

---

---

# RT7789DGS For 19V/65W Demo Board Test Report

---

---

Product P/N	RT7789DGS
Lot No.	
Date Code	
EVB Number	19V_65W_V0
Document Version	

Prepared by: Jason Hsiao

Reviewed by: \_\_\_\_\_

Approved by: \_\_\_\_\_

Date: 2016/06/30

Application Engineering Department  
System Development Division

## CONTENTS

Revision History.....	4
1. Electrical Specification.....	5
2. Summary.....	6
3. Test Facility .....	8
4. Test Circuit .....	9
5. Electrical Characteristics Test Items.....	10
5.1 Input Characteristics.....	10
5.1.1 Efficiency .....	10
5.1.2 Efficiency at 10% load of full rated output current.....	11
5.1.3 Input power under no load & light load .....	12
5.1.4 Standby power test .....	13
5.1.5 Start-up time .....	14
5.1.6 Brown-in and Brown-out.....	15
5.1.7 Bleeding resistor removal (BRR™) .....	16
5.1.8 Slope compensation and sub-harmonic .....	17
5.1.9 Hold-up time.....	18
5.2 Output Characteristics .....	19
5.2.1 Line regulation and load regulation.....	19
5.2.2 Output ripple & noise .....	20
5.2.3 Overshoot and rising time at start up.....	21
5.2.4 Undershoot and falling time at power off.....	23
5.2.5 Load transient and cycle test .....	24
5.3 Protections .....	25
5.3.1 OCP and recovery.....	25
5.3.2 Vout OVP and recovery .....	26
5.3.3 SC and recovery .....	27
5.3.4 CS pin OTP and recovery .....	28
5.4 Key Component Waveforms .....	29
5.4.1 Voltage stress on MOSFET .....	29
5.4.2 Voltage stress on Secondary Rectifier Diode .....	31
5.5 Standard and safety.....	33
5.5.1 EMI (Test result is peak ) .....	33
5.5.2 Safety (ESD & Surge) .....	35

6. Bill of Material ..... 36  
7. Transformer Specification ..... 38

**Revision History**

Version	Description	Date
00	Initial	2016/06/30

**1. Electrical Specification**

AC Input Voltage .....	90V <sub>rms</sub> ~265V <sub>rms</sub>
Line Frequency .....	47Hz~63Hz
DC Output Voltage .....	19V
Nominal Output Current .....	3.42A
Efficiency .....	> DOE 6 & CoC Tier2 Standard
Power Consumption .....	< 75mW
Hold-up Time .....	> 5mS
Output Ripple & Noise .....	< 380mV
Load Regulation .....	±5%
Line Regulation .....	±1%
Over Load Protection .....	Auto Recovery
Short Circuit Protection .....	Auto Recovery
Over Voltage Protection .....	Auto Recovery
CS Pin Over Temperature Protection .....	Auto Recovery

2. Summary

Item No.	Test Item	Test Result	Comment
<b>5.1</b>	<b>Input Characteristics</b>		
5.1.1	Efficiency	Pass	
5.1.2	Efficiency at 10% load of full rated output current	Pass	
5.1.3	Input power under no load & light load	Pass	
5.1.4	Standby power test	Pass	
5.1.5	Start-up time	Pass	
5.1.6	Brown-in and Brown-out	Pass	
5.1.7	Bleeding resistor removal (BRR™)	Pass	
5.1.8	Slope compensation and sub-harmonic	Pass	
5.1.9	Hold-up time	Pass	
<b>5.2</b>	<b>Output Characteristics</b>		
5.2.1	Line regulation and load regulation	Pass	
5.2.2	Output ripple & noise	Pass	
5.2.3	Overshoot and rising time at start up	Pass	
5.2.4	Undershoot and falling time at power off	Pass	

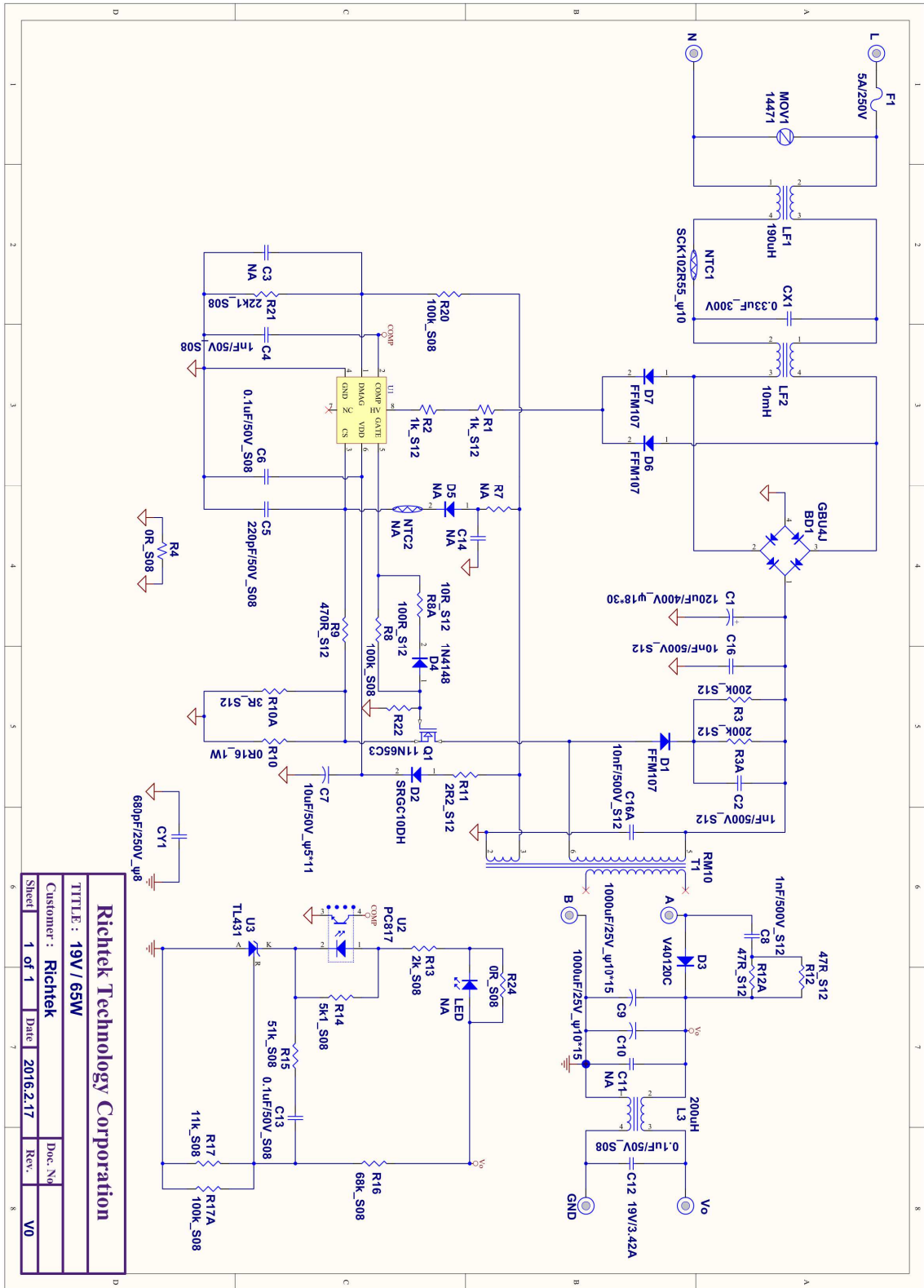
5.2.5	Load transient and cycle test	Pass	
5.3	Protections		
5.3.1	OCP and recovery	Pass	
5.3.2	Vout OVP and recovery	Pass	
5.3.3	SC and recovery	Pass	
5.3.4	CS Pin OTP	Pass	
5.4	Key Component Waveforms		
5.4.1	Voltage stress on MOSFET	Pass	
5.4.2	Voltage stress on Secondary Rectifier Diode	Pass	
5.5	Standard and safety		
5.5.1	EMI	Pass	
5.5.2	Safety (ESD & Surge)	Pass	

3. Test Facility

Instrument	Manufacturer	Type/Serial No.
AC Source	EXTECH	6800
Power meter	YOKOGAWA	WT210
Oscilloscope	LeCroy	604Zi
Electronic Load	Chroma	63030
Multi-meter	Fluke	287
Differential probe	LeCroy	ADP305
Current amplifier	LeCroy	CP030



4. Test Circuit



5. Electrical Characteristics Test Items

5.1 Input Characteristics

5.1.1 Efficiency

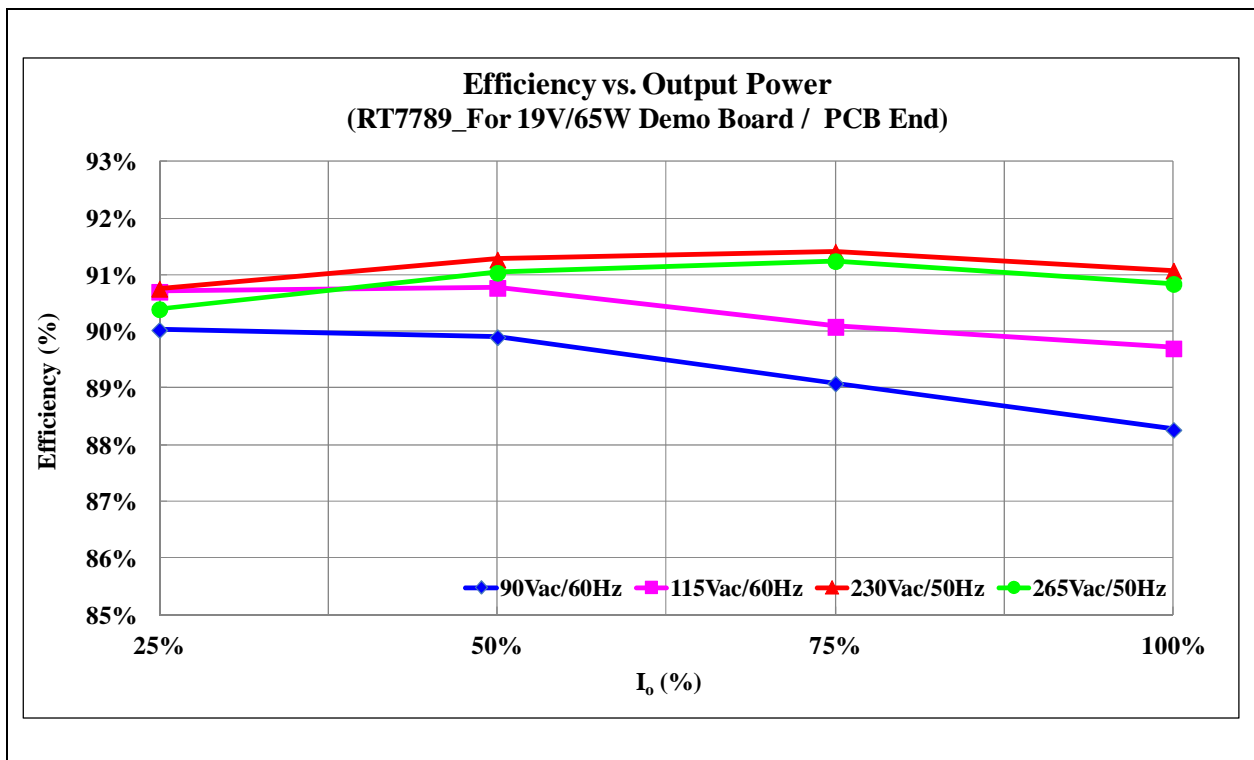
Test Method	Efficiency at different load conditions & Burn-in 20min
Test Conditions	Measured at PCB End

Test Result

Input Voltage	Measured Efficiency $\eta$ (%)				Average $\eta$ (%)	DOE VI > 88%	CoC Tier2 > 89%
	25%	50%	75%	100%			
90Vac / 60Hz	90.04	89.91	89.09	88.27	89.33	Pass	Pass
115Vac / 60Hz	90.71	90.78	90.09	89.71	90.32	Pass	Pass
230Vac / 50Hz	90.76	91.28	91.42	91.08	91.14	Pass	Pass
265Vac / 50Hz	90.40	91.04	91.25	90.85	90.89	Pass	Pass

Note: DOE VI regulation limit :  $49W < P_o \leq 250W \rightarrow \eta \geq 88\%$

CoC Tier2 regulation limit :  $49W < P_o \leq 250W \rightarrow \eta \geq 89\%$



Test Method	Efficiency at different load conditions & Burn-in 20min
Test Conditions	Measured at 18AWG / 1.5M Cable End

**Test Result**

Input Voltage	Measured Efficiency $\eta$ (%)				Average $\eta$ (%)	DOE VI > 88%	CoC Tier2 > 89%
	25%	50%	75%	100%			
115Vac / 60Hz	90.38	90.13	89.12	88.42	89.51	Pass	Pass
230Vac / 50Hz	90.44	90.62	90.43	89.77	90.32	Pass	Pass

Note: DOE VI regulation limit :  $49W < P_o \leq 250W \rightarrow \eta \geq 88\%$

