

## 115W to 300W, 9 to 36V or 18 to 75 V Input Non-Isolated 1 x 1" DC-DC Buck-Boost Converters



Industrial

COTS

Test

COMM

Broadcast

Robotics



The i1C series are non-isolated buck-boost DC-DC converters that deliver up to 300W in a compact and familiar industry standard 1 x 1 inch footprint. Operating from either a 9-36V or 18-75V input, it comes with a wide adjustable output of 3.3 up to 60V that can support multiple system load voltages, minimizing part number variations. Encased in a 5-sided metal case that supports -40 to 120°C case temperature operation along with its remarkable 98% efficiency, the i1C series provides a higher power migration path in applications where space is at a premium.

| Features                                                 | Benefits                                                                      |
|----------------------------------------------------------|-------------------------------------------------------------------------------|
| • Up to 300W in a 1 x 1 inch Industry Standard Footprint | • High Power Density, Less Board Area Needed                                  |
| • Encapsulated in a 5-sided metal case                   | • Improves EMI                                                                |
| • 120°C maximum case temperature                         | • Rugged deployment in harsh environment with high shock & vibration exposure |
| • Efficiency - Up to 98%                                 | • Longer Battery Life / Low Power Consumed                                    |
| • Wide Output Adjustment from 3.3V up to 60V             | • One Part Supports Multiple System Voltages                                  |
| • Wide Input Range                                       | • Can Operate from Different DC Input Source Voltages                         |

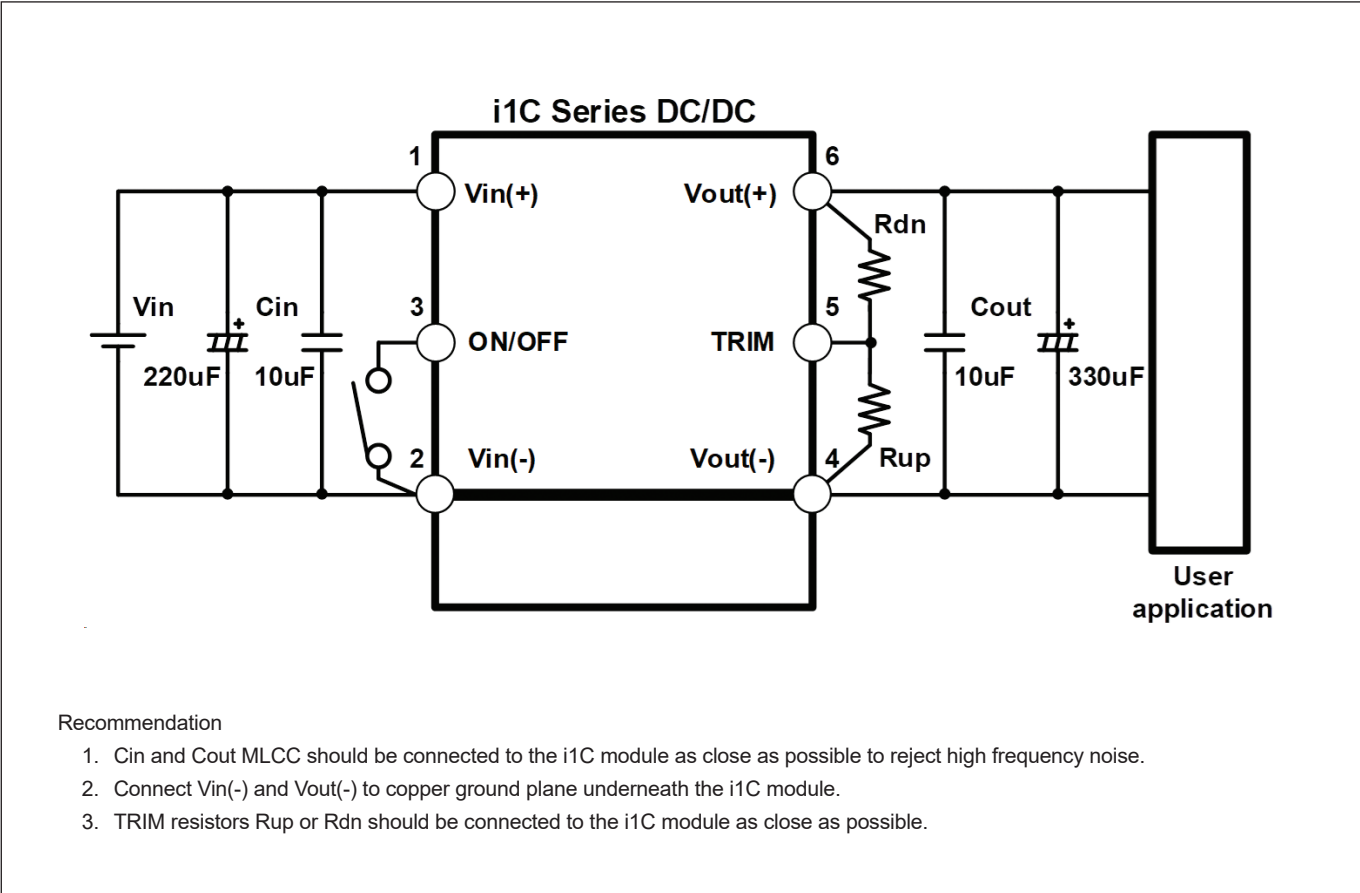
| Model Selector                      |                   |                            |                                     |                 |               |                     |            |
|-------------------------------------|-------------------|----------------------------|-------------------------------------|-----------------|---------------|---------------------|------------|
| Model                               | Input Voltage (V) | Nominal Output Voltage (V) | Output Voltage Adjustment Range (V) | Max Current (A) | Max Power (W) | Remote On/Off Logic | Pin Length |
| <a href="#">i1C2W010A120V-000-R</a> | 9 - 36            | 12                         | 9.6 - 28                            | 10              | 200           | Positive            | 0.145"     |
| <a href="#">i1C2W010A120V-001-R</a> | 9 - 36            | 12                         | 9.6 - 28                            | 10              | 200           | Negative            | 0.145"     |
| <a href="#">i1C2W010A120V-004-R</a> | 9 - 36            | 12                         | 9.6 - 28                            | 10              | 200           | Positive            | 0.220"     |
| <a href="#">i1C2W010A120V-005-R</a> | 9 - 36            | 12                         | 9.6 - 28                            | 10              | 200           | Negative            | 0.220"     |
| <a href="#">i1C2W012A050V-000-R</a> | 9 - 36            | 5                          | 3.3 - 9.6                           | 12              | 115           | Positive            | 0.145"     |
| <a href="#">i1C2W012A050V-001-R</a> | 9 - 36            | 5                          | 3.3 - 9.6                           | 12              | 115           | Negative            | 0.145"     |
| <a href="#">i1C2W012A050V-004-R</a> | 9 - 36            | 5                          | 3.3 - 9.6                           | 12              | 115           | Positive            | 0.220"     |
| <a href="#">i1C2W012A050V-005-R</a> | 9 - 36            | 5                          | 3.3 - 9.6                           | 12              | 115           | Negative            | 0.220"     |
| <a href="#">i1C4W006A280V-000-R</a> | 18 - 75           | 28                         | 28 - 60                             | 6               | 300           | Positive            | 0.145"     |
| <a href="#">i1C4W006A280V-001-R</a> | 18 - 75           | 28                         | 28 - 60                             | 6               | 300           | Negative            | 0.145"     |
| <a href="#">i1C4W006A280V-004-R</a> | 18 - 75           | 28                         | 28 - 60                             | 6               | 300           | Positive            | 0.220"     |
| <a href="#">i1C4W006A280V-005-R</a> | 18 - 75           | 28                         | 28 - 60                             | 6               | 300           | Negative            | 0.220"     |
| <a href="#">i1C4W010A120V-000-R</a> | 18 - 75           | 12                         | 9.6 - 28                            | 10              | 200           | Positive            | 0.145"     |
| <a href="#">i1C4W010A120V-001-R</a> | 18 - 75           | 12                         | 9.6 - 28                            | 10              | 200           | Negative            | 0.145"     |
| <a href="#">i1C4W010A120V-004-R</a> | 18 - 75           | 12                         | 9.6 - 28                            | 10              | 200           | Positive            | 0.220"     |
| <a href="#">i1C4W010A120V-005-R</a> | 18 - 75           | 12                         | 9.6 - 28                            | 10              | 200           | Negative            | 0.220"     |

