

Bulletin PD-21032 rev. A 06/06

International  
**IR** Rectifier

25CTQ...SPbF  
25CTQ..-1PbF

SCHOTTKY RECTIFIER

30 Amp

$$I_{F(AV)} = 30\text{Amp}$$
$$V_R = 35/45\text{V}$$

Major Ratings and Characteristics

| Characteristics                                     | Values     | Units            |
|-----------------------------------------------------|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform                    | 30         | A                |
| $V_{RRM}$ range                                     | 35/45      | V                |
| $I_{FSM}$ @ $t_p = 5\text{ }\mu\text{s}$ sine       | 990        | A                |
| $V_F$ @ 15 Apk, $T_J = 125^\circ\text{C}$ (per leg) | 0.50       | V                |
| $T_J$ range                                         | -55 to 150 | $^\circ\text{C}$ |

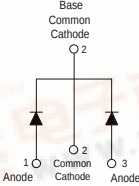
Description/ Features

The 25CTQ.. center tap Schottky rectifier series has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150° C  $T_J$  operation
- Center tap TO-220 package
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

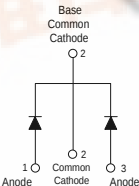
Case Styles

25CTQ...SPbF



**D²PAK**

25CTQ...-1PbF



**TO-262**



## 25CTQ...SPbF, 25CTQ...-1PbF Series

Bulletin PD-21032 rev. A 06/06

International  
IOR Rectifier

### Voltage Ratings

| Part number                                     | 25CTQ035SPbF<br>25CTQ035-1PbF | 25CTQ040SPbF<br>25CTQ040-1PbF | 25CTQ045SPbF<br>25CTQ045-1PbF |
|-------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|
| $V_R$ Max. DC Reverse Voltage (V)               | 35                            | 40                            | 45                            |
| $V_{RWM}$ Max. Working Peak Reverse Voltage (V) |                               |                               |                               |

### Absolute Maximum Ratings

| Parameters                                                                        | 25CTQ | Units | Conditions                                                                                                               |
|-----------------------------------------------------------------------------------|-------|-------|--------------------------------------------------------------------------------------------------------------------------|
| $I_{F(AV)}$ Max. Average Forward Current<br>* See Fig. 5                          | 30    | A     | 50% duty cycle @ $T_C = 102^\circ\text{C}$ , rectangular wave form                                                       |
| $I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7 | 990   | A     | 5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse                                                                      |
|                                                                                   | 250   |       | 10ms Sine or 6ms Rect. pulse                                                                                             |
| $E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)                                | 20    | mJ    | $T_J = 25^\circ\text{C}$ , $I_{AS} = 3\text{Amps}$ , $L = 4.40\text{mH}$                                                 |
| $I_{AR}$ Repetitive Avalanche Current (Per Leg)                                   | 3     | 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                                                       | 25CTQ | Units            | Conditions                                                            |
|------------------------------------------------------------------|-------|------------------|-----------------------------------------------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)    | 0.56  | V                | @ 15A                                                                 |
|                                                                  | 0.71  | V                | @ 30A                                                                 |
|                                                                  | 0.50  | V                | @ 15A                                                                 |
|                                                                  | 0.64  | V                | @ 30A                                                                 |
| $I_{RM}$ Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1) | 1.75  | mA               | $T_J = 25^\circ\text{C}$                                              |
|                                                                  | 70    | mA               | $T_J = 125^\circ\text{C}$                                             |
| $C_T$ Max. Junction Capacitance (Per Leg)                        | 900   | pF               | $V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$ |
| $L_S$ Typical Series Inductance (Per Leg)                        | 8.0   | nH               | Measured lead to lead 5mm from package body                           |
| $dv/dt$ Max. Voltage Rate of Change                              | 10000 | V/ $\mu\text{s}$ | (Rated $V_R$ )                                                        |

