

TEST - REPORT

No. 55503-050321

for T4EX-72 MHz

R/C-Transmitter

Applicant: Futaba Corporation

Purpose of testing: To show compliance with

FCC Code of Federal Regulations,
CFR 47, Part 95, Subpart C&E

FCC Code of Federal Regulations,
CFR 47, Part 2, Subpart J

Note:

The test data of this report relate only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

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1 Description of Equipment under Test (EUT)

General data of EUT	
Type designation ¹ :	T4EX-72 MHz
Parts ² :	
Serial number(s):	0001
Manufacturer:	Futaba Corporation
Type of equipment:	R/C-Transmitter
Version:	As delivered
FCC ID:	AZPT4EX-72
Additional parts/accessories:	

¹ Type designation of the system if EUT consists of more than one part.

² Type designations of the parts of the system, if applicable.

2 Administrative Data

Application details	
Applicant (full address):	Futaba Corporation R/C Engineering Unit 1 1080, Yabutsuka Chosei-son, Chosei-gun, Chiba-ken, 299-4395 Japan
Contact person:	Mr. Fujita
Contract identification:	---
Receipt of EUT:	6 June 2005
Date(s) of test:	June 2005
Note(s):	---

Report details	
Report number:	55503-050321
Issue date:	June 20, 2005

3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	Senton GmbH EMI/EMC Test Center
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-171/94-02
FCC test site registration number	90926
Industry Canada test site registration:	IC 3050
Contact person:	Mr. Johann Roidt Phone: (+49) (0)9421 5522-0 Fax: (+49) (0)9421 5522-99

4 Summary

Summary of test results

The tested sample complies with the requirements set forth in the
Code of Federal Regulations CFR 47, Part 95, Subpart C & E
 and the
Code of Federal Regulations CFR 47 Part 2, Subpart J
 of the Federal Communication Commission (FCC).

Personnel involved in this report

Laboratory Manager:



.....
Mr. Johann Roidt

Responsible for testing:



.....
Mr. Martin Steindl

Responsible for test report:

Mr. Martin Steindl

5 Operation Mode and Configuration of EUT

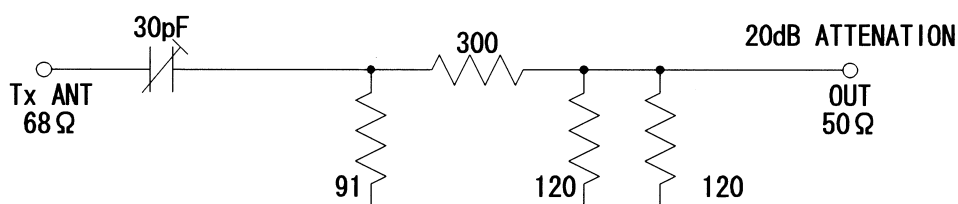
Operation Mode(s)

Transmitting continuously
Antenna extended to maximum
Battery supply: 9.6 V
Operating with $f = 72.81 \text{ MHz}$

Configuration(s) of EUT

The EUT was configured as stand alone device

For conducted measurements a dummy load was used as delivered by applicant. A short description of the circuit can be found in the following figure.



To stop modulation for frequency-error-test, the modulation input of the RF-board was bound to V_{cc} with a 10 kΩ resistor

List of ports and cables

Not Applicable

List of devices connected to EUT

Not Applicable

List of support devices

Item	Description	Type Designation	Serial no. or ID	Manufacturer
1	Dummy Load			Futaba

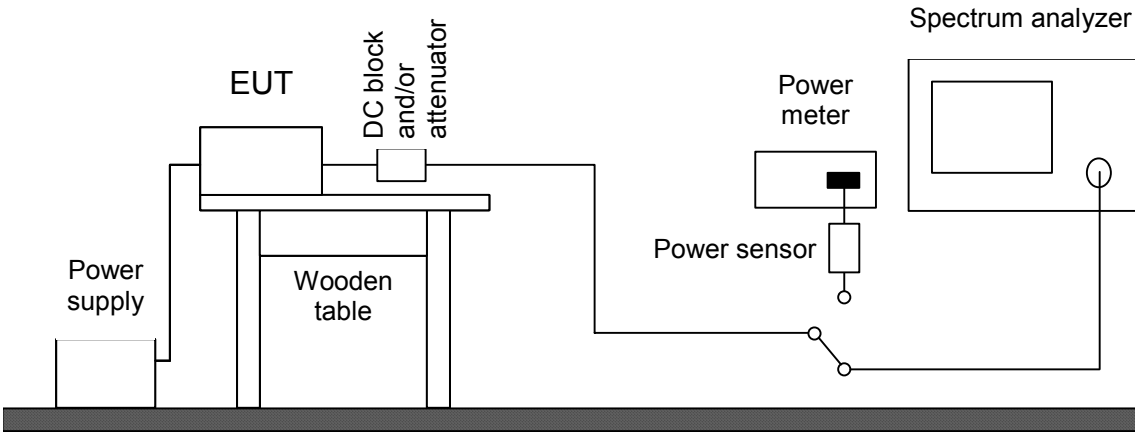
6 Measuring Methods

6.1 Maximum Transmitter Power

The maximum transmitter power was measured conducted and radiated.

6.1.1 Conducted Maximum Transmitter Power

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 95, section 95.639
Guide:	CFR 47 Part 2, section 2.1046
Conducted output power is measured at the RF output terminals (e.g. antenna connector if antenna is detachable) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer and/or a power meter with appropriate sensor. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable. If a spectrum analyzer is used and no other settings are specified resolution bandwidth shall be selected according to the carrier frequency f_c and set to 100 kHz. The video bandwidth shall be at least three times greater than the resolution bandwidth. The settings used have to be indicated within the appropriate test record(s).	



Test instruments used:

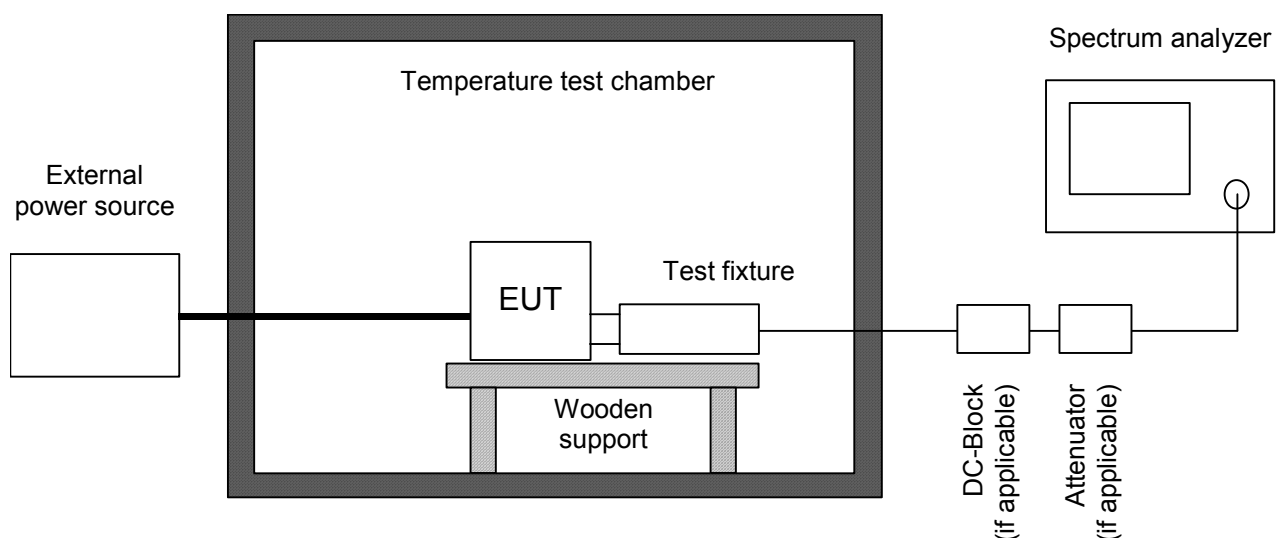
Used	Type	Model	Serial No. or ID	Manufacturer
☐	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Radio Communication Service Monitor	CMS 54	838384/030	Rohde & Schwarz
☐	Power meter	NRVS	836856/015	Rohde & Schwarz
☐	Peak power sensor	NRV-Z31	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	863828/015	Rohde & Schwarz
☒	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda
☒	Dummy Load	LD 01	001	Futaba

6.1.2 Radiated Maximum Transmitter Power

Measurement Procedure:
For measurement setup and procedure see section <i>Unwanted Emission 30 MHz - 1 GHz</i> (6.4)

6.2 Frequency tolerance

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 95, section 95.623
Guide:	ANSI C63.4
The frequency tolerance of the carrier signal is measured over a temperature variation of -30 °C to +50 °C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of +20 °C. If the EUT provides an antenna connector the spectrum analyzer is connected to this port. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). In cases where the EUT does not provide an antenna connector a test fixture is used. For battery operated equipment, the test is performed using a new battery. Alternatively, an external supply voltage can be used and is at least set to: - the maximum battery voltage as delivered by a new battery or 115% of the battery nominal voltage - the battery nominal voltage 85% of the battery nominal voltage - the battery operating end point voltage which shall be specified by the equipment manufacturer The EUT is operating providing an unmodulated carrier. The peak detector of the spectrum analyzer is selected and resolution as well as video bandwidth are set to values appropriate to the shape of the spectrum of the EUT. The frequency counter mode of the spectrum analyzer is used to maximize the accuracy of the measured frequency tolerance. If an unmodulated carrier is not available a significant and stable point on the spectrum is selected and the span is reduced to a value that delivers an accuracy which shall be better than 1% of the maximum frequency tolerance allowed for the carrier signal. This method may be performed as long as the margin to the frequency tolerance allowed is larger than the uncertainty of the measured frequency tolerance.	

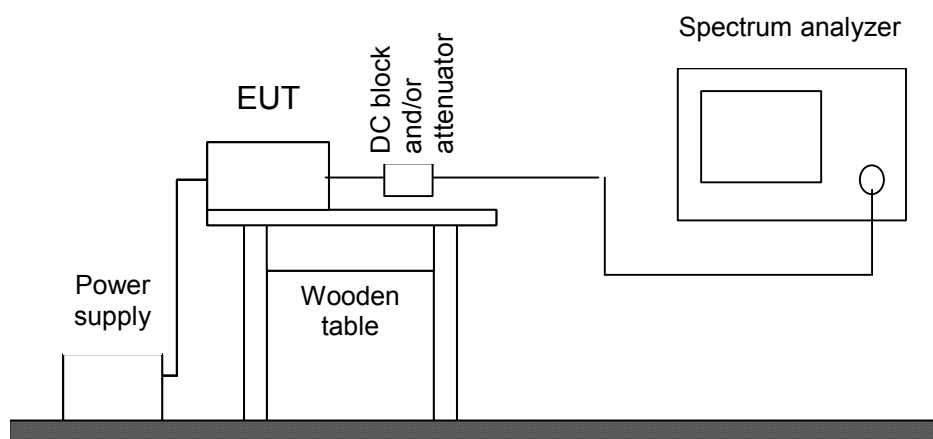


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Radio Communication Service Monitor	CMS 54	838384/030	Rohde & Schwarz
☐	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda
☐	Test probe	TP01	001	Senton
☒	DC power supply	NGSM 32/10	203	Rohde & Schwarz
☐	Isolating transformer	RT 5A	10387	Grundig
☐	Isolating transformer	RT 5A	10416	Grundig
☒	Temperature test chamber	HT4010	07065550	Heraeus
☒	Dummy Load	LD 01	001	Futaba

6.3 Emission Bandwidth

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.1046(a)
Guide:	TIA/EI-603
Emission bandwidth is measured at the RF output terminals (e.g. antenna connector if antenna is detachable) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable. The occupied bandwidth measurement was performed referring to 99% of total power with RBW as close to, but not less than 1% of the 99% power bandwidth.	

