

7WBD383

Translating Bus Exchange Switch

The 7WBD383 is an advanced high-speed low-power translating bus exchange switch in ultra-small footprints.

Features

- High Speed: $t_{PD} = 0.25 \text{ ns (Max) @ } V_{CC} = 4.5 \text{ V}$
- 3Ω Switch Connection Between 2 Ports
- Power Down Protection Provided on Inputs
- Zero Bounce
- TTL-Compatible Control Inputs
- Ultra-Small Pb-Free Packages
- These are Pb-Free Devices



ON Semiconductor®

<http://onsemi.com>

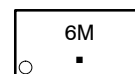
MARKING DIAGRAMS



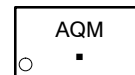
UDFN8
MU SUFFIX
CASE 517AJ



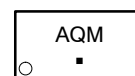
ULLGA8
1.45 x 1.0
CASE 613AA



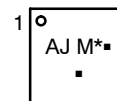
ULLGA8
1.6 x 1.0
CASE 613AB



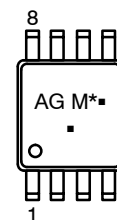
ULLGA8
1.95 x 1.0
CASE 613AC



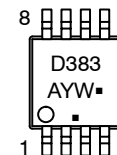
UQFN8
MU SUFFIX
CASE 523AN



US8
US SUFFIX
CASE 493



Micro8™
DM SUFFIX
CASE 846A



- A = Assembly Location
- Y = Year
- W = Work Week
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)
*Date Code orientation may vary depending upon manufacturing location.

This document contains information on some products that are still under development. ON Semiconductor reserves the right to change or discontinue these products without notice.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

7WBD383

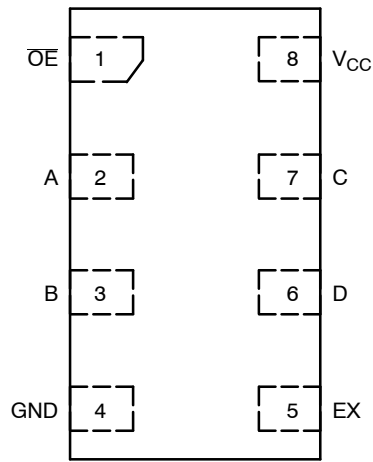


Figure 1. ULLGA8/UDFN8
(Top Thru-View)

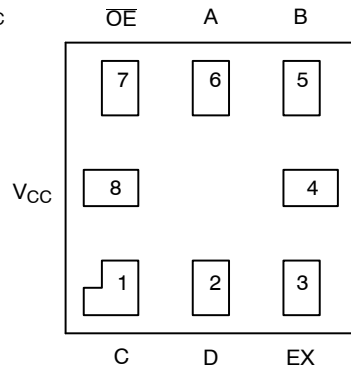


Figure 2. UQFN8
(Top Thru-View)

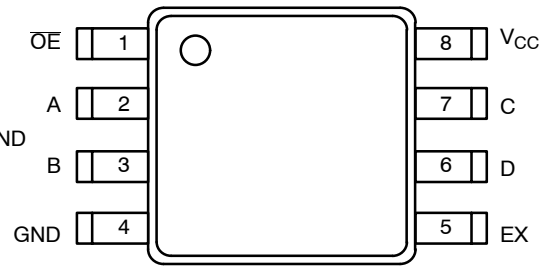


Figure 3. US8/Micro8
(Top View)

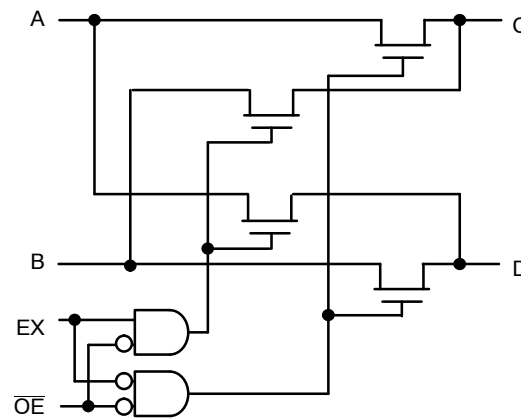


Figure 4. Logic Diagram

FUNCTION TABLE

Input \overline{OE}	Input EX	Function
L	L	A = C; B = D
L	H	A = D; B = C
H	X	Disconnect

