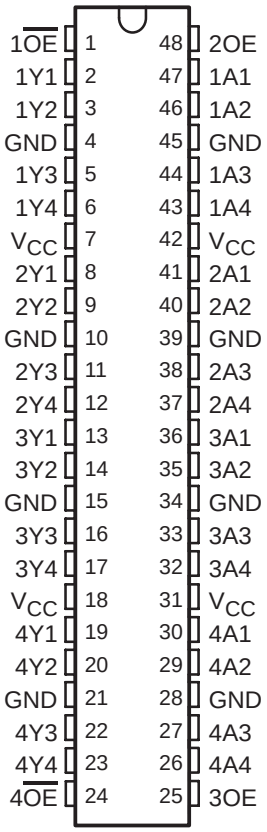
SN74ABT16241
16-BIT BUFFER/DRIVER WITH 3-STATE OUTPUTS

SCBS347 − MAY 1994

- **Member of the Texas Instruments *Widebus*™ Family**
- **State-of-the-Art *EPIC*-II*B*™ BiCMOS Design Significantly Reduces Power Dissipation**
- **Typical V_{OLP} (Output Ground Bounce) < 1 V at V_{CC} = 5 V, T_A = 25°C**
- **Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise**
- **Flow-Through Architecture Optimizes PCB Layout**
- **High-Drive Outputs (−32-mA I_{OH}, 64-mA I_{OL})**
- **Packaged in Plastic 300-mil Shrink Small-Outline (SSOP) Packages**

DL PACKAGE
(TOP VIEW)



description

The SN74ABT16241 is a 16-bit buffer and line driver designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The device can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. This device provides true outputs and complementary output-enable (OE and $\overline{OE}$) inputs.

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. OE should be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

The SN74ABT16241 is available in TI's shrink small-outline package (DL), which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The SN74ABT16241 is characterized for operation from −40°C to 85°C.

FUNCTION TABLE

INPUTS		OUTPUTS	INPUTS		OUTPUTS
$1\overline{OE}$, $4\overline{OE}$	1A, 4A	1Y, 4Y	2OE, 3OE	2A, 3A	2Y, 3Y
L	H	H	H	H	H
L	L	L	H	L	L
H	X	Z	L	X	Z

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TEXAS INSTRUMENTS
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265
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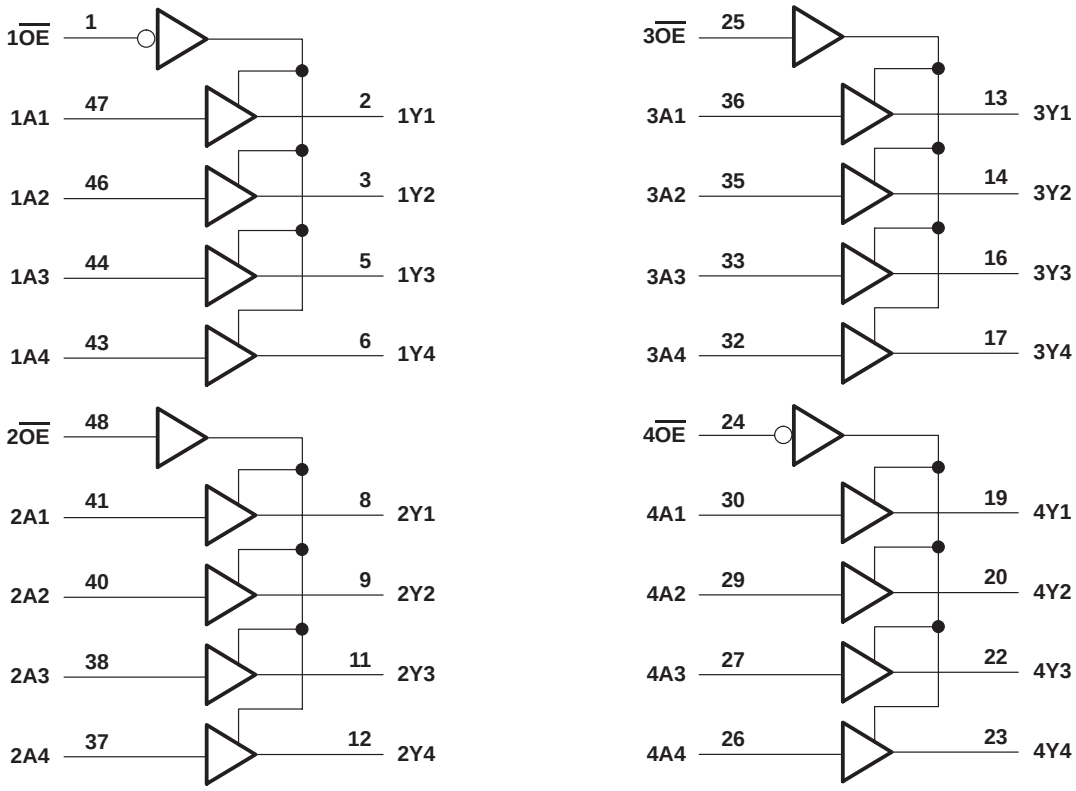
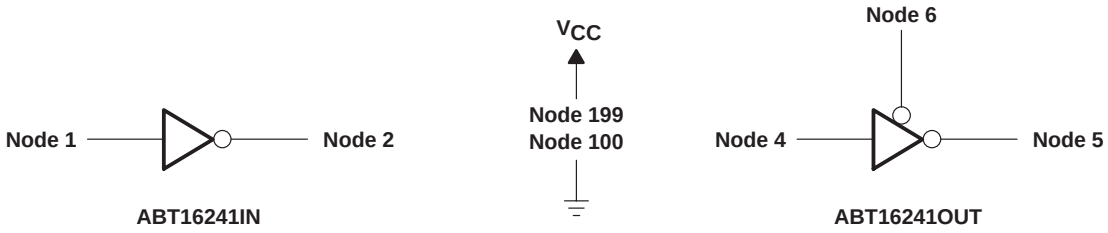
logic diagram (positive logic)



