

Preliminary W78T064



8K×8 ONE-TIME PROGRAMMABLE ROM

GENERAL DESCRIPTION

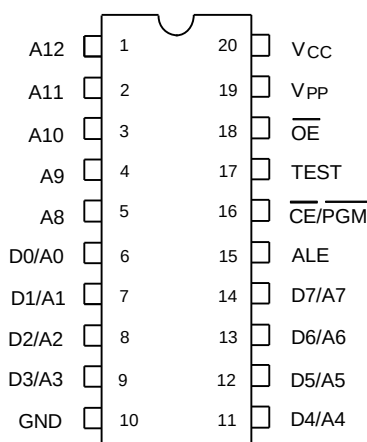
The W78T064 is a high-speed, low-power, programmable read-only OTP device organized as 8192×8 bits. The chip operates on a single 5 volt power supply and is packaged in a low-cost, 20-pin plastic DIP.

The W78T064 is designed for the Winbond W78C31/W78C32 series or Intel 80C31/80C32 compatible products. The product has a built-in octal latch circuit, which eliminates the need for a 74LS373 TTL in the application circuit.

FEATURES

- Designed especially for use in Winbond W78C31/W78C32 series or Intel 80C31/80C32 compatible application circuits
- High speed access time: 100 nS
- Operating current: 15 mA (typ.)
- Standby current: 5 μ A (typ.)
- Single 5V power supply
- +12V programming voltage
- TTL compatible inputs/outputs
- Tri-state outputs
- Packaged in 20-pin plastic DIP

