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Electromagnetic Emissions Test Report

Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7
FCC Part 15 Subpart C

Toto USA, Inc.
Transmitter
Model: 9E3014

UPN:	7957A-9E3014
FCC ID:	ME4-TEC1DS
GRANTEE:	Toto USA, Inc. 5351 E. Jurupa St. Ontario, CA 91761
TEST SITE(S):	Elliott Laboratories 684 W. Maude Ave Sunnyvale, CA 94086 Canada Numbers: IC 2845-2
REPORT DATE:	November 5, 2008
FINAL TEST DATE:	September 24 - September 25, 2008
AUTHORIZED SIGNATORY:	Mark Briggs Staff Engineer

A2LA ACCREDITED

Testing Cert #2016-01

REVISION HISTORY

Rev #	Date	Comments	Modified By
1	12-08-2008	Original issue	

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SCOPE

An electromagnetic emissions test has been performed on the Toto USA, Inc. model 9E3014 pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Toto USA, Inc. model TEC1DS remote unit[1] and therefore apply only to the tested sample. The sample was selected and prepared by Tony Zhou of IAPMO Research and Testing Lab.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification.

[1] Model designation TEC1DS refers to the complete system (transmitter and receiver), the model number/name for the remote transmitter is 9E3014.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Toto USA, Inc. model 9E3014 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

MOMENTARILY OPERATED DEVICES – CONTROL SIGNALS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.231 (a) (1)	RSS 210 A1.1.1 (1)	Duration of manually activated transmissions	554ms	< 5 seconds	Complies
15.231 (a) (2)	RSS 210 A1.1.1 (2)	Duration of automatically activated transmissions	The device can only be manually activated.	< 5 seconds	Not applicable
15.231 (a) (3)	RSS 210 A1.1.1 (3)	Transmissions at predetermined / regular intervals	Device may only transmit under manual control and there is no provision for operation at predetermined intervals.	Such transmissions are not permitted	Complies
15.231 (a) (4)	RSS 210 A1.1.1 (4)	Pendency of transmissions used during emergencies	Device is not an alarm device	Device may transmit continuously under an alarm condition	Not applicable
15.231 (b)	RSS 210 Table 4	Fundamental Signal Strength	53.3dBµV/m @ 294.90MHz (-21.0dB)	Refer to table in limits section	Complies
15.231 (b) / 15.209	RSS 210 Table 2 / 4	Radiated Spurious Emissions, 30 - 3000 MHz	48.6dBµV/m @ 589.597MHz (-5.7dB)	Refer to table in limits section	Complies
15.231 (c)	-	Bandwidth (20dB)	182 kHz	< 0.5% of operating frequency	Complies
-	RSS 210 A1.1.3	Bandwidth (99%)	217 kHz		
15.231 (d)	RSS 210 A1.1.4	Frequency Stability - 40.66 – 40.70 MHz band	Device does not operate in the 40.66-40.70MHz band		Not applicable

Note 1 – The device transmits continuously while the button is activated. The minimum transmit time (recorded when the control is activated and then immediately released) was 554ms. If the remote was activated for a period exceeding this minimum time it stopped transmitting as soon as the remote was released.
Note 2 – As the device could be mounted on the floor or on a wall it was tested in all three orthogonal orientations.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antenna is integral to the device and is not user accessible.	Unique antenna connector or integral antenna	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	The remote transmitter does not contain a receiver.		Not applicable
15.207	RSS GEN Table 2	AC Conducted Emissions	The remote transmitter is battery powered and not equipped to be powered from an AC power source.	Refer to standard	Not applicable
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	The FCC considers the device categorically exempt from RF exposure evaluations. Refer to RSS 102 declaration for Canada	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual	Refer to page 2 of the manual.	Statement required regarding non-interference	Complies
			Antenna is integral to the device	Statement required regarding detachable antenna	Not applicable

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Toto USA, Inc. model TEC1DS is a remote control system comprised of a receiver unit and a transmitter unit that is designed to allow remote control of a faucet. The transmitter unit is designed to be wall-mounted or floor-mounted and the receiver would be wall/cabinet mounted. Both transmitter and receiver are battery-powered with no provision for operating from an external AC-DC adapter.

The sample was received on September 19, 2008 and tested on September 24 and September 25, 2008. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Toto USA Inc	9E3014	Remote control - sample configured to transmit continuously	8B01	FCC ID: ME4-TEC1DS Canada: 7957A-9E3014
		Remote control - "normal" sample	7B19	

ANTENNA SYSTEM

The antenna is integral to the device.

ENCLOSURE

The transmitter enclosure is primarily constructed of plastic. It measures approximately 15cm wide by 5cm deep by 2cm high.

MODIFICATIONS

The EUT was not modified whilst at Elliott.

SUPPORT EQUIPMENT AND INTERFACE CABLING

The transmitter is a stand-alone device with no provision for connection to peripheral devices. No support equipment or cables were connected to the remote during testing.

