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AP3771 For 12V 1A Adapter Test Report

General Design Specification:

Ø AC Input Range 90-264Vac

Ø DC Output 12V, 1A

Ø Meet “<100mW” No-Load standby Power Consumption Requirement

Ø Meet “EPA_2.0” Requirement

Key Performance



Item	Spec	Test Conditions	Test Data	Result
Output Voltage	11.4~12.60V	90~264Vac @ 0~1A	11.80~12.25V	Pass
Ripple	<200mVp-p	90~264Vac @ 0~1A	121mVp-p	Pass
Standby Power	<100mW	230Vac @ 0A	62mW	Pass
Dynamic	11.4~12.60V	90~264Vac @ 0.1~0.90~0.1A 5mS 0.1A/uS	11.5~12.24v	Pass
ESD	Air:8KV	115,230Vac @ 1A	Air:8KV	Pass
EMC	EN55022B	115Vac 230Vac@ 1A	-6dB	Pass

Specification



Description	Min	Type	Max	Units	Conditions
Input					
Voltage	90		264	VAC	
Frequency	47	50/60	63	Hz	
No-Load Input Power (230Vac)			100	mW	
Output					
Output Voltage	11.4	12.0	12.6	V	
Output Current	0		1	A	
Output Power		12		W	
Output Ripple Voltage			200	mVp-p	I _{out} =1A @ 25°C, 20MHzbandwidth
Output Over Current Protection	1		1.25		Hiccup, Auto Restart
Ambient Temperature			45	°C	
Efficiency					
Average Efficiency (EPS 2.0)	77.76			%	Measured at end of output DC-Cable, 115Vac &230Vac @ 25°C
EMI	Pass EN55022 Class B with 6dB Margin				

Test Equipment



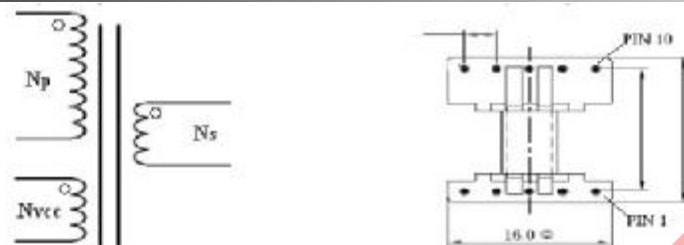
Item	Model
AC Source	Chroma 61602
Power Meter	YOKOGAWA WT210
Electronic Load	Chroma 63100
Oscilloscope	YOKOGAWA DLM2024 2.5GS/s 200MHz
Digit Multimeter	Agilent 34410A
Data Acquisition	Agilent 34970A

Bill Of Material



NO.	Spec.	position	NO.	Spec.	position
1	EE-19卧式	T1	18	FR107 1A 1000V DO-41	D6
2	EE8.3: 27mH共模电感	L1	19	SB5100 : 5A 100V DO-27	D7
3	220uH共模电感	L2	20	4N60 :4A 600V TO-220	Q1
4	200K Ω \pm 5% 1206 1/4W	R1, R2	21	AP3771B SOT23-6	U1
5	50 Ω \pm 5% 0805 1/6W	R3	22	10uF 400V 10*16mm Electrolytic	C1, C2
6	1.5M Ω \pm 5% 1206 1/4W	R4	23	680uF 16V 8*12mm Electrolytic(ESR@40K:27mohm)	C3,C4
7	2.2M Ω \pm 5% 1206 1/4W	R5	24	2200PF 1KV \pm 15% Ceramic	C5
8	1 Ω \pm 5% 0805 1/6W	R6	25	0.22UF/50V \pm 15% 0805 X7R Ceramic	C6
9	51 Ω \pm 5% 1206 1/4W	R7	26	4.7uF 50V 5*10mm Electrolytic	C7
10	39K Ω \pm 1% 0805 1/6W	R8	27	1nF/500V \pm 15% 1206 X7R Ceramic	C8
11	30K Ω \pm 1% 0805 1/6W	R9	28	1A 250V	F1
12	33K Ω \pm 1% 0805 1/6W	R10	29	100pF 250V	Y
13	4.1K Ω \pm 5% 0805 1/6W	R11	30		
14	1.1 Ω \pm 1% 1206 1/4W	R12, R13	31		
15	22 Ω \pm 5% 1206 1/4W	R14	32		
16	10K Ω \pm 5% 1206 1/4W	R15	33		
17	1N4007 1A 1000V DO-41	D1, D2, D3, D4, D6			

Transformer Specification



3. Primary Inductance 原边电感

原边电感量 (Pin 2 - Pin 1): $L_p = 0.70\text{mH}$, $\pm 5\%$ (@ 1kHz), 漏感 $< 20\mu\text{H}$ 。
High voltage 3000VAC 1sec $< 1\text{mA}$

4. WINDING DETAILS 详细绕线

Wdg.No.	Start 起线	Finish 收线	Turns 圈数	Wire Dia. 线径	Wdg Type Spread/ Even 绕线方法 疏绕/密绕	Wdg Direction 绕线方向	Turns/Layer No. Of Layers
W1	2	3	58T	$\phi 0.27\text{mm}$	单线两层一次绕完	RIGHT	
1 layers of Polyester Yellow tape, T=0.05 mm							
W2	4	5	16T	$\phi 0.23\text{mm} * 2$	双线一层一次绕完	RIGHT	
1 layers of Polyester Yellow tape, T=0.05 mm							
W3	10	7	14T	$\phi 0.35\text{mm} * 2$ 三层绝缘线	双线两层一次绕完	RIGHT	
1 layers of Polyester Yellow tape, T=0.05 mm							
W4	5	NC	5T	$\phi 0.23\text{mm}$	疏绕	RIGHT	
2 layers of Polyester Yellow tape, T=0.05 mm							
W5	3	1	22T	$\phi 0.27\text{mm}$	单线一层一次绕完	RIGHT	
2 layer of Polyester Yellow tape, T=0.05mm							

