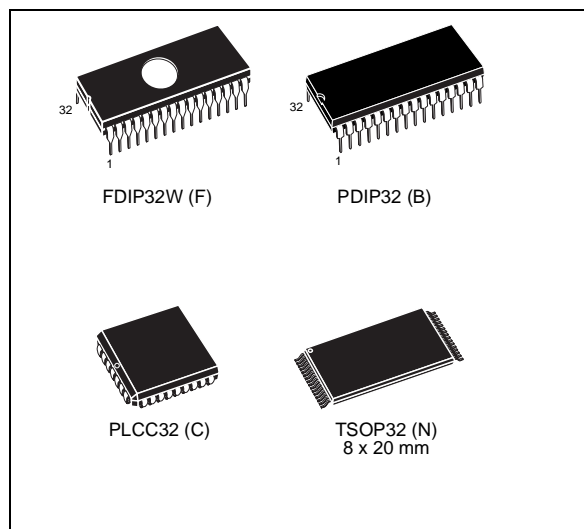


## 2 Mbit (256Kb x 8) UV EPROM and OTP EPROM

### Features

- $5V \pm 10\%$  supply voltage in Read operation
- Access time: 55ns
- Low power consumption:
  - Active Current 30mA at 5MHz
  - Standby Current 100 $\mu$ A
- Programming voltage:  $12.75V \pm 0.25V$
- Programming time: 100 $\mu$ s/word
- Electronic signature
  - Manufacturer Code: 20h
  - Device Code: 61h
- Packages
  - ECOPACK<sup>®</sup> packages available.



# 1 Summary description

The M27C2001 is a high speed 2 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 262,144 by 8 bits.

The FDIP32W (window ceramic frit-seal package) has a transparent lids which allow 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.

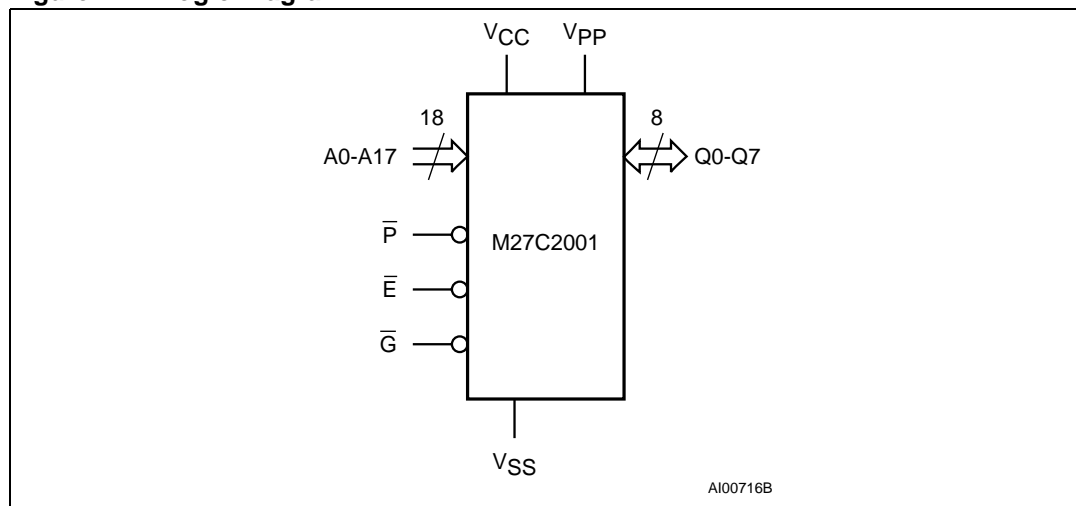
For applications where the content is programmed only one time and erasure is not required, the M27C2001 is offered in PDIP32, PLCC32 and TSOP32 (8 x 20 mm) packages.

In order to meet environmental requirements, ST offers the M27C2001 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](http://www.st.com).

**Figure 1. Logic Diagram**



**Table 1. Signal Names**

A0-A17	Address Inputs
Q0-Q7	Data Outputs
$\bar{E}$	Chip Enable
$\bar{G}$	Output Enable
$\bar{P}$	Program
$V_{PP}$	Program Supply
$V_{CC}$	Supply Voltage
$V_{SS}$	Ground

### 3 Maximum ratings

Except for the rating "Operating Temperature Range", stresses above those listed in the [Table 4](#) 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.

