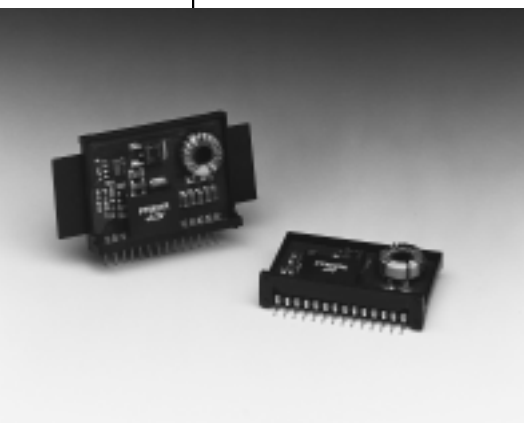


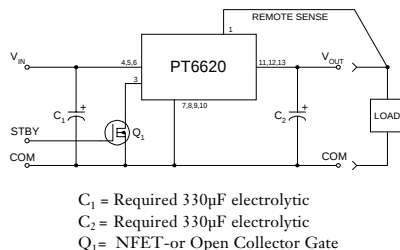
PT6620 Series**6 AMP 12V INPUT
INTEGRATED SWITCHING REGULATOR**[Application Notes](#)
[Mechanical Outline](#)
[Product Selector Guide](#)

- Single Device: 6A Output
- Input Voltage Range: 9V to 14V
- Adjustable Output Voltage
- 83% Efficiency
- Remote Sense Capability
- Standby Function
- Over-Temperature Protection

The PT6620 series is a new addition to Power Trends' line of 12V bus Integrated Switching Regulators (ISRs).

Designed for stand-alone operation in applications requiring as much as 6A of output current, the PT6620 is packaged in a 14-Pin SIP (Single In-line Package) and is available in a surface-mount configuration.

Only two external capacitors are required for proper operation. Please note that this product does not include short circuit protection.

Standard Application**Specifications**

Characteristics (T _a = 25°C unless noted)	Symbols	Conditions	PT6620 SERIES			
			Min	Typ	Max	Units
Output Current	I _o	T _a = 60°C, 200 LFM, pkg P T _a = 25°C, natural convection	0.1* 0.1*	— —	6.0** 6.5**	A A
Input Voltage Range	V _{in}	0.1A ≤ I _o ≤ 6.0A V _o ≤ +5V +6V ≤ V _o ≤ +9V	+9 V _o +3	— —	+14 +14	V V
Output Voltage Tolerance T _a = 0 to 60°C	ΔV _o	V _{in} = +12V, I _o = 6.0A	V _o -0.1	—	V _o +0.1	V
Output Voltage Adjust Range	V _{oadj}	Pin 14 to V _o or ground V _o = +3.3V V _o = +1.5V V _o = +2.5V V _o = +3.6V V _o = +5.0V V _o = +9.0V	2.3 1.4 1.9 2.5 2.9 5.2	— — — — — —	4.5 2.7 3.7 4.8 6.5 10.0	V
Line Regulation	Reg _{line}	+9V ≤ V _{in} ≤ +14V, I _o = 6.0A	—	±0.5	±1.0	% V _o
Load Regulation	Reg _{load}	V _{in} = +12V, 0.1 ≤ I _o ≤ 6.0A	—	±0.5	±1.0	% V _o
V _o Ripple/Noise	V _n	V _{in} = +12V, I _o = 6.0A V _o ≤ +6V V _o > +6V	— —	50 1.0	— —	mVpp % V _o
Transient Response with C ₂ = 330μF	t _{tr} V _{os}	I _o step between 3.0A and 6.0A V _o over/undershoot	— —	100 150	— —	μSec mV
Efficiency	η	V _{in} = +12V, I _o = 3.0A V _o = +3.3/3.6V V _o = +1.5V V _o = +2.5V V _o = +5.0V V _o = +9.0V	—	84	—	%
			—	68	—	%
			—	76	—	%
			—	86	—	%
			—	93	—	%
			—	—	—	%
		V _{in} = +12V, I _o = 6.0A V _o = +3.3/3.6V V _o = +1.5V V _o = +2.5V V _o = +5.0V V _o = +9.0V	—	83	—	%
			—	66	—	%
			—	75	—	%
			—	85	—	%
		V _o = +9.0V	—	92	—	%

* ISR will operate down to no load with reduced specifications.

** See SOA curves - Output power is limited to 30W maximum.

Note: The PT6620 Series requires a 330µF (output) and 330µF (input) electrolytic capacitors for proper operation in all applications.

