

## FCC Test Report

### (PART 27)

**Report No.:** RF180626C10C-2

**FCC ID:** 2AJOTTA-1100

**Test Model:** TA-1100

**Received Date:** Jun. 26, 2018

**Test Date:** Jul. 25, 2018

**Issued Date:** Aug. 01, 2018

**Applicant:** HMD Global Oy

**Address:** Karaportti 2, 02610 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 (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, 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 /  
Designation Number:** 427177 / TW0011



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

## Table of Contents

<b>Release Control Record</b> .....	<b>3</b>
<b>1 Certificate of Conformity</b> .....	<b>4</b>
<b>2 Summary of Test Results</b> .....	<b>5</b>
2.1 Measurement Uncertainty .....	5
2.2 Test Site and Instruments .....	6
<b>3 General Information</b> .....	<b>8</b>
3.1 General Description of EUT .....	8
3.2 Configuration of System under Test.....	9
3.2.1 Description of Support Units .....	9
3.3 Test Mode Applicability and Tested Channel Detail .....	10
3.4 EUT Operating Conditions .....	11
3.5 General Description of Applied Standards.....	11
<b>4 Test Types and Results</b> .....	<b>12</b>
4.1 Output Power Measurement .....	12
4.1.1 Limits of Output Power Measurement .....	12
4.1.2 Test Procedures.....	12
4.1.3 Test Setup .....	13
4.1.4 Test Results .....	14
4.2 Radiated Emission Measurement .....	15
4.2.1 Limits of Radiated Emission Measurement .....	15
4.2.2 Test Procedure .....	15
4.2.3 Deviation from Test Standard .....	15
4.2.4 Test Setup .....	16
4.2.5 Test Results .....	17
<b>5 Pictures of Test Arrangements</b> .....	<b>23</b>
<b>Appendix – Information on the Testing Laboratories</b> .....	<b>24</b>
<b>Annex A – Test Report for TA-1095 (Dual SIM)</b> .....	<b>25</b>

### Release Control Record

Issue No.	Description	Date Issued
RF180626C10C-2	Original Release	Aug. 01, 2018

## 1 Certificate of Conformity

**Product:** Smart Phone

**Brand:** NOKIA

**Test Model:** TA-1100


**Sample Status:** Engineering Sample


**Applicant:** HMD Global Oy

**Test Date:** Jul. 25, 2018

**Standards:** FCC Part 27, Subpart C, M

This report is issued as a supplementary report to BV CPS report no.: RF180626C10D-2. This report shall be used by combining with its original report.

**Prepared by :** , **Date:** Aug. 01, 2018  
Ivonne Wu / Supervisor

**Approved by :** , **Date:** Aug. 01, 2018  
Dylan Chiou / Project Engineer

## 2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(h)	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	N/A	Refer to Note
2.1055 27.54	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
--	Peak to Average Ratio	N/A	Refer to Note
2.1051 27.53(l)	Out-of-Band Emissions Measurements	N/A	Refer to Note
2.1051 27.53(m)	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 27.53(m)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.30 dB at 10140.00 MHz.

**Note:** Only EIRP and radiated spurious emissions tests 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	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

## 2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
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 9120D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
Fixed Attenuator Woken	00801A1GGAM02Y	NA	May 17, 2018	May 16, 2019
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RF C-SMS-100-SMS- 120+RFC-SMS-1 00-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RF C-SMS-100-SMS- 24)	Jun. 19, 2018	Jun. 18, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
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
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2017	Dec. 27, 2018
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019

- 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

<b>Product</b>	Smart Phone	
<b>Brand</b>	NOKIA	
<b>Test Model</b>	TA-1100	
<b>Status of EUT</b>	Engineering Sample	
<b>Power Supply Rating</b>	5.0 Vdc or 9 Vdc or 12 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (Li-ion battery)	
<b>Modulation Type</b>	QPSK, 16QAM	
<b>Frequency Range</b>	LTE Band 7 (Channel Bandwidth: 5 MHz)	2502.5 ~ 2567.5 MHz
	LTE Band 7 (Channel Bandwidth: 10 MHz)	2505 ~ 2565 MHz
	LTE Band 7 (Channel Bandwidth: 15 MHz)	2507.5 ~ 2562.5 MHz
	LTE Band 7 (Channel Bandwidth: 20 MHz)	2510 ~ 2560 MHz
	LTE Band 38 (Channel Bandwidth: 5 MHz)	2572.5 ~ 2617.5 MHz
	LTE Band 38 (Channel Bandwidth: 10 MHz)	2575.0 ~ 2615.0 MHz
	LTE Band 38 (Channel Bandwidth: 15 MHz)	2577.5 ~ 2612.5 MHz
	LTE Band 38 (Channel Bandwidth: 20 MHz)	2580.0 ~ 2610.0 MHz
<b>Max. EIRP Power</b>	LTE Band 7 (Channel Bandwidth: 20 MHz)	144.78 mW
<b>Antenna Type</b>	LTE Band 7: PIFA Antenna with -0.04 dBi gain LTE Band 38: PIFA Antenna with -0.26 dBi gain	
<b>Accessory Device</b>	Refer to Note as below	
<b>Data Cable Supplied</b>	Refer to Note as below	

