27.53(m)	2.1051 27.53(m) (4)(6)	2.1051 27.53(h)	Conducted Spurious Emissions	N/A	Refer to Note
2.1051 27.53(h)	2.1053 27.53(m)	2.1051 27.53(c)	2.1051 27.53(c)	2.1051 27.53(g)	2.1053 27.53(m)	2.1053 27.53(m) (4)(6)	2.1051 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -17.6dB at 1559.00MHz.

Note: Only Radiated Spurious Emissions test had been performed for the addendum. Refer to original report for other test data.

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	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

For test date: Jun. 29, 2018

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 11, 2018	Apr. 10, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	May 29, 2018	May 28, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2017	Aug. 07, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A01638	Feb. 22, 2018	Feb. 21, 2019
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 15, 2018	Jan. 14, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Temperature And Humidity Chamber TERCHY	HRM-120RF	931022	Nov. 20, 2017	Nov. 19, 2018
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Radio Communication Analyzer	MT8821C	6261786083	Dec. 21, 2017	Dec. 20, 2018

Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-9.

For test date: Sep. 04, 2018

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 11, 2018	Apr. 10, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	May 29, 2018	May 28, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna TESEQ	HLA 6121	45745	Jun. 14, 2018	Jun. 13, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2018	Aug. 07, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A01638	Feb. 22, 2018	Feb. 21, 2019
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 15, 2018	Jan. 14, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 31, 2018	Jul. 30, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Temperature And Humidity Chamber TERCHY	HRM-120RF	931022	Nov. 20, 2017	Nov. 19, 2018
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Radio Communication Analyzer	MT8821C	6261786083	Dec. 21, 2017	Dec. 20, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-9.

3 General Information

3.1 General Description of EUT

Product	SmartPhone		
Brand	NOKIA		
Test Model	TA-1082		
Status of EUT	Production Unit		
Power Supply Rating	5.0 Vdc or 9 Vdc or 12 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (Li-ion battery)		
Modulation Type	WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM, 64QAM		
Operating Frequency	WCDMA Band 4		1712.4MHz ~ 1752.6MHz
	LTE Band 4	Channel Bandwidth 1.4MHz	1710.7MHz ~ 1754.3MHz
		Channel Bandwidth 3MHz	1711.5MHz ~ 1753.5MHz
		Channel Bandwidth 5MHz	1712.5MHz ~ 1752.5MHz
		Channel Bandwidth 10MHz	1715.0MHz ~ 1750.0MHz
		Channel Bandwidth 15MHz	1717.5MHz ~ 1747.5MHz
		Channel Bandwidth 20MHz	1720.0MHz ~ 1745.0MHz
	LTE Band 7	Channel Bandwidth 5MHz	2622.5MHz ~ 2687.5MHz
		Channel Bandwidth 10MHz	2625.0MHz ~ 2685.0MHz
		Channel Bandwidth 15MHz	2627.5MHz ~ 2682.5MHz
		Channel Bandwidth 20MHz	2630.0MHz ~ 2680.0MHz
		Channel Bandwidth 5+20MHz	2502.5MHz ~ 2555.8MHz
		Channel Bandwidth 10+15MHz	2505.0MHz ~ 2553.0MHz
		Channel Bandwidth 10+20MHz	2505.0MHz ~ 2550.6MHz
		Channel Bandwidth 15+10MHz	2507.5MHz ~ 2550.5MHz
		Channel Bandwidth 15+15MHz	2507.5MHz ~ 2547.5MHz
		Channel Bandwidth 15+20MHz	2507.5MHz ~ 2545.4MHz
		Channel Bandwidth 20+5MHz	2510.0MHz ~ 2548.3MHz
		Channel Bandwidth 20+10MHz	2510.0MHz ~ 2545.6MHz
		Channel Bandwidth 20+15MHz	2510.0MHz ~ 2542.9MHz
		Channel Bandwidth 20+20MHz	2510.0MHz ~ 2540.2MHz
	LTE Band 12	Channel Bandwidth 1.4MHz	699.7MHz ~ 715.3MHz
		Channel Bandwidth 3MHz	700.5MHz ~ 714.5MHz
		Channel Bandwidth 5MHz	701.5MHz ~ 713.5MHz
		Channel Bandwidth 10MHz	704.0MHz ~ 711.0MHz
	LTE Band 13	Channel Bandwidth 5MHz	779.5MHz ~ 784.5MHz
		Channel Bandwidth 10MHz	782.0MHz

