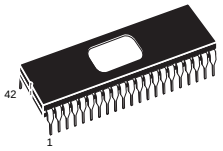
M27V160

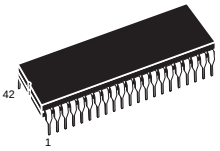
16 Mbit (2Mb x8 or 1Mb x16)
Low Voltage UV EPROM and OTP EPROM

Features

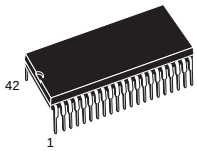
- 3V to 3.6V Low Voltage in Read Operation
- Access Time: 100 ns
- Byte-wide or Word-wide Configurable
- 16 Mbit Mask ROM Replacement
- Low Power Consumption
  - Active Current: 30 mA at 8 MHz
  - Standby Current: 60 µA
- Programming Voltage: 12.5V ± 0.25V
- Programming Time: 50 µs/word
- Electronic Signature
  - Manufacturer Code: 20h
  - Device Code: B1h
- ECOPACK® packages available



FDIP42W (F)

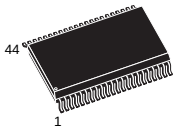


PDIP42 (B)



SDIP42 (S)

PLCC44 (K)



SO44 (M)

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1 Summary description

The M27V160 is a low voltage 16 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 data or program storage. It is organised as either 2 Mbit words of 8 bit or 1 Mbit words of 16 bit. The pin-out is compatible with a 16 Mbit Mask ROM.

The M27V160 operates in the read mode with a supply voltage as low as 3V. The decrease in operating power allows either a reduction of the size of the battery or an increase in the time between battery recharges.

The FDIP42W (window ceramic frit-seal package) has a transparent lid which allows the user to expose the chip to ultraviolet light to erase the bit pattern. A new pattern can then be written rapidly to the device by following the programming procedure.

For applications where the content is programmed only one time and erasure is not required, the M27V160 is offered in PDIP42, SDIP42, PLCC44 and SO44 packages.

In order to meet environmental requirements, ST offers the M27V160 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

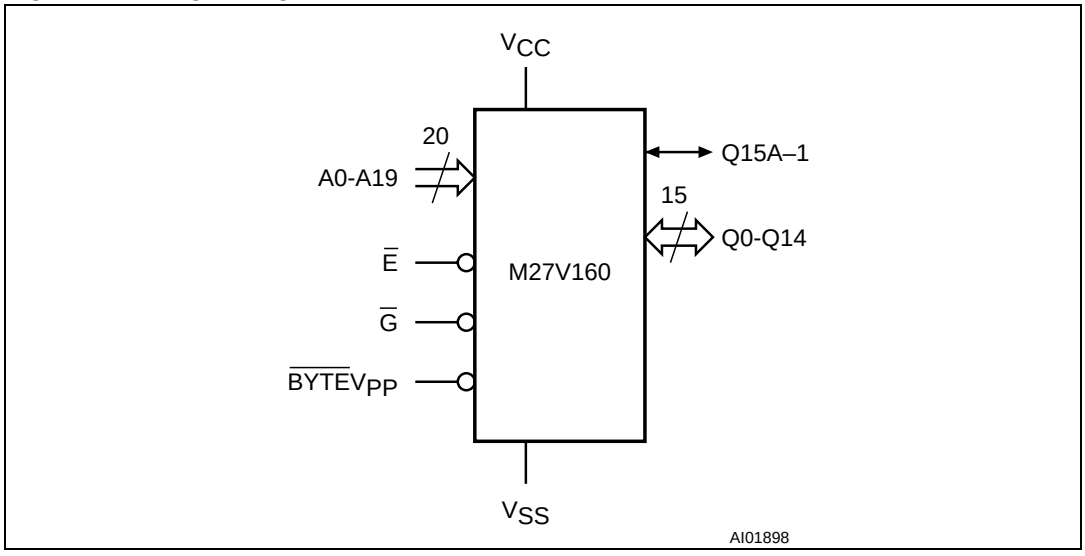


Table 1. Signal descriptions

Signal	Description
A0-A19	Address Inputs
Q0-Q7	Data Outputs
Q8-Q14	Data Outputs
Q15A–1	Data Output / Address Input
$\overline{E}$	Chip Enable
$\overline{G}$	Output Enable
$\overline{BYTE}V_{PP}$	Byte Mode / Program Supply
V_{CC}	Supply Voltage
V_{SS}	Ground
NC	Not Connected Internally

