



REGULATORY COMPLIANCE REPORT

TITLE: FCC & IC MPE Report for 15.247 & RSS-210 Frequency Hopping Device
Tower CCU: FCC ID: EO9CCU100T; IC: 864A-CCU100T

AUTHOR:

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

REVISION HISTORY

a				Engineering
				Regulatory
				Engineering
				Regulatory
				Engineering
				Regulatory

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Test Data Summary
FCC 15.247 / IC RSS-210; Frequency Hopping Transmitter;
 FCC ID:EO9CCU100T; IC:864A-CCU100T
 IC Device Models (for IC): TOWERCCU

Rule	Description	Spec Limit	Max. Reading	Pass/Fail
Parts 1.1310 & 2.1091(mobile) or 2.1093 (portable) / RSS-102 Sec 4.2	Limits for Maximum Permissible Exposure (MPE)	formula	0.55 mW / cm ² @ 31 cm 5.5 W/M ² @ 0.31 M	Pass

*Rule versions: FCC Part 1; FCC Part 2; FCC Part 15, RSS-102 Issue 4 (03-2010); RSS-210 Issue 8 (12-2010); RSS-Gen Issue 3 (12-2010).
 Reference docs: ANSI C63.4-2003; DA 00-705 (03-30-2000); OET65 (08-1997); OET65C (06-2001); IEEE C95.3-2002.*

Cognizant Personnel	
<u>Name</u>	<u>Title</u>
Jeff Delamater	Development Engineer
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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.

Peripheral Devices

None

1.1310 & 2.1091(mobile) or 2.1093(portable) / RSS-102 Sec 4.2-Canada Safety Code 6; Table 5

Maximum Permissible Exposure (MPE)

Radiofrequency radiation exposure limits. - 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.

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.

MPE reports:

ISM CKC 90820-14
 WWAN N7N-MC8790 09U12924-1

radio	frequency range (MHz)	measured output power (dbm)	conducted power (watts)	maximum mobile antenna gain (dbi)	antenna gain numeric	maximum EIRP (dBm)
ISM	903-926.8	27.8	0.603	8.15	6.53	35.95
WWAN	824.2-848.8	32	1.585	5	3.16	37
	2.4GHz	18.08	0.064	5	3.16	23.08

FCC:

radio	frequency range (MHz)	EIRP (mW)	distance (cm)	power density (mW/cm ²)	limit (mW/cm ²)	Duty Cycle
ISM	903-926.8	3936	20	0.783	0.610	100%
WWAN	824/850	2506	20	0.498	0.55	50%
	2.4GHz	203.2	20	0.040	1.0	100%
	(combined)			(0.539)	(0.55)	(75%)
total			31.01	0.55	0.55	83.3%

Industry Canada:

radio	frequency range (MHz)	EIRP (W)	distance (M)	power density (W/m ²)	limit (W/m ²)	Duty Cycle
ISM	903-926.8	3.936	0.2	7.830	6.10	100%
WWAN	824/850	2.506	0.2	4.983	5.5	50%
	2.4GHz	0.2032	0.2	0.404	1.0	100%
	(combined)			(5.39)	(5.5)	(75%)
total			0.310	5.5	5.5	83.3%

Determine the maximum power density for the general / uncontrolled population minimum separation distance of 20 cm.

$$\begin{array}{lll} \text{for frequencies } < 1 \text{ GHz:} & f_{\text{MHz}} / 1500 \text{ mW/cm}^2 & == f_{\text{MHz}} / 150 \text{ W/m}^2 \\ \text{for frequencies } > 1 \text{ GHz:} & 1 \text{ mW/cm}^2 & == 10 \text{ W/cm}^2 \end{array}$$

The power density is calculated as:

$$P_d = \text{power density in } \text{mW/cm}^2$$

$$P_t = \text{transmit power in milliwatts} \quad P_d = \frac{P_t \times G}{4 \times \pi \times r^2}$$

$$G = \text{numeric antenna gain}$$

$$r = \text{distance between body and transmitter in centimeters.}$$

FCC Limits:

$$\begin{array}{ll} 2.4 \text{ GHz} & = 1 \text{ mW / cm}^2 @ 20 \text{ cm} \\ 926.8 \text{ MHz} / 1500 & = 0.618 \text{ mW / cm}^2 @ 20 \text{ cm} \\ 824.2 \text{ MHz} / 1500 & = 0.55 \text{ mW / cm}^2 @ 20 \text{ cm} \end{array}$$

IC Limits:

$$\begin{array}{ll} 2.4 \text{ GHz} & = 10 \text{ W / M}^2 @ 0.2 \text{ m} \\ 926.8 \text{ MHz} / 150 & = 6.18 \text{ W / M}^2 @ 0.2 \text{ m} \\ 824.2 \text{ MHz} / 150 & = 5.5 \text{ W / M}^2 @ 0.1 \text{ m} \end{array}$$

ISM

Max antenna gain = 8.15 dBi = 6.53 numeric

Max TX power = 27.8 dBm = 602.6 milliwatts

results:

$$P_D = (602.6 \times 6.53) / (4 \times \pi \times 20 \text{ cm}^2) = 0.783 \text{ mW / cm}^2 @ 20 \text{ cm}$$

$$\text{W/m}^2 = 10 \text{ times mW/cm}^2 = 7.83 \text{ W/M}^2 @ 0.2 \text{ m}$$

or solving for distance:

$$0.610 \text{ mW / cm}^2 @ 22.7 \text{ cm}$$

$$6.10 \text{ W/m}^2 @ 0.227 \text{ m}$$

WWAN - 824MHz

Max antenna gain = 5 dBi = 3.16 numeric

Max TX power = 32 dBm = 1585 milliwatts

results:

$$P_D = (1585 \times 3.16) / (4 \times \pi \times 20 \text{ cm}^2) * 50\% \text{ duty cycle} = 0.498 \text{ mW / cm}^2 @ 20 \text{ cm}$$

$$\text{W/m}^2 = 10 \text{ times mW/cm}^2 * 50\% \text{ duty cycle} = 4.983 \text{ W/M}^2 @ 0.2 \text{ m}$$

WWAN - 2.4GHz

Max antenna gain = 5 dBi = 3.16 numeric

Max TX power = 18.08 dBm = 64 milliwatts

results:

$$P_D = (64 \times 3.16) / (4 \times \pi \times 20 \text{ cm}^2) = 0.040 \text{ mW / cm}^2 @ 20 \text{ cm}$$

$$\text{W/m}^2 = 10 \text{ times mW/cm}^2 = 0.404 \text{ W/M}^2 @ 0.2 \text{ m}$$