Operating Frequency	LTE Band 17	Channel Bandwidth 5MHz	706.5MHz ~ 713.5MHz		
		Channel Bandwidth 10MHz	709.0MHz ~ 711.0MHz		
	LTE Band 38	Channel Bandwidth 5MHz	2572.5MHz ~ 2617.5MHz		
		Channel Bandwidth 10MHz	2575.0MHz ~ 2615.0MHz		
		Channel Bandwidth 15MHz	2577.5MHz ~ 2615.0MHz		
		Channel Bandwidth 20MHz	2580.0MHz ~ 2610.0MHz		
	LTE Band 41	Channel Bandwidth 5MHz	2537.5MHz ~2652.5MHz		
		Channel Bandwidth 10MHz	2540MHz ~2650MHz		
		Channel Bandwidth 15MHz	2542.5MHz ~2647.5MHz		
		Channel Bandwidth 20MHz	2545MHz ~2645MHz		
	LTE Band 66	Channel Bandwidth 1.4MHz	1710.7MHz ~ 1779.3MHz		
		Channel Bandwidth 3MHz	1711.5MHz ~ 1778.5MHz		
		Channel Bandwidth 5MHz	1712.5MHz ~ 1775.00MHz		
		Channel Bandwidth 10MHz	1715.0MHz ~ 1772.5MHz		
		Channel Bandwidth 15MHz	1717.5MHz ~ 1747.5MHz		
		Channel Bandwidth 20MHz	1720.0MHz ~ 1770.0MHz		
Max. EIRP Power	WCDMA Band 4		457.088mW (26.6dBm)		
			QPSK	16QAM	64QAM
	LTE Band 4	Channel Bandwidth 1.4MHz	245.471mW (23.9dBm)	194.984mW (22.9dBm)	190.546mW (22.8dBm)
		Channel Bandwidth 3MHz	263.027mW (24.2dBm)	213.796mW (23.3dBm)	208.930mW (23.2dBm)
		Channel Bandwidth 5MHz	257.040mW (24.1dBm)	199.526mW (23.0dBm)	190.546mW (22.8dBm)
		Channel Bandwidth 10MHz	263.027mW (24.2dBm)	199.526mW (23.0dBm)	194.984mW (22.9dBm)
		Channel Bandwidth 15MHz	269.153mW (24.3dBm)	218.776mW (23.4dBm)	208.930mW (23.2dBm)
		Channel Bandwidth 20MHz	295.121mW (24.7dBm)	234.423mW (23.7dBm)	229.087mW (23.6dBm)
	LTE Band 7	Channel Bandwidth 5MHz	151.356mW (21.8dBm)	123.027mW (20.9dBm)	109.648mW (20.4dBm)
		Channel Bandwidth 10MHz	162.181mW (22.1dBm)	131.826mW (21.2dBm)	125.893mW (21.0dBm)
		Channel Bandwidth 15MHz	173.780mW (22.4dBm)	141.254mW (21.5dBm)	131.826mW (21.2dBm)
		Channel Bandwidth 20MHz	181.970mW (22.6dBm)	147.911mW (21.7dBm)	138.038mW (21.4dBm)
		Channel Bandwidth 20+20MHz	190.546mW (22.8dBm)	-	-
	LTE Band 38	Channel Bandwidth 5MHz	323.594mW (25.1dBm)	257.040mW (24.1dBm)	234.423mW (23.7dBm)
		Channel Bandwidth 10MHz	269.153mW (24.3dBm)	218.776mW (23.4dBm)	204.174mW (23.1dBm)
		Channel Bandwidth 15MHz	309.030mW (24.9dBm)	239.883mW (23.8dBm)	218.776mW (23.4dBm)
		Channel Bandwidth 20MHz	316.228mW (25.0dBm)	257.040mW (24.1dBm)	234.423mW (23.7dBm)

