SENTON
EMV-Prüfzentrum EMI/EMC-Testcenter

Straubing, Juli 12, 2001

T E S T - R E P O R T

No. 50530-10276

for

RC390-02 24V

Remote Control Receiver Module

Applicant:	ELDAT GmbH
Purpose of testing:	To show compliance with
	FCC Code of Federal Regulations, Part 15 Subpart B Class B
	Industry Canada Radio Standards Specification RSS-210 Issue 2, Section 6.1 (Category I Equipment)

Table of Contents

1. Administrative Data

Equipment Under Test (EUT):	RC390-02 24V
Serial number(s):	0001
Type of equipment:	Remote Control Receiver Module
Parts/accessories:	
FCC-ID:	NKPRC390-0224SPC

Applicant: (full address)	
Contract identification:	---
Contact person:	
Manufacturer:	ELDAT GmbH

Receipt of EUT:	
Date of test:	
Note:	

Responsible for testing:	Johann Roidt
Responsible for test report:	Johann Roidt

2. Identification of Test Laboratory

Test Laboratory: (full address):	Senton GmbH EMI/EMC Test Center Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany	
Contact person:	Mr. Johann Roidt	
Communication:	Telephone Fax eMail:	(+49) 0 94 21 / 55 22-0 (+49) 0 94 21 / 55 22-99 Office@senton.de
FCC registration number:	90926	
Industry Canada file number:	IC 3050	

3. Summary of Test Results

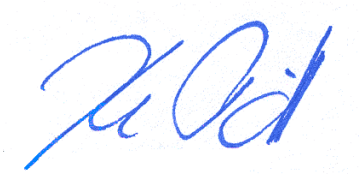
The tested sample complies with the requirements set forth in the

FCC Part 15 Subpart B Class B

of the Federal Communication Commission (FCC).

and the

Radio Standards Specification RSS-210 Issue 2, Section 6.1 for Low Power Licence-Exempt Radiocommuniction Devices of Industry Canada.



Johann Roidt
Technical Manager

4. Operation Mode of EUT

Not applicable

5. Configuration of EUT and Peripheral Devices

Configuration of cables of EUT

Not applicable

Configuration of peripheral devices connected to EUT

All tests were performed with the Receiver module installed in a garage door opener unit.

6. Measuring Methods

6.1. Conducted Emission 0.45 MHz - 30 MHz (§15.107) / RSS-210 Section 7.4)

Conducted emissions were measured in the frequency range 0.45 MHz to 30 MHz. The bandwidth of the EMI-Receiver was set to 9 kHz and the detector-function was set to CISPR quasi-peak.
The test setup was made in accordance with ANSI C63.4-1992.
Measurements were performed on phase and neutral lines of the power-cords of the tested system. Preliminary scans were taken with the detector-function of the EMI-receiver set to peak to determine the conducted EMI-profile of the EUT. At the final test the cables and equipment were placed and moved within the range of positions likely to find their maximum emissions.
See figure 1 for the measurement setup.

Test equipment used (see equipment list for details):
04, 22, 23, 60, 63

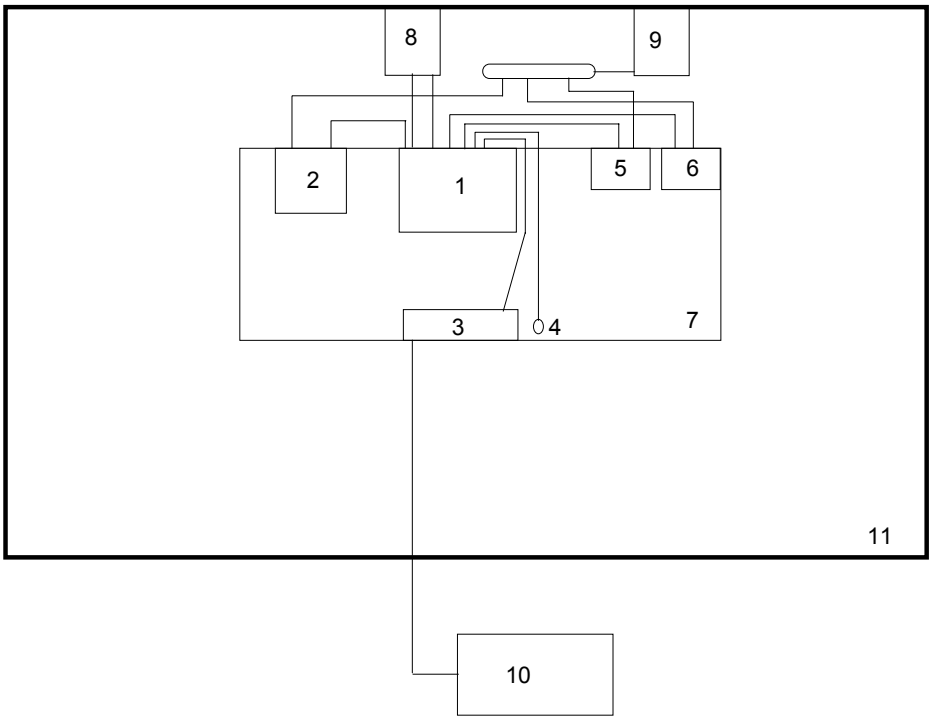


Figure 1: Example of measurement setup for conducted emission test

1 EUT
2 Monitor
3 Keyboard
4 Mouse
5 Parallel Printer
6 Serial Printer
7 Wooden table
8 LISN for EUT
9 LISN for peripheral device(s)
10 Test receiver
11 Shielded room

6.2. Radiated Emission 30 MHz - 1 GHz (FCC §15.109 / RSS-210 Section 7.3)

Radiated emissions are measured over the frequency range from 30 MHz to 1 GHz. The bandwidth of the EMI-receiver is set to 120 kHz and the detector-function is set to CISPR quasi-peak.
The test setup is made in accordance with ANSI C63.4-1992.
Measurements are made in both the horizontal and vertical planes of polarization.
Preliminary scans are taken in a semi-anechoic room using a spectrum analyzer with the detector function set to peak. 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.
All tests are performed at a test-distance of 3 meters.
For final testing an open-area test-site is used. During the tests the EUT is rotated all around and the receiving-antenna is raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. The cables and equipment is placed and moved within the range of position likely to find their maximum emissions.

See figure 2 for the measurement setup.

Test equipment used (see equipment list for details):
01, 02, 05, 12, 38, 39, 40, 41, 58, 61, 64, 66

