



LED Driver Design with iW3620 _27V350mA EBC887

Summary and Features :

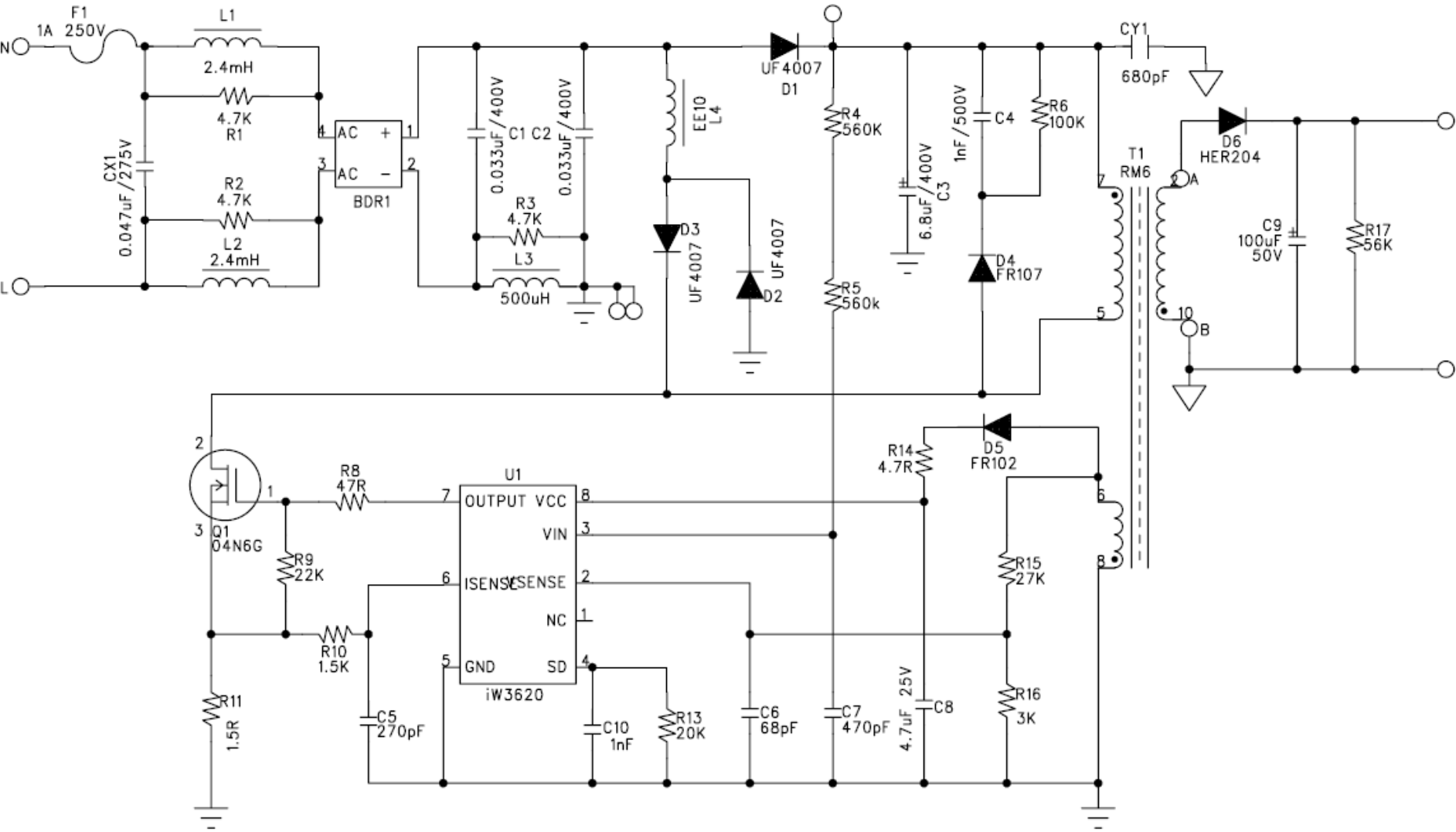
- 1. LED driver, 27V, CC@0.35A ; Wide AC input range @90Vac- 264Vac**
- 2 For Isolated or Non-isolated Applications**
- 3. High Efficiency and Minimum Parts count**
- 4. Meet EMI EN55015B-QP & AV limits; Meet IEC61000-3-2 Class C**
- 5. Fully protected against AC input UV, OV, O/P Short/Open, meet single point failure test.**

1. Specification

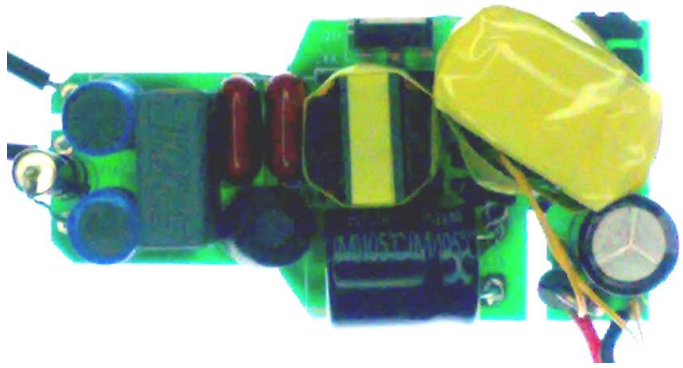


Description		Symbol	Min	Typ	Max	Units	Comment	
Input								
Voltage		V_{IN}	90	230	264	V _{AC}	2 Wire	
Frequency		f_{LINE}	47	50	63	Hz		
Open-load Input Power (264V _{AC})						W		
Output								
Const Voltage	Output Voltage	V_{OUT_CV}		27		V	Measured at the PCB connector	
	Output Current	I_{OUT_CV}				A		
Const Current	Output Voltage	V_{OUT_CV}				V	Min Vout is depend on Vcc	
	Output Current	I_{OUT_CV}		0.35		A		
Total Output Power								
Continuous Output Power		P_{OUT}		8		W		
Over Current Protection		I_{OUT_MAX}		0.35		A	Auto-restart	
Efficiency		η	80			%	Measured at end of PCB, (T _A = 25 °C)	
Power Fact		PF	0.9				Harmonic meet IEC61000-3-2 Class C	
Environmental								
Conducted EMI			Meets EN55015B					
Safety								
Operation Temperature		T_{opr}			50	° C	Free convection, sea level	

