

International  
**IR** Rectifier

## 18TQ...PbF Series

SCHOTTKY RECTIFIER

18 Amp

$$I_{F(AV)} = 18\text{Amp}$$

$$V_R = 35/45\text{V}$$

### Major Ratings and Characteristics

| Characteristics                           | Values     | Units            |
|-------------------------------------------|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform          | 18         | A                |
| $V_{RRM}$ range                           | 35/45      | V                |
| $I_{FSM}$ @ $t_p = 5 \mu\text{s}$ sine    | 1800       | A                |
| $V_F$ @ 18 Apk, $T_J = 125^\circ\text{C}$ | 0.53       | V                |
| $T_J$ range                               | -55 to 175 | $^\circ\text{C}$ |

### Description/ Features

The 18TQ...PbF Schottky rectifier series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to  $175^\circ\text{C}$  junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

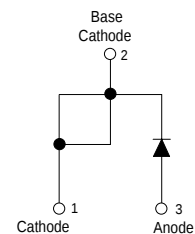
- $175^\circ\text{C}$   $T_J$  operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

### Case Styles

18TQ...PbF



TO-220AC



## Voltage Ratings

| Part number                                     | 18TQ035PbF | 18TQ040PbF | 18TQ045PbF |
|-------------------------------------------------|------------|------------|------------|
| $V_R$ Max. DC Reverse Voltage (V)               | 35         | 40         | 45         |
| $V_{RWM}$ Max. Working Peak Reverse Voltage (V) |            |            |            |

## Absolute Maximum Ratings

| Parameters                                                              | 18TQ | Units | Conditions                                                                                                               |
|-------------------------------------------------------------------------|------|-------|--------------------------------------------------------------------------------------------------------------------------|
| $I_{F(AV)}$ Max. Average Forward Current<br>* See Fig. 5                | 18   | A     | 50% duty cycle @ $T_C = 149^\circ\text{C}$ , rectangular wave form                                                       |
| $I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current * See Fig. 7 | 1800 | A     | 5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse                                                                      |
|                                                                         | 390  |       | 10ms Sine or 6ms Rect. pulse                                                                                             |
| $E_{AS}$ Non-Repetitive Avalanche Energy                                | 24   | mJ    | $T_J = 25^\circ\text{C}$ , $I_{AS} = 3.6\text{Amps}$ , $L = 3.7\text{mH}$                                                |
| $I_{AR}$ Repetitive Avalanche Current                                   | 3.6  | A     | Current decaying linearly to zero in 1 $\mu\text{sec}$<br>Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical |

## Electrical Specifications

| Parameters                                                | 18TQ  | Units            | Conditions                                                              |
|-----------------------------------------------------------|-------|------------------|-------------------------------------------------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop (1)<br>* See Fig. 1    | 0.60  | V                | @ 18A                                                                   |
|                                                           | 0.72  | V                | @ 36A                                                                   |
|                                                           | 0.53  | V                | @ 18A                                                                   |
|                                                           | 0.67  | V                | @ 36A                                                                   |
| $I_{RM}$ Max. Reverse Leakage Current (1)<br>* See Fig. 2 | 2.5   | mA               | $T_J = 25^\circ\text{C}$                                                |
|                                                           | 25    | mA               | $T_J = 125^\circ\text{C}$                                               |
| $C_T$ Max. Junction Capacitance                           | 1400  | pF               | $V_R = 5V_{DC}$ , (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$ |
| $L_S$ Typical Series Inductance                           | 8.0   | nH               | Measured lead to lead 5mm from package body                             |
| $dv/dt$ Max. Voltage Rate of Change (Rated $V_R$ )        | 10000 | V/ $\mu\text{s}$ |                                                                         |

