TÜV AMERICA

EMC - TEST REPORT
UNITED STATES STANDARD FCC PART 95

Test Report File No.	:	**SC405780-03** Date of Issue: 28 February 2006
Model / Serial No.	:	**9300 / --**
Product Type	:	STS Transmitter
Applicant	:	DEXCOM INCORPORATED
Manufacturer	:	DEXCOM INCORPORATED
License holder	:	DEXCOM INCORPORATED
Address	:	5555 Oberlin Drive
	:	San Diego, CA 92121
Test Result	:	See General Remarks (page 9).
Test Project Number Reference(s)	:	**SC405780-03**
Total pages - Test Report	:	33

NOTE: All test equipment used during testing is calibrated and traceable to NIST.

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DIRECTORY
Test Report

Technical Documentation

Appendices

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TEST REGULATIONS:

The tests were performed according to the following regulations:

☐ - EN 50081-1: 1991

☐ - EN 55011: 1998, Amendment A2: 2002	☐ - Group 1 ☐ - Class A	☐ - Group 2 ☐ - Class B
☐ - EN 55013: 1990		
☐ - EN 55014: 1993	☐ - Household appliances and similar ☐ - Portable tools ☐ - Semiconductor devices	
☐ - EN 55022: 1987	☐ - Class A	☐ - Class B
☐ - EN 55022: 1998, Amendment A2: 2003	☐ - Class A	☐ - Class B
☐ - VCCI	☐ - Class A ITE	☐ - Class B ITE
☐ - CNS 13438: 1994	☐ - Class A	☐ - Class B
■ - FCC Part 95		
☐ - AS/NZS 3548: 1995	☐ - Class A	☐ - Class B
☐ - CISPR 11: 1997	☐ - Group 1 ☐ - Class A	☐ - Group 2 ☐ - Class B
☐ - CISPR 22: 1997	☐ - Class A	☐ - Class B

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Environmental Conditions In The Laboratory:

	Actual
Temperature	: 23 °C
Relative Humidity	: 50 %
Atmospheric Pressure	: 100.0 kPa

Power Supply Utilized:

Power supply system : Battery Operated

Symbol Definitions:

■ - Applicable
☐ - Not Applicable

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Test Conditions: FREQUENCY STABILITY

The FREQUENCY STABILITY measurements were performed in the following location at the San Diego Testing Facility:

☐ **- Test not applicable**

■ - TR-2, Test Room, 16’ x 10’ x 9’

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal’ed
E4446A	6823	Spectrum Analyzer	Agilent	US44300486	04/04
T30RC	6225	Environmental Chamber	Tenney Environmental	27244-02	05/04
E3612A	6456	DC Power Supply	Hewlett Packard	KR83006892	N/A
34401A	6709	Digital Volt Meter	Hewlett Packard	3146A03945	07/04

Remarks: One year calibration cycle for all test equipment and sites.

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Test Conditions: EMISSION BANDWIDTH

The EMISSION BANDWIDTH measurements were performed in the following location at the San Diego Testing Facility:

☐ **- Test not applicable**

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
E4446A	6823	Spectrum Analyzer	Agilent	US44300486	04/04
E3612A	6456	DC Power Supply	Hewlett Packard	KR83006892	N/A
34401A	6709	Digital Volt Meter	Hewlett Packard	3146A03945	07/04

Remarks: One year calibration cycle for all test equipment and sites.

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Test Conditions: MAXIMUM TRANSMITTER POWER

The MAXIMUM TRANSMITTER POWER measurements were performed in the following location at the San Diego Testing Facility:

☐ **- Test not applicable**

■ - Roof (Small Open Area Test Site)

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
3146	6641	Log Periodic Antenna	EMCO	106X	06/04
E4440A	6814	Spectrum Analyzer	Hewlett Packard	MY42510441	12/03
8648C	6586	Signal Generator	Hewlett Packard	3642U01074	12/03
UHA 9105	6651	Dipole Antenna	Schwarzbeck	EMACO1	Verified

Remarks: One year calibration cycle for all test equipment and sites.

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Equipment Under Test (EUT) Test Operation Mode:

The equipment under test was operated under the following conditions during testing:

☐ - Standby

☐ - Test Program (H - Pattern)

☐ - Test Program (Color Bar)

☐ - Test Program (Customer Specified)

☐ - Practice Operation

■ - Normal Operating Mode

☐ - _____

Configuration of the equipment under test:

☐ - See Constructional Data Form in Appendix B

■ - See Product Information Form(s) in Appendix B

The following peripheral devices and interface cables were connected during the testing:

☐ - _____ Type: _____

☐ - _____ Type: _____

☐ - _____ Type: _____

☐ - _____ Type: _____

☐ - _____ Type: _____

☐ - _____ Type: _____

☐ - Unshielded power cable

☐ - Unshielded cables

☐ - Shielded cables MPS. No.: _____

☐ - Customer specific cables

☐ - _____

☐ - _____

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GENERAL REMARKS:

NOTE: All photographs are representative of setup for maximum emissions.

