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Translating Bus Exchange Switch

7WBD383

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

ON Semiconductor®

Features

- High Speed: t_{PD} = 0.25 ns (Max) @ V_{CC} = 4.5 V
- 3 Ω 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

MARKING DIAGRAMS

	UDFN8 MU SUFFIX CASE 517AJ	ALM ▪
	UDFN8 1.95 x 1.0 CASE 517CA	X M
	Micro8 DM SUFFIX CASE 846A	D383 AYW▪
	UQFN8 MU SUFFIX CASE 523AN	AJ M*▪
	US8 US SUFFIX CASE 493	AG ALYW
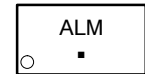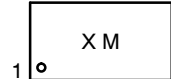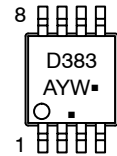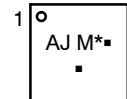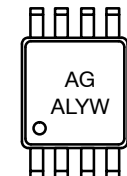
Commercial

AL, X, D383, AJ, AG	= Specific Device Code
M	= Date Code
A	= Assembly Location
L	= Lot Code
Y	= Year Code
W	= Week Code
▪	= Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

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

January, 2021 − Rev. 4

Publication Order Number:
7WBD383/D
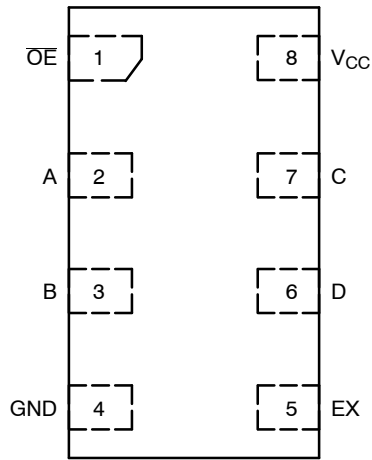
7WBD383

Figure 1. UDFN8
(Top Thru−View)
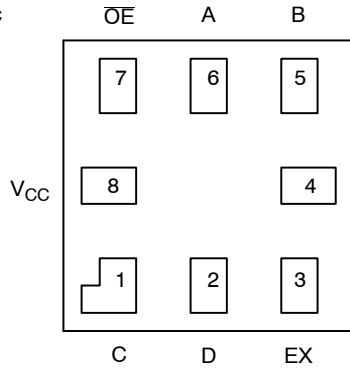
Figure 2. UQFN8
(Top Thru−View)
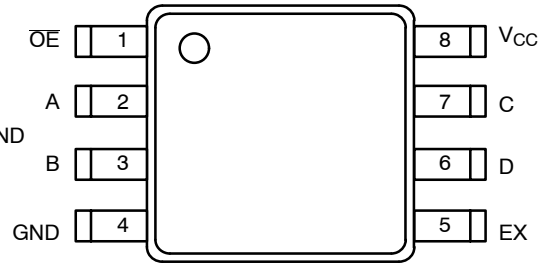
Figure 3. US8/Micro8
(Top View)
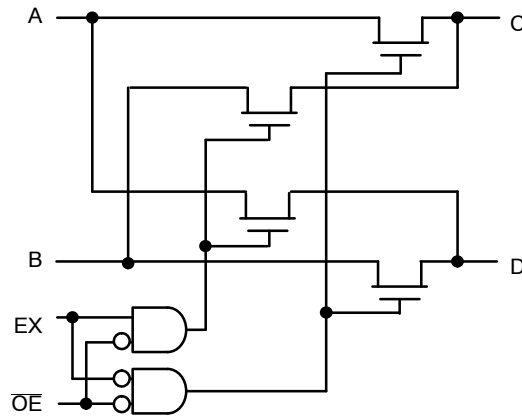
Figure 4. Logic Diagram

