CY7C286

64K x 8 Reprogrammable PROM

Features

- **CMOS for optimum speed/power**
- **Windowed for reprogrammability**
- **High speed**
  - **— t_{AA} = 45 ns**
- **Low power**
  - **— 120 mA active**
  - **— 40 mA standby**
- **EPROM technology, 100%programmable**
- **5V ±10% V_{CC}, commercial and military**
- **TTL-compatible I/O**
- **Capable of withstanding >2001V static discharge**

Functional Description

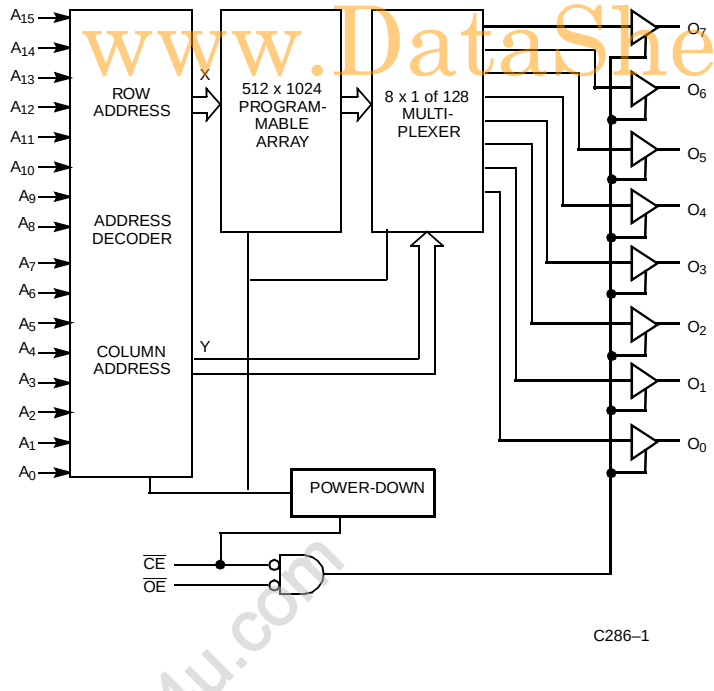
The CY7C286 is a high-performance 64K x 8 CMOS PROM. The CY7C286 is configured in the JEDEC-standard 512K EPROM pinout and is available in a 28-pin, 600-mil package and a 32-pin PLCC package. Power consumption is 120 mA in the active mode and 40 mA in the standby mode. Access time is 45 ns.

The CY7C286 is available in a cerDIP package equipped with an erasure window to provide reprogrammability. When exposed to UV light, the PROM is erased and can be reprogrammed. The memory cells utilize proven EPROM floating-gate technology and byte-wide intelligent programming algorithms.

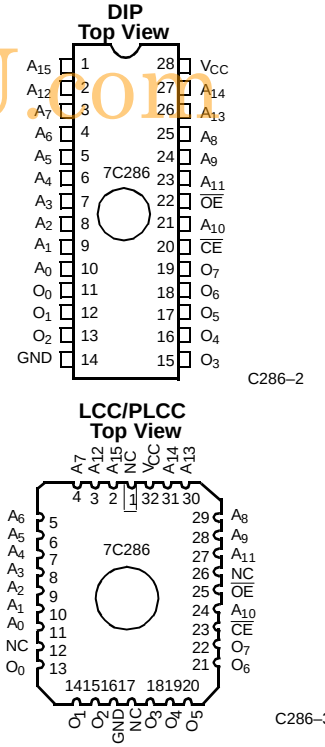
The CY7C286 offers the advantage of low power, superior performance, and programming yield. The EPROM cell requires only 12.5V for the supervoltage and low current requirements allow for gang programming. The EPROM cells allow for each memory location to be 100% tested with each cell being programmed, erased, and repeatedly exercised prior to encapsulation. Each PROM is also tested for AC performance to guarantee that the product will meet DC and AC specification limits after customer programming.

Reading the CY7C286 is accomplished by placing active LOW signals on the $\overline{OE}$ and $\overline{CE}$ pins. The contents of the memory location addressed by the address lines ($A_0 - A_{15}$) will become available on the output lines ($O_0 - O_7$).