Pin-Out Information

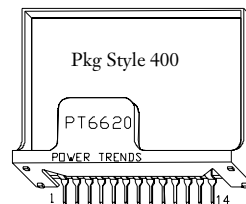
Pin	Function
1	Remote Sense
2	Do Not Connect
3	STBY* - Standby
4	V _{in}
5	V _{in}
6	V _{in}
7	GND
8	GND
9	GND
10	GND
11	V _{out}
12	V _{out}
13	V _{out}
14	V _{out} Adjust

Ordering Information

PT6621□ = +3.3 Volts
 PT6622□ = +1.5 Volts
 PT6623□ = +2.5 Volts
 PT6624□ = +3.6 Volts
 PT6625□ = +5.0 Volts
 PT6626□ = +9.0 Volts

PT Series Suffix (PT1234X)

Case/Pin Configuration	Heat Spreader	Heat Spreader with Side Tabs
Vertical Through-Hole	P	R
Horizontal Through-Hole	D	G
Horizontal Surface Mount	E	B



Note: Back surface of product is conducting metal

PT6620 Series

Specifications (continued)

Characteristics ($T_i = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	PT6620 SERIES			Units
			Min	Typ	Max	
Switching Frequency	f_o	$9\text{V} \leq V_{in} \leq 14\text{V}$ $0.1\text{A} \leq I_o \leq 6.0\text{A}$ PT6622	500 500	650 550	775 600	kHz kHz
Recommended Operating Temperature Range	T_a	Free Air Convection (40-60 LFM) Over V_{in} and I_o ranges with heat tab	-40	—	+65**	$^\circ\text{C}$
Absolute Maximum Operating Temperature Range	T_a		-40	—	+85	$^\circ\text{C}$
Storage Temperature	T_s	—	-40	—	+125	$^\circ\text{C}$
Mechanical Shock	—	Per Mil-STD-883D, Method 2002.3	—	500	—	G's
Mechanical Vibration	—	Per Mil-STD-883D, Method 2007.2, 20-2000 Hz, soldered in a PC board	—	7.5	—	G's
Weight	—	—	—	14	—	grams

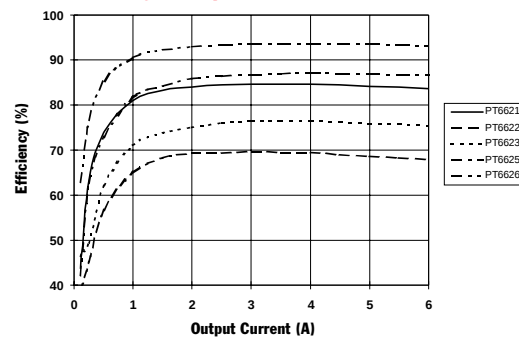
** See SOA curves - Output power is limited to 30W maximum.

Note: The PT6620 Series requires a 330 μF (output) and 100 μF (input) electrolytic capacitors for proper operation in all applications.

