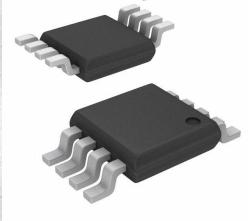


# **MC10EPT20DTG Datasheet**

www.digi-electronics.com



DiGi Electronics Part Number

Manufacturer

Manufacturer Product Number

Description

**Detailed Description** 

MC10EPT20DTG-DG

onsemi

MC10EPT20DTG

IC TRANSLATOR UNIDIR 8TSSOP

Mixed Signal Translator Unidirectional 1 Circuit 1 C hannel 8-TSSOP

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# Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
MC10EPT20DTG	onsemi
Series:	Product Status:
10EPT	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	10EPT20

# **Environmental & Export classification**

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	3 (168 Hours)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	

# onsemi

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



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

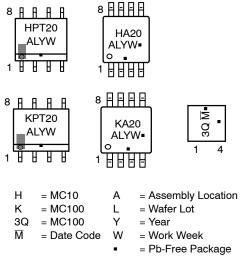
- 390 ps Typical Propagation Delay
- Maximum Input Clock Frequency > 1 GHz Typical
- Operating Range:
- $V_{CC} = 3.0 \text{ V}$  to 3.6 V with GND = 0 V
- PNP TTL Input for Minimal Loading
- Q Output will Default HIGH with Input Open
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant





SOIC-8 NBTSSOP-8DFN-8D SUFFIXDT SUFFIXMN SUFFIXCASE 751-07CASE 948R-02CASE 506AA

## MARKING DIAGRAMS\*



(Note: Microdot may be in either location)

## **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.

<sup>\*</sup>For additional marking information, refer to Application Note <u>AND8002/D</u>.

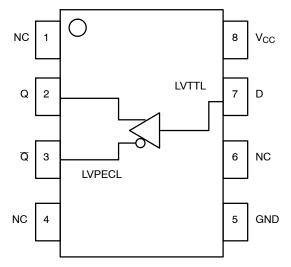


Table 1. PIN DESCRIPTION						
PIN	FUNCTION					
Q, <u>Q</u>	Differential PECL Outputs					
D	LVTTL Input					
V <sub>CC</sub>	Positive Supply					
GND	Ground					
NC	No Connect					
EP	(DFN8 only) Thermal exposed pad must be connected to a suffi- cient thermal conduit. Electrically connect to the most negative sup- ply (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	•

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

### **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	$V_{I} \leq V_{CC}$	6	V
I <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
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8	185 140	°C/W
$\theta_{JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44	°C/W
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	DFN-8	129 84	°C/W
$\theta_{JC}$	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<sub>CC</sub> = 3.3 V, GND = 0 V, T<sub>A</sub> = $-40^{\circ}$ C to $+85^{\circ}$ 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
Ι <sub>ΙL</sub>	Input LOW Current (V <sub>in</sub> = 0.5 V)			-0.6	mA
V <sub>IK</sub>	Input Clamp Voltage (I <sub>in</sub> = -18 mA)			-1.2	V
V <sub>IH</sub>	Input HIGH Voltage	2.0			V
V <sub>IL</sub>	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<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
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.

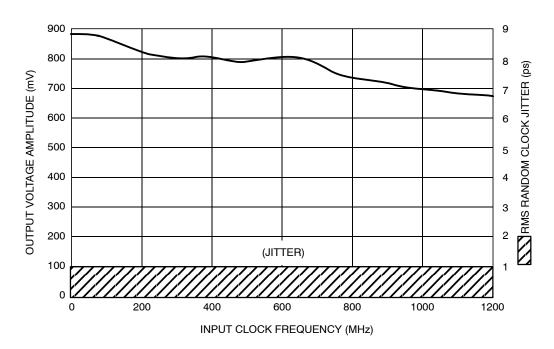
## Table 7. AC CHARACTERISTICS ( $V_{CC}$ = 3.0 V to 3.6 V, GND = 0 V (Note 1))

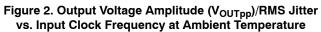
			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f <sub>max</sub>	Maximum Input Clock Frequency		> 1			> 1			> 1		GHz
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay to Output Differential	280	350	430	300	370	450	320	400	490	ps
t <sub>SKEW</sub>	Device-to-Device 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.