Note: 1、Core 贴铜皮接地

2、Cut Pin 6, 8, 9

Regulation, Ripple, OCP and Efficiency



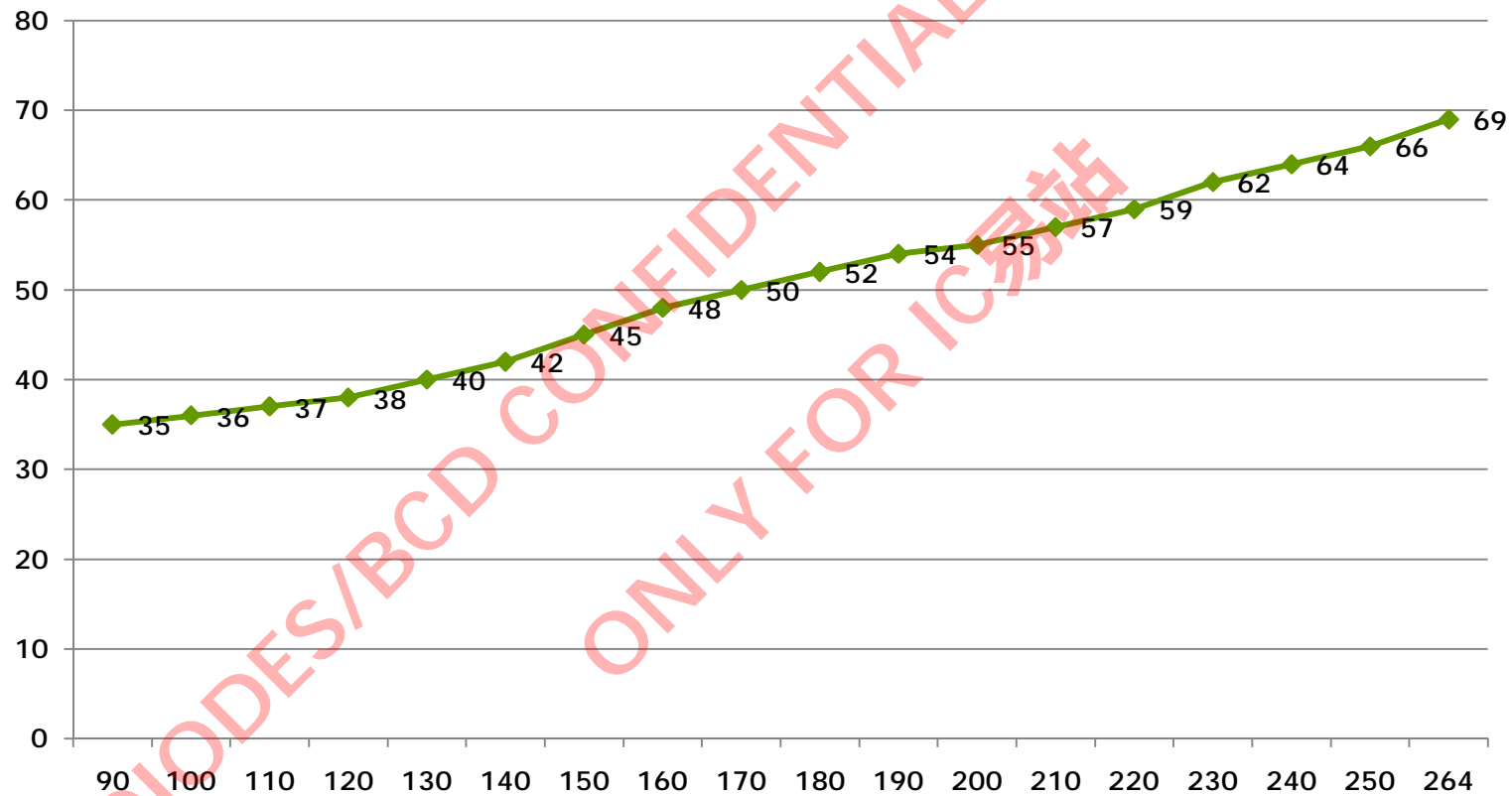
V _{IN} (V)	P _{IN} (W)	V _{OUT} (V)	I _O (A)	Ripple (mV)	P _{OUT} (W)	η	OCP	Average η	SPEC.
90V/60Hz	14.78	12.21	1.00	124	12.21	82.61%	1.14	83.16%	EPS2.0 77.76%
	10.89	12.05	0.75	110	9.037	82.98%			
	7.18	11.94	0.50	95	5.97	83.14%			
	3.53	11.85	0.25	75	2.962	83.92%			
115V/60Hz	14.53	12.20	1.00	108	12.20	83.96%	1.15	84.00%	
	10.77	12.06	0.75	90	9.045	83.98%			
	7.12	11.95	0.50	85	5.975	83.91%			
	3.52	11.86	0.25	75	2.965	84.23%			
230V/50Hz	14.50	12.22	1.00	95	12.22	84.27%	1.15	83.57%	
	10.75	12.07	0.75	90	9.052	84.20%			
	7.14	11.96	0.50	90	5.98	83.75%			
	3.61	11.85	0.25	70	2.9625	82.06%			
264V/50Hz	14.56	12.22	1.00	98	12.22	83.92%	1.15	82.81%	
	10.82	12.07	0.75	90	9.0525	83.66%			
	7.19	11.96	0.50	90	5.98	83.17%			
	3.68	11.85	0.25	54	2.9625	80.50%			

