

FlipKY[®], Chip Scale Package Schottky Barrier Rectifier, 0.5 A


 FlipKY[®]
FEATURES

- Ultra low V_F to footprint area
- Very low profile (< 0.6 mm)
- Low thermal resistance
- Supplied tested and on tape and reel
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

APPLICATIONS

- Reverse polarity protection
- Current steering
- Freewheeling
- Flyback
- Oring

DESCRIPTION

Vishay's FlipKY[®] product family utilizes wafer level chip scale packaging to deliver Schottky diodes with the lowest V_F to PCB footprint area in industry. The three pad 0.9 mm x 1.2 mm devices can deliver up to 0.5 A and occupy only 1.08 mm² of board space. The anode and cathode connections are made through solder bump pads on one side of the silicon enabling designers to strategically place the diodes on the PCB. This design not only minimizes board space but also reduces thermal resistance and inductance, which can improve overall circuit efficiency.

Typical applications include hand-held, portable equipment such as cell phones, MP3 players, bluetooth, GPS, PDAs, and portable hard disk drives where space savings and performance are crucial.

| PRODUCT SUMMARY | |
|-------------------------|------------|
| $I_{F(AV)}$ | 0.5 A |
| V_R | 40 V |
| V_F at I_F | 0.42 V |
| I_{RM} max. at 25 °C | 10 μ A |
| I_{RM} max. at 125 °C | 2 mA |
| T_J max. | 150 °C |
| E_{AS} | 5 mJ |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|-------------------------------|-------------|-------|
| SYMBOL | CHARACTERISTICS | MAX. | UNITS |
| V_{RRM} | | 40 | V |
| $I_{F(AV)}$ | Rectangular waveform | 0.5 | A |
| I_{FSM} | | 190 | |
| V_F | 0.5 A_{pk} , $T_J = 125$ °C | 0.42 | V |
| T_J | | - 55 to 150 | °C |

| VOLTAGE RATINGS | | | |
|--------------------------------------|-----------|----------------|-------|
| PARAMETER | SYMBOL | VS-FCSP05H40TR | 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 $T_{PCB} = 114\text{ °C}$, rectangular waveform | | 0.5 | A |
| Maximum peak one cycle non-repetitive surge current at 25 °C | I_{FSM} | 5 μ s sine or 3 μ s rect. pulse | Following any rated load condition and with rated V_{RRM} applied | 190 | |
| | | 10 ms sine or 6 ms rect. pulse | | 10 | |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25\text{ °C}$, $I_{AS} = 2.0\text{ A}$, $L = 5.0\text{ mH}$ | | 5 | mJ |
| Repetitive avalanche current | I_{AR} | Current decaying linearly to zero in 1 μ s Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | | 0.5 | A |

| ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified) | | | | | | |
|--|----------------|---|---------------------------|-------|--------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | TYP. | MAX. | UNITS |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 0.5 A | $T_J = 25\text{ °C}$ | 0.48 | 0.52 | V |
| | | 1 A | | 0.54 | 0.58 | |
| | | 0.5 A | $T_J = 125\text{ °C}$ | 0.38 | 0.42 | |
| | | 1 A | | 0.46 | 0.50 | |
| Maximum reverse leakage current See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ °C}$ | $V_R = \text{Rated } V_R$ | 1 | 10 | μ A |
| | | | $V_R = 20\text{ V}$ | 0.2 | 0.5 | |
| | | | $V_R = 10\text{ V}$ | 0.08 | 0.25 | |
| | | | $V_R = 5\text{ V}$ | 0.05 | 0.15 | |
| | | $T_J = 125\text{ °C}$ | $V_R = \text{Rated } V_R$ | 0.5 | 2 | mA |
| | | | $V_R = 20\text{ V}$ | 0.2 | 1 | |
| | | | $V_R = 10\text{ V}$ | 0.15 | 0.8 | |
| | | | $V_R = 5\text{ V}$ | 0.125 | 0.5 | |
| Maximum junction capacitance | C_T | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), 25 °C | | - | 90 | pF |
| Maximum voltage rate of charge | dV/dt | Rated V_R | | - | 10 000 | V/ μ s |

Note(1) Pulse width < 300 μ s, 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 | | 35 | °C/W |
| Maximum thermal resistance, junction to ambient | R_{thJA} | | | 150 | |