Figure 2. DIP Connections

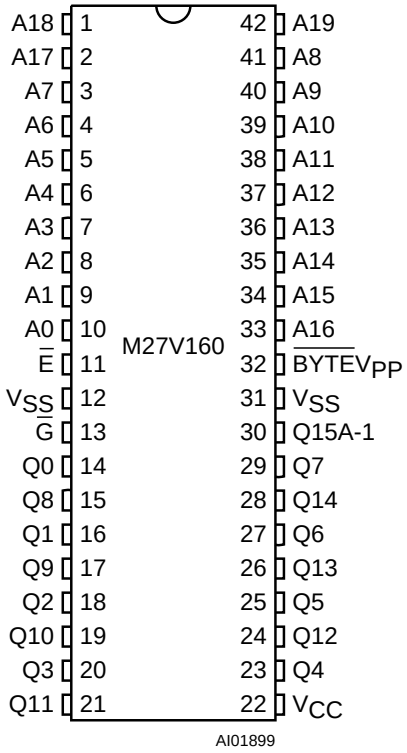


Figure 3. SO Connections

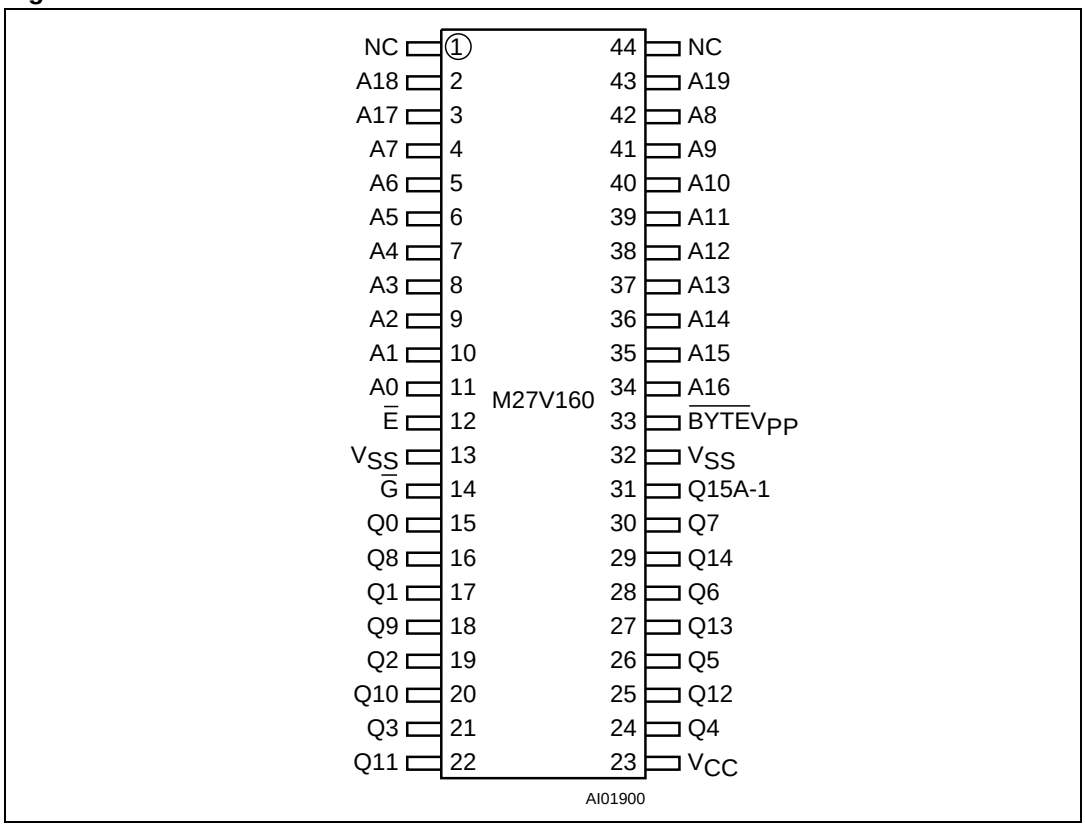
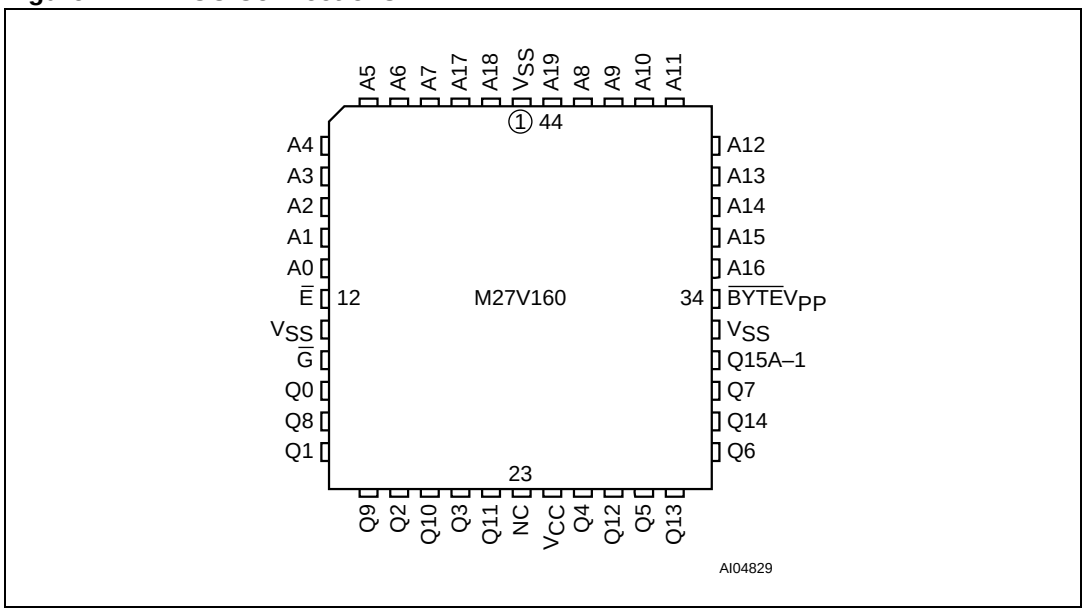


Figure 4. PLCC Connections



2 Device description

Table 2 lists the operating modes of the M27V160. A single power supply is required in the read mode. All inputs are TTL compatible except for V_{PP} and 12V on A9 for the Electronic Signature.

Table 2. Operating Modes (1)

Mode	$\overline{E}$	$\overline{G}$	$\overline{BYTE}V_{PP}$	A9	Q15A–1	Q14-Q8	Q7-Q0
Read Word-wide	V_{IL}	V_{IL}	V_{IH}	X	Data Out	Data Out	Data Out
Read Byte-wide Upper	V_{IL}	V_{IL}	V_{IL}	X	V_{IH}	Hi-Z	Data Out
Read Byte-wide Lower	V_{IL}	V_{IL}	V_{IL}	X	V_{IL}	Hi-Z	Data Out
Output Disable	V_{IL}	V_{IH}	X	X	Hi-Z	Hi-Z	Hi-Z
Program	V_{IL} Pulse	V_{IH}	V_{PP}	X	Data In	Data In	Data In
Verify	V_{IH}	V_{IL}	V_{PP}	X	Data Out	Data Out	Data Out
Program Inhibit	V_{IH}	V_{IH}	V_{PP}	X	Hi-Z	Hi-Z	Hi-Z
Standby	V_{IH}	X	X	X	Hi-Z	Hi-Z	Hi-Z
Electronic Signature	V_{IL}	V_{IL}	V_{IH}	V_{ID}	Code	Codes	Codes

1. X = V_{IH} or V_{IL}, V_{ID} = 12V ± 0.5V.

2.1 Read mode

The M27V160 has two organisations, Word-wide and Byte-wide. The organisation is selected by the signal level on the $\overline{BYTE}V_{PP}$ pin. When $\overline{BYTE}V_{PP}$ is at V_{IH} the Word-wide organisation is selected and the Q15A–1 pin is used for Q15 Data Output. When the $\overline{BYTE}V_{PP}$ pin is at V_{IL} the Byte-wide organisation is selected and the Q15A–1 pin is used for the Address Input A–1. When the memory is logically regarded as 16 bit wide, but read in the Byte-wide organisation, then with A–1 at V_{IL} the lower 8 bits of the 16 bit data are selected and with A–1 at V_{IH} the upper 8 bits of the 16 bit data are selected.

The M27V160 has two control functions, both of which must be logically active in order to obtain data at the outputs. In addition the Word-wide or Byte- wide organisation must be selected.

Chip Enable ($\overline{E}$) is the power control and should be used for device selection. Output Enable ($\overline{G}$) is the output control and should be used to gate data to the output pins independent of device selection. Assuming that the addresses are stable, the address access time (t_{AVQV}) is equal to the delay from $\overline{E}$ to output (t_{ELQV}). Data is available at the output after a delay of t_{GLQV} from the falling edge of $\overline{G}$, assuming that $\overline{E}$ has been low and the addresses have been stable for at least t_{AVQV}-t_{GLQV}.

2.2 Standby mode

The M27V160 has a standby mode which reduces the active current from 20mA to 20µA with low voltage operation $V_{CC} \leq 3.6V$, see Read Mode DC Characteristics table for details.The M27V160 is placed in the standby mode by applying a CMOS high signal to the

$\overline{E}$ input. When in the standby mode, the outputs are in a high impedance state, independent of the $\overline{G}$ input.

