



# 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, 27

The product was received on Oct. 11, 2022 and testing was performed from Oct. 20, 2022 to Oct. 29, 2022. 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.

Louis Wu

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
FG182625-01A	01	Initial issue of report	Nov. 17, 2022

## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
	§27.50 (j)(3)	Equivalent Isotropic Radiated Power (n77)	Pass	
-	§27.50 (j)(4)	Peak-to-Average Ratio	-	See Note
-	§2.1049	Occupied Bandwidth	-	See Note
-	§2.1051 §27.53 (l)(2)	Conducted Band Edge Measurement (n77)	-	See Note
-	§2.1051 §27.53 (l)(2)	Conducted Spurious Emission (n77)	-	See Note
-	§2.1055 §27.54	Frequency Stability Temperature & Voltage	-	See Note
4.2	§2.1051 §27.53 (l)(2)	Radiated Spurious Emission (n77)	Pass	15.03 dB under limit at 15168.000 MHz

**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 (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.  
It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
- The measurement uncertainty please refer to this report "Uncertainty of Evaluation".

### Comments and Explanations:

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Yun Huang**

**Report Producer: Clio Lo**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

WCDMA/LTE/5G NR, and GNSS.

Product Feature	
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
Test Antenna Gain	5G NR n77: -3.54 dBi

**Remark:** The EUT's information above is 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	EMRright 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 Location

<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>	Ivy Yeh
<b>Temperature (°C)</b>	23~24
<b>Relative Humidity (%)</b>	50~51

<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> 03CH12-HY (TAF Code: 3786)
<b>Test Engineer</b>	Wilson Wu
<b>Temperature (°C)</b>	20~25
<b>Relative Humidity (%)</b>	50~60
<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 Applicable Standards

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

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ FCC 47 CFR Part 2, 27
- ♦ 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. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

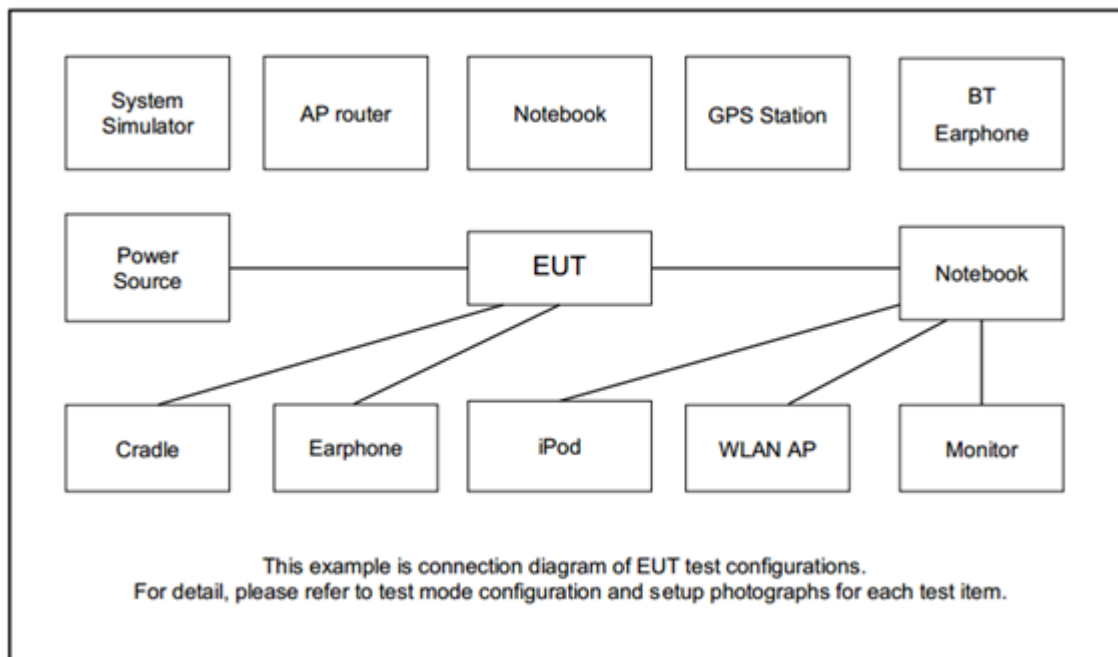
### 2.1 Test Mode

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 only the worst case emissions were reported in this report..

