

Patent pending on package assembly

- Single-Device: +5V/3.3V input
- Remote Sense
- +5V & +3.3V Input Voltage
- Adjustable Output Voltage
- 23-pin Space-Saving Package
- Solderable Copper Case

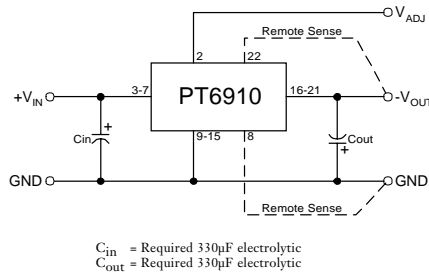
The PT6910 series is a series of high performance 12 watt, plus to minus voltage converters that are designed to power the latest ECL (-5.2V) and

GaAs (-2.0V) ICs from an existing +5.0V or +3.3V source.

These regulators are similar to the popular PT6900 series with the added feature of Power Trends' unique solderable copper case.

A 330µF electrolytic capacitor is required on both the input and output for proper operation. Also note that this product does not include short-circuit protection.

Standard Application



Pin-Out Information

Pin	Function	Pin	Function
1	Do not connect	13	GND
2	V_{out} Adjust	14	GND
3	V_{in}	15	GND
4	V_{in}	16	V_{out}
5	V_{in}	17	V_{out}
6	V_{in}	18	V_{out}
7	V_{in}	19	V_{out}
8	Remote Sense GND	20	V_{out}
9	GND	21	V_{out}
10	GND	22	Remote Sense V_{out}
11	GND	23	Do not connect
12	GND		

Ordering Information

+5V Input	+3.3V Input	V_{out}
PT6911□	PT6914□	= -2.0V
PT6912□	PT6915□	= -5.2V
PT6913□		= -1.5V

PT Series Suffix (PT1234X)

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

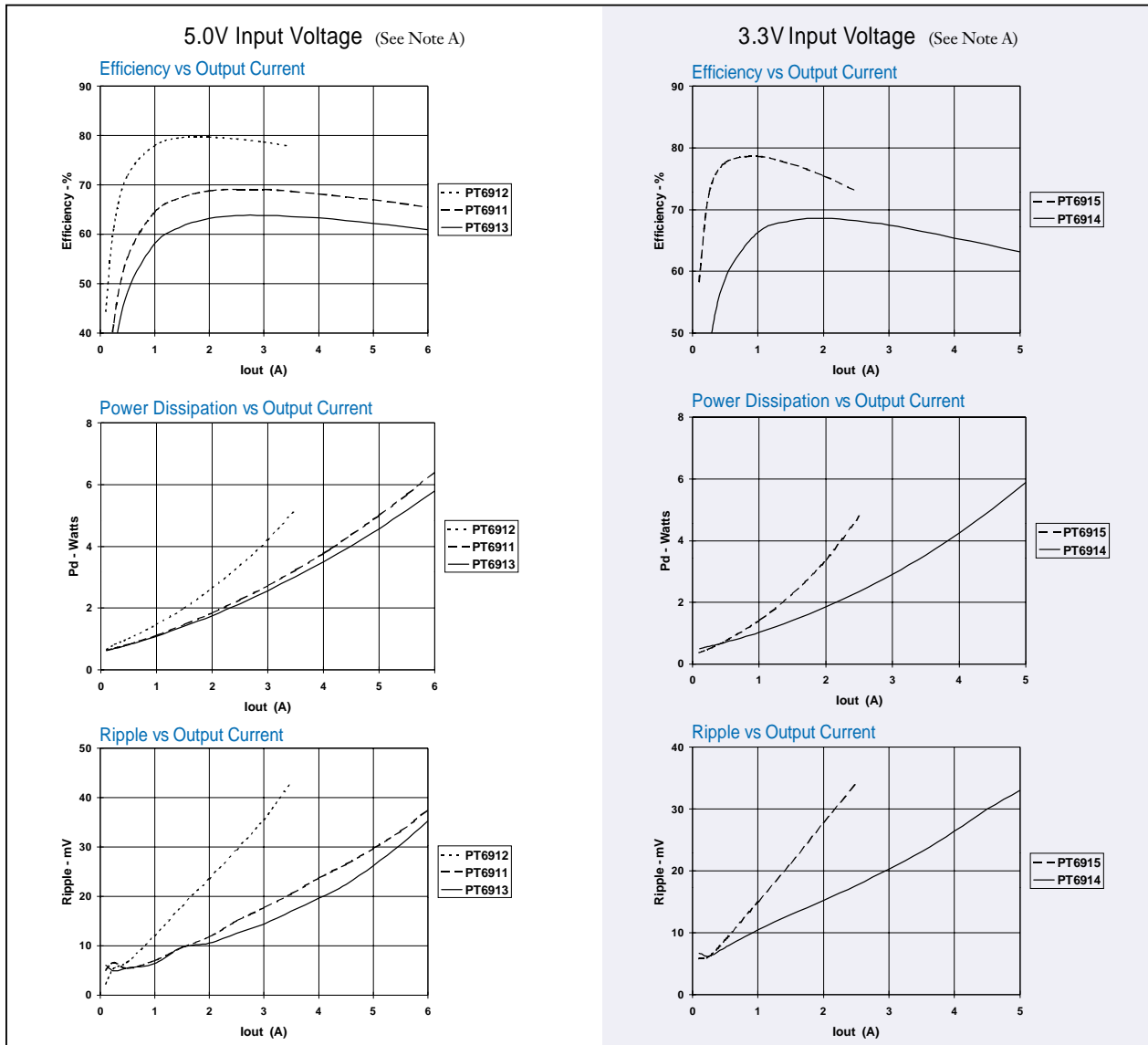
(For dimensions and PC board layout, see Package Styles 1300 and 1310.)

