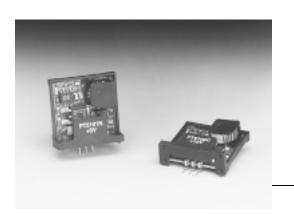
PT5100 Series

1-A Positive Step-down Integrated Switching Regulator

SLTS028B

(Revised 11/8/2001)



Features

- 90%+ Efficiency
 - Internal Short-Circuit Protection
- Pin-Compatible with 3-Terminal Linear Regulators
- Laser-Trimmed Output Voltage
- Over-Temperature Protection
- Small Footprint
- Wide Input Range
- 5-Pin Mount Option (Suffixes L & M)

Description

The PT5100 modules are a series of economical, easy-to-use 1-A positive step-down, Integrated Switching Regulators (ISRs). These ISRs are compatible with most TO-220 style linear regulators, and when employed as a linear replacement, provide significant benefits in both efficiency and power dissipation. They are recommended for use in a wide variety of on-board power regulation applications. These include computer, data storage, industrial controls, and battery powered equipment. Modules are laser-trimmed for optimal output voltage accuracy, and exhibit excellent line and load regulation. The PT5100 also features output current limiting and thermal shutdown protection.

Standard Application

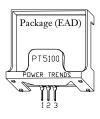


PT5101□	=	+5.0 Volts
PT5102□	=	+12.0 Volts
PT5103□	=	+3.3 Volts
PT5105□	=	+6.5 Volts
PT5107□	=	+15.0 Volts
PT5109□	=	+5.6 Volts
PT5110□	=	+9.0 Volts
PT5111□	=	+10.0 Volts
PT5112□	=	+8.0 Volts

PT Series Suffix (PT1234x)

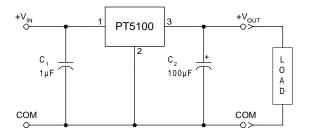
Case/Pin Configuration	Order Suffix	Package Code
Vertical	Ν	(EAD)
Horizontal	Α	(EAA)
SMD	C	(EAC)
Horizontal, 2-pin Tab	Μ	(EAM)
SMD, 2-Pin Tab	L	(EAL)

(Reference the applicable package code drawing for the dimensions and PC board layout)



Pin-Out Information

Pin	Function
1	V _{in}
2	GND
3	V_{out}



 C_1 = Optional 1µF ceramic capacitor C_2 = Required 100µF electrolytic



1-A Positive Step-down Integrated Switching Regulator

						PT5100 SERIES			
Characteristic	Symbol	Conditions		Min	Тур	Max	Units		
Output Current	Io	Over V _{in} range		0.1 (1)	_	1.0	А		
Input Voltage Range	V _{in}	Over I _o Range					VDC		
Set Point Voltage Tolerance	Votol			_	±1	±2	%Vo		
Temperature Variation	Reg _{temp}	$0^{\circ} \leq T_a \leq +60^{\circ}C$, $I_o = I_omin$		_	±0.5		%Vo		
Line Regulation	Regline	Over V _{in} range		_	±5	±10	mV		
Load Regulation	Regload	Over I _o range		—	±5	±10	mV		
Total Output Voltage Variation	ΔV_{o} tot	Includes set-point, line, load, $0^{\circ} \le T_a \le +60^{\circ}C$		_	±1.5	±3	%Vo		
Efficiency	η		$V_{o} = 15V \\ V_{o} = 12V \\ V_{o} = 10V \\ V_{o} = 5.0V \\ V_{o} = 3.3V$	 	95 94 92 90 82	 	%		
Vo Ripple (pk-pk)	Vr	20MHz bandwidth		_	2	_	%Vo		
Transient Response t _{tr}		1A/µs load step, 50% to 100% Iomax	_	100	200	μs			
	ΔV_{tr}	V _o over/undershoot		_	±5.0	_	%Vo		
Current Limit	Ilim	$\Delta V_0 = -1\%$		1.2	2.6	_	Α		
Switching Frequency	$f_{ m s}$	Over V _{in} range	V _o ≥5.0V V _o ≤3.3V	500 575	650 725	800 875	kHz		
External Output Capacitance	Cout			100	_	_	μF		
Operating Temperature Range	Ta	Over V _{in} range		-40 (2)	_	+85 (3)	°C		
Thermal Resistance	θ_{ja}	Free-air convection (40-60LFM)	$V_{o} = 3.3V$ $V_{o} = 5.0V$ $V_{o} \ge 12V$		45 50 60		°C/W		
Storage Temperature	Ts	—		-40	—	+125	°C		
Reliability	MTBF	Per Bellcore TR-332 50% stress, $T_a = 40^{\circ}$ C, ground benign	l	11.3	—	—	106 H		
Mechanical Shock	—	Per Mil-Std-883D, method 2002.3, 1mS, half-sine, mounted to a fixture		—	500	—	G's		
Mechanical Vibration	—	Per Mil-Std-883D, Method 2007.2 20-2000Hz, soldered in PC board	—	5 (4)	—	G's			
Weight	_	Suffixes N, A, & C Suffixes L & M	_	4.5 6.5	_	grams			
Flammability	_	Materials meet UL 94V-0							

