VARIANT FCC TEST REPORT

(PART 27)

Applicant:	FIH International Co., Ltd.
Address:	No.18, Tongji zhonglu, Beijing Economic & Technological Development Area

Manufacturer or Supplier:	HMD Global Oy
Address:	Karaportti 2 02610 Espoo FINLAND
Product:	GSM/WCDMA/LTE Mobile Phone
Brand Name:	Nokia
Model Name:	TA-1049
FCC ID:	2AJOTTA-1049
Date of tests:	Jun. 05, 2018 ~ Oct. 19, 2018

The tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 27, Subpart C, L** ☒ **ANSI/TIA/EIA-603- D**
☒ **FCC Part 2** ☒ **ANSI/TIA/EIA-603-E** ☒ **ANSI C63.26-2015**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Roger Li Engineer / Mobile Department	Approved by Sam Tung Manager / Mobile Department
Roger Date: Oct. 19, 2018	 Date: Oct. 19, 2018

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180604W006-5	Original release	Oct. 19, 2018

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 27 & Part 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
2.1046 27.50(d)(4)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	N/A	N/A
2.1049 27.53(h)	Occupied Bandwidth	N/A	N/A
27.50(d)(5)	Peak to average ratio	N/A	N/A
27.53(h)	Band Edge Measurements	N/A	N/A
2.1051 27.53(h)	Conducted Spurious Emissions	N/A	N/A
2.1053 27.53(h)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -21.15dB at 44.86MHz.

1.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.66dB
Radiated emissions	9KHz ~ 30MHz	2.68dB
	30MHz ~ 1GMHz	3.26dB
	1GHz ~ 18GHz	4.48dB
	18GHz ~ 40GHz	4.12dB

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

1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 16,18	Mar. 15,19
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Mar. 16,18	Mar. 15,19
Bilog Antenna 1	ETS-LINDGREN	3143B	00161964	Nov. 26,16	Nov. 25,18
Bilog Antenna 2	ETS-LINDGREN	3143B	00161965	Nov. 26,16	Nov. 25,18
Horn Antenna 1	ETS-LINDGREN	3117	00168728	Nov. 26,16	Nov. 25,18
Horn Antenna 2	ETS-LINDGREN	3117	00168692	Nov. 26,16	Nov. 25,18
Loop antenna	Daze	ZN30900A	0708	Nov. 20,17	Nov. 19,18
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Dec. 16,16	Dec. 15,18
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Mar. 02,18	Mar. 01,19
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 09,18	Jul. 08,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Apr. 21,18	Apr. 20,19
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jul. 09,18	Jul. 08,19
Power Meter	Anritsu	ML2495A	1506002	Mar. 02,18	Mar. 01,19
Power Sensor	Anritsu	MA2411B	1339352	Mar. 16,18	Mar. 15,19
Humid & Temp Programmable Tester	Juyi	ITH-120-45-CP-AR	IAA1504-001	Jul. 09,18	Jul. 08,19
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Mar. 13,18	Mar. 12,19

NOTE: 1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.

3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 525120.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	GSM/WCDMA/LTE Mobile Phone	
MODEL NAME	TA-1049	
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.9Vdc (Li-ion, battery)	
MODULATION TECHNOLOGY	**WCDMA IV**	BPSK
	LTE	QPSK, 16QAM
FREQUENCY RANGE	**WCDMA IV**	1712.4MHz ~ 1752.6MHz
	LTE Band 4 Channel Bandwidth: 1.4MHz	1710.7MHz ~ 1754.3MHz
	LTE Band 4 Channel Bandwidth: 3MHz	1711.5MHz ~ 1753.5MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~ 1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715.0MHz ~ 1750.0MHz
	LTE Band 4 Channel Bandwidth: 15MHz	1717.5MHz ~ 1747.5MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720.0MHz ~ 1745.0MHz
	LTE Band 12 Channel Bandwidth: 1.4MHz	699.7MHz ~ 715.3MHz
	LTE Band 12 Channel Bandwidth: 3MHz	700.5MHz ~ 714.5MHz
	LTE Band 12 Channel Bandwidth: 5MHz	701.5MHz ~ 713.5MHz
	LTE Band 12 Channel Bandwidth: 10MHz	704.0MHz ~ 711.0MHz
	LTE Band 17 Channel Bandwidth: 5MHz	706.5MHz ~ 713.5MHz
	LTE Band 17 Channel Bandwidth: 10MHz	709.0MHz ~ 711.0MHz
MAX. ERP/EIRP POWER	**WCDMA IV**	194mW
	LTE Band 4 Channel Bandwidth: 3MHz	151mW
	LTE Band 12 Channel Bandwidth: 3MHz	158mW
	LTE Band 17 Channel Bandwidth: 5MHz	183mW
ANTENNA TYPE	**WCDMA IV**	Fixed Internal Antenna with 2.76dBi
	LTE Band 4	Fixed Internal Antenna with 2.76dBi

	LTE Band 12	Fixed Internal Antenna with -1.29dBi
	LTE Band 17	Fixed Internal Antenna with -1.29dBi
HW VERSION	HW0309	
SW VERSION	000C_0_34A	
ACCESSORY DEVICE	Refer to note as below	
DATA CABLE	USB cable: non-shielded, detachable, 1.0m Earphone cable: non-shielded, detachable, 1.5m	

NOTE:

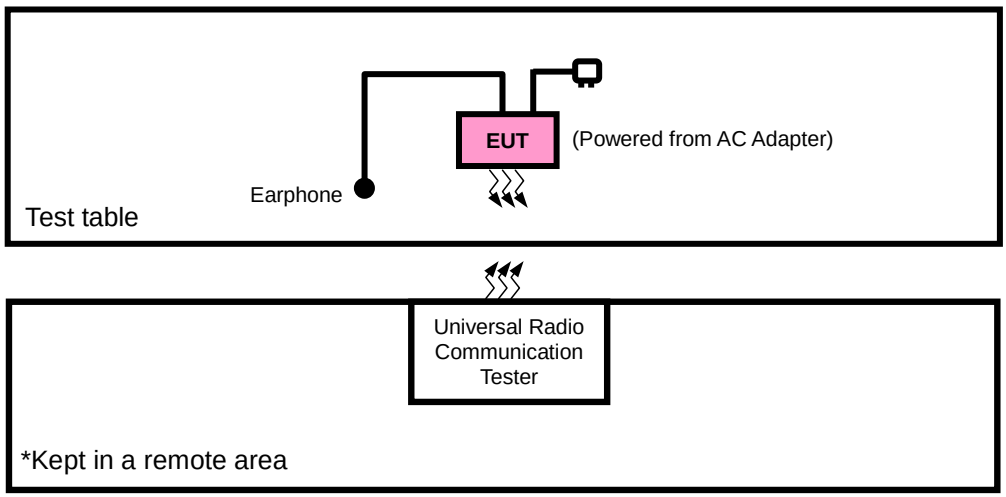
1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. This report is issued as a supplementary report to the original report RF180131W003-5. The differences compared with original report are updated HW and adding 2nd Manufacturer of components and antenna.

