https://product.tdk.com/en/power/i1c
www.emea.lambda.tdk.com/i1c

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
i1C2W010A120V-000-R	9 - 36	12	9.6 - 28	10	200	Positive	0.145"
i1C2W010A120V-001-R	9 - 36	12	9.6 - 28	10	200	Negative	0.145"
i1C2W010A120V-004-R	9 - 36	12	9.6 - 28	10	200	Positive	0.220"
i1C2W010A120V-005-R	9 - 36	12	9.6 - 28	10	200	Negative	0.220"
i1C2W012A050V-000-R	9 - 36	5	3.3 - 9.6	12	115	Positive	0.145"
i1C2W012A050V-001-R	9 - 36	5	3.3 - 9.6	12	115	Negative	0.145"
i1C2W012A050V-004-R	9 - 36	5	3.3 - 9.6	12	115	Positive	0.220"
i1C2W012A050V-005-R	9 - 36	5	3.3 - 9.6	12	115	Negative	0.220"
i1C4W006A280V-000-R	18 - 75	28	28 - 60	6	300	Positive	0.145"
i1C4W006A280V-001-R	18 - 75	28	28 - 60	6	300	Negative	0.145"
i1C4W006A280V-004-R	18 - 75	28	28 - 60	6	300	Positive	0.220"
i1C4W006A280V-005-R	18 - 75	28	28 - 60	6	300	Negative	0.220"
i1C4W010A120V-000-R	18 - 75	12	9.6 - 28	10	200	Positive	0.145"
i1C4W010A120V-001-R	18 - 75	12	9.6 - 28	10	200	Negative	0.145"
i1C4W010A120V-004-R	18 - 75	12	9.6 - 28	10	200	Positive	0.220"
i1C4W010A120V-005-R	18 - 75	12	9.6 - 28	10	200	Negative	0.220"

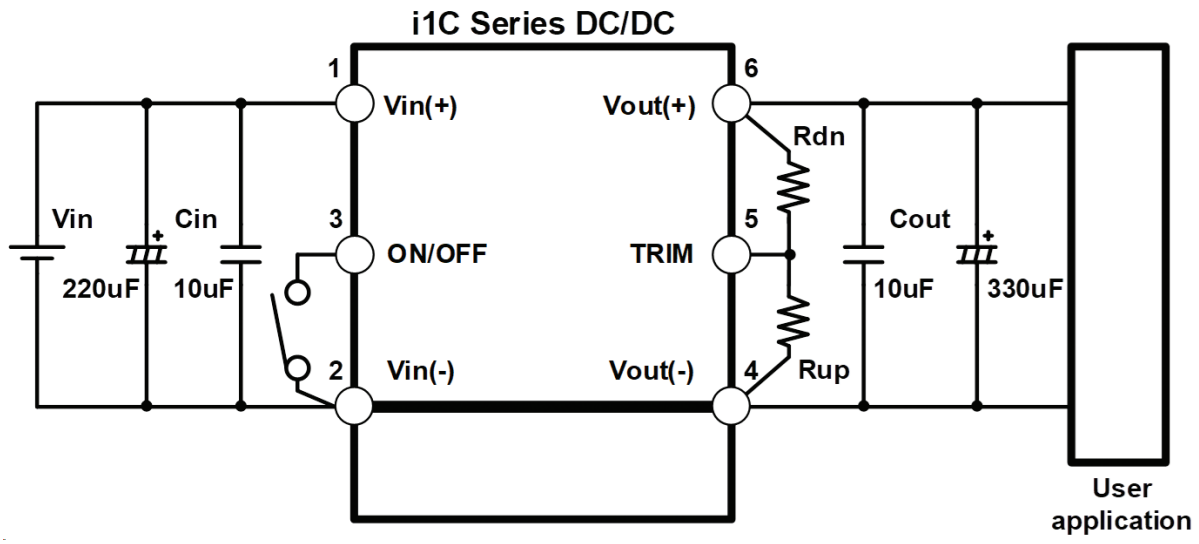
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Related Products

