

74FST3384

10-Bit Low Power Bus Switch

The ON Semiconductor 74FST3384 is a 10-bit low power bus switch. The device is CMOS TTL compatible when operating between 4.0 and 5.5 Volts. The device exhibits extremely low R_{ON} and adds nearly zero propagation delay. The device adds no noise or ground bounce to the system.

Features

- $R_{ON} < 4 \Omega$ Typical
- Less Than 0.25 ns–Max Delay Through Switch
- Nearly Zero Standby Current
- No Circuit Bounce
- Control Inputs are TTL/CMOS Compatible
- Pin-For-Pin Compatible With QS3384, FST3384, CBT3384
- All Popular Packages: SOIC–24, TSSOP–24, QSOP–24
- All Devices in Package TSSOP are Inherently Pb–Free*

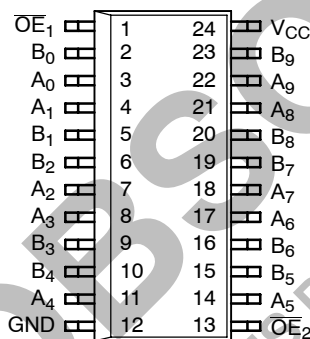


Figure 1. 24-Lead Pinout

TRUTH TABLE

$\overline{OE}_1$	$\overline{OE}_2$	B_0-B_4	B_5-B_9	Function
L	L	A_0-A_4	A_5-A_9	Connect
L	H	A_0-A_4	HIGH-Z State	Connect
H	L	HIGH-Z State	A_5-A_9	Connect
H	H	HIGH-Z State	HIGH-Z State	Disconnect

NOTE: H = HIGH Voltage Level, L = LOW Voltage Level



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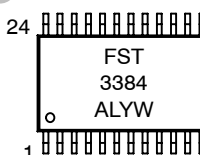
MARKING DIAGRAMS



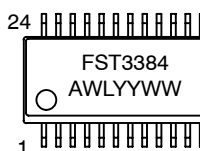
SOIC–24
DW SUFFIX
CASE 751E



TSSOP–24
DT SUFFIX
CASE 948H



QSOP–24
QS SUFFIX
CASE 492B



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

PIN NAMES

Pin	Description
$\overline{OE}_1, \overline{OE}_2$	Bus Switch Enable
A_0-A_9	Bus A
B_0-B_9	Bus B

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

74FST3384

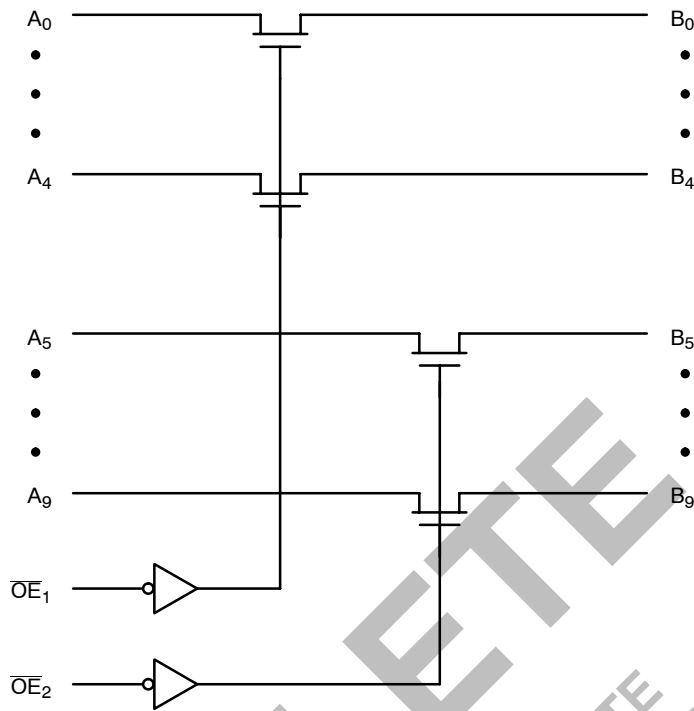


Figure 2. Logic Diagram

ORDERING INFORMATION

Device Order Number	Package	Shipping [†]
74FST3384DW	SOIC-24	48 Units / Rail
74FST3384DWR2	SOIC-24	2500 Units / Tape & Reel
74FST3384DT	TSSOP-24* (Pb-Free)	96 Units / Rail
74FST3384DTR2	TSSOP-24* (Pb-Free)	2500 Units / Tape & Reel
74FST3384QS	QSOP-24	96 Units / Rail
74FST3384QSR	QSOP-24	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.

*This package is inherently Pb-Free.

