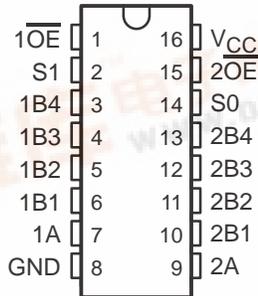


LOW-VOLTAGE DUAL 1-OF-4 FET MULTIPLEXER/DEMULTIPLEXER

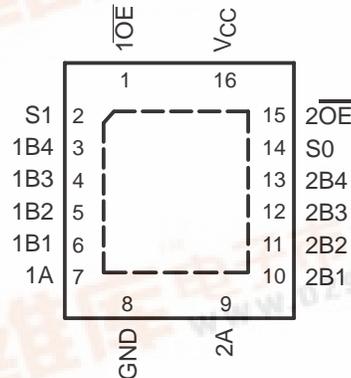
SCDS039H – DECEMBER 1997 – REVISED OCTOBER 2003

- Functionally Equivalent to QS3253
- 5-Ω Switch Connection Between Two Ports
- Rail-to-Rail Switching on Data I/O Ports
- I_{off} Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

D, DBQ, DGV, OR PW PACKAGE
(TOP VIEW)



RGY PACKAGE
(TOP VIEW)



description/ordering information

The SN74CBTLV3253 is a dual 1-of-4 high-speed FET multiplexer/demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The select (S0, S1) inputs control the data flow. The FET multiplexers/demultiplexers are disabled when the associated output-enable (\overline{OE}) input is high.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} feature ensures that damaging current will not backflow through the device when it is powered down. The device has isolation during power off.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

ORDERING INFORMATION

| TA | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---------------|-------------|-------------------|-----------------------|-------------------|
| -40°C to 85°C | QFN – RGY | Tape and reel | SN74CBTLV3253RGYR | CL253 |
| | | Tube | SN74CBTLV3253D | CBTLV3253 |
| | SOIC – D | Tape and reel | SN74CBTLV3253DR | |
| | | SSOP (QSOP) – DBQ | Tape and reel | SN74CBTLV3253DBQR |
| | TSSOP – PW | Tape and reel | SN74CBTLV3253PWR | CL253 |
| | TVSOP – DGV | Tape and reel | SN74CBTLV3253DGV | CL253 |

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

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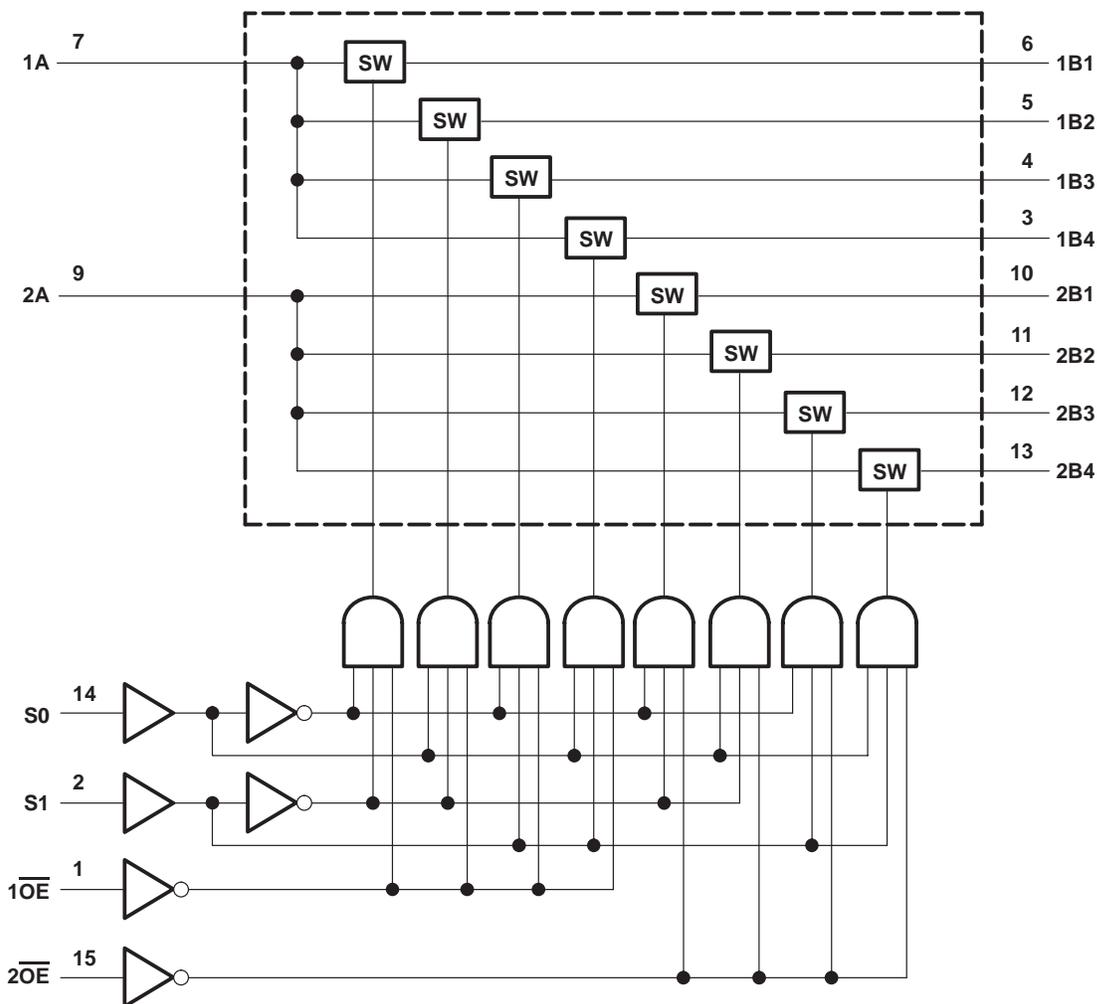
SN74CBTLV3253 LOW-VOLTAGE DUAL 1-OF-4 FET MULTIPLEXER/DEMULTIPLEXER

