

### FlipKY™

0.5 Amp  
40 Volt

#### Features

- Ultra Low  $V_F$  To Footprint Area
- Very Low Profile (<0.6mm)
- Low Thermal Resistance
- Supplied Tested And On Tape & Reel

#### Applications

- Reverse Polarity Protection
- Current Steering
- Freewheeling
- Flyback
- Oring



#### Major Ratings and Characteristics

Characteristics	IR05H40CSP	Units
$I_{F(AV)}$ Rectangular waveform	0.5	A
$V_{RRM}$	40	V
$I_{FSM}$ @tp = 5 $\mu$ s sine	190	A
$V_F$ @0.5 Apk, $T_J=125^\circ\text{C}$	0.42	V
$T_J$ range	-55 to 150	$^\circ\text{C}$

#### Description

International Rectifier'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 0.9mm x 1.2mm devices can deliver up to 0.5A and occupy only 1.08mm<sup>2</sup> of board space. The anode and cathode connections are made through solder bump pads on one side of the silicon rather than through protruding leads 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, PDAs, and portable hard disk drives where space savings and performance are crucial.

## Voltage Ratings

Part number	IR05H40CSPTR
$V_R$ Max. DC Reverse Voltage (V)	40
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)	

## Absolute Maximum Ratings

Parameters	Value	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current	0.5	A	50% duty cycle @ $T_{PCB} = 114^\circ\text{C}$ , rectangular wave form
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current @ $25^\circ\text{C}$	190	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse
	10		10ms Sine or 6ms Rect. pulse
$E_{AS}$ Non-Repetitive Avalanche Energy	5	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 2.0\text{A}$ , $L = 5.0\text{mH}$
$I_{AR}$ Repetitive Avalanche Current	0.5	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ Frequency limited by $T_J$ max. $V_a = 1.5 \times V_r$ typical

## Electrical Specifications

Parameters	Typ.	Max.	Units	Conditions	
$V_{FM}$ Max. Forward Voltage (1) Drop * See Fig. 1	0.48	0.52	V	@ 0.5A	$T_J = 25^\circ\text{C}$
	0.54	0.58		@ 1A	
	0.38	0.42		@ 0.5A	$T_J = 125^\circ\text{C}$
	0.46	0.50		@ 1A	
$I_{RM}$ Max. Reverse Leakage (1) Current * See Fig. 2	1	10	$\mu\text{A}$	$T_J = 25^\circ\text{C}$	$V_R = \text{rated } V_R$
	0.2	0.5			$V_R = 20\text{V}$
	0.08	0.25			$V_R = 10\text{V}$
	0.05	0.15			$V_R = 5\text{V}$
	0.5	2	mA	$T_J = 125^\circ\text{C}$	$V_R = \text{rated } V_R$
	0.2	1			$V_R = 20\text{V}$
	0.15	0.8			$V_R = 10\text{V}$
	0.125	0.5			$V_R = 5\text{V}$
$C_T$ Max. Junction Capacitance	-	90	pF	$V_R = 5V_{DC}$ (test signal range 100kHz to 1MHz) $25^\circ\text{C}$	
$dv/dt$ Max. Voltage Rate of Charge	-	10000	V/ $\mu\text{s}$	(Rated $V_R$ )	

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%

## Thermal-Mechanical Specifications

Parameters	Value	Units	Conditions
$T_J$ Max. Junction Temperature Range (*)	-55 to 150	$^\circ\text{C}$	
$T_{stg}$ Max. Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$R_{thJLB}$ Typ. Thermal Resistance Junction to PCB (**)	35	$^\circ\text{C/W}$	DC operation
$R_{thJA}$ Max. Thermal Resistance Junction to Ambient (**)	150	$^\circ\text{C/W}$	

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

(\*\*) Mounted on dual sided 0.58 inch square FR4 PCB with 0.2 square inches of 1oz top copper area

