
CMOS Programmable Electrically Erasable Logic Device

February 1993

Features**Advanced CMOS EEPROM Technology**

- Low Power Consumption
- 65mA + 1mA/MHz Max

High Performance

- tPD = 30ns Max, tOE = 30ns Max

Architectural Flexibility

- 8 Inputs and 10 I/Os
- Programmable-AND/OR arrays with 42 Product Terms/
10 Sum Terms

EE Reprogrammability

- Superior programming and functional yield
- Low-cost, "windowless" package
- Erases and programs in seconds

FPLA Architecture

- Superset Replacement for PLS153
- 10 additional product terms
- Output-enable terms in OR array
- Signature word
- Foolproof design security

Application Versatility

- Replace random SSI/MSI logic
- Create customized comparators, multiplexers, encoders,
converters, etc.

Development Support

- Third-party software and programmers
- AMI PEEL Development System with APEEL Logic
Assembler

General Description

The AMI PEEL253 is a CMOS Programmable Electrically Erasable Logic device that provides a high-performance, low-power, reprogrammable, and architecturally enhanced alternative to conventional programmable logic devices (PLDs). Designed in advanced CMOS EEPROM technology, the PEEL253 rivals speed parameters of comparable bipolar PLDs while providing a dramatic improvement in active power consumption. The EE reprogrammability of the PEEL253 reduces development and field retrofit costs and enhances testability to ensure 100% field programmability and function. PEEL technology allows for low-cost, "windowless" packaging in a ceramic or plastic 20-pin, 300-mil DIP.

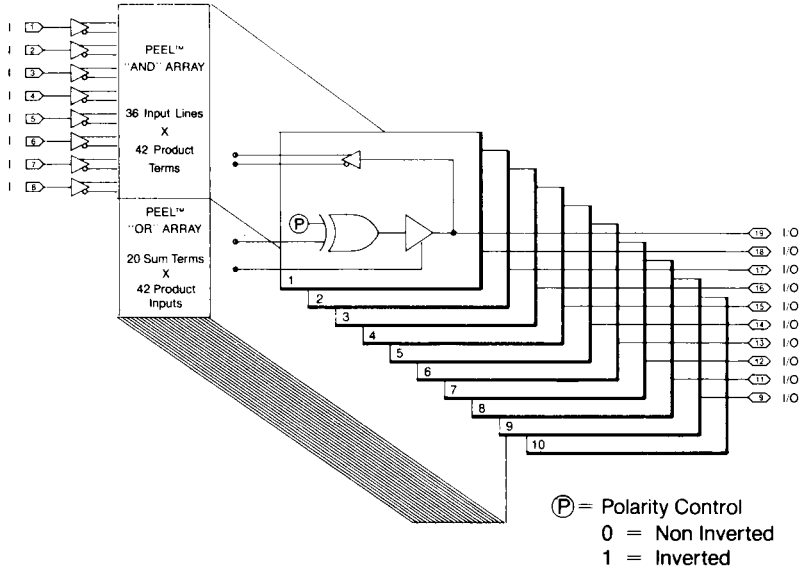
The PEEL253 provides both a programmable-AND array and a programmable OR array. It offers superset compatibility with the bipolar PLS153 with several architectural enhancements, including output enable terms in the OR array, 10 additional product terms, and signature word. Applications for the PEEL253 cover a wide range of combinatorial functions: replacement of SSI/MSI logic circuitry, priority encoders, comparators, parity generators, code converters, address decoders, and multiplexers. The PEEL253 is supported by popular development tools and programmers from third-party manufacturers, and by AMI's APEEL Logic Assembler.

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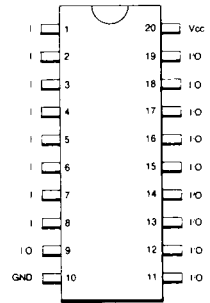
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Figure 36: PEEL253 Pin and Block Diagram

