

**ETSI EN 301 908-1 V15.2.1 (2023-01)**

**Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06)**

**ETSI TS 138 521-1 V17.4.1 (2022-07)**

**ETSI TS 138 521-3 V17.7.0 (2023-01)**

## TEST REPORT

For

**Shenzhen Huafurui Technology Co., Ltd.**

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**Tested Model: KINGKONG STAR**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Smart phone
<b>Report Number:</b>	SZ1230414-19311E
<b>Report Date:</b>	2023/5/29
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	SZ1230414-19311E	Original Report	2023/5/29

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

<b>Product Name:</b>	Smart phone
<b>EUT Model:</b>	KINGKONG STAR
<b>Rated Input Voltage:</b>	3.87Vdc from battery or 5/9/12Vdc from adapter
<b>Adapter information:</b>	Model: HJ-PD33W-EU
	100-240Vac 50/60Hz
	5Vdc 3.0A, 9Vdc 3.0A or 12Vdc 2.75A, 33W MAX
<b>Serial Number:</b>	24B1_1
<b>EUT Received Date:</b>	2023/5/1
<b>EUT Received Status:</b>	Good

### Technical Specification

<b>NR SA Band:</b>	n3: 1710-1785MHZ (TX), 1805-1880MHZ (RX) n7: 2500-2570MHZ (TX), 2620-2690MHZ (RX)
<b>Max. RF Output Power (Conducted) (dBm):</b>	n3: 24 n7: 24
<b>Antenna Gain (dBi)<sup>▲</sup>:</b>	n3: 0.24 n7: -0.6
<b>Modulation Type:</b>	DFT-s-OFDM (PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM) CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM)

### Objective

This report is prepared on behalf of *Shenzhen Huafurui Technology Co., Ltd.* in accordance with ETSI EN 301 908-1 V15.2.1 (2023-01), IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements , Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06), IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 25: New Radio (NR) User Equipment (UE), ETSI TS 138 521-1 V17.4.1 (2022-07) 5G NR, User Equipment (UE) conformance specification, Radio transmission and reception, Part 1: Range 1 standalone, ETSI TS 138 521-3 V17.7.0 (2023-01) 5G NR, User Equipment (UE) conformance specification, Radio transmission and reception, Part 3: Range 1 and Range 2 Interworking operation with other radios.

The objective is to determine the EUT compliance with ETSI EN 301 908-1 V15.2.1 (2023-01) and Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06), ETSI TS 138 521-1 V17.4.1 (2022-07) and ETSI TS 138 521-3 V17.7.0 (2023-01).

## Measurement Uncertainty

Item	Parameter	F <sub>lab</sub>	Maximum allowable uncertainty
1	ERP 30MHz-180MHz	±3.62dB	±6 dB
2	ERP 180MHz-12750MHz	±2.6 dB	±3 dB
3	Transmitter maximum output power	±0.73 dB*	±0,7 dB
4	Transmitter spectrum emissions mask	±1,6 dB*	±1,5 dB
5	Transmitter spurious emissions 9 kHz < f ≤ 4 GHz	±1.6 dB*	±2,0 dB
6	Transmitter spurious emissions 4 GHz < f ≤ 12,75 GHz	±1.6 dB	±4,0 dB
7	Transmitter Minimum output power	±0.73 dB	±2,0 dB
8	Receiver Adjacent Channel Selectivity (ACS)	±2.8 dB*	±1,1 dB
9	Receiver Blocking characteristics 1 MHz < finterferer ≤ 3 GHz	±1.5 dB*	±1,3 dB
10	Receiver Blocking characteristics 3 GHz < finterferer ≤ 12,75 GHz	±3.3 dB*	±3,2 dB
11	Receiver spurious response 1 MHz < finterferer ≤ 3 GHz	±1.5 dB*	±1,3 dB
12	Receiver spurious response 3 GHz < finterferer ≤ 12,75 GHz	±3.3 dB*	±3,2 dB
13	Receiver intermodulation characteristics	±1.3 dB	±1,4 dB
14	Receiver spurious emissions 9 kHz < f ≤ 4 GHz	±1.6 dB	±2,0 dB
15	Receiver spurious emissions 4 GHz < f ≤ 12,75 GHz	±1.6 dB	±4,0 dB
16	Transmitter adjacent channel leakage power ratio	±0.8 dB	±0,8 dB

Note: \* Test system of laboratory have a measurement uncertainty greater than that specified in harmonized standard, this equipment can still be used provided that an adjustment is made follows: any additional uncertainty in the test system over and above that specified in harmonized standard should be used to tighten the test requirements - making the test harder to pass (for some tests, e.g. receiver tests, this may require modification of stimulus signals). This procedure will ensure that a test system not compliant with harmonized standard does not increase the probability of passing a EUT that would otherwise have failed a test if a test system compliant with harmonized standard had been used.

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

## Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing according to EN 301 908-1 and EN 301 908-25.

#### 5G NR

Mode	Band	Duplex	SCS(kHz)	Bandwidths(BW)
SA	N3	FDD	15, 30	5, 10, 15, 20, 30
SA	N7	FDD	15, 30	5, 10, 15, 20

The extreme conditions which were declared by the manufacturer and the normal conditions are as below:

Extreme test Temperature(°C)		Extreme test Voltage(Vdc)	
NT, Normal Temperature:	25	NV, Normal Voltage:	4.26
LT, Low Temperature:	-10	LV, Low Voltage:	3.7
HT, High Temperature:	55	HV, High Voltage:	4.45

### EUT Exercise Software

No exercise software.

### Special Accessories

No special accessory.

### Equipment Modifications

No modifications were made to the unit tested.

### Support Equipment List and Details

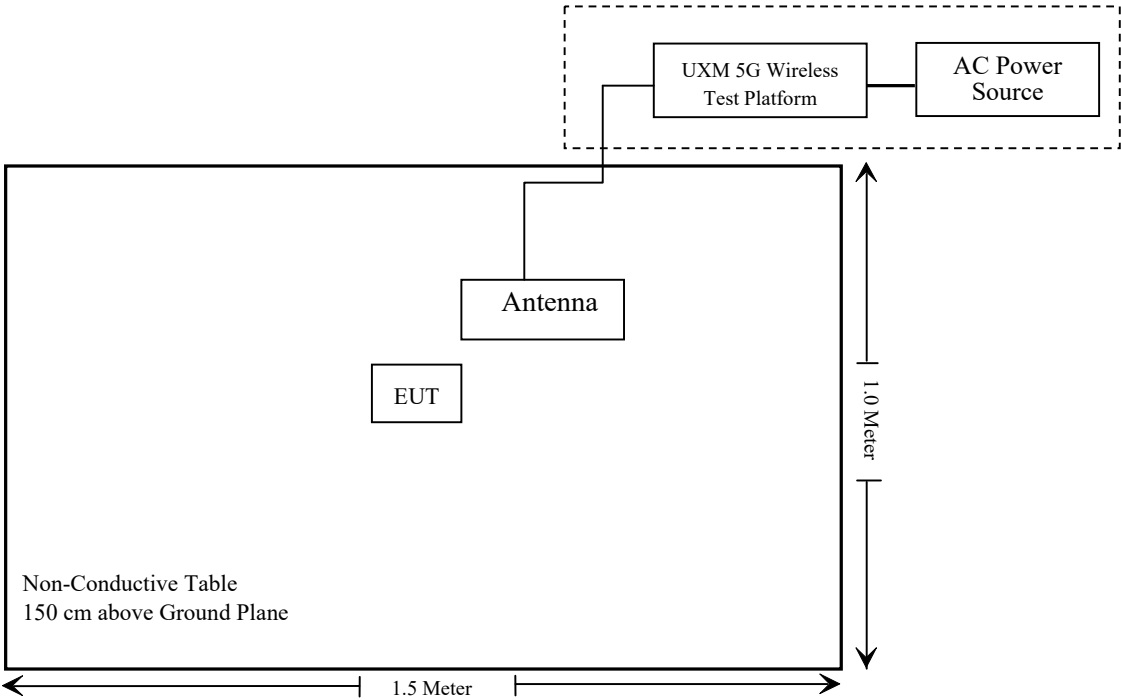
Manufacturer	Description	Model	Serial Number
Keysight	UXM 5G Wireless Test Platform	E7515B	MY58120284

### External I/O Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
DC Cable	No	No	1.2	EUT	Adapter



Block Diagram of Test Setup



**Test Equipment List**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
Sunol Sciences	Antenna	JB3	A060611-1	2020/11/10	2023/11/9
R&S	EMI Test Receiver	ESR3	102453	2022/11/18	2023/11/17
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2022/7/19	2023/7/18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2022/7/19	2023/7/18
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2022/7/19	2023/7/18
Sonoma	Amplifier	310N	372193	2022/7/18	2023/7/17
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2022/9/4	2023/9/3
Agilent	Signal Generator	E8247C	MY43321350	2022/11/18	2023/11/17
AH	Double Ridge Guide Horn Antenna	SAS-571	1394	2023/2/22	2026/2/21
Agilent	Spectrum Analyzer	E4440A	MY44303352	2022/11/22	2023/11/21
HUBER+SUHNER	Coaxial Cable	SUCOFLEX 126EA	MY369/26/26 EA	2022/10/13	2023/10/12
AH	Preamplifier	PAM-0118	135	2022/10/13	2023/10/12
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021/10/12	2024/10/11
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2022/9/4	2023/9/3
Agilent	Signal Generator	E8247C	MY43321350	2022/11/18	2023/11/17
<b>RF Conducted test</b>					
R&S	Spectrum Analyzer	FSP 38	100478	2022/11/22	2023/11/21
UNI-T	Multimeter	UT39A	M130199938	2022/11/18	2023/11/17
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A
Agilent	MXG Vector Signal Generator	N5182B	MY51350142	2022/11/18	2023/11/17
Agilent	Signal Generator	E8247C	MY43321350	2022/11/18	2023/11/17
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30173	2022/11/16	2023/11/15
JD	RF Regulatory Test System	5G NR	-	NA	NA