(*) Frequency Stability failed to function at 55° C. See Data Record TD3 of TD11.

SUMMARY:

All tests according to the regulations cited on page 3 were

■ - **Performed***

☐ - Performed with the following **exceptions**

Statement of Measurement Uncertainty

The data and results referenced in this document are true and accurate. The measurement uncertainty is calculated to be ±2 dB for conducted emissions and ±4 dB for radiated emissions.

Equipment Received Date: 15 December 2004

Testing Start Date: 15 December 2004

Testing End Date: 09 February 2006

- TÜV AMERICA, INC. -

Reviewing Engineer:

David Gray
(EMC Engineer In Charge)

Test Engineer:

Jim Owen
(EMC Manager)

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Technical Documentation

Test Data Sheets

and

Test Setup Drawing(s)

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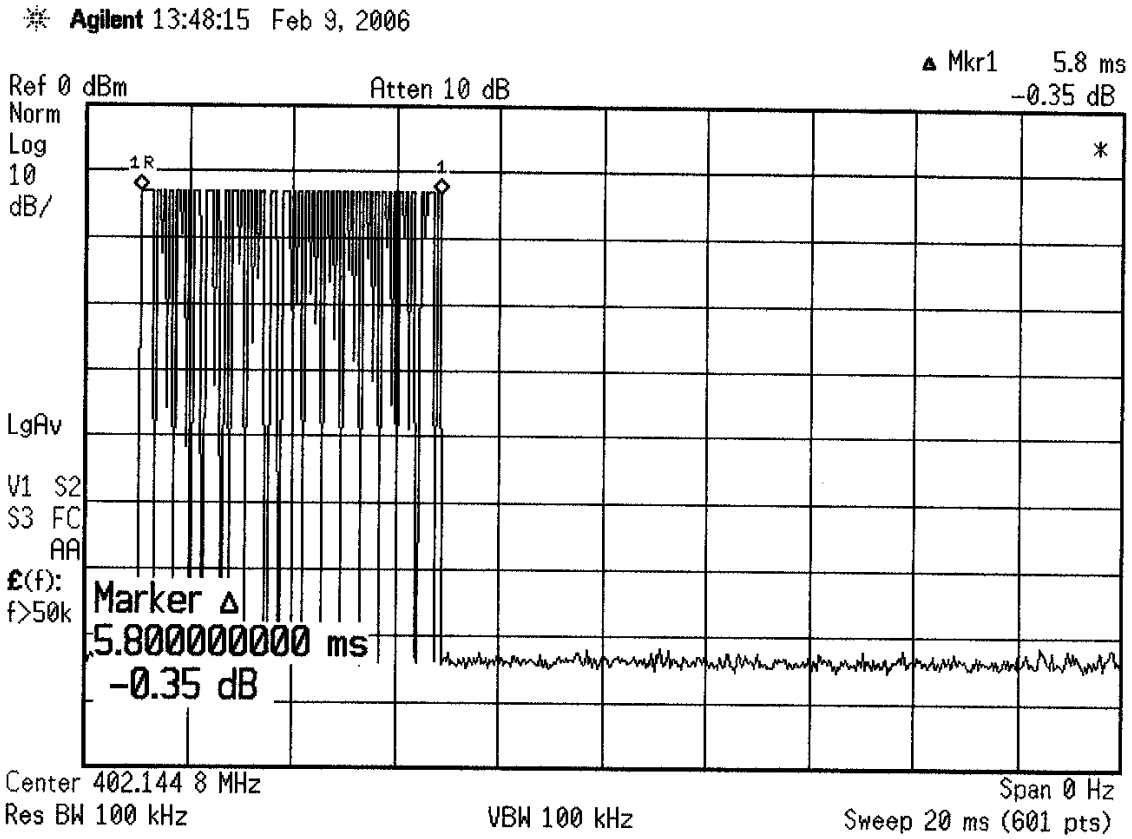
Pulse Duration Part 95, Paragraph 95.628(a)

95.628(a)



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FCC Part 95.628(e) - Frequency Stability

Temperature °C	**Frequency (Hz)**
0	402 134 270
10	402 132 960
20	402 136 680
30	402 111 400
40	402 134 650
50	402 138 270
55	Equipment failed to function

