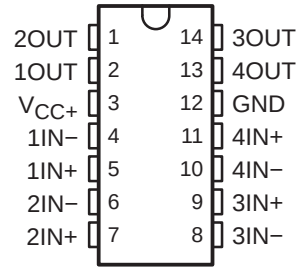
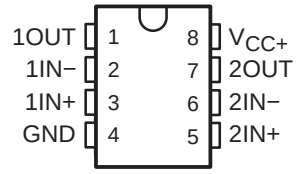
- **2.7-V and 5-V Performance**
- **Low Supply Current:**
  LMV331 . . . 60 μA Typ
  LMV393 . . . 100 μA Typ
  LMV339 . . . 170 μA Typ
- **Input Common-Mode Voltage Range Includes Ground**
- **Low Output Saturation Voltage . . . 200 mV Typ**
- **Open-Collector Output for Maximum Flexibility**

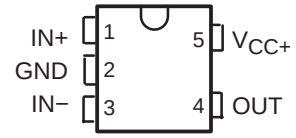
LMV339 . . . D OR PW PACKAGE
(TOP VIEW)



LMV393 . . . D, DDU, DGK, OR PW PACKAGE
(TOP VIEW)



LMV331 . . . DBV OR DCK PACKAGE
(TOP VIEW)



description/ordering information

The LMV393 and LMV339 devices are low-voltage (2.7 V to 5.5 V) versions of the dual and quad comparators, LM393 and LM339, which operate from 5 V to 30 V. The LMV331 is the single-comparator version.

The LMV331, LMV339, and LMV393 are the most cost-effective solutions for applications where low-voltage operation, low power, space saving, and price are the primary specifications in circuit design for portable consumer products. These devices offer specifications that meet or exceed the familiar LM339 and LM393 devices at a fraction of the supply current.

ORDERING INFORMATION

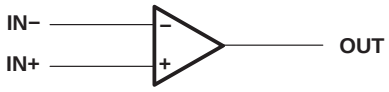
T_A		PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING‡
−40°C to 85°C	Single	SC-70 (DCK)	Reel of 3000	LMV331IDCKR	R2_
			Reel of 250	LMV331IDCKT	
		SOT23-5 (DBV)	Reel of 3000	LMV331IDBVR	R1I_
			Reel of 250	LMV331IDBVT	
	Dual	MSOP/VSSOP (DGK)	Reel of 2500	LMV393IDGKR	R9R
		SOIC (D)	Tube of 75	LMV393ID	MV393I
			Reel of 2500	LMV393IDR	
		TSSOP (PW)	Tube of 90	LMV393IPW	MV393I
			Reel of 2000	LMV393IPWR	
		VSSOP (DDU)	Reel of 2000	LMV393IDDUR	RABR
	Quad	SOIC (D)	Tube of 50	LMV339ID	LMV339I
			Reel of 2500	LMV339IDR	
		TSSOP (PW)	Tube of 150	LMV339IPW	MV339I
			Reel of 2000	LMV339IPWR	