DecentTest	Multiplex Switch Test Control Set	DT7200SCU	DQ76345A	NA	NA
DecentTest	Filter Switch Unit	DT7200FSU	DQ76345B	NA	NA
Keysight	UXM 5G Wireless Test Platform	E7515B	MY58120284	2022/11/16	2023/11/15

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

### Environmental Conditions

Test Item:	Radiated emissions (below 1GHz)	Radiated emissions (above 1GHz)	RF Conducted test
Temperature:	23.5 °C	24.0 °C	23.3~26.8°C
Relative Humidity:	56 %	69%	38~62%
ATM Pressure:	100.9 kPa	100.4 kPa	100.1~102.6kPa
Tester:	Joe Li	Joe Li	Ken Chen
Test Date:	2023/5/12	2023/5/15	2023/5/4~2023/5/23

**SUMMARY OF TEST RESULTS**

SN	Rule and Clause	Description of Test	Test Result
1	EN 301 908-1 Clause 4.2.2	Radiated emissions (UE)	Compliant
2	EN 301 908-1 Clause 4.2.3	Radiated emissions (BS and repeater)	Not applicable
3	EN 301 908-1 Clause 4.2.4	Control and monitoring functions (UE)	Compliant
4	EN 301 908-25 Clause 4.1.2.2	Transmitter maximum output power	Compliant
5	EN 301 908-25 Clause 4.1.2.3	Transmitter minimum output power	Compliant
6	EN 301 908-25 Clause 4.1.2.4	Transmitter spectrum emission mask	Compliant
7	EN 301 908-25 Clause 4.1.2.5	Transmitter adjacent channel leakage power ratio	Compliant
8	EN 301 908-25 Clause 4.1.2.6	Transmitter spurious emissions	Compliant
9	EN 301 908-25 Clause 4.1.2.7	Receiver Reference Sensitivity Level	Compliant*
10	EN 301 908-25 Clause 4.1.2.8	Receiver adjacent channel selectivity (ACS)	Compliant*
11	EN 301 908-25 Clause 4.1.2.9	Receiver blocking characteristics	Compliant*
12	EN 301 908-25 Clause 4.1.2.10	Receiver spurious response	Compliant*
13	EN 301 908-25 Clause 4.1.2.11	Receiver intermodulation characteristics	Compliant*
14	EN 301 908-25 Clause 4.1.2.12	Receiver spurious emissions	Compliant*
15	EN 301 908-25 Clause 4.1.2.13	Transmit OFF power	Compliant

Note\*: For receiver conducted tests, the main and aux antennas coupled together for testing.

## 1 – RADIATED EMISSIONS (UE)

### Applicable Standard

This test assesses the ability of radio communications equipment and ancillary equipment to limit unwanted emissions from the enclosure port.

This test is applicable to radio communications equipment and ancillary equipment, except for NR UE operating in FR2.

NOTE: For NR UE operating in FR2, the radiated emission is covered by radiated spurious emission requirement in ETSI EN 301 908-25 [i.12].

This test shall be performed on the radio communications equipment and/or a representative configuration of the ancillary equipment.

### Limit

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out-of-band emissions and spurious emissions are based on Recommendations ITU-R SM.329-12 [1] and SM.1539-1 [i.6].

The requirements shown in table 4.2.2.2-1 are only applicable for frequencies in the spurious domain.

**Table 4.2.2.2-1: Radiated spurious emissions requirements (UE)**

Frequency	Minimum requirement (e.r.p.)/ reference bandwidth idle mode	Minimum requirement (e.r.p.)/ reference bandwidth traffic mode	Applicability
$30 \text{ MHz} \leq f < 1\,000 \text{ MHz}$	-57 dBm/100 kHz	-36 dBm/100 kHz	All
$1 \text{ GHz} \leq f < 12,75 \text{ GHz}$	-47 dBm/1 MHz	-30 dBm/1 MHz	All
$12,75 \text{ GHz} \leq f < 5^{\text{th}}$ harmonic of the upper frequency edge of the Uplink operating band in GHz	-47 dBm/1 MHz	-30 dBm/1 MHz	All (note 3)
$12,75 \text{ GHz} < f < 26 \text{ GHz}$	-47 dBm/1 MHz	-30 dBm/1 MHz	All (note 4)
$f_c - 2,5 \times 5 \text{ MHz} < f < f_c + 2,5 \times 5 \text{ MHz}$ (note 1 and note 2)	Not defined	Not defined	UTRA FDD, UTRA TDD, 3,84 Mcps option, cdma2000, spreading rate 3
$f_c - 2,5 \times \text{BW}_{\text{Channel}} \text{ MHz} < f < f_c + 2,5 \times \text{BW}_{\text{Channel}} \text{ MHz}$ (note 1 and note 2)	Not defined	Not defined	E-UTRA FDD, E-UTRA TDD, Mobile WiMAX™
$f_c - (1,5 \times \text{BW}_{\text{Channel}} + 5) \text{ MHz} < f < f_c + (1,5 \times \text{BW}_{\text{Channel}} + 5) \text{ MHz}$ (note 1)	Not defined	Not defined	NR operating in FR1
$f_c - 2,5 \times 10 \text{ MHz} < f < f_c + 2,5 \times 10 \text{ MHz}$ (note 1 and note 2)	Not defined	Not defined	UTRA TDD, 7,68 Mcps option
$f_c - 4 \text{ MHz} < f < f_c + 4 \text{ MHz}$ (note 1 and note 2)	Not defined	Not defined	UTRA TDD, 1,28 Mcps option cdma2000, spreading rate 1

NOTE 1:  $f_c$  is the UE transmit centre frequency.  
 NOTE 2: This frequency range is not in the spurious domain, no requirement is then defined for this frequency range.  
 NOTE 3: Applies for Band that the upper frequency edge of the Uplink Band more than 2,69 GHz.  
 NOTE 4: Applies for Band that the upper frequency edge of the Uplink Band more than 5,2 GHz.

## Test Procedure

According to ETSI EN 301 908-1 V15.2.1 (2023-01) clause 5.3.1

## Test Data

Note: Pretest with low, middle, high channel, the worst case please refer to following tables:

### 5G\_NR\_n3

1747.5 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
3495.00	H	51.12	-64.51	12.20	1.33	-53.64	-30.00	23.64
3495.00	V	50.83	-62.79	12.20	1.33	-51.92	-30.00	21.92
5242.50	H	50.07	-62.53	12.90	1.31	-50.94	-30.00	20.94
5242.50	V	50.45	-59.65	12.90	1.31	-48.06	-30.00	18.06
440.63	H	49.42	-60.97	0.00	0.65	-61.62	-36.00	25.62
757.47	V	45.81	-62.71	0.00	0.93	-63.64	-36.00	27.64

### 5G\_NR\_n3 idle mode

1747.5 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1450.00	H	50.71	-68.96	9.79	1.17	-60.34	-47.00	13.34
1627.00	V	50.98	-67.88	10.38	1.80	-59.30	-47.00	12.30
245.16	H	49.52	-66.31	0.00	0.50	-66.81	-57.00	9.81
757.43	V	45.83	-62.69	0.00	0.93	-63.62	-57.00	6.62

### 5G\_NR\_n7

2535 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
5070.00	H	52.71	-59.40	12.97	1.29	-47.72	-30.00	17.72
5070.00	V	51.69	-57.70	12.97	1.29	-46.02	-30.00	16.02
7605.00	H	50.44	-58.03	12.84	1.57	-46.76	-30.00	16.76
7605.00	V	50.37	-58.64	12.84	1.57	-47.37	-30.00	17.37
440.34	H	49.44	-60.96	0.00	0.65	-61.61	-36.00	25.61
826.57	V	44.23	-62.64	0.00	0.96	-63.60	-36.00	27.60

**5G NR n7 idle mode****2535 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1583.00	H	50.85	-68.32	10.25	1.59	-59.66	-47.00	12.66
1642.00	V	51.12	-67.69	10.43	1.86	-59.12	-47.00	12.12
245.28	H	49.84	-66.00	0.00	0.50	-66.50	-57.00	9.50
757.61	V	45.64	-62.88	0.00	0.93	-63.81	-57.00	6.81

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

Note 2:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

### 3 – CONTROL AND MONITORING FUNCTIONS (UE)

#### Applicable Standard

This requirement, together with other control and monitoring technical requirements identified in the table of cross references in the applicable part, verifies that the control and monitoring functions of the UE prevent it from transmitting in the absence of a valid network.

This test is applicable to radio communications equipment and ancillary equipment in the operating band defined in the applicable part of this multipart harmonized standard.

This test shall be performed on the radio communications equipment and/or a representative configuration of the ancillary equipment.

#### Limit

For NR UE operating in FR2, the maximum measured radiated power during the duration of the test shall not exceed -13 dBm.

For any other UE (including NR UE operating in FR1), the maximum measured power during the duration of the test shall not exceed -30 dBm.

#### Test Procedure

According to ETSI EN 301 908-1 V15.2.1 (2023-01) clause 5.3.3

#### Test Data

**Test Result:** Compliant.

Maximum power measured(dBm)			Limit (dBm)
First Switch on Observation Period (15 Minute)	Switch off Observation Period (0.5 Minute)	Second Switch on Observation Period (1 Minute)	
-50	-49	-54	-30



## 4 – TRANSMITTER MAXIMUM OUTPUT POWER

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.2.1, Transmitter maximum output power for Single Carrier:

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth. The period of measurement shall be at least one sub-frame (1 ms).

### Limits

The maximum output power shall be within the range prescribed by the nominal maximum output power and tolerance in tables 4.1.2.2.1.2-1 and 4.1.2.2.1.2-2.

