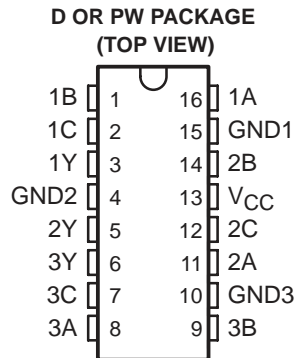**TL52055**
WIDE-BANDWIDTH, 2-INPUT, 1-OUTPUT 3-CIRCUIT VIDEO SWITCH
SCDS169A – MAY 2004 – REVISED APRIL 2005

- 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)

1B	1	16	1A
1C	2	15	GND1
1Y	3	14	2B
GND2	4	13	V_{CC}
2Y	5	12	2C
3Y	6	11	2A
3C	7	10	GND3
3A	8	9	3B

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

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

TEXAS INSTRUMENTS

TL52055
WIDE-BANDWIDTH, 2-INPUT, 1-OUTPUT
3-CIRCUIT VIDEO SWITCH
SCDS169A – MAY 2004 – REVISED APRIL 2005

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.

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

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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	V$_{CC}$ V$_{BIAS}$ = 2.9 V (5.2 V)‡ 20 kΩ A B 100 Ω	2.9 V (5.2 V)†	Input
3 5 6	1Y 2Y 3Y	V$_{CC}$ V$_{CC}$ Y 1 mA	2.1 V (4.4 V)†	Output
2 12 7	1C 2C 3C	V$_{CC}$ 20 kΩ C 50 kΩ		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.

TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

PARAMETER MEASUREMENT INFORMATION
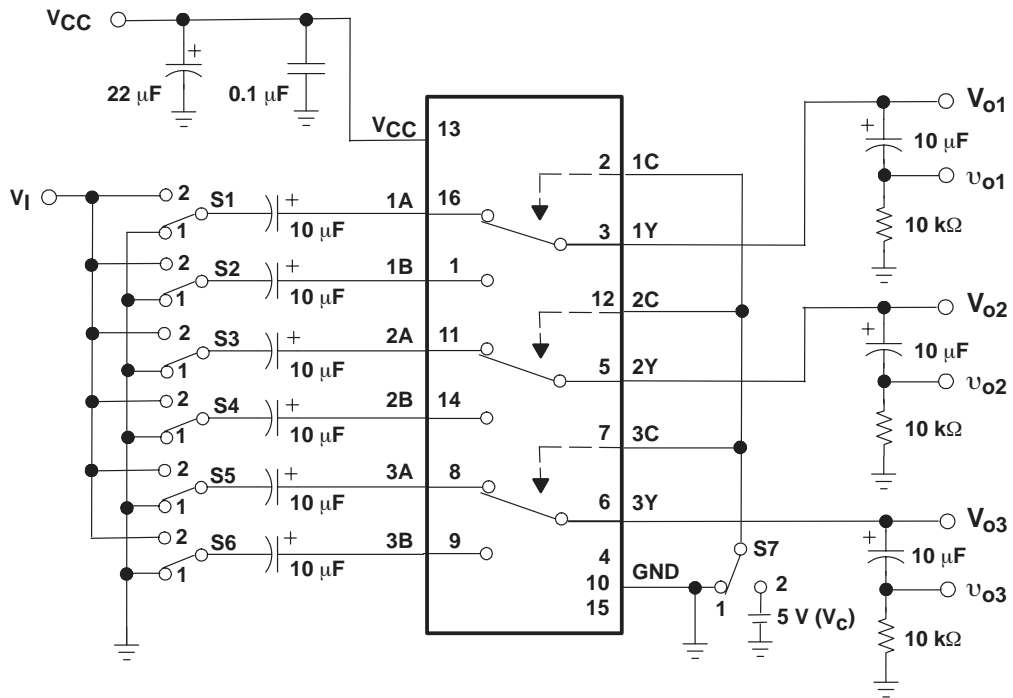
SYMBOL	S1	S2	S3	S4	S5	S6	S7	MEASUREMENT POINT
I_{CC1}	1	1	1	1	1	1	1	V_{CC}
I_{CC2}	1	1	1	1	1	1	1	
G_F	2	1	1	1	1	1	1	$\upsilon_{o1}, \upsilon_{o2}, \upsilon_{o3}$
G_V	2	1	1	1	1	1	1	
D_G/D_P	2	1	1	1	1	1	1	
CT_{SW1}	2	1	1	1	1	1	2	υ_{o1}
CT_{SW2}	1	2	1	1	1	1	1	
CT_{SW3}	1	1	2	1	1	1	2	υ_{o2}
CT_{SW4}	1	1	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	$\upsilon_{o2}, \upsilon_{o3}$
	1	2	1	1	1	1	2	
CT_{CH2}	1	1	2	1	1	1	1	$\upsilon_{o1}, \upsilon_{o3}$
	1	1	1	2	1	1	2	
CT_{CH3}	1	1	1	1	2	1	1	$\upsilon_{o1}, \upsilon_{o2}$
	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