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) UDFN8 UQFN8 Micro8	251 111 208 392	°C/W
P$_D$	Power Dissipation in Still Air at 85°C	US8 UDFN8 UQFN8 Micro8	498 1127 601 319	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	Human Body Mode (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 N/A	V
I$_{LATCHUP}$	Latchup Performance Above V$_{CC}$ and Below GND at 125 °C (Note 5)		±200	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. 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 0	5 DC	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	Conditions	V_{CC} (V)	$T_A = 25°C$ Min	Typ	Max	$T_A = -55°C$ to $+125°C$ Min	Max	Unit
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	$0 \leq V_{IN} \leq 5.5$ 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 $\overline{OE} = $ GND $\overline{OE} = V_{CC}$	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	

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	Test Condition	V_{CC} (V)	$T_A = 25$ °C Min	Typ	Max	$T_A = -55°C$ to $+125°C$ Min	Max	Unit
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

TYPICAL DC CHARACTERISTICS
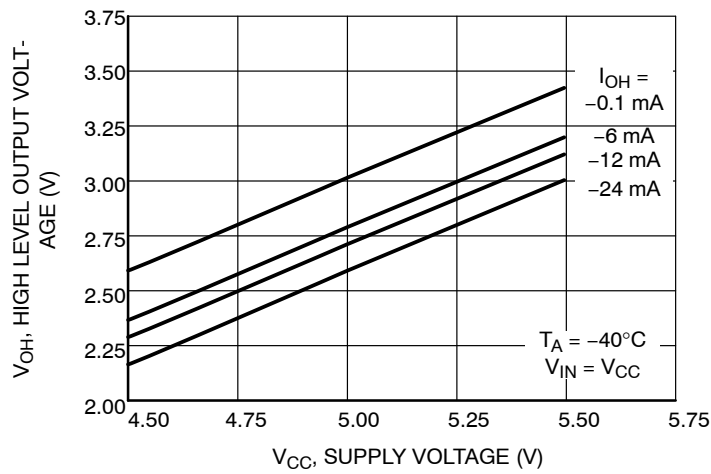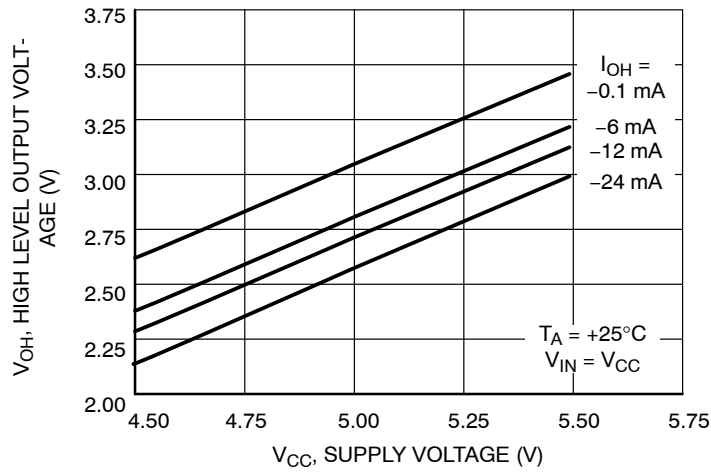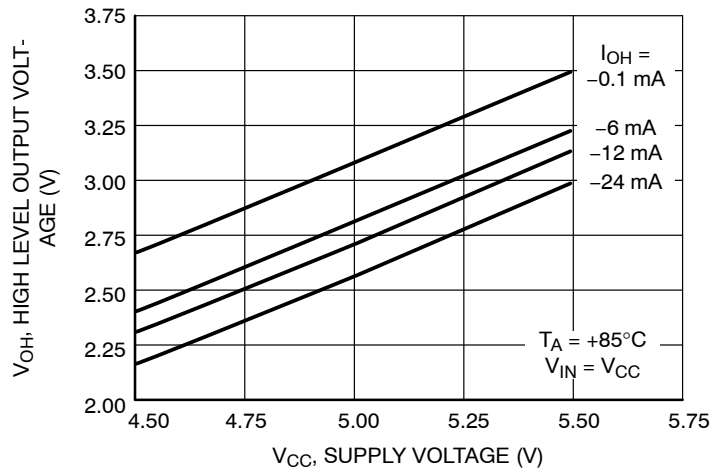
Figure 5. Output Voltage High vs Supply Voltage

