



EC4AW8 SERIES 3.96-6 WATT 8:1 INPUT RANGE ISOLATED DC-DC CONVERTER

Features

- Efficiency up to 87%
- Fixed Switching Frequency
- Positive Remote On/Off (Optional)
- Fully Protected (OVP/OCP/UVLO)
- 3000Vdc I/O Isolation
- Operating Temperature -40 to +105°C
- 1.25"x0.8"x0.4" Size Meet Industrial Standard
- Safety Meets IEC/EN/UL 62368-1
- Meets EN 55032 Class A without External Filter
- 5000m Operating Altitude



| MODEL NUMBER | INPUT VOLTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | | INPUT CURRENT 48V _{in} (TYP.) | | % EFF (TYP.) | | | CAPACITOR LOAD MAX. |
|--------------|---------------|----------------|----------------|---------|---|-----------|-------------------|-------------------|-------------------|---------------------|
| | | | MIN. | MAX. | NO LOAD | FULL LOAD | 12V _{in} | 24V _{in} | 48V _{in} | |
| EC4AW8-48S33 | 9-75 VDC | 3.3 VDC | 0 mA | 1200 mA | 5 mA | 109 mA | 77 | 78 | 76 | 1800uF |
| EC4AW8-48S05 | 9-75 VDC | 5 VDC | 0 mA | 1000 mA | 5 mA | 130 mA | 82 | 83 | 80 | 1200uF |
| EC4AW8-48S12 | 9-75 VDC | 12 VDC | 0 mA | 500mA | 5 mA | 147 mA | 85 | 87 | 85 | 1000uF |
| EC4AW8-48S15 | 9-75 VDC | 15 VDC | 0 mA | 400 mA | 7 mA | 146 mA | 86 | 87 | 86 | 470uF |
| EC4AW8-48D05 | 9-75 VDC | ±5 VDC | 0 mA | ±500 mA | 5 mA | 130 mA | 82 | 83 | 80 | 600uF |
| EC4AW8-48D12 | 9-75 VDC | ±12 VDC | 0 mA | ±250 mA | 5 mA | 147 mA | 85 | 86 | 85 | 250uF |
| EC4AW8-48D15 | 9-75 VDC | ±15 VDC | 0 mA | ±200 mA | 8 mA | 148 mA | 85 | 87 | 85 | 200uF |

NOTE:

1. Nominal input voltage 12V_{dc}, 24V_{dc} or 48V_{dc}.
2. Measured at nominal input voltage.

PART NUMBER

| Series | Nominal Input Voltage | Number of Outputs | Nominal Output Voltage | Remote On/Off Logic |
|---------|-----------------------|------------------------|---|------------------------------|
| EC4AW8- | II | O | XX | L |
| EC4AW8 | 48 : 48 VDC | S : Single D : Dual | 33 : 3.3VDC 05 : 5.0VDC 12 : 12VDC 15 : 15VDC 05 : ±5.0 VDC 12 : ±12 VDC 15 : ±15 VDC | Blank : None P : Positive |

Part Number Example:

EC4AW8-48S12: 6W, 8:1 9-75Vdc Input, Single 12Vdc Output

EC4AW8-48S12P: 6W, 8:1 9-75Vdc Input, Single 12Vdc Output, Positive Logic

TECHNICAL SPECIFICATIONS

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

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|----------------------------|----------------------------------|----------------------|------|------|------|-----------------|
| Input Voltage | Continuous | All | -0.3 | | 75 | V _{dc} |
| Input Surge Voltage | 100ms max. | All | | | 100 | V _{dc} |
| Operating Temperature | With de-rating, above 80°C | 3.3Vo 5Vo ±5Vo | -40 | | 105 | °C |
| | With de-rating, above 85°C | Others | -40 | | 105 | |
| Operating Case Temperature | At the center part of case plate | All | -40 | | 115 | °C |
| Storage Temperature | | All | -55 | | 125 | °C |

INPUT CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-----------------------------------|---|------------------------|------|------|------|------------------|
| Operating Input Voltage | | All | 9 | 48 | 75 | V _{dc} |
| Input Under Voltage Lockout | | | | | | |
| Turn-On Voltage Threshold | 100% Load | All | 7.6 | 8.1 | 8.8 | V _{dc} |
| Turn-Off Voltage Threshold | 100% Load | All | 7.0 | 7.5 | 8.0 | V _{dc} |
| Lockout Hysteresis Voltage | 100% Load | All | | 0.6 | | V _{dc} |
| Maximum Input Current | V _{in} =9V _{dc} , Full load | All | | 810 | | mA |
| No-Load Input Current | V _{in} =48V _{dc} , I _o =0A | See Model Number Table | | | | mA |
| Input Filter | Pi Type | All | | | | |
| Inrush Current (I ² t) | As per ETS300 132-2 | All | | | 0.1 | A ² s |
| Input Reflected Ripple Current | V _{in} =Nominal, L=12uH, Load=Full load | All | | 30 | | mA |

