

The NM27LV010—A Low Voltage 1 Meg EPROM

National Semiconductor
Application Note 809
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February 1992



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INTRODUCTION

National Semiconductor is a broad-based supplier of CMOS EPROMs, and this product line has had a reputation for very low power consumption. A new family of 3V CMOS EPROMs is currently being designed for low voltage, low power applications. The NM27LV010, a byte-wide 1 Megabit EPROM, is the first in this family of 3V parts and it is currently available in production quantities. Other densities will soon be announced.

Although the 3V integrated circuit market is currently in its infancy, the market is growing very rapidly. The NM27LV010 is one of the first memory devices to be designed specifically for low voltage applications.

PACKAGES AND PINOUTS

The NM27LV010 is available in three packages: a 32-pin LCC (leadless chip carrier with erase window), a 32-pin PLCC (plastic leaded chip carrier), and a 32-pin TSOP (thin small outline package). The LCC and PLCC pin configuration is shown in *Figure 1* and the TSOP pin configuration is shown in *Figure 2*. The pin configuration of the LCC and PLCC packages conform to the JEDEC standard for conventional 1 Meg EPROMs, which means that this 3V part is plug compatible with standard 5V, 1 Meg EPROMs.

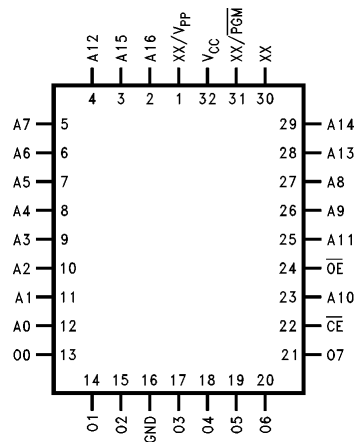


FIGURE 1. LCC and PLCC Pin Configuration

TL/D/11368-1



TL/D/11368-2

FIGURE 2. TSOP Pin Configuration

OPERATING CHARACTERISTICS

There are two general categories of 3V applications. The first category is systems with regulated power supplies. These systems require a V_{CC} operating voltage range of 3.0V–3.6V. The second category is systems with unregulated power supplies that are generally powered directly off batteries. These systems require a V_{CC} operating range of about 2.6V–3.6V. The NM27LV010 can be used in both of these operating ranges.

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OPERATING CHARACTERISTICS (Continued)

In the regulated 3.0V–3.6V operating range the part has a minimum access time of 200 ns over the commercial temperature range (0°C to +70°C). The input levels are $V_{IL} = 0.8V$ and $V_{IH} = 2.0V$, and the output levels are $V_{OL} = 0.4V$ and $V_{OH} = 2.4V$. These are standard 5V logic levels. The part will also operate over the military temperature range (–55°C to +125°C) with a regulated power supply.

In the unregulated 2.6V–3.6V power supply range the part has a minimum access time of 350 ns.

Low power consumption is a very important requirement in low voltage applications and the NM27LV010 satisfies this requirement very well. The power drain at 3V and 1 MHz operating frequency is typically about 12 mW. This is a small fraction of the power consumption of typical 5V 1 Meg EPROMs.

Although the NM27LV010 is specifically designed to operate in the 3V range, the part has the versatility to operate up to 5.5V as well. Consequently it can be used in systems that have a wide power supply variation or in systems that are required to operate at both 5V and at 3V.

The part is manufactured with National's proprietary 1.2 μ m CMOS split gate EPROM process. National has been in high volume production with this process for a significant time period and the quality and reliability of the NM27C010 should meet the same high standards as other EPROMs manufactured with this technology.

PROGRAMMING

The NM27C010 is programmed using the Fast Programming Algorithm with V_{PP} at 12.75V and V_{CC} at 6.25V. This is the same algorithm that is used for the standard 5V NM27C010 EPROM. The manufacturer's identification code of the NM27LV010 is "8F86", which is also the code for the NM27C010. Therefore the NM27LV010 can be programmed on any programmer that is capable of programming the 5V NM27C010. Since there are currently a large number of programmers available that can program the NM27C010, most customers will be able to program the 3V part without modifying their existing equipment.

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APPLICATIONS

The industry is rapidly moving toward a new 3V power supply standard. JEDEC has recommended that all 64M DRAMs and 16M SRAMs be designed for 3.3V operating voltage. Also, JEDEC has recently created a new low voltage committee which encompasses ASIC, logic, microprocessor, and memory products. 3V microprocessors have been announced, as have other 3V digital integrated circuits, so systems can now be designed that are 100% low voltage operation.

3V operation has the advantage for system manufacturers that their systems use less power and battery operation is much more practical. The advantage for chip manufacturers is that geometries can be scaled smaller to be in line with the state-of-the-art processing technologies that are currently available.

Laptop and notebook computers can be designed for 3V operation. The 3V EPROM could be used in these systems for BIOS, disk control, and possibly disk replacement.

The EPROM could also be used for 3V cellular phone designs. Many cellular phones are battery operated and power consumption must be minimized.

Hand held games and aircraft avionics could also be good applications for the part.

Most 3V systems are miniaturized end space is at a premium. The three packages that are provided for the NM27LV010 are small surface mount packages that are ideal for use in miniaturized systems.

SUMMARY

The NM27LV010 is specifically designed to operate in 3V systems. Its power consumption is very low, but the access time is as fast as many 5V EPROMs.

The part is plug compatible with conventional 5V 1 Meg EPROMs and it will program the same as the National's 5V NM27C010 part.

This low voltage EPROM should find many uses in the fast emerging 3V marketplace. National has been in the EPROM business for many years and the company has a solid reputation for building quality products and providing excellent customer service. The quality and service associated with this new part will be consistent with that of previous products.



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