

RF EXPOSURE EVALUATION REPORT

FCC ID : N7NEM75T
Equipment : Radio Module
Brand Name : AirPrime
Model Name : EM7590
Marketing Name : EM7590
Applicant : Sierra Wireless, Inc.
13811 Wireless Way, Richmond, BC V6V 3A4 Canada
Manufacturer : Sierra Wireless, Inc.
13811 Wireless Way, Richmond, BC V6V 3A4 Canada
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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History of this test report

Report No.	Version	Description	Issued Date
FA242018	Rev. 01	Initial issue of report	Aug. 05, 2022

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Radio Module
Brand Name	AirPrime
Model Name	EM7590
Marketing Name	EM7590
FCC ID	N7NEM75T
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 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 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
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Reviewed by: Jason Wang

Report Producer: Carlie Tsai

2. Maximum RF average output power among production units

Mode		Maximum Transmit Power Level (dBm)
WCDMA	Band II	24.00
	Band IV	24.00
	Band V	24.00
FDD LTE	Band 2	24.00
	Band 4	24.00
	Band 5	24.00
	Band 7	24.00
	Band 12	24.00
	Band 13	24.00
	Band 14	24.00
	Band 25	24.00
	Band 26	24.00
	Band 66	24.00
	Band 71	24.00
TDD LTE	Band 41	24.00
	Band 48	23.00

3. RF Exposure Limit Introduction

According to Part1.1307b, 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:

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

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

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

ERP _{20cm} (mW)	0.3 GHz ≤ f < 1.5 GHz:	2040 f
	1.5 GHz ≤ f ≤ 6 GHz:	3060

4. RF Exposure Evaluation

4.1. Standalone assessment

Band	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum ERP (dBm)	Maximum EIRP (mW)	Maximum ERP (mW)	P _{th}	P _{th} (mW)	Maximum ERP/EIRP Limit (mW)	Part1.1307 option(b) Threshold (mW)
WCDMA Band II	9.00	24.0	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000
WCDMA Band IV	6.00	24.0	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000
WCDMA Band V	7.00	24.0	31.0	28.85	1258.93	767.36	28.85	767.36	7000	1680.960
LTE Band 2	9.00	24.0	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000
LTE Band 4	6.00	24.0	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000
LTE Band 5	7.00	24.0	31.0	28.85	1258.93	767.36	28.85	767.36	7000	1680.960
LTE Band 7	9.00	24.0	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000
LTE Band 12	6.60	24.0	30.6	28.45	1148.15	699.84	28.45	699.84	3000	1425.960
LTE Band 13	6.90	24.0	30.9	28.75	1230.27	749.89	28.75	749.89	3000	1585.080
LTE Band 14	6.90	24.0	30.9	28.75	1230.27	749.89	28.75	749.89	3000	1607.520
LTE Band 25	9.00	24.0	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000
LTE Band 26	7.00	24.0	31.0	28.85	1258.93	767.36	28.85	767.36	7000	1660.560
LTE Band 41	9.00	24.0	33.0	30.85	1995.26	1216.19	30.85	1216.19	2000	3060.000
LTE Band 48	0.00	23.0	23.0	20.85	199.53	121.62	23.00	199.53	200	3060.000
LTE Band 66	6.00	24.0	30.0	27.85	1000.00	609.54	27.85	609.54	1000	3060.000
LTE Band 71	6.40	24.0	30.4	28.25	1096.48	668.34	28.25	668.34	3000	1352.520

4.2. Collocated assessment

Note:

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 25dBm and for Bluetooth is less than or equal to 11dBm.
2. A maximum antenna gain of 5 dBi for WLAN/BT has been assumed for all collocated antennas.

Band	Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Maximum EIRP (dBm)	Maximum ERP (dBm)	Maximum EIRP (mW)	Maximum ERP (mW)	P _{th}	P _{th} (mW)	Part1.1307 option(b) Threshold (mW)	Part1.1307 option(b) P/Pth
WCDMA Band II	7.30	24.0	31.3	29.15	1348.96	822.24	29.15	822.24	3060.000	0.269
WCDMA Band IV	6.00	24.0	30.0	27.85	1000.00	609.54	27.85	609.54	3060.000	0.199
WCDMA Band V	4.90	24.0	28.9	26.75	776.25	473.15	26.75	473.15	1680.960	0.281
LTE Band 2	7.30	24.0	31.3	29.15	1348.96	822.24	29.15	822.24	3060.000	0.269
LTE Band 4	6.00	24.0	30.0	27.85	1000.00	609.54	27.85	609.54	3060.000	0.199
LTE Band 5	4.90	24.0	28.9	26.75	776.25	473.15	26.75	473.15	1680.960	0.281
LTE Band 7	8.20	24.0	32.2	30.05	1659.59	1011.58	30.05	1011.58	3060.000	0.331
LTE Band 12	4.50	24.0	28.5	26.35	707.95	431.52	26.35	431.52	1425.960	0.303
LTE Band 13	4.80	24.0	28.8	26.65	758.58	462.38	26.65	462.38	1585.080	0.292
LTE Band 14	4.80	24.0	28.8	26.65	758.58	462.38	26.65	462.38	1607.520	0.288
LTE Band 25	7.30	24.0	31.3	29.15	1348.96	822.24	29.15	822.24	3060.000	0.269
LTE Band 26	4.90	24.0	28.9	26.75	776.25	473.15	26.75	473.15	1660.560	0.285
LTE Band 41	8.20	24.0	32.2	30.05	1659.59	1011.58	30.05	1011.58	3060.000	0.331
LTE Band 48	0.00	23.0	23.0	20.85	199.53	121.62	23.00	199.53	3060.000	0.065
LTE Band 66	6.00	24.0	30.0	27.85	1000.00	609.54	27.85	609.54	3060.000	0.199
LTE Band 71	4.30	24.0	28.3	26.15	676.08	412.10	26.15	412.10	1352.520	0.305
WLAN2.4GHz Band	5.0	25.0	30.0	27.85	1000.00	609.54	27.85	609.54	3060.000	0.199
WLAN5GHz Band	5.0	25.0	30.0	27.85	1000.00	609.54	27.85	609.54	3060.000	0.199
WLAN6GHz Band	5.0	25.0	30.0	27.85	1000.00	609.54	27.85	609.54	3060.000	0.199
Bluetooth	5.0	11.0	16.0	13.85	39.81	24.27	13.85	24.27	3060.000	0.008

WWAN P/Pth Ratio	WLAN P/Pth Ratio	Bluetooth P/Pth Ratio	Σ (P/Pth Ratio) of WWAN + WLAN + Bluetooth
0.331	0.199	0.008	0.538

Note:

1. According part1.1307b, the P/Pth Ratio is using for Sim-Tx analysis, above table was showing WWAN transmitting with WLAN and Bluetooth and the summation ratio is smaller than 1.

**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)	Stanalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
EM7590	WCDMA	Band II	24.00	9.00	7.30
		Band IV	24.00	6.00	6.00
		Band V	24.00	7.00	4.90
	LTE	Band 2	24.00	9.00	7.30
		Band 4	24.00	6.00	6.00
		Band 5	24.00	7.00	4.90
		Band 7	24.00	9.00	8.20
		Band 12	24.00	6.60	4.50
		Band 13	24.00	6.90	4.80
		Band 14	24.00	6.90	4.80
		Band 25	24.00	9.00	7.30
		Band 26	24.00	7.00	4.90
		Band 41	24.00	9.00	8.20
		Band 48	23.00	0.00	0.00
		Band 66	24.00	6.00	6.00
		Band 71	24.00	6.40	4.30