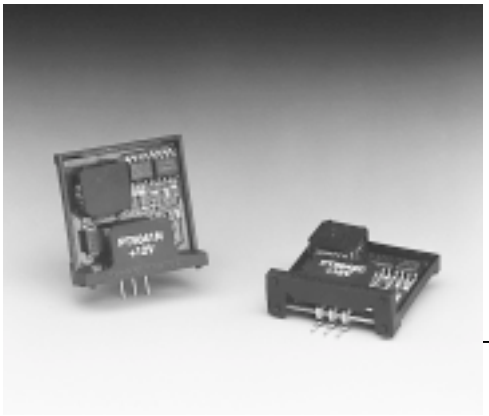
PT5040 Series

1-A Positive Step-up Integrated Switching Regulator

SLTS026B

(Revised 12/19/2001)



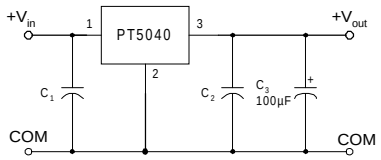
Features

- Wide Input Voltage Range
- 85% Efficiency
- Internal Over-Temperature Protection
- Laser-trimmed Output Voltage
- Soft Start
- 5-Pin Mount Option (Suffixes L & M)

Description

The PT5040 is a series of 3-pin boost-voltage Integrated Switching Regulators (ISRs). These ISRs are designed for use with +5V bus systems that require an additional regulated +8V to +20V with up to 1A of output current. These ISRs are packaged in the 3-pin, single in-line pin (SIP) package configuration.

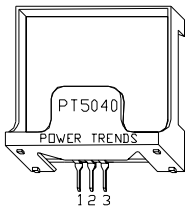
Standard Application



C_1 = Optional ceramic (1-5µF)
C_2 = Optional ceramic (1-5µF)
C_3 = Required Electrolytic (100µF)

Pin-Out Information

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



Ordering Information

PT5041☐ = +12 Volts
PT5042☐ = +15 Volts
PT5044☐ = +8 Volts
PT5045☐ = +9 Volts
PT5046☐ = +10 Volts
PT5047☐ = +18 Volts
PT5048☐ = +12.6 Volts
PT5049☐ = +20 Volts

PT Series Suffix (PT1234x)

Case/Pin Configuration	Order Suffix	Package Code *
Vertical	**N**	(EAD)
Horizontal	**A**	(EAA)
SMD	**C**	(EAC)
Horizontal, 2-pin Tab	**M**	(EAM)
SMD, 2-Pin Tab	**L**	(EAL)

** Previously known as package styles 100/110.*

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

NOTE: Boost Topology ISRs are not Short-Circuit Protected.

Specifications (Unless otherwise stated, T_a =25°C, V_{in} =5V, I_o =$I_o$max, C_3 =100µF)

