



# EC4A SERIES

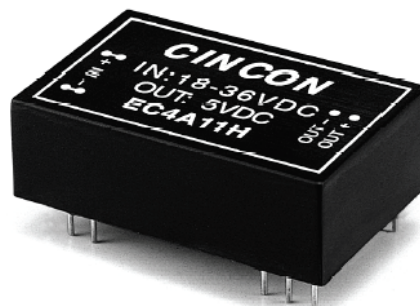
## 5-6 WATT 2:1 INPUT RANGE

### DC-DC CONVERTERS



## FEATURES

- \* 5-6W Isolated Output
- \* 24-Pin DIP Package
- \* Efficiency to 87%
- \* 2:1 Input Range
- \* Regulated Outputs
- \* Pi Input Filter
- \* Continuous Short Circuit Protection
- \* Meet EMI EN55022 class A ("-E" model)
- \* No Tantalum Capacitor inside ("-E" model)
- \* Wide Operating Temperature Range ("-E" model)
- \* UL60950-1 Approval for H/HM Versions only and "-E" Model



| MODEL<br>NUMBER <sup>(1)</sup> | INPUT<br>VOLTAGE <sup>(2)</sup> | OUTPUT<br>VOLTAGE | OUTPUT<br>CURRENT |         | INPUT CURRENT |        |           |        | % EFF. <sup>(3)</sup> |      | CAPACITOR<br>LOAD MAX. |
|--------------------------------|---------------------------------|-------------------|-------------------|---------|---------------|--------|-----------|--------|-----------------------|------|------------------------|
|                                |                                 |                   |                   |         | NO LOAD       |        | FULL LOAD |        |                       |      |                        |
|                                |                                 |                   |                   | “-E”    |               | “-E”   |           | “-E”   |                       | “-E” |                        |
| EC4A01                         | 9-18 VDC                        | 5 VDC             | 1000 mA           | 1000 mA | 7.5 mA        | 7.5 mA | 541 mA    | 514 mA | 77                    | 81   | 4700uF                 |
| EC4A02                         | 9-18 VDC                        | 12 VDC            | 470 mA            | 500 mA  | 7.5 mA        | 10 mA  | 573 mA    | 595 mA | 82                    | 84   | 4700uF                 |
| EC4A03                         | 9-18 VDC                        | 15 VDC            | 400 mA            | 400 mA  | 7.5 mA        | 15 mA  | 625 mA    | 588 mA | 80                    | 85   | 4700uF                 |
| EC4A04                         | 9-18 VDC                        | ±12 VDC           | ±230 mA           | ±250 mA | 12 mA         | 12 mA  | 554 mA    | 588 mA | 83                    | 85   | 2200uF                 |
| EC4A05                         | 9-18 VDC                        | ±15 VDC           | ±190 mA           | ±200 mA | 12 mA         | 18 mA  | 556 mA    | 588 mA | 81                    | 85   | 2200uF                 |
| EC4A06                         | 9-18 VDC                        | ±5 VDC            | ±500 mA           | ±500 mA | 12 mA         | 12 mA  | 541 mA    | 514 mA | 77                    | 81   | 2200uF                 |
| EC4A07                         | 9-18 VDC                        | 3.3 VDC           | 1000 mA           | 1200 mA | 7.5 mA        | 7.5 mA | 382 mA    | 429 mA | 72                    | 77   | 4700uF                 |
| EC4A11                         | 18-36 VDC                       | 5 VDC             | 1000 mA           | 1000 mA | 5 mA          | 5 mA   | 260 mA    | 251 mA | 80                    | 83   | 4700uF                 |
| EC4A12                         | 18-36 VDC                       | 12 VDC            | 470 mA            | 500 mA  | 5 mA          | 8 mA   | 280 mA    | 291 mA | 84                    | 86   | 4700uF                 |
| EC4A13                         | 18-36 VDC                       | 15 VDC            | 400 mA            | 400 mA  | 5 mA          | 8 mA   | 298 mA    | 287 mA | 84                    | 87   | 4700uF                 |
| EC4A14                         | 18-36 VDC                       | ±12 VDC           | ±230 mA           | ±250 mA | 7.5 mA        | 8 mA   | 280 mA    | 291 mA | 82                    | 86   | 2200uF                 |
| EC4A15                         | 18-36 VDC                       | ±15 VDC           | ±190 mA           | ±200 mA | 7.5 mA        | 10 mA  | 293 mA    | 287 mA | 81                    | 87   | 2200uF                 |
| EC4A16                         | 18-36 VDC                       | ±5 VDC            | ±500 mA           | ±500 mA | 7.5 mA        | 8 mA   | 260 mA    | 254 mA | 80                    | 82   | 2200uF                 |
| EC4A17                         | 18-36 VDC                       | 3.3 VDC           | 1000 mA           | 1200 mA | 5 mA          | 5 mA   | 186 mA    | 209 mA | 74                    | 79   | 4700uF                 |
| EC4A21                         | 36-72 VDC                       | 5 VDC             | 1000 mA           | 1000 mA | 2 mA          | 3 mA   | 132 mA    | 126 mA | 79                    | 83   | 4700uF                 |
| EC4A22                         | 36-72 VDC                       | 12 VDC            | 470 mA            | 500 mA  | 2 mA          | 6 mA   | 142 mA    | 144 mA | 83                    | 87   | 4700uF                 |
| EC4A23                         | 36-72 VDC                       | 15 VDC            | 400 mA            | 400 mA  | 2 mA          | 6 mA   | 154 mA    | 144 mA | 81                    | 87   | 4700uF                 |
| EC4A24                         | 36-72 VDC                       | ±12 VDC           | ±230 mA           | ±250 mA | 3 mA          | 6 mA   | 142 mA    | 144 mA | 81                    | 87   | 2200uF                 |
| EC4A25                         | 36-72 VDC                       | ±15 VDC           | ±190 mA           | ±200 mA | 3 mA          | 6 mA   | 147 mA    | 144 mA | 81                    | 87   | 2200uF                 |
| EC4A26                         | 36-72 VDC                       | ±5 VDC            | ±500 mA           | ±500 mA | 3 mA          | 5 mA   | 130 mA    | 126 mA | 80                    | 83   | 2200uF                 |
| EC4A27                         | 36-72 VDC                       | 3.3 VDC           | 1000 mA           | 1200 mA | 2 mA          | 2 mA   | 93 mA     | 104 mA | 74                    | 79   | 4700uF                 |