EUT OPERATION

Two samples were provided for testing. The first sample was configured to transmit continuously as soon as batteries were installed and this sample was used for field strength measurements of the fundamental and spurious emissions and for bandwidth measurements. The second sample was configured to transmit normally (i.e. when activated by pushing the control button) and this sample was used for timing verification measurements.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on September 23, September 24 and September 25, 2008 at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
SVOATS #2	90593	IC 2845-2	684 West Maude Ave, Sunnyvale CA 94085-3518

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception, on OATS sites, of predictable local TV, radio, and mobile communications traffic. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

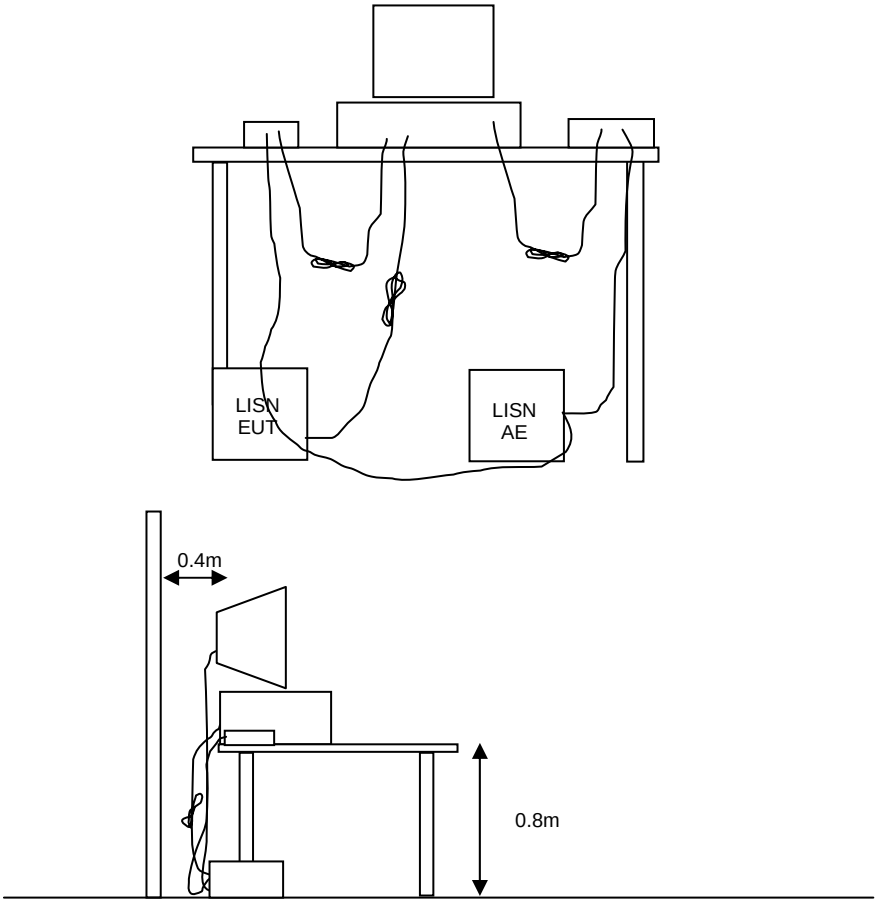
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