**Table 4.1.2.2.1.2-1: Maximum Output Power test requirement for Power Class 3**

NR band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)
n1					23	$\pm 2 \pm TT$
n2					23	$\pm 2^s \pm TT$
n3					23	$\pm 2^s \pm TT$
n5					23	$\pm 2 \pm TT$
n7					23	$\pm 2^s \pm TT$
n8					23	$\pm 2^s \pm TT$
n12					23	$\pm 2^s \pm TT$
n20					23	$\pm 2^s \pm TT$
n25					23	$\pm 2 \pm TT$
n28					23	$+2/-2.5$
n34					23	$\pm 2 \pm TT$
n38					23	$\pm 2 \pm TT$
n39					23	$\pm 2 \pm TT$
n40					23	$\pm 2 \pm TT$
n41					23	$\pm 2^s \pm TT$
n50					23	$\pm 2 \pm TT$
n51					23	$\pm 2 \pm TT$
n66					23	$\pm 2 \pm TT$
n70					23	$\pm 2 \pm TT$
n71					23	$+2+TT/-2.5-TT$
n74					23	$\pm 2 \pm TT$
n77					23	$+2+TT/-3-TT$
n78					23	$+2+TT/-3-TT$
n79					23	$+2+TT/-3-TT$
n80					23	$\pm 2 \pm TT$
n81					23	$\pm 2 \pm TT$
n82					23	$\pm 2 \pm TT$
n83					23	$+2+TT/-2.5-TT$
n84					23	$\pm 2 \pm TT$
n86					23	$\pm 2 \pm TT$

NOTE 1:  $P_{PowerClass}$  is the maximum UE power specified without taking into account the tolerance

NOTE 2:  $P_{Powerclass}$  3 is default power class unless otherwise stated

NOTE 3: Refers to the transmission bandwidths (Figure 5.3.3-1 of ETSI TS 138 521-1 [1]) confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1,5 dB

NOTE 4: TT for each frequency and channel bandwidth is specified in table 4.1.2.2.1.2-3

**Table 4.1.2.2.1.2-2: Maximum Output Power test requirement for Power Class 2**

NR band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)
n41			26	+2+TT/-3 <sup>3</sup> -TT		
n77			26	+2+TT/-3-TT		
n78			26	+2+TT/-3-TT		
n79			26	+2+TT/-3-TT		

NOTE 1:  $P_{PowerClass}$  is the maximum UE power specified without taking into account the tolerance

NOTE 2:  $P_{powerclass\ 3}$  is default power class unless otherwise stated

NOTE 3: Refers to the transmission bandwidths (Figure 5.3.3-1 of ETSI TS 138 521-1 [1]) confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1,5 dB

NOTE 4: TT for each frequency and channel bandwidth is specified in table 4.1.2.2.1.2-3

**Table 4.1.2.2.1.2-3: Test Tolerance (UE maximum output power)**

	$f \leq 3.0\text{GHz}$	$3.0\text{GHz} < f \leq 4.2\text{GHz}$	$4.2\text{GHz} < f \leq 6.0\text{GHz}$
<b>BW <math>\leq 40\text{MHz}</math></b>	0.7 dB	1.0 dB	1.0 dB
<b><math>40\text{MHz} &lt; \text{BW} \leq 100\text{MHz}</math></b>	1.0 dB	1.0 dB	1.0 dB

### Test Condition

Initial conditions described in clause 6.2.1.4.1 of ETSI TS 138 521-1 [1] shall apply.

Initial conditions described in clause 6.2B.1.1.4.1 of ETSI TS 138 521-3 [1] shall apply.

### Test Procedure

Test procedure described in clause 6.2.1.4.2 of ETSI TS 138 521-1 [1] shall apply.

Test procedure described in clause 6.2B.1.1.4.1 of ETSI TS 138 521-3 [1] shall apply.

### Test Data

*EUT operation mode: Transmitting*

**Test Result: Compliant**

Please refer to plot in the Appendix A.

## 5 – TRANSMITTER MINIMUM OUTPUT POWER

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.2.3.1, Transmitter minimum output power for Single Carrier:

The minimum controlled output power of the UE is defined as the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks), when the power is set to a minimum value. The minimum output power is defined as the mean power in one sub-frame TBD 1ms.

### Limits

The minimum output power shall not exceed the values specified in table 4.1.2.3.1.2-1.

**Table 4.1.2.3.1.2-1: Minimum output power**

Channel bandwidth (MHz)	Minimum output power (dBm)	Measurement bandwidth (MHz)
5	-40+TT	4.515
10	-40+TT	9.375
15	-40+TT	14.235
20	-40+TT	19.095
25	-39+TT	23.955
30	-38.2+TT	28.815
40	-37+TT	38.895
50	-36+TT	48.615
60	-35.2+TT	58.35
80	-34+TT	78.15
90	-33.5+TT	88.23
100	-33+TT	98.31

NOTE 1: TT for each frequency and channel bandwidth is specified in table 4.1.2.3.1.2-2

**Table 4.1.2.3.1.2-2: Test Tolerance (Minimum output power)**

	$f \leq 3.0\text{GHz}$	$3.0\text{GHz} < f \leq 6.0\text{GHz}$
$\text{BW} \leq 40\text{MHz}$	1.0 dB	1.3 dB
$40\text{MHz} < \text{BW} \leq 100\text{MHz}$	1.3 dB	1.3 dB

### Test Condition

Initial conditions described in clause 6.3.1.4.1 of ETSI TS 138 521-1 [1] shall apply.

Initial conditions described in clause 6.3B.1.2.4.1 of ETSI TS 138 521-3 [1] shall apply.

**Test Procedure**

SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0\_1 for C\_RNTI to schedule the UL RMC according to table 6.3.1.4.1-1 of ETSI TS 138 521-1 [1]. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

Send continuously uplink power control "down" commands in every uplink scheduling information to the UE; allow at least 200 ms starting from the first TPC command in this step to ensure that the UE transmits at its minimum output power.

3) Measure the mean power of the UE in the associated measurement channel bandwidth specified in table 4.1.2.3.1.2-1 for the specific channel bandwidth under test. The period of measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

**Test Data**

*EUT operation mode: Transmitting*

**Test Result: Compliant**

Please refer to plot in the Appendix B.

## 6 – TRANSMITTER SPECTRUM EMISSION MASK

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.4.1, Transmitter spectrum emission mask for Single Carrier:

The spectrum emission mask of the UE applies to frequencies ( $\Delta f_{\text{OoB}}$ ) starting from the  $\pm$  edge of the assigned E-UTRA channel bandwidth

Limit:

The power of any UE emission shall fulfil requirements in tables 4.1.2.4.1.2.1-1.

Table 4.1.2.4.1.2.1-1: NR General spectrum emission mask

	Spectrum emission limit (dBm) / Channel bandwidth													
$\Delta f_{\text{OoB}}$ (MHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz	Measurement bandwidth	
$\pm 0-1$	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT						1 % channel bandwidth	
$\pm 0-1$								-24 + TT	-24 + TT	-24 + TT	-24 + TT	-24 + TT	30 kHz	
$\pm 1-5$	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	-10 + TT	1 MHz	
$\pm 5-6$	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT	-13 + TT		
$\pm 6-10$	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 10-15$		-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 15-20$			-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 20-25$				-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 25-30$					-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 30-35$						-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 35-40$							-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 40-45$								-25 + TT	-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 45-50$									-25 + TT	-25 + TT	-25 + TT	-25 + TT		
$\pm 50-55$										-25 + TT	-25 + TT	-25 + TT		
$\pm 55-60$											-25 + TT	-25 + TT		
$\pm 60-65$												-25 + TT		
$\pm 65-80$														
$\pm 80-90$														
$\pm 90-95$														
$\pm 95-100$														
$\pm 100-105$														

Note 1:

The first and last measurement position with a 30 kHz filter is at  $\Delta f_{\text{OoB}}$  equals to 0.015 MHz and 0.985 MHz.

Note 2:

At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3:

The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.

Note 4:

TT for each frequency and channel bandwidth is specified in table 4.1.2.4.1.2.1-2.

Table 4.1.2.4.1.2.1-2: Test Tolerance (Spectrum Emission Mask)

	$f \leq 3.0\text{GHz}$	$3.0\text{GHz} < f \leq 4.2\text{GHz}$	$4.2\text{GHz} < f \leq 6.0\text{GHz}$
$BW \leq 100\text{MHz}$	1.5 dB	1.8 dB	1.8 dB

### Test Condition

Initial conditions described in clause 6.5.2.2.4.1 of ETSI TS 138 521-1 [1] shall apply for General spectrum emission mask.

Initial conditions described in clause 6.5B.2.1.1.4.1 of ETSI TS 138 521-3 [1] shall apply for Additional spectrum emission mask.

### Test Procedure

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §5.1.3.3.1.1.2

Test procedure described below shall apply for General spectrum emission mask:

1) SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0\_1] for C\_RNTI to schedule the UL RMC according to table 6.5.2.2.4.1-1 of ETSI TS 138 521-1 [1]. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2) Send continuously power control "up" commands to the UE until the UE transmits at PUMAX level. Allow at least 200ms for the UE to reach PUMAX level.

3) Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in table 4.1.2.2.1.2-1 (for Transmitter maximum output power for single carrier) or table 6.2.2.5-1 (for Maximum power reduction) of ETSI TS 138 521-1 [1]. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

4) Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 4.1.2.4.1.2.1-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5.2.2.4.1-1 of ETSI TS 138 521-1 [1], send an NR RRCReconfiguration message according to ETSI TS 138 508-1 [4] clause 4.6.3 table 4.6.3-89 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an NR RRCReconfiguration message with CP-OFDM condition.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5.2.2.4.1-1 of ETSI TS 138 521-1 [1], send an NR RRCReconfiguration message according to ETSI TS 138 508-1 [4] clause 4.6.3 table 4.6.3-89 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an NR RRCReconfiguration message with CP-OFDM condition.

Test procedure described below shall apply for Additional spectrum emission mask:

1) SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0\_1] for C\_RNTI to schedule the UL RMC according to the applicable table from table 6.2.4.3.1-1 to table 6.2.4.3.1-2.1 of ETSI TS 138 521-1 [1]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2) Send continuously uplink power control "up" commands in the uplink scheduling information to the UE. Allow at least 200 ms starting from the first TPC command in this step for the UE to reach PUMAX level.

3) Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test

### Test Data

*EUT operation mode: Transmitting*

**Test Result: Compliant**

Please refer to plot in the Appendix C.

## 7 – TRANSMITTER ADJACENT CHANNEL LEAKAGE POWER RATIO

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.5.1,

The Out of band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and an adjacent channel leakage power ratio.

Adjacent channel leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency. NR adjacent channel leakage power ratio (NRACLR) is the ratio of the filtered mean power centred on the assigned NR channel frequency to the filtered mean power centred on an adjacent NR channel frequency at nominal channel spacing.

UTRA adjacent channel leakage power ratio (UTRAACLR) is the ratio of the filtered mean power centred on the assigned NR channel frequency to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

UTRA ACLR requirement is applicable when signalled by the network with network signalling value indicated by the field additionalSpectrumEmission.

### Limits

If the measured adjacent channel power is greater than –50 dBm then the measured NR ACLR shall be higher than the limits in table 4.1.2.5.1.2.1-2.

**Table 4.1.2.5.1.2.1-1: NR ACLR measurement bandwidth**

NR channel bandwidth / NR ACLR measurement bandwidth												
	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
NR ACLR measurement bandwidth	4.51 5	9.37 5	14.23 5	19.09 5	23.95 5	28.81 5	38.89 5	48.61 5	58.3 5	78.1 5	88.2 3	98.31

**Table 4.1.2.5.1.2.1-2: NR ACLR requirement**

	Power class 1	Power class 2	Power class 3
NR <sub>ACLR</sub>		31 + TT dB	30 + TT dB
NOTE 1: TT for each frequency and channel bandwidth is specified in table 4.1.2.5.1.2.1-3.			

**Table 4.1.2.5.1.2.1-3: Test Tolerance (NR ACLR)**

	f ≤ 3.0GHz	3.0GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6.0GHz
BW ≤ 100MHz	0.8 dB	0.8 dB	0.8 dB

If the measured adjacent channel power is greater than  $-50$  dBm then the measured UTRA ACLR shall be higher than the limits in table 6.5.2.2.1.5-24.1.2.5.1.2.2-2.

NR channel bandwidth / NR ACLR measurement bandwidth												
	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
NR ACLR measurement bandwidth	4,515	9,375	14,235	19,095	23,955	28,815	38,895	48,615	58,35	78,15	88,23	98,31

**Table 4.1.2.5.1.2.2-2: UTRA ACLR requirement**

	Power class 3
$UTRA_{ACLR1}$	33 dB + TT
$UTRA_{ACLR2}$	36 dB + TT
NOTE 1: TT = 0.8 dB for $f \leq 4.0$ GHz, TT = 1.0 dB for $4.0$ GHz $< f \leq 6.0$ GHz,	

### Test Condition

Initial conditions described in clause 6.5.2.4.1.4.1 of ETSI TS 138 521-1 [1] shall apply for NR ACLR.  
Initial conditions described in clause 6.5B.2.1.3.4.1 of ETSI TS 138 521-3 [1] shall apply for NR ACLR.

### Test Procedure

Test procedure described in clause 6.5.2.4.1.4.2 of ETSI TS 138 521-1 [1] shall apply for NR ACLR.  
Test procedure described in clause 6.5B.2.1.3.4.1 of ETSI TS 138 521-2 [1] shall apply for NR ACLR.

### Test Data

*EUT operation mode: Transmitting*

#### Test Result: Compliant

Please refer to plot in the Appendix D.



## 8 – TRANSMITTER SPURIOUS EMISSIONS

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.6, Transmitter spurious emissions for Single Carrier:

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated.

### Limits

This clause specifies the requirements for the specified NR band for Transmitter Spurious emissions requirement with frequency range as indicated in table 4.1.2.6.1.2.1-1.

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in table 4.1.2.6.1.2.1-0 from the edge of the channel bandwidth. The spurious emission limits in table 4.1.2.6.1.2.1-1 apply for all transmitter band configurations (NRB) and channel bandwidths. The measured average power of spurious emission shall not exceed the described value in table 4.1.2.6.1.2.1-1.

NOTE 1: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

NOTE 2: To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

**Table 4.1.2.6.1.2.1-1: Boundary between NR out of band and general spurious emission domain**

Channel bandwidth	OOB boundary $\Delta f_{\text{OOB}}$ (MHz)
$BW_{\text{channel}}$	$BW_{\text{channel}} + 5$

**Table 4.1.2.6.1.2.1-2: General spurious emissions test requirements**

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	-36 dBm	1 kHz	
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	-36 dBm	10 kHz	
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-36 dBm	100 kHz	
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-30 dBm	1 MHz	
	-25 dBm	1 MHz	3
$12.75 \text{ GHz} \leq f < 5\text{th}$ harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	1
$12.75 \text{ GHz} < f < 26 \text{ GHz}$	-30 dBm	1 MHz	2
NOTE 1: Applies for Band that the upper frequency edge of the UL Band more than 2.69 GHz			
NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz			
NOTE 3: Applies for EN-DC combinations that include n41 when NS_04 is signalled.			

Requirements for spurious emissions for UE co-existence, see the: Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) Table 4.1.2.6.1.2.2-1: Requirements for spurious emissions for UE co-existence

### Test Condition

Initial conditions described in clause 6.5.3.1.4.1, 6.5.3.2.4.1 and 6.5.3.3.4.1 of ETSI TS 138 521-1 [1] shall apply for spurious emissions.

Initial conditions described in clause 6.2B.3.1.4.1, 6.2B.3.2.4.1 and 6.2B.3.3.4.1 of ETSI TS 138 521-3 [1] shall apply for spurious emissions.

### Test Procedure

Test procedure described as below shall apply for General spurious emissions:

- 1) SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0\_1] for C\_RNTI to schedule the UL RMC according to table 6.5.3.1.4.1-1 of ETSI TS 138 521-1 [1]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 2) Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at PUMAX level.
- 3) Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 4.1.2.6.1.2.1-2. The centre frequency of the filter shall be stepped in contiguous steps according to table 4.1.2.6.1.2.1-2. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

Test procedure described in clause 6.5.3.2.4.2 of ETSI TS 138 521-1 [1] shall apply for Spurious emission for UE co-existence.

Test procedure described in clause 6.5.3.3.4.2 of ETSI TS 138 521-1 [1] shall apply for Additional spurious emissions.

### Test Data

*EUT operation mode: Transmitting*

**Test Result: Compliant**

Please refer to plot in the Appendix E.

## 9 – RECEIVER REFERENCE SENSITIVITY LEVEL

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### Applicable Standard

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

In later subclauses of Section 4 where the value of REFSENS is used as a reference to set the corresponding requirement:

in all bands, the UE shall be verified against those requirements by applying the REFSENS value in Table 7.3.2-1 4.1.2.7.1-1 with 2 Rx antenna ports tested;

for bands where the UE is required to be equipped with 4 Rx antenna ports, the UE shall additionally be verified against those requirements by applying the resulting REFSENS value derived from the requirement in Table 7.3.2-2 4.1.2.7.1-2 with 4 Rx antenna ports tested.

### Limits

The throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in ETSI TS 138.101-1, Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in ETSI TS 138.101-1, Annex A.5.1.1/A.5.2.1) with parameters specified in Table 1.2.7.1-1 and Table 4.1.2.7.1-2.

Table 4.1.2.7.1-1: Two antenna port reference sensitivity QPSK PREFSENS

Operating Band	Operating band / SCS / Channel bandwidth / Duplex-mode													Duplex Mode
	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	
n1	15	-100.0	-96.8	-95.0	-93.8									FDD
	30		-97.1	-95.1	-94.0									
	60		-97.5	-95.4	-94.2									
n2	15	-98.0	-94.8	-93.0	-91.8									FDD
	30		-95.1	-93.1	-92.0									
	60		-95.5	-93.4	-92.2									
n3	15	-97.0	-93.8	-92.0	-90.8	-89.7	-88.9							FDD
	30		-94.1	-92.1	-91.0	-89.8	-89.0							
	60		-94.5	-92.4	-91.2	-90.0	-89.1							
n5	15	-98.0	-94.8	-93.0	-90.8									FDD
	30		-95.1	-93.1	-91.0									
	60													
n7 <sup>1</sup>	15	-98.0	-94.8	-93.0	-91.8									FDD
	30		-95.1	-93.1	-92.0									
	60		-95.5	-93.4	-92.2									
n8	15	-97.0	-93.8	-92.0	-90.0									FDD
	30		-94.1	-92.1	-90.2									
	60													
n12	15	-97.0	-93.8	-94.0										FDD
	30		-94.1	-94.1										
	60													
n20	15	-97.0	-93.8	-91.0	-89.8									FDD
	30		-94.1	-91.1	-90.0									
	60													
n25	15	-96.5	-93.3	-91.5	-90.3									FDD
	30		-93.6	-91.6	-90.5									
	60		-94.0	-91.9	-90.7									
n28	15	-98.5	-95.5	-93.5	-90.8									FDD
	30		-95.6	-93.6	-91.0									
	60													
n34	15	-100.0	-96.8	-95.0										TDD
	30		-97.1	-95.1										
	60		-97.5	-95.4										
n38 <sup>1</sup>	15	-100.0	-96.8	-95.0	-93.8									TDD
	30		-97.1	-95.1	-94.0									
	60		-97.5	-95.4	-94.2									
n39	15	-100.0	-96.8	-95.0	-93.8	-92.7	-91.9	-90.6						TDD
	30		-97.1	-95.1	-94.0	-92.8	-92.0	-90.7						
	60		-97.5	-95.4	-94.2	-93.0	-92.1	-90.9						
n40	15	-100.0	-96.8	-95.0	-93.8	-92.7	-91.9	-90.6	-89.6					TDD
	30		-97.1	-95.1	-94.0	-92.8	-92.0	-90.7	-89.7	-88.9	-87.6			
	60		-97.5	-95.4	-94.2	-93.0	-92.1	-90.9	-89.8	-89.1	-87.6			
n41 <sup>1</sup>	15		-94.8	-93.0	-91.8			-88.6	-87.6					TDD
	30		-95.1	-93.1	-92.0			-88.7	-87.7	-86.9	-85.6	-85.1	-84.7	
	60		-95.5	-93.4	-92.2			-88.9	-87.8	-87.1	-85.6	-85.1	-84.7	
n50	15	-100.0	-96.8	-95.0	-93.8			-90.6	-89.6					TDD
	30		-97.1	-95.1	-94.0			-90.7	-89.7	-88.9	-87.6			
	60		-97.5	-95.4	-94.2			-90.9	-89.8	-89.1	-87.6			

