专业PCB**ISN54ABT245A\$SN74ABT245B** OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS081L - JANUARY 1991 - REVISED APRIL 2005

- Typical Volp (Output Ground Bounce) <1 V at $V_{CC} = 5$ V, $T_A = 25$ °C
- Ioff and Power-Up 3-State Support Hot
- High-Drive Outputs (-32-mA IOH, 64-mA IOL)
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD 17
- **ESD Protection Exceeds JESD 22**
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

SN54ABT245A . . . J OR W PACKAGE SN74ABT245B...DB, DGV, DW, N, NS, OR PW PACKAGE (TOP VIEW)

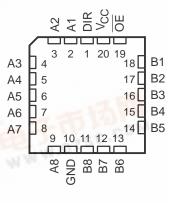
DIR VCC 19 OE A1 A2 18 **∏** B1 **A3** 17 B2 16 В3 A4 A5 15 П в4 A6 14 **B**5 13 **∏** B6 Α7 A8 🛮 9 12 Пв7 **GND** 11 **B8**

(TOP VIEW) VCC $\overline{\Box}$ 20 OE Α1 2 19 18 A2 3 **B1** АЗ 4 17 B2

SN74ABT245B...RGY PACKAGE

16 ВЗ A4 5 Α5 6 15 В4 7 **B5** A6 14 13 **B6** A7 8 **B7 A8** 9 12 10 11 GND 88

SN54ABT245B . . . FK PACKAGE (TOP VIEW)



description/ordering information

These octal bus transceivers are designed for asynchronous communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (OE) input can be used to disable the device so the buses are effectively isolated.

ORDERING INFORMATION

TA	PACKAGE	All B	ORDERABLE PART NUMBER	TOP-SIDE MARKING		
- A	PDIP – N	Tube	SN74ABT245BN	SN74ABT245BN		
HILL.	QFN – RGY	Tape and reel	SN74ABT245BRGYR	AB245B		
Ft.I-F	0010 DW	Tube	SN74ABT245BDW	ARTOAFR		
	SOIC – DW	Tape and reel	SN74ABT245BDWR	ABT245B		
	SOP – NS	Tape and reel	SN74ABT245BNSR	ABT245B		
-40°C to 85°C	SSOP - DB	Tape and reel	SN74ABT245BDBR	AB245B		
	T000D DW	Tube	SN74ABT245BPW	NAPO ED		
	TSSOP – PW	Tape and reel	SN74ABT245BPWR	AB245B		
	TVSOP - DGV	Tape and reel	SN74ABT245BDGVR	AB245B		
-	VFBGA – GQN	Tona and and	SN74ABT245BGQNR	4 DO 45 D		
and C	VFBGA – ZQN (Pb-free)	Tape and reel	SN74ABT245BZQNR	AB245B		
	CDIP – J	Tube	SNJ54ABT245AJ	SNJ54ABT245AJ		
–55°C to 125°C	CFP – W	Tube	SNJ54ABT245AW	SNJ54ABT245AW		
	LCCC – FK	Tube	SNJ54ABT245AFK	SNJ54ABT245AFK		

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

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.



SN54ABT245A, SN74ABT245B OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

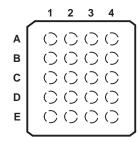
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description/ordering information (continued)

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.

This device is fully specified for hot-insertion applications using I_{off} and power-up 3-state. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

SN74ABT245B...GQN OR ZQN PACKAGE (TOP VIEW)



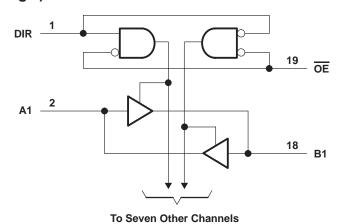
terminal assignments

	1	2	3	4
Α	A1	DIR	Vcc	OE
В	А3	B2	A2	B1
С	A5	A4	B4	В3
D	A7	B6	A6	B5
Е	GND	A8	B8	В7

FUNCTION TABLE

INP	UTS	OPERATION				
OE	DIR	OPERATION				
L	L	B data to A bus				
L	Н	A data to B bus				
Н	Χ	Isolation				

logic diagram (positive logic)



Pin numbers shown are for the DB, DGV, DW, FK, J, N, NS, PW, RGY, and W packages.