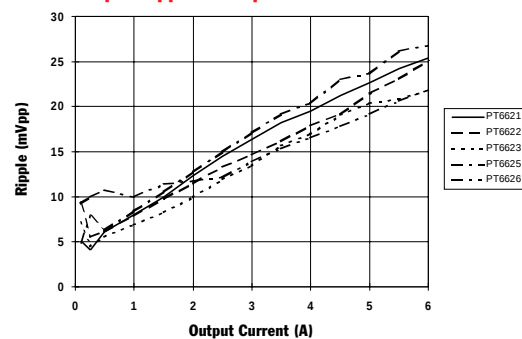
CHARACTERISTIC DATA

PT6620 Series @ $V_{in}=+12\text{V}$

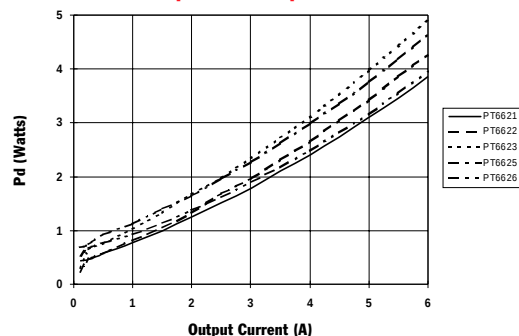
Efficiency vs Output Current



Output Ripple vs Output Current

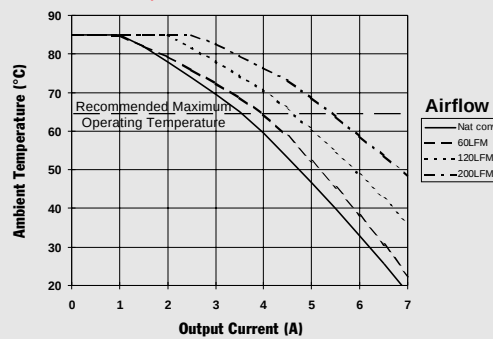


Power Dissipation vs Output Current

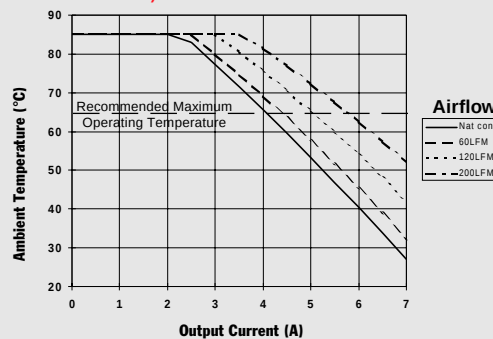


Safe Operating Area Curves @ $V_{in}=+12\text{V}$

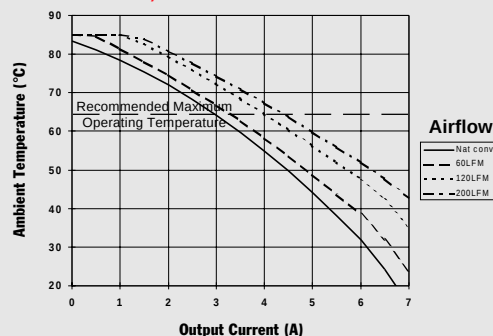
PT6621P, 3.3V



PT6622P, 1.5V



PT6625P, 5.0V



Note: SOA curves represent operating conditions at which internal components are at or below manufacturer's maximum rated operating temperatures.

[More Application Notes](#)**Adjusting the Output Voltage of the PT6620 7Amp12V Bus Converter Series**

The output voltage of the Power Trends PT6650 Series ISRs may 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 allowable 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 14 (V_o adjust) and pins 7-10 (GND).

Adjust Down: Add a resistor (R1), between pin 14 (V_o adjust) and pins 11-13 (V_{out}).

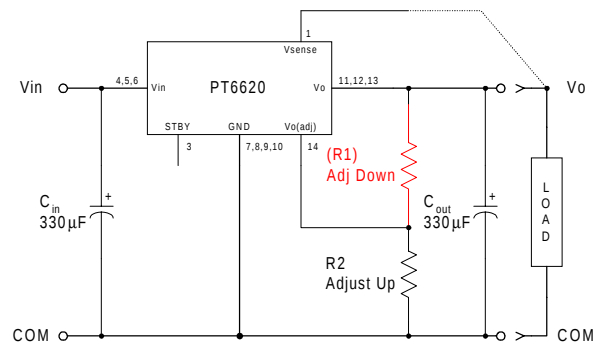
Refer to Figure 1 and Table 2 for both the placement and value of the required resistor, either (R1) or R2 as appropriate.

Notes:

1. Use only a single 1% resistor in either the (R1) or R2 location. Place the resistor as close to the ISR as possible.
2. Never connect capacitors from V_o adjust to either GND, V_{out} , or the Remote Sense pin. Any capacitance added to the V_o adjust pin will affect the stability of the ISR.
3. If the Remote Sense feature is being used, connecting the resistor (R1) between pin 14 (V_o adjust) and pin 1 (Remote Sense) can benefit load regulation.
4. The minimum input voltage required by the part is $V_{out} + 3$, or 9V, whichever is higher.
5. The maximum output current must be limited to the equivalent of 30Watts.

$$\text{i.e. } I_{out}(\text{max}) = \frac{12}{V_a} \quad \text{Adc,}$$

where V_a is the adjusted output voltage.

Figure 1

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

$$(R1) = \frac{R_o (V_a - 1.25)}{(V_o - V_a)} - R_s \quad \text{k}\Omega$$

$$R2 = \frac{1.25 R_o}{V_a - V_o} - R_s \quad \text{k}\Omega$$

Where: V_o = Original output voltage
 V_a = Adjusted output voltage
 R_o = The resistance value in Table 1
 R_s = The series resistance from Table 1

Table 1**PT6620 ADJUSTMENT AND FORMULA PARAMETERS**

Series Pt #	PT6622	PT6623	PT6621	PT6624	PT6625	PT6626
V_o (nom)	1.5V	2.5V	3.3V	3.6V	5.0V	9.0V
V_a (min)	1.4V	1.9V	2.3V	2.5V	2.9V	5.2V
V_a (max)	2.7V	3.7V	4.5V	4.8V	6.5V	10.0V
R_o (k Ω)	4.99	10.0	12.1	12.1	16.2	12.1
R_s (k Ω)	2.49	4.99	12.1	12.1	12.1	12.1

