

3.3 V Dual Differential LVPECL/LVDS to LVTTTL Translator MC100LVELT23

Description

The MC100LVELT23 is a dual differential LVPECL/LVDS to LVTTTL translator. Because LVPECL (Positive ECL) or LVDS levels are used only +3.3 V and ground are required. The small outline 8-lead package and the dual gate design of the LVELT23 makes it ideal for applications which require the translation of a clock and a data signal.

The LVELT23 is available in only the ECL 100K standard. Since there are no LVPECL outputs or an external V_{BB} reference, the LVELT23 does not require both ECL standard versions. The LVPECL inputs are differential. Therefore, the MC100LVELT23 can accept any standard differential LVPECL input referenced from a V_{CC} of +3.3 V.

Features

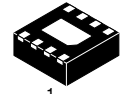
- 2.0 ns Typical Propagation Delay
- Maximum Frequency > 180 MHz
- Differential LVPECL Inputs
- PECL Mode Operating Range: $V_{CC} = 3.0 \text{ V to } 3.8 \text{ V}$ with $GND = 0 \text{ V}$
- 24 mA LVTTTL Outputs
- Flow Through Pinouts
- Internal Pulldown and Pullup Resistors
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



SOIC-8 NB
D SUFFIX
CASE 751-07

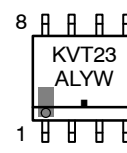


TSSOP-8
DT SUFFIX
CASE 948R-02

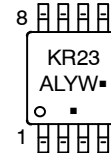


DFN-8
MN SUFFIX
CASE 506AA

MARKING DIAGRAM



SOIC-8



TSSOP-8



DFN-8

A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

*For additional marking information, refer to Application Note [AND8002/D](#).

ORDERING INFORMATION

Device	Package	Shipping [†]
MC100LVELT23DG	SOIC-8 NB (Pb-Free)	98 Units/Tube
MC100LVELT23DR2G	SOIC-8 NB (Pb-Free)	2500/Tape & Reel
MC100LVELT23DTG	TSSOP-8 (Pb-Free)	100 Units/Tube
MC100LVELT23DTRG	TSSOP-8 (Pb-Free)	2500/Tape & Reel
MC100LVELT23MNRG	DFN-8 (Pb-Free)	1000/Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

MC100LVELT23

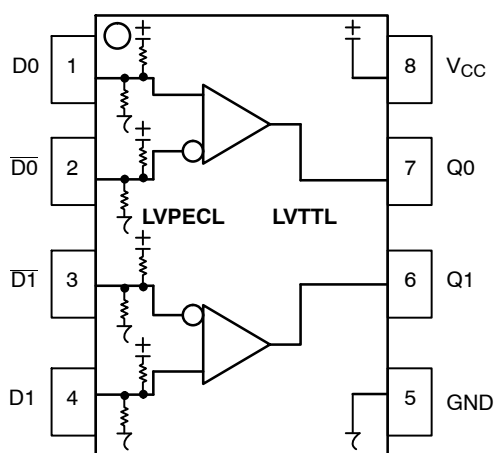


Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

Table 1. PIN DESCRIPTION

Pin	Function
Q0, Q1 D0*, D1* D0*, D1*	LVTTTL Outputs Differential LVPECL Inputs
V _{CC} GND EP	Positive Supply Ground (DFN8 only) Thermal exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply (GND) or leave unconnected, floating open.

** Pins will default to $V_{CC}/2$ when left open.

Table 2. ATTRIBUTES

Characteristics	Value
Internal Input Pulldown Resistor	50 kΩ
Internal Input Pullup Resistor	50 kΩ
ESD Protection Human Body Model Machine Model CDM	> 1500 V > 100 V > 2000 V
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Pb-Free Pkg
SOIC-8 NB TSSOP-8 DFN-8	Level 1 Level 3 Level 1
Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count	91
Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	