CoC Tier2 regulation limit :  $49W < P_o \leq 250W \rightarrow \eta \geq 89\%$

**5.1.2 Efficiency at 10% load of full rated output current**

Test Method	
Test Conditions	Measured at 18AWG / 1.5M Cable End

**Test Result**

Input Voltage	Output Load	Measured Eff. (%)	Specification	Test Result
90Vac / 60Hz	10% Full Load	89.26	> 79%	Pass
115Vac / 60Hz		89.50		Pass
230Vac / 50Hz		87.74		Pass
265Vac / 50Hz		86.75		Pass

Note 1: CoC Tier2 regulation limit :  $49W < P_o \leq 250W \rightarrow \eta \geq 79\%$

**5.1.3 Input power under no load & light load**

Test Method	
Test Conditions	

Input power under no load:

**Test Result**

Input Voltage	Output Load	Input Wattage (mW)	DOE VI < 210mW	CoC Tier2 < 150mW
90Vac / 60Hz	<b>No Load</b>	21.99	Pass	Pass
115Vac / 60Hz		23.43	Pass	Pass
230Vac / 50Hz		32.54	Pass	Pass
265Vac / 50Hz		40.54	Pass	Pass

Note: DOE VI regulation limit :  $49W < P_o \leq 250W \rightarrow P_{in} < 210mW$

CoC Tier2 regulation limit :  $49W < P_o \leq 250W \rightarrow P_{in} < 150mW$

EPA 4.0 Regulation Limit:

Test Result

Output Wattage (W)	Input Wattage (W)		Specification	Test Result
	115V	230V		
0.25W (0.251)	0.302	0.326	< 0.5W ( $\eta > 50\%$ )	Pass
0.5W (0.514)	0.595	0.631	< 0.714W ( $\eta > 70\%$ )	Pass
1W (1.010)	1.150	1.210	< 1.428W ( $\eta > 70\%$ )	Pass
1.15W (1.159)	1.311	1.376	< 1.642W ( $\eta > 70\%$ )	Pass
1.5W (1.506)	1.702	1.779	< 2.142W ( $\eta > 70\%$ )	Pass
1.7W (1.710)	1.930	2.014	< 2.428W ( $\eta > 70\%$ )	Pass
2W (2.001)	2.259	2.349	< 2.857W ( $\eta > 70\%$ )	Pass

Measurement by Power Meter YOKOGAWA WT210

5.1.4 Standby power test

Test Method	
Test Conditions	Measured with 18AWG / 1.5M Cable

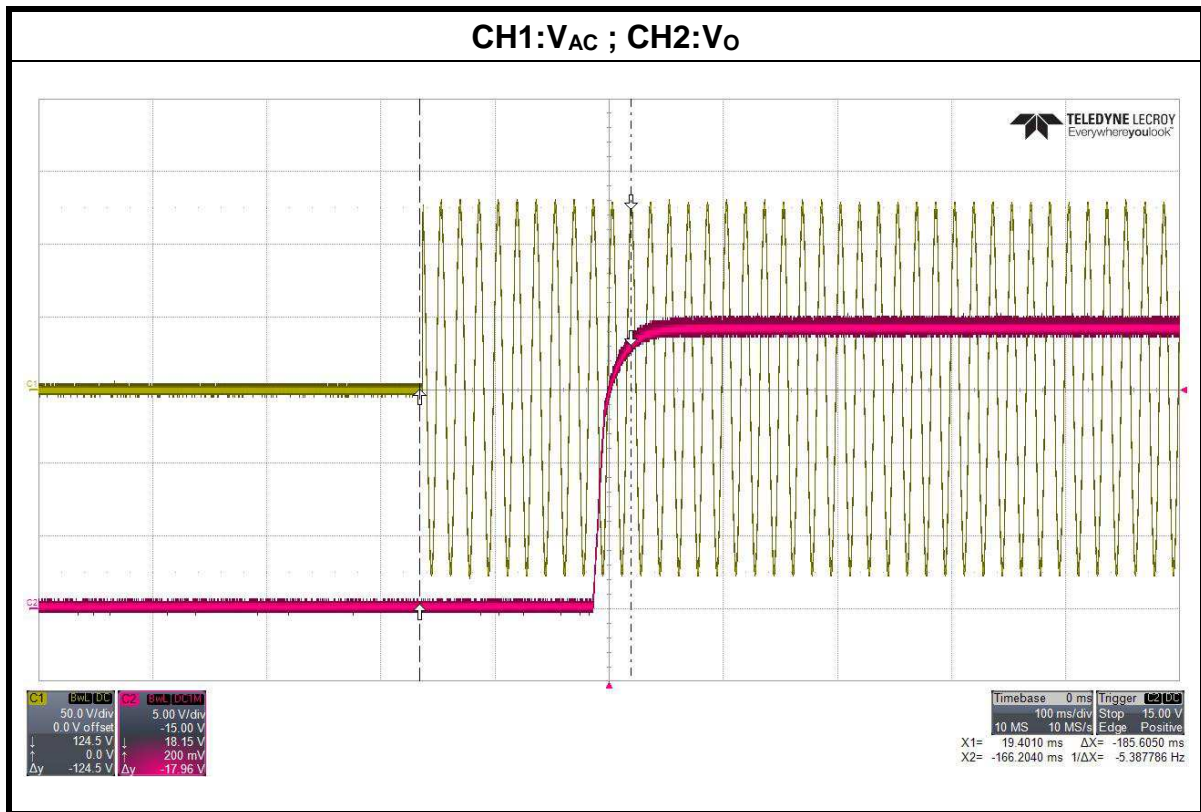
Input Voltage	Input wattage (W)	Pout	Specification	Test Result
90Vac / 60Hz	0.592	0.5W (0.514W)	< 1W	Pass
115Vac / 60Hz	0.595			Pass
230Vac / 50Hz	0.631			Pass
265Vac / 50Hz	0.655			Pass

**5.1.5 Start-up time**

Test Method	
Test Conditions	

**Test Result**

Input Voltage	Start-up Time	Specification	Test Result
90Vac / 60Hz	0.186m sec.	< 1 sec.	Pass



Note: Output power at full load.

**5.1.6 Brown-in and Brown-out**

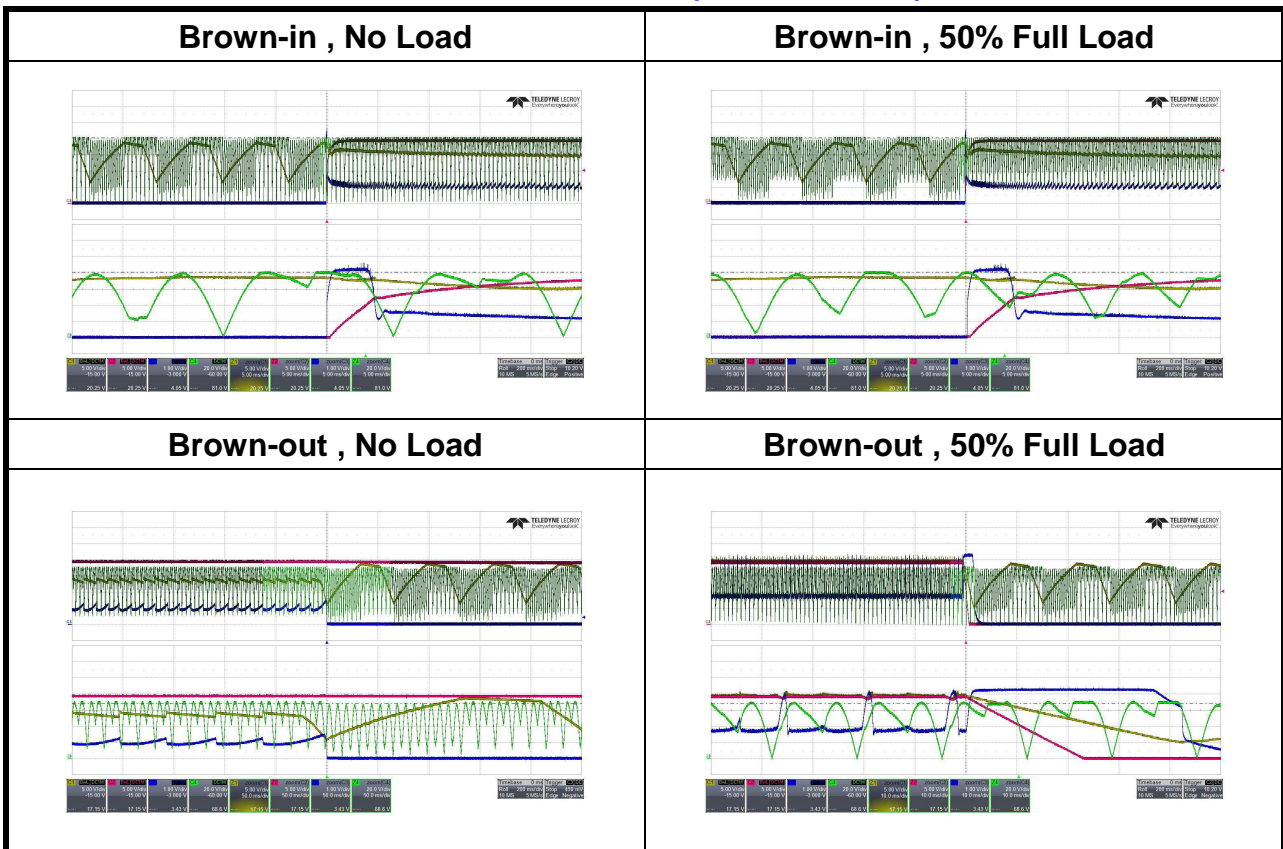
Test Method	
Test Conditions	

**Test Result**

Input Voltage	Input Wattage (W)
90Vac / 60Hz	75.01
85Vac / 60Hz	75.27
80Vac / 60Hz	75.83
75Vac / 60Hz	76.58
70Vac / 60Hz	77.61
65Vac / 60Hz	77.95
60Vac / 60Hz	X (OLP)

**BNI/BNO : 57.7Vac / 49.7Vac (No Load)**

**BNI/BNO : 57.7Vac / 50.0Vac (50% Full Load)**

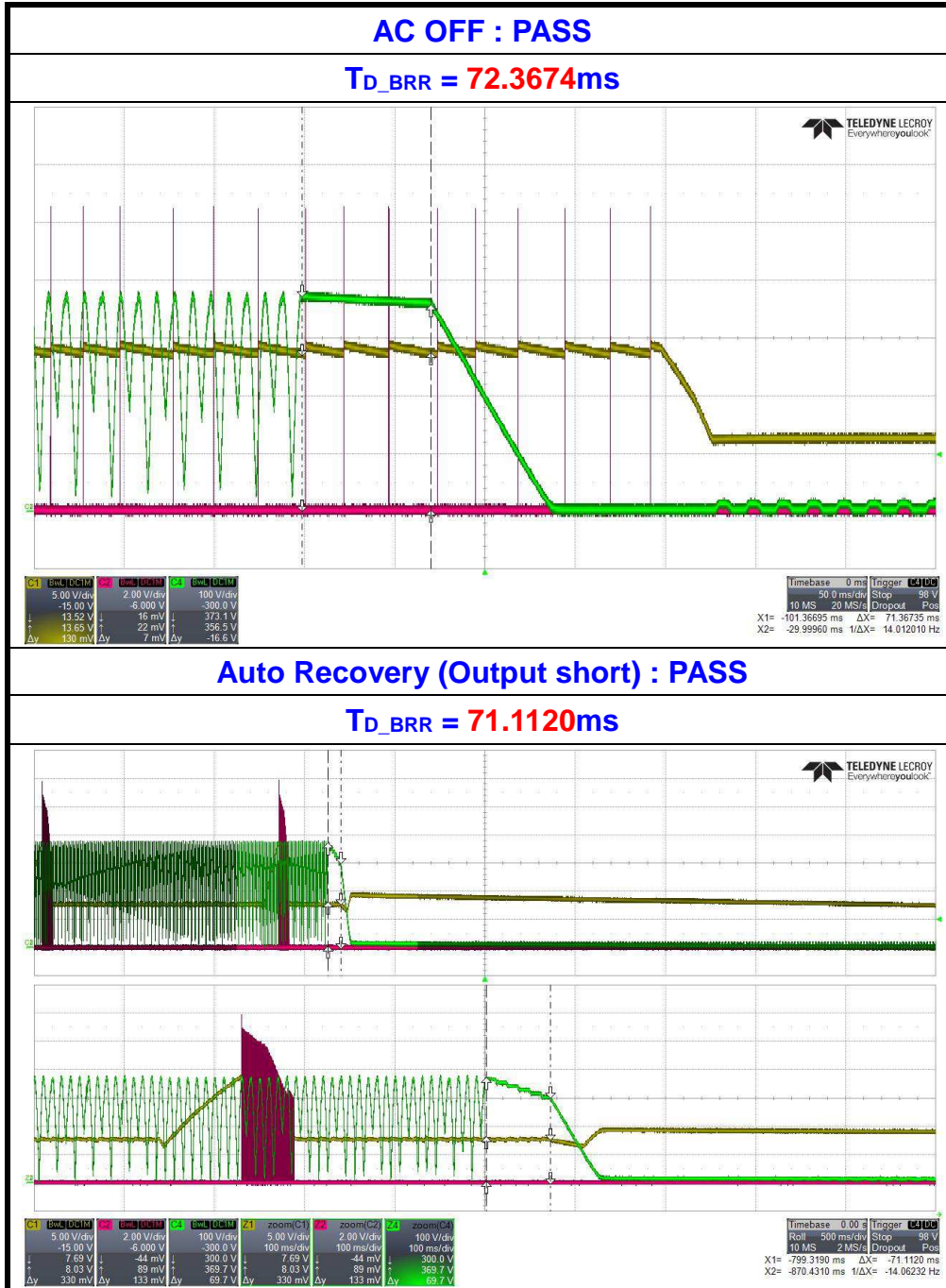


**CH1:V<sub>DD</sub>, CH2:V<sub>O</sub>, CH3:V<sub>Bulk</sub>, CH4:V<sub>HV</sub> waveforms must be taken simultaneously.**

