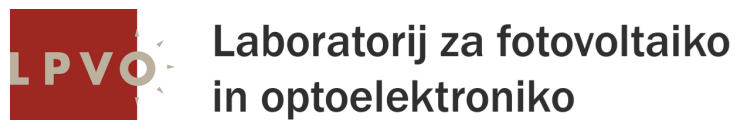
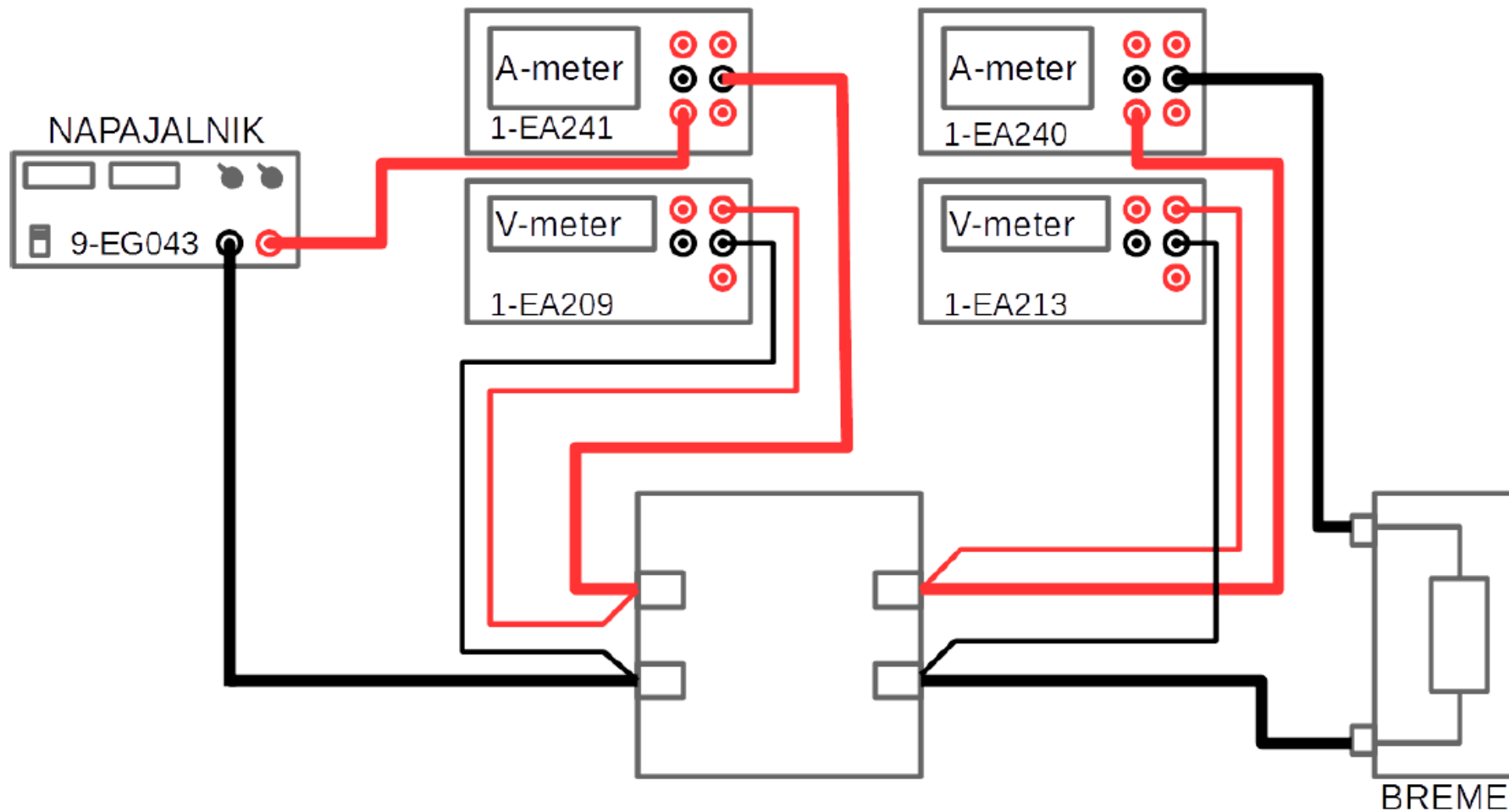


Načrtovanje elektronike za **EMC**²

Rezultati tekmovanja



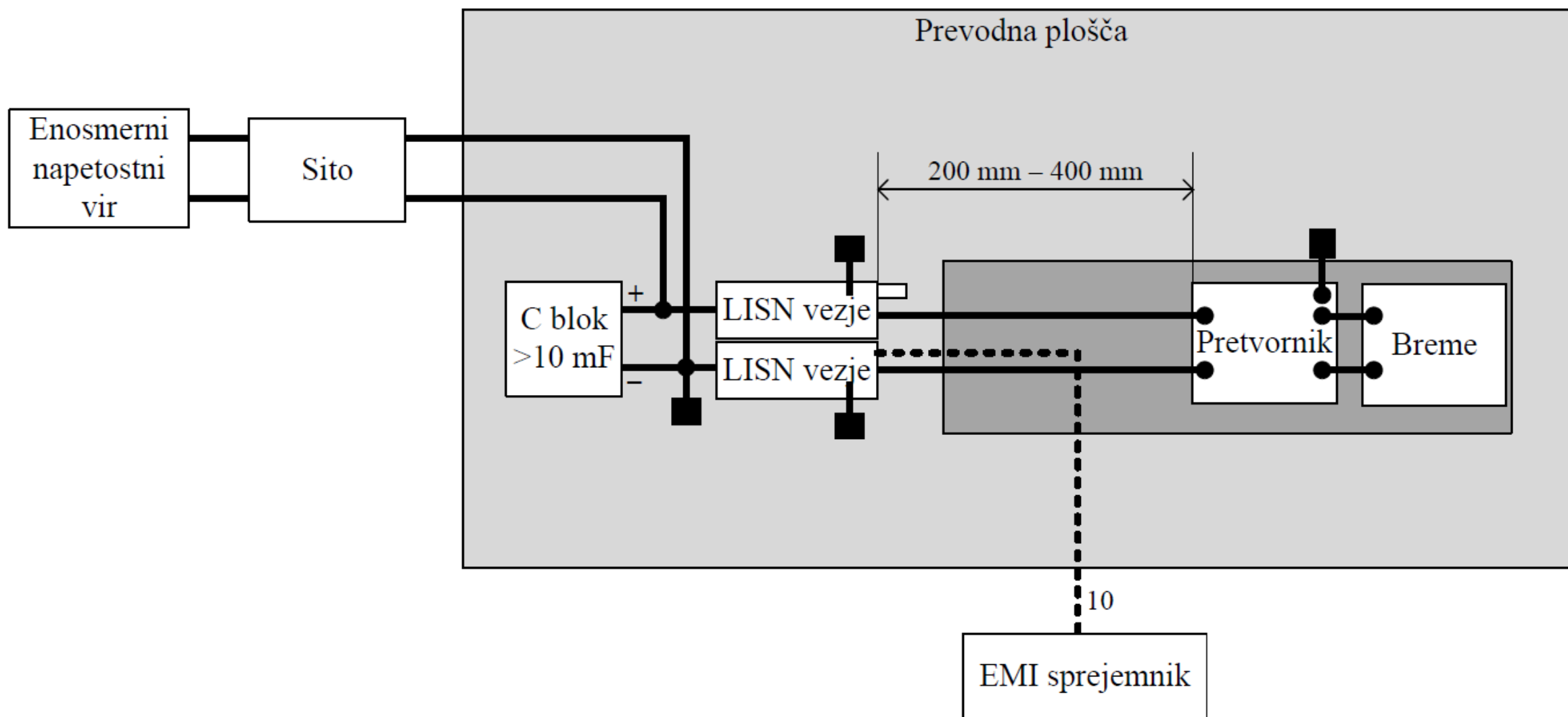
Preizkušanje električnih karakteristik



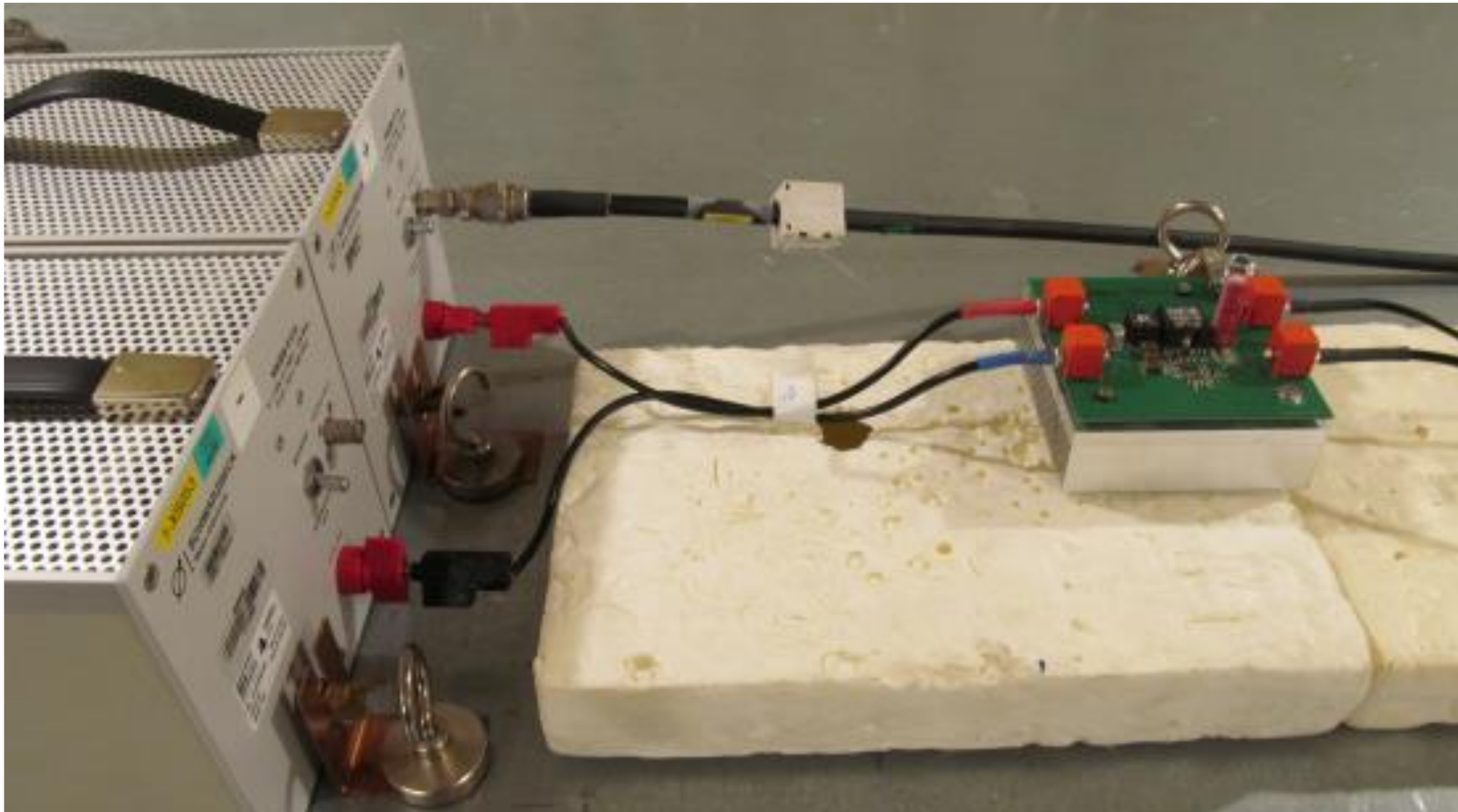
Preizkušanje električnih karakteristik



Meritve prevodnih emisij



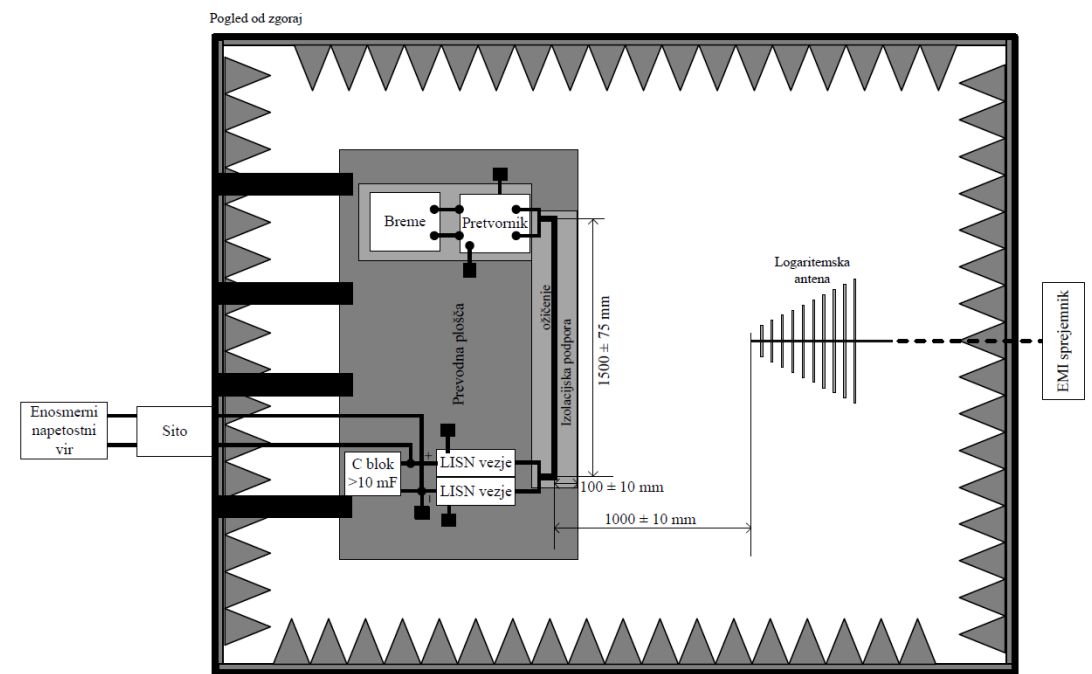
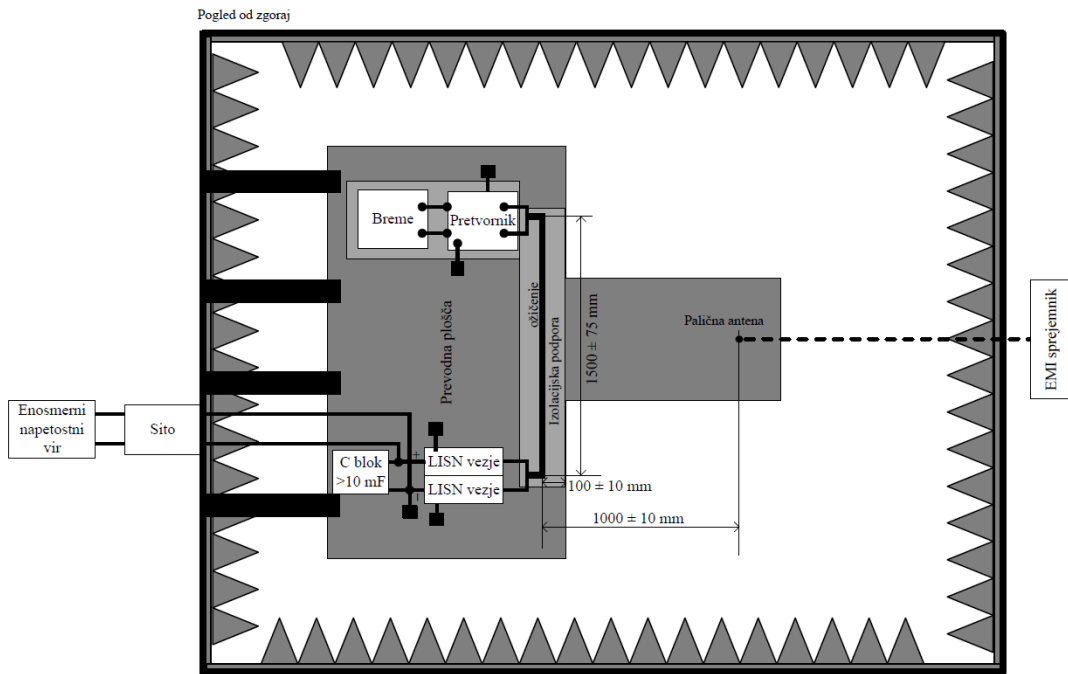
Meritve prevodnih emisij



Meritve sevalnih emisij

do 30 MHz

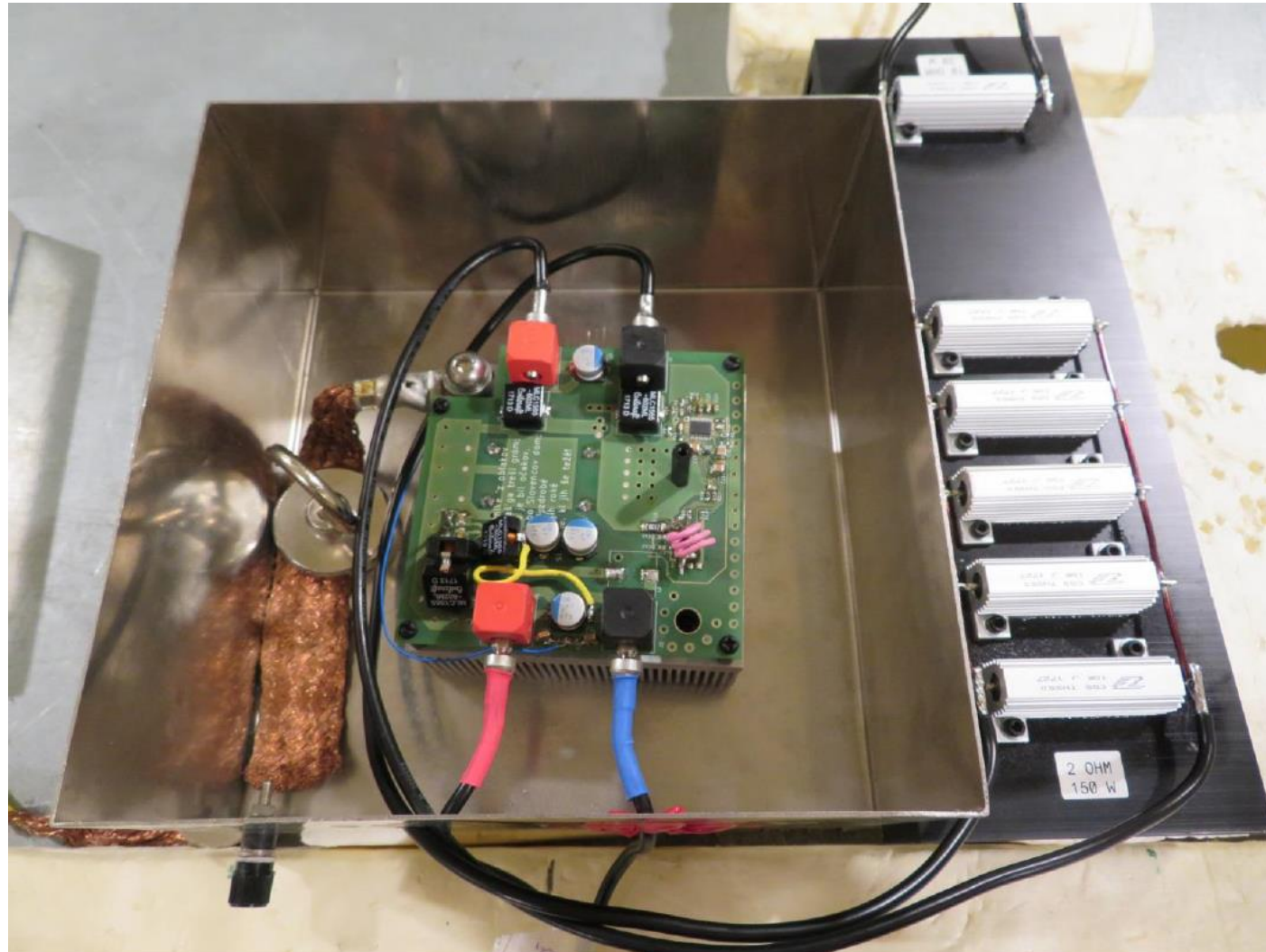
od 30 MHz do 1 GHz



Meritve sevalnih emisij



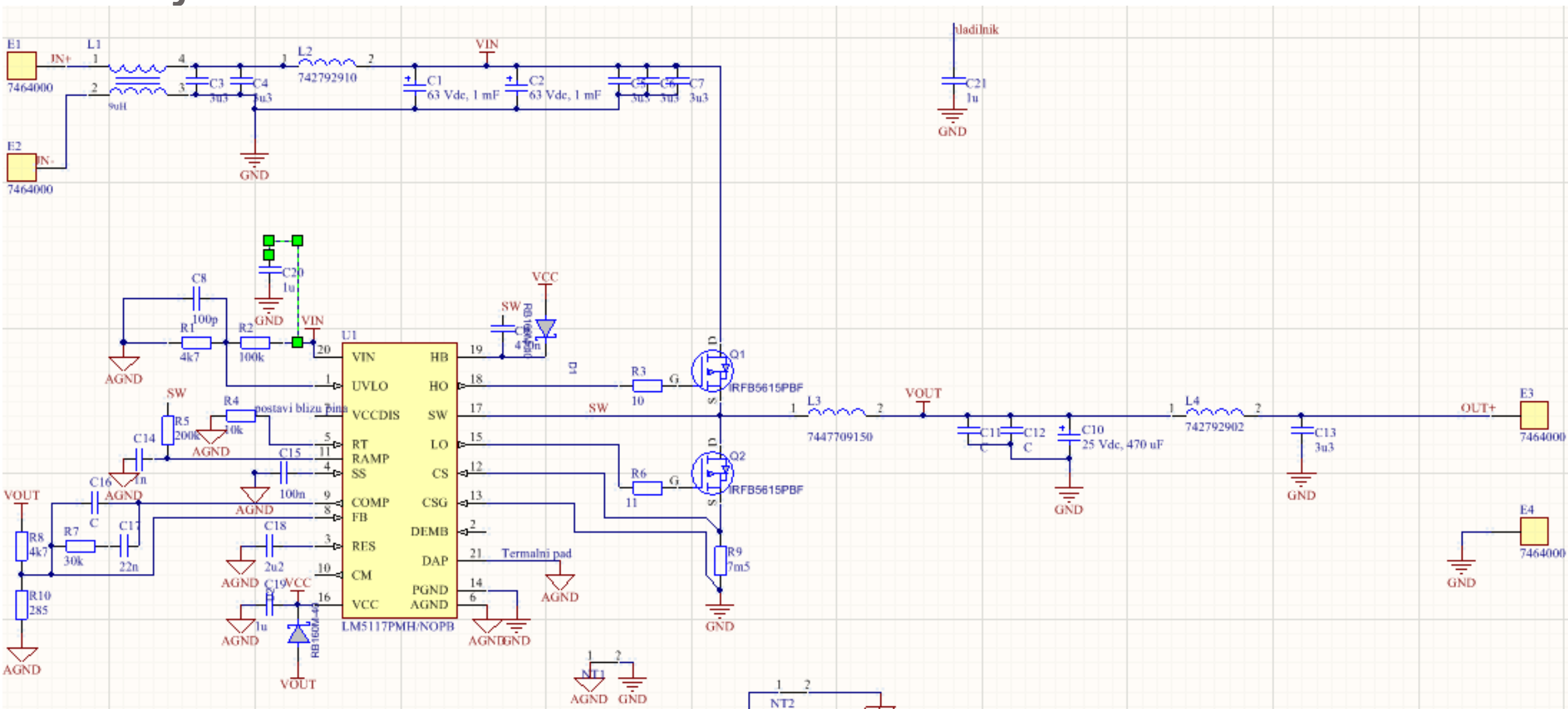
Meritve sevalnih emisij v ohišju iz Mu-metala



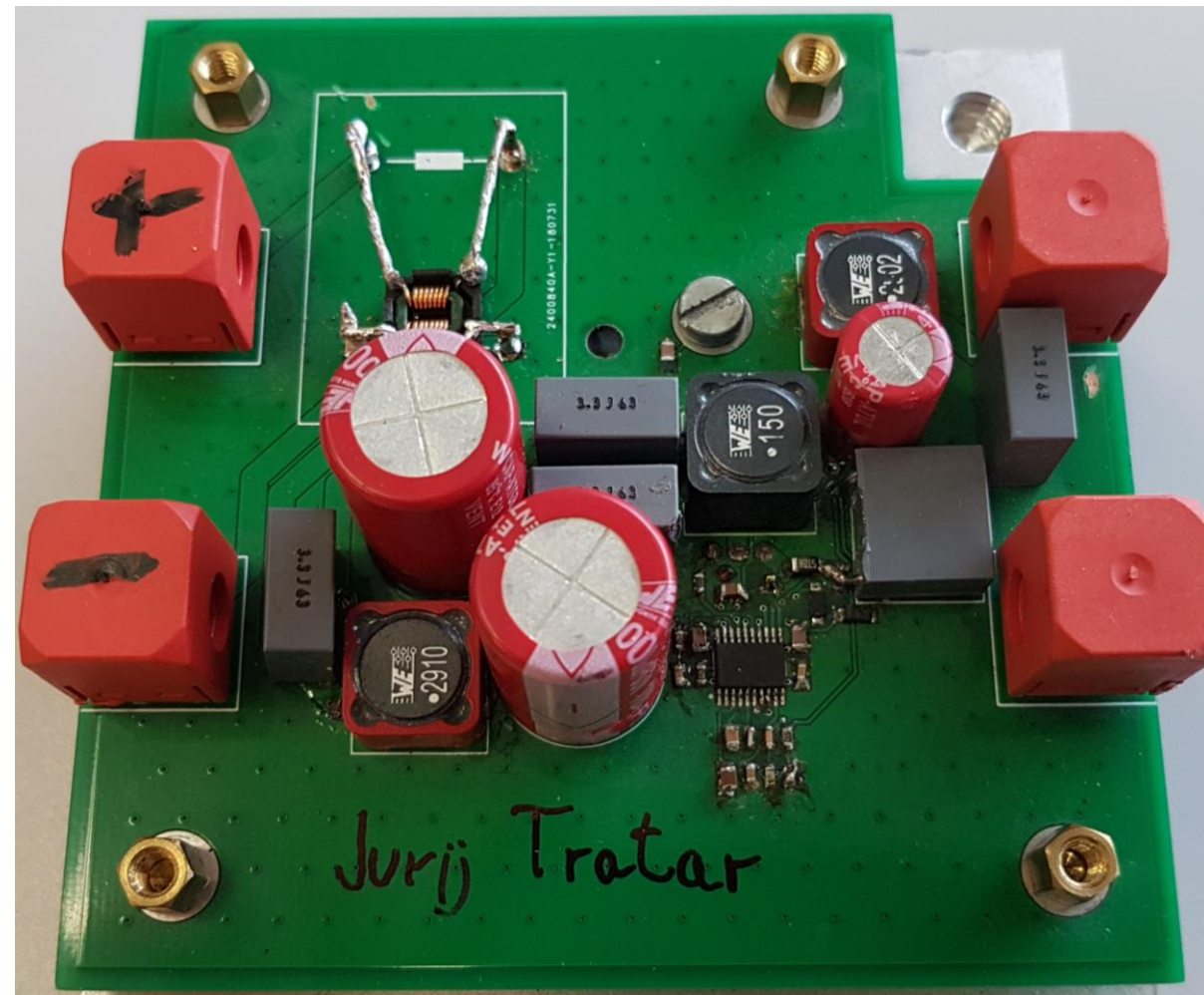
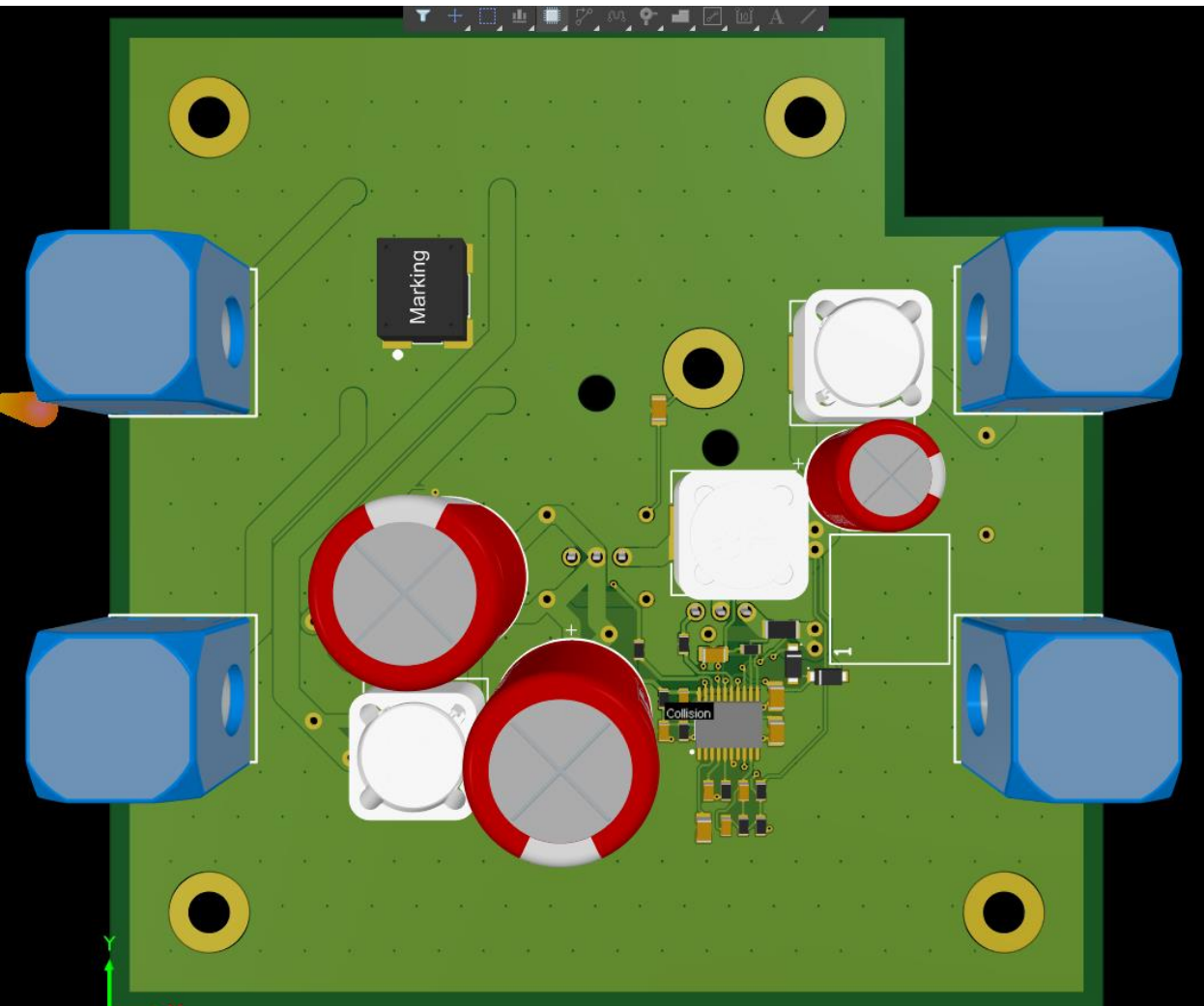
Tekmovalci

- 14 študentov je naročilo material za projekt
- 9 študentov je naročilo tiskana vezja
- Od tega je oddalo projekte 9 študentov
 - S01 Jurij Tratar
 - S02 Žiga Šmelcer
 - S03 Bernard Veršnjak
 - S04 in S05 Jan Žagar
 - S06 Matjaž Janežič
 - S07 Jan Cvijanovič Hudoklin
 - S08 Martin Kregar in Blaž Okorn
 - S09 Marko Remec
 - S10 Gregor Pečar

Jurij Tratar



Jurij Tratar



Jurij Tratar: Kosovnica

Naziv elementa	Koda proizvajalca	Proizvajalec	Cena/kos	Št. Kosov	Cena
Poliestrski kondenzator 3,3uF	R60DF4330506AJ	Kemet	0.24 €	8	1.90 €
N kanalni MOSFET	IPA086N10N3G XKSA1	Infineon	0.71 €	2	1.42 €
Elektrolitski kondenzator 470uF	860040475008	WE	0.27 €	1	0.27 €
Elektrolitski kondenzator 1mF	860010780024	WE	1.11 €	2	2.22 €
Sofazna dušilka 9uH	744273801	WE	1.87 €	1	1.87 €
Ferite bead 200 Ohm, 5,5A	742792910	WE	1.94 €	1	1.94 €
Močnostna tuljava 15uH, 8A	7447709150	WE	1.66 €	1	1.66 €
Ferite bead 565 Ohm, 8A	742792902	WE	2.31 €	1	2.31 €
					13.59 €

