Quad 2-Input Data Selectors/Multiplexers

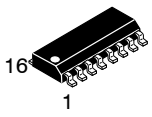
MC74HC157A

The MC74HC157A is identical in pinout to the LS157. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

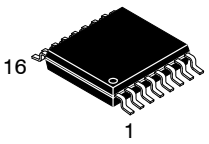
This device routes 2 nibbles (A or B) to a single port (Y) as determined by the Select input. The data is presented at the outputs in noninverted form. A high level on the Output Enable input sets all four Y outputs to a low level.

Features

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1 μA
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements Defined by JEDEC Standard No. 7A
- Chip Complexity: 82 FETs or 20.5 Equivalent Gates
- −Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant



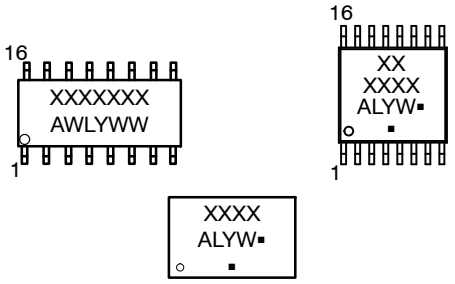
SOIC−16
D SUFFIX
CASE 751B



TSSOP−16
DT SUFFIX
CASE 948F

QFN16
MN SUFFIX
CASE 485AW

MARKING DIAGRAMS



A	=	Assembly Location
WL, L	=	Wafer Lot
YY, Y	=	Year
WW, W	=	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.

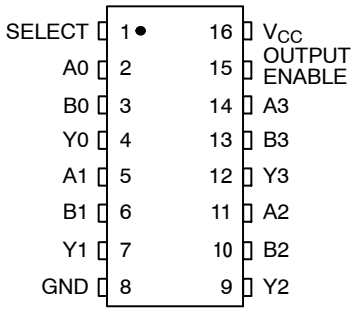


Figure 1. Pin Assignment

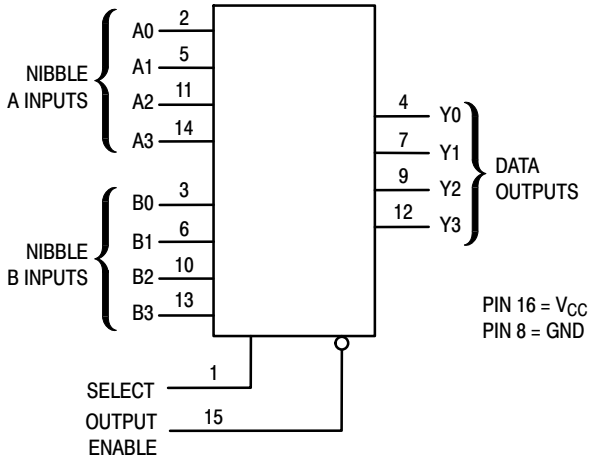


Figure 2. Logic Diagram

FUNCTION TABLE

Inputs		Outputs
Output Enable	**Select**	**Y0 – Y3**
H	X	L
L	L	A0 – A3
L	H	B0 – B3

X = don't care
A0–A3, B0–B3 = the levels of the respective Data–Word Inputs.

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		–0.5 to +6.5	V
V_{IN}	DC Input Voltage		–0.5 to V_{CC} + 0.5	V
V_{OUT}	DC Output Voltage		–0.5 to V_{CC} + 0.5	V
I_{IN}	DC Input Current, per Pin		±20	mA
I_{OUT}	DC Output Current, per Pin		±25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins		±50	mA
I_{IK}	Input Clamp Current (V_{IN} < 0 or V_{IN} > V_{CC})		±20	mA
I_{OK}	Output Clamp Current (V_{OUT} < 0 or V_{OUT} > V_{CC})		±20	mA
T_{STG}	Storage Temperature		–65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature Under Bias		±150	°C
θ_{JA}	Thermal Resistance (Note 1)	SOIC–16 QFN16 TSSOP–16	126 118 159	°C/W
P_D	Power Dissipation in Still Air at 25°C	SOIC–16 QFN16 TSSOP–16	995 1062 787	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 2)	Human Body Model Charged Device Model	2000 N/A	V