SN54ABT245A, SN74ABT245B OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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

Supply voltage range, V _{CC}	–0.5 V to 7 V
Input voltage range, V _I (except I/O ports) (see Note 1)	0.5 V to 7 V
Voltage range applied to any output in the high or power-off state, V _O	–0.5 V to 5.5 V
Current into any output in the low state, I _O : SN54ABT245A	96 mA
SN74ABT245B	128 mA
Input clamp current, I _{IK} (V _I < 0)	–18 mA
Output clamp current, I _{OK} (V _O < 0)	–50 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package	
(see Note 2): DGV package	92°C/W
(see Note 2): DW package	
(see Note 2): GQN/ZQN package	
(see Note 2): N package	
(see Note 2): NS package	
(see Note 2): PW package	
(see Note 3): RGY package	
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)

		SN54ABT245A		SN74AB	LINIT	
		MIN	MAX	MIN	MAX	UNIT
Vcc	Supply voltage	4.5	5.5	4.5	5.5	V
VIH	High-level input voltage	2		2		V
V _{IL}	Low-level input voltage		0.8		0.8	V
VI	Input voltage	0	Vcc	0	VCC	V
IOH	High-level output current		-24		-32	mA
loL	Low-level output current		48		64	mA
Δt/Δν	Input transition rise or fall rate		5		5	ns/V
Δt/ΔV _{CC}	Power-up ramp rate			200		μs/V
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 4: All unused 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.



SN54ABT245A, SN74ABT245B OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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

PARAMETER		TEST CONDITIONS		T _A = 25°C			SN54ABT245A		SN74ABT245B			
		TEST CON	DITIONS	MIN	TYP [†]	MAX	MIN	MAX	MIN	MAX	UNIT	
VIK		$V_{CC} = 4.5 \text{ V},$	$I_{I} = -18 \text{ mA}$			-1.2		-1.2		-1.2	V	
		$V_{CC} = 4.5 \text{ V},$	$I_{OH} = -3 \text{ mA}$	2.5			2.5		2.5			
1/2		$V_{CC} = 5 V$,	$I_{OH} = -3 \text{ mA}$	3			3		3		\/	
VOH		V _{CC} = 4.5 V	$I_{OH} = -24 \text{ mA}$	2			2				V	
		VCC = 4.5 V	$I_{OH} = -32 \text{ mA}$	2*					2			
V _{OL}		V _{CC} = 4.5 V	I _{OL} = 48 mA			0.55		0.55			V	
VOL		VCC = 4.5 V	$I_{OL} = 64 \text{ mA}$			0.55*				0.55	V	
V _{hys}					100						mV	
	Control inputs	$V_{CC} = 0 \text{ to } 5.5 \text{ V, V}_{I}$	= V _{CC} or GND			±1		±1		±1		
l _l	A or B ports	$V_{CC} = 2.1 \text{ V to } 5.5 \text{ V}$ $V_{I} = V_{CC} \text{ or GND}$				±20		±100		±20	μΑ	
lozpu		$V_{CC} = 0 \text{ to } 2.1 \text{ V},$ $V_{O} = 0.5 \text{ V to } 2.7 \text{ V},$			±50		±50		±50	μΑ		
lozpd		V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, OE = X				±50		±50		±50	μΑ	
I _{OZH} ‡		$V_{CC} = 2.1 \text{ V to } 5.5 \text{ V},$ $V_{O} = 2.7 \text{ V}, \overline{OE} \ge 2 \text{ V}$				10		10		10	μΑ	
l _{OZL} ‡		$V_{CC} = 2.1 \text{ V} \text{ to } 5.5 \text{ V}$ $V_{O} = 0.5 \text{ V}, \overline{OE} \ge 2 \text{ V}$				-10		-10		-10	μΑ	
l _{off}		$V_{CC} = 0$,	V_I or $V_O \le 5.5 \text{ V}$			±100				±100	μΑ	
ICEX		V _{CC} = 5.5 V, V _O = 5.5 V	Outputs high			50		50		50	μΑ	
IO§		V _{CC} = 5.5 V,	V _O = 2.5 V	-50	-140	-180	-50	-180	-50	-180	mA	
		V _{CC} = 5.5 V,	Outputs high		5	250		250		250	μΑ	
ICC	A or B ports	$I_{O} = 0$,	Outputs low		22	30		30		30	mA	
		$V_I = V_{CC}$ or GND	Outputs disabled		1	250		250		250	μΑ	
	Doto inputo	$V_{CC} = 5.5 \text{ V},$ One input at 3.4 V,	Outputs enabled			1.5		1.5		1.5	mA	
ΔI _{CC} ¶	Data inputs	Other inputs at VCC or GND	Outputs disabled			50		50		50	μА	
	Control inputs	V_{CC} = 5.5 V, One input at 3.4 V, Other inputs at V_{CC} or GND				1.5		1.5		1.5	mA	
Ci	Control inputs	V _I = 2.5 V or 0.5 V			4						pF	
C _{io}	A or B ports	$V_0 = 2.5 \text{ V or } 0.5 \text{ V}$			8						pF	

