



36 W Networking LD5523N & LD8926A81



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Revision: 01

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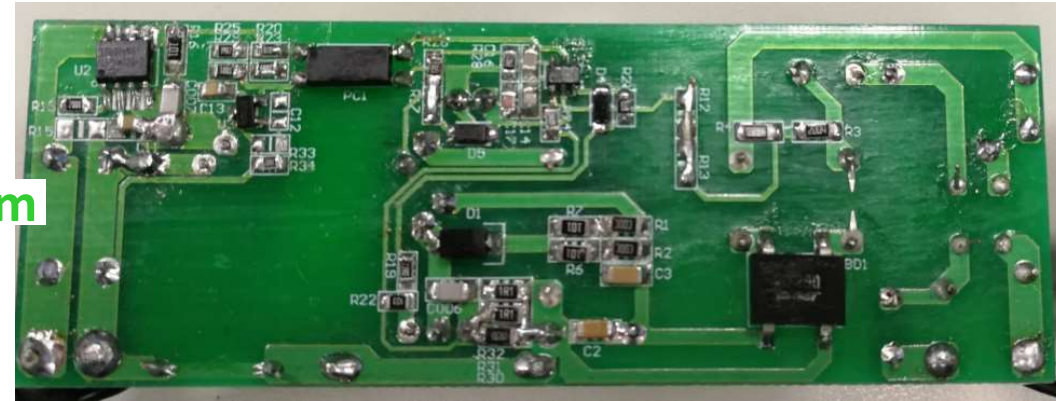
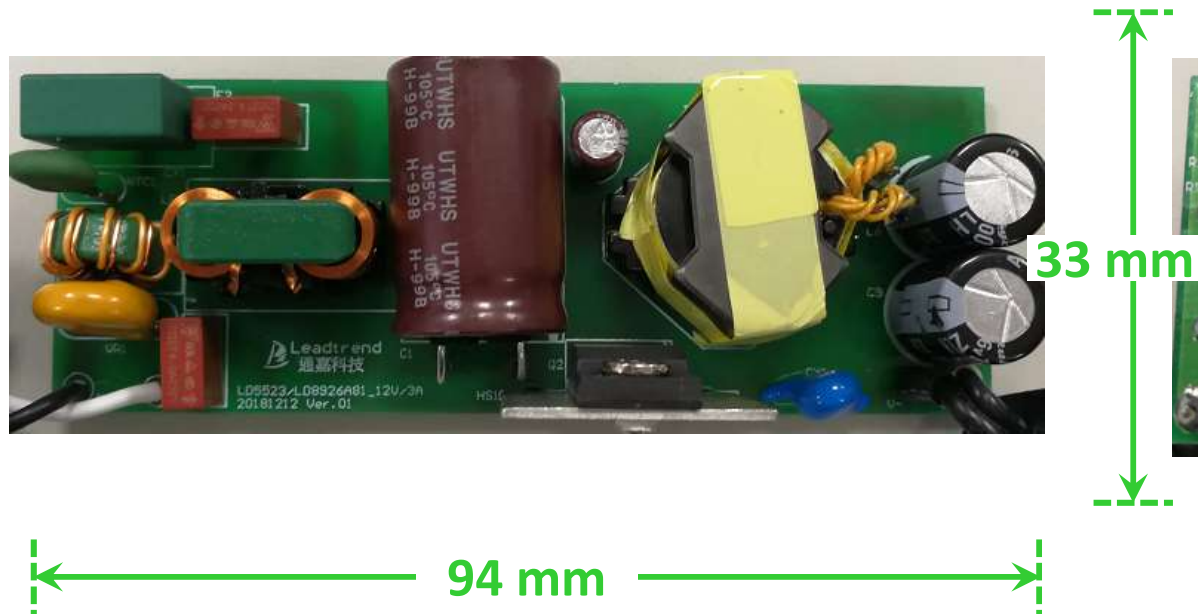
1. Specification

Item	Min.	Typ.		Max.	Test Result
Input Voltage (V _{AC})	90	115	230	264	—
Input Frequency (Hz)	47 / 60	60	50	63 / 50	—
Output Voltage (V)	12				—
Output Current (A)	3				—
Efficiency	CoC Tier 2				Pass
Standby Power (mW)	< 75				Pass
Output Voltage Accuracy (%)	< ± 5 (11.4 ~ 12.6 V)				Pass
Over Current Protection (%)	< 150				Pass
Ripple & Noise Voltage (mV)	< 120				Pass
Dynamic Load (%)	< ± 5 % of V _{OUT} (20 ↔ 80 % Load)		< ± 10 % of V _{OUT} (10 ↔ 90 % Load)		Pass
Turn-on Delay Time (S)	< 3				Pass
Hold-up Time (mS)	> 10 @ Typical AC Input				Pass
Rise Time (mS)	< 40				Pass
Overshoot (%)	< 10				Pass
AC Brown-in (V _{AC})	< 85				Pass
AC Brown-out (V _{AC})	< 85				Pass
EMI	EN55032 Class B				Pass