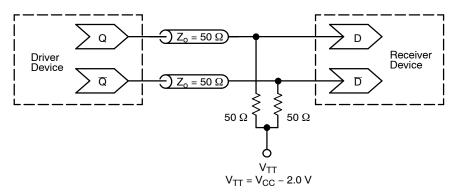


Figure 3. Typical Termination for Output Driver and Device Evaluation (See Application Note <u>AND8020/D</u> – Termination of ECL Logic Devices.)

### **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)	

+For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, <u>BRD8011/D</u>.

3. **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 <u>www.onsemi.com</u>.

#### **Resource Reference of Application Notes**

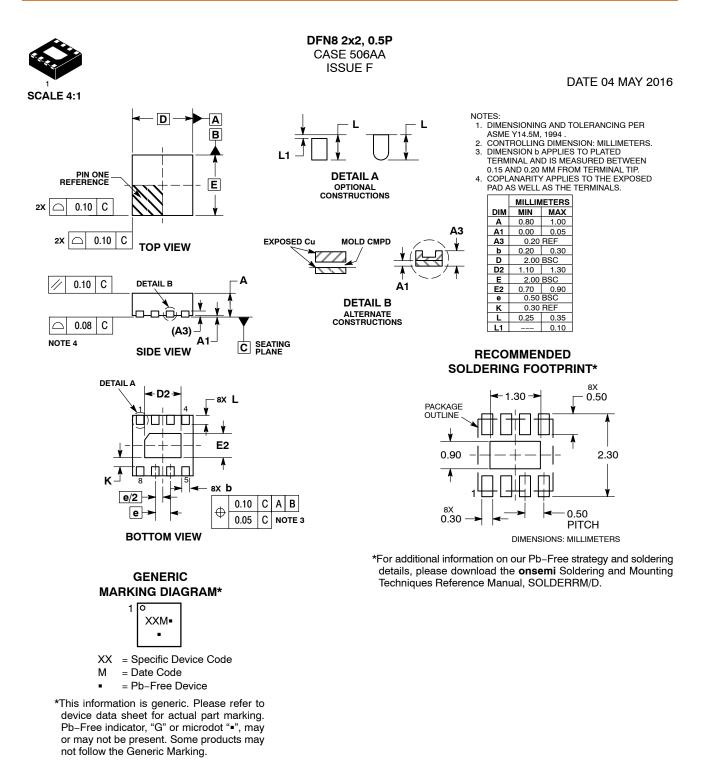
- AN1405/D ECL Clock Distribution Techniques
- **AN1406/D** Designing with PECL (ECL at +5.0 V)
- AN1503/D ECLinPS™ I/O SPiCE Modeling Kit
- AN1504/D Metastability and the ECLinPS Family
- AN1568/D Interfacing Between LVDS and ECL
- AN1672/D The ECL Translator Guide
- AND8001/D Odd Number Counters Design
- 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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## MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

