Leadtrend
通嘉科技

20V/3A 60 W

LD5762E1 & LD8526

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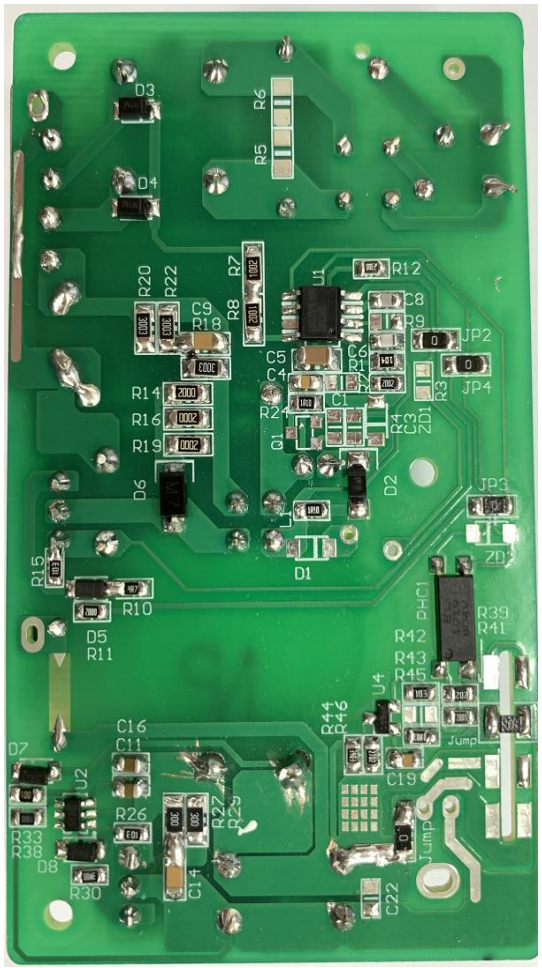
1. Specification

Item		Min.	Typ.		Max.	Test Result
Input Voltage (V_{AC})		90	115	230	264	–
Input Frequency (Hz)		47	60	50	63	–
Output Voltage & Current (V / A)		20V / 3A				–
Efficiency		CoC Tier 2				Pass
Standby Power (mW)		< 75				Pass
Output Voltage Accuracy (%)	Typical load	< ± 5				Pass
	Peak load	> -10				Pass
Over Current Protection (A)		< 5.3				Pass
Over Voltage Protection (V)		< 25				Pass
Ripple & Noise Voltage (mV)		< 300				Pass
Dynamic Load (%)		< ± 5 of $V_{BUS,SET}$				Pass
Turn-on Delay Time (S)		< 3				Pass
Rise Time (mS)		< 40				Pass
Overshoot (%)		< 10				Pass
EMI (Conduction)		EN55032 Class B				Pass
Component stress(%)		Continue <90 ; instant <95				Pass