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%

## Thermal-Mechanical Specifications

| Parameters                                              | 18TQ         | Units              | Conditions                           |
|---------------------------------------------------------|--------------|--------------------|--------------------------------------|
| $T_J$ Max. Junction Temperature Range                   | -55 to 175   | $^\circ\text{C}$   |                                      |
| $T_{stg}$ Max. Storage Temperature Range                | -55 to 175   | $^\circ\text{C}$   |                                      |
| $R_{thJC}$ Max. Thermal Resistance Junction to Case     | 1.50         | $^\circ\text{C/W}$ | DC operation * See Fig. 4            |
| $R_{thCS}$ Typical Thermal Resistance, Case to Heatsink | 0.50         | $^\circ\text{C/W}$ | Mounting surface, smooth and greased |
| wt Approximate Weight                                   | 2 (0.07)     |                    | g (oz.)                              |
| T Mounting Torque                                       | Min. 6 (5)   | Kg-cm<br>(lbf-in)  |                                      |
|                                                         | Max. 12 (10) |                    |                                      |
| Marking Device                                          | 18TQ045      |                    |                                      |

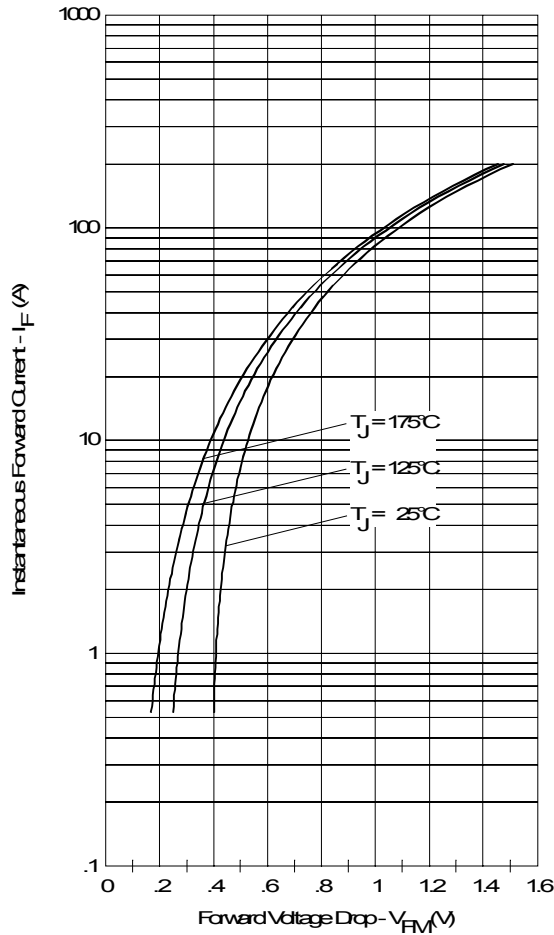


