

POWER OVER ETHERNET TRANSFORMERS 以太网电源变压器**POE 系列****BRIEF INTRODUCTION**

Power over Ethernet (PoE) has been widely used to deliver power and data over a single cable to devices such as security and surveillance cameras, video IP phones, public Wi-Fi hotspots, smart home appliances, etc. As new applications and the next generation of powered devices (PD) are emerging from the PoE market, PoE Standards are evolving to meet the requirement for higher power, up to 71W PD input power. Miden's PD power transformers are perfect solutions to meet the demands of these applications and provide the regulated output voltage with the desired power level and isolation. For the signal path at the Ethernet line side, isolation transformers and common mode chokes for both the transmit and receive sections are incorporated into a single package. The center-tapped 1:1 transformers are used for injecting current, and common mode chokes are used to filter out EMI.

Miden's PoE power transformers offer different power levels compatible with traditional IEEE 802.3af/at as well as the new high power standard IEEE 802.bt. These power transformers are designed in compact package sizes while still maintaining high power conversion efficiency and high isolation voltages. They also have the flexibility to provide great variety of outputs (voltage, current) to suit a wide variety of PoE power devices. Flyback and Forward/Active Clamp Forward topologies can be found in our power transformer offerings. In general, Flybacks are better at higher voltage/lower current output design and more cost effective while more efficiency can be achieved in the Forward topology.

以太网供电(PoE)已广泛用于通过单根电缆向安全和监控摄像头、视频 IP 电话、公共 Wi-Fi 热点、智能家电等设备提供电力和数据。作为新应用和下一个随着 PoE 市场不断涌现出新一代受电设备 (PD), PoE 标准也在不断发展以满足更高功率的要求, PD 输入功率高达 71W。MIDEN 的 PD 电源变压器是满足这些应用需求的完美解决方案, 可提供具有所需功率水平和隔离度的稳压输出电压。对于以太网线路侧的信号路径, 用于发送和接收部分的隔离变压器和共模扼流圈被集成到一个封装中。中心抽头的 1:1 变压器用于注入电流, 共模扼流圈用于滤除 EMI。

MIDEN 公司的 PoE 电力变压器提供不同的功率水平, 兼容传统的 IEEE 802.3af/at 以及新的高功率标准 IEEE 802.bt。这些电力变压器以紧凑的封装尺寸设计, 同时仍然保持高功率转换效率和高隔离电压。它们还具有提供各种输出 (电压、电流) 的灵活性, 以适应各种 PoE 功率设备。在我们的电力变压器产品中可以找到反激和正向/有源箝位正向拓扑。一般来说, 反激在更高电压/更低电流的输出设计中更好, 并且更具成本效益, 同时在正向拓扑中可以实现更高的效率。

POE STANDARDS OVERVIEW

PSE Output power	15.4W	30W	45W	60W	75W	90W
PD Input power	13W	25.5W	40W	51W	62W	71W
TYPE1	802.3af Class 0-3	802.3at Class 4				
TYPE1	Class 0-3					
TYPE1	Class 0-3	Class 4	802.3bt Class 5	802.3bt Class 6	802.3bt Class 7	
TYPE1	Class 0-3	Class 4	Class 5	Class 6		
TYPE1	Class 0-3	Class 4	Class 5	Class 6	802.3bt Class 7	802.3bt Class 8

PoE IEEE Standard Power Levels

POWER OVER ETHERNET TRANSFORMERS 以太网电源变压器

POE 系列

IEEE 802.3af (POE)

	Vout				
PD INPUT POWER	3.3V	5V	12V	19.5V	24V
3W(Flyback)	POE30P-33L	POE30P-50L	POE30P-12L		
6W(Flyback)	POE60F-33L	POE60F-50L	POE60F-12L		
7W(Flyback)	POE70P-33L	POE70P-50L	POE70P-12L		
13W(Flyback)	POE13P-33L	POE13P-50L	POE13P-12L	POE13P-19L	POE13P-24L
13W(Flyback)	POE13F-33L	POE13F-50L	POE13F-12L	POE13F-19L	POE13F-24L

IEEE 802.3at (POE+)

	Vout				
PD INPUT POWER	3.3V	5V	12V	19.5V	24V
25W(Forward)	FCT1-33M22SL	FCT1-50M22SL	FCT1-120M22SL		
30W(Flyback)	POE300F-33L	POE300F-50L	POE300F-12L	POE300F-19L	POE300F-24L
30W(Forward)	FCT1-33D3SL	FCT1-50D3SL	FCT1-120D3SL	FCT1-195D3SL	FCT1-240D3SL