Consult Technical Support for Availability.

| Related Products                      |                                     |                                                                                                         |
|---------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------|
| Type                                  | Part Number                         | Description                                                                                             |
| Isolated DC-DC Converter              | <a href="#">CCG</a>                 | 15-30W 1 x 1 inch Footprint, Input 9-36V or 18-76V, 3.3 to 30V single or dual outputs                   |
| Ruggedized DC-DC Buck Converter       | <a href="#">RGA</a>                 | 250W, Input 9-40V and Output 3.3-24V or, 9-53V Input and 3.3V up to 40V Output                          |
| Ruggedized DC-DC Buck Converter       | <a href="#">RGB</a>                 | 400-750W, Input 9-18V, 18-32V, 18-60V; Output 0.8-8V 60A, 3.3-18V 45A, 3.3-24V 33A                      |
| Ruggedized DC-DC Buck-Boost Converter | <a href="#">RGC</a>                 | 300W, Input 9-53V, Output 9.6-48V 8A or 5-28V 12.5A                                                     |
| DC-DC Buck-Boost Converter            | <a href="#">i7C</a>                 | 300W, Input 9-53V or 9-36V, Output 9.6-48V 8A, 5-28V 12.5A or 8-24V 20A                                 |
| DC-DC Buck Converter                  | <a href="#">i7A</a>                 | 400-750W, Input 9-18V, 18-32V, 18-60V, 28-60V; Output 0.8-8V 60A, 3.3-18V 45A, 3.3-24V 33A, 3.3-32V 20A |
| DC-DC Buck Converter                  | <a href="#">i6A4W</a>               | 250W, Input 9 -53V, Output 3.3-40V 10A or 3.3-15V 20A                                                   |
| Isolated DC-DC Converter              | <a href="#">GQA</a>                 | 120W Industrial, Input 9-36V, Isolated Quarter Brick                                                    |
| EMI Filter Module                     | <a href="#">RGE</a>                 | 80V, 20A or 40A Differential Mode Filter Module                                                         |
| ORing FET Module                      | <a href="#">i1R</a>                 | 60V/60A; 30V/80A ORing FET (Ideal Diode) Module                                                         |
| Evaluation Board                      | <a href="#">i1C2W12A-C01-EVK-S1</a> | Evaluation board with i1C2W012A050V-001-R                                                               |
| Evaluation Board                      | <a href="#">i1C2W10A-C01-EVK-S1</a> | Evaluation board with i1C2W010A120V-001-R                                                               |
| Evaluation Board                      | <a href="#">i1C4W06A-C01-EVK-S1</a> | Evaluation board with i1C4W006A280V-001-R                                                               |
| Evaluation Board                      | <a href="#">i1C4W10A-C01-EVK-S1</a> | Evaluation board with i1C4W010A120V-001-R                                                               |

Consult Technical Support for Availability.

