

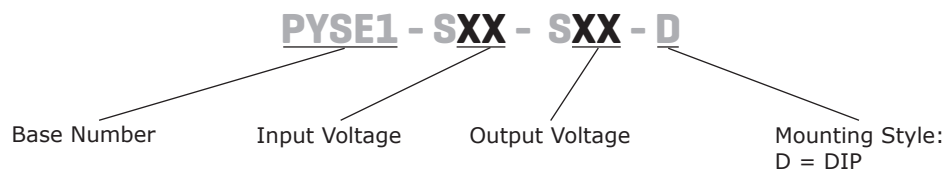
**SERIES: PYSE1-D | DESCRIPTION: DC-DC CONVERTER**
**FEATURES**

- 1 W isolated output
- single unregulated output
- compact DIP package
- continuous short circuit protection
- 1500 Vdc isolation
- no load input current as low as 8 mA
- extended temperature range (-40~105°C)
- efficiency up to 81%
- UL 62368
- designed to meet EN/BS EN 62368



| MODEL                        | input voltage |                | output voltage<br>(Vdc) | output current |             | output power<br>max<br>(W) | ripple & noise <sup>1</sup><br>max<br>(mVp-p) | efficiency <sup>2</sup><br>typ<br>(%) |
|------------------------------|---------------|----------------|-------------------------|----------------|-------------|----------------------------|---|---------------------------------------|
|                              | typ<br>(Vdc)  | range<br>(Vdc) |                         | min<br>(mA)    | max<br>(mA) |                            |   |                                       |
| PYSE1-S12-S3-D               | 12            | 10.8~13.2      | 3.3                     | 30             | 303         | 1                          | 75  | 75                                    |
| PYSE1-S12-S5-D               | 12            | 10.8~13.2      | 5                       | 20             | 200         | 1                          | 75  | 80                                    |
| PYSE1-S12-S9-D <sup>3</sup>  | 12            | 10.8~13.2      | 9                       | 12             | 111         | 1                          | 75  | 78                                    |
| PYSE1-S12-S12-D              | 12            | 10.8~13.2      | 12                      | 9              | 83          | 1                          | 75  | 80                                    |
| PYSE1-S12-S15-D              | 12            | 10.8~13.2      | 15                      | 7              | 67          | 1                          | 75  | 81                                    |
| PYSE1-S12-S24-D              | 12            | 10.8~13.2      | 24                      | 5              | 42          | 1                          | 100   | 81                                    |
| PYSE1-S15-S5-D <sup>3</sup>  | 15            | 13.5~16.5      | 5                       | 20             | 200         | 1                          | 75  | 80                                    |
| PYSE1-S15-S9-D <sup>3</sup>  | 15            | 13.5~16.5      | 9                       | 12             | 111         | 1                          | 75  | 80                                    |
| PYSE1-S15-S15-D <sup>3</sup> | 15            | 13.5~16.5      | 15                      | 7              | 67          | 1                          | 75  | 81                                    |
| PYSE1-S24-S3-D               | 24            | 21.6~26.4      | 3.3                     | 30             | 303         | 1                          | 75  | 75                                    |
| PYSE1-S24-S5-D               | 24            | 21.6~26.4      | 5                       | 20             | 200         | 1                          | 75  | 79                                    |
| PYSE1-S24-S9-D <sup>3</sup>  | 24            | 21.6~26.4      | 9                       | 12             | 111         | 1                          | 75  | 80                                    |
| PYSE1-S24-S12-D              | 24            | 21.6~26.4      | 12                      | 9              | 83          | 1                          | 75  | 81                                    |
| PYSE1-S24-S15-D              | 24            | 21.6~26.4      | 15                      | 7              | 67          | 1                          | 75  | 81                                    |
| PYSE1-S24-S24-D              | 24            | 21.6~26.4      | 24                      | 5              | 42          | 1                          | 100   | 81                                    |

Notes: 1. Ripple and noise are measured using the parallel cable method at 20 MHz bandwidth.  
 2. Efficiency is measured in nominal input voltage and rated output load.  
 3. Model is not UL or CE certified.

