UCC5610
18-LINE 3–5 VOLT LOW CAPACITANCE SCSI ACTIVE TERMINATOR

SLUS362A − FEBRUARY 1997 − REVISED NOVEMBER 2000

- **Complies With SPI-2 and SPI-3 Standards**
- **2.75-V to 7-V Operation**
- **1.8-pF Channel Capacitance during Disconnect**
- **0.5-μA Supply Current in Disconnect Mode**
- **110-Ω/2.5-kΩ Programmable Termination**
- **Completely Meets SCSI Hot Plugging**
- **−650-mA Sourcing Current for Termination**
- **+400-mA Sinking Current for Active Negation Drivers**
- **Trimmed Termination Current to 4%**
- **Trimmed Impedance to 7%**
- **Current Limit and Thermal Shutdown Protection**

description

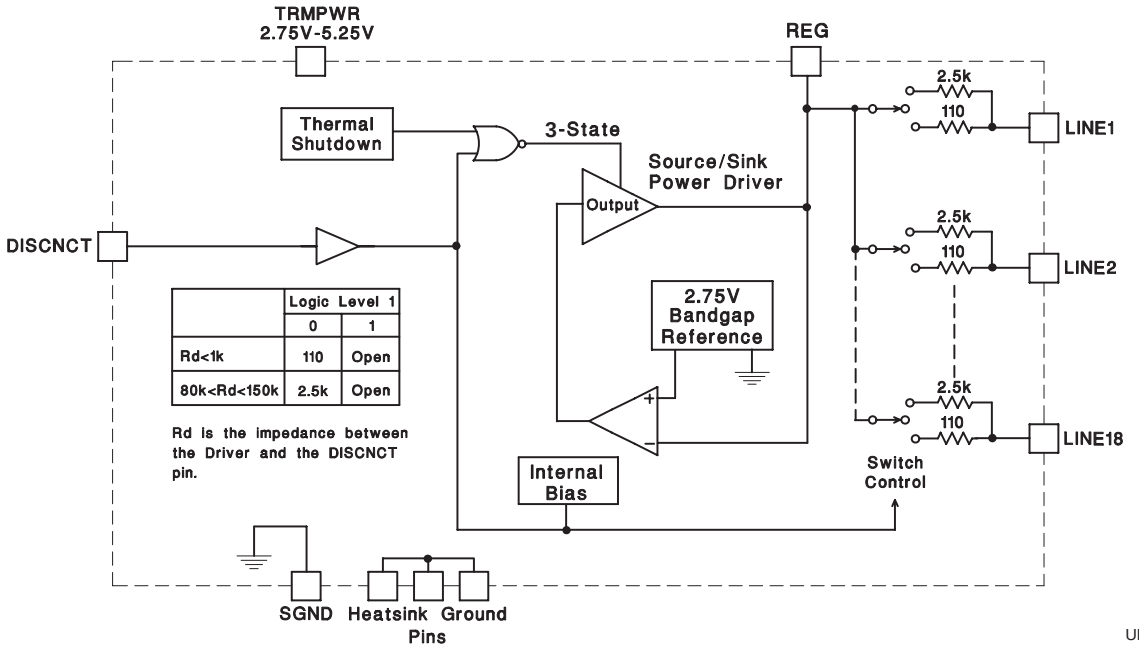
The UCC5610 provides 18 lines of active termination for a SCSI (small computer systems interface) parallel bus. The SCSI standard recommends active termination at both ends of the cable.

The UCC5610 is ideal for high performance 3.3-V SCSI systems. The key features contributing to such low operating voltage are the 0.1-V drop-out regulator and the 2.75-V reference. During disconnect the supply current is typically only 0.5 μA, which makes the IC attractive for battery powered systems.

The UCC5610 is designed with an ultralow-channel capacitance of 1.8 pF, which eliminates effects on signal integrity from disconnected terminators at interim points on the bus.