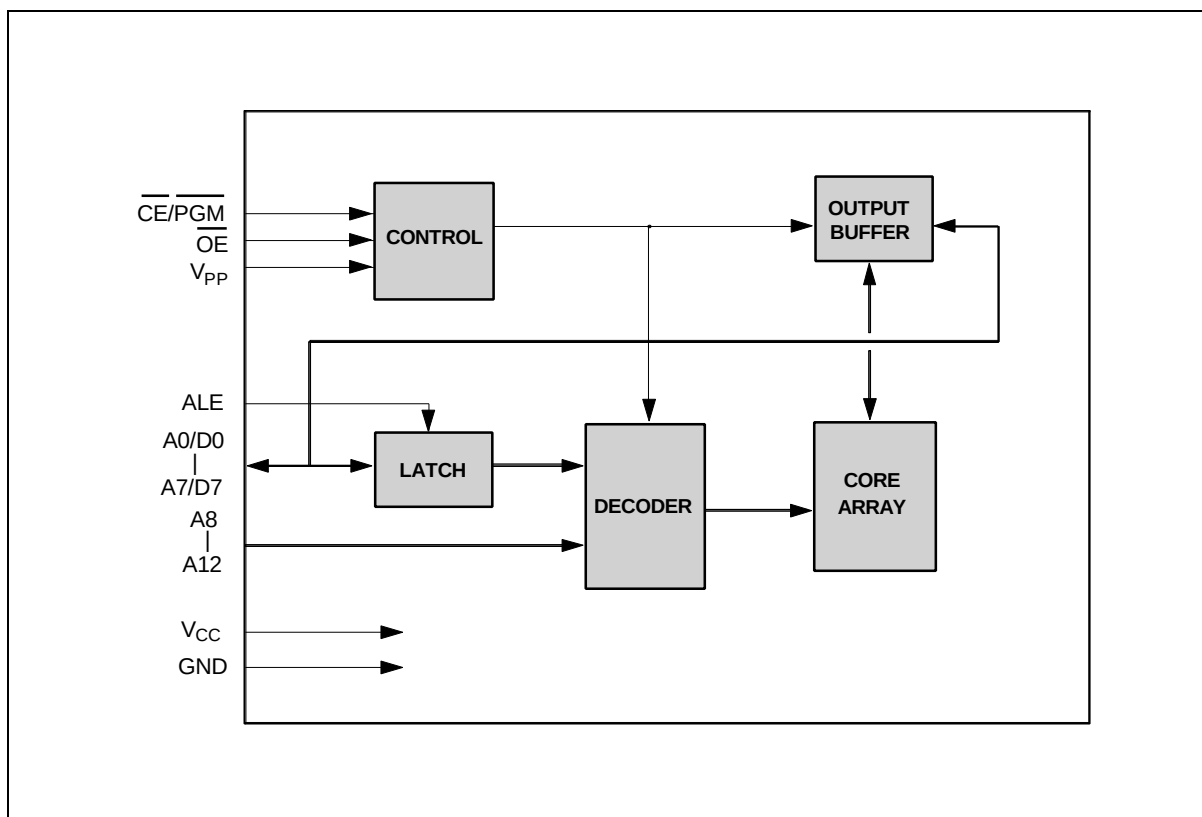
PIN CONFIGURATION



PIN DESCRIPTION

I/O SYMBOL	I/O	FUNCTION
A0/D0 A7/D7	I/O	Address/data pins
A8 A12	I	Address input pins
$\overline{\text{CE}}$ (PGM)	I	Acts as chip enable or program pin
ALE	I	Acts as address latch enable pin
$\overline{\text{OE}}$	I	Chip output enable pin
V _{PP}	I	Program power supply pin
TEST	I	Test pin
V _{CC}	I	Positive power supply pin
GND	I	Negative power supply pin

BLOCK DIAGRAM





FUNCTIONAL DESCRIPTION

Read Mode

For Winbond W78C31/W78C32 series or Intel 80C31/80C32 compatible application circuits, this function has an octal latch circuit, so a 74LS373 TTL is not needed in the application circuit. The read mode is entered when $V_{PP} = 5V$ and $V_{CC} = 5V$. The control timing is shown below under AC Read Waveforms.

Program Mode

A programming operation is the only way to change data from "1" to "0." To program the chip, addresses A0 to A7 must be latched and $V_{PP} = 12V$, $V_{CC} = 5V$, $\overline{OE} = V_{IH}$, and $\overline{CE} = V_{IH}$. Under these conditions, pulsing $\overline{CE}$ low starts the programming operation. The control timing is shown below under Programming Waveforms.

Program Verify Mode

All the bytes in the chip must be verified to check whether they have been successfully programmed with the desired data. Addresses A0 to A7 must be latched in the latch circuit for the program verify operation to be performed correctly. Program verify mode is entered when $V_{PP} = 12V$, $\overline{CE} = V_{IH}$, and $\overline{OE} = V_{IL}$. The control timing is shown under Programming Waveforms below.

Program Inhibit Mode

Program inhibit mode allows parallel programming of multiple chips with different data. When $\overline{CE} = V_{IH}$, programming of non-target chips is inhibited, so that except for the $\overline{CE}$ and $\overline{OE}$ pins, these products may have common inputs.

Standby Mode

This mode is entered when $\overline{CE} = V_{IH}$. The V_{CC} current can then be reduced.

Truth Table

$V_{IH} = 2.4$ to $5.5V$, $V_{IL} = 0.0$ to $0.8V$

MODE	PIN				
	$\overline{CE}$	$\overline{OE}$	V_{CC}	V_{PP}	*O/P
Read	V_{IL}	V_{IL}	5V	5V	DOUT
Output Disable	V_{IL}	V_{IH}	5V	5V	H-Z
Standby (TTL)	V_{IH}	-	5V	5V	H-Z
Standby (CMOS)	5V	-	5V	5V	H-Z
Program	V_{IL}	V_{IH}	5V	12V	DIN
Program Verify	V_{IH}	V_{IL}	5V	12V	DOUT
Program Inhibit	V_{IH}	V_{IH}	5V	12V	H-Z

* O/P are output from A0/D0 to A7/D7.

ABSOLUTE MAXIMUM RATINGS (Read mode function only)

PARAMETER	MINIMUM	UNIT
Supply Voltage to Ground Potential	-0.3 to +7.0	V
Applied Input/Output Voltage	-0.3 to +7.0	V
Power Dissipation	200	mW
Ambient Operating Temperature	0 to +70	°C
Storage Temperature	-55 to +150	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

ELECTRICAL CHARACTERISTICS**Read Operation DC Characteristics**

(V_{CC} = 5.0V, T_A = 25° C)

PARAMETER	SYM.	TEST CONDITIONS	SPEC.			UNIT
			MIN.	TYP.	MAX.	
V _{CC} Supply Voltage	V _{CC}	-	4.5	5.0	5.5	V
Input Load current	I _{LI}	V _{IN} = 0 to V _{CC}	-	0.01	1.0	μA
Output Leakage Current	I _{LO}	V _{OUT} = 0 to V _{CC}	-	-	±10	μA
V _{CC} Standby Current	I _{SB}	$\overline{CE} = V_{IH}$ (TTL)	-	-	1.0	mA
		$\overline{CE} = V_{CC} \pm 0.2V$ (CMOS)	-	-	100	μA
V _{CC} Operating Current	I _{CC}	$\overline{CE} = V_{IL}$, f = 5 MHz I _{OUT} = 0 mA	-	-	30	mA
V _{PP} Operating Current	I _{PP}	V _{PP} = V _{CC}	-	-	100	μA
Input Low Voltage	V _{IL}	-	-0.3	-	0.8	V
Input High Voltage	V _{IH}	-	2.0	-	V _{CC} +0.5	V
Output Low Voltage	V _{OL}	I _{OL} = 2.1 mA	-	-	0.45	V
Output High Voltage	V _{OH}	I _{OH} = -0.4 mA	2.4	-	-	V
V _{PP} Operating Voltage	V _{PP}	-	V _{CC} -0.7	-	V _{CC}	V