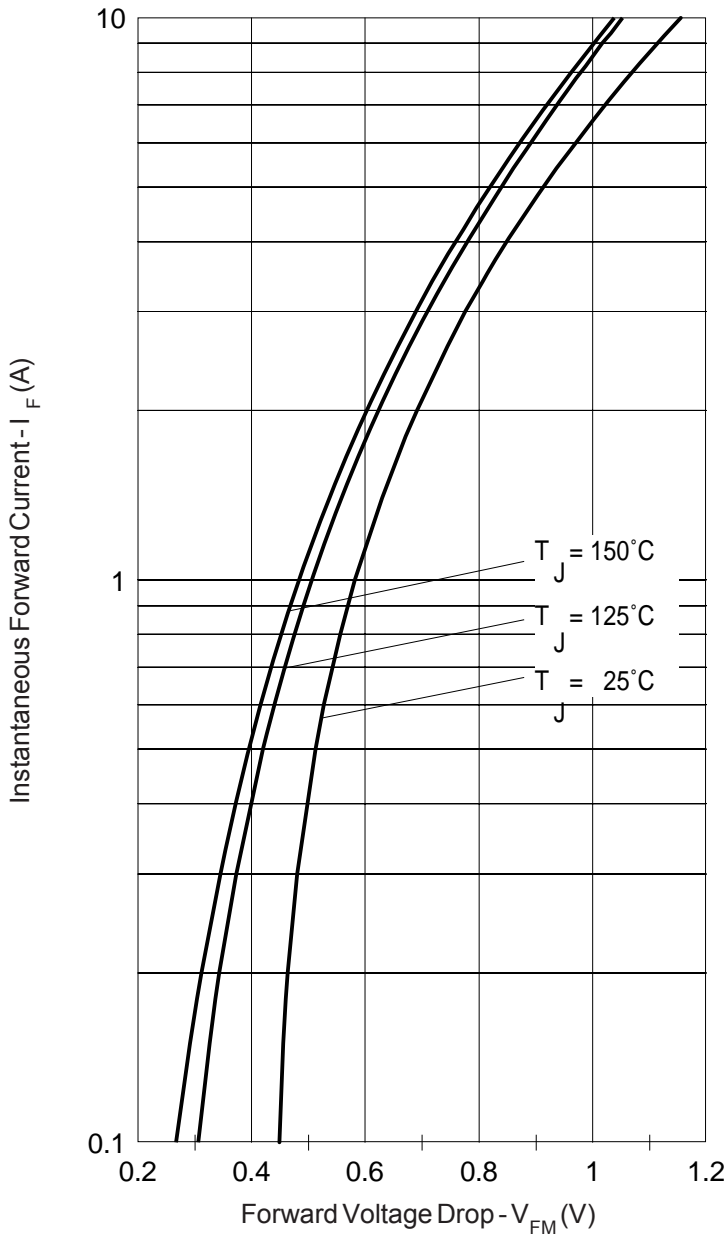


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

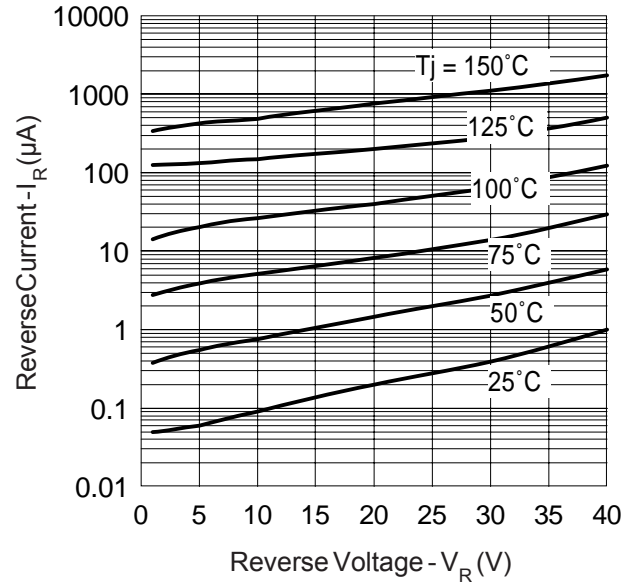


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

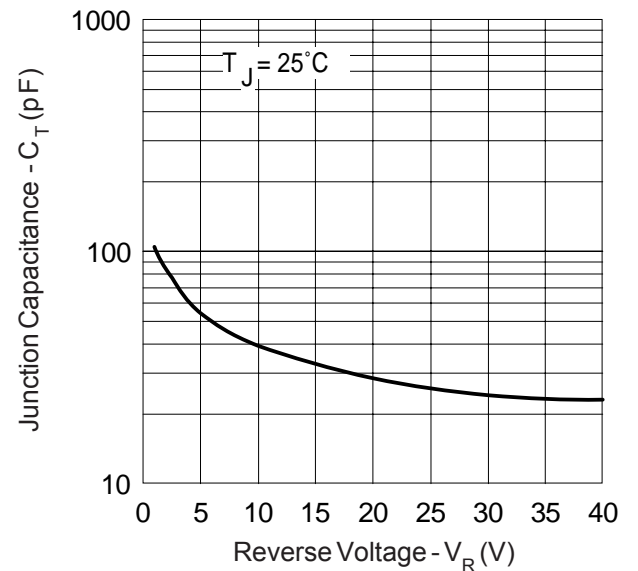