Specifications (Unless otherwise stated, $T_a = 25^{\circ}$ C, $V_{in} = V_{in}min$, $C_{out} = 100\mu$ F, and $I_o = I_omax$)

Notes: (1) The ISR will operate at no load with reduced specifications.
(2) For operation below 0°C, use a tantalum type capacitor for C₂.
(3) See Thermal Derating curves.
(4) The tab pins on the 5-pin mount package types (suffixes L & M) must be soldered. For more information see the applicable package outline drawing.

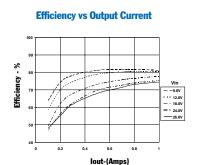
Typical Characteristics

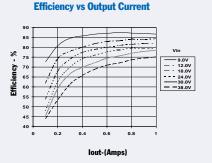
1-A Positive Step-down Integrated Switching Regulator

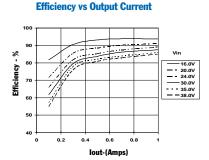


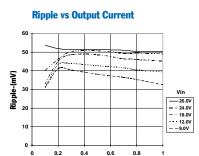
PT5101, 5.0 VDC (See Note A)

PT5102, 12.0 VDC (See Note A)





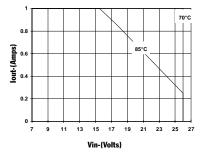




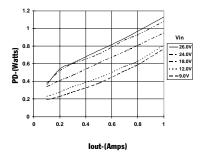
lout-(Amps)

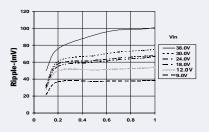
0

Thermal Derating (Ta) (See Note B)



Power Dissipation vs Output Current

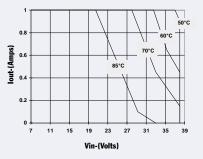




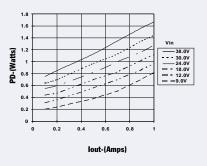
Ripple vs Output Current

lout-(Amps)

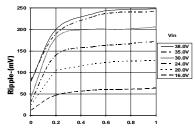




Power Dissipation vs Output Current

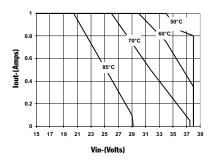


Ripple vs Output Current

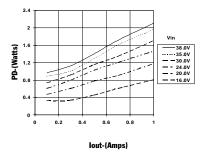


lout-(Amps)

Thermal Derating (Ta) (See Note B)



Power Dissipation vs Output Current



Note A: Characteristic data has been developed from actual products tested at 25°C. This data is considered typical data for the Converter. Note B: Thermal derating graphs are developed in free-air convection cooling, which corresponds to approximately 40–60LFM of airflow.





