

ISOLATED DC/DC CONVERTERS

48V Input / 5V/2A or 12V/1A or 24V/0.5A Output

bel
POWER PRODUCTS

07LC-10T Series

- Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Output Over-voltage Protection
- Low Cost
- OCP/SCP



Description

The 07LC-10T Series converters are isolated DC/DC converters that operate from a nominal 48V source. These converters provide up to 12W of output power. These units are designed to be highly efficient and cost-effective. Features include remote on/off, short circuit protection, over-current protection, and output over-voltage protection. These converters are provided in a compact, industry standard package.

Part Selection

| Output Voltage | Input Voltage | Max. Output Current | Max. Output Power | Typical Efficiency | Model Number |
|----------------|---------------|---------------------|-------------------|--------------------|--------------|
| 5V | 36 – 72V | 2A | 10W | 82% | 07LC-10T050 |
| 12V | 36 – 72V | 1A | 12W | 83% | 07LC-10T120 |
| 24V | 36 – 72V | 0.5A | 12W | 85% | 07LC-10T240 |

Note: Add “G” suffix at the end of the model number to indicate Tray Packaging.

Absolute Maximum Ratings

| Parameter | Min | Typ | Max | Notes |
|-----------------------------|-------|-----|-------|----------------------|
| Input Voltage (continuous) | -0.3V | - | 72V | |
| Input Voltage (peak/surge) | - | - | 100V | 100ms non-repetitive |
| Remote On/Off (Active Low) | -0.3V | - | 18V | |
| Remote On/Off (Active High) | -0.3V | - | 7V | |
| Output Power | - | - | 12W | |
| Ambient Temperature | 0°C | - | 70°C | |
| Storage Temperature | -40°C | - | 125°C | |

Input Specifications

| Parameter | Min | Typ | Max | Notes |
|--|-----|-----------------------|-----------------------|--|
| Input Voltage | 36V | - | 72V | |
| Input Current (no load) | - | 25mA | 40mA | |
| Input Current (full load) | - | - | 0.45 A | |
| Remote Off Input Current (Active Low) | - | 5mA | 10mA | |
| Remote Off Input Current (Active High) | - | - | 10mA | |
| Input Reflected Ripple Current (pk-pk) | - | 15mA | 30mA | Tested with simulated source impedance of 10uH, 5Hz to 20MHz; use a 47uF/100V electrolytic capacitor with ESR = 1 ohm max. at 200KHz at 25°C |
| Input Reflected Ripple Current (RMS) | - | 5mA | 10mA | |
| I^2t Inrush Current Transient | - | 0.039A ² s | 0.062A ² s | |
| Turn-on Voltage Threshold | - | 30V | - | |