SPICE block diagram



SPICE FUNCTION TABLE

NODE		OPERATION	NODE			OPERATION
1	2		4	5	6	
L	H	Input	L	H	L	Output
H	L	Input	H	L	L	Output
			X	Z	H	Hi-Z

SPICE netlist

```
*    ABT16241 SPICE I/O MODEL SUBCIRCUIT
*    ADVANCED BUS INTERFACE
*    ADVANCED SYSTEM LOGIC, TEXAS INSTRUMENTS
*
*    SUBCIRCUITS:  ABT16241IN, ABT16241OUT
*
*    PACKAGE PARASITICS
       .LIB 'PKGS.LIB'   SSOP48
*
*    PROCESS MODELS
       .LIB 'EPIC2B.LIB' NOMINAL_L13
*      .LIB 'EPIC2B.LIB' STRONG_L13
*      .LIB 'EPIC2B.LIB' WEAK_L13
*
* ABT16241 INPUT SUBCIRCUIT
*    NODES:              INPUT NODE
*                        |     INTERNAL OUTPUT NODE
*                        |     |     VCC
*                        |     |     |     GND
*                        |     |     |     |
.SUBCKT ABT16241IN       1     2     199   100
 X_PKGIN           1     1001                    SSOP48_47
 X_PKGVCC          199   1199                    SSOP48_07
 X_PKGGND          100   1100                    SSOP48_04
 XABT16241IN       1001  2     1199  1100        ABT16241__IN
.ENDS ABT16241IN
*
* ABT16241 OUTPUT SUBCIRCUIT
*    NODES:              INTERNAL INPUT NODE
*                        |     OUTPUT NODE
*                        |     |     INTERNAL OE NODE
*                        |     |     |     VCC
*                        |     |     |     |     GND
*                        |     |     |     |     |
.SUBCKT ABT16241OUT      4     5     6     199   100
 X_PKGOUT          5     1005                    SSOP48_02
 X_PKGVCC          199   1199                    SSOP48_07
 X_PKGGND          100   1100                    SSOP48_04
 XABT16241OUT      4     1005  6     1199  1100  ABT16241__OUT
.ENDS ABT16241OUT
*
.SUBCKT ABT16241__IN     501   502   599   500
 XP1         502   504   506   599   PM          WP=200U     LP=0.8U
 XP2         509   502   599   599   PM          WP=20U      LP=0.8U
 XP3         506   509   599   599   PM          WP=85U      LP=0.8U
 XP4         508   500   599   599   PM          WP=50U      LP=0.8U
 XN1         502   504   500   500   NM          WN=220U     LN=0.8U
 XN2         509   502   500   500   NM          WN=20U      LN=0.8U
 XN4         599   500   508   500   NM          WN=20U      LN=0.8U
 QA          599   508   507         Q2_NPN      10
 QB          599   507   506         Q5_NPN      60
 Q_ESD1      501   500   500         Q7_NPN      200
 Q_ESD       504   505   500         Q5_NPN      46
 XR1         506   507   507   507   RMOS        WR=4U       RES=6K
 RESD1       501   504                           50
 RESD2       505   500                           1K
 CBP         501   500                           0.3P
 CL          502   500                           0.2P
.ENDS ABT16241__IN
*
.SUBCKT ABT16241__OUT    601   602   603   699   600
 XP1         605   603   699   699   PM          WP=200U     LP=0.8U
 XP4         601   603   621   699   PM          WP=40U      LP=0.8U
 XP5         613   601   605   699   PM          WP=30U      LP=0.8U
 XP10        618   603   699   699   PM          WP=50U      LP=0.8U
 XP11        607   612   605   699   PM          WP=60U      LP=0.8U
 XN1         607   601   608   600   NM          WN=100U     LN=0.8U
```

