



Test Report: 6W72013 issue 2

Applicant: DESA Speciality LLC
PO Box 90004, 2901 Industrial
Ave, Bowling Green, KY
42102, USA

Apparatus: 6033-TX

FCC ID: BJ4-WRC6033TX

In Accordance With: FCC Part 15 Subpart C, §15.231
Periodic operation in the band 40.66-40.70MHz and
above 70 MHz.

Tested By: Nemko Canada Inc.
303 River Road
Ottawa, Ontario
K1V 1H2

Authorized By:

A handwritten signature in blue ink, appearing to read "Xu Jin".

Xu Jin, Wireless Specialist

Date:

Total Number of Pages: 21

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	6033-TX
Specification:	FCC Part 15 Subpart C, 15.231
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Roman Kuleba, EMC/Wireless Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows: 315MHz 6033TX Periodic Transmitter

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	Heath/Zenith 6033-TX Transmitter (TX constant On Mode)	—
2	Heath/Zenith 6033-TX Transmitter	—

The first samples were received on: August 19, 2006

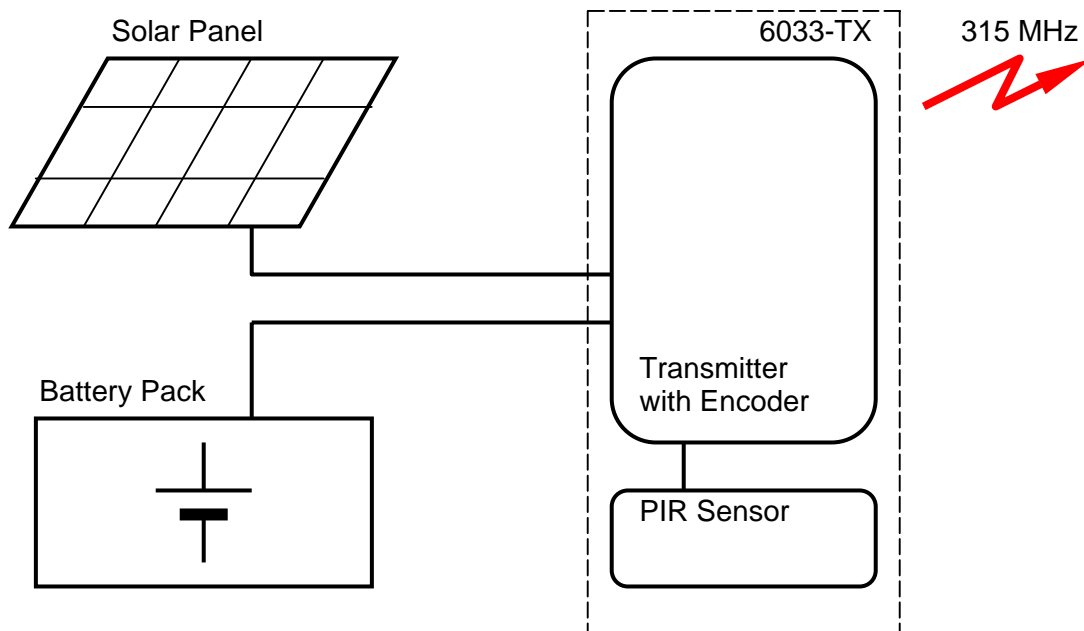
1.3 Theory of Operation

The 6033-TX Wireless Solar PIR Transmitter is a transmitting device used for the remote control of lighting by utilizing RF transmission technology and a compatible RF receiver. The device operates on 315 MHz and is capable of transmitting several commands, which are used by the compatible receiver to turn the room lights ON, OFF or to dim the lights to a prescribed level. The wireless transmitter is normally off with the RF transmission starting when one of the two PIR (Passive Infra Red) sensors detects motion. The encoder turns on transmission twice for approximately 1 second. It is then reset for another motion event.

1.4 Technical Specifications of the EUT

Manufacturer:	DESA Speciality LLC
Operating Frequency:	315 MHz (single channel)
Emission Designator:	L1D
Rated Power:	0.00000105 W (-29.8 dBm), conducted
Modulation:	PCM
Antenna Data:	Integral Antenna
Antenna Connector:	None
Power Source:	2.4VDC (Rechargeable Battery Pack and Solar Panel)

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.231

Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range : 15 – 30 °C
 Humidity range : 20 - 75 %
 Pressure range : 86 - 106 kPa
 Power supply range : +/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	May 10/07
Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	May 16/07
Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	May 16/07
Biconical (1) Antenna	EMCO	3109	FA000805	May 03/07
Log Periodic Antenna #2	EMCO	LPA-25	FA001355	May 16/07
Horn Antenna #2	EMCO	3115	FA000825	Dec. 16/06
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	Aug. 2/07
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	Aug. 2/07