Note: All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

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Output Specifications

| Parameter | | Min | Typ | Max | Notes | |
|--|---------------------|---------------------|--------|--------|---|---|
| Output Voltage Set Point | V _O =5V | 4.850V | 5.00V | 5.150V | V _{in} =48V for all outputs | |
| | V _O =12V | 11.64V | 12.00V | 12.36V | | |
| | V _O =24V | 23.28V | 24.00V | 24.72V | | |
| Line Regulation | V _O =5V | - | 10mV | 15 mV | | |
| | V _O =12V | - | 20 mV | 36 mV | | |
| | V _O =24V | - | 35 mV | 48 mV | | |
| Load Regulation | V _O =5V | - | 15mV | 25 mV | | |
| | V _O =12V | - | 36 mV | 60 mV | | |
| | V _O =24V | - | 48 mV | 80 mV | | |
| Regulation Over Temperature (0°C to 70°C) | | - | 75mV | 150mV | | |
| Output Current | V _O =5V | 0.2A | - | 2A | | |
| | V _O =12V | 0.1A | - | 1A | | |
| | V _O =24V | 0.05A | - | 0.5A | | |
| Current Limit Threshold (V _O = 90% V _{O, nom}) | V _O =5V | - | 3A | - | | |
| | V _O =12V | - | 1.5A | - | | |
| | V _O =24V | - | 0.75A | - | | |
| Short Circuit Surge Transient | | - | TBD | - | A ² s | |
| Ripple and Noise (RMS) | V _O =5V | - | 18mV | 30mV | 0 - 20MHz Bandwidth with 1uF ceramic load capacitance | |
| | V _O =12V | - | 21mV | 40mV | | |
| | V _O =24V | - | 45mV | 70mV | | |
| Ripple and Noise (pk-pk) | V _O =5V | - | 60mV | 100mV | 0 - 20MHz Bandwidth with 1uF ceramic load capacitance | |
| | V _O =12V | - | 80mV | 120mV | | |
| | V _O =24V | - | 120mV | 180mV | | |
| Turn on Time | | - | 2mS | - | | |
| Overshoot at Turn on | | - | 0% | 3% | | |
| Output Capacitance | V _O =5V | 0uF | - | 800uF | | |
| | V _O =12V | 0uF | - | 100uF | | |
| | V _O =24V | 0uF | - | 20uF | | |
| Transient Response | | | | | | |
| 50% ~ 100% Max Load | Overshoot | V _O =5V | - | 100mV | 150mV | di/dt = 0.1A/uS; V _{in} = 48V; T _a = 25°C and 1uF ceramic capacitance |
| | Settling Time | | - | 100uS | 150uS | |
| 100% ~ 50% Max Load | Overshoot | V _O =5V | - | 100mV | 150mV | |
| | Settling Time | | - | 100uS | 150uS | |
| 50% ~ 100% Max Load | Overshoot | V _O =12V | - | 150mV | 250mV | |
| | Settling Time | | - | 150uS | 200uS | |
| 100% ~ 50% Max Load | Overshoot | V _O =12V | - | 150mV | 250mV | |
| | Settling Time | | - | 150uS | 200uS | |
| 50% ~ 100% Max Load | Overshoot | V _O =24V | - | 350mV | 500mV | |
| | Settling Time | | - | 200uS | 250uS | |
| 100% ~ 50% Max Load | Overshoot | V _O =24V | - | 350mV | 500mV | |
| | Settling Time | | - | 200uS | 250uS | |

Note: All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

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General Specifications

| Parameter | Min | Typ | Max | Notes |
|---------------------------------|-----------------------|--------|--------|---|
| Efficiency | | | | |
| Vo=5V | 78% | 82% | - | Vin=48V, Io= Io, max |
| Vo=12V | 79% | 83% | - | |
| Vo=24V | 81% | 85% | - | |
| Switching Frequency | 200KHz | 250KHz | 300KHz | |
| Output Trim Range | 95%Vo | - | 105%Vo | For all outputs |
| Protection Features | | | | |
| Overvoltage Protection Setpoint | | | | |
| Vo=5V | - | 6.8V | - | |
| Vo=12V | - | 15V | - | |
| Vo=24V | - | 30V | - | |
| MTBF | 2,000,000 hours | | | Calculated Per Bell Core TR-332 (Io = Nomal; Ta = 25°C) |
| Isolation | - | 1500 V | - | |
| Dimensions | | | | |
| Inches (L x W x H) | 1.91 x 0.98 x 0.477 | | | |
| Millimeters (L x W x H) | 48.51 x 24.89 x 12.12 | | | |
| Weight | - | 10.3g | - | |

Note: All specifications are typical at 25°C unless otherwise stated.

