Ver 1.1

Fast Recovery Diode

Datasheet

Part Number：2CZ5811/2CZ5811US

中国航天 CASC
北京微电子技术研究所
Beijing Microelectronics Technology Institute

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Version No.	Publish Time	Revised Chapter	Revise Introduction	Note
1.0	12.21.2016		Document creation	
1.1	09.12.2018		Text and wording modifications	

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1. Features

- Ultrafast recovery and low leakage current
- Voidless hermetically sealed glass package with Tungsten slugs
- Extremely robust construction
- Inherently radiation hard
- High forward surge current capability
- Low thermal resistance
- Triple-layer passivation
- High temperature metallurgical bonding
- Two types of package
- Axial lead termination package and surface mount (“US” suffix) package

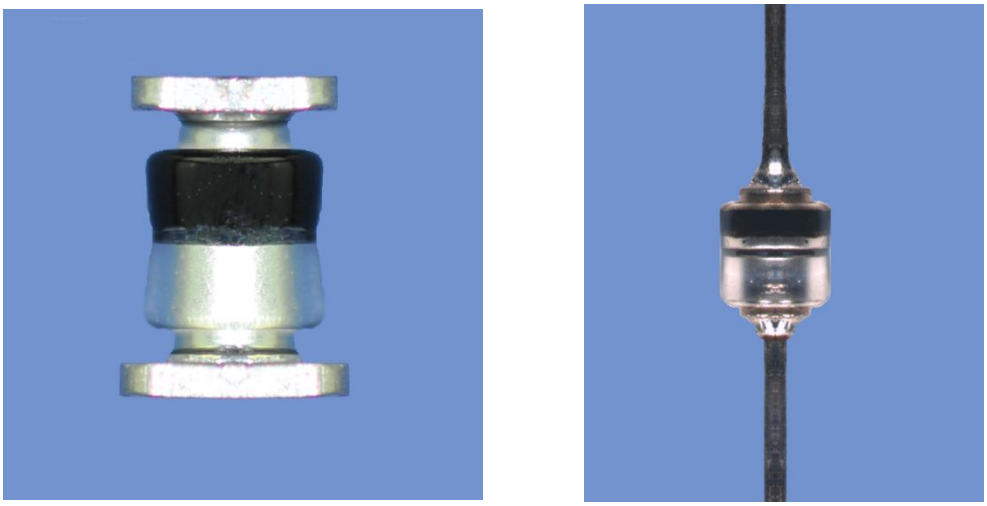
2. General Description

The 2CZ5811(US) is a high performance, high reliability ultrafast recovery rectifier with voidless-glass construction using a high temperature metallurgical bond. 2CZ5811(US) has the advantage of extremely fast switching , low forward loss and high forward surge current capability. These devices designed mainly for rectification, also as freewheeling and switching devices, are widely used in various aerospace systems and other high-reliability applications. BMTI also offers numerous other rectifier products to meet higher and lower current ratings with various recovery time speed requirements in both axial lead and surface mount packages, such as 2CZ5806(US), 2CZ5415(US), 2CZ5418(US), etc.

3. Device Configuration

The 2CZ5811(US) devices are constructed utilizing hermetically sealed voidless hard glass with high temperature metallurgical bonding between both sides of the silicon die and terminal pins. The lead or end-cap is constructed with oxygen-free copper, coated with tin-lead alloy by hot solder dipping on its surface. The

configuration of 2CZ5811US and 2CZ5811 are shown in Figure 1 as follows.