**Table 4. Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
$T_A$	Ambient Operating Temperature <sup>(1)</sup>	-40 to 125	°C
$T_{BIAS}$	Temperature Under Bias	-50 to 125	°C
$T_{STG}$	Storage Temperature	-65 to 150	°C
$V_{IO}$ <sup>(2)</sup>	Input or Output Voltage (except A9)	-2 to 7	V
$V_{CC}$	Supply Voltage	-2 to 7	V
$V_{A9}$ <sup>(2)</sup>	A9 Voltage	-2 to 13.5	V
$V_{PP}$	Program Supply Voltage	-2 to 14	V

1. Depends on range.
2. 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  $V_{CC} + 0.5V$  with possible overshoot to  $V_{CC} + 2V$  for a period less than 20ns.

## 4 DC and AC parameters

This section summarizes the operating measurement conditions, and the DC and AC characteristics of the device. The parameters in the DC and AC characteristics Tables that follow, are derived from tests performed under the Measurement Conditions summarized in [Table 5](#), Operating and AC Measurement Conditions. Designers should check that the operating conditions in their circuit match the operating conditions when relying on the quoted parameters.

**Table 5. AC Measurement conditions**

	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

**Table 6. Capacitance <sup>(1)</sup>** ( $T_A = 25^\circ\text{C}$ ,  $f = 1\text{ MHz}$ )

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

**Figure 6. AC Testing Input Output Waveform**

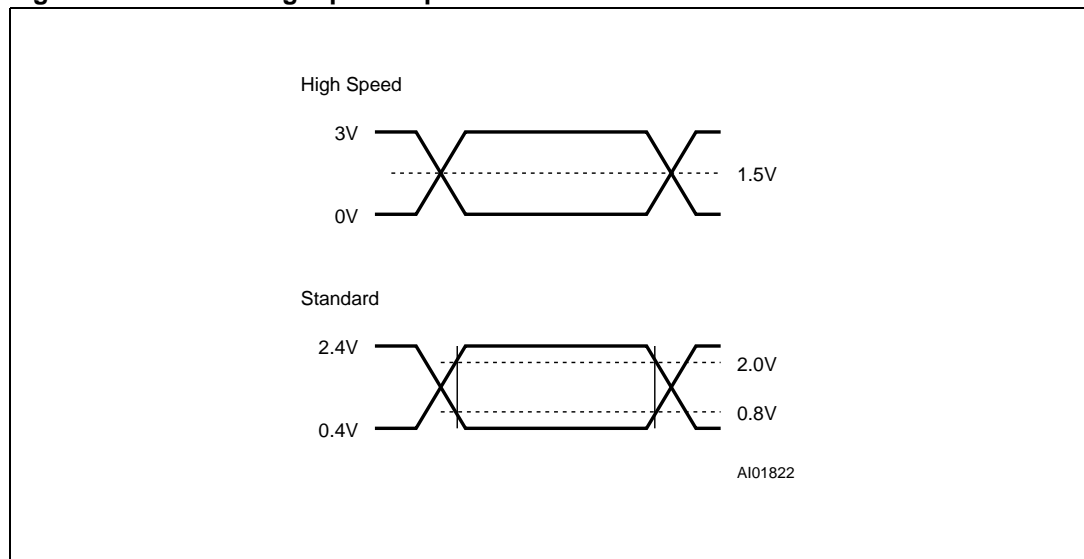


Figure 7. AC Testing Load Circuit

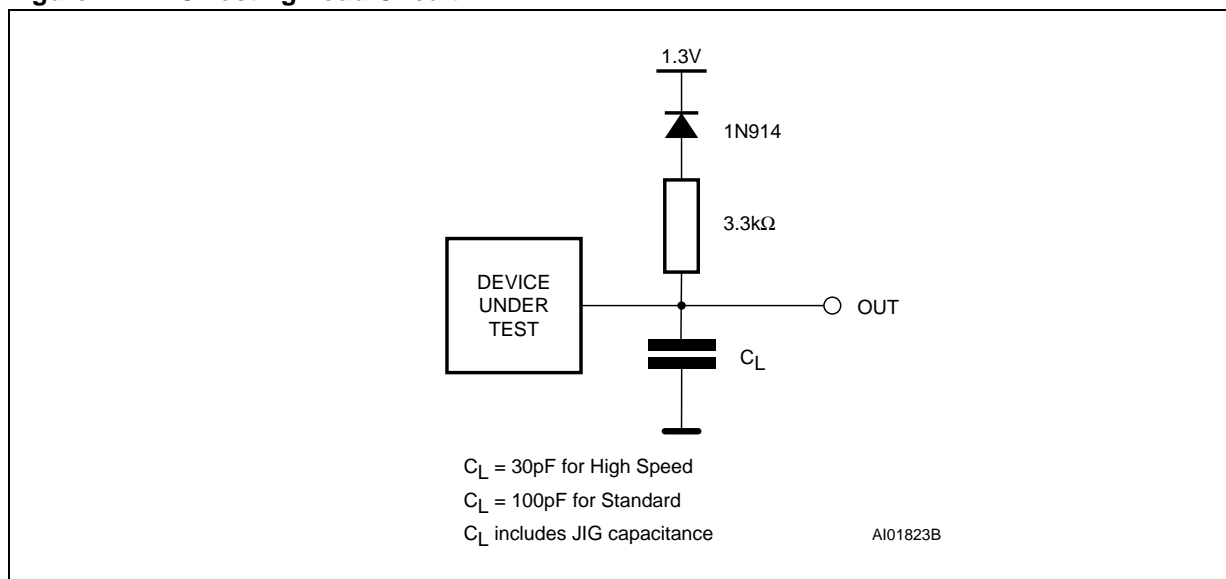


Table 7. Read Mode DC Characteristics (1)  
 (T<sub>A</sub> = 0 to 70°C or -40 to 85°C; V<sub>CC</sub> = 5V ± 5% or 5V ± 10%; V<sub>PP</sub> = V<sub>CC</sub>)

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