Type	Part Number	Description
Isolated DC-DC Converter	CCG	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	RGA	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	RGB	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	RGC	300W, Input 9-53V, Output 9.6-48V 8A or 5-28V 12.5A
DC-DC Buck-Boost Converter	i7C	300W, Input 9-53V or 9-36V, Output 9.6-48V 8A, 5-28V 12.5A or 8-24V 20A
DC-DC Buck-Boost / Pass-Through	i9C	1500W, Input 9-80V, Output 9.6-60V 30A, Programmable High Efficiency Pass-Through
DC-DC Buck Converter	i7A	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	i6A4W	250W, Input 9 -53V, Output 3.3-40V 10A or 3.3-15V 20A
Isolated DC-DC Converter	GQA	120W Industrial, Input 9-36V, Isolated Quarter Brick
EMI Filter Module	RGF	80V, 20A or 40A Differential Mode Filter Module
ORing FET Module	i1R	60V/60A; 30V/80A ORing FET (Ideal Diode) Module
Evaluation Board	i1C2W12A-C01-EVK-S1	Evaluation board with i1C2W012A050V-001-R
Evaluation Board	i1C2W10A-C01-EVK-S1	Evaluation board with i1C2W010A120V-001-R
Evaluation Board	i1C4W06A-C01-EVK-S1	Evaluation board with i1C4W006A280V-001-R
Evaluation Board	i1C4W10A-C01-EVK-S1	Evaluation board with i1C4W010A120V-001-R

Consult Technical Support for Availability.

Typical Application Circuit



Recommendation

1. Cin and Cout MLCC should be connected to the i1C module as close as possible to reject high frequency noise.
2. Connect Vin(-) and Vout(-) to copper ground plane underneath the i1C module.
3. TRIM resistors Rup or Rdn should be connected to the i1C module as close as possible.

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Specification

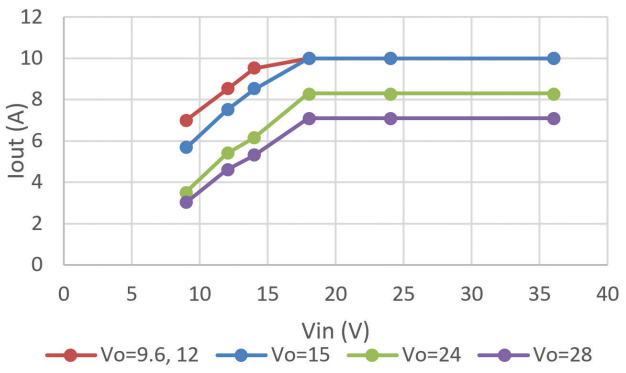
Model		i1C2W010A120V	i1C2W012A050V	i1C4W010A120V	i1C4W006A280V
Input					
Operating Voltage Range	Vdc	9 - 36		18 - 75	
Continuous Input Voltage	Vdc	-0.25 to 40		-0.25 to 80	
Input Current (max)	A	20 (Vin,min to Vin,max, Po,max)		15 (Vin,min to Vin,max, Po,max)	
Standby Input Current	mA	2 (Vin,nom, Remote 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	-	Designed to meet IEC62368-1, 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 [2]	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)[3] Step Down/Buck	mVpp	150 (24Vin, 12Vo, 10A)	60 (24Vin, 5Vo, 12A)	50 (24Vin, 12Vo, 10A)	40 (48Vin, 28Vo, 6A)
Step Up/Boost	mVpp	240 (12Vin, 24Vo, 4.6A)	NA	160 (18Vin, 24Vo, 4.6A)	450 (18Vin, 48Vo, 3A)
Output Current [2]	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 [4]	330 - 3000 [4]	100 - 3000 [4]	220 - 2200 [4]
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.

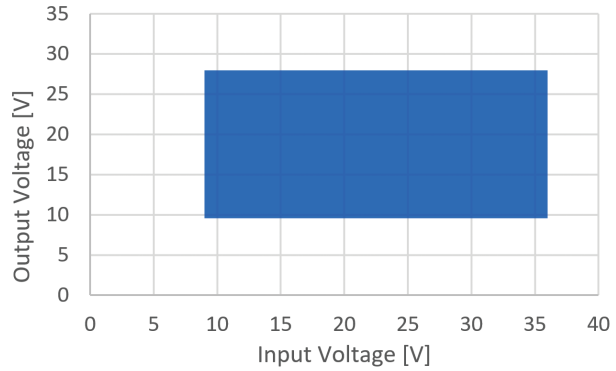
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Input vs. Output Operating Range