List of Accessories:

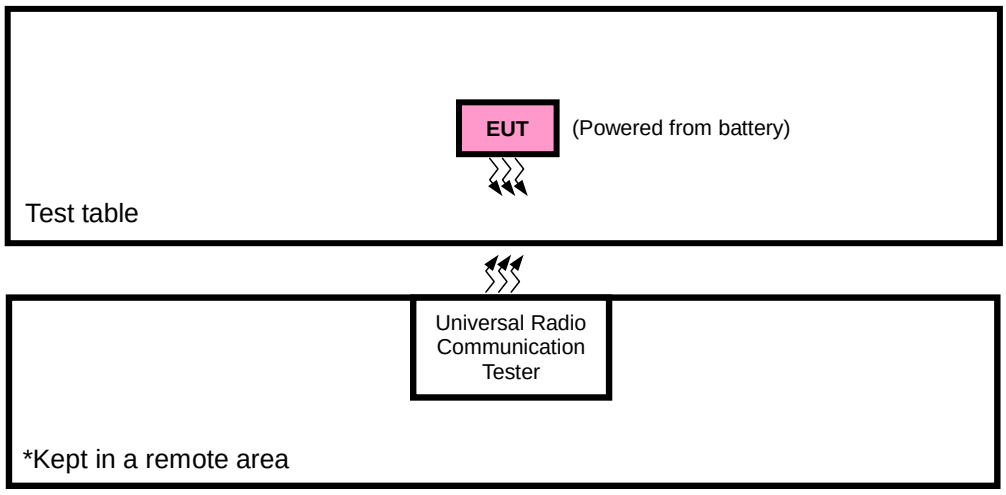
ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
Adapter 1	Salcomp	Salcomp (Shenzhen) Co., Ltd.	FC0202	I/P: 100-240Vac, 150mA O/P: 5Vdc, 1000mA
Adapter 2	Aohai	DONGGUAN AOHAI TECHNOLOGY CO., LTD.	AD-5WU	I/P: 100-240Vac, 150mA O/P: 5Vdc, 1000mA
Battery	SCUD	SCUD (Fujian) Electronics CO., Ltd.	HE336	Rating: 3.85Vdc, 2900mAh
Earphone 1	Nokia	FIT	WH-108	1.5m non-shielded cable w/o core
Earphone 2	Nokia	OBO	WH-108	1.5m non-shielded cable w/o core
USB Cable	Nokia	FIH	CA-190CD	1.0m non-shielded cable w/o core

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



FOR CONDUCTED & E.R.P./E.I.R.P TEST



2.3 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A
2	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	AC Line: Unshielded, Detachable 1.5m

NOTE:

1. All power cords of the above support units are non shielded (1.8m).

2.4 DESCRIPTION OF TEST MODES

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 in ERP/EIRP and radiated emission was found when positioned on X-plane for WCDMA/LTE. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	**EUT + Adapter + USB Cable + Earphone with WCDMA or LTE link**
B	**EUT + Battery with WCDMA or LTE link**

WCDMA MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
B	EIRP	1312 to 1513	1312, 1413, 1513	WCDMA
A	RADIATED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA

LTE BAND 4

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	19957 to 20393	20175	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	20175	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	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.

LTE BAND 12

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	ERP	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23095	10MHz	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.

LTE BAND 17

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	ERP	23755 to 23825	23755, 23790, 23825	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	23755 to 23825	23755, 23790, 23825	5MHz	QPSK	1 RB / 0 RB Offset
		23780 to 23800	23790	10MHz	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(ERP)	24deg. C, 60%RH	3.9Vdc from Battery	Vincent
RADIATED EMISSION	24deg. C, 60%RH	5Vdc from adapter	Vincent

2.5 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 v03

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

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

3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 699-716 MHz bands are limited to 3 watts ERP.

3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

a. The EUT was set up for the maximum power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range). RBW and VBW is 10MHz for LTE.

b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G

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

e. E.R.P = E.I.R.P- 2.15 dB

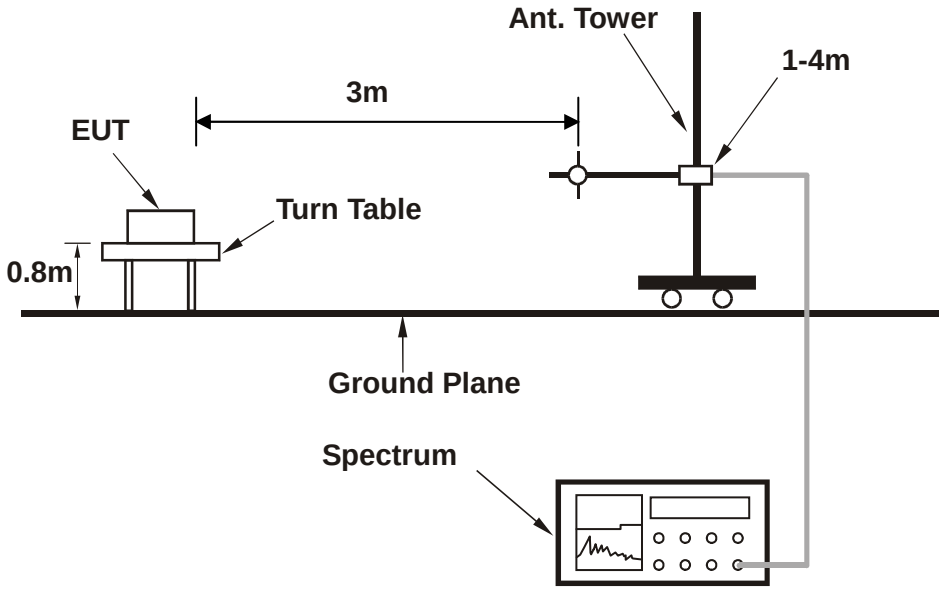
CONDUCTED POWER MEASUREMENT:

a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.