Note:

1. This report is issued as a supplementary report to BV CPS report no.: RF180626C10D-2. The difference is listed as below. Only EIRP and radiated spurious emissions tests were verified in this report.

Report No.	FCC ID	Model	Difference
RF180626C10D-2	2AJOTTA-1095	TA-1095	Dual SIM
RF180626C10C-2	2AJOTTA-1100	TA-1100	Single SIM

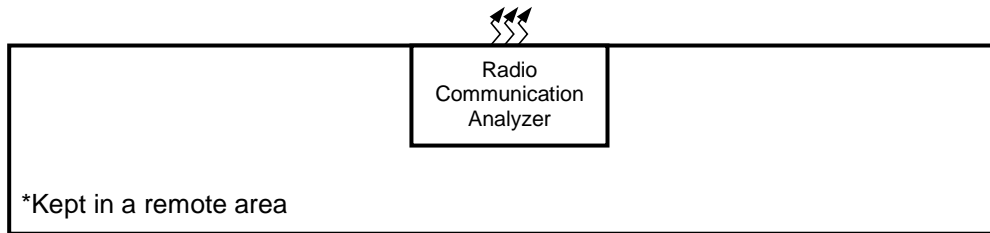
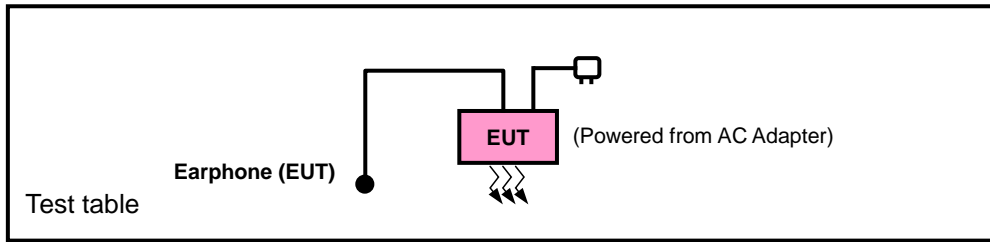
\* The models have the same layout, circuit, and components, but different SIM tray.

2. There're 2 configurations for the EUT listed as below.  
Main Sample: EUT + Battery 1  
2<sup>nd</sup> Sample: EUT + Battery 2  
✧ Only the worst test data of main sample was presented in the report.
3. The EUT's accessories list refers to Ext. Pho.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

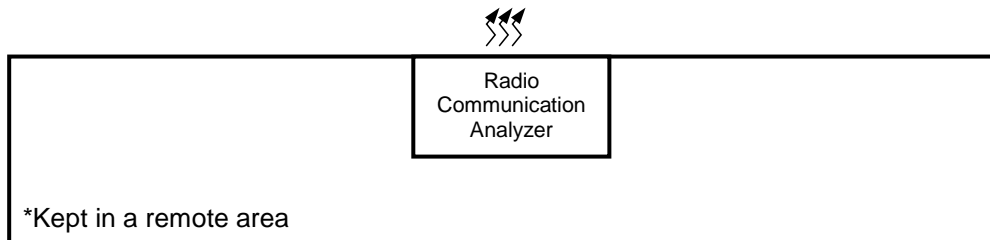
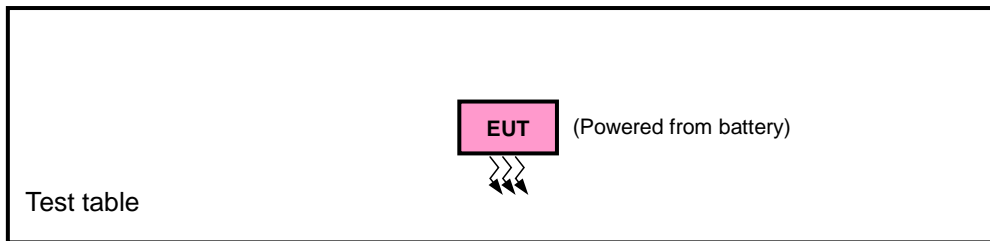


