Series **DC3** & **DC3-T**

50W Isolated Regulated High Power DC-DC Converter

PICO Electronics, Inc.

PRODUCT OVERVIEW

The DC3 & DC3-T series are isolated DC-DC converters with a wide 3:1 input voltage range of 300V to 900V and output power up to 50W. These modules have shutdown feature and continuous short-circuit protection.

The compact size has threaded inserts to mount securely for high vibration and shock applications. Conduction cooling is available through the baseplate or compatible heat sink.

FEATURES

- Wide 300V to 900V input range
- 3.3V to 300V output models
- Up to 50W output
- Input/output isolation
- Sense feature
- Shutdown feature
- Short-circuit protection
- Through hole or terminal strip
- Fixed operating frequency
- No external components required

Contact Pico for part number of available options:

- Expanded operating temp: -40°C to +85°C
- Select screening per MIL-STD-883:
  - Stabilization Bake
  - Temperature Cycle
  - Burn-In
- Special Input Voltage, Output Voltage, Isolation Voltage or Output Power

DC3	-28	S	T
SERIES NAME	NOM. OUTPUT VOLTAGE	NUMBER OF OUTPUTS	MOUNTING
DC3	**-3.3** = 3.3V **-5** = 5V **-5.2** = 5.2V **-12** = 12V **-15** = 15V **-24** = 24V **-28** = 28V **-48** = 48V **-100** = 100V **-125** = 125V **-150** = 150V **-175** = 175V **-200** = 200V **-225** = 225V **-250** = 250V **-275** = 275V **-300** = 300V	**S** = SINGLE **D** = DUAL	BLANK = THROUGH HOLE **T** = TERMINAL STRIP

MODEL LIST

SINGLE OUTPUT

Output Voltage [VDC]	Output Current Min. [A]	Output Current Max. [A]	Output Power [W]	Efficiency (1) [%] typ.	Load Regulation 10-100% [±%] max	Output Ripple @ 1MHz BW [mVp-p] max	Output Voltage Tolerance (1) [±%]
3.3	0.909	9.09	30	68	2	75	2
5	0.8	8	40	74		75	
5.2	0.77	7.7	40	74		75	
12	0.416	4.16	50	80		75	
15	0.333	3.33		80		75	
24	0.208	2.08		84	1	75	1
28	0.179	1.79		85		75	
48	0.104	1.04		85		75	
100	0.05	0.5		82		100	
125	0.04	0.4		82		125	
150	0.033	0.33		82		150	
175	0.029	0.29		81		175	
200	0.025	0.25		81		200	
225	0.022	0.22		81		225	
250	0.02	0.2		81		250	
275	0.018	0.18		80		300	
300	0.017	0.17		80		300	

DUAL OUTPUT

Output Voltage [±VDC]	Output Current Min. [±A]	Output Current Max. [±A]	Output Power [±W]	Efficiency (1) [%] typ.	Load Regulation 10-100% [±%] max	Output Ripple @ 1MHz BW [mVp-p] max	Output Voltage Tolerance (1) [±%]
5	0.4	4	20	75	2	75	2
12	0.208	2.08	25	80			
15	0.166	1.66		80			
24	0.104	1.04		84			
28	0.089	0.892		84			

Note 1: Tested at nominal input voltage and full output load.

SPECIFICATIONS (Nominal V_{IN}, Full Load, T_A = +25°C, 1 hour warm up unless otherwise specified)

INPUT

Parameter	Condition	Min.	Typ.	Max.	Units
Input Voltage Range		300	600	900	VDC

OUTPUT

Parameter	Condition	Min.	Typ.	Max.	Units
Line Regulation		-	1	-	%

ENVIRONMENTAL

Parameter	Condition	Min.	Typ.	Max.	Units
Operating Temperature Range	Baseplate	0	-	+85	°C
Storage Temperature Range		-55	-	+105	°C
Temperature Coefficient		-	0.02	-	%/°C
Cooling	Conduction through baseplate				

GENERAL

Parameter	Condition	Min.	Typ.	Max.	Units
Operating Frequency	Fixed	-	66	-	kHz
Isolation Voltage	Input to output	2121	-	-	VDC
	Input/output to baseplate	2121	-	-	
Size (L x W x H)	Through hole	3.225 x 2.27 x 0.725 (81.915 x 57.658 x 18.415)			inches (mm)
	Terminal strip	4.325 x 2.27 x 0.725 (109.855 x 57.658 x 18.415)			
Weight		-	190	-	grams
Case	Aluminum baseplate and Glass Reinforced Polymer				
Potting	Vacuum Impregnated Epoxy				
Box Packaging (W x L x H)	8 x 7.5 x 1.5 (203.2 x 190.5 x 38.1) or 12 x 9 x 1.5 (304.8 x 228.6 x 38.1)				inches (mm)