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit	
V _{CC}	DC Supply Voltage	-0.5 to +7.0	V	
V _{IN}	Control Pin Input Voltage	-0.5 to +7.0	V	
V _{I/O}	Switch Input / Output Voltage	-0.5 to +7.0	V	
I _{IK}	Control Pin DC Input Diode Current V _{IN} < GND	-50	mA	
I _{OK}	Switch I/O Port DC Diode Current V _{I/O} < GND	-50	mA	
I _O	ON-State Switch Current	± 128	mA	
	Continuous Current Through V _{CC} or GND	± 150	mA	
I _{CC}	DC Supply Current Per Supply Pin	± 150	mA	
I _{GND}	DC Ground Current per Ground Pin	± 150	mA	
T _{STG}	Storage Temperature Range	-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	US8 (Note 1)	251	°C/W
		UDFN8	111	
		UQFN8	208	
		ULLGA8	455	
		Micro8	392	
P _D	Power Dissipation in Still Air at 85°C	US8	498	mW
		UDFN8	1127	
		UQFN8	601	
		ULLGA8	274	
		Micro8	319	
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 Human Body Mode (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000	V	
		> 200		
		N/A		
I _{LATCHUP}	Latchup Performance Above V _{CC} and Below GND at 125 °C (Note 5)	± 200	mA	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA / JESD22-A114-A.
3. Tested to EIA / JESD22-A115-A.
4. Tested to JESD22-C101-A.
5. Tested to EIA / JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	Positive DC Supply Voltage	4.0	5.5	V
V _{IN}	Control Pin Input Voltage	0	5.5	V
V _{I/O}	Switch Input / Output Voltage	0	5.5	V
T _A	Operating Free-Air Temperature	-55	+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate Control Input Switch I/O	0	5	nS/V
		0	DC	

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DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C			T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IK}	Clamp Diode Voltage	I _{I/O} = -18 mA	4.5			-1.2		-1.2	V
V _{IH}	High-Level Input Voltage (Control)		4.0 to 5.5	2.0			2.0		V
V _{IL}	Low-Level Input Voltage (Control)		4.0 to 5.5			0.8		0.8	V
V _{OH}	Output Voltage High	See Figure 5							
I _{IN}	Input Leakage Current	0 ≤ V _{IN} ≤ 5.5 V	5.5			±0.1		±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{I/O} = 0 to 5.5 V	0			±0.1		±1.0	μA
I _{CC}	Quiescent Supply Current	I _O = 0, V _{IN} = V _{CC} or 0 V OE = GND OE = V _{CC}	5.5			±1.0 ±0.1		±1.0 ±1.0	mA μA
ΔI _{CC}	Increase in Supply Current (Control Pin)	One input at 3.4 V; Other inputs at V _{CC} or GND	5.5					2.5	mA
R _{ON}	Switch ON Resistance	V _{I/O} = 0, I _{I/O} = 64 mA I _{I/O} = 30 mA	4.5		3 3	7 7		7 7	Ω
		V _{I/O} = 2.4, I _{I/O} = 15 mA			15	50		50	
		V _{I/O} = 2.4, I _{I/O} = 15 mA	4.0		50	70		70	

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition	V _{CC} (V)	T _A = 25 °C			T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PD}	Propagation Delay, Bus to Bus	See Figure 6	4.0 to 5.5			0.25		0.25	ns
t _{PD-EX}	Propagation Delay, EX to Bus	See Figure 6 and Figure 7	4.0 to 5.5			4.5		4.5	ns
t _{EN}	Output Enable Time	See Figure 6	4.5 to 5.5	0.8	2.5	4.2	0.8	4.2	ns
			4.0	0.8	3.0	4.6	0.8	4.6	
t _{DIS}	Output Disable Time		4.5 to 5.5	0.8	3.0	4.8	0.8	4.8	ns
			4.0	0.8	2.9	4.4	0.8	4.4	
C _{IN}	Control Input Capacitance	V _{IN} = 5 or 0 V	5.0		2.5				pF
C _{IO(ON)}	Switch On Capacitance	Switch ON	5.0		10				pF
C _{IO(OFF)}	Switch Off Capacitance	Switch OFF	5.0		5				pF

