

Two Output Differential Buffer for PCIe Gen3

9DB233

Recommended Application:

2 output PCIe Gen3 zero-delay/fanout buffer

General Description:

The 9DB233 zero-delay buffer supports PCIe Gen3 requirements, while being backwards compatible to PCIe Gen2 and Gen1. The 9DB233 is driven by a differential SRC output pair from an IDT 932S421 or 932SQ420 or equivalent main clock generator. It attenuates jitter on the input clock and has a selectable PLL bandwidth to maximize performance in systems with or without Spread-Spectrum clocking. An SMBus interface allows control of the PLL bandwidth and bypass options, while 2 clock request (OE#) pins make the 9DB233 suitable for Express Card applications.

Key Specifications:

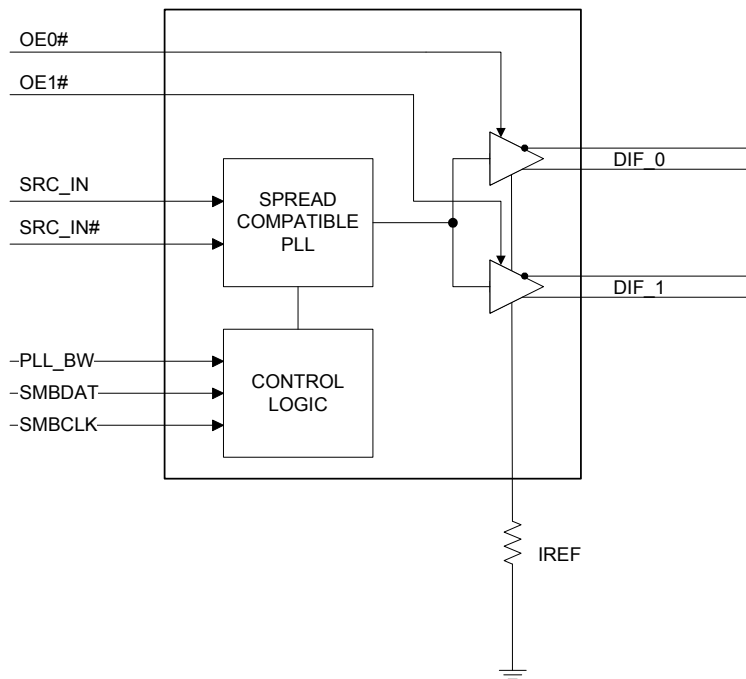
- Cycle-to-cycle jitter < 50 ps
- Output-to-output skew < 50 ps
- PCIe Gen3 phase jitter < 1.0ps RMS

Features/Benefits:

- OE# pins/Suitable for Express Card applications
- PLL or bypass mode/PLL can dejitter incoming clock
- Selectable PLL bandwidth/minimizes jitter peaking in downstream PLL's
- Spread Spectrum Compatible/tracks spreading input clock for low EMI
- SMBus Interface/unused outputs can be disabled

Output Features:

- 2 - 0.7V current mode differential output pairs (HSCL)

Block Diagram


Pin Configuration

PLL_BW	1	9DB233	20	VDDA
SRC_IN	2		19	GNDA
SRC_IN#	3		18	IREF
vOE0#	4		17	vOE1#
VDD	5		16	VDD
GND	6		15	GND
DIF_0	7		14	DIF_1
DIF_0#	8		13	DIF_1#
VDD	9		12	VDD
SMBDAT	10		11	SMBCLK

Note: Pins preceded by ' v ' have internal 120K ohm pull down resistors

Power Distribution Table

Pin Number		Description
VDD	GND	
5,9,12,16	6,15	Differential Outputs
9	6	SMBUS
20	19	IREF
20	19	Analog VDD & GND for PLL core

