

**SIC SCHOTTKY BARRIER DIODE**

**Reverse Voltage - 650 V**

**Forward Current - 4 A**

**FEATURES**

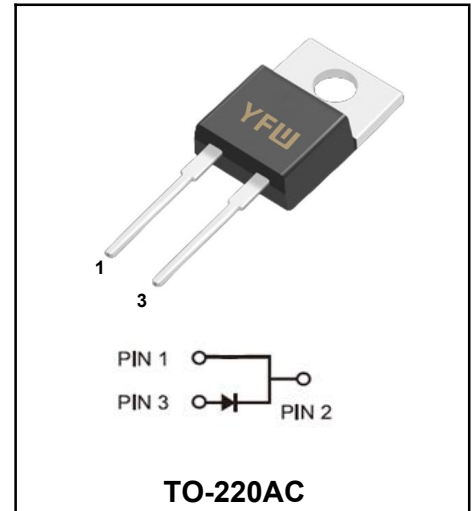
- ◆650-Volt SiC JBS Rectifier
- ◆Zero Reverse Recovery
- ◆Positive Temperature Coefficient on VF
- ◆Temperature-Independent Switching Behavior
- ◆Extremely Fast Switching
- ◆Extremely Low Leakage Current

**APPLICATIONS**

- ◆Uninterruptible power supply
- ◆Switch mode power supply
- ◆Power factor correction
- ◆Solar inverter

**BENEFITS**

- ◆High-speed switching
- ◆Low heat dissipation requirements
- ◆Reduced EMI
- ◆High-reliability



**Maximum Ratings at Ta=25°C unless otherwise specified**

| Parameter                                            | Test Conditions                                                               | Symbol           | Value       | Unit |
|------------------------------------------------------|-------------------------------------------------------------------------------|------------------|-------------|------|
| Repetitive Peak Reverse Voltage                      | T <sub>C</sub> = 25°C                                                         | V <sub>RRM</sub> | 650         | V    |
| Continuous Forward Current for Rth(j- c,max)         | T <sub>C</sub> = 25°C                                                         | I <sub>F</sub>   | 12          | A    |
|                                                      | T <sub>C</sub> = 110°C                                                        |                  | 8           |      |
|                                                      | T <sub>C</sub> = 154°C                                                        |                  | 4           |      |
| Non-Repetitive Forward Surge Current, Sine Half-Wave | T <sub>C</sub> = 25°C, tp = 10ms                                              | I <sub>FSM</sub> | 32          | A    |
|                                                      | T <sub>C</sub> = 110°C, tp = 10ms                                             |                  | 27          |      |
| Repetitive Forward Surge Current, Sine Half-Wave     | T <sub>C</sub> = 25°C, tp = 10ms                                              | I <sub>FRM</sub> | 30          | A    |
|                                                      | T <sub>C</sub> = 110°C, tp = 10ms                                             |                  | 26          |      |
| Single Pulse Avalanche Energy                        | T <sub>C</sub> = 25°C, L= 0.5mH, V <sub>DD</sub> = 50V, I <sub>peak</sub> =6A | E <sub>AS</sub>  | 9           | mJ   |
| Operating Temperature Range                          | -                                                                             | T <sub>J</sub>   | 175         | °C   |
| Storage Temperature Range                            | -                                                                             | T <sub>STG</sub> | -55 to +175 | °C   |
| Typical Thermal Resistance (Note1)                   | -                                                                             | R <sub>θJC</sub> | 2.74        | °C/W |

**Note1:Pulse test: 300 μs pulse width, 2 % duty cycle**

Electrical Characteristics unless otherwise specified

| Parameter                                       |                                 | Symbol          | Value |      |     | Unit |
|-------------------------------------------------|---------------------------------|-----------------|-------|------|-----|------|
| Forward Voltage Drop(Note2)                     |                                 |                 | Min   | Typ  | Max |      |
| I <sub>R</sub> = 100μA                          |                                 | V <sub>DC</sub> | 650   |      | -   | V    |
| at I <sub>F</sub> =4A                           | T <sub>A</sub> =25°C            | V <sub>F</sub>  | -     | 1.37 | 1.7 | V    |
|                                                 | T <sub>A</sub> =175°C           |                 | -     | 1.66 | -   |      |
| Maximum Reverse Current at V <sub>R</sub> =650V | T <sub>A</sub> =25°C            | I <sub>R</sub>  | -     | 0.5  | 20  | μA   |
|                                                 | T <sub>A</sub> =175°C           |                 | -     | 8.5  | -   |      |
| Total capacitive charge                         | V <sub>R</sub> = 400V           | Q <sub>C</sub>  | -     | 12   | -   | nC   |
| Total capacitance                               | V <sub>R</sub> = 1V, f = 1MHz   | C               | -     | 155  | -   | pF   |
|                                                 | V <sub>R</sub> = 200V, f = 1MHz |                 | -     | 23   | -   |      |
|                                                 | V <sub>R</sub> = 400V, f = 1MHz |                 | -     | 17   | -   |      |
| Capacitance stored energy                       | V <sub>R</sub> = 400V           | E <sub>C</sub>  | -     | 1.7  | -   | μJ   |