**5.1.7 Bleeding resistor removal (BRR™)**

Test Method	Vin = 265Vac/50Hz ; No Load
Test Conditions	AC OFF & Auto Recovery

**Test Result**



**Note: CH1:V<sub>DD</sub>, CH2:V<sub>GATE</sub>, CH4:V<sub>HV</sub> waveforms must be taken simultaneously.**

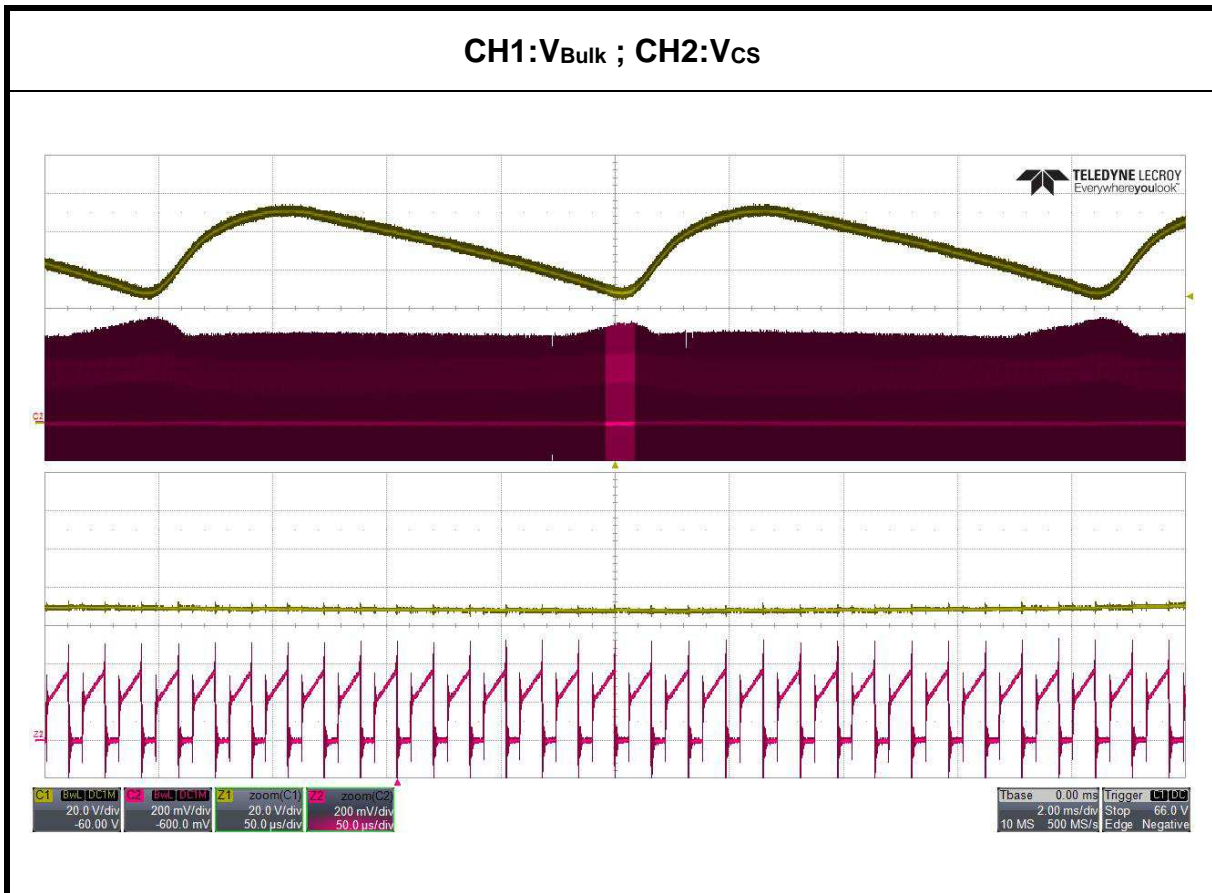


**5.1.8 Slope compensation and sub-harmonic**

Test Method	
Test Conditions	

**Test Result**

Input Voltage	Output Load	Test Result
80Vac / 60Hz	Full Load	Pass



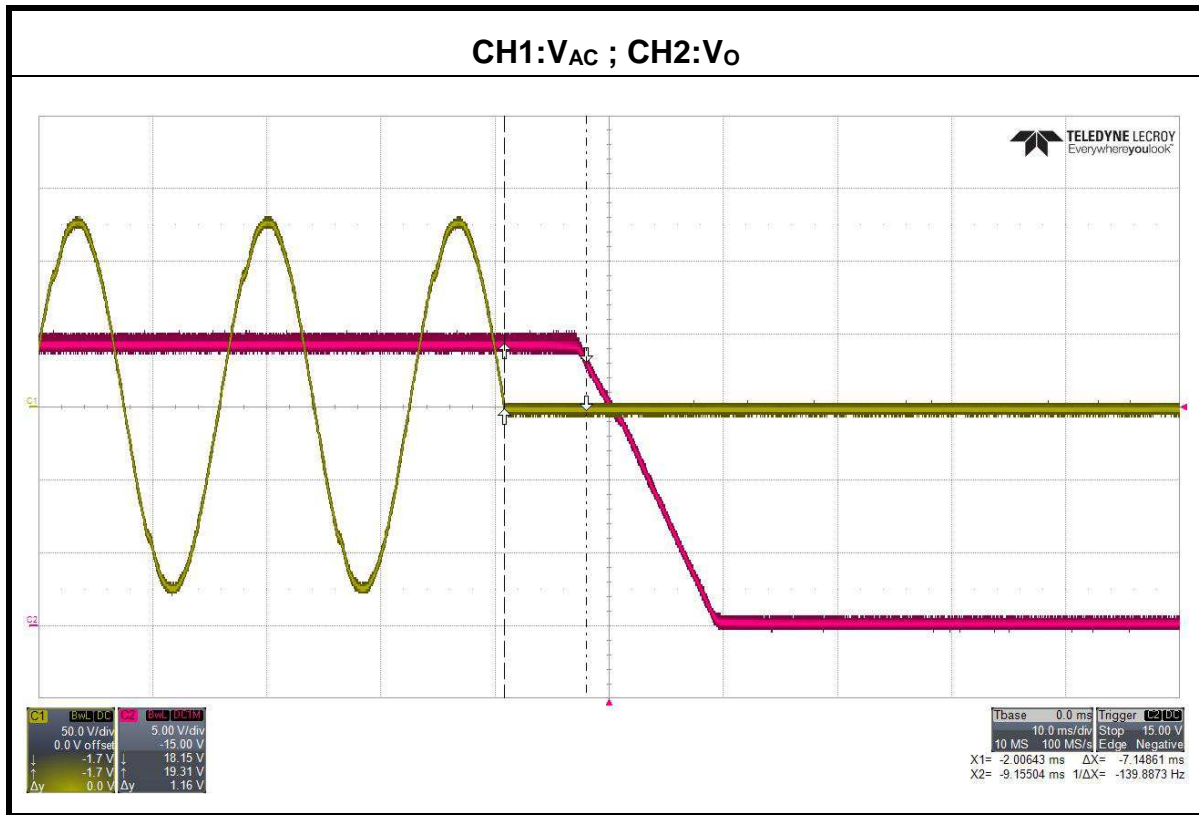
**5.1.9 Hold-up time**

Test Method	
Test Conditions	

**Test Result**

Input Voltage	Hold-up Time	Specification	Test Result
90Vac / 60Hz	7.148m sec.	> 5m sec.	Pass

Note: Output power at full load. (90Vin @ 0 deg)



## 5.2 Output Characteristics

### 5.2.1 Line regulation and load regulation

Test Method	
Test Conditions	Measured at PCB End

#### Test Result

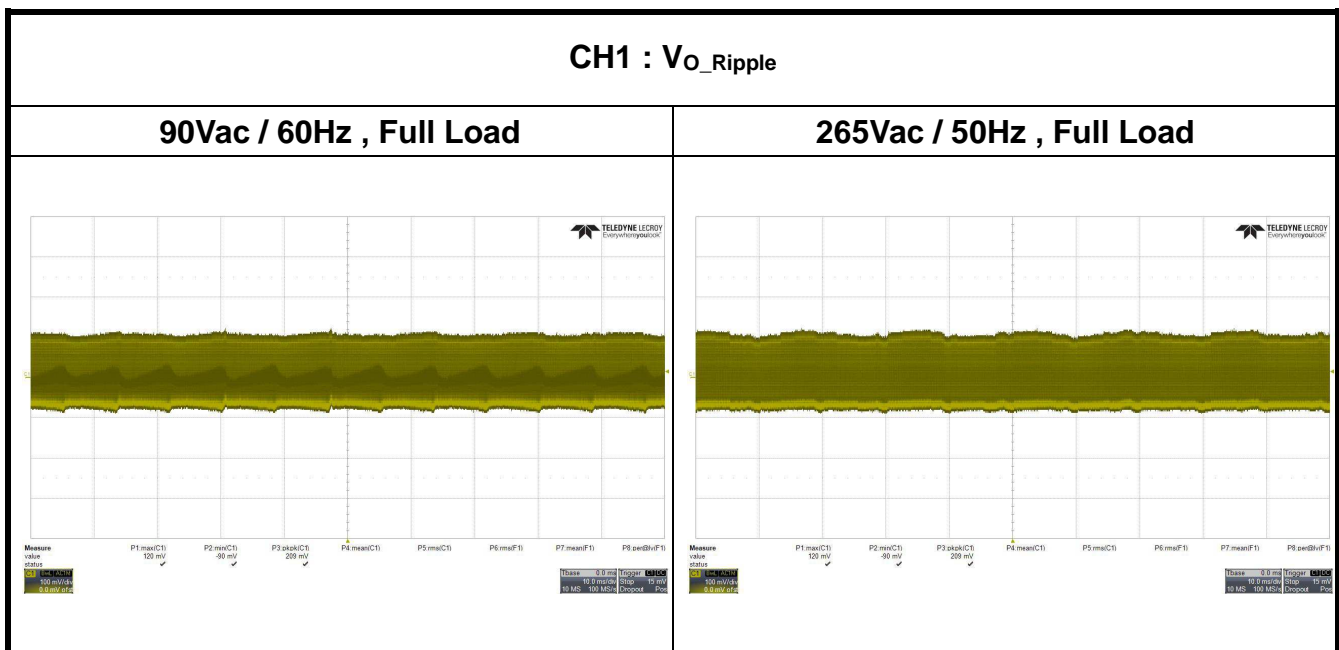
Input Voltage	Measured ( V )			Load Regulation Specification	Result
	Output Full Load	Output Mid Load	Output No Load		
90Vac / 60Hz	19.341	19.434	19.475	Vout ± 5 %	Pass
115Vac / 60Hz	19.343	19.430	19.475		Pass
132Vac / 60Hz	19.346	19.427	19.475		Pass
180Vac / 50Hz	19.325	19.416	19.475		Pass
230Vac / 50Hz	19.306	19.404	19.475		Pass
265Vac / 50Hz	19.291	19.394	19.475		Pass
Line Regulation Specification	Vout ± 1 %				
Result	Pass	Pass	Pass		

**5.2.2 Output ripple & noise**

Test Method	
Test Conditions	Measured at 18AWG / 1.5M Cable End

**Test Result**

Input Voltage	Output load	Measured (mVp-p)	Specification	Test Result
90Vac / 60Hz	Full Load	209	< 380mV	Pass
265Vac / 50Hz	Full Load	209		Pass



Note: Measured by using a 12 inch twisted pair terminal with a 10uF aluminum electrolytic capacitor and a 0.1uF ceramic in parallel, measured at full load.

