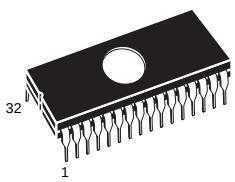
M27C1001

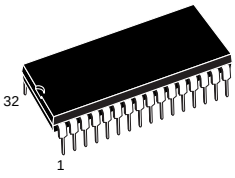
1 Mbit (128 Kbit x 8) UV EPROM and OTP EPROM

Features

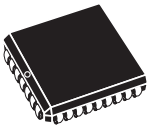
- 5v ± 10% Supply Voltage in Read Operation
- Access Time: 35ns
- Low Power Consumption:
  - Active Current: 30 mA at 5 MHz
  - Standby Current: 100 µA
- Programming Voltage: 12.75V ± 0.25V
- Programming Time: 100 µs/word
- Electronic Signature
  - Manufacturer Code: 20h
  - Device Code: 05h
- ECOPACK® packages available



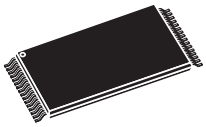
FDIP32W (F)



PDIP32 (B)



PLCC32 (C)



TSOP32 (N)
8 x 20 mm

1 Summary description

The M27C1001 is a 1 Mbit EPROM offered in the two ranges: UV (ultra violet erase) and OTP (one time programmable). It is ideally suited for microprocessor systems requiring large programs and is organized as 131,072 words of 8 bits.

The FDIP32W (window ceramic frit-seal package) has a transparent lid that enables the user to expose the chip to ultraviolet light to erase the bit pattern. A new pattern can then be written to the device by following the programming procedure.

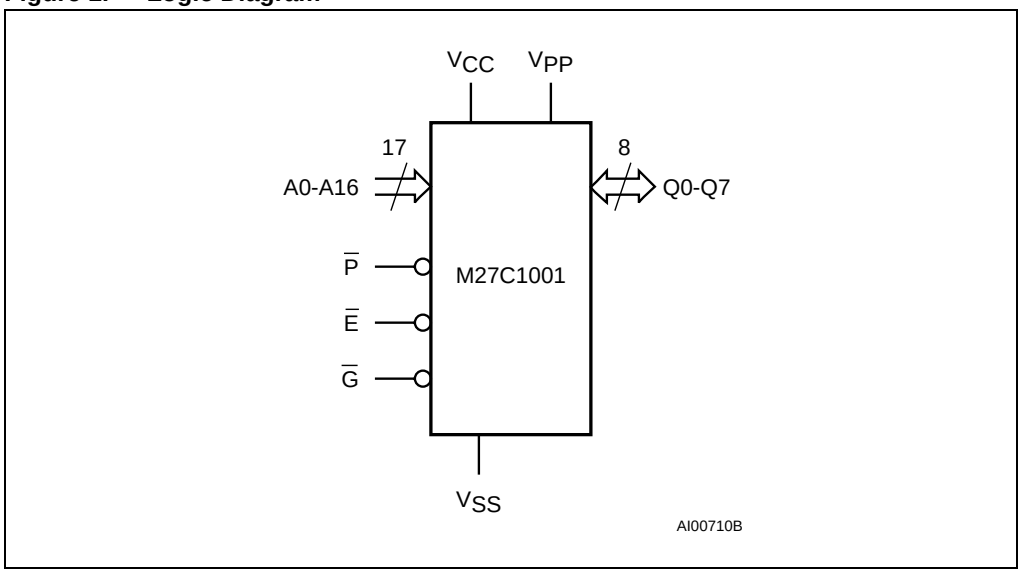
For applications where the content is programmed only one time and erasure is not required, the M27C1001 is offered in PDIP32, PLCC32 and TSOP32 (8 x 20 mm) packages.

In order to meet environmental requirements, ST offers the M27C1001 in ECOPACK® packages. ECOPACK packages are Lead-free. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label.

ECOPACK is an ST trademark. ECOPACK® specifications are available at: www.st.com.

See *Figure 1: Logic Diagram* and *Table 1: Signal Descriptions* for a brief overview of the signals connected to this device.

