

#### TÜV AUSTRIA SERVICES GMBH

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Medical Technology/ Communication Technology/ EMC

Department: Testing Body for Communication Technology/ EMC

TÜV ®



Testing Laboratory, Inspection Body, Certification Body, Calibration Laboratory

Notified Body 0408 IC 4413

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### TEST REPORT

of the accredited test laboratory

TÜV Nr.:M/EMV-08/139

about

the following EMC - test/- research

Applicant:

KEBA AG

Gewerbepark Urfahr

A-4041 Linz

**Product:** 

IC 140/ C-OEM

IC 140/ D-OEM

Serial Number:

.

FCC ID:

U870003

Standard:

47 CFR Ch. I Part 15 (September 20, 2007)

RSS-210 Issue 7 (June 2007)

TÜV AUSTRIA SERVICES GMBH
Test laboratory for EMC

Supervisor of EMC-laboratory

Ing. Wilhelm Seier

Official SERVICES OF AUSTRIA MAN

Checked by

Ing. Michael Emminger

Copy Nbr.:

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The results of this test report only refer to the provided equipment.



### Contents

	Designation	page
1.	Applicant	3
2.	Description of EUT	4
3.	Standards / Final result	5
4.	Test results	
4.1.	Conducted emission	6-7
4.2	Radiated emission	8-9
4.3	Operation within the band 13,110 – 14,010 MHz	10-12
ppendix	Designation	pages
1	Test equipment used	3
2	Photodocumentation	11
3	Measurement diagrams	7



### 1. **Applicant**

Company:

KEBA AG

Department:

Development center

Address:

Gewerbepark Urfahr

A-4041 Linz

Contact person:

Mr. Dipl.-Ing. (FH) Michael Höllerschmid

EUT received on:

17.03.2008

Tests were performed on: 18.03.2008 to 26.03.2008



## 2. Description of EUT

EUT:

IC 140/ C-OEM

IC 140/ D-OEM

Serial Number:

---

Manufacturer:

KEBA AG

Gewerbepark Urfahr

A-4041 Linz

Description:

Keba provided the following configuration for the measurements:

Serial production

Operating mode:

The measurements were carried out at the following running states:

normal use



## 3. Standards / Final result

Name	Title	Deviation	Result
47 CFR Ch. I Part 15 (September 20, 2007)	Radio Frequency Devices	none	PASS
RSS-210 Issue 7 (June 2007)	Low Power Licence-Exempt Radiocommunuication Devices (All Frequency Bands)	none	PASS

PASS EUT passed FAIL EUT failed



### 4. Test results

### 4. 1. Conducted emission on the DC line

### Limits

Frequeny range	Lir	mit
Detector	Quasi Peak	Average
0,150 - 0,5 MHz	66 - 56 dBµV decreasing with the logarithm of frequency	56 - 46 dBμV decreasing with the logarithm of frequency
0,5 - 5 MHz	56 dBμV	46 dBμV
5 - 30 MHz	60 dBμV	50 dBμV
Remark: Quas	Peak and Average limits must be bot	h met

### Measuring apparatus parameters:

Parameter	Preview measurement	Final measurement	Parameter	Preview measurement	Final measurement
Start frequency	150 kHz	150 kHz	Detector	MP/AV	QP/AV
Stop frequency	30 MHz	30 MHz	Measuring time	10 ms	1 s
Stepsize	5 kHz	5 kHz	RF-attenuation	0dB	0 dB
IF- Bandwidth	9 kHz	9 kHz	Preamplifier	0 dB	0 dB

Operating mode	Measuring result
Normal operation	Measurement diagram 1



### Test result:

### 4. 1.1.) Measurement with QP-Detector

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
13,19	48,6	60	11,4		+	FLO
13,295	51,6	60	8,4		+	FLO
13,4	55,8	60	4,2		+	FLO
13,56	87,6	60	-27,6	**	+	FLO
13,72	55,5	60	4,5		+	FLO
13,825	50,7	60	9,3		+	FLO

### 4. 1.2.) Measurement with AV-Detector

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
13,4	37,1	50	12,9		+	FLO
13,56	87,3	50	-37,3	**	+	FLO

