

Pb Free Plating Product

## 30CPU04



30Ampere,400Volt Dual Common Cathode Ultrafast Recovery Rectifier Diode

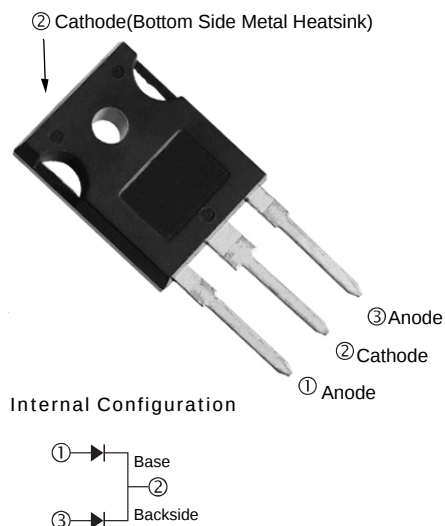
## APPLICATION

- Freewheeling, Snubber, Clamp
- Inversion Welder
- PFC
- Plating Power Supply
- Ultrasonic Cleaner and Welder
- Converter & Chopper
- UPS

## PRODUCT FEATURE

- Ultrafast Recovery Time
- Soft Recovery Characteristics
- Low Recovery Loss
- Low Forward Voltage
- High Surge Current Capability
- Low Leakage Current

TO-247AC/TO-247ADS-SQ



## GENERAL DESCRIPTION

30CPH04 using ThinkiSemi FRED FAB process(planar passivation pellet) with ultrafast and soft recovery characteristics.

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                   | SYMBOL            | TEST CONDITIONS                                                         | VALUES      | UNITS              |
|---------------------------------------------|-------------------|-------------------------------------------------------------------------|-------------|--------------------|
| Peak repetitive reverse voltage             | $V_{RRM}$         |                                                                         | 400         | V                  |
| Average rectified forward current           | $I_{F(AV)}$       |                                                                         | 15          | A                  |
| per leg                                     |                   |                                                                         |             |                    |
| total device                                |                   | Rated $V_R$ , $T_C = 149\text{ }^{\circ}\text{C}$                       | 30          |                    |
| Non-repetitive peak surge current per leg   | $I_{FSM}$         | $T_C = 25\text{ }^{\circ}\text{C}$ , $t_p = 10\text{ ms}$               | 200         |                    |
| Peak repetitive forward current per leg     | $I_{FRM}$         | Rated $V_R$ , $T_C = 149\text{ }^{\circ}\text{C}$ , square wave, 20 kHz | 30          |                    |
| Operating junction and storage temperatures | $T_J$ , $T_{Stg}$ |                                                                         | -65 to +175 | $^{\circ}\text{C}$ |

ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

| PARAMETER                           | SYMBOL           | TEST CONDITIONS                                           | MIN. | TYP. | MAX. | UNITS         |
|-------------------------------------|------------------|-----------------------------------------------------------|------|------|------|---------------|
| Breakdown voltage, blocking voltage | $V_{BR}$ , $V_R$ | $I_R = 100\text{ }\mu\text{A}$                            | 400  | -    | -    | V             |
| Forward voltage                     | $V_F$            | $I_F = 15\text{ A}$                                       | -    | 1.17 | 1.25 |               |
|                                     |                  | $I_F = 15\text{ A}$ , $T_J = 150\text{ }^{\circ}\text{C}$ | -    | 0.93 | 1.12 |               |
| Reverse leakage current             | $I_R$            | $V_R = V_R$ rated                                         | -    | 0.3  | 10   | $\mu\text{A}$ |
|                                     |                  | $T_J = 150\text{ }^{\circ}\text{C}$ , $V_R = V_R$ rated   | -    | 30   | 500  |               |
| Junction capacitance                | $C_T$            | $V_R = 400\text{ V}$                                      | -    | 28   | -    | pF            |
| Series inductance                   | $L_S$            | Measured lead to lead 5 mm from package body              | -    | 12   | -    | nH            |

| DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified) |                  |                                                                            |                                                                                   |      |      |      |       |
|--------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|-------|
| PARAMETER                                                                            | SYMBOL           | TEST CONDITIONS                                                            |                                                                                   | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time                                                                | t <sub>rr</sub>  | I <sub>F</sub> = 1 A, dI <sub>F</sub> /dt = 50 A/μs, V <sub>R</sub> = 30 V |                                                                                   | -    | 36   | 60   | ns    |
|                                                                                      |                  | T <sub>J</sub> = 25 °C                                                     | I <sub>F</sub> = 15 A<br>dI <sub>F</sub> /dt = 200 A/μs<br>V <sub>R</sub> = 200 V | -    | 46   | -    |       |
|                                                                                      |                  | T <sub>J</sub> = 125 °C                                                    |                                                                                   | -    | 80   | -    |       |
| Peak recovery current                                                                | I <sub>RRM</sub> | T <sub>J</sub> = 25 °C                                                     |                                                                                   | -    | 3.6  | -    | A     |
|                                                                                      |                  | T <sub>J</sub> = 125 °C                                                    |                                                                                   | -    | 8.7  | -    |       |
| Reverse recovery charge                                                              | Q <sub>rr</sub>  | T <sub>J</sub> = 25 °C                                                     |                                                                                   | -    | 84   | -    | nC    |
|                                                                                      |                  | T <sub>J</sub> = 125 °C                                                    |                                                                                   | -    | 345  | -    |       |

| THERMAL - MECHANICAL SPECIFICATIONS             |                                   |                                            |              |      |            |                        |
|-------------------------------------------------|-----------------------------------|--------------------------------------------|--------------|------|------------|------------------------|
| PARAMETER                                       | SYMBOL                            | TEST CONDITIONS                            | MIN.         | TYP. | MAX.       | UNITS                  |
| Maximum junction and storage temperature range  | T <sub>J</sub> , T <sub>Stg</sub> |                                            | -65          | -    | 175        | °C                     |
| Thermal resistance, junction to case per leg    | R <sub>thJC</sub>                 |                                            | -            | 0.8  | 1.5        | °C/W                   |
| Thermal resistance, junction to ambient per leg | R <sub>thJA</sub>                 | Typical socket mount                       | -            | -    | 40         |                        |
| Thermal resistance, case to heatsink            | R <sub>thCS</sub>                 | Mounting surface, flat, smooth and greased | -            | 0.4  | -          |                        |
| Weight                                          |                                   |                                            | -            | 6.0  | -          | g                      |
|                                                 |                                   |                                            | -            | 0.21 | -          | oz.                    |
| Mounting torque                                 |                                   |                                            | 6.0<br>(5.0) | -    | 12<br>(10) | kgf · cm<br>(lbf · in) |
| Marking device                                  |                                   | Case style TO-247AC/TO-247ADS-SQ           | 30CPU04      |      |            |                        |

