

# MC100EPT20DTR2G Datasheet



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DiGi Electronics Part Number MC100EPT20DTR2G-DG

Manufacturer onsemi

Manufacturer Product Number MC100EPT20DTR2G

Description IC TRANSLATOR UNIDIR 8TSSOP

Detailed Description Mixed Signal Translator Unidirectional 1 Circuit 1 C

hannel 8-TSSOP



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# **Purchase and inquiry**

Manufacturer Product Number:	Manufacturer:
MC100EPT20DTR2G	onsemi
Series:	Product Status:
100EPT	Active
Translator Type:	Channel Type:
Mixed Signal	Unidirectional
Number of Circuits:	Channels per Circuit:
1	1
Input Signal:	Output Signal:
LVCMOS, LVTTL	LVPECL
Output Type:	Data Rate:
Differential	
Operating Temperature:	Features:
-40°C ~ 85°C (TA)	
Mounting Type:	Package / Case:
Surface Mount	8-TSSOP, 8-MSOP (0.118", 3.00mm Width)
Supplier Device Package:	Base Product Number:
8-TSSOP	100EPT20

# **Environmental & Export classification**

8542.39.0001

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	3 (168 Hours)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	



# 3.3 V LVTTL/LVCMOS to **Differential LVPECL Translator**

## MC10EPT20, MC100EPT20

The MC10EPT20 is a 3.3 V TTL/CMOS to differential PECL translator. Because PECL (Positive ECL) levels are used, only +3.3 V and ground are required. The small outline SOIC-8 NB package and the single gate of the EPT20 makes it ideal for those applications where space, performance, and low power are at a premium.

The 100 Series contains temperature compensation.

#### **Features**

- 390 ps Typical Propagation Delay
- Maximum Input Clock Frequency > 1 GHz Typical
- Operating Range:
  - $V_{CC} = 3.0 \text{ V}$  to 3.6 V with GND = 0 V
- PNP TTL Input for Minimal Loading
- Q Output will Default HIGH with Input Open
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant





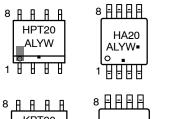


SOIC-8 NB **D SUFFIX CASE 751-07** 

TSSOP-8 DT SUFFIX

DFN-8 **MN SUFFIX** 

### **MARKING DIAGRAMS\***









= MC10 = Assembly Location = MC100= Wafer Lot = MC100= Year = Date Code W = Work Week = Pb-Free Package

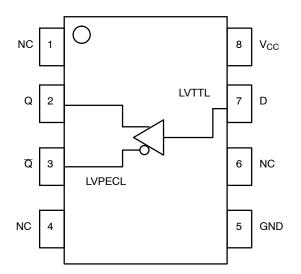
(Note: Microdot may be in either location)

\*For additional marking information, refer to Application Note AND8002/D.

### **ORDERING INFORMATION**

See detailed ordering and shipping information on page 6 of this data sheet.

NOTE: Some of the devices on this data sheet have been DISCONTINUED. Please refer to the table on page 6.



**Table 1. PIN DESCRIPTION** 

PIN	FUNCTION
$Q, \overline{Q}$	Differential PECL Outputs
D	LVTTL Input
V <sub>CC</sub>	Positive Supply
GND	Ground
NC	No Connect
EP	(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.

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

### **Table 2. ATTRIBUTES**

Characteristics	Value
Internal Input Pulldown Resistor	N/A
Internal Input Pullup Resistor	N/A
ESD Protection Human Body Model Machine Model Charged Device Model	> 1.5 kV > 200 V > 2 kV
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	150 Devices
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	

<sup>1.</sup> For additional information, see Application Note AND8003/D.

**Table 3. MAXIMUM RATINGS** 

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V <sub>CC</sub>	Power Supply	GND = 0 V		6	V
VI	Input Voltage	GND = 0 V	V <sub>I</sub> ≤ V <sub>CC</sub>	6	V
l <sub>out</sub>	Output Current	Continuous Surge		50 100	mA
TA	Operating Temperature Range			-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC-8 NB	190 130	°C/W
θJC	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8 NB	41 to 44	°C/W
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8	185 140	°C/W
θJC	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44	°C/W
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	DFN-8	129 84	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	(Note 1)	DFN-8	35 to 40	°C/W
T <sub>sol</sub>	Wave Solder (Pb-Free)	<2 to 3 sec @ 260°C		265	°C

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. LVTTL INPUT DC CHARACTERISTICS ( $V_{CC} = 3.3 \text{ V}$ , GND = 0 V,  $T_A = -40 ^{\circ}\text{C}$  to +85  $^{\circ}\text{C}$ )

Symbol	Characteristic	Min	Тур	Max	Unit
I <sub>IH</sub>	Input HIGH Current (V <sub>in</sub> = 2.7 V)			20	μΑ
I <sub>IHH</sub>	Input HIGH Current MAX (V <sub>in</sub> = 6.0 V)			100	μΑ
I <sub>IL</sub>	Input LOW Current (V <sub>in</sub> = 0.5 V)			-0.6	mA
$V_{IK}$	Input Clamp Voltage (I <sub>in</sub> = -18 mA)			-1.2	V
V <sub>IH</sub>	Input HIGH Voltage	2.0			V
$V_{IL}$	Input LOW Voltage			0.8	V

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.

