High Performance
1024 x 4 PROM
Ti-W PROM Family

Features/Benefits
- 24 ns typical access time
- Reliable Titanium-Tungsten fuses (Ti-W) guarantees greater than 98% programming yields
- Low voltage generic programming
- Pin compatible with standard Schottky PROMs
- PNP inputs for low input current
- Open collector and three-state outputs

Description
The 53/63S440 and 53/63S441/A are 1024 x 4 bipolar PROMs featuring low input current PNP inputs, full Schottky clamping with open collector or three-state outputs. The titanium-tungsten fuses store a logical low and are programmed to the high-state. Special on-chip circuitry and extra fuses provide preprogramming testing which assures high programming yields and high reliability.

The 63 series is specified for operation over the commercial temperature and voltage range. The 53 series is specified for the military ranges.

Applications
- Microprogram control stores
- Microprocessor program store
- Look-up table
- Character generator
- Code converter
- Programmable logic element (PLE") 10 inputs, 4 outputs, 1024 product terms

Programming
The 53/63S440 and 53/63S441/A PROMs are programmed with the same programming algorithm as all other Monolithic Memories' generic Ti-W PROMs. For details refer to Monolithic Memories' LSI Data Book.

Selection Guide

<table>
<thead>
<tr>
<th>MEMORY SIZE</th>
<th>ORGANIZATION</th>
<th>PINS (TYP)</th>
<th>PERFORMANCE</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 K</td>
<td>1024 x 4</td>
<td>18 (N,J,F W,L)</td>
<td>Enhanced</td>
<td>63S441A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Standard</td>
<td>TS</td>
</tr>
</tbody>
</table>

Pin Configuration

Part Numbering System

PLETM is a registered trademark of Monolithic Memories.

2175 Mission College Boulevard, Santa Clara, CA 95050 Tel: (408) 970-9700 TWX: 910-338-2374
Absolute Maximum Ratings

Supply voltage $V_{CC}$ ............................................................ -0.5 V to 7 V
Input voltage .................................................................. -1.5 V to 7 V
Off-state output voltage .................................................. 0.5 V to 5.5 V
Storage temperature ....................................................... -65° to +150°C

Operating Conditions

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MILITARY</th>
<th>COMMERICAL</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CC}$</td>
<td>Supply voltage</td>
<td>4.5</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td>$T_A$</td>
<td>Operating free-air temperature</td>
<td>-55</td>
<td>125</td>
<td>0</td>
</tr>
</tbody>
</table>

Electrical Characteristics Over Operating Conditions

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>MIL</th>
<th>COM</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{IL}$</td>
<td>Low-level input voltage</td>
<td></td>
<td>0.8</td>
<td>V</td>
</tr>
<tr>
<td>$V_{IH}$</td>
<td>High-level input voltage</td>
<td></td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>$V_{IC}$</td>
<td>Input clamp voltage</td>
<td>$V_{CC} = \text{MIN}$</td>
<td>$I_I = -18 \text{ mA}$</td>
<td>-1.5</td>
</tr>
<tr>
<td>$I_{IL}$</td>
<td>Low-level input current</td>
<td>$V_{CC} = \text{MAX}$</td>
<td>$V_I = 0.4 \text{ V}$</td>
<td>-0.25</td>
</tr>
<tr>
<td>$I_{IH}$</td>
<td>High-level input current</td>
<td>$V_{CC} = \text{MAX}$</td>
<td>$V_I = V_{CC} \text{ MAX}$</td>
<td>40</td>
</tr>
<tr>
<td>$V_{OL}$</td>
<td>Low-level output voltage</td>
<td>$V_{CC} = \text{MIN}$</td>
<td>$I_{OL} = 16 \text{ mA}$</td>
<td>MIL</td>
</tr>
<tr>
<td>$V_{OH}$</td>
<td>High-level output voltage*</td>
<td>$V_{CC} = \text{MIN}$</td>
<td>$I_{OH} = 2 \text{ mA}$</td>
<td>COM</td>
</tr>
<tr>
<td>$I_{OZL}$</td>
<td>Off-state output current*</td>
<td>$V_{CC} = \text{MAX}$</td>
<td>$V_O = 0.4 \text{ V}$</td>
<td>-40</td>
</tr>
<tr>
<td>$I_{OZH}$</td>
<td>Open collector output current</td>
<td>$V_{CC} = \text{MAX}$</td>
<td>$V_O = 2.4 \text{ V}$</td>
<td>40</td>
</tr>
<tr>
<td>$I_{CEX}$</td>
<td>Open collector output current</td>
<td>$V_{CC} = \text{MAX}$</td>
<td>$V_O = 5.5 \text{ V}$</td>
<td>100</td>
</tr>
<tr>
<td>$I_{OS}$</td>
<td>Output short-circuit current**</td>
<td>$V_{CC} = 5 \text{ V}$</td>
<td>$V_O = 0 \text{ V}$</td>
<td>-20</td>
</tr>
<tr>
<td>$I_{CC}$</td>
<td>Supply current</td>
<td>$V_{CC} = \text{MAX}$</td>
<td>All inputs grounded. All outputs open.</td>
<td>95</td>
</tr>
</tbody>
</table>