AC LOADING AND WAVEFORMS

From Output Under Test

500 Ω   S1   ○ 7 V

○ Open

○ GND

C_L = 50 pF*

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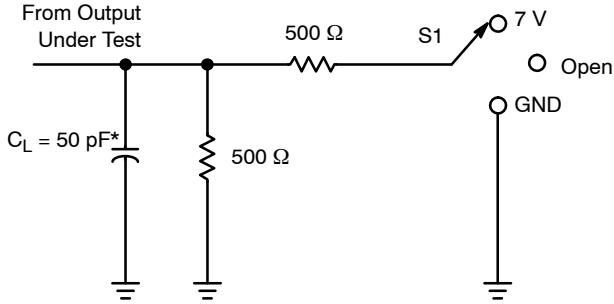
Test	S1
t_{PD}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

*C_L includes probes and jig capacitance.
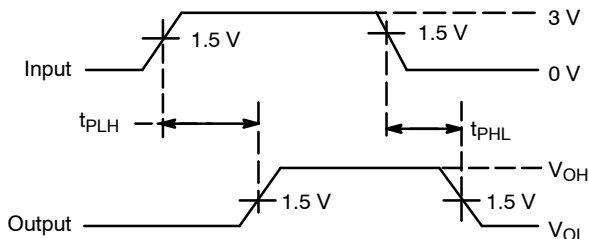
Voltage Waveforms
Propagation Delay Times

Input — 1.5 V — 1.5 V — 3 V / 0 V

t_{PLH} t_{PHL}

Output — 1.5 V — 1.5 V — V_{OH} / V_{OL}

Voltage Waveforms
Enable and Disable Times

Output Control — 1.5 V — 1.5 V — 3 V / 0 V

t_{PZL} t_{PLZ}

Output Waveform 1 S1 at 7 V (Note 6) — 1.5 V — 3.5 V — V_{OL} + 0.3 V — V_{OL}

t_{PZH} t_{PHZ}

Output Waveform 2 S1 at Open (Note 6) — 1.5 V — V_{OH} — V_{OH} − 0.3 V — 0 V

6. 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
7. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
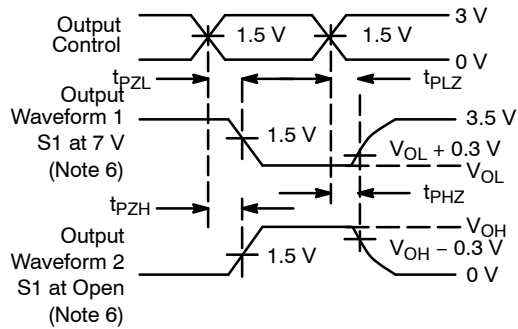8. The outputs are measured one at a time, with one transition per measurement.
9. t_{PLZ} and t_{PHZ} are the same as t_{DIS}.
10. t_{PZL} and t_{PZH} are the same as t_{EN}.
11. t_{PHL} and t_{PLH} are the same as t_{PD}.

Figure 6. t_{PD}, t_{EN}, t_{DIS} Loading and Waveforms
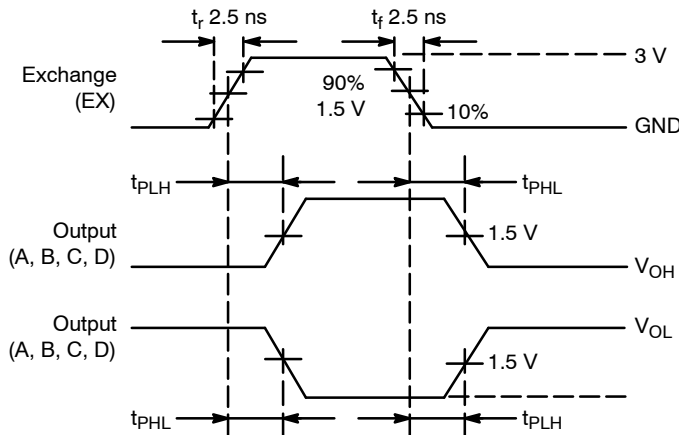
t_r 2.5 ns t_f 2.5 ns