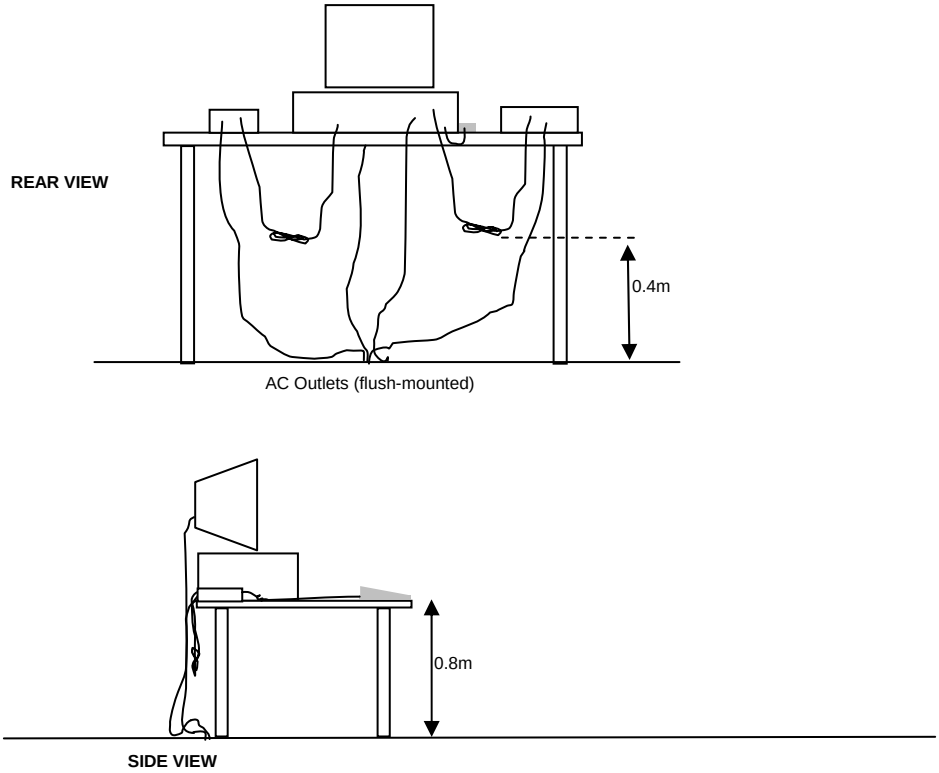


A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

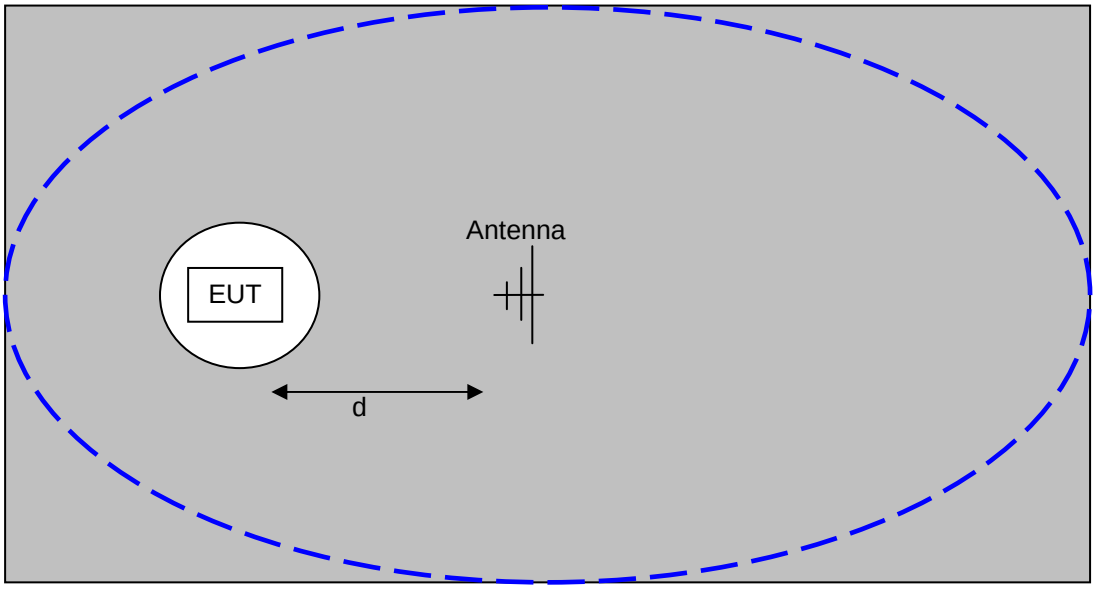
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

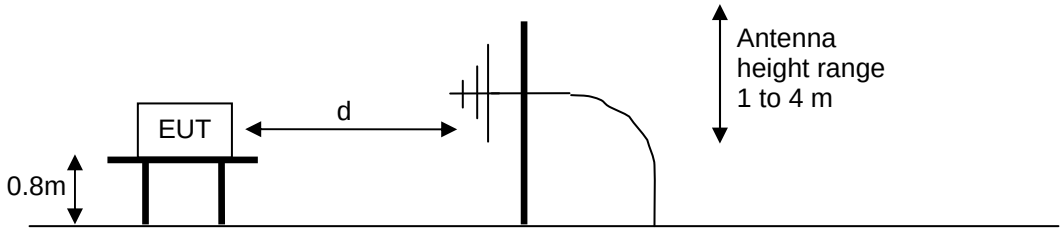
When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



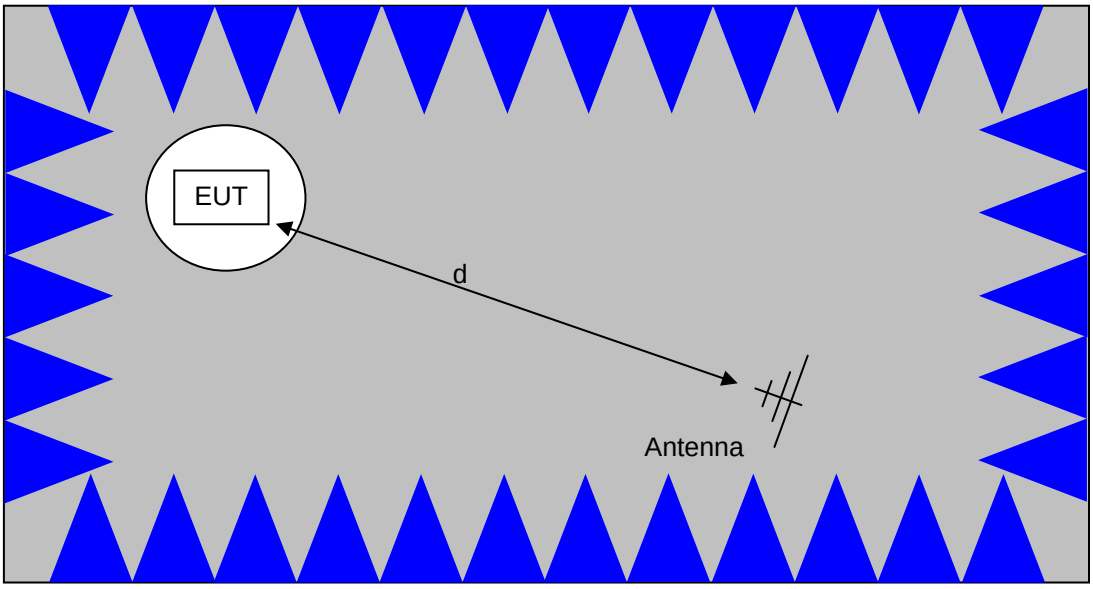
Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.