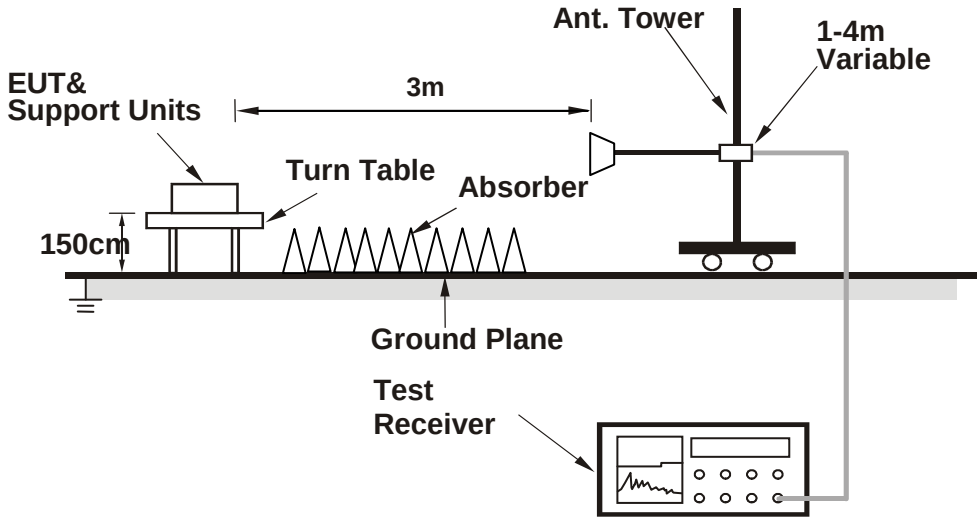
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP

EIRP / ERP Measurement:
<Radiated Emission below or equal 1 GHz>

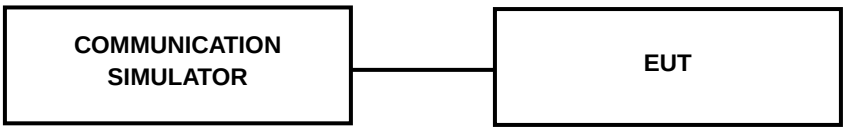


<Radiated Emission above 1 GHz>



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

CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

AVERAGE CONDUCTED OUTPUT POWER (dBm)

Band	WCDMA IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	**23.57**	23.51	23.49
HSPA			
HSDPA Subtest-1	22.63	22.57	22.55
HSDPA Subtest-2	22.62	22.56	22.54
HSDPA Subtest-3	22.10	22.04	22.02
HSDPA Subtest-4	22.08	22.02	22.00
HSUPA Subtest-1	22.57	22.51	22.49
HSUPA Subtest-2	20.71	20.65	20.63
HSUPA Subtest-3	21.70	21.64	21.62
HSUPA Subtest-4	20.69	20.63	20.61
HSUPA Subtest-5	22.53	22.47	22.45

LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 19957	Mid CH 20175	High CH 20393	MPR
				Frequency 1710.7 MHz	Frequency 1732.5 MHz	Frequency 1754.3 MHz	
1.4MHz	QPSK	1	0	22.10	22.03	22.05	0
		1	2	21.91	21.84	21.86	0
		1	5	21.89	21.82	21.84	0
		3	0	22.08	22.01	22.03	0
		3	1	21.89	21.82	21.84	0
		3	3	21.87	21.80	21.82	0
		6	0	21.17	21.10	21.12	1
	16QAM	1	0	21.24	21.17	21.19	1
		1	2	21.21	21.14	21.16	1
		1	5	21.16	21.09	21.11	1
		3	0	21.23	21.16	21.18	1
		3	1	21.20	21.13	21.15	1
		3	3	21.15	21.08	21.10	1
		6	0	20.15	20.08	20.10	2
BW	Modulation	RB Size	RB Offset	Low CH 19965	Mid CH 20175	High CH 20385	MPR
				Frequency 1711.5 MHz	Frequency 1732.5 MHz	Frequency 1753.5 MHz	
3 MHz	QPSK	1	0	22.11	22.04	22.06	0
		1	7	21.92	21.85	21.87	0
		1	14	21.90	21.83	21.85	0
		8	0	21.22	21.15	21.17	1
		8	3	21.01	20.94	20.96	1
		8	7	21.03	20.96	20.98	1
		15	0	21.18	21.11	21.13	1
	16QAM	1	0	21.25	21.18	21.20	1
		1	7	21.22	21.15	21.17	1
		1	14	21.17	21.10	21.12	1
		8	0	20.10	20.03	20.05	2
		8	3	20.07	20.00	20.02	2
		8	7	20.04	19.97	19.99	2
		15	0	20.16	20.09	20.11	2

LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 19975	Mid CH 20175	High CH 20375	MPR
				Frequency 1712.5 MHz	Frequency 1732.5 MHz	Frequency 1752.5 MHz	
5 MHz	QPSK	1	0	22.14	22.07	22.09	0
		1	12	21.95	21.88	21.90	0
		1	24	21.93	21.86	21.88	0
		12	0	21.25	21.18	21.20	1
		12	6	21.04	20.97	20.99	1
		12	13	21.06	20.99	21.01	1
		25	0	21.21	21.14	21.16	1
	16QAM	1	0	21.28	21.21	21.23	1
		1	12	21.25	21.18	21.20	1
		1	24	21.20	21.13	21.15	1
		12	0	20.13	20.06	20.08	2
		12	6	20.10	20.03	20.05	2
		12	13	20.07	20.00	20.02	2
		25	0	20.19	20.12	20.14	2
BW	Modulation	RB Size	RB Offset	Low CH 20000	Mid CH 20175	High CH 20350	MPR
				Frequency 1715 MHz	Frequency 1732.5 MHz	Frequency 1750 MHz	
10 MHz	QPSK	1	0	22.18	22.11	22.13	0
		1	24	21.99	21.92	21.94	0
		1	49	21.97	21.90	21.92	0
		25	0	21.29	21.22	21.24	1
		25	12	21.08	21.01	21.03	1
		25	25	21.10	21.03	21.05	1
		50	0	21.25	21.18	21.20	1
	16QAM	1	0	21.32	21.25	21.27	1
		1	24	21.29	21.22	21.24	1
		1	49	21.24	21.17	21.19	1
		25	0	20.17	20.10	20.12	2
		25	12	20.14	20.07	20.09	2
		25	25	20.11	20.04	20.06	2
		50	0	20.23	20.16	20.18	2

