

## Applications

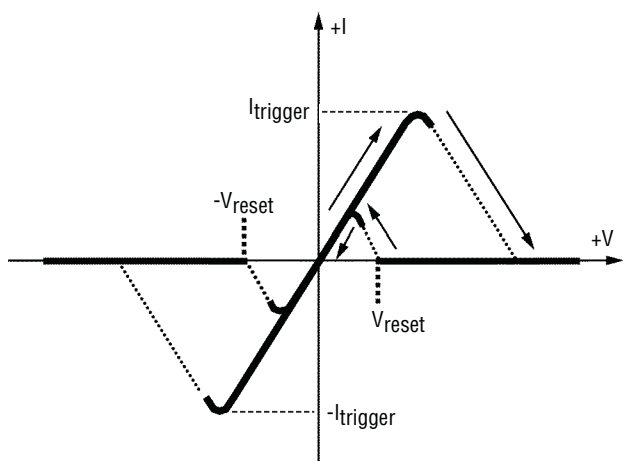
- Sensor protection
- Signal line protection

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

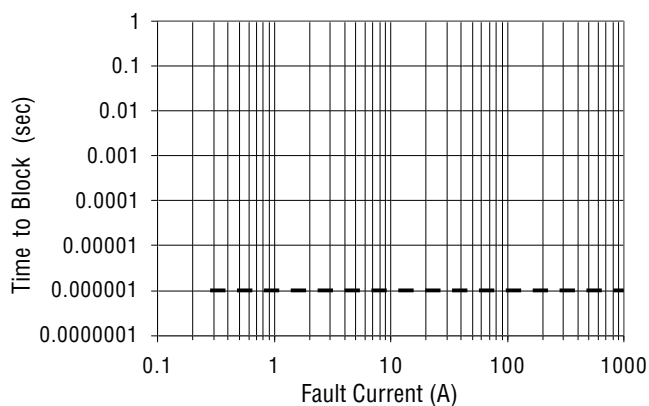
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### Typical Performance Characteristics

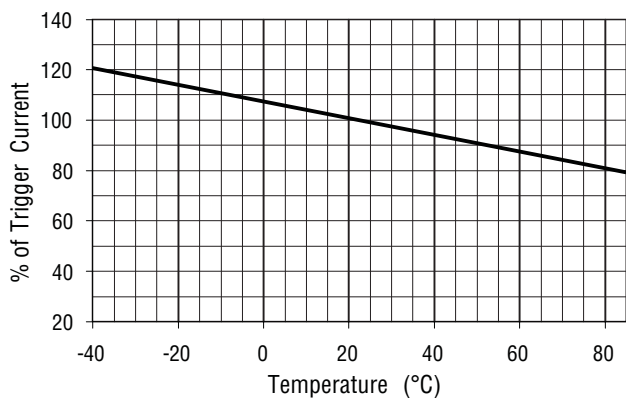
#### V-I Characteristics



#### Time to Block vs. Fault Current



#### Trigger Current Temperature



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

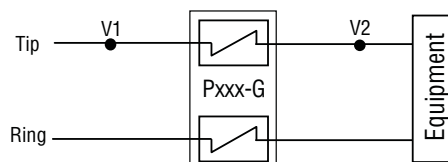
# P500-G and P850-G Series Dual TBU® High-Speed Protectors

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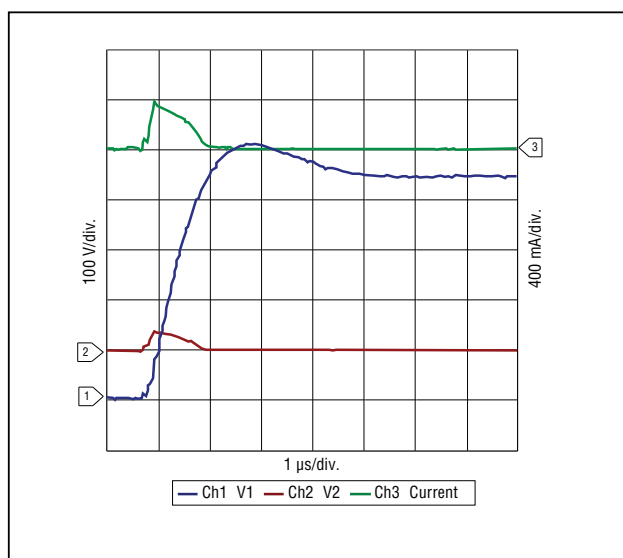
## Operational Characteristics

