

International IOR Rectifier

16CTU04
16CTU04S
16CTU04-1

Ultrafast Rectifier

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature

| |
|---------------------|
| $t_{rr} = 60ns$ |
| $I_{F(AV)} = 16Amp$ |
| $V_R = 400V$ |




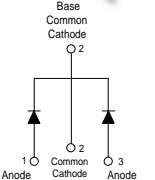
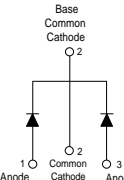
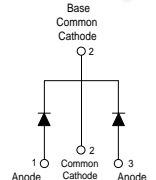
Description/ Applications

International Rectifier's FRED.. series are the state of the art Ultra fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time. The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics. These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as free-wheeling diode in low voltage inverters and chopper motor drives. Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

Absolute Maximum Ratings

| Parameters | Max | Units |
|--|---|------------|
| V_{RRM} Peak Repetitive Peak Reverse Voltage | 400 | V |
| $I_{F(AV)}$ Average Rectified Forward Current | Per Leg | 8 |
| | Total Device, (Rated V_R), $T_C = 155^\circ C$ | 16 |
| I_{FSM} Non Repetitive Peak Surge Current, $T_C = 25^\circ C$ | 100 | A |
| I_{FRM} Peak Repetitive Forward Current (Rated V_R , Square wave, 20KHz), $T_C = 155^\circ C$ | 16 | |
| T_J, T_{STG} Operating Junction and Storage Temperatures | - 65 to 175 | $^\circ C$ |

Case Styles

| 16CTU04 | 16CTU04S | 16CTU04-1 |
|--|---|--|
|  |  |  |
| <p>Base Common Cathode O 2</p>  <p>1 O Anode O 2 Common Cathode O 3 Anode</p> <p>TO-220AB</p> | <p>Base Common Cathode O 2</p>  <p>1 O Anode O 2 Common Cathode O 3 Anode</p> <p>D²PAK</p> | <p>Base Common Cathode O 2</p>  <p>1 O Anode O 2 Common Cathode O 3 Anode</p> <p>TO-262</p> |

Electrical Characteristics @ T_J = 25°C, Per Leg (unless otherwise specified)

| Parameters | Min | Typ | Max | Units | Test Conditions |
|--|-----|------|-----|-------|---|
| V _{BR} , V _r Breakdown Voltage, Blocking Voltage | 400 | - | - | V | I _R = 100μA |
| V _F Forward Voltage | - | 1.19 | 1.3 | V | I _F = 8A |
| | - | 0.94 | 1.0 | V | I _F = 8A, T _J = 150°C |
| I _R Reverse Leakage Current | - | 0.2 | 10 | μA | V _R = V _R Rated |
| | - | 20 | 500 | μA | T _J = 150°C, V _R = V _R Rated |
| C _T Junction Capacitance | - | 14 | - | pF | V _R = 400V |
| L _S Series Inductance | - | 8.0 | - | nH | Measured lead to lead 5mm from package body |

Dynamic Recovery Characteristics @ T_J = 25°C, Per Leg (unless otherwise specified)

| Parameters | Min | Typ | Max | Units | Test Conditions |
|---|-----|-----|-----|-------|---|
| t _{rr} Reverse Recovery Time | - | 35 | 60 | ns | I _F = 1.0A, di _F /dt = 50A/μA, V _R = 30V |
| | - | 43 | - | | T _J = 25°C |
| | - | 67 | - | | T _J = 125°C |
| I _{RRM} Peak Recovery Current | - | 2.8 | - | A | T _J = 25°C |
| | - | 6.3 | - | | T _J = 125°C |
| Q _{rr} Reverse Recovery Charge | - | 60 | - | nC | T _J = 25°C |
| | - | 210 | - | | T _J = 125°C |