2.3 Two-line output control

Because EPROMs are usually used in larger memory arrays, this product features a 2 line control function which accommodates the use of multiple memory connection. The two line control function allows:

- the lowest possible memory power dissipation,
- complete assurance that output bus contention will not occur.

For the most efficient use of these two control lines, $\overline{E}$ should be decoded and used as the primary device selecting function, while $\overline{G}$ should be made a common connection to all devices in the array and connected to the $\overline{READ}$ line from the system control bus. This ensures that all deselected memory devices are in their low power standby mode and that the output pins are only active when data is required from a particular memory device.

2.4 System considerations

The power switching characteristics of Advanced CMOS EPROMs require careful decoupling of the supplies to the devices. The supply current I_{CC} has three segments of importance to the system designer: the standby current, the active current and the transient peaks that are produced by the falling and rising edges of $\overline{E}$. The magnitude of the transient current peaks is dependent on the capacitive and inductive loading of the device outputs. The associated transient voltage peaks can be suppressed by complying with the two line output control and by properly selected decoupling capacitors. It is recommended that a 0.1µF ceramic capacitor is used on every device between V_{CC} and V_{SS}. This should be a high frequency type of low inherent inductance and should be placed as close as possible to the device. In addition, a 4.7µF electrolytic capacitor should be used between V_{CC} and V_{SS} for every eight devices. This capacitor should be mounted near the power supply connection point. The purpose of this capacitor is to overcome the voltage drop caused by the inductive effects of PCB traces.

2.5 Programming

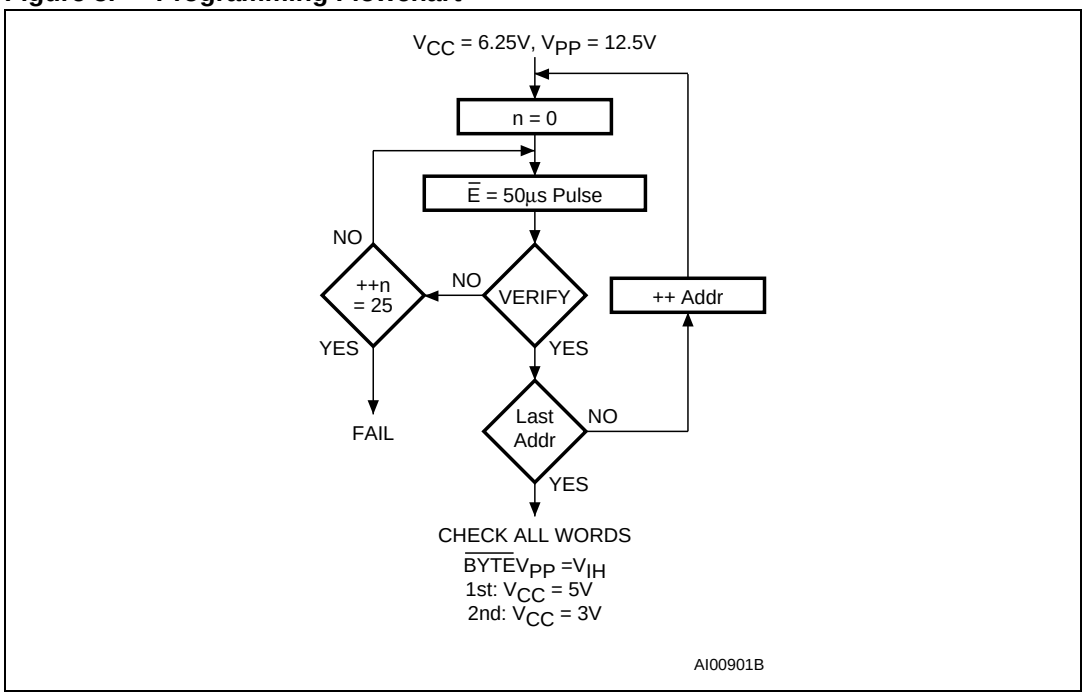
The M27V160 has been designed to be fully compatible with the M27C160. As a result the M27V160 can be programmed as the M27C160 on the same programming equipments applying 12.75V on V_{PP} and 6.25V on V_{CC} by the use of the same PRESTO III algorithm. When delivered (and after each erasure for UV EPROM), all bits of the M27V160 are in the '1' state. Data is introduced by selectively programming '0's to the desired bit locations. Although only '0's will be programmed, both '1's and '0's can be present in the data word. The only way to change a '0' to a '1' is by die exposure to ultraviolet light (UV EPROM). The M27V160 is in the programming mode when V_{pp} input is at 12.5V, $\overline{G}$ is at V_{IH} and $\overline{E}$ is pulsed to V_{IL}. The data to be programmed is applied to 16 bits in parallel to the data output pins. The levels required for the address and data inputs are TTL. V_{CC} is specified to be 6.25V ± 0.25V.

2.6 Presto III programming algorithm

The Presto III Programming Algorithm allows the whole array to be programed with a guaranteed margin in a typical time of 52.5 seconds. Programming with Presto III consists of applying a sequence of 50µs program pulses to each word until a correct Verify occurs (see *Figure 5.*).

During programing and verify operation a Margin Mode circuit is automatically activated to guarantee that each cell is programed with enough margin. No overprogram pulse is applied since the Verify in Margin Mode at V_{CC} much higher than 3.6V provides the necessary margin to each programmed cell.

Figure 5. Programming Flowchart



2.7 Program Inhibit

Programming of multiple M27V160s in parallel with different data is also easily accomplished. Except for $\overline{E}$, all like inputs including $\overline{G}$ of the parallel M27V160 may be common. A TTL low level pulse applied to a M27V160's $\overline{E}$ input and V_{PP} at 12.5V, will program that M27V160. A high level $\overline{E}$ input inhibits the other M27V160s from being programmed.

2.8 Program Verify

A verify (read) should be performed on the programmed bits to determine that they were correctly programmed. The verify is accomplished with $\overline{E}$ at V_{IH} and $\overline{G}$ at V_{IL}, V_{PP} at 12.5V and V_{CC} at 6.25V.

2.9 Electronic Signature

The Electronic Signature (ES) mode allows the reading out of a binary code from an EPROM that will identify its manufacturer and type. This mode is intended for use by programming equipment to automatically match the device to be programmed with its corresponding programming algorithm. The ES mode is functional in the 25°C ± 5°C ambient temperature range that is required when programming the M27V160. To activate the ES mode, the programming equipment must force 11.5V to 12.5V on address line A9 of the M27V160, with $V_{PP} = V_{CC} = 5V$.

Two identifier bytes may then be sequenced from the device outputs by toggling address line A0 from V_{IL} to V_{IH}. All other address lines must be held at V_{IL} during Electronic Signature mode.

