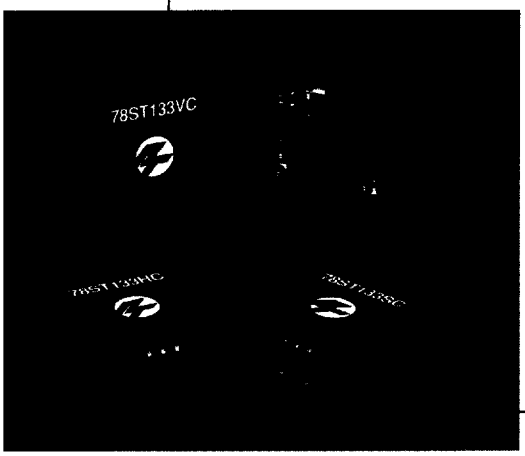
78ST1 Series

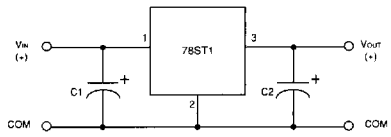
1.5 AMP POSITIVE STEP-DOWN INTEGRATED SWITCHING REGULATOR



- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short Circuit and Over-Temperature Protection
- Pin Compatible with Existing Linear 3-Terminal Regulators
- Fast Transient Response

The 78ST1 Series has extremely fast transient response for use in applications with large and/or fast changes in output current such as disk drives, relays, LED's etc. These easy-to-use, 3-terminal, Integrated Switching Regulators (ISRs) have a maximum output current of 1.5 Amps and an output voltage that is laser trimmed. They also have excellent line and load regulation and are available in 3.3, 3.6, 5, 6.5, 9, and 12V versions.

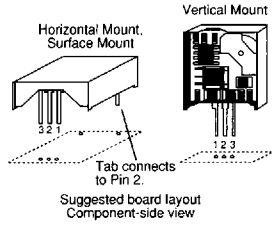
Standard Application



C_1 = Optional electrolytic (10µF)
C_2 = Required 100µF electrolytic

Pin-Out Information

Pin No.	Function
1	Input
2	Common
3	Output



Ordering Information

1.5 Amp Positive Integrated Switching Regulator

78ST1 XX Y C

Output Voltage
- **33** = 3.3 Volts
- **36** = 3.6 Volts
- **05** = 5.0 Volts
- **65** = 6.5 Volts
- **09** = 9.0 Volts
- **12** = 12.0 Volts

Package Style A
- **V** = Vertical Mount
- **S** = Surface Mount
- **H** = Horizontal Mount

(For dimensions, see page 64.)

Specifications

Characteristics (T_A=25°C unless noted)	Symbols	Conditions	78ST1 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range	0.1**	—	1.5	Amps
Current Limit	I_{cl}	V_{in}=8V V_o=+5V	—	3.0	—	Amps
Short Circuit Current	I_{sc}	V_{in}=V_o+3V	—	3.5	—	Apk
Input Voltage Range	V_{in}	0.10 ≤ I_o ≤ 1.5 Amp V_o=3.3V V_o=5V V_o=12V	7 7 14.5	— — —	26 30 30	VDC VDC VDC
Static Voltage Tolerance	ΔV_o	Over V_{in} range, I_o=1 Amp T_a=-40°C to shutdown	—	±1.0	±2.0	%V_o
Ripple Rejection	RR	Over V_{in} range @ 120 Hz	—	45	—	dB
Line Regulation	Reg_{line}	Over V_{in} range	—	±0.2	±0.4	%V_o
Load Regulation	Reg_{load}	0.10 ≤ I_o ≤ 1.5 Amp	—	±0.1	±0.2	%V_o
Ripple/Noise	V_n	V_{in}=8V, I_o=1.5A, V_o=3.3/5V V_{in}=15V, I_o=1.5A, V_o=12V	—	50 80	—	mV_{pp} mV_{pp}
Transient Response (with 100µF output cap)	t_{tr}	50% load change V_o over/undershoot	—	100 5.0	— —	µSec %V_o
Efficiency	η	V_{in}=10V, I_o=1A, V_o=3.3V V_{in}=10V, I_o=1A, V_o=5V V_{in}=17V, I_o=1A, V_o=12V	— — —	80 85 90	— — —	% % %
Switching Frequency	f_o	Over V_{in} range, I_o=1.5 Amp	600	650	700	KHz
EMI/RFI	—	Over V_{in} range, I_o=1.5 Amp	Meets FCC Class B for Radiated Emission			
Operating Temperature	T_a	Free Air Convection, (40-60LFM) V_o=3.3V/5V Over V_{in} and I_o Ranges V_o=12V	-40 -40	— —	+60* ★	°C °C
Thermal Resistance	θ_{JA}	Free Air Convection, (40-60LFM)	—	45	—	°C/W
Storage Temperature	T_s	—	-40	—	+125	°C
Mechanical Shock	Per Mil-STD-883C, Method 2002.3 Condition C, soldered in a PC board		—	—	50	G's
Mechanical Vibration	Per Mil-STD-883D, Method 2007.2 Condition A, 20-2000 Hz		—	10	—	G's
Weight	—	—	—	0.25 7.0	— —	Ounces Grams
Relative Humidity	—	Non-condensing	0	—	95	%

