SENTON

■ EMV-Prüfzentrum ■ EMI/EMC-Testcenter ■

Straubing, 29 September 2003

T E S T - R E P O R T

No. 50305-30587-8

for

Model 219XX, Article Code G86-219XX ZZ ZZ ZZ

Wireless Keyboard

Uniform variants: Model 217XX, Article Code G86-217XX ZZ ZZ ZZ

Applicant:	Cherry GmbH
Test Specification:	FCC Code of Federal Regulations, CFR 47, Part 15, Sections 15.209 and 15.227

Table of Contents

1. Administrative Data

Test item (EUT)	
Type designation	Model 219XX, Article Code G-86-219XX ZZ ZZ ZZ
Uniform variants:	Model 217XX, Article Code G-86-217XX ZZ ZZ ZZ
Serial number(s):	001
Type of equipment:	Wireless Keyboard
Parts/accessories:	
FCC-ID:	
Technical data	
Frequency range	26.96 - 27.28 MHz
Operational frequencies	27.145 MHz
Type of modulation	10K0A1D
Pulse frequency	N/A
Pulse width	N/A
Antenna	Integrated
Power supply	3 V DC (2 Alkaline Batteries
Applicant: (full address)	Cherry GmbH Cherrystrasse D-91275 Auerbach / Germany
Contract identification:	---
Contact person:	Jürgen Meier
Manufacturer:	Applicant
Application details	
Receipt of EUT:	27 August 2003
Date of test:	September 2003
Note:	
Responsible for testing:	Johann Roidt
Responsible for test report:	Johann Roidt

2. Identification of Test Laboratory

DETAILS OF THE TEST LABORATORY	
COMPANY NAME:	Senton GmbH EMI/EMC Test Center
ADDRESS:	Aeussere Fruehlingsstrasse 45 D-94315 Straubing Germany
LABORATORY ACCREDITATION:	DAR-Registration No. TTI-P-G 062/94-40
FCC TEST SITE LISTING	
INDUSTRY CANADA TEST SITE REGISTRATION	IC 3050
NAME FOR CONTACT PURPOSES:	Mr. Johann Roidt
TELEPHONE: (+49) (0)9421 5522-0	FAX: (+49) (0)9421 5522-99

PERSONNEL INVOLVED IN THIS TEST REPORT	
TECHNICAL DIRECTOR:	 Mr. Johann Roidt
RESPONSIBLE FOR TESTING:	Mr. Johann Roidt
RESPONSIBLE FOR TEST REPORT:	Mr. Johann Roidt

SUMMARY OF TEST RESULTS
The tested sample complies with the requirements set forth in the **Code of Regulations CFR 47, Part 15, Sections 15.209 and 15.227**

3. Operation Mode of EUT

Normal operation

4. Configuration

Configuration of the EUT
Not applicable

Cables connected to the EUT
Not applicable

Peripheral devices connected to the EUT
Not applicable

5. Measuring Methods

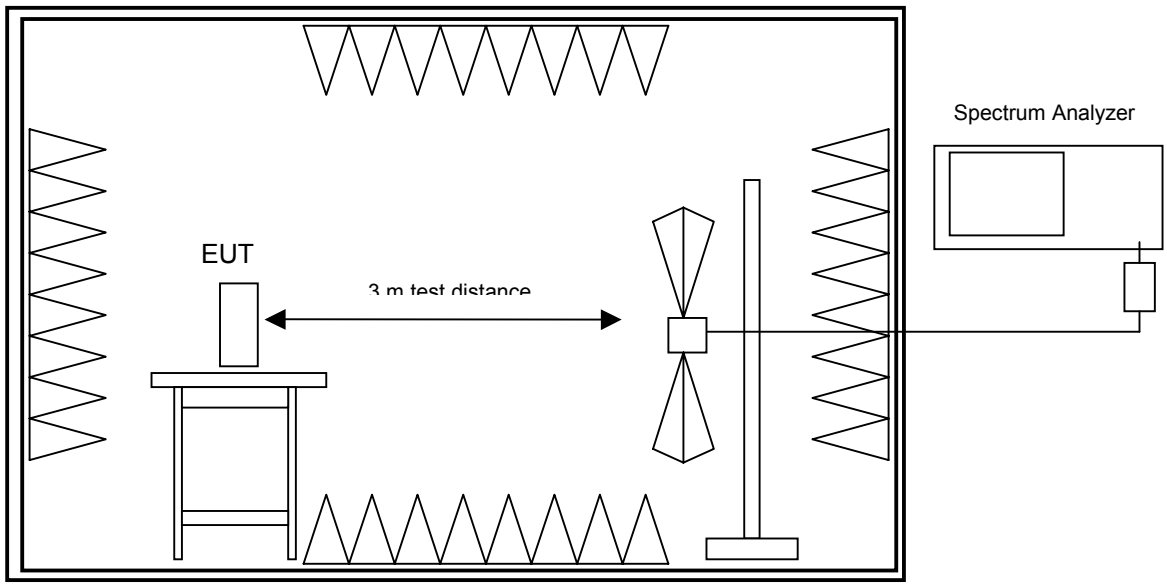
5.1. Field Strength of Emissions, Prescans in a fully-anechoic Room

