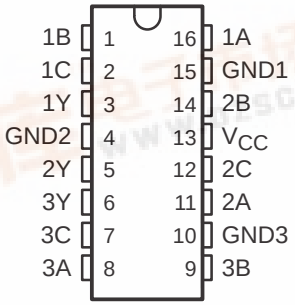
TL52055
WIDE-BANDWIDTH, 2-INPUT, 1-OUTPUT 3-CIRCUIT VIDEO SWITCH

SCDS169 – MAY 2004

- Functionally Similar to M52055, NJM2283, MM1231, and BA7602
- V_{CC} Operating Range From 4.5 V to 9 V
- Wide Frequency Range (0 dB at 40 MHz, V_{CC} = 5 V)
- Crosstalk (−75 dB at 4.43 MHz)
- BiCMOS Technology
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Performance Tested Per JESD 22
  - 2000-V Human-Body Model (A114-B, Class II)
  - 1000-V Charged-Device Model (C101)
- Applications
  - Digital TV, LCD TV, PDP TV, and CRT TV
  - VCR, Projector, and DVD Player

D OR PW PACKAGE
(TOP VIEW)



description/ordering information

The TL52055 is a wide-bandwidth, 2-input, 1-output, 3-circuit video switch. All inputs are bias types. The select (1C, 2C, 3C) inputs control the signal path of A port and B port. The device can be used for switching separate video signals and component-video signals and is suitable for DTV, LCD, PDP, and other high-quality AV systems. The device provides no loss (0 dB) up to 40 MHz and has a very low crosstalk.

ORDERING INFORMATION

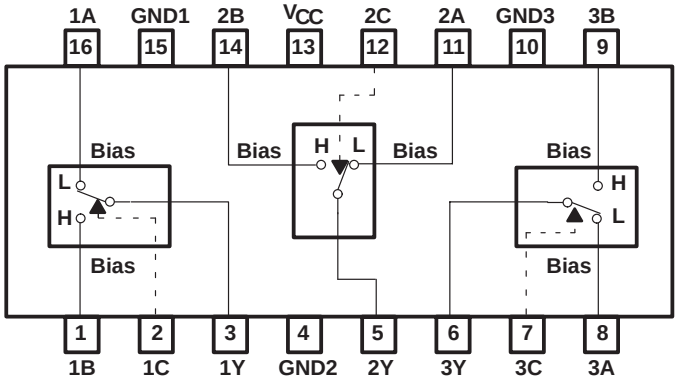
T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 85°C	SOIC − D	Tube	TL52055D	TL52055
		Tape and reel	TL52055DR	
	TSSOP − PW	Tape and reel	TL52055PWR	ZA055

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE

INPUT C	ON CHANNEL
L	A port to Y port
H	B port to Y port
OPEN	A port to Y port

block diagram



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

Supply voltage range, V_{CC} . . . . . −0.3 V to 12 V
Package thermal impedance, θ_{JA} (see Note 1): D package . . . . . 73°C/W
PW package . . . . . 108°C/W
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: The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

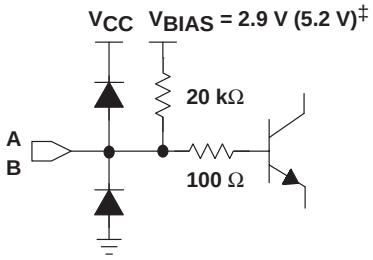
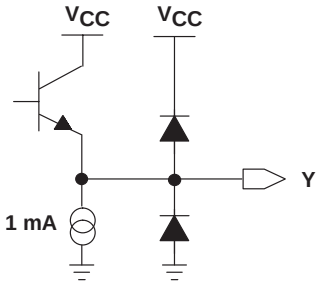
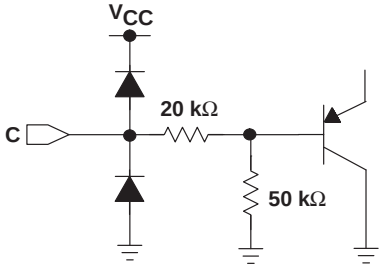
		MIN	MAX	UNIT
V_{CC}	Supply voltage	4.5	9	V
T_A	Operating free-air temperature	−40	85	°C