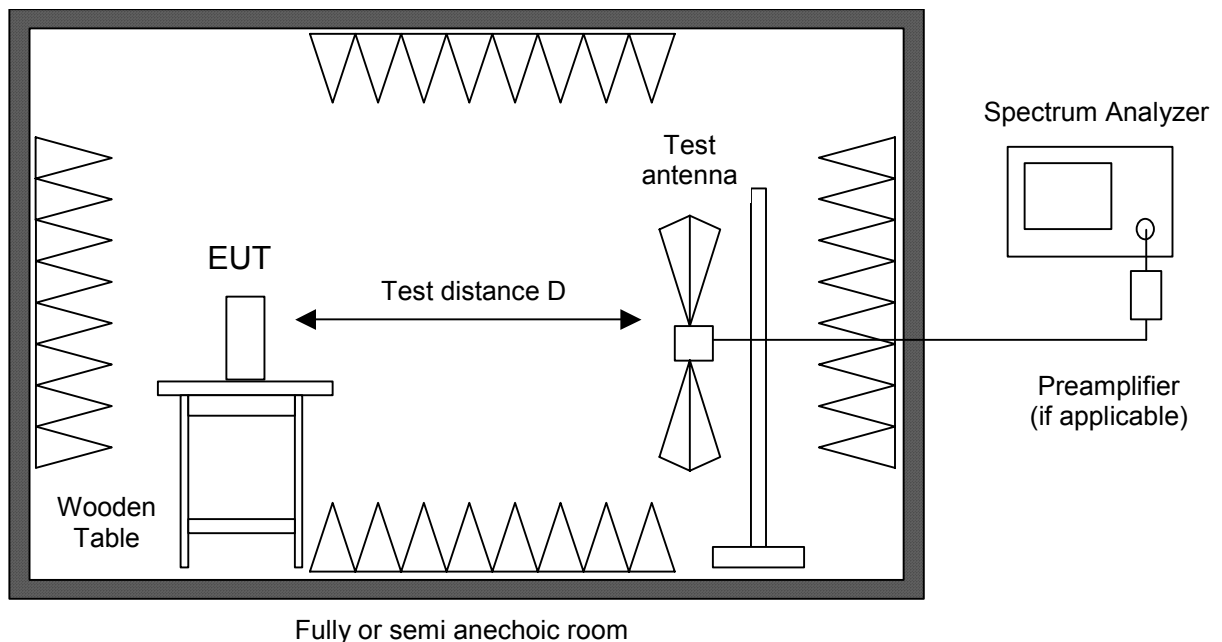


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☐	Power meter	NRVS	836856/015	Rohde & Schwarz
☐	Peak power sensor	NRV-Z31	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	863828/015	Rohde & Schwarz
☒	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda
☒	Dummy Load	LD 01	001	Futaba

6.4 Unwanted Emission 30 MHz - 1 GHz

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 95, section 95.635
Guide:	ANSI C63.4 TIA/EIA-603, section 2.2.12
Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution bandwidth set to 30 kHz, video bandwidth set to 100 kHz. Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing. During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions. Final testing was performed referring to substitution method as described in TIA/EIA-603, section 2.2.12 ("Radiated Spurious Emissions").	



Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	Spectrum analyzer	R 3271	05050023	Advantest
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Preamplifier	CPA9231A	3393	Schaffner
☐	Preamplifier	R14601		Advantest
☐	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
☐	Preamplifier 0.5-8 GHz	AMF-4D-005080-25-13P	860149	Miteq
☐	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
☐	External Mixer	WM782A	845881/005	Tektronix
☐	Harmonic Mixer	FS-Z30	843389/007	Rohde & Schwarz
	Accessories			
☒	Trilog broadband antenna	VULB 9163	9163-188	Schwarzbeck
☐	Horn antenna	3115	9508-4553	EMCO
☐	Horn antenna	3160-03	9112-1003	EMCO
☐	Horn antenna	3160-04	9112-1001	EMCO
☐	Horn antenna	3160-05	9112-1001	EMCO
☐	Horn antenna	3160-06	9112-1001	EMCO
☐	Horn antenna	3160-07	9112-1008	EMCO
☐	Horn antenna	3160-08	9112-1002	EMCO
☐	Horn antenna	3160-09	9403-1025	EMCO
☐	Horn antenna	3160-10	399185	EMCO
☒	Fully anechoic room	No. 2	1452	Albatross Projects
☐	Semi-anechoic room	No. 3	1453	Siemens

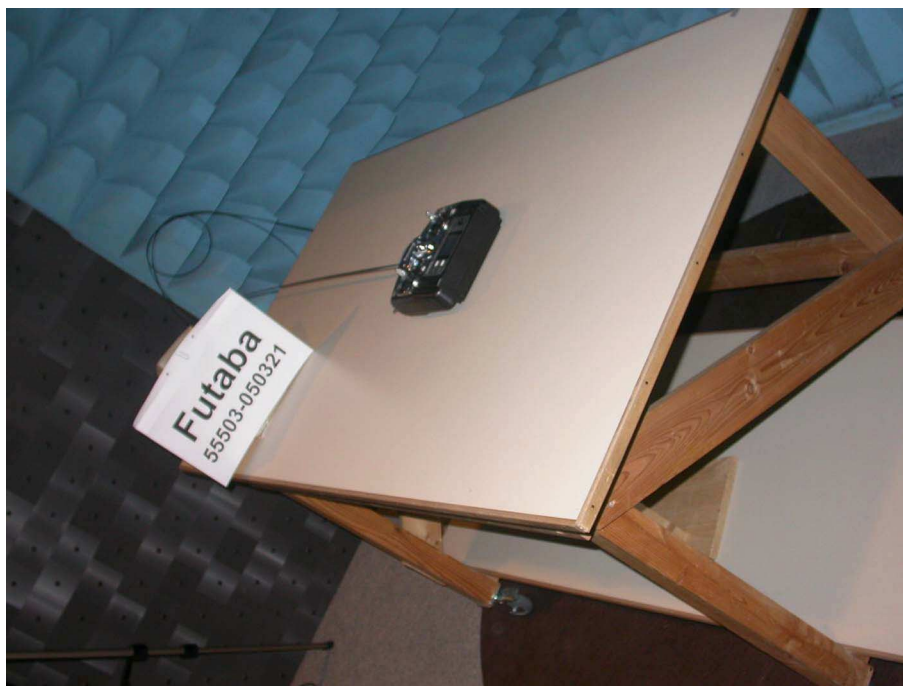
7 Photographs of Test Setups

Test setup unwanted radiation 30 MHz - 1 GHz



Position 1

**Test setup unwanted radiation 30 MHz - 1 GHz
(continued)**



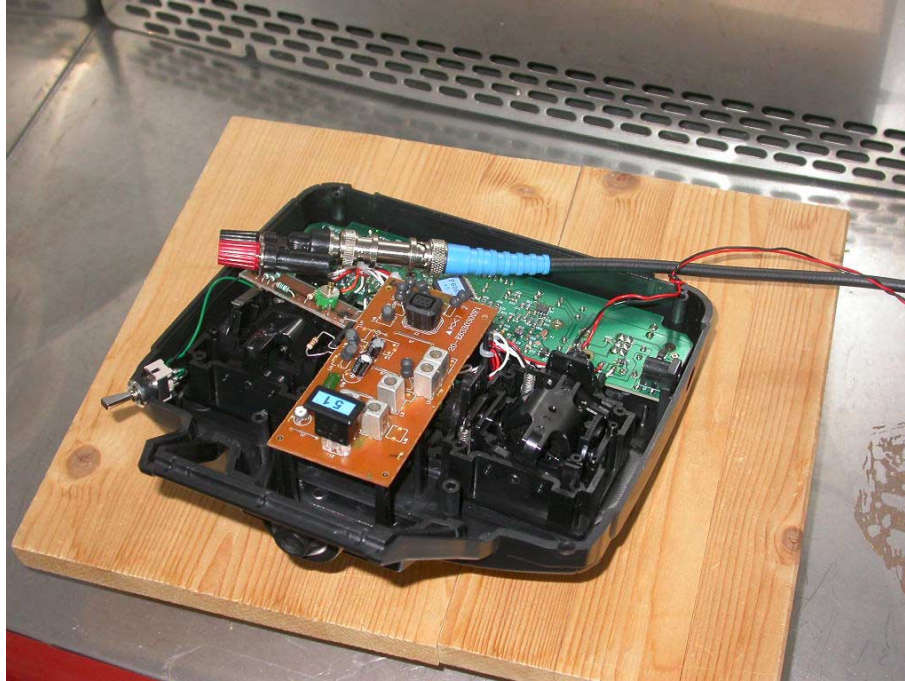
Position 2

**Test setup unwanted radiation 30 MHz - 1 GHz
(continued)**



Position 3

Test setup frequency tolerance



8 Test Results

CFR 47 Part 95 Subpart C / E CFR 47 Part 2 Subpart J			
<i>Section(s):</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
95.639	Maximum transmitter power	23	Passed
95.623	Frequency tolerance	25	Passed
95.633	Emission bandwidth	28	Passed
95.635	Unwanted radiation 30 MHz - 1 GHz	30	Passed

8.1 Maximum transmitter power

8.1.1 Maximum transmitter power - Conducted

Rules and specifications:	CFR 47 Part 95, section 95.639(b)(3)
Guide:	CFR 47 Part 2, section 2.1046
Limit:	0.75 W in the 72 – 76 MHz frequency band
Measurement procedure:	Conducted Maximum Transmitter Power (6.1.1)

Comment:	Test was performed with and without modulation.		
Date of test:	20 June 2005		
Test site:	Fully anechoic room, cabin no. 2		
Test conditions:	Temperature	+ 20 °C	
	Nominal supply voltage:	9.6 V	
Specifications:	Voltage range:	±15 % of nominal supply voltage	

Supply voltage (V)	Modulation	Transmitter power (dBm)	Transmitter power (W)	Limit (W)
8.16	off	18.60	0.072	0.750
9.60	off	20.60	0.115	0.750
11.04	off	22.00	0.158	0.750
8.16	on	19.00	0.079	0.750
9.60	on	19.90	0.098	0.750
11.04	on	20.60	0.115	0.750

Test Result:	Test passed
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8.1.2 Maximum transmitter power - Radiated

Rules and specifications:	CFR 47 Part 95, section 95.635
Guide:	ANSI C63.4 TIA/EIA-603, section 2.2.12
Limit:	0.75 W (28.8 dBm) in the 72 – 76 MHz frequency band
Measurement procedure:	Radiated Maximum Transmitter Power (6.1.2)

Comment:	Test was performed without modulation.
Date of test:	15 June 2005
Test site:	Fully anechoic room, cabin no. 2
Test conditions:	Temperature + 20 °C Nominal supply voltage: 9.6 V
Note:	For calculation of correction factors see table "Test Site Calibration Data Sheets", supplied as additional information summarized on page 36.

Position of EUT	Antenna polarization	Frequency (MHz)	Reading value (dBm)	Correction factor (dB)	E(I)RP (dBm)	Limit (dBm)	Margin to limit (dB)
EUT in vertical position, Antenna to the top	Horizontal	72.850	-32.8	26.9	-6.0	28.8	+34.8
EUT in horizontal position, Rear side on table	Vertical	72.850	-19.5	27.7	8.2	28.8	+20.6
EUT in horizontal position, Left side on table	Vertical	72.850	-19.3	27.7	8.4	28.8	+20.4

Test Result:	Test passed
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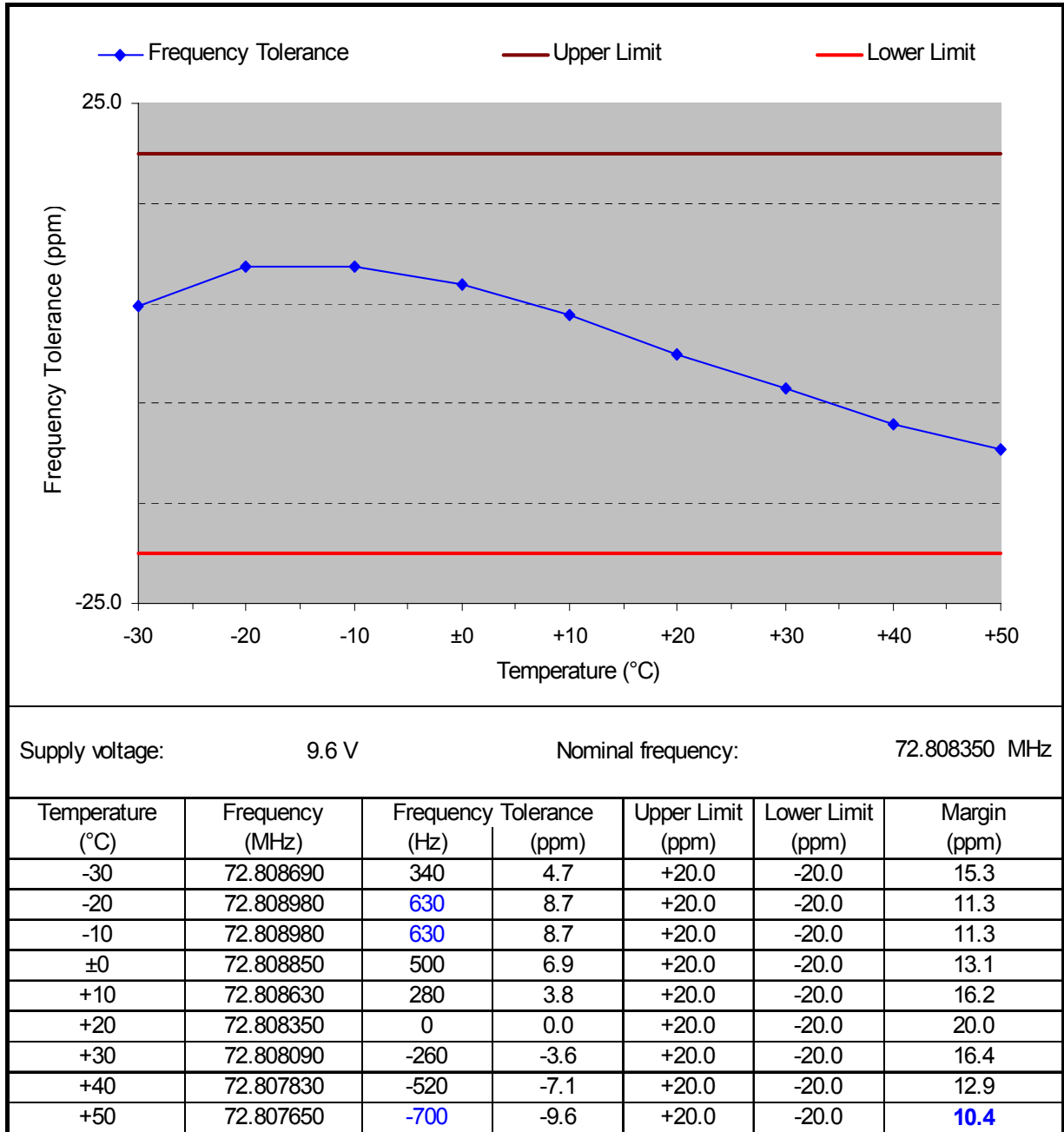
8.2 Carrier Frequency Stability