* COU (Calibrate on Use)

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of Power source	N	N/A
15.207(a)	Powerline Conducted Emissions	N	N/A
15.209(a)	Radiated Emissions within Restricted Bands	Y	PASS
15.231(a)(1)	Manually operated transmitter	N	N/A
15.231(a)(2)	Automatically activated transmitter	Y	PASS
15.231(a)(3)	Periodic transmissions at regular predetermined intervals	N	N/A
15.231(a)(4)	Radiators used in cases of emergency	N	N/A
15.231(a)(5)	Set-up information for security systems	N	N/A
15.231(b)	Radiated Emissions	Y	PASS
15.231(c)	20dB Bandwidth	Y	PASS
15.231(d)	Devices operating within the frequency band 40.66-40.70 MHz	N	N/A
15.231(e)	Radiated emissions for Periodic radiators	N	N/A

Notes: The EUT was tested with new batteries.

Appendix A : Test Results

Clause 15.209(a) Radiated Emissions within Restricted Bands

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvoltsmeter) (kHz)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Conditions:

Sample Number:	1	Temperature:	15°C
Date:	September 13 – 14, 2006	Humidity:	75%
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results:

See Attached Table for Results

Additional Observations:

These results apply to emissions found in the Restricted Bands defined in FCC Part 15 Subpart C, 15.205.

The Spectrum was searched from 30MHz to the 10th Harmonic.

All measurements were performed using a Peak Detector with 100 kHz RBW on frequencies below 1GHz and 1MHz RBW on frequencies above 1GHz at a distance of 3 meters.

The EUT was measured on three orthogonal axes.

For all measurements the EUT was powered with fully charged batteries.

Radiated Emissions within Restricted Bands, continued

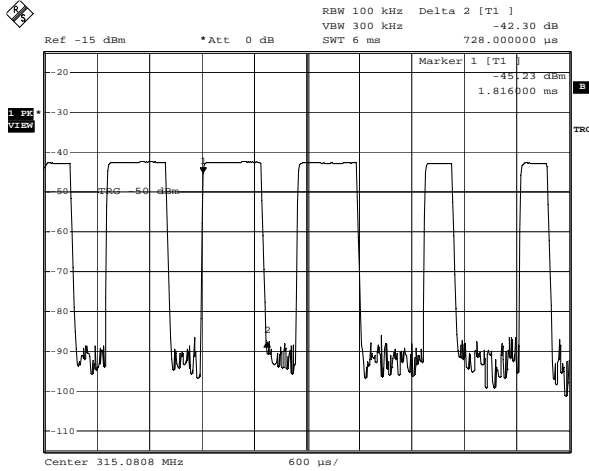
Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	Duty Cycle Corr.	Cable Loss (dB)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detect.
1 1575.0000	Horn2	V	69.7	27.1	49.0	N/A	3.8	51.6	74.0	22.4	Peak
2 2205.0000	Horn2	V	72.8	28.7	58.8	N/A	4.6	47.3	74.0	26.7	Peak
3 2835.0000	Horn2	V	67.8	30.3	59.7	N/A	5.5	43.9	74.0	30.1	Peak
4 1575.0000	Horn2	H	77.4	27.1	49.0	N/A	3.8	59.4	74.0	14.6	Peak
5 2205.0000	Horn2	H	74.5	28.7	58.8	N/A	4.6	49.0	74.0	25.0	Peak
6 2835.0000	Horn2	H	70.8	30.3	59.7	N/A	5.5	46.9	74.0	27.1	Peak
1 1575.0000	Horn2	V	69.7	27.1	49.0	-9.87	5.6	43.53	54.0	10.47	Average
2 2205.0000	Horn2	V	72.8	28.7	58.8	-9.87	6.8	39.63	54.0	14.37	Average
3 2835.0000	Horn2	V	67.8	30.3	59.7	-9.87	8.1	36.63	54.0	17.37	Average
4 1575.0000	Horn2	H	77.4	27.1	49.0	-9.87	5.6	51.23	54.0	2.77	Average
5 2205.0000	Horn2	H	74.5	28.7	58.8	-9.87	6.8	41.33	54.0	12.67	Average
6 2835.0000	Horn2	H	70.8	30.3	59.7	-9.87	8.1	39.63	54.0	14.37	Average

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn Antenna, ED = EMCO Dipole
 Note 2: Positive Peak detector used

Radiated Emissions within Restricted Bands, continued

Duty Cycle:

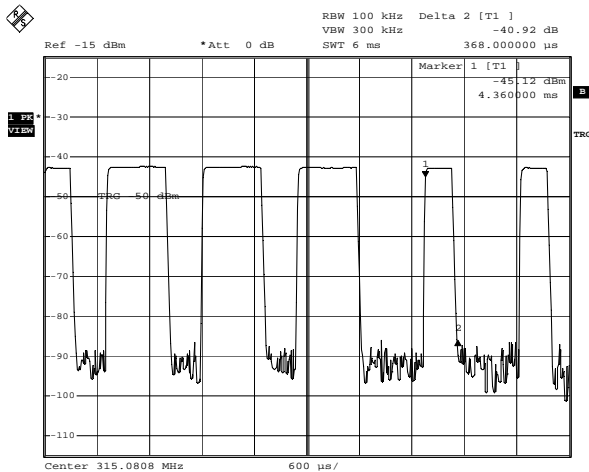
Data is transmitted by means of pulse-width modulated signal (long and short pulses):



Duration of a long pulse:

$$T_L = 0.728 \text{ ms}$$

Duty Cycle
Date: 14.SEP.2006 20:29:11



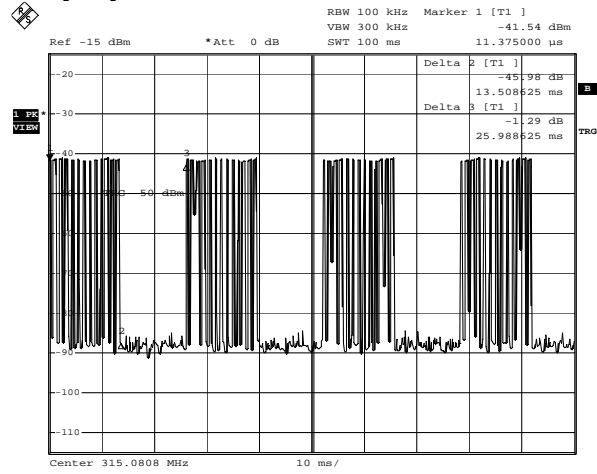
Duration of a short pulse:

$$T_S = 0.368 \text{ ms}$$

Duty Cycle
Date: 14.SEP.2006 20:30:52

Radiated Emissions within Restricted Bands, continued

Duty Cycle:



Duty Cycle

Date: 14.SEP.2006 20:15:13

Duty-cycle Correction Factor:

Customer declared for the worst case of the pulse train would be composed by total of 9 long pulses and 4 short pulses within one burst.

Number of long pulses within one burst:

$$N_L = 9$$

Number of short pulses within one burst:

$$N_S = 4$$

Total TX-On time for a single burst:

$$T_{ON/BURST} = N_L \times T_L + N_S \times T_S$$

$$T_{ON/BURST} = 9 \cdot 0.728 \text{ ms} + 4 \cdot 0.368 \text{ ms}$$

$$T_{ON/BURST} = 8.024 \text{ ms}$$

Number of bursts within 100 ms:

$$N = 4$$

Total TX-On time within 100 ms:

$$T_{ON} = N \times T_{ON/BURST} = 4 \cdot 8.024 \text{ ms}$$

$$T_{ON} = 32.096 \text{ ms}$$

$$DCF = 20 \cdot \log_{10} (T_{ON}/100 \text{ ms}) = 20 \cdot \log_{10} (32.096 \text{ ms} / 100 \text{ ms}) = 20 \cdot \log_{10} 0.32096 = -9.87 \text{ dB}$$

Clause 15.231(a)(2) Automatically Activated Transmitter

The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

(4) Intentional radiators, which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

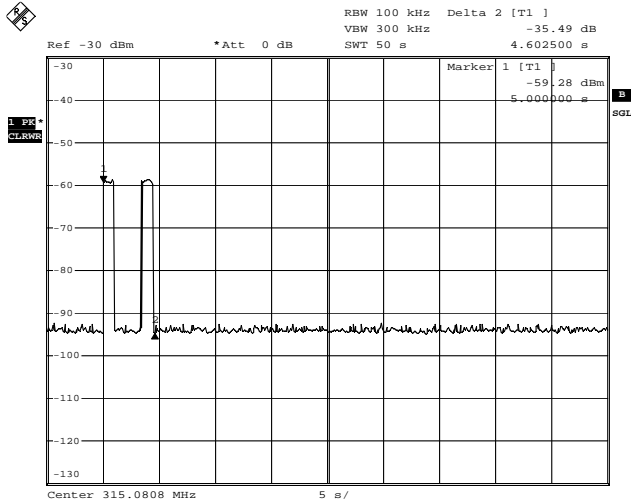
(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

Test Conditions:

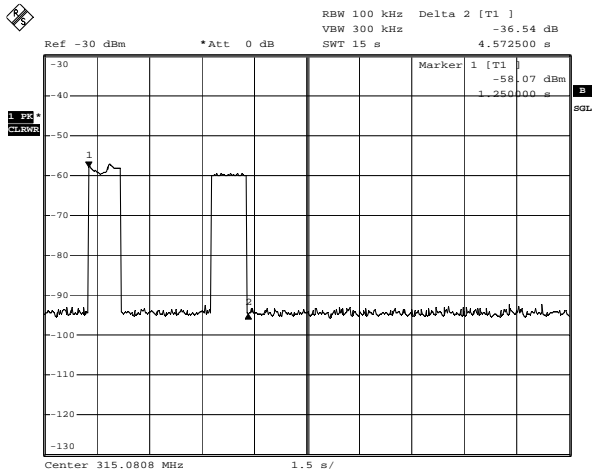
Sample Number:	1	Temperature:	15°C
Date:	September 14, 2006	Humidity:	75%
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Pass (see attached plots).