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

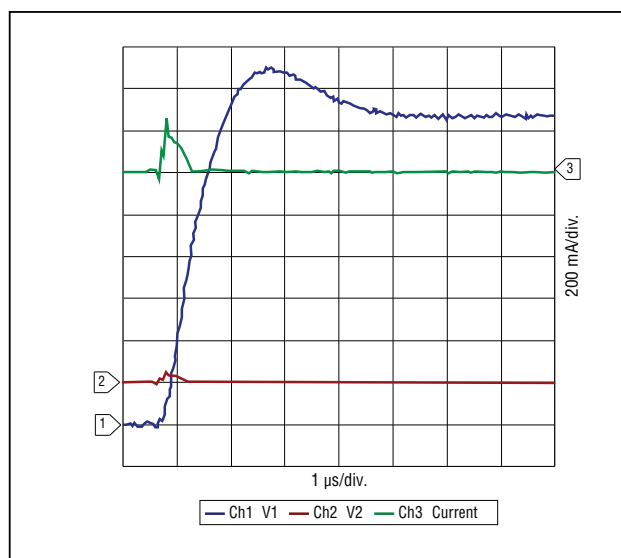
TEST CONFIGURATION DIAGRAM



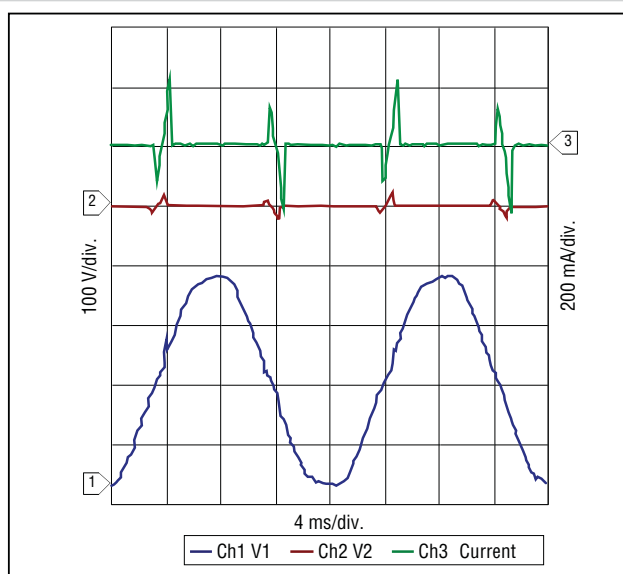
### P500-G Lightning, 500 V



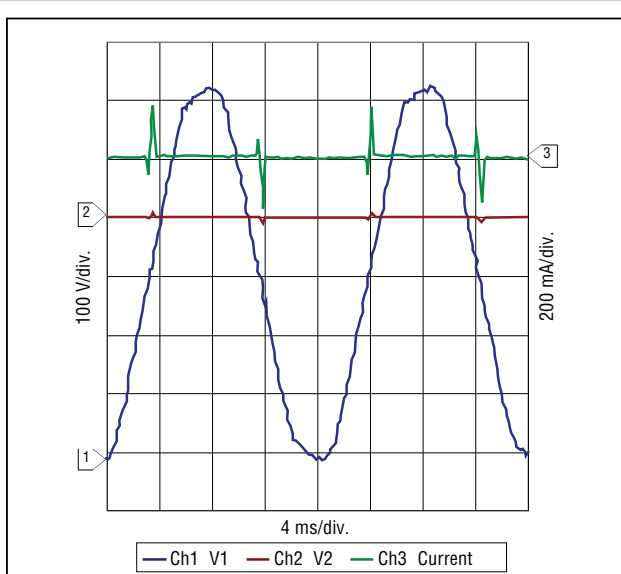
### P850-G Lightning, 850 V



### P500-G Power Fault, 120 Vrms, 25 A



### P850-G Power Fault, 230 Vrms, 25 A



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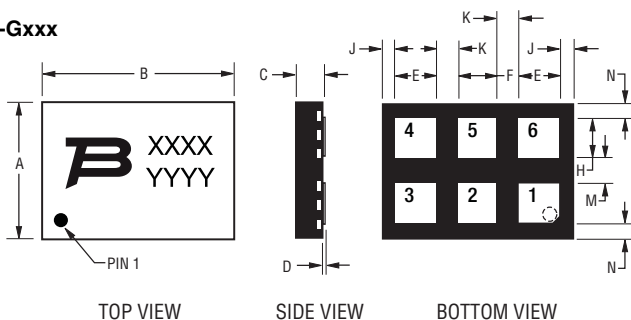
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# P500-G and P850-G Series Dual TBU® High-Speed Protectors

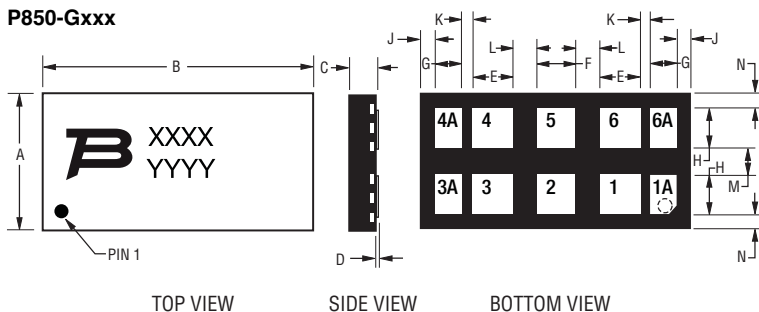
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## Product Dimensions

### P500-Gxxx



### P850-Gxxx

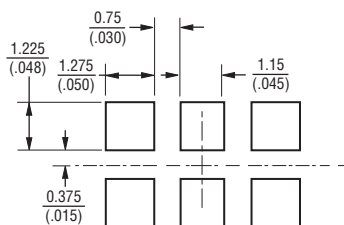


Pads 1A and 1 are internally connected; the same for pads 3A with 3, 4A with 4, and 6A with 6. This allows for one PCB layout to accommodate the P500 or P850.

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

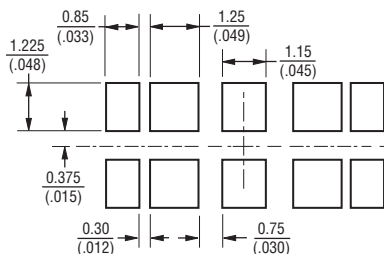


### Pad Designation

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.

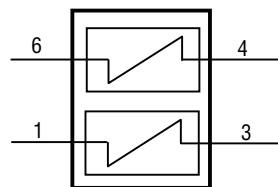
TBU® devices have matte-tin termination finish. Suggested layout should use non-solder mask define (NSMD). Recommended stencil thickness is 0.10-0.12 mm (.004-.005 in.) with stencil opening size 0.025 mm (.0010 in.) less than the device pad size. As when heat sinking any power device, it is recommended 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. Users should verify actual device performance in their specific applications.