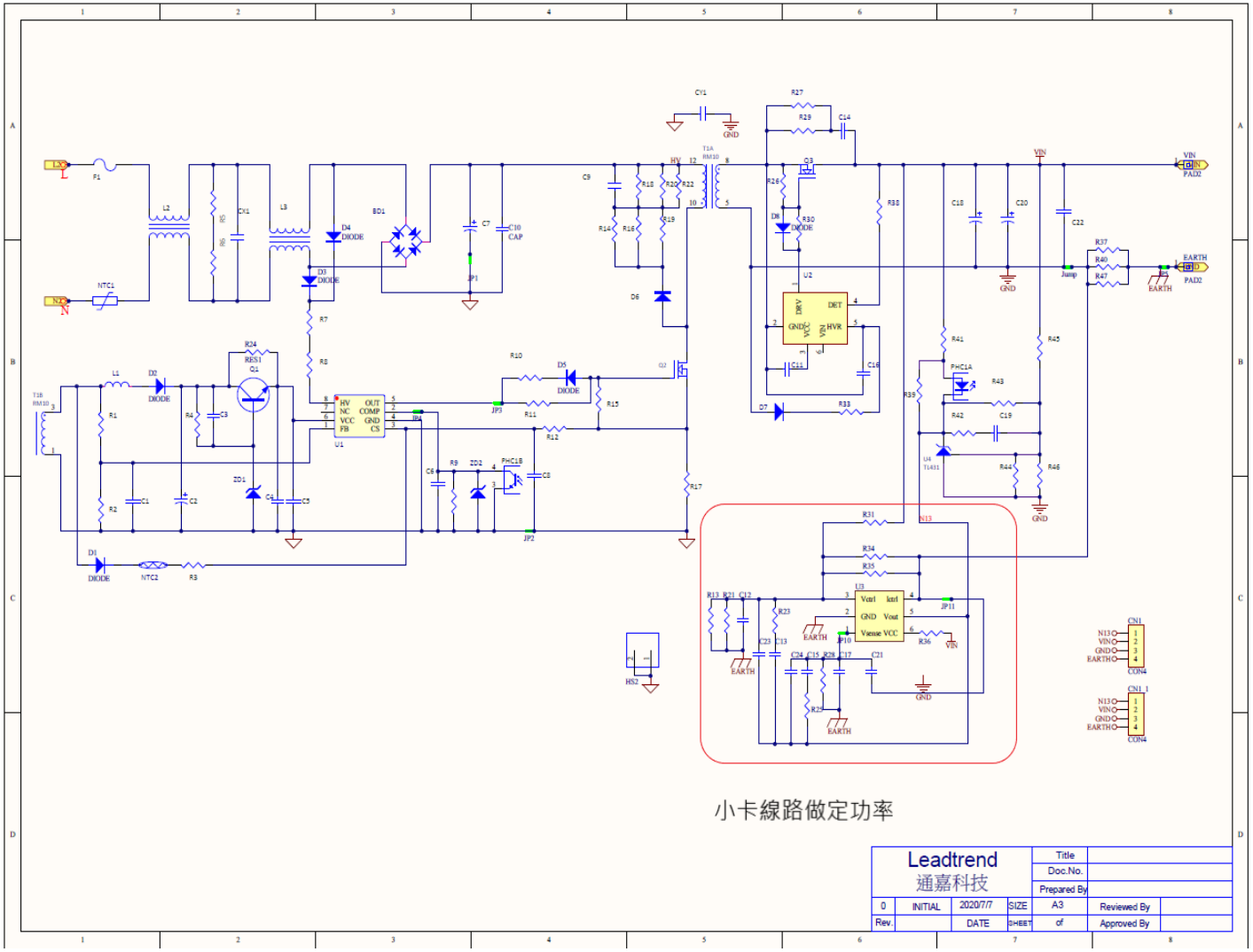
2. Outline

Top View

Bottom View

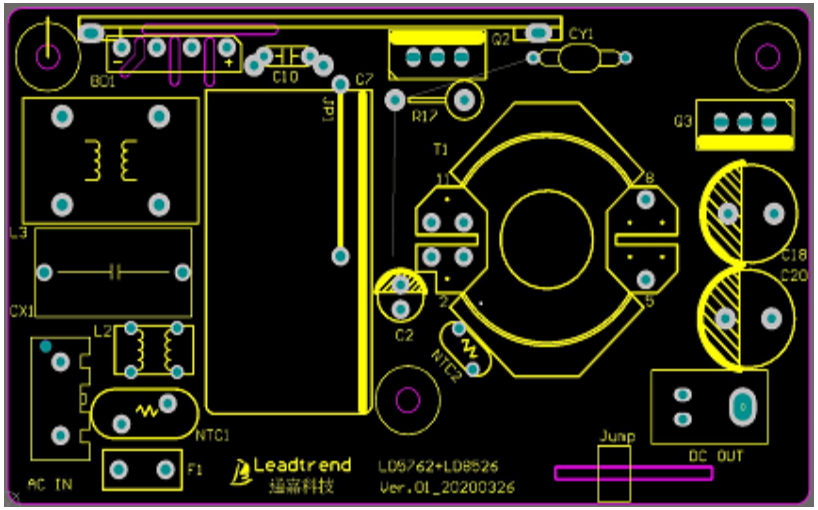


3. Schematic

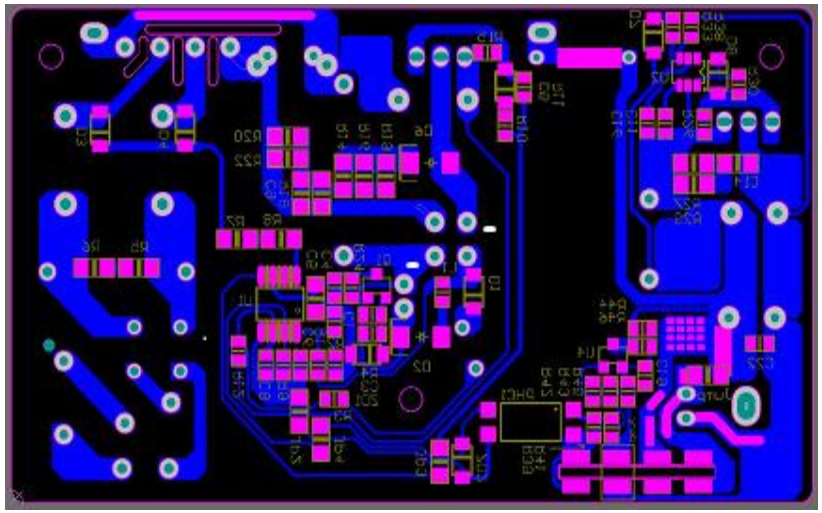

小卡線路做定功率
Leadtrend
通嘉科技
Title
Doc.No.
Prepared By
Reviewed By
Approved By
INITIAL
2020/7/7
SIZE
A3
DATE
SHEET
of

4. PCB Layout

Top Side



Bottom Side



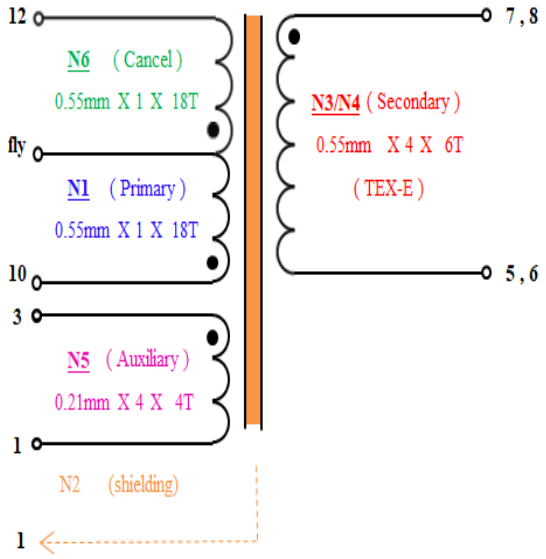
5. Bill of Materials

Location	Description	Q'ty
JP2,JP3,JP4,Jump*2	0 Ω / J / 1206	5
R1	100 KΩ / F / 0805	1
R2	20 KΩ / F / 0805	1
R5,R6	NC	2
R7,R8	10 KΩ / J / 1206	2
R24	1.1 Ω / F / 0805	1
R10	4.7 Ω / J / 0805	1
R11	200 Ω / J / 0805	1
R12	330 Ω / J / 1206	1
'R14, R16, R19	200 Ω / J / 1206	3
R15	10 KΩ / J / 0805	1
R17	0.27 Ω / 2W	1
R18, R20, R22	300 KΩ / J / 1206	3
R26,R42	10 KΩ / J / 0805	2
R27,R29	30 Ω / J / 1206	2
R30	3 Ω / J / 0805	1
R33	10 Ω / J / 0805	1
R38	180 Ω / J / 0805	1
R39	2 KΩ / J / 0805	1
R41	2 KΩ / J / 0805	1
R44	390 KΩ/ F / 0805	1
R45	180 KΩ / F / 0805	1
R46	27 KΩ / F / 0805	1
BD1	KBP306 / 4A / 600V	1
C2	10 uF / 50V / 5*11	1
C4,C19	0.1 uF (104) / 50 V / X7R / 0805	2
C5	0.1 uF (104) / 50V / X7R / 1206	1
C6	1000 pF (102) / 50 V / X7R / 0805	1
C7	120 uF (102) / 400 V	1
C8	220 pF / 50 V / X7R / 0805	1
C9	1000 pF (102) / 1 KV / X7R / 1206	1
C11,C16	2.2 uF / 50V 0805	2

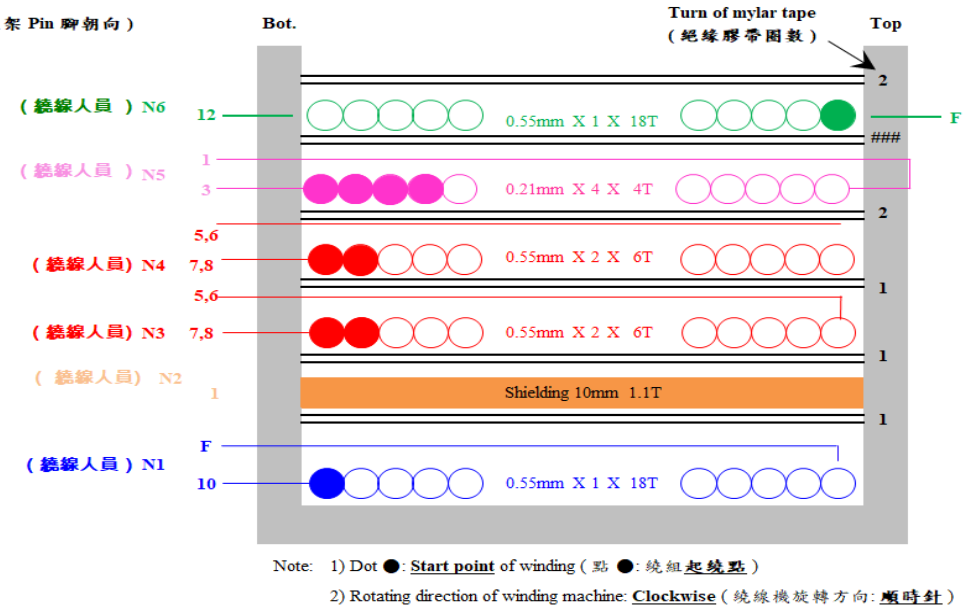
Location	Description	Q'ty
C14	1000 pF / 50V / X7R /1206	1
C18, C20	1000 uF / 25 V / ZLH / 10*20	2
CX1	0.33 uF / 300V / X1	1
CY1	470 pF / Y1	1
D5, D8	1N4148	2
D3, D4	FM4007	2
D2	FR107	1
D6	M7	1
D7	BAV20W	1
F1	T4A/250VAC	1
PHC1	EL1019	1
U2	LD5762E1 SO-8	1
U3	TL431	1
U4	LD8526 SOT-26	1
T1	RM10 / KP44A / 36 : 6 : 4 / 500 μH	1
TR1	5Ω / 3A	1
JP1	17.5 mm	1
L1	1.1 Ω / J / 0805	1
Q2	650V / 0.36R	1
Q3	AOTF292L	1
PCB	107 x 51 mm / CEM-1 / 1 oz	1
L2	JUMP	2
L3	SO1515:20mH	1
HS1	55*20*1.5mm	1