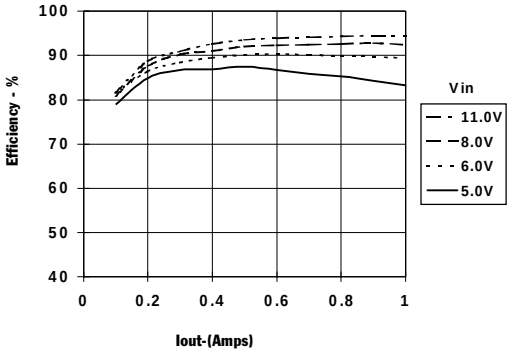
Characteristics	Symbol	Conditions		PT5040 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range	PT5049	0.1 (1)	—	0.5	A
			PT5047	0.1 (1)	—	0.6	
			PT5041/48	0.1 (1)	—	1.0	
			PT5042	0.1 (1)	—	0.75	
			PT5044	0.1 (1)	—	1.5	
			PT5045/46	0.1 (1)	—	1.2	
Input Voltage Range	V_{in}	Over Io range		4.75	—	(V_o-1)	V
			PT5047/5049	4.75	—	14	
Output Voltage Tolerance	ΔV_o	Over V_{in} Range T_a= -20°C to SOA derating limit (3)		—	±1.5	±3.0	$\%V_o$
Line Regulation	Reg_{line}	Over V_{in} range		—	±0.5	±1.0	$\%V_o$
Load Regulation	Reg_{load}	$I_o$min ≤ I_o ≤ $I_o$max		—	±0.5	±1.0	$\%V_o$
Efficiency	η	I_o=0.5A		—	85	—	%
V_o Ripple (pk-pk)	V_r	20MHz bandwidth		—	±2	±5	$\%V_o$
Transient Response	t_{tr}	25% load change		—	500	—	µSec
	V_{os}	V_o over/undershoot		—	3.0	5.0	$\%V_o$
Current Limit	I_{lim}			—	150 (2)	—	$\%I_o$max
Inrush Current	I_{ir}	On start up		—	5.5 (3)	—	A
	t_{ir}			—	1	—	mSec
Switching Frequency	f_s	Over V_{in} and I_o ranges	V_o<15V	500	650	800	kHz
			V_o≥15V	650	800	950	
Operating Temperature Range	T_a	—		-20	—	+85 (4)	°C
Thermal Resistance	θ_{ja}	Free Air Convection (40-60LFM)		—	40	—	°C/W
Storage Temperature	T_s			-40	—	+125	°C
Mechanical Shock		Per Mil-STD-883D, Method 2002.3 1 msec, Half Sine, mounted to a fixture	—	500	—	G's	
Mechanical Vibration Per Mil-STD-883D, 20-2000 Hz		Suffixes N, A, & C		—	5	—	G's
		Suffixes L & M		—	20 (5)	—	
Weight		Suffixes N, A, & C		—	4.5	—	grams
		Suffixes L & M		—	6.5	—	

Notes: *(1) The ISR will operate at no load with reduced specifications.*
(2) Boost topology ISRs are not short circuit protected.
(3) The inrush current stated is above the normal input current for the associated output load.
(4) See Safe Operating Area curves or consult the factory for the appropriate derating
(5) 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.

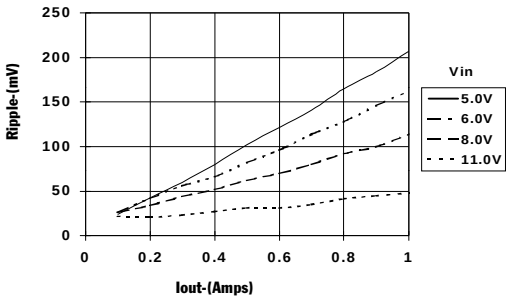
Typical Characteristics

PT5041, +12.0 VDC (See Note A)

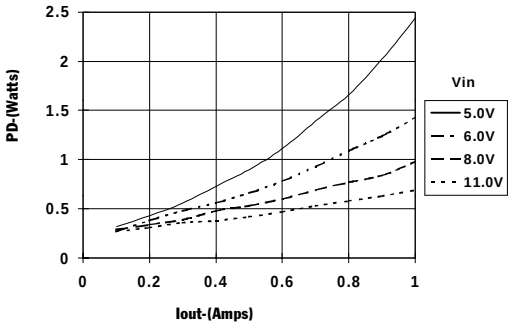
Efficiency vs Output Current



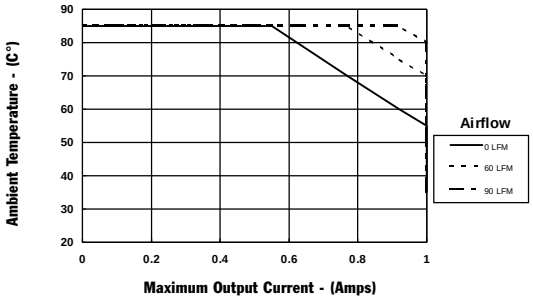
Ripple Voltage vs Output Current



Power Dissipation vs Output Current

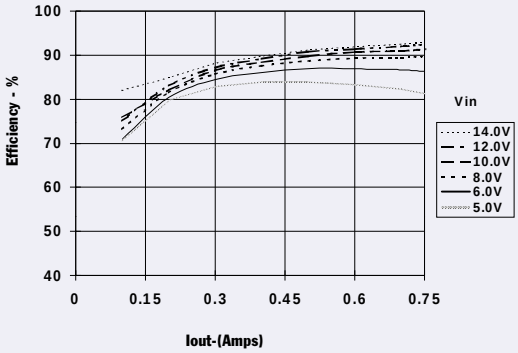


Safe Operating Area (V_{IN}=5V) (See Note B)

