TEST REPORT

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Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2308-0118

2. Customer

• Name (FCC) : LG Electronics USA, Inc.

• Address (FCC) : 111 Sylvan Avenue North Building Englewood Cliffs New Jersey United States 07632

3. Use of Report : FCC Class II Permissive Change

4. Product Name / Model Name : NAD module / TM15FNNATY0
FCC ID : BEJTM15FNNATY0

5. FCC Regulation(s): Part 27
Test Method Used : KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015

6. Date of Test : 2023.04.13 ~ 2023.06.28

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : JaeHyeok Bang (Signature)	Technical Manager Name : JaeJin Lee (Signature)

2023 . 08 . 24 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2308-0118	Aug. 24, 2023	Initial issue	JaeHyeok Bang	JaeJin Lee

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1. GENERAL INFORMATION

Equipment Class	PCS Licensed Transmitter (PCB)
Product Name	NAD module
Model Name	TM15FNNATY0
Add Model Name	-
PMN(Product Marketing Name)	TM15FNNATY0
FVIN(Firmware Version Identification Number)	5G.NAD.06a
EUT Serial Number	No specified
Supplying power	DC 3.90 V
Waveform	CP-OFDM, DFT-s-OFDM
Modulation type	π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM
Channel Bandwidth(MHz)	100, 90, 80, 60, 50, 40, 30, 20
Antenna Information	Antenna Type: Pannel Antenna Gain(Including path loss between conducted test feeding point and antenna terminal): -3.5 dBi (n77: 3 450 ~ 3 550 MHz), -4.8 dBi (n77: 3 700 ~ 3 980 MHz)

3 450 ~ 3 550 MHz band

NR Frequency Band	Channel Bandwidth (MHz)	Modulation	TX Frequency (MHz)	EIRP	
				Max power (dBm)	Max power (W)
n77	100	π/2 BPSK	3 500.01	25.41	0.348
n77	100	QPSK	3 500.01	25.36	0.344
n77	100	16QAM	3 500.01	25.27	0.337
n77	100	64QAM	3 500.01	23.59	0.229
n77	100	256QAM	3 500.01	21.26	0.134
n77	90	π/2 BPSK	3 495.00 ~ 3 504.99	25.67	0.369
n77	90	QPSK	3 495.00 ~ 3 504.99	25.44	0.350
n77	90	16QAM	3 495.00 ~ 3 504.99	24.70	0.295
n77	90	64QAM	3 495.00 ~ 3 504.99	23.52	0.225
n77	90	256QAM	3 495.00 ~ 3 504.99	22.11	0.163
n77	80	π/2 BPSK	3 490.02 ~ 3 510.00	25.44	0.350
n77	80	QPSK	3 490.02 ~ 3 510.00	25.62	0.365
n77	80	16QAM	3 490.02 ~ 3 510.00	24.38	0.274
n77	80	64QAM	3 490.02 ~ 3 510.00	22.69	0.186
n77	80	256QAM	3 490.02 ~ 3 510.00	20.93	0.124
n77	60	π/2 BPSK	3 480.00 ~ 3 519.99	26.19	0.416
n77	60	QPSK	3 480.00 ~ 3 519.99	25.95	0.394
n77	60	16QAM	3 480.00 ~ 3 519.99	25.70	0.372
n77	60	64QAM	3 480.00 ~ 3 519.99	23.67	0.233
n77	60	256QAM	3 480.00 ~ 3 519.99	22.37	0.173
n77	50	π/2 BPSK	3 475.02 ~ 3 525.00	25.93	0.392
n77	50	QPSK	3 475.02 ~ 3 525.00	25.79	0.379
n77	50	16QAM	3 475.02 ~ 3 525.00	25.49	0.354
n77	50	64QAM	3 475.02 ~ 3 525.00	23.50	0.224
n77	50	256QAM	3 475.02 ~ 3 525.00	22.59	0.181
n77	40	π/2 BPSK	3 470.01 ~ 3 529.98	26.74	0.472
n77	40	QPSK	3 470.01 ~ 3 529.98	26.43	0.440
n77	40	16QAM	3 470.01 ~ 3 529.98	25.48	0.353
n77	40	64QAM	3 470.01 ~ 3 529.98	24.04	0.254
n77	40	256QAM	3 470.01 ~ 3 529.98	22.89	0.195
n77	30	π/2 BPSK	3 465.00 ~ 3 534.99	26.63	0.460
n77	30	QPSK	3 465.00 ~ 3 534.99	26.45	0.442
n77	30	16QAM	3 465.00 ~ 3 534.99	25.77	0.378
n77	30	64QAM	3 465.00 ~ 3 534.99	24.44	0.278
n77	30	256QAM	3 465.00 ~ 3 534.99	22.68	0.185
n77	20	π/2 BPSK	3 460.01 ~ 3 540.00	26.16	0.413
n77	20	QPSK	3 460.01 ~ 3 540.00	25.66	0.368
n77	20	16QAM	3 460.01 ~ 3 540.00	25.39	0.346
n77	20	64QAM	3 460.01 ~ 3 540.00	24.43	0.277
n77	20	256QAM	3 460.01 ~ 3 540.00	24.01	0.252