Programming Operation DC Characteristics

(V_{CC} = 5.0V, T_A = 25° C)

PARAMETER	SYMBOL	TEST CONDITIONS	SPEC.			UNIT
			MIN.	TYP.	MAX.	
Input Load Current	I _{LI}	V _{IN} = V _{IL} or V _{IH}	-	-	1.0	μA
V _{CC} Program Current	I _{CP}	$\overline{CE}$ = V _{IL}	-	-	30	mA
V _{PP} Program Current	I _{PP}	$\overline{CE}$ = V _{IL}	-	-	30	mA
Input Low Voltage	V _{IL}	-	-0.1	-	0.8	V
Input High Voltage	V _{IH}	-	2.4	-	5.5	V
Output Low Voltage	V _{OL}	I _{OL} = 2.1 mA (Verify)	-	-	0.45	V
Output High Voltage	V _{OH}	I _{OH} = -0.4 mA (Verify)	2.4	-	-	V
V _{PP} Program Voltage	V _{PP}	(Program)	11.75	12.0	12.25	V
V _{CC} Supply Voltage	V _{CP}	(Program)	4.5	5.0	5.5	V

Read Operation AC Characteristics

(V_{CC} = 5.0V, T_A = 25° C)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Chip Enable Access Time	T _{CE}	-	100	nS
Address Access Time	T _{ACC}	-	100	nS
Output Enable Access Time	T _{OE}	-	50	nS
$\overline{OE}$ High to H-Z Output	T _{DF}	-	30	nS
Output Hold from Address Change	T _{OH}	0	-	nS
Data Setup Time on ALE Pin	T _S	5	-	nS
Data Hold Time on ALE Pin	T _H	13	-	nS
ALE Pulse Width	T _W	20	-	nS

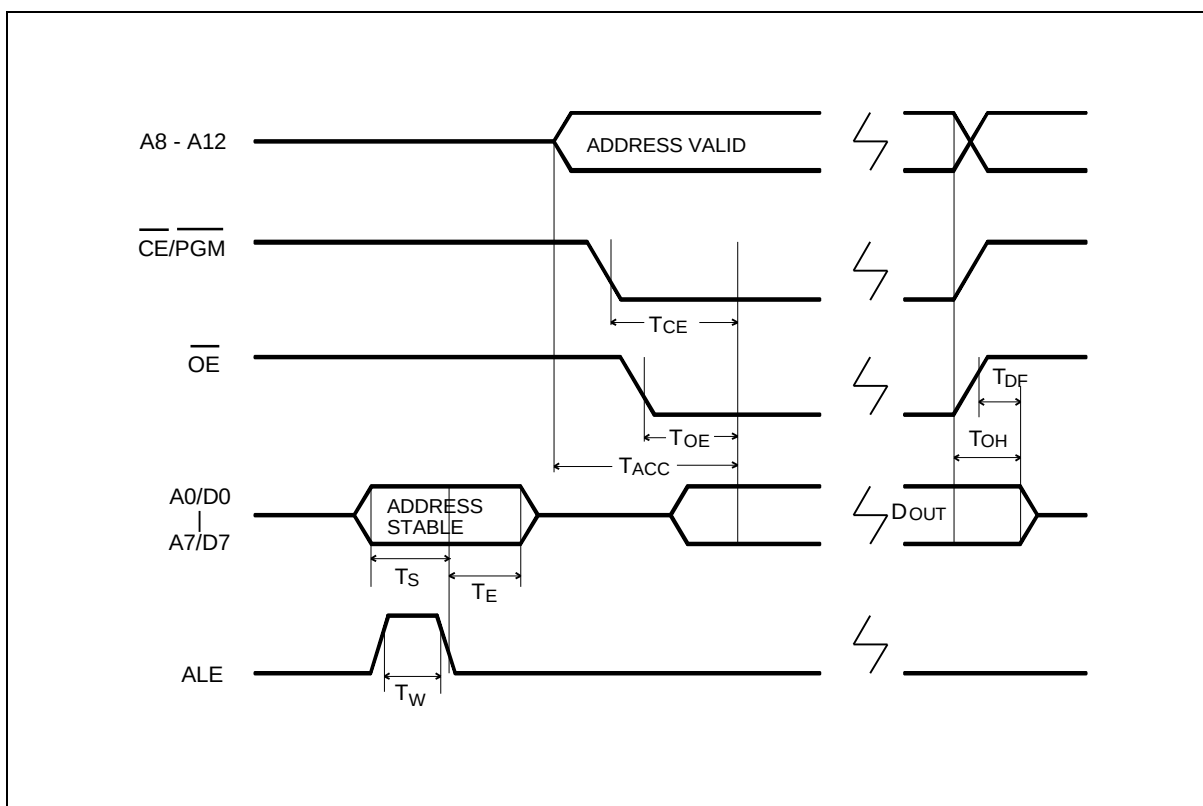
Programming Operation AC Characteristics

