

Applications

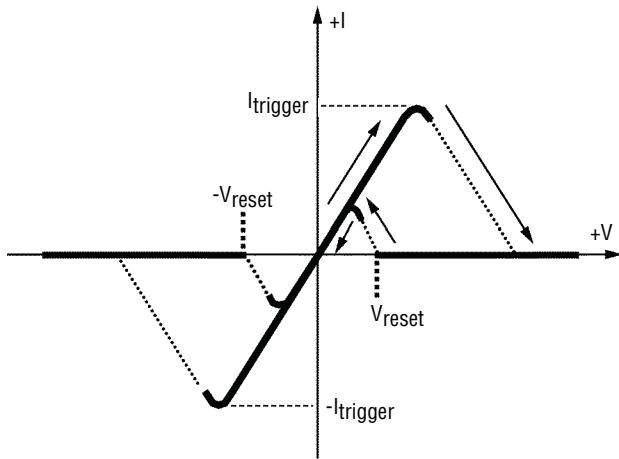
- Sensor protection
- Signal line protection

P500-G and P850-G Series Dual TBU® High-Speed Protectors

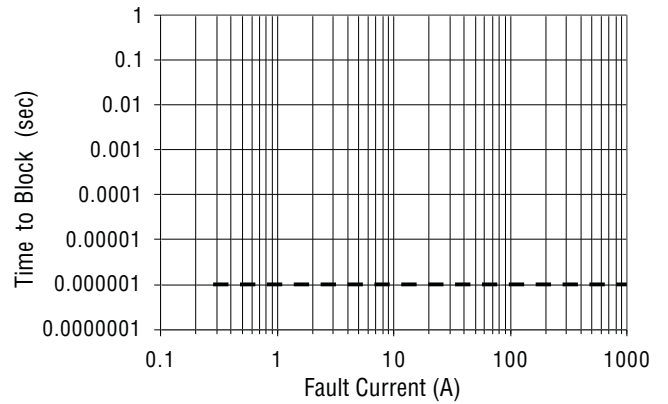
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Typical Performance Characteristics

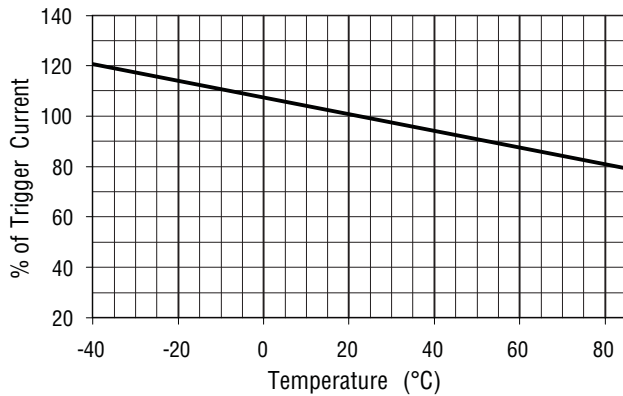
V-I Characteristics



Time to Block vs. Fault Current



Trigger Current Temperature



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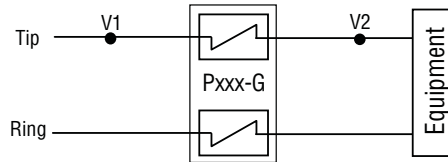
P500-G and P850-G Series Dual TBU® High-Speed Protectors