Table 5. 10EPT PECL OUTPUT DC CHARACTERISTICS ( $V_{CC} = 3.3 \text{ V}$ , GND = 0 V (Note 1))

			-40°C		25°C			85°C			
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
Icc	Positive Power Supply Current	18	23	28	18	23	28	19	24	29	mA
V <sub>OH</sub>	Output HIGH Voltage (Note 2)	2165	2290	2415	2230	2355	2480	2290	2415	2540	mV
V <sub>OL</sub>	Output LOW Voltage (Note 2)	1365	1490	1615	1430	1555	1680	1490	1615	1740	mV

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.

- 1. Output parameters vary 1:1 with V $_{CC}$ . 2. All loading with 50  $\Omega$  to V $_{CC}$  2.0 V.

Table 6. 100EPT PECL OUTPUT DC CHARACTERISTICS (V<sub>CC</sub> = 3.3 V, GND = 0 V (Note 1))

		−40°C		25°C			85°C				
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I <sub>CC</sub>	Positive Power Supply Current	20	25	30	22	27	32	23	28	33	mA
V <sub>OH</sub>	Output HIGH Voltage (Note 2)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
V <sub>OL</sub>	Output LOW Voltage (Note 2)	1355	1480	1605	1355	1480	1605	1355	1480	1605	mV

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.

- 1. Output parameters vary 1:1 with  $V_{CC}$ .
- 2. All loading with 50  $\Omega$  to  $V_{CC}$  2.0 V.

Table 7. AC CHARACTERISTICS ( $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}, \text{ GND} = 0 \text{ V (Note 1)}$ )

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f <sub>max</sub>	Maximum Input Clock Frequency		> 1			> 1			> 1		GHz
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay to Output Differential	280	350	430	300	370	450	320	400	490	ps
t <sub>SKEW</sub>	Device-to-Device Skew (Note 2)			150			150			170	ps
t <sub>JITTER</sub>	RMS Random Clock Jitter		1	2		1	2		1	2	ps
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q, Q (20% – 80%)	70	100	170	80	120	180	90	140	190	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 lfpm.

- 1. Measured using a LVTTL source, 50% duty cycle clock source. All loading with 50  $\Omega$  to V<sub>CC</sub> 2.0 V.
- 2. Skew is measured between outputs under identical transitions.

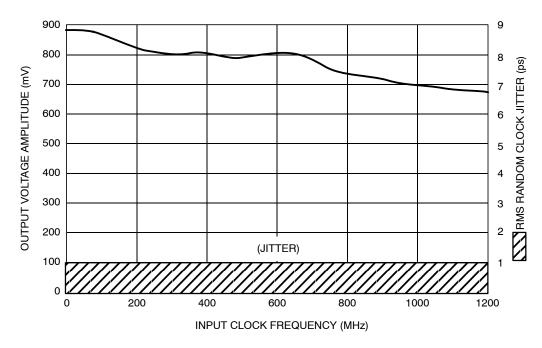


Figure 2. Output Voltage Amplitude (V<sub>OUTpp</sub>)/RMS Jitter vs. Input Clock Frequency at Ambient Temperature

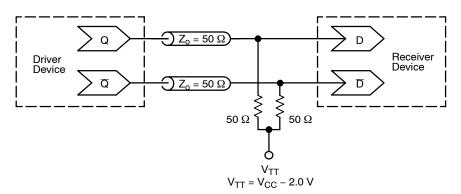


Figure 3. Typical Termination for Output Driver and Device Evaluation (See Application Note <u>AND8020/D</u> – Termination of ECL Logic Devices.)

#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
MC10EPT20DG	SOIC-8 NB (Pb-Free)	98 Units/Tube
MC100EPT20DG	SOIC-8 NB (Pb-Free)	98 Units/Tube
MC100EPT20DR2G	SOIC-8 NB (Pb-Free)	2500 / Tape & Reel
MC100EPT20DTG	TSSOP-8 (Pb-Free)	100 Units/Tube
MC100EPT20DTR2G	TSSOP-8 (Pb-Free)	2500 / Tape & Reel
MC100EPT20MNR4G	DFN-8 (Pb-Free)	1000 / Tape & Reel

### **DISCONTINUED** (Note 3)

MC10EPT20DTG	TSSOP-8	100 Units/Tube
	(Pb-Free)	

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, <a href="https://example.com/BRD8011/D">BRD8011/D</a>.