Logic Block Diagram



Pin Configurations



For a 64K x 8 PROM with registered outputs, see the CY7C287.

Selection Guide

		7C286–45	7C286–50	7C286–60	7C286–70	7C286–80
Maximum Access Time (ns)		45	50	60	70	80
Maximum Operating Current (mA)	Com'l	120	120	120	90	
	Mil			150	120	120
Maximum Standby Current (mA)	Com'l	40	40	40	30	
	Mil			50	40	40

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature .....–65°C to +150°C

Ambient Temperature with Power Applied.....–55°C to +125°C

Supply Voltage to Ground Potential ..... –0.5V to +7.0V

DC Voltage Applied to Outputs in High Z State ..... –0.5V to +7.0V

DC Input Voltage..... –3.0V to +7.0V

DC Program Voltage 13.0V

UV Exposure ..... 7258 Wsec/cm^2

Static Discharge Voltage ..... >2001V (per MIL–STD–883, Method 3015.2)

Latch-Up Current..... >200 mA

Operating Range

Range	Ambient Temperature	V_{CC}
Commercial	0°C to +70°C	5V ± 10%
Industrial[1]	–40°C to +85°C	5V ± 10%
Military[2]	–55°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range[3, 4]

Parameter	Description	Test Conditions		7C286–45, 50 Min.	7C286–45, 50 Max.	7C286–60 Min.	7C286–60 Max.	7C286–70, 80 Min.	7C286–70, 80 Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = –2.0 mA		2.4		2.4		2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8.0 mA	Com'l		0.4		0.4		0.4	V
		V_{CC} = Min., I_{OL} = 6.0 mA	Mil				0.4		0.4	
V_{IH}	Input HIGH Voltage	Guaranteed Input Logical HIGH Voltage for Inputs		2.0	V_{CC}	2.0	V_{CC}	2.0	V_{CC}	V
V_{IL}	Input LOW Voltage	Guaranteed Input Logical LOW Voltage for Inputs			0.8		0.8		0.8	V
I_{IX}	Input Load Current	GND ≤ V_{IN} ≤ V_{CC}		–10	+10	–10	+10	–10	+10	µA
V_{CD}	Input Diode Clamp Voltage			Note 4						
I_{OZ}	Output Leakage Current	GND ≤ V_{OUT} ≤ V_{CC}, Output Disabled		–40	+40	–40	+40	–40	+40	µA
I_{OS}	Output Short Circuit Current	V_{CC} = Max., V_{OUT} = GND[5]		–20	–90	–20	–90	–20	–90	mA
I_{CC}	V_{CC} Operating Supply Current	V_{CC} = Max., I_{OUT} = 0 mA	Com'l		120		120		90	mA
			Mil				150		120	
I_{SB}	Standby Supply Current	V_{CC} = Max., $\overline{CE}$ = HIGH	Com'l		40		40		30	mA
			Mil				50		40	
V_{PP}	Programming Supply Voltage			12	13	12	13	12	13	V
I_{PP}	Programming Supply Current				50		50		50	mA
V_{IHP}	Input HIGH Programming Voltage			3.0		3.0		3.0		V
V_{ILP}	Input LOW Programming Voltage				0.4		0.4		0.4	V

Electrical Characteristics Over the Operating Range[3, 4]