Fig. 1 - Maximum Forward Voltage Drop Characteristics

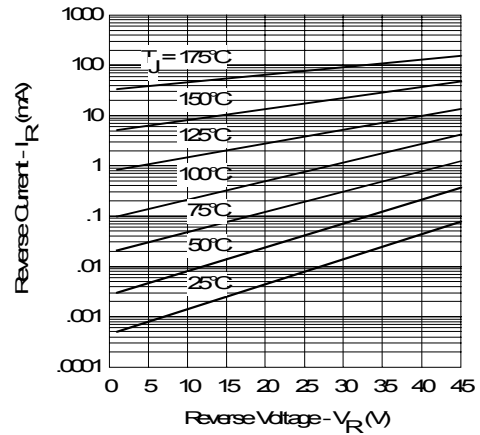


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

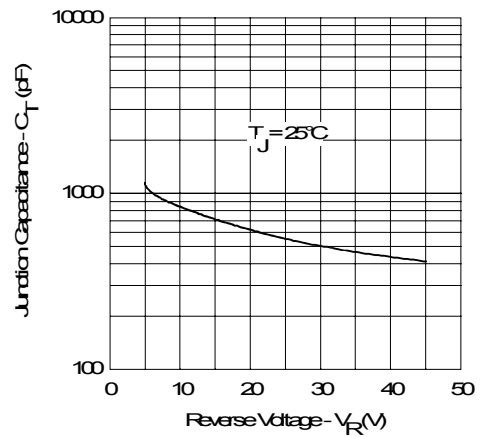


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

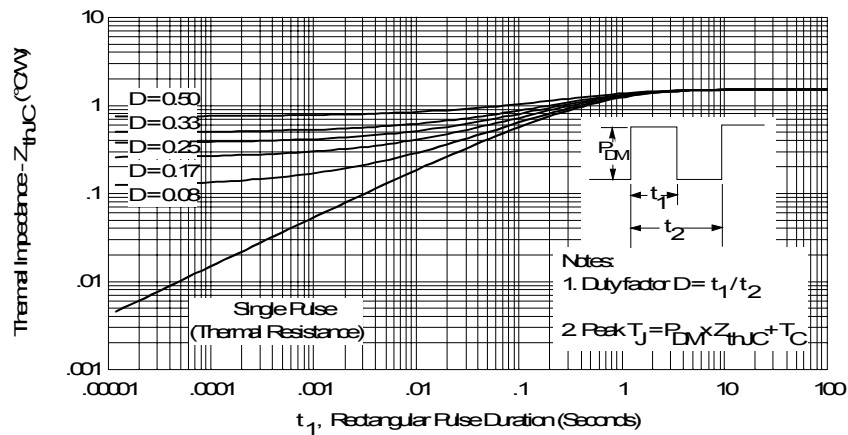


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

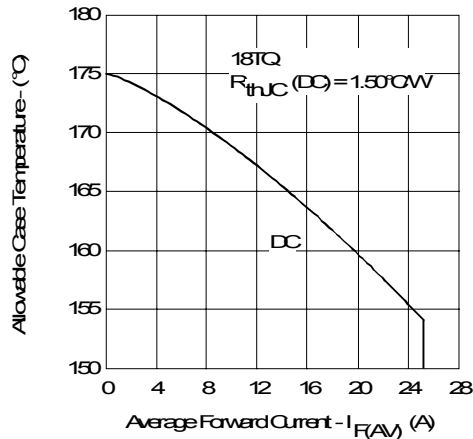


Fig. 5 - Maximum Allowable Case Temperature Vs. Average Forward Current

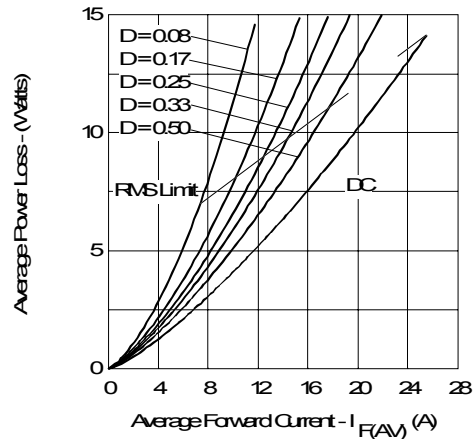


Fig. 6 - Forward Power Loss Characteristics

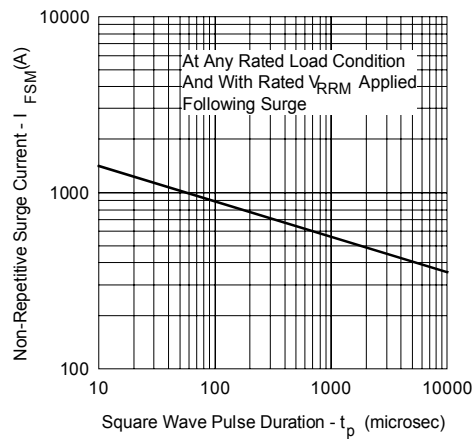


Fig. 7 - Maximum Non-Repetitive Surge Current

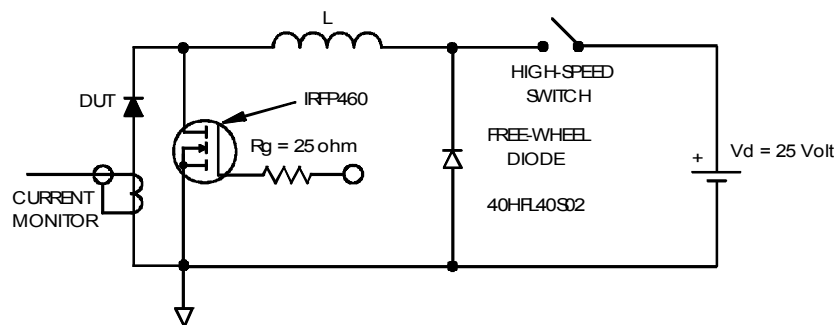
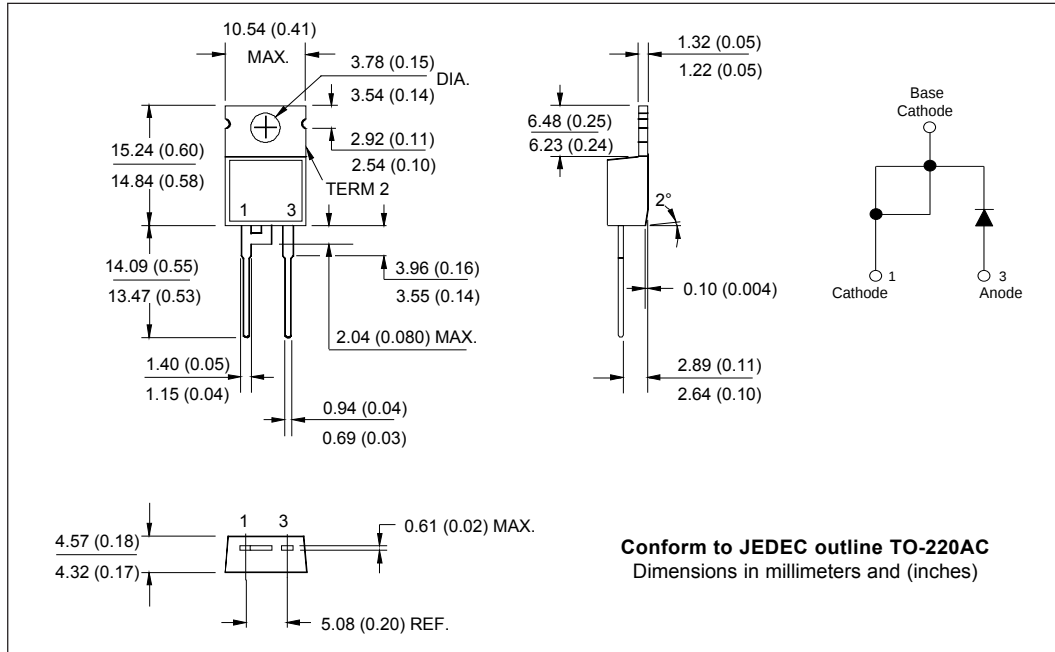
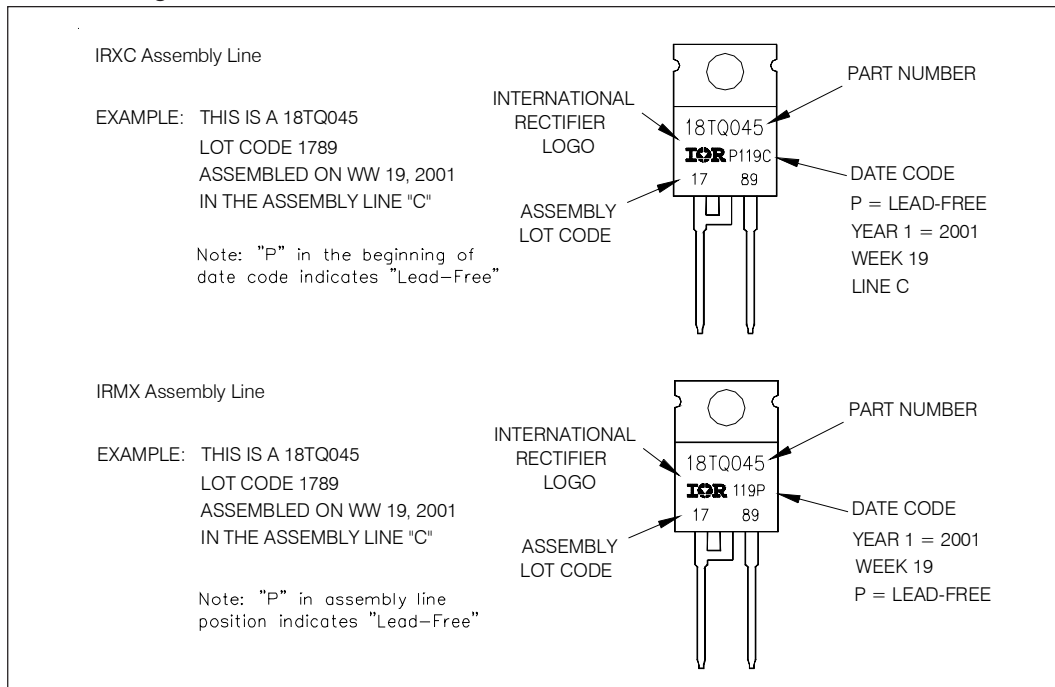


