

# RF EXPOSURE EVALUATION REPORT

FCC ID : J9CQCARD7280N2  
Equipment : QCARD7280  
Brand Name : Qualcomm  
Model Name : QCARD7280N2  
Applicant : Qualcomm Technologies, Inc.  
5775 Morehouse Drive, San Diego, California  
92121, United State  
Manufacturer : Qualcomm Semiconductor Limited  
No. 16-1 Zhanye 2nd Rd. East District Hsinchu  
City, 300091 (Taiwan)  
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

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Approved by: Cona Huang / Deputy Manager



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## **Table of Contents**

<b>1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) .....</b>	<b>4</b>
<b>2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS .....</b>	<b>5</b>
<b>3. RF EXPOSURE LIMIT INTRODUCTION .....</b>	<b>6</b>
<b>4. RF EXPOSURE EVALUATION .....</b>	<b>7</b>
4.1. Collocated assessment .....	8





**1. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	QCARD7280
Brand Name	Qualcomm
Model Name	QCARD7280N2
FCC ID	J9CQCARD7280N2
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n70 : 1695 MHz ~ 1710 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz WLAN 6E: 5925 MHz ~ 6425 MHz, 6425 MHz ~ 6525 MHz, 6525 MHz ~ 6875 MHz, 6875 MHz ~ 7125 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM WLAN:802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
EUT Stage	Identical Prototype

**Reviewed by: Jason Wang**

**Report Producer: Daisy Peng**



## 2. Maximum RF average output power among production units

**Remark:**

In RF test, EUT TX power level was configured via the test mode and set slightly higher than the maximum power level to cover the range of TX power variation among units

Mode	Band Number	Maximum Average Power (dBm)
WCDMA	B2	25.20
WCDMA	B4	25.20
WCDMA	B5	25.20
LTE	B2	25.20
LTE	B4	25.20
LTE	B5	25.20
LTE	B12	25.20
LTE	B13	25.20
LTE	B14	25.20
LTE	B25	25.20
LTE	B26	25.20
LTE	B30	25.20
LTE	B38	25.20
LTE	B38(HPUE)	27.20
LTE	B41	25.20
LTE	B41(HPUE)	27.20
LTE	B48	25.20
LTE	B66	25.20
LTE	B71	25.20
FR1	n2	25.20
FR1	n5	25.20
FR1	n25	25.20
FR1	n38	25.20
FR1	n41	25.20
FR1	n41(HPUE)	27.20
FR1	n48	25.20
FR1	n66	25.20
FR1	n70	25.20
FR1	n71	25.20
FR1	n77	25.20
FR1	n77(HPUE)	27.20

Mode	Maximum Average Power (dBm)
BT BLE	11.05
BT BR/EDR	20.16
2.4GHz WLAN	22.86
5GHz WLAN	20.46
6GHz WLAN	15.81

### 3. RF Exposure Limit Introduction

Per 1.1307(b)(3), (i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);
- (B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th} \text{ (mW)} = ERP_{20cm} (d / 20)^x \text{ for distance } d \leq 20\text{cm}$$

$$P_{th} \text{ (mW)} = ERP_{20cm} \text{ for distance } 20\text{cm} < d \leq 40\text{cm}$$

$$x = -\log_{10} \left( \frac{60}{ERP_{20cm} \sqrt{f}} \right)$$

$ERP_{20cm} \text{ (mW)}$	$0.3 \text{ GHz} \leq f < 1.5 \text{ GHz}:$	2040 f
	$1.5 \text{ GHz} \leq f \leq 6 \text{ GHz}:$	3060

- (C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$ .
1.34-30	$3,450 R^2/f^2$ .
30-300	$3.83 R^2$ .
300-1,500	$0.0128 R^2 f$ .
1,500-100,000	$19.2 R^2$ .