I_F = 8A
V_R = 200V
di_F/dt = 200A/μs

Thermal - Mechanical Characteristics

| Parameters | Min | Typ | Max | Units |
|---|------|------|-----|--------|
| T _J Max. Junction Temperature Range | - | - | 175 | °C |
| T _{Stg} max. Storage Temperature Range | - 65 | - | 175 | |
| R _{thJC} Thermal Resistance, Junction to Case | - | 1.8 | 2 | °C/W |
| R _{thJA} ① Thermal Resistance, Junction to Ambient | - | - | 50 | |
| R _{thCS} ② Thermal Resistance, Case to Heatsink | - | 0.5 | - | |
| Wt Weight | - | 2.0 | - | g |
| | - | 0.07 | - | (oz) |
| Mounting Torque | 6.0 | - | 12 | Kg-cm |
| | 5.0 | - | 10 | lbf.in |

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

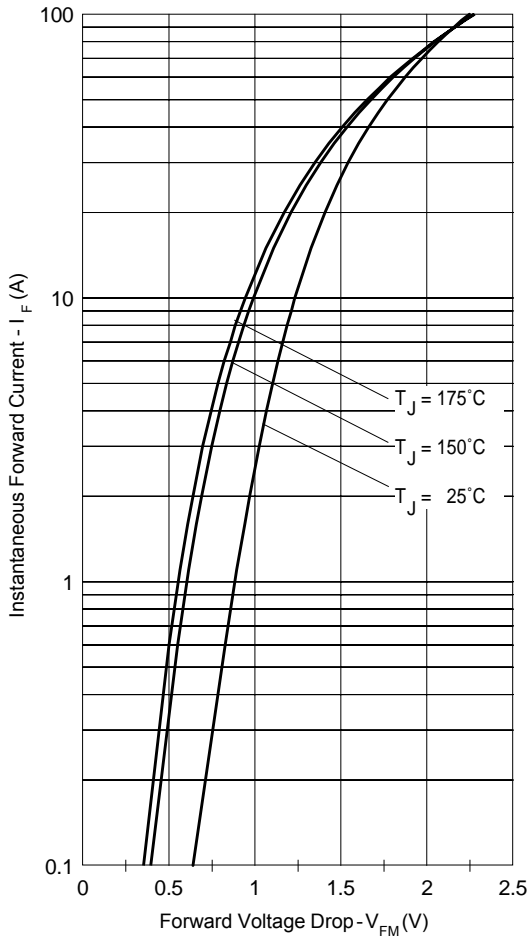


Fig. 1 - Typical Forward Voltage Drop Characteristics

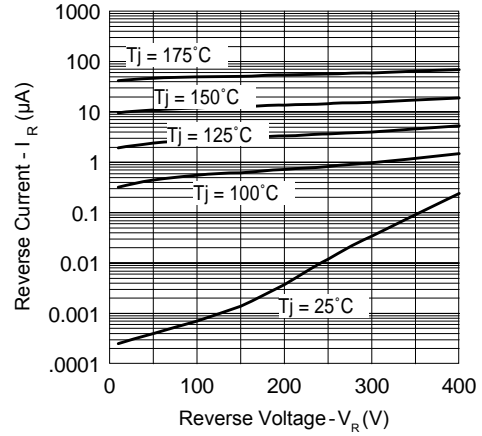


