

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

INDOOR CEILING MOUNT SURVEILLANCE TRANSCEIVER

MODEL NUMBER: BIC-4170-1U

FCC ID: BVCBIC4170 IC: 3506A-BIC4170

REPORT NUMBER: 10U13213-1, Revision A

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Prepared for TYCO SAFETY PRODUCTS SENSORMATIC 6600 CONGRESS AVENUE BOCA RATON, FL 33487, U.S.A.

Prepared by COMPLIANCE CERTIFICATION SERVICES 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

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	07/26/10	Initial Issue	F. Ibrahim
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1. ATTESTATION OF TEST RESULTS

	APPLICABLE STANDA	RDS		
DATE TESTED:	JUNE 02 – JULY 22, 2010	1		
SERIAL NUMBER:	123S0952016094 (RADIA	123S0952016094 (RADIATED), 123S095201608 (CONDUCTED)		
MODEL:	BIC-4170-1U			
EUT DESCRIPTION:	INDOOR CEILING MOUN	T SURVEILLANCE TRANSCEIVER		
COMPANY NAME:	TYCO SAFETY PRODUC 6600 CONGRESS AVENU BOCA RATON, FL 33487,	JE		

STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

FRANK IBRAHIM EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

Tested By:

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MENGISTU MEKURIA EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an indoor ceiling mount surveillance transceiver that operates in 2.4 GHz band.

The radio module is manufactured by Tyco Sensormatic.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2402 - 2480	Basic GFSK	-4.30	0.37
2402 - 2480	Enhanced 8PSK	-4.89	0.32

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an inverted F type antenna, with a maximum gain of 2.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was Blue Test3, rev. 2.0.0.0.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

Radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to the channel with the highest output power.

The EUT was investigated for X, Y, and Z orientations. After the investigation the worst orientation was turned out to be the Y orientation. All the emission tests have been done with Y orientation.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

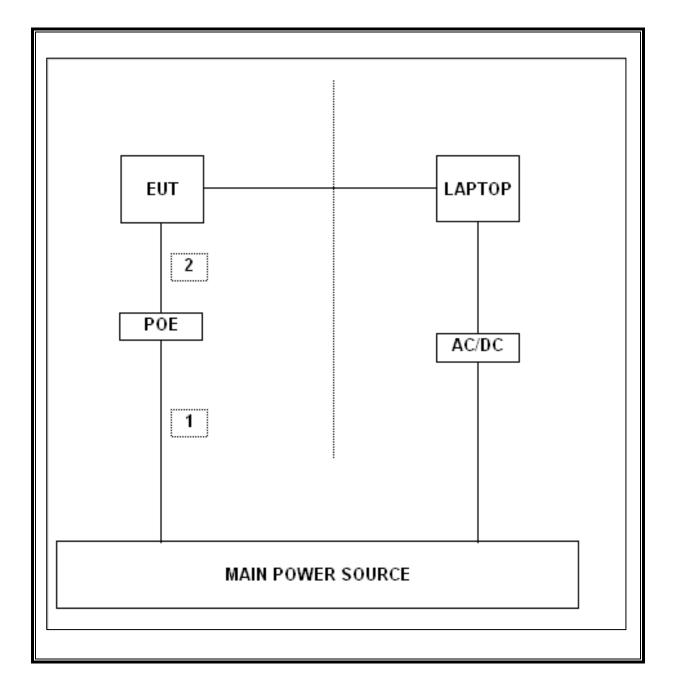
PERIPHERAL SUPPORT EQUIPMENT LIST						
Description	Manufacturer	Model	Serial Number	FCC ID		
Original POE	I.T.E Power Supply	PW180KB 4800F01	08094A	DcC		
POE # 1	I.T.E Power Supply	PW180KB 4800F04	2114	DcC		
POE # 2	I.T.E Power Supply	0334B5555	2067	DcC		

I/O CABLES

	I/O CABLE LIST							
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length	Remarks		
1	AC	1	AC	Un-Shielded	2.0 M	N/A		
2	Eternet	1	RS-485	Un-Shielded	6.0 m	N/A		

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SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	02/05/10	05/05/11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	08/24/09	08/24/10
Power Sensor, 18 GHz	Agilent / HP	8481A	N02782	10/28/09	07/28/11
Power Meter	Agilent / HP	438A	C01068	12/16/09	06/16/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/06/10	01/06/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	02/04/09	08/04/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/14/10	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	01/29/09	07/29/10

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7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

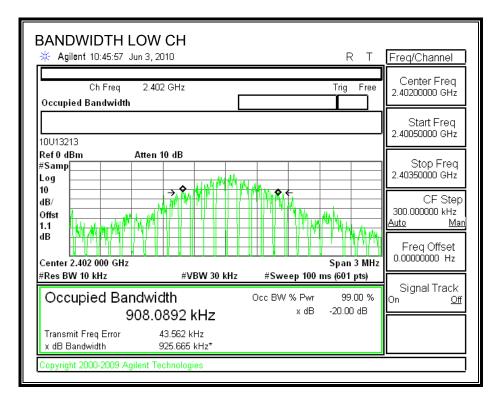
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

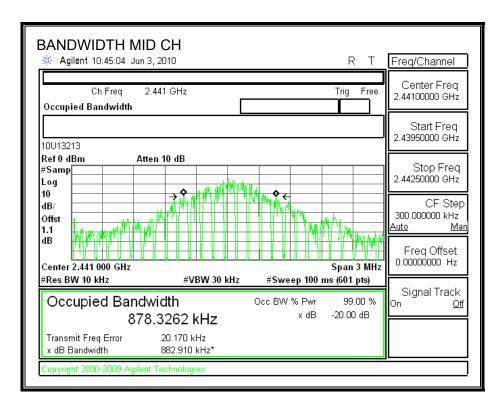
Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	925.665	908.0892
Middle	2441	882.91	878.3273
High	2480	906.352	906.2673

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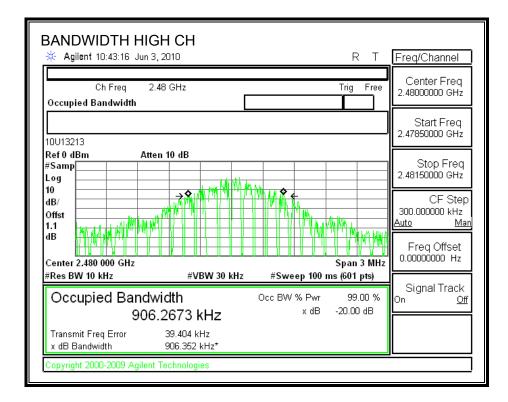
20 dB AND 99% BANDWIDTH



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7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

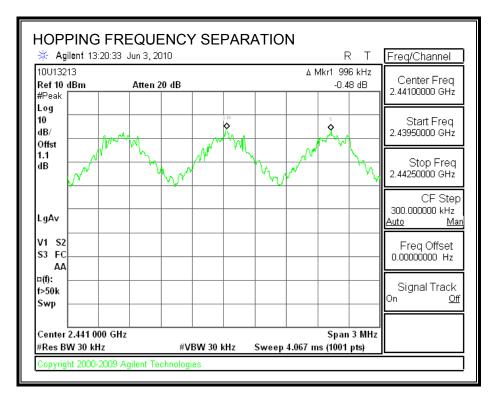
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

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RESULTS

HOPPING FREQUENCY SEPARATION



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7.1.3. NUMBER OF HOPPING CHANNELS

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

TEST PROCEDURE

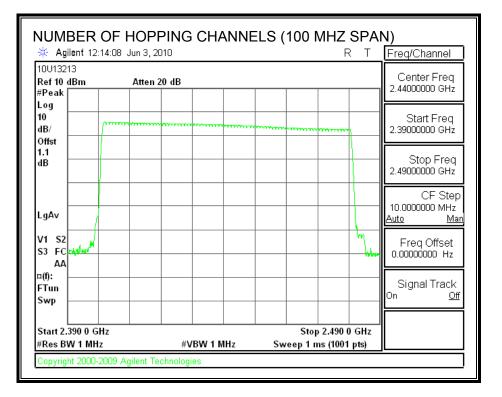
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

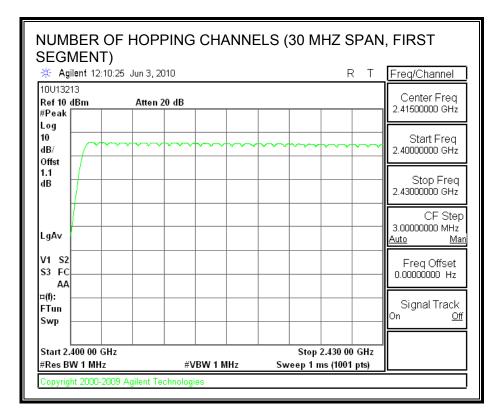
79 Channels observed.

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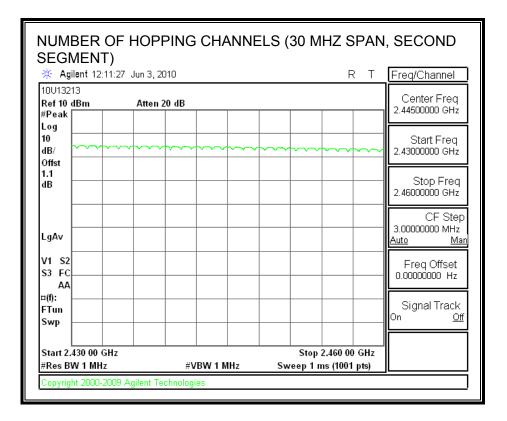
NUMBER OF HOPPING CHANNELS



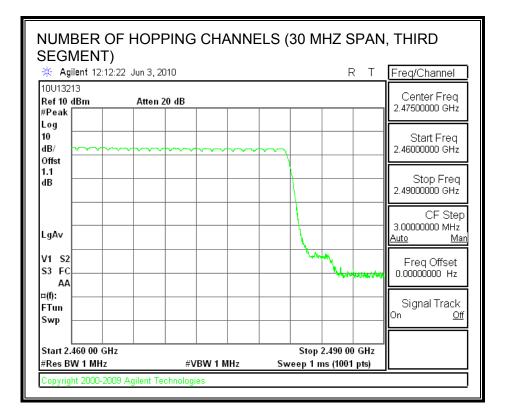
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7.1.4. AVERAGE TIME OF OCCUPANCY

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

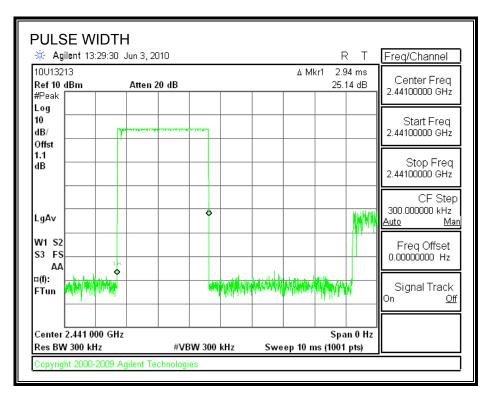
Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

