


<div>+28V 220 Amp Non-Isolated Power Controller</div>		<div>Mii Micropac</div>
<div>Features:</div> <ul style="list-style-type: none">• Open frame / PC Board design• Light weight – 200 grams• Operation temperature of -40°C to +85°C• SPST, normally open DC power control• I²T overload protected output with Switch Status Output• I²c telemetry reporting of Switch voltage, current and base-plate temperature• Power MOSFET output with Low on-state resistance		

<div>DESCRIPTION:</div> <p>This non-Isolated DC Power Controller is a low mass open construction DC switch intended for applications within an enclosure. In addition to load switching, the incorporated I²T overload protection / fault protection provides a circuit breaker function. A status output signals output switch conditions of On / Off and Overload. An I²c interface communicates switch voltage, current and base plate temperature.</p> <p>MOSFETs output switch provides soft start and low On voltage drop for cool operation.</p> <p>The Logic Control input operates from a bias supply of 18 to 32V.</p> <p>The Power Controller combines the functionality of a relay and circuit breaker. Output current is monitored for over-current with an I²T trip curve. Fault currents beyond the I²T trip limits are terminated instantly. Over-current conditions include Over-Load and Shorted Output during Turn-On. An open-collector Output Status is available to indicate the State of the Output Switch MOSFETs. The output remains blocked until the short is removed and the unit reset. Output Status is an Active Low for Control Off or Tripped condition and High into a pull up resistance for a (Control High) Normally On Output State. Controlling the IPC Off then back on resets a Tripped condition.</p>		<div>Application:</div> <ul style="list-style-type: none">• 28 Volts DC, 220 Amp Power Switching <div></div>
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<div>ABSOLUTE MAXIMUM RATINGS</div>	
Load Voltage ¹	100 VDC
Load Current ²	Not more Than 5 Times Rated Operating Current / Self Protecting
Bias supply voltage, V _{DD}	-0.6 to 32 VDC
Control Voltage	1 Volt above V _{DD} / 1 Volt below Return
Operating temperature	-40°C to +85°C Case
Storage temperature	-55°C to +125°C
<div>Notes:</div>	
¹ Reversing output polarity may cause permanent damage	
¹ The (circuit breaker) I ² t function immediately terminates surge currents per Figure 2 or 3.	

ELECTRICAL CHARACTERISTICS: $T_C = -40^{\circ}\text{C}$ to 85°C unless specified.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output characteristics					
Operating Voltage	Intended system voltage		28		VDC
Continuous blocking voltage	Output device Rating			95	VDC
Rated Output Current	28V			220	ADC
Load Start current for up to 100ms adjust range	28V		440		ADC
Maximum On Stage Voltage drop	25°C @ 220A		0.7		VDC
On-state resistance, R_{ds}	25°C @ 220A		3		mOhms
Turn-on time / Rise Time	Figure 2		4.0/1.0	5.0/3.0	mS
Turn-off time / Fall Time	Figure 2		4.0/1.0	5.0/3.0	mS
Maximum Off State leakage	@ Continuous Blocking Voltage			5	mA
Snubbing	Externally required				
Input characteristics					
CMOS configurations (Figure 1)					
Bias supply range, V_{DD}		18	28	32	VDC
Bias current			80	90	mA
Control voltage range		-0.5		5.5	VDC
Turn-on voltage			2.9		VDC
Turn-off voltage			2.9		VDC
Status Output Specification					
Trip Reset Time	Remove overload & Cycle input	50			mS
Status Supply Voltage (open Collector)				32	VDC
Status off leakage current	$V_S = 35$ VDC			4	μ ADC
Status on voltage	$I_{STATUS} = 5$ MA @ 25°C			0.4	VDC
High-To-Low Transition Time	$I_{STATUS} = 5$ MA		20	50	μ S
General Specifications					
@ 25°C					
Dielectric withstanding	Power to I^2c circuits	500			VDC
Junction temperature				150	°C
Thermal resistance, θ_{JC}				0.3	°C/W
Output Capacitance			30,000		pF
Input to Output Capacitance			250		pF
Data Communication I^2c B / Phase 2 - 3					
Address	4 bits / jumper programmable				
Data:					
Switch Voltage / Resolution	40.96V full scale / 12 Bit A to D		10		mV / BIT
Switch Voltage / Accuracy			±5%		
Output Current / Resolution	409.6A full scale / 12 Bit A to D		100		mA / BIT
Output Current / Accuracy			±5%		
Temperature / Resolution	0°C and above 204.8°C Full scale		0.05°C		°C / BIT
Temperature / Accuracy			2.0°C		
Mass				200	gram