### 3.2 Configuration of System under Test

#### <Radiated Emission Test>



#### <E.I.R.P. 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:

EUT Configure Mode	Description
A	Main Sample
B	2 <sup>nd</sup> Sample

SIM	Band	EIRP	Radiated Emission
1	LTE Band 7	Z-plane	Z-axis

#### LTE Band 7

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Radiated Emission	20850 to 21350	20850, 21100 21350	20 MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100 21350	20 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
EIRP	25 deg. C, 65 % RH	3.85 Vdc	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 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 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

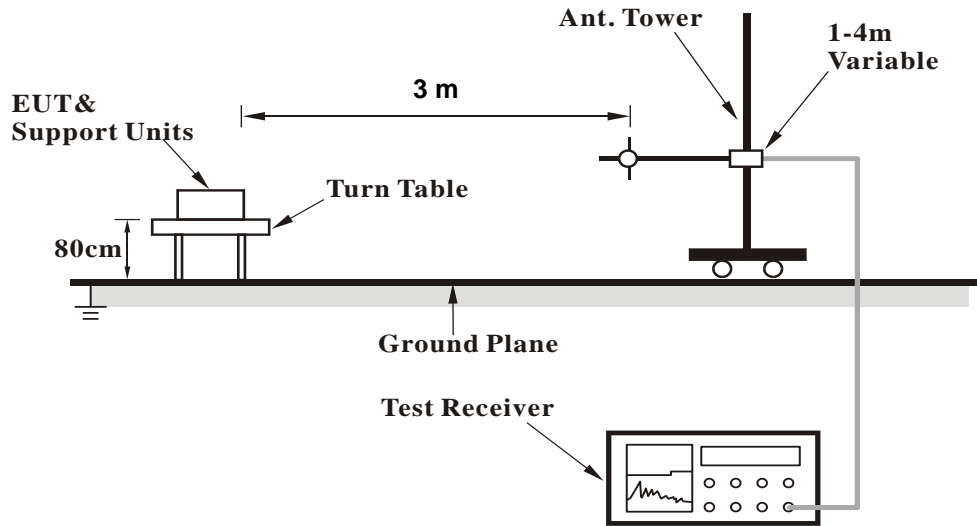
#### 4.1.2 Test Procedures

##### **EIRP Measurement:**

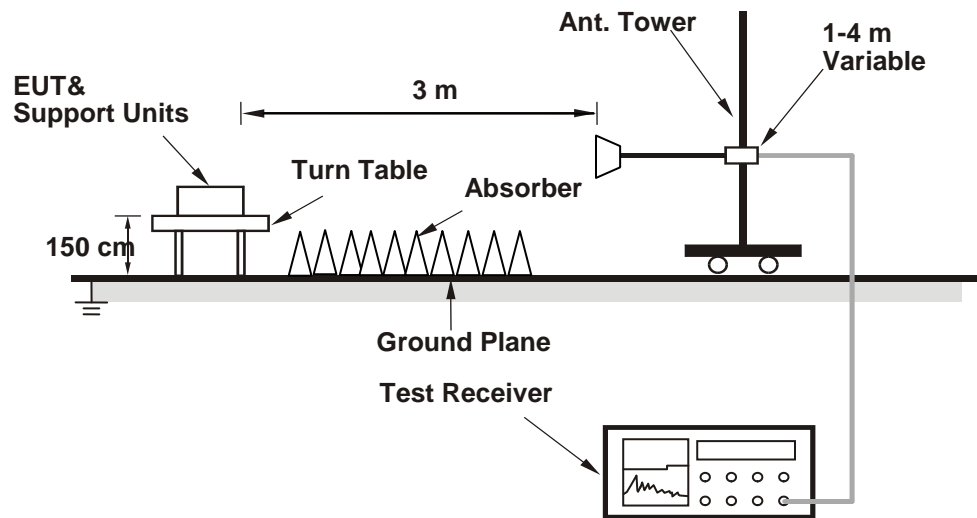
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, 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.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

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  
**EIRP Power (dBm)**  
**Mode A**