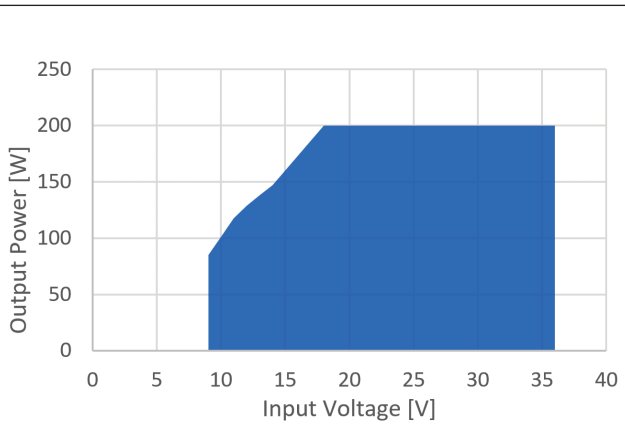
i1C2W010A120V-xxx-R



Input Voltage vs. Output Current operating range.

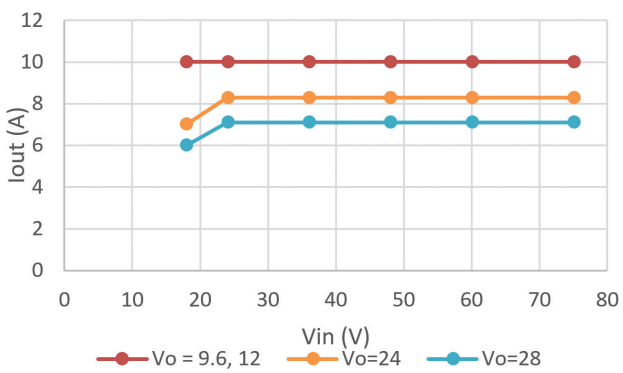


Input Voltage vs. Output Voltage operating range.

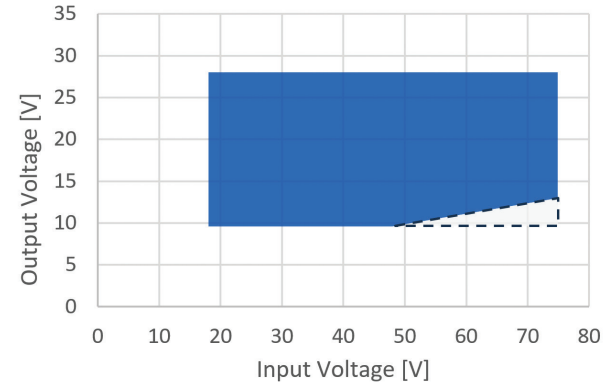


Input Voltage vs. Output Power operating range.

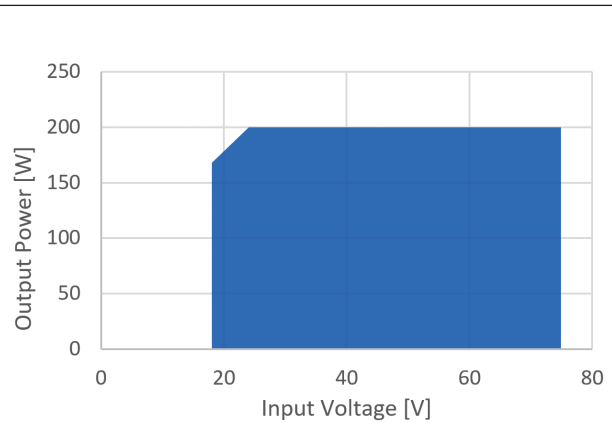
i1C4W010A120V-xxx-R



Input Voltage vs. Output Current 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.

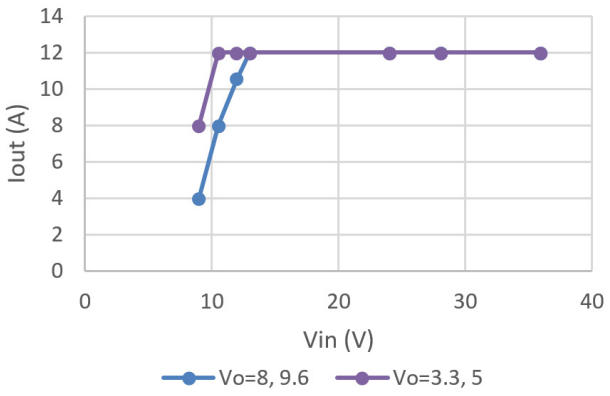


Input Voltage vs. Output Power operating range.

