Great Mixed Signal Technologies

GMT1121X
SmarTERM™
9-Line Active SCSI Terminator

DESCRIPTION

The GMT1121X Small Computer Systems Interface (SCSI) Terminator provides accurate 9 line linear Single Ended (SE) active negation termination for legacy SCSI Single Ended Systems. Data transfer rates up to 40 Mbytes/s (Fast-20, Ultra Wide) can be accomplished with SE SCSI. The SCSI standard recommends and the SPI (Fast-20, Ultra) specification requires active negation termination at both ends of the SCSI bus.

Bus signal integrity is maintained with proper SE termination, which is accomplished by one precision 2.85 V sink/source regulator and nine (9) precision 110-ohm termination lines. The 2.85 V regulator output allows full source termination current and sink active negation current, and internal circuit trimming is utilized to correct the line impedances to within 5% of 110-ohms. The GMT1121X are designed with a low channel capacitance of 1.8pF, which minimizes the dynamic loading effects from the disconnected terminator. Also, the GMT1121X are completely hot pluggable and appear as high impedance at the terminating channels with TRMPWR = 0 V or open. Other features include thermal shutdown, current limiting circuitry, and during disconnect, the supply current is only 100 ì A, which makes the IC attractive for lower powered systems. This device is offered in thermally enhanced lead frame versions of the industry standard 16-pin SOIC, 16-pin DIP and 20 pin TSSOP packages.

FEATURES

- **FULLY COMPLIANT IN SPI, SCSI-3, SCSI-2 & SCSI-1 APPLICATIONS**
- **WIDE OPERATING RANGE, 3.75 V TO 5.50 V**
- **1.8 pF CHANNEL CAPACITANCE DURING DISCONNECT**
- **100 µA SUPPLY CURRENT IN DISCONNECT MODE**
- **ACCURATE TRIMMED TERMINATION IMPEDANCE: 110Ω +/- 5%**
- **SCSI BUS HOT PLUG COMPATIBLE, 10 nA TYPICAL**
- **UP TO 400 mA SOURCING CURRENT AND 200 mA SINKING CURRENT FOR ACTIVE NEGATION TERMINATION**
- **ONBOARD THERMAL SHUTDOWN CIRCUITRY**

APPLICATION CONSIDERATIONS

TERMPWR is connected to the SCSI bus TERMPWR LINE. To maximize noise immunity, supply decoupling should be as close to the TERMPWR pin and returned to an analog signal compliant ground plane. Local decoupling of the TERMPWR line is best accomplished by using a 0.01 µF capacitor (recommended) in parallel with 2.2 µF or 4.7 µF capacitor (required). To maintain specified regulation, a 4.7 µF capacitor (required) in parallel with a 0.01 µF capacitor (recommended) is required between the VREG pin and ground on each GMT1121. Placement of the capacitor(s) should be as close to the VREG pin as possible to minimize trace length. Also, the terminator IC should be as physically close to the SCSI connector as possible to minimize signal trace length. Primary filter or bypass capacitor ESR values should be between 0.75 ohms and 3.0 ohms.

Table 1: ORDERING INFORMATION

16-Pin SOIC	16-Pin DIP	20-Pin-TSSOP
1121AM	1121AN	1121DP
1121BM	1121BN	
1121CM		
1121DM		
1121EM		

Table 2: Product Family

PART NUMBER	DISCONNECT	OPERATING TEMP RANGE
GMT1121A	Active Low	-40°C to +125°C
GMT1121B	Active High	-40°C to +125°C
GMT1121C	Active Low	-40°C to +125°C
GMT1121D	Active Low	-40°C to +125°C
GMT1121E	No Disconnect	-40°C to +125°C