Rules and Specifications:	Sections 15.109 & 15.209
Guide:	ANSI C63.4 1997

Measurement Procedure:

Radiated emissions are measured over the frequency range from 30 MHz to the maximum frequency as required in section 15.33

Measurements were 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 100 kHz. All tests were performed at a test-distance of 3 meters. 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. For final testing an open-area test-site was used. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions.



Fully anechoic chamber

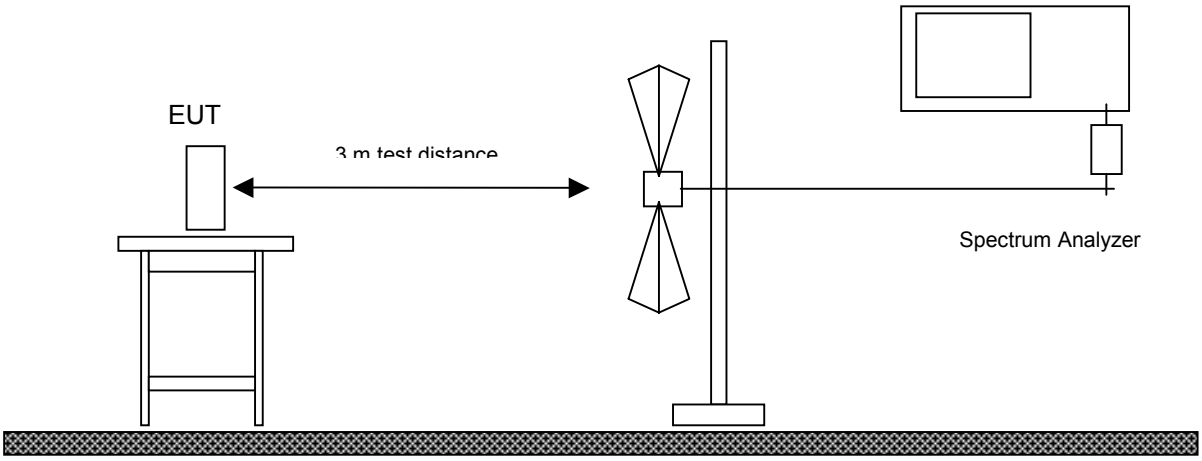
Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
113	Preamplifier	CPA9231A	3393	Schaffner
141	Biconical antenna	HK 116	829708/006	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
145	Horn antenna	3115	9508-4553	EMCO
146	Horn antenna set	3160-03/-09	9112-1003	EMCO
114	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
115	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
003	Fully anechoic room	No. 2	1452	Albatross Projects

5.2. Radiated Emission Measurement at Open Area Test Site

Rules and Specifications:	Sections 15.109 & 15.209
Guide:	ANSI C63.4 1997

Measurement Procedure:
Radiated emissions are measured in the frequency range specified in section 15.33. Resolution and video bandwidth of the spectrum analyzer are set to 1 MHz. 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. Additional measurements are performed at critical frequencies with reduced span. EUT is rotated all around and receiving antenna is raised and lowered to find the maximum levels of emission. The cables and equipment are placed and moved within the range of position likely to find their maximum emissions. All tests are performed in a fully-anechoic chamber with a test-distance of 3 meters. If required preamplifiers are used for the whole frequency range. Special care is taken to avoid overload in transmit mode (using appropriate attenuators and filters if necessary).