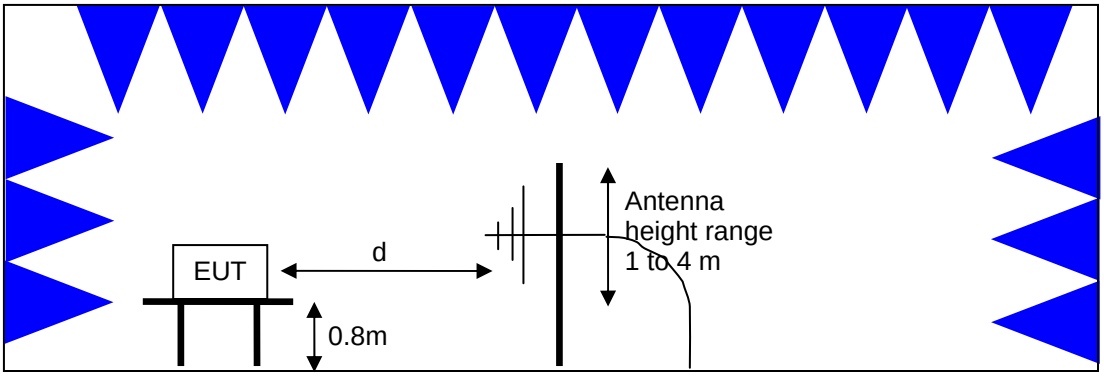


Test Configuration for Radiated Field Strength Measurements
OATS- Plan and Side Views



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

RADIATED FUNDAMENTAL AND SPURIOUS EMISSIONS – MOMENTARILY OPERATED DEVICES

The table below shows the limits for both the fundamental and spurious emissions for control signals. The limits for data signals, or signals with predetermined transmissions, are given in the second table

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	1250	125
130 - 174	1250 - 3750	125 - 375
174 – 260	3750	375
260 – 470	3750 – 12,500	375 - 1250
Above 470	12,500	1250

Spurious Emissions Limits – Control Signals

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 1,000 MHz, 23-Sep-08
Engineer: Mehran Birgani

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	26-Mar-09
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	13-Dec-08
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	780	09-Oct-08
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	29-May-09

Radiated Emissions, 30 - 3,000 MHz, 24-Sep-08
Engineer: Mehran Birgani

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	26-Mar-09
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	13-Dec-08
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	780	09-Oct-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	08-Nov-08
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-Jun-10
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	29-May-09

Radiated Emissions, 30 - 1,000 MHz, 25-Sep-08
Engineer: Mehran Birgani

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Log Periodic Antenna 300-1000 MHz	EL300.1000	55	27-Feb-09
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	19-Sep-09
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	29-Jan-09

Radiated Emissions, 30 - 1,000 MHz, 26-Sep-08
Engineer: Rafael Varelas

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Log Periodic Antenna, 0.3-1 GHz	EL300.1000	297	30-Jan-09
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	19-Sep-09
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	29-Jan-09

EXHIBIT 2: Test Measurement Data

8 Pages

Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO	Project Engineer:	Mark Briggs
Emissions Standard(s):	FCC Part 15 Subparts B,C and RSS 210	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Toto USA, INC

Model

TEC1DS System Model 551001Receiver and Model 9E3014 Remote

Date of Last Test: 9/29/2008

Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Shearen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

Transmitter (Remote Model 9E3014) Measurements

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.

General Test Configuration

The EUT was located on the turntable for radiated emissions testing. The EUT was tested in all three orthogonal orientations.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 16 °C

Rel. Humidity: 60 %

Summary of Results

Run #	Test Performed	Limit	Result	Value / Margin
1	Fundamental Signal Field Strength	FCC 15.231(a) RSS 210 Annex A.1	Pass	53.3dBµV/m @ 294.90MHz (-21.0dB)
1	Transmitter Radiated Spurious Emissions, 30 - 3000 MHz	FCC 15.209 & 15.231 RSS 210/RSS GEN	Pass	48.6dBµV/m @ 589.597MHz (-5.7dB)
2	99% Bandwidth	FCC 15.231(a) RSS 210 Annex A.1	Pass	217 kHz
2	20dB Bandwidth	15.239, RSS 210	Pass	182 kHz
3	Transmit time	FCC 15.231(a) RSS 210 Annex A.1	Pass	554ms (maximum allowed is 5s)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