V_N = 3.0 vdc

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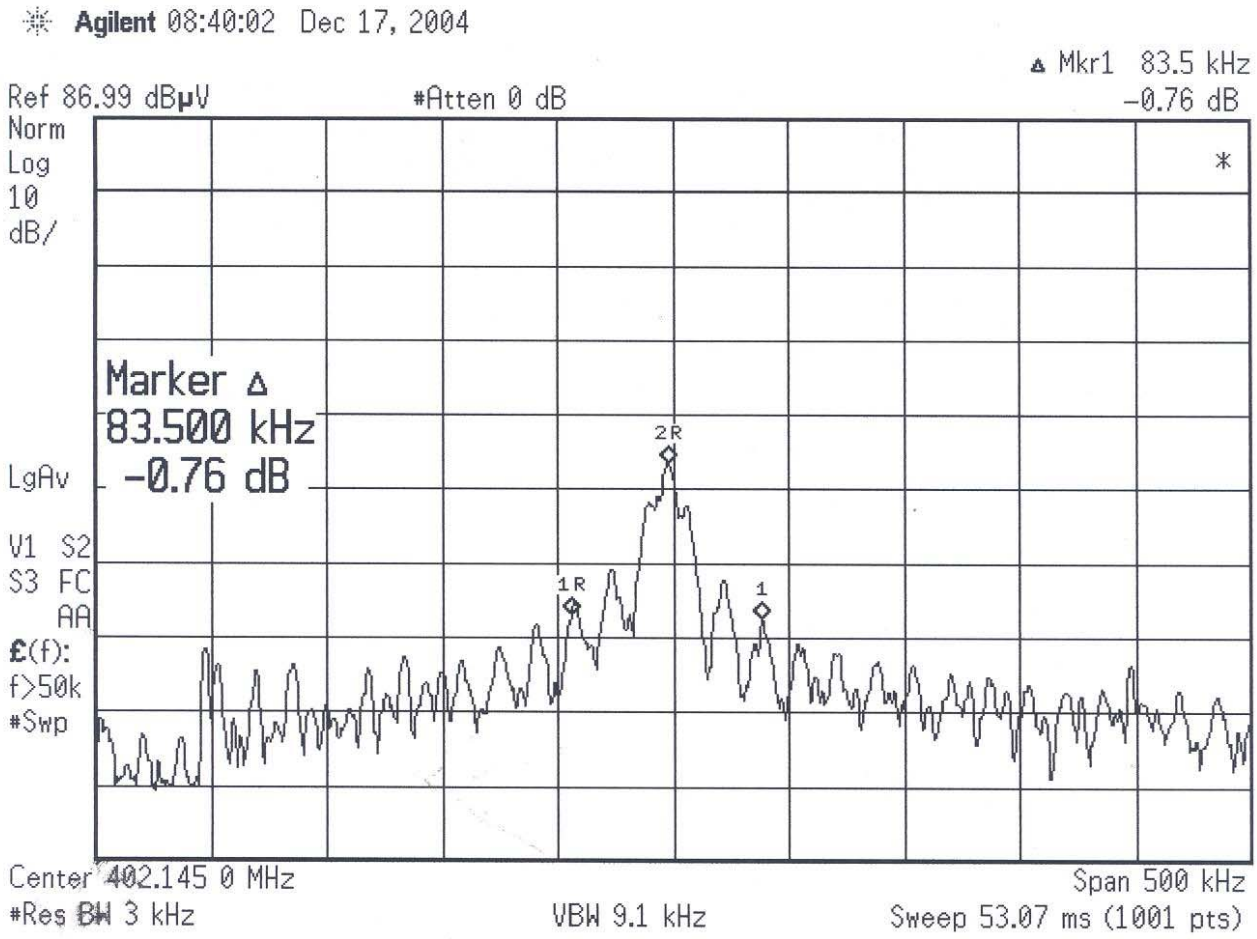
FCC Part 95.633(e)(1) - Emission Bandwidth



Limit: ≤300 kHz

EUT: Complies

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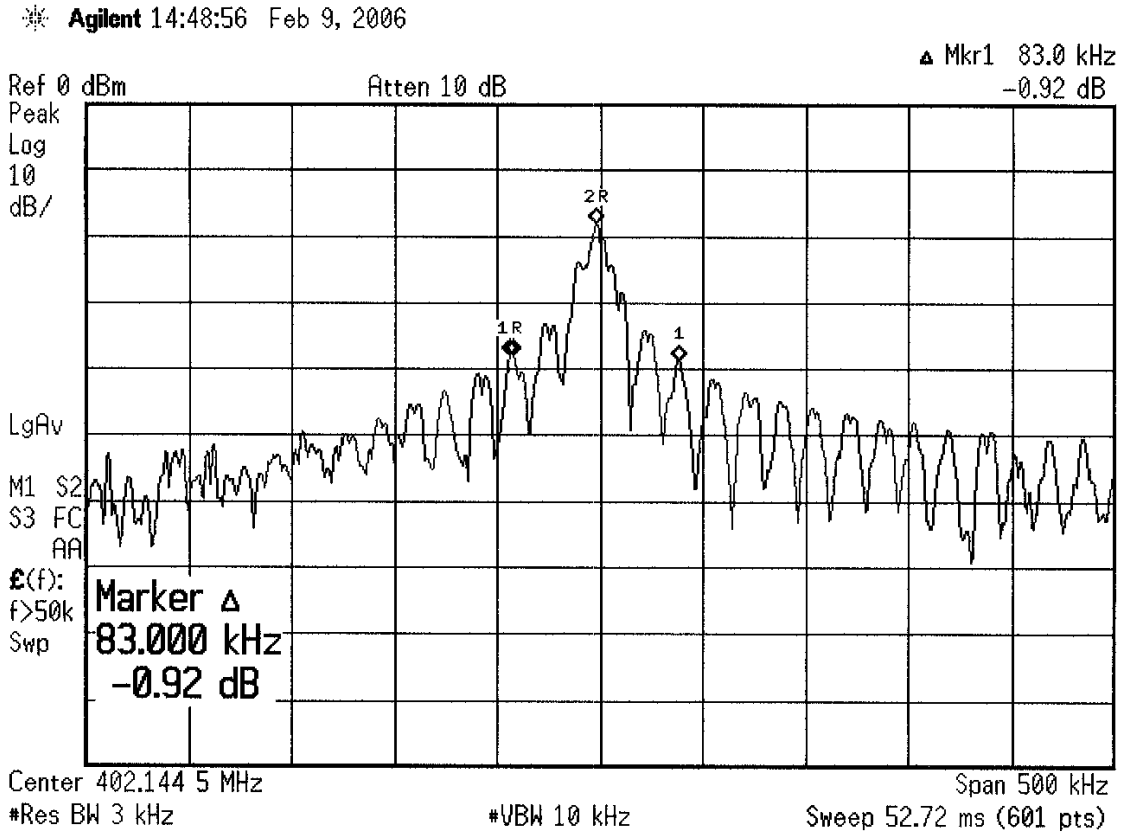
FCC Part 95.635(d) - Bandwidth