Figure 1: FUNCTIONAL BLOCK DIAGRAM

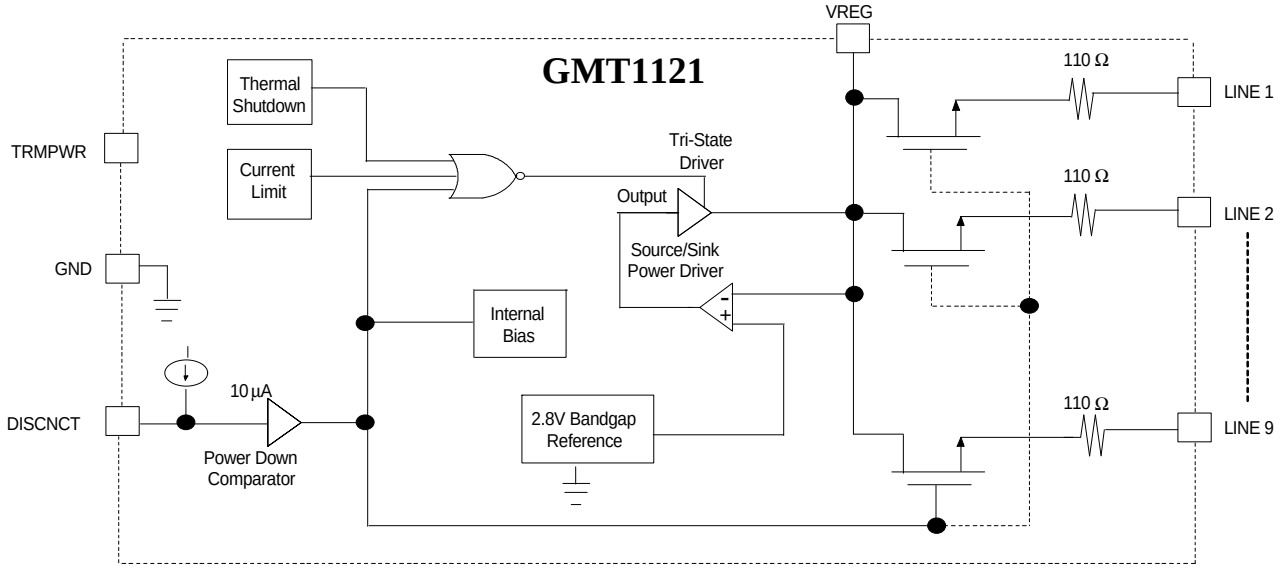
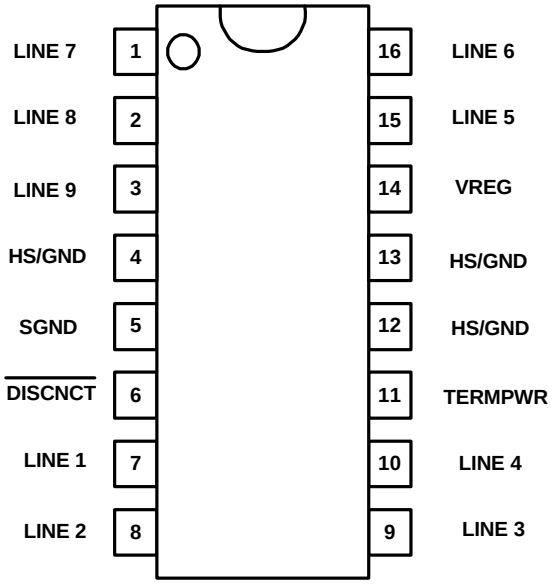
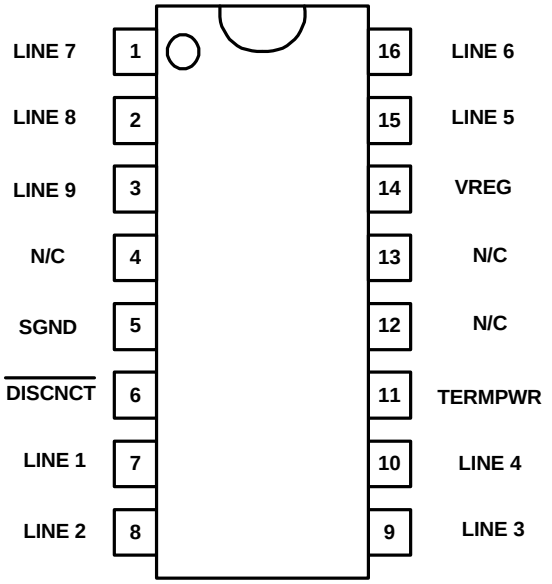