*See Thermal Derating chart. ** ISR will operate down to no load with reduced specifications.

Note: *The 78ST1 Series requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications.*

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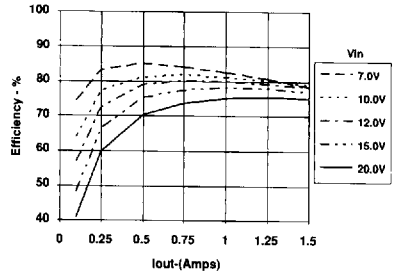
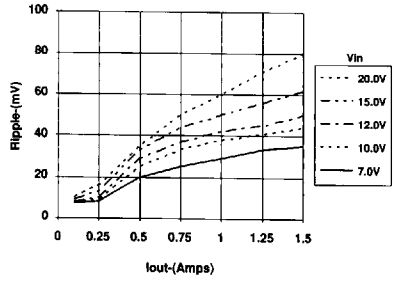
CHARACTERISTIC DATA

78ST133, 3.3 VDC
(See Note 1)

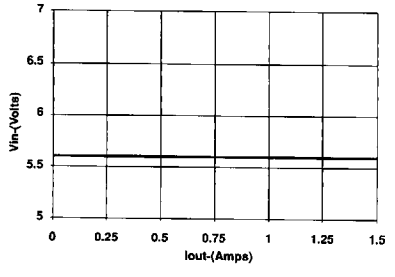
Efficiency vs Output Current



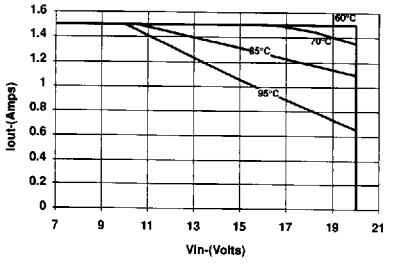
Ripple vs Output Current



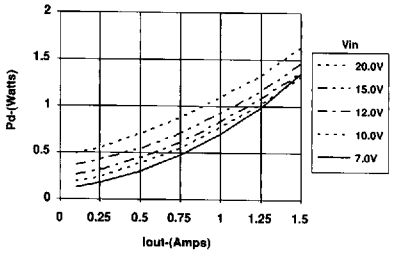
Minimum Input Voltage (See Note 2)



Thermal Derating (T_a) (See Note 3)

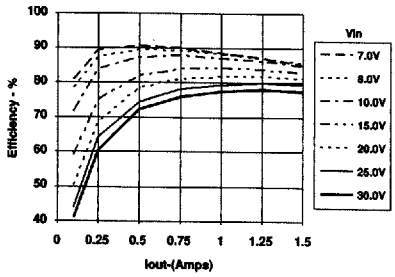


Power Dissipation vs Output Current

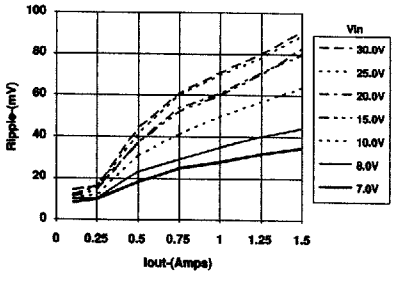


78ST105, 5.0 VDC
(See Note 1)

