

# Low-Voltage Multiplexer/Demultiplexer, Bus Switch

## Product Preview

**T30LMSW3B3257 /**  
**T30LMSW3B3253 /**  
**T30LMSW3B3125 /**  
**T30LMSW3B3126**

The T30LMSW3B3257 device is a 4-bit 1-of-2 highspeed FET multiplexer/demultiplexer. The select (S) input controls the data flow. The FET multiplexers/demultiplexers are disabled when the output-enable ( $\overline{OE}$ ) input is high.

The T30LMSW3B3253 device is a dual 1-of-4 highspeed FET multiplexer and demultiplexer. The select (S0, S1) inputs control the data flow. The FET multiplexers/demultiplexers are disabled when the output-enable ( $\overline{OE}$ ) input is high.

The T30LMSW3B3125 and T30LMSW3B3126 devices are quadruple FET bus switches featuring independent line switches. Each switch of the T30LMSW3B3125 is disabled when the associated output-enable ( $\overline{OE}$ ) input is high. Each switch of the T30LMSW3B3126 is disabled when the associated output-enable (OE) input is low.

These devices are fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  feature ensures that damaging current will not backflow through the devices when the devices are powered down. The devices have isolation during power off.

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

### Features

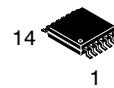
- 5  $\Omega$  Switch Connection Between 2 Ports
- Rail to Rail Switching on Data Ports
- $I_{off}$  Supports Partial Power Down Mode Operation
- Break-Before-Make circuitry for 3257 and 3253
- 2000 V HBM ESD Protection (JESD22)

### Typical Applications

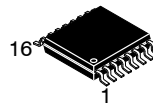
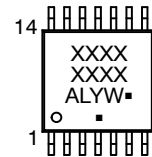
- Internet of Things
- Wireless Headphones
- Muxing/Demuxing
- Datacenters and Enterprise Computing
- Building Automation

This document contains information on a product under development. onsemi reserves the right to change or discontinue this product without notice.

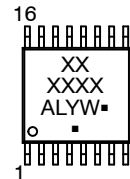
### MARKING DIAGRAMS



TSSOP-14  
DT SUFFIX  
CASE 948G



TSSOP-16  
DT SUFFIX  
CASE 948F



XXXXXX = Specific Device Code  
 A = Assembly Location  
 L, WL = Wafer Lot  
 Y, YY = Year  
 W, WW = Work Week  
 G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

