TEST REPORT

Dt&C Co., Ltd.
42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2312-0173

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 Original Grant

4. Product Name / Model Name : Telematics(24CY DCM 5G) / TF24SENI
FCC ID : BEJTF24SENI2

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

6. Date of Test : 2023.11.23 ~ 2023.12.05

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 : SeungMin Gil (Signature)	Technical Manager Name : JaeJin Lee (Signature)

2023 . 12 . 28 .

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
DRTFCC2312-0173	Dec. 28, 2023	Initial issue	SeungMin Gil	JaeJin Lee

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1. GENERAL INFORMATION

Equipment Class	PCS Licensed Transmitter (PCB)
Product Name	Telematics(24CY DCM 5G)
Model Name	TF24SENI
Add Model Name	-
PMN(Product Marketing Name)	TF24SENI
FVIN(Firmware Version Identification Number)	N/A
EUT Serial Number	No specified
Supplying power	DC 12 V
Waveform	CP-OFDM, DFT-S-OFDM
Modulation type	π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM
Channel Bandwidth(MHz)	NR Band n77: 100, 90, 80, 60, 50, 40, 30, 20

	Antenna Gain(dBi)	
NR Band	Internal Antenna 2 (PIFA Antenna)	External Antenna 2 (Pannel Antenna)
n77(3 450 ~ 3 550 MHz)	-1.7	0.6
n77(3 700 ~ 3 980 MHz)	-0.2	-0.2

Note: The antenna gain was corrected for path loss from the conducted feed point to the antenna terminal.

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.

This device has 4 antennas and RF switch circuit.

5G NR Band	Internal antenna 1	Internal antenna 2	External antenna 1	External antenna 2
n12, n5, n66, n2	Support	Support	Support	Support
n77	Not support	Support	Not support	Support

The device does not support MIMO technology.

2.2. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 ℃ ~ +25 ℃
▪ Relative Humidity	42 % ~ 46 %

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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Telephone	:	+ 82-31-321-2664
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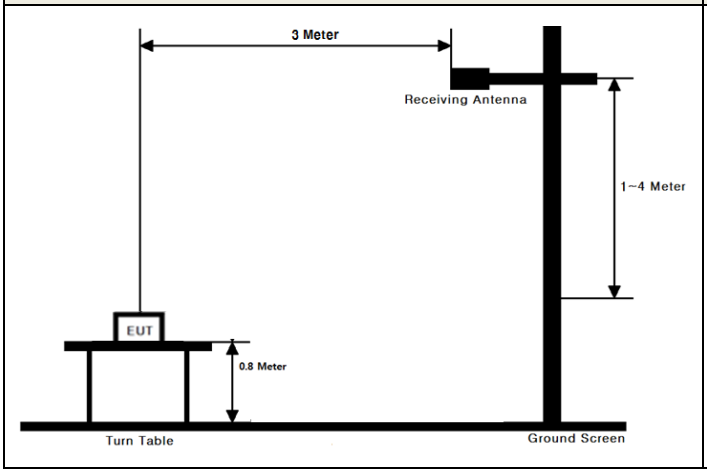
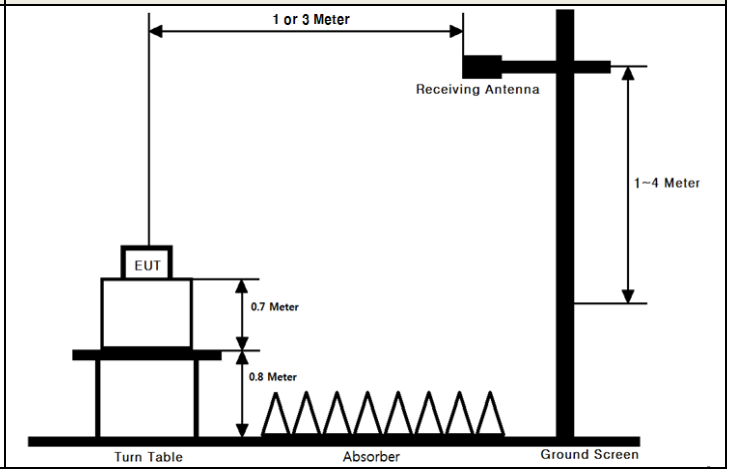
3. DESCRIPTION OF TESTS

3.1. EIRP (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 % to 5 % of 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. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
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	3500.0	1.0	5.0	0.2	7.0 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.