NOTES:

- 1) Minimum Commanded “Off” or “On” time is 100msec.
- 2) These IPCs have load current memory. Allow 100 seconds between overload or shorted load restarts for full current startup.
- 3) Input transitions should be “bounce-less contact” with transitions of <1 msec.
- 4) Inductive loads must be suppressed for operational command transients and Internal Fault shutdown times as short as 5 μ s.

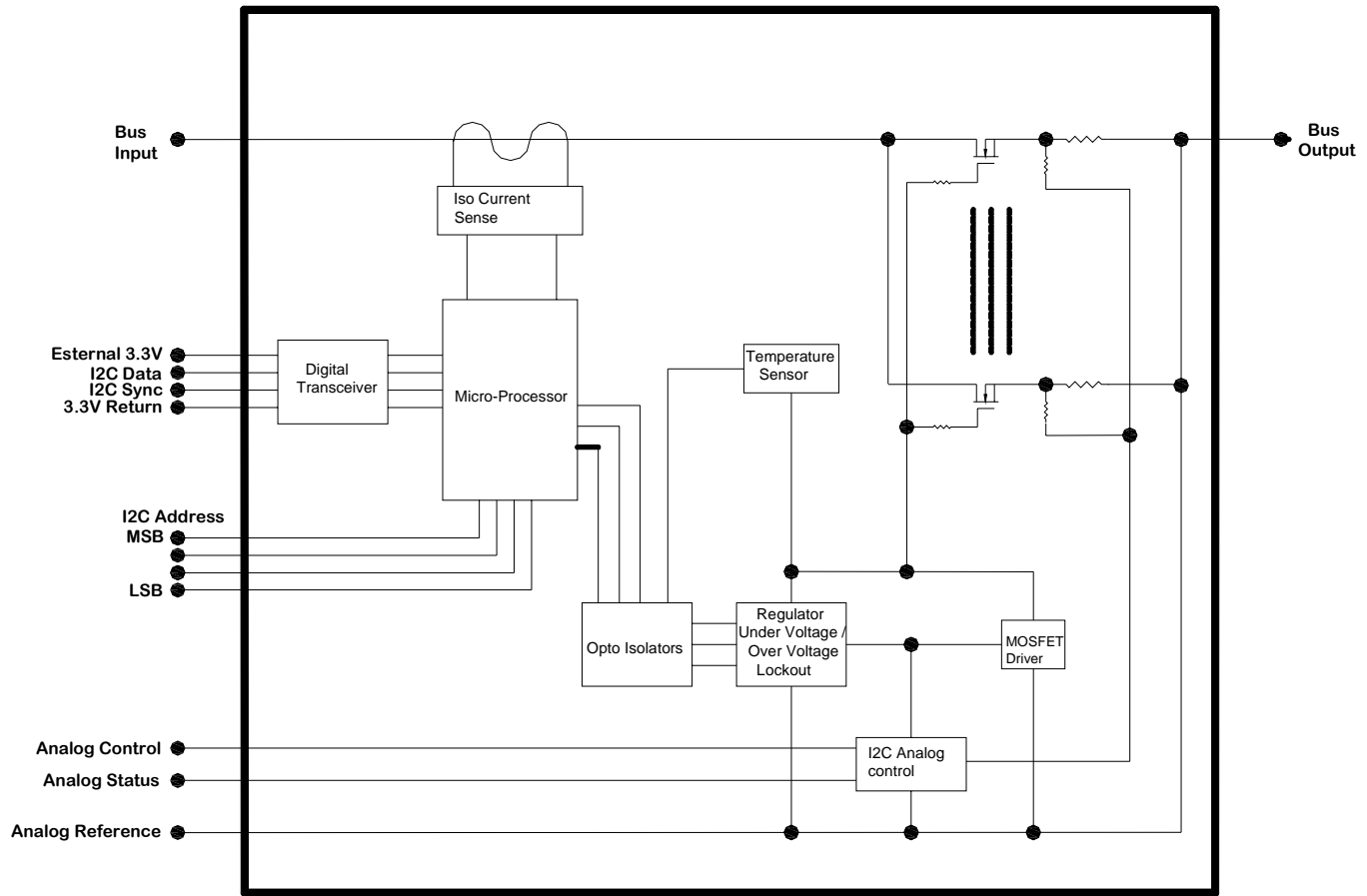


FIGURE 1

Preface: The proposed Bus Switch is based on the IPC family in general and the 53290 specifically. Modifications will conform to the specific Blackdog application.

Features include analog control commands and status monitoring. This ensures a “Hard” control of the Smart Switch minimizing accidental load power application. A μ Processor based system communicating in I²C accesses Smart Power Switch makes available operating conditions such as device temperature, switched current, switch status and analog signals. The analog circuits and the μ Processor are powered from the bus Input and require the bus to be active for any control or monitoring function.

A deliberate design feature of the system is to power up in the “off” condition. After the application of Bus Power to the input, the analog control must be brought to a “0” off state then to “1” on state to activate the system. A resistive pull-down is also part of the control circuit to ensure an Off