

Series XP

300W Isolated Regulated High Power DC-DC Converter



PRODUCT OVERVIEW

The XP series are isolated DC-DC converters with 2:1 input voltage ranges and high 300W output power in a low profile full brick size - 4.6" x 2.4" x 0.5". These modules have trim capability, shutdown features and frequency sync. Protections include input overvoltage, output short-circuit, output overvoltage and over temperature.

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



FEATURES

- 2:1 input range models
- 3.3V to 28V output models
- Up to 300W output
- Input/output isolation
- Single outputs
- Up to +85°C baseplate operating temperature
- Trim capability
- Remote shutdown feature
- Operating Frequency sync feature
- Fixed operating frequency
- No external components required

Contact Pico for part number of available options:

- Expanded operating temp: -55°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

XP	A	-28S
SERIES NAME	INPUT VOLTAGE RANGE	NOMINAL OUTPUT VOLTAGE
XP	A = 18 - 36V B = 36 - 72V	-3.3S = 3.3V -5S = 5V -9S = 9V -12S = 12V -15S = 15V -24S = 24V -28S = 28V

MODEL LIST

Pico Part Number	Output Voltage [VDC]	Output Current		Output Power [W]	Efficiency ⁽¹⁾ [%] typ.	Input Current ⁽¹⁾ [A]	Line Regulation [±%] max	Load Regulation 10-100% ⁽²⁾ [±%] max	Output Ripple @ 1MHz BW [mVp-p] max	Output Voltage Tolerance ⁽¹⁾ [±%]
		Min. [A]	Max. [A]							
XPA3.3S	3.3	2.5	25	82.5	78	3.78	0.5	0.75	50	1
XPA5S	5	2.5	25	125	80	5.58	0.5	0.5	50	0.75
XPA5.2S	5.2	2.4	24	125	80	5.58	0.5	0.5	50	0.75
XPA9S	9	1.94	19.4	175 ⁽³⁾	83	7.53	0.5	0.5	50	0.5
XPA12S	12	1.67	16.7	200 ⁽³⁾	84	8.5	0.5	0.5	50	0.5
XPA15S	15	1.33	13.3	200 ⁽³⁾	85	8.4	0.5	0.5	50	0.5
XPA24S	24	0.938	9.38	225 ⁽³⁾	86	9.34	0.2	0.3	75	0.3
XPA28S	28	0.804	8.04	225 ⁽²⁾	86	9.34	0.2	0.3	75	0.3
XPB3.3S	3.3	3.03	30.3	100	79	3.86	0.5	0.75	50	1
XPB5S	5	3	30	150	81	3.86	0.5	0.5	50	0.75
XPB5.2S	5.2	2.88	28.8	150	81	3.86	0.5	0.5	50	0.75
XPB9S	9	2.78	27.8	250	85	6.13	0.5	0.5	50	0.5
XPB12S	12	2.29	22.9	275	86	6.67	0.5	0.5	50	0.5
XPB15S	15	1.83	18.3	275	86	6.67	0.5	0.5	50	0.5
XPB24S	24	1.25	12.5	300	86	7.27	0.2	0.3	75	0.3
XPB28S	28	1.07	10.7	300	87	7.18	0.2	0.3	75	0.3

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

Note 2: Maintain minimum 10% of rated load to prevent a voltage surge.

Note 3: Deate 10% power per input voltage for 18-21V

SPECIFICATIONS (Nominal V_{IN} , Full Load, $T_A = +25^{\circ}\text{C}$, 1 hour warm up unless otherwise specified)**INPUT**

Parameter	Condition	Min.	Typ.	Max.	Units
Input Voltage Range	XPA models	18	28	36	VDC
	XPB models	36	48	72	

ENVIRONMENTAL

Parameter	Condition	Min.	Typ.	Max.	Units
Operating Temperature Range	Baseplate	0	-	+85	$^{\circ}\text{C}$
Storage Temperature Range		-55	-	+105	$^{\circ}\text{C}$
Cooling	Conduction through baseplate				

GENERAL

Parameter	Condition	Min.	Typ.	Max.	Units
Operating Frequency		-	300	-	kHz
Isolation Voltage	Input to output	2000	-	-	VDC
	Input to baseplate	2000	-	-	
	Output to baseplate	1000	-	-	
Insulation Resistance		100	-	-	M Ω
Size	L x W x H	4.6 x 2.5 x 0.5 (116.84 x 63.5 x 12.7)			inches (mm)
Weight		-	210	-	grams
Case	Aluminum baseplate and Glass Reinforced Polymer				
Potting	Vacuum Impregnated Epoxy				
Tube Packaging (W x H x L)	2.595 x 1.105 x 20 (65.913 x 28.067 x 101.6)				inches (mm)