PT6620 Series**Application****Notes****Table 2****PT6620 ADJUSTMENT RESISTOR VALUES**

Series Pt #	PT6622	PT6623	PT6621	PT6624	PT6625
Current	7.5A _{dc}	7.5A _{dc}	7.5A _{dc}	7.5A _{dc}	6.0A _{dc}
V _o (nom)	1.5V _{dc}	2.5V _{dc}	3.3V _{dc}	3.6V _{dc}	5.0V _{dc}
V _a (req'd)					
1.4	(5.0)k Ω				
1.5					
1.6	59.9k				
1.7	28.7k				
1.8	18.3k				
1.9	13.1k	(5.8)k Ω			
2.0	10.0k	(10.0)k Ω			
2.1	7.9k	(16.3)k Ω			
2.2	6.4k	(26.7)k Ω			
2.3	5.3k	(47.5)k Ω	(0.6)k Ω		
2.4	4.4k	(110.0)k Ω	(3.4)k Ω		
2.5	3.8k		(6.8)k Ω	(1.7)k Ω	
2.6	3.2k	120.0k	(11.2)k Ω	(4.2)k Ω	
2.7		57.5k	(17.1)k Ω	(7.4)k Ω	
2.8		36.7k	(25.4)k Ω	(11.3)k Ω	
2.9		26.3k	(37.8)k Ω	(16.4)k Ω	(0.6)k Ω
3.0		20.0k	(58.5)k Ω	(23.2)k Ω	(2.1)k Ω
3.1		15.8k	(99.8)k Ω	(32.7)k Ω	(3.7)k Ω
3.2		12.9k	(224.0)k Ω	(46.9)k Ω	(5.5)k Ω
3.3		10.6k		(70.6)k Ω	(7.4)k Ω
3.4		8.9k	139.0k	(118.0)k Ω	(9.7)k Ω
3.5		7.5k	63.5k	(260.0)k Ω	(12.2)k Ω
3.6		6.4k	38.3k		(15.1)k Ω
3.7		5.4k	25.7k	139.0k	(18.4)k Ω
3.8			18.2k	63.5k	(22.3)k Ω
3.9			13.1k	38.3k	(26.9)k Ω
4.0			9.5k	25.7k	(32.5)k Ω
4.1			6.8k	18.2k	(39.2)k Ω
4.2			4.7k	13.1k	(47.6)k Ω
4.3			3.0k	9.5k	(58.5)k Ω
4.4			1.7k	6.8k	(73.0)k Ω
4.5			0.5k	4.7k	(93.2)k Ω
4.6				3.0k	(124.0)k Ω
4.7				1.7k	(174.0)k Ω
4.8				0.5k	(275.0)k Ω
4.9					(579.0)k Ω
5.0					
5.1					190.0k

Series Pt #	PT6625	PT6626
Current	6A _{dc}	3.3A _{dc}
V _o (nom)	5.0V _{dc}	9.0V _{dc}
V _a (req'd)		
5.2	89.1k	(0.5)k Ω
5.3	55.4k	(1.1)k Ω
5.4	38.5k	(1.9)k Ω
5.5	28.4k	(2.6)k Ω
5.6	21.7k	(3.4)k Ω
5.7	16.8k	(4.2)k Ω
5.8	13.2k	(5.1)k Ω
5.9	10.4k	(6.1)k Ω
6.0	8.2k	(7.1)k Ω
6.1	6.3k	(8.1)k Ω
6.2	4.8k	(9.3)k Ω
6.3	3.5k	(10.5)k Ω
6.4	2.4k	(11.9)k Ω
6.5	1.4k	(13.3)k Ω
6.6		(14.9)k Ω
6.7		(16.6)k Ω
6.8		(18.4)k Ω
6.9		(20.5)k Ω
7.0		(22.7)k Ω
7.1		(25.2)k Ω
7.2		(27.9)k Ω
7.3		(31.0)k Ω
7.4		(34.4)k Ω
7.5		(38.3)k Ω
7.6		(42.8)k Ω
7.8		(53.9)k Ω
8.0		(69.6)k Ω
8.2		(93.0)k Ω
8.4		(132.0)k Ω
8.6		(210.0)k Ω
8.8		(445.0)k Ω
9.0		
9.2		63.5k
9.4		25.7k
9.6		13.1k
9.8		6.8k
10.0		3.0k

R1 = (Red) R2 = Black

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