Pin Description

PIN #	PIN NAME	PIN TYPE	DESCRIPTION
1	PLL_BW	IN	3.3V input for selecting PLL Band Width 0 = low, 1= high
2	SRC_IN	IN	0.7 V Differential SRC TRUE input
3	SRC_IN#	IN	0.7 V Differential SRC COMPLEMENTARY input
4	vOE0#	IN	Active low input for enabling DIF pair 0. This pin has an internal pull-down. 1 =disable outputs, 0 = enable outputs
5	VDD	PWR	Power supply, nominal 3.3V
6	GND	PWR	Ground pin.
7	DIF_0	OUT	0.7V differential true clock output
8	DIF_0#	OUT	0.7V differential Complementary clock output
9	VDD	PWR	Power supply, nominal 3.3V
10	SMBDAT	I/O	Data pin of SMBUS circuitry, 5V tolerant
11	SMBCLK	IN	Clock pin of SMBUS circuitry, 5V tolerant
12	VDD	PWR	Power supply, nominal 3.3V
13	DIF_1#	OUT	0.7V differential Complementary clock output
14	DIF_1	OUT	0.7V differential true clock output
15	GND	PWR	Ground pin.
16	VDD	PWR	Power supply, nominal 3.3V
17	vOE1#	IN	Active low input for enabling DIF pair 1. This pin has an internal pull-down. 1 =disable outputs, 0 = enable outputs
18	IREF	OUT	This pin establishes the reference for the differential current-mode output pairs. It requires a fixed precision resistor to ground. 475ohm is the standard value for 100ohm differential impedance. Other impedances require different values. See data sheet.
19	GNDA	PWR	Ground pin for the PLL core.
20	VDDA	PWR	3.3V power for the PLL core.

Note:

Pins preceded by 'v' have internal 120K ohm pull down resistors

Electrical Characteristics - Absolute Maximum Ratings

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
3.3V Core Supply Voltage	VDDA				4.6	V	1,2
3.3V Logic Supply Voltage	VDD				4.6	V	1,2
Input Low Voltage	V _{IL}		GND-0.5			V	1
Input High Voltage	V _{IH}	Except for SMBus interface			V _{DD} +0.5V	V	1
Input High Voltage	V _{IHSMB}	SMBus clock and data pins			5.5V	V	1
Storage Temperature	T _s		-65		150	°C	1
Junction Temperature	T _j				125	°C	1
Input ESD protection	ESD prot	Human Body Model	2000			V	1

¹Guaranteed by design and characterization, not 100% tested in production.

²Operation under these conditions is neither implied nor guaranteed.

Electrical Characteristics - Input/Supply/Common Parameters

TA = T_{COM} or T_{IND}; Supply Voltage VDD = 3.3 V +/-5%

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Ambient Operating Temperature	T _{COM}	Commercial range	0		70	°C	1
	T _{IND}	Industrial range	-40		85	°C	1
Input High Voltage	V _{IH}	Single-ended inputs, except SMBus, low threshold and tri-level inputs	2		V _{DD} + 0.3	V	1
Input Low Voltage	V _{IL}	Single-ended inputs, except SMBus, low threshold and tri-level inputs	GND - 0.3		0.8	V	1
Input Current	I _{IN}	Single-ended inputs, V _{IN} = GND, V _{IN} = VDD	-5		5	uA	1
	I _{INP}	Single-ended inputs V _{IN} = 0 V; Inputs with internal pull-up resistors V _{IN} = VDD; Inputs with internal pull-down resistors	-200		200	uA	1
Input Frequency	F _{ibyp}	V _{DD} = 3.3 V, Bypass mode	10		110	MHz	2
	F _{ipll}	V _{DD} = 3.3 V, 100MHz PLL mode	33	100.00	110	MHz	2
Pin Inductance	L _{pin}				7	nH	1
Capacitance	C _{IN}	Logic Inputs, except DIF_IN	1.5		5	pF	1
	C _{INDIF_IN}	DIF_IN differential clock inputs	1.5		2.7	pF	1,4
	C _{OUT}	Output pin capacitance			6	pF	1
Clk Stabilization	T _{STAB}	From V _{DD} Power-Up and after input clock stabilization or de-assertion of PD# to 1st clock			1.8	ms	1,2
Input SS Modulation Frequency	f _{MODIN}	Allowable Frequency (Triangular Modulation)	30		33	kHz	1
OE# Latency	t _{LATOE#}	DIF start after OE# assertion DIF stop after OE# deassertion	1		3	cycles	1,3
Tdrive_PD#	t _{DRVPD}	DIF output enable after PD# de-assertion			300	us	1,3
Tfall	t _F	Fall time of control inputs			5	ns	1,2
Trise	t _R	Rise time of control inputs			5	ns	1,2
SMBus Input Low Voltage	V _{ILSMB}				0.8	V	1
SMBus Input High Voltage	V _{IHSMB}		2.1		V _{DD} SMB	V	1
SMBus Output Low Voltage	V _{OLSMB}	@ I _{PULLUP}			0.4	V	1
SMBus Sink Current	I _{PULLUP}	@ V _{OL}	4			mA	1
Nominal Bus Voltage	V _{DD} SMB	3V to 5V +/- 10%	2.7		5.5	V	1
SCLK/SDATA Rise Time	t _{RSMB}	(Max V _{IL} - 0.15) to (Min V _{IH} + 0.15)			1000	ns	1
SCLK/SDATA Fall Time	t _{FSMB}	(Min V _{IH} + 0.15) to (Max V _{IL} - 0.15)			300	ns	1
SMBus Operating Frequency	f _{MAXSMB}	Maximum SMBus operating frequency			100	kHz	1,5