### NOTE:

1. Suffix "-E" of the models are high efficiency and wide operating temperature version.
2. Nominal Input Voltage is 12, 24 or 48 VDC.
3. Typical value at nominal input voltage and full load.

# SPECIFICATIONS

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

## INPUT SPECIFICATIONS:

|                                  |         |             |
|----------------------------------|---------|-------------|
| Input Voltage Range              | 12V     | 9-18V       |
|                                  | 24V     | 18-36V      |
|                                  | 48V     | 36-72V      |
| Input Surge Voltage (100ms max.) | 12V     | 25Vdc max.  |
|                                  | 24V     | 50Vdc max.  |
|                                  | 48V     | 100Vdc max. |
| Input Filter                     | Pi Type |             |

## OUTPUT SPECIFICATIONS:

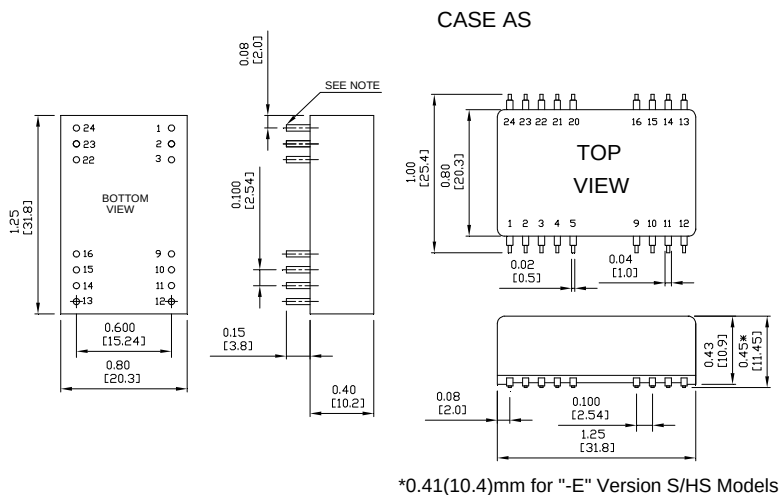
|                                   |                      |                |
|-----------------------------------|----------------------|----------------|
| Voltage Accuracy                  | ±2.0% max.           |                |
| Voltage Balance (Dual)            | ±1.0% max.           |                |
| Temperature Coefficient           | ±0.05%/°C            |                |
| Ripple & Noise, 20MHz BW (Note 5) | 3.3V/5V              | 100mV p-p, max |
|                                   | 12V/15V              | 1% p-p max.    |
| Short Circuit Protection          | Continuous           |                |
| Line Regulation                   | Single/Dual (Note 1) | ±0.5% max.     |
| Load Regulation                   | Single (Note 2)      | ±0.5% max.     |
|                                   | Dual (Note 3)        | ±1.0% max.     |
| Start up time                     | 5 ms max.            |                |

## NOTE:

1. Measured From High Line to Low Line
2. Measured From Full Load to 10% Load
3. Measured From Full Load to 1/4 Load
4. Maximum case temperature under any operating condition should not exceed 95°C (Plastic Case), 100°C (Copper Case)
5. The output noise is measured with 0.1uF MLCC across for SMD package
6. S and HS models for "E" Version Only