Rules and specifications:	CFR 47 Part 95, section 95.623(c)
Guide:	ANSI C63.4
Limit:	The frequency tolerance of the carrier signal shall be maintained within $\pm 0.002\%$ (± 20 ppm) of the carrier frequency under nominal conditions.
Temperature range:	-30°C to +50°C (at normal supply voltage)
Voltage range:	85% to 115% of the rated supply voltage (at a temperature of +20 °C)
Measurement procedure:	Frequency tolerance (6.2)

Comment:	
Mode:	Transmitting without modulation.
Date of test:	20 June 2005

Test Result:	Test passed
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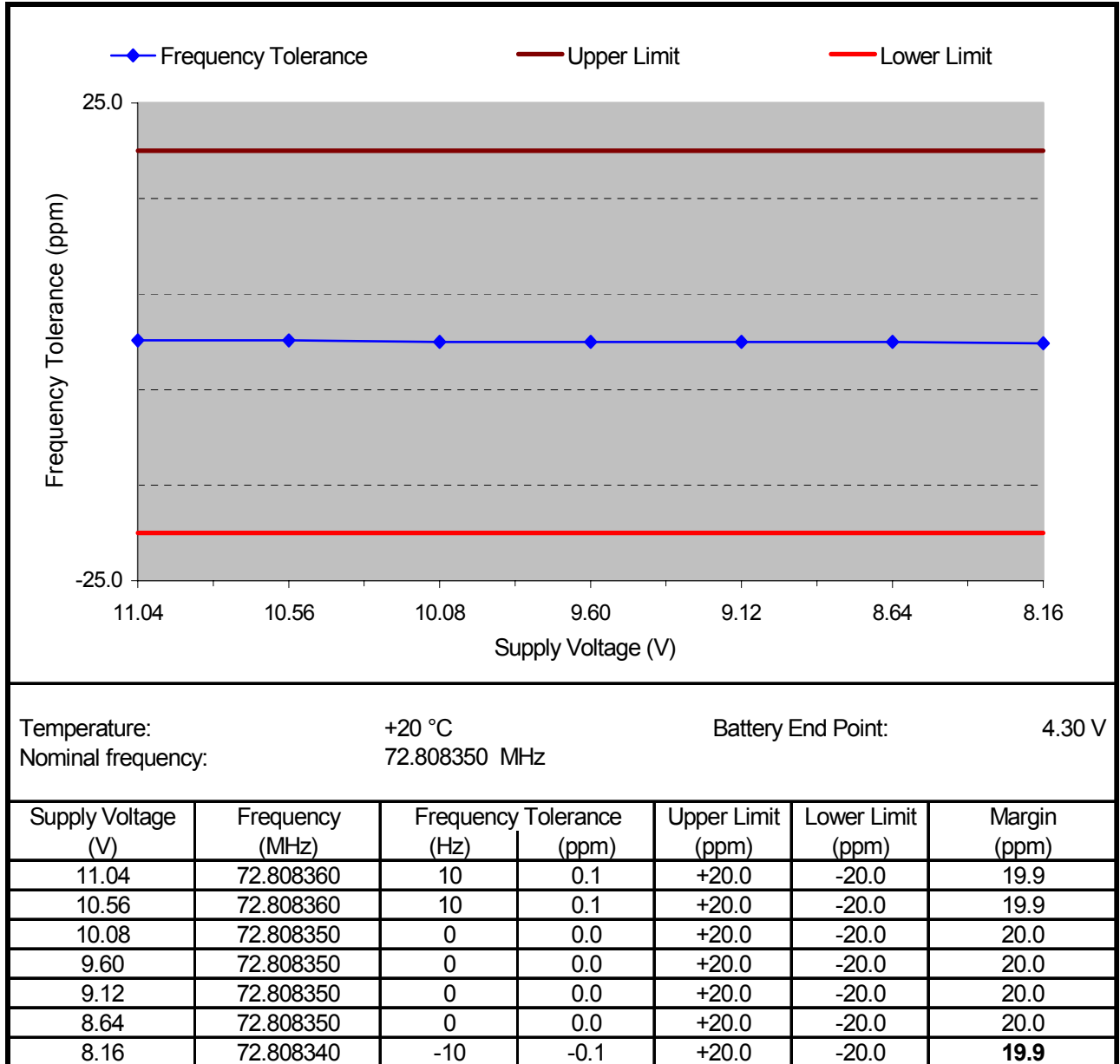
8.2.1 Frequency Stability vs. Temperature



Test Result:

Test passed

8.2.2 Frequency Stability vs. Supply Voltage



Note: EUT is equipped with a low battery warning indicator, starting at 8.52 V

Test Result: Test passed

8.3 Emission Bandwidth

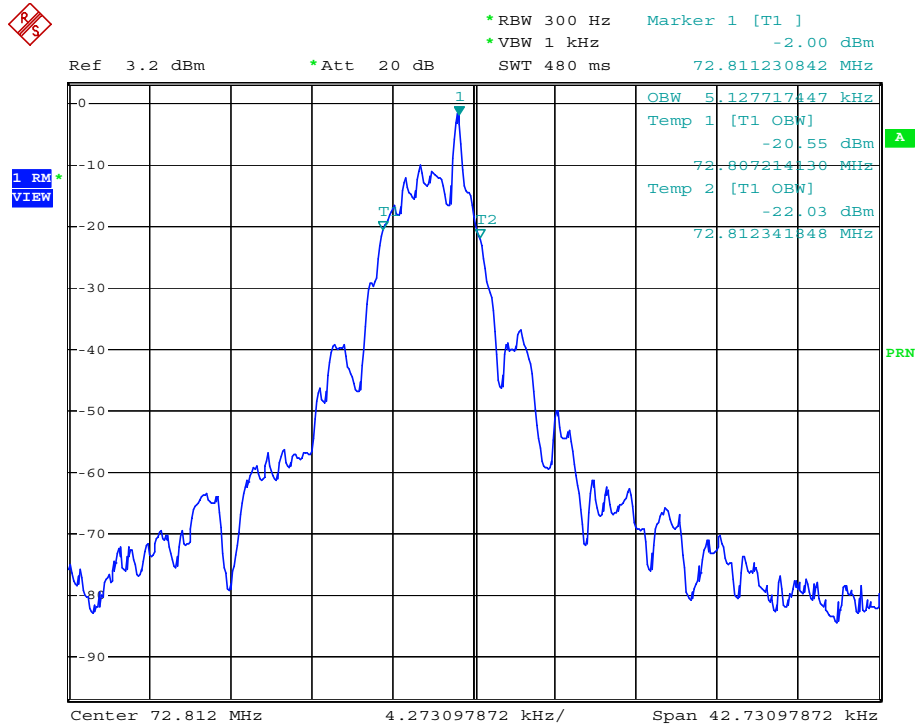
Rules and specifications:	CFR 47 Part 2, section 2.1046(a)
Guide:	TIA/EI-603
Limit:	Authorized bandwidth: 8 kHz
Measurement procedure:	Emission Bandwidth (6.3)

Calculation	$B_n = 2 \cdot B \cdot K$
B = modulation range	B = 2.5 kHz
K = Overall numerical factor	K = 1
	$B_n = 2 \cdot 2.5 \text{ kHz} \cdot 1 = 5 \text{ kHz}$
Type of Emission	5K0F1D

Test Result:	Test passed
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Comment: Emission bandwidth was measured as occupied bandwidth.
Tested on antenna connector via dummy load.

Date of test: 20 June 2005



Comment: Futaba050321: Occupied Bandwidth
Date: 20.JUN.2005 09:30:06

Occupied Bandwidth (99 %): **5.13 kHz**

Test Result: **Test passed**

8.4 Unwanted Radiation 30 MHz - 1 GHz

Rules and specifications:	CFR 47 Part 95, section 95.635
Guide:	ANSI C63.4 TIA/EIA-603, section 2.2.12
Limit:	$10 \log(P_{\text{carrier}}) - 56 \text{ dB}$ with P_{carrier} as the maximum transmitter power limit in W for the unmodulated carrier according to §95.639; that is -26.0 dBm .
Note	For calculation of correction factors see tables "Test Site Calibration Data Sheets" (supplied as additional information summarized on page 36)
Measurement procedure:	Unwanted Emission 30 MHz - 1 GHz (6.4)

Test Result:	Test passed
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Position:	EUT in vertical position, antenna to the top
Mode:	Transmitting with modulation
Date of test:	15 June 2005
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters

Maximum transmitter power (conducted):	19.90 dBm	0.098 W
Maximum transmitter power (radiated):	14.8 dBm	0.030 W
Calculated limit (referring to TP):	-26.0 dBm	

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBm)	Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
87.400	vertical	Peak	-64.2	28.4	-35.7	-26.0	9.7
145.600	vertical	Peak	-66.2	19.5	-46.7	-26.0	20.7
218.400	vertical	Peak	-83.8	20.5	-63.3	-26.0	37.3
291.200	vertical	Peak	-91.6	26.7	-64.9	-26.0	38.9
364.000	horizontal	Peak	-100.6	29.3	-71.3	-26.0	45.3
436.800	vertical	Peak	-94.9	28.8	-66.1	-26.0	40.1
509.600	vertical	Peak	-98.4	29.4	-69.0	-26.0	43.0
582.800	vertical	Peak	-104.5	32.6	-71.9	-26.0	45.9
728.000	vertical	Peak	-100.3	32.2	-68.0	-26.0	42.0
800.800	vertical	Peak	-91.0	35.2	-55.8	-26.0	29.8
873.600	vertical	Peak	-92.0	35.8	-56.1	-26.0	30.1
946.800	vertical	Peak	-91.0	34.9	-56.1	-26.0	30.1

Test Result:	Test passed
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Position:	EUT in horizontal position with rear side on table
Mode:	Transmitting with modulation
Date of test:	15 June 2005
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters

Maximum transmitter power (conducted):	19.90 dBm	0.098 W
Maximum transmitter power (radiated):	14.9 dBm	0.031 W
Calculated limit (referring to TP):	-26.0 dBm	

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBm)	Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
87.400	horizontal	Peak	-65.3	28.2	-37.1	-26.0	11.1
145.600	horizontal	Peak	-66.8	21.3	-45.5	-26.0	19.5
218.400	horizontal	Peak	-79.3	21.5	-57.8	-26.0	31.8
291.200	horizontal	Peak	-79.9	25.3	-54.6	-26.0	28.6
364.000	horizontal	Peak	-87.6	29.3	-58.4	-26.0	32.4
436.800	horizontal	Peak	-92.4	30.8	-61.6	-26.0	35.6
509.600	horizontal	Peak	-92.9	30.4	-62.5	-26.0	36.5
582.800	horizontal	Peak	-96.3	31.5	-64.8	-26.0	38.8
728.000	vertical	Peak	-101.0	32.2	-68.7	-26.0	42.7
728.400	horizontal	Peak	-95.3	33.9	-61.4	-26.0	35.4
800.800	horizontal	Peak	-90.4	34.3	-56.1	-26.0	30.1
873.600	horizontal	Peak	-91.5	34.4	-57.2	-26.0	31.2
946.800	horizontal	Peak	-88.6	36.2	-52.4	-26.0	26.4

Test Result:	Test passed
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Position:	EUT in horizontal position with left side on table.
Mode:	Transmitting with modulation
Date of test:	15 June 2005
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters

Maximum transmitter power (conducted):	19.90 dBm	0.098 W
Maximum transmitter power (radiated):	14.9 dBm	0.031 W
Calculated limit (referring to TP):	-26.0 dBm	