Exchange (EX) — 90% 1.5 V — 10% — 3 V / GND

t_{PLH} t_{PHL}

Output (A, B, C, D) — 1.5 V — V_{OH}

Output (A, B, C, D) — 1.5 V — V_{OL}

t_{PHL} t_{PLH}

Figure 7. t_{PD-EX} Waveforms

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
7WBD383DMR2G	Micro8 (Pb−Free)	4000 / Tape & Reel
7WBD383DMUTCG	UDFN8, 1.95 x 1.0, 0.5 mm Pitch (Pb−Free)	3000 / 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.

7WBD383

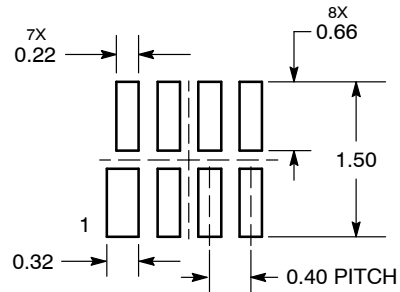## PACKAGE DIMENSIONS

UDFN8 1.8 x 1.2, 0.4P
CASE 517AJ
ISSUE O
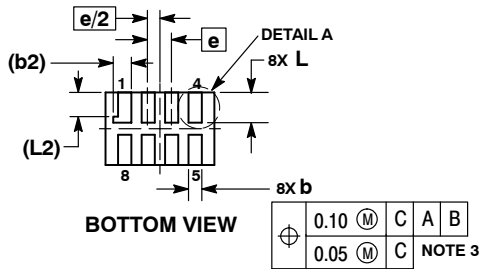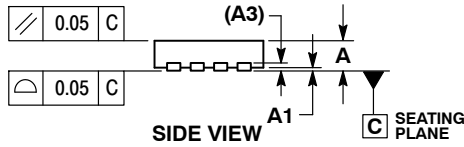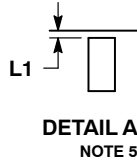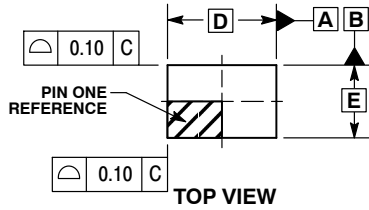
TOP VIEW

DETAIL A
NOTE 5

SIDE VIEW

SEATING PLANE

BOTTOM VIEW

	0.10 Ⓜ	C	A	B
⊕	0.05 Ⓜ	C		NOTE 3

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.

DIM	MILLIMETERS	
	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
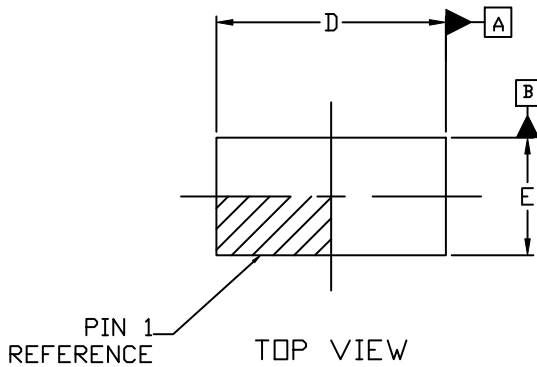
7X 0.22

8X 0.66

1.50

1

0.32

0.40 PITCH

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.