			QPSK	16QAM	64QAM
Max. EIRP Power	LTE Band 41	Channel Bandwidth 5MHz	309.030mW (24.9dBm)	245.471mW (23.9dBm)	218.776mW (23.4dBm)
		Channel Bandwidth 10MHz	316.228mW (25.0dBm)	275.423mW (24.4dBm)	239.883mW (23.8dBm)
		Channel Bandwidth 15MHz	269.153mW (24.3dBm)	213.796mW (23.3dBm)	186.209mW (22.7dBm)
		Channel Bandwidth 20MHz	275.423mW (24.4dBm)	223.872mW (23.5dBm)	119.526mW (23.0dBm)
	LTE Band 66	Channel Bandwidth 1.4MHz	812.831mW (29.1dBm)	645.654mW (28.1dBm)	630.957mW (28.0dBm)
		Channel Bandwidth 3MHz	851.138mW (29.3dBm)	691.831mW (28.4dBm)	676.083mW (28.3dBm)
		Channel Bandwidth 5MHz	831.764mW (29.2dBm)	676.083mW (28.3dBm)	660.693mW (28.2dBm)
		Channel Bandwidth 10MHz	831.764mW (29.2dBm)	676.083mW (28.3dBm)	660.693mW (28.2dBm)
		Channel Bandwidth 15MHz	851.138mW (29.3dBm)	676.083mW (28.3dBm)	660.693mW (28.2dBm)
		Channel Bandwidth 20MHz	776.247mW (28.9dBm)	630.957mW (28.0dBm)	575.440mW (27.6dBm)
Max. ERP Power	LTE Band 12	Channel Bandwidth 1.4MHz	89.125mW (19.5dBm)	72.444mW (18.6dBm)	69.183mW (18.4dBm)
		Channel Bandwidth 3MHz	87.096mW (19.4dBm)	69.183mW (18.4dBm)	66.069mW (18.2dBm)
		Channel Bandwidth 5MHz	85.114mW (19.3dBm)	67.608mW (18.3dBm)	64.565mW (18.1dBm)
		Channel Bandwidth 10MHz	89.125mW (19.5dBm)	69.183mW (18.4dBm)	66.069mW (18.2dBm)
	LTE Band 13	Channel Bandwidth 5MHz	83.176mW (19.2dBm)	66.069mW (18.2dBm)	66.069mW (18.2dBm)
		Channel Bandwidth 10MHz	81.283mW (19.1dBm)	64.565mW (18.1dBm)	61.660mW (17.9dBm)
	LTE Band 17	Channel Bandwidth 5MHz	70.795mW (18.5dBm)	54.954mW (17.4dBm)	53.703mW (17.3dBm)
		Channel Bandwidth 10MHz	67.608mW (18.3dBm)	52.481mW (17.2dBm)	51.286mW (17.1dBm)