condition in the event of an open control line. Switch turn on time is controlled with a compromise of limiting power dissipation and the ability to power up capacitive loads. An I²t feature from the 53290 is incorporated with a 2X let-through current for up to 100msec at which the switch will latch Off until the analog control is cycled low then back on.

There is no-board clamping or snubbing for this application. The rationale is there are circuits and functions both from the bus input and output that already require transient protection. These external protections will be relied on unless otherwise specified.

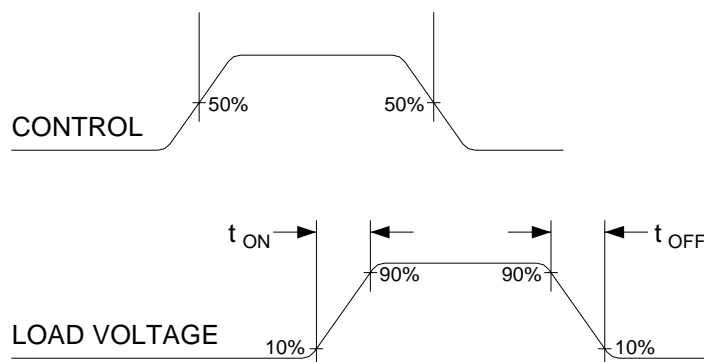


Figure 2 Switching Characteristics

	Turn on into Short Sequence						Short while on Sequence			
Control	0	1	1	0	1	1	1	1	0	1
I out	Off	Off	Off	Off	On	On	Off	Off	Off	On
Switch Status	0	0	0	0	Open "1"	Open "1"	0	0	0	Open "1"
Shorted Output	Shorted	Shorted	X	Off	Off	Off	On	X	X	Off

Truth Table – Short circuit and Status

Notes:

1. Unit Powers up in the OFF condition with application of Primary power.
2. Fault Status reports only when Primary Power is present.
3. An OFF Control to ON Control transition is required to first turn the Unit On.
4. A loss of V_{DD} will return the output state to OFF.
5. Truth Table Power sequencing: Output Status open collector pull-up resistor is assigned a separate and always On voltage producing a "1" when "Open".

