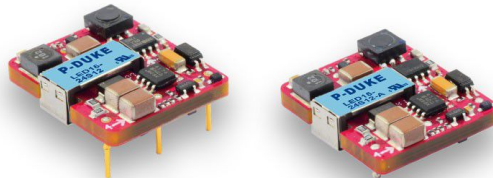




3
YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway



2250
VDC
Isolation
Voltage

2 : 1
Input
Range

NO
Min. Load
Required

REMOTE
ON
OFF

OCP

OVP

SCP

UVP

PART NUMBER STRUCTURE

LED15	-	48		S		12	-	A
Series Name		Input Voltage (VDC)		Output Quantity		Output Voltage (VDC)		Options

24: 18~36	S: Single	12: 12
48: 36~75		15: 15

- : Negative logic remote ON/OFF with DIP(Standard)
- A: Negative logic remote ON/OFF with SMD
- B: Positive logic remote ON/OFF with DIP
- C: Positive logic remote ON/OFF with SMD
- D: DIP type without Ctrl pin
- E: SMD type without Ctrl pin
- F: DIP type, negative logic remote ON/OFF without Trim pin
- G: SMD type, negative logic remote ON/OFF without Trim pin
- H: DIP type without Ctrl & Trim pin
- I: SMD type without Ctrl & Trim pin
- J: DIP type, positive logic remote ON/OFF without Trim pin
- K: SMD type, positive logic remote ON/OFF without Trim pin

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

Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load
	VDC	VDC	mA	mA	%	μF
LED15-24S12	18 ~ 36	12	1250	15	87	1000
LED15-24S15	18 ~ 36	15	1000	15	88	660
LED15-48S12	36 ~ 75	12	1250	10	87	1000
LED15-48S15	36 ~ 75	15	1000	10	88	660

INPUT SPECIFICATIONS							
Parameter	Conditions			Min.	Typ.	Max.	Unit
Operating input voltage range	24Vin(nom)			18	24	36	VDC
	48Vin(nom)			36	48	75	
Start up voltage	24Vin(nom)						VDC
	48Vin(nom)						
Shutdown voltage	24Vin(nom)			13	14.5	16	VDC
	48Vin(nom)			28.5	30.5	33	
Start up time	Constant resistive load	Power up					ms
		Remote ON/OFF					
Input surge voltage	100ms, max.	24Vin(nom)					VDC
		48Vin(nom)					
Remote ON/OFF	Referred to -Vin pin	Positive logic	DC-DC ON	Open or 3 ~ 15VDC			mA
		(Option)	DC-DC OFF	Short or 0 ~ 1.2VDC			
		Negative logic	DC-DC ON	Short or 0 ~ 1.2VDC			mA
		(Standard)	DC-DC OFF	Open or 3 ~ 15VDC			
		Input current of Ctrl pin		-0.5			1.0
		Remote off input current					20

OUTPUT SPECIFICATIONS							
Parameter	Conditions			Min.	Typ.	Max.	Unit
Voltage accuracy				-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load			-0.2		+0.2	%
Load regulation	No Load to Full Load			-0.2		+0.2	%
Voltage adjustability				-10		+10	%
Ripple and noise	Measured by 20MHz bandwidth With a 1μF M/C X7R and a 10μF T/C			100			mVp-p
Temperature coefficient				-0.02		+0.02	%/°C
Transient response recovery time	25% load step change, $\Delta I_o / \Delta t = 0.1A/us$			300			μs
Over voltage protection				12Vout		19.6	VDC
				15Vout		20.5	
Over load protection	% of Iout rated; Hiccup mode			150			%
Output voltage overshoot				3			%
Short circuit protection				Continuous, automatics recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	1 minute Input to Output	2250			VDC
Isolation resistance	500VDC	10			MΩ
Isolation capacitance			1000		pF
Switching frequency		423	470	517	kHz
Safety approvals	IEC/ EN/ UL62368-1				UL:E193009 CB:UL(Demko)
Weight					10.5g (0.36oz)
MTBF	MIL-HDBK-217F, Full load				3.438 x 10 ⁶ hrs

ENVIRONMENTAL SPECIFICATIONS

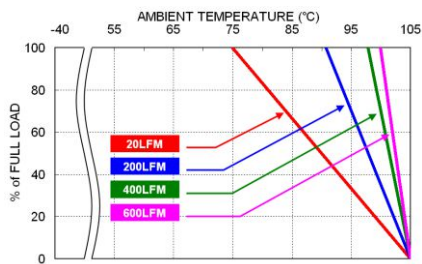
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating *The power module operates in a variety of thermal environments; however, sufficient cooling should be provided to help ensure reliable operation.	-40		+105	°C
Maximum case temperature				120	°C
Storage temperature range		-55		+125	°C
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH
Moisture sensitivity level(MSL)	Only for SMD type Verification according to IPC J-STD-020E				IPC J-STD-033C Level 2a
Lead-free reflow solder process	Only for SMD type				The time above 217°C 30~60sec. Peak temperature 245°C max. Time above 240°C 10sec. max.

