TEST REPORT

Product	:	LTE MODULE
Trade mark	:	GlocalMe
Model/Type reference	:	GLMM18A02
Serial Number	:	N/A
Report Number	:	EED32K00246401
FCC ID	:	2AC88-GLMM18A02
Date of Issue	:	Jan. 25, 2019
Test Standards	:	47 CFR Part 15Subpart C
Test result	:	PASS

Prepared for:

HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED
Suite 603, 6/F, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Kowloon, HongKong

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested by:	Peter	Compiled by:	Tom- chen
	Peter		Tom chen
Reviewed by:	Max liang	Approved by:	Kevin Yang
	Max Liang		Kevin yang
Date:	Jan. 25, 2019		Check No.:3096318232

CENTRE TESTING INTERNATIONAL GROUP CO.,LTD. CTI Report Seal

2 Version

Version No.	Date	Description
00	Jan. 25, 2019	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Remark: Test according to ANSI C63.4-2014 & ANSI C63.10-2013. The tested sample(s) and the sample information are provided by the client.			

4 Content

1 COVER PAGE 1

2 VERSION 2

3 TEST SUMMARY 3

4 CONTENT 4

5 TEST REQUIREMENT 5

5.1 TEST SETUP 5
5.1.1 For Conducted test setup 5
5.1.2 For Radiated Emissions test setup 5
5.1.3 For Conducted Emissions test setup 6
5.2 TEST ENVIRONMENT 6
5.3 TEST CONDITION 6

6 GENERAL INFORMATION 7

6.1 CLIENT INFORMATION 7
6.2 GENERAL DESCRIPTION OF EUT 7
6.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD 8
6.4 DESCRIPTION OF SUPPORT UNITS 8
6.5 TEST LOCATION 8
6.6 DEVIATION FROM STANDARDS 8
6.7 ABNORMALITIES FROM STANDARD CONDITIONS 8
6.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER 9
6.9 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2) 9

7 EQUIPMENT LIST 10

8 RADIO TECHNICAL REQUIREMENTS SPECIFICATION 13

Appendix A): 6dB Occupied Bandwidth 14
Appendix B): Conducted Peak Output Power 16
Appendix C): Band-edge for RF Conducted Emissions 18
Appendix D): RF Conducted Spurious Emissions 20
Appendix E): Power Spectral Density 23
Appendix F): Antenna Requirement 25
Appendix G): AC Power Line Conducted Emission 26
Appendix H): Restricted bands around fundamental frequency (Radiated) 29
Appendix I): Radiated Spurious Emissions 34

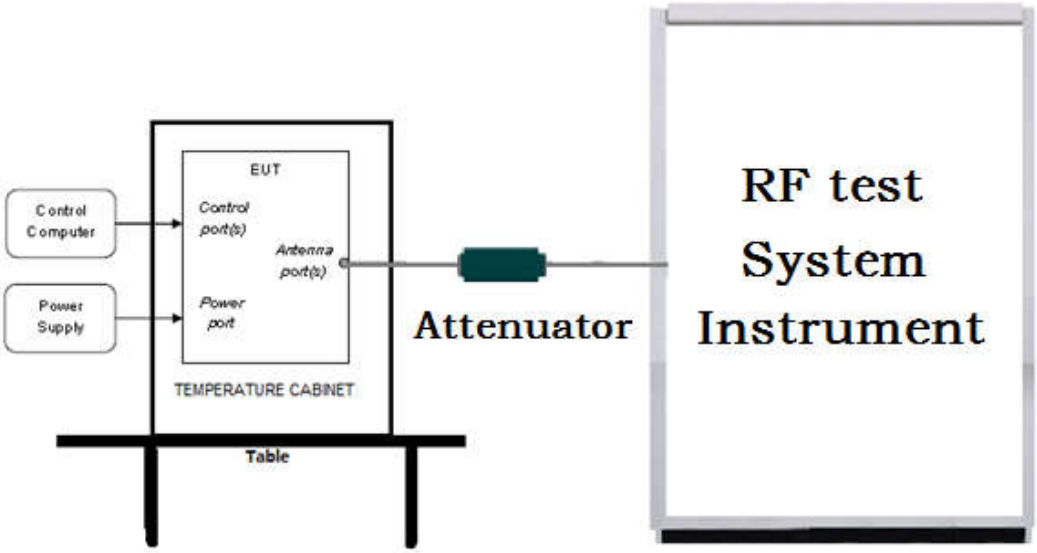
PHOTOGRAPHS OF TEST SETUP 39

PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS 41

5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

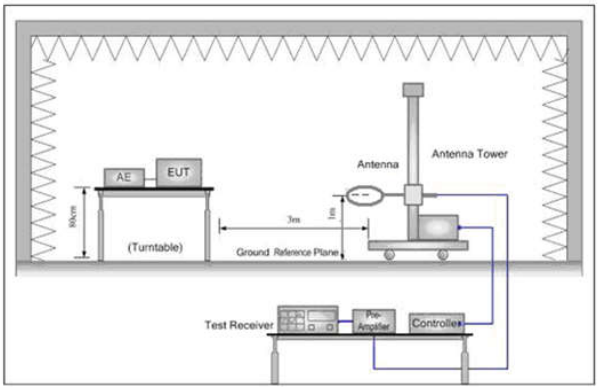


Figure 1. Below 30MHz

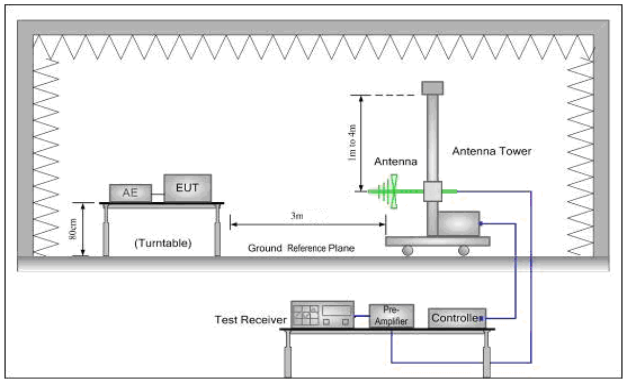


Figure 2. 30MHz to 1GHz

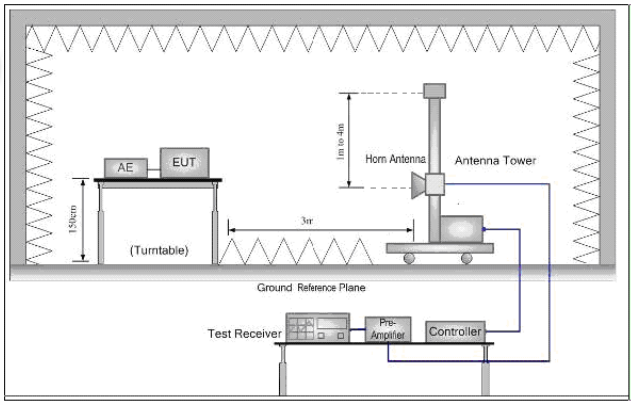
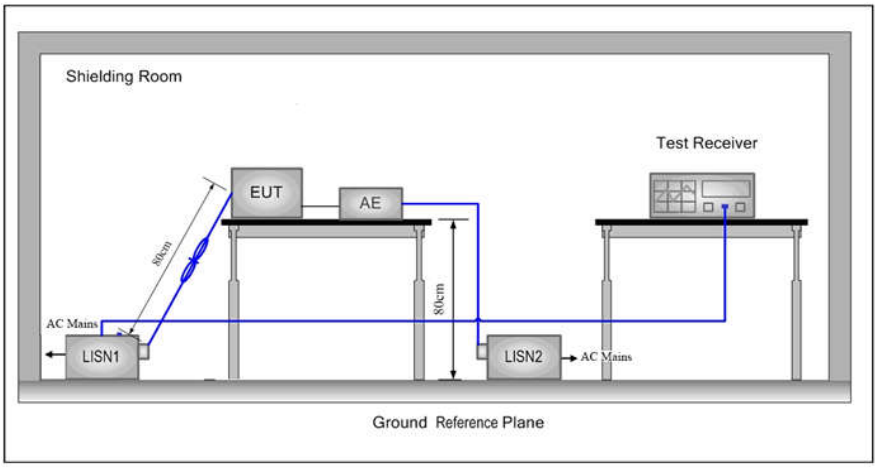


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	25°C
Humidity:	57 % RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel 40
		2402MHz	2440MHz	2480MHz
Transmitting mode:	The EUT transmitted the continuous signal at the specific channel(s).			

6 General Information

6.1 Client Information

Applicant:	HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED
Address of Applicant:	Suite 603, 6/F, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Kowloon, HongKong
Manufacturer:	HONGKONG UCLOUDLINK NETWORK TECHNOLOGY LIMITED
Address of Manufacturer:	Suite 603, 6/F, Laws Commercial Plaza, 788 Cheung Sha Wan Road, Kowloon, HongKong
Factory:	SHENZHEN CHIHANG TECHNOLOGY CO., LTD
Address of Factory:	1-4/F, Building 5, Detai Industrial Park, Huarong Road, Dalang Street, Longhua, Shenzhen

6.2 General Description of EUT

Product Name:	LTE MODULE
Model No.(EUT):	GLMM18A02
Trade mark:	GlocalMe
EUT Supports Radios application:	4.0 BT Dual mode: 2402MHz to 2480MHz WiFi: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz GPS: L1:1559MHz to 1610MHz GSM/GPRS/EGPRS 850: Tx: 824-849MHz, Rx: 869-894MHz GSM/GPRS/EGPRS 1900: Tx: 1850-1910MHz, Rx: 1930-1990MHz WCDMA Band 2: Tx: 1850-1910MHz, Rx: 1930-1990MHz WCDMA Band 4: Tx: 1850-1910MHz, Rx: 2110-2155MHz WCDMA Band 5: Tx: 824- 849MHz, Rx: 869 -894MHz LTE Band 2: Tx: 1850-1910MHz, Rx: 1930-1990MHz LTE Band 4: Tx: 1710-1755 MHz, Rx: 2110-2155 MHz LTE Band 5: Tx: 824-849 MHz, Rx: 869-894MHz LTE Band 7: TX:2500-2570 MHz, Rx: 2620-2690 MHz LTE Band 12: Tx: 699-716 MHz, Rx: 729-746 MHz LTE Band 13: Tx: 777-787 MHz, Rx: 746-756 MHz LTE Band 17: Tx: 704-716 MHz, Rx: 734-746 MHz LTE Band 26: Tx: 814-849 MHz, Rx: 859-894 MHz LTE Band 38: Tx: 2570- 2620MHz, Rx: 2570-2620MHz LTE Band 40: Tx:2305–2315 MHz, Rx:2305–2315MHz Tx:2350–2360 MHz, Rx:2350–2360MHz LTE Band 41: Tx: 2535-2655 MHz, Rx: 2535 -2655 MHz
Power Supply:	DC 3.3V
Firmware version:	GLMM18A01_TSV1.0.000.005.180821_userdebug(manufacturer declare)
Hardware version:	M2_VB(manufacturer declare)
Sample Received Date:	Sep. 10, 2018
Sample tested Date:	Sep. 11, 2018 to Dec. 12, 2018

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.0
Modulation Technique:	DSSS
Modulation Type:	GFSK
Number of Channel:	40
Test Power Grade:	N/A
Test Software of EUT:	N/A
Antenna Type	External Antenna
Antenna Gain:	-0.5dBi
Test Voltage:	DC 3.3V, AC120V/60Hz

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

6.4 Description of Support Units

The EUT has been tested independently.