Test Items	NR Band	Bandwidth (MHz)												Modulation					RB #			Test Channel		
		10	15	20	25	30	40	50	60	70	80	90	100	PI/2 BPSK	QPSK	16QAM	64QAM	256QAM	1	Half	Full	L	M	H
Max. Output Power	n77				-	v							v	v	v	v	v	v	v	v	v	v	v	v
E.I.R.P	n77				-	v							v	v	v	v	v	v	Max. Power					
Radiated Spurious Emission	n77				-	v							v	v					v				v	
Remark	1. The mark “v” means that this configuration is chosen for testing																							
	2. The mark “-” means that this bandwidth is not supported.																							
	3. 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.																							
	4. For radiated measurement, pre-scanned in two modes, DFT-s OFDM and CP OFDM. The worst cases (DFT-s OFDM) were recorded in this report, and the worst modes of FR1 and LTE for simultaneous transmission were verified and compliant.																							
	5. Test combination is EN-DC 5A_n77A.																							
	6. All the radiated test cases were performed with Adapter 1, Battery 2, power cable 1 and Sample 1.																							

## 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.	5G Wireless Test Platform	Anritsu	MT8000A	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
3.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

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

5G NR Band n77 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
100	Channel	650000	656000	662000
	Frequency	3750	3840	3930
30	Channel	647668	656000	664332
	Frequency	3715.02	3840	3965

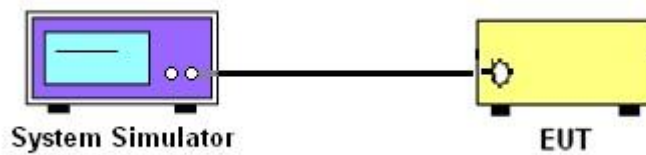
### 3 Conducted Test Items

#### 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 and EIRP

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

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

The EIRP of mobile transmitters must not exceed 1 Watts for 5G NR n77

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$ , 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 the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