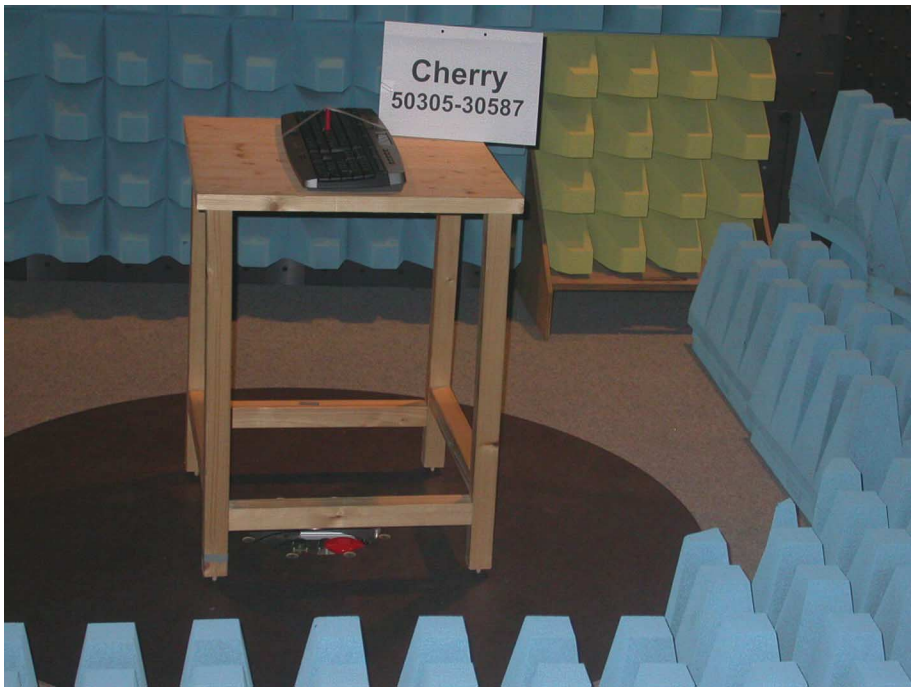


Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	EMI Receiver	ESVP	881414/009	Rohde & Schwarz
141	Biconical antenna	HK 116	829708/006	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
145	Horn antenna	3115	9508-4553	EMCO
146	Horn antenna set	3160-03/-09	9112-1003	EMCO
114	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
115	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
003	Open Field Test Site	No. 1	N/A	Senton

6. Photographs Taken During Testing

Test setup for radiated emission measurement (fully anechoic room)



Test setup for radiated emission measurement (open area test site)

7. List of Measurements

FCC Part 15			
Section(s):	**Test**	**Page(s)**	**Result**
15.205	Restricted Bands		Pass
15.227 (a)	Field strength of emissions - inband	---	Pass
15.227 (b)	Field strength of emissions - outside assigned frequency band	---	Pass
15.209	Field strength of emissions - Receiver		Pass

Field Strength of Emissions - Transmitter

Rules and Specifications:	15.227 (a) Field Strength of Emissions - inband 15.227 (b) Field Strength of Emissions - outside assigned frequency band
Guide:	ANSI C63.4
Limit:	The field strength of any emission in this band shall not exceed 10,000 microvolts/meter at 3 meters. The field strength of any emission which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209

Tested Frequency:	27.145 MHz (Transmitter under Test)
Test Site:	Open Area Test Site (< 1 GHz), Fully anechoic chamber (> 1 GHz)
Distance:	3 Meter

Frequency (MHz)	Detector	Antenna Polarization	Analyzer Reading (dBµV)	Correction Factor (dB/m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
27,145	Av	Hor	38,70	15,00	53,70	80,00	**26,3**
54,090	Q.P.	Hor	12,70	10,30	23,00	40,00	**17,0**
81,120	Q.P.	Hor	8,30	9,70	18,00	40,00	**22,0**
108,160	Q.P.	Hor.	11,36	11,30	22,66	43,50	**20,8**

***** = All emissions showed more than 20 dB margin to the limit**

Sample calculation of erp values:

Field Strength (dBµV/m) = Analyzer Reading (dBµV) + Correction Factor (dB/m)