Automatically Activated Transmitter – Duration of Transmission, continued



Date: 14.SEP.2006 02:06:53



Duration of Transmission

Date: 14.SEP.2006 02:12:07

Measured total duration of one transmission cycle: 4.6025 seconds
Limit: 5.0 seconds
Margin: 0.3975 seconds

Clause 15.231(b) Radiated Emissions (not in restricted bands)

In addition to the provisions of 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750	125 to 375
174-260	3,750	375
260-470	3,750 to 12,500	375 to 1,250
Above 470	12,500	1,250

Test Conditions:

Sample Number:	1	Temperature:	15°C
Date:	September 13, 2006	Humidity:	75%
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results:

See Attached Table for Results

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic.

All measurements were performed using a Peak Detector with 100 kHz RBW on frequencies below 1GHz and 1MHz RBW on frequencies above 1GHz at a distance of 3 meters.

The EUT was measured on three orthogonal axes.

For all measurements the EUT was powered with fully charged battery.

Radiated Emissions (not in restricted bands), continued

Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	Duty Cycle Corr.	Cable Loss (dB)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detect.
1 315.0000	LP2	V	61.0	15.5	N/A	-9.87	2.2	68.83	75.6	6.77	Average
2 630.0000	LP2	V	29.5	20.3	N/A	-9.87	3.3	43.23	55.6	12.37	Average
3 945.0000	LP2	V	23.7	23.0	N/A	-9.87	4.1	40.93	55.6	14.67	Average
4 1260.0000	Horn2	V	80.9	25.0	49.1	-9.87	4.8	51.73	55.6	3.87	Average
5 1890.0000	Horn2	V	66.0	27.4	49.1	-9.87	6.3	40.73	55.6	14.87	Average
6 2520.0000	Horn2	V	72.0	30.1	59.9	-9.87	7.5	39.83	55.6	15.77	Average
1 315.0000	LP2	H	56.3	15.3	N/A	-9.87	2.2	63.93	75.6	11.67	Average
2 630.0000	LP2	H	23.8	20.9	N/A	-9.87	3.3	38.13	55.6	17.47	Average
3 945.0000	LP2	H	31.0	24.0	N/A	-9.87	4.1	49.23	55.6	6.37	Average
4 1260.0000	Horn2	H	83.5	25.0	49.1	-9.87	4.8	54.33	55.6	1.27	Average
5 1890.0000	Horn2	H	67.0	27.5	49.1	-9.87	6.3	41.83	55.6	13.77	Average
6 2520.0000	Horn2	H	76.4	30.1	59.9	-9.87	7.5	44.23	55.6	11.37	Average

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole
 Note 2: Positive Peak detector used

Clause 15.231(c) 20dB Bandwidth

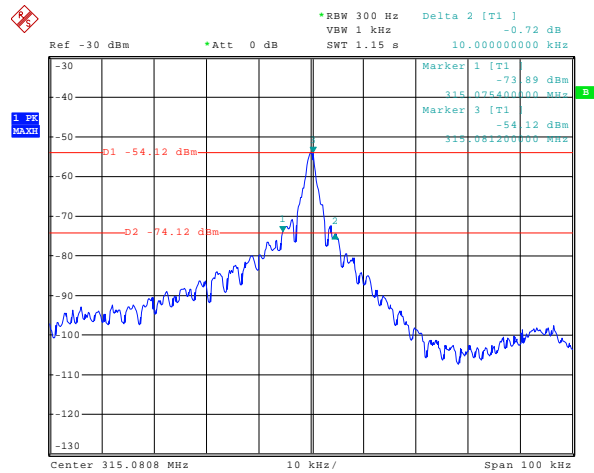
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Conditions:

Sample Number:	1	Temperature:	15°C
Date:	September 14, 2006	Humidity:	75%
Modification State:	0	Tester:	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Pass (see plot)

Measured 20dB Bandwidth: 10 kHz
 Limit: 787.5 kHz



Date: 14.SEP.2006 01:28:58

Appendix B : Setup Photographs

Radiated Spurious Emissions Setup (Front):



Radiated Spurious Emissions Setup (Rear):



Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions

