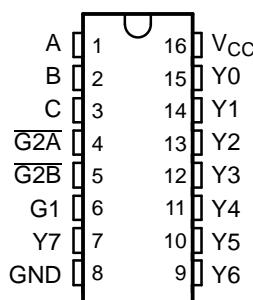


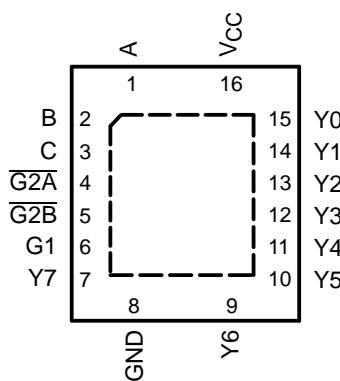
## FEATURES

- 2-V to 5.5-V  $V_{CC}$  Operation
- Max  $t_{pd}$  of 9.5 ns at 5 V
- Typical  $V_{OLP}$  (Output Ground Bounce) <0.8 V at  $V_{CC}$  = 3.3 V,  $T_A$  = 25°C
- Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot) >2.3 V at  $V_{CC}$  = 3.3 V,  $T_A$  = 25°C
- Support Mixed-Mode Voltage Operation on All Ports
- $I_{off}$  Supports Partial-Power-Down Mode Operation
- 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)
  - 1000-V Charged-Device Model (C101)

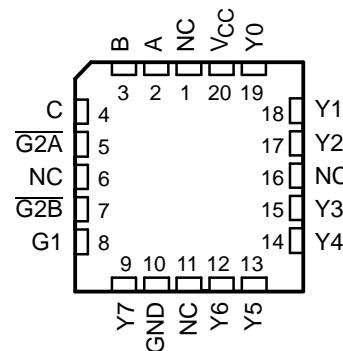
**SN54LV138A... J OR W PACKAGE**  
**SN74LV138A... D, DB, DGV, NS**  
**OR PW PACKAGE**  
**(TOP VIEW)**



**SN74LV138A... RGY PACKAGE**  
**(TOP VIEW)**



**SN54LV138A... FK PACKAGE**  
**(TOP VIEW)**



NC – No internal connection

## DESCRIPTION/ORDERING INFORMATION

The 'LV138A devices are 3-line to 8-line decoders/demultiplexers designed for 2-V to 5.5-V  $V_{CC}$  operation.

### ORDERING INFORMATION

$T_A$	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
$-40^{\circ}C$ to $85^{\circ}C$	QFN – RGY	Reel of 1000	SN74LV138ARGYR	LV138A
	SOIC – D	Tube of 40	SN74LV138AD	LV138A
		Reel of 2500	SN74LV138ADR	LV138A
	SOP – NS	Reel of 2000	SN74LV138ANSR	74LV138A
	SSOP – DB	Reel of 2000	SN74LV138ADBR	LV138A
	TSSOP – PW	Tube of 90	SN74LV138APW	LV138A
		Reel of 2000	SN74LV138APWR	
		Reel of 250	SN74LV138APWT	
$-55^{\circ}C$ to $125^{\circ}C$	TVSOP – DGV	Reel of 2000	SN74LV138ADGVR	LV138A
	CDIP – J	Tube of 25	SNJ54LV138AJ	SNJ54LV138AJ
	CFP – W	Tube of 150	SNJ54LV138AW	SNJ54LV138AW
	LCCC – FK	Tube of 55	SNJ54LV138AFK	SNJ54LV138AFK

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

## DESCRIPTION/ORDERING INFORMATION (CONTINUED)

These devices are designed for high-performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems, these decoders can be used to minimize the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit, the delay times of these decoders and the enable time of the memory usually are less than the typical access time of the memory. This means that the effective system delay introduced by the decoder is negligible.

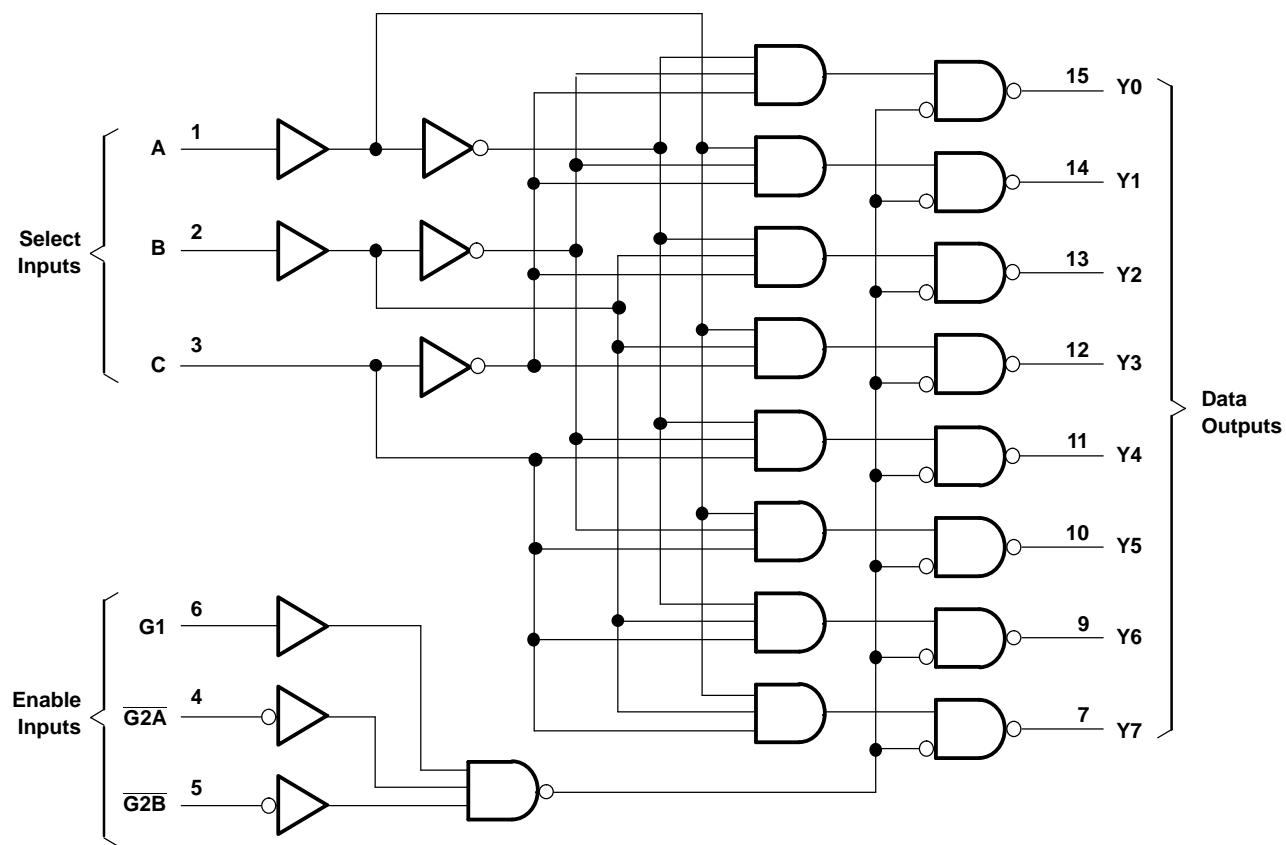
The conditions at the binary-select inputs (A, B, C) and the three enable inputs (G1,  $\overline{G2A}$ ,  $\overline{G2B}$ ) select one of eight output lines. The two active-low ( $\overline{G2A}$ ,  $\overline{G2B}$ ) and one active-high (G1) enable inputs reduce the need for external gates or inverters when expanding. A 24-line decoder can be implemented without external inverters and a 32-line decoder requires only one inverter. An enable input can be used as a data input for demultiplexing applications.

