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TDK·Lambda

i7C Series

https://product.tdk.com/en/power/i7c
www.emea.lambda.tdk.com/i7c

300W, 9 to 53V or 9 to 36V Input Non-Isolated Buck-Boost DC-DC Converter





The i7C series of non-isolated step-up / step-down converters are ideal for generating additional DC output voltage rails up to 300 W from a single output 12V, 24V or 48V AC-DC power supply. The highly efficient i7C series accepts a very wide DC input and has a wide output adjustment range. Three mechanical configurations are available; low profile open frame, baseplate construction for conduction cooling, or integral heat sink for convection or forced air cooling. Full feature(*) options are available including output current monitoring (Imon), switching frequency synchronization (Sync) and power good (PG) or output current limit adjust (Itrim).

Features	Benefits
• Up to 300W in a 1/16th Brick Pin-Out	• High Power Density, Less Board Area Needed
• High Efficiency - Up to 97%	• Longer Battery Life / Low Power Consumed
• Wide 5 to 28V, 8 to 24V or 9.6 to 48V Output Adjustment	• One Part Supports Multiple System Voltages
• Wide 9 to 36V or 9 to 53V Input Range	• Compatible With a Wide Range of DC Source Voltages
• Low Component Count With Minimal External Components	• Low Cost
• Low Airflow With Minimal Derating Requirements	• Easy To Cool In End System

Model Selector

Model	Input Voltage (V)	Output Voltage (V)	Max Current (A)	Max Power (W)	Remote ON/OFF Logic	Full Feature(*) Imon, Sync	Full Feature(*) PG or Itrim	Integrated Heatsink	Integrated Baseplate
i7C4W008A120V-001-R	9 - 53	9.6 - 48	8	300	Negative	-	-	-	-
i7C4W008A120V-002-R	9 - 53	9.6 - 48	8	300	Positive	Yes	PG	-	-
i7C4W008A120V-003-R	9 - 53	9.6 - 48	8	300	Negative	Yes	PG	-	-
i7C4W008A120V-0C1-R	9 - 53	9.6 - 48	8	300	Negative	-	-	-	Yes
i7C4W008A120V-0C3-R	9 - 53	9.6 - 48	8	300	Negative	Yes	PG	-	Yes
i7C4W008A120V-0F1-R	9 - 53	9.6 - 48	8	300	Negative	-	-	Yes	-
i7C4W008A120V-0F3-R	9 - 53	9.6 - 48	8	300	Negative	Yes	PG	Yes	-
i7C4W008A120V-P03-R	9 - 53	9.6 - 48	8	300	Negative	Yes	Itrim	-	-
i7C4W008A120V-PC3-R	9 - 53	9.6 - 48	8	300	Negative	Yes	Itrim	-	Yes
i7C4W008A120V-PF3-R	9 - 53	9.6 - 48	8	300	Negative	Yes	Itrim	Yes	-
i7C4W012A050V-001-R	9 - 53	5 - 28	12.5	300	Negative	-	-	-	-
i7C4W012A050V-002-R	9 - 53	5 - 28	12.5	300	Positive	Yes	PG	-	-
i7C4W012A050V-003-R	9 - 53	5 - 28	12.5	300	Negative	Yes	PG	-	-
i7C4W012A050V-0C1-R	9 - 53	5 - 28	12.5	300	Negative	-	-	-	Yes
i7C4W012A050V-0C3-R	9 - 53	5 - 28	12.5	300	Negative	Yes	PG	-	Yes
i7C4W012A050V-0F1-R	9 - 53	5 - 28	12.5	300	Negative	-	-	Yes	-
i7C4W012A050V-0F3-R	9 - 53	5 - 28	12.5	300	Negative	Yes	PG	Yes	-
i7C4W012A050V-P03-R	9 - 53	5 - 28	12.5	300	Negative	Yes	Itrim	-	-
i7C4W012A050V-PC3-R	9 - 53	5 - 28	12.5	300	Negative	Yes	Itrim	-	Yes
i7C4W012A050V-PF3-R	9 - 53	5 - 28	12.5	300	Negative	Yes	Itrim	Yes	-
i7C2W020A120V-001-R	9 - 36	8 - 24	20	300	Negative	-	-	-	-
i7C2W020A120V-002-R	9 - 36	8 - 24	20	300	Positive	Yes	PG	-	-
i7C2W020A120V-003-R	9 - 36	8 - 24	20	300	Negative	Yes	PG	-	-
i7C2W020A120V-0C1-R	9 - 36	8 - 24	20	300	Negative	-	-	-	Yes
i7C2W020A120V-0C3-R	9 - 36	8 - 24	20	300	Negative	Yes	PG	-	Yes
i7C2W020A120V-0F1-R	9 - 36	8 - 24	20	300	Negative	-	-	Yes	-
i7C2W020A120V-0F3-R	9 - 36	8 - 24	20	300	Negative	Yes	PG	Yes	-
i7C2W020A120V-P03-R	9 - 36	8 - 24	20	300	Negative	Yes	Itrim	-	-
i7C2W020A120V-PC3-R	9 - 36	8 - 24	20	300	Negative	Yes	Itrim	-	Yes
i7C2W020A120V-PF3-R	9 - 36	8 - 24	20	300	Negative	Yes	Itrim	Yes	-