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

### Thermal-Mechanical Specifications

| Parameters        |                                                        | 25CTQ      | Units   | Conditions                            |              |  |
|-------------------|--------------------------------------------------------|------------|---------|---------------------------------------|--------------|--|
| T <sub>J</sub>    | Max. Junction Temperature Range                        | -55 to 150 | °C      |                                       |              |  |
| T <sub>stg</sub>  | Max. Storage Temperature Range                         | -55 to 150 | °C      |                                       |              |  |
| R <sub>thJC</sub> | Max. Thermal Resistance Junction to Case (Per Leg)     | 3.25       | °C/W    | DC operation                          | * See Fig. 4 |  |
| R <sub>thJC</sub> | Max. Thermal Resistance Junction to Case (Per Package) | 1.63       | °C/W    | DC operation                          |              |  |
| R <sub>thCS</sub> | Typical Thermal Resistance, Case to Heatsink           | 0.50       | °C/W    | Mounting surface , smooth and greased |              |  |
| wt                | Approximate Weight                                     | 2.0 (0.07) | g (oz.) |                                       |              |  |
| T                 | Mounting Torque                                        | Min.       | 6 (5)   | Kg-cm (lbf-in)                        |              |  |
|                   |                                                        | Max.       | 12 (10) |                                       |              |  |
|                   | Marking Device                                         | 25CTQ...S  |         | Case style D <sup>2</sup> Pak         |              |  |
|                   |                                                        | 25CTQ...-1 |         | Case style TO-262                     |              |  |