Typical Application Circuit



| Specification                                          |        |                                                                            |                           |                           |                                 |               |
|--------------------------------------------------------|--------|----------------------------------------------------------------------------|---------------------------|---------------------------|---------------------------------|---------------|
| Model                                                  |        | i1C2W010A120V                                                              |                           | i1C2W012A050V             | i1C4W010A120V                   | i1C4W006A280V |
| Input                                                  |        |                                                                            |                           |                           |                                 |               |
| Operating Voltage Range                                | Vdc    | 9 - 36                                                                     |                           |                           | 18 - 75                         |               |
| Continuous Input Voltage                               | Vdc    | -0.25 to 40                                                                |                           |                           | -0.25 to 80                     |               |
| Input Current (max)                                    | A      | 20 (Vin,min to Vin,max, Po,max)                                            |                           |                           | 15 (Vin,min to Vin,max, Po,max) |               |
| Standby Input Current                                  | mA     | 2 (Vin,nom, Remote ON/OFF = OFF)                                           |                           |                           |                                 |               |
| No Load Input Current (typical)                        | mA     | 40                                                                         | 21                        | 27                        |                                 |               |
| Turn-ON Input Voltage                                  | Vdc    | 8.2                                                                        |                           |                           | 15.3                            |               |
| Turn-OFF Input Voltage                                 | Vdc    | 7.7                                                                        |                           |                           | 14.3                            |               |
| Efficiency (typical)                                   | %      | 98                                                                         | 94                        | 97                        | 98                              |               |
| Safety Certifications and Markings                     | -      | CE Mark and UKCA Mark                                                      |                           |                           |                                 |               |
| Output                                                 |        |                                                                            |                           |                           |                                 |               |
| Output Voltage Initial Setpoint                        | %      | ±2                                                                         |                           |                           |                                 |               |
| Output Voltage Tolerance                               | %      | ±4 (Over all Line, Load, and Temperature conditions to end of life)        |                           |                           |                                 |               |
| Output Voltage Adjustment Range <sup>(2)</sup>         | Vdc    | 9.6 - 28                                                                   | 3.3 - 9.6                 | 9.6 - 28                  | 28 - 60                         |               |
|                                                        |        | (Refer to Product Specifications for Output Trim Equation)                 |                           |                           |                                 |               |
| Line Regulation                                        | %      | 0.2                                                                        |                           |                           |                                 |               |
| Load Regulation                                        | %      | 0.5                                                                        |                           |                           |                                 |               |
| Ripple & Noise (typical) <sup>(3)</sup> Step Down/Buck | mVpp   | 150 (24Vin, 12Vo, 10A)                                                     | 60 (24Vin, 5Vo, 12A)      | 50 (24Vin, 12Vo, 10A)     | 40 (48Vin, 28Vo, 6A)            |               |
|                                                        | mVpp   | 240 (12Vin, 24Vo, 4.6A)                                                    | NA                        | 160 (18Vin, 24Vo, 4.6A)   | 450 (18Vin, 48Vo, 3A)           |               |
| Step Up/Boost                                          |        |                                                                            |                           |                           |                                 |               |
| Output Current <sup>(2)</sup>                          | A      | 0 - 10                                                                     | 0 - 12                    | 0 - 10                    | 0 - 6                           |               |
| Over Current Protection Threshold (typ)                | A      | 14                                                                         | 16.5                      | 14                        | 8                               |               |
| Short Circuit Current (Vo = 0.25V)                     | A      | 12                                                                         | 14.5                      | 14                        | 7.5                             |               |
| External Load Capacitance                              | uF     | 100 - 3000 <sup>(4)</sup>                                                  | 330 - 3000 <sup>(4)</sup> | 100 - 3000 <sup>(4)</sup> | 220 - 2200 <sup>(4)</sup>       |               |
| Switching Frequency                                    | kHz    | 250                                                                        |                           |                           |                                 |               |
| Overtemperature Protection                             | °C     | Yes                                                                        |                           |                           |                                 |               |
| Remote On/Off                                          | -      | Positive (-000-R, -004-R suffix) or Negative (-001-R, -005-R suffix) Logic |                           |                           |                                 |               |
| Remote Sense                                           | -      | NA                                                                         |                           |                           |                                 |               |
| Environmental                                          |        |                                                                            |                           |                           |                                 |               |
| Operating Temperature (Tcase)                          | °C     | -40 to 120                                                                 |                           |                           |                                 |               |
| Storage Temperature                                    | °C     | -55 to 125                                                                 |                           |                           |                                 |               |
| Humidity (non condensing)                              | %RH    | 10 - 95                                                                    |                           |                           |                                 |               |
| Cooling                                                | -      | Conduction Cooling (Convection or Forced Air Cooling possible)             |                           |                           |                                 |               |
| Shock                                                  | -      | MIL-STD-810G, Method 516.6 Procedure I                                     |                           |                           |                                 |               |
| Vibration                                              | -      | MIL-STD-810G, Method 514.6 Procedure I, Category 4                         |                           |                           |                                 |               |
| Thermal Cycling Test (TCT)                             | -      | 700 cycles / -40 to 125°C, 60°C/minute ramp, 30-minute dwell time          |                           |                           |                                 |               |
| Other                                                  |        |                                                                            |                           |                           |                                 |               |
| Weight (typ / max)                                     | g      | 20 / 30                                                                    |                           |                           |                                 |               |
| Size (LxWxH)                                           | mm     | 26.42 x 26.42 x 10.2                                                       |                           |                           |                                 |               |
| Size (LxWxH)                                           | Inches | 1.04 x 1.04 x 0.40                                                         |                           |                           |                                 |               |
| Through Hole Pin Length Options                        |        | Refer to Model Selector Table                                              |                           |                           |                                 |               |
| MTBF - Telcordia SR-332 (100% Load, 40°C)              | MHrs   | > 23                                                                       |                           |                           |                                 |               |
| Warranty                                               | yrs    | 3                                                                          |                           |                           |                                 |               |

