

FST3125

4-Bit Bus Switch

The ON Semiconductor FST3125 is a quad, high performance switch. The device is CMOS TTL compatible when operating between 4 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.

The device consists of four independent 1-bit switches with separate Output/Enable (\overline{OE}) pins. Port A is connected to Port B when \overline{OE} is low. If \overline{OE} is high, the switch is high Z.

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 QS3125, FST3125, CBT3125
- All Popular Packages: TSSOP–14, SOIC–14
- These are Pb–Free Devices

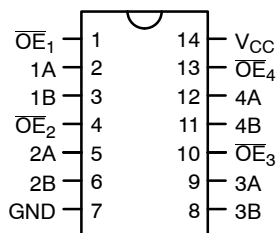


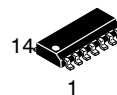
Figure 1. Pin Assignment for SOIC and TSSOP



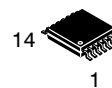
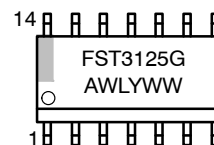
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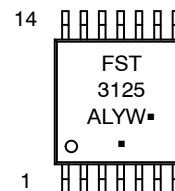
MARKING DIAGRAMS



SOIC–14
D SUFFIX
CASE 751A



TSSOP–14
DT SUFFIX
CASE 948G



A = Assembly Location
WL, L = Wafer Lot
Y = Year
WW, W = Work Week
G or ■ = Pb–Free Package
(Note: Microdot may be in either location)

PIN NAMES

Pin	Description
$\overline{OE}_1, \overline{OE}_2, \overline{OE}_3, \overline{OE}_4$	Bus Switch Enables
1A, 2A, 3A, 4A	Bus A
1B, 2B, 3B, 4B	Bus B
NC	Not Connected

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.

FST3125

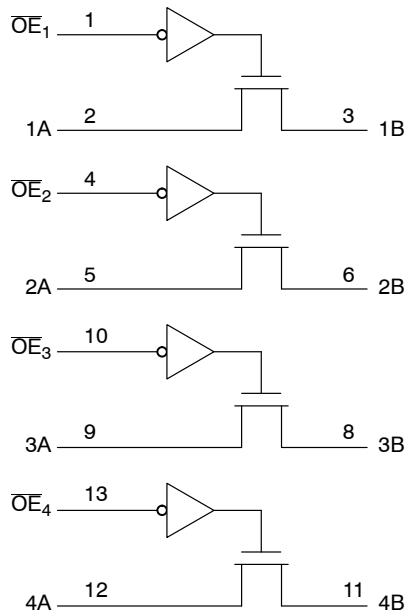


Figure 2. Logic Diagram

TRUTH TABLE

Inputs	Outputs
OE	A, B
L	A = B
H	Z

ORDERING INFORMATION

Device Order Number	Package	Shipping [†]
FST3125DR2G	SOIC-14 (Pb-Free)	2500 Units / Tape & Reel
FST3125DTR2G	TSSOP-14 (Pb-Free)	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.

FST3125

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	$^{\circ}C$
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	$^{\circ}C$
T_J	Junction Temperature Under Bias	+ 150	$^{\circ}C$
θ_{JA}	Thermal Resistance (Note 1)	SOIC 125 TSSOP 170	$^{\circ}C/W$
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 2) Machine Model (Note 3) Charged Device Model	> 4000 > 400 > 2000	V
$I_{Latchup}$	Latchup Performance Above V_{CC} and Below GND at 85 $^{\circ}C$ (Note 4)	± 100	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 with no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-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)	0	5.5	V
V_O	Output Voltage (HIGH or LOW State)	0	5.5	V
T_A	Operating Free-Air Temperature	-55	+125	$^{\circ}C$
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate Switch Control Input Switch I/O	0 0	5 DC	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.

FST3125

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -55°C to +125°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.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Figures	Limits				Unit
				T _A = -55°C to +125°C				
				V _{CC} = 4.5 to 5.5 V		V _{CC} = 4.0 V		
				Min	Max	Min	Max	
t _{PHL} , t _{PLH}	Prop Delay Bus to Bus (Note 7)	V _I = OPEN	3 and 4		0.25		0.25	ns
t _{PZH} , t _{PZL}	Output Enable Time	V _I = 7 V for t _{PZL} V _I = OPEN for t _{PZH}	3 and 5	1.0	5.0		5.5	ns
t _{PHZ} , t _{PLZ}	Output Disable Time	V _I = 7 V for t _{PLZ} V _I = OPEN for t _{PHZ}	3 and 5	1.5	5.3		5.6	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).