Figure 1. Logic Diagram



3 Maximum ratings

Table 4. Absolute Maximum Ratings(1)

Symbol	Parameter	Value	Unit
T_A	Ambient Operating Temperature (2)	–40 to 125	°C
T_{BIAS}	Temperature Under Bias	–50 to 125	°C
T_{STG}	Storage Temperature	–65 to 150	°C
V_{IO} (3)	Input or Output Voltage (except A9)	–2 to 7	V
V_{CC}	Supply Voltage	–2 to 7	V
V_{A9} (3)	A9 Voltage	–2 to 13.5	V
V_{PP}	Program Supply Voltage	–2 to 14	V

1. Except for the rating "Operating Temperature Range", stresses above those listed in the Table "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the Operating sections of this specification is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics SURE Program and other relevant quality documents.
2. Depends on range.
3. Minimum DC voltage on Input or Output is –0.5V with possible undershoot to –2.0V for a period less than 20ns.
Maximum DC voltage on Output is VCC +0.5V with possible overshoot to VCC +2V for a period less than 20ns.

4 DC and AC characteristics

T_A = 0 to 70°C, –40 to 85°C or –40 to 125°C; V_{CC} = 5V ± 5% or 5V ± 10%; V_{PP} = V_{CC}

Table 5. Read Mode DC Characteristics (1)

Symbol	Parameter	Test Condition	Min.	Max.	Unit
I_{LI}	Input Leakage Current	$0V \le V_{IN} \le V_{CC}$		±10	µA
I_{LO}	Output Leakage Current	$0V \le V_{OUT} \le V_{CC}$		±10	µA
I_{CC}	Supply Current	$\overline{E} = V_{IL}$, $\overline{G} = V_{IL}$, I_{OUT} = 0mA, f = 5MHz		30	mA
I_{CC1}	Supply Current (Standby) TTL	$\overline{E} = V_{IH}$		1	mA
I_{CC2}	Supply Current (Standby) CMOS	$\overline{E} > V_{CC} - 0.2V$		100	µA
I_{PP}	Program Current	$V_{PP} = V_{CC}$		10	µA
V_{IL}	Input Low Voltage		–0.3	0.8	V
V_{IH} (2)	Input High Voltage		2	V_{CC} + 1	V
V_{OL}	Output Low Voltage	I_{OL} = 2.1mA		0.4	V
V_{OH}	Output High Voltage TTL	I_{OH} = –400µA	2.4		V
	Output High Voltage CMOS	I_{OH} = –100µA	V_{CC} – 0.7V		V

1. V_{CC} must be applied simultaneously with or before V_{PP} and removed simultaneously or after V_{PP}.
2. Maximum DC voltage on Output is V_{CC} +0.5V.

T_A = 25 °C; V_{CC} = 6.25V ± 0.25V; V_{PP} = 12.75V ± 0.25V

Table 6. Programming Mode DC Characteristics (1)

Symbol	Parameter	Test Condition	Min.	Max.	Unit
I_{LI}	Input Leakage Current	$V_{IL} \le V_{IN} \le V_{IH}$		±10	µA
I_{CC}	Supply Current			50	mA
I_{PP}	Program Current	$\overline{E} = V_{IL}$		50	mA
V_{IL}	Input Low Voltage		–0.3	0.8	V
V_{IH}	Input High Voltage		2	V_{CC} + 0.5	V
V_{OL}	Output Low Voltage	I_{OL} = 2.1mA		0.4	V
V_{OH}	Output High Voltage TTL	I_{OH} = –400µA	2.4		V
V_{ID}	A9 Voltage		11.5	12.5	V

1. V_{CC} must be applied simultaneously with or before V_{PP} and removed simultaneously or after V_{PP}.

T_A = 25 °C, f = 1 MHz

Table 7. Capacitance (1)

Symbol	Parameter	Test Condition	Min	Max	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V		6	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V		12	pF

1. Sampled only, not 100% tested.

Table 8. AC Measurement Conditions

Parameter	High Speed	Standard
Input Rise and Fall Times	≤ 10ns	≤ 20ns
Input Pulse Voltages	0 to 3V	0.4V to 2.4V
Input and Output Timing Ref. Voltages	1.5V	0.8V and 2V

