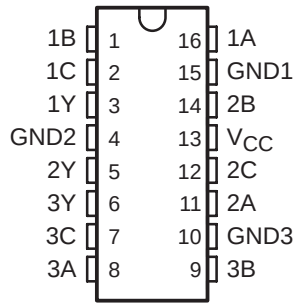
- **Functionally Similar to M52055, NJM2283, MM1231, and BA7602**
- **V_{CC} Operating Range From 4.5 V to 9 V**
- **Wide Frequency Range (0 dB at 40 MHz, V_{CC} = 5 V)**
- **Crosstalk (−75 dB at 4.43 MHz)**
- **BiCMOS Technology**
- **Latch-Up Performance Exceeds 250 mA Per JESD 17**
- **ESD Performance 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

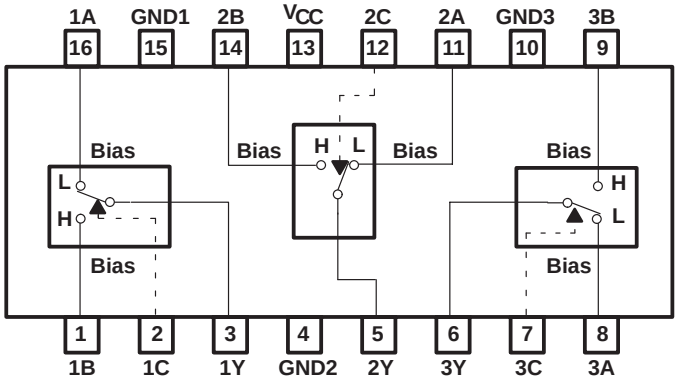
T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 85°C	SOIC − D	Tube	TL52055D	TL52055
		Tape and reel	TL52055DR	
	TSSOP − PW	Tape and reel	TL52055PWR	ZA055

† 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

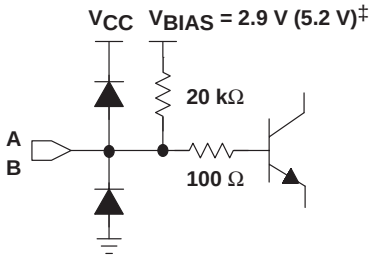
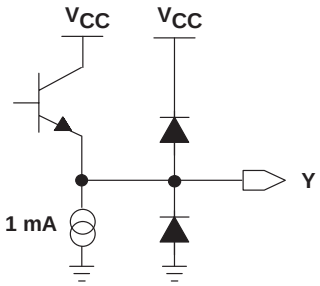
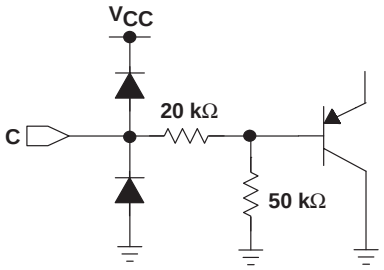
		MIN	MAX	UNIT
V_{CC}	Supply voltage	4.5	9	V
T_A	Operating free-air temperature	−40	85	°C

