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AP3105NA For 12V 3.0A charge Solution

General Design Specification:

Ø AC Input Range 90-264Vac

Ø DC Output 12V, 3.0A

Ø Meet “<300mW” No-Load standby Power Consumption Requirement

Ø Meet “EPA_2.0” Requirement

Key Performance



Item	Spec	Test Conditions	Test Data	Result
Output Voltage	11.4~12.6V	90~264Vac @ 0~3.0A	12.156~12.206V	Pass
Ripple	<120mVp-p	90~264Vac @ 0~3.0A	48.3~100.2mVp-p	Pass
Standby Power	<300mW	230Vac @ 0A	182mW	Pass
EMC	EN55022B	115Vac 230Vac@ 3.0A	>8dB	Pass

Specification



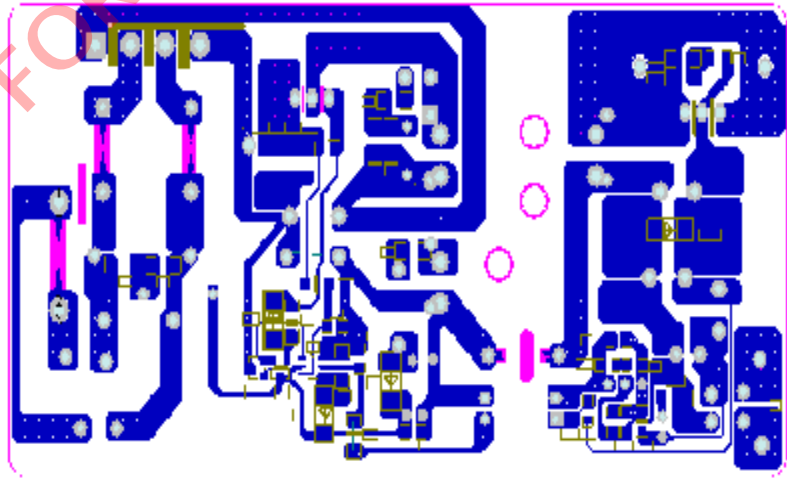
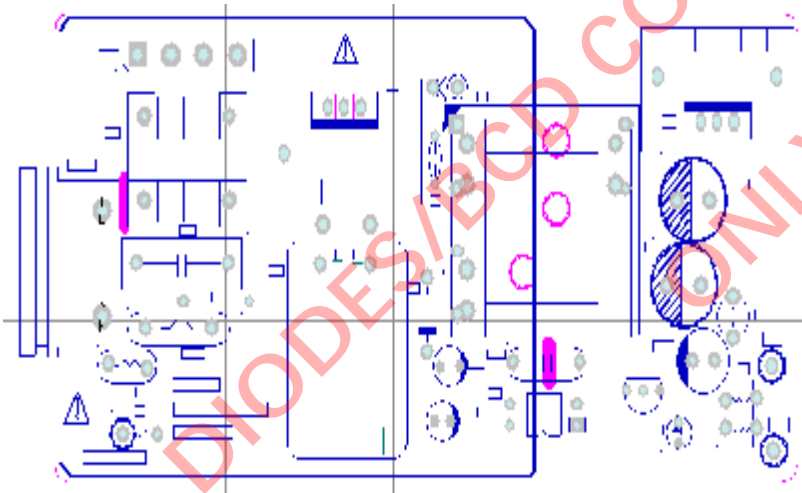
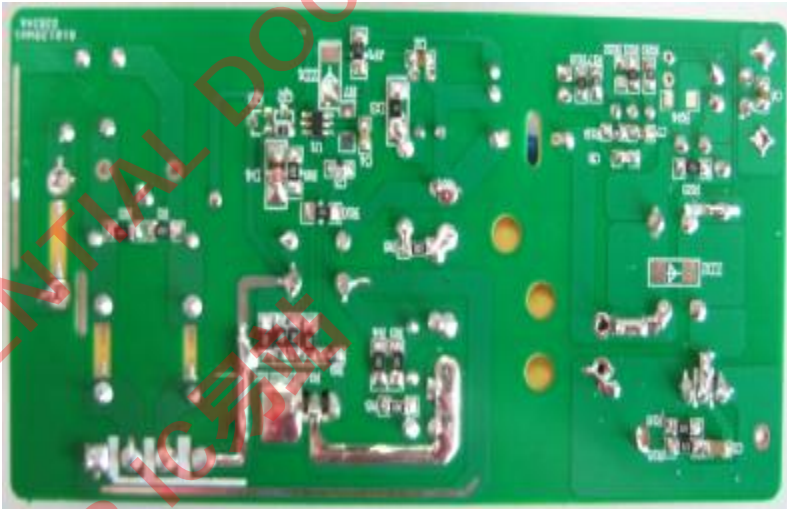
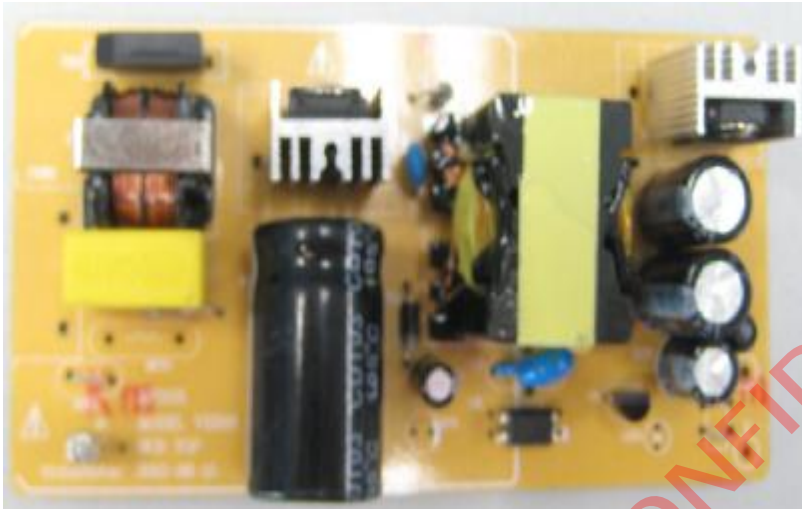
Description	Min	Type	Max	Units	Conditions
Input					
Voltage	90		264	VAC	
Frequency	47	50/60	63	Hz	
No-Load Input Power (230Vac)			300	mW	
Output					
Output Voltage	11.4	12	12.6	V	
Output Current	0		3.0	A	
Output Power		36		W	
Output Ripple Voltage			120	mVp-p	I _{out} = 1.5A @ 25°C, 20MHz bandwidth
Output Over Current Protection	3.0		6.0		Hiccup, Auto Restart
Ambient Temperature			40	°C	
Efficiency					
Average Efficiency (EPS 2.0)				84.63%	Measured at end of output DC-Cable, 115Vac & 230Vac @ 25°C
EMI	Pass EN55022 Class B with 8dB Margin				

