



# FCC RADIO TEST REPORT

**FCC ID** : QYLEM9190F  
**Equipment** : WWAN Module  
**Brand Name** : Getac  
**Model Name** : EM9190  
**Applicant** : Getac Technology Corporation.  
5F., Building A, No. 209, Sec.1, Nangang  
Rd.,Nangang Dist., Taipei City 11568, Taiwan, R.O.C.  
**Standard** : FCC 47 CFR Part 2, 90(R)

The product was received on Aug. 26, 2021 and testing was started from Sep. 17, 2021 and completed on Oct. 13, 2021. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Louis Wu

**Sporton International Inc. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issued Date
FG182625D	01	Initial issue of report	Oct. 25, 2021
FG182625D	02	Revise remark description in section 2.1	Oct. 26, 2021



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
	§90.542 (a)(7)	Effective Radiated Power	Pass	-
-	-	Peak-to-Average Ratio	-	See Note
-	§2.1049	Occupied Bandwidth	-	See Note
-	§2.1053 §90.543 (e)(2)	Conducted Band Edge Measurement	-	See Note
-	§2.1051 §90.210 (n)	Emission Mask	-	See Note
-	§2.1053 §90.543 (e)(3)	Conducted Spurious Emission	-	See Note
-	§2.1055 §90.539 (e)	Frequency Stability Temperature & Voltage	-	See Note
-	§90.542 (a)(7)	Effective Radiated Power	-	See Note
4.2	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	Pass	-

**Note:** The module (Model: EM9190) makes no difference after verifying output power, this report reuses test data from the module report.

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Yun Huang**

**Report Producer: Cindy Liu**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

WCDMA/LTE/5G NR, and GNSS.

Product Specification subjective to this standard	
Sample 1	EUT with Host 1
Sample 2	EUT with Host 2
Antenna Type	WWAN <Main>: PIFA Antenna <Aux.>: PIFA Antenna GPS / Glonass / BDS / Galileo : PATCH Antenna
Antenna Gain	<Main>: -0.34 dBi <Aux.>: -1.36 dBi

**Remark:** The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

The product was installed into Tablet PC (Brand Name: Getac, Model Name: F110, F110G6, F110-Ex, F110-631) during test, and the host information was recorded in the following table.

Host Information	
Host 1	Host with SKU A
Host 2	Host with SKU B

SKU	SKU A	SKU B
CPU	i5-1135G7 (Non Vpro)	i7-1165G7 (Vpro)
DDR	Kingston DDR4-3200 32GB	Kingston DDR4-3200 32GB
SSD	512GB	1TB
PANEL	Full HD AUO	Full HD AUO
DIGITIZER	N/A	EMRight Digitizer
OPTION BAY	2D Barcode Reader	RS232 + LAN
Expansion Bay	Smart Card	Smart Card
Right side option	NXP RFID(PN7462)	Finger Print
WLAN/BT	Intel AX201	Intel AX201
WWAN(4G)	EM9190	EM9190
GPS/GNS	EM9190	EM9190
Rear 8M Camera	Support	Support
Webcam FHD	Not Support	Not Support
IR Webcam	Support	Support
USB3.2 Gen2 x 1 Type-A	Support	Support
Type-C (thunder bolt)	Support	Support
Audio/MIC	Support	Support

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.



### 1.3 Testing Site

<b>Test Site</b>	Sporton International Inc. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	TH03-HY
<b>Test Engineer</b>	HaoEn Zhang
<b>Temperature</b>	22.3~24.5°C
<b>Relative Humidity</b>	52.3~54.1%

<b>Test Site</b>	Sporton International Inc. Wensan Laboratory
<b>Test Site Location</b>	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	03CH15-HY (TAF Code: 3786)
<b>Test Engineer</b>	Leo Li, Mancy Chou and Bigshow Wang
<b>Temperature</b>	22.6~23.2°C
<b>Relative Humidity</b>	46~53%
<b>Remark</b>	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786



