

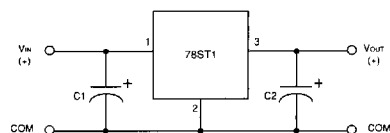
78ST1 Series

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.

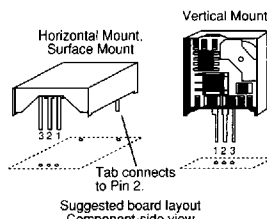
Standard Application



C₁ = Optional electrolytic (10µF)
C₂ = 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 (I _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) Over V _{in} and I _o Ranges	-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.

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

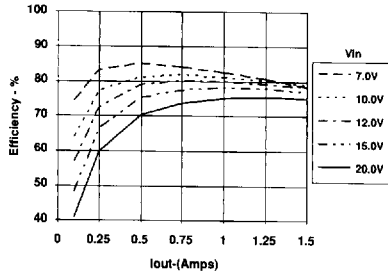
CHARACTERISTIC DATA

DATA SHEETS
78/79 Series ISRs

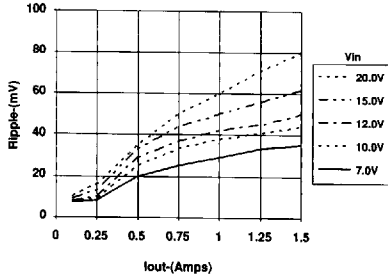
78ST133, 3.3 VDC

(See Note 1)

Efficiency vs Output Current

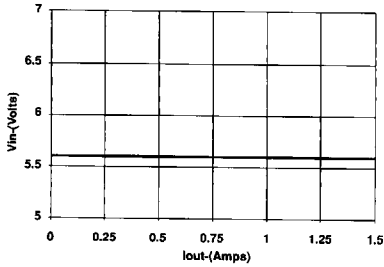


Ripple vs Output Current



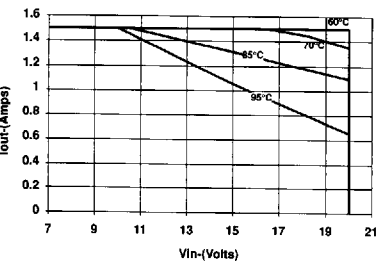
Minimum Input Voltage

(See Note 2)

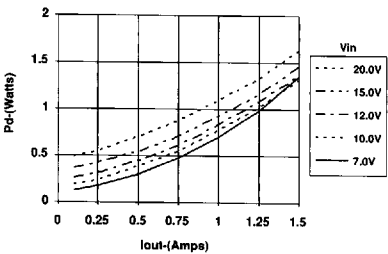


Thermal Derating (T_a)

(See Note 3)



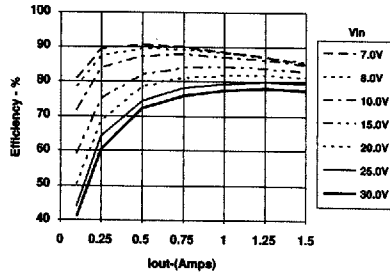
Power Dissipation vs Output Current



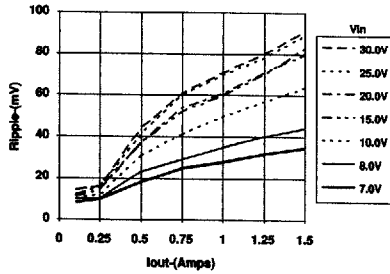
78ST105, 5.0 VDC

(See Note 1)