PROTECTIONS & FEATURES

Parameter	Condition	Min.	Typ.	Max.	Units
Short circuit or Overload	Hiccup mode, self-recovery	110	-	120	%
Overtemperature	Baseplate, self-recovery	Shutdown	95	-	$^{\circ}\text{C}$
		Restart	50	-	
Output Overvoltage	Zener diode clamp	-	120	-	%
Shutdown (SHUTDOWN)	Non-latched shutdown, Self-recovery	2.5	-	7	VDC
Output Voltage Trim (TRIM, TRIM UP & TRIM DOWN)		-5	0	5	%
Remote Sense Compensation		-	-	1	VDC

Note 3: The parallel option allows units to operate the outputs in parallel to share load, increase total power or allow for N+1 redundancy.v

SPECIFICATIONS (Nominal V_{IN} , Full Load, $T_A = +25^\circ\text{C}$, 1 hour warm up unless otherwise specified)**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

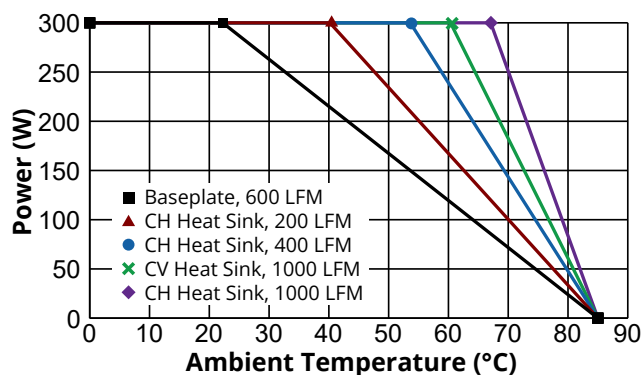
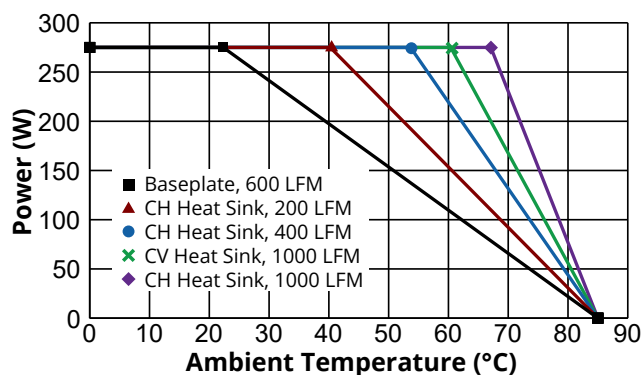
Parameter	Referenced Standard	Description
Stabilization Bake	MIL-STD-883	Referenced Method 1008 Non-operating maximum storage temperature for 24 hours
Temperature Cycle	MIL-STD-883	Referenced Method 1010 Non-operating at temperature extremes, 15 mins/temp, 10 cycles
Burn-In	MIL-STD-883	Referenced Method 1015 Max operating temperature for 160 hours
Expanded Operating Temperature Range		-55°C to +85°C

THERMAL RESISTANCE

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

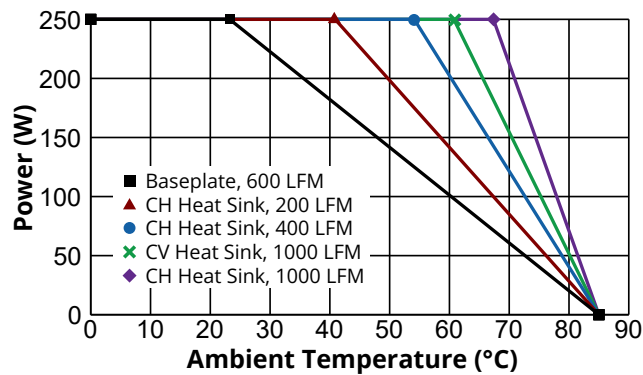
 P_{OUT} = Output Power in Watts η = Efficiency T_C = Case temperature in $^\circ\text{C}$ T_A = Ambient temperature in $^\circ\text{C}$ T_{RCA} = Thermal resistance of case to air in $^\circ\text{C} / \text{W}$ **Thermal resistance of case (T_{RCA})**