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd
Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China
Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
No tests were sub-contracted.
FCC Designation No.: CN1164

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

7 Equipment List

RF test system					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-13-2018	03-12-2019
Signal Generator	Keysight	N5182B	MY53051549	03-13-2018	03-12-2019
High-pass filter	Sinoscite	FL3CX03WG18NM12-0398-002	---	01-10-2018	01-09-2019
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-10-2018	01-09-2019
DC Power	Keysight	E3642A	MY54426035	03-13-2018	03-12-2019
PC-1	Lenovo	R4960d	---	03-13-2018	03-12-2019
BT&WI-FI Automatic control	R&S	OSP120	101374	03-13-2018	03-12-2019
RF control unit	JS Tonscend	JS0806-2	15860006	03-13-2018	03-12-2019
RF control unit	JS Tonscend	JS0806-1	15860004	03-13-2018	03-12-2019
RF control unit	JS Tonscend	JS0806-4	158060007	03-13-2018	03-12-2019
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	03-13-2018	03-12-2019
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	10-11-2017	10-12-2018
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	10-12-2018	10-11-2019

Conducted disturbance Test					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100435	05-25-2018	05-24-2019
Temperature/ Humidity Indicator	Defu	TH128	/	07-02-2018	07-01-2019
Communication test set	Agilent	E5515C	GB47050 534	03-16-2018	03-15-2019
Communication test set	R&S	CMW500	152394	03-16-2018	03-15-2019
LISN	R&S	ENV216	100098	05-10-2018	05-10-2019
LISN	schwarzbeck	NNLK8121	8121-529	05-10-2018	05-10-2019
Voltage Probe	R&S	ESH2-Z3 0299.7810.5 6	100042	06-13-2017	06-11-2020
Current Probe	R&S	EZ-17 816.2063.03	100106	05-30-2018	05-29-2019
ISN	TESEQ	ISN T800	30297	02-06-2018	02-05-2019

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-04-2016	06-03-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	10-27-2017	10-28-2018
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	10-28-2018	10-27-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-30-2018	07-29-2019
Microwave Preamplifier	Agilent	8449B	3008A02425	08-21-2018	08-20-2019
Microwave Preamplifier	Tonscend	EMC051845SE	980380	01-19-2018	01-18-2019
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-23-2021
Horn Antenna	ETS-LINDGREN	3117	00057410	06-05-2018	06-03-2021
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	6042	06-05-2018	06-04-2021
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041	06-05-2018	06-04-2021
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018	05-10-2019
Receiver	R&S	ESCI	100435	05-25-2018	05-24-2019
Receiver	R&S	ESCI7	100938-003	11-22-2017	11-23-2018
Receiver	R&S	ESCI7	100938-003	11-23-2018	11-22-2019
Multi device Controller	maturo	NCD/070/10711112	---	01-10-2018	01-09-2019
LISN	schwarzbeck	NNBM8125	81251547	05-11-2018	05-10-2019
LISN	schwarzbeck	NNBM8125	81251548	05-11-2018	05-10-2019
Signal Generator	Agilent	E4438C	MY45095744	03-13-2018	03-12-2019
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	10-11-2017	10-12-2018
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	10-12-2018	10-11-2019
Communication test set	Agilent	E5515C	GB47050534	03-16-2018	03-15-2019
Cable line	Fulai(7M)	SF106	5219/6A	01-10-2018	01-09-2019
Cable line	Fulai(6M)	SF106	5220/6A	01-10-2018	01-09-2019
Cable line	Fulai(3M)	SF106	5216/6A	01-10-2018	01-09-2019
Cable line	Fulai(3M)	SF106	5217/6A	01-10-2018	01-09-2019
Communication test set	R&S	CMW500	104466	02-05-2018	02-04-2019
High-pass filter	Sinoscite	FL3CX03WG18NM12-0398-002	---	01-10-2018	01-09-2019
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX01CA09CL12-0395-001	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX01CA08CL12-0393-001	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX02CA04CL12-0396-002	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX02CA03CL12-0394-001	---	01-10-2018	01-09-2019

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices

Test Results List:

Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

Appendix A): 6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict	Remark
BLE	LCH	0.6682	1.0553	PASS	Peak detector
BLE	MCH	0.6691	1.0601	PASS	
BLE	HCH	0.6652	1.0564	PASS	

Test Graphs

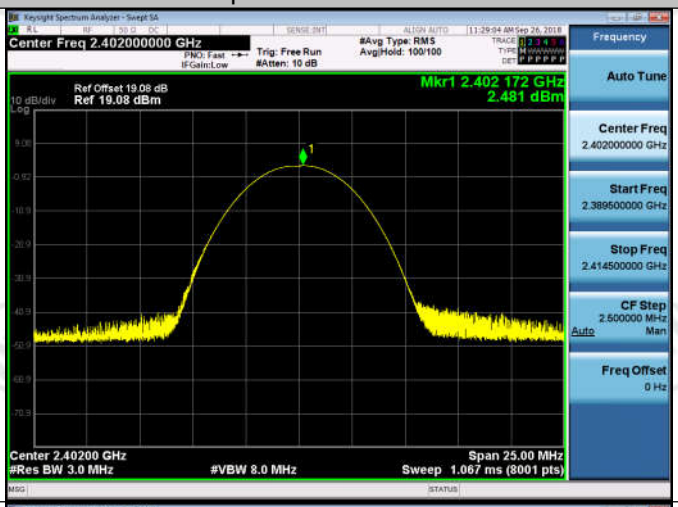
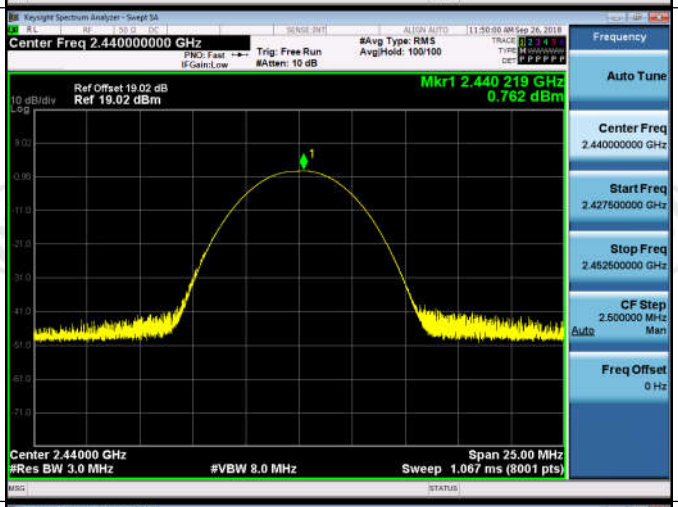
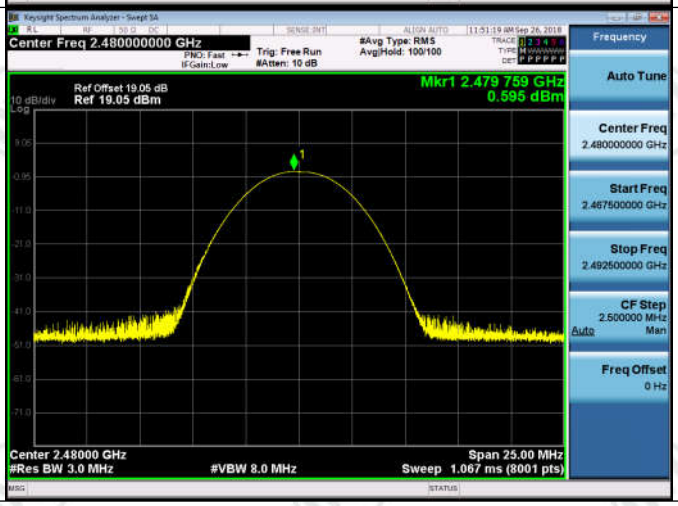
		Graphs	
LCH			
MCH			
HCH			

Appendix B): Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
BLE	LCH	2.481	PASS
BLE	MCH	0.762	PASS
BLE	HCH	0.595	PASS

Test Graphs

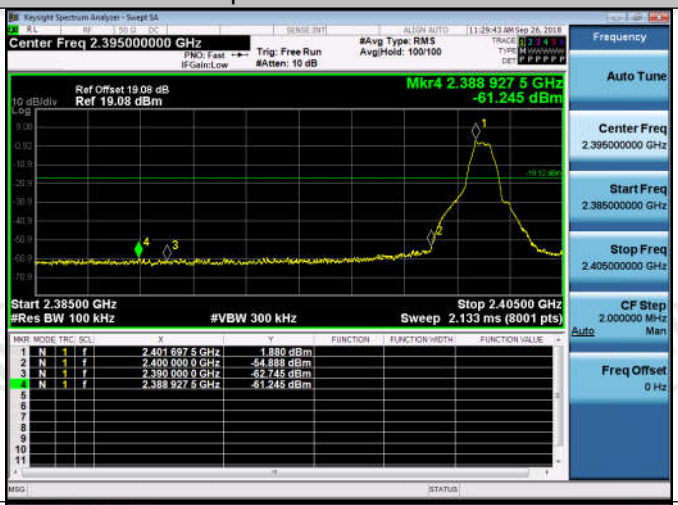
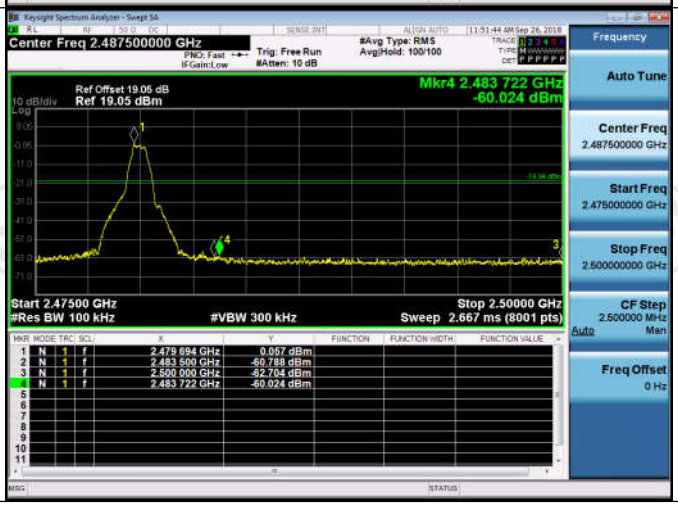
		Graphs	
LCH			
MCH			
HCH			

Appendix C): Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	1.880	-61.245	-18.12	PASS
BLE	HCH	0.057	-60.024	-19.94	PASS

Test Graphs

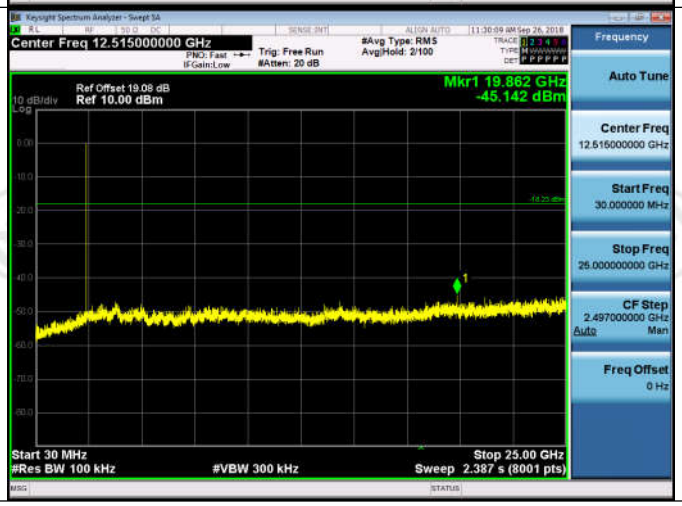
Graphs			
LCH			
HCH			

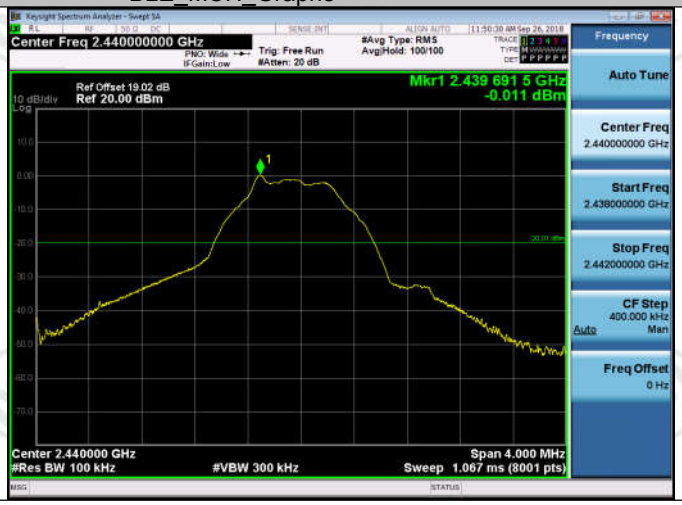
Appendix D): RF Conducted Spurious Emissions