LTE Band 4							
BW	Modulation	RB Size	RB Offset	Low CH 20025	Mid CH 20175	High CH 20325	MPR
				Frequency 1717.5 MHz	Frequency 1732.5 MHz	Frequency 1747.5 MHz	
15 MHz	QPSK	1	0	22.24	22.17	22.19	0
		1	37	22.05	21.98	22.00	0
		1	74	22.03	21.96	21.98	0
		36	0	21.35	21.28	21.30	1
		36	19	21.14	21.07	21.09	1
		36	39	21.16	21.09	21.11	1
		75	0	21.31	21.24	21.26	1
	16QAM	1	0	21.38	21.31	21.33	1
		1	37	21.35	21.28	21.30	1
		1	74	21.30	21.23	21.25	1
		36	0	20.23	20.16	20.18	2
		36	19	20.20	20.13	20.15	2
		36	39	20.17	20.10	20.12	2
		75	0	20.29	20.22	20.24	2
BW	Modulation	RB Size	RB Offset	Low CH 20050	Mid CH 20175	High CH 20300	MPR
				Frequency 1720 MHz	Frequency 1732.5 MHz	Frequency 1745 MHz	
20MHz	QPSK	1	0	**22.27**	22.20	22.22	0
		1	50	22.08	22.01	22.03	0
		1	99	22.06	21.99	22.01	0
		50	0	21.38	21.31	21.33	1
		50	25	21.17	21.10	21.12	1
		50	50	21.19	21.12	21.14	1
		100	0	21.34	21.27	21.29	1
	16QAM	1	0	21.41	21.34	21.36	1
		1	50	21.38	21.31	21.33	1
		1	99	21.33	21.26	21.28	1
		50	0	20.26	20.19	20.21	2
		50	25	20.23	20.16	20.18	2
		50	50	20.20	20.13	20.15	2
		100	0	20.32	20.25	20.27	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23017 Frequency 699.7 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23173 Frequency 715.3 MHz	MPR
1.4 MHz	QPSK	1	0	21.90	21.92	21.99	0
		1	2	21.86	21.88	21.95	0
		1	5	21.84	21.86	21.93	0
		3	0	21.88	21.90	21.97	0
		3	1	21.84	21.86	21.93	0
		3	3	21.82	21.84	21.91	0
		6	0	20.93	20.95	21.02	1
	16QAM	1	0	21.03	21.05	21.12	1
		1	2	20.99	21.01	21.08	1
		1	5	20.97	20.99	21.06	1
		3	0	21.02	21.04	21.11	1
		3	1	20.98	21.00	21.07	1
		3	3	20.96	20.98	21.05	1
		6	0	19.95	19.97	20.04	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23025 Frequency 700.5 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23165 Frequency 714.5 MHz	MPR
3 MHz	QPSK	1	0	21.94	21.96	22.03	0
		1	7	21.90	21.92	21.99	0
		1	14	21.88	21.90	21.97	0
		8	0	21.02	21.04	21.11	1
		8	3	20.99	21.01	21.08	1
		8	7	20.96	20.98	21.05	1
		15	0	20.97	20.99	21.06	1
	16QAM	1	0	21.07	21.09	21.16	1
		1	7	21.03	21.05	21.12	1
		1	14	21.01	21.03	21.10	1
		8	0	20.05	20.07	20.14	2
		8	3	20.01	20.03	20.10	2
		8	7	20.00	20.02	20.09	2
		15	0	19.99	20.01	20.08	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23035 Frequency 701.5 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23155 Frequency 713.5 MHz	MPR
5 MHz	QPSK	1	0	22.00	22.02	22.09	0
		1	12	21.96	21.98	22.05	0
		1	24	21.94	21.96	22.03	0
		12	0	21.08	21.10	21.17	1
		12	6	21.05	21.07	21.14	1
		12	13	21.02	21.04	21.11	1
		25	0	21.03	21.05	21.12	1
	16QAM	1	0	21.13	21.15	21.22	1
		1	12	21.09	21.11	21.18	1
		1	24	21.07	21.09	21.16	1
		12	0	20.11	20.13	20.20	2
		12	6	20.07	20.09	20.16	2
		12	13	20.06	20.08	20.15	2
		25	0	20.05	20.07	20.14	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23060 Frequency 704 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23130 Frequency 711 MHz	MPR
10 MHz	QPSK	1	0	22.03	22.05	**22.12**	0
		1	24	21.99	22.01	22.08	0
		1	49	21.97	21.99	22.06	0
		25	0	21.11	21.13	21.20	1
		25	12	21.08	21.10	21.17	1
		25	25	21.05	21.07	21.14	1
		50	0	21.06	21.08	21.15	1
	16QAM	1	0	21.16	21.18	21.25	1
		1	24	21.12	21.14	21.21	1
		1	49	21.10	21.12	21.19	1
		25	0	20.14	20.16	20.23	2
		25	12	20.10	20.12	20.19	2
		25	25	20.09	20.11	20.18	2
		50	0	20.08	20.10	20.17	2

LTE Band 17							
BW	Modulation	RB Size	RB Offset	Low CH 23755	Mid CH 23790	High CH 23825	MPR
				Frequency 706.5 MHz	Frequency 710 MHz	Frequency 713.5 MHz	
5 MHz	QPSK	1	0	21.97	21.99	21.95	0
		1	12	21.94	21.96	21.92	0
		1	24	21.90	21.92	21.88	0
		12	0	21.04	21.06	21.02	1
		12	6	21.03	21.05	21.01	1
		12	13	20.95	20.97	20.93	1
		25	0	20.99	21.01	20.97	1
	16QAM	1	0	21.18	21.20	21.16	1
		1	12	21.13	21.15	21.11	1
		1	24	21.10	21.12	21.08	1
		12	0	20.08	20.10	20.06	2
		12	6	20.04	20.06	20.02	2
		12	13	19.99	20.01	19.97	2
		25	0	20.03	20.05	20.01	2
BW	Modulation	RB Size	RB Offset	Low CH 23780	Mid CH 23790	High CH 23800	MPR
				Frequency 709 MHz	Frequency 710 MHz	Frequency 711 MHz	
10 MHz	QPSK	1	0	22.01	**22.03**	21.99	0
		1	24	21.98	22.00	21.96	0
		1	49	21.94	21.96	21.92	0
		25	0	21.08	21.10	21.06	1
		25	12	21.07	21.09	21.05	1
		25	25	20.99	21.01	20.97	1
		50	0	21.03	21.05	21.01	1
	16QAM	1	0	21.22	21.24	21.20	1
		1	24	21.17	21.19	21.15	1
		1	49	21.14	21.16	21.12	1
		25	0	20.12	20.14	20.10	2
		25	12	20.08	20.10	20.06	2
		25	25	20.03	20.05	20.01	2
		50	0	20.07	20.09	20.05	2

EIRP

WCDMA IV

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
1312	1712.40	-18.88	41.39	22.51	178.20	H
1413	1732.60	-19.48	41.36	21.88	154.17	H
1513	1752.60	-19.74	42.63	22.89	**194.49**	H
1312	1712.40	-26.37	44.17	17.80	60.20	V
1413	1732.60	-26.45	44.20	17.75	59.57	V
1513	1752.60	-26.56	44.35	17.79	60.05	V

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

LTE BAND 4

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
19965	1711.5	-20.29	41.27	20.98	125.23	H	1
20175	1732.5	-20.05	41.36	21.31	135.21	H	1
20385	1753.5	-20.97	42.76	21.79	**150.90**	H	1
19965	1711.5	-26.89	44.26	17.37	54.60	V	1
20175	1732.5	-27.23	44.20	16.97	49.77	V	1
20385	1753.5	-27.25	44.23	16.98	49.91	V	1

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

LTE BAND 12

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23025	700.5	-8.98	32.63	21.50	141.29	H	3
23095	707.5	-9.08	33.23	22.00	**158.49**	H	3
23165	714.5	-9.90	33.21	21.16	130.47	H	3
23025	700.5	-16.78	32.33	13.40	21.86	V	3
23095	707.5	-16.94	32.60	13.51	22.44	V	3
23165	714.5	-16.73	32.30	13.42	21.98	V	3

REMARKS: 1. ERP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB) -2.15(dB).

