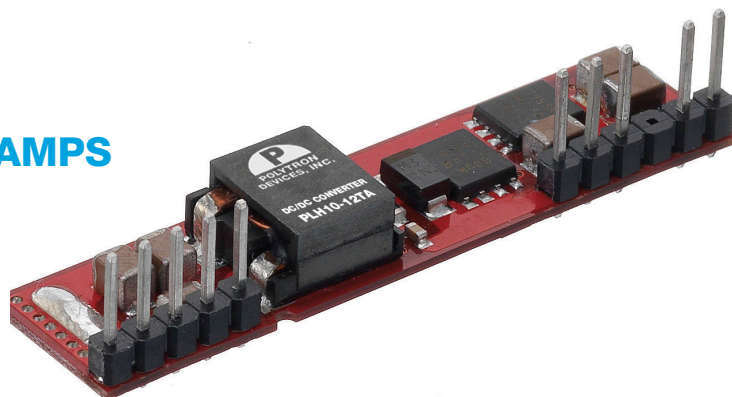


## DC-DC CONVERTERS

### NON-ISOLATED, POINT OF LOAD, 10 AMPS

#### SMD OR SIP PACKAGE

#### PLS(H)10 SERIES



#### FEATURES

- Output Current up to 10A
- Small Size and Low Profile:  
1.30" × 0.53" × 0.30" (SMD);  
2.00" × 0.50" × 0.28" (SIP)
- High Efficiency up to 93% at 3.3V Full Load
- Input Range From 8.3Vdc to 14Vdc
- Fixed Switching Frequency
- SMD and SIP Packages
- Input Under-Voltage Protection
- SMD Package Qualified for Leadfree Reflow Solder Process According IPC J-STD-020D
- Output Voltage Programmable From 0.75Vdc to 5Vdc Via External Resistor
- Safety Meets UL60950-1, EN60950-1 and IEC60950-1
- Compliant to RoHS II & Reach
- CE Marked

#### SELECTION GUIDE

All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current Load A		ON/OFF Logic	Efficiency % (5.0V <sub>in</sub> , 3.3Vdc @ 6A)	Model Number	Package
		Min.	Max.				
$V_{out(set)} \leq 3.63V$ $V_{in} = 8.3-14Vdc$ $V_{out(set)} > 3.63V$ $V_{in} = 8.3 - 13.2Vdc$	0.75 ~ 5Vdc	0	10	Negative	93	PLS10-12T	SMD
	0.75 ~ 5Vdc	0	10	Positive	93	PLS10-12TP	SMD
	0.75 ~ 5Vdc	0	10	Negative	93	PLH10-12T	Vertical Mounting SIP
	0.75 ~ 5Vdc	0	10	Positive	93	PLH10-12TP	Vertical Mounting SIP
	0.75 ~ 5Vdc	0	10	Negative	93	PLH10-12TA	Horizontal Mounting SIP
	0.75 ~ 5Vdc	0	10	Positive	93	PLH10-12TAP	Horizontal Mounting SIP