EMC SPECIFICATIONS

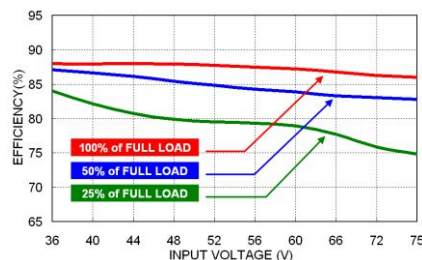
Parameter	Conditions	Level
EMI	EN55032 With external components	Class A, Class B
EMS	EN55035	
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 ± 2kV	Perf. Criteria B
Surge	EN61000-4-5 With an external input filter capacitor (Nippon chemi-con KY series, 220μF/100V) ± 1kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

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

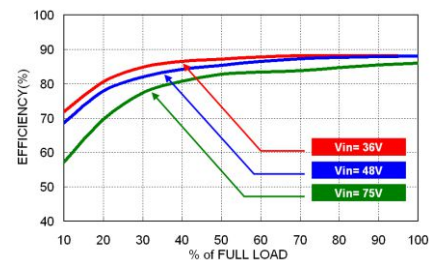
CHARACTERISTIC CURVE



LED15-48S15 Derating Curve



LED15-48S15 Efficiency vs. Input Voltage



LED15-48S15 Efficiency vs. Output Load

FUSE CONSIDERATION

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

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

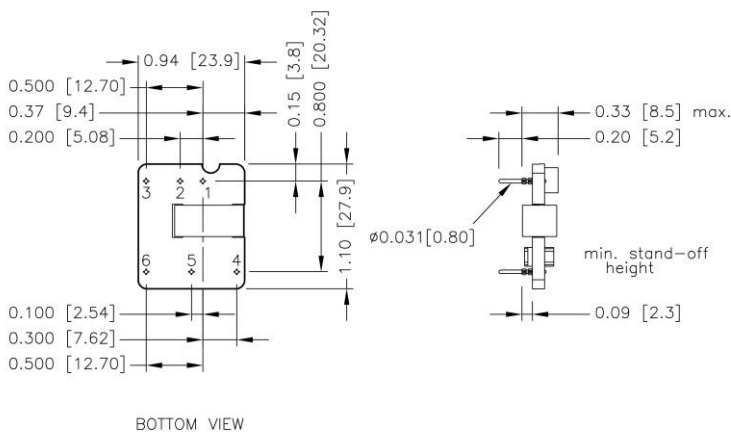
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse. The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
LED15-24□□□	1.6	Slow-Blow
LED15-48□□□	1.0	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

MECHANICAL DRAWING

DIP TYPE

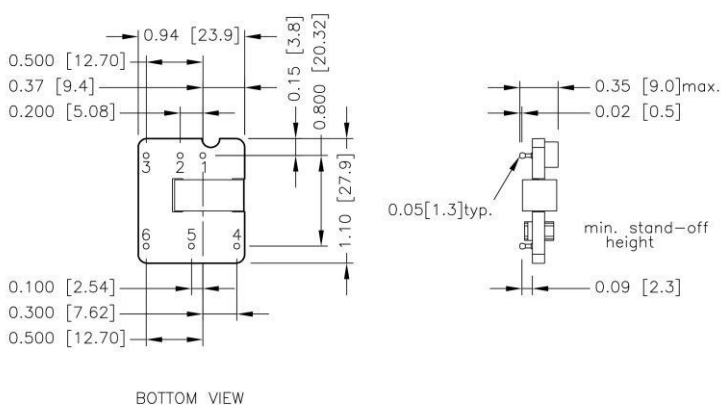


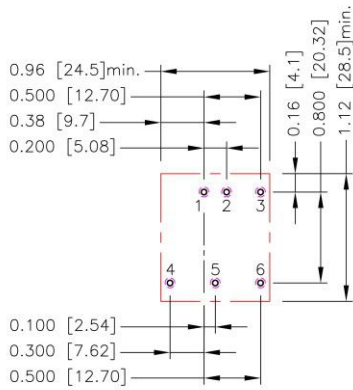
PIN CONNECTION

PIN	DEFINE
1	+Vin
2	-Vin
3	Ctrl
4	+Vout
5	Trim
6	-Vout

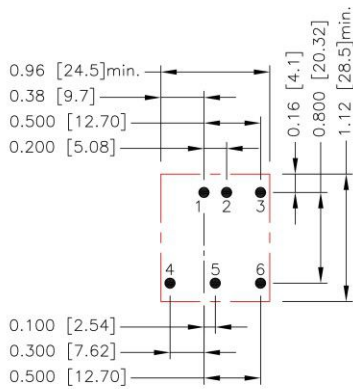
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