Airflow	Baseplate only	CV Heat Sink	CH Heat Sink	Units
Free Air	5.1	3.5	3.0	$^\circ\text{C} / \text{W}$
200 LFM	2.8	1.8	1	
400 LFM	1.8	1.1	0.7	
600 LFM	1.4	0.8	0.55	
800 LFM	1.2	0.65	0.45	
1000 LFM	1	0.55	0.4	

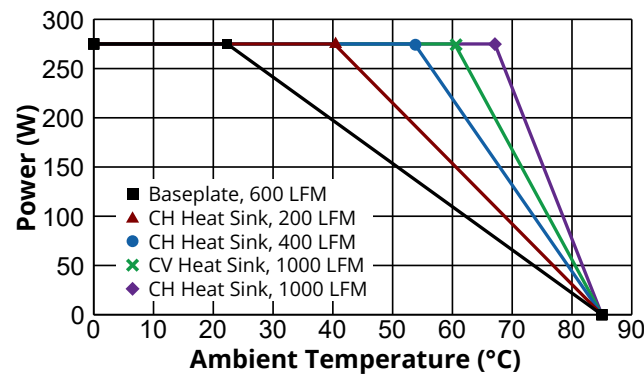
DERATING GRAPHS (Nominal V_{IN} , Full Load, Efficiency @ Full Load)**Models with Max. Output Power = 300W
& Efficiency at full load = 87%****Models with Max. Output Power = 275W
& Efficiency at full load = 86%**

DERATING GRAPHS

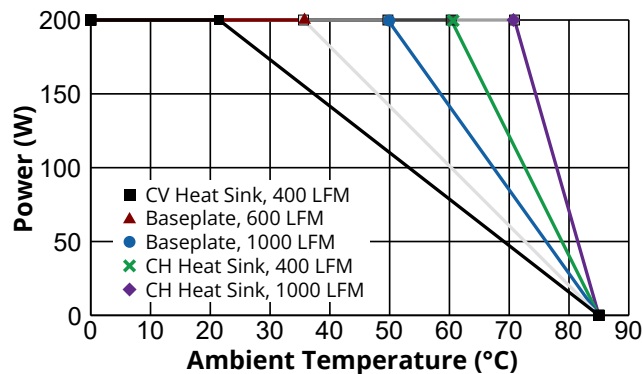
Models with Max. Output Power = 250W
& Efficiency at full load = 85%



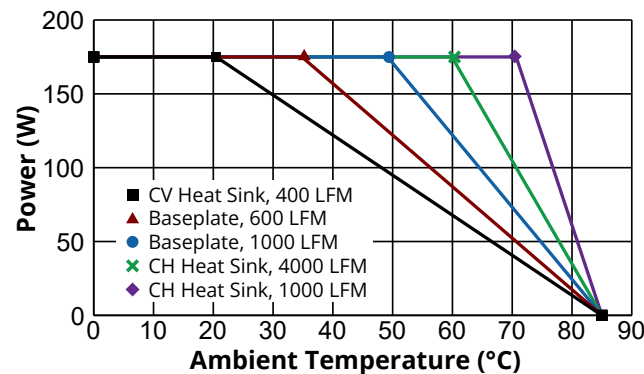
Models with Max. Output Power = 275W
& Efficiency at full load = 86%