* Note: Output Voltage measured at end of PCB

Standby Power



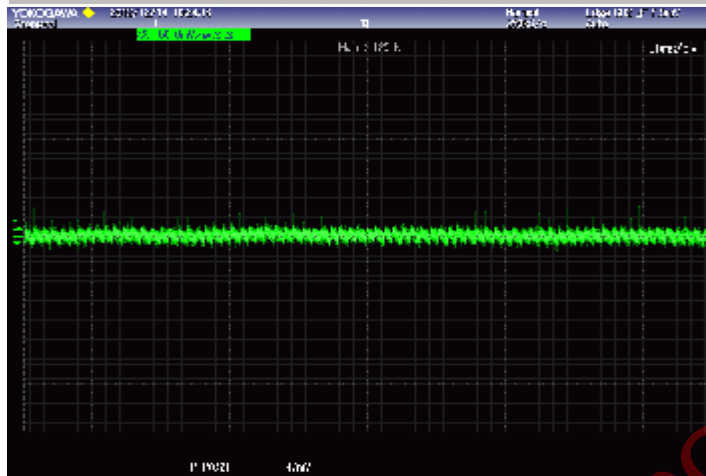
Stb Power



Output Ripple & Noise

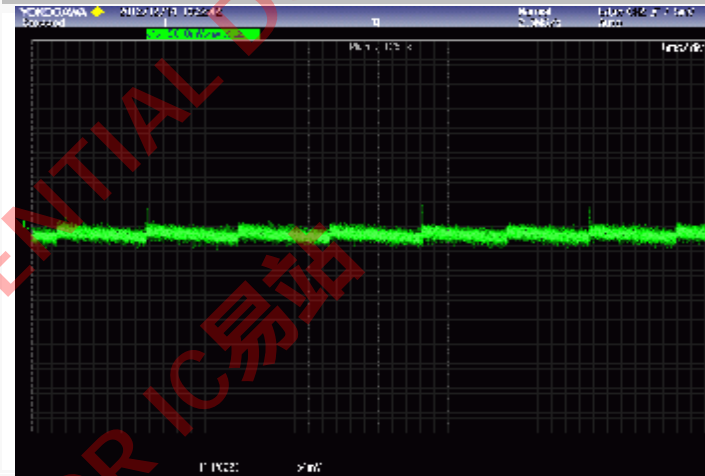


90Vac No Load



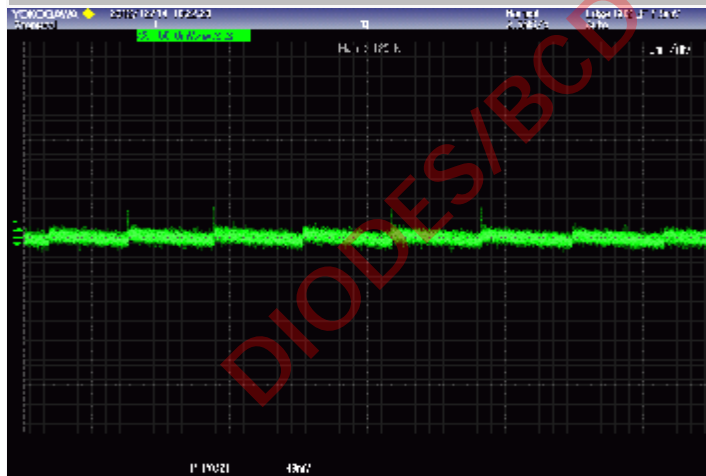
47.0mV

115Vac No Load



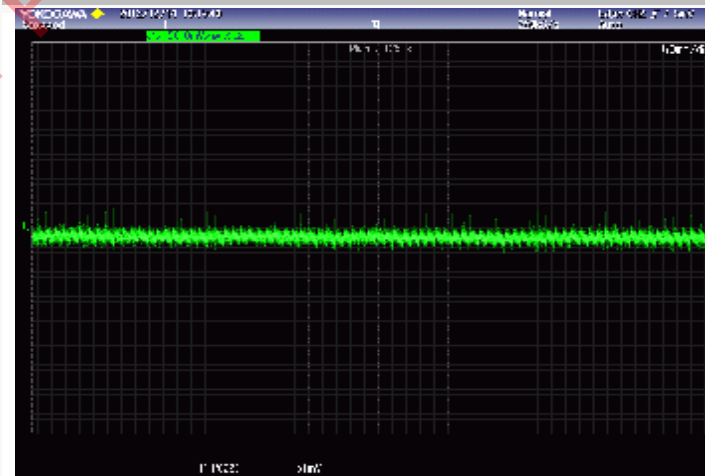
54.0mv

230Vac No Load



48.0mV

264Vac No Load

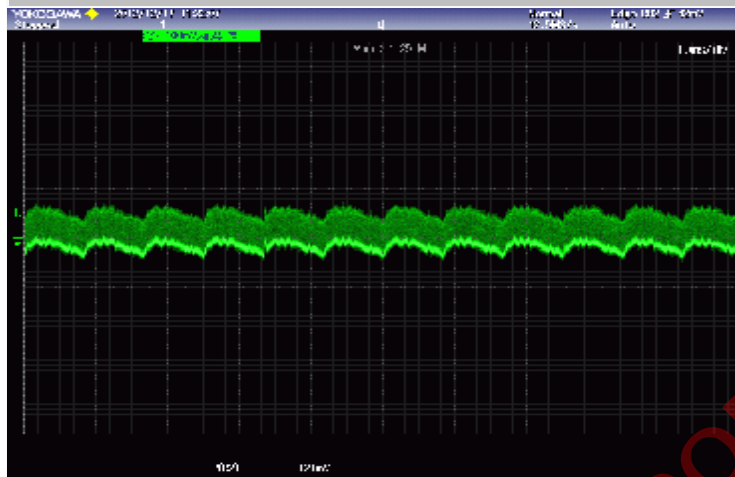