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBm)	Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
87.400	horizontal	Peak	-65.5	28.2	-37.3	-26.0	11.3
145.600	horizontal	Peak	-67.3	21.3	-46.0	-26.0	20.0
218.400	horizontal	Peak	-78.9	21.5	-57.4	-26.0	31.4
291.200	horizontal	Peak	-80.2	25.3	-54.9	-26.0	28.9
364.000	horizontal	Peak	-88.6	29.3	-59.3	-26.0	33.3
436.800	horizontal	Peak	-91.9	30.8	-61.1	-26.0	35.1
509.600	horizontal	Peak	-93.4	30.4	-63.0	-26.0	37.0
582.800	vertical	Peak	-97.0	32.6	-64.4	-26.0	38.4
728.400	horizontal	Peak	-96.1	33.9	-62.2	-26.0	36.2
800.800	vertical	Peak	-92.4	35.2	-57.3	-26.0	31.3
873.600	vertical	Peak	-90.8	35.8	-54.9	-26.0	28.9
946.800	horizontal	Peak	-88.9	36.2	-52.7	-26.0	26.7

Test Result:	Test passed
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9 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

☒	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 10, 2004
☐	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	April 5, 2005
☒	CFR 47 Part 95 Subpart C/E	Code of Federal Regulations Part 95 (Personal Radio Services), Subpart C/E (Radio Control(R/C) Radio Service) of the Federal Communication Commission (FCC)	October 1, 2003
☒	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	December 11, 2003 (published on January 30, 2004)
☐	CAN/CSA-CEI/IEC CISPR 22	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	2002
☒	TIA/EIA-603	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	February 1993
☒	TIA/EIA-603-1	Addendum to TIA/EIA-603	March 4, 1998
☐	TRC-43	Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada	October 9, 1982

10 Additional Information supplementary to the Test Report

Item	Description	No. of Pages
1	Test Site Calibration Data Sheets	4
2	Additional Test Sheets	12

Test Site Calibration 25 MHz - 5 GHz for ERP Measurements (Substitution Method)

Test site: Semi-anechoic room, cabin no. 2
 Test distance: Standard position [m]: 3
 Date: 07/15/2002
 Operator: R. Heller
 Transmit antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. A-1261
 Log.-per. antenna HL 223, Rohde & Schwarz, inv.-no. A-1262
 Horn antenna EMCO 3115, EMCO, inv.-no. B-1516
 Receiving antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. C-1560
 Log.-per. antenna 3147, EMCO, inv.-no. A-1009
 Signal source: Tracking generator of ESMI, Rohde & Schwarz, inv.-no. A-1569,
 connected to transmit antenna via cables inv.-no. 1683, port 2 of AP 1
 and 1592, nominal power at signal generator set to 0 dBm
 Receiving cables: Inv.-no. 1657, 1681 and 1592
 Test receiver: ESMI, Rohde & Schwarz, inv.-no. A-1569
 Antenna heights: TX antenna (h1): 1.5 metre
 RX antenna (h2): 1.5 metre
 Antenna position: TX antenna: center of turn table
 Polarization: horizontal

Frequency	Transmit signal	TX antenna gain		True transmit signal	Analyzer reading	Correction for reading
[MHz]	P tx [dBm]	(isotropic) [dBi]	(dipole) [dBd]	P true [dBm]	P site [dBm]	in "dBm" [dB]
25.0	-1.1	-17.0	-19.2	-20.3	-44.9	25.3
30.0	-1.4	-13.8	-16.0	-17.3	-40.0	23.3
35.0	-1.5	-11.1	-13.3	-14.7	-36.1	22.0
40.0	-1.5	-8.8	-11.0	-12.5	-38.8	27.0
45.0	-1.6	-6.7	-8.9	-10.5	-35.7	25.9
50.0	-1.6	-5.1	-7.3	-8.9	-34.3	26.1
55.0	-1.7	-3.8	-6.0	-7.6	-32.9	25.9
60.0	-1.7	-2.8	-5.0	-6.7	-32.2	26.2
65.0	-1.7	-2.0	-4.2	-5.9	-31.4	26.2
70.0	-1.7	-1.3	-3.5	-5.2	-30.6	26.1
75.0	-1.8	-0.7	-2.9	-4.7	-30.4	26.4
80.0	-1.9	-0.1	-2.3	-4.1	-30.4	26.9
85.0	-1.9	0.2	-2.0	-3.9	-30.3	27.1
90.0	-2.0	0.5	-1.7	-3.6	-29.6	26.6
95.0	-2.0	0.6	-1.6	-3.6	-28.9	26.0
100.0	-2.0	0.7	-1.5	-3.5	-28.2	25.3
110.0	-2.1	0.9	-1.3	-3.3	-27.9	25.2
120.0	-2.1	1.0	-1.2	-3.3	-27.4	24.8
130.0	-2.2	1.1	-1.1	-3.3	-27.2	24.6
140.0	-2.3	1.4	-0.8	-3.0	-26.3	23.9
150.0	-2.3	1.8	-0.4	-2.7	-25.6	23.6
160.0	-2.4	1.9	-0.3	-2.6	-25.4	23.4
170.0	-2.4	2.0	-0.2	-2.6	-25.3	23.4
180.0	-2.5	2.1	0.0	-2.5	-25.6	23.7
190.0	-2.6	2.3	0.2	-2.4	-26.4	24.6
200.0	-2.6	2.3	0.2	-2.4	-27.8	26.0
200.1	-2.3	6.5	4.4	2.0	-19.4	22.0
220.0	-2.6	6.9	4.8	2.1	-19.6	22.4
240.0	-2.7	7.0	4.9	2.1	-20.5	23.3
260.0	-2.8	7.1	5.0	2.2	-21.5	24.4
280.0	-2.9	7.3	5.1	2.2	-22.9	25.7

Test Site Calibration 25 MHz - 5 GHz for ERP Measurements (Substitution Method)

Test site: Semi-anechoic room, cabin no. 2
Test distance: Standard position [m]: 3
Date: 07/15/2002
Operator: R. Heller
Transmit antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. A-1261
Log.-per. antenna HL 223, Rohde & Schwarz, inv.-no. A-1262
Horn antenna EMCO 3115, EMCO, inv.-no. B-1516
Receiving antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. C-1560
Log.-per. antenna 3147, EMCO, inv.-no. A-1009
Signal source: Tracking generator of ESMI, Rohde & Schwarz, inv.-no. A-1569,
connected to transmit antenna via cables inv.-no. 1683, port 2 of AP 1
and 1592, nominal power at signal generator set to 0 dBm
Receiving cables: Inv.-no. 1657, 1681 and 1592
Test receiver: ESMI, Rohde & Schwarz, inv.-no. A-1569
Antenna heights: TX antenna (h1): 1.5 metre
RX antenna (h2): 1.5 metre
Antenna position: TX antenna: center of turn table
Polarization: horizontal

Frequency	Transmit signal	TX antenna gain		True transmit signal	Analyzer reading	Correction
[MHz]	P tx [dBm]	(isotropic) [dBi]	(dipole) [dBd]	P true [dBm]	P site [dBm]	for reading in "dBm" [dB]
300.0	-3.0	7.2	5.1	2.1	-23.0	25.7
325.0	-3.0	7.2	5.1	2.0	-23.9	26.6
350.0	-3.2	7.1	5.0	1.8	-25.7	28.2
375.0	-3.2	7.2	5.1	1.8	-26.2	28.7
400.0	-3.1	6.8	4.7	1.6	-27.8	30.0
425.0	-3.4	6.7	4.6	1.1	-29.1	30.9
433.9	-3.4	6.8	4.7	1.3	-29.8	31.7
450.0	-3.4	7.0	4.9	1.4	-30.6	32.6
475.0	-3.6	6.9	4.8	1.2	-30.1	32.0
500.0	-3.7	7.0	4.9	1.2	-30.2	32.1
550.0	-3.8	7.5	5.4	1.6	-29.3	31.6
600.0	-3.7	7.0	4.9	1.1	-28.9	30.7
650.0	-4.0	6.9	4.8	0.8	-30.3	31.7
700.0	-4.2	6.5	4.4	0.2	-33.0	33.9
750.0	-4.2	7.2	5.1	0.8	-34.6	36.1
800.0	-4.3	7.1	5.0	0.7	-34.3	35.7
850.0	-4.6	6.7	4.6	0.0	-33.2	33.8
867.8	-4.4	6.6	4.5	0.0	-32.9	33.7
900.0	-4.6	7.0	4.9	0.3	-33.1	34.1
950.0	-4.6	7.7	5.6	0.9	-34.4	36.0
1000.0	-4.7	7.0	4.9	0.2	-36.9	37.8
1000.1	-4.6	4.3		-0.3	-36.8	37.2
1500.0	-5.6	6.9		1.3	-41.1	43.2
2000.0	-6.2	7.1		0.9	-42.7	44.4
2500.0	-6.6	7.6		1.0	-46.0	47.8
3000.0	-6.8	7.7		0.9	-47.9	49.7
3500.0	-7.6	7.8		0.2	-49.4	50.5
4000.0	-8.2	7.9		-0.3	-53.7	54.3
4500.0	-9.0	9.0		0.0	-55.3	56.4
5000.0	-9.5	8.9		-0.6	-55.5	55.9

Test Site Calibration 25 MHz - 5 GHz for ERP Measurements (Substitution Method)

Test site: Semi-anechoic room, cabin no. 2
 Test distance: Standard position [m]: 3
 Date: 07/15/2002
 Operator: R. Heller
 Transmit antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. A-1261
 Log.-per. antenna HL 223, Rohde & Schwarz, inv.-no. A-1262
 Horn antenna EMCO 3115, EMCO, inv.-no. B-1516
 Receiving antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. C-1560
 Log.-per. antenna 3147, EMCO, inv.-no. A-1009
 Signal source: Tracking generator of ESMI, Rohde & Schwarz, inv.-no. A-1569,
 connected to transmit antenna via cables inv.-no. 1683, port 2 of AP 1
 and 1592, nominal power at signal generator set to 0 dBm
 Receiving cables: Inv.-no. 1657, 1681 and 1592
 Test receiver: ESMI, Rohde & Schwarz, inv.-no. A-1569
 Antenna heights: TX antenna (h1): 1.5 metre
 RX antenna (h2): 1.5 metre
 Antenna position: TX antenna: center of turn table
 Polarization: vertical

Frequency	Transmit signal ¹ P tx [dBm]	TX antenna gain		True transmit signal P true [dBm]	Analyzer reading P site [dBm]	Correction for reading in "dBm" [dB]
[MHz]		(isotropic) [dBi]	(dipole) [dBd]			
25.0	-1.1	-17.0	-19.2	-20.3	-43.4	23.8
30.0	-1.4	-13.8	-16.0	-17.3	-38.6	21.9
35.0	-1.5	-11.1	-13.3	-14.7	-34.9	20.8
40.0	-1.5	-8.8	-11.0	-12.5	-34.3	22.5
45.0	-1.6	-6.7	-8.9	-10.5	-37.0	27.1
50.0	-1.6	-5.1	-7.3	-8.9	-34.3	26.1
55.0	-1.7	-3.8	-6.0	-7.6	-32.7	25.7
60.0	-1.7	-2.8	-5.0	-6.7	-32.5	26.4
65.0	-1.7	-2.0	-4.2	-5.9	-31.3	26.1
70.0	-1.7	-1.3	-3.5	-5.2	-30.6	26.1
75.0	-1.8	-0.7	-2.9	-4.7	-29.9	25.9
80.0	-1.9	-0.1	-2.3	-4.1	-29.9	26.5
85.0	-1.9	0.2	-2.0	-3.9	-30.5	27.2
90.0	-2.0	0.5	-1.7	-3.6	-30.3	27.3
95.0	-2.0	0.6	-1.6	-3.6	-29.0	26.1
100.0	-2.0	0.7	-1.5	-3.5	-28.3	25.5
110.0	-2.1	0.9	-1.3	-3.3	-27.9	25.2
120.0	-2.1	1.0	-1.2	-3.3	-28.2	25.5
130.0	-2.2	1.1	-1.1	-3.3	-27.0	24.3
140.0	-2.3	1.4	-0.8	-3.0	-25.8	23.4
150.0	-2.3	1.8	-0.4	-2.7	-25.1	23.1
160.0	-2.4	1.9	-0.3	-2.6	-25.1	23.1
170.0	-2.4	2.0	-0.2	-2.6	-25.0	23.1
180.0	-2.5	2.1	0.0	-2.5	-25.1	23.2
190.0	-2.6	2.3	0.2	-2.4	-25.5	23.7
200.0	-2.6	2.3	0.2	-2.4	-26.9	25.2
200.1	-2.3	6.5	4.4	2.0	-18.4	21.1
220.0	-2.6	6.9	4.8	2.1	-18.7	21.5
240.0	-2.7	7.0	4.9	2.1	-20.0	22.8
260.0	-2.8	7.1	5.0	2.2	-21.4	24.3
280.0	-2.9	7.3	5.1	2.2	-23.7	26.6

Test Site Calibration 25 MHz - 5 GHz for ERP Measurements (Substitution Method)