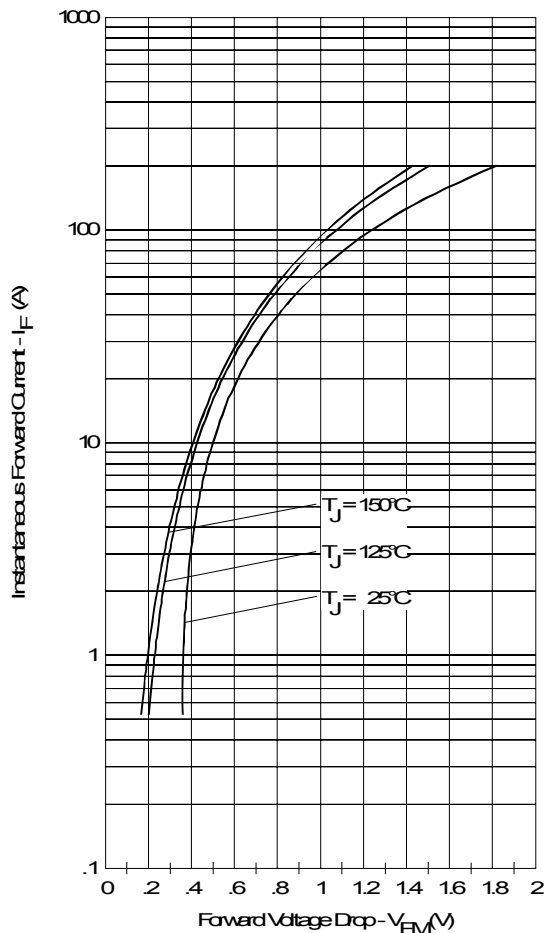


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

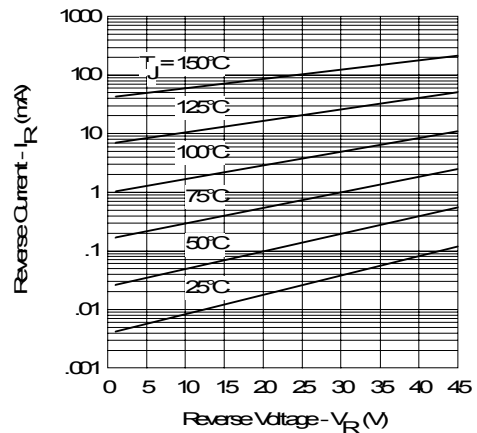


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

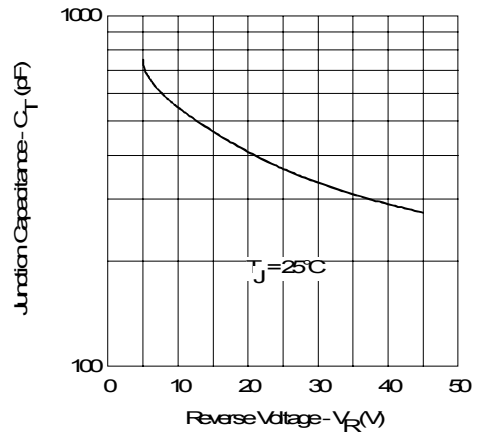


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

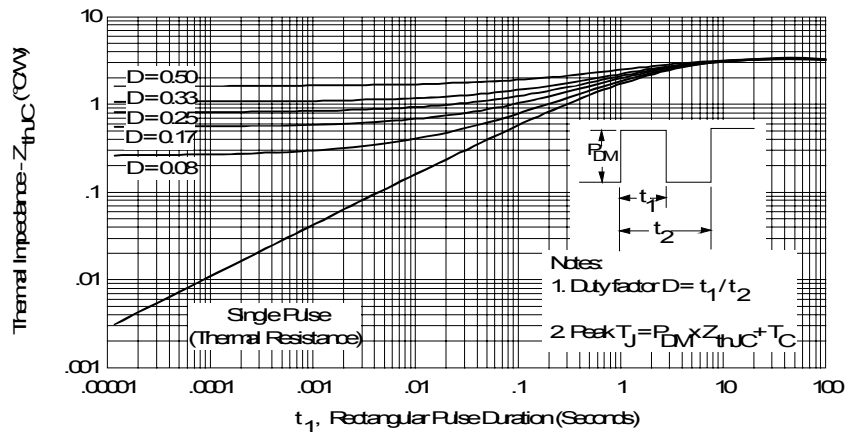


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