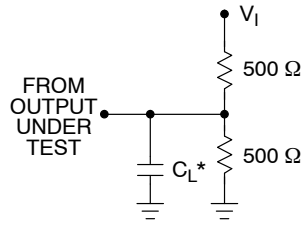
CAPACITANCE (Note 8)

Symbol	Parameter	Conditions	Typ	Max	Unit
C _{IN}	Control Pin Input Capacitance	V _{CC} = 5.0 V	3		pF
C _{I/O}	Input/Output Capacitance	V _{CC} , \overline{OE} = 5.0 V	5		pF

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

FST3125

AC Loading and Waveforms



NOTES:

1. Input driven by 50 Ω source terminated in 50 Ω.
2. C_L includes load and stray capacitance.
- *C_L = 50 pF

Figure 3. AC Test Circuit

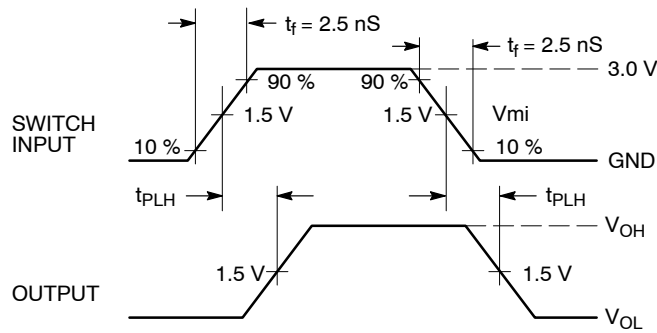


Figure 4. Propagation Delays

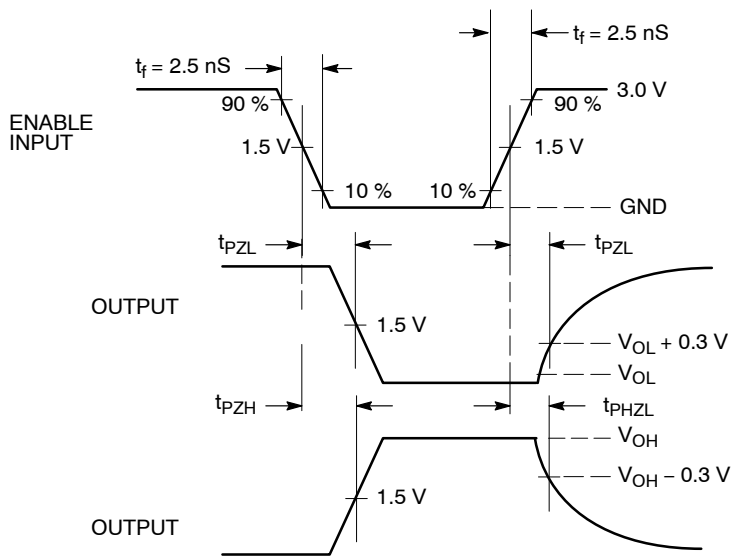
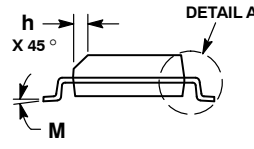
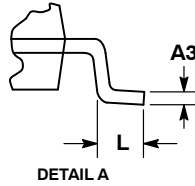
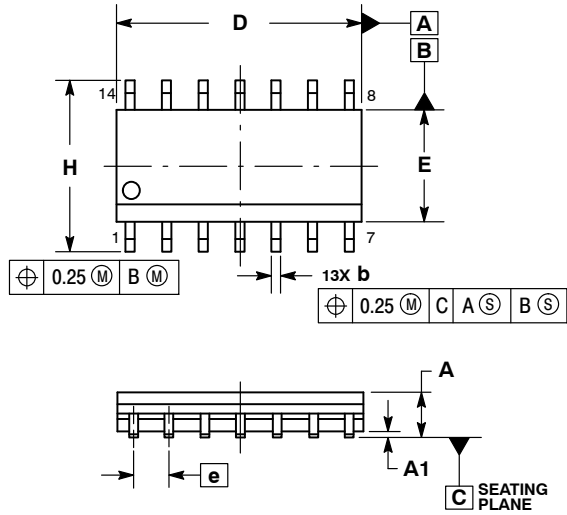