T30LMSW3B3257 / T30LMSW3B3253 / T30LMSW3B3125 / T30LMSW3B3126

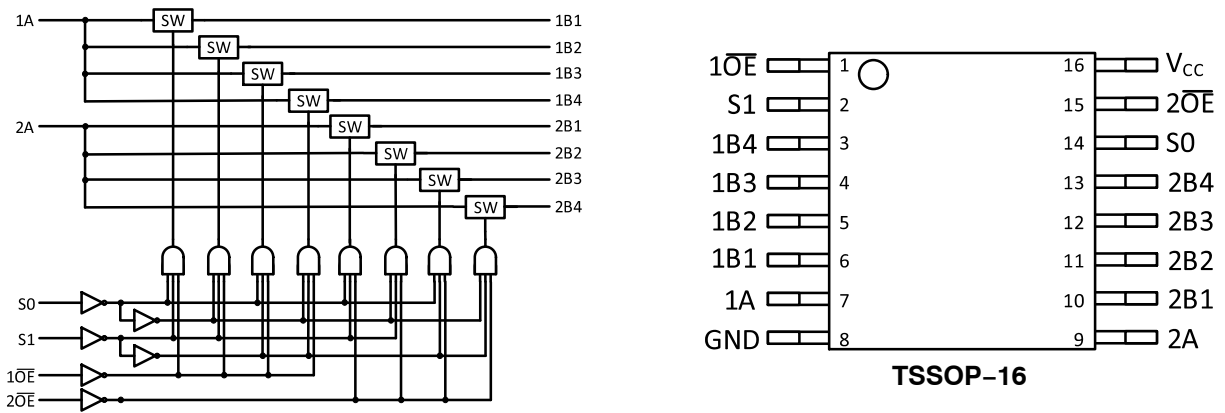


Figure 1. T30LMSW3B3253 Logic Diagram and Pin Assignment

T30LMSW3B3253 FUNCTION TABLE

Inputs			Function
OE	S1	S0	
L	L	L	A = B1
L	L	H	A = B2
L	H	L	A = B3
L	H	H	A = B4
H	X	X	Disconnect

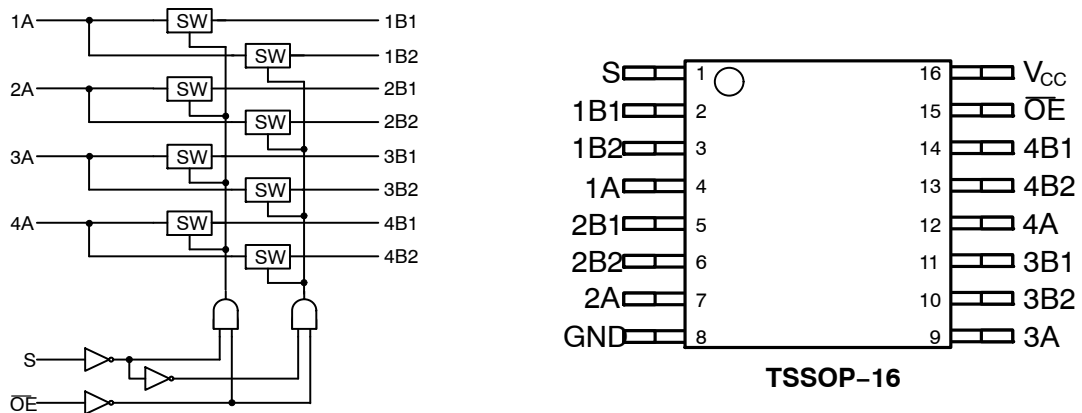
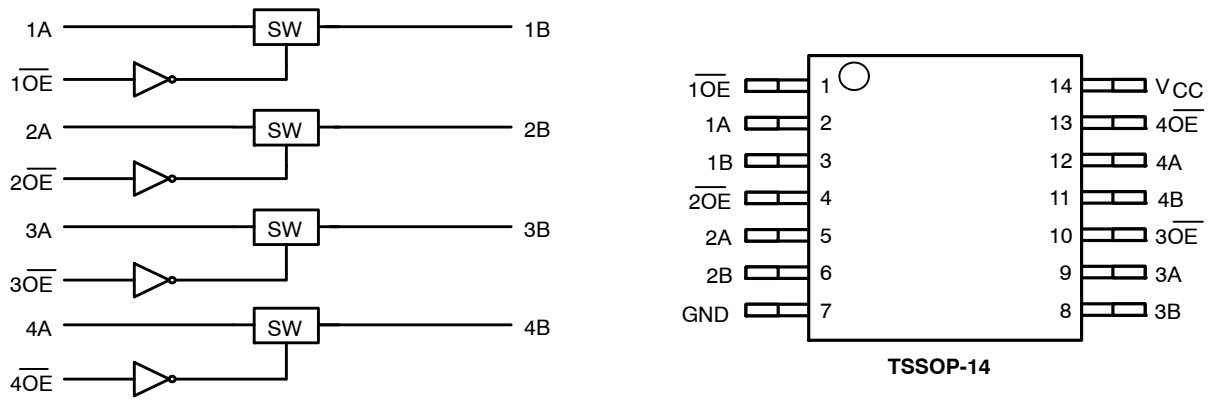