SCDS039H – DECEMBER 1997 – REVISED OCTOBER 2003

FUNCTION TABLE
(each multiplexer/demultiplexer)

| INPUTS | | | FUNCTION |
|-----------------|----|----|------------------|
| \overline{OE} | S1 | S0 | |
| L | L | L | A port = B1 port |
| L | L | H | A port = B2 port |
| L | H | L | A port = B3 port |
| L | H | H | A port = B4 port |
| H | X | X | Disconnect |

logic diagram (positive logic)

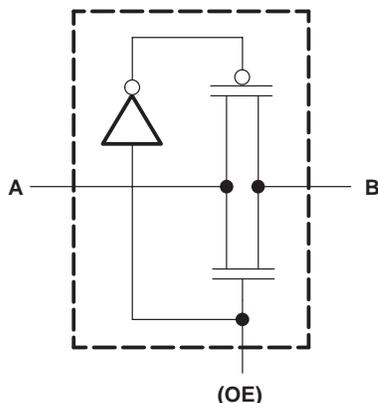


SN74CBTLV3253

LOW-VOLTAGE DUAL 1-OF-4 FET MULTIPLEXER/DEMULTIPLEXER

SCDS039H – DECEMBER 1997 – REVISED OCTOBER 2003

simplified schematic, each FET switch



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

| | |
|--|-----------------|
| Supply voltage range, V_{CC} | –0.5 V to 4.6 V |
| Input voltage range, V_I (see Note 1) | –0.5 V to 4.6 V |
| Continuous channel current | 128 mA |
| Input clamp current, I_{IK} ($V_{I/O} < 0$) | –50 mA |
| Package thermal impedance, θ_{JA} (see Note 2): D package | 73°C/W |
| (see Note 2): DBQ package | 90°C/W |
| (see Note 2): DGV package | 120°C/W |
| (see Note 2): PW package | 108°C/W |
| (see Note 3): RGY package | 39°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.

- NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
 2. The package thermal impedance is calculated in accordance with JESD 51-7.
 3. The package thermal impedance is calculated in accordance with JESD 51-5.

recommended operating conditions (see Note 4)

| | | MIN | MAX | UNIT |
|----------|----------------------------------|---------------------------|-----|------|
| V_{CC} | Supply voltage | 2.3 | 3.6 | V |
| V_{IH} | High-level control input voltage | $V_{CC} = 2.3$ V to 2.7 V | 1.7 | V |
| | | $V_{CC} = 2.7$ V to 3.6 V | 2 | |
| V_{IL} | Low-level control input voltage | $V_{CC} = 2.3$ V to 2.7 V | 0.7 | V |
| | | $V_{CC} = 2.7$ V to 3.6 V | 0.8 | |
| T_A | Operating free-air temperature | –40 | 85 | °C |