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

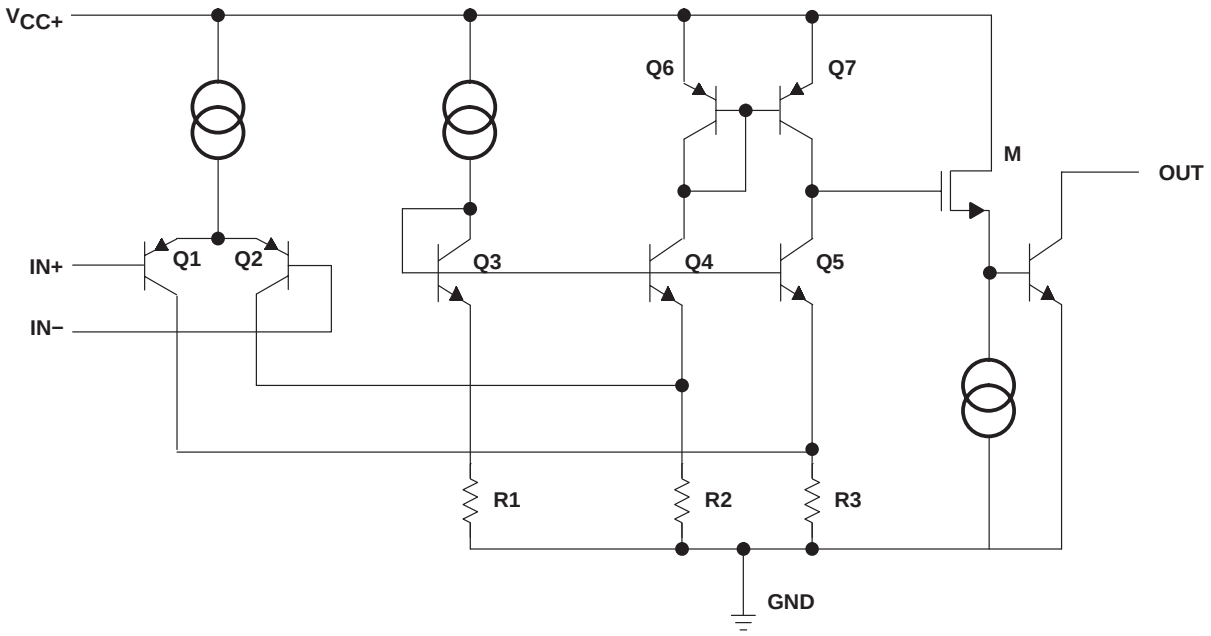
‡ DBV/DCK: The actual top-side marking has one additional character that designates the assembly/test site.

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.

symbol (each comparator)



simplified schematic



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

Supply voltage, V_{CC+} (see Note 1)	5.5 V
Differential input voltage, V_{ID} (see Note 2)	±5.5 V
Input voltage range, V_I (either input)	0 V to 5.5 V
Package thermal impedance, θ_{JA} (see Notes 3 and 4): D (8-pin) package	97°C/W
D (14-pin) package	86°C/W
DBV package	206°C/W
DCK package	252°C/W
DDU package	TBD°C/W
DGK package	172°C/W
PW (8-pin) package	149°C/W
PW (14-pin) package	113°C/W
Operating virtual junction temperature, T_J	150°C
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.

NOTES: 1. All voltage values (except differential voltages and V_{CC+} specified for the measurement of I_{OS}) are with respect to the network GND.
2. Differential voltages are at IN+ with respect to IN−.
3. Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) − T_A)/\theta_{JA}$. Selecting the maximum of 150°C can affect reliability.
4. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

		MIN	MAX	UNIT
V_{CC+}	Supply voltage (single-supply operation)	2.7	5.5	V
V_{OUT}	Output voltage		V_{CC+} + 0.3	V
T_A	Operating free-air temperature	−40	85	°C

electrical characteristics at specified free-air temperature, V_{CC+} = 2.7 V, GND = 0 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		1.7	7	mV
$\alpha_{V_{IO}}$	Average temperature coefficient of input offset voltage		−40°C to 85°C		5		μV/°C
I_{IB}	Input bias current		25°C		10	250	nA
			−40°C to 85°C			400	
I_{IO}	Input offset current		25°C		5	50	nA
			−40°C to 85°C			150	
I_O	Output current (sinking)	$V_O \le 1.5$ V	25°C	5	23		mA
	Output leakage current		25°C		0.003		μA
			−40°C to 85°C			1	
V_{ICR}	Common-mode input voltage range		25°C		−0.1 to 2		V
V_{SAT}	Saturation voltage	$I_O \le 1$ mA	25°C		200		mV
I_{CC}	Supply current	LMV331	25°C		40	100	μA
		LMV393 (both comparators)	25°C		70	140	
		LMV339 (all four comparators)	25°C		140	200	

switching characteristics, T_A = 25°C, V_{CC+} = 2.7 V, R_L = 5.1 kΩ, GND = 0 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	TYP	UNIT
t_{PHL}	Propagation delay, high- to low-level output switching	Input overdrive = 10 mV	1000	ns
		Input overdrive = 100 mV	350	
t_{PLH}	Propagation delay, low- to high-level output switching	Input overdrive = 10 mV	500	ns
		Input overdrive = 100 mV	400	