3 700 ~ 3 980 MHz band

NR Frequency Band	Channel Bandwidth (MHz)	Modulation	TX Frequency (MHz)	EIRP	
				Max power (dBm)	Max power (W)
n77	100	π/2 BPSK	3 750.00 ~ 3 930.00	25.77	0.378
n77	100	QPSK	3 750.00 ~ 3 930.00	25.74	0.375
n77	100	16QAM	3 750.00 ~ 3 930.00	25.29	0.338
n77	100	64QAM	3 750.00 ~ 3 930.00	24.28	0.268
n77	100	256QAM	3 750.00 ~ 3 930.00	22.28	0.169
n77	90	π/2 BPSK	3 745.02 ~ 3 934.98	25.74	0.375
n77	90	QPSK	3 745.02 ~ 3 934.98	25.01	0.317
n77	90	16QAM	3 745.02 ~ 3 934.98	25.51	0.356
n77	90	64QAM	3 745.02 ~ 3 934.98	24.37	0.273
n77	90	256QAM	3 745.02 ~ 3 934.98	22.25	0.168
n77	80	π/2 BPSK	3 740.01 ~ 3 939.99	24.86	0.306
n77	80	QPSK	3 740.01 ~ 3 939.99	24.82	0.303
n77	80	16QAM	3 740.01 ~ 3 939.99	24.48	0.280
n77	80	64QAM	3 740.01 ~ 3 939.99	23.22	0.210
n77	80	256QAM	3 740.01 ~ 3 939.99	21.33	0.136
n77	60	π/2 BPSK	3 730.02 ~ 3 949.98	24.88	0.308
n77	60	QPSK	3 730.02 ~ 3 949.98	24.84	0.305
n77	60	16QAM	3 730.02 ~ 3 949.98	24.81	0.303
n77	60	64QAM	3 730.02 ~ 3 949.98	23.45	0.221
n77	60	256QAM	3 730.02 ~ 3 949.98	21.44	0.139
n77	50	π/2 BPSK	3 725.01 ~ 3 954.99	25.65	0.367
n77	50	QPSK	3 725.01 ~ 3 954.99	24.75	0.298
n77	50	16QAM	3 725.01 ~ 3 954.99	24.59	0.288
n77	50	64QAM	3 725.01 ~ 3 954.99	23.71	0.235
n77	50	256QAM	3 725.01 ~ 3 954.99	21.19	0.132
n77	40	π/2 BPSK	3 720.00 ~ 3 960.00	24.51	0.282
n77	40	QPSK	3 720.00 ~ 3 960.00	25.08	0.322
n77	40	16QAM	3 720.00 ~ 3 960.00	24.87	0.307
n77	40	64QAM	3 720.00 ~ 3 960.00	23.25	0.211
n77	40	256QAM	3 720.00 ~ 3 960.00	21.67	0.147
n77	30	π/2 BPSK	3 715.02 ~ 3 964.98	25.66	0.368
n77	30	QPSK	3 715.02 ~ 3 964.98	25.31	0.340
n77	30	16QAM	3 715.02 ~ 3 964.98	25.08	0.322
n77	30	64QAM	3 715.02 ~ 3 964.98	24.28	0.268
n77	30	256QAM	3 715.02 ~ 3 964.98	22.55	0.180

2. INTRODUCTION

2.1. EUT DESCRIPTION

This device supports the following capabilities:

Multi-Band LTE, LTE up-link carrier aggregation and 5G NR(FR1)

5G NR supports SCS 15 kHz for FDD Band and SCS 30 kHz for TDD Band.

2.2. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 ℃ ~ +26 ℃
▪ Relative Humidity	42 % ~ 47 %

2.3. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.4. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Radiated Disturbance (Below 1 GHz)	4.8 dB (The confidence level is about 95 %, k = 2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.0 dB (The confidence level is about 95 %, k = 2)
Radiated Disturbance (Above 18 GHz)	5.2 dB (The confidence level is about 95 %, k = 2)

2.5. TEST FACILITY

Dt&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.
The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014.