^{*} On products compliant to MIL-PRF-38535, this parameter does not apply.



[†] All typical values are at $V_{CC} = 5 \text{ V}$.

[‡] The parameters I_{OZH} and I_{OZL} include the input leakage current.

§ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

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

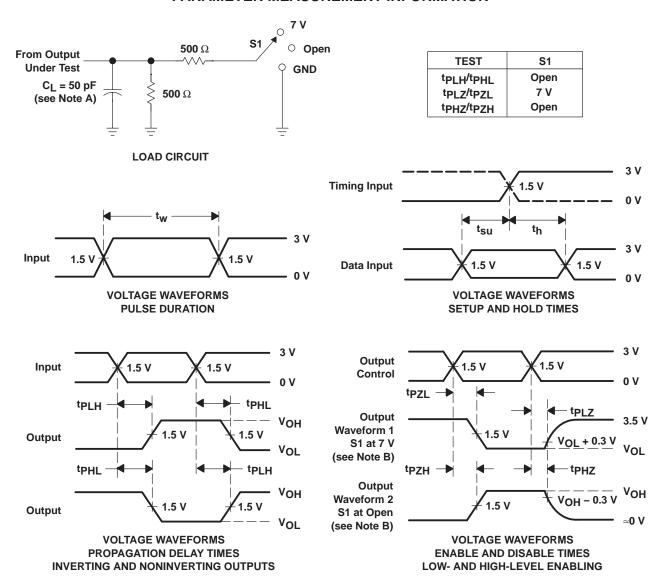
SN54ABT245A, SN74ABT245B **OCTAL BUS TRANSCEIVERS** WITH 3-STATE OUTPUTS SCBS081L - JANUARY 1991 - REVISED APRIL 2005

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	TO	V _{CC} = 5 V, T _A = 25°C			SN54ABT245A		SN74ABT245B		UNIT
	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A D	D on A	1	2	3.2	0.8	3.8	1	3.6	
^t PHL	A or B	B or A	1	2.6	3.5	1	4.2	1	3.9	ns
^t PZH	ŌĒ	A D	2	3.5	4.5	1.2	6.2	2	5.6	
tPZL	OE	A or B	1.9	4	5.3	1.3	6.8	1.9	6.2	ns
^t PHZ	ŌĒ	A or B	2.2	4.4	5.4	2.2	6.1	2.2	5.9	no
t _{PLZ}	OE	AUB	1.5	3	4	1.0	4.9	1.5	4.5	ns
t _{sk(o)}					0.5				0.5	ns

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PARAMETER MEASUREMENT INFORMATION



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, $Z_O = 50 \,\Omega$, $t_f \leq$ 2.5 ns, $t_f \leq$ 2.5 ns.
- D. The outputs are measured one at a time, with one transition per measurement.
- E. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms







5-Jul-2005

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-9214802Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
5962-9214802QRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
5962-9214802QSA	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
SN74ABT245BDBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI
SN74ABT245BDBR	ACTIVE	SSOP	DB	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR Level-1-235C-UNLIM
SN74ABT245BDBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1YEAR
SN74ABT245BDGVR	ACTIVE	TVSOP	DGV	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74ABT245BDGVRE4	ACTIVE	TVSOP	DGV	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74ABT245BDW	ACTIVE	SOIC	DW	20	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR Level-1-235C-UNLIM
SN74ABT245BDWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT245BDWR	ACTIVE	SOIC	DW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR Level-1-235C-UNLIM
SN74ABT245BDWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT245BGQNR	ACTIVE	VFBGA	GQN	20	1000	TBD	SNPB	Level-1-240C-UNLIM
SN74ABT245BN	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74ABT245BNSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT245BNSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT245BPW	ACTIVE	TSSOP	PW	20	70	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74ABT245BPWE4	ACTIVE	TSSOP	PW	20	70	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74ABT245BPWLE	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI
SN74ABT245BPWR	ACTIVE	TSSOP	PW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74ABT245BPWRE4	ACTIVE	TSSOP	PW	20	2000	Pb-Free (RoHS)	CU NIPDAU	Level-1-250C-UNLIM
SN74ABT245BRGYR	ACTIVE	QFN	RGY	20	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1YEAR
SN74ABT245BZQNR	ACTIVE	VFBGA	ZQN	20	1000	Pb-Free (RoHS)	SNAGCU	Level-1-260C-UNLIM
SNJ54ABT245AFK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ABT245AJ	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54ABT245AW	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC

(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.



PACKAGE OPTION ADDENDUM

5-Jul-2005

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) 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.

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.

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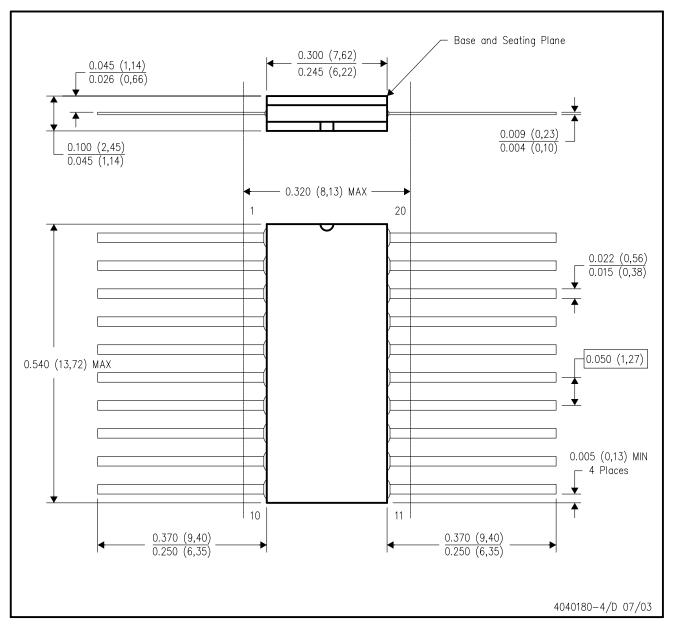
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- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