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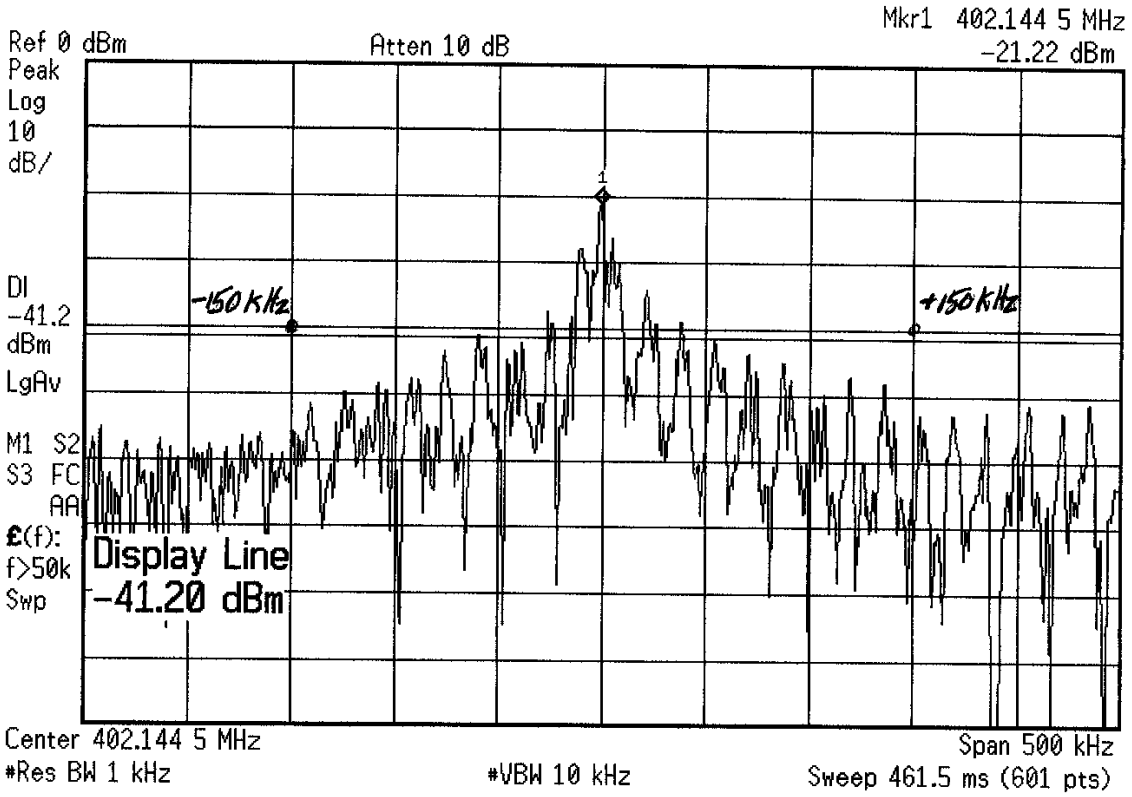
±150 kHz - -20 dBC

FCC Part 95.635(d)(4)