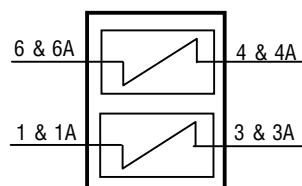
DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$

## Block Diagram

### P500-Gxxx



### P850-Gxxx



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

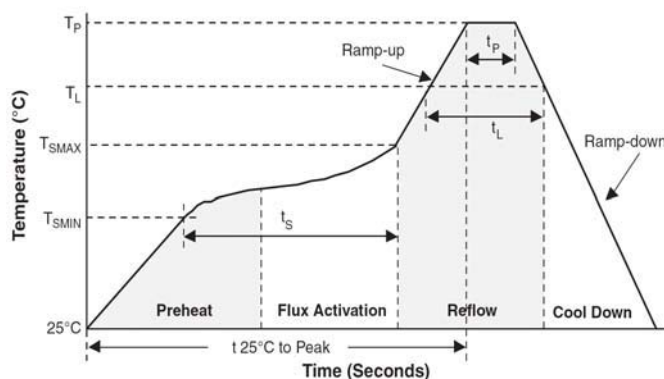
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### Thermal Resistances

Part #	Symbol	Parameter	Value	Unit
P500-G	R <sub>th(j-a)</sub>	Junction to leads (package)	113	°C/W
		Junction to leads (per TBU® device)	236	°C/W
P850-G	R <sub>th(j-a)</sub>	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 <sub>smax</sub> to T <sub>p</sub> )	3 °C/sec. max.
Preheat <ul style="list-style-type: none"> <li>- Temperature Min. (T<sub>smin</sub>)</li> <li>- Temperature Max. (T<sub>smax</sub>)</li> <li>- Time (t<sub>smin</sub> to t<sub>smax</sub>)</li> </ul>	150 °C 200 °C 60-180 sec.
Time maintained above: <ul style="list-style-type: none"> <li>- Temperature (T<sub>L</sub>)</li> <li>- Time (t<sub>L</sub>)</li> </ul>	217 °C 60-150 sec.
Peak/Classification Temperature (T <sub>p</sub> )	260 °C
Time within 5 °C of Actual Peak Temp. (t <sub>p</sub> )	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

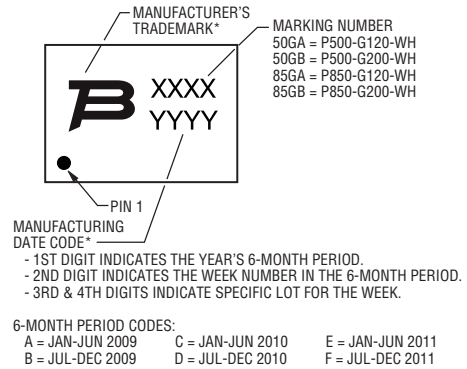
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## How to Order

