

General Information on The Drafted Technical Specifications for Narrowband Terminal Equipment of Mobile Broadband Business

To respond to the domestic IoT development and connect to the world, NCC has stipulated the specifications based on 3GPP TS 36.521-1, CNS14958-1, CNS14959, CNS13438, and CNS14336-1, Technical Specifications for Mobile Broadband Business Terminal Equipment and other international technical specifications. The specifications have included narrowband terminal equipment of mobile broadband business, such as LTE Machine Type Communications (LTE-M1) and narrowband IoT (NB-IoT), with an expectation to promote the development of relevant industries in the country. Below is the summarized information:

1. Legal sources (Point 1)
2. Scope of application (Point 2)
3. Technical standards (Point 3)
4. Definition of the terms (Point 4)
5. General testing items and eligibility criteria (Point 5)
6. Testing items and eligibility criteria for LTE-M1 terminal equipment (Point 6)
7. Testing items and eligibility criteria for NB-IoT terminal equipment (Point 7)
8. Testing requirement (Point 8)
9. Warning labels (Point 9)
10. Date of promulgation (Point 10)

Drafted Technical Specifications for Narrowband Terminal Equipment of Mobile Broadband Business

Regulations	Descriptions
<p>1. Legal source The specifications are promulgated pursuant to Item 1, Article 42 of the Telecommunications Act.</p>	<p>Legal source of the specifications.</p>
<p>2. Scope The specifications have adopted the narrowband terminal equipment type approval of LTE Machine Type Communications (LTE-M1) and Narrowband IoT (NB-IoT) of frequency division duplex (FDD).</p> <p>2.1 The frequency bands that are applicable to LTE-M1 terminal equipment are as follows: 700 MHz(uplink 703 MHz to 748 MHz; downlink 758 MHz to 803 MHz), 900 MHz (uplink 885 MHz to 915 MHz; downlink 930 MHz to 960 MHz), 1800 MHz (uplink 1710 MHz to 1785 MHz; downlink 1805 MHz to 1880 MHz), 2100 MHz(uplink1920 MHz to 1980 MHz; downlink 2110 MHz to 2170 MHz), 2500 MHz and 2600 MHz (uplink 2500 MHz to 2570 MHz; downlink 2620 MHz to 2690 MHz) frequency bands.</p> <p>2.2 The frequency bands that are applicable to NB-IoT terminal equipment are as follows: 700MHz(uplink 703 MHz to 748 MHz; downlink 758 MHz to 803 MHz), 900 MHz (uplink 885 MHz to 915 MHz; downlink 930 MHz to 960 MHz), 1800 MHz (uplink 1710 MHz to 1785 MHz; downlink 1805 MHz to 1880 MHz) and 2100 MHz(uplink1920 MHz to 1980 MHz; downlink 2110 MHz to 2170 MHz) frequency bands.</p>	<p>1. The frequency band and equipment to which the specifications are applicable.</p> <p>2. The LTE Machine Type Communications (LTE-M1) and Narrowband IoT (NB-IoT) in the specifications refer to LTE Cat-M1 and LTE Cat-NB1 as prescribed the 3rd Generation Partnership Project (3GPP) unites telecommunications standard development organizations.</p> <p>3. Some of the 1800 MHz frequency band (uplink 1770 MHz to 1785 MHz; downlink 1865 MHz to 1880 MHz)and 2100 MHz frequency bands (uplink1920 MHz to 1980 MHz; downlink 2110 MHz to 2170 MHz) are open for application starting from 2017.</p>
<p>3. Technical standards The specifications are promulgated based on CNS14958-1, CNS14959, CNS13438 and CNS14336-1, Technical Specifications for Mobile Broadband Business Terminal Equipment and other international technical specifications.</p>	<p>The specifications have included the content of some international technical specifications, including 3GPP TS 36.521-1 and IEC 62209-2.</p>
<p>4. Definition of the terms.</p> <p>4.1 Narrowband terminal equipment for mobile broadband business: Is divided into portable and mobile devices according to the distance to emission source; can be divided into LTE-M1 and NB-IoT terminal equipment according to the used frequency band.</p> <p>4.2 Portable terminal equipment: Terminal equipment that is no more than 20 cm (including) away from the emission source in the normal</p>	<p>1. Section 4.2 and 4.3 are stipulated in accordance with FCC 2.1091 and 2.1093.</p> <p>2. Section 4.4 and 4.5 are stipulated in accordance to LTE Cat-M1 and LTE Cat-NB1 prescribed by 3GPP.</p>