Test Equipment

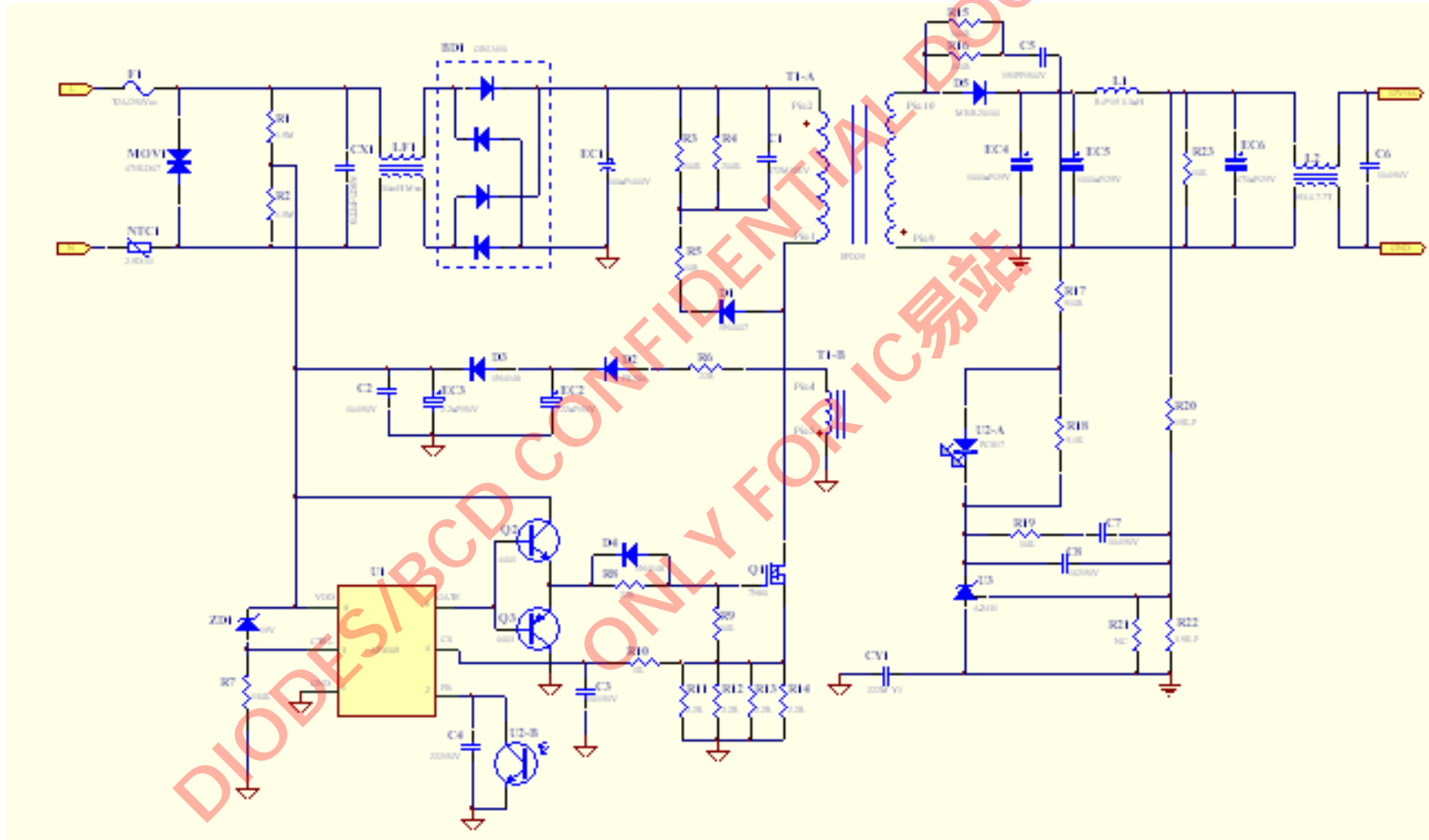


Item	Model
AC Source	Chroma 61602
Power Meter	YOKOGAWA WT210
Electronic Load	Chroma 63100
Oscilloscope	YOKOGAWA DLM2024 2.5GS/s 200MHz
Digit Multimeter	Agilent 34410A
Data Acquisition	Agilent 34970A

PCB Layout



Schematic Circuit

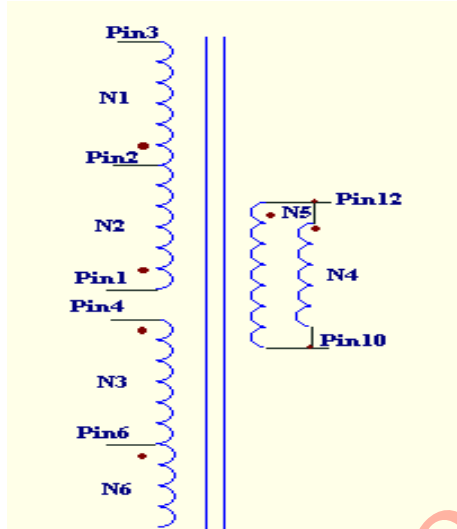


Bill Of Material



NO.	Spec.	Position	NO.	Spec.	Position
1	100nF/50V ±15% 0805X7R	C3	22	TL431 TO-92A	U3
2	2200PF/50V ±15% 0805 X7R	C4	23	1N4007 1A 1000V DO-41	D1
3	0.1uF/50V ±10% 0805 X7R	C2,C6,C7	24	FR107	D2
4	150PF/500V ±15% 0805 X7R	C5	25	1N4148	D4
5	1000PF/50V ±15% 0805 X7R	C8	26	MBR20100	D5
6	1.5MΩ ±5% 1206 1/4W	R1,R2	27	桥堆GBU410 DIP	BD1
7	200KΩ ±5% 1206 1/4W	R3,R4	28	MOS 7N60 TO-220A	Q1
8	10Ω ±5% 1206 1/4W	R5	29	JUMP	NTC1
9	22Ω ±5% 1206 1/4W	R6,R8,R15,R16	30	0.22uF250V	CX1
10	10KΩ ±5% 0805 1/8W	R9,R19	31	222M	CY1
11	1KΩ ±5% 1206 1/4W	R10	32	100uF/400V EC18*26 Electrolytic	EC1
12	2.2Ω±5% 1206 1/4W	R11,R12,R13,R14	33	10uF 50V 5*10mm Electrolytic	EC2
13	510Ω ±1% 0805 1/8W	R17	34	1000uF 25V 10*12mm Electrolytic	EC4 ,EC5
14	5.1KΩ ±1% 0805 1/8W	R18	35	470uF 25V 8*12mm Electrolytic	EC6
15	15KΩ ±1% 0805 1/8W	R20	36	JUMP	JW1,JW2
16	3.9KΩ ±1% 0805 1/8W	R21	37	PQ2620	T1
17	10KΩ ±2% 0805 1/8W	R23	38	30mH	LF1
18	0Ω ±5% 1206 1/4W	JP1,D3	39	3.3uH 4*15	L1
19	0Ω±5% 0603 1/10W	Q2-E	40	JUMP	L2
20	AP3105NA SOT23-6	U1	41	T2.0A/250	F1
21	光耦PC817/DIP4	U2	42	Heatsink1 (特制2.0mm厚的铝散热片)	HS1, HS2

Transformer Specification



骨架类型: PQ2620 6+6
电感L:1→3 750uH±7%

绕线顺序: N1-N4-N2-N5-N3-N6

WDG	TERMINAL	WIRE GAUGE	TURNS	TAPE	KEMARKS
N1	2→3	2UEW ϕ 0.35mm*2	17	2	密绕一层
N4	12→10	TEX-E ϕ 0.45mm*2	5	2	均绕一层
N2	1→2	2UEW ϕ 0.35mm*2	16	2	密绕一层
N5	12→10	TEX-E ϕ 0.45mm*2	5	2	均绕一层
N3	4→6	2UEW ϕ 0.27mm*1	6	2	均绕一层
N6	6→NC	2UEW ϕ 0.27mm*1	30	2	密绕一层

Regulation, Ripple, OCP and Efficiency



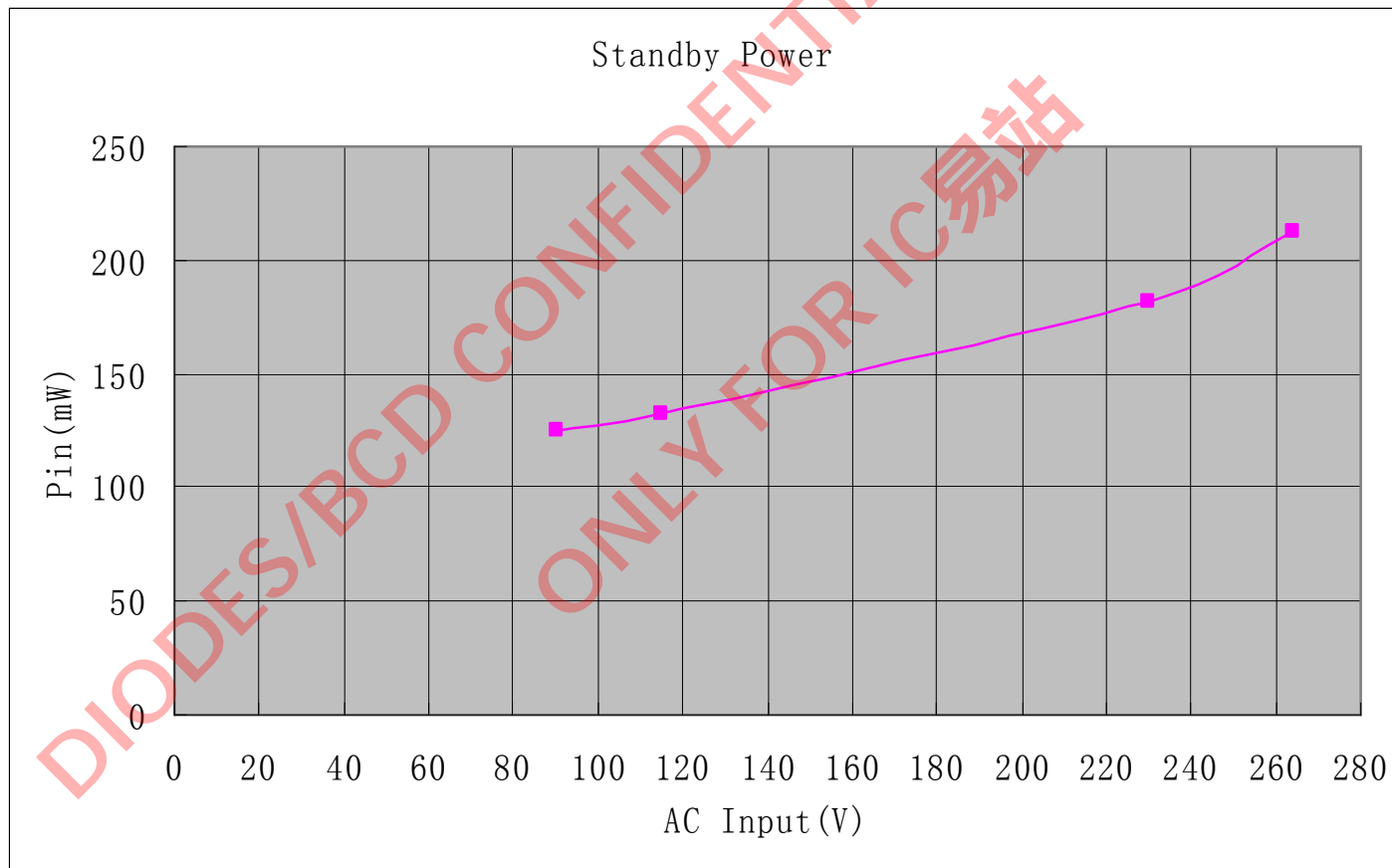
$V_{IN}(V)$	$P_{IN}(W)$	$V_{OUT}(V)$	$I_O(A)$	$P_{OUT}(W)$	η	OCP	Average η	SPEC.
115V/60Hz	10.44	12.189	0.7512	9.1564	87.70%	4.12	87.03%	84.63%
	20.89	12.178	1.5012	18.2816	87.51%			
	31.55	12.165	2.2506	27.3785	86.78%			
	42.35	12.154	3.0006	36.4693	86.11%			
230V/50Hz	10.54	12.188	0.7512	9.1556	86.87%	4.37	87.56%	
	20.78	12.180	1.5012	18.2846	87.99%			
	31.26	12.169	2.2506	27.3875	87.61%			
	41.56	12.156	3.0006	36.4753	87.77%			

* Note: Output Voltage measured at end of PCB

Standby Power



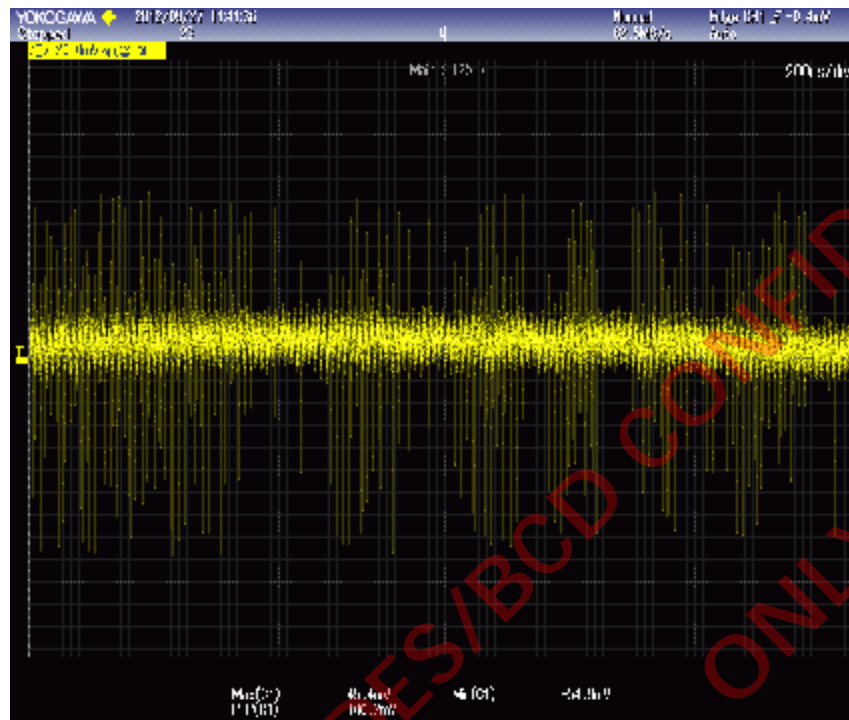
AC Input(V)	90	115	230	264
Standby Power(mW)	125	132	182	213