Figure 2: Package Pinout Diagrams

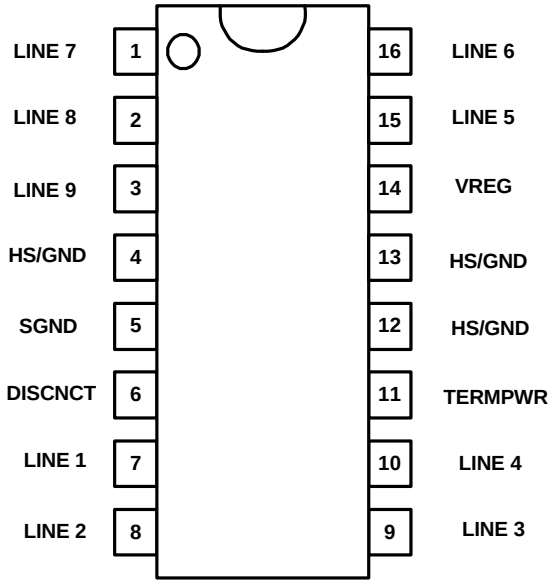
GMT1121AM
SOIC-16 (Top View)



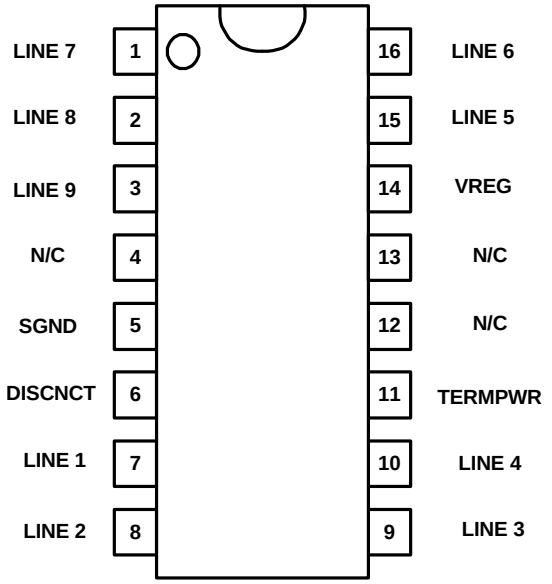
GMT1121AN
DIP-16 (Top View)



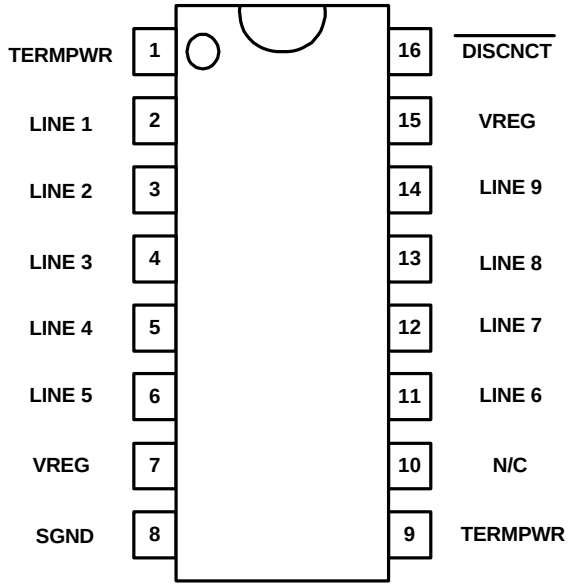
GMT1121BM
SOIC-16 (Top View)



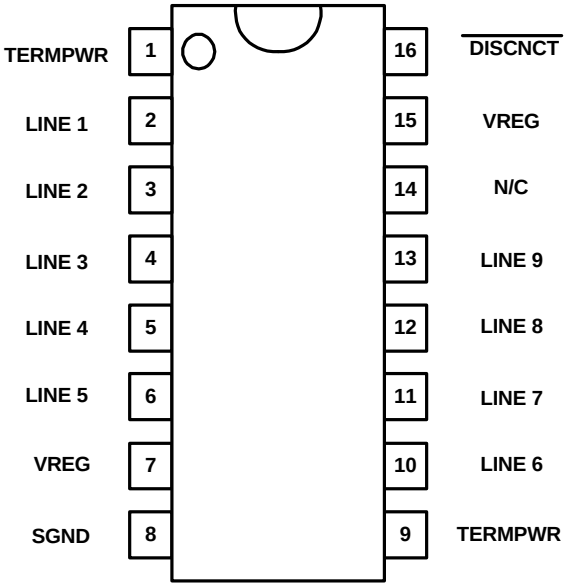
GMT1121BN
DIP-16 (Top View)



