

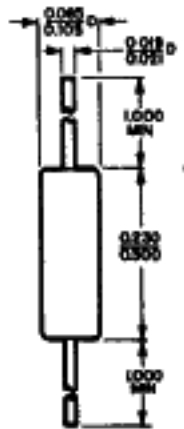
# MICROWAVE DIODE CORPORATION



**IN3831  
THROUGH  
IN3846**

## SILICON PLANAR THYRISTOR DIODES

Also known as Four Layer Diodes and Shockley Diodes  
Switching Voltage 20 to 100 volts  
Holding current .5 to 45 mA.



### PACKAGE OUTLINE

#### ELECTRICAL PARAMETERS

Type	Switching Voltage $V_g$ (V)		Holding Current $I_H$ (mA)	
	25°C	-40 to 85 C	25 C	-40 to 85 C
IN3831	20±4	14-25	.5 to 15	40 max.
IN3832	25±4	19-30	.5 - 15	40 max.
IN3833	30±4	23-36	.5 - 15	40 max.
IN3834	35±4	28-41	.5 - 15	40 max.
IN3835	40±4	32-46	.5 - 15	40 max.
IN3836	45±4	37-51	.5 - 15	40 max.
IN3837	50±4	41-57	.5 - 15	40 max.
IN3838	100±10	80-115	.5 - 15	40 max.
IN3839	20±4	14-25	14 - 45	5 min.
IN3840	25±4	19-30	14 - 45	5 min.
IN3841	30±4	23-36	14 - 45	5 min.
IN3842	35±4	28-41	14 - 45	5 min.
IN3843	40±4	32-46	14 - 45	5 min.
IN3844	45±4	37-51	14 - 45	5 min.
IN3845	50±4	41-57	14 - 45	5 min.
IN3846	100±10	80-115	14 - 45	5 min.

#### PARAMETERS FOR ALL INDUSTRIAL TYPES A+T=25°C

Switching Current	$I_s$ :	< 75µA
Holding Voltage	$V_h$ :	.5 to 1.2 volts
On Voltage	$V_{on}$ :	< 1.2 V at 70 mA
On Impedance	$Z_{on}$ :	< 2 ohms at 70 mA at 60 c/s
Forward Leakage Current	$I_{fl}$ :	< 2 µA at .75 Nominal $V_s$
Reverse Leakage Current	$I_{rl}$ :	< 2 µA at .75 Nominal $V_s$
Reverse Breakdown Voltage	$V_{rb}$ :	> Nominal $V_s$
Turn on Time	$T_{on}$ :	10 to 500 ns. Dependent on targetted value and circuit.
Turn off Time	$T_{off}$ :	20 to 1000 ns. Dependent on targetted value and circuit.
Capitance	$C$ :	10 to 50 pf. Dependent on nominal $V_s$ and applied voltage.
Power Rating	$P$ :	250 mW. Derating 10 25% @ 125°C.
Current Carrying Capacity		250 mA steady dc. Maximum current 10 amps with duty factor, repetition rate, pulse duration and ambient temperature such that power rating is not exceeded.
Ambient Temperature		-65°C. to 150°C.
Operating Range		
Storage Temperature		-75°C to 200°C

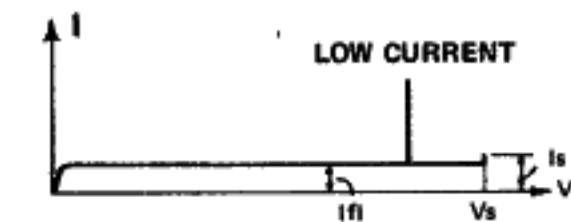
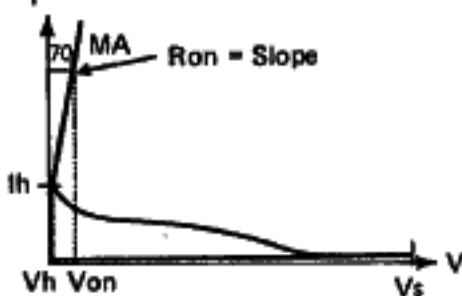
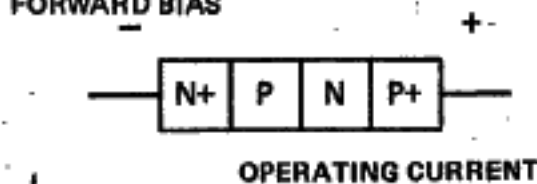
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U.S. ROUTE 3 - BOX 250  
WEST STEWARTSTOWN, NEW HAMPSHIRE 03597  
(603) 246-3362