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.

**FUNCTION TABLE**

ENABLE INPUTS			SELECT INPUTS			OUTPUTS							
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A	Y0	Y1	Y20	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

LOGIC DIAGRAM (POSITIVE LOGIC)



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

# SN54LV138A, SN74LV138A 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS

SCLS395L—APRIL 1998—REVISED AUGUST 2005



## Absolute Maximum Ratings<sup>(1)</sup>

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

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage range	-0.5	7	V
$V_I$	Input voltage range <sup>(2)</sup>	-0.5	7	V
$V_O$	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	-0.5	7	V
$V_O$	Output voltage range <sup>(2)(3)</sup>	-0.5	$V_{CC} + 0.5$	V
$I_{IK}$	Input clamp current	$V_I < 0$	-20	mA
$I_{OK}$	Output clamp current	$V_O < 0$	-50	mA
$I_O$	Continuous output current	$V_O = 0$ to $V_{CC}$	$\pm 25$	mA
	Continuous current through $V_{CC}$ or GND		$\pm 50$	mA
$\theta_{JA}$	Package thermal impedance	D package <sup>(4)</sup>	73	°C/W
		DB package <sup>(4)</sup>	82	
		DGV package <sup>(4)</sup>	120	
		NS package <sup>(4)</sup>	64	
		PW package <sup>(4)</sup>	108	
		RGY package <sup>(5)</sup>	39	
$T_{stg}$	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) This value is limited to 5.5 V maximum.
- (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.

**Recommended Operating Conditions<sup>(1)</sup>**

		SN54LV138A <sup>(2)</sup>		SN74LV138A		UNIT
		MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply voltage	2	5.5	2	5.5	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V	1.5	1.5		V
		V <sub>CC</sub> = 2.3 V to 2.7 V	V <sub>CC</sub> × 0.7	V <sub>CC</sub> × 0.7		
		V <sub>CC</sub> = 3 V to 3.6 V	V <sub>CC</sub> × 0.7	V <sub>CC</sub> × 0.7		
		V <sub>CC</sub> = 4.5 V to 5.5 V	V <sub>CC</sub> × 0.7	V <sub>CC</sub> × 0.7		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V	0.5	0.5		V
		V <sub>CC</sub> = 2.3 V to 2.7 V	V <sub>CC</sub> × 0.3	V <sub>CC</sub> × 0.3		
		V <sub>CC</sub> = 3 V to 3.6 V	V <sub>CC</sub> × 0.3	V <sub>CC</sub> × 0.3		
		V <sub>CC</sub> = 4.5 V to 5.5 V	V <sub>CC</sub> × 0.3	V <sub>CC</sub> × 0.3		
V <sub>I</sub>	Input voltage	0	5.5	0	5.5	V
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 2 V	-50	-50		μA
		V <sub>CC</sub> = 2.3 V to 2.7 V	-2	-2		
		V <sub>CC</sub> = 3 V to 3.6 V	-6	-6		
		V <sub>CC</sub> = 4.5 V to 5.5 V	-12	-12		
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 2 V	50	50		μA
		V <sub>CC</sub> = 2.3 V to 2.7 V	2	2		
		V <sub>CC</sub> = 3 V to 3.6 V	6	6		
		V <sub>CC</sub> = 4.5 V to 5.5 V	12	12		
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 2.3 V to 2.7 V	200	200		ns/V
		V <sub>CC</sub> = 3 V to 3.6 V	100	100		
		V <sub>CC</sub> = 4.5 V to 5.5 V	20	20		
T <sub>A</sub>	Operating free-air temperature	-55	125	-40	85	°C

(1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

(2) Product Preview

**Electrical Characteristics**

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	SN54LV138A <sup>(1)</sup>			UNIT
			MIN	TYP	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	2 V to 5.5 V	V <sub>CC</sub> - 0.1		V <sub>CC</sub> - 0.1	V
	I <sub>OH</sub> = -2 mA	2.3 V	2		2	
	I <sub>OH</sub> = -6 mA	3 V	2.48		2.48	
	I <sub>OH</sub> = -12 mA	4.5 V	3.8		3.8	
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	2 V to 5.5 V		0.1	0.1	V
	I <sub>OL</sub> = 2 mA	2.3 V		0.4	0.4	
	I <sub>OL</sub> = 6 mA	3 V		0.44	0.44	
	I <sub>OL</sub> = 12 mA	4.5 V		0.55	0.55	
I <sub>I</sub>	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V		±1	±1	μA
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V		20	20	μA
I <sub>off</sub>	V <sub>I</sub> or V <sub>O</sub> = 0 to 5.5 V	0		5	5	μA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V		2.1	2.1	pF

(1) Product Preview

# SN54LV138A, SN74LV138A 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS

SCLS395L—APRIL 1998—REVISED AUGUST 2005



## Switching Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 2.5 V \pm 0.2 V$  (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ C$			SN54LV138A <sup>(1)</sup>		SN74LV138A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{pd}$	A, B, or C	Y	$C_L = 15 \text{ pF}$	11.7 <sup>(2)</sup>	17.6 <sup>(2)</sup>	21 <sup>(2)</sup>	1	21	1	21	ns
	G1			12.3 <sup>(2)</sup>	19.2 <sup>(2)</sup>	22 <sup>(2)</sup>	1	22	1	22	
	$\overline{G2A}$ or $\overline{G2B}$			11.4 <sup>(2)</sup>	18.2 <sup>(2)</sup>	21 <sup>(2)</sup>	1	21	1	21	
$t_{pd}$	A, B, or C	Y	$C_L = 50 \text{ pF}$	14.9	21.4	25	1	25	1	25	ns
	G1			15.7	22.6	26	1	26	1	26	
	G2A or G2B			14.8	22	25	1	25	1	25	

(1) Product Preview

(2) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## Switching Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 3.3 V \pm 0.3 V$  (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ C$			SN54LV138A <sup>(1)</sup>		SN74LV138A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{pd}$	A, B, or C	Y	$C_L = 15 \text{ pF}$	8.1 <sup>(2)</sup>	11.4 <sup>(2)</sup>	21 <sup>(2)</sup>	1	13.5	1	13.5	ns
	G1			8.4 <sup>(2)</sup>	12.8 <sup>(2)</sup>	22 <sup>(2)</sup>	1	15	1	15	
	$\overline{G2A}$ or $\overline{G2B}$			7.8 <sup>(2)</sup>	11.4 <sup>(2)</sup>	21 <sup>(2)</sup>	1	13.5	1	13.5	
$t_{pd}$	A, B, or C	Y	$C_L = 50 \text{ pF}$	10.3	15.8	18	1	18	1	18	ns
	G1			10.6	16.3	18.5	1	18.5	1	18.5	
	G2A or G2B			10	14.9	17	1	17	1	17	