Test Results:	Pass	

8. Referenced Regulations

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

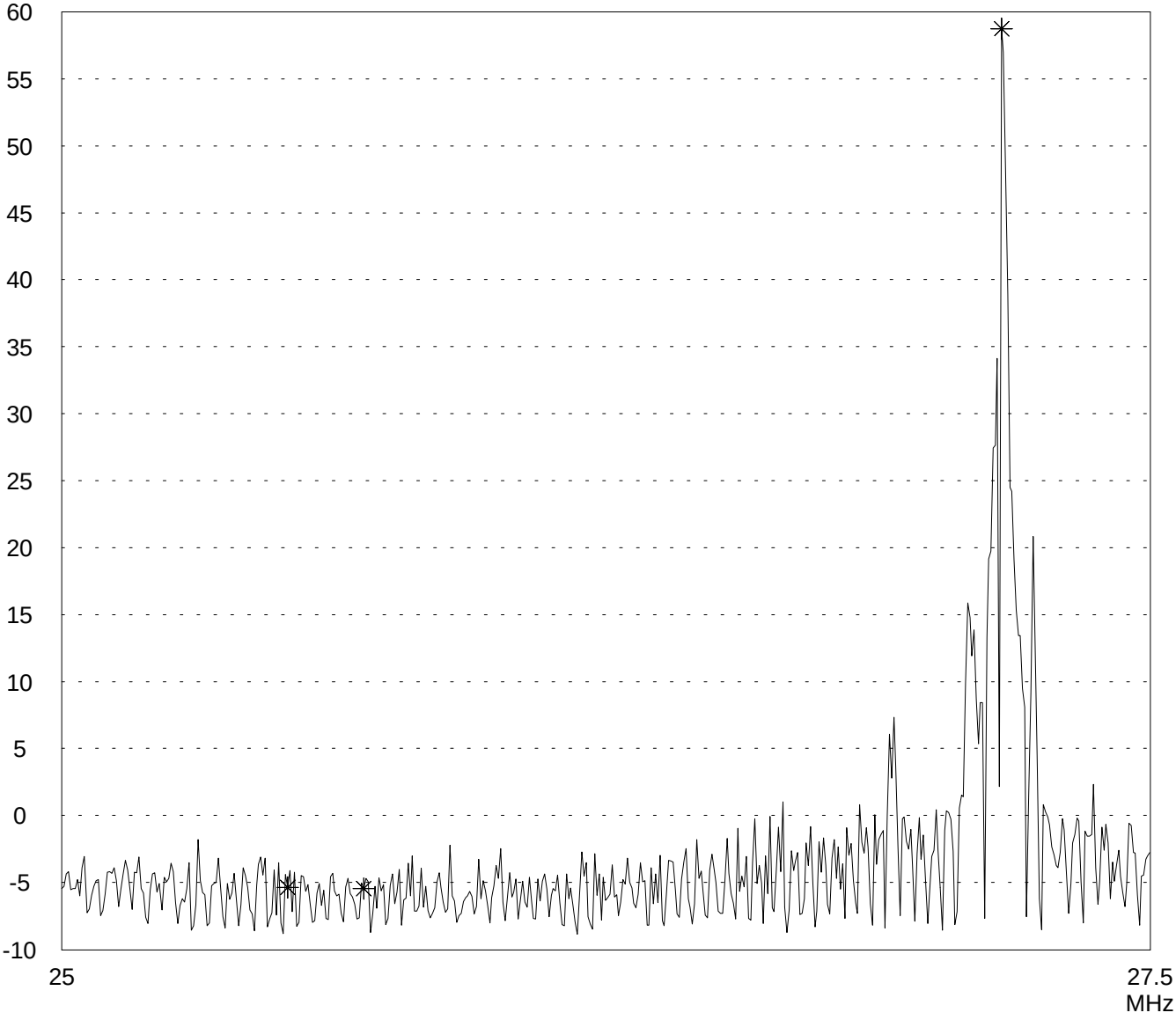
☒	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency Allocations And Radio Treaty Matters, General Rules And Regulations) of the Federal Communication Commission (FCC)	October 1, 2001
☐	CFR 47 Part 15 Subpart A	Code of Federal Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)	March 13, 2003
☐	CFR 47 Part 15 Subpart B	Code of Federal Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)	March 13, 2003
☒	CFR 47 Part 15 Subpart C	Code of Federal Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)	March 13, 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 - 40 GHz	October, 1992
☒	RSS-210	Radio Standards Specification RSS-210 Issue 5 for Low Power Licence-Exempt Radiocommuniction Devices of Industry Canada	November 2001
☐	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

Charts taken during testing

Restricted bands of operation 25 MHz - 27.5 MHz
acc. to FCC Part 15.205 (Fully Anechoic Chamber)

Model: Tastatur Modell 219XX	Comment: - 2 x 1.5 V alkaline battery supply - solar panel attached - sending continiously
Serial no.: Prototyp #2	
Applicant: Cherry GmbH	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 09/10/2003 / Operator: M. Steindl	
Test performed: automatically / File name: default.emi	
Detector: Peak	List of values: Selected by hand

dBµV/m Limit1: FCC Part 15 Transducer: HK 116 (A-1560)

