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Test report No:
NIE: 59675RAN.002A1

Assessment report
RF EXPOSURE REPORT ACCORDING TO
IEEE Std C95.3™ -2002 (R2008)
FCC 47 CFR Part 2.1091
ISED RSS-102 Issue 5:2015

Identification of item tested	IOT Module
Trademark	nRF91
Model and /or type reference	nRF9160
Other identification of the product	FCC ID: 2ANPO00NRF9160 IC: 24529-NRF9160 IMEI TAC: 35265610 HW Version: DEV2.1.6 SW Version: mfw_nrf9160_0.7.0-29.alpha
Features	LTE Cat-M1, LTE-NB1, GPS
Manufacturer	NORDIC SEMICONDUCTOR ASA P.O. Box 436, 0213 Oslo, Norway.
Test method requested, standard	IEEE Std C95.3™ -2002 (R2008). IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices. ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager  MIGUEL LACAVE GARCÍA 2019.05.03 10:38:15 +02'00'
Date of issue	2019-05-03
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Data provided by the client

The sample consist of an IOT Module that has Application CPU, LTE Cat-M1, Cat-NB1 Radio and GPS Receiver.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Identification of the client

NORDIC SEMICONDUCTOR ASA

P.O. Box 436, 0213 Oslo, Norway

Document history

Report number	Date	Description
59675RAN.002	2019-05-02	First release
59675RAN.002A1	2019-05-03	Second release. Added SW version in cover page.

General description of the device under evaluation

The device under evaluation consists of an IOT Module that has Application CPU, LTE Cat-M1, Cat-NB1 Radio and GPS Receiver.

The maximum output power declared by the manufacturer for each supported band is:

Band (MHz)	Technology	Band	Max. RF output power (dBm)	Tune-up tolerance (dB)	Max. output power, including tune-up (dBm)
1900	LTE Cat-M1 / LTE Cat-NB1	2	23.0	+1/-3	24.0
1700		4	23.0	+1/-3	24.0
850		5	23.0	+1/-3	24.0
700		12	23.0	+1/-3	24.0
700		13	23.0	+1/-3	24.0
700	LTE Cat-M1	14	23.0	+1/-3	24.0
700	LTE Cat-M1 / LTE Cat-NB1	17	23.0	+1/-3	24.0
1900		25	23.0	+1/-3	24.0
850		26	23.0	+1/-3	24.0
1700		66	23.0	+1/-3	24.0

Table 1: Equipment specifications

Assessment summary

Radiofrequency radiation exposure limits							
FCC 47 CFR § 2.1091 & ISED RSS-102 Issue 5 (2015-03)							
Assessment	**Band (MHz)**	**Technology**	**Band**	**Maximum gain to meet FCC MPE limits (dBi)**	**Maximum gain to meet ISED MPE limits (dBi)**	**Maximum gain to meet FCC/ISED EIRP limits (dBi)**	**Maximum gain to be in compliance with the limits (dBi)**
1	1900	LTE Cat-M1 / LTE Cat-NB1	2	13.0	9.5	9.0	**9.0**
2	1700		4	13.0	9.2	6.0	**6.0**
3	850		5	10.4	7.1	16.6	**7.1**
4	700		12	9.6	6.6	12.92	**6.6**
5	700		13	10.1	6.9	12.92	**6.9**
6	700	LTE Cat-M1	14	10.2	6.9	12.92	**6.9**
7	700	LTE Cat-M1 / LTE Cat-NB1	17	9.7	6.6	12.92	**6.6**
8	1900		25	13.0	9.5	9.0	**9.0**
9	850		26	10.3	7.0	16.6	**7.0**
10	1700		66	13.0	9.2	6.0	**6.0**

Table 2: Assessment summary

Appendix A: FCC RF Exposure

FCC RF Exposure evaluation

Devices operating in standalone mobile device exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be at least 20 cm and fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile device exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When a device qualifies for the categorical exclusion provision of § 2.1091(c), the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to §1.1310 Radiofrequency radiation exposure limits, paragraph (e), the limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields are:

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*100	6
3.0–30	1842/f	4.89/f	$*900/f^2$	6
30–300	61.4	0.163	1.0	6
300–1,500	.....	.....	f/300	6
1,500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*100	30
1.34–30	824/f	2.19/f	$*180/f^2$	30
30–300	27.5	0.073	0.2	30
300–1,500	.....	.....	f/1500	30
1,500–100,000	.....	.....	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

FCC EIRP Limits

Maximum FCC EIRP limits are stated into FCC 47 CFR §22.913, FCC 47 CFR §24.232 and FCC 47 CFR §22.50 standards, these limits are frequency-dependent and are shown in the following table:

Standard	Frequency Band	Technology & Band	EIRP limit (W)	EIRP limit (dBm)
FCC 47 CFR §27.50 (c)	700	LTE 12, 17	4.92	36.92
FCC 47 CFR §27.50 (d)	700	LTE 13	4.92	36.92
FCC Clause 90.542 (a) (7)	700	LTE 14	4.92	36.92
FCC 47 CFR §22.913	850	LTE 5/26	11.48	40.6
FCC 47 CFR §27.50 (d)	1700	LTE 4/66	1.0	30.0
FCC 47 CFR §24.232	1900	LTE 2/25	2.0	33.0

FCC MPE Evaluation Results

Each supported transmission technology will be evaluated to determine if it is in compliance with limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction:

Power density: $S[mW/cm^2] = \frac{P_{max}[mW]}{4\Pi R[cm]^2}$

Minimum compliance distance: $R_{min}[cm] = \sqrt{\frac{P_{max}[mW]}{4\Pi S[mW/cm^2]}}$

Maximum gain to meet the MPE limit: $G_{max}[dBi] = (10 * \log[S[mW/cm^2] * 4\Pi R[cm]^2) - P_{max}[dBm]$

S = power density

P_{max} = power input to the antenna

R = distance to the center of radiation of the antenna (evaluation distance)

R_{min} = distance to the center of radiation of the antenna

G_{max} = power gain of the antenna in the direction of interest relative to an isotropic radiator

Assessment 1 - LTE Cat-M1 / LTE Cat-NB1 Band 2

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	1850
General population - Power density limit (mW/cm^2):	1.0

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	1.0
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	13.0
Power density using max antenna gain (mW/cm^2):	0.997

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	33.0	9.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	9.0

Assessment 2 - LTE Cat-M1 / LTE Cat-NB1 Band 4

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	1710
General population - Power density limit (mW/cm^2):	1.0

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	1.0
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	13.0
Power density using max antenna gain (mW/cm^2):	0.997

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	30.0	6.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.0

Assessment 3 - LTE Cat-M1 / LTE Cat-NB1 Band 5

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	824
General population - Power density limit (mW/cm^2):	0.549

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	0.549
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	10.4
Power density using max antenna gain (mW/cm^2):	0.548

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	40.6	16.6

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	10.4

Assessment 4 - LTE Cat-M1 / LTE Cat-NB1 Band 12

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	699
General population - Power density limit (mW/cm^2):	0.466

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	0.466
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	9.6
Power density using max antenna gain (mW/cm^2):	0.456

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	9.6

Assessment 5 - LTE Cat-M1 / LTE Cat-NB1 Band 13

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	777
General population - Power density limit (mW/cm^2):	0.518

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	0.518
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	10.1
Power density using max antenna gain (mW/cm^2):	0.511

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	10.1

Assessment 6 - LTE Cat-M1 Band 14

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	788
General population - Power density limit (mW/cm^2):	0.525

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	0.525
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	10.2
Power density using max antenna gain (mW/cm^2):	0.523

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	10.2

Assessment 7 - LTE Cat-M1 / LTE Cat-NB1 Band 17

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	704
General population - Power density limit (mW/cm^2):	0.469

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	0.469
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	9.7
Power density using max antenna gain (mW/cm^2):	0.466

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	9.7

Assessment 8 - LTE Cat-M1 / LTE Cat-NB1 Band 25

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	1850
General population - Power density limit (mW/cm^2):	1.0

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	1.0
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	13.0
Power density using max antenna gain (mW/cm^2):	0.997

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	33.0	9.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	9.0

Assessment 9 - LTE Cat-M1 / LTE Cat-NB1 Band 26

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	814
General population - Power density limit (mW/cm^2):	0.543

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	0.543
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	10.3
Power density using max antenna gain (mW/cm^2):	0.535

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	40.6	16.6

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	10.3

Assessment 10 - LTE Cat-M1 / LTE Cat-NB1 Band 66

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (mW):	251.2
Minimum use distance (cm):	20.0
Worst Case Frequency (MHz):	1710
General population - Power density limit (mW/cm^2):	1.0

Power density at minimum use distance:

Power density (mW/cm^2):	0.05
General population - Power density limit (mW/cm^2):	1.0
Verdict for general population:	PASS

The power density level for this transmission mode is below general population exposure power density limit.

Maximum gain to meet the §1.1310 Radiofrequency radiation exposure limits:

Maximum antenna gain to meet reference level (dBi):	13.0
Power density using max antenna gain (mW/cm^2):	0.997

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	30.0	6.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.0

Appendix B: ISED RF Exposure

ISED RF Exposure evaluation for mobile devices

According to RSS-102 Issue 5, Paragraph "4. Exposure Limits", Industry of Canada has adopted the RF field strength limits established in Health Canada's RF exposure guideline, Safety code 6:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Table 6: RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[23]	170	180	-	Instantaneous*
0.1-10	-	$1.6/f$	-	6**
1.29-10	$193/f^{0.5}$	-	-	6**
10-20	61.4	0.163	10	6
20-48	$129.8/f^{0.25}$	$0.3444/f^{0.25}$	$44.72/f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	$15.60f^{0.25}$	$0.04138f^{0.25}$	$0.6455f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	$616000/f^{1.2}$
150000-300000	$0.354f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