51.0mV

Output Ripple & Noise

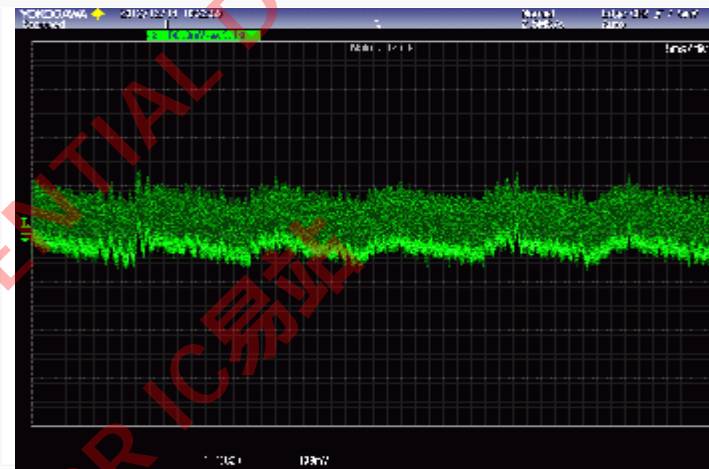


90Vac Full Load



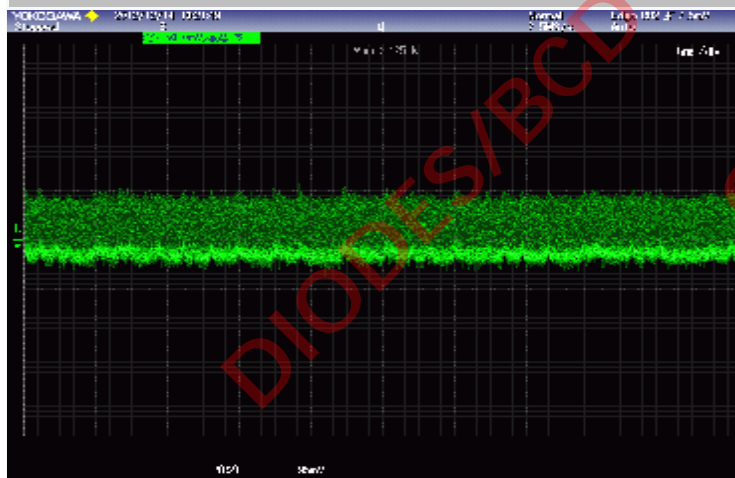
121mV

115Vac Full Load



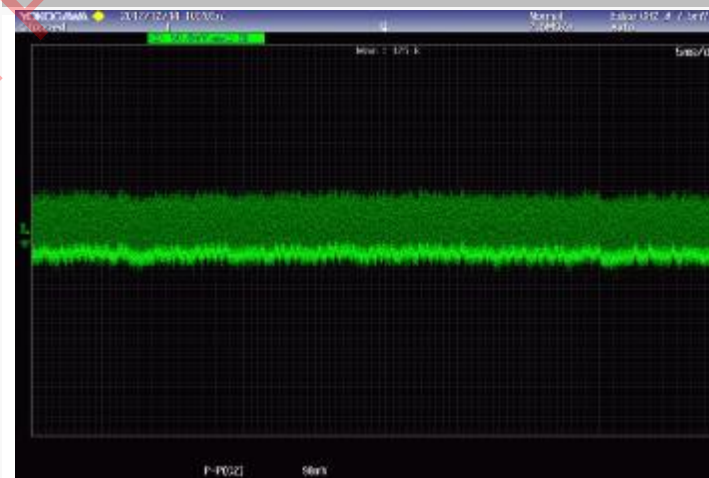
108mV

230Vac Full Load



95mV

264Vac Full Load

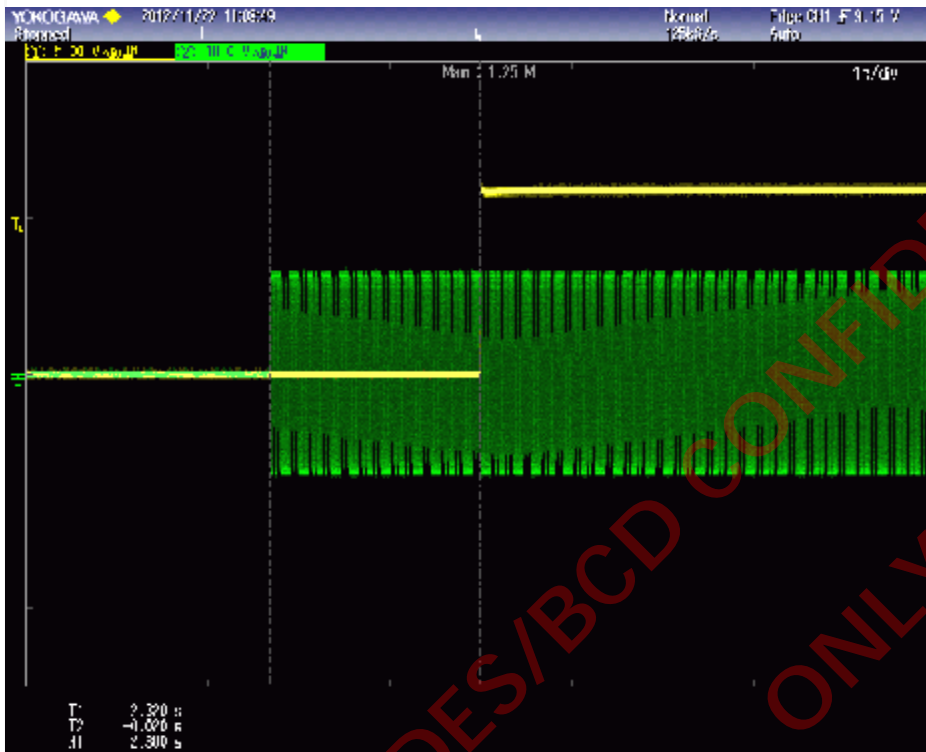


98mV

Turn On Delay Time

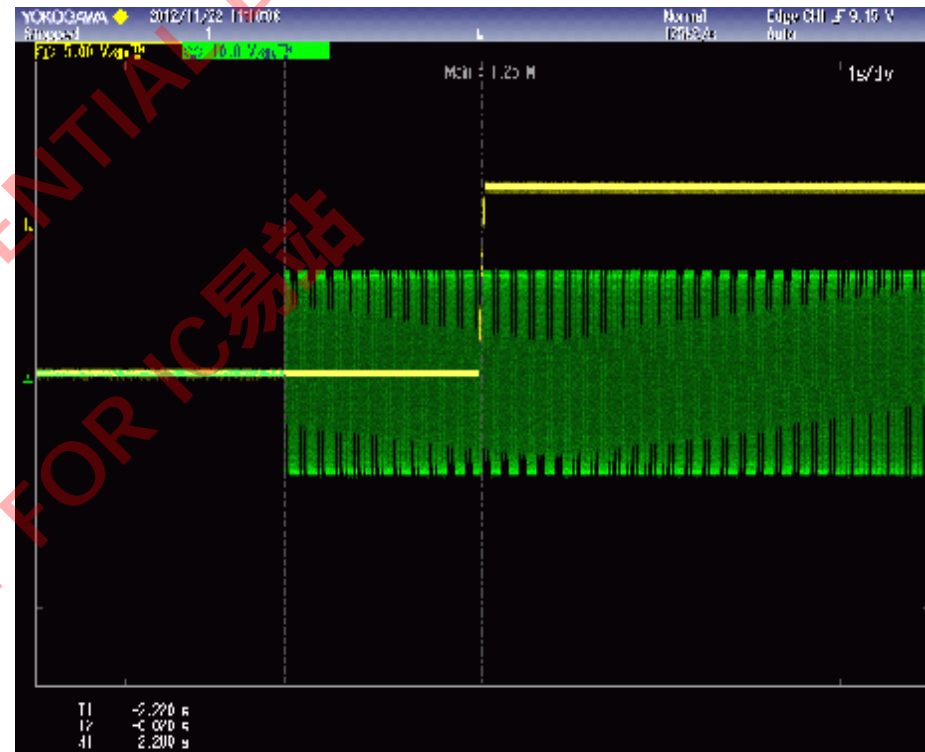


90Vac No Load