Block Diagram



Pin Diagram



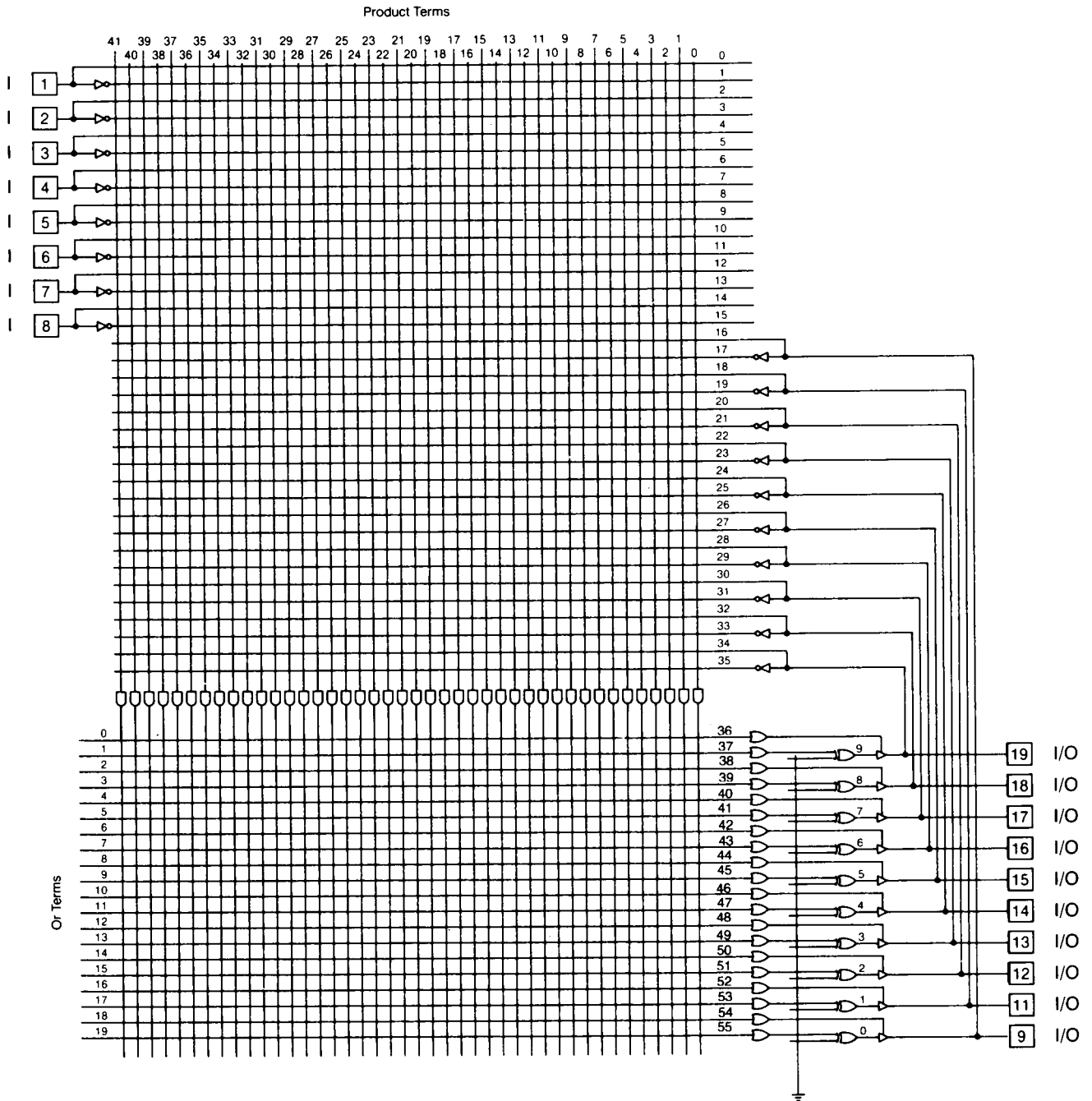
Pin Names

- I = Input Only
- I/O = Bi-Directional Input/Output
- GND = Ground
- Vcc = Power Supply (+5V)

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Figure 37: PEEL253 Logic Array Diagram



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Absolute Values
Absolute Maximum Ratings⁸

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V _{cc}	Supply Voltage	Relative to GND	-0.5	7.0	V
V _i	Voltage applied to Input ⁴	Relative to GND ^{1,10}	-0.5	V _{cc} + 0.6	V
V _o	Voltage applied to Output	Relative to GND ¹	-0.5	V _{cc} + 0.6	V
I _o	Output Current	Per pin (I _{ol} , I _{oh})		+25	mA
T _{st}	Storage Temperature		-65	+150	C
T _{lt}	Lead Temperature	(soldering 10 seconds)		+300	C

Operating Ranges

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V _{cc}	Supply Voltage	Commercial	4.75	5.25	V
		Industrial	4.5	5.5	V
T _a	Operating Temperature	Commercial	0	+70	C
		Industrial	-40	+85	C
T _r	Clock Rise Time ⁵	Test points at 10% and 90% levels		250	ns
T _f	Clock Fall Time ⁵	Test points at 10% and 90% levels		250	ns
T _{rvcc}	V _{cc} Rise Time ⁵	Test points at 10% and 90% levels		250	ms