¹Guaranteed by design and characterization, not 100% tested in production.

²Control input must be monotonic from 20% to 80% of input swing.

³Time from deassertion until outputs are >200 mV

⁴DIF_IN input

⁵The differential input clock must be running for the SMBus to be active

Electrical Characteristics - Clock Input ParametersT_A = T_{COM} or T_{IND}; Supply Voltage VDD = 3.3 V +/-5%

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Input High Voltage - DIF_IN	V _{IHDIF}	Differential inputs (single-ended measurement)	600	800	1150	mV	1
Input Low Voltage - DIF_IN	V _{ILDIF}	Differential inputs (single-ended measurement)	V _{SS} - 300	0	300	mV	1
Input Common Mode Voltage - DIF_IN	V _{COM}	Common Mode Input Voltage	300		1000	mV	1
Input Amplitude - DIF_IN	V _{SWING}	Peak to Peak value	300		1450	mV	1
Input Slew Rate - DIF_IN	dv/dt	Measured differentially	0.4		8	V/ns	1,2
Input Leakage Current	I _{IN}	V _{IN} = V _{DD} , V _{IN} = GND	-5		5	uA	1
Input Duty Cycle	d _{tin}	Measurement from differential waveform	45		55	%	1
Input Jitter - Cycle to Cycle	J _{DIFIN}	Differential Measurement	0		125	ps	1

¹ Guaranteed by design and characterization, not 100% tested in production.² Slew rate measured through +/-75mV window centered around differential zero**Electrical Characteristics - DIF 0.7V Current Mode Differential Outputs**T_A = T_{COM} or T_{IND}; Supply Voltage VDD = 3.3 V +/-5%

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Slew rate	Trf	Scope averaging on	0.6	2.5	4	V/ns	1, 2, 3
Slew rate matching	ΔTrf	Slew rate matching, Scope averaging on		9.5	20	%	1, 2, 4
Voltage High	VHigh	Statistical measurement on single-ended signal using oscilloscope math function. (Scope averaging on)	660	740	850	mV	1
Voltage Low	VLow		-150	8	150		1
Max Voltage	Vmax	Measurement on single ended signal using absolute value. (Scope averaging off)		760	1150	mV	1
Min Voltage	Vmin		-300	-3			1
Vswing	Vswing	Scope averaging off	300	1506		mV	1, 2
Crossing Voltage (abs)	Vcross_abs	Scope averaging off	250	378	550	mV	1, 5
Crossing Voltage (var)	ΔVcross	Scope averaging off		54	140	mV	1, 6