#### Notes

(1) Typical specification unless otherwise indicated. See website for detailed product [specifications](#).

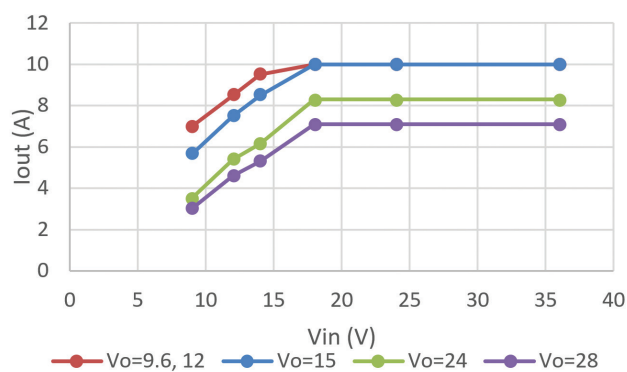
(2) Observe maximum power limit. Allowable output current varies with input voltage.

(3) Measured with one 330 µF electrolytic and 22 µF ceramic capacitors, BW = 20MHz.

(4) Contact technical support for very low ESR capacitor banks or if higher capacitance is required.

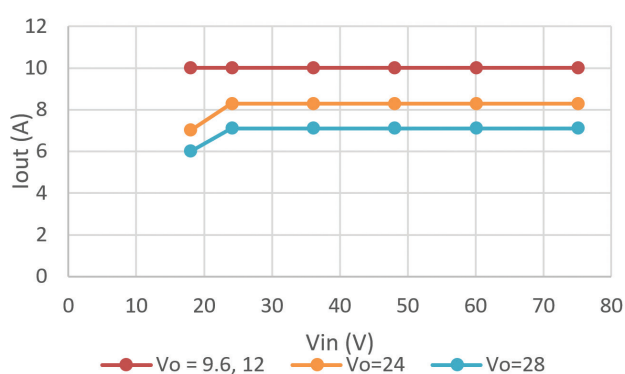
## Input vs. Output Operating Range

i1C2W010A120V-xxx-R

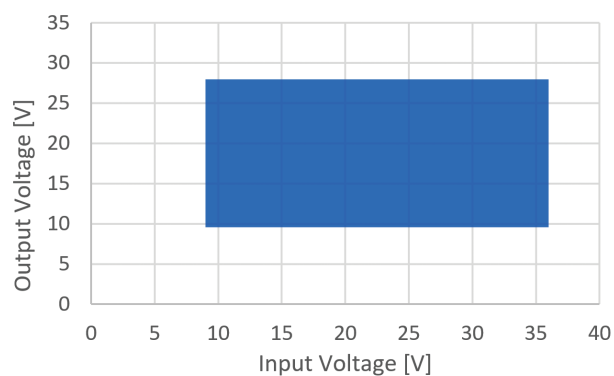


Input Voltage vs. Output Current operating range.

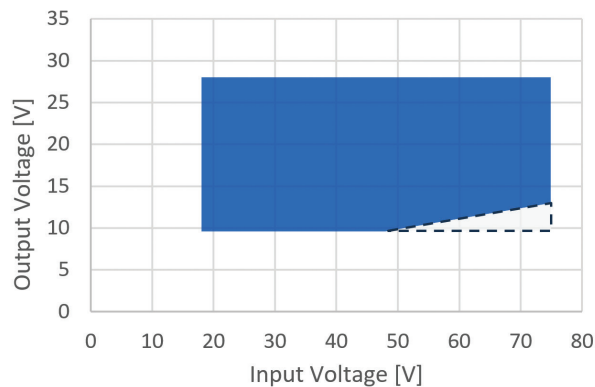
i1C4W010A120V-xxx-R



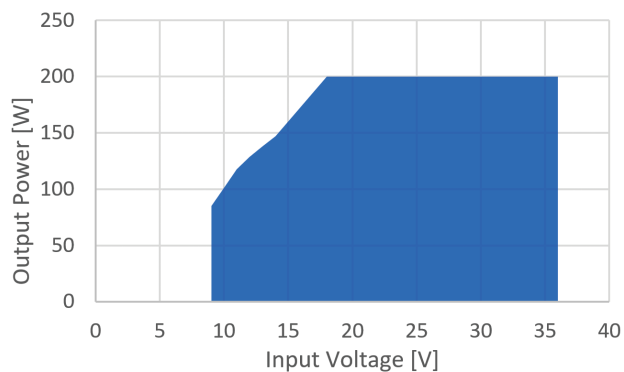
Input Voltage vs. Output Current operating range.