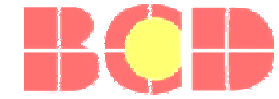
T_{DELAY} : 2.3S

90Vac Full Load

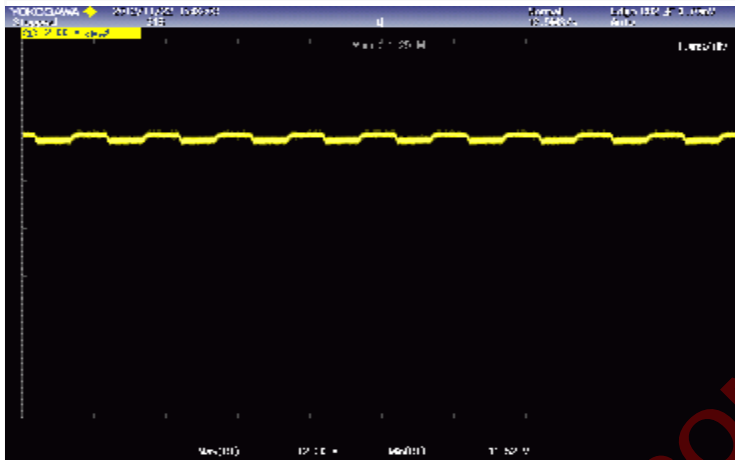


T_{DELAY} : 2.2S

Dynamic

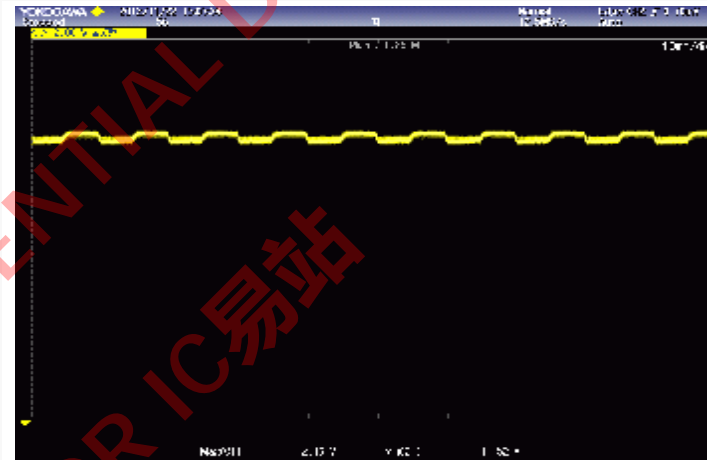


90Vac 10%~90%~10% 5mS 0.1A/uS



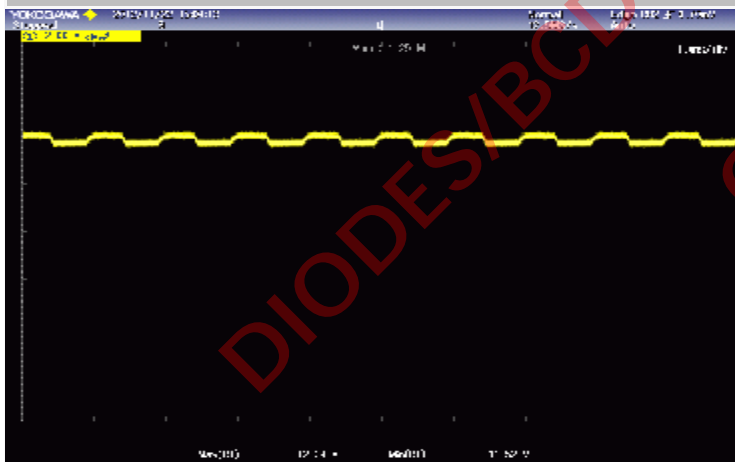
Vomin
11.52
Vomax
12.20

115Vac 10%~90%~10% 5mS 0.1A/uS



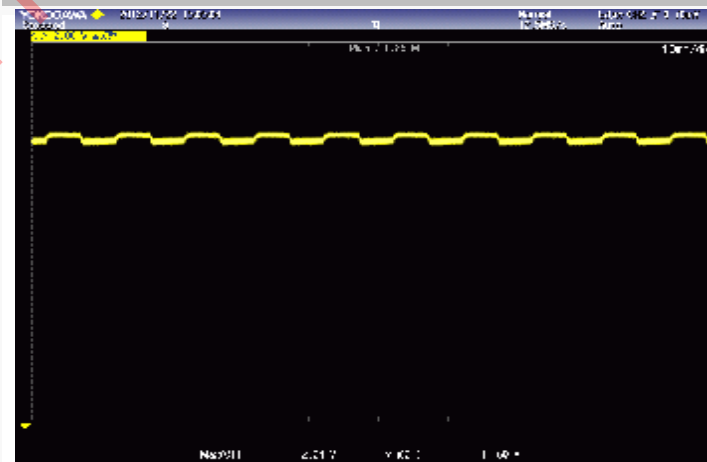
Vomin
11.52
Vomax
12.16