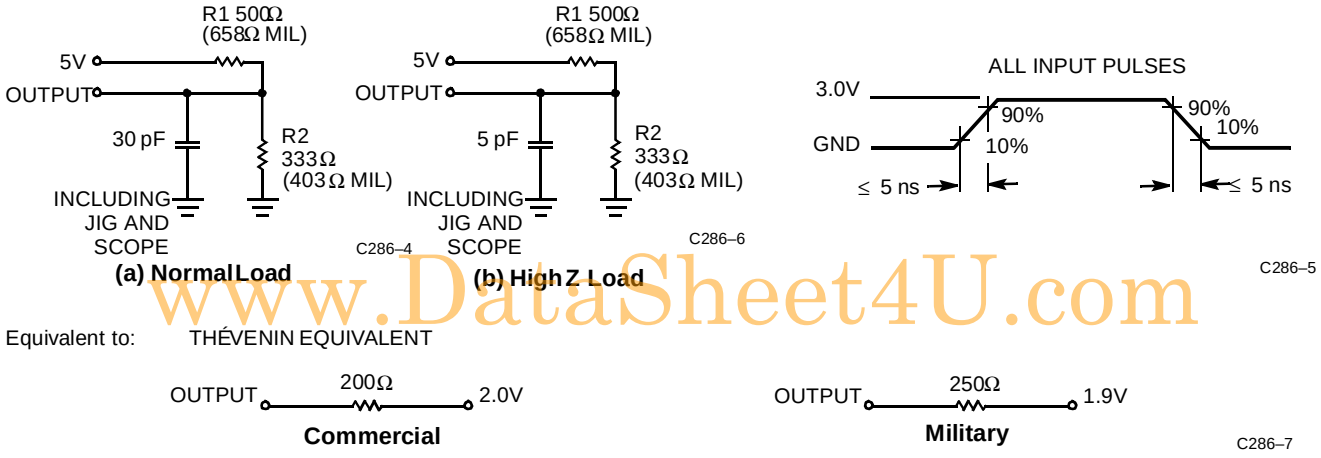
Parameter	Description	Test Conditions	7C286–45, 50		7C286–60		7C286–70, 80		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	

Notes:
1. Contact a Cypress representative for industrial temperature range specifications.
2. T_A is the "instant on" case temperature.
3. See the last page of this specification for Group A subgroup testing information.
4. See Introduction to CMOS PROMs for general information on testing.
5. Short circuit test should not exceed 30 seconds.

Capacitance[4]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	T_A = 25°C, f = 1 MHz, V_{CC} = 5.0V	10	pF
C_{OUT}	Output Capacitance		10	pF

AC Test Loads and Waveform[4]

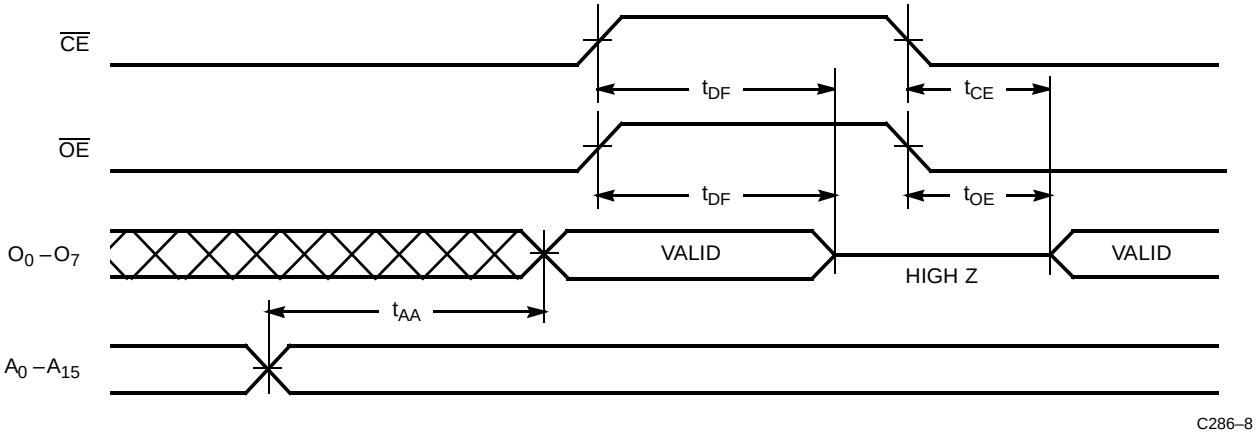


Equivalent to: THÉVENIN EQUIVALENT

Switching Characteristics Over the Operating Range[3,4]

Parameter	Description	7C286–45		7C286–50		7C286–60		7C286–70		7C286–80		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t_{AA}	Address Access Time		45		50		60		70		80	ns
t_{CE}	Output Valid from $\overline{CE}$		45		50		60		70		80	ns
t_{OE}	Output Valid from $\overline{OE}$		15		18		20		25		25	ns
t_{DF}	Output Three-State from $\overline{CE}$/$\overline{OE}$		15		18		20		25		25	ns
t_{PU}	Chip Enable to Power-Up	0		0		0		0		0		ns
t_{PD}	Chip Disable to Power-Down		40		40		50		60		60	ns

Switching Waveform



Erasure Characteristics

Wavelengths of light less than 4000 Angstroms begin to erase the 7C286 in the windowed package. For this reason, an opaque label should be placed over the window if the PROM is exposed to sunlight or fluorescent lighting for extended periods of time.