Emission Designator	WCDMA Band 4		4M13F9W		
			QPSK	16QAM	64QAM
	LTE Band 4	Channel Bandwidth 1.4MHz	1M09G7D	1M09W7D	1M09W7D
		Channel Bandwidth 3MHz	2M69G7D	2M69W7D	2M68W7D
		Channel Bandwidth 5MHz	4M48G7D	4M46W7D	4M48W7D
		Channel Bandwidth 10MHz	8M93G7D	8M96W7D	8M93W7D
		Channel Bandwidth 15MHz	13M4G7D	13M4W7D	13M4W7D
		Channel Bandwidth 20MHz	17M9G7D	17M8W7D	17M9W7D
	LTE Band 7	Channel Bandwidth 5MHz	4M48G7D	4M48W7D	4M48W7D
		Channel Bandwidth 10MHz	8M93G7D	8M93W7D	8M96W7D
		Channel Bandwidth 15MHz	13M4G7D	13M4W7D	13M4W7D
		Channel Bandwidth 20MHz	18M0G7D	17M9W7D	17M9W7D
		Channel Bandwidth 20+20MHz	37M6G7D	-	-
	LTE Band 12	Channel Bandwidth 1.4MHz	1M09G7D	1M09W7D	1M09W7D
		Channel Bandwidth 3MHz	2M69G7D	2M69W7D	2M68W7D
		Channel Bandwidth 5MHz	4M48G7D	4M48W7D	4M50W7D
		Channel Bandwidth 10MHz	8M96G7D	8M96W7D	8M96W7D
	LTE Band 13	Channel Bandwidth 5MHz	4M48G7D	4M48W7D	4M48W7D
		Channel Bandwidth 10MHz	8M93G7D	8M93W7D	8M93W7D
	LTE Band 17	Channel Bandwidth 5MHz	4M48G7D	4M48W7D	4M48W7D
		Channel Bandwidth 10MHz	8M96G7D	9M00W7D	8M96W7D
	LTE Band 38	Channel Bandwidth 5MHz	4M46G7D	4M45W7D	4M46W7D
		Channel Bandwidth 10MHz	8M90G7D	8M93W7D	8M93W7D
		Channel Bandwidth 15MHz	13M4G7D	13M3W7D	13M4W7D
		Channel Bandwidth 20MHz	17M9G7D	17M9W7D	17M9W7D
	LTE Band 41	Channel Bandwidth 5MHz	4M46G7D	4M48W7D	4M48W7D
		Channel Bandwidth 10MHz	8M93G7D	8M96W7D	8M96W7D
		Channel Bandwidth 15MHz	13M4G7D	13M4W7D	13M4W7D
		Channel Bandwidth 20MHz	17M8G7D	18M0W7D	17M9W7D
	LTE Band 66	Channel Bandwidth 1.4MHz	1M08G7D	1M09W7D	1M09W7D
		Channel Bandwidth 3MHz	2M69G7D	2M69W7D	2M68W7D
		Channel Bandwidth 5MHz	4M46G7D	4M46W7D	4M48W7D
		Channel Bandwidth 10MHz	8M93G7D	8M93W7D	8M93W7D
		Channel Bandwidth 15MHz	13M4G7D	13M4W7D	13M4W7D
		Channel Bandwidth 20MHz	18M0G7D	17M9W7D	18M0W7D

Antenna Connector	WCDMA Band 4, LTE Band 4, LTE Band 66: Main Ant.: Fixed Internal antenna with 1.6dBi gain Aux. Ant.: Fixed Internal antenna with -3.3dBi gain LTE Band 7, LTE Band 38: Main Ant.: Fixed Internal antenna with 0.2dBi gain Aux. Ant.: Fixed Internal antenna with -1.2dBi gain LTE Band 12, LTE Band 13, LTE Band 17: Main Ant.: Fixed Internal antenna with -2.1dBi gain Aux. Ant.: Fixed Internal antenna with -1.2dBi gain LTE Band 41: Main Ant.: Fixed Internal antenna with 0.7dBi gain Aux. Ant.: Fixed Internal antenna with -1.2dBi gain (Brand: TongDa Electrics, Model: MEAOP61010A)
Antenna Connector	NA
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

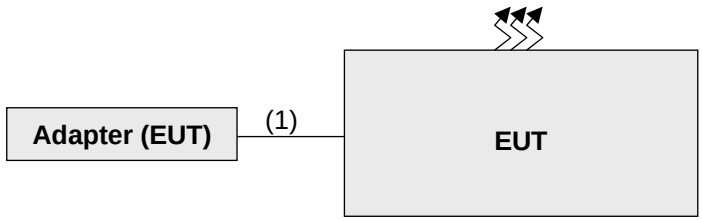
Note:

1. This report is issued as a supplementary to BV CPS report no.: RF180523C09-2 R1. The difference is listed as below. Only radiated emissions test was verified for this report.

Report No.	FCC ID	Model	Difference
RF180523C09-2	2AJOTTA-1087	TA-1087	Dual SIM
RF180523C10-2	2AJOTTA-1082	TA-1082	Single SIM
* The models have the same layout, circuit, and components, but different SIM tray.			