### 4. RF Exposure Evaluation

**General Note:**

1. Pi is mean the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm
2. Pth is mean the exemption threshold power (Pth) according to the § 1.1307(b)(3)(i)(B) formula for fixed, mobile, or portable RF source i.
3. In this report was used Part1.1307(b)(3)(i)(B) perfrom RF Exposure evaluation
4. The distance of 20cm is for this device

Band	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum ERP (dBm)	Maximum EIRP (mW)	Maximum ERP (mW)	Pi (dBm)	Pi (mW)	Maximum RSE Limit (mW)	Part1.1307 option(b) Threshold (mW)	Part1.1307 option(b) Pi/Pth
WCDMA Band 2	2.30	25.20	27.5	25.35	562.34	342.77	25.35	342.77	2000	3060.000	0.112
WCDMA Band 4	2.10	25.20	27.3	25.15	537.03	327.34	25.20	331.13	1000	3060.000	0.108
WCDMA Band 5	0.00	25.20	25.2	23.05	331.13	201.84	25.20	331.13	7000	1680.960	0.197
LTE Band 2	2.30	25.20	27.5	25.35	562.34	342.77	25.35	342.77	2000	3060.000	0.112
LTE Band 4	2.10	25.20	27.3	25.15	537.03	327.34	25.20	331.13	1000	3060.000	0.108
LTE Band 5	0.00	25.20	25.2	23.05	331.13	201.84	25.20	331.13	7000	1680.960	0.197
LTE Band 12	-0.50	25.20	24.7	22.55	295.12	179.89	25.20	331.13	3000	1425.960	0.232
LTE Band 13	-0.20	25.20	25.0	22.85	316.23	192.75	25.20	331.13	3000	1585.080	0.209
LTE Band 14	-0.20	25.20	25.0	22.85	316.23	192.75	25.20	331.13	3000	1607.520	0.206
LTE Band 25	2.30	25.20	27.5	25.35	562.34	342.77	25.35	342.77	2000	3060.000	0.112
LTE Band 26	0.00	25.20	25.2	23.05	331.13	201.84	25.20	331.13	7000	1660.560	0.199
LTE Band 30	-1.30	25.20	23.9	21.75	245.47	149.62	25.20	331.13	250	3060.000	0.108
LTE Band 38	1.00	25.20	26.2	24.05	416.87	254.10	25.20	331.13	2000	3060.000	0.108
LTE Band 38(HPUE)	1.00	27.20	28.2	26.05	660.69	402.72	27.20	524.81	2000	3060.000	0.172
LTE Band 41	1.00	25.20	26.2	24.05	416.87	254.10	25.20	331.13	2000	3060.000	0.108
LTE Band 41(HPUE)	1.00	27.20	28.2	26.05	660.69	402.72	27.20	524.81	2000	3060.000	0.172
LTE Band 48	-2.20	25.20	23.0	20.85	199.53	121.62	25.20	331.13	200	3060.000	0.108
LTE Band 66	2.10	25.20	27.3	25.15	537.03	327.34	25.20	331.13	1000	3060.000	0.108
LTE Band 71	-1.00	25.20	24.2	22.05	263.03	160.32	25.20	331.13	3000	1352.520	0.245
5G NR n2	2.30	25.20	27.5	25.35	562.34	342.77	25.35	342.77	2000	3060.000	0.112
5G NR n5	0.00	25.20	25.2	23.05	331.13	201.84	25.20	331.13	7000	1680.960	0.197
5G NR n25	2.30	25.20	27.5	25.35	562.34	342.77	25.35	342.77	2000	3060.000	0.112
5G NR n38	1.00	25.20	26.2	24.05	416.87	254.10	25.20	331.13	2000	3060.000	0.108
5G NR n41	1.00	25.20	26.2	24.05	416.87	254.10	25.20	331.13	2000	3060.000	0.108
5G NR n41(HPUE)	1.00	27.20	28.2	26.05	660.69	402.72	27.20	524.81	2000	3060.000	0.172
5G NR n48	-2.20	25.20	23.0	20.85	199.53	121.62	25.20	331.13	200	3060.000	0.108
5G NR n66	2.10	25.20	27.3	25.15	537.03	327.34	25.20	331.13	1000	3060.000	0.108
5G NR n70	2.10	25.20	27.3	25.15	537.03	327.34	25.20	331.13	1000	3060.000	0.108
5G NR n71	-1.00	25.20	24.2	22.05	263.03	160.32	25.20	331.13	3000	1352.520	0.245
5G NR n77	1.80	25.20	27.0	24.85	501.19	305.49	25.20	331.13	1000	3060.000	0.108
5G NR n77(HPUE)	1.80	27.20	29.0	26.85	794.33	484.17	27.20	524.81	1000	3060.000	0.172

