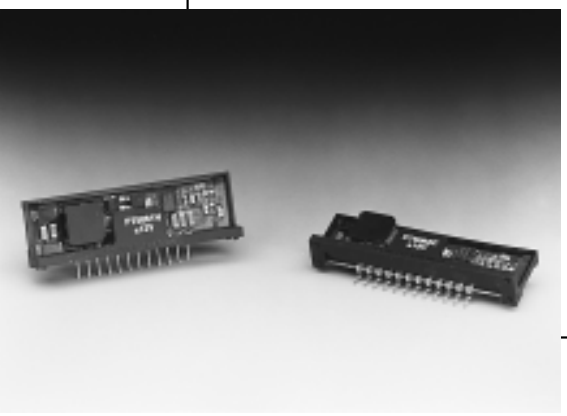
PT5060 Series

+5V to ±12V/15V 9W DUAL OUTPUT INTEGRATED SWITCHING REGULATOR

Revised 5/15/98

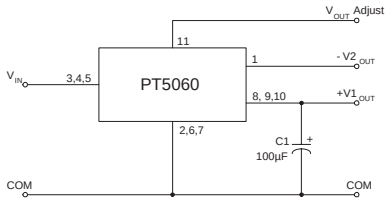


- Dual Outputs:
  +12V @ 0.5A
  -12V @ 0.25A
- Wide Input Voltage Range:
- 85% Efficiency
- Adjustable Output Voltage
- Laser-trimmed Output Voltage

The Power Trends' PT5060 Series is a dual output Integrated Switching Regulator (ISR) designed for use in +5 volt systems that require low power ±12 or ±15 volt rails. They can be used to power such application circuits as D/A and A/D converters, Op Amps, and interface logic. Both output voltages can be easily adjusted with one external resistor. These ISRs are offered in a low profile 12-pin SIP package in either vertical or horizontal through-hole or SMD-configurations.

Please note that this product does not include short-circuit protection.

Standard Application



C_1 = Required 100µF electrolytic

Pin-Out Information

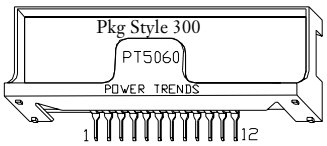
Pin	Function
1	-$V2_{out}$
2	GND
3	V_{in}
4	V_{in}
5	V_{in}
6	GND
7	GND
8	+$V1_{out}$
9	+$V1_{out}$
10	+$V1_{out}$
11	V_{out} Adjust
12	Do Not Connect

Ordering Information

PT5061☐ = ±12 Volts
PT5062☐ = ±15 Volts

PT Series Suffix (PT1234X)

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



Specifications

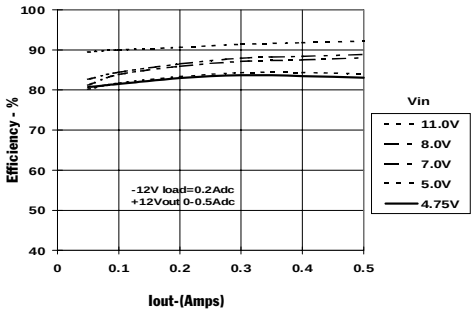
Characteristics (T_a = 25°C unless noted)	Symbols	Conditions		PT5060 SERIES Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range	V_o=+12V V_o=-12V	0.05 0.05*	— —	0.50 0.25	A A
			V_o=+15V V_o=-15V	0.05 0.05*	— —	0.40 0.20	A A
Current Limit**	I_{cl}	V_{in} = +5V		—	1.5 $I_o$max**	—	A
Inrush Current	I_{ir} t_{tr}	V_{in} = +5V @ max I_o On start up		— —	5.5 2	— —	A mSec
Input Voltage Range	V_{in}	I_o = 0.1 to $I_o$max		4.75	—	V_o-1V	V
Output Voltage Tolerance	ΔV_o	Over V_{in} and I_o ranges T_A= 0°C to +70°C	+V_o -V_o	— —	±1.5 ±5	±3.0 ±10	%V_o %V_o
Line Regulation	Reg_{line}	Over V_{in} range, I_o=0.5A, V_o= +12V		—	±0.5	±1.0	%V_o
Load Regulation	Reg_{load}	0.1 < I_o < $I_o$max, V_{in} = +5V, V_o= +12V		—	±0.5	±1.0	%V_o
V_o Ripple/Noise	V_n	V_{in}= +5V, I_o=$I_o$max	+V_o -V_o	— —	±1.5 ±2.0	±3 ±3	%V_o %V_o
Transient Response	t_{tr} V_{os}	25% load change V_o over/undershoot		— —	100 3.0	— 5.0	µSec %V_o
Efficiency	η	V_{in}= +5V, I_o=0.25A each output		—	85	—	%
Switching Frequency	f_o	Over V_{in} and I_o ranges		—	650	—	kHz
Absolute Maximum Operating Temperature Range	T_a	—		0	—	+85	°C
Recommended Operating Temperature Range	T_a	Free Air Convection (40-60LFM) Over V_{in} and I_o ranges		0	—	+65***	°C
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		—	15	—	G's
Weight				—	6.5	—	grams

* Do not operate below minimum load.
** Boost topology ISRs are not short circuit protected.
*** See SOA Curves.