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

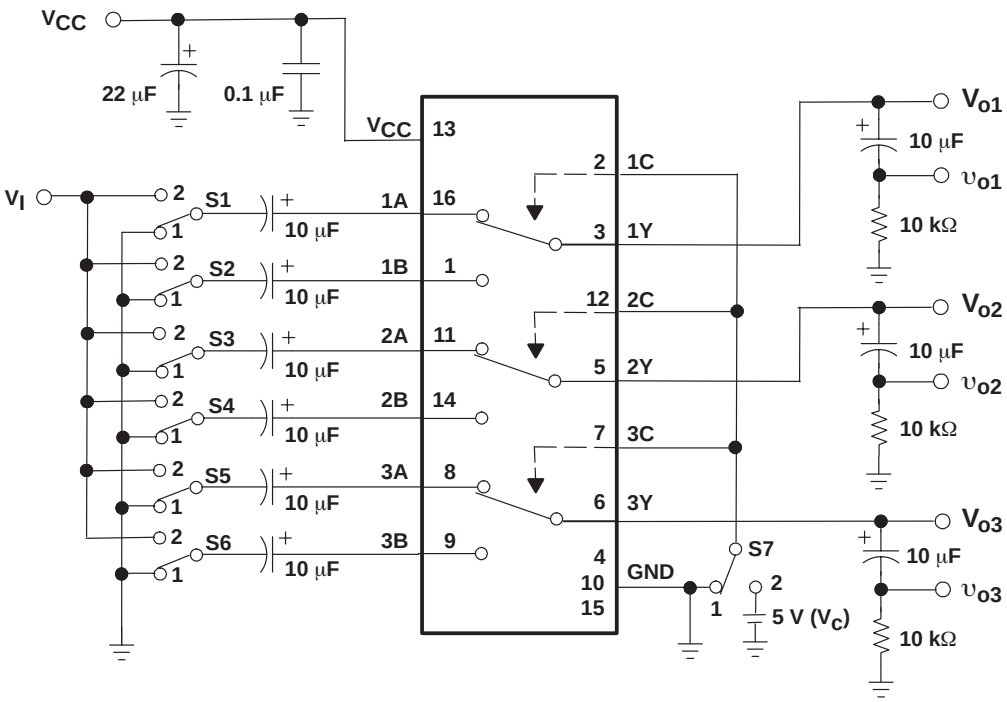
† Frequency bandwidth is defined as the maximum frequency, with 0-dB gain.
‡ G_F is the difference of G_V at 30 MHz and at 1 MHz.
§ Switch crosstalk is defined as the crosstalk from an ON-channel to an OFF-channel (xA to xB).
¶ Channel crosstalk is defined as the crosstalk between two ON-channels (1Y 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 V (4.4 V)†	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	1	1	1	1	υ_{o2}, υ_{o3}
	1	2	1	1	1	1	2	
CT_{CH2}	1	1	2	1	1	1	1	υ_{o1}, υ_{o3}
	1	1	1	2	1	1	2	
CT_{CH3}	1	1	1	1	2	1	1	υ_{o1}, υ_{o2}
	1	1	1	1	1	2	2	
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

