SY733021U

2.5/3.3V 1-to-1 Differential to LVCMOS/LVTTL Translator

Precision Edge®

General Description

Micrel's SY733021U is a 1-to-1, differential-to-LVCMOS / LVTTL translator. The differential input is highly flexible and can accept LVPECL, LVDS, LVHSTL, SSTL, and HCSL input types.

SY733021U is part of Micrel's Precision Edge® product line, is pin-to-pin compatible with IDT's ICS83021I and is available as a Pb-free 8-pin SOIC in either tube or tape and reel packaging. The SY733021U runs on a 2.5V (±5%) or a 3.3V (±10%) power supply and is guaranteed over the full industrial temperature range (–40°C to +85°C).

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

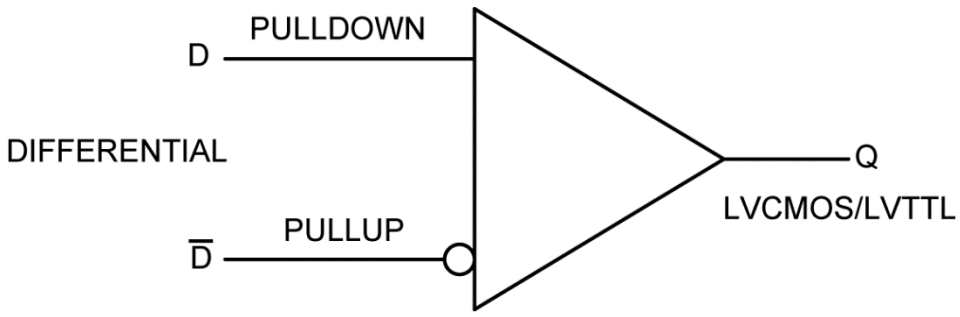
Features

- Differential LVPECL, LVDS, LVHSTL, SSTL, and HCSL inputs
- 350MHz maximum frequency
- Additive phase jitter:
  - 90fs$_{RMS}$, 100MHz (637kHz to 10MHz)
- <500ps part-to-part skew
- 1.9ns typical propagation delay (V_{CC} = 2.5V)
- 2.5V ±5% or 3.3V ±10% power supply operation
- –40°C to +85°C industrial operating temperature
- Available in 8-pin SOIC lead-free package

Applications

- Clock distribution
- PCIExpress®
- Servers
- Switches
- Routers

Functional Block Diagram



Precision Edge is a registered trademark of Micrel, Inc.

PCI-Express is a registered trademark of PCI-SIG.

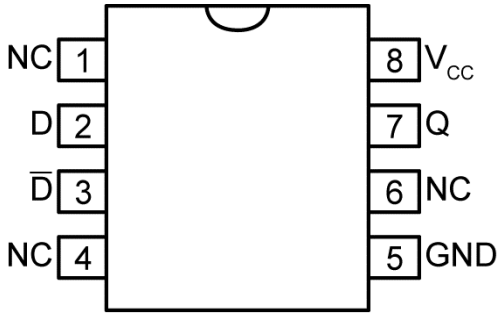
Ordering Information[1]

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY733021UZG	8L SOIC	Industrial	SY733021U with Pb-Free Bar-Line Indicator	NiPdAu
SY733021UZGTR[2]	8L SOIC	Industrial	SY733021U with Pb-Free Bar-Line Indicator	NiPdAu

Note:

1. Contact factory for die availability. Dice are guaranteed at T_A = 25°C, DC Electricals only.
2. Tape and reel.

Pin Configuration



8-Pin SOIC (Z8-1)

Pin Description

Pin Number	Pin Name	Functional Description
7	Q	TTL Output
2, 3	D, /D	Differential Inputs
8	V_{CC}	+3.3V or +2.5V Power Supply
5	GND	Ground
1, 4, 6	NC	No Connect

Truth Table

D	/D	Q
L	H	L
H	L	H
Open	Open	L

hbwhelp@micrel.com or (408) 955-1690

Absolute Maximum Ratings[3]

Input Voltage (V_{IN}) ..... –0.5V to V_{CC} + 0.5V
Supply Voltage (V_{CC}) 4.6V
Lead Temperature (soldering, 20s) ..... 260°C
Storage Temperature (T_S) ..... –65°C to +150°C

Operating Ratings[4]

Supply Voltage (V_{CC}) ..... +2.5V ± 5% or +3.3V ± 10%
Ambient Temperature (T_A) ..... –40°C to +85°C
Junction Thermal Resistance
SOIC (θ_{JA}) ..... 113°C/W