1. V<sub>CC</sub> must be applied simultaneously with or before V<sub>PP</sub> and removed simultaneously or after V<sub>PP</sub>.
2. Maximum DC voltage on Output is V<sub>CC</sub> + 0.5V.

**Table 8. Programming Mode DC Characteristics (1)**  
 ( $T_A = 25^\circ\text{C}$ ;  $V_{CC} = 6.25\text{V} \pm 0.25\text{V}$ ;  $V_{PP} = 12.75\text{V} \pm 0.25\text{V}$ )

Symbol	Parameter	Test Condition	Min	Max	Unit
$I_{LI}$	Input Leakage Current	$0 \leq V_{IN} \leq V_{IH}$		$\pm 10$	$\mu\text{A}$
$I_{CC}$	Supply Current			50	mA
$I_{PP}$	Program Current	$\bar{E} = V_{IL}$		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	$I_{OL} = 2.1\text{mA}$		0.4	V
$V_{OH}$	Output High Voltage TTL	$I_{OH} = -400\mu\text{A}$	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  $V_{PP}$ .

**Table 9. Read Mode AC Characteristics (1)**  
 ( $T_A = 0$  to  $70^\circ\text{C}$  or  $-40$  to  $85^\circ\text{C}$ ;  $V_{CC} = 5\text{V} \pm 5\%$  or  $5\text{V} \pm 10\%$ ;  $V_{PP} = V_{CC}$ )

Symbol	Alt	Parameter	Test Condition	M27C2001								Unit
				-55 (2)		-70		-80		-90		
				Min	Max	Min	Max	Min	Max	Min	Max	
$t_{AVQV}$	$t_{ACC}$	Address Valid to Output Valid	$\bar{E} = V_{IL}$ , $\bar{G} = V_{IL}$		55		70		80		90	ns
$t_{ELQV}$	$t_{CE}$	Chip Enable Low to Output Valid	$\bar{G} = V_{IL}$		55		70		80		90	ns
$t_{GLQV}$	$t_{OE}$	Output Enable Low to Output Valid	$\bar{E} = V_{IL}$		30		35		40		40	ns
$t_{EHQZ}^{(3)}$	$t_{DF}$	Chip Enable High to Output Hi-Z	$\bar{G} = V_{IL}$	0	30	0	30	0	30	0	30	ns
$t_{GHQZ}^{(3)}$	$t_{DF}$	Output Enable High to Output Hi-Z	$\bar{E} = V_{IL}$	0	30	0	30	0	30	0	30	ns
$t_{AXQX}$	$t_{OH}$	Address Transition to Output Transition	$\bar{E} = V_{IL}$ , $\bar{G} = V_{IL}$	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. In case of 55ns speed see High Speed AC measurement conditions.