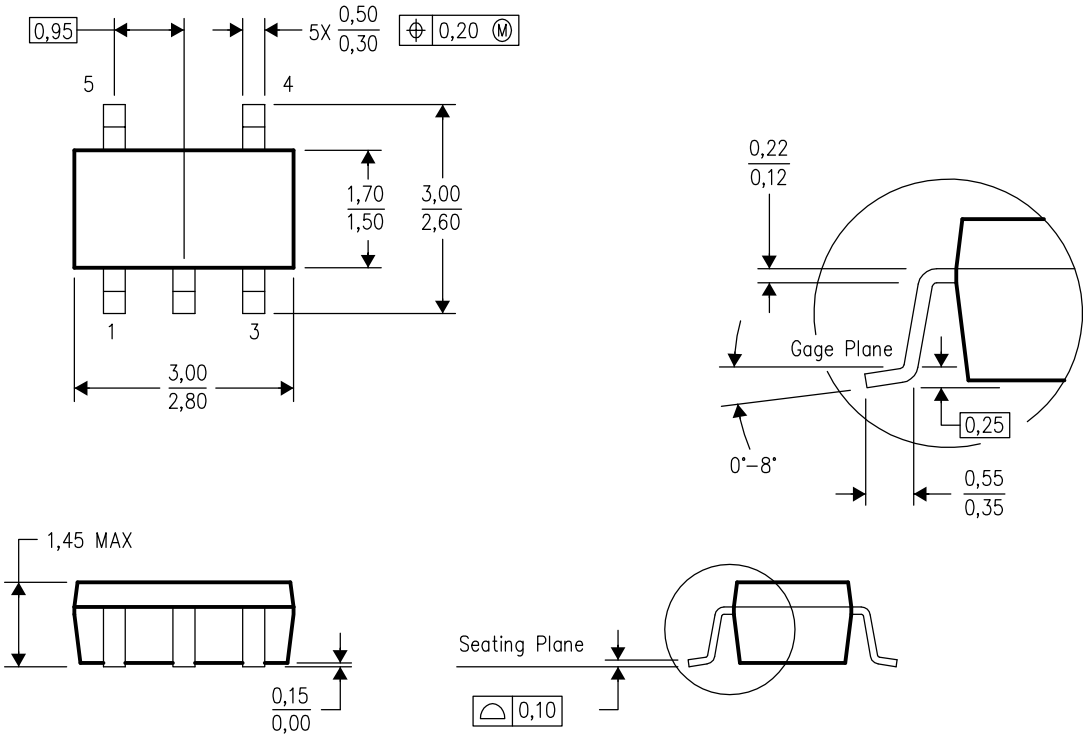
electrical characteristics at specified free-air temperature, V_{CC+} = 5 V, GND = 0 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		1.7	7	mV
			−40°C to 85°C			9	
$\alpha_{V_{IO}}$	Average temperature coefficient of input offset voltage		25°C		5		μV/°C
I_{IB}	Input bias current		25°C		25	250	nA
			−40°C to 85°C			400	
I_{IO}	Input offset current		25°C		2	50	nA
			−40°C to 85°C			150	
I_O	Output current (sinking)	$V_O \le 1.5$ V	25°C	10	84		mA
	Output leakage current		25°C		0.003		μA
			−40°C to 85°C			1	
V_{ICR}	Common-mode input voltage range		25°C		−0.1 to 4.2		V
A_{VD}	Large-signal differential voltage gain		25°C	20	50		V/mV
V_{SAT}	Saturation voltage	$I_O \le 4$ mA	25°C		200	400	mV
			−40°C to 85°C			700	
I_{CC}	Supply current	LMV331	25°C		60	120	μA
			−40°C to 85°C			150	
		LMV393 (both comparators)	25°C		100	200	
			−40°C to 85°C			250	
		LMV339 (all four comparators)	25°C		170	300	
			−40°C to 85°C			350	

switching characteristics, T_A = 25°C, V_{CC+} = 5 V, R_L = 5.1 kΩ, GND = 0 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	TYP	UNIT
t_{PHL}	Propagation delay, high- to low-level output switching	Input overdrive = 10 mV	600	ns
		Input overdrive = 100 mV	200	
t_{PLH}	Propagation delay, low- to high-level output switching	Input overdrive = 10 mV	450	ns
		Input overdrive = 100 mV	300	

