



## EC2SA 2W Isolated DC-DC Converters

Application Note V13 July 2016

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### ISOLATED DC-DC Converter EC2SA SERIES APPLICATION NOTE



Approved By:

| Department                             | Approved By | Checked By | Reported By |
|----------------------------------------|-------------|------------|-------------|
| Research and Development<br>Department | Enoch       | Danny      | Joyce       |
| Quality Assurance<br>Department        | Jack        | Benny      |             |



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### 1. Introduction

The EC2SA series offer 2 watts of output power in a 0.86x0.36x0.44 inches SIL-8 plastic packages. The EC2SA series has a 2:1 wide input voltage range of 4.5-9, 9-18, 18-36 and 36-75VDC and provides a precisely regulated output. This series has features such as high efficiency, 1500VDC of isolation and allows an ambient operating temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  without de-rating. The features include short circuit protection and remote on/off control. All models are very suitable for distributed power architectures, telecommunications, battery operated equipment and industrial applications.

### 2. DC-DC Converter Features

- \* 2W Isolated Output
- \* Compact SIP-8 Package
- \* Efficiency to 84%
- \* 2:1 Input Range
- \* Regulated Outputs
- \* Remote On/Off Control
- \* 1500VDC Isolation
- \* Continuous Short Circuit Protection

### 3. Electrical Block Diagram

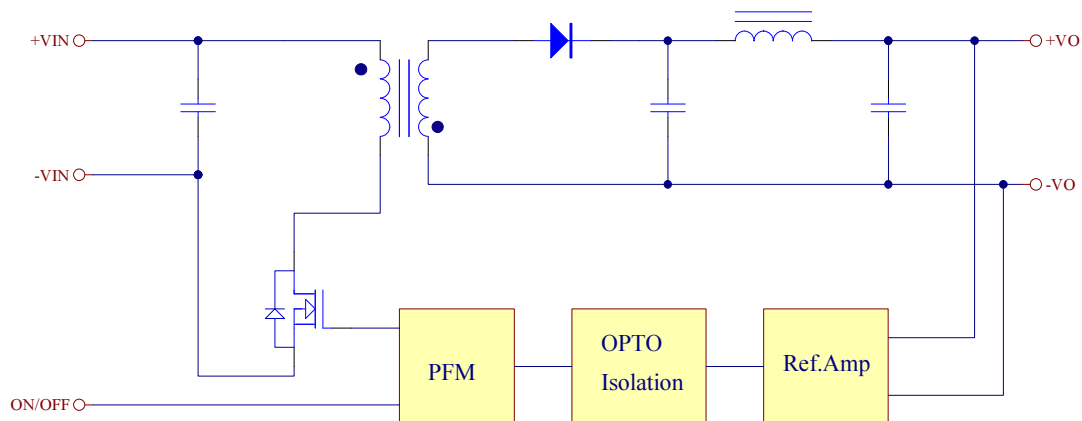


Figure1 Electrical Block Diagram of single output module

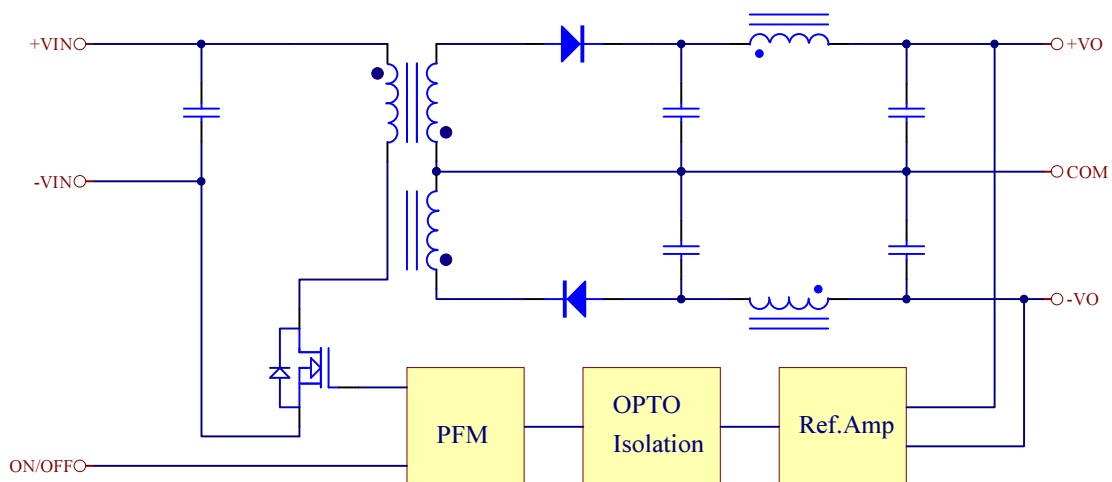


Figure2 Electrical Block Diagram of dual output module



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### 4. 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. | Typical | Max. | Units |
|--------------------------------|----------------------|--------|------|---------|------|-------|
| Input Voltage                  |                      |        |      |         |      |       |
| Continuous                     |                      | 5Vin   | 0    |         | 9    | Vdc   |
|                                |                      | 12Vin  | 0    |         | 18   |       |
|                                |                      | 24Vin  | 0    |         | 36   |       |
|                                |                      | 48Vin  | 0    |         | 75   |       |
| Transient                      | 100ms                | 5Vin   |      |         | 15   | Vdc   |
|                                |                      | 12Vin  |      |         | 25   |       |
|                                |                      | 24Vin  |      |         | 50   |       |
|                                |                      | 48Vin  |      |         | 100  |       |
| Operating Ambient Temperature  |                      | All    | -40  |         | +85  | °C    |
| Case Temperature               |                      | All    |      |         | 100  | °C    |
| Storage Temperature            |                      | All    | -55  |         | +125 | °C    |
| Input/Output Isolation Voltage | 1 minute             | All    | 1500 |         |      | Vdc   |

#### INPUT CHARACTERISTICS

|                                                          |                                                                                      |                                 |                        |                         |                          |                  |
|----------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------|------------------------|-------------------------|--------------------------|------------------|
| MAXIMUM CHARACTERISTICS                                  |                                                                                      |                                 |                        |                         |                          |                  |
| Operating Input Voltage                                  |                                                                                      | 5Vin<br>12Vin<br>24Vin<br>48Vin | 4.5<br>9<br>18<br>36   | 5<br>12<br>24<br>48     | 9<br>18<br>36<br>75      | Vdc              |
| Input Under-Voltage Protection Only For Suffix "N" Model |                                                                                      |                                 |                        |                         |                          |                  |
| Turn-On Voltage Threshold                                |                                                                                      | 5Vin<br>12Vin<br>24Vin<br>48Vin | 3.3<br>6.8<br>13<br>26 |                         | 4.2<br>7.3<br>15.5<br>31 | V <sub>dc</sub>  |
| Turn-Off Voltage Threshold                               |                                                                                      | 5Vin<br>12Vin<br>24Vin<br>48Vin | 3<br>5.8<br>12<br>24   |                         | 3.9<br>6.3<br>14.5<br>29 | V <sub>dc</sub>  |
| Lockout Hysteresis Voltage                               |                                                                                      | 5Vin<br>12Vin<br>24Vin<br>48Vin |                        | 0.3<br>0.5<br>1<br>2    |                          | V <sub>dc</sub>  |
| Maximum Input Current                                    | 100% Load, Vin=4.5V<br>100% Load, Vin=9V<br>100% Load, Vin=18V<br>100% Load, Vin=36V | 5Vin<br>12Vin<br>24Vin<br>48Vin |                        | 580<br>280<br>140<br>70 |                          | mA               |
| No-Load Input Current                                    | Vin=Nominal input                                                                    | 5Vin<br>12Vin<br>24Vin<br>48Vin |                        | 60<br>30<br>18<br>9     |                          | mA               |
| Off Converter Input Current                              | Shutdown input idle current                                                          | All                             |                        |                         | 1                        | mA               |
| Inrush Current (I <sup>2</sup> t)                        |                                                                                      | All                             |                        |                         | 0.01                     | A <sup>2</sup> s |
| Input Reflected-Ripple Current                           | P-P thru 12uH inductor, 5Hz to 20MHz                                                 | All                             |                        | 30                      |                          | mA               |