Models with Max. Output Power = 200W
& Efficiency at full load = 85%

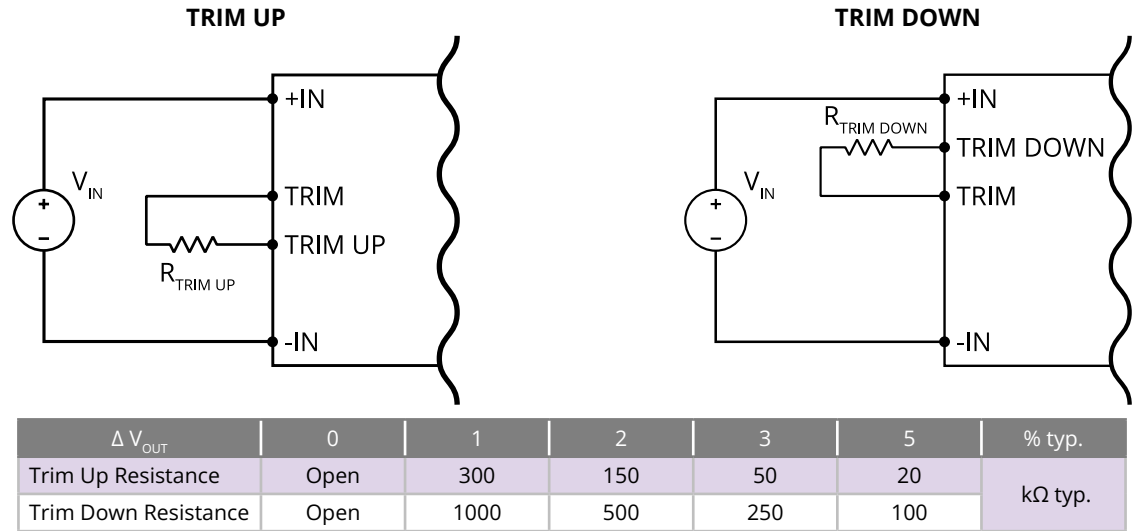


Models with Max. Output Power = 175W
& Efficiency at full load = 83%



TYPICAL CONNECTION CIRCUIT

TRIM

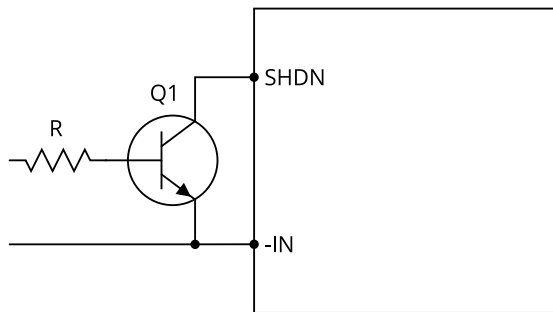


Note: Each individual unit will vary slightly. It is recommended to use a 1M Ω multi-turn trimmer potentiometer to determine resistance value and achieve desired adjustment. Use minimum 1/2W power rating resistor. Keep the trim resistor leads as short as possible to eliminate the stray inductance which will effect the trimming results.

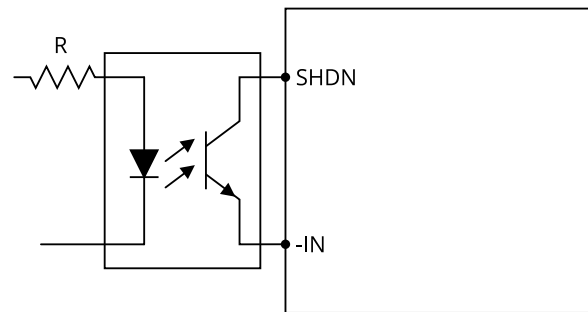
TYPICAL CONNECTION CIRCUIT

SHUTDOWN

NON-ISOLATED

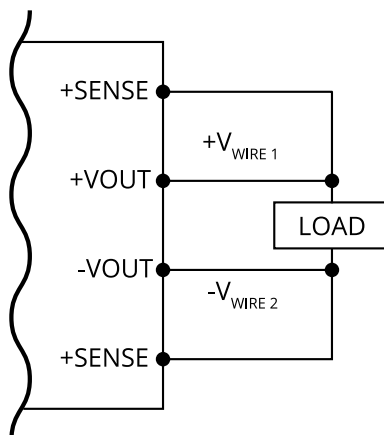


ISOLATED



SENSE

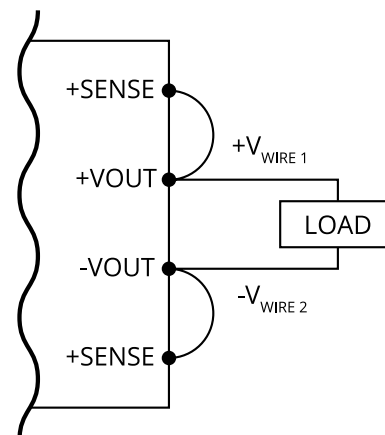
REMOTE SENSE



$$V_{OUT} = V_{LOAD} + V_{WIRE\ 1} + V_{WIRE\ 2}$$

The positive remote sense (+SENSE) should be connected to the positive output (+VOUT) at the physical load location. The negative remote sense (-SENSE) should be connected to the negative output (-VOUT) at the physical load location. VOUT may compensate up to 1V of drop in the load wires. Voltage will be regulated at the load.