PROTECTIONS & FEATURES

Parameter	Condition	Min.	Typ.	Max.	Units
Short circuit	Continuous				
Shutdown (SDN)	Non-latched shutdown, Self-recovery	-	4	-	VDC

DESIGNED TO MEET

Test	Referenced Standard	Description
Vibration	MIL-STD-202	Method 204, Vibration, High Frequency, Condition D
Shock	MIL-STD-202	Method 213, Shock (Specified Pulse), Condition I
Humidity	MIL-STD-202	Method 106, Moisture Resistance
Altitude	MIL-STD-202	Method 105, Barometric Pressure (Reduced), Condition D

OPTIONS AVAILABLE – CONTACT PICO FOR PART NUMBER

Parameter	Referenced Standard	Description
Stabilization Bake	MIL-STD-883	Referenced Method 1008 Non-operating maximum storage temperature for 24 hours
Temperature Cycle	MIL-STD-883	Referenced Method 1010 Non-operating at temperature extremes, 15 mins/temp, 10 cycles
Burn-In	MIL-STD-883	Referenced Method 1015 Max operating temperature for 160 hours
Expanded Operating Temperature Range	-40°C to +85°C	

THERMAL RESISTANCE

$$P_{OUT} = \frac{T_C - T_A}{T_{RCA} \times (1 / \eta - 1)}$$

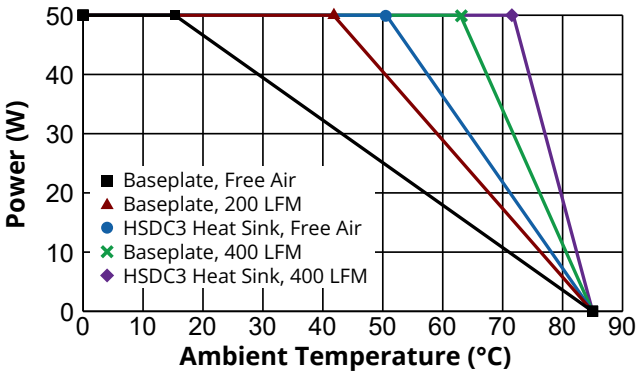
P_{OUT} = *Output Power in Watts*
η = *Efficiency*
T_C = *Case temperature in °C*
T_A = *Ambient temperature in °C*
T_{RCA} = *Thermal resistance of case to air in °C/w*

Thermal resistance of case (T_{RCA})

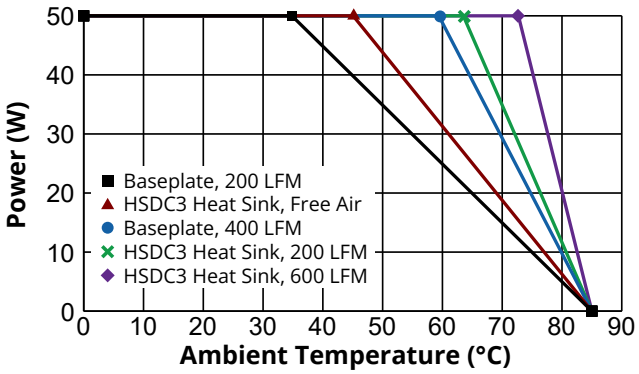
Airflow	Baseplate only	HSDC3 Heat Sink	Units
Free Air	7.9	3.9	°C / W
200 LFM	4.9	2.1	
400 LFM	2.5	1.5	
600 LFM	2.2	1.2	
800 LFM	1.5	1	
1000 LFM	1.2	0.98	

DERATING GRAPHS (Nominal V_{IN}, Full Load, Efficiency @ Full Load)