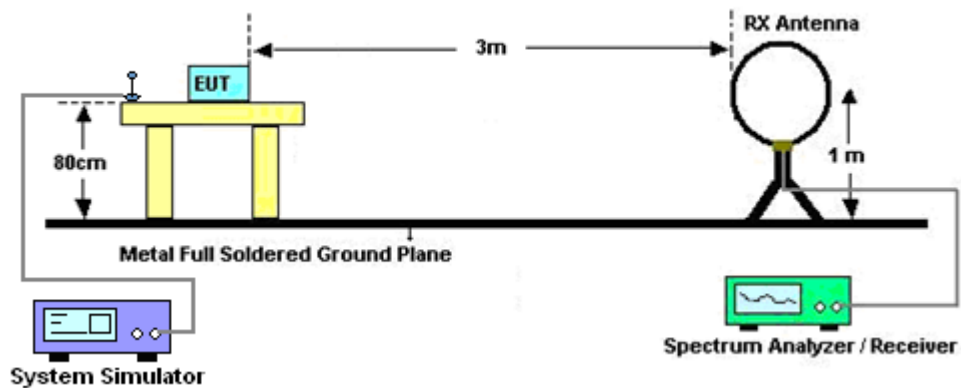
## 4 Radiated Test Items

### 4.1 Measuring Instruments

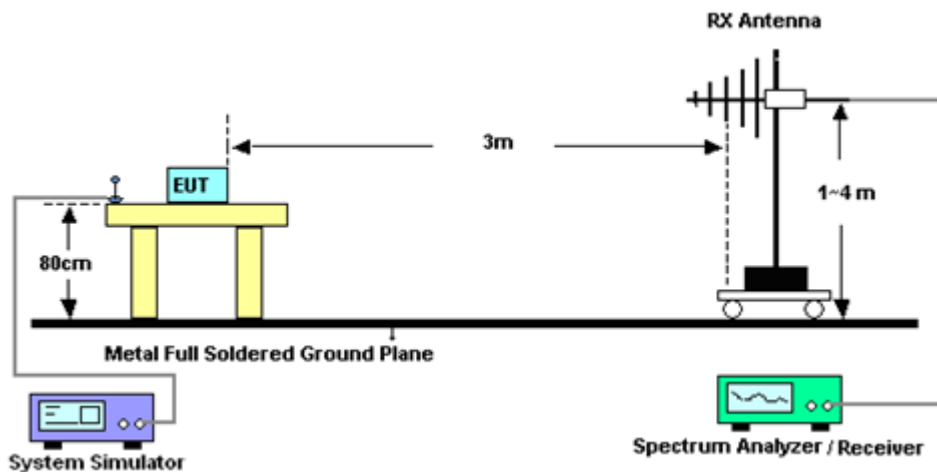
See list of measuring instruments of this test report.

#### 4.1.1 Test Setup

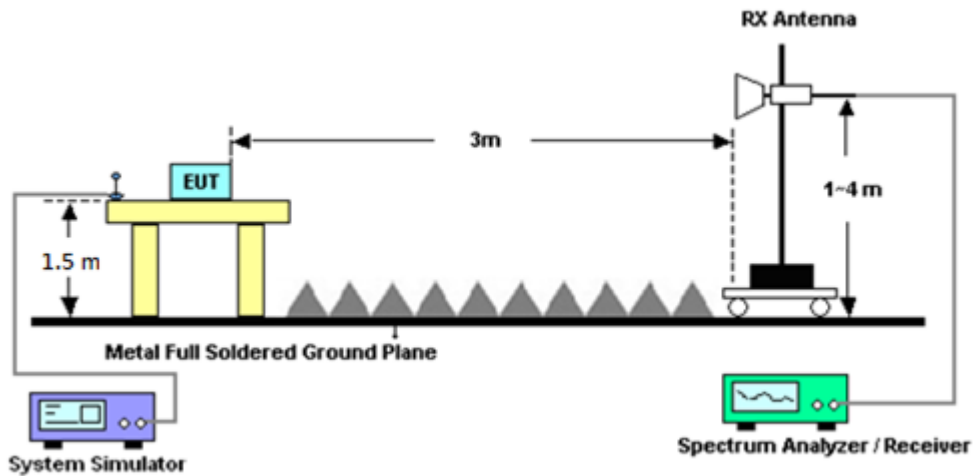
For radiated emissions below 30MHz



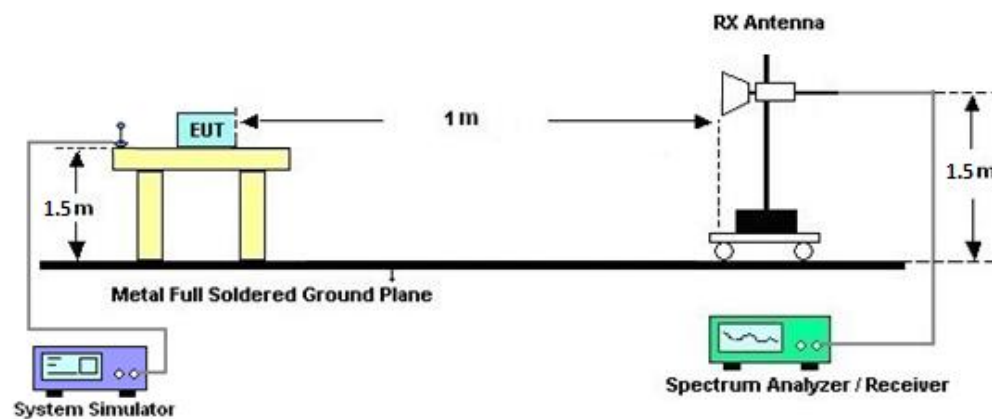
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



#### 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 Measurement

### 4.2.1 Description of Radiated Spurious Emission Measurement

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.