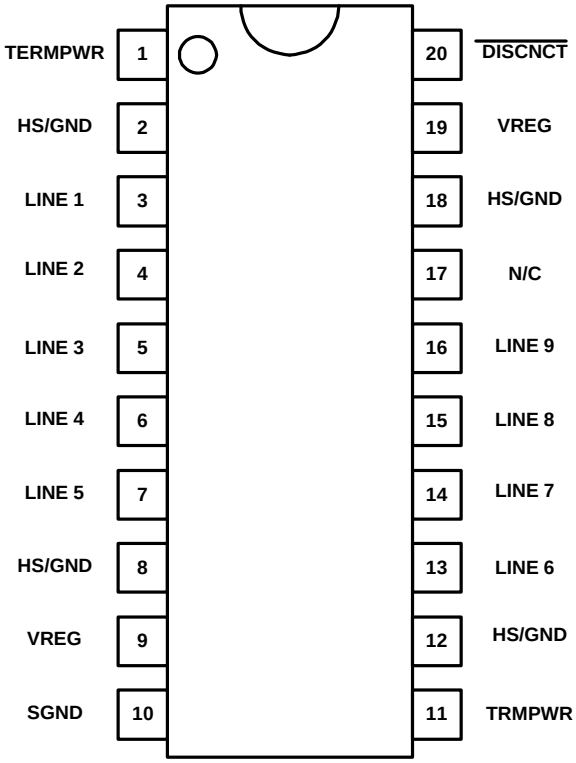
GMT1121CM
SOIC-16 (Top View)



GMT1121DM
SOIC-16 (Top View)



GMT1121DP
TSSOP-20 (Top View)



GMT1121EM
SOIC-16 (Top View)

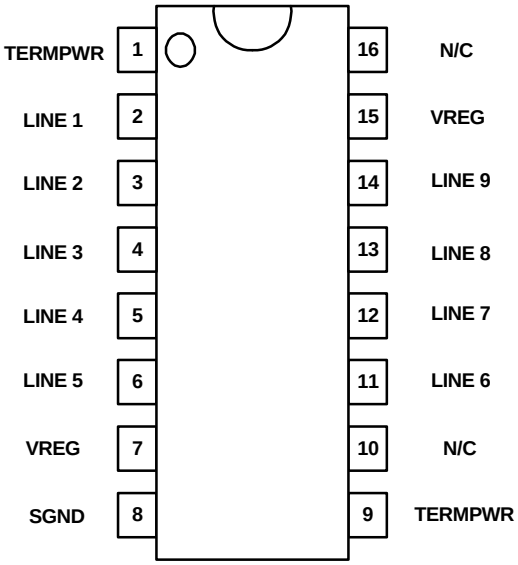


Table 3: ABSOLUTE MAXIMUM RATINGS

TRMPWR Voltage	7V
Signal Line Voltage	0V to TRMPWR
Storage Temperature	-65° to +150°C
Junction Temperature	+125°C
Lead Temperature (Soldering, 10sec.)	+300°C

RECOMMENDED OPERATING CONDITIONS

TRMPWR Voltage……3.75 V to 5.5 V
Temperature Range……....0°C to +70°C

Table 4: THERMAL DATA

1121DP	
Thermal Resistance-Junction to Ambient, θ_{JA}	90° C/W
1121AN & 1121BN	
Thermal Resistance-Junction To Ambient, θ_{JA}	65° C/W
1121CM, 1121DM, 1121EM	
Thermal Resistance-Junction To Ambient, θ_{JA}	50° C/W
1121AM &1121BM	
Thermal Resistance-Junction To Ambient, θ_{JA}	40° C/W

