iWatt
Intelligent AC-DC and LED Power™

LED Driver with iW1706-00

(Input 90V~264Vac Output 10V700mA)

General Design Specification:

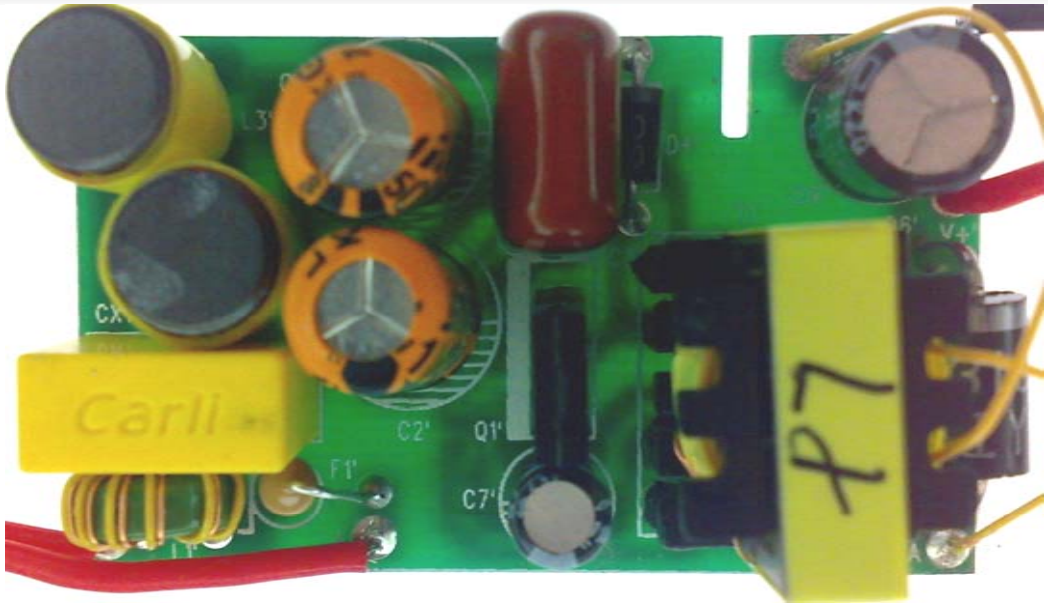
1. AC Input Range 90V-264Vac
2. DC Output 10V, 700mA(Constant Current)
3. Isolated High efficiency ,High PF

1. Specification

Description		Symbol	Min	Typ	Max	Units	Comment
Input							
Voltage		V_{IN}	90		264	V_{AC}	2 Wire
Frequency		f_{LINE}		72		KHz	
Open-load Input Power (264V_{AC})						W	
Output							
Const Voltage	Output Voltage	V_{OUT_CV}		10		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}		700		mA	
Total Output Power							
Continuous Output Power		P_{OUT}		7		W	
Over Current Protection		I_{OUT_MAX}				A	Auto-restart
Efficiency		η		81		%	Measured at end of PCB@230
Power Fact		*PF*		0.87			Harmonic meet IEC61000-3-2
Turn on Delay Time						Sec	
Conducted EMI				Meets EN55015B			
Hi-pot test						KV	
Operation temperature		T_{opr}		40		° C	Free convection, sea level