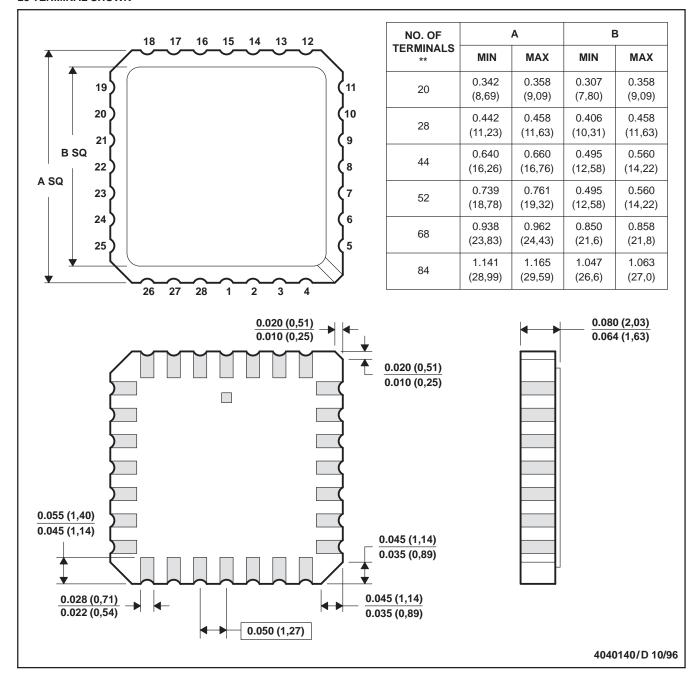
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within Mil-Std 1835 GDFP2-F20



FK (S-CQCC-N**)

28 TERMINAL SHOWN

LEADLESS CERAMIC CHIP CARRIER

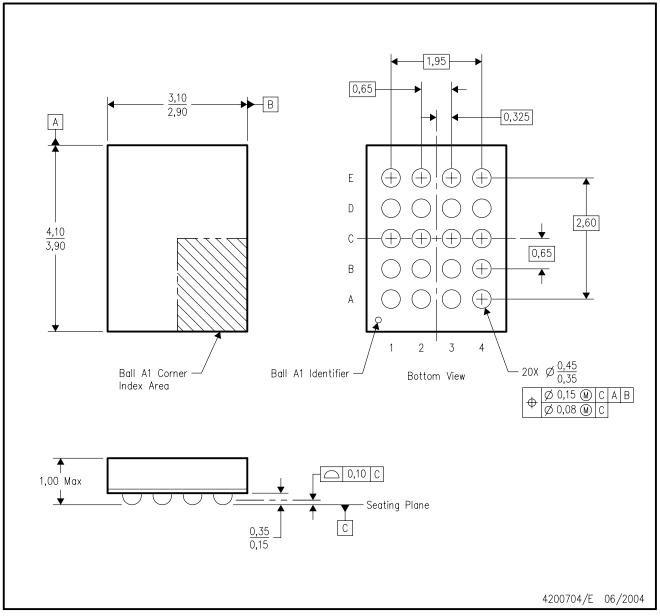


- NOTES: A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004



GQN (R-PBGA-N20)

PLASTIC BALL GRID ARRAY

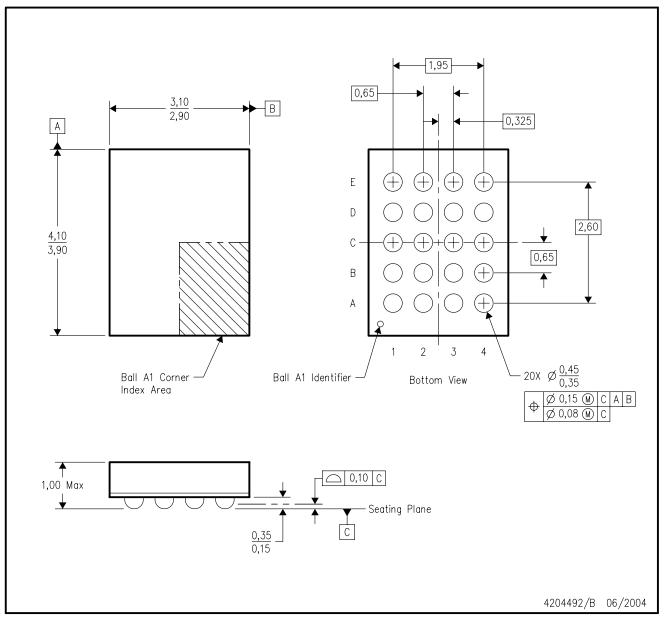


- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Falls within JEDEC MO-225 variation BC.
- D. This package is tin-lead (SnPb). Refer to the 20 ZQN package (drawing 4204492) for lead-free.