NOTE 4: All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

SN74CBTLV3253

LOW-VOLTAGE DUAL 1-OF-4 FET MULTIPLEXER/DEMULTIPLEXER

SCDS039H – DECEMBER 1997 – REVISED OCTOBER 2003

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | MIN | TYP† | MAX | UNIT |
|--------------------------|---|---|----------------------|-----|------|----------|---------------|
| V_{IK} | | $V_{CC} = 3\text{ V}$, $I_I = -18\text{ mA}$ | | | | -1.2 | V |
| I_I | | $V_{CC} = 3.6\text{ V}$, $V_I = V_{CC}$ or GND | | | | ± 1 | μA |
| I_{off} | | $V_{CC} = 0$, V_I or $V_O = 0$ to 3.6 V | | | | 15 | μA |
| I_{CC} | | $V_{CC} = 3.6\text{ V}$, $I_O = 0$, $V_I = V_{CC}$ or GND | | | | 10 | μA |
| ΔI_{CC}^\ddagger | Control inputs | $V_{CC} = 3.6\text{ V}$, One input at 3 V , Other inputs at V_{CC} or GND | | | | 300 | μA |
| C_i | Control inputs | $V_I = 3\text{ V}$ or 0 | | | | 3 | pF |
| $C_{io(OFF)}$ | A port | $V_O = 3\text{ V}$ or 0 , $\overline{OE} = V_{CC}$ | | | | 20.5 | pF |
| | B port | | | | | 5.5 | |
| r_{on}^\S | $V_{CC} = 2.3\text{ V}$, TYP at $V_{CC} = 2.5\text{ V}$ | $V_I = 0$ | $I_I = 64\text{ mA}$ | 5 | 8 | Ω | |
| | | | $I_I = 24\text{ mA}$ | 5 | 8 | | |
| | | $V_I = 1.7\text{ V}$ | $I_I = 15\text{ mA}$ | 27 | 40 | | |
| | $V_{CC} = 3\text{ V}$ | $V_I = 0$ | $I_I = 64\text{ mA}$ | 5 | 7 | | |
| | | | $I_I = 24\text{ mA}$ | 5 | 7 | | |
| | | $V_I = 2.4\text{ V}$ | $I_I = 15\text{ mA}$ | 10 | 15 | | |

† All typical values are at $V_{CC} = 3.3\text{ V}$ (unless otherwise noted), $T_A = 25^\circ\text{C}$.

‡ This is the increase in supply current for each input that is at the specified voltage level, rather than V_{CC} or GND.

§ Measured by the voltage drop between the A and the B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ | | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ | | UNIT |
|-----------|---------------------|-------------|--|-----|--|-----|------|
| | | | MIN | MAX | MIN | MAX | |
| t_{pd} | A or B [¶] | B or A | 0.15 | | 0.25 | | ns |
| | S | A or B | 1 | 6.8 | 1 | 5.5 | |
| t_{en} | S | A or B | 1 | 4.3 | 1 | 4 | ns |
| t_{dis} | S | A or B | 1 | 5.1 | 1 | 5.5 | ns |
| t_{en} | \overline{OE} | A or B | 1 | 5 | 1 | 4.8 | ns |
| t_{dis} | \overline{OE} | A or B | 1 | 5.5 | 1 | 5.4 | ns |

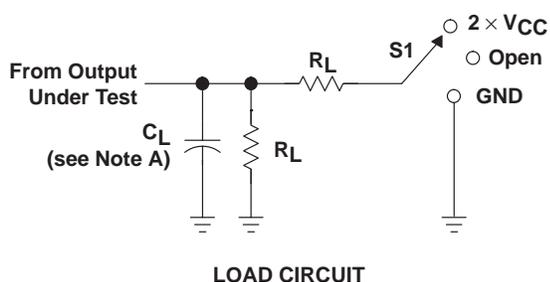
¶ The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