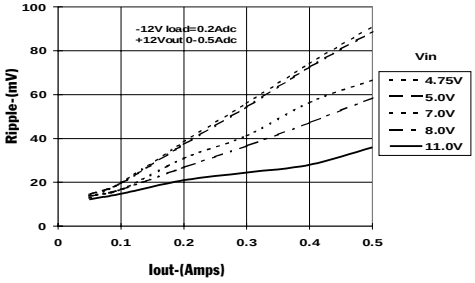
Power Trends, Inc. 27715 Diehl Road, Warrenville, IL 60555 **(800) 531-5782** Fax: (630) 393-6902 **http://www.powertrends.com**

PT5061 +/- 12VDC (See Note 1)

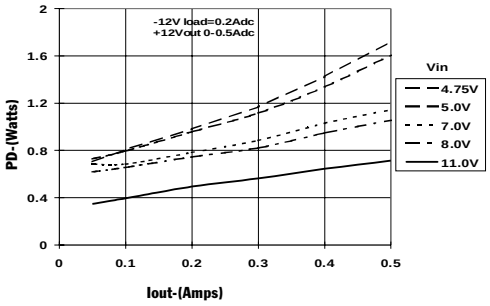
Efficiency vs Output Current



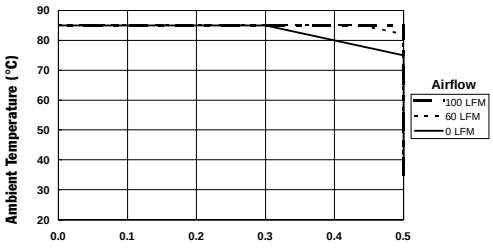
Ripple Voltage vs Output Current



Power Dissipation vs Output Current



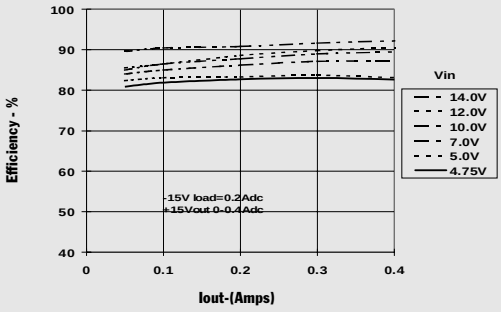
Safe Operating Area Curve (V_{in} = 5.0V; I_{out2} = 0.25A)



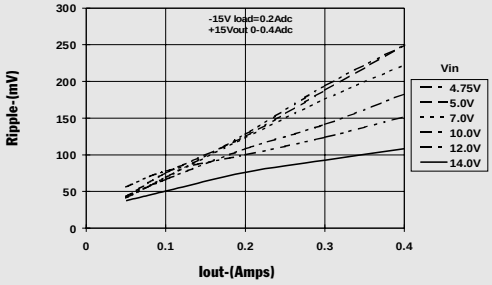
Maximum Positive Output Current (A)

PT5062 +/- 15V (See Note 1)

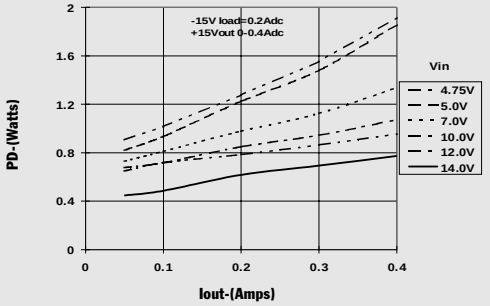
Efficiency vs Output Current



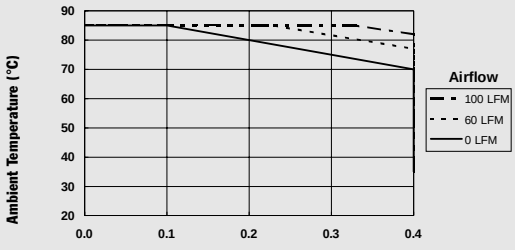
Ripple Voltage vs Output Current



Power Dissipation vs Output Current



Safe Operating Area Curve (V_{in} = 5.0V; I_{out2} = 0.25A)



Maximum Positive Output Current (A)

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.*

Adjusting the Output Voltage of the PT5060 Dual Output Boost Converter Series

The dual output voltage of the Power Trends PT5060 Series ISRs can be adjusted higher or lower than the factory trimmed pre-set voltage with the addition of a single external resistor. Table 1 accordingly gives the applicable adjustment range for each model in the series as V_a (min) and V_a (max).