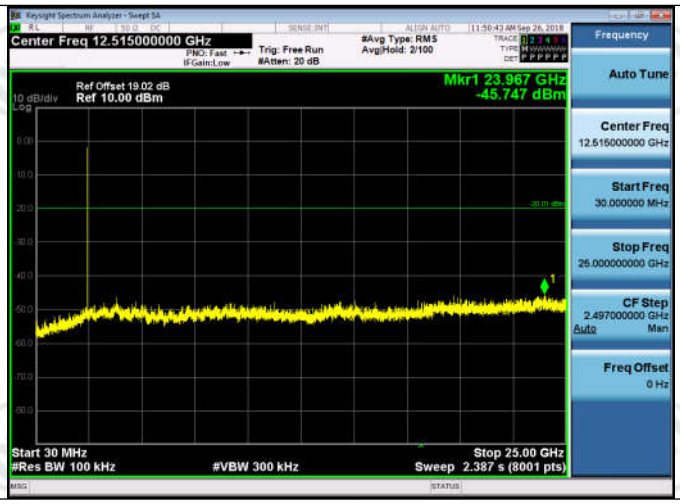
Result Table

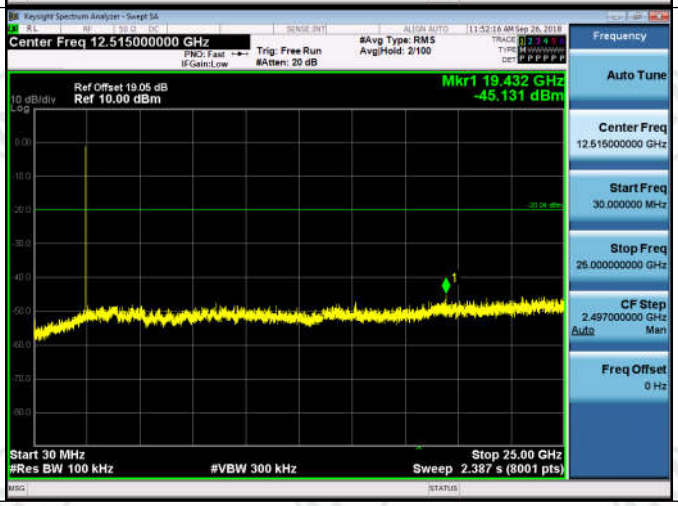
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	1.771	<Limit	PASS
BLE	MCH	-0.011	<Limit	PASS
BLE	HCH	-0.038	<Limit	PASS

Test Graphs

BLE_LCH_Graphs	
Pref/BLE/LCH	
Puw/BLE/LCH	

BLE_MCH_Graphs	
Pref/BLE/MCH	

Puw/BLE/MCH			

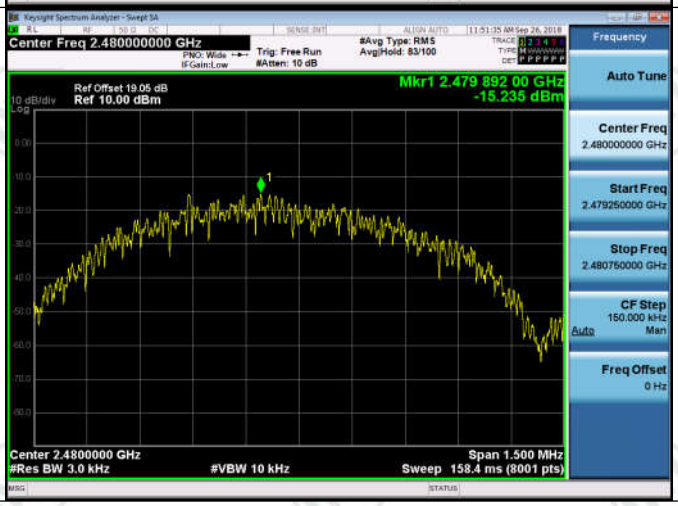
BLE_HCH_Graphs			
Pref/BLE/HCH			
Puw/BLE/HCH			

Appendix E): Power Spectral Density

Result Table

Mode	Channel	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE	LCH	-13.293	8	PASS
BLE	MCH	-15.081	8	PASS
BLE	HCH	-15.235	8	PASS

Test Graphs

Graphs			
LCH			
MCH			
HCH			

Appendix F): Antenna Requirement

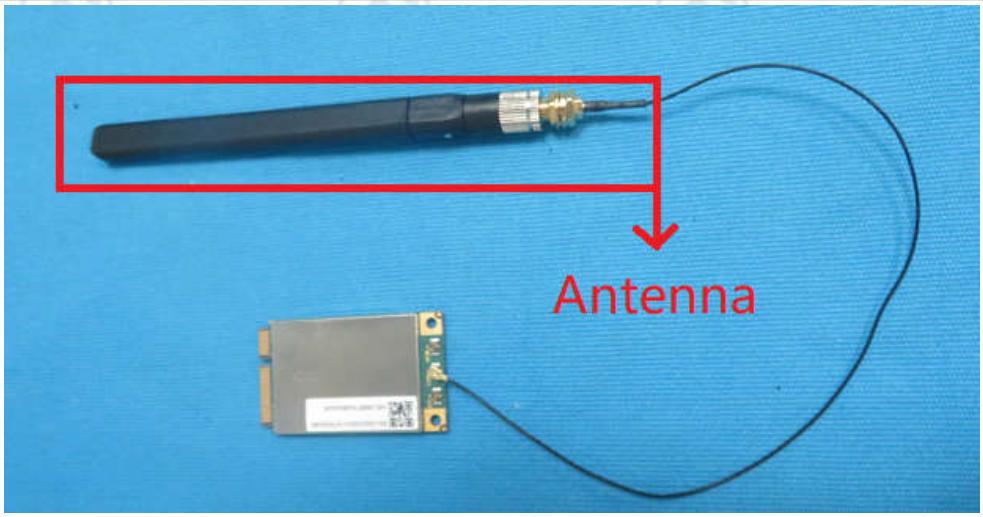
15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is External antenna and no consideration of replacement. The best case gain of the antenna is -0.5dBi.

Appendix G): AC Power Line Conducted Emission

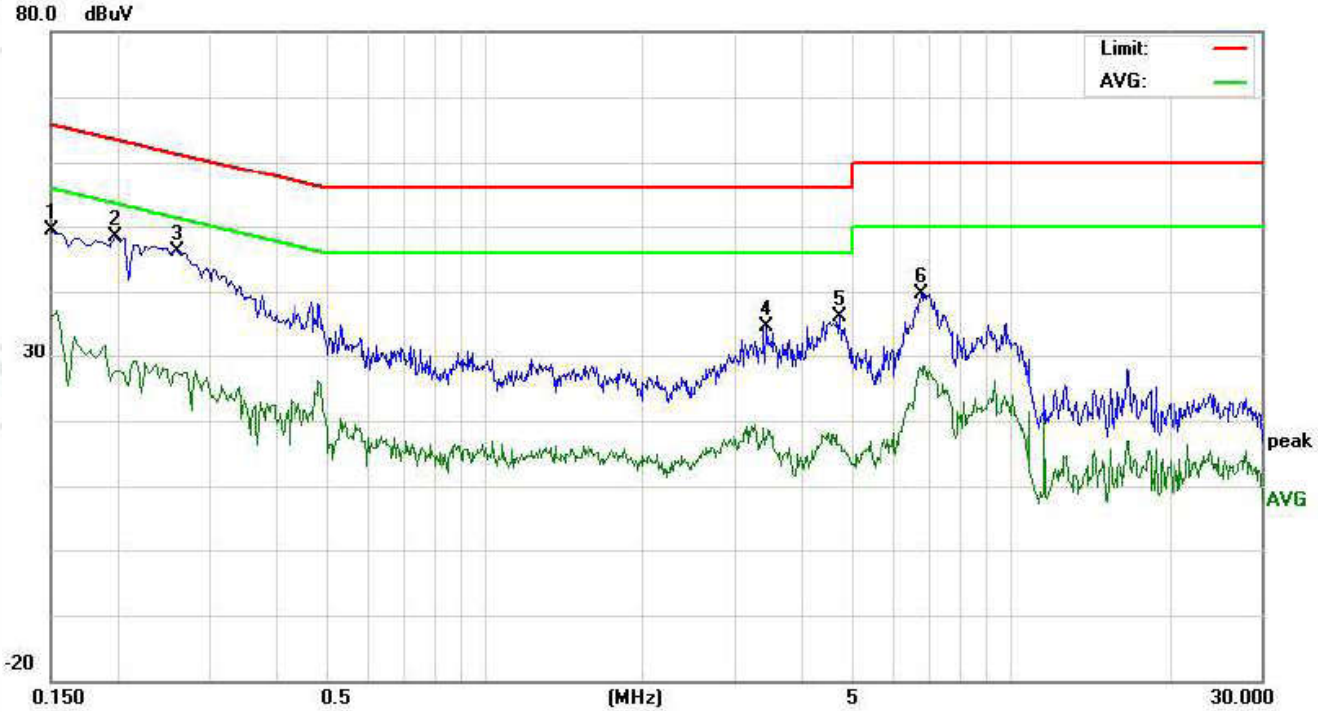
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1)The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBμV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
NOTE : The lower limit is applicable at the transition frequency</td></tr>
</table>