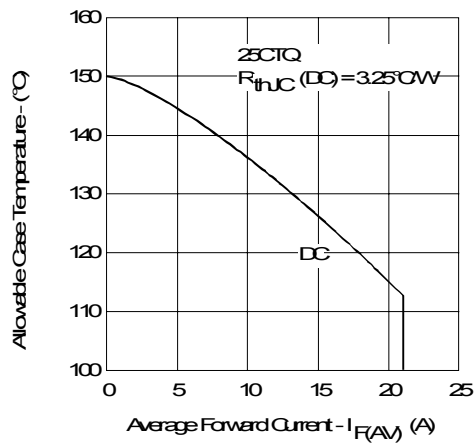


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

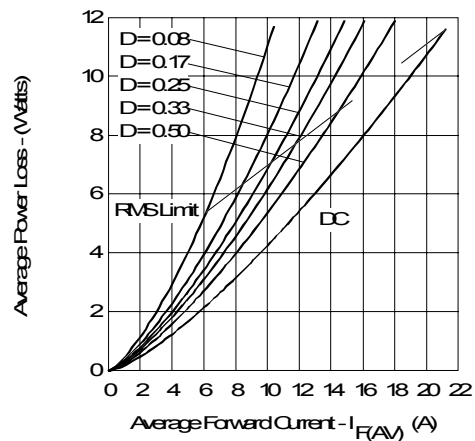


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

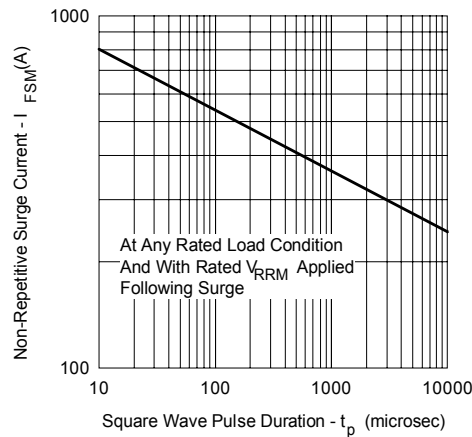


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

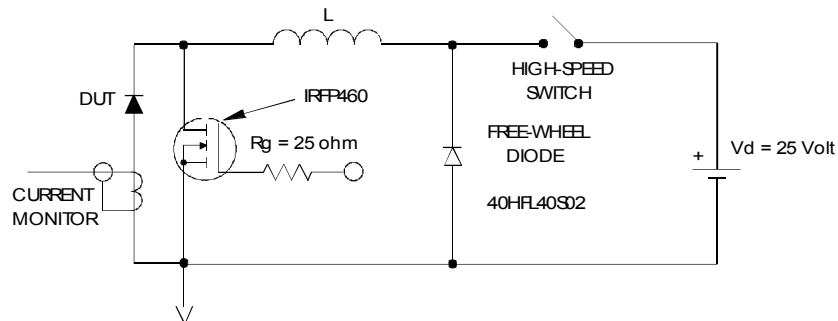
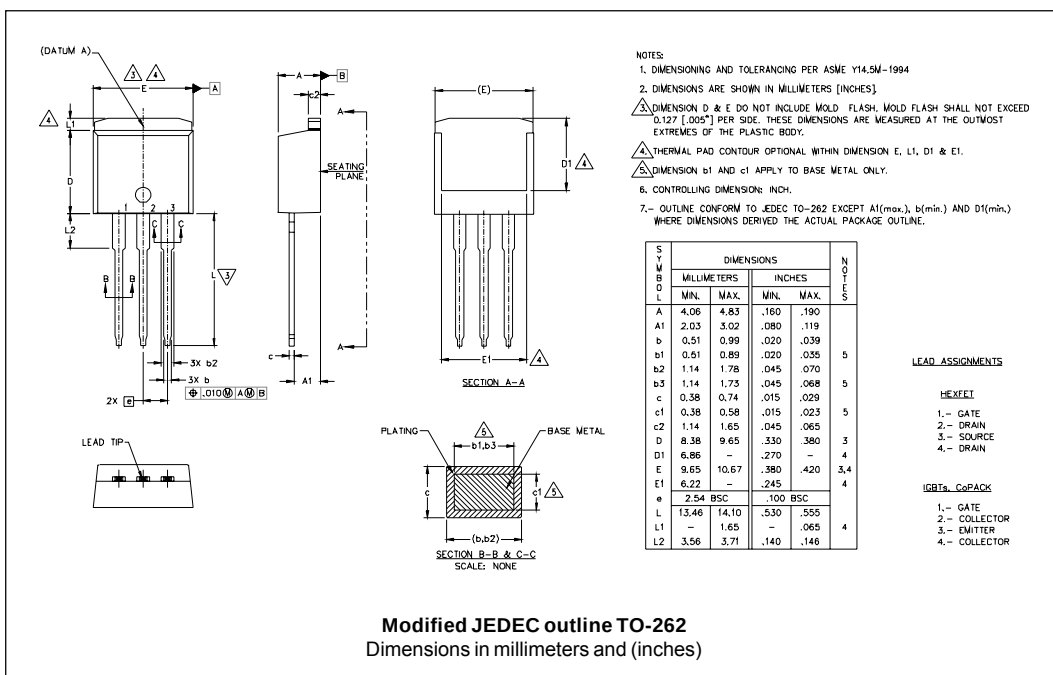
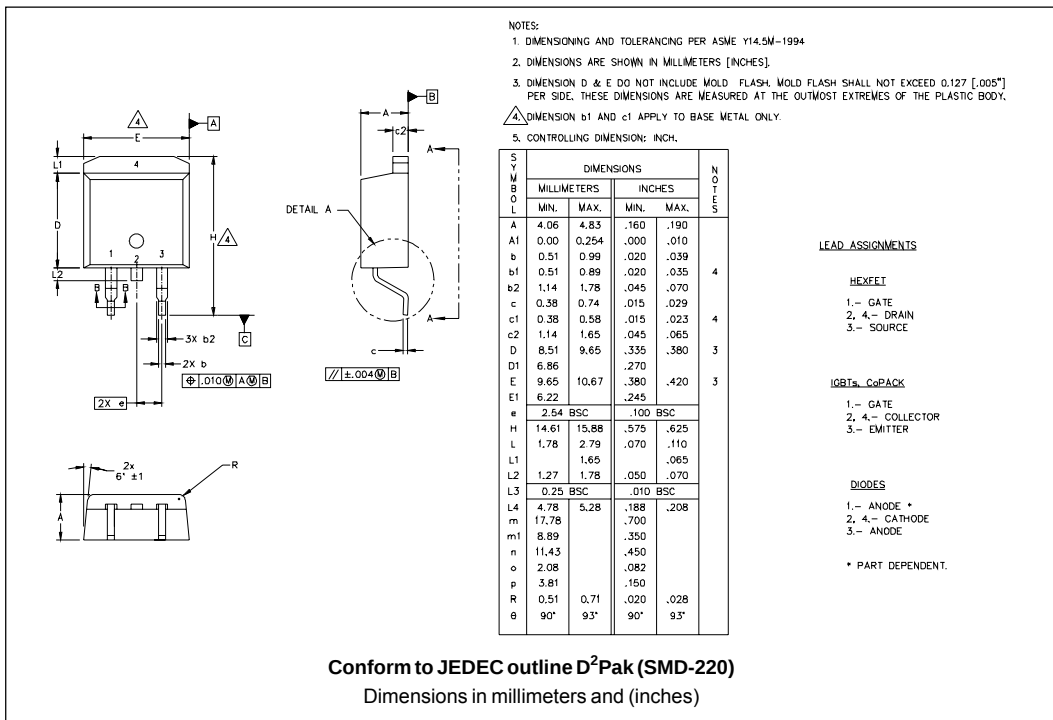


