Surface Mount RF Schottky Diodes in SOT-323 (SC-70)

Technical Data

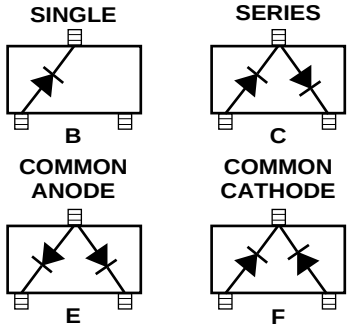
HSMS-280A Series
HSMS-281A Series
HSMS-282A Series

Features

- **Surface Mount SOT-323 Package**
- **Low Turn-On Voltage (As Low as 0.34 V at 1 mA)**
- **Low FIT (Failure in Time) Rate***
- **Six-sigma Quality Level**
- **Single and Dual Versions**
- **Tape and Reel Options Available**

* For more information see the Surface Mount Schottky Reliability Data Sheet.

Package Lead Code Identification (Top View)



Description/Applications

These Schottky diodes are specifically designed for analog and digital applications requiring devices in SOT-323 surface mount packages. This series offers a wide range of specifications and package configurations to give the designer wide flexibility. Typical applications of these Schottky diodes are mixing, detecting, switching, sampling, clamping, and wave shaping.

Absolute Maximum Ratings, T_C= 25ºC

Symbol	Parameter	Unit	Absolute Maximum[1]
I_f	Forward Current (1µs Pulse)	Amp	1
P_{IV}	Peak Inverse Voltage	V	Same as V_{BR}
T_J	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150
θ_{jc}	Thermal Resistance[2]	°C/W	150

Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to the device.
2. T_C = +25°C, where T_C is defined to be the temperature at the package pins where contact is made to the circuit board.

Electrical Specifications, T_C = +25°C, Single Diode[1]

Part Number HSMS-	Package Marking Code[2]	Lead Code	Configuration	Minimum Breakdown Voltage V_{BR} (V)	Maximum Forward Voltage V_F (mV)	Maximum Forward Voltage V_F (V) @ I_F (mA)	Maximum Reverse Leakage I_R (nA) @ V_R (V)	Maximum Capacitance C_T (pF)	Typical Dynamic Resistance R_D (Ω)
280B	A0	B	Single	70	400	1.0 15	200 50	2.0	35
280C	A2	C	Series						
280E	A3	E	Common Anode						
280F	A4	F	Common Cathode						
281B	B0	B	Single	20	400	1.0 35	200 15	1.2	15
281C	B2	C	Series						
281E	B3	E	Common Anode						
281F	B4	F	Common Cathode						
282B	C0	B	Single	15	340	0.7 30	100 1	1.0	12
282C	C2	C	Series						
282E	C3	E	Common Anode						
282F	C4	F	Common Cathode						
Test Conditions				I_R = 10 µA	I_F = 1 mA[3]			V_F = 0 V f = 1 MHz[4]	I_F = 5 mA

Notes:

1. Effective Carrier Lifetime (τ) for all these diodes is 100 ps maximum measured with Krakauer method at 5 mA, except HSMS-282X which is measured at 20 mA.
2. Package marking code is laser marked.
3. ΔV_F for diodes in pairs is 15.0 mV maximum at 1.0 mA.
4. ΔC_{TO} for diodes in pairs is 0.2 pF maximum.

Typical Performance, T_C = 25°C (unless otherwise noted), Single Diode

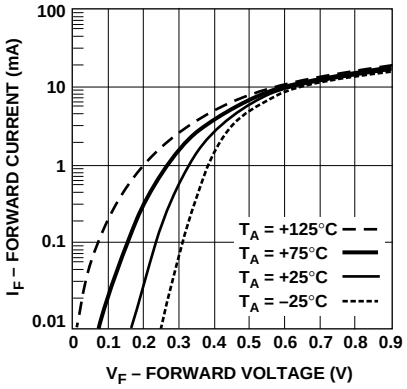


Figure 1. Forward Current vs. Forward Voltage at Temperatures—HSMS-280A Series.

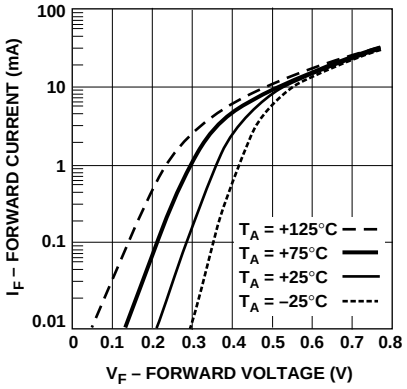


Figure 2. Forward Current vs. Forward Voltage at Temperatures—HSMS-281A Series.