DBV (R–PDSO–G5) PLASTIC SMALL–OUTLINE PACKAGE

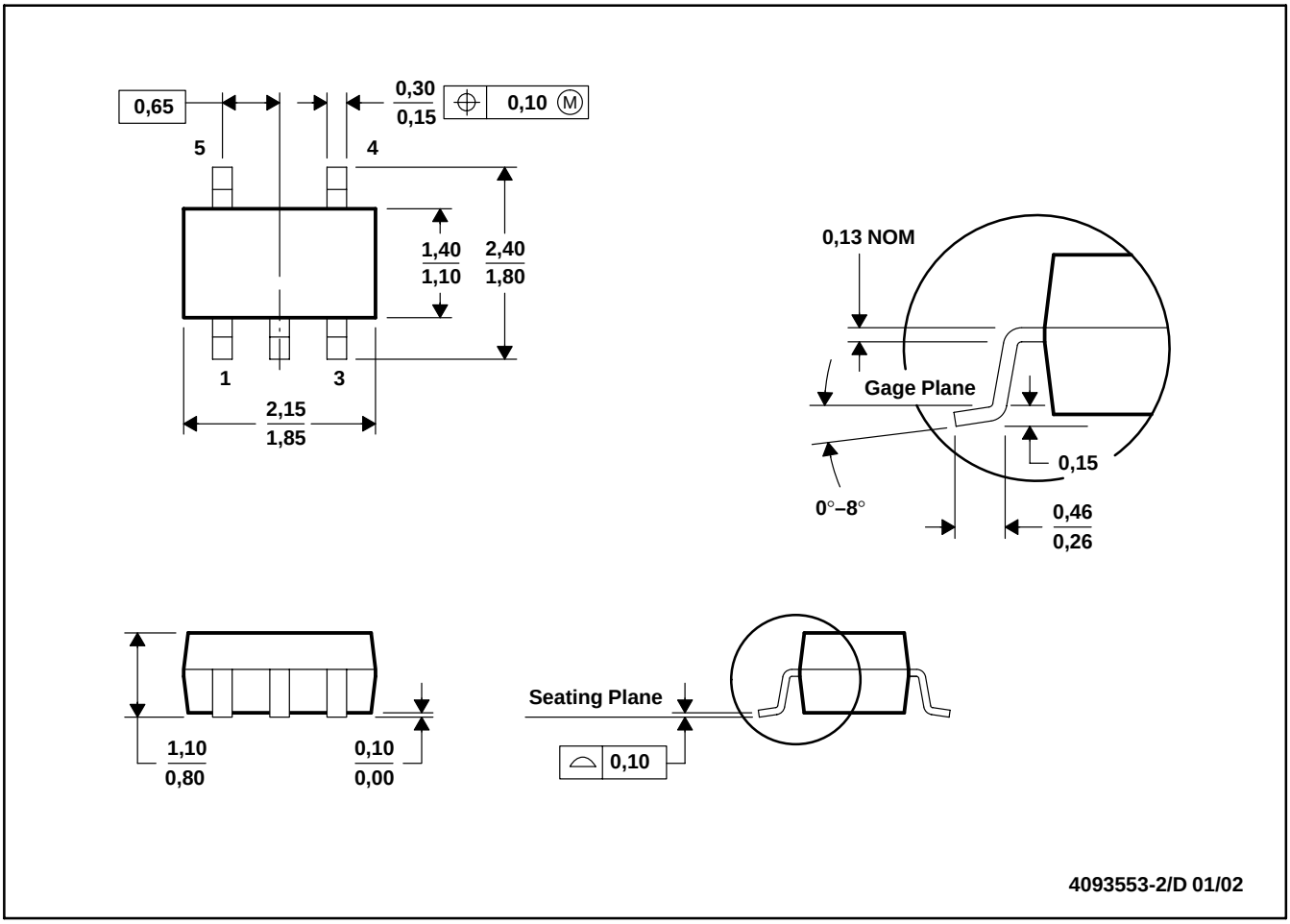


4073253–4/H 10/2003

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.
D. Falls within JEDEC MO–178 Variation AA.

