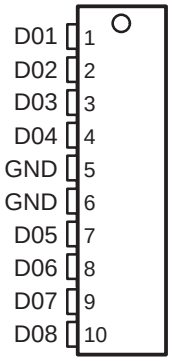
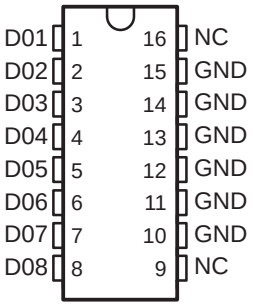
- **Designed to Reduce Reflection Noise**
- **Repetitive Peak Forward Current 300 mA**
- **8-Bit Array Structure Suited for Bus-Oriented Systems**

SC PACKAGE
(TOP VIEW)



D PACKAGE
(TOP VIEW)



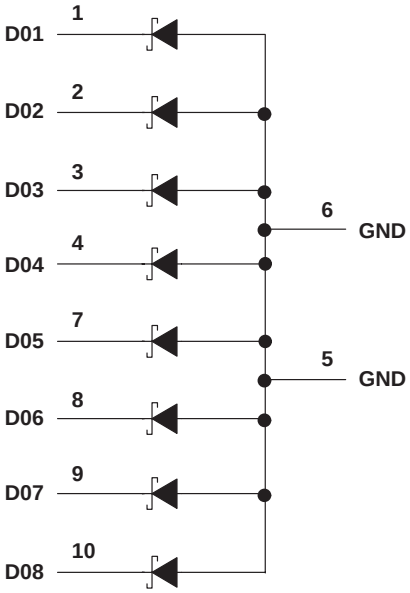
description

This Schottky barrier diode bus-termination array is designed to reduce reflection noise on memory bus lines. This device consists of an 8-bit high-speed Schottky diode array suitable for a clamp to GND.

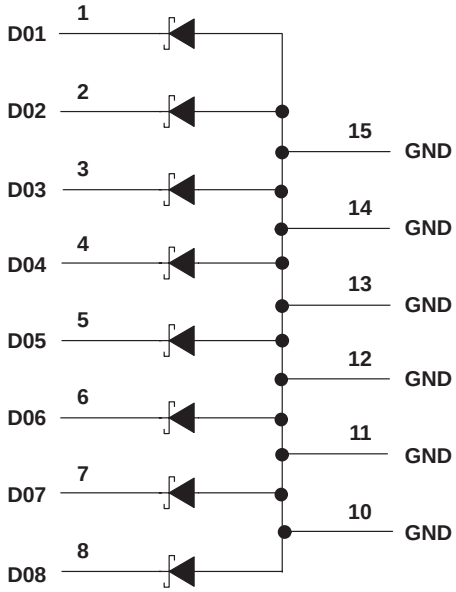
The SN74S1056 is characterized for operation from 0°C to 70°C.

schematic diagrams

SC Package



D Package



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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Steady-state reverse voltage, V_R . . . . . 7 V
Continuous forward current, I_F: Any D terminal from GND . . . . . 50 mA
Total through all GND terminals . . . . . 170 mA
Repetitive peak forward current, I_{FRM} (see Note 1): Any D terminal from GND . . . . . 300 mA
Total through all GND terminals . . . . . 1.2 A
Continuous total power dissipation at (or below) 25°C free-air temperature . . . . . 1000 mW
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: These values apply for $t_w \leq 100$ µs, duty cycle ≤ 20%.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

single-diode operation (see Note 2)

PARAMETER		TEST CONDITIONS		MIN	TYP‡	MAX	UNIT
I_R	Static reverse current	V_R = 7 V				10	µA
V_F	Static forward voltage	I_F = 18 mA			0.65	0.85	V
		I_F = 50 mA			0.8	1	
V_{FM}	Peak forward voltage	I_F = 300 mA			1.41		V
C_t	Total capacitance	V_R = 0 V,	f = 1 MHz		11	20	pF
		V_R = 2 V,	f = 1 MHz		8	16	

‡ All typical values are at T_A = 25°C.