Control Specifications

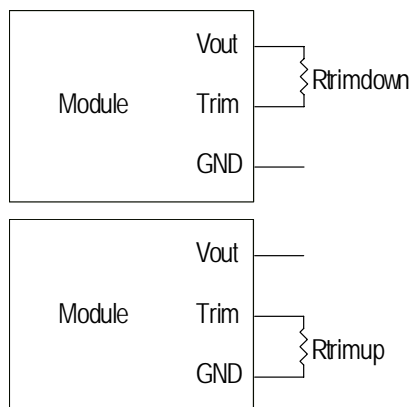
| Parameter | Min | Typ | Max | Notes |
|------------------------|-------------|-------|-----|--------------------------------------|
| Remote On/Off | | | | |
| Signal Low (Unit On) | Active Low | -0.3V | - | The remote on/off pin open, Unit On. |
| Signal High (Unit Off) | | 2.4V | - | |
| Signal Low (Unit Off) | Active High | -0.3V | - | |
| Signal High (Unit On) | | 2.4V | - | |

Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) and the nominal output voltage of the converter (Vnom) are shown below. The Trim Down resistor should be connected between the Trim pin and Vout. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

$$R_{TrimDown} = \frac{A}{V_{nom} - V_{adj}} - B$$

$$R_{TrimUp} = \frac{C}{V_{adj} - V_{nom}} - D$$



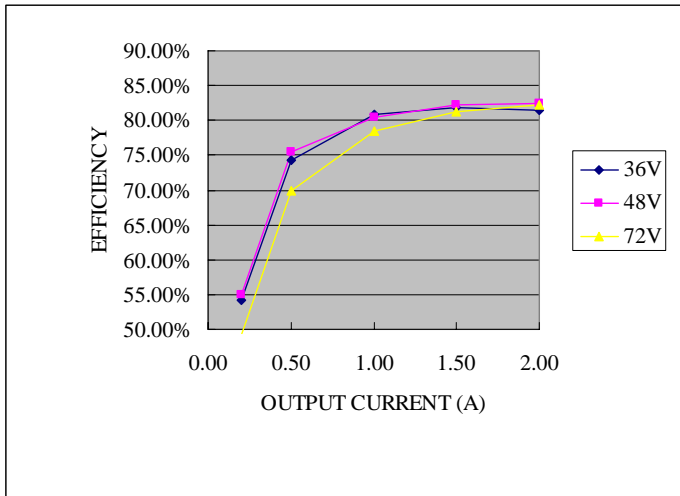
| Vnom | A | B | C | D |
|------|---------|--------|--------|--------|
| 24 | 489.490 | 28.310 | 26.660 | 6.810 |
| 12 | 113.550 | 16.990 | 13.020 | 6.490 |
| 5 | 56.410 | 51.200 | 18.228 | 36.500 |

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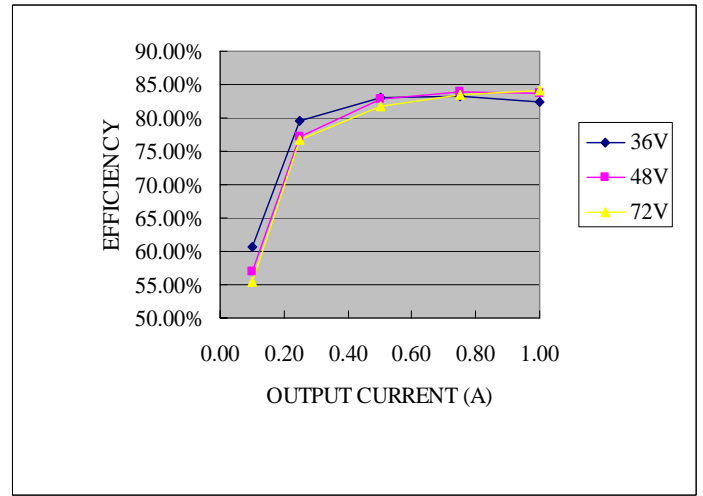
48V Input / 5V/2A or 12V/1A or 24V/0.5A Output