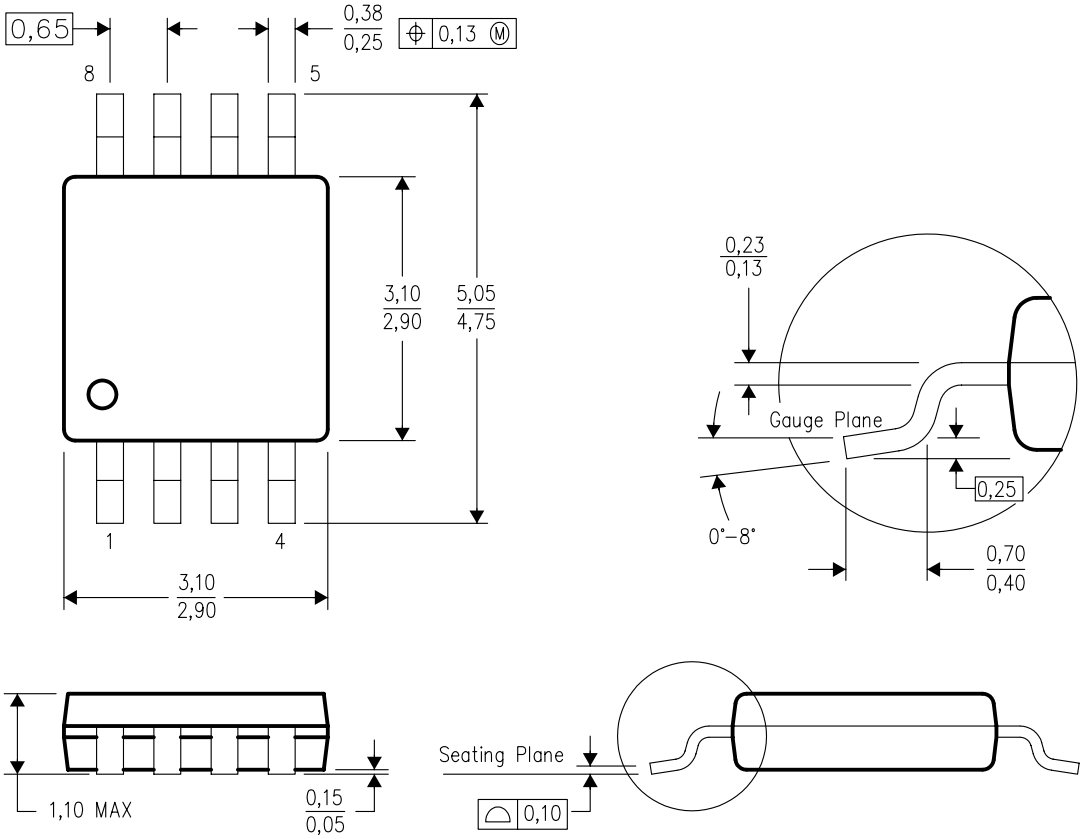
MPDS025C – FEBRUARY 1997 – REVISED FEBRUARY 2002

DCK (R-PDSO-G5) **PLASTIC SMALL-OUTLINE PACKAGE**



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.
D. Falls within JEDEC MO-203

