

# SPECIFICATION

Device Name : SILICON DIODE

Type Name : ESAD92M-02RR

Spec. No. : MS5D3002

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|         | DATE        | NAME              | APPROVED       |   |
|---------|-------------|-------------------|----------------|---|
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|         |             |                   |                | DWGNO. <span style="font-size: 1.2em;">MS5D3002 1/12</span> |



## 1. SCOPE

This specification provides the ratings and the test requirement for FUJI SILICON DIODE  
ESAD92M-02RR

## 2. OUT VIEW , MARKING , MOLDING RESIN , CHARACTERISTICS

- (1) Out view is shown MS5D3002 9/12  
(2) Marking is shown MS5D3002 9/12

It is marked to type name or abbreviated type name, polarity and Lot No.

- (3) Molding resin  
Epoxy resin UL:V-0  
(4) Characteristics is shown MS5D3002 10/12~12/12

Bar Code Label of EIAJ C-3 Specification. Indispensable description items are shown as below.

- (1) Type Name  
(2) Production Code  
(3) Quantity  
(4) Lot No.(Date code)  
(5) Company Code

## 3. RATINGS

### 3.1 MAXIMUM RATINGS (at Ta=25°C unless otherwise specified.)

| ITEM                                   | SYMBOL    | CONDITIONS                               | RATINGS  | UNITS |
|--|-----------|--|----------|-------|
| Repetitive peak reverse voltage        | $V_{RRM}$ |  | 200      | V     |
| Isolating voltage                      | Viso      | Terminals-to-Case,AC.1min                | 1500     | V     |
| Average output current                 | $I_o$     | 50Hz Square wave duty =1/2<br>Tc = 108°C | 20*      | A     |
| Non-repetitive forward surge current** | $I_{FSM}$ | Sine wave, 10ms 1shot                    | 100      | A     |
| Operating junction temperature         | Tj        |  | 150      | °C    |
| Storage temperature                    | Tstg      |  | -40~+150 | °C    |

\* Out put current of center tap full wave connection.

\*\* Rating per element

### 3.2 ELECTRICAL (at Ta=25°C unless otherwise specified.)

| ITEM                     | SYMBOL   | CONDITIONS                          | MAXIMUM | UNITS   |
|--------------------------|----------|-------------------------------------|---------|---------|
| Forward voltage ***      | $V_F$    | $I_F = 10 A$                        | 0.95    | V       |
| Reverse current ***      | $I_R$    | $V_R = V_{RRM}$                     | 200     | $\mu A$ |
| Reverse recovery time*** | trr      | $I_F=0.1A, I_R=0.2A, I_{rec}=0.05A$ | 0.04    | $\mu s$ |
| Thermal resistance       | Rth(j-c) | Junction to case                    | 2.0     | °C/W    |

\*\*\* Rating per element

### 3.3 MECHANICAL CHARACTERISTICS

|                  |                    |         |     |
|------------------|--------------------|---------|-----|
| Mounting torque  | Recommended torque | 0.4~0.6 | N·m |
| Approximate mass |                    | 6       | g   |

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#### 4. TEST AND INSPECTION

##### 4.1 STANDARD TEST CONDITION

Standard test condition is Ta=25°C、65%R.H.

If judgment is no doubt, the test condition is possible to test in normal condition

Ta=5~35°C、48~85%R.H.

##### 4.2 STRUCTURE INSPECTION

It inspect with eye and measure, Item 2 shall be satisfied.

##### 4.3 FORWARD AND REVERSE CHARACTERISTICS

It inspect on the standard condition, Item 3.2 shall be satisfied.