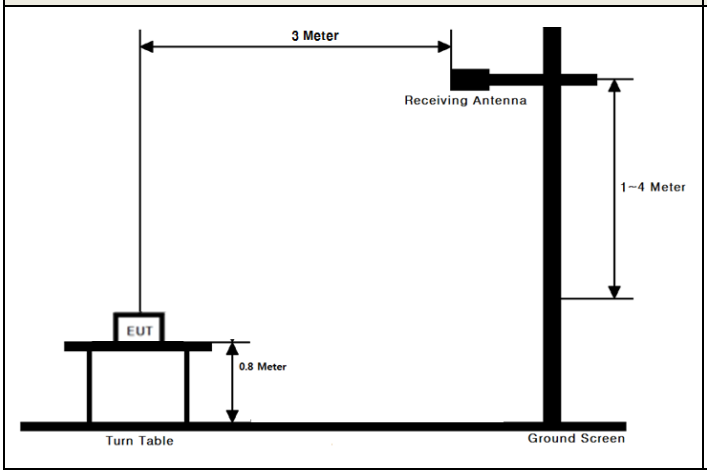
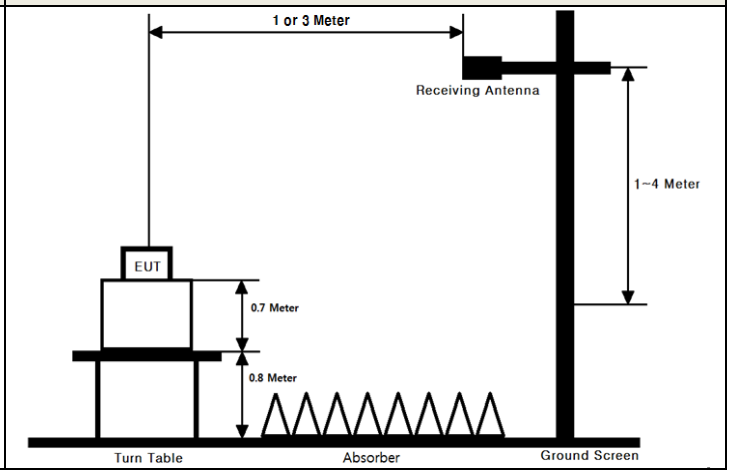
The ERP/EIRP is calculated using the following formula:

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	22/12/16	23/12/16	MY50110097
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
Power Divider	Weinschel	1515-1	23/06/23	24/06/23	UB881
Loop Antenna	ETS-Lindgren	6502	23/11/09	24/11/09	00060496
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	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	JUNFLON	MWX315	23/01/04	24/01/04	M-10

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.
Note 3: This device uses the certified module.(FCC ID: BEJTM15FNNATY0, IC: 2703H-TM15FNNATY0)
Please refer to the module test report for conducted signal test items. The conducted output power was verified to be the same as module.
Note 4: All antenna configuration were investigated and worst case data were reported.
Note 5: The DFT-s-OFDM and CP-OFDM waveforms were investigated, and worst case(DFT-s-OFDM) configuration results are 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

<Test case: External ANT 2>

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	1/271	V	17.23	8.48	25.71	0.373
		QPSK		V	16.81	8.48	25.29	0.338
		16QAM		V	16.54	8.48	25.02	0.317
		64QAM		V	14.81	8.48	23.29	0.213
		256QAM		V	13.38	8.48	21.86	0.153
90	3 495.00	π/2 BPSK	1/243	V	15.53	8.46	23.99	0.250
		QPSK		V	15.12	8.46	23.58	0.228
		16QAM		V	14.39	8.46	22.85	0.193
		64QAM		V	13.38	8.46	21.84	0.153
		256QAM		V	11.74	8.46	20.20	0.105
	3 504.99	π/2 BPSK	1/243	V	17.07	8.48	25.55	0.359
		QPSK		V	16.47	8.48	24.95	0.313
		16QAM		V	16.08	8.48	24.56	0.286
		64QAM		V	14.84	8.48	23.32	0.215
		256QAM		V	13.13	8.48	21.61	0.145
80	3 490.02	π/2 BPSK	1/107	V	15.79	8.44	24.23	0.265
		QPSK		V	15.49	8.44	23.93	0.247
		16QAM		V	15.27	8.44	23.71	0.235
		64QAM		V	14.14	8.44	22.58	0.181
		256QAM		V	12.37	8.44	20.81	0.121
	3 510.00	π/2 BPSK	1/215	V	15.74	8.47	24.21	0.263
		QPSK		V	15.54	8.47	24.01	0.252
		16QAM		V	14.63	8.47	23.10	0.204
		64QAM		V	13.44	8.47	21.91	0.155
		256QAM		V	11.70	8.47	20.17	0.104
60	3 480.00	π/2 BPSK	1/80	V	15.14	8.40	23.54	0.226
		QPSK		V	15.03	8.40	23.43	0.220
		16QAM		V	14.97	8.40	23.37	0.217
		64QAM		V	14.05	8.40	22.45	0.176
		256QAM		V	11.89	8.40	20.29	0.107
	3 519.99	π/2 BPSK	1/160	V	16.13	8.47	24.60	0.288
		QPSK		V	16.00	8.47	24.47	0.280
		16QAM		V	14.85	8.47	23.32	0.215
		64QAM		V	13.88	8.47	22.35	0.172
		256QAM		V	12.81	8.47	21.28	0.134