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20-Aug-2011

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
PT5101A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5101C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5101CT	NRND	SIP MODULE	EAC	3	200	TBD	Call TI	Level-1-215C-UNLIM	
PT5101G	NRND	SIP MODULE	EAG	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5101H	NRND	SIP MODULE	EAH	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5101J	NRND	SIP MODULE	EAJ	3	16	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5101L	NRND	SIP MODULE	EAL	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5101M	NRND	SIP MODULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5101N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5101S	NRND	SIP MODULE	EAF	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5101U	NRND	SIP MODULE	EAU	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5102A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5102C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5102CT	NRND	SIP MODULE	EAC	3	200	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5102H	NRND	SIP MODULE	EAH	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5102M	NRND	SIP MODULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5102N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5103A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5103C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5103L	NRND	SIP MODULE	EAL	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5103M	NRND	SIP MODULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5103N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5105A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5105C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5105N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5107A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5107C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5107J	NRND	SIP MODULE	EAJ	3	16	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5107M	NRND	SIP MODULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5107N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	



www.ti.com

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
PT5109A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5109C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5109N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5110A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5110C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5110N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5111A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5111M	NRND	SIP MODULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5111N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5112A	NRND	SIP MODULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	
PT5112C	NRND	SIP MODULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM	
PT5112N	NRND	SIP MODULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type	

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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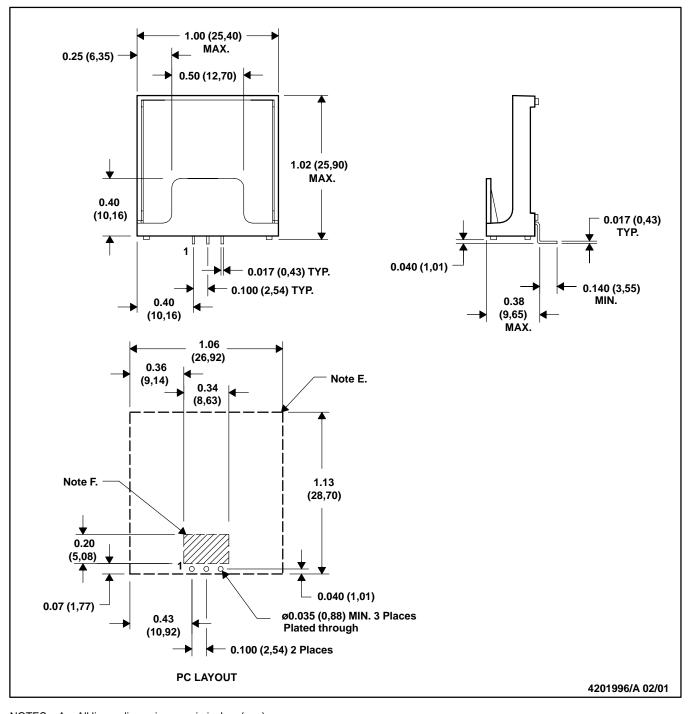
20-Aug-2011

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MPSI005 - MARCH 2001

EAA (R-PSIP-T3)