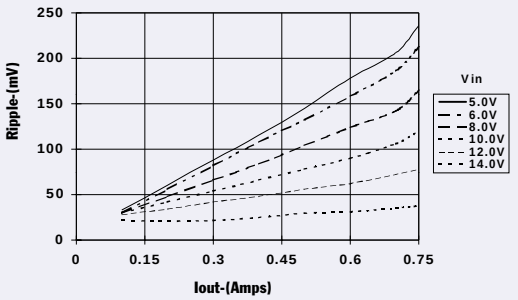


PT5042, +15.0 VDC (See Note A)

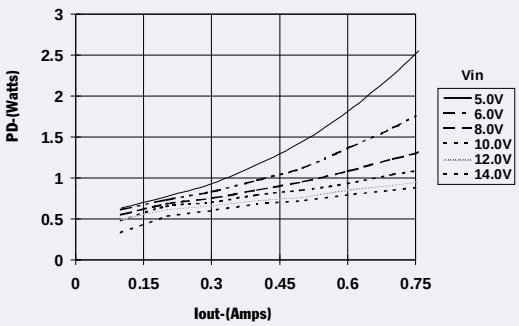
Efficiency vs Output Current



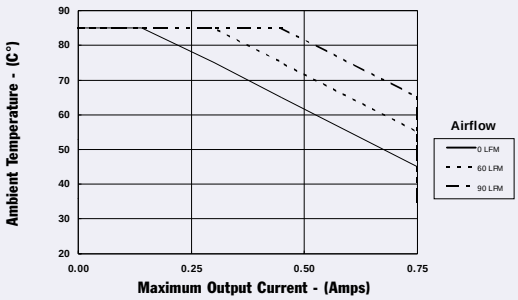
Ripple Voltage vs Output Current



Power Dissipation vs Output Current



Safe Operating Area (V_{IN}=5V) (See Note B)



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.*

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
PT5041A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5041C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5041CT	ACTIVE	SIP MOD ULE	EAC	3	200	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5041H	ACTIVE	SIP MOD ULE	EAH	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5041J	ACTIVE	SIP MOD ULE	EAJ	3	16	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5041L	ACTIVE	SIP MOD ULE	EAL	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5041M	ACTIVE	SIP MOD ULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5041N	ACTIVE	SIP MOD ULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5041S	ACTIVE	SIP MOD ULE	EAF	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5042A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5042C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5042L	ACTIVE	SIP MOD ULE	EAL	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5042M	ACTIVE	SIP MOD ULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5042N	ACTIVE	SIP MOD ULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5044A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5044C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5044L	ACTIVE	SIP MOD ULE	EAL	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5044M	ACTIVE	SIP MOD ULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5044N	ACTIVE	SIP MOD ULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5045A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5045C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5045L	ACTIVE	SIP MOD ULE	EAL	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5046A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5046C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5046M	ACTIVE	SIP MOD ULE	EAM	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
PT5046N	ACTIVE	SIP MOD ULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5047A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5047C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5047H	ACTIVE	SIP MOD ULE	EAH	3	16	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5047N	ACTIVE	SIP MOD ULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5048A	ACTIVE	SIP MOD ULE	EAA	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5048C	ACTIVE	SIP MOD ULE	EAC	3	35	Pb-Free (RoHS)	Call TI	Level-1-215C-UNLIM
PT5048N	ACTIVE	SIP MOD ULE	EAD	3	35	Pb-Free (RoHS)	Call TI	N / A for Pkg Type
PT5049A	ACTIVE	SIP MOD ULE	EAA	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5049C	ACTIVE	SIP MOD ULE	EAC	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5049L	ACTIVE	SIP MOD ULE	EAL	3	35	TBD	Call TI	Level-1-215C-UNLIM
PT5049N	ACTIVE	SIP MOD ULE	EAD	3	35	TBD	Call TI	Level-1-215C-UNLIM

[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.

to Customer on an annual basis.

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