**5.2.3 Overshoot and rising time at start up**

Test Method	
Test Conditions	Measured at 18AWG / 1.5M Cable End

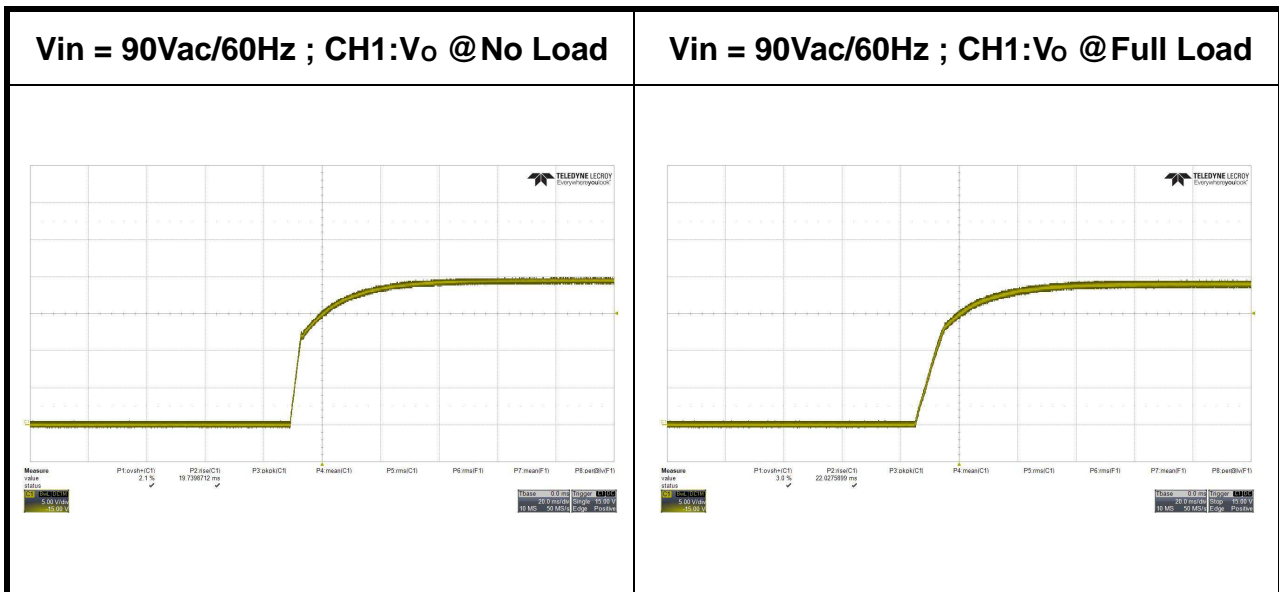
**Test Result**

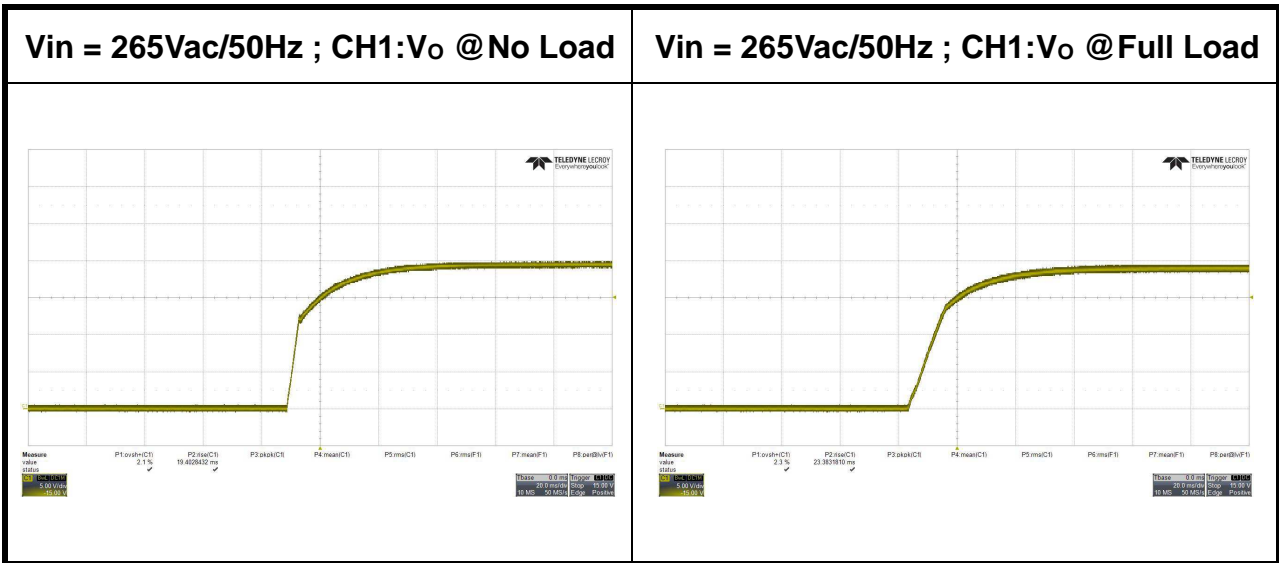
**Output rise time test result**

Input Voltage	Measured ( ms )		Specification (10% ~ 90% Vout)	Test Result
	No Load	Full Load		
90Vac / 60Hz	19.740	22.027	< 50ms	Pass
265Vac / 50Hz	19.403	23.838	< 50ms	Pass

**Output overshoot test result**

Input Voltage	Measured ( % )		Specification	Test Result
	No Load	Full Load		
90Vac / 60Hz	2.1	3.0	≤ 8% of V <sub>O</sub>	Pass
265Vac / 50Hz	2.1	2.3	≤ 8% of V <sub>O</sub>	Pass



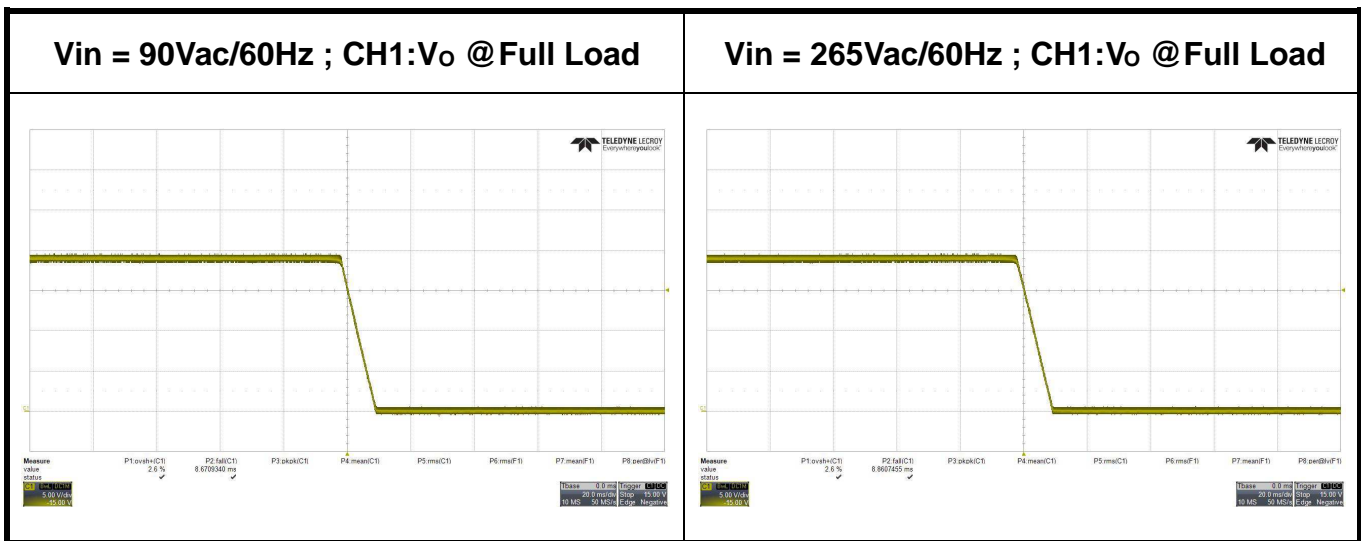


**5.2.4 Undershoot and falling time at power off**

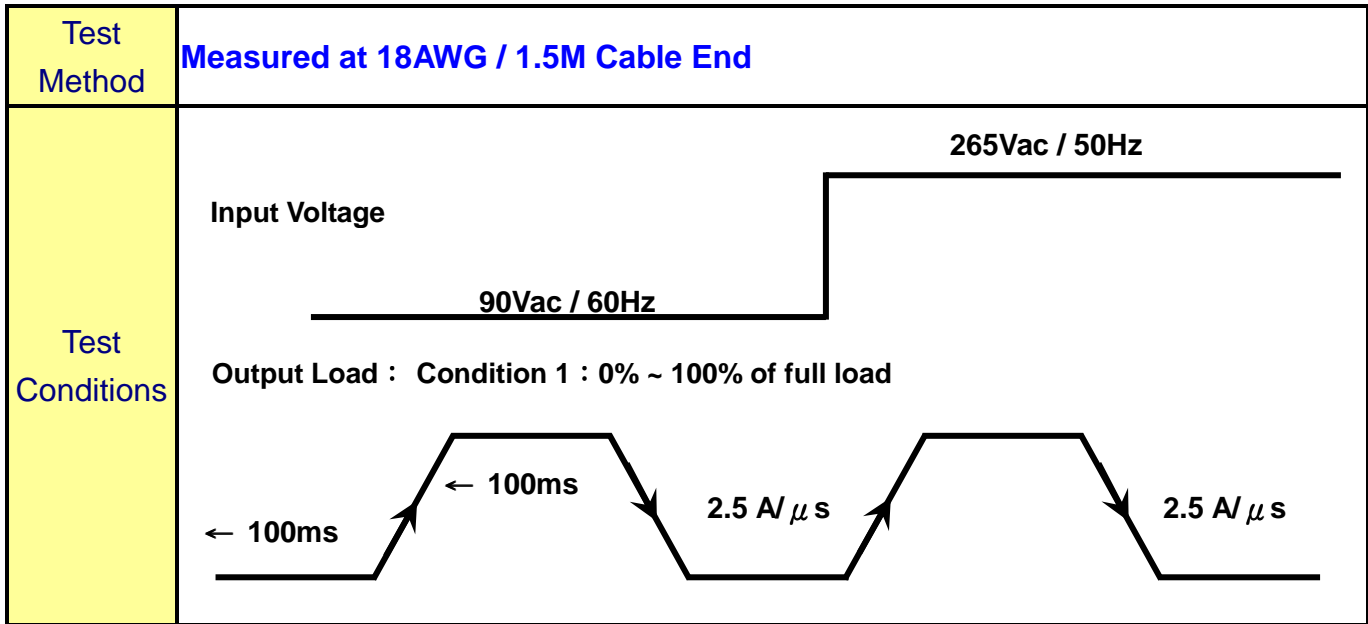
Test Method	
Test Conditions	Measured at 18AWG / 1.5M Cable End

**Output falling time test result**

Input Voltage	Measured ( ms )	Specification (90% ~ 10% Vout)	Test Result
	Full Load		
90Vac / 60Hz	8.671	< 50ms	Pass
265Vac / 50Hz	8.861	< 50ms	Pass

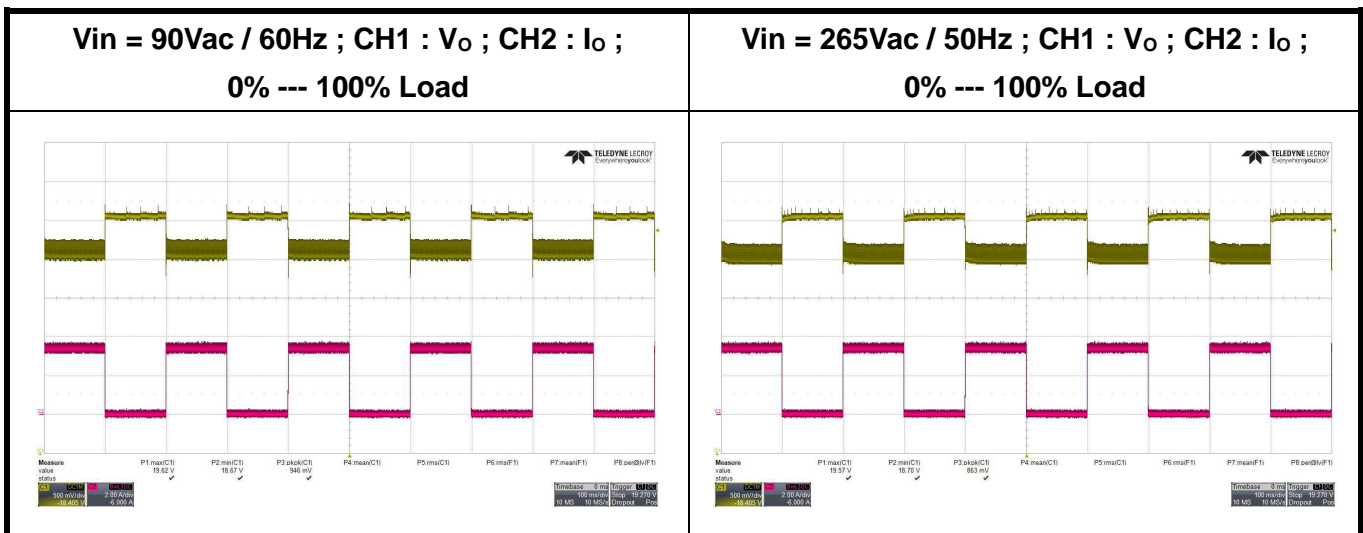


**5.2.5 Load transient and cycle test**



**Test Result**

Input Voltage	Measured Vo ( V )		Specification	Test Result
	0% -- 100% Load	100% -- 0% Load		
90Vac / 60Hz	18.670	19.620	Vout ± 5 %	Pass
265Vac / 50Hz	18.700	19.570	Vout ± 5 %	Pass





