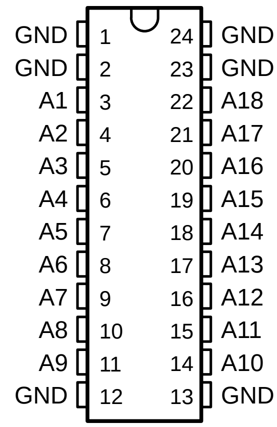
- **Designed to Reduce Reflection Noise**
- **Repetitive Peak Forward Current . . . 300 mA**
- **18-Bit Array Structure Suited for Bus-Oriented Systems**

DW PACKAGE
(TOP VIEW)

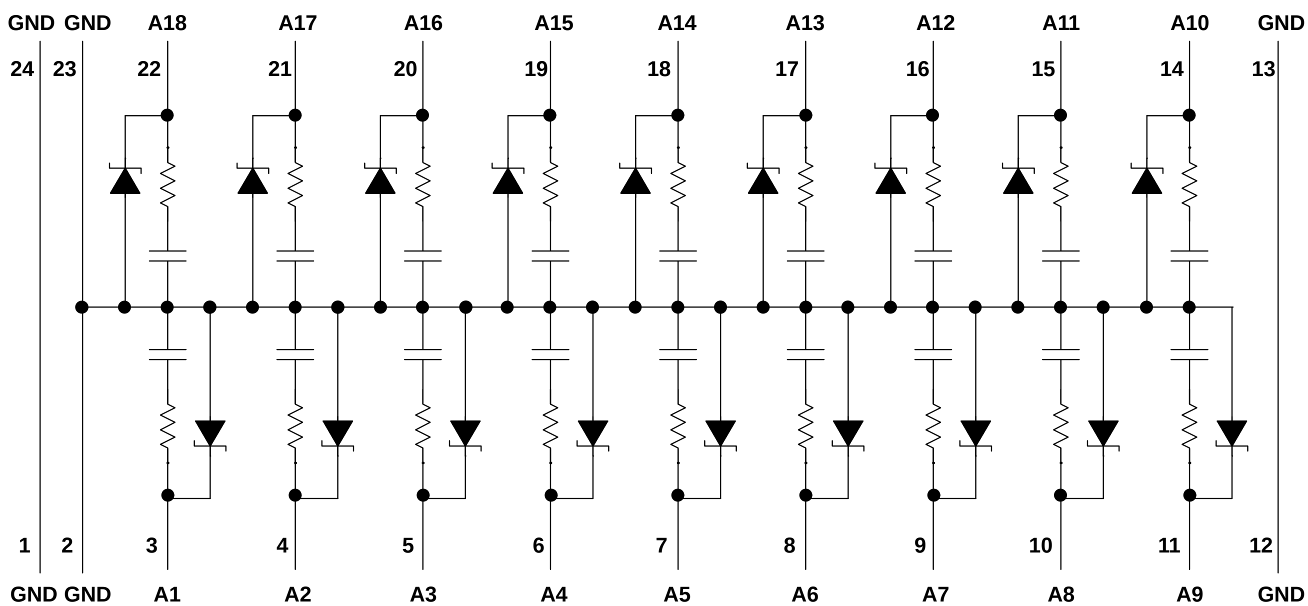


description

This bus-termination array is designed to reduce reflection noise and minimize ringing on high-performance bus lines. The SN74F1018 features an 18-bit R-C network and Schottky barrier diode array. These Schottky diodes provide clamp-to-ground functionality and serve to minimize overshoot and undershoot of high-speed switching buses.

The SN74F1018 is characterized for operation from 0°C to 70°C.

schematic diagram



Resistor = 50 Ω ± 10%
Capacitor = 47 pF ± 10%, V_R = 2.5 V, f = 1 MHz
Diode = Schottky

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}‡: 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 . . . . 500 mW
Operating free-air temperature range . . . . 0°C to 70°C
Storage temperature range . . . . –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.
‡ These values apply for $t_w \le 100$ µs, duty cycle ≤ 20%.

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

single-diode operation (see Note 1)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
I_R	Static reverse current	$V_R = 7$ V			2	µA
V_F	Static forward voltage	$I_F = 18$ mA		0.8	1	V
		$I_F = 50$ mA		1	1.2	
V_{FM}	Peak forward voltage	$I_F = 200$ mA		1.25		V
C_t	Total capacitance	$V_R = 0$			80	pF
		$V_R = 2$ V			60	
		$V_R = 3$ V			55	

† All typical values are at $T_A = 25°C$.
NOTE 1: 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 GND current = 1.2 A,	See Note 2		10	50	µA

NOTE 2: 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, $T_A = 25°C$

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, $R_L = 100\ \Omega$		8	10	ns

undershoot characteristics

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{US}	Undershoot voltage	$t_f = 2$ ns, $t_w = 50$ ns, $V_{IH} = 5$ V, $V_{IL} = 0$, $Z_S = 25\ \Omega$, $Z_O = 50\ \Omega$, L = 36-inch coaxial cable		0.7	0.8	V

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 SN74F1018 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 will reduce negative transients, but they can also 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 Figure 1. The diode conducts current whenever 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 voltage for the SN74F1018 is shown in Figure 1.