PLASTIC SINGLE-IN-LINE MODULE



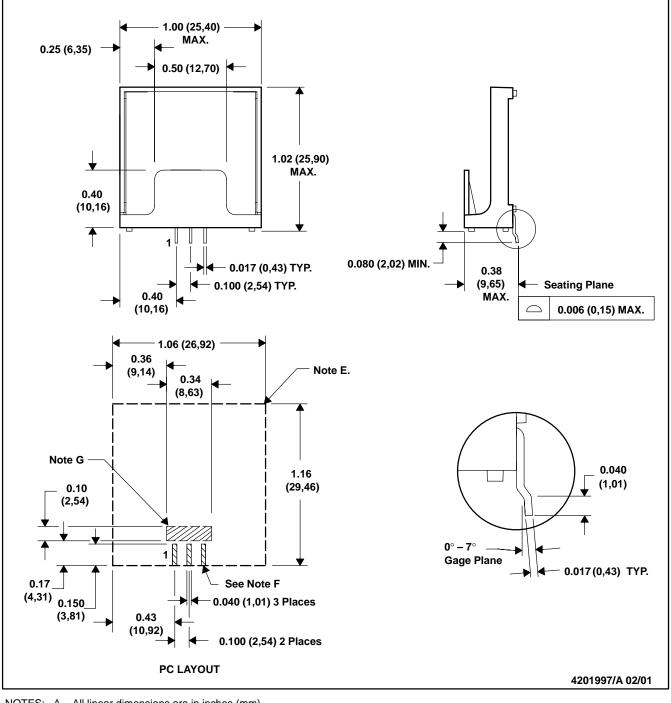
NOTES: A. All linear dimensions are in inches (mm).

- B. This drawing is subject to change without notice.
- C. 2–place decimals are $\pm~0.030~(\pm~0,76~\text{mm}).$
- D. 3-place decimals are \pm 0.010 (\pm 0, 25 mm).
- E. Recommended mechanical keep-out area.
- F. No copper, power or signal traces in this area.

MPSI006 - MARCH 2001

EAC (R-PSIP-G3)

PLASTIC SINGLE-IN-LINE MODULE



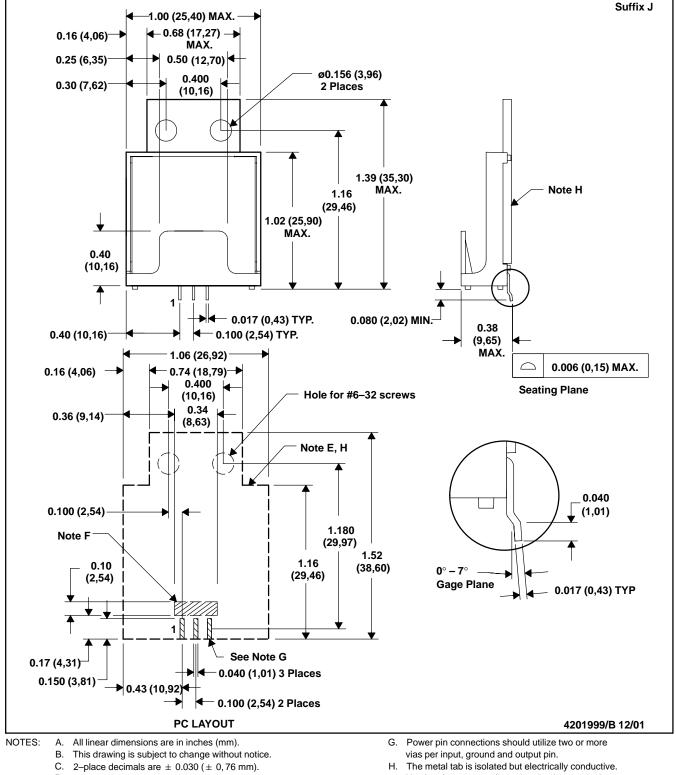
NOTES: A. All linear dimensions are in inches (mm).

- B. This drawing is subject to change without notice.
- C. 2-place decimals are \pm 0.030 (\pm 0,76 mm).
- D. 3-place decimals are \pm 0.010 (\pm 0, 25 mm).
- E. Recommended mechanical keep-out area.
- F. Power pin connections should utilize two or more vias per input, ground and output pin.
- G. No copper, power or signal traces in this area.

