

REGULATORY COMPLIANCE REPORT

TITLE: FCC & ISED MPE Report for 15.247 & RSS-247 Frequency Hopping Device

FCC ID:EWQ500GC; IC: 864D-500GC

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REV	CCO	DESCRIPTION OF CHANGE	DATE	APPROVALS	
001		INITIAL RELEASE		Engineering	
				Regulatory	

REVISION HISTORY

002		updated PO		Engineering	
				Regulatory	
				Engineering	
				Regulatory	
				Engineering	
				Regulatory	

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Test Data Summary

FCC 15.247 / ISSED RSS-247; Frequency Hopping Transmitter;

500GC – Commercial, 902.2MHz – 927.75 MHz

FCC ID:EWQ500GC; IC: 864D-500GC ISSED Device HVIN/Models: 5U, 6U

OATS Registration Number: FCC 90716/ISSED 864D-1; 500051-0 NVLAP, ICSI; 0803.05 A2LA, CKC

Rule	Description	Spec Limit	Max. Reading	Pass/Fail
Parts 2.1091(mobile) & 1.1310	Limits for Maximum Permissible Exposure (MPE)	formula	0.128mW / cm ² @ 20 cm	Pass
RSS-102i5 Sec. 4, Table 4	RF Field Strength Limits for Devices Used by the General Public	formulas	1.28W/M ² @ 0.2 M	Pass

Rule versions: FCC Part 1; FCC Part 2; FCC Part 15, RSS-102 Issue 5 (03-2015); RSS-247 Issue 1 (5-2015); RSS-Gen Issue 4 (12-2014).
Reference docs: ANSI C63.4-2014; ANSI C63.10-2013; DA 00-705 (03-30-2000); OET65 (08-1997); OET65C (06-2001); IEEE C95.3-2002.

Cognizant Personnel	
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CONDITIONS DURING TESTING

No Modifications to the EUT were necessary during the testing.

ANSI C63.4 - Temperature and Humidity During Testing

The temperature during testing was within +10° C and +40° C.

The Relative humidity was between 10% and 90%.

RSS-Gen 4.3: Tests shall be performed at ambient temperature

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Itron declares that the EUT tested was representative of a production unit.

EQUIPMENT UNDER TEST

EUT Module

Manuf: Itron, Inc.
Itron p/n: ERG-7000-007, -008
Serial Number(s) unit 12
Power source Fresh Batteries were used

Peripheral Devices

None

2.1091(mobile) & 1.1310 /

RSS-102 Sec 4 (table4) - Canada Safety Code 6; Table 5

Maximum Permissible Exposure (MPE)

2.1091. Radiofrequency radiation exposure evaluation: mobile devices. (a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular § 1.1307(b). (b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

1.1307 (b) In addition to the actions listed in paragraph (a) of this section, Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the preparation of an Environmental Assessment (EA) if the particular facility, operation or transmitter would cause human exposure to levels of radiofrequency radiation in excess of the limits in §§1.1310 and 2.1093 of this chapter.

1.1310. Radiofrequency radiation exposure limits. - (e) Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields. (The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.)

2.1093. Radiofrequency radiation exposure evaluation: portable devices.

Power level	Field ⁽¹⁾ strength (dBuV/m)	EIRP ⁽²⁾ (dbm)	Conducted ⁽³⁾ power (dbm)	Conducted power (milliwatts)	antenna ⁽⁴⁾ gain (dbi)	antenna gain numeric	mW / cm ² @ 20 cm	W/M ² @ 0.2 M	Max EIRP (Watts)
0 ⁽⁰⁾	93.6	-1.6	N/A	N/A	N/A	N/A	0.0001376	0.001376	0.0006918
10	102.4	7.2	6.91	4.91	0.29	1.07	0.001044	0.010441	0.005
24	N/A	23.79	22.33	171.00	1.46	1.40	0.047613393	0.476133928	0.239
27	123.3	28.1	26.64	461.32	1.46	1.40	0.128448527	1.284485272	0.646

(0) see appendix A for more

(1) Field strength (dBuV/m) CKC report 98972-4, page 7 and 14 CKC report 98972-6, page 8 and 15

(2) EIRP (dbm) used 412172 D01 Determining ERP and EIRP v01r01 to calculates EIRP

(3) Conducted power (dbm) From Itron Report FCC-7000-005

(4) Antenna gain (dbi) = EIRP-Conducted power

Determine the maximum power density for the general / uncontrolled population minimum separation distance of 20 cm. The power density is calculated as:

P_d = power density in mW/cm^2

P_t = transmit power in milliwatts

$$P_d = \frac{P_t \times G}{4 \times \pi \times r^2}$$

G = numeric antenna gain

r = distance between body and transmitter in centimeters.