## 1.4 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ ANSI C63.26-2015
- ♦ FCC 47 CFR Part 2, Part 90(R)
- ♦ ANSI / TIA-603-E
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

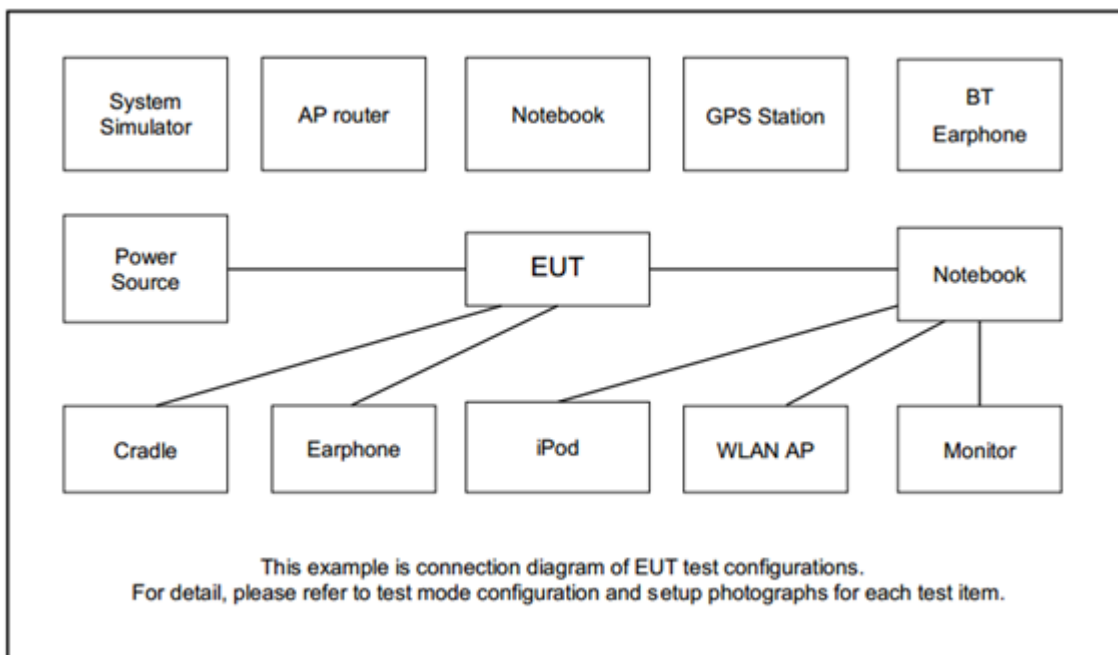
### 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and find Z Plane as worst plane.

Conducted Test Cases	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel			
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H	
Max. Output Power	14	-	-	v	v	-	-	v	v	v	v	v	v	v	v	v	
E.R.P	14	-	-	v	v	-	-	v	v	v	Max. Power						
Radiated Spurious Emission	14	-	-	v				v				v			v	v	v
Remark	<ol style="list-style-type: none"> <li>The mark "v" means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</li> <li>All the radiated test cases were performed with Adapter 1 and Sample 2.</li> </ol>																

### 2.2 Connection Diagram of Test System







## 2.3 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

## 2.4 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23330	-
	Frequency	-	793	-
5	Channel	23305	23330	23355
	Frequency	790.5	793	795.5

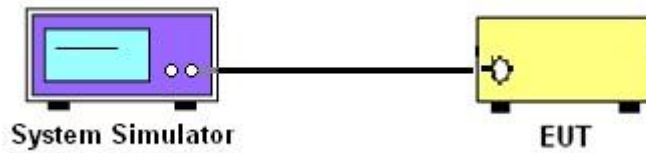
### 3 Conducted Test Items

#### 3.1 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.1 Test Setup

##### 3.1.2 Conducted Output Power



##### 3.1.3 Test Result of Conducted Test

Please refer to Appendix A.