PACKAGE DIMENSIONS

UDFN8 1.95x1.0, 0.5P
CASE 517CA
ISSUE A

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO TO ALL THE TERMINALS.
5. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.
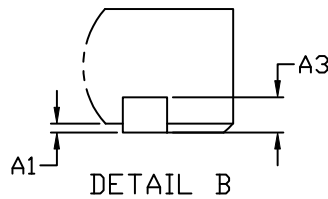
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.45	0.50	0.55
A1	0.00	---	0.05
A3	0.13 REF		
b	0.15	0.20	0.25
D	1.85	1.95	2.05
E	0.90	1.00	1.10
e	0.50 BSC		
L	0.25	0.30	0.35
L1	0.30	0.35	0.40

TOP VIEW

PIN 1 REFERENCE

DETAIL B

DETAIL B

SIDE VIEW

SEATING PLANE

NOTE 4

BOTTOM VIEW   NOTE 3

7X L

8X b

RECOMMENDED MOUNTING FOOTPRINT✱

PACKAGE OUTLINE

0.50 PITCH

7X 0.49

1.24

0.54

8X 0.30

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

PACKAGE DIMENSIONS

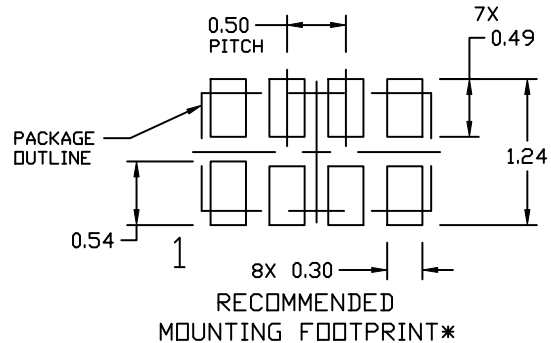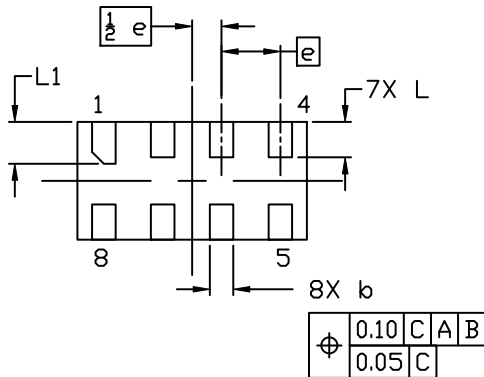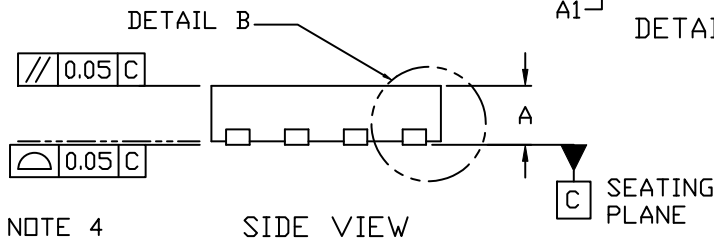**UQFN8, 1.6x1.6, 0.5P**
CASE 523AN
ISSUE O
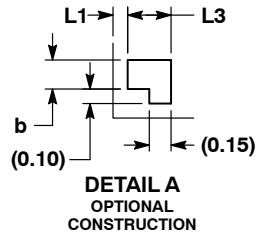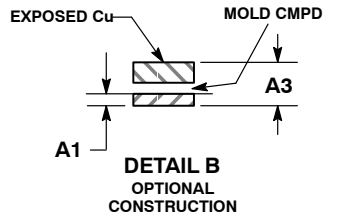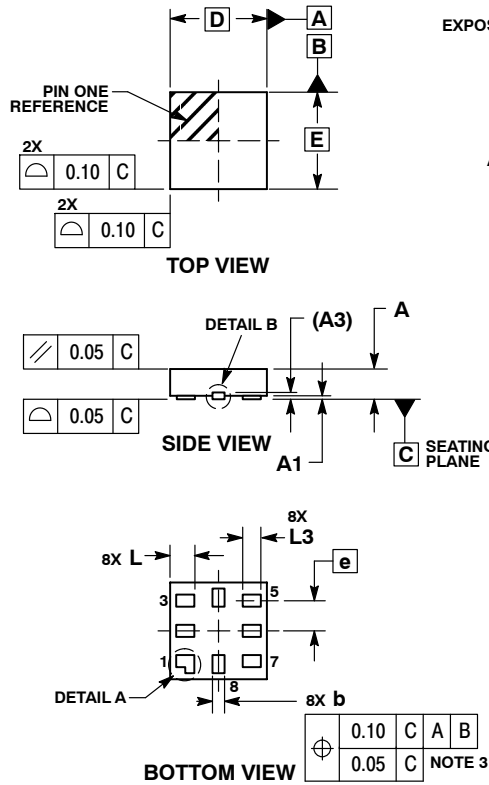
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