Operating Band	Operating band / SCS / Channel bandwidth / Duplex-mode													Duplex Mode
	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	
n51	15	-100.0												TDD
	30													
	60													
n66	15	-99.5	-96.3	-94.5	-93.3			-90.1						FDD
	30		-96.6	-94.6	-93.5			-90.2						
	60		-97.0	-94.9	-93.7			-90.4						
n70	15	-100.0	-96.8	-95.0	-93.8	-92.7								FDD
	30		-97.1	-95.1	-94.0	-92.8								
	60		-97.5	-95.4	-94.2	-93.0								
n71	15	-97.2	-94.0	-91.6	-86.0									FDD
	30		-94.3	-91.9	-87.4									
	60	-												
n74	15	-99.5 <sup>3</sup>	-96.3 <sup>3</sup>	-94.5 <sup>3</sup>	-93.3 <sup>3</sup>									FDD
	30		-96.6 <sup>3</sup>	-94.6 <sup>3</sup>	-93.5 <sup>3</sup>									
	60		-97.0 <sup>3</sup>	-94.9 <sup>3</sup>	-93.7 <sup>3</sup>									
n77 (3.3 to 3.8 GHz) <sup>1</sup>	15		-95.8	-94.0	-92.7			-89.6	-88.6					TDD
	30		-96.1	-94.1	-92.9			-89.7	-88.7	-87.9	-86.6	-86.1	-85.6	
	60	-	-96.5	-94.4	-93.1			-89.9	-88.8	-88.0	-86.7	-86.2	-85.7	
n77 <sup>1</sup>	15		-95.3	-93.5	-92.2			-89.1	-88.1					TDD
	30		-95.6	-93.6	-92.4			-89.2	-88.2	-87.4	-86.1	-85.6	-85.1	
	60	-	-96.0	-93.9	-92.6			-89.4	-88.3	-87.5	-86.2	-85.7	-85.2	
n78 <sup>1</sup>	15		-95.8	-94.0	-92.7			-89.6	-88.6					TDD
	30		-96.1	-94.1	-92.9			-89.7	-88.7	-87.9	-86.6	-86.1	-85.6	
	60		-96.5	-94.4	-93.1			-89.9	-88.8	-88.0	-86.7	-86.2	-85.7	
n79 <sup>1</sup>	15							-89.6	-88.6					TDD
	30							-89.7	-88.7	-87.9	-86.6		-85.6	
	60							-89.9	-88.8	-88.0	-86.7		-85.7	

NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE.  
 NOTE 2: The transmitter shall be set to P<sub>UMAX</sub> as defined in subclause 6.2.4  
 NOTE 3: <sup>3</sup> indicates that the requirement is modified by -0.5 dB when the assigned NR channel bandwidth is confined within 1475.9-1510.9 MHz.

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 4.1.2.7.1-1 shall be modified by the amount given in  $\Delta R_{B,4R}$  in Table 4.1.2.7.1-2 for the applicable operating bands.

Table 4.1.2.7.1-2: Four antenna port reference sensitivity allowance  $\Delta R_{B,4R}$

Operating band	$\Delta R_{B,4R}$ (dB)
n1, n2, n3, n40, n7, n34, n38, n39, n41, n66, n70	-2.7
n77, n78, n79	-2.2

The reference receive sensitivity (REFSENS) requirement specified in Table 4.1.2.7.1-1 and Table 4.1.2.7.1-2 shall be met for an uplink transmission using QPSK DFT-s-OFDM waveforms and for uplink transmission bandwidth less than or equal to that specified in Table 4.1.2.7.1-3.

Table 4.1.2.7.1-3: Uplink configuration for reference sensitivity

Operating Band	Operating band / SCS / Channel bandwidth / Duplex mode													Duplex Mode
	SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz	
n1	15	25	50 <sup>1</sup>	75 <sup>1</sup>	100 <sup>1</sup>									FDD
	30		24	36 <sup>1</sup>	50 <sup>1</sup>									
	60		10 <sup>1</sup>	18	24									
n2	15	25	50 <sup>1</sup>	50 <sup>1</sup>	50 <sup>1</sup>									FDD
	30	10 <sup>1</sup>	24	24 <sup>1</sup>	24 <sup>1</sup>									
	60		10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>11</sup>									
n3	15	25	50 <sup>1</sup>	50 <sup>1</sup>	50 <sup>1</sup>	50 <sup>1</sup>	50 <sup>1</sup>							FDD
	30		24	24 <sup>1</sup>	24 <sup>1</sup>	24 <sup>1</sup>	24 <sup>1</sup>							
	60		10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>							
n5	15	25	25 <sup>1</sup>	25 <sup>1</sup>	25 <sup>1</sup>									FDD
	30		10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>									
	60													
n7	15	25	50 <sup>1</sup>	75 <sup>1</sup>	75 <sup>1</sup>									FDD
	30		24	36 <sup>1</sup>	36 <sup>1</sup>									
	60		10 <sup>1</sup>	18	18 <sup>1</sup>									
n8	15	25	25 <sup>1</sup>	25 <sup>1</sup>	25 <sup>1</sup>									FDD
	30		10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>									
	60													
n12	15	20 <sup>1</sup>	20 <sup>1</sup>	20 <sup>1</sup>										FDD
	30		10 <sup>1</sup>	10 <sup>1</sup>										
	60													
n20	15	25	20 <sup>1</sup>	20 <sup>2</sup>	20 <sup>2</sup>									FDD
	30		10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>2</sup>									
	60													
n25	15	25	50	50 <sup>1</sup>	50 <sup>1</sup>									FDD
	30		24	24 <sup>1</sup>	24 <sup>1</sup>									
	60		10	10 <sup>1</sup>	10 <sup>1</sup>									
n28	15	25	25 <sup>1</sup>	25 <sup>1</sup>	25 <sup>1</sup>									FDD
	30		10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>									
	60													
n34	15	25	50	75										TDD
	30		24	36										
	60		10	18										
n38	15	25	50	75	100									TDD
	30		24	36	50									
	60		10	18	24									
n39	15	25	50	75	100	128	160	216						TDD
	30		24	36	50	64	75	100						
	60		10	18	24	30	36	50						
n40	15	25	50	75	100	128	160	216	270					TDD
	30		24	36	50	64	75	100	128	162	216			
	60		10	18	24	30	36	50	64	75	100			
n41	15		50	75	100			216	270					TDD
	30		24	36	50			100	128	162	216	243	270	
	60		10	18	24			50	64	75	100	120	135	
n50	15	25	50	75	100			216	270					TDD
	30		24	36	50			100	128	162	NOTE 3			
	60		10	18	24			50	64	75	NOTE 3			

Operating band / SCS / Channel bandwidth / Duplex mode														Duplex Mode
Operating Band	SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz	
n51	15	25												TDD
	30													
	60													
n66	15	25	50 <sup>1</sup>	75 <sup>1</sup>	100 <sup>1</sup>			216						FDD
	30		24	36 <sup>1</sup>	50 <sup>1</sup>			100 <sup>1</sup>						
	60		10 <sup>1</sup>	18	24			50 <sup>1</sup>						
n70	15	25	50 <sup>1</sup>	75 <sup>1</sup>	NOTE 3	NOTE 3								FDD
	30		24	36 <sup>1</sup>	NOTE 3	NOTE 3								
	60		10 <sup>1</sup>	18	NOTE 3	NOTE 3								
n71	15	25	25 <sup>1</sup>	20 <sup>1</sup>	20 <sup>1</sup>									FDD
	30		12 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>									
	60													
n74	15	25	25 <sup>1</sup>	25 <sup>1</sup>	25 <sup>1</sup>									FDD
	30		10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>									
	60		5 <sup>1</sup>	5 <sup>1</sup>	5 <sup>1</sup>									
n77	15		50	75	100			216	270					TDD
	30		24	36	50			100	128	162	216	243	270	
	60	-	10	18	24			50	64	75	100	120	135	
n77 (3.8 to 4.2 GHz)	15		50	75	100			216	270					TDD
	30		24	36	50			100	128	162	216	243	270	
	60		10	18	24			50	64	75	100	120	135	
n78	15		50	75	100			216	270					TDD
	30		24	36	50			100	128	162	216	243	270	
	60		10	18	24			50	64	75	100	120	135	
n79	15							216	270					TDD
	30							100	128	162	216		270	
	60							50	64	75	100		135	

NOTE 1: <sup>1</sup> Refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1).

NOTE 2: <sup>2</sup> refers to Band 20; for 15 kHz SCS, in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB<sub>start</sub> 11 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB<sub>start</sub> 16; for 30 kHz SCS, in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB<sub>start</sub> 6 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB<sub>start</sub> 8; for 60 kHz SCS, in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB<sub>start</sub> 3 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB<sub>start</sub> 4;

NOTE 3: For DL channel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest duplex distance shall be used.

Unless given by Table 4.1.2.7.1-4, the minimum requirements specified in Tables 4.1.2.7.1-1 and 4.1.2.7.1-2 shall be verified with the network signalling value NS\_01 (Table 6.2.3-1) configured.