¹ Guaranteed by design and characterization, not 100% tested in production. I_{REF} = VDD/(3xR_R). For R_R = 475Ω (1%), I_{REF} = 2.32mA. I_{OH} = 6 x I_{REF} and V_{OH} = 0.7V @ Z_O=50Ω (100Ω differential impedance).² Measured from differential waveform³ Slew rate is measured through the Vswing voltage range centered around differential 0V. This results in a +/-150mV window around differential 0V.⁴ Matching applies to rising edge rate for Clock and falling edge rate for Clock#. It is measured using a +/-75mV window centered on the average cross point where Clock rising meets Clock# falling. The median cross point is used to calculate the voltage thresholds the oscilloscope is to use for the edge rate calculations.⁵ Vcross is defined as voltage where Clock = Clock# measured on a component test board and only applies to the differential rising edge (i.e. Clock rising and Clock# falling).⁶ The total variation of all Vcross measurements in any particular system. Note that this is a subset of V_cross_min/max (V_cross absolute) allowed. The intent is to limit Vcross induced modulation by setting V_cross_delta to be smaller than V_cross absolute.**Electrical Characteristics - Current Consumption**T_A = T_{COM} or T_{IND}; Supply Voltage VDD = 3.3 V +/-5%

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Operating Supply Current	I _{DD3.30P}	All outputs active @100MHz, C _L = Full load;		70	80	mA	1
Powerdown Current	I _{DD3.3PD}	All diff pairs driven			N/A	mA	1
	I _{DD3.3PDZ}	All differential pairs tri-stated			N/A	mA	1

¹ Guaranteed by design and characterization, not 100% tested in production.

Electrical Characteristics - Output Duty Cycle, Jitter, Skew and PLL Characteristics

TA = T_{COM} or T_{IND}; Supply Voltage VDD = 3.3 V +/-5%

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
PLL Bandwidth	BW	-3dB point in High BW Mode	2	2.3	4	MHz	1
		-3dB point in Low BW Mode	0.4	0.5	1	MHz	1
PLL Jitter Peaking	t _{JPEAK}	Peak Pass band Gain		1	2	dB	1
Duty Cycle	t _{DC}	Measured differentially, PLL Mode	45	48	55	%	1
Duty Cycle Distortion	t _{DCD}	Measured differentially, Bypass Mode @100MHz	-2	1	2	%	1,4
Skew, Input to Output	t _{pdBYP}	Bypass Mode, V _T = 50%	2500	3660	4500	ps	1
	t _{pdPLL}	Hi BW PLL Mode V _T = 50%	-250	0	250	ps	1
Skew, Output to Output	t _{sk3}	V _T = 50%		15	50	ps	1
Jitter, Cycle to cycle	t _{jyc-cyc}	PLL mode		40	50	ps	1,3
		Additive Jitter in Bypass Mode		10	50	ps	1,3

¹ Guaranteed by design and characterization, not 100% tested in production.

² I_{REF} = V_{DD}/(3xR_R). For R_R = 475Ω (1%), I_{REF} = 2.32mA. I_{OH} = 6 x I_{REF} and V_{OH} = 0.7V @ Z_O=50Ω.

³ Measured from differential waveform

⁴ Duty cycle distortion is the difference in duty cycle between the output and the input clock when the device is operated in bypass mode.

Electrical Characteristics - PCIe Phase Jitter Parameters

TA = T_{COM} or T_{IND}; Supply Voltage VDD = 3.3 V +/-5%

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
Phase Jitter, PLL Mode	t _{jphPCleG1}	PCIe Gen 1		32	86	ps (p-p)	1,2,3
	t _{jphPCleG2}	PCIe Gen 2 Lo Band 10kHz < f < 1.5MHz		1.1	3	ps (rms)	1,2
		PCIe Gen 2 High Band 1.5MHz < f < Nyquist (50MHz)		2.3	3.1	ps (rms)	1,2
t _{jphPCleG3}	PCIe Gen 3 (PLL BW of 2-4MHz, CDR = 10MHz)		0.5	1	ps (rms)	1,2,4	
Additive Phase Jitter, Bypass Mode	t _{jphPCleG1}	PCIe Gen 1		2	5	ps (p-p)	1,2,3
	t _{jphPCleG2}	PCIe Gen 2 Lo Band 10kHz < f < 1.5MHz		0.2	0.3	ps (rms)	1,2
		PCIe Gen 2 High Band 1.5MHz < f < Nyquist (50MHz)		0.8	1	ps (rms)	1,2
	t _{jphPCleG3}	PCIe Gen 3 (PLL BW of 2-4MHz, CDR = 10MHz)		0.1	0.2	ps (rms)	1,2,4

¹ Applies to all outputs.