- FCC & IC MRA Designation No. : KR0034

- ISED#: 5740A

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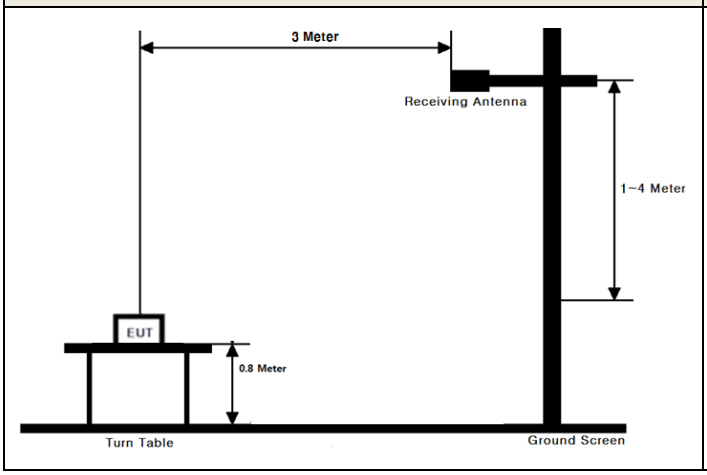
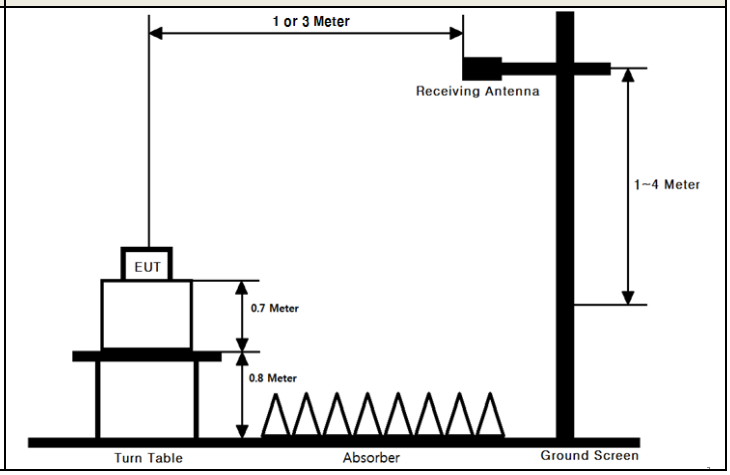
3. DESCRIPTION OF TESTS

3.1. Maximum Output Power

ERP or EIRP (Effective Radiated Power or Equivalent Isotropic Radiated Power)

Test Set-up

Below 1GHz	Above 1GHz
	

These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Limit

3450 ~ 3550 MHz band: Mobile devices are limited to 1Watt (30 dBm) EIRP.

3700 ~ 3980 MHz band: Mobile devices are limited to 1Watt (30 dBm) EIRP.

Test Procedure

- **KDB971168 D01v03 - Section 5.4**
- **ANSI C63.26-2015 – Section 5.2.4.5, 5.2.4.4.2**
- **ANSI/TIA-603-E-2016 - Section 2.2.17**

Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1 x to 5 x the OBW
3. Set VBW ≥ 3 x RBW.
4. Set number of points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   1) Set = auto-couple, or
   2) Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. Set sweep trigger to “free run”

8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
9. By using the marker function to identify the maximum PSD instead of summing the power across the OBW.
10. Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25 %.

EUT duty cycle

Band	Frequency(MHz)	T_{on}(ms)	T_{on+off} (ms)	Duty cycle = T_{on} / (T_{on+off})	10 log (1/duty cycle)
n77	3500.01	0.99	4.998	0.20	6.99 dB

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

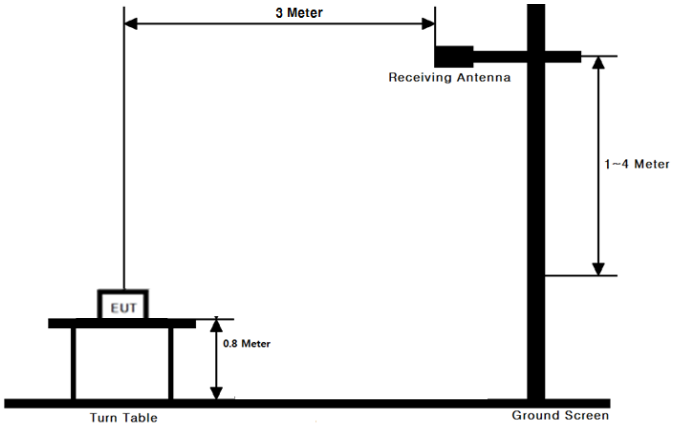
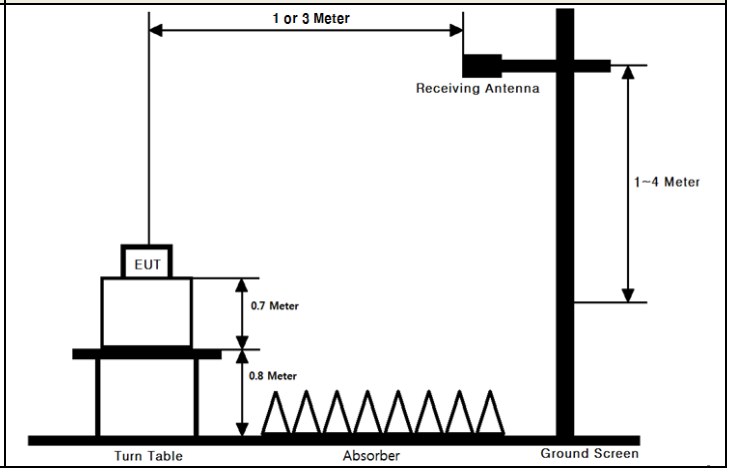
The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna`s terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference
Between the gain of the horn antenna and an isotropic antenna are taken into consideration.