##### 4.4 TEST

|                 | Test No.                     | Test Items   | Testing methods and Conditions   | Reference Standard<br>EIAJ<br>ED4701 | Sampling number | Acceptance number |
|-----------------|------------------------------|--|--|--------------------------------------|-----------------|-------------------|
| Mechanical test | 1                            | Terminal Strength (Tensile)  | Pull force : 25N<br>Force maintaining duration :10±1s  | EIAJ ED4701/401 method 1             | 5               | (0 : 1)           |
|                 | 2                            | Terminal Strength (Bending)  | Load force : 10N<br>Number of times : 2times(90deg./time)  | EIAJ ED4701/401 method 3             | 5               |                   |
|                 | 3                            | Mounting Strength  | Screwing torque value:(M3) : 50±10N·cm   | EIAJ ED4701/402 method 2             | 5               |                   |
|                 | 4                            | Vibration  | Frequency : 100Hz to 2kHz<br>Acceleration : 100m/s <sup>2</sup><br>Sweeping time : 4min./1 cycle<br>4times for each X, Y&Z directions. | EIAJ ED4701/403 test code D          | 5               |                   |
|                 | 5                            | Shock  | Peak amplitude : 15km/s <sup>2</sup><br>Duration time : 0.5ms<br>3times for each X, Y&Z directions.                                    | EIAJ ED4701/404 test code D          | 5               |                   |
|                 | 6                            | Solder ability 1   | Solder : Sn-37Pb<br>Solder temp. : 235±5°C<br>Immersion time : 5±0.5s<br>Apply to flux   | EIAJ ED4701/303 test code A          | 5               |                   |
|                 |                              | Solder ability 2   | Solder : Sn-3Ag-0.5Cu<br>Solder temp. : 245±5°C<br>Immersion time : 5±0.5s<br>Apply to flux  | —————                                | 5               |                   |
| 7               | Resistance to Soldering Heat | Solder temp. : 260±5°C<br>Immersion time : 10±1s<br>Number of times : 1times | EIAJ ED4701/302 test code A  | 5                                    |                 |                   |

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|                       | Test No. | Test Items                          | Testing methods and Conditions   | Reference Standard<br>EIAJ ED4701 | Sampling number | Acceptance number |
|-----------------------|----------|-------------------------------------|--|-----------------------------------|-----------------|-------------------|
| <b>Endurance test</b> | 1        | High Temp.<br>Storage               | Temperature :Tstg max<br>Test duration : 1000h   | EIAJ<br>ED4701/201                | 22              | (0 : 1)           |
|                       | 2        | Low Temp.<br>Storage                | Temperature :Tstg min<br>Test duration : 1000h   | EIAJ<br>ED4701/202                | 22              |                   |
|                       | 3        | Temperature<br>Humidity<br>Storage  | Temperature : 85±2°C<br>Relative humidity : 85±5%<br>Test duration : 1000h   | EIAJ<br>ED4701/103<br>test code C | 22              |                   |
|                       | 4        | Temperature<br>Humidity<br>Bias     | Temperature : 85±2°C<br>Relative humidity : 85±5%<br>Bias Voltage : V <sub>RRM</sub> × 0.8<br>Test duration : 1000h  | EIAJ<br>ED4701/103<br>test code C | 22              |                   |
|                       | 5        | Unsaturated<br>Pressurized<br>Vapor | Temperature : 130±2°C<br>Relative humidity : 85±5%<br>Vapor pressure : 230kPa<br>Test duration : 48h   | EIAJ<br>ED4701/103<br>test code F | 22              |                   |
|                       | 6        | Temperature<br>Cycle                | High temp. side : Tstg max<br>Room temp. : 5~35°C<br>Low temp. side : Tstg min<br>Duration time : HT 30min,RT 5min LT 30min<br>Number of cycles : 100 cycles       | EIAJ<br>ED4701/105                | 22              |                   |
|                       | 7        | Thermal<br>Shock                    | Fluid : pure water(running water)<br>High temp. side : 100+0/-5°C<br>Low temp. side : 0+5/-0°C<br>Duration time : HT 5min,LT 5min<br>Number of cycles : 100 cycles | EIAJ<br>ED4701/307<br>test code A | 22              |                   |
|                       | 8        | Steady state<br>Operating<br>life   | T <sub>a</sub> =25±5°C<br>Rated load<br>Test duration : 1000h  | —————                             | 22              |                   |
|                       | 9        | Intermittent<br>Operating<br>life   | T <sub>j</sub> =T <sub>jmax</sub> ~50°C<br>3min ON, 3min OFF<br>Test duration : 10000cycles  | EIAJ<br>ED4701/106                | 22              |                   |
|                       | 10       | High Temp.<br>Reverse<br>Bias       | Temperature : T <sub>a</sub> =100 °C<br>Bias Voltage : V <sub>R</sub> =V <sub>RRM</sub> duty=1/2<br>Test duration : 1000h  | EIAJ<br>ED4701/101                | 22              |                   |

|                  |                           |                                 |
|------------------|---------------------------|---------------------------------|
| Failure Criteria | $I_R \leq USL \times 5$   | USL : Upper specification Limit |
|                  | $V_F \leq USL \times 1.1$ |                                 |



## Installation

- Soldering involves temperatures which exceed the device storage temperature rating. To avoid device damage and to ensure reliability, observe the following guidelines from the quality assurance standard.