GFSK Mode

Pulse	Number of	Average	Limit	Margin
Width	Pulses in	Time of		-
(msec)	3.16	(sec)	(sec)	(sec)
, <i>,</i>	seconds			
2.94	11	0.323	0.4	-0.077

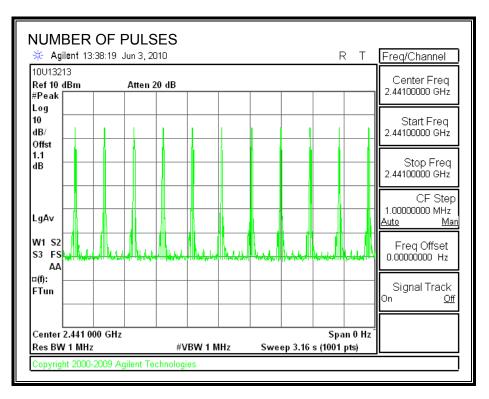
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PULSE WIDTH



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NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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7.1.5. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

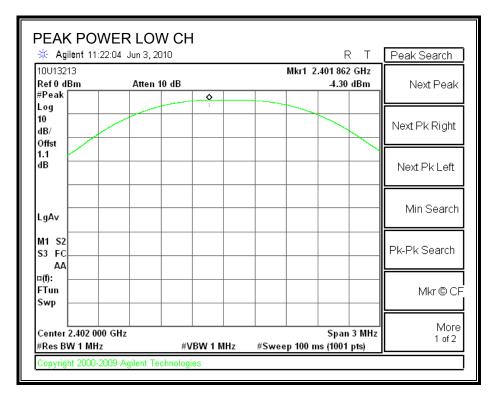
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

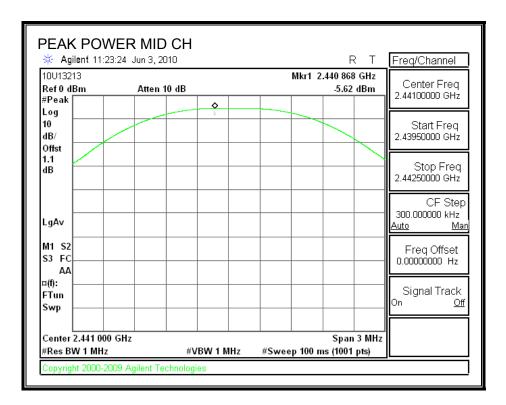
Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	-4.30	30	-34.30
Middle	2441	-5.62	30	-35.62
High	2480	-7.38	30	-37.38

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OUTPUT POWER



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Agilent 11:2 10U13213	4.20 00110,2011	, 	Mlad	R T	r rogronamier
Ref 0 dBm #Peak	Atten 10			-7.38 dBm	Contor Eroa
Log					
10 dB/					Start Freq 2.47850000 GHz
Offst 1.1					
dB					Stop Freq 2.48150000 GHz
					CF Step 300.000000 kHz
LgAv					<u>Auto Ma</u>
M1 S2 S3 FC					Freq Offset 0.00000000 Hz
AA ⊐(f):					
FTun Swp					Signal Track On <u>Off</u>
Center 2.480 000) GHz			Span 3 MH	

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7.1.6. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 1.1dB was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	-5.62
Middle	2441	-6.98
High	2480	-8.47

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7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

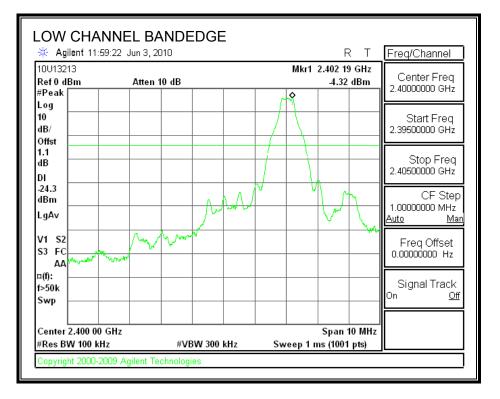
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

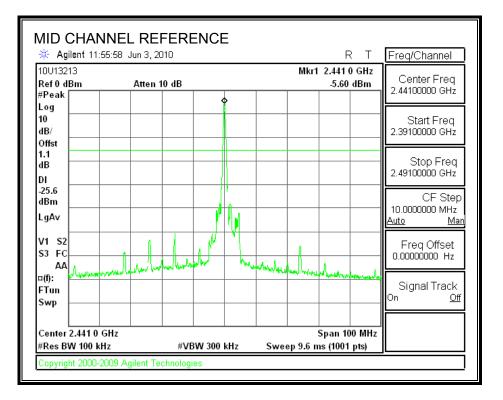


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10U13213 Ref 0 dBm	·	Atten 10 d	В			2 3.198 GHz -60.64 dBm	Center Freq 13.0150000 GHz
#Peak Log 10 dB/	• 						Start Freq 30.000000 MHz
Offst 1.1 dB DI	2						Stop Freq 26.000000 GHz
-24.3		-	y war	hour and a second		-	CF Step 2.59700000 GHz <u>Auto Mar</u>
Start 30 M #Res BW 1 Marker		Type	#VBW 300 kH:		p 2.482 s	26.000 GHz (1001 pts) Amplitude	Freq Offset 0.00000000 Hz
1 2	(1) (1)	Freq Freq	2.393 3.198	GHz	-4	4.28 dBm 0.64 dBm	Signal Track On <u>Off</u>

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SPURIOUS EMISSIONS, MID CHANNEL

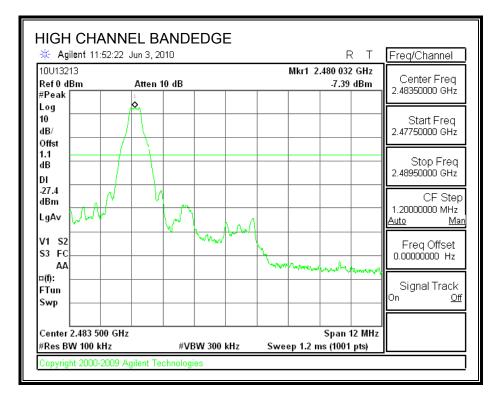


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Atten 10 d	В	N	4kr2 7.328 GHz -61.83 dBm	Center Freq 13.0150000 GHz
				Start Freq 30.0000000 MHz
2				Stop Freq 26.0000000 GHz
dau and a second of the second				CF Step 2.59700000 GHz <u>Auto Mar</u>
Hz			2 s (1001 pts)	Freq Offset 0.00000000 Hz
ace Type) Freq) Freq	X Axis 2.445 GHz 7.328 GHz		Amplitude -6.86 dBm -61.83 dBm	Signal Track On <u>Off</u>
	Iz Type Freq	Hz #VBW 300 kHz Tope Type X Axis) Freq 2.445 GHz	Atten 10 dB	Image: Stop 26.000 GHz Image: Stop 26.0

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SPURIOUS EMISSIONS, HIGH CHANNEL

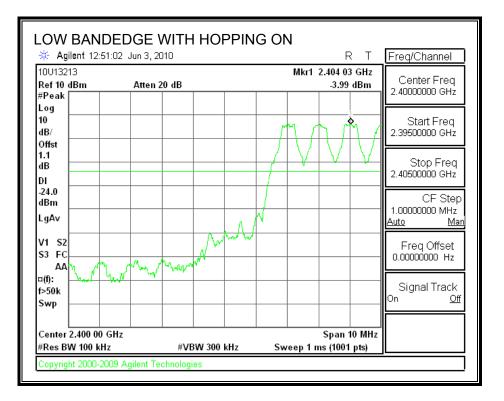


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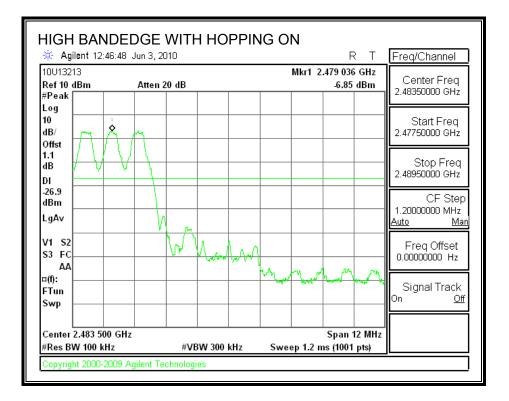
GHz Freq MHz
Freq GHz
Step
GHz <u>Mar</u>
ffset) Hz
rack <u>Off</u>
ſ

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SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

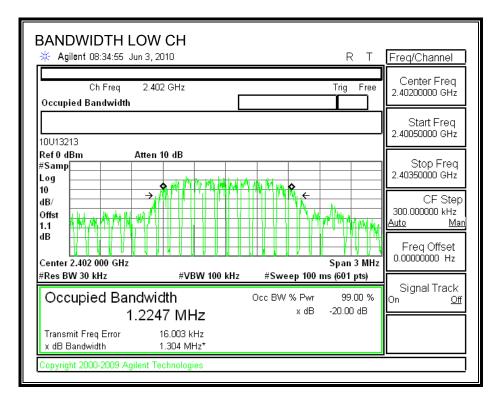
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(MHz)	(MHz)
Low	2402	1.304	1.2247
Middle	2441	1.309	1.2231
High	2480	1.345	1.2237

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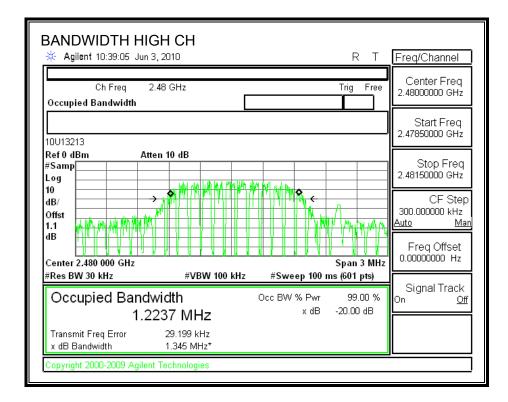
20 dB AND 99% BANDWIDTH



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BANDWIDTH MID CH * Agilent 10:37:55 Jun 3, 2010 R T	Freq/Channel
Ch Freq 2.441 GHz Trig Free Occupied Bandwidth	Center Freq 2.44100000 GHz
10U13213	Start Freq 2.43950000 GHz
Ref 0 dBm Atten 10 dB #Samp Log 10 dB/ Offst 1.1 dB Center 2.441 000 GHz #Sweep 100 ms (601 pts)	Stop Freq 2.44250000 GHz CF Step 300.000000 kHz <u>Auto Man</u> Freq Offset 0.00000000 Hz
Occupied Bandwidth Occ BW % Pwr 99.00 %	Signal Track ^{On <u>Off</u>}
1.2231 MHz x dB -20.00 dB Transmit Freq Error 7.450 kHz x dB Bandwidth 1.309 MHz*	