Fig. 8 - Unclamped Inductive Test Circuit

## Outlines Table



## Part Marking Information

**D<sup>2</sup>PAK**

EXAMPLE: THIS IS A 25CTQ045S  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000

Note: "P" in assembly line position indicates "Lead-Free"

**TO-262**

EXAMPLE: THIS IS A 25CTQ045-1  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2002

Note: "P" in assembly line position indicates "Lead-Free"

## Tape & Reel Information

SECTION Y-Y

NOTES:

- 1.0 10 SPROCKET HOLE PITH CUMULATIVE TOLERANCE ±.02
- 2.0 CAMBER NOT TO EXCEED 1mm In 100mm
- 3.0 MATERIAL: CONDUCTIVE BLACK STYRENIC ALLOY
- 4.0 K<sub>0</sub> MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
- 5.0 MEASURED FROM CENTRELINE OF SPROCKET HOLE TO CENTRELINE OF POCKET
- 6.0 VENDOR: (OPTIONAL)
- 7.0 MUST ALSO MEET REQUIREMENTS OF EIA STANDAR #EIA-481A TAPING OF SURFACE MOUNT COMPONENTS FOR AUTOMATIC PLACEMENT
- 8.0 SURFACE RESISTIVITY OF MOLDED MATL. MUST MEASURE LESS OR EQUAL TO 10<sup>6</sup> OHMS PER SQUARE. MEASURED IN ACCORDANCE TO PROCEDURE GIVEN IN ASTM D-257 & ASTM D-991
- 9.0 TOTAL LENGTH PER REEL MUST BE 45 METERS
- 10.0 © CRITICAL

| Symbol | Value         |
|--------|---------------|
| Ao     | 10.50 +/- 0.1 |
| Bo     | 15.80 +/- 0.1 |
| B2     | 10.25 +/- 0.1 |
| Ko     | 4.90 +/- 0.1  |
| F      | 11.50 +/- 0.1 |
| P1     | 16.00 +/- 0.1 |
| W      | 24.00 +/- 0.3 |

