

# JTL60 Series

DC-DC Converter



## 60 Watts

- Single and Dual Outputs
- Wide 4:1 Input Range
- 2" x 1" Footprint
- -40 °C to +85 °C Operation
- Full Load at 50 °C Ambient
- 1600 VDC Isolation
- Output Trim  $\pm 10\%$
- Remote On/Off
- 3 Year Warranty



**Dimensions:**

JTL60:  
2.0 x 1.0 x 0.45" (50.8 x 25.4 x 11.5 mm)

### Models & Ratings

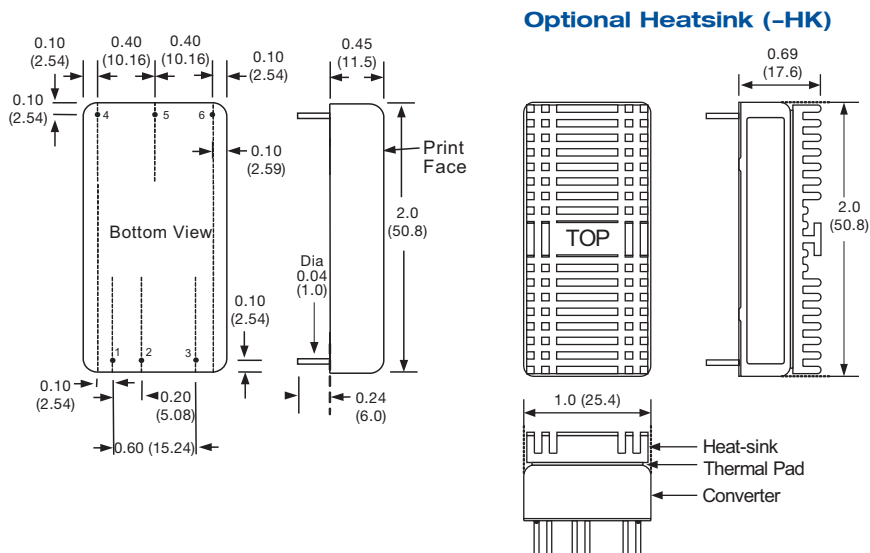
Input Voltage	Output Voltage	Output Current	Input Current <sup>(1)</sup>		OVP setting	Efficiency	Max. capacitive load <sup>(2)</sup>	Model Number <sup>(3)</sup>
			No Load	Full Load				
9-36 V	5.0 V	12.0 A	25 mA	2705 mA	6.2 V	92%	30,000 $\mu$ F	JTL6024S05
	12.0 V	5.0 A	25 mA	2705 mA	15.0 V	92%	5850 $\mu$ F	JTL6024S12
	15.0 V	4.0 A	25 mA	2690 mA	20.0 V	93%	3900 $\mu$ F	JTL6024S15
	$\pm 12.0$ V	$\pm 2.5$ A	40 mA	2750 mA	$\pm 15.0$ V	91%	$\pm 3900$ $\mu$ F	JTL6024D12
	$\pm 15.0$ V	$\pm 2.0$ A	50 mA	2730 mA	$\pm 20.0$ V	91%	$\pm 2400$ $\mu$ F	JTL6024D15
18-75 V	5 V	12.0 A	25 mA	1345 mA	6.2 V	93%	30,000 $\mu$ F	JTL6048S05
	12 V	5.0 A	25 mA	1350 mA	15.0 V	92%	5850 $\mu$ F	JTL6048S12
	15 V	4.0 A	25 mA	1345 mA	20.0 V	93%	3900 $\mu$ F	JTL6048S15
	$\pm 12$ V	$\pm 2.5$ A	40 mA	1375 mA	$\pm 15.0$ V	91%	$\pm 3900$ $\mu$ F	JTL6048D12
	$\pm 15$ V	$\pm 2.0$ A	50 mA	1375 mA	$\pm 20.0$ V	91%	$\pm 2400$ $\mu$ F	JTL6048D15

### Notes

1. Input currents measured at nominal input voltage.
2. Maximum capacitive load is per output.

3. Add suffix '-HK' for optional heatsink

### Mechanical Details



Pin Connections		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Remote On/Off	Remote On/Off
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

### Notes

1. All dimensions are in inches (mm)
2. Weight: 0.09 lbs (41.0 g) approx.
3. Pin diameter: 0.02 $\pm$ 0.002 (0.5 $\pm$ 0.05)
4. Pin pitch tolerance:  $\pm 0.014$  ( $\pm 0.35$ )
5. Case tolerance:  $\pm 0.02$  ( $\pm 0.5$ )

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**XP** XP Power

## Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	9		36	VDC	24 V nominal
	18		75	VDC	48 V nominal
Input Reflected Ripple Current		20		mA pk-pk	Through 11 $\mu$ H inductor and 22 $\mu$ F capacitor
Input Surge			50	VDC for 100 ms	24 V models
			100	VDC for 100 ms	48 V models

## Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5.0		30	VDC	See Models and Ratings table
Output Trim	$\pm 10$			%	See Application Note
Initial Set Accuracy			$\pm 1$	%	At full load
Minimum Load	0			%	No minimum load required
Line Regulation			$\pm 0.5$	%	From minimum to maximum input at full load
Load Regulation			0.5/1.0	%	From 0% to full load for single/dual output
Cross Regulation			$\pm 5$	%	On dual output models, when one output is at 100% load and other is varied from 25% load to full load
Start Up Time		60		ms	
Ripple & Noise			100	mV pk-pk	Measured using 20 MHz bandwidth and 1.0 $\mu$ F ceramic capacitor
Overload Protection	120		140	%	
Short Circuit Protection					Continuous hiccup mode, with auto recovery
Maximum Capacitive Load					See Models and Ratings table
Temperature Coefficient			0.02	%/ $^{\circ}$ C	
Overvoltage Protection					See Models and Ratings table
Remote On/Off	Output is on if remote on/off (pin 3) is open or high (3-12 VDC) Output turns off if remote on/off (pin 3) is low (<1.2 VDC max)				

## General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		93		%	See Models and Ratings table
Isolation: Input to Output	1600			VDC	
Isolation: Input and output to Case	1600			VDC	
Switching Frequency		225		kHz	
Isolation Resistance	$10^9$			$\Omega$	
Isolation Capacitance		2200		pF	
Power Density			66	W/in <sup>3</sup>	
Mean Time Between Failure	210			kHrs	MIL-HDBK-217F, +25 $^{\circ}$ C GB
Weight		0.1 (45.0)		lb (g)	

## Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+85	$^{\circ}$ C	See Derating Curve
Storage Temperature	-55		+125	$^{\circ}$ C	
Case Temperature			+115	$^{\circ}$ C	
Humidity			95	%RH	Non-condensing
Cooling					Natural convection

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## EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55032	Class A	See Application Note
Radiated	EN55032	Class A	

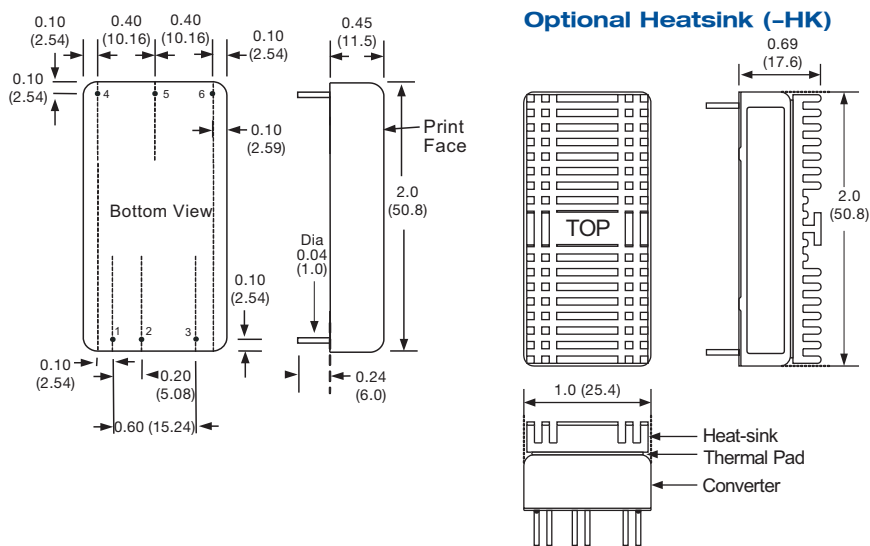
## EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD Immunity	EN61000-4-2	±6 kV/±8 kV	A	Contact Discharge/Air Discharge
Radiated Immunity	EN61000-4-3	20 Vrms	A	
EFT/Burst	EN61000-4-4	2 kV	A	External input filter required, see applications note
Surge	EN61000-4-5	2 kV	A	External input filter required, see applications note
Conducted Immunity	EN61000-4-6	10 V rms	A	
Magnetic Fields	EN61000-4-8	100 A/m	A	

## Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
UL	UL62368-1 & CAN/CSA C22.2 No. 62368-1-14	Information Technology

## Mechanical Details

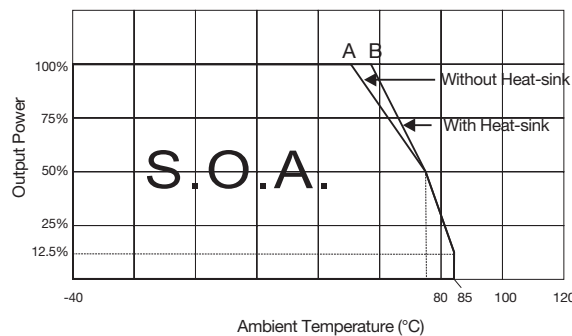


Pin Connections		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Remote On/Off	Remote On/Off
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

### Notes

- All dimensions are in inches (mm)
- Weight: 0.1 lbs (45.0 g) approx.
- Pin diameter: 0.04±0.002 (1.0±0.05)
- Pin pitch tolerance: ±0.014 (±0.35)
- Case tolerance: ±0.02 (±0.5)

