

# SN74F1018

## 18-BIT SCHOTTKY BARRIER DIODE R-C BUS-TERMINATION ARRAY

SDFS094 – NOVEMBER 1992 – REVISED DECEMBER 1993

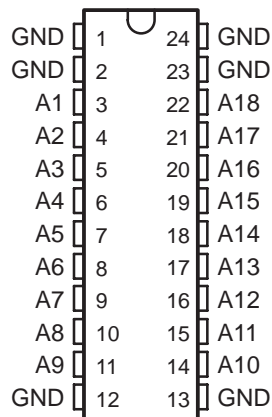
- Designed to Reduce Reflection Noise
- Repetitive Peak Forward Current . . . 300 mA
- 18-Bit Array Structure Suited for Bus-Oriented Systems

### description

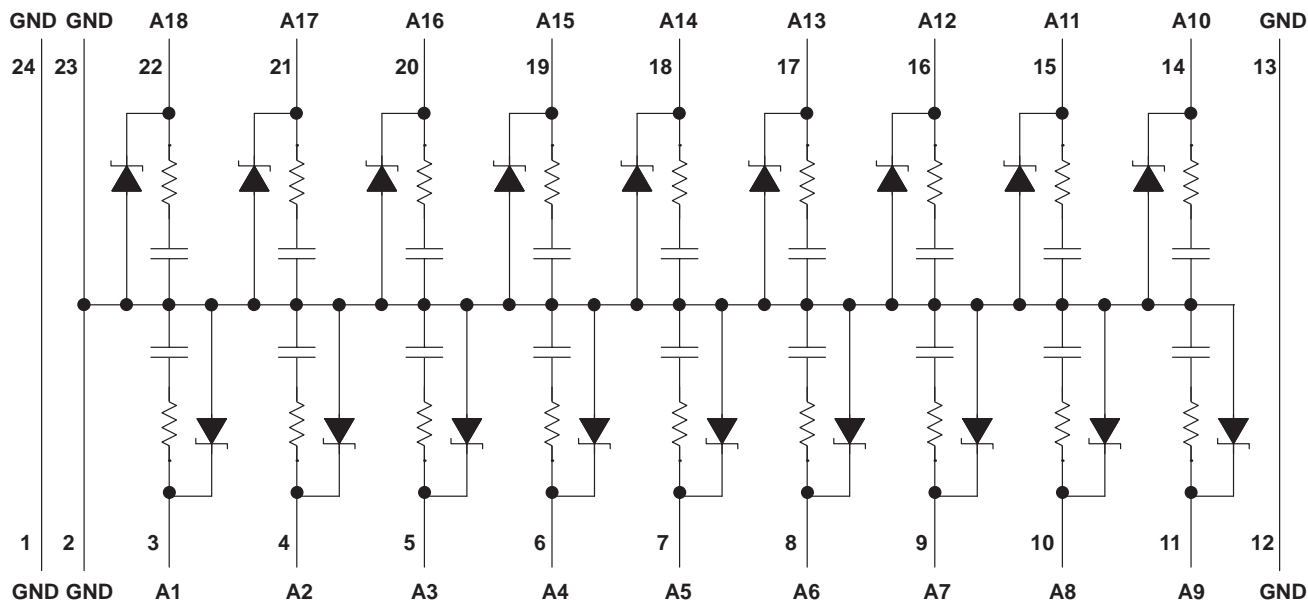
This bus-termination array is designed to reduce reflection noise and minimize ringing on high-performance bus lines. The SN74F1018 features an 18-bit R-C network and Schottky barrier diode array. These Schottky diodes provide clamp-to-ground functionality and serve to minimize overshoot and undershoot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

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

DW PACKAGE  
(TOP VIEW)



### schematic diagram



Resistor =  $50 \Omega \pm 10\%$   
 Capacitor =  $47 \text{ pF} \pm 10\%$ ,  $V_R = 2.5 \text{ V}$ ,  $f = 1 \text{ MHz}$   
 Diode = Schottky

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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, $I_{FRM}^\ddagger$ : 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  $t_W \leq 100 \mu s$ , duty cycle  $\leq 20\%$ .

#### 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	$\mu A$
$V_F$ 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  $T_A = 25^\circ C$ .

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	$\mu A$

NOTE 2:  $I_x$  is measured under the following conditions with one diode static, all others switching:

Switching diodes:  $t_W = 100 \mu s$ , duty cycle = 20%;

Static diode:  $V_R = 5 V$ ; the static diode input current is the internal crosstalk current  $I_x$ .

##### switching characteristics, $T_A = 25^\circ C$

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.