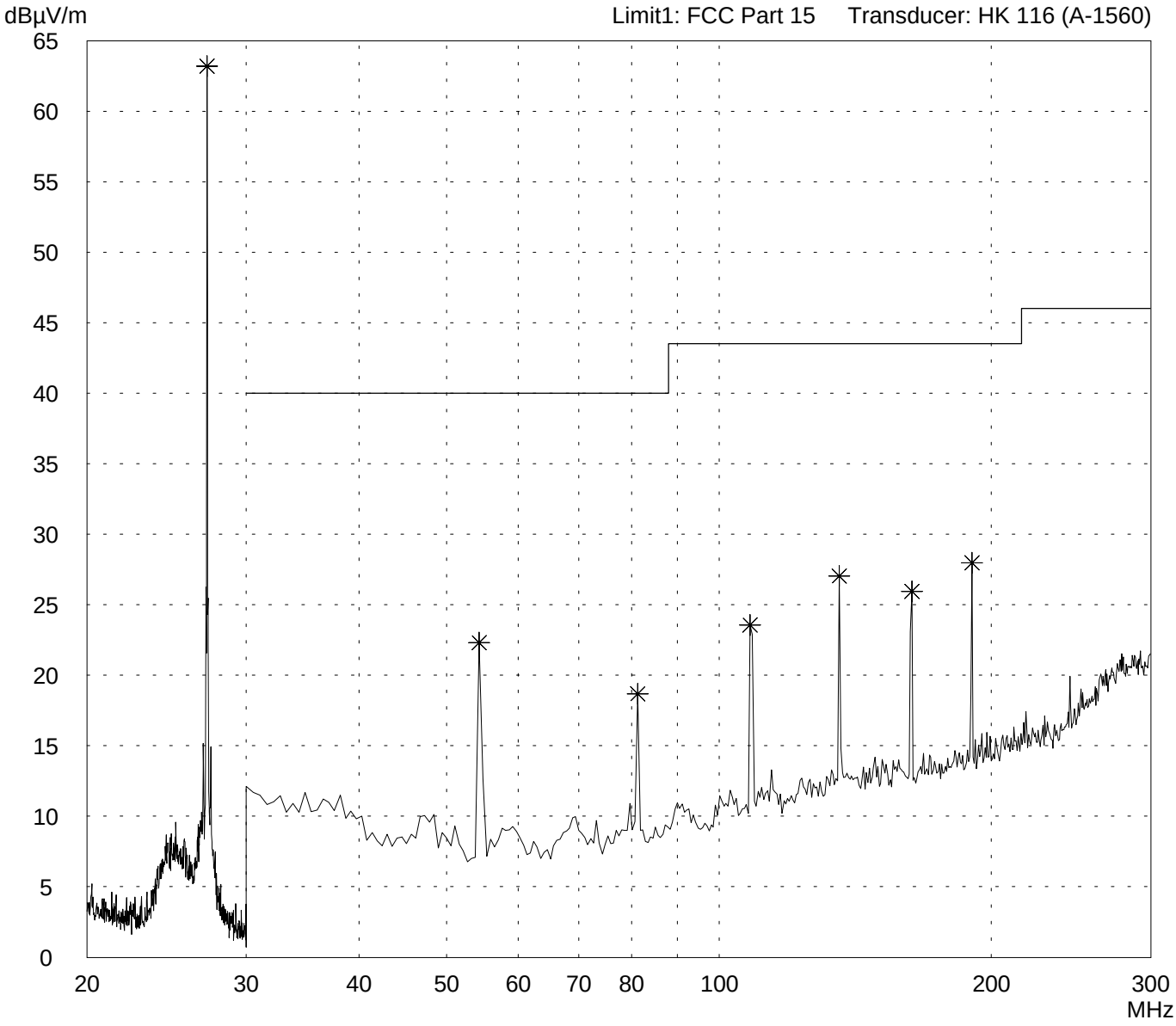


Result: Requirement kept	Project file: 50305-30587-1 Page of Pages

Radiated Emission Test 20 MHz - 300 MHz
acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Tastatur Modell 219XX	Comment: - 2 x 1.5 V alkaline battery supply - solar panel attaced - sending continiously
Serial no.: Prototyp #2	
Applicant: Cherry GmbH	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 09/10/2003 / Operator: M. Steindl	
Test performed: automatically / File name: default.emi	