Preferred model

* Contact Technical Support for other part number suffix and feature combinations.

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Specification

Model		i7C4W012A050V	i7C4W008A120V	i7C2W020A120V
Input				
Input Voltage range	Vdc	9 - 53 (Turn on at 9.5V typ)		9 - 36 (Turn on at 9.5V typ)
Input Current (max)	A	25		30
Standby Input Current (typ)	mA	0.25 (Nominal input, ON/OFF = OFF)		
No Load Input Current, Vin = 24 V (typ)	mA	5.0 (Vo = 12 V)		5.0 (Vo = 24 V)
Efficiency	%	91 - 96	93 - 97	94 - 97
Safety Certifications and Markings	-	IEC/EN/UL/CSA/EN62368-1, 60950-1, CE Mark and UKCA Mark		
Output				
Output Voltage Tolerance	%	± 4		
Switching Frequency	kHz	250		
Line Regulation	%	0.8	0.8	0.8
Load Regulation	%	0.8	0.5	0.8
External Load Capacitance	uF	330 - 3000		1000 - 5000
Ripple & Noise	mV	200	180	200
Overcurrent Protection Threshold (typ)	A	17	15	26
Overcurrent Limit Adjustment Range (-Px3-R)	A	3 - 17	2 - 15	3 - 20
Overcurrent Limit Adjustment Tolerance	%	±8		
Overtemperature Protection	-	Yes		
Remote Sense	-	(+) Sense, compensating up to 5% of output voltage		
Remote On/Off	-	See Model Selector		
Power Good	-	Optional (Full Feature Version, -0x3-R suffix)		
Frequency Synchronization (Sync)	-	Optional (Full Feature Version)		
Current Monitor	-	Optional (Full Feature Version)		
Overcurrent Limit Adjust (Itrim)	-	Optional (Full Feature Version, -Px3-R sufix)		
Series Operation	-	Not possible		
Environmental				
Operating Temperature	°C	-40 to 125 (See i7C4W Specification; i7C2W Specification for Derating)		
Storage Temperature	°C	-55 to 125		
Humidity (non condensing)	%RH	5 - 95 (Operating & Storage)		
Cooling	-	Convection, conduction (baseplate) or forced air		
Altitude (2)	m	2000		
Other				
Weight (Typ)	g	Open Frame: 25 Baseplate: 50 Heatsink: 70		Open Frame: 28 Baseplate: 56 Heatsink: 75
Size (LxWxH)	mm	Open Frame: 34 x 36.8 x 11.87 With Baseplate: 34 x 36.8 x 13.0 With Heatsink: 34 x 36.8 x 24.9		34 x 36.8 x 14.35 34 x 36.8 x 15.5 34 x 36.8 x 24.9
Size (LxWxH)	Inches	Open Frame: 1.34 x 1.45 x 0.5 With Baseplate: 1.34 x 1.45 x 0.51 With Heatsink: 1.34 x 1.45 x 0.98		1.34 x 1.45 x 0.58 1.34 x 1.45 x 0.61 1.34 x 1.45 x 0.98
MTBF - Telcordia SR-332	-	> 10 MHrs; 100% Load; Ta = 40 °C		
Warranty	yrs	3		

Notes
(1) See website for detailed specifications and test methods.
(2) Contact Technical Support for operation at higher altitudes.