## 3.2 Conducted Output Power Measurement and ERP

### 3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 14.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$ ,  $ERP = EIRP - 2.15$ , where

$P_T$  = transmitter output power in dBm

$G_T$  = gain of the transmitting antenna in dBi

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna in dB

### 3.2.2 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

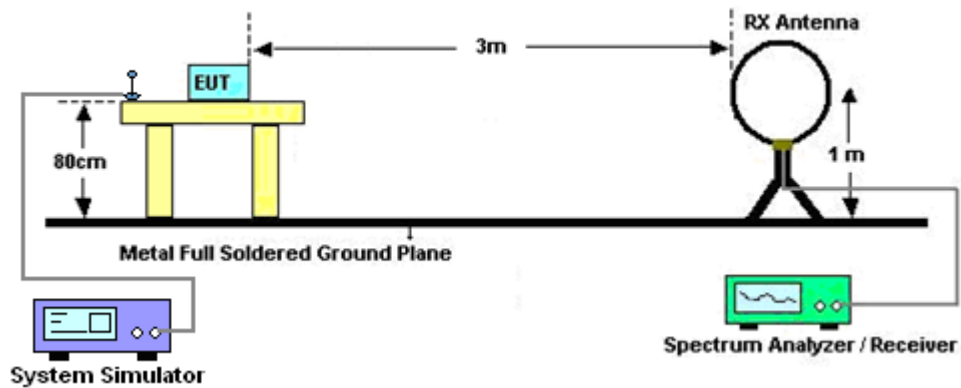
## 4 Radiated Test Items

### 4.1 Measuring Instruments

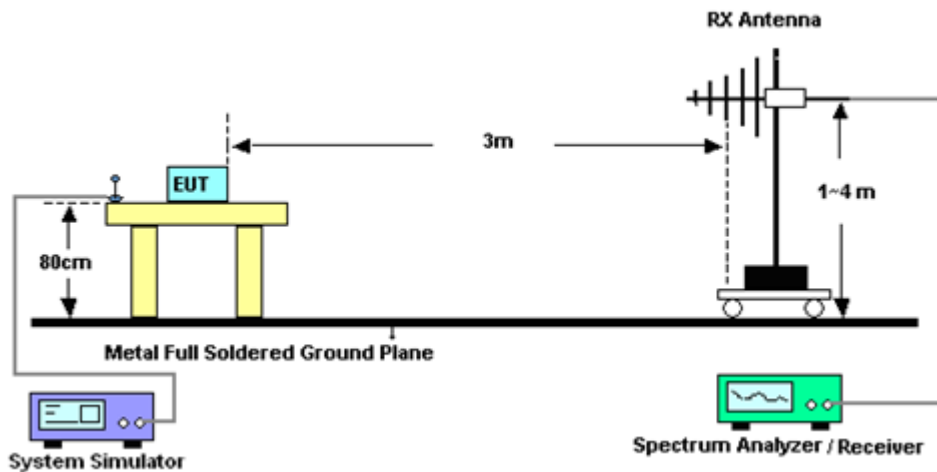
See list of measuring instruments of this test report.

#### 4.1.1 Test Setup

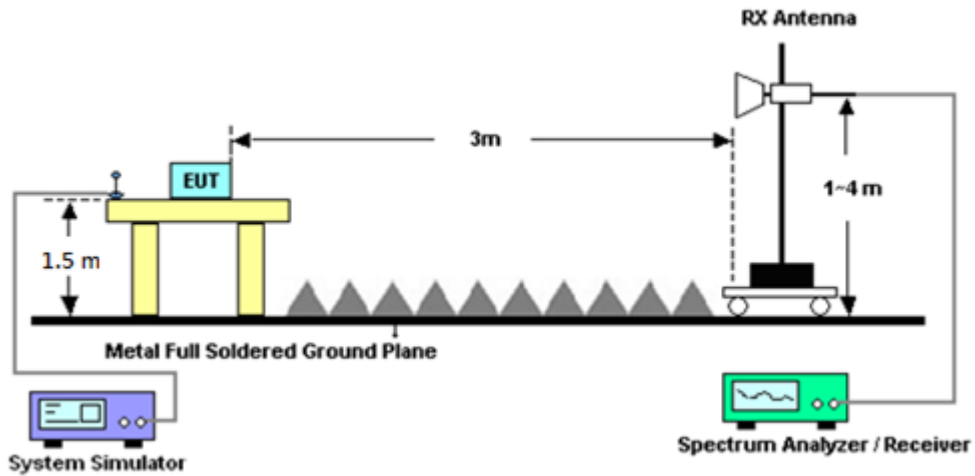
For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