Figure 2. T30LMSW3B3257 Logic Diagram and Pin Assignment

T30LMSW3B3257 FUNCTION TABLE

Inputs		Function
OE	S	
L	L	A = B1
L	H	A = B2
H	X	Disconnect

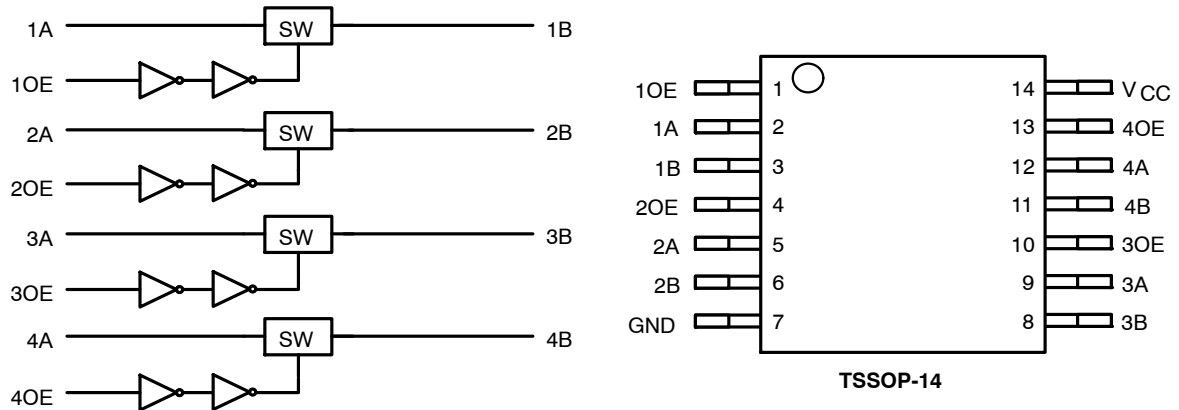
**T30LMSW3B3257 / T30LMSW3B3253 / T30LMSW3B3125 / T30LMSW3B3126**



**Figure 3. T30LMSW3B3125 Logic Diagram and Pin Assignment**

**T30LMSW3B3125 FUNCTION TABLE**

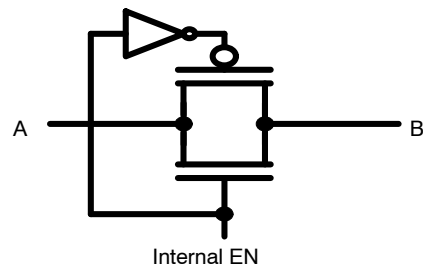
$\overline{OE}$	Function
L	A = B
H	Disconnect



**Figure 4. T30LMSW3B3126 Logic Diagram and Pin Assignment**

**T30LMSW3B3126 FUNCTION TABLE**

OE	Function
L	Disconnect
H	A = B



**Figure 5. Individual FET Switch Simplified Schematic**

**MAXIMUM RATINGS**

Symbol	Parameter	Condition	Value	Unit
$V_{CCA}, V_{CCB}$	Supply Voltage		-0.5 to +4.3	V
$V_I$	Input Voltage (Note 1)		-0.5 to +4.3	V
	Continuous Channel Current		128	mA
$I_{IK}$	Input Clamp Current	$V_{I/O} < GND$	-50	mA
$I_{CC}$	DC Supply Current Per Supply Pin		±100	mA
$I_{GND}$	DC Ground Current per Ground Pin		±100	mA
$T_J$	Junction Temperature		+150	°C
$T_{STG}$	Storage Temperature		-65 to +150	°C
$\theta_{JA}$	Thermal Resistance (Note 2)	TSSOP-16 TSSOP-14	159 150	°C/W
$P_D$	Power Dissipation in Still Air	TSSOP-16 TSSOP-14	787 833	mW
MSL	Moisture Sensitivity		Level 1	
$F_R$	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
$V_{ESD}$	ESD Withstand Voltage (Note 3)	Human Body Model Charged Device Model	2 TBD	kV
$I_{LATCHUP}$	Latchup Performance Above $V_{CC}$ and Below GND at 25 °C (Note 4)		±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. Measured with minimum pad spacing on an FR4 board, using 76 mm-by-114 mm, 2 ounce copper trace no air flow per JESD51-7.
3. HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22-A115-A (Machine Model) be discontinued per JEDEC/JEP172A.
4. Tested to EIA/JESD78 Class II.