Run #1: Radiated Emissions, 30-3000 MHz, Transmitter Fundamental and Spurious Emissions

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 3,000 MHz	3	3	0.0

Note:	The limits for devices operating under 15.231 are calculated in the table below. The limits in 15.231(b) are for devices that fulfill the requirements of 15.231(a). The limits for 15.231(e) are for all other devices provided that they meet the requirements of 15.231(e). Spurious emissions falling in restricted bands must comply with the 15.209 limit, all other spurious emissions must comply with the higher of the limit calculated below or the 15.209 limit.
Note:	The field strength of any spurious emissions may not exceed the field strength of the fundamental signal.

Frequency (MHz)	15.231(b) Limits			15.231(e) Limits		
	Fundamental		Spurious	Fundamental		Spurious
	uV/m	dBuV/m	dBuV/m	uV/m	dBuV/m	dBuV/m
294.85	5202.1	74.3	54.3	2080.8	66.4	46.4

Note:	The field strength of any spurious emissions may not exceed the 15.209 limit when the spurious emission falls in a restricted band. Additionally the spurious emissions can exceed the limit calculated above if the 15.209 limit is higher.

Fundamental Signal

Date of Test: 9/25/2008
Test Engineer: Rafael Varelas
Test Location: SV OATS #2

Config. Used: 1
Config Change: Transmitter operating continuously
EUT Voltage: Battery

Frequency	Level	Pol	RSS 210 / FCC 15.231		Detector	Azimuth	Height	Comments	Orientation
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters		
294.897	**53.3**	**H**	**74.3**	**-21.0**	PK	205	1.0	Note 2	Flat
294.897	46.9	V	74.3	-27.4	PK	235	2.7	Note 2	Side
294.897	44.9	H	74.3	-29.4	PK	360	1.0	Note 2	Side
294.897	44.9	H	74.3	-29.4	PK	360	1.5	Note 2	Upright
294.897	41.6	V	74.3	-32.7	PK	222	2.6	Note 2	Upright
294.897	39.5	V	74.3	-34.8	PK	341	1.5	Note 2	Flat

Note 1:	As the device could be installed on the floor or on a wall it was tested in all three orientations. Data for each orientation is shown above.
Note 2:	Peak field strength measurement, average field strength limit. As the peak readings are below the average limit, no average measurements were made. For reference, the average value of the emission was about 5dB lower than the peak value.

Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

Spurious Emissions - Preliminary Scan

Date of Test: 9/24/2008 Config. Used: 1
Test Engineer: Mehran Birgani Config Change: Transmitter only, Operating continuously
Test Location: Chamber #2 EUT Voltage: Battery

Frequency	Level	Pol	RSS 210 / FCC 15.231		Detector	Azimuth	Height	Comments	Orientation
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters		Flat
589.597	45.7	H	54.3	-8.6	Peak	26	1.7		Flat
257.948	36.4	H	46.0	-9.6	Peak	119	1.7		Flat
1987.190	39.6	H	54.3	-14.7	Peak	78	1.7		Side
334.036	30.3	H	46.0	-15.7	Peak	195	1.7		Flat
36.851	32.1	H	54.3	-22.2	Peak	208	1.7		Flat
221.094	29.5	H	54.3	-24.8	Peak	148	1.7		Flat
184.247	28.7	H	54.3	-25.6	Peak	179	1.7		Flat

Note 1:	As the device could be installed on the floor or on a wall it was tested in all three orientations. Data for the worst-case orientation is shown above.
Note 2:	Frequencies in restricted bands are subject to the general limits (FCC 15.209, RSS GEN Table 2). For all others the limit is 54.3dBuV/m (average or QP).

Spurious Emissions - OATS Measurements

Date of Test: 9/25/2008 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: Transmitter operating continuously
Test Location: SV OATS #2 EUT Voltage: Battery

Frequency	Level	Pol	RSS 210 / FCC 15.231		Detector	Azimuth	Height	Comments	Orientation
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters		
589.597	48.6	H	54.3	-5.7	QP	335	2.5	Signal\Ambient noise	Upright
589.584	48.1	H	54.3	-6.2	QP	335	2.5	Signal\Ambient noise	Upright
589.584	46.9	H	54.3	-7.4	QP	120	2.6	Signal\Ambient noise	Side
589.597	45.4	H	54.3	-8.9	QP	119	2.6	Signal\Ambient noise	Side
257.948	32.6	H	46.0	-13.4	QP	110	1.3	In restricted band	Flat
257.948	29.8	H	46.0	-16.2	QP	0	2.3	In restricted band	Upright

Note 1:	As the device could be installed on the floor or on a wall it was tested in all three orientations. Data for the worst-case orientation is shown above.
Note 2:	Frequencies in restricted bands are subject to the general limits (FCC 15.209, RSS GEN Table 2). For all others the limit is 54.3dBuV/m (average or QP).

Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

Run #2: Bandwidth Measurement(s)

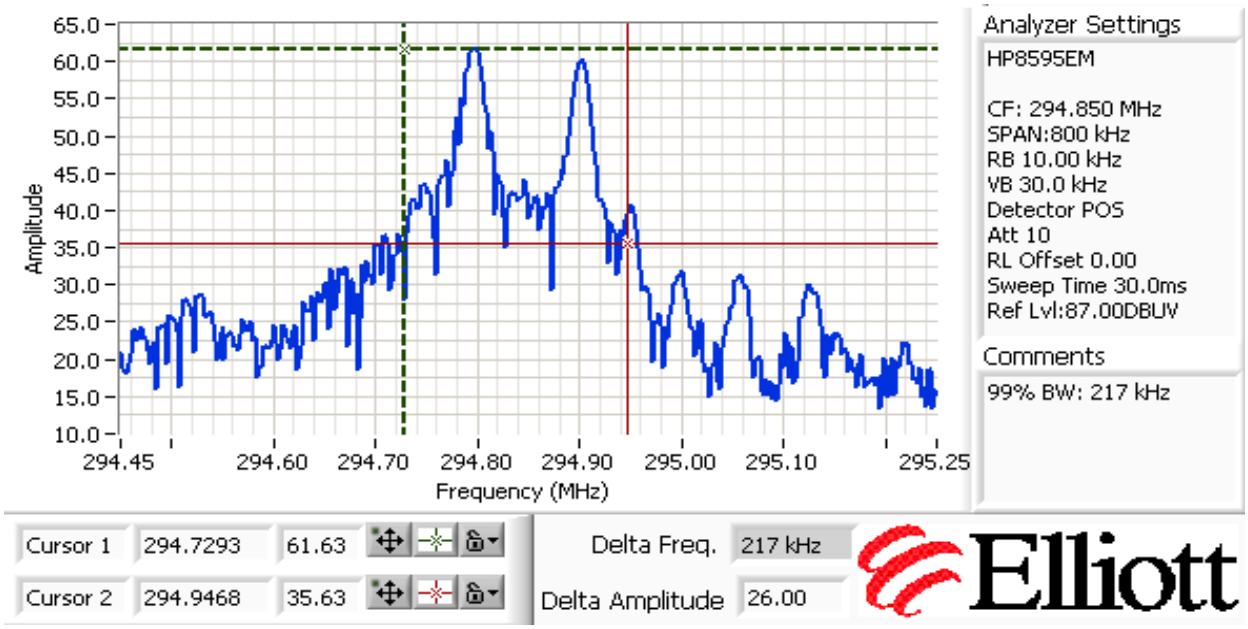
Date of Test: 9/25/2008
Test Engineer: Mehran Birgani
Test Location: OATS #2

Config. Used: 1
Config Change: Transmitter operating continuously
EUT Voltage: Battery

RSS 210 bandwidth requirement (based on 99% bandwidth measurement)

Power Setting	Frequency (MHz)	Resolution Bandwidth	Video Bandwidth	99% Bandwidth	RSS 210 Limit (kHz)
-	294.85	10kHz	30kHz	217.00	737.125