3.2. UNDESIRABLE EMISSIONS

Test Set-up

Below 1GHz	Above 1GHz
	

These measurements were performed at 3 test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Limit

For mobile operations in the 3450-3550 MHz band and 3700-3980 MHz, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI/TIA-603-E-2016 - Section 2.2.12**
- **ANSI C63.26-2015 – Section 5.5**

If the device cannot be configured to transmit continuously (duty cycle < 98%) and a free- running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

Test setting

1. RBW = 1 MHz / VBW ≥ 3 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.
For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.
This measurement was performed with the EUT oriented in 3 orthogonal axis.

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	23/06/23	24/06/23	US47360812
Spectrum Analyzer	KEYSIGHT	N9030B	22/12/16	23/12/16	MY55480168
DC power supply	SM techno	SDP30-5D	23/06/23	24/06/23	305DNF079
Multimeter	FLUKE	17B+	22/12/16	23/12/16	36390701WS
Radio Communication Analyzer	KEYSIGHT	E7515B	23/06/23	24/06/23	MY60192461
Thermohygrometer	BODYCOM	BJ5478	22/12/16	23/12/16	120612-2
Signal Generator	Rohde Schwarz	SMBV100A	22/12/16	23/12/16	255571
Signal Generator	ANRITSU	MG3695C	22/12/16	23/12/16	173501
Resistive Divider	Clear Microwave	D240	22/09/27	23/09/27	1
Loop Antenna	ETS-Lindgren	6502	22/04/22	24/04/22	203480
Bilog Antenna	Schwarzbeck	VULB 9160	22/12/16	23/12/16	3362
Dipole Antenna	Schwarzbeck	UHA 9105	22/12/16	24/12/16	2262
HORN ANT	ETS	3117	22/12/16	23/12/16	00140394
HORN ANT	A.H.Systems	SAS-574	23/06/23	24/06/23	155
PreAmplifier	H.P	8447D	22/12/16	23/12/16	2944A07774
PreAmplifier	Agilent	8449B	22/12/16	23/12/16	3008A02108
PreAmplifier	A.H.Systems Inc.	PAM-1840VH	23/06/23	24/06/23	163
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	22/12/16	23/12/16	7
High-pass filter	Wainwright	WHNX5.0/26.5G-6SS	23/06/23	24/06/23	8
High-pass filter	Wainwright	WHKX6-6320-8000-26500-40CC	22/12/16	23/12/16	2
Cable	HUBER+SUHNER	SUCOFLEX100	23/01/04	24/01/04	M-1
Cable	HUBER+SUHNER	SUCOFLEX100	23/01/04	24/01/04	M-2
Cable	Junkosah	MWX241/B	23/01/04	24/01/04	M-3
Cable	Junkosah	MWX221	23/01/04	24/01/04	M-4
Cable	Junkosah	MWX221	23/01/04	24/01/04	M-5
Cable	DTNC	Cable	23/01/04	24/01/04	M-6
Cable	JUNFLON	J12J101757-00	23/01/04	24/01/04	M-7
Cable	HUBER+SUHNER	SUCOFLEX104	23/01/04	24/01/04	M-8
Cable	HUBER+SUHNER	SUCOFLEX106	23/01/04	24/01/04	M-9
Cable	DTNC	Cable	23/01/04	24/01/04	RFC-102

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.
Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
27.50(k.3) 27.50(j.3)	Radiated Output Power	< 1 Watts max. EIRP	Radiated	**C**
2.1053 27.53(n) 27.53(l)	Undesirable Emissions	< -13 dBm/MHz		**C**

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable
Note 2: This test item was performed in three orthogonal EUT positions and the worst case data was reported.

6. SAMPLE CALCULATION

A. Emission Designator

1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3) During the test, the turn table is rotated until the maximum signal is found.
4) Record the field strength meter's level. (ex. Spectrum reading level is -8.5 dBm)
5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
6) Increase the signal generator output till the field strength meter's level is equal to the item (4). (ex. Signal generator level is -18.04 dBm)
7) The gain of the cable and amplifier between the signal generator and terminals of substituted antenna is 46.92 dB at test frequency.
8) Record the level at substituted antenna terminal. (ex. 28.88dBm)
9) The result is calculated as below;

EIRP(dBm) = LEVLE@ANTENNA TERMINAL + TX Antenna Gain (dBi)
ERP(dBm) = LEVLE@ANTENNA TERMINAL + TX Antenna Gain (dBd)
Where, TX Antenna Gain (dBd) = TX Antenna Gain (dBi) - 2.15 dB

7. TEST DATA

7.1. EIRP

- Test Notes

1) This is device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the below table.