2. Outline

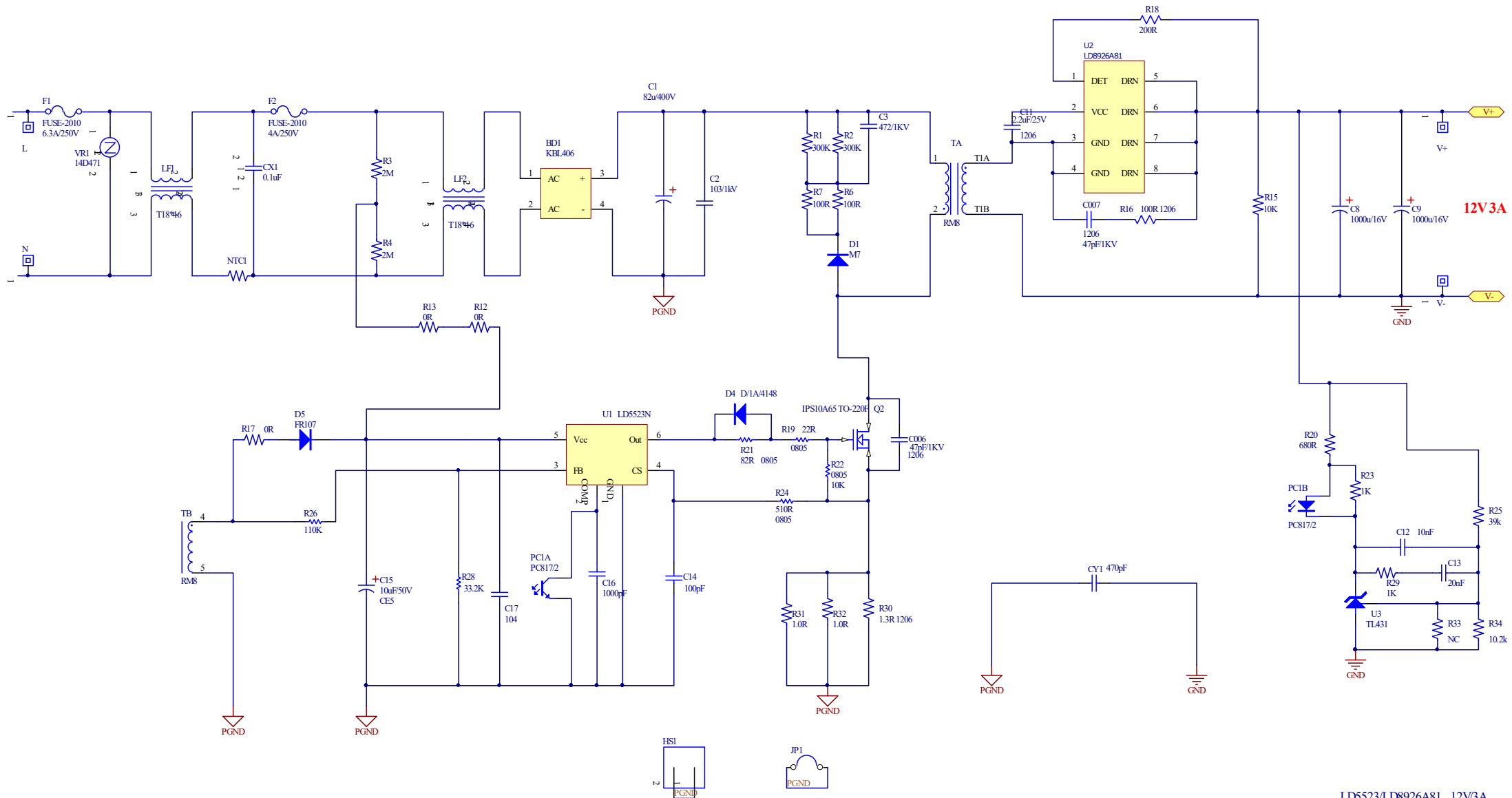
Top View

Bottom View



Side View

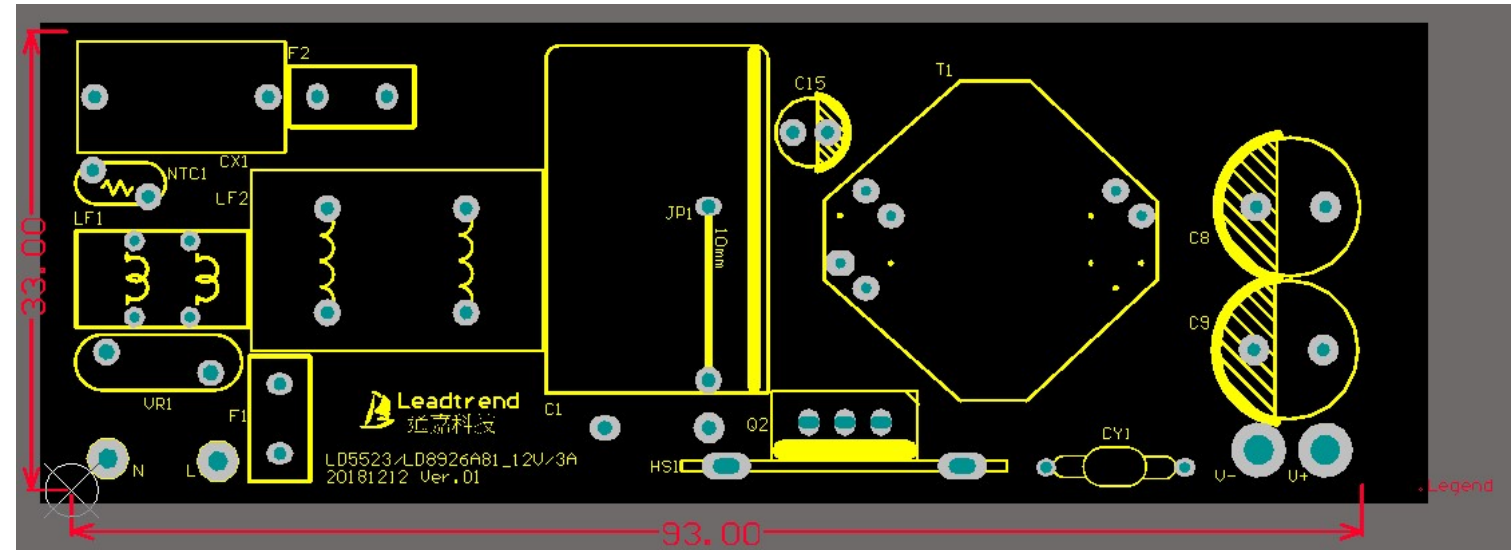
3. Schematic



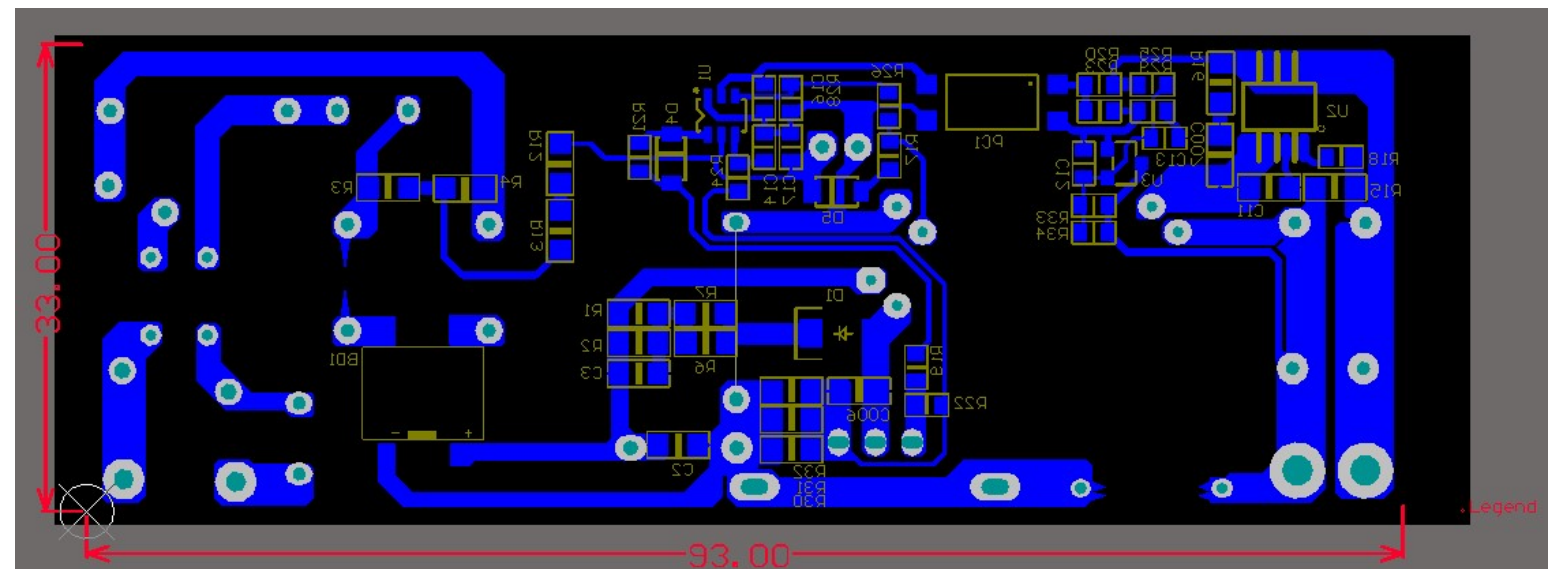
LD5523/LD8926A81 _12V/3A

4. PCB Layout

Top Side



Bottom Side



5. Bill of Materials

Designator	Footprint	Quantity	Value
BD1	SDIP4L	1	KBL406
C1	CEA16C-2	1	82u/400V
C2	C1206	1	103/1kV
C3	C1206	1	102/1KV
C11	C1206	1	2.2uF/25V,
C8, C9	CEA10	2	1000u/16V
C12	C0805	1	10nF
C13	C0805	1	20nF
C14	C0805	1	100pF/50V
C15	CEA5-1	1	10uF/50V
C16	C0805	1	1nF/50V
C17	C0805	1	104/50V
CX1	CX/15*8*15/H	1	0.22uF
CY1	CY7.5	1	470pF
D1	DO-214AC	1	M7
D4	SOD-123	1	D/1A/4148
D5	SOD-123	1	FR107

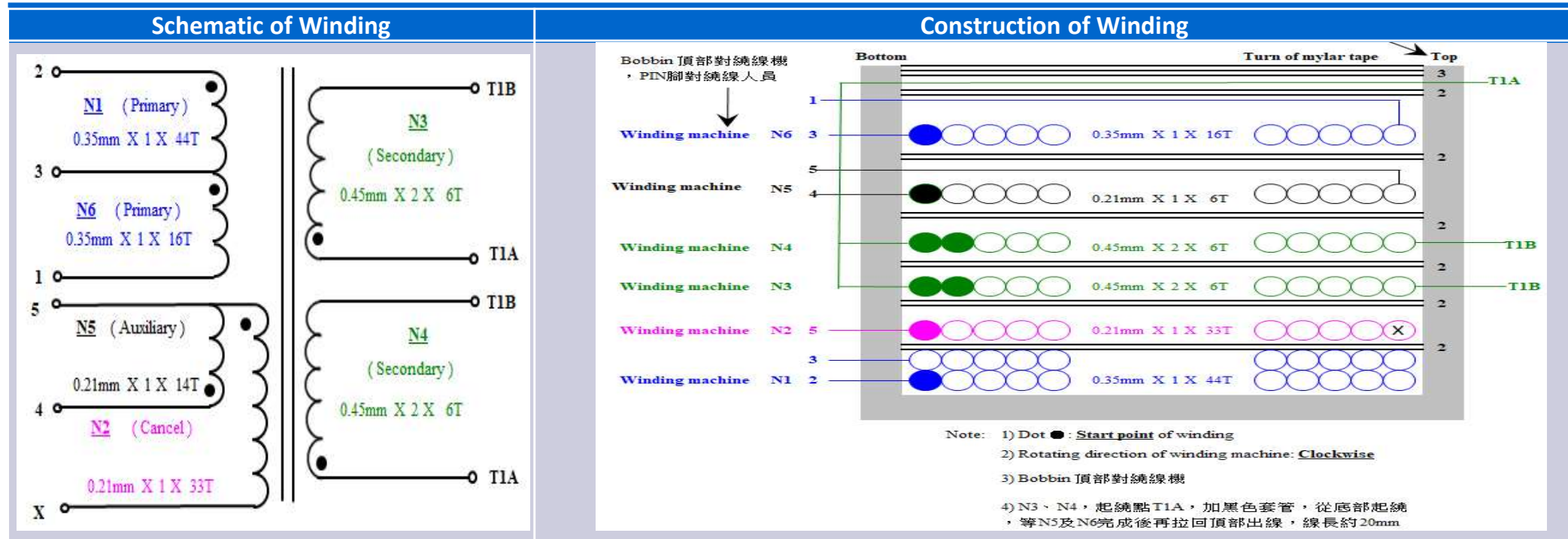
5. Bill of Materials

Designator	Footprint	Quantity	Value
F1	FU/SF	1	6.3A/250V
F2	FU/SF	1	4A/250V
HS1	HS	1	HS1
JP1	J(12.5mm)	1	JUMPER1
L, N	PAD1.5	2	PAD2
LF1	CORE	1	T12* 6* 4 , 240uH
LF2	ESQ1515	1	10mH
NTC1	SCK05	1	R_SMD
PC1	PC-SMT-P7.7	1	PC817/2
Q2	QTO-220G	1	IPS10A65 TO-220F
R1, R2	R1206	2	300K
R3, R4	R1206	2	2M
R6, R7	R1206	2	100R
R12, R13	R1206	2	0R
C007	C1206	1	331/1KV
R16	R1206	1	100R
R17	R0805	1	0R
R18	R0805	1	200R

5. Bill of Materials

Designator	Footprint	Quantity	Value
R19	R0805	1	22R
R20	R0805	1	300R
R21	R0805	1	82R
R22	R0805	1	10K
R23, R29	R0805	2	1K
R24	R0805	1	510R
R25	R0805	1	39K
R26	R0805	1	120K
R28	R0805	1	33.2K
R30	R1206	1	1.3R
R31, R32	R1206	2	1.1R
R33	R0805	1	NC
R34	R0805	1	10K
T1	RM8	1	RM8
U1	SOT-26	1	LD5523N
U2	SOP8	1	LD8926A81
U3	L-QSOT-23	1	TL431
線材	線材	1	20AWG , 1500mm
intel	CONNTER	1	C8
VR1	TVR10	1	10D561

6. Transformer Design



Winding No.	Pin No.		Winding Types	Number of Turns		Remarks	
	Start	Finish		Winding	Tape		
N1	2	3	0.35 mm X 1	44	1	N _p	Pin 朝人員順繞
N2	5	X	0.21 mm X 1	33	2	Cancel	Pin 朝人員順繞
N3	T1A	T1B	0.45 mm X 2	6	2	N _s	Pin 朝人員順繞 雙線並繞
N4	T1A	T1B	0.45 mm X 2	6	2	N _s	Pin 朝人員順繞 雙線並繞
N5	4	5	0.21 mm X 1	6	1	Aux	Pin 朝人員順繞
N6	3	1	0.35 mm X 1	16	1	N _p	Pin 朝人員順繞

Bobbin Shape	Core Material	A _e (mm ²)	L _p (μH)
RM8	KP44A	64	1,050 ± 5 % @ 75 kHz / 1 V



7. Efficiency

Input Voltage	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz
Output Current	100 %, 75 %, 50 %, 25 % of Full Load	
Measured Point of Output Voltage	End of Cable (20AWG / 1.5 m)	
Duration of Burn-in	30 Minutes	
Requirement	CoC Tier 2	

V _{IN,AC} (V / Hz)	V _{OUT} (V)	I _{OUT} (A)	P _{OUT} (W)	P _{IN} (W)	η (%)	η _{AV,4-Points} (%)	Requirement (%)
115 / 60	11.703	3	35.109	40.17	87.40%	88.91	> 87.4
	11.793	2.25	26.534	29.93	88.65%		
	11.877	1.5	17.816	19.78	90.07%		
	11.959	0.75	8.969	10.02	89.51%		
230 / 50	11.719	3	35.157	39.52	88.96%	89.34	> 87.4
	11.802	2.25	26.555	29.5	90.02%		
	11.882	1.5	17.823	19.84	89.83%		
	11.96	0.75	8.970	10.13	88.55%		

8. No Load Power Consumption

Input Voltage	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz
Output Current	0 A	
Requirement	< 75 mW (CoC Tier 2)	

V _{IN,AC} (V / Hz)	P _{IN} (mW)	Requirement (mW)
115 / 60	36	< 75
230 / 50	68	

9. Line / Load Regulation

Input Voltage	90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Output Current	No Load & Full Load			
Measured Point of Output Voltage	End of Cable 1.5m 20awg			
Requirement	< ± 5 %			

V _{IN,AC} (V / Hz)	V _{OUT} (V)		Requirement (V)
	0 A	3 A	
90 / 47	12.065	11.722	11.4 ~ 12.6
115 / 60	12.065	11.734	
230 / 50	12.065	11.741	
264 / 63	12.069	11.747	

10. Over Current Protection

Input Voltage		90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Requirement	Protection Mode	Auto Recovery			
	OCP Trigger Point	< 150 % of Full Load			

V _{IN,AC} (V / Hz)	I _{OUT,OCP} (A)	Protection Mode	Requirement
			OCP Trigger Point (A)
90 / 47	3.42	Auto Recovery	< 4.5A
115 / 60	3.86	Auto Recovery	
230 / 50	3.68	Auto Recovery	
264 / 63	3.62	Auto Recovery	