6. Transformer Design

Schematic of Winding



Construction of Winding



Winding No.	Pin No.		Winding Types	Number of Turns		Remarks	
	Start	Finish		Winding	Tape		
N1	10	F	0.4 mm X 2	18	1	N_{P1}	Pin 朝外順繞
N2	1	X	11 mm X 1mil	1.1	1	Shielding	Pin 朝外順繞
N3	7,8	5,6	0.55 mm X 3	6	2	N_{S1}	Pin 朝外順繞
N4	7,8	5,6	0.55 mm X 3	6	2	N_{S1}	Pin 朝外順繞
N5	3	1	0.21 mm X 4	4	1.5	N_{aux}	Pin 朝外順繞
N6	F	12	0.4 mm X 2	18	2	N_{p2}	Pin 朝外順繞

Bobbin Shape	Core Material	A_e (mm^2)	L_p (µH)
RM10	KP44A	100	500 ± 5 % @ 1 kHz / 1 V

Bottom View of Bobbin

7. Efficiency

Input Voltage	115 V_{AC} / 60 Hz	230 V_{AC} / 50 Hz
Output Current	100 %, 75 %, 50 %, 25 %, 10 % of Full Load	
Measured Point of Output Voltage	Cable end (18AWG/1.5M)	
Duration of Burn-in	30 Minutes	
Requirement	CoC Tier 2	

7. Efficiency (Cont.)

$V_{IN,AC}$ (V / Hz)	$V_{BUS,SET}$ (V)	$V_{BUS,Cable}$ (V)	I_{OUT} (A)	$P_{BUS,Cable}$ (W)	P_{IN} (W)	η (%)	$\eta_{AV,4\text{-}Points}$ (%)	Requirement (%)
115 / 60	20	19.88	3.002	59.68	67.17	89.143	89.52	> 89
		19.952	2.25	44.892	50.04	89.730		
		20.025	1.5007	30.052	33.41	89.903		
		20.099	0.7507	15.088	16.848	89.758		
		20.145	0.3	6.0435	6.882	87.816	–	> 79
230 / 50	20	19.877	3.002	59.67075	65.86	90.602	90.31	> 89
		19.949	2.2515	44.91517	49.49	90.756		
		20.021	1.5008	30.04752	33.19	90.532		
		20.094	0.7507	15.08457	16.88	89.364		
		20.139	0.3	6.0417	6.993	86.396	–	> 79

8. No Load Power Consumption

Input Voltage	115 V_{AC} / 60 Hz	230 V_{AC} / 50 Hz
Output Current	20V / 0 A	
Requirement	CoC Tier 2	

$V_{IN,AC}$ (V / Hz)	**P_{IN} (mW)**	**Requirement (mW)**
115 / 60	47	< 75
230 / 50	70	

9. Line / Load / Cross Regulation

Input Voltage		90 V_{AC} / 47 Hz		264 V_{AC} / 63 Hz	
Output Current		20V: 0A/3.00A			
Measured Point of Output Voltage		Cable end			
Requirement		< ± 5 %			
Mode	**$V_{BUS,SET}$ (V)**	**$V_{IN,AC}$ (V / Hz)**	**$V_{BUS,PCB}$ (V)**		**Requirement (V)**
			0 A	**3 A / 20V**	
Typical	20	90 / 47	20.264	19.926	19 ~ 21
		264 / 63	20.244	19.922	

10. Over Current Protection

Input Voltage		90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Requirement	Protection Mode	Auto Recovery	
	OCP Trigger Point	< 5.3A	

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	$I_{OUT,OCP}$ (A)	Requirement	
			Protection Mode	OCP Trigger Point (A)
20	90 / 47	3.89	Auto Recovery	< 5.3
	264 / 63	4.31	Auto Recovery	

11. Over Voltage Protection

Input Voltage	90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current	20V: 0A/3.0A	
Measured Point of Output Voltage	End of Cable	
Requirement	< 25V	

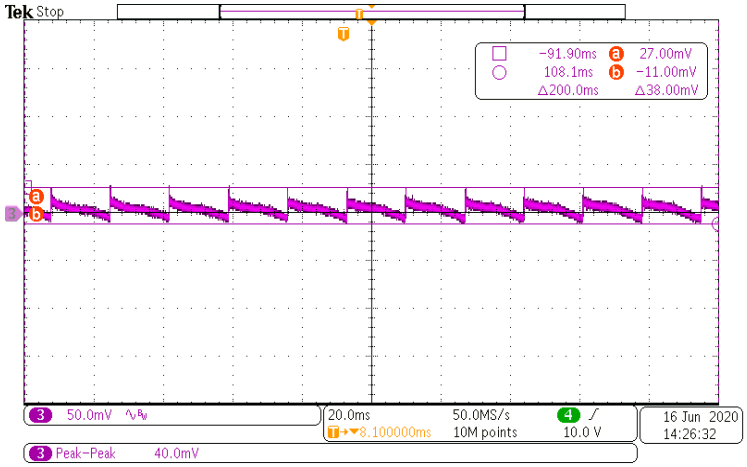
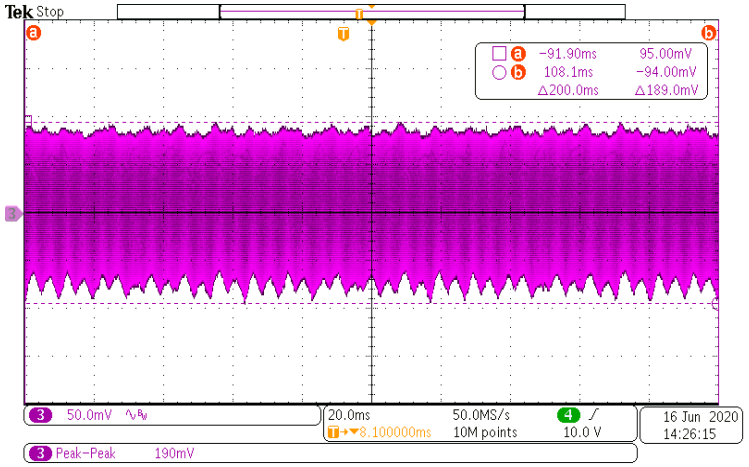
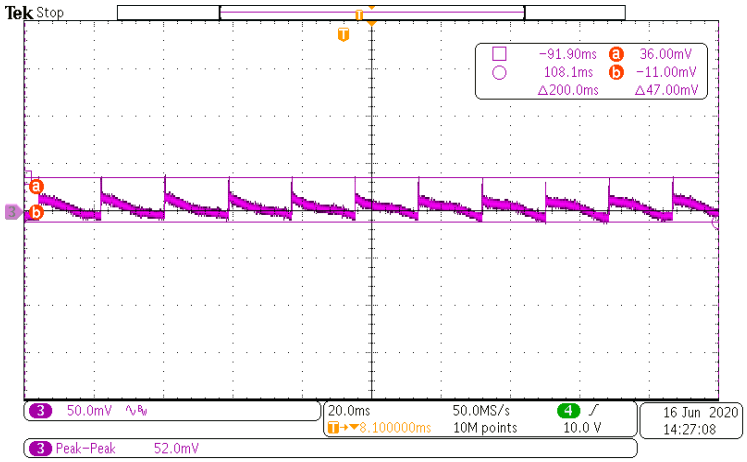
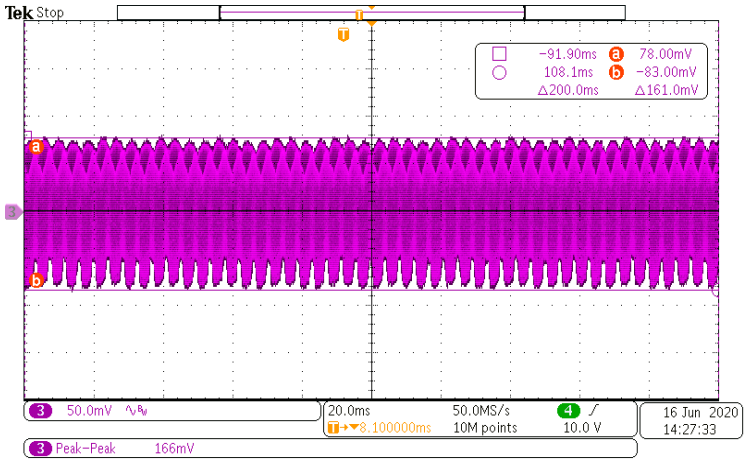
Load (A)	**$V_{BUS,SET}$ (V)**	**$V_{IN,AC}$ (V / Hz)**	**$V_{BUS,OVP}$ (V)**	**Requirement (V)**
0A	20	90 / 47	22.6	< 25
		264 / 63	22.7	
3A	20	90 / 47	22.2	< 25
		264 / 63	22.1	