Table 1: Solder temperature and duration

| Method         | Solder temperature | Duration   |
|----------------|--------------------|------------|
| Flow           | 260±5°C            | 10±1sec    |
| Soldering iron | 350±10°C           | 3.5±0.5sec |

- The immersion depth of the lead should basically be up to the lead stopper and the distance should be a maximum of 1.5mm from the device.
- When flow-soldering, be careful to avoid immersing the package in the solder bath.
- Refer to the following torque reference When mounting the device on a heat sink. Excess torque applied to the mounting screw causes damage to the device and weak torque will increase the thermal resistance, both of which conditions may destroy the device.

Table 2: Recommended tightening torque

| Package style | Screw | Recommended tightening torque |
|---------------|-------|-------------------------------|
| TO-3PF        | M3    | 0.4~0.6N·m                    |

- The heat sink should have a flatness within  $\pm 30 \mu\text{m}$  and roughness within  $10 \mu\text{m}$ . Also, keep the tightening torque within the limits of this specification.
- Improper handling may cause isolation breakdown leading to a critical accident.
- We recommend the use of thermal compound to optimize the efficiency of heat radiation. It is important to evenly apply the compound and to eliminate any air voids.

## Storage

- The Diodes must be stored at a standard temperature of 5 to 35°C and relative humidity of 45 to 75%. If the storage area is very dry, a humidifier may be required. In such a case, use only deionized water or boiled water, since the chlorine in tap water may corrode the leads.
- The Diodes should not be subjected to rapid changes in temperature to avoid condensation on the surface of the Diodes. Therefore, store the Diodes in a place where the temperature is steady.
- The Diodes should not be stored on top of each other, since this may cause excessive external force on the case.
- The Diodes should not be stored with the lead terminals remaining unprocessed. Rust may cause presoldered connections to go fail during later processing.
- The Diodes should be stored in antistatic containers or shipping bags.

## 7. Appendix

- This products does not contain PBBs (Polybrominated Biphenyl) or PBDEs (Polybrominated Diphenyl Ether ) , substances.
- This products does not contain Class-I ODS and Class-II ODS substances set force by 'Clean Air Act of US' law.

- If you have any questions about any part of this Specification, please contact Fuji Electric Device Technology or its sales agent before using the product
- Neither Fuji nor its agents shall be held liable for any injury caused by using the products not in accordance with the instructions.
- The application examples described in this specification are merely typical uses of Fuji Electric DeviceTechnology products.  
This specification does not confer any industrial property rights or other rights, nor constitute a license for such rights.

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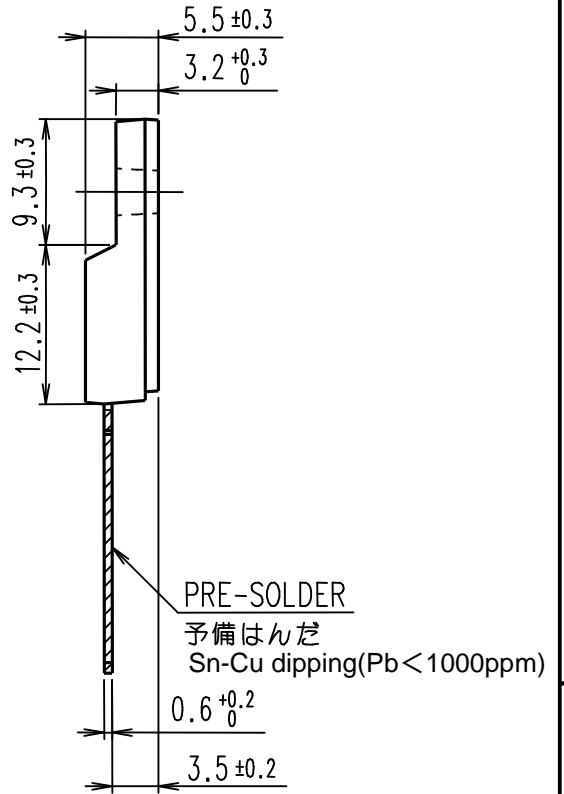
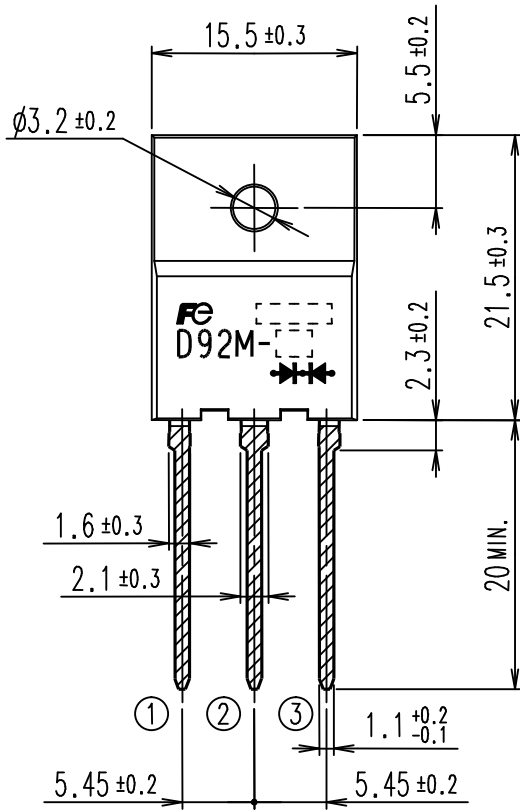