2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

LTE BAND 17

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23755	706.5	-7.87	32.64	22.62	**182.60**	H	3
23790	710.0	-8.45	32.92	22.32	170.61	H	3
23825	713.5	-8.84	32.83	21.84	152.62	H	3
23755	706.5	-17.08	32.14	12.91	19.53	V	3
23790	710.0	-17.02	32.18	13.01	20.00	V	3
23825	713.5	-17.26	31.95	12.54	17.96	V	3

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).

2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 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 43 +10 log10(P) dB. The limit of emission equal to –13dBm

3.2.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G

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

d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

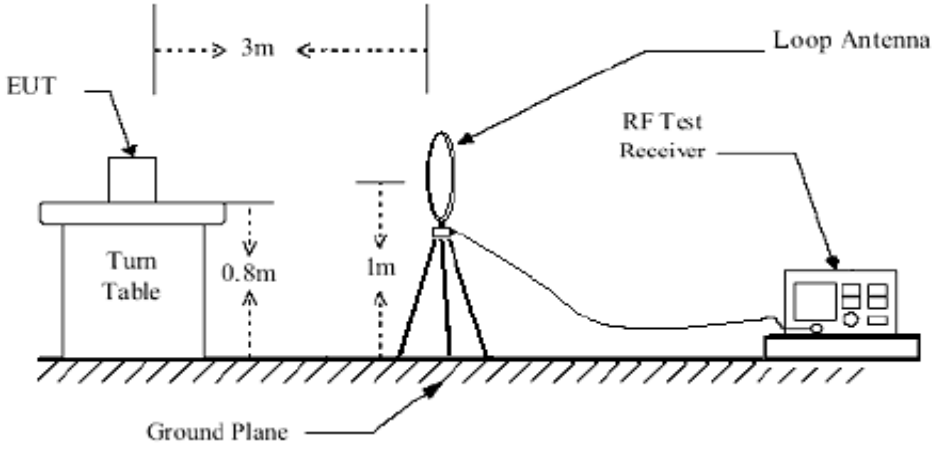
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.2.3 DEVIATION FROM TEST STANDARD

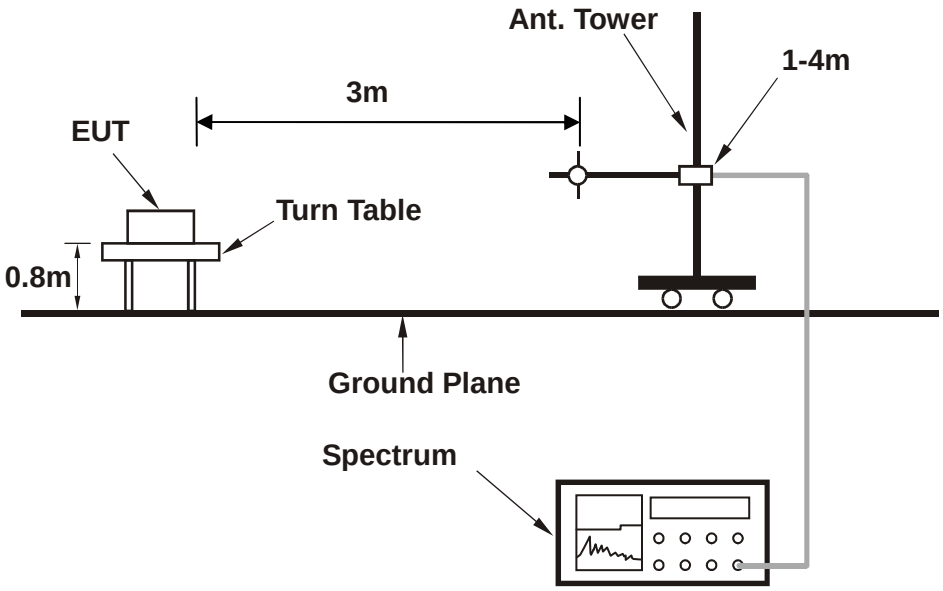
No deviation

3.2.4 TEST SETUP

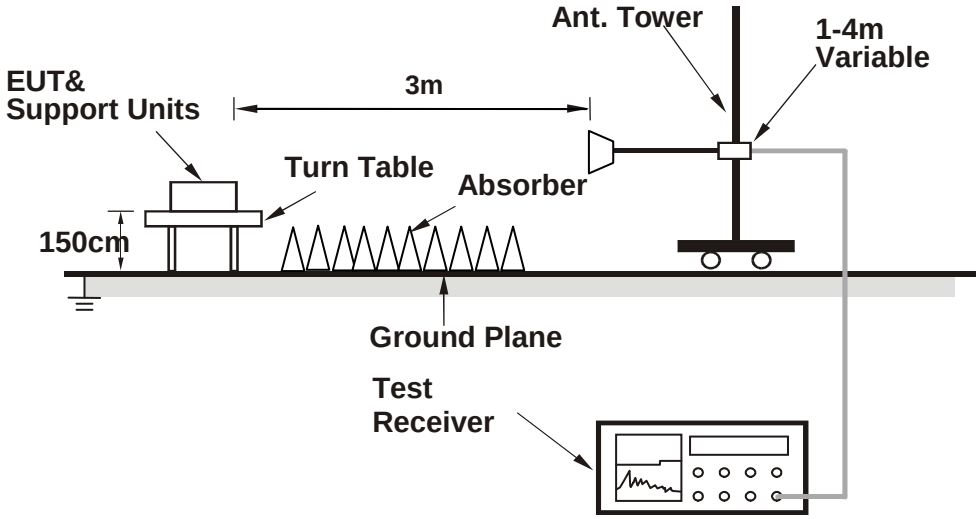
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



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

3.2.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

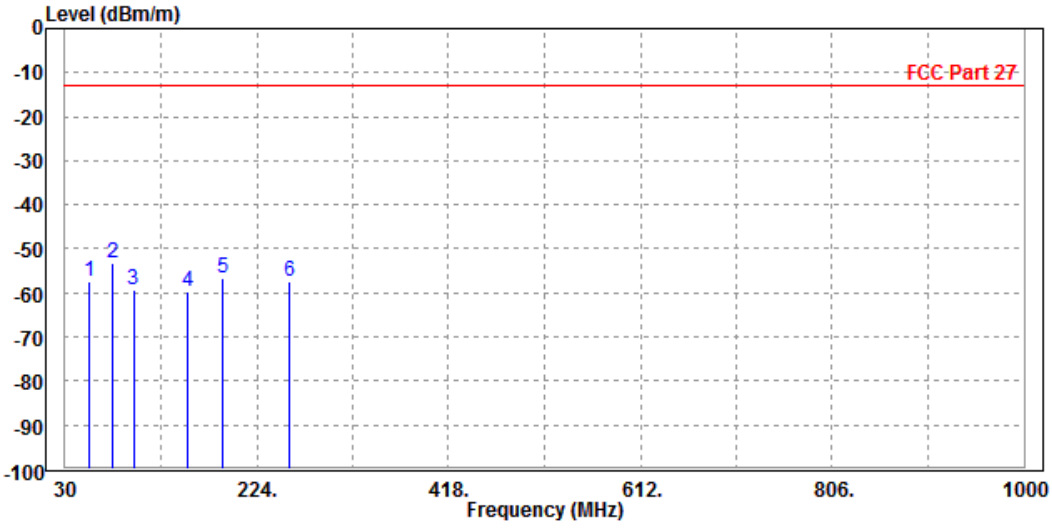
9 KHz – 30 MHz data: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

