

60W Convection cooled

DC-DC converters

The JTL60 series is housed in a 50.8 x 25.4 x 11.5mm (2" x 1" x 0.45") metal case with a power density of 66W/in³. Featuring a 4:1 input voltage range of 9 to 36VDC or 18 to 75VDC with both single and dual outputs, singles have 5, 12 or 15VDC with duals having either ±12 or ±15VDC. Single output models are adjustable +/-10% with a trim resistor.

The JTL60 is tightly regulated and provides 1.6kVDC isolation between input and output. Operating temperature range is from -40°C to +85°C, with derating above +45°C. An optional heatsink (suffix -HK) extends the full power operating temperature when fitted. Remote on/off is standard.



Features

- ▶ Regulated single outputs 5 to 15VDC
- ▶ Regulated dual outputs ±12 & ±15VDC
- ▶ 4:1 input range
- ▶ 50.8 x 25.4mm (2" x 1") footprint, 11.5mm (0.45") profile
- ▶ Output trim ±10% (single O/P)
- ▶ 1.6kVDC isolation
- ▶ Remote On/Off
- ▶ -40°C to +85°C operating temperature
- ▶ Full power to +45°C
- ▶ 3 year warranty

Applications



Autonomous equipment



Industrial electronics & robotics



Technology

Dimensions

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

Models & ratings

| Model number ⁽³⁾ | Input voltage | Output voltage | Output current | Efficiency | OVP setting | Input current ⁽¹⁾ | | Maximum capacitive load ⁽²⁾ |
|-----------------------------|---------------|----------------|----------------|------------|-------------|------------------------------|-----------|--|
| | | | | | | No load | Full load | |
| JTL6024S05 | 9-36VDC | 5.0VDC | 12.0A | 92% | 6.2V | 25mA | 2705mA | 30,000µF |
| JTL6024S12 | | 12.0VDC | 5.0A | 92% | 15.0V | 25mA | 2705mA | 5850µF |
| JTL6024S15 | | 15.0VDC | 4.0A | 93% | 20.0V | 25mA | 2690mA | 3900µF |
| JTL6024D12 | | ±12.0VDC | ±2.5A | 91% | ±15.0V | 40mA | 2750mA | ±3900µF |
| JTL6024D15 | | ±15.0VDC | ±2.0A | 91% | ±20.0V | 50mA | 2730mA | ±2400µF |

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Notes:

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

3. Add suffix '-HK' for optional heatsink

Models & ratings

| Model number ⁽³⁾ | Input voltage | Output voltage | Output current | Efficiency | OVP setting | Input current ⁽¹⁾ | | Maximum capacitive load ⁽²⁾ |
|-----------------------------|---------------|----------------|----------------|------------|-------------|------------------------------|-----------|--|
| | | | | | | No load | Full load | |
| JTL6048S05 | 18-75VDC | 5.0VDC | 12.0A | 93% | 6.2V | 25mA | 1345mA | 30,000µF |
| JTL6048S12 | | 12.0VDC | 5.0A | 92% | 15.0V | 25mA | 1350mA | 5850µF |
| JTL6048S15 | | 15.0VDC | 4.0A | 93% | 20.0V | 25mA | 1345mA | 3900µF |
| JTL6048D12 | | ±12.0VDC | ±2.5A | 91% | ±15.0V | 40mA | 1375mA | ±3900µF |
| JTL6048D15 | | ±15.0VDC | ±2.0A | 91% | ±20.0V | 50mA | 1375mA | ±2400µF |

Notes:

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

3. Add suffix '-HK' for optional heatsink

Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|--------------------------------|---------|---------|---------|----------|--|
| Input voltage range | 9 | | 36 | VDC | 24VDC nominal |
| | 18 | | 75 | | 48VDC nominal |
| Input reflected ripple current | | 20 | | mA/pk-pk | Through 11µH inductor and 22µF capacitor |
| Input surge | | | 50 | VDC | 24VDC models (for 100ms) |
| | | | 100 | | 48VDC models (for 100ms) |

Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|--------------------------|---|---------|---------|----------|---|
| Output voltage | 5.0 | | 30 | VDC | See models and ratings table |
| Output voltage trim | ±10 | | | % | See application note |
| Initial set accuracy | | | ±1 | % | At full load |
| Minimum load | 0 | | | % | No minimum load required |
| Line regulation | | | ±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 | | | ±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 20MHz bandwidth and 1.0µF ceramic capacitor |
| Short circuit protection | Continuous hiccup mode, with auto recovery | | | | |
| Temperature coefficient | | | 0.02 | %/°C | |
| Overload protection | 120 | | 140 | % | |
| Remote on/off | Output is on if remote on/off (pin 3) is open or high (3-12VDC) Output turns off if remote on/off (pin 3) is low (<1.2VDC max) | | | | |
| Overvoltage protection | See models & ratings table | | | | |
| Maximum capacitive load | See models & ratings table | | | | |

General

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|----------------------------|-----------------|------------|------------|--|----------------------------|
| Efficiency | | 93 | | % | See models & ratings table |
| Isolation: input to output | 1600 | | | VDC | Functional |
| Isolation: input to case | 1600 | | | VDC | |
| Isolation: output to case | 1600 | | | VDC | |
| Isolation capacitance | | 2200 | | pF | |
| Isolation resistance | 10 ⁹ | | | | |
| Switching frequency | | 225 | | kHz | |
| Power density | | | 4.0 (66.0) | W/cm ² (W/in ²) | |
| Mean time between failure | 210 | | | khrs | MIL-HDBK-217F, +25°C GB |
| Weight | | 45.0 (0.1) | | g (lb) | |

Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|-----------------------|--------------------|---------|---------|-------|--------------------|
| Operating temperature | -40 | | +85 | °C | See derating curve |
| Storage temperature | -55 | | +125 | °C | |
| Case temperature | | | +115 | °C | |
| Cooling | Natural convection | | | | |
| Humidity | | | 95 | % | RH, non condensing |

Safety approvals

| Safety agency | Standard | Notes & conditions |
|---------------|--|------------------------|
| UL | UL62368-1 & CAN/CSA C22.2 No. 62368-1-14 | Information technology |
| CE | Meets all applicable directives | |
| UKCA | Meets all applicable legislation | |

Emissions - EMC

| Phenomenon | Standard | Test level | Notes & conditions |
|------------|----------|------------|----------------------|
| Conducted | EN55032 | Class A | See application note |
| Radiated | EN55032 | Class A | |

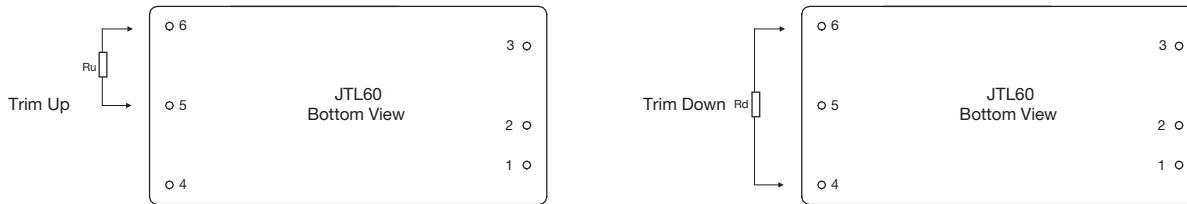
Immunity - EMC

| Phenomenon | Standard | Test level | Criteria | Notes & conditions |
|--------------------|-------------|------------|----------|---|
| ESD immunity | EN61000-4-2 | ±6kV/±8kV | A | Contact discharge/air discharge |
| Radiated immunity | EN61000-4-3 | 20Vrms | A | |
| EFT/burst | EN61000-4-4 | 2kV | A | External input filter required, see applications note |
| Surge | EN61000-4-5 | 2kV | A | External input filter required, see applications note |
| Conducted immunity | EN61000-4-6 | 10Vrms | A | |
| Magnetic fields | EN61000-4-8 | 100A/m | A | |

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)

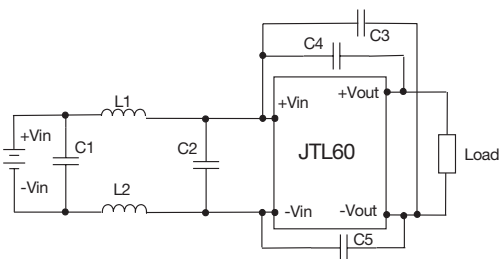
| Model | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Voutx0.99 | Voutx0.98 | Voutx0.97 | Voutx0.96 | Voutx0.95 | Voutx0.94 | Voutx0.93 | Voutx0.92 | Voutx0.91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

Trim up resistor values (Ru)