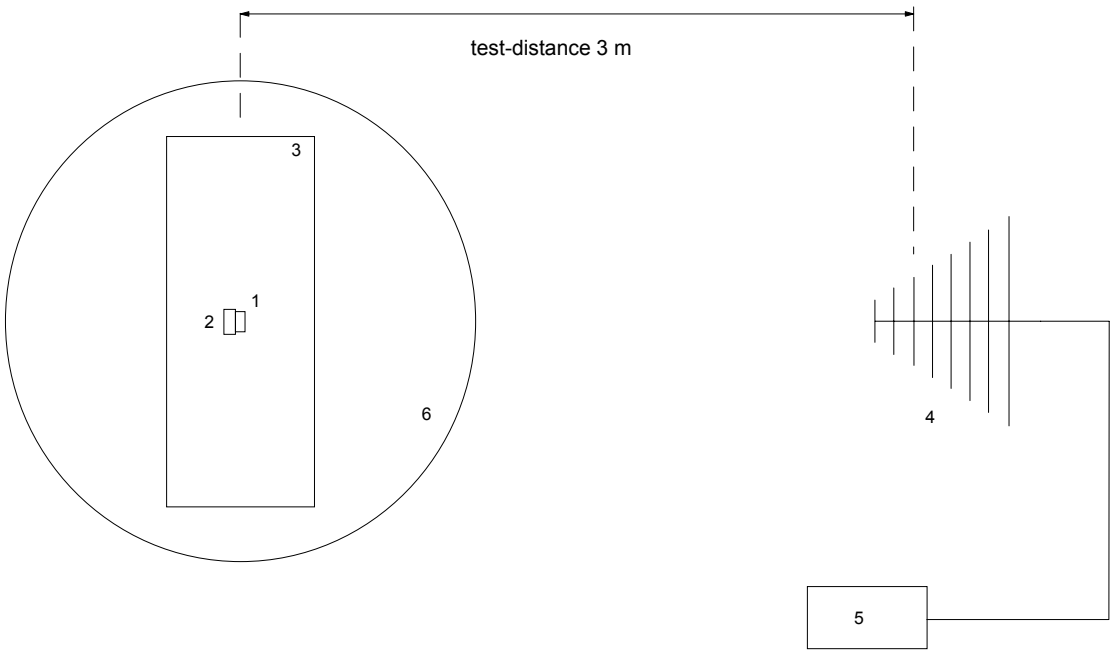


Figure 2: Measurement setup for radiated emission test below 1 GHz

1	Transmitter (EUT)	4	Measurement antenna
2	Wooden pedestal (if necessary)	5	Test receiver
3	Wooden table	6	Turn table

6.3. Radiated Emission 1 GHz - 4.5 GHz (FCC §15.109 / RSS-210 Sections 7.3)

Radiated emissions are measured in the frequency range 1 GHz to 4.5 GHz. 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 semi-anechoic chamber with a test-distance of 3 meters.
If possible preamplifiers are used for the whole frequency range. Special care is taken to avoid overload in transmit mode (using appropriate attenuators or filters if necessary).

See figure 3 for the measurement setup.

Test equipment used (see equipment list for details):
02, 13, 14, 16, ,42, 44, 45, 57, 64

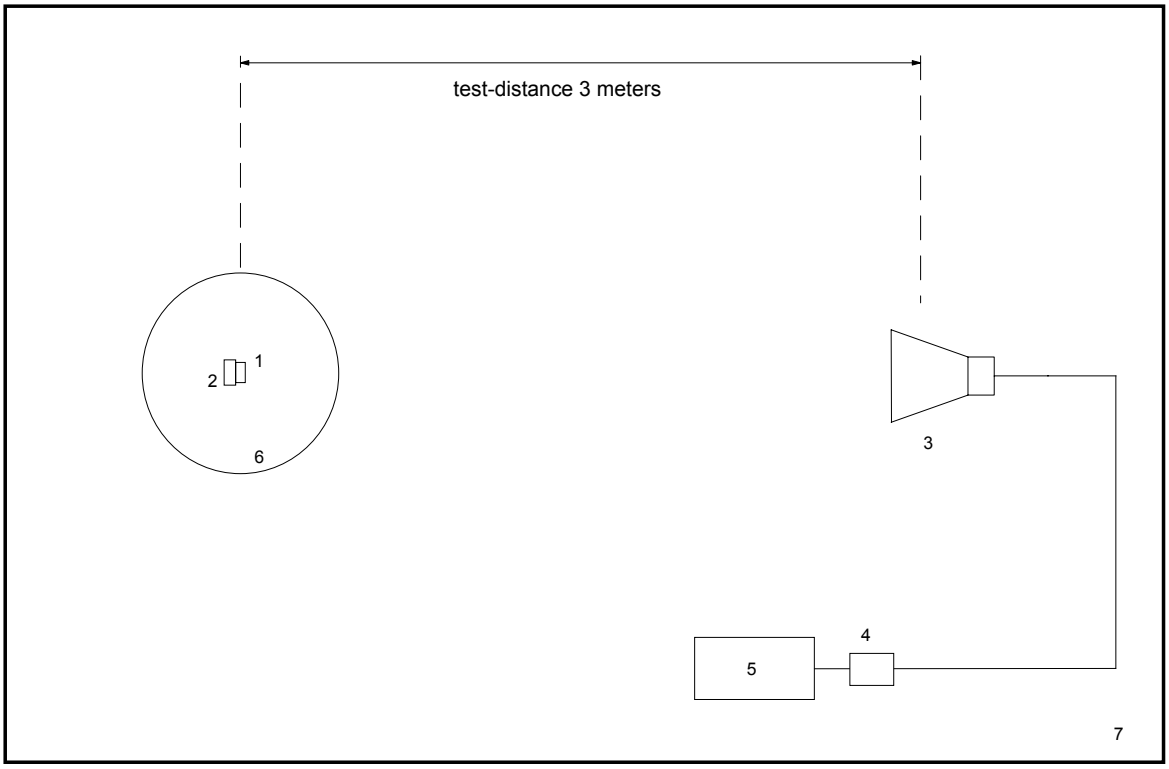


Figure 3: Measurement setup for radiated emission test above 1 GHz

1 Transmitter (EUT)
2 Wooden pedestal (if necessary)
3 Measurement antenna
4 Preamplifier (if applicable)
5 Spectrum analyzer
6 Turn table
7 Semi anechoic room