**PART NUMBER KEY**


**INPUT**

| parameter            | conditions/description  | min                        | typ | max  | units |
|----------------------|-------------------------|----------------------------|-----|------|-------|
| input voltage        | 12 Vdc input models     | 10.8                       | 12  | 13.2 | Vdc   |
|                      | 15 Vdc input models     | 13.5                       | 15  | 16.5 | Vdc   |
|                      | 24 Vdc input models     | 21.6                       | 24  | 26.4 | Vdc   |
| filter               | capacitance filter      |                            |     |      |       |
| current <sup>3</sup> | 12 Vdc input models     | 3.3 Vdc output models      |     | 118  | mA    |
|                      |                         | 5, 9, 12 Vdc output models |     | 110  | mA    |
|                      |                         | 15, 24 Vdc output models   |     | 109  | mA    |
|                      | 15 Vdc input models     | 5, 9 Vdc output models     |     | 88   | mA    |
| 15 Vdc output models |                         | 87                         | mA  |      |       |
| 24 Vdc input models  | 3.3 Vdc output models   |                            | 61  | mA   |       |
|                      | 5 Vdc output models     |                            | 58  | mA   |       |
|                      | 9 Vdc output models     |                            | 57  | mA   |       |
|                      | all other output models |                            | 56  | mA   |       |

Note: 3. At full load.

**OUTPUT**

| parameter               | conditions/description       | min                     | typ   | max   | units |
|-------------------------|------------------------------|-------------------------|-------|-------|-------|
| output capacitance      | 3.3, 5 Vdc output models     |                         |       | 2,400 | μF    |
|                         | 9 Vdc output models          |                         |       | 1,200 | μF    |
|                         | 12, 15 Vdc output models     |                         |       | 560   | μF    |
|                         | 24 Vdc output models         |                         |       | 220   | μF    |
| voltage accuracy        | see output regulation curves |                         |       |       |       |
| line regulation         | input voltage change: ±1%    | 3.3 Vdc output models   |       | 1.5   | %     |
|                         |                              | all other output models |       | 1.2   | %     |
| load regulation         | 10% ~ 100% load              | 3.3 Vdc output models   |       | 20    | %     |
|                         |                              | 5 Vdc output models     |       | 15    |       |
|                         |                              | all other output models |       | 10    |       |
| switching frequency     | at full load, nominal input  |                         | 260   |       | kHz   |
| temperature coefficient | at full load                 |                         | ±0.02 |       | %/°C  |

**PROTECTIONS**

| parameter                | conditions/description    | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| short circuit protection | continuous, auto recovery |     |     |     |       |

**SOLDERABILITY**

| parameter                            | conditions/description                                 | min | typ | max | units |
|--------------------------------------|--|-----|-----|-----|-------|
| pin soldering resistance temperature | soldering spot is 1.5 mm away from case for 10 seconds |     |     | 260 | °C    |

## SAFETY AND COMPLIANCE

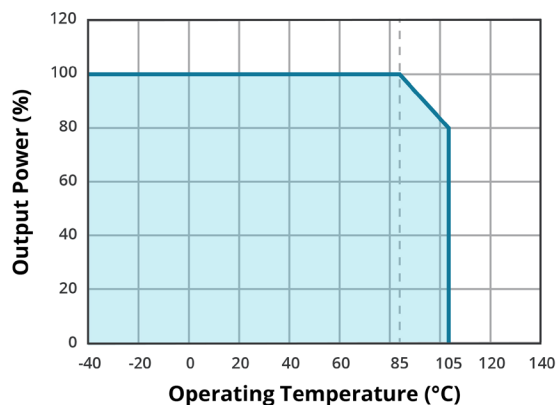
| parameter             | conditions/description                                      | min   | typ | max | units   |
|-----------------------|---|-------|-----|-----|---------|
| isolation voltage     | input to output for 1 minute at 1 mA                        | 1,500 |     |     | Vdc     |
| isolation resistance  | input to output at 500 Vdc                                  | 1,000 |     |     | MΩ      |
| isolation capacitance | input to output, 100 kHz / 0.1 V                            |       | 20  |     | pF      |
| safety approvals      | certified to 62368: UL<br>designed to meet 62368: EN, BS EN |       |     |     |         |
| conducted emissions   | CISPR 32/EN 55032 Class B                                   |       |     |     |         |
| radiated emissions    | CISPR 32/EN 55032 Class B                                   |       |     |     |         |
| ESD                   | IEC/EN 61000-4-2 Air ±8kV, Contact ±6kV                     |       |     |     |         |
| MTBF                  | as per MIL-HDBK-217F, 25°C                                  | 3,500 |     |     | K hours |
| RoHS                  | yes   |       |     |     |         |