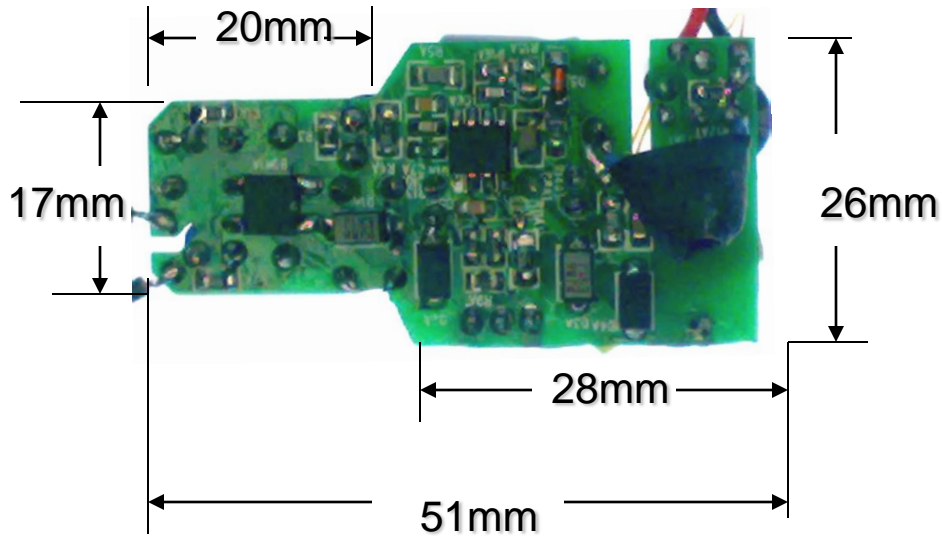
2.Schematic circuit



3.Circuit Board Photograph



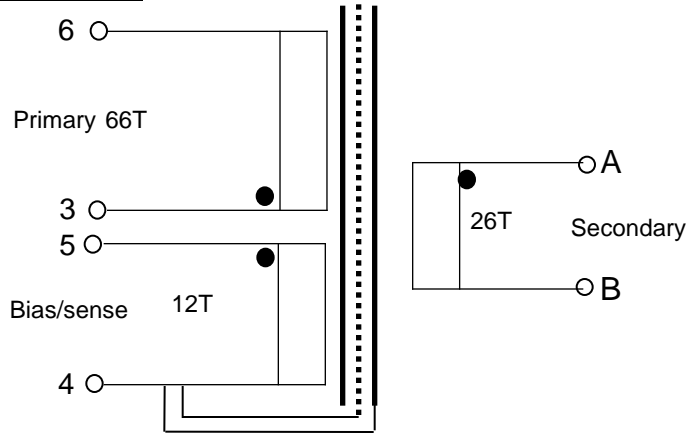
Top side



Bottom side

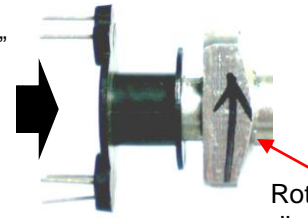
4. Transformer Design

SCHEMATIC

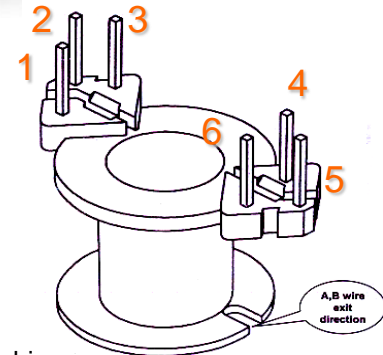


Instruction for start of first winding...

Winding Start pin-2 & End pin-3 in "Clockwise" direction – looking from Bottom side of the Bobbin.



Rotating direction of winding machine



ELECTRICAL SPECIFICATIONS:

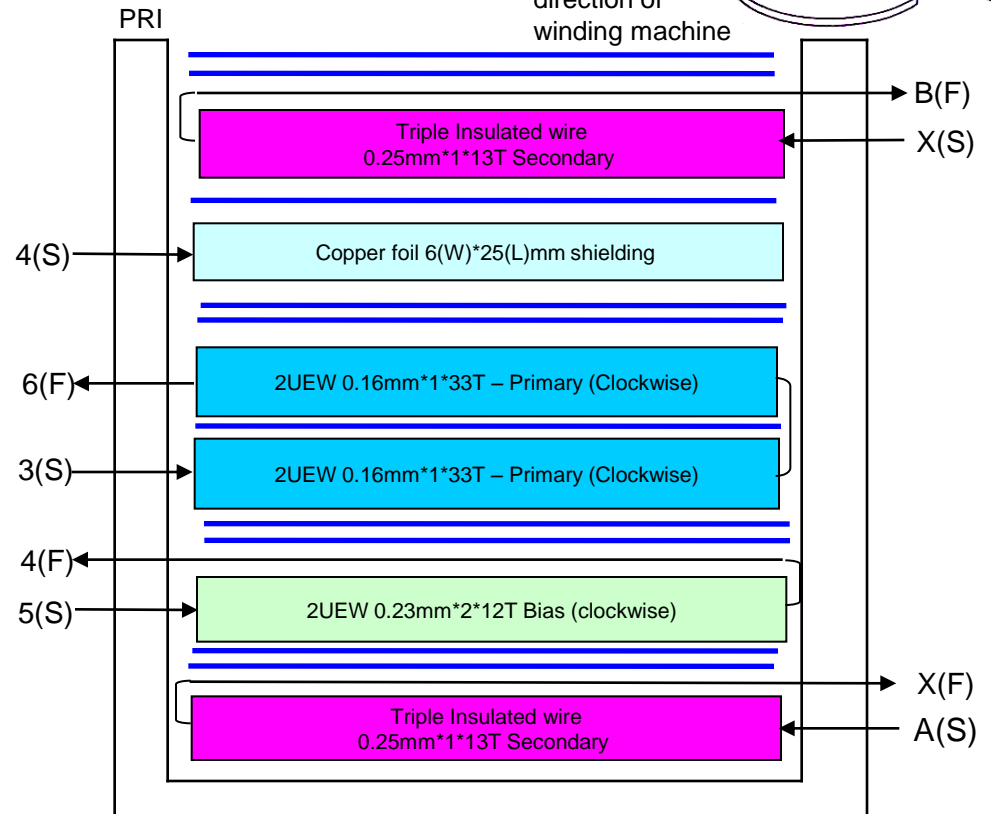
1. Primary Inductance (L_p) = 1mH @10KHz
2. Primary Leakage Inductance (L_k) <= 10uH @10KHz
3. Electrical Strength = 3KV, 50/60Hz, 1Min

MATERIALS:

1. Core : RM6 (Ferrite Material TDK PC40 or equivalent)
2. Bobbin : RM6. Primary=3, Secondary=3
3. Magnet Wires (Pri) : Type 2-U EW
4. Magnet Wire (Sec) : Triple Insulated Wires
5. Layer Insulation Tape : 3M1298 or equivalent.