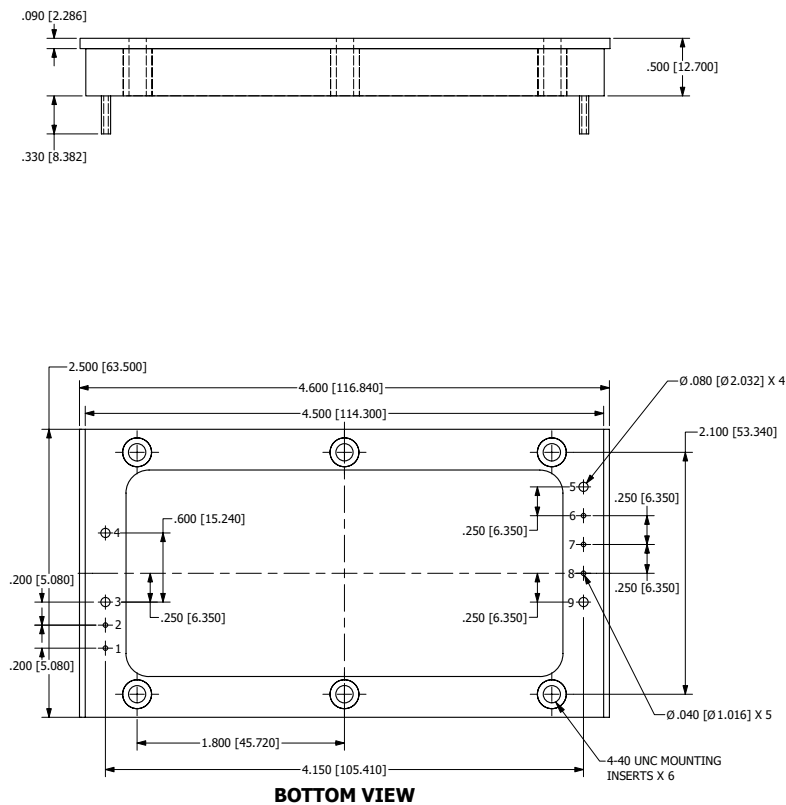
LOCAL SENSE



$$V_{LOAD} = V_{OUT} - V_{WIRE\ 1} - V_{WIRE\ 2}$$

Alternatively, for local sense, +SENSE should be connected to +VOUT and -SENSE should be connected to -VOUT at the output terminals. Voltage will be regulated at the output terminals.

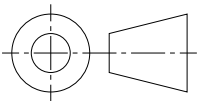
MECHANICAL DRAWINGS



PIN	FUNCTION	PIN DIAMETER
1	SYNC	.040 [1.016]
2	SHUT DOWN	.040 [1.016]
3	-IN	.080 [2.032]
4	+IN	.080 [2.032]
5	+OUT	.080 [2.032]
6	+SENSE	.040 [1.016]
7	TRIM	.040 [1.016]
8	-SENSE	.040 [1.016]
9	-OUT	.080 [2.032]

