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## HIGH EFFICIENCY FAST RECOVERY DIODES

## MAIN PRODUCT CHARACTERISTICS

| $\mathbf{I}_{\mathbf{F}(\mathrm{AV})}$ | 30 A |
| :---: | :---: |
| $\mathrm{~V}_{\mathrm{RRM}}$ | 400 V |
| trr | 50 ns |
| $\mathrm{~V}_{\mathrm{F}}$ | 1.4 V |

## FEATURES AND BENEFITS

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- SMD PACKAGE


## DESCRIPTION

Single rectifier suited for freewheeling in converters and motor control circuits.
Packaged in $D^{2}$ PAK, this surface mount device is intended for use in high frequency inverters, free wheeling and polarity protection applications.


## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter |  | Value | Unit |
| :---: | :---: | :---: | :---: | :---: |
| VRRM | Repetitive peak reverse voltage |  | 400 | V |
| $\mathrm{I}_{\text {F (RMS }}$ | RMS forward current |  | 50 | A |
| $\mathrm{I}_{\mathrm{F}(\mathrm{AV})}$ | Average forward current | $\begin{aligned} & \mathrm{TC}=100^{\circ} \mathrm{C} \\ & \delta=0.5 \end{aligned}$ | 30 | A |
| IFSM | Surge non repetitive forward current | $\mathrm{tp}=10 \mathrm{~ms}$ sinusoidal | 350 | A |
| IFRM | Repetitive peak forward current | $\begin{aligned} & \mathrm{tp}=5 \mu \mathrm{~s} \\ & \mathrm{f}=5 \mathrm{kHz} \end{aligned}$ | 280 | A |
| Tstg Tj | Storage and junction temperature range |  | -40 to +150 | ${ }^{\circ} \mathrm{C}$ |

THERMAL RESISTANCE

| Symbol | Parameter | Value | Unit |
| :---: | :--- | :---: | :---: | :---: |
| Rth (j-c) | Junction to case | 1 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |

STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{I}_{\mathrm{R}}$ * | Reverse leakage current | $\mathrm{V}_{\mathrm{R}}=\mathrm{V}_{\text {RRM }}$ | $\mathrm{T}_{\mathrm{j}}=25^{\circ} \mathrm{C}$ |  |  | 35 | $\mu \mathrm{A}$ |
|  |  |  | $\mathrm{T}_{\mathrm{j}}=100^{\circ} \mathrm{C}$ |  |  | 6 | mA |
| $\mathrm{V}_{\mathrm{F}}$ ** | Forward voltage drop | $\mathrm{IF}=30 \mathrm{~A}$ | $\mathrm{T}_{\mathrm{j}}=100^{\circ} \mathrm{C}$ |  |  | 1.4 | V |
|  |  | $\mathrm{I}_{\mathrm{F}}=30 \mathrm{~A}$ | $\mathrm{T}_{\mathrm{j}}=25^{\circ} \mathrm{C}$ |  |  | 1.5 |  |

Pulse test: *tp $=5 \mathrm{~ms}, \delta<2 \%$
** $\mathrm{tp}=380 \mu \mathrm{~s}, \delta<2 \%$
To evaluate the conduction losses use the following equation :
$\mathrm{P}=1.1 \times \mathrm{I}_{\mathrm{F}(\mathrm{AV})}+0.0095 \mathrm{I}_{\mathrm{F}}{ }^{2}(\mathrm{RMS})$

## RECOVERY CHARACTERISTICS

| Symbol | Parameter | Test Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| trr | Reverse recovery time | $\begin{aligned} & \mathrm{T}_{\mathrm{j}}=25^{\circ} \mathrm{C} \\ & \mathrm{Irr}=0.25 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \mathrm{I}_{F}=0.5 \mathrm{~A} \\ & \mathrm{I}_{\mathrm{R}}=1 \mathrm{~A} \end{aligned}$ |  |  | 50 | ns |
|  |  | $\begin{aligned} & \mathrm{T}_{j}=25^{\circ} \mathrm{C} \\ & \mathrm{dl}_{\mathrm{F}} / \mathrm{dt}=-15 \mathrm{~A} / \mu \mathrm{s} \end{aligned}$ | $\begin{aligned} & I_{F}=1 \mathrm{~A} \\ & \mathrm{~V}_{\mathrm{R}}=30 \mathrm{~V} \end{aligned}$ |  |  | 100 |  |