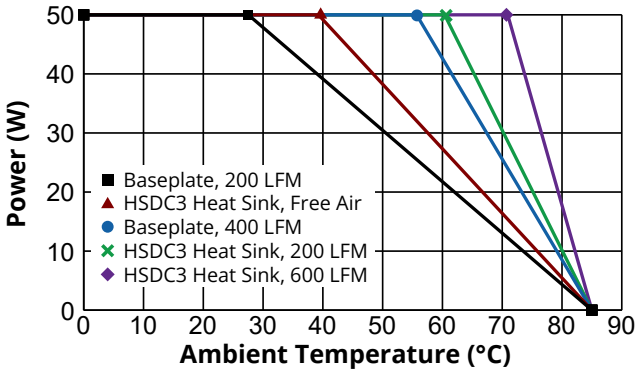
Models with Max. Output Power = 50W & Efficiency at full load = 85%



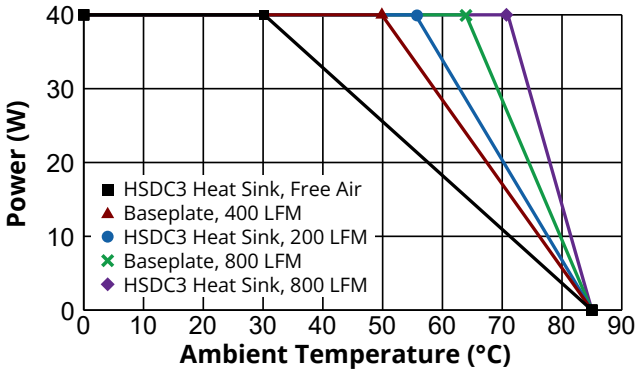
Models with Max. Output Power = 50W & Efficiency at full load = 83%