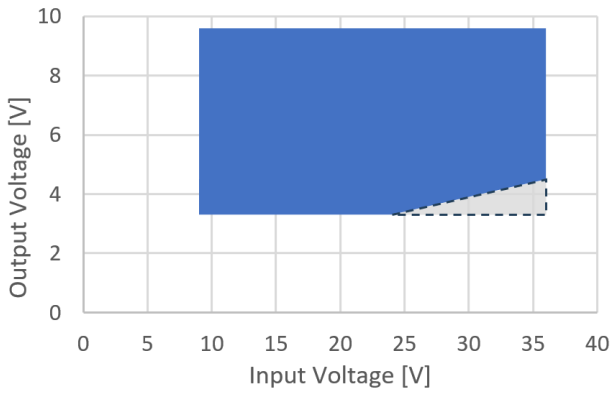
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Input vs. Output Operating Range

i1C2W012A050V-xxx-R

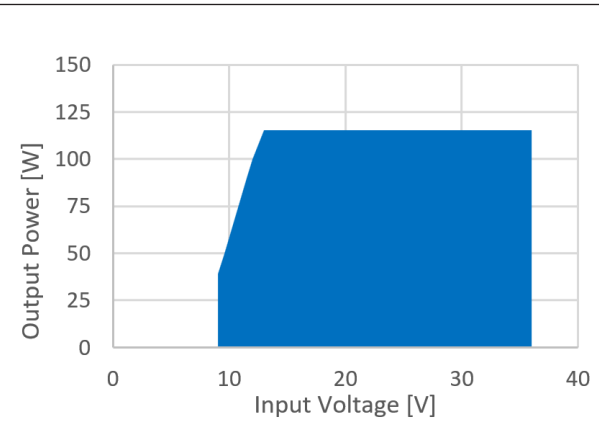


Input Voltage vs. Output Current operating range.



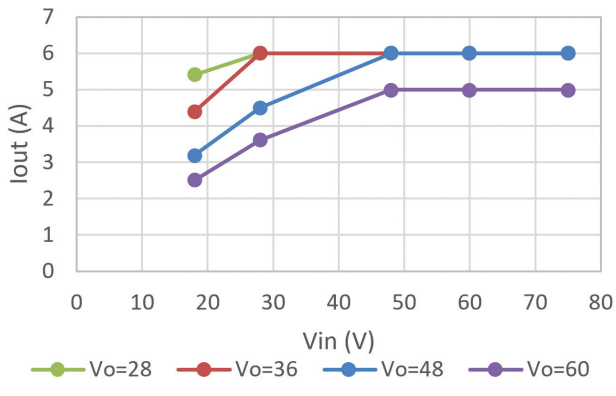
Input Voltage vs. Output Voltage operating range.

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.

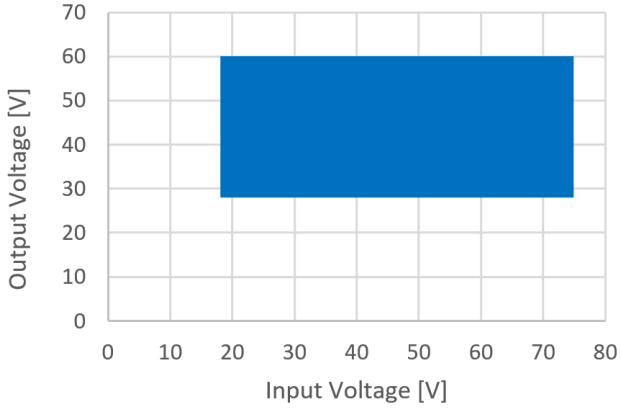


Input Voltage vs. Output Power operating range.