#### 4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

**Note:**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



## 4.2 Radiated Spurious Emission

### 4.2.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)



## 5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 04, 2021	Sep. 17, 2021~ Sep. 20, 2021	Jan. 03, 2022	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	37059 & 01	30MHz~1GHz	Oct. 11, 2020	Sep. 17, 2021~ Sep. 20, 2021	Oct. 10, 2021	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&0 0800N1D01N -06	41912&05	30MHz to 1GHz	Feb. 08, 2021	Sep. 17, 2021~ Sep. 20, 2021	Feb. 07, 2022	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2020	Sep. 17, 2021~ Sep. 20, 2021	Dec. 27, 2021	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-01620	1-18GHz	Nov. 03, 2020	Sep. 17, 2021~ Sep. 20, 2021	Nov. 02, 2021	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1326	1GHz~18GHz	Nov. 03, 2020	Sep. 17, 2021~ Sep. 20, 2021	Nov. 02, 2021	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55- 303	17100018000 55006	1GHz~18GHz	May 06, 2021	Sep. 17, 2021~ Sep. 20, 2021	May 05, 2022	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 19, 2021	Sep. 17, 2021~ Sep. 20, 2021	Aug. 18, 2022	Radiation (03CH15-HY)
Spectrum Analyzer	Keysight	N9038A	MY54130085	20MHz~8.4GHz	Nov. 02, 2020	Sep. 17, 2021~ Sep. 20, 2021	Nov. 01, 2021	Radiation (03CH15-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Mar. 05, 2021	Sep. 17, 2021~ Sep. 20, 2021	Mar. 04, 2022	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Sep. 17, 2021~ Sep. 20, 2021	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Sep. 17, 2021~ Sep. 20, 2021	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24( k5)	RK-000451	N/A	N/A	Sep. 17, 2021~ Sep. 20, 2021	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104, 102E	MY36980/4, MY9838/4PE, 508405/2E	30MHz~18G	Nov. 16, 2020	Sep. 17, 2021~ Sep. 20, 2021	Nov. 15, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 22, 2021	Sep. 17, 2021~ Sep. 20, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 22, 2021	Sep. 17, 2021~ Sep. 20, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 11, 2021	Sep. 17, 2021~ Sep. 20, 2021	Mar. 10, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1 530-8000-40 SS	SN12	1.53GHz Low Pass Filter	Sep. 14, 2021	Sep. 17, 2021~ Sep. 20, 2021	Sep. 13, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-935 -1000-15000- 40ST	SN1	1GHz High Pass Filter	Apr. 29, 2021	Sep. 17, 2021~ Sep. 20, 2021	Apr. 28, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-270 0-3000-1800 0-60ST	SN4	3GHz High Pass Filter	Sep. 15, 2021	Sep. 17, 2021~ Sep. 20, 2021	Sep. 14, 2022	Radiation (03CH15-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Jan. 31, 2021	Sep. 17, 2021~ Sep. 20, 2021	Jan. 30, 2022	Radiation (03CH15-HY)
Radio Communication Analyzer	Anritsu	MT8821C	6272278356	N/A	Aug. 05, 2021	Oct. 08, 2021~ Oct. 13, 2021	Aug. 04, 2022	Conducted (TH03-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#B	1-18GHz	Jan. 09, 2021	Oct. 08, 2021~ Oct. 13, 2021	Jan. 08, 2022	Conducted (TH03-HY)



## 6 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.98 dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.31 dB
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## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power & ERP)