**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

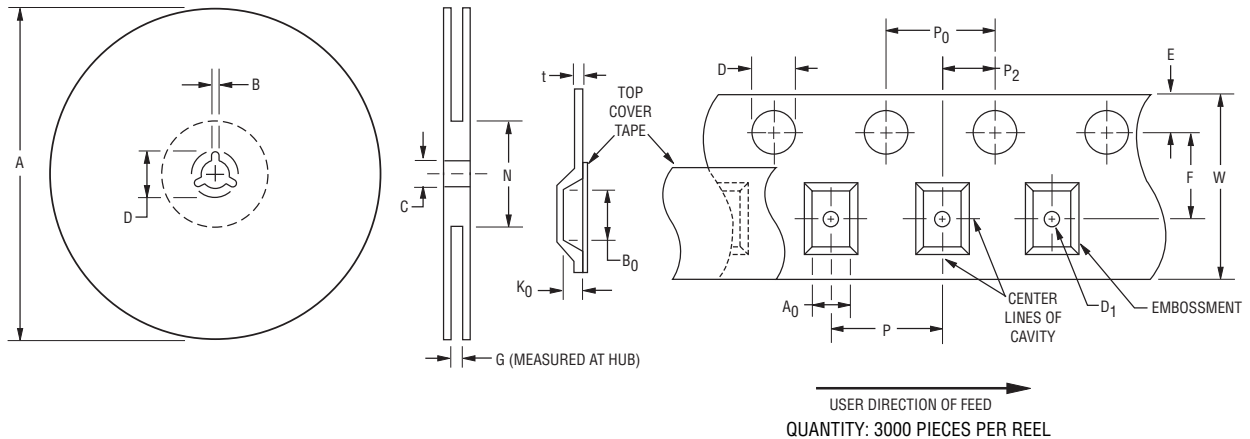
## Typical Part Marking



EXAMPLE: ARBC  
 - 1ST DIGIT 'A' = JAN-JUN 2009  
 - 2ND DIGIT 'R' = WEEK 18; WEEK OF APRIL 27  
 - 3RD & 4TH DIGITS 'BC' = LOT SPECIFIC INFORMATION

\*TRANSITION FROM FULTEC TRADEMARK AND LOT CODE TO BOURNS TRADEMARK AND DATE CODE IN 2009.

## 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 <sub>0</sub>		B <sub>0</sub>		D		D <sub>1</sub>		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 <sub>0</sub>		P		P <sub>0</sub>		P <sub>2</sub>		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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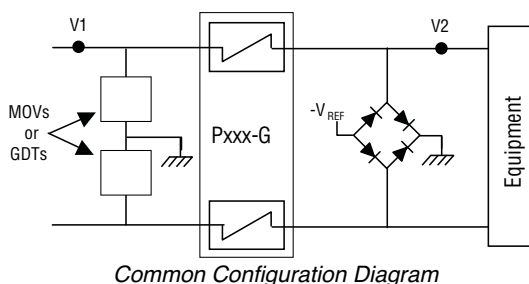
# P500-G and P850-G Series Dual TBU® High-Speed Protectors

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## Reference Designs

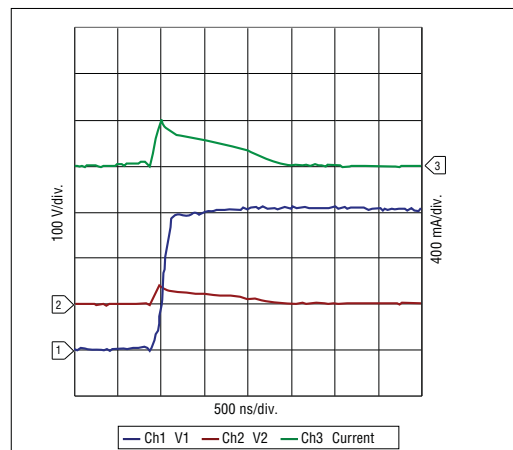
A cost-effective protection solution combines the Bourns® TBU® protection device with a pair of MOVs or Bourns® GDTs and a diode bridge. The diagram below illustrates a common configuration of these components. The graphs to the right demonstrate the operational characteristics of the circuit.

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



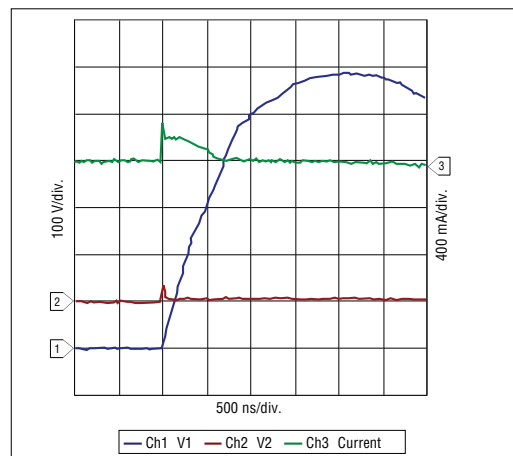
Common Configuration Diagram

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.



P500-G Solution: 5000 V Lightning 2/10 μsec, 500 A

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.



P850-G Solution: 4000 V Lightning 10/700 μsec, 100 A

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**www.bourns.com**

REV. 06/14

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