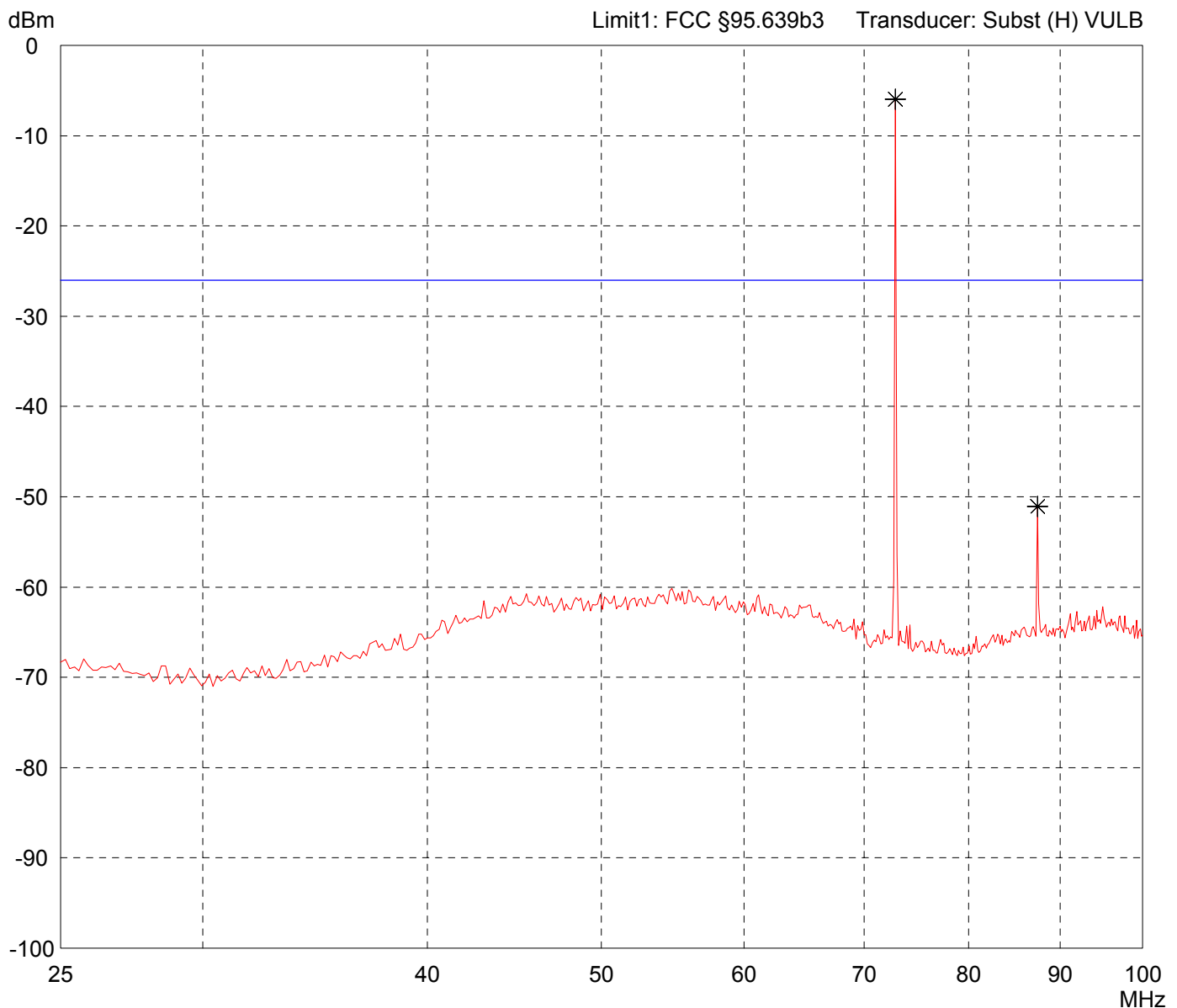
Test site: Semi-anechoic room, cabin no. 2
 Test distance: Standard position [m]: 3
 Date: 07/15/2002
 Operator: R. Heller
 Transmit antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. A-1261
 Log.-per. antenna HL 223, Rohde & Schwarz, inv.-no. A-1262
 Horn antenna EMCO 3115, EMCO, inv.-no. B-1516
 Receiving antennae: Biconical antenna HK 116, Rohde & Schwarz, inv.-no. C-1560
 Log.-per. antenna 3147, EMCO, inv.-no. A-1009
 Signal source: Tracking generator of ESMI, Rohde & Schwarz, inv.-no. A-1569,
 connected to transmit antenna via cables inv.-no. 1683, port 2 of AP 1
 and 1592, nominal power at signal generator set to 0 dBm
 Receiving cables: Inv.-no. 1657, 1681 and 1592
 Test receiver: ESMI, Rohde & Schwarz, inv.-no. A-1569
 Antenna heights: TX antenna (h1): 1.5 metre
 RX antenna (h2): 1.5 metre
 Antenna position: TX antenna: center of turn table
 Polarization: vertical

Frequency	Transmit signal ¹ P tx [dBm]	TX antenna gain		True transmit signal P true [dBm]	Analyzer reading P site [dBm]	Correction for reading in "dBm" [dB]
[MHz]		(isotropic) [dBi]	(dipole) [dBd]			
300.0	-3.0	7.2	5.1	2.1	-25.3	28.0
325.0	-3.0	7.2	5.1	2.0	-26.7	29.3
350.0	-3.2	7.1	5.0	1.8	-28.2	30.7
375.0	-3.2	7.2	5.1	1.8	-27.9	30.4
400.0	-3.1	6.8	4.7	1.6	-28.3	30.5
425.0	-3.4	6.7	4.6	1.1	-28.2	30.0
433.9	-3.4	6.8	4.7	1.3	-28.6	30.6
450.0	-3.4	7.0	4.9	1.4	-28.8	30.9
475.0	-3.6	6.9	4.8	1.2	-28.1	30.0
500.0	-3.7	7.0	4.9	1.2	-28.2	30.0
550.0	-3.8	7.5	5.4	1.6	-29.5	31.7
600.0	-3.7	7.0	4.9	1.1	-31.6	33.4
650.0	-4.0	6.9	4.8	0.8	-32.4	33.8
700.0	-4.2	6.5	4.4	0.2	-32.2	33.1
750.0	-4.2	7.2	5.1	0.8	-31.3	32.8
800.0	-4.3	7.1	5.0	0.7	-34.4	35.7
850.0	-4.6	6.7	4.6	0.0	-36.3	36.9
867.8	-4.4	6.6	4.5	0.0	-36.3	37.1
900.0	-4.6	7.0	4.9	0.3	-35.7	36.6
950.0	-4.6	7.7	5.6	0.9	-34.9	36.5
1000.0	-4.7	7.0	4.9	0.2	-34.7	35.6
1000.1	-4.6	4.3		-0.3	-36.3	36.7
1500.0	-5.6	6.9		1.3	-39.1	41.2
2000.0	-6.2	7.1		0.9	-44.3	46.1
2500.0	-6.6	7.6		1.0	-45.1	46.9
3000.0	-6.8	7.7		0.9	-46.5	48.3
3500.0	-7.6	7.8		0.2	-50.3	51.4
4000.0	-8.2	7.9		-0.3	-52.8	53.4
4500.0	-9.0	9.0		0.0	-55.9	57.0
5000.0	-9.5	8.9		-0.6	-54.7	55.1

Radiated Power Test 25 MHz - 100 MHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: EUT in upright position (P1)
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

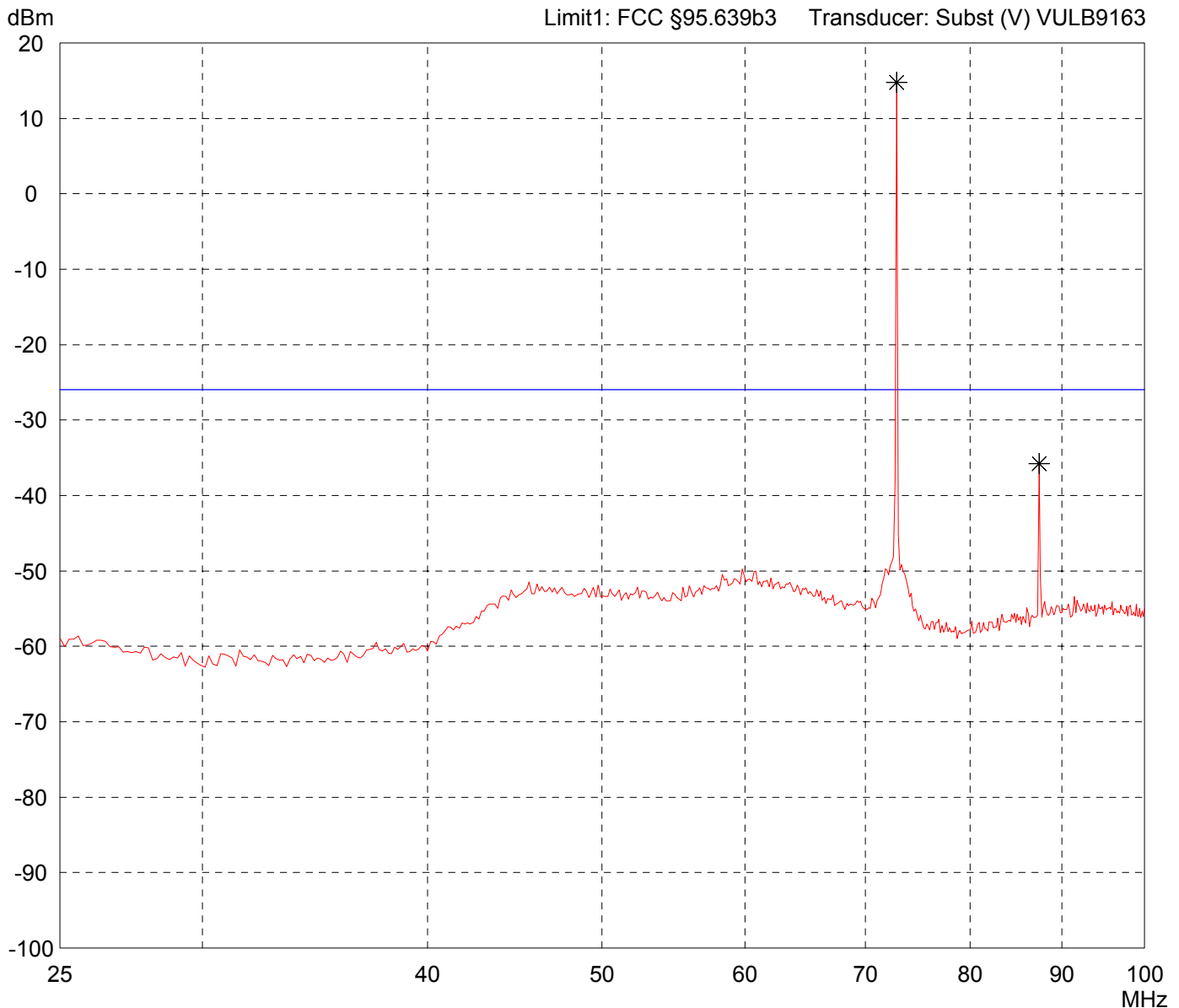
Detector: Peak	List of values: Selected by hand
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Result: Limit kept (Carrier excluded)	Project file: 55503-50321
	Page of Pages

Radiated Power Test 25 MHz - 100 MHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: EUT in upright position (P1)
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	
	File name: default.emi
Detector: Peak	List of values: 10 dB Margin
	50 Subranges