<sup>\*\*</sup> This part of emission is coverd by 15.225 (a) and A2.6.(a)



### 4. 2. Radiated emission

### Limits according to 15.209 and A2.7 (Table 2+3)

	Detector	Quasi Peak
Frequency range	Limit	Measurement distance
0,009 – 0,490 MHz	2400µV / f(kHz)	300 m
0,490 – 1,705 MHz	24000μV / f(kHz)	30 m
1,705 - 30 MHz	30	30 m
30 – 88 MHz	100	3 m
88 – 216 MHz	150	3 m
216 – 960 MHz	200	3 m
Above 960 MHz	500	3 m

The Limit was increased for a constant measurement distance of 3m with a factor of 40 dB per Decade.

Operating mode	Measuring result
Normal operation	IC 140/ C-OEM → Measurement diagram 2-4
	IC 140/ C-OEM → Measurement diagram 5-7



Test result:

### 4. 2.1.) Measurement in the frequency range 9 kHz to 1000 MHz

Due to the large margin to the limit, no final measurement was performed.



# 4.3. 15.225 Operation within the band 13,110 – 14,010 MHz RSS-210 A2.6 13,110 – 14,010 MHz

### Limits:

### 15.225 (a) + A2.6 (a):

The field strength of any emissions within the band 13,553 - 13,567 MHz shall not exceed 15.848 microvolts/meter ( $84 \text{ dB}_{\mu}\text{V/m}$ ) at 30 meters.

### 15.225 (b) and A2.6 (b):

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

### 15.225 (c) and A2.6 (c):

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

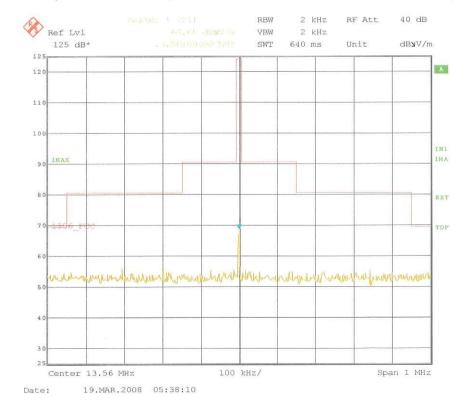
### 15.225 (d) and A2.6 (d):

30 microvolts/m at 30 m, outside the band 13.110-14.010 MHz

### Test result:

#### IC 140/ C-OEM

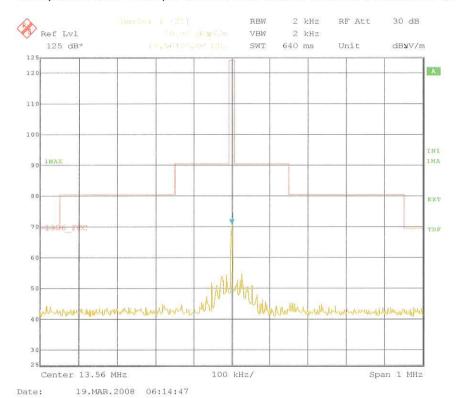
The field strength at 13,56 MHz in 3 m distance was measured as 68,2 dBμV/m. Extrapolated with 40 dB per decade to 30 meters distance it would be 28,2 dBμV/m.





### IC 140/ D-OEM

The field strength at 13,56 MHz in 3 m distance was measured as 71,3 dB $\mu$ V/m. Extrapolated with 40 dB per decade to 30 meters distance it would be 31,3 dB $\mu$ V/m.





### 15.225 (e) and A2.6:

The frequency tolerance of the carrier signal shall be maintained within  $\pm$  0,01 % of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation of the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### Measurement results:

Test conditions		Transmitter frequency
		13,56 MHz
T <sub>nom</sub> ( 20 )°C	V <sub>nom</sub> ( 24 )VDC	13,560256 MHz
T <sub>nom</sub> ( 20 )°C	V <sub>min</sub> ( 20,4 )VDC	13,560252 MHz
T <sub>nom</sub> ( 20 )°C	V <sub>max</sub> ( 27,6 )VDC	13,560254 MHz
T <sub>min</sub> ( -20 )°C	V <sub>nom</sub> ( 24 )VDC	13,560208 MHz
T <sub>max</sub> ( 50 )°C	V <sub>nom</sub> ( 24 )VDC	13,560210 MHz
Maximum deviation from nominal frequency under extreme test conditions (%)		0,000256 MHz
Measurement uncertainty		<u>+</u> 10 Hz