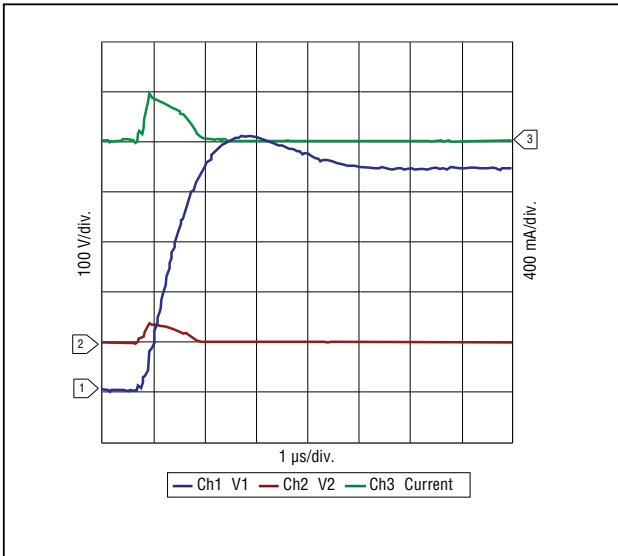
Operational Characteristics

The graphs below demonstrate the operational characteristics of the TBU® device. For each graph the fault voltage, protected side voltage, and current is presented.