LTE Band 7							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	20850.0	2510.0	-22.63	44.16	21.53	142.23	H
	21100.0	2535.0	-22.59	44.20	21.61	144.78	
	21350.0	2560.0	-23.28	44.81	21.53	142.13	
	20850.0	2510.0	-29.22	44.78	15.56	35.97	V
	21100.0	2535.0	-28.49	44.09	15.60	36.29	
	21350.0	2560.0	-29.19	44.72	15.53	35.73	
Channel Bandwidth: 20 MHz / 16QAM							
Z	20850.0	2510.0	-23.61	44.16	20.55	113.50	H
	21100.0	2535.0	-23.56	44.20	20.64	115.80	
	21350.0	2560.0	-24.29	44.81	20.52	112.64	
	20850.0	2510.0	-30.23	44.78	14.55	28.51	V
	21100.0	2535.0	-29.51	44.09	14.58	28.69	
	21350.0	2560.0	-30.18	44.72	14.54	28.44	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

## 4.2 Radiated Emission Measurement

### 4.2.1 Limits of Radiated Emission Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25 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.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ .
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$ .

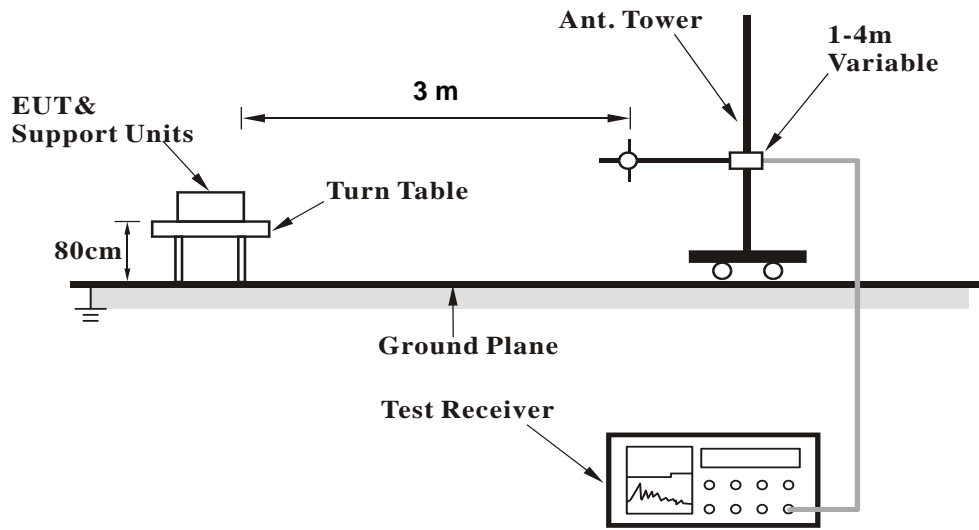
**NOTE:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

### 4.2.3 Deviation from Test Standard

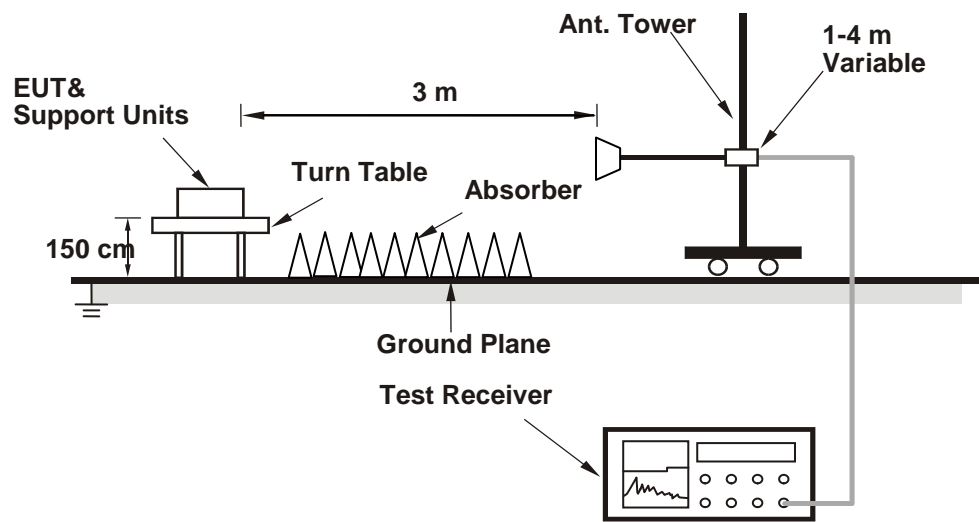
No deviation.