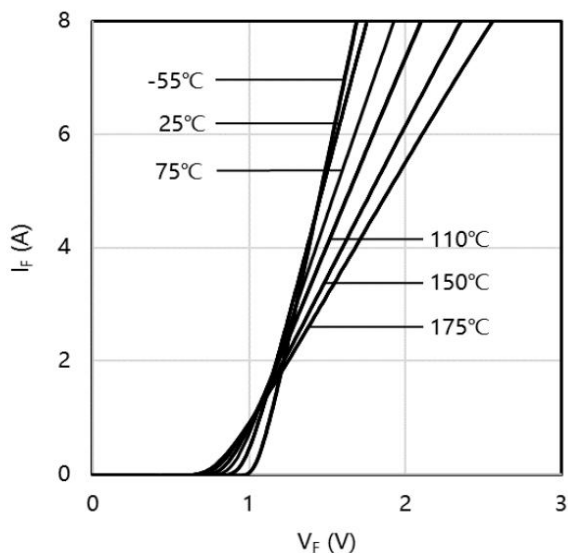
Note2:Pulse test: 300  $\mu s$  pulse width, 1 % duty cycle

**RATINGS AND CHARACTERISTIC CURVES**

**Figure 1.  $V_F$  Typical Forward Characteristics**

$I_F = 0 \sim 8A$

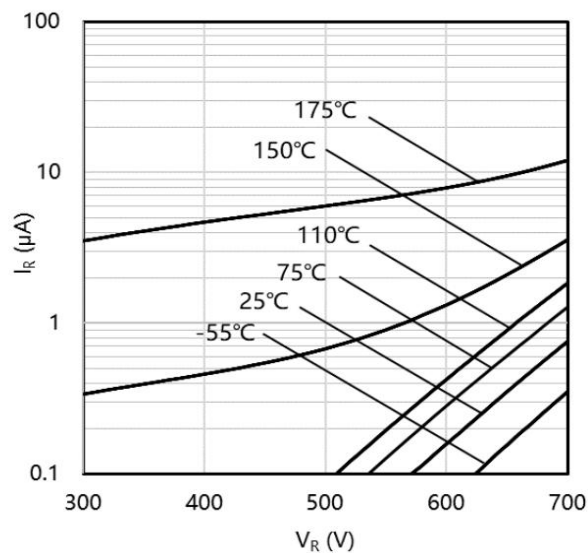
$T_{VJ}$  ranges from  $-55^\circ C$  to  $175^\circ C$



**Figure 2.  $I_R$  Typical Reverse Characteristics**

$V_R = 300 \sim 700 V$

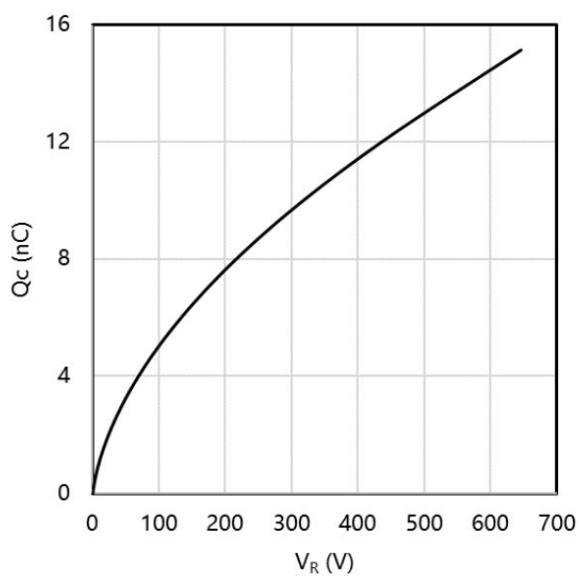
$T_{VJ}$  ranges from  $25^\circ C$  to  $175^\circ C$