IEEE 802.3bt AND EXTENDED POWER

	Vout				
PD INPUT POWER	3.3V	5V	12V	24V	48V
62W(Flyback)	POE62F-33E	POE62F-50E	POE62F-12E	POE62F-24E	POE62F-48E
62W(Forward)	POE600F-33L	POE600F-50L	POE600F-12L	POE600F-24L	
71W(Flyback)	POE71F-33E	POE71F-50E	POE71F-12E	POE71F-24E	POE71F-48E

SPECIFICATION

Remark: Inductance is for the primary, measured at 250KHz, 0.1Vrms, 0Adc.

P/N	Power (W)	L (uH) ±10%	Lk (uH) Max	DCR(Ω)Max			Turns ratio		Output
				Pri	Bias	Sec	Pri:Sec	Pri:Bias	
POE30P-33L	3	310	4.75	1.02	2.01	0.066	1:0.19	1:0.70	3.3V,0.91A
POE30P-50L	3	310	4.50	1.02	2.01	0.118	1:0.28	1:0.70	5.0V,0.60A
POE30P-12L	3	310	4.25	1.04	2.01	0.700	1:0.70	1:0.70	12V,0.25A
POE60F-33L	6	65	3.90	0.138	0.180	0.007	1:0.11	1:0.36	3.3V,1.8A
POE60F-50L	6	60	2.30	0.130	0.165	0.009	1:0.15	1:0.35	5.0V,1.2A
POE60F-12L	6	55	0.70	0.095	0.150	0.017	1:0.35	1:0.35	12V,0.5A
POE70P-33L	7	155	4.00	0.414	0.822	0.036	1:0.19	1:0.667	3.3V,2.12A
POE70P-50L	7	155	3.60	0.414	0.822	0.060	1:0.262	1:0.667	5.0V,1.4A
POE70P-12L	7	155	3.25	0.414	0.822	0.343	1:0.667	1:0.667	12V,0.6A