7. Equipment List

To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

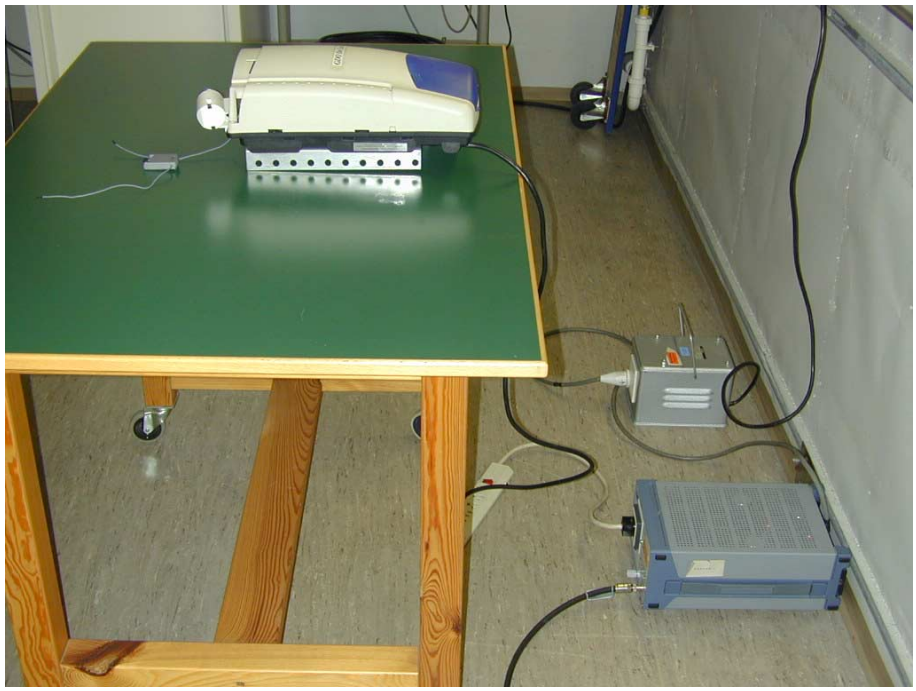
No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	R 3271	05050023	Advantest
02	EMI Test Receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
03	Test Receiver	ESH 3	880112/032	Rohde & Schwarz
04	Test Receiver	ESHS 10	860043/016	Rohde & Schwarz
05	Test Receiver	ESV	881414/009	Rohde & Schwarz
06	Test Receiver	ESVP	881120/024	Rohde & Schwarz
07	Audio Analyzer	UPA	862954	Rohde & Schwarz
08	Power Meter	NRVS	836856/015	Rohde & Schwarz
09	Power Sensor	NRV-Z52	837901/030	Rohde & Schwarz
10	Power Sensor	NRV-Z4	863828/015	Rohde & Schwarz
11	Preamplifier	ESV-Z3	860907/004	Rohde & Schwarz
12	Preamplifier	R14601		Advantest
13	Preamplifier	ACX/080-3030	32640	CTT
14	Preamplifier	ACO/180-3530	32641	CTT
15	Signal Generator	SMS	872166/039	Rohde & Schwarz
16	Signal Generator	HP 8673 D	2930A00966	Hewlett Packard
17	Waveform Generator	HP 33120 A	US34005375	Hewlett Packard
18	Attenuator 20 dB	4776-20	9503	Narda
19	Attenuator 10 dB	4776-10	9412	Narda
20	Pulse Limiter	ESH 3-Z2	1144	Rohde & Schwarz
21	Pulse Limiter	11947 A	3107A00566	Hewlett Packard
22	V-Network	ESH 3-Z5	862770/018	Rohde & Schwarz
23	V-Network	ESH 3-Z5	894785/005	Rohde & Schwarz
24	V-Network	ESH 3-Z5	830952/025	Rohde & Schwarz
25	V-Network	ESH 3-Z6	830722/010	Rohde & Schwarz
26	V-Network	NSLK 8127	8127152	Schwarzbeck
27	V-Network	NNLA 8119	8119148	Schwarzbeck
28	V-Network	SE 01	01	Senton
29	T-Network	ESH 3-Z4	890602/011	Rohde & Schwarz
30	T-Network	ESH 3-Z4	890602/012	Rohde & Schwarz
31	High Impedance Probe	TK 9416	01	Schwarzbeck
32	High Impedance Probe	TK 9416	02	Schwarzbeck
33	Current Probe	ESH 2-Z1	863366/18	Rohde & Schwarz
34	Current Probe	ESV-Z1	862553/3	Rohde & Schwarz

No.	Type	Model	Serial Number	Manufacturer
35	Absorbing Clamp	MDS 21	80911	Lüthi
36	Absorbing Clamp	MDS 21	79690	Lüthi
37	Loop Antenna	HFH2-Z2	882964/1	Rohde & Schwarz
38	Biconical Antenna	HK 116	842204/001	Rohde & Schwarz
39	Biconical Antenna	HK 116	836239/02	Rohde & Schwarz
40	Log. Periodic Antenna	HL 223	841516/023	Rohde & Schwarz
41	Log. Periodic Antenna	HL 223	834408/12	Rohde & Schwarz
42	Horn Antenna	3115	9508-4553	Emco
43	Horn Antenna	3160-03	9112-1003	Emco
44	Horn Antenna	3160-04	9112-1001	Emco
45	Horn Antenna	3160-05	9112-1001	Emco
46	Horn Antenna	3160-06	9112-1001	Emco
47	Horn Antenna	3160-07	9112-1008	Emco
48	Horn Antenna	3160-08	9112-1002	Emco
49	Horn Antenna	3160-09	9403-1025	Emco
50	Digital multimeter	199	463386	Keithley
51	DC Power Supply	NGSM 32/10	203	Rohde & Schwarz
52	DC Power Supply	NGB	2455	Rohde & Schwarz
53	DC Power Supply	NGA	386	Rohde & Schwarz
54	Temperature Test Chamber	HT4010	07065550	Heraeus
55	Cable	RG214	1309	Senton
56	Cable	200CM_001	1357	Rosenberger
57	Cable	150CM_001	1479	Rosenberger
58	Cable Set EG1	RG214	1189 - 1191	Senton
59	Cable Set Cabine 1	RG214		Senton
60	Cable Set Cabine 2	RG214		Senton
61	Cable Set Cabine 3	RG214		Senton
62	Shielded Room	No. 1	1451	Senton
63	Shielded Room	No. 2	1452	Senton
64	Semi-anechoic Chamber	No. 3	1453	Siemens
65	Shielded Room	No. 4	1454	Euroshield
66	Open Area Test Site	EG 1		Senton
67	Test fixture			Senton

8. Photographs Taken During Testing

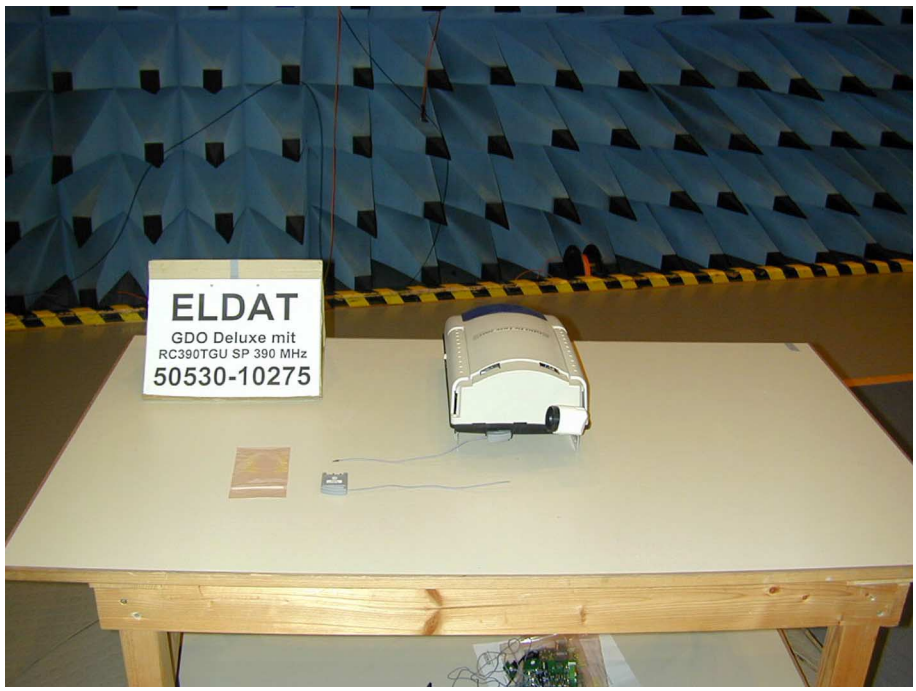
Photo No. 8.1

Test setup for conducted emission test 450 kHz - 30 MHz



Photos No. 8.2 - 8.3

Test setup for radiated emission pre-test 30 MHz - 1 GHz
(semi anechoic room)



Photos No. 8.4 - 8.5

Test setup for radiated emission final test 30 MHz - 1 GHz
(open area test site)

9. List of Measurements

9.1. List of Measurements According To FCC Part 15 Subpart B

FCC Part 15 Subpart B			
Section(s):	**Test**	**Page(s)**	**Result**
§15.107	Conducted emission test 450 kHz - 30 MHz		Passed
§15.109	Radiated emission test 9 kHz - 30 MHz	---	Not Applicable (acc. to §15.33)
§15.109	Radiated emission test 30 MHz – 2.0 GHz		Passed
§15.111	Antenna power conducted emissions 9 kHz - 4.5 GHz		Not Applicable

