

TEST REPORT
of the accredited test laboratory

TÜV Nr.:M/EMV-02/225

about
the following EMC - test/- research

Applicant: Fronius International GmbH
Günther Fronius Str. 1
A-4600 Wels/Thalheim

Product: RFID-Module, RCU5000i

Serial Number: Module produced for testing

Standard: 47 CFR Ch. I Part 15

Division Medical
Technology/
Communication
Technology/ EMC

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Ing. Wilhelm Seier



14. 10. 2002

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Checked by


Ing. Michael Emminger

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

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1. Applicant

Company	Fronius International GmbH
Department	
Address	A-4600 Wels/Thalheim; Günther Fronius Str. 1
Contact person	Hr. Peter Mair

EUT received on 12th August 2002

Tests were performed on 12th and 13th August 2002

2. Description of EUT

EUT	RFID Module; RCU5000i
Serial Number	Module produced for testing
Manufacturer	Fronius International GmbH A-4600 Wels/Thalheim; Günther Fronius Str. 1
Description	Fronius International GmbH provided the following configuration for the measurements: Module produced for testing powered by 5VDC The rest of PCB without placed components
Operating mode	The measurements were carried out at the following running states: continuous transmission with carrier unmodulated / normal puls modulation

3. Standards / Final result

Name	Title	Deviation	Result
47 CFR Ch. I Part 15	Radio Frequency Devices	none	PASS
PASS EUT passed FAIL EUT failed			

4. Test results

4. 1. Radiated emission

Limits

Frequency range	Detector Quasi Peak	
	Limit	Measurement distance
0,009 – 0,490 MHz	2400 μ V / f(kHz)	300 m
0,490 – 1,705 MHz	24000 μ V / 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
Remark: The Limit was increased for a constant measurement distance of 3m with a factor of 40 dB per Decade.		

Operating mode	Measuring result
Continuous unmodulated carrier	Measurement diagram 1
Continuous pulse-modulated carrier transponder card attached to the equipment	Measurement diagram 2
Continuous unmodulated carrier	Measurement diagram 3
Continuous unmodulated carrier	Measurement diagram 4

Test result:

4. 2.1.) Measurement in the frequency range 9 kHz to 30 MHz with unmodulated carrier and no transponder card attached:

Frequency kHz	Level QP dB μ V/m	Limit dB μ V/m	Margin dB	Exceed- Mark
134,475	72,9	105,0	32,1	

4. 2.2.) Measurement in the frequency range 9 kHz to 30 MHz with pulse-modulated carrier and transponder card attached:

Frequency kHz	Level QP dB μ V/m	Limit dB μ V/m	Margin dB	Exceed- Mark
134,475	72,0	105,0	33,0	

4. 2.2.) Measurement in the frequency range 30 MHz to 200 MHz

Frequency MHz	Level dB μ V/m	Limit dB μ V/m	Margin dB	Exceed- Mark	Height cm	Azimuth deg	Polarization
39,00	31,8	40,0	8,2		100	80	vertical
80,00	30,3	40,0	9,7		246	196	horizontal
112,30	33,9	43,5	9,6		265	196	horizontal
128,30	33,8	43,5	9,7		285	0	horizontal