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POE 系列

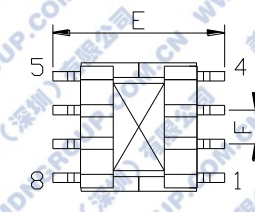
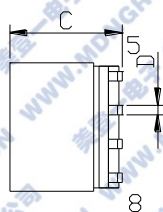
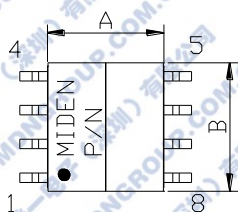
P/N	Power (W)	L (uH) ±10%	Lk (uH) Max	DCR(Ω)Max			Turns ratio		Output
				Pri	Bias	Sec	Pri:Sec	Pri:Bias	
POE13P-33L	13	127	1.25	0.255	0.310	0.024	1:0.166	1:0.5	3.3V,4.0A
POE13P-50L	13	127	0.95	0.222	0.348	0.039	1:0.25	1:0.5	5.0V,2.6A
POE13P-12L	13	127	0.65	0.199	0.308	0.065	1:0.50	1:0.5	12V,1.08A
POE13P-19L	13	127	0.80	0.290	0.355	0.066	1:0.567	1:0.5	19.5V,0.67A
POE13P-24L	13	127	0.60	0.255	0.315	0.067	1:0.667	1:0.5	24V,0.54A
POE13F-33L	13	40	3.4	0.138	0.180	0.007	1:0.11	1:0.36	3.3V,3.9A
POE13F-50L	13	40	1.9	0.130	0.165	0.009	1:0.15	1:0.35	5.0V,2.6A
POE13F-12L	13	35	0.6	0.095	0.150	0.017	1:0.35	1:0.35	12V,1.1A
POE13F-19L	13	37	0.4	0.085	0.150	0.025	1:0.567	1:0.35	19.5V,0.67A
POE13F-24L	13	37	0.4	0.086	0.150	0.049	1:0.667	1:0.33	24V,0.54A
FCT1-33M22SL	25	95	1.44	0.115	0.347	0.008	1:0.16	1:0.63	3.3V,7.2A
FCT1-50M22SL	25	95	0.88	0.144	0.298	0.018	1:0.25	1:0.53	5.0V,4.8A
FCT1-120M22SL	25	95	0.73	0.150	0.352	0.063	1:0.53	1:0.53	12V,2.0A
POE300F-33L	30	42	3.00	0.070	0.220	0.003	1:0.09	1:0.33	3.3V,9A
POE300F-50L	30	42	1.60	0.069	0.225	0.005	1:0.14	1:0.33	5V,6A
POE300F-12L	30	42	0.55	0.061	0.195	0.015	1:0.33	1:0.33	12V,2.5A
POE300F-19L	30	42	0.43	0.060	0.195	0.037	1:0.56	1:0.33	19.5V,1.5A
POE300F-24L	30	42	0.31	0.060	0.195	0.055	1:0.67	1:0.33	24V,1.25A
FCT1-33D3SL	30	72.9min	0.43	0.275	0.250	0.005	1:0.33	1:1	3.3V,9A
FCT1-50D3SL	30	72.9min	0.42	0.275	0.250	0.010	1:0.44	1:1	5V,6A
FCT1-120D3SL	30	72.9min	0.18	0.275	0.250	0.029	1:1	1:1	12V,2.5A
FCT1-195D3SL	30	72.9min	0.24	0.275	0.235	0.032	1:1.44	1:0.88	19.5V,1.5A
FCT1-240D3SL	30	72.9min	0.24	0.275	0.235	0.073	1:1.78	1:0.88	24V,1.25A
POE62F-33ED	62	22.2	0.50	0.035	0.130	0.002	1:0.143	1:0.50	3.3V,17.1A
POE62F-50ED	62	22.2	0.38	0.035	0.130	0.003	1:0.214	1:0.05	5V,11.3A
POE62F-12ED	62	17.8	0.17	0.019	0.108	0.009	1:0.5	1:0.5	12V,4.7A
POE62F-24ED	62	17.8	0.12	0.019	0.108	0.036	1:1	1:0.5	24V,2.4A
POE62F-48ED	62	17.8	0.11	0.019	0.108	0.140	1:2	1:0.5	48V,1.2A
POE71F-33ED	71	18.9	0.50	0.035	0.130	0.002	1:0.143	1:0.50	3.3V,19.7A
POE71F-50ED	71	18.9	0.38	0.035	0.130	0.003	1:0.214	1:0.5	5V,13A
POE71F-12ED	71	15.5	0.17	0.019	0.108	0.010	1:0.5	1:0.5	12V,5.4A
POE71F-24ED	71	15.5	0.12	0.019	0.108	0.036	1:1	1:0.5	24V,2.7A
POE71F-48ED	71	15.5	0.11	0.019	0.108	0.140	1:2	1:0.5	48V,1.35A
POE600F-33L	60	100	0.55	0.035	0.185	0.003	6:1	6:3.5	3.3V,18.2A
POE600F-50L	60	100	0.30	0.035	0.185	0.003	4:1	4:2.3	5.0V,12A
POE600F-12L	60	100	0.17	0.035	0.156	0.008	2:1	2:1	12V,5A
POE600F-24L	60	100	0.14	0.035	0.156	0.030	1:1	1:0.5	24V,2.5A

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POE 系列

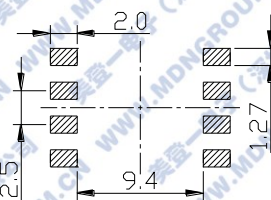
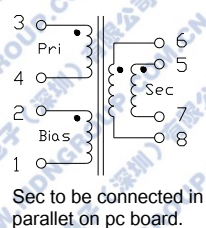
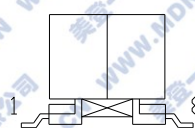
DIMENSIONS AND LAND PATTERNS(mm)

POE30P-XXL



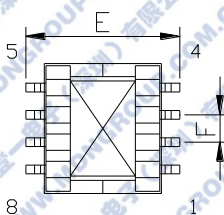
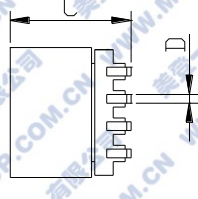
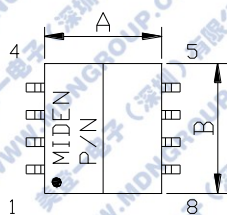
SCHEMATICS