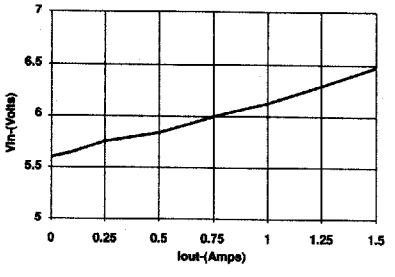
Efficiency vs Output Current



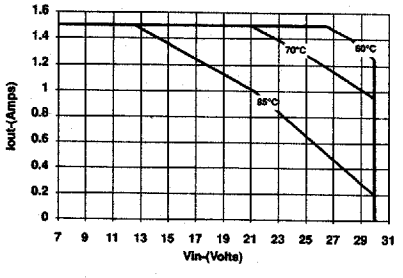
Ripple vs Output Current



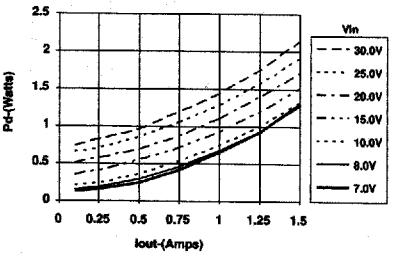
Minimum Input Voltage (See Note 2)



Thermal Derating (T_a) (See Note 3)

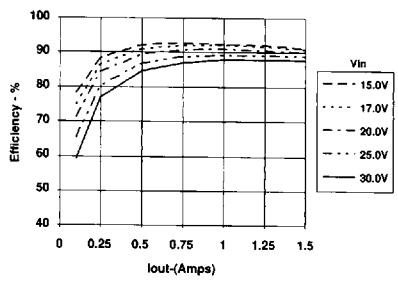


Power Dissipation vs Output Current

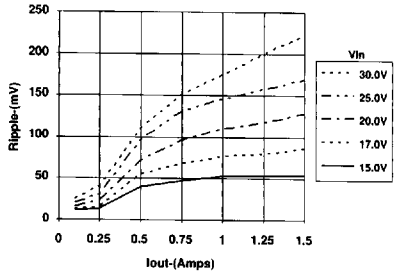


78ST112, 12.0 VDC
(See Note 1)

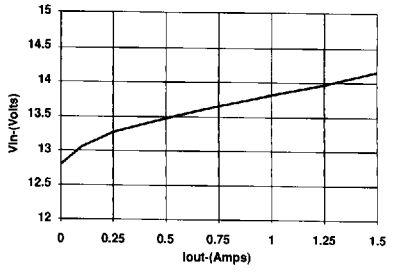
Efficiency vs Output Current



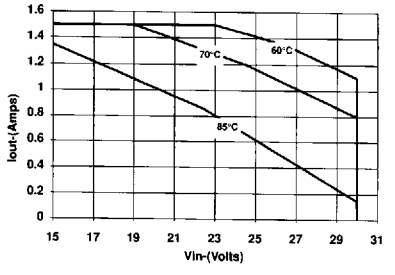
Ripple vs Output Current



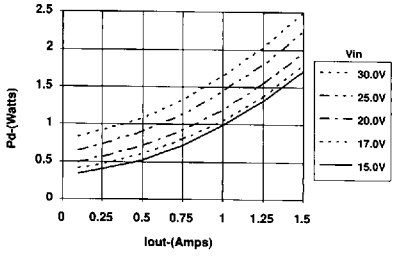
Minimum Input Voltage (See Note 2)



Thermal Derating (T_a) (See Note 3)



Power Dissipation vs Output Current



Note 1: *All data listed in the above graphs, except for derating data, has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.*
Note 2: *Minimum V_{in} data is typical and is not guaranteed. The data corresponds to a 2% output voltage drop.*
Note 3: *Thermal derating graphs are developed in free air convection cooling of 40-60 LFM soldered in a printed circuit board. (See Thermal Application Notes on page 49).*

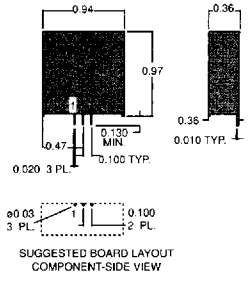
3 Pin Standard
PT5100, PT5020, PT5040 Series