7.1.1. 3 450 ~ 3 550 MHz band

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	EIRP (dBm)	EIRP (W)
100	3 500.01	π/2 BPSK	1/136	V	16.93	8.48	25.41	0.348
		QPSK		V	16.88	8.48	25.36	0.344
		16QAM		V	16.79	8.48	25.27	0.337
		64QAM		V	15.11	8.48	23.59	0.229
		256QAM		V	12.78	8.48	21.26	0.134
90	3 495.00	π/2 BPSK	1/123	V	17.21	8.46	25.67	0.369
		QPSK		V	16.73	8.46	25.19	0.330
		16QAM		V	16.24	8.46	24.70	0.295
		64QAM		V	15.06	8.46	23.52	0.225
		256QAM		V	12.49	8.46	20.95	0.124
	3 504.99	π/2 BPSK	1/123	V	17.09	8.48	25.57	0.361
		QPSK		V	16.96	8.48	25.44	0.350
		16QAM		V	16.18	8.48	24.66	0.292
		64QAM		V	14.69	8.48	23.17	0.207
		256QAM		V	13.63	8.48	22.11	0.163
80	3 490.02	π/2 BPSK	1/108	V	17.00	8.44	25.44	0.350
		QPSK		V	17.18	8.44	25.62	0.365
		16QAM		V	15.82	8.44	24.26	0.267
		64QAM		V	14.09	8.44	22.53	0.179
		256QAM		V	12.11	8.44	20.55	0.114
	3 510.00	π/2 BPSK	1/108	V	16.53	8.47	25.00	0.316
		QPSK		V	16.90	8.47	25.37	0.344
		16QAM		V	15.91	8.47	24.38	0.274
		64QAM		V	14.22	8.47	22.69	0.186
		256QAM		V	12.46	8.47	20.93	0.124
60	3 480.00	π/2 BPSK	1/80	V	17.56	8.40	25.96	0.394
		QPSK		V	17.55	8.40	25.95	0.394
		16QAM		V	17.30	8.40	25.70	0.372
		64QAM		V	15.27	8.40	23.67	0.233
		256QAM		V	13.97	8.40	22.37	0.173
	3 519.90	π/2 BPSK	1/80	V	17.72	8.47	26.19	0.416
		QPSK		V	17.25	8.47	25.72	0.373
		16QAM		V	17.01	8.47	25.48	0.353
		64QAM		V	15.10	8.47	23.57	0.228
		256QAM		V	12.94	8.47	21.41	0.138

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	EIRP (dBm)	EIRP (W)
50	3 475.02	π/2 BPSK	1/66	V	17.55	8.38	25.93	0.392
		QPSK		V	17.41	8.38	25.79	0.379
		16QAM		V	17.11	8.38	25.49	0.354
		64QAM		V	14.83	8.38	23.21	0.209
		256QAM		V	14.21	8.38	22.59	0.181
	3 525.00	π/2 BPSK	1/66	V	17.37	8.47	25.84	0.384
		QPSK		V	17.24	8.47	25.71	0.372
		16QAM		V	16.23	8.47	24.70	0.295
		64QAM		V	15.03	8.47	23.50	0.224
		256QAM		V	12.85	8.47	21.32	0.136
40	3 470.01	π/2 BPSK	1/52	V	18.39	8.35	26.74	0.472
		QPSK		V	18.08	8.35	26.43	0.440
		16QAM		V	17.13	8.35	25.48	0.353
		64QAM		V	15.62	8.35	23.97	0.249
		256QAM		V	13.80	8.35	22.15	0.164
	3 500.01	π/2 BPSK	1/52	V	17.26	8.48	25.74	0.375
		QPSK		V	16.52	8.48	25.00	0.316
		16QAM		V	16.04	8.48	24.52	0.283
		64QAM		V	14.74	8.48	23.22	0.210
		256QAM		V	12.95	8.48	21.43	0.139
	3 529.98	π/2 BPSK	1/52	V	18.12	8.46	26.58	0.455
		QPSK		V	17.85	8.46	26.31	0.428
		16QAM		V	16.92	8.46	25.38	0.345
		64QAM		V	15.58	8.46	24.04	0.254
		256QAM		V	14.43	8.46	22.89	0.195
30	3 465.01	π/2 BPSK	1/38	V	18.01	8.33	26.34	0.431
		QPSK		V	17.72	8.33	26.05	0.403
		16QAM		V	17.32	8.33	25.65	0.367
		64QAM		V	15.93	8.33	24.26	0.267
		256QAM		V	13.28	8.33	21.61	0.145
	3 500.01	π/2 BPSK	1/38	V	16.95	8.48	25.43	0.349
		QPSK		V	16.69	8.48	25.17	0.329
		16QAM		V	16.15	8.48	24.63	0.290
		64QAM		V	14.29	8.48	22.77	0.189
		256QAM		V	13.28	8.48	21.76	0.150
	3 534.99	π/2 BPSK	1/38	V	18.17	8.46	26.63	0.460
		QPSK		V	17.99	8.46	26.45	0.442
		16QAM		V	17.31	8.46	25.77	0.378
		64QAM		V	15.98	8.46	24.44	0.278
		256QAM		V	14.22	8.46	22.68	0.185

