

IEEE 802.3at PoE PD with Integrated DC-DC Controller

1. General Description

The User's Guide describes the design and operation of the KTA1137A EVB-001 evaluation board. The KTA1137A is an IEEE 802.3af/at compliant combination powered device (PD) controller and power supply controller optimized for isolated and non-isolated converter topologies. The KTA1137A EVB-001 demonstrates a 12V, 25W flyback converter for PD applications. The KTA1137A is a pin compatible with the discontinued AS1138 and may be substituted with minimal effort.

2. Ordering Information

Part Number	Description	IC Package
KTA1137AEUAB-EV1	KTA1137A EVAL Kit	QFN55-20

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3. Description

KTA1137A EVB-001 allows reference circuitry evaluation of the KTA1137A. It provides power and signal I/O connections and an array of test points for signal observation. A non-synchronous 12V, 25W flyback topology design is featured, but synchronous rectified designs are also possible using the KTA1137A.

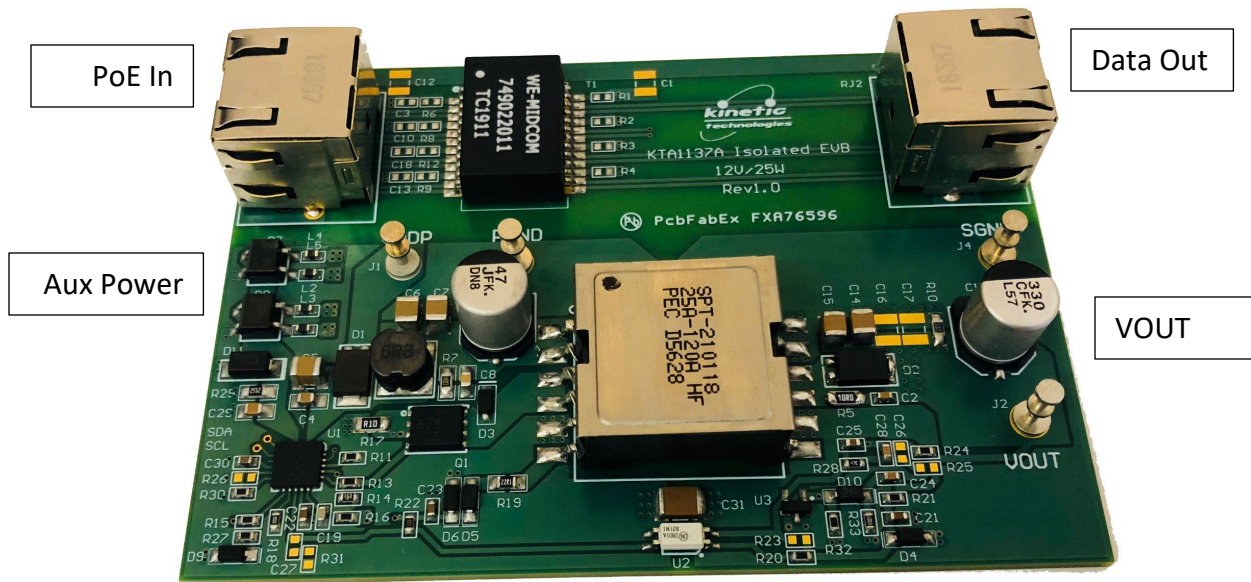


Figure 1. KTA1137A EVB-001

3.1 Features

- 25W output
- Operates from either POE or external AC power adaptor(48V)
- Isolated 12V output voltage

3.2 Applications

- Voice over Internet Protocol---IP telephones
- Wireless LAN---Wireless Access Points
- Security---Wired IP cameras

4. Electrical Specifications

Table 1. KTA1137A EVB-001 Electrical and Performance Specifications

Parameter	Condition	Min	Typ	Max	Units
Power Interface					
Input voltage	Applied to the power pins of connectors RJ1 or J1	0		57	V
Operation voltage	After start-up	34		57	V
Input UVLO	Rising input voltage		34		V
	Falling input voltage		30		V
Detection voltage	At device terminals	2.7		13	V
Classification voltage	At device terminals	11		24	V
Classification current	$R_{CLASS} = 63.4k\Omega$	36		44	mA
Inrush current-limit		100		400	mA
Operation current-limit			1200		mA
DC/DC Converter					
Output voltage	$34 \leq V_{IN} \leq 57V$, $I_{LOAD} \leq I_{LOAD(max)}$	12V output			V
Output current	$34 \leq V_{IN} \leq 57V$	12V output	2.1		A
Output ripple voltage, peak to peak	$V_{IN} = 48V$, $I_{LOAD} = 2.1A$	12V output	50		mV
Efficiency, end to end	$V_{IN} = 48V$, $I_{LOAD} = 2.1A$	12V output	86.61		%
Switching Frequency		110		130	kHz