Dimensions in millimeters and (inches)

## Ordering Information Table

| Device Code |    |                                                                                                                                                                                                                                  |   |   |     |   |         |
|-------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-----|---|---------|
|             | 25 | C                                                                                                                                                                                                                                | T | Q | 045 | S | TRL PbF |
|             | ①  | ②                                                                                                                                                                                                                                | ③ | ④ | ⑤   | ⑥ | ⑦ ⑧     |
| <b>1</b>    | -  | Current Rating (25A)                                                                                                                                                                                                             |   |   |     |   |         |
| <b>2</b>    | -  | Circuit Configuration                                                                                                                                                                                                            |   |   |     |   |         |
|             |    | C = Common Cathode                                                                                                                                                                                                               |   |   |     |   |         |
| <b>3</b>    | -  | T = TO-220                                                                                                                                                                                                                       |   |   |     |   |         |
| <b>4</b>    | -  | Schottky "Q" Series                                                                                                                                                                                                              |   |   |     |   |         |
| <b>5</b>    | -  | Voltage Ratings                                                                                                                                                                                                                  |   |   |     |   |         |
| <b>6</b>    | -  | <ul style="list-style-type: none"> <li>S = D<sup>2</sup>Pak</li> <li>-1= TO-262</li> </ul>                                                                                                                                       |   |   |     |   |         |
| <b>7</b>    | -  | <ul style="list-style-type: none"> <li>none = Tube (50 pieces)</li> <li>TRL = Tape &amp; Reel (Left Oriented - for D<sup>2</sup>Pak only)</li> <li>TRR = Tape &amp; Reel (Right Oriented - for D<sup>2</sup>Pak only)</li> </ul> |   |   |     |   |         |
| <b>8</b>    | -  | <ul style="list-style-type: none"> <li>none = Standard Production</li> <li>PbF = Lead-Free</li> </ul>                                                                                                                            |   |   |     |   |         |

|           |
|-----------|
| 035 = 35V |
| 040 = 40V |
| 045 = 45V |

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25CTQ045
*****
*   This model has been developed by           *
*   Wizard SPICE MODEL GENERATOR (1999)      *
*   (International Rectifier Corporation)      *
*   Contain Proprietary Information           *
*****
* SPICE Model Diode is composed by a          *
* simple diode plus paralalled VCG2T         *
*****
.SUBCKT 25CTQ045 ANO CAT
D1 ANO 1 DMOD (0.07089)
*Define diode model
.MODEL DMOD D(IS=1.72789623043916E-04A,N=1.16449261507669,BV=52V,
+ IBV=0.347382965330896A,RS= 0.000623832,CJO=2.01681525450576E-08,
+ VJ=1.79426113441105,XTI=2, EG=0.778356513713514)
*****
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=30.866905105089)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP(((((-2.873853E-03/30.86691)*((V(2,CAT)*1E6)/(I(VX)+1E-6)-
1))+1)*5.486216E-02*ABS(V(ANO,CAT)))-1)}
*****
.ENDS 25CTQ045

Thermal Model Subcircuit
.SUBCKT 25CTQ045 5 1

CTHERM1    5    4    4.04E-01
CTHERM2    4    3    2.01E+00
CTHERM3    3    2    8.32E+00
CTHERM4    2    1    3.80E+02

R THERM1    5    4    1.62E+00
R THERM2    4    3    1.22E+00
R THERM1    3    2    3.50E-01
R THERM1    2    1    4.34E-02

.ENDS 25CTQ045

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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  
**IR** Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
TAC Fax: (310) 252-7309  
Visit us at [www.irf.com](http://www.irf.com) for sales contact information. 06/06