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. 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.
2. HBM tested to EIA / JESD22–A114–A. CDM tested to JESD22–C101–A. JEDEC recommends that ESD qualification to EIA/JESD22–A115A (Machine Model) be discontinued.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage		2.0	6.0	V
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Note 3)		0	V_{CC}	V
T_A	Operating Free–Air Temperature		–55	+125	°C
t_r, t_f	Input Rise or Fall Time	V_{CC} = 2.0 V V_{CC} = 4.5 V V_{CC} = 6.0 V	0 0 0	1000 500 400	ns

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.

3. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit			Unit
				–55 to 25°C	≤ 85°C	≤ 125°C	
V_{IH}	Minimum High–Level Input Voltage	V_{OUT} = 0.1 V or V_{CC} – 0.1 V $\|I_{OUT}\| \le 20$ μA	2.0 3.0 4.5 6.0	1.5 2.1 3.15 4.2	1.5 2.1 3.15 4.2	1.5 2.1 3.15 4.2	V
V_{IL}	Maximum Low–Level Input Voltage	V_{OUT} = 0.1 V or V_{CC} – 0.1 V $\|I_{OUT}\| \le 20$ μA	2.0 3.0 4.5 6.0	0.5 0.9 1.35 1.8	0.5 0.9 1.35 1.8	0.5 0.9 1.35 1.8	V
V_{OH}	Minimum High–Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL}					V
		$\|I_{OUT}\| \le 20$ μA	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	
		$\|I_{OUT}\| \le 2.4$ mA $\|I_{OUT}\| \le 6.0$ mA $\|I_{OUT}\| \le 7.8$ mA	3.0 4.5 6.0	2.48 3.98 5.48	2.34 3.84 5.34	2.2 3.7 5.2	
V_{OL}	Minimum Low–Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL}					V
		$\|I_{OUT}\| \le 20$ μA	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	
		$\|I_{OUT}\| \le 2.4$ mA $\|I_{OUT}\| \le 6.0$ mA $\|I_{OUT}\| \le 7.8$ mA	3.0 4.5 6.0	0.26 0.26 0.26	0.33 0.33 0.33	0.4 0.4 0.4	
I_{IN}	Maximum Input Leakage Current	$V_{IN} = V_{CC}$ or GND	6.0	±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	$V_{IN} = V_{CC}$ or GND	6.0	4.0	40	160	μA

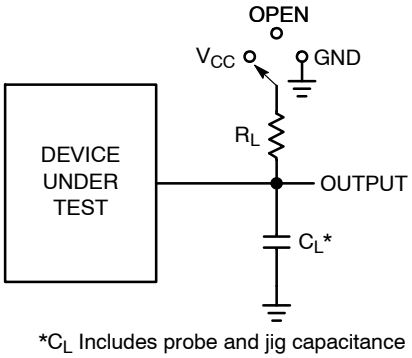
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			–55 to 25°C	≤ 85°C	≤ 125°C	
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Input A or B to Output Y	2.0 3.0 4.5 6.0	105 65 21 18	130 85 26 22	160 115 32 27	ns
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Select to Output Y	2.0 3.0 4.5 6.0	110 70 22 19	140 90 28 24	165 115 33 28	ns
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Output Enable to Output Y	2.0 3.0 4.5 6.0	100 60 20 17	125 80 25 21	150 110 30 26	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time, Any Output	2.0 3.0 4.5 6.0	75 27 15 13	95 32 19 16	110 36 22 19	ns
C_{in}	Maximum Input Capacitance	–	10	10	10	pF