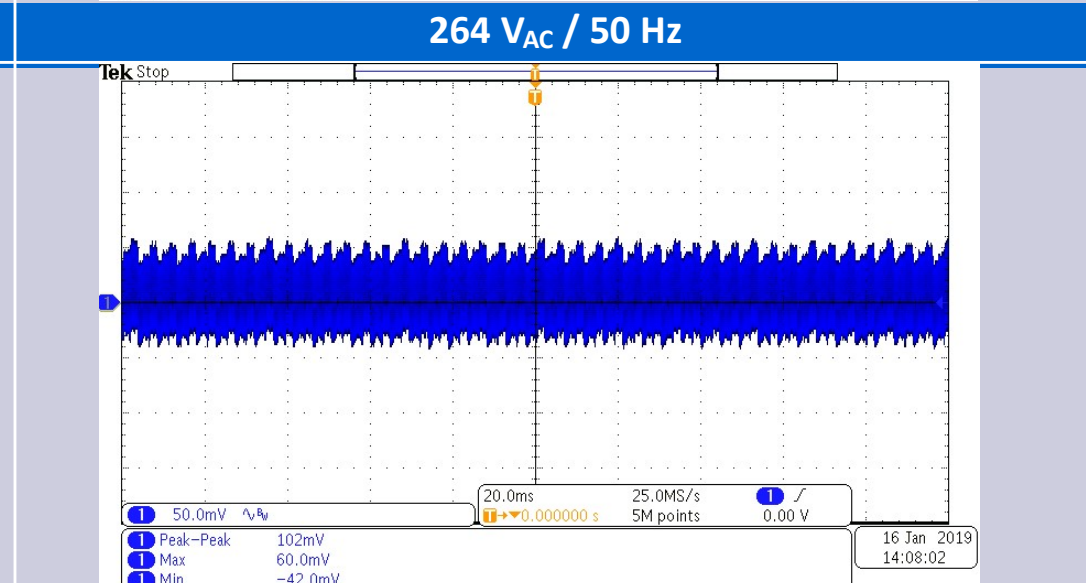
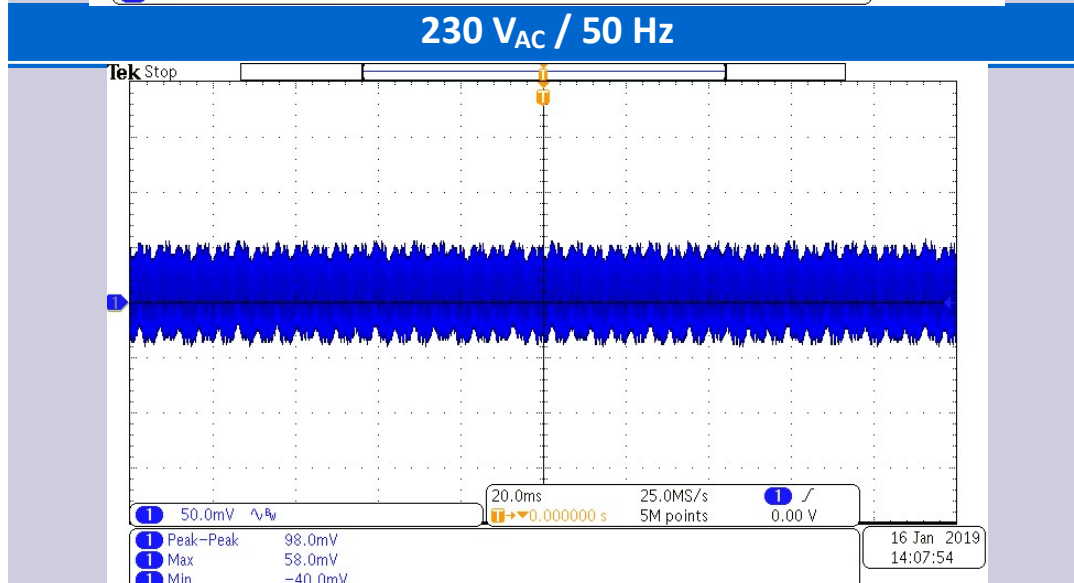
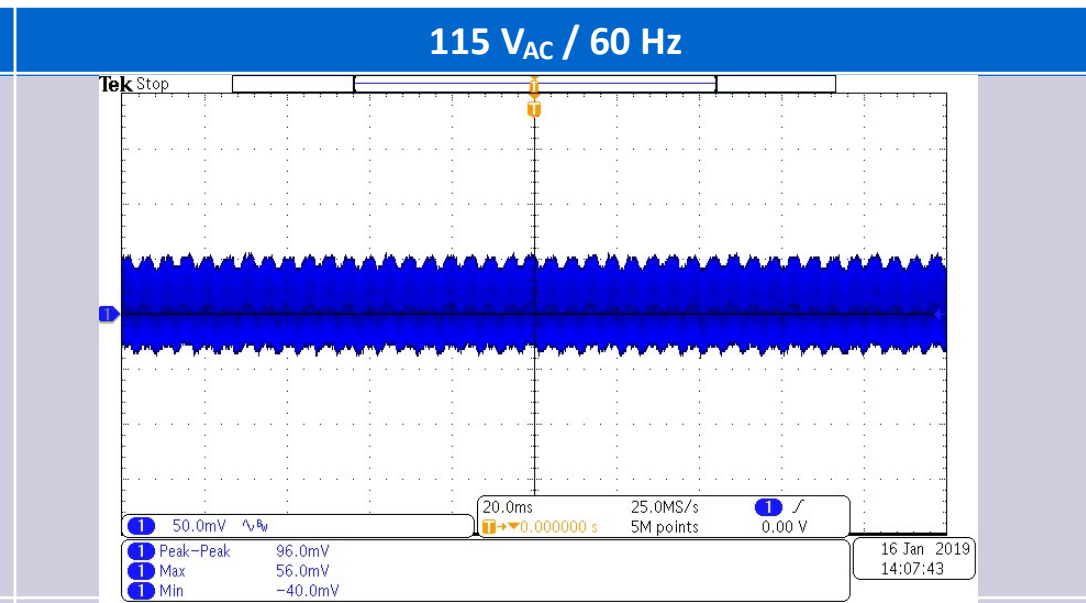
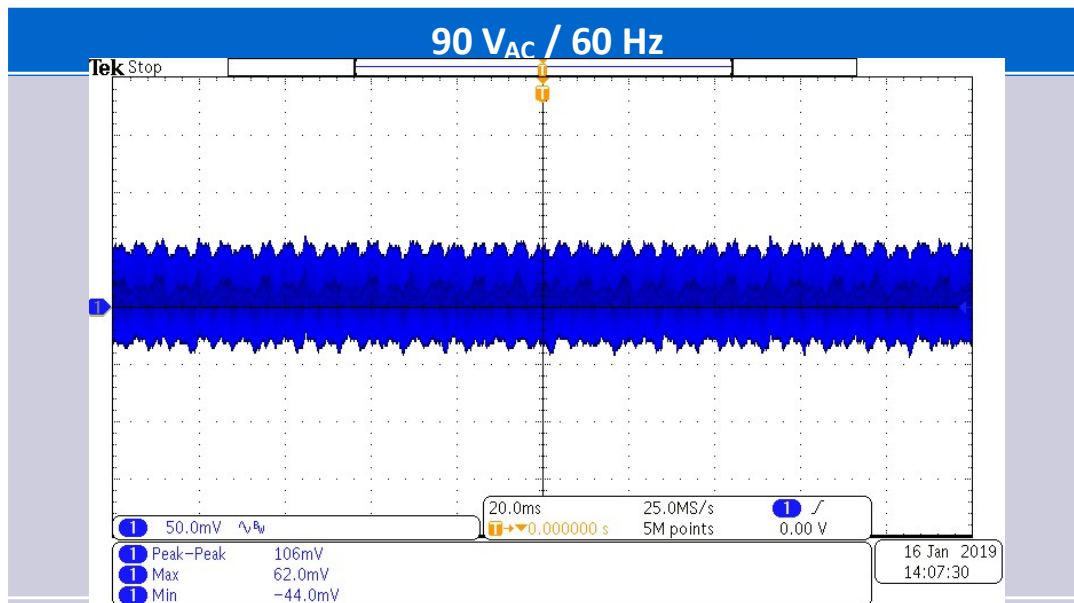
11. Ripple & Noise Voltage

Input Voltage	90 V _{AC} / 60 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 50 Hz
Output Current	No Load & Full Load			
Measured Point of Output Voltage	End of Cable			
Bandwidth	20 MHz (with 10 μ F E-cap & 0.1 μ F MLCC)			
Requirement	< 120 mV			

V _{IN,AC} (V / Hz)	V _{OUT,PK-PK} (mV)	Requirement (mV)
	3 A	
90 / 60	106	< 120
115 / 60	96	
230 / 50	98	
264 / 50	102	

11. Ripple & Noise Voltage (Cont.)

12 V / 3 A



12. Dynamic Load

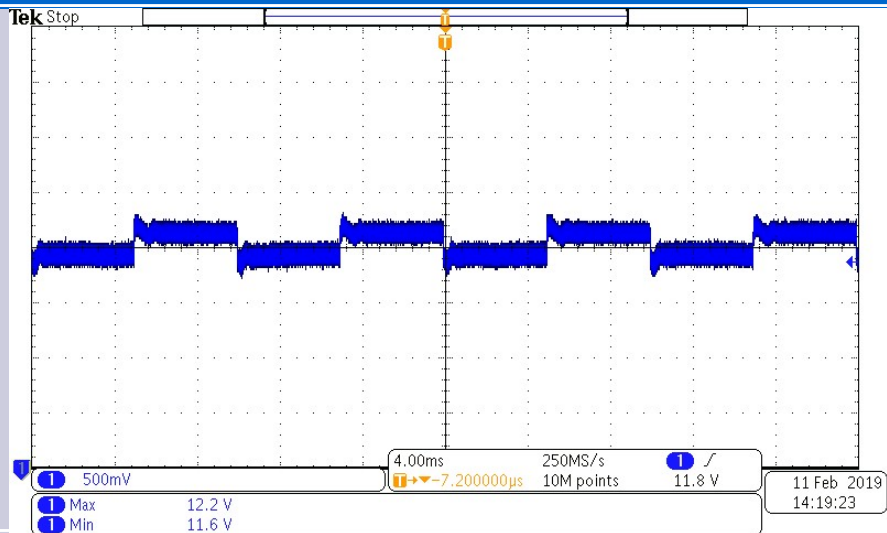
Input Voltage	90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Output Current	20 ↔ 80 % of Full Load (0.60 ↔ 2.40 A)		10 ↔ 90 % of Full Load (0.3 ↔ 2.7 A)	
Frequency of Load	100 Hz (5 mS High / 5 mS Low)			
Slew Rate of Load	2.5 A / μS			
Measured Point of Output Voltage	End of Cable			
Requirement	< ± 5 % of V _{OUT} (20 ↔ 80 % Load)		< ± 10 % of V _{OUT} (10 ↔ 90 % Load)	

Load (%)	V _{IN,AC} (V / Hz)	V _{OUT} (V)		Requirement (V)
		Min.	Max.	
20 ↔ 80	90 / 47	11.6	12.2	11.4 ~ 12.6
	115 / 60	11.6	12.2	
	230 / 50	11.6	12.2	
	264 / 63	11.6	12.2	
10 ↔ 90	90 / 47	11.5	12.3	11.4 ~ 12.6
	115 / 60	11.5	12.3	
	230 / 50	11.5	12.3	
	264 / 63	11.5	12.3	

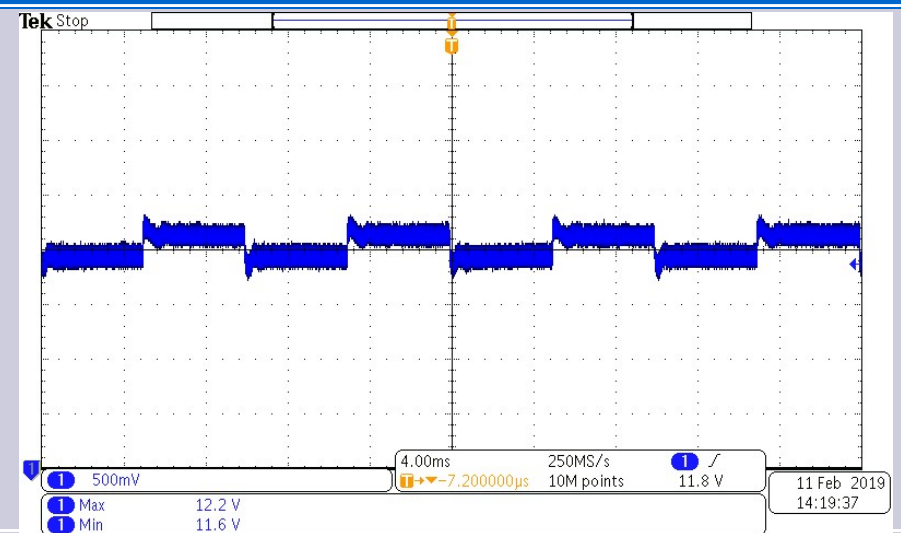
12. Dynamic Load (Cont.)