1. Refer to Application Note [AND8003/D](#) for additional information.

MC100LVELT23

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V _{CC}	PECL Power Supply	GND = 0 V		3.8	V
V _I	Input Voltage	GND = 0 V, V _I not more positive than V _{CC}		3.8	V
I _{out}	Output Current	Continuous Surge		50 100	mA
T _A	Operating Temperature Range			–40 to +85	°C
T _{stg}	Storage Temperature			–65 to +150	°C
θ _{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC–8 NB	190 130	°C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC–8 NB	41 to 44 ± 5%	°C/W
θ _{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP–8	185 140	°C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP–8	41 to 44 ± 5%	°C/W
θ _{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	DFN–8	129 84	°C/W
T _{sol}	Wave Solder Pb-Free	< 2 to 3 sec @ 260°C		265	°C
θ _{JC}	Thermal Resistance (Junction-to-Case)	(Note 1)	DFN–8	35 to 40	°C/W

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. JEDEC standard multilayer board – 2S2P (2 signal, 2 power)

Table 4. LVPECL INPUT DC CHARACTERISTICS (V_{CC} = 3.3 V; GND = 0 V (Note 1))

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{CCH}	Power Supply Current (Outputs set to HIGH)	10	20	35	10	20	35	10	20	35	mA
I _{CCL}	Power Supply Current (Outputs set to LOW)	15	27	40	15	27	40	15	27	40	mA
V _{IH}	Input HIGH Voltage (Note 3)	2135		2420	2135		2420	2135		2420	mV
V _{IL}	Input LOW Voltage (Note 3)	1490		1825	1490		1825	1490		1825	mV
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Notes 2 and 3)	1.2		V _{CC}	1.2		V _{CC}	1.2		V _{CC}	V
I _{IH}	Input HIGH Current			150			150			150	μA
I _{IL}	Input LOW Current	$\bar{D}$ –150			–150			–150			μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. All values vary 1:1 with V_{CC}. V_{CC} can vary ±0.3 V.
2. V_{IHCMR} min varies 1:1 with GND, max varies 1:1 with V_{CC}.
3. LVTTTL output R_L = 500 Ω to GND.

MC100LVELT23

Table 5. LVTTTL OUTPUT DC CHARACTERISTICS ($V_{CC} = 3.3\text{ V}$; $GND = 0\text{ V}$ (Note 1))

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage ($I_{OH} = -3.0\text{ mA}$) (Note 2)	2.4			2.4			2.4			V
V_{OL}	Output LOW Voltage ($I_{OL} = 24\text{ mA}$) (Note 2)			0.5			0.5			0.5	V
I_{OS}	Output Short Circuit Current	-180		-50	-180		-50	-180		-50	mA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. All values vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.3\text{ V}$.
2. LVTTTL output $R_L = 500\ \Omega$ to GND.

Table 6. AC CHARACTERISTICS ($V_{CC} = 3.3\text{ V}$; $GND = 0\text{ V}$ (Notes 1, 2))

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
F_{max}	Maximum Toggle Frequency (Note 3)	180			180			180			MHz
t_{PLH} , t_{PHL}	Propagation Delay to Output Differential	1.0	1.5	2.5	1.0	1.7	2.5	1.0	1.7	2.5	ns
t_{SK++} , t_{SK--} , t_{SKPP}	Output-to-Output Skew++ Output-to-Output Skew-- Part-to-Part Skew (Note 4)		15 35 70	60 80 500		15 40 70	70 80 500		30 40 140	125 80 500	ps
t_{JITTER}	Random Clock Jitter (RMS)		4.0	10		4.0	10		4.0	10	ps
V_{PP}	Input Voltage Swing (Differential Configuration) (Note 5)	200	800	1000	200	800	1000	200	800	1000	mV
t_r , t_f	Output Rise/Fall Times (0.8 V – 2.0 V) $Q, \bar{Q}$	330	600	900	330	600	900	330	650	900	ps

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. All values vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.3\text{ V}$.
2. LVTTTL output $R_L = 500\ \Omega$ to GND and $C_L = 20\text{ pF}$ to GND. Refer to Figure 2.
3. F_{max} guaranteed for functionality only. V_{OL} and V_{OH} levels are guaranteed at DC only.
4. Skews are measured between outputs under identical conditions.
5. 200 mV input guarantees full logic swing at the output.