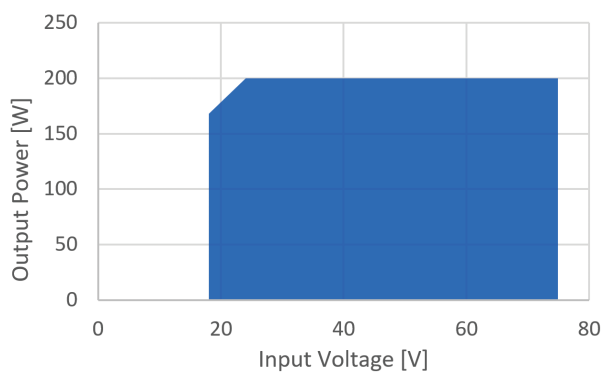
Input Voltage vs. Output Voltage operating range.



Input Voltage vs. Output Voltage operating range.  
Operating the unit in the unspecified region indicated by the dashed lines will not damage the unit, though at light loads can lead to increased output ripple and/or poor regulation.



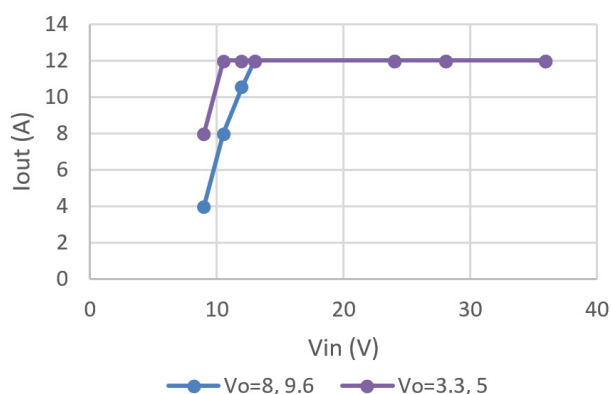
Input Voltage vs. Output Power operating range.



Input Voltage vs. Output Power operating range.

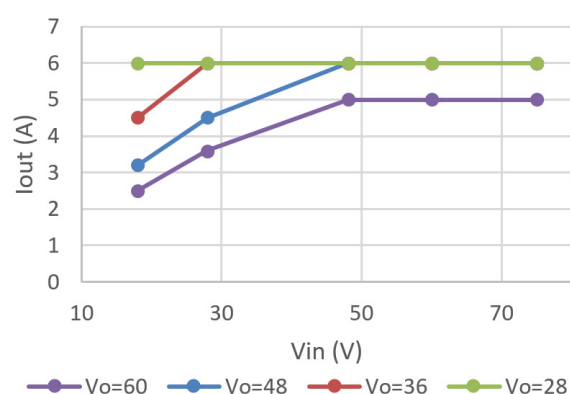
## Input vs. Output Operating Range

**i1C2W012A050V-xxx-R**

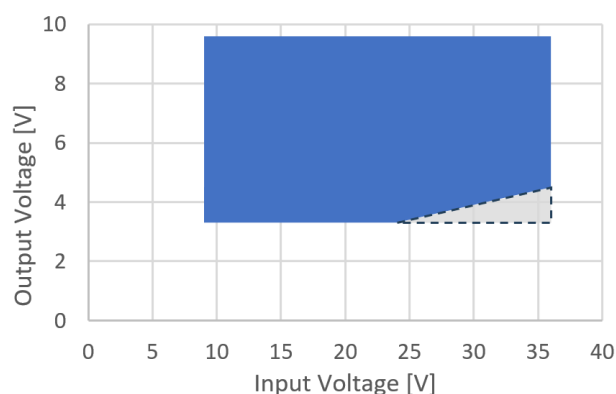


Input Voltage vs. Output Current operating range.

**i1C4W006A280V-xxx-R**

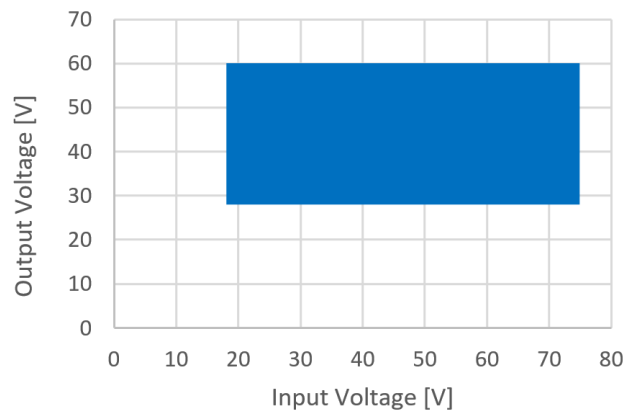


Input Voltage vs. Output Current operating range.

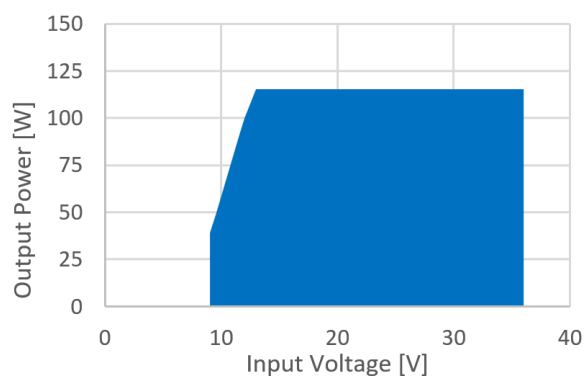


Input Voltage vs. Output Voltage operating range.