SN74CBTLV3253

LOW-VOLTAGE DUAL 1-OF-4 FET MULTIPLEXER/DEMULTIPLEXER

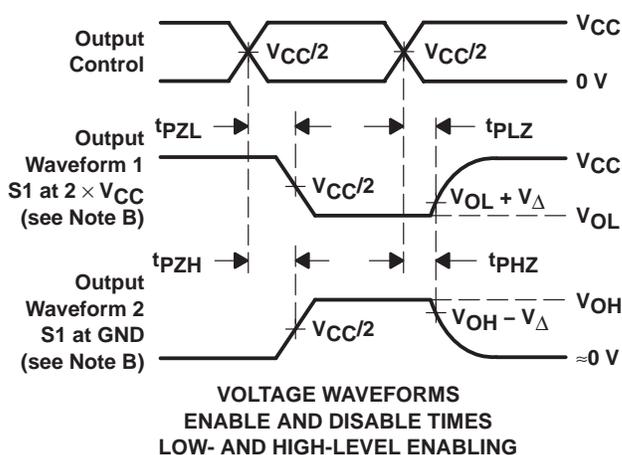
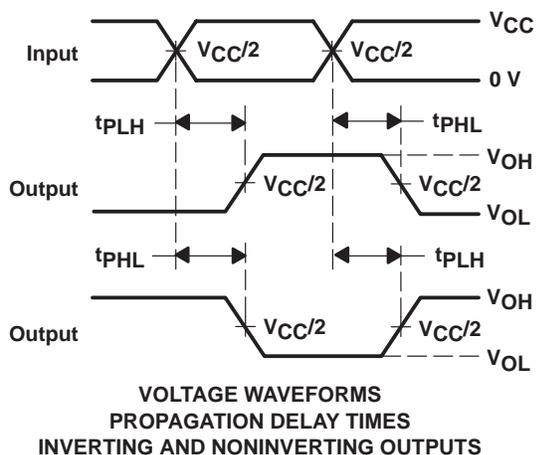
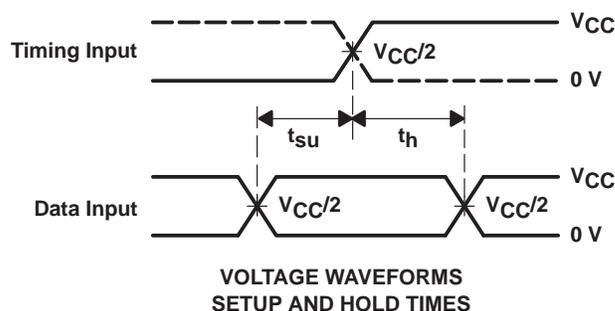
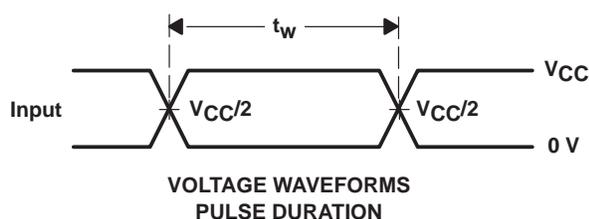
SCDS039H – DECEMBER 1997 – REVISED OCTOBER 2003

PARAMETER MEASUREMENT INFORMATION



| TEST | S1 |
|-------------------|-------------------|
| t_{PLH}/t_{PHL} | Open |
| t_{PLZ}/t_{PZL} | $2 \times V_{CC}$ |
| t_{PHZ}/t_{PZH} | GND |

| V_{CC} | C_L | R_L | V_{Δ} |
|-----------------------------------|-------|--------------|--------------|
| $2.5 \text{ V} \pm 0.2 \text{ V}$ | 30 pF | 500 Ω | 0.15 V |
| $3.3 \text{ V} \pm 0.3 \text{ V}$ | 50 pF | 500 Ω | 0.3 V |



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 - C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$, $t_r \leq 2 \text{ ns}$, $t_f \leq 2 \text{ ns}$.
 - D. The outputs are measured one at a time with one transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 - H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

