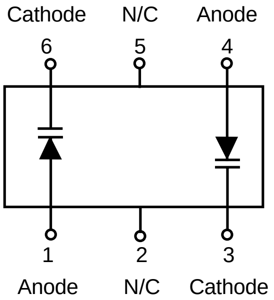
Dual SCHOTTKY Barrier Diodes

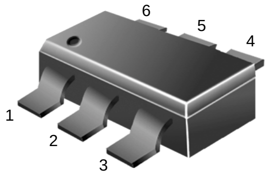
MBD54DWT1

30 VOLTS
DUAL HOT–CARRIER
DETECTOR AND SWITCHING
DIODES

These SCHOTTKY barrier diodes are designed for high speed switching applications, circuit protection, and vol tage clamping. Extremely low forward voltage reduces conduction loss. Miniature surface mount package is excellent for hand held and portable applications where space is limited.

- Extremely Fast Switching Speed
- Low Forward Voltage — 0.35 V @ $I_F = 10$ mAdc





SOT–363
CASE 419B–01, STYLE 6

MAXIMUM RATINGS (T = 125°C unless otherwise noted)

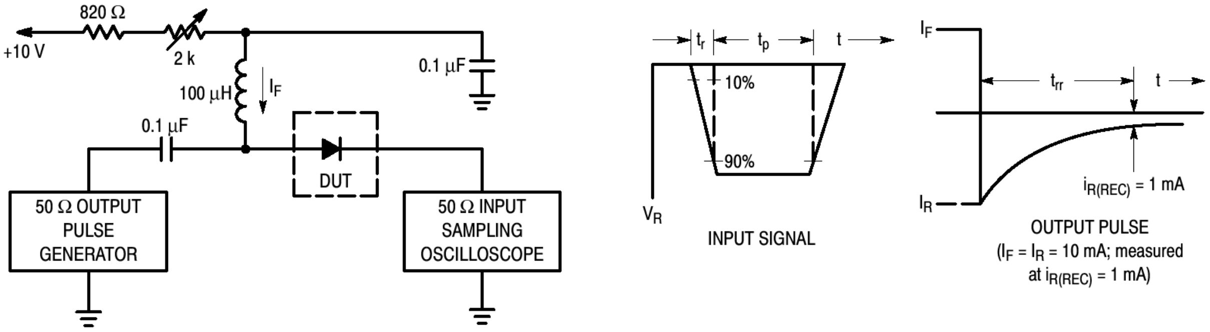
Rating	Symbol	Value	Unit
Reverse Voltage	V_R	30	Volts
Forward Power Dissipation	P_F		
@ $T_A = 25°C$		150	mW
Derate above 25°C		1.2	mW/°C
Forward Current (DC)	I_F	200 Max	mA
Junction Temperature	T_J	125 Max	°C
Storage Temperature Range	T_{stg}	–55 to +150	°C

DEVICE MARKING

MBD54DWT1 = BL

ELECTRICAL CHARACTERISTICS ($T_A = 25°C$ unless otherwise noted) (EACH DIODE)

Characteristic	Symbol	Min	Typ	Max	Unit
Reverse Breakdown Voltage ($I_R = 10\ \mu A$)	$V_{(BR)R}$	30	—	—	Volts
Total Capacitance ($V_R = 1.0$ V, f = 1.0 MHz)	C_T	—	7.6	10	pF
Reverse Leakage ($V_R = 25$ V)	I_R	—	0.5	2.0	µAdc
Forward Voltage ($I_F = 0.1$ mAdc)	V_F	—	0.22	0.24	Vdc
Forward Voltage ($I_F = 30$ mAdc)	V_F	—	0.41	0.5	Vdc
Forward Voltage ($I_F = 100$ mAdc)	V_F	—	0.52	1.0	Vdc
Reverse Recovery Time ($I_F = I_R = 10$ mAdc, $I_{R(REC)} = 1.0$ mAdc) Figure 1	t_{rr}	—	—	5.0	ns
Forward Voltage (I F = 1.0 mAdc)	V_F	—	0.29	0.32	Vdc
Forward Voltage (I F = 10 mAdc)	V_F	—	0.35	0.40	Vdc
Forward Current (DC)	I_F	—	—	200	mAdc
Repetitive Peak Forward Current	I_{FRM}	—	—	300	mAdc
Non–Repetitive Peak Forward Current (t <1.0s)	I_{FSM}	—	—	600	mAdc