# Appendix 1 Test equipment used



			. /		
X	Anechoic Chamber with 3m measurement distance	NT-100	D	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
	Stripline according to ISO 11452-5	NT-108		ESVP - Test receiver 20 - 1000 MHz	NT-201
B	MA 240 - Antenna mast 1 - 4 m height	NT-110		ESPC - Test receiver 9 kHz - 2,5 GHz	NT-203
B	DS 412 - Turntable 0 - 400 ° Azimuth	NT-111	A	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
Ø	HD 100 Controller Mast+Turntable	NT-112		Digital Radio Tester CTS55	NT-208
	HUF-Z2 - Bicon. Antennna 20 - 300 MHz	NT-120		Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121		CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
	HFH-Z2 - Loop Antenna 9 kHz - 30 MHz	NT-122		3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123		Radiocommunicationanalyzer Marconi 2945A	NT-212
	3121C - Dipole Antenna 28 - 1000 MHz	NT-124		2855S - Communication analyzer	NT-213
	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125		Mixer M28HW 26,5 GHz - 40 GHz	NT-214
	3116 - Horn Antenna 18 - 40 GHz	NT-126		Diode Detector 0,01 GHz - 26,5 GHz	NT-215
	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	X.	RubiSource T&M Timing reference	NT-216
	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128		Radiocommunicationanalyzer SWR 1180 MD	NT-217
X	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129		Mixer M19HWD 40 GHz – 60 GHz	NT-218
	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130		Mixer M12HWD 60 GHz – 90 GHz	NT-219
	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131		TDS - 540 DSO Digital scope	NT-220
	Loop Antenna H-Field	NT-132		TPS 2014 Digital scope	NT-222
	Horn Antenna 500 MHz - 2900 MHz	NT-133		Artificial Ear according to IEC 60318	NT-224
	Horn Antenna 500 MHz - 6000 MHz	NT-133/1		1 kHz Sound calibrator	NT-225
	Log. per. Antenna 800 MHz - 2500 MHz	NT-134		B10 - Harmonics and flicker analyzer	NT-232
	Log. per. Antenna 800 MHz - 2500 MHz	NT-135		SRM-3000 Spectrumanalyzer	NT-233
	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137		E-field probe SRM 75 MHz – 3 GHz	NT-234
	Conical Dipol Antenna PCD8250	NT-138		Hall-Teslameter ETM-1	NT-241
	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139		EFA-3 H-field- / E-field probe	NT-243
	HZ-1 Antenna tripod	NT-150		E-field measuring instrument EMR-200; 100 kHz – 3 GHz	NT-244
	BN 1500 Antenna tripod	NT-151		E-field probe 100 kHz – 3 GHz	NT-245
	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156		Magneticfield-Sensor 300 kHz – 30 MHz	NT-246
	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-172		E-field probe 3 MHz – 18 GHz	NT-247