9.2. List of Measurements According To Industry Canada RSS-210

Industry Canada RSS-210 Issue 2			
Section(s):	**Test**	**Page(s)**	**Result**
7.4	Conducted emission test 450 kHz - 30 MHz		Not Applicable
7.3	Radiated emission test 30 MHz - 4.5 GHz		Passed
7.2	Antenna power conducted emissions 9 kHz - 4.5 GHz		Not Applicable

10. Referenced Regulations

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

☒	FCC Part 15 Subpart A	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)	October 20, 1997
☒	FCC Part 15 Subpart B	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)	October 20, 1997
☒	FCC Part 15 Subpart C	Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)	October 20, 1997
☒	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 2 for Low Power Licence-Exempt Radiocommuniction Devices of Industry Canada	February 24, 1996

11. Test Results

Measurement of Conducted Emissions according to FCC Rules, Part 15, Subpart C, Section 15.207 Frequency Band 0.45 - 30 MHz

Model:	**GDO DeLuxe 2005 with RC390-02 24V**
Type:	**Receiver**
Serial No.	**10**
Applicant:	**ELDAT GmbH**
Test Site:	**Shielded Room No. 2**
Distance:	**3 Meter**
Date of Test:	**May 25, 2001**

Frequency (MHz)	Detector	Analyzer Reading (dBµV)	Correction Factor (dB)	Emission Level (dBµV)	Limit dBµV	Margin dB
0.45-30	QP		---		48	**> 20**

Test equipment used (see equipment list for details):
02, 13, 14, 16, 38, 40 ,42, 57, 64, 67

Field Strength of Emissions according to FCC Rules, Part 15, Subpart C, Section 15.209 Frequency Band > 30 MHz

Model:	**GDO DeLuxe 2005 with RC390-02 24V**
Type:	**Receiver**
Serial No.	**10**
Applicant:	**ELDAT GmbH**
Test Site:	**Open Field Test Site**
Distance:	**3 Meter**
Date of Test:	**May 25, 2001**

Frequency (MHz)	Detector	Antenna Polarization	Analyzer Reading (dBµV)	Correction Factor (dB)	Field Strength (dBµV/m)	Limit dBµV/m	Margin dB
391.2	Q.P.	Hor.	16.0	25.0	41.0	46.0	**5.0**
784.2	Q.P.	Hor.	5.0	32.9	37.9	46.0	**8.1**
1565.7	Peak	Ver.	9.0	37.8	46.8	54.0	**7.2**
1962.8	Peak	Ver.	12.0	41.2	53.2	54.0	**0.8**

***** = No emissions above noise floor detected**

Sample calculation of field strength values:

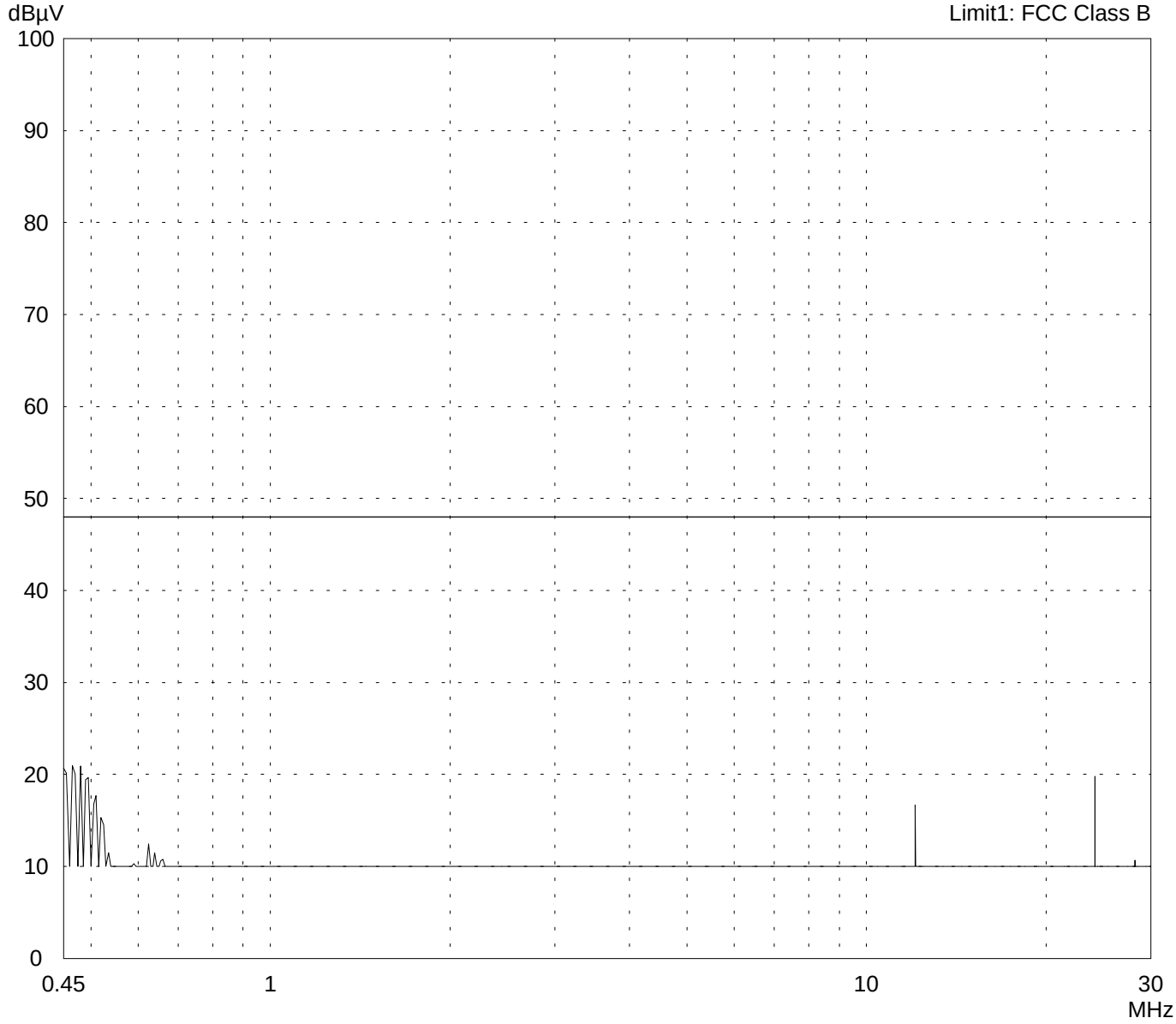
Field Strength (dBµV/m) = Analyzer Reading (dBµV) + Correction Factor (dB)

Test equipment used (see equipment list for details):
02, 13, 14, 16, 38, 40 ,42, 57, 64, 67

Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart B Class B

Model: GDO DeLuxe 2005 mit RC 390-02 24V	Mode:
Serial no.: ---	
Applicant: Eldat GmbH	
Test site: Shielded room, cabin no. 2	
Tested on: Linecord Phase L1	
Date of test: June 06, 2001 / Operator: J. Roidt	
Test performed: automatically / File name:	