**Figure 3. Total Capacitance Charge Characteristics**

$V_R = 0 \sim 650 V$

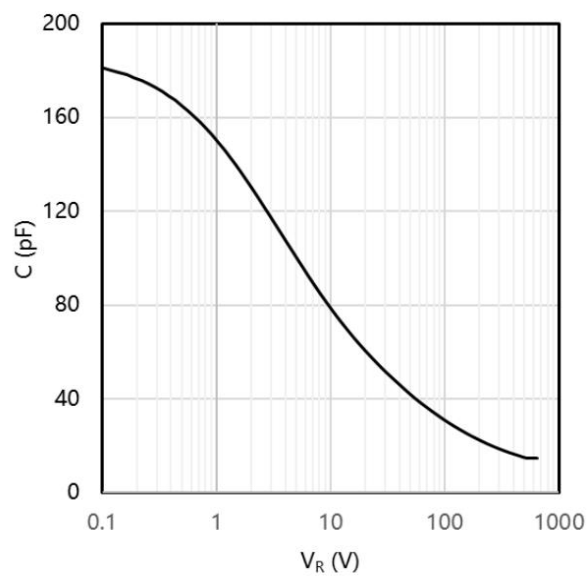
$T_{VJ} = 25^\circ C$



**Figure 4. Total Capacitance Characteristics**

$V_R = 0 \sim 650 V$

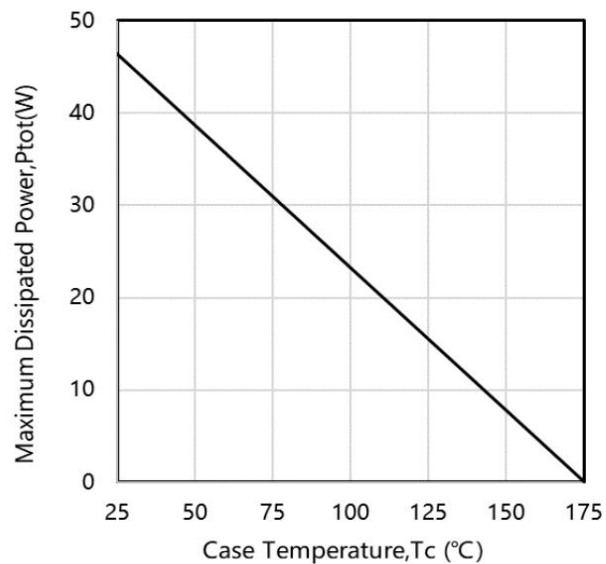
$T_{VJ} = 25^\circ C$



RATINGS AND CHARACTERISTIC CURVES

**Figure 5. Power dissipation as function of case temperature**

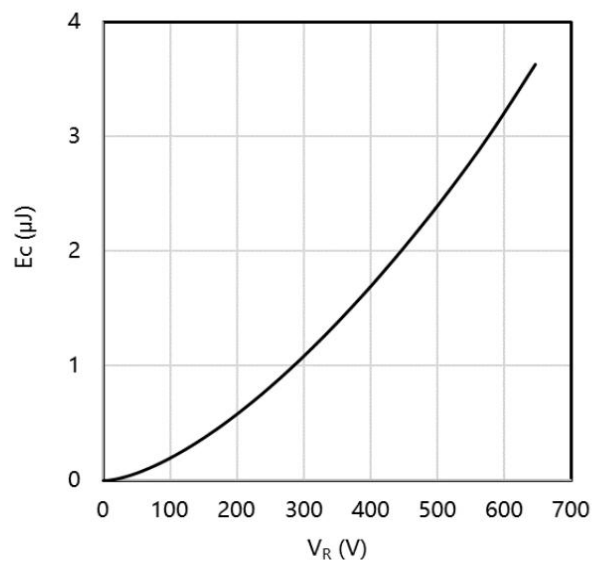
$T_{WJ}$  ranges from 25 °C to 175 °C



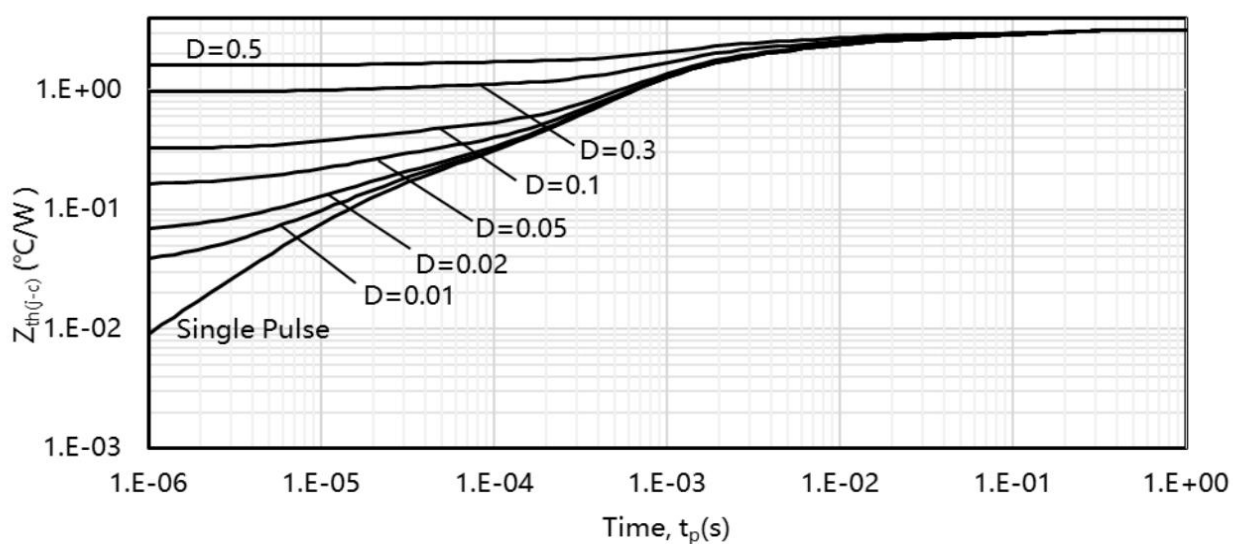
**Figure 6. Capacitance Stored Energy**

$V_R = 0 \sim 650$  V

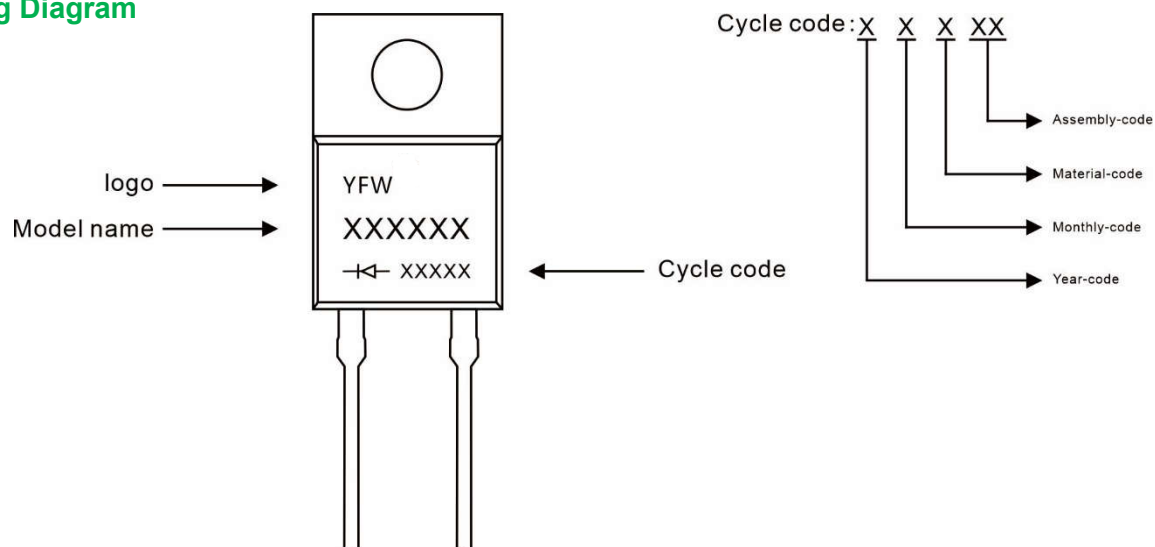
$T_{WJ} = 25$  °C



**Figure 7. Max. transient thermal impedance,  $Z_{th,j-c}=f(t_p)$ , parameter:  $D=t_p/T$**



## Marking Diagram



## Ordering information

| Model name   | Package  | Unit Weight   | Base Quantity | Packing Quantity           |
|--------------|----------|---------------|---------------|----------------------------|