Division Medical Technology/ Communication Technology/ EMC

Department: EMC

Test report number: M/EMV-08/139

Page: 1 of 3

Date: 11.04.2008

# Appendix 1 (continued) Test equipment used



	H-field probe 27 MHz – 1 GHz	NT-248	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
	ELT-400 1 Hz – 400 kHz	NT-249	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
	FCC-203I EM Injection clamp	NT-251	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
	FCC-203I-DCN Ferrite decoupling network	NT-252	Preamplifier 1 GHz - 4 GHz	NT-335
	PR50 Current Probe	NT-253	Preamplifier for GPS MKU 152 A	NT-336
	PR630 Current Probe	NT-254	Preamplifier 100 MHz – 23 GHz	NT-337
	Fluke 87 V True RMS Multimeter	NT-260	DC Block 10 MHz – 18 GHz Model 8048	NT-338
	Model 2000 Digital Multimeter	NT-261	2-97201 Electronic load	NT-341
	Fluke 87 V Digital Multimeter	NT-262/1	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
X	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	VDS 200 Mobil-impuls-generator	NT-350
	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	LD 200 Mobil-impuls-generator	NT-351
	ESH3-Z4 T-Artificial network	NT-303	MPG 200 Mobil-Impuls-Generators	NT-352
	PHE 4500/B Power amplifier	NT-304	EFT 200 Mobil-impuls-generator	NT-353
	EZ10 T-Artificial Network	NT-305	AN 200 S1 Artificial Network	NT-354
	ENY22 Artificial Network	NT-308	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
	ENY41 Artificial Network	NT-309	PHE 4500 - Mains impedance network	NT-401
	SMG - Signal generator 0,1 - 1000 MHz	NT-310	IP 6.2 Coupling filter for data lines (Surge)	NT-403
	PM 5518 TXVPS Video generator	NT-311	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
	RefRad Reference generator	NT-312	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	IP 4 - Capacitive clamp (Burst)	NT-411
	40 MHz Arbitrary Generator TGA1241	NT-315	Highpass-Filter 100 MHz – 3 GHz	NT-412
	PEFT - Burst generator up to 4 kV	NT-320	Highpass-Filter 600 MHz – 4 GHz	NT-413
	ESD 30 System up to 25 kV	NT-321	Highpass-Filter 1250 MHz – 4 GHz	NT-414
	PSURGE 4.1 Surge generator	NT-324	Highpass-Filter 1800 MHz – 16 GHz	NT-415
	TRANSIENT 1000 Immunity test system	NT-325	Highpass-Filter 3500 MHz – 18 GHz	NT-416
	VCS 500-M6 Surge-Generator	NT-326	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417
	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418