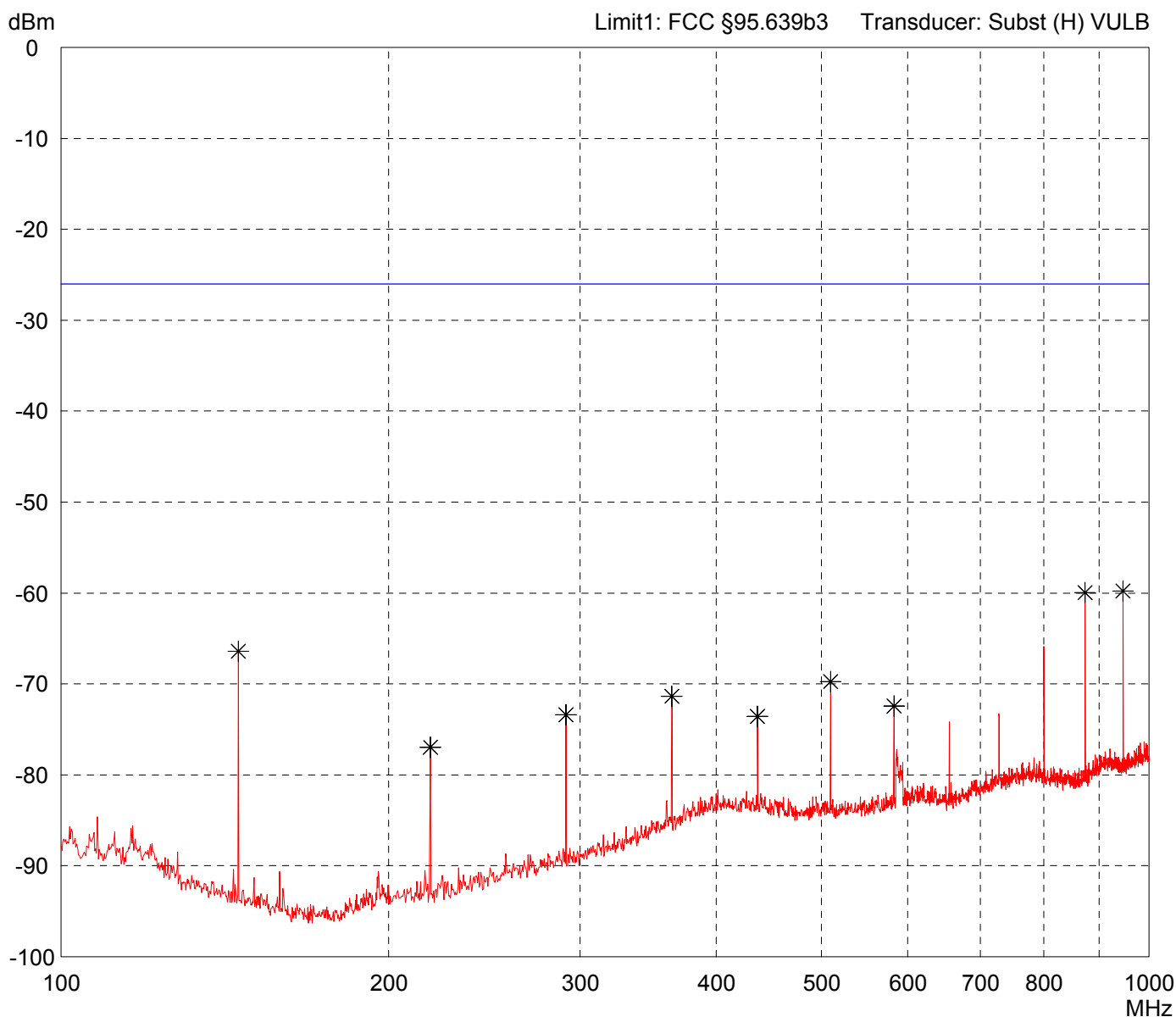


Result: Limit kept (Carrier excluded)	Project file: 55503-50321
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Radiated Power Test 100 MHz - 1 GHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: EUT in upright position (P1) - With 100 MHz high-pass-filter
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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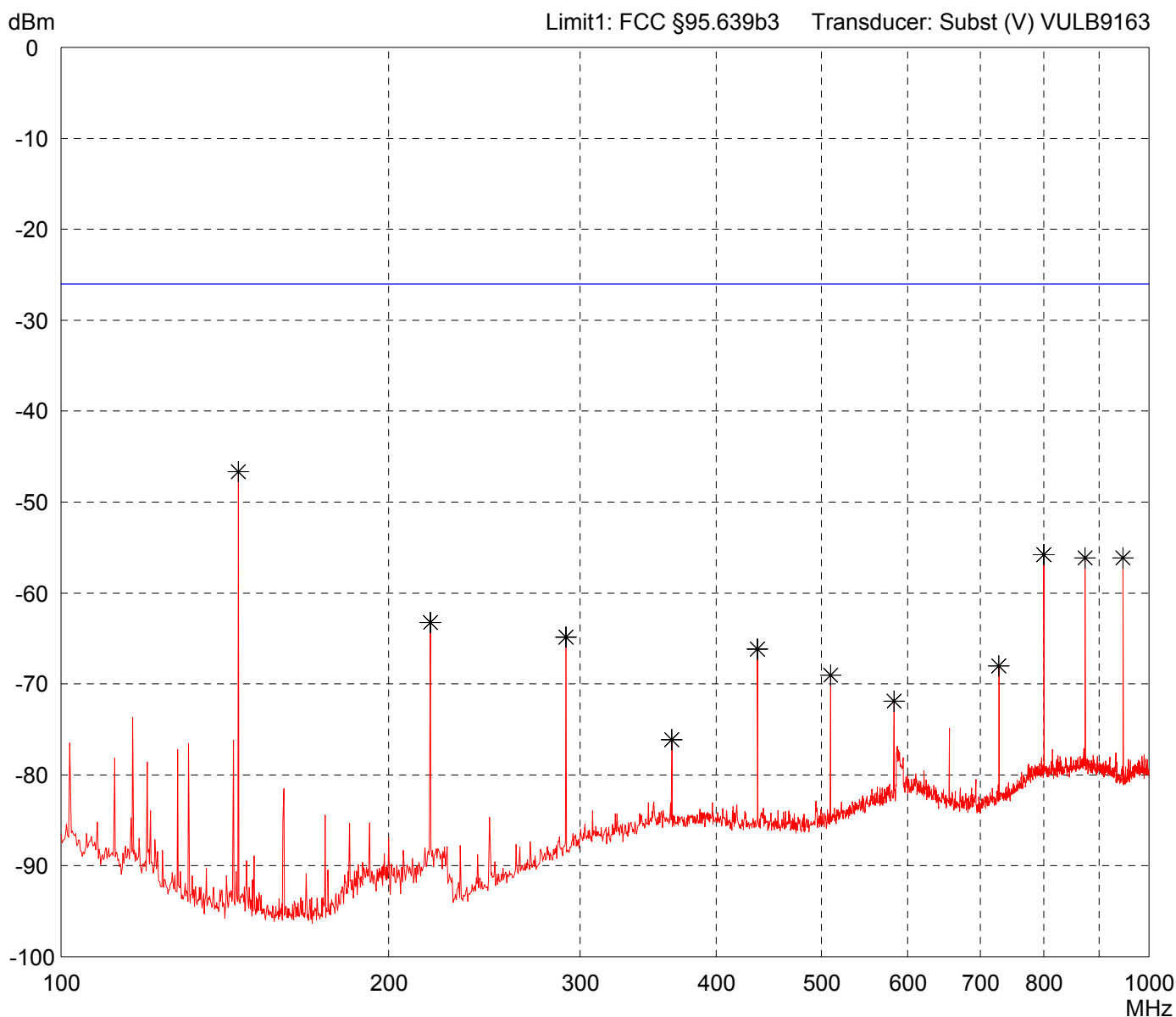


Result: Limit kept	Project file: 55503-50321
	Page of Pages

Radiated Power Test 100 MHz - 1 GHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: EUT in upright position (P1) - With 100 MHz high-pass-filter
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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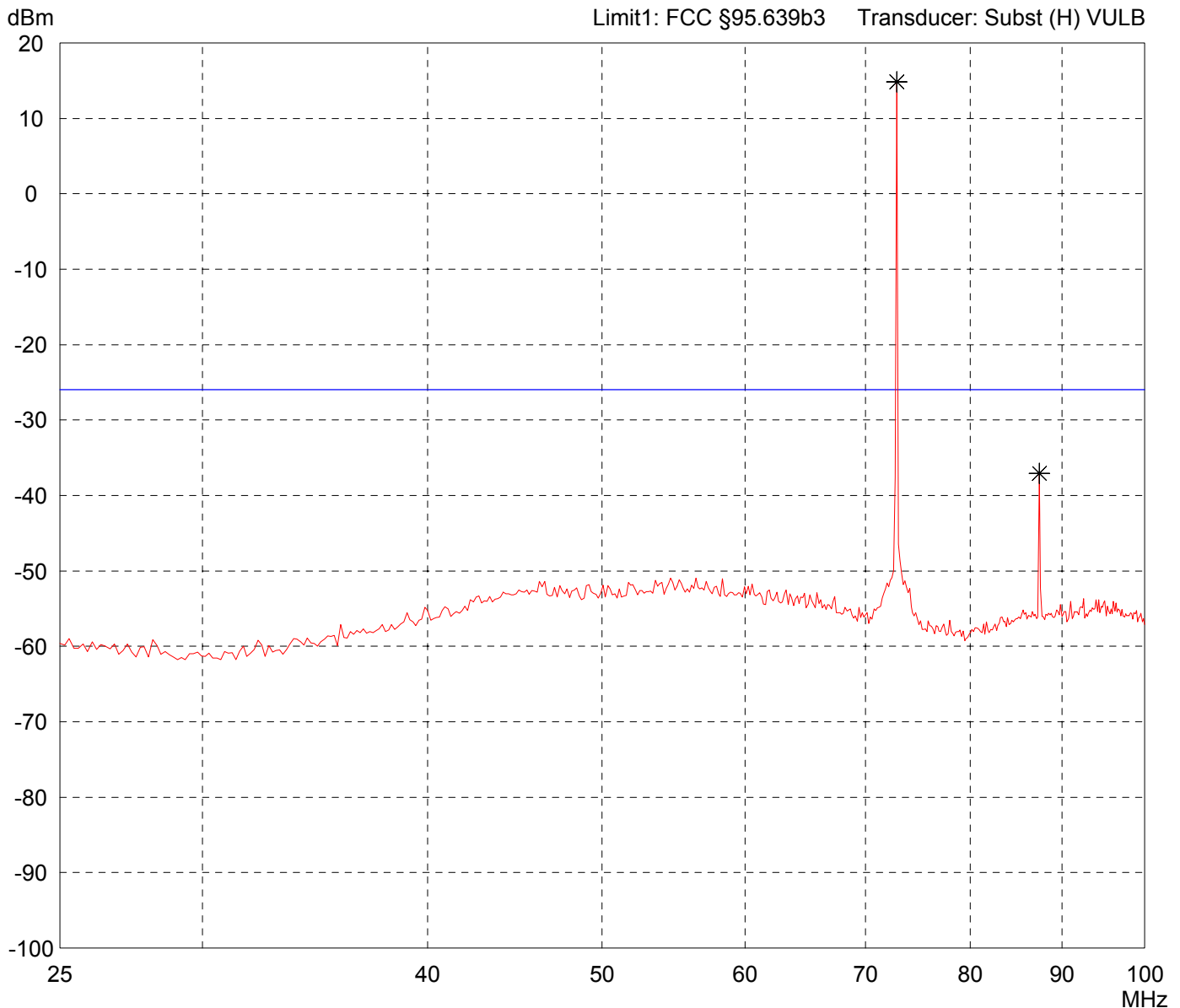


Result: Limit kept	Project file: 55503-50321
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Radiated Power Test 25 MHz - 100 MHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: Flat on table (P2)
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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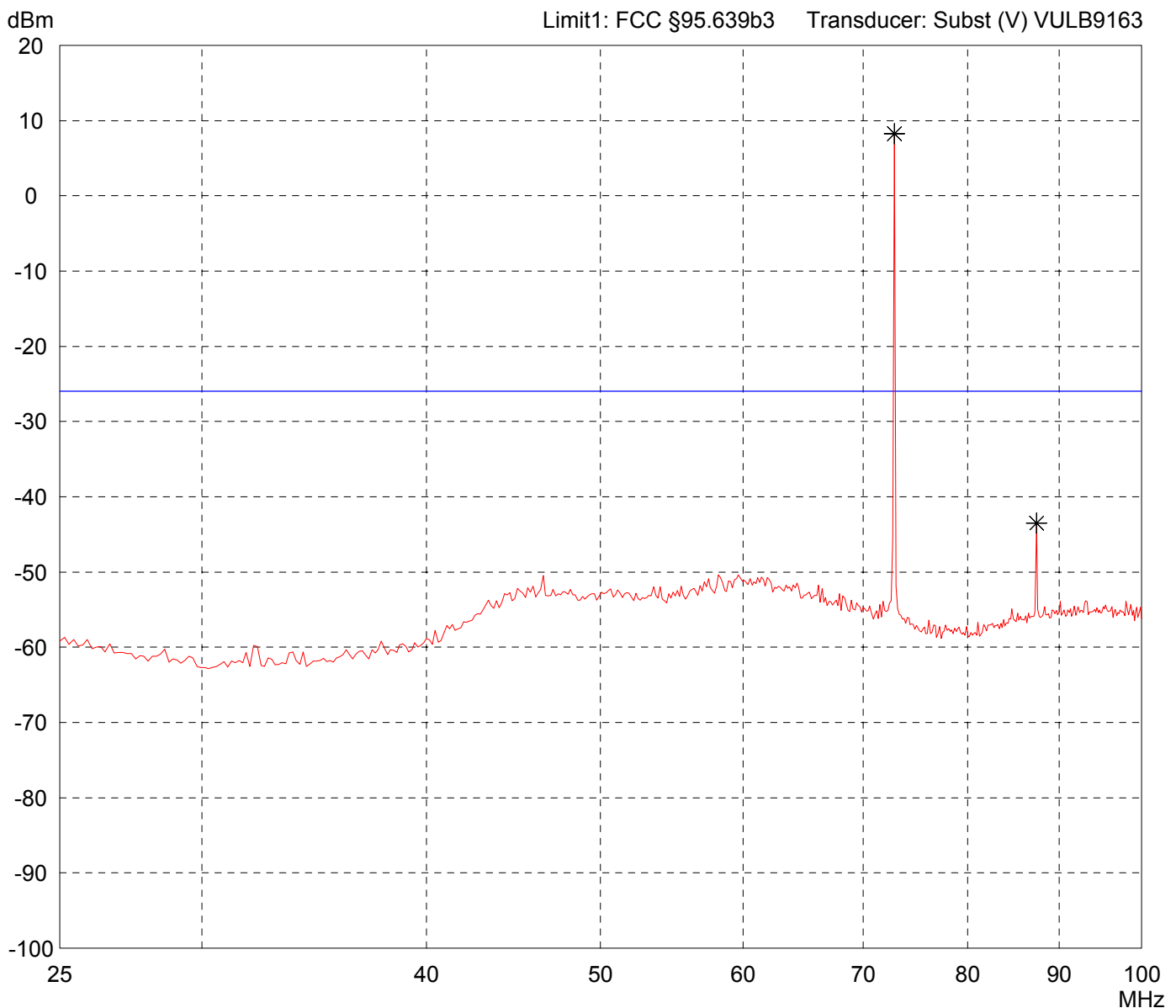


