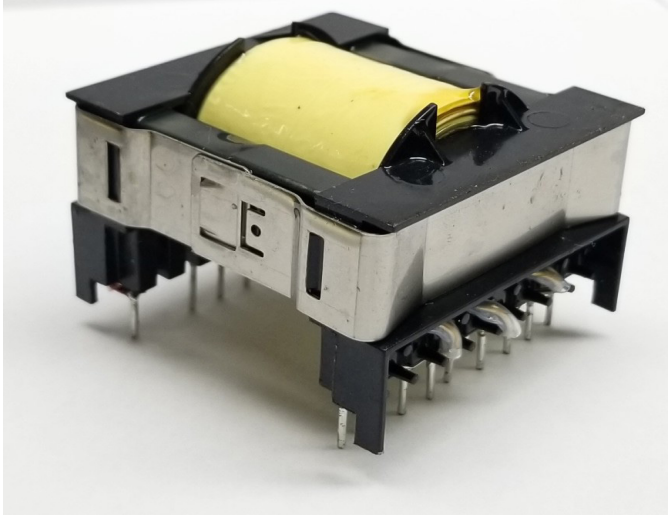
ETD Style Transformer

The ETD style transformers are a very versatile geometry. These transformers are optimized for SMPS power tranformers with switching frequencies between 20 and 250kHz. The ETD (Economic Transformer Design) implies the ETD's power density is maximized in relation to its volume and weight.

Power vs. Operating Frequency[1,2]

ETD Type	Transformer Finished Size			WaAc	20kHz	50kHz	100kHz	250kHz
	Length (mm)	Width (mm)	Height (mm)	(cm^4)	(watts)	(watts)	(watts)	(watts)
ETD29	35.2	35.2	25.4	0.722	60	100	150	293
ETD34	39.6	42.8	32.9	1.190	70	110	170	332
ETD39	44.6	47.8	36.1	2.210	150	240	380	741
ETD44	49.6	52.2	38.1	3.700	300	450	700	1365
ETD49	54.5	57.2	40.6	5.760	410	650	1000	1950
ETD54	61.5	61.4	46.4	8.850	650	1000	1600	3120
ETD59	66.9	66.4	49.4	13.500	1000	1600	2500	4875

The ETD series is also definded by its round center post. This round center post reduces the mean length turn as compared to square center post geometries. This feature alone reduces winding resistance and winding losses. The ETD bobbins in this series have wide winding windows that allow for larger wire sizes. These bobbins also contain many pins for configuring different winding possibilities. The ETD style also has a system of clips to hold and secure cores to the bobbins.



A_L Values for Common Cores

ETD Type	Mag R	Mag P	Mag F	FC 3C90	FC 3C94	FC 3C96	FC 3C95	FC 3F3	TDK PC47	TSC7070
ETD29	2250	2843	3316	2350	2350	2200	2860	2200	2500	2850
ETD34	2707	2933	3600	2700	2700	2500	3270	2500	2780	3210
ETD39	2973	3227	4050	3000	3000	N/A	3650	2800	3150	3520
ETD44	3667	4000	4950	3800	3800	N/A	4640	3500	4000	4360
ETD49	4093	4440	5400	4200	4200	N/A	5140	3900	4440	4825
ETD54	5200	6281	7400	5000	5000	N/A	6120	4600	N/A	N/A
ETD59	5747	6240	7500	6000	6000	N/A	7340	5600	N/A	6840

A_L values are for ungapped cores and are +/- 25%, measured in nH/T2

ETD Style Transformer

Although the throughput power is optimized for AC/DC SMPS applications the shielding is only somewhat improved over standard E cores. All the ETD dimensions are optimized for transformer efficiency and have space to allow for adequate airflow to keep the assembly cool.