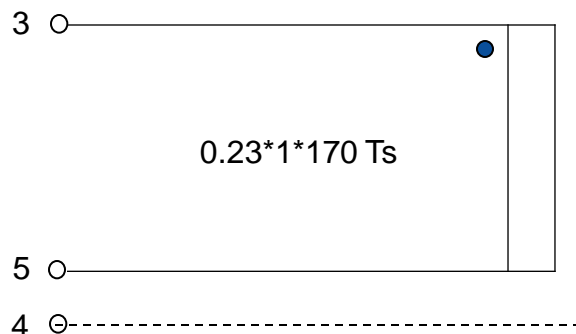
FINISHED :

1. Cut remained of Pin after wires termination
2. Varnish the complete assembly



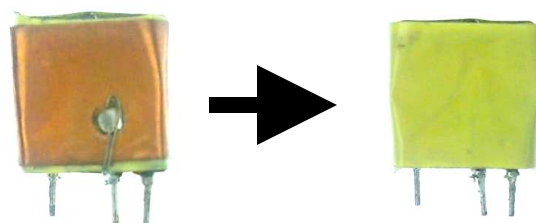
5.PFC Inductor L4 Design

SCHEMATIC



ELECTRICAL SPECIFICATIONS:

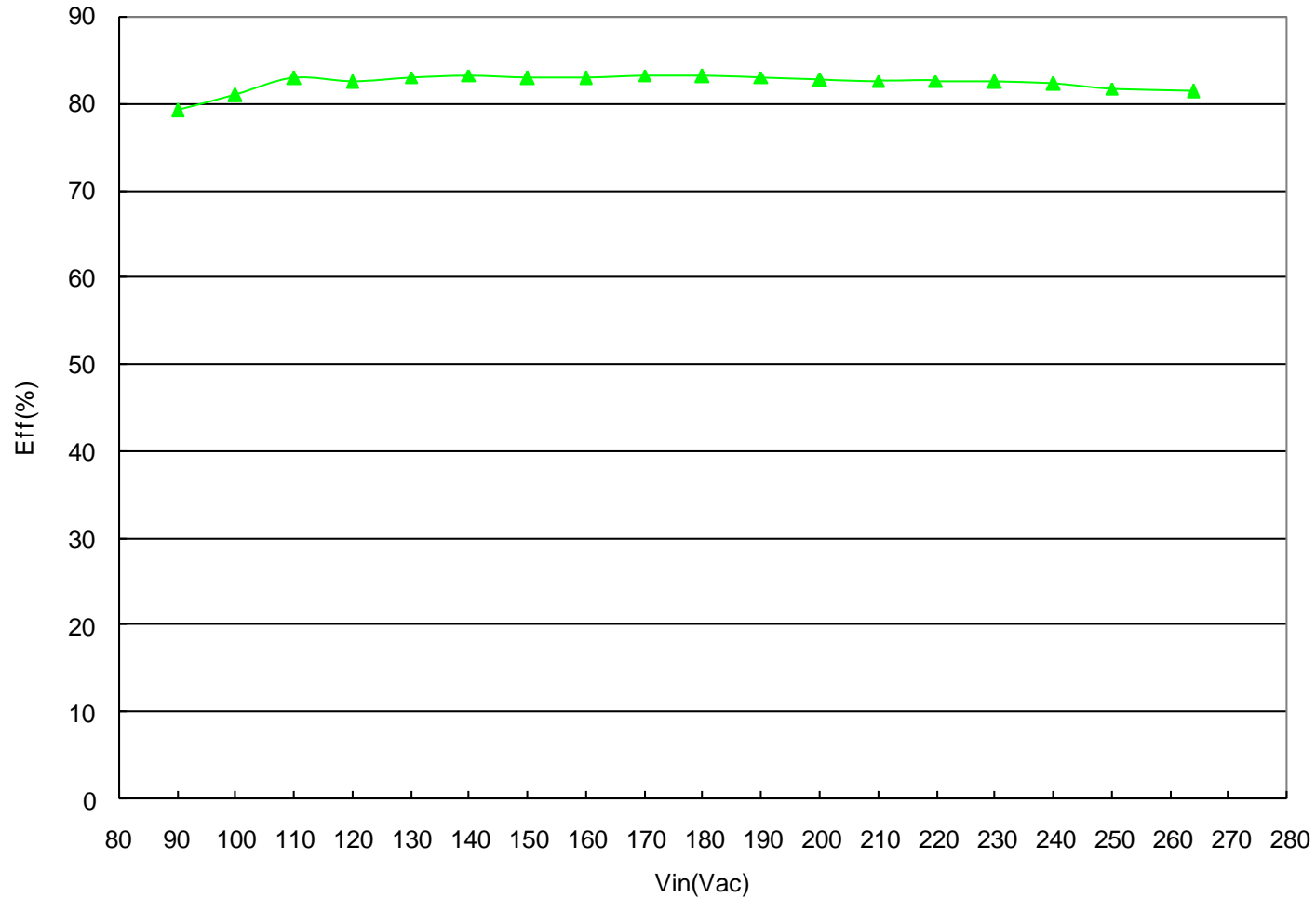
1. Inductance (L_p) = 1.3mH @10KHz
2. Core : EE10 (Ferrite Material TDK PC40 or equivalent)
3. Bobbin : EE10
4. Ferrite core is connected to Pin 4 after assembling
5. Cut remained of Pin1,2,6,7,8 after wires termination
6. Varnish the complete assembly



