

## 阅读申明

- 1.本站收集的数据手册和产品资料都来自互联网，版权归原作者所有。如读者和版权方有任何异议请及时告之，我们将妥善解决。
- 2.本站提供的中文数据手册是英文数据手册的中文翻译，其目的是协助用户阅读，该译文无法自动跟随原稿更新，同时也可能存在翻译上的不当。建议读者以英文原稿为参考以便获得更精准的信息。
- 3.本站提供的产品资料，来自厂商的技术支持或者使用者的心得体会等，其内容可能存在描述上的差异，建议读者做出适当判断。
- 4.如需与我们联系，请发邮件到marketing@iczoom.com，主题请标有“数据手册”字样。

## Read Statement

1. The datasheets and other product information on the site are all from network reference or other public materials, and the copyright belongs to the original author and original published source. If readers and copyright owners have any objections, please contact us and we will deal with it in a timely manner.
2. The Chinese datasheets provided on the website is a Chinese translation of the English datasheets. Its purpose is for reader's learning exchange only and do not involve commercial purposes. The translation cannot be automatically updated with the original manuscript, and there may also be improper translations. Readers are advised to use the English manuscript as a reference for more accurate information.
3. All product information provided on the website refer to solutions from manufacturers' technical support or users the contents may have differences in description, and readers are advised to take the original article as the standard.
4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets" .



## Features

- Superior circuit protection
- Overcurrent and overvoltage protection
- Blocks surges up to rated limits
- High-speed performance
- Small SMT package
- Agency listing: <sup>®</sup>

## Applications

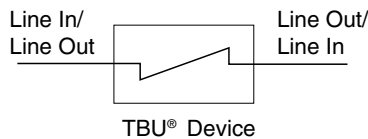
- Voice / VDSL cards
- Protection modules and dongles
- Process control equipment
- Test and measurement equipment
- General electronics

# TBU-CA Series - TBU<sup>®</sup> High-Speed Protectors

### General Information

The TBU-CA Series of Bourns<sup>®</sup> TBU<sup>®</sup> products are low capacitance single bidirectional high-speed protection components, constructed using MOSFET semiconductor technology, and designed to protect against faults caused by short circuits, AC power cross, induction and lightning surges.

The TBU<sup>®</sup> high-speed protector placed in the system circuit will monitor the current with the MOSFET detection circuit triggering to provide an effective barrier behind which sensitive electronics will not be exposed to large voltages or currents during surge events. The TBU<sup>®</sup> device is provided in a surface mount DFN package and meets industry standard requirements such as RoHS and Pb Free solder reflow profiles.



### Agency Listing

Description	
UL	File Number: E315805

### Absolute Maximum Ratings (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Symbol	Parameter	Part Number	Value	Unit
V <sub>imp</sub>	Peak impulse voltage withstand with duration less than 10 ms	TBU-CA025-xxx-WH	250	V
		TBU-CA040-xxx-WH	400	
		TBU-CA050-xxx-WH	500	
		TBU-CA065-xxx-WH	650	
		TBU-CA085-xxx-WH	850	
V <sub>rms</sub>	Continuous A.C. RMS voltage	TBU-CA025-xxx-WH	100	V
		TBU-CA040-xxx-WH	200	
		TBU-CA050-xxx-WH	250	
		TBU-CA065-xxx-WH	300	
		TBU-CA085-xxx-WH	425	
T <sub>op</sub>	Operating temperature range		-55 to +125	°C
T <sub>stg</sub>	Storage temperature range		-65 to +150	°C
T <sub>jmax</sub>	Maximum Junction Temperature		+125	°C
ESD	HBM ESD protection per IEC 61000-4-2		±2	kV

## **BOURNS<sup>®</sup>**

**Asia-Pacific:** Tel: +886-2 2562-4117 • Fax: +886-2 2562-4116

**EMEA:** Tel: +36 88 520 390 • Fax: +36 88 520 211

**The Americas:** Tel: +1-951 781-5500 • Fax: +1-951 781-5700

[www.bourns.com](http://www.bourns.com)

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011. 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.