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7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

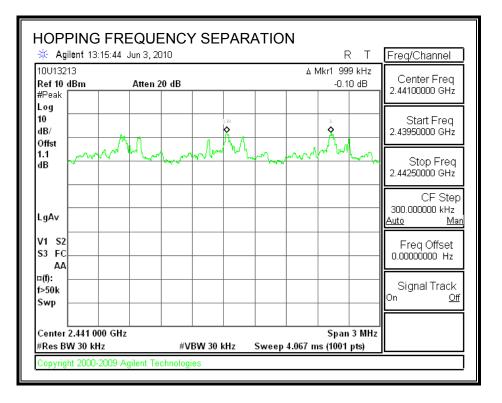
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

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RESULTS

HOPPING FREQUENCY SEPARATION



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7.2.3. NUMBER OF HOPPING CHANNELS

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

TEST PROCEDURE

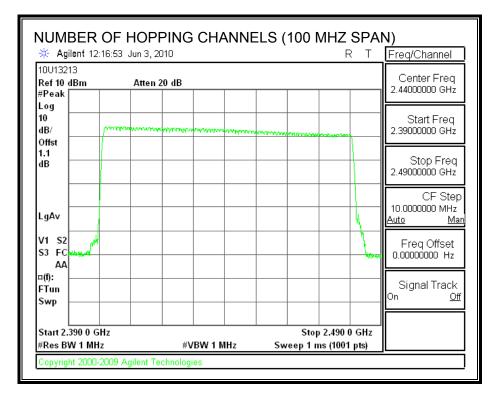
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

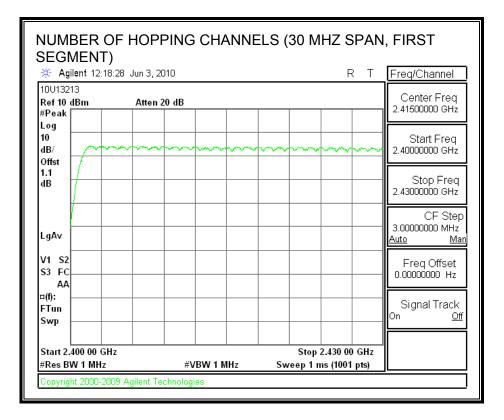
79 Channels observed.

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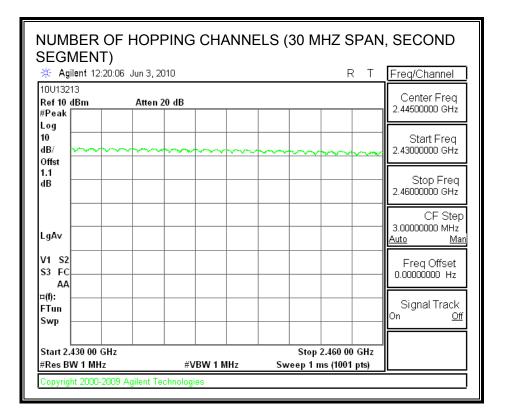
NUMBER OF HOPPING CHANNELS



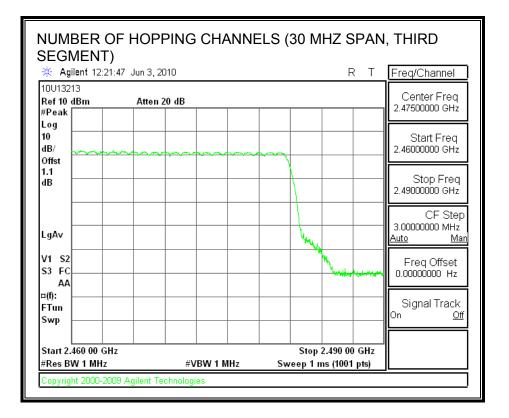
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7.2.4. AVERAGE TIME OF OCCUPANCY

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

8PSK Mode

Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3.04	11	0.334	0.4	-0.066

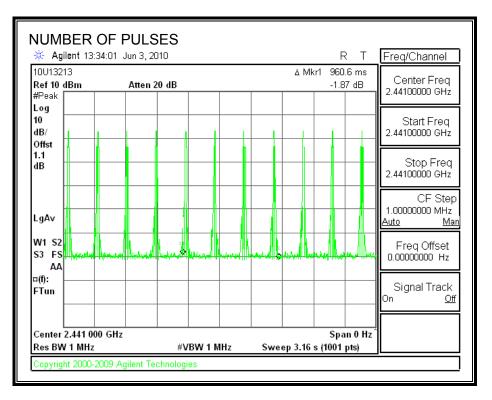
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PULSE WIDTH

					Ŧ	
 Agilent 13:32 10U13213 Ref 10 dBm 	Atten 20 dB		ΔMI	R (r1 3.0- -6.32	4 ms	Freq/Channel
#Peak Log 10						2.44100000 GHz Start Freg
dB/ Offst 1.1			anyoniday			2.44100000 GHz
dB						Stop Freq 2.44100000 GHz
LgAv						CF Step 1.0000000 MHz <u>Auto Man</u>
W1 S2 S3 FS	nijonanimitinka kata mila ni	\$	Str. Way May	all in the set	ule autor	Freq Offset 0.00000000 Hz
¤(f): FTun	al hualdan n beeks an fillanae.		din alle al for all	Alarka Juseph	1919 1991	Signal Track On <u>Off</u>
Center 2.441 000 Res BW 1 MHz		VBW 1 MHz	Sweep 10 n	•	n O Hz pts)	
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NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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7.2.5. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

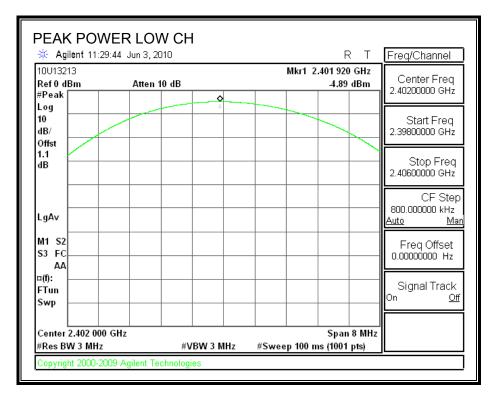
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

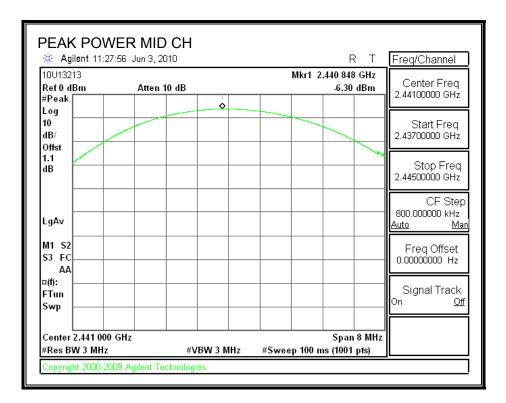
Channel	Frequency	Output Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2402	-4.89	30	-34.89
Middle	2441	-6.30	30	-36.30
High	2480	-8.18	30	-38.18

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OUTPUT POWER



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10U13213 Ref 0 dBm	Atten 10 d	В	Mkr1 2	.479 952 GHz -8.18 dBm	Freq/Channel
#Peak		1			2.48000000 GHz
Log 10 dB/					Start Freq 2.47600000 GHz
Offst 1.1 dB					Stop Freq
					2.48400000 GHz
LgAv					CF Step 800.000000 kHz
					Auto Ma
M1 S2 S3 FC AA					Freq Offset 0.00000000 Hz
¤(f):					Signal Track
Swp					On <u>Off</u>
Center 2.480 000	GHz			Span 8 MHz	

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7.2.6. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 1.1 dB was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	-8.66
Middle	2441	-10.18
High	2480	-11.78

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7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

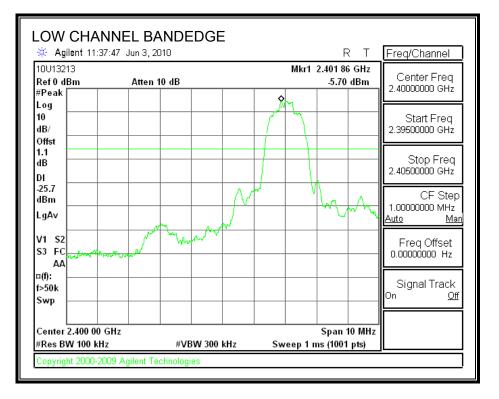
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

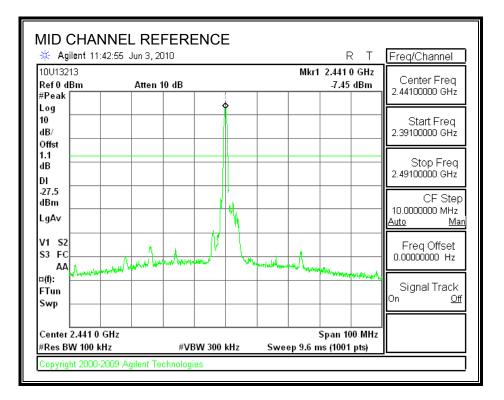


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10U13213				Mkr2 809 MH	Ell Contor From
Ref0dBm #Peak	0	Atten 10 d	B	-64.46 dBm	13.0150000 GHz
Log 10 dB/ Offst					Start Freq 30.0000000 MHz
1.1 dB ₂ DI ♥					Stop Freq 26.0000000 GHz
-25.7 dBm		the survey of the low has			CF Step 2.59700000 GHz <u>Auto Ma</u>
Start 30 M #Res BW 1			#VBW 300 kHz	Stop 26.000 GHz 32 s (1001 pts)	Freq Offset
Marker 1 2	Trace (1) (1)	Type Freq Freq	X Axis 2.393 GHz 809 MHz	Amplitude -9.34 dBm -64.46 dBm	Signal Track

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SPURIOUS EMISSIONS, MID CHANNEL