Efficiency vs Output Current

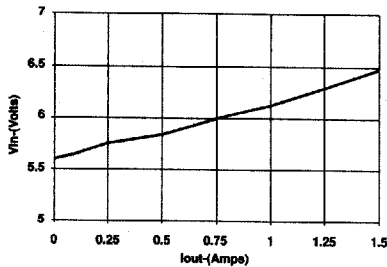


Ripple vs Output Current



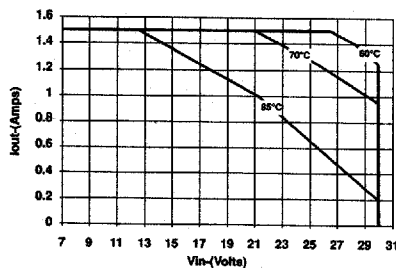
Minimum Input Voltage

(See Note 2)

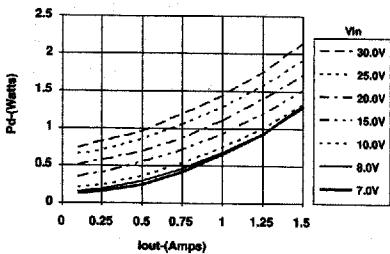


Thermal Derating (T_a)

(See Note 3)



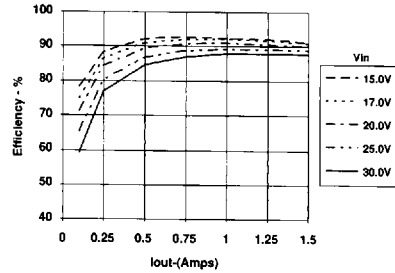
Power Dissipation vs Output Current



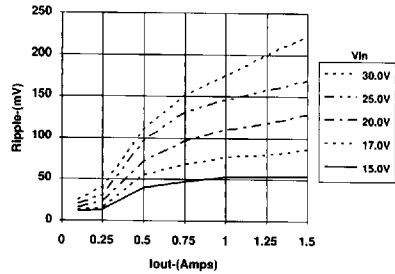
78ST112, 12.0 VDC

(See Note 1)

Efficiency vs Output Current

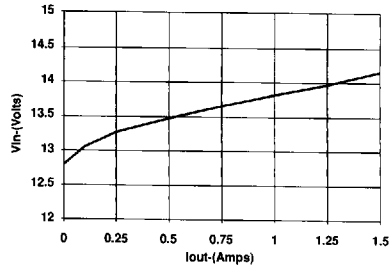


Ripple vs Output Current



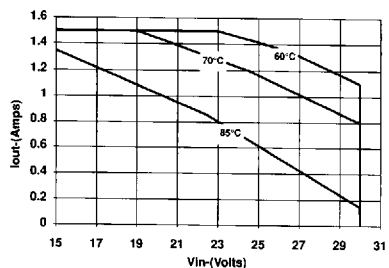
Minimum Input Voltage

(See Note 2)

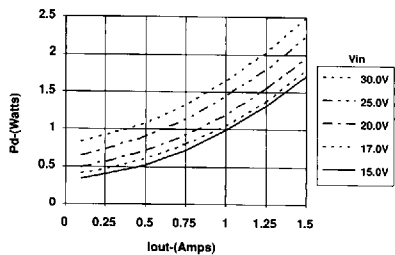


Thermal Derating (T_a)

(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).

14 Pin Standard

PT6500 Series

PACKAGE INFORMATION AND DIMENSIONS

Note 1: All dimensions are in inches.

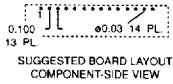
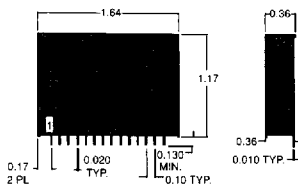
Note 2: All tolerances for 2-place decimals are ± 0.30 .

Note 3: All 3-place decimals are ± 0.10 except lead thickness and width which are ± 0.02 .