The recommended dose of ultraviolet light for erasure is a wavelength of 2537 angstroms for a minimum dose (UV intensity multiplied by exposure time) of 25 Wsec/cm^2. For an ultraviolet lamp with a 12 mW/cm^2 power rating, the exposure time would be approximately 35 minutes. The CY7C286 needs to be within 1 inch of the lamp during erasure. Permanent damage may result if the PROM is exposed to high-intensity UV light for an extended period of time. 7258 Wsec/cm^2 is the recommended maximum dosage.

Programming Modes

Programming support is available from Cypress as well as from a number of third-party software vendors. For detailed programming information, including a listing of software packages, please see the PROM Programming Information located at the end of this section. Programming algorithms can be obtained from any Cypress representative.

Table 1. CY7C286 Mode Selection.

	Pin[6]				
	$\overline{PGM}$	**LATCH**	**$\overline{VFY}$**	**V_{PP}**	**$D_0 - D_7$**
Mode: Read or Output Disable	**A_{10}**	**A_{11}**	**$\overline{CE}$**	**$\overline{OE}$**	**$O_7 - O_0$**
Read	A_{10}	A_{11}	V_{IL}	V_{IL}	$O_7 - O_0$
Output Disable	A_{10}	A_{11}	X	V_{IH}	High Z
Output Disable & Power Down	A_{10}	A_{11}	V_{IH}	X	High Z
Mode: Other	**$\overline{PGM}$**	**LATCH**	**$\overline{VFY}$**	**V_{PP}**	**$D_7 - D_0$**
Program	V_{ILP}	V_{ILP}	V_{IHP}	V_{PP}	$D_7 - D_0$
Program Verify	V_{IHP}	V_{ILP}	V_{ILP}	V_{PP}	$O_7 - O_0$
Program Inhibit	V_{IHP}	V_{ILP}	V_{IHP}	V_{PP}	High Z
Blank Check	V_{IHP}	V_{ILP}	V_{ILP}	V_{PP}	Zeros

Note:
6. X can be V_{IL} or V_{IH}.

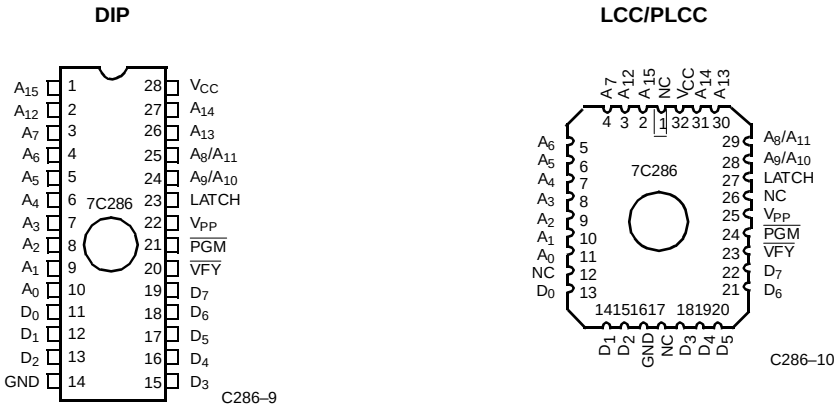


Figure 1. Programming Pinouts.