5. Schematic

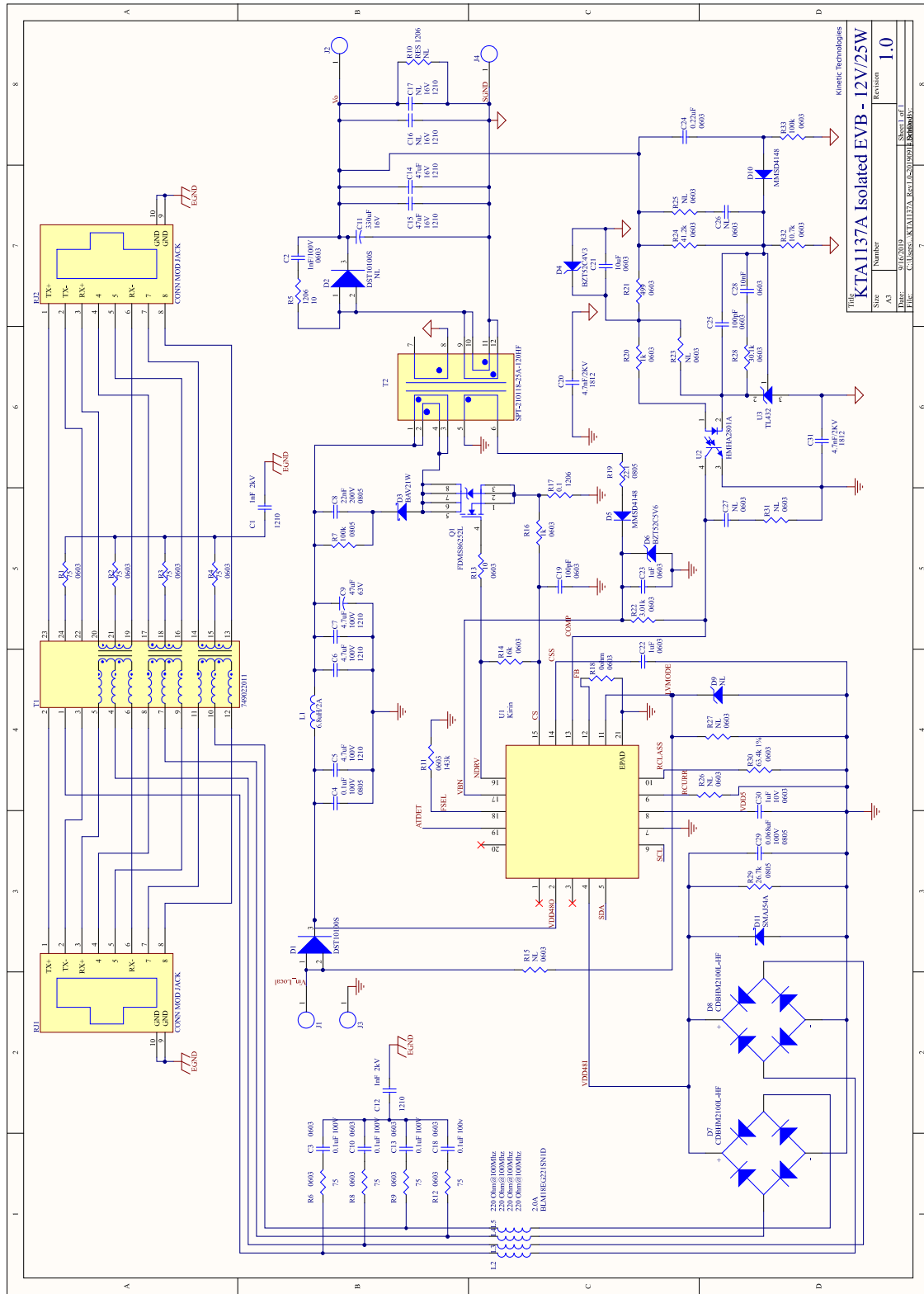


Figure 2. KTA1137A EVB-001 Schematic

6. General Configuration and Description

6.1 Physical Access

Table 2 lists the KTA1137A EVB-001 connectors functionality.

Table 2. Connectors Functionality

Connector	Description
J1	External adaptor input.
J2	Output voltage connector
RJ1	Ethernet power input connector (RJ45 Style Connector).
RJ2	Ethernet data port connector.

7. Test Setup

Figure 3 shows a typical setup for KTA1137A EVB-001. Input voltage can be applied as described in Table 2.

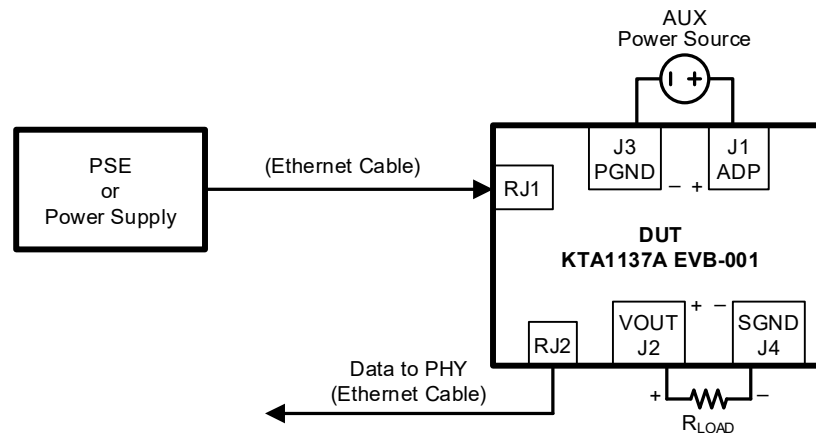


Figure 3. Typical KTA1137A EVB-001 Test Setup

8. KTA1137A EVB-001 Typical Performance Data

8.1 12V DC/DC Efficiency

Figure 4 illustrates three different 48VDC input efficiency plots:

1. POE, 48V from RJ1
2. Converter only 48V
3. Adaptor 48V from J1

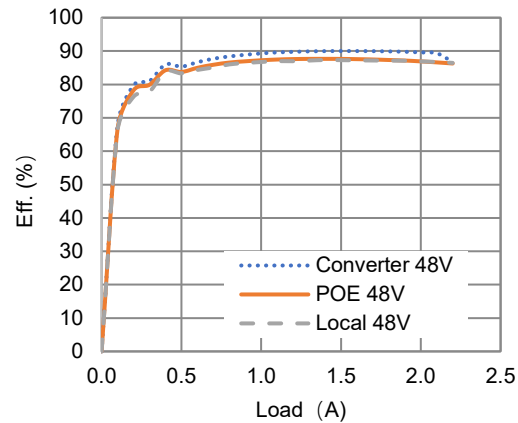


Figure 4. KTA1137A EVB-001 Efficiency with 12V Output

8.2 Operational Waveform

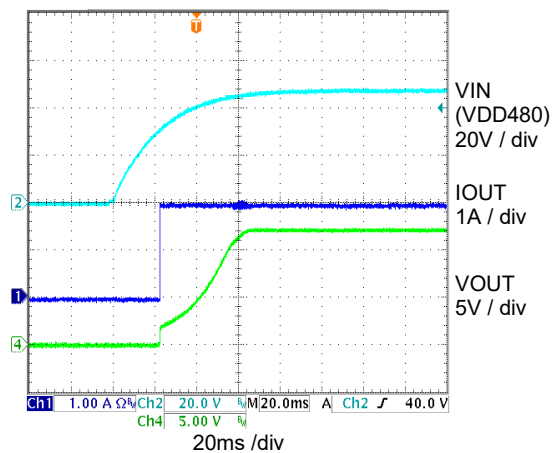


Figure 5. Power-up

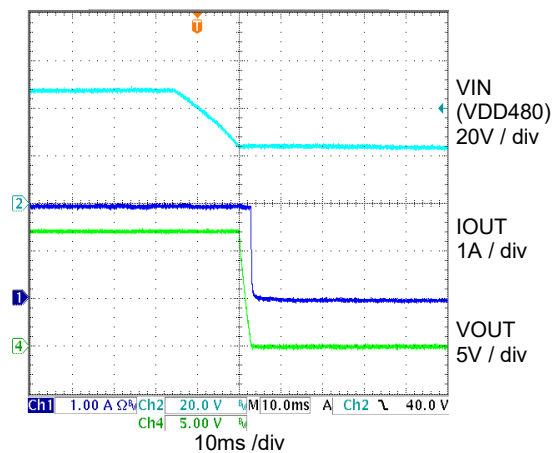


Figure 6. Power-down

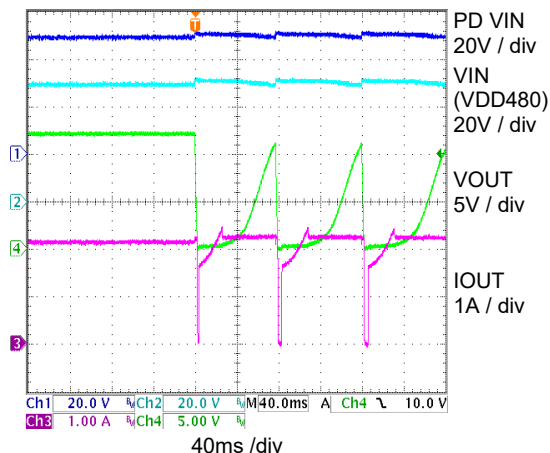


Figure 7. Over Current Protection (Overload)