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TYPICAL DC CHARACTERISTICS

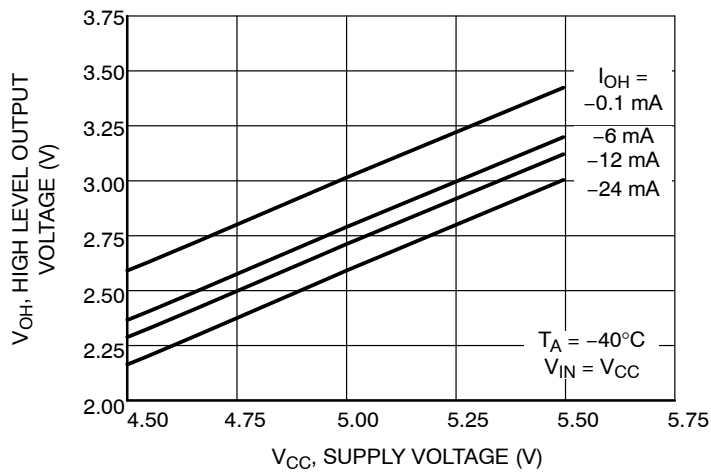
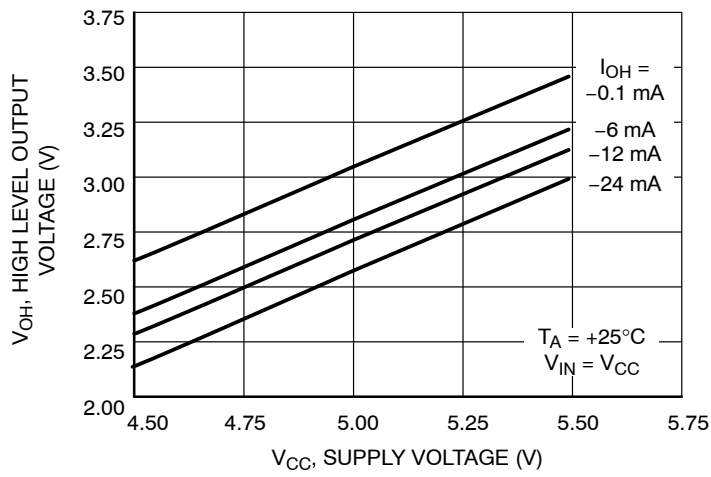
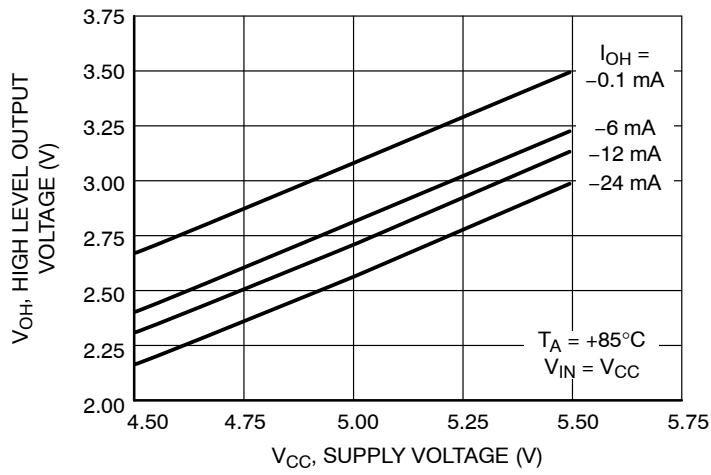
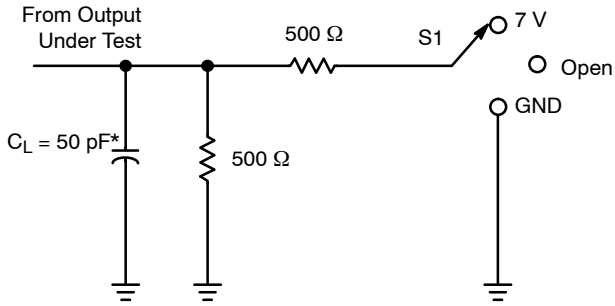


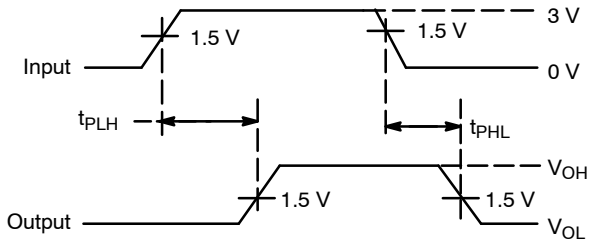
Figure 5. Output Voltage High vs Supply Voltage

AC LOADING AND WAVEFORMS

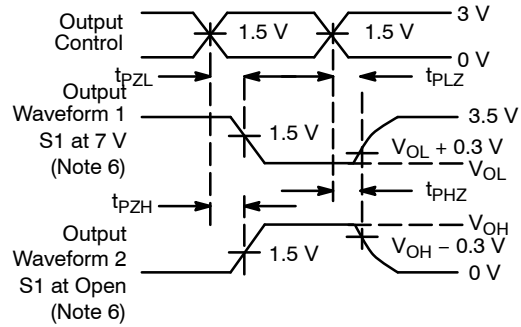


Test	S1
t_{PD}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

* C_L includes probes and jig capacitance.