DC Electrical Characteristics[5]

V_{CC} = +2.5V ±5% or +3.3V ±10%; T_A = -40°C to +85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{CC}	Power Supply Voltage		2.375	2.5	2.625	V
			2.97	3.3	3.63	
I_{CC}	Power Supply Current				20	mA

TTL DC Electrical Characteristics[5, 6]

T_A = -40°C to +85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{OH}	Output High Voltage	V_{CC} = 2.625V	1.8			V
		V_{CC} = 3.63V	2.6			
V_{OL}	Output Low Voltage	V_{CC} = 2.625V or 3.63V			0.5	V

Differential Input DC Electrical Characteristics[5]

V_{CC} = +2.5V ±5% or +3.3V ±10%; T_A = -40°C to +85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{IH}	Input High Current	D, V_{IN} = V_{CC} = 3.63V or 2.625V			150	µA
		/D, V_{IN} = V_{CC} = 3.63V or 2.625V			5	
I_{IL}	Input Low Current	D, V_{IN} = 0V, V_{CC} = 3.63V or 2.625V	-5			µA
		/D, V_{IN} = 0V, V_{CC} = 3.63V or 2.625V	-150			
V_{PP}	Peak-to-Peak Input Voltage	V_{IL} ≥ -0.3V	0.15		1.3	V
V_{IHCMR}	Input High Common Mode Range	Note 7	GND + 0.5		V_{CC} – 0.85	V

Notes:

3. Permanent device damage may occur if absolute maximum ratings are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to absolute maximum ratings conditions may affect device reliability.
4. The datasheet limits are not guaranteed if the device is operated beyond the recommended operating conditions.
5. The circuit is designed to meet the DC specifications shown in the above tables after thermal equilibrium has been established.
6. Outputs terminated with 50Ω to V_{CC}/2. See Parameter Measurement Set-Up.
7. V_{IHCMR} maximum varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

AC Electrical Characteristics

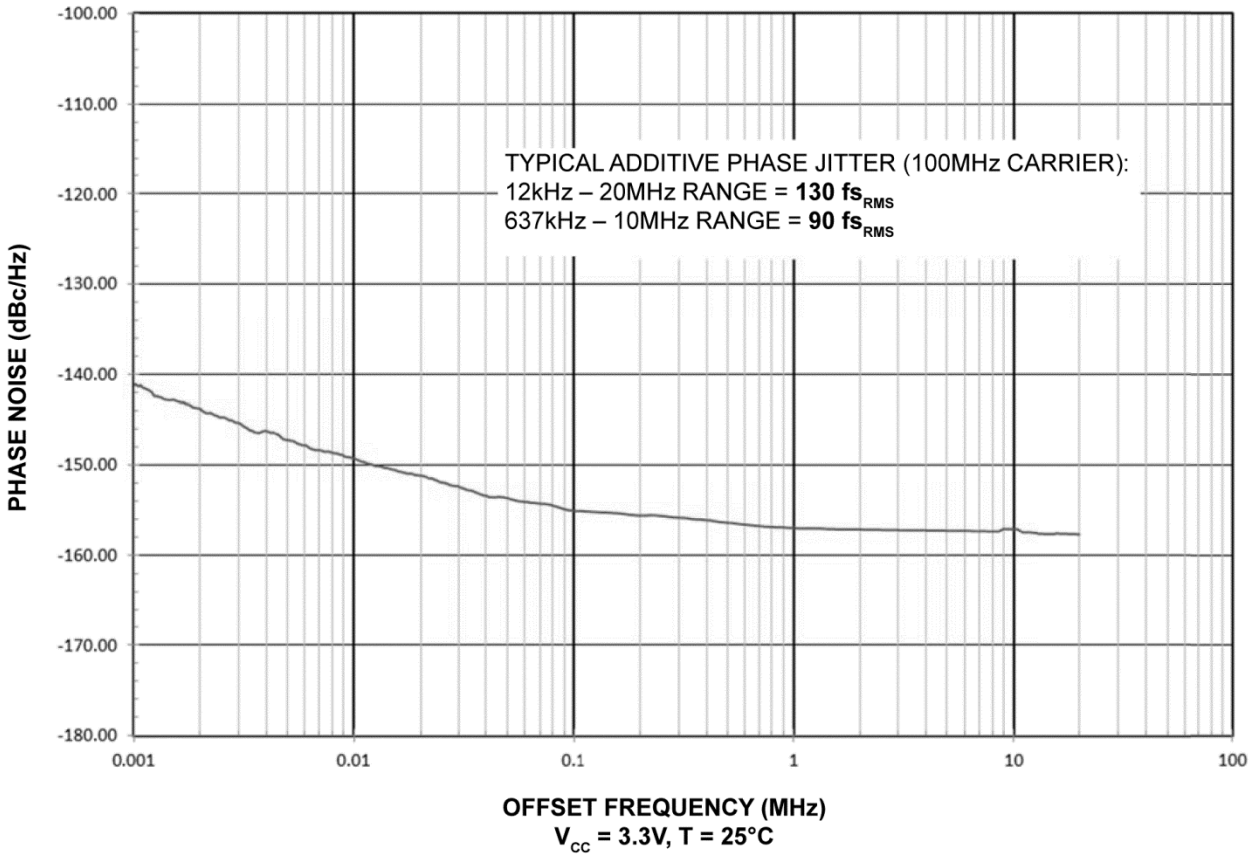
V_{CC} = +2.5V ±5% or +3.3V ±10%; T_A = -40°C to +85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
f_{MAX}	Maximum Frequency		350			MHz
t_{PD}	Propagation Delay	Note 8, +2.5V ±5% supply	1.7	1.9	2.5	ns
		Note 8, +3.3V ±10% supply	1.5	1.8	2.3	
t_{Skew}	Part-to-Part skew	Notes 9 and 10			500	ps
t_R, t_F	Output Rise/Fall Times	20%–80% at 100 MHz, +2.5V ±5% supply	125	200	400	ps
		20%–80% at 100 MHz, +3.3V ±10% supply	100			
T_{RJ_Jitter}	Additive Phase Jitter	12kHz–20MHz at 100MHz		130		fs_{RMS}
		637kHz–10MHz at 100MHz		90		fs_{RMS}
T_{DCY}	Duty Cycle		45	50	55	%