Specifications

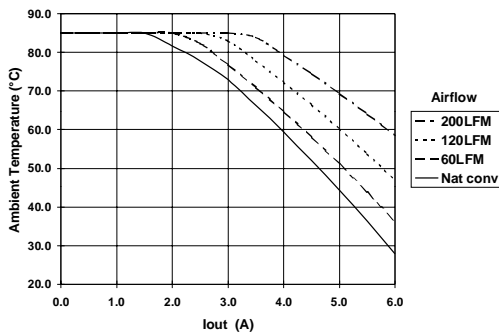
Characteristics ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	PT6910 SERIES			Units	
			Min	Typ	Max		
Output Current	I_o	$T_a = +25^\circ\text{C}$, natural convection					
		$V_{in} = 5.0\text{V}$	$V_o = -2.0\text{V} / -1.5\text{V}$ $V_o = -5.2\text{V}$	0.1 (1)	—	6.0 (2) 3.5 (2)	A
		$V_{in} = 3.3\text{V}$	$V_o = -2.0\text{V}$ $V_o = -5.2\text{V}$	0.1 (1)	—	5.0 (2) 2.5 (2)	A
Input Voltage Range		$0.1\text{A} \leq I_o \leq I_{max}$ PT6911 PT6912/PT6913 PT6914/PT6915	4.5 3.1	—	5.5 3.6	V	
Output Voltage Tolerance	ΔV_o	Nominal V_{in} , $I_o = I_{max}$ $0^\circ\text{C} \leq T_a \leq +60^\circ\text{C}$	$V_o - 0.05$	—	$V_o + 0.05$	V	
Output Adjust Range	V_o	Pin 14 to V_o or GND $V_o = -2.0\text{V}$ $V_o = -5.2\text{V}$ $V_o = -1.5\text{V}$	-1.4 -2.7 -1.2	—	-4.4 -6.5 -3.4	V	
Line Regulation	Reg_{line}	Over V_{in} range, $I_o = I_{max}$	—	± 0.5	± 1.0	%	
Load Regulation	Reg_{load}	$V_{in} = V_{nom}$, $0.1 \leq I_o \leq I_{max}$	—	± 0.5	± 1.0	%	
V_o Ripple/Noise	V_n	$V_{in} = V_{nom}$, $I_o = I_{max}$ $V_o = -1.5\text{V} / -2.0\text{V}$ $V_o = -5.2\text{V}$	— —	40 50	— —	mV	
Transient Response with $C_{out} = 330\mu\text{F}$	t_{tr}	I_o step between $0.5I_{max}$ and I_{max}	—	200	—	µSec	
	V_{os}	V_o over/undershoot	—	200	—	mV	
Efficiency	η	$V_{in} = +5\text{V}$, $I_o = 0.5I_{max}$ $V_o = -1.5\text{V}$ $V_o = -2.0\text{V}$ $V_o = -5.2\text{V}$	— — —	65 70 77	— — —	%	
		$V_{in} = +3.3\text{V}$, $I_o = 0.5I_{max}$ $V_o = -2.0\text{V}$ $V_o = -5.2\text{V}$	— —	67 75	— —	%	
Switching Frequency	f_o	Over V_{in} and I_o ranges	500	—	600	kHz	
Absolute Maximum Operating Temperature Range	T_a		0	—	+85 (2)	$^\circ\text{C}$	
Recommended Operating Temperature Range	T_a	Over V_{in} Range	0	—	+60	$^\circ\text{C}$	
Storage Temperature	T_s		-40	—	+125	$^\circ\text{C}$	
Weight	—	Vertical/Horizontal	—	26	—	grams	