Fig. 8 - Unclamped Inductive Test Circuit

## Outline Table



## Part Marking Information



Ordering Information Table

| Device Code                             |                              |   |           |     |
|-----------------------------------------|------------------------------|---|-----------|-----|
| 18                                      | T                            | Q | 045       | PbF |
| 1                                       | 2                            | 3 | 4         | 5   |
| 1                                       | - Current Rating (18 = 18A)  |   |           |     |
| 2                                       | - Package                    |   |           |     |
|                                         | T = TO-220                   |   |           |     |
| 3                                       | - Schottky "Q" Series        |   |           |     |
| 4                                       | - Voltage Ratings            |   |           |     |
| 5                                       | • none = Standard Production |   |           |     |
|                                         | • PbF = Lead-Free            |   |           |     |
|                                         |                              |   | 035 = 35V |     |
|                                         |                              |   | 040 = 40V |     |
|                                         |                              |   | 045 = 45V |     |
| Tube Standard Pack Quantity : 50 pieces |                              |   |           |     |

```
18TQ045
*****
*   This model has been developed by           *
*   Wizard SPICE MODEL GENERATOR (1999)       *
*   (International Rectifier Corporation)       *
*   Contains Proprietary Information           *
*****
* SPICE Model Diode is composed by a          *
* simple diode plus paralalled VCG2T          *
*****
.SUBCKT 18TQ045 ANO CAT
D1 ANO 1 DMOD (0.10899)
*Define diode model
.MODEL DMOD D(IS=4.49213078685186E-05A,N=1.23149728754907,BV=52V,
+ IBV=9.03115410463162E-02A,RS= 0.000664839,CJO=2.73074429693125E-08,
+ VJ=0.881972575936711,XTI=2, EG=0.789061316955255)
*****
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=18.1199792035774)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP(((((-3.316412E-03/18.11998)*((V(2,CAT)*1E6)/(I(VX)+1E-6)-1)))+1)*6.806625E-
02*ABS(V(ANO,CAT)))-1)}
*****
.ENDS 18TQ045

Thermal Model Subcircuit
.SUBCKT 18TQ045 5 1

CTHERM1      5      4      6.49E-01
CTHERM2      4      3      3.46E+00
CTHERM3      3      2      1.63E+01
CTHERM4      2      1      3.01E+02

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Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level and Lead-Free.  
Qualification Standards can be found on IR's Web site.

International  
**IOR** Rectifier

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