### **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

<sup>3.</sup> **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on <a href="https://www.onsemi.com">www.onsemi.com</a>.

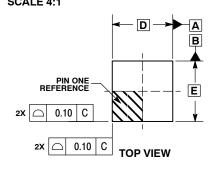


# **MECHANICAL CASE OUTLINE**

### PACKAGE DIMENSIONS



**DATE 04 MAY 2016** 



DETAIL B

SIDE VIEW

(A3)

SEATING PLANE

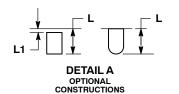
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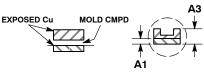
0.10 С

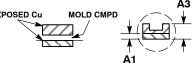
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**DETAIL A** 

NOTE 4







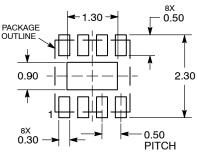
**DETAIL B** ALTERNATE CONSTRUCTIONS

#### NOTES

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

	MILLIMETERS				
DIM	MIN	MAX			
Α	0.80	1.00			
<b>A</b> 1	0.00	0.05			
А3	0.20	0.20 REF			
b	0.20	0.30			
D	2.00	2.00 BSC			
D2	1.10	1.30			
Е	2.00	BSC			
E2	0.70	0.90			
е	0.50	0.50 BSC			
K	0.30	0.30 REF			
L	0.25	0.35			
L1		0.10			

### **RECOMMENDED SOLDERING FOOTPRINT\***



DIMENSIONS: MILLIMETERS

+D2 → 0.10 CAB е С 0.05 NOTE 3 **BOTTOM VIEW** 

### **GENERIC MARKING DIAGRAM\***



XX = Specific Device Code

= Date Code

= Pb-Free Device

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

DOCUMENT NUMBER:	98AON18658D	Electronic versions are uncontrolled except when accessed directly from the Document Repos Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	DFN8, 2.0X2.0, 0.5MM PITCH		PAGE 1 OF 1

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<sup>\*</sup>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.



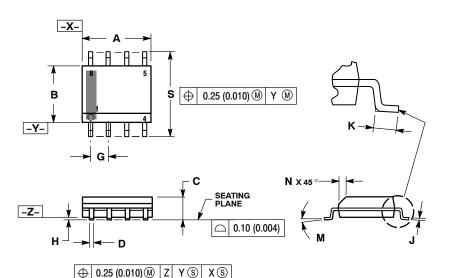
# **MECHANICAL CASE OUTLINE**

PACKAGE DIMENSIONS



SOIC-8 NB CASE 751-07 **ISSUE AK** 

**DATE 16 FEB 2011** 



- NOTES:
  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  CONTROLLING DIMENSION: MILLIMETER.
- DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE
- 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.
- 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

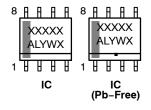
	MILLIMETERS		RS INCHES	
DIM	MIN	MAX	MIN	MAX
Α	4.80	5.00	0.189	0.197
В	3.80	4.00	0.150	0.157
С	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
Н	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
М	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

### **SOLDERING FOOTPRINT\***



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

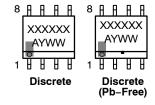
### **GENERIC MARKING DIAGRAM\***



XXXXX = Specific Device Code = Assembly Location

= Wafer Lot = Year = Work Week

= Pb-Free Package



XXXXXX = Specific Device Code = Assembly Location

Α

= 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.

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### **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	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	PIN 1. COLLECTOR, DIE #1 2. BASE, #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	STYLE 12: PIN 1. SOURCE 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 9. 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	STYLE 19: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. MIRROR 2	STYLE 20: PIN 1. SOURCE (N) 2. GATE (N) 3. SOURCE (P) 4. GATE (P) 5. DRAIN 6. DRAIN
3. V10UT 4. TXE 5. RXE 6. VEE 7. GND 8. ACC  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:	7. DRAIN 1 8. MIRROR 1 8. TYLE 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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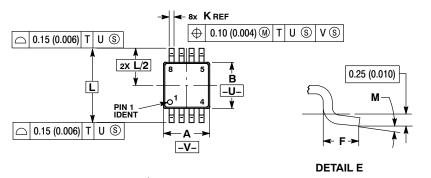
### **MECHANICAL CASE OUTLINE**

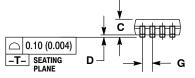
PACKAGE DIMENSIONS

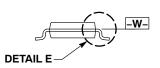


TSSOP-8 3.00x3.00x0.95 CASE 948R-02 **ISSUE A** 

**DATE 07 APR 2000** 







#### NOTES:

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

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
Α	2.90	3.10	0.114	0.122
В	2.90	3.10	0.114	0.122
С	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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DESCRIPTION:	TSSOP-8 3.00x3.00x0.95		PAGE 1 OF 1	

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