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

Mode A

LTE Band 7

Channel Bandwidth: 20 MHz / QPSK

Low Channel

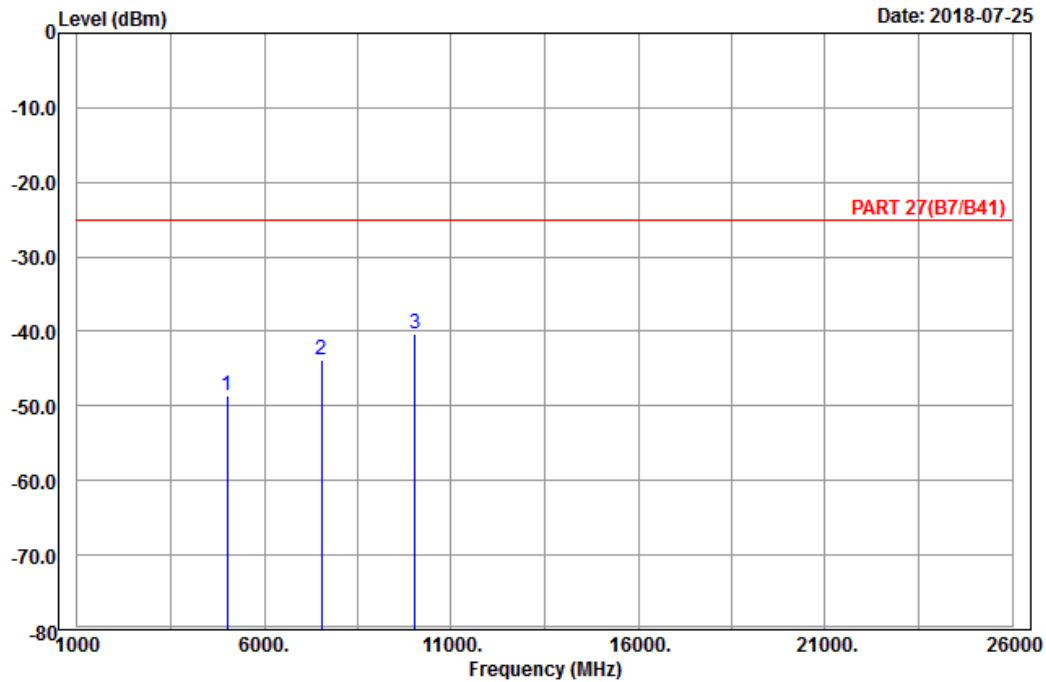


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A D T

Data: 9

Date: 2018-07-25



Site : 966 chamber 1  
 Condition: PART 27(B7/B41) Horizontal  
 Remark : LTE\_Band 7\_Link\_CH20850  
 Tested by: Harry Hsueh

	Read	Limit	Over				
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		
1	5020.00	-48.65	-67.73	-25.00	-23.65	19.08	Peak
2	7530.00	-43.80	-66.65	-25.00	-18.80	22.85	Peak
3	pp 10040.00	-40.33	-66.60	-25.00	-15.33	26.27	Peak