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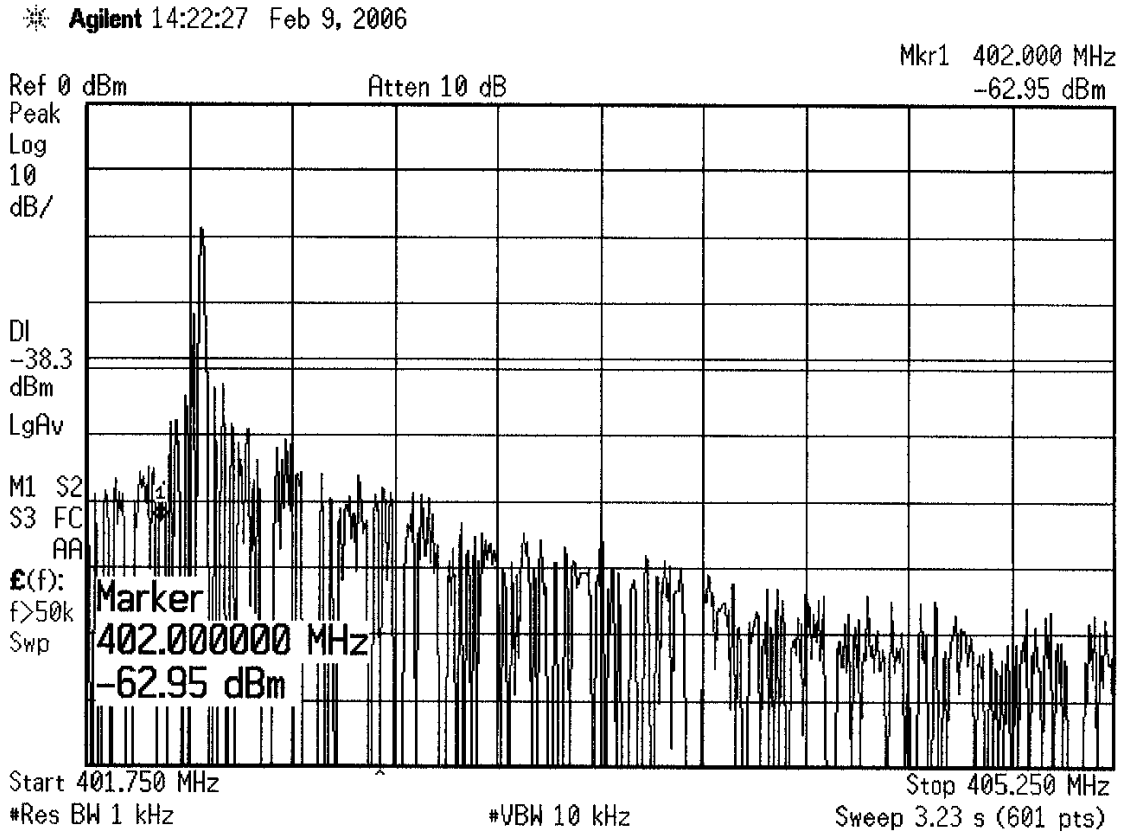
Line –20 dBc

FCC Part 95.635(d)(5)



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FCC Part 95.639(f)(1) - Maximum Transmitter Power

Freq (MHz)	Level (dBm)	Corr (AE + Cable)	Level (μW)	Limit (μW)
402.14	-19.8	0	10.5 EIRP	25

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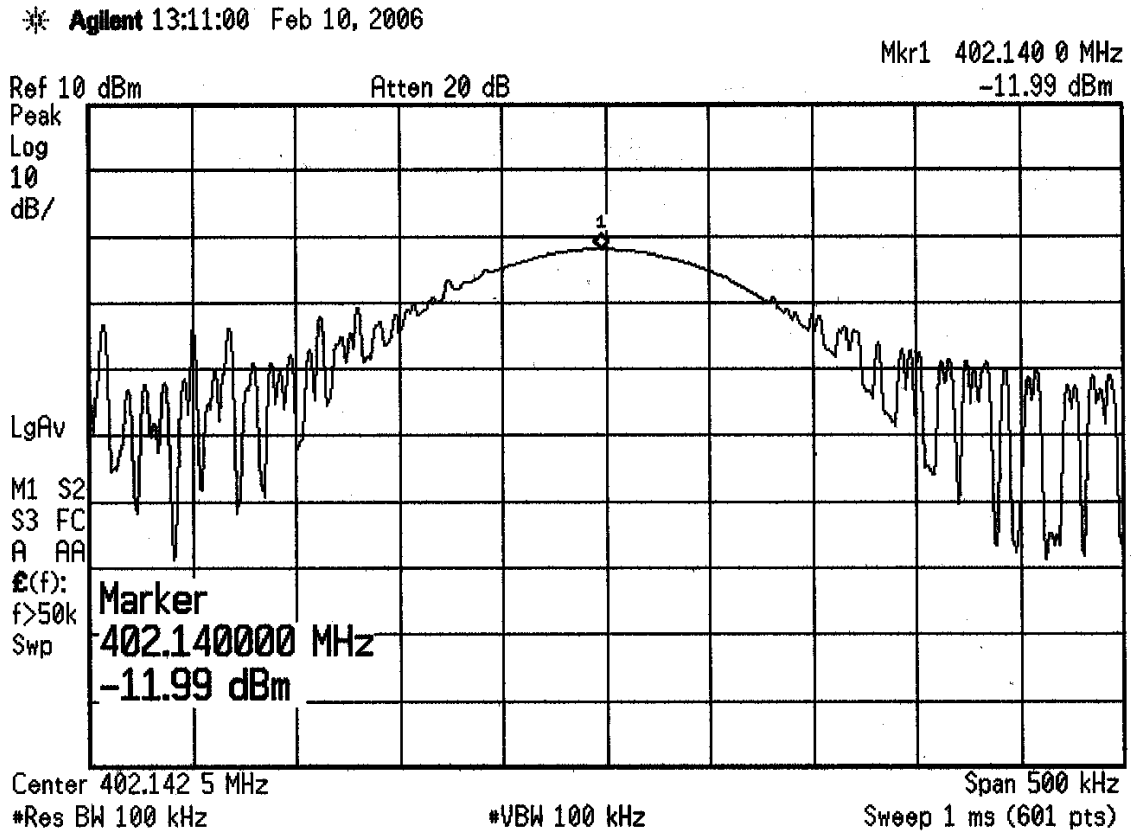
Conducted Output Power, FCC Part 95