## ENVIRONMENTAL

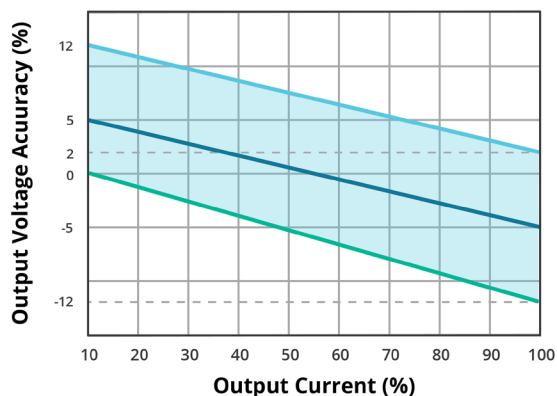
| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curve     | -40 |     | 105 | °C    |
| storage temperature   |                        | -55 |     | 125 | °C    |
| storage humidity      | non-condensing         | 5   |     | 95  | %     |
| vibration             | 10~150 Hz              |     |     | 5   | G     |

## DERATING CURVES

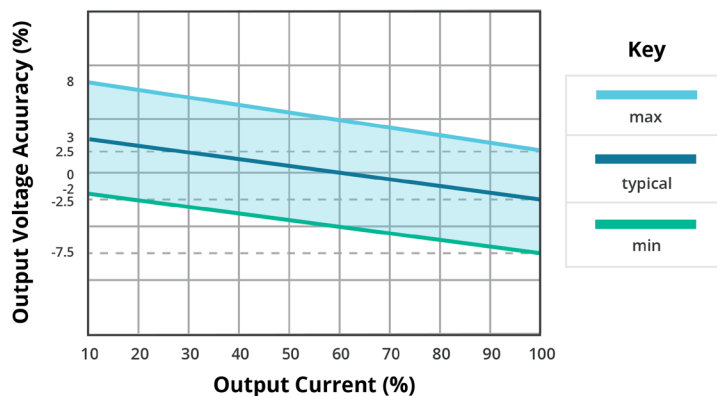
**TEMPERATURE DERATING CURVE**



**OUTPUT REGULATION CURVE  
3.3 Vdc output model  
(nominal input)**

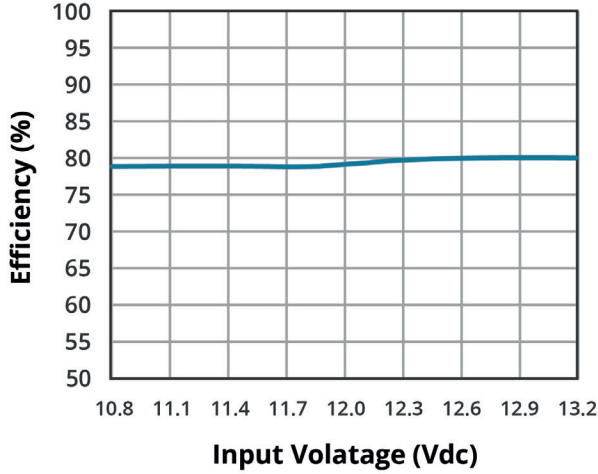


**OUTPUT REGULATION CURVE  
all other output models  
(nominal input)**

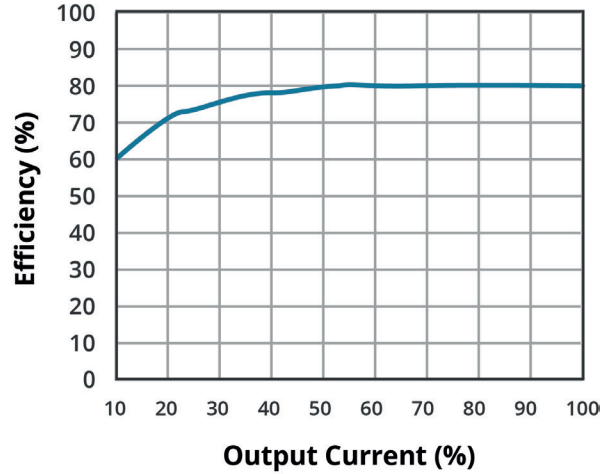


## EFFICIENCY CURVES

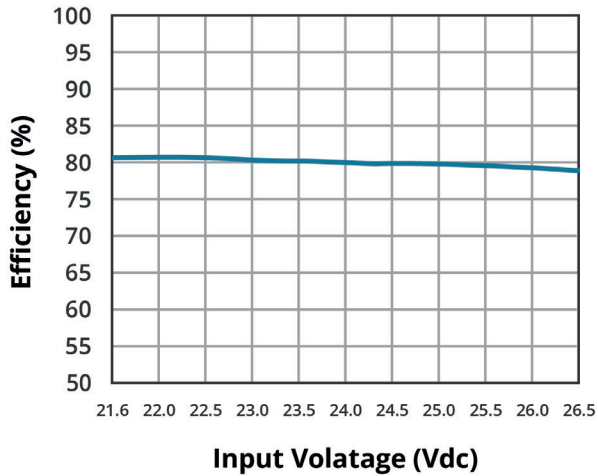
**EFFICIENCY VS INPUT VOLTAGE**  
**PYSE1-S12-S5-D**  
*(full load)*