			Typical @ 25°C	
C_{PD}	Power Dissipation Capacitance (Per Enabled Output) (Note 4)	5.0	33	pF

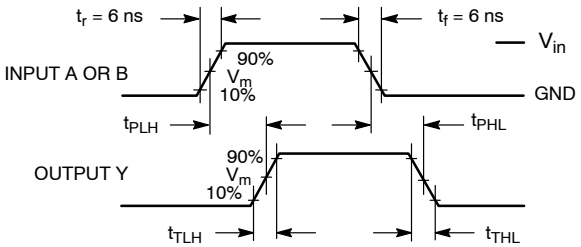
4. Used to determine the no–load dynamic power consumption: $P_D = C_{PD} \times V_{CC}^2 \times f + I_{CC} \times V_{CC}$.



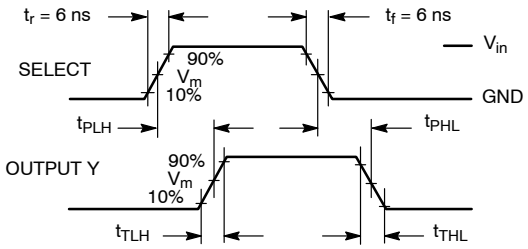
*C_L Includes probe and jig capacitance

Test	Switch Position	C_L	R_L
t_{PLH} / t_{PHL}	Open	50 pF	1 kΩ
t_{PLZ} / t_{PZL}	V_{CC}		
t_{PHZ} / t_{PZH}	GND		

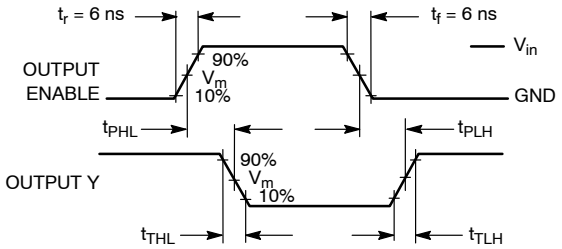
Figure 3. Test Circuit



A or B to Y



Y versus Selected, Noninverted



Output Enable to Y

Device	V_{IN}, V	V_m, V
MC74HC157A	V_{CC}	50% x V_{CC}

Figure 4. Switching Waveforms

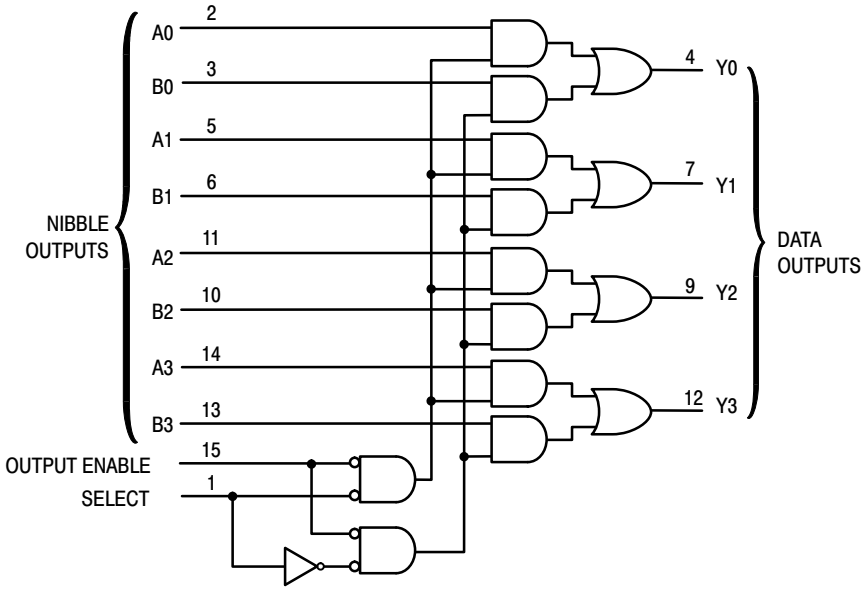


Figure 5. Expanded Logic Diagram

PIN DESCRIPTIONS

INPUTS

A0, A1, A2, A3 (Pins 2, 5, 11, 14)

Nibble A inputs. The data present on these pins is transferred to the outputs when the Select input is at a low level and the Output Enable input is at a low level. The data is presented to the outputs in noninverted form.