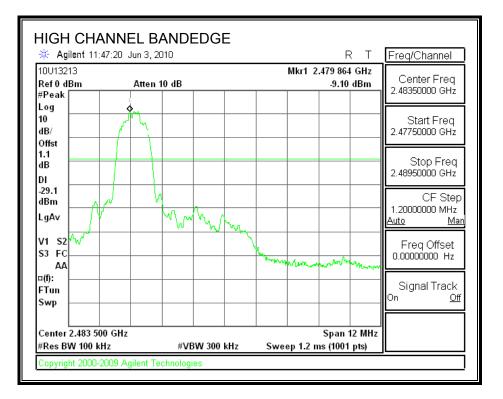


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-	f 11:44:43	Jun 3, 2010				F	• •	Freq/Channel
10U13213 Ref 0 dBm #Peak	1	Atten 10 di	3		N	Mkr2 80 -63.99		Center Freq 13.0150000 GHz
Log 10 dB/ Offst								Start Freq 30.0000000 MHz
1.1 dB ₂ DI ♥								Stop Freq 26.0000000 GHz
-27.5 dBm	adad daran		and the second s		a transferration	hand the second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	CF Step 2.59700000 GHz <u>Auto Mar</u>
Start 30 M #Res BW 1		i	#VBW 300 kHz	Swee	Sto 9 2.482 9	p 26.00 s (1001		Freq Offset 0.00000000 Hz
Marker 1 2	Trace (1) (1)	Type Freq Freq	X Axis 2.445 GHz 809 MHz			Amplitu -11.84 dB -63.99 dB	m	Signal Track On <u>Off</u>
Convright 2	000-2009 A	qilent Techno	logies					

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SPURIOUS EMISSIONS, HIGH CHANNEL

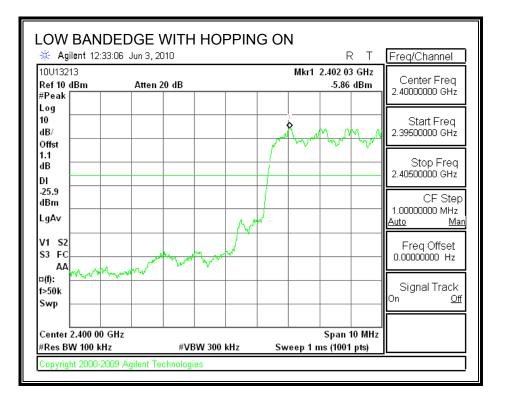


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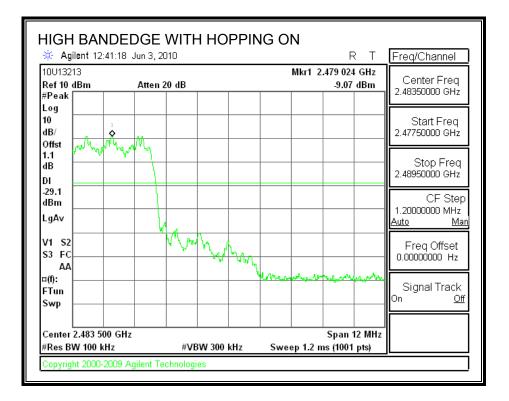
		EL SPUF Jun 3, 2010				RТ	Freq/Channel
10U13213 Ref 0 dBm #Peak	\$	Atten 10 dB				35 MHz 4 dBm	Center Freq 13.0150000 GHz
Log 10 dB/ Offst							Start Freq 30.000000 MHz
1.1 dB							Stop Freq 26.0000000 GHz
-29.1 dBm LgAv	adad alara	and the second	and some of the second	**************************************			CF Step 2.59700000 GHz <u>Auto Mar</u>
Start 30 M #Res BW 1		#\	/BW 300 kHz	Sweep 2	Stop 26.0 .482 s (1001		Freq Offset 0.00000000 Hz
Marker 1 2	Trace (1) (1)	Type Freq Freq	X Axis 2.471 GHz 835 MHz		Ampli -9.02 d -60.04 d	9m	Signal Track On <u>Off</u>
Convright 2	000-2009 A	gilent Technolo	nies				

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SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

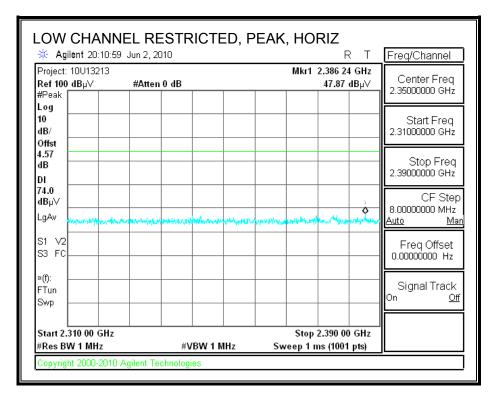
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

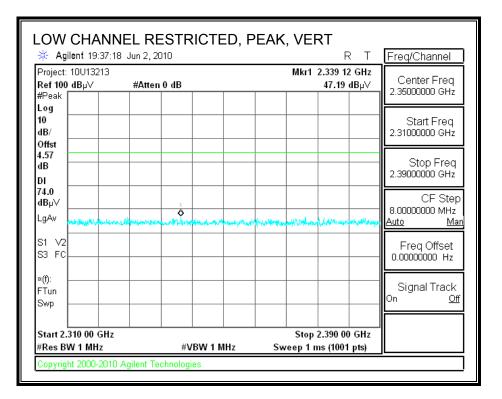


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🔆 Agilent 20:11	INEL RESTRI :45 Jun 2, 2010	• · - -,		R T	Freq/Channel
Project: 10U13213 Ref 100 dB µ∨ #Peak	#Atten 0 dB		Mkr1	2.378 00 GHz 36.23 dBµ∀	Center Freq 2.3500000 GHz
Log 10 dB/					Start Freq 2.31000000 GHz
Offst 4.57 dB DI					- Stop Freq 2.3900000 GHz
54.0 dBµ∨ LgAv					CF Step 8.00000000 MHz Auto Mar
S1 V2 S3 FC				1	Freq Offset 0.00000000 Hz
×(f): FTun Swp					Signal Track
Start 2.310 00 GH #Res BW 1 MHz	-	W 10 Hz	Stop Sweep 6.238	2.390 00 GHz s (1001 pts)	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

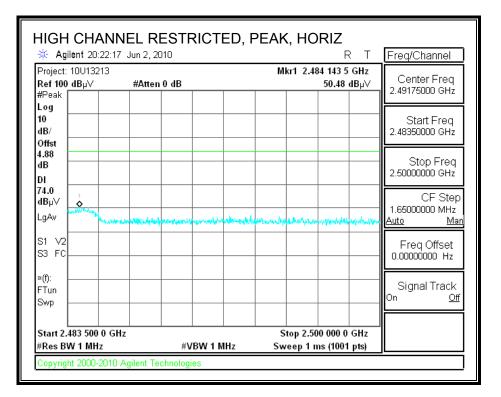


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LOW CHANNEL	. RESTRICTED, 1 2, 2010	AVG, VERT	Freq/Channel
Project: 10U13213 Ref 100 dB µ∨	Atten 0 dB	Mkr1 2.378 00 GHz 34.69 dBµ∀	Center Freq 2.3500000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
dB			Stop Freq 2.3900000 GHz
54.0 dBµ√ LgAv			CF Step 8.0000000 MHz <u>Auto Man</u>
S1 V2		¢	Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.390 00 GHz Sweep 6.238 s (1001 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

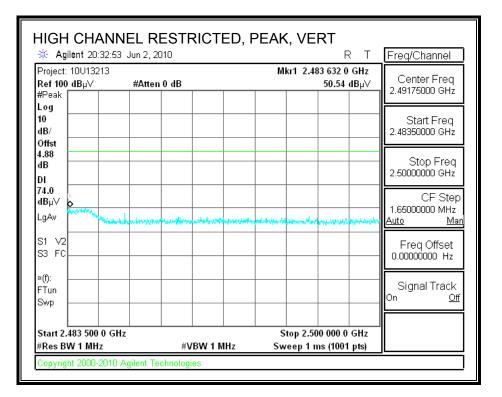


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🔆 Agilent 20:22:48 Jun 2	. 2010	R T	Freq/Channel
Project: 10U13213 Ref 100 dB µ∨ #At #Peak	ten 0 dB	Mkr1 2.484 028 0 GHz 39.86 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
4.88 dB DI			Stop Freq 2.5000000 GHz
54.0 dBµ∨ LgAw ₁			CF Step 1.6500000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
×(f):			Signal Track ^{On <u>Off</u>}
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.500 000 0 GHz Sweep 1.287 s (1001 pts)	
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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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HIGH CHANNEL		к со, т <u>с</u> п т	Freq/Channel
Project: 10U13213 Ref 100 dB μ∨ # At #Peak	ten 0 dB	Mkr1 2.483 995 0 GHz 39.57 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
4.88 dB			- Stop Freq 2.5000000 GHz
54.0 dBμV			CF Step 1.65000000 MHz <u>Auto Mar</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
*(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.500 000 0 GHz Sweep 1.287 s (1001 pts)	

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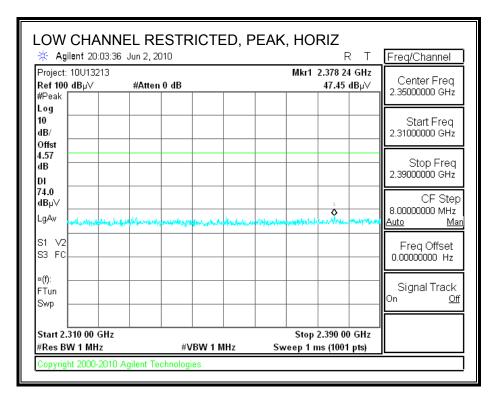
HARMONICS AND SPURIOUS EMISSIONS