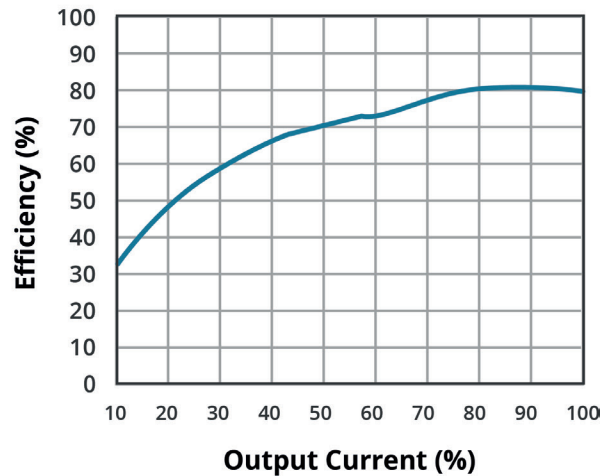
**EFFICIENCY VS OUTPUT LOAD**  
**PYSE1-S12-S5-D**  
*(Vin = 12 Vdc)*



**EFFICIENCY VS INPUT VOLTAGE**  
**PYSE1-S24-S5-D**  
*(full load)*



**EFFICIENCY VS OUTPUT LOAD**  
**PYSE1-S24-S5-D**  
*(Vin = 24 Vdc)*



## MECHANICAL

| parameter     | conditions/description                                       | min | typ | max | units |
|---------------|--|-----|-----|-----|-------|
| dimensions    | 12.70 x 10.16 x 8.20 [0.5 x 0.4 x 0.322 inch]                |     |     |     | mm    |
| case material | black plastic, flame-retardant and heat-resistant (UL94 V-0) |     |     |     |       |
| weight        |  |     | 1.8 |     | g     |

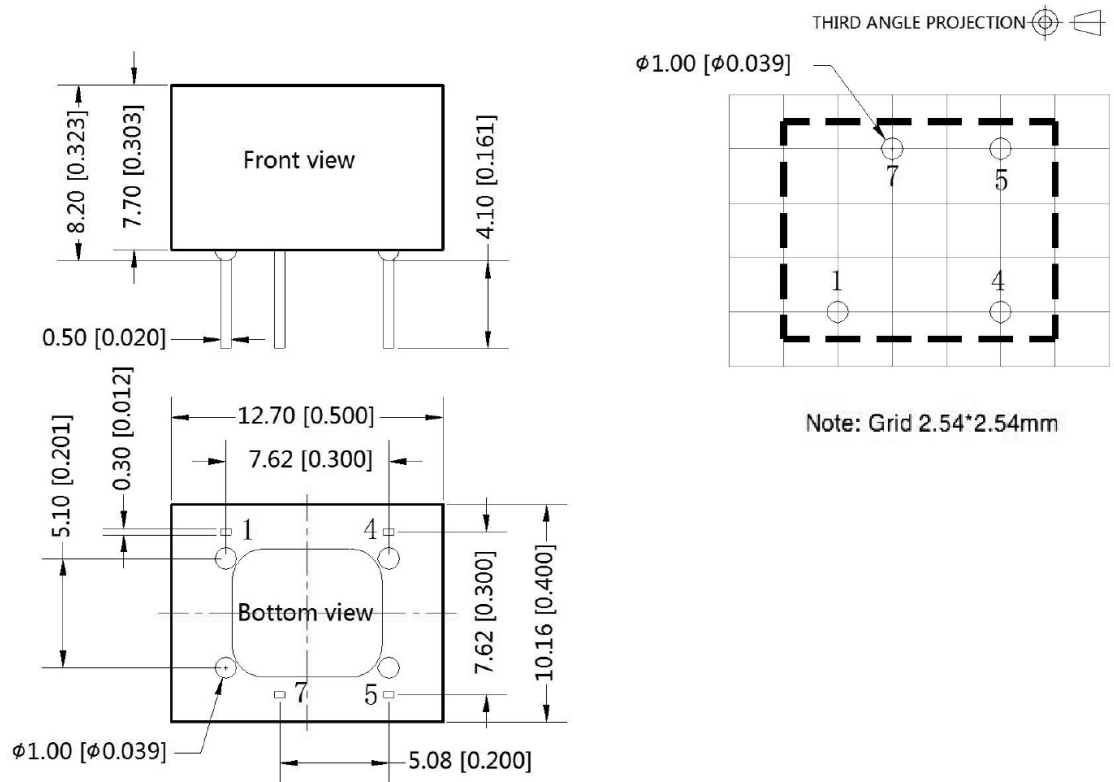
## MECHANICAL DRAWING

units: mm [inch]

tolerance:  $\pm 0.25$  [ $\pm 0.010$ ]

pin diameter tolerance:  $\pm 0.10$  [ $\pm 0.004$ ]

| PIN Out |          |
|---------|----------|
| PIN     | Function |
| 1       | GND      |
| 4       | Vin      |
| 5       | +Vo      |
| 7       | 0V       |