Table 5: ELECTRICAL CHARACTERISTICS – GMT1122A and GMT1122B

Operating voltages of 4.75V. T_A = 0°C to 70°C

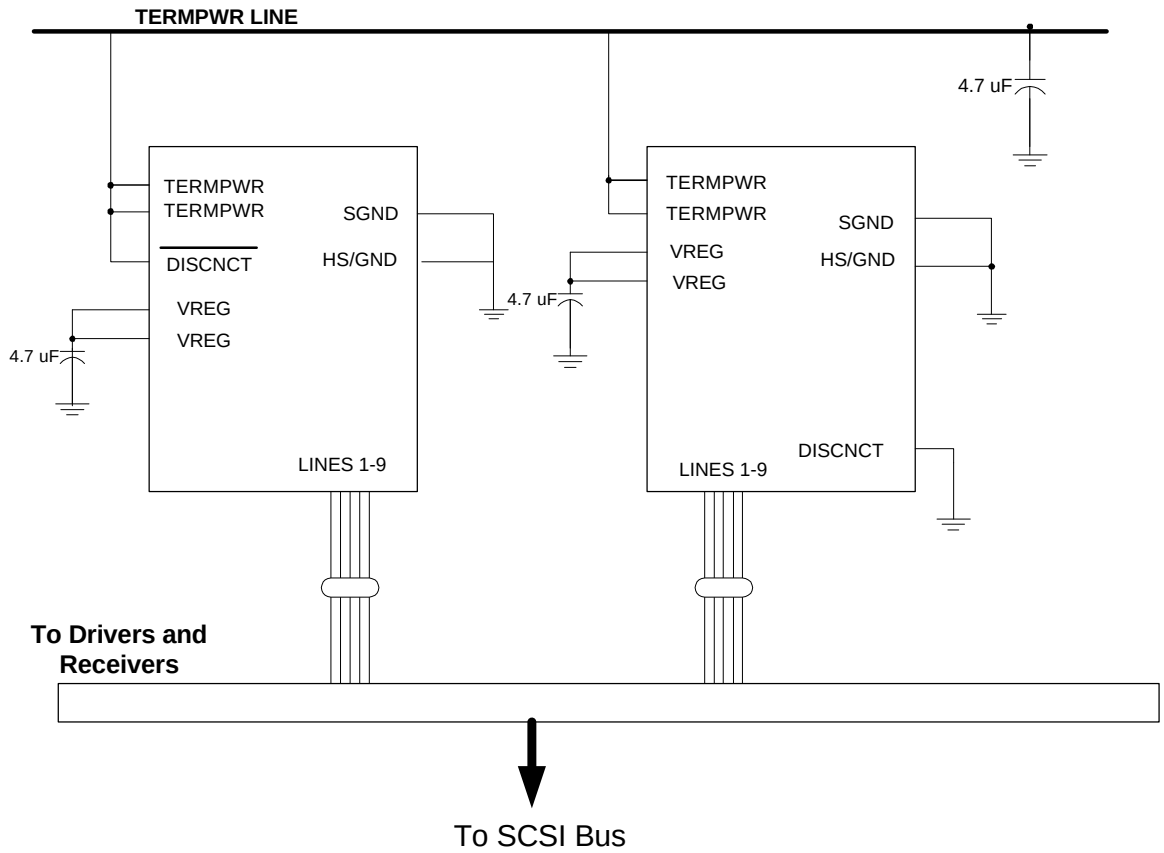
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current Section					
TRMPWR	All termination lines = open		1.0	2.0	mA
TRMPWR	All termination lines = 0.2V		210	230	mA
Power Down Mode (Active High)	DSCNCT = TRMPWR		50	100	µA
Power Down Mode (Active Low)	DSCNCT = 0.0V		100	150	µA
Regulator Section					
Regulator Output Voltage		2.6	2.8	3.0	V
Drop Out Voltage	All termination lines = 0.2V		0.4	0.8	V
Short Circuit Current	V_{REG} = 0.0V	-275	-400	-600	mA
Sink Current	V_{REG} = 3.5V	100			mA
Thermal Shutdown	(note 2)		170		°C
Thermal Shutdown Hysteresis	(note 2)		10		°C
Output Section (Termination Lines)					
Termination Impedance	V_{LINE} = 0.5 V	104.5	110	115.5	Ω
Output High Voltage	V_{TRMPWR} = 4.0V (note 1)	2.6	2.8	3.0	V
Maximum Output current	V_{LINE} = .02 VT_J = 25°C V_{LINE} = 0.2 V V_{LINE} = T_J = 25°C, TRMPWR = 4.0 V, (note 1) V_{LINE} = 0.2 V, TRMPWR = 4.0 V, (note 1) V_{LINE} = 0.5 V	-22.1 -20.7 -21 -20 -	-23.3 -23.3 -23 -23 -	-24 -24 -24 -24 -24	mA mA mA mA mA
Output Leakage	DSCNCT = 2.4 V, TRMPWR = 0.0 V to 5.25 V, REG = 0.2 V, V_{LINE} = 5.25 V		10	400	nA
Output Capacitance	DISCNCT = 2.4 V (note 2)		1.8	2.5	pF
Disconnect (DISCNCT) Section					
DISCNCT Threshold		0.8	1.5	2.0	V
Input Current	DISCNCT = 0.0 V		-10	-30	µA