Notes: 1. A 2.0 kΩ variable resistor adjusted for a Forward Current (I_F) of 10 mA.

2. Input pulse is adjusted so $I_{R(peak)}$ is equal to 10 mA.

3. t_p » t_{rr}

Figure 1. Recovery Time Equivalent Test Circuit

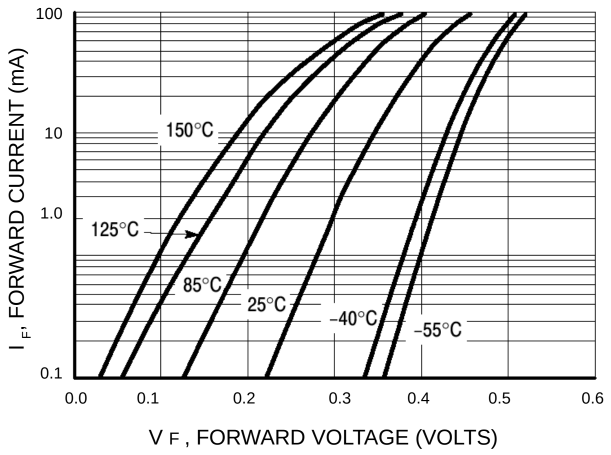


Figure 2. Forward Voltage

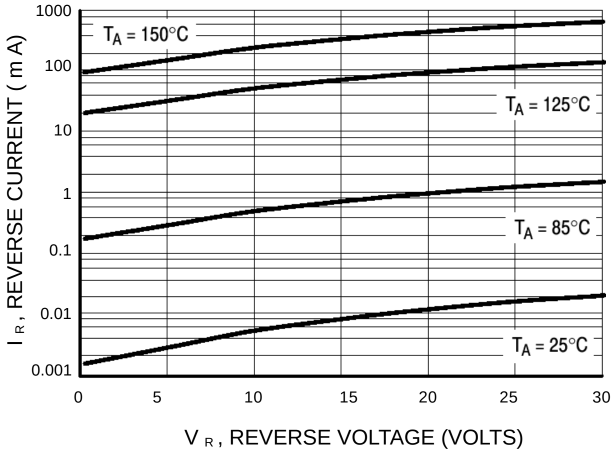


Figure 3. Leakage Current

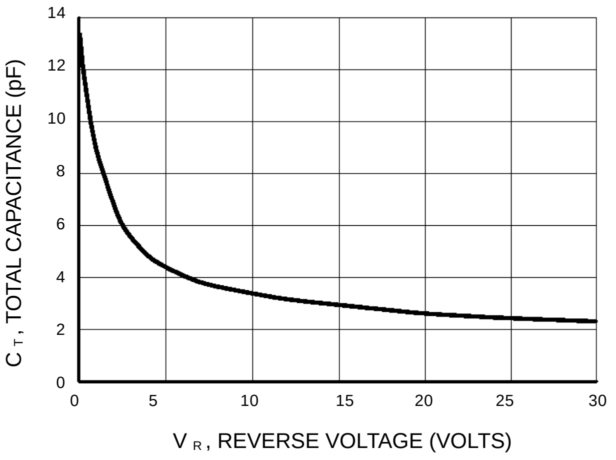


Figure 4. Total Capacitance

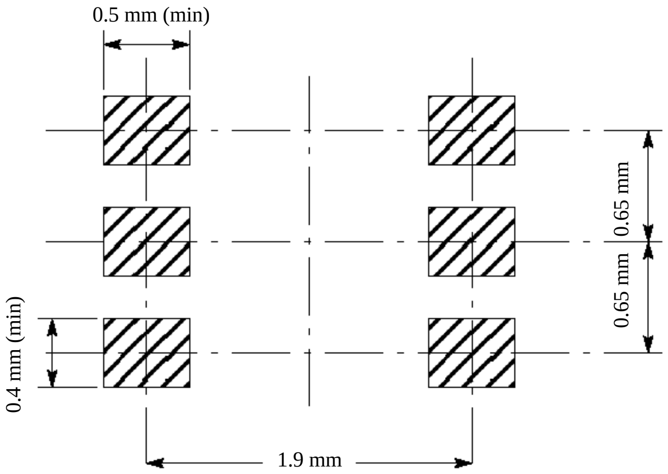
MBD110DWT1 MBD330DWT1 MBD770DWT1

INFORMATION FOR USING THE SOT–363 SURFACE MOUNT PACKAGE

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.

SOT–363



SOT–363 POWER DISSIPATION

The power dissipation of the SOT–363 is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by TJ(max) , the maximum rated junction temperature of the die, R qJA , the thermal resistance from the device junction to ambient, and the operating temperature, T_A. Using the values provided on the data sheet for the SOT–363 package, PD can be calculated as follows:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature T_A of 25°C, one can calculate the power dissipation of the device which in this case is 150 milliwatts.