## Derating Curve



A = 45 °C for JTL6024S05 and 50 °C for other models  
 B = 52 °C for JTL6024S05-HK and 57 °C for other models

# JTL60 Series

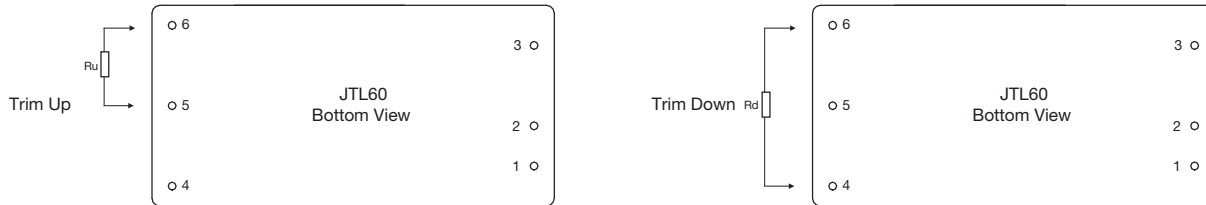
DC-DC Converter



## Application Notes

### External Output Trimming

Output can be externally trimmed by using the method as below, (single output models only)



### Trim Down Resistor Values (Rd)

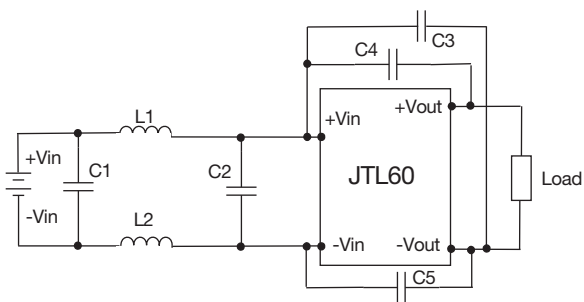
Models	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
	Voutx0.99	Voutx0.98	Voutx0.97	Voutx0.96	Voutx0.95	Voutx0.94	Voutx0.93	Voutx0.92	Voutx0.91	Voutx0.90
5V	151.459 kΩ	133.906 kΩ	83.261 kΩ	59.010 kΩ	44.786 kΩ	35.435 kΩ	28.819 kΩ	23.892 kΩ	20.079 kΩ	17.042 kΩ
12V	638.700 kΩ	309.724 kΩ	198.291 kΩ	142.236 kΩ	108.494 kΩ	85.954 kΩ	69.831 kΩ	57.727 kΩ	48.305 kΩ	40.763 kΩ
15V	842.916 kΩ	431.715 kΩ	283.823 kΩ	207.666 kΩ	161.238 kΩ	129.974 kΩ	107.488 kΩ	90.539 kΩ	77.305 kΩ	66.685 kΩ

### Trim Down Resistor Values (Ru)

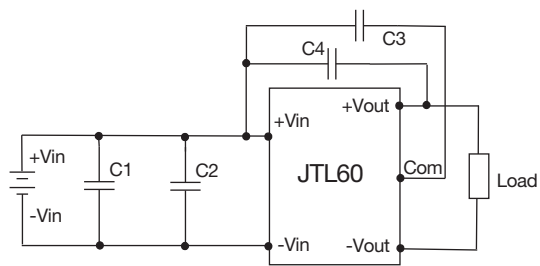
Models	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
	Voutx1.01	Voutx1.02	Voutx1.03	Voutx1.04	Voutx1.05	Voutx1.06	Voutx1.07	Voutx1.08	Voutx1.09	Voutx1.10
5V	256.848 kΩ	37.895 kΩ	23.952 kΩ	16.708 kΩ	12.271 kΩ	9.273 kΩ	7.113 kΩ	5.482 kΩ	4.107 kΩ	3.183 kΩ
12V	215.446 kΩ	97.176 kΩ	58.401 kΩ	39.133 kΩ	27.610 kΩ	19.944 kΩ	14.476 kΩ	10.379 kΩ	7.195 kΩ	4.649 kΩ
15V	233.526 kΩ	99.391 kΩ	58.514 kΩ	38.725 kΩ	27.052 kΩ	19.352 kΩ	13.891 kΩ	9.817 kΩ	6.661 kΩ	4.144 kΩ

### EMI Filter

#### Single Output Versions



#### Dual Output Versions



Single	C1	L1/L2	C2	C3	C4	C5
24V	1812, 4.7 μF, 50 V	12 μH	1812, 4.7 μF, 50 V	1206, 470 pF, 2 kV	1206, 1000 pF, 2 kV	1206, 1000 pF, 2 kV
48V	1812, 5 μF, 100 V	12 μH	1812, 5 μF, 50 V	1206, 470 pF, 2 kV	1206, 1000 pF, 2 kV	1206, 1000 pF, 2 kV

Dual	C1	C2	C3	C4
24V	1812, 4.7 μF, 50 V	1812, 7 μF, 50 V	1206, 2200 pF, 2 kV	1206, 1500 pF, 2 kV
48V	1812, 5 μF, 100 V	1812, 5 μF, 50 V	1206, 2200 pF, 2 kV	1206, 1500 pF, 2 kV

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