SPICE netlist (continued)

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XN2          606   619   607   600   NM          WN=50U      LN=0.8U
XN3          608   609   600   600   NM          WN=25U      LN=0.8U
XN4          608   603   600   600   NM          WN=80U      LN=0.8U
XN6          613   603   600   600   NM          WN=25U      LN=0.8U
XN7          602   621   600   600   NM          WN=100U     LN=0.8U
XN8          621   603   600   600   NM          WN=10U      LN=0.8U
XN9          601   622   621   600   NM          WN=20U      LN=0.8U
XN10         619   619   620   600   NM          WN=25U      LN=0.8U
XN11         620   604   602   600   NM          WN=25U      LN=0.8U
XN12         613   601   600   600   NM          WN=40U      LN=0.8U
QM1          616   615   602         Q9_NPN      200
QM2          602   608   600         Q11_NPN     600
QM3          614   613   615         Q4_NPN      15
QD4          614   614   616         Q2_NPN      8
QDR1         615   615   613         Q2_NPN      8
D1           613   614               D1_GDS      156
D2           699   617               D9_GSD      4700
XR1          606   605   605   605   RMOS        WR=6U       RES=1K
XR2          607   606   606   606   RMOS        WR=4U       RES=3K
XR3          614   605   605   605   RMOS        WR=6U       RES=1K