Jurij Tratar: Električne meritve

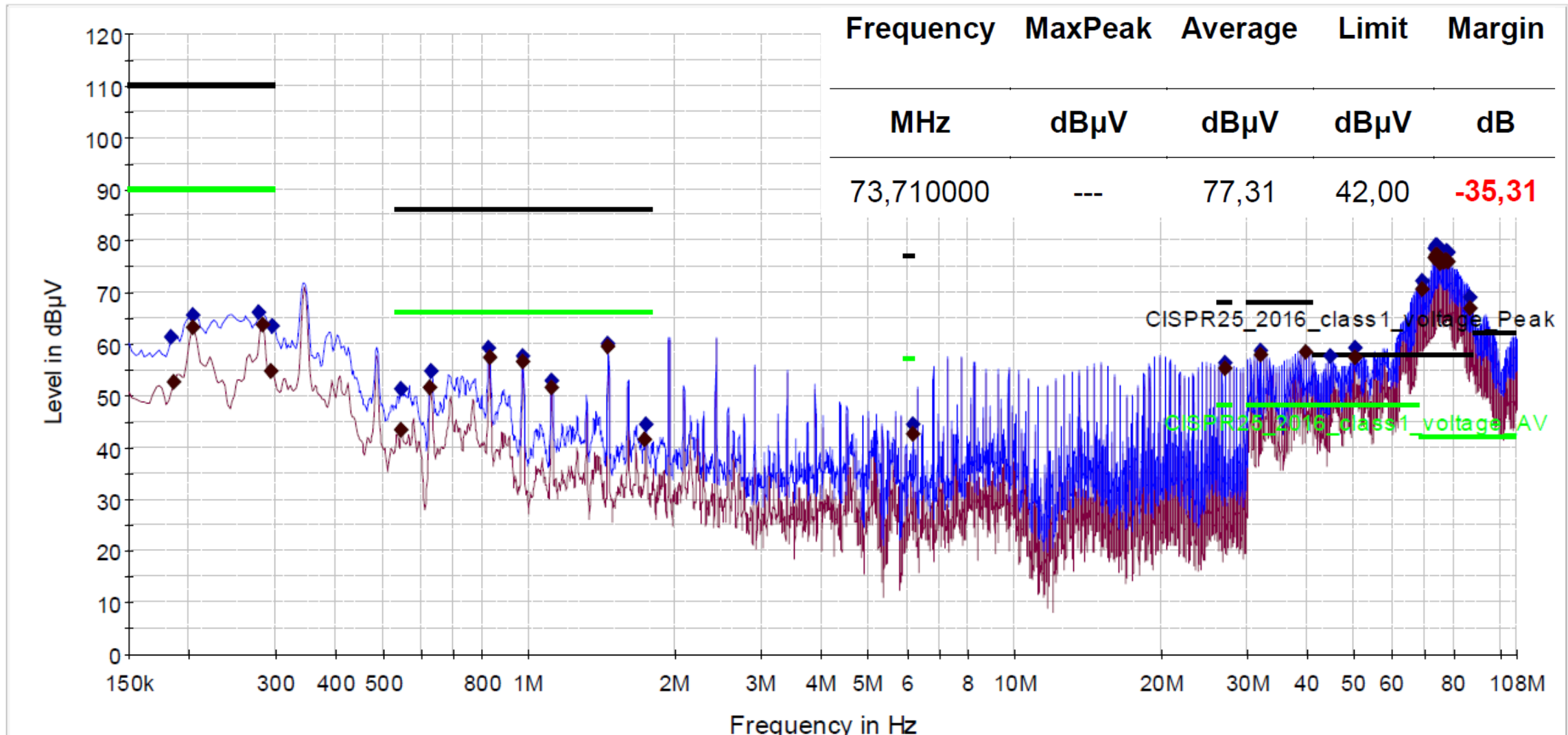
Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S01	I _{vh} [A]	0,619	0,504	0,411	2,846	2,181	1,769
	I _{izh} [A]	1,386	1,385	1,385	6,742	6,745	6,745
	U _{izh} [V]	13,973	13,969	13,969	13,849	13,846	13,843

Izkoristek: **89,2%** (zahteva nad 75%)

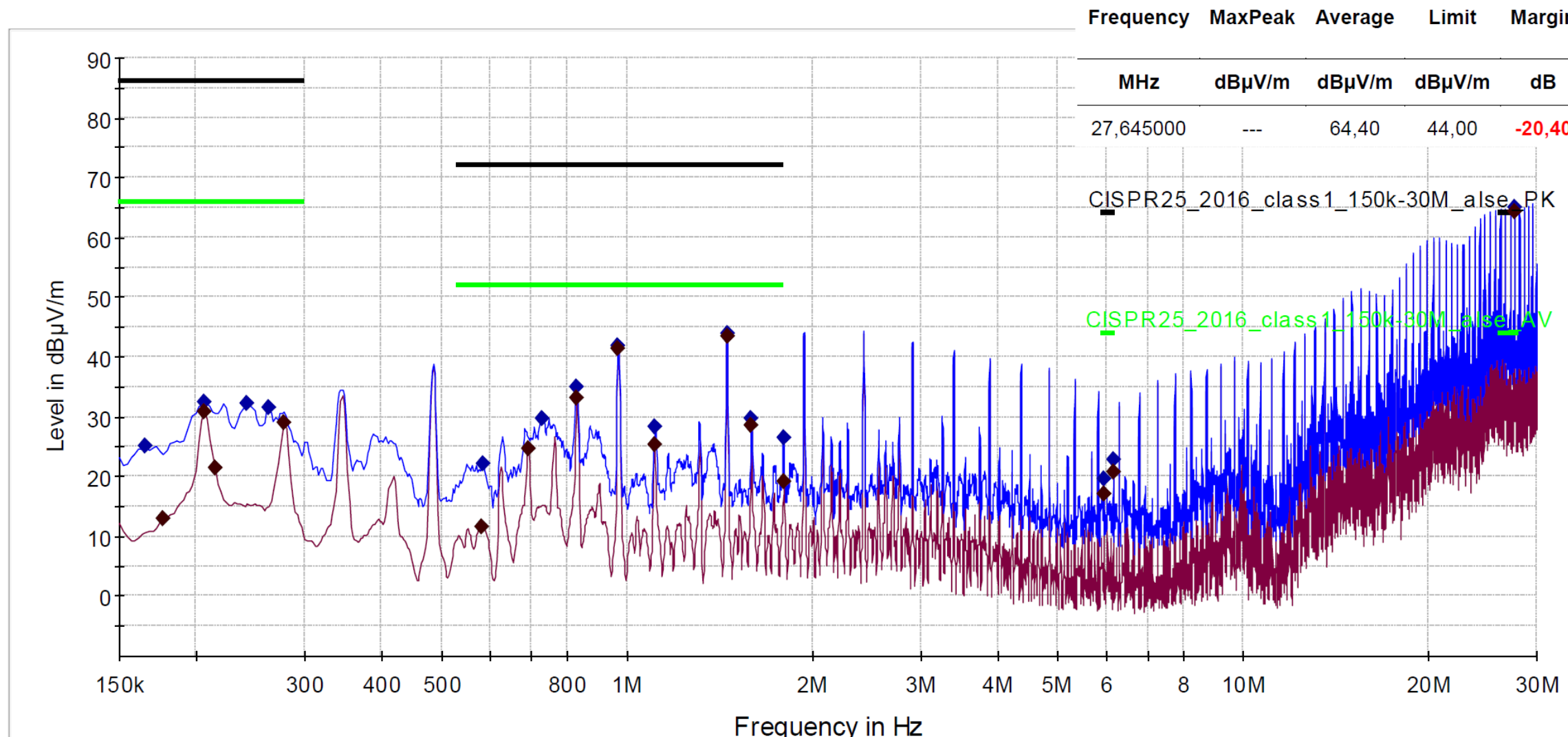
Valovitost pri osnovni frekvenci: **25,3 mV** (zahteva pod 0,2 V)

Valovitost skupno: **1,05 V** (zahteva pod 0,5 V)

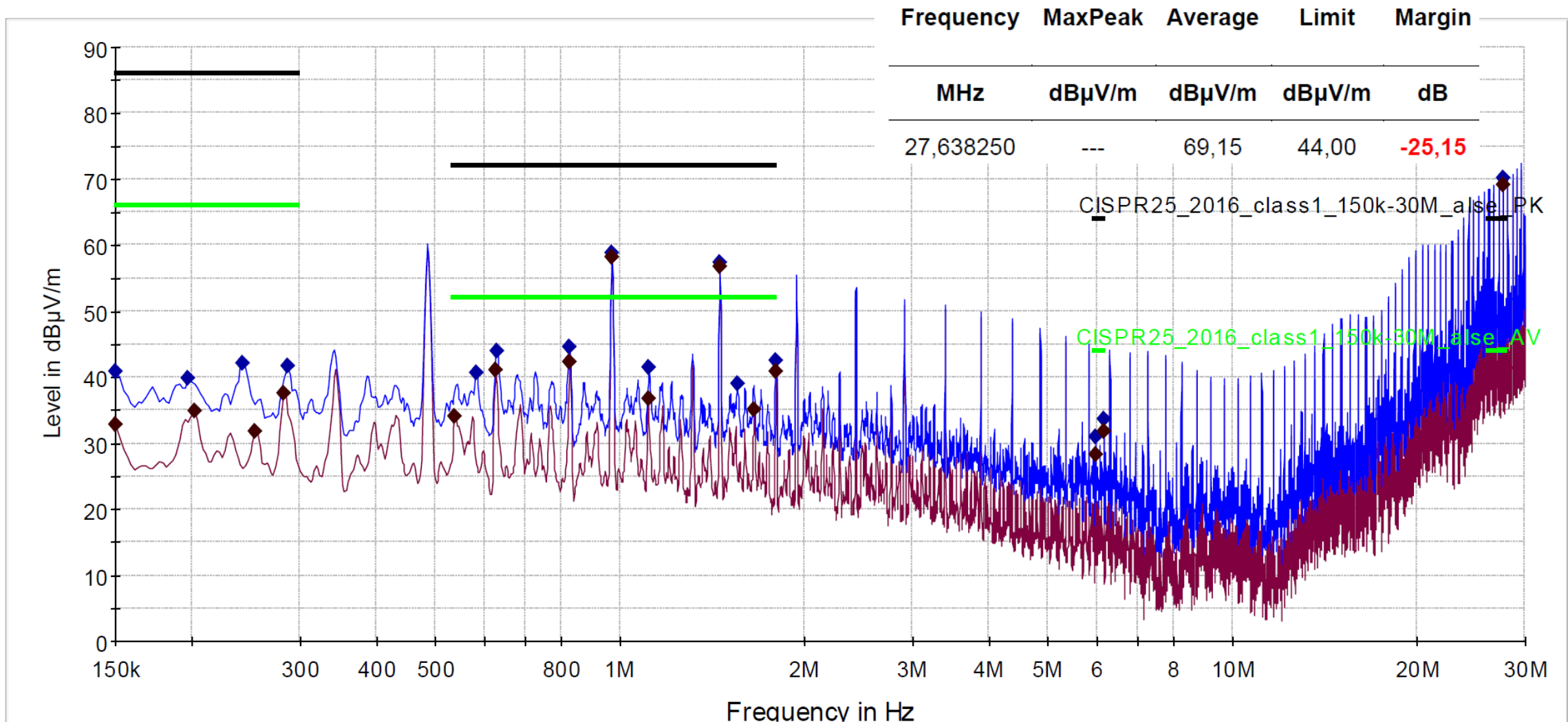
Jurij Tratar: Prevodne motnje



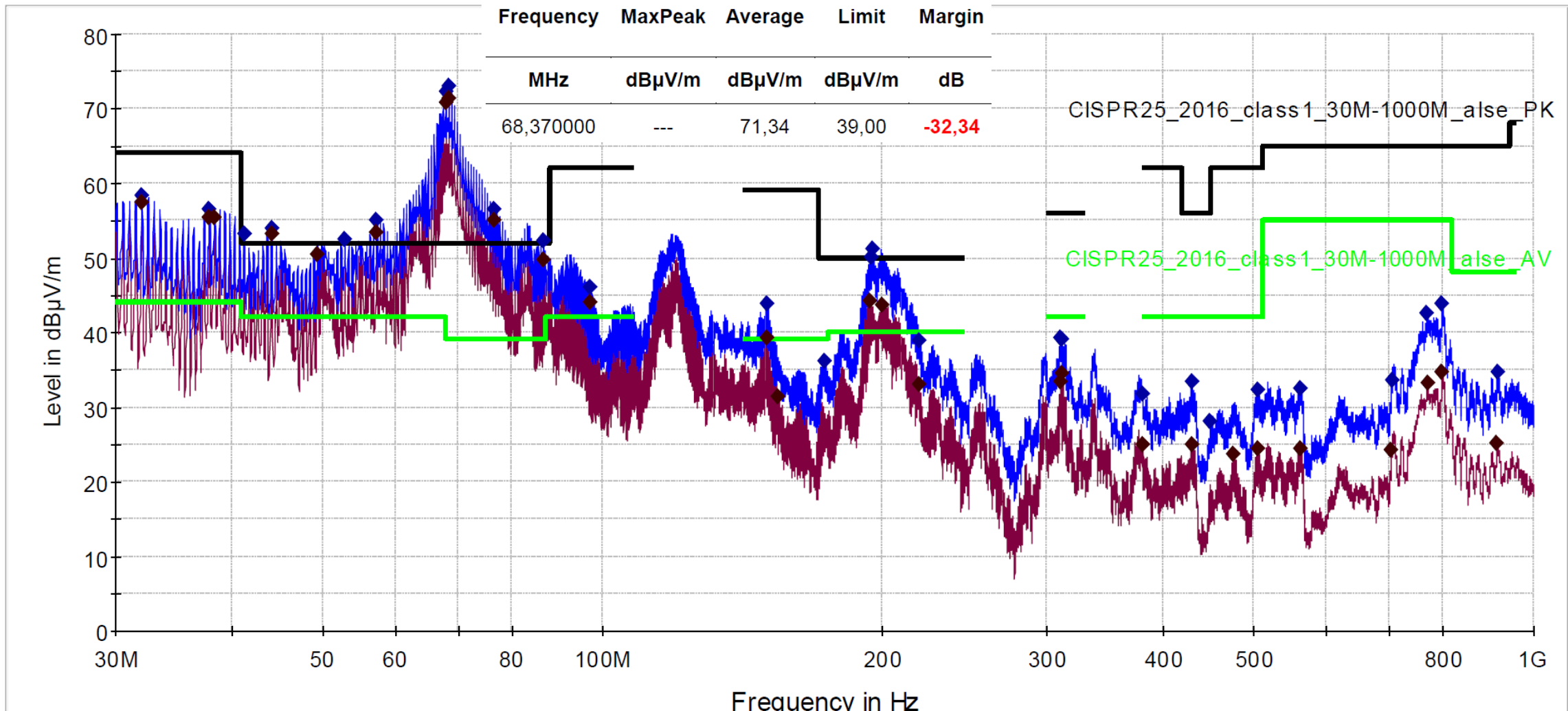
Jurij Tratar: Sevalne motnje do 30 MHz



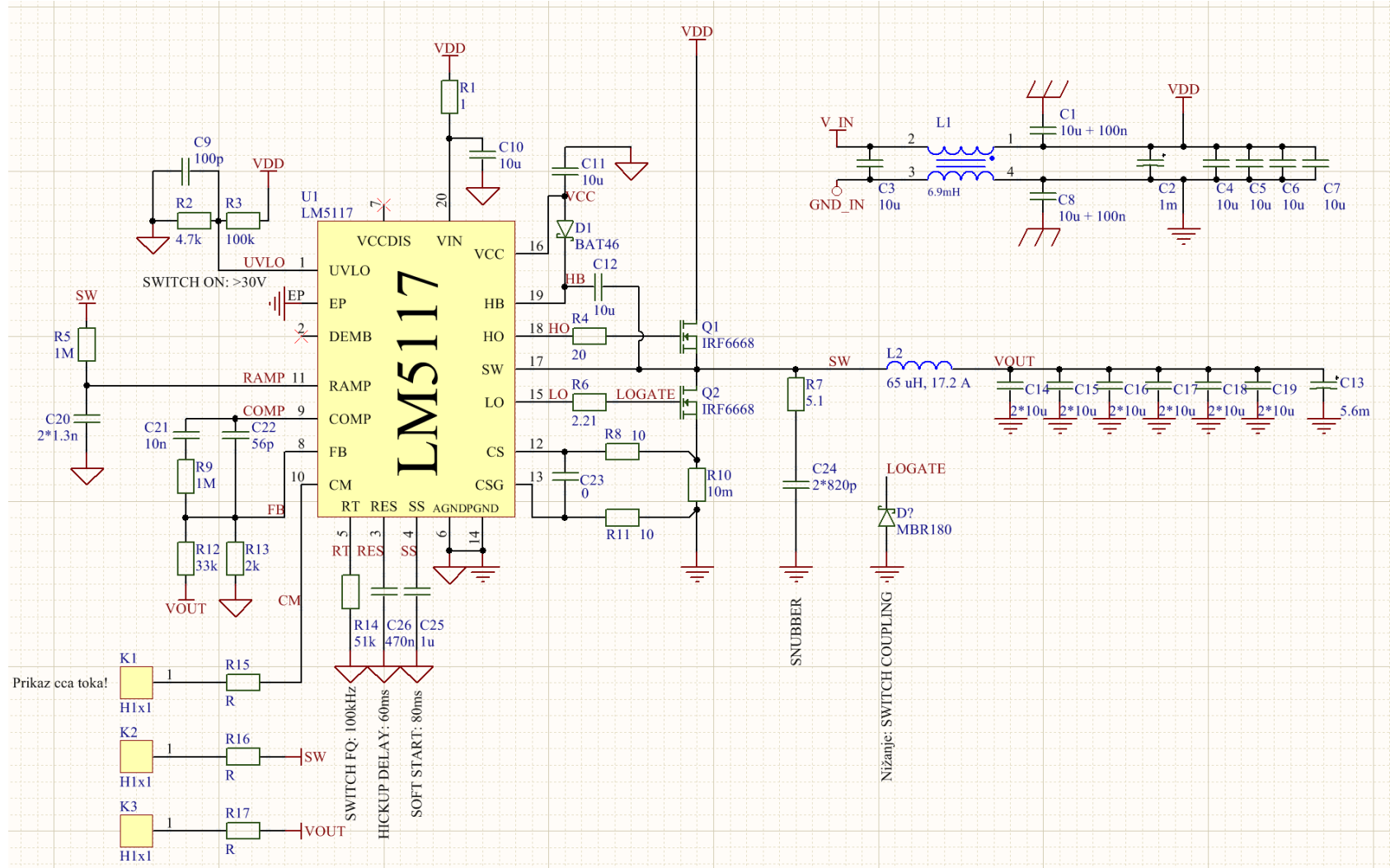
Jurij Tratar: Sevalne motnje do 30 MHz (MUMETAL)



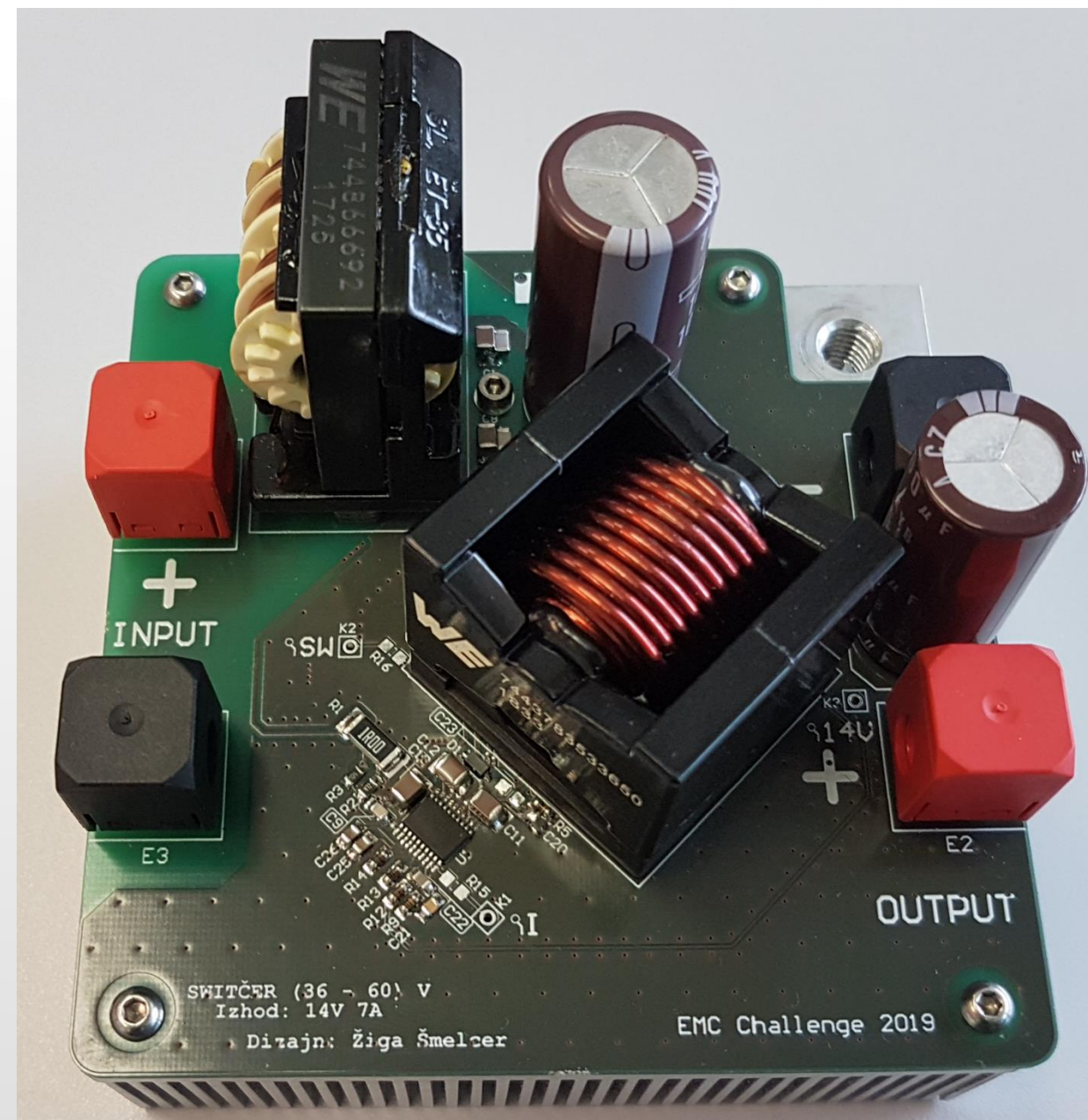
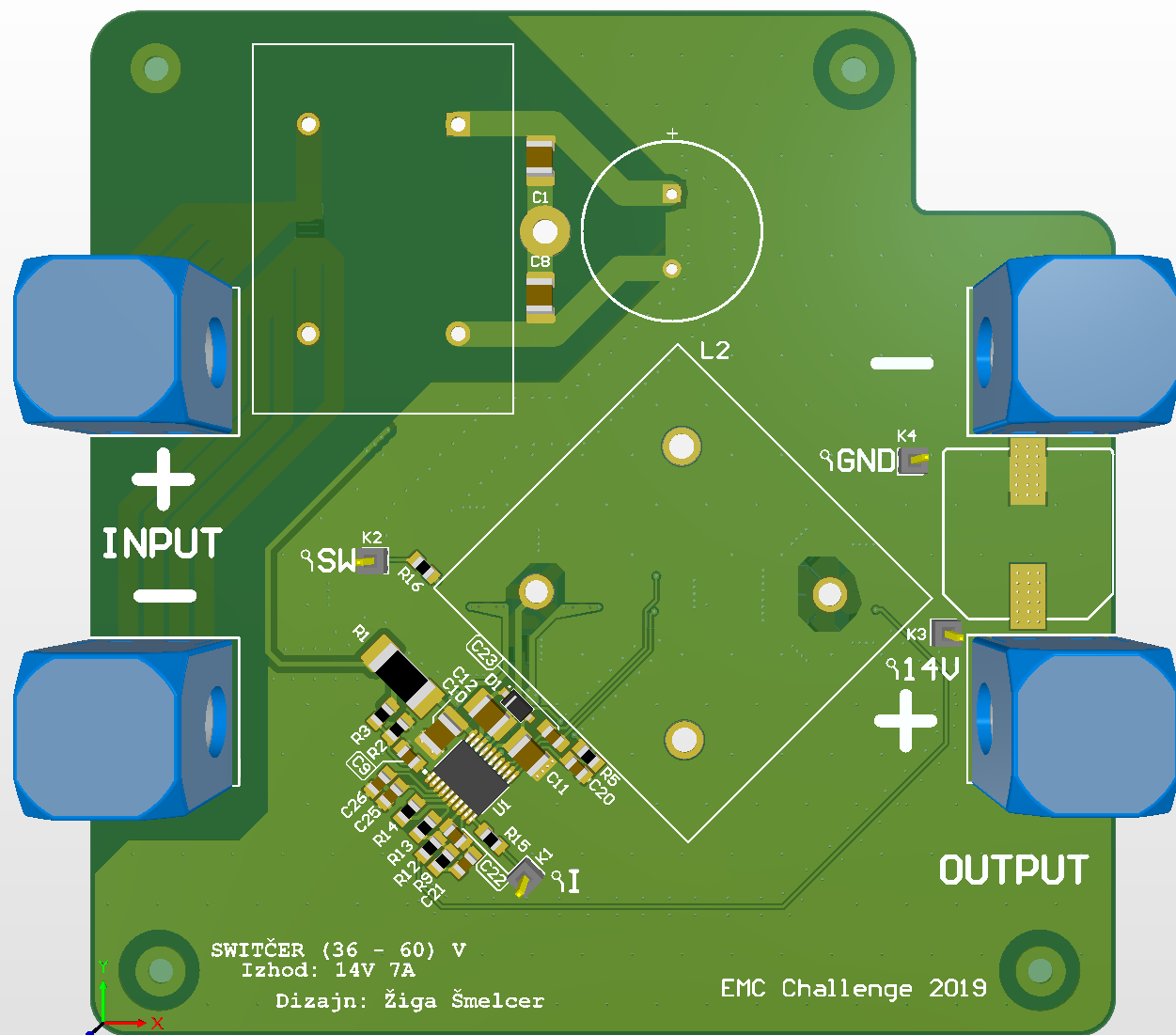
Jurij Tratar: Sevalne motnje do 1 GHz



Žiga Šmelcer



Žiga Šmelcer



Žiga Šmelcer: Kosovnica

Naziv elementa	Koda proizvajalca	Proizvajalec	Cena/kos	Št. Kosov	Cena
ELCO 5.6mF 25V 4.08A ripple	EKYB250ELL562MLP1S		0.682	1	0.682
ELCO 1mF 100V 3.86A ripple	EKZN101ELL102MM40S		1.27	1	1.27
MLCC 100nF 100V COG	MMU01020C2001FB300		0.208	2	0.416
MLCC 10uF 75V X7R	CGA6P1X7R1N106M250AC		0.36	8	2.88
MLCC 10uF 50V X7R	C3216X7R1H106K160AC		0.27	12	3.24
MLCC 820pF 100V COG	C1206C821J1GACTU		0.144	2	0.288
Power MOSFET 80V 22nC 12mΩ DirectFET	IRF6668TRPBF		0.675	2	1.35
WE-FCL Common Mode Power Line Choke, ET35, 6.9mH, 4A, 250V	744866692	WE	2.22	1	2.22
THT High Current Inductor WE- HCFT, size 3533, 65 uH, 17.2 A	7443783533650	WE	8.5	1	8.5
					20.846

Žiga Šmelcer: Električne meritve

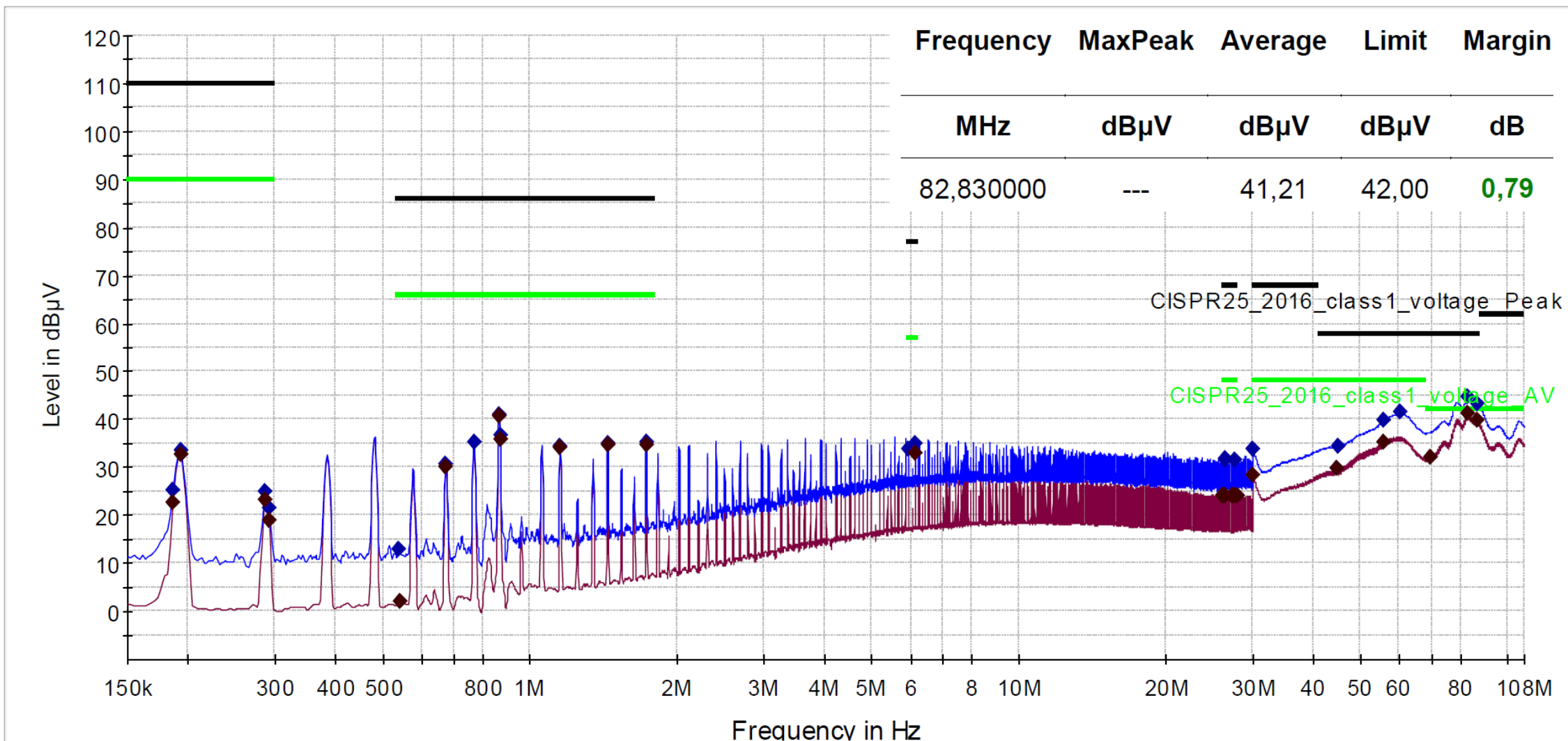
Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S02	I_{vh} [A]	0,572	0,478	0,358	2,774	2,088	1,682
	I_{izh} [A]	1,387	1,387	1,388	6,797	6,798	6,800
	U_{izh} [V]	13,956	13,957	13,958	13,945	13,946	13,947

Izkoristek: **94,6%** (zahteva nad 75%)

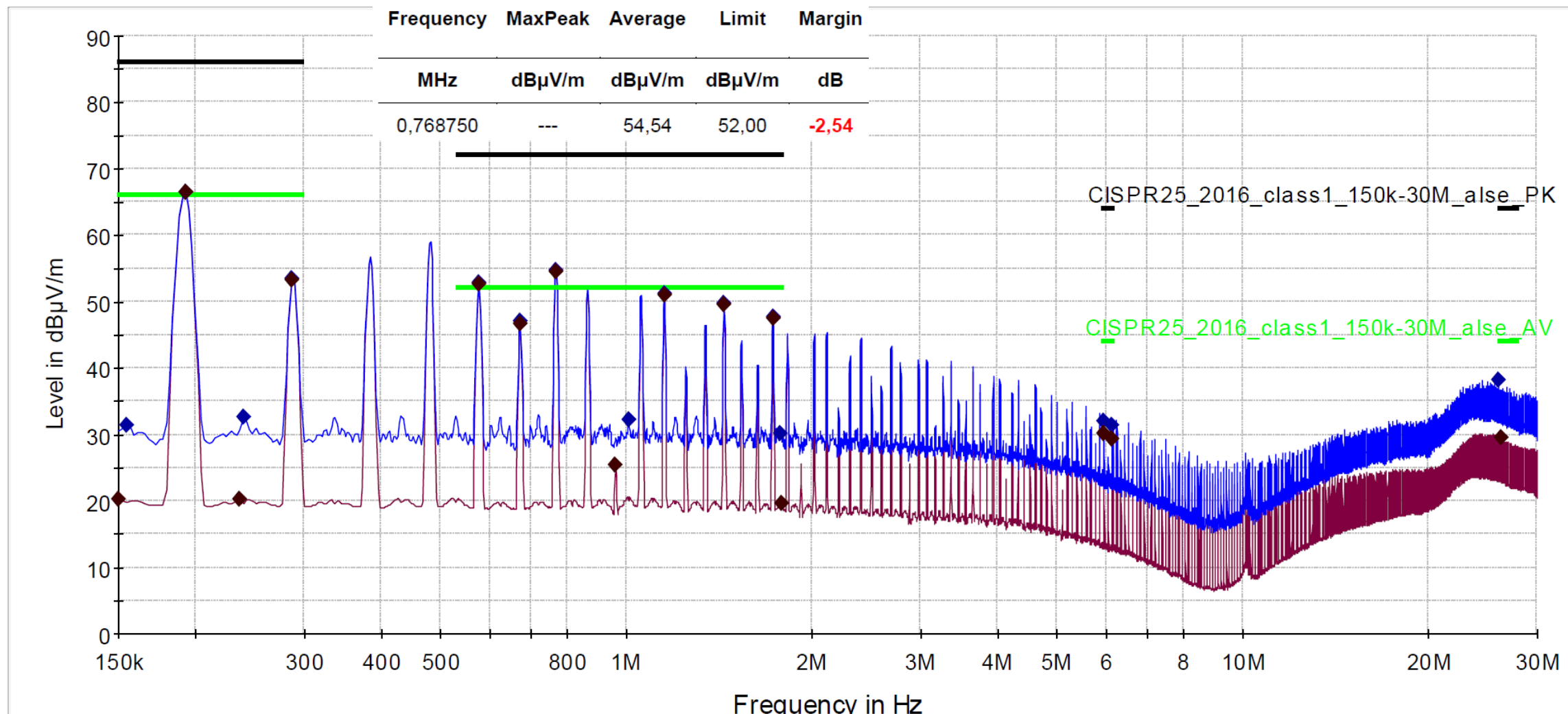
Valovitost pri osnovni frekvenci: **24,7 mV** (zahteva pod 0,2 V)

