National Semiconductor

**PRELIMINARY**
October 1993

# DP802518 TROPIC Tsunami™ TROPIC II™ Microcode ROM

## General Description

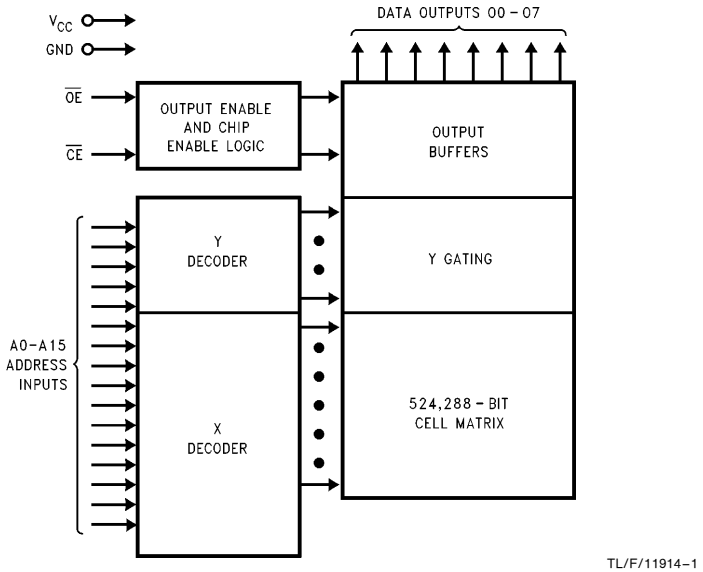
The DP802518 Tsunami is the microcode device for the high performance Token Ring Protocol Interface Controller—TROPIC II Token Ring chipset. this device features an interface compatible to the DP80253 controller, which allows direct connection without the use of glue logic.

The DP802518 Tsunami is implemented using National Semiconductor's Advanced CMOS process, and operates from a single 5V ± 10% power supply. The Tsunami is available in either a 28-pin DIP or 32-pin PLCC package.

## Features

- TROPIC II compatible
  - — Glueless interface
- High performance CMOS
- Surface Mount and DIP Packages
  - — 28-pin molded plastic DIP
  - — 32-pin PLCC

## Block Diagram



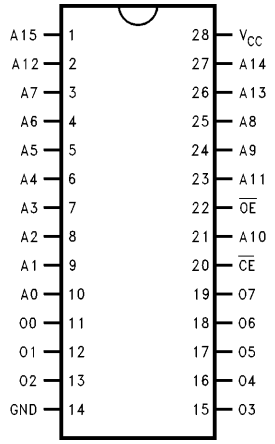

TL/F/11914–1

TRI-STATE® is a registered trademark of National Semiconductor Corporation.
TROPIC Tsunami™ and TROPIC II™ are trademarks of National Semiconductor Corporation.

## Connection Diagrams

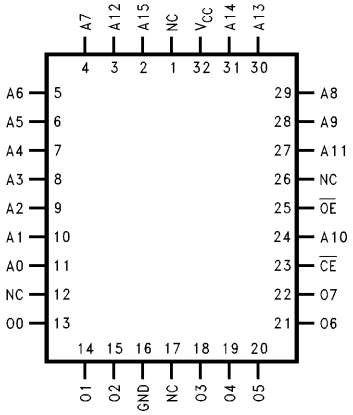
**DIP**




TL/F/11914–2

**Order Number DP802518N**
**See NS Package Number N28B**

**PLCC**




TL/F/11914–3

**Order Number DP802518V**
**See NS Package Number VA32A**

**Commercial Temperature Range (0°C to +70°C)**
**$V_{CC}$ = 5V ±10%**

| Parameter/Order Number | Check Sum |
|---|---|
| DP802518 N, V | xxxx |

**Pin Names**

| | |
|---|---|
| A0–A15 | Addresses |
| $\overline{CE}$ | Chip Enable |
| $\overline{OE}$ | Output Enable |
| O0–O7 | Outputs |
| NC | No Connect |

## Absolute Maximum Ratings (Note 1)

**If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.**

| | |
|---|---|
| Storage Temperature | −65°C to +150°C |
| All Input Voltages with Respect to Ground | −0.6V to +7V |
| $V_{CC}$ Supply Voltage with Respect to Ground | −0.6V to +7V |
| ESD Protection | >2000V |
| All Output Voltages with Respect to Ground | $V_{CC}$ +1.0V to GND −0.6V |

## Operating Range

| Range | Temperature | $V_{CC}$ |
|---|---|---|
| Commercial | 0°C to +70°C | 5V ±10% |