(V_{CC} = 5.0V, T_A = 25° C)

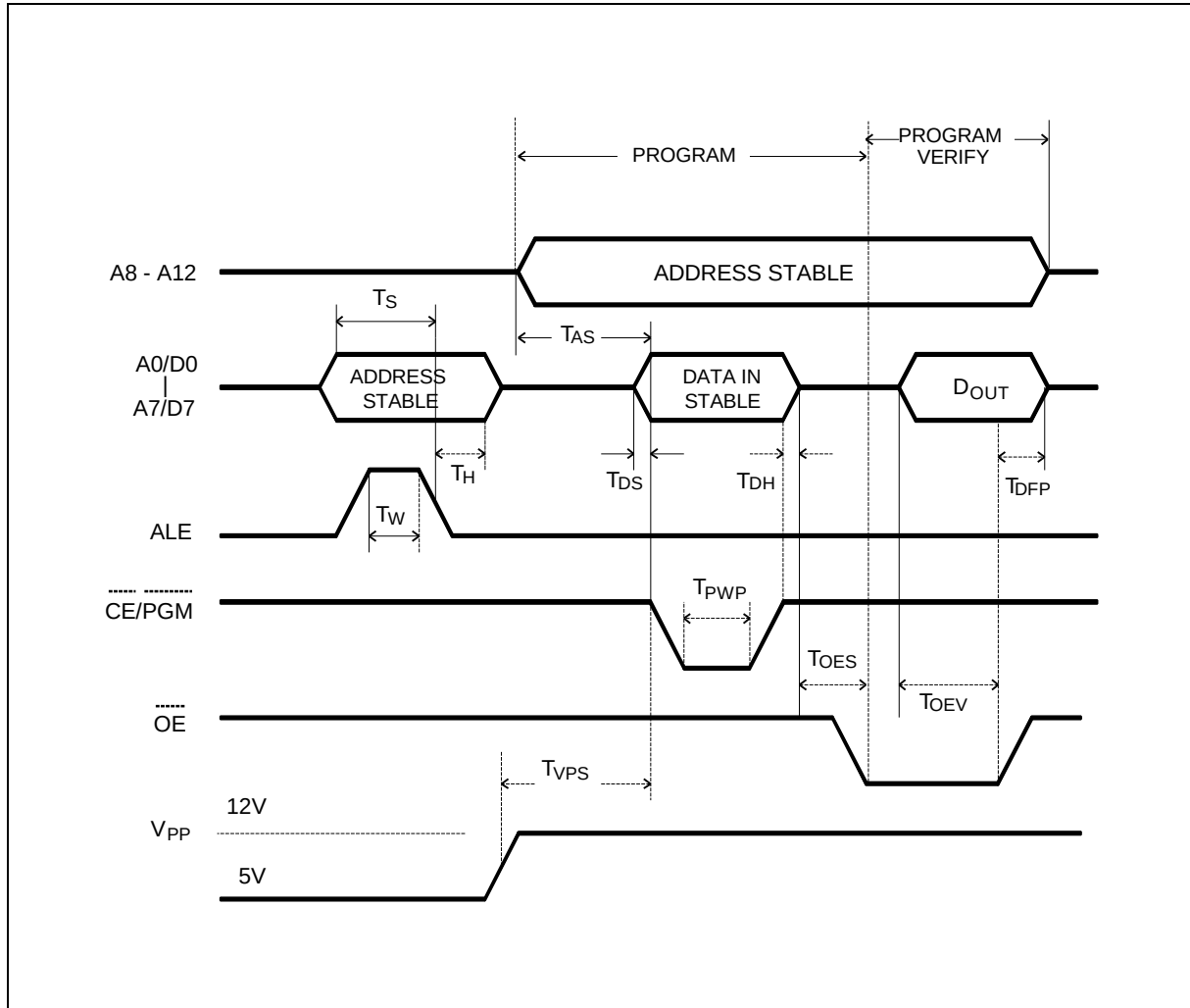
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
V _{PP} Setup Time	T _{VPS}	2.0	-	-	μS
Data Setup Time	T _{DS}	2.0	-	-	μS
Data Hold Time	T _{DH}	2.0	-	-	μS