<p>operation mode.</p> <p>4.3 Mobile terminal equipment: Terminal equipment that is at least 20 cm away from the emission source in the normal operation mode.</p> <p>4.4 LTE-M1 terminal equipment: Refers to terminal equipment that receives network services through the mobile broadband network; the frequency band of its used channel shall be no more than 1.08 MHz (including).</p> <p>4.5 NB-IoT terminal equipment: Refers to terminal equipment that receives network services through the mobile broadband network; the frequency band of its used channel shall be 180kHz.</p>	
<p>5. General testing items and eligibility criteria</p> <p>5.1 Tests of this section are applicable to LTE-M1 and NB-IoT terminal equipment.</p> <p>5.2 Frequency stability:</p> <p>5.2.1 Under normal supply voltage, the temperature shall vary between -20°C and 50°C. At 10 °C as a unit, at different temperatures, results of the measurements shall be taken in increments of 0/2/5/10 minutes; the frequency should be maintained within 0.1PPM of the main wave frequency of the channel.</p> <p>5.2.2 The temperature at 20°C and the supply voltage within ±15% of the rating voltage value; results of the measurements shall be taken in increments of 0/2/5/10 minutes; the frequency should be maintained within 0.1PPM of the main wave frequency of the channel. If the allowable value of the operating voltage cannot reach ± 15% of the rated voltage value, please take the self-declared voltage value of manufacturers.</p> <p>5.3 Specific Absorption Rate (SAR):</p> <p>5.3.1 Tests of this paragraph are applicable to portable terminal equipment.</p> <p>5.3.2 SAR standard value:</p> <p>5.3.2.1 Shall comply with CNS14959. The partial exposure SAR limit for devices that get close to the head and body during the use is 2 W/kg; the partial exposure SAR limit for other equipment is 4 W/kg.</p> <p>5.3.2.2 CNS 14958-1 or IEC 62209-2 shall be adopted as the SAR measurement procedures.</p> <p>5.4 Power density:</p> <p>5.4.1 This test is applicable to portable terminal equipment.</p> <p>5.4.2 The maximum value of power density: 0.35mW/cm² for frequency 700MHz; 0.45mW/cm² for frequency 900MHz; 0.9mW/cm² for frequency 1800MHz;</p>	<ol style="list-style-type: none"> 1. Section 5.2 to 5.6 is based on FCC 2.1055, IEC 62209-2, CNS 14958-1, CNS14959, CNS13438 and CNS14336-1. 2. The measurement of partial head SAR as specified in Section 5.3.2.1 shall adopt CNS 14958-1, whereas other SAR measurements shall comply with IEC 62209-2. 3. Terminal equipment featuring the charging function as described in Section 5.8 shall comply with mobile phone and charger connection interface, charging cable and charger relevant provisions stated in Technical Specifications for Mobile Broadband Business Terminal Equipment. 4. Terminal equipment featuring the function of public warning and disaster prevention messages as described in Section 5.9 shall comply with Technical Specifications for Mobile Broadband Business Terminal Equipment.

<p>1.0 mW/cm² for frequency 2100MHz, 2500MHz and 2600MHz.</p> <p>The measurement distance shall be 20 cm or less from the human body to the antenna declared by the device supplier.</p> <p>5.5 The electromagnetic compatibility (EMC) test: Shall comply with the standard specifications of CNS13438; devices to be tested shall be tested under the operating and idle modes (radiation disturbance) and the charging mode (conducted disturbance at the mains ports). Otherwise, tests shall not be conducted.</p> <p>5.6 Electrical safety: Shall comply with the standard regulations of CNS14336-1.</p> <p>5.7 IMEI number and unique guarantee: 5.7.1 This test, which requires a SIM terminal equipment, can be applied when in normal usage 5.7.2 The testing instrument reads and records IMEI. The Applicant shall provide the unique guarantee of IMEI.</p> <p>5.8 Terminal equipment featuring the charging function shall comply with charging and connection interface relevant provisions of Technical Specifications for Mobile Broadband Business Terminal Equipment</p> <p>5.9 Terminal equipment featuring the function of public warning and disaster prevention messages shall comply with Technical Specifications for Mobile Broadband Business Terminal Equipment relevant regulations.</p>	
<p>6. Testing items and eligibility criteria for LTE-M1 terminal equipment</p> <p>6.1 Tests of this section are applicable to LTE-M1 terminal equipment.</p> <p>6.2 Power limits: 6.2.1 Emission power limit: 6.2.1.1 Effective radiated power (ERP) 1 W for portable terminal equipment. 2 W for mobile terminal equipment. 6.2.1.2 Conducted output power limit: Class 3: 23 dBm+2.0/-2.5dB. Class 5: 20 dBm + 2.0/-2.5 dB.</p> <p>6.2.2 Testing methods: 6.2.2.1 When measuring the emission power, devices must be used with RMS (root mean square) equivalent voltage to measure any continuous transmission time. The measurement results shall be used to adjust the emission power based on the responding</p>	<p>Specified testing items and eligibility criteria for LTE-M1 terminal equipment. This section is based on international technical specifications 3GPP TS 36.521.</p>