**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Min	Max	Unit
$V_{CCA}, V_{CCB}$	Positive DC Supply Voltage	1.65	3.6	V
$V_I$	Control Pin Input Voltage	GND	3.6	V
$V_{I/O}$	I/O Pin Voltage	GND	$V_{CCA}$	V
$T_A$	Operating Temperature Range	-40	+125	°C
$\Delta t/\Delta V$	Control Input Transition Rise or Fall Rate	0	200	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V <sub>CCA</sub> (V)	T <sub>A</sub> = -40 °C to +85 °C			T <sub>A</sub> = -40 °C to +125 °C		Unit
				Min	Typ (Note 5)	Max	Min	Max	
V <sub>IH</sub>	Input HIGH Voltage		1.65–1.95	0.7 * V <sub>CC</sub>	–	–	0.7 * V <sub>CC</sub>	–	V
			2.3–2.7	1.7	–	–	1.7	–	
			2.7–3.6	2.0	–	–	2.0	–	
V <sub>IL</sub>	Input LOW Voltage		1.65–1.95	–	–	0.3 * V <sub>CC</sub>	–	0.3 * V <sub>CC</sub>	V
			2.3–2.7	–	–	0.7	–	0.7	
			2.7–3.6	–	–	0.8	–	0.8	
V <sub>IK</sub>	Clamp Diode Voltage	I <sub>I</sub> = -18 mA	3.0	–	–	-1.2	–	-1.2	V
I <sub>I</sub>	Input Leakage	V <sub>I</sub> = V <sub>CC</sub> or GND	3.6	–	–	±0.5	–	±0.5	μA
I <sub>off</sub>	Power Off Leakage	V <sub>I</sub> or V <sub>O</sub> = GND to 3.6 V	0	–	–	1.0	–	1.0	μA
I <sub>CC</sub>	Supply Current	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	3.6	–	–	1.0	–	1.0	μA
ΔI <sub>CC</sub>	Additional Supply Current	Control Pins; One input at 3 V, Other inputs at V <sub>CC</sub> or GND	3.6	–	–	100	–	100	μA
C <sub>I</sub>	Control Input Capacitance	V <sub>I</sub> = 3 V or GND		–	3	–	–	–	pF
C <sub>IO(off)</sub>	Switch Off Capacitance (T30LMSW3B3257)	$\overline{OE} = V_{CC}$ ; A		–	10.5	–	–	–	pF
		V <sub>I</sub> = 3 V or GND B		–	5.5	–	–	–	
	Switch Off Capacitance (T30LMSW3B3253)	$\overline{OE} = V_{CC}$ ; A		–	20.5	–	–	–	
		V <sub>I</sub> = 3 V or GND B		–	5.5	–	–	–	
Switch Off Capacitance (T30LMSW3B3125 / T30LMSW3B3126)	$\overline{OE} = V_{CC}$ or OE = GND;		–	7.0	–	–	–		
	V <sub>I</sub> = 3 V or GND								
R <sub>ON</sub>	ON Resistance	V <sub>I</sub> = 0 V; I <sub>I</sub> = 24 mA	1.65–1.95	–	6	10	–	10	Ω
		V <sub>I</sub> = 1.05 V; I <sub>I</sub> = 15 mA		–	26	50	–	50	
		V <sub>I</sub> = 0 V; I <sub>I</sub> = 64 mA	2.3–2.7	–	4	7	–	7	
		I <sub>I</sub> = 24 mA		–	4	7	–	7	
		V <sub>I</sub> = 1.7 V; I <sub>I</sub> = 15 mA		–	10	20	–	20	
		V <sub>I</sub> = 0 V; I <sub>I</sub> = 64 mA	3.0–3.6	–	4	6	–	6	
		I <sub>I</sub> = 24 mA		–	4	6	–	6	
		V <sub>I</sub> = 2.4 V; I <sub>I</sub> = 15 mA		–	8	12	–	12	