² See <http://www.pcisig.com> for complete specs

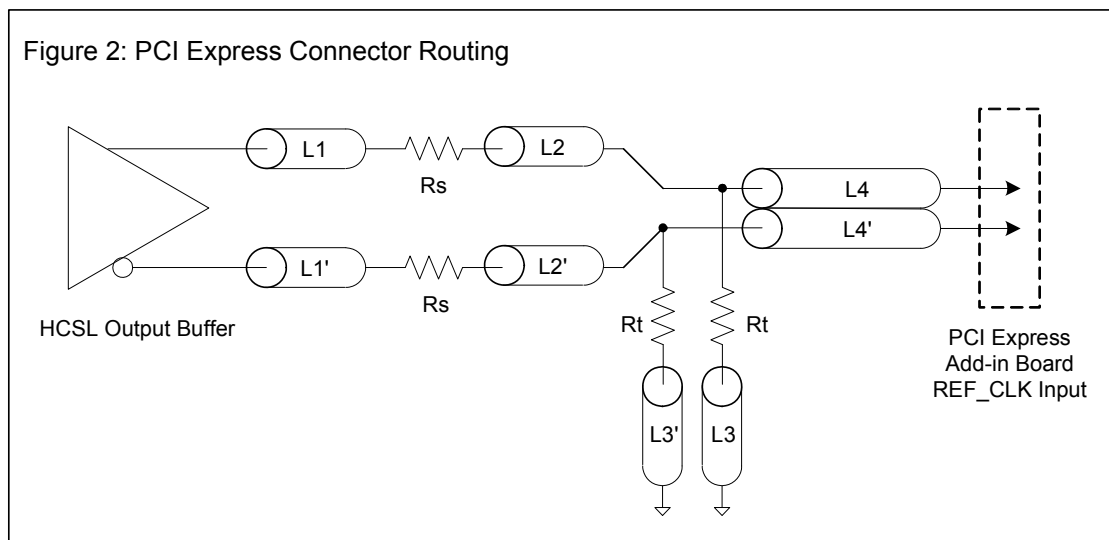
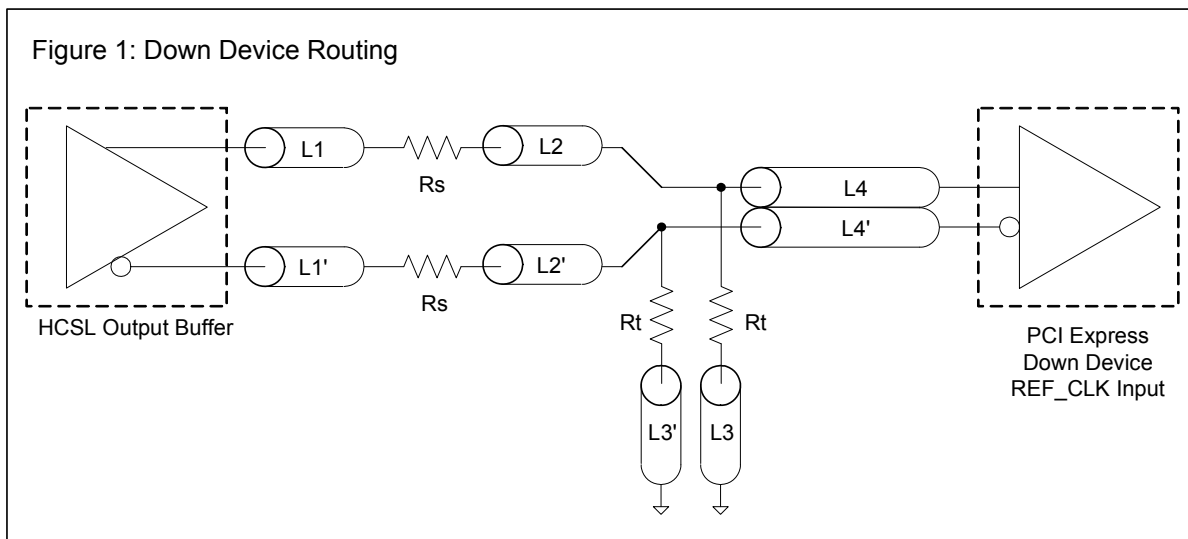
³ Sample size of at least 100K cycles. This figures extrapolates to 108ps pk-pk @ 1M cycles for a BER of 1-12.