## Case A Dimensions:

NOTE: Pin Size is 0.02 ±0.002Inch (0.5±0.05mm) DIA  
All Dimensions In Inches (mm)  
Tolerances Inches: X.XX= ±0.02 , X.XXX= ±0.010  
Millimeters: X.X= ±0.5 , X.XX= ±0.25

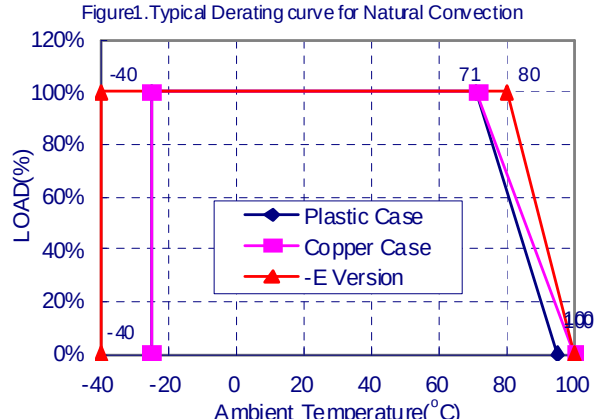


## GENERAL SPECIFICATIONS:

|                                                      |                                           |                                         |
|------------------------------------------------------|-------------------------------------------|-----------------------------------------|
| Efficiency                                           | See Table                                 |                                         |
| Isolation Voltage:                                   |                                           |                                         |
| 500 VDC min.                                         | Standard Models                           |                                         |
| 3K VDC min. ... (Non-Conductive Black Plastic Only)  | Suffix "H" Models                         |                                         |
| 1.5K VDC min.                                        | Suffix "HM" Models                        |                                         |
| Isolation Resistance                                 | 10 <sup>9</sup> ohm min.                  |                                         |
| Isolation Capacitance                                | 250pF Typ.                                |                                         |
| Switching Frequency                                  | 100KHz, min.                              |                                         |
| Operating Ambient Temperature Range                  | -25°C to +71°C                            |                                         |
|                                                      | "-E" models: -40°C to +85°C with Derating |                                         |
| Power de-rating Curve                                | see Figure1                               |                                         |
| Case Temperature (Note 4) ... Plastic/Copper case... | 95°C/100°C max.                           |                                         |
| Cooling                                              | Natural Convection                        |                                         |
| Storage Temperature Range                            | -40°C to +100°C                           |                                         |
| Humidity                                             | 95% RH max. Non condensing                |                                         |
| MTBF                                                 | MIL-STD-217F 2000Khrs typ.                |                                         |
|                                                      | "-E" models: 1800Khrs typ.                |                                         |
| Dimensions                                           | DIP                                       | 1.25×0.80×0.40 inches(31.8×20.3×10.2mm) |
|                                                      | SMD                                       | 1.25×0.80×0.45 inches(31.8×20.3×11.4mm) |
|                                                      | S/H S Models (note 6) ...                 | 1.25×0.80×0.41 inches(31.8×20.3×10.4mm) |

## Case Material:

|                   |                                              |
|-------------------|----------------------------------------------|
| Standard Models   | Non-Conductive Black Plastic                 |
| Suffix "M" Models | Black Coated Copper with Non-conductive Base |
| Suffix "S" Models | SMD package                                  |
| Weight            | 12.5g                                        |



| PIN CONNECTION |               |     |             |     |               |               |     |             |     |
|----------------|---------------|-----|-------------|-----|---------------|---------------|-----|-------------|-----|
| 500 VDC        |               |     |             |     | 1.5K & 3K VDC |               |     |             |     |
| Pin            | Single Output |     | Dual Output |     | Pin           | Single Output |     | Dual Output |     |
|                | DIP           | SMD | DIP         | SMD |               | DIP           | SMD | DIP         | SMD |
| 1,24           | +V Input      |     | +V Input    |     | 1,24          | NP            | NC  | NP          | NC  |
| 2,23           | NC            |     | -V Output   |     | 2,3           | -V Input      |     | -V Input    |     |
| 3,22           | NC            |     | Common      |     | 4,5           | NP            | NC  | NP          | NC  |
| 4              | NP            | NC  | NP          | NC  | 9             | NC            |     | Common      |     |
| 5              | NP            | NC  | NP          | NC  | 10,15         | NC            |     | NC          |     |
| 9              | NP            | NC  | NP          | NC  | 11            | NC            |     | -V Output   |     |
| 10,15          | -V Output     |     | Common      |     | 12,13         | NP            | NC  | NP          | NC  |
| 11,14          | +V Output     |     | +V Output   |     | 14            | +V Output     |     | +V Output   |     |
| 12,13          | -V Input      |     | -V Input    |     | 16            | -V Output     |     | Common      |     |
| 16             | NP            | NC  | NP          | NC  | 20,21         | NP            | NC  | NP          | NC  |
| 20,21          | NP            | NC  | NP          | NC  | 22,23         | +V Input      |     | +V Input    |     |

\* NP-NO PIN

\* NC-NO CONNECTION WITH PIN

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

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