## APPLICATION CIRCUIT

Input and/or output ripple can be further reduced by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 1.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

Figure 1

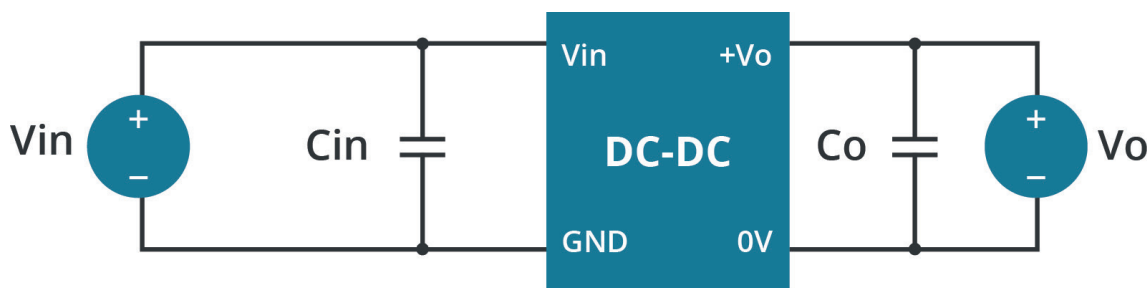


Table 1

| Vin (Vdc) | Cin (μF/V) | Vo (Vdc) | Cout (μF/V) |
|-----------|------------|----------|-------------|
| 12        | 2.2/25     | 3.3/5    | 10/16       |
| 15        | 2.2/25     | 9        | 4.7/25      |
| 24        | 1/50       | 12       | 2.2/25      |
| -         |            | 15/24    | 1/50        |

## EMC RECOMMENDED CIRCUIT

Figure 2

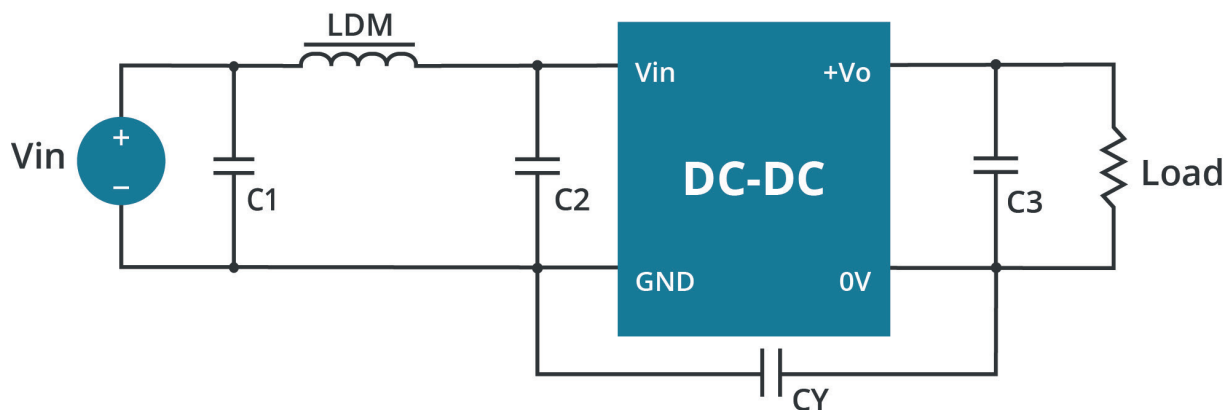


Table 2

| Recommended External Circuit Components |       |                          |
|---|-------|--------------------------|
| EMI                                     | C1/C2 | 4.7μF/50V                |
|   | C3    | Refer to the Co in Fig.1 |
|   | LDM   | 6.8μH                    |
|   | CY    | 270pF/2kVdc              |

## REVISION HISTORY

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| rev. | description             | date       |
|------|-------------------------|------------|
| 1.0  | initial release         | 06/21/2021 |
| 1.01 | CE certification updted | 12/16/2022 |

The revision history provided is for informational purposes only and is believed to be accurate.



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