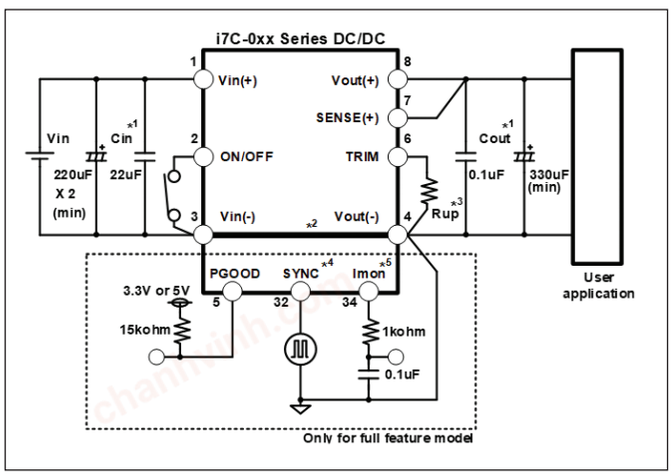
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Related Products

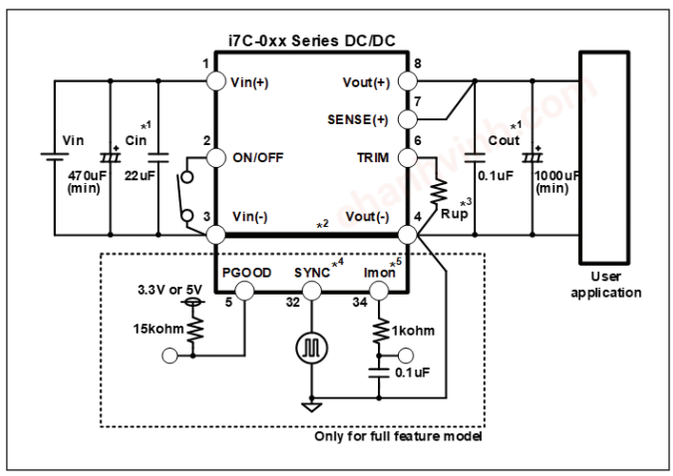
Type	Part Number	Description
DC-DC Buck-Boost Converter	i1C	200W, Input 9-36V or 18-75, Output 9.6-28V, 1x1 inch Footprint
DC-DC Buck Converter	i3A	100W, Input 9-53V, Output 5-30V 4.5A or 3.3-16.5V 8A
DC-DC Buck Converter	i6A4W	250W, Input 9-53V, Output 3.3-40V 10A or 3.3-15V 20A
DC-DC Buck Converter	i7A	400-750W, Input 9-18V, 18-60V or 18-32V, Output 0.8-8V 60A; 3.3-24V 33A or 3.3-18V 45A
DC-DC Buck Converter, Ruggedized	RGA	250W, Input 9-40V and Output 3.3-24V or, 9-53V Input and Output 3.3V up to 40V
DC-DC Buck Converter, Ruggedized	RGB	400-750W, 9-18Vin, 0.8-8Vo 60A; 18-32Vin, 3.3-18Vo 45A, 18-60Vin, 3.3-24Vo 33A
DC-DC Buck-Boost Converter, Ruggedized	RGC	300W, Input 9-53V, Output 9.6-48V, 8A; or, 5-28V, 12.5A
Evaluation Kit	i7C08A-C03-EVK-S1	Evaluation kit with i7C4W008A120V-003-R Full Featured Module
	i7C12A-C03-EVK-S1	Evaluation kit with i7C4W012A050V-003-R Full Featured Module
	i7C20A-C03-EVK-S1	Evaluation kit with i7C2W020A120V-003-R Full Featured Module
	i7C08A-CC3-EVK-P2	Evaluation kit with two (2) i7C4W008A120V-P03-R Modules in Parallel
	i7C12A-CC3-EVK-P2	Evaluation kit with two (2) i7C4W012A050V-P03-R Modules in Parallel
	i7C20A-CC3-EVK-P2	Evaluation kit with two (2) i7C2W020A120V-P03-R Modules in Parallel