time, resolution bandwidth capability and sensitivity of the device.

6.2.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the highest level of bandwidth on each channel and shall comply with the provisions of Table 1.

6.3 Spectrum emission mask:

6.3.1 Limits of the spectrum emission mask:
Shall comply with the spectrum emission mask values prescribed in Table 2.

6.3.2 Testing methods:

6.2.2.1 The spectrum emission mask limit values vary according to the bandwidth and Δf_{00B} . The resolution bandwidth (RBW) during the measurement shall not be smaller than the set values prescribed in Table 2.

6.3.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the lowest level of bandwidth, 5MHz, 10 MHz, and the highest level of bandwidth on each channel and shall comply with the provisions of Table 3.

6.4 Radiation emission limit outside the conduction band:

6.4.1 Shall comply with specification values of the out-of-band radiation with the provisions of Table 4.

6.4.2 Testing methods:

6.4.2.1 Frequency range of the out-of-band radiation measurement does not include Δf_{OOB} stated in 6.3.1. During the measurement, the resolution bandwidth shall not smaller than the set value with the provisions of Table 4.

6.4.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall be undertaken on the lowest level of bandwidth on each channel and shall comply with the provisions of Table 5.

6.5 Adjacent channel leakage ratio (ACLR):

6.5.1 Shall comply with the ACLR specification values prescribed in Table 6.

6.5.2 Testing Methods:

6.5.2.1 Measure the averaged power of the testing and adjacent channels to calculate the ACLR. During the measurement, the measurement bandwidth of the channels shall adhere to specification values of Table 6.

6.5.2.2 Testing shall be conducted on three channels: low, medium, and high. Tests shall

<p>be undertaken on the lowest level of bandwidth, 5MHz, 10 MHz, and the highest level of bandwidth on each channel and shall comply with the provisions of Table 7.</p> <p>6.6 Emission within non-resource blocks:</p> <p>6.6.1 Shall comply with specification values of non-resource blocks as prescribed in Table 8.</p> <p>6.6.2 Testing methods: Tests for the 5 MHz bandwidth shall be conducted according to Table 9</p>	
<p>7. Testing items and eligibility criteria for NB-IoT terminal equipment</p> <p>7.1 Tests of this section are applicable to NB-IoT terminal equipment.</p> <p>7.2 Power limits:</p> <p>7.2.1 Emission power limit:</p> <p>7.2.1.1 Effective radiated power (ERP) 1 W for portable terminal equipment. 2 W for mobile terminal equipment.</p> <p>7.2.1.2 Conducted output power limit: Class 3: 23dBm+2.0/-2.0dB. Class 5: 20 dBm + 2.0/-2.0 dB.</p> <p>7.2.2 Testing methods:</p> <p>7.2.2.1 When measuring the emission power, devices must be used with RMS (root mean square) equivalent voltage to measure any continuous transmission time. The measurement results shall be used to adjust the emission power based on the responding time, resolution bandwidth capability and sensitivity of the device.</p> <p>7.2.2.2 Tests shall be conducted according to Table 10.</p> <p>7.3 Spectrum emission mask:</p> <p>7.3.1 Limits of the spectrum emission mask: Shall comply with the spectrum emission mask values prescribed in Table 11; frequency defined in Table 12 shall comply with the spectrum emission mask values prescribed in Table 13.</p> <p>7.3.2 Testing methods:</p> <p>7.3.2.1 The spectrum emission mask limit values vary according to the bandwidth and Δf_{00B}. The resolution bandwidth (RBW) during the measurement shall not be smaller than the set values prescribed in Table 11 or Table 13.</p> <p>7.3.2.2 Tests shall be conducted according to Table 14.</p> <p>7.4 Radiation emission limit outside the conduction band:</p>	<p>Specified testing items and eligibility criteria for NB-IoT terminal equipment. This section is based on international technical specifications 3GPP TS 36.521</p>