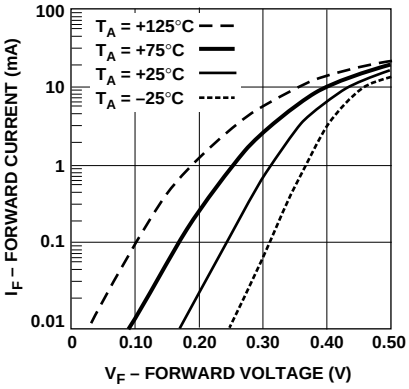


Figure 3. Forward Current vs. Forward Voltage at Temperatures—HSMS-282A Series.

Typical Performance, T_C = 25°C (unless otherwise noted), Single Diode, continued

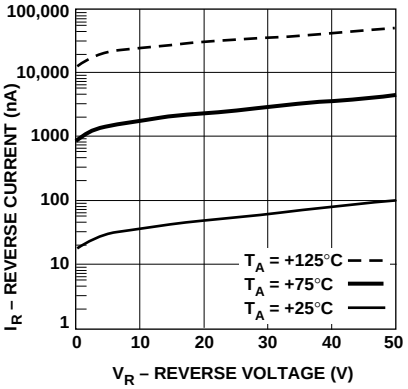


Figure 4. Reverse Current vs. Reverse Voltage at Temperatures—HSMS-280A Series.

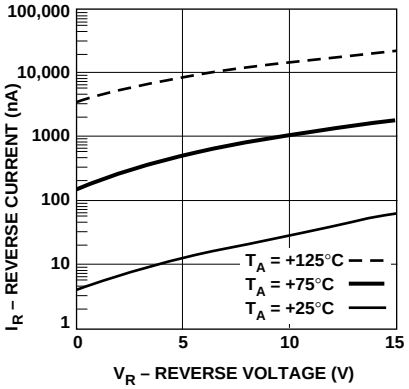


Figure 5. Reverse Current vs. Reverse Voltage at Temperatures—HSMS-281A Series.

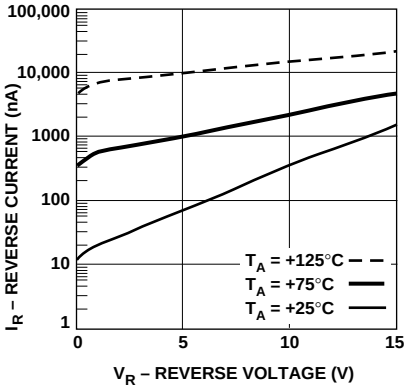


Figure 6. Reverse Current vs. Reverse Voltage at Temperatures—HSMS-282A Series.

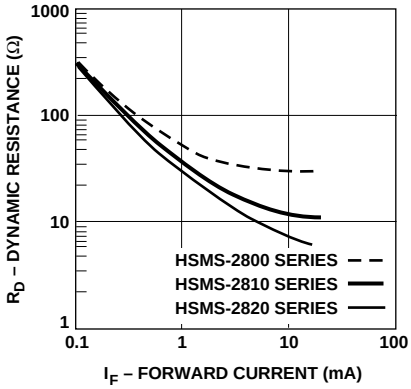


Figure 7. Dynamic Resistance vs. Forward Current.

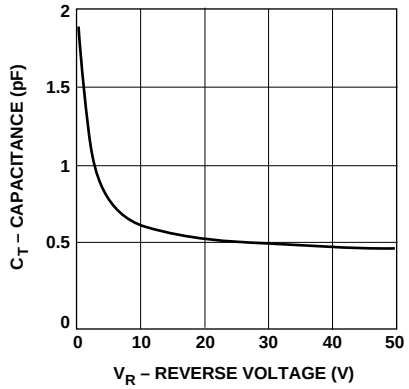


Figure 8. Total Capacitance vs. Reverse Voltage—HSMS-280A Series.

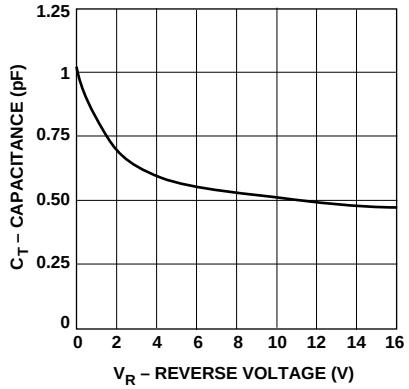


Figure 9. Total Capacitance vs. Reverse Voltage—HSMS-281A Series.

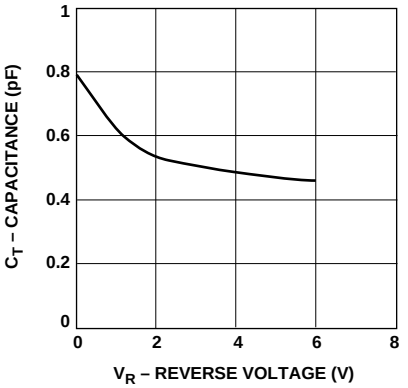


Figure 10. Total Capacitance vs. Reverse Voltage—HSMS-282A Series.