2. The EUT's accessories list refers to Ext. Pho.

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. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.0	N	0	Accessory Device

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 on X-plane (For WCDMA Band 4, LTE Band 41), Z-plane (For LTE Band 12, 13, 17). Following channel(s) was (were) selected for the final test as listed below:

WCDMA Band 4 Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	Radiated Emission Below 1GHz	1312 to 1513	1312(1712.4MHz)	WCDMA
-	Radiated Emission Above 1GHz	1312 to 1513	1312(1712.4MHz)	WCDMA

LTE Band 12

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	23060 to 23130	23095(707.5MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	23060 to 23130	23095(707.5MHz)	10MHz	QPSK	1 RB / 0 RB Offset

LTE Band 13

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	23205 to 23255	23205(779.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	23205 to 23255	23205(779.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset

LTE Band 17

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	23755 to 23825	23755(706.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	23755 to 23825	23755(706.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset

LTE Band 41

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	40140 to 41140	41140(2645.0MHz)	20MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	40140 to 41140	41140(2645.0MHz)	20MHz	QPSK	1 RB / 0 RB Offset

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Radiated Emission	22deg. C, 66%RH 25deg. C, 65%RH	120Vac, 60Hz	Han Wu Greg Lin

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 27

KDB 971168 D01 Power Meas License Digital Systems v03r01

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 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

For WCDMA Band 4
According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

For LTE Band 41
In the FCC 27.53(m) (4)(6),On any frequency outside a licensee’s frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least 55 + 10 log (P) dB. The emission limit equal to –25dBm.

For LTE Band 12
According to FCC 27.53(g) for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

For LTE Band 13
According to FCC 27.53(c)(2) for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.
For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm

For LTE Band 17
According to FCC 27.53(g) for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

4.1.2 Test Procedure

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

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 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

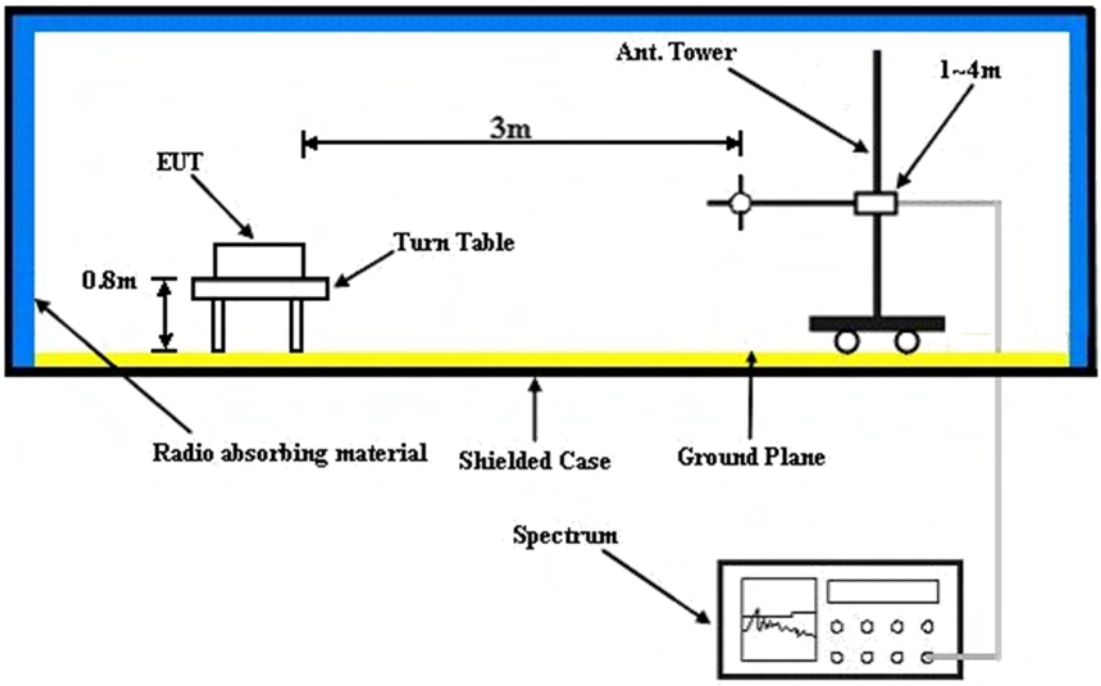
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

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

4.1.3 Deviation from Test Standard

No deviation.