Note 1: Measuring each line with the other 8 held low (0.2 V).
Note 2: Guaranteed by design.

Table 6: PIN DESCRIPTION

1121AM (note 3)	1121AN (note 3)	1121CM	1121DM	1121DP	1121EM	SYMBOL	FUNCTIONS
6	6	16	16	20	N/A	**DISCNCT**	Disconnect forces all channels to become high impedance, and places the terminator into low power mode.
4,12,13	N/A	N/A	N/A	2,8,12,18	N/A	**HS/GND**	Heat Sink/Ground: Connect to maximized CU area (GND). Use feed through vias to evenly distribute heat.
14	14	7,15	7,15	9,19	7,15	**VREG**	2.8 V internal regulator.
11	11	1,9	1,9	1,11	1,9	**TRMPWR**	Power Supply.
1-3,7-10,15,16	1-3,7-10,15,16	2-6,11-14	2-6,10-13	3-7,13-16	2-6,11-14	**LINES 1-9**	Terminator Channels, 110 Ohms.
5	5	8	8	10	8	**SGND**	Electrical Ground.

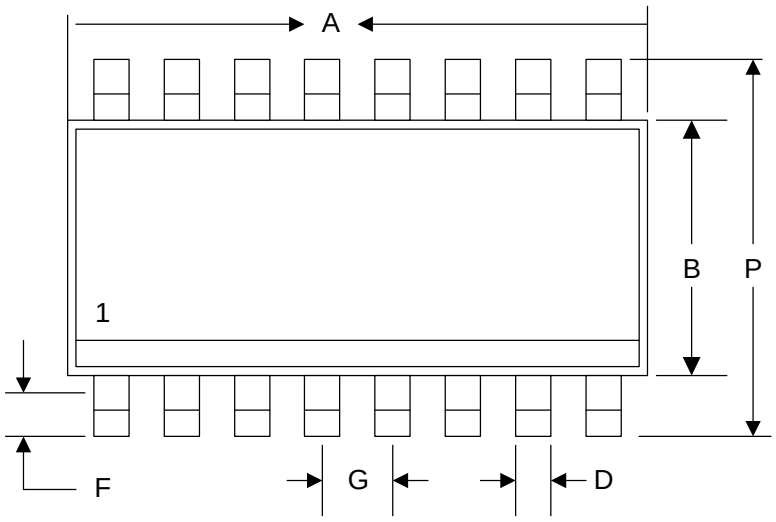
TYPICAL APPLICATION FOR GMT1121A and 1121B



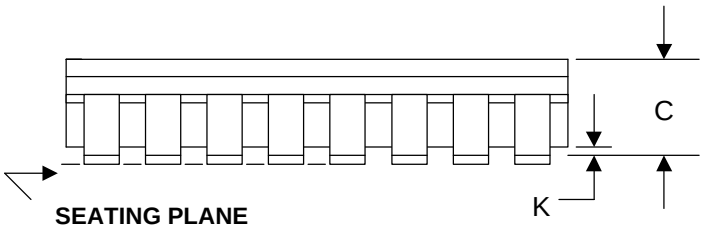
Notes:

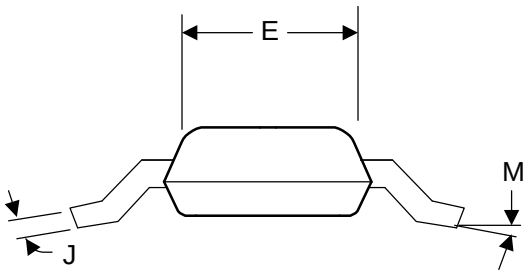
3. 1121BM and 1121BN incorporate active high DISCNCT.
4. HS/GND Pins available on 1121AM, 1121BM, and the 1121DP.
5. The DISCNCT feature is not available on the 1121EM.
6. The 1121A and 1121B incorporate 1 TERMPWR and 1 VREG pin each.