#### OUTPUT CHARACTERISTIC

|                          |                                             |         |        |      |        |     |
|--------------------------|---------------------------------------------|---------|--------|------|--------|-----|
| Output Voltage Set Point | Vin nominal, Io=Io <sub>max</sub> , Tc=25°C | Vo=3.3V | 3.250  | 3.3  | 3.349  | Vdc |
|                          |                                             | Vo=5.0V | 4.925  | 5.0  | 5.075  |     |
|                          |                                             | Vo=12V  | 11.82  | 12   | 12.18  |     |
|                          |                                             | Vo=15V  | 14.77  | 15   | 15.23  |     |
|                          |                                             | Vo=±5V  | ±4.92  | ±5.0 | ±5.08  |     |
|                          |                                             | Vo=±12V | ±11.82 | ±12  | ±12.18 |     |
|                          |                                             | Vo=±15V | ±14.77 | ±15  | ±15.23 |     |
|                          |                                             |         |        |      |        |     |



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|                                   |                                                      |         |     |  |       |      |
|-----------------------------------|------------------------------------------------------|---------|-----|--|-------|------|
| Output Voltage Balance            | Vin=nominal, Io=Io <sub>max</sub> , Tc=25°C          | Dual    |     |  | ±1.0  | %    |
| Output Voltage Regulation         |                                                      |         |     |  |       |      |
| Load Regulation                   | Io=Full Load to 10% Load<br>Io=Full Load to 10% Load | Single  |     |  | ±0.5  | %    |
|                                   |                                                      | Dual    |     |  | ±1.0  | %    |
| Line Regulation                   | Vin=High line to Low line Full Load                  | All     |     |  | ±0.5  | %    |
| Cross Regulation                  | Asymmetrical Load 25%/100%                           | Dual    |     |  | ±5    | %    |
| Temperature Coefficient           | Ta=-40°C to 85°C                                     | All     |     |  | ±0.03 | %/°C |
| Output Voltage Ripple and Noise   |                                                      |         |     |  |       |      |
| Peak-to-Peak                      | Full Load, 20MHz bandwidth                           | All     |     |  | 75    | mV   |
| Operating Output Current Range    |                                                      | Vo=3.3V | 0   |  | 500   | mA   |
|                                   |                                                      | Vo=5.0V | 0   |  | 400   |      |
|                                   |                                                      | Vo=12V  | 0   |  | 167   |      |
|                                   |                                                      | Vo=15V  | 0   |  | 134   |      |
|                                   |                                                      | Vo=±5V  | 0   |  | ±200  |      |
|                                   |                                                      | Vo=±12V | 0   |  | ±83   |      |
|                                   |                                                      | Vo=±15V | 0   |  | ±67   |      |
| Output DC Current-Limit Inception | Output Voltage =90% Vo <sub>nominal</sub>            |         | 120 |  |       | %    |
| Maximum Output Capacitance        | Full load, Resistance                                | Vo=3.3V | 0   |  | 500   | uF   |
|                                   |                                                      | Vo=5.0V | 0   |  | 400   |      |
|                                   |                                                      | Vo=12V  | 0   |  | 167   |      |
|                                   |                                                      | Vo=15V  | 0   |  | 134   |      |
|                                   |                                                      | Vo=±5V  | 0   |  | 200   |      |
|                                   |                                                      | Vo=±12V | 0   |  | 83    |      |
|                                   |                                                      | Vo=±15V | 0   |  | 67    |      |

### DYNAMIC CHARACTERISTICS

| PARAMETER                                          | NOTES and CONDITIONS                            | Device | Min. | Typical | Max. | Units |
|----------------------------------------------------|-------------------------------------------------|--------|------|---------|------|-------|
| Output Voltage Current Transient                   |                                                 |        |      |         |      |       |
| Step Change in Output Current                      | 75% to 100% Io <sub>max</sub> , di/dt=0.1A/us   | All    |      |         | ±6   | %     |
| Setting Time<br>(within 1% Vo <sub>nominal</sub> ) | di/dt=0.1A/us                                   | All    |      |         | 500  | us    |
| Turn-On Delay and Rise Time                        |                                                 |        |      |         |      |       |
| Turn-On Delay Time, From Input                     | Vin <sub>min</sub> to 10% Vo <sub>nominal</sub> | All    |      | 1       |      | ms    |
| Turn-On Delay Time, From On/off                    | Von/off to 10% Vo <sub>nominal</sub>            | All    |      | 1       |      | ms    |
| Output Voltage Rise Time                           | 10% to 90%Vo <sub>nominal</sub>                 | All    |      | 2.5     |      | ms    |

### EFFICIENCY

|           |                                                 |       |  |    |  |   |
|-----------|-------------------------------------------------|-------|--|----|--|---|
| 100% Load | Vin=Nominal Vin, Io=Io <sub>max</sub> , Tc=25°C | 05S33 |  | 73 |  | % |
|           |                                                 | 05S05 |  | 76 |  |   |
|           |                                                 | 05S12 |  | 80 |  |   |
|           |                                                 | 05S15 |  | 80 |  |   |
|           |                                                 | 05D05 |  | 77 |  |   |
|           |                                                 | 05D12 |  | 79 |  |   |
|           |                                                 | 05D15 |  | 80 |  |   |
|           |                                                 | 12S33 |  | 76 |  |   |
|           |                                                 | 12S05 |  | 79 |  |   |
|           |                                                 | 12S12 |  | 82 |  |   |
|           |                                                 | 12S15 |  | 83 |  |   |
|           |                                                 | 12D05 |  | 79 |  |   |
|           |                                                 | 12D12 |  | 82 |  |   |
|           |                                                 | 12D15 |  | 83 |  |   |
|           |                                                 | 24S33 |  | 76 |  |   |
|           |                                                 | 24S05 |  | 79 |  |   |
|           |                                                 | 24S12 |  | 82 |  |   |
|           |                                                 | 24S15 |  | 83 |  |   |
|           |                                                 | 24D05 |  | 79 |  |   |
|           |                                                 | 24D12 |  | 81 |  |   |
|           |                                                 | 24D15 |  | 84 |  |   |



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|  |  |       |  |    |  |  |
|--|--|-------|--|----|--|--|
|  |  | 48S33 |  | 74 |  |  |
|  |  | 48S05 |  | 79 |  |  |
|  |  | 48S12 |  | 82 |  |  |
|  |  | 48S15 |  | 84 |  |  |
|  |  | 48D05 |  | 78 |  |  |
|  |  | 48D12 |  | 82 |  |  |
|  |  | 48D15 |  | 84 |  |  |

### ISOLATION CHARACTERISTICS

|                       |                          |     |  |     |      |     |
|-----------------------|--------------------------|-----|--|-----|------|-----|
| Isolation Voltage     | Input to Output 1 minute | All |  |     | 1500 | Vdc |
| Isolation Resistance  | Input to Output          | All |  |     | 1000 | MΩ  |
| Isolation Capacitance | Input to Output          | All |  | 500 |      | pF  |

### FEATURE CHARACTERISTICS

|                                          |                                    |     |     |  |                           |     |
|------------------------------------------|------------------------------------|-----|-----|--|---------------------------|-----|
| Switching Frequency                      |                                    | All | 100 |  |                           | KHz |
| On/Off Control                           |                                    |     |     |  |                           |     |
| Module On                                | Open ,high impedance or <1.2V      | All | 0   |  | 1.2 or<br>Open<br>Circuit | V   |
| Module Off                               | Voltage of V <sub>on/off</sub> pin | All | 5.5 |  | 15                        | V   |
| On/Off Control Only For Suffix "N" Model |                                    |     |     |  |                           |     |
| Module On                                | Open ,high impedance or <0.8V      | All | 0   |  | 0.8 or<br>Open<br>Circuit | V   |
| Module Off                               | Voltage of V <sub>on/off</sub> pin | All | 4   |  | 15                        | V   |
| Off Converter Input Current              | Shutdown input idle current        | All |     |  | 1                         | mA  |

### GENERAL SPECIFICATIONS

|        |                                                            |     |  |     |  |            |
|--------|------------------------------------------------------------|-----|--|-----|--|------------|
| MTBF   | Io=100%of Io <sub>max</sub> , Ta=25°C<br>per MIL-HDBK-217F | All |  | 2.5 |  | M<br>hours |
| Weight |                                                            | All |  | 4.8 |  | g          |



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### 5. Main Features and Functions

#### 5.1 Operating Temperature Range

The EC2SA series converters can be operated by a wide ambient temperature range from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  without de-rating. The standard model has a plastic case and case temperature can not over  $100^{\circ}\text{C}$  at normal operating.

#### 5.2 Over Current Protection

All different voltage models have full continuous short-circuit protection. To provide protection in a fault condition, the unit is equipped with internal over-current protection. The unit operates normally once the fault condition is removed. At the point of current-limit inception, the converter will go into over current protection.