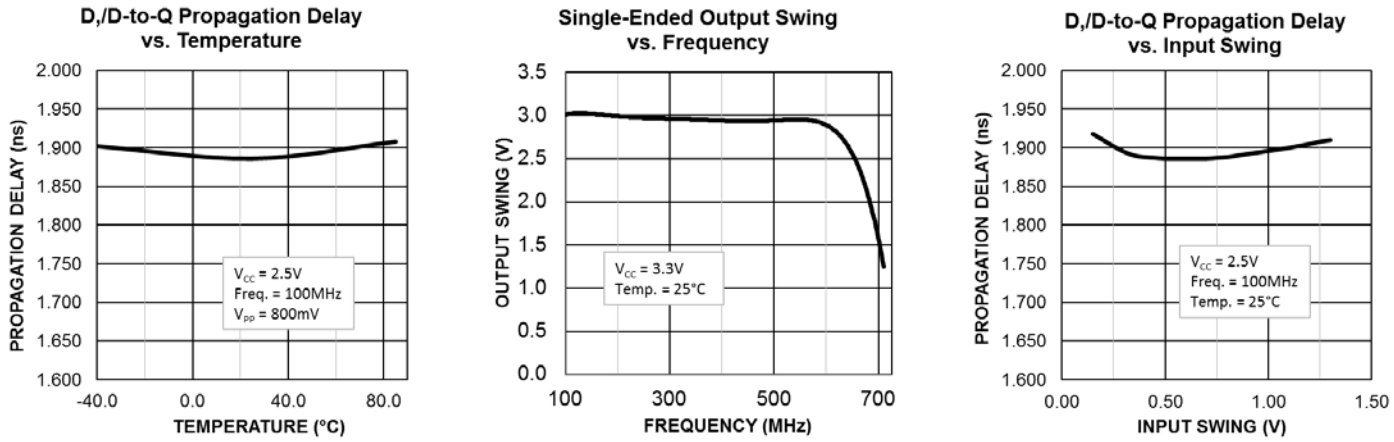
Notes:

8. Measured from the differential input crossing point to $V_{cc}/2$ at the output.
9. Part-to-Part skew is the difference in time between outputs receiving data from the same input, for the same temperature, voltage, and transition.
10. This parameter is defined in accordance with JEDEC Standard 65.