6. Bill of Material

Item	Qty	Reference	Description	Item	Qty	Reference	Description
1	1	U1	iW3620 SOT-8	21	1	Q1	4N60,TO-251
2	2	C1,C2	0.033uF,400V,MP-CAP,105°C	22	3	R1,R2,R3	4.7K,SMD-0805
3	1	C3	6.8uF,400V,E-CAP,105°C	23	2	R5,R4	560K Ω +/-5%,SMD-1206
4	1	C4	1nF,1KV,SMD-1206	24	1	R6	100K Ω +/-5%,SMD-1206
5	1	C5	270pF,50V,NPO,SMD-0805	25	1	R8	100 Ω +/-5%,SMD-0603
6	2	C6,C10	68pF,50V,NPO,SMD-0805	26	1	R9	22K Ω +/-5%,SMD-0603
7	1	C7	470pF,50V,SMD-0805	27	1	R10	1.5K Ω +/-5%,SMD-0603
8	1	C8	4.7uF,50V,SMD-1206	28	1	R11	1.5 Ω +/-1%,SMD-0805
9	1	C9	100uF,50V,E-CAP,105°C	29	1	R13	20K Ω +/-5%,SMD-0805
10	1	CX1	0.047uF,275V,X-CAP	30	1	R14	4.7 Ω +/-5%,SMD-0805
11	1	CY1	Y-CAP 680PF	31	1	R15	27K Ω +/-5%,SMD-0805
12	3	D1,D2,D3	ES1J	32	1	R16	3K Ω +/-5%,SMD-0805
13	1	D4	FR107	33	1	R17	56K Ω +/-5%,SMD-0805
14	2	D5	FR102-SMD,1A200V	34	1	T1	RM6 Vertical Transformer
15	1	D6	HER204				
16	1	F1	1A250V ; Fuse				
17	1	BDR1	MB8S SMD				
18	2	L1,L2	2.4mH, ϕ 6*8				
19	1	L3	500uH, ϕ 6*8				