Valovitost skupno: **0,102 V** (zahteva pod 0,5 V)

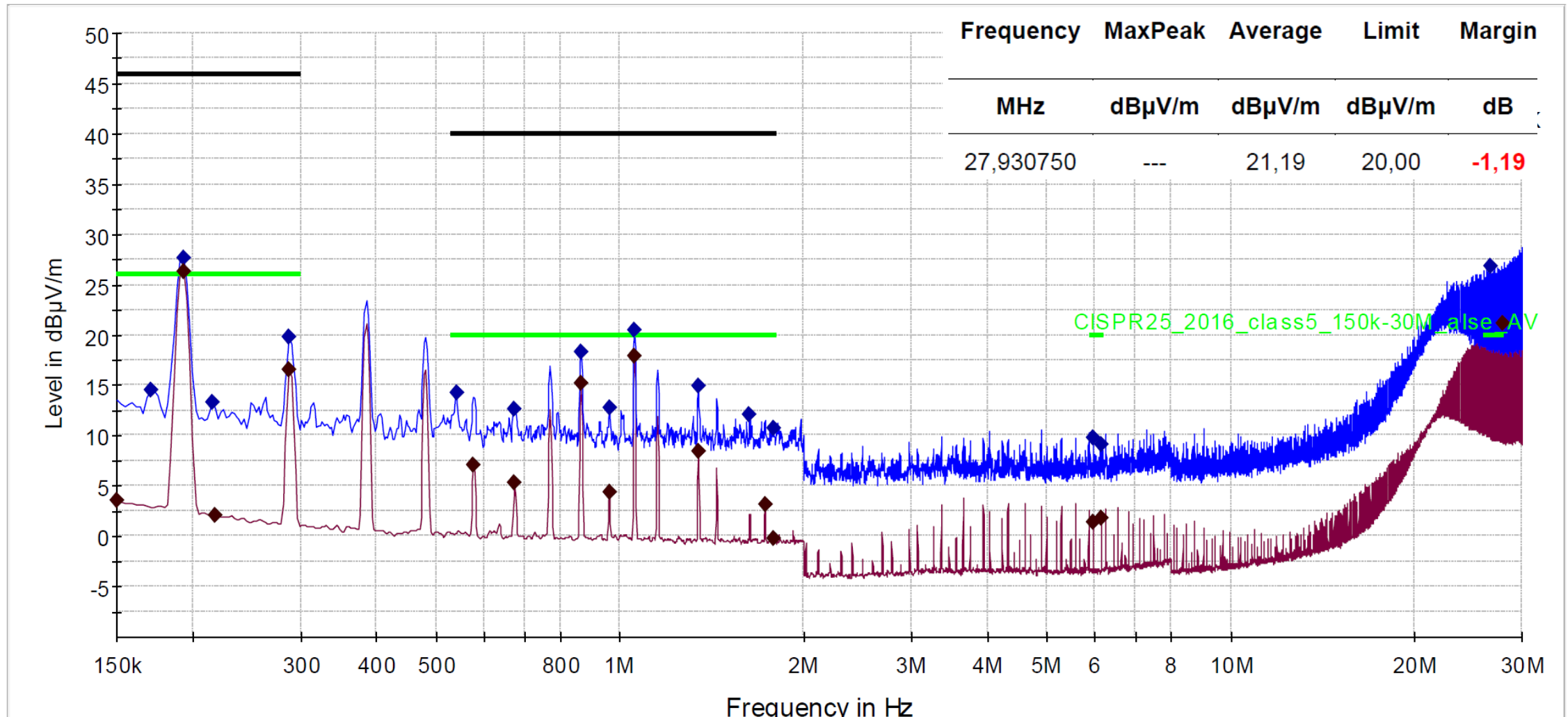
Žiga Šmelcer: Prevodne motnje



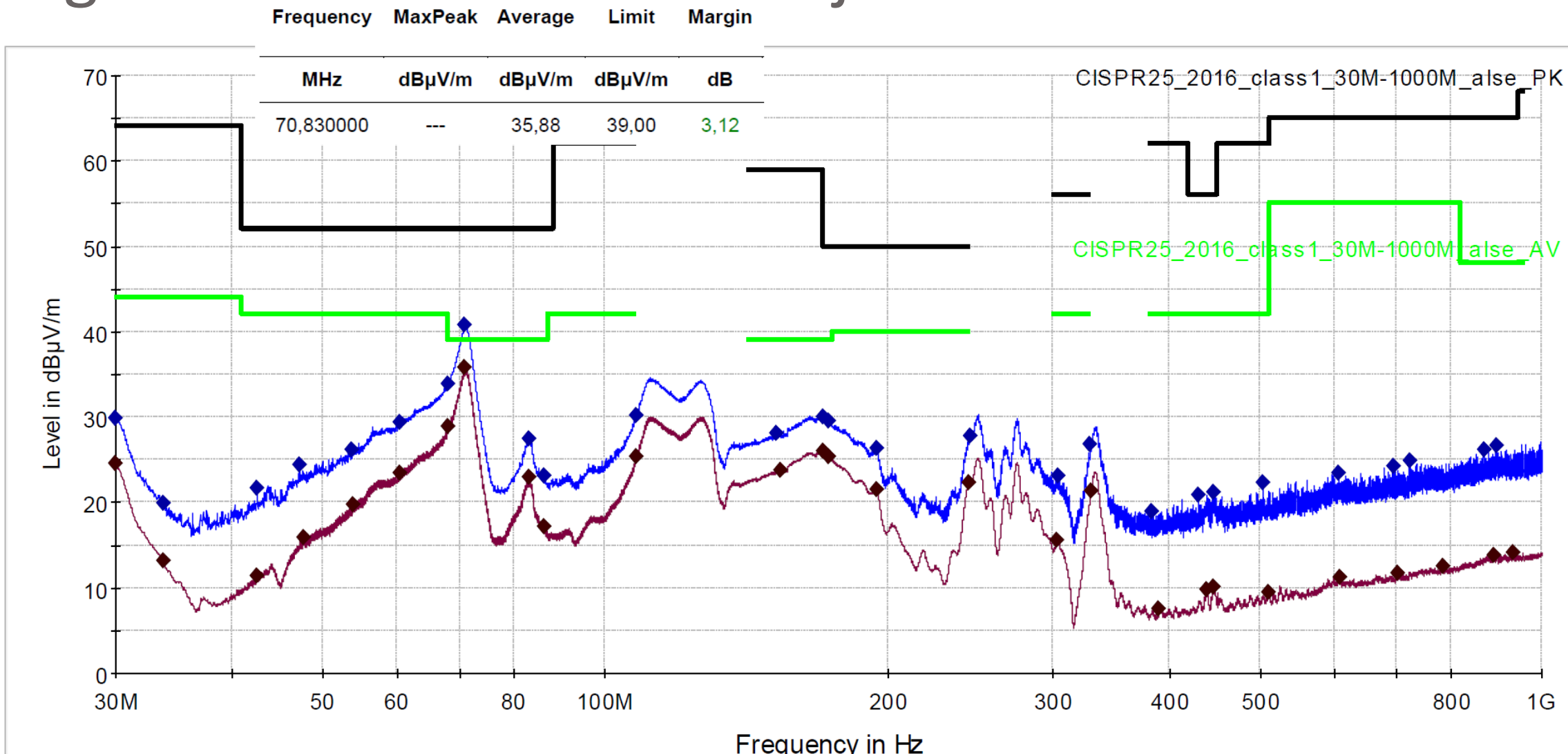
Žiga Šmelcer: Sevalne motnje do 30 MHz



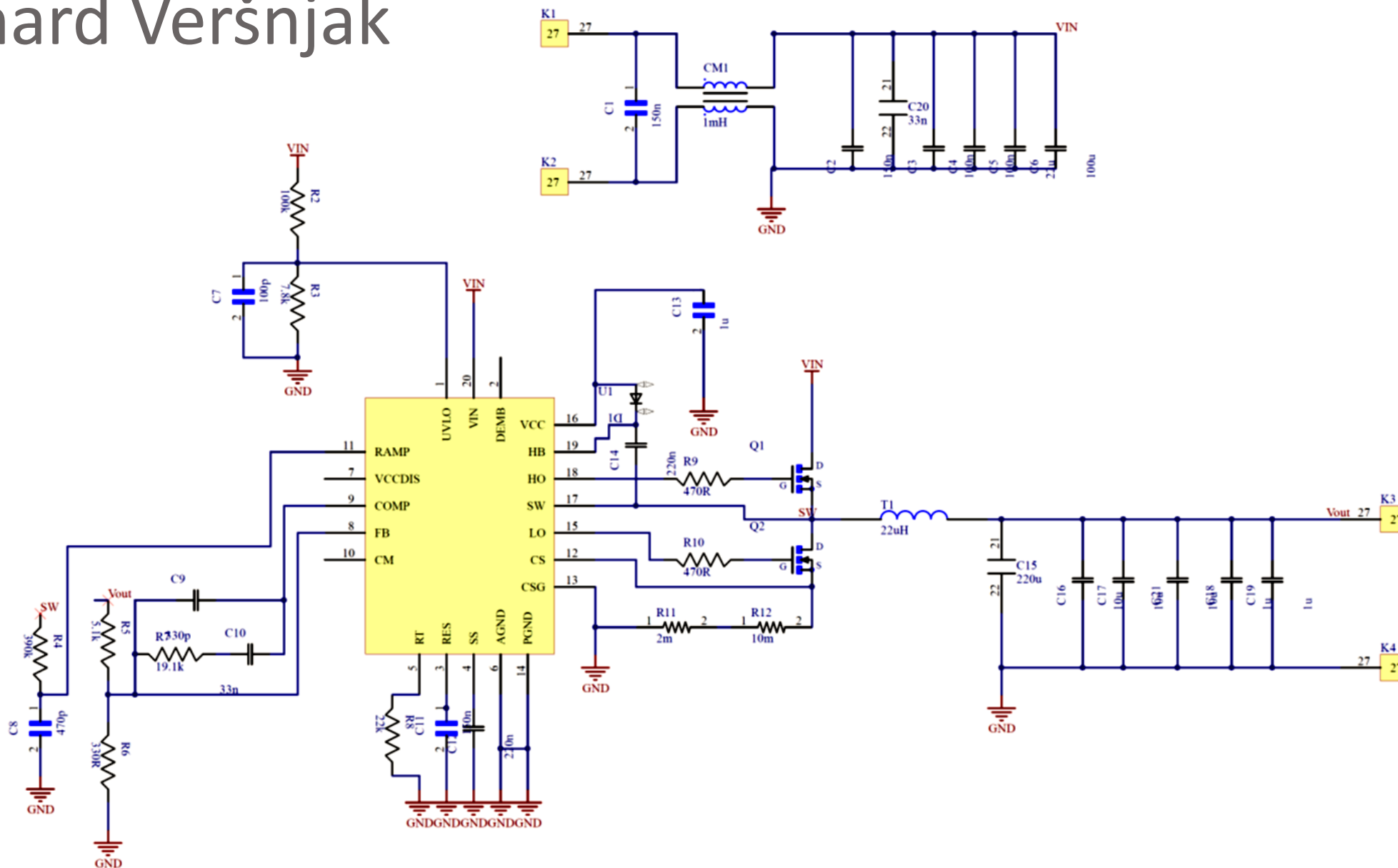
Žiga Šmelcer: Sevalne motnje do 30 MHz (MUMETAL)



Žiga Šmelcer: Sevalne motnje do 1 GHz



Bernard Veršnjak



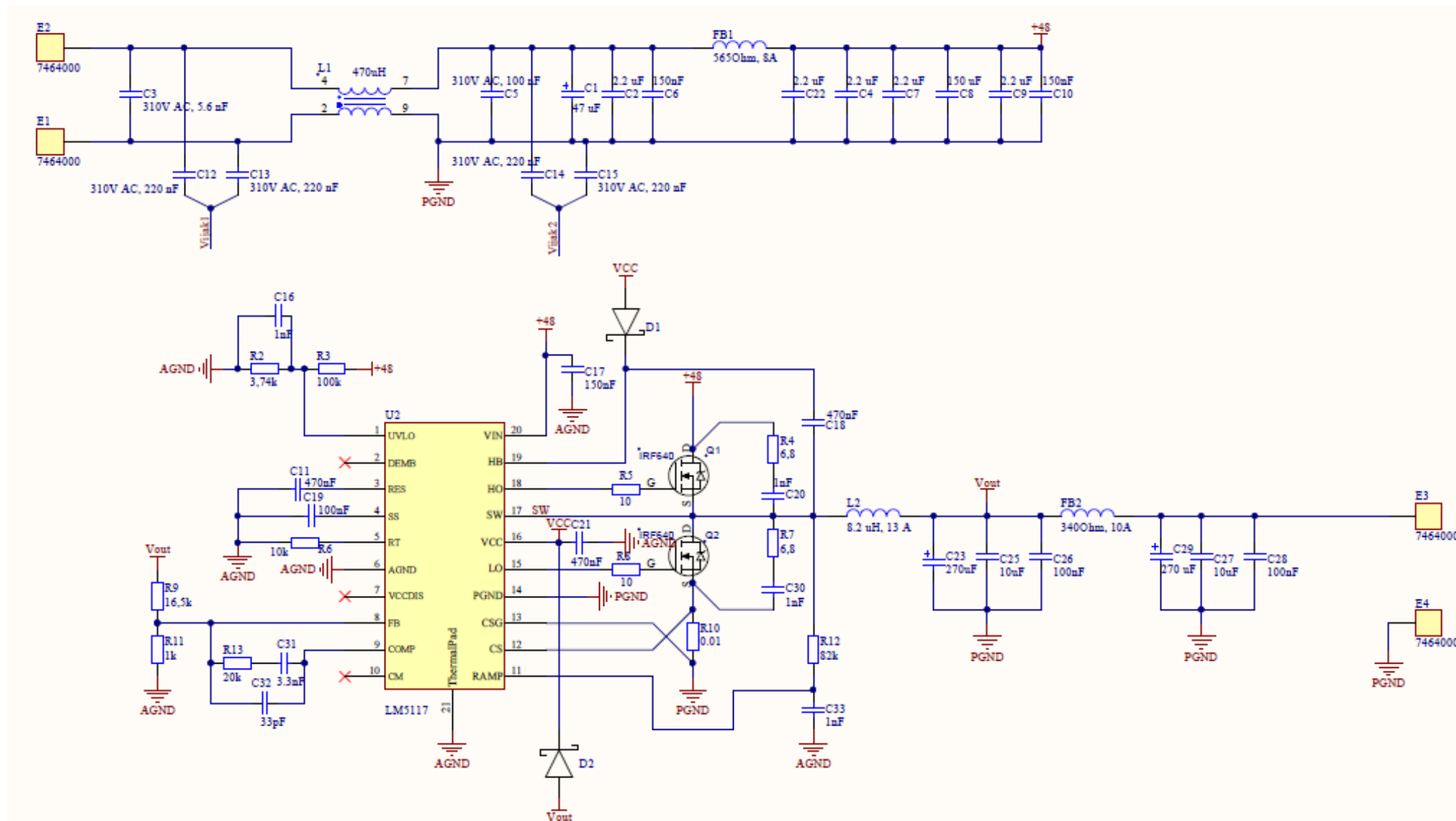
Bernard Veršnjak: Kosovnica

Naziv elementa	Koda proizvajalca	Proizvajalec	Cena/kos	Št. Kosov	Cena
MLCC kondenzator 150n	890334 025031		0.702	1	0.702
MLCC kondenzator150n	885012 208119		0.352	1	0.352
filmski kondenzator 33n	BFC237021333		0.615	1	0.615
keramični kondenzator 100n	S104Z9 3Z5VL83L0R		1.83	1	1.83
keramični kondenzator 100n	MCFYU6104Z6		0.103	1	0.103
elektrolitski kondenzator 22u	MCNP63V226M8X11.5		0.185	1	0.185
elektrolitski kondenzator 100u	ECA2AM101		0.57	1	0.57
MLCC kondenzator 470p	885012 007057		0.082	1	0.082
MLCC kondenzator 470p	885012 206081		0.05	1	0.05
MLCC kondenzator 330p	885012 208072		0.016	1	0.016
MLCC kondenzator 100p	885012 209038		0.634	1	0.634
MLCC kondenzator 150n	8850122 08119		0.704	1	0.704
MLCC kondenzator 220n	885012 208089		0.584	1	0.584
MLCC kondenzator 1u	12061C105KAT2A		0.946	1	0.946
MLCC kondenzator 220n	885012 208089		0.584	1	0.584
elektrolitski kondenzator 220u	ECA1JHG221		0.533	1	0.533
MLCC kondenzator 10u	88501 2107014		0.77	1	0.77
MLCC kondenzator 10u	88501 2107014		0.77	1	0.77
MLCC kondenzator 10u	88501 2107014		0.77	1	0.77
MLCC kondenzator 1u	88501 2206052		0.027	1	0.027
MLCC kondenzator 1u	88501 2206052		0.027	1	0.027
sofazna dušilka 1mH	710-744834101 (mouser)		5.73	1	5.73
Toroidna dušilka 22uH		7447017	2.97	1	2.97
N-MOSFET IRF540	IRF540NPBF		1.08	1	1.08
N-MOSFET IRF3710	IRF540NPBF		1.08	1	1.08
					21.714

Bernard Veršnjak: Električne meritve

- Pri vhodni napetosti 48V je izhodna napetost zelo nestabilna
- Pri vhodnih napetostih 36 V in 48 V in bremenu 2Ω je vhodni tok nad 10 A. Izhodna napetost 17 V.

Jan Žagar



Jan Žagar: Kosovnica

Naziv elementa	Koda proizvajalca	Proizvajalec	Cena/kos	Št. Kosov	Cena
WCAP-PTHR Aluminium Polymer Capacitors Φ 10x12.5mm, 100VDC, 47 μ F	870055975004	Würth Elektronik	2.38 €	1	2.38 €
WCAP-PTHR Aluminum Polymer Capacitors, size Φ 10x12.5mm, 100V DC, 33 μ F	870055975003	Würth Elektronik	1.78 €	1	1.78 €
WCAP-FTXX Film Capacitors, 13x5x10mm, 310V AC, 5.6 nF	890334023002	Würth Elektronik	0.17 €	1	0.17 €
SMD Multilayer Ceramic Capacitor, 0.1 μ F, 100 V, 1206	885012208118	Würth Elektronik	0.09 €	8	0.72 €
WCAP-FTXX Film Capacitors, 18x6x12mm, 310V AC, 100 nF	890334025017	Würth Elektronik	0.21 €	1	0.21 €
WCAP-CSGP Ceramic Capacitors 1206, 2.2 μ F, 100V	885012208124	Würth Elektronik	0.15 €	3	0.45 €
SMD Multilayer Ceramic Capacitor, 10 μ F, 35 V, 1206	2547056	Farnell	0.34 €	1	0.34 €
WCAP-FTXX Film Capacitors, 18x6x11.5mm, 310V AC, 220nF	890334025027	Würth Elektronik	0.24 €	4	0.96 €
WCAP-CSGP Ceramic Capacitors, 470nF, 25V, 0603	885012106020	Würth Elektronik	0.05 €	2	0.10 €
SMD Multilayer Ceramic Capacitor, 0.47 μ F, 25 V, 0805	2496985	Farnell	0.04 €	1	0.04 €
SMD Multilayer Ceramic Capacitor, 0.47 μ F, 100 V, 0805	1867963	Farnell	0.08 €	1	0.08 €
WCAP-PSLC Aluminum Polymer Capacitors, size Φ 8x11.7mm, 25V DC, 270 μ F	875075561009	Würth Elektronik	1.14 €	1	1.14 €
WCAP-CSGP Ceramic Capacitors, 0805, NP0, 50V, 3.3nF	885012007066	Würth Elektronik	0.12 €	1	0.12 €
SMD Multilayer Ceramic Capacitor, 68 pF, 50 V, 0402	3019214	Farnell	0.01 €	1	0.01 €
WCAP-CSGP Ceramic Capacitors, 0805, NP0, 100V, 1nF	885012007088	Würth Elektronik	0.05 €	1	0.05 €
WCAP-CSGP Ceramic Capacitors, 1206, X7R, 100V, 150nF	885012208119	Würth Elektronik	0.17 €	2	0.34 €
WE-PF SMT EMI Suppression Power Ferrite, size 1280, 565 Ω , 8A	742792902	Würth Elektronik	1.81 €	1	1.81 €
WE-PF SMT EMI Suppression Power Ferrite, size 1280, 340 Ω , 10A	742792903	Würth Elektronik	1.81 €	1	1.81 €
WE-ExB Common Mode Power Line Choke, Type L, 470 μ H, 9A, 250V	744844471	Würth Elektronik	6.52 €	1	6.52 €
SMT Flat Wire High Current Inductor WEHCl, size 1890, 15 μ H, 14 A	74435571500	Würth Elektronik	3.70 €	1	3.70 €
IRFB4610PBF - MOSFET Transistor, N Channel, 73 A, 100 V, 0.011 Ω	9052054	Farnell	0.70 €	2	1.39 €
					24.13 €

Jan Žagar: Električne meritve

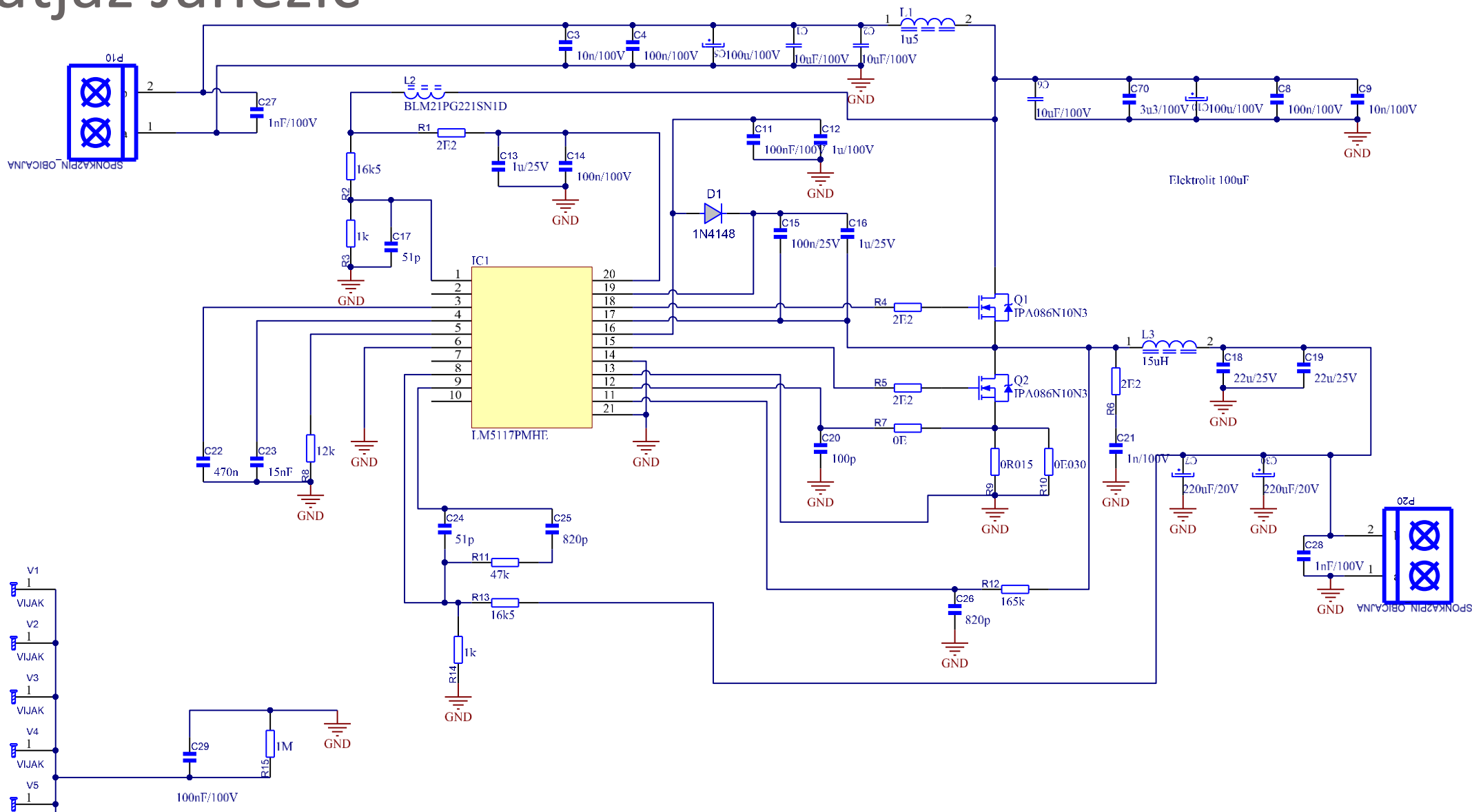
S04

- Brez obremenitve ni izhodne napetosti. Pretvornik ne deluje.

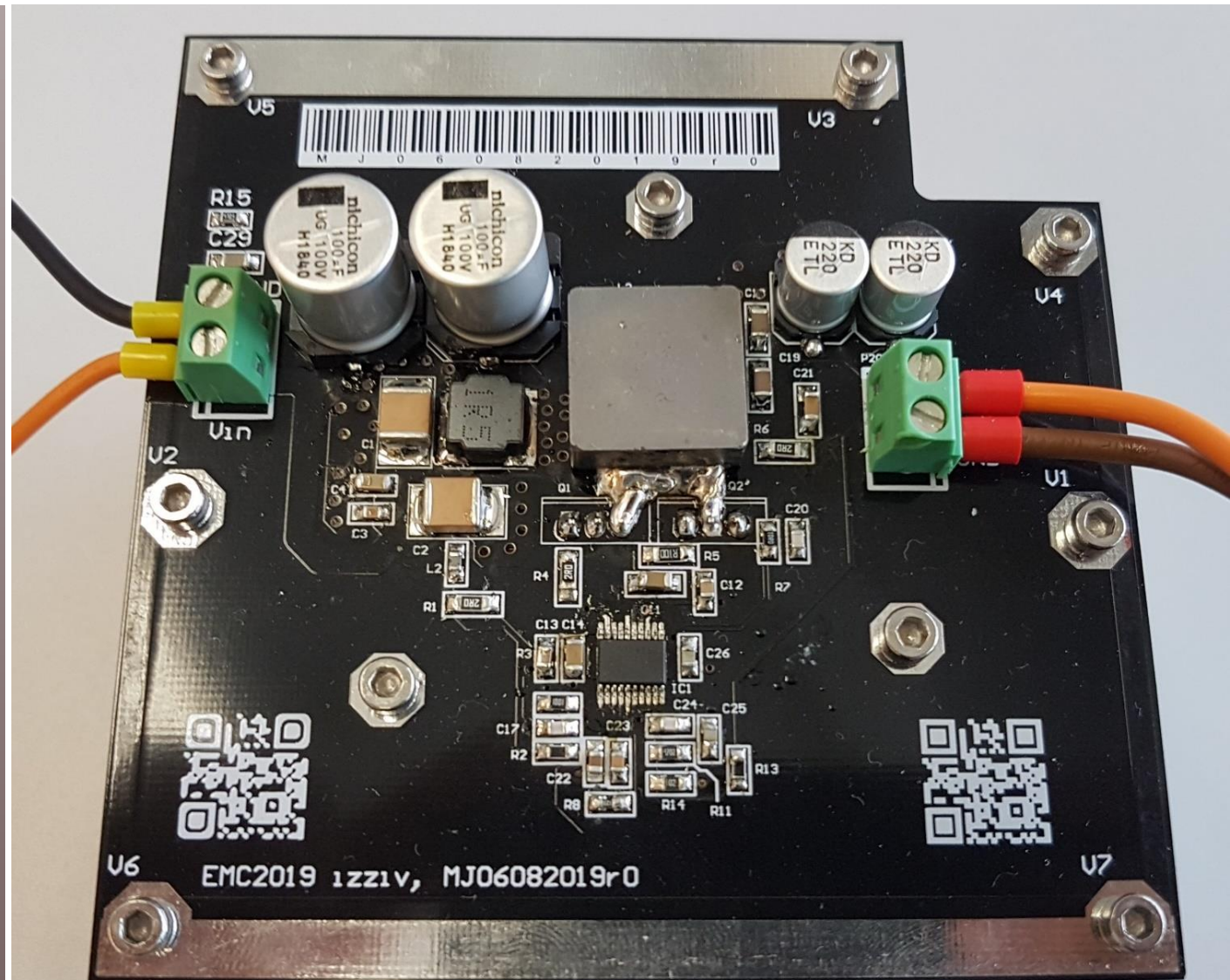
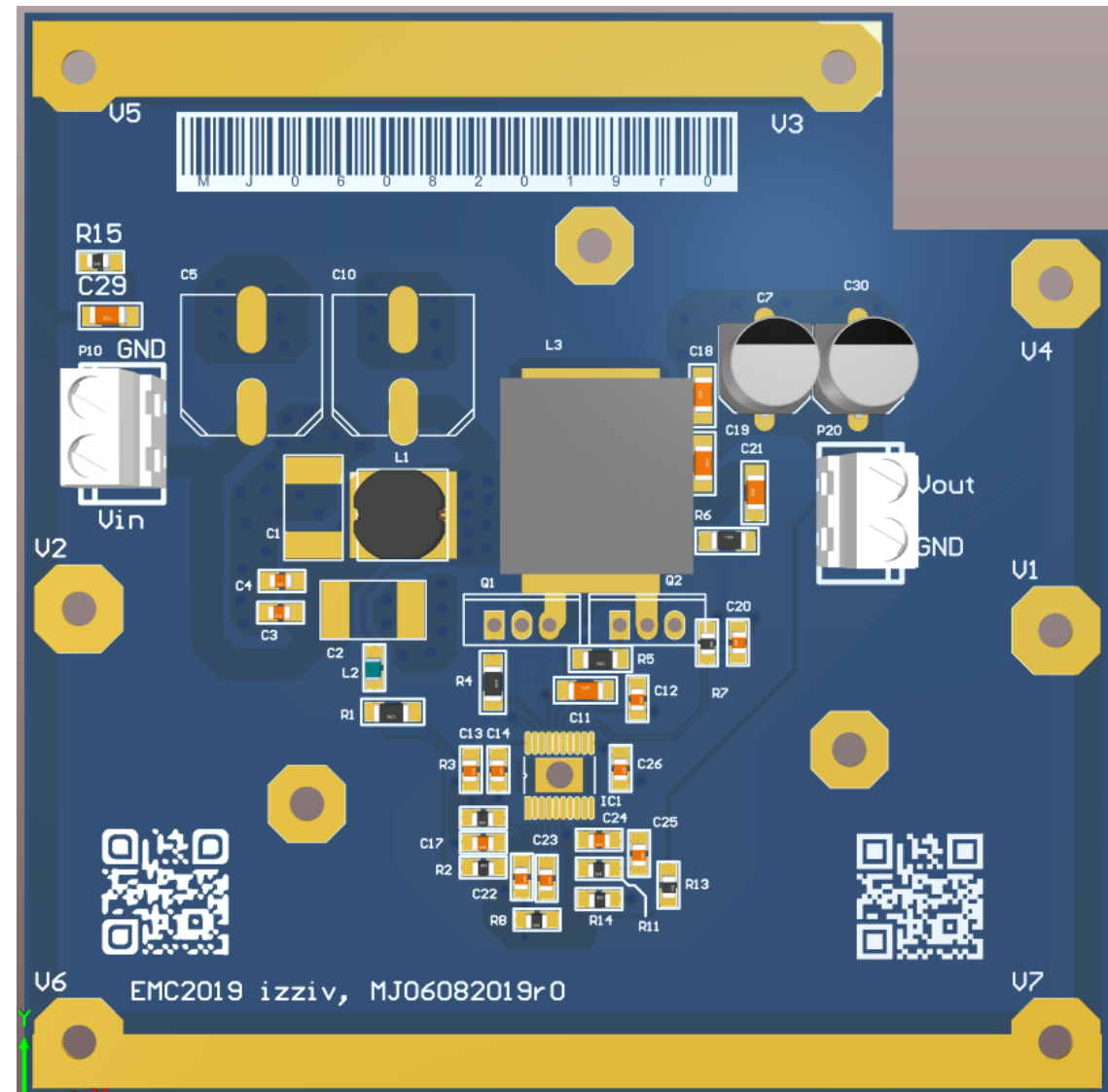
S05

- Brez obremenitve je izhodna napetost 4 V in počasi leze gor.