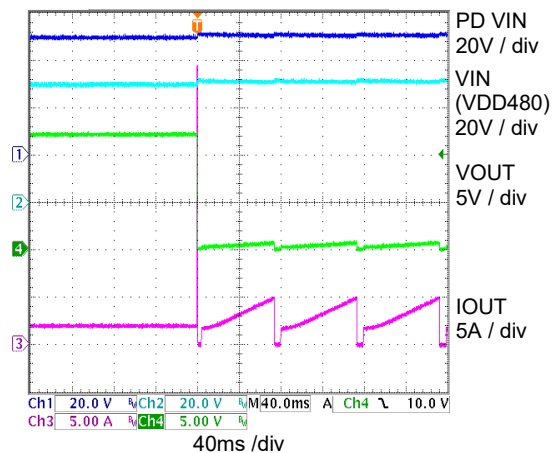


Figure 8. Over Current Protection (Short Circuit)

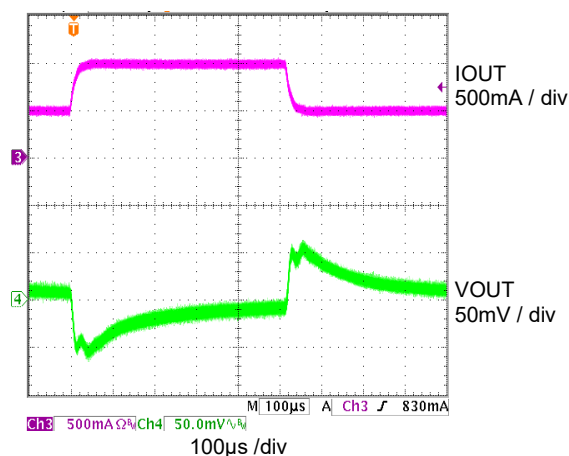


Figure 9. DC-DC Output Step Load

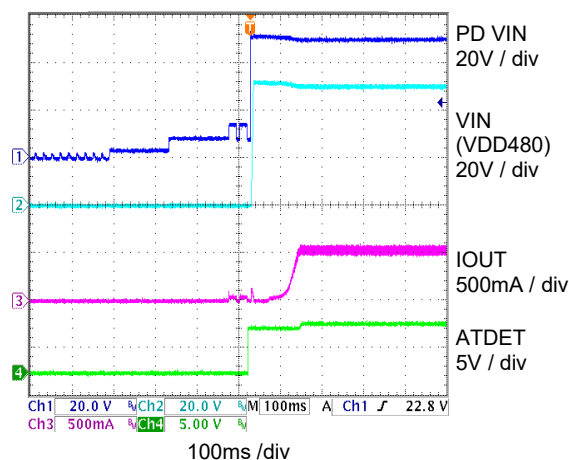


Figure 10. AT Detection

9. EVB Assembly Drawings and Layout Guidelines

9.1 PCB Drawings

The following figure show component placement and layout.