Load: 20 $\leftrightarrow$ 80 %

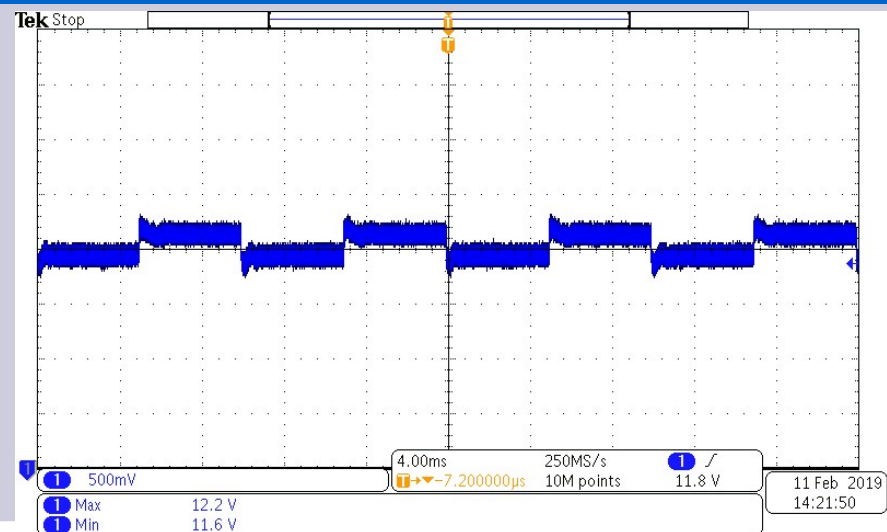
90 V_{AC} / 47 Hz



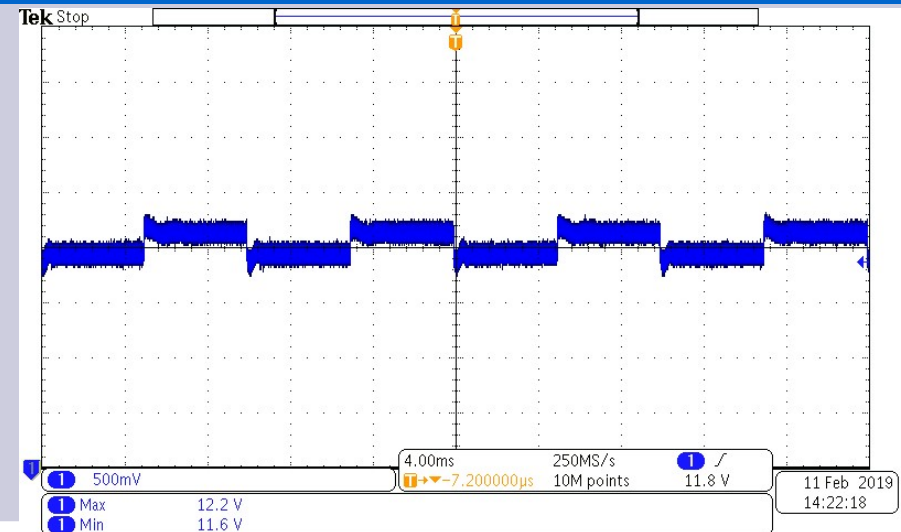
115 V_{AC} / 60 Hz



230 V_{AC} / 50 Hz



264 V_{AC} / 63 Hz



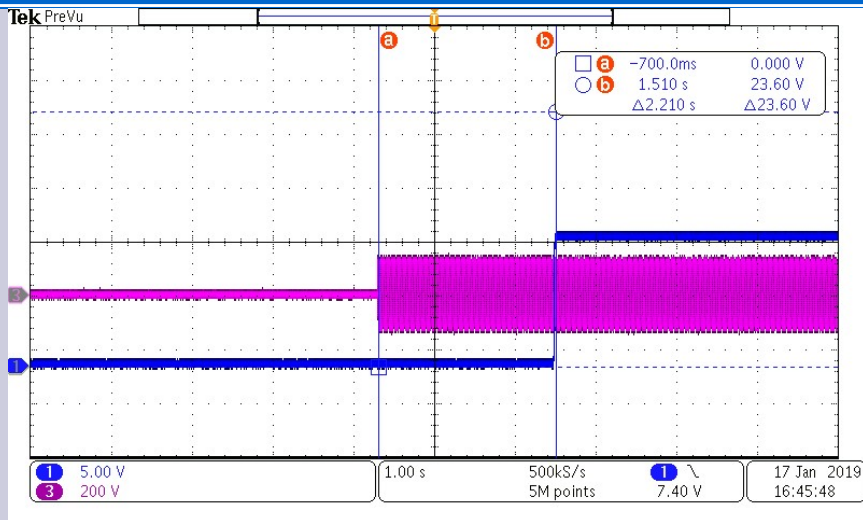
13. Turn-on Delay Time

Input Voltage	90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Output Current	Full Load			
Measured Point of Output Voltage	End of Cable			
Requirement	< 3 S			

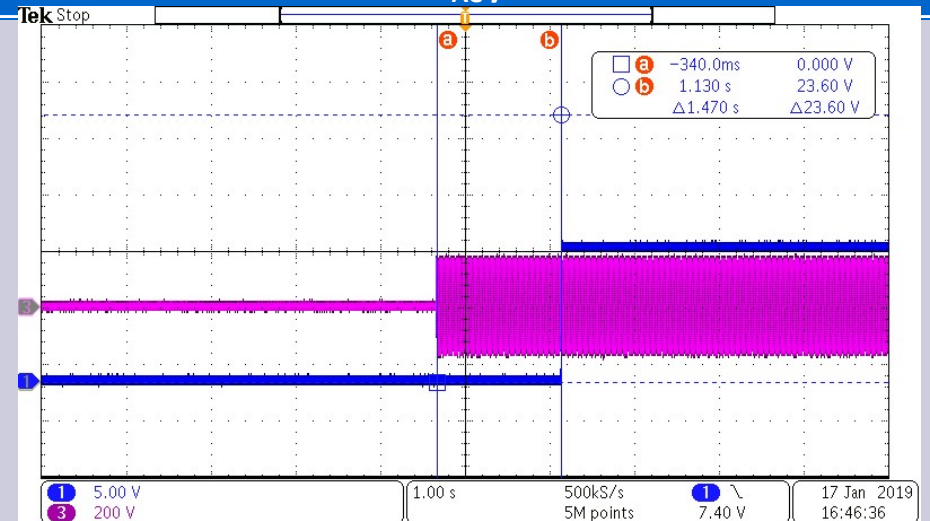
V _{IN,AC} (V / Hz)	T _{ON} (S)	Requirement (S)
90 / 47	2.21	< 3
115 / 60	1.47	
230 / 50	0.66	
264 / 63	0.53	