B0, B1, B2, B3 (Pins 3, 6, 10, 13)

Nibble B inputs. The data present on these pins is transferred to the outputs when the Select input is at a high level and the Output Enable input is at a low level. The data is presented to the outputs in noninverted form.

OUTPUTS

Y0, Y1, Y2, Y3 (Pins 4, 7, 9, 12)

Data outputs. The selected input Nibble is presented at these outputs when the Output Enable input is at a low level. The data present on these pins is in its noninverted form. For the Output Enable input at a high level, the outputs are at a low level.

CONTROL INPUTS

Select (Pin 1)

Nibble select. This input determines the data word to be transferred to the outputs. A low level on this input selects the A inputs and a high level selects the B inputs.

Output Enable (Pin 15)

Output Enable input. A low level on this input allows the selected input data to be presented at the outputs. A high level on this input sets all outputs to a low level.

ORDERING INFORMATION

Device	Package	Marking	Shipping†
MC74HC157ADG	SOIC−16	HC157AG	1000 Units / Tape & Reel
MC74HC157ADR2G	SOIC−16	HC157AG	1000 Units / Tape & Reel
MC74HC157ADR2G−Q*	SOIC−16	HC157AG	1000 Units / Tape & Reel
MC74HC157ADTR2G	TSSOP−16	HC 157A	2500 Units / Tape & Reel
MC74HC157ADTR2G−Q*	TSSOP−16	HC 157A	2500 Units / Tape & Reel

†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.

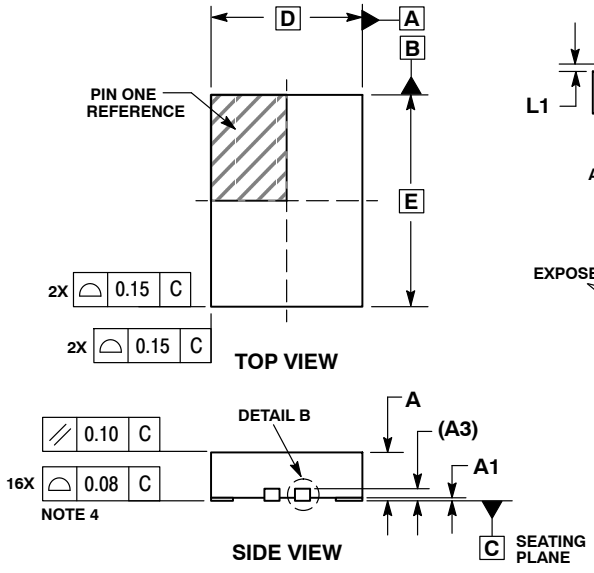
*−Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.