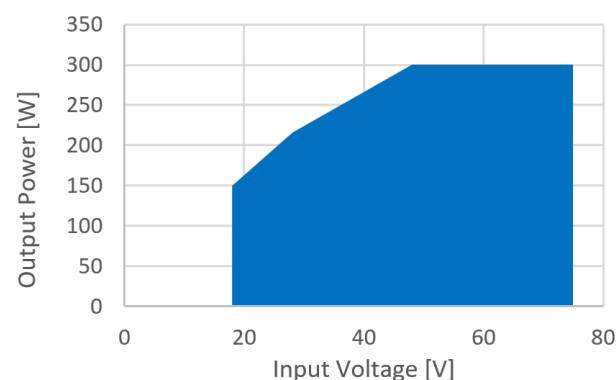
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Input Voltage vs. Output Voltage operating range.

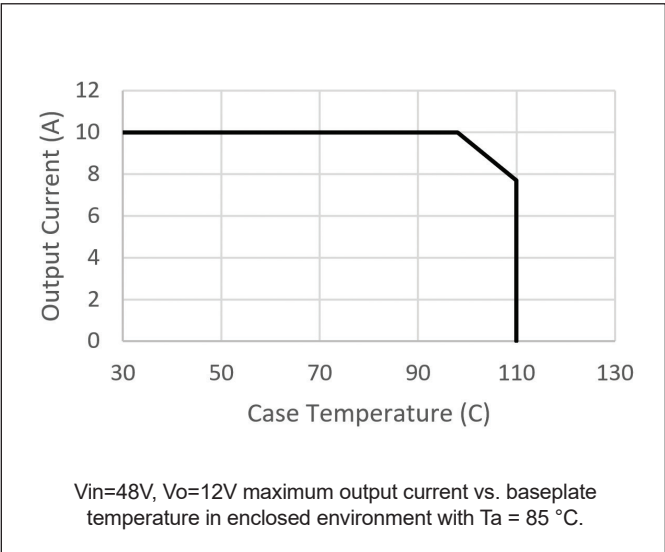
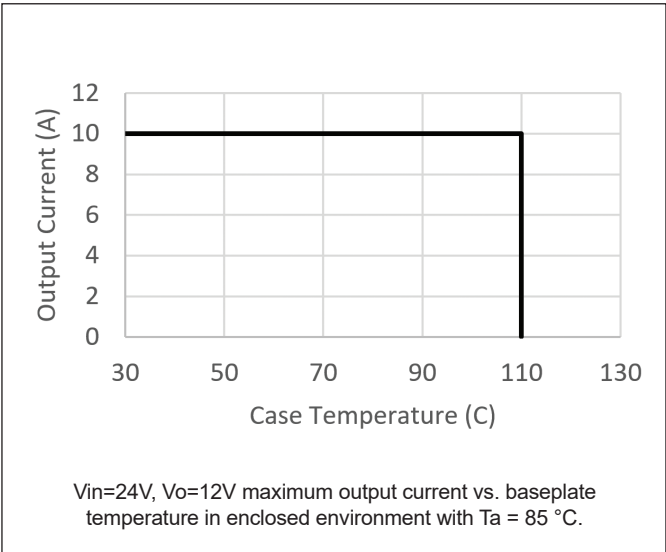
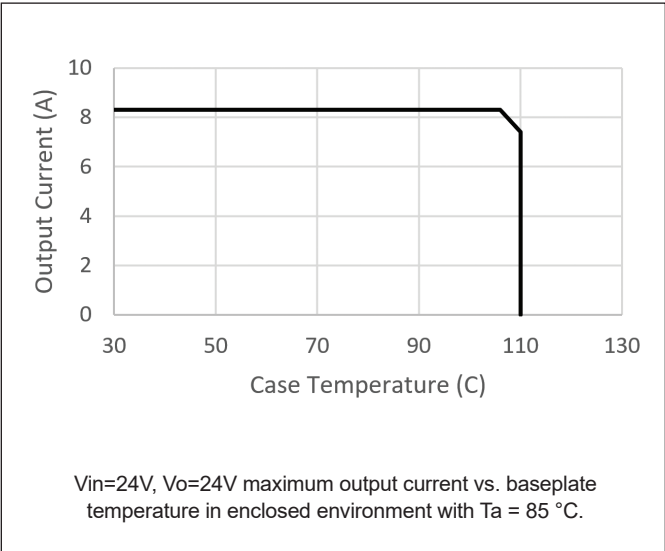
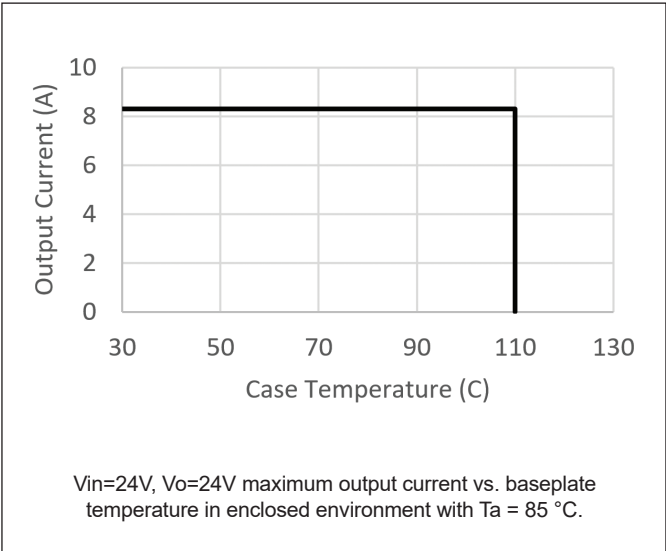
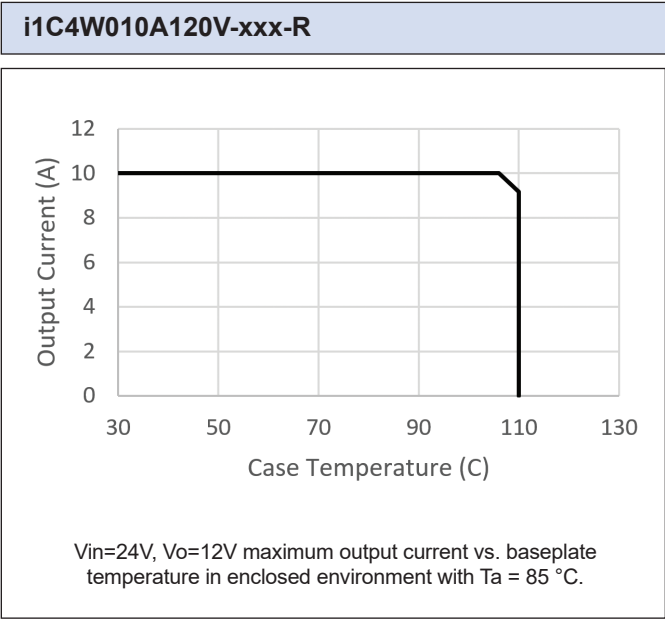
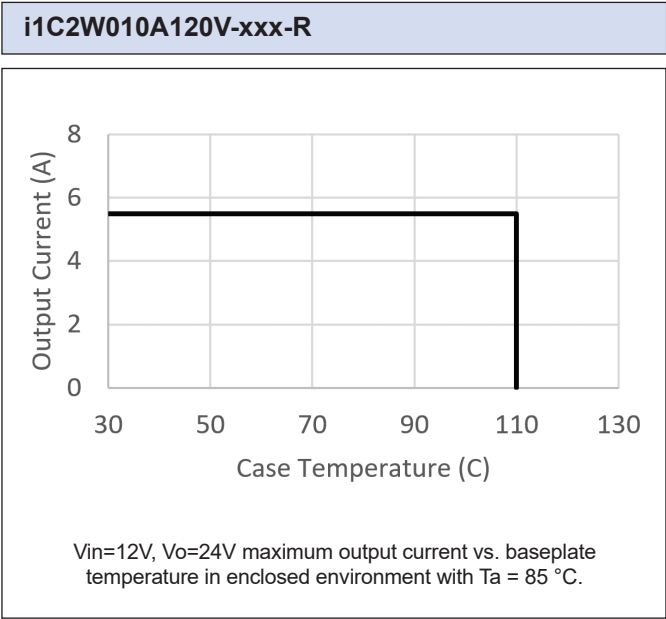