13. Turn-on Delay Time (Cont.)

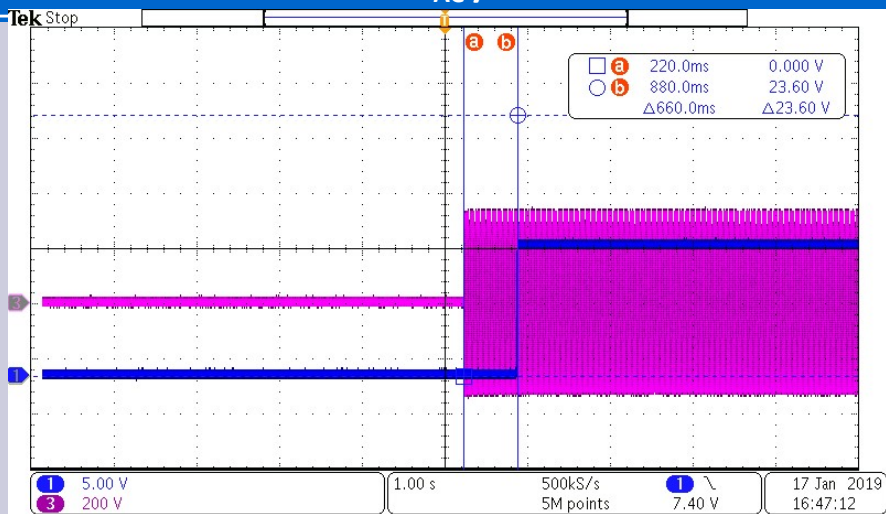
90 V_{AC} / 47 Hz



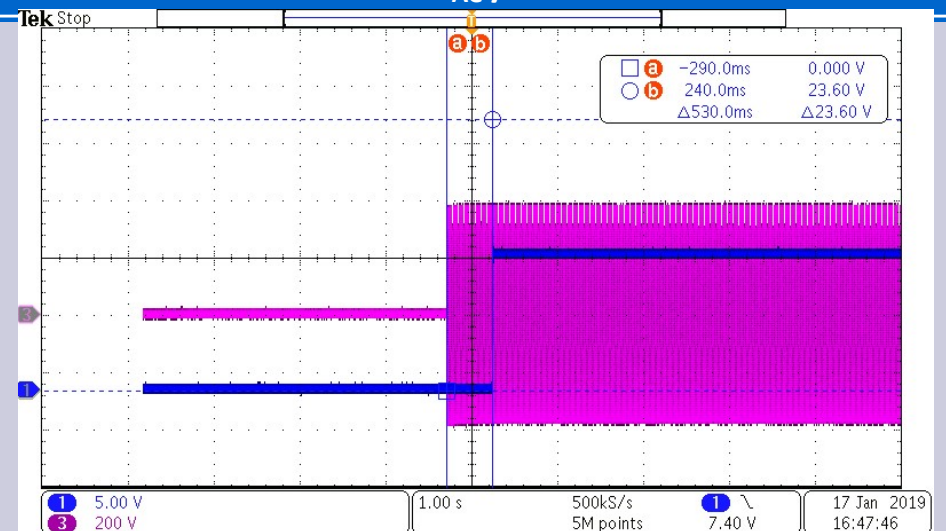
115 V_{AC} / 60 Hz



230 V_{AC} / 50 Hz



264 V_{AC} / 63 Hz

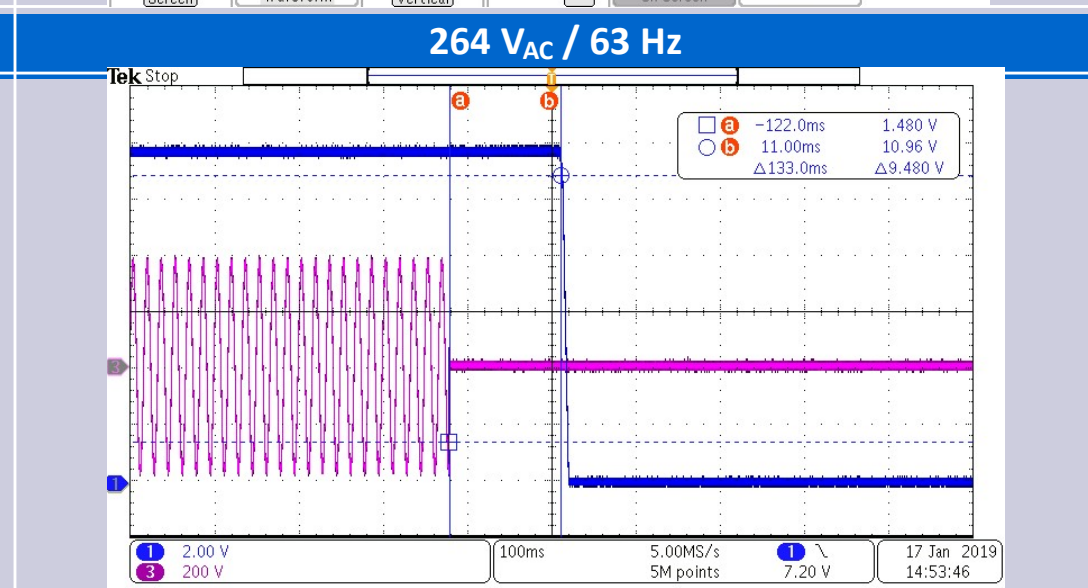
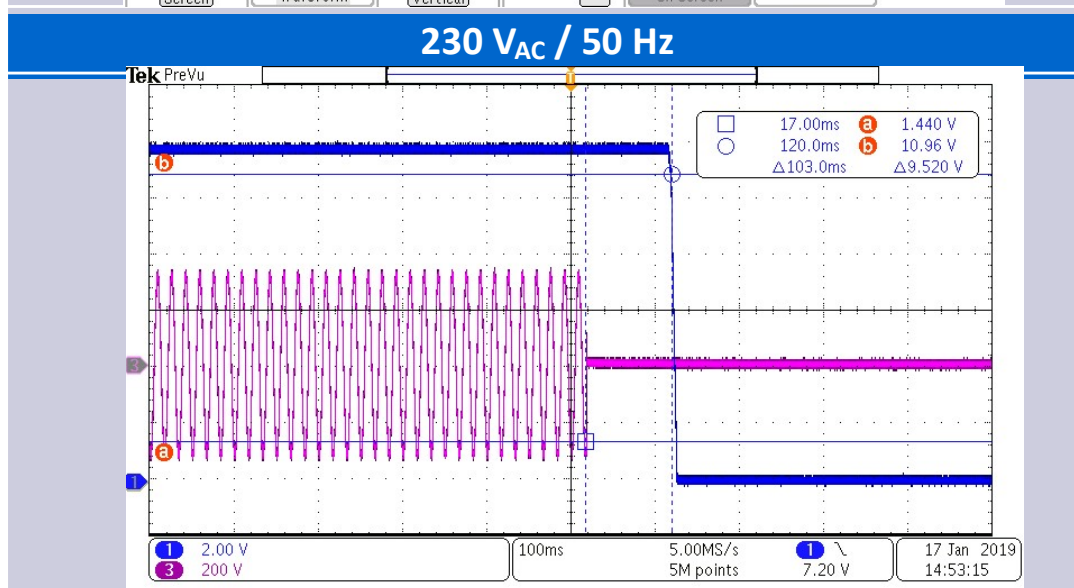
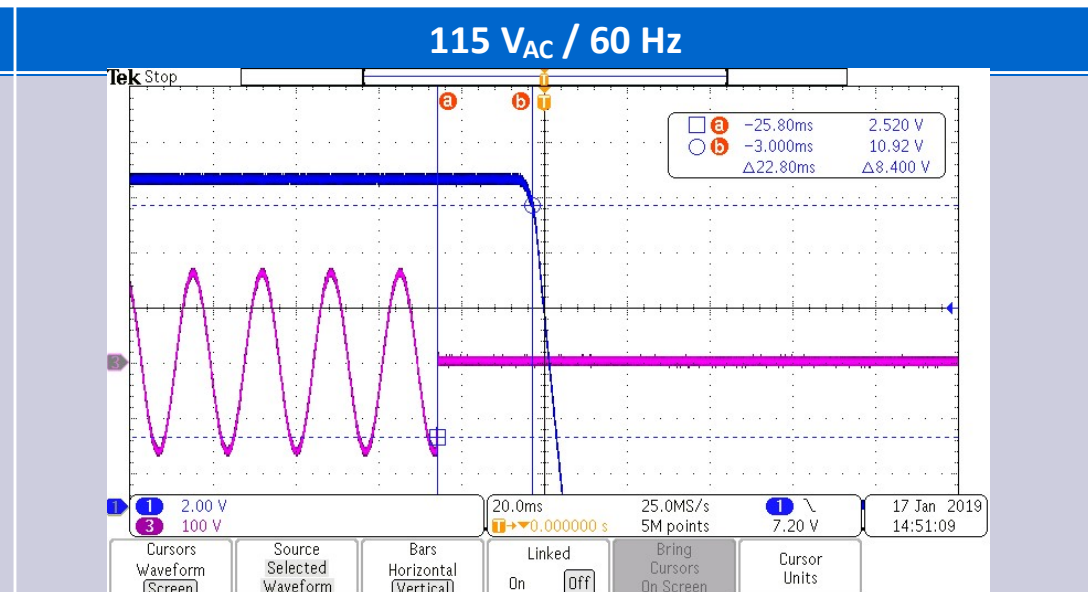
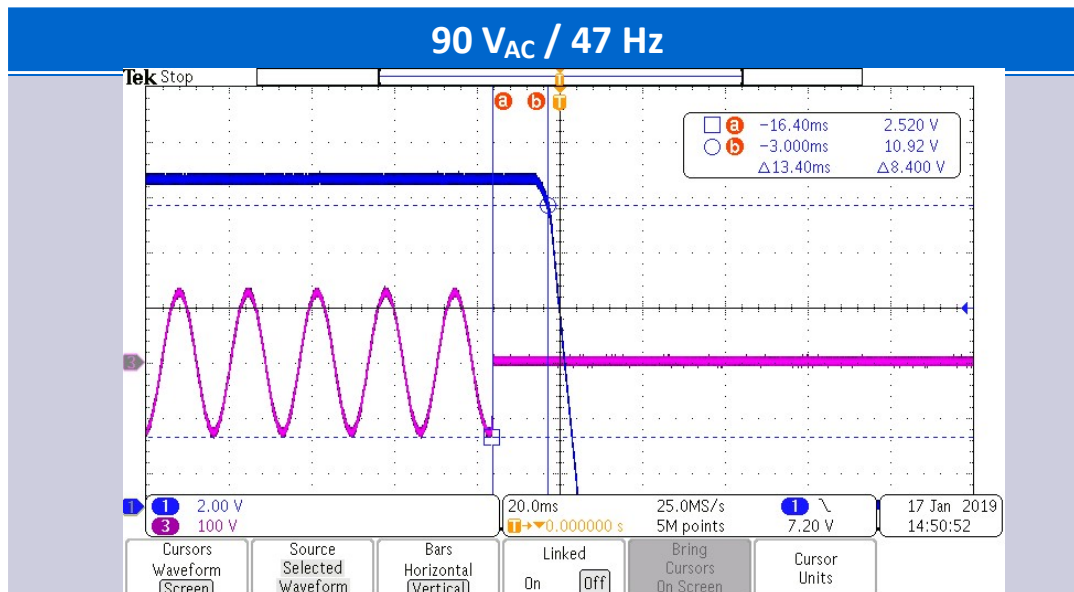


14. Hold-up Time

Input Voltage	90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Output Current	Full Load			
Measured Point of Output Voltage	End of Cable			
Angle of AC Off	0 °			
Requirement	> 10 mS @ Typical AC Input			

V _{IN,AC} (V / Hz)	T _{HOLD-UP} (mS)	Requirement (mS)
90 / 47	13.4	> 10
115 / 60	22.8	> 10
230 / 50	103	> 10
264 / 63	133	> 10

14. Hold-up Time (Cont.)



15. Rise Time & Overshoot

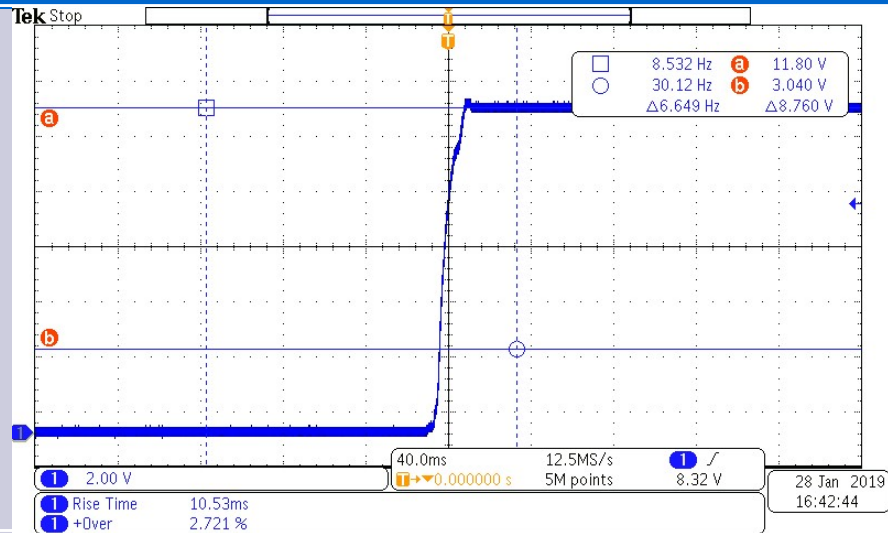
Input Voltage		90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Output Current		Full Load			
Measured Point of Output Voltage		End of Cable			
Requirement	Rise Time	< 40 mS			
	Overshoot	< 10 %			

V _{IN,AC} (V / Hz)	T _{RISE} (mS)	Requirement (mS)
90 / 47	10.53	< 40
115 / 60	9.352	
230 / 50	9.18	
264 / 63	10.01	

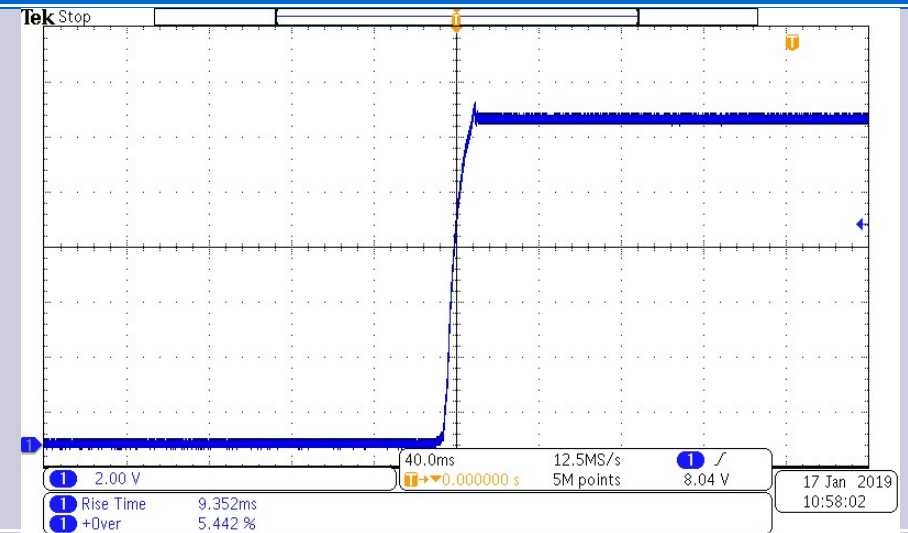
V _{IN,AC} (V / Hz)	Overshoot (%)	Requirement (%)
90 / 47	2.721	< 10
115 / 60	5.442	
230 / 50	4.08	
264 / 63	4.08	