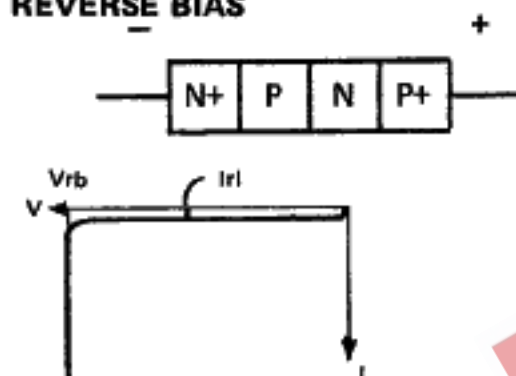


## FOUR LAYER DIODE CHARACTERISTICS

### FORWARD BIAS



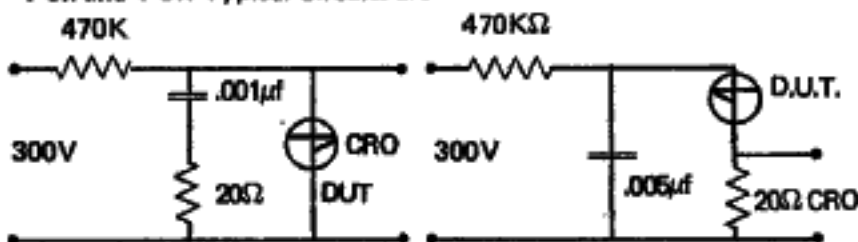
### REVERSE BIAS



### PARAMETER MEASUREMENTS

$V_s$ ,  $I_s$ ,  $V_h$ ,  $V_{on}$ ,  $I_h$ ,  $Z_{on}$ ,  $I_{fi}$ ,  $I_{rl}$  and  $V_{rb}$  can be measured on a Tektronix 575 curve tracer. Applied voltage should be 10 volts above the nominal  $V_s$  with 1k series resistor. More accurate test procedures are available from A.P.D.

$T_{on}$  and  $T_{off}$  Typical Circuits are



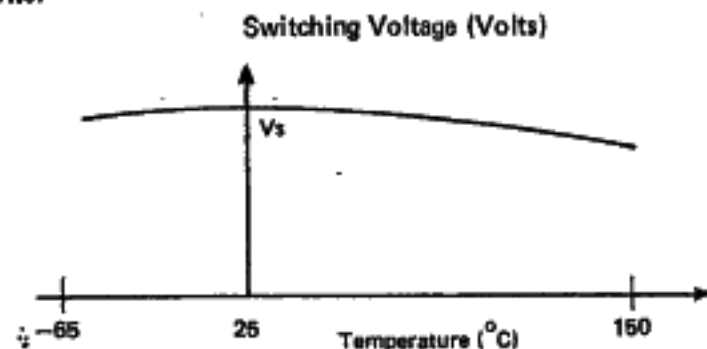
In above circuit typical values of  $T_{on}$  and  $T_{off}$  are

20, 30, 40 volts  
50, 80, 100, 200 volts

$T_{on}$	$T_{off}$
100 ns.	200 ns.
80 ns.	50 ns.

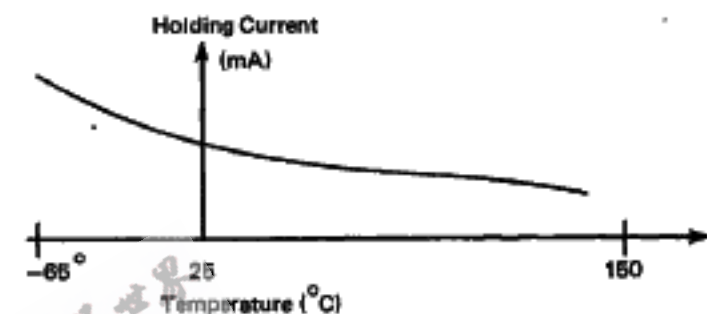
## PARAMETER VARIATIONS WITH TEMPERATURE

Switching Voltage Typical variation of  $V_s$  with temperature is as follows:



The shape of the above and the temperature at which the voltage is a maximum are design parameters.

HOLDING CURRENT. Typical variations of  $I_h$  with temperature is as follows:



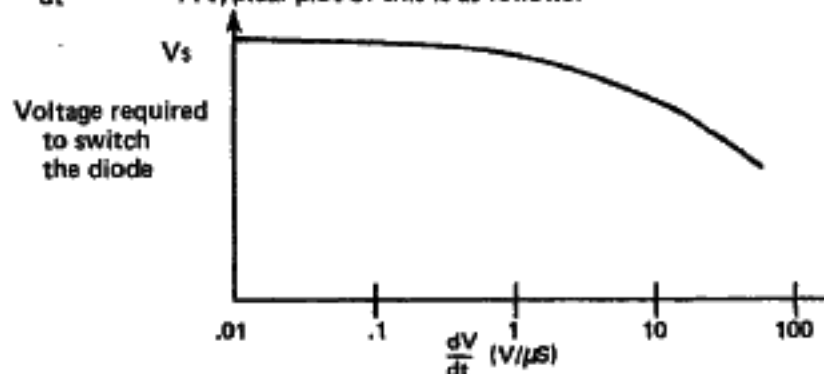
The change in  $I_h$  with temperature can be reduced but other parameters e.g.  $T_{on}$  are increased.

SWITCHING CURRENT. Switching current can be designed to increase or decrease with increasing temperature.

ON VOLTAGE. Decreases as the temperature is raised.

### UNSPECIFIED PARAMETERS

RATE EFFECT. As the rate at which voltage is applied to the diode  $dV/dt$  increases, the voltage required to switch the diode decreases: A typical plot of this is as follows:



The shape of the above can be controlled and the diode can be designed with no change up to 10 V/µs.

HIGH CURRENT ON IMPEDANCE A typical on impedance value at 5 amps for the diode is .2 ohms, using a 575 curve tracer. Variations in the rate of increase of current  $dI/dt$  can add or subtract from this value.

HIGH FREQUENCY POWER TRANSMISSION At frequencies of 100 MHz the diode can transmit power of 100 watts with greater than 99% efficiency.

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