⁴ Subject to final radification by PCI SIG.

SRC Reference Clock			
Common Recommendations for Differential Routing	Dimension or Value	Unit	Figure
L1 length, route as non-coupled 50ohm trace	0.5 max	inch	1
L2 length, route as non-coupled 50ohm trace	0.2 max	inch	1
L3 length, route as non-coupled 50ohm trace	0.2 max	inch	1
R_s	33	ohm	1
R_t	49.9	ohm	1

Down Device Differential Routing			
L4 length, route as coupled microstrip 100ohm differential trace	2 min to 16 max	inch	1
L4 length, route as coupled stripline 100ohm differential trace	1.8 min to 14.4 max	inch	1

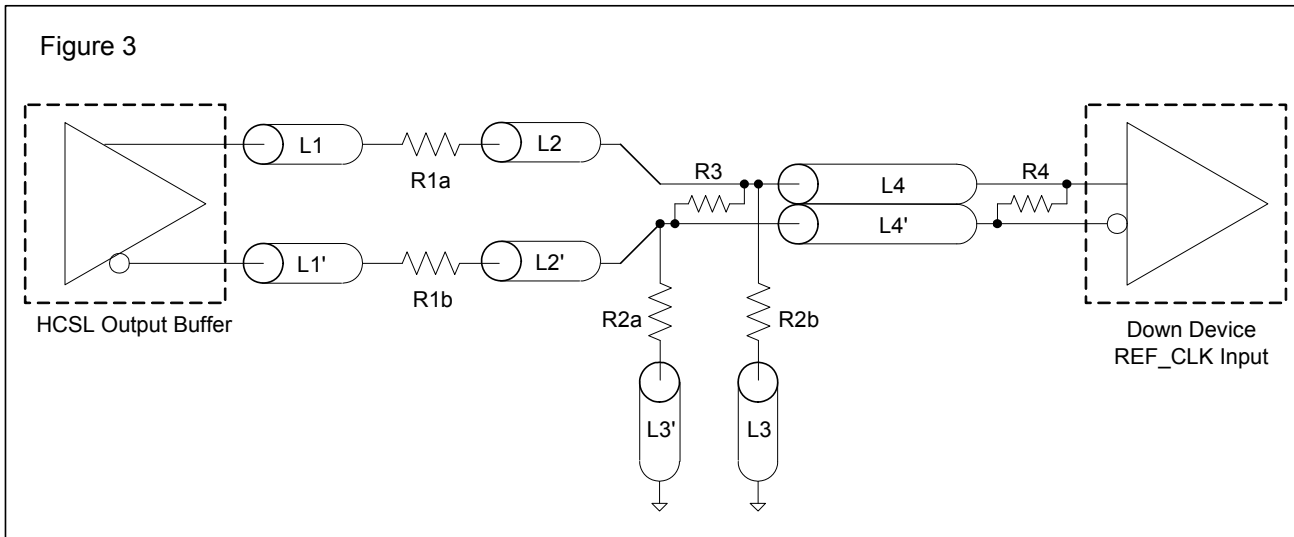
Differential Routing to PCI Express Connector			
L4 length, route as coupled microstrip 100ohm differential trace	0.25 to 14 max	inch	2
L4 length, route as coupled stripline 100ohm differential trace	0.225 min to 12.6 max	inch	2