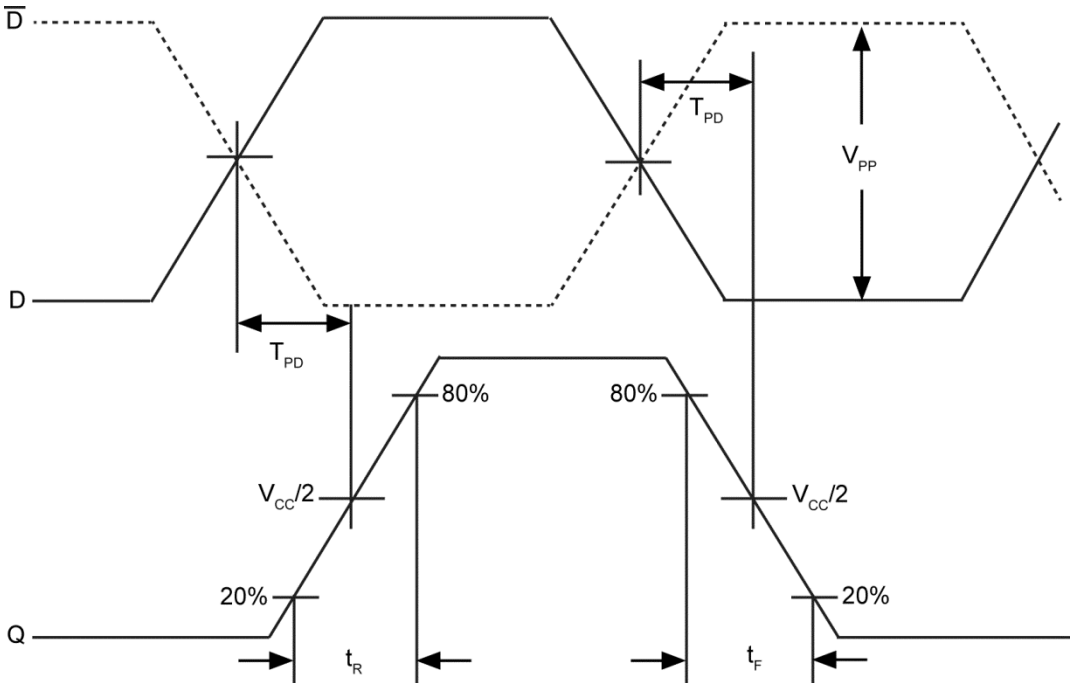
Additive Phase Noise Plot



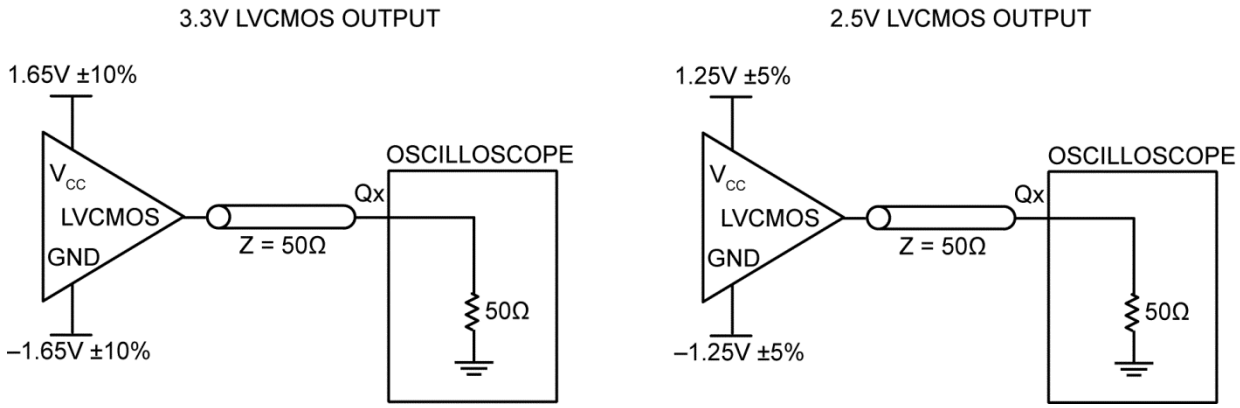
Typical Operating Characteristics



Timing Diagram and Definition of Input Swing

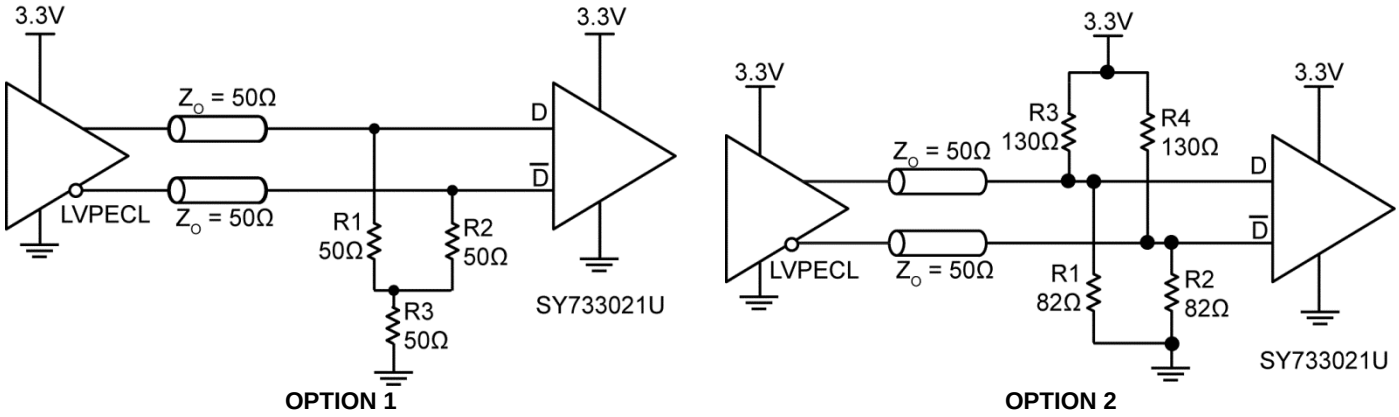


Parameter Measurement Set-Up

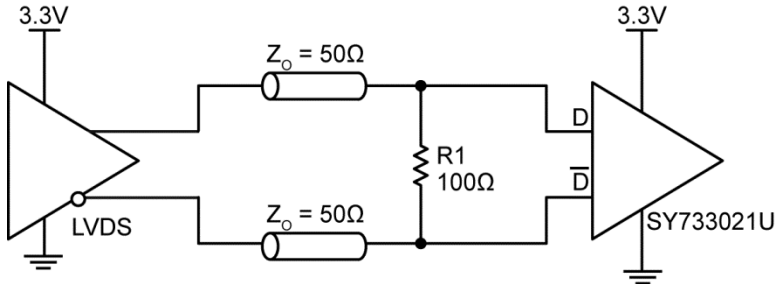


