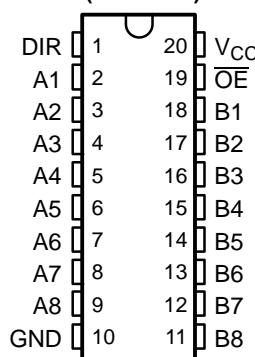


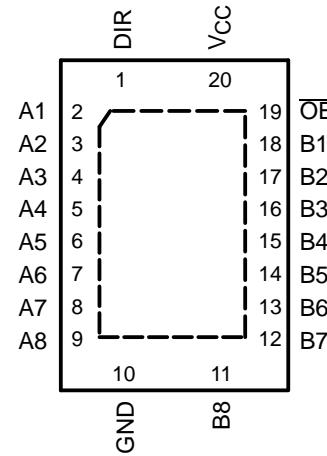
FEATURES

- Operate From 1.65 V to 3.6 V
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 6.3 ns at 3.3 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ C$
- Typical V_{OHV} (Output V_{OH} Undershoot) >2 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ C$
- Support Mixed-Mode Signal Operation on All Ports (5-V Input/Output Voltage With 3.3-V V_{CC})
- I_{off} Supports Partial-Power-Down Mode Operation
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

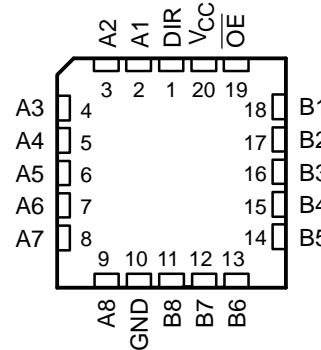
SN54LVCH245A ... J OR W PACKAGE
SN74LVCH245A ... DB, DGV, DW, NS,
OR PW PACKAGE
(TOP VIEW)



SN74LVCH245A ... RGY PACKAGE
(TOP VIEW)



SN54LVCH245A ... FK PACKAGE
(TOP VIEW)



DESCRIPTION/ORDERING INFORMATION

The SN54LVCH245A octal bus transceiver is designed for 2.7-V to 3.6-V V_{CC} operation, and the SN74LVCH245A octal bus transceiver is designed for 1.65-V to 3.6-V V_{CC} operation.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of these devices as translators in a mixed 3.3-V/5-V system environment.

These devices are designed for asynchronous communication between data buses. These 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.

These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down.

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.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level. Use of pullup or pulldown resistors with the bus-hold circuitry is not recommended. The bus-hold circuitry is part of the input circuit and is not disabled by OE or DIR.



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.

**SN54LVCH245A, SN74LVCH245A
OCTAL BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS**

SCES0080—JULY 1995—REVISED DECEMBER 2005

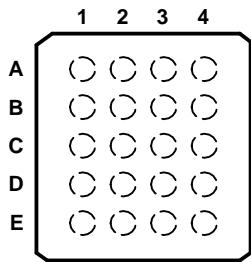
 **TEXAS
INSTRUMENTS**
www.ti.com

ORDERING INFORMATION

T _A	PACKAGE ⁽¹⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	QFN – RGY	Reel of 1000	SN74LVCH245ARGYR
	SOIC – DW	Tube of 25	SN74LVCH245ADW
		Reel of 2000	SN74LVCH245ADWR
	SOP – NS	Reel of 2000	SN74LVCH245ANSR
	SSOP – DB	Reel of 2000	SN74LVCH245ADBR
	TSSOP – PW	Tube of 70	SN74LVCH245APW
		Reel of 2000	SN74LVCH245APWR
		Reel of 250	SN74LVCH245APWT
	TVSOP – DGV	Reel of 2000	SN74LVCH245ADGVR
	VFBGA – GQN	Reel of 1000	SN74LVCH245AGQNR
	VFBGA – ZQN (Pb-free)		SN74LVCH245AZQNR
-55°C to 125°C	CDIP – J	Tube of 20	SNJ54LVCH245AJ
	CFP – W	Tube of 85	SNJ54LVCH245AW
	LCCC – FK	Tube of 55	SNJ54LVCH245AFK

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

**GQN OR ZQN PACKAGE
(TOP VIEW)**



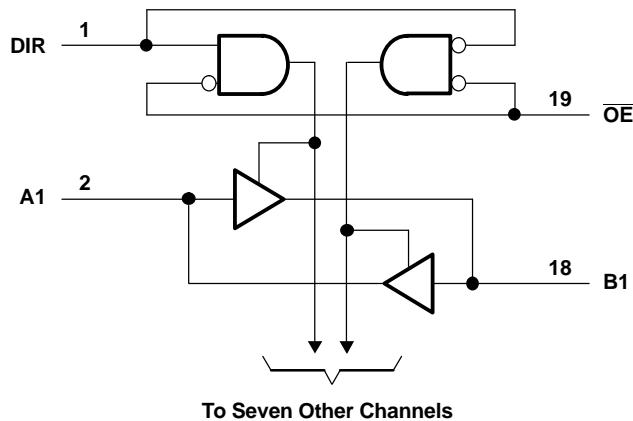
TERMINAL ASSIGNMENTS

	1	2	3	4
A	A1	DIR	V _{CC}	OE
B	A3	B2	A2	B1
C	A5	A4	B4	B3
D	A7	B6	A6	B5
E	GND	A8	B8	B7

FUNCTION TABLE

INPUTS		OPERATION	
OE	DIR		
L	L	B data to A bus	
L	H	A data to B bus	
H	X	Isolation	

LOGIC DIAGRAM (POSITIVE LOGIC)



To Seven Other Channels

Absolute Maximum Ratings⁽¹⁾

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

		MIN	MAX	UNIT
V_{CC}	Supply voltage range	-0.5	6.5	V
V_I	Input voltage range ⁽²⁾	-0.5	6.5	V
V_O	Voltage range applied to any output in the high-impedance or power-off state ⁽²⁾	-0.5	6.5	V
V_O	Voltage range applied to any output in the high or low state ⁽²⁾⁽³⁾	-0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current $V_I < 0$	-	-50	mA
I_{OK}	Output clamp current $V_O < 0$	-	-50	mA
I_O	Continuous output current	-	± 50	mA
	Continuous current through V_{CC} or GND	-	± 100	mA
θ_{JA}	Package thermal impedance	DB package ⁽⁴⁾	70	°C/W
		DGV package ⁽⁴⁾	92	
		DW package ⁽⁴⁾	58	
		GQN/ZQN package ⁽⁴⁾	78	
		NS package ⁽⁴⁾	60	
		PW package ⁽⁴⁾	83	
		RGY package ⁽⁵⁾	37	
T_{stg}	Storage temperature range	-65	150	°C

- (1) 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.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V_{CC} is provided in the recommended operating conditions table.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.
- (5) The package thermal impedance is calculated in accordance with JESD 51-5.

**SN54LVCH245A, SN74LVCH245A
OCTAL BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS**

SCES008O—JULY 1995—REVISED DECEMBER 2005

 **TEXAS
INSTRUMENTS**
www.ti.com

Recommended Operating Conditions⁽¹⁾

		SN54LVCH245A		SN74LVCH245A		UNIT
		MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage	Operating	2	3.6	1.65	3.6
		Data retention only	1.5		1.5	V
V _{IH}	High-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.65 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V		1.7		
		V _{CC} = 2.7 V to 3.6 V	2	2		
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.35 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V		0.7		
		V _{CC} = 2.7 V to 3.6 V	0.8	0.8		
V _I	Input voltage		0	5.5	0	5.5
V _O	Output voltage	High or low state	0	V _{CC}	0	V _{CC}
		3-state	0	5.5	0	5.5
I _{OH}	High-level output current	V _{CC} = 1.65 V			−4	mA
		V _{CC} = 2.3 V			−8	
		V _{CC} = 2.7 V		−12	−12	
		V _{CC} = 3 V		−24	−24	
I _{OL}	Low-level output current	V _{CC} = 1.65 V			4	mA
		V _{CC} = 2.3 V			8	
		V _{CC} = 2.7 V		12	12	
		V _{CC} = 3 V		24	24	
Δt/Δv	Input transition rise or fall rate		10		10	ns/V
T _A	Operating free-air temperature	−55	125	−40	85	°C

(1) 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.

Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	SN54LVCH245A			SN74LVCH245A			UNIT
			MIN	TYP ⁽¹⁾	MAX	MIN	TYP ⁽¹⁾	MAX	
V _{OH}	I _{OH} = -100 µA	1.65 V to 3.6 V				V _{CC} – 0.2			V
		2.7 V to 3.6 V	V _{CC} – 0.2						
	I _{OH} = -4 mA	1.65 V				1.2			
	I _{OH} = -8 mA	2.3 V				1.7			
	I _{OH} = -12 mA	2.7 V	2.2			2.2			
		3 V	2.4			2.4			
	I _{OH} = -24 mA	3 V	2.2			2.2			
V _{OL}	I _{OL} = 100 µA	1.65 V to 3.6 V				0.2			V
		2.7 V to 3.6 V		0.2					
	I _{OL} = 4 mA	1.65 V				0.45			
	I _{OL} = 8 mA	2.3 V				0.7			
	I _{OL} = 12 mA	2.7 V		0.4		0.4			
	I _{OL} = 24 mA	3 V		0.55		0.55			
I _I	Control inputs	V _I = 0 to 5.5 V	3.6 V		±5		±5		µA
I _{off}		V _I or V _O = 5.5 V	0				±10		µA
I _{I(hold)}	V _I = 0.58 V	1.65 V				25			µA
	V _I = 1.07 V					-25			
	V _I = 0.7 V	2.3 V				45			
	V _I = 1.7 V					-45			
	V _I = 0.8 V	3 V	75			75			
	V _I = 2 V		-75			-75			
	V _I = 0 to 3.6 V ⁽²⁾	3.6 V		±500		±500			
I _{OZ} ⁽³⁾	V _O = 0 V or (V _{CC} to 5.5 V)	2.3 V to 3.6 V		±15		±5			µA
I _{CC}	V _I = V _{CC} or GND 3.6 V ≤ V _I ≤ 5.5 V ⁽⁴⁾	I _O = 0 3.6 V		10		10			µA
				10		10			
ΔI _{CC}	One input at V _{CC} – 0.6 V, Other inputs at V _{CC} or GND	2.7 V to 3.6 V		500		500			µA
C _i	Control inputs	V _I = V _{CC} or GND	3.3 V	4	12	4			pF
C _{io}	A or B port	V _O = V _{CC} or GND	3.3 V	5.5	12	5.5			pF

- (1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.
- (2) This is the bus-hold maximum dynamic current required to switch the input from one state to another.
- (3) For the total leakage current in an I/O port, please consult the I_{I(hold)} specification for the input voltage condition 0 V < V_I < V_{CC}, and the I_{OZ} specification for the input voltage conditions V_I = 0 V or V_I = V_{CC} to 5.5 V. The bus-hold current, at input voltage greater than V_{CC}, is negligible.
- (4) This applies in the disabled state only.

**SN54LVCH245A, SN74LVCH245A
OCTAL BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS**

SCES008O—JULY 1995—REVISED DECEMBER 2005



Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54LVCH245A		UNIT	
			$V_{CC} = 2.7\text{ V}$			
			MIN	MAX		
t_{pd}	A or B	B or A	8	1 7	ns	
t_{en}	\overline{OE}	A or B	9.5	1 8.5	ns	
t_{dis}	\overline{OE}	A or B	8.5	1 7.5	ns	

Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74LVCH245A						UNIT	
			$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		$V_{CC} = 2.7\text{ V}$			
			MIN	MAX	MIN	MAX	MIN	MAX		
t_{pd}	A or B	B or A	(1)	(1)	(1)	(1)	7.3	1.5 6.3	ns	
t_{en}	\overline{OE}	A or B	(1)	(1)	(1)	(1)	9.5	1.5 8.5	ns	
t_{dis}	\overline{OE}	A or B	(1)	(1)	(1)	(1)	8.5	1.7 7.5	ns	
$t_{sk(o)}$								1	ns	

(1) This information was not available at the time of publication.

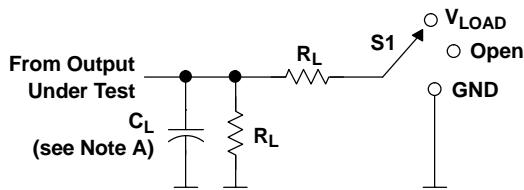
Operating Characteristics

$T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	UNIT	
			TYP	TYP	TYP		
C_{pd}	Power dissipation capacitance per transceiver	Outputs enabled	$f = 10\text{ MHz}$	(1)	(1)	47	pF
		Outputs disabled		(1)	(1)	2	

(1) This information was not available at the time of publication.

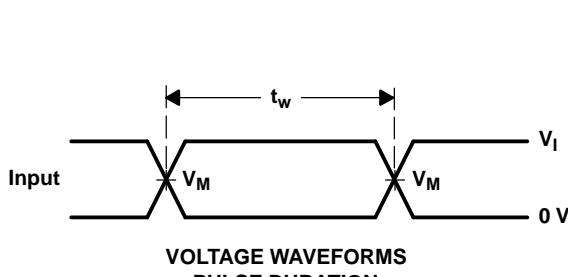
PARAMETER MEASUREMENT INFORMATION



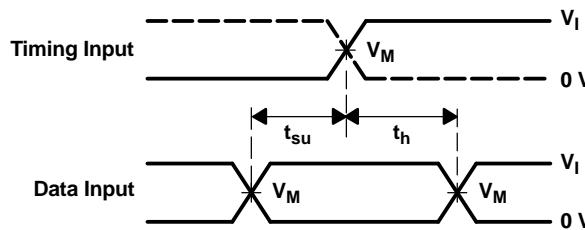
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

LOAD CIRCUIT

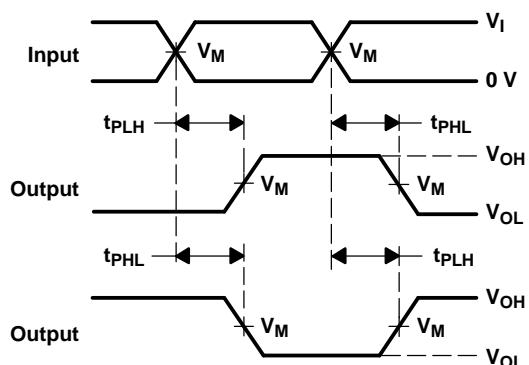
V _{CC}	INPUTS		V _M	V _{LOAD}	C _L	R _L	V _Δ
	V _I	t _r /t _f					
1.8 V ± 0.15 V	V _{CC}	≤ 2 ns	V _{CC} /2	2 × V _{CC}	30 pF	1 kΩ	0.15 V
2.5 V ± 0.2 V	V _{CC}	≤ 2 ns	V _{CC} /2	2 × V _{CC}	30 pF	500 Ω	0.15 V
2.7 V	2.7 V	≤ 2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
3.3 V ± 0.3 V	2.7 V	≤ 2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V



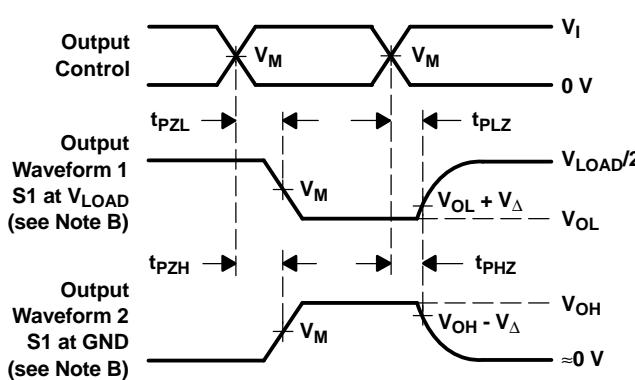
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

NOTES: A. C_J 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: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$.
- 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_{PLZ} 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

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-9754301Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
5962-9754301QRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type
5962-9754301QSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type
5962-9754301V2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
5962-9754301VRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type
5962-9754301VSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type
SN74LVCH245ADBLE	OBsolete	SSOP	DB	20		TBD	Call TI	Call TI
SN74LVCH245ADBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADGVR	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADGVRE4	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADGVRG4	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ADWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245AGQNR	NRND	BGA MI CROSTA R JUNI OR	GQN	20	1000	TBD	SNPB	Level-1-240C-UNLIM
SN74LVCH245ANSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ANSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ANSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APW	ACTIVE	TSSOP	PW	20	1	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWE4	ACTIVE	TSSOP	PW	20	1	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWG4	ACTIVE	TSSOP	PW	20	1	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWLE	OBsolete	TSSOP	PW	20		TBD	Call TI	Call TI

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74LVCH245APWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWT	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWTE4	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245APWTG4	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVCH245ARGYR	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
SN74LVCH245ARGYRG4	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
SN74LVCH245AZQNR	ACTIVE	BGA MI CROSTA R JUNI OR	ZQN	20	1000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM
SN74LVCH245AZXYR	ACTIVE	BGA MI CROSTA R JUNI OR	ZXY	20	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM
SNJ54LVCH245AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
SNJ54LVCH245AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type
SNJ54LVCH245AW	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type

⁽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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited

information may not be available for release.