Notes: (1) ISR-will operate down to no load with reduced specifications.
(2) See Safe Operating Area curves, or consult the factory for the appropriate derating.

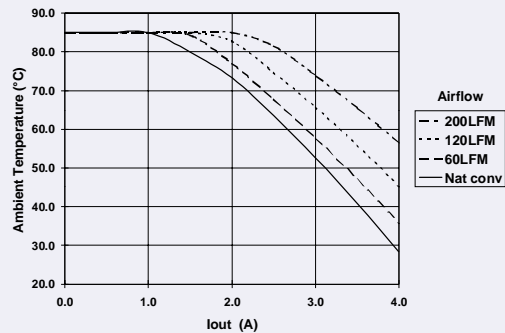
12 Watt 5V/3.3V Input
Plus to Minus Voltage Converter



PT6911 Safe Operating Area, Vin =5.0V (See Note B)



PT6912 Safe Operating Area, Vin =5.0V (See Note B)



Note A: 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 DC-DC Converter.
 Note B: SOA curves represent the condition at which internal components are at or below manufacturer's maximum operating temperature.

PT6900/6910 Series

Adjusting the Output Voltage of the PT6900/PT6910 Positive to Negative Converter Series

The negative output voltage of the Power Trends PT6900 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 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 2 (V_o adjust) and pin 8 (Remote Sense GND).

Adjust Down: Add a resistor (R1), between pin 2 (V_o adjust) and pin 22 (Remote Sense V_o).

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

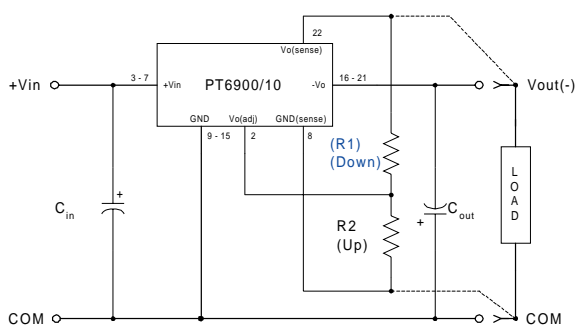
Notes:

1. Only a single 1% resistor is required in either the (R1) or R2 location. Do not use (R1) and R2 simultaneously. 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 Sense pins. Any capacitance added to the V_o adjust pin will affect the stability of the ISR.
3. If the sense pins are not being used, the resistors (R1) and R2 can be connected to V_{out} and GND respectively.
4. An increase in the output voltage must be accompanied by a corresponding reduction in the maximum output current. The revised maximum output current must be reduced to the equivalent of 12Watts.

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

where V_a is the adjusted output voltage.