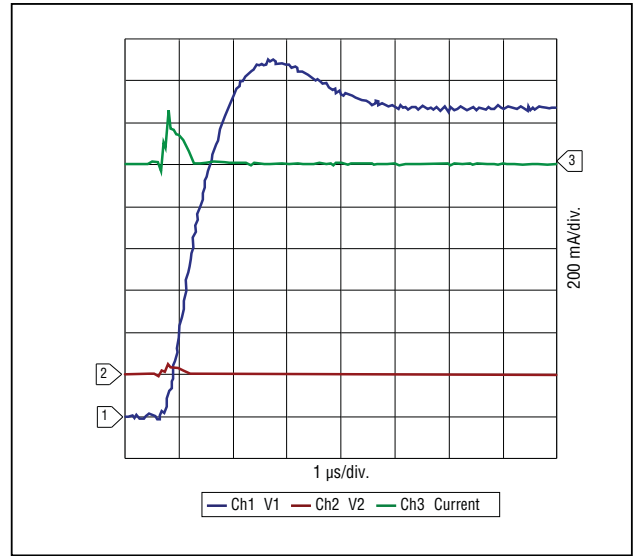
TEST CONFIGURATION DIAGRAM



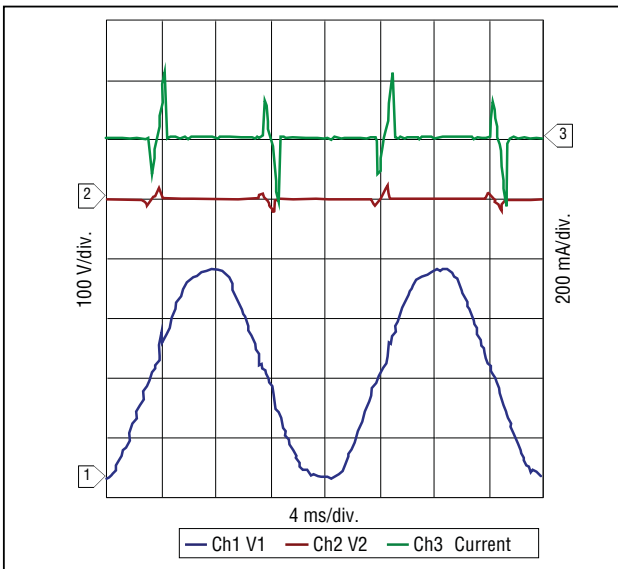
P500-G Lightning, 500 V



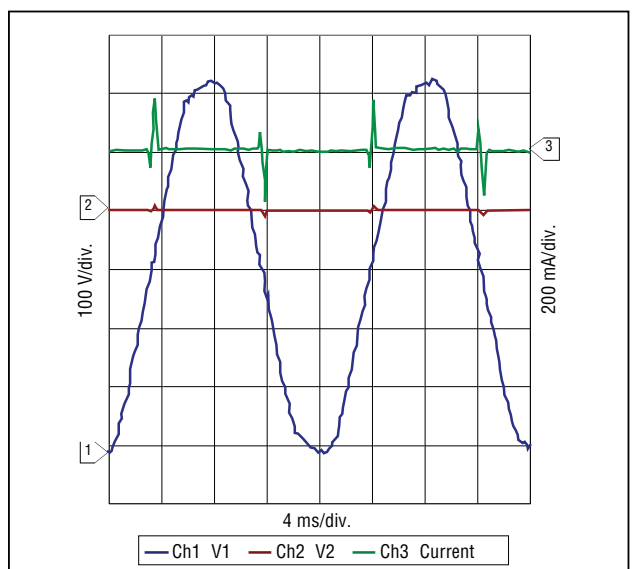
P850-G Lightning, 850 V



P500-G Power Fault, 120 Vrms, 25 A



P850-G Power Fault, 230 Vrms, 25 A



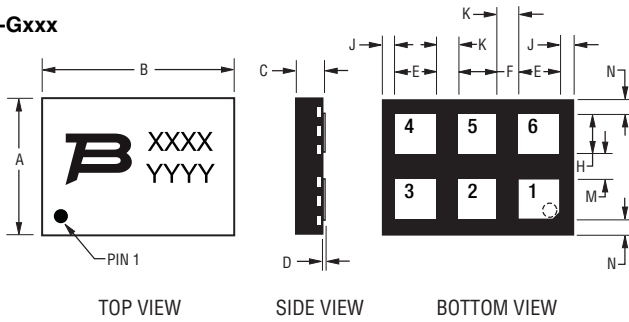
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P500-G and P850-G Series Dual TBU® High-Speed Protectors

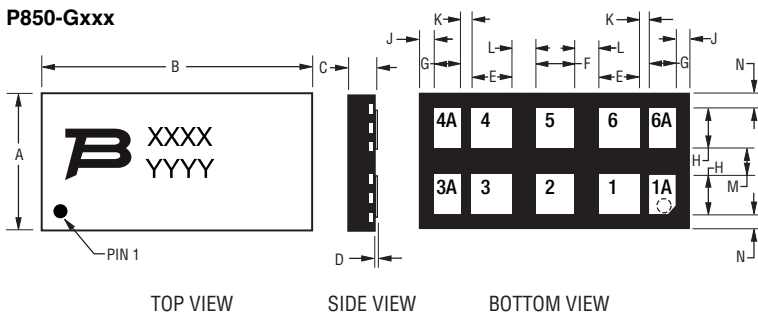
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Product Dimensions

P500-Gxxx



P850-Gxxx

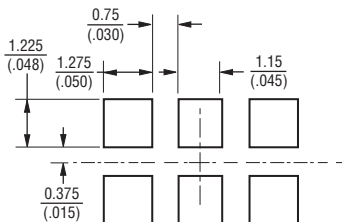


Pads 1A and 1 are internally connected; the same for pads 3A with 3, 4A with 4, and 6A with 6. This allows for one PCB layout to accommodate the P500 or P850.

Dim.	P500-G			P850-G		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	3.40 (.139)	4.00 (.157)	4.10 (.161)	3.40 (.139)	4.00 (.157)	4.10 (.161)
B	5.90 (.232)	6.00 (.236)	6.10 (.240)	8.15 (.321)	8.25 (.325)	8.35 (.329)
C	0.80 (.031)	0.85 (.033)	0.90 (.035)	0.80 (.031)	0.85 (.033)	0.90 (.035)
D	0.000 (.000)	0.025 (.001)	0.050 (.002)	0.000 (.000)	0.025 (.001)	0.050 (.002)
E	1.15 (.045)	1.25 (.049)	1.35 (.053)	1.15 (.045)	1.25 (.049)	1.35 (.053)
F	1.05 (.041)	1.15 (.045)	1.25 (.049)	1.05 (.041)	1.15 (.045)	1.25 (.049)
G	--	--	--	0.725 (.029)	0.825 (.032)	0.925 (.036)
H	1.10 (.043)	1.20 (.047)	1.30 (.051)	1.10 (.043)	1.20 (.047)	1.30 (.051)
J	0.375 (.015)	0.425 (.017)	0.475 (.019)	0.375 (.015)	0.425 (.017)	0.475 (.019)
K	0.70 (.028)	0.75 (.030)	0.80 (.031)	0.25 (.010)	0.30 (.012)	0.35 (.014)
L	--	--	--	0.70 (.028)	0.75 (.030)	0.80 (.031)
M	0.70 (.028)	0.75 (.030)	0.80 (.031)	0.70 (.028)	0.75 (.030)	0.80 (.031)
N	0.375 (.015)	0.425 (.017)	0.475 (.018)	0.375 (.015)	0.425 (.017)	0.475 (.018)