ISED EIRP Limits

Maximum ISED EIRP limits are stated into RSS-130 Issue 1, RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3. These limits are frequency-dependent and are shown in the following table:

Standard	Frequency Band	Technology & Band	EIRP limit (W)	EIRP limit (dBm)
RSS-130 Issue 1	700	LTE 12/13/14/17	4.92	36.92
RSS-132 Issue 3	850	LTE 5/26	11.5	40.6
RSS-139. Issue 3	1700	LTE 4	1.0	30.0
RSS-133 Issue 6	1900	LTE 2/25	2.0	33.0

ISED ISED MPE Evaluation Results

Each supported transmission technology will be evaluated to determine if it is in compliance with RSS-102 Issue 5, RF Field Strength Limits for devices used by the General Public.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction:

Power density: $S[W/m^2] = \frac{P_{max}[W]}{4\Pi R[m]^2}$

Minimum compliance distance: $R_{min}[m] = \sqrt{\frac{P_{max}[W]}{4\Pi S[W/m^2]}}$

Maximum gain to meet the RSS -102 limit: $G_{max}[dBi] = (10 * \log[S[W/m^2] * 4\Pi R[m]^2) + 30 - P_{max}[dBm]$

S = power density

P_{max} = power input to the antenna

R = distance to the center of radiation of the antenna (evaluation distance)

R_{min} = distance to the center of radiation of the antenna

G_{max} = power gain of the antenna in the direction of interest relative to an isotropic radiator

Assessment 1 - LTE Cat-M1 / LTE Cat-NB1 Band 2

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	1850
General public - Power density limit (W/m^2):	4.47

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	4.47
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	9.5
Power density using max antenna gain (W/m^2):	4.45

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	33.0	9.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	9.0

Assessment 2 - LTE Cat-M1 / LTE Cat-NB1 Band 4

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	1710
General public - Power density limit (W/m^2):	4.24

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	4.24
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	9.2
Power density using max antenna gain (W/m^2):	4.16

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	30.0	6.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.0

Assessment 3 - LTE Cat-M1 / LTE Cat-NB1 Band 5

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	824
General public - Power density limit (W/m^2):	2.58

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	2.58
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	7.1
Power density using max antenna gain (W/m^2):	2.56

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	40.6	16.6

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	7.1

Assessment 4 - LTE Cat-M1 / LTE Cat-NB1 Band 12

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	699
General public - Power density limit (W/m^2):	2.3

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	2.3
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	6.6
Power density using max antenna gain (W/m^2):	2.28

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.6

Assessment 5 - LTE Cat-M1 / LTE Cat-NB1 Band 13

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	777
General public - Power density limit (W/m^2):	2.47

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	2.47
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	6.9
Power density using max antenna gain (W/m^2):	2.45

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.9

Assessment 6 - LTE Cat-M1 Band 14

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	788
General public - Power density limit (W/m^2):	2.50

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	2.50
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	6.9
Power density using max antenna gain (W/m^2):	2.45

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.9

Assessment 7 - LTE Cat-M1 / LTE Cat-NB1 Band 17

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	704
General public - Power density limit (W/m^2):	2.31

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	2.31
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	6.6
Power density using max antenna gain (W/m^2):	2.28

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	36.92	12.92

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.6

Assessment 8 - LTE Cat-M1 / LTE Cat-NB1 Band 25

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	1850
General public - Power density limit (W/m^2):	4.47

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	4.47
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	9.5
Power density using max antenna gain (W/m^2):	4.45

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	33.0	9.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	9.0

Assessment 9 - LTE Cat-M1 / LTE Cat-NB1 Band 26

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	814
General public - Power density limit (W/m^2):	2.55

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	2.55
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	7.0
Power density using max antenna gain (W/m^2):	2.50

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	40.6	16.6

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	7.0

Assessment 10 - LTE Cat-M1 / LTE Cat-NB1 Band 66

MPE Evaluation

Maximum output power (dBm):	24.0
Maximum output power (W):	0.25
Minimum use distance (m):	0.2
Worst Case Frequency (MHz):	1710
General public - Power density limit (W/m^2):	4.24

Power density at minimum use distance:

Power density (W/m^2):	0.50
General public - Power density limit (W/m^2):	4.24
Verdict for general public:	PASS

The power density level for this transmission mode is below general public power density limit.

Maximum gain to meet the RSS-102 limits:

Maximum antenna gain to meet reference level (dBi):	9.2
Power density using max antenna gain (W/m^2):	4.16

The power density level using the maximum antenna gain for this transmission mode will be below power density reference level.

EIRP Evaluation

Maximum output power (dBm):	EIRP limit (dBm)	Maximum antenna gain to meet EIRP level (dBi)
24.0	30.0	6.0

Maximum antenna gain to meet power density reference limit / EIRP limit

Maximum antenna gain (dBi):	6.0