230Vac 10%~90%~10% 5mS 0.1A/uS



Vomin
11.52
Vomax
12.24

264Vac 10%~90%~10% 5mS 0.1A/uS



Vomin
11.60
Vomax
12.24

MOS Voltage Stress



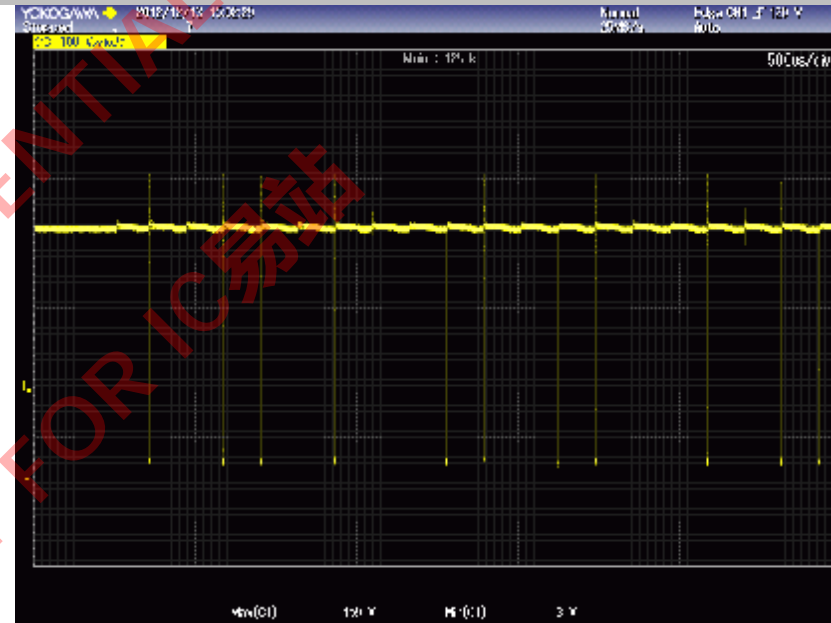
264Vac Full Load

$V_{MAX}: 510V$



264Vac Short

$V_{MAX}: 459V$



Absolute ($T_c = 25^\circ C$ unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	4	A
	Continuous Drain Current $T_c = 100^\circ C$	2.9	A