Recommended Pad Layout

P500-Gxxx

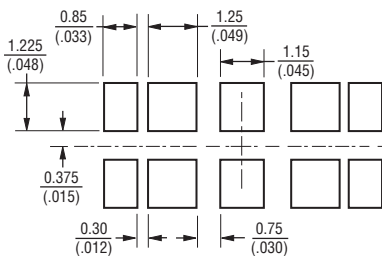


Pad Designation

Pad #	Apply
1	Tip In
2	NC
3	Tip Out
4	Ring Out
5	NC
6	Ring In

NC = Solder to PCB; do not make electrical connection, do not connect to ground.

P850-Gxxx



Pad Designation

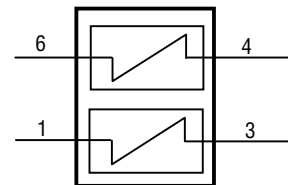
Pad #	Apply	Pad #	Apply
1A	Tip In	4A	Ring Out
1	Tip In	4	Ring Out
2	NC	5	NC
3	Tip Out	6	Ring In
3A	Tip Out	6A	Ring In

NC = Solder to PCB; do not make electrical connection, do not connect to ground.

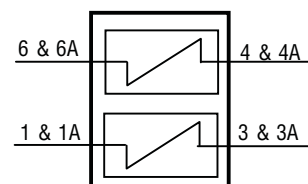
DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

Block Diagram

P500-Gxxx



P850-Gxxx



TBU® devices have matte-tin termination finish. Suggested layout should use non-solder mask define (NSMD). Recommended stencil thickness is 0.10-0.12 mm (.004-.005 in.) with stencil opening size 0.025 mm (.0010 in.) less than the device pad size. As when heat sinking any power device, it is recommended that, wherever possible, extra PCB copper area is allowed. For minimum parasitic capacitance, do not allow any signal, ground or power signals beneath any of the pads of the device.

The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Specifications are subject to change without notice. Users should verify actual device performance in their specific applications.

P500-G and P850-G Series Dual TBU® High-Speed Protectors

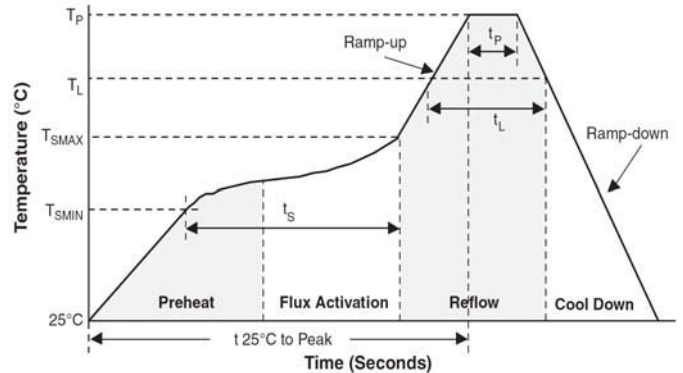
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Thermal Resistances

Part #	Symbol	Parameter	Value	Unit
P500-G	R _{th(j-a)}	Junction to leads (package)	113	°C/W
		Junction to leads (per TBU® device)	236	°C/W
P850-G	R _{th(j-a)}	Junction to leads (package)	119	°C/W
		Junction to leads (per TBU® device)	215	°C/W

Reflow Profile

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (T _{smax} to T _p)	3 °C/sec. max.
Preheat	
- Temperature Min. (T _{smin})	150 °C
- Temperature Max. (T _{smax})	200 °C
- Time (t _{smin} to t _{smax})	60-180 sec.
Time maintained above:	
- Temperature (T _L)	217 °C
- Time (t _L)	60-150 sec.
Peak/Classification Temperature (T _p)	260 °C
Time within 5 °C of Actual Peak Temp. (t _p)	20-40 sec.
Ramp-Down Rate	6 °C/sec. max.
Time 25 °C to Peak Temperature	8 min. max.