Division Medical Technology/ Communication Technology/ EMC

Department: EMC

Test report number: M/EMV-08/139

Page: 2 of 3

Date: 11.04.2008

# Appendix 1 (continued) Test equipment used



RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419		95242-1 – Current probe 10 MHz – 400 MHz	NT-468
RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421		94106-1L-1 – Current probe 20 Hz – 450 MHz	NT-471
RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	Ø	PC P4 3 GHz Test computer	NT-500
RF-Attenuator 30 dB	NT-424		PC P4 1700 MHz Notebook	NT-505
RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425		PC Intel Centrino 1600 MHz Notebook	NT-506
RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	200	Monitoring camera with Monitor	NT-511
RF-Attenuator 6 dB	NT-428	X	ES-K1 Version 1.71 SP2 Test software	NT-520
RF-Attenuator 0 dB - 81 dB	NT-429		SRM-TS Version 1.3 software for SRM-3000	NT-522
WRU 27 - Band blocking 27 MHz	NT-430		SPS-PHE Test software V2.32 voltage fluctuations/harmonics	NT-525
WHJ450C9 AA - High pass 450 MHz	NT-431		SPS-EM Test software V2.32 for PHE 4500/B	NT-527
WHJ250C9 AA - High pass 250 MHz	NT-432		Noise power test apparatus according to EN 55014	NT-530
RF-Load 150 W	NT-433		Vertical coupling plane (ESD)	NT-531
Impedance transducer 1:4; 1:9; 1:16	NT-435		Test cable #4 for EN 61000-4-6	NT-553
RF-Attenuator DC – 18 GHz 6 dB	NT-436	Ø	Test cable #3 for conducted emission	NT-554
RF-Attenuator DC – 18 GHz 6 dB	NT-437		Test cable #5 ESD-cable (2x470k)	NT-555
RF-Attenuator DC – 18 GHz 10 dB	NT-438		Test cable #6 ESD-cable (2x470k)	NT-556
RF-Attenuator DC – 18 GHz 20 dB	NT-439		Test cable #8 Sucoflex 104EA	NT-559
I+P 7780 Directional coupler 100 - 2000 MHz	NT-440		Test cable #9 (for outdoor measurements)	NT-580
ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441		Test cable #10 (for outdoor measurements)	NT-581
Power Divider 6 dB/1 W/50 Ohm	NT-443		Test cable #13 Sucoflex 104PE	NT-584
Directional coupler 0,1 MHz – 70 MHz	NT-444		Test cable #21 for SRM-3000	NT-592
Directional coupler 0,1 MHz – 70 MHz	NT-445		Shield chamber	NT-600
Tube imitations according to EN 55015	NT-450	B	Climatic chamber	M-1200
FCC-801-M2-50A Coupling decoupling network	NT-459		Control and simulation equipment for EUT	
FCC-801-M5-25 Coupling decoupling network	NT-460			
FCC-801-AF10 Coupling decoupling network	NT-461			
FCC-801-S25 Coupling decoupling network	NT-462			
FCC-801-T4 Coupling decoupling network	NT-463			
FCC-801-C1 Coupling decoupling network	NT-464			
F-16A - Current probe 1kHz - 70MHz	NT-465			
	DC – 18 GHz / 50 W RF-Attenuator 20 dB DC - 1000 MHz / 25 W RF-Attenuator 30 dB DC - 1000 MHz / 1 W RF-Attenuator 30 dB DC - 1000 MHz / 1 W RF-Attenuator 6 dB DC - 1000 MHz / 1 W RF-Attenuator 6 dB DC - 1000 MHz / 1 W RF-Attenuator 6 dB DC - 1000 MHz / 1 W RF-Attenuator 6 dB WR - Attenuator 6 dB DC - 1000 MHz / 1 W RF-Attenuator 0 dB - 81 dB WRU 27 - Band blocking 27 MHz WHJ450C9 AA - High pass 450 MHz WHJ250C9 AA - High pass 250 MHz RF-Load 150 W Impedance transducer 1:4; 1:9; 1:16 RF-Attenuator DC – 18 GHz 6 dB RF-Attenuator DC – 18 GHz 6 dB RF-Attenuator DC – 18 GHz 10 dB RF-Attenuator DC – 18 GHz 20 dB I+P 7780 Directional coupler 100 - 2000 MHz ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz Power Divider 6 dB/1 W/50 Ohm Directional coupler 0,1 MHz – 70 MHz Directional coupler 0,1 MHz – 70 MHz Tube imitations according decoupling network FCC-801-M2-50A Coupling decoupling network FCC-801-S25 Coupling decoupling network FCC-801-T4 Coupling decoupling network FCC-801-T4 Coupling decoupling network FCC-801-C1 Coupling decoupling network	DC = 18 GHz / 50 W  RF-Attenuator 20 dB DC = 1000 MHz / 25 W  RF-Attenuator 30 dB DC = 1000 MHz / 1 W  RF-Attenuator 30 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 0 NT-428 6 dB  RF-Attenuator NT-428 6 dB  RF-Attenuator NT-429 0 dB = 81 dB  WRU 27 - Band blocking ZY MHz  WHJ450C9 AA - High pass 450 MHz  WHJ250C9 AA - High pass 250 MHz  RF-Load 150 W  Impedance transducer 1:4; 1:9; 1:16  RF-Attenuator DC = 18 GHz 6 dB  RF-Attenuator DC = 18 GHz 10 dB  RF-Attenuator DC = 18 GHz 11 dB  NT-436  RF-Attenuator DC = 18 GHz 12 dB  NT-437  RF-Attenuator DC = 18 GHz 13 dB  NT-438  NT-439  NT-449  NT-449  NT-440  NT-441  NT-441  NT-441  NT-442  NT-443  NT-443  NT-445  NT-445  NT-446  Coupling decoupling network  FCC-801-M5-25  Coupling decoupling network  FCC-801-C1  Coupling decoupling network  FCC-801-C1  Coupling decoupling network  F-16A - Current probe  NT-465	DC = 18 GHz / 50 W  RF-Attenuator 20 dB DC = 1000 MHz / 25 W  RF-Attenuator 30 dB DC = 1000 MHz / 1 W  RF-Attenuator 30 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator 6 dB DC = 1000 MHz / 1 W  RF-Attenuator NT-428 DG = 1000 MHz / 1 W  RF-Attenuator NT-429 DG = 1000 MHz / 1 W  RF-Attenuator NT-430 DG = 1000 MHz / 1 W  RF-Attenuator NT-430 DG = 1000 MHz / 1 W  RF-Attenuator NT-430 DG = 1000 MHz  RF-Load NT-431 DG = 1000 MHz  RF-Load NT-433 DG = 1000 MHz  RF-Attenuator DC = 18 GHz DG = 1000 MT-435 DG = 1000 MT-436 DG = 1000 MT-441 DG = 1	10 MHz