Schottky Voltage Stress



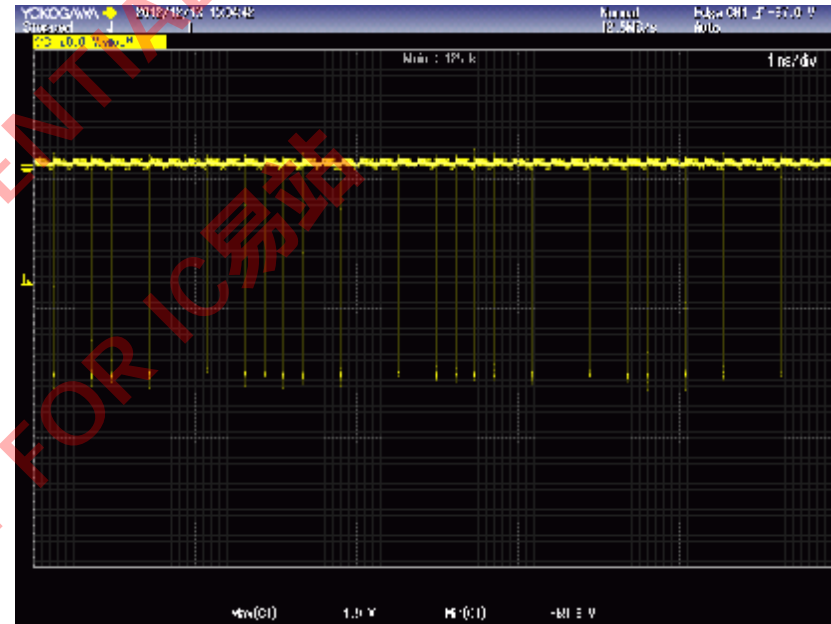
264Vac Full Load

$V_{MAX}: 80.4V$



264Vac Short

$V_{MAX}: 69.8V$

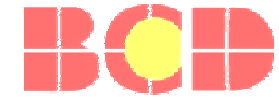


Absolute Maximum Ratings*

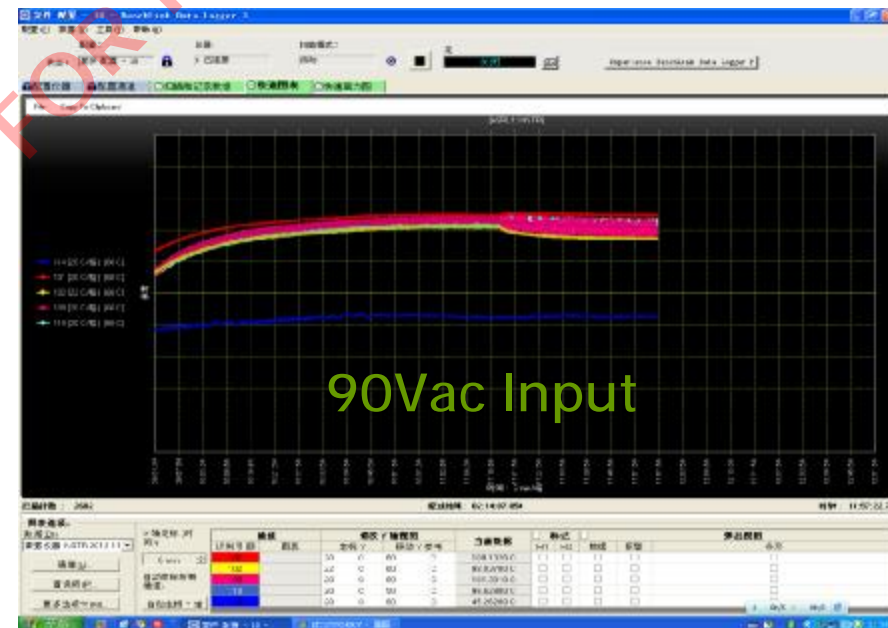
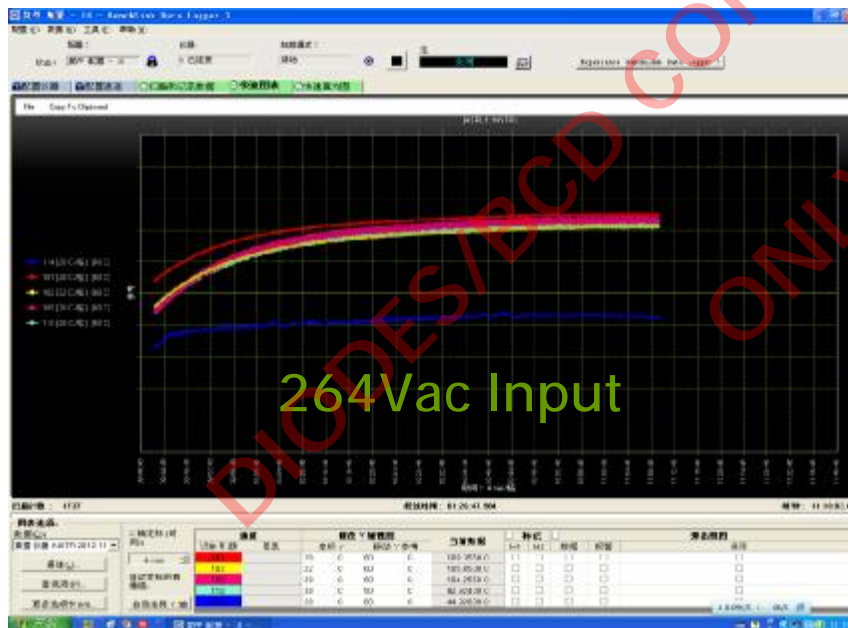
$T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Value							Units
		520	530	540	550	560	580	5100	
V_{RRM}	Maximum Repetitive Reverse Voltage	20	30	40	50	60	80	100	V
$I_{F(AV)}$	Average Rectified Forward Current .375" lead length @ $T_A = 75^\circ C$	5.0							A

Temperature Rise



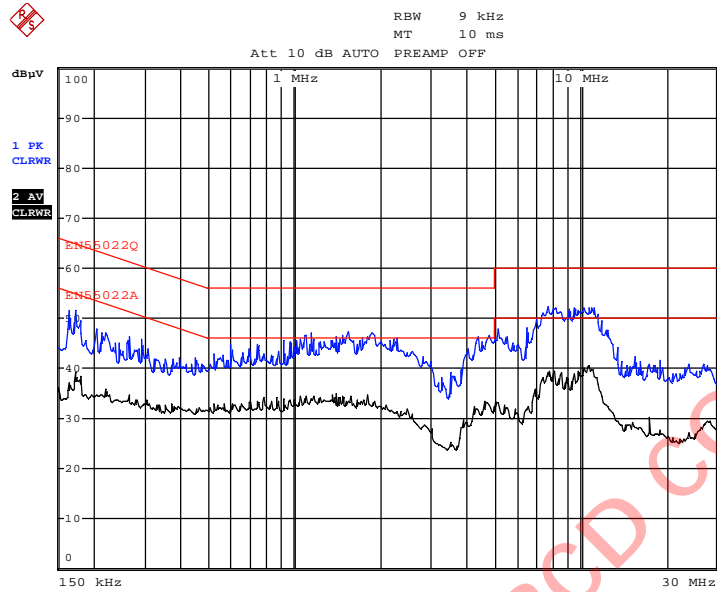
Location	Rated temp (°C)	90V/AC (°C)	264V/AC (°C)	T _{MAX} (°C)	Utilization ratio
MOS(4N60)	150	97.7	105.7	105.7	%
Coil	130	101.2	106.0	106.0	%
Core	130	91.05	93.7	93.7	%
Schottky (SB5100)	150	109.1	109.3	109.3	%
Ambient temperature		45.0	45.0	45.0	