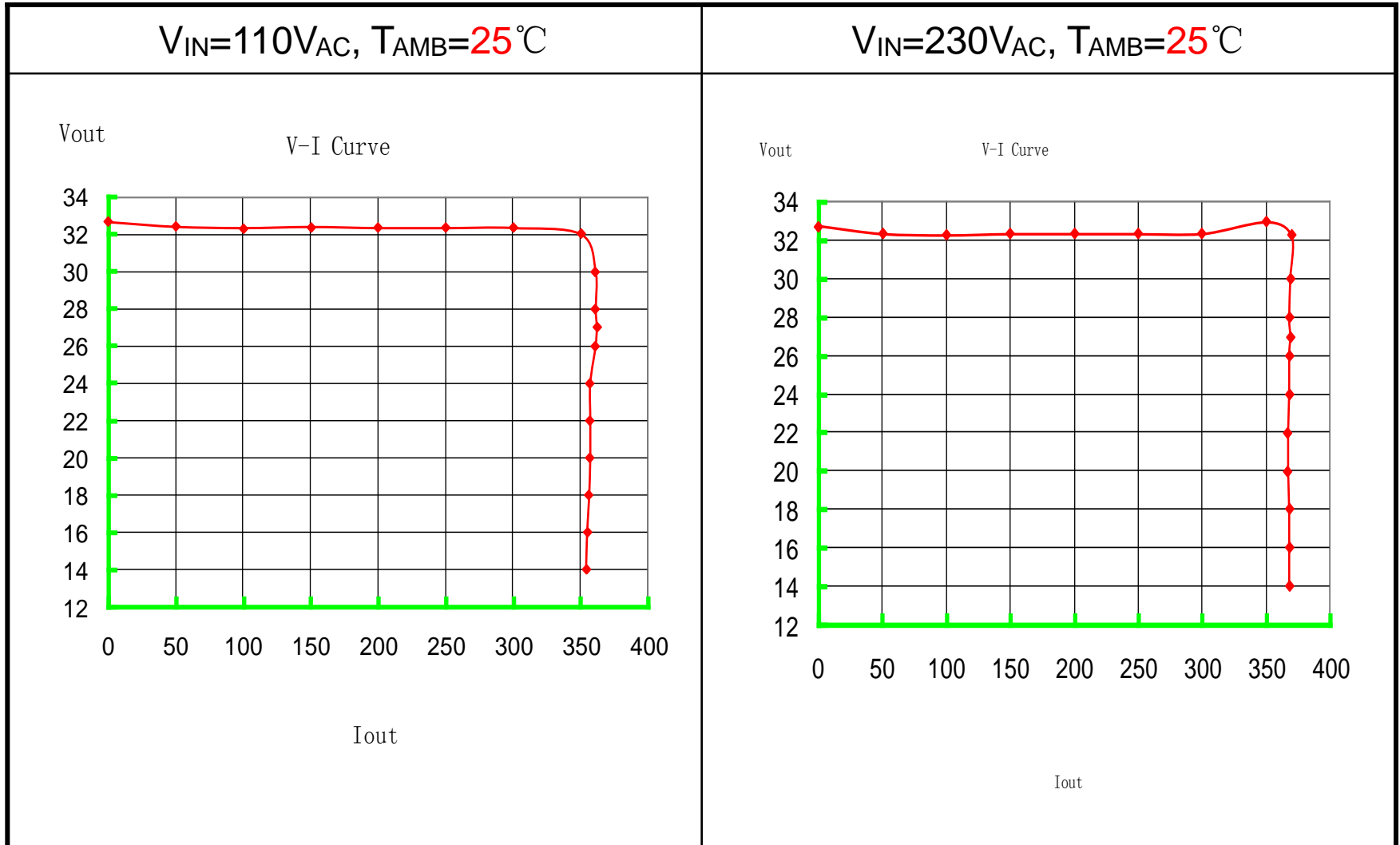
7. Regulation, Efficiency Measurement



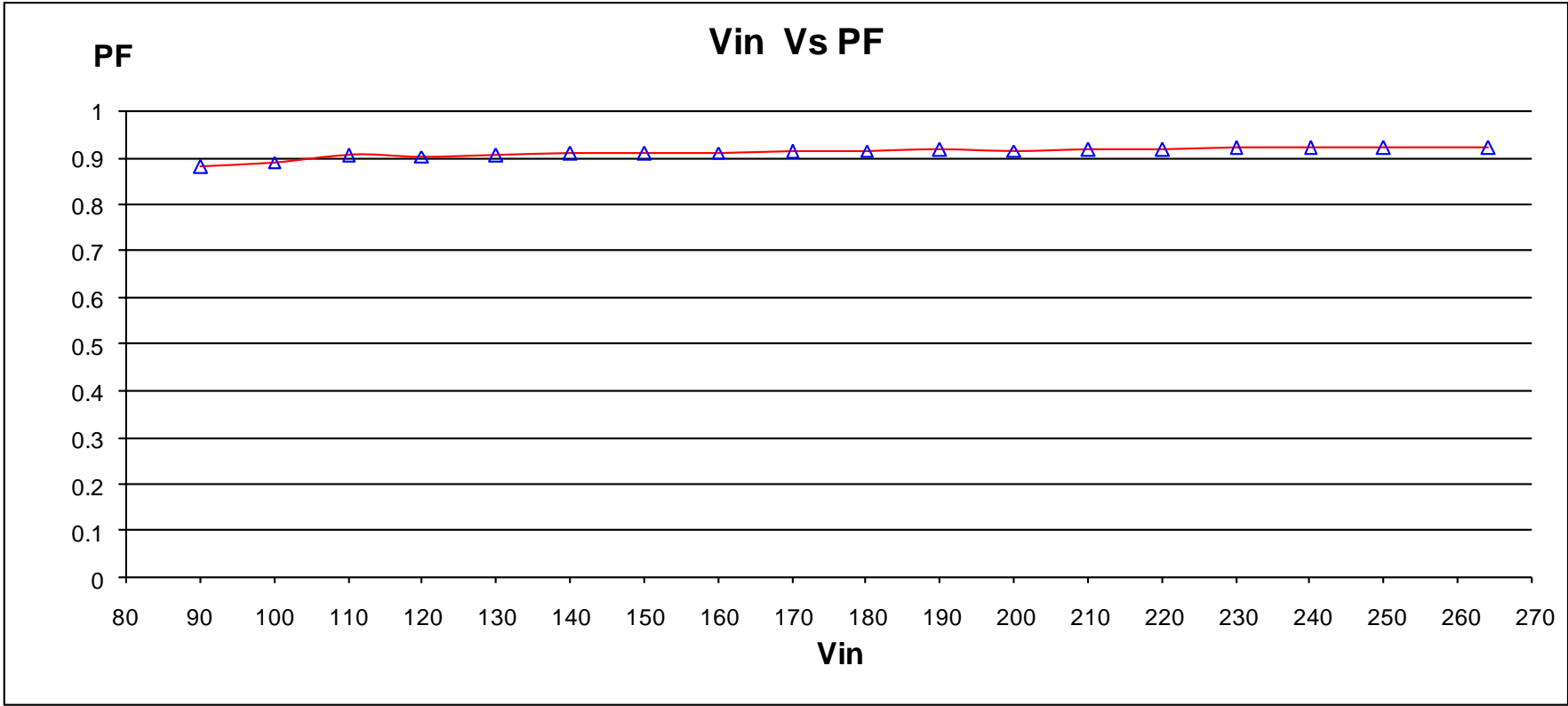
*** Note: Output voltage measured at end of PCB.**

8. Output VI Characteristics

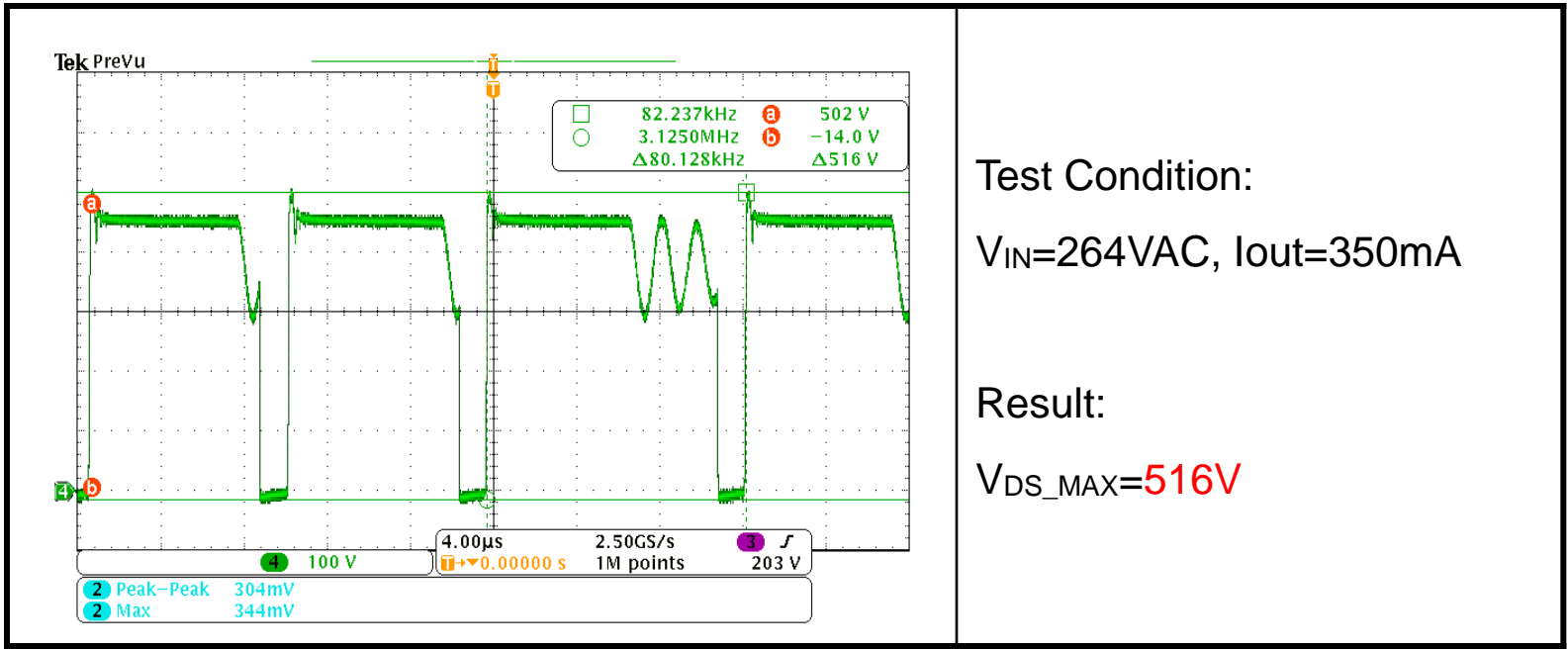
* Note: Output voltage measured at PCB end, $T_{AMB}=25\text{ }^{\circ}\text{C}$