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

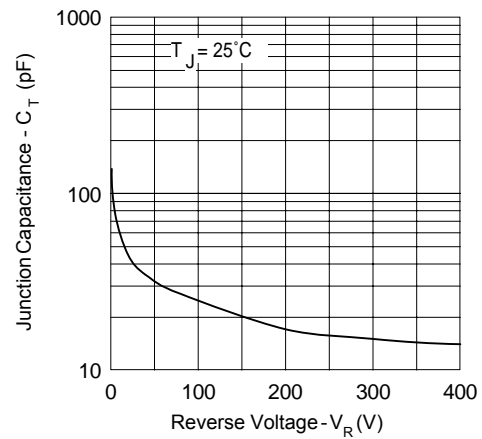


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

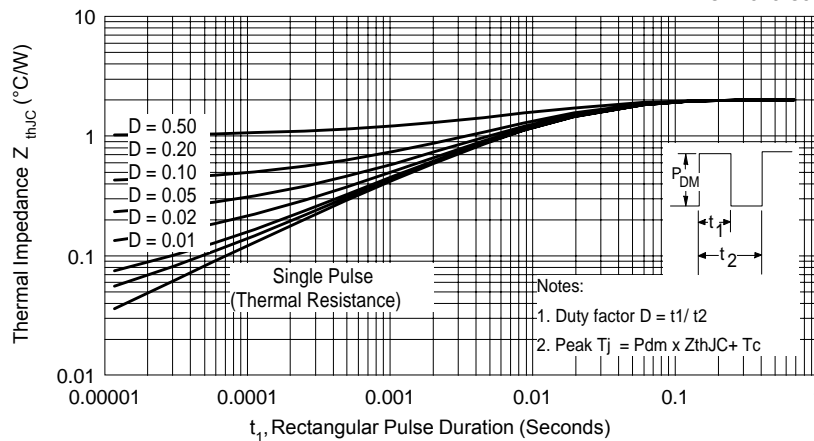


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

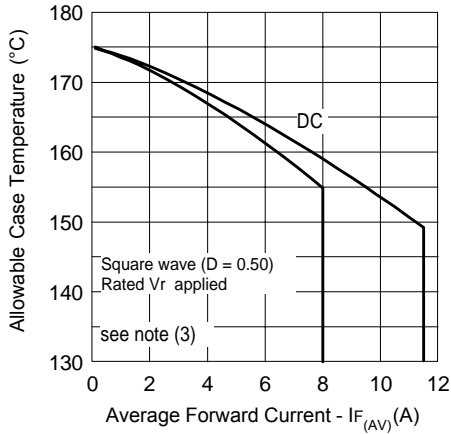


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

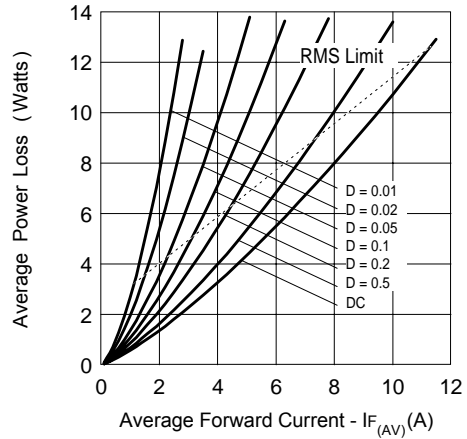


Fig. 6 - Forward Power Loss Characteristics

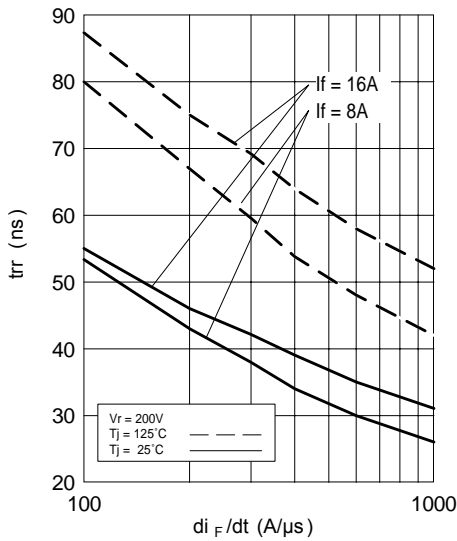


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

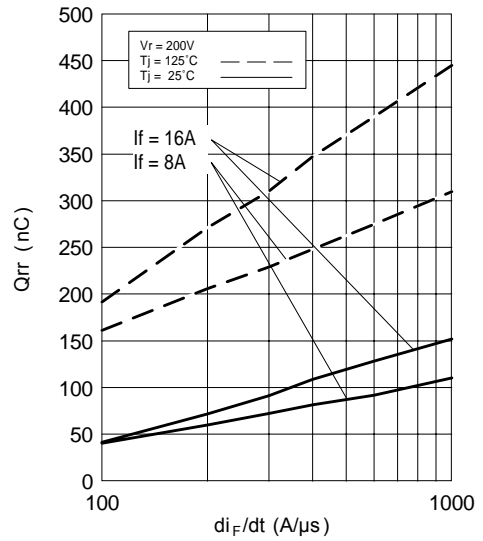


Fig. 8 - Typical Stored Charge vs. di_F/dt

(3) Formula used: $T_c = T_j - (Pd + Pd_{REV}) \times R_{thJC}$;

Pd = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)}/D)$ (see Fig. 6);

Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R (1-D)$; $I_R @ V_{R1}$ = rated V_R