Output Load AC Test Circuit

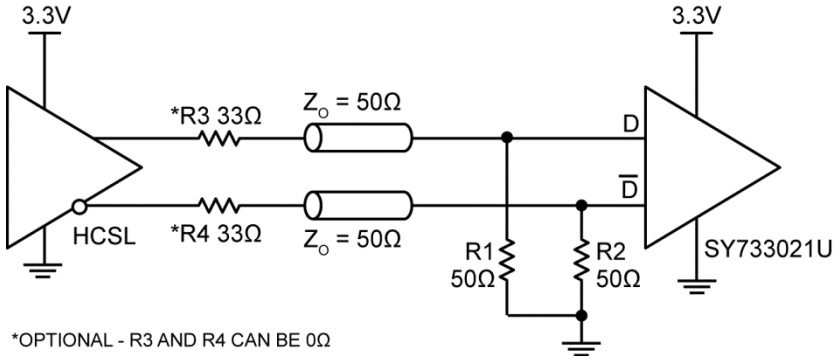
Input Interface Applications



D, /D Input Driven by a 3.3V LVPECL Driver

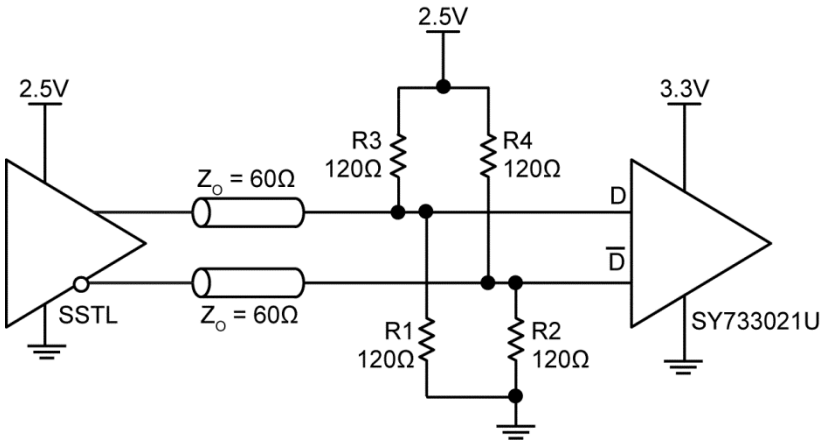


D, /D Input Driven by a 3.3V LVDS Driver



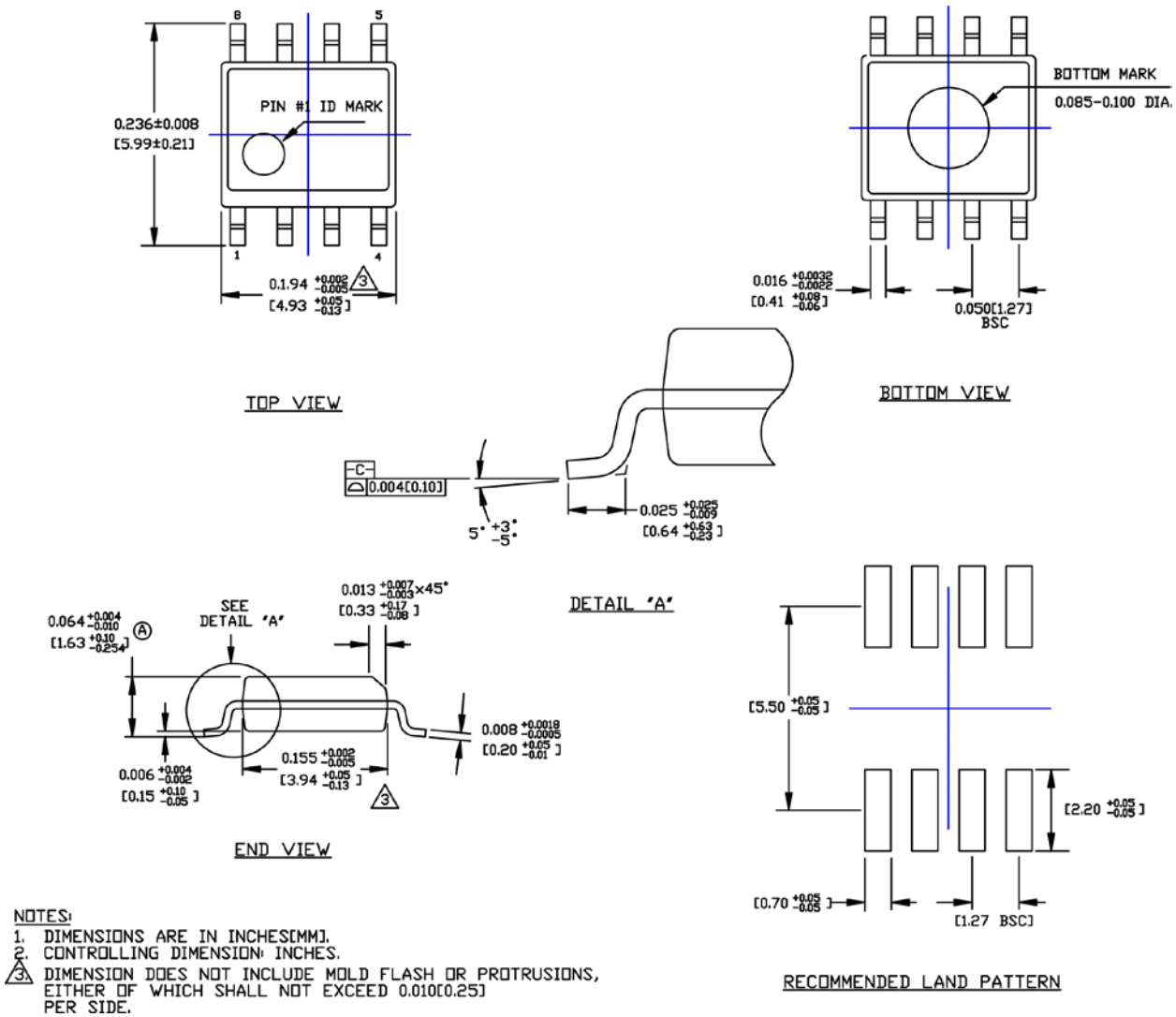
D, /D Input Driven by an HCSL Driver

Input Interface Applications (Continued)



D, /D Input Driven by a 2.5V SSTL Driver

Package Information[11]



8-Pin SOIC (Z8-1)

Note:

11. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

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