4. 2.3.) Measurement in the frequency range 200 MHz to 1000 MHz

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

Appendix 1

Test equipment used

☒	Anechoic Chamber with 3m measurement distance	NT-100	☐	ESPC - Test receiver 9 kHz - 2,5 GHz	NT-203
☒	MA 240 - Antenna mast 1 - 4 m height	NT-110	☒	ESI26 - Test receiver 20 Hz - 26,5 GHz	NT-207
☒	DS 412 - Turntable 0 - 400 ° Azimuth	NT-111	☐	Digital Radio Tester CTS55	NT-208
☒	HD 100 Controller Mast+Turntable	NT-112	☐	Noise-gen., ITU-R 559-2 20 Hz - 20 kHz	NT-209
☐	HUF-Z2 - Bicon. Antenna 20 - 300 MHz	NT-120	☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☒	HFH-Z2 - Loop Antenna. 9 kHz - 30 MHz	NT-122	☐	Radiocommunication analyzer Marconi 2945A	NT-212
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	☐	2855S - Communication analyzer	NT-213
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	3115 - Horn Antenna 1 - 18 GHz	NT-125	☐	Diode Detector 0,01 GHz - 26,5 GHz	NT-215
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126	☐	3160-10 Horn Antenna 26,5 GHz - 40 GHz	NT-216
☐	SAS-200/543 - Bicon. Ant. 20 MHz - 300 MHz	NT-127	☐	Radiocommunication analyzer SWR 1180 MD	NT-217
☐	AT-1080 - Log. Per. Ant. 80 - 1000 MHz	NT-128	☐	Mixer M19HWD 40 GHz - 60 GHz	NT-218
☒	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-129	☐	Mixer M12HWD 60 GHz - 90 GHz	NT-219
☐	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-130	☐	TDS - 540 DSO Digital scope	NT-220
☒	3146 - Log. Per. Ant. 200 - 1000MHz	NT-131	☐	PM97 Scopemeter	NT-221
☐	Loop Antenna H-Field	NT-132	☐	B9-DSP-IS Digital Analyzer for voltage fluctuations	NT-230
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	DFT 555 - Power and harmonics analyzer	NT-231
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	☐	EFA-3 H-field- / E-field probe	NT-243
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	☐	E-field measuring instrument EMR-200; 100 kHz - 3 GHz	NT-244
☐	BiConiLog Antenna 26 MHz - 2000 MHz	NT-137	☐	E-field probe 100 kHz - 3 GHz	NT-245
☐	Conical Dipol Antenna PCD8250	NT-138	☐	Magneticfield-Sensor 300 kHz - 30 MHz	NT-246
☐	HZ-1 Antenna tripod	NT-150	☐	E-field probe 10 MHz - 18 GHz	NT-247
☒	BN 1500 Antenna tripod	NT-151	☐	H-field probe 10 MHz - 1 GHz	NT-248
☐	ESVP - Test receiver 20 - 1000 MHz	NT-201	☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250
☐	Switchbox	NT-202	☐	FCC-203I EM Injection clamp	NT-251

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Test equipment used

☐ FCC-203I-DCN Ferrite decoupling network	NT-252	☐ AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐ PR50 Current Probe	NT-253	☐ APA01 - RF-Amplifier 0,5 GHz - 2,5 GHz	NT-334
☐ Model 2000 Digital Multimeter	NT-261	☐ Preamplifier 1 GHz - 4 GHz	NT-335
☐ Fluke 97 Digital Multimeter	NT-262	☐ 2-97201 Electronic load	NT-341
☐ Fluke 97 Digital Multimeter	NT-263	☒ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐ ESH2-Z5 Artificial mains network 4x25A	NT-300	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐ ESH3-Z5 Artificial mains network 2x10A	NT-301	☐ VDS 200 Mobil-impuls-generator	NT-350
☐ ESH3-Z6 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	☐ FP 16/3-1 3 ph. Coupling filter (Burst)	NT-400
☐ MidiStar Telephone exchange	NT-306	☐ PHE 4500 - Mains impedance network	NT-401
☐ SMG - Signal generator 0,1 - 1000 MHz	NT-310	☐ FP-SURGE 32.1 3 ph. Coupling filter (Surge)	NT-402
☐ PM 5518 TXVPS Video generator	NT-311	☐ IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐ 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
☐ PEFT - Burst generator up to 4 kV	NT-320	☐ HV-Attenuator 54,5 dB (Burst)	NT-420
☐ PSD - ESD generator up to 25 kV	NT-321	☐ RF-Attenuator 20 dB 0,1 - 1000 MHz / 25 W	NT-421
☐ ESD-Pistol	NT-322	☐ RF-Attenuator 10 dB 0,1 - 1000 MHz / 20 W	NT-422
☐ Vacuum-Relais up to 8 kV	NT-323	☐ RF-Attenuator 30 dB 0,1 - 1000 MHz / 1 W	NT-423
☐ PSURGE 4.1 Surge generator	NT-324	☐ RF-Attenuator 30 dB	NT-424
☐ TRANSIENT 1000 Immunity test system	NT-325	☐ RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-425
☐ VCS 500-M6 Surge-Generator	NT-326	☐ RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-426
☐ BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330	☐ Voltage-divider 1:100	NT-427
☐ 500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332	☐ RF-Attenuator 6 dB	NT-428