$$P_D = \frac{150°C - 25°C}{833°C/W} = 150 \text{ milliwatts}$$

The 833°C/W for the SOT–363 package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 150 milliwatts. There are other alternatives to achieving higher power dissipation from the SOT–363 package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal CladE. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

SOLDERING PRECAUTIONS

The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

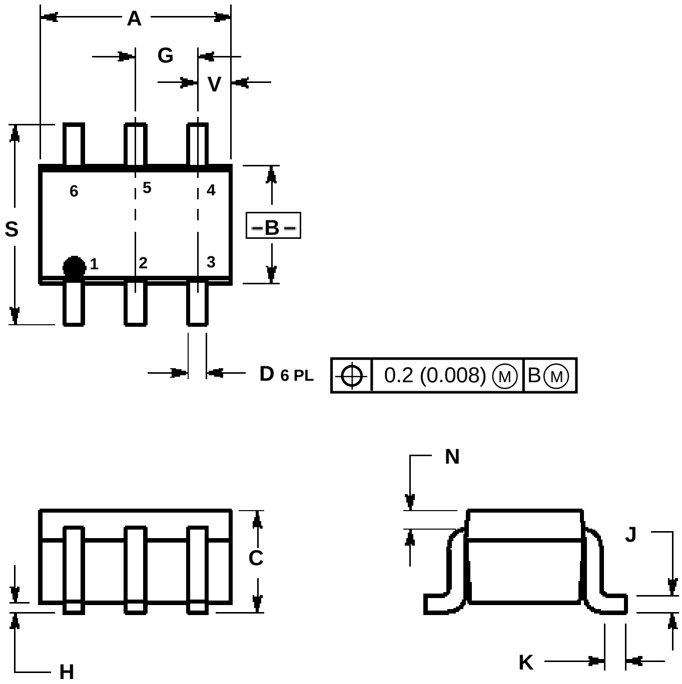
- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

MBD110DWT1 MBD330DWT1 MBD770DWT1

PACKAGE DIMENSIONS

SC–88 (SOT–363)
CASE 419B–01
ISSUE G



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026BSC		0.65BSC	
H	——	0.004	——	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20
V	0.012	0.016	0.30	0.40

STYLE 1:
PIN 1. EMITTER 2
 2. BASE 2
 3. COLLECTOR 1
 4. EMITTER 1
 5. BASE 1
 6. COLLECTOR 2