12. Ripple & Noise Voltage

Input Voltage	90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current	20V: 0A/3.0A	
Measured Point of Output Voltage	End of Cable	
Bandwidth	20 MHz (with 10 µF E-cap & 0.1 µF MLCC)	
Requirement	20V < 300 m V	

$V_{BUS,SET}$ (V)	**$V_{IN,AC}$ (V / Hz)**	**$V_{BUS,PK-PK}$ (mV)**		**Requirement (mV)**
		0 A	**3 A**	
20	90 / 47	40	190	< 300
	264 / 63	52	166	

12. Ripple & Noise Voltage (Cont.)

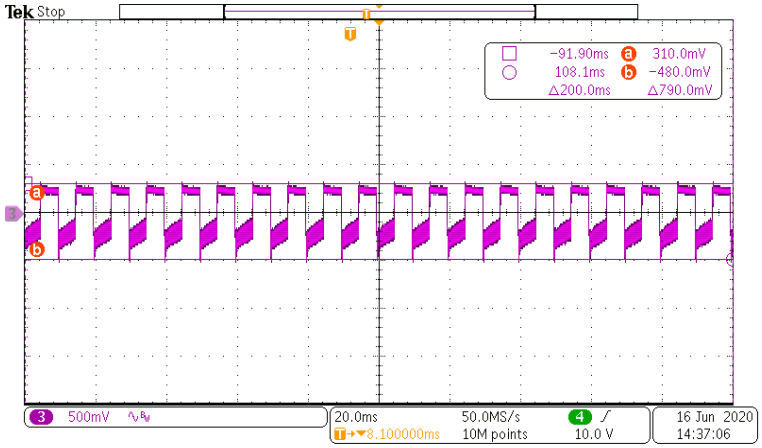
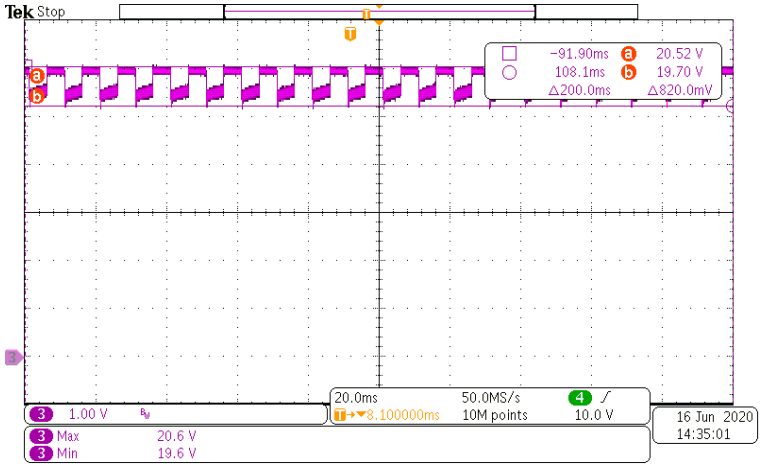
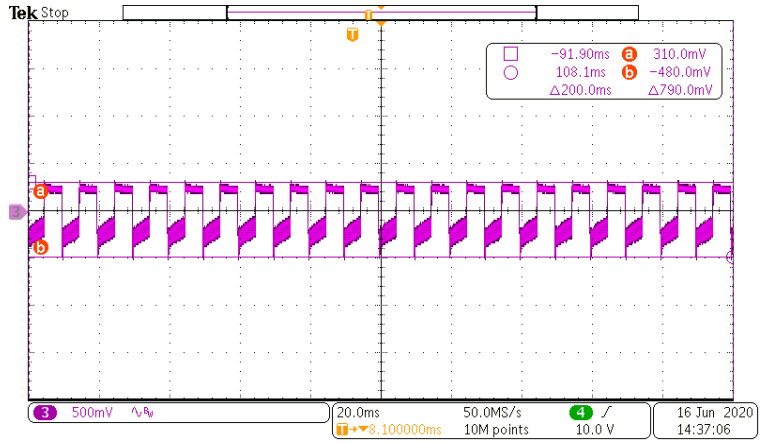
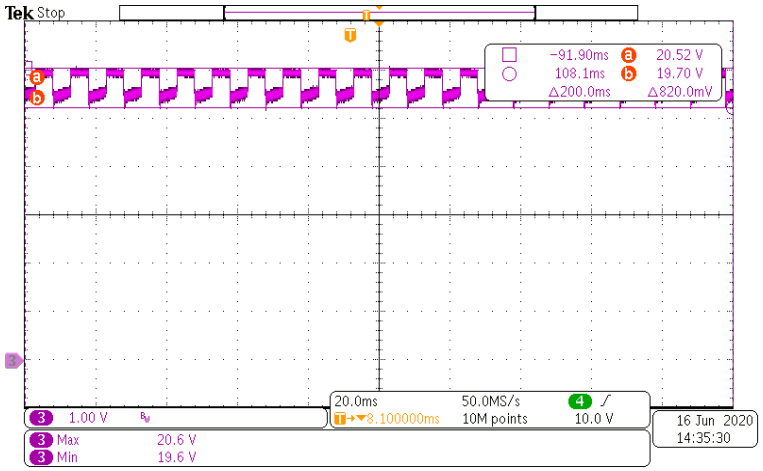
90 V_{AC} / 47 Hz / 20V / 0A	90 V_{AC} / 47 Hz / 20V / 3A
	