(1) Product Preview

(2) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## Switching Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 5 V \pm 0.5 V$  (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ C$			SN54LV138A <sup>(1)</sup>		SN74LV138A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{pd}$	A, B, or C	Y	$C_L = 15 \text{ pF}$	5.6 <sup>(2)</sup>	8.1 <sup>(2)</sup>	21 <sup>(2)</sup>	1	9.5	1	9.5	ns
	G1			5.7 <sup>(2)</sup>	8.1 <sup>(2)</sup>	22 <sup>(2)</sup>	1	9.5	1	9.5	
	$\overline{G2A}$ or $\overline{G2B}$			5.4 <sup>(2)</sup>	8.1 <sup>(2)</sup>	21 <sup>(2)</sup>	1	9.5	1	9.5	
$t_{pd}$	A, B, or C	Y	$C_L = 50 \text{ pF}$	7	10.1	11.5	1	11.5	1	11.5	ns
	G1			7.1	10.1	11.5	1	11.5	1	11.5	
	G2A or G2B			6.8	10.1	11.5	1	11.5	1	11.5	

(1) Product Preview

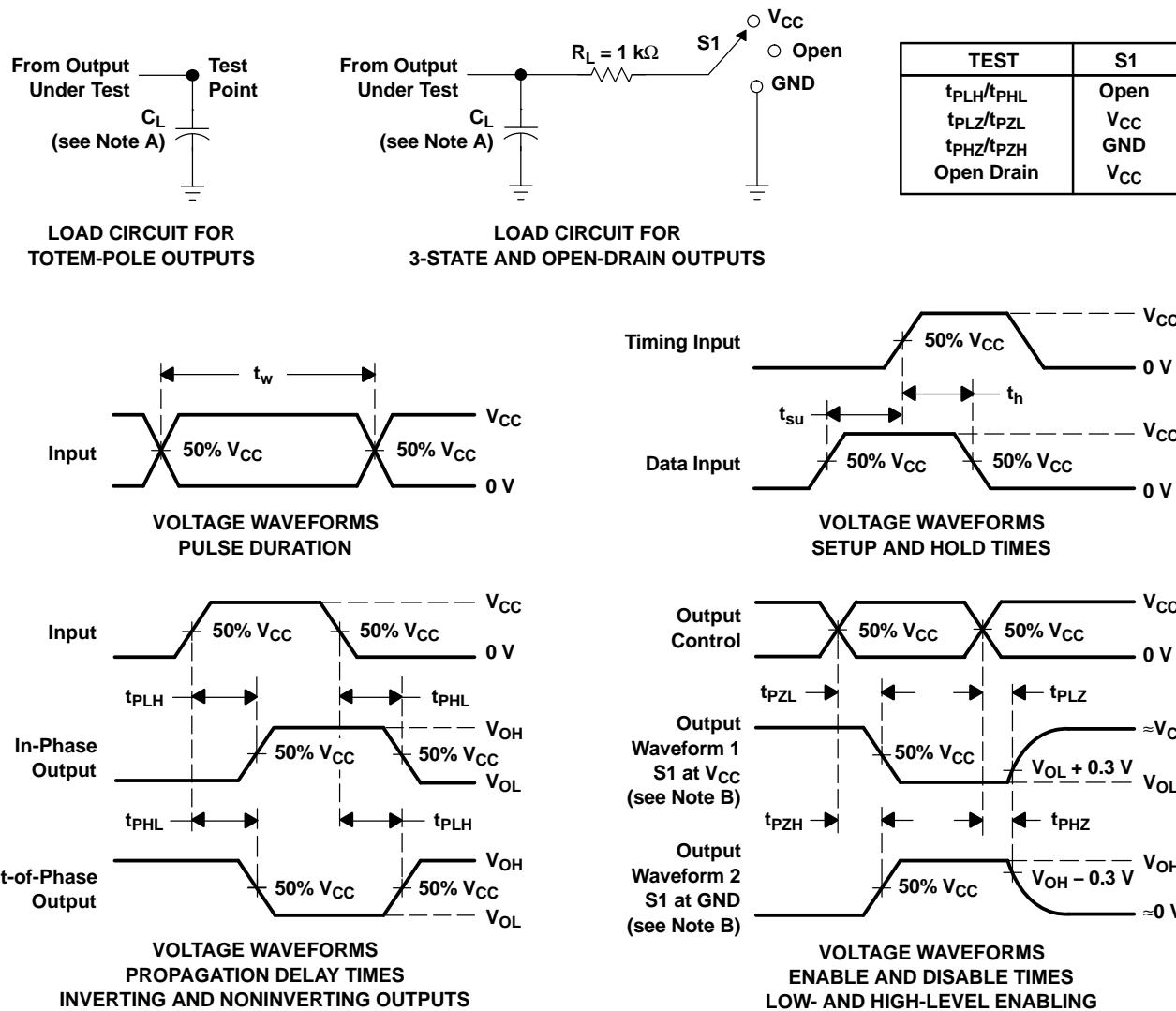
(2) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## Operating Characteristics

$T_A = 25^\circ C$

PARAMETER				TEST CONDITIONS			$V_{CC}$	TYP	UNIT
$C_{pd}$ Power dissipation capacitance				$C_L = 50 \text{ pF}$ , $f = 10 \text{ MHz}$			3.3 V	16.8	pF
							5 V	19.1	

## 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:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 3 \text{ ns}$ ,  $t_f \leq 3 \text{ ns}$ .  
 D. The outputs are measured one at a time, with one input 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.  $t_{PHL}$  and  $t_{PLH}$  are the same as  $t_{pd}$ .  
 H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuits 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)	Op Temp (°C)	Top-Side Markings (4)	Samples
SN74LV138AD	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADBRE4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADBRG4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADGVR	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADGVRE4	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADGVRG4	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ADRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ANSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	74LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138ANSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	74LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138APW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138APWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>
SN74LV138APWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<span style="background-color: red; color: white; padding: 2px;">Samples</span>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
SN74LV138APWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138APWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138APWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138APWT	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138APWTE4	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138APWTG4	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138ARGYR	ACTIVE	VQFN	RGY	16	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	LV138A	<a href="#">Samples</a>
SN74LV138ARGYRG4	ACTIVE	VQFN	RGY	16	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	LV138A	<a href="#">Samples</a>

(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.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.



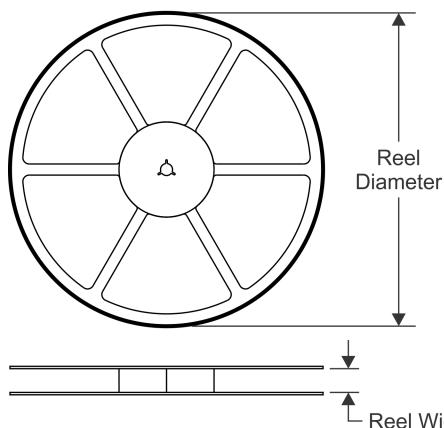
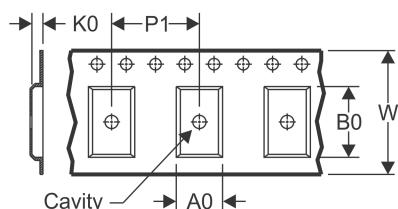
www.ti.com