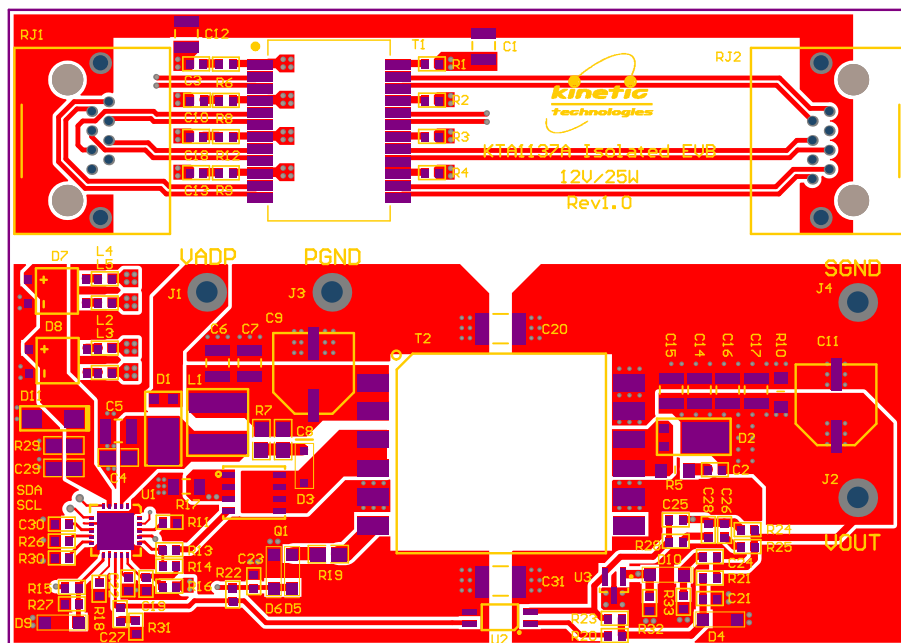


Figure 11. Top Side Layout/Routing

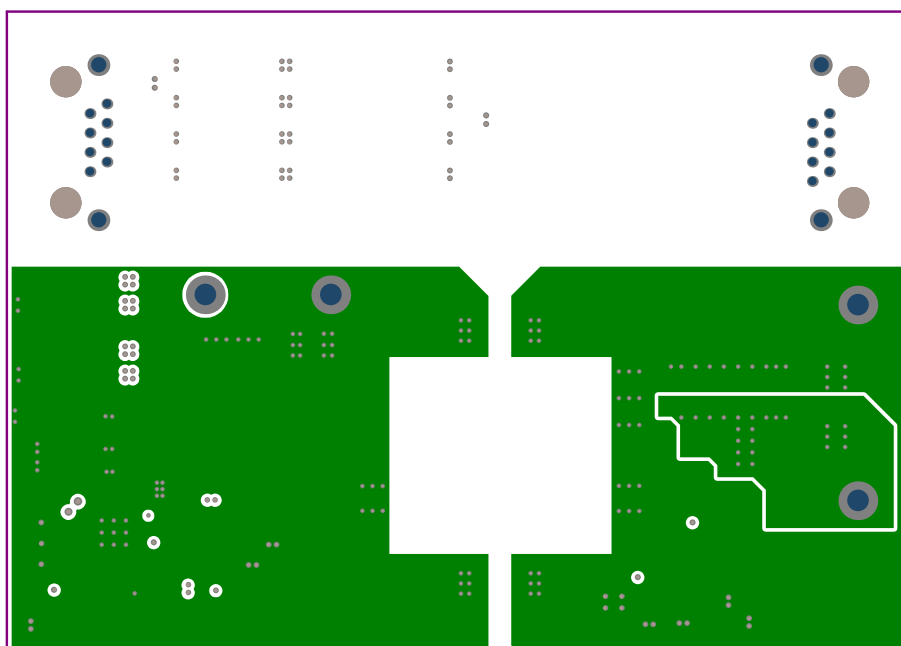


Figure 12. Layer Two Routing

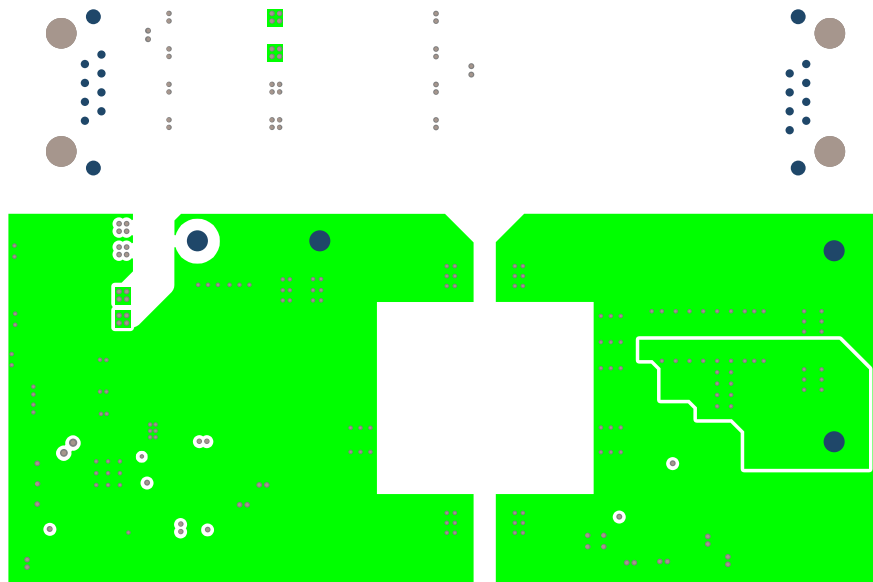


Figure 13. Layer Three Routing

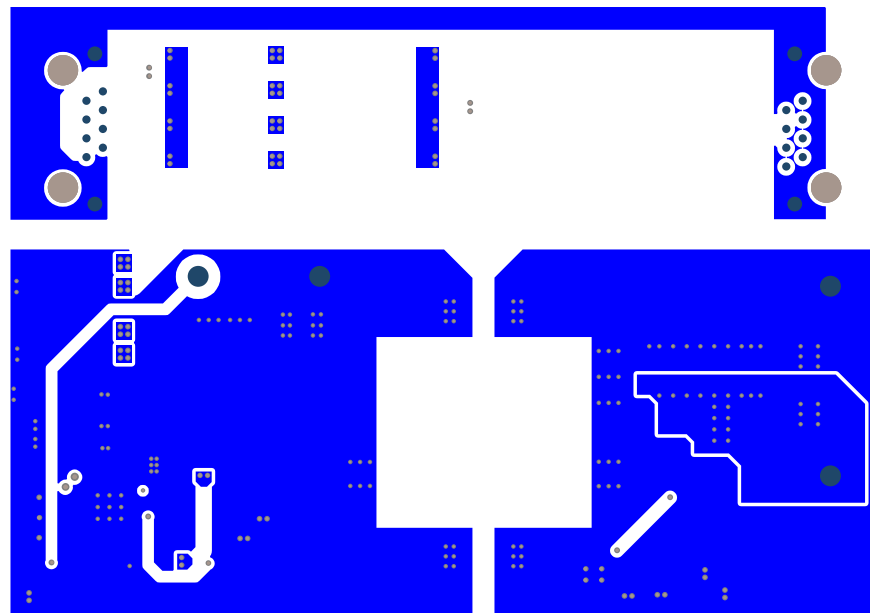


Figure 14. Bottom Layer Routing

The layout of the POE front end and DC/DC converter should follow power and EMI/ESD best practice guideline *Addressing EMC Preemptively in Ethernet Connected Devices*, <https://www.kinet-ic.com/support-training/training/>. Recommendations include:

- Figure 15. KTA1137A PCB Footprint and Ground Route**

- The PCB layout is divided into primary (input) side and secondary (output) side components and typically separated by an isolation barrier. The primary components should be grouped together and the secondary components should be grouped together. T1, U2, C19 and C26 are the only components bridging the isolation barrier between the primary and secondary circuitry. Primary and secondary traces, planes and other conductive items should be separated by a gap specified by the safety agency requirements appropriate for the insulation classification required by the application. The minimum spacing (creepage distance) for up to 63V input and Basic insulation is 1.25mm (IEC60950-1 Edition 2.2 2013-05). It is best practice to create a defined gap under T1, U2, C19 and C26 between primary side and secondary side as shown below.

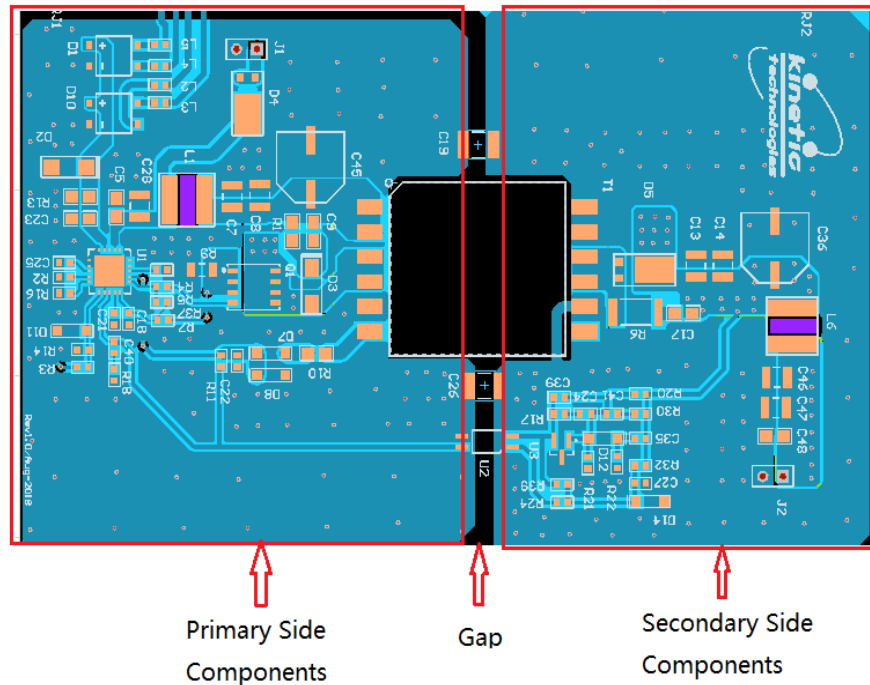


Figure 16. Primary Side and Secondary Side Components Placement

- There should be not crossover between VDD48I and VDD48O.

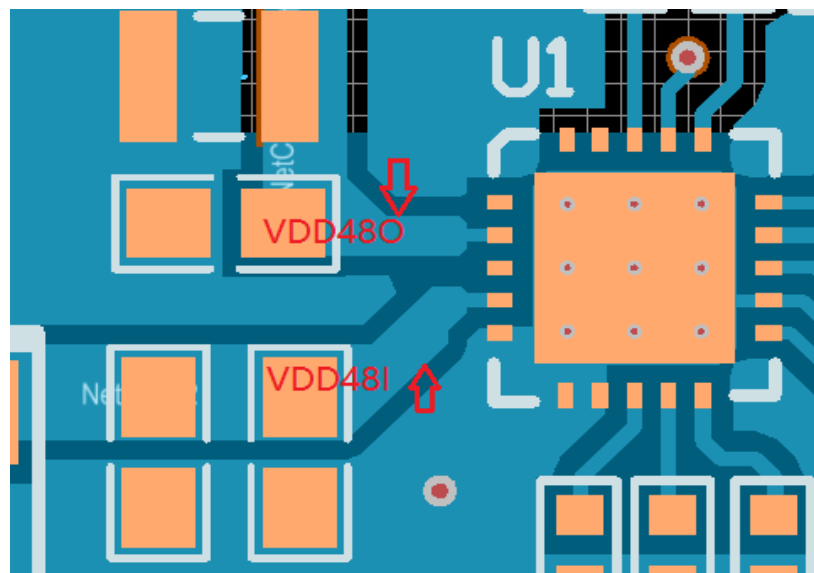


Figure 17. VDD48I and VDD48O Route

- Large copper fills and traces should be used on SMT power -dissipating devices, and wide traces or overlay copper fills should be used in the power path, such as D1, D10, D4, U1, Q1, L1 and T1, D5, L6.