## PLS(H)10 SERIES

### Input Specifications

Operating input voltage range, Vdc	8.3 - 14Vdc	$V_{in}(\text{nom}) = 12\text{V}$ $V_{out}(\text{set}) \leq 3.63\text{V}$
	8.3 - 13.2Vdc	$V_{out}(\text{set}) > 3.63\text{V}$
Input filter <sup>(5)</sup>		C filter
Maximum input current, A	7	$V_{in} = 8.3$ to 14Vdc; $I_o = I_o(\text{max})$
Input reflected ripple current, mA-p-p	20	5-20MHz, 1 $\mu$ H source impedance
Input current no load, mA	$V_{in} = 12\text{V}$ , $I_o = 0$ , module enabled	
	40	$V_{out}(\text{set}) = 0.75\text{Vdc}$
	100	$V_{out}(\text{set}) = 5\text{Vdc}$
Start-up voltage, Vdc	7.9	
Shut-down voltage, Vdc	7.8	
Remote ON/OFF <sup>(6)</sup>		Negative logic, Standard
	$I_{in} = 10\mu\text{A}$ , Max.	ON = Open or $0\text{V} < V_r < 0.3\text{V}$
	$I_{in} = 1\mu\text{A}$ , Max.	OFF = $2.5\text{V} < V_r < V_{in}(\text{max})$
		Positive logic, option
	$I_{in} = 10\mu\text{A}$ , Max.	ON = Open or $(V_{in} - 4) < V_r < V_{in}(\text{max})$
	$I_{in} = 1\mu\text{A}$ , Max.	OFF = $0\text{V} < V_r < 0.3\text{V}$
		Input current of Ctrl pin
	2.0mA (nominal)	Remote off input current
Rise time, mS	6 Max.	10% to 90% $V_{out}(\text{set})$
Turn-on delay time, ms	3	Case 1 <sup>(7)</sup>
	3	Case 2 <sup>(8)</sup>

### Output Specifications

Output current, A	10 Max.		
Voltage accuracy, %	-2 Min., 2 Max	$V_{out}(\text{set})$	
Line regulation, %	$V_{in} = V_{out}(\text{set}) + 0.5\text{V}$ to $V_{in}(\text{max})$ at Full Load		
	-0.3 Min., 0.3 Max.	$V_{out}(\text{set})$	
Load regulation, %	No Load to Full Load		
	-0.4 Min., 0.4 Max.	$V_{out}(\text{set})$	
Minimum load, %	0 Min.		
Output current limit, %	220		
Voltage adjustability <sup>(4)</sup> , V (see fig.1)	0.7525-5.0		
Ripple and noise <sup>(2)</sup>	Measured by 20MHz bandwidth		
	30mVrms, Max.	75mVp-p, Max.	
Temperature coefficient, %/°C	-0.4 Min., -0.4 Max.		
Output voltage overshoot-startup	1% $V_{out}(\text{set})$	$V_{in} = V_{in}(\text{min}) - V_{in}(\text{max})$ ; F.L.	
Dynamic load response	Note2	200mV	$\Delta I_o / \Delta t = 2.5\text{A} / \mu\text{s}$ , $V_{in}(\text{nom})$ , Peak deviation
		25 $\mu\text{s}$	Load change step (50% to 100% or 100% to 50% of $I_o(\text{max})$ ), Setting time ( $V_{out} < 10\%$ peak deviation)
	Note3	100mV	$\Delta I_o / \Delta t = 2.5\text{A} / \mu\text{s}$ , $V_{in}(\text{nom})$ , Peak deviation
		25 $\mu\text{s}$	Load change step (50% to 100% or 100% to 50% of $I_o(\text{max})$ ), Setting time ( $V_{out} < 10\%$ peak deviation)
External load capacitance, $\mu\text{F}$	1000 Max.	ESR $\geq 1\text{m}\Omega$	
	5000 Max.	ESR $\geq 10\text{m}\Omega$	
Short circuit protection	Continuous, automatics recovery		

### General Specifications

Isolation voltage	None
Switching frequency, kHz	300 $\pm$ 10%
Design meet safety standard	UL60950-1, EN60950-1, IEC60950-1

## PLS(H)10 SERIES

### Environmental Specifications

Operating ambient temperature, °C	With derating	-40 Min.	85 Max.
Storage temperature range, °C		-55 Min.	125 Max.
Over temperature protection, °C		125	
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity	Non-condensing	5% to 95% RH	
Lead-free reflow solder process		IPC J STD-020D	
Moisture sensitivity level (MSL)	Level 2a	IPC J STD-033B	

### Physical Specifications

Dimensions, inches	SMD	1.30 × 0.53 × 0.30 (33.0 × 13.5 × 7.5 mm)
	SIP	2.00 × 0.50 × 0.28 (50.8 × 12.7 × 7.2 mm)
Weight	6.0g (0.22oz)	
MTBF <sup>(1)</sup>	3.355 × 10 <sup>6</sup> hrs, MIL-HDBK-217F	