FCC Limits: 902.2MHz / 1500 = 0.602 mW / cm² @ 20cm

IC Limits: 902.2MHz; $0.02619 \times f^{0.6834} \text{ w/m}^2 = 2.74 \text{ W / M}^2$ (@ 0.2M)

IC max limit for calculation: $1.31 \times 10^{-2} f^{0.6834} \text{ watts eirp} = 1.37 \text{ watts EIRP}$

Power level 0

Max field strength = 93.6 dBuV/m

results: $P_D = 0.6918 / (4 \times \pi \times 20cm^2)$

$W/m^2 = 10 \text{ times } mW/cm^2$

Max EIRP = 0.0006918 Watts

= 0.0001376mW / cm² @ 20 cm

= 0.001376 W/M² @ 0.2 M

Power level 1 (+10 dBm nominal)

Max antenna gain = -0.29 dBi = 1.07 numeric

Max TX power = 6.91 dBm = 4.91 milliwatts

results: $P_D = (4.91 \times 0.57) / (4 \times \pi \times 20cm^2)$

$W/M^2 = 10 \text{ times } mW/cm^2$

Max EIRP = 0.005 Watts

= 0.001 mW / cm² @ 20 cm

= 0.010 W/M² @ 0.2 M

Power level 2 (+24 dBm nominal)

Max antenna gain = -1.46 dBi = 1.40 numeric

Max TX power = 22.33dBm = 171 milliwatts

results: $P_D = (171 \times 1.40) / (4 \times \pi \times 20\text{cm}^2)$
 $W/M^2 = 10 \text{ times } mW/cm^2$

Max EIRP = 0.239 Watts

 $= 0.048 \text{ mW} / \text{cm}^2 @ 20 \text{ cm}$
 $= 0.48 \text{ W/M}^2 @ 0.2 \text{ M}$ Power level 3 (+27 dBm nominal)

Max antenna gain = -1.46 dBi = 1.40 numeric

Max TX power = 26.64 dBm = 461 milliwatts

results: $P_D = (461 \times 1.40) / (4 \times \pi \times 20\text{cm}^2)$
 $W/m^2 = 10 \text{ times } mW/cm^2$

Max EIRP = 0.646Watts

 $= 0.128 \text{ mW} / \text{cm}^2 @ 20 \text{ cm}$
 $= 1.28 \text{ W/M}^2 @ 0.2 \text{ M}$

Appendix A

Programming Mode – maximum allowed for reference

All programmed endpoints, 908 MHz

Rule	Description	Spec Limit	Maximum Permitted ⁽¹⁾
Parts 2.1091(mobile) & 1.1310	Limits for Maximum Permissible Exposure (MPE)	0.6053 mW / cm ² @ 20 cm	0.0001544 mW / cm ² @ 20 cm
RSS-102i5 Sec. 4, Table 4	RF Field Strength Limits for Devices Used by the General Public	2.7523 W/M ² @ 0.2 M	0.001544 W/M ² @ 0.2 M

(1) Maximum based on a maximum field strength of 50 millivolts/m specified in title 47 part 249 (1a)

CONDITIONS DURING TESTING

This appendix is based on maximum field strength allowed by Certification to Title 47 part 15.249 (a); therefore a device certified to Title 47 part 15.249 (a) has been certified to produce a field strength of less than 50 millivolts/meter.

EUT Module

Manuf: Itron, Inc.
Itron p/n: N/A
Serial Number(s): N/A
Power source: N/A

Field ⁽²⁾ strength (mV/m)	Field strength (dBuV/m)	EIRP ⁽¹⁾ (dbm)	mW / cm ² @ 20 cm	W/M ² @ 0.2 M	Max EIRP (Watts)	Max EIRP (milliwatts)
50	94	-1.1	0.0001544	0.0015443	0.0007762	0.7762471

(1) EIRP (dbm) used 412172 D01 Determining ERP and EIRP v01r01 to calculate EIRP

(2) Field strength based on Certification to Title 47 part 15.249 (a) A device certified to Title 47 part 15.249 (a) has been certified to produce a field strength of less than 50 millivolts/meter.

Determine the maximum power density for the general / uncontrolled population minimum separation distance of 20 cm. *The power density is calculated as:*

 P_d = power density in mW/cm²
 P_t = transmit power in milliwatts

$$P_d = \frac{P_t \times G}{4 \times \pi \times r^2}$$

G = numeric antenna gain

r = distance between body and transmitter in centimeters.

EIRP (milliwatts) = P (milliwatts) x G (numeric)

$$P_d = \frac{EIRP}{4 \times \pi \times r^2}$$

FCC Limits: 908MHz / 1500 = 0.6053 mW / cm² @ 20cm

IC Limits: 908MHz; 0.02619 x $f^{0.6834}$ w/m² = 2.7523 W / M² (@ 0.2M)

IC max limit for calculation: 1.31 x 10⁻² $f^{0.6834}$ watts eirp = 1.3767 watts EIRP

Programming level

Max EIRP (milliwatts)=0.7762

Max EIRP = 0.0007762 Watts

results: $P_d = 0.7762 / (4 \times \pi \times 20\text{cm}^2) = 0.0001544$ mW / cm² @ 20 cm

W/m² = 10 times mW/cm² = 0.001544 W/M² @ 0.2 M