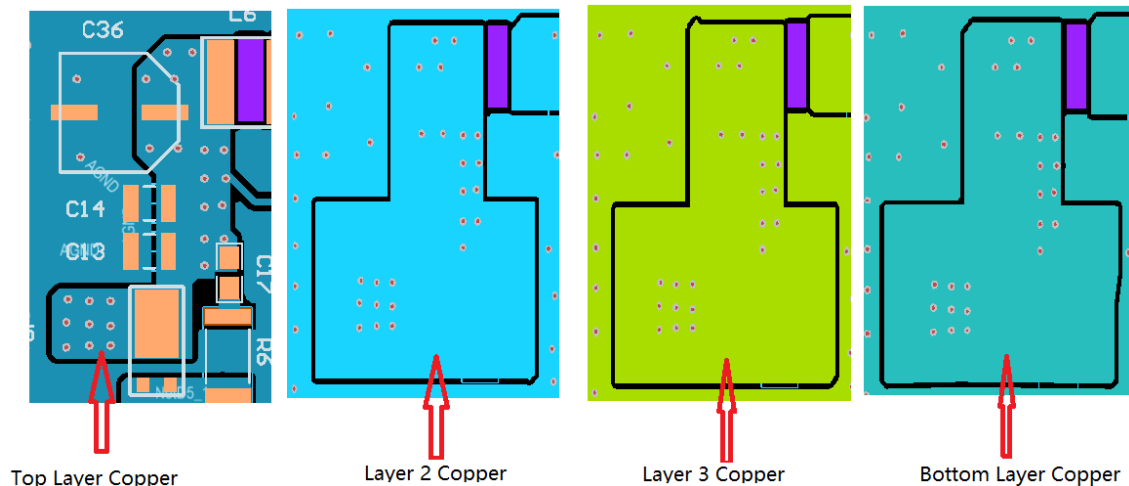


Figure 18. Power-dissipating Device Route

- Parts placement should prioritize a minimize trace length with point to point connections, i.e. no branch connections.
- High current circuitry should have priority over low power connections. Return paths should be paired with the corresponding source either with a dedicated return path or a ground plane.
- To minimize crosstalk there should not be any crossover of signals from one part of the flow to another.
- Spacing consistent with safety standards such as IEC60950 must be observed between the 48V input rails, primary side signals, and between the input and isolated output.
- Where possible, use vertical pairing of signal and return paths.
- Keep high-current and high-voltage switching nodes away from low-level circuits
- Pay special attention to spacing between the high-voltage sections of the converter and all other circuitry.

9.3 EMI Containment

- Use compact loops for high frequency and/or high current circuit paths (power loops and gate drives).

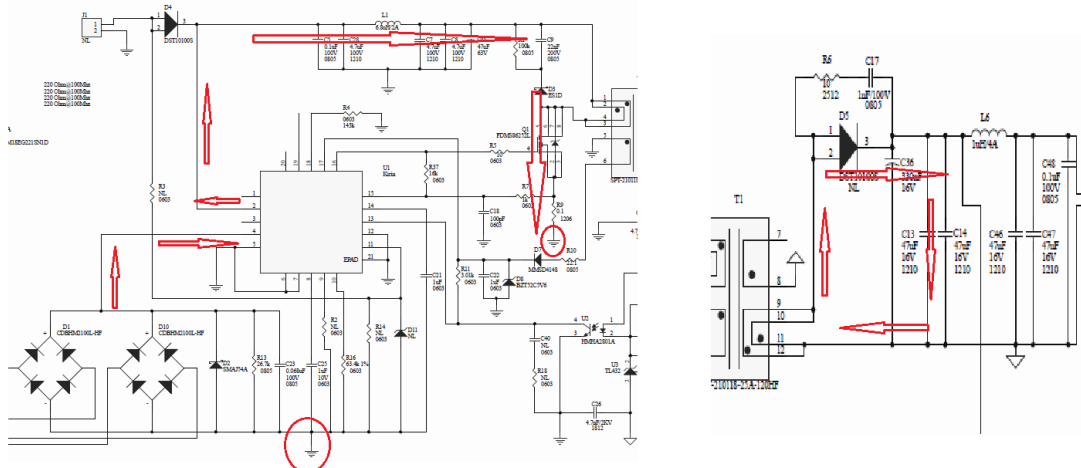


Figure 19. Two Compact Power Loops

- Use minimal, yet thermally adequate, copper areas for heat sinking of components tied to switching nodes (minimize exposed radiating surfaces).
- Use copper ground planes and top layer floods (surround circuitry with ground floods).
- Use 4-layer PCB if economically feasible.
- Minimize or shield the amount of copper area associated with input traces (to minimize radiated pickup).
- Hide copper associated with switching nodes under shielded magnetics where possible.
- Heat sink the “quiet side” of components instead of the “switching side” where possible (like the output side of inductor).
- Use Bob Smith terminations, Bob Smith EFT capacitor, and Bob Smith plane (add reference).
- Use Bob Smith plane as ground shield on input side of PCB (creating a phantom or lateral earth ground).
- Use LC filter at DC/DC input.
- Dampen high frequency ringing on all switching nodes (allow for possible resistor-capacitor or resistor-capacitor diode snubbers).
- Control rise times with gate drive resistors and possible snubbers
- Observe the polarity dot on inductors (embed noisy end)
- Use of ferrite on input (allow for possible use of ferrite beads)
- Maintain segregation between input-related circuitry and power circuitry
- A common-mode input inductor may be required.
- Possible use of integrated RJ45-45 jacks (Magjack, for example)
- End-product enclose considerations(shielding)