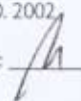
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Test equipment used

☐ RF-Attenuator 0 dB - 81 dB	NT-429	☒ ES-K1 Test software	NT-520
☐ WRU 27 - Band blocking 27 MHz	NT-430	☐ ESPC-K1 Test software	NT-521
☐ WHJ450C9 AA - High pass 450 MHz	NT-431	☐ SPS_PHE - Test software voltage fluctuations/harmonics	NT-525
☐ WHJ250C9 AA - High pass 250 MHz	NT-432	☐ SPS_EM - Test software for PHE 4500/B	NT-527
☐ RF-Load 150 W	NT-433	☐ Noise power test apparatus according to EN 55014	NT-530
☐ Impedance transducer 50 Ohm - 800 Ohm	NT-435	☐ Vertical coupling plane (ESD)	NT-531
☐ I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐ Equipment for ESD-pulse verification.	NT-532
☐ ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐ TEM-Zelle	NT-533
☐ Power Divider 6 dB/1 W/50 Ohm	NT-443	☐ ESV-24 Plotter adapter	NT-540
☐ Directional coupler 0,1 MHz - 70 MHz	NT-444	☒ Test cables	NT-550
☐ Directional coupler 0,1 MHz - 70 MHz	NT-445	☐ Test cable #4 for EN 61000-4-6	NT-553
☐ Tube imitations according to EN 55015	NT-450	☐ Test cable #3 for conducted emission	NT-554
☐ FCC-801-M5-25 Coupling decoupling network	NT-460	☐ Test cable #5 ESD-cable (2x470k)	NT-555
☐ FCC-801-AF10 Coupling decoupling network	NT-461	☐ Test cable #6 ESD-cable (2x470k)	NT-556
☐ FCC-801-S25 Coupling decoupling network	NT-462	☐ Serial data - fiber optic link	NT-557
☐ FCC-801-T4 Coupling decoupling network	NT-463	☐ Test cable #8 Sucoflex 104EA	NT-559
☐ FCC-801-C1 Coupling decoupling network	NT-464	☐ Test cable #9 (for outdoor measurements)	NT-580
☐ F-16A - Current probe 1kHz - 70MHz	NT-465	☐ Test cable #10 (for outdoor measurements)	NT-581
☒ PC P450 - Test computer	NT-500	☐ Test cable #13 PBA-33PBC-10	NT-584
☐ SE 284 GPIB - Plotter	NT 502	☐ Shield chamber	NT-600
☐ PC P133 Test computer #2	NT-504	☐ Climatic chamber -55°C to +180°C	M-512
☐ PC P200 MMX Notebook	NT-505	☐ Control and simulation equipment for EUT	---
☐ PC PIII 933 MHz Notebook	NT-506		
☐ 7110 - Controlling device for E-Field probe	NT-510		
☐ Monitoring camera with Monitor	NT-511		
☐ BSR-V1 - Video transmission system (optical fiber link)	NT-512		