## Read Operation

### DC Electrical Characteristics Over operating range

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|---|---|---|---|---|---|
| $V_{IL}$ | Input Low Level | | −0.5 | 0.8 | V |
| $V_{IH}$ | Input High Level | | 2.0 | $V_{CC}$ + 1 | V |
| $V_{OL}$ | Output Low Voltage | $I_{OL}$ = 2.1 mA | | 0.4 | V |
| $V_{OH}$ | Output High Voltage | $I_{OH}$ = −400 μA | 3.5 | | V |
| $I_{SB1}$ | $V_{CC}$ Standby Current (CMOS) | $\overline{CE}$ = $V_{CC}$ ±0.3V | | 100 | μA |
| $I_{SB2}$ | $V_{CC}$ Standby Current | $\overline{CE}$ = $V_H$ | | 1 | mA |
| $I_{CC}$ | $V_{CC}$ Active Current | $\overline{CE}$ = $\overline{OE}$ = $V_{IL}$, I/O = 0 mA | | 40 | mA |
| $I_{LI}$ | Input Load Current | $V_{IN}$ = 5.5V or GND | −1 | 1 | μA |
| $I_{LO}$ | Output Leakage Current | $V_{OUT}$ = 5.5V, OR GND | −10 | 10 | μA |

### AC Electrical Characteristics Over operating range

| Symbol | Parameter | Min | Max | Units |
|---|---|---|---|---|
| $t_{ACC}$ | Address to Output Delay | | 120 | ns |
| $t_{CE}$ | $\overline{CE}$ to Output Delay | | 120 | |
| $t_{OE}$ | $\overline{OE}$ to Output Delay | | 50 | |
| $t_{DF}$ (Note 2) | Output Disable to Output Float | | 25 | |
| $t_{OH}$ (Note 2) | Output Hold From Addresses, $\overline{CE}$ or $\overline{OE}$, Whichever Occurred First | 7 | | |

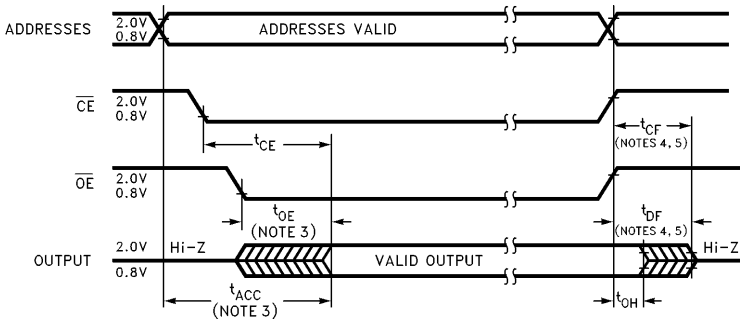
### Capacitance $T_A$ = +25°C, f = 1 MHz (Note 2)

| Symbol | Parameter | Conditions | Typ | Max | Units |
|---|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | $V_{IN}$ = 0V | 13 | 20 | pF |
| $C_{OUT}$ | Output Capacitance | $V_{OUT}$ = 0V | 13 | 20 | pF |

## AC Test Conditions

| | |
|---|---|
| Output Load | 1 TTL Gate and $C_L$ = 100 pF (Note 8) |
| Input Rise and Fall Time | ≤5 ns |
| Input Pulse Levels | 0.45V to 2.4V |
| Timing Measurement Level (Note 8) | (Note 8) |
| Inputs | 0.8V and 2V |
| Outputs | 0.8V and 2V |

## AC Waveforms (Notes 6, 7 and 9)




TL/F/11914–4

**Note 1:** Stresses above 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 operations sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**Note 2:** This parameter is only sampled and is not 100% tested.

**Note 3** $\overline{OE}$ may be delayed up to $t_{ACC} - t_{OE}$ after the falling edge of $\overline{CE}$ without impacting $t_{ACC}$.

**Note 4:** The $t_{DF}$ and $t_{CF}$ compare level is determined as follows:

High to TRI-STATE®, the measure $V_{CH1}$ (DC) − 0.10V;

Low to TRI-STATE, the measured $V_{OL1}$ (DC) + 0.10V.

**Note 5:** TRI-STATE may be attained using $\overline{OE}$ or $\overline{CE}$.

**Note 6:** The power switching characteristics of EPROMs require careful device decoupling. It is recommended that at least a 0.2 μF ceramic capacitor be used on every device between $V_{CC}$ and GND.

**Note 7:** The outputs must be restricted to $V_{CC}$ + 1.0V to avoid latch-up and device damage.

**Note 8:** 1 TTL Gate: $I_{OL}$ = 1.6 mA, $I_{OH}$ = −400 μA.

$C_L$: 100 pF includes fixture capacitance.

**Note 9:** Inputs and outputs can undershoot to −2.0V for 20 ns max.

# Functional Description

### DEVICE OPERATION

The three modes of operation of the Tsunami are listed in Table I. It should be noted that all inputs of the three modes are at TTL levels. The power supply required is supplied via the $V_{CC}$ pin and the power supply tolerance should be 5V ±10%.

