# FlipKY®, 1 A

FlipKY®

## FEATURES

- Ultralow $V_F$ per footprint area
- Low thermal resistance
- One-fifth footprint of SMA
- Super low profile (< 0.7 mm)
- Available tested on tape and reel
- Small footprint, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Designed for consumer level

## DESCRIPTION

True chip-scale packaging is available from Vishay HPP. The FCSP140ETR surface mount Schottky rectifier has been designed for applications requiring low forward drop and very small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

The FlipKY® package is one-fifth the footprint of a comparable SMA package and has a profile of less than 0.7 mm. Combined with the low thermal resistance of the die level device, this makes the FlipKY the best device for applications where printed circuit board space is at a premium and in extremely thin application environments such as battery packs, cell phones and PCMCIA cards.

| PRODUCT SUMMARY | |
|---|---|
| $I_{F(AV)}$ | 1 A |
| $V_R$ | 40 V |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform | 1.0 | A |
| $V_{RRM}$ | | 40 | V |
| $I_{FSM}$ | $t_p$ = 5 µs sine | 250 | A |
| $V_F$ | 1.0 Apk, $T_J$ = 125 °C | 0.38 | V |
| $T_J$ | Range | - 55 to 150 | °C |

| VOLTAGE RATINGS | | | |
|---|---|---|---|
| PARAMETER | SYMBOL | FCSP140ETR | UNITS |
| Maximum DC reverse voltage | $V_R$ | 40 | V |
| Maximum working peak reverse voltage | $V_{RWM}$ | | |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
|---|---|---|---|---|---|
| Maximum average forward current | $I_{F(AV)}$ | 50 % duty cycle at $T_{PCB}$ = 112 °C, rectangular waveform | | 1.0 | A |
| Maximum peak one cycle non-repetitive surge current at 25 °C | $I_{FSM}$ | 5 µs sine or 3 µs rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 250 | |
| | | 10 ms sine or 6 ms rect. pulse | | 21 | |
| Non-repetitive avalanche energy | $E_{AS}$ | $T_J$ = 25 °C, $I_{AS}$ = 2.0 A, L = 5.0 mH | | 10 | mJ |
| Repetitive avalanche current | $I_{AR}$ | Current decaying linearly to zero in 1 µs<br>Frequency limited by $T_J$ maximum $V_A$ = 1.5 x $V_R$ typical | | 2.0 | A |

## ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Maximum forward voltage drop See fig. 1 | $V_{FM}$ (1) | 1 A | $T_J$ = 25 °C | 0.43 | 0.48 | V |
| | | 2 A | | 0.51 | 0.56 | |
| | | 1 A | $T_J$ = 125 °C | 0.34 | 0.38 | |
| | | 2 A | | 0.46 | 0.53 | |
| Maximum reverse leakage current See fig. 2 | $I_{RM}$ (1) | $V_R$ = Rated $V_R$ | $T_J$ = 25 °C | 10 | 80 | µA |
| | | $V_R$ = 20 V | | 3.5 | 20 | |
| | | $V_R$ = 10 V | | 2 | 10 | |
| | | $V_R$ = 5 V | | 1.5 | 5 | |
| | | $V_R$ = Rated $V_R$ | $T_J$ = 125 °C | 9.0 | 20 | mA |
| | | $V_R$ = 20 V | | 3.5 | 8 | |
| | | $V_R$ = 10 V | | 2.5 | 6 | |
| | | $V_R$ = 5 V | | 2 | 5 | |
| Maximum junction capacitance | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C | | - | 160 | pF |
| Maximum voltage rate of charge | dV/dt | Rated $V_R$ | | - | 10 000 | V/µs |

**Note**

(1) Pulse width < 300 µs, duty cycle < 2 %

## THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|
| Maximum junction and storage temperature range | $T_J$ (1), $T_{Stg}$ | | - 55 to 150 | °C |
| Typical thermal resistance junction to PCB | $R_{thJL}$ (2) | DC operation | 40 | °C/W |
| Typical thermal resistance junction to ambient | $R_{thJA}$ | | 62 | |

**Notes**

(1) $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$ thermal runaway condition for a diode on its own heatsink