Output Ripple & Noise

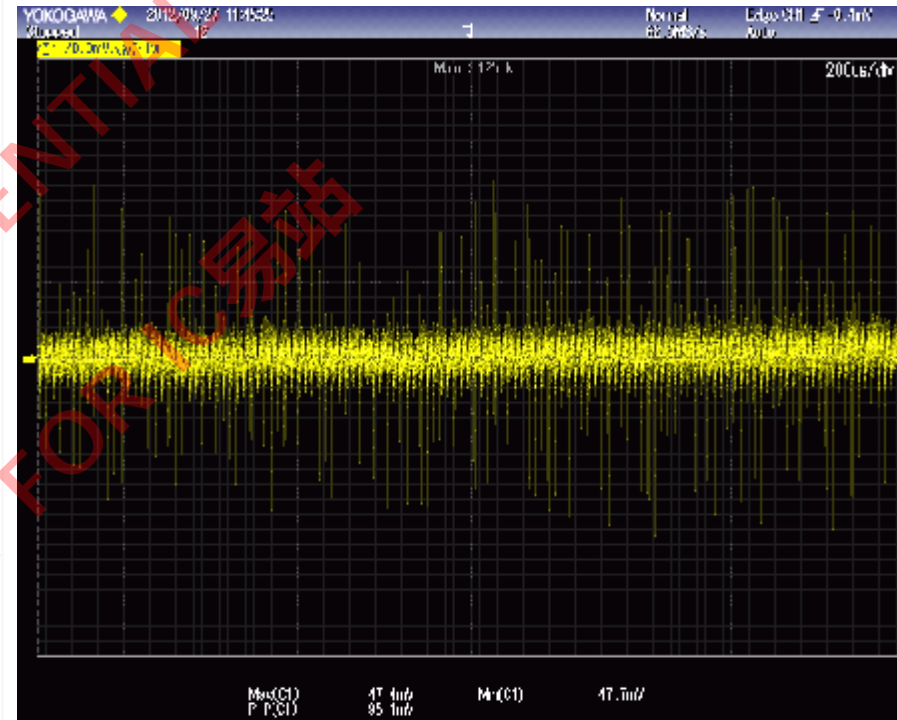


100Vac Full Load



100.2mV

240Vac Full Load

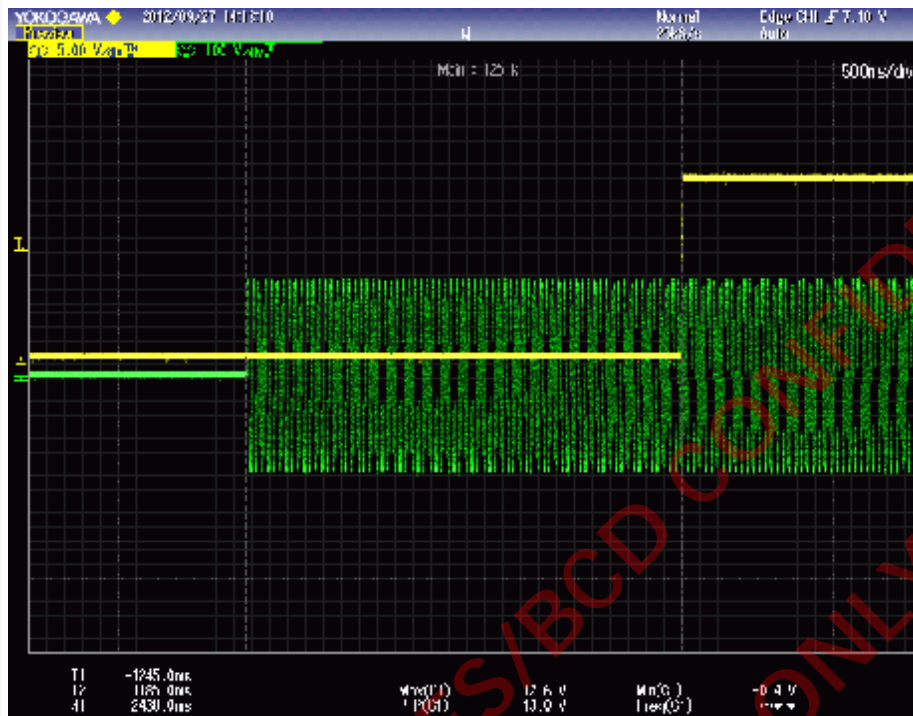


95.1mV

Turn On Delay Time and Hold up time

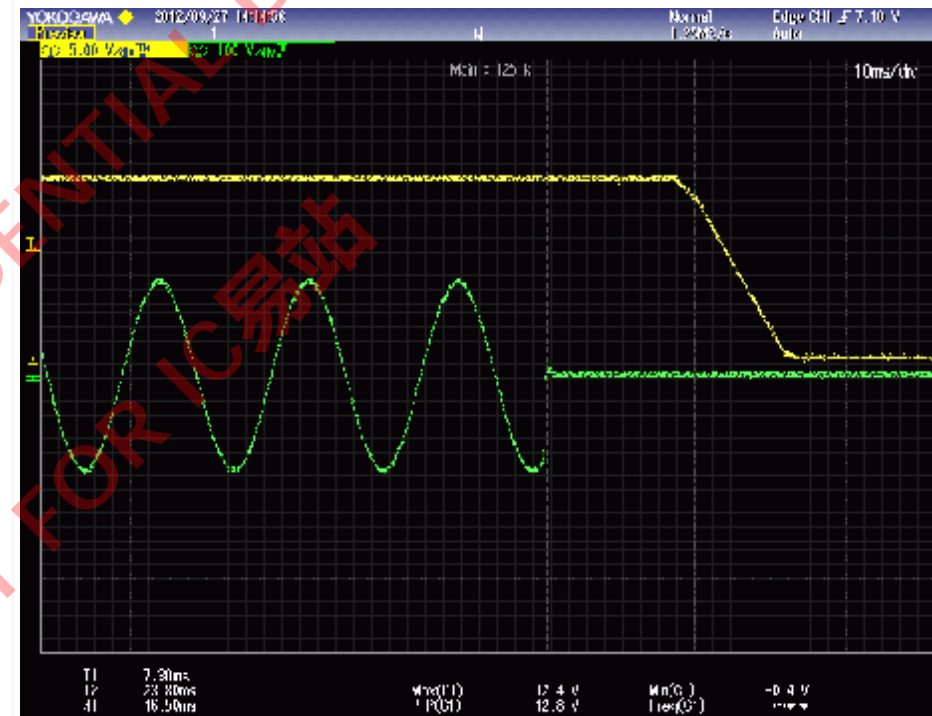


90Vac Full Load



$T_{DELAY}: 2.43S$

90Vac Full Load



$T_{Hold}: 16.5ms$

Output Rise Time



115Vac Full Load



Trise: 7.632mS

230Vac Full Load



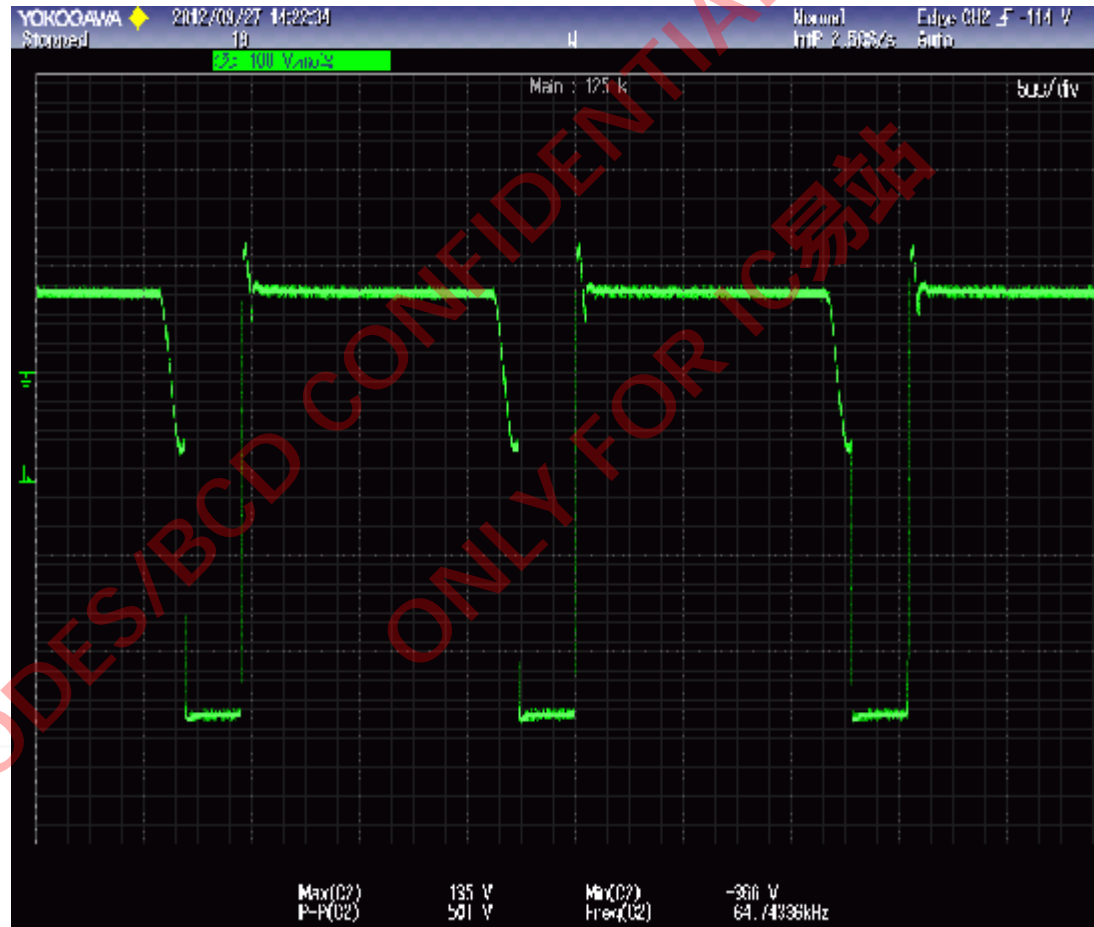