Detector: Peak / Final Results: QP	Final results: 20 dB Margin 25 Subranges



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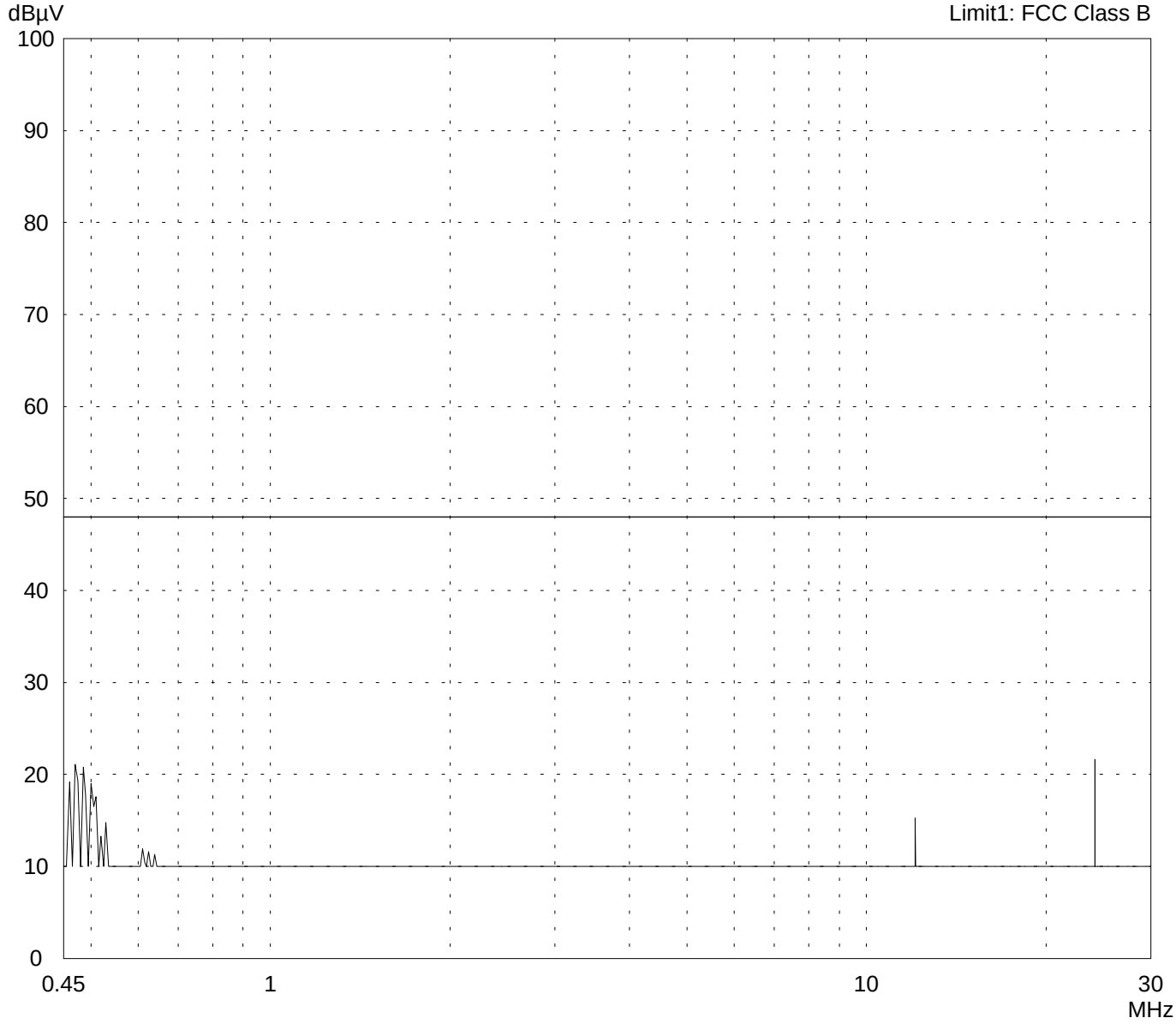
Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart B Class B

Model: GDO DeLuxe 2005 mit RC 390-02 24V	Mode:
Serial no.: ---	
Applicant: Eldat GmbH	
Test site: Shielded room, cabin no. 2	
Tested on: Linecord Phase N	
Date of test: June 06, 2001 / Operator: J. Roidt	
Test performed: automatically / File name:	

Detector: Peak / Final Results: QP	Final results: 20 dB Margin 25 Subranges



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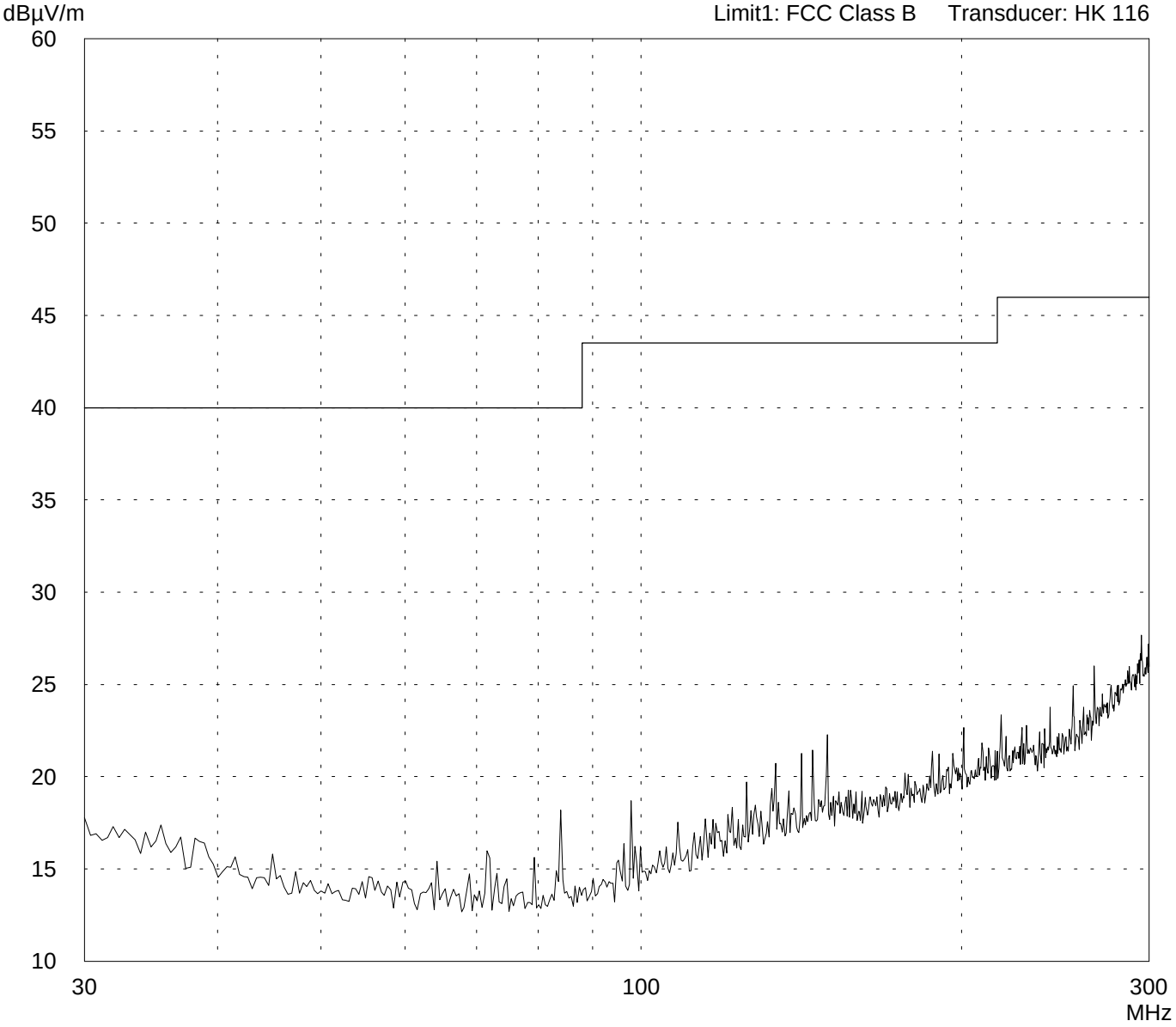
Radiated Emission Test 30 MHz - 300 MHz
according to FCC Part 15 Subpart B Class B