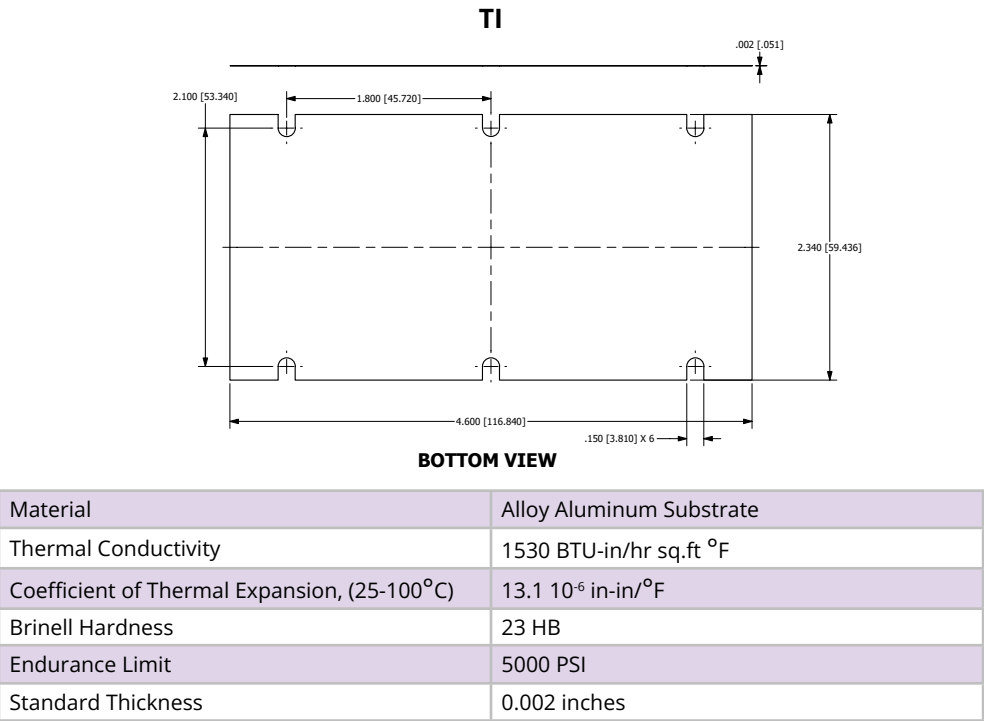
NOTES

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

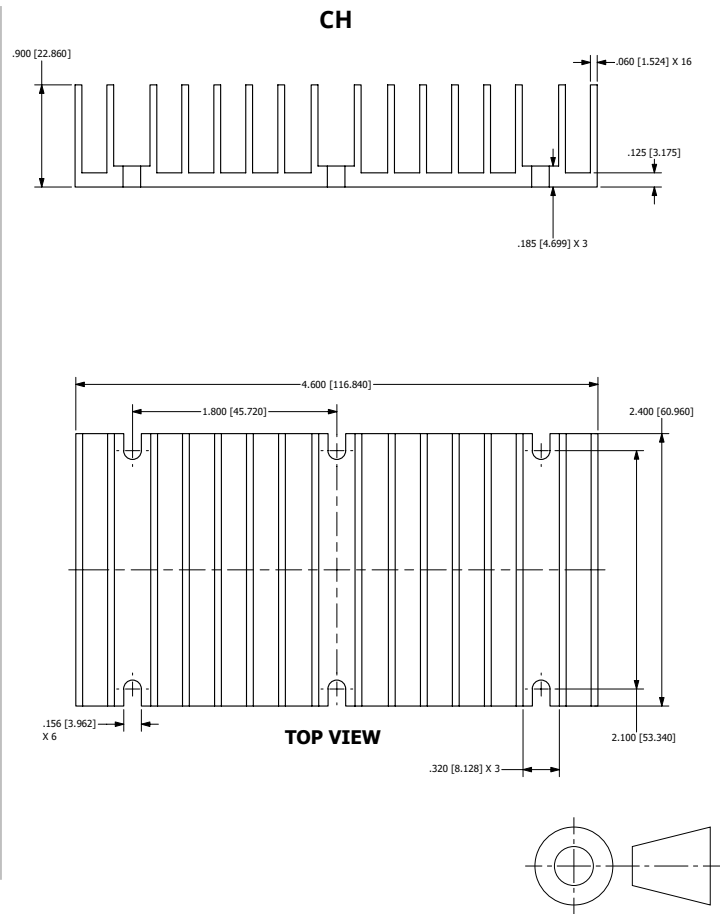
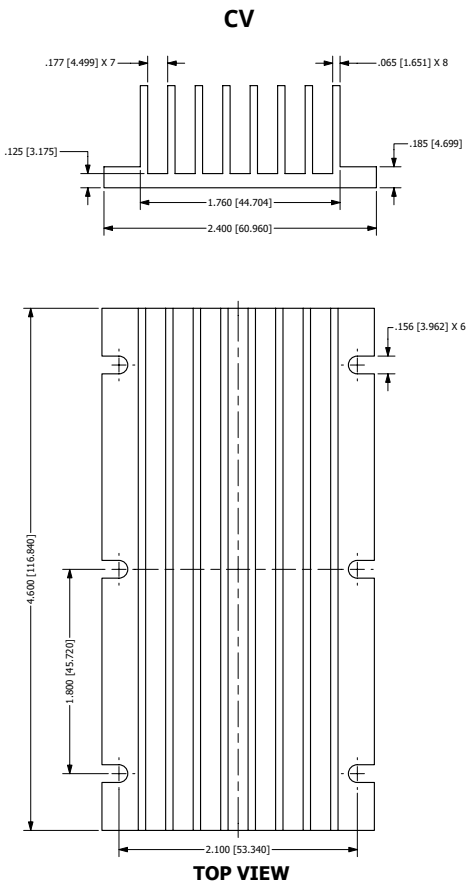