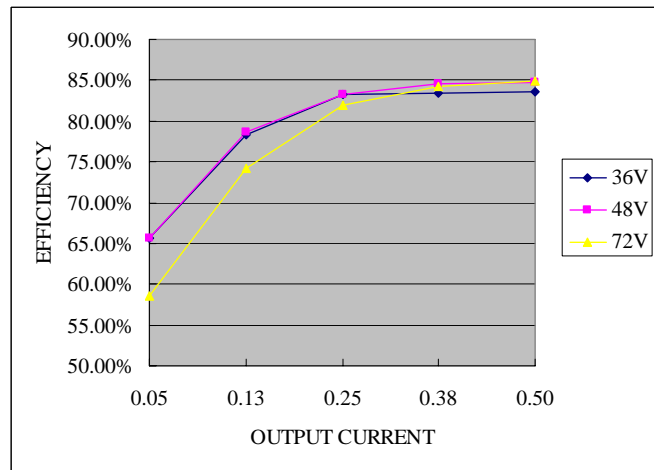
Efficiency Data



07LC-10T050



07LC-10T120



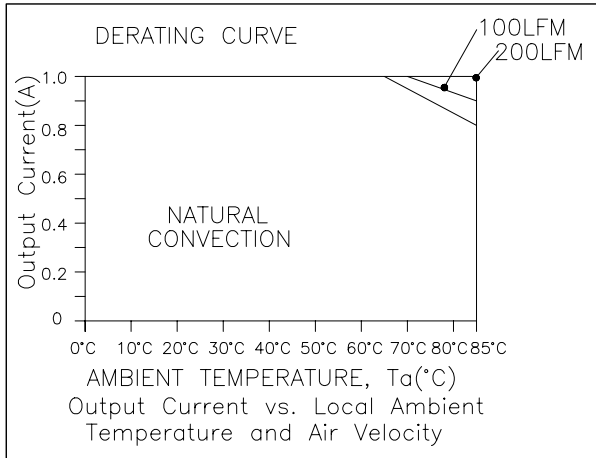
07LC-10T240

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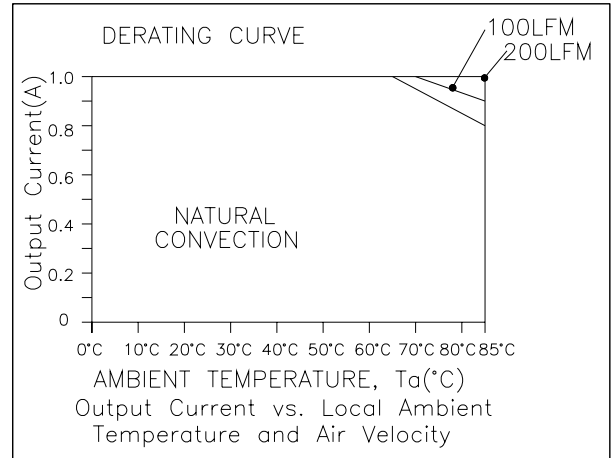
48V Input / 5V/2A or 12V/1A or 24V/0.5A Output