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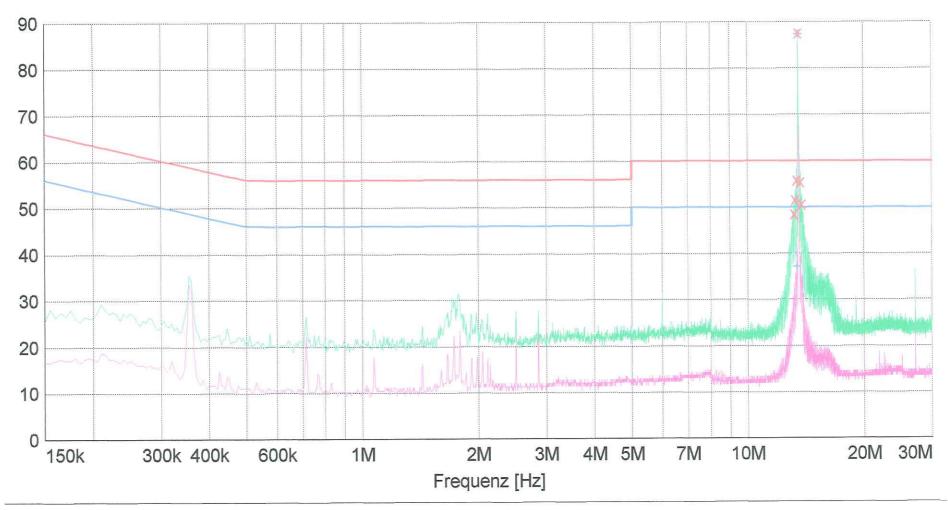
Department: EMC

Test report number: M/EMV-08/139

Page: 3 of 3

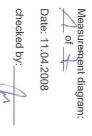
Date: 11.04.2008





X	X	MES	IC140D_VAC_fin
+	+	MES	IC140D_VAC_fin2
		MES	IC140D_VAC_pre
		MES	IC140D_VAC_pre2
_		-LIM	EN 55022 V QP
_		-LIM	EN 55022 V AV

EN 55022 V QP EN 55022 V AV



Department: EMC
Test report reference:
M/EMV-08/139

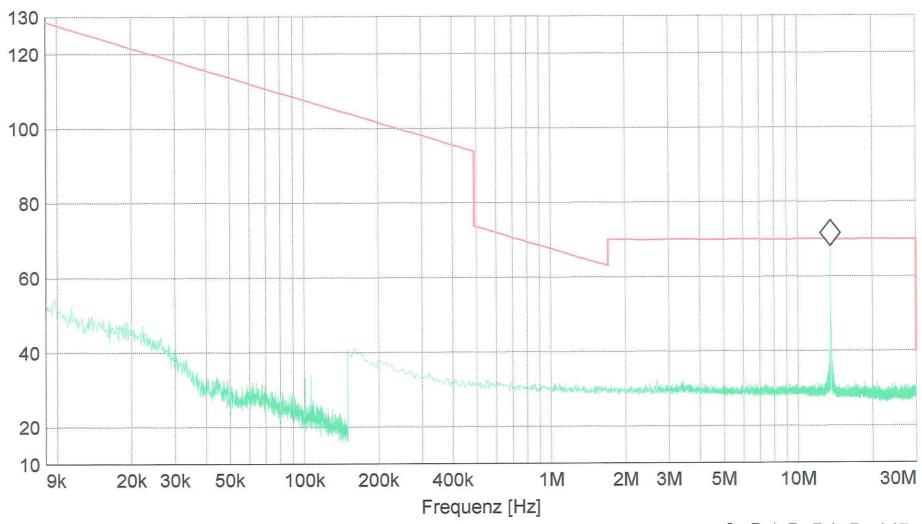
Division Medical
Technology/ Communication
Technology/ EMC
Department: EMC