Ordering Information[7]

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
45	CY7C286–45JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C286–45PC	P15	28-Lead (600-Mil) Molded DIP	
	CY7C286–45WC	W16	28-Lead (600-Mil) Windowed CerDIP	
50	CY7C286–50JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C286–50PC	P15	28-Lead (600-Mil) Molded DIP	
	CY7C286–50WC	W16	28-Lead (600-Mil) Windowed CerDIP	
60	CY7C286–60JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C286–60PC	P15	28-Lead (600-Mil) Molded DIP	
	CY7C286–60WC	W16	28-Lead (600-Mil) Windowed CerDIP	
	CY7C286–60DMB	D16	28-Lead (600-Mil) CerDIP	Military
	CY7C286–60LMB	L55	32-Pin Rectangular Leadless Chip Carrier	
	CY7C286–60QMB	Q55	32-Pin Windowed Rectangular Leadless Chip Carrier	
	CY7C286–60WMB	W16	28-Lead (600-Mil) Windowed CerDIP	
70	CY7C286–70JC	J65	32-Lead Plastic Leaded Chip Carrier	Commercial
	CY7C286–70PC	P15	28-Lead (600-Mil) Molded DIP	
	CY7C286–70WC	W16	28-Lead (600-Mil) Windowed CerDIP	
	CY7C286–70DMB	D16	28-Lead (600-Mil) CerDIP	Military
	CY7C286–70LMB	L55	32-Pin Rectangular Leadless Chip Carrier	
	CY7C286–70QMB	Q55	32-Pin Windowed Rectangular Leadless Chip Carrier	
	CY7C286–70WMB	W16	28-Lead (600-Mil) Windowed CerDIP	
80	CY7C286–80WMB	W16	28-Lead (600-Mil) Windowed CerDIP	Military
	CY7C286–80QMB	Q55	32-Pin Windowed Rectangular Leadless Chip Carrier	

Notes:

7. Most of these products are available in industrial temperature range. Contact a Cypress representative for specifications and product availability.

MILITARY SPECIFICATIONS
Group A Subgroup Testing

DC Characteristics

Parameter	Subgroups
V_{OH}	1, 2, 3
V_{OL}	1, 2, 3
V_{IH}	1, 2, 3
V_{IL}	1, 2, 3
I_{IX}	1, 2, 3
I_{OZ}	1, 2, 3
I_{CC}	1, 2, 3
I_{SB}	1, 2, 3

Switching Characteristics

Parameter	Subgroups
t_{AA}	7, 8, 9, 10, 11
t_{CE}	7, 8, 9, 10, 11
t_{OE}	7, 8, 9, 10, 11

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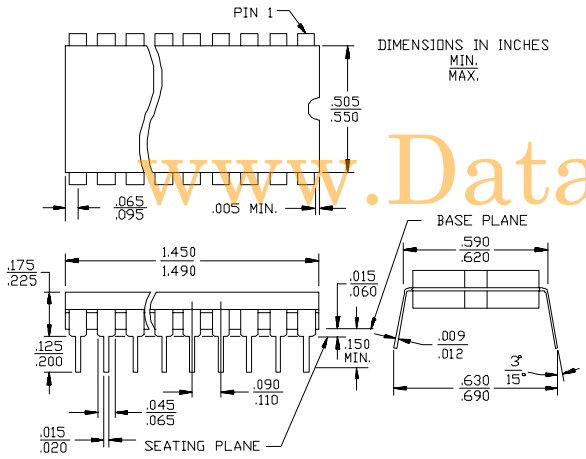
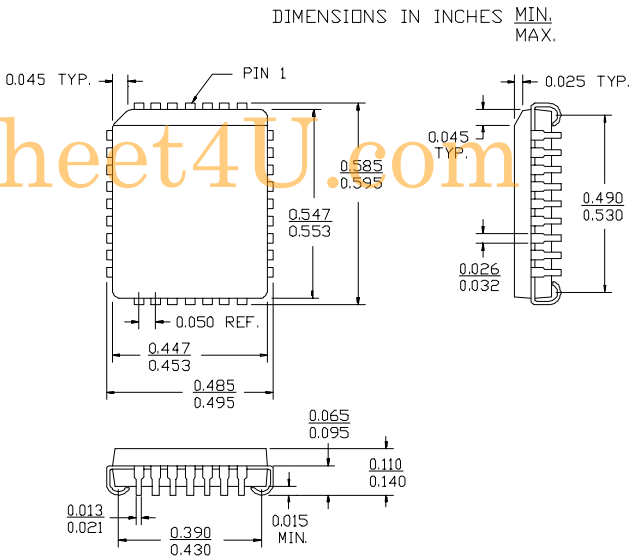
Package Diagrams

