



EMC Test Data

Client: Xirrus	Job Number: JD99498
Model: XI-AC3470	T-Log Number: T99796
	Project Manager: Christine Krebill
Contact: Paul Zahra	Project Coordinator: -
Standard: FCC 15.247/15.407, RSS-247	Class: N/A

Maximum Permissible Exposure / SAR Exclusion

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/13/2016

Test Engineer: Mark Hill

General Test Configuration

Calculation uses the free space transmission formula:

$$S = (PG)/(4 \pi d^2)$$

Where: S is power density (W/m^2), P is output power (W), G is antenna gain relative to isotropic, d is separation distance from the transmitting antenna (m).

Summary of Results

Condition	-	IC Separation distance (cm)
1 module	-	21.2
XR6000 - 16modules	-	51.6
XR4000 - 8 modules	-	50.8
XR2000 - 4 modules	-	39.9

Notes

The XI-AC3470 is intended to be installed into Xirrus XR2000, XR4000 and XR6000 host systems. These host systems can support up to 4, 8, and 12 radio modules, respectively.

The XR series hosts systems will only allow modules of the same type to operate.

The host system will limit the modules operating frequency to ensure that no overlapping channels could be used

Operation in the UNII2 bands not supported at this time

Note, since the EIRP and Power Density levels are lower for operation in the UNII2a/c bands from the original approval, MPE estimates were used in lieu of MPE measurements. The MPE measurements performed in the original approval remain the worse case RFx conditions.



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Antenna Gain Information

Freq	Antenna Gain (dBi) / Chain				BF	MultiChain Legacy	CDD	Sectorized / Xpol	Dir G (PWR)	Dir G (PSD)
	1	2	3	4						
4Tx operation (worse case 4TxBF)										
2400-2483.5	0.8	3.5	0.4	-2.2	Yes	Yes	Yes	No	9.5	9.5

Dir G calculated = maximum of all antennas + 10log(4) (worse case directional gain calculation)

Antenna Gain Information - 4Tx

Freq	Antenna Gain (dBi) / Chain				BF	MultiChain Legacy	CDD	Sectorized / Xpol	Dir G (PWR)	Dir G (PSD)
	1	2	3	4						
5150-5250	1.9	6.7	3.6	1.5	No	Yes	Yes	No	3.9	9.9
5250-5350	2.8	8.8	4.7	5.2	No	Yes	Yes	No	6.0	12.0
5470-5725	3.4	6.9	3.3	5.8	No	Yes	Yes	No	5.1	11.1
5725-5850	3.3	4.9	3.8	3.1	No	Yes	Yes	No	3.8	9.8

Dir G calculated = 10log((AntG1 + AntG2 + AntG3 + AntG4)/4) (gains in linear units) (from KDB 662911 D01)

Antenna Gain Information - 4TxBF

Freq	Antenna Gain (dBi) / Chain				BF	MultiChain Legacy	CDD	Sectorized / Xpol	Dir G (PWR)	Dir G (PSD)
	1	2	3	4						
5150-5250	1.9	6.7	3.6	1.5	Yes	Yes	Yes	No	9.7	9.7
5250-5350	2.8	8.8	4.7	5.2	Yes	Yes	Yes	No	11.7	11.7
5470-5725	3.4	6.9	3.3	5.8	Yes	Yes	Yes	No	11.0	11.0
5725-5850	3.3	4.9	3.8	3.1	Yes	Yes	Yes	No	9.8	9.8

Dir G calculated = 10log(((10^(AntG1/20) + 10^(AntG2/20) + 10^(AntG3/20) + 10^(AntG4/20))^2)/4) (gains in dBi) (from KDB 662911 D01)



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Power Summary (IC)

Freq. Band	EUT Power		Mode	Ant Gain dBi	EUT EIRP		
	dBm	mW*			mW	dBm	
2.4GHz	25.3	339	11b	9.5	3034.3	34.8	<<--worse case mode for 2.4GHz band
2.4GHz	24.9	309	11g	9.5	2754.2	34.4	
2.4GHz	23.6	229	HT20BF	9.5	2041.7	33.1	
2.4GHz	19.8	96	HT40BF	9.5	851.1	29.3	
UNII1	12.6	18	11a	3.9	44.7	16.5	
UNII1	12.6	18	11aBF	9.7	169.8	22.3	
UNII1	12.8	19	HT20	3.9	46.8	16.7	
UNII1	12.8	19	HT20BF	9.7	177.8	22.5	
UNII1	15.8	38	HT40	3.9	93.3	19.7	
UNII1	11.8	15	HT40BF	9.7	141.3	21.5	
UNII1	16.9	49	AC80	3.9	120.2	20.8	
UNII1	13.2	21	AC80BF	9.7	195.0	22.9	<<--worse case mode for UNII1 band
UNII2a	16.7	47	11a	6.0	186.2	22.7	
UNII2a	17.4	55	11a BF	11.7	812.8	29.1	
UNII2a	17.4	55	HT20	6.0	218.8	23.4	
UNII2a	17.6	58	HT20BF	11.7	851.1	29.3	
UNII2a	19.4	87	HT40	6.0	346.7	25.4	
UNII2a	17.8	60	HT40BF	11.7	891.3	29.5	<<--worse case mode for UNII2a band
UNII2a	17.3	54	AC80	6	213.8	23.3	
UNII2a	17.3	54	AC80BF	11.7	794.3	29.0	
UNII2c	17.6	58	11a	5.1	186.2	22.7	
UNII2c	17.6	58	11a BF	11	724.4	28.6	
UNII2c	18.5	71	HT20	5.1	229.1	23.6	
UNII2c	18.5	71	HT20BF	11	891.3	29.5	
UNII2c	21.4	138	HT40	5.1	446.7	26.5	
UNII2c	19.1	81	HT40BF	11	1023.3	30.1	<<--worse case mode for UNII2c band
UNII2c	19.9	98	AC80	5.1	316.2	25.0	
UNII2c	19.1	81	AC80BF	11	1023.3	30.1	
UNII3	25.0	316	11a	3.8	758.6	28.8	
UNII3	25.0	316	11a BF	9.8	3020.0	34.8	<<--worse case mode for UNII3 band
UNII3	22.9	195	HT20	3.8	467.7	26.7	
UNII3	22.9	195	HT20BF	9.8	1862.1	32.7	
UNII3	21.9	155	HT40	3.8	371.5	25.7	
UNII3	21.9	155	HT40BF	9.8	1479.1	31.7	
UNII3	17.2	53	AC80	3.8	125.9	21.0	
UNII3	17.2	53	AC80BF	9.8	501.2	27.0	



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Notes:

EIRP (dBm) = EUT power (dBm) + Ant Gain (dBi)
UNII2c worse case power measurements include total power for transmissions that straddle 5725MHz

Legend:

- 11b BF = 802.11b mode, 4x4, Beamforming
- 11g BF = 802.11g mode, 4x4, beamforming
- HT20BF = 802.11n 20MHz mode, 4x4, beamforming (includes 11ac 20MHz data rates, for 5GHz only)
- HT40BF = 802.11n 40MHz mode, 4x4, beamforming (includes 11ac 40MHz data rates)
- 11a BF = 802.11a, 4x4, beamforming
- AC80BF = 802.11ac, 80MHz, 4x4, beamforming

EUT target powers are reduced from regulatory power levels, by 1.5dB to ensure that any production sample will be at or below the regulatory power level. Refer to operational description. All MPE calculations are done at the regulatory power levels to represent worse case including production tolerance.



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Worse Case Assumptions Made:

100% duty cycle for all transmitting modules
 All transmitters facing the same direction (note - the XR Series hosts are round and the modules are spaced around the host)
 EIRP calculations within a band are based on worse case power/eirp. Channels at the edge of the band operate at reduced power.
 Operating in beamforming modes for all channels (worse case EIRP)
 Power values used are based on the maximum measured powers. The measured powers would meet or exceed the rated power plus production tolerance

Industry Canada MPE Calculation

Use: General
 Antenna: 9.5dBi effective for 2.4GHz TxBF operation
 9.7dBi effective for UNII1 TxBF operation
 11.7dBi effective for UNII2a TxBF operation
 11.0dBi effective for UNII2c TxBF operation
 9.8dBi effective for UNII3 TxBF operation

Using worse case modes only: 11b TxBF for 2.4GHz, HT20 TxBF for UNII1, HT40B TxBF for UNII2a and 2c, 11a TxBF for UNII3

Freq. MHz	EUT Power		Cable Loss Loss dB	Ant Gain dBi	Power at Ant dBm	EIRP mW	Power Density (S) at 21.2 cm mW/cm ²	MPE Limit mW/cm ²
	dBm	mW*						
2412	25.3	338	0	9.5	25.3	3034.3	0.537	0.537
5180	12.8	19	0	9.7	12.8	177.8	0.031	0.905
5260	17.8	60	0	11.7	17.8	891.3	0.158	0.914
5500	19.1	81	0	11	19.1	1023.3	0.181	0.943
5745	25.0	316	0	9.8	25.0	3020.0	0.535	0.971

Multiradio host combinations

Based on RF field measurements, the exposure values do not increase with addition modules beyond the levels observed with 3 adjacent radio modules operating. Worse case calculations for the XR2000 (4 radio host), XR4000 (8 radio host), and XR6000 (16 radio host) are based on three fully coherent modules operating in the 2.4GHz band

Freq. MHz	EIRP mW	# of Channel	Total EIRP mW	Power Density (S) at 39.9 cm mW/cm ²	MPE Limit at 39.9 cm mW/cm ²	% of limit
2437	3034.3	3	9102.9	0.455	0.537	84.8
					Total (% of limit):	84.8

Note: Xirrus specifies a separation distance of 39.9cm for the XR2000 host in their product manual.