electrical characteristics V_{CC} = 5 V/9 V, T_A = 25°C (see Note 2)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
I_{CC1}	Operating current 1	V_{CC} = 9 V, No signal		10.3	14	mA
I_{CC2}	Operating current 2	V_{CC} = 5 V, No signal		9.4	12	mA
f†	Frequency bandwidth	V_{CC} = 5 V, V_{IN} = 1 V_{P-P}		40		MHz
G_V	Voltage gain	F_{IN} = 1, 10 MHz, V_{IN} = 1 V_{P-P}	−0.6	−0.1	0.4	dB
G_F‡	Flatness of voltage gain	F_{IN} = 30 MHz/1 MHz, V_{IN} = 1 V_{P-P}		0		dB
CT_{SW}§	Switch crosstalk	F_{IN} = 4.43 MHz, V_{IN} = 1 V_{P-P}		−75	−60	dB
CT_{CH}¶	Channel crosstalk	F_{IN} = 4.43 MHz, V_{IN} = 1 V_{P-P}		−75	−60	dB
D_G	Differential gain	V_{IN} = 1 V_{P-P}, 10-step video signal		0.3		%
D_P	Differential phase	V_{IN} = 1 V_{P-P}, 10-step video signal		0.3		deg
V_{OS}	Output offset voltage		−10	0	10	mV
Z_I	Input impedance			20		kΩ
V_{IH}	High-level control input voltage (C inputs)	V_{CC} = 5 V and 9 V	2		V_{CC}	V
V_{IL}	Low-level control input voltage (C inputs)	V_{CC} = 5 V and 9 V	0		0.8	V

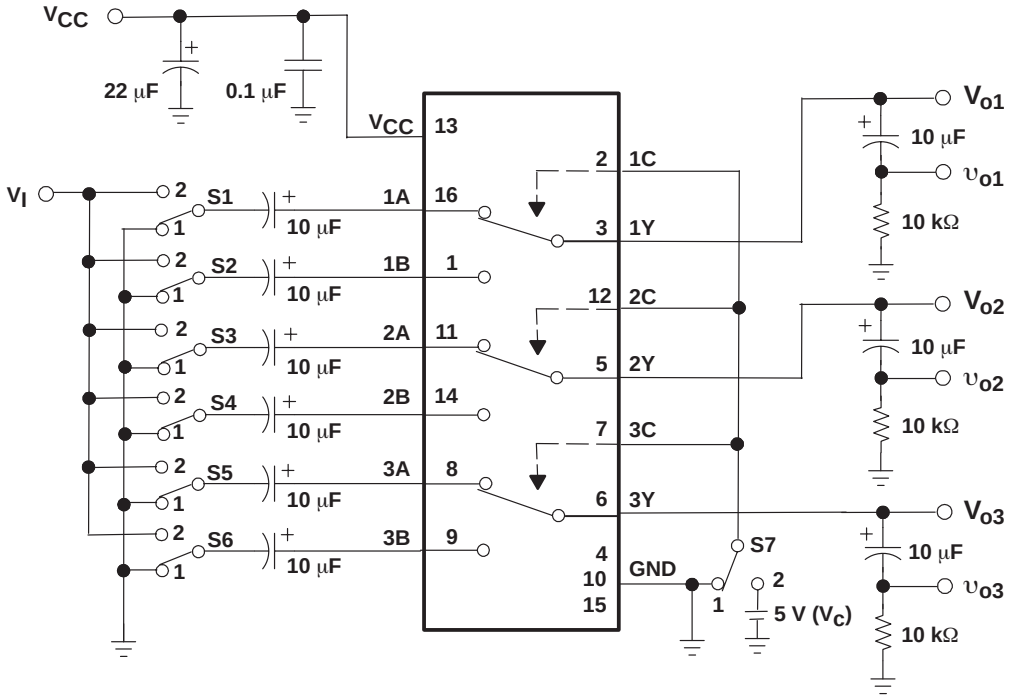
† Frequency bandwidth is defined as the maximum frequency, with 0-dB gain.
‡ G_F is the difference of G_V at 30 MHz and at 1 MHz.
§ Switch crosstalk is defined as the crosstalk from an ON-channel to an OFF-channel (xA to xB).
¶ Channel crosstalk is defined as the crosstalk between two ON-channels (1Y to 2Y, 2Y to 3Y).
NOTE 2: All unused inputs of the device must be open or connected to GND through a capacitor to ensure proper device operation.