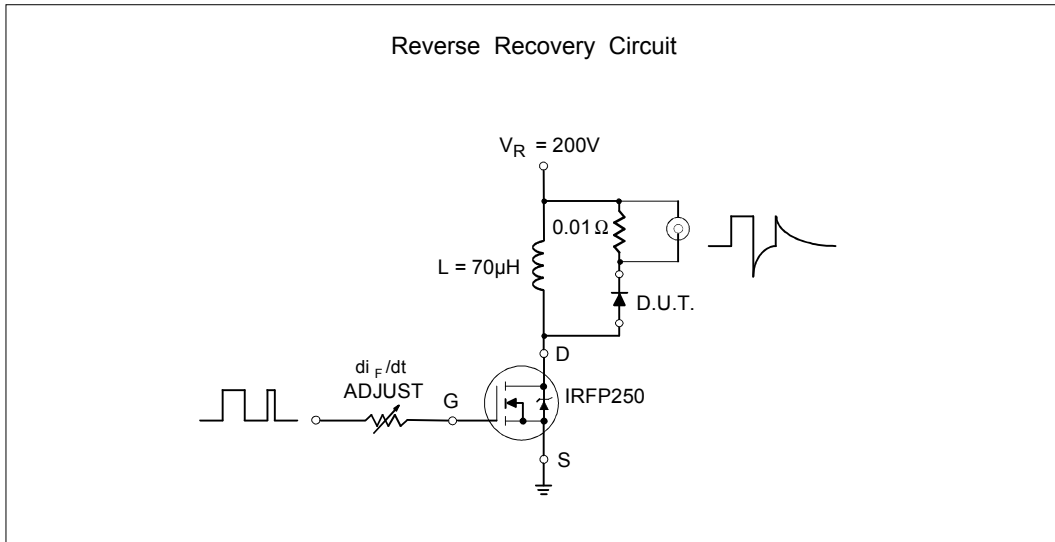


Fig. 9- Reverse Recovery Parameter Test Circuit

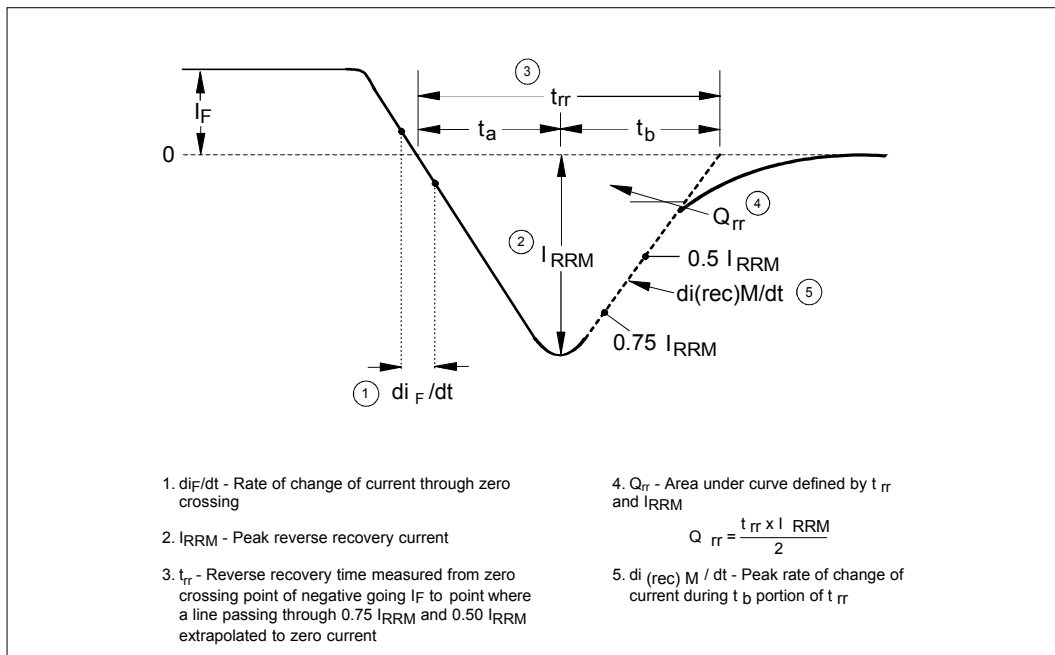
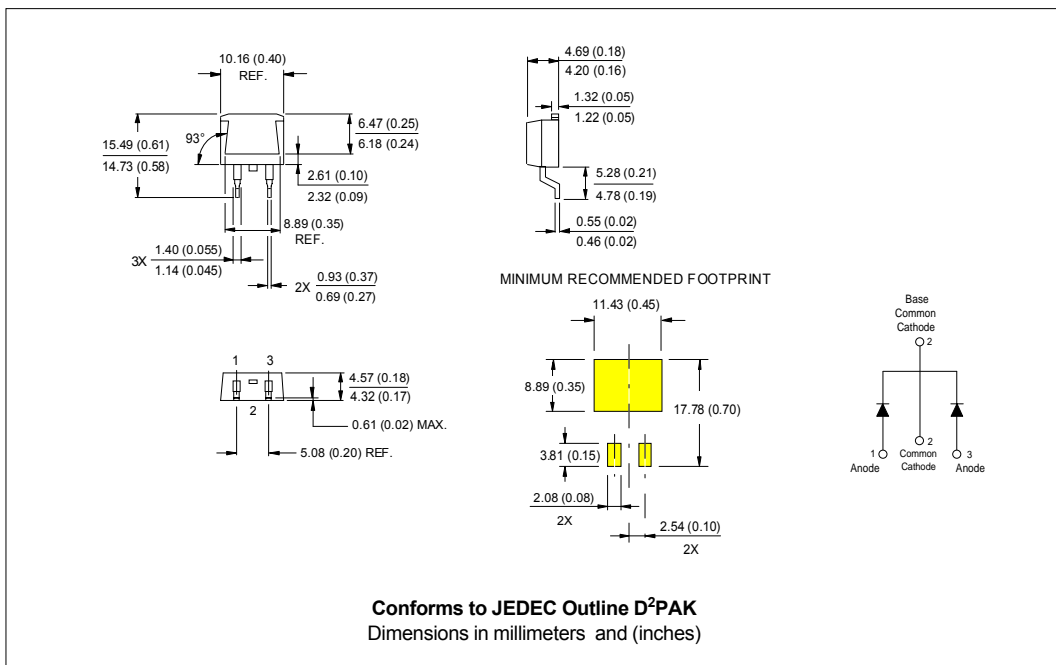
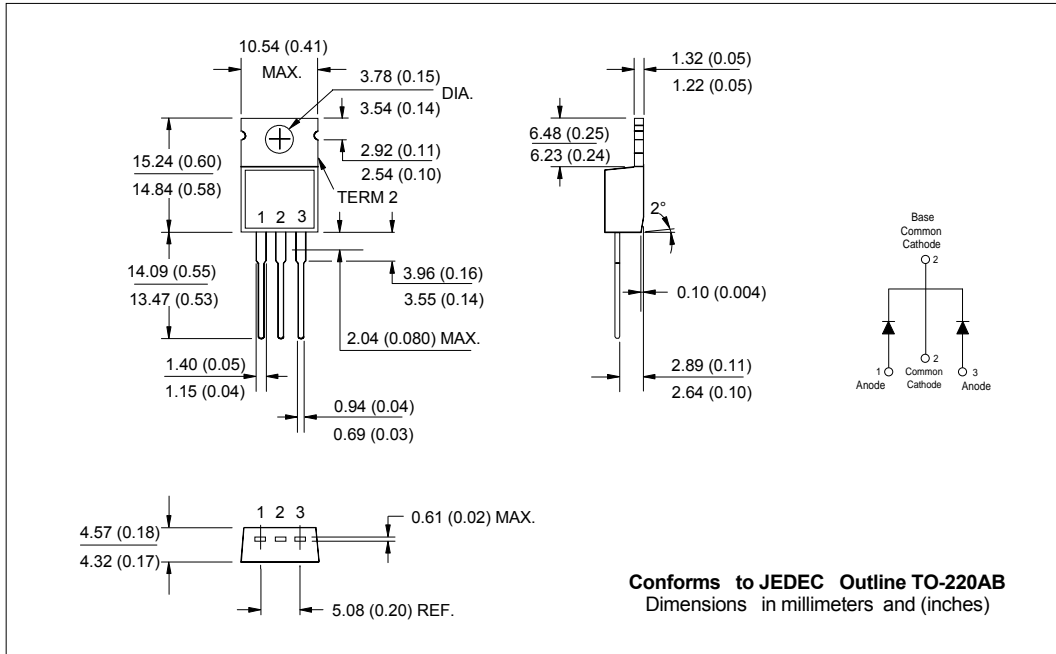
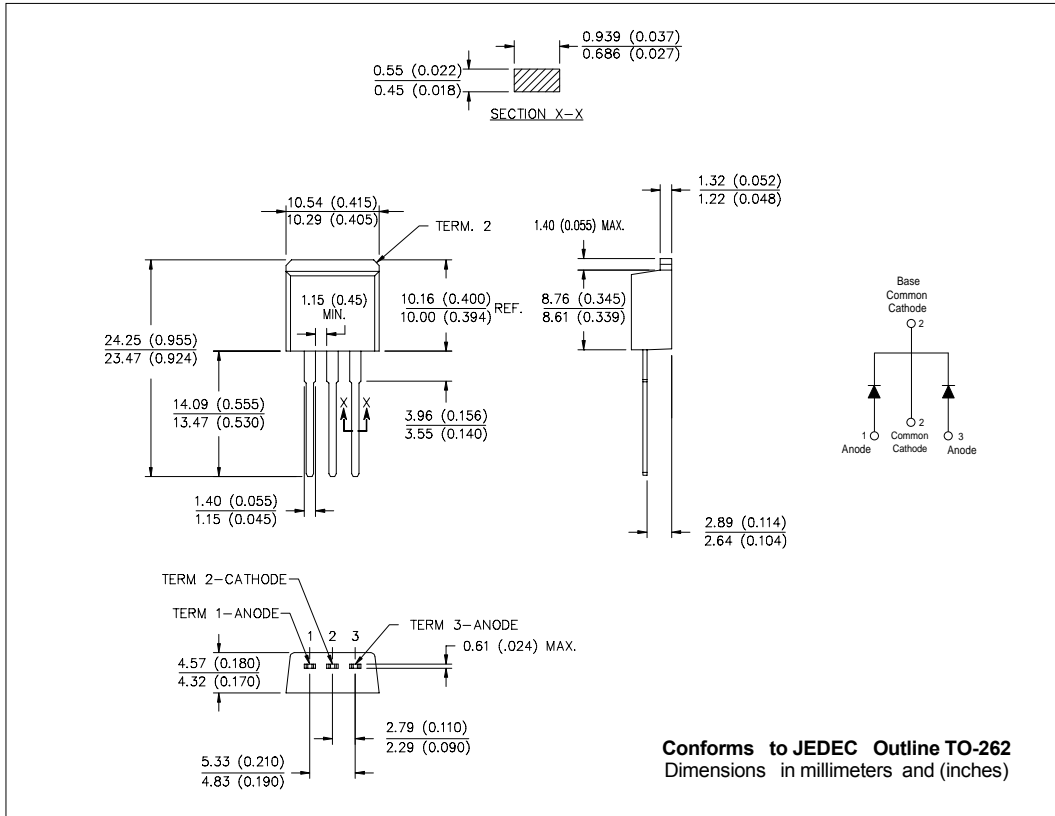


Fig. 10 - Reverse Recovery Waveform and Definitions

Outline Table



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Ordering Information Table

| Device Code | | | | | |
|-------------|---|---|---|----|-----|
| 16 | C | T | U | 04 | - 1 |
| ① | ② | ③ | ④ | ⑤ | ⑥ |
| 1 | - Current Rating (16 = 16A) | | | | |
| 2 | - Common Cathode | | | | |
| 3 | - TO-220/ D ² Pak | | | | |
| 4 | - Ultrafast Recovery | | | | |
| 5 | - Voltage Rating (04 = 400V) | | | | |
| 6 | - Suffix for SMD type -1: TO-262 Option S: TO-220 SMD (D ² Pak) | | | | |

16CTU04, 16CTU04S, 16CTU04-1

Bulletin PD-20752 rev. A 11/01

International
IR Rectifier

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

International
IR Rectifier

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