# FUJI SILICON DIODE

TYPE : ESAD92M-□□RR

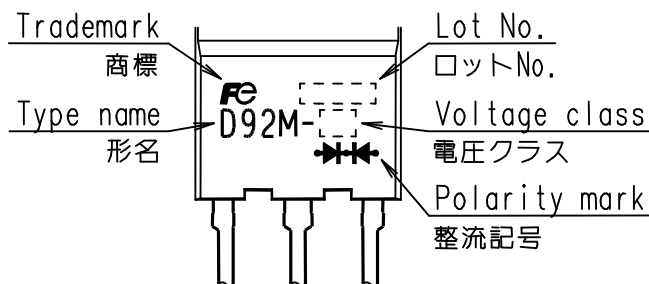
## OUT VIEW

外形寸法図



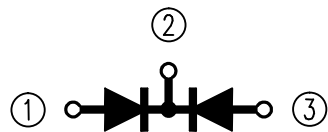
## MARKING

表示内容



## CONNECTION

結線図

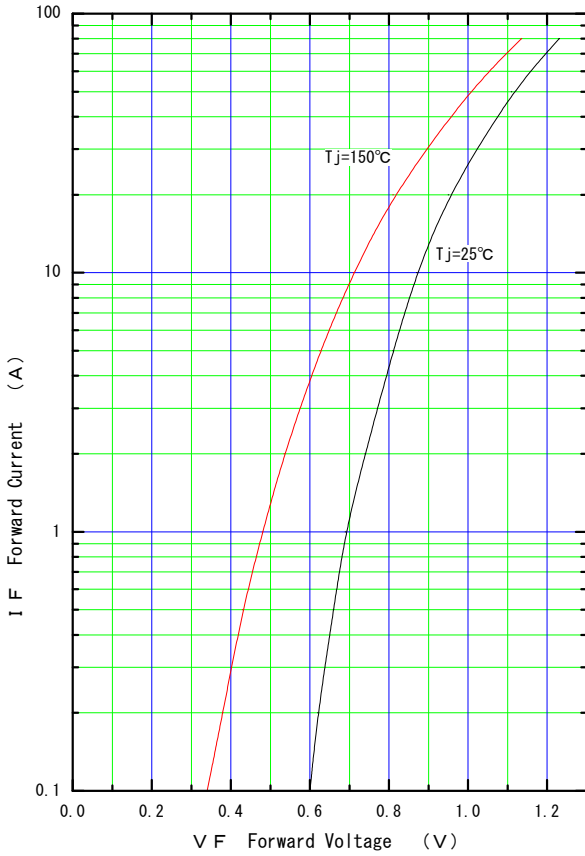


UNIT : mm  
寸法単位 : mm