5. All typical values are at nominal value of V<sub>CC</sub> range and T<sub>A</sub> = 25 °C.

**T30LMSW3B3257 / T30LMSW3B3253 / T30LMSW3B3125 / T30LMSW3B3126**

**AC ELECTRICAL CHARACTERISTICS (T30LMSW3B3257/T30LMSW3B3253)**

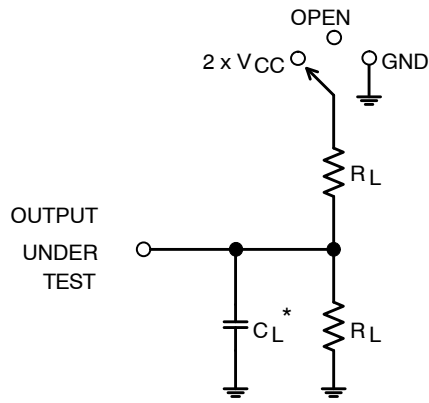
Symbol	Parameter	Test Conditions	V <sub>CCA</sub> (V)	T <sub>A</sub> = -40 °C to +85 °C			T <sub>A</sub> = -40 °C to +125 °C		Unit
				Min	Typ	Max	Min	Max	
				t <sub>PD</sub>	Propagation Delay (Note 6) A to B or B to A	1.65–1.95	–	–	
2.3–2.7	–	–	0.15	–		0.15			
2.7–3.6	–	–	0.25	–		0.25			
t <sub>EN</sub>	Enable Time S to A or B	1.65–1.95	–	–	8.8	–	8.8	ns	
		2.3–2.7	–	–	6.1	–	6.1		
		2.7–3.6	–	–	5.3	–	5.3		
	Enable Time OE to A or B	1.65–1.95	–	–	8.6	–	8.6		
		2.3–2.7	–	–	5.6	–	5.6		
		2.7–3.6	–	–	5	–	5		
t <sub>DIS</sub>	Disable Time S to A or B	1.65–1.95	–	–	5.5	–	5.5	ns	
		2.3–2.7	–	–	4.8	–	4.8		
		2.7–3.6	–	–	4.5	–	4.5		
	Disable Time OE to A or B	1.65–1.95	–	–	6.5	–	6.5		
		2.3–2.7	–	–	5.5	–	5.5		
		2.7–3.6	–	–	5.5	–	5.5		

**AC ELECTRICAL CHARACTERISTICS (T30LMSW3B3125 / T30LMSW3B3126)**

Symbol	Parameter	Test Conditions	V <sub>CCA</sub> (V)	T <sub>A</sub> = -40 °C to +85 °C			T <sub>A</sub> = -40 °C to +125 °C		Unit
				Min	Typ	Max	Min	Max	
				t <sub>PD</sub>	Propagation Delay (Note 6) A to B or B to A	1.65–1.95	–	–	
2.3–2.7	–	–	0.15	–		0.15			
2.7–3.6	–	–	0.25	–		0.25			
t <sub>EN</sub>	Enable Time OE to A or B	1.65–1.95	–	–	8.6	–	8.6	ns	
		2.3–2.7	–	–	5.6	–	5.6		
		2.7–3.6	–	–	5	–	5		
t <sub>DIS</sub>	Disable Time OE to A or B	1.65–1.95	–	–	6.5	–	6.5	ns	
		2.3–2.7	–	–	5.5	–	5.5		
		2.7–3.6	–	–	5.5	–	5		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