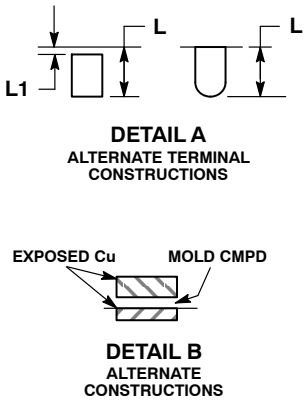
PACKAGE DIMENSIONS

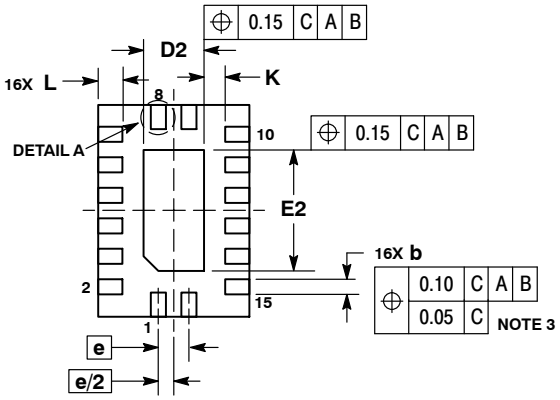
QFN16, 2.5x3.5, 0.5P
CASE 485AW
ISSUE O

DATE 11 DEC 2008

SCALE 2:1







NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.80	1.00
A1	0.00	0.05
A3	0.20 REF	
b	0.20	0.30
D	2.50 BSC	
D2	0.85	1.15
E	3.50 BSC	
E2	1.85	2.15
e	0.50 BSC	
K	0.20	---
L	0.35	0.45
L1	---	0.15

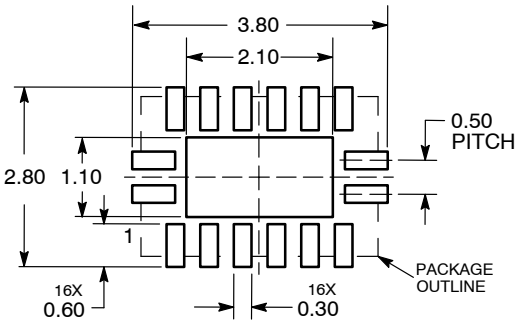
GENERIC MARKING DIAGRAM*

XXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present. Some products may not follow the Generic Marking.

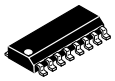
RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

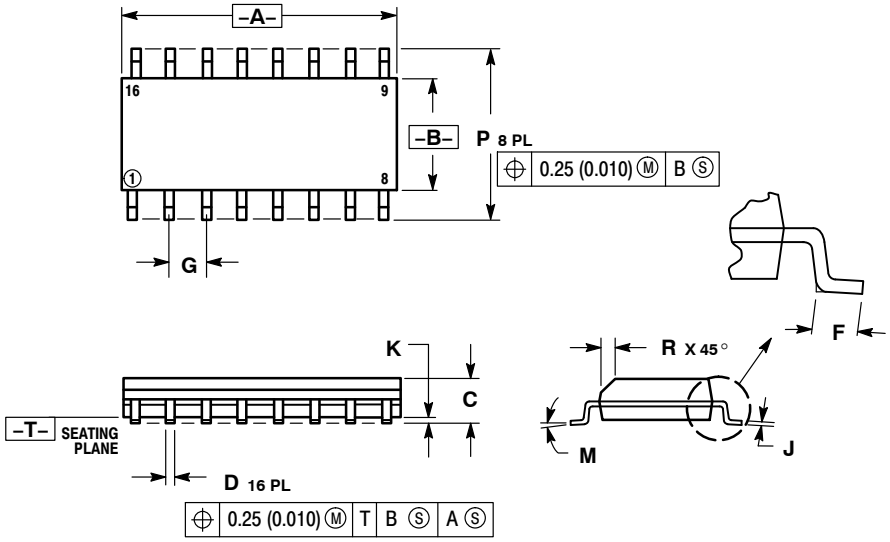
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SCALE 1:1

SOIC−16
CASE 751B−05
ISSUE K

DATE 29 DEC 2006



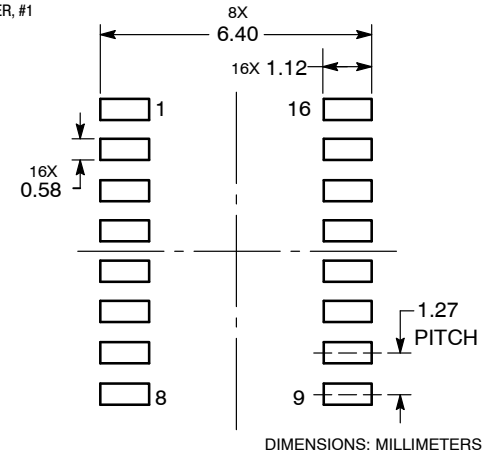
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