9. Input voltage VS Power Fact curve

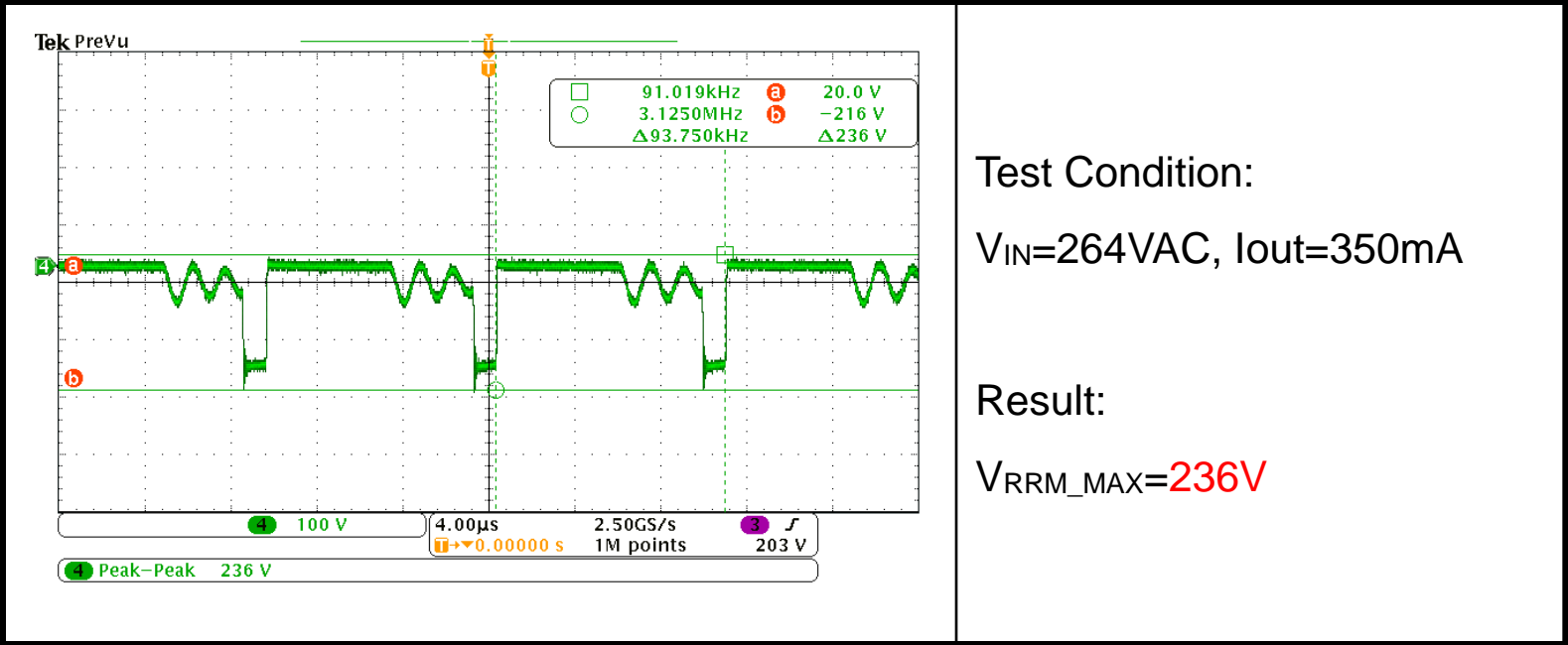


10. Q1 MOSFET V_{DS} waveform



Remark: Mosfet Spec__4A 600V

11. Output Diode Reverse Voltage



Remark: Mosfet Spec__2A 300V

12.PF and harmonic current_120Vac

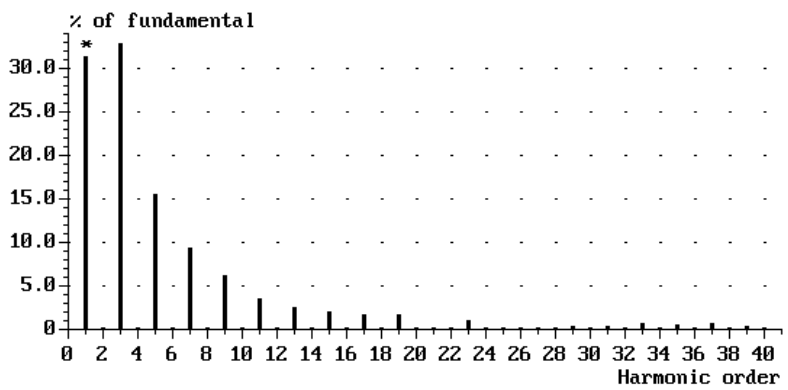


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Current Harmonics

Setup: CLASS_C Gen setting: 1(1) U : 114.80 V fu: 60.001 Hz
 Live Analysed periods: 4 I : 111.31 mA P: 11.69 W
 Module: M1 Limit: Class C (Standard) I1: 103.86 mA
 Note:
 THD=38.55 % (PF=0.915) PASSED
 P < 25 W



App1: DEFAULT (1212_04)

- Next measure
- Change to table
- Absolute current
- Log scale
- Write to disk

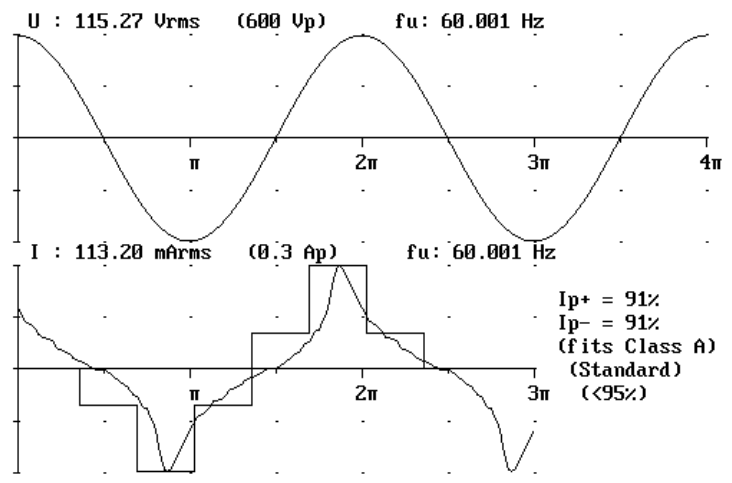


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Waveform M1

Note:



App1: DEFAULT (1611_03)