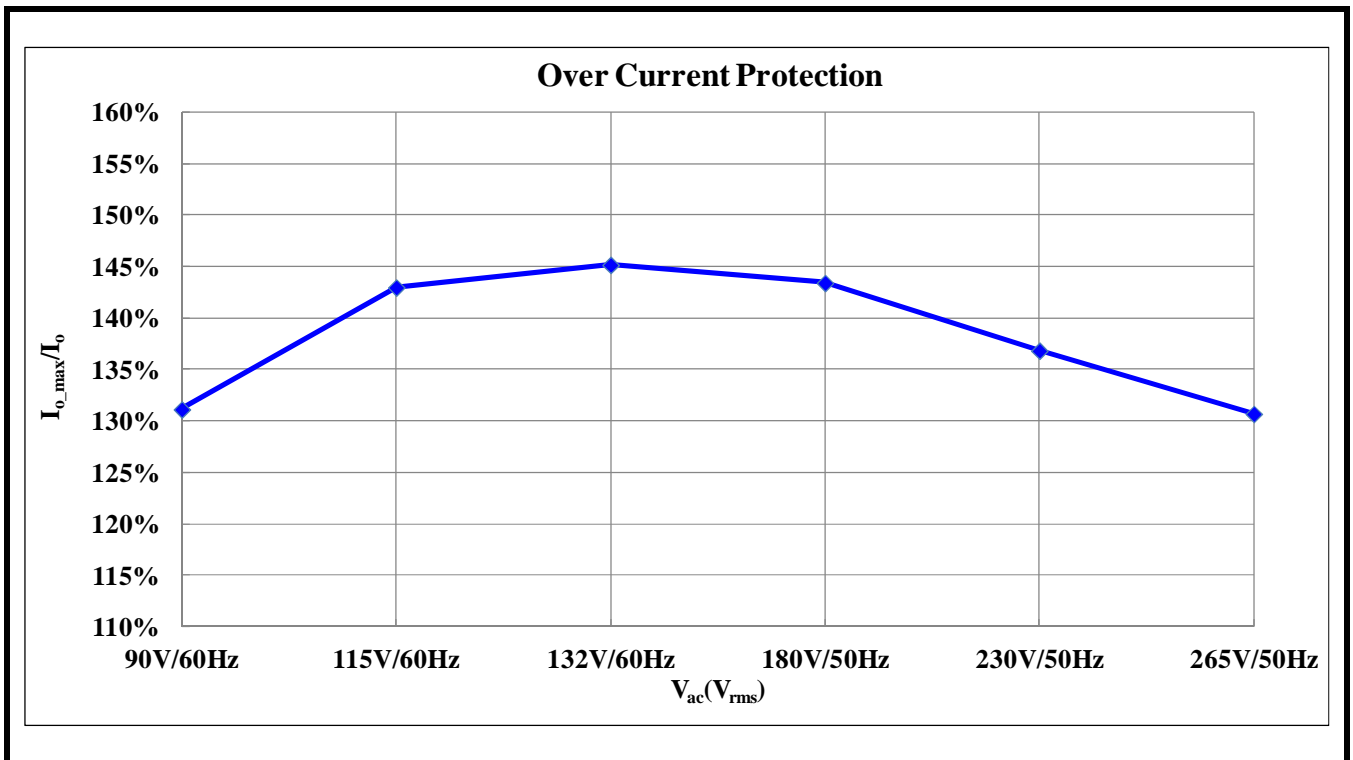
### 5.3 Protections

#### 5.3.1 OCP and recovery

Test Method	
Test Conditions	

#### Test Result

Input Voltage	Output Current (A)	Io_max / Io (%)	Test Result	Specification
90Vac / 60Hz	4.485	131	Pass	120% ~ 150% of the full load
115Vac / 60Hz	4.890	143	Pass	
132Vac / 60Hz	4.965	145	Pass	
180Vac / 50Hz	4.905	136	Pass	
230Vac / 50Hz	4.680	130	Pass	
265Vac / 50Hz	4.470	131	Pass	
△	0.495	14		

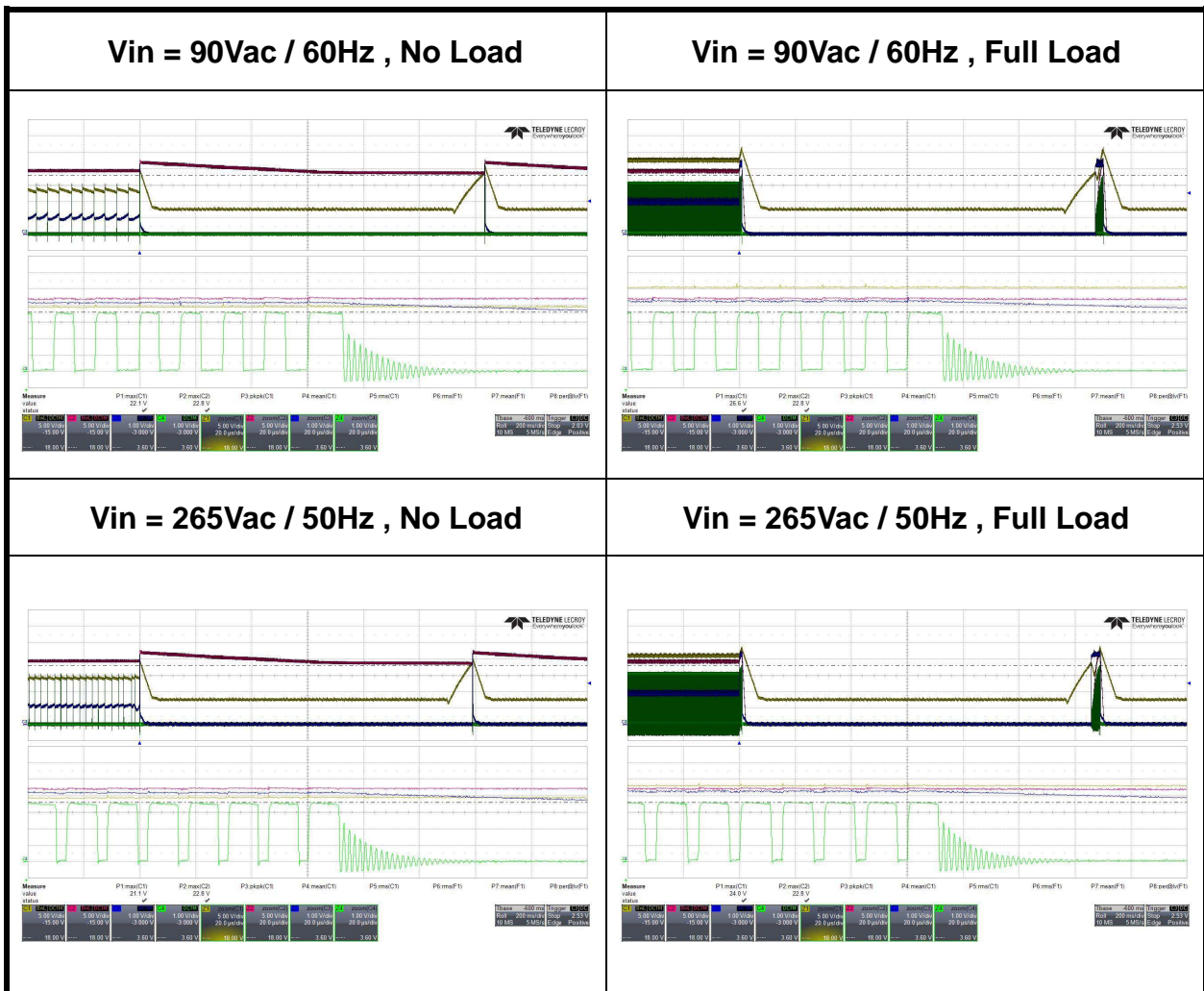


**5.3.2 Vout OVP and recovery**

Test Method	Secondary side photo-coupler short circuit
Test Conditions	Measured at PCB End

**Test Result**

Input Voltage	Output Load	Output Voltage (V)	Measured (W)	Specification
90Vac / 60Hz	No Load	22.80	0.151	Auto Recovery
	Full Load	22.80	1.904	
265Vac / 50Hz	No Load	22.80	0.244	
	Full Load	22.80	2.022	



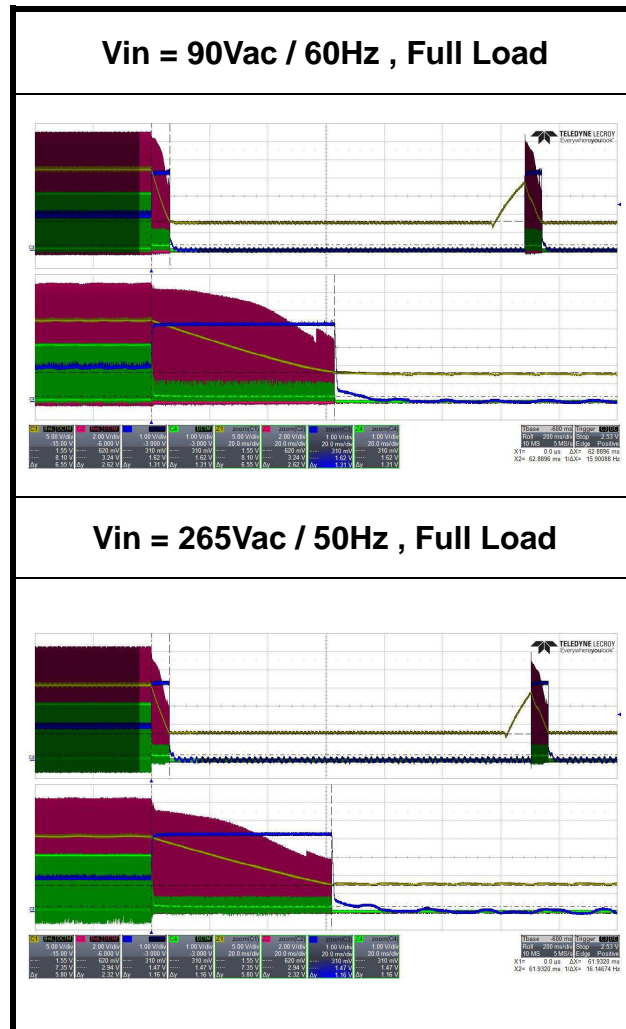
Note: CH1:V<sub>DD</sub>, CH2:V<sub>o</sub>, CH3:V<sub>COMP</sub>, CH4:V<sub>DMAG</sub> waveforms must be taken simultaneously.

**5.3.3 SC and recovery**

Test Method	Output short circuit
Test Conditions	

**Test Result**

Input Voltage	Output Load	Measured (W)	Specification
90Vac / 60Hz	Full Load	0.427	Auto Recovery
265Vac / 50Hz	Full Load	0.483	



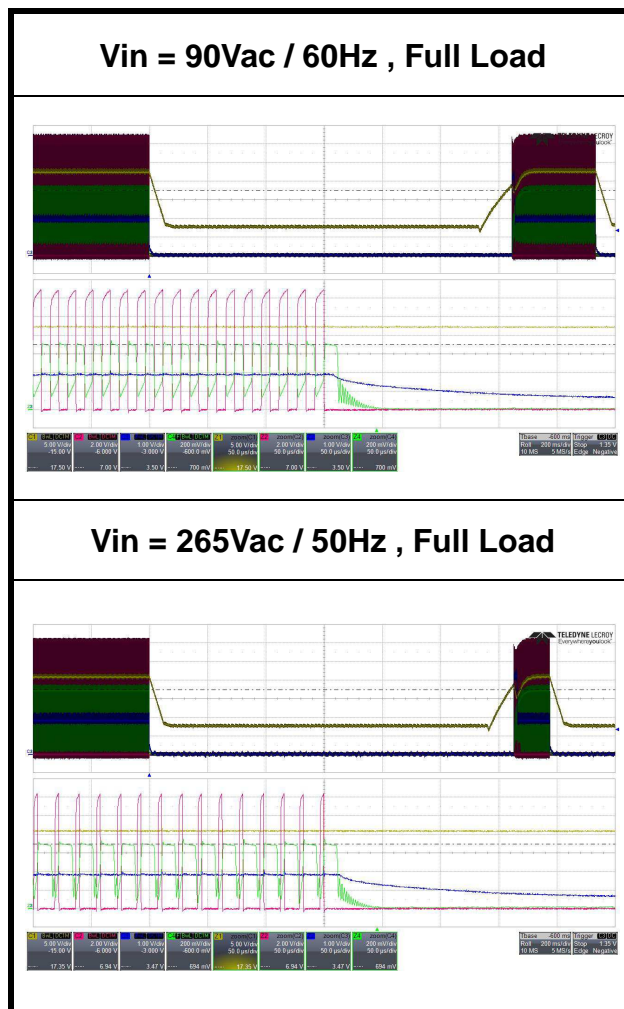
**Note: CH1:V<sub>DD</sub>, CH2:V<sub>GATE</sub>, CH3:V<sub>COMP</sub>, CH4:V<sub>DMAG</sub> waveforms must be taken simultaneously.**

**5.3.4 CS pin OTP and recovery**

Test Method	1N4148+50kΩ VR
Test Conditions	

**Test Result**

Input Voltage	Output Load	V <sub>CS_OTP</sub> (V)	R <sub>NTC</sub> (kΩ)	Specification	Test Result
90Vac / 60Hz	Full Load	0.700	10.813	Auto Recovery	Pass
					Pass
265Vac / 50Hz	Full Load	0.694	10.948		Pass
					Pass