## PACKAGE OPTION ADDENDUM

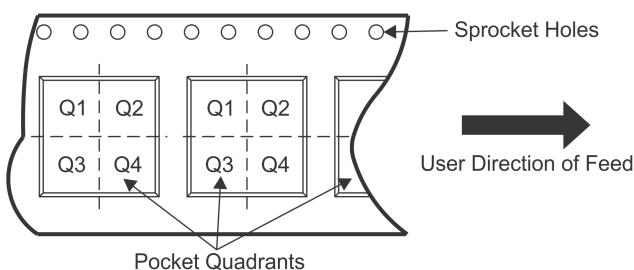
11-Apr-2013

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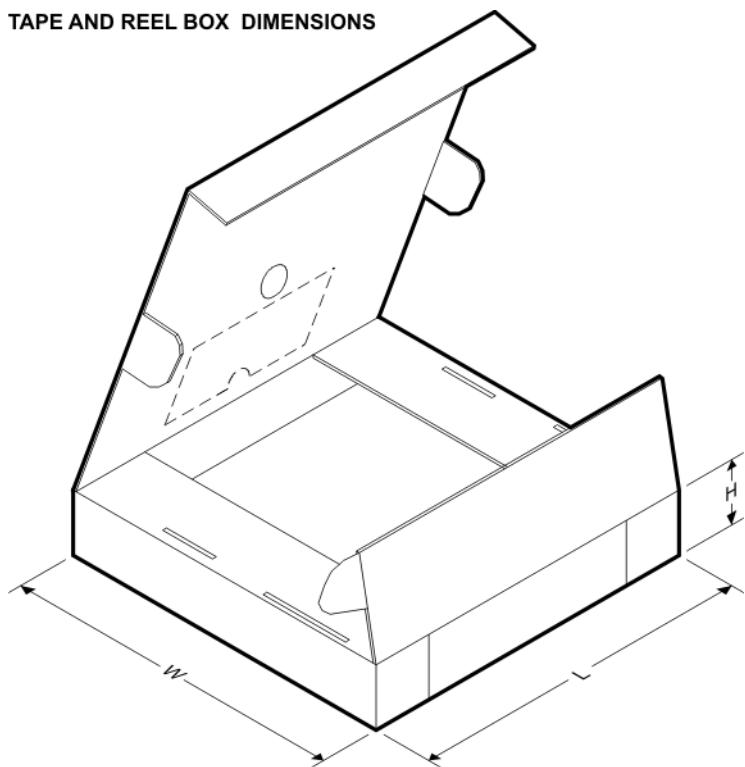
**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**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
SN74LV138ADBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74LV138ADGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74LV138ADR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74LV138ANSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74LV138APWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LV138APWR	TSSOP	PW	16	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
SN74LV138APWRG4	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LV138APWT	TSSOP	PW	16	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LV138ARGYR	VQFN	RGY	16	3000	330.0	12.4	3.8	4.3	1.5	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


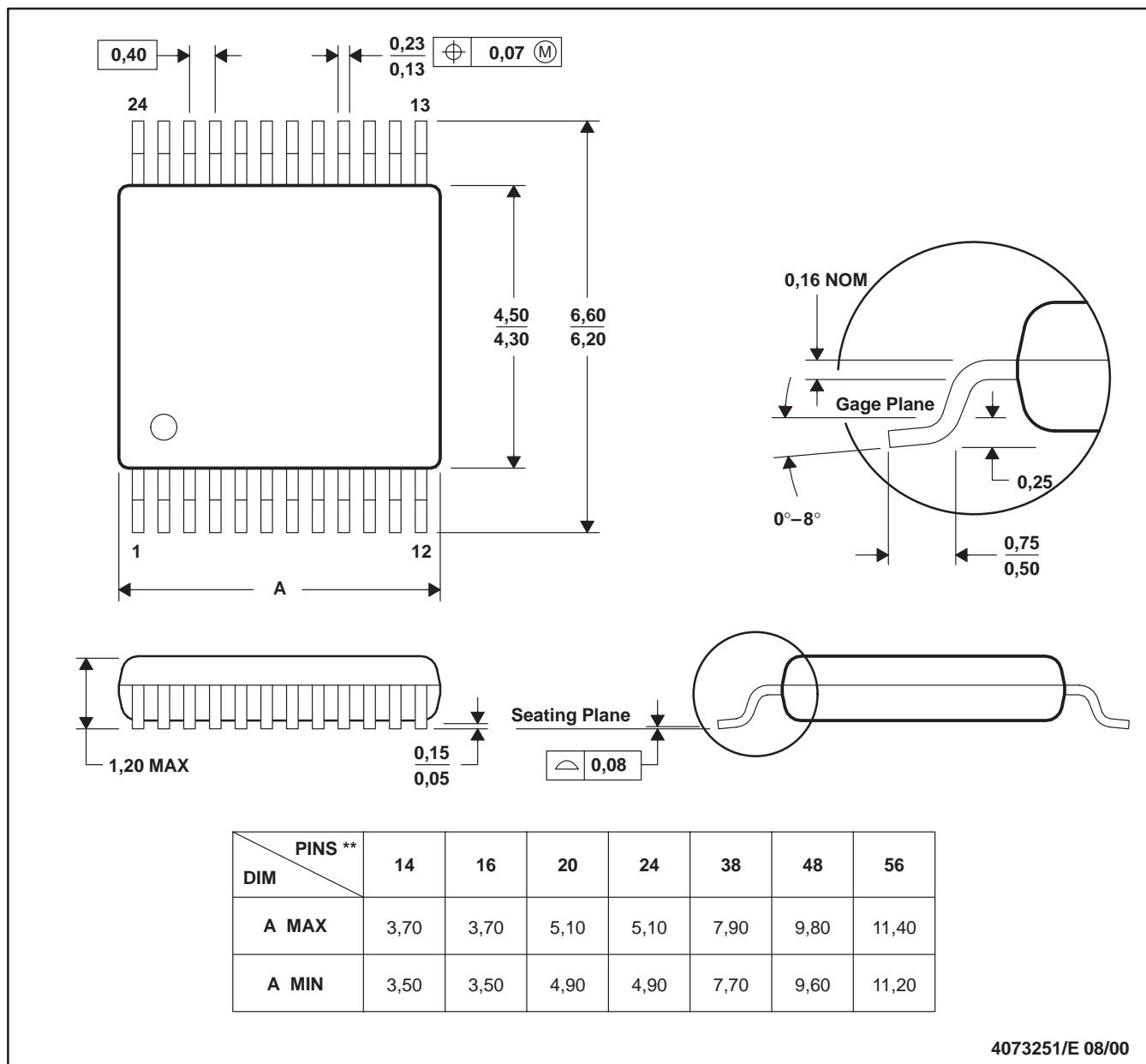
\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LV138ADBR	SSOP	DB	16	2000	367.0	367.0	38.0
SN74LV138ADGVR	TVSOP	DGV	16	2000	367.0	367.0	35.0
SN74LV138ADR	SOIC	D	16	2500	333.2	345.9	28.6
SN74LV138ANSR	SO	NS	16	2000	367.0	367.0	38.0
SN74LV138APWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74LV138APWR	TSSOP	PW	16	2000	364.0	364.0	27.0
SN74LV138APWRG4	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74LV138APWT	TSSOP	PW	16	250	367.0	367.0	35.0
SN74LV138ARGYR	VQFN	RGY	16	3000	367.0	367.0	35.0