2. PCB Layout

AC
Input



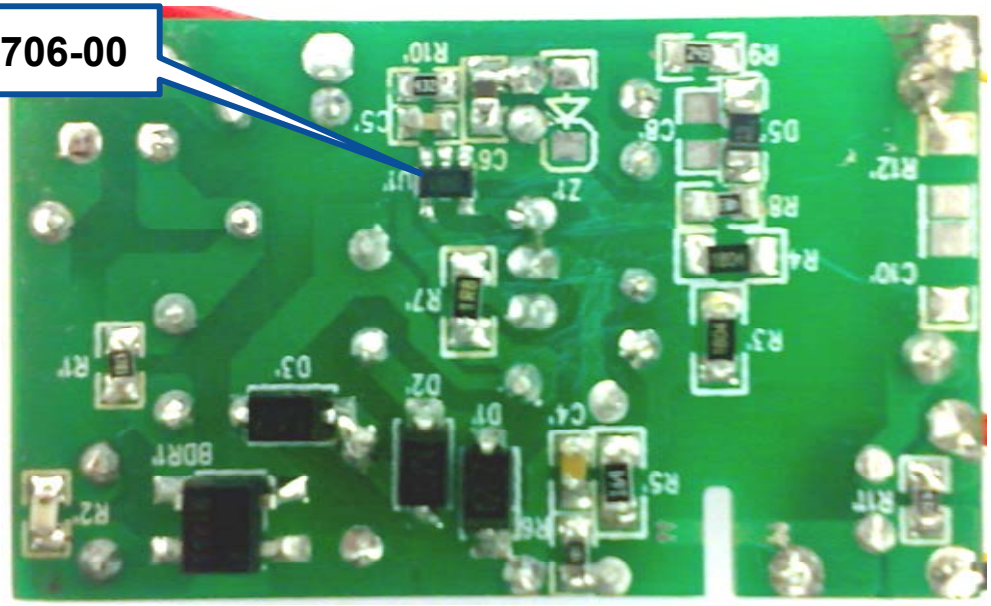
DC
output

To LED

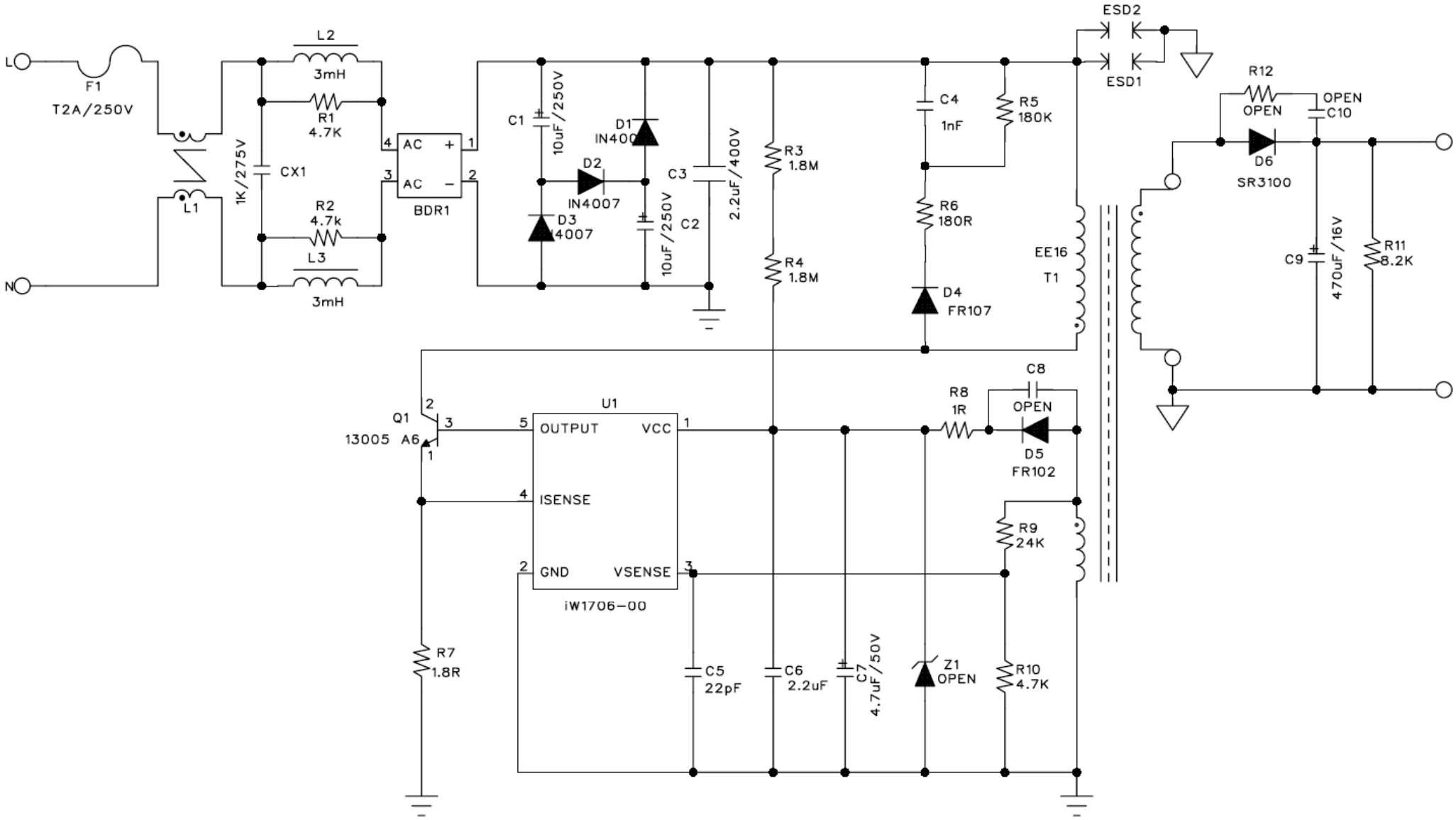
Primary

Secondary

iW1706-00



3. Schematics

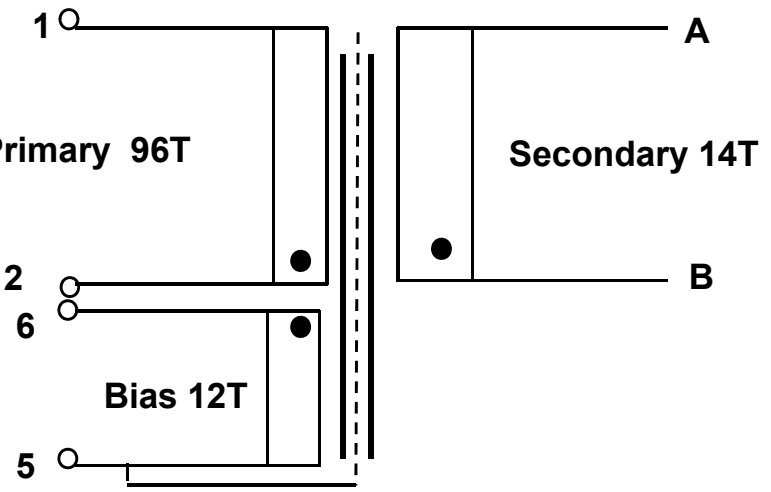


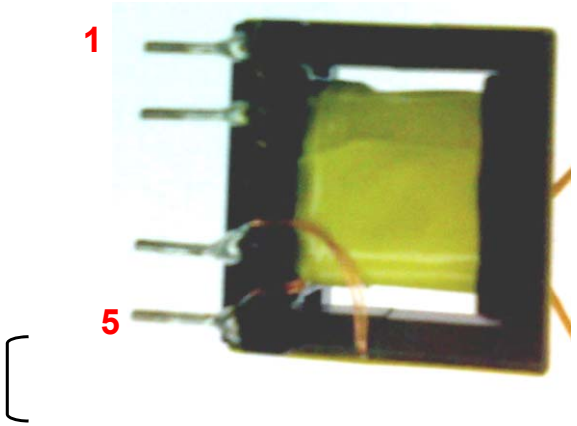
4. Bill of Material

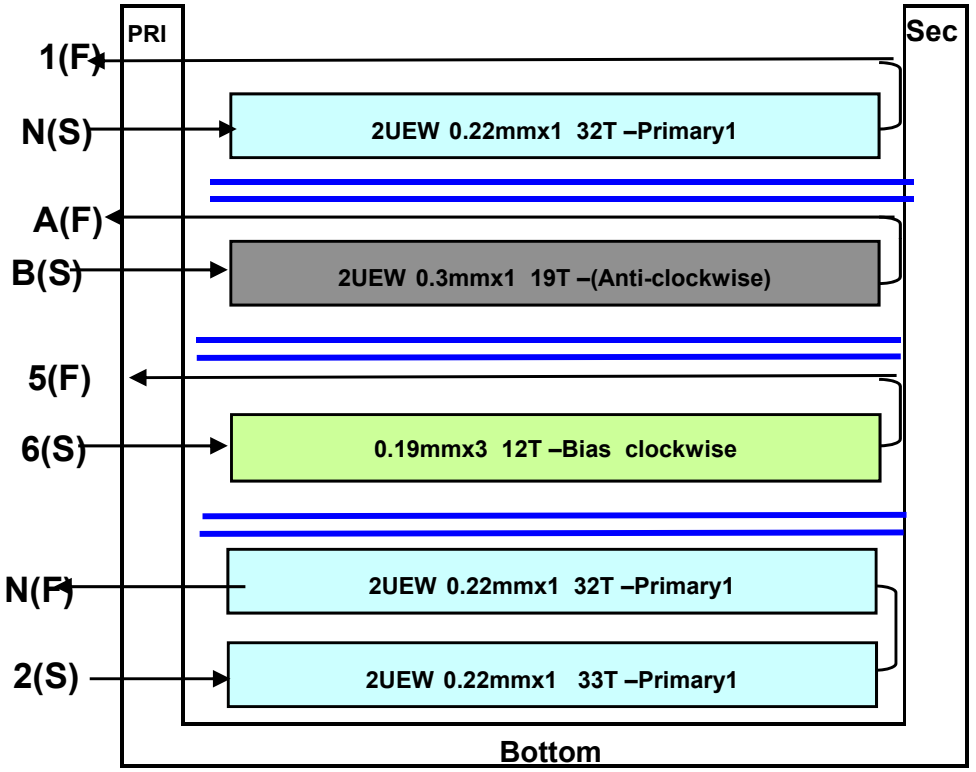
Item	Qty.	Ref.	Description	Cost (US Cent) / unit	Sub-Total (Cent)
1	1	U1	iW1706, Off-line digital PWM Controller, SOT-23		
2	1	C1,C2	10uF, 250V, E-CAP, 105'C		
3	1	C3	2.2uF, 400V,CBB		
4	1	C4	1nF/25V, SMD-0805		
5	1	C5	22pF/25V, SMD-0805		
6		C6	2.2uF100V, SMD-0805		
7	1	C7	4.7uF/50V		
8	1	BR1	MB8S		
9	1	D1,D2,D3	IN4007		
10	1	D4,D5	FR107,1A/1000V		
11		D6	SR3100		
12	1	R1,R2	4.7KΩ±5％, SMD-0805		
13	2	R3,R4	1.8MΩ,±5％, SMD-1206		
14	1	C9	470uF/16V,E-CAP,105'C		
15	1	R6	180Ω±1％, SMD-0805		
16	1	R9	24KΩ±1％, SMD-0805		
17	1	R10	4.7KΩ±1％, SMD-0805		
18	1	R11	8.2KΩ ±5％, SMD-0805		
19	1	R8	1Ω,±5％, SMD-0805		
20	1	R7	1.8Ω,±5％, SMD-1206		
21	1	FR1	1A250V		
22	1	Q1	13005 A6		
23	1	Z1/C8/R12/C10	OPEN		

5. Transformer Design

SCHEMATIC







ELECTRICAL SPECIFICATIONS:

1. Primary Inductance (Lp) = 800uH @10KHz
2. Primary Leakage Inductance (Lk)≤ 50uH@10KHz

MATERIALS:

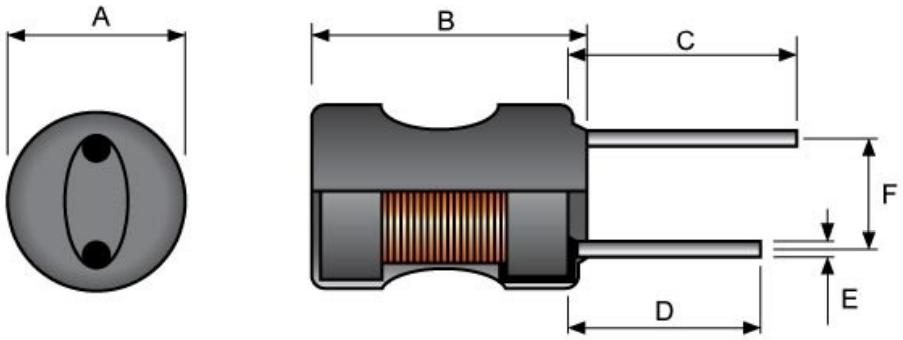
1. Core : EE16 (Ferrite Material TDK PC40 or equivalent)
2. Bobbin : EE16
3. Magnet Wires (Pri) : Type 2-UEW
4. Magnet Wire (Sec) : Triple Insulated Wires
5. Layer Insulation Tape :3M1298 or equivalent.

FINISHED :

1. Cut remained of Pin6.7.8.9.10after wires termination
2. Varnish the complete assembly
3. Core is connected to primary pin5

6.Differential Mode Inductor

6.1 Differential Mode Inductor_L1,L2



Ferrite core size : AxB 8x10mm

Wire gauge: 0.18mm, 300Turns

Inductance @10kHz, 1V: 3mH +/-20%

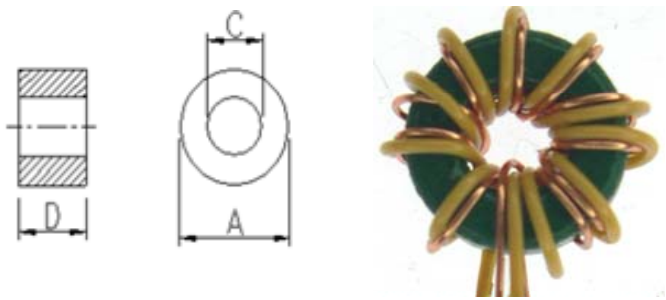
ICR: 1.5OHM +/-20%

7. Common Mode Inductor L1

Properties of B&F Ferrite - Nickel Zinc (Ni-Zn)

Material	μi	Bms(Gs)	Hc(Oe)	Br(Gs)	Tc(℃)	ρ(Ω-cm)	Frequency (MHz)	α ur x 10^{-6}/℃
B29	800	2900	0.30	1420	150	$1*10^{7}$	0.1~0.7	25~45

EMI Toroidal Core (T Type)



Dimensions 尺寸 (mm)

Core Size \ Conf.	A	D	C	Fig
T 8.0x4.0x3.0	8.0±0.3	4.0±0.3	3.0±0.2	1,2,3

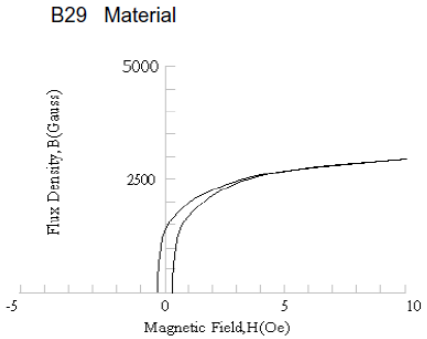
Ferrite core : Ni -Zn T8*4*3

Wire gauge: 0.45mm, 6Turns

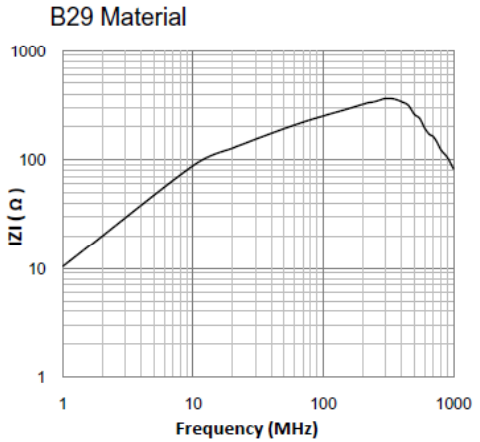
Inductance @10kHz, 1V: 14uH +/-10%

DCR: 0.1 OHM +/-20%

Saturation Flux Density (Ni-Zn)



Impedance Vs Frequency Curve (Ni-Zn)



B.F.