SMD TYPE



RECOMMENDED PAD LAYOUT
DIP TYPE


All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.4.5.6: $\Phi 0.043$ [1.10]
 Top view pad 1.2.3.4.5.6: $\Phi 0.054$ [1.38]
 Bottom view pad 1.2.3.4.5.6: $\Phi 0.087$ [2.20]

SMD TYPE


All dimensions in inch[mm]
 Pad size(lead free recommended)
 Top view pad: $\Phi 0.091$ [2.30]

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.

However, sufficient cooling should be provided to help ensure reliable operation of the unit.

Heat is removed by conduction, convection, and radiation to the surrounding environment.

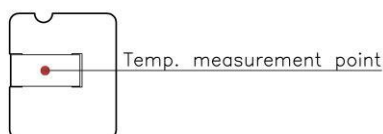
Proper cooling can be verified by measuring the point as the figure below.

The temperature at this location should not exceed "Maximum case temperature".

When operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

You can limit this temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).



TOP VIEW

OUTPUT VOLTAGE ADJUSTMENT

Output voltage set point adjustment allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either the +Output or -Output pins. With an external resistor between the Trim and -Output pin, the output voltage set point increases. With an external resistor between the Trim and +Output pin, the output voltage set point decreases. The external Trim resistor needs to be at least 1/16W of rated power.

Trim Up Equation

$$R_U = \left[\frac{G \times L}{(V_{o,up} - L - K)} - H \right] \Omega$$

Trim Down Equation

$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

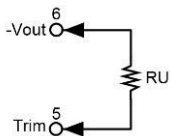
Trim constants

Module	G	H	K	L
LED15-□□S12	10000	5110	9.5	2.5
LED15-□□S15	10000	5110	12.5	2.5

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

Trim-up



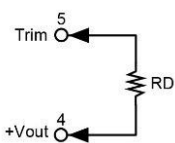
□□S12

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
R _U (kΩ)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

□□S15

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
R _U (kΩ)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557

Trim-down



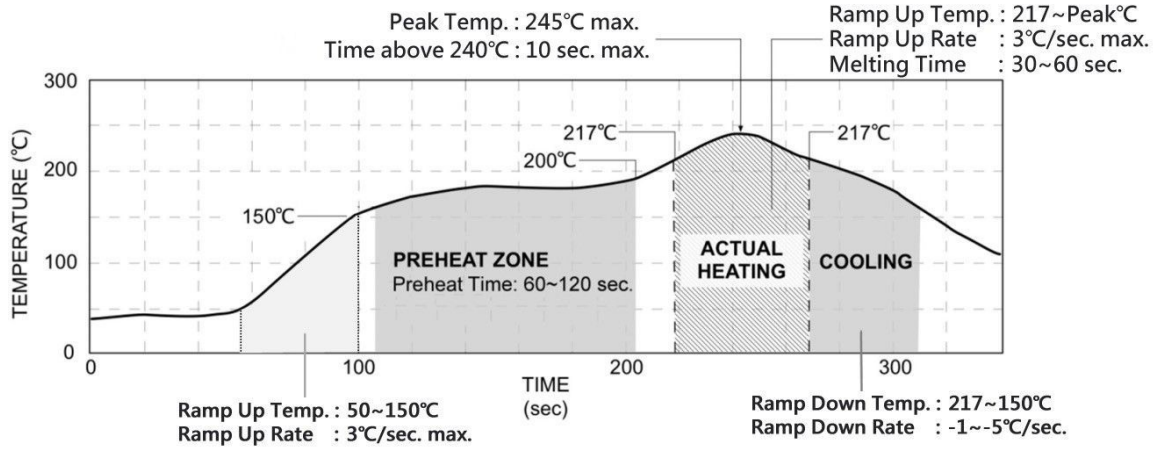
□□S12

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
R _D (kΩ)	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

□□S15

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
R _D (kΩ)	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

LEAD FREE REFLOW PROFILE For SMD Type



*The curves define the maximum peak reflow temperature permissible measured on pin1 or Vin pin.