Matjaž Janežič



Matjaž Janežič



Matjaž Janežič: Kosovnica

Naziv elementa	Koda	Trgovec	Cena/kos	Št. Kosov	Cena
10uF/100V	581-22201C106MAT2A	Mouser	0.829	3	2.487
10n/100V	80-C0805C103K1R	Mouser	0.013	2	0.026
100n/100V	710-885012207128	Mouser	0.059	3	0.177
100u/100V	647-UUG2A101MNQ1MS	Mouser	0.436	2	0.872
220uF/20V	1831295	Farnell	0.283	2	0.566
100nF/100V	710-885012208058	Mouser	0.068	2	0.136
1u/100V	2112709	Farnell	0.140	1	0.14
1u/25V	2112709	Farnell	0.140	2	0.28
100n/25V	710-885012207072	Mouser	0.032	1	0.032
51p	80-C0805C510J4HACTU	Mouser	0.017	2	0.034
22u/25V	963-TMK316BBJ226ML-T	Mouser	0.152	2	0.304
100p	2280669		0.033	1	0.0328
1n/100V	710-885012208106	Mouser	0.068	1	0.068
470n	963-TMK212BJ474KD-T	Mouser	0.018	1	0.018
15nF	710-885012207093	Mouser	0.041	1	0.041
820p	77-VJ0805A821JXBAC	Mouser	0.075	2	0.15
1nF/100V	499316		0.076	2	0.152
4u7/100V	963-HMK325BJ475KN-TE	Mouser	0.344	1	0.344
1N4148	78-LL41	Mouser	0.073	1	0.073
1u5	652-SRN8040TA-1R5Y	Mouser	0.195	1	0.195
BLM21PG221SN1D	1515661		0.024	1	0.0235
15uH	70-IHLP6767GZER150M1	Mouser	2.780	1	2.78
SPONKA2PIN_OBICAJNA	3041440		0.686	2	1.372
IPA086N10N3	726-IPA086N10N3G	Mouser	0.702	2	1.404
					11.707

Matjaž Janežič: Električne meritve

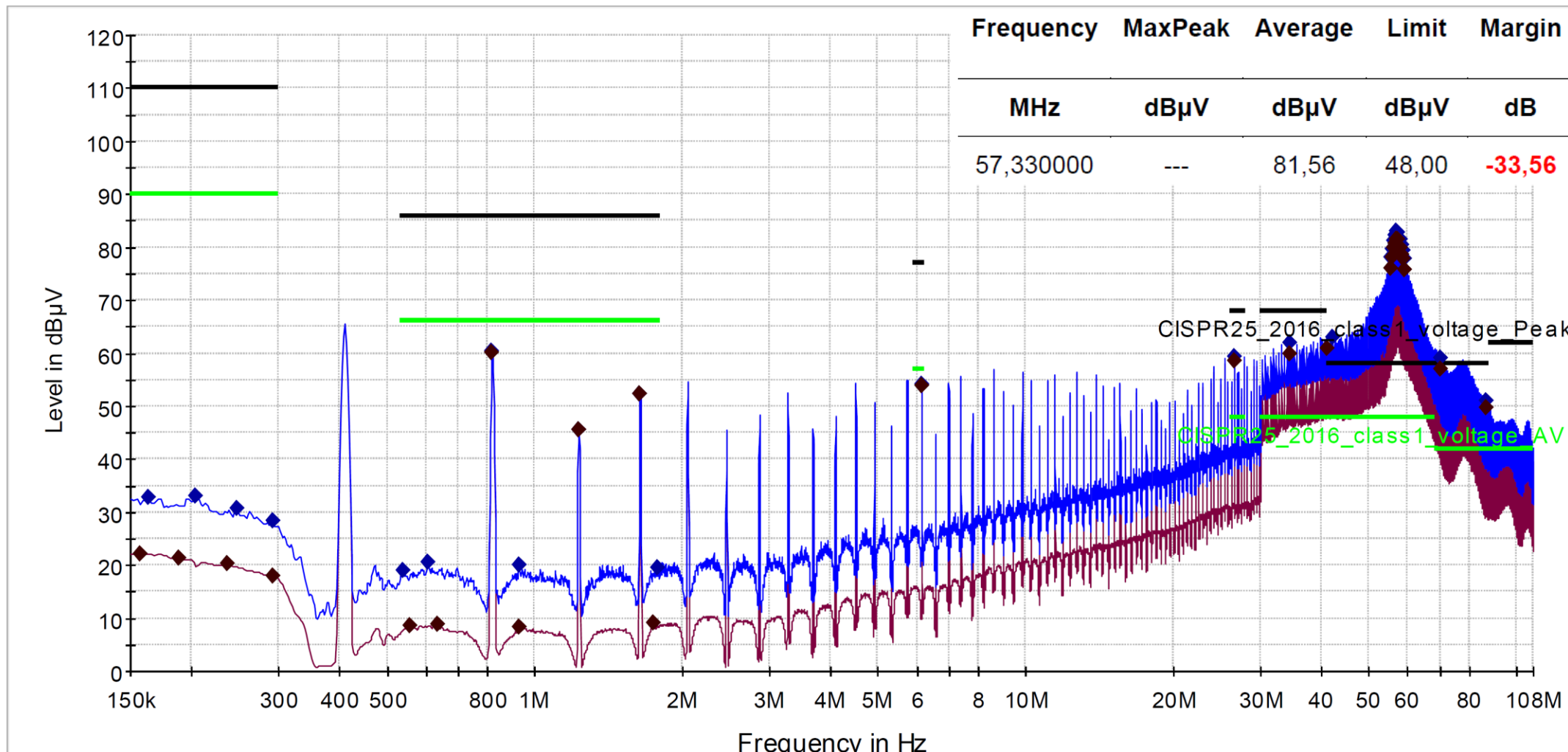
Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S06	I _{vh} [A]	0,619	0,496	0,42	2,847	2,185	1,789
	I _{izh} [A]	1,366	1,372	1,370	6,741	6,741	6,733
	U _{izh} [V]	13,778	13,786	13,770	13,751	13,747	13,730

Izkoristek: **93,2%** (zahteva nad 75%)

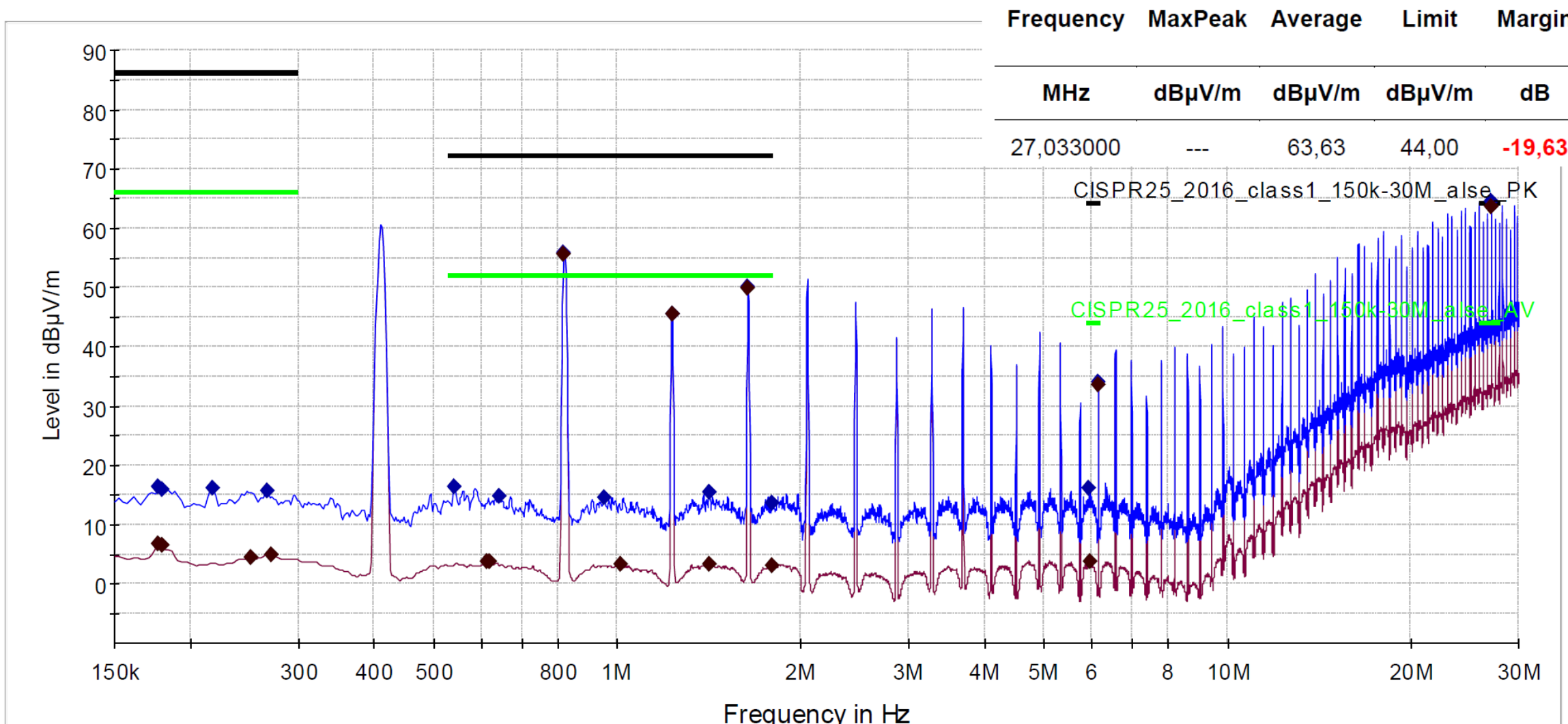
Valovitost pri osnovni frekvenci: **53,4 mV** (zahteva pod 0,2 V)

Valovitost skupno: **1,29 V** (zahteva pod 0,5 V)

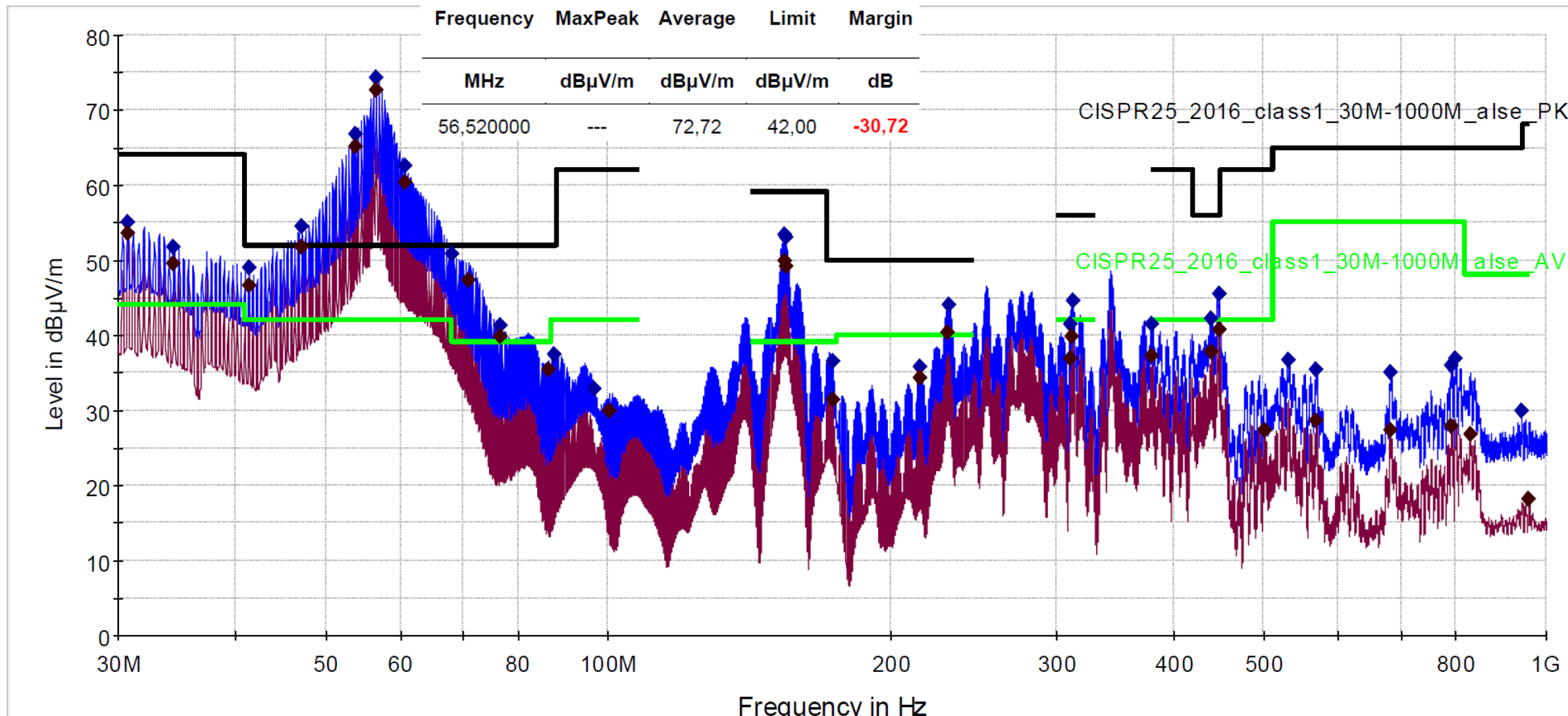
Matjaž Janežič: Prevodne motnje



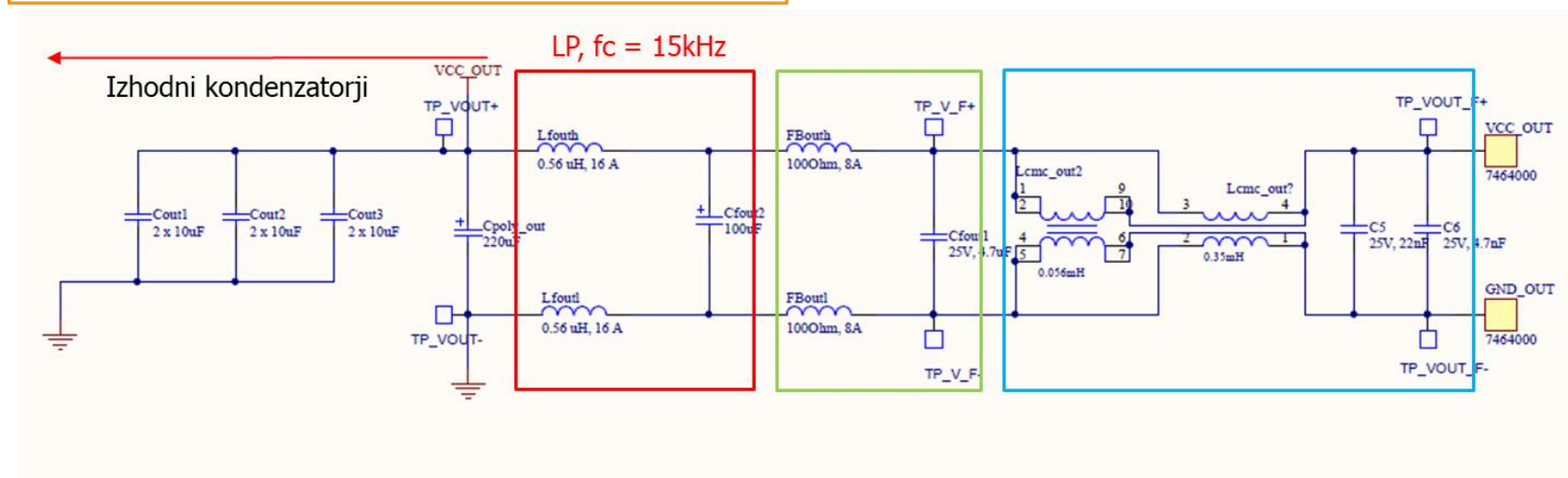
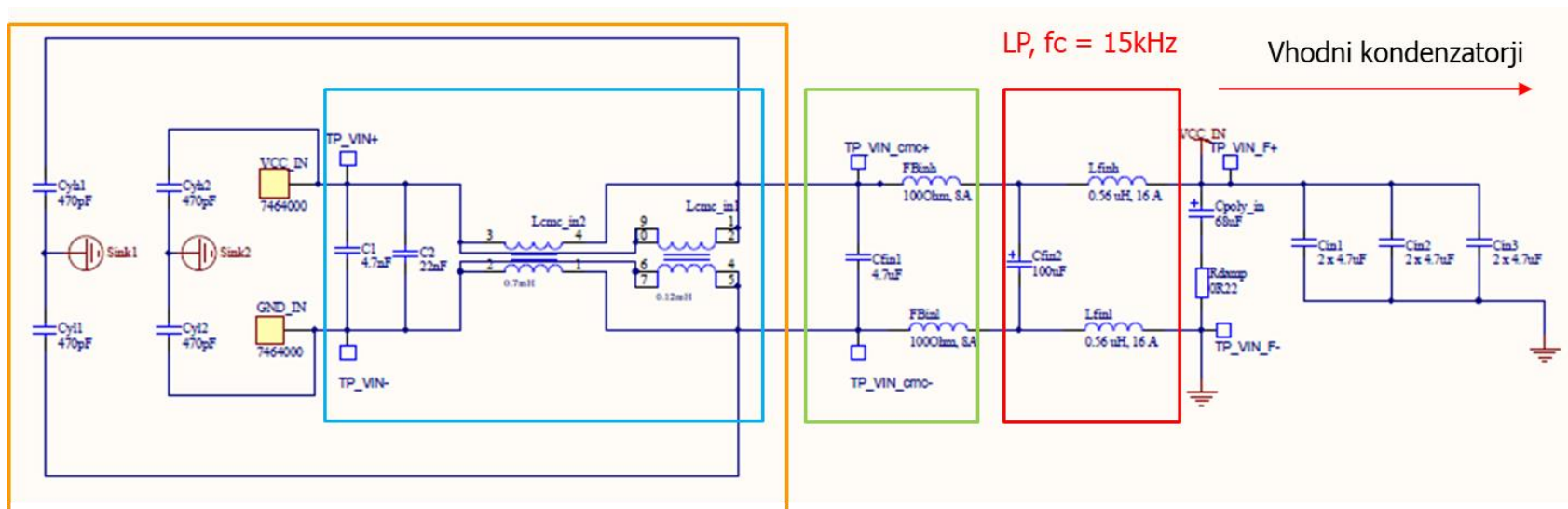
Matjaž Janežič: Sevalne motnje do 30 MHz



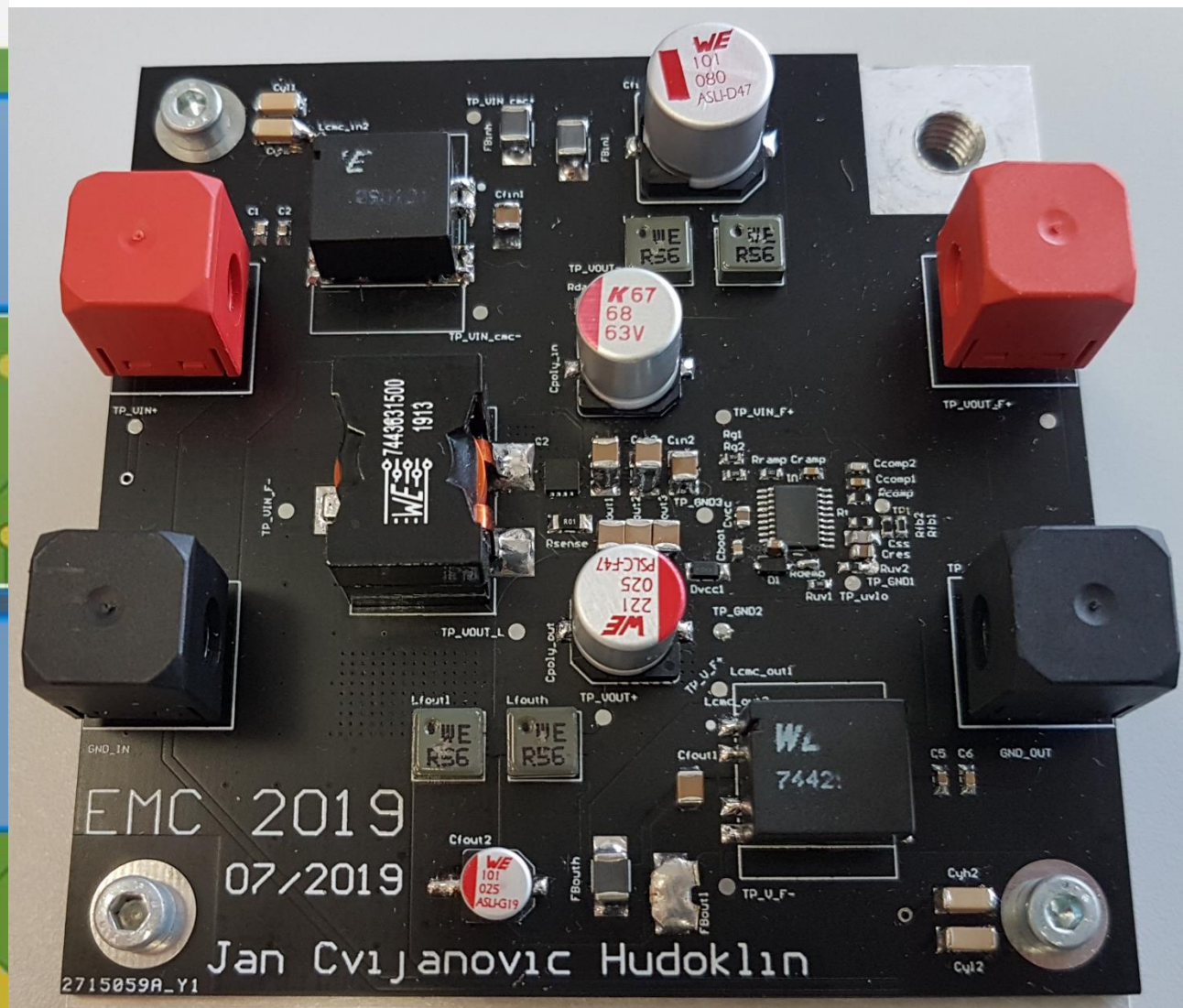
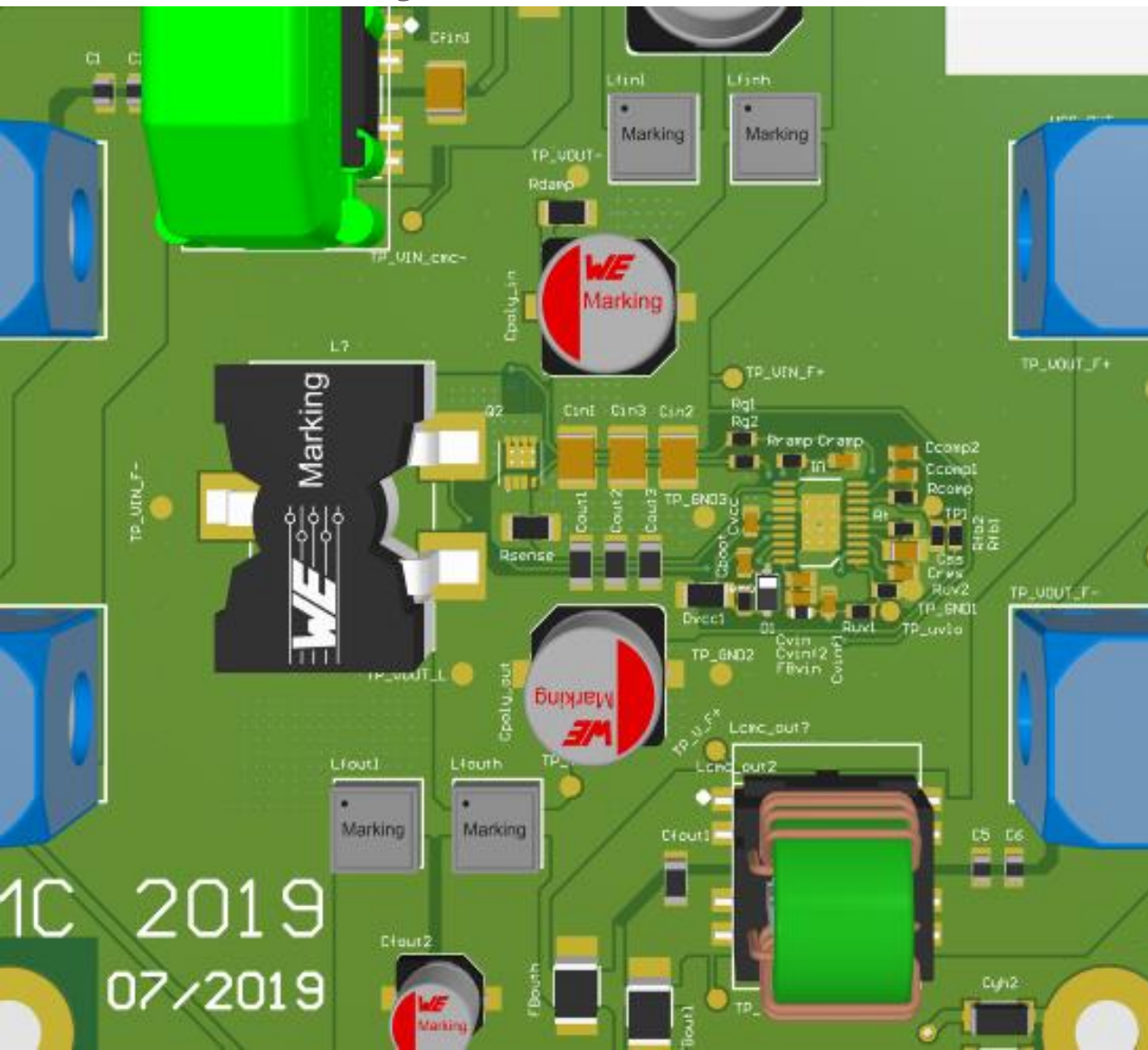
Matjaž Janežič: Sevalne motnje do 1 GHz



Jan Cvijanovič Hudoklin



Jan Cvijanovič Hudoklin



Jan Cvijanovič Hudoklin: Kosovnica

Naziv elementa	Koda	Proizvajalec	Cena/kos	Št. Kosov	Cena
Multilayer Ceramic Capacitors MLCC - SMD/SMT 1210 4.7uF 80volts *Derate Voltage/Temp	GRM32ER71K475KE14L	Murata	0.31 €	6	1.87 €
Multilayer Ceramic Capacitors MLCC - SMD/SMT 0603 100V 4700pF JB 10% T: 0.8mm	C1608JB2A472K080AA	TDK	0.01 €	2	0.03 €
Schottky Diodes & Rectifiers 60V VR 2A 0.52V VF PMDU; SOD-123FL	RB060MM-60TFTR	ROHM	0.11 €	1	0.11 €
Multilayer Ceramic Capacitors MLCC - SMD/SMT WCAP-CSGP 10uF 1206 10% 25V MLCC	885012208069	Würth Elektronik	0.37 €	6	2.24 €
Aluminium Organic Polymer Capacitors WCAP-PSLC 25V 220uF 20% ESR=15mOhms	875075561008	Würth Elektronik	1.10 €	1	1.10 €
Multilayer Ceramic Capacitors MLCC - SMD/SMT WCAP-CSGP 4.7uF 1206 10% 25V MLCC	885012208068	Würth Elektronik	0.28 €	1	0.28 €
Multilayer Ceramic Capacitors MLCC - SMD/SMT WCAP-CSSA X&Y Safety 470pF 2.5kV 10% 1808	885362210009	Würth Elektronik	0.50 €	4	1.99 €
Fixed Inductors WE-XHMI SMD 6030 .56uH 16A 2.9mOhms	744393440056	Würth Elektronik	1.54 €	4	6.16 €
Common Mode Chokes / Filters WE-UCF SMD Sectional 2x0.056mH 10kHz 7A	744290560	Würth Elektronik	3.10 €	1	3.10 €
Common Mode Chokes / Filters WE-UCF SMD Sectional 2x0.12mH 10kHz 5.5A	744290121	Würth Elektronik	3.10 €	1	3.10 €
Multilayer Ceramic Capacitor, 22000 pF, 100 V, 0603 [1608 Metric], ? 10%, X7R, C Series KEMET	C0603C223K1RACTU	KEMET	0.02 €	5	0.09 €
Multilayer Ceramic Capacitor, 0.1 uF, 50 V, 0603 [1608 Metric], ? 5%, X7R, AVX 0603 MLCC	06035C104JAT2A	AVX	0.05 €	2	0.10 €
Multilayer Ceramic Capacitor, 56 pF, 50 V, 0603 [1608 Metric], ? 5%, COG / NPO, AVX 0603 MLCC	06035A560JAT2A	AVX	0.02 €	1	0.02 €
Multilayer Ceramic Capacitor, 820 pF, 50 V, 0603 [1608 Metric], ? 5%, COG / NPO, AVX 0603 MLCC	06035A821JAT2A	AVX	0.03 €	2	0.06 €
CERAMIC CAPACITOR 0.47UF, 25V, X5R, 10%, 0805	TMK212BJ474KD-T	Taiyo Yuden	0.03 €	2	0.06 €
Multilayer Ceramic Capacitor, 15000 pF, 50 V, 0805 [2012 Metric], ? 5%, COG / NPO, CGA Series	CGA4F2C0G1H153J085AA	TDK	0.26 €	1	0.26 €
Ferrite Bead, 1812 [4532 Metric], 100 ohm, 8 A, WE-MPSB Series, 0.006 ohm, ? 25%	74279226101	Würth Elektronik	0.53 €	3	1.59 €
Power Inductor (SMD), 15 uH, 14 A, Shielded, 21 A, WE-HCF Series, 21.8mm x 21.5mm x 14.5mm	7443631500	Würth Elektronik	4.10 €	1	4.10 €
MOSFET Transistor, N Channel, 40 A, 80 V, 0.0096 ohm, 10 V, 3 V	BSZ110N08NS5ATMA1	Infineon	0.38 €	2	0.75 €
Polymer Aluminium Electrolytic Capacitor, 68 uF, 63 V, Radial Can - SMD, A767 Series, 0.03 ohm	A767MU686M1JLAE030	KEMET	1.26 €	1	1.26 €
					28.25 €

Jan Cvijanovič Hudoklin: Električne meritve

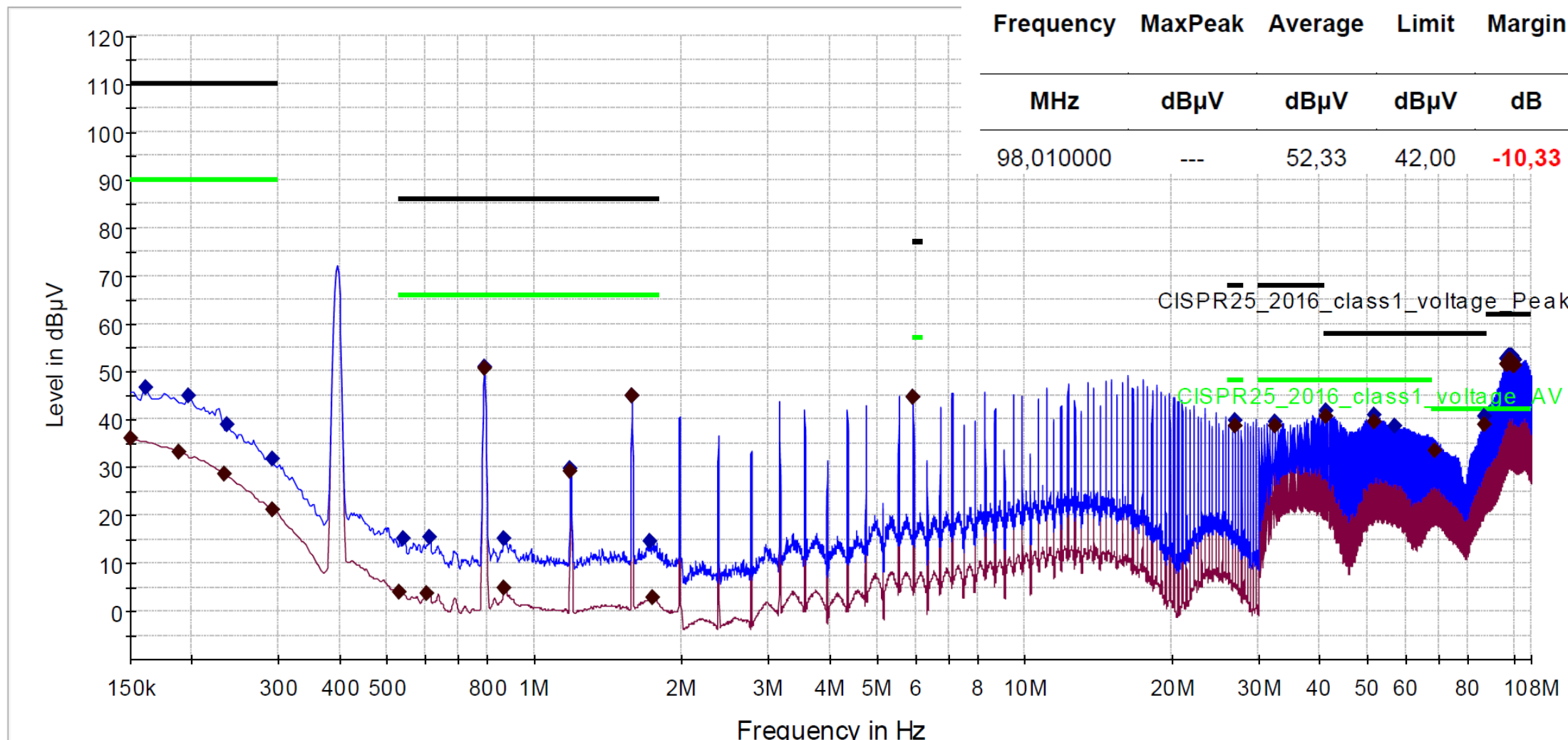
Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S07	I _{vh} [A]	0,567	0,431	0,352	2,730	2,069	1,681
	I _{izh} [A]	1,385	1,385	1,386	6,740	6,739	6,739
	U _{izh} [V]	13,942	13,943	13,948	13,742	13,739	13,738

