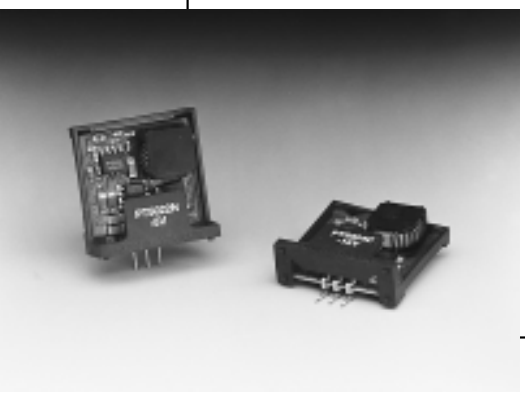
PT5020 Series

POSITIVE INPUT/NEGATIVE OUTPUT INTEGRATED SWITCHING REGULATOR

Revised 5/15/98

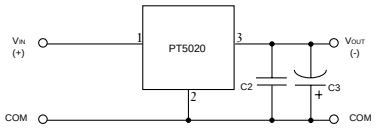


- Input Voltage Range: 4.75 to 7 Volts
- Complete Solution With Only One External Capacitor Required
- Soft Start

The Power Trends' PT5020 ISRs convert a positive input voltage (typ +5V) to a negative output voltage for a wide range of analog and communication circuit applications.

The Plus to Minus ISRs use a "Buck-Boost" topology and are packaged in the 3 pin SIP configuration.

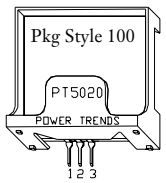
Standard Application



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

PT5021 ☐ = -3.3 Volts
PT5022 ☐ = -5 Volts
PT5023 ☐ = -9 Volts
PT5024 ☐ = -12 Volts
PT5025 ☐ = -15 Volts
PT5026 ☐ = -5.2 Volts
PT5027 ☐ = -8.0 Volts
PT5028 ☐ = -6.5 Volts
PT5029 ☐ = -5.5 Volts
PT5030 ☐ = -6.0 Volts

PT Series Suffix (PT12345X)

Case/Pin Configuration	
Vertical Through-Hole	N
Horizontal Through-Hole	A
Horizontal Surface Mount	C

Specifications

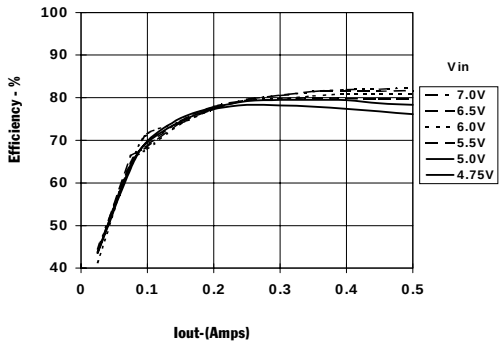
NOTE: Buck-Boost Topology ISRs are not Short-Circuit Protected.

Characteristics (T_a=25°C unless noted)	Symbols	Conditions	PT5020 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range V_o=-3.3V to 6.5V V_o=-9V V_o=-12V V_o=-15V	0.25* 0.10* 0.10* 0.10*	— — — —	1.0 0.60 0.50 0.30	A A A A
Current Limit	I_{cl}	V_{in} = 5V	—	1.5 $I_{o\,max}$	—	A
Inrush Current	I_{ir} t_{ir}	V_{in} = +5V @ max I_o On start up	— —	1.0 1.0	— —	A mSec
Short Circuit Current	I_{sc}	V_{in} = 5V	—	2 $I_{o\,max}$	—	A
Input Voltage Range	V_{in}	I_o = 0.1 to $I_{o\,max}$	4.75	—	7**	V
Output Voltage Tolerance	ΔV_o	Over V_{in} Range I_o= I_{max} T_a = -20°C to shutdown	—	±1.5	±3	$\%V_o$
Line Regulation	Reg_{line}	Over V_{in} range	—	±0.5	±1	$\%V_o$
Load Regulation	Reg_{load}	$I_{min} \le I_o \le I_{max}$	—	±0.5	±1	$\%V_o$
V_o Ripple/Noise	V_n	V_{in}=5V, I_o= I_{max}	—	±2	±5	$\%V_o$
Transient Response	t_{tr}	25% load change V_o over/undershoot	— —	500 3.0	— 5.0	µSec $\%V_o$
Efficiency	η	V_{in}=5V, I_o=0.5 I_{max}	—	75	—	%
Switching Frequency	f_O	Over I_o range V_o=3.3 to 8V $V_o \ge 8$ V	0.8 500	1 650	1.2 800	MHz kHz
Absolute Maximum Operating Temperature Range	T_a	—	-20	—	+85	°C
Recommended Operating Temperature Range	T_a	Free Air Convection, (40-60 LFM) Over V_{in} and I_o range	-20	—	+65***	°C
Thermal Resistance	θ_{ja}	Free Air Convection (40-60LFM)	—	50	—	°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, Method 2007.2, 20-2000 Hz, Soldered in a PC board	—	5	—	G's
Weight			—	4.5	—	grams