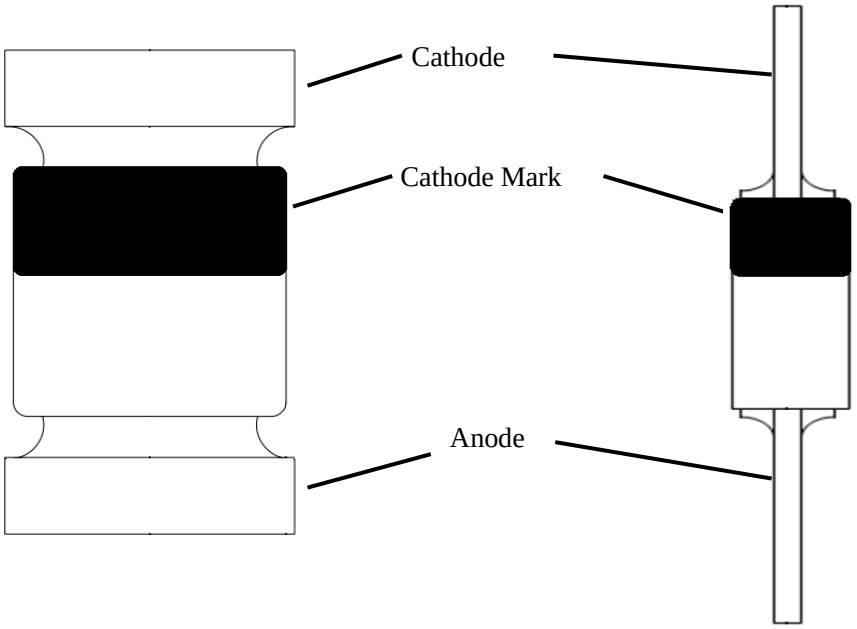


(a) 2CZ5811US (b) 2CZ5811

Figure 1 Device Configuration

4. Terminal Description

The glass body is marked with a black ring at cathode side, while the other side is the anode. There's no serialization printed on the parts. The schematic diagram is shown in Figure 2.



(a) 2CZ5811US (b) 2CZ5811

Figure 2 Terminal identification

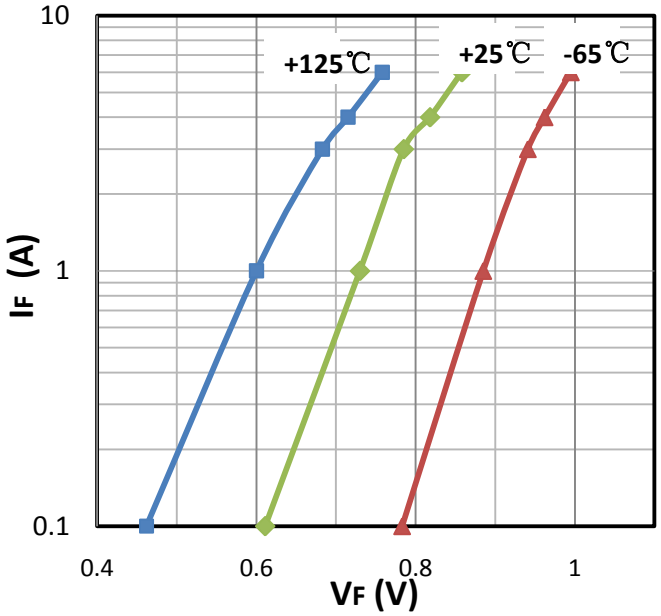
5. Porduct Description

5.1 Construction

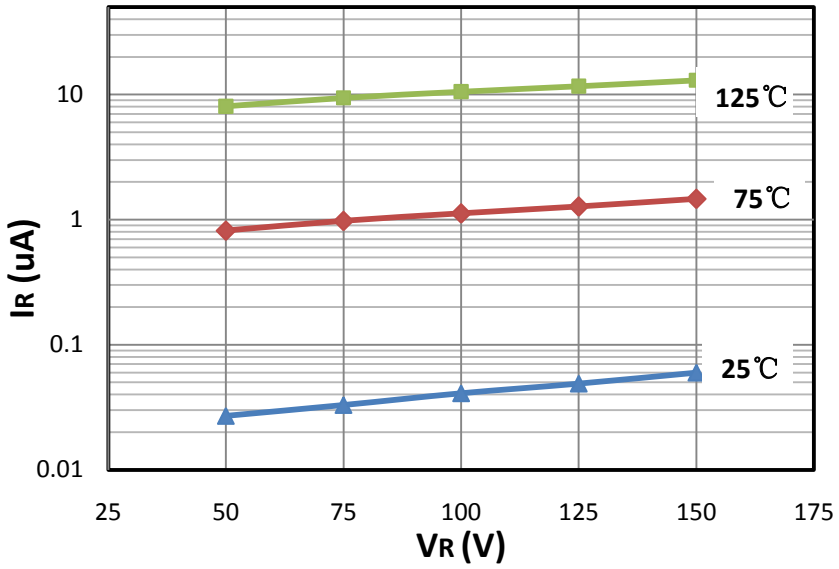
The die of 2CZ5811(US) is constructed utilizing multi-layer epitaxial wafer, moat and passivation technology, with high temperature metallurgical bonding between both sides of the silicon die and terminal pins. The lead or end-cap of the device is constructed with oxygen-free copper, coated with tin-lead alloy by hot solder dipping on its surface.