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P500-G and P850-G Series Dual TBU® High-Speed Protectors

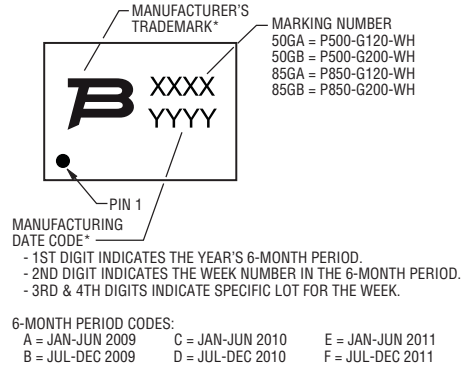
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How to Order

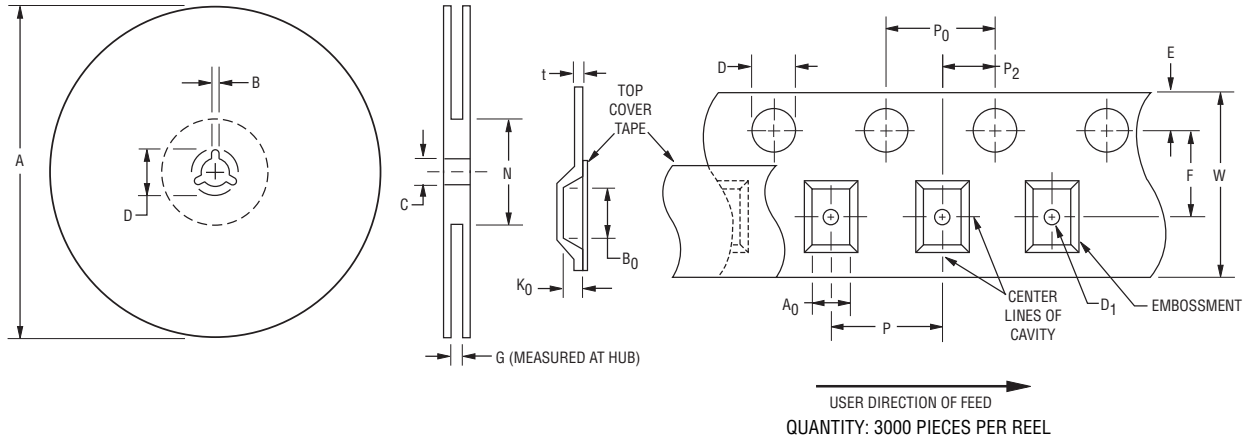
P 500 - G 120 - WH

Form Factor _____
 P = Two TBU® protectors in one device
 Impulse Voltage Rating _____
 500 = 500 V
 850 = 850 V
 Directional Indication for Paired Devices _____
 G = Bidirectional
 Iop Indicator _____
 120 = 100 mA
 200 = 200 mA

Typical Part Marking



Packaging Specifications (per EIA468-B)



Device	A		B		C		D		G	N
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Ref.	Ref.
P500-G, P850-G	326 (12.835)	330.25 (13.002)	1.5 (.059)	2.5 (.098)	12.8 (.504)	13.5 (.531)	20.2 (.795)	-	16.5 (.650)	102 (4.016)

Device	A ₀		B ₀		D		D ₁		E		F	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
P500-G	4.2 (.165)	4.4 (.173)	6.2 (.244)	6.4 (.252)	1.5 (.059)	1.6 (.063)	1.5 (.059)	-	1.65 (.065)	1.85 (.073)	5.4 (.213)	5.6 (.220)
P850-G	4.2 (.165)	4.4 (.173)	8.45 (.333)	8.65 (.341)	1.5 (.059)	1.6 (.063)	1.5 (.059)	-	1.65 (.065)	1.85 (.073)	7.4 (.291)	7.6 (.299)