#### 5.3 Remote On/Off

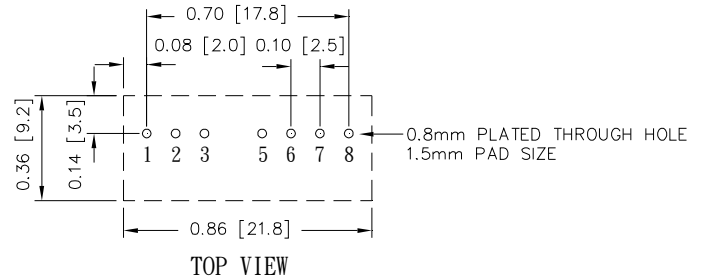
The remote on/off input feature of the converter allows external circuitry to turn the converter on or off. Active-high remote on/off is available as standard. The converter is turned on if the remote on/off pin is high impedance or open circuit. Suffix "N" to the Model Number with the remote ON/OFF pin at 4 to 15Vdc will turn the converter off, other models at 5.5 to 15Vdc. The signal level of the on/off pin is defined with respect to ground. If not using the on/off pin, leave the pin open (module will be on).

### 6. Applications

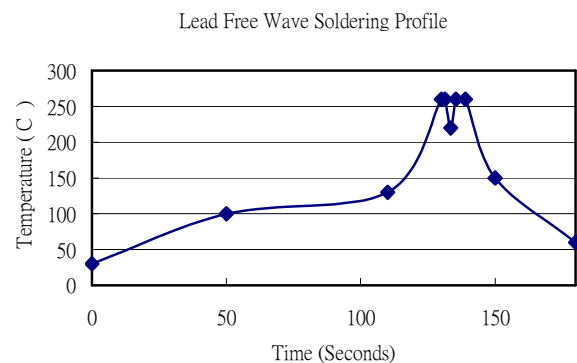
#### 6.1 Recommended Layout PCB Footprints and Soldering Information

The system designer or the end user must ensure that other components and metal in the vicinity of the converter meet the spacing requirements to which the system is approved. Low resistance and low inductance PCB layout traces are the norm and should be used where possible. Due consideration must also be given to proper low impedance tracks between power module,

input and output grounds. The recommended footprints and soldering profiles are shown as Figure 3.



Note: Dimensions are in inches (millimeters)



Note :

1. Soldering Materials: Sn/Cu/Ni
2. Ramp up rate during preheat:  $1.4^{\circ}\text{C}/\text{Sec}$  (From  $50^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ )
3. Soaking temperature:  $0.5^{\circ}\text{C}/\text{Sec}$  (From  $100^{\circ}\text{C}$  to  $130^{\circ}\text{C}$ ),  $60 \pm 20$  seconds
4. Peak temperature:  $260^{\circ}\text{C}$ , above  $250^{\circ}\text{C}$  3~6 Seconds
5. Ramp up rate during cooling:  $-10.0^{\circ}\text{C}/\text{Sec}$  (From  $260^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ )

Figure3 Recommended PCB Layout Footprints and Wave Soldering Profiles for SIL packages



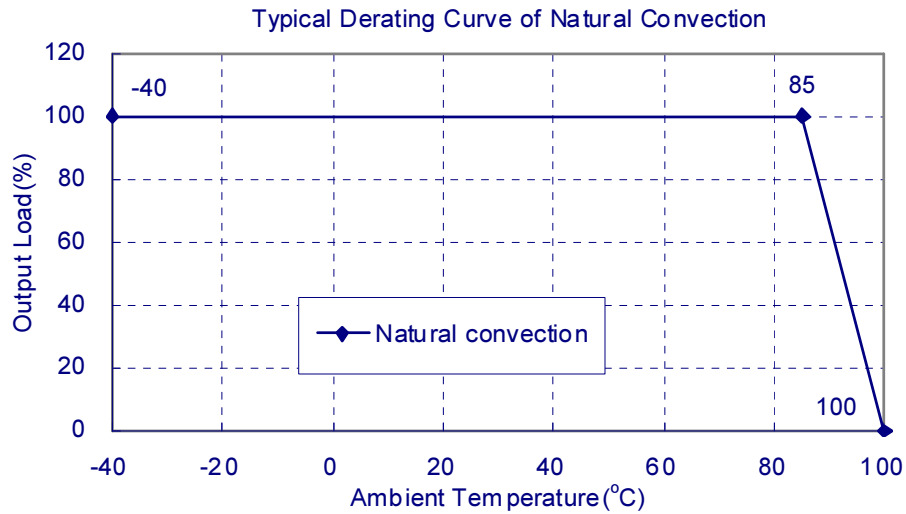
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#### 6.2 Power De-Rating Curves for EC2SA Series

Operating Ambient temperature Range:  $-40^{\circ}\text{C}$  ~  $85^{\circ}\text{C}$  without de-rating.

Maximum case temperature under any operating condition should not exceed  $100^{\circ}\text{C}$ .

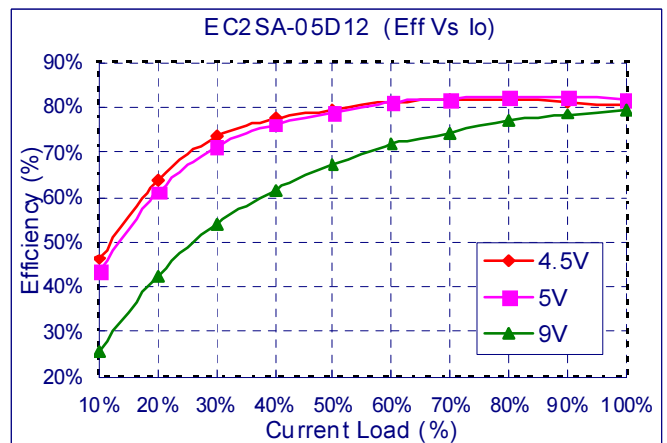
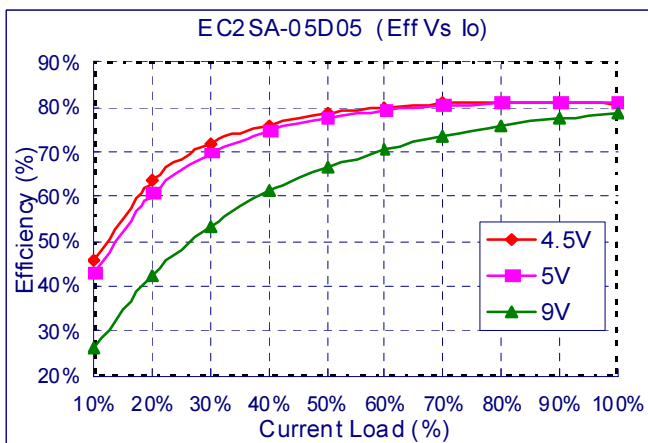
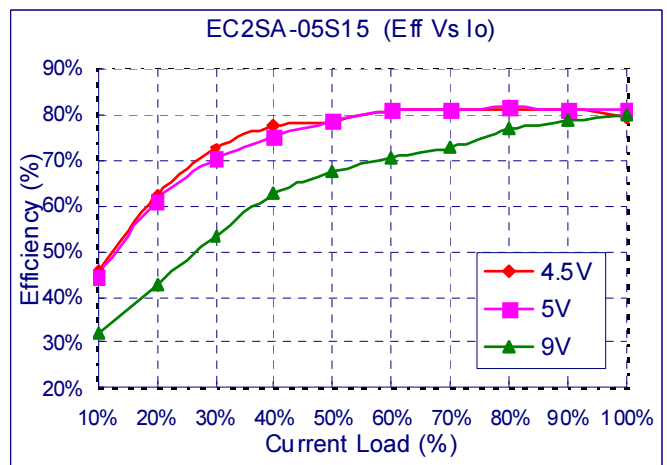
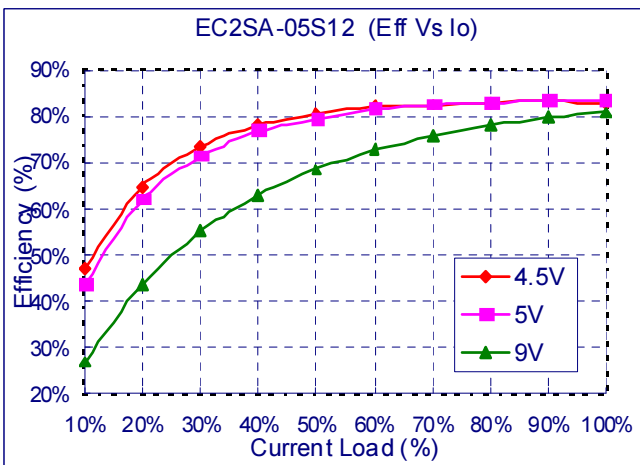
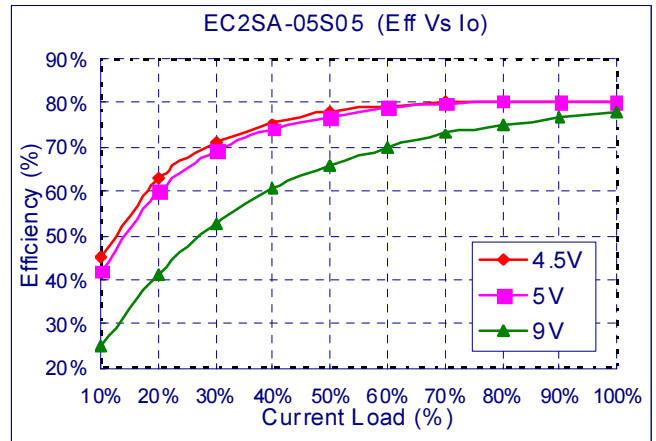
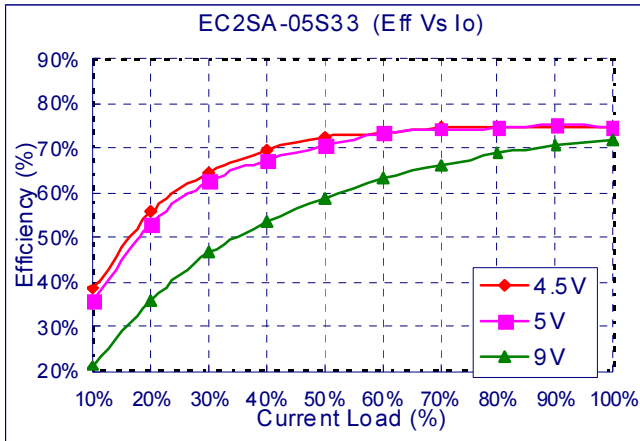