LAND PATTERN



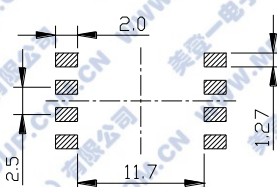
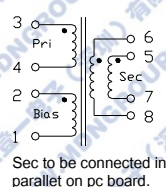
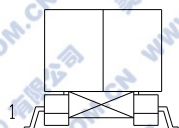
A ±0.5	B max	C max
8.6	11.0	9.0
D ±0.2	E max	F ±0.2
0.7	13.5	2.5

POE70P-XXL



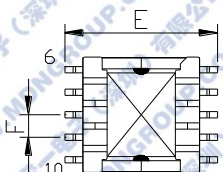
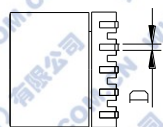
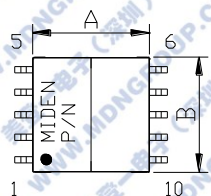
SCHEMATICS

LAND PATTERN

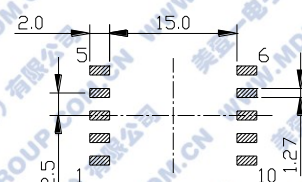
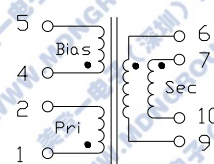
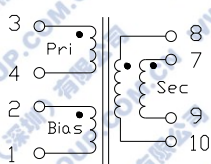


A ±0.5	B max	C max
10.5	12.7	11.0
D ±0.2	E max	F ±0.2
0.7	15.3	2.5

POE13P-XXL, FCT1-XXM22SL

SCHEMATICS 1
For POE13P-XXLSCHEMATICS 2
For FCT1-XXM22SL

LAND PATTERN



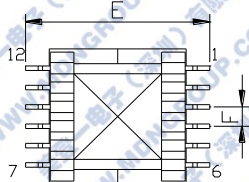
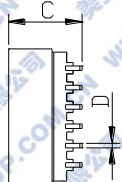
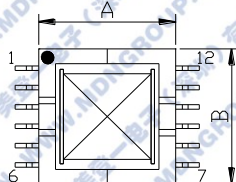
A ±0.5	B max	C max
13.0	13.5	12.7
D ±0.2	E max	F ±0.2
0.7	17.8	2.5

POWER OVER ETHERNET TRANSFORMERS 以太网电源变压器

POE 系列

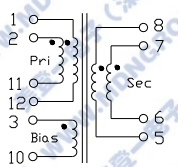
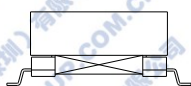
DIMENSIONS AND LAND PATTERNS(mm)

POE60F-XXL, POE13F-XXL

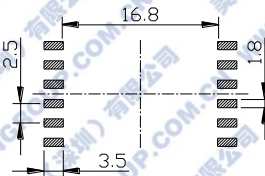


SCHEMATICS

LAND PATTERN

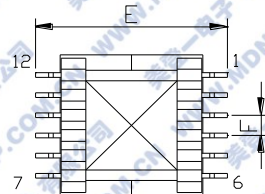
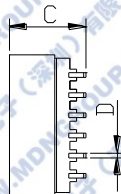
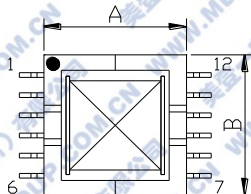


Connect pin 1 to 2, 11 to 12, pin 7 to 8, pins 5 to 6 on the PC board.

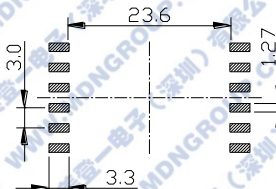


$A \pm 0.8$	B max	C max
15.0	17.2	8.5
$D \pm 0.2$	E max	$F \pm 0.2$
0.70	22.0	2.5

POE300F-XXL, POE600F-XXL, POE62F-XXED, POE71F-XXED, and FCT1-XXD3SL

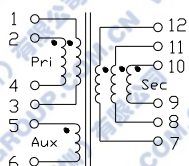


LAND PATTERN



SCHEMATICS 5

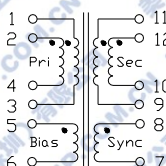
For POE300F-XXL POE62F-XXED
POE71F-XXED POE600F-XXL



Pri and Sec windings to be connected in parallel on the PC board.

SCHEMATICS 6

For FCT1-XXD3SL



Pri and Sec windings to be connected in parallel on the PC board.

$A \pm 0.8$	B max	C max
21.0	21.5	11.5
$D \pm 0.2$	E max	$F \pm 0.2$
0.7	30.0	3.0