Figure 6. AC Testing Input Output Waveform

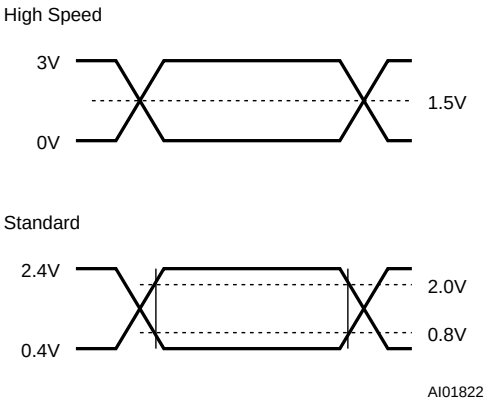
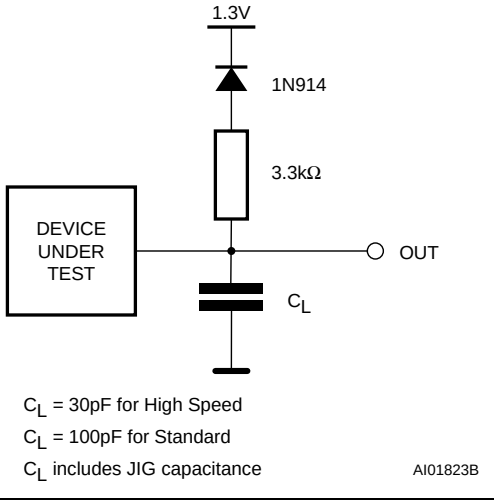


Figure 7. AC Testing Load Circuit



T_A = 0 to 70°C, –40 to 85°C or –40 to 125°C; V_{CC} = 5V ± 5% or 5V ± 10%; V_{PP} = V_{CC}

Table 9. Read Mode AC Characteristics (1)

Symbol	Alt	Parameter	Test Condition	M27C1001								Unit
				-35 (2)		-45		-60		-70		
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t_{AVQV}	t_{ACC}	Address Valid to Output Valid	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}		35		45		60		70	ns
t_{ELQV}	t_{CE}	Chip Enable Low to Output Valid	$\overline{G}$ = V_{IL}		35		45		60		70	ns
t_{GLQV}	t_{OE}	Output Enable Low to Output Valid	$\overline{E}$ = V_{IL}		25		25		30		35	ns
t_{EHQZ} (3)	t_{DF}	Chip Enable High to Output Hi-Z	$\overline{G}$ = V_{IL}	0	25	0	25	0	30	0	30	ns
t_{GHQZ} (3)	t_{DF}	Output Enable High to Output Hi-Z	$\overline{E}$ = V_{IL}	0	25	0	25	0	30	0	30	ns
t_{AXQX}	t_{OH}	Address Transition to Output Transition	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}	0		0		0		0		ns

1. V_{CC} must be applied simultaneously with or before V_{PP} and removed simultaneously or after V_{PP}.
2. Speed obtained with High Speed AC measurement conditions.
3. Sampled only, not 100% tested.

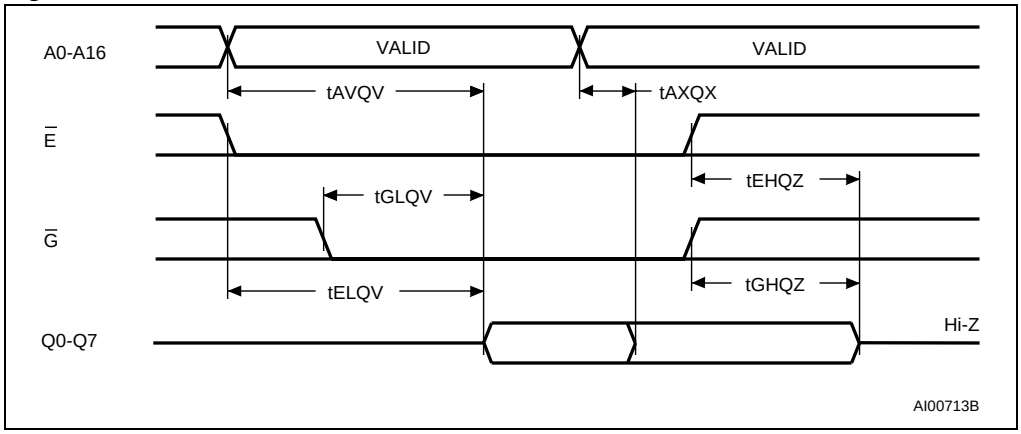
T_A = 0 to 70°C, –40 to 85°C or –40 to 125°C; V_{CC} = 5V ± 5% or 5V ± 10%; V_{PP} = V_{CC}

Table 10. Read Mode AC Characteristics (1)