4.1.4 Test Setup



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

4.1.5 Test Results

Below 1GHz

WCDMA Band 4

Mode	TX channel 1312 (1712.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	35.82	-70.1	-50.7	-15.9	-66.6	-13.0	-53.6
2	163.86	-49.2	-52.4	-2.9	-55.3	-13.0	-42.3
3	221.09	-58.7	-64.9	-1.9	-66.8	-13.0	-53.8
4	352.04	-63.2	-70.3	3.9	-66.4	-13.0	-53.4
5	385.02	-62.1	-66.5	3.5	-63.0	-13.0	-50.0
6	504.33	-64.5	-68.5	3.9	-64.6	-13.0	-51.6
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	32.91	-42.1	-35.0	-17.7	-52.7	-13.0	-39.7
2	44.55	-46.8	-44.3	-10.9	-55.2	-13.0	-42.2
3	145.43	-67.0	-65.9	-3.1	-69.0	-13.0	-56.0
4	181.32	-60.9	-61.3	-3.0	-64.3	-13.0	-51.3
5	376.29	-72.5	-76.6	3.7	-72.9	-13.0	-59.9
6	644.01	-71.0	-69.4	3.7	-65.7	-13.0	-52.7

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 12

Channel Bandwidth: 10MHz

Mode	TX channel 23095 (707.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.97	-52.8	-32.5	-18.8	-51.3	-13.0	-38.3
2	80.44	-46.0	-53.6	0.5	-53.1	-13.0	-40.1
3	392.78	-61.1	-67.0	3.3	-63.7	-13.0	-50.7
4	571.26	-66.5	-71.4	3.7	-67.7	-13.0	-54.7
5	702.21	-65.6	-68.3	3.4	-64.9	-13.0	-51.9
6	924.34	-72.1	-69.7	3.6	-66.1	-13.0	-53.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	84.32	-45.5	-53.0	0.4	-52.6	-13.0	-39.6
2	192.96	-62.9	-63.9	-2.6	-66.5	-13.0	-53.5
3	332.64	-60.6	-67.4	4.0	-63.4	-13.0	-50.4
4	468.44	-66.2	-72.0	3.5	-68.5	-13.0	-55.5
5	711.91	-67.0	-66.7	3.5	-63.2	-13.0	-50.2
6	929.19	-73.0	-70.2	3.7	-66.5	-13.0	-53.5

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 13

Channel Bandwidth: 5MHz

Mode	TX channel 23205 (779.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-51.1	-33.3	-17.1	-50.4	-13.0	-37.4
2	81.41	-43.5	-51.2	0.5	-50.7	-13.0	-37.7
3	158.04	-55.3	-59.7	-2.7	-62.4	-13.0	-49.4
4	406.36	-59.1	-65.0	3.3	-61.7	-13.0	-48.7
5	704.15	-66.7	-69.4	3.5	-65.9	-13.0	-52.9
6	947.62	-74.5	-72.1	3.8	-68.3	-13.0	-55.3
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.97	-40.5	-34.1	-18.8	-52.9	-13.0	-39.9
2	191.99	-60.3	-61.5	-2.6	-64.1	-13.0	-51.1
3	328.76	-63.0	-69.5	4.1	-65.4	-13.0	-52.4
4	454.86	-66.2	-72.1	3.5	-68.6	-13.0	-55.6
5	657.59	-63.8	-64.0	3.7	-60.3	-13.0	-47.3
6	876.81	-74.2	-72.2	3.3	-68.9	-13.0	-55.9