OUTPUT CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|---|--|------------------------|---------------------------|-------|-------|-------|
| Voltage Set Point Accuracy | V _{in} =48V _{dc} , Full load, T _c =25°C | 3.3Vo | -2.0 | | +2.0 | % |
| | | Others | -1.5 | | +1.5 | |
| Output Voltage Balance | V _{in} =48V _{dc} , Full load, T _c =25°C | ±5Vo | -2.0 | | +2.0 | % |
| | | Others | -1.0 | | +1.0 | |
| Output Voltage Regulation | | | | | | |
| Load Regulation | Full load to no load | Single | | | ±0.5 | % |
| | | Dual | | | ±1.0 | |
| Line Regulation | V _{in} =High line to low line, full load | All | | | ±0.5 | % |
| Cross Regulation | Asymmetrical load 25%/100% | Dual | | | ±5 | % |
| Temperature Coefficient | T _c =-40°C to 85°C | All | | | ±0.05 | %/°C |
| Over Voltage Protection | Built-in a zener diode component to clamp output voltage | 3.3Vo | 3.795 | 4.15 | 4.62 | V |
| | | 5Vo | 5.75 | 6.6 | 7 | |
| | | 12Vo | 13.8 | 15.6 | 16.8 | |
| | | 15Vo | 17.25 | 19.15 | 21 | |
| | | ±5Vo | ±5.75 | ±6.6 | ±7 | |
| | | ±12Vo | ±13.8 | ±15.6 | ±16.8 | |
| ±15Vo | ±17.25 | ±19.15 | ±21 | | | |
| Output Voltage Ripple and Noise (20MHz bandwidth) | | | | | | |
| Peak-to-Peak | Full load, 1uF ceramic capacitors | All | | | 100 | mV |
| Output Current Range | V _{in} = 9 to 75V _{dc} | See Model Number Table | | | | A |
| Over Current Protection | Hiccup mode. Auto recovery | All | 110 | | 230 | % |
| Short Circuit Protection | | All | Continuous, Auto Recovery | | | |
| External Load Capacitance | Full load (resistive) | See Model Number Table | | | | uF |

EFFICIENCY

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-----------|---------------------------------------|--------|------------------------|------|------|-------|
| 100% Load | $V_{in}=12V_{dc}, 24V_{dc}, 48V_{dc}$ | All | See Model Number Table | | | % |

DYNAMIC CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|-------------------------------------|---|--------|------|------|------|-------|
| Output Voltage Current Transient | | | | | | |
| Error Band | 75% to 100% of $I_{o,max}$. step load change $dI/dt=0.1A/us$ (within 1% V_{out} nominal) | All | | | ±5 | % |
| Recovery Time | | All | | | 250 | us |
| Turn-On Delay and Rise Time | | | | | | |
| Full load (Constant resistive load) | | | | | | |
| Turn-On Delay Time, From Input | $V_{in,min.}$ to 10% $V_{o,set}$, Power up | All | | 10 | | ms |
| Output Voltage Rise Time | 10% $V_{o,set}$ to 90% $V_{o,set}$ | All | | 8 | | ms |

ISOLATION CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|--|---------------------------|--------|------|------|------|----------|
| Isolation Voltage (100% factory Hi-Pot tested @2sec.) | 1 Minute; input to output | All | | | 3000 | V_{dc} |
| Isolation Resistance | Input to output | All | 1000 | | | MΩ |
| Isolation Capacitance | Input to output | All | | 1000 | | pF |

FEATURE CHARACTERISTICS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|--|--|--------|---------------------------|------|------|----------|
| Switching Frequency | Pulse width modulation (PWM), Fixed | All | | 300 | | KHz |
| On/Off Control, Positive Remote On/Off Logic, Refer to $-V_{in}$ Pin | | | | | | |
| Logic High (Module Off) | $V_{on/off}$ at $I_{on/off}=1.0mA$ | All | 0 | | 1.2 | V_{dc} |
| Logic Low (Module On) | $V_{on/off}$ at $I_{on/off}=0.0uA$, Pin open=on | All | 3.5 or Open Circuit | | 75 | V_{dc} |
| Off Converter Input Current | Shutdown input idle current | All | | | 1 | mA |