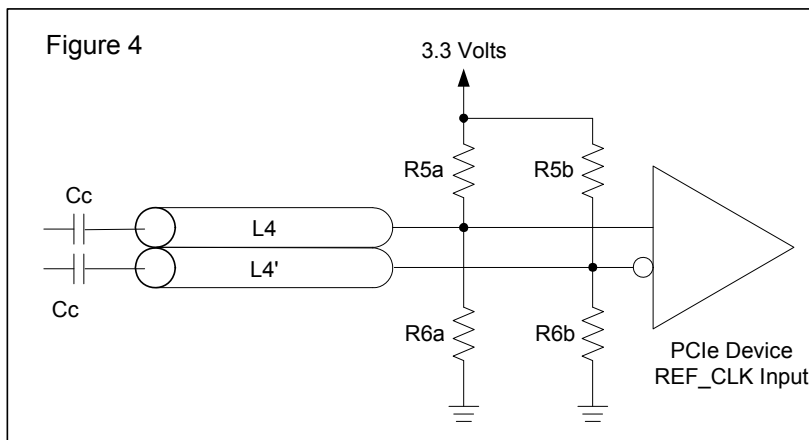
Alternative Termination for LVDS and other Common Differential Signals (figure 3)							
V _{diff}	V _{p-p}	V _{cm}	R1	R2	R3	R4	Note
0.45v	0.22v	1.08	33	150	100	100	
0.58	0.28	0.6	33	78.7	137	100	
0.80	0.40	0.6	33	78.7	none	100	ICS874003i-02 input compatible
0.60	0.3	1.2	33	174	140	100	Standard LVDS

R1a = R1b = R1

R2a = R2b = R2



Cable Connected AC Coupled Application (figure 4)		
Component	Value	Note
R5a, R5b	8.2K 5%	
R6a, R6b	1K 5%	
Cc	0.1 μF	
V _{cm}	0.350 volts	



General SMBus serial interface information for the ICS9DB233

How to Write:

- Controller (host) sends a start bit.
- Controller (host) sends the write address $D4_{(H)}$
- ICS clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- ICS clock will **acknowledge**
- Controller (host) sends the data byte count = X
- ICS clock will **acknowledge**
- Controller (host) starts sending **Byte N through Byte N + X - 1**
(see Note 2)
- ICS clock will **acknowledge** each byte **one at a time**
- Controller (host) sends a Stop bit

How to Read:

- Controller (host) will send start bit.
- Controller (host) sends the write address $D4_{(H)}$
- ICS clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- ICS clock will **acknowledge**
- Controller (host) will send a separate start bit.
- Controller (host) sends the read address $D5_{(H)}$
- ICS clock will **acknowledge**
- ICS clock will send the data byte count = X
- ICS clock sends **Byte N + X - 1**
- ICS clock sends **Byte 0 through byte X (if $X_{(H)}$ was written to byte 8).**
- Controller (host) will need to acknowledge each byte
- Controller (host) will send a not acknowledge bit
- Controller (host) will send a stop bit

Index Block Write Operation		
Controller (Host)		ICS (Slave/Receiver)
T	starT bit	
Slave Address $D4_{(H)}$		
WR	WRite	
Beginning Byte = N		ACK
		ACK
Data Byte Count = X		ACK
Beginning Byte N	X Byte	ACK
◇		◇
◇		◇
◇		◇
Byte N + X - 1		ACK
P	stoP bit	

Index Block Read Operation		
Controller (Host)		ICS (Slave/Receiver)
T	starT bit	
Slave Address $D4_{(H)}$		
WR	WRite	
Beginning Byte = N		ACK
		ACK
RT	Repeat starT	
Slave Address $D3_{(H)}$		
RD	ReaD	
		ACK
		Data Byte Count = X
ACK		
ACK		Beginning Byte N
◇		◇
◇		◇
◇		◇
		Byte N + X - 1
N	Not acknowledge	
P	stoP bit	

SMBus Table: Device Control Register, READ/WRITE ADDRESS (D4/D5)

Byte 0	Pin #	Name	Control Function	Type	0	1	Default
Bit 7	-	SW_EN	Enables SMBus Control of bite 1 and 0	RW	PLL Functions controlled by SMBus registers	PLL Functions controlled by device pins	1
Bit 6	-	RESERVED		RW	-	-	X
Bit 5	-	RESERVED		RW	-	-	X
Bit 4	-	RESERVED		RW	-	-	X
Bit 3	-	RESERVED		RW	-	-	X
Bit 2	-	RESERVED		RW	-	-	X
Bit 1	-	PLL BW #adjust	Selects PLL Bandwidth	RW	Low BW	High BW	1
Bit 0	-	PLL Enable	Bypasses PLL for board test	RW	PLL bypassed (fan out mode)	PLL enabled (ZDB mode)	1