Voltage Waveforms
Propagation Delay Times



Voltage Waveforms
Enable and Disable Times

- 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
- All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
- The outputs are measured one at a time, with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
- t_{PZL} and t_{PZH} are the same as t_{EN} .
- t_{PHL} and t_{PLH} are the same as t_{PD} .

Figure 6. t_{PD} , t_{EN} , t_{DIS} Loading and Waveforms

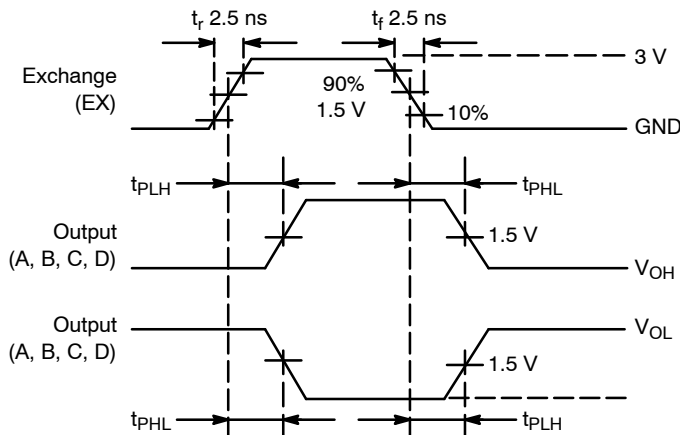


Figure 7. t_{PD-EX} Waveforms

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ORDERING INFORMATION

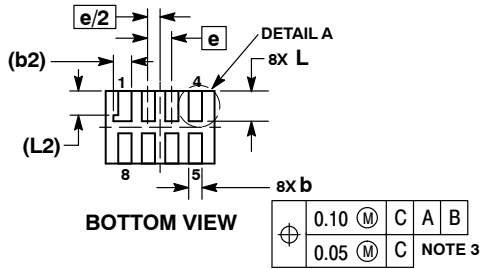
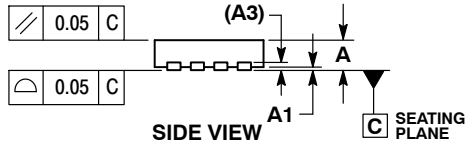
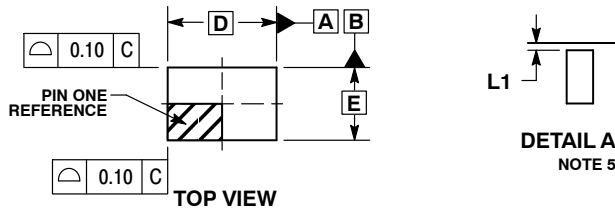
Device	Package	Shipping†
7WBD383USG	US8 (Pb-Free)	3000 / Tape & Reel
7WBD383MUTAG	UDFN8 (Pb-Free)	3000 / Tape & Reel
7WBD383AMUTCG	UQFN8 (Pb-Free)	3000 / Tape & Reel (In Development)
7WBD383AMX1TCG	ULLGA8 – 0.5 mm Pitch (Pb-Free)	3000 / Tape & Reel (In Development)
7WBD383BMX1TCG	ULLGA8 – 0.4 mm Pitch (Pb-Free)	3000 / Tape & Reel (In Development)
7WBD383CMX1TCG	ULLGA8 – 0.35 mm Pitch (Pb-Free)	3000 / Tape & Reel (In Development)
7WBD383DMR2G	Micro8 (Pb-Free)	4000 / Tape & Reel (In Development)

†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.