MECHANICAL DRAWINGS

THERMAL INTERFACE



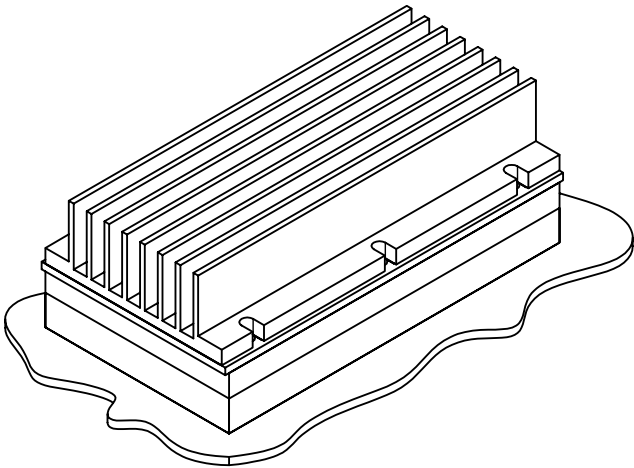
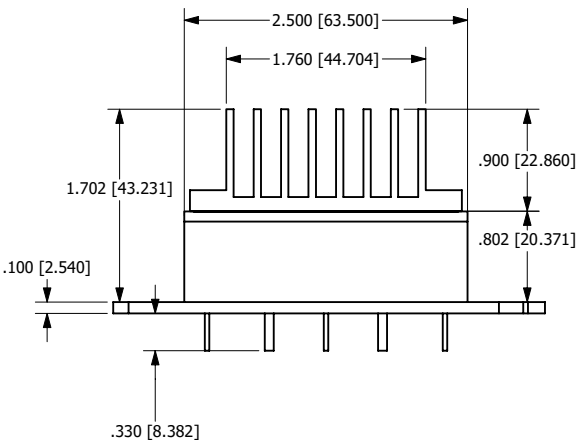
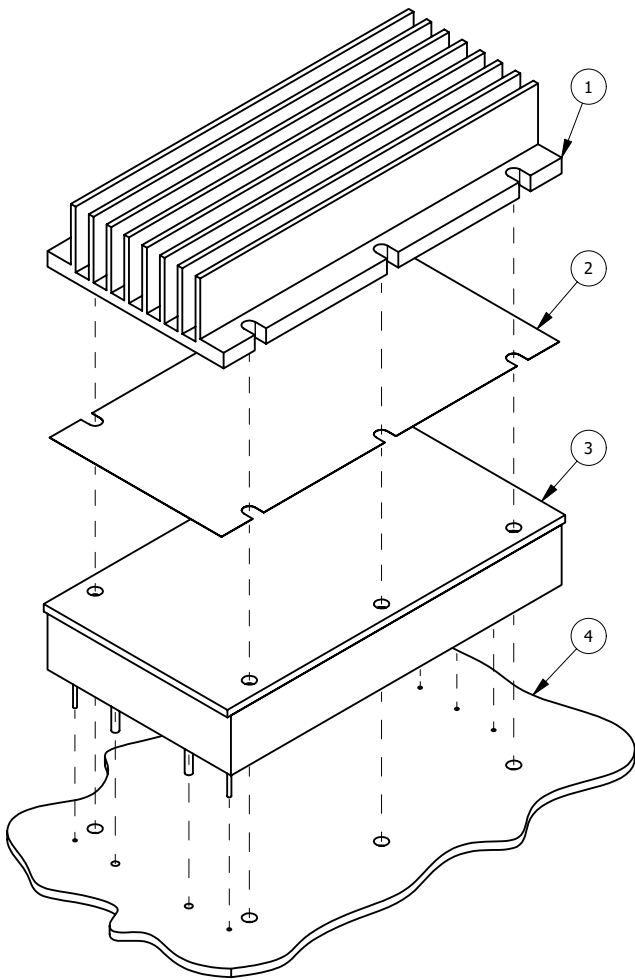
HEAT SINKS