NOTE 2: Test conditions and limits apply separately to each of the diodes. The diodes not under test are open-circuited during the measurement of these characteristics.

multiple-diode operation

PARAMETER		TEST CONDITIONS		MIN	TYP‡	MAX	UNIT
I_X	Internal crosstalk current	Total I_F current = 1.2 A,	See Note 3		0.6	2	mA
		Total I_F current = 126 mA,	See Note 3		0.01	0.1	

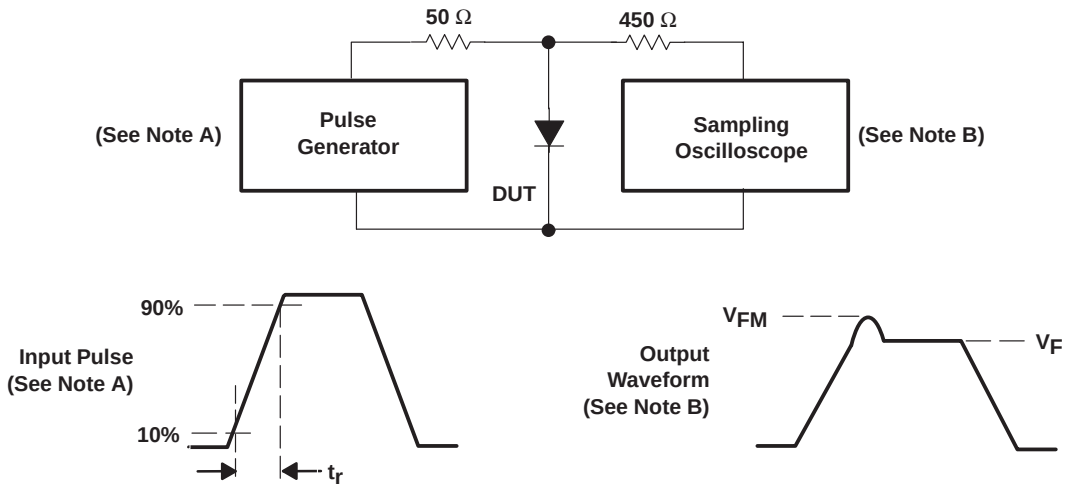
‡ All typical values are at T_A = 25°C.

NOTE 3: I_X is measured under the following conditions with one diode static, all others switching:
Switching diodes: t_w = 100 µs, duty cycle = 20%
Static diode: V_R = 5 V
The static diode input current is the internal crosstalk current I_X.

switching characteristics, T_A = 25°C (see Figures 1 and 2)

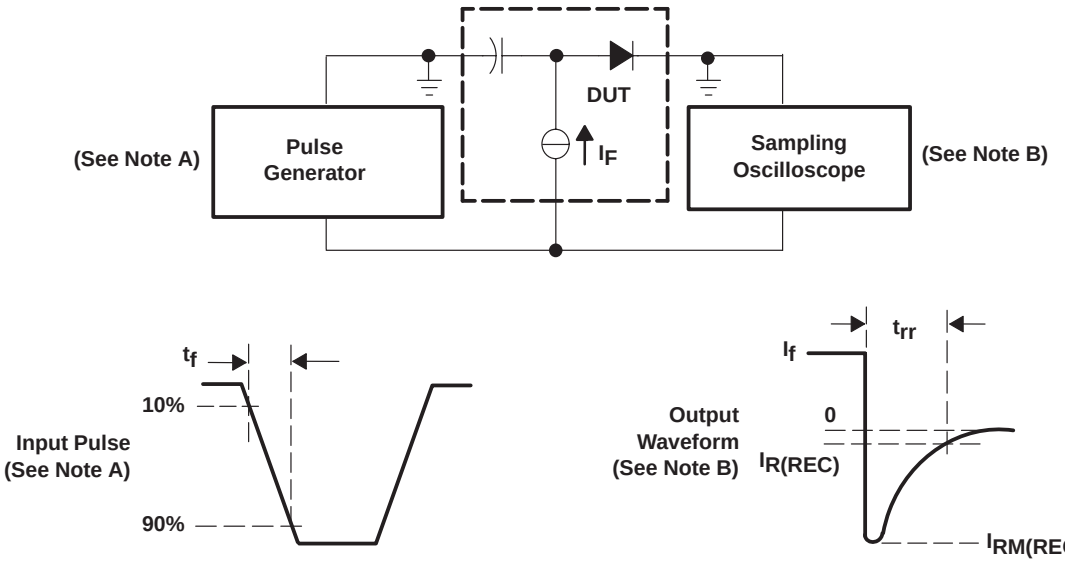
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{rr}	Reverse recovery time	I_F = 10 mA, $I_{RM(REC)}$ = 10 mA, $I_{R(REC)}$ = 1 mA, R_L = 100 Ω		5	10	ns