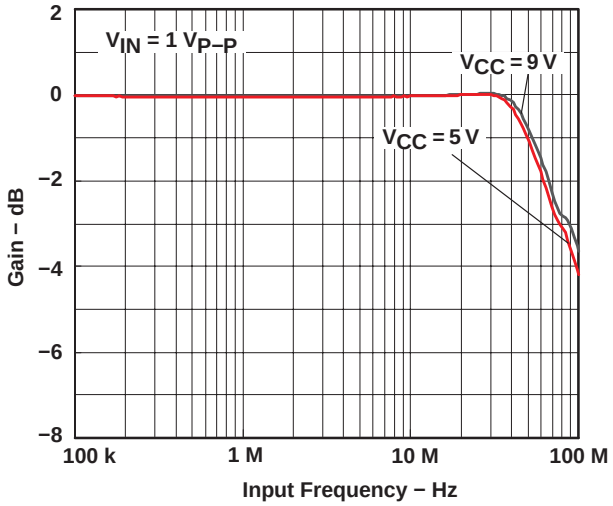


Figure 2. Gain vs Frequency

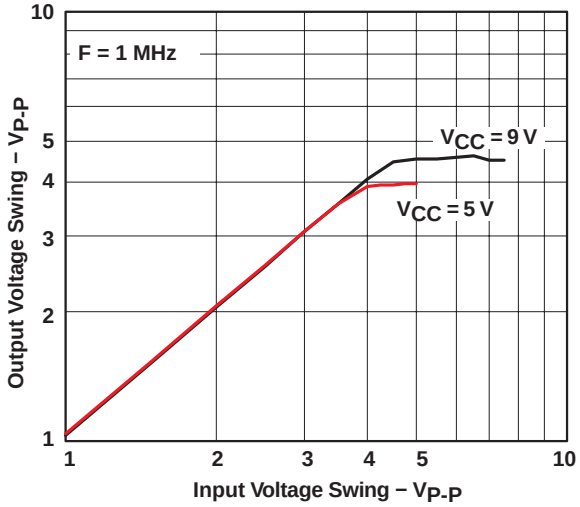


Figure 3. Output Voltage Swing vs Input Voltage Swing

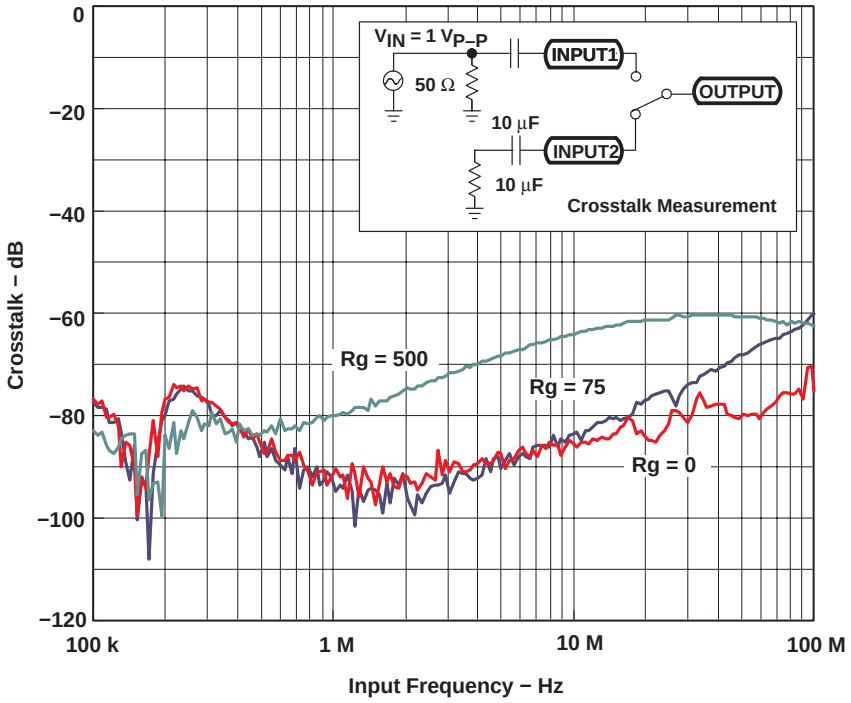


Figure 4. Crosstalk vs Frequency

APPLICATION INFORMATION

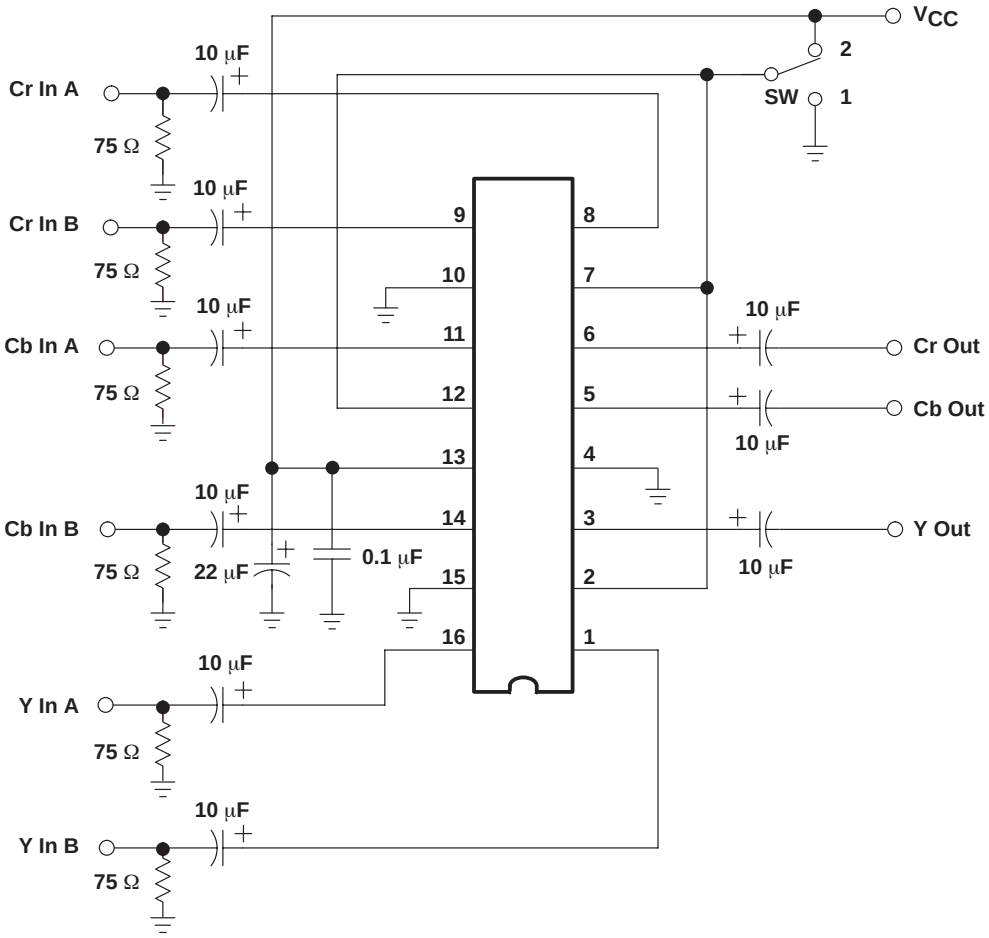


Figure 5. Application of TL52055

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.

USAGE NOTES

1. When using this device, the output drive current should be 5 mA or less.
2. Voltage applied to the control pins (2, 7, and 12) should be less than the power supply voltage (V_{CC}) and greater than the ground voltage (GND).