Models with Max. Output Power = 50W & Efficiency at full load = 81%

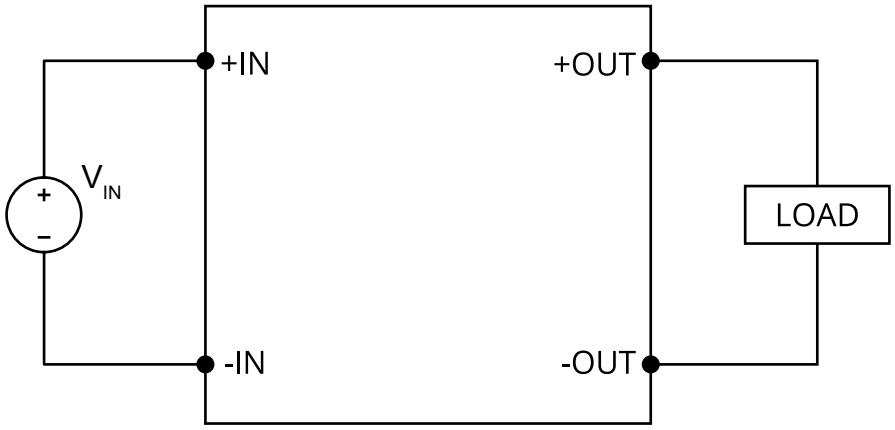


Models with Max. Output Power = 40W & Efficiency at full load = 74%

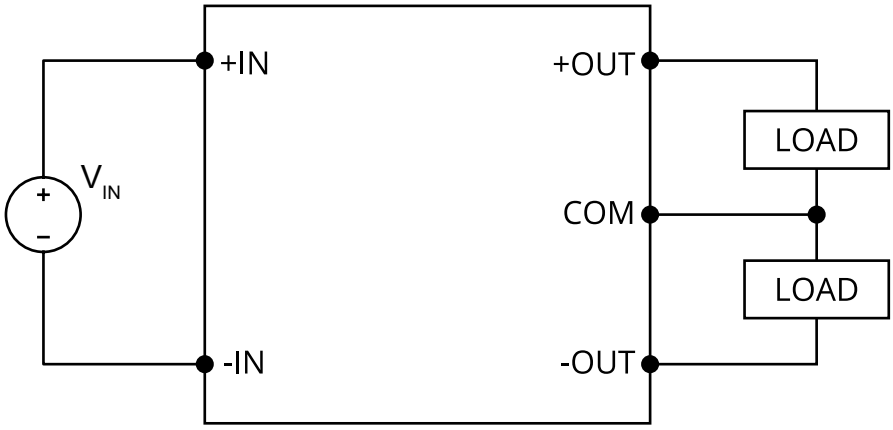


TYPICAL CONNECTION CIRCUIT

SINGLE OUTPUT

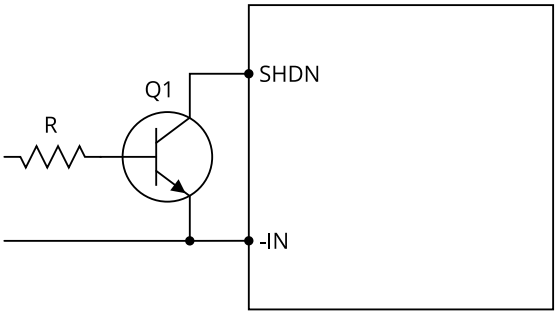


DUAL OUTPUT

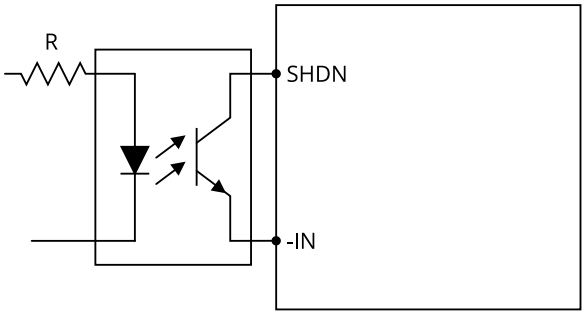


SHUTDOWN

NON-ISOLATED

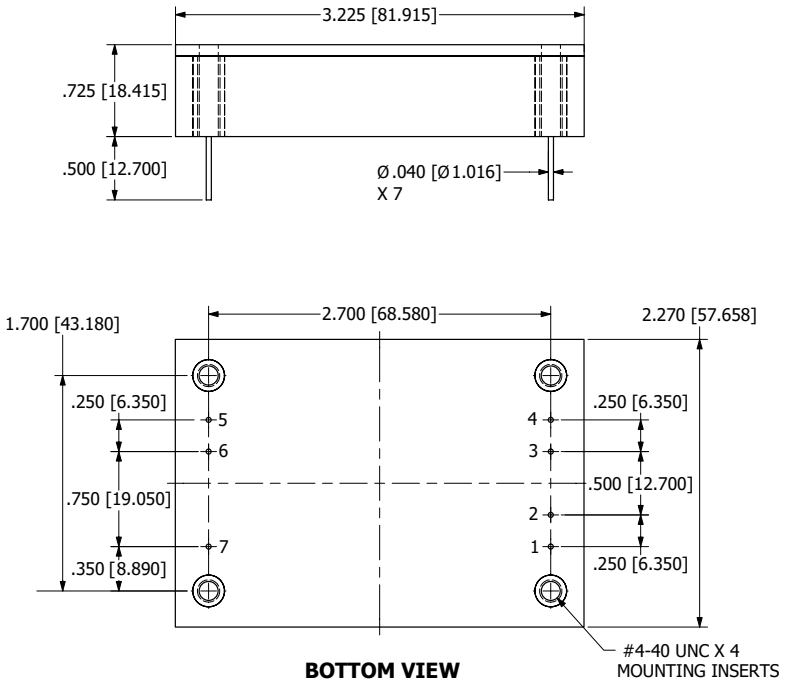


ISOLATED



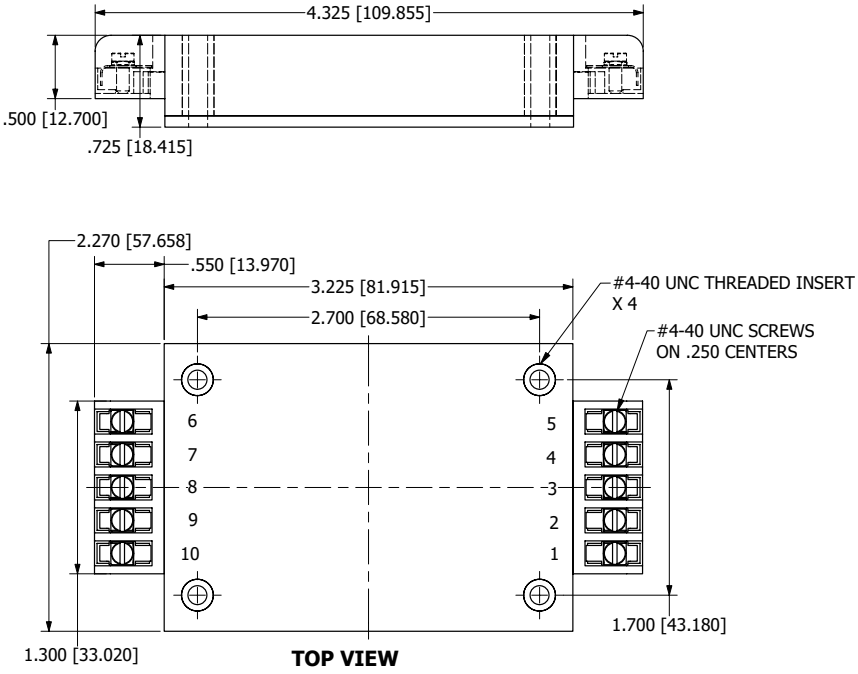
MECHANICAL DRAWINGS

THROUGH HOLE



PIN	FUNCTION			PIN DIAMETER
	Single ≤48V	Single ≥100V	Dual	
1	+OUT			.040 [1.016]
2	+OUT	N/C	COM	
3	-OUT	N/C	COM	
4	-OUT			
5	SDN			
6	-IN			
7	+IN			

TERMINAL STRIP

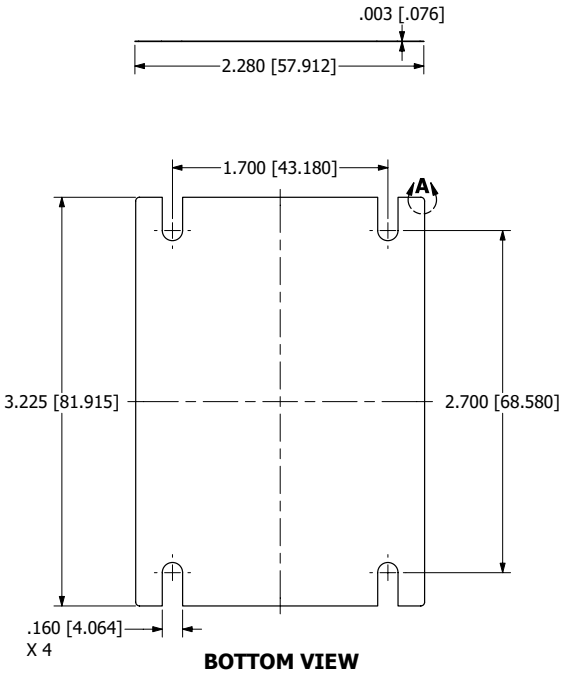