#### Note:

- MIL-HDBK-217F @Ta=25 °C, Full load.
- External with C<sub>out</sub> = 1µF ceramic//10µF tantalum capacitors.
- External with C<sub>out</sub> = 2pcs of 150uF polymer capacitors.
- Output voltage programmable from 0.7525V to 5V by connecting a single resistor (shown as Rtrim in Table 1) between the TRIM and GND pins of the module. To calculate the value of the resistor **Rtrim** for a particular output voltage **V<sub>out</sub>**, use the following equation:

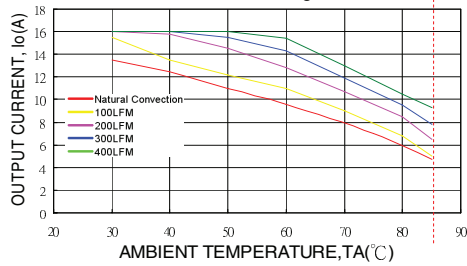
$$R_{trim} = \left[ \frac{21070}{V_{out} - 0.7525} - 5110 \right] \Omega$$

- It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external C<sub>in</sub> is 4pcs of 47µF ceramic capacitors at least.
- Device code with suffix “-P” – Positive logic (ON/OFF is open collector/drain logic input; Signal referenced to GND ) Device code with no suffix – Negative logic (ON/OFF pin is open collector/drain logic input with external pull-up resistor; signal referenced to GND)
- Case 1: On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which V<sub>in</sub>=V<sub>in</sub>(min) until V<sub>out</sub>=10% of V<sub>out</sub>(set))
- Case 2: Input power is applied for at least one second and then the ON/OFF input is set to logic low (delay form instant at which Von/off=0.3V until V<sub>out</sub>=10% of V<sub>out</sub>(set))

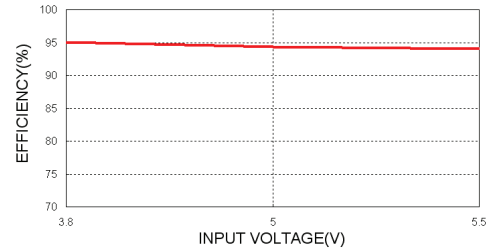
**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

**PLS(H)10 SERIES**

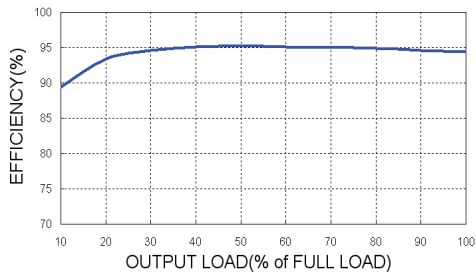
**Characteristic Curve** All specifications are  $V_0 = 3.3V$