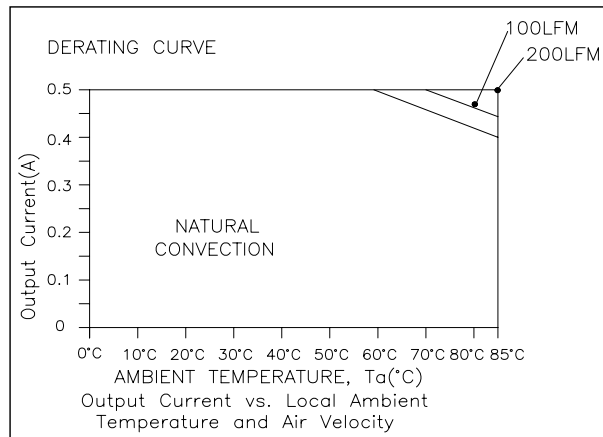
Thermal Derating Curves



$V_o=5\text{V}$, $I_o=2\text{A}$



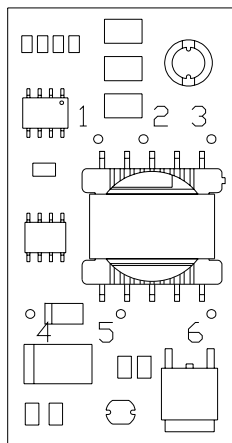
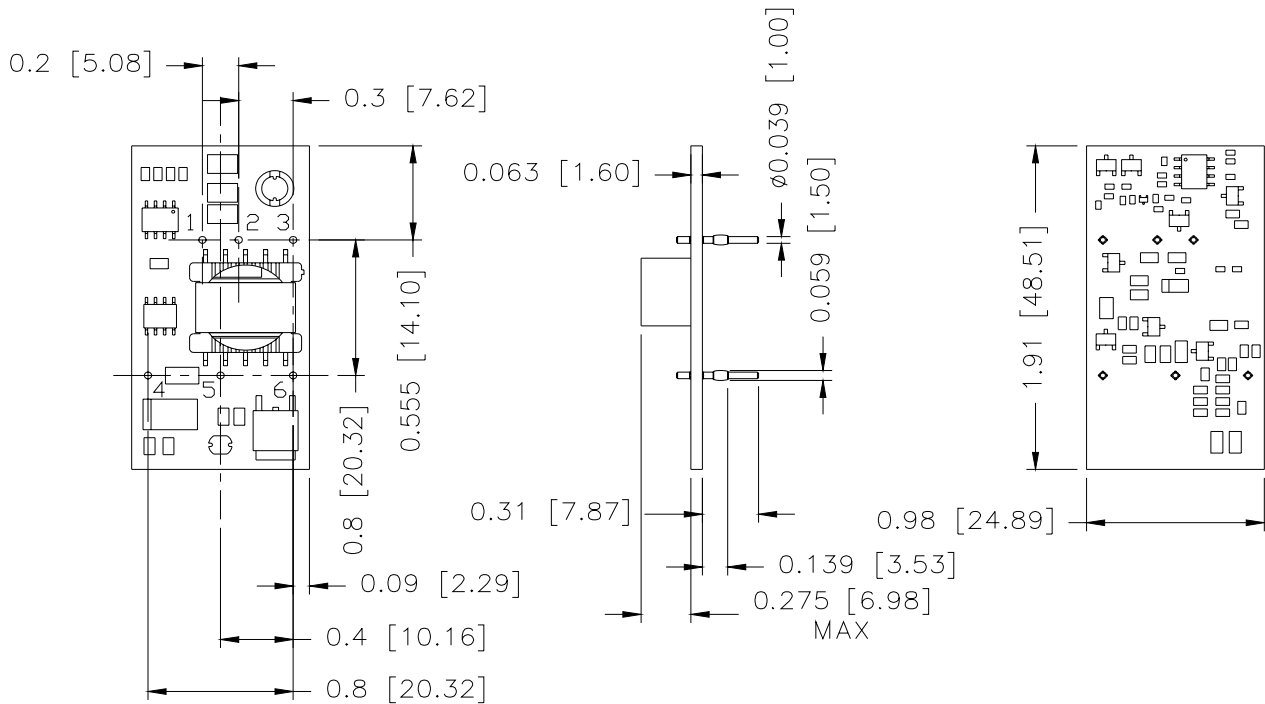
$V_o=12\text{V}$, $I_o=1\text{A}$



$V_o=24\text{V}$, $I_o=0.5\text{A}$

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Pin Connections

| Pin | Function |
|-----|-------------------|
| 1 | V _{in} + |
| 2 | V _{in} - |
| 3 | Remote On/Off |
| 4 | V _o + |
| 5 | Trim |
| 6 | V _o - |

Note: Remote On/Off pin open, unit on.

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