ZQN (R-PBGA-N20)

PLASTIC BALL GRID ARRAY



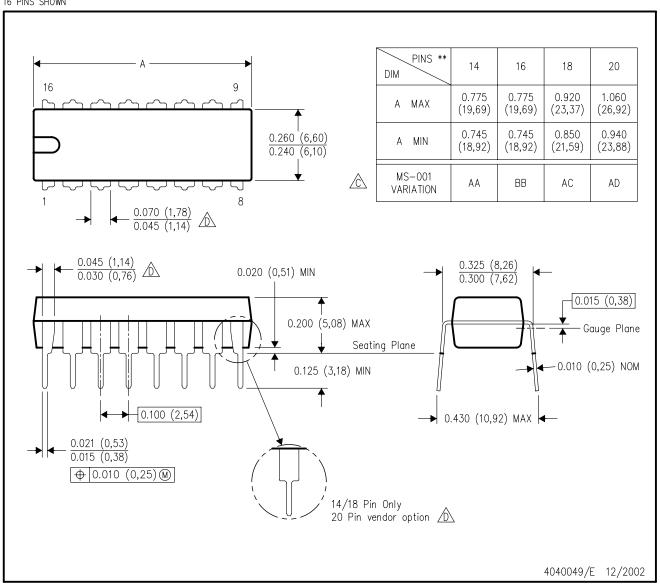
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Falls within JEDEC MO-225 variation BC.
- D. This package is lead-free. Refer to the 20 GQN package (drawing 4200704) for tin-lead (SnPb).



N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



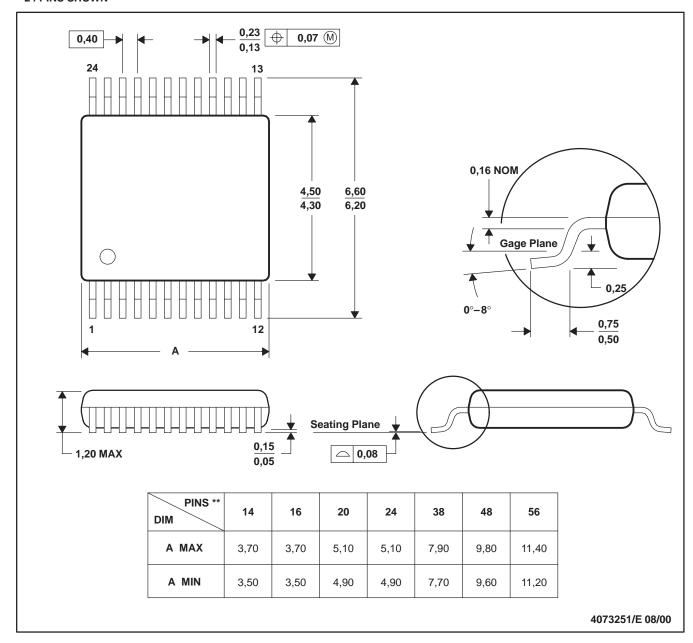
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



DGV (R-PDSO-G**)

24 PINS SHOWN

PLASTIC SMALL-OUTLINE



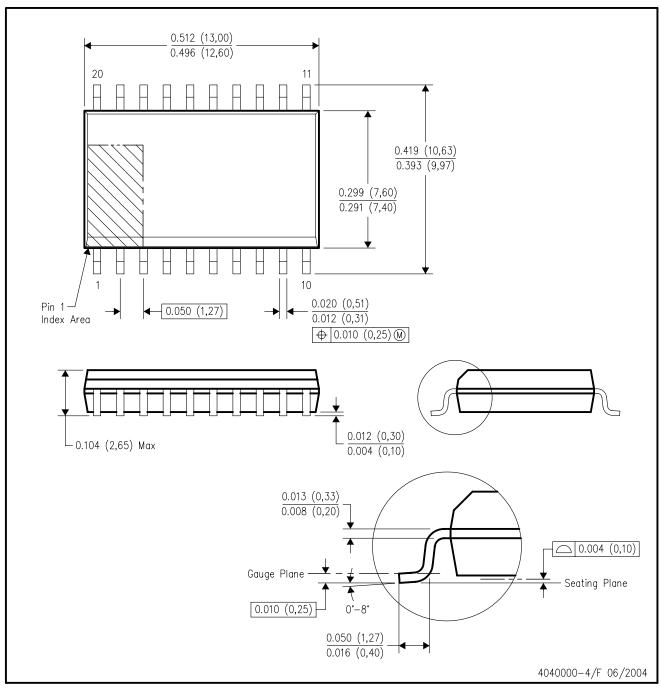
NOTES: A. All linear dimensions are in millimeters.