Contacts Information

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Email Address : bf@bnf.com.hk
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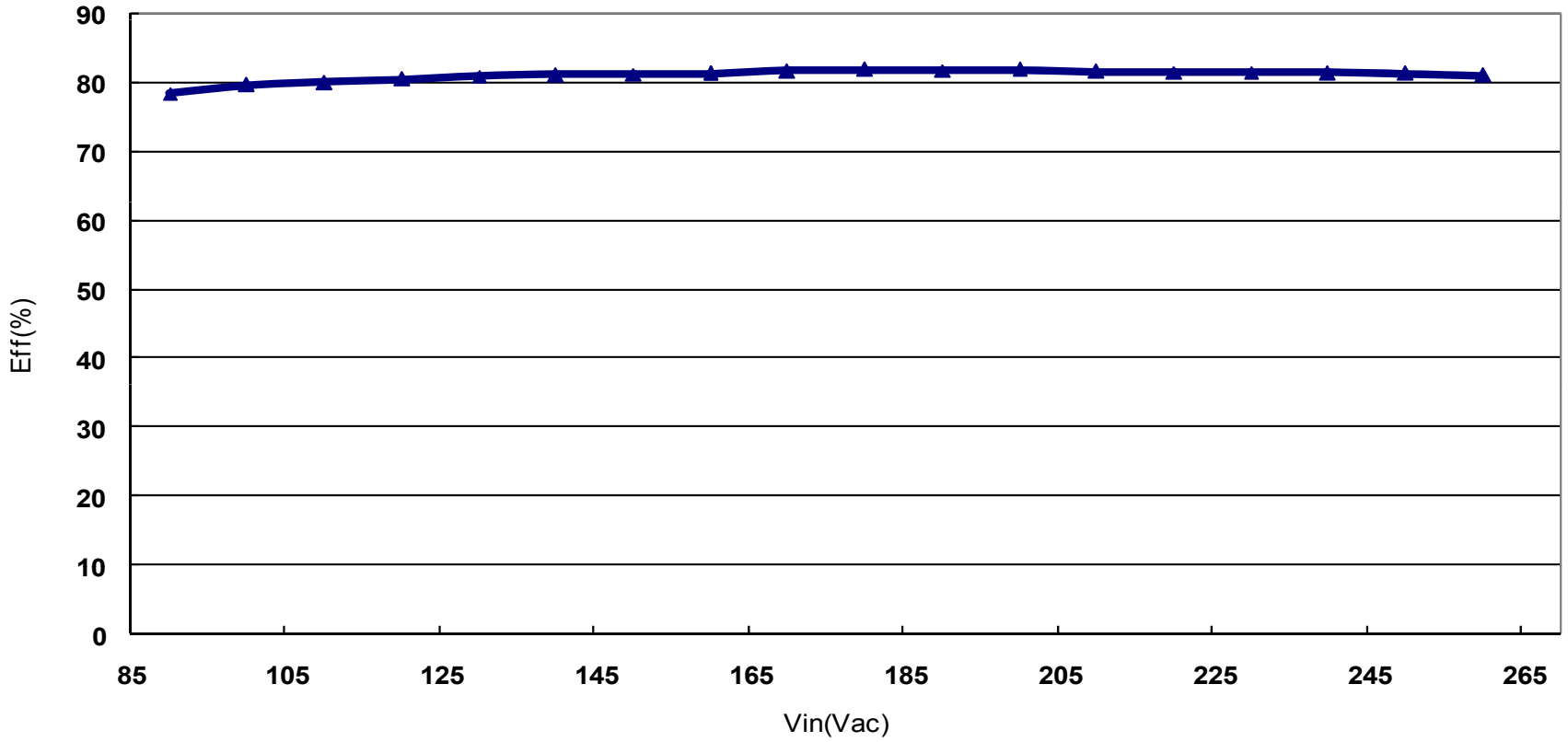
8.Constant Current and Efficiency