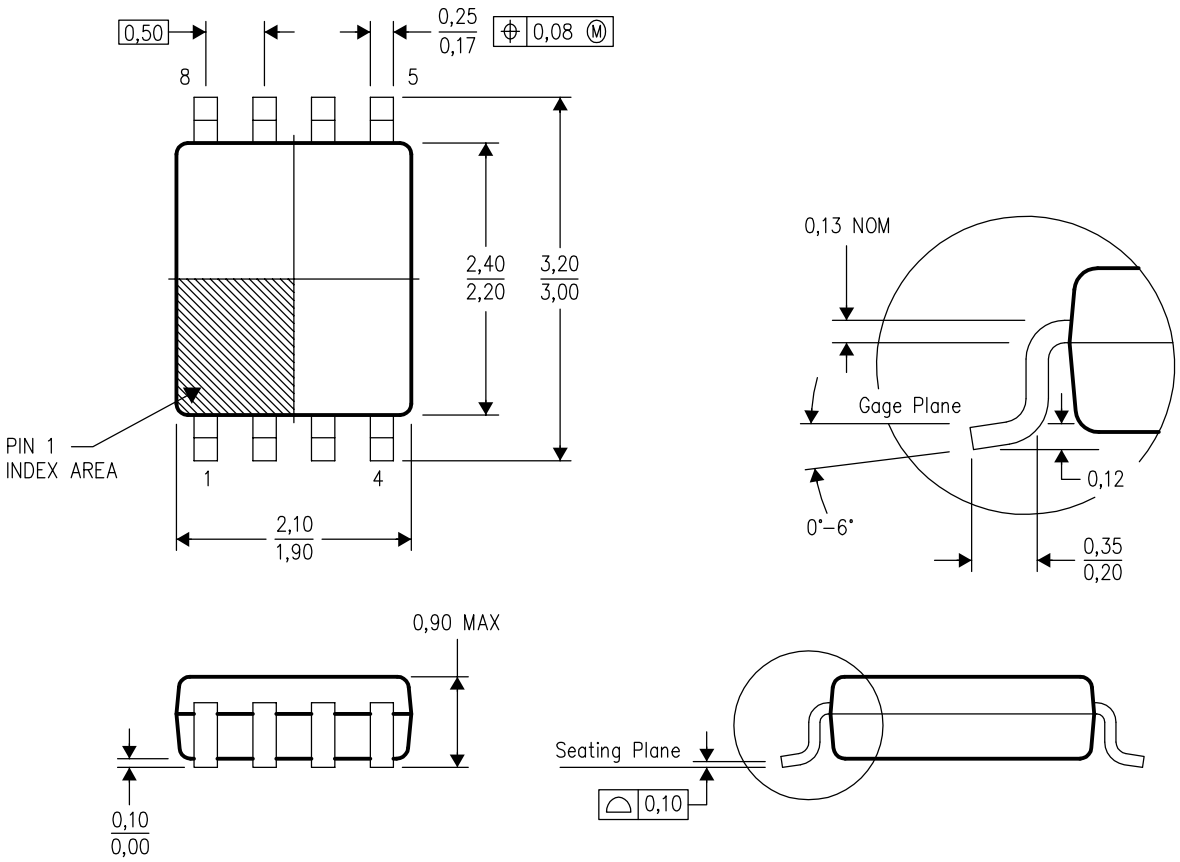
DGK (S–PDSO–G8) PLASTIC SMALL–OUTLINE PACKAGE



4073329/D 12/03

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.
D. Falls within JEDEC MO–187 variation AA.