30 MHz – 1GHz data:

LTE Band 4:

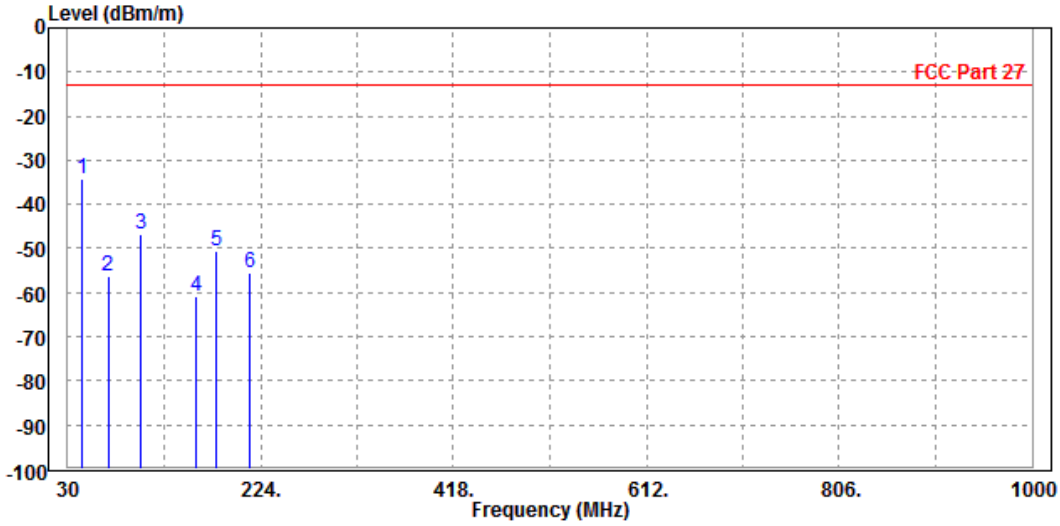
MODE	TX channel 20175	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	54.510	-57.41	-55.89	-13.00	-44.41	-1.52	Peak	Horizontal
2 PP	78.220	-53.06	-44.58	-13.00	-40.06	-8.48	Peak	Horizontal
3	99.200	-59.33	-48.35	-13.00	-46.33	-10.98	Peak	Horizontal
4	154.720	-59.59	-40.77	-13.00	-46.59	-18.82	Peak	Horizontal
5	189.520	-56.50	-38.99	-13.00	-43.50	-17.51	Peak	Horizontal
6	256.830	-57.50	-41.56	-13.00	-44.50	-15.94	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	44.860	-34.15	-31.02	-13.00	-21.15	-3.13	Peak	Vertical
2	70.560	-56.11	-40.83	-13.00	-43.11	-15.28	Peak	Vertical
3	102.870	-46.67	-35.62	-13.00	-33.67	-11.05	Peak	Vertical
4	158.350	-60.72	-45.33	-13.00	-47.72	-15.39	Peak	Vertical
5	178.600	-50.40	-37.08	-13.00	-37.40	-13.32	Peak	Vertical
6	213.750	-55.40	-44.52	-13.00	-42.40	-10.88	Peak	Vertical



ABOVE 1GHz

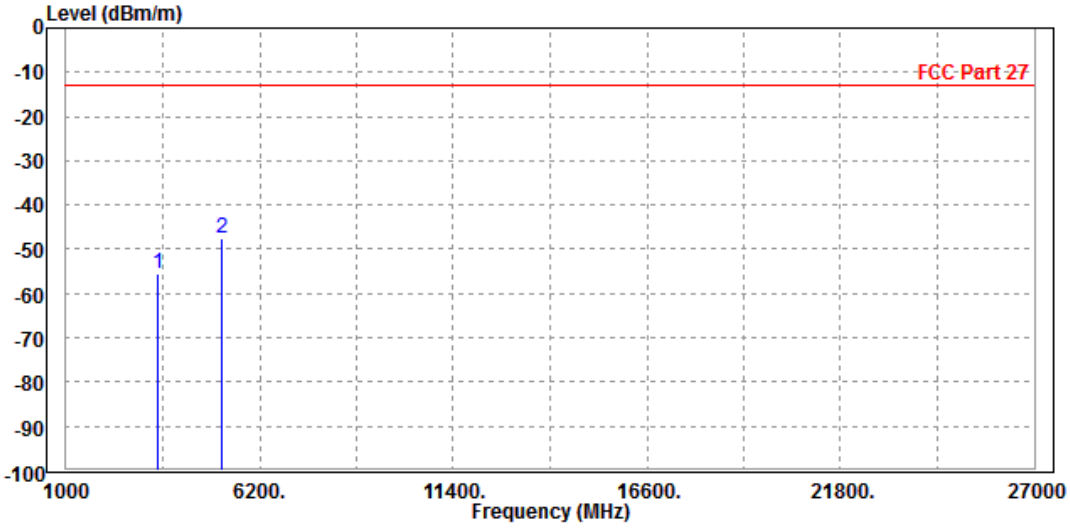
Note: For higher frequency, the emission is too low to be detected.

WCDMA Band IV:

CH 1413

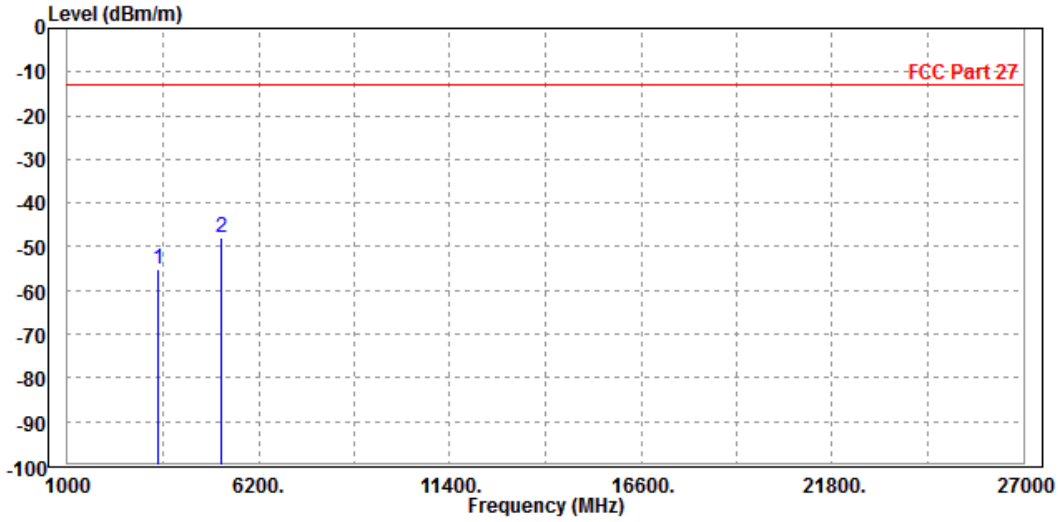
MODE	TX channel 1413	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3444.000	-55.55	-57.50	-13.00	-42.55	1.95	Peak	Horizontal
2 PP	5197.000	-47.65	-56.26	-13.00	-34.65	8.61	Peak	Horizontal