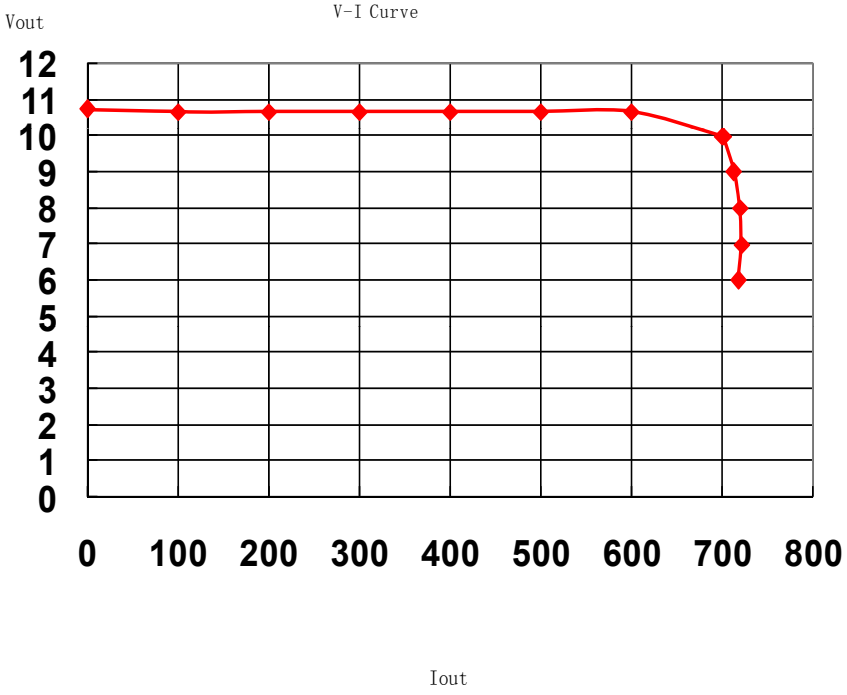
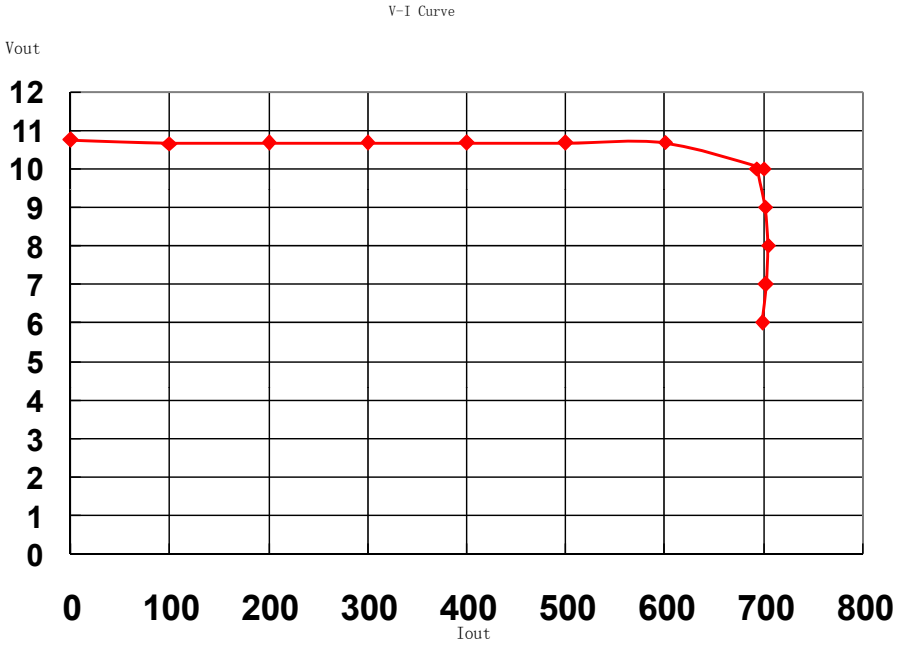
Note: Output voltage measured at end of PCB.



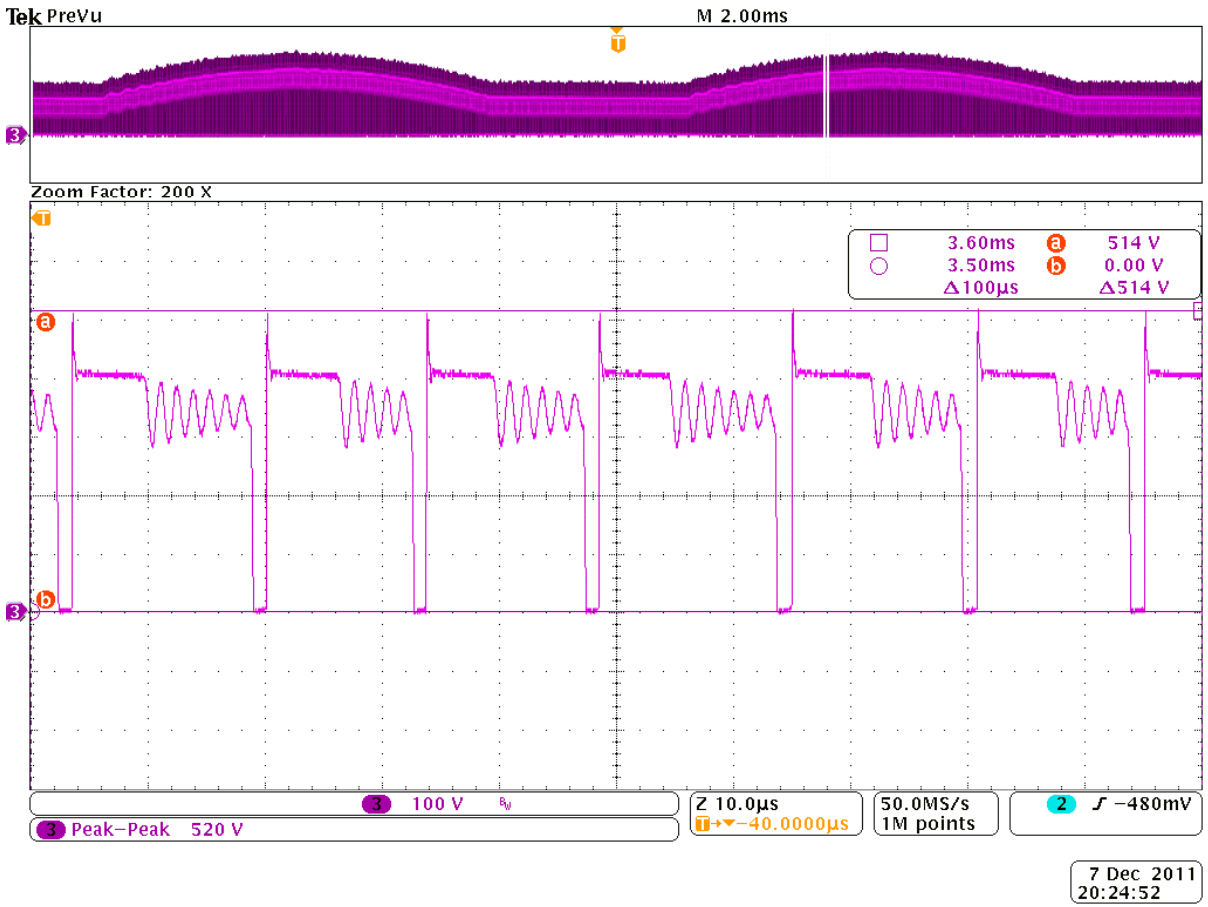
Vin	90	100	110	120	130	140	150	160	170
PF	0.864	0.869	0.871	0.871	0.867	0.862	0.858	0.85	0.843
Vin	180	190	200	210	220	230	240	250	260
Eff	0.834	0.822	0.812	0.8	0.792	0.782	0.773	0.767	0.756

9. Output VI Characteristics

*** Note: Output voltage measured at PCB end, T_{AMB}=25 ℃**

V_{IN}=100V_{ac}, T_{AMB}=25℃	V_{IN}=230V_{ac}, T_{AMB}=25℃
	

10. Vds



Test Condition:

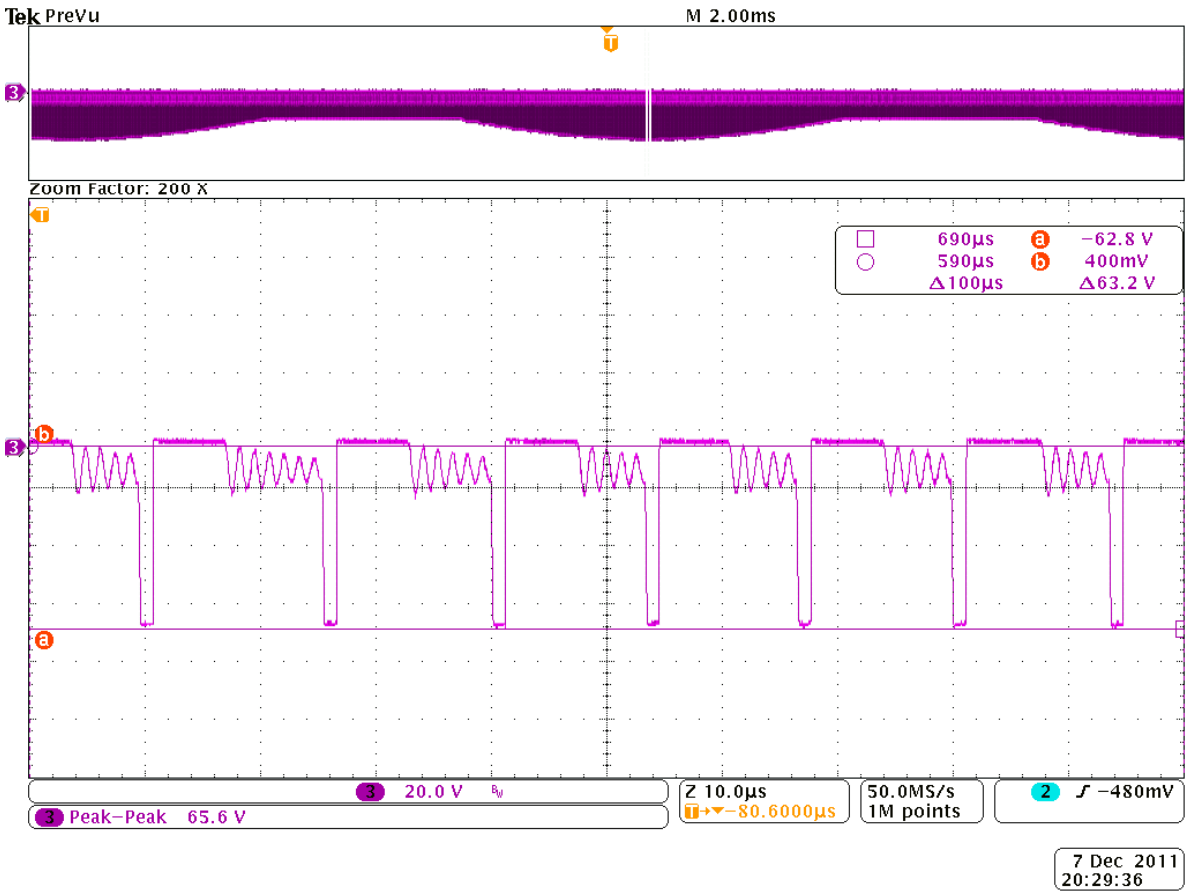
Vin=260Vac, CV10V load

Result:

V_{DS_MAX}=**514**V

Q1use13005

11. V_R waveform



Test Condition:

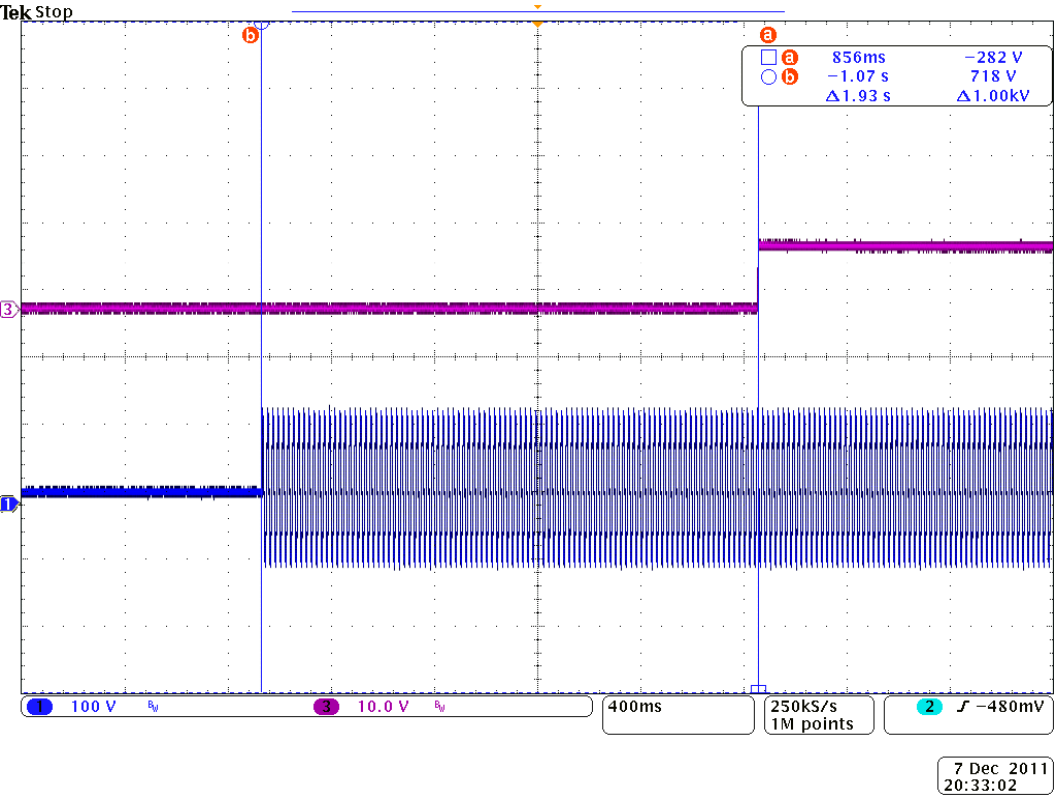
V_{IN}=260VAC, CV10V load

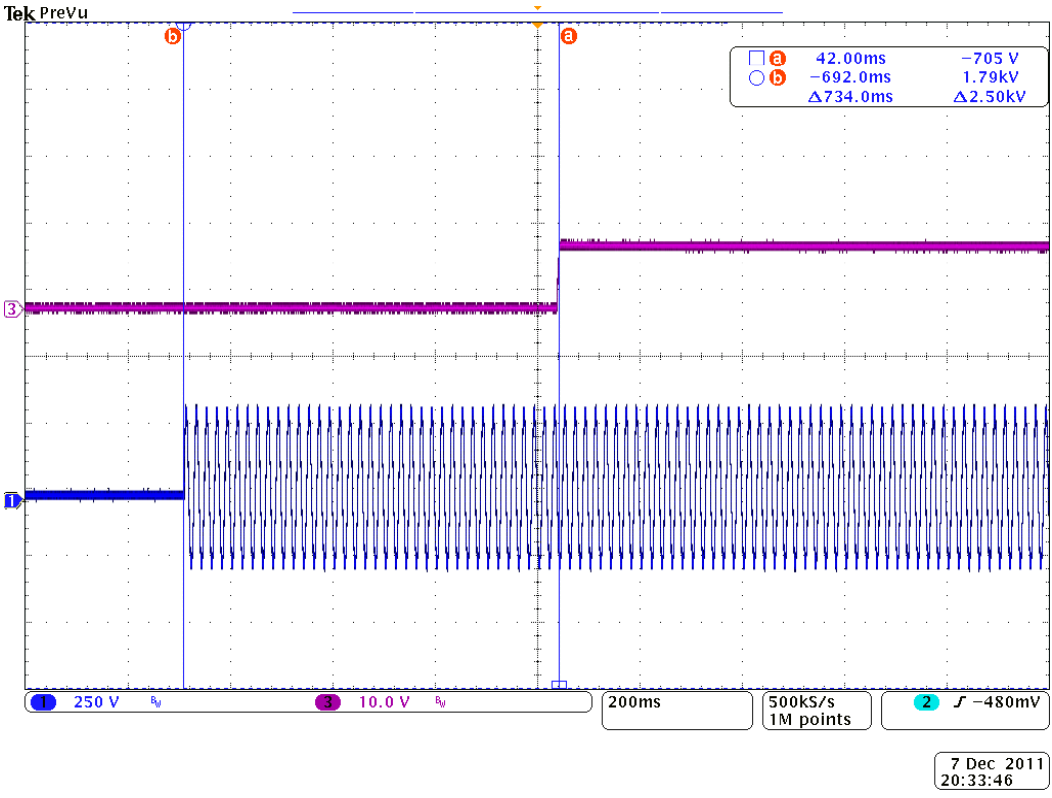
Result:

$V_{R\ (pk—pk)}$=**63.2**V

Output rectifier diode: SR3100(3A 100V)