3. Sampled only, not 100% tested.

**Table 10. Read Mode AC Characteristics <sup>(1)</sup>**(T<sub>A</sub> = 0 to 70°C or -40 to 85°C; V<sub>CC</sub> = 5V ± 5% or 5V ± 10%; V<sub>PP</sub> = V<sub>CC</sub>)

Symbol	Alt	Parameter	Test Condition	M27C2001						Unit
				-10		-12		-15/-20/-25		
				Min	Max	Min	Max	Min	Max	
t <sub>AVQV</sub>	t <sub>ACC</sub>	Address Valid to Output Valid	$\bar{E} = V_{IL}, \bar{G} = V_{IL}$		100		120		150	ns
t <sub>ELQV</sub>	t <sub>CE</sub>	Chip Enable Low to Output Valid	$\bar{G} = V_{IL}$		100		120		150	ns
t <sub>GLQV</sub>	t <sub>OE</sub>	Output Enable Low to Output Valid	$\bar{E} = V_{IL}$		50		50		60	ns
t <sub>EHQZ</sub> <sup>(2)</sup>	t <sub>DF</sub>	Chip Enable High to Output Hi-Z	$\bar{G} = V_{IL}$	0	30	0	40	0	50	ns
t <sub>GHQZ</sub> <sup>(2)</sup>	t <sub>DF</sub>	Output Enable High to Output Hi-Z	$\bar{E} = V_{IL}$	0	30	0	40	0	50	ns
t <sub>AXQX</sub>	t <sub>OH</sub>	Address Transition to Output Transition	$\bar{E} = V_{IL}, \bar{G} = V_{IL}$	0		0		0		ns

1. V<sub>CC</sub> must be applied simultaneously with or before V<sub>PP</sub> and removed simultaneously or after V<sub>PP</sub>.