PIN	FUNCTION		
	Single ≤48V	Single ≥100V	Dual
1	+OUT		
2	+OUT	N/C	COM
3	N/C		
4	-OUT	N/C	COM
5	-OUT		
6	SDN		
7	-IN		
8	N/C		
9	N/C		
10	+IN		

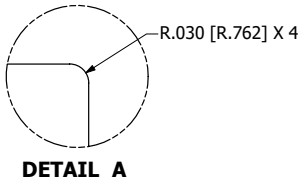
NOTES
a. ALL DIMENSIONS ARE IN INCHES, [ ] = MM
b. RECOMMENDED TORQUE FOR MOUNTING SCREWS: 6-9 INCH-LBS

MECHANICAL DRAWINGS

TIDC3 - THERMAL INTERFACE



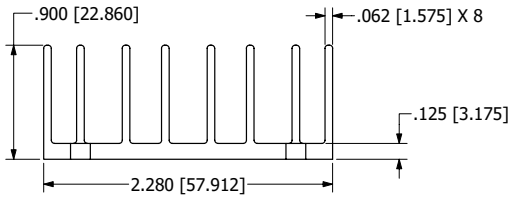
BOTTOM VIEW

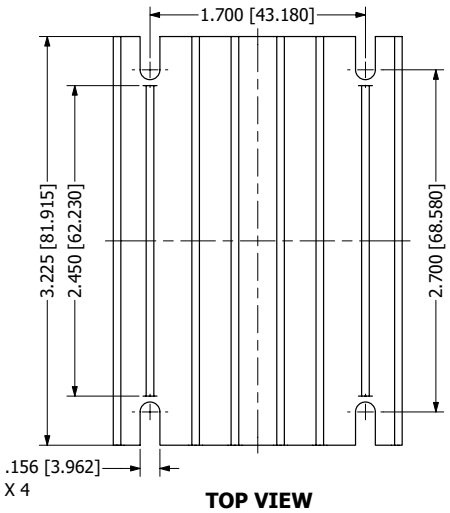


DETAIL A

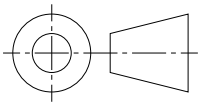
Material	Alloy Aluminum Substrate
Thermal Conductivity	1530 BTU-in/hr sq.ft °F
Coefficient of Thermal Expansion, (25-100°C)	13.1 10^{-6} in-in/°F
Brinell Hardness	23 HB
Endurance Limit	5000 PSI
Standard Thickness	0.003 inches

