FEATURES:

- Bus switches provide zero delay paths
- Low switch on-resistance:
  - FST3xxx – 5Ω
  - FST32xxx – 28Ω
- TTL-compatible input and output levels
- ESD > 2000V per MIL-STD-883, Method 3015;
  > 200V using machine model (C = 200pF, R = 0)
- Available in QSOP, SOIC and PDIP
- Pin-compatible with FCT245/FCT245T

DESCRIPTION:

The FST3245/32245 belong to IDT’s family of Bus switches. Bus switch devices perform the function of connecting or isolating two ports without providing any inherent current sink or source capability. Thus they generate little or no noise of their own while providing a low resistance path for an external driver. These devices connect input and output ports through an n-channel FET. When the gate-to-source junction of this FET is adequately forward-biased the device conducts or the resistance between input and output ports is small. Without adequate bias on the gate-to-source junction of the FET, the FET is turned off.

The low on-resistance and simplicity of the connection between input and output ports reduces the delay in this path to close to zero.

The FST32245 integrates terminating resistors in the device, thus eliminating the need for external 25Ω series resistors.

The FST3245 and FST32245 are octal TTL-compatible bus switches. The OE pin provides output enable control for all 8 bits. The direction control pin (DIR) of the FCT245/FCT245T is replaced with a "No connect" (NC) in the FST3245/32245. Bus switch devices provide an inherently bidirectional connection between ports, thus eliminating the purpose of the direction control pin.

FUNCTIONAL BLOCK DIAGRAM

PIN CONFIGURATION

<table>
<thead>
<tr>
<th>Pin Names</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OE</td>
<td>Output Enable Input (Active LOW)</td>
</tr>
<tr>
<td>NC</td>
<td>No connect</td>
</tr>
<tr>
<td>A0-A7</td>
<td>A Port Bits</td>
</tr>
<tr>
<td>B0-B7</td>
<td>B Port Bits</td>
</tr>
</tbody>
</table>

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COMMERCIAL TEMPERATURE RANGES

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**ABSOLUTE MAXIMUM RATINGS**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Rating Description</th>
<th>Commercial</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTERM</td>
<td>Terminal Voltage with Respect to GND</td>
<td>-0.5 to +7.0</td>
<td>V</td>
</tr>
<tr>
<td>TA</td>
<td>Operating Temperature</td>
<td>0 to +70</td>
<td>°C</td>
</tr>
<tr>
<td>TBIA</td>
<td>Temperature Under Bias</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>TSTG</td>
<td>Storage Temperature</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>PT</td>
<td>Power Dissipation</td>
<td>0.5</td>
<td>W</td>
</tr>
<tr>
<td>IOUT</td>
<td>DC Output Current</td>
<td>-60 to +120</td>
<td>mA</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
2. Input, I/O and Vcc terminals.

**FUNCTION TABLE**

<table>
<thead>
<tr>
<th>OE</th>
<th>B0-7</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>X</td>
<td>Disconnect</td>
</tr>
<tr>
<td>L</td>
<td>A0-7</td>
<td>Connect</td>
</tr>
</tbody>
</table>

**CAPACITANCE** (TA = +25°C, f = 1.0MHz)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIN</td>
<td>Input Capacitance</td>
<td>VIN = 0V</td>
<td>4</td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>COUT</td>
<td>Output Capacitance</td>
<td>VOUT = 0V</td>
<td>5</td>
<td></td>
<td>pF</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Capacitance is characterized but not tested.

**DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE**

Following Conditions Apply Unless Otherwise Specified:
Commercial: TA = 0°C to +70°C, Vcc = 5.0V ±5%

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VH</td>
<td>Input HIGH Voltage</td>
<td>Guaranteed Logic HIGH for Control Inputs</td>
<td>2.0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>VL</td>
<td>Input LOW Voltage</td>
<td>Guaranteed Logic LOW for Control Inputs</td>
<td>—</td>
<td></td>
<td>0.8</td>
<td>µA</td>
</tr>
<tr>
<td>IHI</td>
<td>Input HIGH Current</td>
<td>VCC = Max.</td>
<td></td>
<td>—</td>
<td>±1</td>
<td>µA</td>
</tr>
<tr>
<td>IIL</td>
<td>Input LOW Voltage</td>
<td>VCC = Min.</td>
<td></td>
<td>—</td>
<td>±1</td>
<td>µA</td>
</tr>
<tr>
<td>IOZH</td>
<td>High Impedance Output Current</td>
<td>VCC = Max.</td>
<td></td>
<td>—</td>
<td>±1</td>
<td>µA</td>
</tr>
<tr>
<td>IOZL</td>
<td>(3-State Output pins)</td>
<td>VCC = Min.</td>
<td></td>
<td>—</td>
<td>1</td>
<td>Ω</td>
</tr>
<tr>
<td>IOS</td>
<td>Short Circuit Current</td>
<td>VCC = Max., VO = GND(3)</td>
<td>—</td>
<td>300</td>
<td>—</td>
<td>mA</td>
</tr>
<tr>
<td>VIK</td>
<td>Clamp Diode Voltage</td>
<td>VCC = Min., IIN = –18 mA</td>
<td>—</td>
<td>0.7</td>
<td>1.2</td>
<td>V</td>
</tr>
<tr>
<td>RON</td>
<td>Switch On Resistance(4)</td>
<td>VCC = Min., VIN = 0.0 V</td>
<td>3xxx</td>
<td>5</td>
<td>7</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ION = 30mA</td>
<td>32xx</td>
<td>17</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VCC = Min., VIN = 2.4 V</td>
<td>3xxx</td>
<td></td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ION = 15mA</td>
<td>32xx</td>
<td>20</td>
<td>35</td>
<td>48</td>
</tr>
<tr>
<td>ICC</td>
<td>Quiescent Power Supply Current</td>
<td>VCC = Max., VI = GND or VCC</td>
<td>—</td>
<td>0.1</td>
<td>10</td>
<td>µA</td>
</tr>
</tbody>
</table>