DC Characteristics (Over Operating Range Specifications)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
I _{il}	Input Leakage	V _{in} = GND to V _{cc}			±10	μA
I _{oz}	Output Leakage	I/O = High Impedance V _o = GND to V _{cc}			±10	μA
V _{il}	Input Low Voltage		-0.3		0.8	V
V _{ih}	Input High Voltage		2.0		V _{cc} + 0.3	V
V _{ol}	Output Low Voltage TTL	I _{ol} = +8.0mA ¹²			0.45	V
V _{olc}	Output Low Voltage CMOS	I _{ol} = 10μA ¹²			0.1	V
V _{oh}	Output High Voltage TTL	I _{oh} = -4.0mA ¹²	2.4			V
V _{ohc}	Output High Voltage CMOS	I _{oh} = -10μA ¹²	V _{cc} - 0.1			v

Capacitance

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
C _{in} ^{3,7}	Input Capacitance	Frequency = 1MHz		4	6	pF
C _{out} ^{3,7}	Output Capacitance	Frequency = 1MHz		8	12	pF
C _{clk} ^{3,7}	Clk Pin Capacitance	Frequency = 1MHz		8	13	pF

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Electrical Characteristics (Over Operating Range Specifications)

SYMBOL	PARAMETER	UNITS	PEEL 253-30	
			MIN	MAX
I _{CCS}	V _{CC} Current Standby ⁹	mA		65
I _{CCA}	V _{CC} Current Active ⁹	mA		I _{CCS} + 0.5 mA/MHz
t _{PD}	Input ⁴ to combinatorial output	ns		30
t _{OD}	Input ⁴ to output disable ¹¹	ns		30
t _{OE}	Input ⁴ to output enable ¹¹	ns		30

NOTES:

1. Minimum DC input is -0.5V; however, inputs may undershoot to -2.0V for periods less than 30ns.
2. Voltage applied to input or output must not exceed V_{CC}+1.0V.
3. These measurements are periodically sample tested.
4. "Input" refers to an Input signal.
5. Test points assume signal transitions of 5ns or less from the 10% and 90% points, and timing reference levels of 1.5V (unless otherwise specified).
6. Typical values and capacitance are measured at V_{CC}=5.0V and T_a=25°C.
7. Exposure to absolute maximum ratings over extended periods of time may affect device reliability. Exceeding absolute maximum ratings may cause permanent damage.
8. I/O pins are open (no load).
9. V_{in} specified is not for program/verify operation. Contact AMI for information regarding PEEL program/verify specifications.
10. t_{OD} and t_{OE} are measured at V_{oh}=-0.1V and V_{ol}=+0.1V.
11. Contact factory for increased IOL requirements.

Figure 38: PEEL253 AC Switching Waveforms

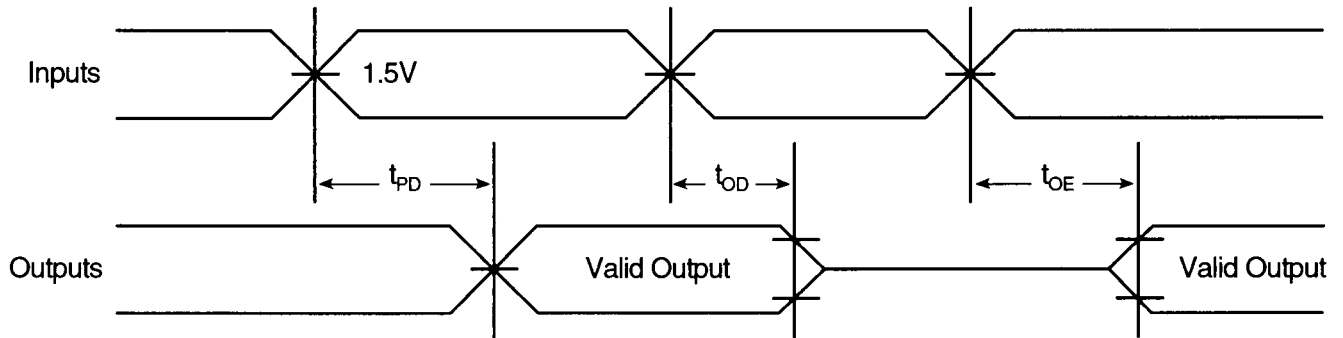


Figure 39: PEEL253 AC Test Loads