264 V_{AC} / 63Hz / 20V / 0A	**264 V_{AC} / 63 Hz / 20V / 3A**
	

13. Dynamic Load

Input Voltage	90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current	20V: 0A/3.0A	
Frequency of Load	100 Hz (5 mS High / 5 mS Low)	
Slew Rate of Load	1.25 A / µS	
Measured Point of Output Voltage	End of Cable	
Requirement	< ± 5 % of $V_{BUS,SET}$	

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	$V_{BUS,PCB}$ (V)		Requirement (V)
		Min.	**Max.**	
20	90 / 47	19.6	20.6	19~21
	264 / 63	19.6	20.6	

13. Dynamic Load (Cont.)

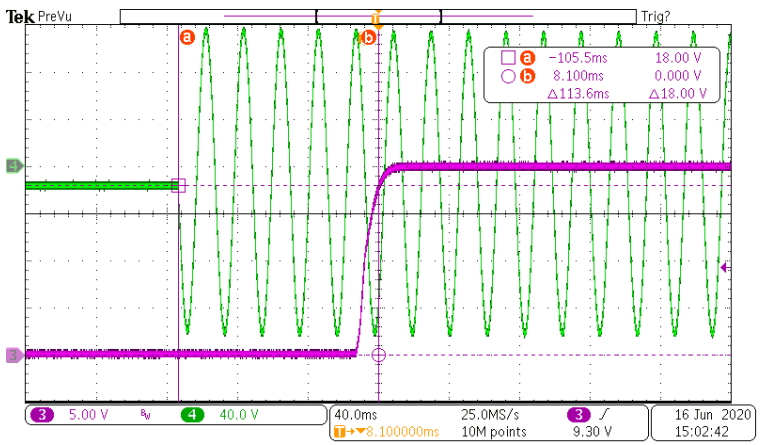
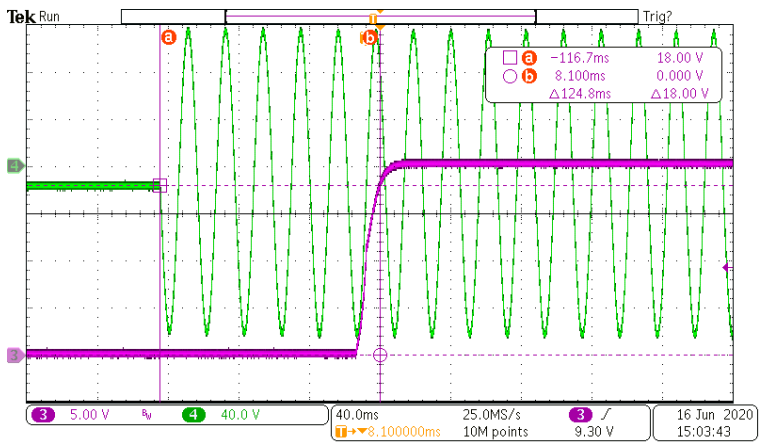
90 V_{AC} / 47 Hz / 20V	264 V_{AC} / 63 Hz /20V
	
90 V_{AC} / 47 Hz / 20V	**264 V_{AC} / 63 Hz / 20V**
	

14. Turn-on Delay Time

Input Voltage	90 V_{AC} / 47 Hz
Output Current	20V : 0 A / 3A
Measured Point of Output Voltage	End of Cable
Requirement	< 1 S

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	T_{ON} (S)		Requirement (S)
		0 A	**3 A**	
20	90 / 47	0.113	0.124	< 1

14. Turn-on Delay Time (Cont.)

90 V_{AC} / 47 Hz / 0A	90 V_{AC} / 47 Hz / 3A
	

15. Rise Time & Overshoot

Input Voltage		90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current		20V : 0 A	
Measured Point of Output Voltage		End of PCB	
Requirement	Rise Time	< 40 mS	
	Overshoot	< 10 %	

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	T_{RISE} (mS)	Requirement (mS)
20	90 / 47	11.6	< 40
	264 / 63	11.8	

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	Overshoot (%)	Requirement (%)
20	90 / 47	3.00	< 10
	264 / 63	3.00	

15. Rise Time & Overshoot (Cont.)

90 V_{AC} / 47 Hz / 0 A	264 V_{AC} / 63 Hz/ 0 A
	

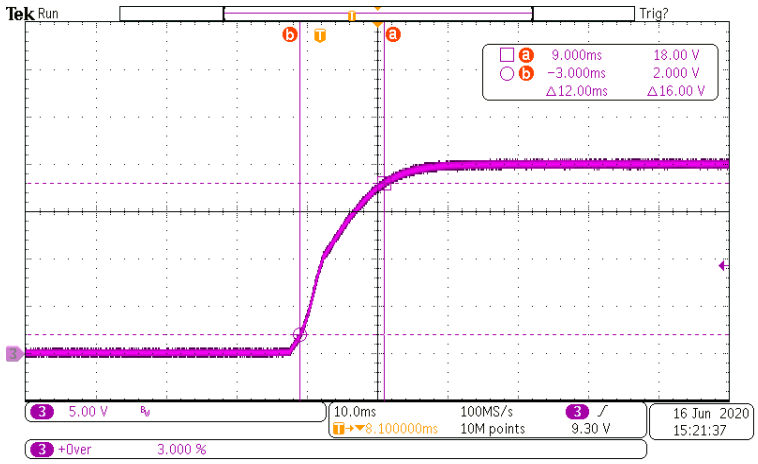
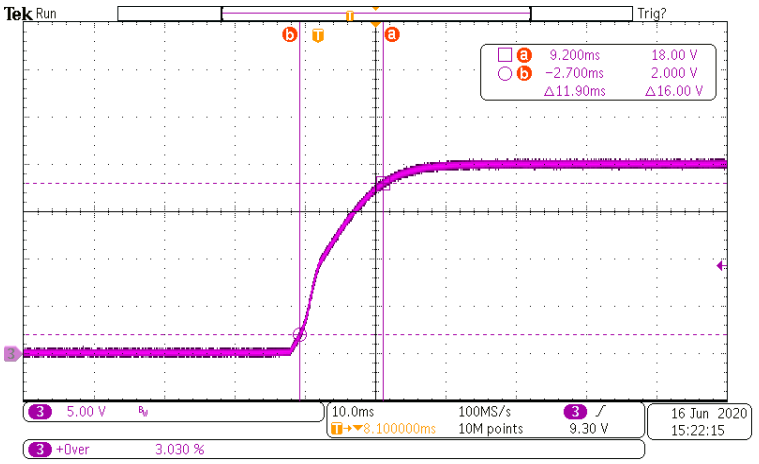
15. Rise Time & Overshoot (Cont.)