The UCC5610 can be programmed for either a 110-Ω or 2.5-kΩ termination. The 110-Ω termination is used for standard SCSI bus lengths and the 2.5-kΩ termination is typically used in short bus applications. When driving the TTL compatible DISCNCT pin directly, the 110-Ω termination is connected when the DISCNCT pin is driven low, and disconnected when driven high. When the DISCNCT pin is driven through an impedance between 80 kΩ and 150 kΩ, the 2.5-kΩ termination is connected when the DISCNCT pin is driven low, and disconnected when driven high.

block diagram



UDG-94128-1

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description (continued)

The power amplifier output stage allows the UCC5610 to source full termination current and sink active negation current when all termination lines are actively negated.

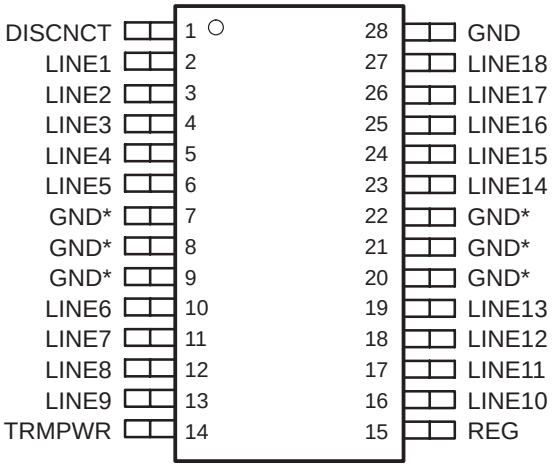
The UCC5610 is pin for pin compatible with Unitrode's other 18-line SCSI terminators, allowing lower capacitance and lower voltage upgrades to existing systems. The UCC5610, as with all Unitrode terminators, is completely hot-pluggable and appears as high impedance at the terminating channels with VTRMPWR = 0 V or open.

Internal circuit trimming is utilized, first to trim the 110-Ω termination impedance to a 7% tolerance, and then most importantly, to trim the output current to a 4% tolerance, which maximizes noise margin.

Other features include thermal shutdown and current limit.

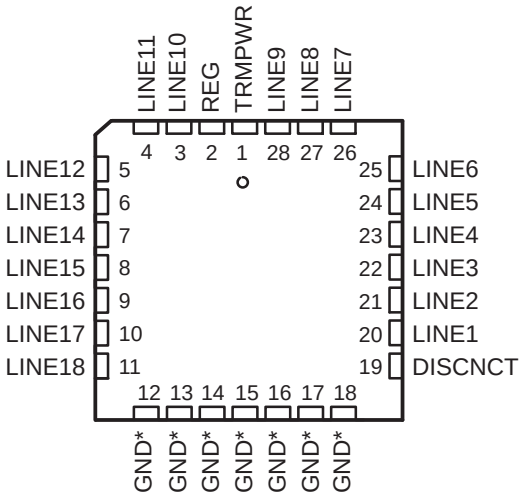
This device is offered in low thermal resistance versions of the industry standard 28-pin wide body SOIC and 28-pin PLCC.

DWP PACKAGE
TOP VIEW



* DWP package pin 28 serves as signal ground; pins 7, 8, 9, 20, 21, 22 serve as heatsink/ground.

QP PACKAGE
TOP VIEW



* QP package pins 12-18 serve as both heatsink and signal ground.