	<u> </u>		y Measurem												
Compli	ance Ce	rtification	Services, Fr	emont	5m Ch	amber									
Compai	ny:		TYCO SAFTY	PRODU	CTS SEI	ISORMA	TIC								
Project			10U13213												
Date:			6/2/2010												
	igineer:		MENGISTU M		7										
Configu Mode:	ration:		EUT WITH PO TX GFSK MO												
			TA OFSICIO	DE											
Fest Eq	uipmen	<u>t:</u>													
н	lorn 1-	18GHz	Pre-ar	nplifer	1-260	ЭНz	Pre-am	Pre-amplifer 26-40GHz Horn > 18GHz							Limit
T73; ¹	S/N: 671	7 @3m	▼ T144 N	Aiteq 30	08A009	31 🗸		· · · · · · · · · · · · · · · · · · ·							FCC 15.209
	quency Ca														
3'	cable 2	2807700	12' c	able 2	28076	00	20'ca	ble 22	2807500		HPF	Re	ject Filte		<u>k Measurements</u> W=VBW=1MHz
3' c	able 228	307700	▼ 12' ca	ıble 228	07600	•	20' cab	le 228	•			• R_	001		a <u>ge Measurements</u> =1MHz ; VBW=10Hz
f	Dist		Read Avg.	AF	CL	Amp	D Corr	1	Peak	Avg	Pk Lim			Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
10W CH	ANNEL (2402.0 MHz 41.0	32.2	33.0	5.8	-36.5	0.0	0.0	43.4	34.5	74	54	-30.6	-19.5	v
.206	3.0	35.2	29.0	35.1	7.2	-36.2	0.0	0.0	41.3	35.1	74	54	-32.7	-18.9	v
.804	3.0	44.7	33.6	33.0	5.8	-36.5	0.0	0.0	47.1	35.9	74	54	- 26.9	- 18.1	Н
.206	3.0	35.7	29.6	35.1	7.2	-36.2	0.0	0.0	41.8	35.8	74	54	-32.2	-18.2	Н
ALL CH	ANNEL (7	441.0 MHz)													
.882	3.0	441.0 Miliz)	32.9	33.1	5.8	-36.5	0.0	0.0	45.3	35.3	74	54	-28.7	-18.7	v
323	3.0	35.4	29.2	35.3	73	-36.2	0.0	0.0	41.8	35.6	74	54	-32.2	-18.4	v
.882	3.0	46.5	34.7	33.1	5.8	-36.5	0.0	0.0	49.0	37.1	74	54	-25.0	- 16 9	Н
323	3.0	37.0	29.8	35.3	73	-36.2	0.0	0.0	43.4	36.2	74	54	-30.6	-17.8	Н
IIGH CH	IANNEL	(2480.0 MHz)	 }												
.960	3.0	44.4	33.0	33.2	59	-36.5	0.0	0.0	47.0	35.6	74	54	- 27.0	-18.4	v
.440	3.0	34.9	28.5	35.5	73	-36.2	0.0	0.0	41.5	35.2	74	54	-32.5	-18.8	v
.960	3.0	46.7	34.4	33.2	5.9	-36.5	0.0	0.0	49.3	37.0	74	54	-24.7	-17.0	H
7.440	3.0	37.9	30.0	35.5	73	-36.2	0.0	0.0	44.5	36.6	74	54	-29.5	-17.4	H
		<u> </u>	L						<u> </u>	ll		<u></u>	L	<u> </u>	
ev. 07.2	2.09														
	f	Measurem	ent Frequency	v		Amp	Preamp	Gain				Avg Lim	Average F	Field Strengt	h Limit
	Dist	Distance to		·			-		ct to 3 mete	ers				d Strength L	
		Analyzer R				Avg			Strength @					. Average L	
	AF	Antenna Fa				Peak			k Field Stre					. Peak Limit	
						HPF	High Pas			0/					-
	CL	Cable Loss	S												

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8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

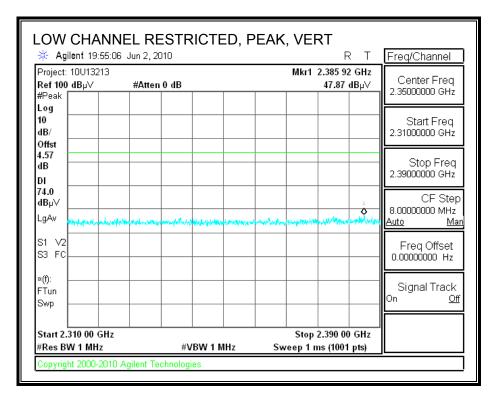


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_OW CHANI		ED, AVG, HORIZ	T Freq/Channel
Project: 10U13213 Ref 100 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.378 08 (35.20 dE	Contor Frog
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
4.57 dB			Stop Freq 2.39000000 GHz
54.0 dBµ∀ LgAv			CF Step 8.00000000 MHz <u>Auto Man</u>
S1 V2			Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10	Stop 2.390 00 (Hz Sweep 6.238 s (1001 pt	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

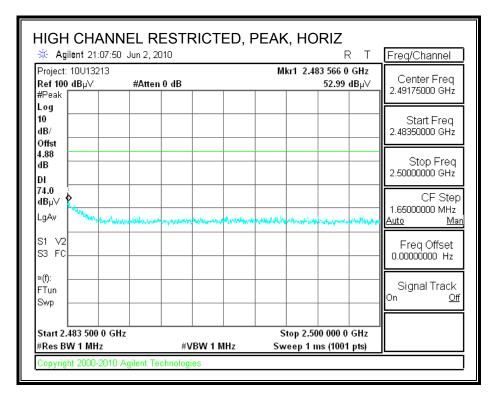


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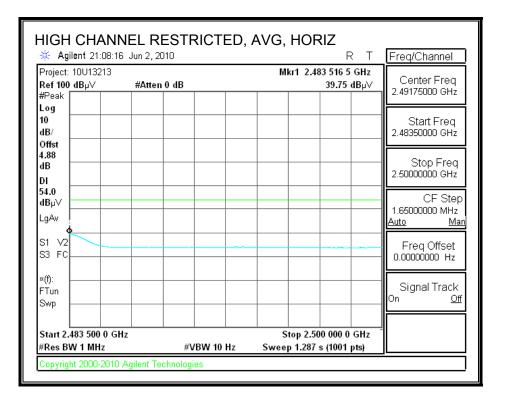
🔆 Agilent 19:56:10 Jun 2		AVG, VERT	Freq/Channel
Project: 10∪13213 Ref 100 dB µ∨ #Att #Peak	ten 0 dB	Mkr1 2.378 00 GHz 35.26 dBµ∨	Center Freq 2.3500000 GHz
Log 10 dB/ Offst			Start Freq 2.3100000 GHz
4.57 dB DI			Stop Freq 2.3900000 GHz
54.0 dBµ∨ LgAv			CF Step 8.0000000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
*(f):			Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.390 00 GHz Sweep 6.238 s (1001 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

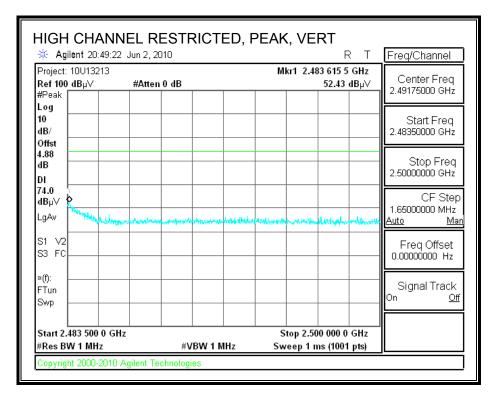


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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 20:49:57 Ju	in 2, 2010	R T	Freq/Channel
#Peak	#Atten 0 dB	Mkr1 2.483 516 5 GHz 39.59 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/ Offst			Start Freq 2.48350000 GHz
dB			Stop Freq 2.5000000 GHz
54.0 dBµ∨ LgAv			CF Step 1.6500000 MHz <u>Auto Man</u>
S1 V2 S3 FC			Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.500 000 0 GHz Sweep 1.287 s (1001 pts)	
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HARMONICS AND SPURIOUS EMISSIONS

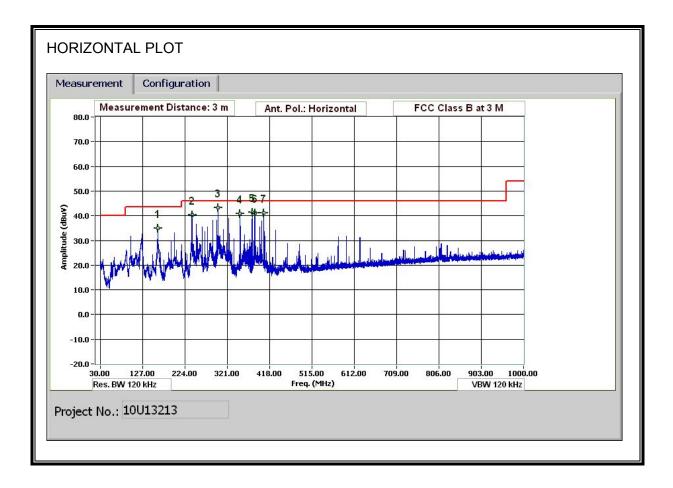
Compan Project : Date: Test En Configu Mode:	#: gineer:		TYCO SAFTY 10U13213 6/2/2010 MENGISTU M EUT WITH PO TX 8PSK MOI	iekuri <i>a</i>)e		NSORMA	ATIC										
fest Eq	uipmen	<u>t:</u>															
н	orn 1-	18GHz	Pre-an	nplifer	1-260	GHz	Pre-am	Pre-amplifer 26-40GHz Horn > 18GHz							Limit		
T73; S	S/N: 671	7 @3m	▼ T144 N	liteq 30	08A009)31 🖵								-	▼ FCC 15.209 ▼		
	quency Cal	2807700	12' c	able 2	28076	600	20' ca	ble 22	807500		HPF	Re	eject Filte		Measurements W=VBW=1MHz		
3' c	able 228	07700	▼ 12' ca	ble 228	07600	•	20' cab	le 228	07500			• R_	001	Averag	ge Measurements MHz ; VBW=10Hz		
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)		
	1 1 /	2402.0 MHz		uD/m	ш			<u>w</u>	uBuv/m	uBu v/m	uBuvin	uBu v/m	, ub	۳D	(11)		
4.804	3.0	42 <i>3</i>	28.8	33.0	5.8	-36.5	0.0	0.0	44.6	31.2	74	54	-29.4	-22.8	v		
7.206 1.804	3.0 3.0	36.7 42.6	25.1 30.9	35.1 33.0	7.2 5.8	-36.2 -36.5	0.0 0.0	0.0 0.0	42.8 44.9	31.2 33.3	74 74	54 54	-31.2 -29.1	-22.8 -20.7	V H		
1.804 7.206	3.0	42.0 37.6	25.2	35.1	5.6 7.2	-36.2	0.0	0.0	44.9	31.3	74	54 54	-29.1	-20.7	H		
					ļ		-										
MID CHA 4.882	NNEL (2 3.0	441.0 MHz) 43.6	29.1	33.1	5.8	-36.5	0.0	0.0	46.1	31.6	74	54	-27.9	-22.4	v		
7.323	3.0	43.0	29.1	35.3	73	-36.2	0.0	0.0	40.1	31.0	74	54	-27.9	-22.6	v		
1.882	3.0	44.4	31.5	33.1	5.8	-36.5	0.0	0.0	46.8	34.0	74	54	-27.2	-20.0	H		
323	3.0	39.1	25.7	35.3	73	-36.2	0.0	0.0	45.5	32.1	74	54	-28.5	-21.9	H		
лси сч		2480.0 MHz	<u> </u>														
цен сн 1960	3.0	2480.0 MHz 44.6	29.3	33.2	5.9	-36.5	0.0	0.0	47.3	31.9	74	54	-26.7	-22.1	v		
.440	3.0	36.5	24.6	35.5	73	-36.2	0.0	0.0	43.1	31.2	74	54	-30.9	-22.8	v		
1.960	3.0	44.2	31.3	33.2	59	-36.5	0.0	0.0	46.8	33.9	74	54	-27.2	- 20.1	н		
7.440	3.0	39 <i>.</i> 5	25.7	35.5	73	-36.2	Q0	0.0	46.1	32.3	74	54	- 27.9	-21.7	H		
Rev. 07.22	f Dist	Measurem Distance to Analyzer R Antenna F Cable Los	leading actor	7		Amp D Corr Avg Peak HPF	Average	Corre Field : ed Peal	ct to 3 mete Strength @ c Field Stre	3 m		Pk Lim Avg Mar	Peak Field Margin vs.	ield Strength I Strength Lii Average Lii Peak Limit	mit		