Technical Data

ETD Type	Ve	Ae/Ac	Le	Wa	WaAc	Bobbin Wind	Bobbin Wind	Mean Length
	(mm^3)	(mm^2)	(mm)	(mm^2)	(cm^4)	Width (mm)	Height (mm)	Turn (mm)
ETD29	5470	76.0	72.0	95.0	0.722	19.4	4.9	53
ETD34	7640	97.1	78.6	123.0	1.194	20.9	5.9	60
ETD39	11500	125.0	92.2	177.0	2.213	25.7	6.9	69
ETD44	17800	173.0	103.0	214.0	3.702	29.5	7.3	77
ETD49	24000	211.0	114.0	273.0	5.760	32.7	8.3	85
ETD54	35500	280.0	127.0	316.0	8.848	36.8	8.6	96
ETD59	51500	368.0	139.0	366.0	13.469	41.2	8.9	106

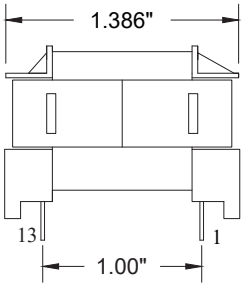
Some manufacturer's core values are slightly different. Check mfg data sheets for exact values.

1. Selection of core size is typically done by evaluating the WaAc (Product of core and window area). This value is used along with some industry recognized formulas developed in A.I. Pressman's book "Switching Power Supply Design". Along with this equation, assumptions of several parameters are usually made to help narrow the core selection.
For this evaluation, the most efficient method of operation is assumed, push-pull square wave. Assuming a Core loss to be approximately 100mW/cm^3. Bmax (flux density) is selected as such: @20kHz - 2000 gauss, @50kHz - 1300 gauss, @100kHz - 900 gauss, @250kHz - 700 gauss.
2. The power handling capabilities are for push-pull topologies. Typically for flyback topologies these values must be de-rated by a factor of 3 or4. For feed-forward topologies de-rate by a factor of 2.

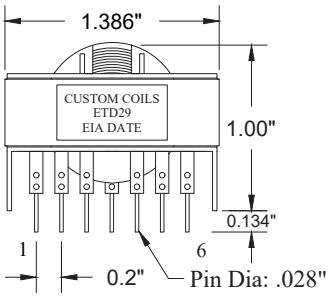
Schematics

ETD Style Transformers

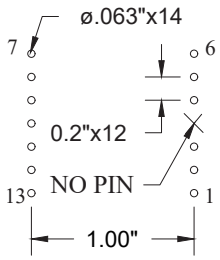
ETD29
FRONT VIEW



ETD29
SIDE VIEW



ETD29
BOARD
FOOTPRINT



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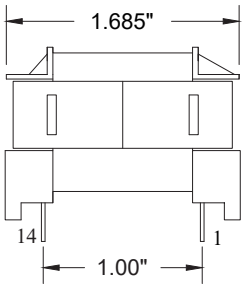
FRONT VIEW



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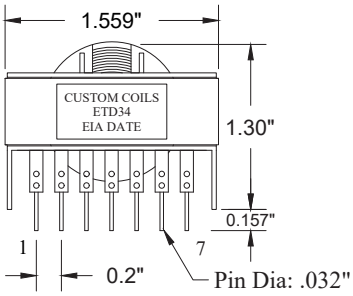
SIDE VIEW



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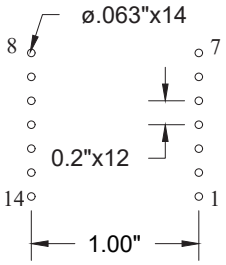
BOARD
FOOTPRINT



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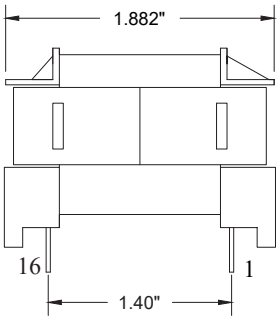
FRONT VIEW



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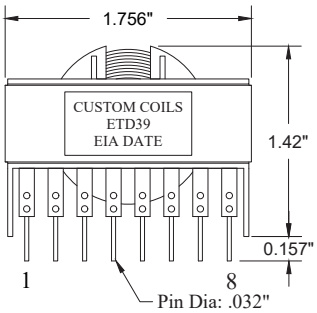
SIDE VIEW



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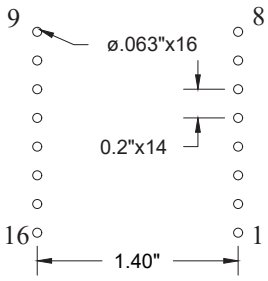
BOARD
FOOTPRINT