# TBU-CA Series - TBU® High-Speed Protectors

# BOURNS®

## Electrical Characteristics (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Symbol	Parameter	Part Number	Min.	Typ.	Max.	Unit	
I <sub>trigger</sub>	Current required for the device to go from operating state to protected state	TBU-CAxxx-050-WH	50	75	100	mA	
		TBU-CAxxx-100-WH	100	150	200		
		TBU-CAxxx-200-WH	200	300	400		
		TBU-CAxxx-300-WH	300	450	600		
		TBU-CAxxx-500-WH	500	750	1000		
R <sub>device</sub>	Series resistance of the TBU device	V <sub>imp</sub> = 250 V I <sub>trigger</sub> (min.) = 50 mA	TBU-CA025-050-WH		13.3	15.3	Ω
		V <sub>imp</sub> = 250 V I <sub>trigger</sub> (min.) = 100 mA	TBU-CA025-100-WH		7.1	8.2	
		V <sub>imp</sub> = 250 V I <sub>trigger</sub> (min.) = 200 mA	TBU-CA025-200-WH		4.2	4.8	
		V <sub>imp</sub> = 250 V I <sub>trigger</sub> (min.) = 300 mA	TBU-CA025-300-WH		3.2	3.8	
		V <sub>imp</sub> = 250 V I <sub>trigger</sub> (min.) = 500 mA	TBU-CA025-500-WH		2.6	3.0	
		V <sub>imp</sub> = 400 V I <sub>trigger</sub> (min.) = 50 mA	TBU-CA040-050-WH		14.3	16.5	
		V <sub>imp</sub> = 400 V I <sub>trigger</sub> (min.) = 100 mA	TBU-CA040-100-WH		8.1	9.4	
		V <sub>imp</sub> = 400 V I <sub>trigger</sub> (min.) = 200 mA	TBU-CA040-200-WH		5.2	6.0	
		V <sub>imp</sub> = 400 V I <sub>trigger</sub> (min.) = 300 mA	TBU-CA040-300-WH		4.3	5.0	
		V <sub>imp</sub> = 400 V I <sub>trigger</sub> (min.) = 500 mA	TBU-CA040-500-WH		3.6	4.2	
		V <sub>imp</sub> = 500 V I <sub>trigger</sub> (min.) = 50 mA	TBU-CA050-050-WH		15.7	18.0	
		V <sub>imp</sub> = 500 V I <sub>trigger</sub> (min.) = 100 mA	TBU-CA050-100-WH		9.5	10.9	
		V <sub>imp</sub> = 500 V I <sub>trigger</sub> (min.) = 200 mA	TBU-CA050-200-WH		6.6	7.5	
		V <sub>imp</sub> = 500 V I <sub>trigger</sub> (min.) = 300 mA	TBU-CA050-300-WH		5.6	6.5	
		V <sub>imp</sub> = 500 V I <sub>trigger</sub> (min.) = 500 mA	TBU-CA050-500-WH		5.0	5.7	
		V <sub>imp</sub> = 650 V I <sub>trigger</sub> (min.) = 50 mA	TBU-CA065-050-WH		17.7	20.3	
		V <sub>imp</sub> = 650 V I <sub>trigger</sub> (min.) = 100 mA	TBU-CA065-100-WH		11.5	13.2	
		V <sub>imp</sub> = 650 V I <sub>trigger</sub> (min.) = 200 mA	TBU-CA065-200-WH		8.6	9.8	
		V <sub>imp</sub> = 650 V I <sub>trigger</sub> (min.) = 300 mA	TBU-CA065-300-WH		7.6	8.8	
		V <sub>imp</sub> = 650 V I <sub>trigger</sub> (min.) = 500 mA	TBU-CA065-500-WH		7.0	8.0	
		V <sub>imp</sub> = 850 V I <sub>trigger</sub> (min.) = 50 mA	TBU-CA085-050-WH		21.4	24.5	
		V <sub>imp</sub> = 850 V I <sub>trigger</sub> (min.) = 100 mA	TBU-CA085-100-WH		15.2	17.4	
		V <sub>imp</sub> = 850 V I <sub>trigger</sub> (min.) = 200 mA	TBU-CA085-200-WH		12.3	14.0	
		V <sub>imp</sub> = 850 V I <sub>trigger</sub> (min.) = 300 mA	TBU-CA085-300-WH		11.3	13.0	
V <sub>imp</sub> = 850 V I <sub>trigger</sub> (min.) = 500 mA	TBU-CA085-500-WH		10.7	12.2			
t <sub>block</sub>	Time for the device to go from normal operating state to protected state				1	μs	
I <sub>Q</sub>	Current through the triggered TBU® device with 50 Vdc circuit voltage		0.25	0.50	1.00	mA	
V <sub>reset</sub>	Voltage below which the triggered TBU® device will transition to normal operating state		12	16	20	V	
R <sub>th(j-l)</sub>	Junction to package pads - FR4 using recommended pad layout			98		°C/W	
R <sub>th(j-l)</sub>	Junction to package pads - FR4 using heat sink on board (6 cm <sup>2</sup> ) (1 in <sup>2</sup> )			40		°C/W	