Typical Application Circuit

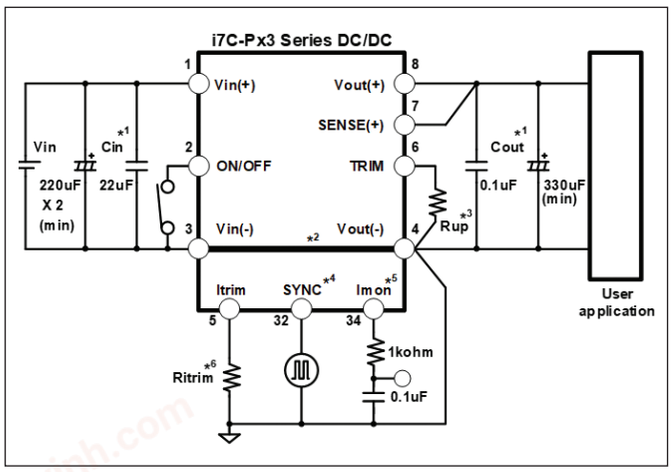
i7C4W (-0xx-R suffix)



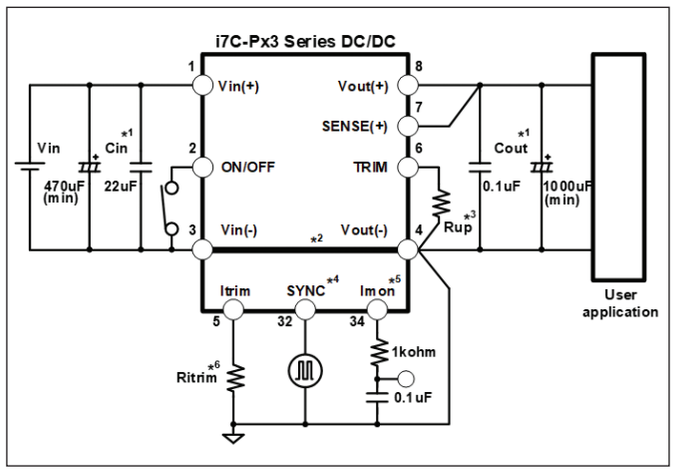
i7C2W (-0xx-R suffix)



i7C4W (-Px3-R suffix with Output Current Limit Adjust)



i7C2W (-Px3-R suffix with Output Current Limit Adjust)

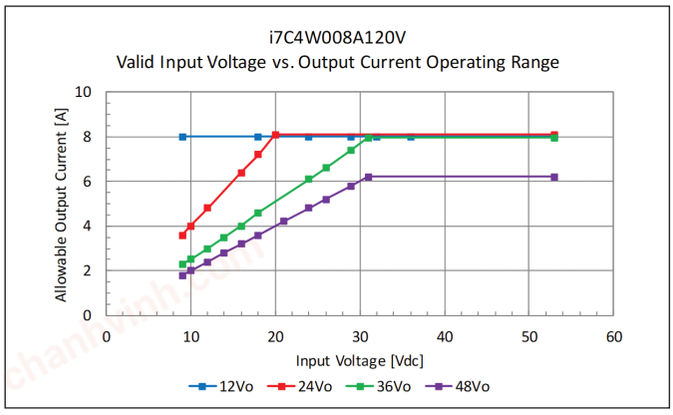


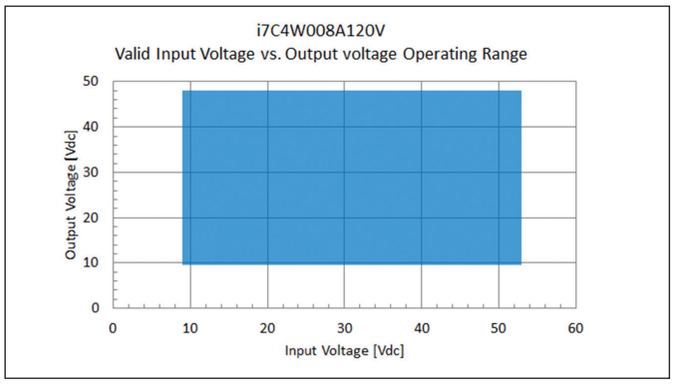
Recommendations:

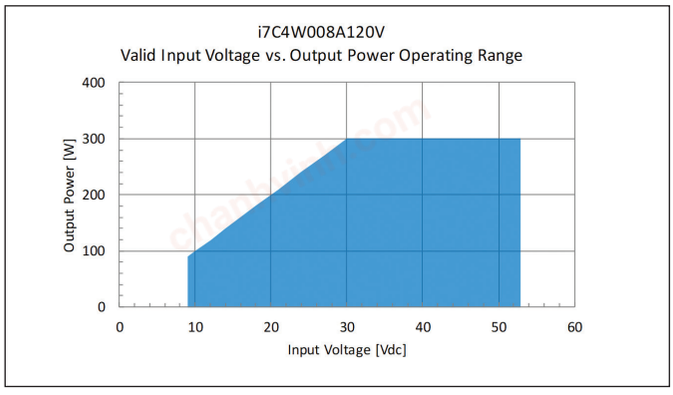
1. Cin/Cout MLCC should be connected to the i7C module as close as possible in order to reject high-frequency noise.
2. Connect Vin(-) and Vout(-) to copper ground plane underneath the i7C module.
3. TRIM resistor "Rup" should be connected to the i7C module as close as possible.
4. SYNC must be connected to GND when not in use.
5. External R-C filter may need for Current Monitor.
6. Current limit TRIM resistor "Ritrim" should be connected to the i7C module as close as possible.

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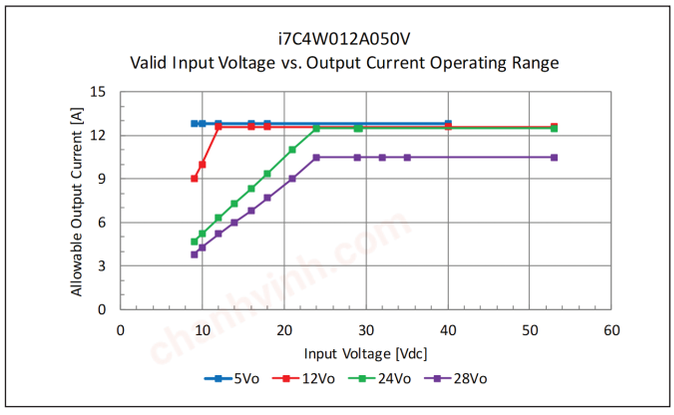
Operating Range i7C4W0008A120V