Trise: 5.648mS

BJT Voltage Stress



264Vac Full Load

Vce: 501V



Schottky Voltage Stress



264Vac Full Load

$V_{MAX}: 82.5V$



Radiation



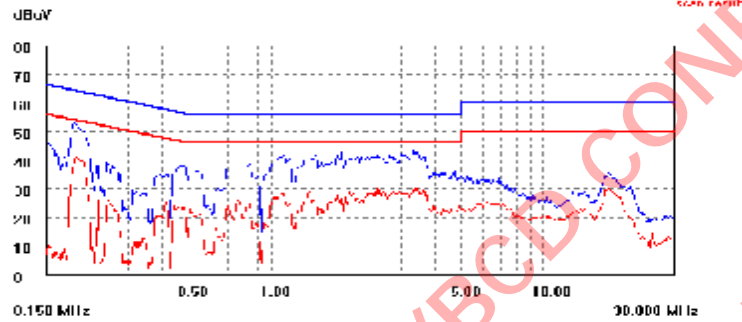
230Vac Full Load L

230Vac Full Load N

EMI TEST REPORT

Organization: BCD Operator: DJ EUT: 12V3A
 Place: BCD Time: 2011/7/27/13:55
 Detector: PK+AV Test-time(ms): 10
 Limit: EN55022B Transducer: PK1
 Remark: 1

Start(MHz)	End(MHz)	Step(MHz)
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025

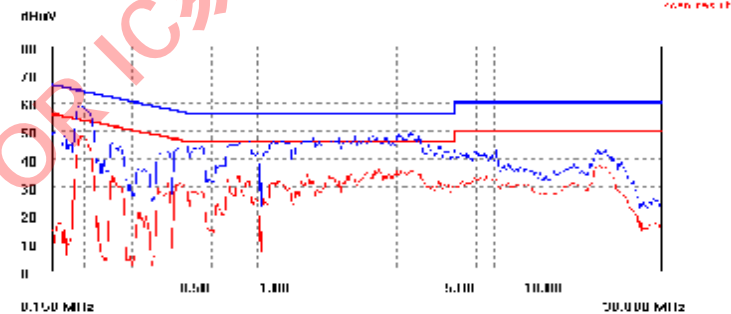


Margin: >8dB

EMI TEST REPORT

Organization: BCD Operator: DJ EUT: 12V3A
 Place: BCD Time: 2011/7/27/13:50
 Detector: PK+AV Test-time(ms): 10
 Limit: EN55022B Transducer: PK1
 Remark: 1

Start(MHz)	End(MHz)	Step(MHz)
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025



Margin: >8dB



Thank You!!!