- Next measure
- Zoom Voltage
- Zoom Current
- Write to disk
- Data cursor



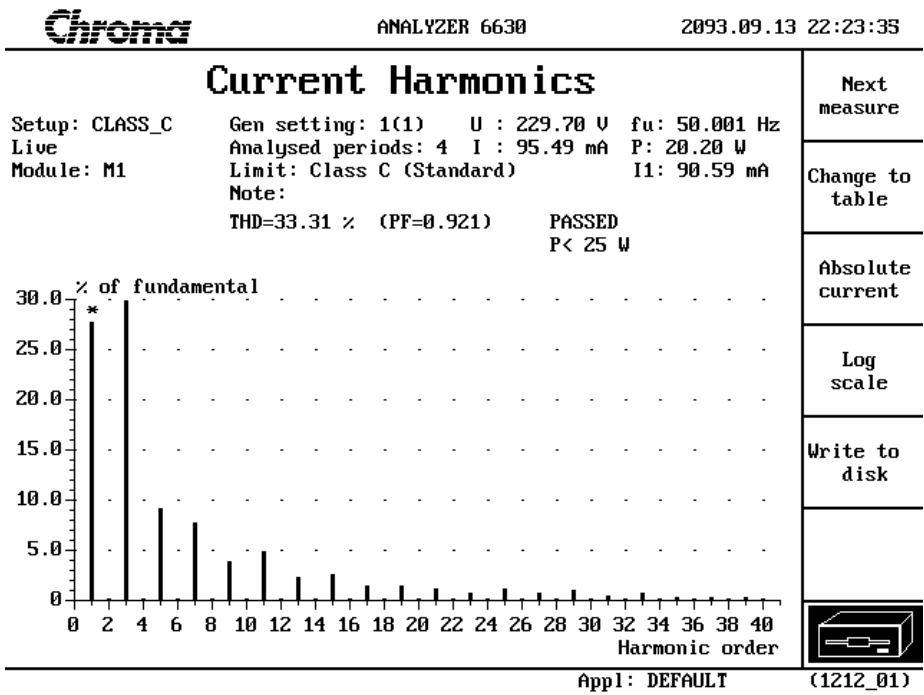
Harmonics current
 @ 115Vac

Meet IEC61000-3-2
 requirement

Ac current waveform
 @ 115Vac

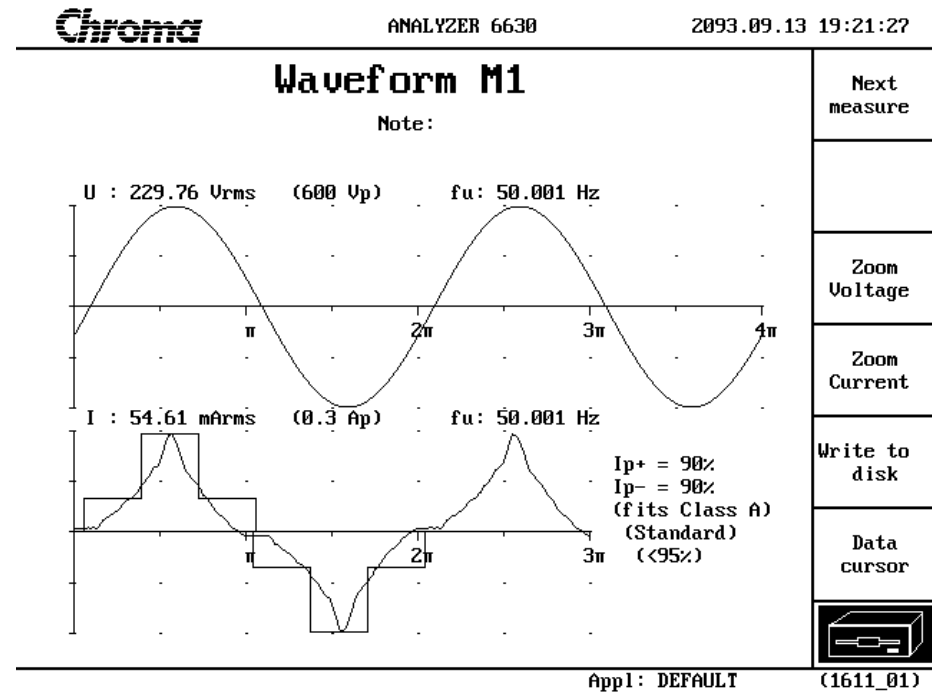
PF=0.915

13.PF and harmonic current 230Vac



Harmonics current