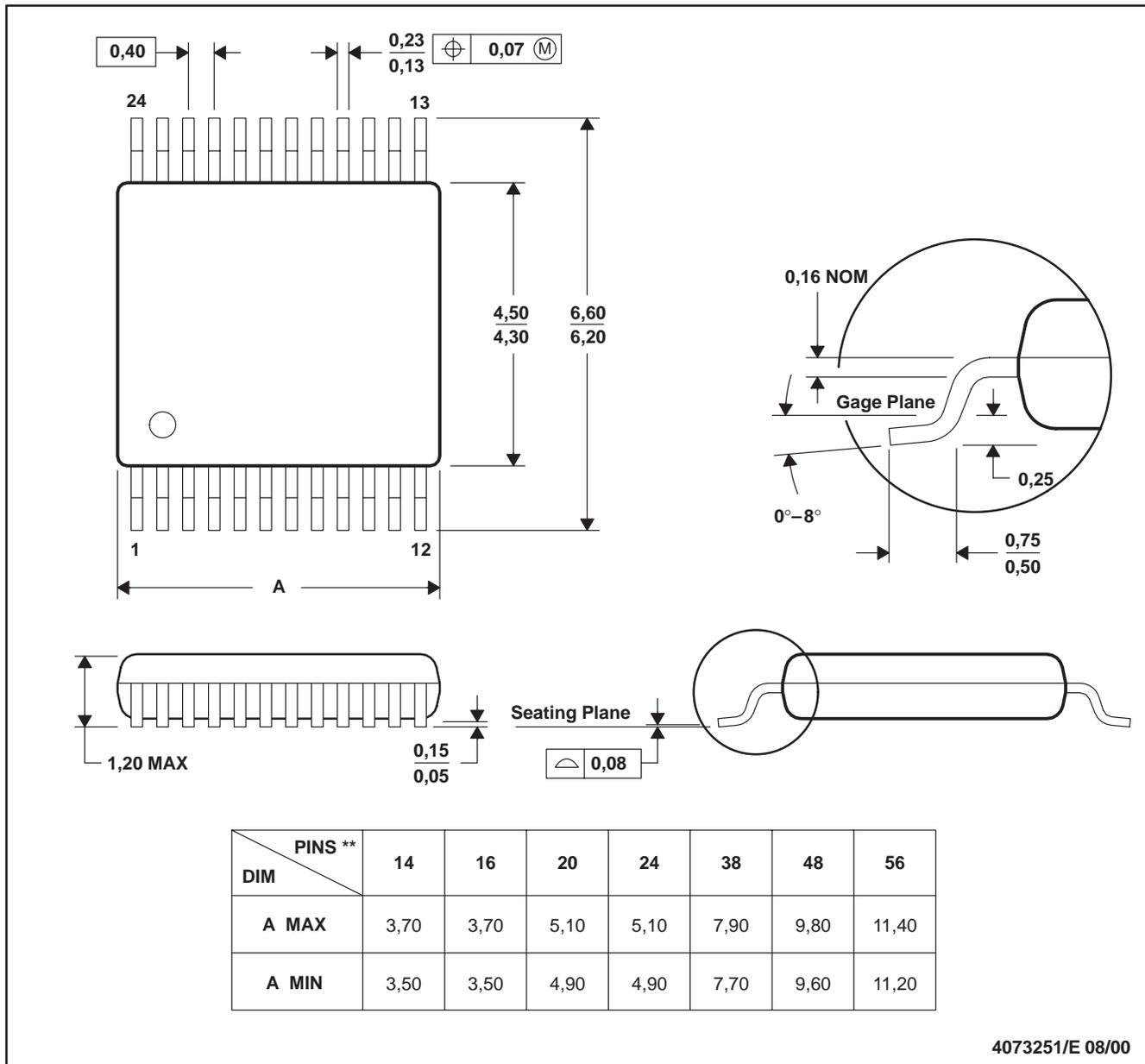
MECHANICAL DATA

MPDS006C – FEBRUARY 1996 – REVISED AUGUST 2000

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN

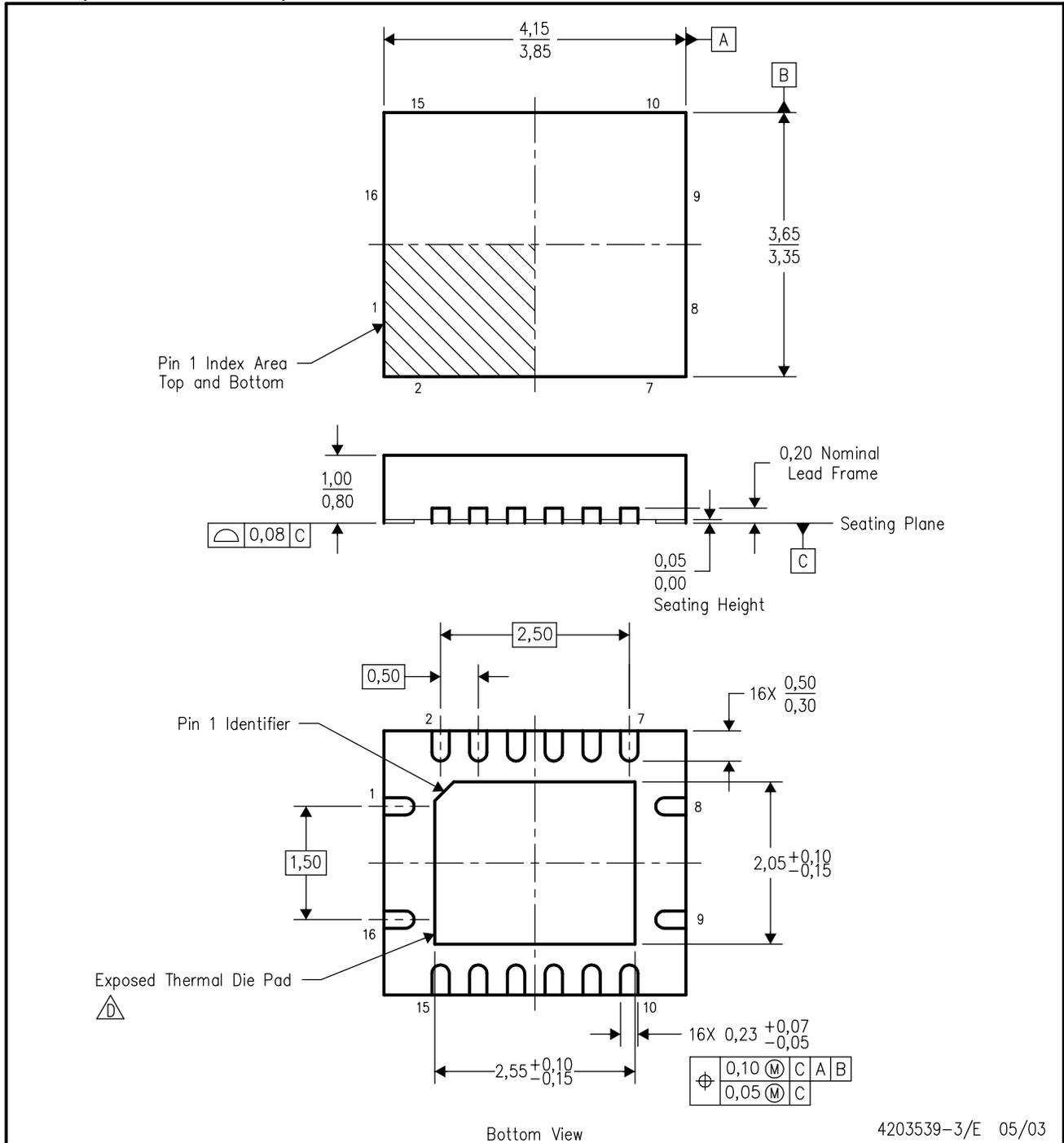


- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

MECHANICAL DATA

RGY (R-PQFP-N16)

PLASTIC QUAD FLATPACK



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - QFN (Quad Flatpack No-Lead) package configuration.
 - The package thermal performance may be enhanced by bonding the thermal die pad to an external thermal plane. This pad is electrically and thermally connected to the backside of the die and possibly selected ground leads.
 - Package complies to JEDEC MO-241 variation BB.