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	15.71	8.38	24.09	0.257
		QPSK		V	15.36	8.38	23.74	0.236
		16QAM		V	14.06	8.38	22.44	0.175
		64QAM		V	12.89	8.38	21.27	0.134
		256QAM		V	11.45	8.38	19.83	0.096
	3 525.00	π/2 BPSK	1/131	V	16.31	8.47	24.78	0.300
		QPSK		V	16.03	8.47	24.50	0.282
		16QAM		V	16.26	8.47	24.73	0.297
		64QAM		V	15.26	8.47	23.73	0.236
		256QAM		V	14.17	8.47	22.64	0.184
40	3 470.01	π/2 BPSK	1/52	V	14.76	8.35	23.11	0.205
		QPSK		V	14.75	8.35	23.10	0.204
		16QAM		V	14.05	8.35	22.40	0.174
		64QAM		V	12.83	8.35	21.18	0.131
		256QAM		V	11.30	8.35	19.65	0.092
	3 500.01	π/2 BPSK	1/1	V	16.22	8.48	24.70	0.295
		QPSK		V	15.85	8.48	24.33	0.271
		16QAM		V	13.96	8.48	22.44	0.175
		64QAM		V	13.49	8.48	21.97	0.157
		256QAM		V	11.91	8.48	20.39	0.109
	3 529.98	π/2 BPSK	1/104	V	17.41	8.46	25.87	0.386
		QPSK		V	17.30	8.46	25.76	0.377
		16QAM		V	16.40	8.46	24.86	0.306
		64QAM		V	15.25	8.46	23.71	0.235
		256QAM		V	13.90	8.46	22.36	0.172
30	3 465.00	π/2 BPSK	1/76	V	14.88	8.33	23.21	0.209
		QPSK		V	14.71	8.33	23.04	0.201
		16QAM		V	14.40	8.33	22.73	0.188
		64QAM		V	12.62	8.33	20.95	0.124
		256QAM		V	11.96	8.33	20.29	0.107
	3 500.01	π/2 BPSK	1/1	V	16.56	8.48	25.04	0.319
		QPSK		V	16.32	8.48	24.80	0.302
		16QAM		V	15.00	8.48	23.48	0.223
		64QAM		V	13.85	8.48	22.33	0.171
		256QAM		V	13.01	8.48	21.49	0.141
	3 534.99	π/2 BPSK	1/76	V	17.77	8.46	26.23	0.420
		QPSK		V	17.43	8.46	25.89	0.388
		16QAM		V	15.62	8.46	24.08	0.256
		64QAM		V	14.78	8.46	23.24	0.211
		256QAM		V	13.65	8.46	22.11	0.163

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	1/49	V	14.77	8.31	23.08	0.203
		QPSK		V	14.84	8.31	23.15	0.207
		16QAM		V	14.12	8.31	22.43	0.175
		64QAM		V	13.35	8.31	21.66	0.147
		256QAM		V	12.16	8.31	20.47	0.111
	3 500.01	π/2 BPSK	1/25	V	16.37	8.48	24.85	0.305
		QPSK		V	16.20	8.48	24.68	0.294
		16QAM		V	14.69	8.48	23.17	0.208
		64QAM		V	14.16	8.48	22.64	0.184
		256QAM		V	12.77	8.48	21.25	0.133
	3 540.00	π/2 BPSK	1/25	V	17.55	8.46	26.01	0.399
		QPSK		V	17.24	8.46	25.70	0.371
		16QAM		V	15.80	8.46	24.26	0.266
		64QAM		V	14.98	8.46	23.44	0.221
		256QAM		V	13.72	8.46	22.18	0.165