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

(2) Mounted on minimum footprint PCB

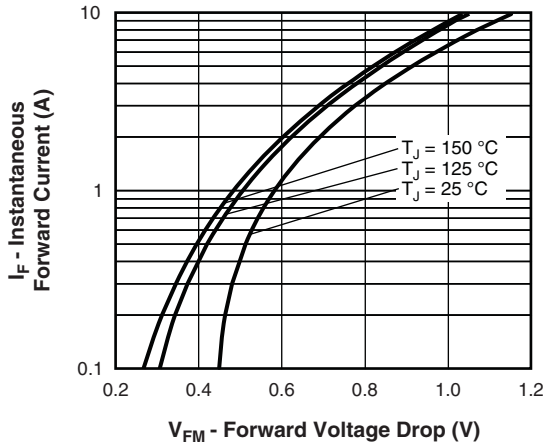


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

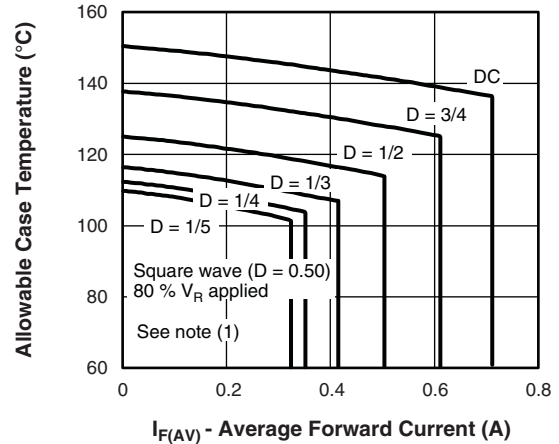


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

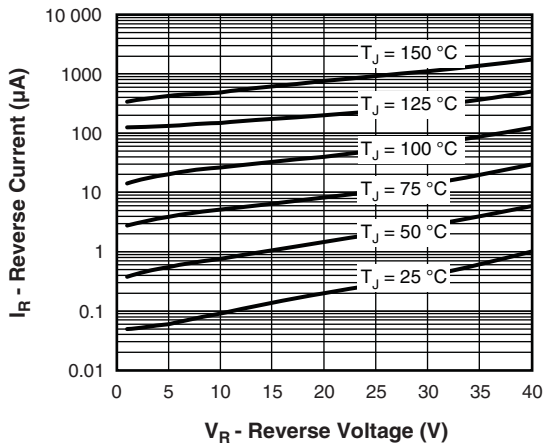


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

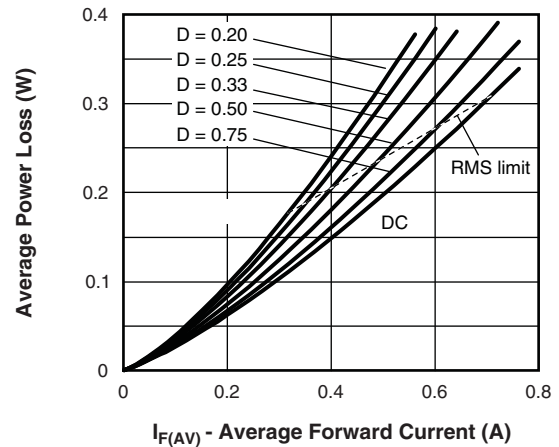


Fig. 5 - Forward Power Loss Characteristics (Per Leg)