**NOTES:**
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at VCC = 5.0V, +25°C ambient.
3. Not more than one output should be tested at one time. Duration of the test should not exceed one second.
4. Measured by voltage drop between ports at indicated current through the switch.
POWER SUPPLY CHARACTERISTICS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions(1)</th>
<th>Min.</th>
<th>Typ.(2)</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔIcc</td>
<td>Quiescent Power Supply Current</td>
<td>VCC = Max., VIN = 3.4V(3)</td>
<td>—</td>
<td>0.5</td>
<td>1.5</td>
<td>mA</td>
</tr>
<tr>
<td>ICCD</td>
<td>Dynamic Power Supply Current(4)</td>
<td>VCC = Max., Outputs Open Enable Pin Toggling 50% Duty Cycle</td>
<td>VIN = VCC</td>
<td>—</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Ic</td>
<td>Total Power Supply Current(6)</td>
<td>VCC = Max., Outputs Open Enable Pin Toggling (8 Switches Toggling) fi = 10MHz 50% Duty Cycle</td>
<td>VIN = 3.4</td>
<td>2.4</td>
<td>3.2</td>
<td>mA</td>
</tr>
</tbody>
</table>

NOTES:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at VCC = 5.0V, +25°C ambient.
3. Per TTL driven input (VIN = 3.4V). All other inputs at VCC or GND.
4. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
5. Values for these conditions are examples of the ICC formula. These limits are guaranteed but not tested.
6. ICC = Icc + ΔIcc DhNt + ICCD (fin)
   ΔIcc = Power Supply Current for a TTL High Input (VIN = 3.4V)
   Dh = Duty Cycle for TTL Inputs High
   Nt = Number of TTL Inputs at Dh
   ICCD = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)
   fin = Input Frequency
   N = Number of Switches Toggling at fin
   All currents are in milliamps and all frequencies are in megahertz.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Commercial: TA = 0°C to +70°C, VCC = 5.0V ±5%

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Condition(1)</th>
<th>Min.(2)</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>tPLH</td>
<td>Data Propagation Delay</td>
<td>CL = 50pF RL = 500Ω</td>
<td>—</td>
<td>—</td>
<td>0.25</td>
<td>1.25</td>
</tr>
<tr>
<td>tPHL</td>
<td>Ai to Bi, Bi to Ai(3,4) (5,6)</td>
<td>—</td>
<td>1.5</td>
<td>—</td>
<td>6.5</td>
<td>7.5</td>
</tr>
<tr>
<td>tPHZ</td>
<td>Switch Turn off Delay</td>
<td>OE to Ai, Bi</td>
<td>1.5</td>
<td>—</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>tPZL</td>
<td>Switch Turn on Delay</td>
<td>OE to Ai, Bi(3)</td>
<td>—</td>
<td>1.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Charge Injection(5,6)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

NOTES:
1. See test circuit and waveforms.
2. Minimum limits guaranteed but not tested.
3. This parameter is guaranteed by design but not tested.
4. The bus switch contributes no propagation delay other than the RC delay of the on resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25 ns for 50 pF load. Since this time is constant and much smaller than the rise/fall times of typical driving signals, it adds very little propagation delay to the system. Propagation delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.
5. Measured at switch turn off, load = 50 pF in parallel with 10 MΩ scope probe, VIN = 0.0 volts.
6. Characterized parameter. Not 100% tested.
TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS

SWITCH POSITION

<table>
<thead>
<tr>
<th>Test</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Drain</td>
<td>Closed</td>
</tr>
<tr>
<td>Disable Low</td>
<td></td>
</tr>
<tr>
<td>Enable Low</td>
<td></td>
</tr>
<tr>
<td>All Other Tests</td>
<td>Open</td>
</tr>
</tbody>
</table>

DEFINITIONS:

- $C_L =$ Load capacitance: includes jig and probe capacitance.
- $R_T =$ Termination resistance: should be equal to $Z_{OUT}$ of the Pulse Generator.

NOTES:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
2. Pulse Generator for All Pulses: Rate $\leq 1.0\text{MHz}$; $t_f \leq 2.5\text{ns}$; $t_r \leq 2.5\text{ns}$
ORDERING INFORMATION

<table>
<thead>
<tr>
<th>IDT</th>
<th>XX</th>
<th>FST</th>
<th>XX</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp. Range</td>
<td>Device Type</td>
<td>Package</td>
<td>Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blank</td>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Plastic DIP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO</td>
<td>Small Outline IC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Quarter-size Small Outline Package</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3245</td>
<td>Octal Bus Switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32245</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>0°C to +70°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>