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	- 0.5 to + 7.0	V
V_I	DC Input Voltage	- 0.5 to + 7.0	V
V_O	DC Output Voltage	- 0.5 to + 7.0	V
I_{IK}	DC Input Diode Current $V_I < GND$	- 50	mA
I_{OK}	DC Output Diode Current $V_O < GND$	- 50	mA
I_O	DC Output Sink Current	128	mA
I_{CC}	DC Supply Current per Supply Pin	± 100	mA
I_{GND}	DC Ground Current per Ground Pin	± 100	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 SOIC TSSOP QSOP	125 170 200	°C/W
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 Model (Note 1) Machine Model (Note 2) Charged Device Model (Note 3)	> 2000 > 200 N/A	V
$I_{Latchup}$	Latchup Performance Above V_{CC} and Below GND at 85°C (Note 4)	± 500	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. Tested to EIA/JESD22-A114-A.
2. Tested to EIA/JESD22-A115-A.
3. Tested to JESD22-C101-A.
4. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage Operating, Data Retention Only	4.0	5.5	V
V_I	Input Voltage (Note 5)	0	5.5	V
V_O	Output Voltage (HIGH or LOW State)	0	5.5	V
T_A	Operating Free-Air Temperature	- 40	+ 85	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate Switch I/O Switch Control Input $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	0	DC 5	ns/V

5. Unused control inputs may not be left open. All control inputs must be tied to a high or low logic input voltage level.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C			Unit
				Min	Typ*	Max	
V _{IK}	Clamp Diode Resistance	I _{IN} = -18mA	4.5			-1.2	V
V _{IH}	High-Level Input Voltage		4.0 to 5.5	2.0			V
V _{IL}	Low-Level Input Voltage		4.0 to 5.5			0.8	V
I _I	Input Leakage Current	0 ≤ V _{IN} ≤ 5.5 V	5.5			±1.0	μA
I _{OZ}	OFF-STATE Leakage Current	0 ≤ A, B ≤ V _{CC}	5.5			±1.0	μA
R _{ON}	Switch On Resistance (Note 6)	V _{IN} = 0 V, I _{IN} = 64 mA	4.5		4	7	Ω
		V _{IN} = 0 V, I _{IN} = 30 mA	4.5		4	7	
		V _{IN} = 2.4 V, I _{IN} = 15 mA	4.5		8	15	
		V _{IN} = 2.4 V, I _{IN} = 15 mA	4.0		11	20	
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND, I _{OUT} = 0	5.5			3	μA
ΔI _{CC}	Increase In I _{CC} per Input	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5			2.5	mA

*Typical values are at V_{CC} = 5.0 V and T_A = 25°C.

6. Measured by the voltage drop between A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the two (A or B) pins.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	$T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $C_L = 50\text{ pF}$, $R_U = R_D = 500\ \Omega$				Unit
			$V_{CC} = 4.5\text{--}5.5\text{ V}$		$V_{CC} = 4.0\text{ V}$		
			Min	Max	Min	Max	
t_{PHL} , t_{PLH}	Prop Delay Bus to Bus (Note 7)	$V_I = \text{OPEN}$		0.25		0.25	ns
t_{PZH} , t_{PZL}	Output Enable Time, I_{OE} to Bus A, B	$V_I = \text{OPEN}$ for t_{PZH}	1.0	5.7		6.2	ns
t_{PHZ} , t_{PLZ}	Output Disable Time, I_{OE} to Bus A, B	$V_I = \text{OPEN}$ for t_{PHZ}	1.0	5.2		5.5	ns

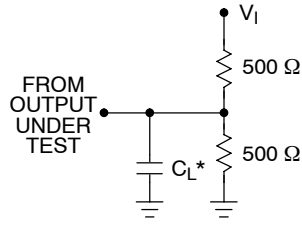
7. This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

CAPACITANCE (Note 8)

Symbol	Parameter	Conditions	Typ	Max	Unit
C _{IN}	Control Pin Input Capacitance	V _{CC} = 5.0 V	6		pF
C _{I/O}	Port Input/Output Capacitance	V _{CC} , $\overline{\text{OE}}$ = 5.0 V	13		pF

8. T_A = +25°C, f = 1 MHz, Capacitance is characterized but not tested.

AC Loading and Waveforms



NOTES:

1. Input driven by $50\ \Omega$ source terminated in $50\ \Omega$.
 2. C_L includes load and stray capacitance.
- * $C_L = 50\ \text{pF}$