Byte 0 (A0 = V_{IL}) represents the manufacturer code and byte 1 (A0 = V_{IH}) the device identifier code. For the STMicroelectronics M27V160, these two identifier bytes are given in *Table 3* and can be read-out on outputs Q7 to Q0. Note that the M27V160 and M27C160 have the same identifier bytes.

Table 3. Electronic Signature

Identifier	A0	Q15 and Q7	Q14 and Q6	Q13 and Q5	Q12 and Q4	Q11 and Q3	Q10 and Q2	Q9 and Q1	Q8 and Q0	Hex Data
Manufacturer's Code	V_{IL}	0	0	1	0	0	0	0	0	20h
Device Code	V_{IH}	1	0	1	1	0	0	0	1	B1h

2.10 Erasure operation (applies to UV EPROM)

The erasure characteristics of the M27V160 is such that erasure begins when the cells are exposed to light with wavelengths shorter than approximately 4000 Å. It should be noted that sunlight and some type of fluorescent lamps have wavelengths in the 3000-4000 Å range. Research shows that constant exposure to room level fluorescent lighting could erase a typical M27V160 in about 3 years, while it would take approximately 1 week to cause erasure when exposed to direct sunlight. If the M27V160 is to be exposed to these types of lighting conditions for extended periods of time, it is suggested that opaque labels be put over the M27V160 window to prevent unintentional erasure. The recommended erasure procedure for M27V160 is exposure to short wave ultraviolet light which has a wavelength of 2537 Å. The integrated dose (i.e. UV intensity x exposure time) for erasure should be a minimum of 30 W-sec/cm^2. The erasure time with this dosage is approximately 30 to 40 minutes using an ultraviolet lamp with 12000 µW/cm^2 power rating. The M27V160 should be placed within 2.5 cm (1 inch) of the lamp tubes during the erasure. Some lamps have a filter on their tubes which should be removed before erasure.

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

4 DC and AC parameters

T_A = 0 to 70°C or –40 to 85°C; V_{CC} = 3.3V ± 10%; V_{PP} = V_{CC}

Table 5. Read Mode DC Characteristics (1)

Symbol	Parameter	Test Condition	Min.	Max.	Unit
I_{LI}	Input Leakage Current	$0V \le V_{IN} \le V_{CC}$		±1	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 = 8MHz, $V_{CC} \le 3.6V$		30	mA
		$\overline{E} = V_{IL}$, $\overline{G} = V_{IL}$, I_{OUT} = 0mA, f = 5MHz, $V_{CC} \le 3.6V$		20	mA
I_{CC1}	Supply Current (Standby) TTL	$\overline{E} = V_{IH}$		1	mA
I_{CC2}	Supply Current (Standby) CMOS	$\overline{E} > V_{CC} - 0.2V$, $V_{CC} \le 3.6V$		60	µA
I_{PP}	Program Current	$V_{PP} = V_{CC}$		10	µA
V_{IL}	Input Low Voltage		–0.3	$0.2V_{CC}$	V
V_{IH} (2)	Input High Voltage		$0.7V_{CC}$	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

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} = 12.5V ± 0.25V

Table 6. Programming Mode DC Characteristics (1)

Symbol	Parameter	Test Condition	Min	Max	Unit
I_{LI}	Input Leakage Current	$0 \le V_{IN} \le V_{CC}$		±1	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		2.4	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} = –2.5mA	3.6		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 7. 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

T_A = 25 °C, f = 1 MHz

Table 8. Capacitance (1)

Symbol	Parameter	Test Condition	Min.	Max.	Unit
C_{IN}	Input Capacitance (except $\overline{BYTE}V_{PP}$)	V_{IN} = 0V		10	pF
	Input Capacitance ($\overline{BYTE}V_{PP}$)	V_{IN} = 0V		120	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V		12	pF

1. Sampled only, not 100% tested.

Figure 6. AC Testing Input Output Waveform

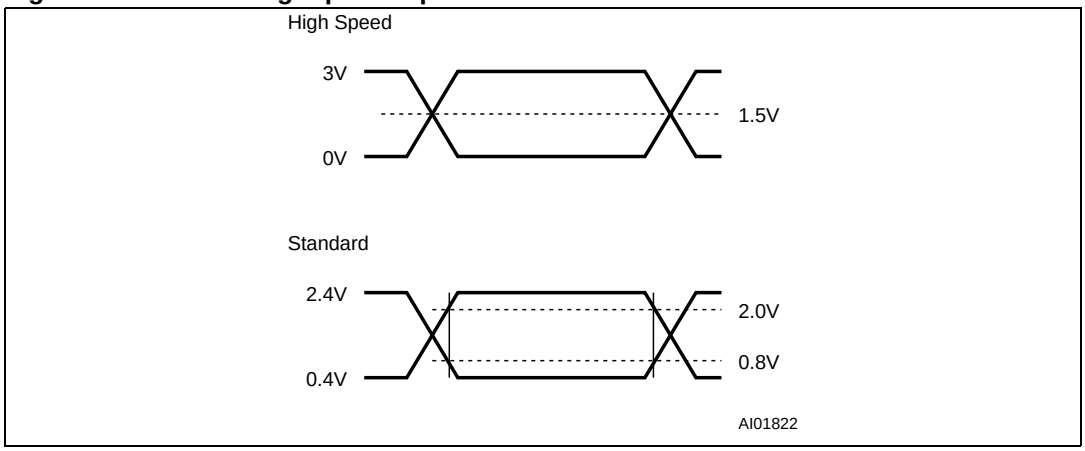
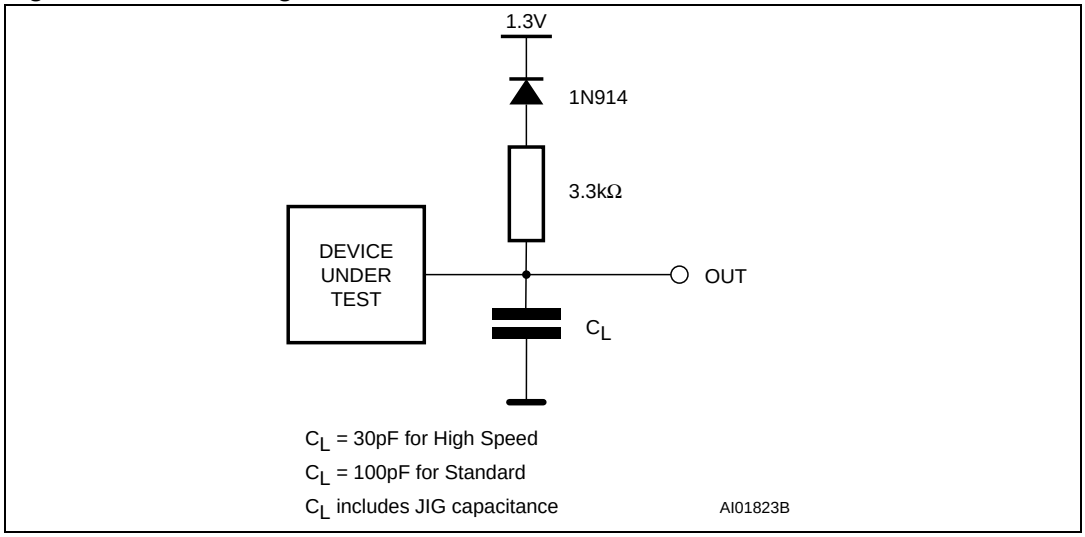