PACKAGE INFORMATION AND DIMENSIONS

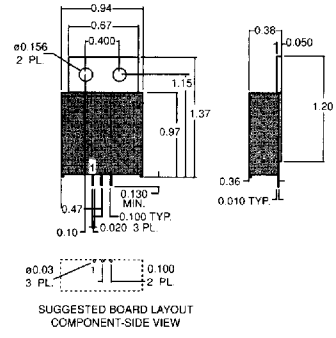
Note 1: *All dimensions are in inches.*
Note 2: *All tolerances for 2-place decimals are ±.030.*
Note 3: *All 3-place decimals are ±.010 except lead thickness and width which are ±.002.*

No Heat Tab	Top Heat Tab

Vertical Through-Hole

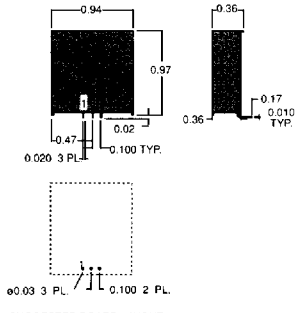


Package N

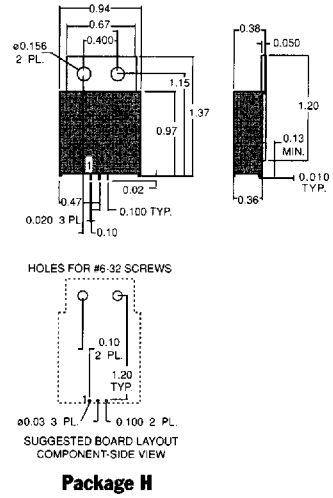


Package S

Horizontal Through-Hole

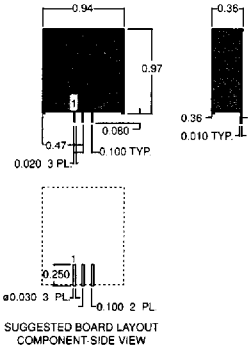


Package A

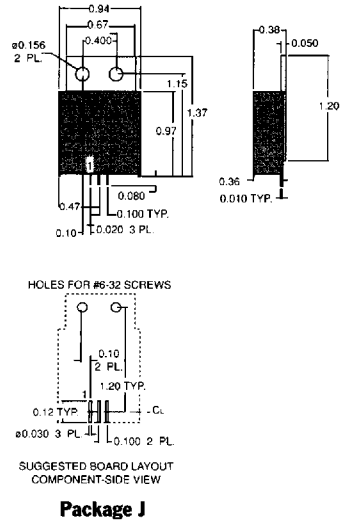


Package H

Horizontal Surface Mount



Package C



Package J

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14 Pin Standard

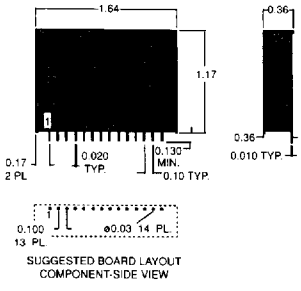
PT6500 Series

PACKAGE INFORMATION AND DIMENSIONS

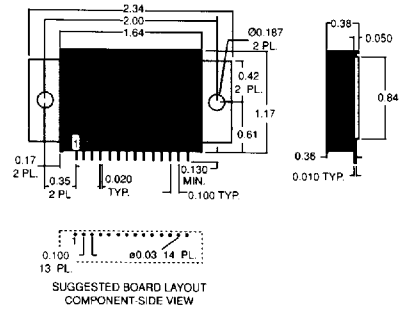
Note 1: *All dimensions are in inches.*
Note 2: *All tolerances for 2-place decimals are ±.030.*
Note 3: *All 3-place decimals are ±.010 except lead thickness and width which are ±.002.*