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

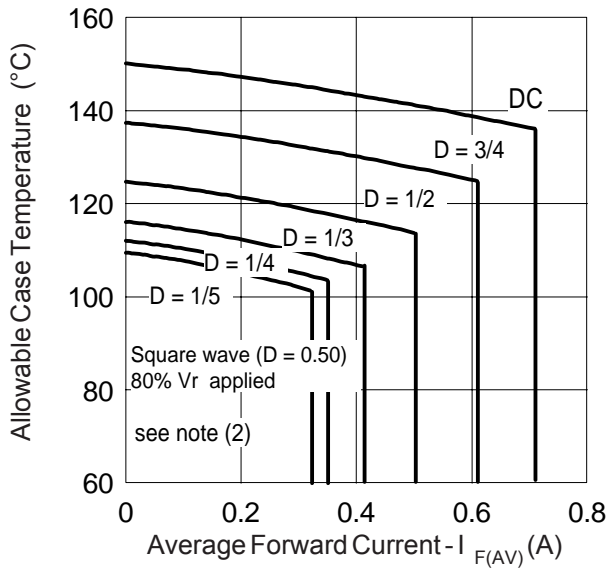


Fig. 4 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

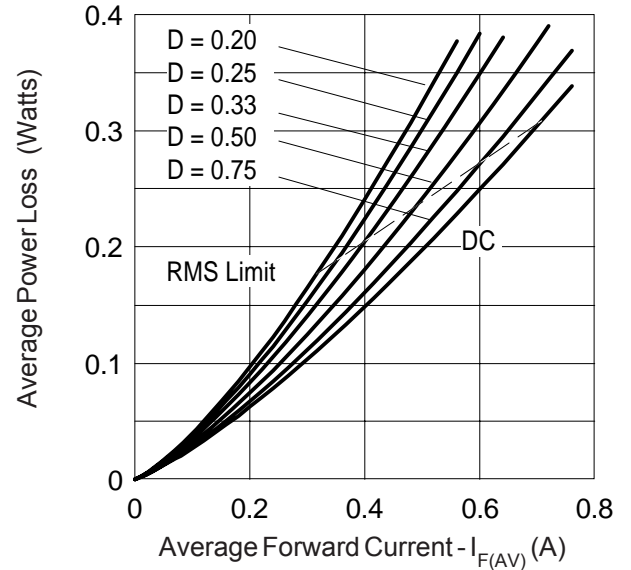


Fig. 5 - Forward Power Loss Characteristics (Per Leg)