Model: RC390TGU SP	Mode:
Serial no.: 10	
Applicant: ELDAT GmbH	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 05/29/2001 / Operator: J. Roidt	
Test performed: automatically / File name:	

Detector: Peak	List of values: 10 dB Margin 50 Subranges



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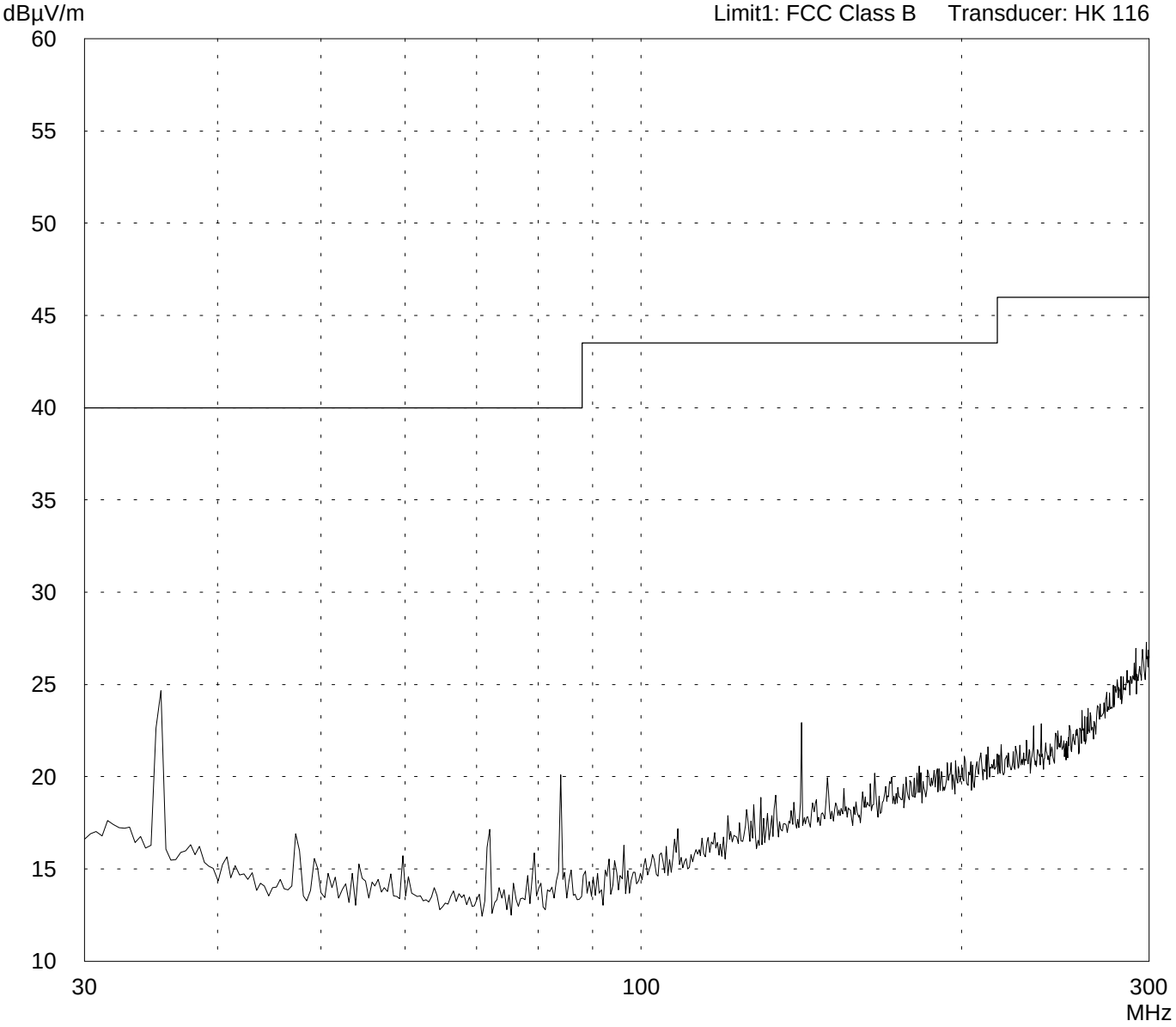
Radiated Emission Test 30 MHz - 300 MHz
according to FCC Part 15 Subpart B Class B

Model: RC390TGU SP	Mode:
Serial no.: 10	
Applicant: ELDAT GmbH	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 05/29/2001 — Operator: J. Roidt	
Test performed: automatically — File name:	

Detector: Peak	List of values: 10 dB Margin — 50 Subranges



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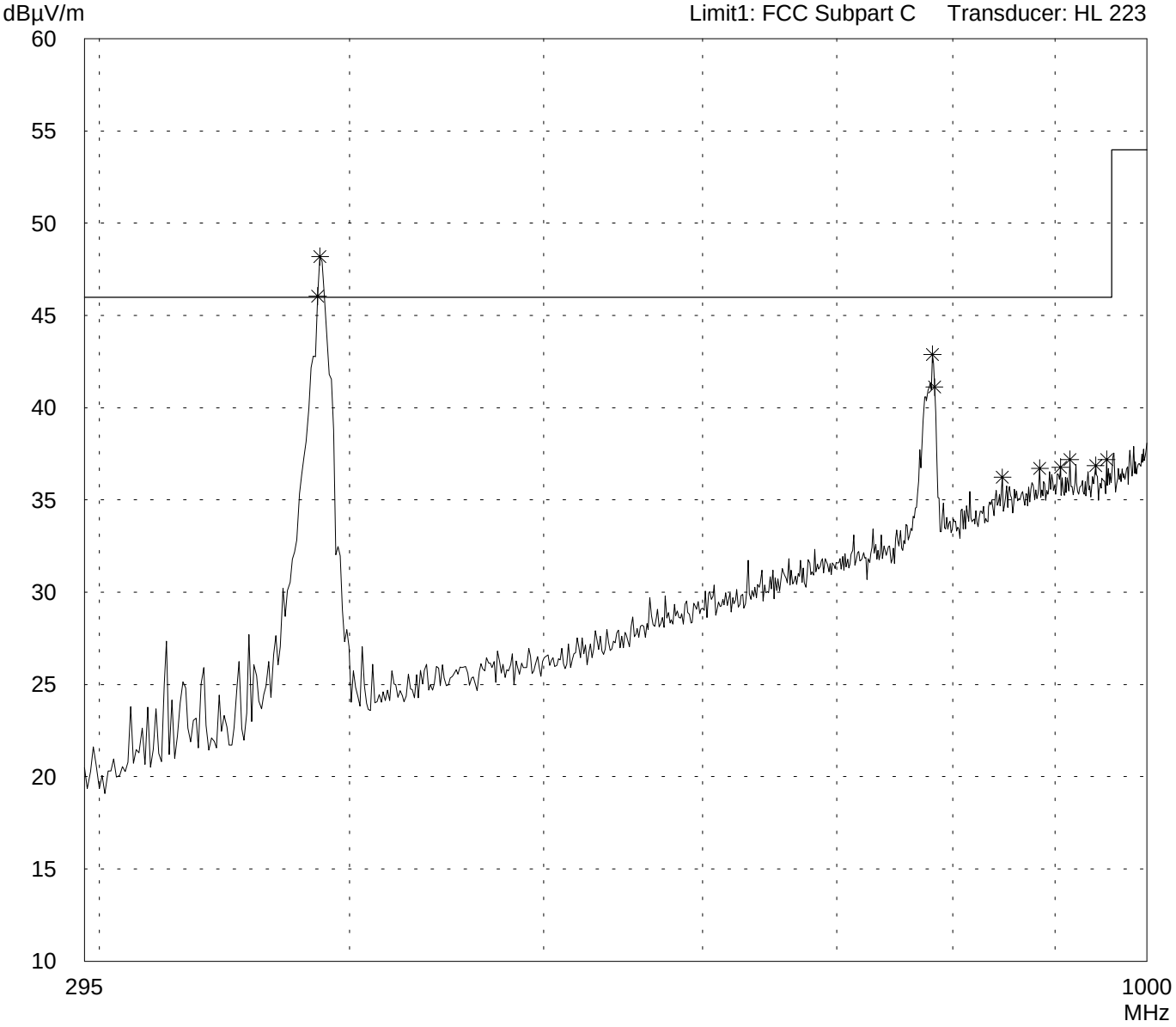
Radiated Emission Test 295 MHz - 1 GHz
according to FCC Part 15 Subpart C

