



RF EXPOSURE EVALUATION REPORT

FCC ID : NKR-VMC-QSA515MNA
Equipment : Module (Data + Voice)
Brand Name : Wistron NeWeb Corporation
Model Name : VMC-QSA515M NA
Applicant : Wistron NeWeb Corporation
20 Park Avenue II, Hsinchu Science Park, Hsinchu 308 Taiwan
Manufacturer : Wistron NeWeb Corporation
20 Park Avenue II, Hsinchu Science Park, Hsinchu 308 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.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.

Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FA370621-01	Rev. 01	Initial issue of report	Dec. 11, 2023



1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Module (Data + Voice)
Brand Name	Wistron NeWeb Corporation
Model Name	VMC-QSA515M NA
FCC ID	NKR-VMC-QSA515MNA
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 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 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 n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3300 MHz ~ 4200 MHz 5G NR n78: 3300 MHz ~ 3800 MHz
Mode	HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
EUT Stage	Production Unit

Reviewed by: Jason Wang

Report Producer: Paula Chen



2. Maximum RF average output power among production units

Mode	Maximum Average Power (dBm)
WCDMA Band 2	25.7
WCDMA Band 4	25.7
WCDMA Band 5	25.7
LTE Band 2	25.7
LTE Band 4	25.7
LTE Band 5	25.7
LTE Band 7	25.7
LTE Band 12	25.7
LTE Band 13	25.7
LTE Band 14	25.7
LTE Band 17	25.7
LTE Band 25	25.7
LTE Band 26	25.7
LTE Band 41	25.7
LTE Band 66	25.7
LTE Band 71	25.7
5G NR n2	26
5G NR n5	26
5G NR n25	26
5G NR n41_PC3	26
5G NR n41_PC2	29
5G NR n66	26
5G NR n71	26
5G NR n77_PC3	26
5G NR n77_PC2	29
5G NR n78_PC3	26
5G NR n78_PC2	29



3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Table with 5 columns: Frequency range (MHz), Electric field strength (V/m), Magnetic field strength (A/m), Power density (mW/cm²), Averaging time (minutes). It is divided into two sections: (A) Limits for Occupational/Controlled Exposures and (B) Limits for General Population/Uncontrolled Exposure.

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

S = PG / (4πR²)

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP (dBm)	Maximum ERP (W)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	4.40	25.70	27.950	0.624	30.100	1.023	2.000	1023.293	0.204	1.000	0.204
WCDMA Band 4	4.00	25.70	27.550	0.569	29.700	0.933	1.000	933.254	0.186	1.000	0.186
WCDMA Band 5	2.00	25.70	25.550	0.359	27.700	0.589	7.000	588.844	0.117	0.549	0.213
LTE Band 2	4.40	25.70	27.950	0.624	30.100	1.023	2.000	1023.293	0.204	1.000	0.204
LTE Band 4	4.00	25.70	27.550	0.569	29.700	0.933	1.000	933.254	0.186	1.000	0.186
LTE Band 5	2.00	25.70	25.550	0.359	27.700	0.589	7.000	588.844	0.117	0.549	0.213
LTE Band 7	2.30	25.70	25.850	0.385	28.000	0.631	2.000	630.957	0.126	1.000	0.126
LTE Band 12	2.00	25.70	25.550	0.359	27.700	0.589	3.000	588.844	0.117	0.466	0.252
LTE Band 13	2.30	25.70	25.850	0.385	28.000	0.631	3.000	630.957	0.126	0.518	0.242
LTE Band 14	2.30	25.70	25.850	0.385	28.000	0.631	3.000	630.957	0.126	0.525	0.239
LTE Band 17	2.00	25.70	25.550	0.359	27.700	0.589	3.000	588.844	0.117	0.469	0.250
LTE Band 25	4.40	25.70	27.950	0.624	30.100	1.023	2.000	1023.293	0.204	1.000	0.204
LTE Band 26	2.00	25.70	25.550	0.359	27.700	0.589	7.000	588.844	0.117	0.543	0.216
LTE Band 41	2.30	25.70	25.850	0.385	28.000	0.631	2.000	630.957	0.126	1.000	0.126
LTE Band 66	4.00	25.70	27.550	0.569	29.700	0.933	1.000	933.254	0.186	1.000	0.186
LTE Band 71	1.30	25.70	24.850	0.305	27.000	0.501	3.000	501.187	0.100	0.442	0.226
5G NR n2	4.40	26.00	28.250	0.668	30.400	1.096	2.000	1096.478	0.218	1.000	0.218
5G NR n5	2.00	26.00	25.850	0.385	28.000	0.631	7.000	630.957	0.126	0.549	0.229
5G NR n25	4.40	26.00	28.250	0.668	30.400	1.096	2.000	1096.478	0.218	1.000	0.218
5G NR n41_PC3	2.30	26.00	26.150	0.412	28.300	0.676	2.000	676.083	0.135	1.000	0.135
5G NR n41_PC2	2.30	29.00	29.150	0.822	31.300	1.349	2.000	1348.963	0.269	1.000	0.269
5G NR n66	4.00	26.00	27.850	0.610	30.000	1.000	1.000	1000.000	0.199	1.000	0.199
5G NR n71	1.30	26.00	25.150	0.327	27.300	0.537	3.000	537.032	0.107	0.442	0.242
5G NR n77_PC3	1.00	26.00	24.850	0.305	27.000	0.501	1000	501.187	0.100	1.000	0.100
5G NR n77_PC2	1.00	29.00	27.850	0.610	30.000	1.000	1000	1000.000	0.199	1.000	0.199
5G NR n78_PC3	1.00	26.00	24.850	0.305	27.000	0.501	1000	501.187	0.100	1.000	0.100
5G NR n78_PC2	1.00	29.00	27.850	0.610	30.000	1.000	1000	1000.000	0.199	1.000	0.199

<EN-DC Simtaneous Transmission analysis>

EN-DC		Σ (Power Density / Limit) of LTE + 5G NR
LTE Power Density / Limit	5G NR Power Density / Limit	
0.252	0.269	0.521

General Note:

- The device support 5G FR1 NSA mode, consider colocation analysis to selected worst case LTE and 5G NR power density / limit to summation to show compliance
- Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/(corresponding MPE limit)], for LTE + 5G NR.
- Considering the collocation with the four transmitters of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant



4.2. Collocated Power Density Calculation

Note:

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 20dBm and for Bluetooth is less than or equal to 15dBm.
2. A maximum antenna gain of 5 dBi for WLAN/BT has been assumed for all collocated antennas.