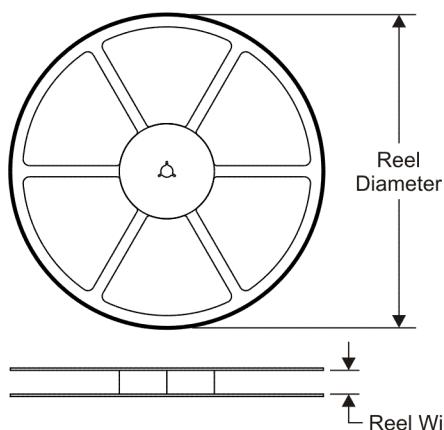
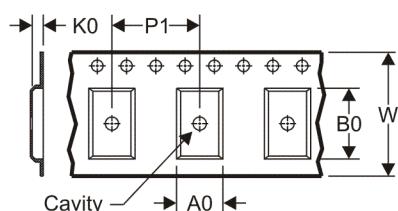
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN54LVCH245A, SN54LVCH245A-SP, SN74LVCH245A :

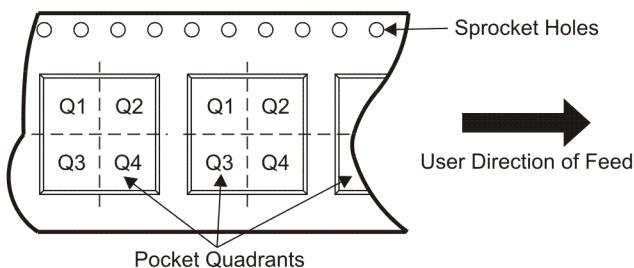
- Automotive: [SN74LVCH245A-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

TAPE AND REEL INFORMATION
REEL DIMENSIONS

TAPE DIMENSIONS


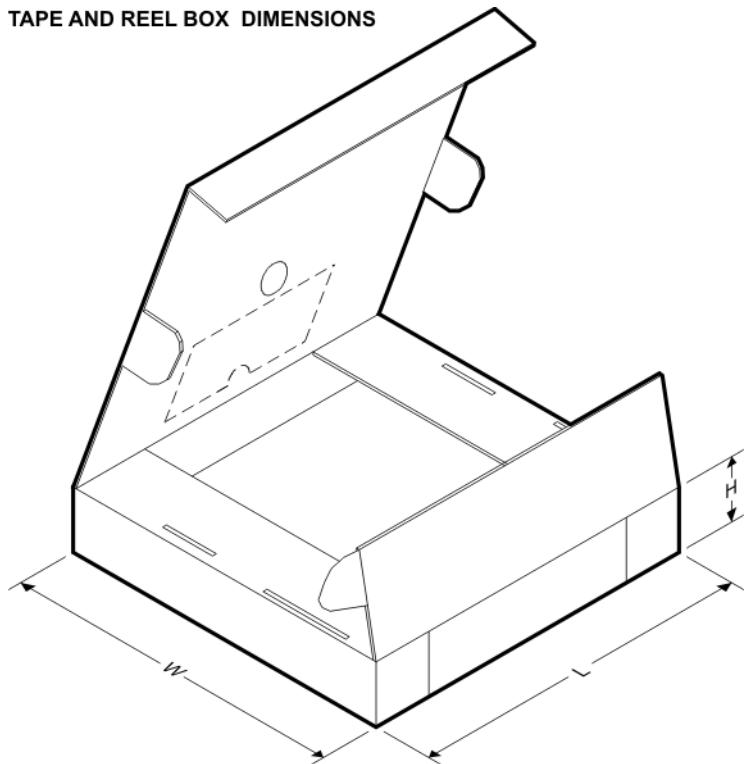
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVCH245ADBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74LVCH245ADGVR	TVSOP	DGV	20	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
SN74LVCH245ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74LVCH245AGQNR	BGA MI CROSTA R JUNI OR	GQN	20	1000	330.0	12.4	3.3	4.3	1.6	8.0	12.0	Q1
SN74LVCH245AGQNR	BGA MI CROSTA R JUNI OR	GQN	20	1000	330.0	12.4	3.3	4.3	1.5	8.0	12.0	Q1
SN74LVCH245ANSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74LVCH245APWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74LVCH245ARGYR	VQFN	RGY	20	3000	180.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1
SN74LVCH245AZQNR	BGA MI CROSTA R JUNI OR	ZQN	20	1000	330.0	12.4	3.3	4.3	1.6	8.0	12.0	Q1
SN74LVCH245AZQNR	BGA MI CROSTA R JUNI	ZQN	20	1000	330.0	12.4	3.3	4.3	1.5	8.0	12.0	Q1

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
	OR											
SN74LVCH245AZXYR	BGA MICROSTAR JUNIOR	ZXY	20	2500	330.0	12.4	2.8	3.3	1.0	4.0	12.0	Q2

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

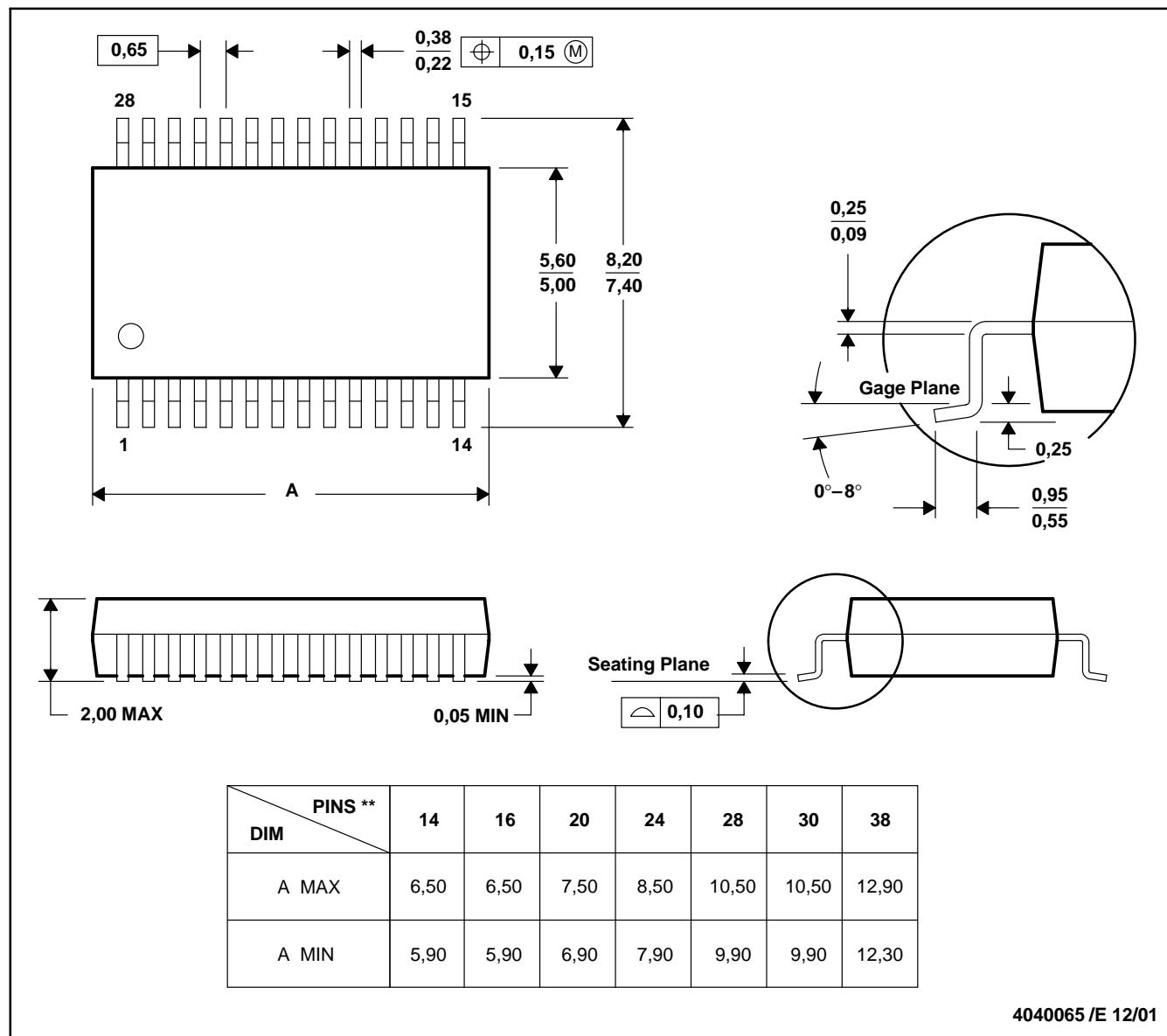
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVCH245ADBR	SSOP	DB	20	2000	346.0	346.0	33.0
SN74LVCH245ADGVR	TVSOP	DGV	20	2000	346.0	346.0	29.0
SN74LVCH245ADWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74LVCH245AGQNR	BGA MICROSTAR JUNIOR	GQN	20	1000	340.5	338.1	20.6
SN74LVCH245AGQNR	BGA MICROSTAR JUNIOR	GQN	20	1000	346.0	346.0	29.0
SN74LVCH245ANSR	SO	NS	20	2000	346.0	346.0	41.0
SN74LVCH245APWR	TSSOP	PW	20	2000	346.0	346.0	33.0
SN74LVCH245ARGYR	VQFN	RGY	20	3000	190.5	212.7	31.8
SN74LVCH245AZQNR	BGA MICROSTAR JUNIOR	ZQN	20	1000	340.5	338.1	20.6
SN74LVCH245AZQNR	BGA MICROSTAR JUNIOR	ZQN	20	1000	346.0	346.0	29.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVCH245AZXYR	BGA MICROSTAR JUNIOR	ZXY	20	2500	340.5	338.1	20.6