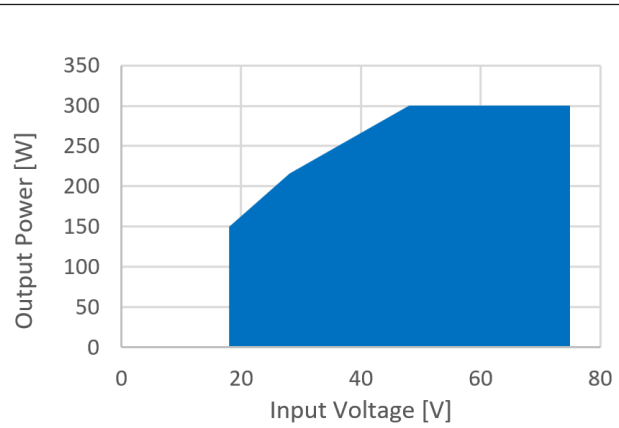
i1C4W006A280V-xxx-R



Input Voltage vs. Output Current operating range.



Input Voltage vs. Output Voltage operating range.

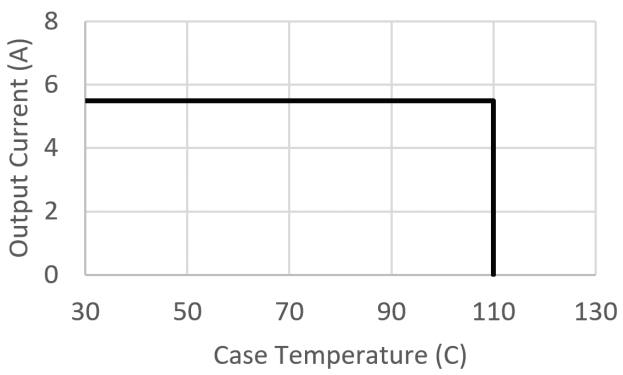


Input Voltage vs. Output Power operating range.

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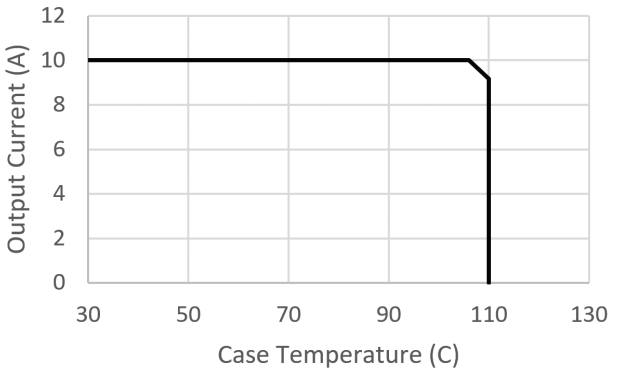
Typical Thermal Derating

i1C2W010A120V-xxx-R

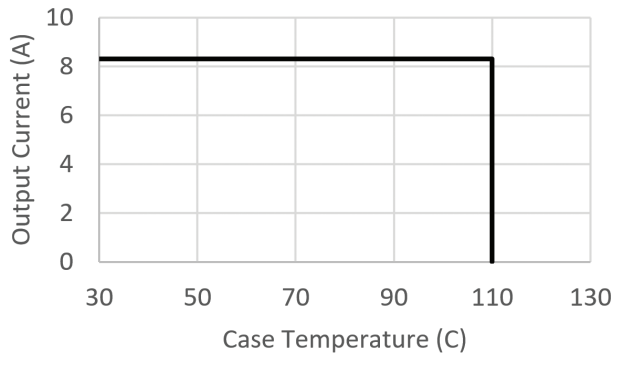


Vin=12V, Vo=24V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.

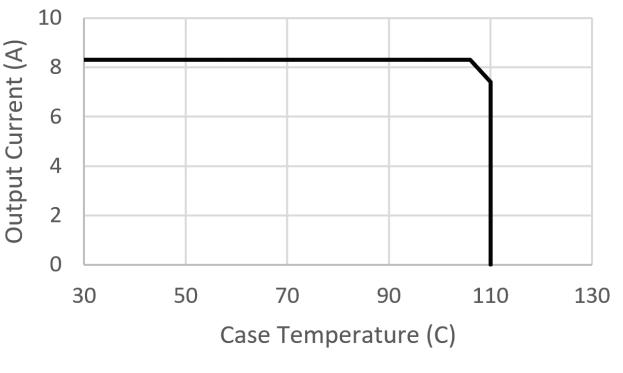
i1C4W010A120V-xxx-R



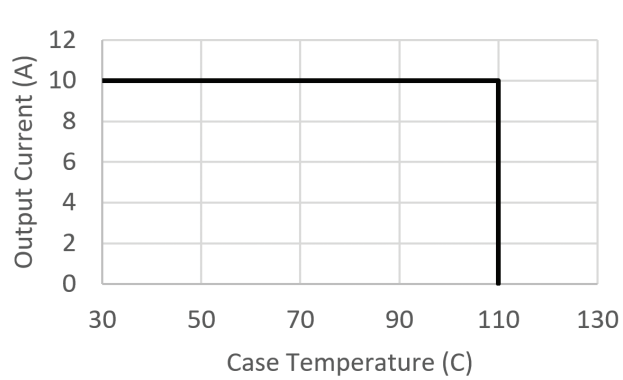
Vin=24V, Vo=12V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.