15. Rise Time & Overshoot (Cont.)

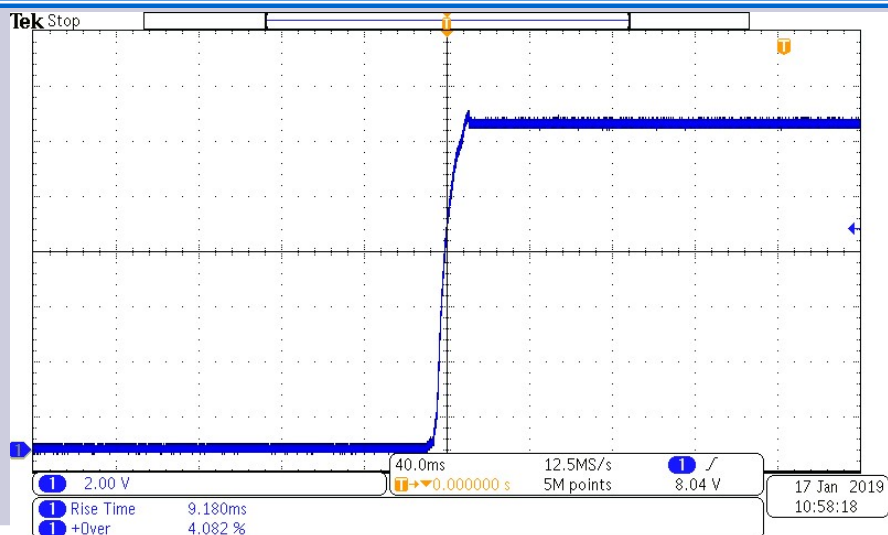
90 V_{AC} / 47 Hz



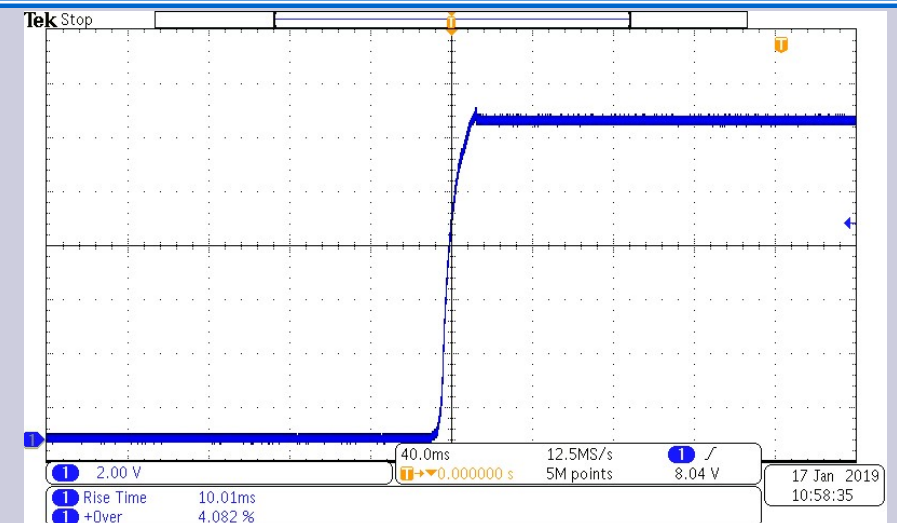
115 V_{AC} / 60 Hz



230 V_{AC} / 50 Hz



264 V_{AC} / 63 Hz



16. AC Brown-in

Output Current	No Load & Full Load
Measured Point of Output Voltage	End of Cable
Requirement	< 85 V _{AC}

V _{BROWN-IN} (V)		Requirement (V _{AC})
0 A	3A	
81	82	< 85

V _{BROWN-OUT} (V)		Requirement (V _{AC})
0 A	3 A	
77	78	< 85

18. Supply Voltage of IC

Input Voltage	90 V _{AC} / 47 Hz	115 V _{AC} / 60 Hz	230 V _{AC} / 50 Hz	264 V _{AC} / 63 Hz
Output Current	No Load & Full Load			
Requirement	> V _{CC_OFF} & < V _{CC_OVP}			

V _{IN,AC} (V / Hz)	V _{CC,U1} (V)					Requirement (V)
	0 A		1.5 A		1.5 A Turn-on Drop	
	Min.	Max.	Min.	Max.	Min.	
90 / 47	10.8	11.4	12.8	13.5	11.40	7.5 ~ 26.5
115 / 60	10.8	11.5	12.7	13.4	10.74	
230 / 50	10.8	11.6	12.6	13.2	11.64	
264 / 63	10.8	11.6	12.6	13.2	11.88	

19. Stress on Switching Parts

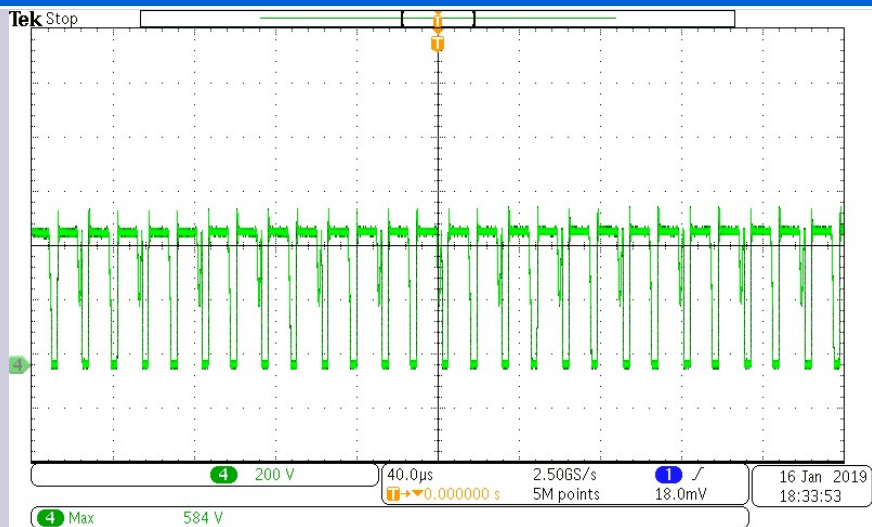
Input Voltage	264 V _{AC} / 63 Hz
Output Current	Full Load
Requirement	< 95 % De-rating

Location	Part No.	Condition	V _{DS} (V)	Requirement (V)
Q2	SVF10N65CF	Normal	584	< 617.5 (650 * 0.95)
		Turn-on	584	
		Short Circuit	584	

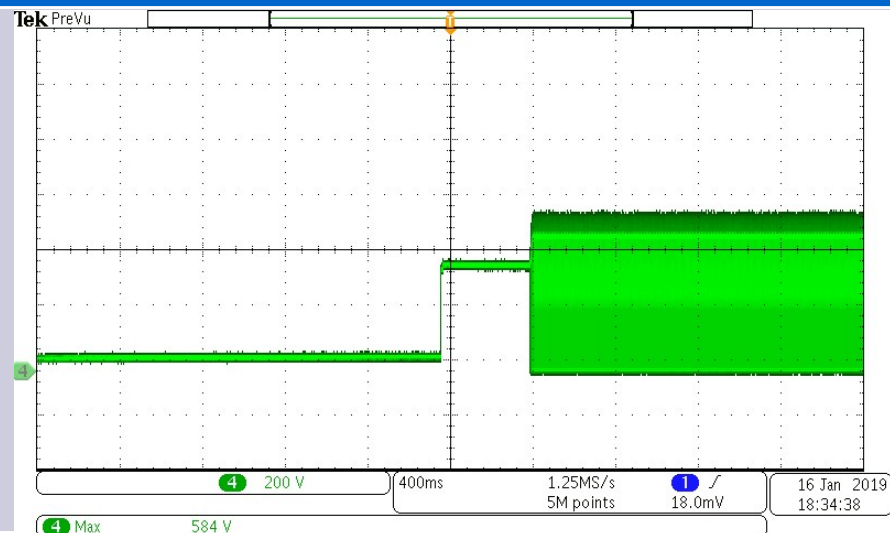
Location	Part No.	Condition	V _{RRM} (V)	Requirement (V)
U2	LD8926A81	Normal	50	< 76 (80 * 0.95)
		Turn-on	50.8	
		Short Circuit	70	