3. The types of output pins for this device are emitter follower. The drive current list below is applied inside the device. If the drive performance is insufficient, apply external drive current within the range in step 1.

Power-Supply Voltage (V_{CC})	Drive Current in the Device (standard value)
5 V	1 mA
9 V	1 mA

PACKAGING INFORMATION

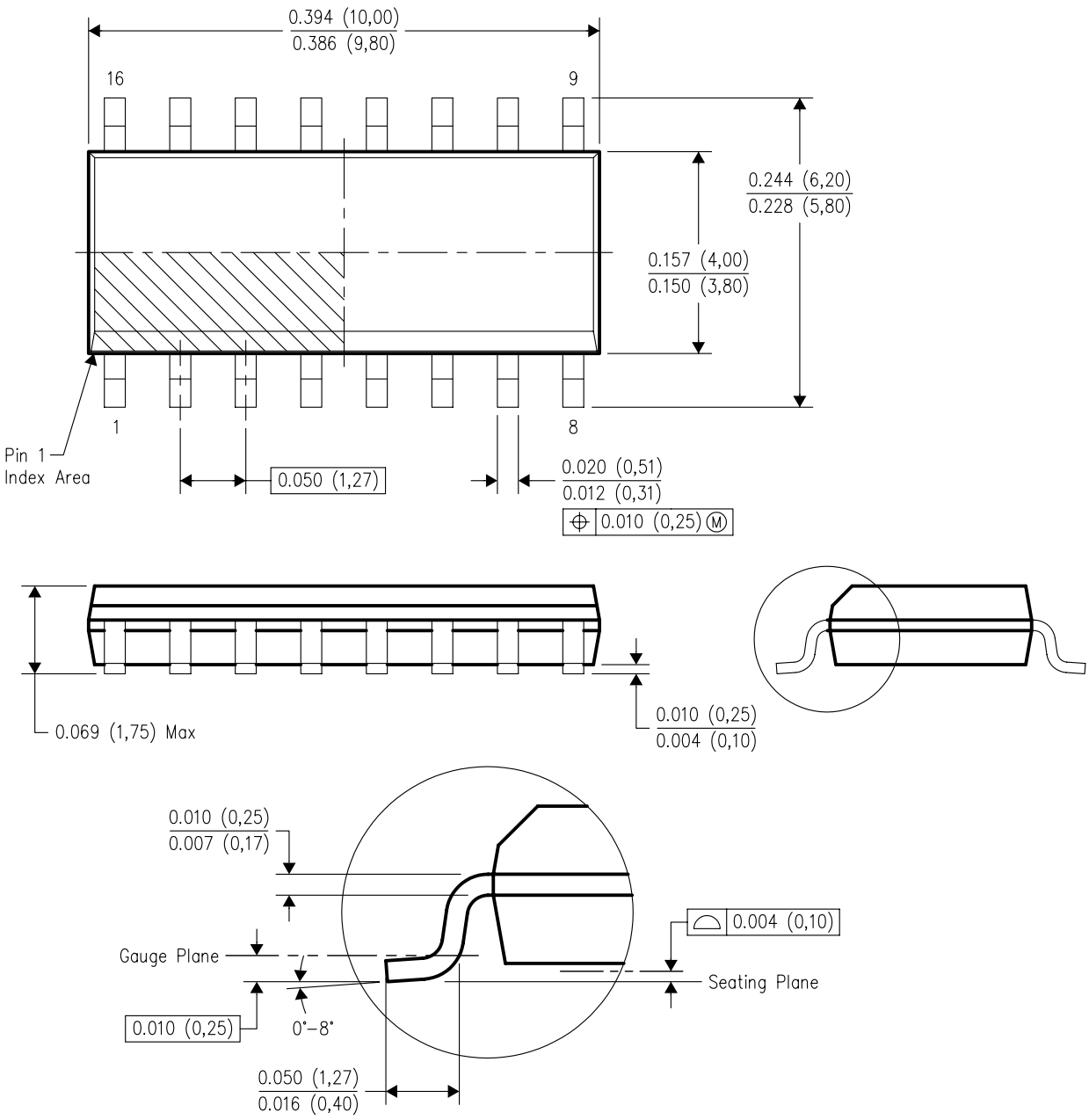
Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
TL52055DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL52055DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL52055PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL52055PWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