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8.3. WORST-CASE BELOW 1 GHz

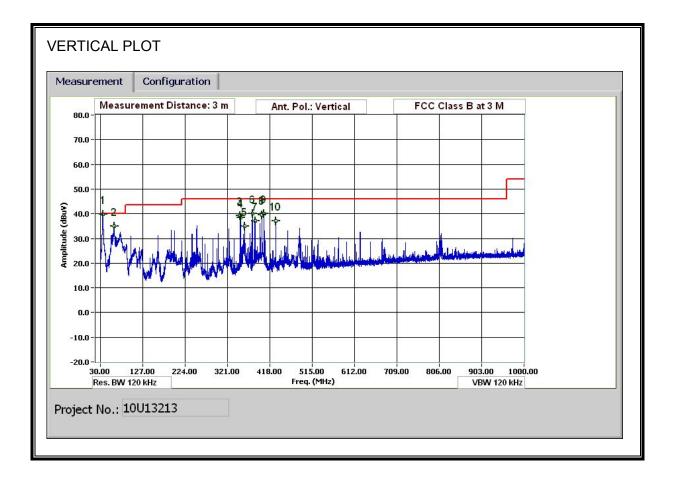
8.3.1. ORIGINAL POE

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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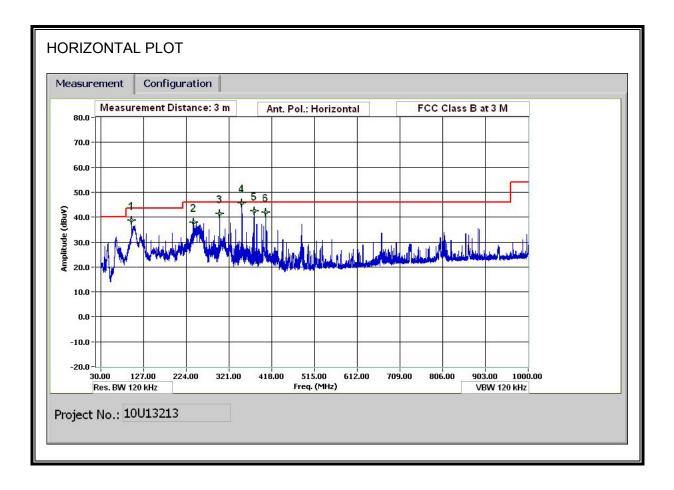
HORIZONTAL AND VERTICAL DATA

Test Engr:		Mengistu	Mekuri	a									
Date:		06/02/09		-									
Project #:			DU13213										
Company:		TYCO SA		onuc	TC CENC	ORMATI							
EUT Descri													
EUT Desci. EUT M/N:	фпол:	INDOOR	CEILIN	GINO	0141 301	WILLANCE TRANSCEIVER							
EUT WDN: Test Targe	.	FCC Clas	aa B										
Mode Ope		TX Mode	55 D										
moue ope	r: f	Measurem	ant Franci		Amp	Preamp (2			Marzin	Margin vs.	T innit	
	ı Dist	Distance t	-		-	-		to 3 meters		margin	margin vs.	Lutui	
	Read	Analyzer l		a	Filter	Filter Ins		to 5 meters					
	AF	Antenna F	-		Corr.	Calculate		transth					
	CL	Cable Loss			Limit	Field Stre		÷					
	<u>с</u> ь	Capie 17032	,			i leiu stre	ngin LB						
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m		dB	V/H	P/A/QP	
35.640	3.0	50.3	17.4	0.6	28.4	0.0	0.0	39.9	40.0	-0.1	v	P	
35.571	3.0	49.1	17.5	0.6	28.4	0.0	0.0	38.7	40.0	-1.3	v	QP	
61.921	3.0	54.6	7.9	0.7	28.4	0.0	0.0	34.8	40.0	-5.2	V	P	
350.053	3.0	51.6	14.2	1.7	28.1	0.0	0.0	39.3	46.0	- 6.7	V	Р	
351.013	3.0	50.8	14.2	1.7	28.1	0.0	0.0	38.5	46.0	-7.5	V	P	
360.014	3.0	46.9	14.3	1.7	28.1	0.0	0.0	34.8	46.0	-11.2	V	Р	
378.014	3.0	51.9	14.6	1.7	28.1	0.0	0.0	40.2	46.0	-5.9	V	P	
384.015	3.0	48.7	14.7	1.8	28.1	0.0	0.0	37.1	46.0	-8.9	V	P	
399.975	3.0	50.8	14.9	1.8	28.1	0.0	0.0	39.4	46.0	-6.6	V	P	
405.015	3.0	51.3	15.0	1.8	28.1	0.0	0.0	40.1	46.0	-5.9	<u>V</u>	P	
432.017	3.0	47.8	15.5	1.9	28.0	0.0	0.0	37.1	46.0	-8.9	V	P	
162.005 240.009	3.0 3.0	50.5 55.4	11.5 11.8	1.1 1.3	28.2	0.0 0.0	0.0 0.0	34.9 40.3	43.5 46.0	-8.6 -5.7	H H	P P	
	3.0	56.8	11.8	1.5	28.2	0.0	0.0 0.0	40.3 43.6	40.U 46.0	- 2 .7	п Н	P P	
300.011	3.0	56.5	13.4	1.5	28.1	0.0	0.0	43.4	46.0 46.0	-2.4	н Н	P QP	
300.011	3.0	53.1	13.4	1.7	28.1	0.0	0.0	40.8	46.0	-5.2	H	P	
299.993		53.1	14.6	1.7	28.1	0.0	0.0	41.4	46.0	-4.6	H	P	
299.993 350.053	3.0	52.7	14.7	1.8	28.1	0.0	0.0	41.0	46.0	-5.0	H	P	
299.993 350.053 378.014	3.0 3.0		•••••••••••••••••••••••	»		0.0	0.0	41.1	46.0	-4.9	H	P	
300.011 299.993 350.053 378.014 384.015 405.015		52.3	15.0	1.8	28.1	. 0.0						F :	

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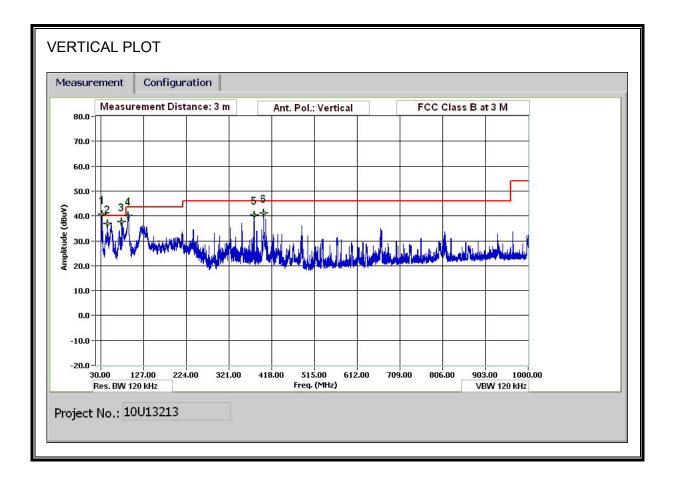
8.3.2. POE # 1 (S/N: 02114)

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



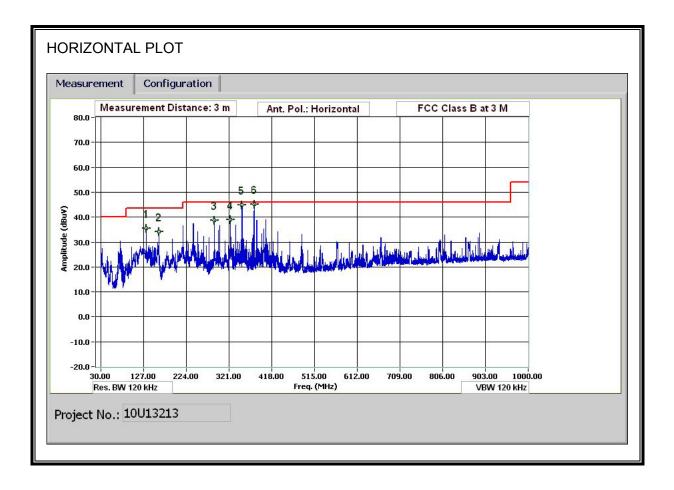
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HORIZONTAL AND VERTICAL DATA