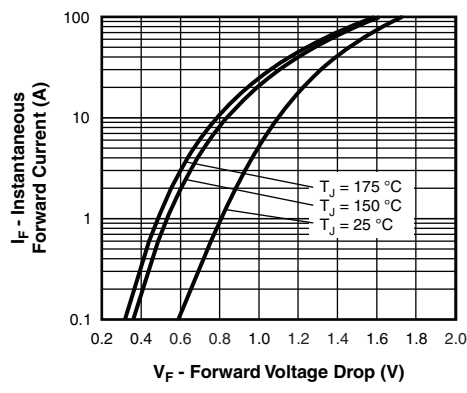


Fig. 1 - Typical Forward Voltage Drop Characteristics

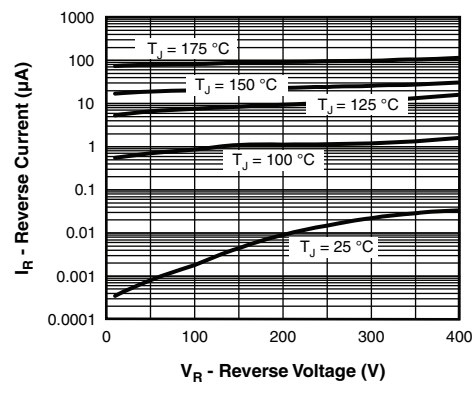


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

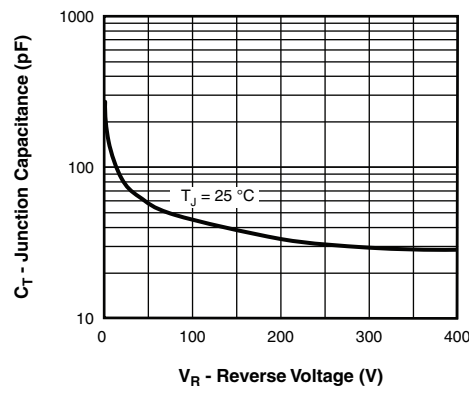


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

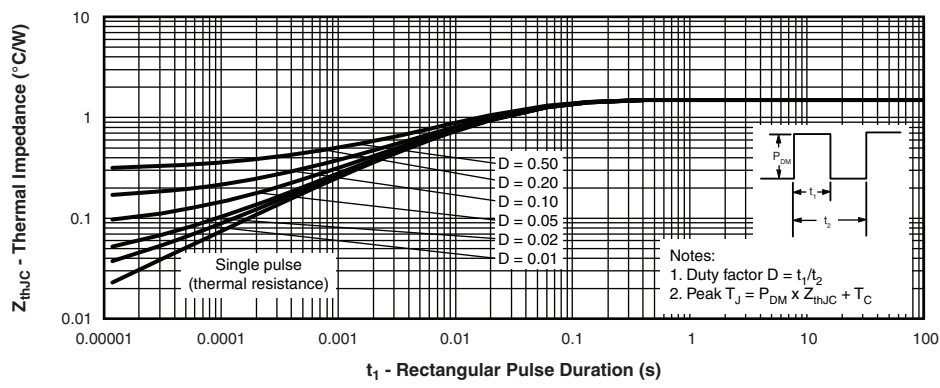


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

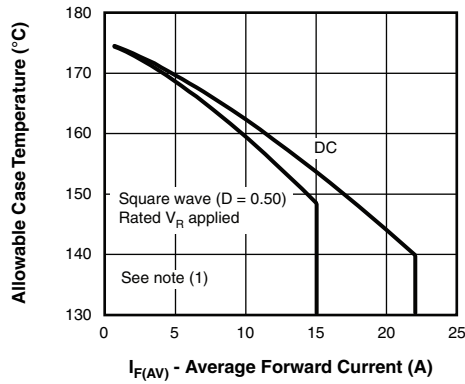


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

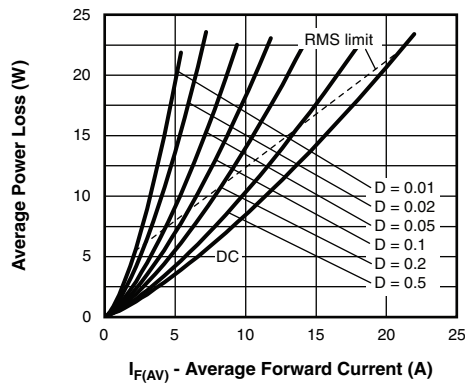


Fig. 6 - Forward Power Loss Characteristics

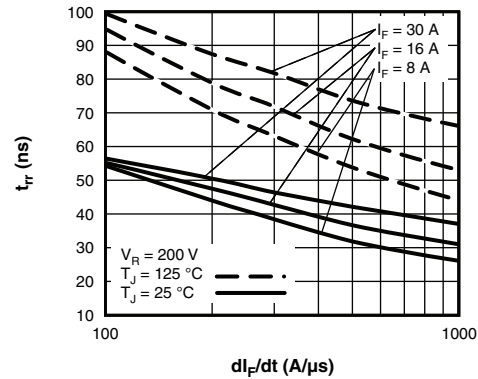


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

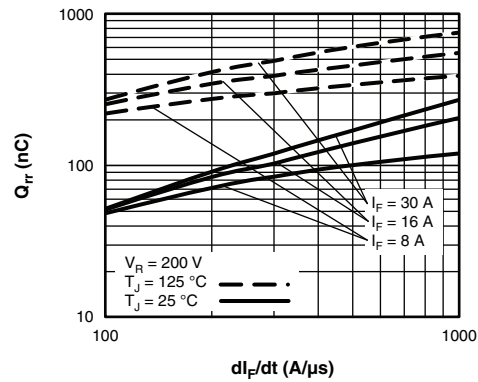


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

#### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$

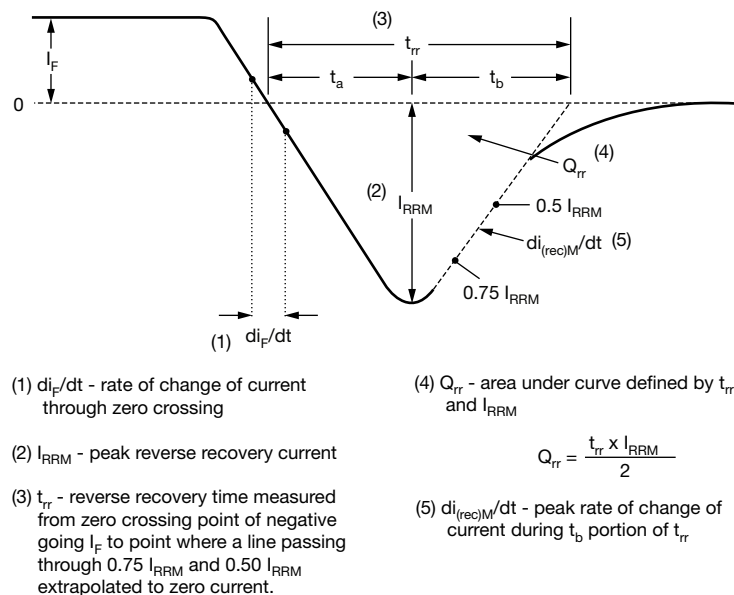