MODE	TX channel 1413	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3444.000	-55.04	-57.54	-13.00	-42.04	2.50	Peak	Vertical
2 PP	5197.000	-47.76	-55.74	-13.00	-34.76	7.98	Peak	Vertical



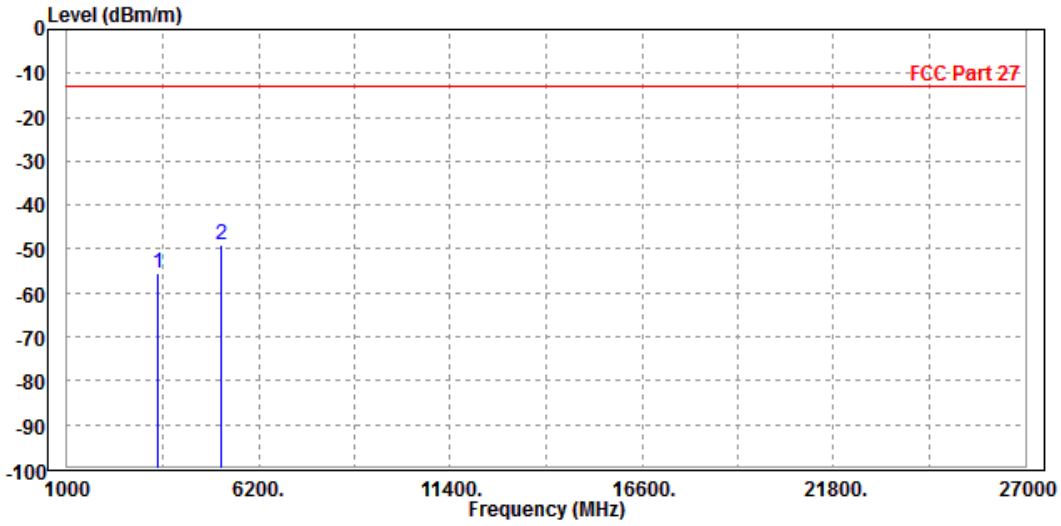
LTE BAND 4

CHANNEL BANDWIDTH: 20MHz / QPSK

CH 20175

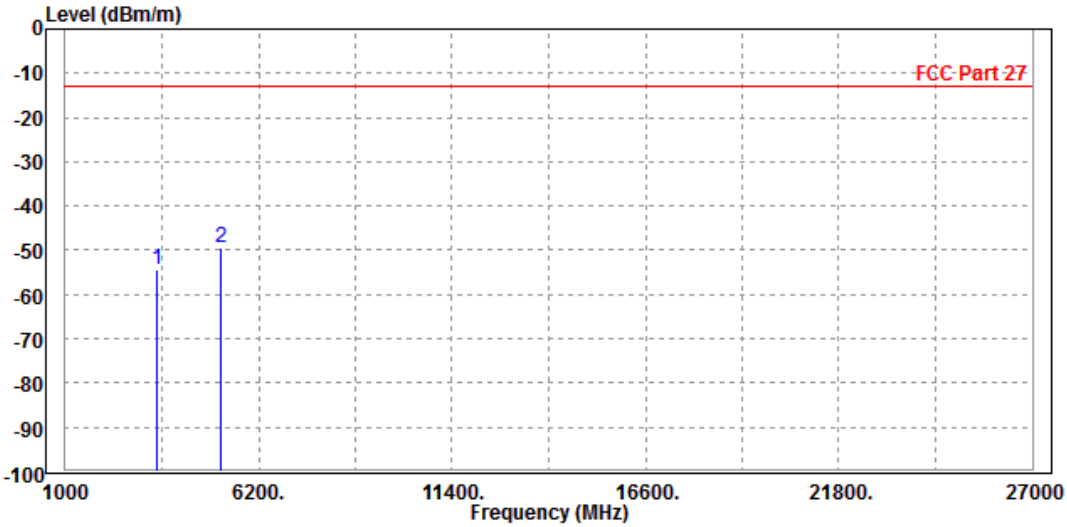
MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3444.000	-55.58	-57.53	-13.00	-42.58	1.95	Peak	Horizontal
2 PP	5197.000	-49.15	-57.76	-13.00	-36.15	8.61	Peak	Horizontal



MODE	TX channel 20175	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3444.000	-54.36	-56.86	-13.00	-41.36	2.50	Peak	Vertical
2 PP	5197.000	-49.49	-57.47	-13.00	-36.49	7.98	Peak	Vertical