TURN-OFF SWITCHING CHARACTERISTICS

| Symbol | Parameter | Test Conditions |  | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| tIRM | Maximum reverse recovery time | $\begin{aligned} & T_{j}=100^{\circ} \mathrm{C} \\ & I_{F}=30 \mathrm{~A} \\ & V_{C C}=200 \mathrm{~V} \\ & L p<0.05 \mu \mathrm{H} \end{aligned}$ | $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}=-120 \mathrm{~A} / \mu \mathrm{s}$ |  |  | 75 | ns |
|  |  |  | $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}=-240 \mathrm{~A} / \mu \mathrm{s}$ |  | 50 |  |  |
| IRM | Maximum reverse recovery current |  | $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}=-120 \mathrm{~A} / \mu \mathrm{s}$ |  |  | 9 | ns |
|  |  |  | $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}=-240 \mathrm{~A} / \mu \mathrm{s}$ |  | 12 |  |  |
| C factor | Turn-off overvoltage coefficient | $\begin{aligned} & \mathrm{T}_{\mathrm{j}}=100^{\circ} \mathrm{C} \\ & \mathrm{~V}_{\mathrm{CC}}=60 \mathrm{~V} \\ & \mathrm{dl}_{\mathrm{F}} / \mathrm{dt}=-30 \mathrm{~A} \end{aligned}$ | $\begin{aligned} \mathrm{I}_{\mathrm{F}} & =\mathrm{I}_{\mathrm{F}(\mathrm{AV})} \\ \mathrm{Lp} & =1 \mu \mathrm{H} \end{aligned}$ |  | 3.3 |  | / |

PIN OUT configuration in $D^{2}$ PAK:


Fig. 1 : Average forward power dissipation versus average forward current.


Fig. 3 : Forward voltage drop versus forward current (maximum values).


Fig. 5 : Non repetitive surge peak forward current versus overload duration.


Fig. 2 : Peak current versus form factor.


Fig. 4 : Relative variation of thermal impedance junction to case versus pulse duration.


Fig. 6 : Average current versus ambient temperature. ( $\delta: 0.5$ )


Fig. 7 : Reverse recovery charge versus $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}$.


Fig. 9 : Peak reverse current versus $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}$.


Fig.11: Dynamic parameters versus junction temperature.


Fig. 8 : Forward recovery times versus $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}$.


Fig. 10 : Peak forward voltage versus $\mathrm{dl}_{\mathrm{F}} / \mathrm{dt}$.


PACKAGE MECHANICAL DATA
$\mathrm{D}^{2}$ PAK (Plastic)

|  | REF. | DIMENSIONS |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Millimeters |  | Inches |  |
|  |  | Min. | Max. | Min. | Max. |
|  | A | 4.40 | 4.60 | 0.173 | 0.181 |
|  | A1 | 2.49 | 2.69 | 0.098 | 0.106 |
|  | A2 | 0.03 | 0.23 | 0.001 | 0.009 |
|  | B | 0.70 | 0.93 | 0.027 | 0.037 |
|  | B2 | 1.14 | 1.70 | 0.045 | 0.067 |
|  | C | 0.45 | 0.60 | 0.017 | 0.024 |
|  | C2 | 1.23 | 1.36 | 0.048 | 0.054 |
|  | D | 8.95 | 9.35 | 0.352 | 0.368 |
|  | E | 10.00 | 10.40 | 0.393 | 0.409 |
|  | G | 4.88 | 5.28 | 0.192 | 0.208 |
|  | L | 15.00 | 15.85 | 0.590 | 0.624 |
|  | L2 | 1.27 | 1.40 | 0.050 | 0.055 |
|  | L3 | 1.40 | 1.75 | 0.055 | 0.069 |
|  | M | 2.40 | 3.20 | 0.094 | 0.126 |
|  | R |  | yp. | 0.0 | typ. |
|  | V2 | $0^{\circ}$ | $8^{\circ}$ | $0^{\circ}$ | $8^{\circ}$ |

FOOT PRINT (in millimeters)


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