(1) 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.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), 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.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

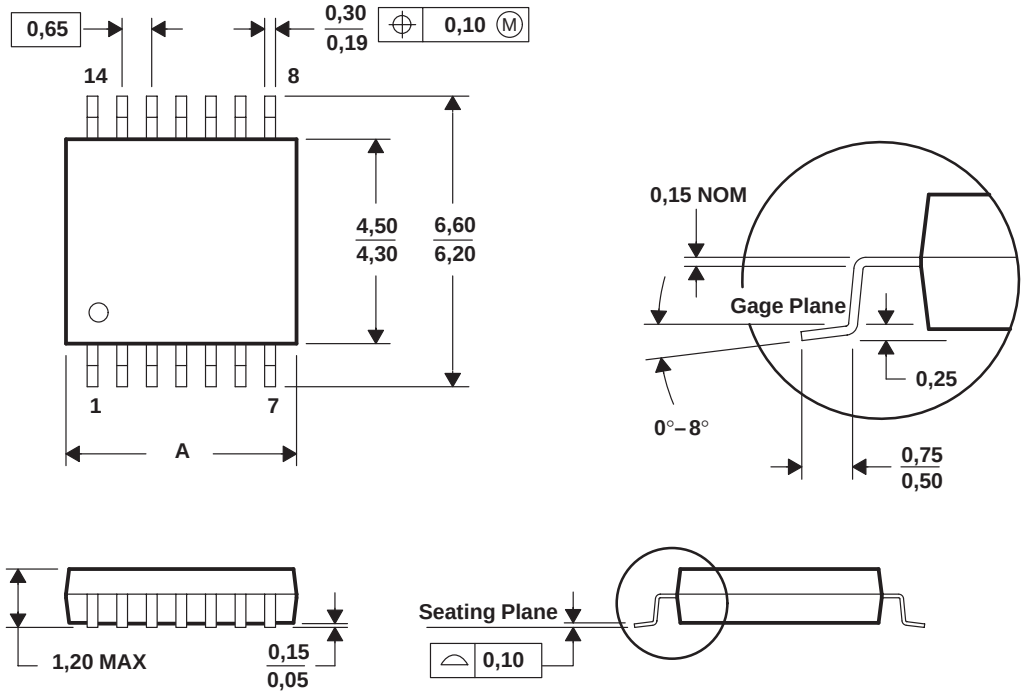
D (R–PDSO–G16) PLASTIC SMALL–OUTLINE PACKAGE



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

4040064/F 01/97

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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