**Note: CH1:V<sub>DD</sub>, CH2:V<sub>GATE</sub>, CH3:V<sub>COMP</sub>, CH4:V<sub>CS</sub> waveforms must be taken simultaneously.**

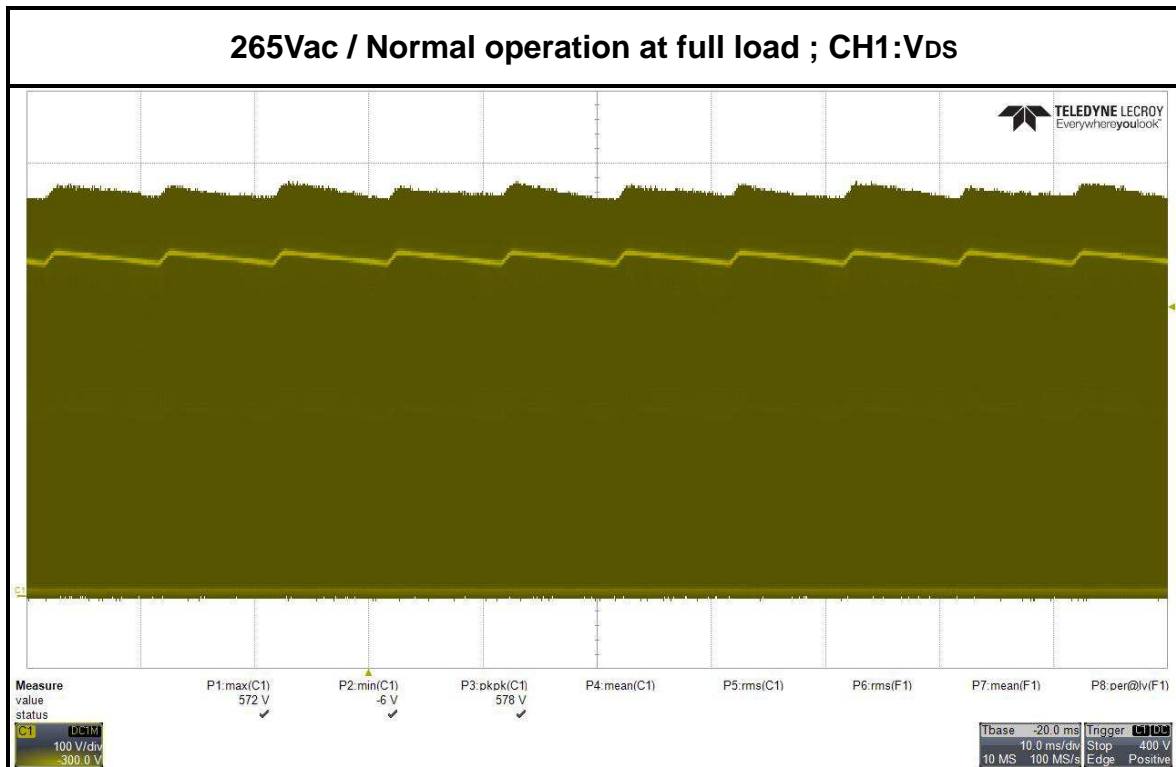
## 5.4 Key Component Waveforms

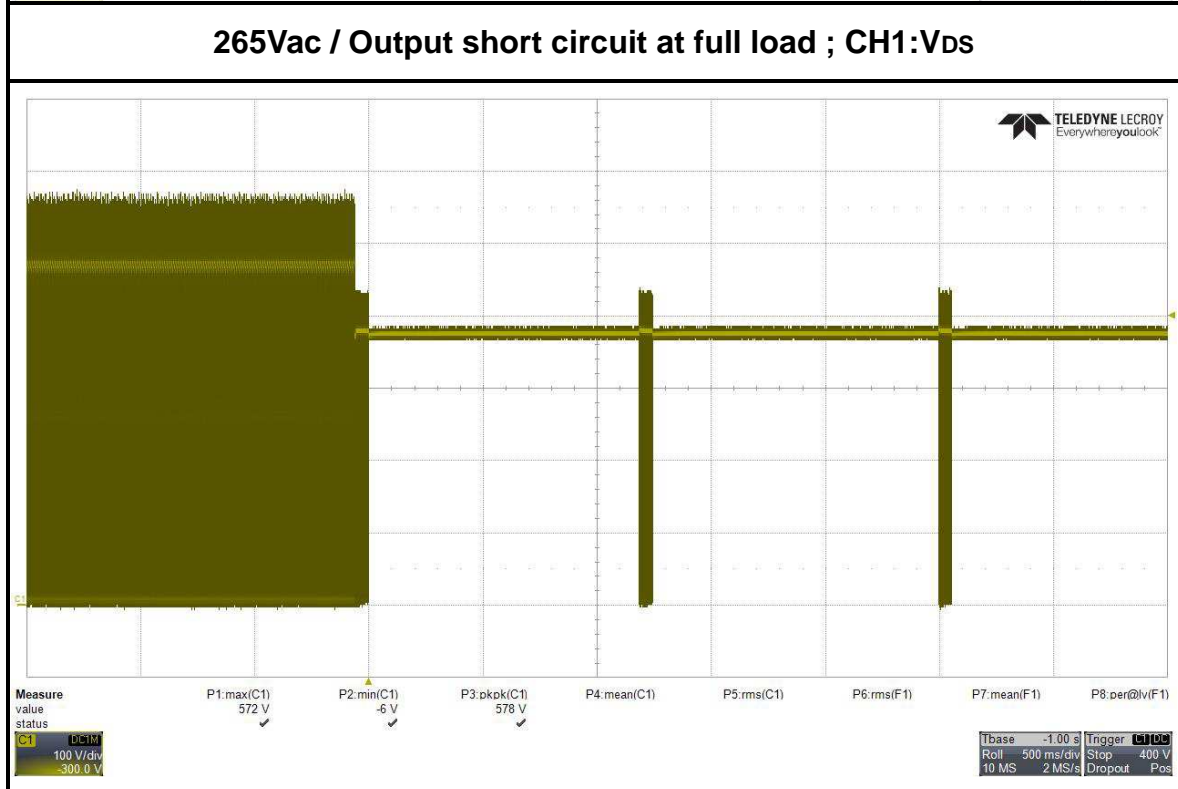
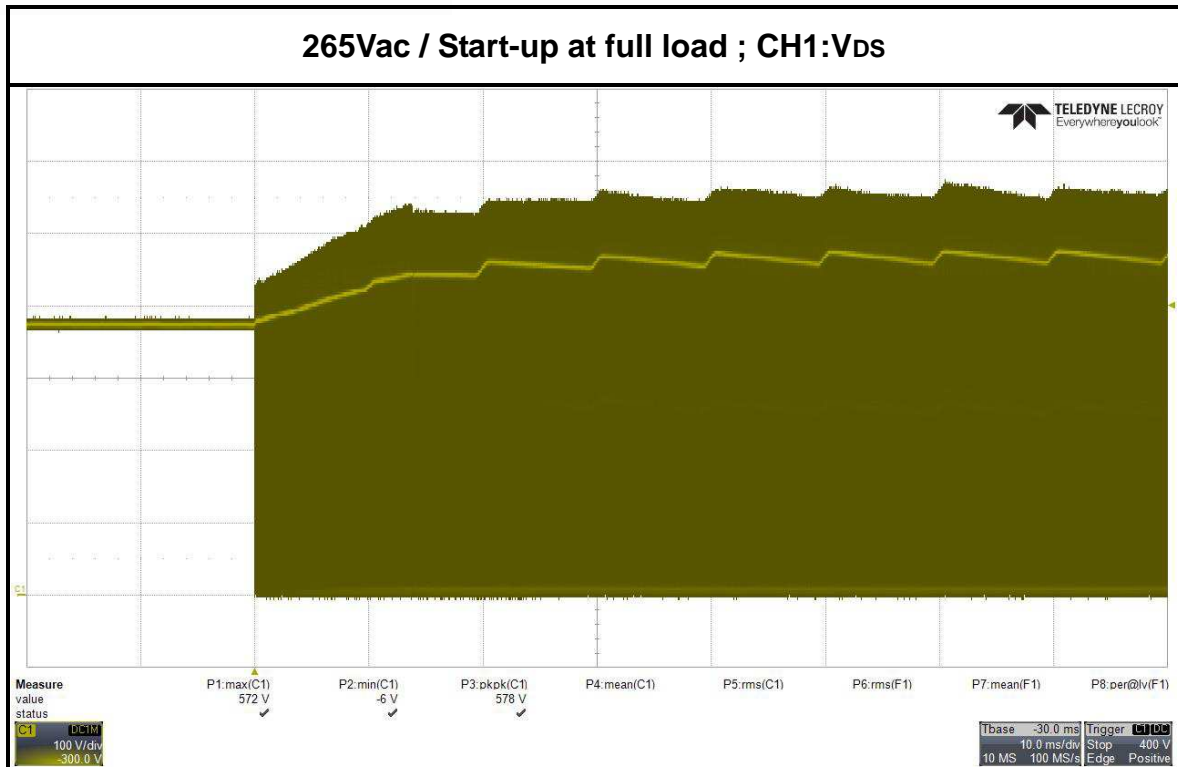
### 5.4.1 Voltage stress on MOSFET

Test Method	
Test Conditions	

#### Test Result

Input Voltage	Test Conditions	Stress on MOSFET	Component Rating
265Vac / 50Hz	Normal operation at full load	572	650V
	Start-up at full load	572	
	Output short at full load	572	