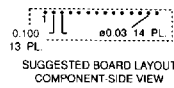
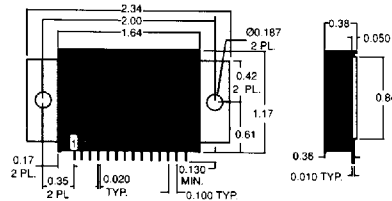
No Heat Tab

Side Heat Tab

Vertical Through-Hole

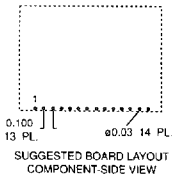
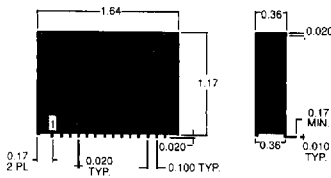


Package N

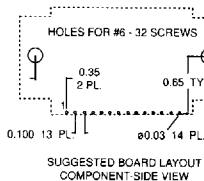
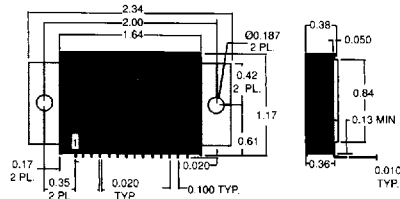


Package R

Horizontal Through-Hole

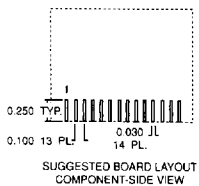
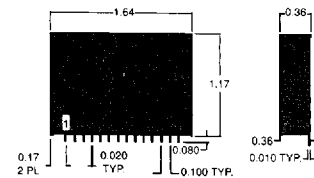


Package A

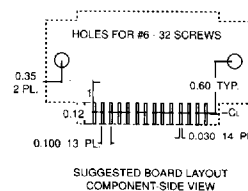
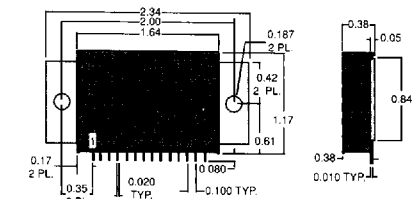


Package G

Horizontal Surface Mount



Package C



Package B

7294122 0000149 317

PACKAGING
 Standard ISRs

78/79 Series

Plastic

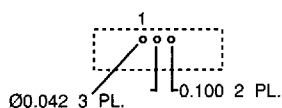
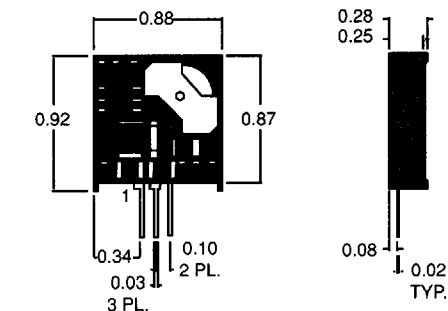
PACKAGE INFORMATION AND DIMENSIONS

Note 1: All dimensions are in inches.

Note 2: All tolerances for 2-place decimals are ± 0.30 .

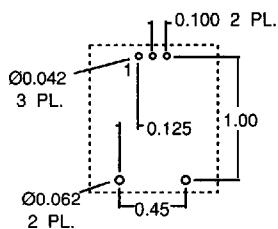
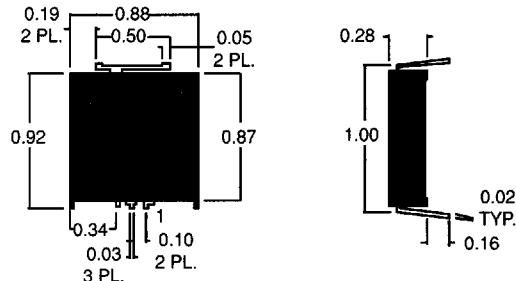
Note 3: All 3-place decimals are ± 0.10 except lead thickness and width which are ± 0.02 .