<Test case: Internal ANT 2>

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	3 534.99	π/2 BPSK	1/271	V	12.52	8.46	20.98	0.125
		QPSK		V	12.38	8.46	20.84	0.121
		16QAM		V	11.82	8.46	20.28	0.107
		64QAM		V	10.70	8.46	19.16	0.082
		256QAM		V	8.98	8.46	17.44	0.056

7.1.2. 3 700 ~ 3 980 MHz band

<Test case: External ANT 2>

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	16.81	8.28	25.09	0.322
		QPSK		V	16.45	8.28	24.73	0.297
		16QAM		V	15.81	8.28	24.09	0.256
		64QAM		V	14.53	8.28	22.81	0.191
		256QAM		V	13.70	8.28	21.98	0.158
	3 840.00	π/2 BPSK	1/271	V	16.13	8.64	24.77	0.300
		QPSK		V	15.89	8.64	24.53	0.284
		16QAM		V	15.73	8.64	24.37	0.273
		64QAM		V	14.54	8.64	23.18	0.208
		256QAM		V	12.65	8.64	21.29	0.135
	3 930.00	π/2 BPSK	1/1	V	17.14	9.07	26.21	0.418
		QPSK		V	16.43	9.07	25.50	0.354
		16QAM		V	16.23	9.07	25.30	0.338
		64QAM		V	14.98	9.07	24.05	0.254
		256QAM		V	13.23	9.07	22.30	0.170
90	3 745.02	π/2 BPSK	1/1	V	17.00	8.28	25.28	0.337
		QPSK		V	16.76	8.28	25.04	0.319
		16QAM		V	15.96	8.28	24.24	0.266
		64QAM		V	14.52	8.28	22.80	0.191
		256QAM		V	13.18	8.28	21.46	0.140
	3 840.00	π/2 BPSK	1/122	V	16.48	8.64	25.12	0.325
		QPSK		V	16.45	8.64	25.09	0.322
		16QAM		V	15.85	8.64	24.49	0.281
		64QAM		V	13.64	8.64	22.28	0.169
		256QAM		V	13.35	8.64	21.99	0.158
	3 934.98	π/2 BPSK	1/122	V	16.20	9.07	25.27	0.337
		QPSK		V	15.79	9.07	24.86	0.306
		16QAM		V	15.61	9.07	24.68	0.293
		64QAM		V	13.23	9.07	22.30	0.170
		256QAM		V	11.27	9.07	20.34	0.108
80	3 740.01	π/2 BPSK	1/1	V	17.45	8.29	25.74	0.375
		QPSK		V	16.83	8.29	25.12	0.325
		16QAM		V	16.69	8.29	24.98	0.315
		64QAM		V	14.67	8.29	22.96	0.198
		256QAM		V	12.81	8.29	21.10	0.129
	3 840	π/2 BPSK	1/1	V	16.31	8.64	24.95	0.313
		QPSK		V	16.04	8.64	24.68	0.294
		16QAM		V	15.44	8.64	24.08	0.256
		64QAM		V	15.17	8.64	23.81	0.240
		256QAM		V	13.47	8.64	22.11	0.163
	3 939.99	π/2 BPSK	1/1	V	16.79	9.06	25.85	0.385
		QPSK		V	16.65	9.06	25.71	0.372
		16QAM		V	16.16	9.06	25.22	0.333
		64QAM		V	14.47	9.06	23.53	0.225
		256QAM		V	12.53	9.06	21.59	0.144