Result: Limit kept (Carrier excluded)	Project file: 55503-50321
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Radiated Power Test 25 MHz - 100 MHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72 Serial no.: ES Sample No. 4 Applicant: Futaba Corporation Test site: Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: 06/15/2005 Operator: M. Steindl Test performed: automatically File name: default.emi	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: Flat on table (P2)
Detector: Peak	List of values: Selected by hand



Result: Limit kept (Carrier excluded)	Project file: 55503-50321
Page of Pages	

Radiated Power Test 100 MHz - 1 GHz acc. to FCC Part 95 Subpart C/E

Model:
T4EX-FM72

Serial no.:
ES Sample No. 4

Applicant:
Futaba Corporation

Test site:
Fully anechoic room, cabin no. 2

Tested on:
Test distance 3 metres
Horizontal Polarization

Date of test:
06/15/2005

Operator:
M. Steindl

Test performed:
automatically

File name:
default.emi

Comment:

- 9.6 V Lithium-Battery supply
- Crystal: 72.810 MHz
- transmitting continuously
- Position: Flat on table (P2)
- With 100 MHz high-pass-filter

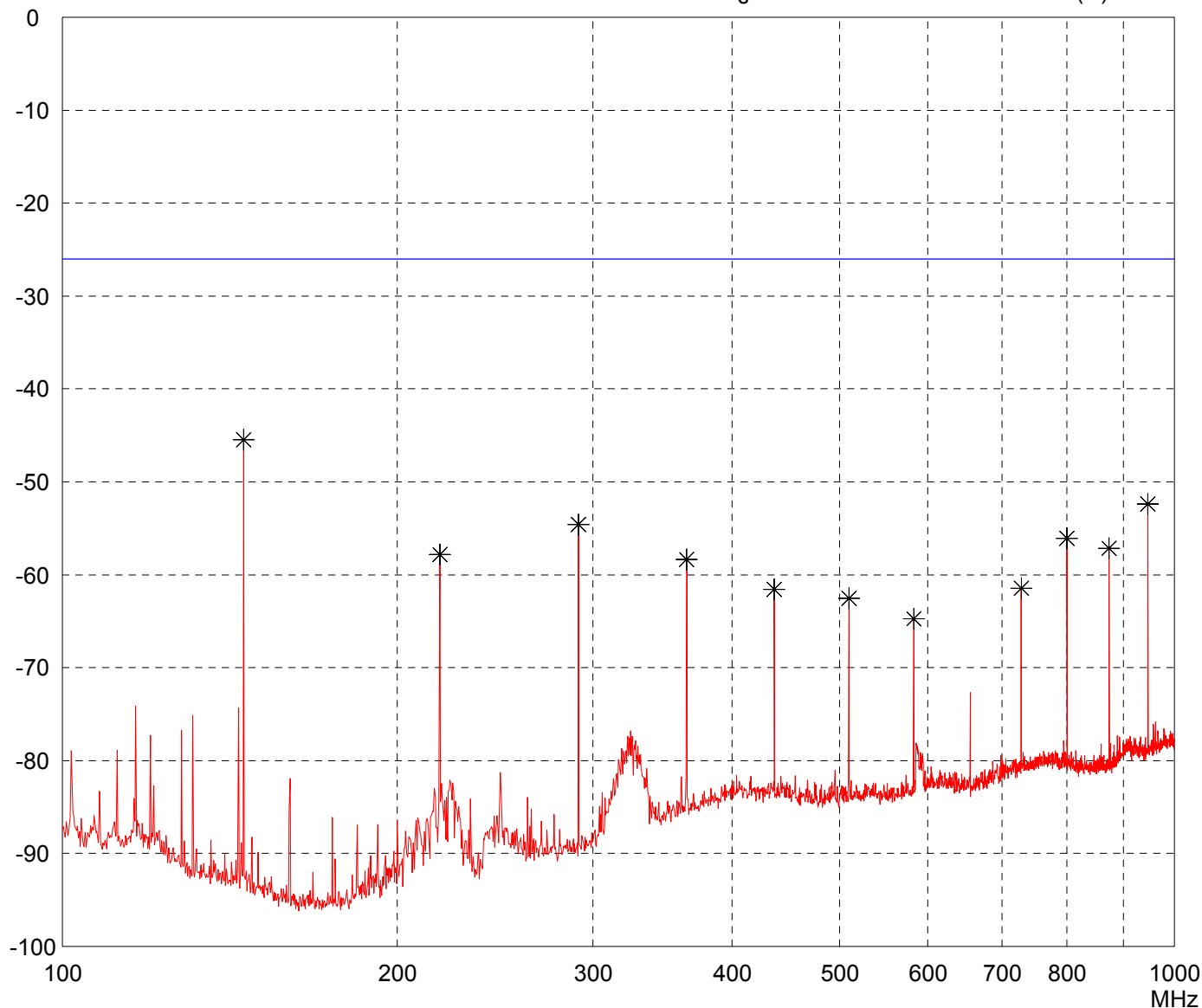
Detector:
Peak

List of values:

Selected by hand

dBm

Limit1: FCC §95.639b3 Transducer: Subst (H) VULB



Result:
Limit kept

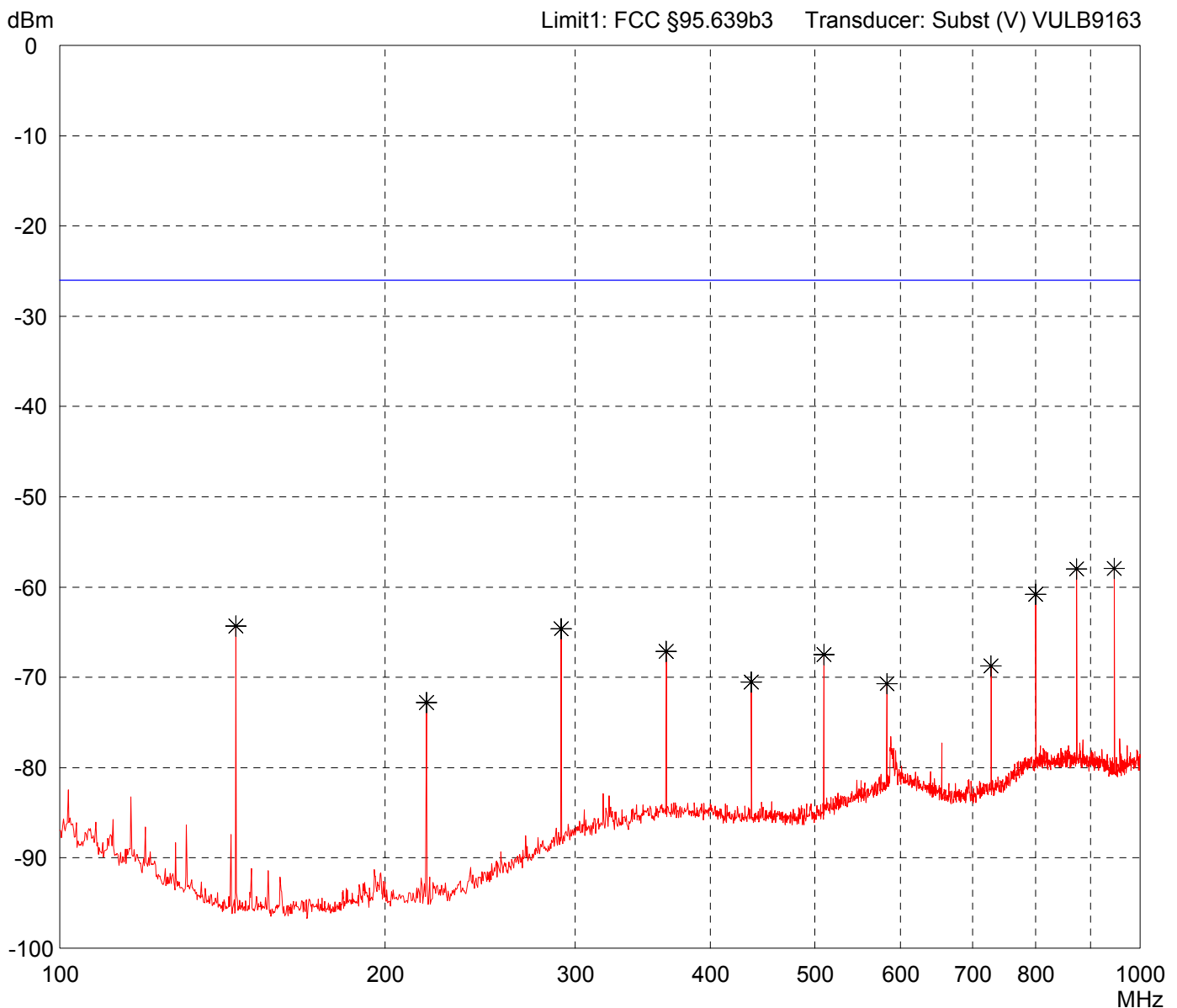
Project file:
55503-50321

Page of Pages

Radiated Power Test 100 MHz - 1 GHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: Flat on table (P2) - With 100 MHz high-pass-filter
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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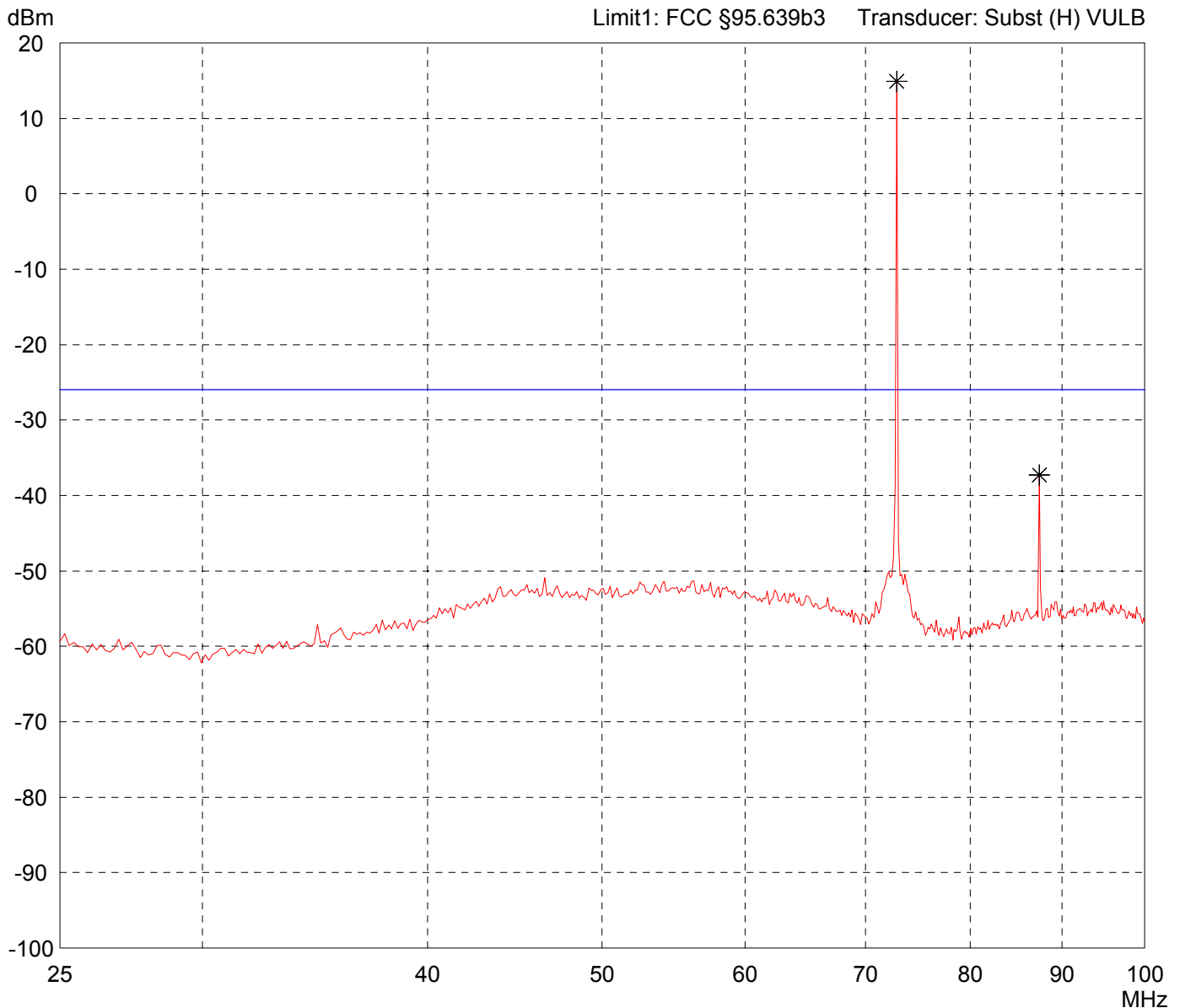