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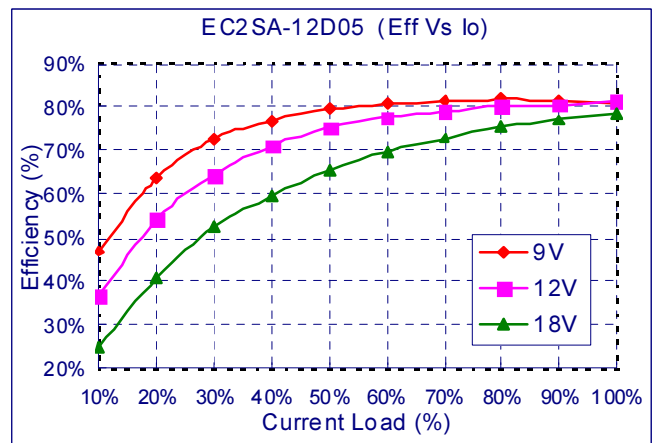
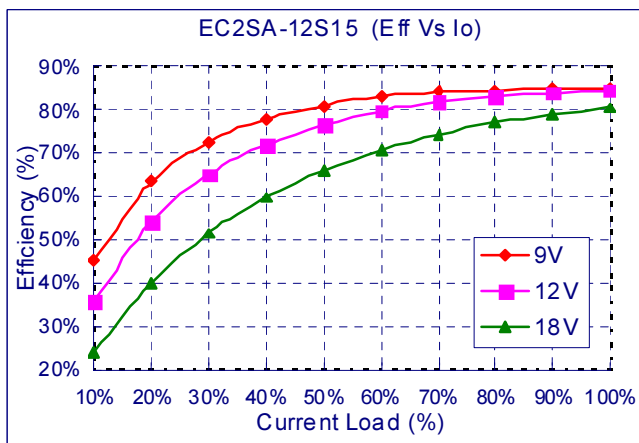
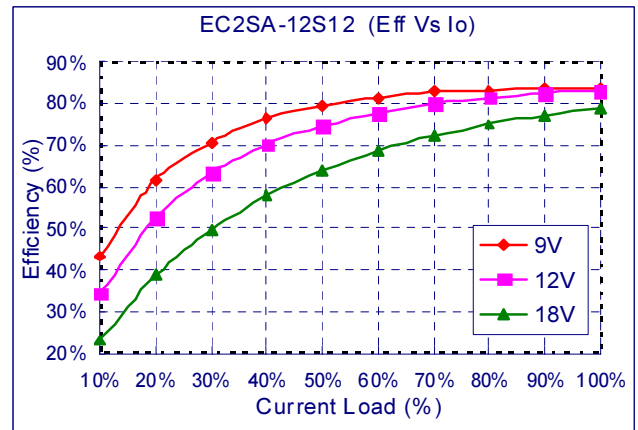
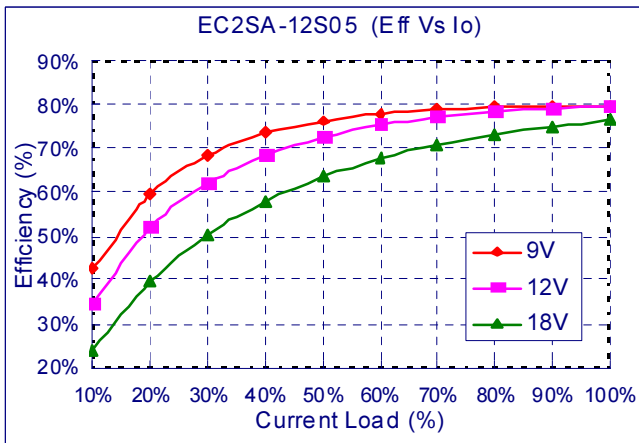
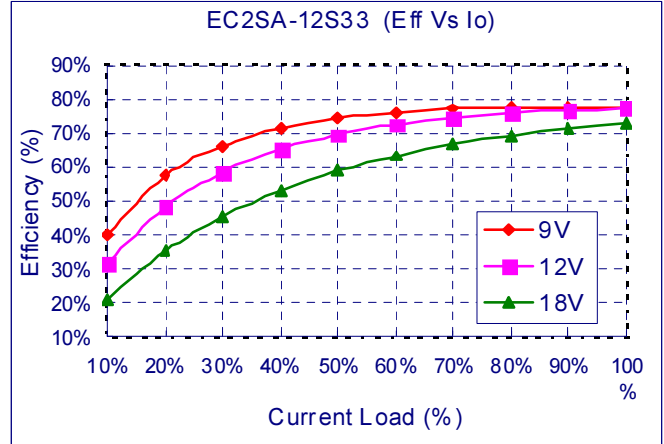
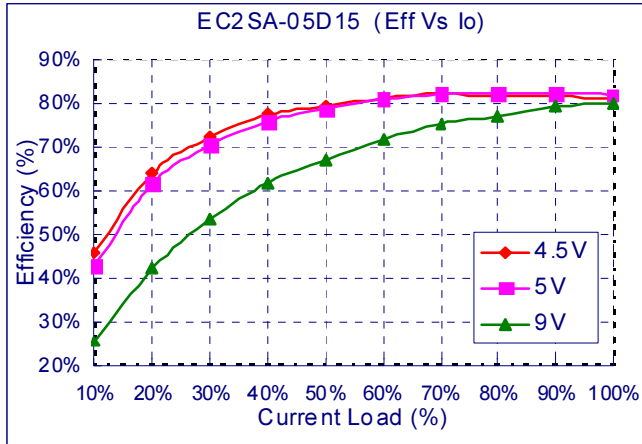
#### 6.3 Efficiency vs. Load Curves