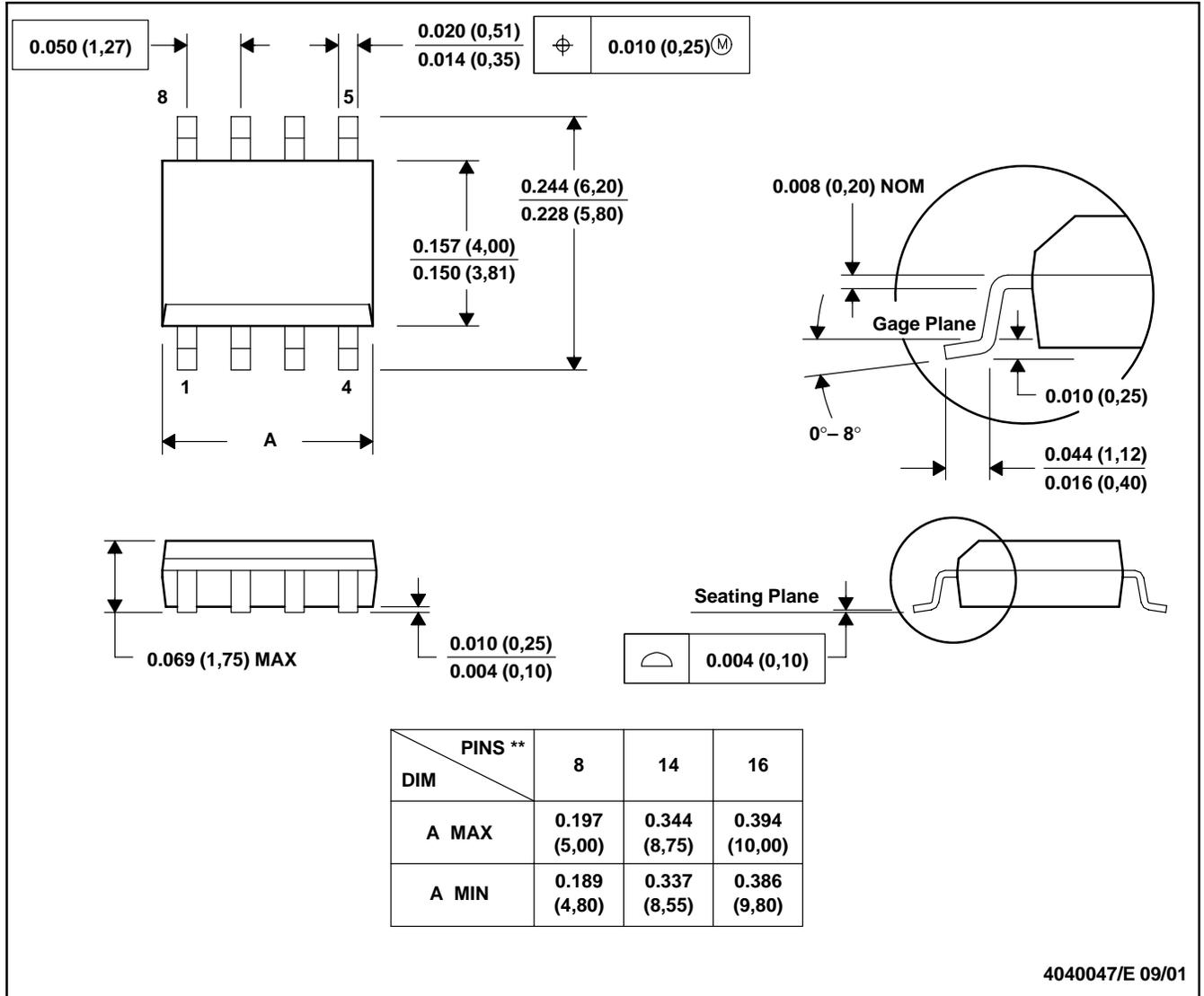
MECHANICAL DATA

MSOI002B – JANUARY 1995 – REVISED SEPTEMBER 2001

D (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



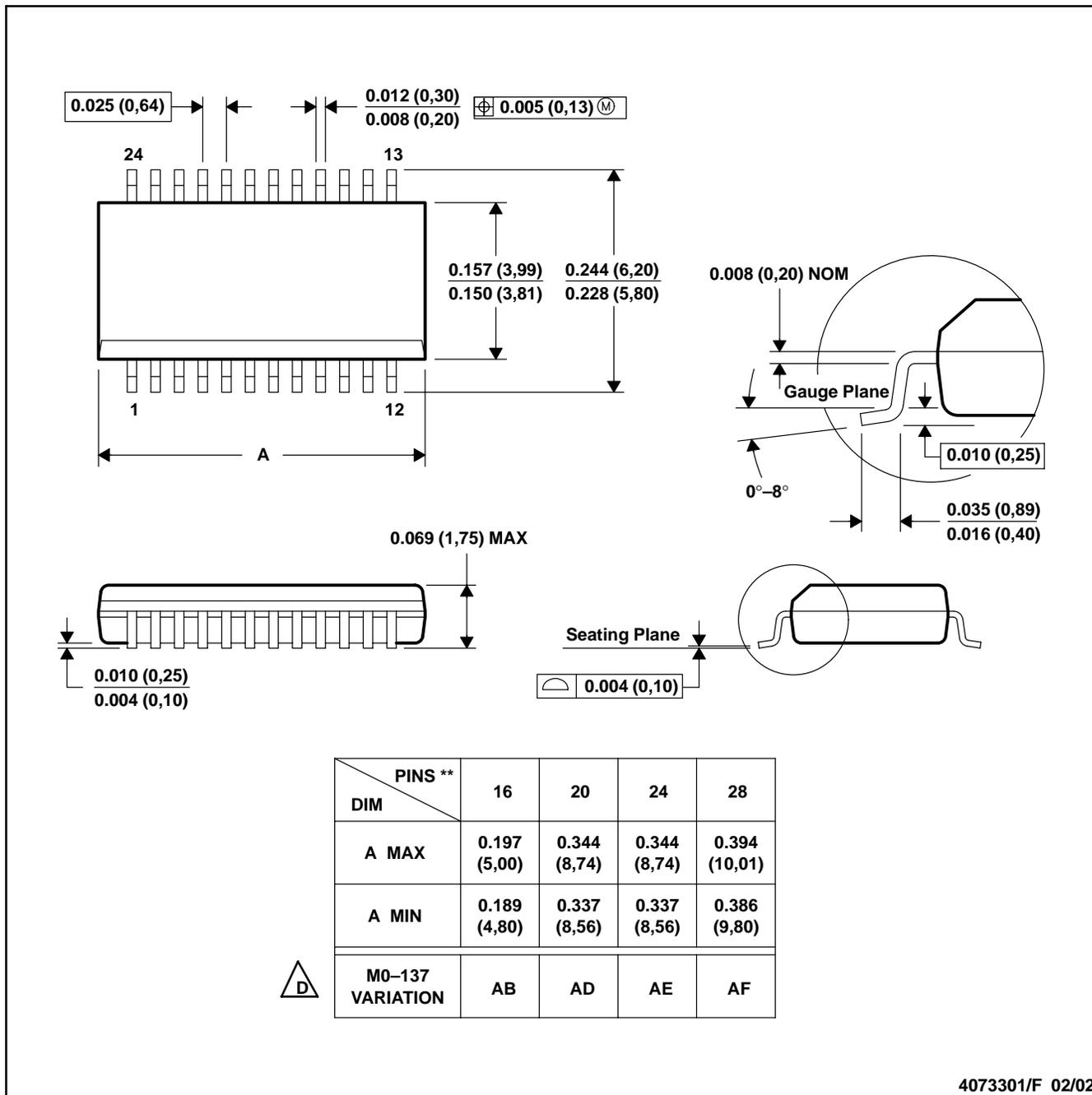
- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012

MECHANICAL DATA

MSOI004E JANUARY 1995 – REVISED MAY 2002

DBQ (R-PDSO-G**)

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 not to exceed 0.006 (0,15).
 D. Falls within JEDEC MO-137.

