REGULATORY COMPLIANCE REPORT

TITLE: FCC & IC MPE Report for 15.247 & RSS-210 Frequency Hopping Device
CCU/Repeater: FCC ID: EO9CCU100; IC: 864A-CCU100
AUTHOR:

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

REVISION HISTORY

a				Engineering	
				Regulatory	
				Engineering	
				Regulatory	
				Engineering	
				Regulatory	

Test Data Summary

FCC 15.247 / IC RSS-210; Frequency Hopping Transmitter;
FCC ID:EO9CCU100; IC:864A-CCU100
IC Device Models (for IC): CCU100; CCU100R; CCU100 Repeater; CCU100R Repeater

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 @ 26.4 cm 5.5 W/M^2 @ 0.264 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

Name	Title
Jeff Delamater	Development Engineer
Jay Holcomb	Regulatory
Jon Smitham	Project Lead

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 +10º C and +40º 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:
WiFi CKC 90893-15
ISM CKC 90893-35
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)
WiFi	*2400-2483.5*	*16.4*	0.044	*0.5*	1.12	*16.90*
ISM	*902-928*	*28.0*	0.631	*5.15*	3.27	*33.15*
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
WiFi	*2400-2483.5*	*48.98*	*20*	*0.0097*	*1.0*	*100%*
ISM	*902-928*	*2065.38*	*20*	*0.411*	*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			**26.42**	**0.55**	**0.55**	**87.5%**

Industry Canada:

radio	frequency range (MHz)	EIRP (W)	distance (m)	power density (W/m^2)	limit (W/m^2)	Duty Cycle
WiFi	*2400-2483.5*	*0.0490*	*0.2*	*0.097*	*10*	*100%*
ISM	*902-928*	*2.0654*	*0.2*	*4.110*	*6.10*	*100%*
WWAN	824/850	2.506	0.2	4.983	5.5	50%
	2.4GHz	0.2032	0.2	0.404	10	100%
	(combined)			(5.39)	(5.5)	(75%)
total			**0.264**	**5.5**	**5.5**	**87.5%**

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

for frequencies <1 GHz: $f_{MHz} / 1500$ mW/cm^2 == $f_{MHz} / 150$ W/m^2
for frequencies >1GHz: 1mW/cm^2 == 10W/cm^2

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: 2.4GHz = 1 mW / cm^2 @ 20cm
926.8MHz/1500 = 0.618 mW / cm^2 @ 20cm
824.2MHz / 1500 = 0.55 mW / cm^2 @ 20cm

IC Limits: 2.4GHz = 10 W / M^2 @ 0.2m
926.8MHz / 150 = 6.18 W / M^2 @ 0.2m
824.2MHz / 150 = 5.5 W / M^2 @ 0.1m

<u>WiFi</u>
Max antenna gain = 0.5 dBi = 1.12 numeric
Max TX power = 16.4 dBm = 44 milliwatts
results: P_D = (44 x 1.12) / (4 x pi x 20cm^2) = 0.0097 mW / cm^2 @ 20cm
W/m2 = 10 times mW/cm^2 = 0.097 *W/M^2* @ 0.2m

<u>ISM</u>
Max antenna gain = 5.15 dBi = 3.27 numeric
Max TX power = 28 dBm = 631 milliwatts
results: P_D = (631 x 3.27) / (4 x pi x 20cm^2) = 0.411 mW / cm^2 @ 20cm
W/m2 = 10 times mW/cm^2 = 4.11 *W/M^2* @ 0.2m

<u>WWAN – 824MHz</u>
Max antenna gain = 5 dBi = 3.16 numeric
Max TX power = 32 dBm = 1585 milliwatts
results: P_D = (1585 x 3.16)/(4 x pi x 20cm^2) * 50% duty cycle = 0.498 mW / cm^2 @ 20cm
W/m2 = 10 times mW/cm^2 * 50% duty cycle = 4.983 *W/M^2* @ 0.2m

<u>WWAN – 2.4GHz</u>
Max antenna gain = 5 dBi = 3.16 numeric
Max TX power = 18.08 dBm = 64 milliwatts
results: P_D = (64 x 3.16) / (4 x pi x 20cm^2) = 0.040 mW / cm^2 @ 20cm
W/m2 = 10 times mW/cm^2 = 0.404 *W/M^2* @ 0.2m