### 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, 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.

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	100488	9 kHz~30 MHz	May 13, 2022	Oct. 28, 2022~ Oct. 29, 2022	May 12, 2023	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Dec. 03, 2021	Oct. 28, 2022~ Oct. 29, 2022	Dec. 02, 2022	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	40103 & 07	30MHz~1GHz	Apr. 24, 2022	Oct. 28, 2022~ Oct. 29, 2022	Apr. 23, 2023	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 08, 2022	Oct. 28, 2022~ Oct. 29, 2022	Oct. 07, 2023	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1212	1GHz~18GHz	Mar. 10, 2022	Oct. 28, 2022~ Oct. 29, 2022	Mar. 09, 2023	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA91702 51	18GHz~40GHz	Nov. 30, 2021	Oct. 28, 2022~ Oct. 29, 2022	Nov. 29, 2022	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA91705 76	18GHz~40GHz	May 14, 2022	Oct. 28, 2022~ Oct. 29, 2022	May 13, 2023	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 23, 2022	Oct. 28, 2022~ Oct. 29, 2022	Mar. 22, 2023	Radiation (03CH12-HY)
Preamplifier	Aglient	8449B	3008A02375	1GHz~26.5GHz	May 24, 2022	Oct. 28, 2022~ Oct. 29, 2022	May 23, 2023	Radiation (03CH12-HY)
Preamplifier	E-INSTRUMENT TECH LTD.	ERA-100M-18 G-56-01-A70	EC1900249	1GHz-18GHz	Dec. 22, 2021	Oct. 28, 2022~ Oct. 29, 2022	Dec. 21, 2022	Radiation (03CH12-HY)
Preamplifier	E-INSTRUMENT TECH LTD.	ERA-100M-18 G-56-01-A70	EC1900269	1GHz-18GHz	Dec. 27, 2021	Oct. 28, 2022~ Oct. 29, 2022	Dec. 26, 2022	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 24, 2021	Oct. 28, 2022~ Oct. 29, 2022	Dec. 23, 2022	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY53470118	10Hz~44GHz	Jan. 12, 2022	Oct. 28, 2022~ Oct. 29, 2022	Jan. 11, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 10, 2022	Oct. 28, 2022~ Oct. 29, 2022	Mar. 09, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 10, 2021	Oct. 28, 2022~ Oct. 29, 2022	Dec. 09, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 21, 2022	Oct. 28, 2022~ Oct. 29, 2022	Feb. 20, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803953/2	30MHz~40GHz	Mar. 08, 2022	Oct. 28, 2022~ Oct. 29, 2022	Mar. 07, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WHKX8-5872. 5-6750-18000-40ST	SN2	6.75GHz High Pass Filter	Mar. 15, 2022	Oct. 28, 2022~ Oct. 29, 2022	Mar. 14, 2023	Radiation (03CH12-HY)
Hygrometer	TECEPEL	DTM-303B	TP140325	N/A	Nov. 26, 2021	Oct. 28, 2022~ Oct. 29, 2022	Nov. 25, 2022	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Oct. 28, 2022~ Oct. 29, 2022	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Oct. 28, 2022~ Oct. 29, 2022	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Oct. 28, 2022~ Oct. 29, 2022	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Oct. 28, 2022~ Oct. 29, 2022	N/A	Radiation (03CH12-HY)
Base Station (Measure)	Anritsu	MT8821C	6262116730	LTE	Jun. 15, 2022	Oct. 20, 2022	Jun. 14, 2023	Conducted (TH03-HY)
Base Station (Measure)	Anritsu	MT8000A	6262134933	FR1	Jun. 13, 2022	Oct. 20, 2022	Jun. 12, 2023	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% ( $U = 2Uc(y)$ )	3.31 dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.25 dB
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### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.81 dB
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## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power) and EIRP