GENERAL SPECIFICATIONS

| PARAMETER | NOTES and CONDITIONS | Device | Min. | Typ. | Max. | Units |
|---------------------|--|--------|------|------|------|------------|
| MTBF | $I_o=100\%$ of $I_{o,max}$; MIL-HDBK - 217F_Notice 1, GB, 25°C | 3.3Vo | | 3520 | | K hours |
| | | 5Vo | | 3266 | | |
| | | 12Vo | | 2780 | | |
| | | 15Vo | | 3089 | | |
| | | ±5Vo | | 3156 | | |
| | | ±12Vo | | 2526 | | |
| | | ±15Vo | | 2802 | | |
| Weight | | All | | 12.3 | | grams |
| Case Material | Plastic, DAP, UL 94V-0 | | | | | |
| Base plate Material | Non-conductive base | | | | | |
| Potting Material | UL 94V-0 | | | | | |
| Pin Material | Base: Copper with Steel Plating: Barrel Tin | | | | | |
| Shock/Vibration | MIL-STD-810F Compliant | | | | | |
| Humidity | 95% RH max. Non condensing | | | | | |
| Altitude | 5000m Operating altitude, 12000m Transport altitude | | | | | |
| Thermal Shock | MIL-STD-810F | | | | | |

EMC SPECIFICATIONS (External components required, please refer to application note.)

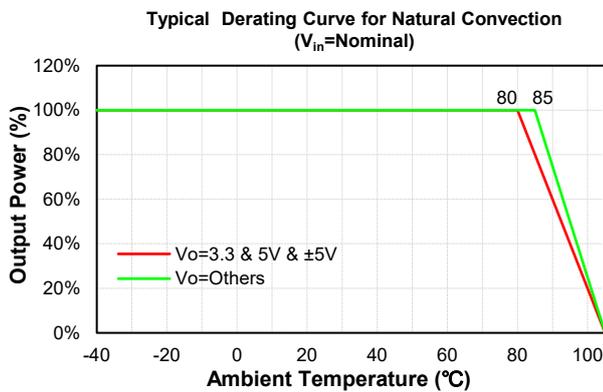
| | | | | | | |
|----------------|---|--|--|--|--|------------------|
| EMI Conduction | Meets EN 55032 Class A (without external filter), Meets EN 55032 Class B (with external filter) | | | | | |
| EMI Radiation | Meets EN 55032 Class A & Class B (without external filter) | | | | | |
| ESD | Meets EN 61000-4-2 Level 2: Air ±8kV, Contact ±4kV | | | | | Perf. Criteria A |