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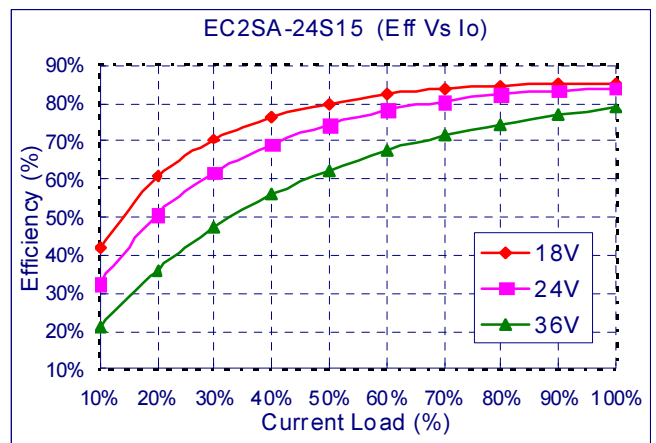
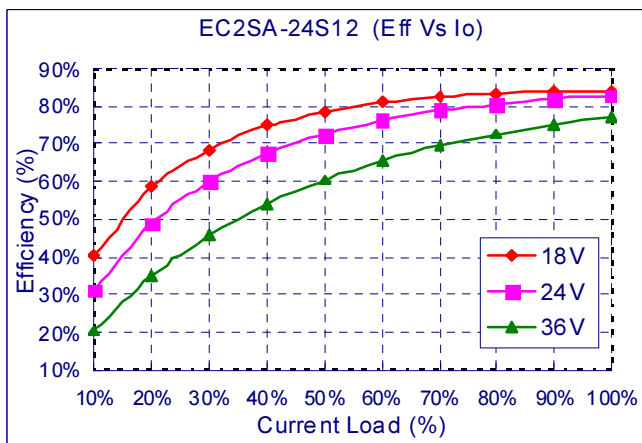
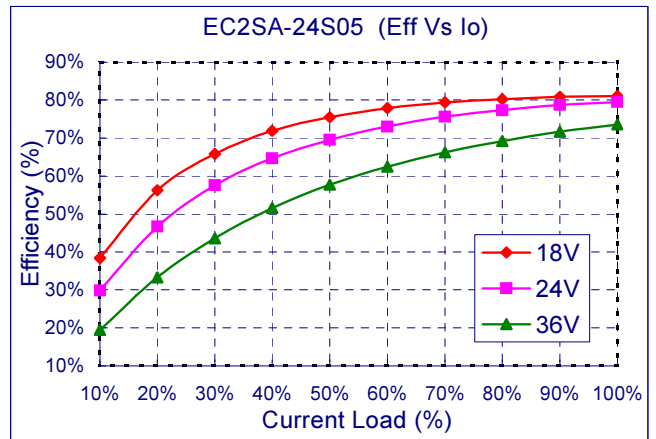
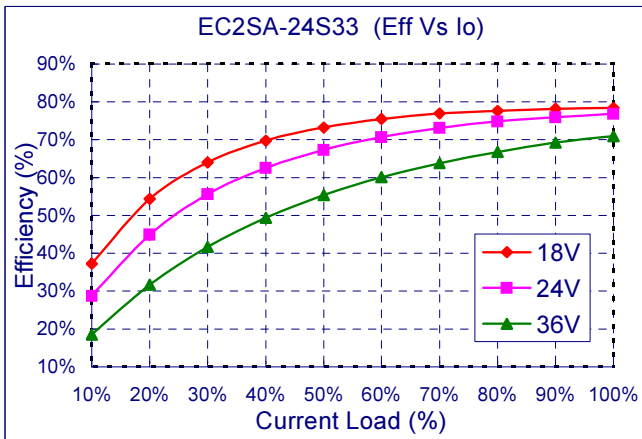
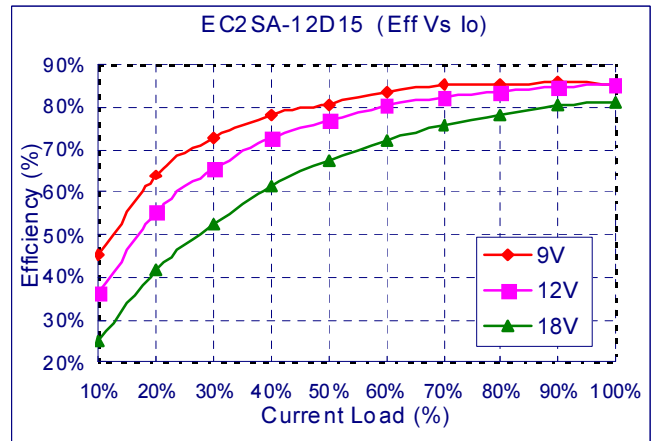
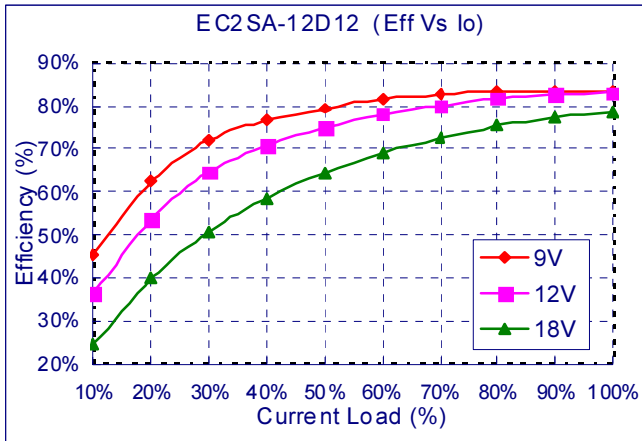
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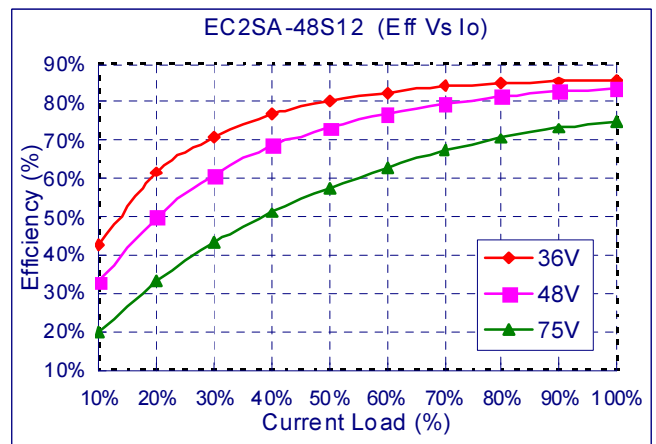
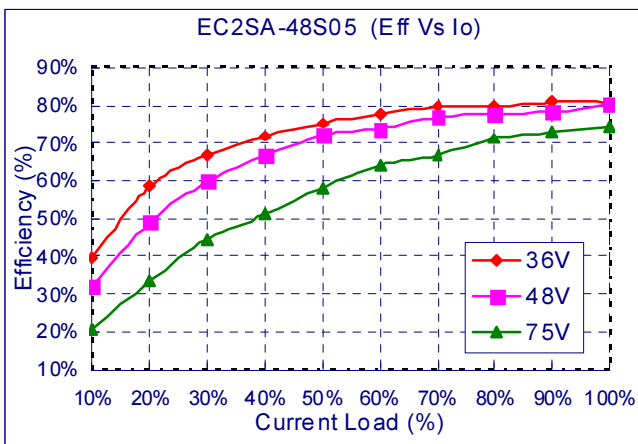
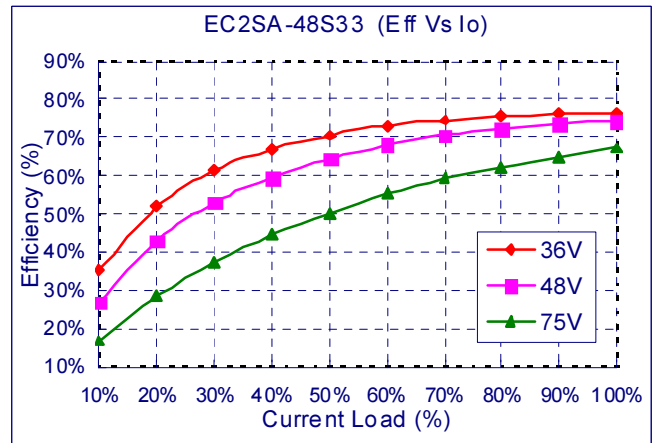
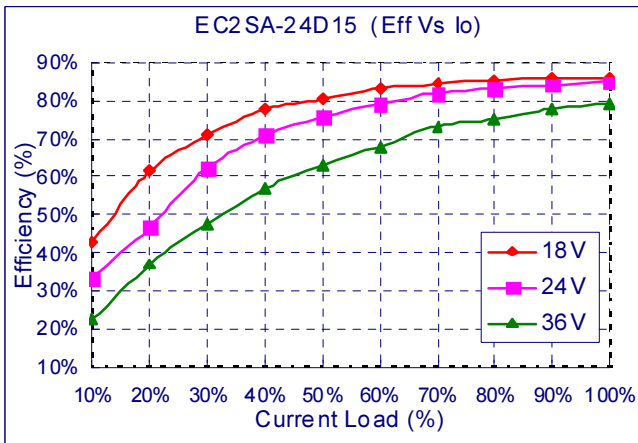
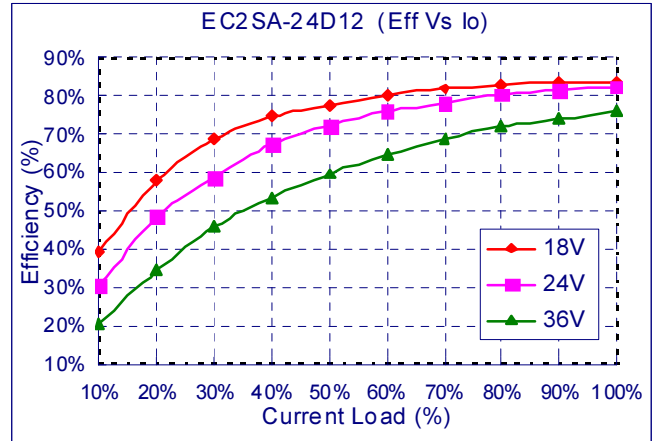
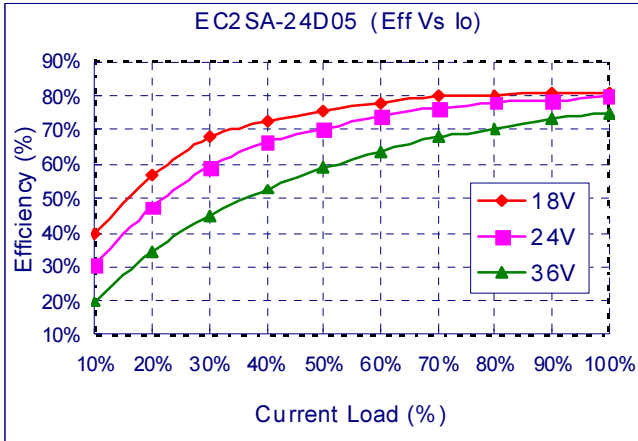
### Application Note V13 July 2016