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	EIRP (dBm)	EIRP (W)
20	3 460.01	π/2 BPSK	1/25	V	17.85	8.31	26.16	0.413
		QPSK		V	17.35	8.31	25.66	0.368
		16QAM		V	16.19	8.31	24.50	0.282
		64QAM		V	15.68	8.31	23.99	0.251
		256QAM		V	13.72	8.31	22.03	0.160
	3 500.01	π/2 BPSK	1/25	V	16.81	8.48	25.29	0.338
		QPSK		V	16.86	8.48	25.34	0.342
		16QAM		V	16.83	8.48	25.31	0.340
		64QAM		V	14.61	8.48	23.09	0.204
		256QAM		V	12.52	8.48	21.00	0.126
	3 540.00	π/2 BPSK	1/25	V	17.39	8.46	25.85	0.385
		QPSK		V	17.14	8.46	25.60	0.363
		16QAM		V	16.93	8.46	25.39	0.346
		64QAM		V	15.97	8.46	24.43	0.277
		256QAM		V	15.55	8.46	24.01	0.252

7.1.2. 3 700 ~ 3 980 MHz band

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	EIRP (dBm)	EIRP (W)
100	3 750.00	π/2 BPSK	1/136	V	17.49	8.28	25.77	0.378
		QPSK		V	17.46	8.28	25.74	0.375
		16QAM		V	17.01	8.28	25.29	0.338
		64QAM		V	16.00	8.28	24.28	0.268
		256QAM		V	14.00	8.28	22.28	0.169
	3 840.00	π/2 BPSK	1/136	V	16.28	8.64	24.92	0.310
		QPSK		V	15.79	8.64	24.43	0.277
		16QAM		V	15.16	8.64	23.80	0.240
		64QAM		V	14.11	8.64	22.75	0.188
		256QAM		V	12.18	8.64	20.82	0.121
	3 930.00	π/2 BPSK	1/136	V	14.90	9.07	23.97	0.250
		QPSK		V	15.16	9.07	24.23	0.265
		16QAM		V	14.23	9.07	23.30	0.214
		64QAM		V	13.04	9.07	22.11	0.163
		256QAM		V	12.01	9.07	21.08	0.128
90	3 745.02	π/2 BPSK	1/123	V	16.68	9.06	25.74	0.375
		QPSK		V	15.95	9.06	25.01	0.317
		16QAM		V	16.45	9.06	25.51	0.356
		64QAM		V	15.31	9.06	24.37	0.273
		256QAM		V	13.19	9.06	22.25	0.168
	3 840.00	π/2 BPSK	1/123	V	15.99	8.64	24.63	0.290
		QPSK		V	15.13	8.64	23.77	0.238
		16QAM		V	15.42	8.64	24.06	0.254
		64QAM		V	14.33	8.64	22.97	0.198
		256QAM		V	12.55	8.64	21.19	0.131
	3 934.98	π/2 BPSK	1/123	V	14.96	9.07	24.03	0.253
		QPSK		V	14.50	9.07	23.57	0.227
		16QAM		V	14.52	9.07	23.59	0.229
		64QAM		V	14.04	9.07	23.11	0.205
		256QAM		V	11.68	9.07	20.75	0.119
80	3 740.01	π/2 BPSK	1/108	V	16.57	8.29	24.86	0.306
		QPSK		V	16.50	8.29	24.79	0.301
		16QAM		V	15.98	8.29	24.27	0.267
		64QAM		V	14.71	8.29	23.00	0.200
		256QAM		V	13.04	8.29	21.33	0.136
	3 840.00	π/2 BPSK	1/108	V	16.19	8.64	24.83	0.304
		QPSK		V	16.18	8.64	24.82	0.303
		16QAM		V	15.84	8.64	24.48	0.280
		64QAM		V	14.58	8.64	23.22	0.210
		256QAM		V	12.58	8.64	21.22	0.132
	3 939.99	π/2 BPSK	1/108	V	15.20	9.06	24.26	0.267
		QPSK		V	14.40	9.06	23.46	0.222
		16QAM		V	14.34	9.06	23.40	0.219
		64QAM		V	12.87	9.06	21.93	0.156
		256QAM		V	11.20	9.06	20.26	0.106