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

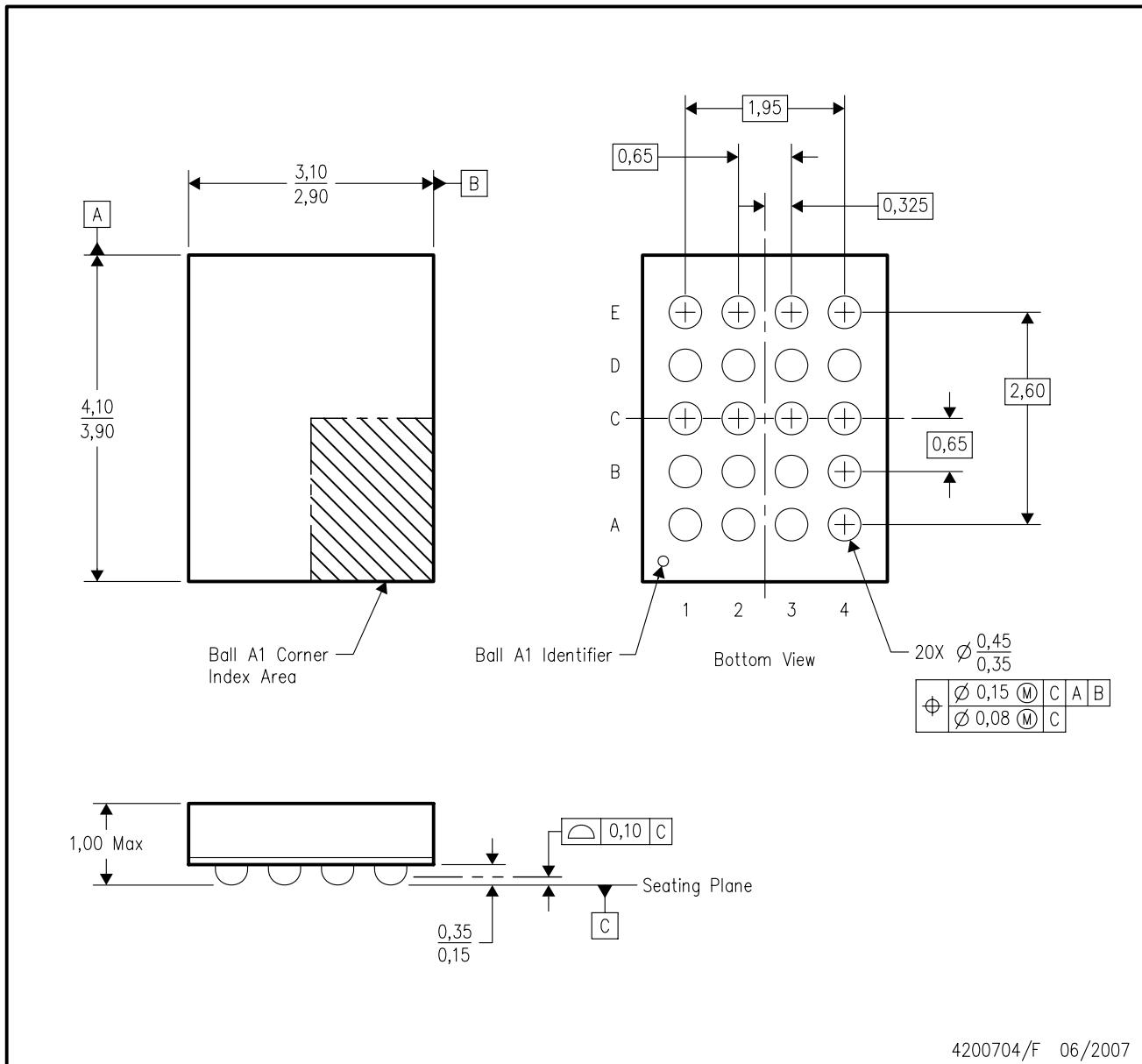
28 PINS SHOWN



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

GQN (R-PBGA-N20)

PLASTIC BALL GRID ARRAY



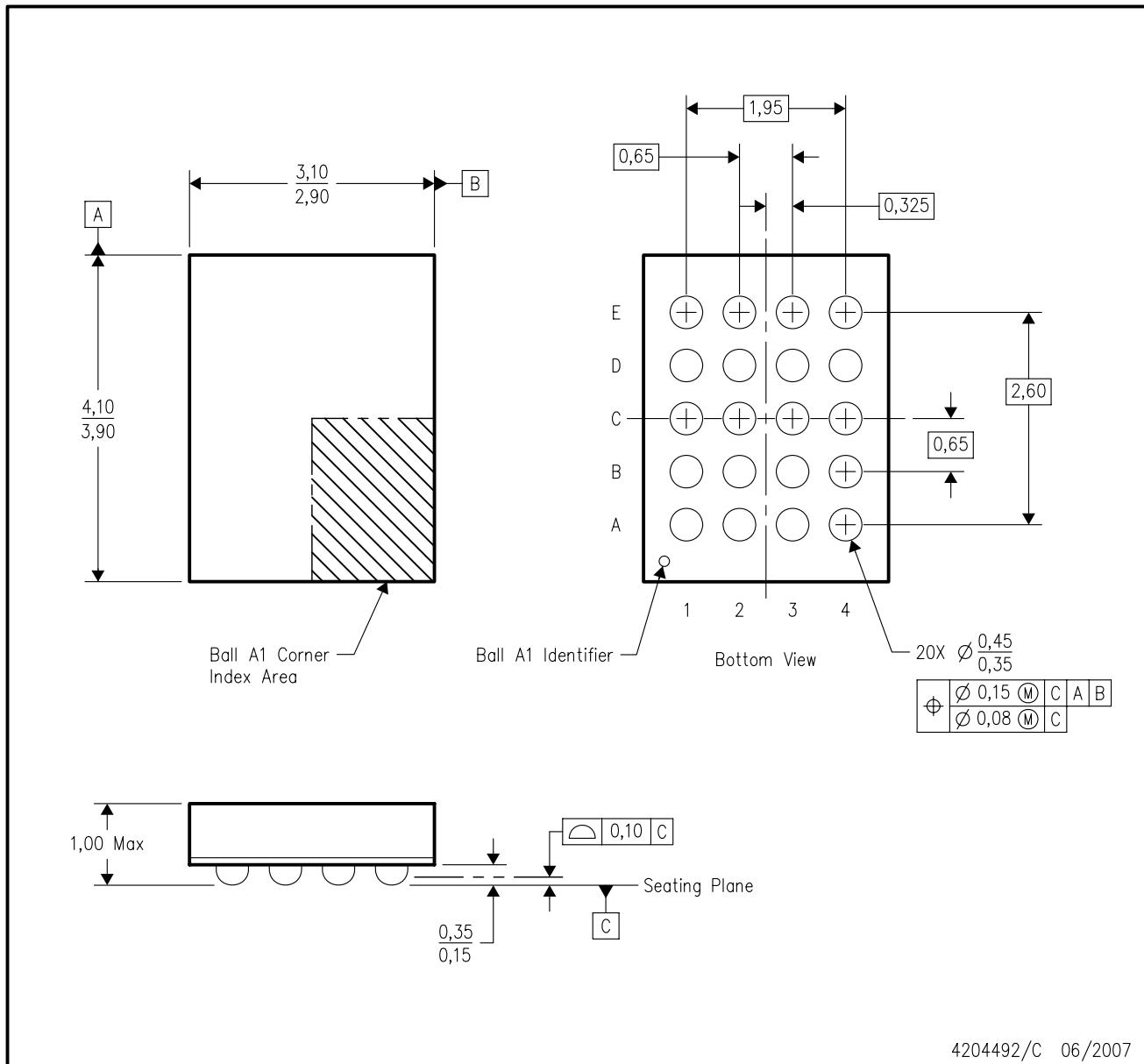
4200704/F 06/2007

NOTES:

- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
- This drawing is subject to change without notice.
- Falls within JEDEC MO-285 variation BC-2.
- 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



4204492/C 06/2007

NOTES:

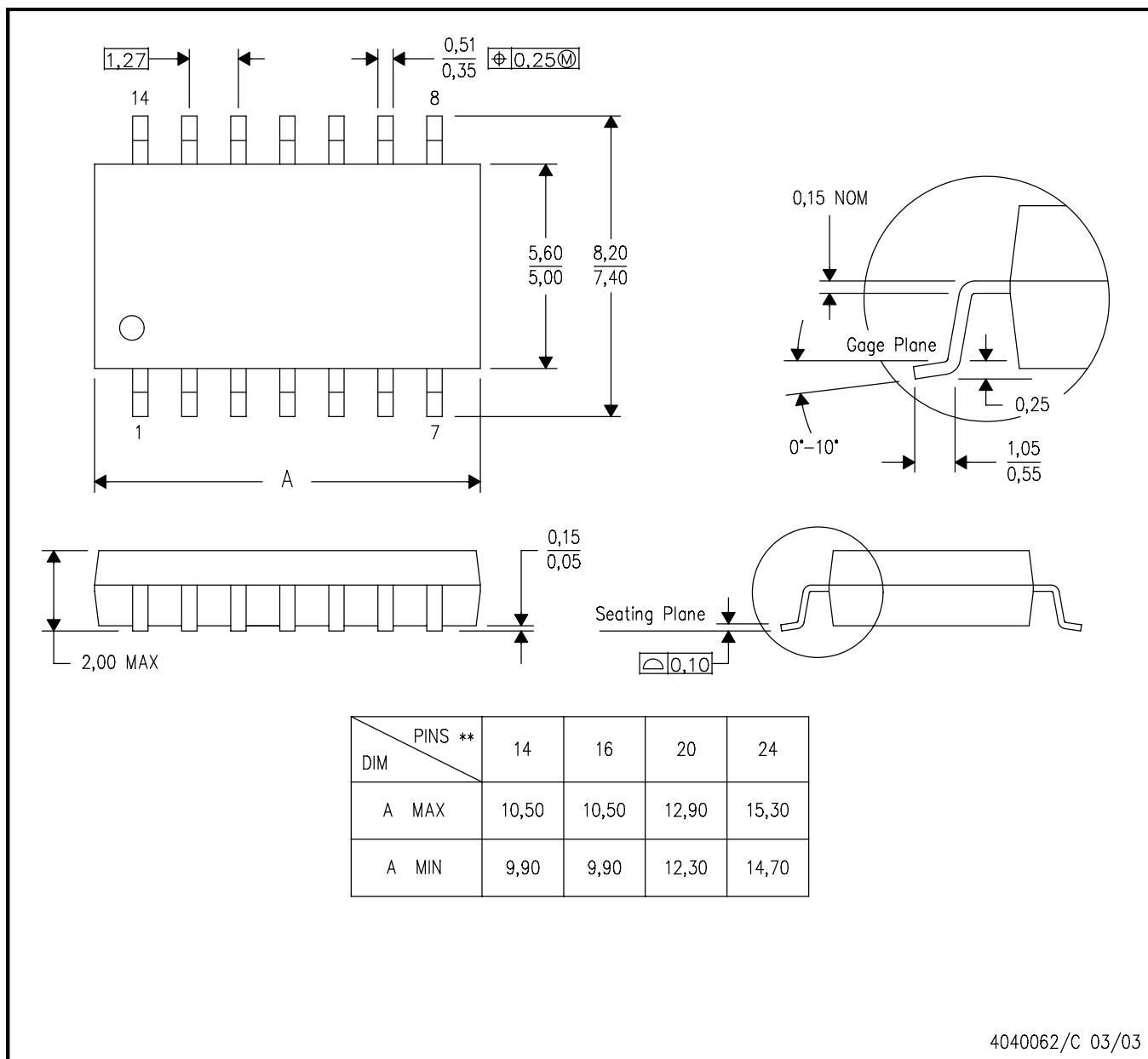
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
- This drawing is subject to change without notice.
- Falls within JEDEC MO-285 variation BC-2.
- This package is lead-free. Refer to the 20 GQN package (drawing 4200704) for tin-lead (SnPb).

MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



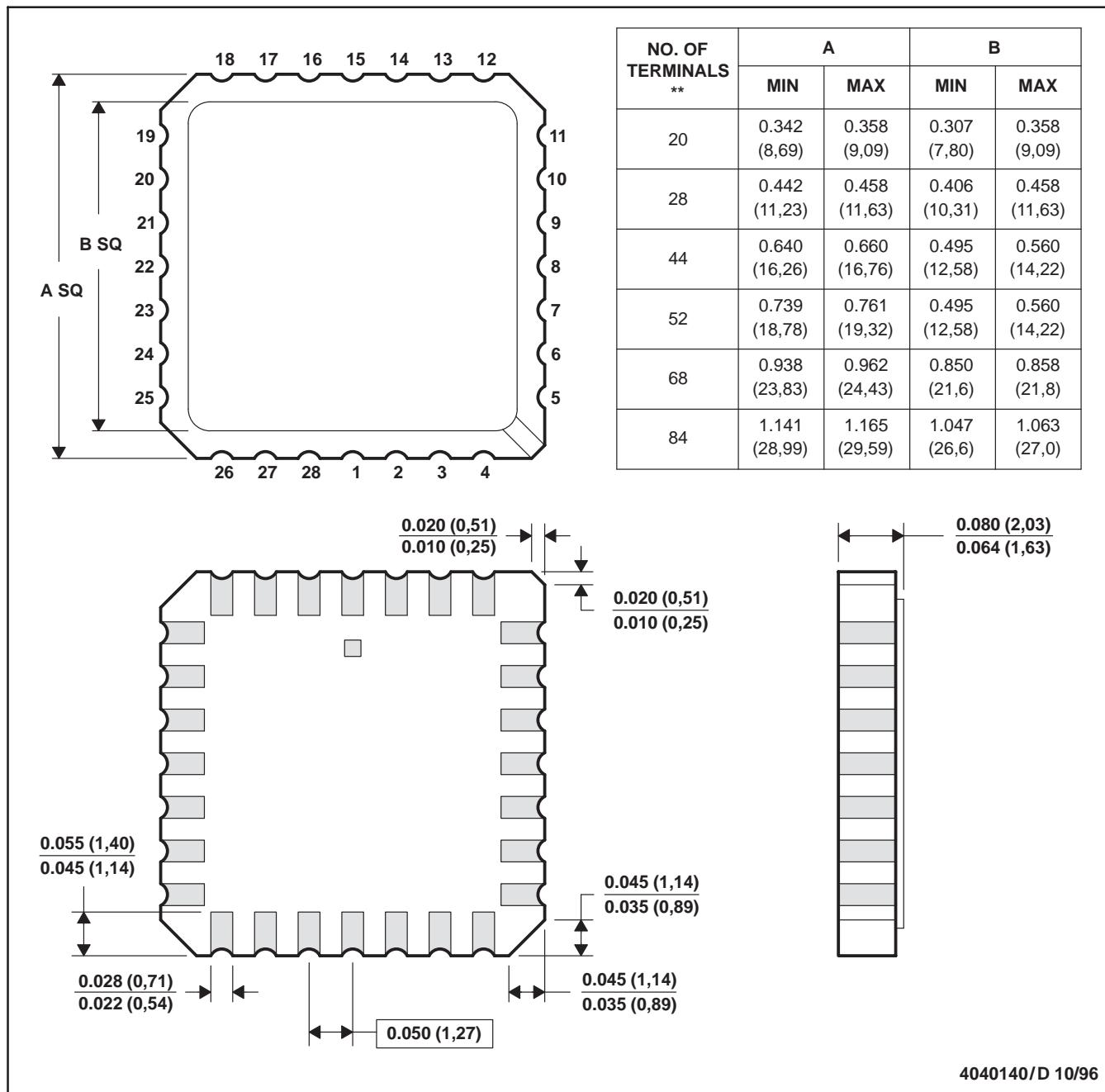
NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

4040062/C 03/03

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



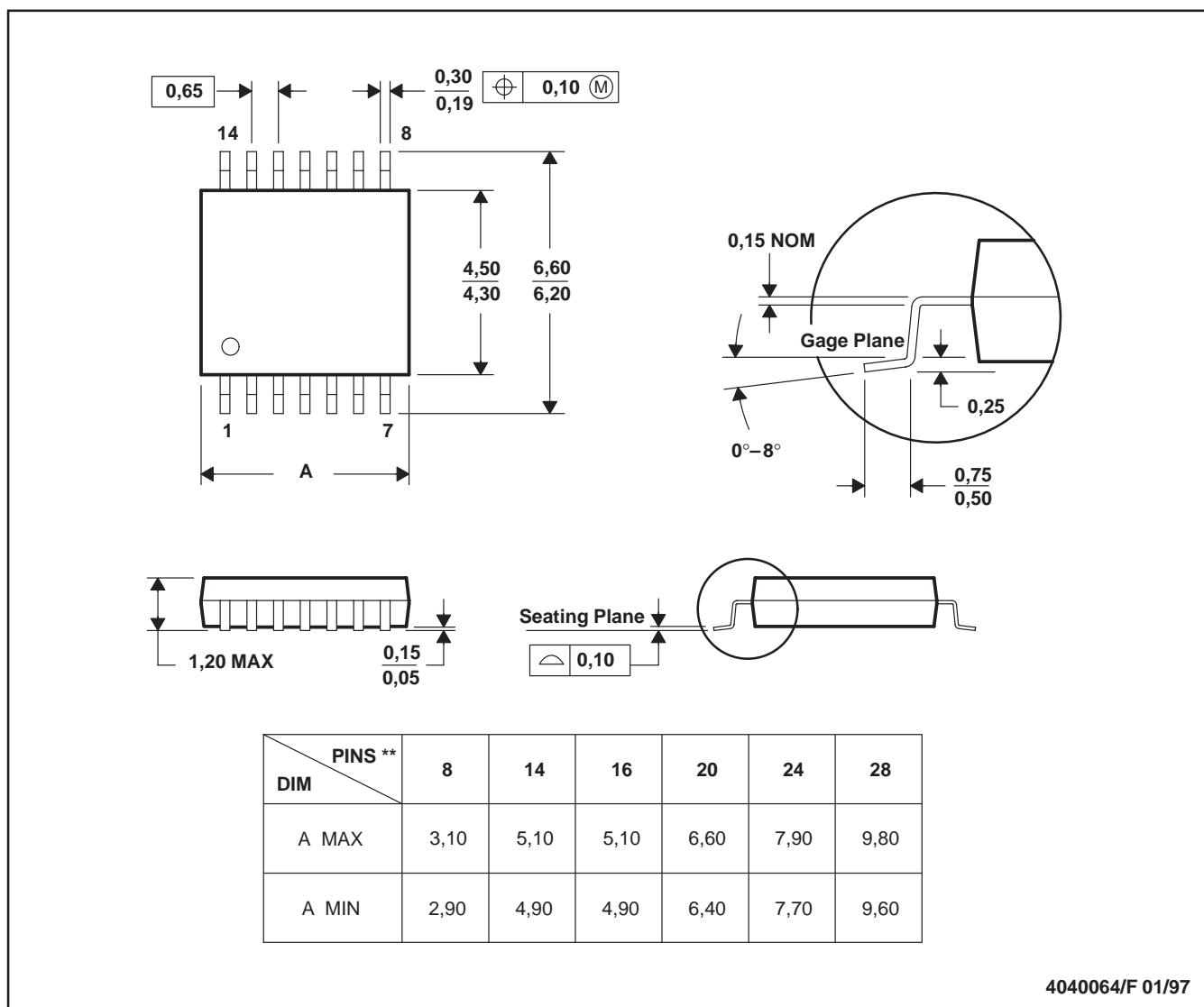
NOTES:

- 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

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



NOTES:

- All linear dimensions are in millimeters.
- This drawing is subject to change without notice.
- Body dimensions do not include mold flash or protrusion not to exceed 0,15.
- Falls within JEDEC MO-153

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

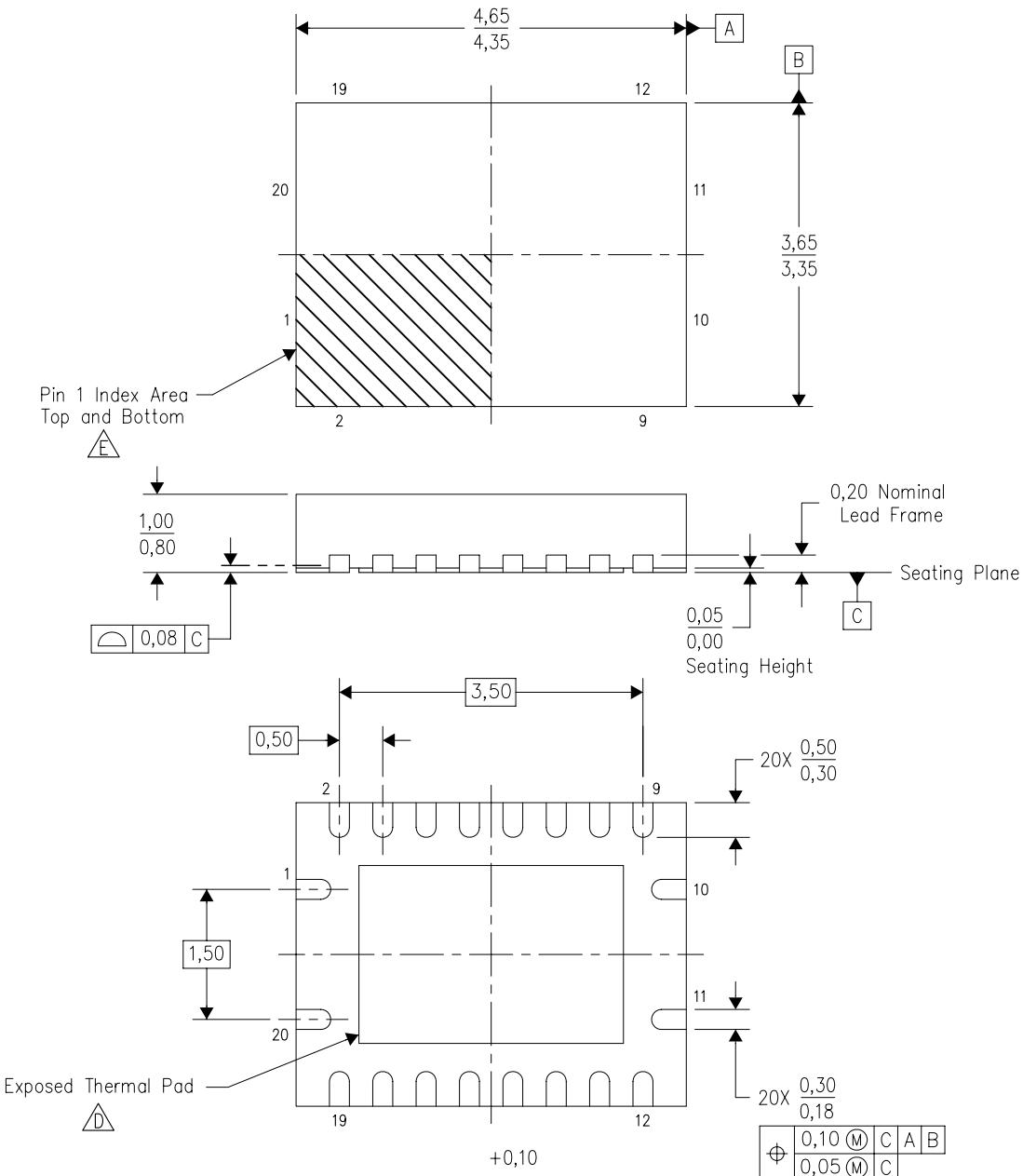


4040083/F 03/03

NOTES: 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.

RGY (R-PVQFN-N20)

PLASTIC QUAD FLATPACK NO-LEAD



Bottom View

4203539-4/H 06/2009

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.

D The package thermal pad must be soldered to the board for thermal and mechanical performance. See the Product Data Sheet for details regarding the exposed thermal pad dimensions.

E 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.

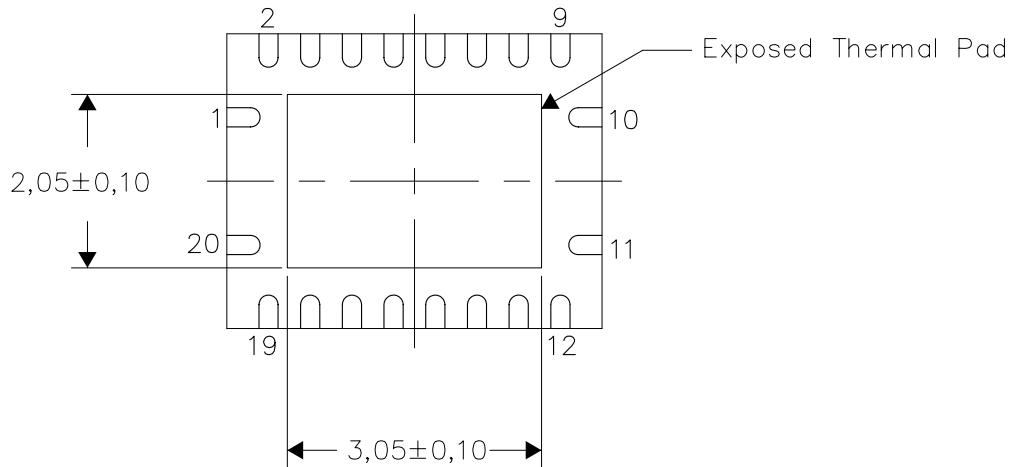
F. Package complies to JEDEC MO-241 variation BC.

THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at www.ti.com.

The exposed thermal pad dimensions for this package are shown in the following illustration.