Input Voltage		90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current		20V : 3 A	
Measured Point of Output Voltage		End of Cable	
Requirement	**Rise Time**	< 40 mS	
	Overshoot	< 10 %	

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	T_{RISE} (mS)	Requirement (mS)
20	90 / 47	12	< 40
	264 / 63	11.9	

$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	Overshoot (%)	Requirement (%)
20	90 / 47	3.00	< 10
	264 / 63	3.03	

15. Rise Time & Overshoot (Cont.)

90 V_{AC} / 47 Hz / 3 A	264 V_{AC} / 63 Hz/ 3 A
	

16. Supply Voltage of IC

Input Voltage	90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current	20V: 0A/3A	
Requirement	> V_{CC_OFF} & < V_{CC_OVP}	

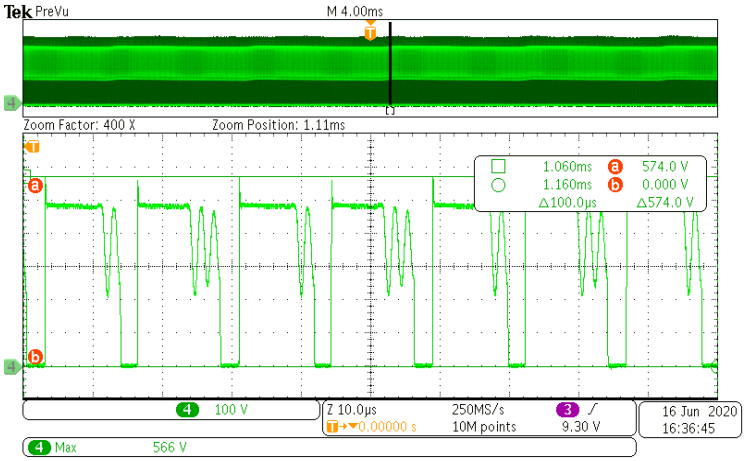
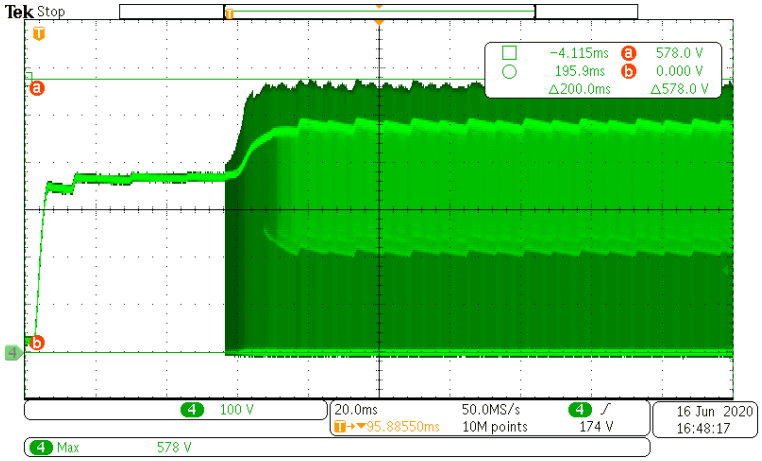
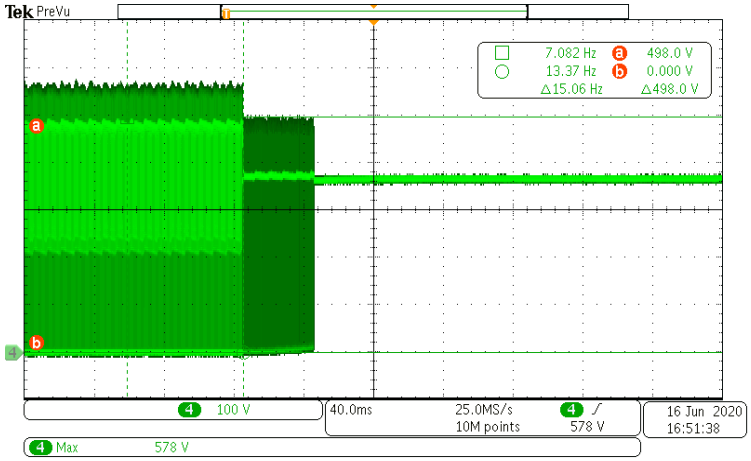
$V_{BUS,SET}$ (V)	**$V_{IN,AC}$ (V / Hz)**	**$V_{CC,U1}$ (V)**				**Requirement (V)**
		No Load		**Full Load**		
		Min.	**Max.**	**Min.**	**Max.**	
20	90 / 47	15.4	16.4	16.2	16.9	7.5 < VCC < 27
	264 / 63	15.2	16.4	16.3	16.9	

17. Stress on Switching Parts

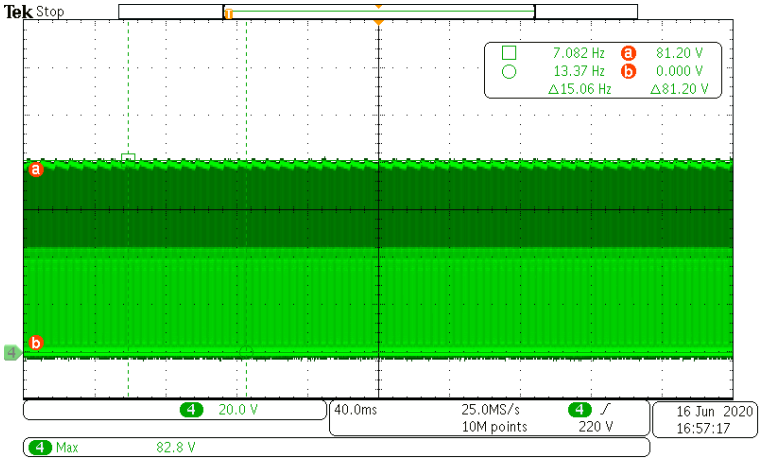
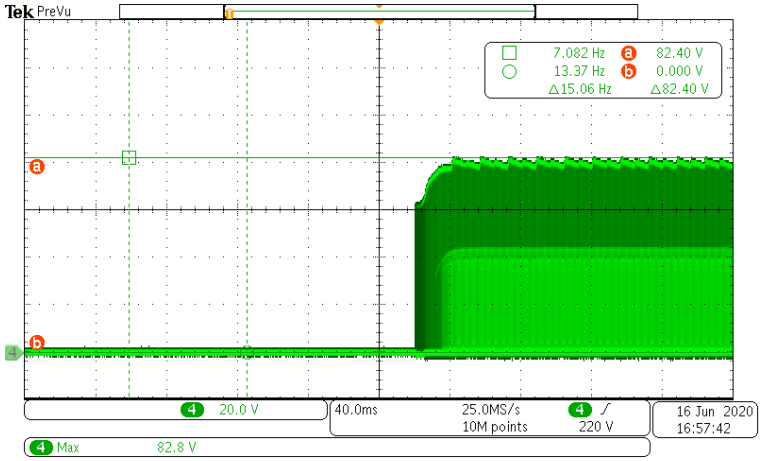
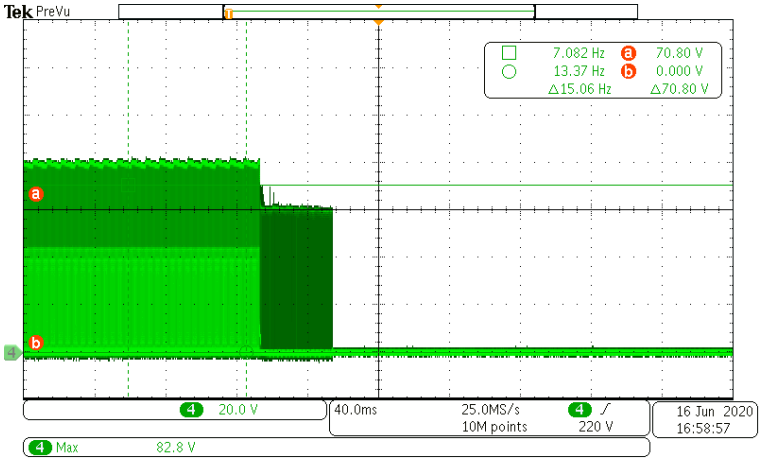
Input Voltage	264 V_{AC} / 63 Hz
Output Current	Full Load (20 V: 3.00 A)
Requirement	Defined by Different Parts