5.2 Scope Display

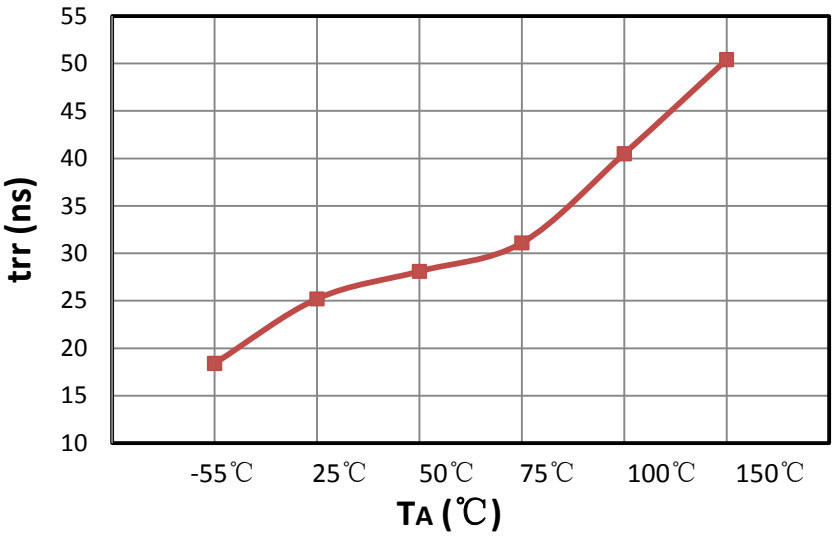
Typical characteristic curves of 2CZ5811(US) are shown in Figure 3.



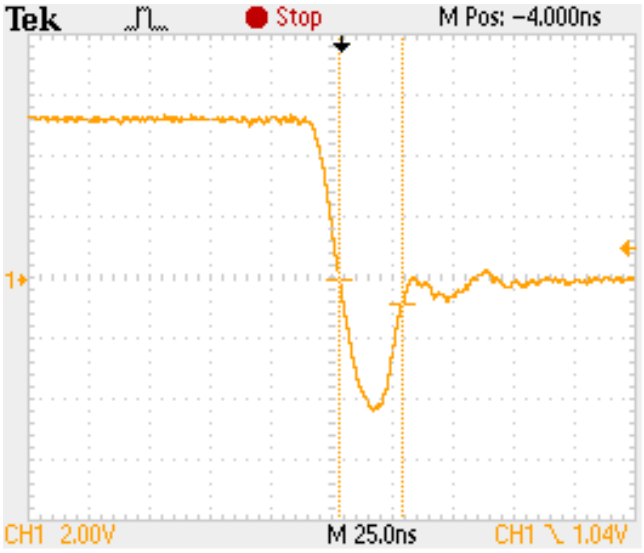
(a) Typical forward characteristics with different temperatures



(b) Typical I_R-V_R characteristics with different temperatures



(c) Typical t_{rr}-T_A characteristics with different temperatures



(d) Typical reverse recovery characteristics
(@I_F=I_{RM}=1A, I_{REC}=0.1A,di/dt=100A/us, T_A=25℃)
Figure 3 Typical characteristic curves of 2CZ5811(US)

5.3 Thermal Impedance

Thermal impedance waveform as shown in Figure 4.