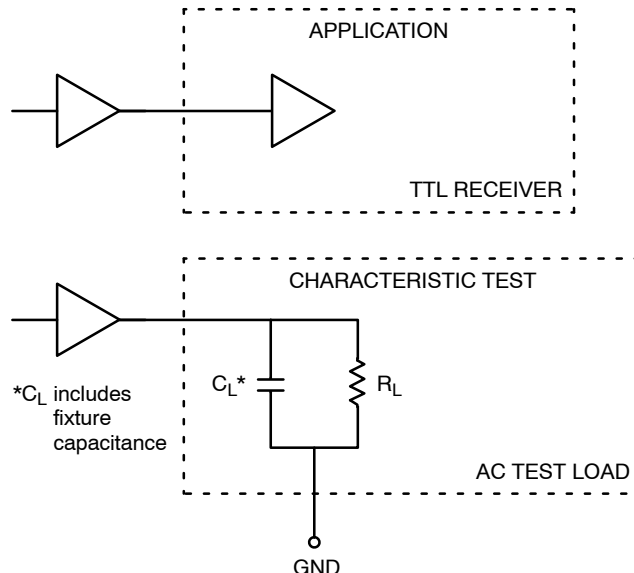


Figure 2. TTL Output Loading Used for Device Evaluation

MC100LVELT23

Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPICE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

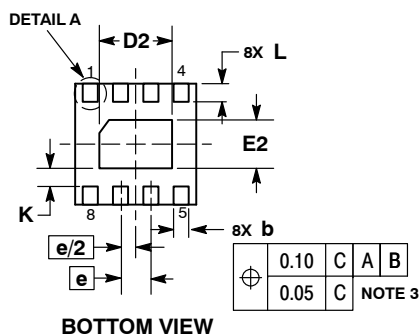
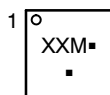
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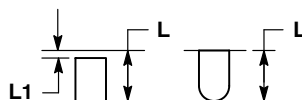
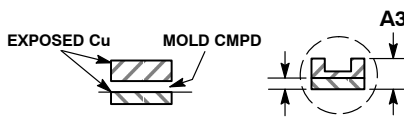
SCALE 4:1

DFN8 2x2, 0.5P
CASE 506AA
ISSUE F

DATE 04 MAY 2016

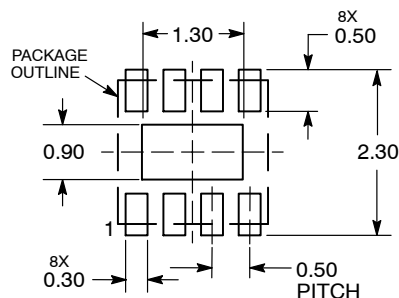

GENERIC
MARKING DIAGRAM*

XX = Specific Device Code
M = Date Code
▪ = Pb-Free Device

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.


DETAIL A
OPTIONAL
CONSTRUCTIONS

DETAIL B
ALTERNATE
CONSTRUCTIONS
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

MILLIMETERS		
DIM	MIN	MAX
A	0.80	1.00
A1	0.00	0.05
A3	0.20	REF
b	0.20	0.30
D	2.00	BSC
D2	1.10	1.30
E	2.00	BSC
E2	0.70	0.90
e	0.50	BSC
K	0.30	REF
L	0.25	0.35
L1		0.10

RECOMMENDED
SOLDERING FOOTPRINT*


DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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DESCRIPTION:	DFN8, 2.0X2.0, 0.5MM PITCH	PAGE 1 OF 1

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SCALE 1:1

SOIC-8 NB
CASE 751-07
ISSUE AK

DATE 16 FEB 2011



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

GENERIC
MARKING DIAGRAM*



XXXXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb-Free Package

XXXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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SOIC-8 NB
CASE 751-07
ISSUE AK