## DGV (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE

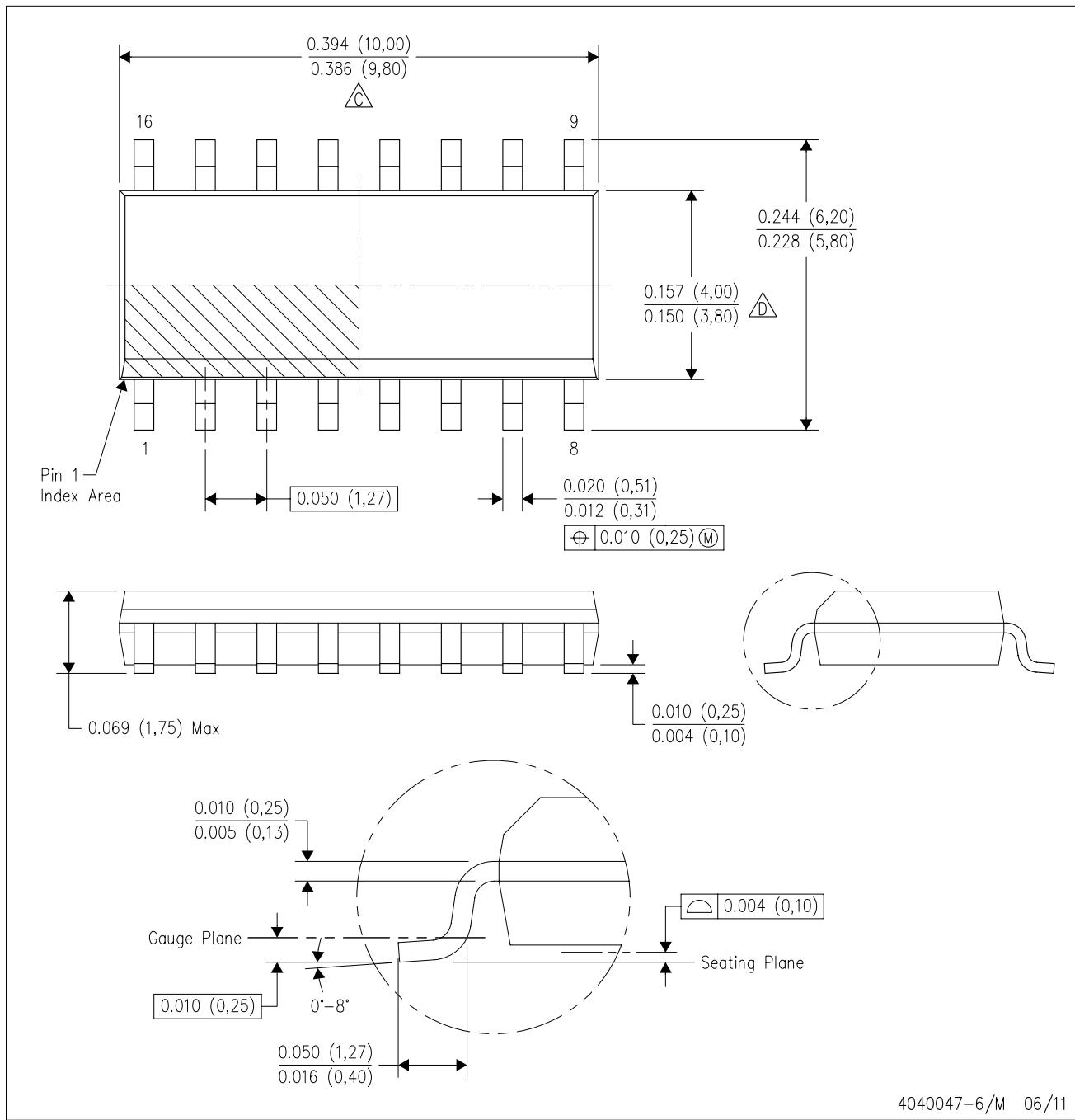
24 PINS SHOWN



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

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice.

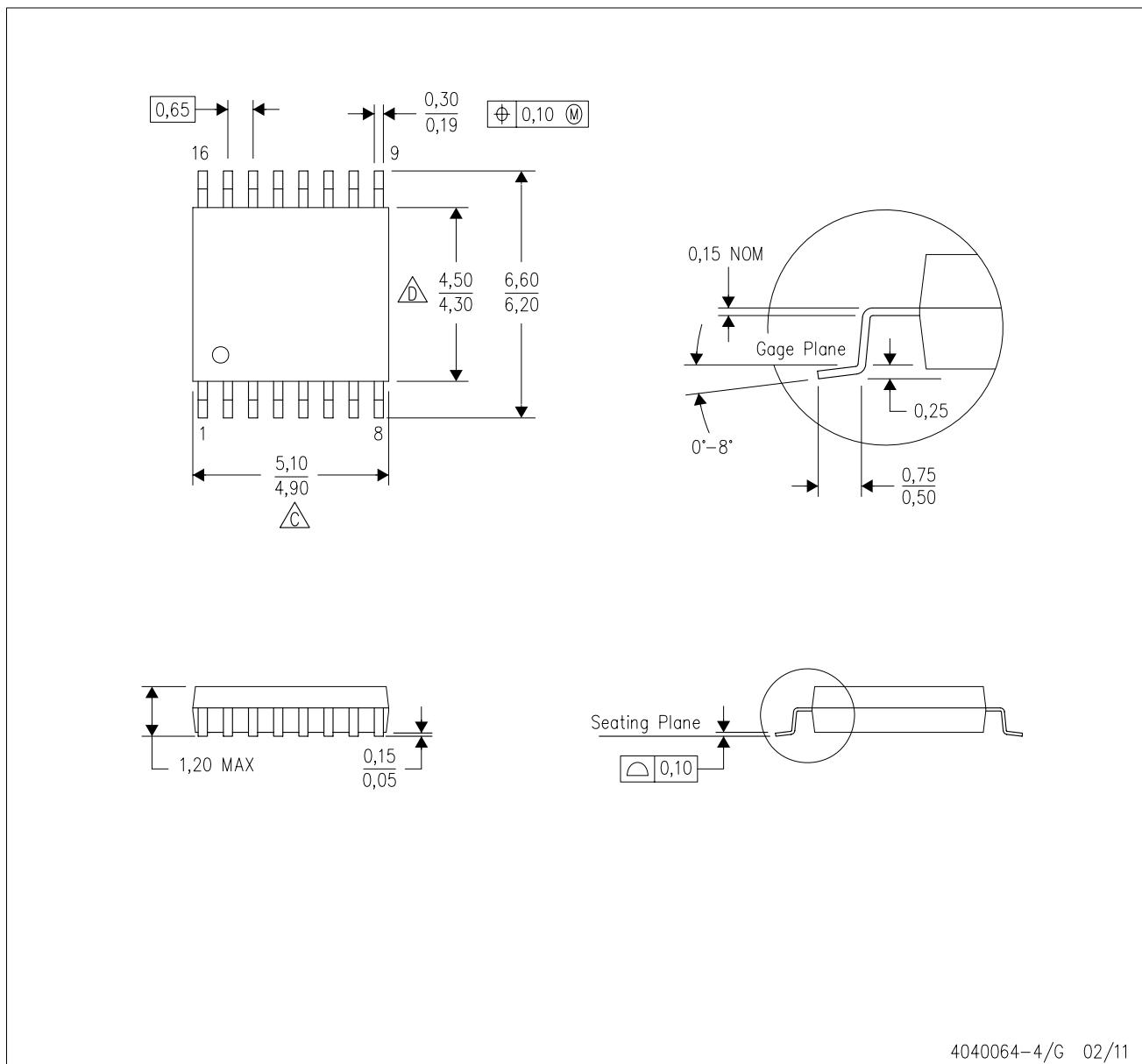
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.

D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.

E. Reference JEDEC MS-012 variation AC.

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



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. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.