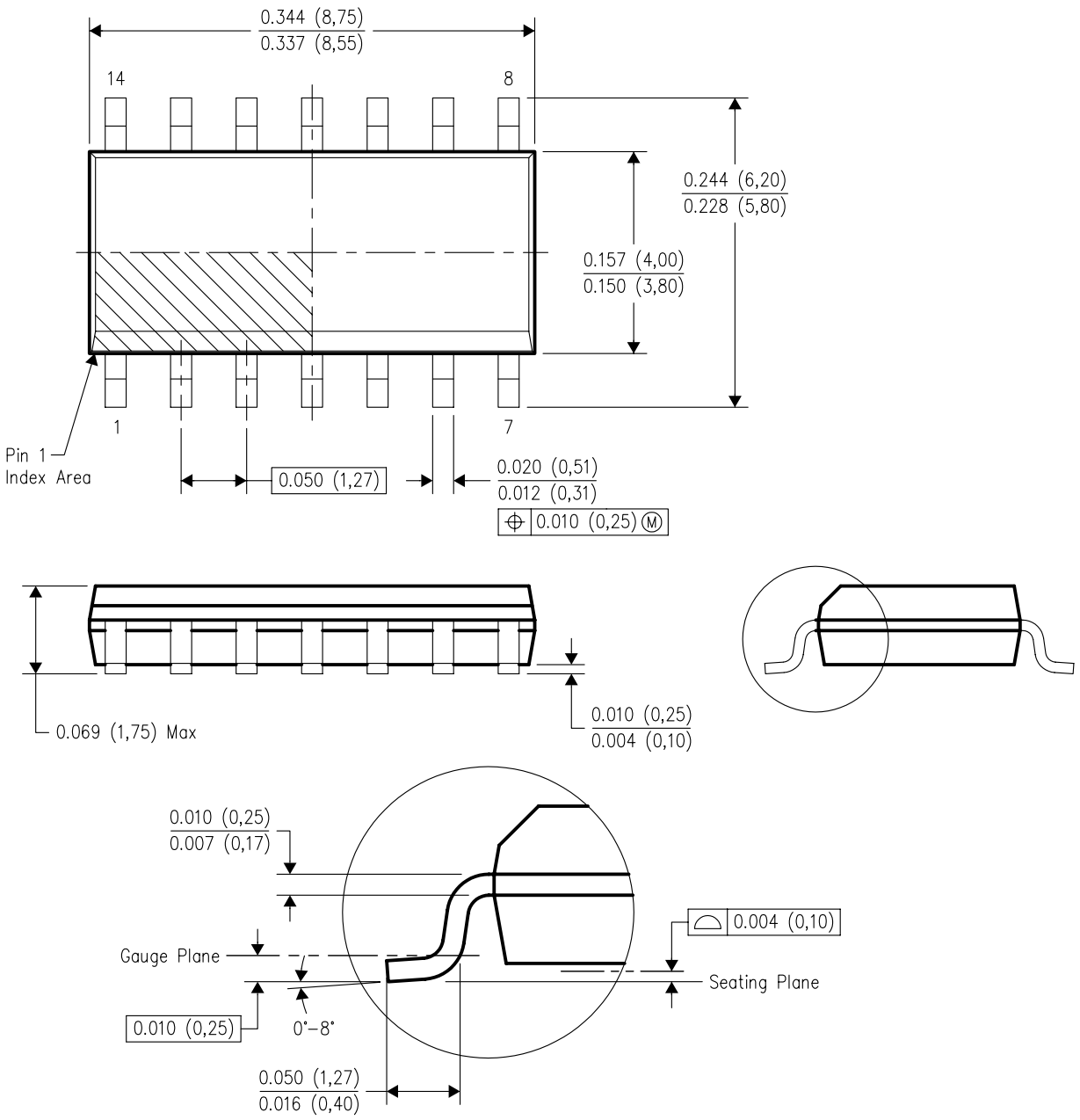
DDU (R–PDSO–G8) PLASTIC SMALL–OUTLINE PACKAGE



4205140/A 05/03

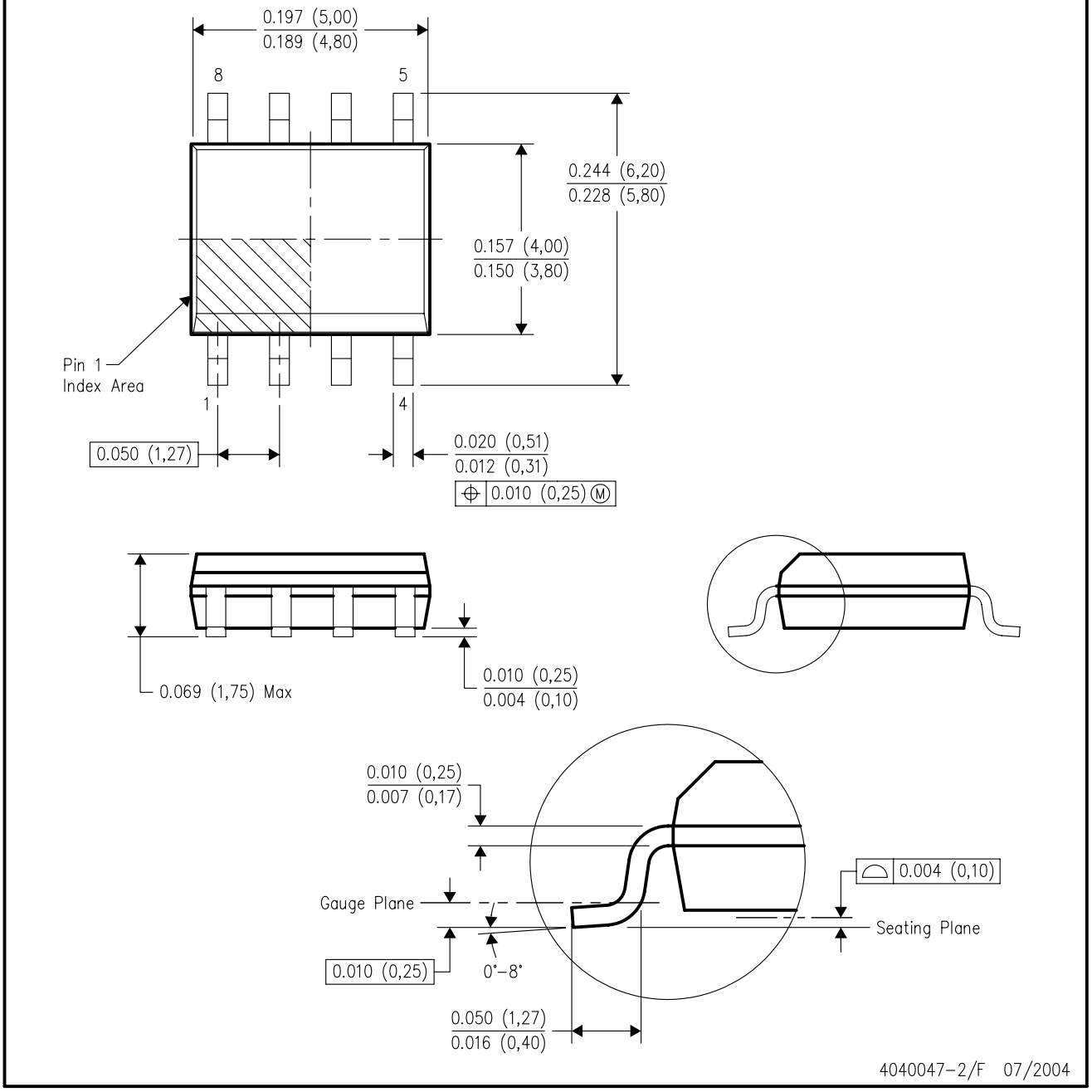
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion.
D. Falls within JEDEC MO–187 variation CA.