Figure 7. AC Testing Load Circuit



T_A = 0 to 70°C or –40 to 85°C; V_{CC} = 3.3V ± 10%; V_{PP} = V_{CC}

Table 9. Read Mode AC Characteristics (1)

Symbol	Alt	Parameter	Test Condition	M27V160						Unit
				-100 (2)		-120		-150		
				Min.	Max.	Min.	Max.	Min.	Max.	
t_{AVQV}	t_{ACC}	Address Valid to Output Valid	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}		100		120		150	ns
t_{BHQV}	t_{ST}	BYTE High to Output Valid	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}		100		120		150	ns
t_{ELQV}	t_{CE}	Chip Enable Low to Output Valid	$\overline{G}$ = V_{IL}		100		120		150	ns
t_{GLQV}	t_{OE}	Output Enable Low to Output Valid	$\overline{E}$ = V_{IL}		50		60		60	ns
t_{BLQZ} (3)	t_{STD}	BYTE Low to Output Hi-Z	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}		45		50		50	ns
t_{EHQZ} (3)	t_{DF}	Chip Enable High to Output Hi-Z	$\overline{G}$ = V_{IL}	0	45	0	50	0	50	ns
t_{GHQZ} (3)	t_{DF}	Output Enable High to Output Hi-Z	$\overline{E}$ = V_{IL}	0	45	0	50	0	50	ns
t_{AXQX}	t_{OH}	Address Transition to Output Transition	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}	5		5		5		ns
t_{BLQX}	t_{OH}	BYTE Low to Output Transition	$\overline{E}$ = V_{IL}, $\overline{G}$ = V_{IL}	5		5		5		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 measurement conditions.
3. Sampled only, not 100% tested.

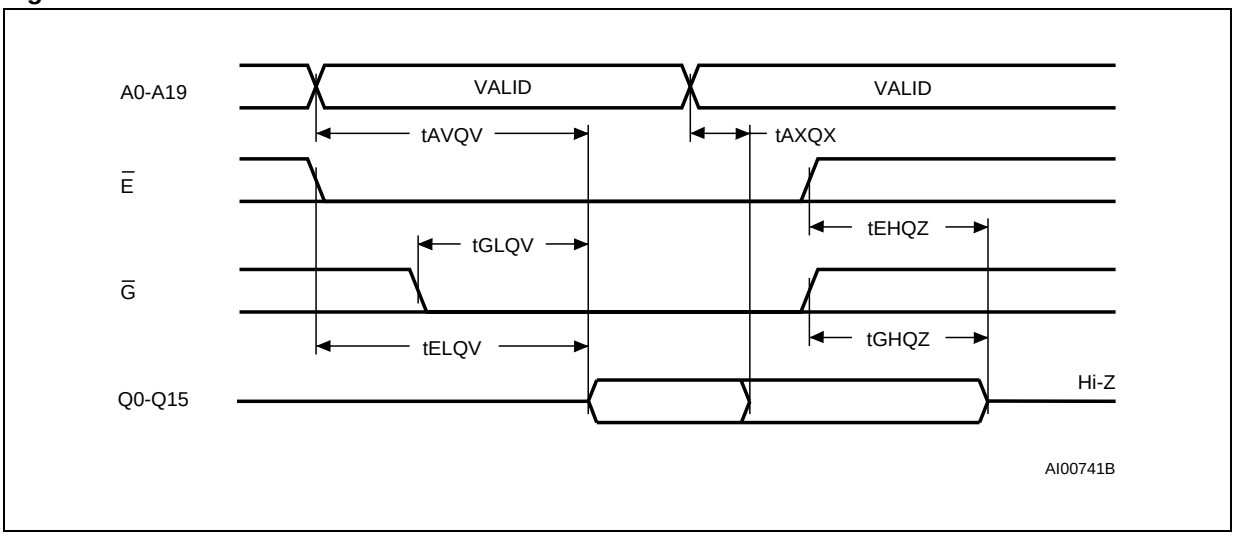
T_A = 25 °C; V_{CC} = 6.25V ± 0.25V; V_{PP} = 12.5V ± 0.25V

Table 10. Programming Mode AC Characteristics (1)

Symbol	Alt	Parameter	Test Condition	Min.	Max.	Unit
t_{AVEL}	t_{AS}	Address Valid to Chip Enable Low		2		µs
t_{QVEL}	t_{DS}	Input Valid to Chip Enable Low		2		µs
t_{VPHAV}	t_{VPS}	V_{PP} High to Address Valid		2		µs
t_{VCHAV}	t_{VCS}	V_{CC} High to Address Valid		2		µs
t_{ELEH}	t_{PW}	Chip Enable Program Pulse Width		45	55	µs
t_{EHQX}	t_{DH}	Chip Enable 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			120	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

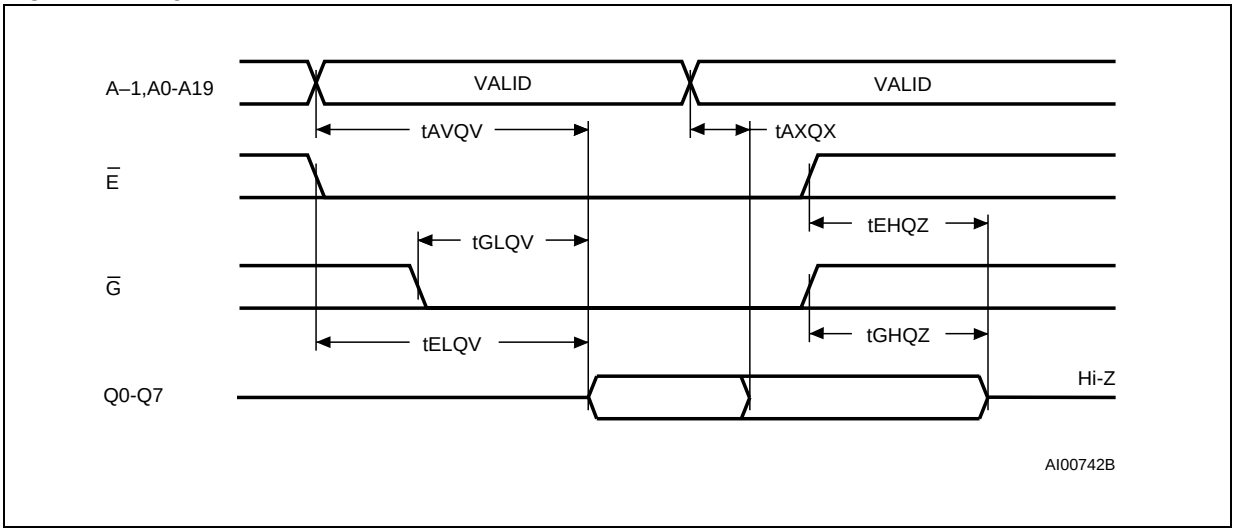
1. V_{CC} must be applied simultaneously with or before V_{PP} and removed simultaneously or after V_{PP}.
2. Sampled only, not 100% tested.