GENERAL SPECIFICATIONS

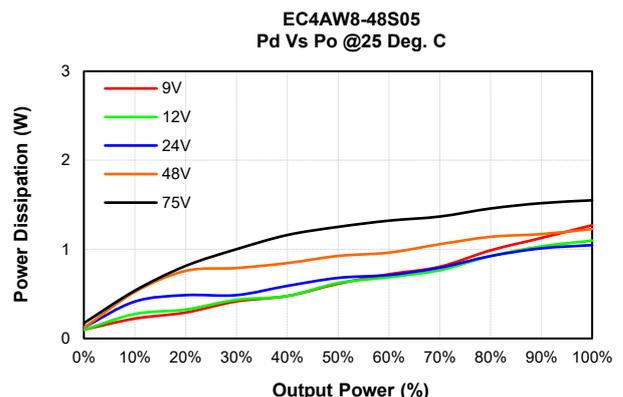
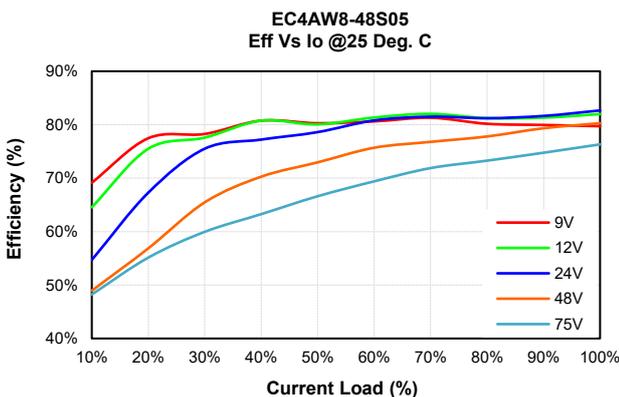
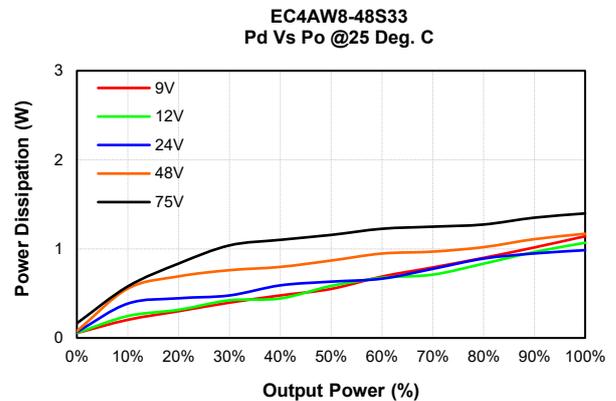
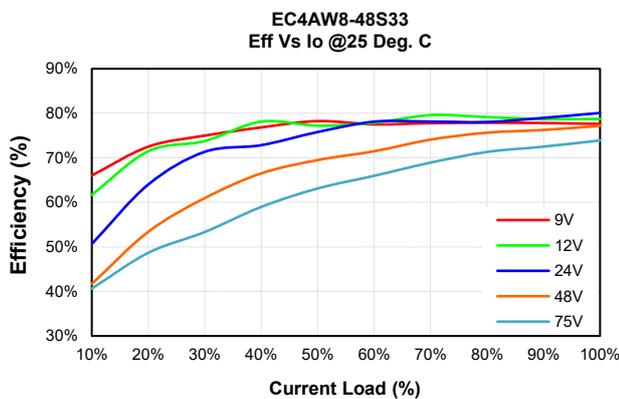
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|----------------------------|---|------------------|
| Radiated Immunity | Meets EN 61000-4-3 Level 2: 80~1000MHz, 3V/m | Perf. Criteria A |
| Fast Transient | Meets EN 61000-4-4 Level 2: On power input port, $\pm 0.5\text{kV}$, external input TVS required | Perf. Criteria A |
| Surge | Meets EN 61000-4-5 Level 2: Line to line, $\pm 0.5\text{kV}$, external input TVS required | Perf. Criteria A |
| Conducted Immunity | Meets EN 61000-4-6 Level 2: 0.15~80MHz, 3V | Perf. Criteria A |
| Application Note Link | EC4AW8 Series App Notes | |
| Packaging Information Link | Packaging Information | |