2. Sampled only, not 100% tested.

Figure 8. Read Mode AC Waveforms

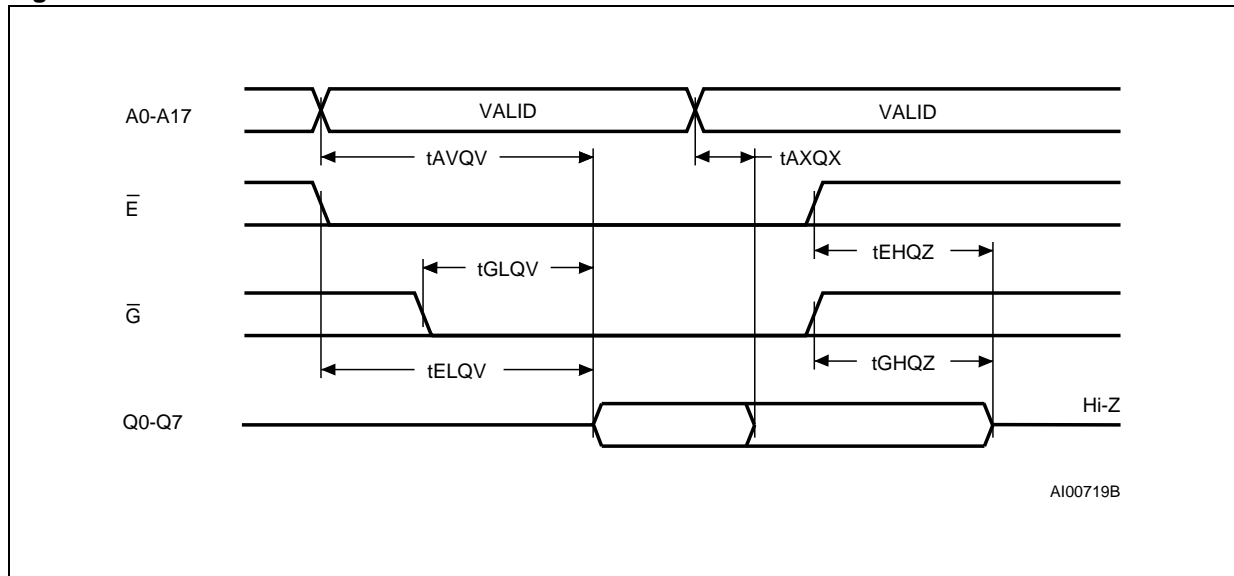


Table 11. Programming Mode AC Characteristics<sup>(1)</sup>  
 ( $T_A = 25^\circ\text{C}$ ;  $V_{CC} = 6.25 \pm 0.25\text{V}$ ;  $V_{PP} = 12.75 \pm 0.25\text{V}$ )

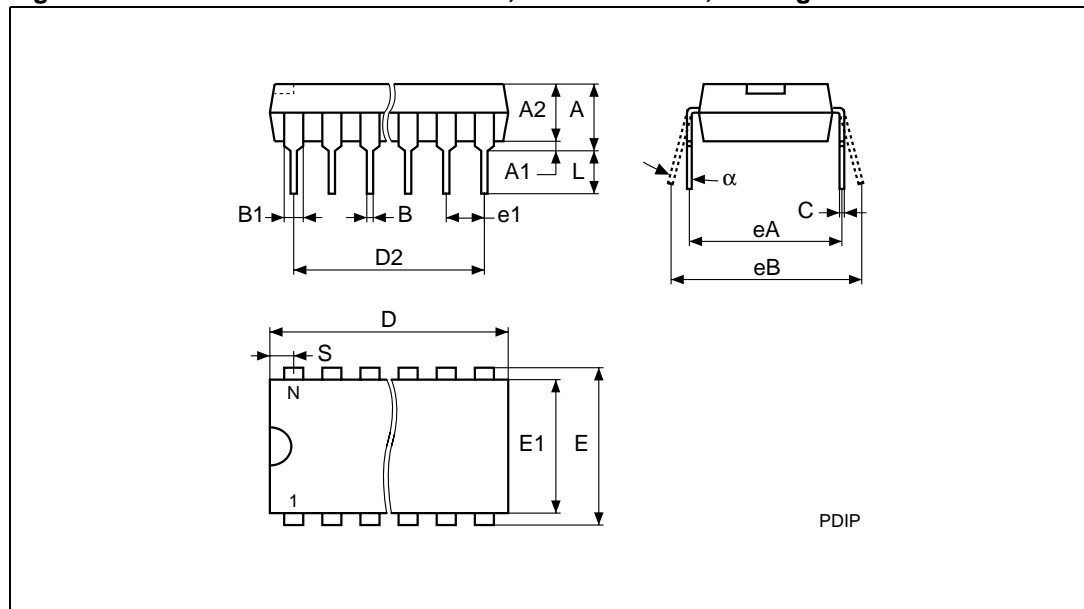
Symbol	Alt	Parameter	Test Condition	Min	Max	Unit
$t_{AVPL}$	$t_{AS}$	Address Valid to Program Low		2		$\mu\text{s}$
$t_{QVPL}$	$t_{DS}$	Input Valid to Program Low		2		$\mu\text{s}$
$t_{VPHPL}$	$t_{VPS}$	$V_{PP}$ High to Program Low		2		$\mu\text{s}$
$t_{VCHPL}$	$t_{VCS}$	$V_{CC}$ High to Program Low		2		$\mu\text{s}$
$t_{ELPL}$	$t_{CES}$	Chip Enable Low to Program Low		2		$\mu\text{s}$
$t_{PLPH}$	$t_{PW}$	Program Pulse Width		95	105	$\mu\text{s}$
$t_{PHQX}$	$t_{DH}$	Program High to Input Transition		2		$\mu\text{s}$
$t_{QXGL}$	$t_{OES}$	Input Transition to Output Enable Low		2		$\mu\text{s}$
$t_{GLQV}$	$t_{OE}$	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