19. Stress on Switching Parts (Cont.)

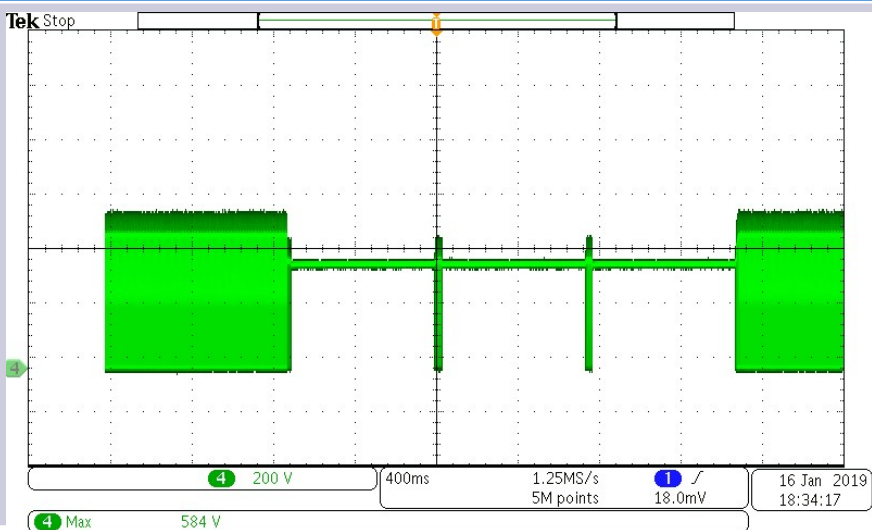
Q2_Normal



Q2_Turn-on

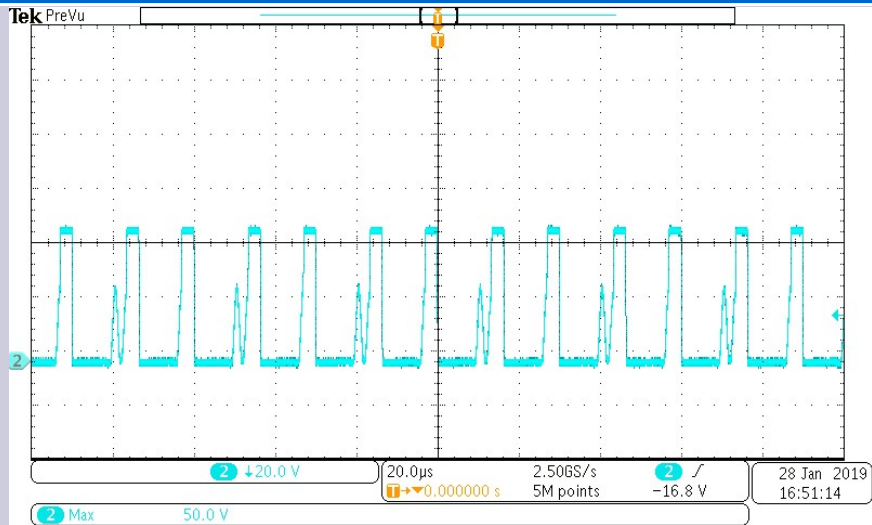


Q2_Short Circuit

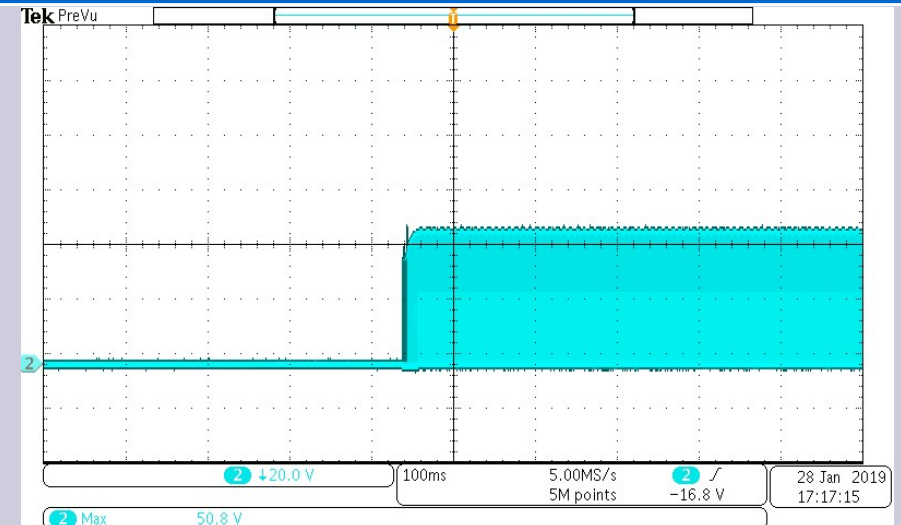


19. Stress on Switching Parts (Cont.)

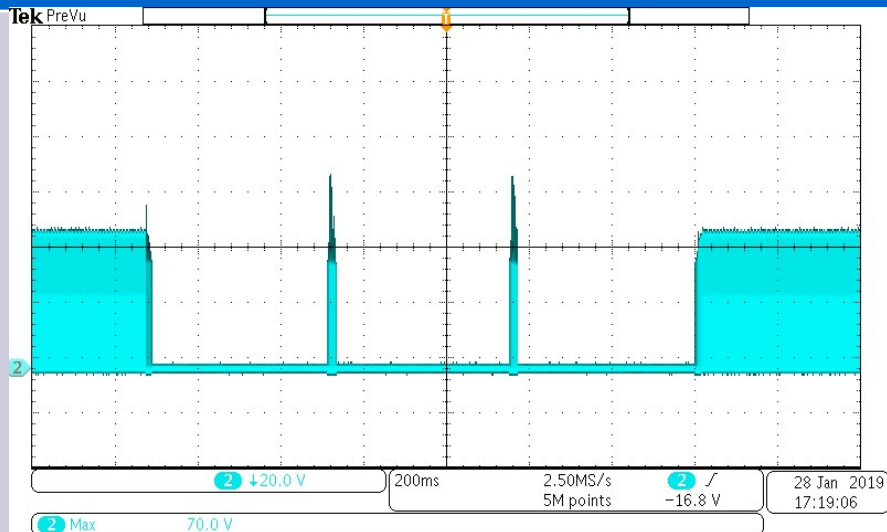
U2_Normal



U2_Turn-on



U2_Short Circuit



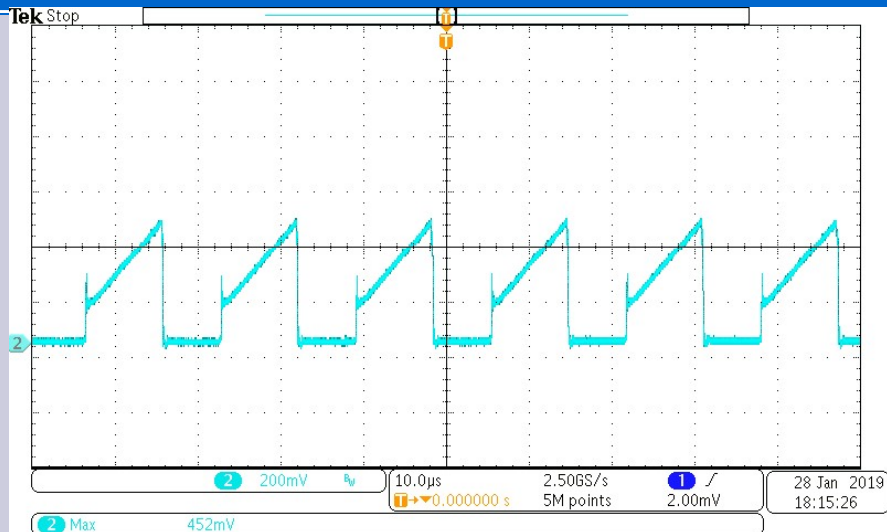
20. Flux Density of Transformer

Input Voltage	90 V _{AC} / 60 Hz	264 V _{AC} / 50 Hz
Output Current	Full Load & Maximum Power & Turn-on & Short Circuit	
Requirement	< 4,200	

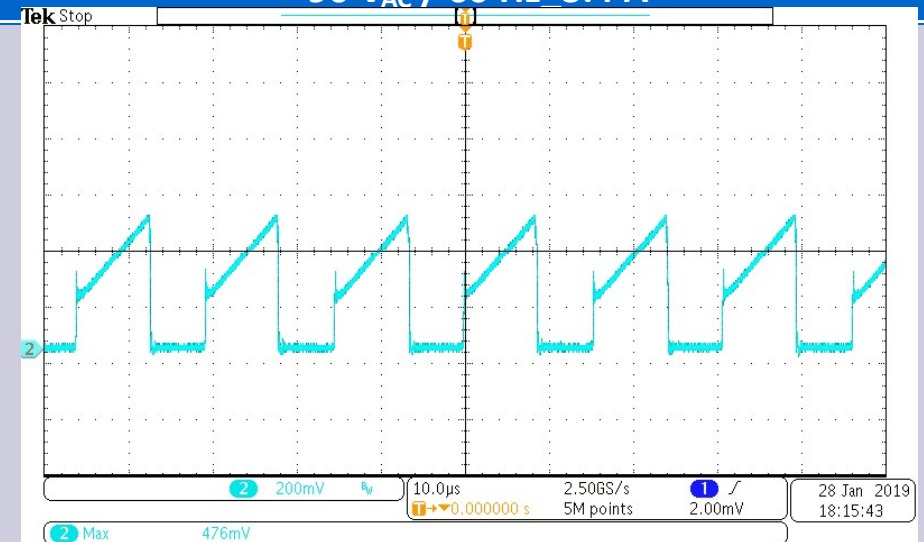
V _{IN,AC} (V / Hz)	I _{OUT} (A)	V _{CS,MAX} (V)	I _{PRI,MAX} (A)	B _{MAX} (G)	Requirement (G)
90 / 60	3	0.452	1.17	3199	< 4,200
	3.42	0.476	1.23	3,363	
	3 A Turn-on	0.5	1.29	3,527	
	Short Circuit	0.5	1.29	3,527	
264 / 50	3	0.396	1.02	2789	
	3.62	0.436	1.13	3089	
	3 A Turn-on	0.428	1.108	3029	
	Short Circuit	0.532	1.378	3767	