7WBD383

PACKAGE DIMENSIONS

UDFN8 1.8 x 1.2, 0.4P
CASE 517AJ-01
ISSUE O

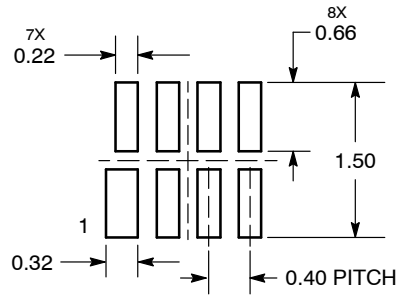


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.
4. MOLD FLASH ALLOWED ON TERMINALS ALONG EDGE OF PACKAGE. FLASH MAY NOT EXCEED 0.03 ONTO BOTTOM SURFACE OF TERMINALS.
5. DETAIL A SHOWS OPTIONAL CONSTRUCTION FOR TERMINALS.

MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127	REF
b	0.15	0.25
b2	0.30	REF
D	1.80	BSC
E	1.20	BSC
e	0.40	BSC
L	0.45	0.55
L1	0.00	0.03
L2	0.40	REF

**MOUNTING FOOTPRINT*
SOLDERMASK DEFINED**



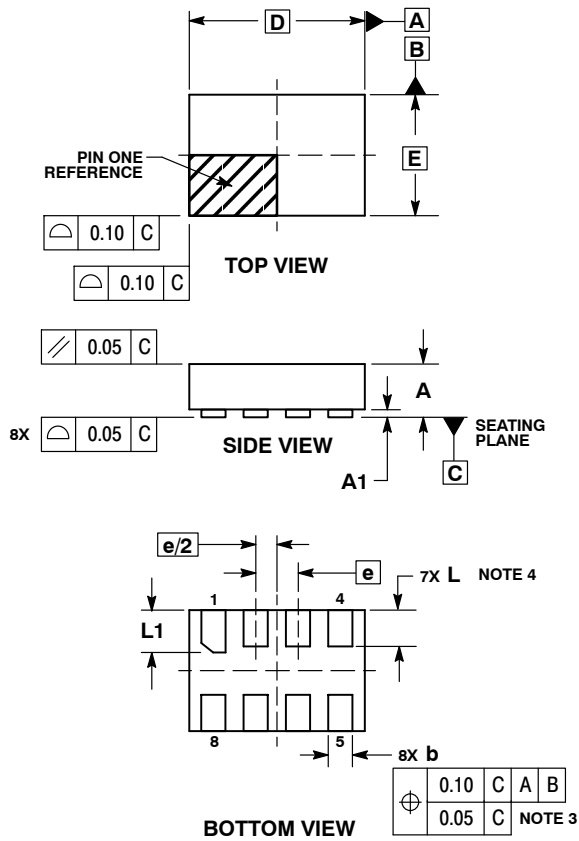
DIMENSIONS: MILLIMETERS

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

7WBD383

PACKAGE DIMENSIONS

ULLGA8 1.45x1.0, 0.35P
CASE 613AA-01
ISSUE A

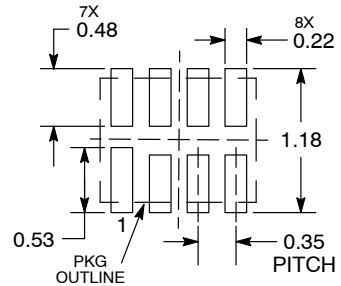


NOTES:

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2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

DIM	MILLIMETERS	
	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.45 BSC	
E	1.00 BSC	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