MPSI007A - MARCH 2001 0 REVISED JANUARY 2002

PLASTIC SINGLE-IN-LINE MODULE

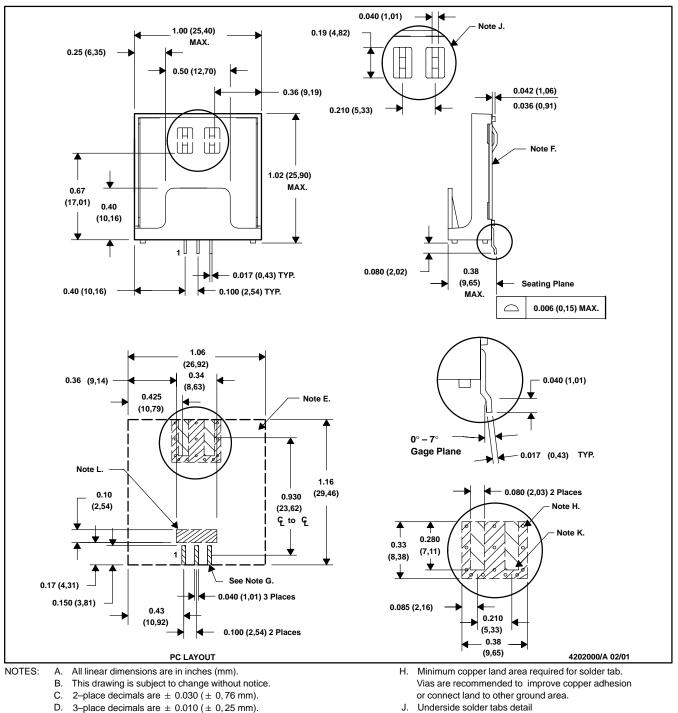




- D. 3-place decimals are \pm 0.010 (\pm 0,25 mm).
- E. Recommended mechanical keep-out area.
- F. No copper, power or signal traces in this area.

H. The metal tab is isolated but electrically conductive.
 No signal traces are allowed under the metal tab area.
 A solid copper island is recommended, which may be grounded.

MPSI008 - MARCH 2001

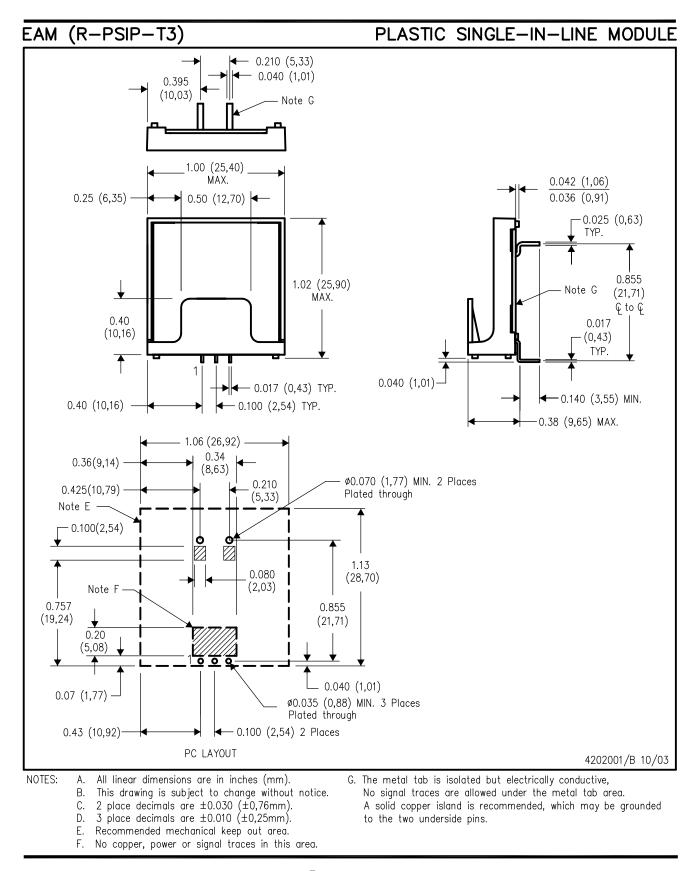


EAL (R-PSIP-G3)

- Ε. Recommended mechanical keep-out area.
- F. The metal tab is isolated but electrically conductive. No signal traces are allowed under the metal tab area. A solid copper island is recommended, which may be grounded.
- G. Power pin connections should utilize two or more vias per input, ground and output pin.