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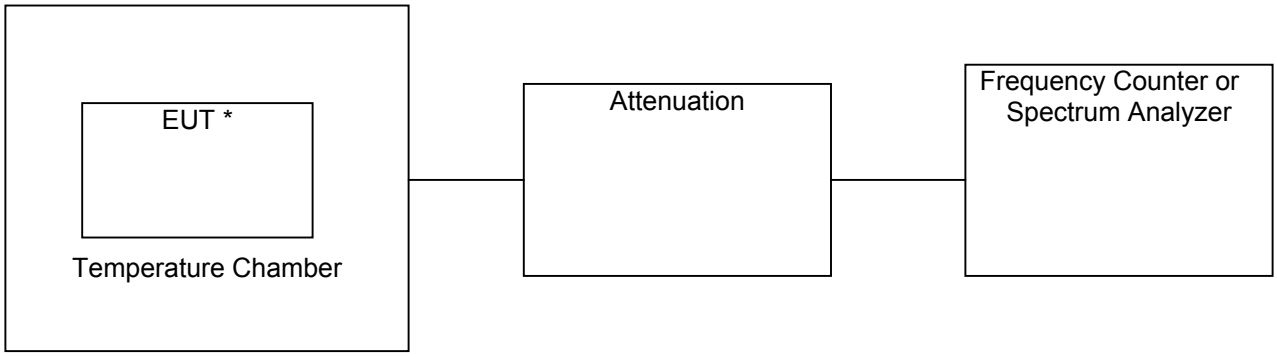
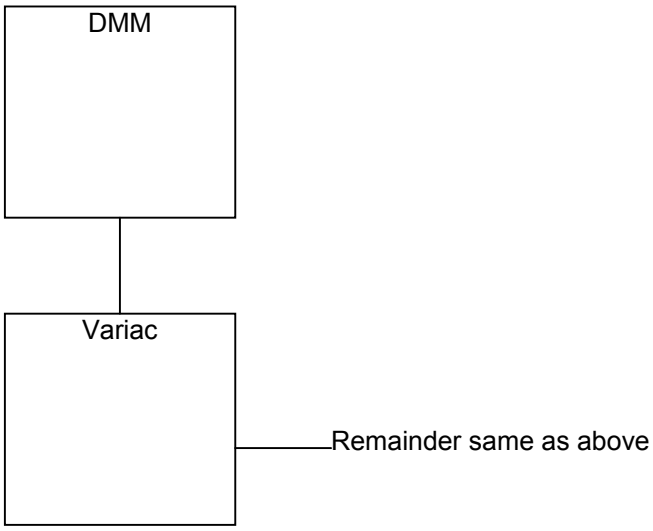
Test Setup for Frequency Stability

Frequency Stability (Variation of Ambient Temperature)



* Could place EUT or the frequency determining part of the EUT inside temperature chamber. The frequency determining part of the EUT is what controls the accuracy of the transmitted frequency.

Frequency stability (variation of supply voltage)



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FREQUENCY STABILITY

Procedure

2.1055 Measurements required: Frequency stability.
(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From ´30□to +50□centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From ´20□to +50□centrigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radio beacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to- Point Microwave Radio Service under part 21 of this chapter, and equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter.

(3) From 0□to +50□centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10□centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature
level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.

(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0□centigrade and +30□centigrade with no primary power applied.

(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10□centigrade above the respective beginning ambient temperature level.

(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished
to the user.

(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

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FREQUENCY STABILITY (continued)

Procedure

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any
heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section.
(For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

Part 95, Paragraph 95.628(e)

Each transmitter in the MICS service must maintain a frequency stability of ±100 ppm of the operating frequency over the range:

25º C to 45º C in the case of medical implant transmitters and 0º C to 55º C in the case of medical implant programmer/control transmitters.