DATE 16 FEB 2011

STYLE 1: PIN 1. EMITTER 2. COLLECTOR 3. COLLECTOR 4. EMITTER 5. EMITTER 6. BASE 7. BASE 8. EMITTER	STYLE 2: PIN 1. COLLECTOR, DIE, #1 2. COLLECTOR, #1 3. COLLECTOR, #2 4. COLLECTOR, #2 5. BASE, #2 6. EMITTER, #2 7. BASE, #1 8. EMITTER, #1	STYLE 3: PIN 1. DRAIN, DIE #1 2. DRAIN, #1 3. DRAIN, #2 4. DRAIN, #2 5. GATE, #2 6. SOURCE, #2 7. GATE, #1 8. SOURCE, #1	STYLE 4: PIN 1. ANODE 2. ANODE 3. ANODE 4. ANODE 5. ANODE 6. ANODE 7. ANODE 8. COMMON CATHODE
STYLE 5: PIN 1. DRAIN 2. DRAIN 3. DRAIN 4. DRAIN 5. GATE 6. GATE 7. SOURCE 8. SOURCE	STYLE 6: PIN 1. SOURCE 2. DRAIN 3. DRAIN 4. SOURCE 5. SOURCE 6. GATE 7. GATE 8. SOURCE	STYLE 7: PIN 1. INPUT 2. EXTERNAL BYPASS 3. THIRD STAGE SOURCE 4. GROUND 5. DRAIN 6. GATE 3 7. SECOND STAGE Vd 8. FIRST STAGE Vd	STYLE 8: PIN 1. COLLECTOR, DIE #1 2. BASE, #1 3. BASE, #2 4. COLLECTOR, #2 5. COLLECTOR, #2 6. EMITTER, #2 7. EMITTER, #1 8. COLLECTOR, #1
STYLE 9: PIN 1. EMITTER, COMMON 2. COLLECTOR, DIE #1 3. COLLECTOR, DIE #2 4. EMITTER, COMMON 5. EMITTER, COMMON 6. BASE, DIE #2 7. BASE, DIE #1 8. EMITTER, COMMON	STYLE 10: PIN 1. GROUND 2. BIAS 1 3. OUTPUT 4. GROUND 5. GROUND 6. BIAS 2 7. INPUT 8. GROUND	STYLE 11: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. DRAIN 2 7. DRAIN 1 8. DRAIN 1	STYLE 12: PIN 1. SOURCE 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 13: PIN 1. N.C. 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN	STYLE 14: PIN 1. N-SOURCE 2. N-GATE 3. P-SOURCE 4. P-GATE 5. P-DRAIN 6. P-DRAIN 7. N-DRAIN 8. N-DRAIN	STYLE 15: PIN 1. ANODE 1 2. ANODE 1 3. ANODE 1 4. ANODE 1 5. CATHODE, COMMON 6. CATHODE, COMMON 7. CATHODE, COMMON 8. CATHODE, COMMON	STYLE 16: PIN 1. EMITTER, DIE #1 2. BASE, DIE #1 3. EMITTER, DIE #2 4. BASE, DIE #2 5. COLLECTOR, DIE #2 6. COLLECTOR, DIE #2 7. COLLECTOR, DIE #1 8. COLLECTOR, DIE #1
STYLE 17: PIN 1. VCC 2. V2OUT 3. V1OUT 4. TXE 5. RXE 6. VEE 7. GND 8. ACC	STYLE 18: PIN 1. ANODE 2. ANODE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. CATHODE 8. CATHODE	STYLE 19: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. MIRROR 2 7. DRAIN 1 8. MIRROR 1	STYLE 20: PIN 1. SOURCE (N) 2. GATE (N) 3. SOURCE (P) 4. GATE (P) 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 21: PIN 1. CATHODE 1 2. CATHODE 2 3. CATHODE 3 4. CATHODE 4 5. CATHODE 5 6. COMMON ANODE 7. COMMON ANODE 8. CATHODE 6	STYLE 22: PIN 1. I/O LINE 1 2. COMMON CATHODE/VCC 3. COMMON CATHODE/VCC 4. I/O LINE 3 5. COMMON ANODE/GND 6. I/O LINE 4 7. I/O LINE 5 8. COMMON ANODE/GND	STYLE 23: PIN 1. LINE 1 IN 2. COMMON ANODE/GND 3. COMMON ANODE/GND 4. LINE 2 IN 5. LINE 2 OUT 6. COMMON ANODE/GND 7. COMMON ANODE/GND 8. LINE 1 OUT	STYLE 24: PIN 1. BASE 2. EMITTER 3. COLLECTOR/ANODE 4. COLLECTOR/ANODE 5. CATHODE 6. CATHODE 7. COLLECTOR/ANODE 8. COLLECTOR/ANODE
STYLE 25: PIN 1. VIN 2. N/C 3. REXT 4. GND 5. IOUT 6. IOUT 7. IOUT 8. IOUT	STYLE 26: PIN 1. GND 2. dv/dt 3. ENABLE 4. ILIMIT 5. SOURCE 6. SOURCE 7. SOURCE 8. VCC	STYLE 27: PIN 1. ILIMIT 2. OVLO 3. UVLO 4. INPUT+ 5. SOURCE 6. SOURCE 7. SOURCE 8. DRAIN	STYLE 28: PIN 1. SW_TO_GND 2. DASIC_OFF 3. DASIC_SW_DET 4. GND 5. V_MON 6. VBULK 7. VBULK 8. VIN
STYLE 29: PIN 1. BASE, DIE #1 2. EMITTER, #1 3. BASE, #2 4. EMITTER, #2 5. COLLECTOR, #2 6. COLLECTOR, #2 7. COLLECTOR, #1 8. COLLECTOR, #1	STYLE 30: PIN 1. DRAIN 1 2. DRAIN 1 3. GATE 2 4. SOURCE 2 5. SOURCE 1/DRAIN 2 6. SOURCE 1/DRAIN 2 7. SOURCE 1/DRAIN 2 8. GATE 1		