**MOUNTING FOOTPRINT
SOLDERMASK DEFINED***



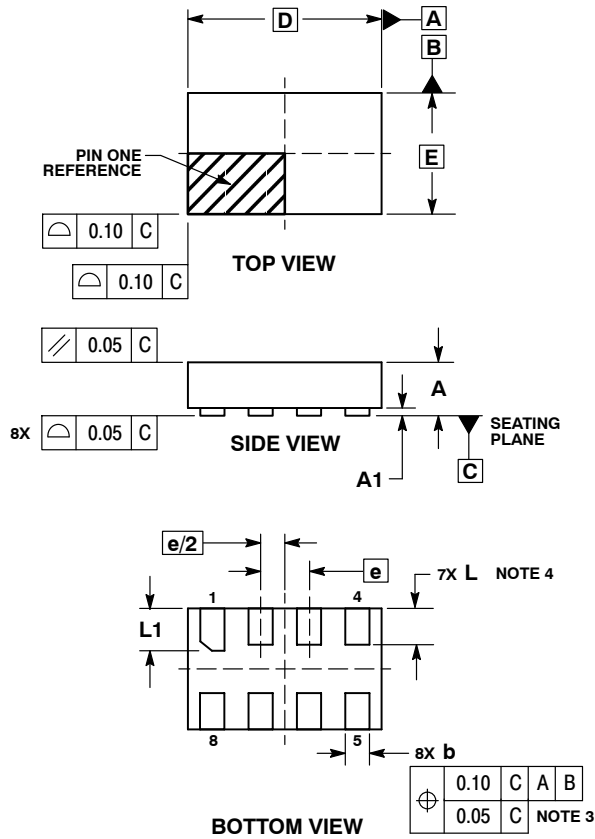
DIMENSIONS: MILLIMETERS

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7WBD383

PACKAGE DIMENSIONS

ULLGA8 1.6x1.0, 0.4P
CASE 613AB-01
ISSUE A

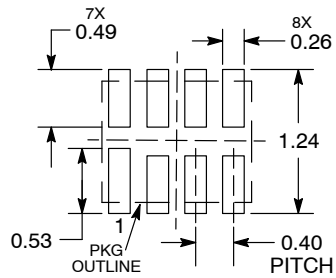


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2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

MILLIMETERS		
DIM	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.60 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.25	0.35
L1	0.30	0.40

**MOUNTING FOOTPRINT
SOLDERMASK DEFINED***



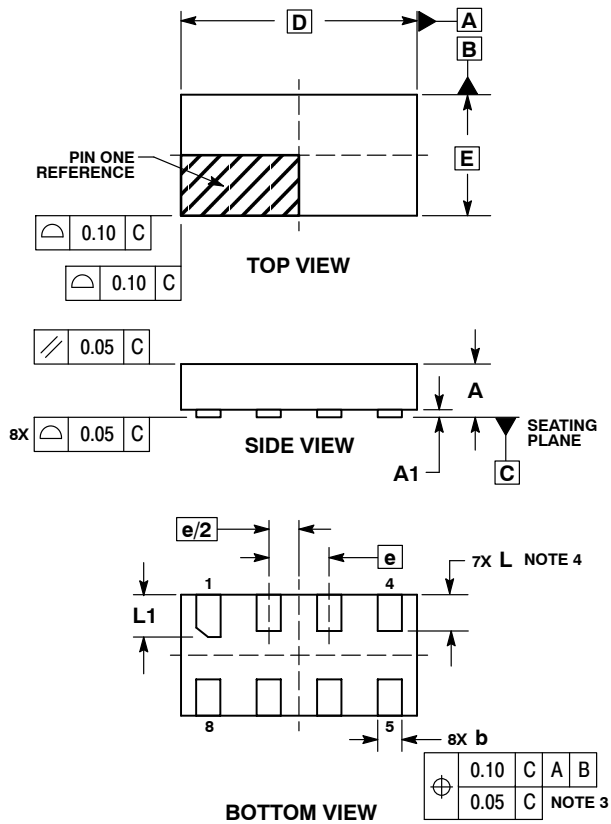
DIMENSIONS: MILLIMETERS

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7WBD383

PACKAGE DIMENSIONS

ULLGA8 1.95x1.0, 0.5P
CASE 613AC-01
ISSUE A

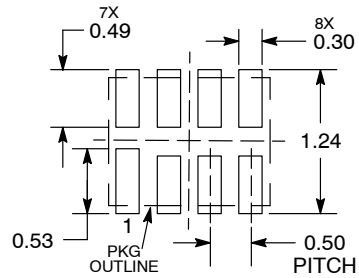


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4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

MILLIMETERS		
DIM	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.95 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