<p>7.4.1 Shall comply with specification values of the out-of-band radiation with the provisions of Table 15.</p> <p>7.4.2 Testing methods:</p> <p>7.4.2.1 Frequency range of the out-of-band radiation measurement does not include Δf_{00B} at 1.7MHz. During the measurement, the resolution bandwidth shall not smaller than the set value prescribed in Table 15.</p> <p>7.4.2.2 Tests shall be conducted according to Table 16.</p> <p>7.5 Adjacent channel leakage ratio (ACLR):</p> <p>7.5.1 Shall comply with the ACLR specification values prescribed in Table 17.</p> <p>7.5.2 Testing methods:</p> <p>7.5.2.1 Measure the averaged power of the testing and adjacent channels to calculate the ACLR. During the measurement, the measurement bandwidth of the channels shall adhere to specification values of Table 17.</p> <p>7.5.2.2 Tests shall be conducted according to Table 18.</p> <p>7.6 Emission within non-resource blocks:</p> <p>7.6.1 Shall comply with specification values of non-resource blocks as prescribed in Table 19.</p> <p>7.6.2 Testing methods: Tests shall be conducted according to Table 20.</p>	
<p>8. Test Requirement</p> <p>Except as otherwise provided in these technical specifications, testing methods for examining emission power, out-of-band radiation emission and frequency stability shall all be processed based on the inspection requirements stated in Point 5 of the Low-power Radio-frequency Devices Technical Specifications (LPRFD Technical Requirements). The inspection procedures shall be processed in accordance of the Appendix 1 “Referential Procedures of Inspecting Transmitters” of the Low-power Radio-frequency Devices Technical Specifications.</p>	Specified testing rules
<p>9. Warning Labels</p> <p>9.1 Warning label of the electromagnetic wave</p> <p>9.1.1 Warning Content: “Please ensure to use the device properly in order to reduce the impact of electromagnetic waves”</p> <p>9.1.2 Labeling: Position the label on the device properly and put labels on the package and instruction manual.</p> <p>9.2 Warning label of the electromagnetic specific absorption rate (SAR)</p>	Specified the content of electromagnetic wave warning message and relevant methods.

<p>9.2.1 Tests of this paragraph are applicable to portable terminal equipment.</p> <p>9.2.2 Warning Content: “The standard value of SAR is ___W/kg; the measured value of tested product is ___ W/kg”.</p> <p>9.2.3 Labeling: Position the label on the device properly and put labels on the package and instruction manual.</p>	
<p>10. The specifications shall become effective as of the date of promulgation.</p>	<p>To specify the date of promulgation of the Specifications.</p>

Table 1. Test Parameters for Channel Bandwidth of Emission Power for LTE-M1 Terminal Equipment.

Channel Bandwidth	Downlink Configuration Not applicable for the maximum emission power	Uplink Configuration		
		Modulation	Resource Block Allocation	
			FDD and HD-FDD	TDD
5MHz		QPSK	1	1
5MHz		QPSK	(Class 5) 3	(Class 5) 3
10MHz		QPSK	1	1
10MHz		QPSK	(Class 3) 4 (Class 5) 5	(Class 3) 4 (Class 5) 5
15MHz		QPSK	1	1
15MHz		QPSK	6	6
20MHz		QPSK	1	1
20MHz		QPSK	6	6

Note: The test method of the RB offset setting value and testing items adhere to 3GPP TS 36.521 technical standards.