Band	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum ERP (dBm)	Maximum EIRP (mW)	Maximum ERP (mW)	Pi (dBm)	Pi (mW)	Part1.1307 option(b) Threshold (mW)	Part1.1307 option(b) Pi/Pth
Bluetooth	3.53	20.16	23.69	21.54	233.88	142.56	21.54	142.56	3060.000	0.047
2.4GHz WLAN	6.54	22.86	29.40	27.25	870.96	530.88	27.25	530.88	3060.000	0.173
5GHz WLAN	7.82	20.46	28.28	26.13	672.98	410.20	26.13	410.20	3060.000	0.134
6GHz WLAN	8.17	15.81	23.98	21.83	250.03	152.41	21.83	152.41	3060.000	0.050

#### 4.1. Collocated assessment

**General Note:**

1. Either MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (*Evaluated<sub>k</sub>* term) shall be used to determine exemption for simultaneous transmission according to Formula (C.1).
2. The sum of the ratios of the applicable terms for MPE-based and MPE shall be less than 1, to determine LTE + NR + WLAN + BT simultaneous transmission exposure compliance.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1 \quad (C.1)$$

Maximum LTE Pi/Pth Ratio	Maximum 5G NR Pi/Pth Ratio	WLAN Pi/Pth Ratio	Bluetooth Pi/Pth Ratio	Σ (P/Pth Ratio) of LTE + 5G NR + WLAN + Bluetooth
0.245	0.245	0.173	0.047	0.710

Maximum LTE Pi/Pth Ratio	Maximum 5G NR Pi/Pth Ratio	WLAN 2.4GHz Pi/Pth Ratio	WLAN 5/6GHz Pi/Pth Ratio	Σ (P/Pth Ratio) of LTE + 5G NR + WLAN 2.4GHz + WLAN 5/6GHz
0.245	0.245	0.173	0.134	0.797





**Conclusion:**

Based on FCC 47 CFR §1.1307, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Device	Technology	Band	Maximum Conducted Power (dBm)	Maximum Allow Antenna Gain (dBi)
QCARD7280N-2	UMTS	WCDMA Band 2	25.20	2.3
		WCDMA Band 4	25.20	2.1
		WCDMA Band 5	25.20	0.0
	LTE	LTE Band 2	25.20	2.3
		LTE Band 4	25.20	2.1
		LTE Band 5	25.20	0.0
		LTE Band 12	25.20	-0.5
		LTE Band 13	25.20	-0.2
		LTE Band 14	25.20	-0.2
		LTE Band 25	25.20	2.3
		LTE Band 26	25.20	0.0
		LTE Band 30	25.20	-1.3
		LTE Band 38	25.20	1.0
		LTE Band 38(HPUE)	27.20	1.0
		LTE Band 41	25.20	1.0
		LTE Band 41(HPUE)	27.20	1.0
		LTE Band 48	25.20	-2.2
		LTE Band 66	25.20	2.1
	LTE Band 71	25.20	-1.0	
	NR	5G NR n2	25.20	2.3
		5G NR n5	25.20	0.0
		5G NR n25	25.20	2.3
		5G NR n38	25.20	1.0
		5G NR n41	25.20	1.0
5G NR n41(HPUE)		27.20	1.0	
5G NR n48		25.20	-2.2	
5G NR n66		25.20	2.1	
5G NR n70		25.20	2.1	
5G NR n71		25.20	-1.0	
5G NR n77	25.20	1.8		
5G NR n77(HPUE)	27.20	1.8		