

MEASUREMENT/TECHNICAL REPORT

Company: General Sensors, Incorporated

FRN: 0006564041

Model

WIAS3

FCC ID: P72WIAS3

Description: This is a report to support a request for an original grant of equipment authorization.

Equipment Type: Low Power Communications Device Transmitter (DXX)

Report prepared for: General Sensors, Incorporated
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Report prepared by: Mairaj Hussain
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Introduction

This report is an application for Certification of a Transmitter operating pursuant to 47 CFR 15.231. The model number covered by this report is WIAS3. This report is designed to demonstrate the compliance of these devices with the requirements outlined in 47 CFR Part 15 using the methods outlined in 47 CFR Part 2.

EUT Configuration				
Work Order: C0157				
Company: General Sensors				
Company Address: 20 Baldwin Drive Branford, CT 06405				
Contact: Don Hudson				
Person(s) Present: None				
MN		SN		
EUT: WIAS3		-		
EUT Description: Wireless freezing pipe sensor. The WIAS3 is a wireless sensor is designed to sense air and pipe temperatures in unheated areas of a building. In door use only.				
EUT Max Frequency: 418 MHz				
Attenuator values for Tx: R22 = 910 ohm, C15 = 62 ohm				
Support Equipment:		MN		SN
None				
EUT Cables:	Qty	Shielded?	Length	Ferrites
None				
Unpopulated EUT Ports:	Qty	Reason		
None				

Statement of Conformity

The WIAS3 has been found to conform with the following parts of the 47 CFR as detailed below:

Applicable FCC part 15C section: **15.231 Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz.**

Part 2	Part 15	Comments
	15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label will be made from maylor and it will be attached with permanent adhesive. A sample label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
	15.207	The unit is DC powered without the capability of being operated from the AC mains.
	15.231 a(1)	See WIAS3 Operation Under Section 15.231
	15.231 a(2)	See WIAS3 Operation Under Section 15.231
	15.231 a(3)	See WIAS3 Operation Under Section 15.231
	15.231 a(4)	Not employed for radio controlled purposes. See WIAS3 Operation Under Section 15.231
	15.231 b(1)(2)(3)	See attached data tables.
	15. 231 c	See attached graphs of the bandwidth
	15.231 d	NA. Transmitter operates at 418 MHz.
	15.231 e	Satisfies paragraph b through d

Test Methodology

Radiated emission testing was performed according to the procedures in ANSI C63.4 (1992). The testing was performed at an antenna to EUT distance of 3 or 1 meter(s) below 30MHz and a distance of 10m above 30MHz. The actual test distance used is noted in the test data sheets. The device's performance was investigated to 5 GHz. Since the device is installed in one orientation, the emissions were maximized around the vertical axis and the maximum reading was recorded. The integrated antenna cannot be maximized separately.

All other performance tests were made in accordance with the procedures outlined in Part 15 of CFR 47. The applicable sections provided under Part 15 are provided in the measurement section of this report.

Test Facility

Curtis-Straus LLC

All testing for the range 9kHz–5000MHz was performed at Curtis-Straus (A2LA Certificate Number 1627-01). The open area test site used to collect the radiated data is located at 527 Great Road, Littleton, MA 01460. Sites “T” was used.

Test Equipment Used

SPECTRUM ANALYZERS					
x	Analyzer	Model No.	Company	Serial No.	Calibration Due
x	GREEN 9kHz-26.5GHz	8593E	HP	3829A03618	04-OCT-2002

OPEN AREA TEST SITES (OATS)					
x	Site	FCC Code	IC Code	VCCI Code	Calibration Due
x	"T" Texas	93448	IC 2762-T	R-905/ C-480	09-SEP-2002

ANTENNAS					
x	Antenna	Model No.	Company	Serial No.	Calibration Due
x	GREEN Bilog: 30MHz-2GHz	CBL6112B	Chase	2742	26-JAN-2003
x	ORANGE Horn: 1-18GHz	3115	EMCO	0004-6123	27-MAY-2003

PREAMPLIFIERS					
x	Preamplifier	Model No.	Company	Serial No.	Calibration Due
x	GREEN 0.01-2000MHz	ZFL-1000-LN	MiniCircuits/ C-S	n/a	22-MAR-2003
x	ORANGE-BLACK 1-20GHz	SMC-12A	MITEQ	690639	06-AUG-2002

Unless otherwise noted the calibration interval is one year. All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

WIAS3 Operation Under Section 15.231

- Manual operation of the unit occurs when the unit is initially installed and tested. Pushing the test button activates the transmission for 453ms and transmission is terminated automatically.
- Automatic transmission occurs every 9 hours when unit “checks-in” with its status. The duration of automatic transmissions is 453ms.
- Periodic Operation, the unit is part of a safety/security system and transmits supervisory signals to insure system integrity. Periodic rate of transmission does not exceed one second per hour for each transmissions.
- Transmissions during alarm conditions. The Tx time limits are waived as indicated in section 15.231. The duration of transmission is 1.4s and it is repeated once every 15 minutes until cleared.

Measurement Results

Operating Frequency

This device operates at 418MHz.