Adjust Up: An increase in the output voltage is obtained by adding a resistor R2, between pin 11 (V_o adjust) and pins 2, 6, or 7 (GND).

Adjust Down: Add a resistor (R1), between pin 11 (V_o adjust) and pins 8, 9 or 10 ($V1_{out}$).

Refer to Figure 1 and Table 2 for both the placement and value of the required resistor, either (R1) or R2 as appropriate.

Notes:

1. Both the positive and negative voltage outputs from the ISR are adjusted simultaneously.
2. Use only a single 1% resistor in either the (R1) or R2 location. Place the resistor as close to the ISR as possible.
3. Never connect capacitors from V_o adjust to either GND or V_o . Any capacitance added to the V_o adjust pin will affect the stability of the ISR.
4. An increase in the output voltage must be accompanied by a corresponding reduction in the specified maximum current at each output. For $V1_{out}$ and $-V2_{out}$, the revised maximum output current must be reduced to the equivalent of 6Watts and 3Watts respectively. i.e.

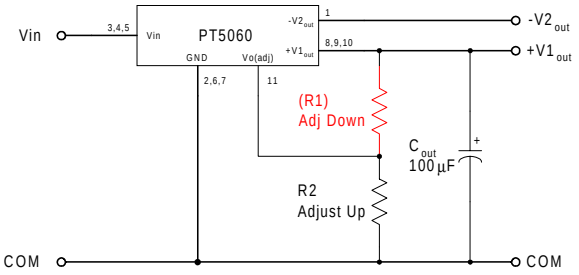
$$I1_{out}(max) = \frac{6}{V_a} \quad Adc$$

and $$I2_{out}(max) = \frac{3}{V_a} \quad Adc,$$

where V_a is the adjusted output voltage.

5. Adjustments to the output voltage will also limit the maximum input voltage that can be applied to the ISR. The maximum input voltage that may be applied is limited to (V_{out} – 1)Vdc or 14Vdc, whichever is less.

Figure 1



The values of (R1) [adjust down], and R2 [adjust up], can also be calculated using the following formulae.

$$(R1) = \frac{3.65\,(V_a - 2.5)}{(V_o - V_a)} - 0.1 \quad k\Omega$$

$$R2 = \frac{9.125}{V_a - V_o} - 0.1 \quad k\Omega$$

Where: V_o = Original output voltage
V_a = Adjusted output voltage

Table 1

PT5060 ADJUSTMENT AND FORMULA PARAMETERS

Series Pt #	PT5061	PT5062
V_o (nom)	±12.0V	±15.0V
V_a (min)	± 7.5V	± 7.5V
V_a (max)	±14.0V	±20.0V

Table 2

PT5060 ADJUSTMENT RESISTOR VALUES

Series Pt #	PT5061	PT5062
Current	0.5/0.25Adc	0.4/0.2Adc
V_o(nom)	±12.0Vdc	±15.0Vdc
V_a(req'd)		
7.0		
7.5	(4.0)kΩ	(2.3)kΩ
8.0	(4.9)kΩ	(2.8)kΩ
8.5	(6.2)kΩ	(3.3)kΩ
9.0	(7.8)kΩ	(3.9)kΩ
9.5	(10.1)kΩ	(4.6)kΩ
10.0	(13.6)kΩ	(5.4)kΩ
10.5	(19.4)kΩ	(6.4)kΩ
11.0	(30.9)kΩ	(7.7)kΩ
11.5	(65.6)kΩ	(9.3)kΩ
12.0		(11.5)kΩ
12.5	18.2kΩ	(14.5)kΩ
13.0	9.0kΩ	(19.1)kΩ
13.5	6.0kΩ	(26.7)kΩ
14.0	4.5kΩ	(41.9)kΩ
14.5		(87.5)kΩ
15.0		
15.5		18.2kΩ
16.0		9.0kΩ
16.5		6.0kΩ
17.0		4.5kΩ
17.5		3.6kΩ
18.0		2.9kΩ
18.5		2.5kΩ
19.0		2.2kΩ
19.5		1.9kΩ
20.0		1.7kΩ

R1 = (Red) R2 = Black

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