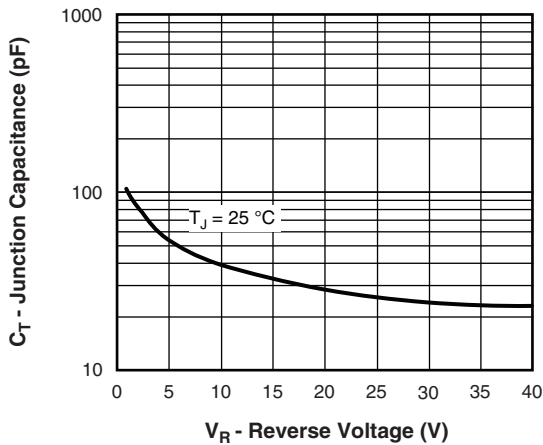


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

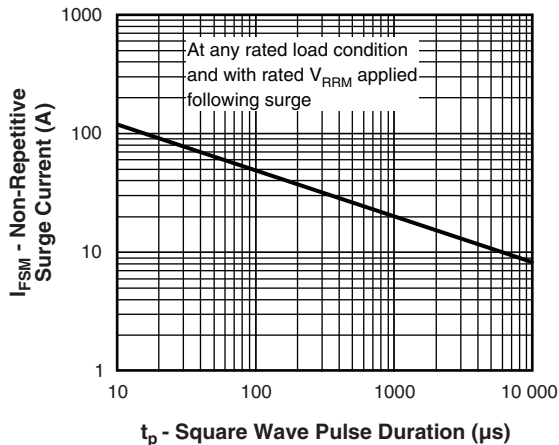


Fig. 6 - Maximum Non-Repetitive Surge Current (Per Leg)

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

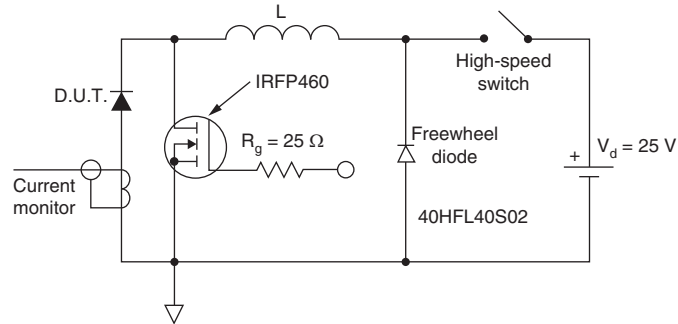


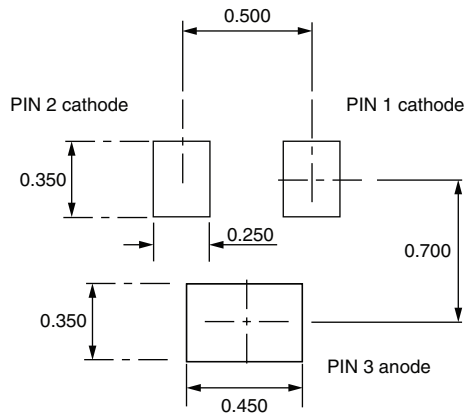
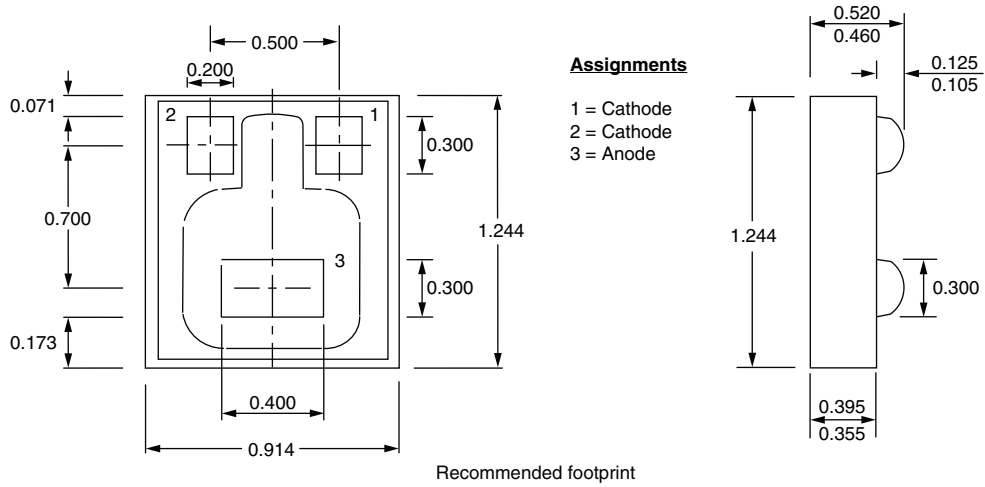
Fig. 7 - Unclamped Inductive Test Circuit

LINKS TO RELATED DOCUMENTS

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|----------------------------|--|
| Dimensions | www.vishay.com/doc?95049 |
| Part marking information | www.vishay.com/doc?95060 |
| Packaging information | www.vishay.com/doc?95062 |
| SPICE model | www.vishay.com/doc?95318 |

FlipKY[®] 0.5 A/0.75 A

DIMENSIONS in millimeters



Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Controlling dimension: millimeter



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