Electric Field Strength Radiation Measurements

Limit calculation at fundamental and spurious:

Limit at 418 MHz from table in 15.231 b = 80.1 dbuV/m

Averaging factor was calculated as:

Max numbers of bits in 100 ms	= 23
no of high in 100 ms	= 12
Averaging factor	= $20 \log (23/12)$
	= 5.6 db

Adjusted Limit at fundamental	= $5.6 + 80.1 = 85.7$ dbuV/m
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Limit used for harmonics	= $60.1 + 5.6 = 65.7$ dbuV/m
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Limit used for other spurious frequencies:	= 60.1 dbuV/m
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Radiated Emissions Table										Curtis-Straus LLC		
Date: 05-Mar-02			Company: General Sensors						Table 1			
Engineer: EG & MH			EUT Desc: WIAS3						Work Order: C0157			
Frequency Range: 30-2000MHz							Measurement Distance: 3 m					
Notes: fundamental, harmonics,and spurious							EUT Max Freq: 418MHz					
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Avg Factor (dB)	Adjusted			FCC Part 15 Sec. 231		
							Reading (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Vpk (no preamp)	418.0	64.6	0.0	16.8	2.4	5.6	78.2			80.1	-1.9	Pass
Vpk	836.0	38.4	21.3	21.1	3.9	5.6	36.5			60.1	-23.6	Pass
Vpk	1254.0	25.7	21.3	23.0	5.1	5.6	26.9			60.1	-33.2	Pass
Vpk	1672.0	26.0	18.7	25.7	6.2	5.6	33.6			60.1	-26.5	Pass
Vpk	36.2	45.9	21.9	16.1	0.4	0.0	40.5			60.1	-19.6	Pass
Vpk	485.2	37.5	21.4	17.8	2.7	0.0	36.6			60.1	-23.5	Pass
Table Result: Pass by -1.9 dB										Worst Freq: 418.0 MHz		
Test Site: "T"		Pre-Amp: Green		Cable: 65 ft RG8A/U		Analyzer: Green		Antenna: Green				

Radiated Emissions Table										Curtis-Straus LLC		
Date: 05-Mar-02			Company: General Sensors					Table 2				
Engineer: EG & MH			EUT Desc: WIAS3					Work Order: C0157				
Frequency Range: 2-5GHz							Measurement Distance: 3 m					
Notes: harmonics and spurious							EUT Max Freq: 418MHz					
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Avg Factor (dBµV/m)	Adjusted			FCC Part 15 Sec. 231		
							Reading (dBµV/m)			Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
nf	2090.0	28.6	24.5	29.4	2.1	5.6	30.0			60.1	-30.1	Pass
nf	2508.0	29.0	24.4	30.6	2.4	5.6	32.0			60.1	-28.1	Pass
nf	2926.0	26.7	24.4	31.2	2.6	5.6	30.5			60.1	-29.6	Pass
nf	3344.0	28.2	24.3	32.3	3.0	5.6	33.6			60.1	-26.5	Pass
nf	3762.0	27.6	24.2	33.6	3.4	5.6	34.8			60.1	-25.3	Pass
nf	4180.0	27.0	24.2	34.2	3.6	5.6	35.0			60.1	-25.1	Pass
Table Result: Pass by -25.2 dB Worst Freq: 4180.0 MHz												
Test Site: "T"		Pre-Amp: Or-Blk		Cable: 3m Microflex		Analyzer: Green		Antenna: Orange Horn				

2-May-02

Emissions Plots

09:43:11 MAR 05, 2002

hp

MKR 418.0100 MHz

REF 70.0 dBμV

#AT 0 dB

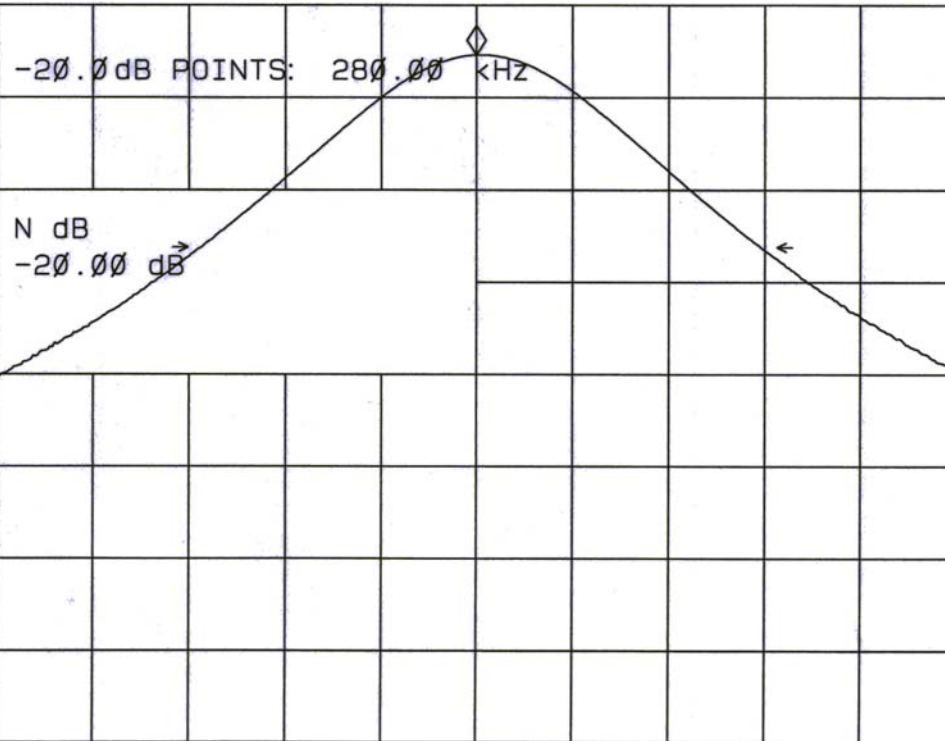
64.61 dBμV

PEAK

LOG

10

dB/



User
Menu

N dB PTS
ON OFF

% AM
ON OFF

TOI
ON OFF

Power
Menu

FFT
Menu

CENTER 418.0100 MHz

#RES BW 120 kHz

VBW 300 kHz

SPAN 500.0 kHz

SWP 20.0 msec

Fundamental

20db Bandwidth = 280 KHz

Limit = 418 MHz * 0.0025 = 1,045 KHz