Model: GDO Deluxe Softline mit RC390TGU SP	Mode:
Serial no.: 10	
Applicant: Eldat	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 05/23/2001 — Operator: J. Roidt	
Test performed: automatically — File name:	

Detector: Peak	List of values: 10 dB Margin — 50 Subranges

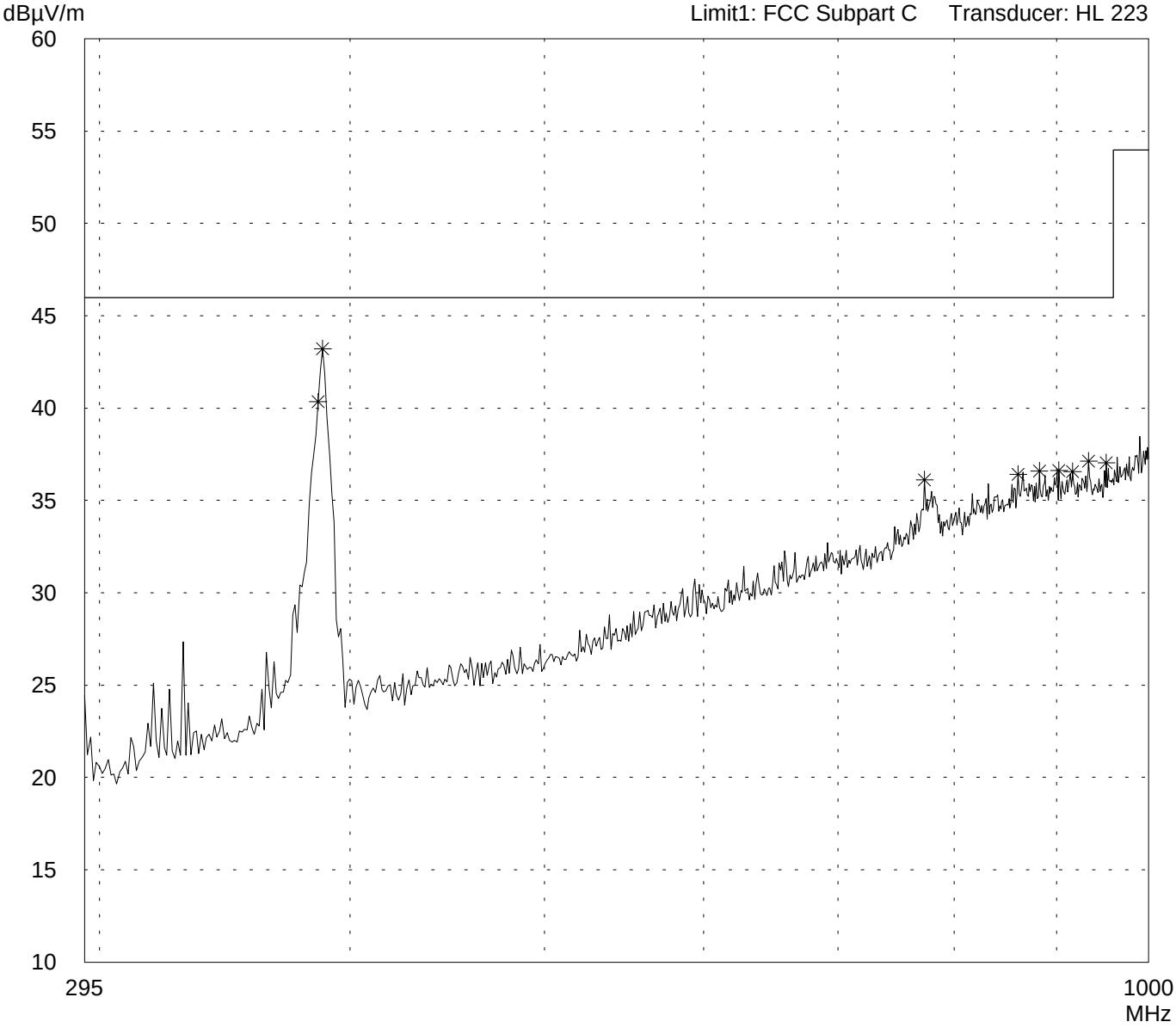


Result: Prescan	Project file: 50530-10276 — Page of Pages

Radiated Emission Test 295 MHz - 1 GHz
according to FCC Part 15 Subpart C

Model: GDO Deluxe Softline mit RC390TGU SP	Mode:
Serial no.: 10	
Applicant: Eldat	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 05/23/2001 / Operator: J. Roidt	
Test performed: automatically / File name:	