Izkoristek: **88,4%** (zahteva nad 75%)

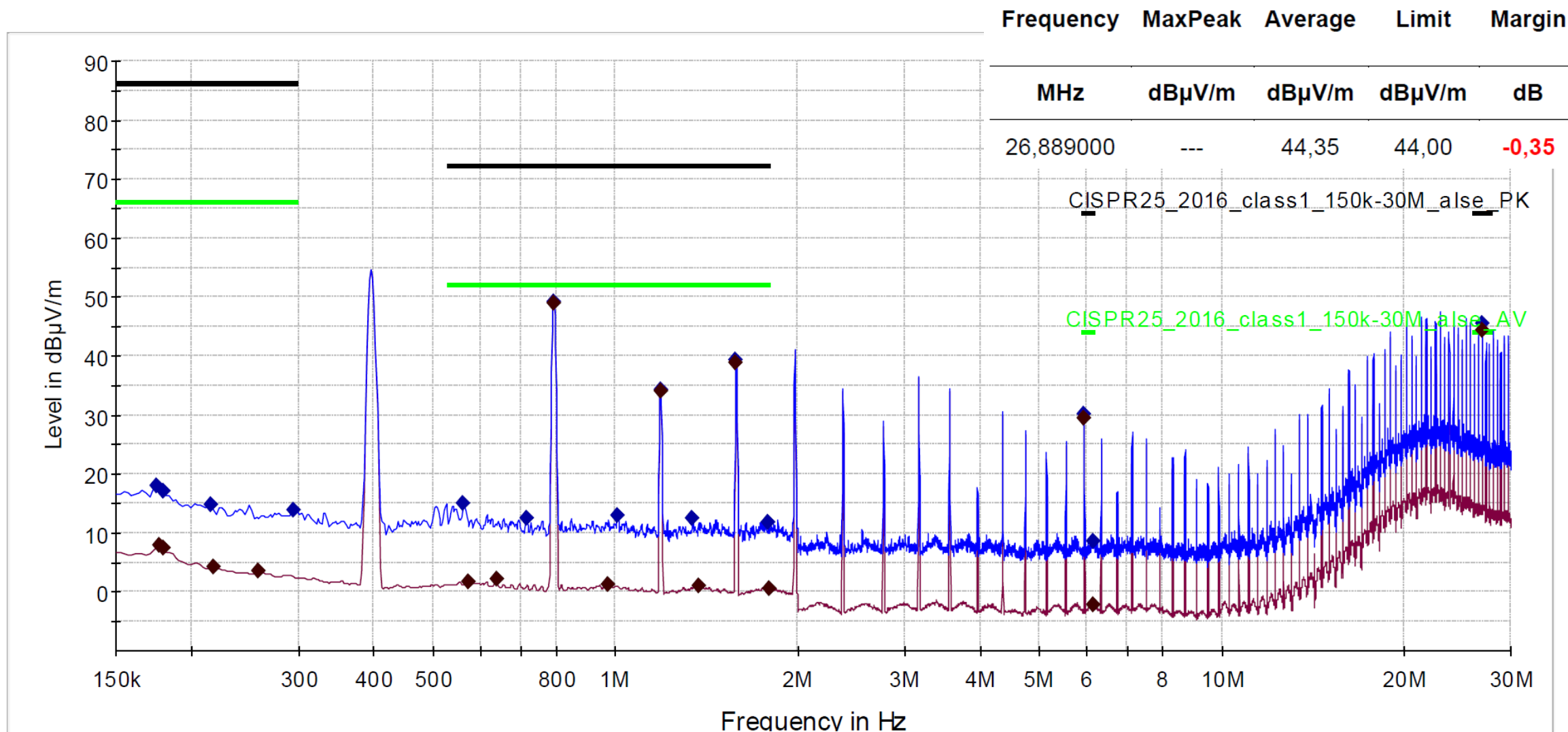
Valovitost pri osnovni frekvenci: **24,2 mV** (zahteva pod 0,2 V)

Valovitost skupno: **0,232 V** (zahteva pod 0,5 V)

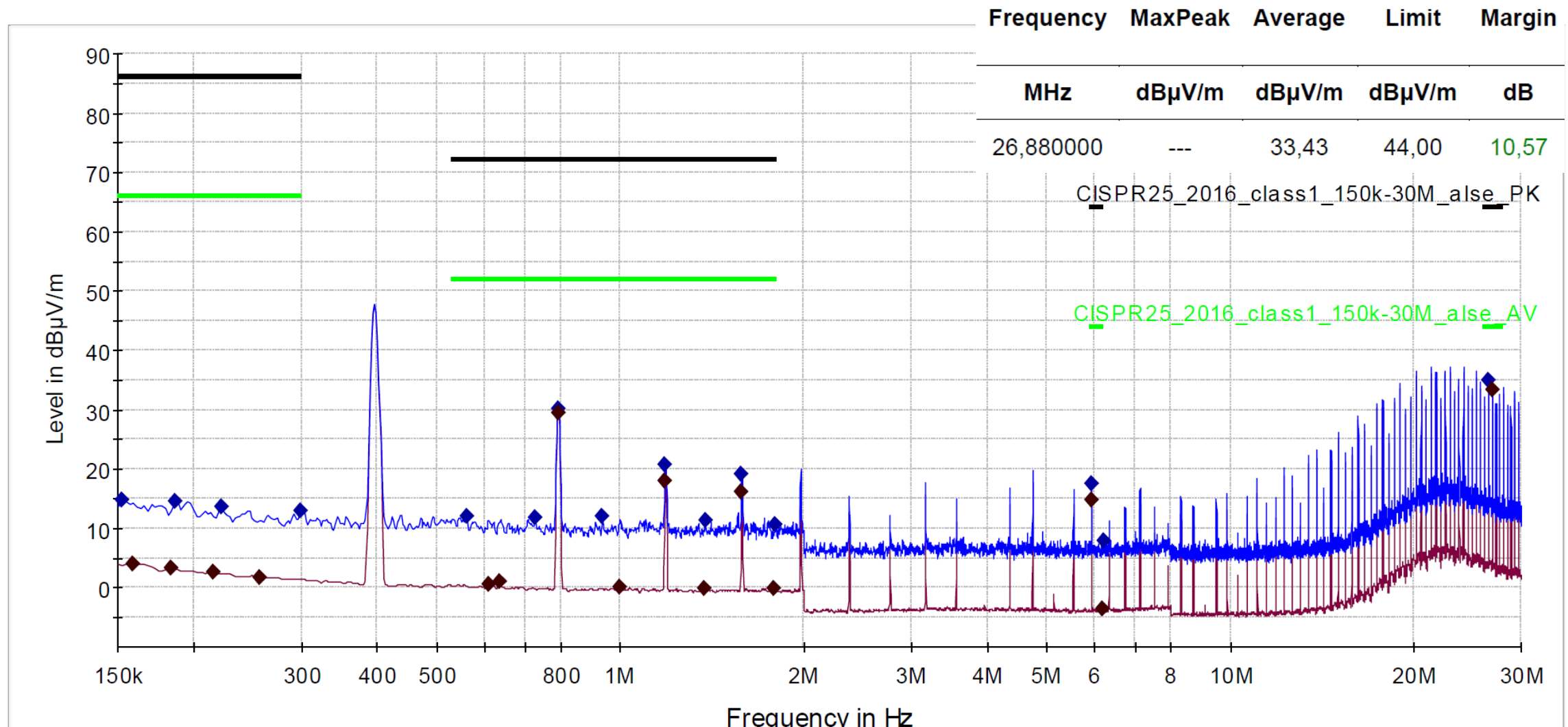
Jan Cvijanovič Hudoklin: Prevodne motnje



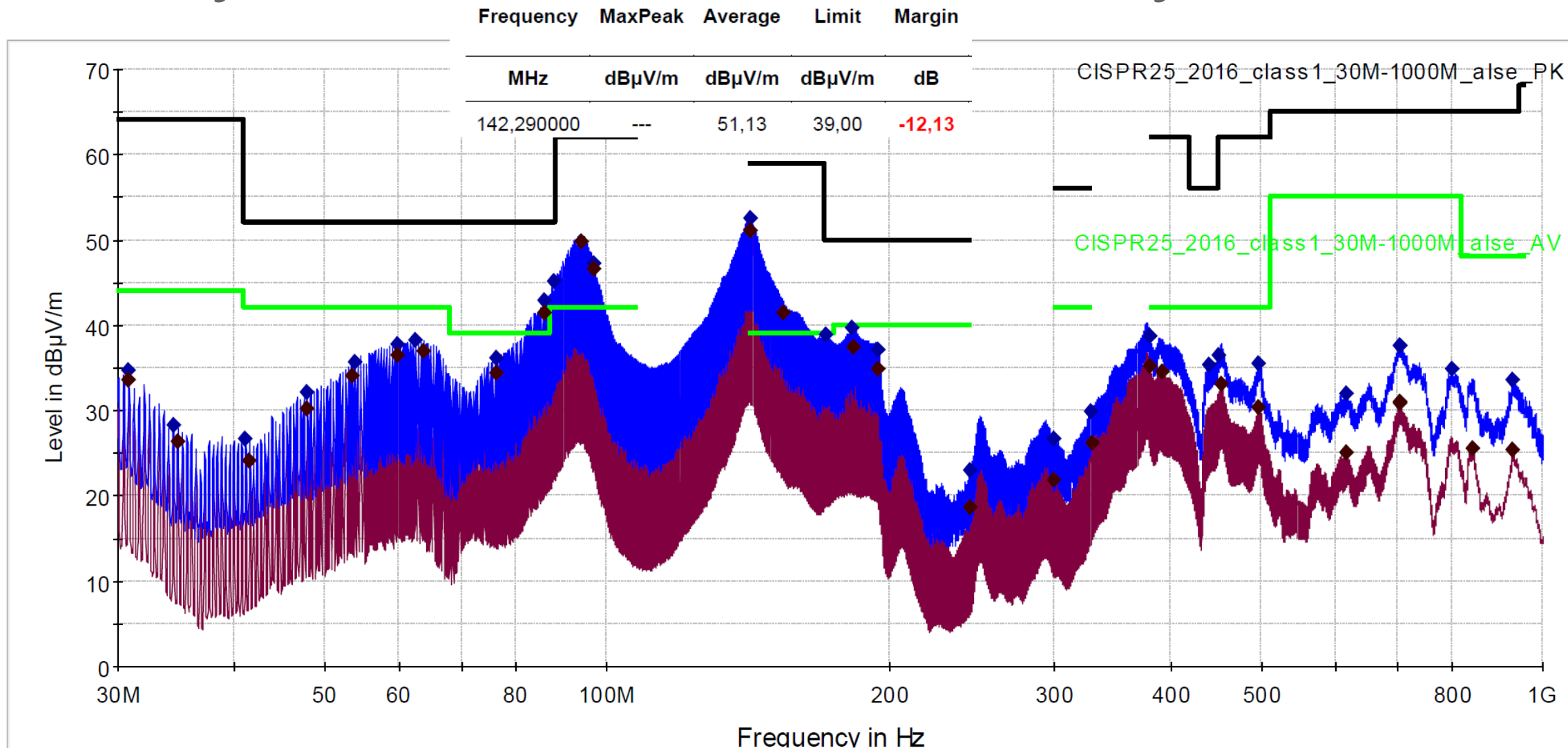
Jan Cvijanovič Hudoklin: Sevalne motnje do 30 MHz



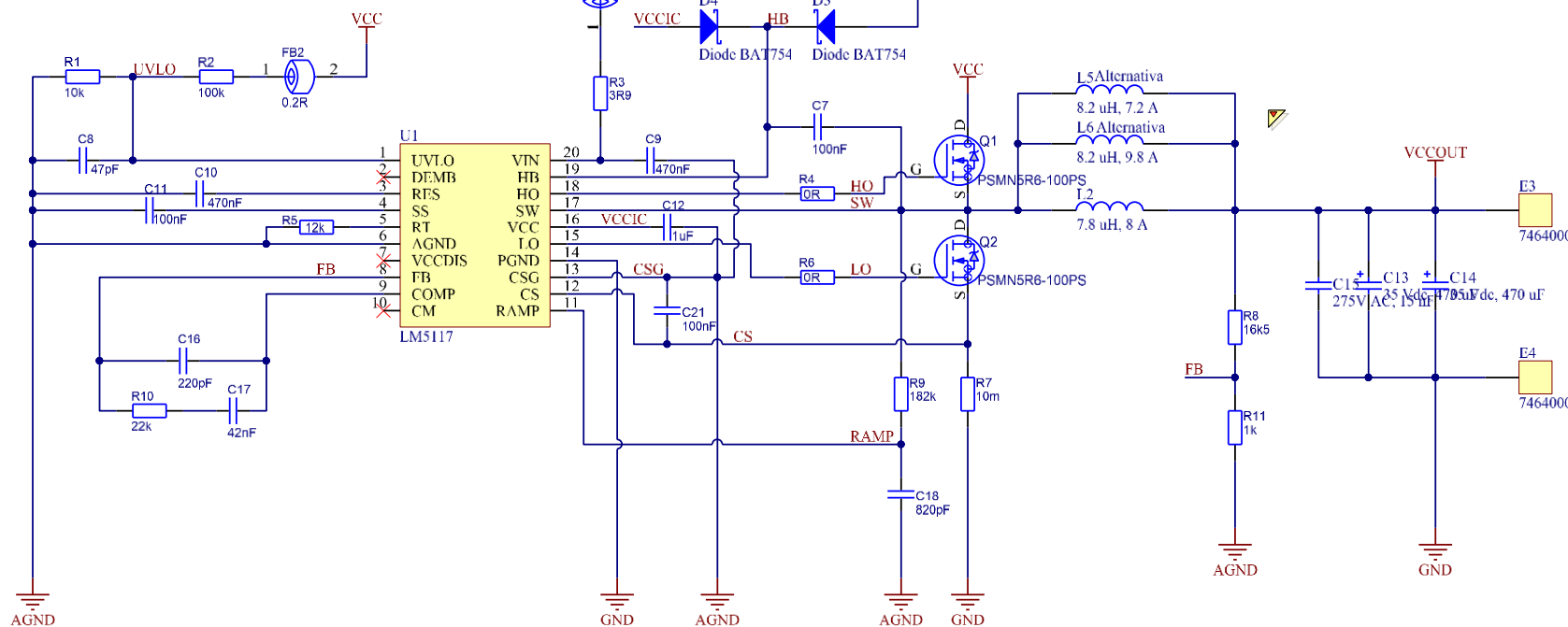
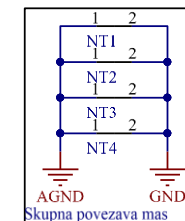
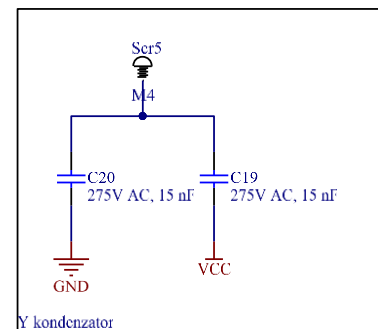
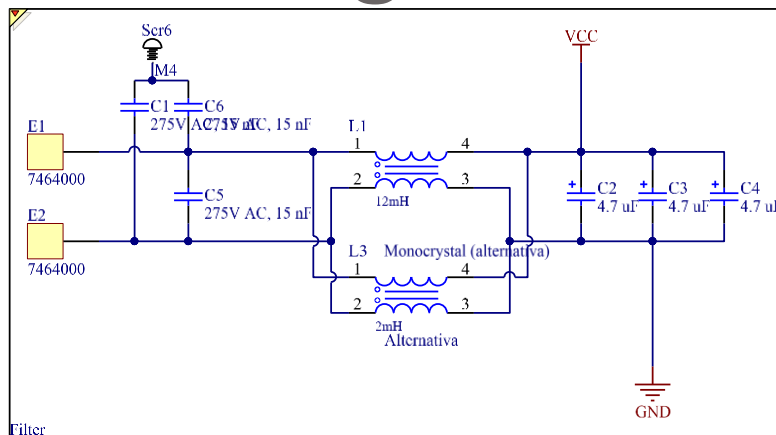
Jan Cvijanovič Hudoklin: Sevalne motnje do 30 MHz (MUMETAL)



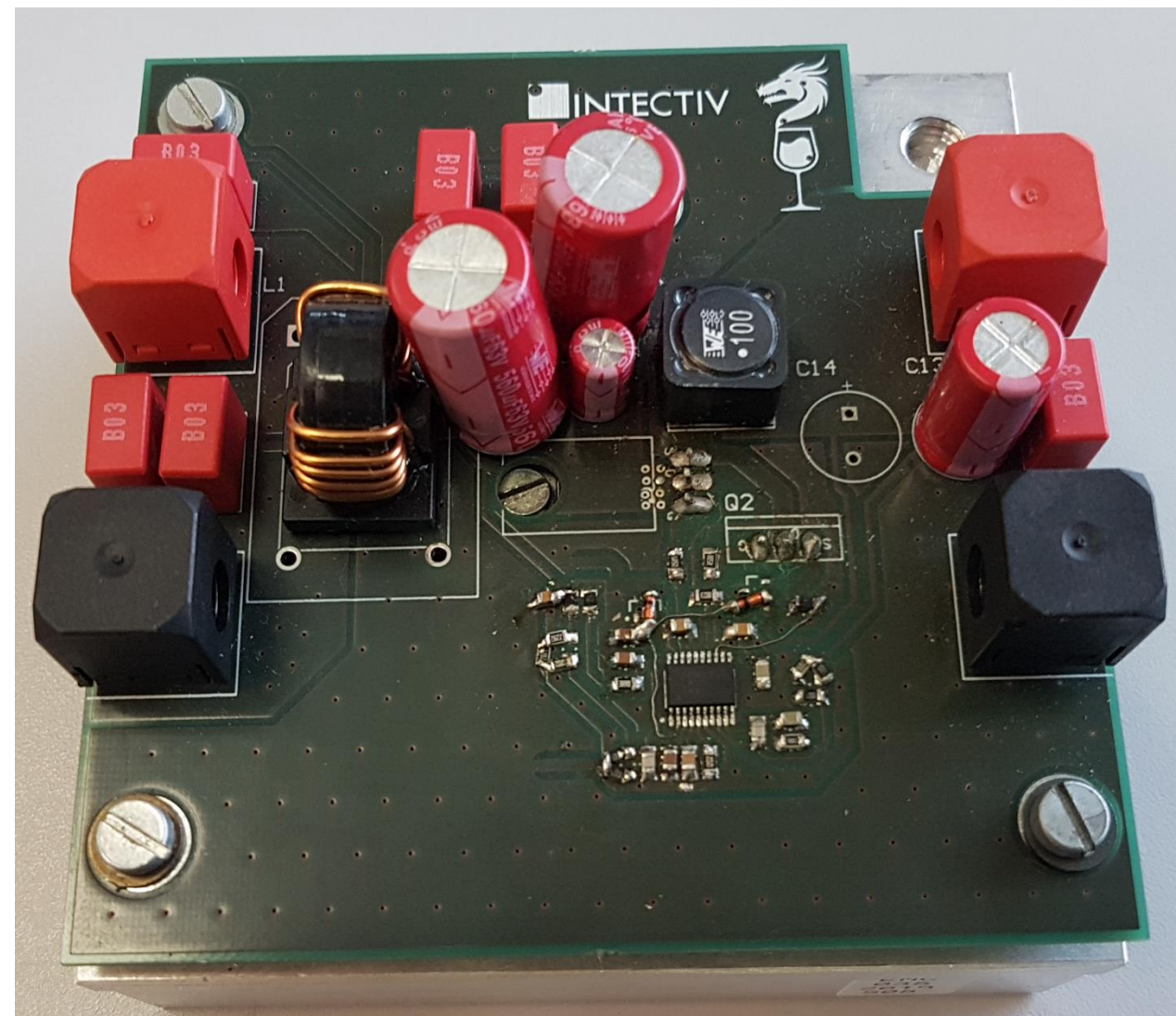
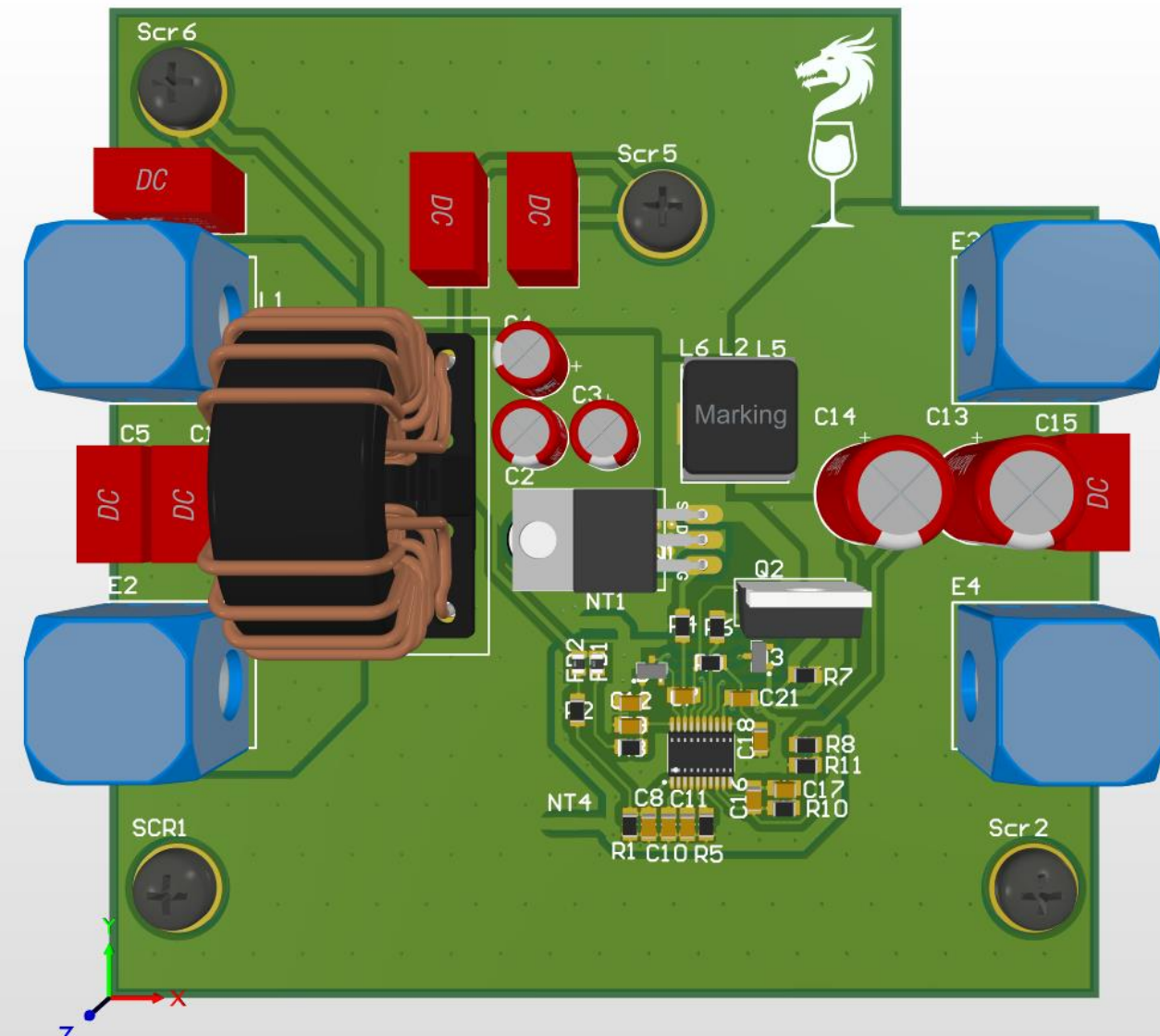
Jan Cvijanović Hudoklin: Sevalne motnje do 1 GHz



Martin Kregar in Blaž Okorn



Martin Kregar in Blaž Okorn



Martin Kregar in Blaž Okorn: Kosovnica

Naziv elementa	Koda	Proizvajalec	Cena/kos	Št. Kosov	Cena
WCAP-FTX2 Film Capacitors, 11x6x10mm, 275V AC, 15 nF	890324022007	WE	0.503	6	3.018
WCAP-ATET Aluminum Electrolytic Capacitors, 6.3x11mm, 100 Vdc, 4.7 uF	860130873005	WE	0.406	3	1.218
WCAP-ATLI Aluminum Electrolytic Capacitors, 10x20mm, 35 Vdc, 470 uF	860080575017	WE	0.68	2	1.36
SMT Flat Wire High Current Inductor WE-HCI, size 1050, 7.8 uH, 8 A	7447709100	WE	3.2	1	3.2
WE-CMBNC Common Mode Power Line Choke Nanocrystalline, Type M, 2mH, 10A, 250V	7448031002	WE	9.89	1	9.89
PSMN5R6-100PS	IRF512		2.24	1	2.24
PSMN5R6-100PS	IRF512		2.24	1	2.24
					23.166

Martin Kregar in Blaž Okorn: Električne meritve

Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S08	I _{vh} [A]	0,663	0,515	0,416	oscilira	2,223	1,844
	I _{izh} [A]	1,387	1,387	1,388	oscilira	6,846	6,850
	U _{izh} [V]	13,965	13,968	13,972	oscilira	13,954	13,960

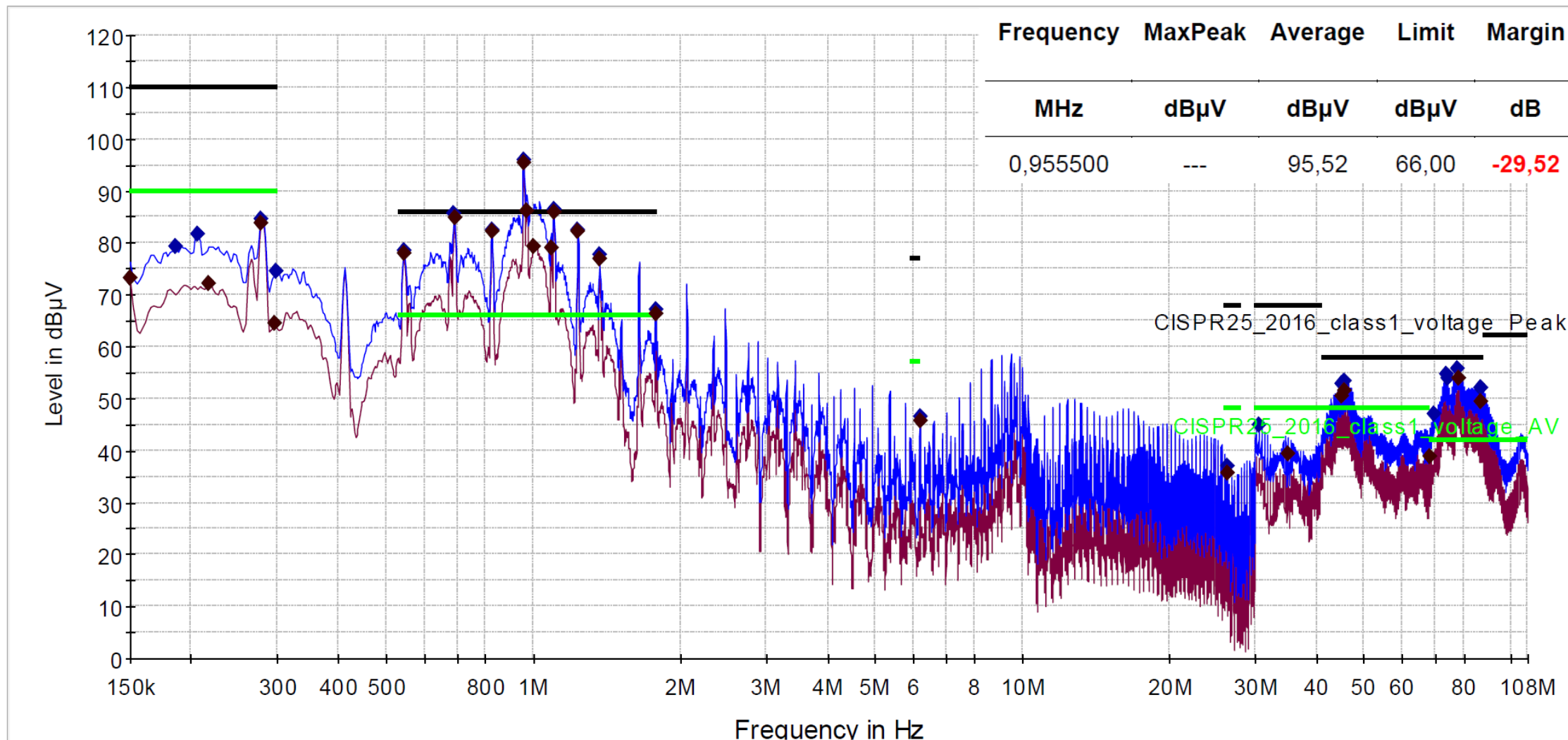
Oscilira pri vhodni napetosti 36 V.