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The input pulse is supplied by a pulse generator having the following characteristics: t_r = 20 ns, Z_O = 50 Ω, freq = 500 Hz, duty cycle = 0.01.
B. The output waveform is monitored by an oscilloscope having the following characteristics: $t_r \le 350$ ps, R_i = 50 Ω, $C_i = \le 5$ pF.

Figure 1. Forward Recovery Voltage



NOTES: A. The input pulse is supplied by a pulse generator having the following characteristics: t_f = 0.5 ns, Z_O = 50 Ω, $t_W = \ge 50$ ns, duty cycle = 0.01.
B. The output waveform is monitored by an oscilloscope having the following characteristics: $t_r \le 350$ ps, R_i = 50 Ω, $C_i = \le 5$ pF.

Figure 2. Reverse Recovery Time

APPLICATION INFORMATION

Large negative transients occurring at the inputs of memory devices (DRAMs, SRAMs, EPROMs, etc.) or on the CLOCK lines of many clocked devices can result in improper operation of the devices. The SN74S1056 diode termination array helps suppress negative transients caused by transmission-line reflections, crosstalk, and switching noise.

Diode terminations have several advantages when compared to resistor termination schemes. Split resistor or Thevenin equivalent termination can cause a substantial increase in power consumption. The use of a single resistor to ground to terminate a line usually results in degradation of the output high level, resulting in reduced noise immunity. Series damping resistors placed on the outputs of the driver reduce negative transients, but they also can increase propagation delays down the line, as a series resistor reduces the output drive capability of the driving device. Diode terminations have none of these drawbacks.

The operation of the diode arrays in reducing negative transients is explained in the following figures. The diode conducts current when the voltage reaches a negative value large enough for the diode to turn on. Suppression of negative transients is tracked by the current-voltage characteristic curve for that diode. A typical current versus voltage plot for the SN74S1056 is shown in Figure 3.

To illustrate how the diode arrays act to reduce negative transients at the end of a transmission line, the test setup in Figure 4(a) was evaluated. The resulting waveforms with and without the diode are shown in Figure 4(b).

The maximum effectiveness of the diode arrays in suppressing negative transients occurs when the diode arrays are placed at the end of a line and/or the end of a long stub branching off a main transmission line. The diodes also can be used to reduce the negative transients that occur due to discontinuities in the middle of a line. An example of this is a slot in a backplane that is provided for an add-on card.