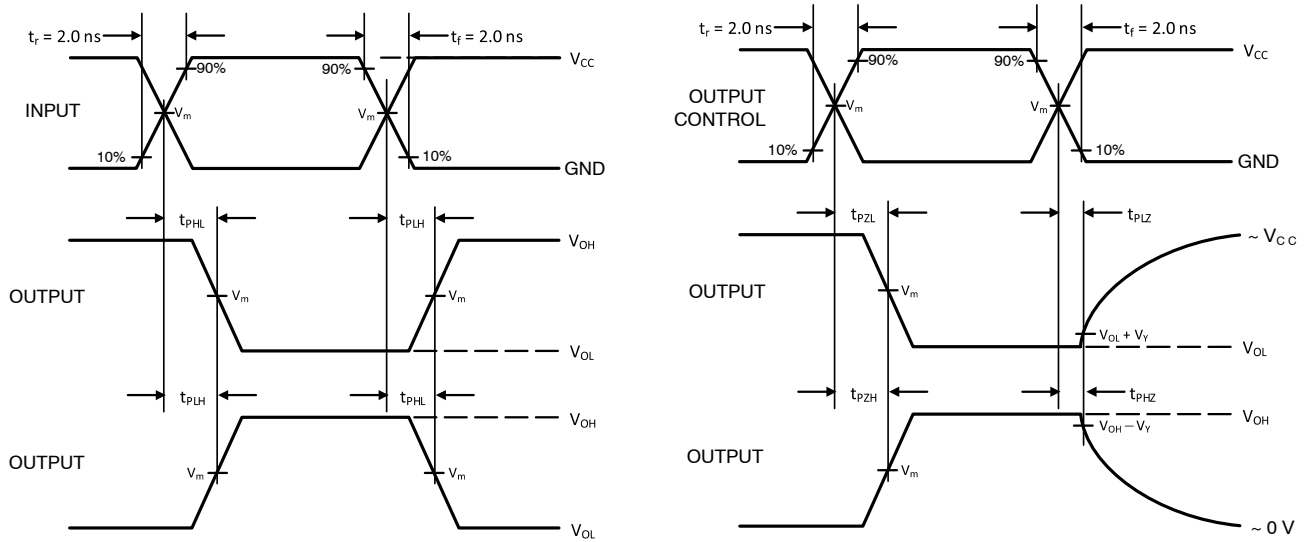
6. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).



Test	Switch Position
$t_{PLH} / t_{PHL}$	Open
$t_{PLZ} / t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ} / t_{PZH}$	GND

$C_L$  includes load and jig capacitance  
 Pulse generator  $Z_0 = 50 \Omega$   
 Input  $f = 10 \text{ MHz}$ ;  $t_W = 500 \text{ ns}$

Figure 6. AC Test Circuit



$V_{CC}, \text{V}$	$C_L, \text{pF}$	$R_L, \Omega$	$V_m, \text{V}$	$V_v, \text{V}$
1.65 V to 1.95 V	15	500	$V_{CC}/2$	0.1
2.3 V to 2.7 V	30	500	$V_{CC}/2$	0.15
3.0 V to 3.6 V	50	500	$V_{CC}/2$	0.3

Figure 7. AC Waveforms

**ORDERING INFORMATION**

Device	Marking	Pin 1 Quadrant	Package	Shipping <sup>†</sup>
T30LMSW3B3257DTR2G	TBD	1	TSSOP-16	2500 / Tape & Reel
T30LMSW3B3253DTR2G	TBD	1	TSSOP-16	2500 / Tape & Reel
T30LMSW3B3125DTR2G	TBD	1	TSSOP-14	2500 / Tape & Reel
T30LMSW3B3126DTR2G	TBD	1	TSSOP-14	2500 / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