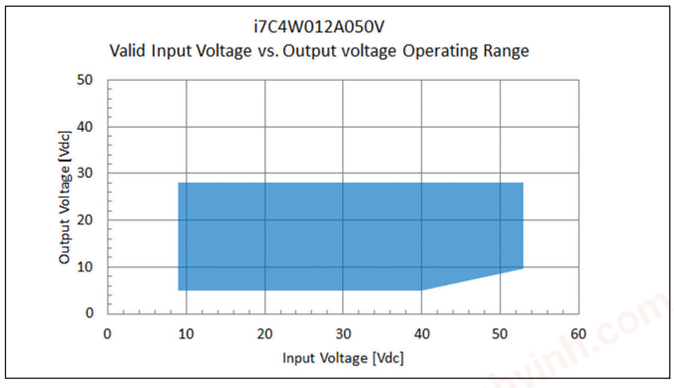


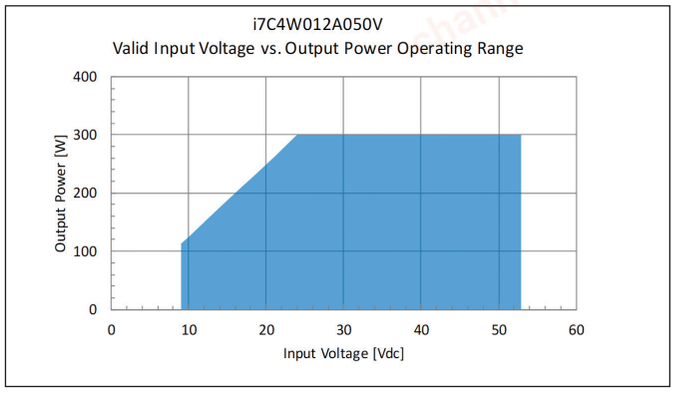




Operating Range i7C4W012A050V

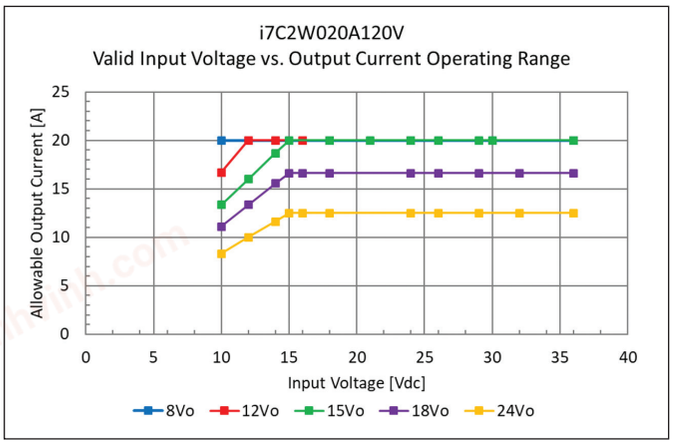


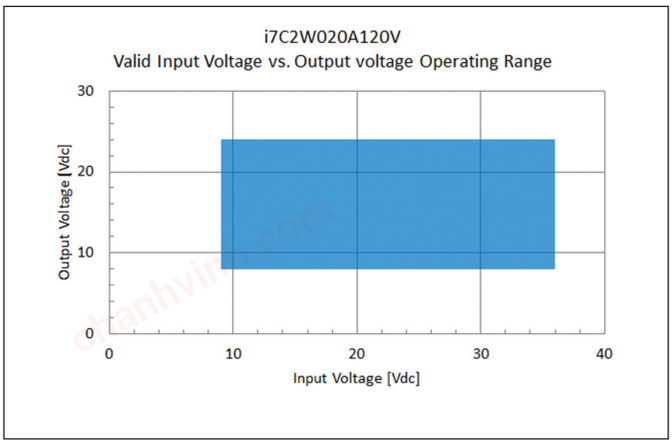


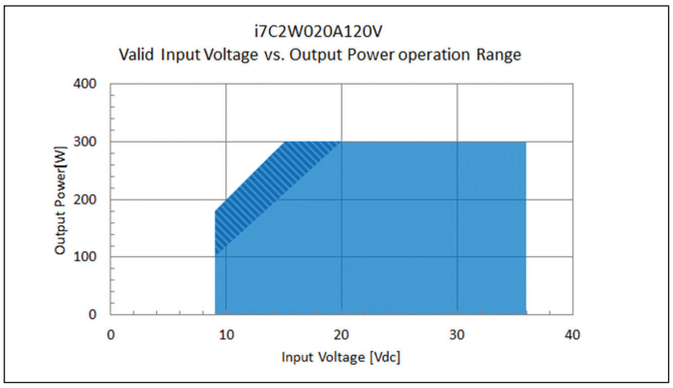


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Operating Range i7C2W020A120V