Vertical Mount



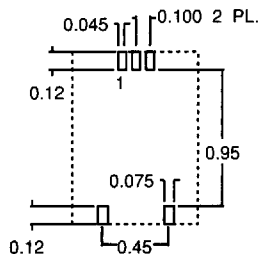
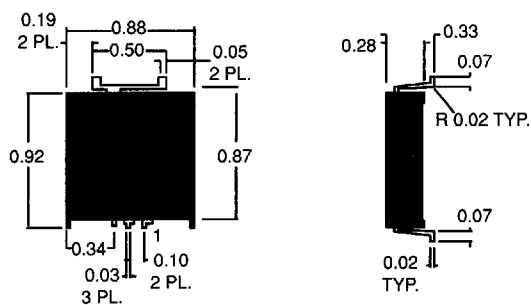
SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

Horizontal Mount



SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

Surface Mount



SUGGESTED BOARD LAYOUT
COMPONENT-SIDE VIEW

7294122 0000150 039

12 Pin Low Profile PT 6100/6200/6300 Series

PACKAGE INFORMATION AND DIMENSIONS

Note 1: All dimensions are in inches.

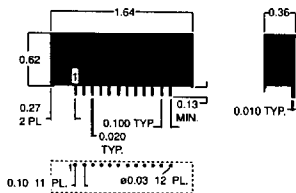
Note 2: All tolerances for 2-place decimals are ± 0.030 .

Note 3: All 3-place decimals are ± 0.010 except lead thickness and width which are ± 0.002 .

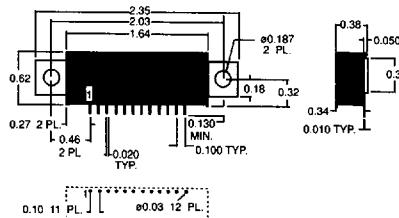
No Heat Tab

Side Heat Tab

Vertical Through-Hole

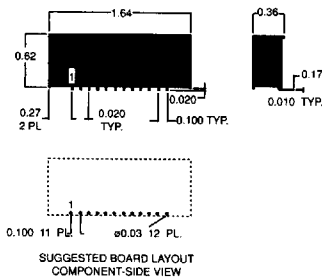


Package N

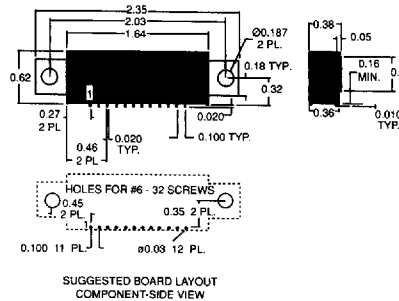


Package R

Horizontal Through-Hole

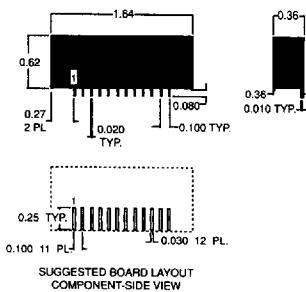


Package A

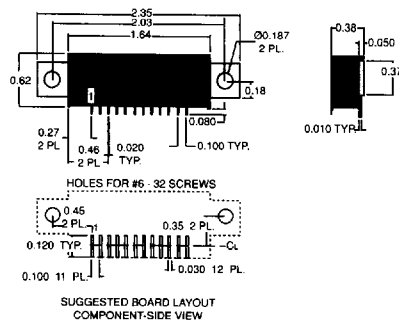


Package G

Horizontal Surface Mount



Package C



Package B

78/79 Series and High-Performance ISRs

PACKAGING

7294122 0000151 T75

12 Pin Low Profile XL

PT 6305/6306/6307/6308 Series

PACKAGE INFORMATION AND DIMENSIONS

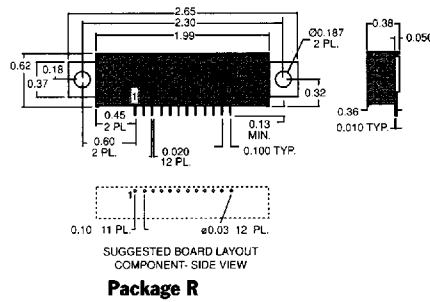
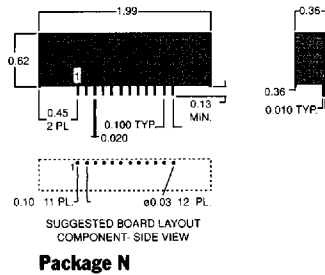
Note 1: All dimensions are in inches.