**Pin 1 Orientation in Tape and Reel**

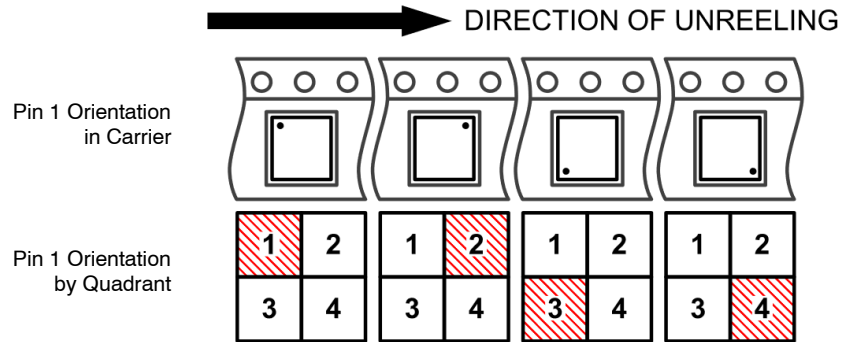
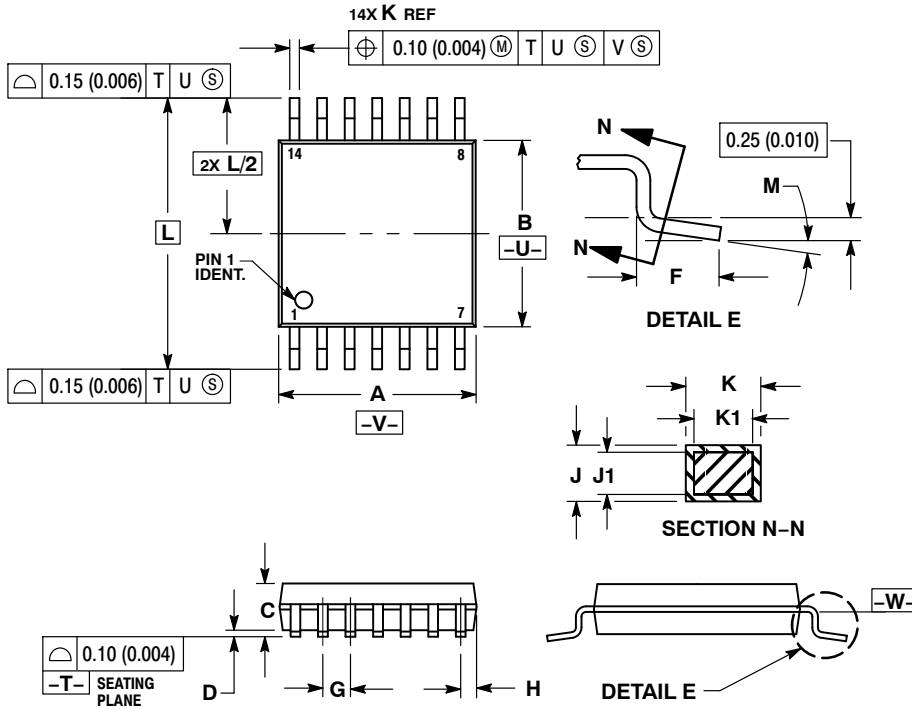


Figure 8.



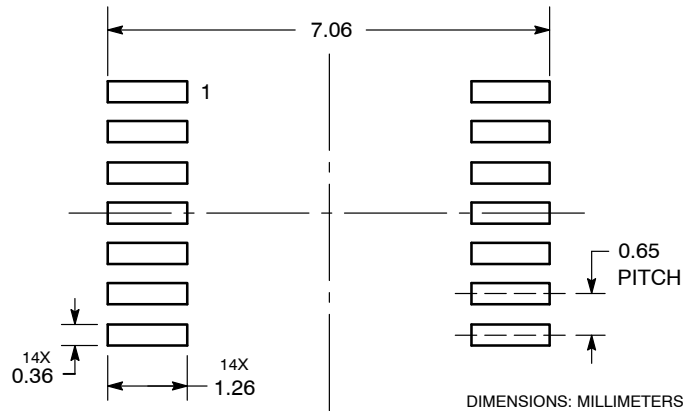
PACKAGE DIMENSIONS

TSSOP-14 WB  
CASE 948G  
ISSUE C



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
  5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
  6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