10. Bill of Materials

Table 3. KTA1137A EVB-001 Bill of Materials

Designator	Description	Manufacturer	Manufacturer P/N	Digikey P/N
C1, C2, C3, C4	Capacitor, Ceramic, 25V, 0.10 μ F, X7R, $\pm$ 10%, 0603	STD	STD	STD
C5, C48	Capacitor, Ceramic, 100V, 0.10 μ F, X7R, $\pm$ 10%, 0805	STD	STD	STD
C7, C8, C28	Capacitor, Ceramic, 100V, 4.7 μ F, X7S, $\pm$ 10%, 1210	STD	STD	STD
C9	Capacitor, Ceramic, 200V, 22nF, X7R, $\pm$ 10%, X7R 0805	STD	STD	STD
C13, C14, C46, C47	Capacitor, Ceramic, 16V, 47 μ F, X5R, $\pm$ 10%, 1210	STD	STD	STD
C17	Capacitor, Ceramic, 100V, 1nF, X7R, $\pm$ 10%, 0805	STD	STD	STD
C18	Capacitor, Ceramic, 50V, 100pF, X7R, $\pm$ 10%, 0603	STD	STD	STD
C19, C26	Capacitor, Ceramic, 2kV, 4.7nF, X7R, $\pm$ 10%, 1812	STD	STD	STD
C21, C22, C25	Capacitor, Ceramic, 10V, 1 μ F, X7R, $\pm$ 10%, X7R, 0603	STD	STD	STD
C23	Capacitor, Ceramic, 100V, 68nF, X7R, $\pm$ 10%, 0805	STD	STD	STD
C24	Capacitor, Ceramic, 50V, 10nF, X7R, $\pm$ 10%, 0603	STD	STD	STD
C27	Capacitor, Ceramic, 10V, 10 μ F, X7R, $\pm$ 20%, 0603	STD	STD	STD
C35	Capacitor, Ceramic, 10V, 0.22 μ F, X7R, $\pm$ 10%, 0603	STD	STD	STD
C45	Capacitor, Aluminum, 63V, 47 μ F, $\pm$ 20%, 8*10.5mm	Panasonic	EEEFK1J470P	PCE3789CT-ND
C36	Capacitor, Aluminum, 16V, 330 μ F, $\pm$ 20% 8*10.5mm	Panasonic	EEEFK1C331P	PCE3789CT-ND
C39	Capacitor, Ceramic, 50V, 100pF, X7R, $\pm$ 10%, 0603	STD	STD	STD
C40, C41	Capacitor, Ceramic, 0603, NL	STD	STD	STD
D1, D10	Schottky Bridge Rectifier, 100V, 2A, MBS2	Comchip	CDBHM2100L-HF	641-1432-1-ND
D2	Diode, TVS, Uni, 54 V, 400W, SMA	Littlefuse	SMAJ54A	SMAJ54ALFCT-ND
D3	Diode, Ultrafast, 200 V, 1A, SMA	ON Semiconductor	ES1D	ES1DFSCT-ND
D4, D5	Diode, Schottky, 100V, 10A, TO277A	Littelfuse Inc.	DST10100S	F7418DKR-ND
D7, D12	Diode, Switching, 100V, 0.2A, SOD123	ON Semiconductor	MMSD4148T1G	MMSD4148T1GOSCT-ND
D8, D11	Diode, Zener, 5.6V, 500mW, SOD123	Diodes Inc	BZT52C5V6-7-F	BZT52C5V6-FDIDKR-ND
D14	Diode, Zener, 4.3V, 500mW SOD123	Diodes Inc	BZT52C4V3-7-F	BZT52C4V3-FDICT-ND
J1	TERM BLK 2P SIDE ENT 2.54mm PCB	TE Connectivity AMP Connectors	282834-2	A98333-ND
J2	TERM BLK 2P SIDE ENT 2.54mm PCB	TE Connectivity AMP Connectors	282834-2	A98333-ND
L1	Fixed, IND, 6.8 μ H, 2.8A, 47.3m Ω	Bourns Inc.	SRN6045-6R8Y	SRN6045-6R8YTR-ND

Designator	Description	Manufacturer	Manufacturer P/N	Digikey P/N
L2, L3, L4, L5	220Ω Impedance Ferrite Bead 0603 SM 2A	Murata	BLM18EG221SN1D	490-3992-1-ND
L6	Fixed, IND, 1μH, 4A, 49mΩ, SMD	Wurth	7447730	732-1249-1-ND
Q1	MOSFET N-CH 150V 8-MLP	ON Semiconductor	FDMS86252L	FDMS86252LCT-ND
R1	Resistor, Chip, 100kΩ, 1/10W, 5%, 0805	STD	STD	STD
R3	Resistor, Chip, 1/10W, 1%, 0603, 20kΩ	STD	STD	STD
R2, R18, R30, R37, R39	Resistor, Chip, 1/10W, 1%, 0603, NL	STD	STD	STD
R4	Resistor, Chip, 143kΩ, 1/16W, 1%, 0603	STD	STD	STD
R5	Resistor, Chip, 10Ω, 1/16W, 1%, 0603	STD	STD	STD
R6	Resistor, Chip, 10Ω, 1W, 5%, 2512	Yageo	RC2512JK-0710RL	YAG3395CT-ND
R7, R24	Resistor, Chip, 1kΩ, 1/16W, 1%, 0603	STD	STD	STD
R9	Resistor, Chip, 0.1Ω, 1/4W, 5%, 1206	Panasonic	ERJ-8RSJR10V	P.10PCT-ND
R10	Resistor, Chip, 22.1Ω, 1/10W, 5%, 0805	STD	STD	STD
R11	Resistor, Chip, 10kΩ, 1/16W, 1%, 0603	STD	STD	STD
R13	Resistor, Chip, 25.5kΩ, 1/10W, 1%, 0805	STD	STD	STD
R14	Resistor, Chip, 4.02kΩ, 1/16W, 1%, 0603	STD	STD	STD
R16	Resistor, Chip, 63.4kΩ, 1/16W, 1%, 0603	STD	STD	STD
R17	Resistor, Chip, 30.1kΩ, 1/16W, 1%, 0603	STD	STD	STD
R20	Resistor, Chip, 41.2kΩ, 1/16W, 1%, 0603	STD	STD	STD
R21	Resistor, Chip, 10.7kΩ, 1/16W, 1%, 0603	STD	STD	STD
R22	Resistor, Chip, 100kΩ, 1/16W, 1%, 0603	STD	STD	STD
R32	Resistor, Chip, 499Ω, 1/16W, 1%, 0603	STD	STD	STD
RJ1	1 Port RJ45 Magjack Connector Through Hole (PoE+)	Bell Fuse	0838-1X1T-W7	0838-1X1T-W7-ND
RJ2	CONN MOD JACK 8P8C R/A UNSHLD	TE Connectivity AMP Connectors	5520252-4	A31408-ND
T1	EFD20	PEC	SPT-210118 25A-120HF	
U1	IEEE 802.3af/at PoE PD with Flyback DC-DC Controller, 20QFN	Kinetic Technologies	KTA1137A	
U2	OPTOISO 3.75kV TRANS 4-MINI-FLAT	ON Semiconductor	HMHA2801A	HMHA2801A-ND
U3	IC, Shunt Regulator, 36V, 100mA, 1%	Texas Instruments	TL432AQDBZR	296-17340-1-ND