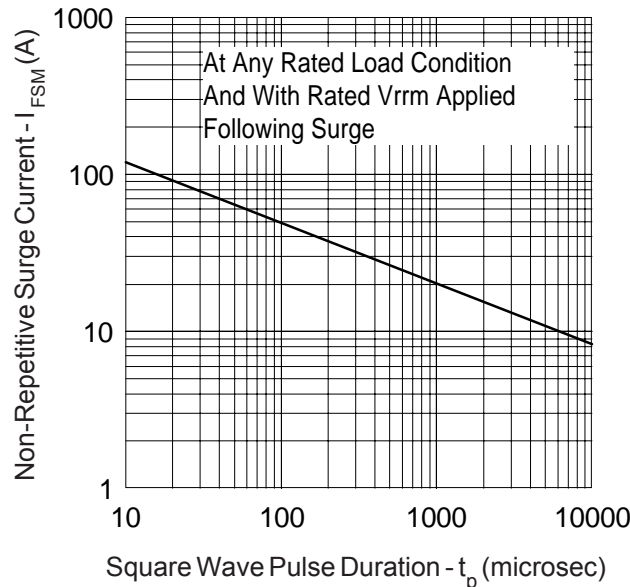


Fig. 6 - Max. Non-Repetitive Surge Current (Per Leg)

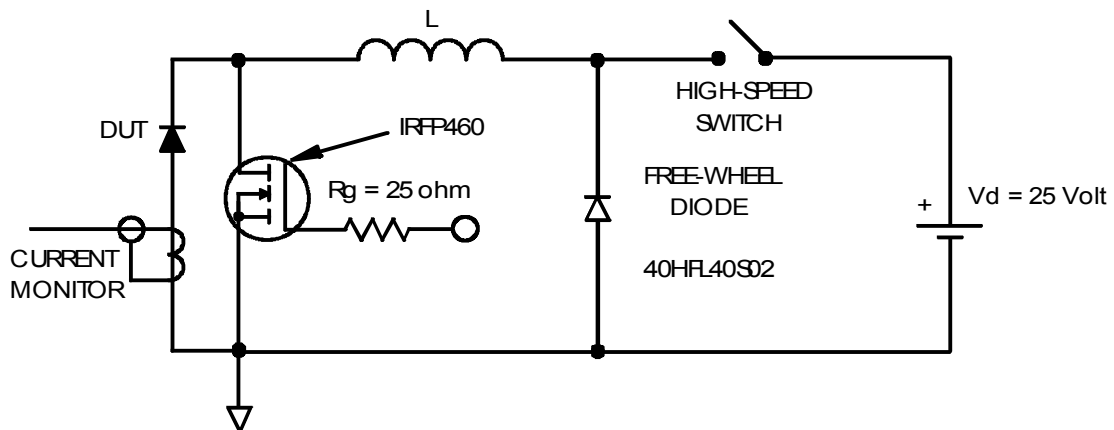


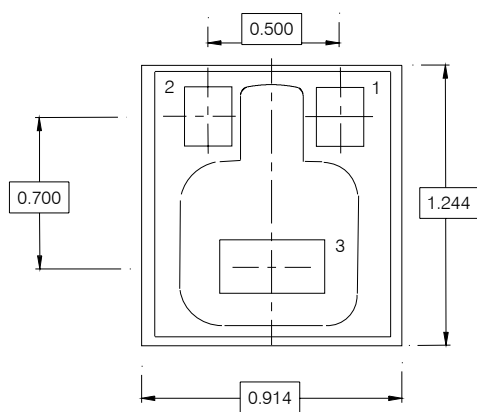
Fig. 8 - Unclamped Inductive Test Circuit

(2) Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ;