Table 2. Set Value of Spectrum Emission Mask of LTE-M1 Terminal Equipment

Channel Bandwidth $\Delta f_{_OOB}$ (MHz)	Emission Limit (dBm)						Measurement Bandwidth
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
± 0 to 1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30kHz
± 1 to 2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 2.5 to 2.8	-23.5	-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 2.8 to 5		-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 5 to 6		-23.5	-11.5	-11.5	-11.5	-11.5	1MHz
± 6 to 10			-23.5	-11.5	-11.5	-11.5	1MHz
± 10 to 15				-23.5	-11.5	-11.5	1MHz
± 15 to 20					-23.5	-11.5	1MHz
± 20 to 25						-23.5	1MHz

Note: $\Delta f_{_OOB}$ refers to the frequency offset out-of-band (Δ Frequency of Out-of-band emission)

Table 3. Test Parameters for Channel Bandwidth of Spectrum Emission Mask for LTE-M1 Terminal Equipment

	Downlink Configuration	Uplink Configuration			
Channel Bandwidth	N/A for SEM testing	Modulation	Resource Block Allocation		
			FDD and HD-FDD	TDD	Narrowband Index
Low and medium channels					
1.4MHz		QPSK	2	2	0
1.4MHz		QPSK	5	5	0
1.4MHz		QPSK	6	6	0
1.4MHz		16QAM	2	2	0
1.4MHz		16QAM	5	5	0
3MHz		QPSK	2	2	0
3MHz		QPSK	5	5	0
3MHz		QPSK	6	6	0
3MHz		16QAM	2	2	0
3MHz		16QAM	5	5	0
5MHz		QPSK	6	6	0
5MHz (Note 3)		16QAM	1	1	0
5MHz		16QAM	3	3	0
5MHz		16QAM	5	5	0
10MHz (Note 3)		QPSK	4	4	0
10MHz		QPSK	6	6	0
10MHz (Note 3)		16QAM	3	3	0
10MHz		16QAM	5	5	0
15MHz		16QAM	5	5	0
20MHz		16QAM	5	5	0
High channel					
1.4MHz		QPSK	2	2	0
1.4MHz		QPSK	5	5	0
1.4MHz		QPSK	6	6	0
1.4MHz		16QAM	2	2	0
1.4MHz		16QAM	5	5	0
3MHz		QPSK	2	2	1
3MHz		QPSK	5	5	1
3MHz		QPSK	6	6	1
3MHz		16QAM	2	2	1
3MHz		16QAM	5	5	1
5MHz		QPSK	6	6	3
5MHz (Note 3)		16QAM	1	1	3
5MHz		16QAM	3	3	3
5MHz		16QAM	5	5	3
10MHz (Note 3)		QPSK	4	4	7
10MHz		QPSK	6	6	7
10MHz (Note 3)		16QAM	3	3	7
10MHz		16QAM	5	5	7
15MHz		16QAM	5	5	11
20MHz		16QAM	5	5	15

Note :

1. The definitino of “Narrowband Index” shall refer to 5.2.4 of 3GPP TS 36.211.
2. The testing method of the RB offset setting value and testing items adhere to 3GPP TS 36.521 technical standards.The RB offset value and testing methods for inspection items shall refer to technical specifications of 3GPP TS 36.521.
3. Only applicable to user equipment of Power Class 3.

Table 4. Out-of-band Radiation Value for LTE-M1 Terminal Equipment.

Frequency Range	Maximum Level	Measurement Bandwidth
$9\text{kHz} \leq f < 150\text{kHz}$	-36 dBm	1kHz
$150\text{kHz} \leq f < 30\text{MHz}$	-36 dBm	10kHz
$30\text{MHz} \leq f < 1\text{GHz}$	-36 dBm	100kHz
$1\text{GHz} \leq f < 12.75\text{GHz}$	-30 dBm	1MHz

Table 5. Test Parameters for Channel Bandwidth of Out-of-band Radiation

	Downlink Configuration	Uplink Configuration			
Channel Bandwidth	Not applicable for out-of-band radiation tests	Modulation	Resource Block Allocation		
			FDD and HD-FDD	TDD	Narrowband Index
Low and medium channels					
1.4MHz		QPSK	1	1	0
1.4MHz		QPSK	6	6	0
3MHz		QPSK	1	1	0
3MHz		QPSK	6	6	0
5MHz		QPSK	1	1	0
5MHz		QPSK	6	6	0
High channel					
1.4MHz		QPSK	1	1	0
1.4MHz		QPSK	6	6	0
3MHz		QPSK	1	1	1
3MHz		QPSK	6	6	1
5MHz		QPSK	1	1	3
5MHz		QPSK	6	6	3

Note: The definitino of “Narrowband Index” shall refer to 5.2.4 of 3GPP TS 36.211.