Detector: Peak	List of values: Selected by hand



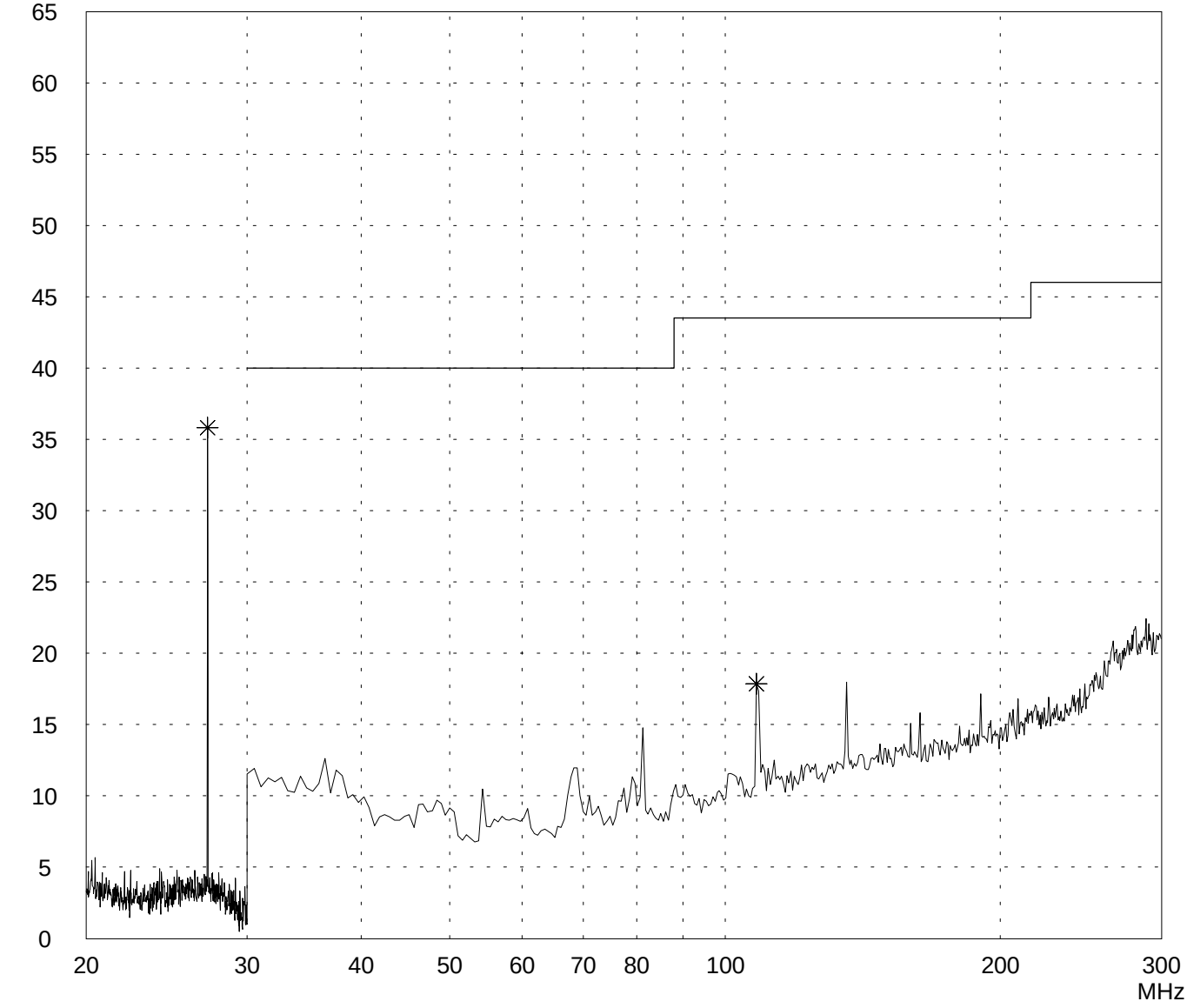
Result: Prescan	Project file: 50305-30587-1 Page of Pages

Radiated Emission Test 20 MHz - 300 MHz
acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Tastatur Modell 219XX	Comment: - 2 x 1.5 V alkaline battery supply - solar panel attaced - sending continiously
Serial no.: Prototyp #2	
Applicant: Cherry GmbH	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 09/10/2003 / Operator: M. Steindl	
Test performed: automatically / File name: default.emi	