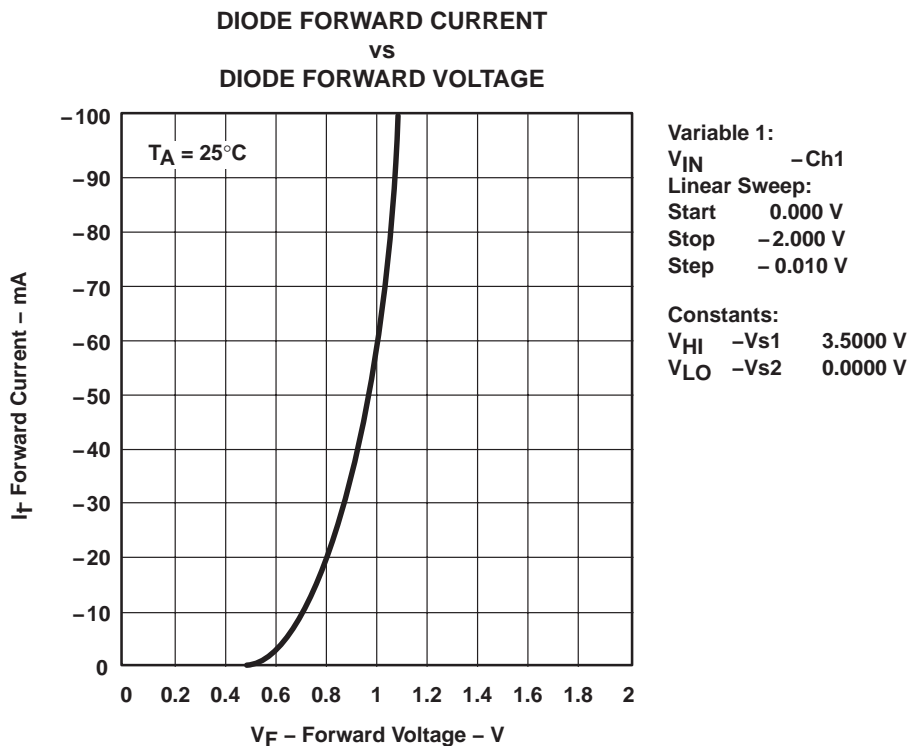
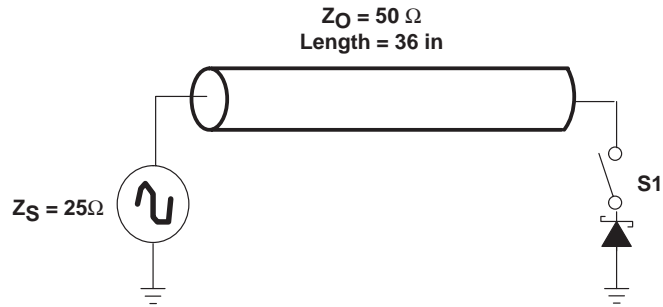


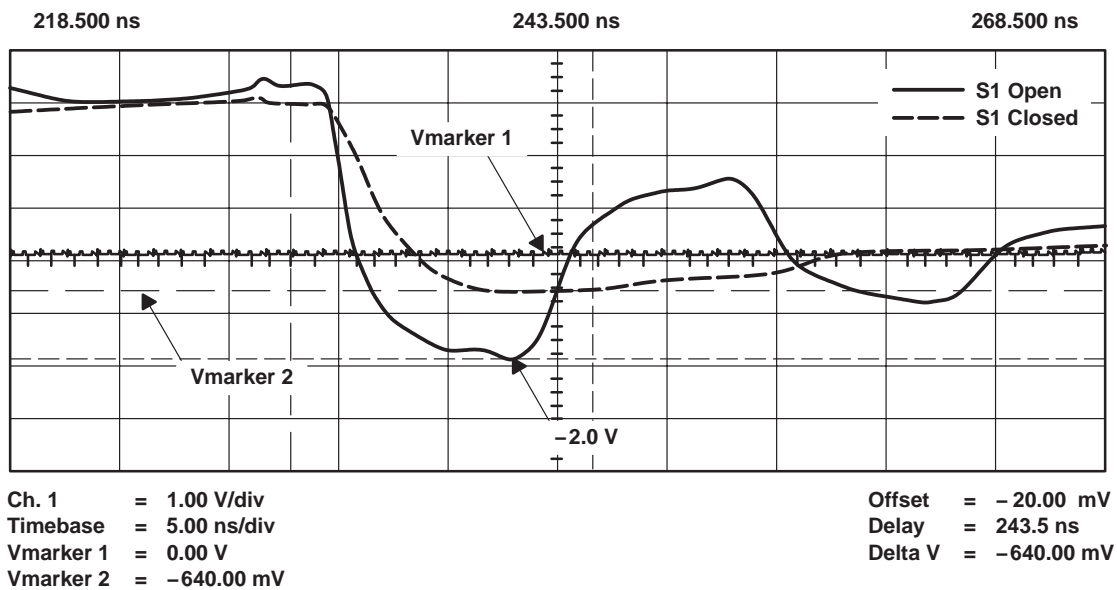
Figure 1

**SN74F1018**  
**18-BIT SCHOTTKY BARRIER DIODE**  
**R-C BUS-TERMINATION ARRAY**

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(a) UNDERSHOOT TEST SETUP



(b) SCOPE DISPLAY

Figure 2. Undershoot Test Setup and Scope Display

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN74F1018DW	OBSOLETE	SOIC	DW	24		TBD	Call TI	Call TI

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

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<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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