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

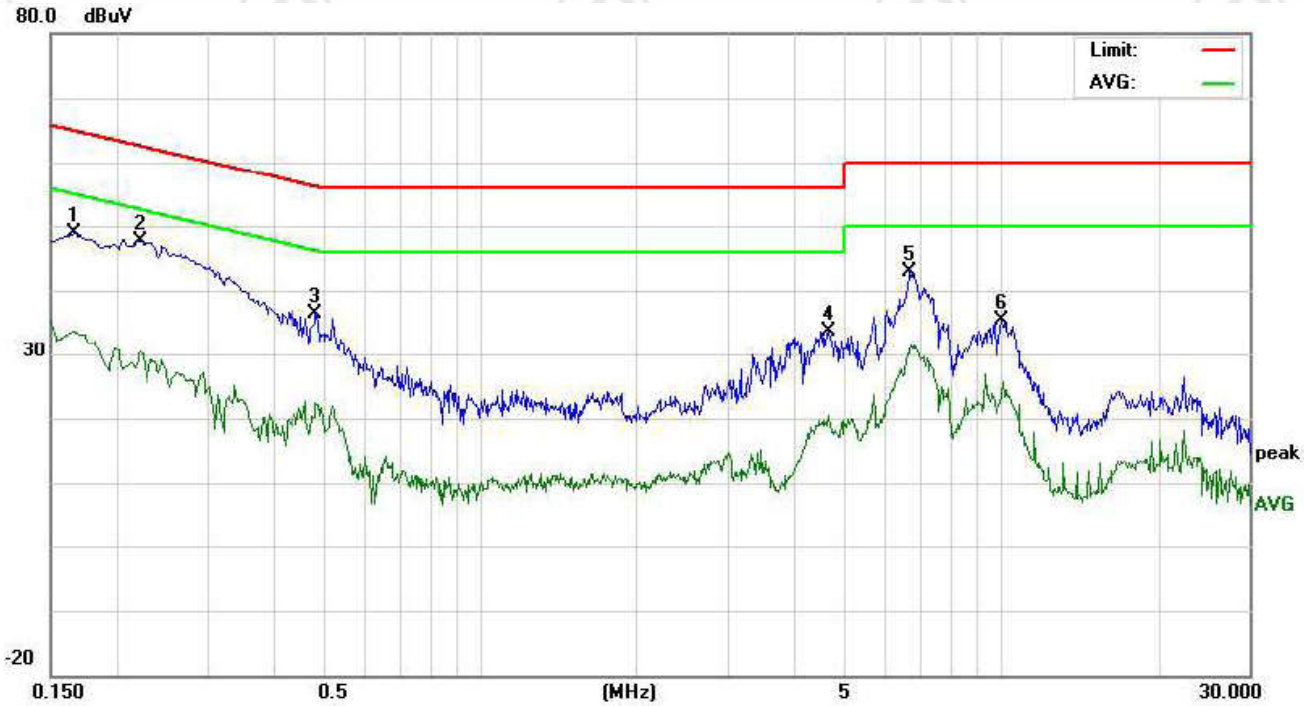
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Product	:	LTE MODULE	**Model/Type reference**	:	GLMM18A02
Temperature	:	21℃	**Humidity**	:	53%
Phase	:	L			



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1500	39.55	36.32	26.13	9.77	49.32	46.09	35.90	65.99	55.99	-19.90	-20.09	P	
2	0.1980	38.72	35.22	18.01	9.71	48.43	44.93	27.72	63.69	53.69	-18.76	-25.97	P	
3	0.2620	39.57	36.95	26.15	9.75	49.32	46.70	35.90	61.36	51.36	-14.66	-15.46	P	
4	3.4380	25.02	22.57	7.59	9.67	34.69	32.24	17.26	56.00	46.00	-23.76	-28.74	P	
5	4.7460	26.48	23.65	6.69	9.63	36.11	33.28	16.32	56.00	46.00	-22.72	-29.68	P	
6	6.7900	30.09	27.88	17.96	9.62	39.71	37.50	27.58	60.00	50.00	-22.50	-22.42	P	

Product	:	LTE MODULE	**Model/Type reference**	:	GLMM18A02
Temperature	:	21℃	**Humidity**	:	53%
Phase	:	N			



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1660	39.12	36.54	23.97	9.75	48.87	46.29	33.72	65.15	55.15	-18.86	-21.43	P	
2	0.2220	37.93	34.17	20.69	9.73	47.66	43.90	30.42	62.74	52.74	-18.84	-22.32	P	
3	0.4860	26.68	23.58	12.56	9.72	36.40	33.30	22.28	56.24	46.24	-22.94	-23.96	P	
4	4.6700	23.96	20.14	10.71	9.63	33.59	29.77	20.34	56.00	46.00	-26.23	-25.66	P	
5	6.7060	33.23	30.69	20.82	9.62	42.85	40.31	30.44	60.00	50.00	-19.69	-19.56	P	
6	9.9700	25.70	22.58	13.79	9.79	35.49	32.37	23.58	60.00	50.00	-27.63	-26.42	P	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

Appendix H): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

Above 1GHz test procedure as below:

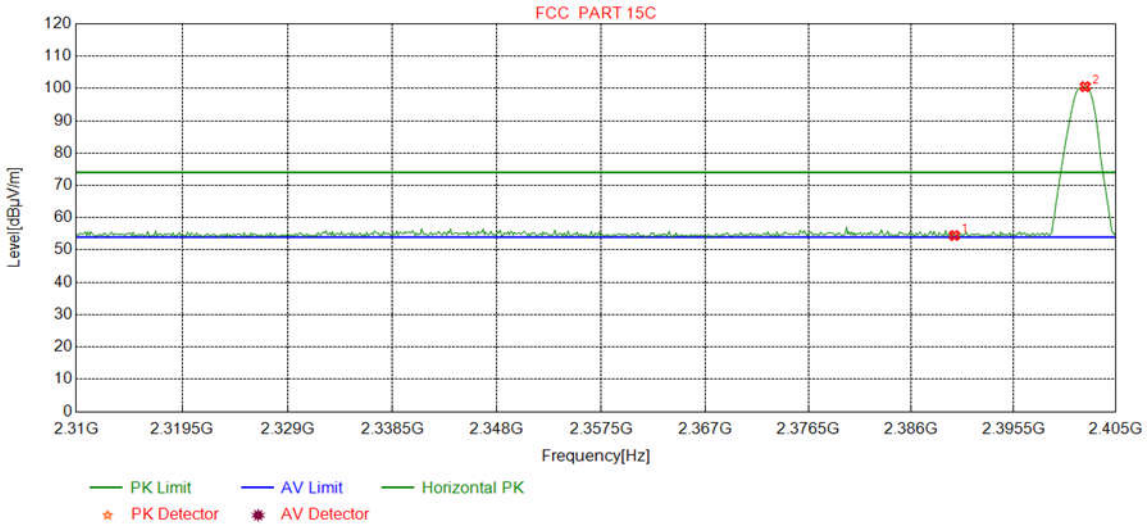
g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. . Test the EUT in the lowest channel , the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

Frequency	Limit (dBμV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

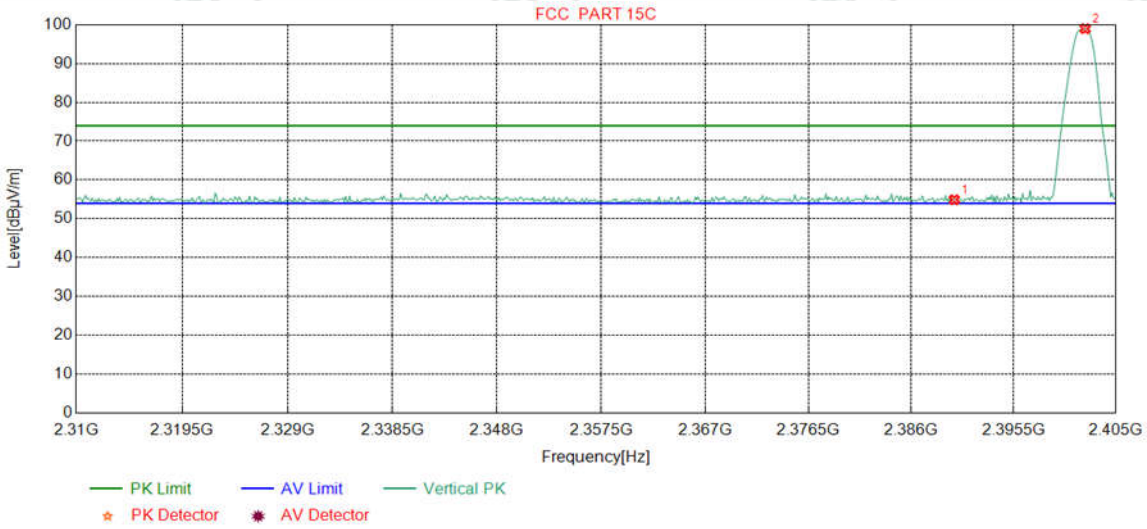
Test plot as follows:

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	Peak		



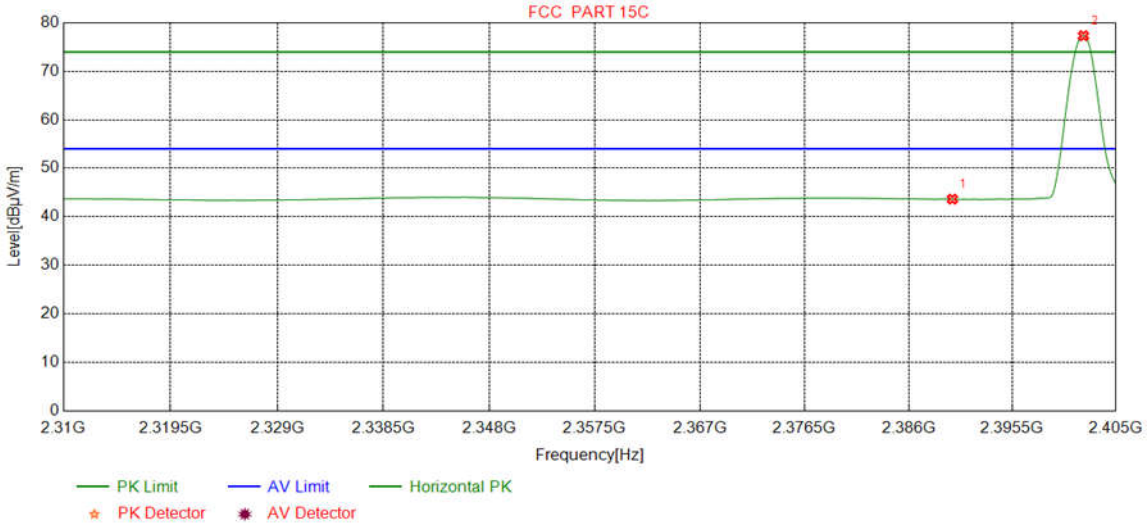
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	45.49	54.49	74.00	19.51	Pass	Horizontal
2	2402.1464	32.26	13.31	-36.60	91.59	100.56	74.00	-26.56	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	Peak		



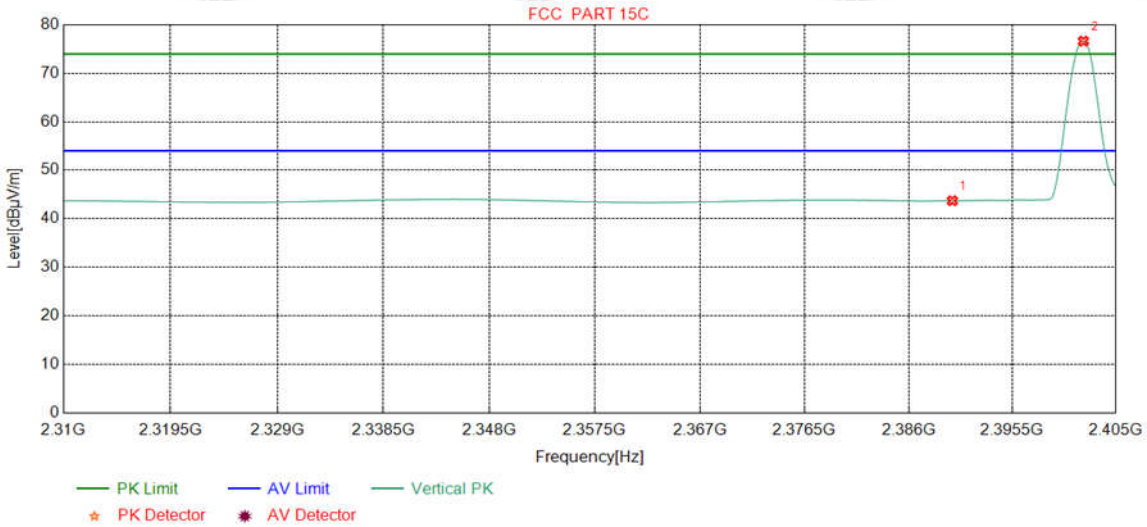
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	45.89	54.89	74.00	19.11	Pass	Vertical
2	2402.1464	32.26	13.31	-36.60	90.04	99.01	74.00	-25.01	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		