Figure 8. Word-Wide Read Mode AC Waveforms



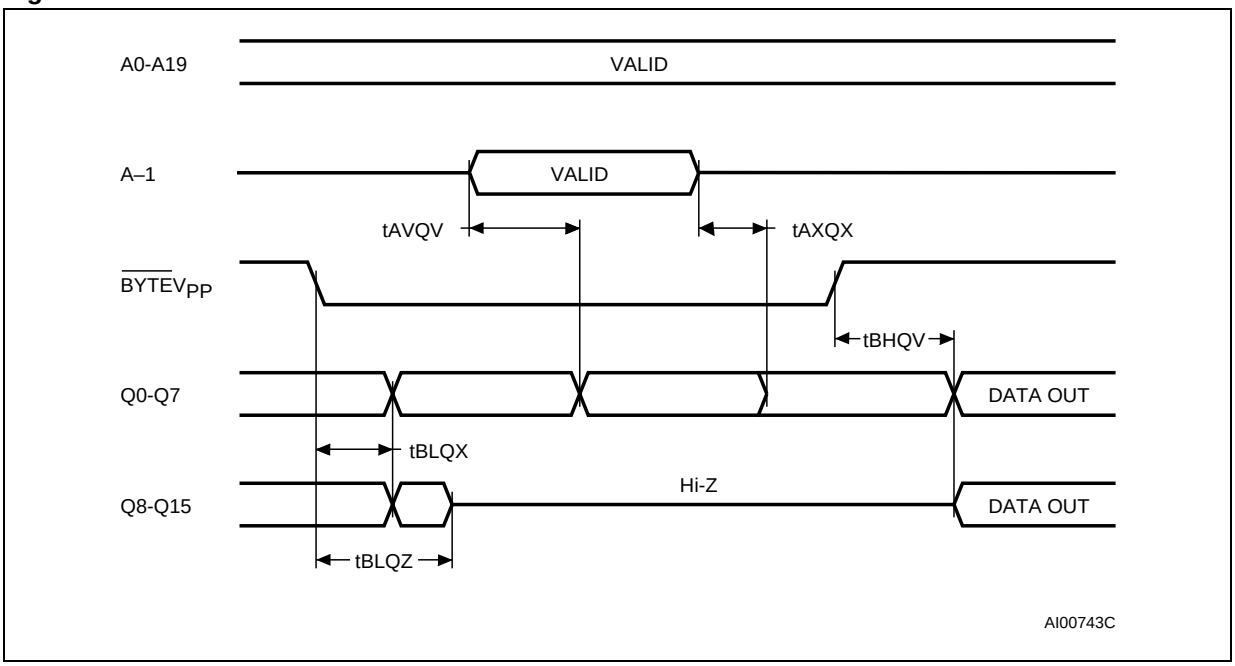
Note: $\overline{BYTE}V_{PP} = V_{IH}$.

Figure 9. Byte-Wide Read Mode AC Waveforms



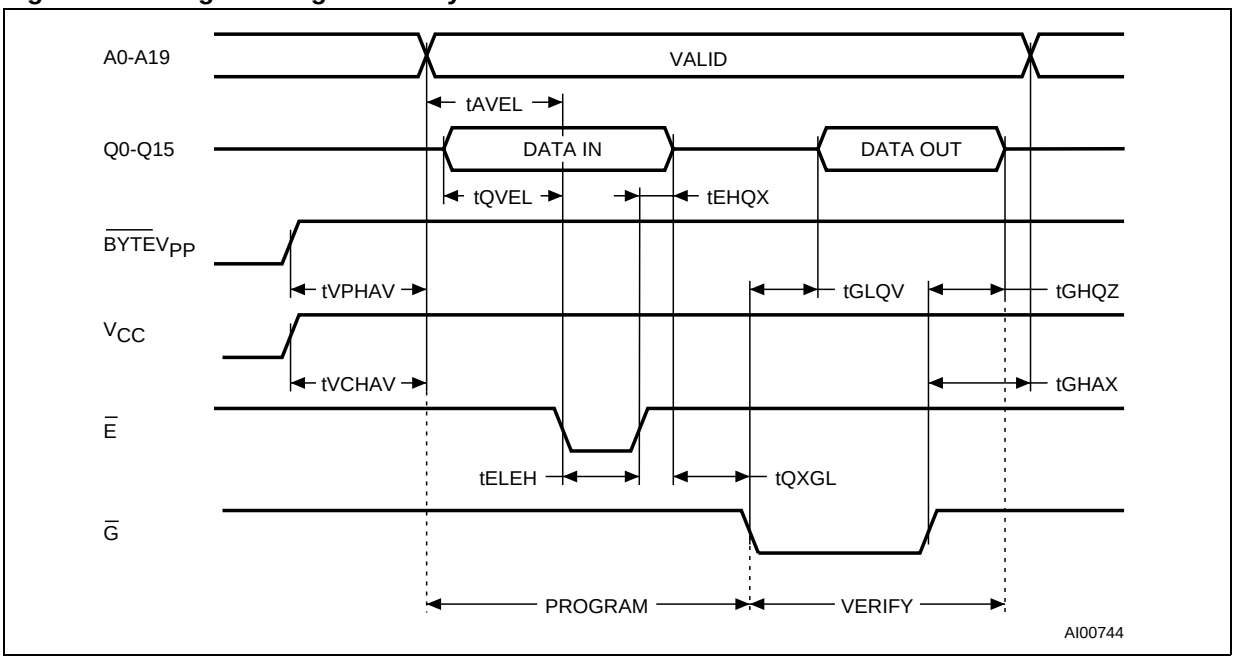
Note: $\overline{BYTE}V_{PP} = V_{IL}$.

Figure 10. $\overline{\text{BYTE}}$ Transition AC Waveforms



Note: Chip Enable ($\overline{E}$) and Output Enable ($\overline{G}$) = V_{IL}.