STYLE 1:		STYLE 2:		STYLE 3:		STYLE 4:	
PIN 1.	COLLECTOR	PIN 1.	CATHODE	PIN 1.	COLLECTOR, DYE #1	PIN 1.	COLLECTOR, DYE #1
2.	BASE	2.	ANODE	2.	BASE, #1	2.	COLLECTOR, #1
3.	EMITTER	3.	NO CONNECTION	3.	EMITTER, #1	3.	COLLECTOR, #2
4.	NO CONNECTION	4.	CATHODE	4.	COLLECTOR, #1	4.	COLLECTOR, #2
5.	EMITTER	5.	CATHODE	5.	COLLECTOR, #2	5.	COLLECTOR, #3
6.	BASE	6.	NO CONNECTION	6.	BASE, #2	6.	COLLECTOR, #3
7.	COLLECTOR	7.	ANODE	7.	EMITTER, #2	7.	COLLECTOR, #4
8.	COLLECTOR	8.	CATHODE	8.	COLLECTOR, #2	8.	COLLECTOR, #4
9.	BASE	9.	CATHODE	9.	COLLECTOR, #3	9.	BASE, #4
10.	EMITTER	10.	ANODE	10.	BASE, #3	10.	EMITTER, #4
11.	NO CONNECTION	11.	NO CONNECTION	11.	EMITTER, #3	11.	BASE, #3
12.	EMITTER	12.	CATHODE	12.	COLLECTOR, #3	12.	EMITTER, #3
13.	BASE	13.	CATHODE	13.	COLLECTOR, #4	13.	BASE, #2
14.	COLLECTOR	14.	NO CONNECTION	14.	BASE, #4	14.	EMITTER, #2
15.	EMITTER	15.	ANODE	15.	EMITTER, #4	15.	BASE, #1
16.	COLLECTOR	16.	CATHODE	16.	COLLECTOR, #4	16.	EMITTER, #1

STYLE 5:		STYLE 6:		STYLE 7:	
PIN 1.	DRAIN, DYE #1	PIN 1.	CATHODE	PIN 1.	SOURCE N-CH
2.	DRAIN, #1	2.	CATHODE	2.	COMMON DRAIN (OUTPUT)
3.	DRAIN, #2	3.	CATHODE	3.	COMMON DRAIN (OUTPUT)
4.	DRAIN, #2	4.	CATHODE	4.	GATE P-CH
5.	DRAIN, #3	5.	CATHODE	5.	COMMON DRAIN (OUTPUT)
6.	DRAIN, #3	6.	CATHODE	6.	COMMON DRAIN (OUTPUT)
7.	DRAIN, #4	7.	CATHODE	7.	COMMON DRAIN (OUTPUT)
8.	DRAIN, #4	8.	CATHODE	8.	SOURCE P-CH
9.	GATE, #4	9.	ANODE	9.	SOURCE P-CH
10.	SOURCE, #4	10.	ANODE	10.	COMMON DRAIN (OUTPUT)
11.	GATE, #3	11.	ANODE	11.	COMMON DRAIN (OUTPUT)
12.	SOURCE, #3	12.	ANODE	12.	COMMON DRAIN (OUTPUT)
13.	GATE, #2	13.	ANODE	13.	GATE N-CH
14.	SOURCE, #2	14.	ANODE	14.	COMMON DRAIN (OUTPUT)
15.	GATE, #1	15.	ANODE	15.	COMMON DRAIN (OUTPUT)
16.	SOURCE, #1	16.	ANODE	16.	SOURCE N-CH

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

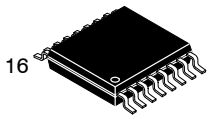
*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