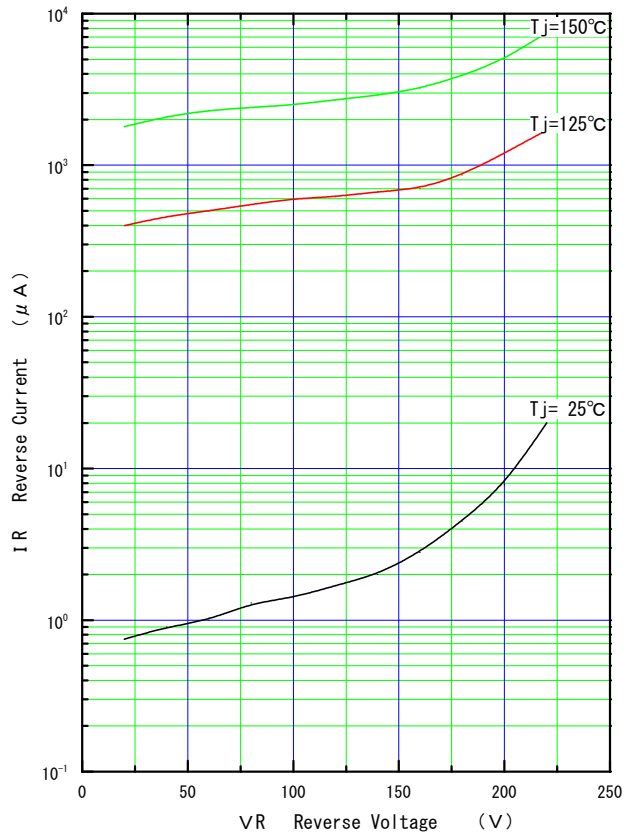
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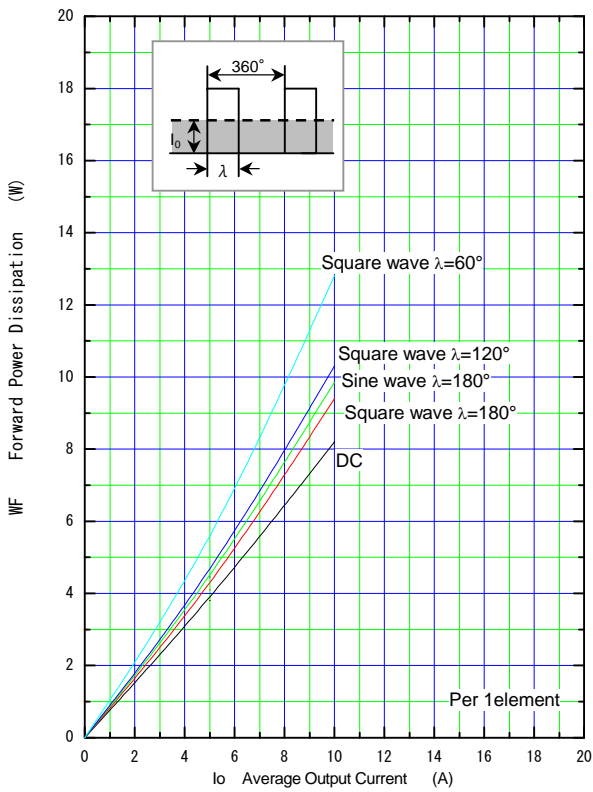
Forward Characteristic (typ.)



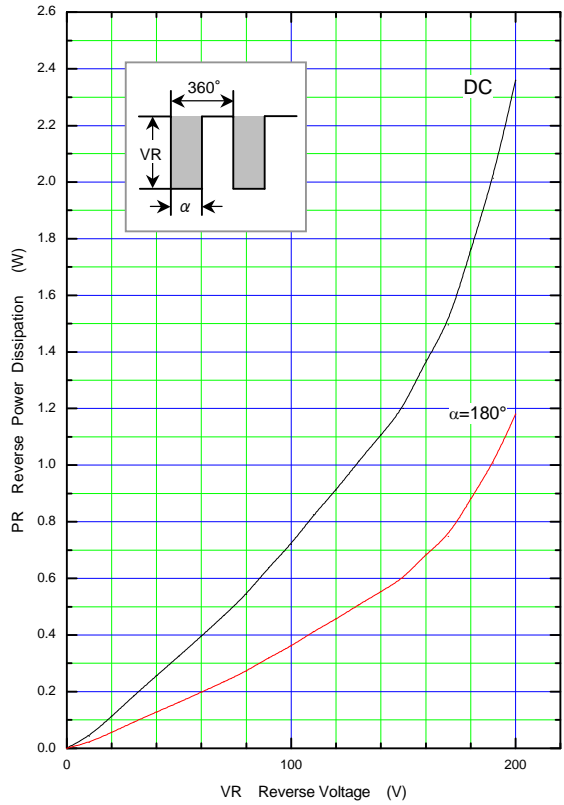
Reverse Characteristic (typ.)



Forward Power Dissipation (max.)