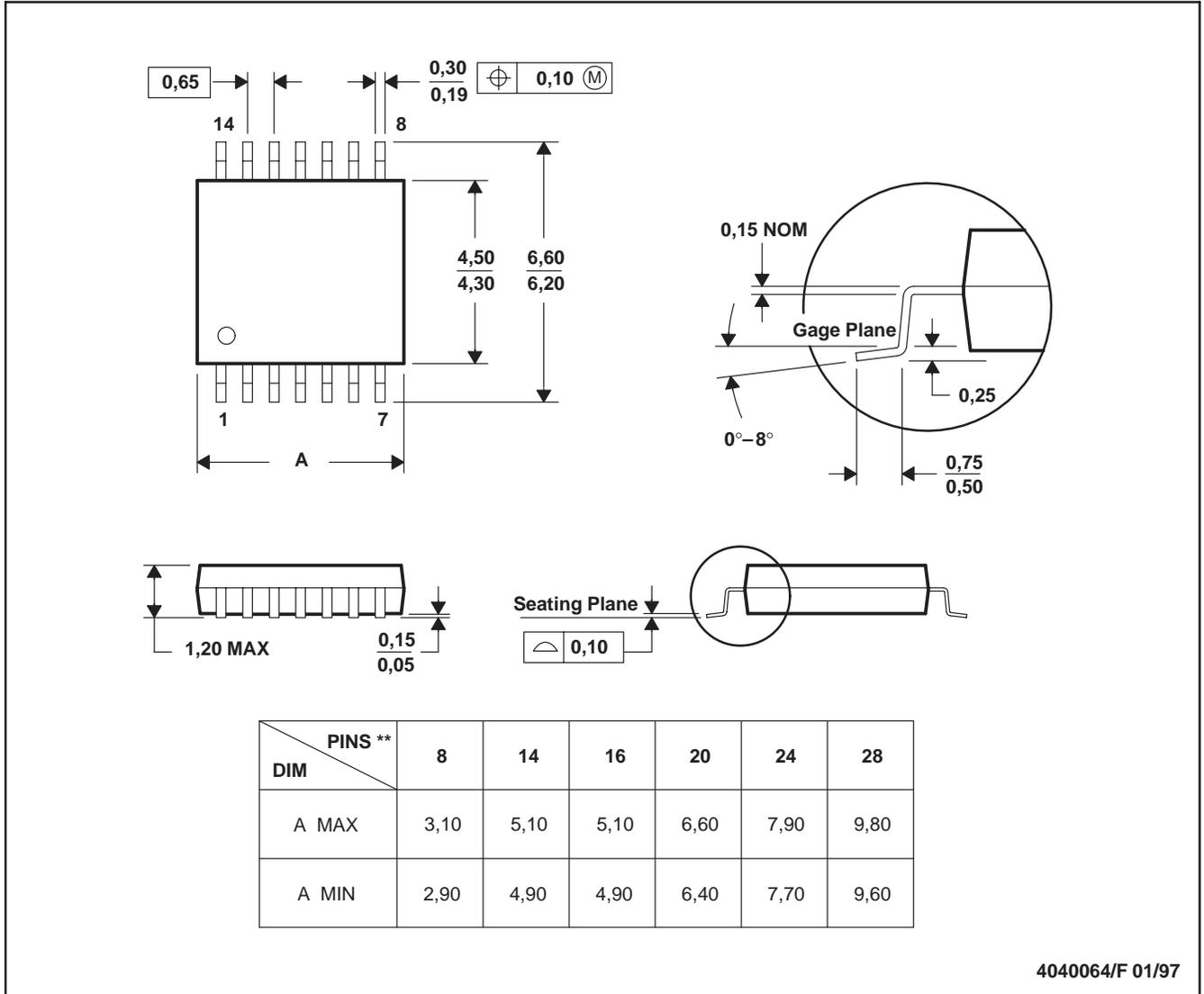
MECHANICAL DATA

MTSS001C – JANUARY 1995 – REVISED FEBRUARY 1999

PW (R-PDSO-G)**

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



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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