R4           616   617                           10
XR10         619   618   618   618   RMOS        WR=3U       RES=20K
XPVREF       670   603   699   699   PM          WP=50U      LP=0.8U
XNVREF       671   671   600   600   NM          WN=30U      LN=0.8U
XRVREF1      604   670   670   670   RMOS        WR=3U       RES=20K
XRVREF2      671   604   604   604   RMOS        WR=3U       RES=1.5K
XNCLAMP      673   612   674   600   NM          WN=250U     LN=0.8U
DCLAMP1      608   673               D6_GSD      800
DCLAMP2      674   602               D6_GSD      800
XPNOR1       675   609   699   699   PM          WP=30U      LP=0.8U
XPNOR2       612   611   675   699   PM          WP=30U      LP=0.8U
XNNOR1       612   611   600   600   NM          WN=6U       LN=0.8U
XNNOR2       612   609   600   600   NM          WN=6U       LN=0.8U
XP_INV1      609   601   699   699   PM          WP=20U      LP=0.8U
XN_INV1      609   601   600   600   NM          WN=10U      LN=0.8U
XP_INV2      622   603   699   699   PM          WP=15U      LP=0.8U
XN_INV2      622   603   600   600   NM          WN=5U       LN=0.8U
XP_INV3      610   603   699   699   PM          WP=4U       LP=0.8U
XN_INV3      610   603   600   600   NM          WN=4U       LN=0.8U