Table 4.1.2.7.1-4: Network signaling value for reference sensitivity

Operating band	Network Signalling value
n2	NS_03
n12	NS_06
n25	NS_03
n66	NS_03
n70	NS_03
n71	NS_35

## Test Data

*EUT operation mode: Receive.*

**Test Result: Compliance**

Band	Test Mode	Test Condition					Throughput (%)	Limits (%)
N3	5MHz_15kHz_1712.5MHz_DFT-s-OFDM_QPSK_RB25@0	NTNV	LTLV	LTHV	HTLV	HTHV	99	100
N3	5MHz_15kHz_1747.5MHz_DFT-s-OFDM_QPSK_RB25@0	NTNV	LTLV	LTHV	HTLV	HTHV	99	100
N3	5MHz_15kHz_1782.5MHz_DFT-s-OFDM_QPSK_RB25@0	NTNV	LTLV	LTHV	HTLV	HTHV	99	100
N3	20MHz_15kHz_1720MHz_DFT-s-OFDM_QPSK_RB50@56	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N3	20MHz_15kHz_1747.5MHz_DFT-s-OFDM_QPSK_RB50@56	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N3	20MHz_15kHz_1775MHz_DFT-s-OFDM_QPSK_RB50@56	NTNV	LTLV	LTHV	HTLV	HTHV	99	100
N3	30MHz_15kHz_1725MHz_DFT-s-OFDM_QPSK_RB50@110	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N3	30MHz_15kHz_1747.5MHz_DFT-s-OFDM_QPSK_RB50@110	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N3	30MHz_15kHz_1770MHz_DFT-s-OFDM_QPSK_RB50@110	NTNV	LTLV	LTHV	HTLV	HTHV	100	100

Band	Test Mode	Test Condition					Throughput (%)	Limits (%)
N7	5MHz_15kHz_2502.5MHz_DFT-s-OFDM_QPSK_RB25@0	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	5MHz_15kHz_2535MHz_DFT-s-OFDM_QPSK_RB25@0	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	5MHz_15kHz_2567.5MHz_DFT-s-OFDM_QPSK_RB25@0	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	15MHz_15kHz_2507.5MHz_DFT-s-OFDM_QPSK_RB75@4	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	15MHz_15kHz_2535MHz_DFT-s-OFDM_QPSK_RB75@4	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	15MHz_15kHz_2562.5MHz_DFT-s-OFDM_QPSK_RB75@4	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	20MHz_15kHz_2510MHz_DFT-s-OFDM_QPSK_RB75@31	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	20MHz_15kHz_2535MHz_DFT-s-OFDM_QPSK_RB75@31	NTNV	LTLV	LTHV	HTLV	HTHV	100	100
N7	20MHz_15kHz_2560MHz_DFT-s-OFDM_QPSK_RB75@31	NTNV	LTLV	LTHV	HTLV	HTHV	100	100



## 10 – RECEIVER ADJACENT CHANNEL SELECTIVITY (ACS)

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.8.1,

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

### Limits

The UE shall fulfil the minimum requirements specified in Table 4.1.2.8.1-1 for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz and the minimum requirements specified in Table 4.1.2.8.1-2. for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz. These requirements apply for all values of an adjacent channel interferer up to -25 dBm and for any SCS specified for the channel bandwidth of the wanted signal. However, it is not possible to directly measure the ACS; instead the lower and upper range of test parameters are chosen as in Table 4.1.2.8.1-3 and Table 4.1.2.8.1-4 for verification of the requirements specified in Table 4.1.2.8.1-1 and as in Table 4.1.2.8.1-5 and Table 4.1.2.8.1-6 for verification of the requirements specified in Table 4.1.2.8.1-2. For these test parameters, the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in [Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1)]. For operating bands with an unpaired DL part (as noted in [Table 5.5-1]), the requirements only apply for carriers assigned in the paired part.

**Table 4.1.2.8.1-1: ACS for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
ACS	dB	[33]	[33]	[30]	[27]	[26]
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
ACS	dB	[25.5]	[24]	[23]	[22.5]	[21]
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
ACS	dB	[20.5]	[20]			

**Table 4.1.2.8.1-2: ACS for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
ACS	dB	[33]	[33]	[33]	[33]	[33]
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
ACS	dB	[33]	[33]	[33]	[33]	

**Table 4.1.2.8.1-3: Test parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, case 1**

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [45.5] dB	REFSENS + [45.5] dB	REFSENS + [42.5] dB	REFSENS + [39.5] dB	REFSENS + [38.5] dB
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [38] dB	REFSENS + [36.5] dB	REFSENS + [35.5] dB	REFSENS + [35] dB	REFSENS + [33.5] dB
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [33] dB	REFSENS + [32.5] dB			
$BW_{interferer}$	MHz	5	5			
$F_{interferer}$ (offset)	MHz	47.5 / -47.5	52.5 / -52.5			
NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L1,c}$ at the minimum UL configuration specified in Table 4.1.2.7-3 with $P_{CMAX\_L1,c}$ defined in clause 4.1.2.2.1.x.						
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 3: The interferer consists of the NR interferer RMC specified in [...]						

**Table 4.1.2.8.1-4: Test parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, case 2**

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
Power in transmission bandwidth configuration	dBm	[-56.5]	[-56.5]	[-53.5]	[-50.5]	[-49.5]
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	[-49]	[-47]	[-46.5]	[-46]	[-44.5]
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
Power in transmission bandwidth configuration	dBm	[-44]	[-43.5]			
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	5	5			
$F_{interferer}$ (offset)	MHz	47.5 / -47.5	52.5 / -52.5			
NOTE 1: The transmitter shall be set to 24 dB below $P_{CMAX\_L1,c}$ at the minimum UL configuration specified in Table 4.1.2.7-3 with $P_{CMAX\_L1,c}$ defined in clause 4.1.2.2.1.x.						
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 3: The interferer consists of the RMC specified in [...]						

**Table 4.1.2.8.1-5: Test parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, case 1**

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [45.5] dB				
$BW_{interferer}$	MHz	10	15	20	40	50
$F_{interferer}$ (offset)	MHz	10 / -10	15 / -15	20 / -20	40 / -40	50 / -50
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [45.5] dB	REFSENS + [45.5] dB	REFSENS + [45.5] dB	REFSENS + [45.5] dB	
$BW_{interferer}$	MHz	60	80	90	100	
$F_{interferer}$ (offset)	MHz	60 / -60	80 / -80	90 / -90	100 / -100	
NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 4.1.2.7-3 with $P_{CMAX\_L,f,c}$ defined in clause 4.1.2.2.1.x.						
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 3: The interferer consists of the RMC specified in [...]						

**Table 4.1.2.8.1-6: Test parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, case 2**

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	[-56.5]				
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	10	15	20	40	50
$F_{interferer}$ (offset)	MHz	10 / -10	15 / -15	20 / -20	40 / -40	50 / -50
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	[-56.5]				
$P_{interferer}$	dBm	-25	-25	-25	-25	
$BW_{interferer}$	MHz	60	80	90	100	
$F_{interferer}$ (offset)	MHz	60 / -60	80 / -80	90 / -90	100 / -100	
NOTE 1: The transmitter shall be set to 24 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 4.1.2.7-3 with $P_{CMAX\_L,f,c}$ defined in clause 4.1.2.2.1.x.						
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 3: The interferer consists of the RMC specified in [...]						

## Test Data

*EUT operation mode: Receive.*

***Test Result: Compliant***

Please refer to plot in the Appendix F.

## 11 – RECEIVER BLOCKING CHARACTERISTICS

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.9.1:

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

Limit:

#### In-band blocking

For NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1) with parameters specified in Table 4.1.2.9.1.2.1-1 and Table 4.1.2.9.1.2.1-2. The said relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table ), the requirements only apply for carriers assigned in the paired part.

**Table 4.1.2.9.1.2.1-1: In-band blocking parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6	6	7	9	10
BW <sub>interferer</sub>	MHz	5				
F <sub>offset, case 1</sub>	MHz	7.5				
F <sub>offset, case 2</sub>	MHz	12.5				
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	11	12	13	14	15
BW <sub>interferer</sub>	MHz	5				
F <sub>offset, case 1</sub>	MHz	7.5				
F <sub>offset, case 2</sub>	MHz	12.5				
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	15.5	16			
BW <sub>interferer</sub>	MHz	5				
F <sub>offset, case 1</sub>	MHz	7.5				
F <sub>offset, case 2</sub>	MHz	12.5				

NOTE 1: The transmitter shall be set to 4 dB below P<sub>CMAX,LTC</sub> at the minimum UL configuration specified in Table 4.1.2.7.1-3with P<sub>CMAX,LTC</sub> defined in clause 6.2.4.

NOTE 2: The interferer consists of the RMC specified in [...]

**Table 4.1.2.9.1.2.1-2: In-band blocking for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

NR band	Parameter	Unit	Case 1	Case 2	Case 3
	$P_{interferer}$	dBm	-56	-44	-15
n1, n2, n3, n5, n7, n8, n12, n20, n25, n28, n34, n38, n39, n40, n41, n50, n51, n66, n70, n74, n75, n76	$F_{interferer}$ (offset)	MHz	$-\text{CBW}/2 - F_{offset, case 1}$ and $\text{CBW}/2 + F_{offset, case 1}$	$\leq -\text{CBW}/2 - F_{offset, case 2}$ and $\geq \text{CBW}/2 + F_{offset, case 2}$	
	$F_{interferer}$	MHz	NOTE 2	$F_{DL\_low} - 15$ to $F_{DL\_high} + 15$	
n71	$F_{interferer}$	MHz	NOTE 2	$F_{DL\_low} - 12$ to $F_{DL\_high} + 15$	$F_{DL\_low} - 12$
NOTE 1: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal. NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: $-\text{CBW}/2 - F_{offset, case 1}$ ; b: $\text{CBW}/2 + F_{offset, case 1}$					

For NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into an immediately adjacent frequency range up 3CBW below or above the UE receive band with CBW is the bandwidth of the wanted signal. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in [Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1)] with parameters specified in Table 4.1.2.9.1.2.1-3 and Table

4.1.2.9.1.2.1-4. The said relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 4.1.2.9.1.2.1-3: In-band blocking parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6				
$BW_{interferer}$	MHz	10	15	20	40	50
$F_{offset, case 1}$	MHz	15	22.5	30	60	75
$F_{offset, case 2}$	MHz	25	37.5	50	100	125
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6				
$BW_{interferer}$	MHz	60	80	90	100	
$F_{offset, case 1}$	MHz	90	120	135	150	
$F_{offset, case 2}$	MHz	150	200	225	250	
NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 4.1.2.7.1-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4.						
NOTE 2: The interferer consists of the RMC specified in [...]						