No Heat Tab	Side Heat Tab

Vertical Through-Hole

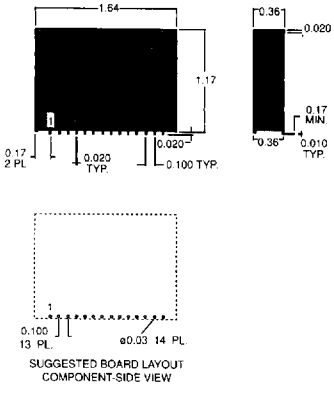


Package N

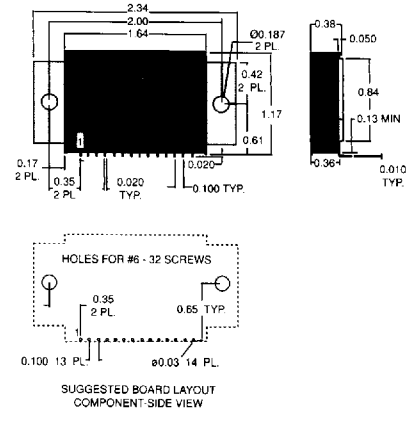


Package R

Horizontal Through-Hole

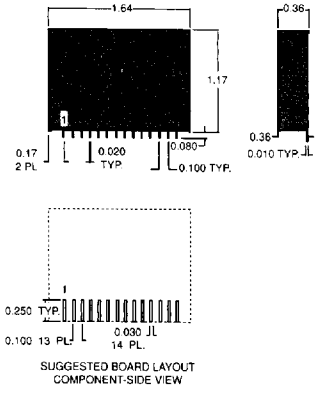


Package A

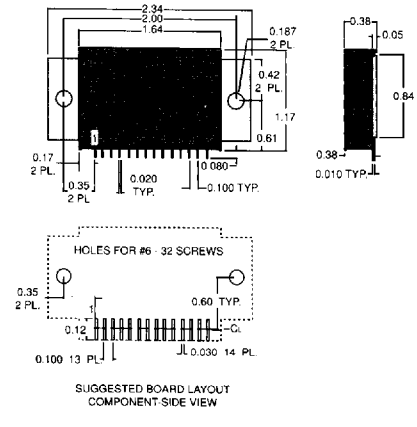


Package G

Horizontal Surface Mount



Package C



Package B

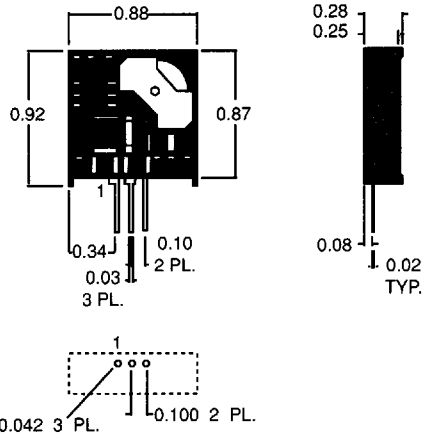
78/79 Series

Plastic

PACKAGE INFORMATION AND DIMENSIONS

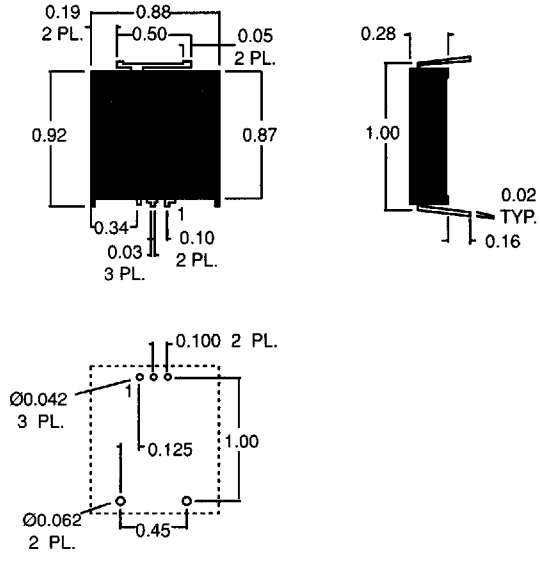
Note 1: *All dimensions are in inches.*
Note 2: *All tolerances for 2-place decimals are ±.030.*
Note 3: *All 3-place decimals are ±.010 except lead thickness and width which are ±.002.*