Result: Limit kept	Project file: 55503-50321
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Radiated Power Test 25 MHz - 100 MHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: On left side (P3)
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
--------------------------	--

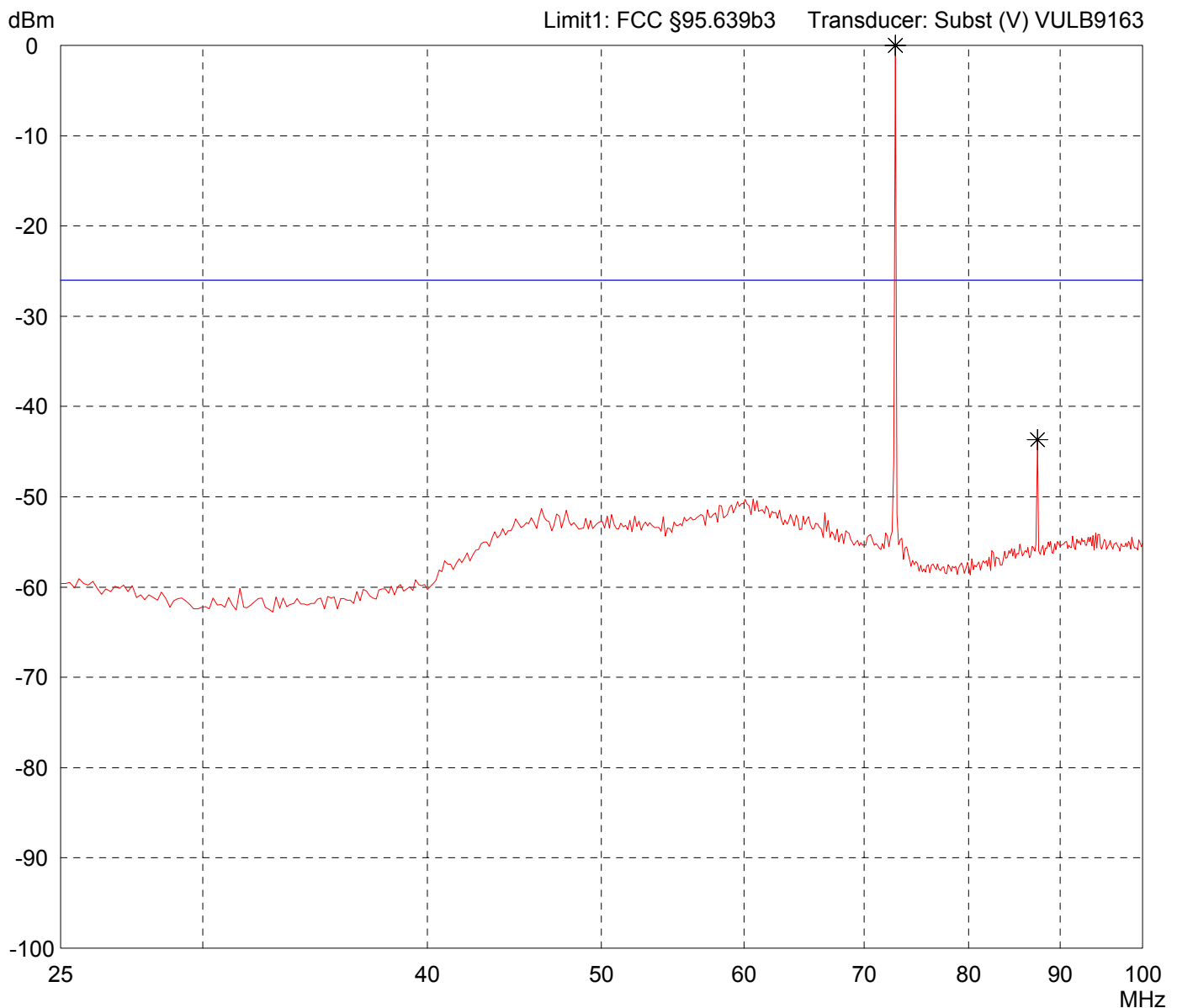


Result: Limit kept (Carrier excluded)	Project file: 55503-50321
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Radiated Power Test 25 MHz - 100 MHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: On left side (P3)
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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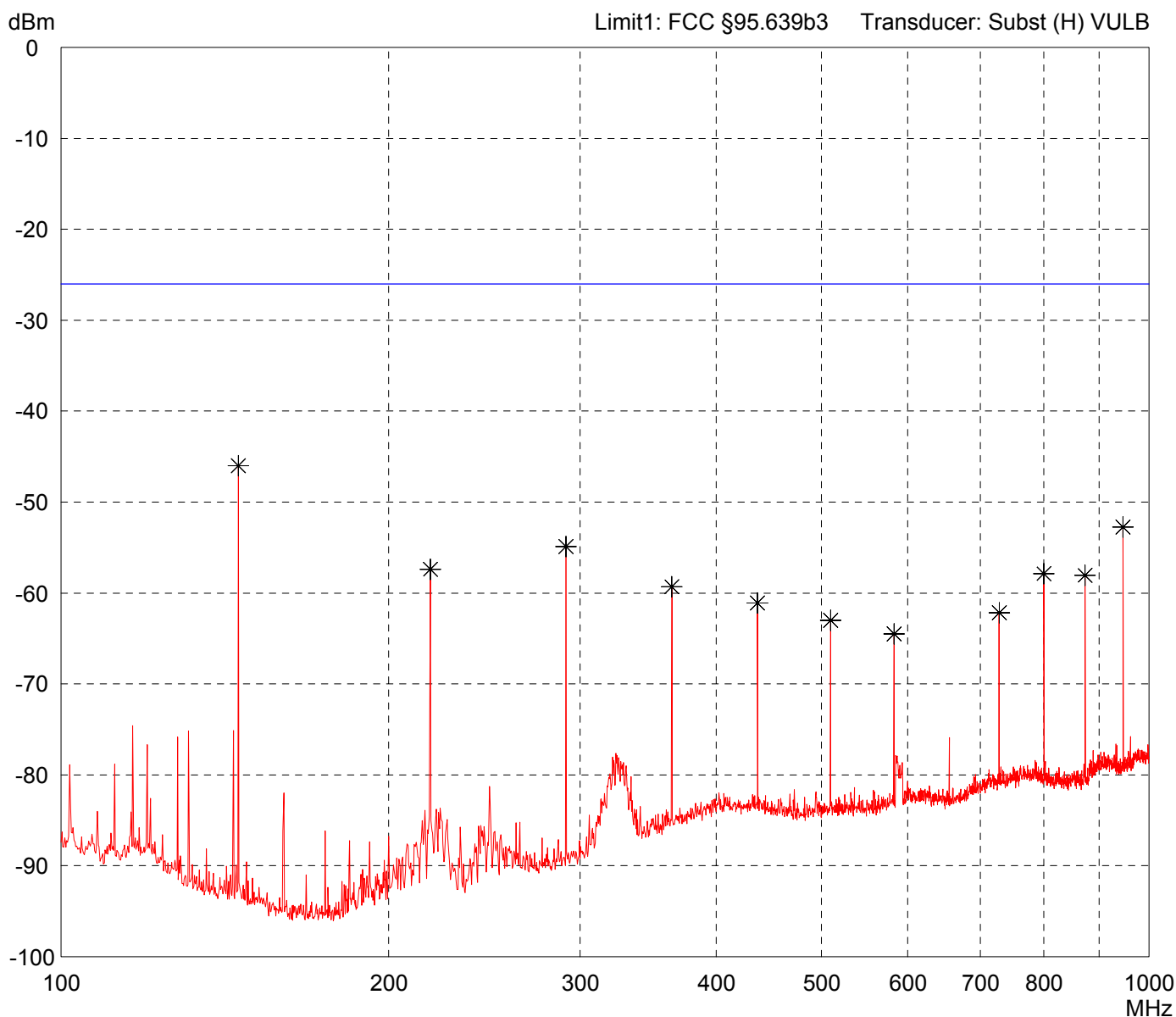


Result: Limit kept (Carrier excluded)	Project file: 55503-50321
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Radiated Power Test 100 MHz - 1 GHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: On left side (P3) - With 100 MHz high-pass-filter
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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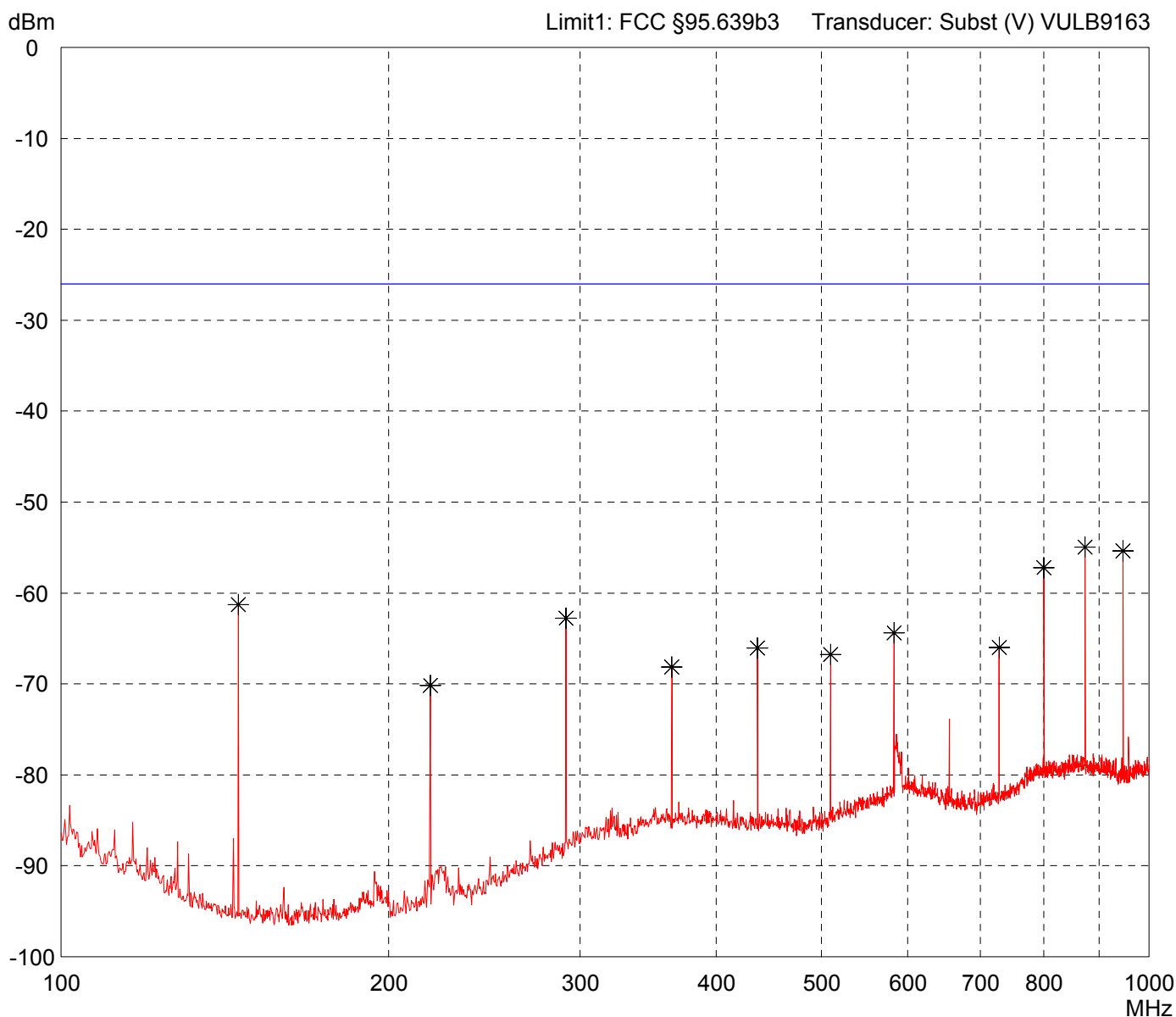


Result: Limit kept	Project file: 55503-50321
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Radiated Power Test 100 MHz - 1 GHz acc. to FCC Part 95 Subpart C/E

Model: T4EX-FM72	Comment: - 9.6 V Lithium-Battery supply - Crystal: 72.810 MHz - transmitting continuously - Position: On left side (P3) - With 100 MHz high-pass-filter
Serial no.: ES Sample No. 4	
Applicant: Futaba Corporation	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 06/15/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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Result: Limit kept	Project file: 55503-50321
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