Conduction

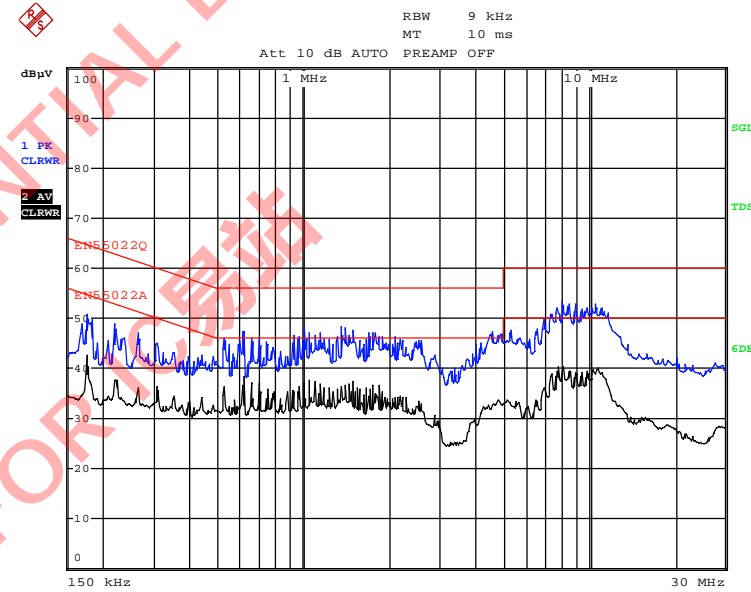


230Vac Full Load Line



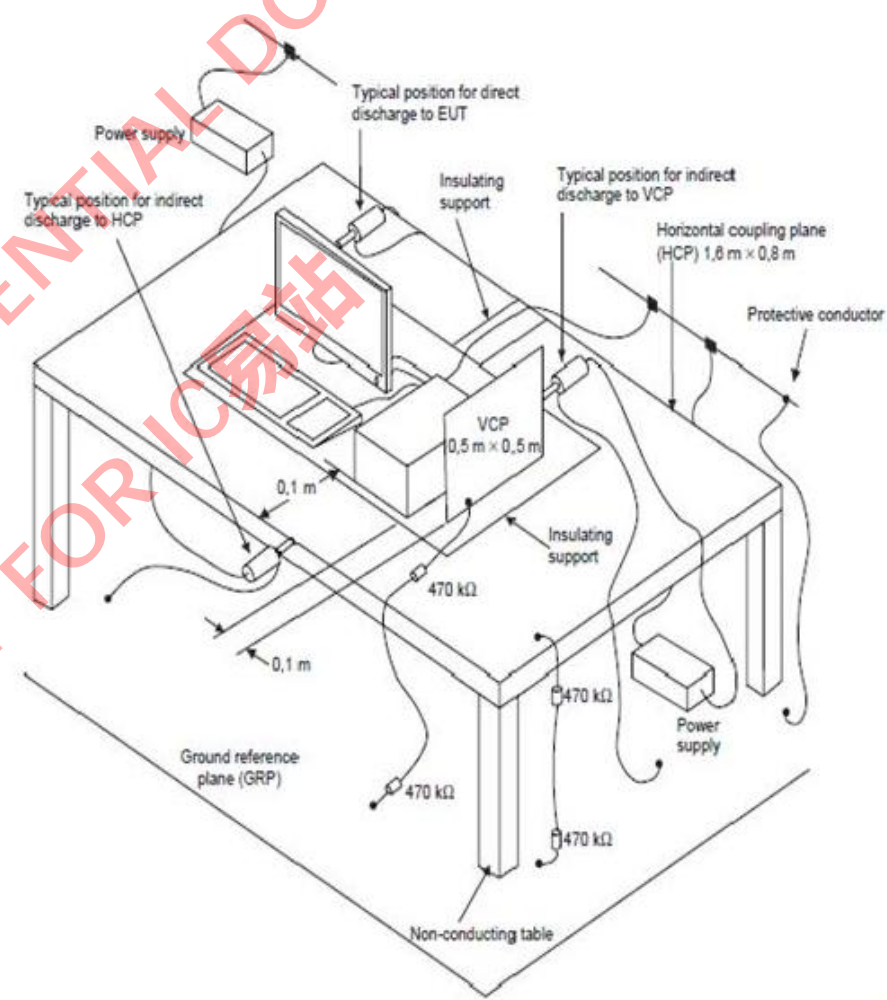
Margin: >6dB

230Vac Full Load Neutral



Margin: >6dB

Air Discharged		No Load Result	Full Load Result
230Vac No Load and Full Load			
15kV	+	Pass	Pass
	-	Pass	Pass
16kV	+	Pass	Pass
	-	Pass	Pass
17kV	+	Pass	Pass
	-	Pass	Pass
18kV	+	Pass	Pass
	-	Pass	Pass
19kV	+	Pass	Pass
	-	Pass	Pass
20kV	+	Pass	Pass
	-	Pass	Pass





Thank You!!!