

**TOSHIBA**

BLDC: Brushless Motor

# **Proposal for Electric Motor Applications**

~ Small Signal Devices ~

Toshiba Electronic Devices & Storage Corporation

2021.April

# eFuse IC (Electronic Fuse)

Value provided

**eFuse IC (Electronic Fuse) can protect circuits from abnormal conditions such as overcurrent and overvoltage repeatedly**

## 1 High-speed short-circuit protection

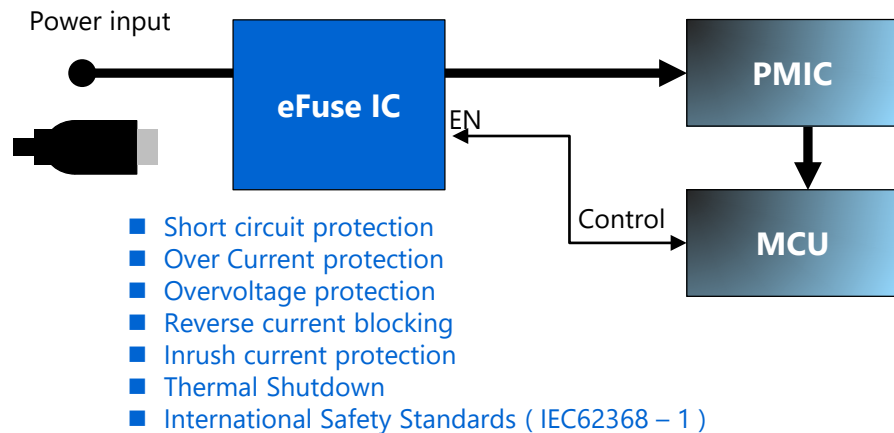
Fast Trip function instantaneously cuts off the output current when a short circuit occurs.  
(150ns typ:TCK8xx)

## 2 Excellent protection characteristics

In the event of an overvoltage or overcurrent, the output voltage and output current are held stably by the overclamp.

## 3 IEC62368-1 certified

Complied with the International Safety Standard IEC62368-1 (G9: IC Current Limiter), it provides robust protection and simplifies designs.



Product lineup

PN	Vin	OCP	OVP	Recovery	Flag	Package
TCKE805NA	4.4V~18V	0.5A~5.0A	6.04V	Auto retry	None	WSON10/10B 3x3mm
TCKE805NL	4.4V~18V	0.5A~5.0A	6.04V	Latched	None	
TCKE812NA	4.4V~18V	0.5A~5.0A	15.1V	Auto retry	None	
TCKE812NL	4.4V~18V	0.5A~5.0A	15.1V	Latched	None	
TCKE800NA	4.4V~18V	0.5A~5.0A	None	Auto retry	None	
TCKE800NL	4.4V~18V	0.5A~5.0A	None	Latched	None	
TCKE712BNL*	4.4V~15V	0.5A~3.65A	Adjustable	Latched	Available	

\* Planned to obtain IEC62368-1 certification

# Small package LDO regulator

Value provided

## Low Dropout Voltage in various packages

### 1 Low Drop-out

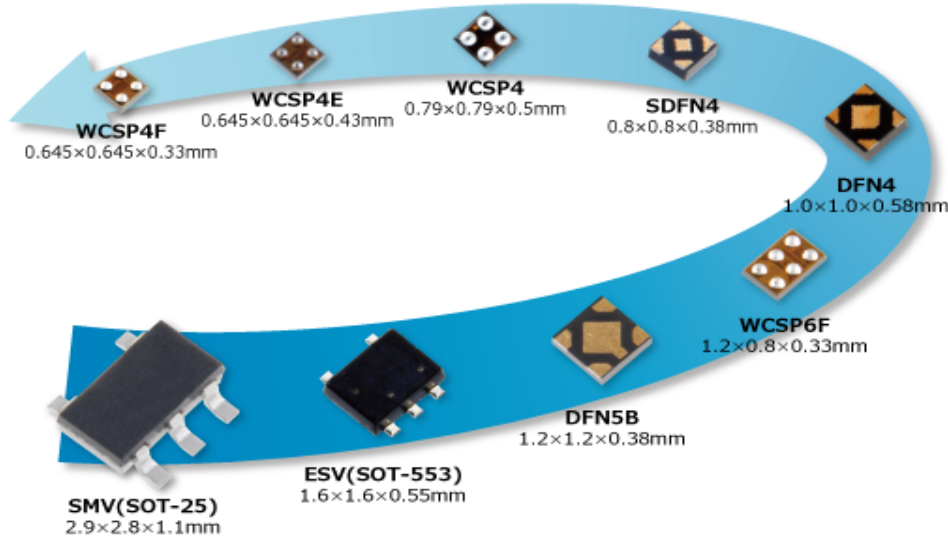
Improve drop-out performance by new process technologies  
(50 % lower drop-out vs previous gen.)