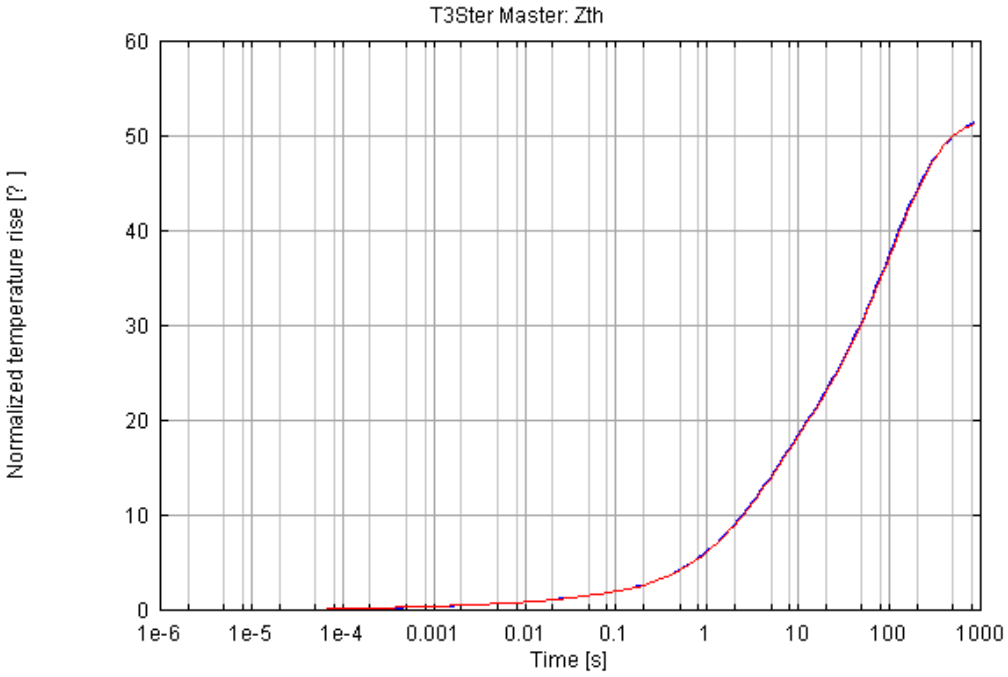


Figure 4 Thermal impedance waveform (T_A=25℃)

5.4 Storage

The device shall be stored at storeroom with environmental temperature 10℃ -30℃, relative humidity less than 70% RH., well ventilation condition, without acid, alkali and other causticity gas.

6. Electrical Characteristics

6.1 Maximum Ratings

Maximun ratings are listed in Table 1 and Table 2.

Table 1 Maximum ratings of 2CZ5811

Characteristics	V_{RWM}	$I_{o(L)}$ @T_L=+75℃,L=9.52mm	I_{O1} @T_A=+55℃	I_{FSM} @+25℃, t_p=8.3ms	trr	$R_{\theta JL}$ @L=9.52mm	$R_{\theta JX}$	T_j	T_{stg}
Unit	V	A	A	A	ns	℃/W	℃/W	℃	℃
Rating	150	6.0	3.0	125	30	22	95	-65～175	-65～175

Table 2 Maximum ratings of 2CZ5811US

Characteristics	V_{RWM}	$I_{o(U)}$ @T_{EC}=+75℃	I_{O1} @T_A=+55℃	I_{FSM} @+25℃, t_p=8.3ms	trr	$R_{\theta JEC}$	$R_{\theta JX}$	T_j	T_{stg}
Unit	V	A	A	A	ns	℃/W	℃/W	℃	℃
Rating	150	6.0	3.0	125	30	6.5	95	-65～175	-65～175

6.2 Primary Electrical Characteristics

Primary electrical characteristics are listed in Table 3.

Table 3 Primary electrical characteristics (at T_A=25℃)

Characteristics	Test condition	Limit		Unit
		Min.	Max.	
V_F	I_F=3A	—	0.865	V
	I_F=4A	—	0.875	V
	I_F=6A	—	0.925	V
I_R	V_R=150V	—	5.0	uA
$V_{(BR)}$	I_R=100uA	160	—	V
t_{rr}	I_F=I_{RM}=1A, I_{REC}=0.1A, di/dt=100A/us	—	30	ns

6.3 Electrical Characteristics at high and low temperature

Electrical Characteristics at high and low temperature are listed in Table 4.

Table 4 Electrical Characteristics at high and low temperature

Characteristics	Test condition	Limit		Unit
		Min.	Max.	
V_F	I_F=4A, T_A=125℃	—	0.800	V
	I_F=4A, T_A=-65℃	—	1.075	V
I_R	V_R=150V, T_A=125℃	—	525	uA
$V_{(BR)}$	I_R=100uA,T_A=-65℃	150	—	V

7. Application Guide

- Selection Principle

In order to improve the reliability of the device, the using conditions shall not exceed the rated parameters or select other devices with higher maximum ratings.

- Assembly & Soldering Consideration

When using the devices, assembly quality has a great influence on system

reliability. Therefore, there must be scientific methods when assembling devices. Attention need to be paid to the lead forming, fixation on PCB, soldering, cleaning and device layout.