Specifications are subject to change without notice.

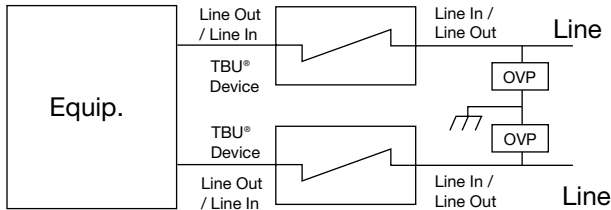
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

# TBU-CA Series - TBU® High-Speed Protectors

**BOURNS®**

## Reference Application

The TBU® devices are general use protectors used in a wide variety of applications. The maximum voltage rating of the TBU® device should never be exceeded. Where necessary, an OVP should be employed to limit the maximum voltage. A cost-effective protection solution combines Bourns® TBU® protection devices with a pair of Bourns® MOVs. For bandwidth sensitive applications, a Bourns® GDT may be substituted for the MOV.



## Basic TBU Operation

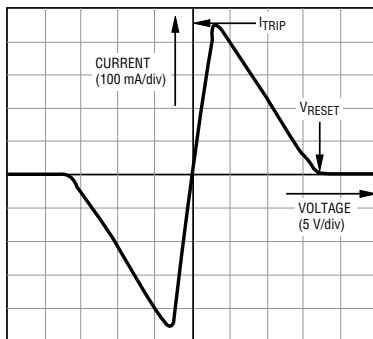
The TBU® device, constructed using MOSFET semiconductor technology, placed in the system circuit will monitor the current with the MOSFET detection circuit triggering to provide an effective barrier behind which sensitive electronics are not exposed to large voltages or currents during surge events. The TBU® device operates in approximately 1  $\mu$ s - once line current exceeds the TBU® device's trigger current  $I_{trigger}$ . When operated, the TBU® device will limit the current to less than the  $I_{trigger}$  value within the  $t_{block}$  duration. If voltage above  $V_{reset}$  is continuously sustained, the TBU® device will subsequently reduce the current to a quiescent current level within a period of time that is dependent upon the applied voltage.

After the surge, the TBU® device resets when the voltage across the TBU® device falls to the  $V_{reset}$  level. The TBU® device will automatically reset on lines which have no DC bias or have DC bias below  $V_{reset}$  (such as unpowered signal lines).

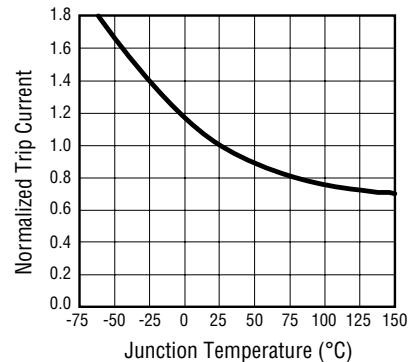
If the line has a normal DC bias above  $V_{reset}$ , the voltage across the TBU® device may not fall below  $V_{reset}$  after the surge. In such cases, special care needs to be taken to ensure that the TBU® device will reset, with software monitoring as one method used to accomplish this. Bourns application engineers can provide further assistance.