DOCUMENT NUMBER:	98ASB42566B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC−16	PAGE 1 OF 1

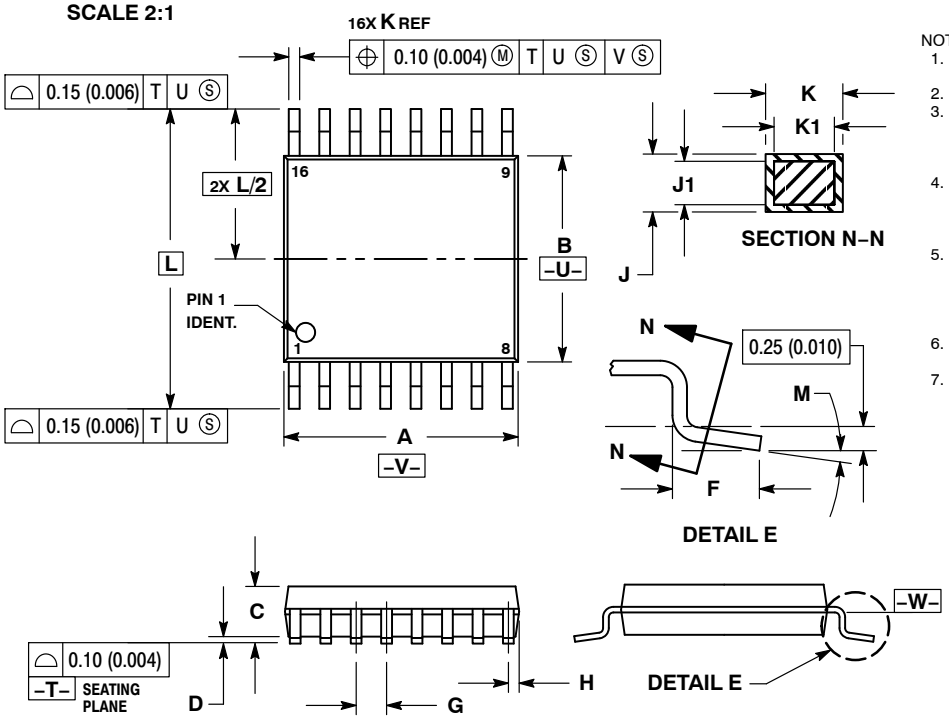
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TSSOP−16 WB
CASE 948F
ISSUE B

DATE 19 OCT 2006



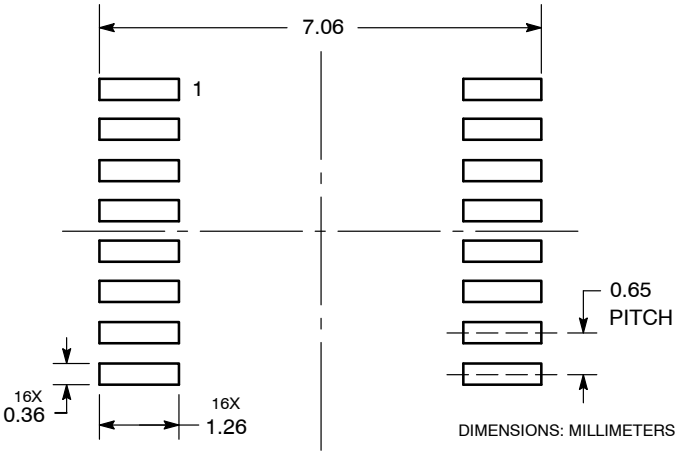
SCALE 2:1



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−.

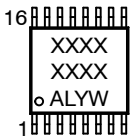
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	−−−	1.20	−−−	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.18	0.28	0.007	0.011
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010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

GENERIC MARKING DIAGRAM*



XXXX	= Specific Device Code
A	= Assembly Location
L	= Wafer Lot
Y	= Year
W	= Work Week
G or ▪	= Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present. Some products may not follow the Generic Marking.

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