Marker:

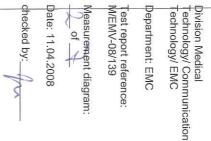
13.56 MHz 68.15 dBµV/m





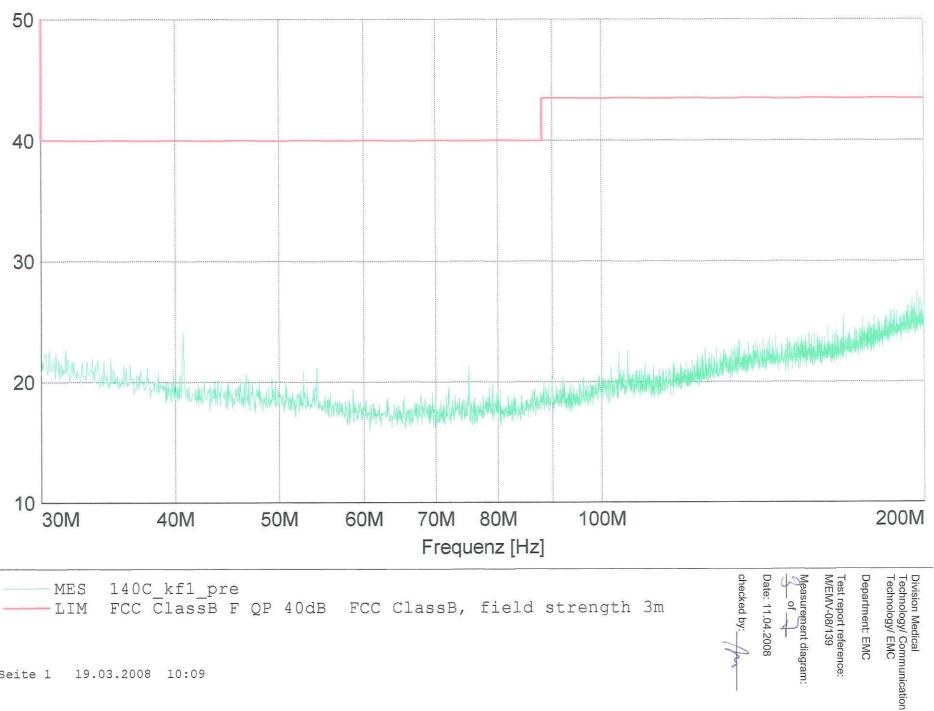
140C kf0 pre MES

-LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m

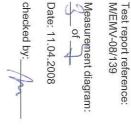






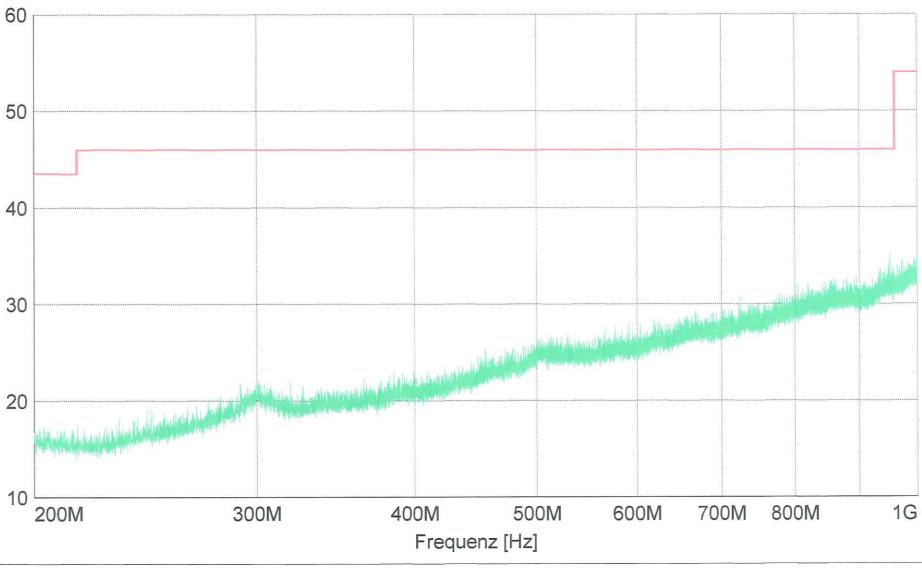


140C\_kf1\_pre MES FCC ClassB F QP 40dB FCC ClassB, field strength 3m









MES 140C\_kf2\_pre
LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m



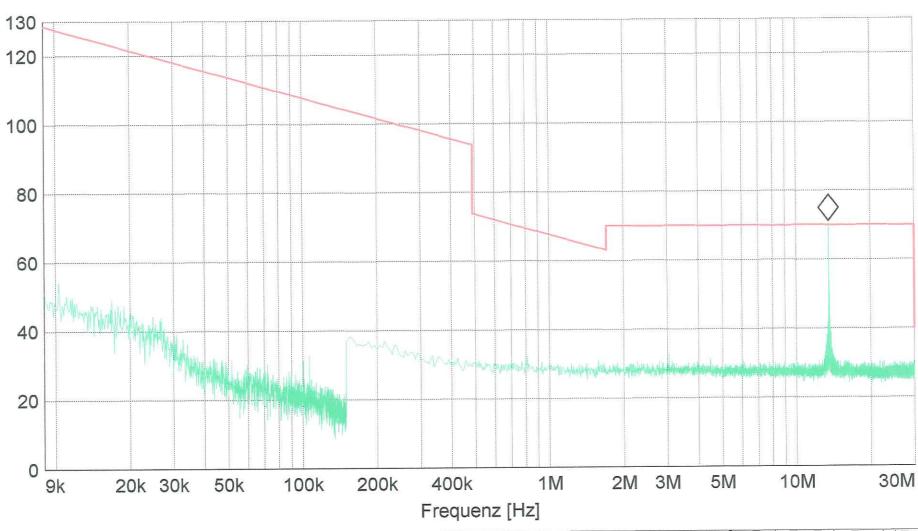


Marker:

13.56 MHz

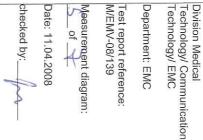
71.28 dBµV/m





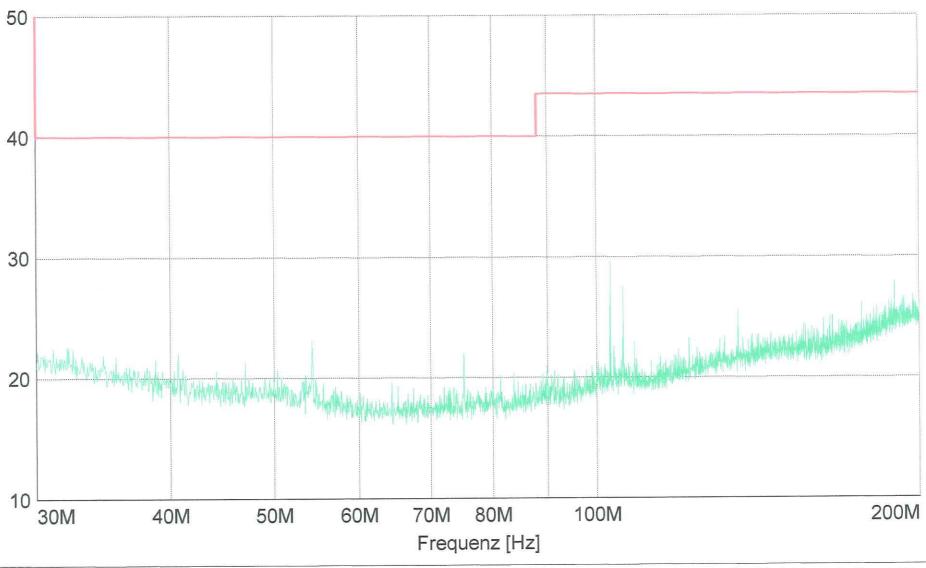
MES 140D\_gf0\_pre

LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m









MES 140D\_gf1\_pre
LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m