Note 2: All tolerances for 2-place decimals are ± 0.30 .

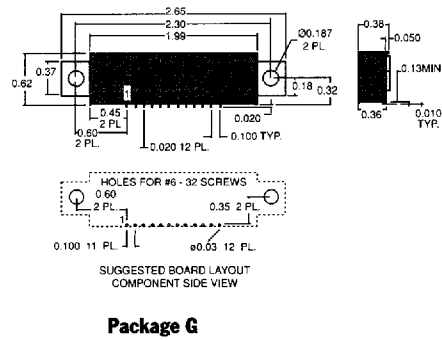
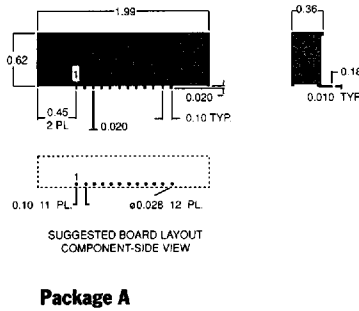
Note 3: All 3-place decimals are ± 0.10 except lead thickness and width which are ± 0.02 .

No Heat Tab	Side Heat Tab
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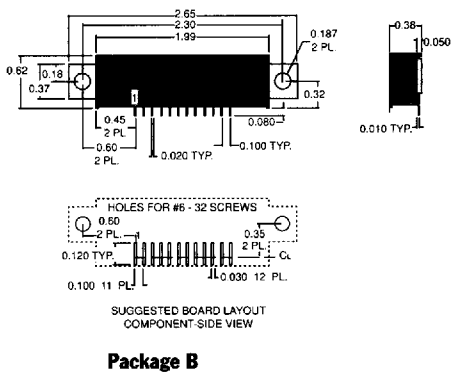
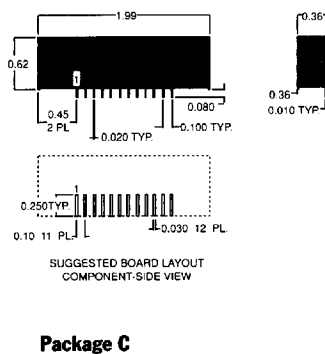
Vertical Through-Hole



Horizontal Through-Hole



Horizontal Surface Mount



7294122 0000152 901

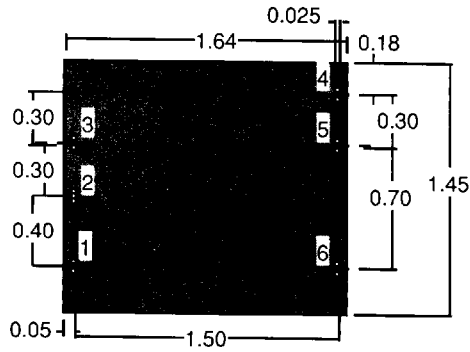
PT 3100/4100 Series

PACKAGE INFORMATION AND DIMENSIONS

Note 1: All dimensions are in inches.

Note 2: All tolerances for 2-place decimals are ± 0.030 .

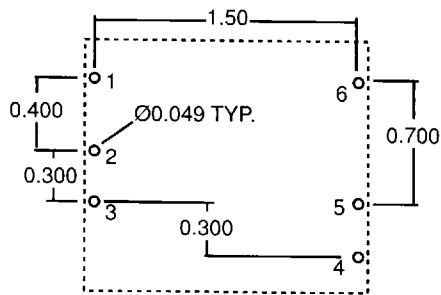
Note 3: All 3-place decimals are ± 0.010 except lead thickness and width which are ± 0.002 .



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

7294122 0000153 848