TL52055
WIDE-BANDWIDTH, 2-INPUT, 1-OUTPUT
3-CIRCUIT VIDEO SWITCH
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TYPICAL CHARACTERISTICS
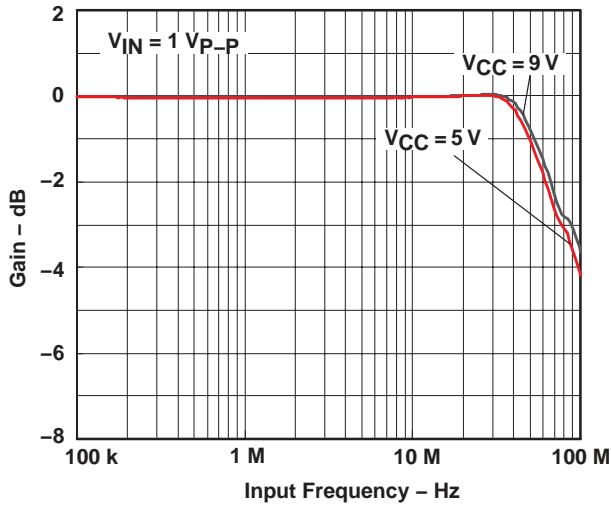
Figure 2. Gain vs Frequency
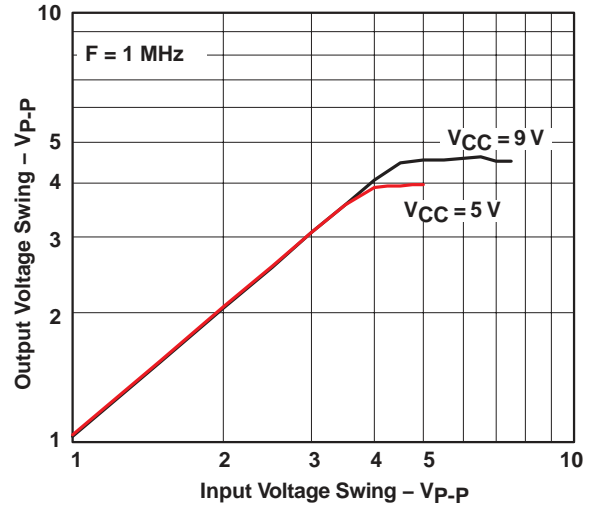
Figure 3. Output Voltage Swing vs Input Voltage Swing
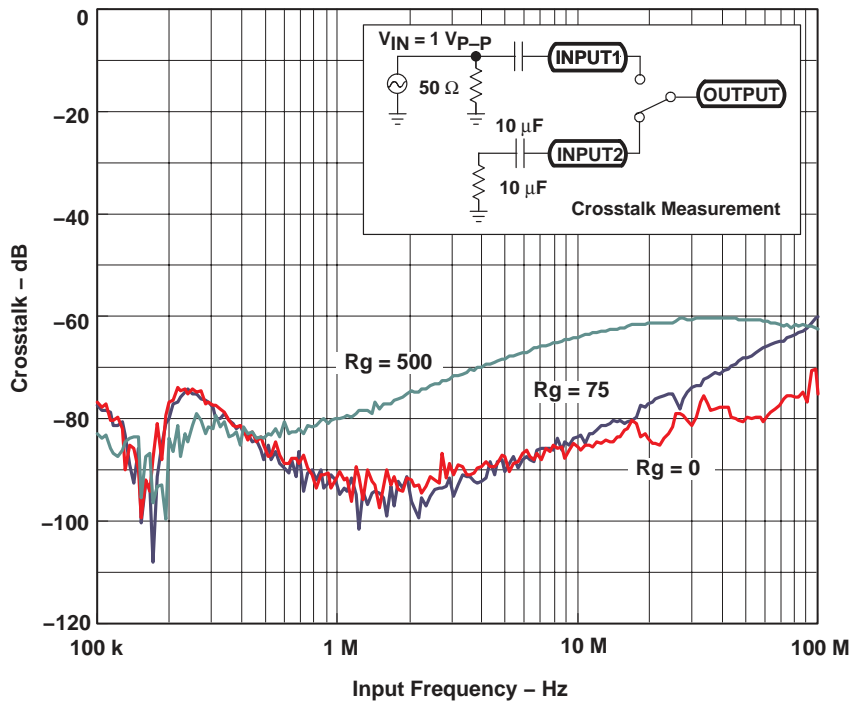
Figure 4. Crosstalk vs Frequency