### 2 High PSRR Low noise output

Suitable for RF, sensors, Camera and audio power supply

### 3 Low quiescent current

Achieved ultra low  $I_q$  (ON): 0.34  $\mu\text{A}$ : TCR3U series by using original circuit technologies



Product lineup

$I_{OUT}(A)$	Series	Future	PSRR(dB) typ@1kHz	$I_Q (\mu A)$ typ
1.5	TCR15AG	Low drop-out•High PSRR	95@0.9V	25
1.3	TCR13AG	Low drop-out•High PSRR	90@0.9V	52
0.8	TCR8BM	Low drop-out•High PSRR	98@0.8V	20
0.5	TCR5RG	High PSRR•Low noise	100@2.8V	7
	TCR5BM	Low drop-out•High PSRR	98@0.8V	19
0.3	TCR3RM	High PSRR•Low noise	100@2.8V	7
	TCR3U	Low $I_q$	70@0.8V	0.34
	TCR3D	Standard	70@2.5V	65
0.2	TCR2L	Low $I_q$	-	1
	TCR2E	Standard	73@2.5V	35
	TAR5	Vin 15V, Bipolar process	70	170

Value provided

## Suitable small signal use case for various sensors required high accuracy

### 1 Low noise output

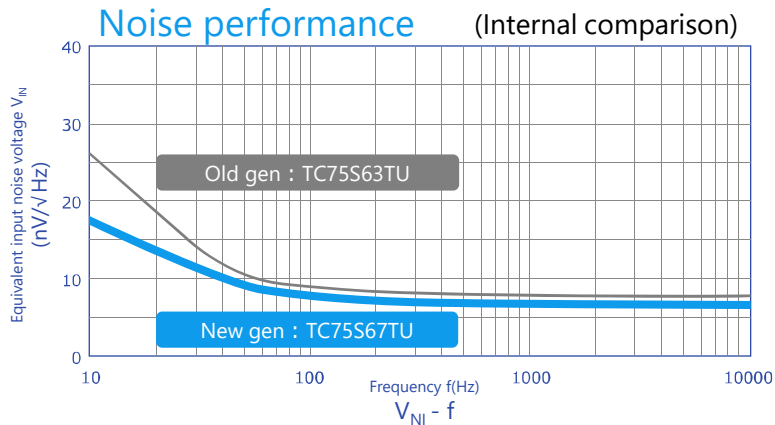
Achieved very low noise output, WW top class[1] by original process and circuit

### 2 Low Off set

Achieved Low off set,  $V_{IO}$  max:1.3 mV (TC75S102/103)

### 3 Low quiescent current

Achieved Low  $I_{DD}$ :0.3  $\mu$ A, TC75S102



Spec	Product lineup		
	TC75S67TU	TC75S102xx	TC75S103xx
Type	Low noise	Low $i_q \cdot V_{DD}$	Standard
$V_{DD}, V_{SS}$	2.2 to 5.5V	1.5 to 5.5V	1.8 to 5.5V
$I_{DD}$	430 $\mu$ A	0.3 $\mu$ A	100 $\mu$ A
$V_{IO}, V_{IO}$ drift	3mV:Max	1.3mV:Max	1.3mV:Max
$f_T$	3.5MHz	0.6kHz	350kHz
SR	1.0V/ms	0.35V/ms	0.6V/ $\mu$ s