The maximum effectiveness of the diode arrays in suppressing negative transients occurs when they are placed at the end of a line and/or the end of a long stub branching off a main transmission line. The diodes can also 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.

DIODE FORWARD CURRENT
vs
DIODE FORWARD VOLTAGE

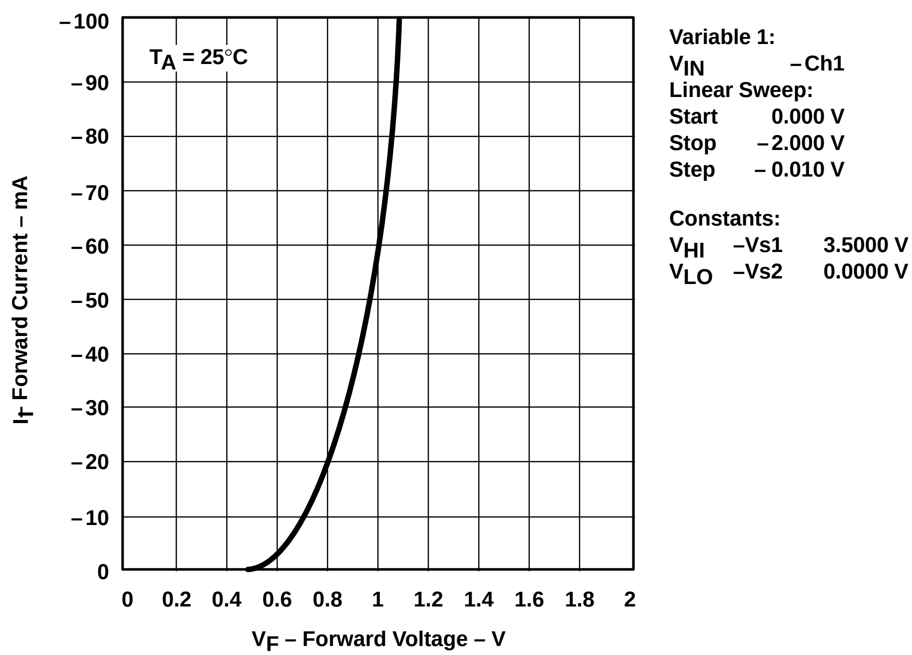
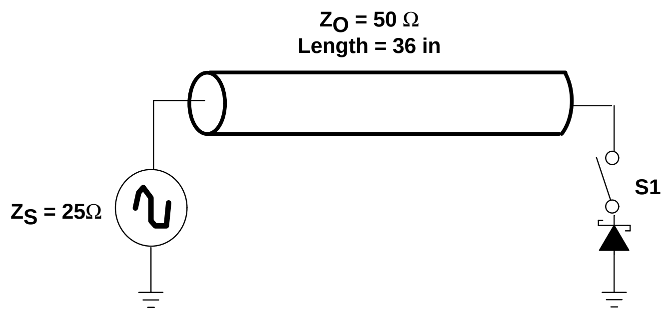
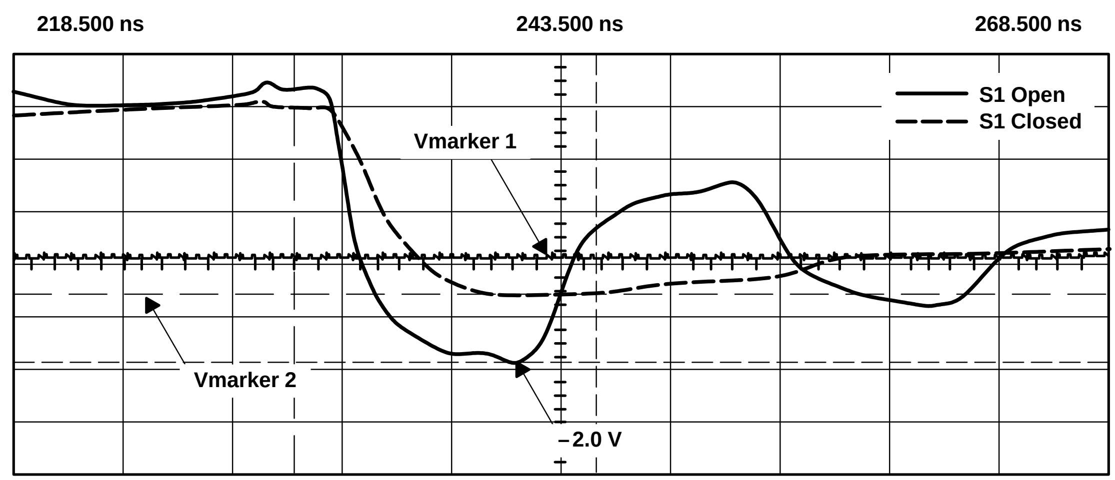


Figure 1



(a) UNDERSHOOT TEST SETUP



Ch. 1	=	1.00 V/div	Offset	=	– 20.00 mV
Timebase	=	5.00 ns/div	Delay	=	243.5 ns
Vmarker 1	=	0.00 V	Delta V	=	–640.00 mV
Vmarker 2	=	–640.00 mV			

(b) SCOPE DISPLAY

Figure 2. Undershoot Test Setup and Scope Display

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