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

Table 13. PDIP32 - 32 lead Plastic DIP, 600 mils width, Package Mechanical Data

Symbol	mm			inches		
	Typ	Min	Max	Typ	Min	Max
A		—	5.08		—	0.200
A1		0.38	—		0.015	—
A2		3.56	4.06		0.140	0.160
B		0.38	0.51		0.015	0.020
B1	1.52	—	—	0.060	—	—
C		0.20	0.30		0.008	0.012
D		41.78	42.04		1.645	1.655
D2	38.10	—	—	1.500	—	—
E	15.24	—	—	0.600	—	—
E1		13.59	13.84		0.535	0.545
e1	2.54	—	—	0.100	—	—
eA	15.24	—	—	0.600	—	—
eB		15.24	17.78		0.600	0.700
L		3.18	3.43		0.125	0.135
S		1.78	2.03		0.070	0.080
$\alpha$		0°	10°		0°	10°
N		32			32	

Figure 11. PDIP32 - 32 lead Plastic DIP, 600 mils width, Package Outline

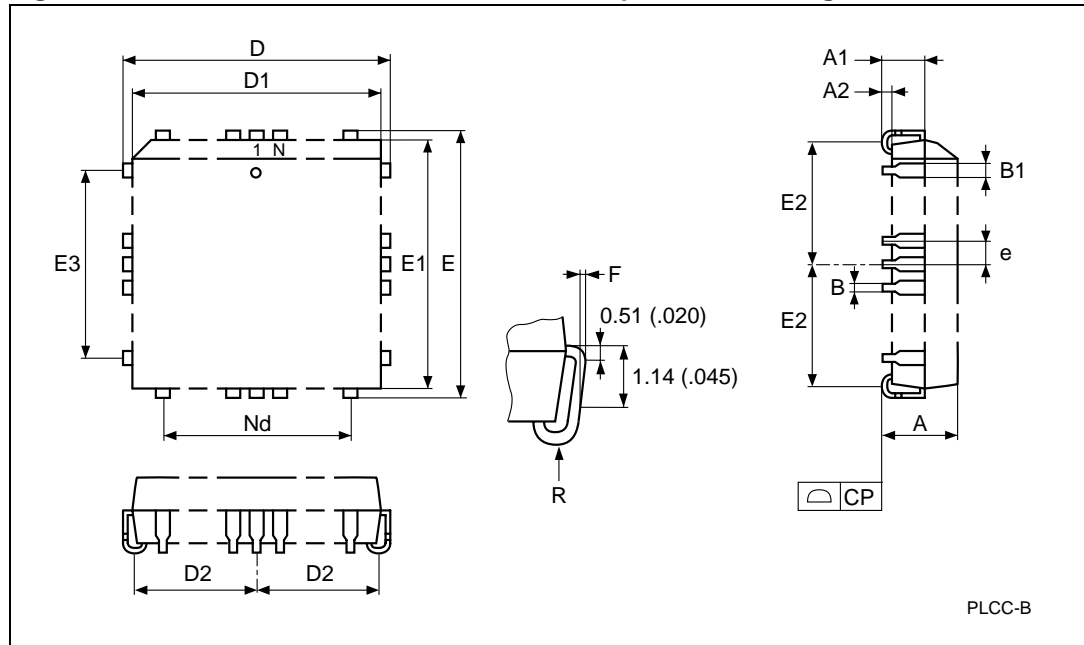


1. Drawing is not to scale.

Table 14. PLCC32 - 32 lead Plastic Leaded Chip Carrier, Package Mechanical Data

Symbol	millimeters			inches			
	Typ	Min	Max	Typ	Min	Max	
A		2.54	3.56		0.100	0.140	
A1		1.52	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	
D		12.32	12.57		0.485	0.495	
D1		11.35	11.56		0.447	0.455	
D2		9.91	10.92		0.390	0.430	
e	1.27			0.050			
E		14.86	15.11		0.585	0.595	
E1		13.89	14.10		0.547	0.555	
E2		12.45	13.46		0.490	0.530	
F		0.00	0.25		0.000	0.010	
R	0.89			0.035			
N		32			32		
Nd		7			7		
Ne		9			9		
CP			0.10			0.004	