equivalent circuit, V_{CC} = 5 V (9 V)†

PIN NO.	PIN NAME	INSIDE EQUIVALENT CIRCUIT	VOLTAGE	NOTE
16 1 11 14 8 9	1A 1B 2A 2B 3A 3B		2.9 V (5.2 V)†	Input
3 5 6	1Y 2Y 3Y		2.1 (4.4)†	Output
2 12 7	1C 2C 3C			Control
13	V_{CC}			
15 4 10	GND1 GND2 GND3			

† Voltages in parentheses are associated with V_{CC} = 9 V.
‡ V_{BIAS} is an internal voltage source.

PARAMETER MEASUREMENT INFORMATION



SYMBOL	S1	S2	S3	S4	S5	S6	S7	MEASUREMENT POINT
I_{CC1}	1	1	1	1	1	1	1	V_{CC}
I_{CC2}	1	1	1	1	1	1	1	
G_F	2	1	1	1	1	1	1	υ_{o1}, υ_{o2}, υ_{o3}
G_V	2	1	1	1	1	1	1	
D_G/D_P	2	1	1	1	1	1	1	
CT_{SW1}	2	1	1	1	1	1	2	υ_{o1}
CT_{SW2}	1	2	1	1	1	1	1	
CT_{SW3}	1	1	2	1	1	1	2	υ_{o2}
CT_{SW4}	1	1	1	2	1	1	1	
CT_{SW5}	1	1	1	1	2	1	2	υ_{o3}
CT_{SW6}	1	1	1	1	1	2	1	
CT_{CH1}	2 1	1 2	1 1	1 1	1 1	1 1	1 2	υ_{o2}, υ_{o3}
CT_{CH2}	1 1	1 1	2 1	1 2	1 1	1 1	1 2	υ_{o1}, υ_{o3}
CT_{CH3}	1 1	1 1	1 1	1 1	2 1	1 2	1 2	υ_{o1}, υ_{o2}
V_{OS}	1	1	1	1	1	1	1/2	V_{o1}, V_{o2}, V_{o3}
V_{IH}/V_{IL}	1/2	1/2	1	1	1	1	V_C	V_C