## EC2SA 2W Isolated DC-DC Converters

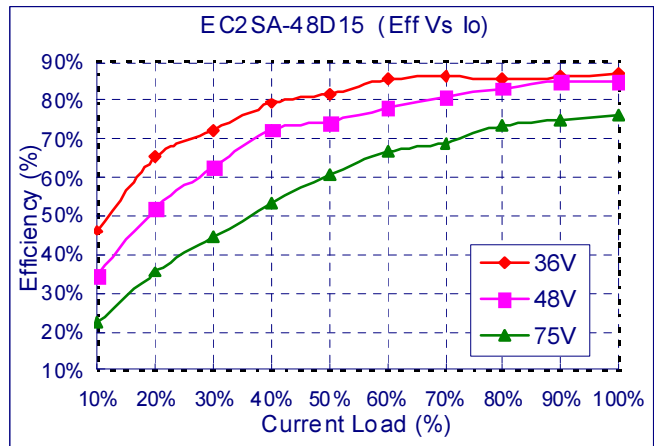
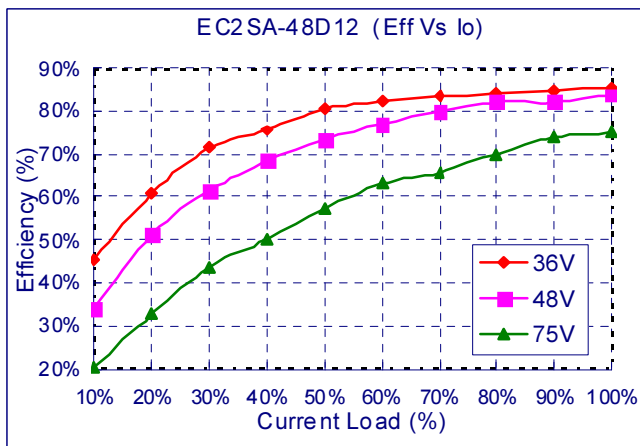
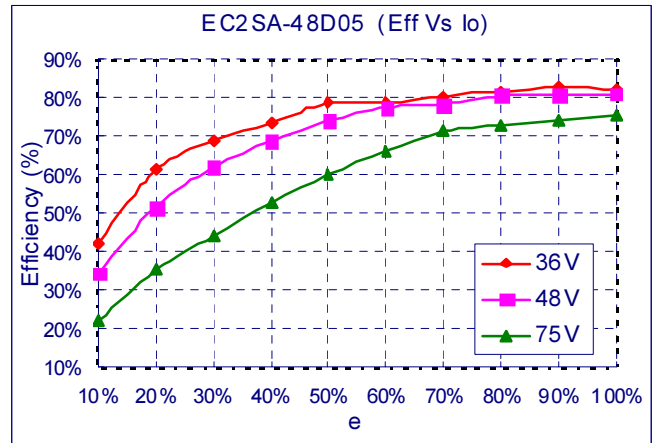
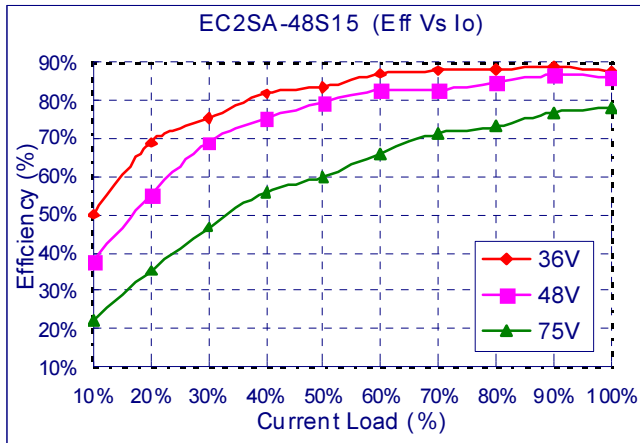
### Application Note V13 July 2016





## EC2SA 2W Isolated DC-DC Converters

### Application Note V13 July 2016



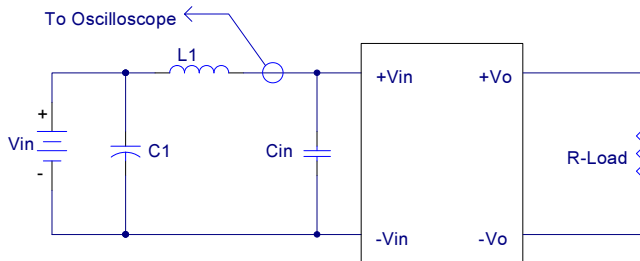


# EC2SA 2W Isolated DC-DC Converters

## Application Note V13 July 2016

### 6.4 Input Capacitance at the Power Module

The converters must be connected to low AC source impedance. To avoid problems with loop stability source inductance should be low. Also, the input capacitors (Cin) should be placed close to the converter input pins to de-couple distribution inductance. However, the external input capacitors are chosen for suitable ripple handling capability. Low ESR capacitors are good choice. Circuit as shown in Figure4 represents typical measurement methods for reflected ripple current. C1 and L1 simulate a typical DC source impedance. The input reflected-ripple current is measured by current probe to oscilloscope with a simulated source Inductance (L1).



L1: 12uH  
C1: None  
Cin: 33uF ESR<0.7ohm @100KHz

Figure4 Input Reflected-Ripple Test Setup

### 6.5 Test Set-Up

The basic test set-up to measure parameters such as efficiency and load regulation is shown in Figure5. When testing the modules under any transient conditions please ensure that the transient response of the source is sufficient to power the equipment under test. We can calculate the

- Efficiency
- Load regulation and line regulation.

The value of efficiency is defined as:

$$\eta = \frac{V_o \times I_o}{V_{in} \times I_{in}} \times 100\%$$

Where

Vo is output voltage,  
Io is output current,  
Vin is input voltage,  
Iin is input current.

The value of load regulation is defined as:

$$Load.reg = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

Where

V<sub>FL</sub> is the output voltage at full load  
V<sub>NL</sub> is the output voltage at 10% load

The value of line regulation is defined as:

$$Line.reg = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

Where: V<sub>HL</sub> is the output voltage of maximum input voltage at full load. V<sub>LL</sub> is the output voltage of minimum input voltage at full load.

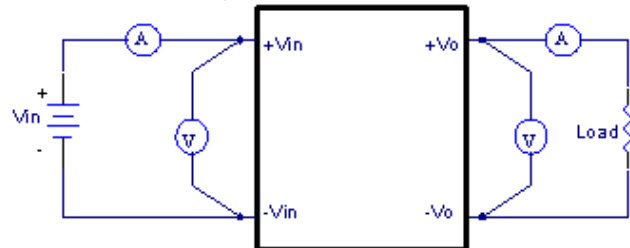
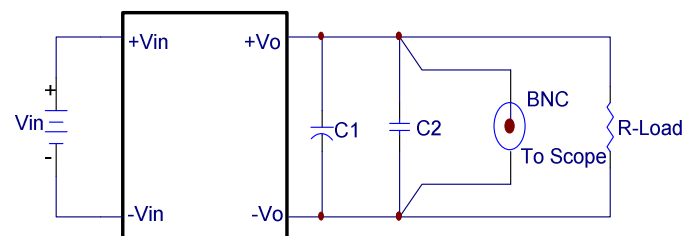


Figure5 EC2SA Series Test Setup

### 6.6 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure6. A coaxial cable was used to prevent impedance mismatch reflections disturbing the noise readings at higher frequencies. Measurements are taken with output appropriately loaded and all ripple/noise specifications are from D.C. to 20MHz Band Width.