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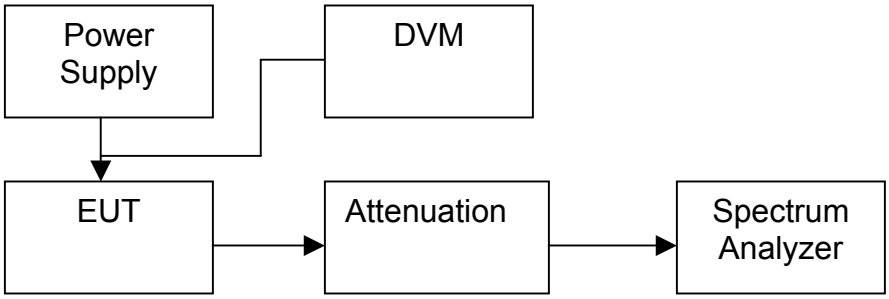
Test Setup for Occupied Bandwidth



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OCCUPIED BANDWIDTH

Procedure

20 dB Bandwidth

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW □ 1% of the 20 dB bandwidth

VBW □ RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this section. Submit this plot(s).

Part 95, Paragraph 95.633(e)

For transmitters in the MICS, the maximum authorized emission bandwidth is 300 kHz.

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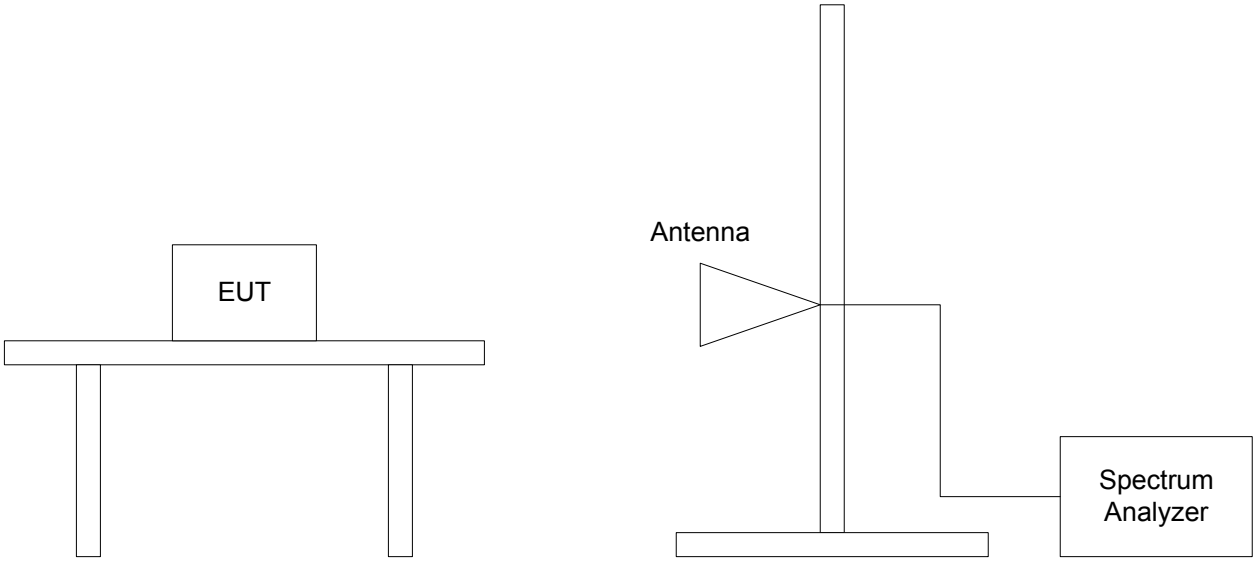
Test Setup for Maximum Transmitter Power



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OUTPUT POWER

Part 95, Paragraph 95.639 - Maximum transmitter power.

In the MICS the following limits apply:

(1) The maximum EIRP for MICS transmitter stations is 25 microwatts. (Note: The antenna associated with any MICS transmitter must be supplied with the transmitter and shall be considered part of the transmitter subject to equipment authorization.)

(2) Compliance of MICS transmitters with the 25 microwatts EIRP limit is determined by measuring the radiated field from the EUT at 3 meters and calculating the EIRP. The equivalent radiated field strength at 3 meters for 25 microwatts EIRP is 18.2 mV/meter when measured on an open area test site, or 9.1 mV/meter when measured on a test site equivalent to free space such as a fully anechoic test chamber. For both, compliance is based on measurements using a peak detector function and measured over an interval of time when transmission is continuous and at its maximum power level. In lieu of using a peak detector function, instrumentation techniques set forth in ANSI C63.17–1998, Section 6.1.2.2.1 or Section 6.1.2.2.2 may be used in determining compliance with the above specifications.

(3) The power radiated in any 300 kHz bandwidth shall not exceed 25 microwatts EIRP. See §§95.633(e) and 95.639(g).