12. Start up and turn on delay time





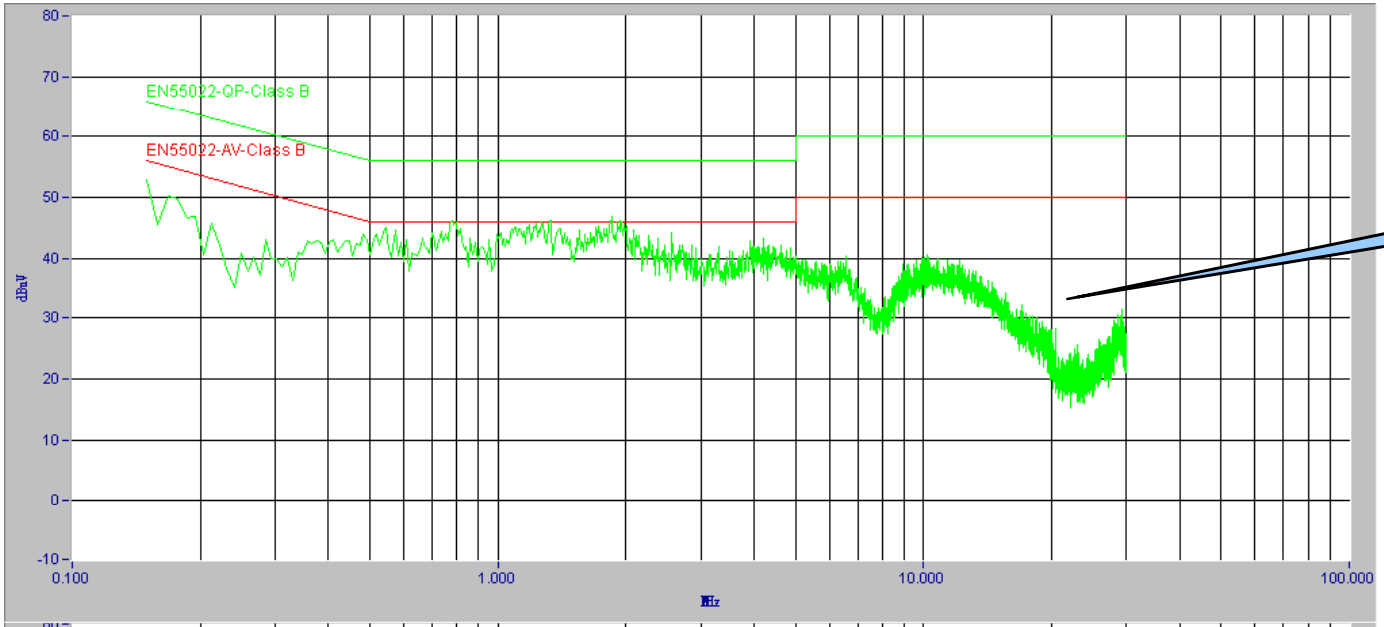
90V_{AC}, Full Load

T_{ST_DELAY}= 1.93S

230V_{AC}, Full Load

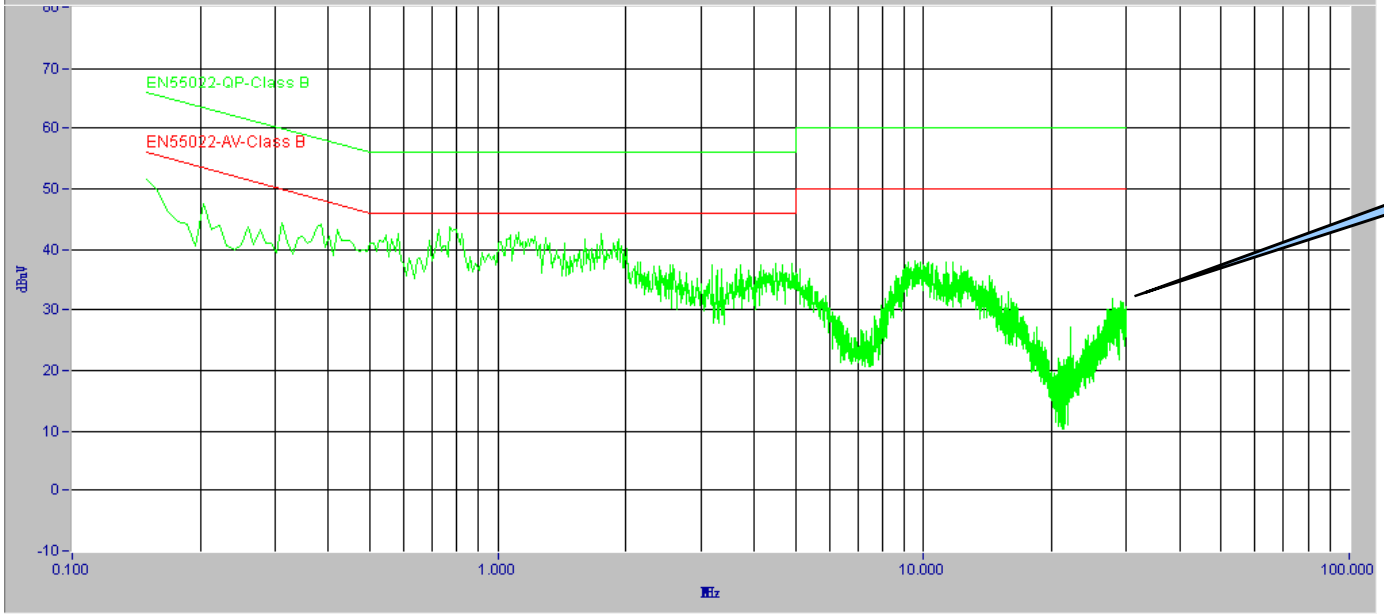
T_{ST_DELAY}= 734mS

13. Conducted EMI (Full Load)



PK Scan
PK Limit line

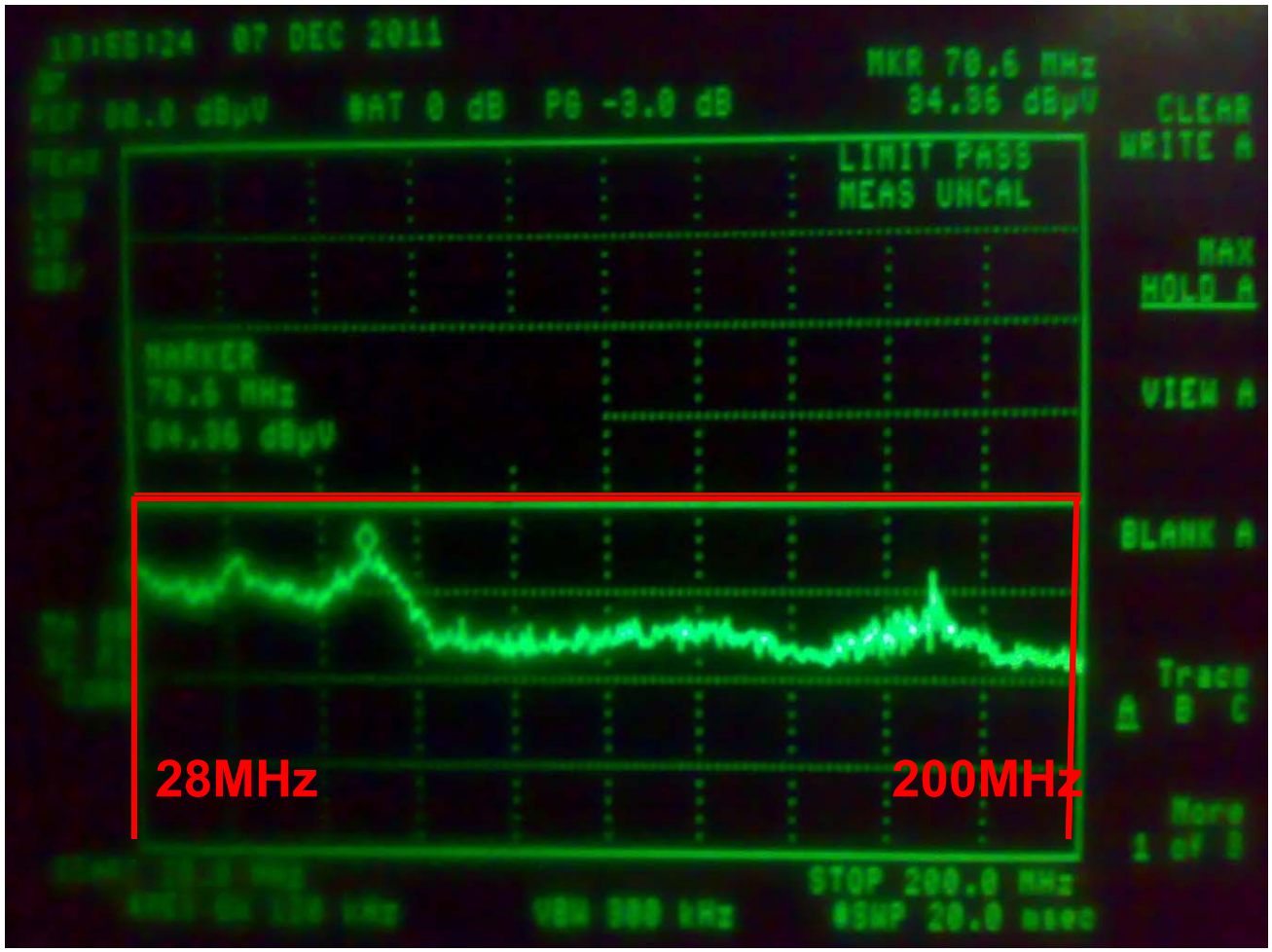
Input=230VAC
L line PK scan



PK Scan
PK Limit line

Input=230VAC
N line PK scan

14. Radiated EMI (Input 230Vac)



Input 230vac 50Hz