D (R–PDSO–G14) 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 AB.

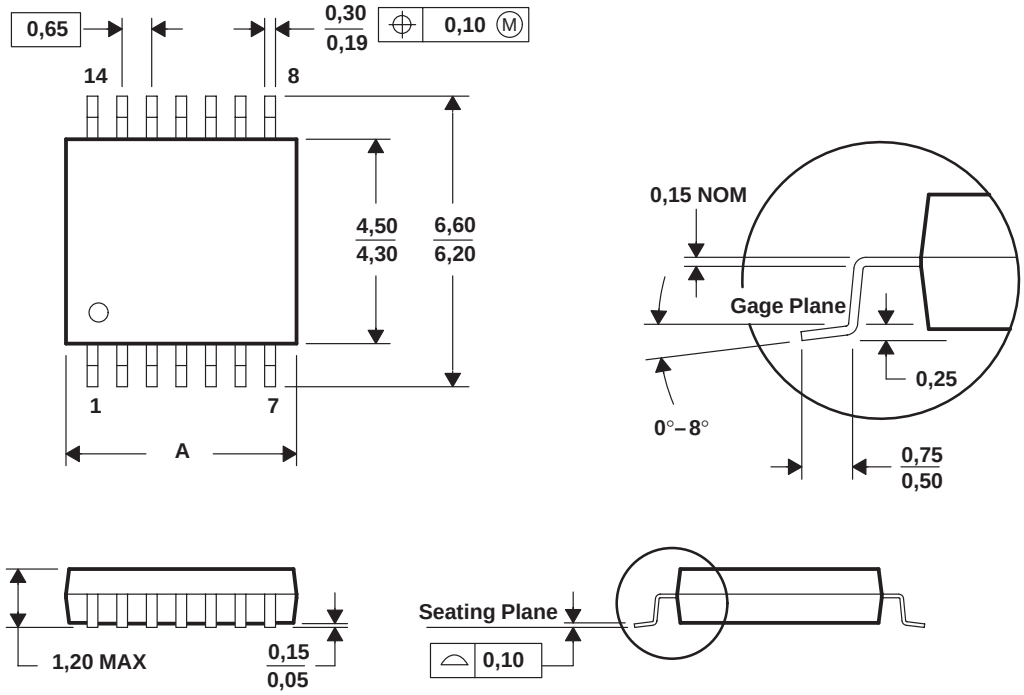
D (R–PDSO–G8) PLASTIC SMALL–OUTLINE PACKAGE



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 AA.

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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