APPLICATION INFORMATION
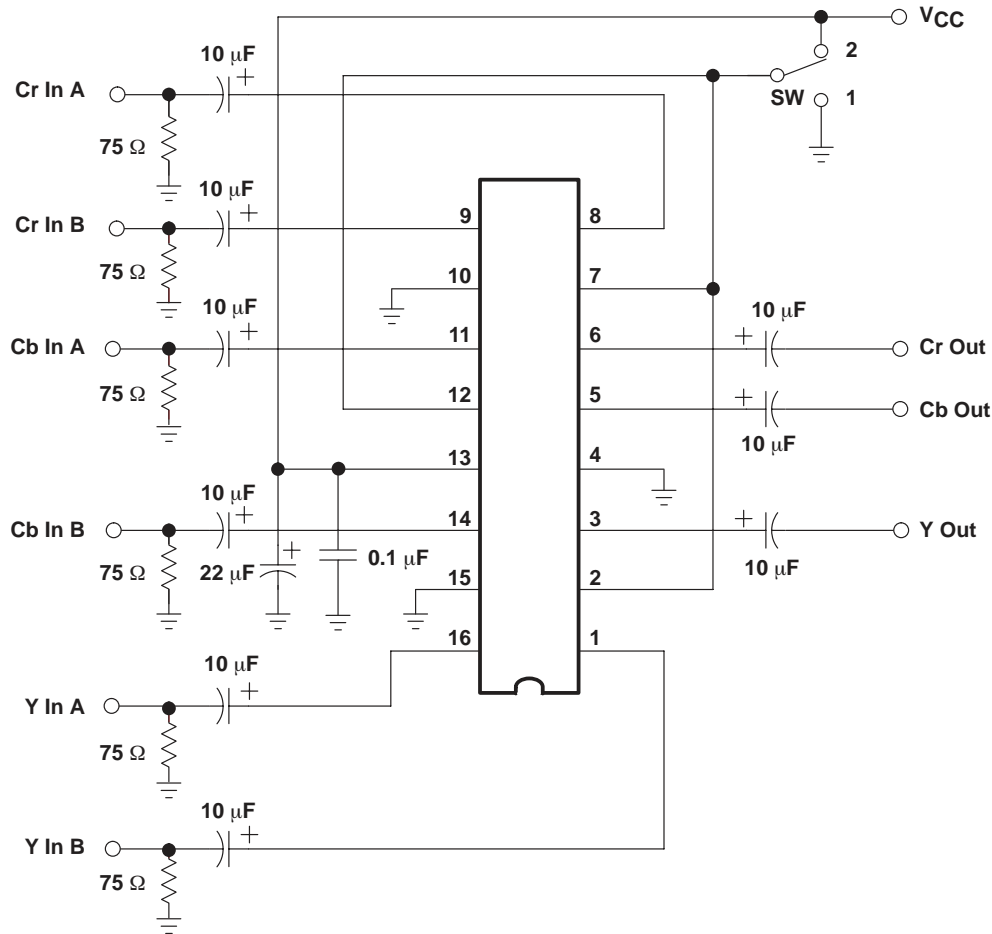
Figure 5. Application of TL52055

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)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL52055DR	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-40 to 85	TL52055	
TL52055DRE4	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-40 to 85		
TL52055DRG4	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-40 to 85		
TL52055PWR	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85	ZA055	
TL52055PWRE4	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85		
TL52055PWRG4	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85		

(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.

(4) Only one of markings shown within the brackets will appear on the physical device.