- K. Solder mask openings to copper island for solder joints to mechanical pins.
- L. No copper, power or signal traces in this area.

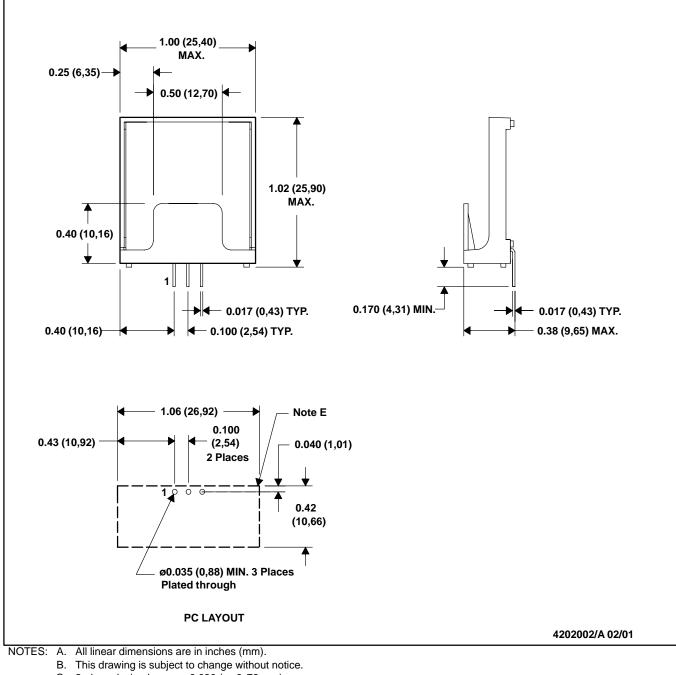






MPSI010 - MARCH 2001

EAD (R-PSIP-T3)

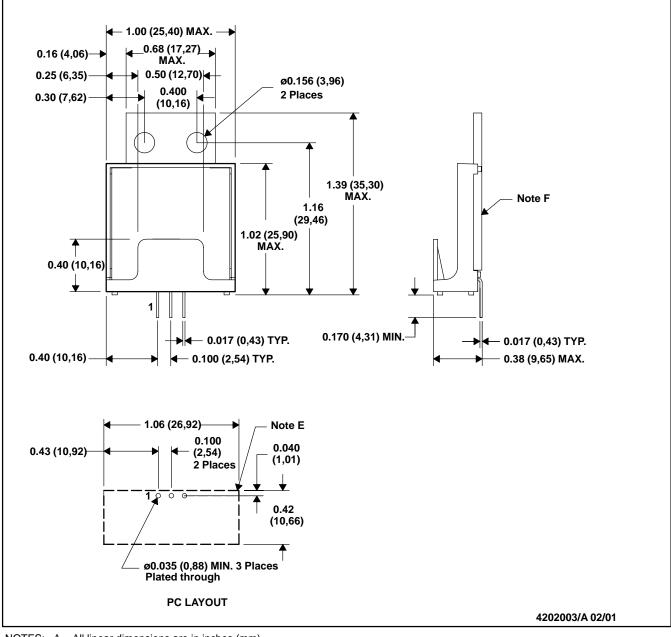


- C. 2-place decimals are \pm 0.030 (\pm 0, 76 mm).
- D. 3-place decimals are \pm 0.010 (\pm 0, 25 mm).
- E. Recommended mechanical keep-out area.