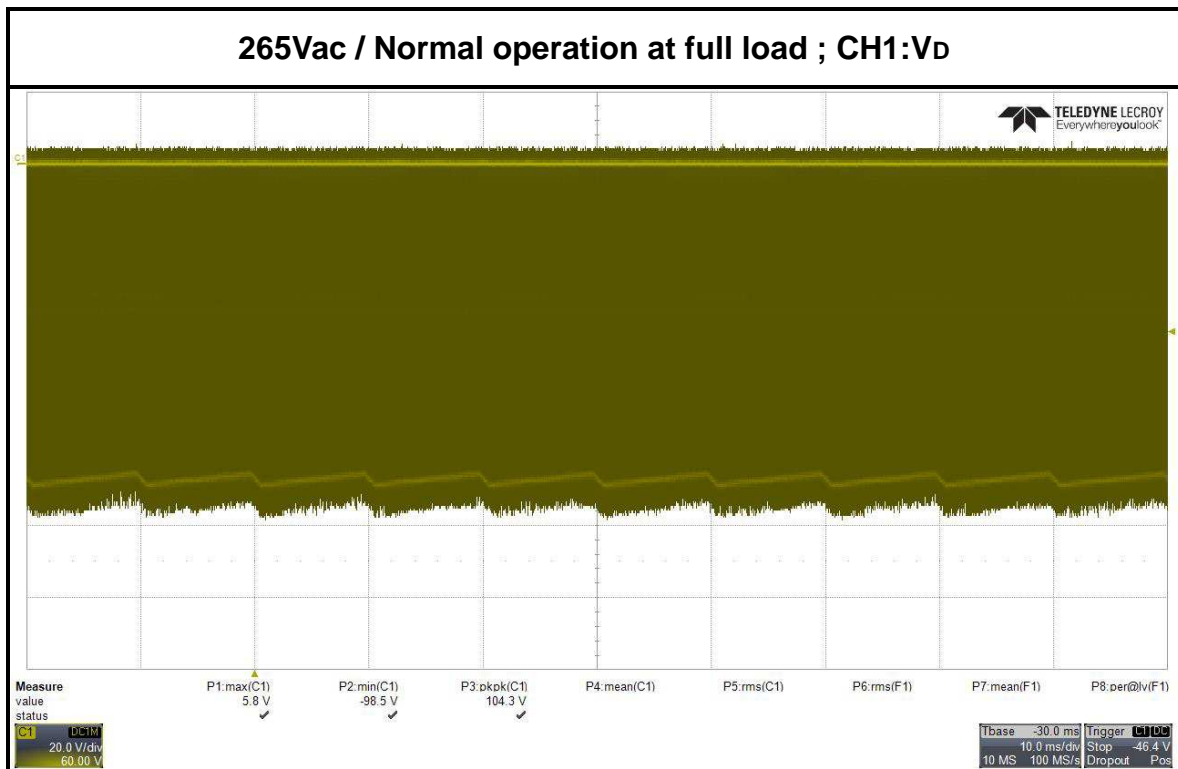


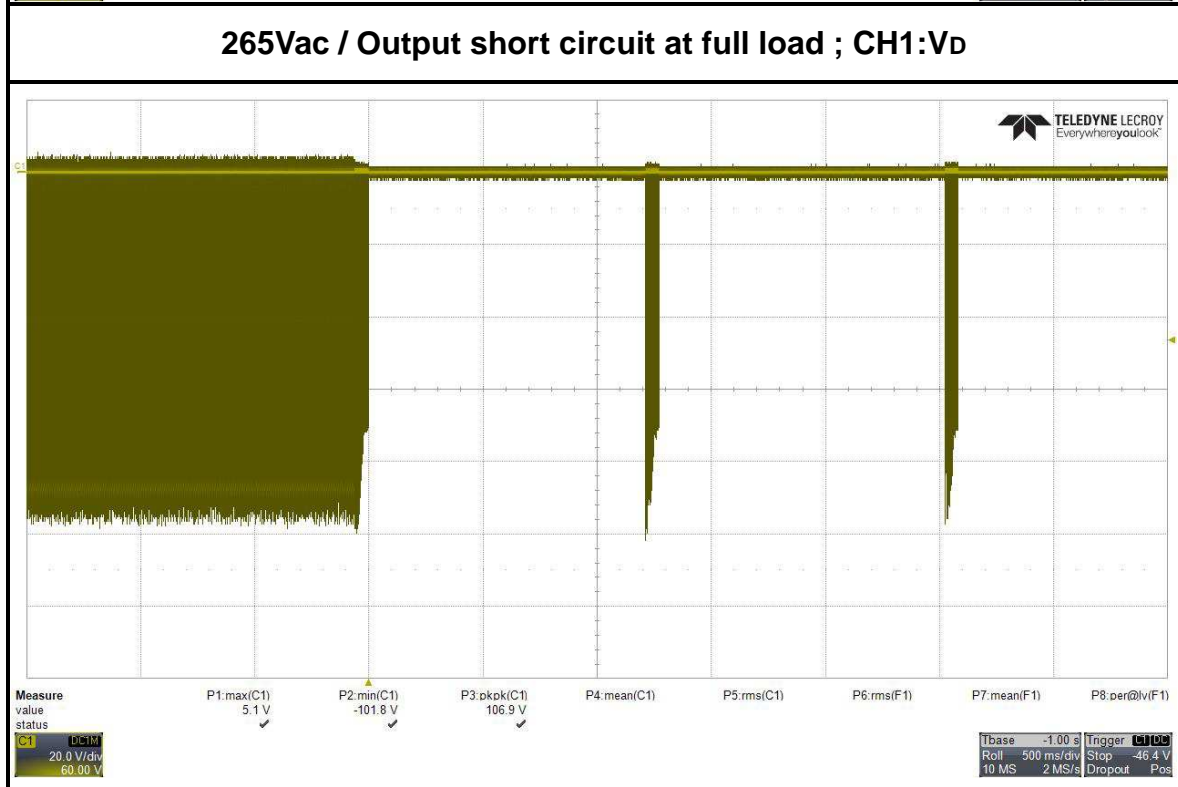
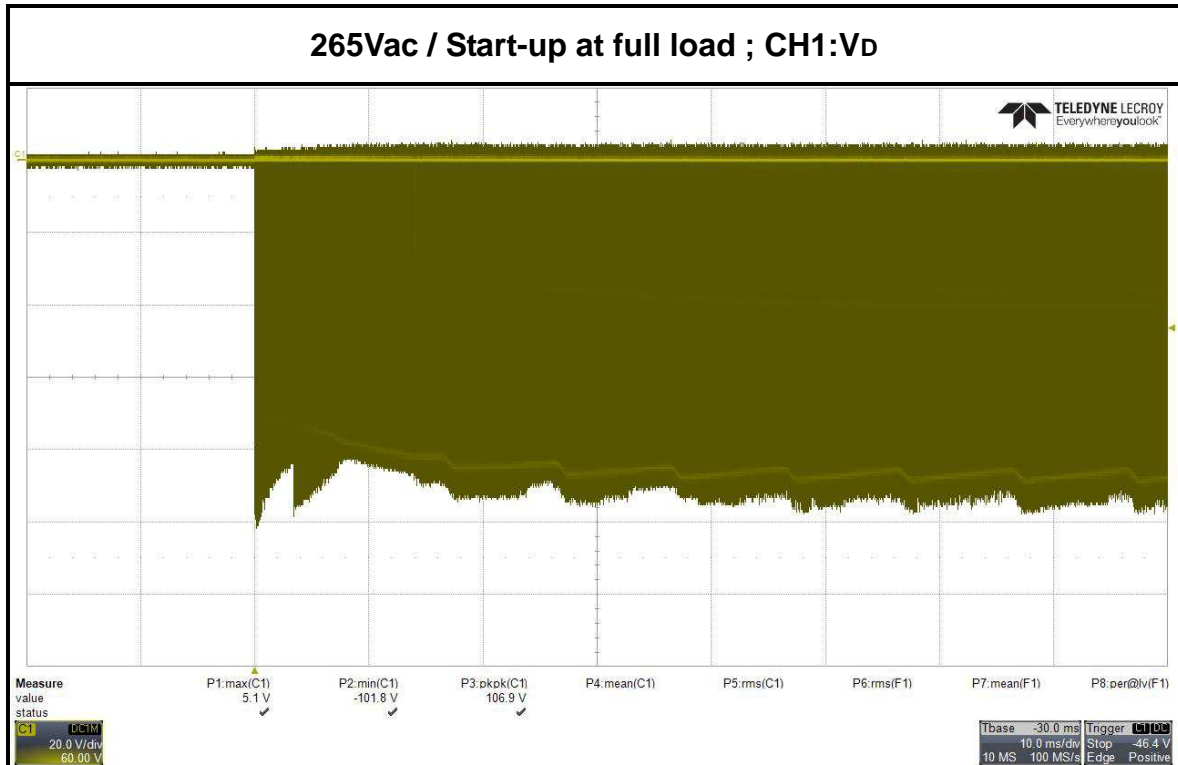


**5.4.2 Voltage stress on Secondary Rectifier Diode**

Test Method	
Test Conditions	

Input Voltage	Test Conditions	Stress on Diode	Component Rating
265Vac/50Hz	Normal operation at full load	98.5	120V
	Start-up at full load	101.8	
	Output short at full load	101.8	







5.5 Standard and safety

5.5.1 EMI (Test result is peak)

**Conduction - Line @ Vin = 110Vac/60Hz ; Output = Full Load**



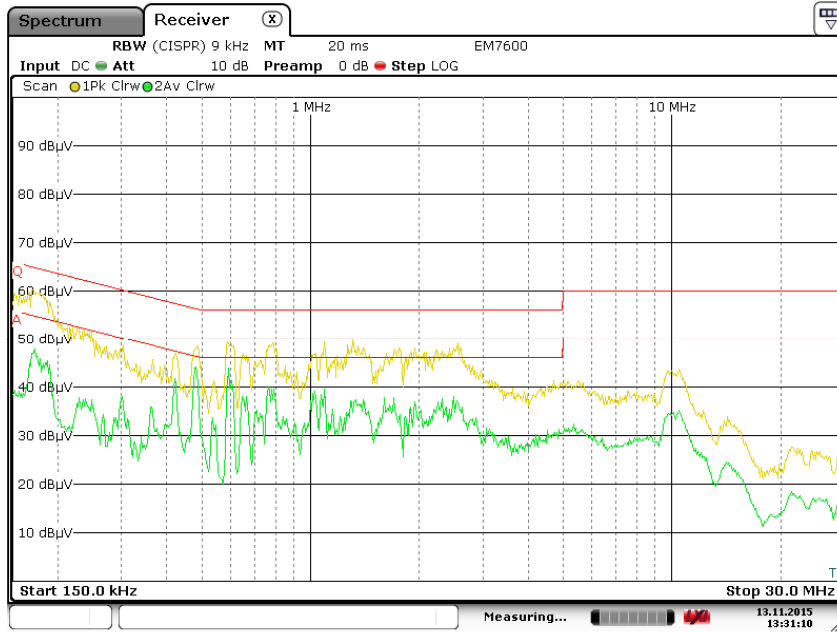
Date: 13.NOV.2015 13:34:01

**Conduction - Neutral @ Vin = 110Vac/60Hz ; Output = Full Load**



Date: 13.NOV.2015 13:28:17

**Conduction - Line @ Vin = 230Vac/50Hz ; Output = Full Load**



**Conduction - Neutral @ Vin = 230Vac/50Hz ; Output = Full Load**



**5.5.2 Safety (ESD & Surge)**

**ESD Test:**

Test Method	
Test Conditions	Applicable Standards: <b>IEC61000-4-2</b>

**Test Result**

IEC61000-4-2 ESD		
Testing Conditions		PSU Test Result
Contact Mode	Air Mode	
± 8KV	± 16KV	Pass
± 10KV	± 18KV	Pass
± 12KV	± 20KV	Pass

**Surge Test:**

Test Method	
Test Conditions	Applicable Standards: <b>IEC61000-4-5</b>

**Test Result**

IEC61000-4-5 Surge		
Testing Conditions		PSU Test Result
Line Coupling	Test Voltage	
L-FG	± 6kV	Pass
N-FG	± 6kV	Pass
LN-FG	± 6kV	Pass
L-N	± 5kV	Pass

**6. Bill of Material**

COMPONENT	SPECIFICATION	LOCATION	Q'TY
品 名	規 格	位 置	數 量
<b>Resistor</b>			
SMD Resistor	1kΩ±5% 1/4W 1206 RoHS	R1, R2	2
SMD Resistor	200kΩ±5% 1/4W 1206 RoHS	R3, R3A	2
SMD Resistor	0Ω±5% 1/8W 0805 RoHS	R4, R24	2
SMD Resistor	100Ω±5% 1/4W 1206 RoHS	R8	1
SMD Resistor	10Ω±5% 1/4W 1206 RoHS	R8A	1
SMD Resistor	470Ω±1% 1/4W 1206 RoHS	R9	1
Dip Resistor	0.16Ω±1% 1W NKNP RoHS	R10	1
SMD Resistor	3Ω±1% 1/4W 1206 RoHS	R10A	1
SMD Resistor	2.2Ω±5% 1/4W 1206 RoHS	R11	1
SMD Resistor	47Ω±5% 1/4W 1206 RoHS	R12, R12A	2
SMD Resistor	2kΩ±5% 1/8W 0805 RoHS	R13	1
SMD Resistor	5.1kΩ±5% 1/8W 0805 RoHS	R14	1
SMD Resistor	51kΩ±5% 1/8W 0805 RoHS	R15	1
SMD Resistor	68kΩ±1% 1/8W 0805 RoHS	R16	1
SMD Resistor	11kΩ±1% 1/8W 0805 RoHS	R17	1
SMD Resistor	100kΩ±1% 1/8W 0805 RoHS	R17A, R20, R22	3
SMD Resistor	22.1kΩ±1% 1/8W 0805 RoHS	R21	1
NTC	SCK102R55 / ψ10	NTC1	1
<b>Capacitor</b>			
Electrolytic Capacitor	Rubycon BXW series: 120uF/400V±10% 105°C ψ18*30mm P=7.5mm RoHS	C1	1
SMD Capacitor	102±10% 500V X7R 1206 RoHS	C2, C8	2
SMD Capacitor	102±10% 50V X7R 0805 RoHS	C4	1
SMD Capacitor	221±10% 50V X7R 0805 RoHS	C5	1
SMD Capacitor	104±10% 50V X7R 0805 RoHS	C6, C12, C13	3
Electrolytic Capacitor	CHI LI TEH GR series: 10uF/50V±20% 105°C ψ5*11mm P=2mm RoHS	C7	1
Electrolytic Capacitor	CHI LI TEH GR series: 1000uF/25V±20% 105°C ψ10*15mm P=5mm RoHS	C9, C10	2
SMD Capacitor	103±10% 500V X7R 1206 RoHS	C16, C16A	2
X1 Capacitor	0.33uF/300V ±10% 17mm*9mm*16mm P=15mm RoHS	CX1	1
Y1 Capacitor	102±20% 250V ψ8 P=10mm RoHS	CY1	1
<b>Inductor</b>			
Line Filter	Size:12*6 max / ψ0.4*1 9Ts / 190uH / RoHS	LF1	1
Line Filter	Size:20*10 max / ψ0.45*1 53Ts / 10mH min / RoHS	LF2	1
Output Filter	Size:14.5*9 max / ψ0.8*1 6Ts / 200uH min / RoHS	L3	1
Transformer	RM-10 6Pin / Lm=570uH±5% / Lk=25uH max / Np: 0.45*1*42(2 Layer), Ns: 0.9*1*8(1 Layer/TEX), Na: 0.2*1*7(1 Layer) / RoHS	T1	1