(2) Mounted on 1" square PCB

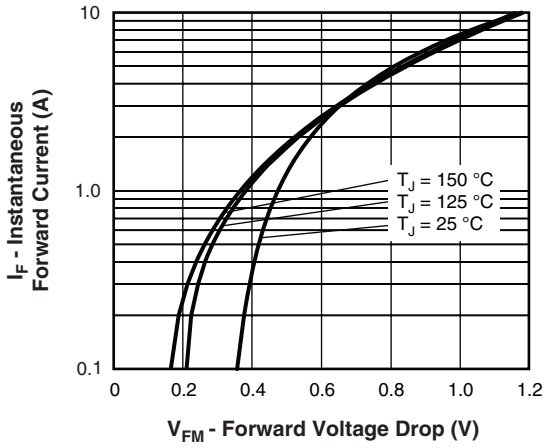


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

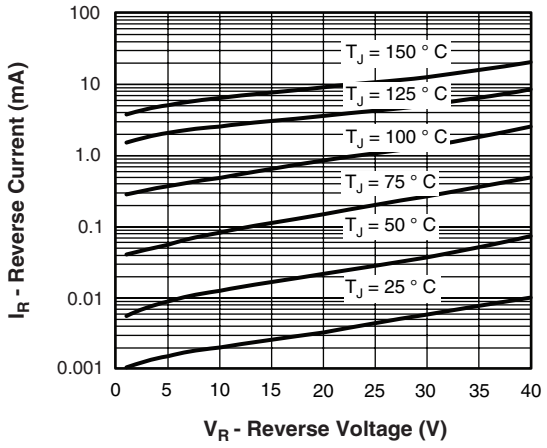


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

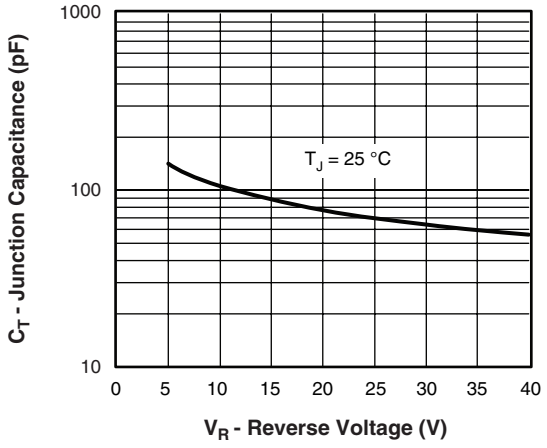


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

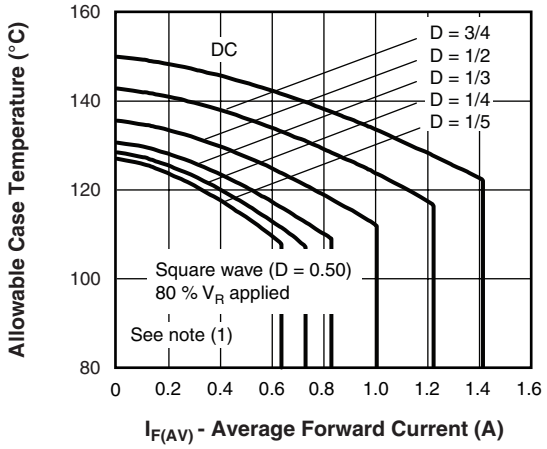


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

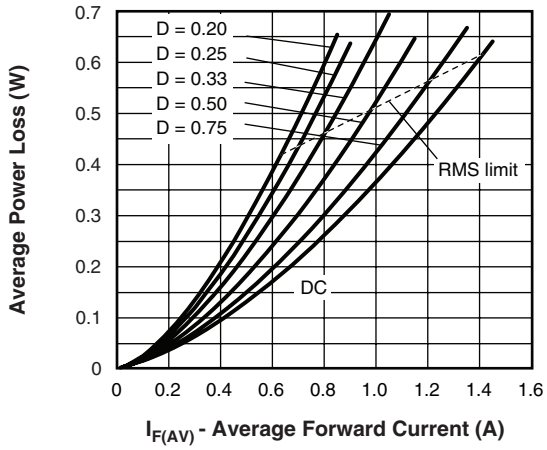


Fig. 5 - Forward Power Loss Characteristics (Per Leg)

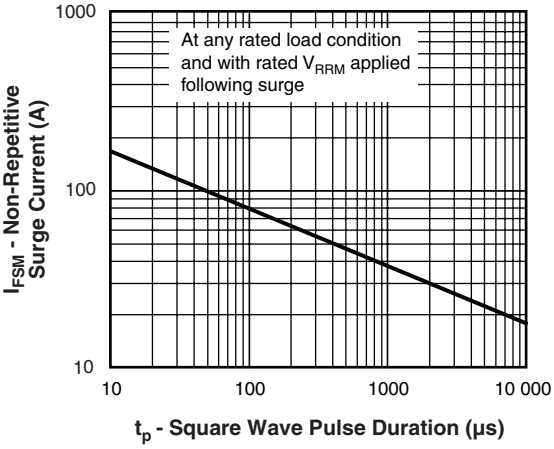


Fig. 6 - Maximum Non-Repetitive Surge Current (Per Leg)

**Note**

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6); $Pd_{REV}$ = Inverse power loss = $V_{R1} \times I_R$ (1 - D); $I_R$ at 80 % $V_R$ applied

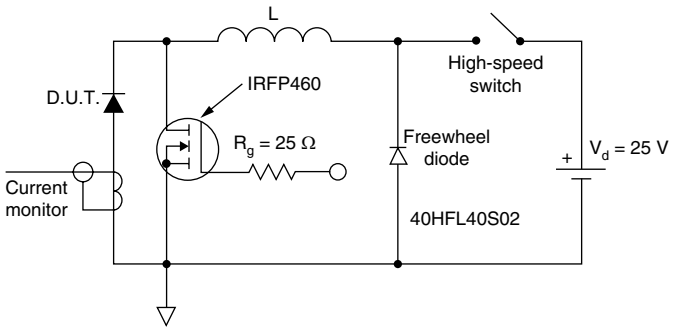


Fig. 7 - Unclamped Inductive Test Circuit

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | http://www.vishay.com/doc?95359 |
| Part marking information | http://www.vishay.com/doc?95281 |
| Packaging information | http://www.vishay.com/doc?95062 |

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