20. Flux Density of Transformer (Cont.)

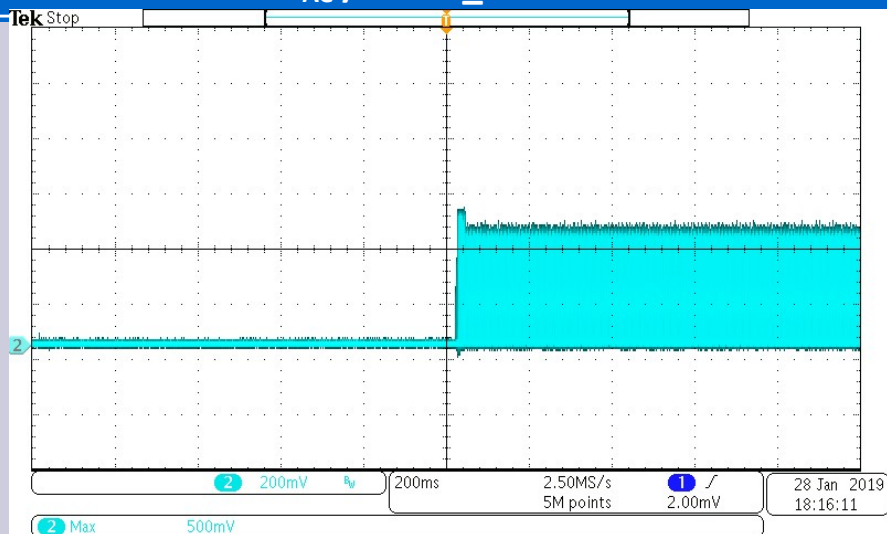
90 V_{AC} / 60 Hz_3 A



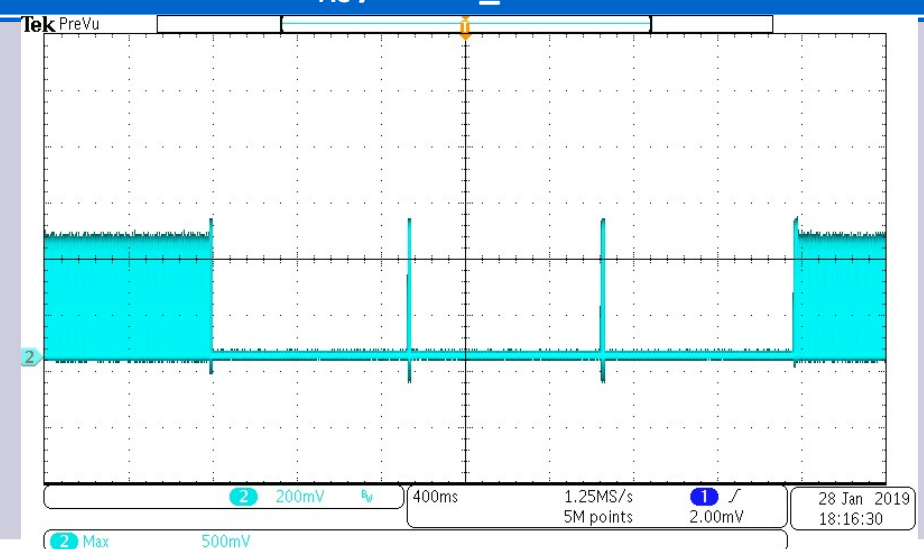
90 V_{AC} / 60 Hz_3.4 A



90 V_{AC} / 60 Hz_3A Turn-on

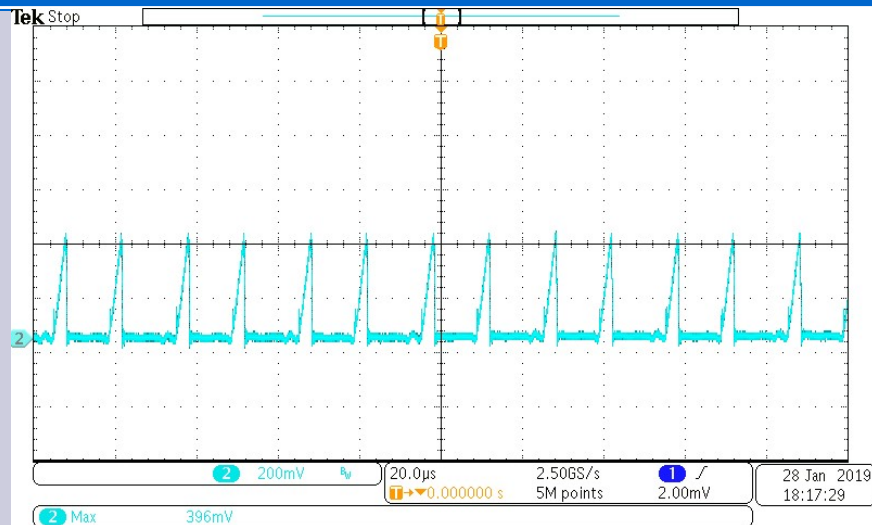


90 V_{AC} / 60 Hz_Short Circuit

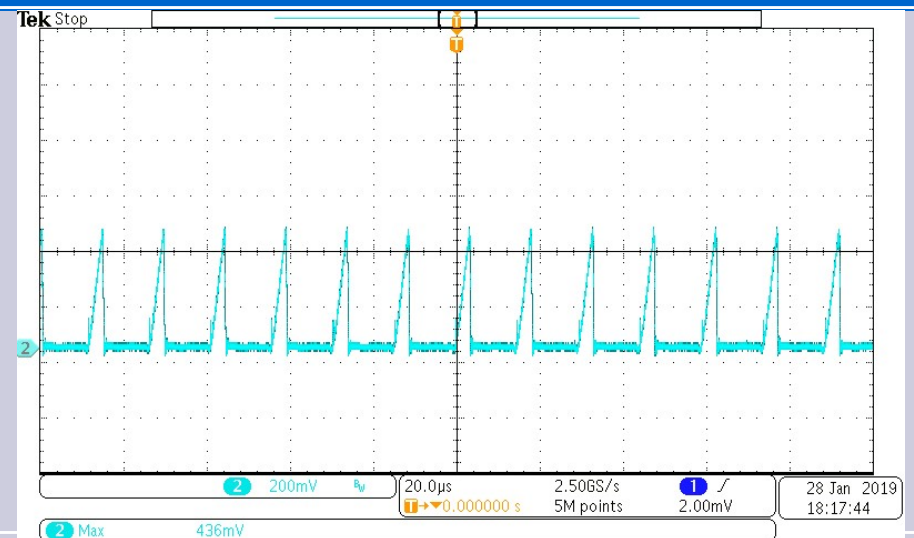


20. Flux Density of Transformer (Cont.)

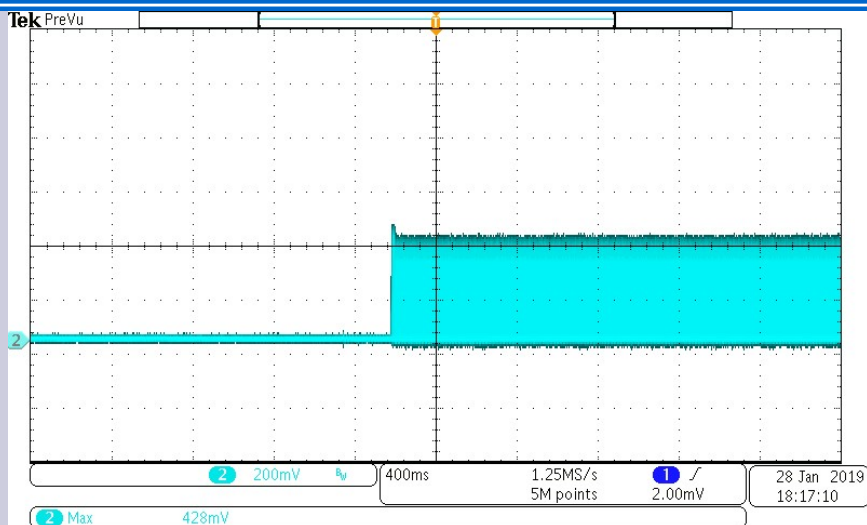
264 V_{AC} / 50 Hz_3 A



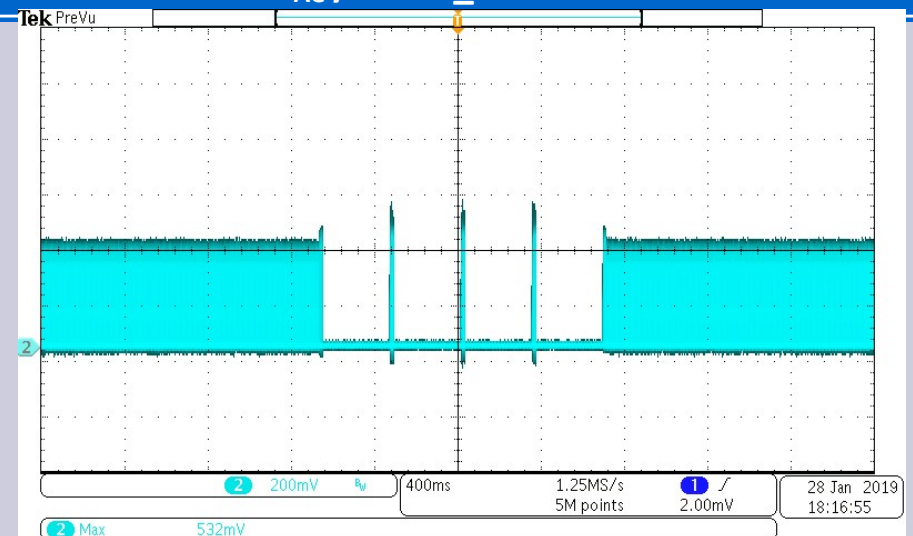
264 V_{AC} / 50 Hz_3.62 A



264 V_{AC} / 50 Hz_3 A Turn-on



264 V_{AC} / 50 Hz_Short Circuit



21. Thermal Test (with case in 40°C ambient)

Component	AC 90V/47Hz	AC 264V/63Hz
LF1	77°C	62°C
LF2	92°C	68.6°C
Bulk cap	91.9°C	78.8°C
1th Mosfet	107°C	92.3°C
Transformer core	95.3°C	93.5°C
Transformer coil	105.3°C	106.1°C
Bridge	103.4°C	73.7°C
LD5523N	84.5°C	77.4°C
LD8926A81	98.2°C	98.6°C

22. EMI

Conduction:

110 V_{AC} / 60 Hz / Line



Leadtrend Technology Corp.

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Site C

Customer Name: 12W

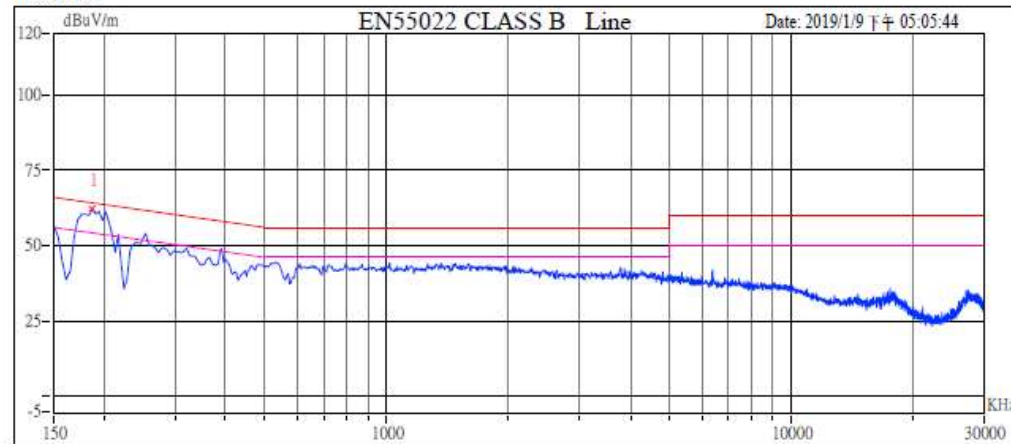
Model Name: LD5523

Test Mode: 110V L

Project No.: 12V1A

Engineer Name: jolin

Index: 128



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	187.0741	62.05	56.82	38.06	64.94	54.94	-8.13	10.37

110 V_{AC} / 60 Hz / Neutral



Leadtrend Technology Corp.

通嘉科技股份有限公司

Site C

Customer Name: 12W

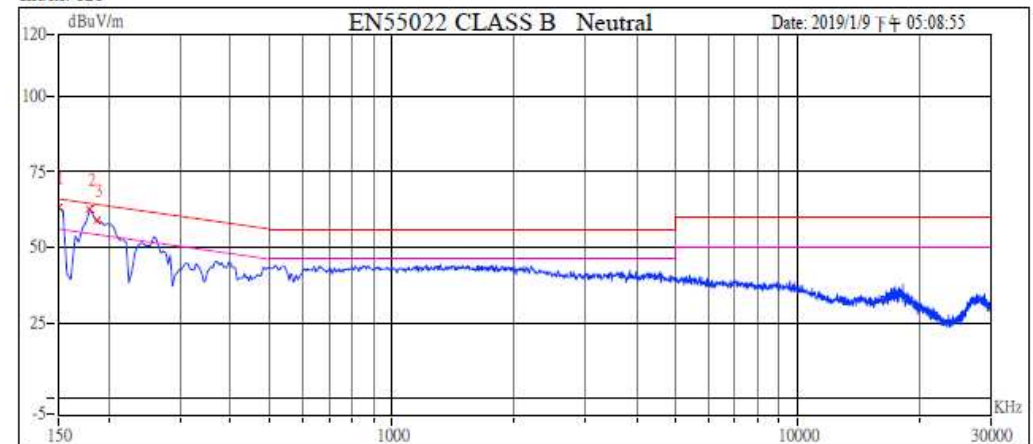
Model Name: LD5523

Test Mode: 110V N

Project No.: 12V1A

Engineer Name: jolin

Index: 128



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	150.0000	63.04	25.07	22.08	66.00	56.00	-33.92	10.42
2	179.6593	62.54	51.38	31.39	65.15	55.15	-13.77	10.40
3	187.0741	58.74	55.41	38.67	64.94	54.94	-9.53	10.40

22. EMI

Conduction:

230 V_{AC} / 50 Hz / Line



Leadtrend Technology Corp.
通嘉科技股份有限公司 Site C

Customer Name: 12W

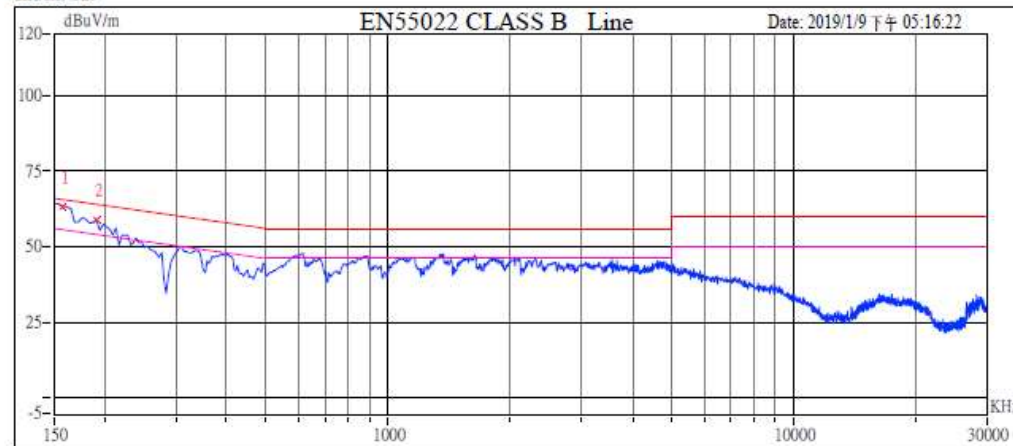
Model Name: LD5523

Test Mode: 230V L

Project No.: 12V1A

Engineer Name: jolin

Index: 129



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	157.4148	63.16	49.66	27.43	65.79	55.79	-16.13	10.38
2	190.7816	58.89	53.35	36.72	64.83	54.83	-11.48	10.36

230 V_{AC} / 50 Hz / Neutral



Leadtrend Technology Corp.
通嘉科技股份有限公司 Site C

Customer Name: 12W

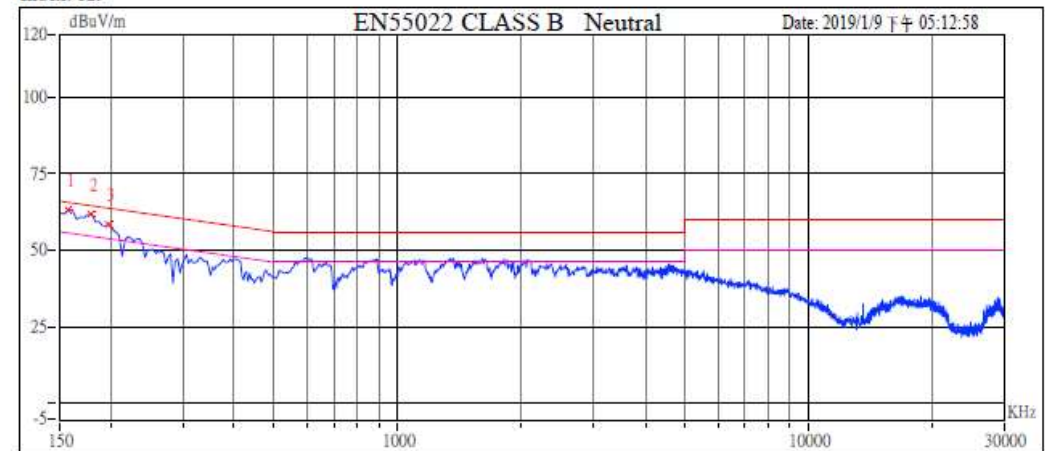
Model Name: LD5523

Test Mode: 230V N

Project No.: 12V1A

Engineer Name: jolin

Index: 129



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	157.4148	63.07	51.59	28.34	65.79	55.79	-14.20	10.42
2	179.6593	61.88	54.15	34.70	65.15	55.15	-11.00	10.40
3	198.1964	58.26	54.85	37.89	64.62	54.62	-9.77	10.39