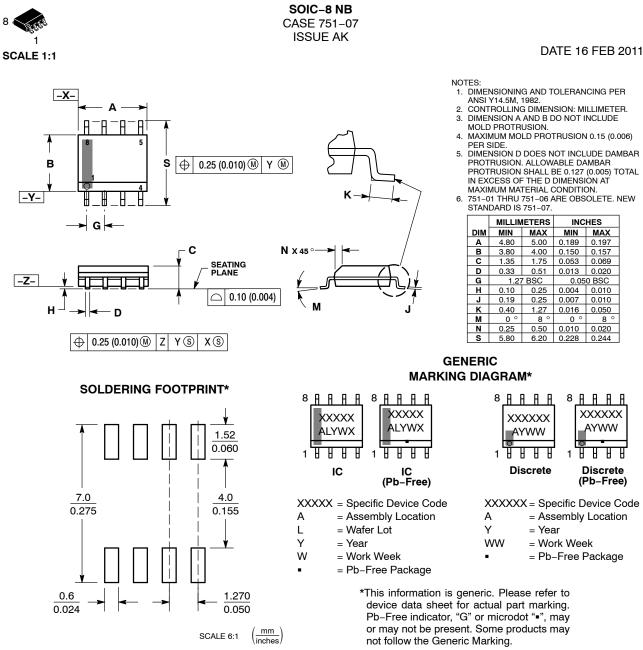


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PACKAGE DIMENSIONS



\*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

STYLE 1: PIN 1. EMITTER COLLECTOR 2. 3. COLLECTOR 4. FMITTER 5. EMITTER BASE 6. 7 BASE EMITTER 8. STYLE 5: PIN 1. DRAIN 2. DRAIN 3. DRAIN DRAIN 4. GATE 5. 6. GATE SOURCE 7. 8. SOURCE STYLE 9: PIN 1. EMITTER, COMMON COLLECTOR, DIE #1 COLLECTOR, DIE #2 2. З. EMITTER, COMMON 4. 5. EMITTER, COMMON 6 BASE. DIE #2 BASE, DIE #1 7. 8. EMITTER, COMMON STYLE 13: PIN 1. N.C. 2. SOURCE 3 GATE 4. 5. DRAIN 6. DRAIN DRAIN 7. DRAIN 8. STYLE 17 PIN 1. VCC 2. V2OUT V10UT 3. TXE 4. 5. RXE 6. VFF 7. GND 8. ACC STYLE 21: CATHODE 1 PIN 1. 2. CATHODE 2 3 CATHODE 3 CATHODE 4 4. 5. CATHODE 5 6. COMMON ANODE COMMON ANODE 7. 8. CATHODE 6 STYLE 25: PIN 1. VIN 2 N/C REXT З. 4. GND 5. IOUT IOUT 6. IOUT 7. 8. IOUT STYLE 29: BASE, DIE #1 PIN 1. 2 EMITTER, #1 BASE. #2 З. EMITTER, #2 4. 5 COLLECTOR, #2 COLLECTOR, #2 6.

STYLE 2: PIN 1. COLLECTOR, DIE, #1 2. COLLECTOR, #1 COLLECTOR, #2 3. 4 COLLECTOR, #2 BASE, #2 5. EMITTER, #2 6. 7 BASE #1 EMITTER, #1 8. STYLE 6: PIN 1. SOURCE 2. DRAIN 3. DRAIN SOURCE 4. SOURCE 5. 6. GATE GATE 7. 8. SOURCE STYLE 10: GROUND PIN 1. BIAS 1 OUTPUT 2. З. GROUND 4. 5. GROUND 6 BIAS 2 INPUT 7. 8. GROUND STYLE 14: PIN 1. N-SOURCE 2. N-GATE P-SOURCE 3 P-GATE 4. P-DRAIN 5 6. P-DRAIN N-DRAIN 7. N-DRAIN 8. STYLE 18 PIN 1. ANODE 2. ANODE SOURCE 3. GATE 4. 5. DRAIN 6 DRAIN CATHODE 7. CATHODE 8. STYLE 22 PIN 1. I/O LINE 1 2. COMMON CATHODE/VCC 3 COMMON CATHODE/VCC 4. I/O LINE 3 COMMON ANODE/GND 5. 6. I/O LINE 4 7. I/O LINE 5 8. COMMON ANODE/GND STYLE 26: PIN 1. GND 2 dv/dt З. ENABLE 4. ILIMIT 5. SOURCE SOURCE 6. SOURCE 7. 8 VCC STYLE 30: DRAIN 1 PIN 1. DRAIN 1 2 GATE 2 З. SOURCE 2 4 SOURCE 1/DRAIN 2 SOURCE 1/DRAIN 2 5. 6.