LTE Band 14 Maximum Average Power [dBm] (GT - LC = -0.34 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)
10	1	0	QPSK		22.38		19.89	0.0975
10	1	25			22.30			
10	1	49			22.24			
10	25	0			21.33			
10	25	12			21.30			
10	25	25			21.26			
10	50	0			21.29			
10	1	0	16-QAM	-	21.67	-	19.18	0.0828
10	1	25			21.61			
10	1	49			21.53			
10	25	0			20.27			
10	25	12			20.34			
10	25	25			20.34			
10	50	0			20.29			
10	1	0	64-QAM		20.53		18.06	0.0640
10	1	25			20.55			
10	1	49			20.45			
10	25	0			19.35			
10	25	12			19.34			
10	25	25			19.30			
10	50	0			19.33			
Limit	ERP < 3W			Result			Pass	



LTE Band 14 Maximum Average Power [dBm] (GT - LC = -0.34 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)
5	1	0	QPSK	22.32	22.24	22.19	19.83	0.0962
5	1	12		22.19	22.07	22.08		
5	1	24		22.12	22.01	22.03		
5	12	0		21.26	21.11	21.05		
5	12	7		21.18	21.08	21.01		
5	12	13		21.16	21.09	21.03		
5	25	0		21.18	21.14	21.03		
5	1	0	16-QAM	21.55	21.52	21.45	19.06	0.0805
5	1	12		21.45	21.41	21.32		
5	1	24		21.43	21.33	21.25		
5	12	0		20.20	20.07	20.08		
5	12	7		20.25	20.19	20.07		
5	12	13		20.18	20.10	20.06		
5	25	0		20.22	20.09	20.00		
5	1	0	64-QAM	20.41	20.38	20.26	17.95	0.0624
5	1	12		20.44	20.35	20.33		
5	1	24		20.30	20.28	20.20		
5	12	0		19.22	19.18	19.14		
5	12	7		19.25	19.10	19.07		
5	12	13		19.18	19.15	19.05		
5	25	0		19.22	19.13	19.08		
Limit	ERP < 3W			Result			Pass	



## Appendix B. Test Results of Radiated Test

### LTE Band 14

LTE Band 14 / 5MHz / QPSK									
Channel	Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1577	-64.43	-42.15	-22.28	-76.34	-69.25	1.79	8.76	H
	2365	-61.69	-13	-48.69	-77.70	-67.29	2.20	9.95	H
	3153	-59.84	-13	-46.84	-78.53	-66.55	2.55	11.41	H
									H
									H
									H
									H
	1577	-63.97	-42.15	-21.82	-76.15	-68.79	1.79	8.76	V
	2365	-60.67	-13	-47.67	-77.39	-66.27	2.20	9.95	V
	3153	-59.43	-13	-46.43	-78.61	-66.14	2.55	11.41	V
									V
									V
									V
									V
Middle	1582	-64.06	-42.15	-21.91	-75.92	-68.91	1.80	8.79	H
	2373	-61.66	-13	-48.66	-77.68	-67.34	2.20	10.03	H
	3163	-59.34	-13	-46.34	-78.09	-66.08	2.56	11.45	H
									H
									H
									H
	1582	-63.67	-42.15	-21.52	-75.84	-68.52	1.80	8.79	V
	2373	-60.20	-13	-47.20	-76.94	-65.88	2.20	10.03	V
	3163	-58.91	-13	-45.91	-78.14	-65.65	2.56	11.45	V
									V
									V
									V
									V
									V



Highest	1587	-64.56	-42.15	-22.41	-76.38	-69.43	1.80	8.82	H
	2380	-61.72	-13	-48.72	-77.76	-67.47	2.20	10.10	H
	3173	-59.53	-13	-46.53	-78.34	-66.31	2.56	11.49	H
									H
									H
									H
									H
	1587	-64.14	-42.15	-21.99	-76.30	-69.01	1.80	8.82	V
	2380	-61.02	-13	-48.02	-77.78	-66.77	2.20	10.10	V
	3173	-59.09	-13	-46.09	-78.37	-65.87	2.56	11.49	V
									V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.