Figure 5. Enable/Disable Delays

FST3125

PACKAGE DIMENSIONS

SOIC-14
D SUFFIX
CASE 751A-03
ISSUE K

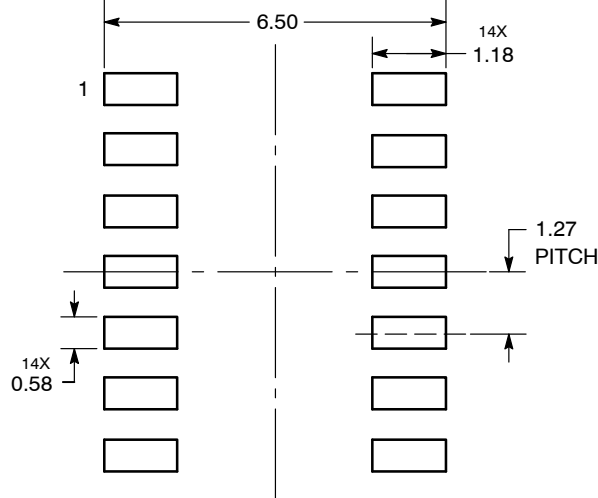


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.054	0.068
A1	0.10	0.25	0.004	0.010
A3	0.19	0.25	0.008	0.010
b	0.35	0.49	0.014	0.019
D	8.55	8.75	0.337	0.344
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.019
L	0.40	1.25	0.016	0.049
M	0°	7°	0°	7°

SOLDERING FOOTPRINT*



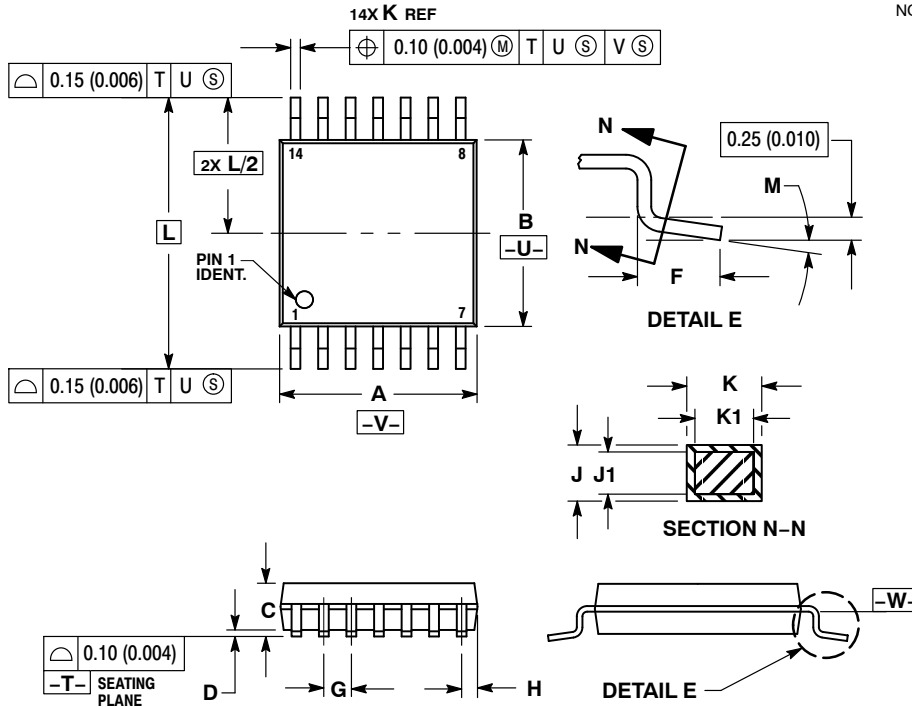
DIMENSIONS: MILLIMETERS

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

FST3125

PACKAGE DIMENSIONS

TSSOP-14
DT SUFFIX
CASE 948G
ISSUE B

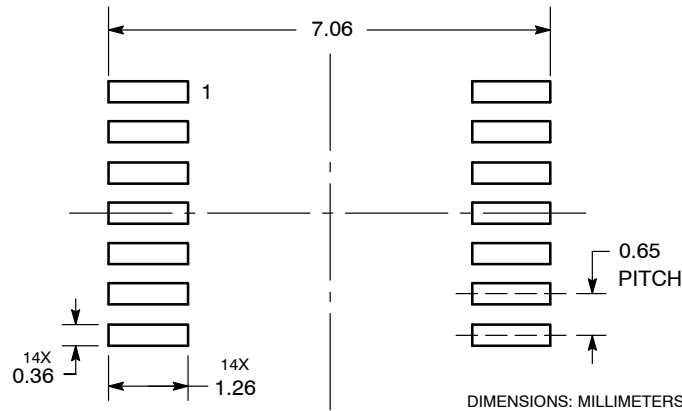


NOTES:

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	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	0.50	0.60	0.020	0.024
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°

SOLDERING FOOTPRINT



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