- 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



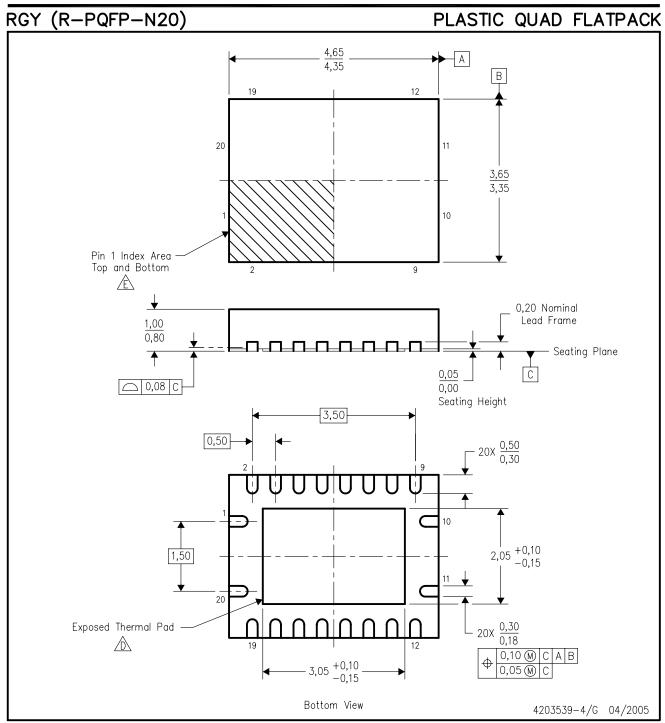
DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



- 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-013 variation AC.





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. QFN (Quad Flatpack No-Lead) package configuration.
- The package thermal pad must be soldered to the board for thermal and mechanical performance.
- Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
- F. Package complies to JEDEC MO-241 variation BC.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



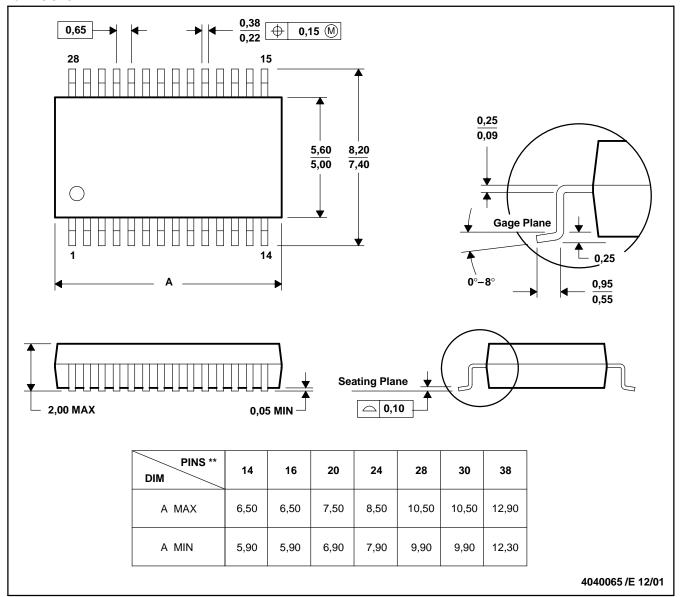
- . All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 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.
- D. Falls within JEDEC MO-150



PW (R-PDSO-G**)

14 PINS SHOWN

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 0,15.

D. Falls within JEDEC MO-153

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