Vertical Mount



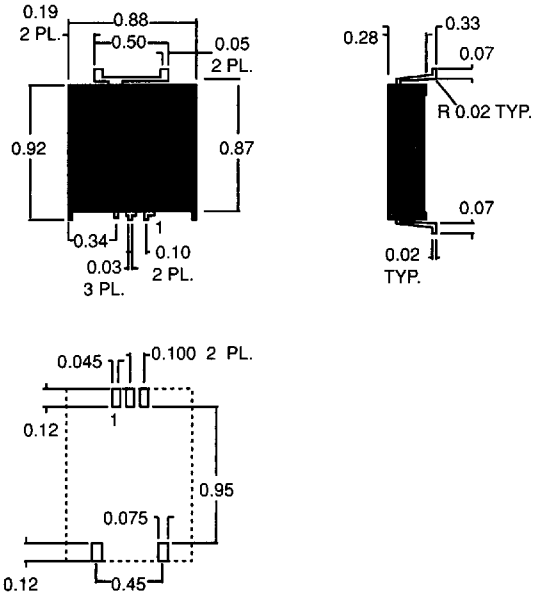
SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

Horizontal Mount



SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

Surface Mount



SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

7294122 0000150 039

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12 Pin Low Profile

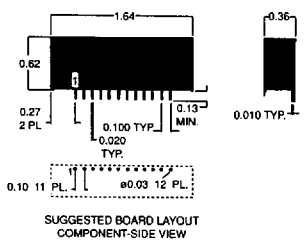
PT 6100/6200/6300 Series

PACKAGE INFORMATION AND DIMENSIONS

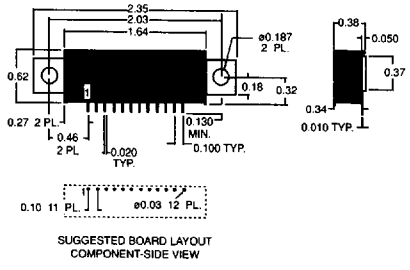
Note 1: *All dimensions are in inches.*
Note 2: *All tolerances for 2-place decimals are ±.030.*
Note 3: *All 3-place decimals are ±.010 except lead thickness and width which are ±.002.*

No Heat Tab	Side Heat Tab

Vertical Through-Hole

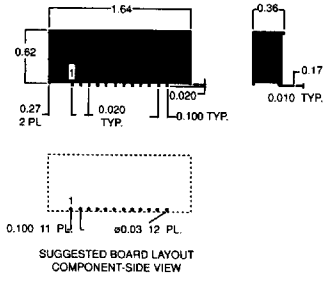


Package N

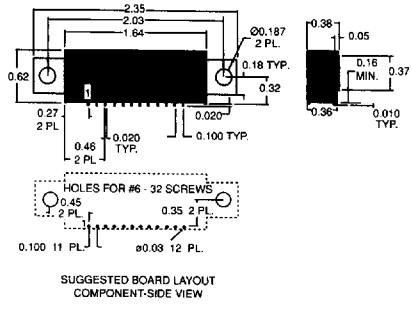


Package R

Horizontal Through-Hole

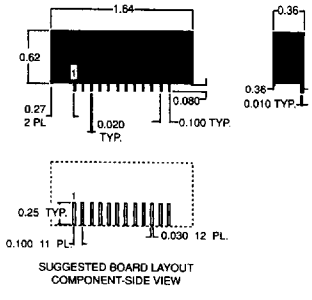


Package A

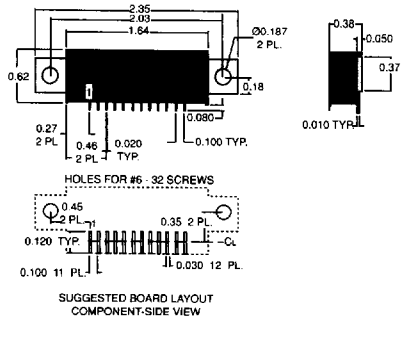


Package G

Horizontal Surface Mount



Package C



Package B

12 Pin Low Profile XL

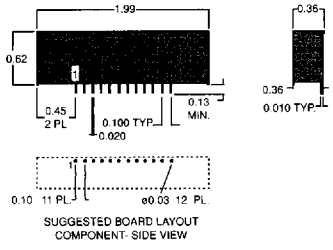
PT 6305/6306/6307/6308 Series

PACKAGE INFORMATION AND DIMENSIONS

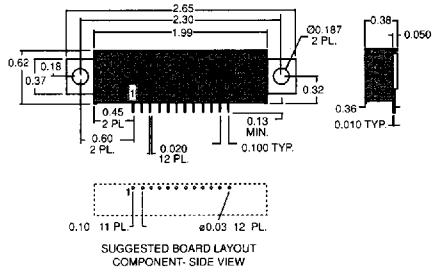
Note 1: *All dimensions are in inches.*
Note 2: *All tolerances for 2-place decimals are ±.030.*
Note 3: *All 3-place decimals are ±.010 except lead thickness and width which are ±.002.*