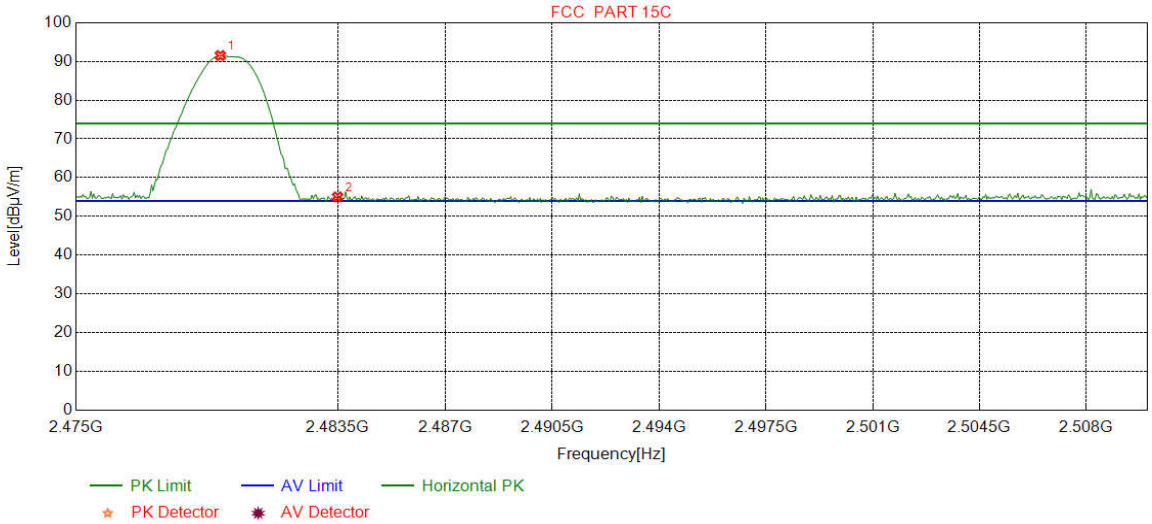
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	34.63	43.63	54.00	10.37	Pass	Horizontal
2	2402.0275	32.26	13.31	-36.60	68.37	77.34	54.00	-23.34	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	AV		



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-36.62	34.72	43.72	54.00	10.28	Pass	Vertical
2	2402.0275	32.26	13.31	-36.60	67.66	76.63	54.00	-22.63	Pass	Vertical

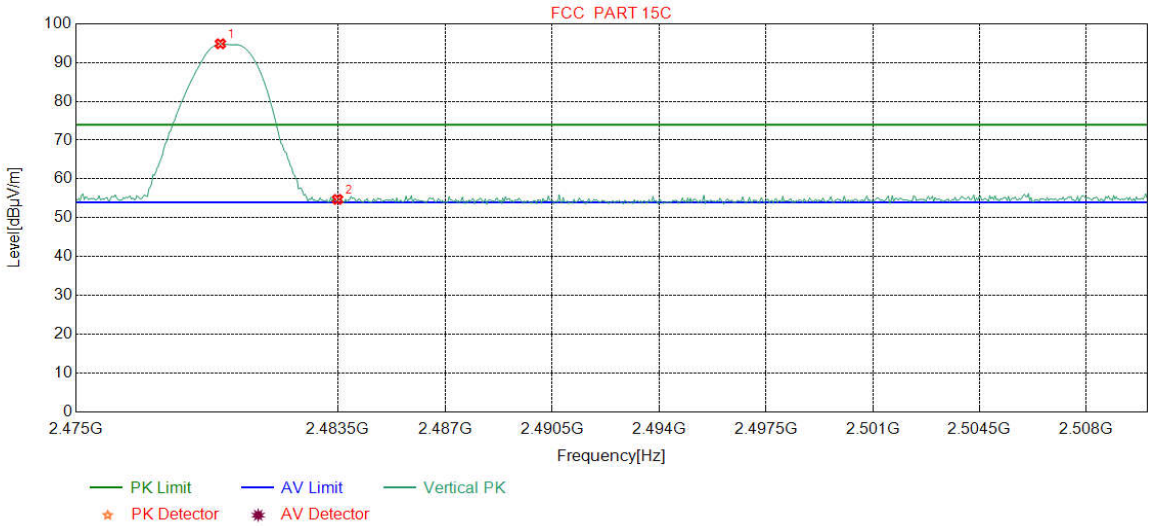
Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	Peak		



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2479.6871	32.37	13.39	-36.77	82.55	91.54	74.00	-17.54	Pass	Horizontal
2	2483.5000	32.38	13.38	-36.80	46.06	55.02	74.00	18.98	Pass	Horizontal

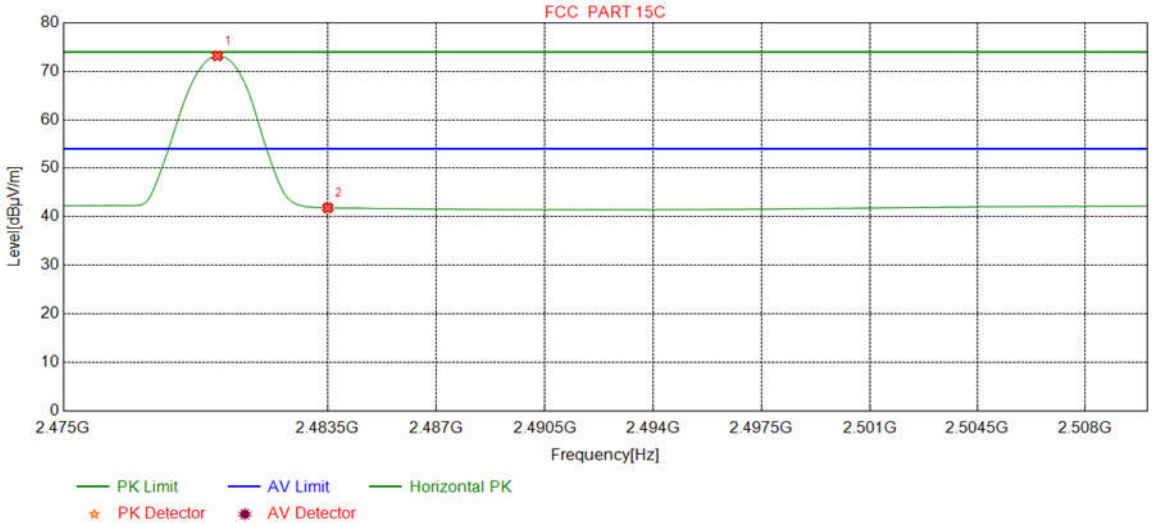
Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	Peak		

Test Graph



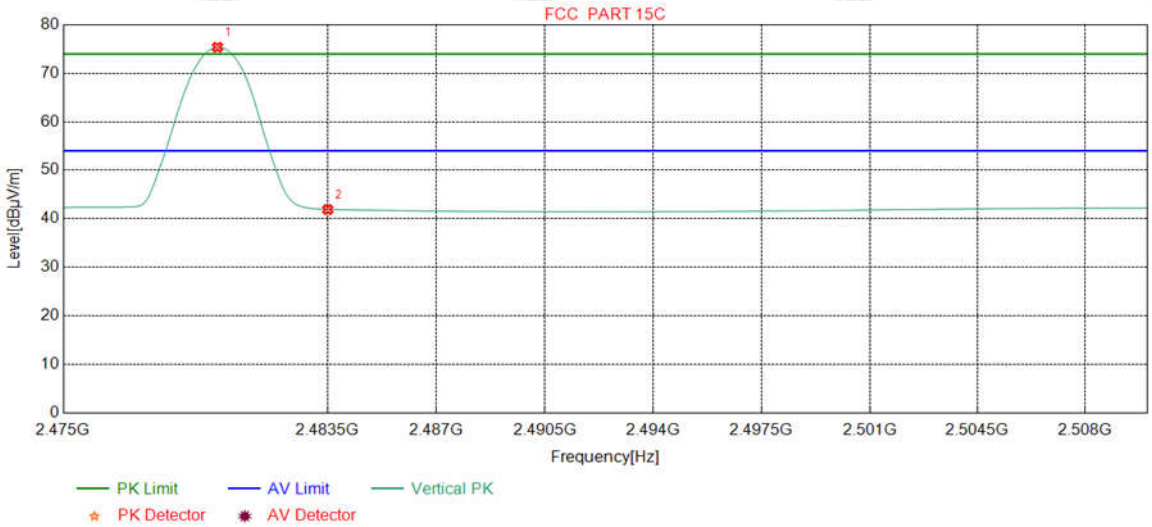
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2479.6871	32.37	13.39	-36.77	85.87	94.86	74.00	-20.86	Pass	Vertical
2	2483.5000	32.38	13.38	-36.80	45.77	54.73	74.00	19.27	Pass	Vertical

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	AV		



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2479.9499	32.37	13.39	-36.77	64.20	73.19	54.00	-19.19	Pass	Horizontal
2	2483.5000	32.38	13.38	-36.80	32.87	41.83	54.00	12.17	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2480
Remark:	AV		



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity
1	2479.9499	32.37	13.39	-36.77	66.39	75.38	54.00	-21.38	Pass	Vertical
2	2483.5000	32.38	13.38	-36.80	32.93	41.89	54.00	12.11	Pass	Vertical

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading -Correct Factor
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

Appendix I): Radiated Spurious Emissions

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

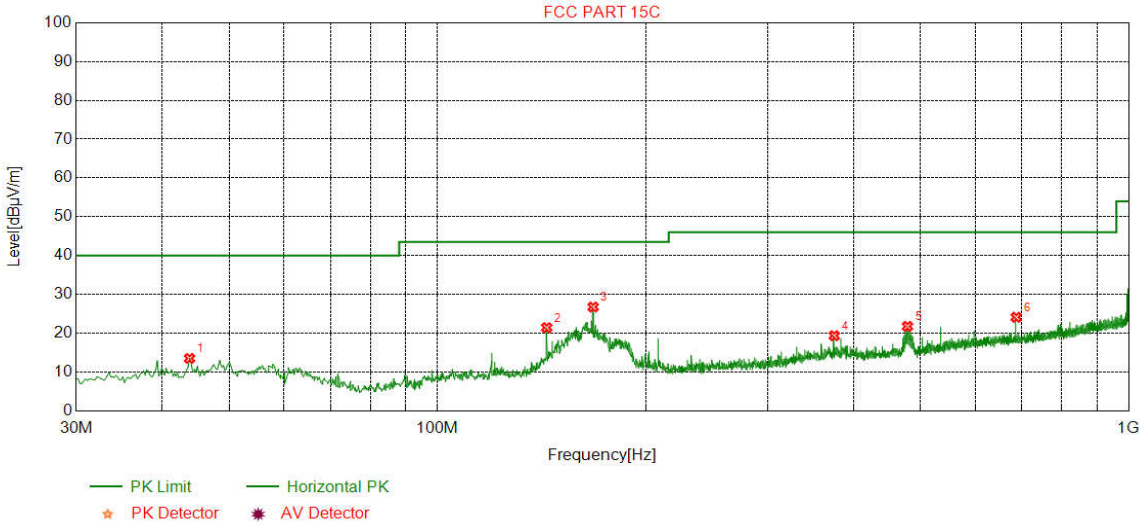
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Radiated Spurious Emissions test Data:

Product	:	LTE MODULE	**Model/Type reference**	:	GLMM18A02
Temperature	:	20℃	**Humidity**	:	61%