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	1/1	V	16.75	8.30	25.05	0.320
		QPSK		V	16.48	8.30	24.78	0.301
		16QAM		V	15.68	8.30	23.98	0.250
		64QAM		V	15.20	8.30	23.50	0.224
		256QAM		V	13.35	8.30	21.65	0.146
	3 840.00	π/2 BPSK	1/1	V	16.97	8.64	25.61	0.364
		QPSK		V	16.64	8.64	25.28	0.337
		16QAM		V	15.87	8.64	24.51	0.283
		64QAM		V	14.46	8.64	23.10	0.204
		256QAM		V	13.27	8.64	21.91	0.155
	3 949.98	π/2 BPSK	1/1	V	17.17	9.06	26.23	0.419
		QPSK		V	16.89	9.06	25.95	0.394
		16QAM		V	15.72	9.06	24.78	0.301
		64QAM		V	14.83	9.06	23.89	0.245
		256QAM		V	13.09	9.06	22.15	0.164
50	3 725.01	π/2 BPSK	1/1	V	17.88	8.31	26.19	0.416
		QPSK		V	17.32	8.31	25.63	0.366
		16QAM		V	17.16	8.31	25.47	0.353
		64QAM		V	16.19	8.31	24.50	0.282
		256QAM		V	14.56	8.31	22.87	0.194
	3 840.00	π/2 BPSK	1/66	V	17.25	8.64	25.89	0.388
		QPSK		V	16.93	8.64	25.57	0.361
		16QAM		V	15.95	8.64	24.59	0.288
		64QAM		V	15.00	8.64	23.64	0.231
		256QAM		V	13.54	8.64	22.18	0.165
	3 954.99	π/2 BPSK	1/66	V	16.40	9.06	25.46	0.351
		QPSK		V	16.17	9.06	25.23	0.333
		16QAM		V	14.88	9.06	23.94	0.248
		64QAM		V	12.96	9.06	22.02	0.159
		256QAM		V	11.62	9.06	20.68	0.117
40	3 720.00	π/2 BPSK	1/52	V	17.42	8.32	25.74	0.375
		QPSK		V	17.05	8.32	25.37	0.344
		16QAM		V	16.03	8.32	24.35	0.272
		64QAM		V	14.61	8.32	22.93	0.196
		256QAM		V	13.31	8.32	21.63	0.146
	3 840.00	π/2 BPSK	1/1	V	17.81	8.64	26.45	0.442
		QPSK		V	17.56	8.64	26.20	0.417
		16QAM		V	17.22	8.64	25.86	0.385
		64QAM		V	16.34	8.64	24.98	0.315
		256QAM		V	14.52	8.64	23.16	0.207
	3 960.00	π/2 BPSK	1/1	V	16.58	9.06	25.64	0.366
		QPSK		V	16.38	9.06	25.44	0.350
		16QAM		V	15.31	9.06	24.37	0.273
		64QAM		V	13.70	9.06	22.76	0.189
		256QAM		V	12.36	9.06	21.42	0.139

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	1/1	V	17.80	8.32	26.12	0.409
		QPSK		V	17.75	8.32	26.07	0.404
		16QAM		V	17.09	8.32	25.41	0.348
		64QAM		V	16.43	8.32	24.75	0.299
		256QAM		V	13.92	8.32	22.24	0.168
	3 840.00	π/2 BPSK	1/76	V	17.08	8.64	25.72	0.373
		QPSK		V	16.79	8.64	25.43	0.349
		16QAM		V	15.32	8.64	23.96	0.249
		64QAM		V	14.92	8.64	23.56	0.227
		256QAM		V	13.27	8.64	21.91	0.155
	3 964.98	π/2 BPSK	1/76	V	16.31	9.06	25.37	0.344
		QPSK		V	16.42	9.06	25.48	0.354
		16QAM		V	16.11	9.06	25.17	0.329
		64QAM		V	14.27	9.06	23.33	0.215
		256QAM		V	12.02	9.06	21.08	0.128
20	3 710.01	π/2 BPSK	1/25	V	17.32	8.33	25.65	0.367
		QPSK		V	17.08	8.33	25.41	0.347
		16QAM		V	15.92	8.33	24.25	0.266
		64QAM		V	14.78	8.33	23.11	0.205
		256QAM		V	14.60	8.33	22.93	0.197
	3 840.00	π/2 BPSK	1/49	V	16.79	8.64	25.43	0.349
		QPSK		V	16.41	8.64	25.05	0.320
		16QAM		V	15.46	8.64	24.10	0.257
		64QAM		V	14.78	8.64	23.42	0.220
		256QAM		V	13.03	8.64	21.67	0.147
	3 969.99	π/2 BPSK	1/25	V	16.19	9.06	25.25	0.335
		QPSK		V	16.10	9.06	25.16	0.328
		16QAM		V	15.24	9.06	24.30	0.269
		64QAM		V	14.17	9.06	23.23	0.210
		256QAM		V	12.11	9.06	21.17	0.131