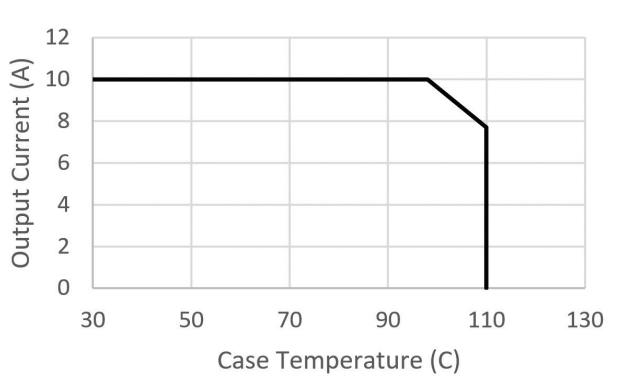
Vin=24V, Vo=24V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.



Vin=24V, Vo=24V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.



Vin=24V, Vo=12V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.

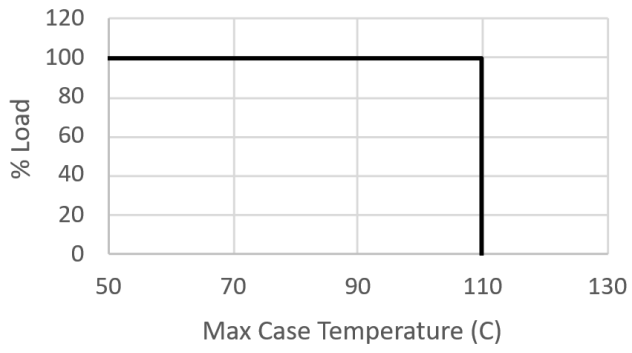


Vin=48V, Vo=12V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.

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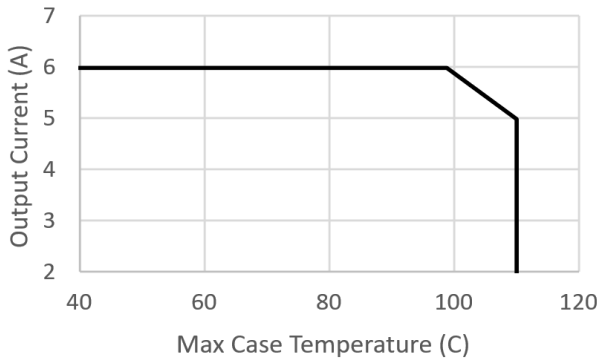
Typical Thermal Derating

i1C2W012A050V-xxx-R

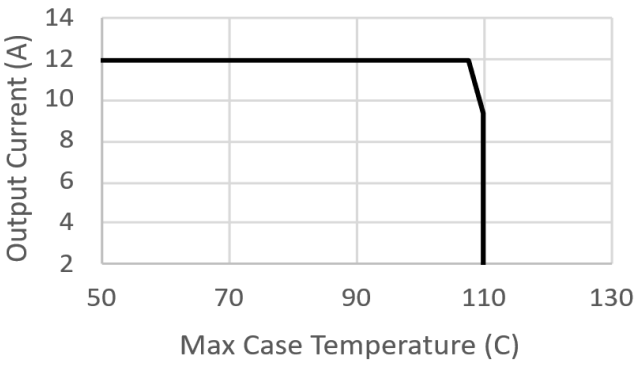


Maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C for Vin < 24V, Vo= Any rated value.