STYLE 3: DRAIN, DIE #1 PIN 1. DRAIN, #1 2. DRAIN, #2 З. DRAIN, #2 4. 5. GATE, #2 SOURCE, #2 6. 7 GATE #1 8. SOURCE, #1 STYLE 7: PIN 1. INPUT 2. EXTERNAL BYPASS З. THIRD STAGE SOURCE GROUND 4. 5. DRAIN 6. GATE 3 SECOND STAGE Vd 7. FIRST STAGE Vd 8. STYLE 11: PIN 1. SOURCE 1 GATE 1 SOURCE 2 2. З. GATE 2 4. 5. DRAIN 2 6. DRAIN 2 DRAIN 1 7. 8. DRAIN 1 STYLE 15: PIN 1. ANODE 1 2. ANODE 1 ANODE 1 3 ANODE 1 4. 5. CATHODE, COMMON CATHODE, COMMON CATHODE, COMMON 6. 7. CATHODE, COMMON 8. STYLE 19: PIN 1. SOURCE 1 GATE 1 SOURCE 2 2. 3. GATE 2 4. 5. DRAIN 2 6. MIRROR 2 7. DRAIN 1 MIRROR 1 8. STYLE 23: PIN 1. LINE 1 IN COMMON ANODE/GND COMMON ANODE/GND 2. 3 LINE 2 IN 4. LINE 2 OUT 5. COMMON ANODE/GND COMMON ANODE/GND 6. 7. 8. LINE 1 OUT STYLE 27: PIN 1. ILIMIT 2 OVI 0 З. UVLO 4. INPUT+ 5. SOURCE SOURCE 6. SOURCE 7. 8 DRAIN

#### DATE 16 FEB 2011

STYLE 4: PIN 1. 2. ANODE ANODE ANODE З. 4. ANODE ANODE 5. 6. ANODE 7 ANODE COMMON CATHODE 8. STYLE 8: PIN 1. COLLECTOR, DIE #1 2. BASE, #1 З. BASE #2 COLLECTOR, #2 4. COLLECTOR, #2 5. 6. EMITTER, #2 EMITTER, #1 7. 8. COLLECTOR, #1 STYLE 12: PIN 1. SOURCE SOURCE 2. 3. GATE 4. 5. DRAIN 6. DRAIN DRAIN 7. 8. DRAIN STYLE 16 EMITTER, DIE #1 PIN 1. 2. BASE, DIE #1 EMITTER, DIE #2 3 BASE, DIE #2 4. 5. COLLECTOR, DIE #2 6. COLLECTOR, DIE #2 COLLECTOR, DIE #1 7. COLLECTOR, DIE #1 8. STYLE 20: PIN 1. SOURCE (N) GATE (N) SOURCE (P) 2. 3. 4. GATE (P) 5. DRAIN 6. DRAIN DRAIN 7. 8. DRAIN STYLE 24: PIN 1. BASE EMITTER 2. 3 COLLECTOR/ANODE COLLECTOR/ANODE 4. 5. CATHODE 6. CATHODE COLLECTOR/ANODE 7. COLLECTOR/ANODE 8. STYLE 28: 11. SW\_TO\_GND 2. DASIC OFF PIN 1. DASIC\_SW\_DET З. 4. GND 5. 6. V MON VBULK 7. VBULK 8 VIN

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8. GATE 1

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7.

8

COLLECTOR, #1

COLLECTOR, #1



PLANE

**MECHANICAL CASE OUTLINE** 

NOTES:

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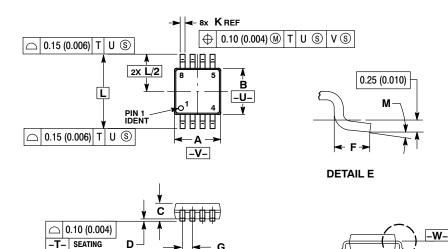
PACKAGE DIMENSIONS



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

DETAIL E

DATE 07 APR 2000



TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY. 5. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-. MILLIMETERS INCHES DIM MIN MAX MIN MAX A B 2.90 3.10 0.114 0.122 2.90 3.10 0.114 0.122 C 0.80 1.10 0.031 0.043 
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 D G 0.65 BSC 0.026 BSC

0.40 0.010 0.016

0.193 BSC 0° 6

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