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 17

Channel Bandwidth: 5MHz

Mode	TX channel 23755 (706.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-62.6	-44.8	-17.1	-61.9	-13.0	-48.9
2	60.07	-65.1	-68.7	-3.4	-72.1	-13.0	-59.1
3	84.32	-56.6	-65.2	0.4	-64.8	-13.0	-51.8
4	153.19	-68.4	-71.8	-2.9	-74.7	-13.0	-61.7
5	258.92	-65.8	-71.4	-1.5	-72.9	-13.0	-59.9
6	296.75	-63.5	-66.7	-1.8	-68.5	-13.0	-55.5
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	34.85	-53.1	-48.9	-16.5	-65.4	-13.0	-52.4
2	60.07	-56.0	-61.5	-3.4	-64.9	-13.0	-51.9
3	85.29	-53.0	-60.9	0.3	-60.6	-13.0	-47.6
4	159.01	-61.6	-64.0	-2.8	-66.8	-13.0	-53.8
5	296.75	-63.4	-63.9	-1.8	-65.7	-13.0	-52.7
6	428.67	-67.8	-73.8	3.5	-70.3	-13.0	-57.3

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 41

Channel Bandwidth: 20MHz

Mode	TX channel 41140 (2645.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	60.07	-62.9	-64.3	-3.4	-67.7	-25.0	-42.7
2	217.21	-55.9	-62.3	-2.0	-64.3	-25.0	-39.3
3	407.33	-62.5	-66.3	3.3	-63.0	-25.0	-38.0
4	535.37	-63.3	-66.8	3.8	-63.0	-25.0	-38.0
5	793.39	-65.4	-63.9	4.0	-59.9	-25.0	-34.9
6	945.68	-65.8	-61.3	3.8	-57.5	-25.0	-32.5
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	112.45	-61.4	-66.3	-2.5	-68.8	-25.0	-43.8
2	213.33	-64.3	-65.8	-2.0	-67.8	-25.0	-42.8
3	343.31	-66.3	-70.9	4.0	-66.9	-25.0	-41.9
4	498.51	-65.3	-69.1	3.8	-65.3	-25.0	-40.3
5	832.19	-60.8	-57.4	3.8	-53.6	-25.0	-28.6
6	932.10	-66.2	-61.1	3.7	-57.4	-25.0	-32.4

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Above 1GHz
WCDMA Band 4

Mode	TX channel 1312 (1712.4MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3505.20	-62.9	-54.7	1.5	-53.2	-13.0	-40.2
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3505.20	-63.2	-55.6	1.5	-54.1	-13.0	-41.1

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 12
Channel Bandwidth: 10MHz

Mode	TX channel 23095 (707.5MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	25deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1415.00	-63.0	-56.4	0.9	-55.5	-13.0	-42.5
2	2122.50	-58.9	-54.0	-0.3	-54.3	-13.0	-41.3
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1415.00	-61.8	-56.4	0.9	-55.5	-13.0	-42.5
2	2122.50	-57.7	-53.9	-0.3	-54.2	-13.0	-41.2

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 13

Channel Bandwidth: 5MHz

Mode	TX channel 23205 (779.5MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	25deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1559.00	-68.0	-60.2	1.3	-58.9	-40.0	-18.9
2	2338.50	-60.0	-54.1	0.0	-54.1	-13.0	-41.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	**1559.00**	**-65.8**	**-58.9**	**1.3**	**-57.6**	**-40.0**	**-17.6**
2	2338.50	-58.5	-54.6	0.0	-54.6	-13.0	-41.6

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 17

Channel Bandwidth: 5MHz

Mode	TX channel 23755 (706.5MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	25deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1413.00	-63.6	-57.2	0.9	-56.3	-13.0	-43.3
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1413.00	-62.5	-57.2	0.9	-56.3	-13.0	-43.3

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

LTE Band 41

Channel Bandwidth: 20MHz

Mode	TX channel 41140 (2645.0MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Han Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5290.00	-60.5	-48.5	1.4	-47.1	-25.0	-22.1
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5290.00	-62.9	-51.5	1.4	-50.1	-25.0	-25.1

Remarks:

1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

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 and approved according to ISO/IEC 17025.

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

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

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