Figure 1. Load Circuit and Test Conditions

TYPICAL CHARACTERISTICS

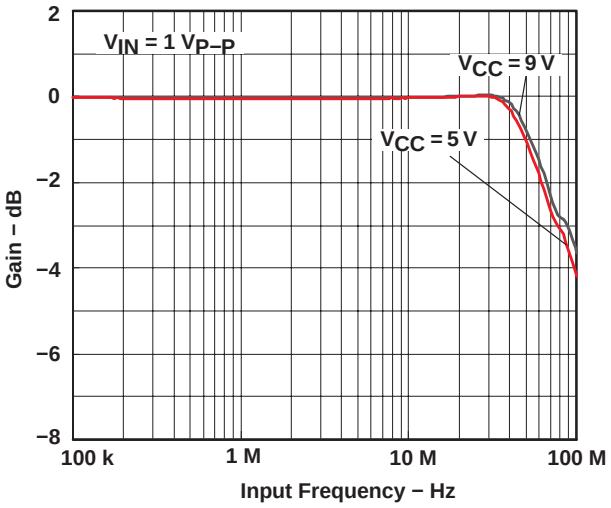


Figure 2. Gain vs Frequency

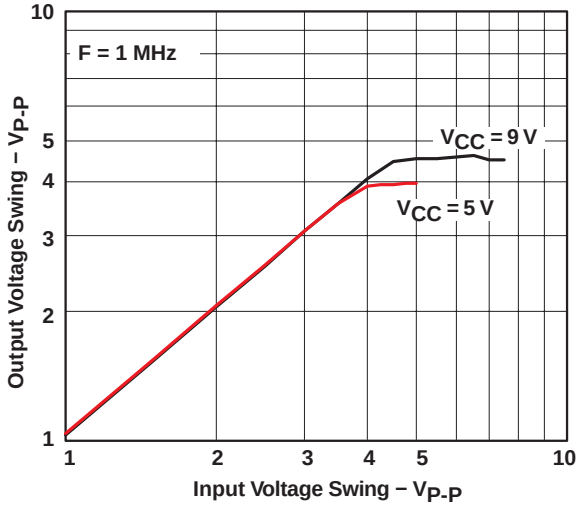


Figure 3. Output Voltage Swing vs Input Voltage Swing