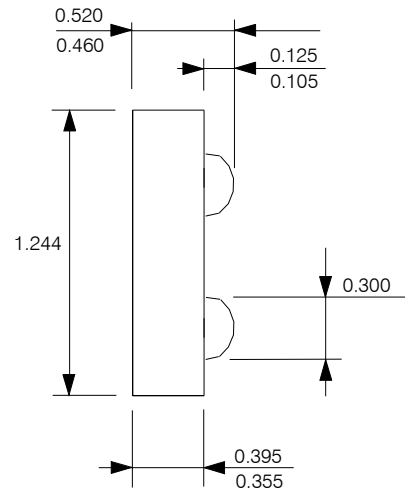
$Pd$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)}/D)$  (see Fig. 6);

$Pd_{REV}$  = Inverse Power Loss =  $V_{R1} \times I_R (1-D)$ ;  $I_R @ 80\% V_R$  applied

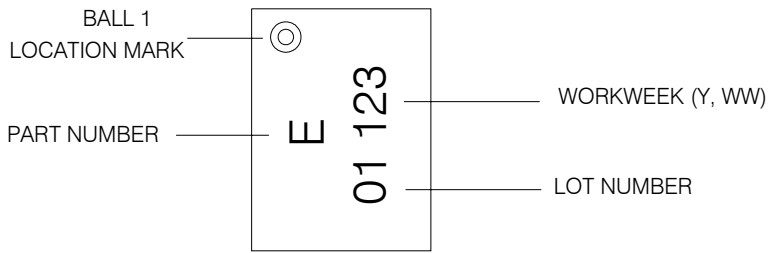
FlipKY™ Outline Dimension and Tape and Reel



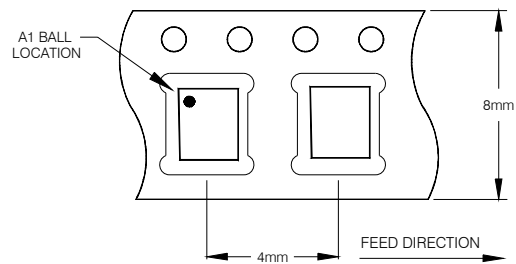
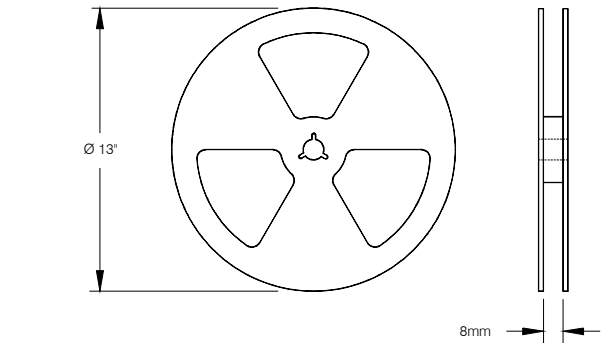
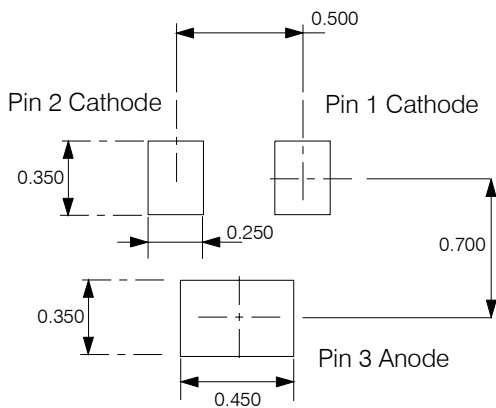
ASSIGNMENTS  
 1 = CATHODE  
 2 = CATHODE  
 3 = ANODE



- NOTES:  
 1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.  
 2. CONTROLLING DIMENSION: MILLIMETER  
 3. DIMENSIONS ARE SHOWN IN MILLIMETERS



RECOMMENDED FOOTPRINT



- NOTES:  
 1. TAPE AND REEL OUTLINE CONFORMS TO EIA-481 & EIA-541.

Special Instruction for PCB assembly: see APPLICATION NOTE **AN-1079**

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