Izkoristek: **89,5%** (zahteva nad 75%)

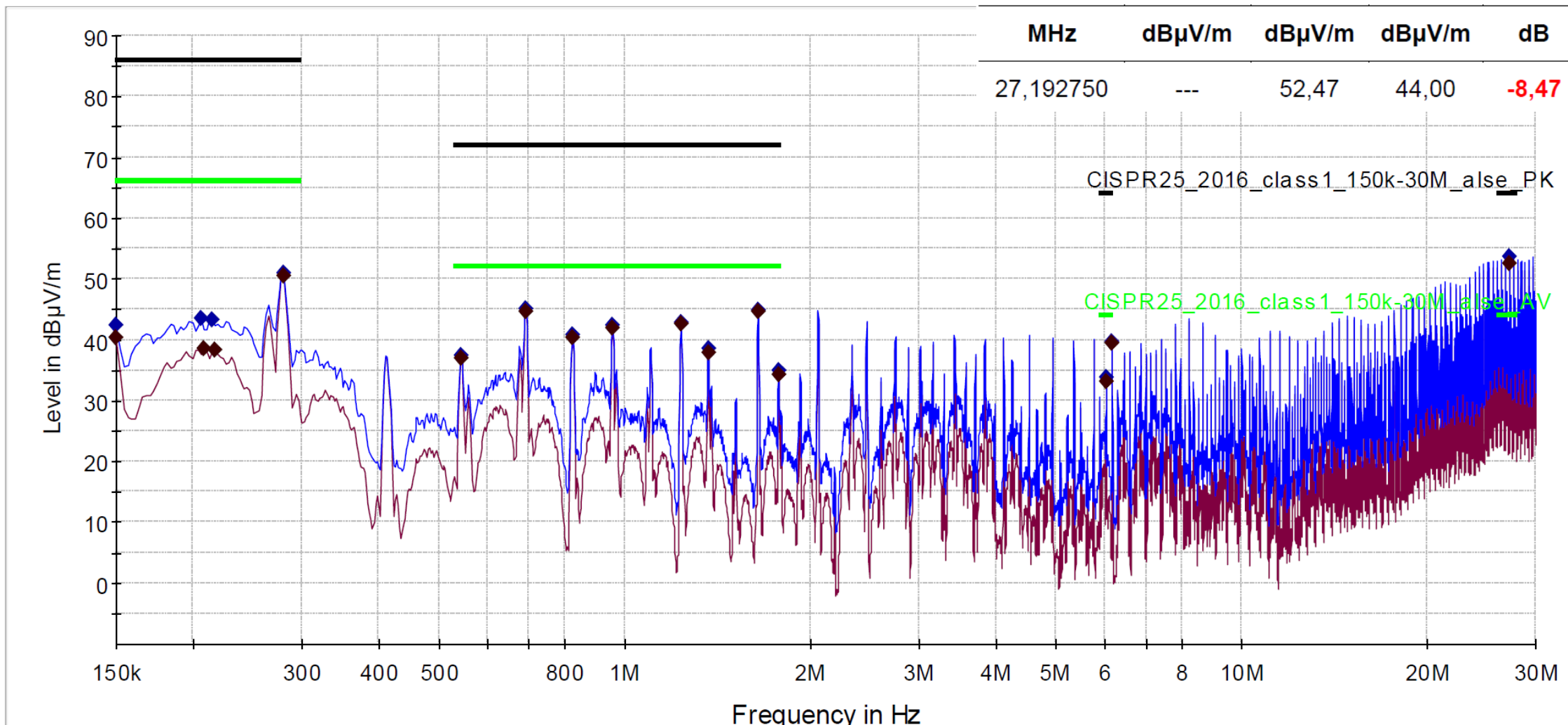
Valovitost pri osnovni frekvenci: **110 mV** (zahteva pod 0,2 V)

Valovitost skupno: **1,18 V** (zahteva pod 0,5 V)

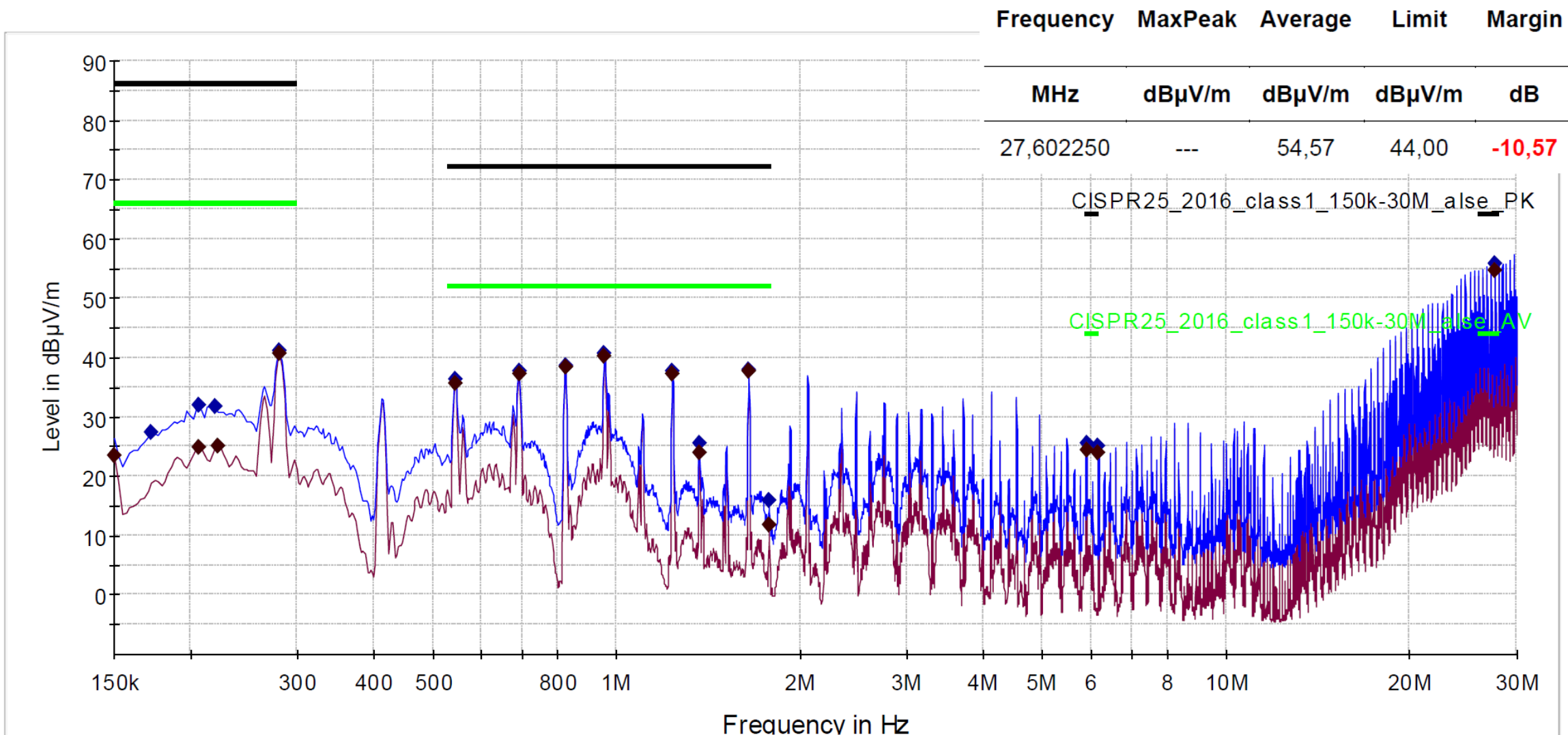
Martin Kregar in Blaž Okorn: Prevodne motnje



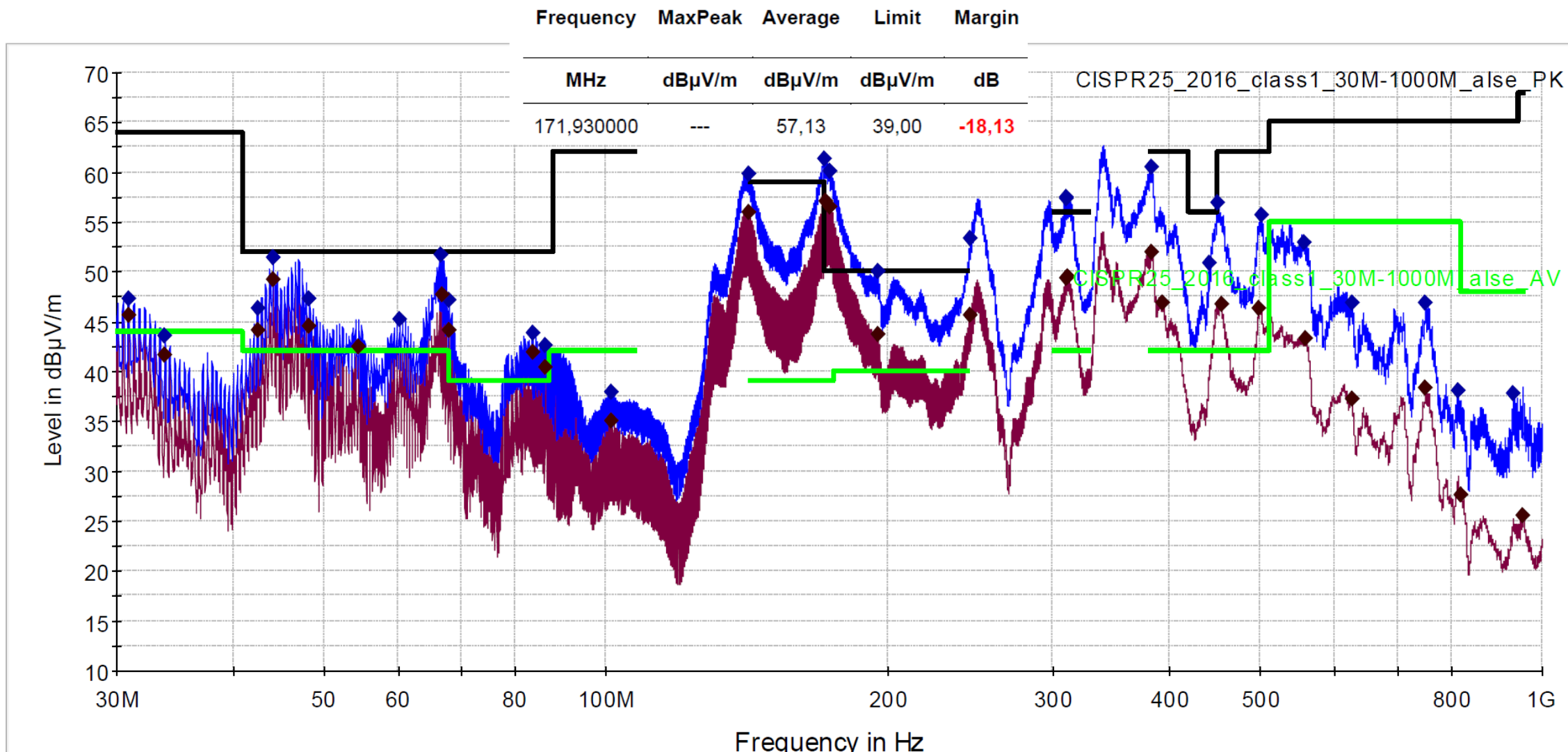
Martin Kregar in Blaž Okorn: Sevalne motnje do 30 MHz



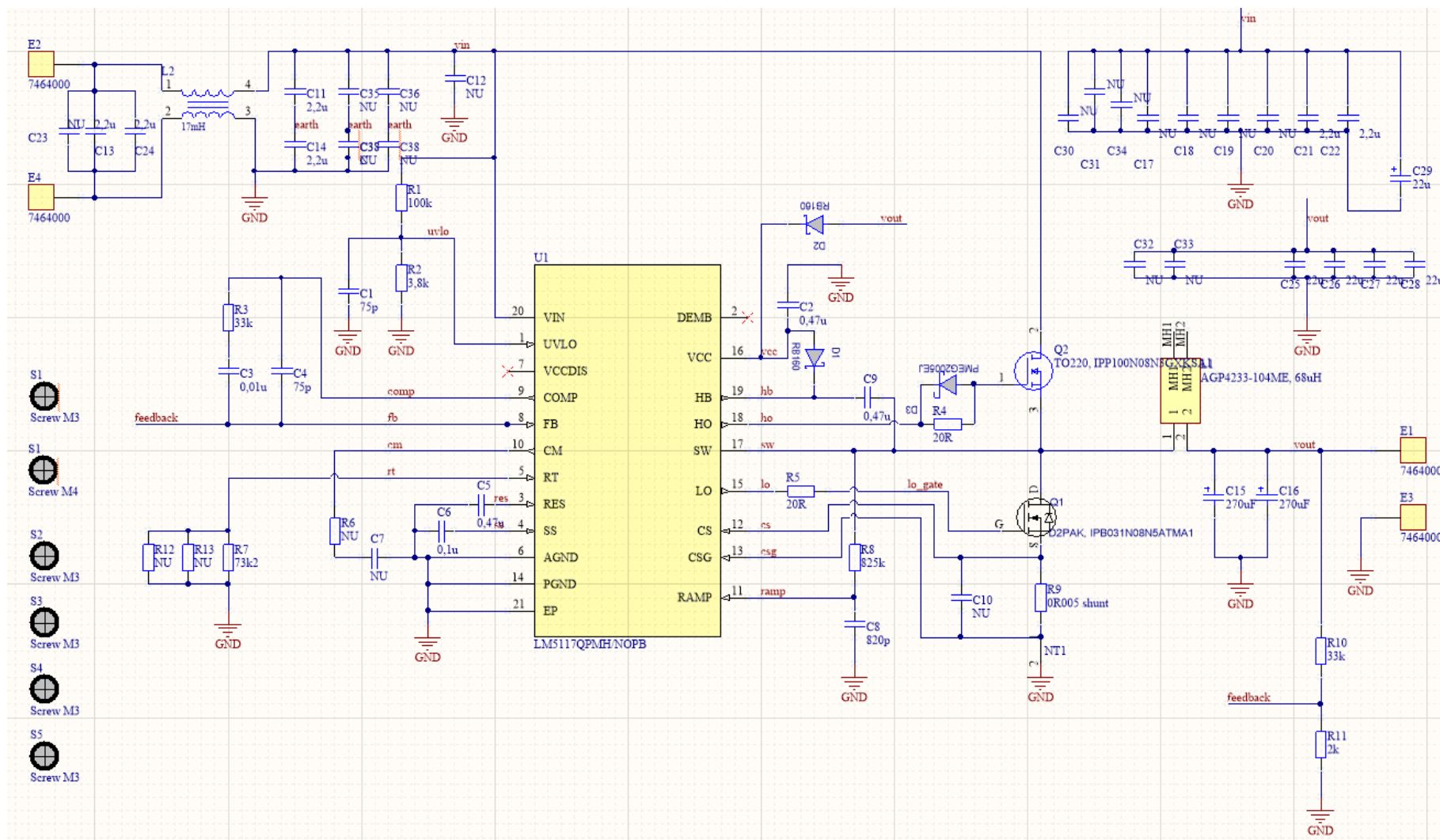
Martin Kregar in Blaž Okorn: Sevalne motnje do 30 MHz (MUMETAL)



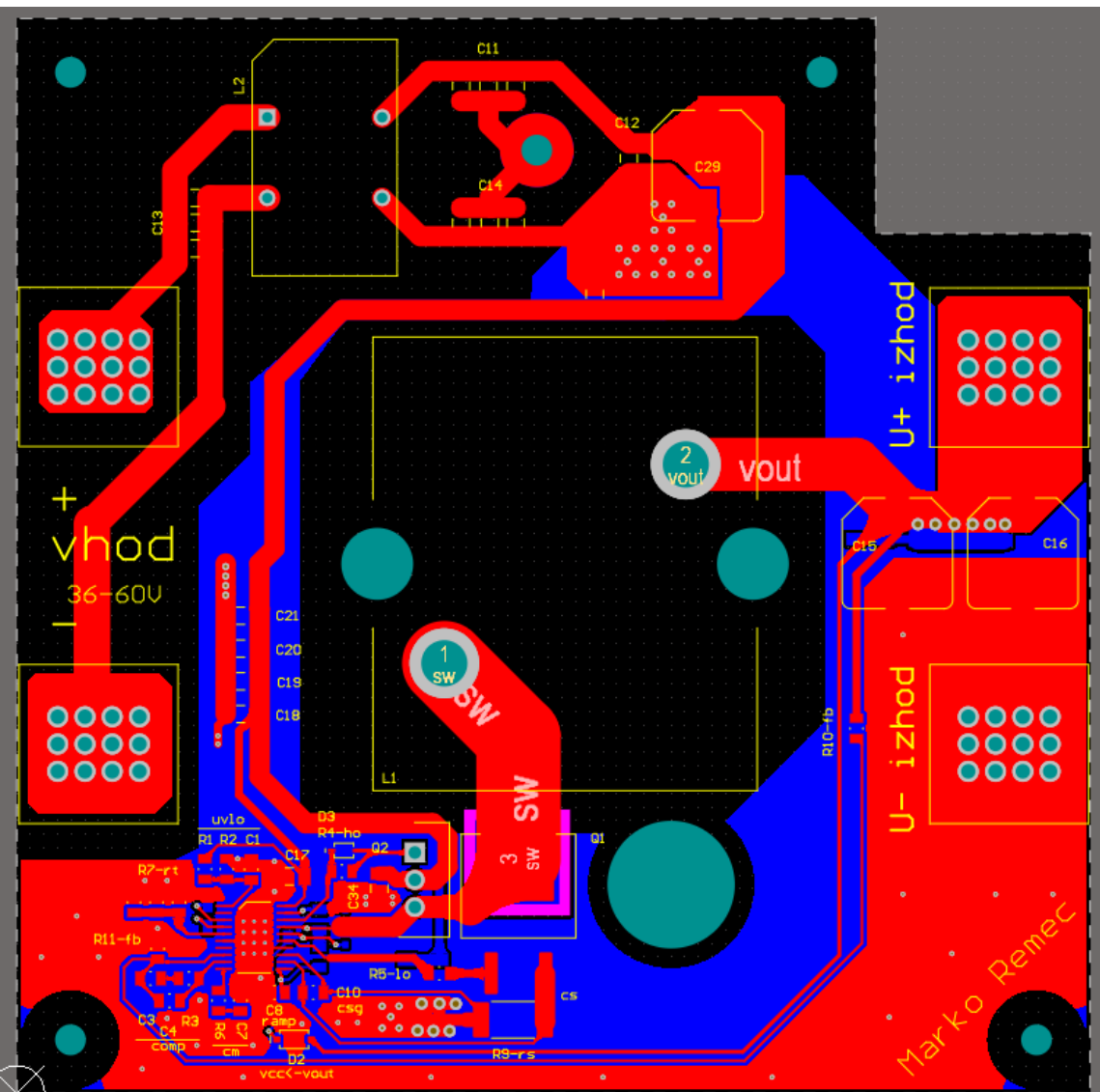
Martin Kregar in Blaž Okorn: Sevalne motnje do 1 GHz



Marko Remec



Marko Remec



Marko Remec: Kosovnica

Naziv elementa	Koda	Trgovec	Cena/kos	Št. Kosov	Cena
Capacitor 2,2u		WE ?	0.25	6	1.50
ALCO 35V DC, 270uF 875075661009		WE	3.40	2	6.80
Capacitor 22u		WE	0.78	4	3.12
Capacitor 22u, 80V		WE	2.10	1	2.10
Inductor AGP4233-104ME, 68uH		Coilcraft	7.84	1	7.84
WE-CMBNC Common Mode Power Line Choke Nanocrystalline, Type M, 17mH, 4A, 250V 17mH		WE	7.30	1	7.30
MOSFET low D2PAK		Farnell	1.26	1	1.26
MOSFET high TO220		Farnell	0.69	1	0.69
					30.61

Marko Remec: Električne meritve

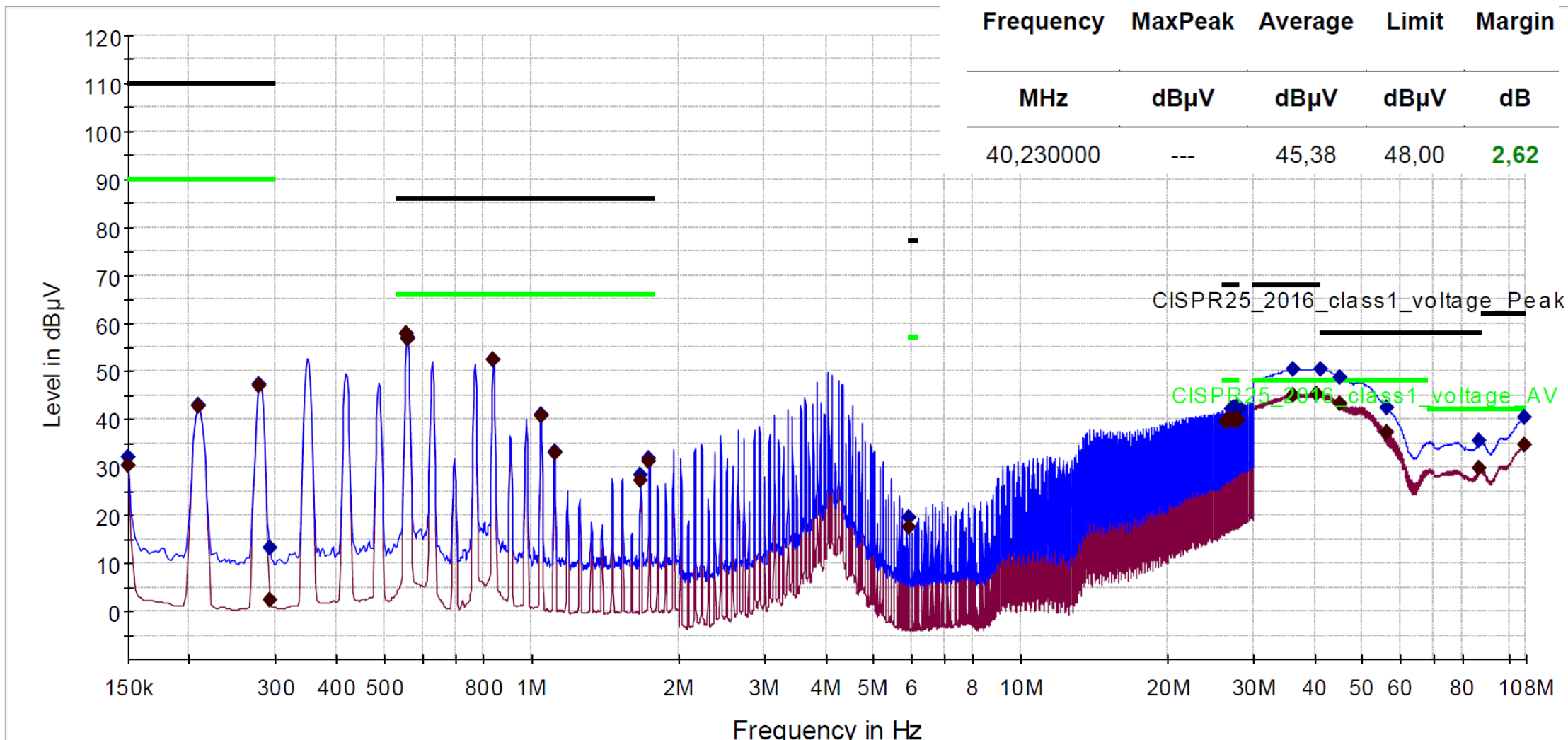
Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S09	I _{vh} [A]	0,562	0,428	0,348	2,720	2,040	1,635
	I _{izh} [A]	1,384	1,384	1,385	6,786	6,785	6,784
	U _{izh} [V]	13,915	13,916	13,918	13,907	13,907	13,908

Izkoristek: **91,3%** (zahteva nad 75%)

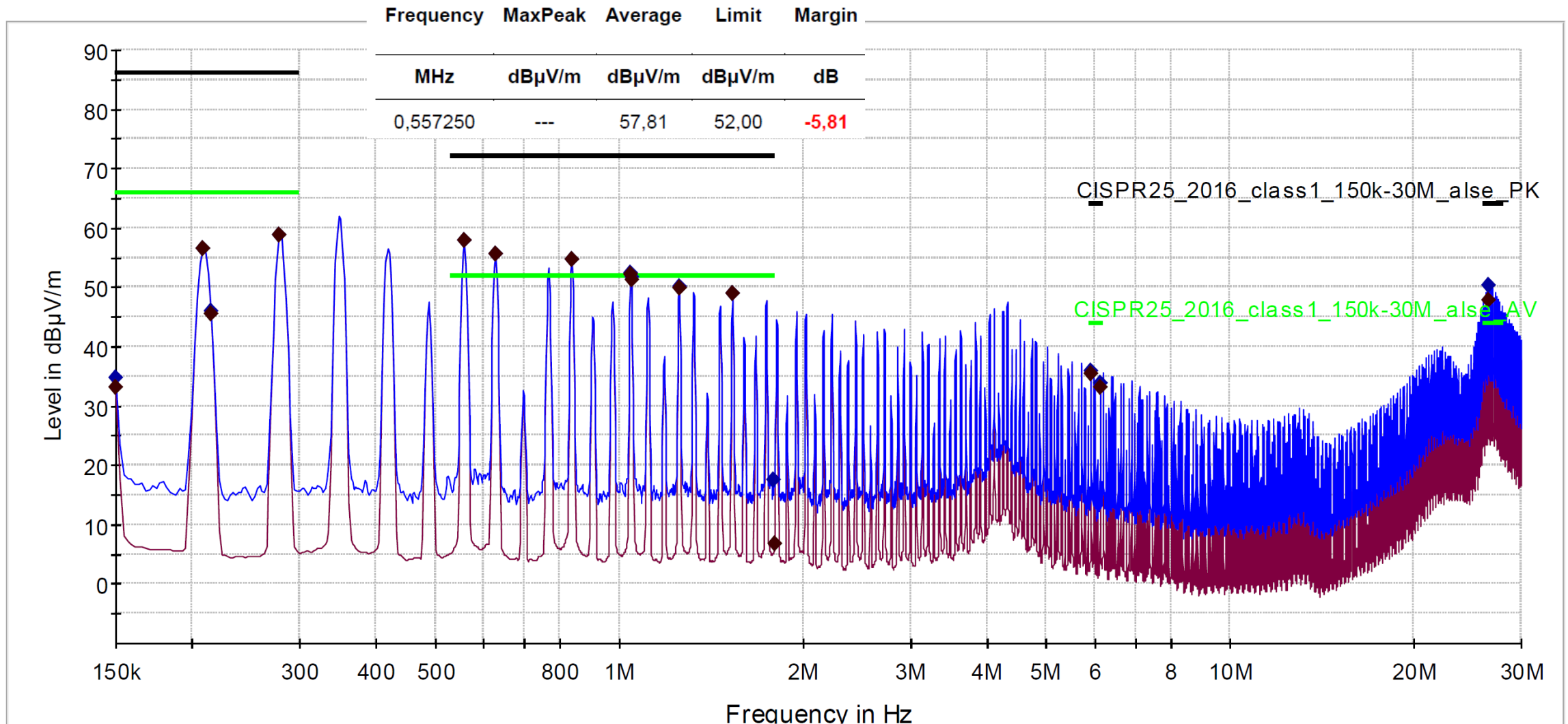
Valovitost pri osnovni frekvenci: **15,3 mV** (zahteva pod 0,2 V)

Valovitost skupno: **0,443 V** (zahteva pod 0,5 V)

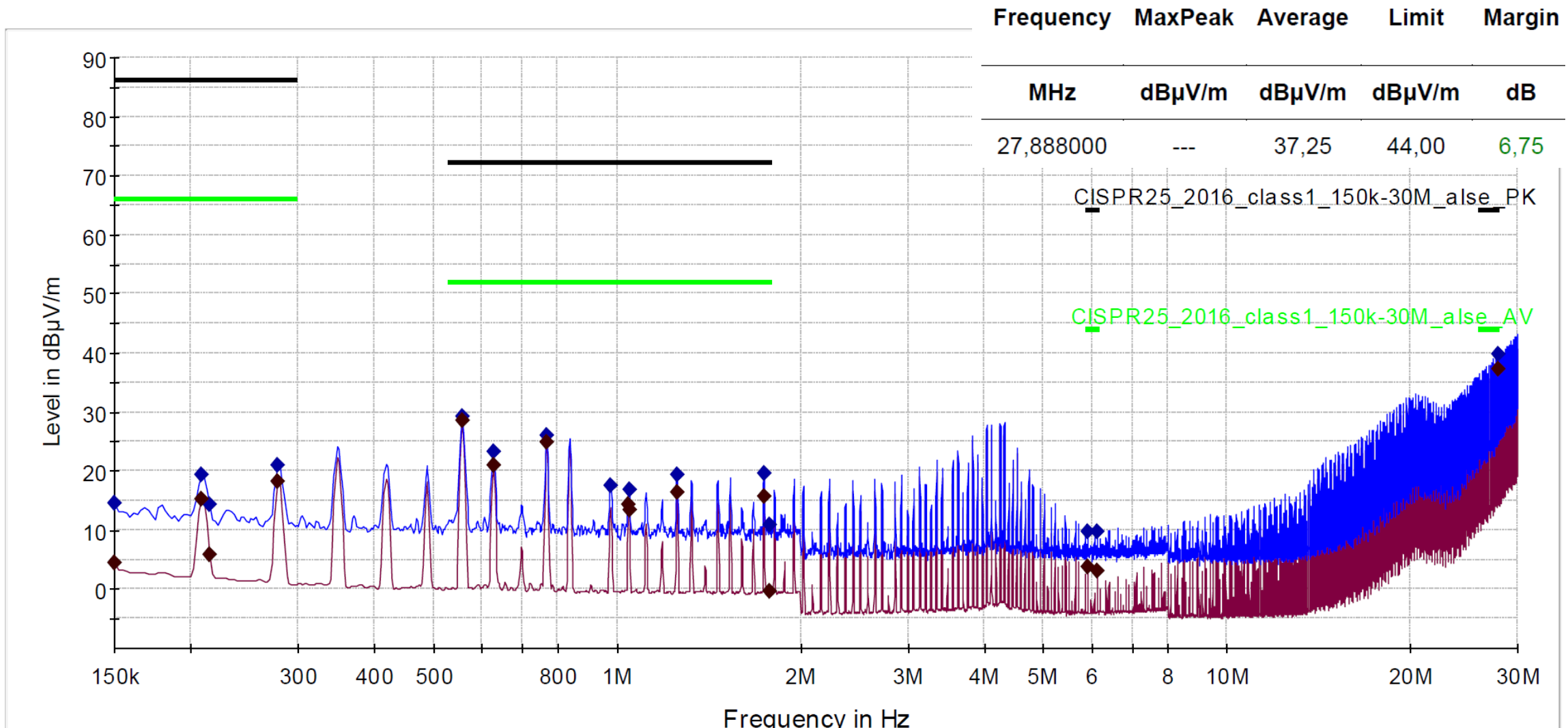
Marko Remec: Prevodne motnje



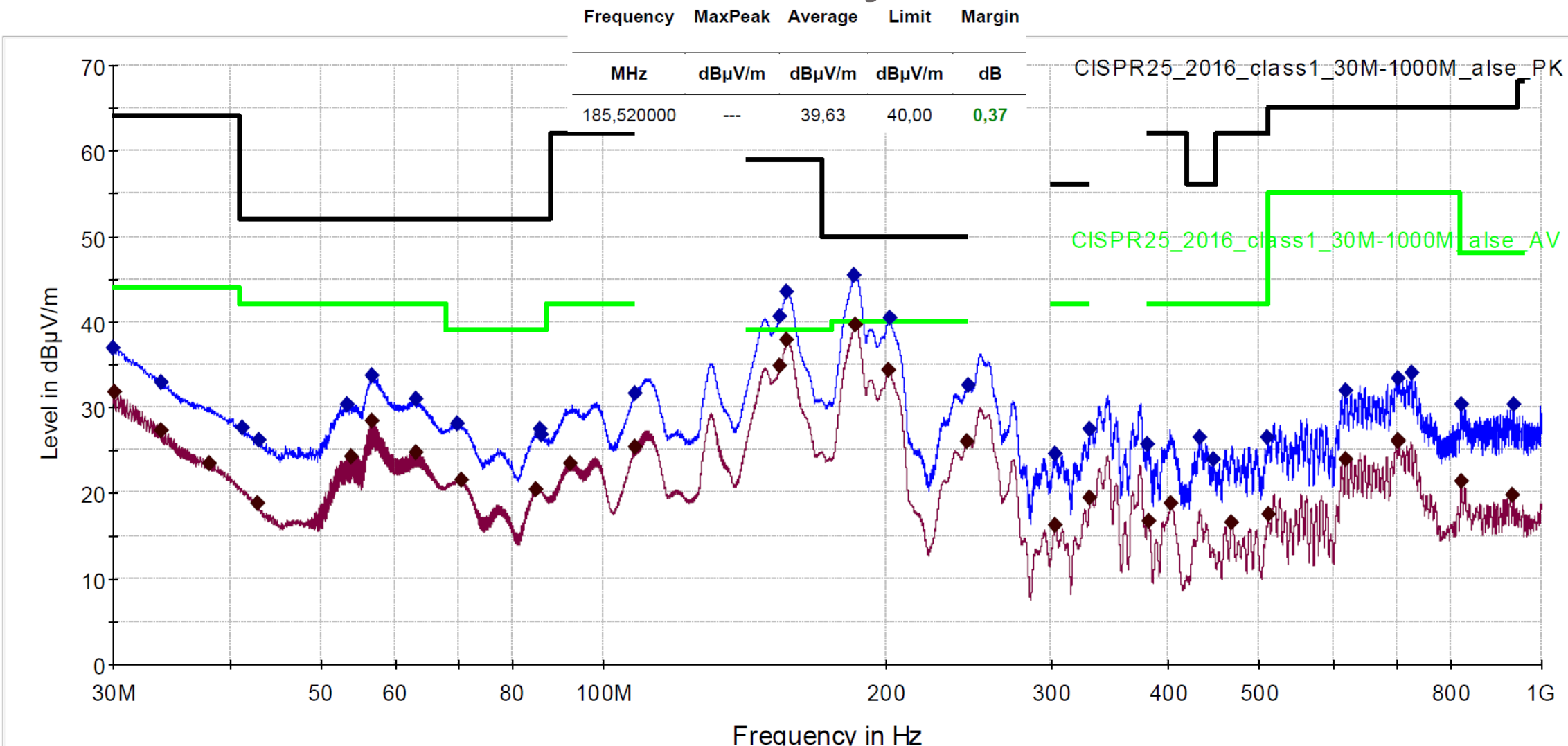
Marko Remec: Sevalne motnje do 30 MHz



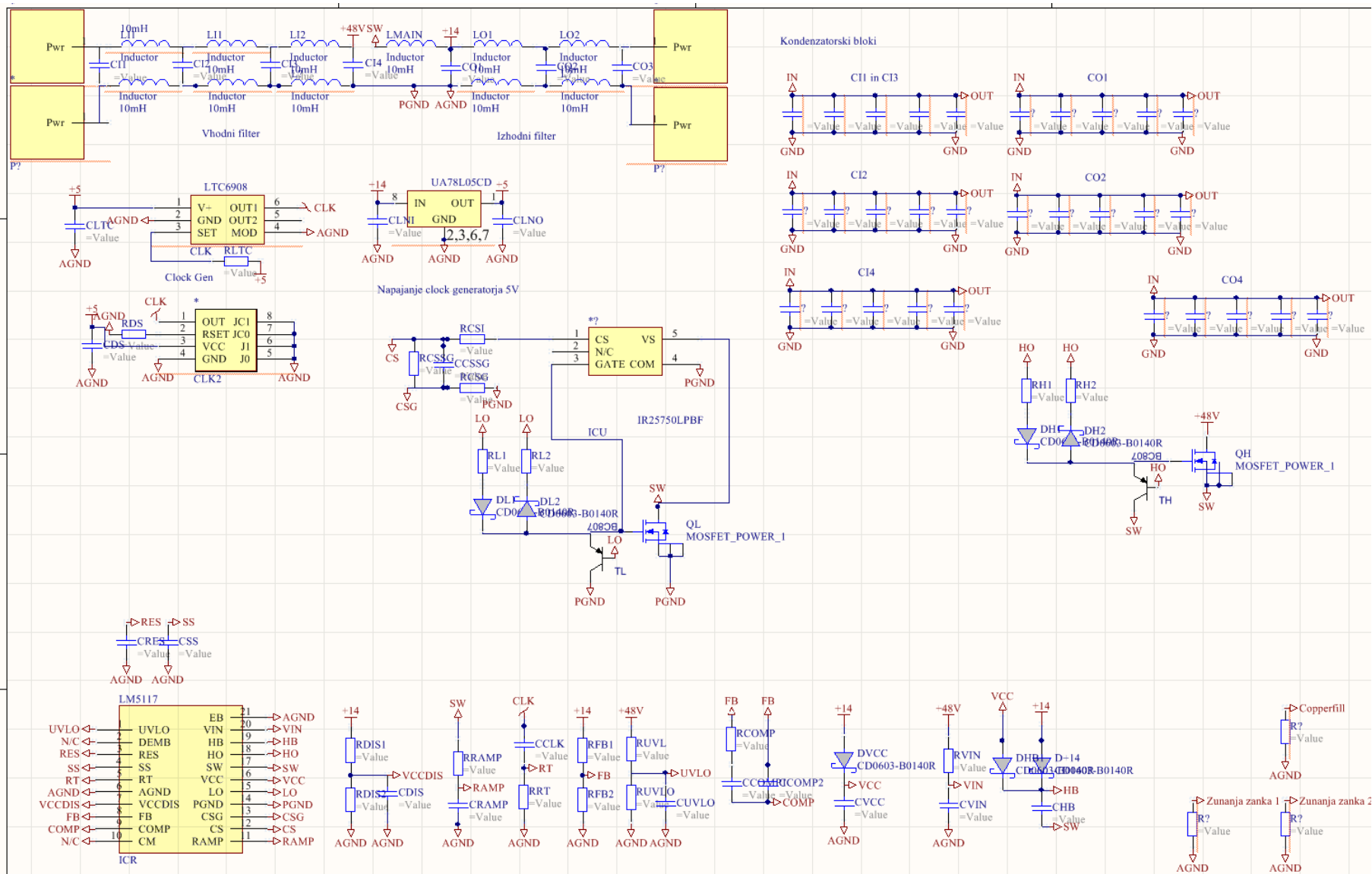
Marko Remec: Sevalne motnje do 30 MHz (MUMETAL)