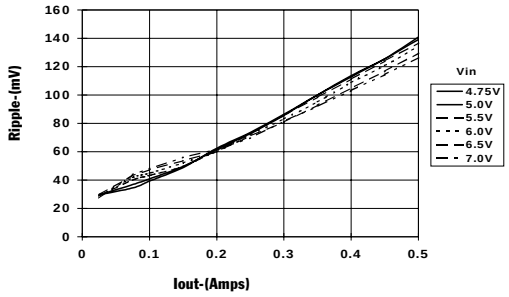
* ISR will operate down to no load with reduced specifications.
** For applications with input voltages greater than 7 VDC, use the PT78NR100 Series.
*** See SOA Curves.

PT5024 (-12VDC) (See Note 1)

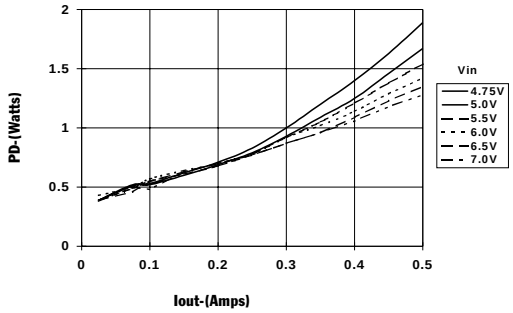
Efficiency vs Output Current



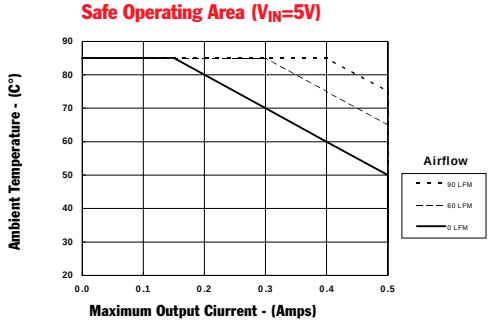
Ripple Voltage vs Output Current



Power Dissipation vs Output Current

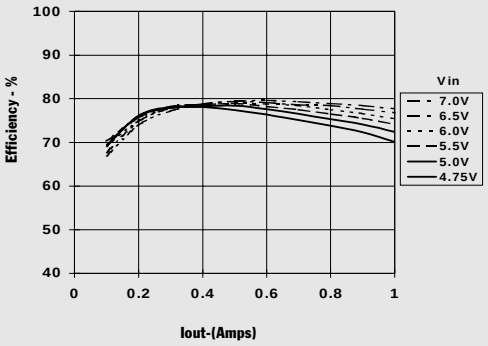


Safe Operating Area (V_{IN}=5V)

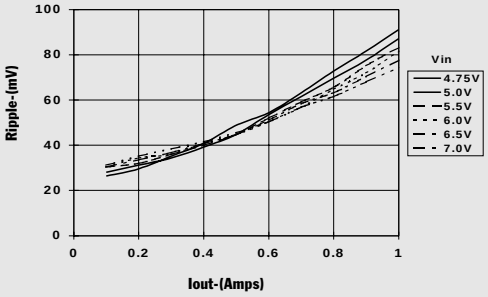


PT5022 (-5VDC) (See Note 1)

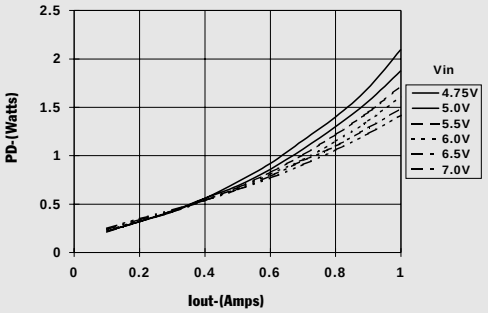
Efficiency vs Output Current



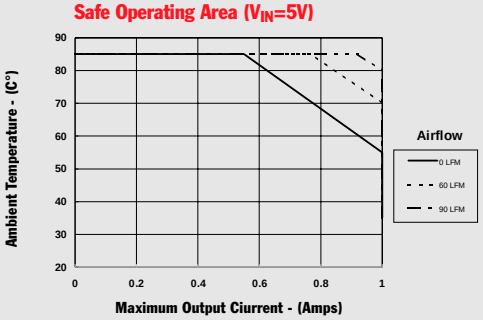
Ripple Voltage vs Output Current



Power Dissipation vs Output Current



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



Note 1: *All data listed in the above graphs has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.*

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.