Assembly Instructions

SOT-323 PCB Footprint

A recommended PCB pad layout for the miniature SOT-323 (SC-70) package is shown in Figure 11 (dimensions are in inches). This layout provides ample allowance for package placement by automated assembly equipment without adding parasitics that could impair the performance.

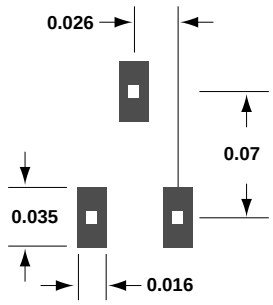


Figure 11. PCB Pad Layout (dimensions in inches).

SMT Assembly

Reliable assembly of surface mount components is a complex process that involves many material, process, and equipment factors, including: method of heating (e.g., IR or vapor phase reflow, wave soldering, etc.) circuit board material, conductor thickness and pattern, type of solder alloy, and the thermal conductivity and thermal mass of components. Components with a low mass, such as the SOT-323 package, will reach solder reflow temperatures faster than those with a greater mass.

HP's SOT-323 diodes have been qualified to the time-temperature profile shown in Figure 12. This profile is representative of an IR reflow type of surface mount assembly process.

After ramping up from room temperature, the circuit board with components attached to it (held in place with solder paste) passes through one or more preheat zones. The preheat zones increase the temperature of the board and components to prevent thermal shock and begin evaporating solvents from the solder paste. The reflow zone briefly elevates the temperature sufficiently to produce a reflow of the solder.

The rates of change of temperature for the ramp-up and cool-down zones are chosen to be low enough to not cause deformation of the board or damage to components due to thermal shock. The maximum temperature in the reflow zone (T_{MAX}) should not exceed 235 °C.

These parameters are typical for a surface mount assembly process for HP SOT-323 diodes. As a general guideline, the circuit board and components should be exposed only to the minimum temperatures and times necessary to achieve a uniform reflow of solder.

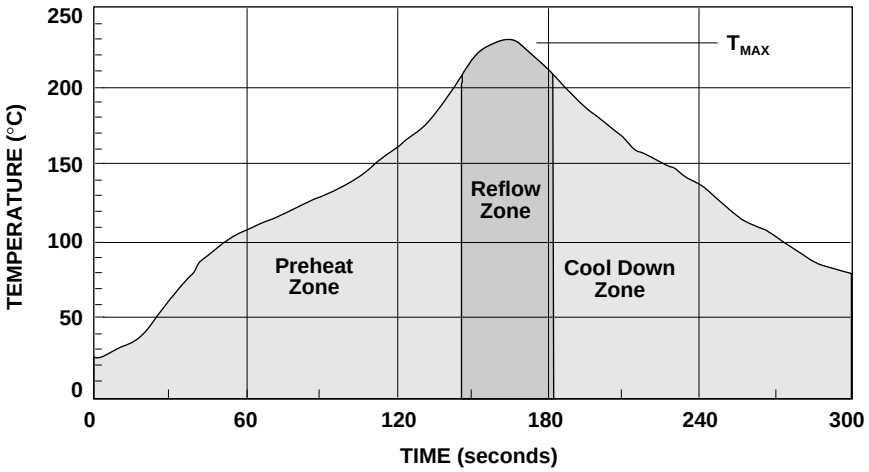
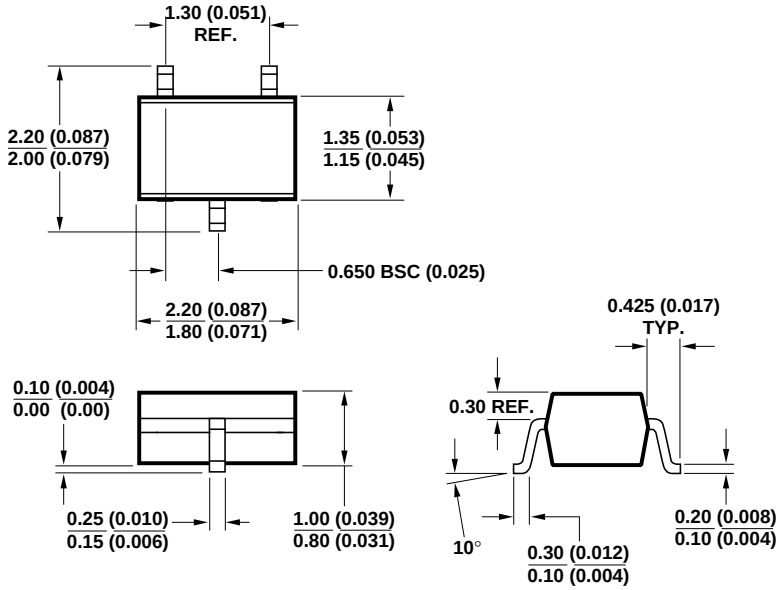


Figure 12. Surface Mount Assembly Profile.