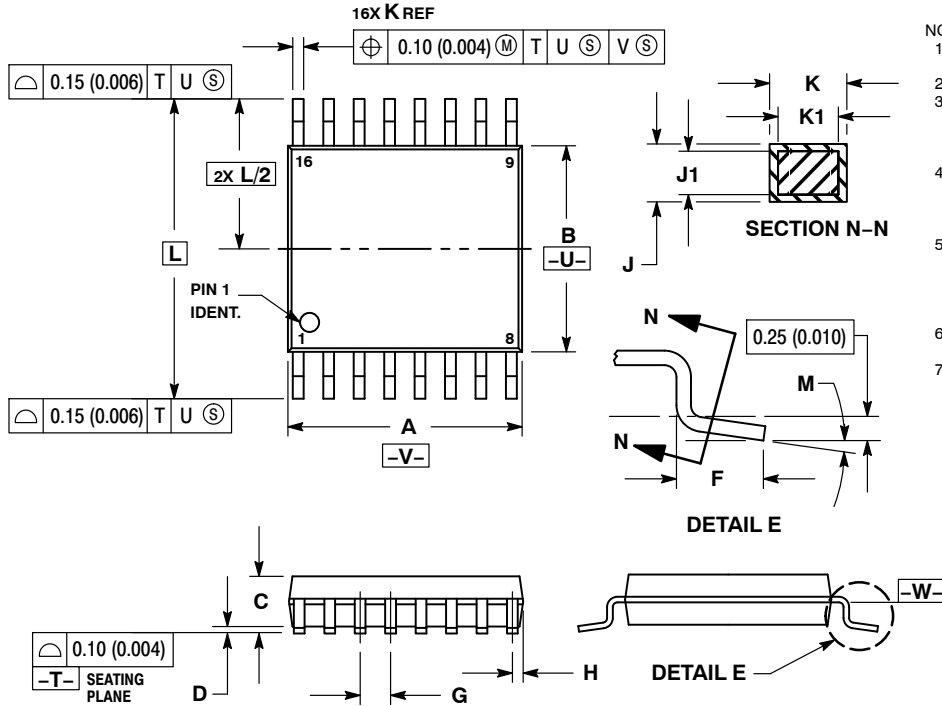
RECOMMENDED  
SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, [SOLDERRM/D](http://www.onsemi.com/SOLDERRM/D).

PACKAGE DIMENSIONS

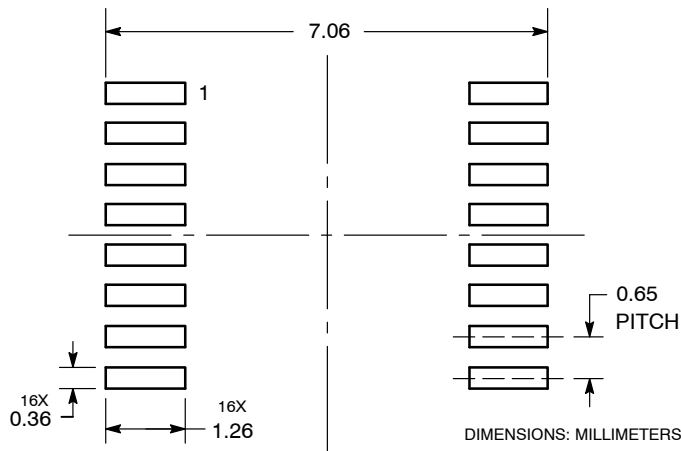
TSSOP-16 WB  
CASE 948F  
ISSUE B



- NOTES:
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  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
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  6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.18	0.28	0.007	0.011
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

RECOMMENDED  
SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the [onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D](#).

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