@230Vac

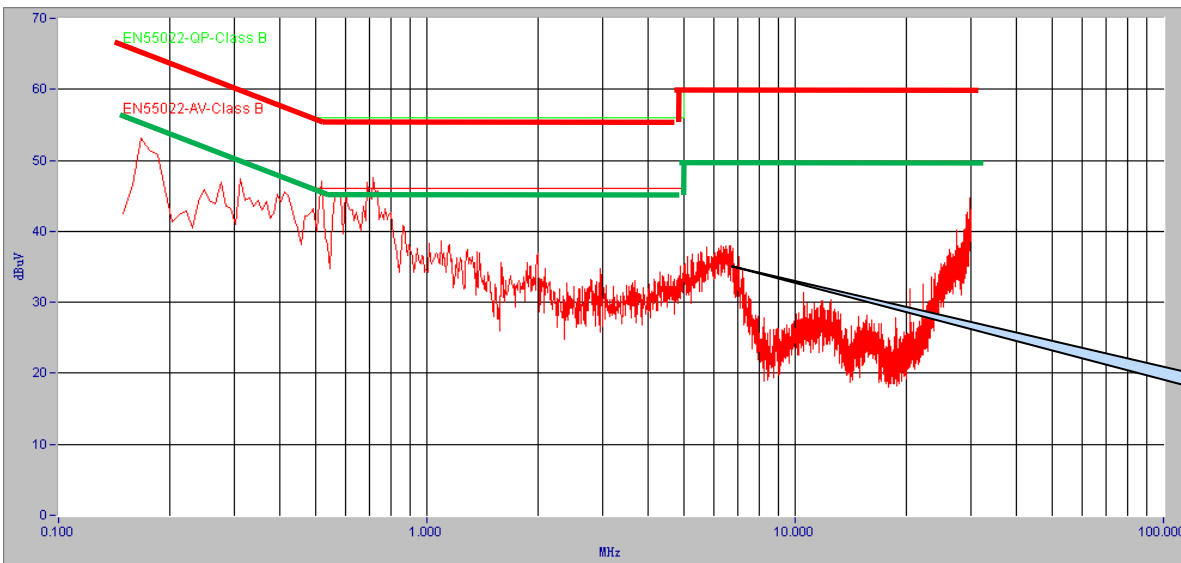
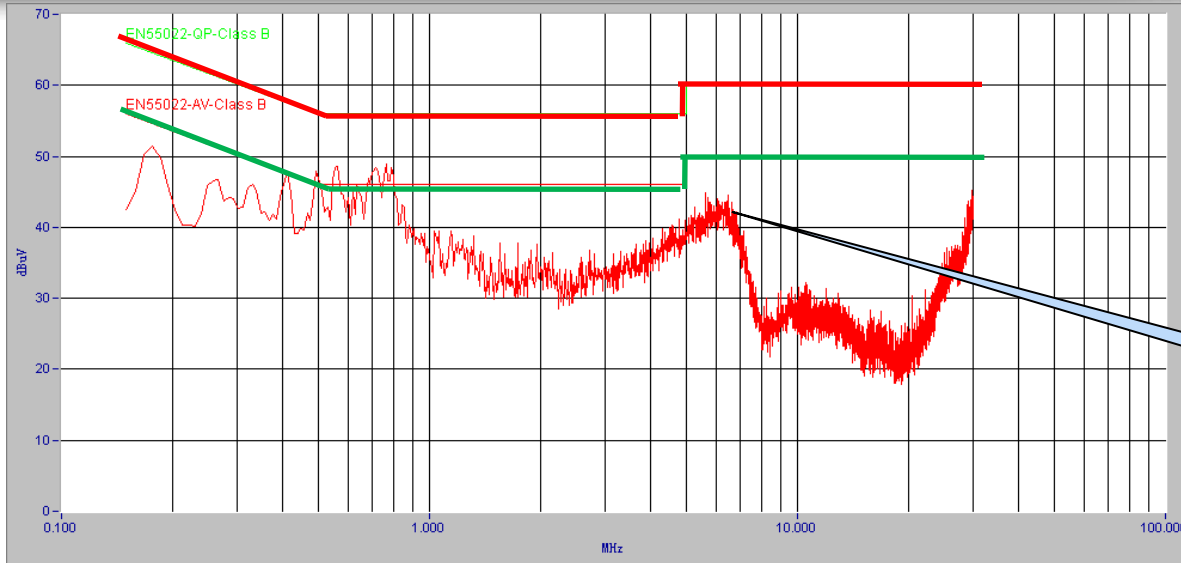
Meet IEC61000-3-2
requirement



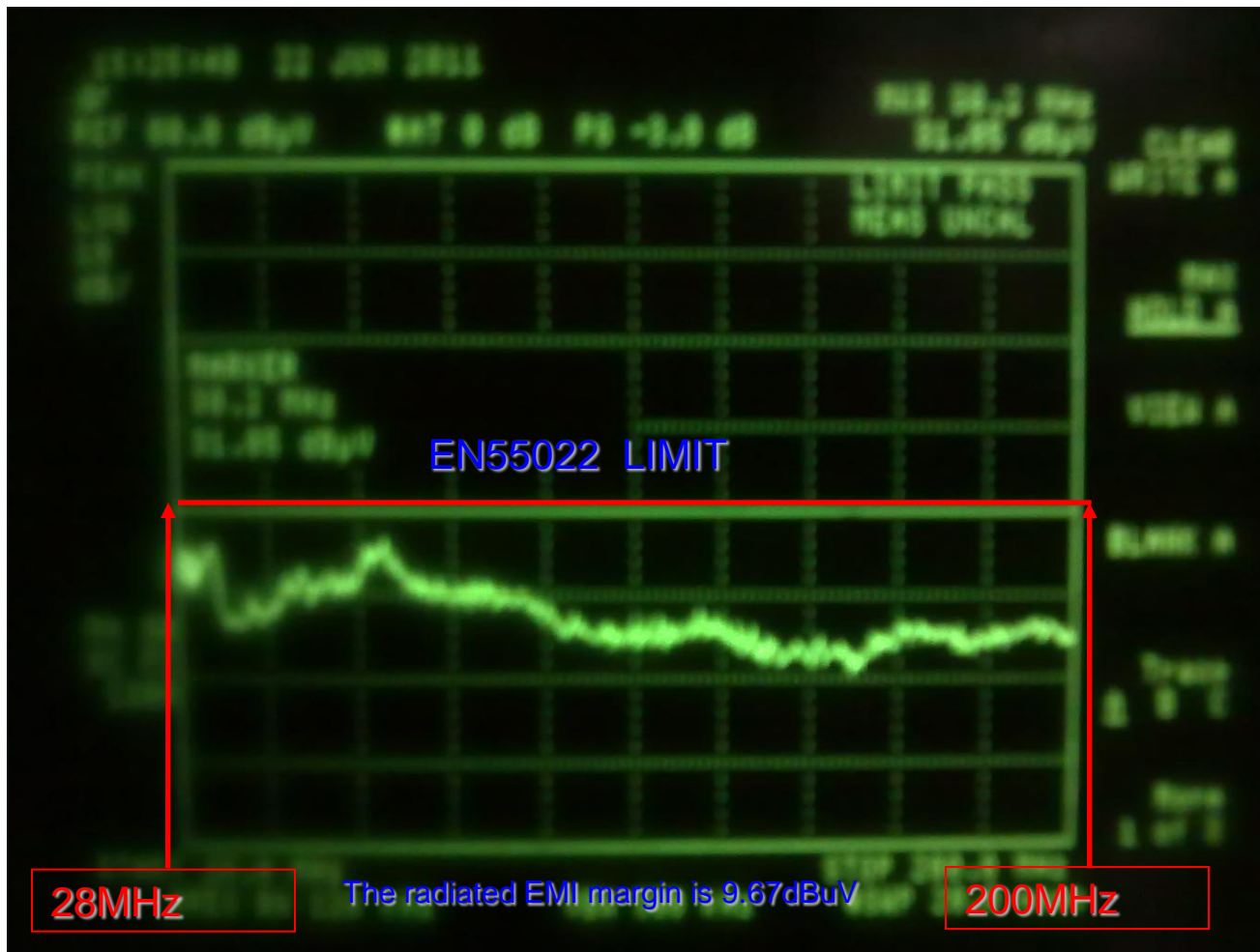
Ac current waveform
@230Vac

PF=0.921

14. Conducted EMI



15. Radiated IEM (for reference)



Note: 1, Vin=230Vac

2, Output is floating