NR n77 Maximum Average Power [dBm] (GT - LC = -3.54 dB)										
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP(W)		
30	1	1	PI/2 BPSK	22.27	22.52	22.43	18.98	0.0791		
30	1	76		22.32	22.45	22.23				
30	36	18		22.24	22.41	22.22				
30	1	0		21.84	22.00	21.99				
30	1	77		21.97	22.08	21.88				
30	75	0		21.90	21.95	21.89				
30	1	1	QPSK	22.21	22.37	22.40				
30	1	76		22.33	22.50	22.20				
30	36	18		22.24	22.38	22.17				
30	1	0		21.32	21.46	21.45				
30	1	77		21.45	21.59	21.33				
30	75	0		21.37	21.50	21.37				
30	1	1	16-QAM	21.31	21.56	21.38	18.02	0.0634		
30	1	1	64-QAM	19.90	20.07	19.96				
30	1	1	256-QAM	17.92	18.09	17.93				
Limit	EIRP < 1W			Result			Pass			

NR n77 Maximum Average Power [dBm] (GT - LC = -3.54 dB)										
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP(W)		
100	1	1	PI/2 BPSK	22.12	22.25	22.10	18.73	0.0746		
100	1	271		22.20	22.26	21.93				
100	135	67		22.12	22.17	22.02				
100	1	0		21.63	21.75	21.74				
100	1	272		21.82	21.82	21.49				
100	270	0		21.68	21.83	21.54				
100	1	1	QPSK	22.03	22.13	22.07				
100	1	271		22.12	22.12	21.90				
100	135	67		22.10	22.27	22.02				
100	1	0		21.10	21.22	21.25				
100	1	272		21.26	21.27	21.00				
100	270	0		21.19	21.30	21.06				
100	1	1	16-QAM	21.05	21.23	21.33	17.79	0.0601		
100	1	1	64-QAM	19.73	19.85	19.81				
100	1	1	256-QAM	17.66	17.90	17.97				
Limit	EIRP < 1W			Result			Pass			

## Appendix B. Test Results of Radiated Test

### EN-DC 5A-n77A

EN-DC 5A-n77A / 10M + 30MHz / PI/2 BPSK									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Margin ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	7653	-41.16	-13	-28.16	-71.75	-48.75	1.89	11.63	H
	11480	-34.50	-13	-21.50	-72.03	-41.03	2.39	11.08	H
	15306	-29.13	-13	-16.13	-70.91	-38.89	2.64	14.55	H
	19133	-63.66	-13	-50.66	-75.46	-75.47	3.25	17.21	H
	22960	-60.02	-13	-47.02	-76.92	-72.92	3.57	18.62	H
	26787	-57.10	-13	-44.10	-77.27	-70.03	3.92	19.00	H
									H
	7653	-41.04	-13	-28.04	-71.84	-48.63	1.89	11.63	V
	11480	-34.83	-13	-21.83	-72.47	-41.36	2.39	11.08	V
	15306	-29.40	-13	-16.40	-71.93	-39.16	2.64	14.55	V
	19133	-64.14	-13	-51.14	-75.7	-75.95	3.25	17.21	V
	22960	-60.35	-13	-47.35	-76.91	-73.25	3.57	18.62	V
	26787	-57.28	-13	-44.28	-77.07	-70.21	3.92	19.00	V
									V

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

**EN-DC 5A-n77A**

EN-DC 5A-n77A / 10M + 100MHz / PI/2 BPSK									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Margin ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	7582	-41.30	-13	-28.30	-71.82	-48.78	1.90	11.53	H
	11373	-34.79	-13	-21.79	-72.21	-41.24	2.35	10.95	H
	15168	-29.33	-13	-16.33	-71.57	-38.52	2.60	13.94	H
	18956	-63.79	-13	-50.79	-75.36	-75.53	3.26	17.14	H
	22748	-60.34	-13	-47.34	-76.87	-73.34	3.55	18.70	H
	26539	-57.57	-13	-44.57	-77.26	-70.15	3.93	18.65	H
									H
	7582	-41.33	-13	-28.33	-72.02	-48.81	1.90	11.53	V
	11373	-34.79	-13	-21.79	-72.28	-41.24	2.35	10.95	V
	15168	-28.03	-13	-15.03	-71.35	-37.22	2.60	13.94	V
	18956	-63.45	-13	-50.45	-74.79	-75.19	3.26	17.14	V
	22748	-60.20	-13	-47.20	-76.35	-73.20	3.55	18.70	V
	26539	-57.85	-13	-44.85	-77.16	-70.43	3.93	18.65	V
									V

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