No Heat Tab	Side Heat Tab

Vertical Through-Hole

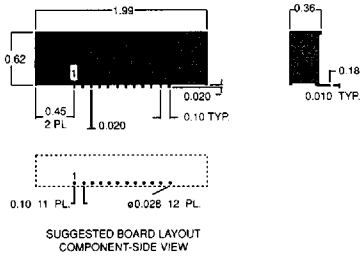


Package N

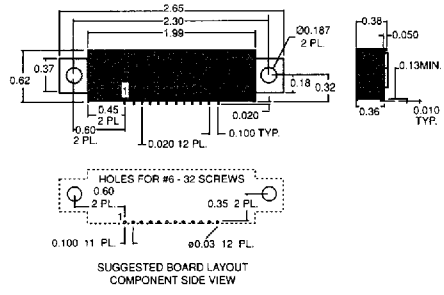


Package R

Horizontal Through-Hole

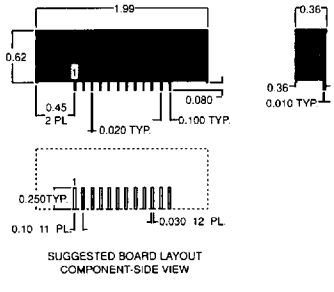


Package A

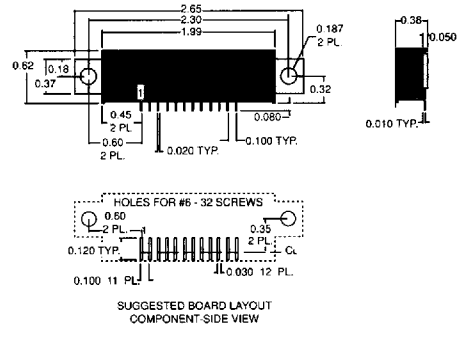


Package G

Horizontal Surface Mount



Package C



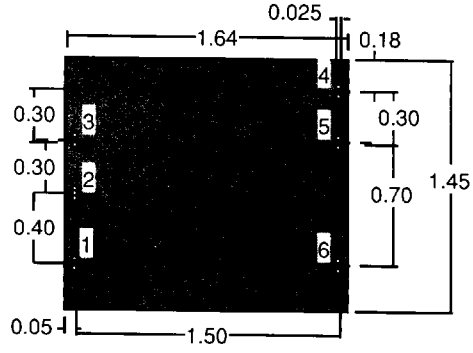
Package B

Power Trends, Inc. 1101 North Raddant Road, Batavia, IL 60510 **(800) 531-5782** Fax: (708) 406-0901

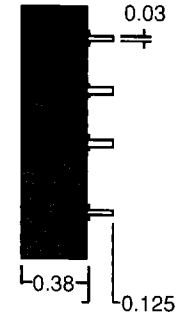
PT 3100/4100 Series

PACKAGE INFORMATION AND DIMENSIONS

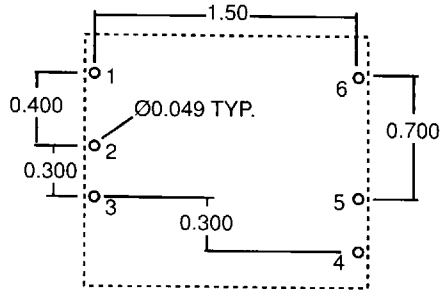
Note 1: *All dimensions are in inches.*
Note 2: *All tolerances for 2-place decimals are ±.030.*
Note 3: *All 3-place decimals are ±.010 except lead thickness and width which are ±.002.*



BOTTOM VIEW



SIDE VIEW



SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

Pin Connections

Pin No.	Function
1	Remote ON/OFF
2	$-V_{in}$
3	$+V_{in}$
4	$-V_{out}$
5	$+V_{out}$
6	N/C