Symbol	Alt	Parameter	Test Condition	M27C1001								Unit
				-80		-90		-10		-12/-15/ -20/-25		
				Min	Max	Min	Max	Min	Max	Min	Max	
t_{AVQV}	t_{ACC}	Address Valid to Output Valid	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}		80		90		100		120	ns
t_{ELQV}	t_{CE}	Chip Enable Low to Output Valid	$\overline{G}$ = V_{IL}		80		90		100		120	ns
t_{GLQV}	t_{OE}	Output Enable Low to Output Valid	$\overline{E}$ = V_{IL}		40		45		50		60	ns
t_{EHQZ} (2)	t_{DF}	Chip Enable High to Output Hi-Z	$\overline{G}$ = V_{IL}	0	30	0	30	0	30	0	40	ns
t_{GHQZ} (2)	t_{DF}	Output Enable High to Output Hi-Z	$\overline{E}$ = V_{IL}	0	30	0	30	0	30	0	40	ns
t_{AXQX}	t_{OH}	Address Transition to Output Transition	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}	0		0		0		0		ns

1. V_{CC} must be applied simultaneously with or before V_{PP} and removed simultaneously or after V_{PP}.
2. Sampled only, not 100% tested.

Figure 8. Read Mode AC Waveforms



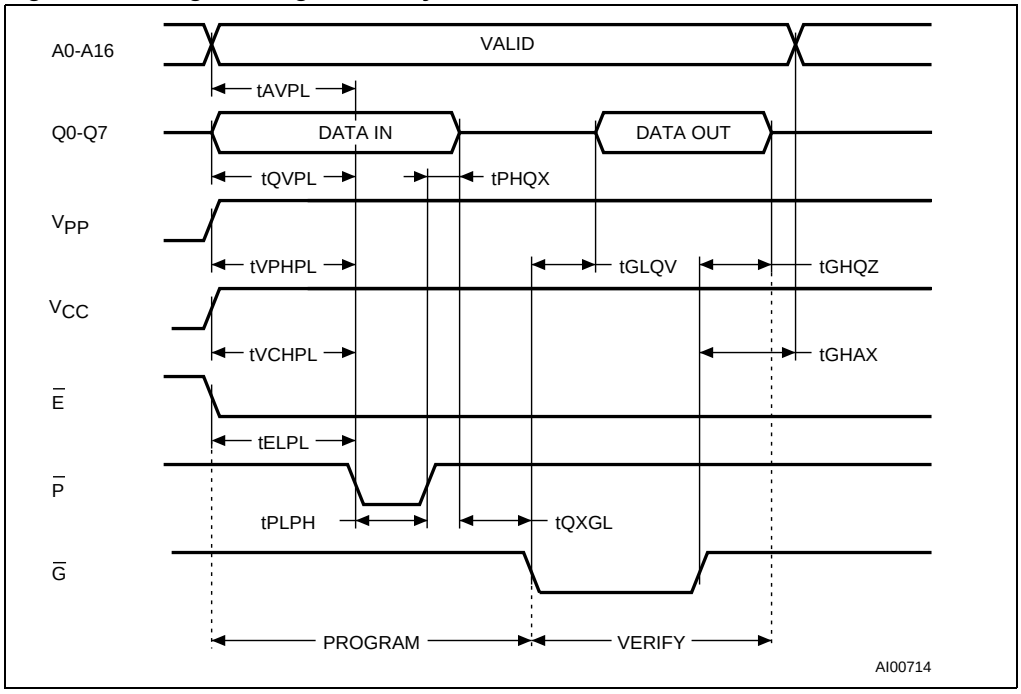
T_A = 25 °C; V_{CC} = 6.25V ± 0.25V; V_{PP} = 12.75V ± 0.25V

Table 11. Programming Mode AC Characteristics (1)

Symbol	Alt	Parameter	Test Condition	Min.	Max.	Unit
t_{AVPL}	t_{AS}	Address Valid to Program Low		2		µs
t_{QVPL}	t_{DS}	Input Valid to Program Low		2		µs
t_{VPHPL}	t_{VPS}	V_{PP} High to Program Low		2		µs
t_{VCHPL}	t_{VCS}	V_{CC} High to Program Low		2		µs
t_{ELPL}	t_{CES}	Chip Enable Low to Program Low		2		µs
t_{PLPH}	t_{PW}	Program Pulse Width		95	105	µs
t_{PHQX}	t_{DH}	Program High to Input Transition		2		µs
t_{QXGL}	t_{OES}	Input Transition to Output Enable Low		2		µs
t_{GLQV}	t_{OE}	Output Enable Low to Output Valid			100	ns
t_{GHQZ} (2)	t_{DFP}	Output Enable High to Output Hi-Z		0	130	ns
t_{GHAX}	t_{AH}	Output Enable High to Address Transition		0		ns

1. V_{CC} must be applied simultaneously with or before V_{PP} and removed simultaneously or after V_{PP}.
2. Sampled only, not 100% tested.