Detector: Peak	List of values: Selected by hand

dBµV/m Limit1: FCC Part 15 Transducer: HK 116 (A-1560)



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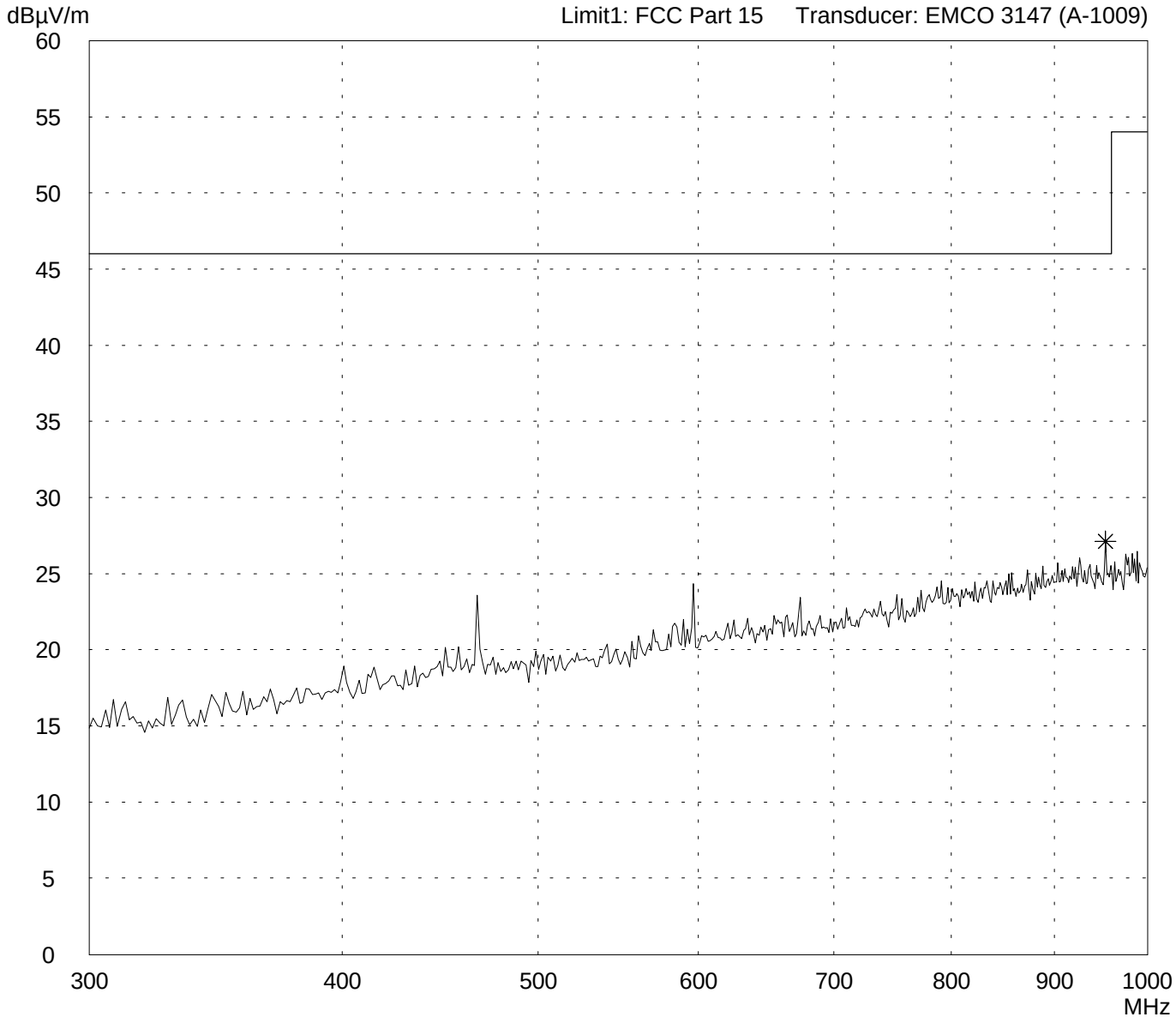
Radiated Emission Test 300 MHz - 1 GHz
acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Tastatur Modell 219XX	Comment: - 2 x 1.5 V alkaline battery supply - solar panel attaced - sending continiously
Serial no.: Prototyp #2	
Applicant: Cherry GmbH	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 09/10/2003 / Operator: M. Steindl	
Test performed: automatically / File name: default.emi	