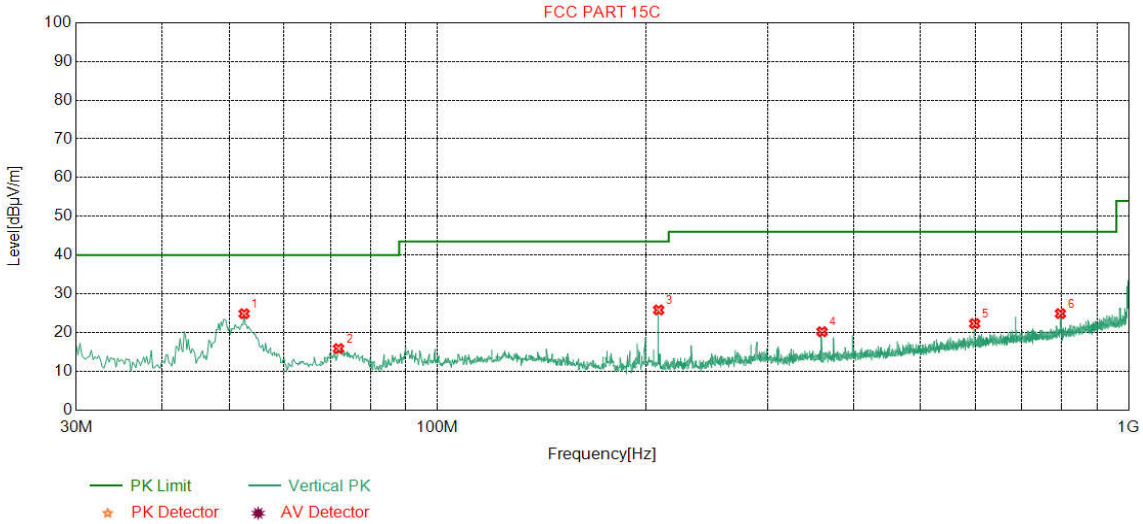
Radiated Emission below 1GHz

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	QP		



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity
1	43.7768	12.98	0.74	-32.11	31.86	13.47	40.00	26.53	Pass	Horizontal
2	143.9008	7.34	1.41	-32.00	44.65	21.40	43.50	22.10	Pass	Horizontal
3	167.9616	8.34	1.52	-31.97	48.83	26.72	43.50	16.78	Pass	Horizontal
4	375.0010	14.85	2.31	-31.88	34.04	19.32	46.00	26.68	Pass	Horizontal
5	478.6177	16.66	2.61	-31.90	34.35	21.72	46.00	24.28	Pass	Horizontal
6	687.5975	19.70	3.14	-32.06	33.30	24.08	46.00	21.92	Pass	Horizontal

Mode:	BLE GFSK Transmitting	Channel:	2402
Remark:	QP		



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity
1	52.5085	12.80	0.82	-32.10	43.32	24.84	40.00	15.16	Pass	Vertical
2	71.9124	8.64	0.97	-32.05	38.28	15.84	40.00	24.16	Pass	Vertical
3	208.9038	11.13	1.71	-31.94	44.91	25.81	43.50	17.69	Pass	Vertical
4	360.0600	14.52	2.27	-31.84	35.23	20.18	46.00	25.82	Pass	Vertical
5	598.7277	18.97	2.95	-31.98	32.34	22.28	46.00	23.72	Pass	Vertical
6	796.6473	20.86	3.38	-32.01	32.64	24.87	46.00	21.13	Pass	Vertical

Transmitter Emission above 1GHz

Mode:		BLE GFSK Transmitting			Channel:				2402		
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity	Remark
1	1791.3583	30.32	3.30	-36.80	50.82	47.64	74.00	26.36	Pass	H	Peak
2	3312.0312	33.32	4.57	-36.77	46.09	47.21	74.00	26.79	Pass	H	Peak
3	4804.0000	34.50	4.55	-36.15	41.23	44.13	74.00	29.87	Pass	H	Peak
4	6570.8071	35.93	5.42	-36.18	44.06	49.23	74.00	24.77	Pass	H	Peak
5	7206.0000	36.31	5.81	-36.43	41.80	47.49	74.00	26.51	Pass	H	Peak
6	9608.0000	37.64	6.63	-36.79	43.31	50.79	74.00	23.21	Pass	H	Peak
7	1592.9186	29.01	3.06	-36.99	52.27	47.35	74.00	26.65	Pass	V	Peak
8	3020.4770	33.21	4.89	-36.78	45.89	47.21	74.00	26.79	Pass	V	Peak
9	4804.0000	34.50	4.55	-36.15	41.44	44.34	74.00	29.66	Pass	V	Peak
10	6281.2031	35.86	5.42	-36.26	44.51	49.53	74.00	24.47	Pass	V	Peak
11	7206.0000	36.31	5.81	-36.43	42.40	48.09	74.00	25.91	Pass	V	Peak
12	9608.0000	37.64	6.63	-36.79	43.23	50.71	74.00	23.29	Pass	V	Peak

Mode:		BLE GFSK Transmitting			Channel:				2440		
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity	Remark
1	1793.3587	30.34	3.31	-36.81	51.01	47.85	74.00	26.15	Pass	H	Peak
2	3571.4071	33.46	4.40	-36.51	44.47	45.82	74.00	28.18	Pass	H	Peak
3	4880.0000	34.50	4.80	-36.09	40.65	43.86	74.00	30.14	Pass	H	Peak
4	6323.1323	35.86	5.46	-36.18	44.49	49.63	74.00	24.37	Pass	H	Peak
5	7320.0000	36.42	5.85	-36.38	41.18	47.07	74.00	26.93	Pass	H	Peak
6	9760.0000	37.70	6.73	-36.81	42.93	50.55	74.00	23.45	Pass	H	Peak
7	1594.5189	29.02	3.07	-36.99	52.54	47.64	74.00	26.36	Pass	V	Peak
8	3019.5020	33.21	4.89	-36.78	46.16	47.48	74.00	26.52	Pass	V	Peak
9	4880.0000	34.50	4.80	-36.09	40.23	43.44	74.00	30.56	Pass	V	Peak
10	5541.1041	35.07	5.16	-36.06	43.22	47.39	74.00	26.61	Pass	V	Peak
11	7320.0000	36.42	5.85	-36.38	41.64	47.53	74.00	26.47	Pass	V	Peak
12	9760.0000	37.70	6.73	-36.81	42.77	50.39	74.00	23.61	Pass	V	Peak

Mode:		BLE GFSK Transmitting			Channel:				2480		
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Magin [dB]	Result	Polarity	Remark
1	1795.3591	30.35	3.31	-36.81	52.12	48.97	74.00	25.03	Pass	H	Peak
2	2988.7978	33.18	4.52	-36.73	47.89	48.86	74.00	25.14	Pass	H	Peak
3	4960.0000	34.50	4.82	-36.20	43.09	46.21	74.00	27.79	Pass	H	Peak
4	6556.1806	35.92	5.37	-36.14	44.33	49.48	74.00	24.52	Pass	H	Peak
5	7440.0000	36.54	5.85	-36.34	41.91	47.96	74.00	26.04	Pass	H	Peak
6	9920.0000	37.77	6.79	-36.82	43.13	50.87	74.00	23.13	Pass	H	Peak
7	1395.2791	28.30	2.89	-37.21	50.01	43.99	74.00	30.01	Pass	V	Peak
8	2117.0234	31.86	3.60	-36.53	48.01	46.94	74.00	27.06	Pass	V	Peak
9	3193.0693	33.28	4.64	-36.73	45.58	46.77	74.00	27.23	Pass	V	Peak
10	4960.0000	34.50	4.82	-36.20	41.29	44.41	74.00	29.59	Pass	V	Peak
11	7440.0000	36.54	5.85	-36.34	42.69	48.74	74.00	25.26	Pass	V	Peak
12	9920.0000	37.77	6.79	-36.82	43.13	50.87	74.00	23.13	Pass	V	Peak

Note:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading -Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

PHOTOGRAPHS OF TEST SETUP

Test model No.: GLMM18A02

Radiated spurious emission Test Setup-1(Below 30MHz)

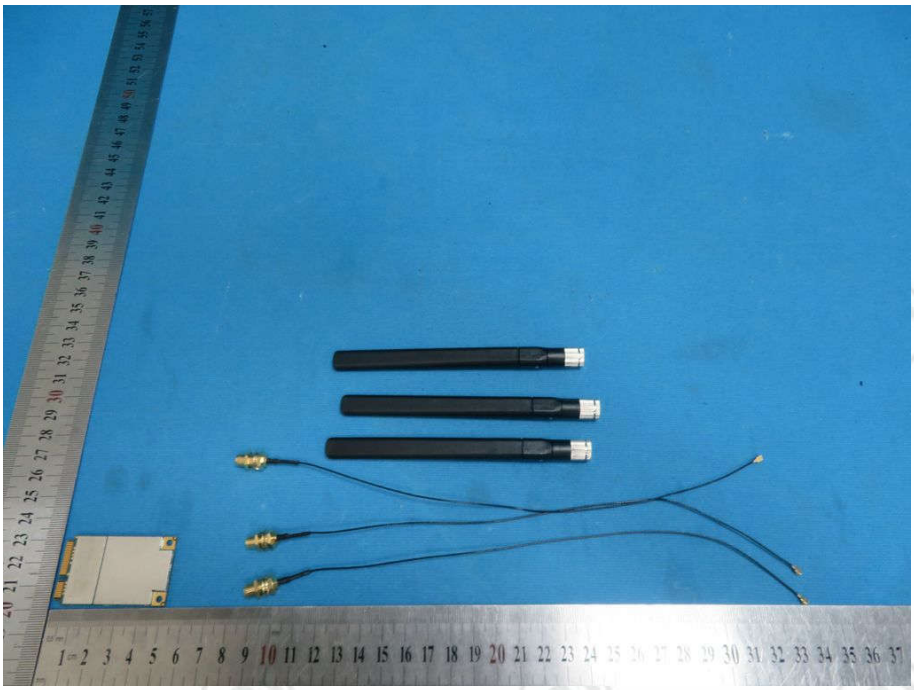
Radiated spurious emission Test Setup-2(Below 1GHz)

Radiated spurious emission Test Setup-3(Above 1GHz)

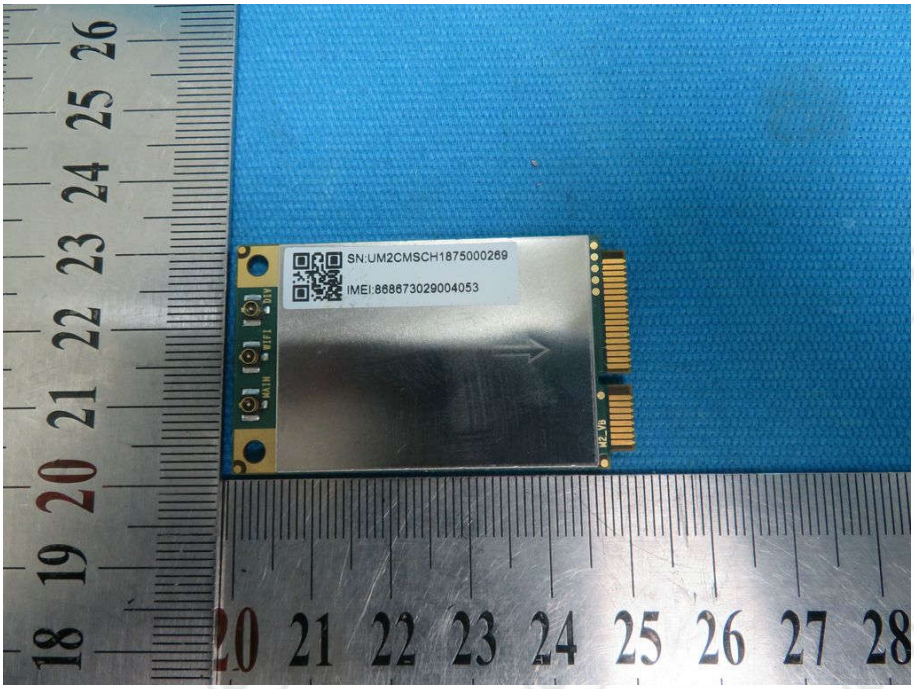
Conducted Emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