| YFWD304065AC | TO-220AC | 0.067oz(1.9g) | 50pcs/tube    | 1000PCS/Box 5000PCS/Carton |

## Package Dimensions

### TO-220AC

| Dim    | Millimeter |       | Inches |       |
|--------|------------|-------|--------|-------|
|        | Min.       | Max.  | Min.   | Max.  |
| A      | 4.34       | 4.67  | 0.171  | 0.184 |
| A1     | 2.52       | 2.82  | 0.099  | 0.111 |
| b      | 0.71       | 0.91  | 0.028  | 0.036 |
| b1     | 1.17       | 1.37  | 0.046  | 0.054 |
| c      | 0.30       | 0.50  | 0.012  | 0.020 |
| c1     | 1.17       | 1.37  | 0.046  | 0.054 |
| D      | 9.90       | 10.20 | 0.390  | 0.402 |
| E      | 8.50       | 8.90  | 0.335  | 0.350 |
| E1     | 12.00      | 12.50 | 0.472  | 0.492 |
| e      | 4.88       | 5.28  | 0.192  | 0.208 |
| F      | 2.60       | 2.80  | 0.102  | 0.110 |
| L      | 13.20      | 13.80 | 0.520  | 0.543 |
| L1     | 3.80       | 4.20  | 0.150  | 0.165 |
| $\Phi$ | 3.60       | 3.96  | 0.142  | 0.156 |

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