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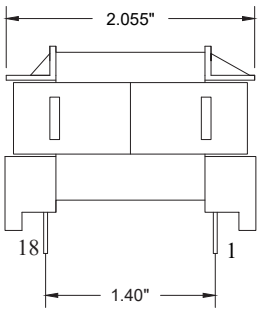
FRONT VIEW



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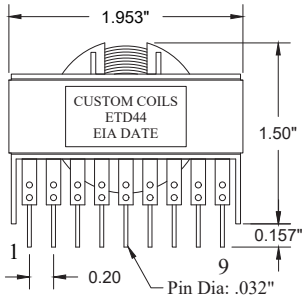
SIDE VIEW



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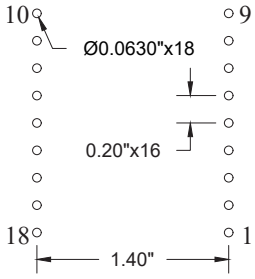
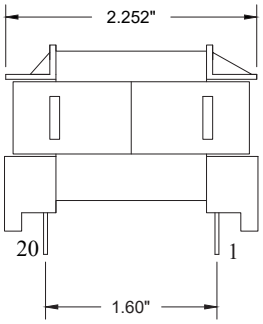
BOARD
FOOTPRINT



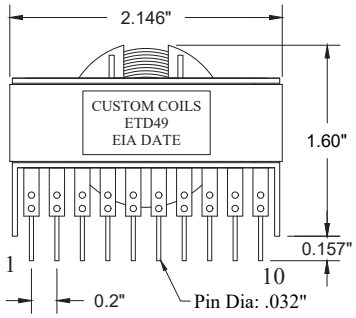
Schematics

ETD Style Transformers (cont)

ETD49
FRONT VIEW



ETD49
SIDE VIEW



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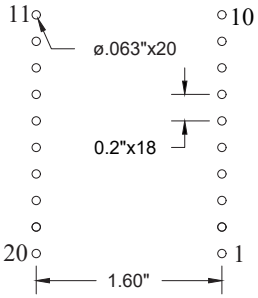
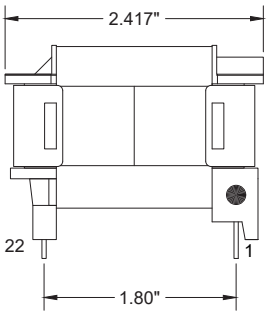
BOARD
FOOTPRINT



ETD54
FRONT VIEW



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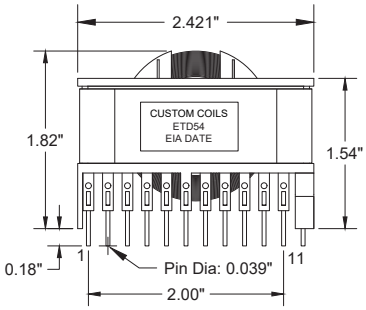
SIDE VIEW



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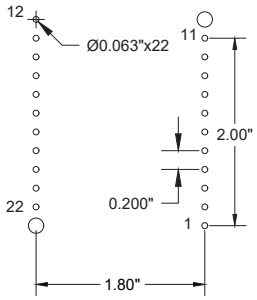
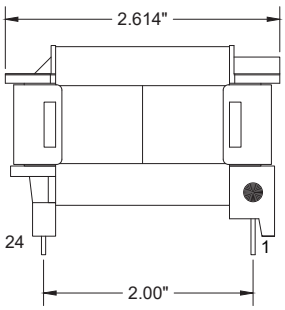
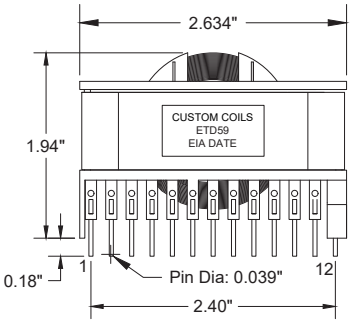
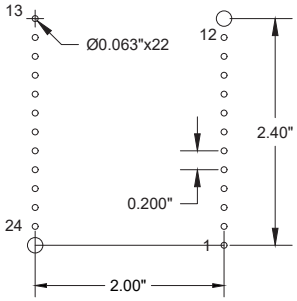
FOOTPRINT



ETD59
FRONT VIEW



ETD59
SIDE VIEW



ETD59
BOARD
FOOTPRINT