Semiconductor			
Bridge Rectifier	GBU4J 4A/600V VF=1V(max) RoHS	BD1	1
FAST Diode	FFM107 1A/1000V VF=1.3V SMA RoHS	D1, D6, D7	3
FAST Diode	SRGC10DH 1A/200V VF=1.05V Trr=150ns SMA(Halogen-free type) RoHS	D2	1
Schottky Diode	V40120C 40A/120V VF=0.43V(max) TO-220AB RoHS	D3	1
FAST Diode	1N4148 200mA/75V SOD-323 RoHS	D4	1
N-MOSFET	SPA11N65C3 11A/650V 0.38Ω P-TO220-3-31 RoHS	Q1	1
IC	RT7789DGS	U1	1
Optocoupler	PC817(C-Type) Dip-4	U2	1
Shunt regulator	TL-431CSF SOT-23 3L RoHS	U3	1
Others			
Fuse	CQMST T5A/250V 8.5x4mmx7.5mm P=5mm RoHS	F1	1
Varistor	TVR-D series: TVR14471 470V±10% ψ14 P=7.5mm S-Type RoHS	MOV1	1
PCB	92mm*42mm*22mm FR-4 1.6mm 2oz 單面板 噴錫 RoHS		1
HEAT SINK	For Q1	HS1	1
HEAT SINK	For D3	HS2	1
平頭螺絲	平頭螺絲M3*6		2
螺帽	六角頭螺母 M3*0.5		2
Jumper	ψ0.6 L=29.5±0.5mm, H=3.5mm P=22.5mm TFL=21mm 冂字型	JP1	1
Jumper	ψ0.6 L=19.5±0.5mm, H=3.5mm P=12.5mm TFL=11mm 冂字型	JP2	1
Jumper	ψ0.6 L=22±0.5mm, H=3.5mm P=15mm TFL=13.5mm 冂字型	JP3	1
Jumper	ψ0.6 L=20.5±0.5mm, H=3.5mm P=13.5mm TFL=12mm 冂字型	JP4	1
Jumper	ψ0.6 L=17±0.5mm, H=3.5mm P=10mm TFL=8.5mm 冂字型	JP5	1
TFL套管	ψ1.0 / C1"+: L=8mm±0.5mm / JP1: L=21mm±0.5mm / JP2: L=11mm±0.5mm / JP3: L=13.5mm±0.5mm / JP4: L=12mm±0.5mm / JP5: L=8.5mm±0.5mm	C1+, JP1~JP5	1
熱縮套管	ψ8 L=20mm max	R10	1
絕緣膠帶	32mm For HS2	HS2	1

7. Transformer Specification

CORE SIZE : **RM-10**

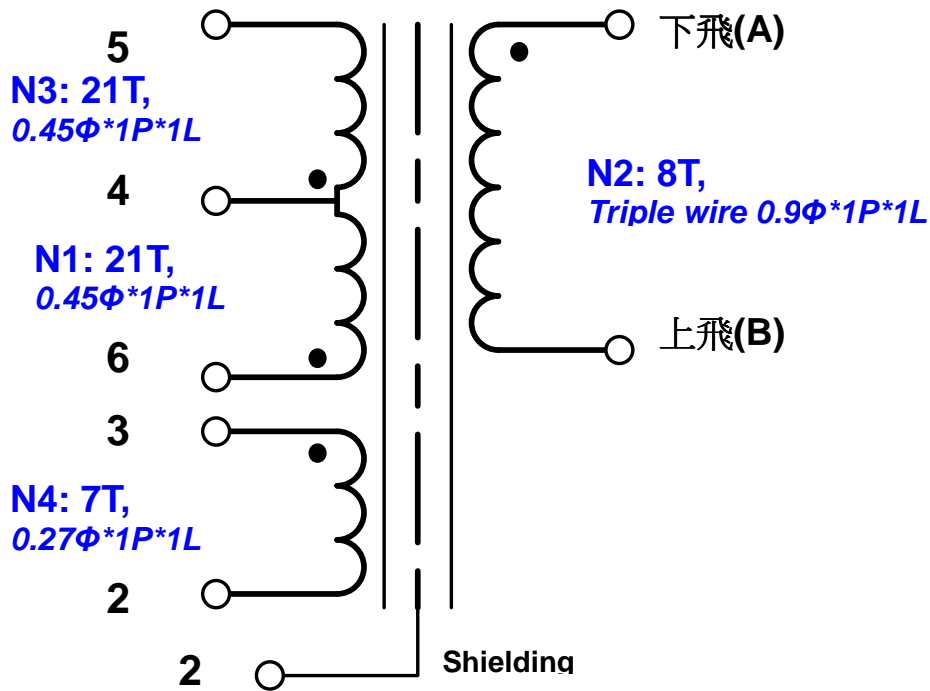
Material: **3C95**

Bobbin/PINs : **Vertical / 6 pins**

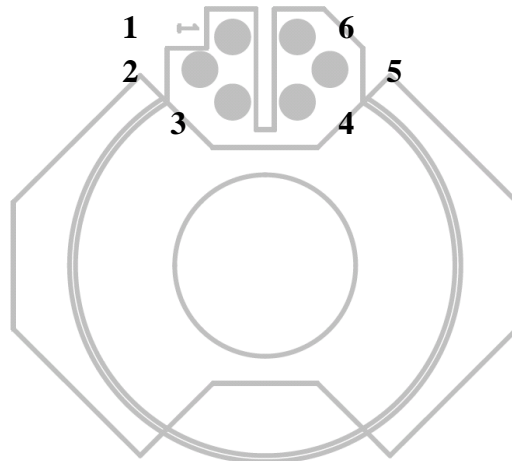
Primary inductor ( $\pm 5\%$ ) : **570uH**

Leakage inductor : **15uH (Maximum)**

Electrical :



Top View



**Transformer Structure:**

Winding No.	Pin	Wire & Wire Copper	Turns	Winding Tape	Tape Layer
<b>Bobbin</b>					
N1	6→4	0.45×1P×1L	21Ts	密繞	1L
E1	2	Cu Shielding(open)	1.2Ts	背膠	1L
N2	A→B	Triple wire 0.9×1P×1L	8Ts	密繞	1L
E2	2	Cu Shielding(open)	1.2Ts	背膠	1L
N3	4→5	0.45×1P×1L	21Ts	密繞	1L
N4	3→2	0.27×1P	7Ts	靠下邊密繞	1L
<b>Core-RM10</b>				<b>570uH</b>	<b>2L</b>

**Note1:** 繞製前 PIN1 先剪除，PIN4 吃錫後剪除

**Note2:** N2、N4 為 0.025t\*8w 的背銅繞製(開路)，焊 0.2 的引線於 PIN 2

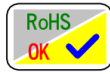
**Note3:** N3 的 A、B 均由二次側頂部進出飛線，A 加黑色 TFL Tube 起繞，B 加透明 TFL Tube 結束，線長均平 BN 頂部量起 30mm，不含吃錫 5mm

**Note4:** 變壓器組裝好後，在 CORE 外部加一圈 0.025t\*10w 的銅箔(短路)，焊 0.2 的引線於 PIN 2

**Note5:** 最後先在 CORE 底部貼 2 層膠帶(22mm)，然後沿著變壓器側邊貼 3 圈膠帶(19mm)

**Note6:** 真空涵浸(Varnished)

LF1 Specification

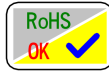


**SPECIFICATION FOR APPROVAL**

CUSTOMER	立 錫	DESCRIPTION	T9*5*3-C	CUSTOMER'S PART NO	T953-191Z			
1. MECHANICAL ASSEMBLY		2. SCHEMATIC						
A	12.0 MAX m/m							
B	6.0 MAX m/m							
C	10.0±1.5 m/m							
D	4.0 ref m/m							
E	4.0 ref m/m							
F	Φ0.4 m/m							
G	m/m							
H	m/m							
I	m/m							
J	m/m							
K	m/m							
L	m/m							
3. WINDING DATA :								
WDG	WIRE / MATL	TURNS	ST	FIN	INDUCTANCE	DCR <sub>MAX</sub>	SLEEVE	REMARK
N1	Φ0.4 TEX-E	9 (內)	1	4	190.0uH min	30mΩ	NO	並繞
N2	Φ0.4 uew2	9 (內)	2	3	190.0uH min	30mΩ	NO	
<ul style="list-style-type: none"> <li>● Test voltage : 500VDC,5mA 3 SEC. between Winding to Core .</li> <li>● Insulation resistance : at 500VDC,more than 100MΩ.</li> <li>● Temperature range : -25℃~80℃.</li> <li>● Inductance measurement condition : 100KHz/1V (HP-4284A).</li> </ul>								
4. MATERIAL LIST:								
ITEM	MATERIAL	VENDOR		NO	CLASS			
CORE	A10,MA100,NC-10H N10,R10K	ACME,KAWATETSU,NICERA, ENCORE,VAKOS						
WIRE	UEW/U,UEW, UEW-4#,UEW-2	PACIFIC,TA WIN, JUNG SHING,FENG CHING		E201757,E317251, E174837,E172395	B			
	TEX-E,TIW-M,TLW-B	FURUKAWA,COSMOLINK,DAH JIN		E206440,E213764, E236542	B			
APPROVED	CHECKED	PREPARED	SAP NO.	DATE	REV	PAGE		
			13070804-2	29-JAN-16	1.0	1/1		
安星企業股份有限公司 AIN HSIN ELECTRONICS CO., LTD.								



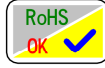
LF2 Specification



**SPECIFICATION FOR APPROVAL**

CUSTOMER	立 錫	DESCRIPTION	TX16*9.1*4.7				CUSTOMER'S PART NO	待客戶提供	
1. MECHANICAL ASSEMBLY		2. SCHEMATIC				A	20.0 MAX m/m		
						B	10.0 MAX m/m		
						C	15.0±1.5 m/m		
						D	Φ0.45 m/m		
						E	m/m		
						F	m/m		
						G	m/m		
						H	m/m		
						I	m/m		
						J	m/m		
3. WINDING DATA :									
WDG	WIRE / MATL	TURNS	ST	FIN	INDUCTANCE	DCR <sub>MAX</sub>	SLEEVE	REMARK	
N1	Φ0.45 UEW-NY	53 ref	1	4	10.0mH min	150mΩ	NO		
N2	Φ0.45 UEW-NY	53 ref	2	3	10.0mH min	150mΩ	NO		
<ul style="list-style-type: none"> <li>● Test voltage : 500VDC,5mA 3 SEC. between Winding to Winding .</li> <li>● Insulation resistance : at 500VDC,more than 100MΩ.</li> <li>● Temperature range : -25℃~80℃.</li> <li>● Inductance measurement condition : 100KHz/1V (HP-4284A).</li> <li>● Core : TX16*9.1*4.7.</li> <li>● 兩繞組中間須加麥拉片0.5*2PCS且須點黑膠固定線與麥拉片.</li> </ul>									
4. MATERIAL LIST:									
ITEM	MATERIAL	VENDOR			NO	CLASS			
CORE	3E6	FERROXCUBE							
WIRE	UEWN/U,UEW-Y, UEY-2#,UEW-NY	PACIFIC,TA WIN, JUNG SHING,FENG CHING			E201757,E317251, E174837,E172395	B			
SEPARATE	LUMIRROR X-10 (S10)	TORAY INDUSTRIES INC.			E86511	VTM-2			
GLUE	EPOXY TH320	TIAN HUAN TECH (DONGGUAN)CO.,CTD.			E257593	V-0			
APPROVED	CHECKED	PREPARED	SAP NO.	DATE	REV	PAGE			
			13090401-2	04-SEP-13	1.1	1/1			
安星企業股份有限公司 AIN HSIN ELECTRONICS CO., LTD.									

L3 Specification



**SPECIFICATION FOR APPROVAL**

CUSTOMER	立 錫	DESCRIPTION	T10*5*5-C	CUSTOMER'S PART NO	待客戶提供			
1. MECHANICAL ASSEMBLY		2. SCHEMATIC		A	14.5 MAX m/m			
				B	9.0 MAX m/m			
				C	10.0±1.5 m/m			
				D	Φ0.8 m/m			
				E	m/m			
				F	m/m			
				G	m/m			
				H	m/m			
				I	m/m			
				J	m/m			
				K	m/m			
L	m/m							
3. WINDING DATA :								
WDG	WIRE / MATL	TURNS	ST	FIN	INDUCTANCE	DCR <sub>MAX</sub>	SLEEVE	REMARK
N1	Φ0.8 UEW-NY	6內	1	4	200.0uH min	6mΩ	NO	並繞
N2	Φ0.8 TEX-E	6內	2	3	200.0uH min	6mΩ	NO	
<ul style="list-style-type: none"> <li>● Test voltage : 500VDC,5mA 3 SEC. between Winding to Core.</li> <li>● Insulation resistance : at 500VDC,more than 100MΩ (between lines).</li> <li>● Temperature range : -25℃~80℃.</li> <li>● Inductance measurement condition : 10KHz/0.1V (HP-4284A).</li> <li>● Core : T10*5*5-C...or Equivalent.</li> </ul>								
4. MATERIAL LIST:								
ITEM	MATERIAL	VENDOR		NO	CLASS			
CORE	A121,R12K	ACME,VAKOS						
WIRE	UEWN/U,UEW-Y, UEY-2#,UEW-NY	PACIFIC,TA WIN, JUNG SHING,FENG CHING		E201757,E317251, E174837,E172395	B			
	TEX-E,TIW-M	FURUKAWA,COSMOLINK		E206440,E213764	B			
APPROVED	CHECKED	PREPARED	SAP NO.	DATE	REV	PAGE		
		 工程部 30. AUG. 13 徐梓嚴	13072301-2	30-AUG-13	1.0	1/1		
安星企業股份有限公司 AIN HSIN ELECTRONICS CO., LTD.								

**DISCLAIMER**

The document contained in this communication and attachment is confidential and is for the use of the intended customers only. Any disclosure, copying or distribution of this report without Richtek's consent is strictly prohibited. If you are not the intended customers, please delete this report entirely without using, retaining, or disclosing any of its contents. This document is for information purposes only and shall not be construed as an offer or solicitation of an offer or an acceptance or a confirmation of any contract or transaction. All data or other information contained herein are not warranted to be complete and accurate and are subject to change without notice. Richtek reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its documents, products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. The document is under copy right protection.