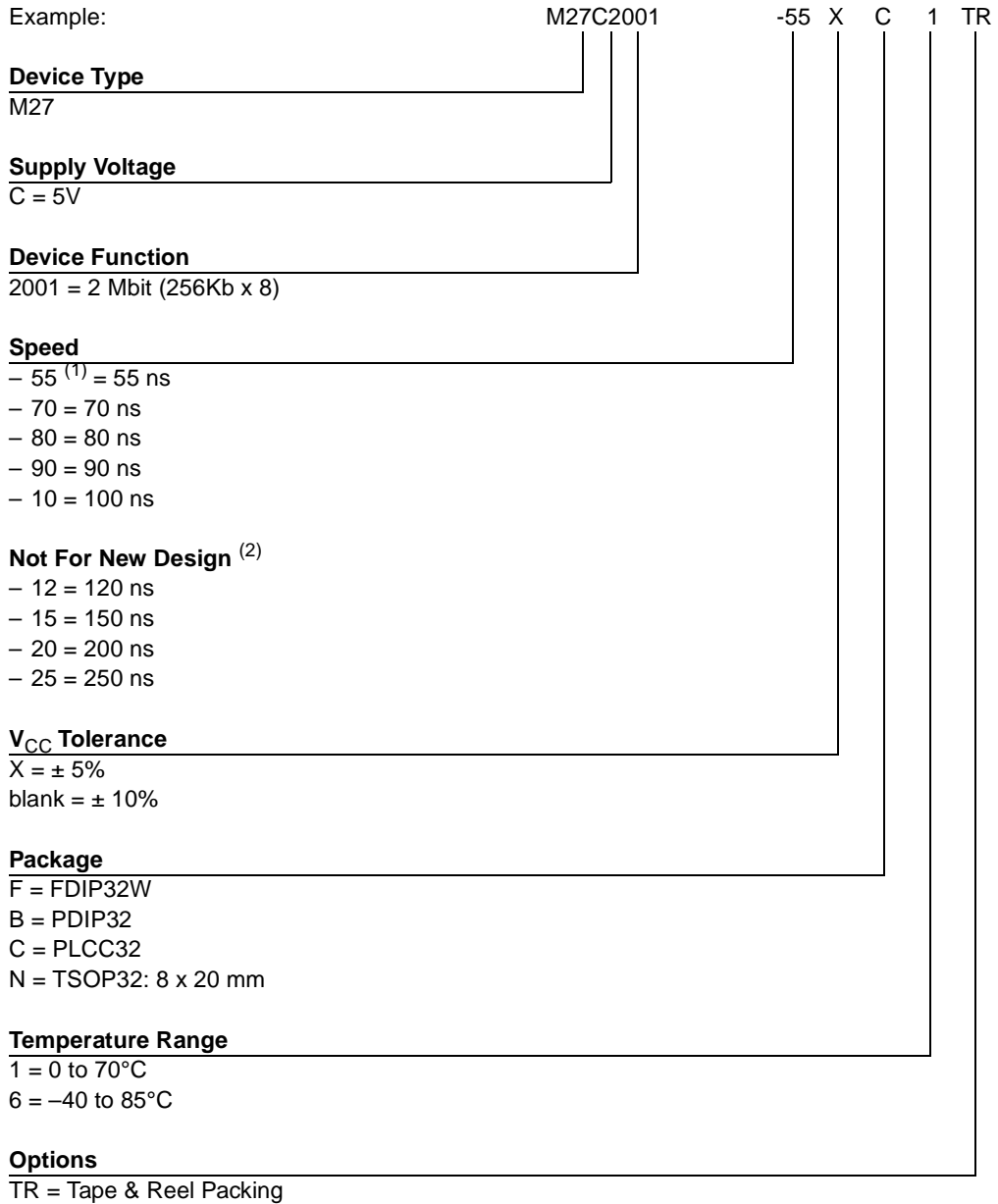
Figure 12. PLCC32 - 32 lead Plastic Leaded Chip Carrier, Package Outline



1. Drawing is not to scale.

## 6 Part numbering scheme

**Table 16. Ordering Information Scheme**



1. High Speed, see AC Characteristics section for further information.
2. These speeds are replaced by the 100ns.

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