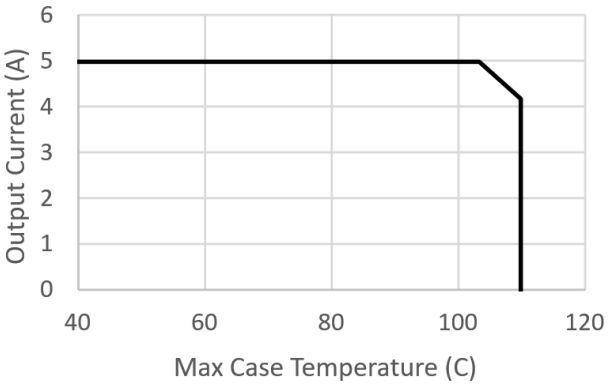
i1C4W006A280V-xxx-R



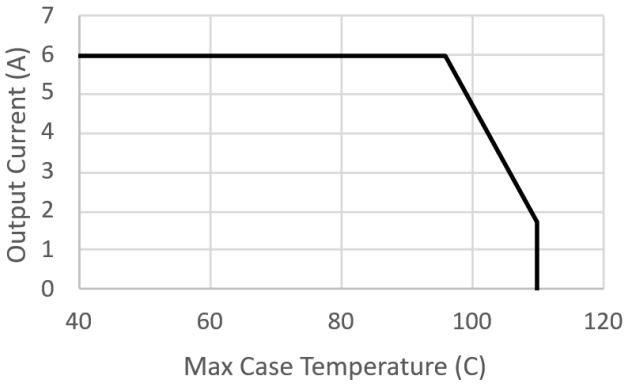
Vin=18V, Vo=28V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.



Maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C with Vin =36V, Vo= 8V



Vin=36V, Vo=48V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.



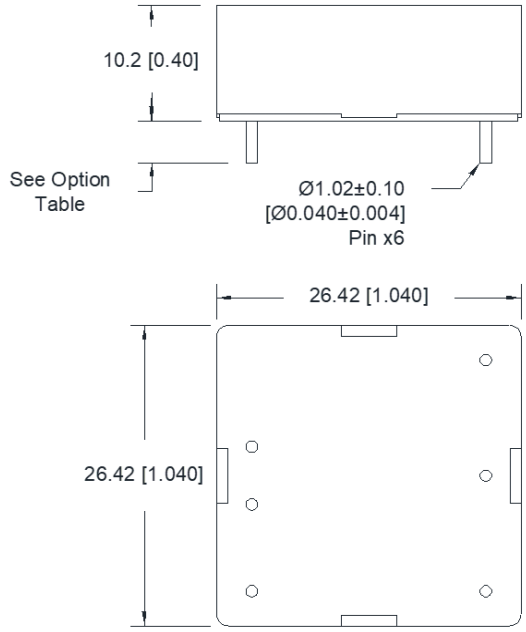
Vin=75V, Vo=28V maximum output current vs. baseplate temperature in enclosed environment with Ta = 85 °C.

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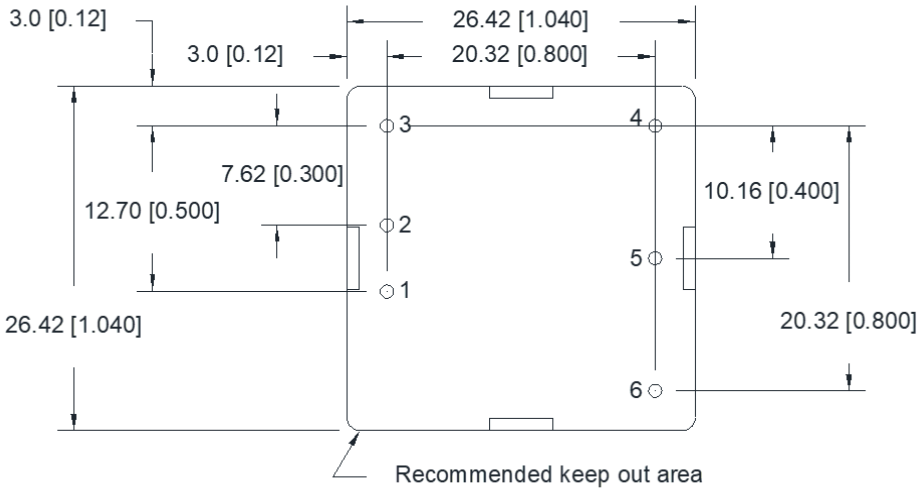
Mechanical Specification

Outline Drawing

Dimensions are in mm [in]. Unless otherwise specified.
Tolerances are: x.x ± 0.5 [0.02] / x.xx ± 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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