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	3.90	25.70	29.6	0.91	912.01	0.182	1.000	0.182
WCDMA Band 4	3.60	25.70	29.3	0.85	851.14	0.169	1.000	0.169
WCDMA Band 5	1.50	25.70	27.2	0.52	524.81	0.104	0.549	0.190
LTE Band 2	3.90	25.70	29.6	0.91	912.01	0.182	1.000	0.182
LTE Band 4	3.60	25.70	29.3	0.85	851.14	0.169	1.000	0.169
LTE Band 5	1.50	25.70	27.2	0.52	524.81	0.104	0.549	0.190
LTE Band 7	1.70	25.70	27.4	0.55	549.54	0.109	1.000	0.109
LTE Band 12	1.00	25.70	26.7	0.47	467.74	0.093	0.466	0.200
LTE Band 13	1.30	25.70	27.0	0.50	501.19	0.100	0.518	0.193
LTE Band 14	1.40	25.70	27.1	0.51	512.86	0.102	0.525	0.194
LTE Band 17	1.00	25.70	26.7	0.47	467.74	0.093	0.469	0.198
LTE Band 25	3.90	25.70	29.6	0.91	912.01	0.182	1.000	0.182
LTE Band 26	1.50	25.70	27.2	0.52	524.81	0.104	0.543	0.192
LTE Band 41	1.70	25.70	27.4	0.55	549.54	0.109	1.000	0.109
LTE Band 66	3.60	25.70	29.3	0.85	851.14	0.169	1.000	0.169
LTE Band 71	0.80	25.70	26.5	0.45	446.68	0.089	0.442	0.201
5G NR n2	3.90	26.00	29.9	0.98	977.24	0.195	1.000	0.195
5G NR n5	1.50	26.00	27.5	0.56	562.34	0.112	0.549	0.204
5G NR n25	3.90	26.00	29.9	0.98	977.24	0.195	1.000	0.195
5G NR n41_PC3	1.70	26.00	27.7	0.59	588.84	0.117	1.000	0.117
5G NR n41_PC2	1.70	29.00	30.7	1.17	1174.90	0.234	1.000	0.234
5G NR n66	3.60	26.00	29.6	0.91	912.01	0.182	1.000	0.182
5G NR n71	0.80	26.00	26.8	0.48	478.63	0.095	0.442	0.216
5G NR n77_PC3	1.00	26.00	27.0	0.50	501.19	0.100	1.000	0.100
5G NR n77_PC2	1.00	29.00	30.0	1.00	1000.00	0.199	1.000	0.199
5G NR n78_PC3	1.00	26.00	27.0	0.50	501.19	0.100	1.000	0.100
5G NR n78_PC2	1.00	29.00	30.0	1.00	1000.00	0.199	1.000	0.199
WLAN2.4GHz Band	5.0	20.0	25.0	0.32	316.23	0.063	1.000	0.063
WLAN5GHz Band	5.0	20.0	25.0	0.32	316.23	0.063	1.000	0.063
Bluetooth	5.0	15.0	20.0	0.10	100.00	0.020	1.000	0.020

EN-DC		WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of LTE + 5G NR + WLAN + Bluetooth
LTE Power Density / Limit	5G NR Power Density / Limit			
0.201	0.234	0.063	0.020	0.518

Note:

1. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)], for LTE + NR + WLAN + Bluetooth.
2. Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 4 collocated transmitters is compliant.



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)	Standalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
VMC-QSA515M NA	UMTS	WCDMA Band 2	25.7	4.4	3.9
		WCDMA Band 4	25.7	4.0	3.6
		WCDMA Band 5	25.7	2.0	1.5
	LTE	LTE Band 2	25.7	4.4	3.9
		LTE Band 4	25.7	4.0	3.6
		LTE Band 5	25.7	2.0	1.5
		LTE Band 7	25.7	2.3	1.7
		LTE Band 12	25.7	2.0	1.0
		LTE Band 13	25.7	2.3	1.3
		LTE Band 14	25.7	2.3	1.4
		LTE Band 17	25.7	2.0	1.0
		LTE Band 25	25.7	4.4	3.9
		LTE Band 26	25.7	2.0	1.5
		LTE Band 41	25.7	2.3	1.7
		LTE Band 66	25.7	4.0	3.6
		LTE Band 71	25.7	1.3	0.8
	FR1	5G NR n2	26.0	4.4	3.9
		5G NR n5	26.0	2.0	1.5
		5G NR n25	26.0	4.4	3.9
		5G NR n41_PC3	26.0	2.3	1.7
		5G NR n41_PC2	29.0	2.3	1.7
		5G NR n66	26.0	4.0	3.6
		5G NR n71	26.0	1.3	0.8
5G NR n77_PC3		26.0	1.0	1.0	
5G NR n77_PC2		29.0	1.0	1.0	
5G NR n78_PC3		26.0	1.0	1.0	
5G NR n78_PC2	29.0	1.0	1.0		