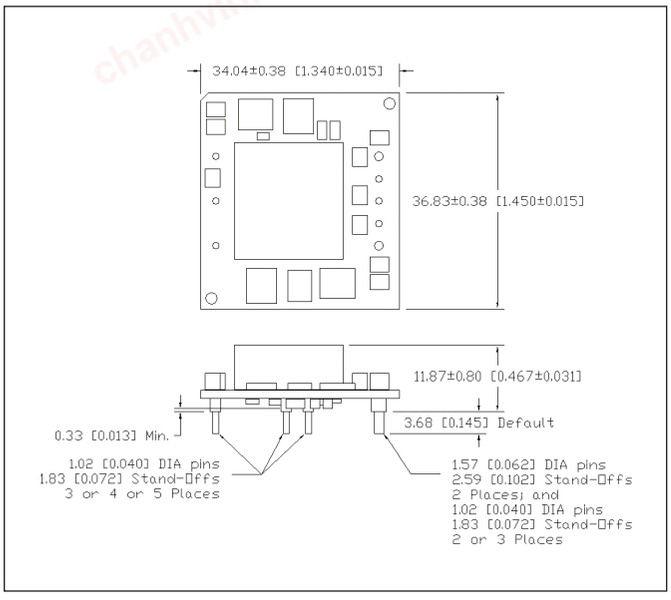




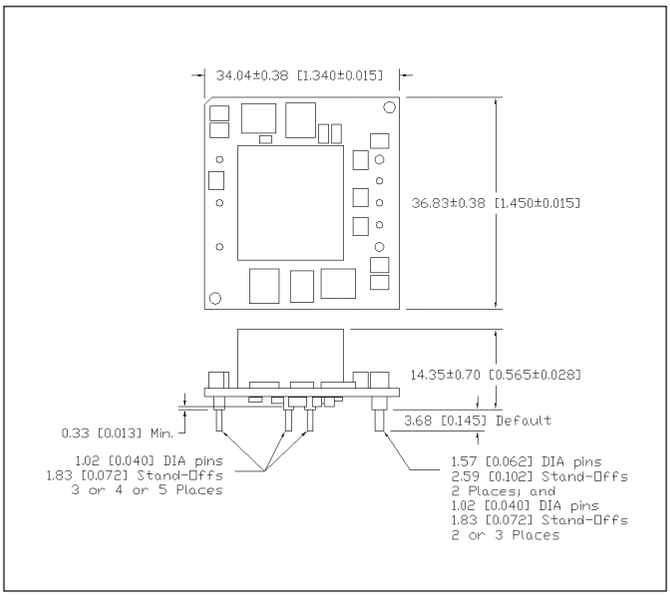
Wider output regulation tolerance (dark blue shaded region) expected during step-up/boost Operation when Vin < 20V, Pout > 100W.
See i7C2W Specifications for related load regulation charts.

Mechanical Specification

i7C4W (-x0x-R suffix Openframe)



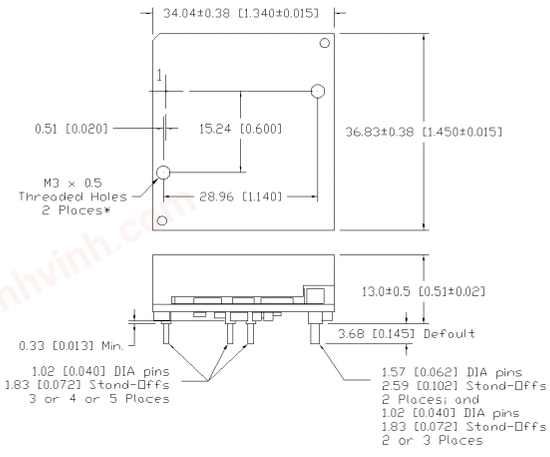
i7C2W (-x0x-R suffix Openframe)



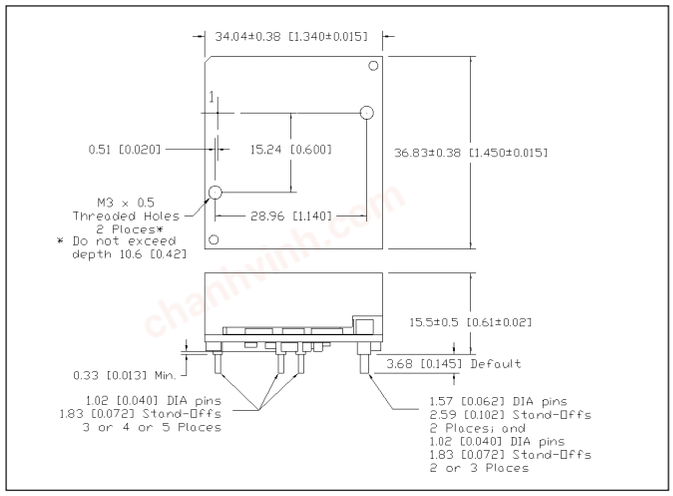
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Mechanical Specification