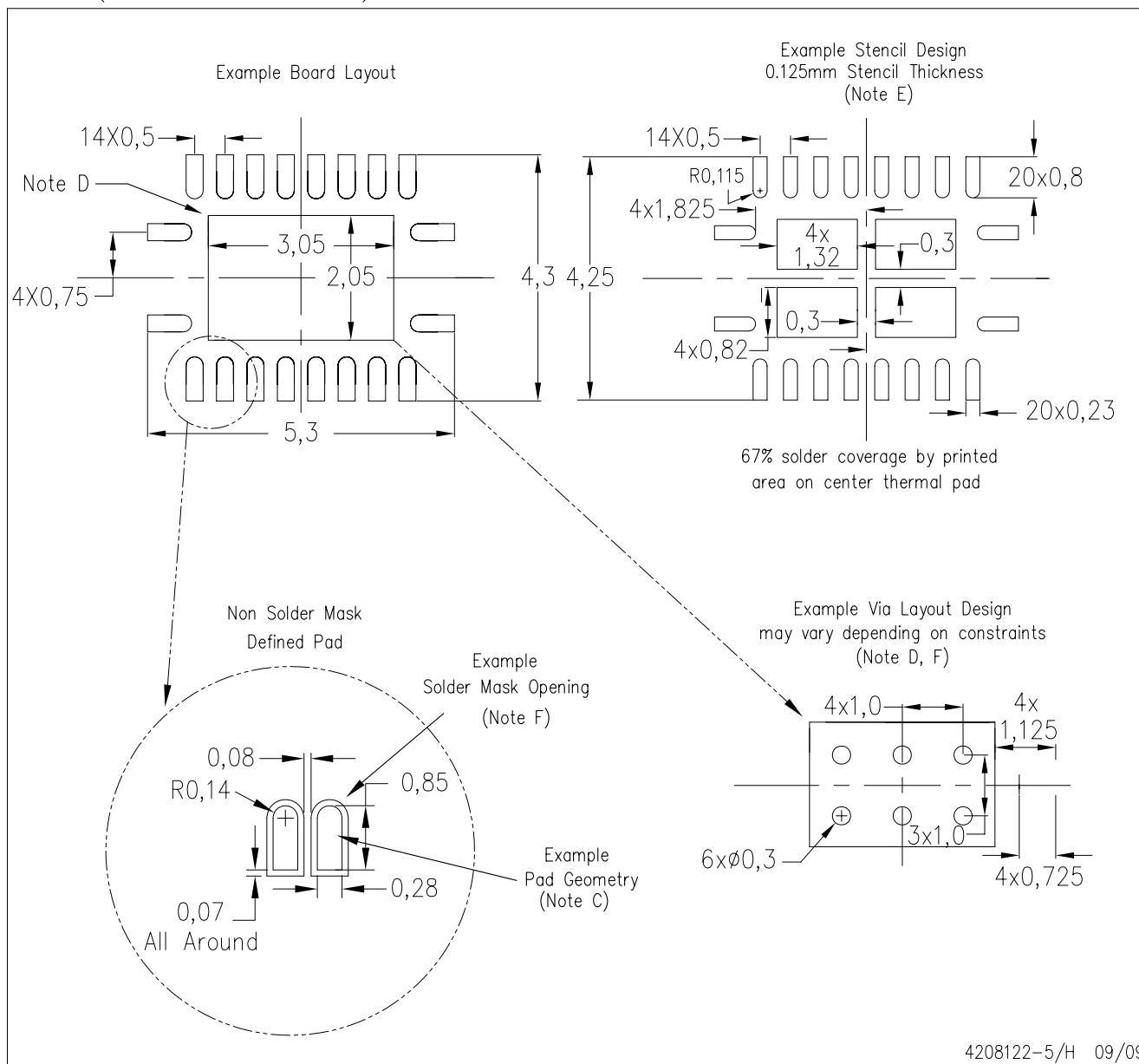


Bottom View

NOTE: All linear dimensions are in millimeters

Exposed Thermal Pad Dimensions

RGY (R-PVQFN-N20)



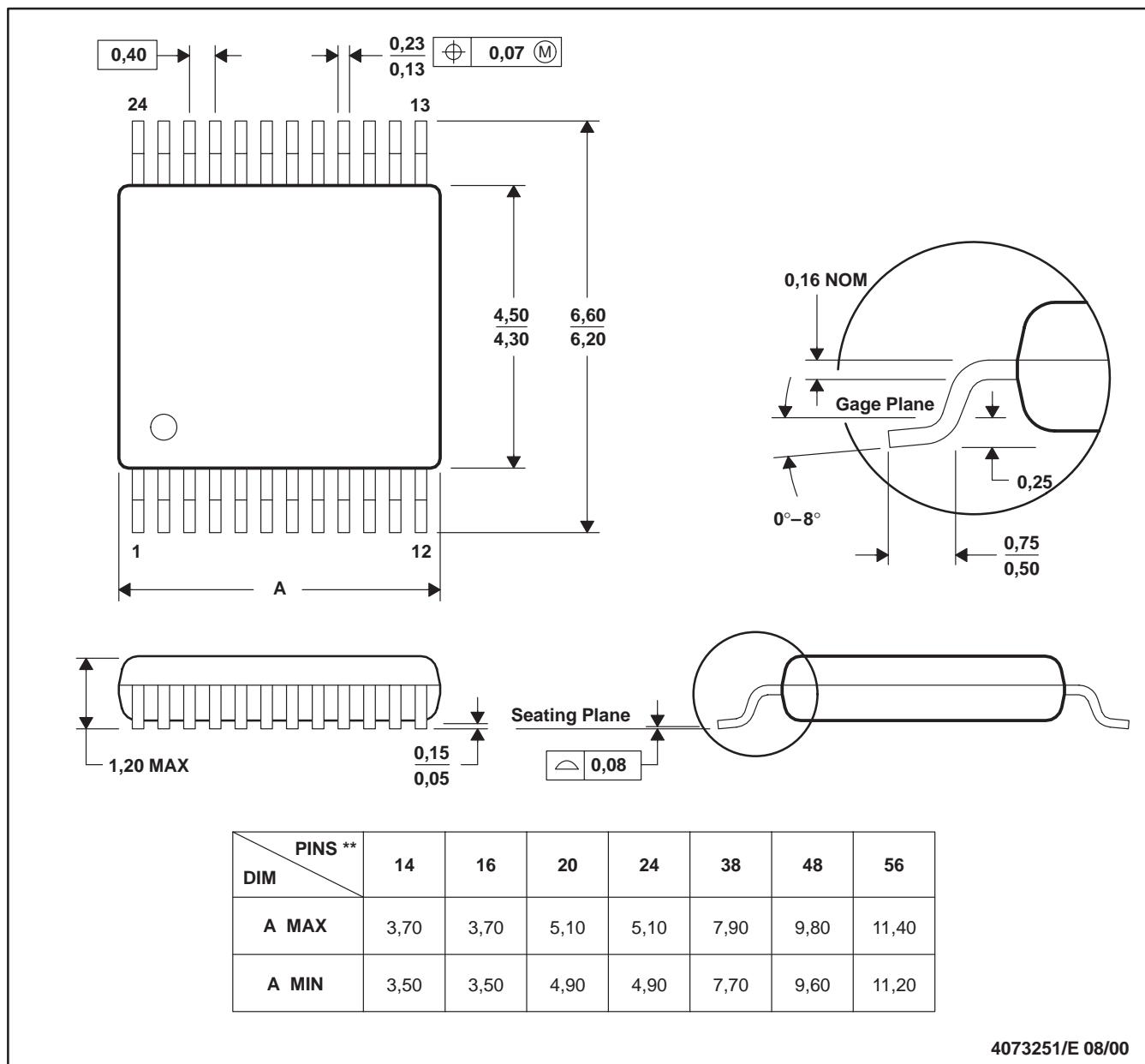
NOTES:

- All linear dimensions are in millimeters.
- This drawing is subject to change without notice.
- Publication IPC-7351 is recommended for alternate designs.
- This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at www.ti.com <<http://www.ti.com>>.
- Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
- Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