Note 1:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB

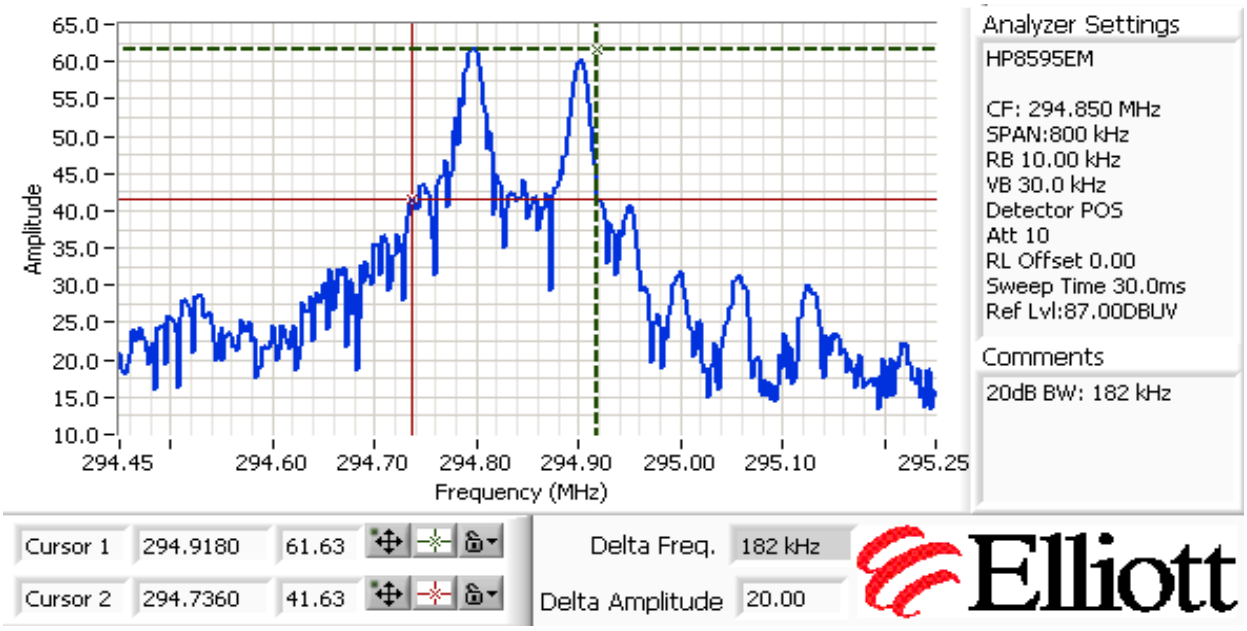


Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

FCC 15.231(a) bandwidth requirement (based on 20dB bandwidth measurement)

Power Setting	Frequency (MHz)	Resolution Bandwidth	Video Bandwidth	20dB BW (kHz)	15.231 Limit (kHz)
-	294.85	10kHz	30kHz	182.00	737.125

Note 1:	20dB bandwidth measured using a resolution bandwidth at least 1% of the maximum permitted bandwidth.



Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

Run #3: Timing Verification Measurement(s)

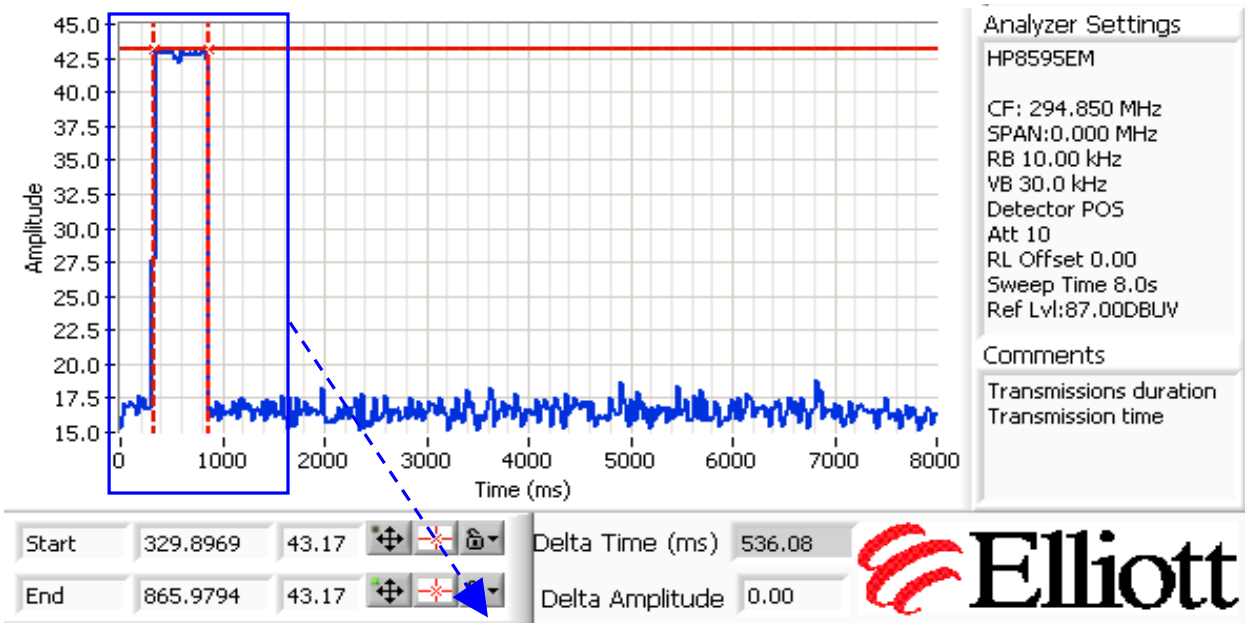
Compliance with 15.231 duration of transmissions and time between transmissions:

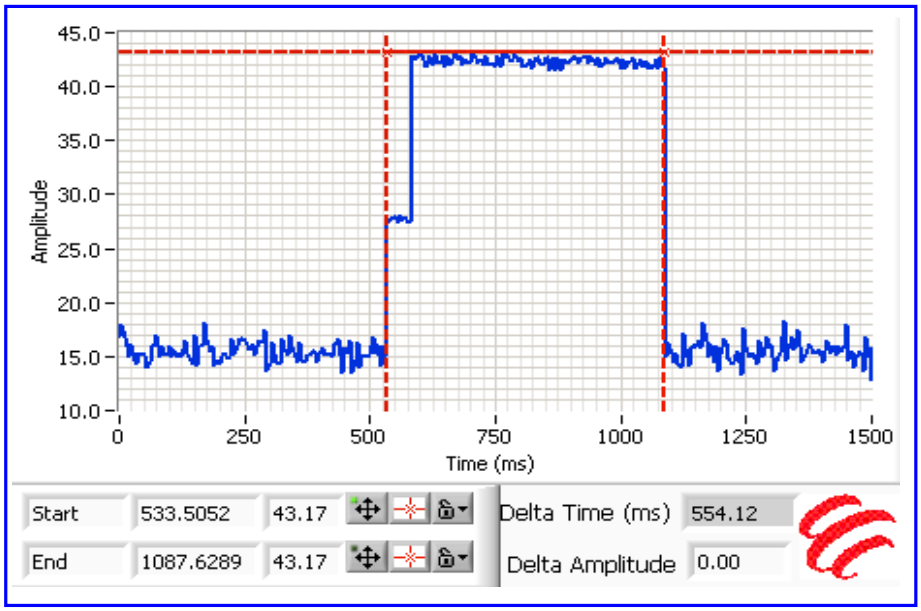
Date of Test: 9/25/2008 Config. Used: 1

Test Engineer: Mehran Birgani Config Change: Transmitter operating in "normal" mode

Test Location: OATS #2 EUT Voltage: Battery

Transmissions are manually initiated and, therefore, random in nature. The device has no mechanism for transmitting automatically at pre-determined intervals. The plot below shows the duration of a transmission initiated by pushing then immediately releasing the control button on the remote control. The duration of 554ms is less than the maximum of 5 seconds allowed for remote control devices.





Client:	Toto USA, INC	Job Number:	J73093
Model:	TEC1DS System Model 551001Receiver and Model 9E3014 Remote	T-Log Number:	T73139
		Account Manager:	Sheareen Washington
Contact:	Tony Zhou, IAPMO		
Standard:	FCC Part 15 Subparts B,C and RSS 210	Class:	-

The plot below shows the duration of a transmission once initiated by pushing the control button on the remote control and keeping it activated. The device transmitted while the button was pressed. For the measurement the button was held down for 6 seconds before being released. When the button was pressed the device transmitted for 554ms at the maximum power level, then the power level dropped by about 17dB and the device transmitted at this lower level until the button was released. It stopped transmitting immediately after the button was released.

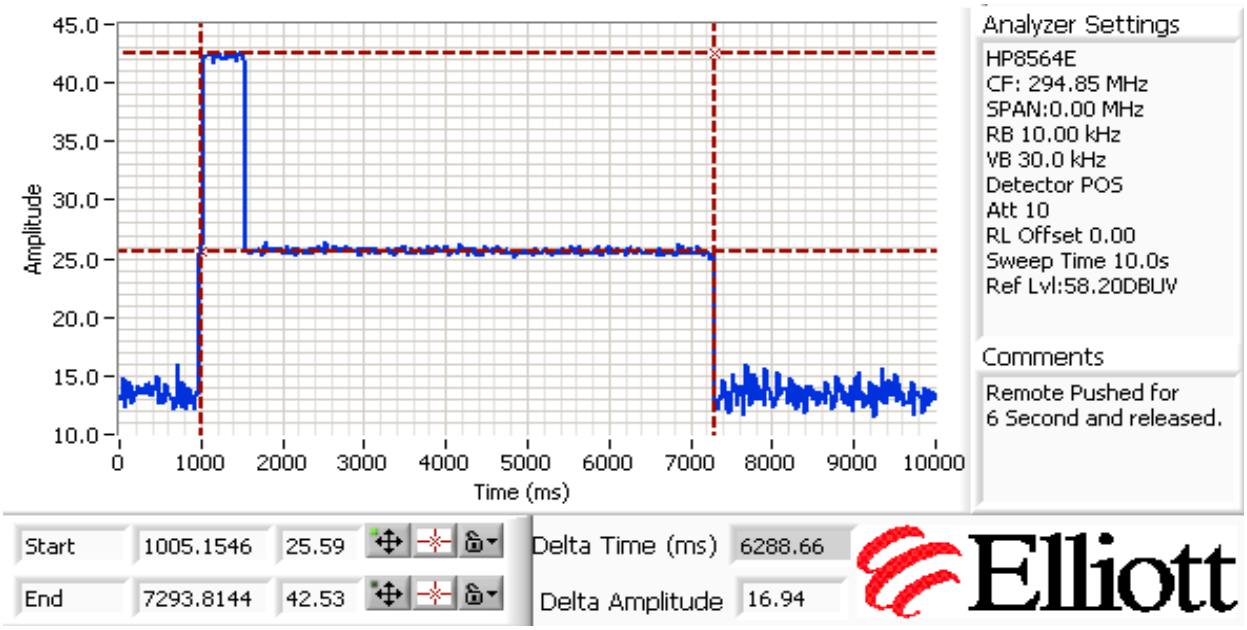


EXHIBIT 3: Photographs of Test Configurations

Uploaded as a separate attachment

EXHIBIT 4: Proposed Label & Label Location

Uploaded as a separate attachment

EXHIBIT 5: Detailed Photographs

Uploaded as a separate attachment

EXHIBIT 6: Operator's Manual

Uploaded as a separate attachment

EXHIBIT 7: Block Diagram

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EXHIBIT 8: Schematic Diagrams

Uploaded as a separate attachment

EXHIBIT 9: Theory of Operation

Uploaded as a separate attachment