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	EIRP (dBm)	EIRP (W)
60	3 730.02	π/2 BPSK	1/80	V	16.58	8.30	24.88	0.308
		QPSK		V	16.54	8.30	24.84	0.305
		16QAM		V	16.51	8.30	24.81	0.303
		64QAM		V	14.60	8.30	22.90	0.195
		256QAM		V	13.14	8.30	21.44	0.139
	3 840.00	π/2 BPSK	1/80	V	15.58	8.64	24.22	0.264
		QPSK		V	15.54	8.64	24.18	0.262
		16QAM		V	15.44	8.64	24.08	0.256
		64QAM		V	14.81	8.64	23.45	0.221
		256QAM		V	12.57	8.64	21.21	0.132
	3 949.98	π/2 BPSK	1/80	V	15.21	9.06	24.27	0.267
		QPSK		V	15.43	9.06	24.49	0.281
		16QAM		V	14.98	9.06	24.04	0.253
		64QAM		V	13.10	9.06	22.16	0.164
		256QAM		V	11.09	9.06	20.15	0.104
50	3 725.01	π/2 BPSK	1/66	V	17.34	8.31	25.65	0.367
		QPSK		V	16.44	8.31	24.75	0.298
		16QAM		V	16.28	8.31	24.59	0.288
		64QAM		V	15.40	8.31	23.71	0.235
		256QAM		V	12.88	8.31	21.19	0.132
	3 840.00	π/2 BPSK	1/66	V	15.02	8.64	23.66	0.232
		QPSK		V	14.94	8.64	23.58	0.228
		16QAM		V	14.70	8.64	23.34	0.216
		64QAM		V	13.04	8.64	21.68	0.147
		256QAM		V	11.59	8.64	20.23	0.106
	3 954.99	π/2 BPSK	1/66	V	15.10	9.06	24.16	0.260
		QPSK		V	14.82	9.06	23.88	0.245
		16QAM		V	14.69	9.06	23.75	0.237
		64QAM		V	13.68	9.06	22.74	0.188
		256QAM		V	12.10	9.06	21.16	0.131
40	3 720.00	π/2 BPSK	1/52	V	16.19	8.32	24.51	0.282
		QPSK		V	16.76	8.32	25.08	0.322
		16QAM		V	16.55	8.32	24.87	0.307
		64QAM		V	14.93	8.32	23.25	0.211
		256QAM		V	13.35	8.32	21.67	0.147
	3 840.00	π/2 BPSK	1/52	V	15.19	8.64	23.83	0.241
		QPSK		V	15.22	8.64	23.86	0.243
		16QAM		V	14.80	8.64	23.44	0.221
		64QAM		V	13.22	8.64	21.86	0.153
		256QAM		V	11.07	8.64	19.71	0.094
	3 960.00	π/2 BPSK	1/52	V	14.45	9.06	23.51	0.224
		QPSK		V	14.30	9.06	23.36	0.217
		16QAM		V	13.86	9.06	22.92	0.196
		64QAM		V	12.66	9.06	21.72	0.148
		256QAM		V	11.31	9.06	20.37	0.109

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	EIRP (dBm)	EIRP (W)
30	3 715.02	π/2 BPSK	1/38	V	17.34	8.32	25.66	0.368
		QPSK		V	16.99	8.32	25.31	0.340
		16QAM		V	16.76	8.32	25.08	0.322
		64QAM		V	15.96	8.32	24.28	0.268
		256QAM		V	14.23	8.32	22.55	0.180
	3 840.00	π/2 BPSK	1/38	V	15.44	8.64	24.08	0.256
		QPSK		V	14.84	8.64	23.48	0.223
		16QAM		V	14.88	8.64	23.52	0.225
		64QAM		V	13.73	8.64	22.37	0.173
		256QAM		V	12.05	8.64	20.69	0.117
	3 964.98	π/2 BPSK	1/38	V	15.05	9.06	24.11	0.258
		QPSK		V	15.55	9.06	24.61	0.289
		16QAM		V	14.43	9.06	23.49	0.224
		64QAM		V	13.95	9.06	23.01	0.200
		256QAM		V	11.17	9.06	20.23	0.105
20	3 710.01	π/2 BPSK	1/25	V	16.08	8.33	24.41	0.276
		QPSK		V	15.61	8.33	23.94	0.248
		16QAM		V	15.55	8.33	23.88	0.244
		64QAM		V	14.68	8.33	23.01	0.200
		256QAM		V	12.78	8.33	21.11	0.129
	3 840.00	π/2 BPSK	1/25	V	15.50	8.64	24.14	0.259
		QPSK		V	15.36	8.64	24.00	0.251
		16QAM		V	15.17	8.64	23.81	0.240
		64QAM		V	13.29	8.64	21.93	0.156
		256QAM		V	11.72	8.64	20.36	0.109
	3 969.99	π/2 BPSK	1/25	V	15.10	9.06	24.16	0.261
		QPSK		V	14.67	9.06	23.73	0.236
		16QAM		V	14.39	9.06	23.45	0.221
		64QAM		V	13.10	9.06	22.16	0.164
		256QAM		V	11.78	9.06	20.84	0.121