AVAILABLE OPTIONS

T_J	PACKAGED DEVICES†	
	SOIC (DWP)	PLCC (QP)
0°C to 70°C	UCC5610DWP	UCC5610QP

† Available tape and reeled. Add TR suffix to device type to order quantities of 1000 devices per reel.

absolute maximum ratings over operating free-air temperature (unless otherwise noted)†‡

Termpwr voltage . . . . . 7 V
Signal line voltage . . . . . 0 V to 7 V
Regulator output current . . . . . Self-regulating
Storage temperature . . . . . −65°Cto 150°C
Operating temperature . . . . . −55°C to 150°C
Lead temperature (soldering, 10 Sec.) . . . . . 300°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

‡ Unless otherwise specified all voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal. Consult Packaging Section of Interface Products Data Book (TI Literature Number SLUD002) for thermal limitations and considerations of packages.

recommended operating conditions

Termpwr voltage . . . . . 2.75 V to 5.25 V
Signal line voltage . . . . . 0 V to 5 V
Disconnect input voltage . . . . . 0 V to Termpwr

electrical characteristics, these specifications apply for T_A = 0°C to 70°C, TRMPWR = 3.3 V, DISCNCT = 0 V, $R_{DISCNCT}$ = 0 Ω, $T_A = T_J$, (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current Section					
Termpwr supply current	All termination lines = open		1	2	mA
	All termination lines = 0.2 V		415	455	mA
Power down mode	DISCNCT = termpwr		0.5	5	µA
Output Section (110 Ω − Terminator Lines)					
Terminator impedance	See Note 4	102.3	110	117.7	Ω
Output high voltage	See Note 1	2.5	2.7	3.0	V
Max output current	V_{LINE} = 0.2 V, T_J = 25°C	−25.4	−23	−22.1	mA
	V_{LINE} = 0.2 V	−25.4	−23	−21	mA
	V_{LINE} = 0.2 V, See Note 1, TRMPWR = 3 V, T_J = 25°C	−25.4	−23	−20.2	mA
	V_{LINE} = 0.2 V, TRMPWR = 3 V, See Note 1	−25.4	−23	−19	mA
	V_{LINE} = 0.5 V			−22.4	mA
Output leakage	DISCNCT = 2.4 V, TRMPWR = 0 V to 5.25 V		10	400	nA
Output capacitance	DISCNCT = 2.4 V, See Note 2, See Note 3, DWP package		1.8	2.5	pF
Output Section (2.5 kΩ − Terminator Lines) ($R_{DISCNCT}$ = 80 kΩ)					
Terminator impedance		2	2.5	3	kΩ
Output high voltage	TRMPWR = 3 V, See Note 1	2.5	2.7	3.0	V
Max output current	V_{LINE} = 0.2 V	−1.4	−1	−0.7	mA
	V_{LINE} = 0.2 V, TRMPWR = 3 V, See Note 1	−1.5	−1	−0.6	mA
Output leakage	DISCNCT = 2.4 V, TRMPWR = 0 to 5.25 V		10	400	nA
Output capacitance	DISCNCT = 2.4 V See Note 2, See Note 3, DWP package		1.8	2.5	pF

NOTES: 1. Measuring each termination line while other 17 are low (0.2 V).
2. Ensured by design. Not production tested.
3. Output capacitance is measured at 0.5 V.
4. Tested by measuring I_{OUT} with V_{OUT} = 0.2 V and $V_{OUT} = V_{REG}$ − 0.1 V then calculating the impedance.

electrical characteristics, these specifications apply for T_A = 0°C to 70°C, TRMPWR = 3.3 V, DISCNCT = 0 V, $R_{DISCNCT}$ = 0 Ω, T_A = T_J, (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Regulator Section					
Regulator output voltage	5.25 V > TRMPWR > 3 V	2.5	2.7	3.0	V
Drop out voltage	All termination lines = 0.2 V		0.1	0.2	V
Short circuit current	V_{REG} = 0 V	−800	−650	−450	mA
Sinking current capability	V_{REG} = 3 V	200	400	800	mA
Thermal shutdown	See Note 2		170		°C
Thermal shutdown hysteresis	See Note 2		10		°C
Disconnect Section					
Disconnect threshold	$R_{DISCNCT}$ = 0 & 80 kΩ	0.8	1.5	2.0	V
Input current	DISCNCT = 0 V		30	50	µA

NOTES: 2. Ensured by design. Not production tested.