#### Read Mode

The Tsunami has two control functions, both of which must be logically active to obtain data at the outputs. Chip Enable ($\overline{CE}$) is the power control and should be used for device selection. Output Enable ($\overline{OE}$) is the output control and should be used to gate data to the output pins, independent of device selection. Assuming that addresses are stable, address access time ($t_{ACC}$) is equal to the delay from $\overline{CE}$ to output ($t_{CE}$). Data is available at the outputs $t_{OE}$ after the falling edge of $\overline{OE}$, assuming that $\overline{CE}$ has been low and addresses have been stable for at least $t_{ACC} - t_{OE}$.

#### Standby Mode

The Tsunami has a standby mode which reduces the active power dissipation drastically, from 275 mW to 0.55 mW. The DP802518 is placed in the standby mode by applying a CMOS high signal to the $\overline{CE}$ input. When in standby mode, the outputs are in a high impedance state, independent of the $\overline{OE}$ input.

#### Output Disable

The DP802518 is placed in output disable by applying a TTL high signal to the $\overline{OE}$ input. When in output disable, all circuitry is enabled except the outputs are in a high impedance state (TRI-STATE).

### APPLICATION

In application, the DP802518 is connected to the DP80253 TROPIC II high performance token ring controllers as shown in *Figure 1*. The DP802518 is connected to the TROPIC II with outputs O0 to O7 connected to L__D0–L__ D7 respectively.

### SYSTEM CONSIDERATION

The power switching characteristics of Tsunami require careful decoupling of the devices. The supply current $I_{CC}$ has three segments that are of interest to the system designer: The standby current level, the active current level, and the transient current peaks that are produced by the voltage transition on the input pins. The magnitude of these transient current peaks is dependent on the output capacitance loading of the device. The associated $V_{CC}$ transient voltage peaks can be suppressed by properly selecting decoupling capacitors. It is recommended that a 0.2 μF ceramic capacitor be used between $V_{CC}$ and GND for each of the eight devices. The bulk capacitor should be located near the point where the power supply is connected to the subsystem. The bulk capacitor is used to overcome the voltage drop caused by the inductive effects of the PC board traces.

## Mode Selection

The modes of operation for the Tsunami are listed in Table I. A single 5V power supply is required and all inputs are at TTL levels.

**TABLE I. Mode Selection**

| Mode | $\overline{CE}$ | $\overline{OE}$ | $V_{CC}$ | Outputs |
|---|---|---|---|---|
| Read | $V_{IL}$ | $V_{IL}$ | 5.0V | $D_{OUT}$ |
| Standby | $V_{IH}$ | X | 5.0V | High Z |
| Output Disable | X | $V_{IH}$ | 5.0V | High Z |

**Note 1:** X can be $V_{IL}$ or $V_{IH}$.

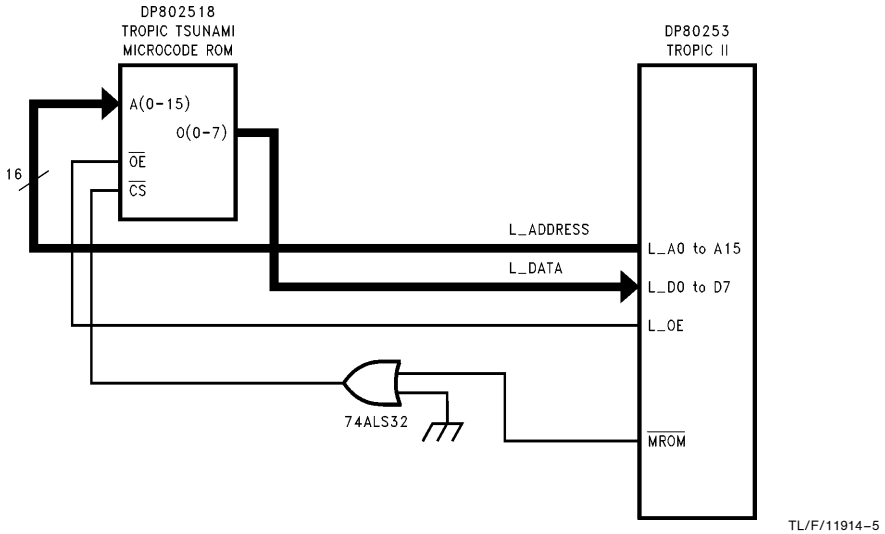
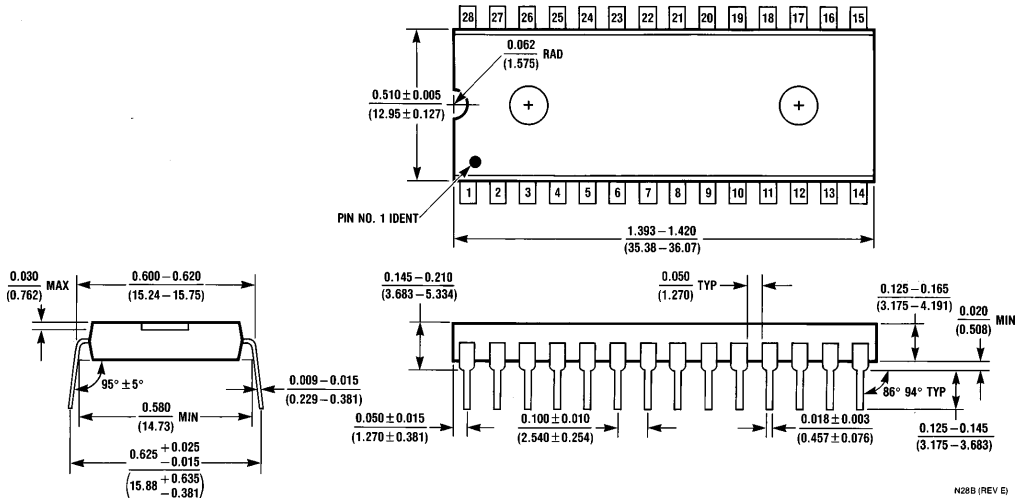