Switching Characteristics Over Operating Conditions (See standard test load)

<table>
<thead>
<tr>
<th>OPERATING CONDITIONS</th>
<th>DEVICE TYPE</th>
<th>$t_{AA}$ (ns) ADDRESS ACCESS TIME</th>
<th>$t_{EA}$ AND $t_{ER}$ (ns) ENABLE ACCESS TIME RECOVERY TIME</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TYP†</td>
<td>MAX</td>
<td>TYP†</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>63S441A</td>
<td>24</td>
<td>35</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>63S440, 63S441</td>
<td>24</td>
<td>45</td>
<td>16</td>
</tr>
<tr>
<td>MILITARY</td>
<td>53S441A</td>
<td>24</td>
<td>50</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>53S440, 53S441</td>
<td>24</td>
<td>55</td>
<td>16</td>
</tr>
</tbody>
</table>

* Three-state only.
** Not more than one output should be shorted at a time and duration of the short-circuit should not exceed one second.
† Typical at 5.0 V $V_{CC}$ and 25°C TAA.
Typical $I_{CC}$ vs Temperature

![Typical $I_{CC}$ vs Temperature](chart1)

Typical $T_{AA}$ vs Temperature

![Typical $T_{AA}$ vs Temperature](chart2)

Switching Test Load

![Switching Test Load](chart3)

Definition of Timing Diagram

<table>
<thead>
<tr>
<th>WAVEFORM</th>
<th>INPUTS</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="chart4" alt="Diagram" /></td>
<td><img src="chart5" alt="Diagram" /></td>
<td><img src="chart6" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Definition of Waveforms

![Definition of Waveforms](chart7)

NOTES:
1. Input pulse amplitude 0 V to 3.0 V.
2. Input rise and fall times 2-5 ns from 0.8 V to 2.0 V.
3. Input access measured at the 1.5 V level.
4. $t_{AA}$ and $t_{EA}$ are tested with switch $S_1$ closed, $C_L = 30 \text{ pF}$ and measured at 1.5 V output level.
5. $t_{ER}$ is tested with $C_L = 5 \text{ pF}$ and $S_1$ closed. "1" to high-impedance test is measured at $V_{OH} - 0.5 \text{ V}$ output level, "0" to high-impedance test is measured at $V_{OL} + 0.5 \text{ V}$ output level.
Commercial Programmers

Monolithic Memories PROMs are designed and tested to give a programming yield greater than 98%. If your programming yield is lower, check your programmer. It may not be properly calibrated.

Programming is final manufacturing — it must be quality-controlled. Equipment must be calibrated as a regular routine, ideally under the actual conditions of use. Each time a new board or a new programming module is inserted, the whole system should be checked. Both timing and voltages must meet published specifications for the device. Remember — The best PROMs available can be made unreliable by improper programming techniques.

PROM PROGRAMMING EQUIPMENT INFORMATION

SOURCE AND LOCATION

Data I/O Corp.
10525 Willows Rd. N.E
C-46
Redmond, WA 98052

Kontron Electronic, Inc.
630 Price Ave.
Redwood City, CA 94036

Digielec Inc.
7335 E. Acoma DR
Suite 103
Scottsdale, AZ 85260

Stag Systems Inc.
1120 San Antonio Rd.
Palo Alto, CA 94303

Package Drawings

N18 Molded DIP

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS MIN.-MAX. IN INCHES
ALL DIMENSIONS MIN.-MAX. IN MILLIMETERS
Package Drawings

J18 Ceramic DIP

L20 Leadless Chip Carrier

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS MIN.-MAX. IN INCHES
ALL DIMENSIONS MIN.-MAX. IN MILLIMETERS
Package Drawings

W20 CERPACK

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS MIN.-MAX. IN INCHES
ALL DIMENSIONS MIN.-MAX. IN MILLIMETERS
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