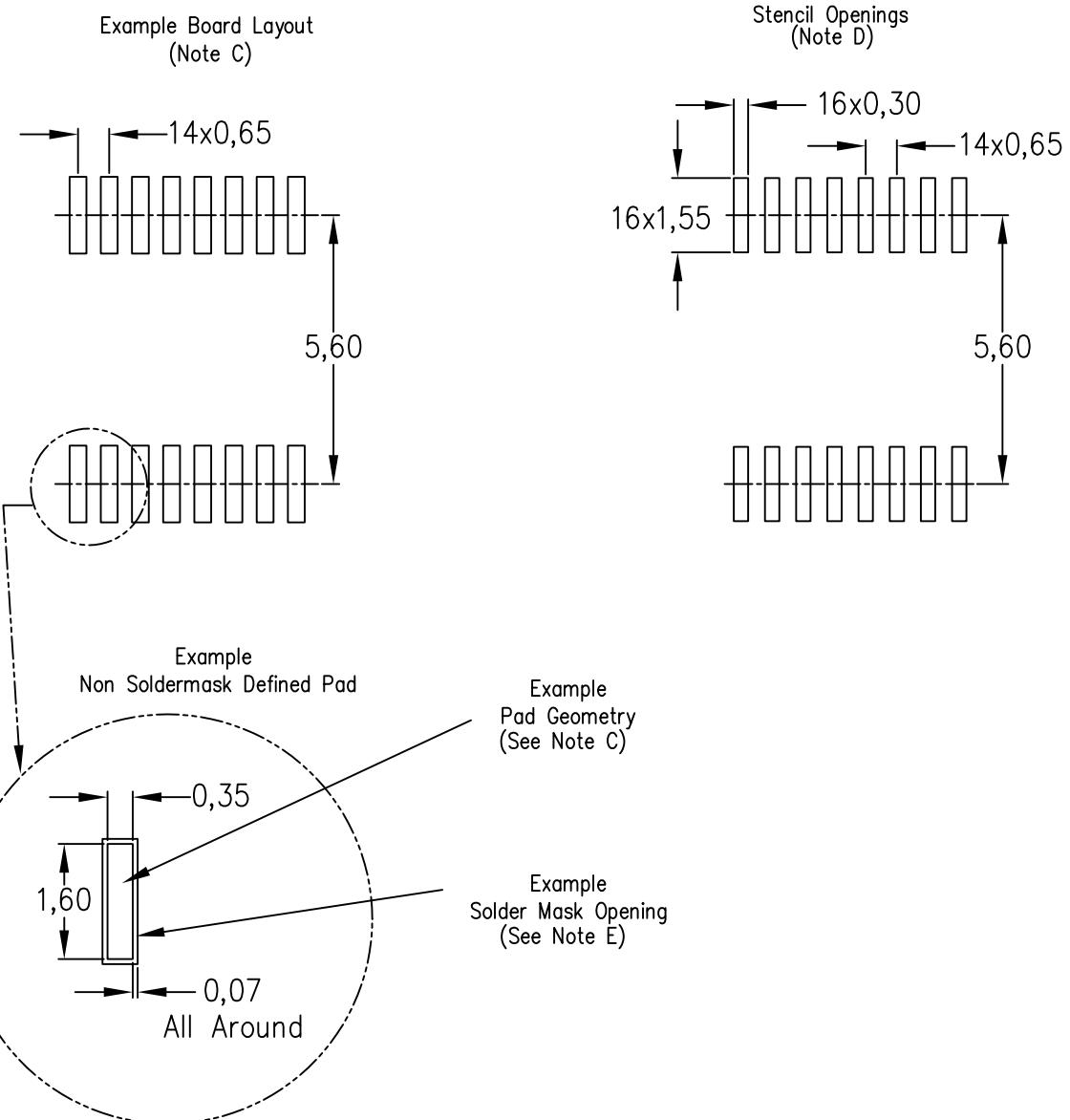
 D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.

E. Falls within JEDEC MO-153

4040064-4/G 02/11

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4211284-3/F 12/12

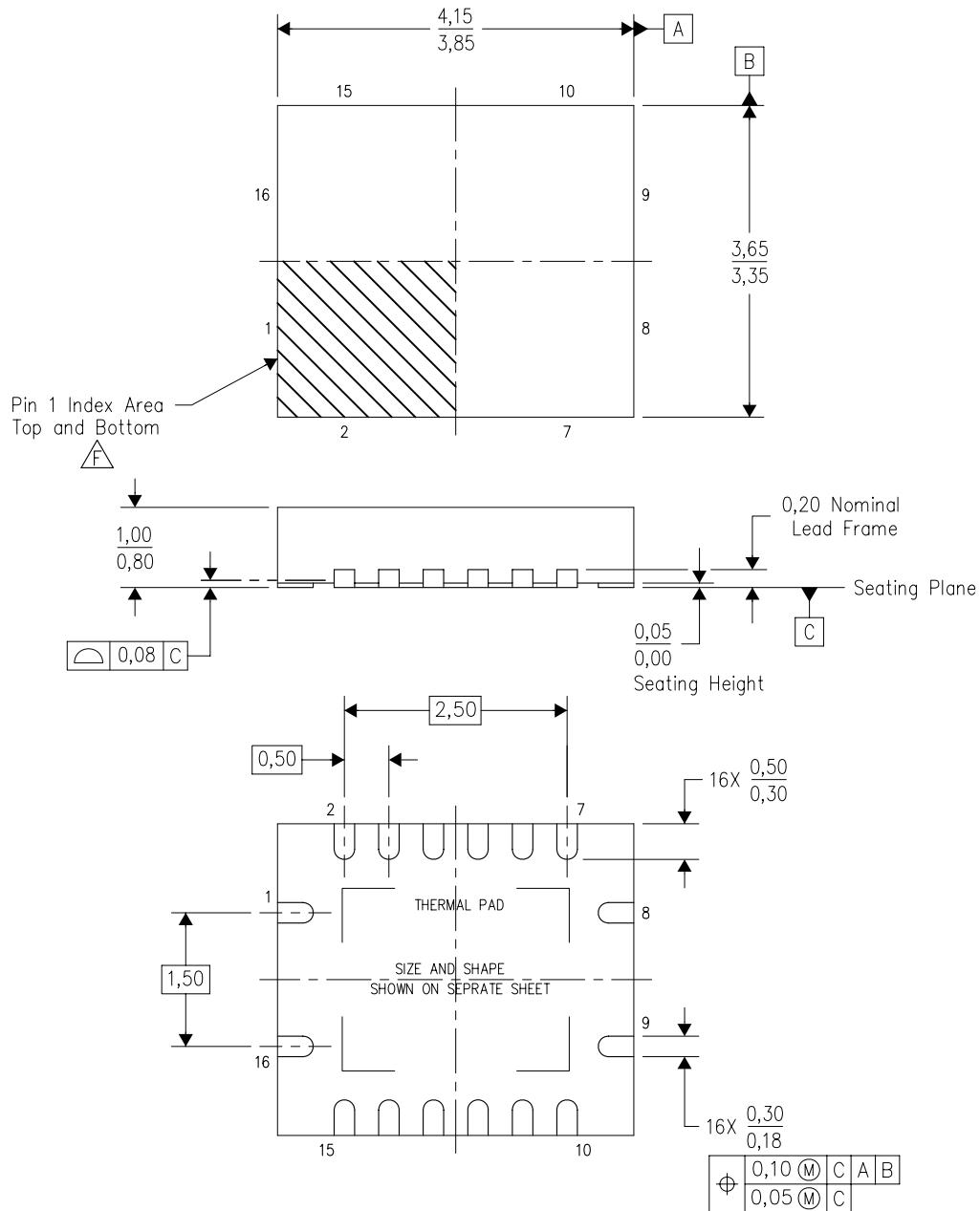
NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. 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 other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

## MECHANICAL DATA

RGY (R-PVQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD



### Bottom View

4203539-3/l 06/2011

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.
- E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.