Input Voltage vs. Output Power operating range.



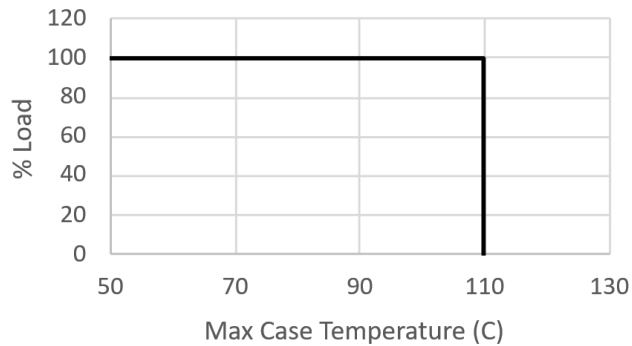
Input Voltage vs. Output Power operating range.

Typical Thermal Derating



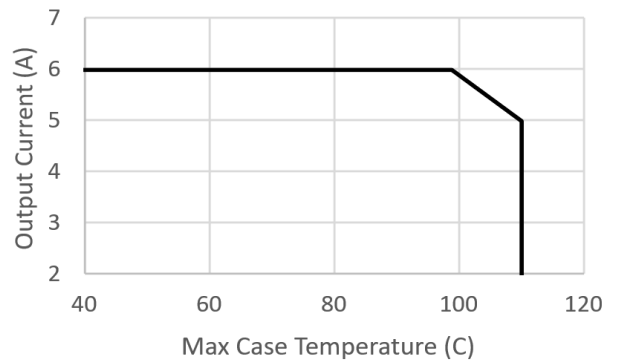
## Typical Thermal Derating

**i1C2W012A050V-xxx-R**

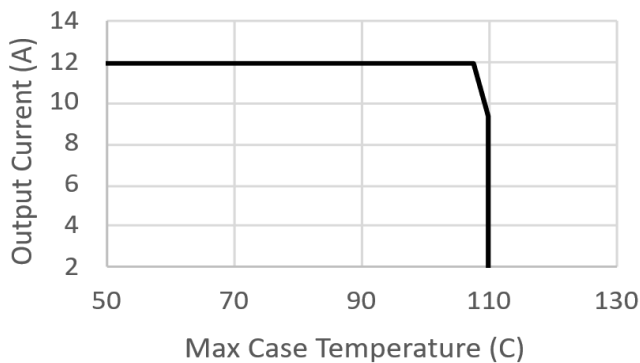


Maximum output current vs. baseplate temperature in enclosed environment with  $T_a = 85^\circ\text{C}$  for  $V_{in} < 24\text{V}$ ,  $V_o = \text{Any rated value}$ .