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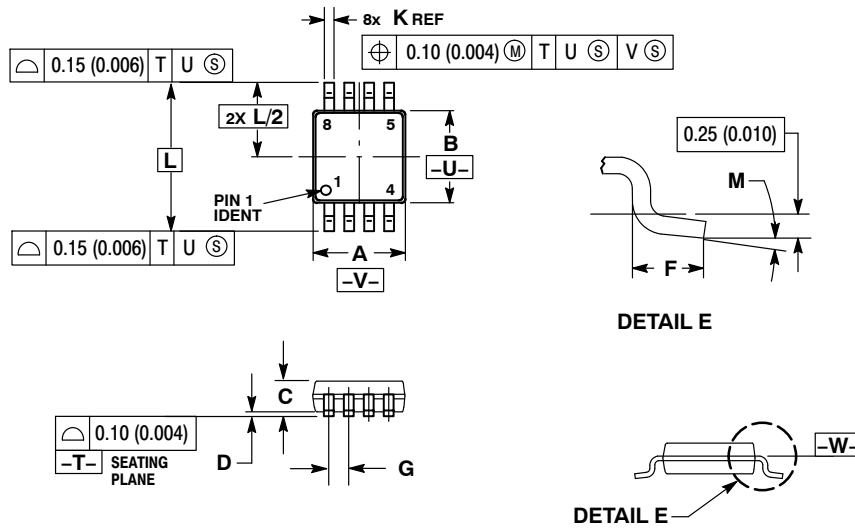
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SCALE 2:1

TSSOP-8 3.00x3.00x0.95
CASE 948R-02
ISSUE A

DATE 07 APR 2000



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	0.80	1.10	0.031	0.043
D	0.05	0.15	0.002	0.006
F	0.40	0.70	0.016	0.028
G	0.65 BSC		0.026 BSC	
K	0.25	0.40	0.010	0.016
L	4.90 BSC		0.193 BSC	
M	0°	6°	0°	6°

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