Table 6.ACLR specification values for LTE-M1 terminal equipment

E-UTRA						
	Channel Bandwidth					
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
E-UTRA _{ACLR1}	29.2 dB					
UE channel	±1.4MHz	±3MHz	±5MHz	±10MHz	±15MHz	±20MHz
E-UTRA Channel Measurement Bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA						
	Channel Bandwidth					
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
UTRA _{ACLR1}	32.2 dB					
Adjacent Channel Centre Frequency Offset (MHz)	$0.7+B_{W_{UTRA}}/2$ / $-0.7-B_{W_{UTRA}}/2$	$1.5+B_{W_{UTRA}}/2$ / $-1.5-B_{W_{UTRA}}/2$	$2.5+B_{W_{UTRA}}/2$ / $-2.5-B_{W_{UTRA}}/2$	$5+B_{W_{UTRA}}/2$ / $-5-B_{W_{UTRA}}/2$	$7.5+B_{W_{UTRA}}/2$ / $-7.5-B_{W_{UTRA}}/2$	$10+B_{W_{UTRA}}/2$ / $-10-B_{W_{UTRA}}/2$
UTRA _{ACLR2}			35.2 dB			
Adjacent Channel Centre Frequency Offset (MHz)			$2.5+3*B_{W_{UTRA}}/2$ / $-2.5-3*B_{W_{UTRA}}/2$	$5+3*B_{W_{UTRA}}/2$ / $-5-3*B_{W_{UTRA}}/2$	$7.5+3*B_{W_{UTRA}}/2$ / $-7.5-3*B_{W_{UTRA}}/2$	$10+3*B_{W_{UTRA}}/2$ / $-10-3*B_{W_{UTRA}}/2$
E-UTRA Channel Measurement Bandwidth	1.08MHz	2.7MHz	4.5MHz	9.0MHz	13.5MHz	18MHz
UTRA 5MHz Channel Measurement Bandwidth (Note 1)	3.84 MHz					
UTRA 1.6MHz Channel Measurement Bandwidth (Note 1)	1.28 MHz					

Note:

1. Applicable to E-UTRA FDD co-existed with UTRA FDD in paired frequency spectrum.
2. Applicable to E-UTRA FDD co-existed with UTRA FDD in non-paired frequency spectrum.
3. The $B_{W_{UTRA}}$ of UTRA FDD is 5MHz; the $B_{W_{UTRA}}$ of UTRA TDD is 1.6MHz °

Table 7. Test Parameters for Channel Bandwidth of ACLR for LTE-M1 Terminal Equipment

Configuration ID	Channel Bandwidth	Downlink Configuration	Uplink Configuration		
		Not applicable to ACLR test.	Modulation	Resource Block Allocation	
				FDD AND HD-FDD	Narrowband Index
Low and medium channels					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 2)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 2)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 2)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
19	15MHz		QPSK	6	0
20	15MHz		16QAM	5	0
High channel					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 2)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (Note 2)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 2)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7
19	15MHz		QPSK	6	11
20	15MHz		16QAM	5	11

Note:

1. The definitino of “Narrowband Index” shall refer to 5.2.4 of 3GPP TS 36.211.
2. Only applicable to user equipment of Power Class 3.

Table 8. Radiation Set Value within Non-Allocated Resource Block of LTE-M1 Terminal Equipment

Parameter Descriptions	Unit	Limit		Applicable Frequency
General	dB	$\max\{-25 - 10 \cdot \log_{10}(N_{RB}/L_{CRB}), 20 \cdot \log_{10}EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB}, +0.8 - 57\text{dBm}/180\text{kHz} - P_{RB}\}$		All non-allocated
IQ Image	dB	-27.2	When the image frequency is the carrier center frequency, which is smaller than 1GHz, and the output power is more than 10dBm	Image Frequency
		-24.2	When the image frequency is the carrier center frequency, which is smaller than 1GHz, and the output power is less than 10dBm.	
		-24.4	When the image frequency is the carrier center frequency, which is bigger than or equals to 1GHz.	
Carrier leakage	dBc	-27.2	Output power is >10dBm, and carrier center frequency < 1GHz	Carrier frequency
		-24.2	Output power is >10dBm, and carrier center frequency \geq 1GHz	
		-24.2	0dBm \leq Output power \leq 10dBm	
		-19.2	-30dBm \leq Output power \leq 0dBm	
		-9.2	-40dBm \leq Output power < -30dBm	

Note:

1. The RB offset value and testing methods for inspection items shall refer to technical specifications of 3GPP TS 36.521.
2. The definition of parameters in Table 8 shall refer to Table 6.5.2.3EA.5-1 of 3GPP TS 36.521.