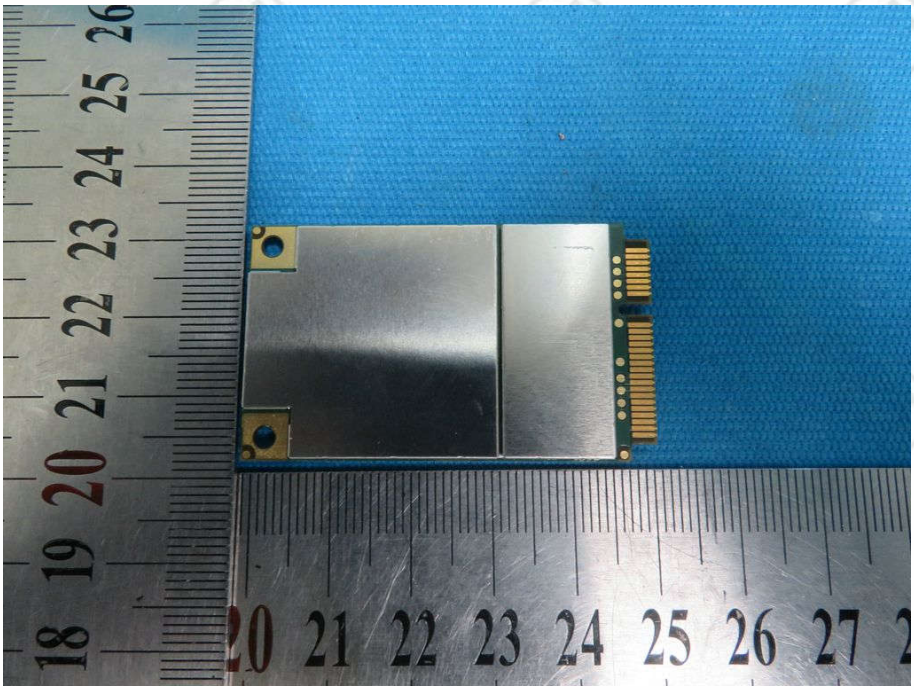
Test model No.: GLMM18A02



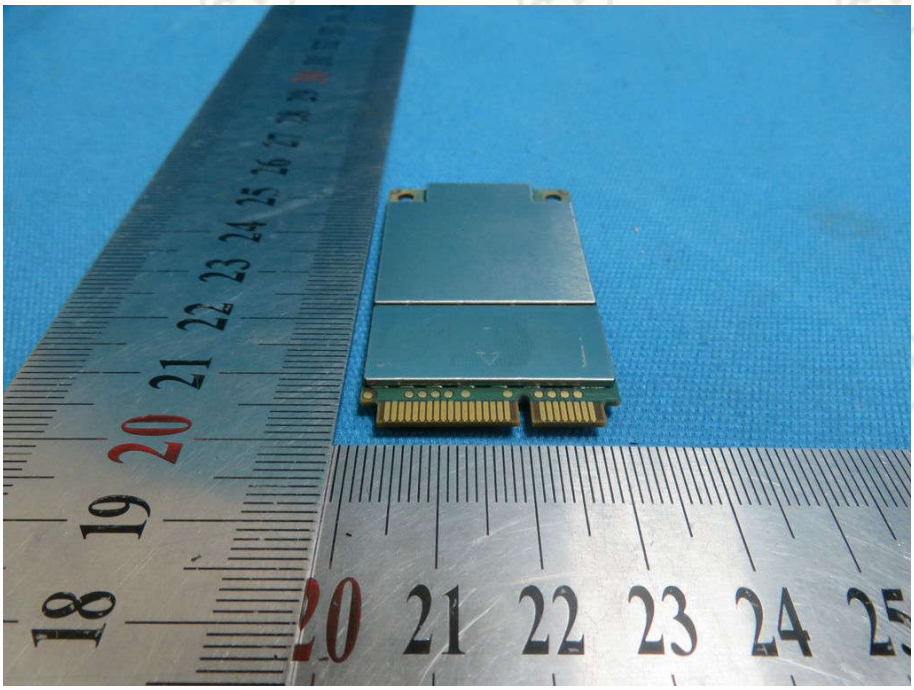
View of Product-1



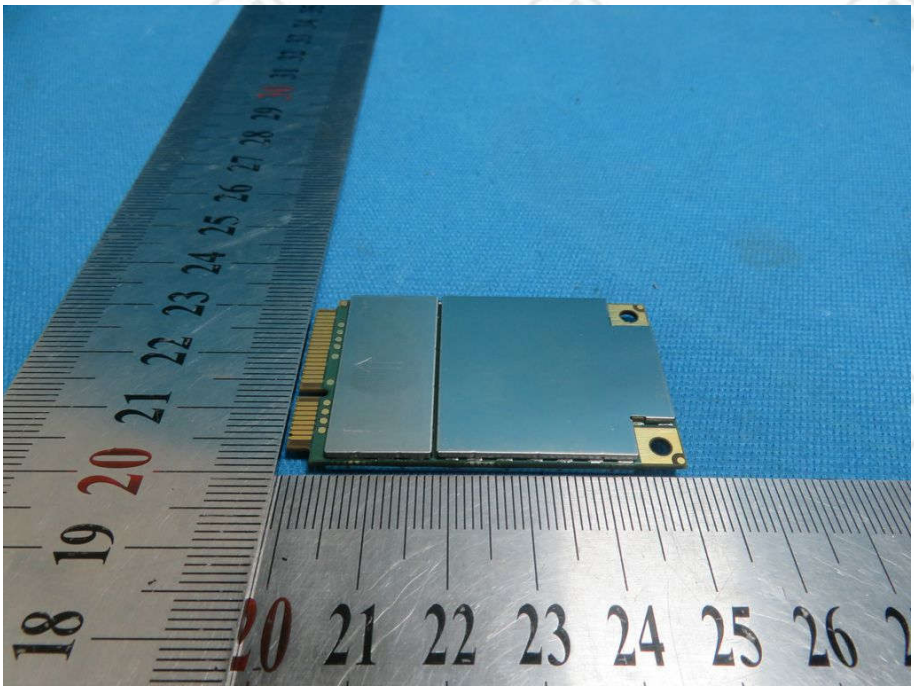
View of Product-2



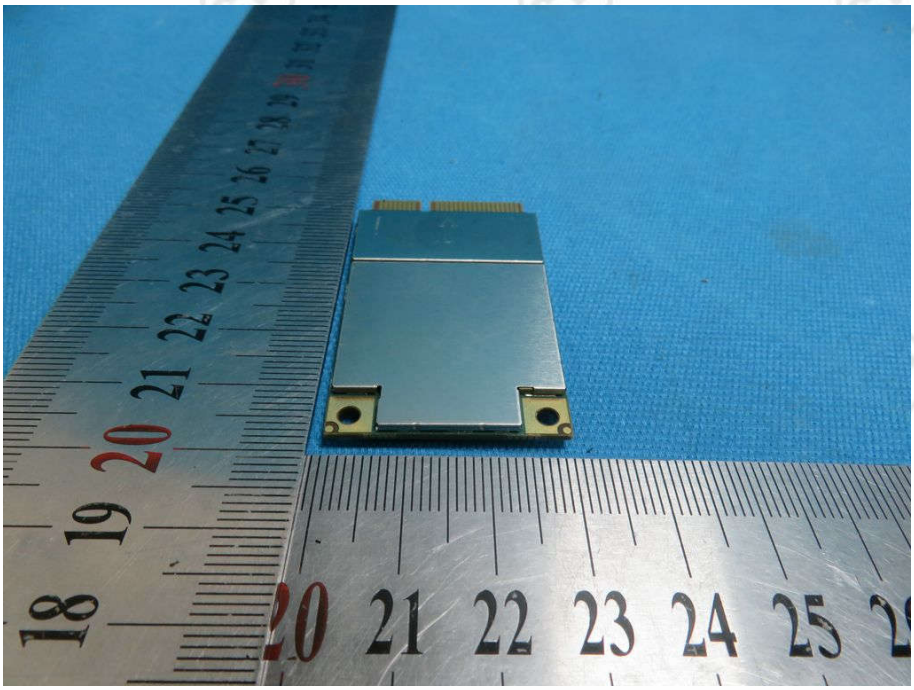
View of Product-3



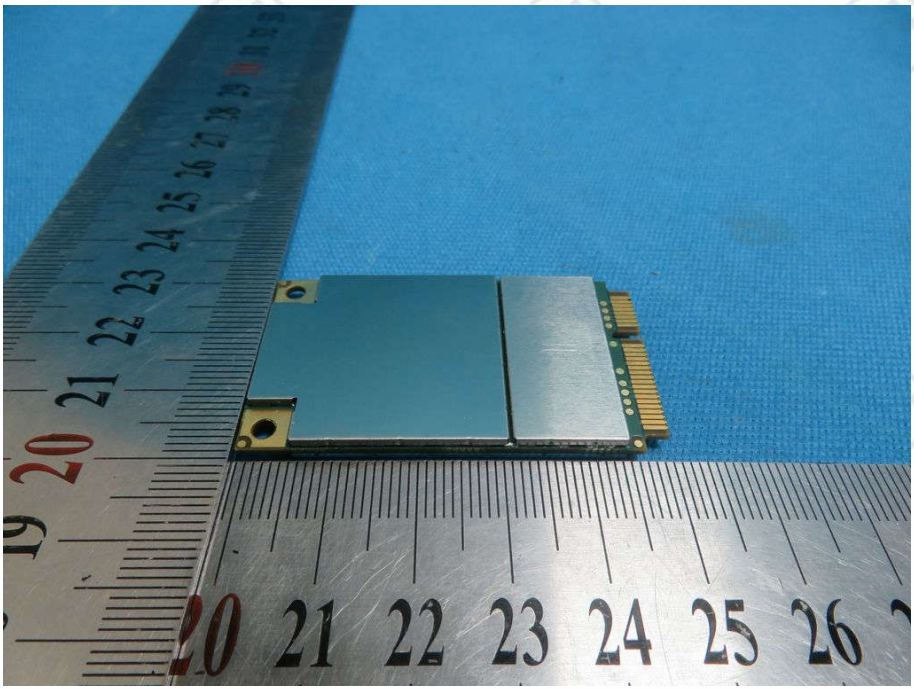
View of Product-4



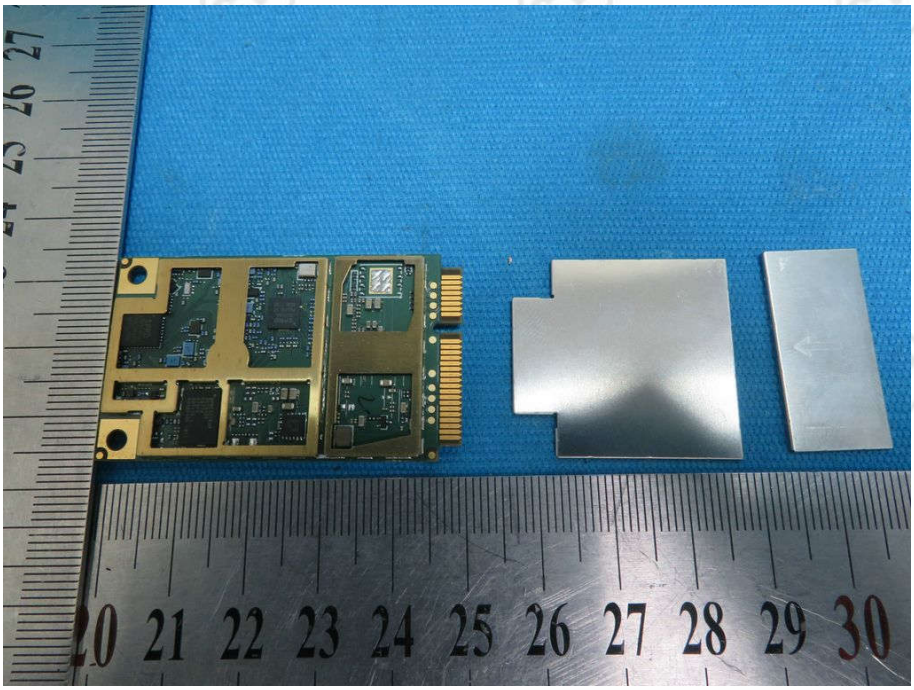
View of Product-5



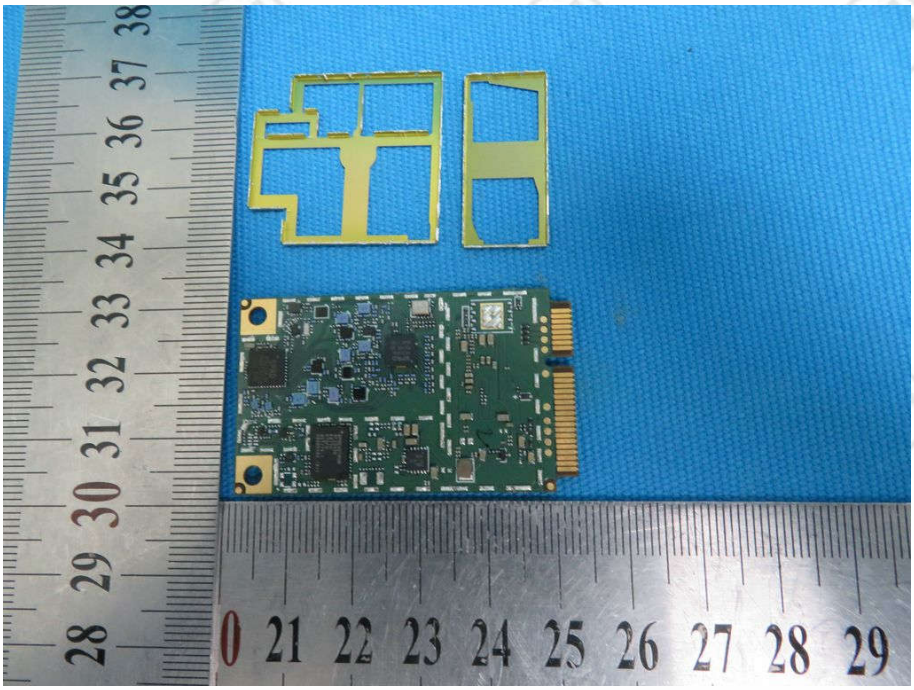