7.2. UNDESIRABLE EMISSIONS (Radiated)

- Test Notes

1) This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported.
2) EN-DC mode operation were investigated and the worst case configuration results are reported.
3) The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter.
   No other spurious and harmonic emissions were reported greater than listed emissions.
4) Limit for NR Band 77 = -13 dBm/MHz

7.2.1. 3 450 ~ 3 550 MHz band

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
100	3 500.01	π/2 BPSK	1/136	7 002.92	V	-61.94	11.57	-50.37	-13.00	37.37
		QPSK		7 004.84	V	-62.08	11.57	-50.51	-13.00	37.51
		16QAM		6 999.99	V	-61.96	11.56	-50.40	-13.00	37.40
		64QAM		6 999.68	V	-62.06	11.56	-50.50	-13.00	37.50
		256QAM		6 995.04	V	-61.99	11.56	-50.43	-13.00	37.43
40	3 470.01	π/2 BPSK	1/52	6 939.57	V	-61.97	11.53	-50.44	-13.00	37.44
		QPSK		6 939.63	V	-61.81	11.53	-50.28	-13.00	37.28
		16QAM		6 940.03	V	-61.88	11.53	-50.35	-13.00	37.35
		64QAM		6 938.12	V	-61.97	11.53	-50.44	-13.00	37.44
		256QAM		6 935.37	V	-61.73	11.52	-50.21	-13.00	37.21

ENDC MODE: NR n77 + LTE B2

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
40	3 470.01	π/2 BPSK	1/52	5 620.03	V	-66.17	10.41	-55.76	-13.00	42.76
				6 942.00	V	-61.98	11.54	-50.44	-13.00	37.44
		QPSK		5 620.03	V	-65.96	10.41	-55.55	-13.00	42.55
				6 941.44	V	-62.06	11.53	-50.53	-13.00	37.53
		16QAM		5 619.90	V	-65.67	10.41	-55.26	-13.00	42.26
				6 936.95	V	-62.01	11.53	-50.48	-13.00	37.48
		64QAM		5 620.12	V	-65.49	10.41	-55.08	-13.00	42.08
				6 939.78	V	-61.92	11.53	-50.39	-13.00	37.39
		256QAM		5 620.03	V	-66.10	10.41	-55.69	-13.00	42.69
				6 935.76	V	-62.01	11.52	-50.49	-13.00	37.49

7.2.2. 3 700 ~ 3 900 MHz band

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
100	3 750.00	π/2 BPSK	1/136	7 500.08	V	-61.91	12.16	-49.75	-13.00	36.75
		QPSK		7 504.29	V	-61.95	12.16	-49.79	-13.00	36.79
		16QAM		7 499.85	V	-61.80	12.16	-49.64	-13.00	36.64
		64QAM		7 499.90	V	-61.94	12.16	-49.78	-13.00	36.78
		256QAM		7 500.00	V	-61.85	12.16	-49.69	-13.00	36.69
	3 840.00	π/2 BPSK	1/136	7 680.00	V	-59.30	12.21	-47.09	-13.00	34.09
		QPSK		7 679.97	V	-65.71	12.21	-53.50	-13.00	40.50
		16QAM		7 679.75	V	-58.91	12.21	-46.70	-13.00	33.70
		64QAM		7 680.24	V	-66.38	12.21	-54.17	-13.00	41.17
		256QAM		7 680.03	V	-59.48	12.21	-47.27	-13.00	34.27
	3 930.00	π/2 BPSK	1/136	7 860.01	V	-58.42	12.35	-46.07	-13.00	33.07
		QPSK		7 860.01	V	-58.78	12.35	-46.43	-13.00	33.43
		16QAM		7 859.95	V	-57.90	12.35	-45.55	-13.00	32.55
		64QAM		7 860.00	V	-65.41	12.35	-53.06	-13.00	40.06
		256QAM		7 860.03	V	-58.27	12.35	-45.92	-13.00	32.92

ENDC MODE: NR n77 + LTE B2

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
100	3 750.00	π/2 BPSK	1/136	5 620.03	V	-67.20	10.41	-56.79	-13.00	43.79
				7 500.12	V	-61.59	12.16	-49.43	-13.00	36.43
		QPSK		5 620.03	V	-67.41	10.41	-57.00	-13.00	44.00
				7 499.91	V	-61.51	12.16	-49.35	-13.00	36.35
		16QAM		5 620.11	V	-67.19	10.41	-56.78	-13.00	43.78
				7 500.01	V	-61.35	12.16	-49.19	-13.00	36.19
		64QAM		5 620.08	V	-67.09	10.41	-56.68	-13.00	43.68
				7 500.12	V	-61.52	12.16	-49.36	-13.00	36.36
		256QAM		5 620.04	V	-67.16	10.41	-56.75	-13.00	43.75
				7 500.22	V	-61.41	12.16	-49.25	-13.00	36.25