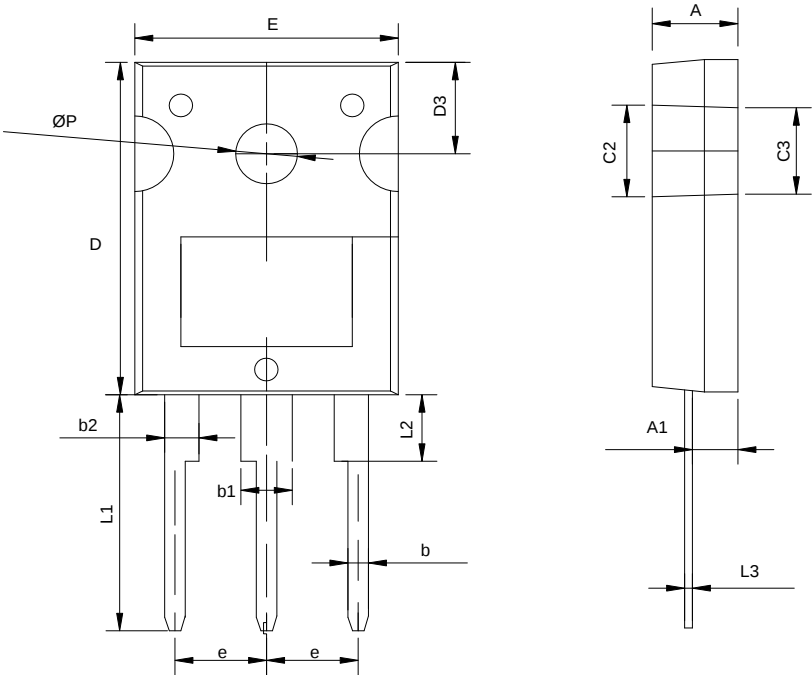


Fig. 9 - Reverse Recovery Waveform and Definitions

THINKI TO-247AC/TO-247ADS-SQ package outline



| SYMBOL | MILLIMETER |       |       |
|--------|------------|-------|-------|
|        | MIN        | NOM   | MAX   |
| A      | 4.80       | 5.00  | 5.20  |
| A1     | 2.30       | 2.50  | 2.70  |
| b      | 1.10       | 1.20  | 1.30  |
| b1     | 2.90       | 3.10  | 3.30  |
| b2     | 1.90       | 2.10  | 2.30  |
| c2     | 5.50       | 6.00  | 6.50  |
| c3     | 4.95       | 5.10  | 5.25  |
| D      | 19.00      | 20.00 | 21.00 |
| D3     | 5.30       | 5.50  | 5.70  |
| e      | 5.34       | 5.44  | 5.54  |
| E      | 15.40      | 15.60 | 15.80 |
| L1     | 14.40      | 14.60 | 14.80 |
| L2     | 3.85       | 4.00  | 4.15  |
| L3     | 0.35       | 0.50  | 0.65  |
| ØP     | 3.40       | 3.60  | 3.80  |