Package Dimensions

Outline SOT-323 (SC-70 3 Lead)



DIMENSIONS ARE IN MILLIMETERS (INCHES)

Part Number Ordering Information

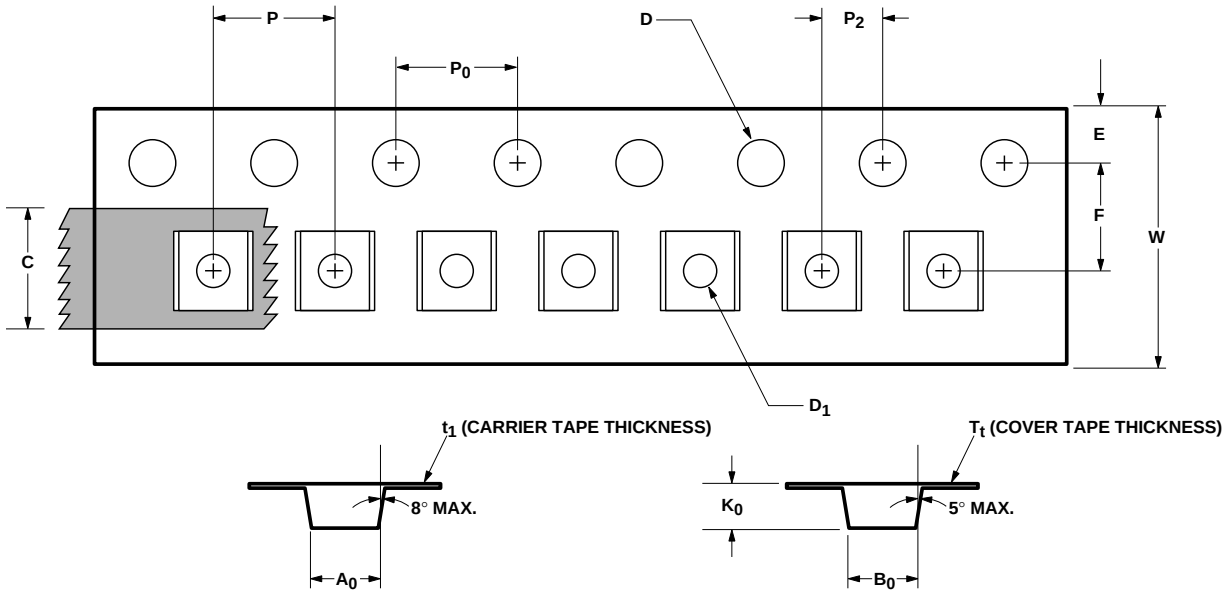
Part Number	No. of Devices	Container
HSMS-28XA-TR1*	3000	7" Reel
HSMS-28XA-BLK*	100	antistatic bag

* where X = 0, 1, or 2; A = B, C, E, or F

HEWLETT® PACKARD

Tape Dimensions and Product Orientation

For Outline SOT-323 (SC-70 3 Lead)



DESCRIPTION		SYMBOL	SIZE (mm)	SIZE (INCHES)
CAVITY	LENGTH	A_0	2.24 ± 0.10	0.088 ± 0.004
	WIDTH	B_0	2.34 ± 0.10	0.092 ± 0.004
	DEPTH	K_0	1.22 ± 0.10	0.048 ± 0.004
	PITCH	P	4.00 ± 0.10	0.157 ± 0.004
	BOTTOM HOLE DIAMETER	D_1	1.00 + 0.25	0.039 + 0.010
PERFORATION	DIAMETER	D	1.55 ± 0.05	0.061 ± 0.002
	PITCH	P_0	4.00 ± 0.10	0.157 ± 0.004
	POSITION	E	1.75 ± 0.10	0.069 ± 0.004
CARRIER TAPE	WIDTH	W	8.00 ± 0.30	0.315 ± 0.012
	THICKNESS	t_1	0.255 ± 0.013	0.010 ± 0.0005
COVER TAPE	WIDTH	C	5.4 ± 0.10	0.205 ± 0.004
	TAPE THICKNESS	T_t	0.062 ± 0.001	0.0025 ± 0.00004
DISTANCE	CAVITY TO PERFORATION (WIDTH DIRECTION)	F	3.50 ± 0.05	0.138 ± 0.002
	CAVITY TO PERFORATION (LENGTH DIRECTION)	P_2	2.00 ± 0.05	0.079 ± 0.002

www.hp.com/go/rf

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