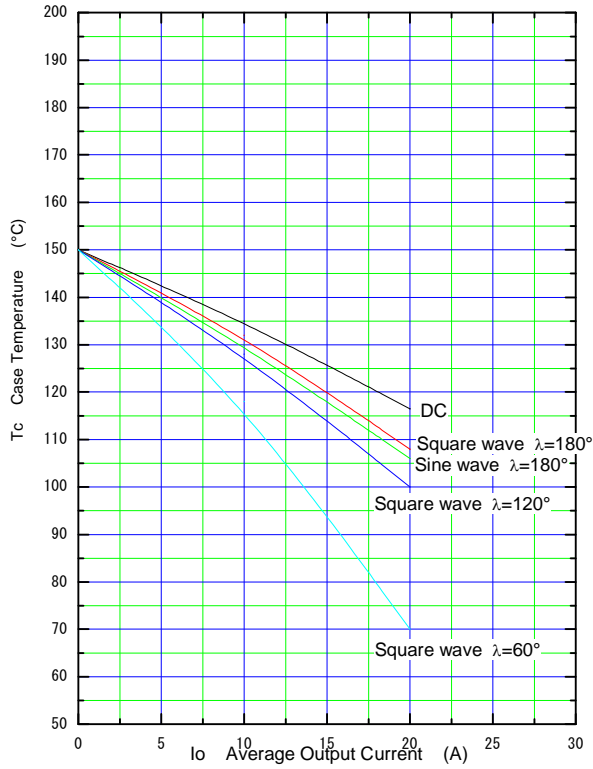


Reverse Power Dissipation (max.)



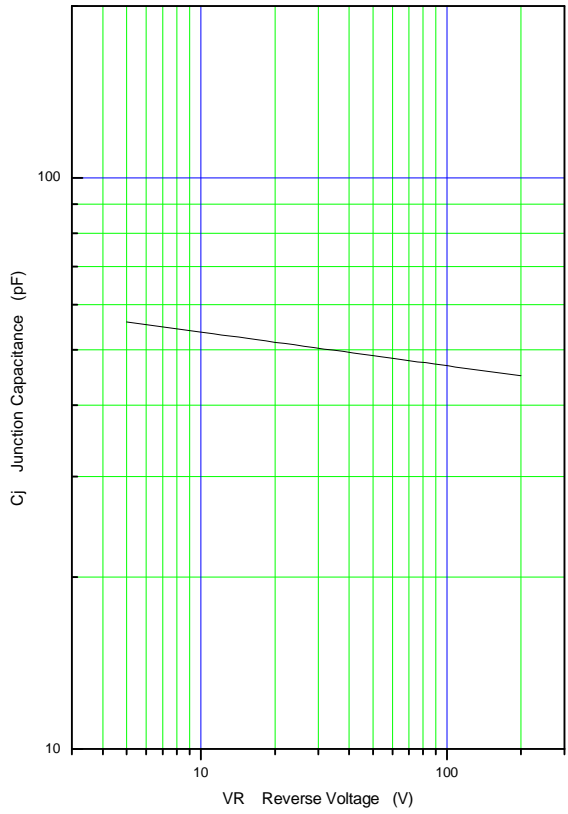
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Current Derating (Io-Tc) (max.)

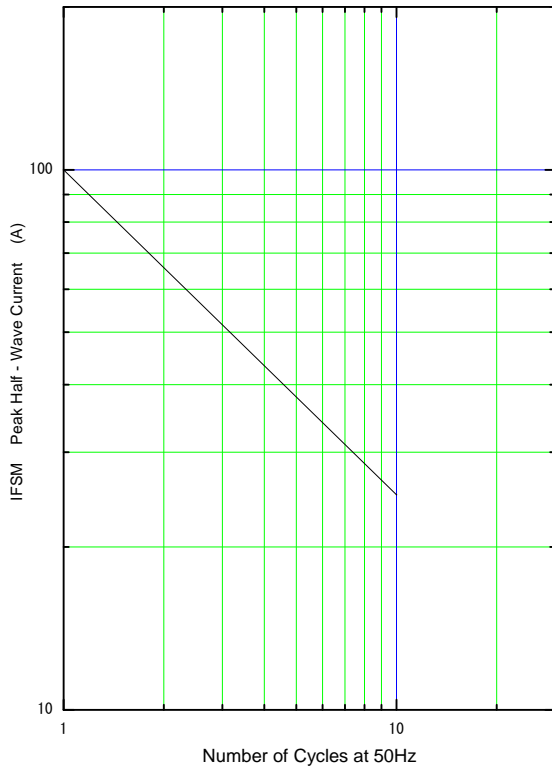


λ: Conduction angle of forward current for each rectifier element  
 Io: Output current of center-tap full wave connection

Junction Capacitance Characteristic (typ.)



Surge Capability (max.)



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