Table 9. Test Parameters for Channel Bandwidth of radiation within the non-allocated resource block for LTE-M1 terminal equipment

		Downlink Configuration		Uplink Configuration			
PUSCH							
Channel Bandwidth	Not applicable to radiation within the non-allocated resource block.			Modulation	Resource Block Allocation		
					FDD AND HD-FDD	TDD	narrowband Index
5MHz				QPSK	1	1	0
PUCCH							
Channel Bandwidth	Modulation	Resource Block Allocation			FDD : PUCCH format=Format 1a TDD : PUCCH format=Format 1a/1b		
		FDD	TDD	narrowband Index			
5MHz	QPSK	3	3	0			

Note: The definitino of “Narrowband Index” shall refer to 5.2.4 of 3GPP TS 36.211.

Table 10. Test Parameters for Channel Bandwidth of Emission Power for NB-IoT

Configuration ID	Downlink Configuration	Uplink Configuration		
		Modulation	N _{tones}	Sub-carrier Spacing (kHz)
	Not applicable for maximum emission power			
1 (Note 2)		BPSK	1@0	3.75
2 (Note 2)		BPSK	1@47	3.75
3 (Note 2)		QPSK	1@0	15
4 (Note 3)		QPSK	1@11	15
5 (Note 1)		QPSK	3@3	15

Note:

1. Applicable to terminal equipment that supports multi-tone transmissions.
2. Only applicable to low channel.
3. Only applicable to high channel.

Table 11. Spectrum Emission Mask Value for NB-IoT Terminal Equipment.

Δf_OOB (kHz)	Spectrum Emission Limit (dBm)	Measurement Bandwidth
±0 to 100	$(27.5 + (F - 0) \times \frac{-3.5 - 27.5}{100 - 0})$	30 kHz
±100 to 150	$(-3.5 + (F - 100) \times \frac{-6.5 - (-3.5)}{150 - 100})$	30 kHz
±150 to 300	$(-6.5 + (F - 150) \times \frac{-27.5 - (-6.5)}{300 - 150})$	30 kHz
±300 to 500	$(-27.5 + (F - 300) \times \frac{-33.5 - (-27.5)}{500 - 300})$	30 kHz
±500 to 1700	-33.5	30 kHz

Note: Δf_OOB is the off-set amount outside the emission frequency band (ΔFrequency of Out-of-band emission).

Table 12. Foffset of Spectrum Emission Mask of NB-IoT Terminal Equipment

Channel Bandwidth (MHz)	Foffset [kHz]
1.4	165
3	190
5	200
10	225
15	240
20	245

Note: The Foffset frequency that shefited on sides of the passage shall comply with the spectrum emission mask value prescribed in Table 14.

Table 13. Emission Limit of Spectrum Emission Mask Foffset for NB-IoT Terminal Equipment

Spectrum Emission Limit (dBm)							Measurement Bandwidth
Channel Bandwidth Δf_{OOB} (MHz)	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
± 0 to 1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30kHz
± 1 to 2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 2.5 to 2.8	-23.5	-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 2.8 to 5		-8.5	-8.5	-8.5	-8.5	-8.5	1MHz
± 5 to 6		-23.5	-11.5	-11.5	-11.5	-11.5	1MHz
± 6 to 10			-23.5	-11.5	-11.5	-11.5	1MHz
± 10 to 15				-23.5	-11.5	-11.5	1MHz
± 15 to 20					-23.5	-11.5	1MHz
± 20 to 25						-23.5	1MHz

Note: Δf_{OOB} is the off-set amount outside the emission frequency band (Δ Frequency of Out-of-band emission).

Table 14. Test Paramater for Bandwidth Frequency of Spectrum Emission Mask for NB-IoT Terminal Equipment

Configuration ID	Downlink Configuration	Uplink Configuration		
		Modulation	N_{tones}	Sub-carrier Spacing (kHz)
	Not applicable to spectrum emission mask.			
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		QPSK	1@0	15
4		QPSK	1@11	15
5(Note)		QPSK	3@0	15
6 (Note)		QPSK	3@3	15
7 (Note)		QPSK	3@9	15
8 (Note)		QPSK	6@0	15
9 (Note)		QPSK	6@6	15
10 (Note)	QPSK	12@0	15	

Note: the maximum power (MPR) of maximum emission power of terminal equipment shall refer to 6.2.3F.3 of 3GPP TS 36.521.