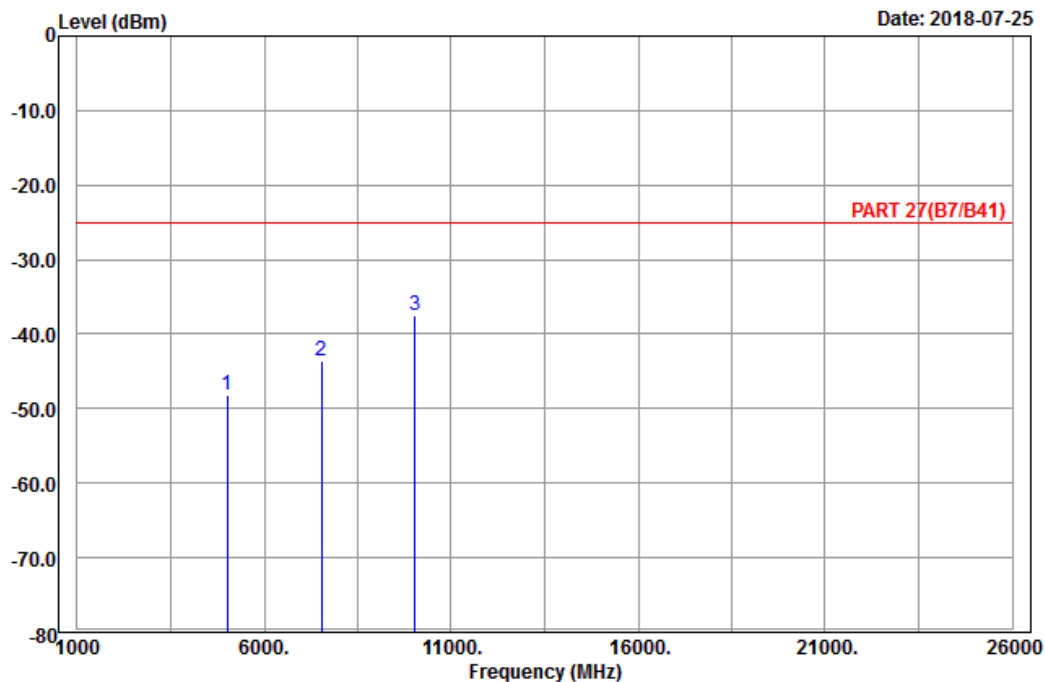


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Data: 10

Date: 2018-07-25



Site : 966 chamber 1  
 Condition: PART 27(B7/B41) Vertical  
 Remark : LTE\_Band 7\_Link\_CH20850  
 Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5020.00	-48.20	-67.28	-25.00	-23.20	19.08	Peak
2	7530.00	-43.63	-66.48	-25.00	-18.63	22.85	Peak
3 pp	10040.00	-37.47	-63.74	-25.00	-12.47	26.27	Peak

Middle Channel

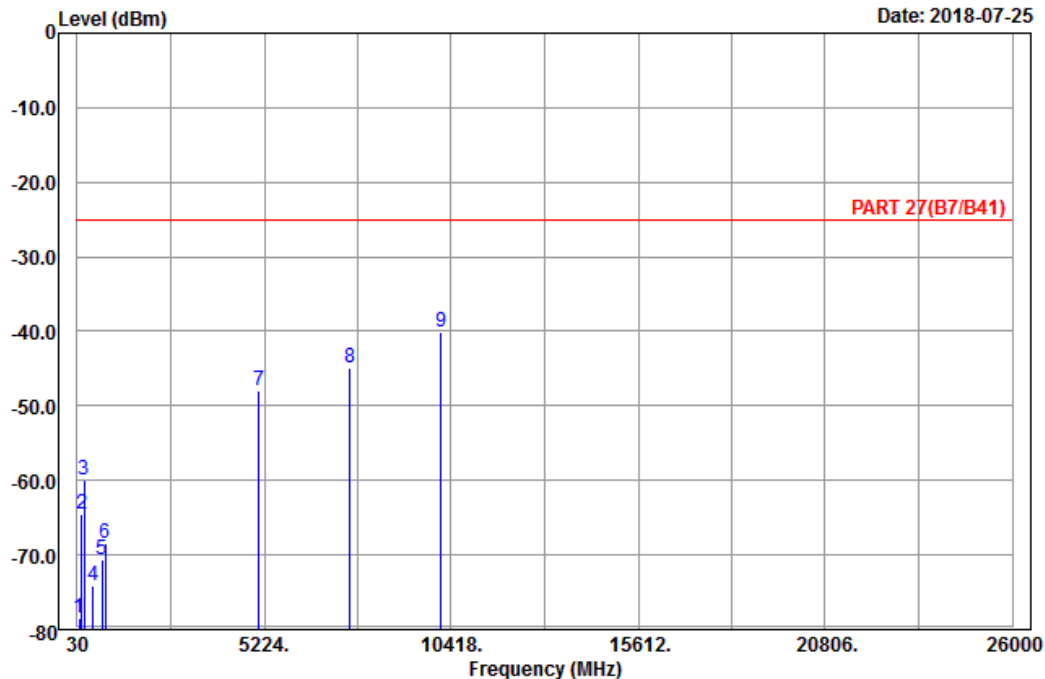


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Data: 13

Date: 2018-07-25



Site : 966 chamber 1  
 Condition: PART 27(B7/B41) Horizontal  
 Remark : LTE\_Band 7\_Link\_CH21100  
 Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	89.67	-78.57	-67.90	-25.00	-53.57	-10.67	Peak
2	152.85	-64.48	-56.62	-25.00	-39.48	-7.86	Peak
3	226.29	-60.05	-54.22	-25.00	-35.05	-5.83	Peak
4	475.70	-74.13	-69.57	-25.00	-49.13	-4.56	Peak
5	727.00	-70.57	-69.68	-25.00	-45.57	-0.89	Peak
6	818.00	-68.37	-70.18	-25.00	-43.37	1.81	Peak
7	5070.00	-47.89	-67.28	-25.00	-22.89	19.39	Peak
8	7605.00	-44.99	-67.98	-25.00	-19.99	22.99	Peak
9	pp 10140.00	-40.02	-66.44	-25.00	-15.02	26.42	Peak