APPLICATION INFORMATION

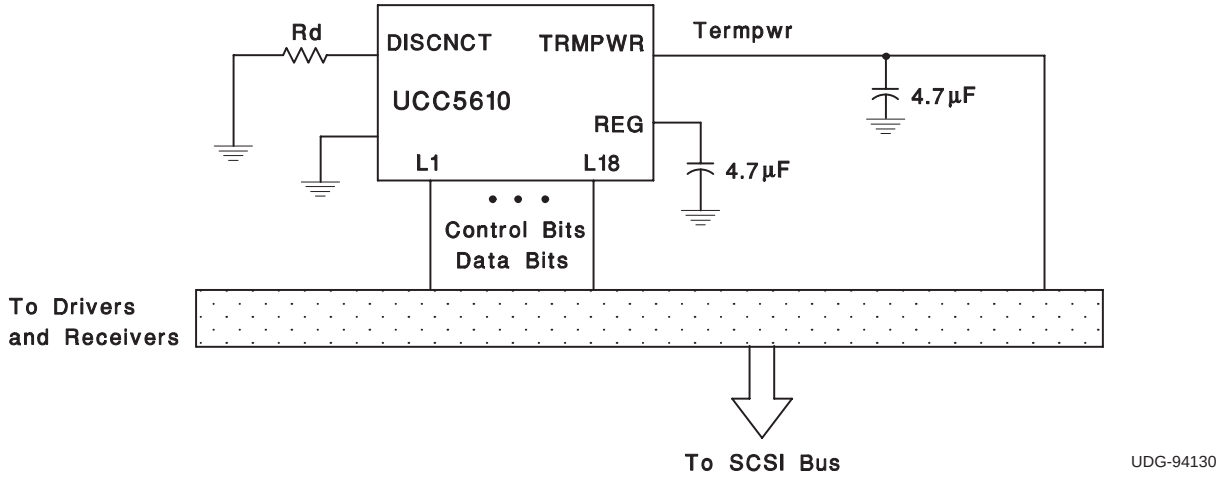


Figure 1. Typical SCSI Bus Configurations Utilizing a UCC5610 Device

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
UCC5610DWP	NRND	SOIC	DW	28		TBD	Call TI	Call TI	0 to 70		
UCC5610DWPG4	NRND	SOIC	DW	28		TBD	Call TI	Call TI	0 to 70		
UCC5610DWPTR	NRND	SOIC	DW	28		TBD	Call TI	Call TI	0 to 70		
UCC5610DWPTRG4	NRND	SOIC	DW	28		TBD	Call TI	Call TI	0 to 70		
UCC5610QP	NRND	PLCC	FN	28		TBD	Call TI	Call TI	0 to 70		
UCC5610QPTR	NRND	PLCC	FN	28		TBD	Call TI	Call TI	0 to 70		