HSDC3 - HEAT SINK



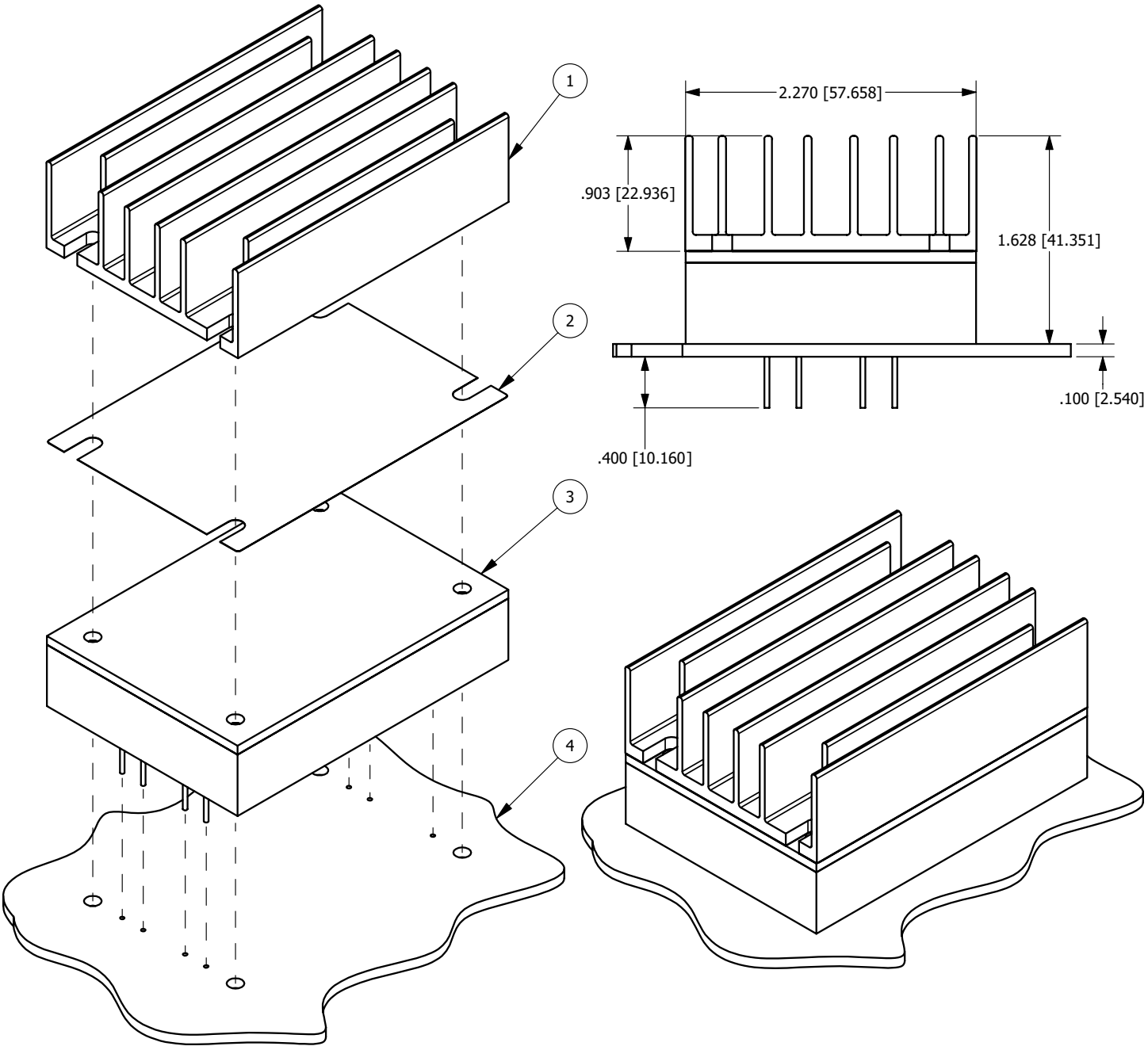


TOP VIEW



MECHANICAL DRAWINGS

HEAT SINK ASSEMBLY



ITEM	QTY	DESCRIPTION
1	1	HSDC3 HEAT SINK
2	1	TIDC3 THERMAL INTERFACE
3	1	DC3 OR DC3-T MODULE
4	1	PCB

BOX PACKAGING - BULK