XP_INV4      611   610   699   699   PM          WP=4U       LP=0.8U
XN_INV4      611   610   600   600   NM          WN=4U       LN=0.8U
CBP          602   600                           0.3P
.ENDS ABT16241__OUT
*
```

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
SN74ABT16241DGGR	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI
SN74ABT16241DL	OBSOLETE	SSOP	DL	48		TBD	Call TI	Call TI
SN74ABT16241DLR	OBSOLETE	SSOP	DL	48		TBD	Call TI	Call TI

(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)

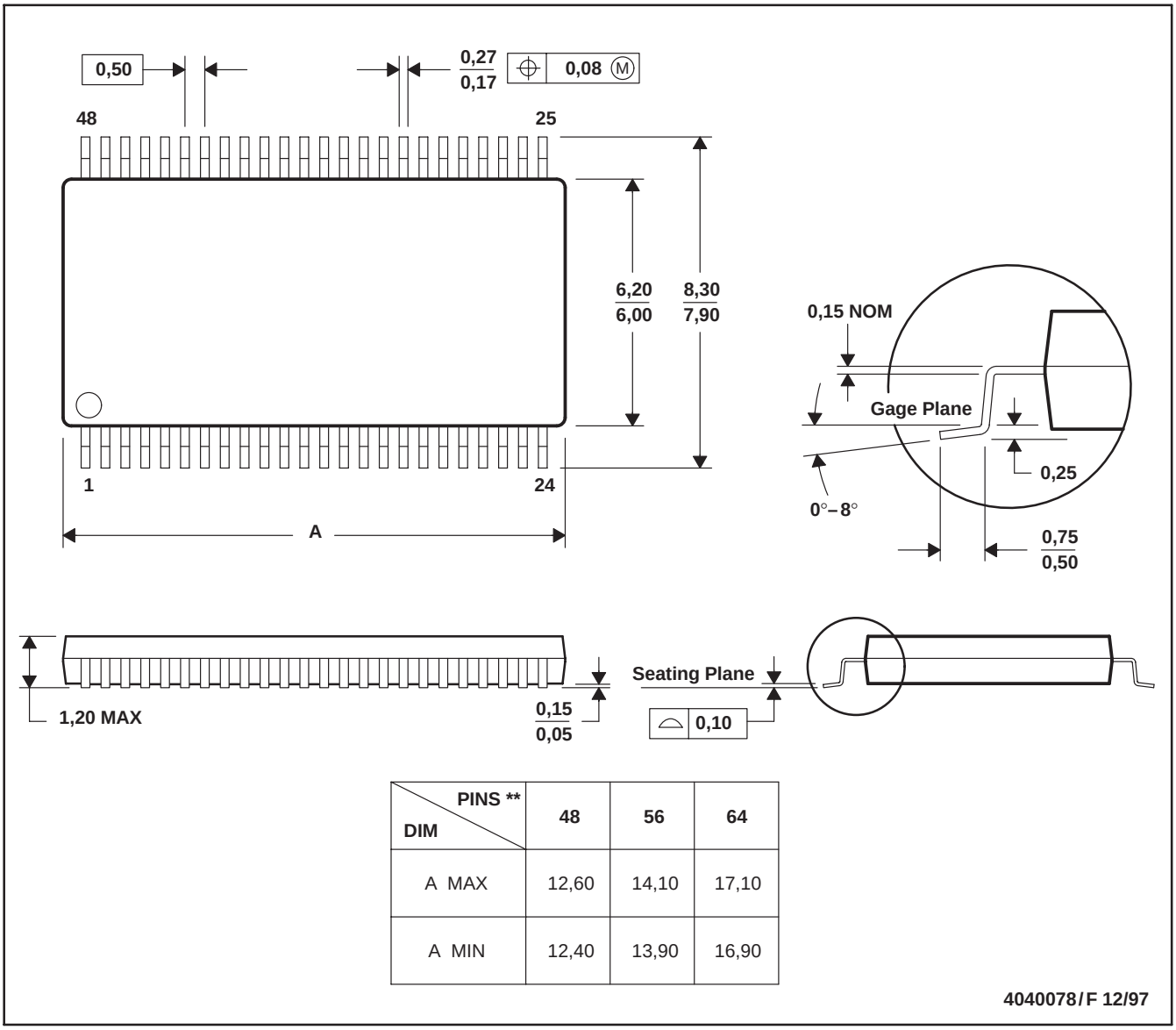
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

OTHER QUALIFIED VERSIONS OF SN74ABT16241 :
- Military: SN54ABT16241

NOTE: Qualified Version Definitions:
- Military - QML certified for Military and Defense Applications

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

48 PINS SHOWN

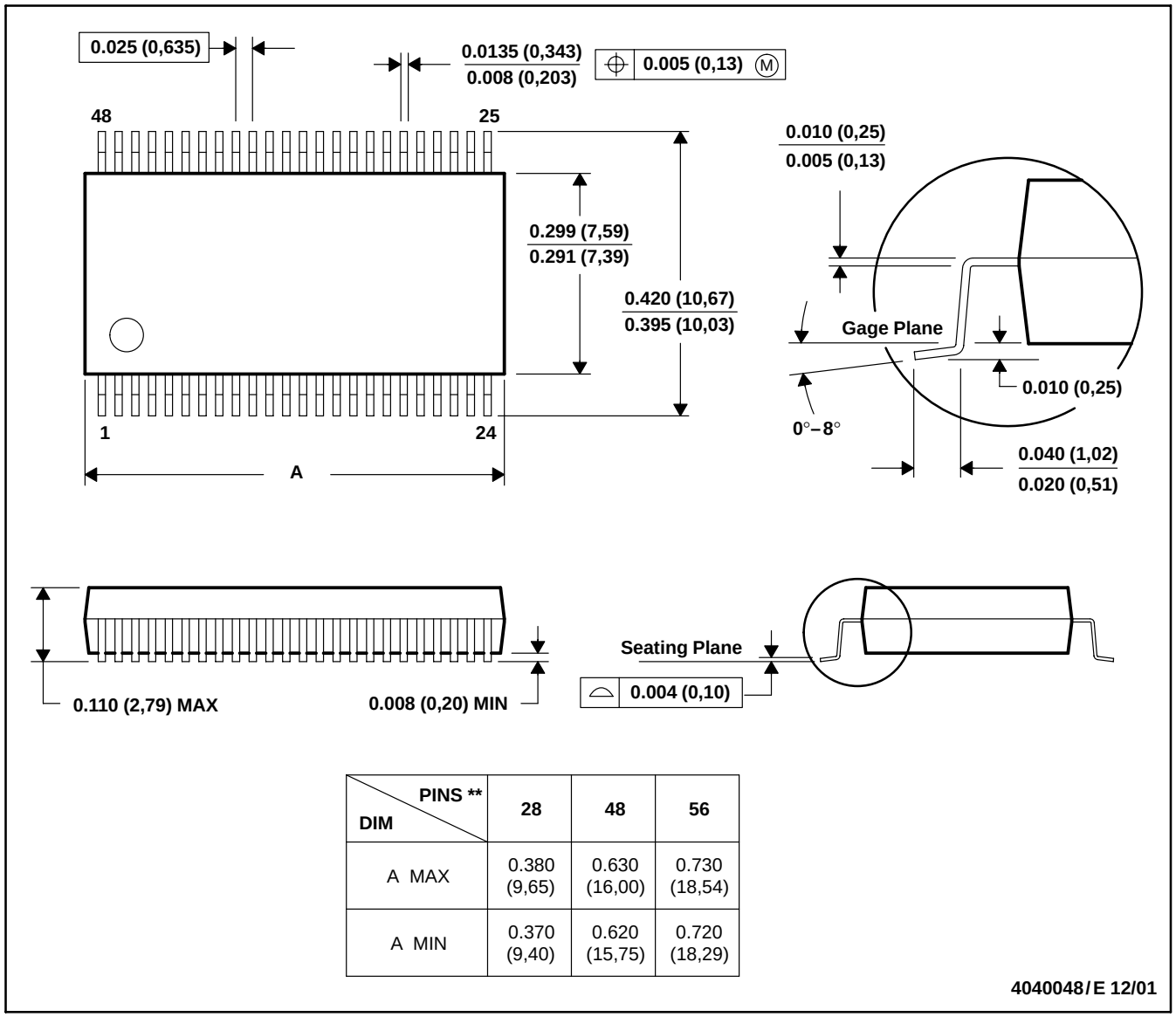


DIM \ PINS **	48	56	64
A MAX	12,60	14,10	17,10
A MIN	12,40	13,90	16,90

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

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

48 PINS SHOWN



DIM \ PINS **	28	48	56
A MAX	0.380 (9,65)	0.630 (16,00)	0.730 (18,54)
A MIN	0.370 (9,40)	0.620 (15,75)	0.720 (18,29)

4040048/E 12/01

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 MO-118

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