**MOUNTING FOOTPRINT
SOLDERMASK DEFINED***



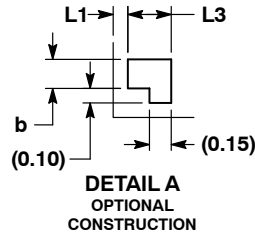
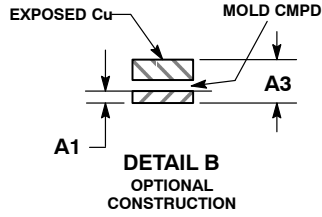
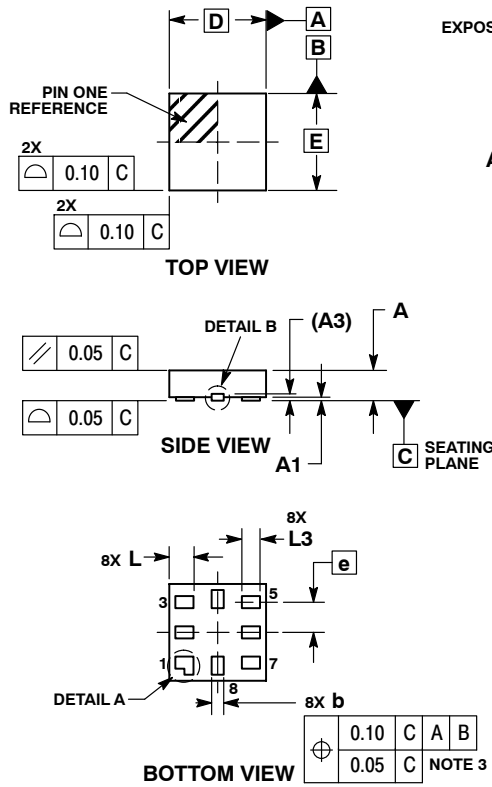
DIMENSIONS: MILLIMETERS

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7WBD383

PACKAGE DIMENSIONS

UQFN8, 1.6x1.6, 0.5P
CASE 523AN-01
ISSUE O

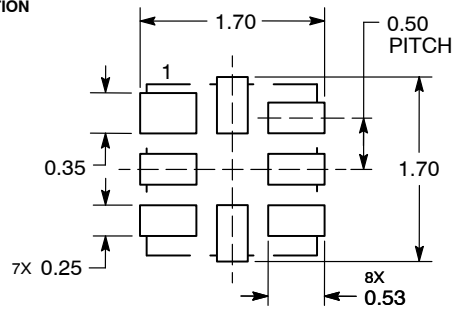


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2. CONTROLLING DIMENSION: MILLIMETERS.
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MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.60
A1	0.00	0.05
A3	0.13	REF
b	0.15	0.25
D	1.60	BSC
E	1.60	BSC
e	0.50	BSC
L	0.35	0.45
L1	---	0.15
L3	0.25	0.35