[1] Toshiba original research in Dec 2020

# Small package Schottky Barrier Diode

Value provided

## Down sizing by new package US2H which is low Rth

### 1 Low Rth

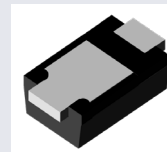
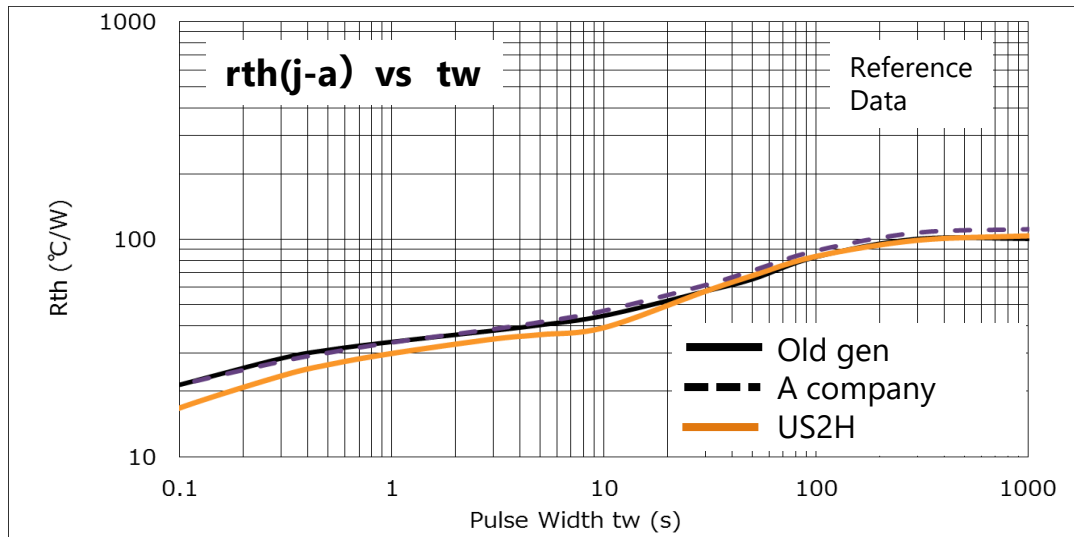
New US2H package is lower thermal resistance Rth compared with competitors

### 2 Low VF and Low IR

Improved key trade off performances (VF vs IR) for  $V_R$ :30 to 60V and  $I_O$ :1 to 2A products

### 3 Common footprint

US2H (SOD-323HE) 2.5x1.4x0.6 mm is same footprint of competitors

Product lineup				
品番	$V_R$ (V)	$I_O$ (A)	VF(V) typ@2A	$I_R$ ( $\mu$ A) max.
CUHS20S30	30	2.0	0.34	500 @ $V_R=30V$
CUHS15S30	30	1.5	0.37@1.5A	500 @ $V_R=30V$
CUHS20S40	40	2.0	0.40	300 @ $V_R=40V$
CUHS15S40	40	1.5	0.45@1.5A	200 @ $V_R=40V$
CUHS20F30	30	2.0	0.40	60 @ $V_R=30V$
CUHS15F30	30	1.5	0.46@1.5A	50 @ $V_R=30V$
CUHS20F40	40	2.0	0.47	60 @ $V_R=40V$
CUHS15F40	40	1.5	0.57	50 @ $V_R=40V$
CUHS10F60	60	1.0	—	40
CUHS15F60	60	1.5	0.66@1.5A	50
CUHS20F60	60	2.0	0.52	70
CUHS15S60	60	1.5	0.57@1.5A	200
CUHS20S60	60	2.0	0.46	650

# RESTRICTIONS ON PRODUCT USE

Toshiba Corporation and its subsidiaries and affiliates are collectively referred to as "TOSHIBA". Hardware, software and systems described in this document are collectively referred to as "Product".


- TOSHIBA reserves the right to make changes to the information in this document and related Product without notice.
- This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
- Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
- PRODUCT IS NEITHER INTENDED NOR WARRANTED FOR USE IN EQUIPMENTS OR SYSTEMS THAT REQUIRE EXTRAORDINARILY HIGH LEVELS OF QUALITY AND/OR RELIABILITY, AND/OR A MALFUNCTION OR FAILURE OF WHICH MAY CAUSE LOSS OF HUMAN LIFE, BODILY INJURY, SERIOUS PROPERTY DAMAGE AND/OR SERIOUS PUBLIC IMPACT ("UNINTENDED USE").** Except for specific applications as expressly stated in this document, Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, lifesaving and/or life supporting medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, and devices related to power plant. **IF YOU USE PRODUCT FOR UNINTENDED USE, TOSHIBA ASSUMES NO LIABILITY FOR PRODUCT.** For details, please contact your TOSHIBA sales representative or contact us via our website.
- Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the applicable export laws and regulations including, without limitation, the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. **TOSHIBA ASSUMES NO LIABILITY FOR DAMAGES OR LOSSES OCCURRING AS A RESULT OF NONCOMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.**

\*Arm and Cortex are registered trademarks of Arm limited (or its subsidiaries) in the US and/or elsewhere.

\*TXZ+ is a trademark of Toshiba Electronic Devices & Storage Corporation.

\*Other company names, product names, and service names may be trademarks of their respective companies.

Information in this document, including product prices and specifications, content of services and contact information, is current on the date of the announcement but is subject to change without prior notice.



*Our semiconductor and storage products  
will always be a driving force to change the world*

---

Toshiba Electronic Devices and Storage, together with our customers,  
will accelerate our future journey.

We aim to be a company that will be chosen  
for our pioneering technology and spirit embedded in our products.