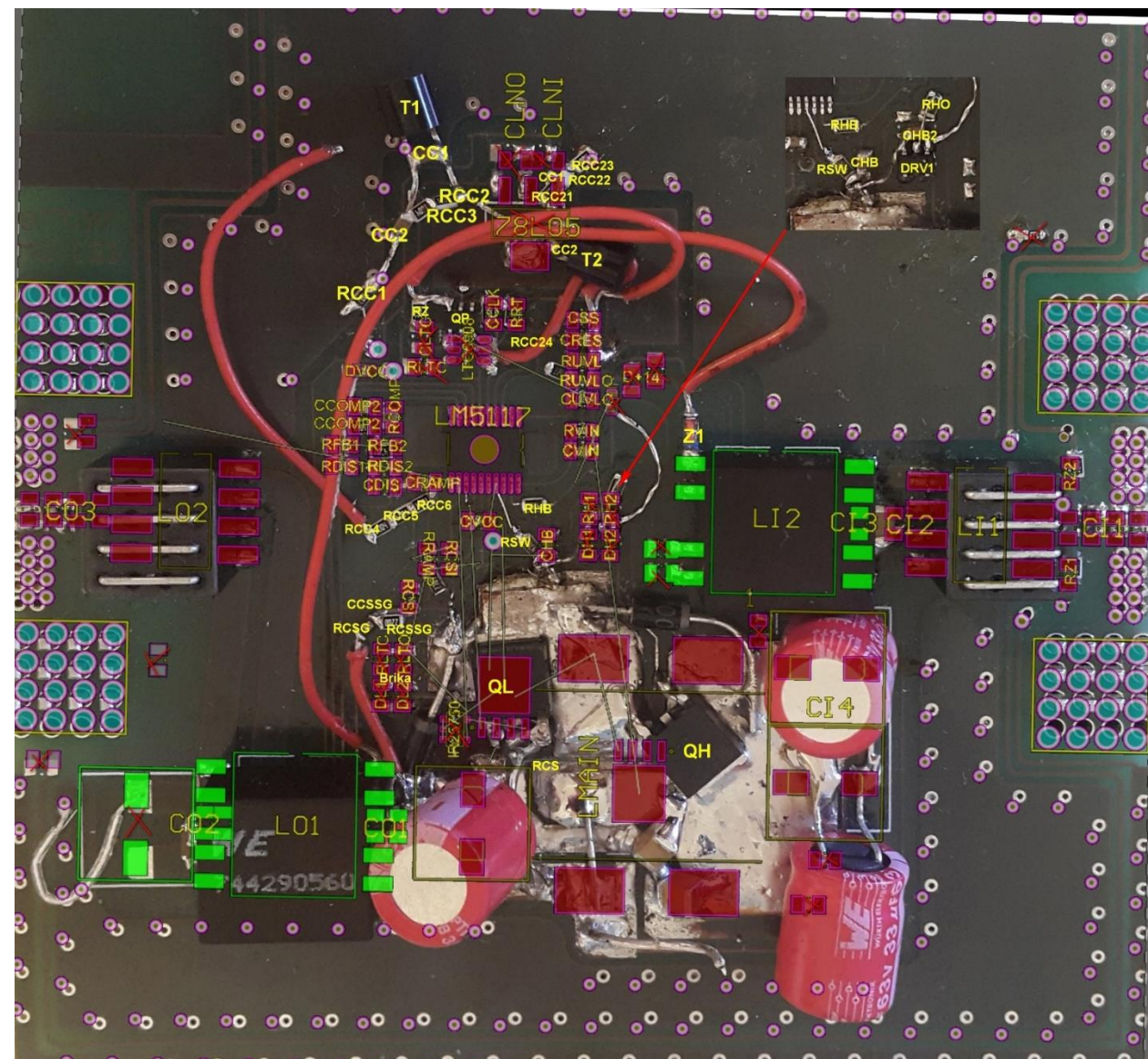
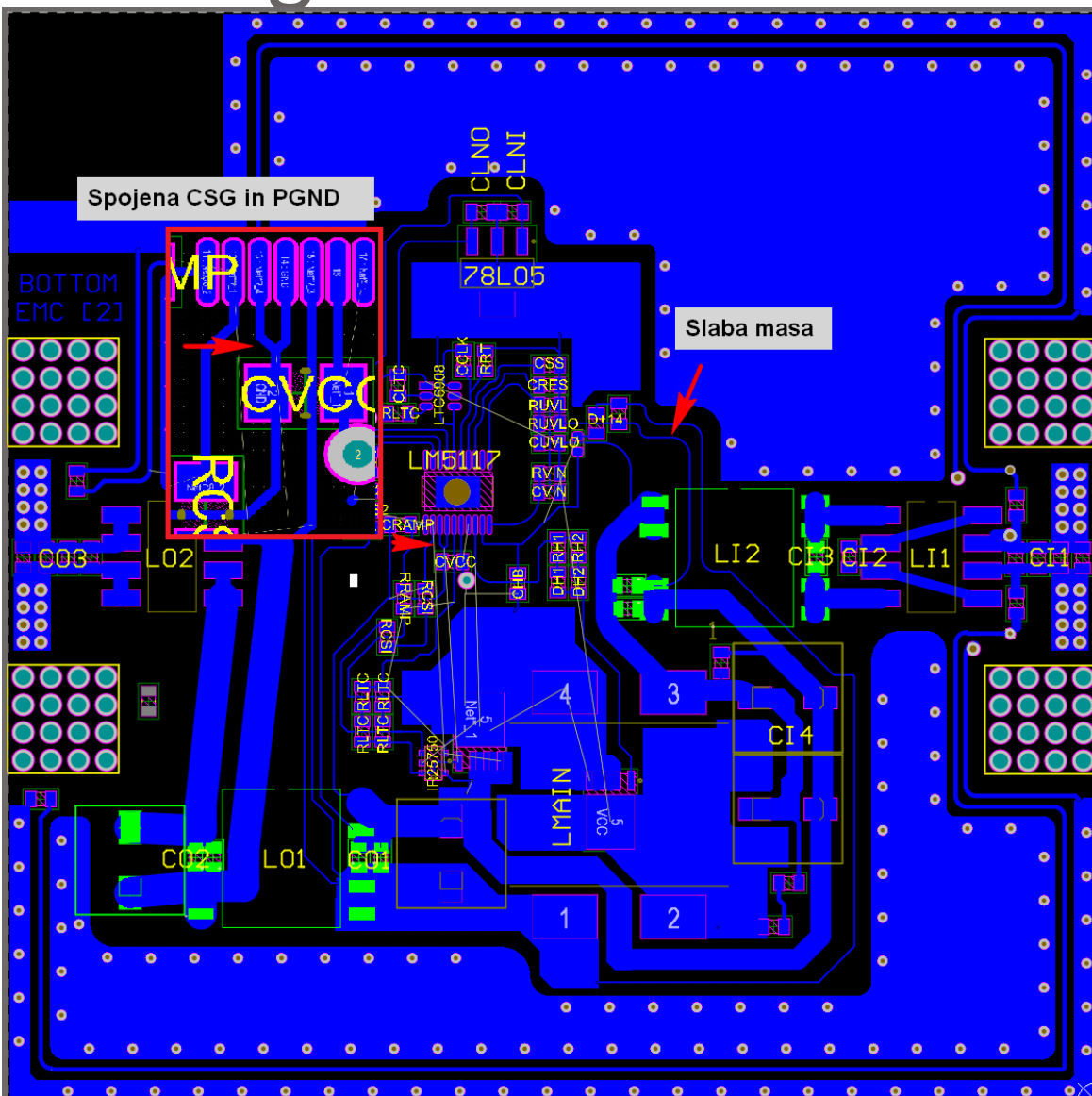
Marko Remec: Sevalne motnje do 1 GHz



Gregor Pečar



Gregor Pečar



Gregor Pečar: Kosovnica

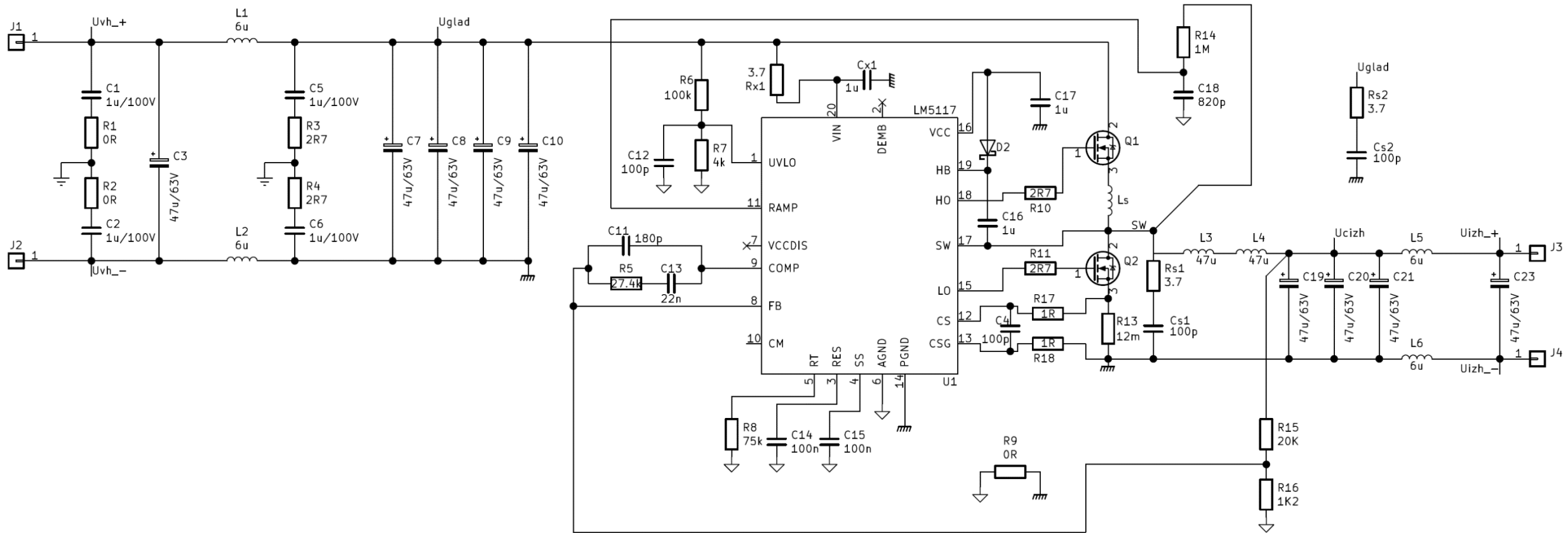
Naziv elementa	Koda	Trgovec	Cena/kos	Št. Kosov	Cena
Ferrite Bead, 248 ohm	1635788		1.11	1	1.11 €
Filter, Line, Common Mode, 320 µH, WE-UCF Series, 3.25 A	2431604		2.77	1	2.77 €
Toroidal Inductor, Low EMI, ATCA Series, 250 µH, 10 A, 0.027 ohm	2665050		3.67	1	3.67 €
Filter, Line, Common Mode, 56 µH, WE-UCF Series, 7 A	2431607		2.65	1	2.65 €
Ferrite Bead, 248 ohm	1635788		1.11	1	1.11 €
SMD Multilayer Ceramic Capacitor, 100 pF, 100 V	2812425		0.0371	1	0.04 €
SMD Multilayer Ceramic Capacitor, 1000 pF, 100 V	2812117		0.0533	1	0.05 €
SMD Multilayer Ceramic Capacitor, 10000 pF, 100 V	2812368		0.0328	2	0.07 €
SMD Multilayer Ceramic Capacitor, 0.1 µF, 100 V	2812440		0.0158	3	0.05 €
SMD Multilayer Ceramic Capacitor, 2.2 µF, 100 V	2985636		0.15425	4	0.62 €
Polymer Aluminium Electrolytic Capacitor, 33 µF, 63 V	2466560		0.865	2	1.73 €
Polymer Aluminium Electrolytic Capacitor, 33 µF, 63 V	2466560		1.73	1	1.73 €
Polymer Aluminium Electrolytic Capacitor, 560 µF, 16 V	2466580		0.499	1	0.50 €
SMD Multilayer Ceramic Capacitor, 47 µF, 16 V	885012109011		0.626667	3	1.88 €
SMD Multilayer Ceramic Capacitor, 47 µF, 16 V	885012109011		1.88	1	1.88 €
SMD Multilayer Ceramic Capacitor, 47 µF, 16 V	885012109011		1.88	1	1.88 €
SMD Multilayer Ceramic Capacitor, 1 µF, 16 V	2495171		0.01796	5	0.09 €
SMD Multilayer Ceramic Capacitor, 0.1 µF, 16 V	2533933		0.00292	5	0.01 €
SMD Multilayer Ceramic Capacitor, 10000 pF, 16 V	2812459		0.0711	1	0.07 €
SMD Multilayer Ceramic Capacitor, 1000 pF, 16 V	2812455		0.0106	5	0.05 €
SMD Multilayer Ceramic Capacitor, 1 µF, 16 V	2495171		0.0898	1	0.09 €
SMD Multilayer Ceramic Capacitor, 1 µF, 16 V	2495171		0.0898	1	0.09 €
SMD Multilayer Ceramic Capacitor, 1 µF, 50 V	2495197		0.014633	3	0.04 €
SMD Multilayer Ceramic Capacitor, 10000 pF, 100 V	2812368		0.0607	1	0.06 €
SMD Multilayer Ceramic Capacitor, 180 pF, 50 V	2495153		0.02985	2	0.06 €
SMD Multilayer Ceramic Capacitor, 1 µF, 16 V	2495171		0.0898	1	0.09 €
MOSFET Transistor, N Channel, 90 A, 100 V, 0.0057 ohm	2480817		0.898	1	0.90 €
MOSFET Transistor, N Channel, 90 A, 100 V, 0.0057 ohm	2480817		0.898	1	0.90 €
Bipolar (BJT) Single Transistor, NPN, 30 V, 800 mA, 100 hFE	9206884		0.312	1	0.31 €
Bipolar (BJT) Single Transistor, NPN, 30 V, 800 mA, 100 hFE	9206884		0.312	1	0.31 €
MOSFET Transistor, N Channel, 4 A, 20 V	2056678		0.124	1	0.12 €
Schottky Rectifier, SRxxx Series, 100 V, 1 A	1861419		0.0347	1	0.03 €
Zener Single Diode, 56 V	2677514		0.03	1	0.03 €
Schottky Rectifier, SRxxx Series, 100 V, 1 A	1861419		0.0347	1	0.03 €
Schottky Rectifier, SRxxx Series, 100 V, 1 A	1861419		0.0347	1	0.03 €
Schottky Rectifier, SRxxx Series, 100 V, 1 A	1861419		0.0347	1	0.03 €
MOSFET Driver, 40V, 10A	3127499		0.206	1	0.21 €
					25.31 €

Gregor Pečar: Električne meritve

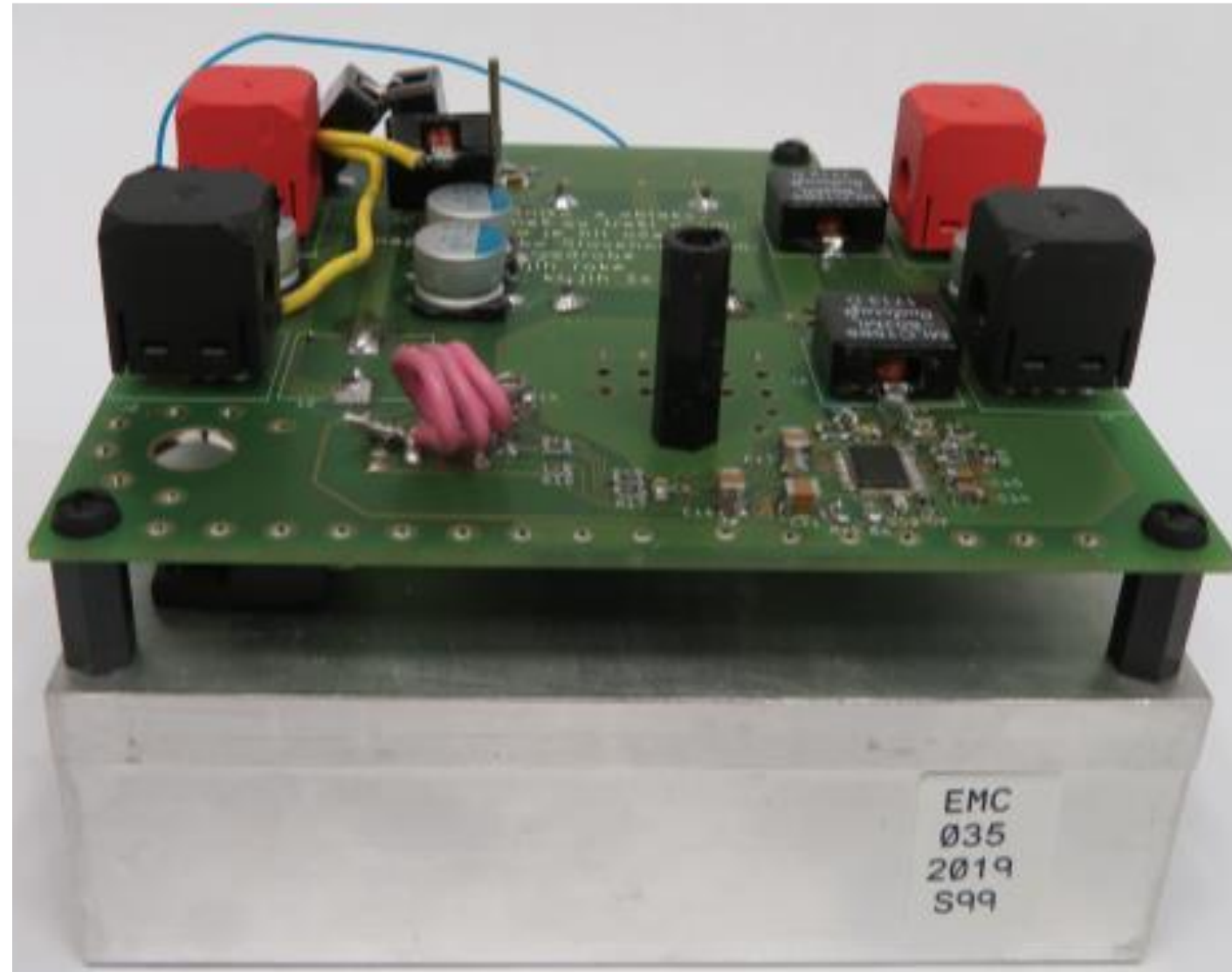
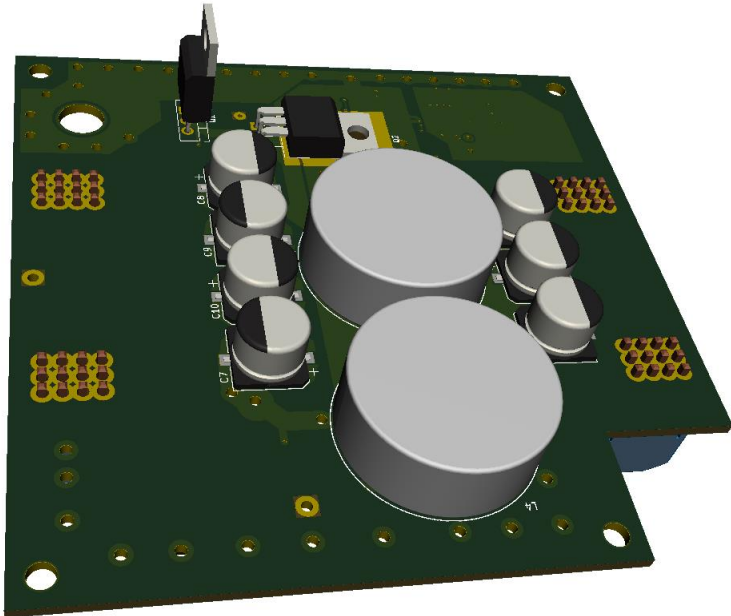
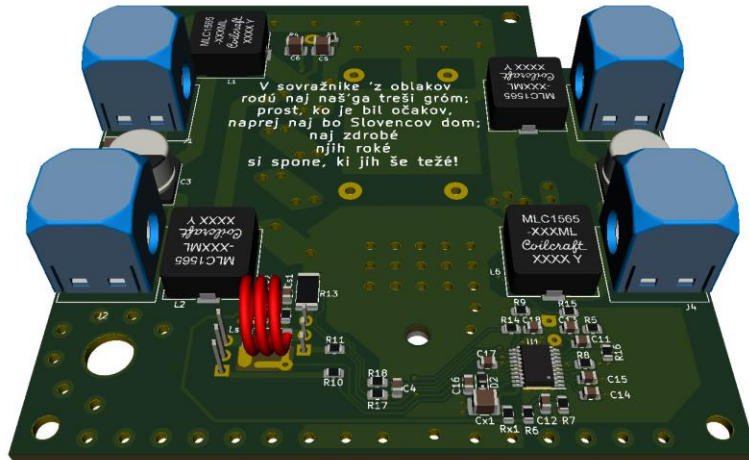
- Pri bremenu 2 Ohm močno brenčanje. Pri bremenu 10 Ohm in vhodni napetosti 36 V odpovedal vzorec.

Izkoristek: **91,9%** (*zahteva nad 75%*)

MAHLE



MAHLE



MAHLE: Kosovnica

Naziv elementa	Koda proizvajalca	Proizvajalec	Cena/kos	Št. kosov	Cena
CONDUCTIVE POLYMER ALUMINUM SOLID ELECTROLYTIC CAPACITORS 47u/63V	647-PCR1J470MCL1GS	Nichion	0.949	9	8.54
High Current Through Hole Inductor, High Temperature Series 47u	2448247	Vishay Dale	5.53	2	11.06
Shielded Power Inductors MLC12xx/15xx 6u	994-MLC1565-602MLB	Coilcraft	1.37	4	5.48
Transistor IRFI4410	2580017	IR	0.963	2	1.93
					27.01

MAHLE: Električne meritve

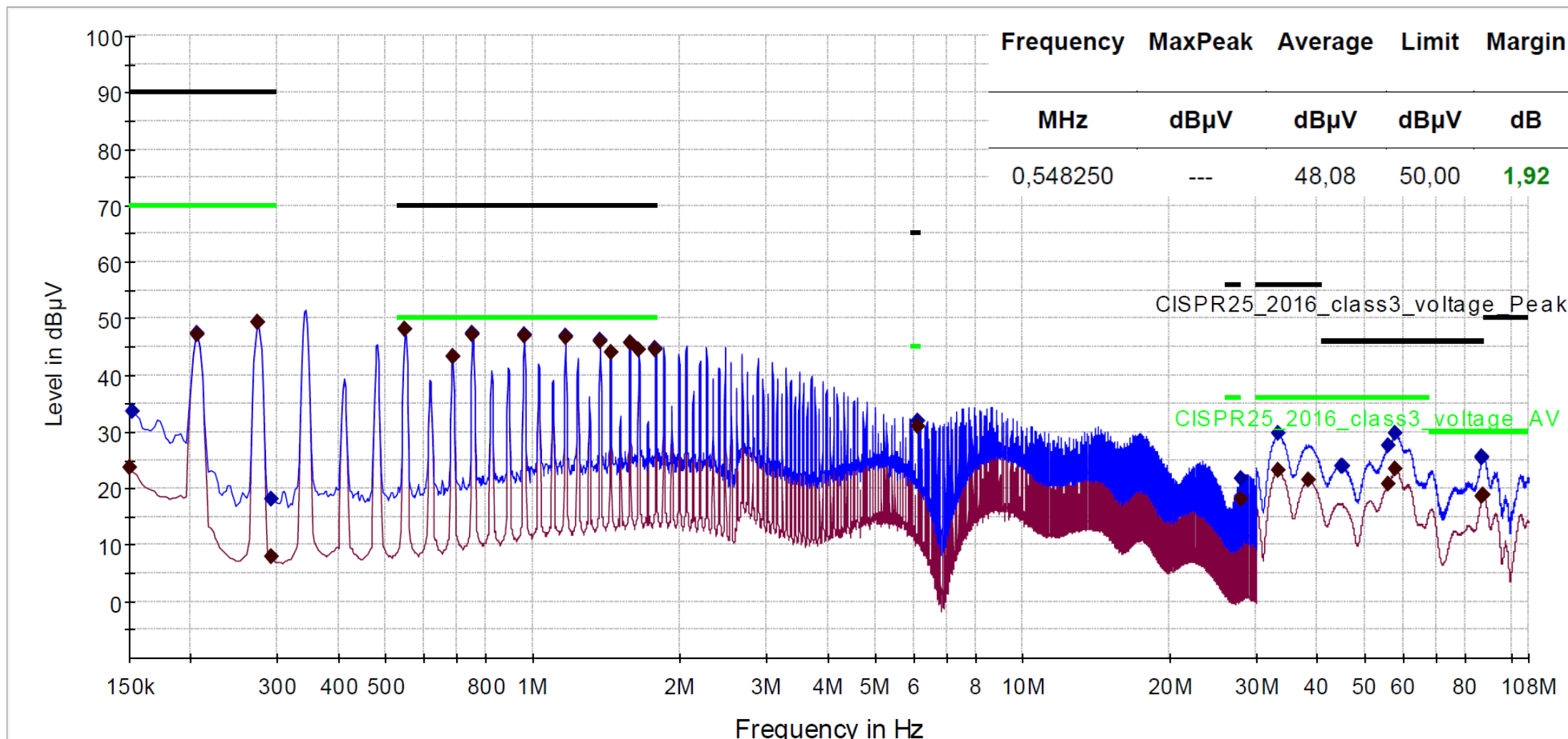
Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
		36 V	48 V	60 V	36 V	48 V	60 V
S99	I_{vh} [A]	0,582	0,444	0,361	2,895	2,196	1,782
	I_{izh} [A]	1,405	1,405	1,405	6,869	6,871	6,872
	U_{izh} [V]	14,125	14,127	14,130	13,999	13,999	14,000

Izkoristek: **91,3%** (zahteva nad 75%)

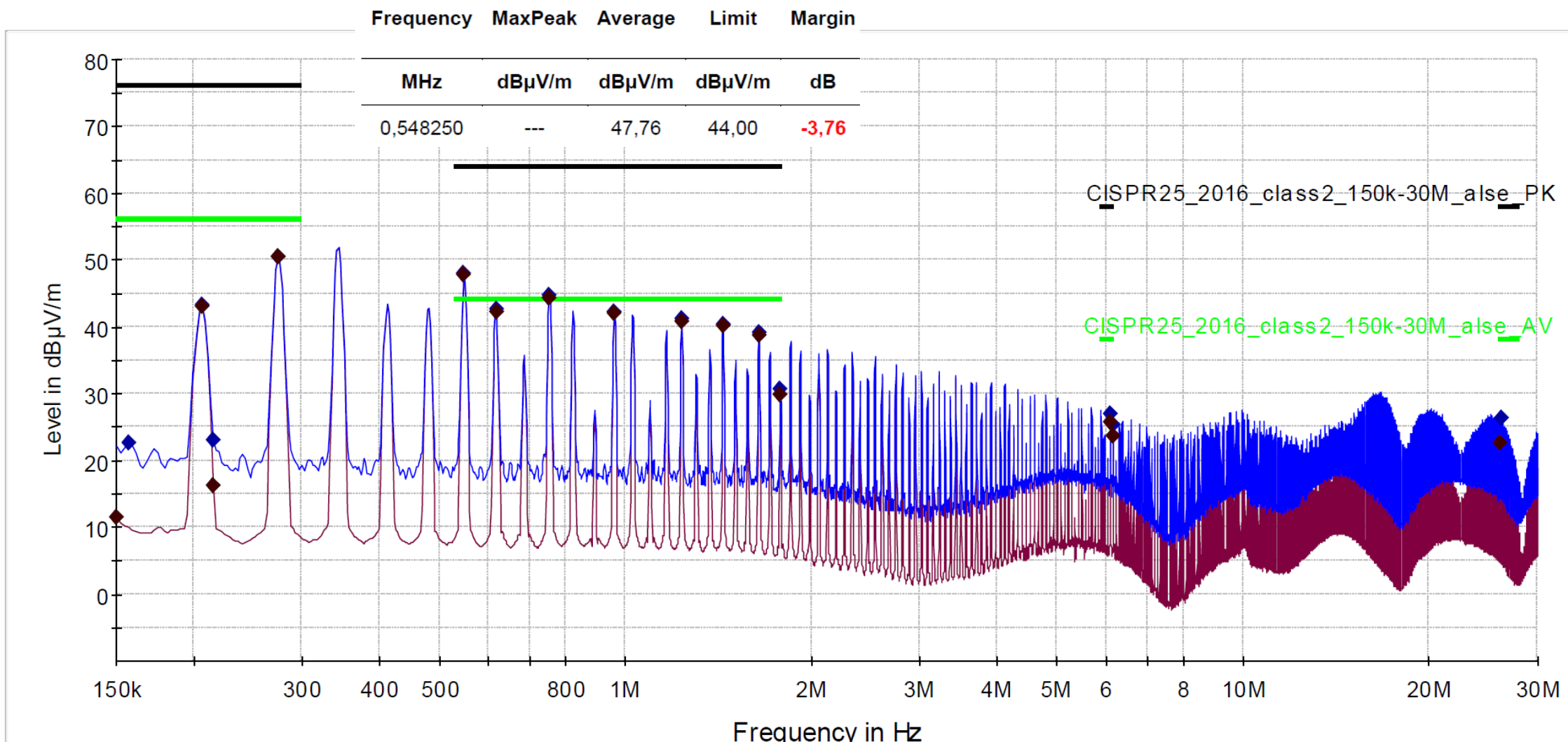
Valovitost pri osnovni frekvenci: **22,5 mV** (zahteva pod 0,2 V)

Valovitost skupno: **0,0964V** (zahteva pod 0,5 V)