11. Appendix 1 – Representative Sifos Results

11.1 ALT A MDI

PDA-600 TEST REPORT				Coverage:	ALT A	MDI	Type-1	Software Version:	1.10	
November 26, 2019 10:19 AM					ALT B	MDI-X	Type-2 PHY	PDA Firmware:	1.07	
Product Tested: Kinetic_KTA1137A_EVB				Cycles:	1	Color Key:	Type-2 LLDP	Report Ver:	1.6	
					PASS	FAIL	WARN	INFO	Serial Number	602A0004
Detection & Classification				PSE Emulation:	Pairs:	A	Polarity:	MDI	Det_Cycles:	3
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
Rdet		25.33	kohm	25.33	25.33	25.33	23.70	26.30	P	
Rdet_final		25.29	kohm	25.29	25.29	25.29	23.70	26.30	P	
Rdet_unpwr		>99.00	kohm	99.00	99.00	99.00	<12.00	>45.00	P	
Cdet		0.07	uF	0.07	0.07	0.07	0.05	0.12	P	
Cdet_final		0.07	uF	0.07	0.07	0.07	0.05	0.12	P	
1 Event Classification										
Iclass		40.3	mA	40.3	40.3	40.3	36.0	44.0	P	
ClassNum		4		4	4	-	0	4	P	
Tclass		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
ClassStability		1					1	1	P	
2 Event Classification										
Iclass_event1		40.3	mA	40.3	40.3	40.3	36.0	44.0	P	
Iclass_event2		40.4	mA	40.4	40.4	40.4	36.0	44.0	P	
MarkI		2.30	mA	2.30	2.30	2.30	0.25	4.00	P	
ClassNum2		4		4	4	-	0	4	P	
Tclass_event1		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
Tclass_event2		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
ClassStability_event1		1					1	1	P	
ClassStability_event2		1					1	1	P	
Power-Up / Down										
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
InrushI_1		-1.0	mA	-1.0	-1.0	-1.0	0.0	400.0	NA	
InrushI_2		367.6	mA	367.6	367.6	367.6	0.0	400.0	P	
Pmax_Tdelay		1.9	W	1.9	1.9	1.9	0.0	14.4	P	
Inrush_delayed		0		0	0	-	0	0	P	
Von		37.5	VDC	37.5	37.5	37.5	30.0	42.0	P	
Voff		31.8	VDC	31.8	31.8	31.8	30.0	37.0	P	
Vhyst		5.7	VDC	5.7	5.7	5.7	4.0	12.0	P	
BackfeedV		0.0	VDC	0.0	0.0	0.0	0.0	2.8	P	
ClassRecover		0		0	0	-	0	0	P	
SigRecoverTime		0.0	sec	0.0	0.0	0.0	0.0	30.0	P	
MDI Powered Type-1				PSE Emulation:	On Time:	10 sec	Off Time:	10 sec	Vport:	-1.0
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
MDI Powered Type-2 PHY				PSE Emulation:	On Time:	10 sec	Off Time:	10 sec	Vport:	54.0
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
MinI_2		12.3	mA	12.3	12.3	12.3	0.0	524.2	P	
MaxI_2		15.6	mA	15.6	15.6	15.6	10.0	524.2	P	
Vport_2		54.0	VDC	54.0	54.0	54.0	42.5	57.0	INFO	
Ipeak_2		0.84	W	0.84	0.84	0.84	0.0	28.3	P	
Pavg_2		0.70	W	0.70	0.70	0.70	0.0	25.5	P	
MPSViolation_2		0		0	0	-	0	0	P	
TcutWindowViolation_2		0		0	0	-	0	0	P	
DutyCycleViolation_2		0		0	0	-	0	0	P	
MDI Powered Type-2 LLDP				PSE Emulation:	On Time:	-1 sec	Off Time:	10 sec	Vport:	-1.0
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	

11.2 ALT B MDI

PDA-600 TEST REPORT				Coverage: ALT A MDI Type-1		Software Version: 1.10			
November 26, 2019 10:19 AM				ALT B MDI-X Type-2 PHY		PDA Firmware: 1.07			
Product Tested: Cycles:				Color Key:		Report Ver: 1.6			
Kinetic_KTA1137A_EVB 1				PASS FAIL WARN INFO		Serial Number 602A0004			
Detection & Classification									
PSE Emulation :				Pairs:	B	Polarity:	MDI	Det Cycles:	3
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F
Rdet		25.43	kohm	25.43	25.43	25.43	23.70	26.30	P
Rdet_final		25.43	kohm	25.43	25.43	25.43	23.70	26.30	P
Rdet_unpwr		>99.00	kohm	99.00	99.00	99.00	<12.00	>45.00	P
Cdet		0.07	uF	0.07	0.07	0.07	0.05	0.12	P
Cdet_final		0.07	uF	0.07	0.07	0.07	0.05	0.12	P
1 Event Classification									
Iclass		40.6	mA	40.6	40.6	40.6	36.0	44.0	P
ClassNum		4		4	4	-	0	4	P
Tclass		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P
ClassStability		1					1	1	P
2 Event Classification									
Iclass_event1		40.6	mA	40.6	40.6	40.6	36.0	44.0	P
Iclass_event2		40.6	mA	40.6	40.6	40.6	36.0	44.0	P
MarkI		2.40	mA	2.40	2.40	2.40	0.25	4.00	P
ClassNum2		4		4	4	-	0	4	P
Tclass_event1		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P
Tclass_event2		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P
ClassStability_event1		1					1	1	P
ClassStability_event2		1					1	1	P
Power-Up / Down									
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F
InrushI_1		-1.0	mA	-1.0	-1.0	-1.0	0.0	400.0	NA
InrushI_2		367.9	mA	367.9	367.9	367.9	0.0	400.0	P
Pmax_Tdelay		1.9	W	1.9	1.9	1.9	0.0	14.4	P
Inrush_delayed		0		0	0	-	0	0	P
Von		37.5	VDC	37.5	37.5	37.5	30.0	42.0	P
Voff		31.9	VDC	31.9	31.9	31.9	30.0	37.0	P
Vhyst		5.6	VDC	5.6	5.6	5.6	3.9	12.0	P
BackfeedV		0.0	VDC	0.0	0.0	0.0	0.0	2.8	P
ClassRecover		0		0	0	-	0	0	P
SigRecoverTime		0.0	sec	0.0	0.0	0.0	0.0	30.0	P
MDI Powered Type-1									
PSE Emulation :				On Time:	10 sec	Off Time:	10 sec	Vport:	-1.0
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F
MDI Powered Type-2 PHY									
PSE Emulation :				On Time:	10 sec	Off Time:	10 sec	Vport:	54.0
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F
MinI_2		12.4	mA	12.4	12.4	12.4	0.0	524.2	P
MaxI_2		16.6	mA	16.6	16.6	16.6	10.0	524.2	P
Vport_2		54.0	VDC	54.0	54.0	54.0	42.5	57.0	INFO
Ppeak_2		0.90	W	0.90	0.90	0.90	0.0	28.3	P
Pavg_2		0.70	W	0.70	0.70	0.70	0.0	25.5	P
MPSViolation_2		0		0	0	-	0	0	P
TcutWindowViolation_2		0		0	0	-	0	0	P
DutyCycleViolation_2		0		0	0	-	0	0	P
MDI Powered Type-2 LLDP									
PSE Emulation :				On Time:	-1 sec	Off Time:	10 sec	Vport:	-1.0
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F