Figure 11. Programming and Verify Modes AC Waveforms



5 Package mechanical data

5.1 42-pin Ceramic Frit-seal DIP with window (FDIP42WB)

Figure 12. FDIP42WB package outline

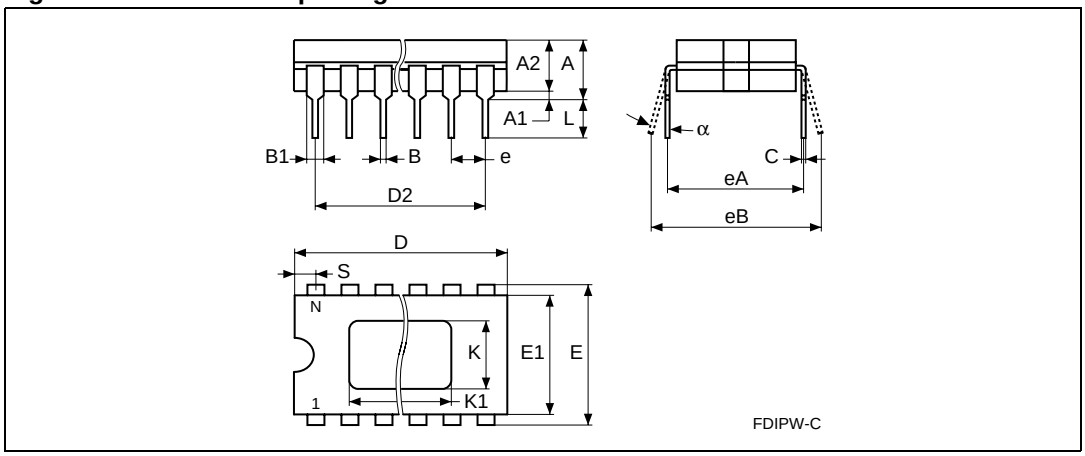


Table 11. FDIP42WB package mechanical data

Symbol	millimeters			inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.71			0.225
A1	0.50		1.78	0.020		0.070
A2	3.90		5.08	0.154		0.200
B	0.40		0.55	0.016		0.022
B1	1.27		1.52	0.050		0.060
C	0.22		0.31	0.009		0.012
D			54.81			2.158
D2	–	50.80	–	–	2.000	–
E		15.24			0.600	
E1	14.50		14.90	0.571		0.587
e	2.29		2.79	0.090		0.110
eA	15.40		15.80	0.606		0.622
eB	16.17		18.32	0.637		0.721
K	9.32		9.47	0.367		0.373
K1	11.30		11.55	0.445		0.455
L	3.18		4.10	0.125		0.161
S	1.52		2.49	0.060		0.098
α	4°		15°	4°		15°
N		42			42	

5.2 42-pin Plastic DIP, 600 mils width (PDIP42)

Figure 13. PDIP42 package outline

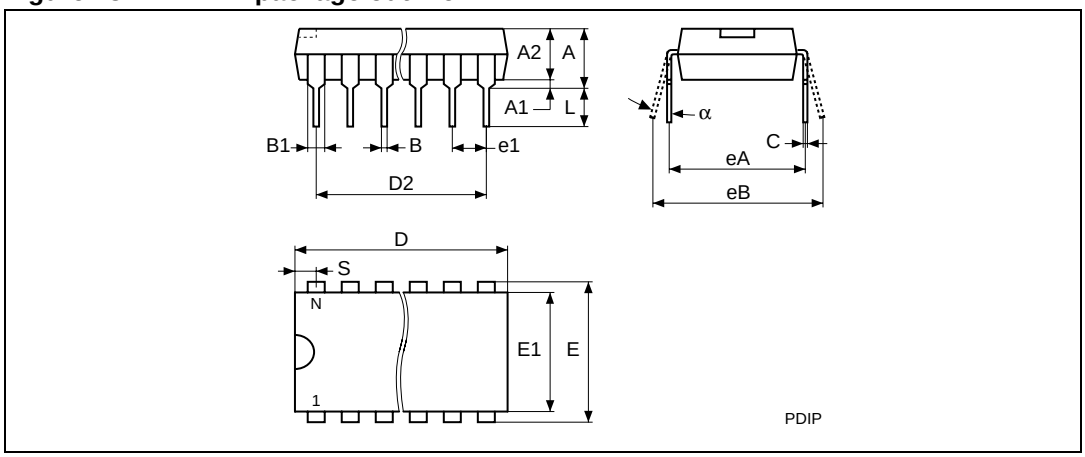


Table 12. PDIP42 package mechanical data

Symbol	millimeters			inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	–		5.08	–		0.200
A1	0.25		–	0.010		–
A2	3.56		4.06	0.140		0.160
B	0.38		0.53	0.015		0.021
B1	1.27		1.65	0.050		0.065
C	0.20		0.36	0.008		0.014
D	52.20		52.71	2.055		2.075
D2	–	50.80	–	–	2.000	–
E	–	15.24	–	–	0.600	–
E1	13.59		13.84	0.535		0.545
e1	–	2.54	–	–	0.100	–
eA	–	14.99	–	–	0.590	–
eB	15.24		17.78	0.600		0.700
L	3.18		3.43	0.125		0.135
S	0.86		1.37	0.034		0.054
α	0°		10°	0°		10°
N		42			42	

5.3 42-lead Shrink Plastic DIP, 600 mils width (SDIP42)

Figure 14. SDIP42 package outline

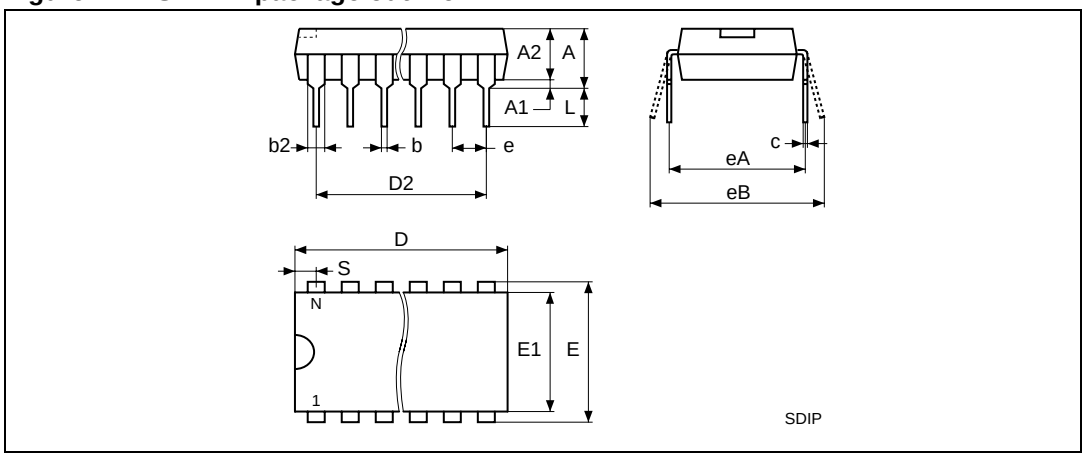


Table 13. SDIP42 package mechanical data

Symbol	millimeters			inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.08			0.200
A1	0.51			0.020		
A2	3.05	3.81	4.57	0.120	0.150	0.180
b	0.38	0.46	0.56	0.015	0.018	0.022
b2	0.89	1.02	1.14	0.035	0.040	0.045
c	0.23	0.25	0.38	0.009	0.010	0.015
D	36.58	36.83	37.08	1.440	1.450	1.460
e	–	1.78	–	–	0.070	–
E	15.24		16.00	0.600		0.630
E1	12.70	13.72	14.48	0.500	0.540	0.570
eA		15.24			0.600	
eB			18.54			0.730
L	2.54	3.30	3.56	0.100	0.130	0.140
S		0.64			0.025	
N		42			42	