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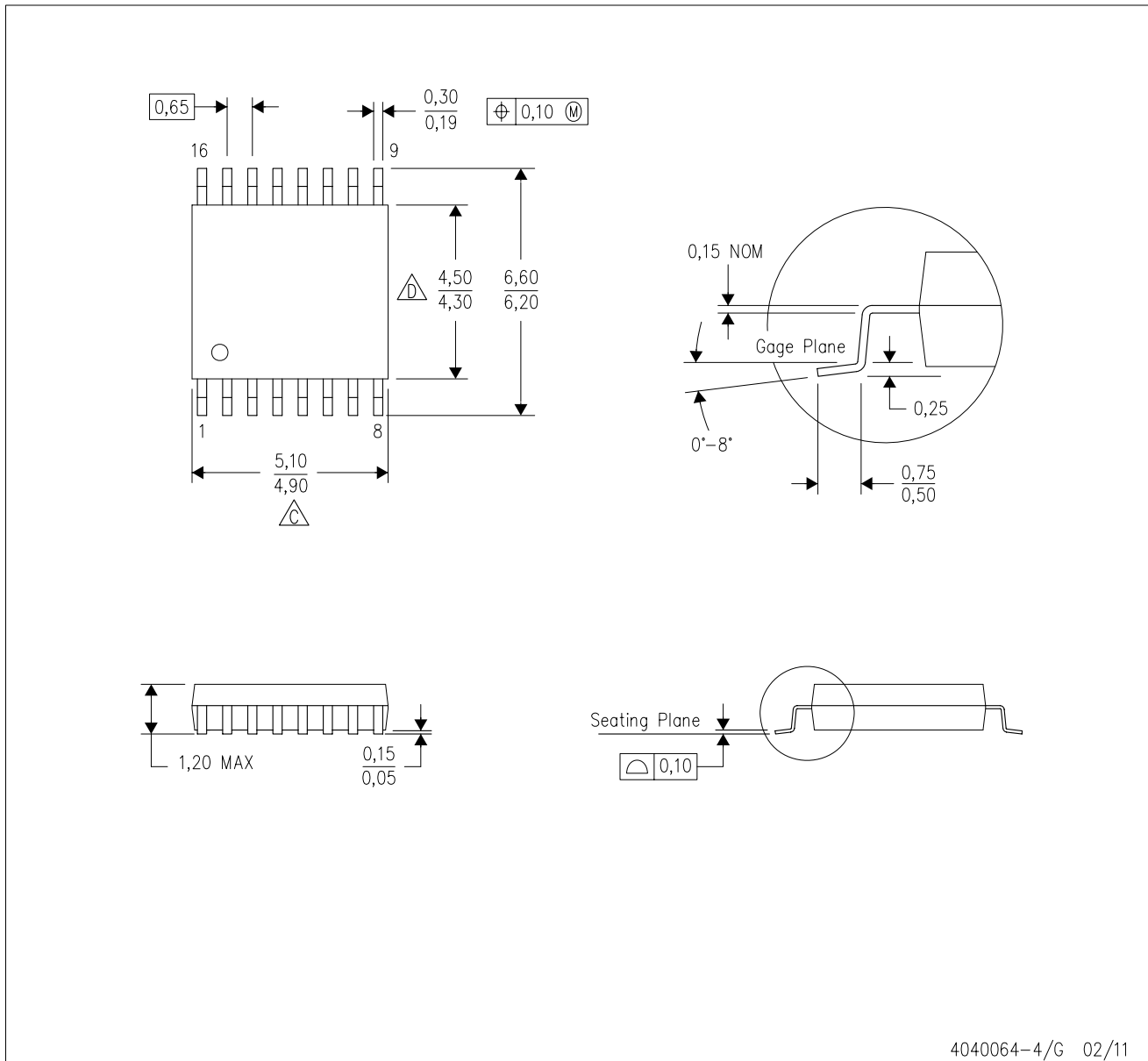D (R−PDSO−G16)   PLASTIC SMALL OUTLINE

0.394 (10,00)
0.386 (9,80)
⚠C

16   9

0.244 (6,20)
0.228 (5,80)

0.157 (4,00)
0.150 (3,80) ⚠D

1   8

Pin 1
Index Area

0.050 (1,27)

0.020 (0,51)
0.012 (0,31)
⊕ 0.010 (0,25) Ⓜ

0.069 (1,75) Max

0.010 (0,25)
0.004 (0,10)

0.010 (0,25)
0.005 (0,13)

0.004 (0,10)