View of Product-6



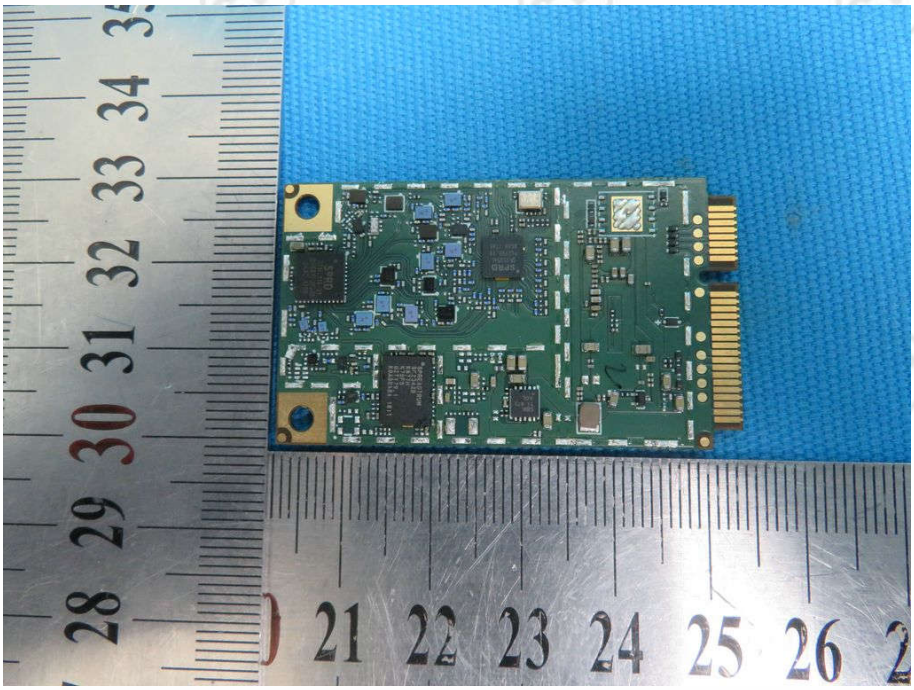
View of Product-7



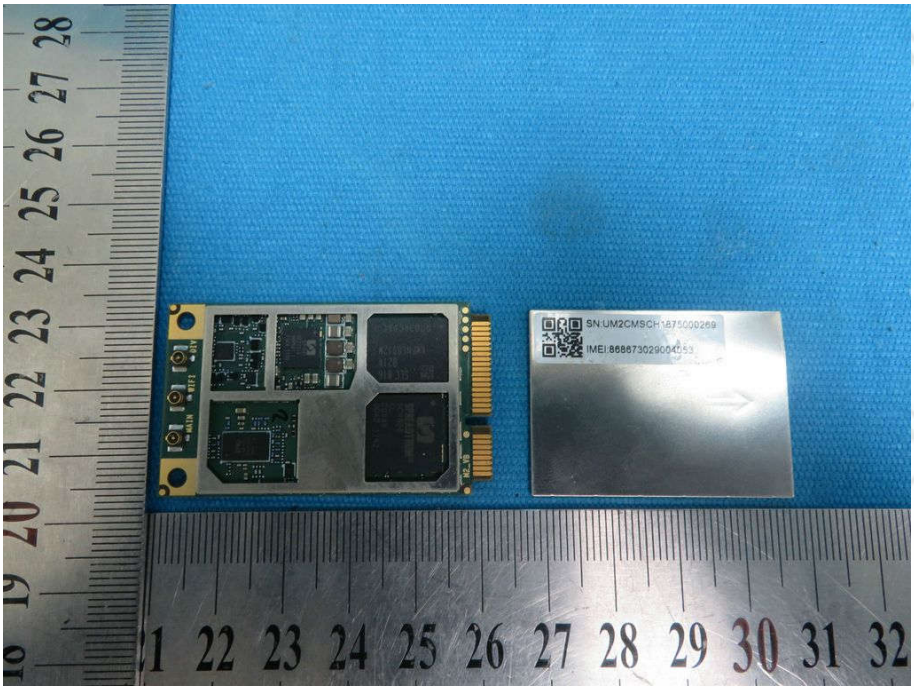
View of Product-8



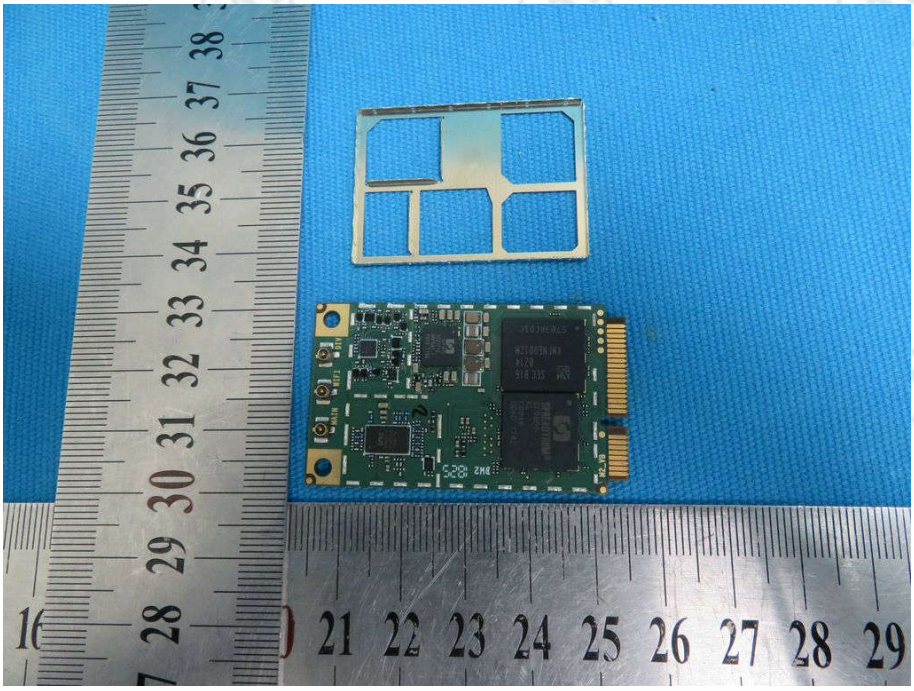
View of Product-9



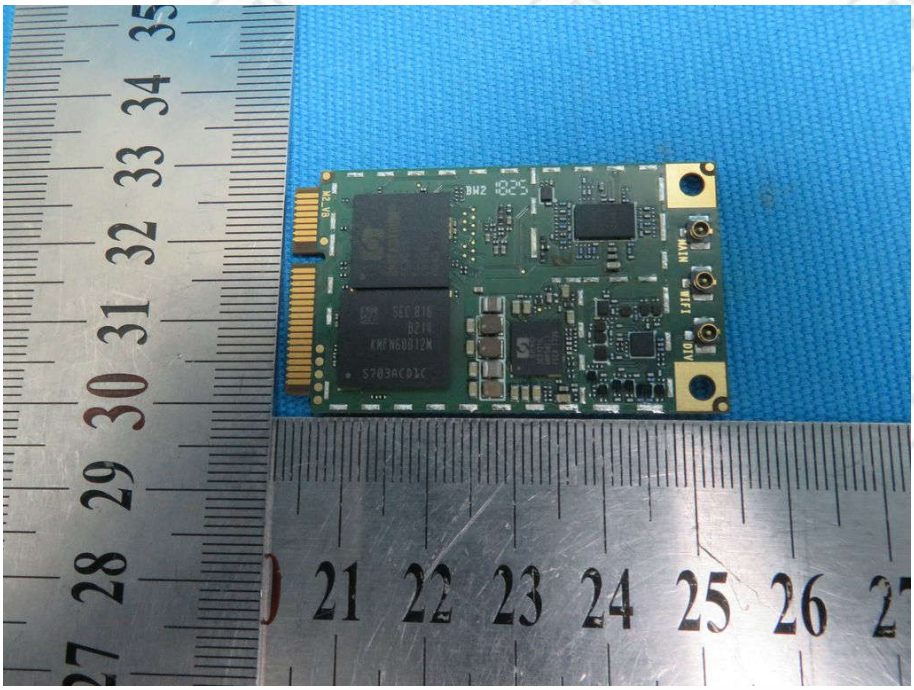
View of Product-10



View of Product-11



View of Product-12



View of Product-13

*** End of Report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.