M 8/14/16 Pin Small Outline IC (Narrow Body)



Dim	Min	Nom	Max
B			
C	1.52	---	1.72
D	0.36	---	0.46
F	0.41		1.27
G	1.27 BCS		
J	0.19		0.25
K	0.10	---	0.25
M	0	---	8
P	5.80	---	6.20



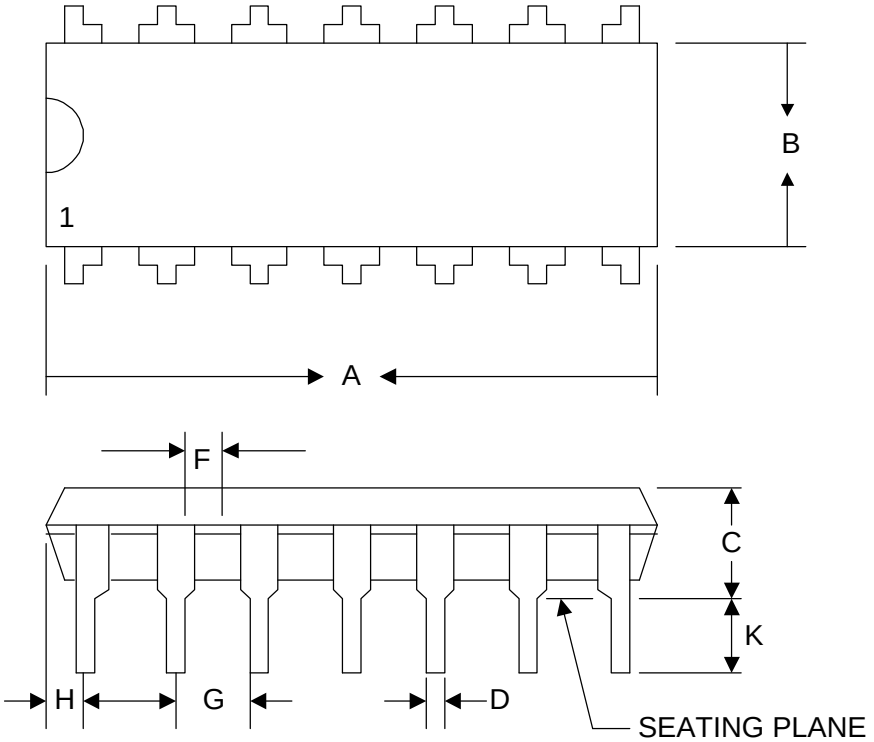


	8	14	16
A_{MIN}	4.8	8.56	9.80
A_{NOM}	4.98	8.74	9.98

NOTES:

7. All linear dimensions are in millimeters (angles in degrees).
8. This drawing is subjected to change without notice.
9. Body dimensions do not include mold flash, protrusions or gate burrs.

N 8/14/16/18/20 Pin Plastic Dual Inline Package (PDIP)