Table 15.Out-of-band Radiation Value for NB-IoT Terminal Equipment.

Frequency Range	Maximum Level	Measurement Bandwidth
$9\text{kHz} \leq f < 150\text{kHz}$	-36 dBm	1kHz
$150\text{kHz} \leq f < 30\text{MHz}$	-36 dBm	10kHz
$30\text{MHz} \leq f < 1\text{GHz}$	-36 dBm	100kHz
$1\text{GHz} \leq f < 12.75\text{GHz}$	-30 dBm	1MHz

Table 16. Test Parameters for Channel Broadband of Out-of-band Radiation for NB-IoT Terminal Equipment.

Configuration ID	Downlink Configuration	Uplink Configuration		
		Modulation	N_{tones}	Sub-carrier Spacing (kHz)
	Not applicable to out-of-band radiation tests.			
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		BPSK	1@0	15
4		BPSK	1@11	15
5(Note)		QPSK	12@0	15

Note: Applicable to terminal equipment that supports multi-tone transmissions.

Table 17.Test Parameters for Channel Bandwidth of ACLR for NB-IoT Terminal Equipment

	GSM	UTRA/E-UTRA
ACLR limit	19.2dB	36.2dB
Adjacent Channel Centre Frequency Offset from NB Channel Edge	$\pm 200\text{kHz}$	$\pm 2.5\text{MHz}$
Adjacent Channel Measurement Bandwidth	180kHz	3.84MHz
Measurement Filter	Rectangular Filter	Root-Raised Cosine Filter $\alpha=0.22$
Channel Measurement Bandwidth	180kHz	180kHz
Channel Measurement Filter	Rectangular Filter	Rectangular Filter

Table 18. Test Parameter for Channel Broadband of ACLR for NB-IoT Terminal Equipment.

Configuration ID	Downlink Configuration	Uplink Configuration		
		Modulation	N _{tones}	Sub-carrier Spacing (kHz)
	Not applicable to ACLR tests.			
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		QPSK	1@0	15
4		QPSK	1@11	15
5 (Note)		QPSK	3@0	15
6 (Note)		QPSK	3@3	15
7 (Note)		QPSK	3@9	15
8 (Note)		QPSK	6@0	15
9 (Note)		QPSK	6@6	15
10 (Note)	QPSK	12@0	15	

Note: Applicable to terminal equipment that supports multi-tone transmissions.

Table 19. Radiation Set Value within Non-Allocated Resource Block of NB-IoT Terminal Equipment

Parameter Descriptions	Unit	Limit		Applicable Frequency
General	dB	$\max\{-15 - 10 \cdot \log_{10}(N_{\text{tone}}/L_{\text{Ctone}}), -18 - 5 \cdot (\Delta_{\text{RB}} - 1) / L_{\text{Ctone}}, -57\text{dBm} / (3.75\text{kHz or } 15\text{kHz}) - P_{\text{tone}}\} + 0.8$		All non-allocated
IQ Image	dB	-25 + TT		Image Frequency
Carrier leakage	dBc	-24.2	$0 \text{ dBm} \leq \text{Output power}$ $f \leq 3.0\text{GHz} : 3.2\text{dBm} \pm 3.2\text{dB}$	Carrier frequency
		-19.2	$-30 \text{ dBm} \leq \text{Output power} \leq 0 \text{ dBm}$ $f \leq 3.0\text{GHz} : -26.8\text{dBm} \pm 3.2\text{dB}$	
		-9.2	$-40 \text{ dBm} \leq \text{Output power} \leq -30 \text{ dBm}$ $f \leq 3.0\text{GHz} : -36.8\text{dBm} \pm 3.2\text{dB}$	

Note:

1. The tone offset set value and testing methods of testing items shall refer to technical specifications of 3GPP TS 36.521.
2. The definition of parameters as described in Table 19 shall refer to Table 6.5.2.3F.5-1 of 3GPP TS 36.521.

Table 20. Test Parameter for Channel Broadband of Radiations within Non-allocated Resource Block for NB-IoT Terminal Equipment

Configuration ID	Downlink Configuration	Uplink Configuration		
	Not applicable to tests of radiations within non-allocated resource block.	Modulation	N_{tones}	Sub-carrier Spacing (kHz)
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		QPSK	1@0	15
4		QPSK	1@11	15

Note: Applicable to terminal equipment that supports multi-tone transmissions.