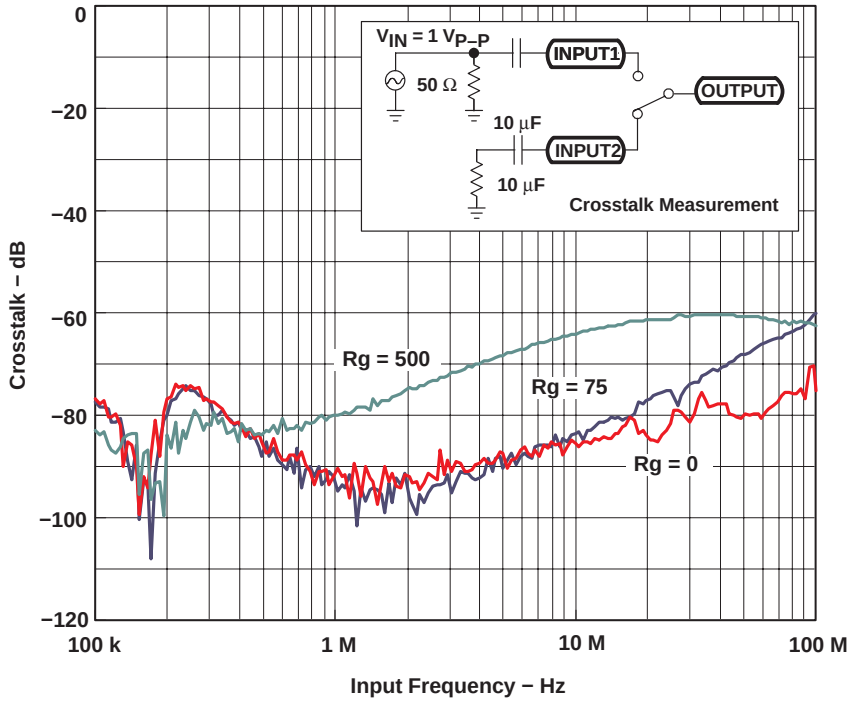


Figure 4. Crosstalk vs Frequency

APPLICATION INFORMATION

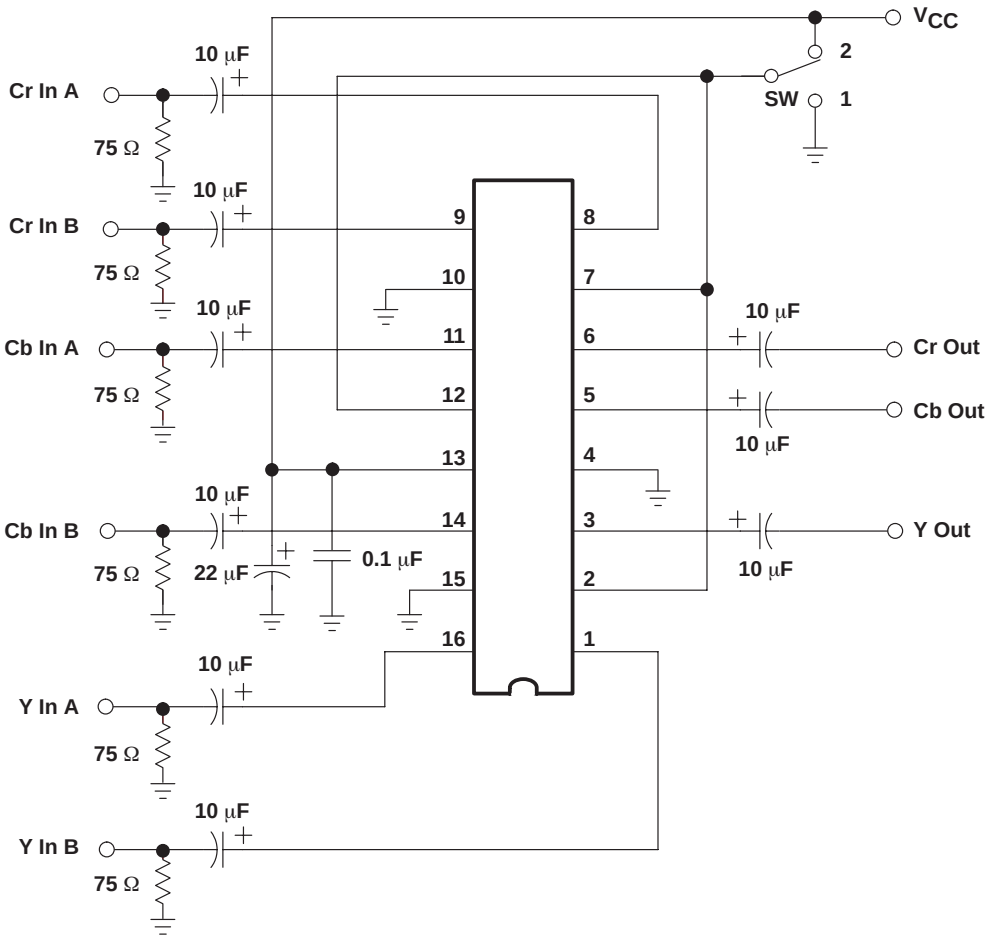
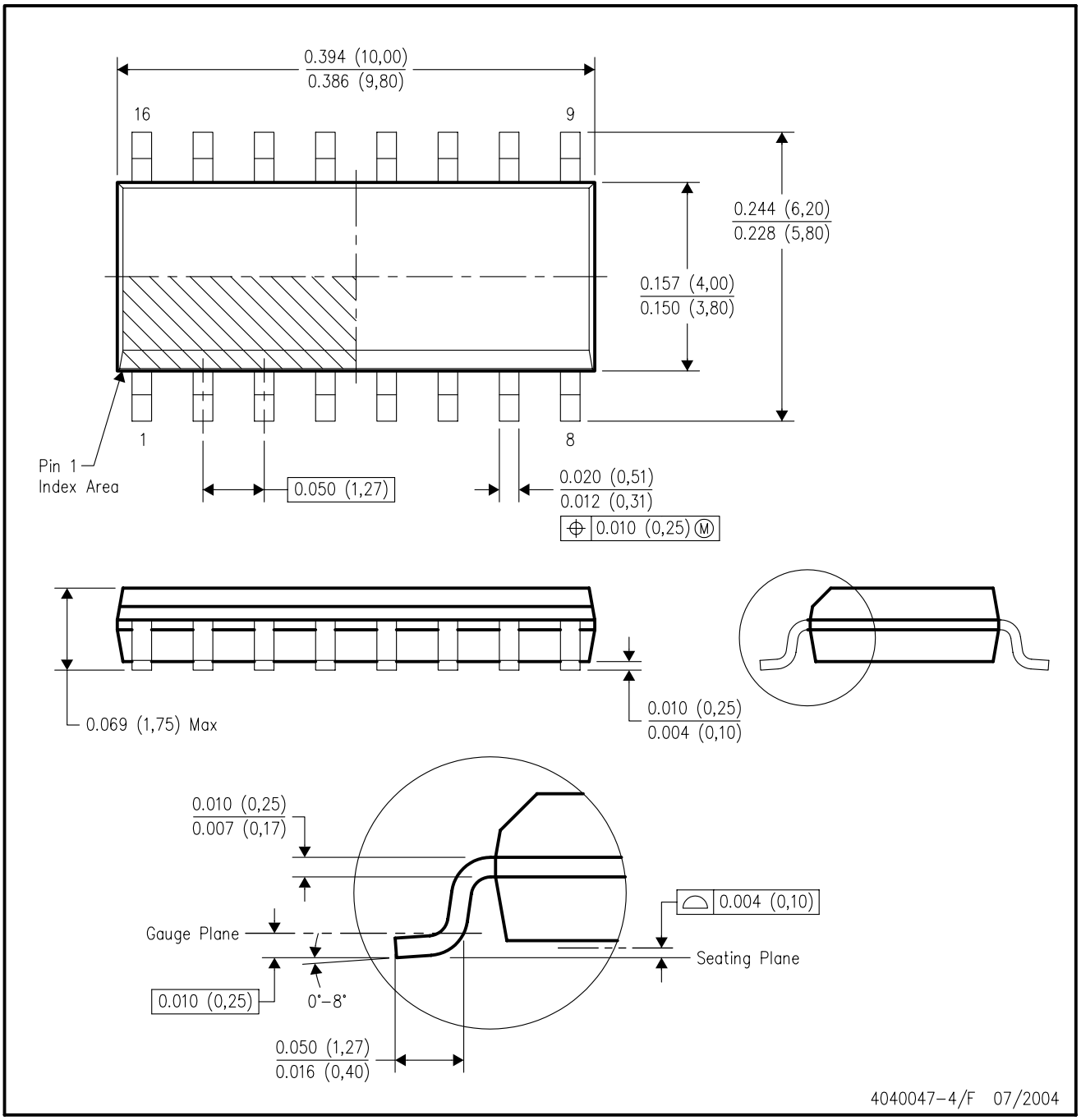