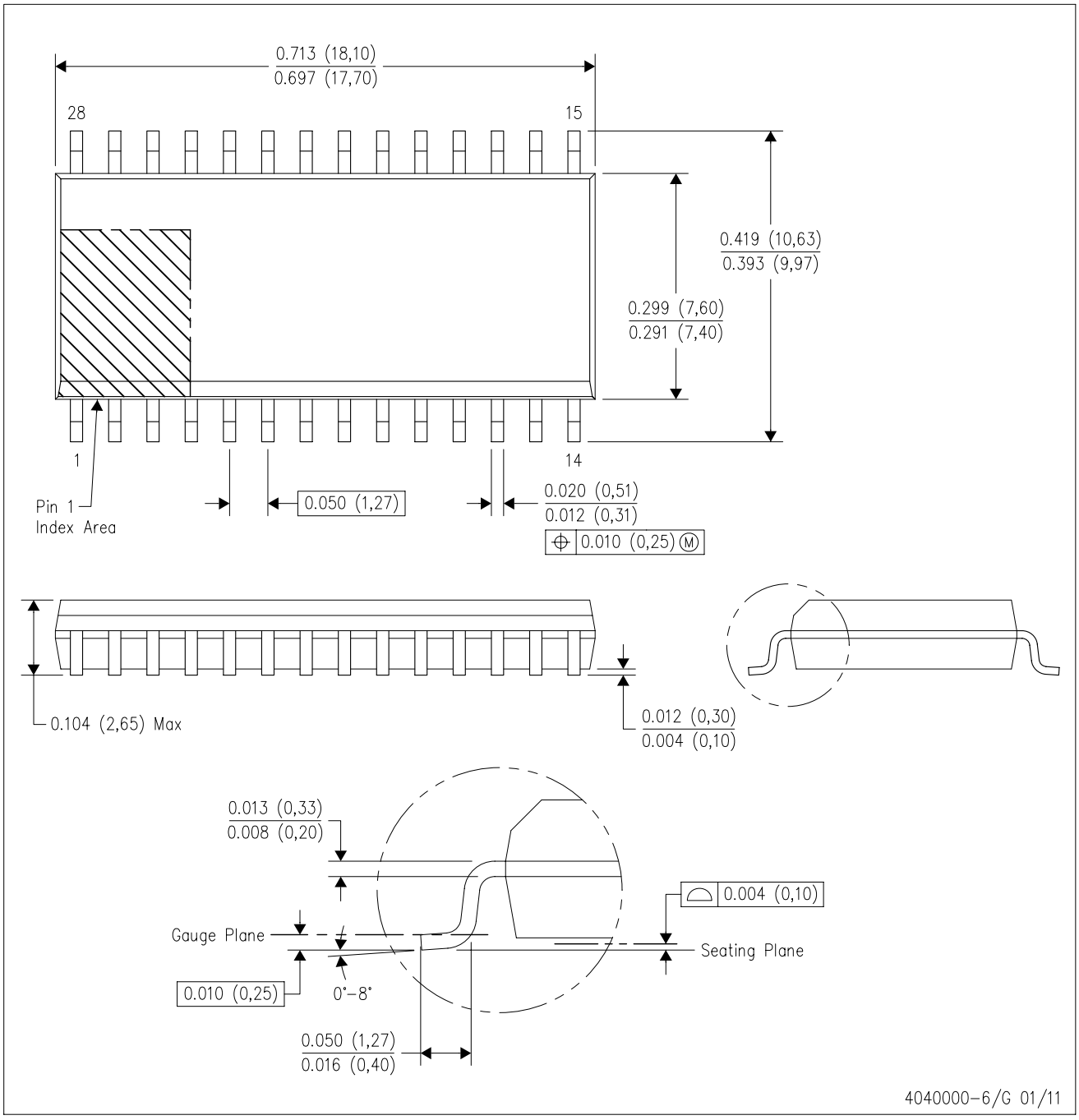
(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