Gauge Plane

Seating Plane

0.010 (0,25)   0°–8°

0.050 (1,27)
0.016 (0,40)
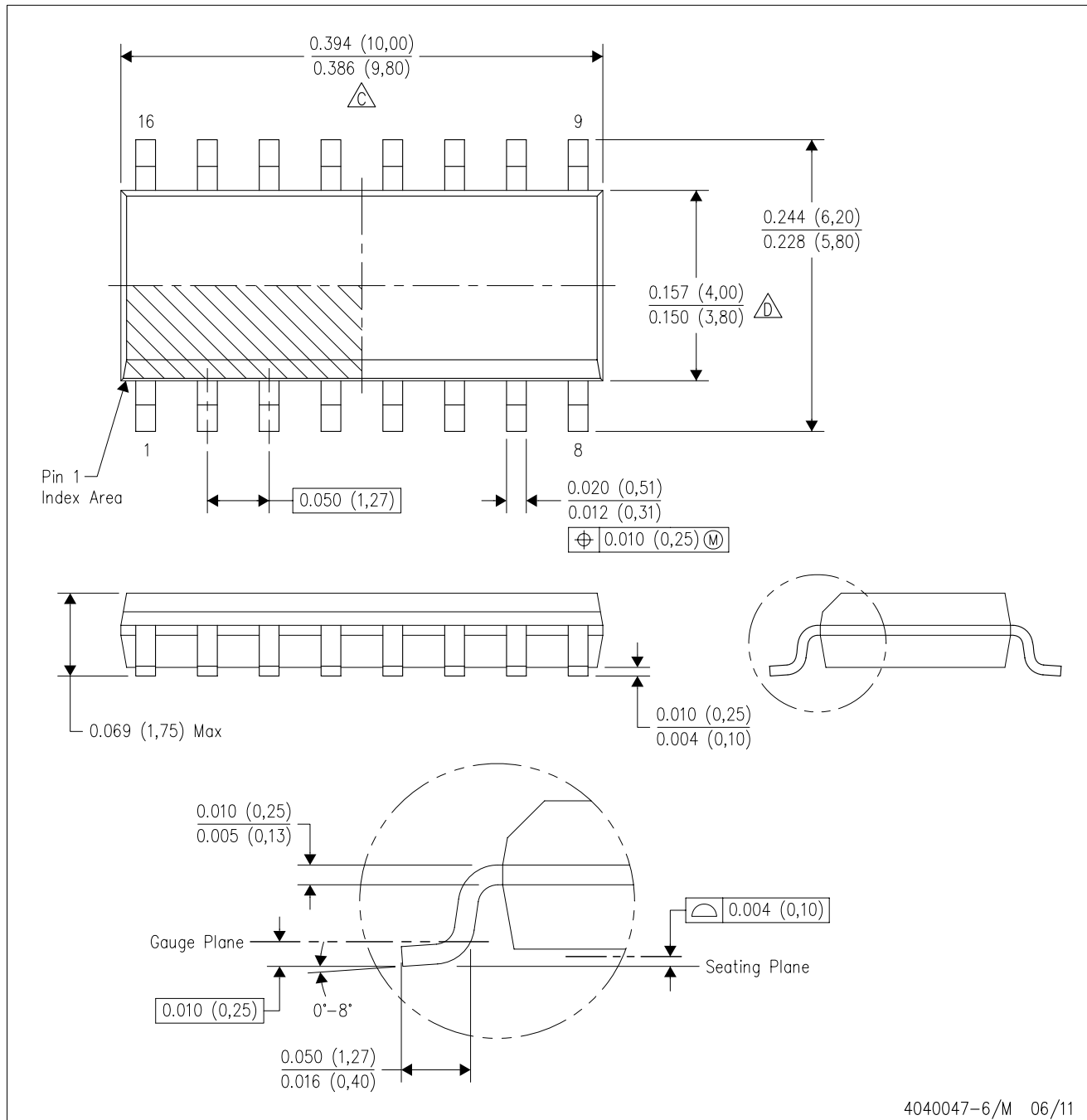
4040047-6/M   06/11

NOTES: A. All linear dimensions are in inches (millimeters).
         B. This drawing is subject to change without notice.
       ⚠C Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall
             not exceed 0.006 (0,15) each side.
       ⚠D Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
         E. Reference JEDEC MS–012 variation AC.

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PW (R−PDSO−G16)   PLASTIC SMALL OUTLINE

0,65

0,30 / 0,19

⊕ 0,10 Ⓜ

16

9

D̸ 4,50 / 4,30

6,60 / 6,20

1

8

5,10 / 4,90

△C

0,15 NOM

Gage Plane

0°−8°

0,25

0,75 / 0,50

1,20 MAX

0,15 / 0,05

Seating Plane

⌒ 0,10

4040064−4/G 02/11

NOTES: A.   All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M−1994.
         B.   This drawing is subject to change without notice.
         △C   Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
         △D   Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
         E.   Falls within JEDEC MO−153

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