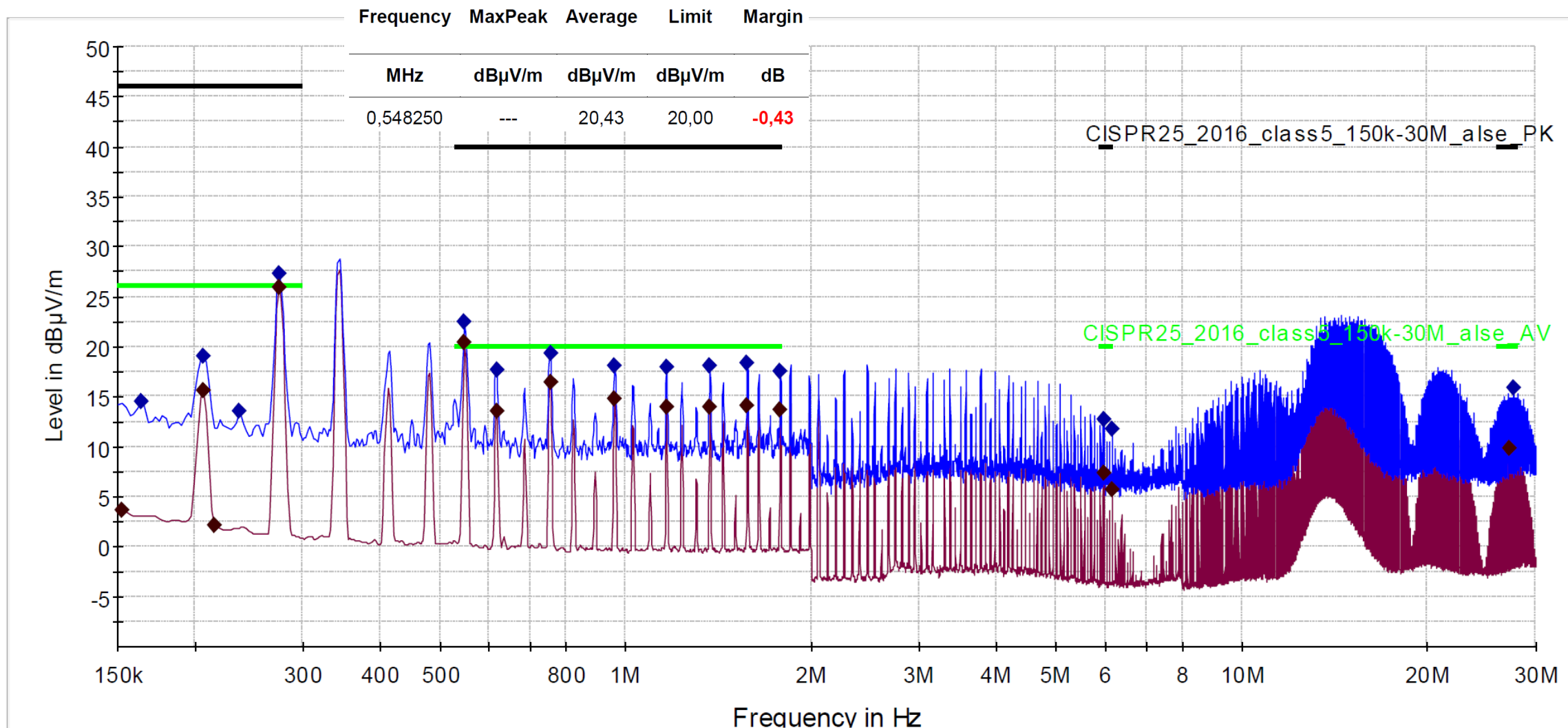
MAHLE: Prevodne motnje



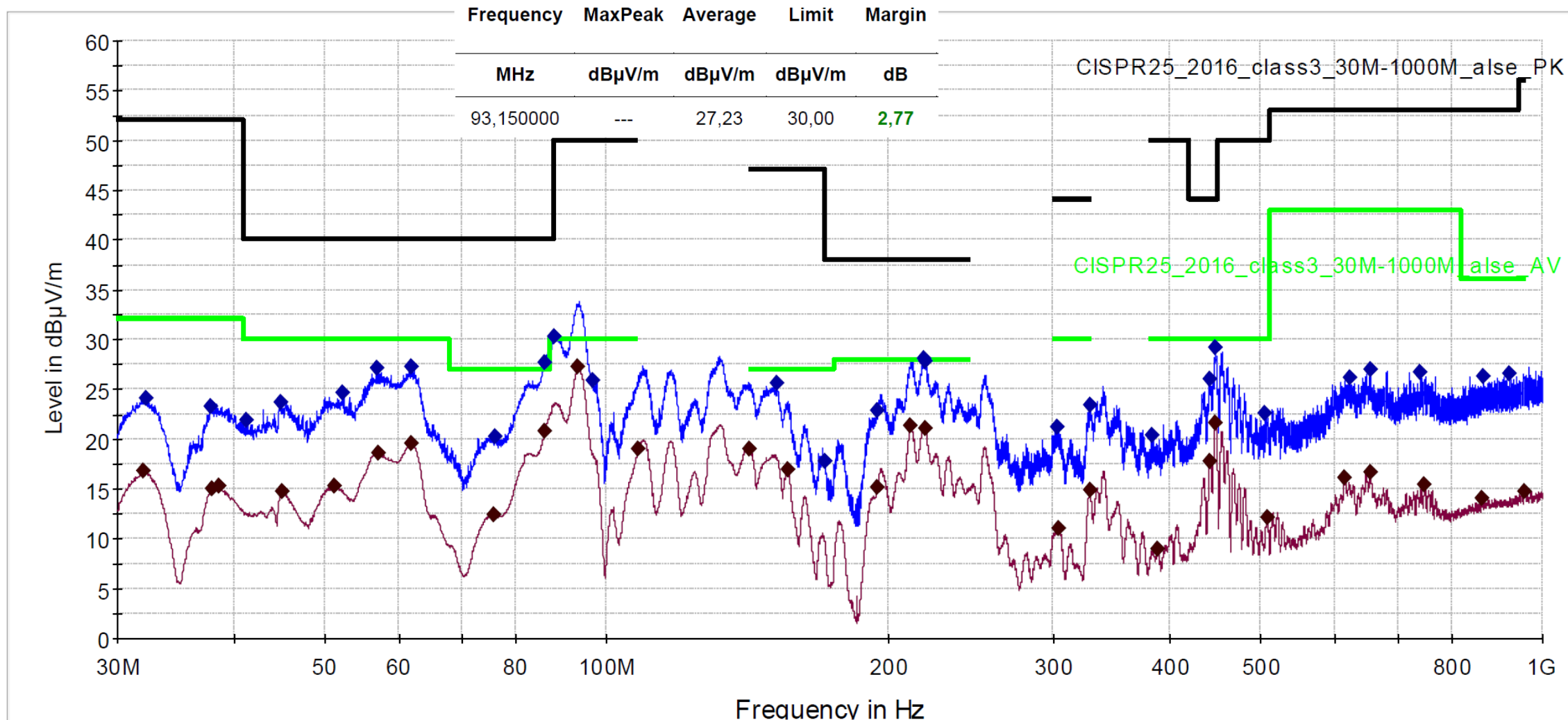
MAHLE: Sevalne motnje do 30 MHz



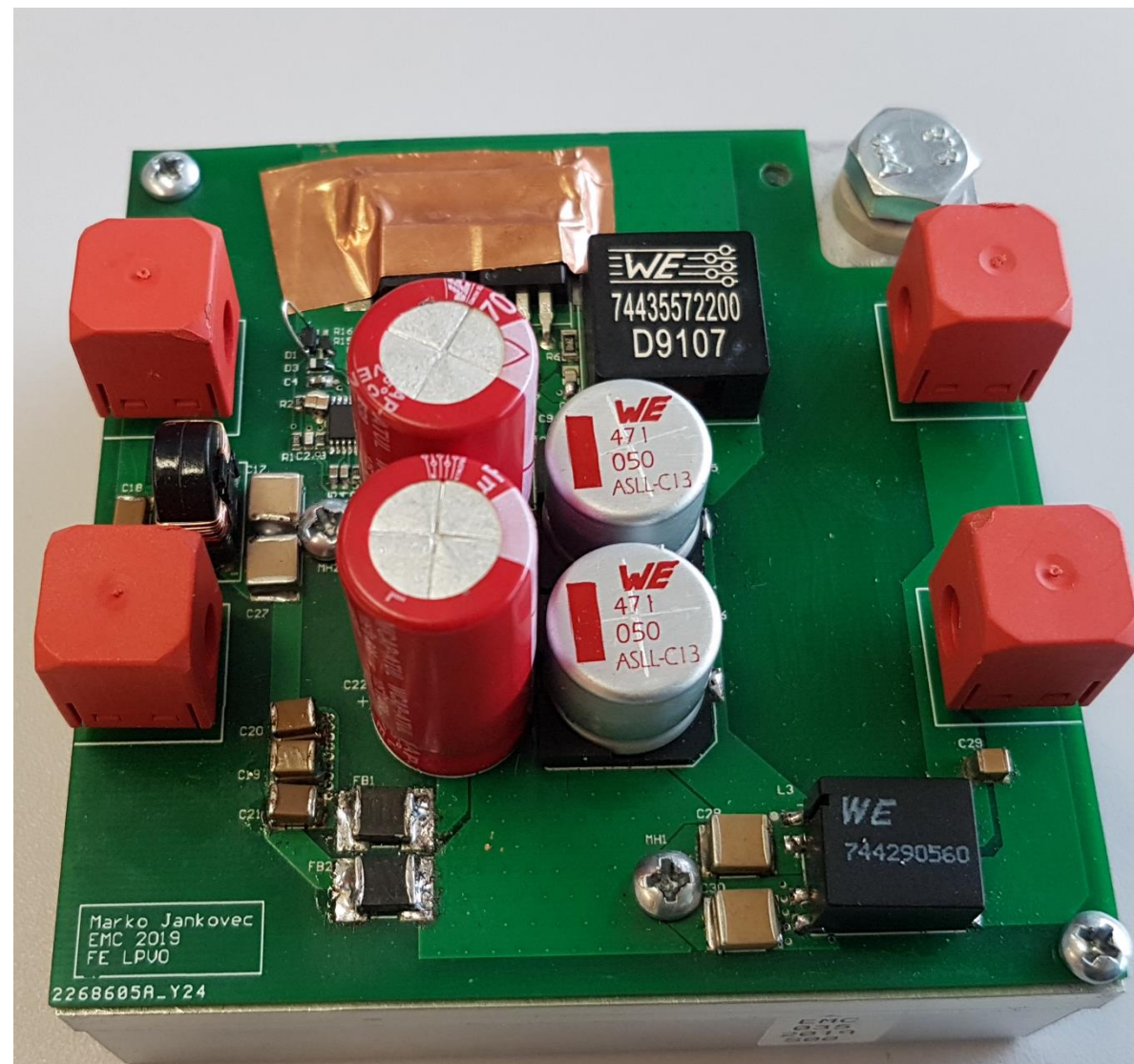
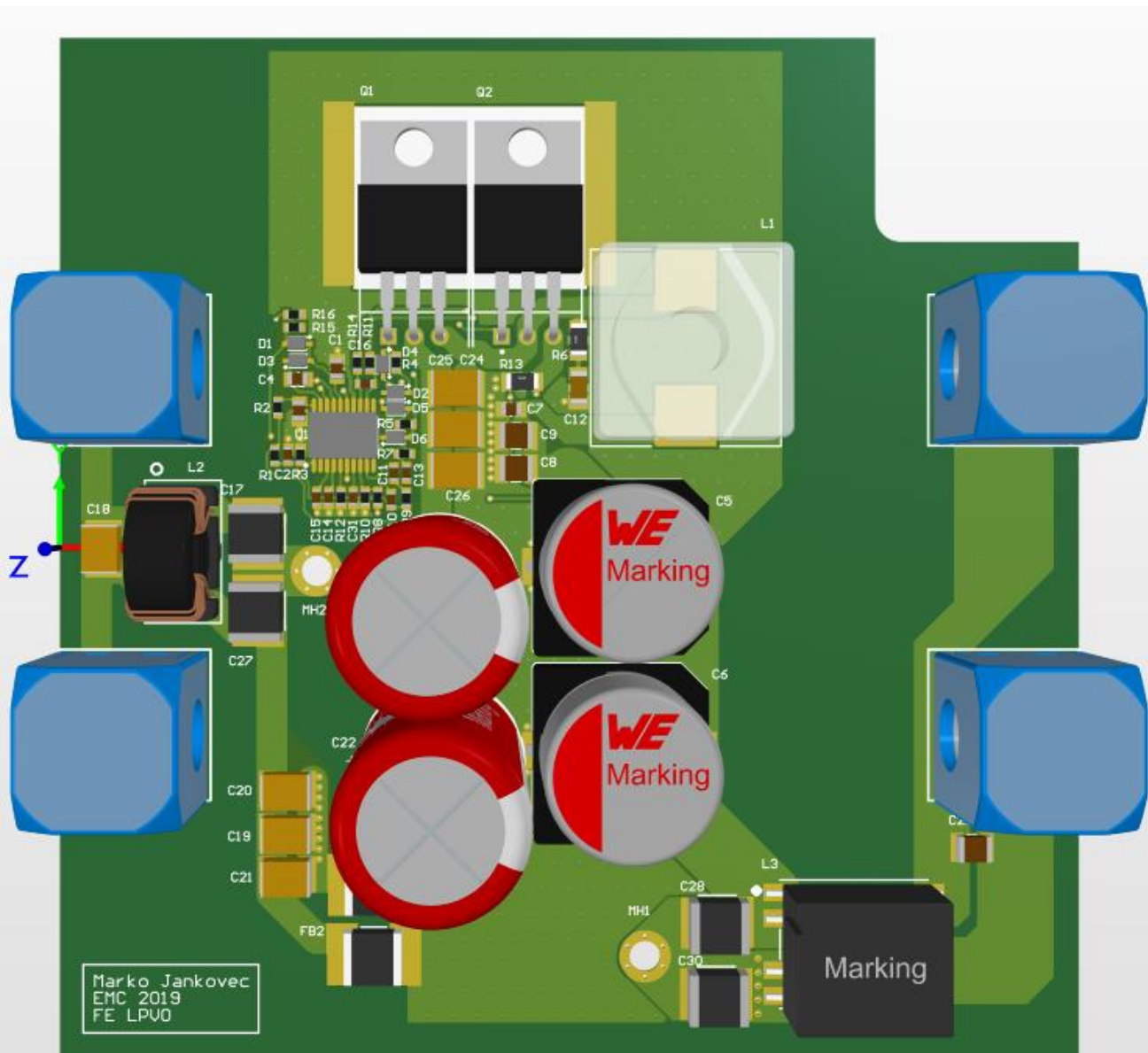
MAHLE: Sevalne motnje do 30 MHz (MUMETAL)



MAHLE: Sevalne motnje do 1 GHz



FE



FE: Kosovnica

Naziv elementa	Koda proizvajalca	Proizvajalec	Cena/kos	Št. Kosov	Cena
ceramic X7R SMD capacitor smd 0805 4.7μF 16V	MC0805B475K160CT	Multicomp	1.04 €	1	0.04 €
electrolytic SMD capacitor 470μF 50V 16mm X 17mm	865060663013	WE	1.22 €	2	2.44 €
ceramic Y5V SMD capacitor smd 0805 1μF 50V	CC0805ZKY5V9BB105	Multicomp	0.06 €	1	0.06 €
ceramic X7R SMD capacitor smd 1210 22μF 25V	GRM32ER71E226ME15L	Murata	0.33 €	6	1.99 €
ceramic X7R SMD capacitor smd 1812 3.3μF 100V	C1812C335K1RACAUTO	Kemet	0.32 €	13	4.16 €
WCAP-ATUL Aluminum Electrolytic Capacitors, 16x35.5mm, 100 Vdc, 470 uF	860040880011	WE	2.44 €	2	4.88 €
WE-MPSB SMT EMI Multilayer Power Suppression Bead, size 2220, 550Ohm, 4A	74279224551	WE	0.92 €	2	1.85 €
SMD Flat Wire High Current Inductor WE-HCI, L=22.0 μH	74435572200	WE	2.64 €	1	2.64 €
THT Common Mode Power Line Choke WE-CMBNC , L=2x1mH	7448012501	WE	4.86 €	1	4.86 €
WE-UCF SMT Common Mode Line Filter, 0.056mH, 0.0047Ohm, 80V	744290560	WE	2.65 €	1	2.65 €
FQP45N15V2 - MOSFET Transistor, N Channel, 45 A, 150 V, 0.034 ohm, 10 V, 4 V	FQP45N15V2	ON SEMI	0.79 €	2	1.57 €
					27.13 €

FE: Električne meritve

Vzorec	/	Rb = 10 Ω			Rb = 2 Ω		
	U _{vh}	36 V	48 V	60 V	36 V	48 V	60 V
S00	I _{vh} [A]	/	/	/	2,997	2,299	uničen
	I _{izh} [A]	/	/	/	6,780	6,781	uničen
	U _{izh} [V]	/	/	/	13,827	13,825	uničen

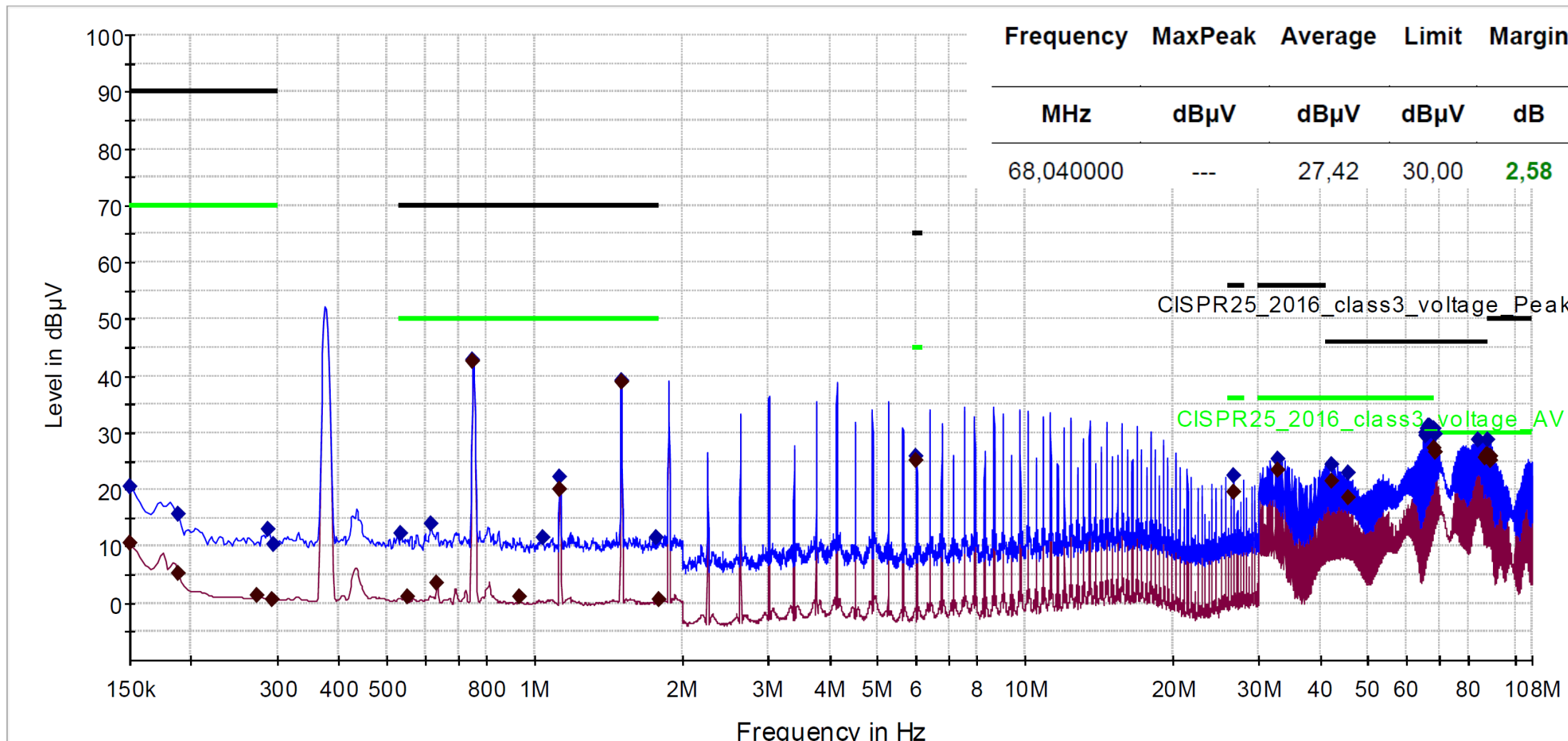
Pri bremenu in vhodni napetosti 55 V vzorec odpovaldal

Izkoristek: **85%** (zahteva nad 75%)

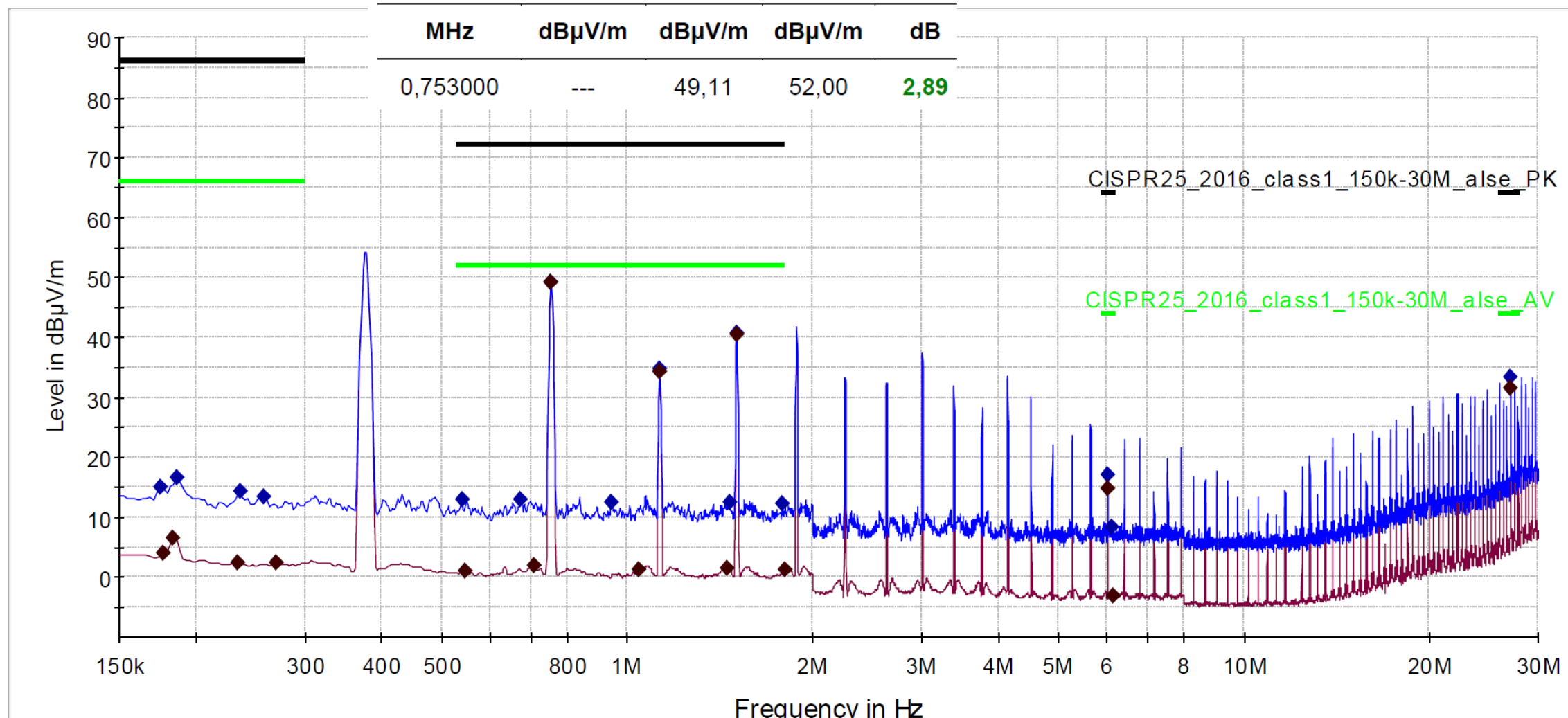
Valovitost pri osnovni frekvenci: **6 mV** (zahteva pod 0,2 V)

Valovitost skupno: **0,052 V** (zahteva pod 0,5 V)

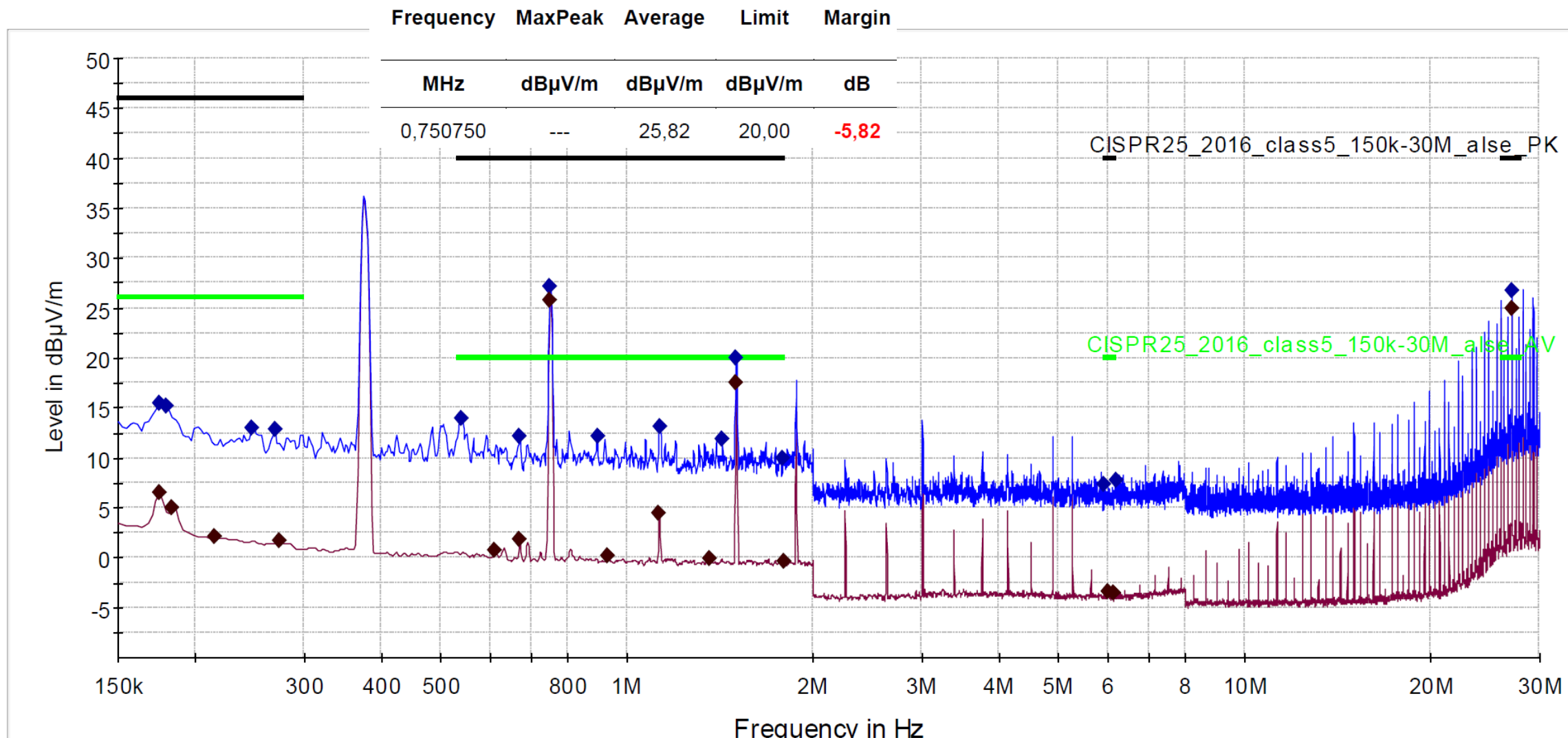
FE: Prevodne motnje



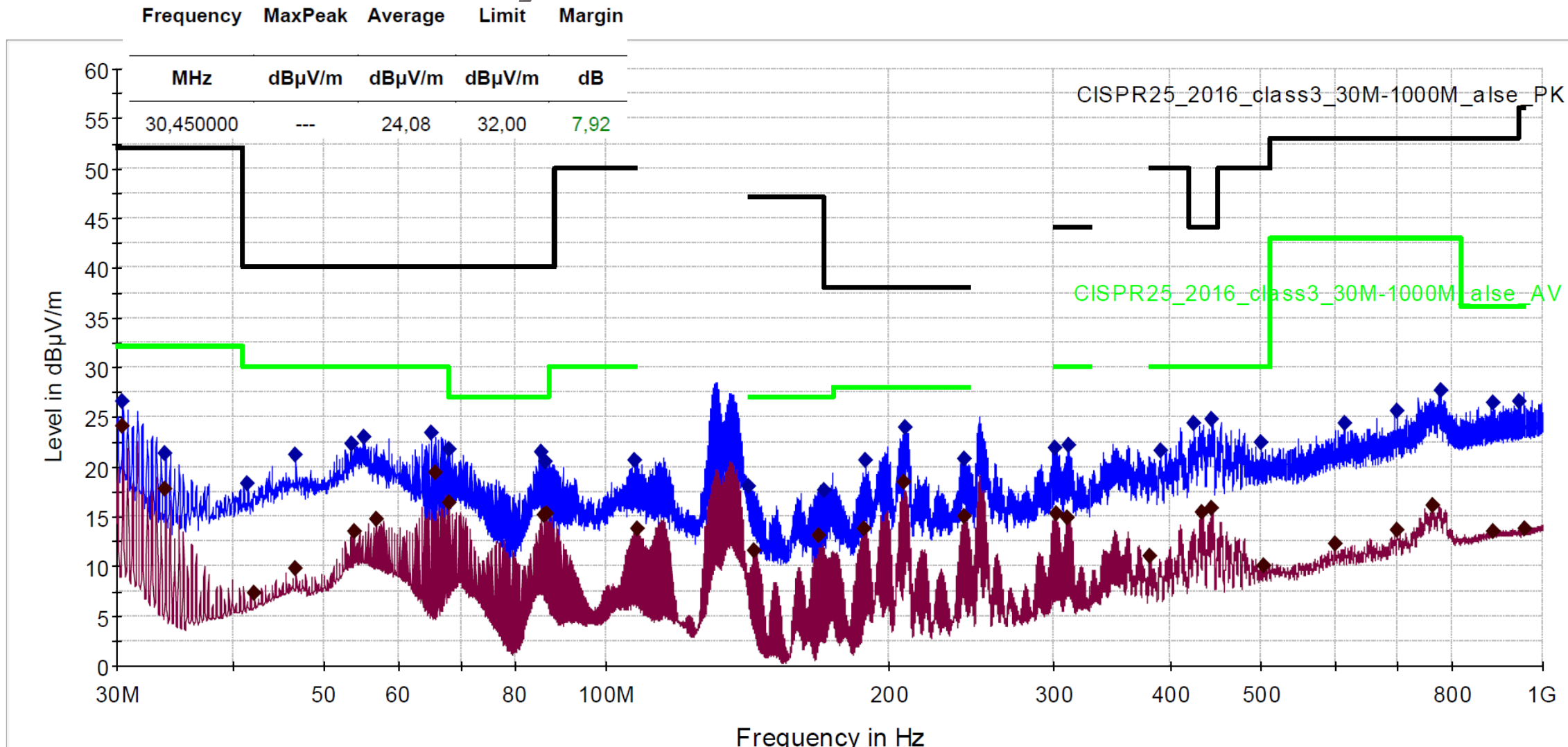
FE: Sevalne motnje do 30 MHz



FE: Sevalne motnje do 30 MHz (MUMETAL)



FE: Sevalne motnje do 1 GHz



Končni rezultati

Tekmovalec		Funkcionalnost				Valovitost / mV		Emisije				Točke						Rezultat	
Koda	Ime	Meh.	Del.	Cena	Izk.	Osn.	Cel.	CE	class	RE	class	Zam.	Fun.	Cena	Izk.	CE	RE	Vsota	Mesto
S02	Žiga Šmelcer	NE	DA	20.85 €	93%	24.7	102	0.79	1	-2.54	0		8	19.53	19.6	0.66	-2.54	45.25	1
S09	Marko Remec	DA	DA	30.61 €	92%	15.3	443	2.62	1	-5.81	0	-10	10	0	21.4	2.18	-5.81	17.77	2
S07	Jan Cvijanovič Hudoklin	DA	DA	28.25 €	90%	24.2	232	-10.3	0	-12.1	0		10	4.72	13.4	-10.3	-12.1	5.66	3
S06	Matjaž Janežič	NE	DA	11.71 €	88%	53.5	1290	-33.6	0	-30.7	0		6	37.81	18.2	-33.6	-30.7	-2.274	4
S01	Jurij Tratar	DA	DA	13.59 €	95%	25.3	1050	-35.3	0	-32.3	0		8	34.04	14.2	-35.3	-32.3	-11.41	5
S08	Martin Kregar in Blaž Okorn	DA	DA	23.17 €	96%	110	1118	-29.5	0	-18.1	0		6	14.89	14.5	-29.5	-18.1	-12.26	6
S03	<i>Bernard Veršnjak</i>	DA	NE	21.74 €															DNF
S04/05	<i>Jan Žagar</i>	DA	NE	24.13 €															DNF
S10	<i>Gregor Pečar</i>	DA	DA	25.31 €	91%							-10							DNF
S00	FE	DA	DA	27.13 €	85%	6	96.4	2.58	3	2.89	1	-10	8	6.96	10	14.3	1.81	31.07	
S99	MAHLE	DA	DA	27.01 €	91%	22.5	52.6	1.92	3	4.28	1		10	7.2	16.3	12.4	2.68	48.58	



Laboratorij za fotovoltaiiko
in optoelektroniko

MAHLE



SIQ



HT
Europ



Hvala vsem!