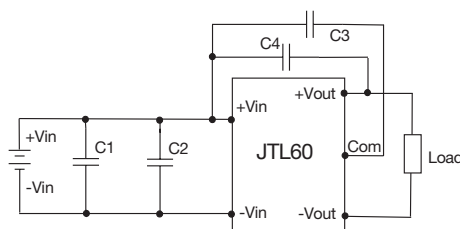
| Model | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Voutx1.01 | Voutx1.02 | Voutx1.03 | Voutx1.04 | Voutx1.05 | Voutx1.06 | Voutx1.07 | Voutx1.08 | Voutx1.09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

EMI filter

Single output versions



Dual output versions

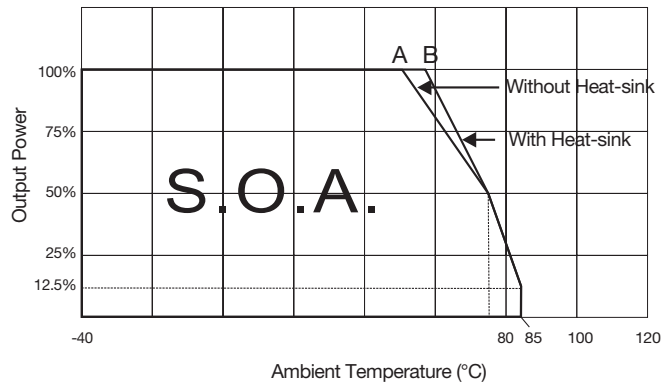


| Single | C1 | L1/L2 | C2 | C3 | C4 | C5 |
|--------|------------------|-------|------------------|------------------|-------------------|--------------------|
| 24V | 1812, 4.7μF, 50V | 12μH | 1812, 4.7μF, 50V | 1206, 470pF, 2kV | 1206, 1000pF, 2kV | 1206, 1000 pF, 2kV |
| 48V | 1812, 5μF, 100V | 12μH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

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

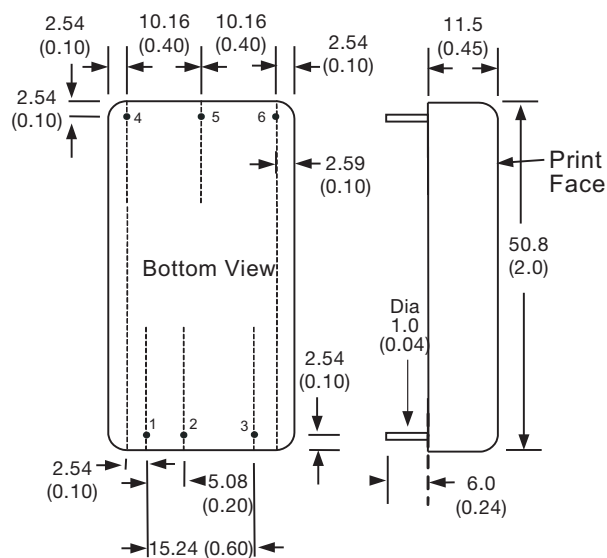
Application notes

Derating curve

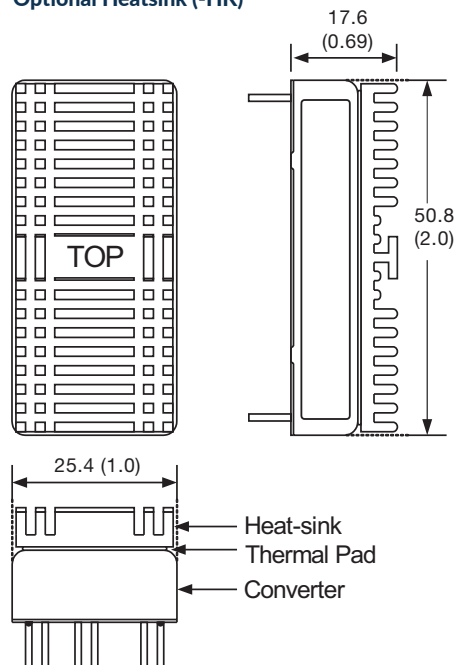


A = 45°C for JTL6024S05 and +50°C for other models
 B = 52°C for JTL6024S05-HK and +57°C for other models

Mechanical details



Optional Heatsink (-HK)



| 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 mm (inches).
- Pin diameter: 1.0 ± 0.05 (0.04 ± 0.002)
- Pin pitch tolerance: ± 0.35 (± 0.014)
- Case tolerance: ± 0.5 (± 0.02)
- Stand-off tolerance ± 0.1 (± 0.004)

Specifications subject to change without notice.