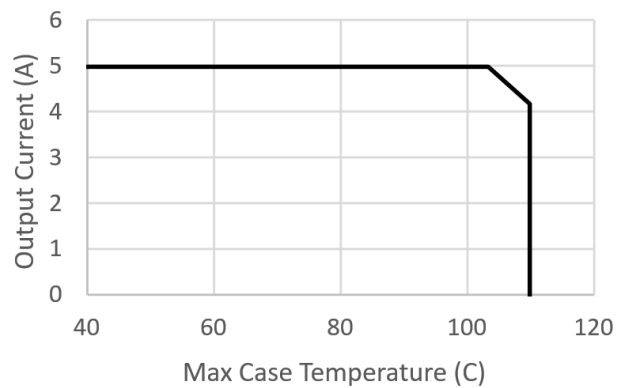
**i1C4W006A280V-xxx-R**



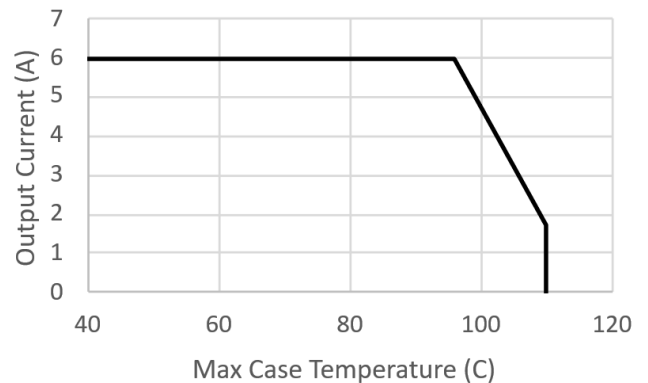
$V_{in}=18\text{V}$ ,  $V_o=28\text{V}$  maximum output current vs. baseplate temperature in enclosed environment with  $T_a = 85^\circ\text{C}$ .



Maximum output current vs. baseplate temperature in enclosed environment with  $T_a = 85^\circ\text{C}$  with  $V_{in} = 36\text{V}$ ,  $V_o = 8\text{V}$



$V_{in}=36\text{V}$ ,  $V_o=48\text{V}$  maximum output current vs. baseplate temperature in enclosed environment with  $T_a = 85^\circ\text{C}$ .

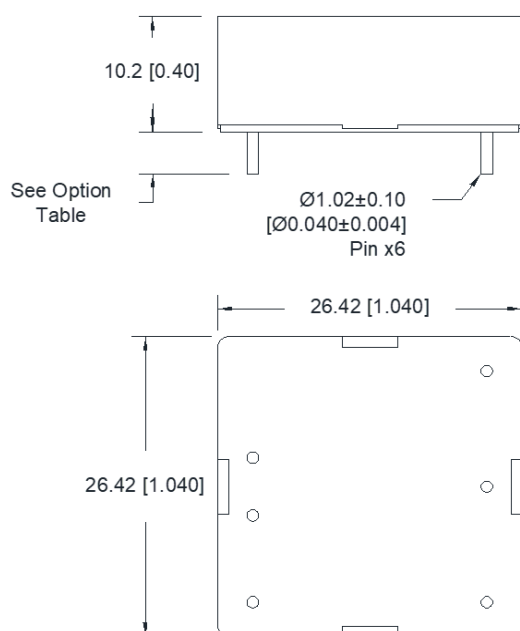


$V_{in}=75\text{V}$ ,  $V_o=28\text{V}$  maximum output current vs. baseplate temperature in enclosed environment with  $T_a = 85^\circ\text{C}$ .

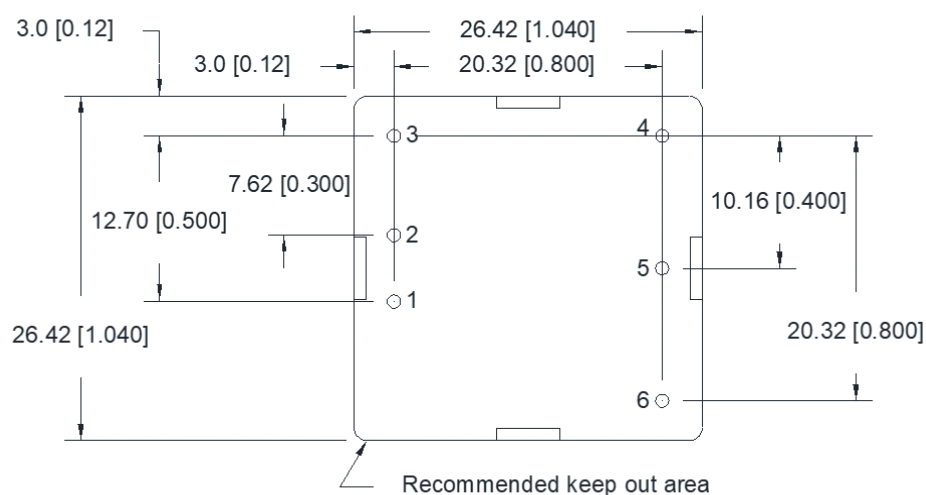
## Mechanical Specification

## Outline Drawing

Dimensions are in mm [in]. Unless otherwise specified.  
Tolerances are:  $x.x \pm 0.5$  [0.02] /  $x.xx \pm 0.25$  [0.010]



## Recommended PCB Hole Pattern (Top View)



## Pinout

| PIN | Function      | PIN | Function       | PIN | Function |
|-----|---------------|-----|----------------|-----|----------|
| 1   | Vin (+)       | 3   | ON/OFF         | 5   | TRIM     |
| 2   | Vin (-) / GND | 4   | Vout (-) / GND | 6   | Vout (+) |



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