D		Tom Che	n										
Date:		07/22/10											
Project #:		10U13213											
Company:		Tyco Safe							~				
EUT Descr	iption:		•			ce transco	eiver, 2.	4GHz FHS	5				
EUT M/N:		EUT with		nd Lap	top PC								
Test Targe		FCC Cla											
Mode Ope		TX mode				-							
	f	Measurem	-		Amp	Preamp (Margin	Margin vs.	Limit	
	Dist	Distance t		a				to 3 meters					
	Read	Analyzer l			Filter	Filter Ins							
	AF	Antenna F			Corr.	Calculate							
	CL	Cable Loss	;		Limit	Field Stre	ngth Lir	nit					
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Horizonta	1 POE1												
100.083	3.0	56.1	9.9	0.9	28.3	0.0	0.0	38.6	43.5	-4.9	H	Р	
	3.0	52.9	11.8	1.3	28.2	0.0	0.0	37.9	46.0	- 8.1	H	Р	
240.009						0.0	0.0	41.5	46.0	-4.5	H	P	
	3.0	54.7	13.4	1.5	28.1	0.0	0.0	41.2					
300.011			13.4 14.2	1.5 1.7	28.1	0.0	0.0	44.2	46.0	-1.8	H	QP	
300.011 350.053	3.0	54.7				·							
300.011 350.053 378.014 405.015	3.0 3.0 3.0 3.0	54.7 56.5	14.2	1.7	28.1	0.0	0.0	44.2	46.0	- 1.8	H	QP	
300.011 350.053 378.014 405.015 Vertical P	3.0 3.0 3.0 3.0	54.7 56.5 54.2 53.1	14.2 14.6 15.0	1.7 1.7 1.8	28.1 28.1 28.1	0.0 0.0 0.0	0.0 0.0 0.0	44.2 42.4 41.8	46.0 46.0 46.0	-1.8 -3.6 -4.2	H H H	QP P P	
240.009 300.011 350.053 378.014 405.015 Vertical P 32.640	3.0 3.0 3.0 3.0 OE1 3.0	54.7 56.5 54.2 53.1 40.3	14.2 14.6 15.0 19.0	1.7 1.7 1.8 0.5	28.1 28.1 28.1 28.1	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	44.2 42.4 41.8 31.3	46.0 46.0 46.0 40.0	-1.8 -3.6 -4.2 -8.7	H H H V	QP P P QP	
300.011 350.053 378.014 405.015 Vertical P 32.640 45.481	3.0 3.0 3.0 3.0 0E1 3.0 3.0 3.0	54.7 56.5 54.2 53.1 40.3 54.0	14.2 14.6 15.0 19.0 10.6	1.7 1.7 1.8 0.5 0.6	28.1 28.1 28.1 28.4 28.4	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	44.2 42.4 41.8 31.3 36.8	46.0 46.0 46.0 40.0 40.0	-1.8 -3.6 -4.2 -8.7 -3.2	H H H V V	QP P P QP P	
300.011 350.053 378.014 405.015 Vertical P 32.640 45.481 77.042	3.0 3.0 3.0 3.0 OE1 3.0 3.0 3.0 3.0	54.7 56.5 54.2 53.1 40.3 54.0 57.6	14.2 14.6 15.0 19.0 10.6 7.5	1.7 1.7 1.8 0.5 0.6 0.8	28.1 28.1 28.1 28.4 28.4 28.4 28.3	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	44.2 42.4 41.8 31.3 36.8 37.6	46.0 46.0 46.0 40.0 40.0 40.0	-1.8 -3.6 -4.2 -8.7 -3.2 -2.4	H H V V V	QP P QP P P P	
300.011 350.053 378.014 405.015 Vertical P 32.640 45.481 77.042 92.283	3.0 3.0 3.0 0E1 3.0 3.0 3.0 3.0 3.0 3.0	54.7 56.5 54.2 53.1 40.3 54.0 57.6 59.5	14.2 14.6 15.0 19.0 10.6 7.5 8.1	1.7 1.7 1.8 0.5 0.6 0.8 0.9	28.1 28.1 28.1 28.4 28.4 28.4 28.3 28.3	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	44.2 42.4 41.8 31.3 36.8 37.6 40.2	46.0 46.0 40.0 40.0 40.0 40.0 40.0 43.5	-1.8 -3.6 -4.2 -8.7 -3.2 -2.4 -3.3	H H V V V V	QP P QP P P P P	
300.011 350.053 378.014 405.015 Vertical P 32.640 45.481	3.0 3.0 3.0 3.0 OE1 3.0 3.0 3.0 3.0	54.7 56.5 54.2 53.1 40.3 54.0 57.6	14.2 14.6 15.0 19.0 10.6 7.5	1.7 1.7 1.8 0.5 0.6 0.8	28.1 28.1 28.1 28.4 28.4 28.4 28.3	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	44.2 42.4 41.8 31.3 36.8 37.6	46.0 46.0 46.0 40.0 40.0 40.0	-1.8 -3.6 -4.2 -8.7 -3.2 -2.4	H H V V V	QP P QP P P P	

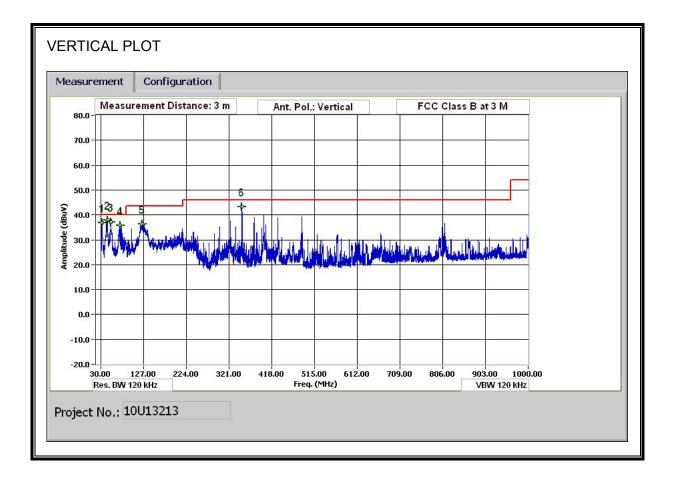
8.3.3. POE # 2 (S/N: 02067)

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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HORIZONTAL AND VERTICAL DATA

Test Engr:		Tom Che	n										
Date:		07/22/10											
Project #:		10U13213											
Company:		Tyco Safe											
EUT Descr	iption:		-			ce transco	eiver, 2.	4GHz FHS	S				
EUT M/N:		EUT with		nd Lap	top PC								
Test Targe		FCC Cla	ss B										
Mode Ope		TX mode	worst ca:	se									
	f	Measurem	-		Amp	Preamp (Margin	Margin vs.	Limit	
	Dist	Distance t		a	D Corr	Distance	Correct	to 3 meters					
	Read	Analyzer l	Reading		Filter	Filter Ins							
	AF	Antenna F			Corr.	Calculate	d Field S	trength					
	CL	Cable Loss	;		Limit	Field Stre	ength Lir	nit					
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Согт.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Vertical P	OE2												
32.400	3.0	45.6	19.1	0.5	28.4	0.0	0.0	36.8	40.0	-3.2	V	P	
44.881	3.0	54.8	10.9	0.6	28.4	0.0	0.0	37.9	40.0	-2.1	V	Р	
52.801	3.0	56.6	8.2	0.6	28.4	0.0	0.0	37.1	40.0	-2.9	V	P P	
74.282	3.0	55.5	7.7	0.8	28.3	0.0	0.0	35.7	40.0	-4.3	V		
124.684	3.0	49.9	13.7	1.1	28.3	0.0	0.0	36.3	43.5	-7.2	V	Р	
350.053	3.0	55.6	14.2	1.7	28.1	0.0	0.0	43.3	46.0	-2.7	V	Р	
Horizonta	···· ¥·····												
	3.0	49.1	13.4	1.1	28.3	0.0	0.0	35.4	43.5	-8.1	H	P	
133.324	3.0	49.7	11.5	1.1	28.2	0.0	0.0	34.1	43.5	-9.4	H	P	
162.005			13.0	1.5	28.1	0.0 0.0	0.0 0.0	38.8 39.1	46.0 46.0	-7.2	H	P P	
162.005 288.011	3.0	52.4		1.0				39.1		-6.9	н	P :	
162.005		52.4 51.9 57.2	13.8 14.2	1.6 1.7	28.1 28.1	0.0	0.0	45.0	46.0	-1.0	H	P	

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8.4. RECEIVER ABOVE 1 GHz

	<u> </u>		7 Measurem												
Compli	ance Ce	ertification	Services, Fr	emont	5m Ch	amber									
Compa	ny:		TYCO SAFTY	PRODU	CTS SE	NSORMA	TIC								
Project	:#:		10U13213												
Date:			6/2/2010												
	ngineer:		MENGISTU N												
Configu Mode:	uration:		EUT WITH PO	JE											
noue.			IA MODE												
est Ee	quipmer	ıt:													
H	lorn 1	18GHz	Pre-ar	mplifer	1-260	GHz	Pre-am	plifer	26-40GH	Iz	Ho	orn > 18G	Hz		Limit
173.	S/N: 671	7 @3m	T144 M	Miteq 30	084004	31									RX RSS 210
	5/11/07 1	r eesiii		nice so	00400.										
Hi Fre	quency Ca	ibles ———													
3'	cable 2	22807700	12' c	able 2	28076	000	20' ca	ble 22	2807500		HPF	Re	ject Filte		<u>x Measurements</u> W=VBW=1MHz
3' 0	cable 22	807700	• 12' ca	able 228	07600	•	20' cab	le 228	07500			•			<u>ge Measurements</u> 1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
\mathbf{GHz}	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
.128	3.0	54.6	44.7	24.3	2.5	-39.3	0.0	0.0	42.1	32.2	74	54	- 31 .9	- 21.8	v
.626 .439	3.0 3.0	51.6 48.2	47.8 43.8	26.0 28.3	3.1 3.9	-38.6 -37.5	0.0 0.0	0.0 0.0	42.0 43.0	38.3 38.5	74	54 54	-32.0 -31.0	-15.7 -15.5	v
.128	3.0	48.2	43.8	28.3	25	-37.5	0.0	0.0	43.0	23.8	74	54 54	-31.0	-15.5	 Н
.626	3.0	51.9	48.3	26.0	3.1	-38.6	0.0	0.0	42.4	38.8	74	54	-31.6	-15.2	H
.439	3.0	46.4	39.7	28.3	39	-37.5	0.0	0.0	41.1	34.4	74	54	- 32.9	-19.6	H
]											
ev. 07.2	2.09														
							_	a :							
	f	Measurem Distance to	ent Frequenc	У		Amp	Preamp		ct to 3 met			<u> </u>	0	Field Strength	
	Dist Rood	Analyzer R							ct to 3 met: Strength @					d Strength Li : Average Li	
	Read AF	Analyzer K Antenna F:	-			Avg Peak			strengtn @ k Field Stre			<u> </u>	-	: Average Li : Peak Limit	
	CL	Cable Los:				HPF	High Pas			ugu		PK. IVIAI	iviargin vs	. геак ілпіі	
		Capie Los:	•			TTLL	rugu ras	s rutei							

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8.5. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted L	imit (dBuV)
	Quasi-peak	Average
0.15-0.5	66 to 56 °	56 to 46 *
0.5-5	56	46
5-30	60	50

Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

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RESULTS

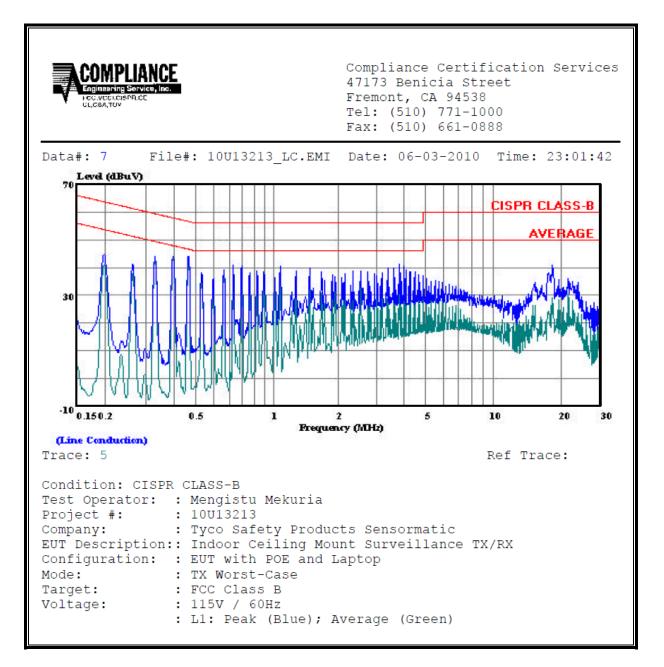
8.5.1. ORIGINAL POE

<u>6 WORST EMISSIONS</u>

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark	
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV(dB)	L1/L2	
0.33	43.98		43.16	0.00	59.45	49.45	-15.47	-6.29	L1	
0.40	44.14		43.38	0.00	57.94	47.94	-13.80	-4.56	L1	
0.46	44.00		43.10	0.00	56.67	46.67	-12.67	-3.57	L1	
0.33	43.34		42.63	0.00	59.45	49.45	-16.11	-6.82	L2	
0.40	43.38		42.41	0.00	57.94	47.94	-14.56	-5.53	L2	
0.46	43.00		41.90	0.00	56.67	46.67	-13.67	-4.77	L2	
6 Worst I	Data									