PLS10-12T Derating Curve



PLS10-12T Efficiency vs. Output Load



PLS10-12T Efficiency vs. Input Voltage

**Trim**

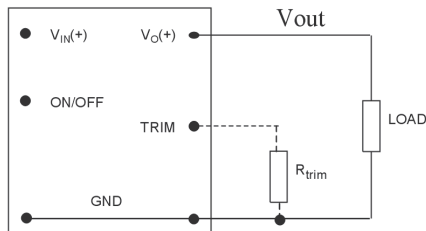


Figure 1

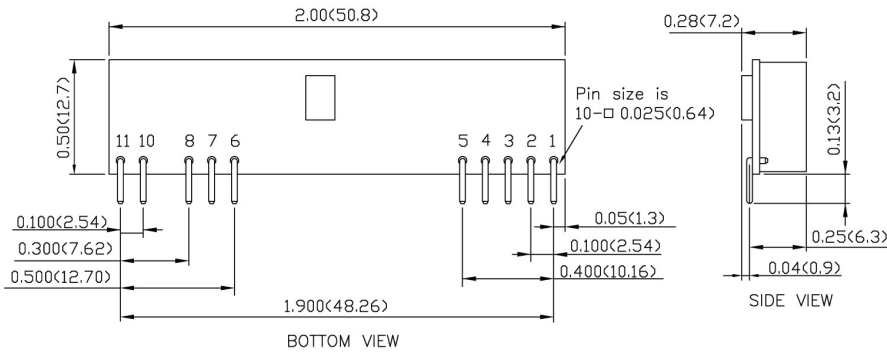
TABLE 1

$V_{out}(set)$ (V)	RTRIM (K $\Omega$ )
0.7525	Open
1.2	22.46
1.5	13.05
1.8	9.024
2.5	5.009
3.3	3.122
5	1.472

# PLS(H)10 SERIES

## Mechanical Drawing

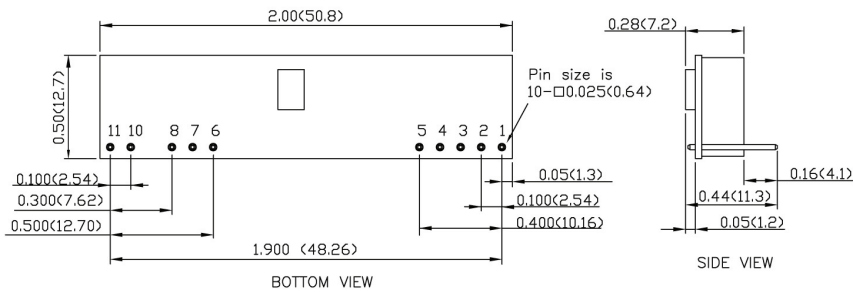
### PLH10-12T Type



#### PIN CONNECTION

PIN	DEFINE
1	+Output
2	+Output
3	+Sense
4	+Output
5	GND
6	GND
7	+Input
8	+Input
10	Trim
11	Ctrl

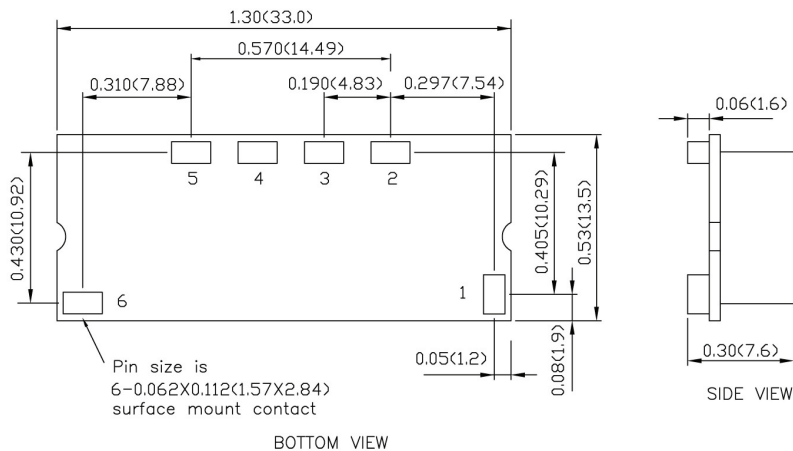
### PLH10-12T Type



#### PIN CONNECTION

PIN	DEFINE
1	+Output
2	+Output
3	+Sense
4	+Output
5	GND
6	GND
7	+Input
8	+Input
10	Trim
11	Ctrl

### PLS10-12T Type



#### PIN CONNECTION

PIN	DEFINE
1	Ctrl
2	+Sense
3	Trim
4	+Output
5	GND
6	+Input

- All dimensions in inch (mm)
- Tolerance:  $x.xx \pm 0.02$  ( $x.x \pm 0.5$ )  
 $x.xxx \pm 0.01$  ( $x.xx \pm 0.25$ )
- Pin pitch tolerance  $\pm 0.01$  (0.25)
- Pin dimension tolerance  $\pm 0.004$  (0.1)