DW (R–PDSO–G28) PLASTIC SMALL OUTLINE



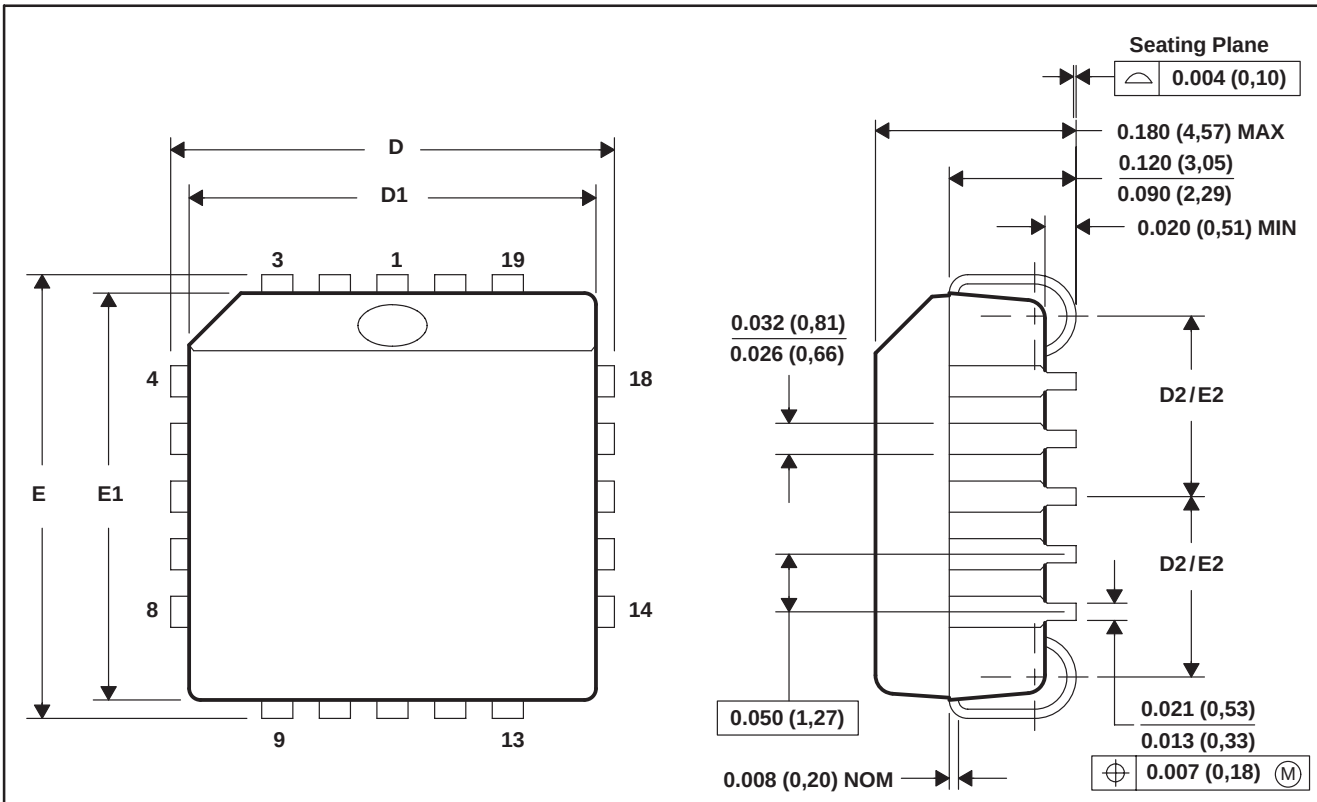
NOTES:
A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AE.

MPLC004A – OCTOBER 1994

FN (S-PQCC-J**)

PLASTIC J-LEADED CHIP CARRIER

20 PIN SHOWN



NO. OF PINS **	D/E		D1/E1		D2/E2	
	MIN	MAX	MIN	MAX	MIN	MAX
20	0.385 (9,78)	0.395 (10,03)	0.350 (8,89)	0.356 (9,04)	0.141 (3,58)	0.169 (4,29)
28	0.485 (12,32)	0.495 (12,57)	0.450 (11,43)	0.456 (11,58)	0.191 (4,85)	0.219 (5,56)
44	0.685 (17,40)	0.695 (17,65)	0.650 (16,51)	0.656 (16,66)	0.291 (7,39)	0.319 (8,10)
52	0.785 (19,94)	0.795 (20,19)	0.750 (19,05)	0.756 (19,20)	0.341 (8,66)	0.369 (9,37)
68	0.985 (25,02)	0.995 (25,27)	0.950 (24,13)	0.958 (24,33)	0.441 (11,20)	0.469 (11,91)
84	1.185 (30,10)	1.195 (30,35)	1.150 (29,21)	1.158 (29,41)	0.541 (13,74)	0.569 (14,45)

4040005/B 03/95

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS-018

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