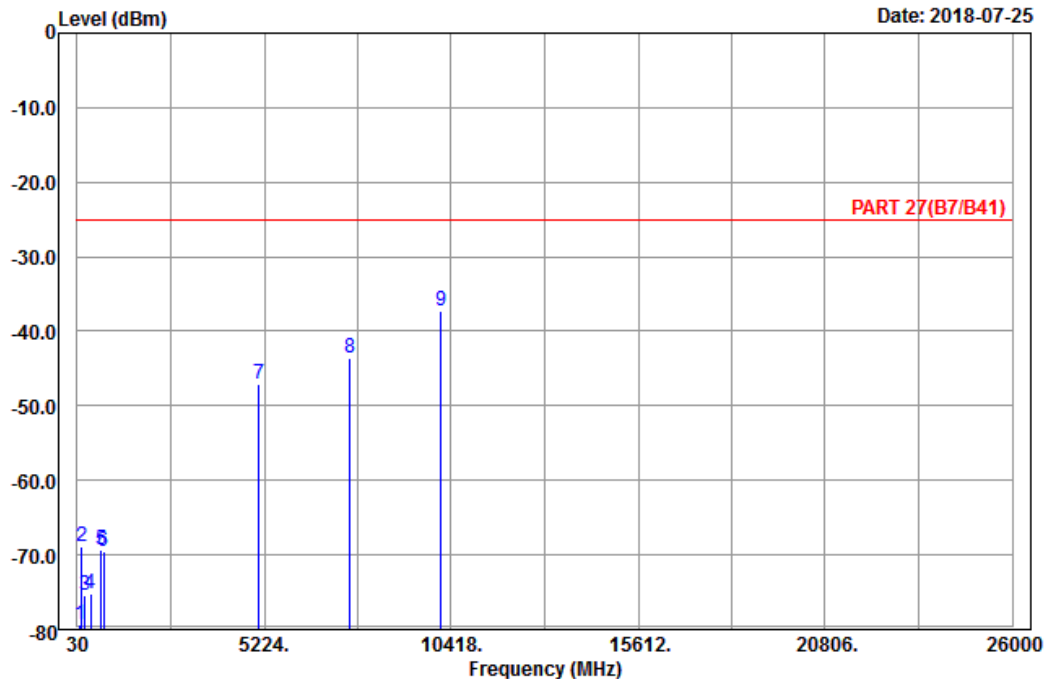


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Data: 14

Date: 2018-07-25



Site : 966 chamber 1  
 Condition: PART 27(B7/B41) Vertical  
 Remark : LTE\_Band 7\_Link\_CH21100  
 Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	108.03	-79.44	-70.26	-25.00	-54.44	-9.18	Peak
2	158.79	-68.79	-61.09	-25.00	-43.79	-7.70	Peak
3	240.60	-75.43	-69.79	-25.00	-50.43	-5.64	Peak
4	413.40	-75.21	-72.17	-25.00	-50.21	-3.04	Peak
5	686.40	-69.26	-68.95	-25.00	-44.26	-0.31	Peak
6	773.90	-69.49	-69.78	-25.00	-44.49	0.29	Peak
7	5070.00	-47.00	-66.39	-25.00	-22.00	19.39	Peak
8	7605.00	-43.49	-66.48	-25.00	-18.49	22.99	Peak
9	pp 10140.00	-37.30	-63.72	-25.00	-12.30	26.42	Peak