Figure 1



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

$$(R1) = \frac{24.9 (V_a - V_r)}{(V_o - V_a)} - R_s \text{ k}\Omega$$

$$R2 = \frac{24.9 V_r}{(V_a - V_o)} - R_s \text{ k}\Omega$$

Where:

- V_o = Original output voltage
- V_a = Adjusted output voltage
- V_r = Reference voltage in Table 1
- R_s = The resistance given in Table 1

Table 1

PT6900/PT6910 ADJUSTMENT RANGE AND FORMULA PARAMETERS			
Series Pt #			
5.0V Bus	PT6903/13	PT6901/11	PT6902/12
3.3V Bus		PT6904/14	PT6905/15
V_o (nom)	-1.5V	-2.0V	-5.2V
V_a (min)	-1.2V	-1.4V	-2.7V
V_a (max)	-3.4V	-4.5V	-6.5V
V_r	-1.0V	-1.0V	-0.92V
R_s (k Ω)	12.7	10.0	17.4

PT6900/6910 Series

Table 2

PT6900/PT6910 ADJUSTMENT RESISTOR VALUES

Series Pt #	PT6903/13	PT6901/11	PT6902/12
5.0V Bus			
3.3V Bus		PT6904/14	PT6905/15
V ₀ (nom)	-1.5Vdc	-2.0Vdc	-5.2Vdc
V _a (req'd)			
-1.2	(3.9)kΩ		
-1.3	(24.7)kΩ		
-1.4	(86.9)kΩ	(6.6)kΩ	
-1.5		(14.9)kΩ	
-1.6	236.0kΩ	(27.4)kΩ	
-1.7	112.0kΩ	(48.1)kΩ	
-1.8	70.3kΩ	(89.6)kΩ	
-1.9	49.6kΩ	(214.0)kΩ	
-2.0	37.1kΩ		
-2.1	28.8kΩ	239.0kΩ	
-2.2	22.9kΩ	115.0kΩ	
-2.3	18.4kΩ	73.0kΩ	
-2.4	15.0kΩ	52.3kΩ	
-2.5	12.2kΩ	39.8kΩ	
-2.6	9.9kΩ	31.5kΩ	
-2.7	8.1kΩ	25.6kΩ	(0.3)kΩ
-2.8	6.5kΩ	21.1kΩ	(2.1)kΩ
-2.9	5.1kΩ	17.7kΩ	(4.0)kΩ
-3.0	3.9kΩ	14.9kΩ	(6.1)kΩ
-3.1	2.9kΩ	12.6kΩ	(8.5)kΩ
-3.2	2.0kΩ	10.8kΩ	(11.0)kΩ
-3.3	1.1kΩ	9.2kΩ	(13.8)kΩ
-3.4	0.4kΩ	7.8kΩ	(16.9)kΩ
-3.5		6.6kΩ	(20.4)kΩ
-3.6		5.6kΩ	(24.3)kΩ
-3.7		4.7kΩ	(28.7)kΩ
-3.8		3.8kΩ	(33.8)kΩ

R1 = (Blue)

R2 = Black

Series Pt #	PT6901/11	PT6902/12
5.0V Bus		
3.3V Bus	PT6904/14	PT6905/15
V ₀ (nom)	-2.0Vdc	-5.2Vdc
V _a (req'd)		
-3.9	3.1kΩ	(39.7)kΩ
-4.0	2.5kΩ	(46.5)kΩ
-4.1	1.9kΩ	(54.6)kΩ
-4.2	1.3kΩ	(64.3)kΩ
-4.3	0.8kΩ	(76.1)kΩ
-4.4	0.4kΩ	(90.9)kΩ
-4.5	0.0kΩ	(106.0)kΩ
-4.6		(135.0)kΩ
-4.7		(171.0)kΩ
-4.8		(224.0)kΩ
-4.9		(313.0)kΩ
-5.0		(491.0)kΩ
-5.1		(1020.0)kΩ
-5.2		
-5.3		212.0kΩ
-5.4		97.1kΩ
-5.5		59.0kΩ
-5.6		39.9kΩ
-5.7		28.4kΩ
-5.8		20.8kΩ
-5.9		15.3kΩ
-6.0		11.2kΩ
-6.1		8.1kΩ
-6.2		5.5kΩ
-6.3		3.4kΩ
-6.4		1.7kΩ
-6.5		0.2kΩ

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