28-Lead (600-Mil) CerDIP D16
MIL–STD–1835 D–10 Config.A

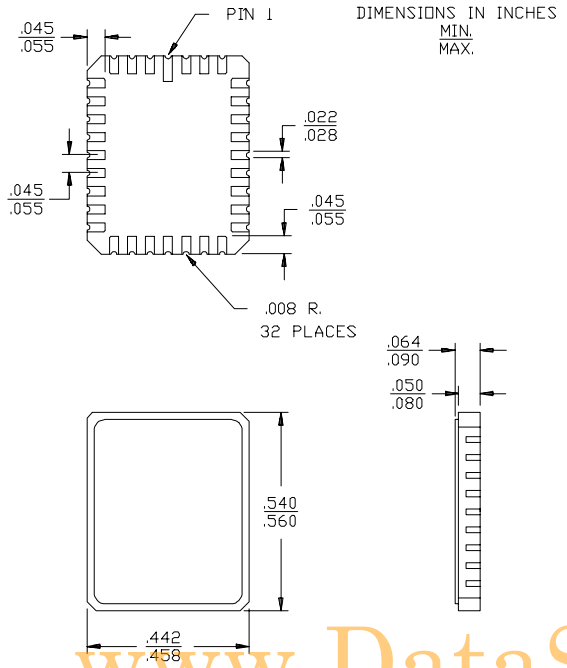


32-Lead Plastic Leaded Chip Carrier J65

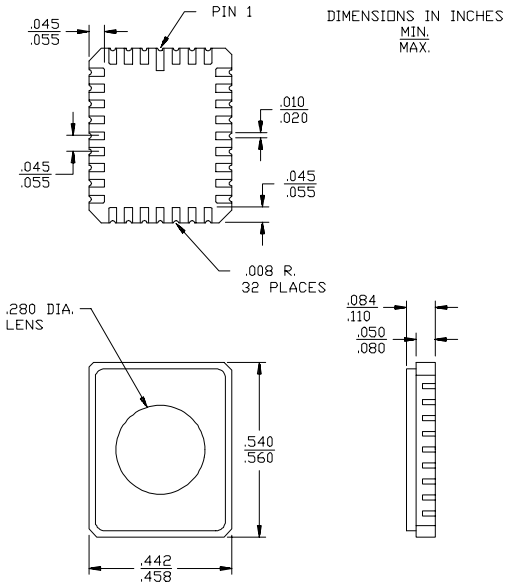


Package Diagrams (Continued)

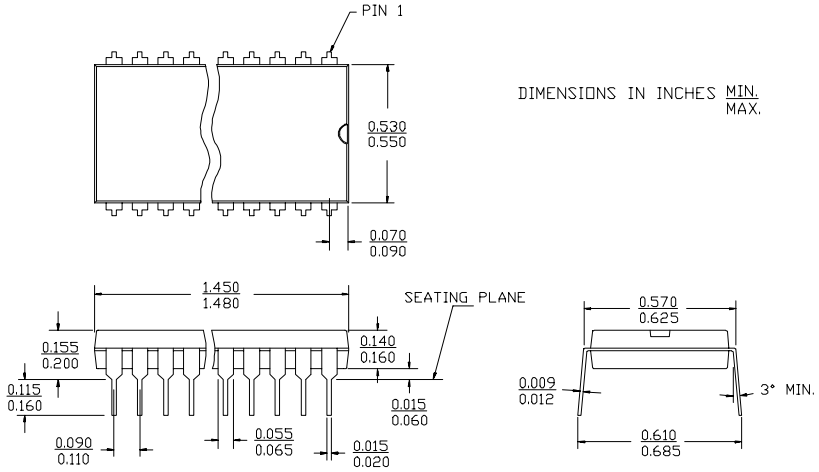
32-Pin Rectangular Leadless Chip Carrier L55
MIL–STD–1835 C–12



32-Pin Windowed Rectangular Leadless Chip Carrier Q55
MIL–STD–1835 C–12



28-Lead (600-Mil) Molded DIP P15



Package Diagrams (Continued)

28-Lead (600-Mil) Windowed CerDIP W16
MIL–STD–1835 D–10 Config.A