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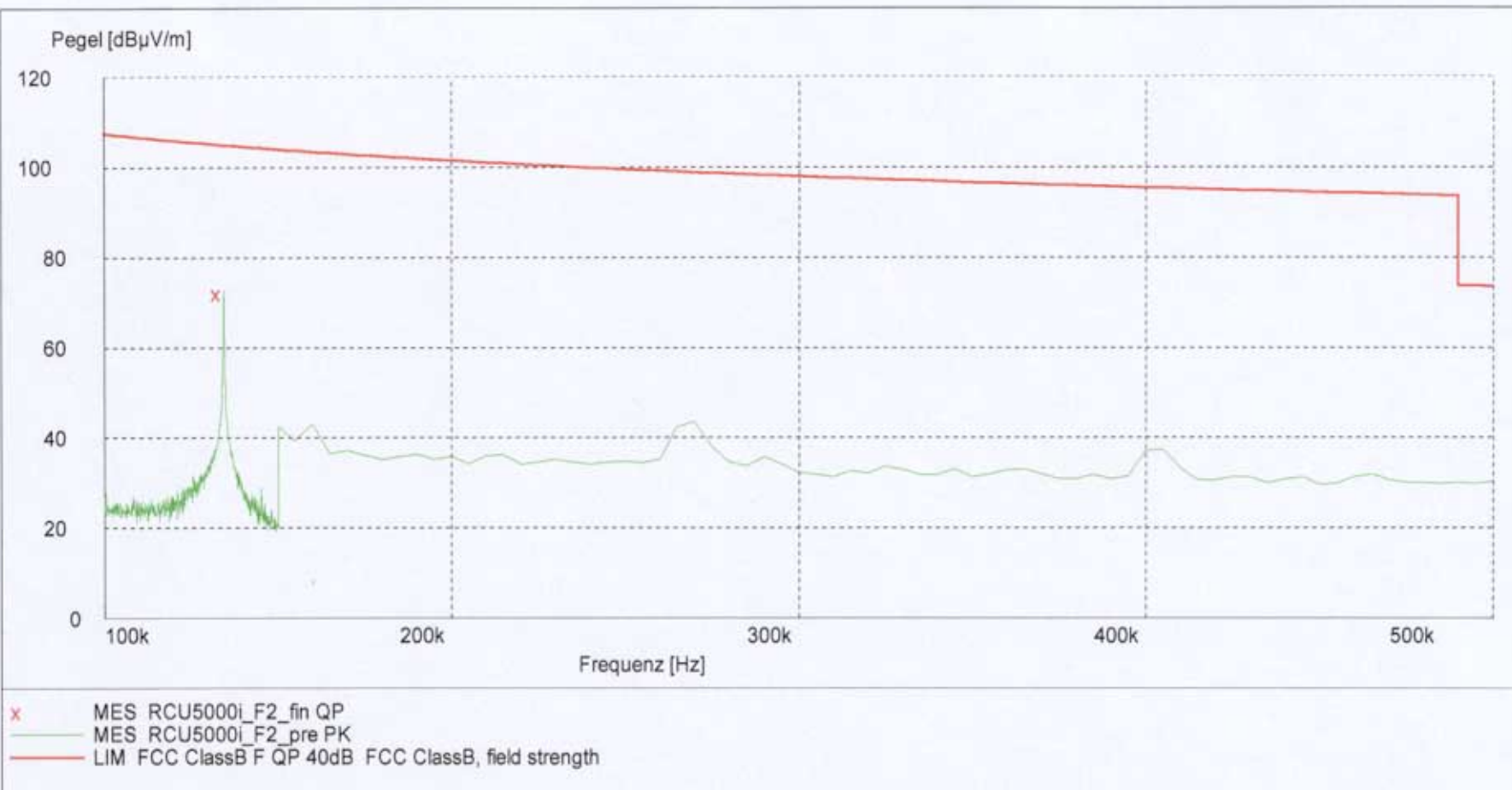