The soldering temperature generally should not exceed 245℃. For the device with axial lead termination package, the distance between solder joints and the main device shall be over 1.5mm, and the soldering time generally should not exceed 10s. For the device with surface mount package, the soldering time generally should not exceed 5s.

- Device Test Consideration

The device should be tested under the following conditions unless otherwise specified.

Environment temperature：25℃±5℃

Relative humidity：20%～70%

Atmospheric pressure：86kPa～106kPa

The operating conditions of the device under test should not exceed the maximum rating. It is necessary to avoid the surge voltage applied to the device, caused during switching. The parasitic current of the test circuit and the external leakage current should be much lower than the reverse current of the device under test.

8. Package

2CZ5811US is available in surface mount MELF package, as shown in Figure 5 and the physical dimensions are listed in Table 5.

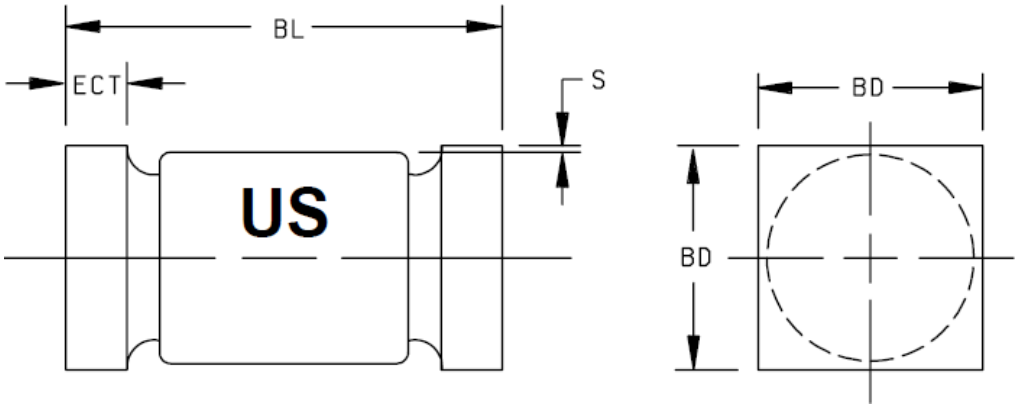


Figure 5 Configuration of 2CZ5811US

Table 5 Physical dimensions of 2CZ5811US

Symbol	Dimensions	
	2CZ5811US	
	Millimeters	
	Min.	Max.
BD	3.48	3.76
BL	5.08	5.72
ECT	0.48	0.71
S	0.08	—

2CZ5811 is available in axial lead termination package, as shown in Figure 6 and the physical dimensions are listed in Table 6.

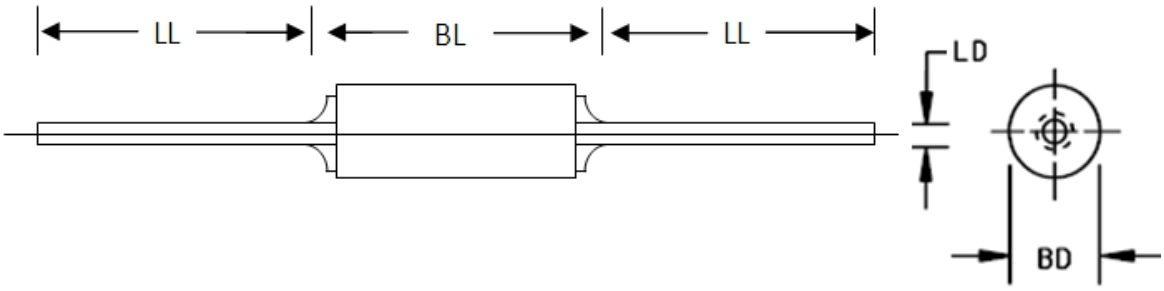


Figure 6 Configuration of 2CZ5811

Table 6 Physical dimensions of 2CZ5811

Symbol	Dimensions	
	2CZ5811	
	Millimeters	
	Min.	Max.
BD	2.92	3.61
BL	4.30	7.62
LD	0.91	1.07
LL	22.86	33.02
NOTE: Dimensions are pre-solder dip		

Service & Supply

Address: No.2. Siyingmen N.Rd. Donggaodi Fengtai District,BeiJing,China

Department: Department of international cooperation

Telephone: +86(0)10-68757343

Email：gjhz@mxtronics.com

Fax: +86(0)10-68757706

Zip code: 100076