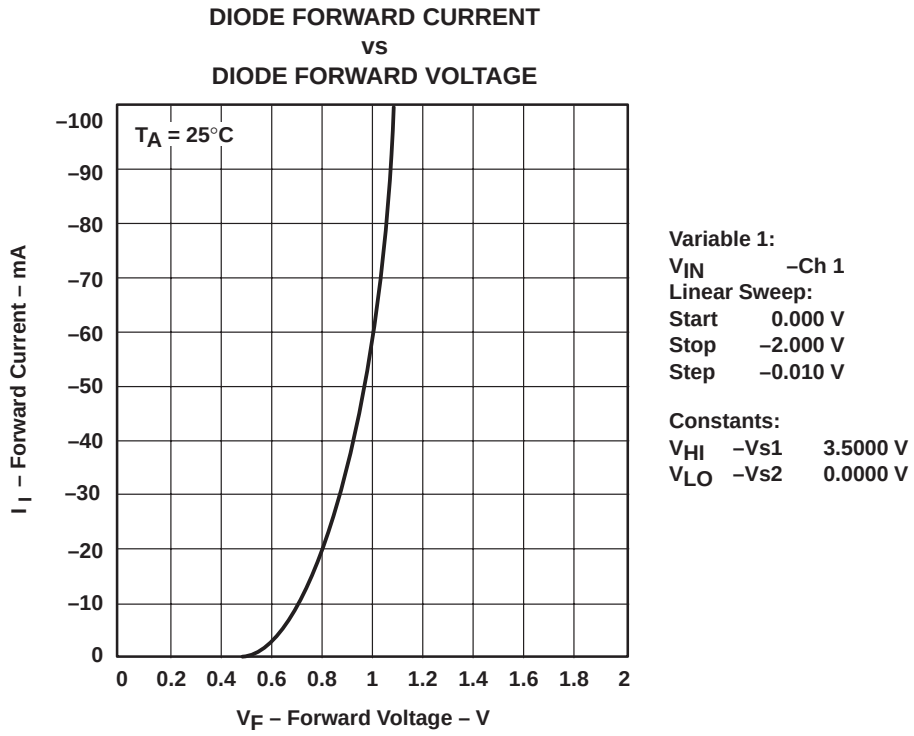
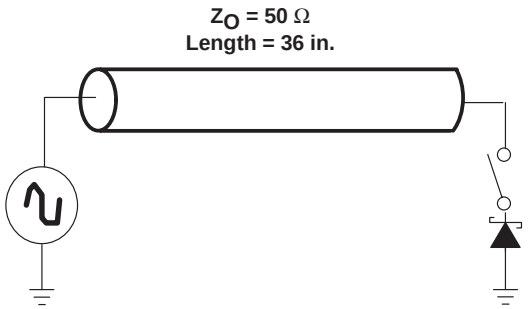
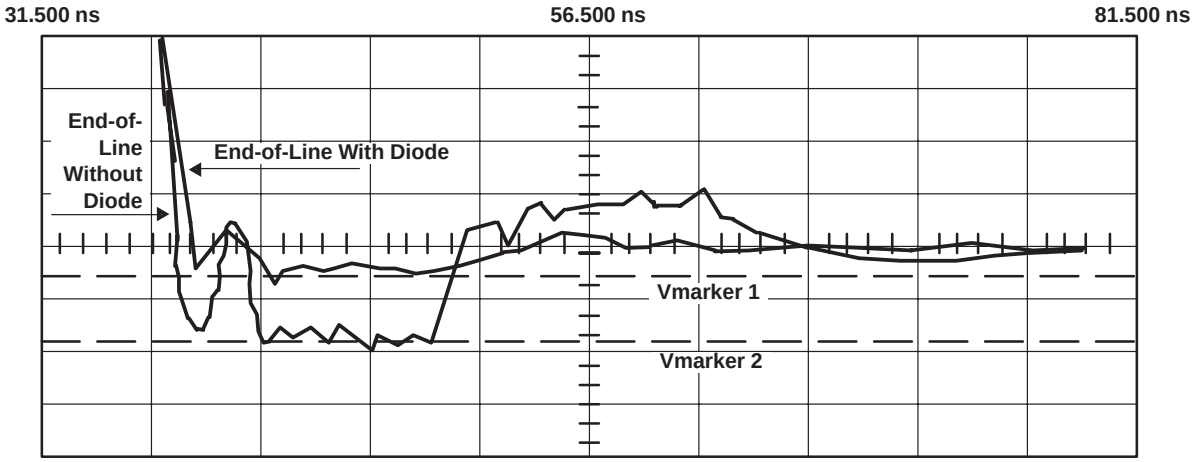


Figure 3. Current Versus Voltage for the SN74S1056

APPLICATION INFORMATION



(a) DIODE TEST SETUP



Ch 1 = 1.880 V/div
Timebase = 5.00 ns/V
Memory 1 = 1.880 V/div
Vmarker 1 = –1.353 V
Vmarker 2 = –3.647 V

Offset = 0.000 V
Delay = 56.500 ns
Delta V = –2.293 V

(b) OSCILLOSCOPE DISPLAY

Figure 4. Diode Test Setup and Oscilloscope Display

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