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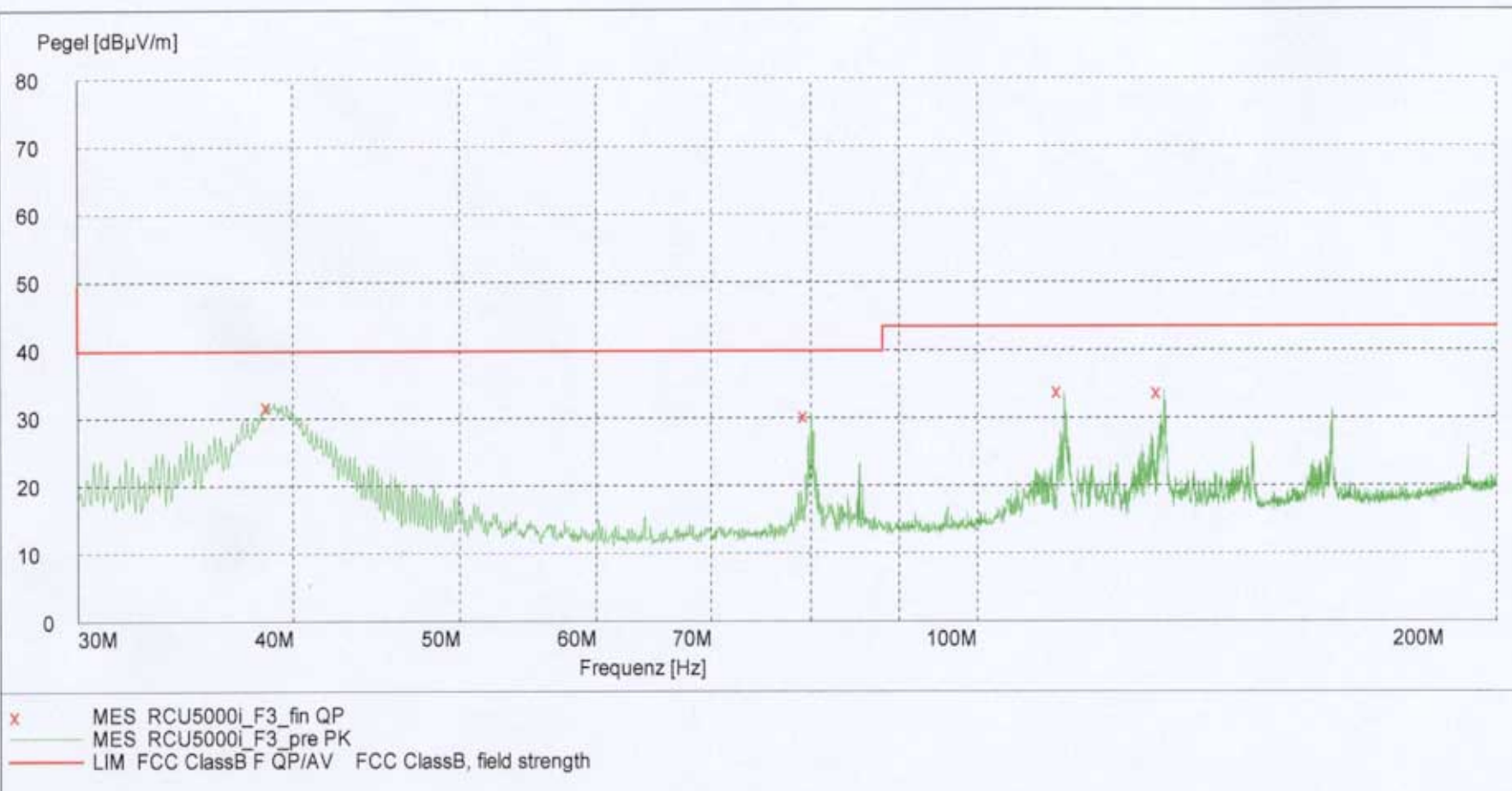
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