Location	**Part No.**	**Mode**	**Condition**	**$V_{BUS,SET}$ (V)**	**I_{OUT} (A)**	**V_{DS} (V)**	**Requirement (V)**
Q1	70S360P7		Normal	20	3.00	574	< 630 (700 * 0.90)
			Turn-on	20	3.00	586	< 665 (700 * 0.95)
			Short	20	--	498	
Q2	AOT296L		Normal	20	3.00	82.8	< 90 (100 * 0.90)
			Turn-on	20	3.00	82.8	< 95 (100 * 0.95)
			Short	20	--	70.8	

17. Stress on Switching Parts (Cont.)

Q1_20 V / 3.00 A_Normal	Q1_20V / 3.00A_Turn-on
	
Q1_20 V / Short	
	

17. Stress on Switching Parts (Cont.)

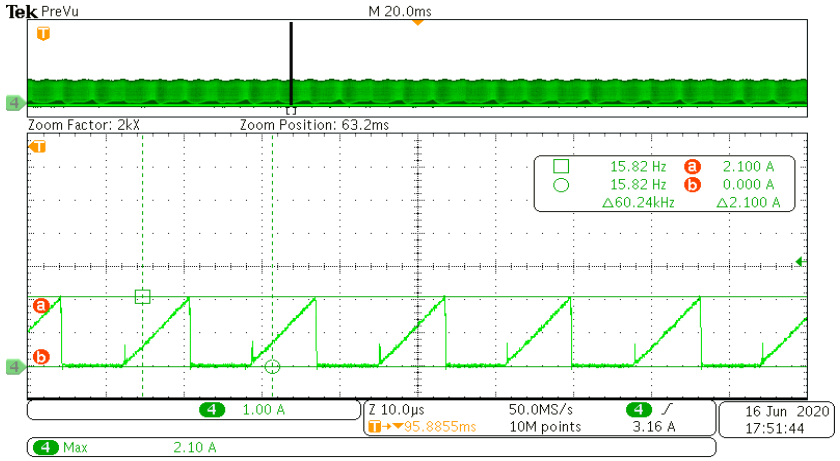
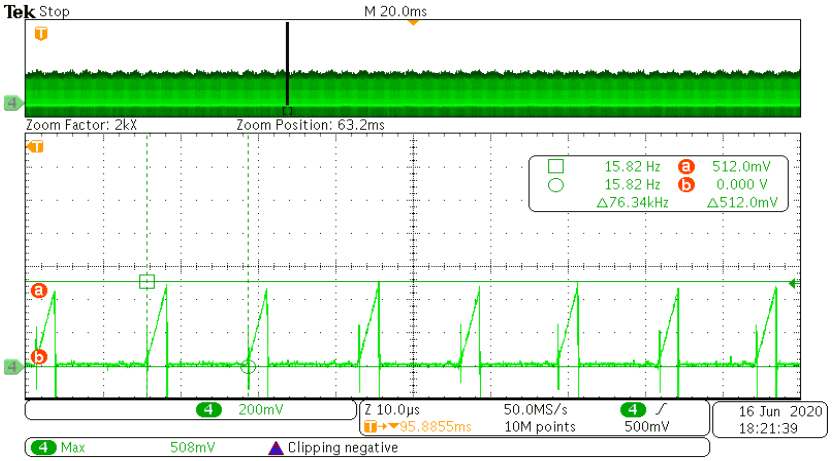
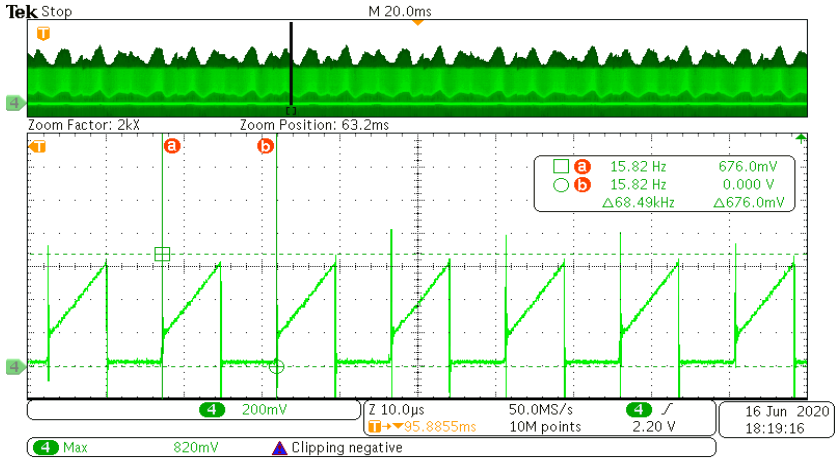
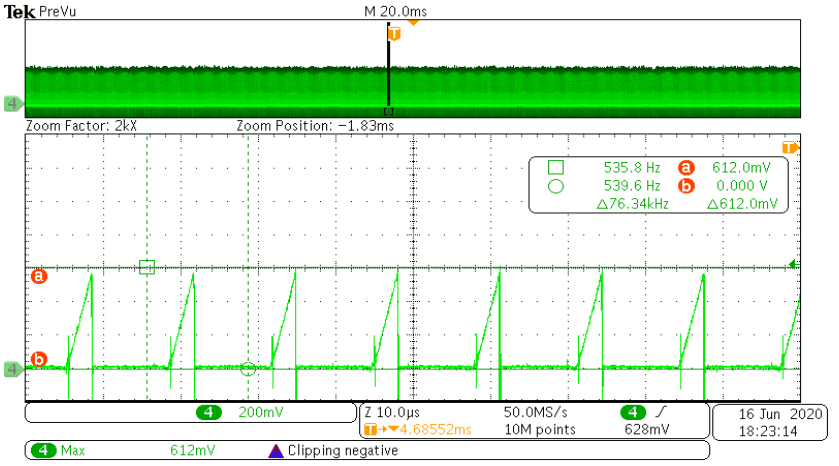
Q2_20 V / 3.00 A_Normal	Q2_20V / 3.00A_Turn-on
	
Q2_20 V / Short	
	

18. Flux Density of Transformer

Input Voltage	90 V_{AC} / 47 Hz	264 V_{AC} / 63 Hz
Output Current	Full Load & Maximum Power	
Requirement	90 % of Rating	

Mode	**$V_{BUS,SET}$ (V)**	**I_{OUT} (A)**	**$V_{IN,AC}$ (V / Hz)**	**$I_{PRI,MAX}$ (A)**	**B_{MAX} (G)**	**Requirement (G)**
Normal	20	3.00	90 / 47	2.1	2679	< 3,780 (4,200 * 0.90)
		3.00	264 / 63	1.9	2427	
OCP		3.89	90 / 47	2.504	3198	
		4.31	264 / 63	2.267	2888	

18. Flux Density of Transformer (Cont.)

20 V / 3.00 A _90 V_{AC} / 47 Hz (Rcs = 0.27Ω)	20 V / 3.00A_264 V_{AC} / 63 Hz (Rcs = 0.27Ω)
	
20 V / 3.89 A_90 V_{AC} / 47 Hz (Rcs = 0.27Ω)	**20 V / 4.31 A_264 V_{AC} / 63 Hz (Rcs = 0.27Ω)**
	

19. EMI

Conduction:

20 V / 3 A

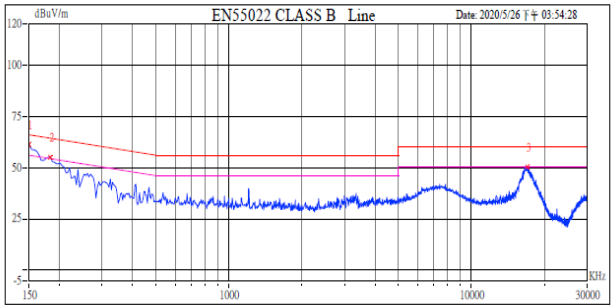
110 V_{AC} / 60 Hz / Line

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

Customer Name: 60W
Model Name: 20V 3A
Test Mode: 110V L

Project No.: LD5762E1+LD8526
Engineer Name: Jeff

Index: 1



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	150.0000	61.32	23.22	19.34	66.00	56.00	-36.66	10.38
2	183.3667	55.27	46.03	27.67	65.05	55.05	-19.02	10.37
3	17046.0922	50.37	42.84	36.96	60.00	50.00	-13.04	11.96

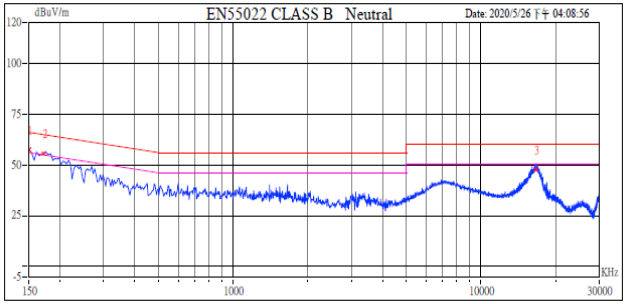
110 V_{AC} / 60 Hz / Neutral

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

Customer Name: 20V 3A
Model Name: LD5762E1+LD8526
Test Mode: 110V N

Project No.: 20V 3A
Engineer Name: Jeff

Index:



	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	150.0000	57.62	20.11	17.02	66.00	56.00	-38.98	10.42
2	172.2445	55.82	45.68	26.48	65.36	55.36	-19.69	10.41
3	16645.2906	47.74	42.63	36.39	60.00	50.00	-13.61	12.17

19. EMI (Cont.)

Conduction:

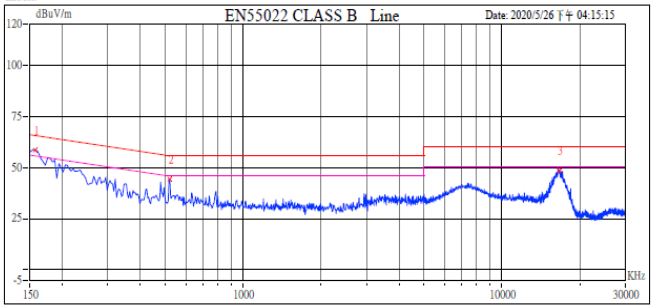
20 V / 3 A

220 V_{AC} / 50 Hz / Line

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

Customer Name: 20V 3A
Project No.: 20V 3A
Model Name: LD5762E1+LD8526
Engineer Name: Jeff
Test Mode: 110V N

Index:



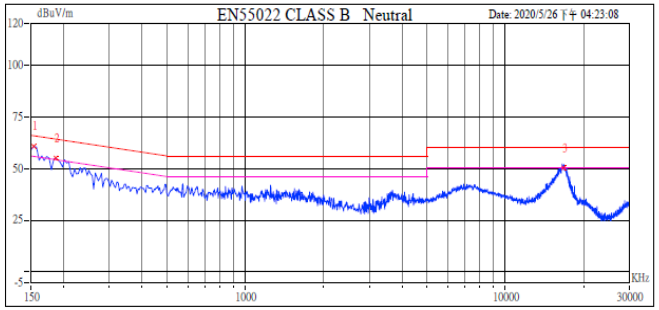
	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	157.4148	58.60	26.81	23.20	65.79	55.79	-32.59	10.38
2	520.7415	44.26	30.84	23.52	56.00	46.00	-22.48	10.40
3	16645.2906	48.48	41.94	35.57	60.00	50.00	-14.43	11.91

220 V_{AC} / 50 Hz / Neutral

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

Customer Name: 20V 3A
Project No.: 20V 3A
Model Name: LD5762E1+LD8526
Engineer Name: Jeff
Test Mode: 220V N

Index: 2



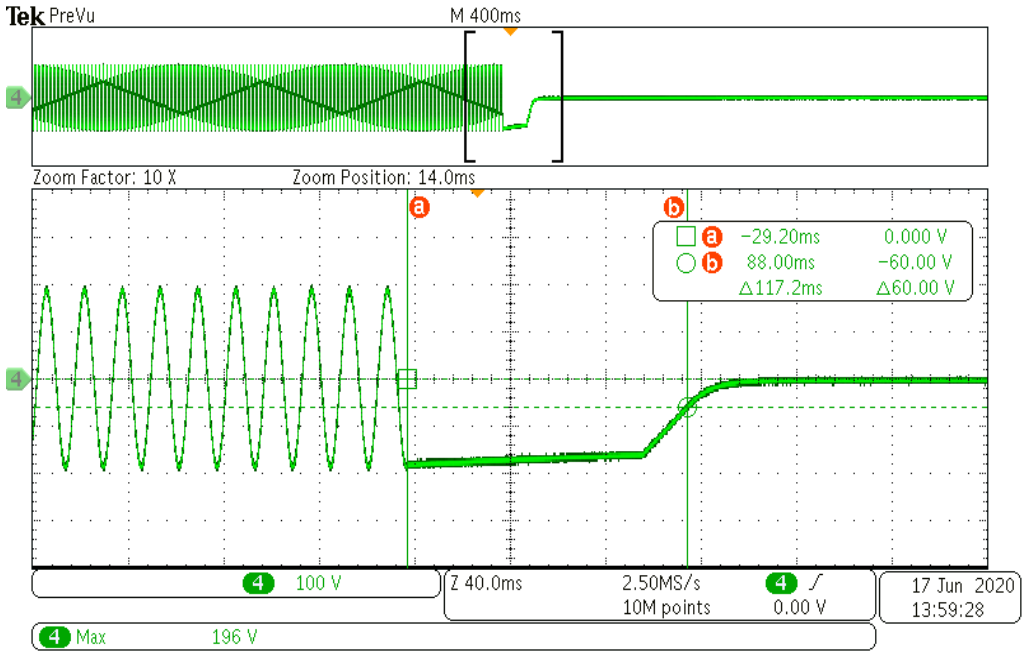
	Freq(KHz)	Peak Amptd(dBuV)	QP Amptd(dBuV)	Avg Amptd(dBuV)	QP Limit(dBuV)	Avg Limit(dBuV)	Margin(dB)	Factor(dB)
1	153.7074	60.66	29.38	25.79	65.89	55.89	-30.11	10.42
2	187.0741	54.93	43.59	27.15	64.94	54.94	-21.35	10.40
3	16741.4830	50.52	45.22	39.12	60.00	50.00	-10.88	12.19

20. X CAP discharge

Input Voltage	264 V_{AC} / 63 Hz
Output Current	No Load
Requirement	IEC62368 (@2 sec < 60V)

20 V / 0 A

264 Vac / 63Hz



Result
117.2 mS

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THANK YOU

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Green your power Green the World

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