Device	K ₀		P		P ₀		P ₂		t		W	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
P500-G	1.0 (.039)	1.2 (.047)	7.9 (.311)	8.1 (.319)	3.9 (.159)	4.1 (.161)	1.9 (.075)	2.1 (.083)	0.25 (.010)	0.35 (.014)	11.7 (.461)	12.3 (.484)
P850-G	1.1 (.043)	1.3 (.051)	7.9 (.311)	8.1 (.319)	3.9 (.159)	4.1 (.161)	1.9 (.075)	2.1 (.083)	0.25 (.010)	0.35 (.014)	15.7 (.618)	16.3 (.642)

DIMENSIONS: $\frac{\text{MM}}{\text{(INCHES)}}$

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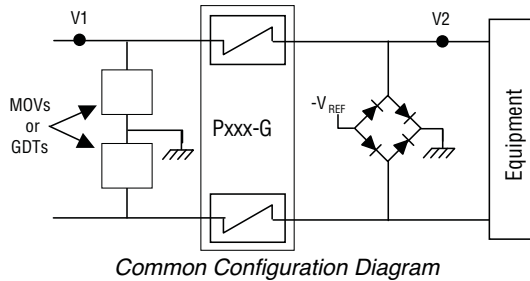
P500-G and P850-G Series Dual TBU® High-Speed Protectors



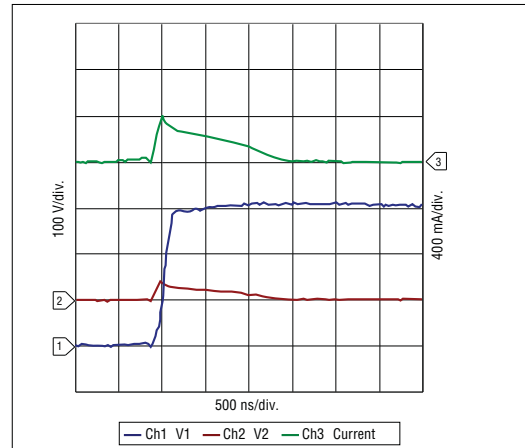
Reference Designs

A cost-effective protection solution combines the Bourns® TBU® protection device with a pair of MOVs or Bourns® GDTs and a diode bridge. The diagram below illustrates a common configuration of these components. The graphs to the right demonstrate the operational characteristics of the circuit.

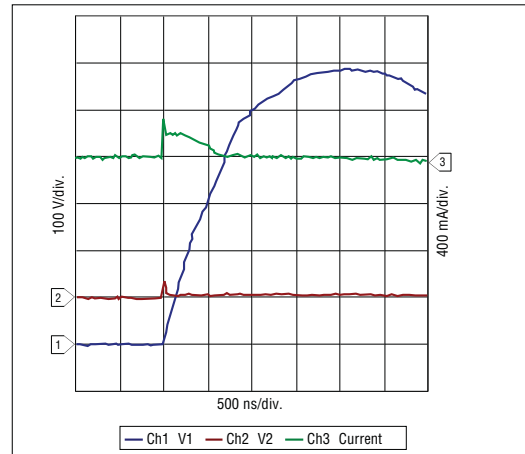
For new SLIC applications, we recommend that customers evaluate our new TBU-PL series.



P500-G Configuration (GR-1089 Intra-building and 5 kV Lightning)			
Product	Qty.	Part Number	Source
TBU® Device	1	P500-Gxxx-WH	Bourns, Inc.
MOV	2	MOV-10D201K	Bourns, Inc.
Diode bridge	2	GSD2004S-V MMBD2004S	Vishay Diodes Inc.



P850-G Configuration (ITU-T K.20, K.21, K.20E, K.21E, K.45)			
Product	Qty.	Part Number	Source
TBU® Device	1	P850-G120-WH	Bourns, Inc.
MOV	2	MOV-10D361K	Bourns, Inc.
Diode bridge	2	GSD2004S-V MMBD2004S	Vishay Diodes Inc.



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REV. 06/14

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