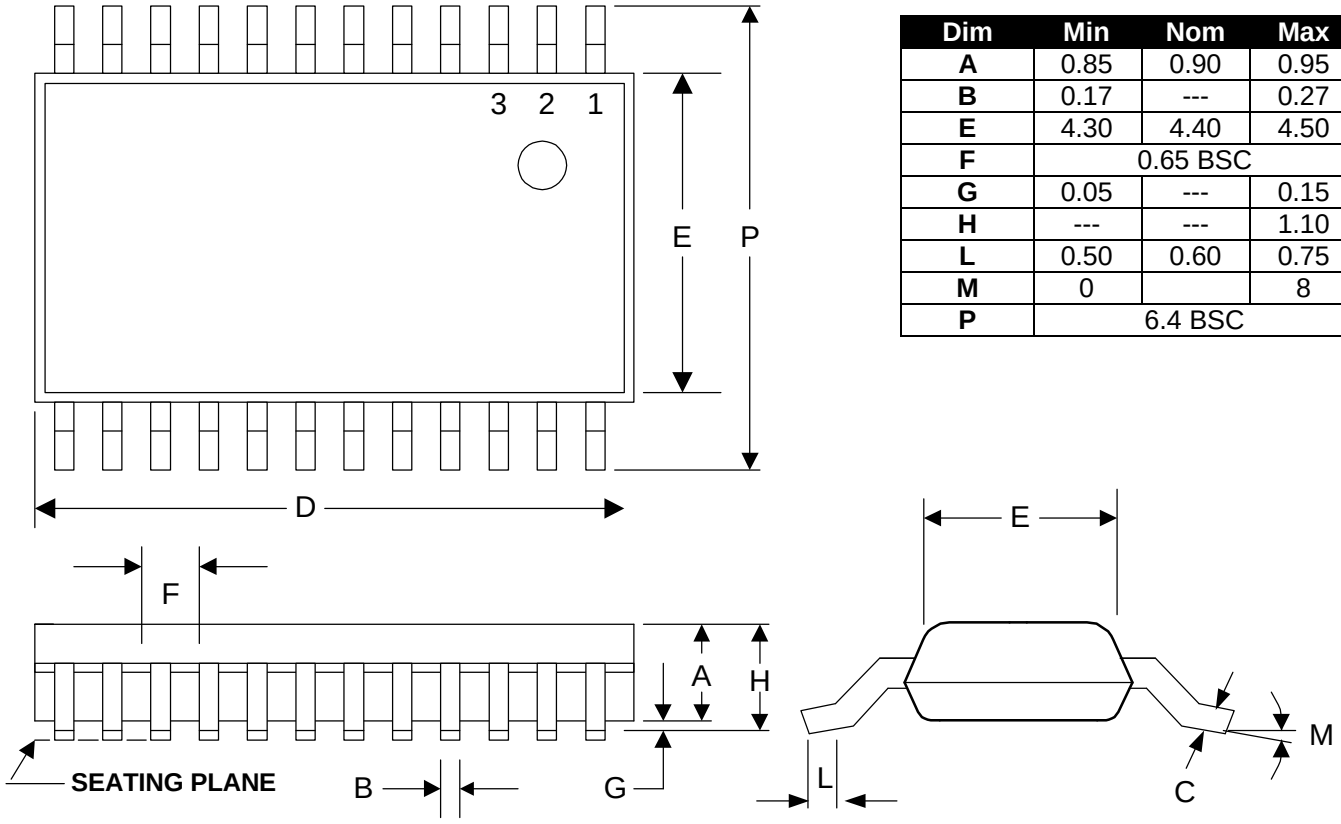
Dim	Min	Nom	Max
B	---	6.35	---
C			
D	---	0.46	---
F	---	1.52	---
G	---	2.54	---
J	---	0.25	---
K	---	3.18	---
L	7.62	---	8.28
M			

	8	14	16	18	20
A	9.52	19.05	19.05	22.61	25.91
H	0.96 REF	1.91 REF	0.64 REF	1.14 REF	1.52 REF

NOTES:

10. All linear dimensions are in millimeters (angles in degrees).
11. This drawing is subject to change without notice.
12. Body dimensions do not include mold flash, protrusions or gate burrs.

P 8/14/16/20/24/28 Pin Thin Small Shrink Outline Package (TSSOP)



Dim	Min	Nom	Max
A	0.85	0.90	0.95
B	0.17	---	0.27
E	4.30	4.40	4.50
F	0.65 BSC		
G	0.05	---	0.15
H	---	---	1.10
L	0.50	0.60	0.75
M	0		8
P	6.4 BSC		

	8	14	16	20	24	28
D_{MIN}	2.9	4.9	4.9	6.4	7.7	9.6
D_{NOM}	3	5	5	6.5	7.8	9.7
D_{MAX}	3.1	5.1	5.1	6.6	7.9	9.8

NOTES:

13. All linear dimensions are in millimeters (angles in degrees).
14. This drawing is subject to change without notice.
15. Body dimensions do not include mold flash, protrusions or gate burrs.

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(b) A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system.

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