Detector: Peak	List of values: Selected by hand

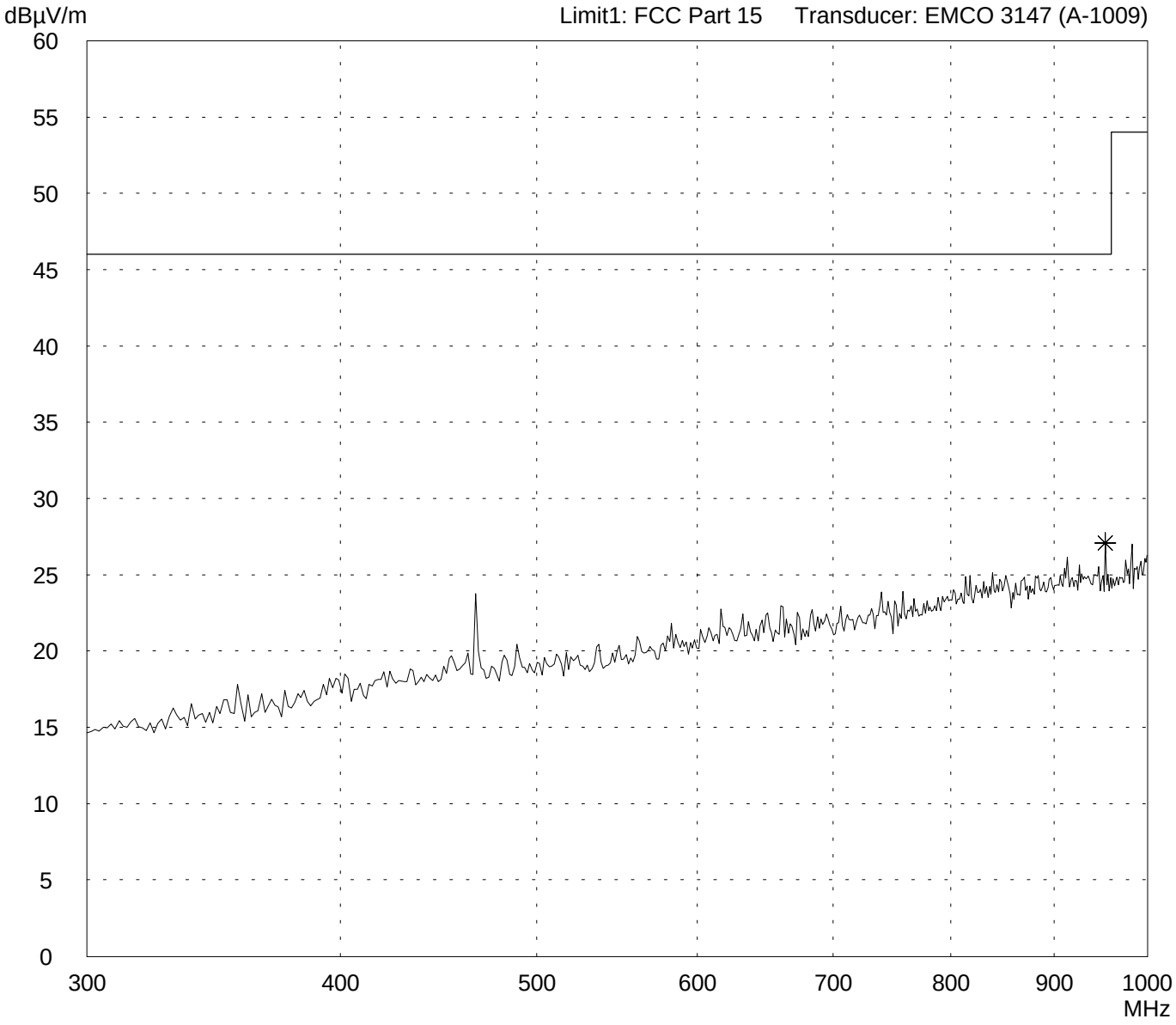


Result: Prescan	Project file: 50305-30587-1 Page of Pages

Radiated Emission Test 300 MHz - 1 GHz
acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Tastatur Modell 219XX	Comment: - 2 x 1.5 V alkaline battery supply - solar panel attaced - sending continiously
Serial no.: Prototyp #2	
Applicant: Cherry GmbH	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 09/10/2003 / Operator: M. Steindl	
Test performed: automatically / File name: default.emi	

Detector: Peak	List of values: Selected by hand



Result: Prescan	Project file: 50305-30587-1 Page of Pages