Figure 5. Application of TL52055

Figure 5 shows a typical application of the TL52055 in component-video signaling. Typically, the peak-to-peak amplitude of a component-video signal is less than 1 V. If the frequency of operation is less than 40 MHz, the switch does not cause any loss of signal. Also, due to low crosstalk, there is no degradation of the video switch.

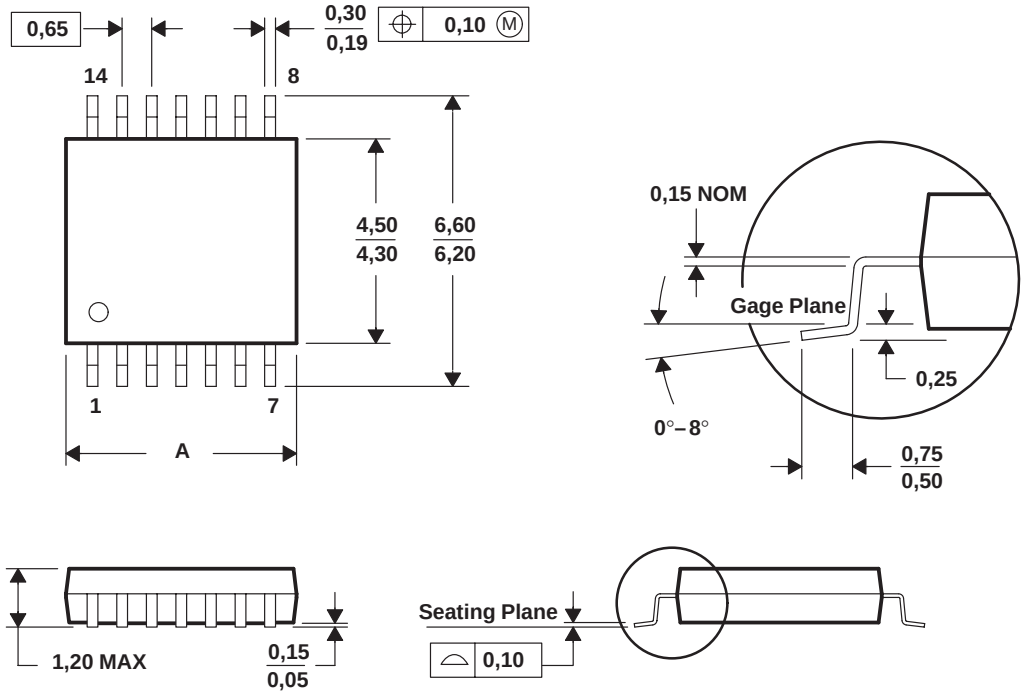
D (R–PDSO–G16) PLASTIC SMALL–OUTLINE PACKAGE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–012 variation AC.

PW (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14 PINS SHOWN



DIM \ PINS **	8	14	16	20	24	28
A MAX	3,10	5,10	5,10	6,60	7,90	9,80
A MIN	2,90	4,90	4,90	6,40	7,70	9,60

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NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
D. Falls within JEDEC MO-153

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Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265