Figure 3. AC Test Circuit

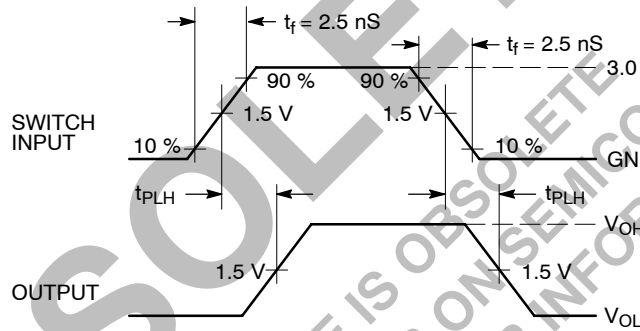


Figure 4. Propagation Delays

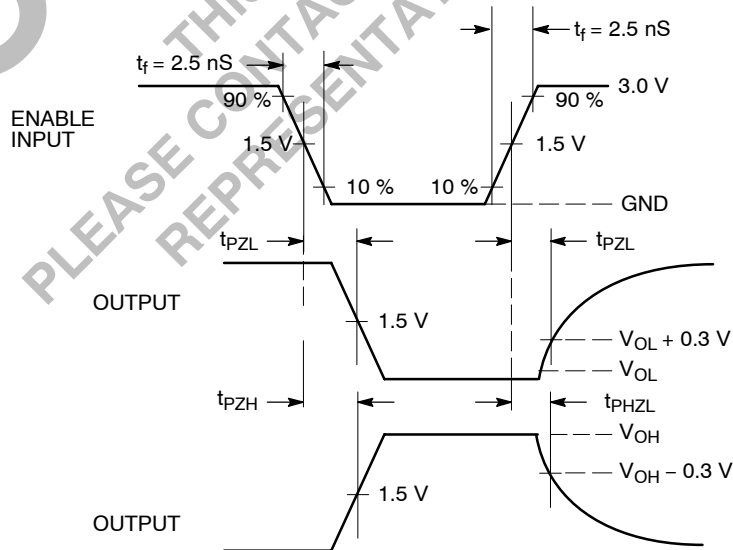
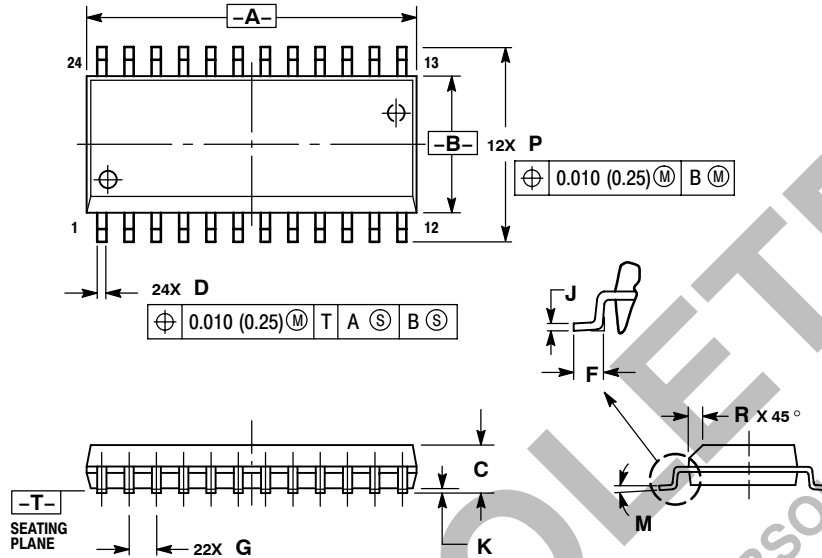


Figure 5. Enable/Disable Delays

74FST3384

PACKAGE DIMENSIONS

SOIC-24
D SUFFIX
CASE 751E-04
ISSUE E



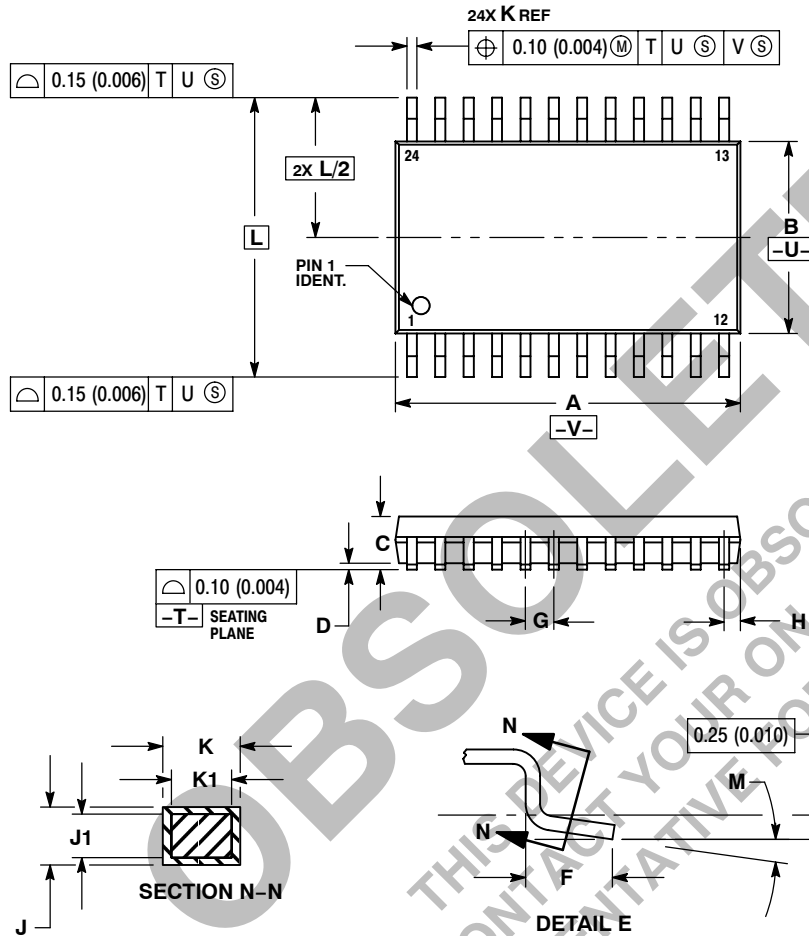
NOTES:

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 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	15.25	15.54	0.601	0.612
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.41	0.90	0.016	0.035
G	1.27 BSC		0.050 BSC	
J	0.23	0.32	0.009	0.013
K	0.13	0.29	0.005	0.011
M	0°	8°	0°	8°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

PACKAGE DIMENSIONS

TSSOP-24
DT SUFFIX
CASE 948H-01
ISSUE A



NOTES:

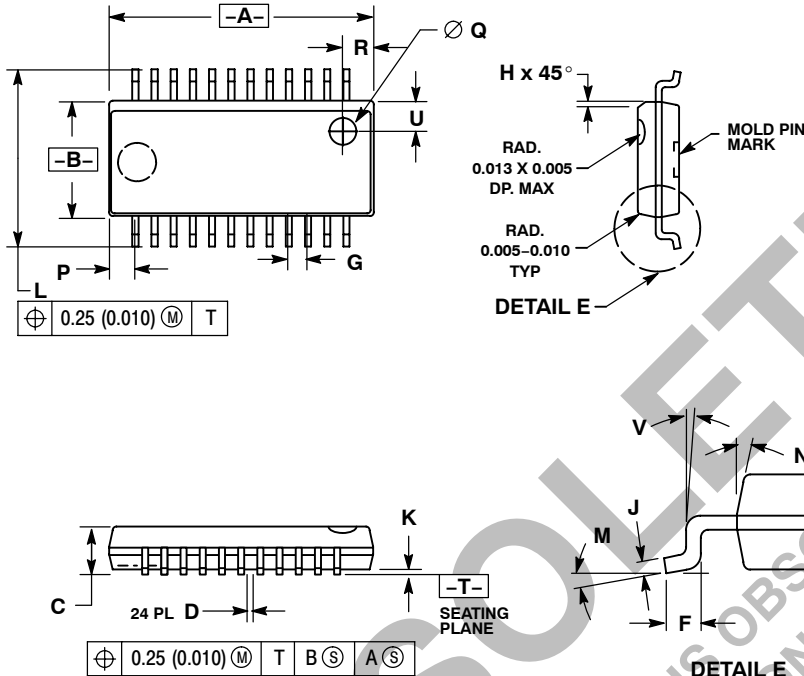
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD 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-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	7.70	7.90	0.303	0.311
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	0.27	0.37	0.011	0.015
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°



PACKAGE DIMENSIONS

QSOP-24
QS SUFFIX
CASE 492B-01
ISSUE O



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. THE BOTTOM PACKAGE SHALL BE BIGGER THAN THE TOP PACKAGE BY 4 MILS (NOTE: LEAD SIDE ONLY). BOTTOM PACKAGE DIMENSION SHALL FOLLOW THE DIMENSION STATED IN THIS DRAWING.
4. PLASTIC DIMENSIONS DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 6 MILS PER SIDE.
5. BOTTOM EJECTOR PIN WILL INCLUDE THE COUNTRY OF ORIGIN (COO) AND MOLD CAVITY I.D.

DIM	INCHES		MILLIMETERS	
	MAX	MIN	MAX	MIN
A	0.337	0.344	8.56	8.74
B	0.150	0.157	3.81	3.99
C	0.061	0.068	1.55	1.73
D	0.008	0.012	0.20	0.31
F	0.016	0.035	0.41	0.89
G	0.025	BSC	0.64	BSC
H	0.008	0.018	0.20	0.46
J	0.0098	0.0075	0.249	0.191
K	0.004	0.010	0.10	0.25
L	0.290	0.244	5.84	6.20
M	0°	8°	0°	8°
N	0°	7°	0°	7°
P	0.027	0.037	0.69	0.94
Q	0.035	DIA	0.89	DIA
R	0.035	0.045	0.89	1.14
U	0.035	0.045	0.89	1.14
V	0°	8°	0°	8°

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