TOP VIEW

DETAIL B
OPTIONAL CONSTRUCTION

SIDE VIEW

DETAIL A
OPTIONAL CONSTRUCTION

DIM	MILLIMETERS	
	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

BOTTOM VIEW

SOLDERING FOOTPRINT*

1.70
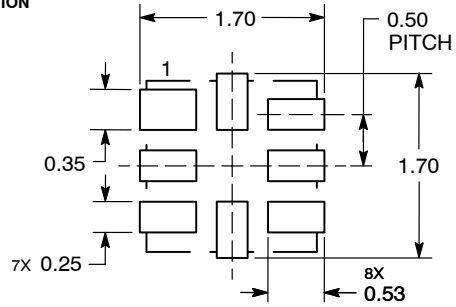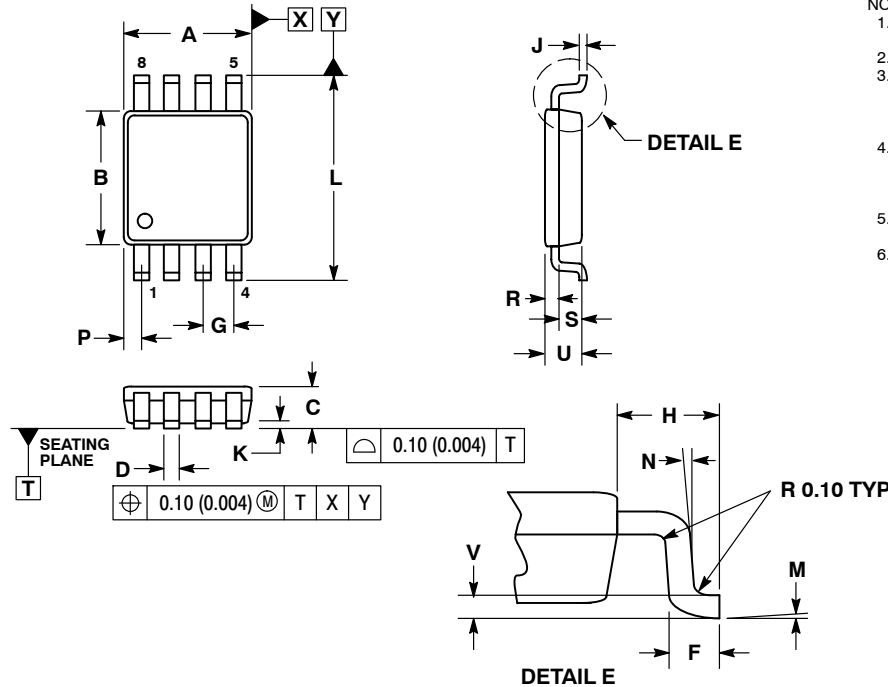0.50 PITCH
0.35
1.70
7X 0.25
8X 0.53

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.
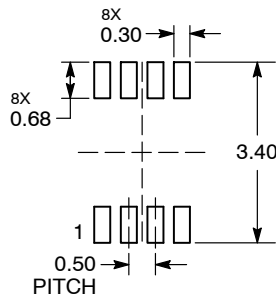
PACKAGE DIMENSIONS

US8
CASE 493
ISSUE D

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 0.14MM (0.0055") PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.14MM (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076–0.0203MM (0.003–0.008").
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508MM (0.0002").

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	0.128
M	0 °	6 °	0 °	6 °
N	0 °	10 °	0 °	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	

DETAIL E

R 0.10 TYP

RECOMMENDED SOLDERING FOOTPRINT*

8X
0.30

8X
0.68

3.40

0.50
PITCH

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.