Note: C1: None  
C2: None

Figure6 Output Voltage Ripple and Noise Measurement Set-Up

### 6.7 Output Capacitance

The EC2SA series converters provide unconditional stability with or without external capacitors. For good transient response low ESR output capacitors should be located close to the point of load. These series converters are designed to work with load capacitance to see technical specifications.



# EC2SA 2W Isolated DC-DC Converters

## Application Note V13 July 2016

### 7. Safety & EMC

#### 7.1 Input Fusing and Safety Considerations.

The EC2SA series converters have not an internal fuse. However, to achieve maximum safety and system protection, always use an input line fuse. We recommended a time delay fuse 1A for 5V<sub>in</sub> models, 500mA for 12V<sub>in</sub> models and 250mA for 24V<sub>in</sub> and 48V<sub>in</sub> modules. Figure7 circuit is recommended by a Transient Voltage Suppressor diode across the input terminal to protect the unit against surge or spike voltage and input reverse voltage.

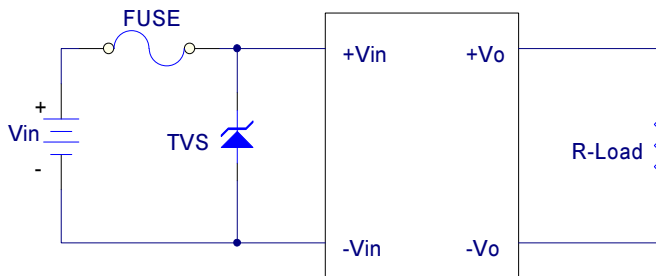


Figure7 Input Protection

#### 7.2 EMC Considerations

EMI Test standard: EN55022 Class A and Class B Conducted Emission  
Test Condition: Input Voltage: Nominal, Output Load: Full Load

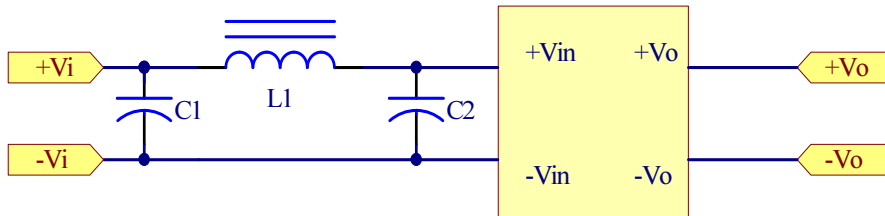


Figure8 Connection circuit for conducted EMI testing



## EC2SA 2W Isolated DC-DC Converters

### Application Note V13 July 2016

| Model No.   | EN55022 class A |    |       | EN55022 class B |    |       |
|-------------|-----------------|----|-------|-----------------|----|-------|
|             | C1              | C2 | L1    | C1              | C2 | L1    |
| EC2SA-05S33 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-05S05 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-05S12 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-05S15 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-05D05 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-05D12 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-05D15 | 10uF/16V 1206   | NC | 2.2uH | 10uF/25V 1210   | NC | 10uH  |
| EC2SA-12S33 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-12S05 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-12S12 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-12S15 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-12D05 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-12D12 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-12D15 | 2.2uF/25V 1206  | NC | 12uH  | 2.2uF/25V 1210  | NC | 33uH  |
| EC2SA-24S33 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-24S05 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-24S12 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-24S15 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-24D05 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-24D12 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-24D15 | 4.7uF/50V 1812  | NC | 12uH  | 6.8uF/50V 1812  | NC | 33uH  |
| EC2SA-48S33 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |
| EC2SA-48S05 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |
| EC2SA-48S12 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |
| EC2SA-48S15 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |
| EC2SA-48D05 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |
| EC2SA-48D12 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |
| EC2SA-48D15 | 1uF/100V 1812   | NC | 68uH  | 2.2uF/100V 1812 | NC | 150uH |

Note: All of capacitors are ceramic capacitors.