<Test case: Internal ANT 2>

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)
40	3 840.00	π/2 BPSK	1/1	V	10.78	8.64	19.42	0.087
		QPSK		V	10.49	8.64	19.13	0.082
		16QAM		V	10.47	8.64	19.11	0.081
		64QAM		V	8.91	8.64	17.55	0.057
		256QAM		V	7.68	8.64	16.32	0.043

7.2. UNDESIRABLE EMISSIONS (Radiated)

- Test Notes

1) 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.
2) EN-DC mode operation were investigated and the worst case configuration results are reported.
3) Limit for NR Band n77 = -13 dBm/MHz

7.2.1. 3 450 ~ 3 550 MHz band

<Test case: External ANT 2>

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	1/271	7 100.70	V	-60.81	11.71	-49.10	-13.00	36.10
		QPSK		7 100.68	V	-60.39	11.71	-48.68	-13.00	35.68
		16QAM		7 100.64	V	-60.64	11.71	-48.93	-13.00	35.93
		64QAM		7 099.23	V	-60.89	11.71	-49.18	-13.00	36.18
		256QAM		7 098.07	V	-60.55	11.71	-48.84	-13.00	35.84

<Test case: Internal ANT 2>

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)
30	3 534.99	π/2 BPSK	1/76	7 076.63	V	-60.18	11.69	-48.49	-13.00	35.49
		QPSK		7 077.43	V	-60.21	11.69	-48.52	-13.00	35.52
		16QAM		7 077.46	V	-60.38	11.69	-48.69	-13.00	35.69
		64QAM		7 076.75	V	-60.12	11.69	-48.43	-13.00	35.43
		256QAM		7 077.10	V	-60.36	11.69	-48.67	-13.00	35.67

7.2.2. 3 700 ~ 3 900 MHz band

<Test case: External ANT 2>

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	7 499.84	V	-60.27	12.16	-48.11	-13.00	35.11
		QPSK		7 500.09	V	-60.17	12.16	-48.01	-13.00	35.01
		16QAM		7 499.60	V	-60.29	12.16	-48.13	-13.00	35.13
		64QAM		7 499.70	V	-60.40	12.16	-48.24	-13.00	35.24
		256QAM		7 499.71	V	-60.16	12.16	-48.00	-13.00	35.00
	3 840.00	π/2 BPSK	1/271	7 777.24	V	-49.21	12.30	-36.91	-13.00	23.91
		QPSK		7 777.09	V	-48.52	12.30	-36.22	-13.00	23.22
		16QAM		7 777.31	V	-49.76	12.30	-37.46	-13.00	24.46
		64QAM		7 777.25	V	-51.27	12.30	-38.97	-13.00	25.97
		256QAM		7 776.93	V	-54.45	12.30	-42.15	-13.00	29.15
	3 930.00	π/2 BPSK	1/1	7 762.68	V	-47.36	12.28	-35.08	-13.00	22.08
		QPSK		7 762.67	V	-47.54	12.28	-35.26	-13.00	22.26
		16QAM		7 762.78	V	-48.21	12.28	-35.93	-13.00	22.93
		64QAM		7 762.70	V	-51.54	12.28	-39.26	-13.00	26.26
		256QAM		7 762.77	V	-53.47	12.28	-41.19	-13.00	28.19

<Test case: Internal ANT 2>

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	3 840.00	π/2 BPSK	1/1	7 644.91	V	-60.05	12.21	-47.84	-13.00	34.84
		QPSK		7 645.01	V	-60.07	12.22	-47.85	-13.00	34.85
		16QAM		7 643.74	V	-60.18	12.21	-47.97	-13.00	34.97
		64QAM		7 644.66	V	-60.18	12.21	-47.97	-13.00	34.97
		256QAM		7 644.62	V	-60.24	12.21	-48.03	-13.00	35.03

ENDC MODE: NR n77 + LTE B2

<Test case: External ANT 2>

Band	Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset
NR n77	40	3 840.0	QPSK	1/1
LTE B2	15	1 857.5	QPSK	1/36

Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
3 715.18	H	-53.47	8.32	-45.15	-13.00	32.15
7 642.60	V	-59.79	12.21	-47.58	-13.00	34.58
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-