CHARACTERISTIC CURVE

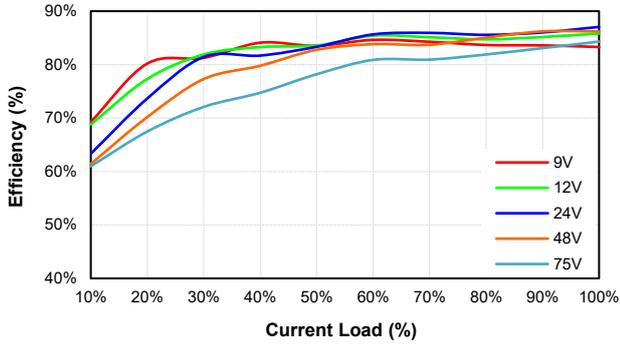
Power Derating Curve



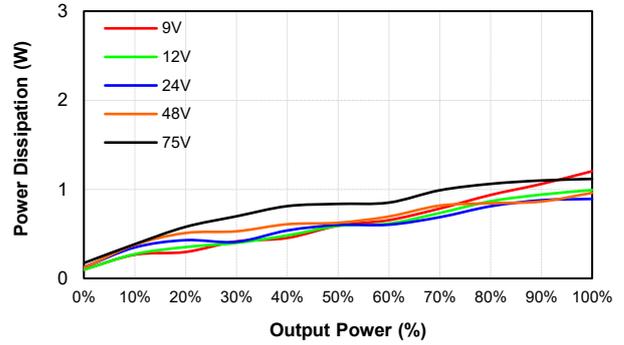
Performance Data



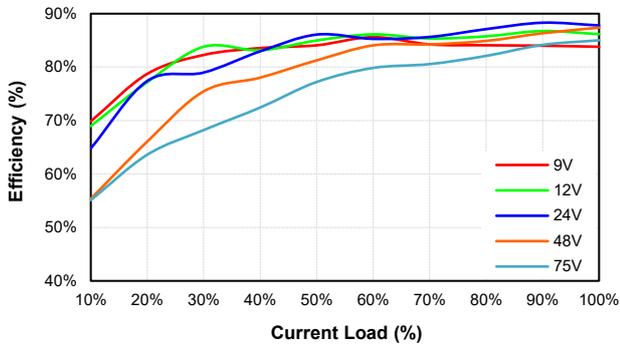
EC4AW8-48S12
Eff Vs Io @25 Deg. C



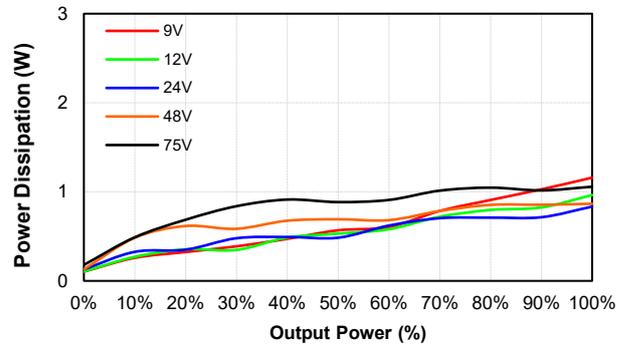
EC4AW8-48S12
Pd Vs Po @25 Deg. C



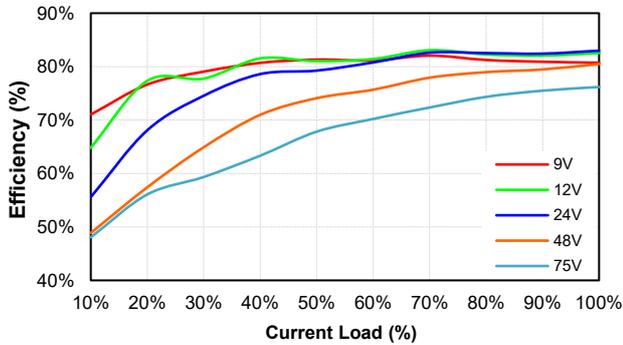
EC4AW8-48S15
Eff Vs Io @25 Deg. C



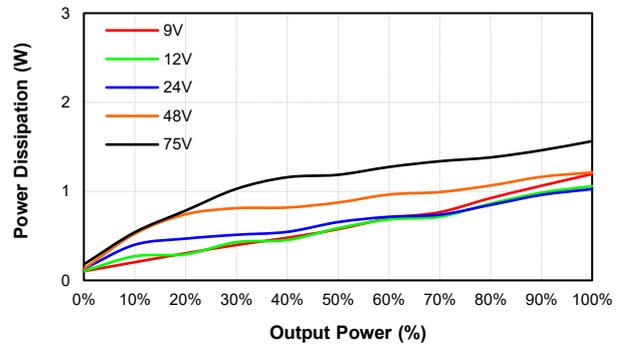
EC4AW8-48S15
Pd Vs Po @25 Deg. C



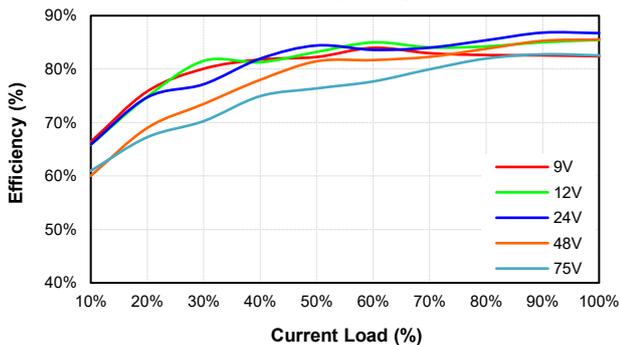
EC4AW8-48D05
Eff Vs Io @25 Deg. C



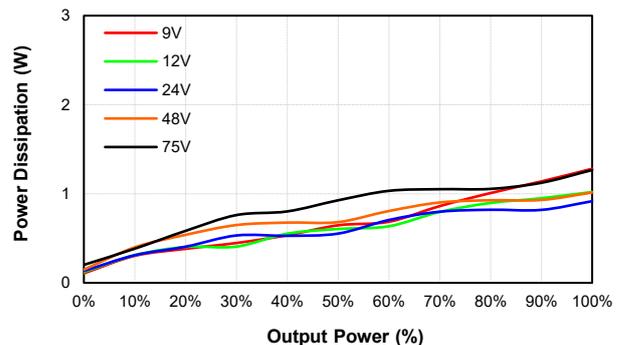
EC4AW8-48D05
Pd Vs Po @25 Deg. C



EC4AW8-48D12
Eff Vs Io @25 Deg. C

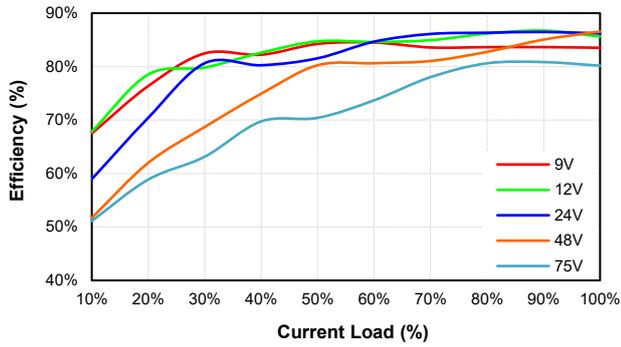


EC4AW8-48D12
Pd Vs Po @25 Deg. C