Figure 9. Programming and Verify Modes AC Waveforms



5.3 32-lead Rectangular Plastic Leaded Chip Carrier (PLCC32)

Figure 12. PLCC32 package outline

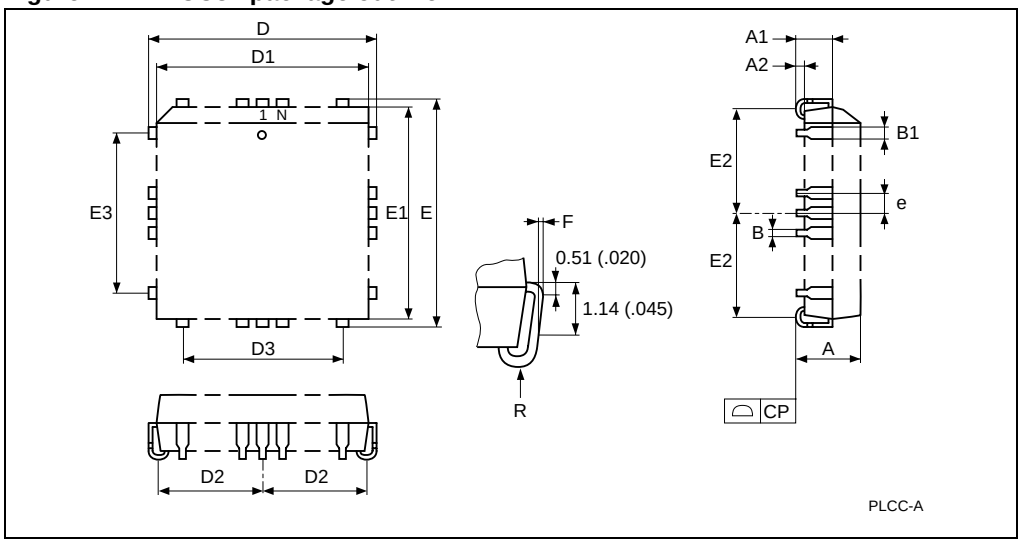


Table 14. PLCC32 package mechanical data

Symbol	millimeters			inches		
	Min	Typ	Max	Min	Typ	Max
A	3.18		3.56	0.125		0.140
A1	1.53		2.41	0.060		0.095
A2	0.38			0.015		
B	0.33		0.53	0.013		0.021
B1	0.66		0.81	0.026		0.032
CP			0.10			0.004
D	12.32		12.57	0.485		0.495
D1	11.35		11.51	0.447		0.453
D2	4.78		5.66	0.188		0.223
D3		7.62			0.300	
E	14.86		15.11	0.585		0.595
E1	13.89		14.05	0.547		0.553
E2	6.05		6.93	0.238		0.273
E3		10.16			0.400	
e		1.27			0.050	
F	0.00		0.13	0.000		0.005
R		0.89			0.035	
N		32			32	

6 Part numbering

Table 16. Ordering information scheme

Example: M27C1001 -35 X C 1 TR

Device Type

M27

Supply Voltage

C = 5V

Device Function

1001 = 1 Mbit (128Kb x 8)

Speed

-35 (1) = 35 ns
-45 = 45 ns
-60 = 60 ns
-70 = 70 ns
-80 = 80 ns
-90 = 90 ns
-10 = 100 ns
-12 = 120 ns
-15 = 150 ns
-20 = 200 ns
-25 = 250 ns

V_{CC} Tolerance

blank = ± 10%
X = ± 5%

Package

F = FDIP32W
B = PDIP32
C = PLCC32
N = TSOP32: 8 x 20 mm

Temperature Range

1 = 0 to 70 °C
3 = –40 to 125 °C
6 = –40 to 85 °C

Options

TR = ECOPACK® package, Tape & Reel Packing

1. High Speed, see AC Characteristics section for further information.

For a list of available options (Speed, Package, etc...) or for further information on any aspect of this device, please contact the STMicroelectronics Sales Office nearest to you.