

CONSIDERATION IN DESIGN OF SWITCH MODE POWER MAGNETICS

In switch mode power supplies, the power transformer is used to provide input to output isolation, optimize the voltage ratio for minimum peak current, reverse voltages on the semiconductors, and to provide multiple outputs. The basic data required in order to begin the design process are the circuit type, maximum and minimum input voltages, operating frequency, D.C. voltage, and current for each output. To this, the voltage drop of the diodes must be added plus, series regulators.

The total of all secondary powers (V.A.) give the transformer power rating.

The secondary standard transformer listed in Table I, Table II, and Table III are rated at a nominal 50KHz switching frequency, 20 milli-Tesla flux density and a 40°C temperature rise.

The following correcting factors must be used to calculate rating for specific applications.

<u>CIRCUIT TYPE</u>	<u>MULTIPLIER</u>	<u>FREQUENCY</u>	<u>MULTIPLIER</u>
BRIDGE	1.12	25KHz	1.50
CURRENT FED	1.21	50KHz	1.00
PUSH PULL	1.31	75KHz	0.83
FORWARDED CONV.	1.89	100KHz	0.70
FLYBACK	2.07	150KHz	0.55

The power rating used to choose the appropriate core size is:

**SIZE RATING=TRANSFORMER PWR X CIRCUIT TYPE MULTIPLIER X
FREQUENCY MULTIPLIER**

An example might be a transformer for a power supply to supply 15VDC at 20A. The circuit is a forward converter and the switching frequency is 100KHz. The maximum diode drop is 1.2V.

Output power will be $(15V+1.2V)*20A=324W$.

Circuit multiplier=1.89=612VA.

Frequency multiplier-0.70=428VA.

The Table I size is T-14.

Using these calculations and the worksheets following, the size and mounting of the transformer can be estimated easily in the design process. Table I is for standard printed circuit configuration and is the most cost effective, Table II is low profile for more restricted size limitations, and Table III is for more subminiature surface-mount applications.

Our engineers would be happy to discuss specific non-standard envelope, frequency, temperature, or safety specifications and arrange for quick sample delivery to meet your requirements.

SWITCH MODE POWER TRANSFORMER SIZE RATING TABLE

TABLE I - STANDARD

TYPE	POWER	SIZE								
		A	B	C	D	E	F	G	FIG	PINS
5T6183-11	55W	1.03	.80	.76	.200	.150	.615	.16	1	10
5T6183-12	150W	1.20	.76	1.20	.200	.200	1.00	.11	1	10
5T6183-13	250W	1.48	1.01	1.08	.200	.150	.86	.15	2	12
5T6183-14	450W	1.63	1.13	1.15	.250	.200	.95	.17	2	12
5T6183-15	800W	1.76	1.27	1.30	.300	.200	1.10	.17	2	12

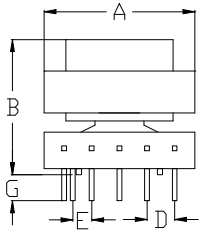


FIGURE 1

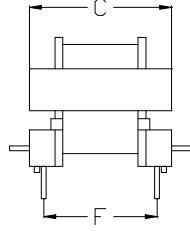


FIGURE 2

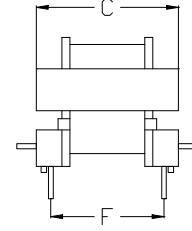
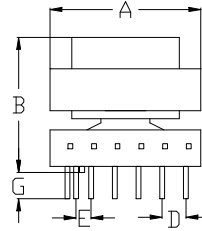
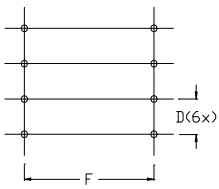
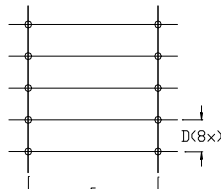


TABLE II - LOW PROFILE

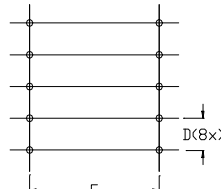
TYPE	POWER	SIZE								
		A	B	C	D	E	F	G	FIG	PINS
5T6183-21	40W	.68	.50	1.35	.150	.150	1.00	.16	3	8
5T6183-22	125W	1.02	.76	1.28	.200	.200	.80	.16	3	10
5T6183-23	200W	1.02	.76	1.60	.200	.200	1.10	.16	3	10



T21



T22



T23

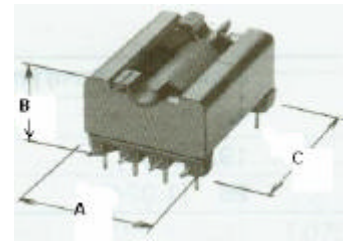
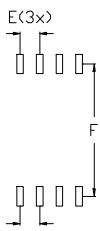


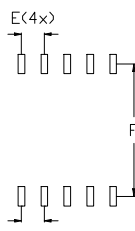
FIGURE 3

TABLE III - SURFACE-MOUNT

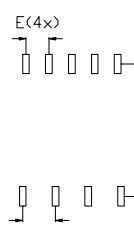
TYPE	POWER	SIZE								
		A	B	C	D	E	F	G	FIG	PINS
5T6183-31	1.5W	.44	.21	.46	.12	.12	.425	/	4	8
5T6183-32	5W	.54	.31	.81	.20	.14	.728		4	10
5T6183-33	20W	.72	.40	.91	.20	.14	.858		4	9
5T6183-34	28W	.80	.40	1.00	.20	.14	.937		4	10
5T6183-35	55W	1.03	.40	1.14	.20	.14	1.10		4	11



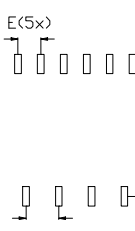
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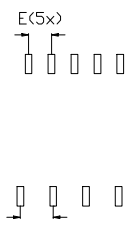
T-32



T-33



T-34



T-35

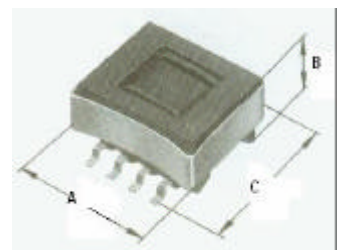


FIGURE 4