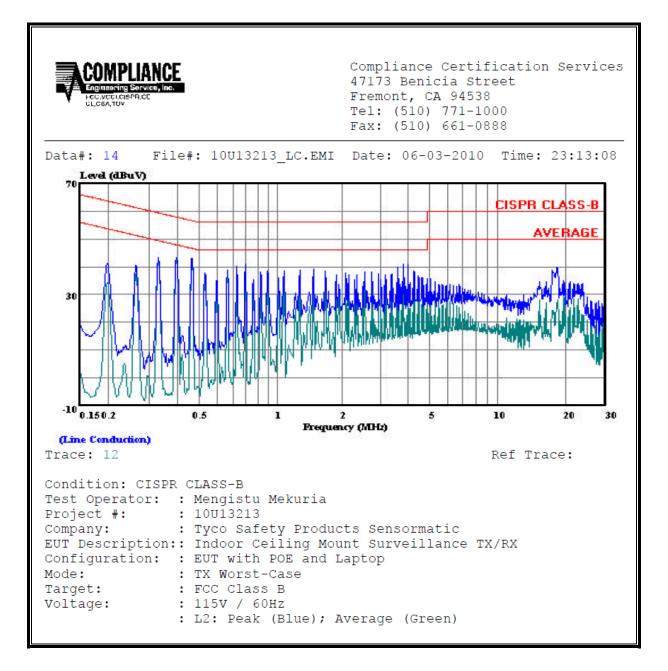
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LINE 1 RESULTS



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LINE 2 RESULTS



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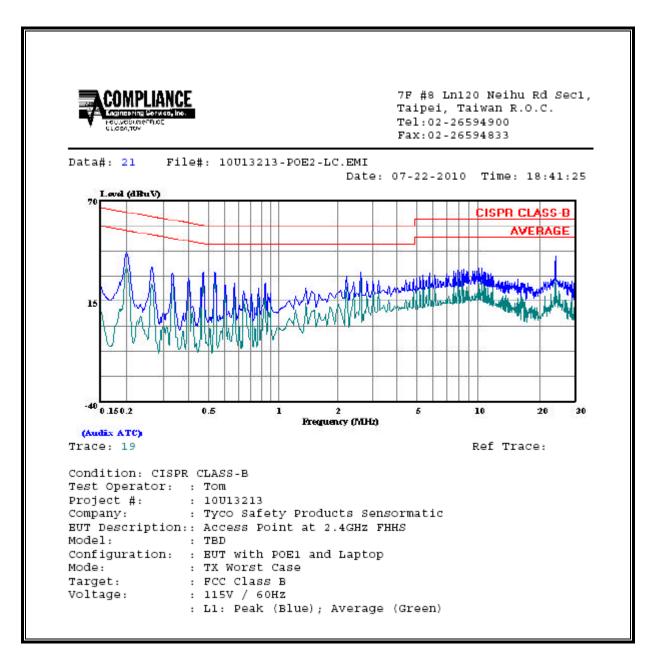
8.5.2. POE # 1 (S/N: 02114)

6 WORST EMISSIONS

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark		
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV(dB)	L1/L2		
0.20	41.89		33.77	0.00	63.61	53.61	-21.72	-19.84	L1		
0.27	33.91		24.34	0.00	61.21	51.21	-27.30	-26.87	L1		
0.47	30.27		28.04	0.00	56.58	46.58	-26.31	-18.54	L1		
0.20	37.92		29.89	0.00	63.61	53.61	-25.69	-23.72	L2		
0.27	32.98		25.76	0.00	61.21	51.21	-28.23	-25.45	L2		
24.01	40.09		30.27	0.00	60.00	50.00	-19.91	-19.73	L2		
6 Worst I	 Data										

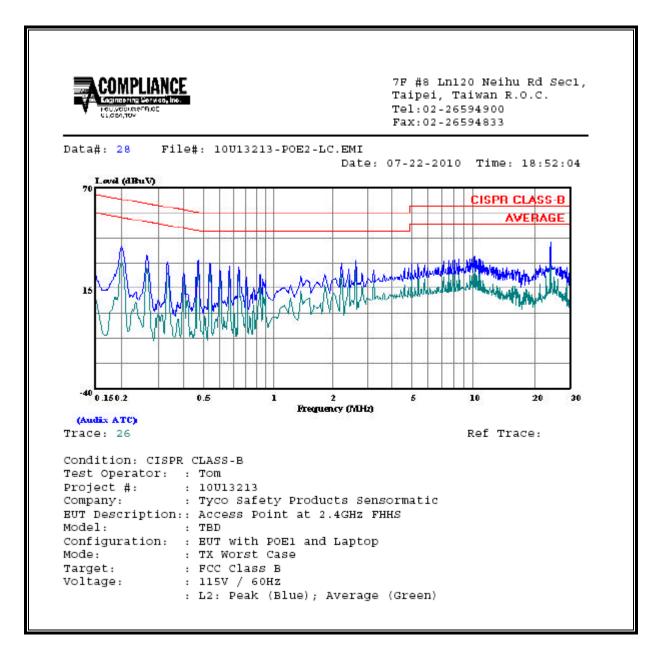
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LINE 1 RESULTS



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LINE 2 RESULTS



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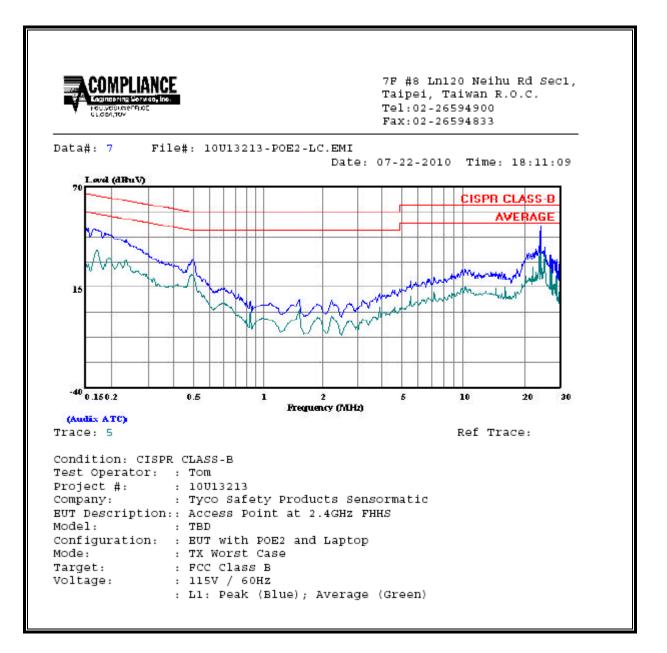
8.5.3. POE # 2 (S/N: 02067)

6 WORST EMISSIONS

	CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark		
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV(dB)	L1/L2		
0.16	47.31		27.71	0.00	65.73	55.73	-18.42	-28.02	L1		
0.49	30.03		21.54	0.00	56.15	46.15	-26.12	-24.61	L1		
24.01	48.67		37.89	0.00	60.00	50.00	-11.33	-12.11	L1		
0.15	48.11		27.31	0.00	65.84	55.84	-17.73	-28.53	L2		
0.17	46.45		29.74	0.00	65.16	55.16	-18.71	-25.42	L2		
24.01	48.77		38.41	0.00	60.00	50.00	-11.23	-11.59	L2		
6 Worst I	Data										

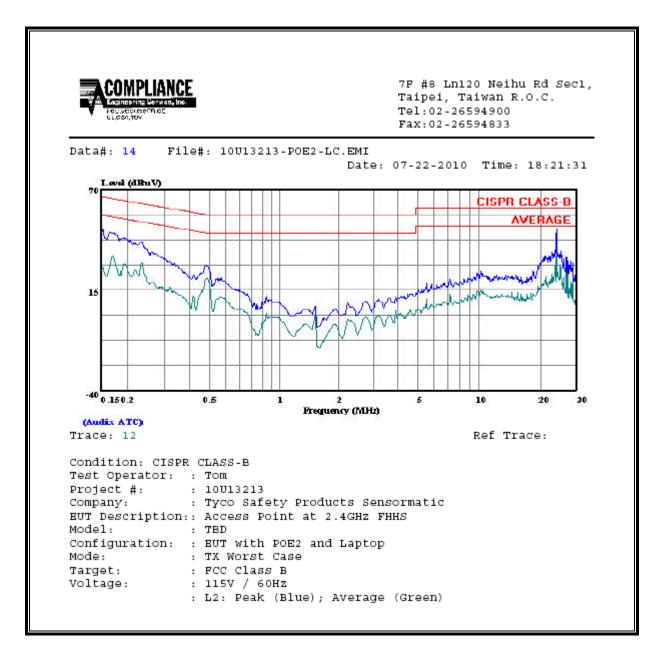
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LINE 1 RESULTS



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LINE 2 RESULTS



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9. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (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.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)	
(A) Lim	its for Occupational	l/Controlled Exposu	res		
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/F 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 6	
(B) Limits	for General Populati	on/Uncontrolled Exp	oosure		
0.3–1.34 1.34–30	614 824/f	1.63 2.19/f	*(100) *(180/f²)	30 30	

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)-Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)	
30–300 300–1500 1500–100,000	27.5	0.073	0.2 f/1500 1.0	30 30 30	

f = frequency in MHz

* = Plane-wave equivalent power density NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occu-tions where a transient through a location where occu-

pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5

Exposure Limits for Persons Not Classed As RF and Microwave Ex-
posed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m ²)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/f	2.19/ <i>f</i>		6
10–30	28	2.19/f		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042f ^{0.5}	f/150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 /f ^{1.2}
150 000–300 000	0.158f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616 000 /f ^{1.2}

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m² is equivalent to 1 mW/cm^2 .
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m² EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

Power density in units of W/m² is converted to units of mWc/m² by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

where

D = Separation distance in m EIRP = Equivalent Isotropic Radiated Power in W S = Power density in W/m²

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter xGx = Numeric gain of antenna x

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

<u>LIMITS</u>

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

<u>RESULTS</u>

Band	Mode	Separation	Output	Antenna	IC Power	FCC Power
		Distance	Power	Gain	Density	Density
		(m)	(dBm)	(dBi)	(W/m^2)	(mW/cm^2)
2.4 GHz	Bluetooth	0.20	-4.30	2.50	0.001315	0.000132

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