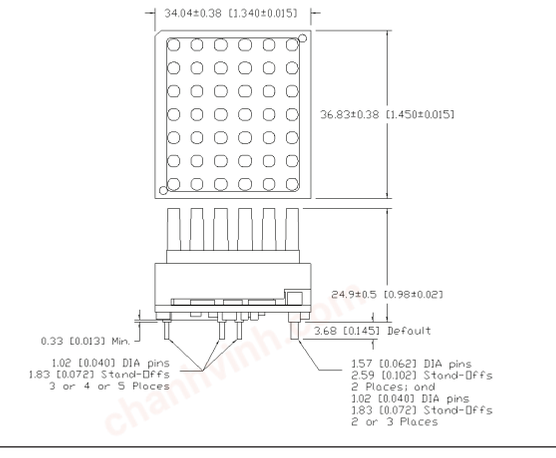
i7C4W (-xCx-R suffix Baseplate)



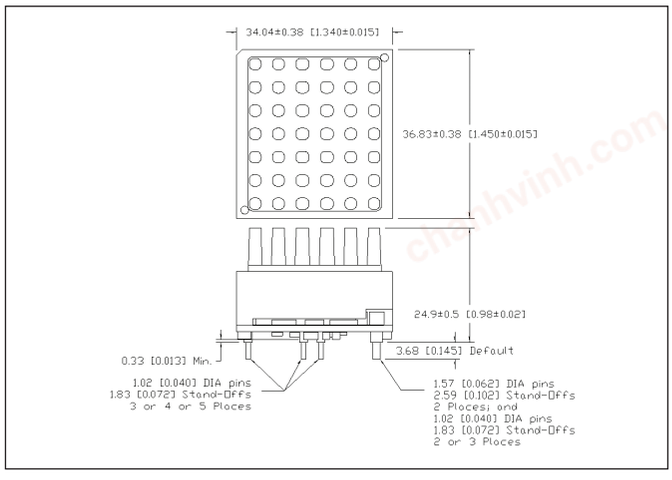
i7C2W (-xCx-R suffix Baseplate)



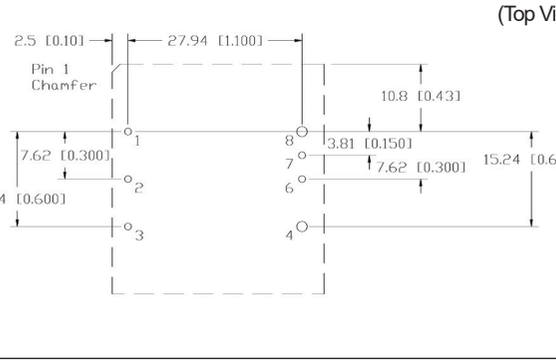
i7C4W (-xFx-R suffix Heatsink)



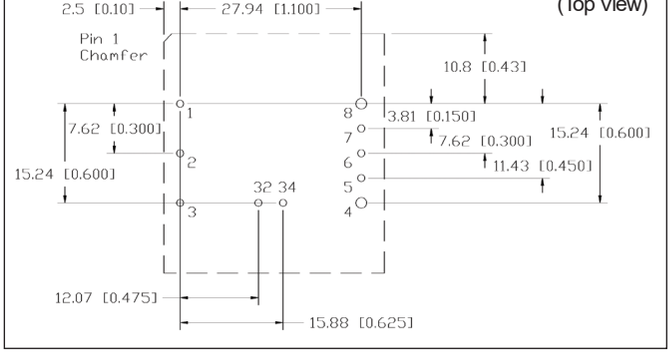
i7C2W (-xFx-R suffix Heatsink)



Recommended Hole Pattern (-xx1-R suffix)



Recommended Hole Pattern (-xx2-R; -xx3-R suffix)



Pinout

PIN	Function	PIN	Function
1	Vin (+)	6	TRIM
2	On / Off	7	SENSE +
3	Vin (-) / GND	8	Vout (+)
4	Vout (-) / GND	32	Sync (option)
5	Power Good or Itrim (option)	34	Imon (option)

Note:

1) Dimensions are in mm [inch].
2) Pin base material is brass or copper with gold over nickel plating.
3) Baseplate and heatsink are not connected to ground (floating).

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