 F. 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.

- G. Package complies to JEDEC MO-241 variation BA.

# THERMAL PAD MECHANICAL DATA

RGY (R-PVQFN-N16)

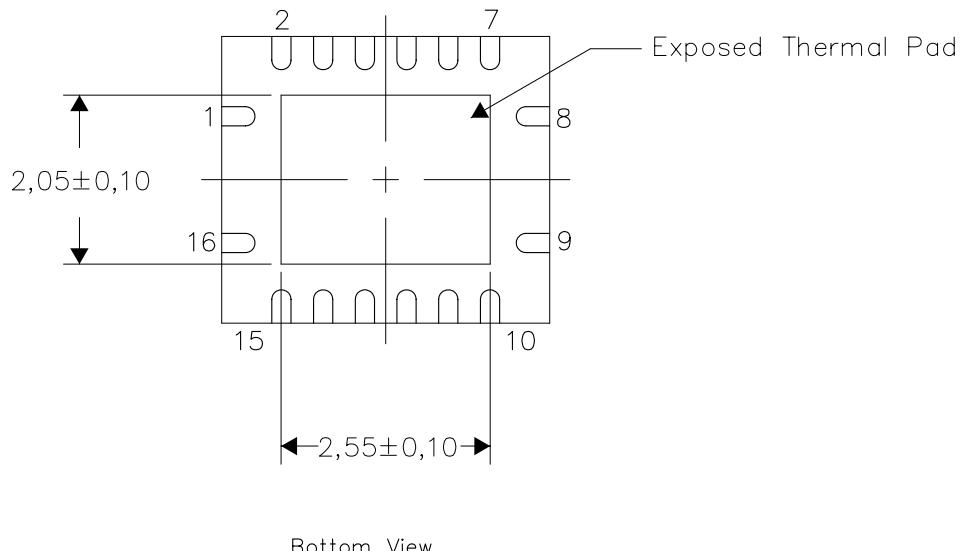
PLASTIC QUAD FLATPACK NO-LEAD

## 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](http://www.ti.com).

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



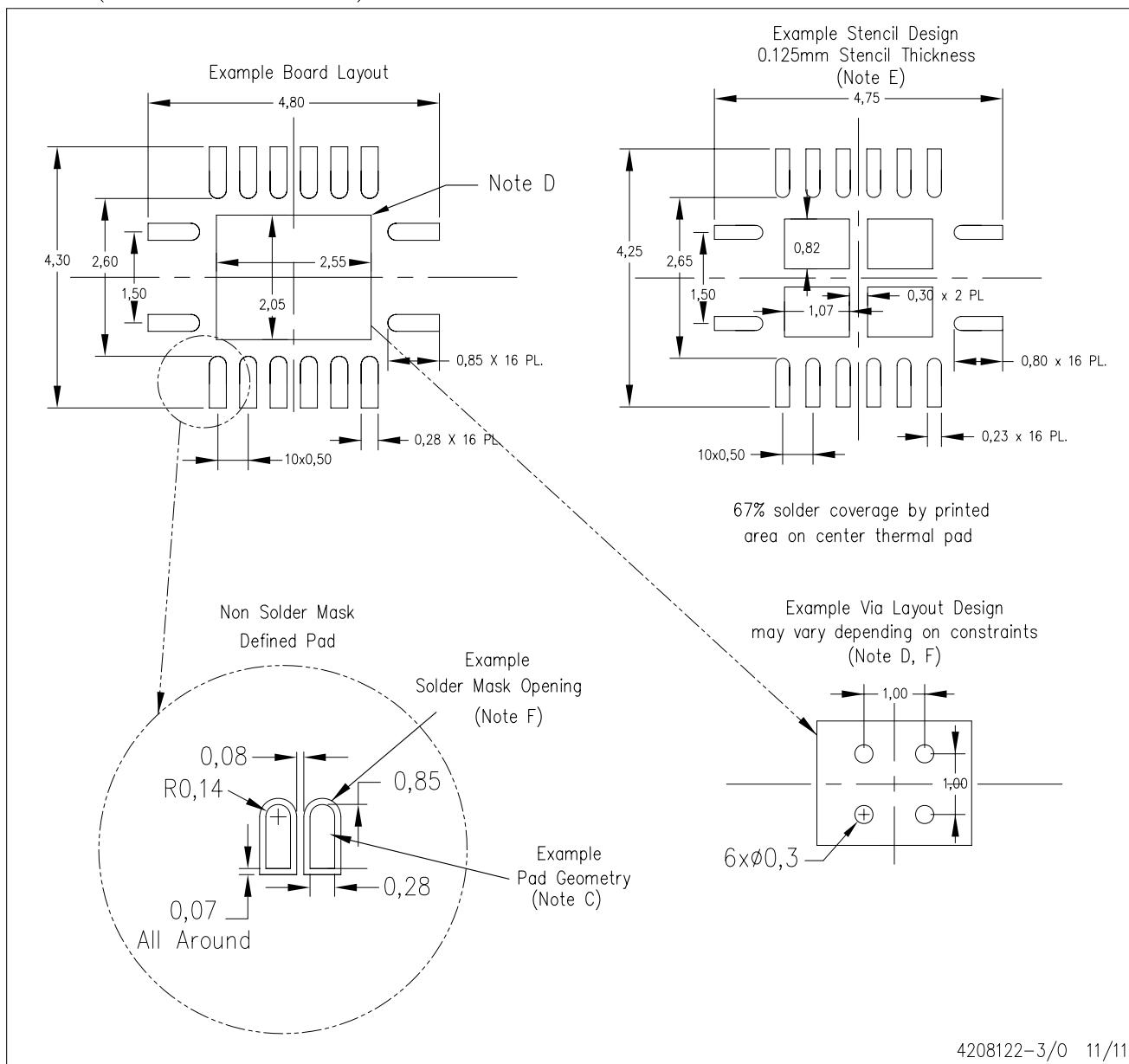
Exposed Thermal Pad Dimensions

4206353-3/0 11/11

NOTE: All linear dimensions are in millimeters

RGY (R-PVQFN-N16)

PLASTIC QUAD FLATPACK NO-LEAD



4208122-3/0 11/11

NOTES:

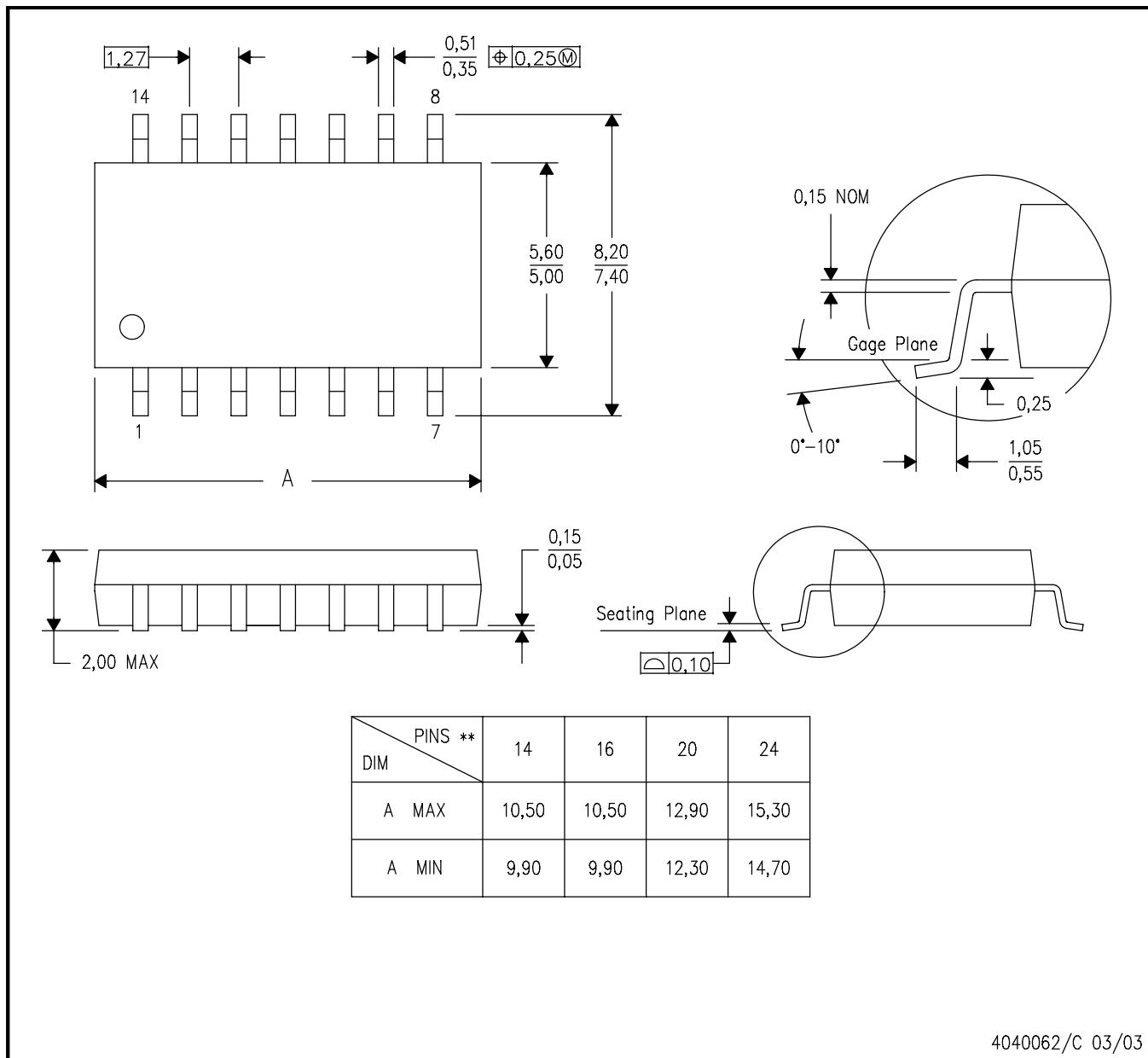
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, Quad Flat-Pack QFN/SON PCB Attachment, 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) <<http://www.ti.com>>.
- E. 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.
- F. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

## MECHANICAL DATA

NS (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

**14-PINS SHOWN**



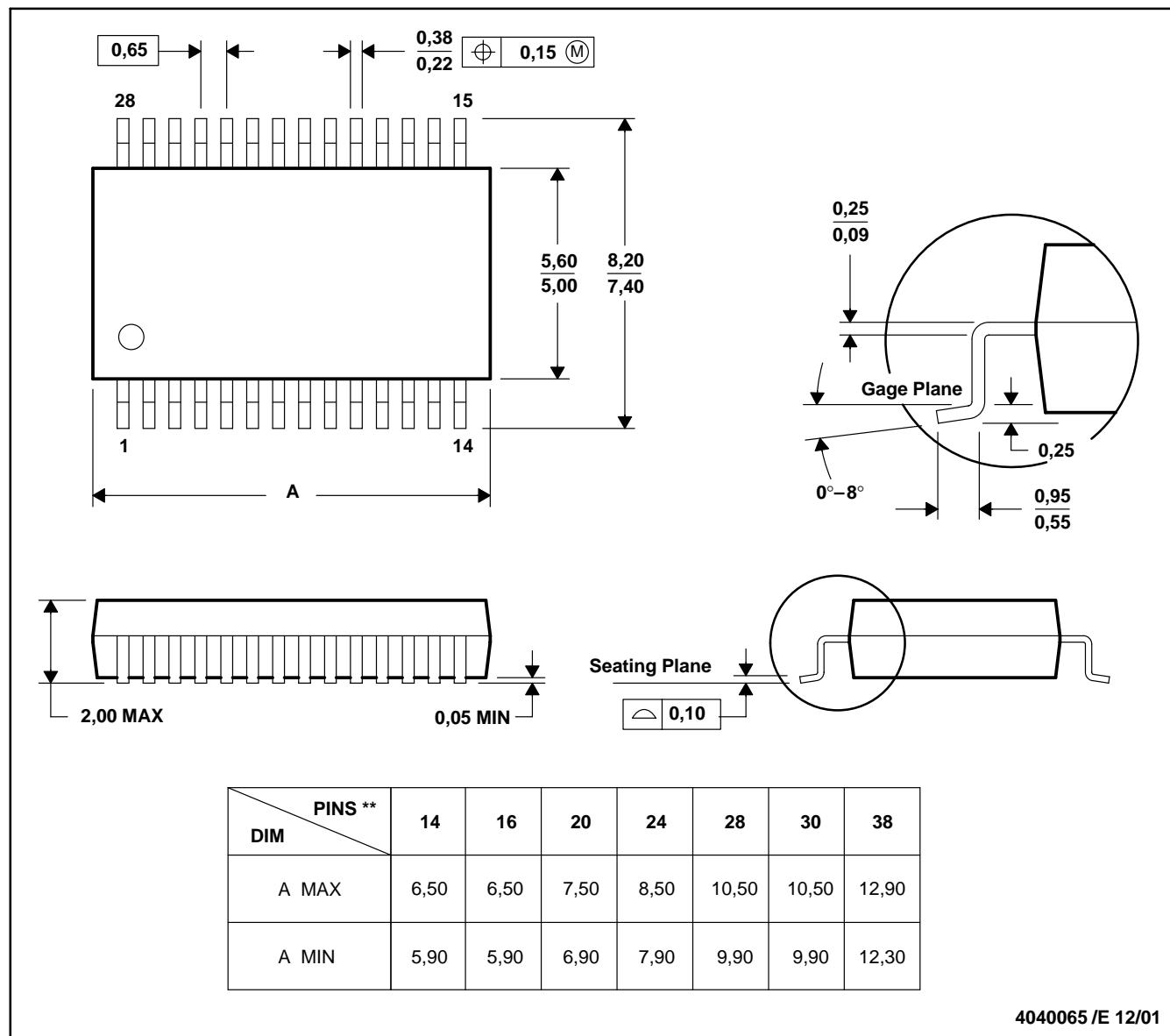
NOTES:

- 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.

## 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

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DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>
	<b>TI E2E Community</b>
	<a href="http://e2e.ti.com">e2e.ti.com</a>