I²C Data Protocol:

The data string is organized as an 8 byte string.

String (8 bytes) Data

0	LSB Status Input
1	MSB Status Input
2	LSB Switch Voltage
3	MSB Switch Voltage
4	LSB Current Output
5	MSB Current Output
6	LSB Temperature
7	MSB Temperature

I²C address is 7 bits. The 4 bit address is located from bit 3, to bit 7. A count of 10 is added to the incoming address to position the 4 hardwired bits. Over bits 3 to 7.

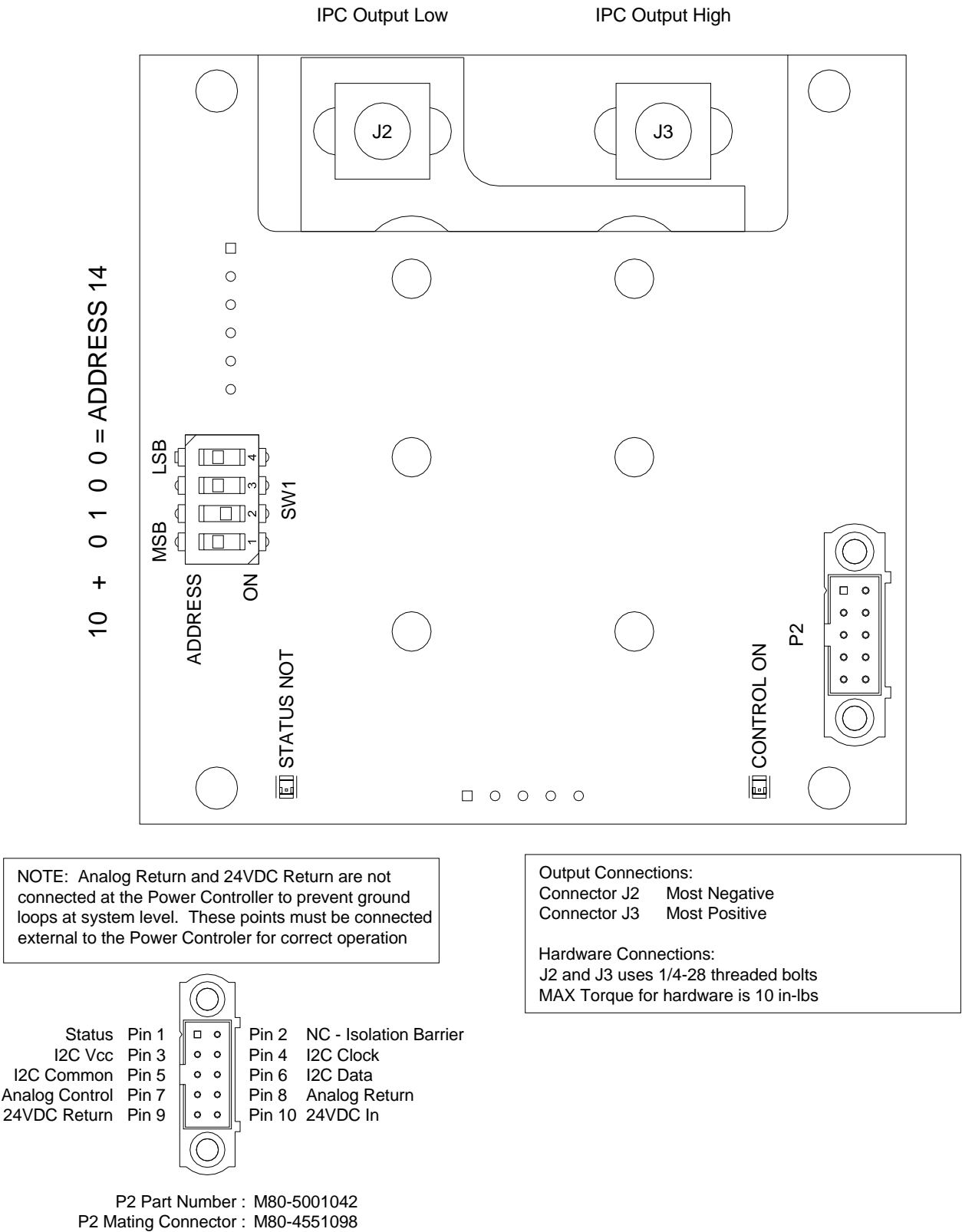


Figure 3 Pin Assignment

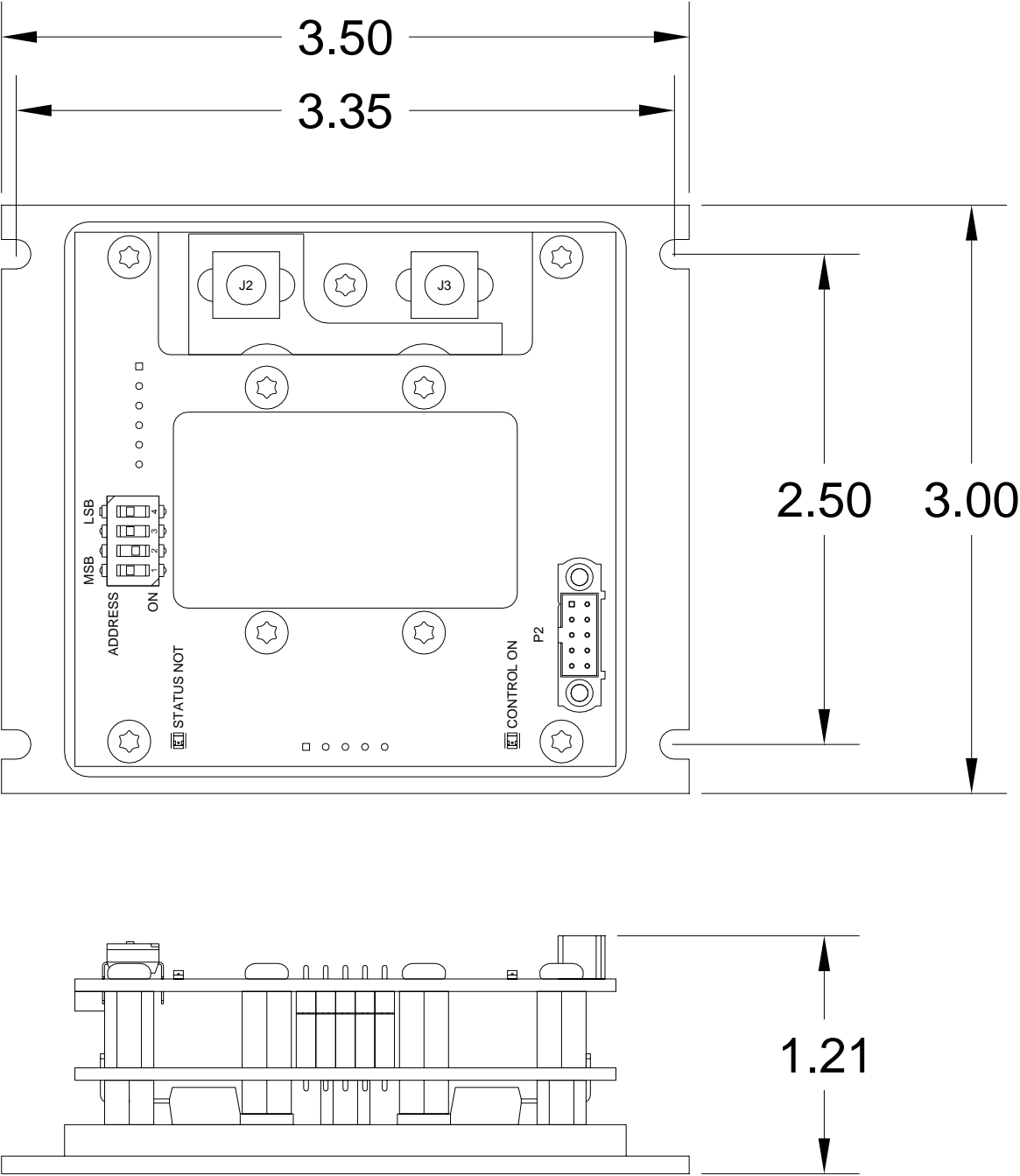


Figure 4 Package Dimensions

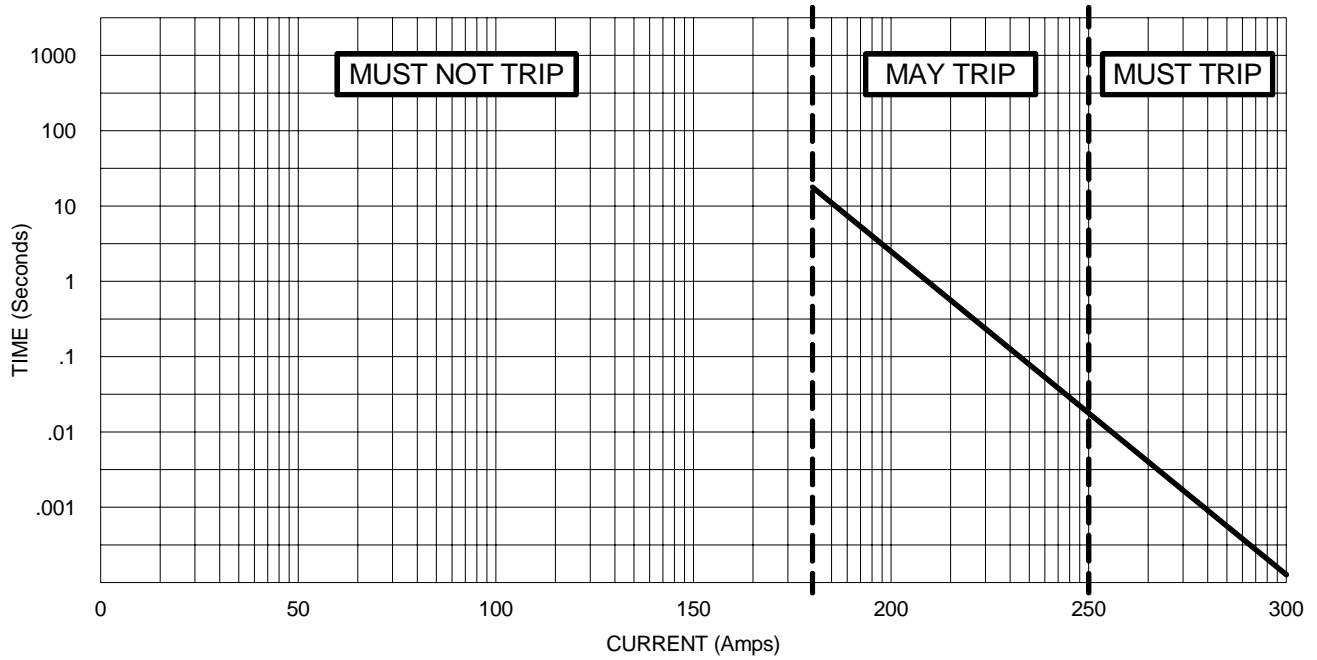


Figure 5 Trip Curve

TRIP CURVE NOTES:

1. Output currents are interrupted in the Must Trip / May Trip / Must Not Trip per the following graph.
2. Output (sustaining) Current is 10 to 90A.
3. Load fault current from the "ON" operating condition are limited by the source and load impedance.
4. Over current and fault trip currents terminate abruptly and are snubbed for up to 3 μ H of load inductance.

Product Status:

This document contains information on a product under development. Micropac reserves the right to change this product.