## Performance Graphs

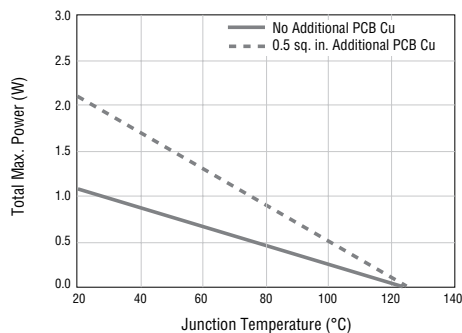
### Typical V-I Characteristics (TBU-CA050-300-WH)



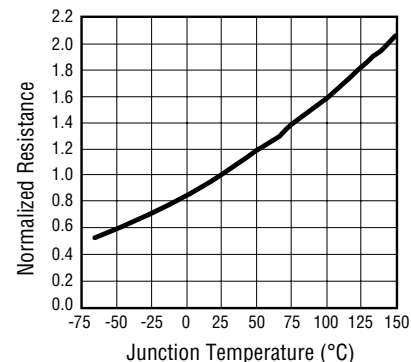
### Typical Trigger Current vs. Temperature



### Power Derating Curve



### Typical Resistance vs. 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.

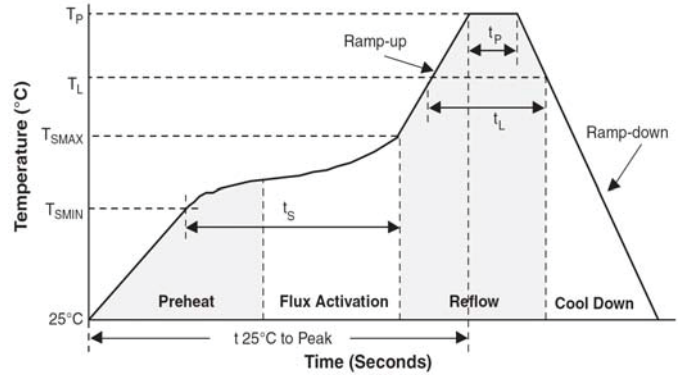


# TBU-CA Series - TBU® High-Speed Protectors

# BOURNS®

## 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.



## How to Order

**TBU - CA 085 - 500 - WH**

TBU® Product \_\_\_\_\_

Series \_\_\_\_\_  
CA = Bi-Series

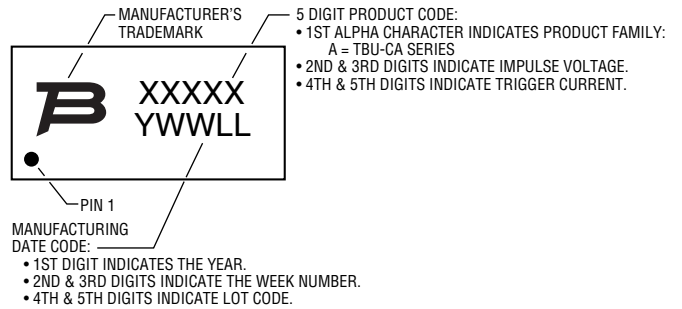
Impulse Voltage Rating \_\_\_\_\_  
025 = 250 V  
040 = 400 V  
050 = 500 V  
065 = 650 V  
085 = 850 V

Trigger Current \_\_\_\_\_  
050 = 50 mA  
100 = 100 mA  
200 = 200 mA  
300 = 300 mA  
500 = 500 mA