5.4 44-lead Square Plastic Leaded Chip Carrier (PLCC44)

Figure 15. PLCC44 package outline

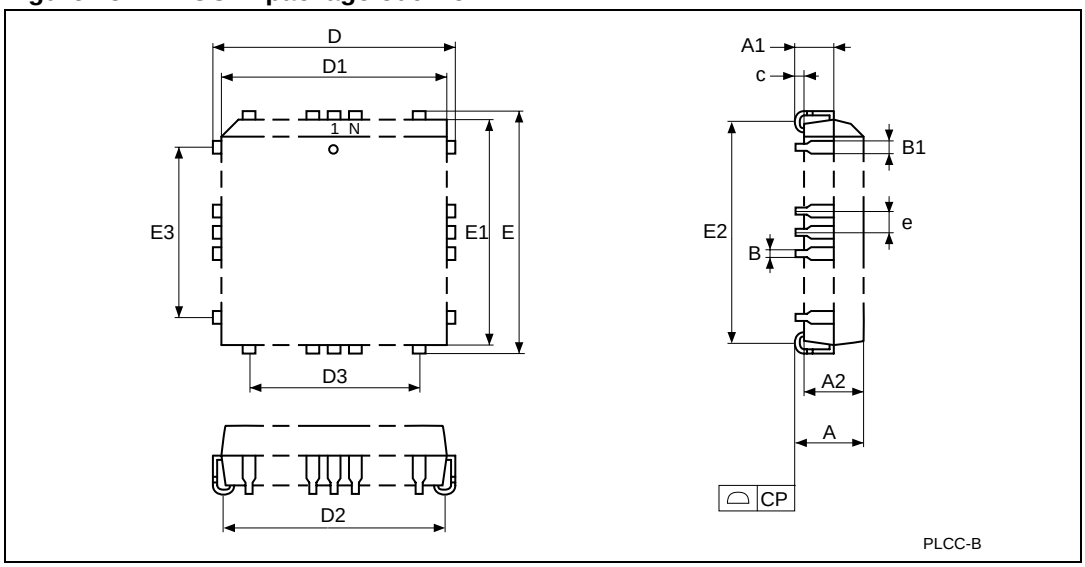


Table 14. PLCC44 package mechanical data

Symbol	millimeters			inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.200		4.570	0.1654		0.1799
A1	2.290		3.040	0.0902		0.1197
A2	3.650		3.700	0.1437		0.1457
B	0.331		0.533	0.0130		0.0210
B1	0.661		0.812	0.0260		0.0320
CP			0.101			0.0040
c		0.510			0.0201	
D	17.400		17.650	0.6850		0.6949
D1	16.510		16.662	0.6500		0.6560
D2	14.990		16.000	0.5902		0.6299
D3	–	12.700	–	–	0.5000	–
E	17.400		17.650	0.6850		0.6949
E1	16.510		16.660	0.6500		0.6559
E2	14.990		16.000	0.5902		0.6299
E3	–	12.700	–	–	0.5000	–
e	–	1.270	–	–	0.0500	–
N		44			44	

5.5 44-lead Plastic Small Outline, 525 mils body width (SO44)

Figure 16. SO44 package outline

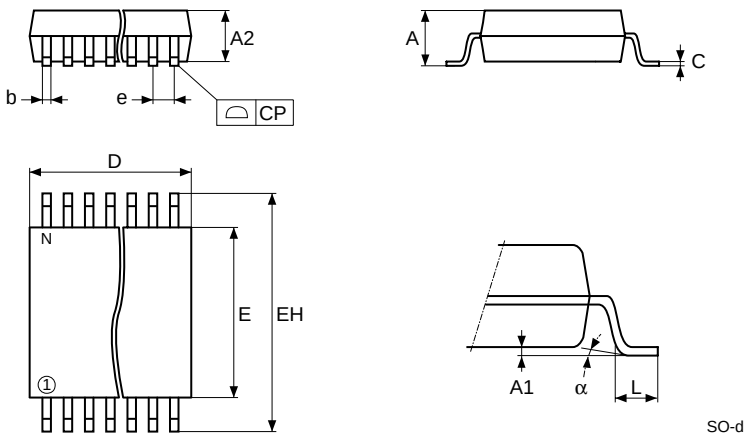


Table 15. SO44 package mechanical data

Symbol	millimeters			inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			2.80			0.1102
A1	0.10			0.0039		
A2	2.20	2.30	2.40	0.0866	0.0906	0.0945
b	0.35	0.40	0.50	0.0138	0.0157	0.0197
C	0.10	0.15	0.20	0.0039	0.0059	0.0079
CP			0.08			0.0030
D	28.00	28.20	28.40	1.1024	1.1102	1.1181
E	13.20	13.30	13.50	0.5197	0.5236	0.5315
EH	15.75	16.00	16.25	0.6201	0.6299	0.6398
e	–	1.27	–	–	0.0500	–
L		0.80			0.0315	
α			8°			8°
N		44			44	

6 Part Numbering

Table 16. Ordering Information Scheme

Example: M27V160 -100 X M 1

Device Type

M27

Supply Voltage

V = 3V to 3.6V

Device Function

160 = 16 Mbit (2Mb x 8 or 1Mb x 16)

Speed

-100 (1)= 100 ns

-120 = 120 ns

-150 = 150 ns

V_{CC} Tolerance

blank = 3.3V ± 10%

X = 3.3V ± 5%

Package

F = FDIP42W (2)

B = PDIP42

S = SDIP42

K = PLCC44

M = SO44 (2)

Temperature Range

1 = 0 to 70 °C

6 = –40 to 85 °C

1. High Speed, see AC Characteristics section for further information.
2. Packages option available on request. Please contact STMicroelectronics local Sales Office.

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.

7 Revision history

Table 17. Document revision history

Date	Revision	Changes
10-Mar-2000	1	First Issue
23-Apr-2001	2	PLCC44 package added
19-Jul-2001	3	SDIP42 package added
21-Mar-2002	4	SO44 package mechanical and data clarified
12-Apr-2006	5	Converted to new template. Added ECOPACK® information. Removed “On-board Programming” section. Removed Tape & Reel Packing option.

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