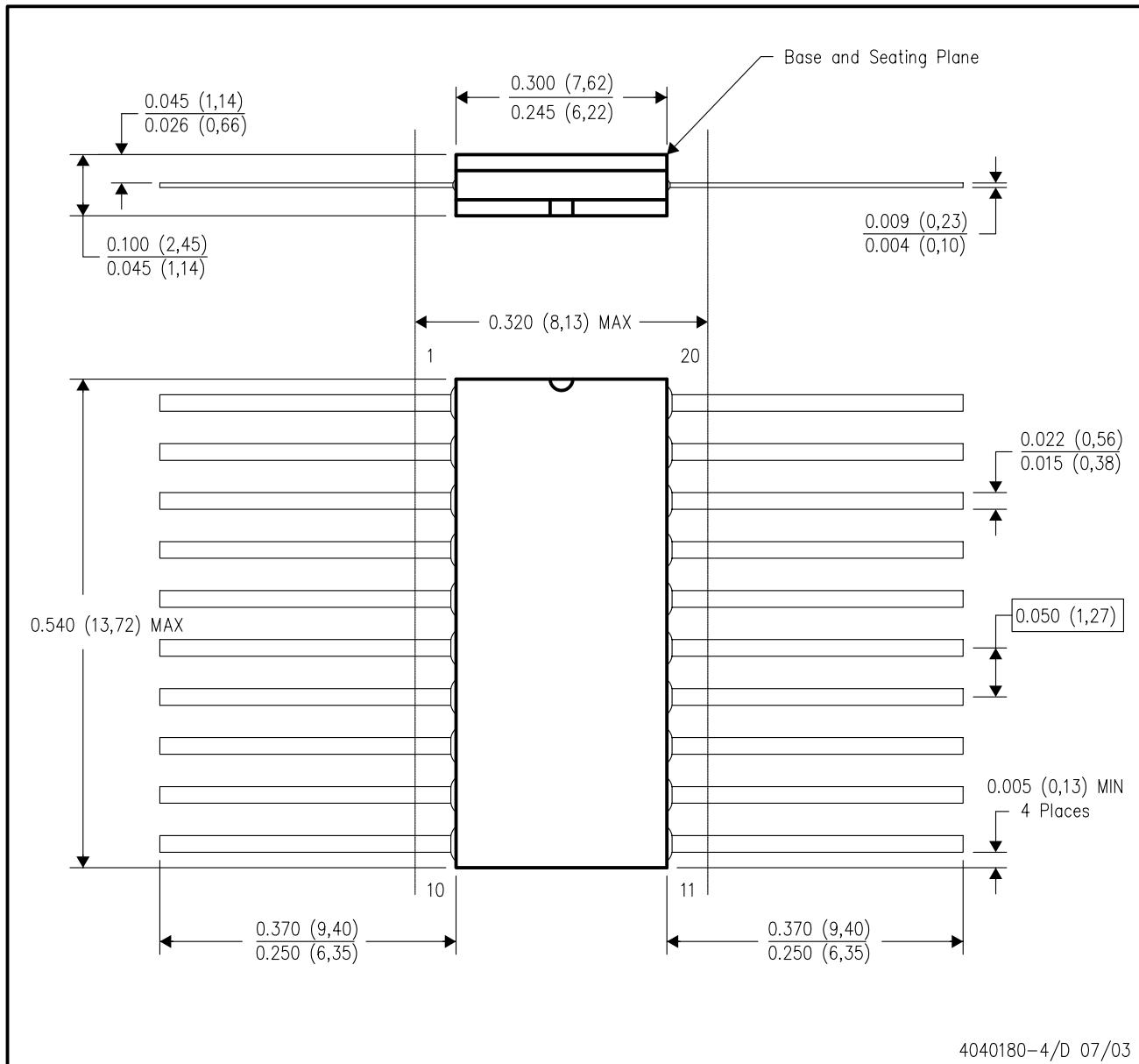
24 PINS SHOWN



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

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK

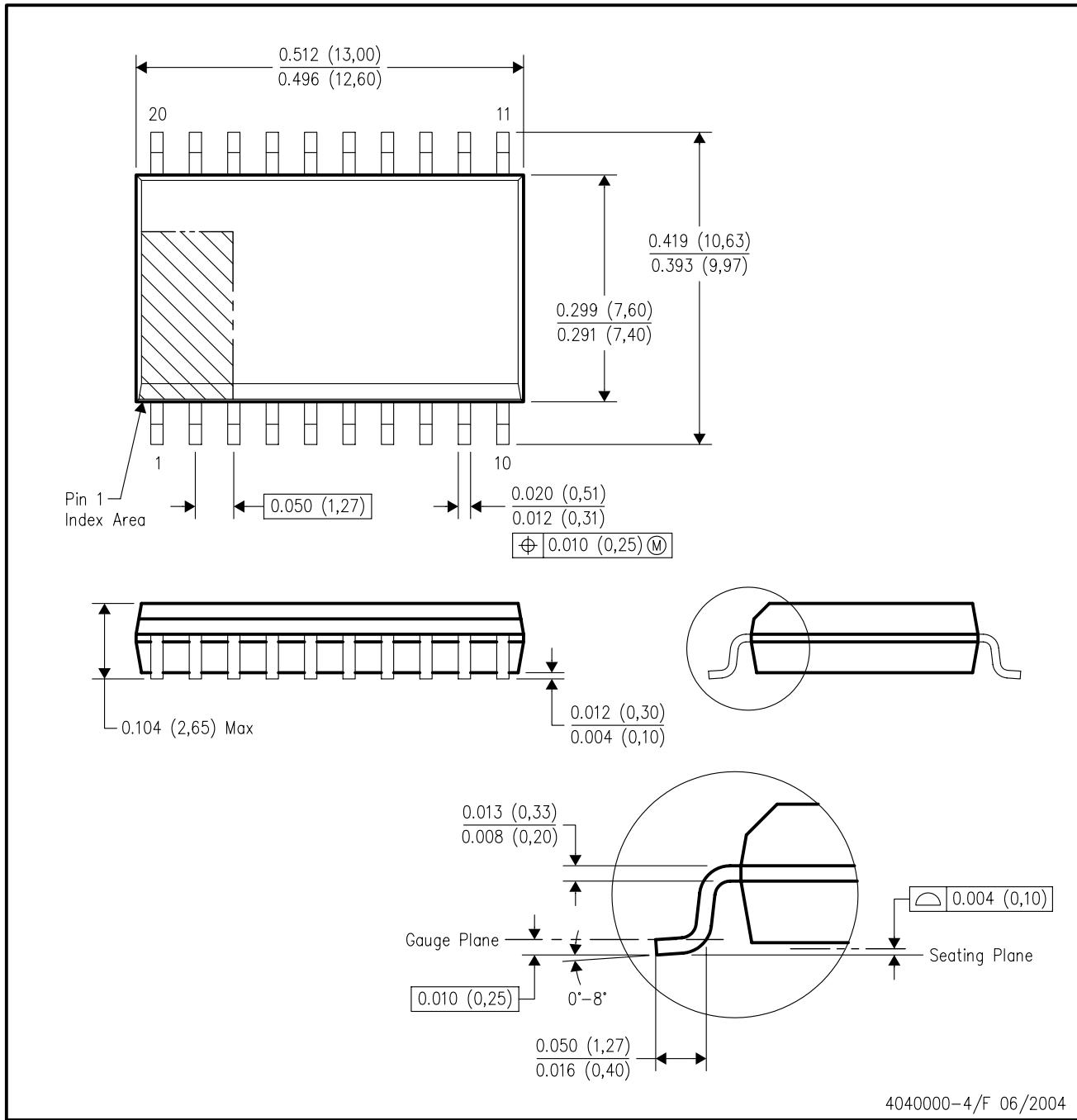


NOTES:

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

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE

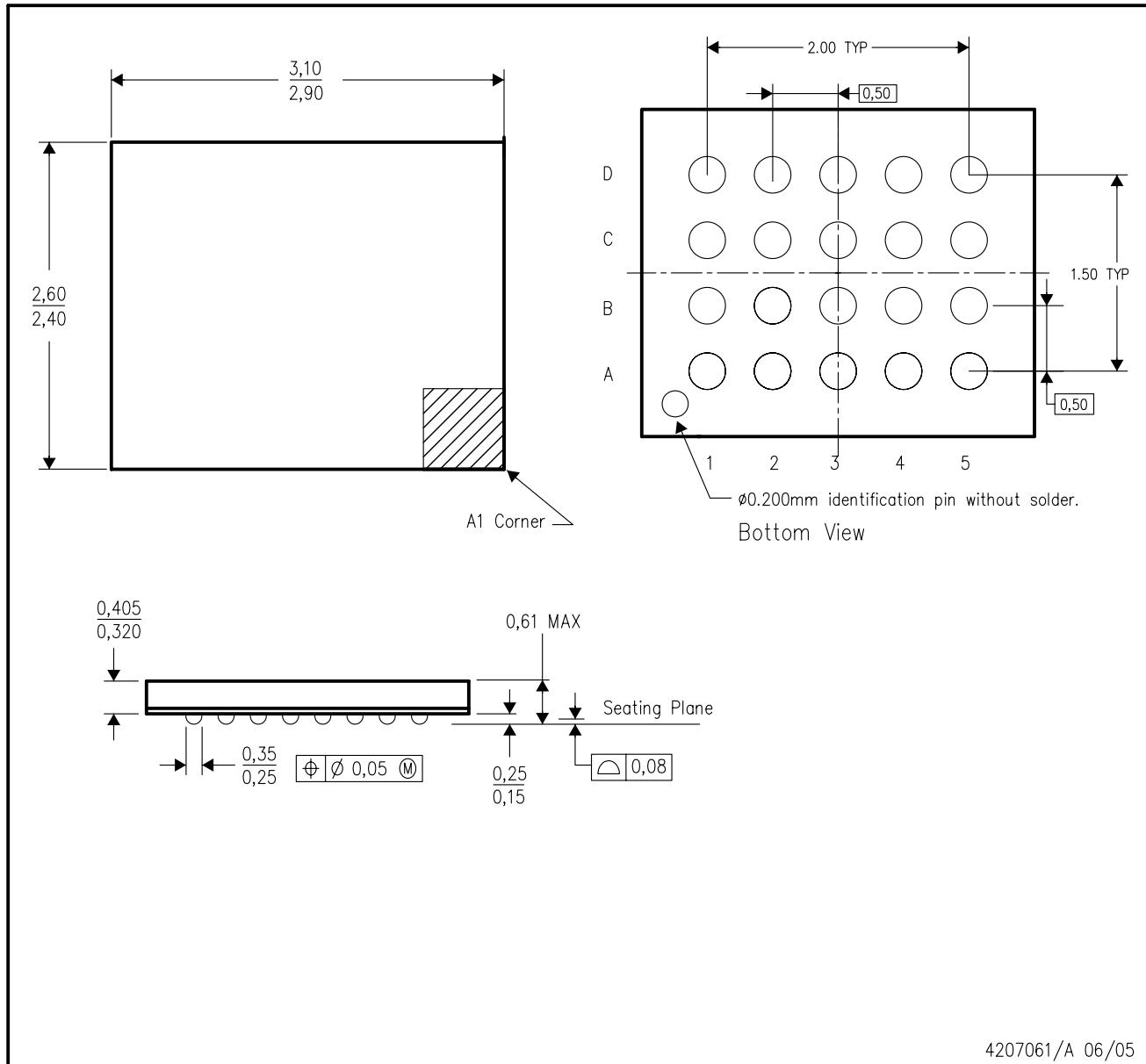


NOTES:

- All linear dimensions are in inches (millimeters).
- This drawing is subject to change without notice.
- Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- Falls within JEDEC MS-013 variation AC.

ZXY (S-PBGA-N20)

PLASTIC BALL GRID ARRAY



NOTES:

- All linear dimensions are in millimeters.
- This drawing is subject to change without notice.
- This package is a lead-free solder ball design.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products	Applications
Amplifiers amplifier.ti.com	Audio www.ti.com/audio
Data Converters dataconverter.ti.com	Automotive www.ti.com/automotive
DLP® Products www.dlp.com	Communications and Telecom www.ti.com/communications
DSP dsp.ti.com	Computers and Peripherals www.ti.com/computers
Clocks and Timers www.ti.com/clocks	Consumer Electronics www.ti.com/consumer-apps
Interface interface.ti.com	Energy www.ti.com/energy
Logic logic.ti.com	Industrial www.ti.com/industrial
Power Mgmt power.ti.com	Medical www.ti.com/medical
Microcontrollers microcontroller.ti.com	Security www.ti.com/security
RFID www.ti-rfid.com	Space, Avionics & Defense www.ti.com/space-avionics-defense
RF/IF and ZigBee® Solutions www.ti.com/lprf	Video and Imaging www.ti.com/video
	Wireless www.ti.com/wireless-apps