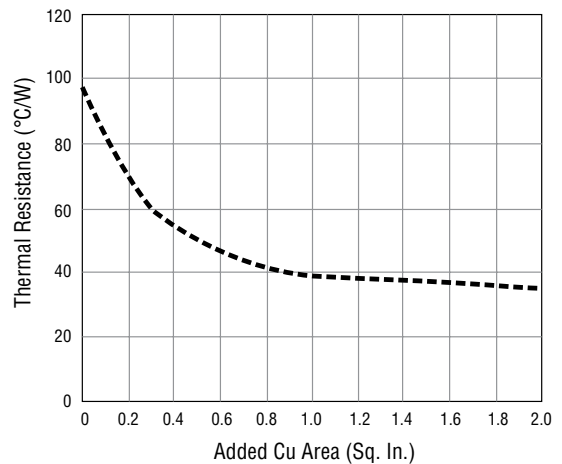
Hold to Trip Ratio Suffix \_\_\_\_\_  
W = Hold to Trip Ratio

Package Suffix \_\_\_\_\_  
H = DFN Package

## Typical Part Marking



## Thermal Resistance vs Additional PCB Cu Area

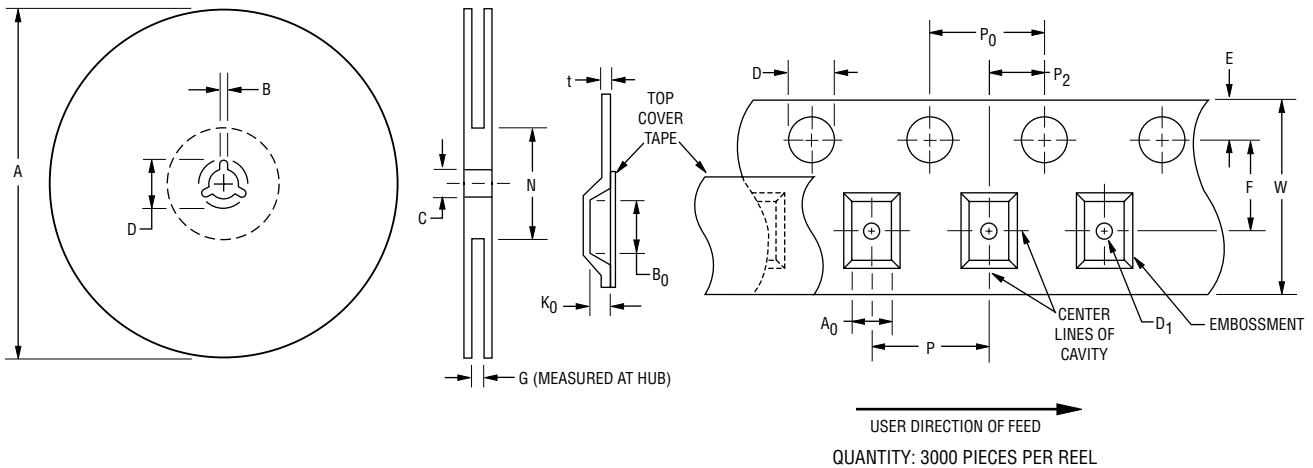


Specifications are subject to change without notice.  
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.  
Users should verify actual device performance in their specific applications.

# TBU-CA Series - TBU® High-Speed Protectors

# BOURNS®

## Packaging Specifications



A		B		C		D		G	N
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Ref.	Ref.
326	330	1.5	2.5	12.8	13.5	20.2	-	16.5	102
(12.835)	(13.002)	(.059)	(.098)	(.504)	(.531)	(.795)		(.650)	(4.016)

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.
4.3	4.5	6.7	6.9	1.5	1.6	1.5	-	1.65	1.85	7.4	7.6
(.169)	(.177)	(.264)	(.272)	(.059)	(.063)	(.059)		(.065)	(.073)	(.291)	(.299)
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.
1.0	1.2	7.9	8.1	3.9	4.1	1.9	2.1	0.25	0.35	15.7	16.3
(.039)	(.047)	(.311)	(.319)	(.159)	(.161)	(.075)	(.083)	(.010)	(.014)	(.618)	(.642)

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

REV. 01/17

"TBU" is a registered trademark of Bourns, Inc. in the United States and other countries. 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.