Weight: 145 grams typical

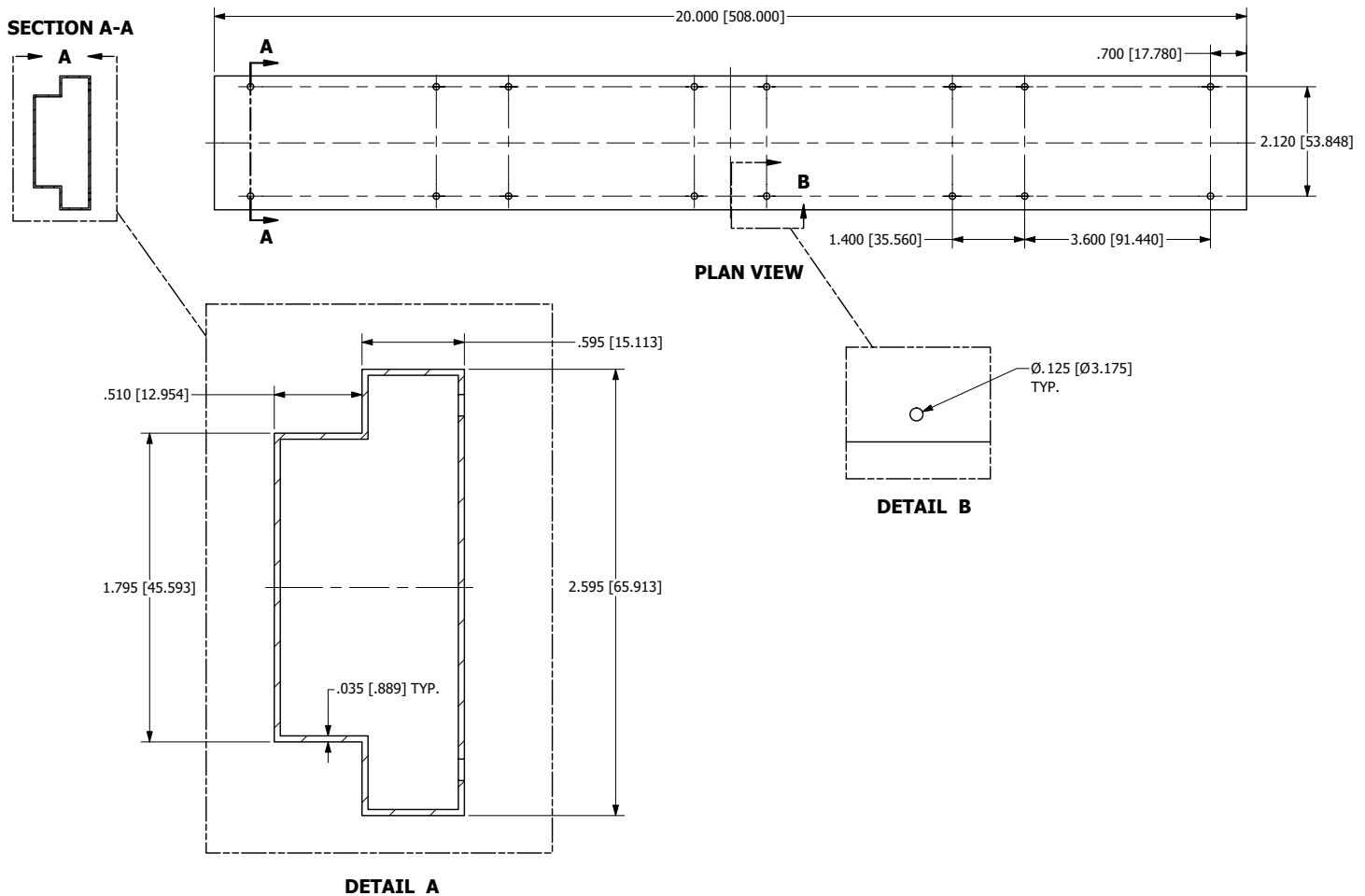
MECHANICAL DRAWINGS

HEAT SINK ASSEMBLY

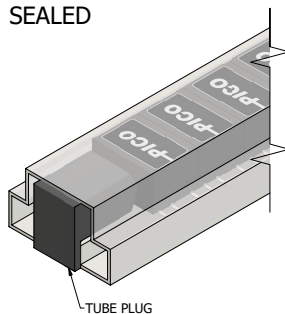


ITEM	QTY	DESCRIPTION
1	1	CH OR CV HEAT SINK
2	1	TI THERMAL INTERFACE
3	1	XP MODULE
4	1	PCB

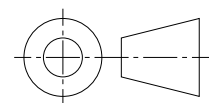
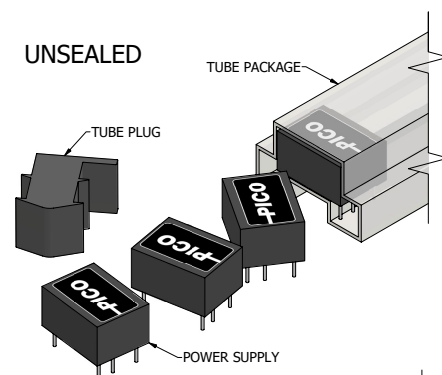
TUBE PACKAGING



SEALED



UNSEALED



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