MPSI011 - MARCH 2001

EAF (R-PSIP-T3)

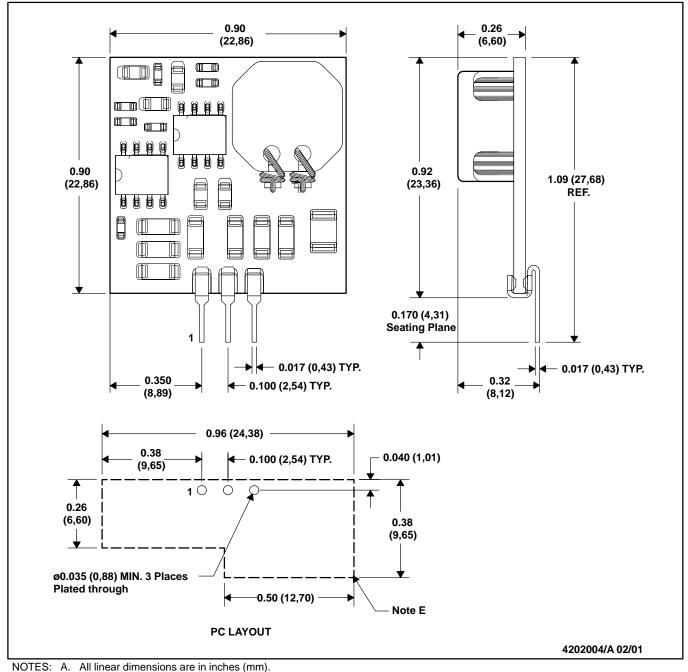


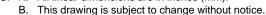
- NOTES: A. All linear dimensions are in inches (mm).
 - B. This drawing is subject to change without notice.
 - C. 2-place decimals are \pm 0.030 (\pm 0,76 mm).
 - D. 3-place decimals are \pm 0.010 (\pm 0,25 mm).
 - E. Recommended mechanical keep-out area.
 - F. The metal tab is isolated but electrically conductive, it can be grounded.



MPSI012 - MARCH 2001





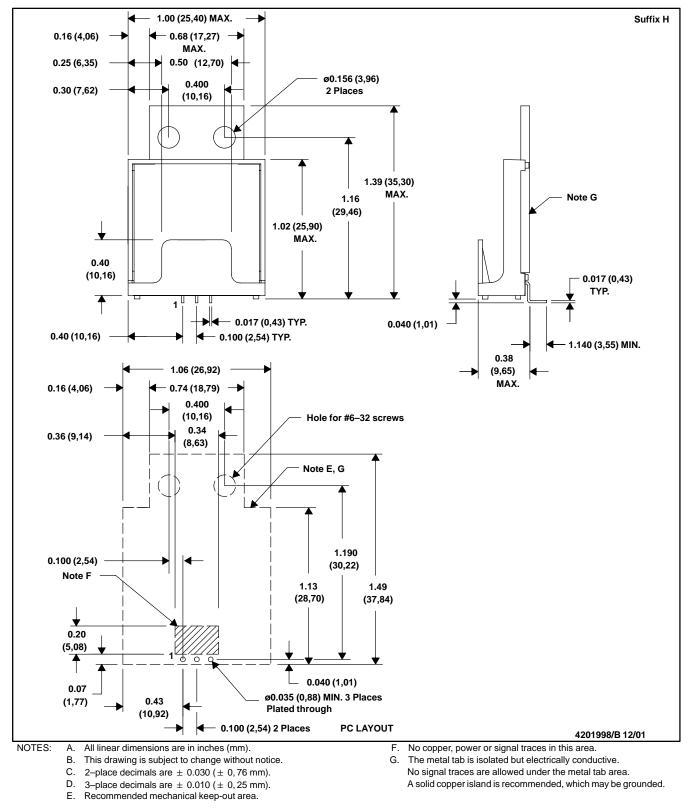


- C. 2-place decimals are \pm 0.030 (\pm 0,76 mm).
- D. 3-place decimals are \pm 0.010 (\pm 0, 25 mm).
- E. Recommended mechanical keep-out area.



MPSI023A - MARCH 2001 - REVISED JANUARY 2002

PLASTIC SINGLE-IN-LINE MODULE



EAH (R-PSIP-T3)



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DSP	dsp.ti.com	Industrial	www.ti.com/industrial
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