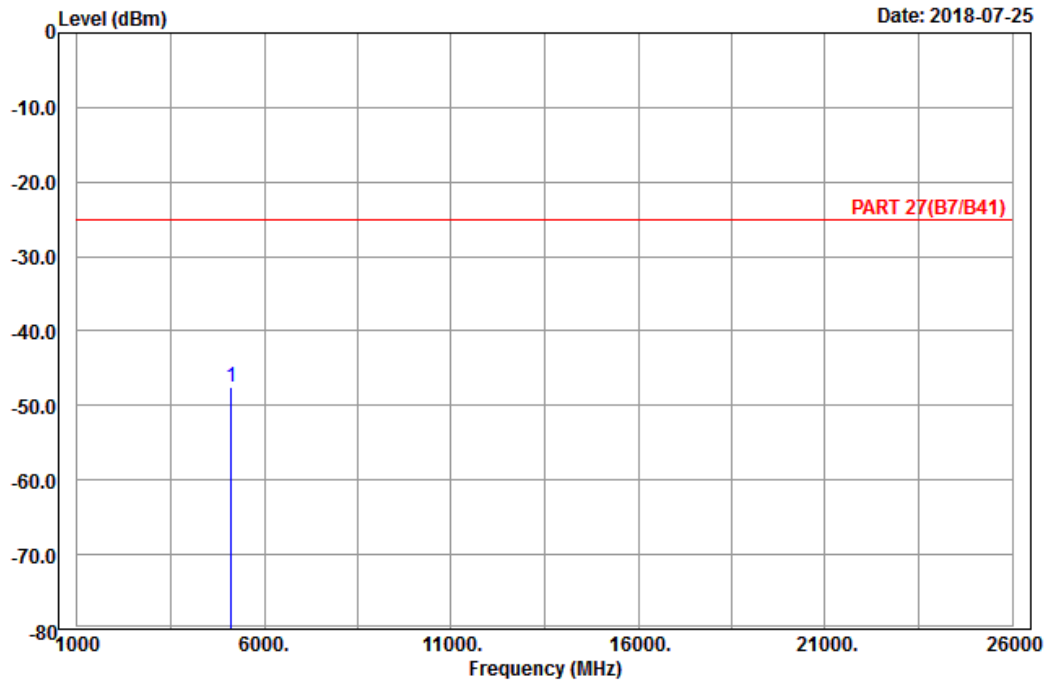
High Channel



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A D T

Data: 9



Site : 966 chamber 1  
 Condition: PART 27(B7/B41) Horizontal  
 Remark : LTE\_Band 7\_Link\_CH21350  
 Tested by: Karl Lee

	Read	Limit	Over				
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		
1 pp 5120.00	-47.51	-67.22	-25.00	-22.51	19.71	Peak	

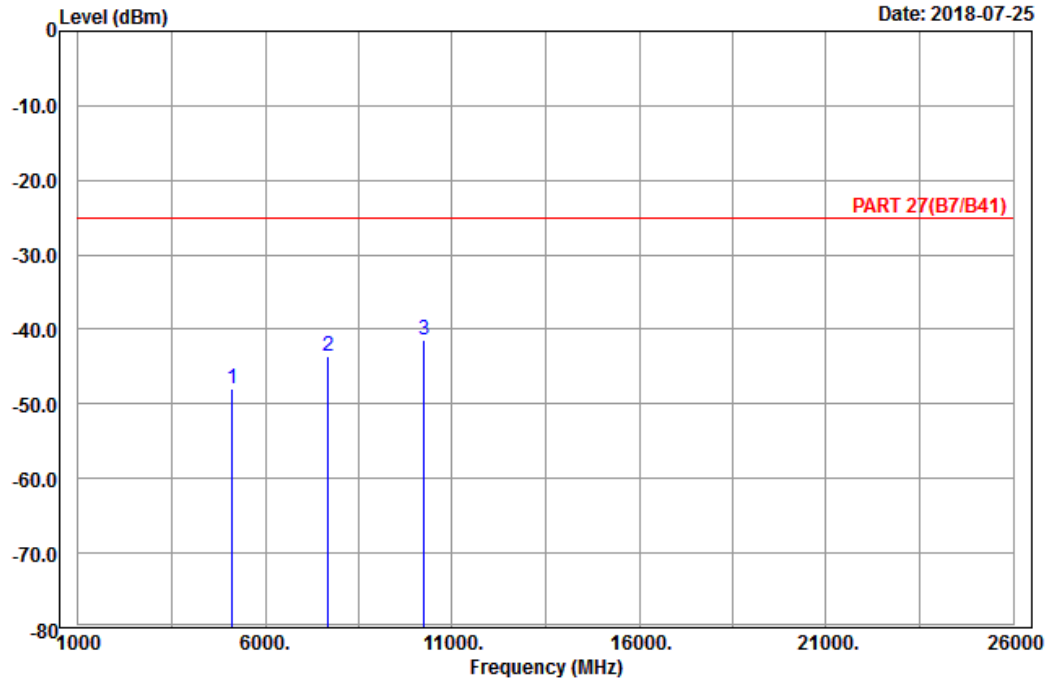


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Data: 10

Date: 2018-07-25



Site : 966 chamber 1  
 Condition: PART 27(B7/B41) Vertical  
 Remark : LTE\_Band 7\_Link\_CH21350  
 Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5120.00	-47.98	-67.69	-25.00	-22.98	19.71	Peak
2	7680.00	-43.52	-66.64	-25.00	-18.52	23.12	Peak
3 pp	10240.00	-41.32	-67.86	-25.00	-16.32	26.54	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.

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

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**Hwa Ya EMC/RF/Safety**

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**Web Site:** [www.bureauveritas-adt.com](http://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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