11.3 ALT A MDI-X

PDA-600 TEST REPORT				Coverage: ALT A MDI Type-1			Software Version: 1.10			
November 26, 2019 10:19 AM				ALT B MDI-X Type-2 PHY			PDA Firmware: 1.07			
Product Tested: Cycles:				Color Key:			Report Ver: 1.6			
Kinetic_KTA1137A_EVB 1				PASS FAIL WARN INFO			Serial Number 602A0004			
Detection & Classification										
PSE Emulation :			Pairs:	A	Polarity:	MDI-X	Det_Cycles:	3		
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
Rdet		25.29	kohm	25.29	25.29	25.29	23.70	26.30	P	
Rdet_final		25.36	kohm	25.36	25.36	25.36	23.70	26.30	P	
Rdet_unpwr		>99.00	kohm	99.00	99.00	99.00	<12.00	>45.00	P	
Cdet		0.07	uF	0.07	0.07	0.07	0.05	0.12	P	
Cdet_final		0.07	uF	0.07	0.07	0.07	0.05	0.12	P	
1 Event Classification										
Iclass		40.4	mA	40.4	40.4	40.4	36.0	44.0	P	
ClassNum		4		4	4	-	0	4	P	
Tclass		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
ClassStability		1					1	1	P	
2 Event Classification										
Iclass_event1		40.4	mA	40.4	40.4	40.4	36.0	44.0	P	
Iclass_event2		40.3	mA	40.3	40.3	40.3	36.0	44.0	P	
MarkI		2.30	mA	2.30	2.30	2.30	0.25	4.00	P	
ClassNum2		4		4	4	-	0	4	P	
Tclass_event1		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
Tclass_event2		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
ClassStability_event1		1					1	1	P	
ClassStability_event2		1					1	1	P	
Power-Up / Down										
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
InrushI_1		-1.0	mA	-1.0	-1.0	-1.0	0.0	400.0	NA	
InrushI_2		366.8	mA	366.8	366.8	366.8	0.0	400.0	P	
Pmax_Tdelay		1.9	W	1.9	1.9	1.9	0.0	14.4	P	
Inrush_delayed		0		0	0	-	0	0	P	
Von		37.6	VDC	37.6	37.6	37.6	30.0	42.0	P	
Voff		31.8	VDC	31.8	31.8	31.8	30.0	37.0	P	
Vhyst		5.7	VDC	5.7	5.7	5.7	3.9	12.0	P	
BackfeedV		0.0	VDC	0.0	0.0	0.0	0.0	2.8	P	
ClassRecover		0		0	0	-	0	0	P	
SigRecoverTime		0.0	sec	0.0	0.0	0.0	0.0	30.0	P	
MDI Powered Type-1										
PSE Emulation :			On Time:	10 sec	Off Time:	10 sec	Vport:	-1.0		
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
MDI Powered Type-2 PHY										
PSE Emulation :			On Time:	10 sec	Off Time:	10 sec	Vport:	54.0		
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
MinI_2		12.4	mA	12.4	12.4	12.4	0.0	523.2	P	
MaxI_2		14.6	mA	14.6	14.6	14.6	10.0	523.2	P	
Vport_2		54.1	VDC	54.1	54.1	54.1	42.5	57.0	INFO	
Ppeak_2		0.79	W	0.79	0.79	0.79	0.0	28.3	P	
Pavg_2		0.70	W	0.70	0.70	0.70	0.0	25.5	P	
MPSViolation_2		0		0	0	-	0	0	P	
TcutWindowViolation_2		0		0	0	-	0	0	P	
DutyCycleViolation_2		0		0	0	-	0	0	P	
MDI Powered Type-2 LLDP										
PSE Emulation :			On Time:	-1 sec	Off Time:	10 sec	Vport:	-1.0		
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	

11.4 ALT B MDI-X

PDA-600 TEST REPORT				Coverage: ALT A MDI Type-1			Software Version: 1.10			
November 26, 2019 10:19 AM				ALT B MDI-X Type-2 PHY			PDA Firmware: 1.07			
Product Tested: Cycles:				Color Key:			Report Ver: 1.6			
Kinetic_KTA1137A_EVB 1				PASS FAIL WARN INFO			Serial Number 602A0004			
Detection & Classification										
PSE Emulation :				Pairs:	B	Polarity:	MDI-X	Det Cycles:	3	
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
Rdet		25.36	kohm	25.36	25.36	25.36	23.70	26.30	P	
Rdet_final		25.43	kohm	25.43	25.43	25.43	23.70	26.30	P	
Rdet_unpwr		>99.00	kohm	99.00	99.00	99.00	<12.00	>45.00	P	
Cdet		0.07	uF	0.07	0.07	0.07	0.05	0.12	P	
Cdet_final		0.07	uF	0.07	0.07	0.07	0.05	0.12	P	
1 Event Classification										
Iclass		40.6	mA	40.6	40.6	40.6	36.0	44.0	P	
ClassNum		4		4	4	-	0	4	P	
Tclass		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
ClassStability		1					1	1	P	
2 Event Classification										
Iclass_event1		40.6	mA	40.6	40.6	40.6	36.0	44.0	P	
Iclass_event2		40.6	mA	40.6	40.6	40.6	36.0	44.0	P	
MarkI		2.40	mA	2.40	2.40	2.40	0.25	4.00	P	
ClassNum2		4		4	4	-	0	4	P	
Tclass_event1		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
Tclass_event2		0.0005	sec	0.0005	0.0005	0.0005	0.0005	0.0050	P	
ClassStability_event1		1					1	1	P	
ClassStability_event2		1					1	1	P	
Power-Up / Down										
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
InrushI_1		-1.0	mA	-1.0	-1.0	-1.0	0.0	400.0	NA	
InrushI_2		368.0	mA	368.0	368.0	368.0	0.0	400.0	P	
Pmax_Tdelay		1.9	W	1.9	1.9	1.9	0.0	14.4	P	
Inrush_delayed		0		0	0	-	0	0	P	
Von		37.7	VDC	37.7	37.7	37.7	30.0	42.0	P	
Voff		31.9	VDC	31.9	31.9	31.9	30.0	37.0	P	
Vhyst		5.8	VDC	5.8	5.8	5.8	3.9	12.0	P	
BackfeedV		0.0	VDC	0.0	0.0	0.0	0.0	2.8	P	
ClassRecover		0		0	0	-	0	0	P	
SigRecoverTime		0.0	sec	0.0	0.0	0.0	0.0	30.0	P	
MDI Powered Type-1										
PSE Emulation :				On Time:	10 sec	Off Time:	10 sec	Vport:	-1.0	
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
MDI Powered Type-2 PHY										
PSE Emulation :				On Time:	10 sec	Off Time:	10 sec	Vport:	54.0	
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	
MinI_2		12.3	mA	12.3	12.3	12.3	0.0	524.1	P	
MaxI_2		17.3	mA	17.3	17.3	17.3	10.0	524.1	P	
Vport_2		54.0	VDC	54.0	54.0	54.0	42.5	57.0	INFO	
Ppeak_2		0.93	W	0.93	0.93	0.93	0.0	28.3	P	
Pavg_2		0.70	W	0.70	0.70	0.70	0.0	25.5	P	
MPSViolation_2		0		0	0	-	0	0	P	
TcutWindowViolation_2		0		0	0	-	0	0	P	
DutyCycleViolation_2		0		0	0	-	0	0	P	
MDI Powered Type-2 LLDP										
PSE Emulation :				On Time:	-1 sec	Off Time:	10 sec	Vport:	-1.0	
Parameter	Cycle:	1	Units	Min.	Max.	Average	Low Lim.	High Lim.	P/F	

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