# EC2SA 2W Isolated DC-DC Converters

## Application Note V13 July 2016

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
25.71 dBμV

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

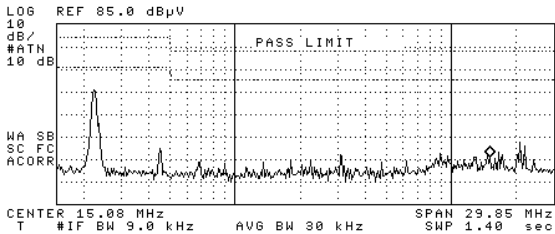


Figure9 Conducted Class A of EC2SA-05S05

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
28.08 dBμV

SWEPTIME  
1.40 sec

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

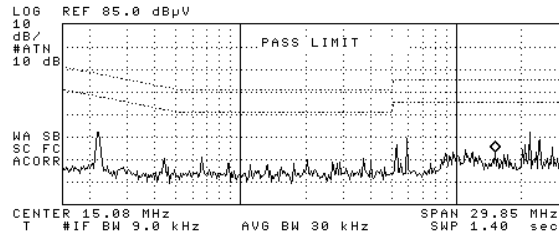


Figure13 Conducted Class B of EC2SA-05S05

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
21.85 dBμV

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

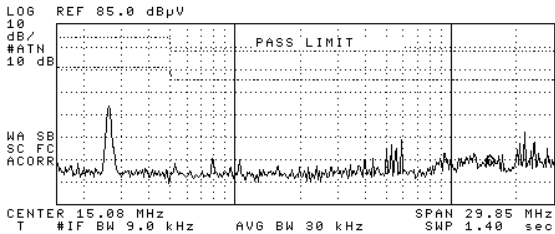


Figure10 Conducted Class A of EC2SA-12S15

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
24.24 dBμV

SWEPTIME  
1.40 sec

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

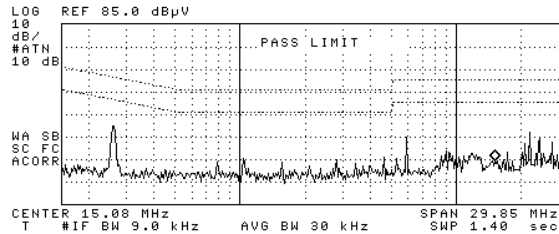


Figure14 Conducted Class B of EC2SA-12S15

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
25.59 dBμV

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

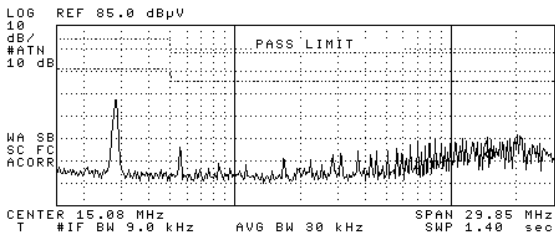


Figure11 Conducted Class A of EC2SA-24D12

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
28.31 dBμV

SWEPTIME  
1.40 sec

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

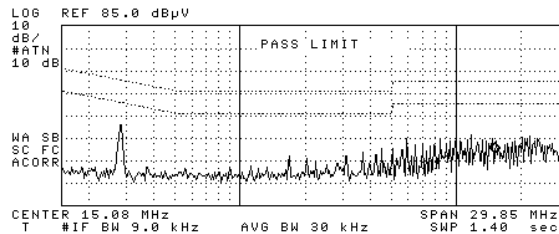


Figure15 Conducted Class B of EC2SA-24D12

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
37.91 dBμV

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

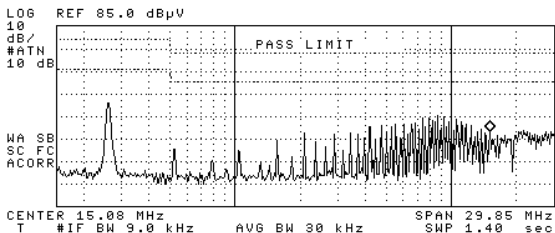


Figure12 Conducted Class A of EC2SA-48D15

09:11:24 JAN 16, 1995

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.10 MHz  
37.73 dBμV

SWEPTIME  
1.40 sec

CATALOG  
CARD

RECALL  
SETUP

RECALL  
LIST

RECALL  
LIMITS

RECALL  
ANTENNA

More  
1 of 3

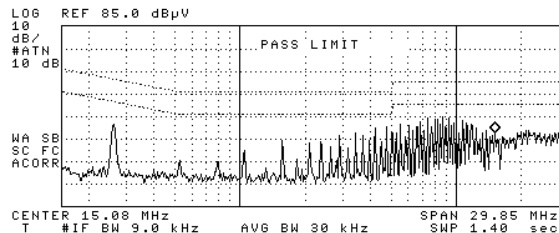


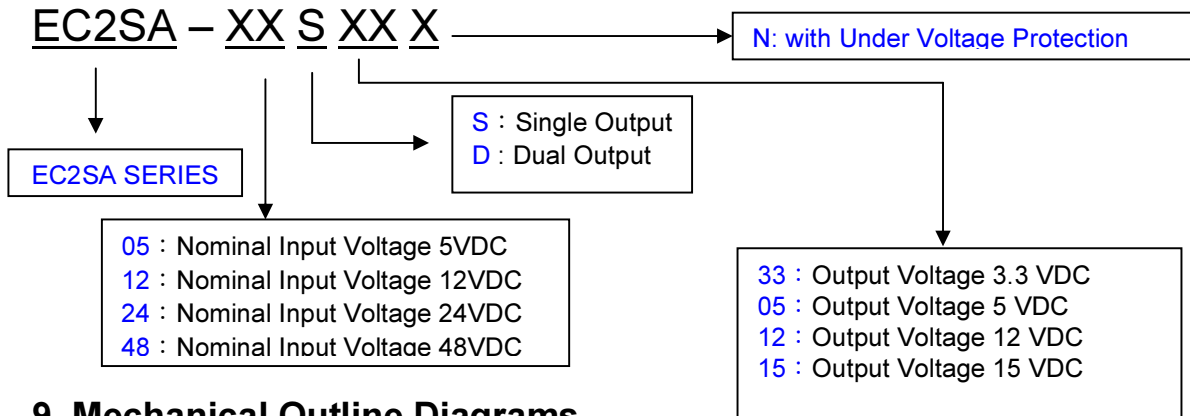
Figure16 Conducted Class B of EC2A-48D15



# EC2SA 2W Isolated DC-DC Converters

Application Note V13 July 2016

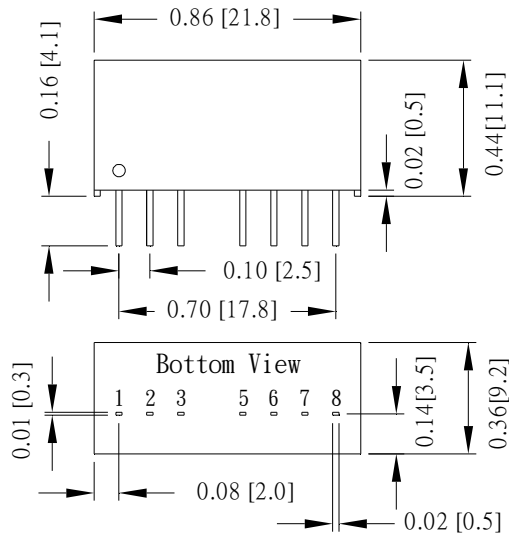
## 8. Part Number



## 9. Mechanical Outline Diagrams

### 9.1 Mechanical Outline Diagrams

All Dimensions In Inches(mm)  
Tolerances : Inches millimeters  
X.XX±0.02 X.X±0.5  
Pin ±0.002 ±0.05



| PIN CONNECTION |        |        |
|----------------|--------|--------|
| Pin            | Single | Dual   |
| 1              | -Vin   | -Vin   |
| 2              | +Vin   | +Vin   |
| 3              | CTRL   | CTRL   |
| 5              | NC     | NC     |
| 6              | +Vo    | +Vo    |
| 7              | -Vo    | Common |
| 8              | NC     | -Vo    |



## EC2SA 2W Isolated DC-DC Converters

### Application Note V13 July 2016

#### 9.2 Packaging Details

The EC2SA series SIL version are supplied in tube(11x20x330mm). Modules are shipped in quantities of 14 modules per Tube. Details of tube dimensions are shown below.

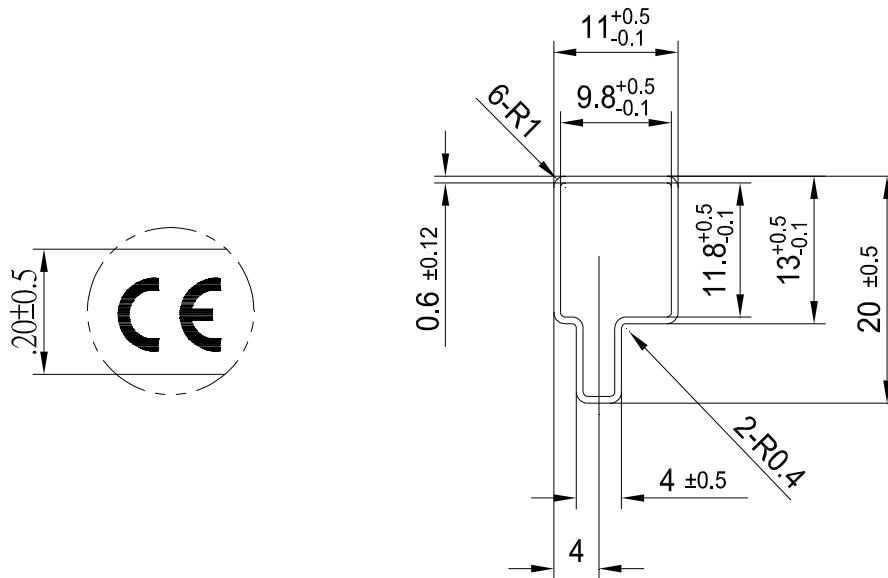


Figure17 SIL Packages Tube for EC2SA

#### CINCON ELECTRONICS CO., LTD.

##### Headquarter Office:

14F, No.306, Sec.4, Hsin Yi Rd.,  
Taipei, Taiwan  
Tel: 886-2-27086210  
Fax: 886-2-27029852  
E-mail: [sales@cincon.com.tw](mailto:sales@cincon.com.tw)  
Web Site: <http://www.cincon.com>

##### Factory:

No. 8-1, Fu Kong Rd.,  
Fu Hsing Industrial Park  
Fu Hsing Hsiang, ChangHua Hsien,  
Taiwan  
Tel: 886-4-7690261  
Fax: 886-4-7698031

##### Cincon American Office:

1655 Mesa Verde Ave, Ste 180,  
Ventura, CA 93003  
Tel: 805-639-3350  
Fax: 805-639-4101  
E-mail: [info@cincon.com](mailto:info@cincon.com)

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[EC2SA-24S05](#) [EC2SA-12S33](#) [EC2SA-05S15](#) [EC2SA-48S12](#) [EC2SA-48D05](#) [EC2SA-24S12](#) [EC2SA-05D12](#) [EC2SA-](#)  
[48S33](#) [EC2SA-24S33](#) [EC2SA-48D15](#) [EC2SA-24D15](#) [EC2SA-12D05](#) [EC2SA-48S05](#) [EC2SA-48S15](#) [EC2SA-05S12](#)  
[EC2SA-24S15](#) [EC2SA-24D12](#) [EC2SA-48D12](#) [EC2SA-24D05](#) [EC2SA-05D15](#) [EC2SA-05D05](#) [EC2SA-05D05N](#)  
[EC2SA-05D12N](#) [EC2SA-05D15N](#) [EC2SA-05S05N](#) [EC2SA-05S12N](#) [EC2SA-05S15N](#) [EC2SA-05S33N](#) [EC2SA-](#)  
[12D05N](#) [EC2SA-12D12N](#) [EC2SA-12D15N](#) [EC2SA-12S05N](#) [EC2SA-12S12N](#) [EC2SA-12S15N](#) [EC2SA-12S33N](#)  
[EC2SA-24D05N](#) [EC2SA-24D12N](#) [EC2SA-24D15N](#) [EC2SA-24S05N](#) [EC2SA-24S12N](#) [EC2SA-24S15N](#) [EC2SA-](#)  
[24S33N](#) [EC2SA-48D05N](#) [EC2SA-48D12N](#) [EC2SA-48D15N](#) [EC2SA-48S05N](#) [EC2SA-48S12N](#) [EC2SA-48S15N](#)  
[EC2SA-48S33N](#)