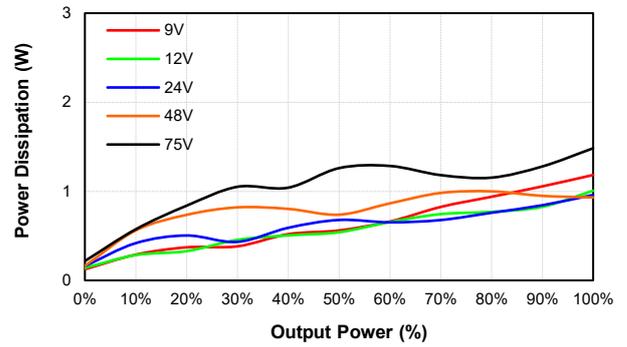


EC4AW8 Series

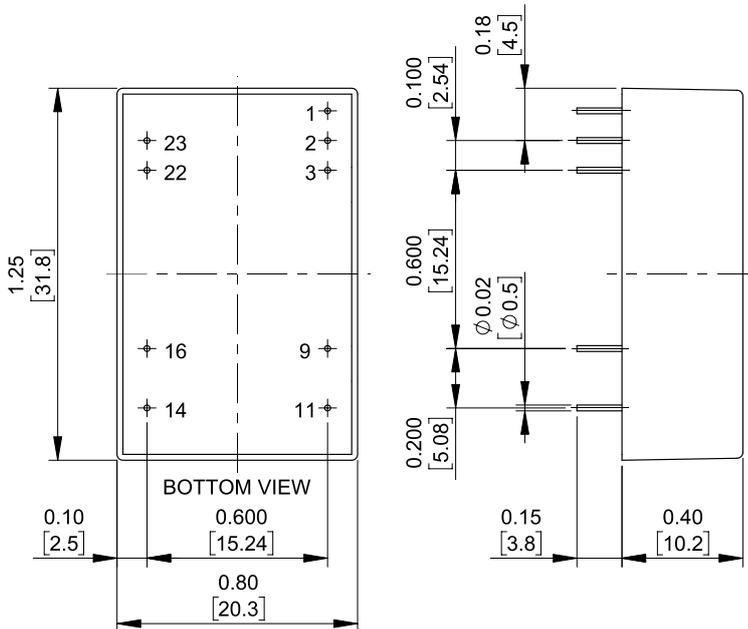
EC4AW8-48D15
Eff Vs Io @25 Deg. C



EC4AW8-48D15
Pd Vs Po @25 Deg. C



MECHANICAL SPECIFICATION



All Dimensions in Inches[mm]
Tolerance Inches: x.xx=±0.02, x.xxx=±0.010
Millimeters: x.x=±0.5, x.xx=±0.25

Pin Connection

| Pin | Single | Dual |
|-------|-------------------------------|-----------|
| 1 | NP Remote On/Off(Optional) | |
| 2,3 | -V Input | -V Input |
| 9 | NC | Common |
| 11 | NC | -V Output |
| 14 | +V Output | +V Output |
| 16 | -V Output | Common |
| 22,23 | +V Input | +V Input |

Note: Pin Size is $\phi 0.02 \pm 0.002$ Inch [$\phi 0.5 \pm 0.05$ mm]
NP-No Pin
NC-No Connection with Pin