SOLDERING FOOTPRINT*



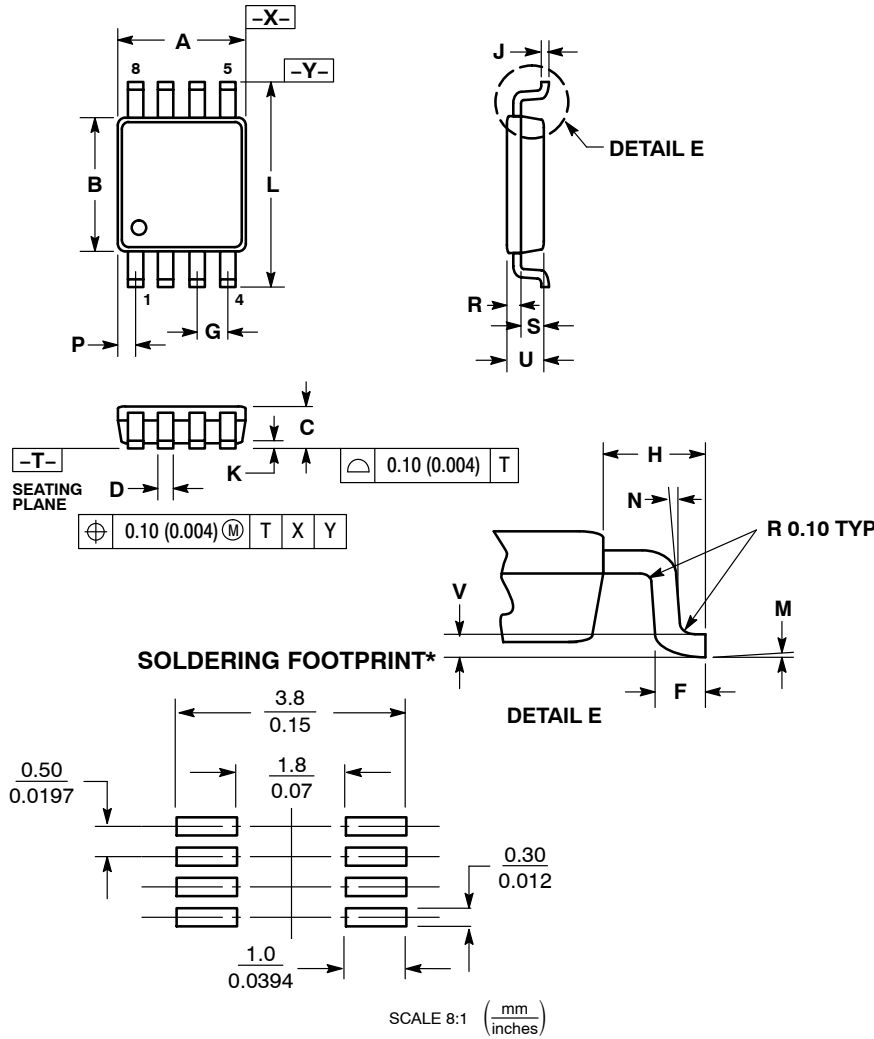
DIMENSIONS: MILLIMETERS

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7WBD383

PACKAGE DIMENSIONS

US8
CASE 493-02
ISSUE B



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH, PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION. INTER-LEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.140 (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076-0.0203 MM. (300-800 μ).
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508 (0.0020").

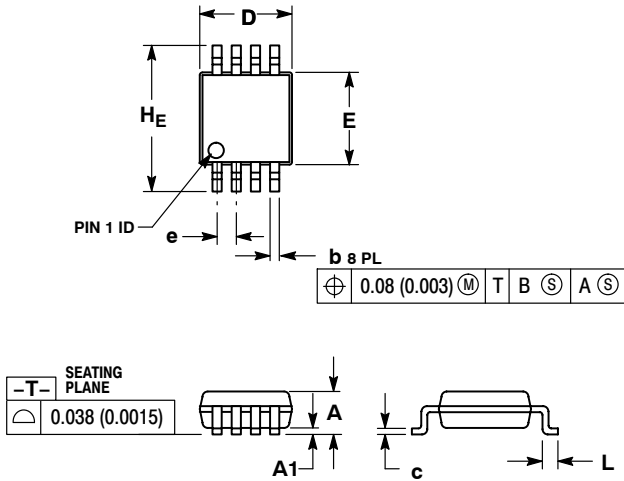
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.90	2.10	0.075	0.083
B	2.20	2.40	0.087	0.094
C	0.60	0.90	0.024	0.035
D	0.17	0.25	0.007	0.010
F	0.20	0.35	0.008	0.014
G	0.50 BSC		0.020 BSC	
H	0.40 REF		0.016 REF	
J	0.10	0.18	0.004	0.007
K	0.00	0.10	0.000	0.004
L	3.00	3.20	0.118	0.126
M	0°	6°	0°	6°
N	5°	10°	5°	10°
P	0.23	0.34	0.010	0.013
R	0.23	0.33	0.009	0.013
S	0.37	0.47	0.015	0.019
U	0.60	0.80	0.024	0.031
V	0.12 BSC		0.005 BSC	

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

7WBD383

PACKAGE DIMENSIONS

Micro8™
CASE 846A-02
ISSUE H

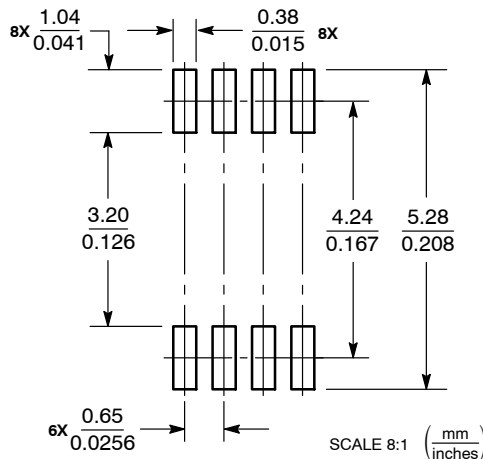


NOTES:

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, PROTRUSIONS 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. 846A-01 OBSOLETE, NEW STANDARD 846A-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	--	--	1.10	--	--	0.043
A1	0.05	0.08	0.15	0.002	0.003	0.006
b	0.25	0.33	0.40	0.010	0.013	0.016
c	0.13	0.18	0.23	0.005	0.007	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
E	2.90	3.00	3.10	0.114	0.118	0.122
e	0.65 BSC			0.026 BSC		
L	0.40	0.55	0.70	0.016	0.021	0.028
HE	4.75	4.90	5.05	0.187	0.193	0.199

SOLDERING FOOTPRINT*



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

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