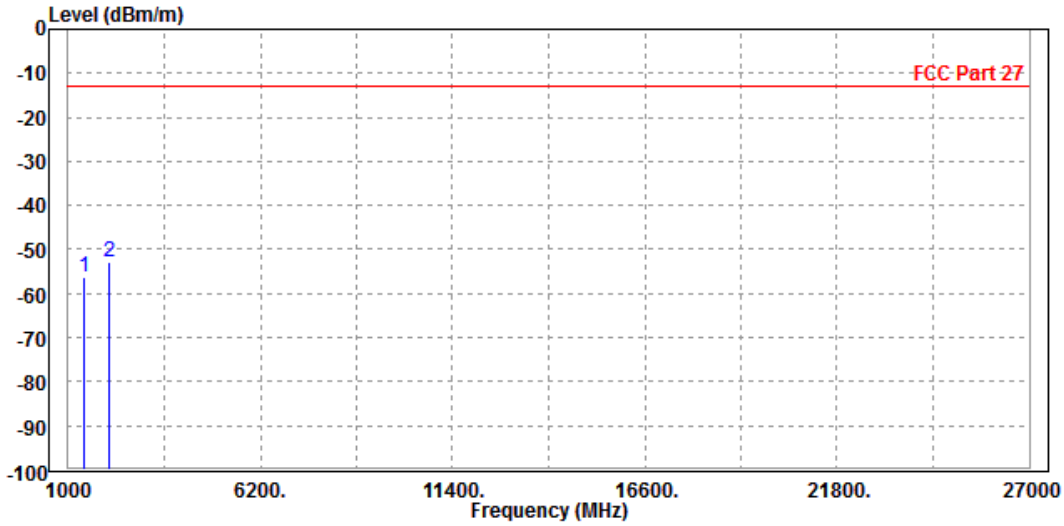
LTE BAND 12

CHANNEL BANDWIDTH: 3MHz / QPSK

CH 23095

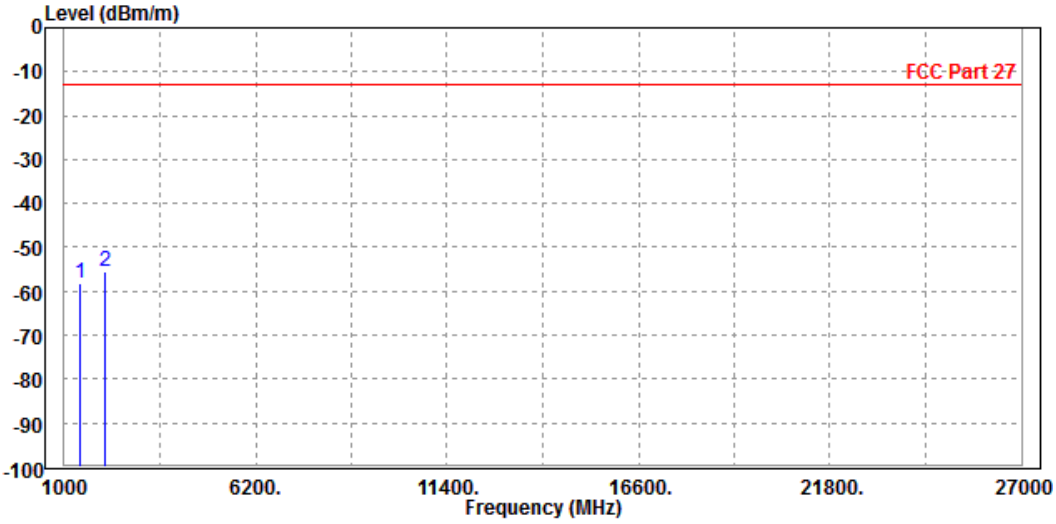
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-56.24	-49.52	-13.00	-43.24	-6.72	Peak	Horizontal
2 PP	2122.000	-52.95	-51.01	-13.00	-39.95	-1.94	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-58.16	-52.72	-13.00	-45.16	-5.44	Peak	Vertical
2 PP	2122.000	-55.43	-55.19	-13.00	-42.43	-0.24	Peak	Vertical



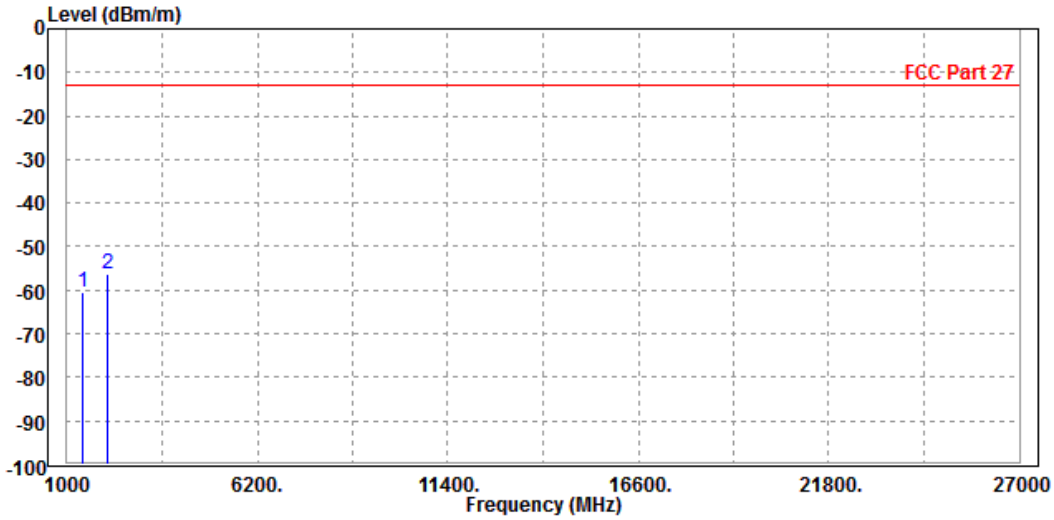
LTE Band 17

CHANNEL BANDWIDTH: 5MHz / QPSK

CH 23825

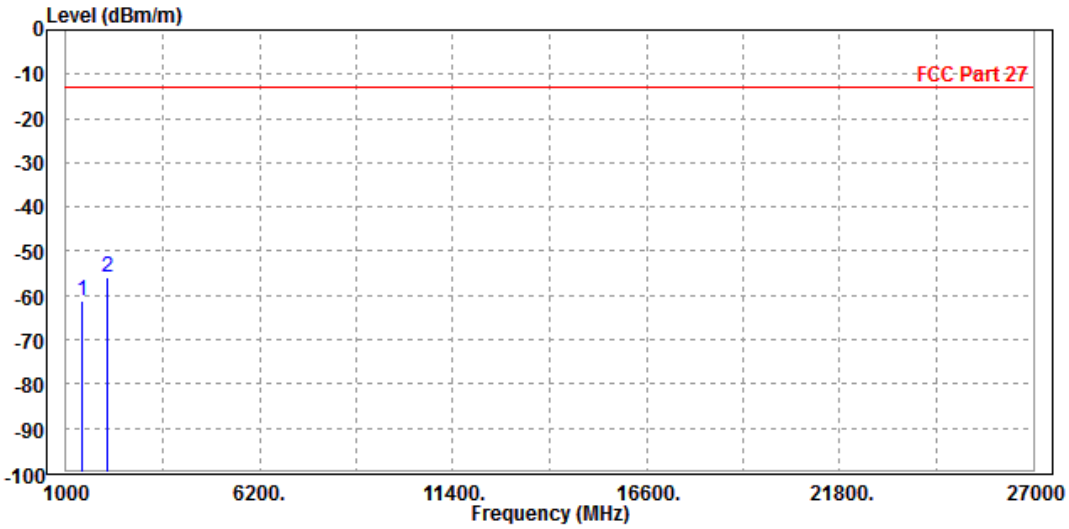
MODE	TX channel 23825	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-60.35	-53.63	-13.00	-47.35	-6.72	Peak	Horizontal
2 PP	2130.000	-56.43	-54.50	-13.00	-43.43	-1.93	Peak	Horizontal



MODE	TX channel 23825	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9V from adapter
TESTED BY	Vincent		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-61.24	-55.80	-13.00	-48.24	-5.44	Peak	Vertical
2 PP	2130.000	-55.94	-55.70	-13.00	-42.94	-0.24	Peak	Vertical



4 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 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:

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Web Site: www.adt.com.tw

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

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---