Programming Operation AC Characteristics, continued

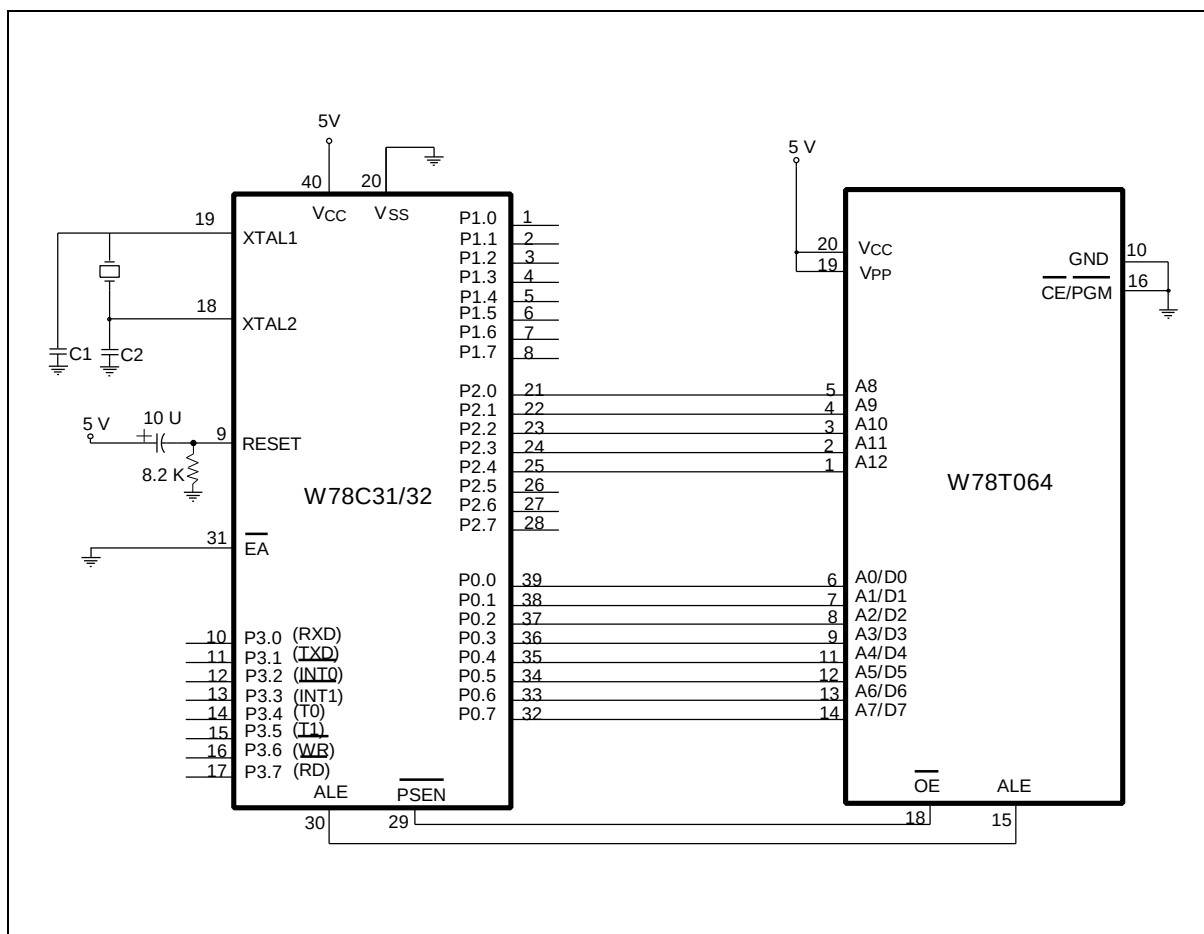
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Address Setup Time	T _{AS}	2.0	-	-	μS
$\overline{\text{CE}}$ Program Pulse Width	T _{PWP}	95	100	105	μS
$\overline{\text{OE}}$ Setup Time	T _{OES}	2.0	-	-	μS
$\overline{\text{OE}}$ High to Output H-Z	T _{DFP}	0	-	130	nS
Data Valid from $\overline{\text{OE}}$	T _{OEV}	-	-	150	nS

AC READ WAVEFORMS

PROGRAMMING WAVEFORMS



APPLICATION CIRCUIT



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