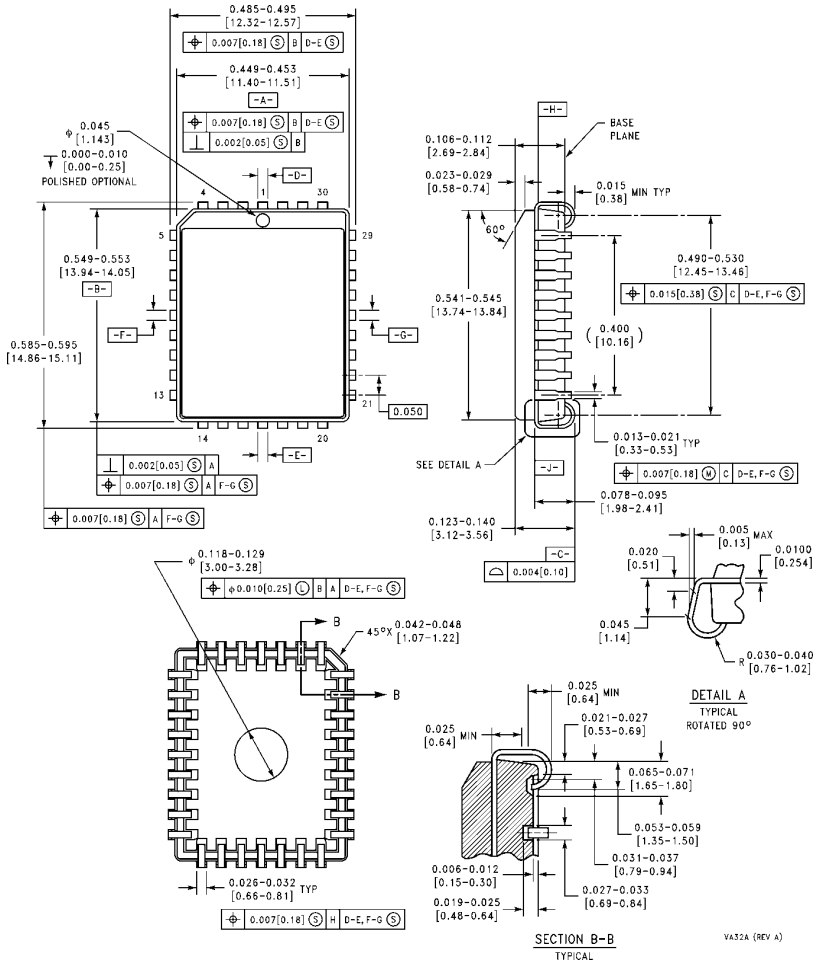

**FIGURE 1. Typical Interfacing of the TROPIC Tsunami Microcode ROM**

## Physical Dimensions inches (millimeters)




**28-Lead (0.600″ Wide) Molded Dual-In-Line Package**
**Order Number DP802518N**
**NS Package Number N28B**

## Physical Dimensions inches (millimeters) (Continued)




**28-Lead Molded Dual-In-Line Package**
**Order Number DP802518V**
**NS Package Number VA32A**

**LIFE SUPPORT POLICY**

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**National Semiconductor Corporation**
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

**National Semiconductor Europe**
Fax: (+49) 0-180-530 85 86
Email: cnjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

**National Semiconductor Hong Kong Ltd.**
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

**National Semiconductor Japan Ltd.**
Tel: 81-043-299-2309
Fax: 81-043-299-2408