**Table 4.1.2.9.1.2.1-4: In-band blocking for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

NR band	Parameter	Unit	Case 1	Case 2
n77, n78, n79	$P_{interferer}$	dBm	-56	-44
	$F_{interferer}$ (offset)	MHz	$-\text{CBW}/2 - F_{offset, case 1}$ and $\text{BW}/2 + F_{offset, case 1}$	$\leq -\text{CBW}/2 - F_{offset, case 2}$ and $\geq \text{CBW}/2 + F_{offset, case 2}$
	$F_{interferer}$		NOTE 2	$F_{DL\_low} - 3\text{CBW}$ to $F_{DL\_high} + 3\text{CBW}$
NOTE 1: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.				
NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: $-\text{CBW}/2 - F_{offset, case 1}$ ; b: $\text{CBW}/2 + F_{offset, case 1}$				
NOTE 3: CBW denotes the channel bandwidth of the wanted signal				

### Out-of-band blocking

For NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1) with parameters specified in Table 4.1.2.9.1.2.2-1 and Table 4.1.2.9.1.2.2-2. The said relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table), the requirements only apply for carriers assigned in the paired part.

**Table 4.1.2.9.1.2.2-1: Out-of-band blocking parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6	6	7	9	10
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	11	12	13	14	15
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	15.5	16			
NOTE: The transmitter shall be set to 4 dB below $P_{CMAX\_LTC}$ at the minimum UL configuration specified in Table 4.1.2.7.1-3 with $P_{CMAX\_LTC}$ defined in clause 6.2.4.						



**Table 4.1.2.9.1.2.2-2: Out of-band blocking for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

NR band	Parameter	Unit	Range 1	Range 2	Range 3
n1, n2, n3, n5, n7, n8, n12, n20, n25, n28, n34, n38, n39, n40, n41, n50, n51, n66, n70, n71, n74, n75, n76	$P_{interferer}$	dBm	-44	-30	-15
	$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL\_low} < -15$ or $15 < f - F_{DL\_high} < 60$	$-85 < f - F_{DL\_low} \leq -60$ or $60 \leq f - F_{DL\_high} < 85$	$1 \leq f \leq F_{DL\_low} - 85$ or $F_{DL\_high} + 85 \leq f \leq 12750$
NOTE: The power level of the interferer ( $P_{interferer}$ ) for Range 3 shall be modified to -20 dBm for $F_{interferer} > 6000$ MHz.					

For interferer frequencies across ranges 1, 2 and 3 in Table 4.1.2.9.1.2.2-2, a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil \} / \min \{ \lceil n \cdot N_{RB} / 10 \rceil, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\lfloor CBW/2 \rfloor, 5)$  MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration,  $CBW$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in sub-clause 4.1.2.12 apply.

For NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range up to 3CBW below or from 3CBW above the UE receive band, where CBW is the channel bandwidth. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1) with parameters specified in Table 4.1.2.9.1.2.2-3 and Table 4.1.2.9.1.2.2-4. The said relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 4.1.2.9.1.2.2-3: Out-of-band blocking parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6	7	9	9	9
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	9	9	9	9	
NOTE: The transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 4.1.2.7.1-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4.						

**Table 4.1.2.9.1.2.2-4: Out of-band blocking for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

NR band	Parameter	Unit	Range1	Range 2	Range 3
n77, n78 (NOTE 3)	$P_{interferer}$	dBm	-44	-30	-15
	$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL\_low} \leq -3CBW$ or $3CBW \leq f - F_{DL\_high} < 60$	$-200 < f - F_{DL\_low} \leq -MAX(60,3CBW)$ or $MAX(60,3CBW) \leq f - F_{DL\_high} < 200$	$1 \leq f \leq F_{DL\_low} - MAX(200,3CBW)$ or $F_{DL\_high} + MAX(200,3CBW) \leq f \leq 12750$
n79 (NOTE 4)	$F_{interferer}$ (CW)	MHz	N/A	$-150 < f - F_{DL\_low} \leq -MAX(60,3CBW)$ or $MAX(60,3CBW) \leq f - F_{DL\_high} < 150$	$1 \leq f \leq F_{DL\_low} - MAX(150,3CBW)$ or $F_{DL\_high} + MAX(150,3CBW) \leq f \leq 12750$
<p>NOTE 1: The power level of the interferer (<math>P_{interferer}</math>) for Range 3 shall be modified to -20 dBm for <math>F_{interferer} &gt; 6000</math> MHz.</p> <p>NOTE 2: CBW denotes the channel bandwidth of the wanted signal</p> <p>NOTE 3: The power level of the interferer (<math>P_{interferer}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{interferer} &gt; 2700</math> MHz and <math>F_{interferer} &lt; 4800</math> MHz. For <math>CBW &gt; 15</math> MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3CBW from the band edge. For <math>CBW</math> larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3CBW from the band edge.</p> <p>NOTE 4: The power level of the interferer (<math>P_{interferer}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{interferer} &gt; 3650</math> MHz and <math>F_{interferer} &lt; 5750</math> MHz. For <math>CBW \geq 40</math> MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3CBW from the band edge.</p>					

For interferer frequencies across ranges 1, 2 and 3 in Table 4.1.2.9.1.2.2-4, a maximum of

$$\lfloor \max\{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\} / \min\{\lceil n \cdot N_{RB} / 10 \rceil, 5\} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(CBW / 2, 5)$  MHz with  $RB$   $N$  the number of resource blocks in the downlink transmission bandwidth configuration,  $CBW$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in sub-clause 4.1.2.10 apply.

#### Narrow band blocking

This requirement is measure of a receiver's ability to receive a NR signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The relative throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1) with parameters specified in Table 4.1.2.9.1.2.3-1. For operating bands with an unpaired DL part (as noted in Table), the requirements only apply for carriers assigned in the paired part.

Table 4.1.2.9.1.2.3-1: Narrow Band Blocking

NR band	Parameter	Unit	Channel Bandwidth										
			5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100MHz
n1,n2, n3, n5, n7, n8, n12, n20, n25, n28, n34, n38, n39, n40, n41, n50, n51, n66, n70, n71, n74, n75, n76	$P_w$	dBm	$P_{\text{PRESENS}}$ + channel-bandwidth specific value below										
			16	13	14	16	16	16	16	16	16	16	16
	$P_{\text{uw}} \text{ (CW)}$	dBm	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
	$F_{\text{uw}}$ (offset SCS= 15 kHz)	MHz	2.7075	5.2125	7.7025	10.2075	13.0275	20.5575	NA	NA	NA	NA	NA
	$F_{\text{uw}}$ (offset SCS= 30 kHz)	MHz	NA	NA	NA	NA			TBD	TBD			
NOTE 1: The transmitter shall be set a 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 4.1.2.7.1-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4													
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101.													
NOTE 3: The PREFSENS power level is specified in Table 4.1.2.7.1-1 and Table 4.1.2.7.1-2 for two and four antenna ports, respectively.													

**Test Data***EUT operation mode: Receive.****Test Result: Compliant****In-Band Blocking, Out-Band Blocking, Narrow band blocking***N3**

Bandwidth (MHz)	Test RB	Throughput (%)			Limits (%)
		Out-of-band (High Channel)			
		Range 1	Range 2	Range 3	
5	25#0	99.00	100.00	100.00	≥ 95
20	50#56	100.00	100.00	100.00	≥ 95
30	50#110	100.00	100.00	100.00	≥ 95

**N7**

Bandwidth (MHz)	Test RB	Throughput (%)			Limits (%)
		Out-of-band (High Channel)			
		Range 1	Range 2	Range 3	
5	25#0	100.00	100.00	99.00	≥ 95
15	75#4	100.00	100.00	100.00	≥ 95
20	75#31	100.00	100.00	100.00	≥ 95

## 12 – RECEIVER SPURIOUS RESPONSE

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) §4.1.2.10:

Spurious response is a measure of the ability of the receiver to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency for which a response is obtained, i.e. for which the out-of-band blocking limit as specified in subclause 4.1.2.9.3 is not met.

### Limits

The throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 in ETSI TS 138.101-1) with parameters for the wanted signal as specified in Table 4.1.2.10-1 for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz and in Table 4.1.2.10-2 for NR bands with  $F_{DL\_high} \geq 3300$  MHz and  $F_{UL\_high} \geq 3300$  MHz and for the interferer as specified in Table 4.1.2.10-3. The said relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.5-1), the requirements only apply for carriers assigned in the paired part.

**Table 4.1.2.10-1: Spurious response parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6	6	7	9	10
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	11	12	13	14	15
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	15.5	16			
NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 4.1.2.7-3 with $P_{CMAX\_L,f,c}$ defined in clause 4.1.2.2.1.x.						

**Table 4.1.2.10-2: Spurious response parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	6	7	9	9	9
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	REFSENS + channel specific value below				
	dB	9	9	9	9	

NOTE 1: The transmitter shall be set to 4 dB below  $P_{CMAX\_Lfc}$  at the minimum UL configuration specified in Table 4.1.2.7-3 with  $P_{CMAX\_Lfc}$  defined in clause 4.1.2.7-3 .

**Table 4.1.2.10-3: Spurious response**

Parameter	Unit	Level
$P_{interferer}$ (CW)	dBm	-44
$F_{interferer}$	MHz	Spurious response frequencies

**Test Data***EUT operation mode: Receive.***Test Result: Compliant****N3**

Bandwidth (MHz)	Test RB	Test Channel	Throughput (%)	Limits (%)
5	25#0	Middle	100.00	$\geq 95$
20	50#56	Middle	100.00	$\geq 95$
30	50#110	Middle	100.00	$\geq 95$

**N7**

Bandwidth (MHz)	Test RB	Test Channel	Throughput (%)	Limits (%)
5	25#0	Middle	100.00	$\geq 95$
15	75#4	Middle	100.00	$\geq 95$
20	75#31	Middle	100.00	$\geq 95$

## 13 – RECEIVER INTERMODULATION CHARACTERISTICS

### Applicable Standard

According to Draft EN 301 908-25 V15.1.1\_15.0.9 (2021-06) § 4.1.2.11,

Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

### Limits

The wide band intermodulation requirement is defined using a CW carrier and modulated NR signal as interferer 1 and interferer 2 respectively.

The throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 in ETSI TS 138.101-1 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 2 in ETSI TS 138.101-1) with parameters specified in Table 4.1.2.11-1 for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz and Table 7.8.2-2 for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz. The said relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.5-1), the requirements only apply for carriers assigned in the paired part.

**Table 4.1.2.11-1: Wide band intermodulation parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

Rx parameter	Units	Channel bandwidth											
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
$P_w$ in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below											
		6	6	7	9	10	11	12	13	14	15	15	16
$P_{interferer\ 1}$ (CW)	dBm	-46											
$P_{interferer\ 2}$ (Modulated)	dBm	-46											
$BW_{interferer\ 2}$	MHz	5											
$F_{interferer\ 1}$ (Offset)	MHz	-BW/2 - 7.5 / +BW/2 + 7.5											
$F_{interferer\ 2}$ (Offset)	MHz	$2 \cdot F_{interferer\ 1}$											

NOTE 1: The transmitter shall be set to 4dB below PCMAX<sub>L,c</sub> or PCMAX<sub>L</sub> as defined in TBD.

NOTE 2: Reference measurement channel is TBD.

NOTE 3: The modulated interferer consists of the Reference measurement channel specified in TBD.

NOTE 4: The  $F_{interferer\ 1}$  (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and  $F_{interferer\ 2}$  (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer.

**Table 4.1.2.11-2: Wide band intermodulation parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

Rx parameter	Unit s	Channel bandwidth							
		10 MHz	20 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
$P_w$ in Transmission Bandwidth Configuration, per CC	dBm		REFSENS + 6						
$P_{interferer\ 1}$ (CW)	dBm		-46						
$P_{interferer\ 2}$ (Modulated)	dBm		-46						
$BW_{interferer\ 2}$	MHz		BW						
$F_{interferer\ 1}$ (Offset)	MHz		-2BW / +2BW						
$F_{interferer\ 2}$ (Offset)	MHz		$2 \cdot F_{interferer\ 1}$						

NOTE 1: The transmitter shall be set to 4dB below PCMAX<sub>L,c</sub> or PCMAX<sub>L</sub> as defined in TBD.

NOTE 2: Reference measurement channel is TBD.

NOTE 3: The modulated interferer consists of the Reference measurement channel specified in TBD.

NOTE 4: The Finterferer 1 (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and Finterferer 2 (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer.

## Test Data

*EUT operation mode: Receive.*

***Test Result: Compliant***

Please refer to plot in the Appendix G.



## 14 – RECEIVER SPURIOUS EMISSIONS

### Applicable Standard

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

### Limits

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 4.1.2.12.1-1.

**Table 7.9-1: General receiver spurious emission requirements**

Frequency range	Measurement bandwidth	Maximum level	NOTE
$30 \text{ MHz} \leq f < 1 \text{ GHz}$	100 kHz	-57 dBm	
$1 \text{ GHz} \leq f \leq 12.75 \text{ GHz}$	1 MHz	-47 dBm	
$12.75 \text{ GHz} \leq f \leq 5^{\text{th}}$ harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	2
12.75 GHz – 26 GHz	1 MHz	-47dBm	3
NOTE 1: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1 in ETSI TS 138.101.			
NOTE 2: Applies for Band that the upper frequency edge of the DL Band more than 2.69 GHz.			
NOTE 3: Applies for Band that the upper frequency edge of the DL Band more than 5.2 GHz.			

### Test Condition

Initial conditions described in clause 7.9.4.1 of ETSI TS 138 521-1 [1]

### Test Procedure

Initial conditions described in clause 7.9.4.2 of ETSI TS 138 521-1 [1]

### Test Data

*EUT operation mode: Receive.*

### Test Result: Compliant

Please refer to plot in the Appendix H.

## 15 – TRANSMIT OFF POWER

### Applicable Standard

Transmit OFF power is defined as the mean power in the channel bandwidth when the transmitter is OFF. The transmitter is considered OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During DTX and measurements gaps, the transmitter is not considered OFF. An excess transmit OFF power potentially increases the Rise Over Thermal (RoT) and therefore reduces the cell coverage area for other UEs.

### Limits

The transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power for TDD Bands Only shall not exceed the values specified in Table 4.1.2.13-1.

**Table 4.1.2.13.1-1: Transmit OFF power**

Channel bandwidth (MHz)	Transmit OFF power (dBm)	Measurement bandwidth (MHz)
5	-50+TT	4.515
10	-50+TT	9.375
15	-50+TT	14.235
20	-50+TT	19.095
25	-50+TT	23.955
30	-50+TT	28.815
40	-50+TT	38.895
50	-50+TT	48.615
60	-50+TT	58.35
80	-50+TT	78.15
100	-50+TT	88.23
NOTE 1: .....		

**Table 4.1.2.13.1-2: Test Tolerance (Transmit OFF power)**

	$f \leq 3.0\text{GHz}$	$3.0\text{GHz} < f \leq 6.0\text{GHz}$
$\text{BW} \leq 40\text{MHz}$	1.5 dB	1.8 dB
$40\text{MHz} < \text{BW} \leq 100\text{MHz}$	1.7 dB	1.8 dB

### Test Procedure

Initial conditions described in clause 6.3.3 of ETSI TS 138 521-1 [1]

**Test Data****Test Result: Compliant**

Band	Test Mode	Test Condition					Maximum Transmit off Power(dBm)	Limits (dBm)
n3	5MHz_15kHz_1712.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	5MHz_15kHz_1747.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	5MHz_15kHz_1782.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	20MHz_15kHz_1720MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	20MHz_15kHz_1747.5MHz_DFT-s-OFDM QPSK6	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	20MHz_15kHz_1775MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	30MHz_15kHz_1725MHz_DFT-s-OFDM QPSK0	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	30MHz_15kHz_1747.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	30MHz_15kHz_1770MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	5MHz_30kHz_1712.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	5MHz_30kHz_1747.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	5MHz_30kHz_1782.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	20MHz_30kHz_1720MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	20MHz_30kHz_1747.5MHz_DFT-s-OFDM QPSK6	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	20MHz_30kHz_1775MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	30MHz_30kHz_1725MHz_DFT-s-OFDM QPSK0	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	30MHz_30kHz_1747.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n3	30MHz_30kHz_1770MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5

Band	Test Mode	Test Condition					Maximum Transmit off Power(dBm)	Limits (dBm)
n7	5MHz_15kHz_2502.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	5MHz_15kHz_2535MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	5MHz_15kHz_2567.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	15MHz_15kHz_2507.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	15MHz_15kHz_2535MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	15MHz_15kHz_2562.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	20MHz_15kHz_2510MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	20MHz_15kHz_2535MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	20MHz_15kHz_2560MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	5MHz_30kHz_2502.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	5MHz_30kHz_2535MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	5MHz_30kHz_2567.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	15MHz_30kHz_2507.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	15MHz_30kHz_2535MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	15MHz_30kHz_2562.5MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	20MHz_30kHz_2510MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	20MHz_30kHz_2535MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5
n7	20MHz_30kHz_2560MHz_DFT-s-OFDM QPSK	NTNV	LTLV	LTHV	HTLV	HTHV	-60	-48.5

## **EXHIBIT A - EUT PHOTOGRAPHS**

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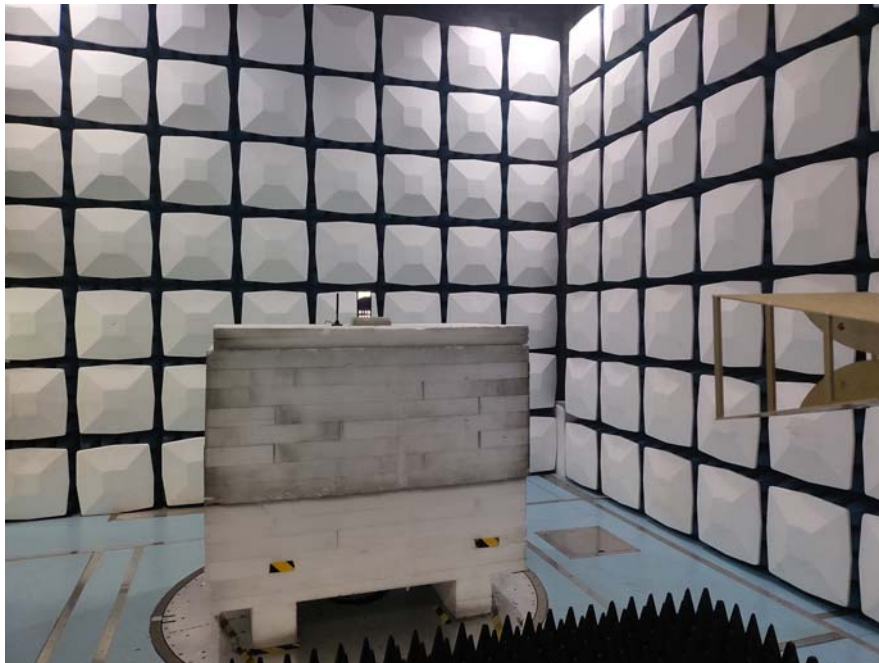
For photos in this section, please refer to report No.: SZ1230414-19311E-RF EXHIBIT-EUT PHOTOGRAPHS<sup>▲</sup>.

## EXHIBIT B - TEST SETUP PHOTOGRAPHS

**Radiated Spurious Emissions Test View (Below 1GHz)**



**Radiated Spurious Emissions Test View (Above 1GHz)**



**\*\*\*\*\*END OF REPORT\*\*\*\*\***