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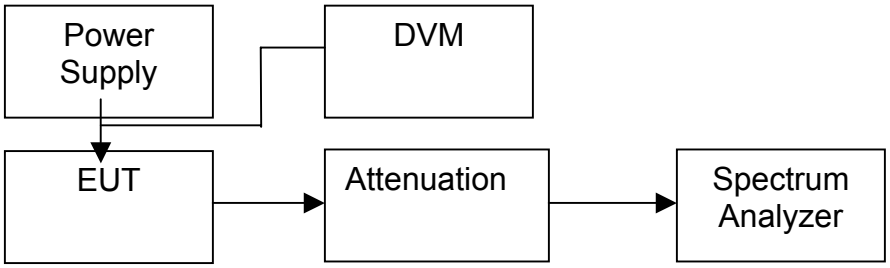
Test Setup for Pulse Duration



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PULSE DURATION

§ 95.628 MICS transmitter.

(a) *Frequency monitoring.* Medical implant programmer/control transmitters must incorporate a mechanism for monitoring the channel or channels that the MICS system devices intend to occupy. The monitoring system antenna shall be the antenna normally used by the programmer/control transmitter for a communications session. Before a medical implant programmer/control transmitter initiates a MICS communications session, the following access criteria must be met:

(1) The monitoring system bandwidth measured at its 20 dB down points must be equal to or greater than the emission bandwidth of the intended transmission.

(2) Within 5 seconds prior to initiating a communications session, circuitry associated with a medical implant programmer/control transmitter must monitor the channel or channels the MICS system devices intend to occupy for a minimum of 10 milliseconds per channel.

(3) Based on use of an isotropic monitoring system antenna, the monitoring threshold power level must not be more than 10logB(Hz) − 150 (dBm/Hz) + G(dBi) where B is the emission bandwidth of the MICS communication session transmitter having the widest emission and G is the medical implant programmer/control transmitter monitoring system antenna gain relative to an isotropic antenna. For purposes of showing compliance with the above provision, the above calculated threshold power level must be increased or decreased by an amount equal to the monitoring system antenna gain above or below the gain of an isotropic antenna, respectively.

(4) If no signal in a MICS channel above the monitoring threshold power level is detected, the medical implant programmer/control transmitter may initiate a MICS communications session involving transmissions to and from a medical implant device on that channel. The MICS communications session may continue as long as any silent period between consecutive data transmission bursts does not exceed 5 seconds. If a channel meeting the criteria in paragraph (a)(3) of this section is unavailable, the channel with the lowest ambient power level may be accessed.

(5) When a channel is selected prior to a MICS communications session, it is permissible to select an alternate channel for use if communications is interrupted, provided that the alternate channel selected is the next best choice using the above criteria. The alternate channel may be accessed in the event a communications session is interrupted by interference. The following criteria must be met:

(i) Before transmitting on the alternate channel, the channel must be monitored for a period of at least 10 milliseconds.

(ii) The detected power level during this 10 millisecond or greater monitoring period must be no higher than 6 dB above the power level detected when the channel was chosen as the alternate channel.

(iii) In the event that this alternate channel provision is not used by the MICS system or if the criteria in (i) and (ii) are not met, a channel must be selected using the access criteria specified in paragraphs (a)(1) through (a)(4) of this section.

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PULSE DURATION (continued)

Procedure

The following procedure is intended to provide guidance on performing pulse length and pulse repetition rate measurements. Any detailed procedure described in the relevant regulatory standard is to take precedence over this procedure. The EUT is to be operated under the conditions detailed in the relevant regulatory standard.

i). The spectrum analyzer shall be set to display the transmitted signal from the EUT, centered on a transmitting channel.

ii). The analyzer shall be set to zero Hz span, 1 MHz resolution bandwidth, 3 MHz video bandwidth. The sweep time shall be set as necessary to capture the duration of the pulse width

iii). The marker delta function is then used to determine the duration of the pulse at the 50% amplitude point of the pulse, or as designated in the relevant specification.
This duration is to be recorded.

iv) The sweep time shall then be adjusted to show 2 pulses on the display. The marker delta function shall then be used to coincide with the 50% point of the first pulse leading edge and the 50% point of the second pulse leading edge. This duration (the repetition rate or repetition frequency) is to be recorded.

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Appendix A

Test Setups
(Photographs)

NOTE: All photographs are representative of setup for maximum emissions.

See Test Setup Drawings

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Appendix B

Product Information Form(s)

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General Equipment Description -- *NOTE: This information will be input into your test report as shown below.*

EUT Description: STS Transmitter/Receiver System

EUT Name: STS Transmitter/Receiver System

Model No.: Tx 9300 & Rx 8204 Serial No.: --

Product Options: --

Configurations to be tested: Connected to PC, Blood Glucose Monitor, Wall Charger

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: Tx Battery
Rx 120V (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: Rx 1

Current (Amps/phase(max)): -- Current (Amps/phase(nominal)): --

Other: --

Other Special Requirements

--

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Consumer

EUT Power Cable - Rx only

☐ Permanent OR ■ Removable Length (in meters): --
☐ Shielded OR ■ Unshielded
☐ Not Applicable

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Appendix C

Change History

Not Applicable

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Appendix D

Supplemental Information

Not Applicable

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