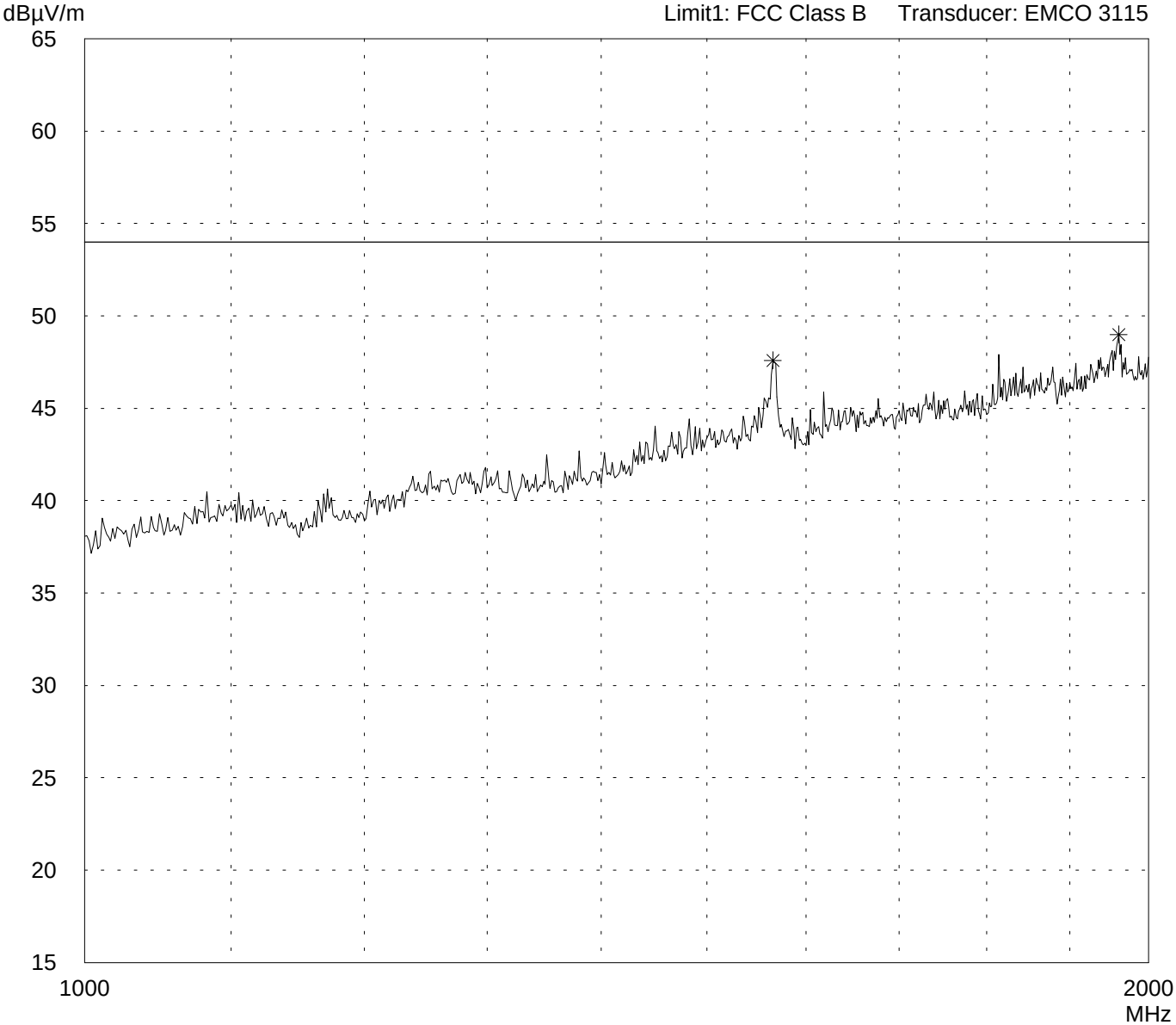
Detector: Peak	List of values: 10 dB Margin 50 Subranges



Result: Prescan	Project file: 50530-10276 Page of Pages

Radiated Emission Test 1 GHz - 2 GHz
according to FCC Part 15 Subpart B Class B

Model: RC390TGU SP 390 MHZ	Mode: Operation in GDO
Serial no.: 6	
Applicant: ELDAT GmbH	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: May 25, 2001 / Operator: J. Roidt	
Test performed: by hand / File name:	
Detector: Peak	List of values: Selected by hand



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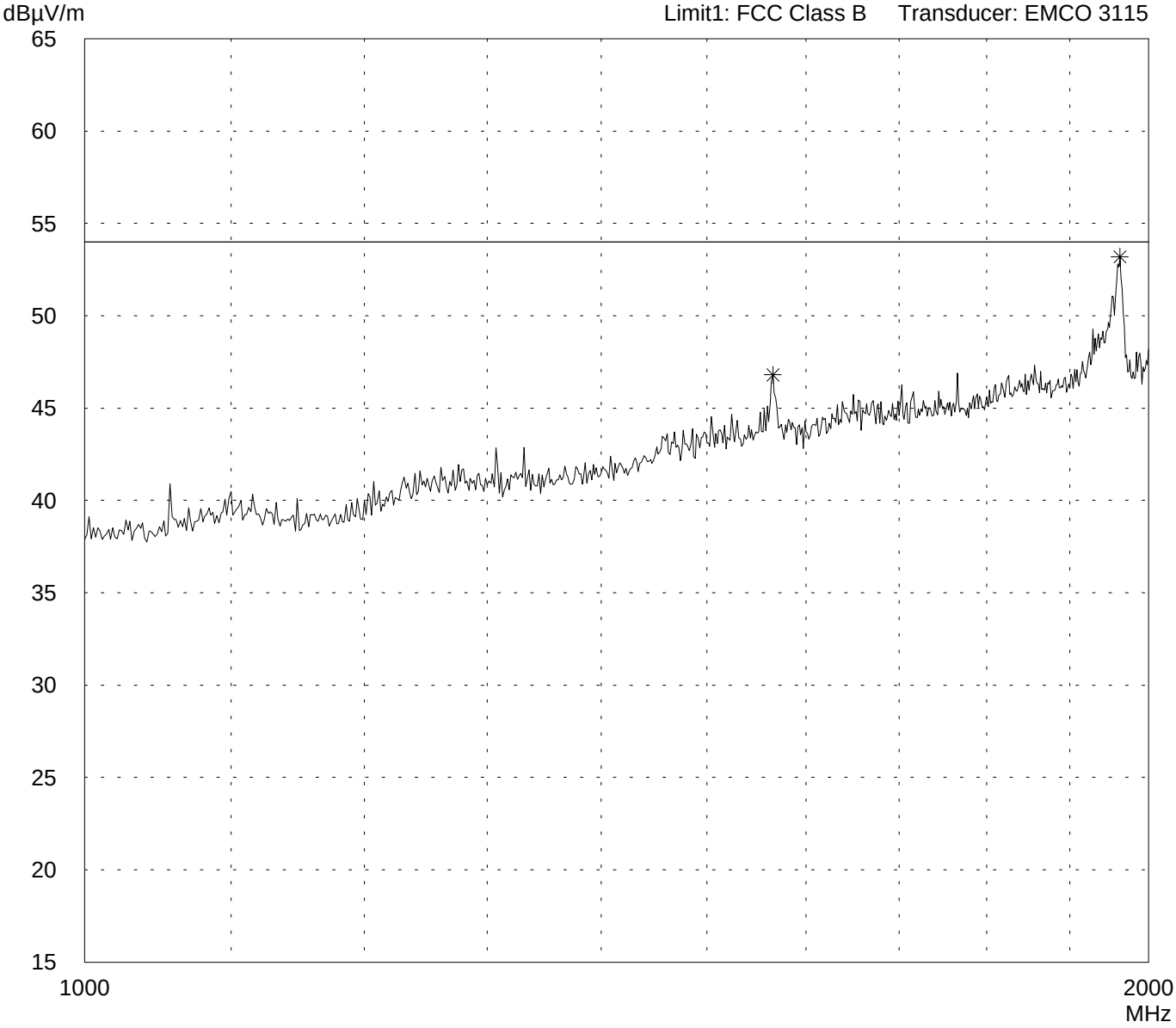
Radiated Emission Test 1 GHz - 2 GHz
according to FCC Part 15 Subpart B Class B

Model: RC390TGU SP 390 MHZ	Mode: Operation in GDO
Serial no.: 10	
Applicant: ELDAT GmbH	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: May 25, 2001 / Operator: J. Roidt	
Test performed: by hand / File name:	
Detector: Peak	List of values: Selected by hand



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