SMBus Table: Output Enable Register

Byte 1	Pin #	Name	Control Function	Type	0	1	Default
Bit 7	-	RESERVED		RW	-	-	X
Bit 6	-	RESERVED		RW	-	-	X
Bit 5	-	RESERVED		RW	-	-	X
Bit 4	-	RESERVED		RW	-	-	X
Bit 3	-	RESERVED		RW	-	-	X
Bit 2	-	RESERVED		RW	-	-	X
Bit 1	-	RESERVED		RW	-	-	X
Bit 0	-	RESERVED		RW	-	-	X

SMBus Table: Function Select Register

Byte 2	Pin #	Name	Control Function	Type	0	1	Default
Bit 7	-	RESERVED		RW	-	-	X
Bit 6	-	RESERVED		RW	-	-	X
Bit 5	-	RESERVED		RW	-	-	X
Bit 4	-	RESERVED		RW	-	-	X
Bit 3	-	RESERVED		RW	-	-	X
Bit 2	-	RESERVED		RW	-	-	X
Bit 1	-	RESERVED		RW	-	-	X
Bit 0	-	RESERVED		RW	-	-	X

SMBus Table: Vendor & Revision ID Register

Byte 3	Pin #	Name	Control Function	Type	0	1	Default
Bit 7	-	RID3	REVISION ID	R	-	-	0
Bit 6	-	RID2		R	-	-	0
Bit 5	-	RID1		R	-	-	0
Bit 4	-	RID0		R	-	-	1
Bit 3	-	VID3	VENDOR ID	R	-	-	0
Bit 2	-	VID2		R	-	-	0
Bit 1	-	VID1		R	-	-	0
Bit 0	-	VID0		R	-	-	1

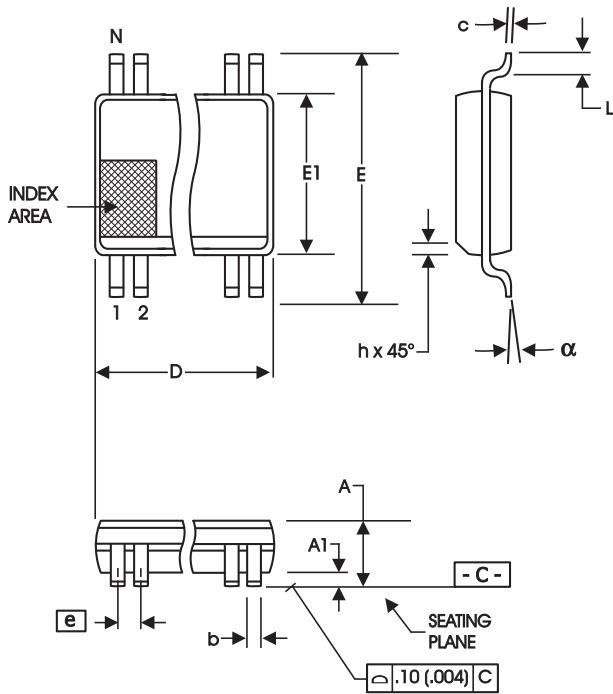
SMBus Table: DEVICE ID

Byte 4	Pin #	Name	Control Function	Type	0	1	Default
Bit 7	-	Device ID = 06 Hex		R	-	-	0
Bit 6	-			R	-	-	0
Bit 5	-			R	-	-	0
Bit 4	-			R	-	-	0
Bit 3	-			R	-	-	0
Bit 2	-			R	-	-	1
Bit 1	-			R	-	-	1
Bit 0	-			R	-	-	0

SMBus Table: Byte Count Register

Byte 5	Pin #	Name	Control Function	Type	0	1	Default
Bit 7	-	BC7	Writing to this register will configure how many bytes will be read back, default is 06 = 6 bytes.	RW	-	-	0
Bit 6	-	BC6		RW	-	-	0
Bit 5	-	BC5		RW	-	-	0
Bit 4	-	BC4		RW	-	-	0
Bit 3	-	BC3		RW	-	-	0
Bit 2	-	BC2		RW	-	-	1
Bit 1	-	BC1		RW	-	-	1
Bit 0	-	BC0		RW	-	-	0

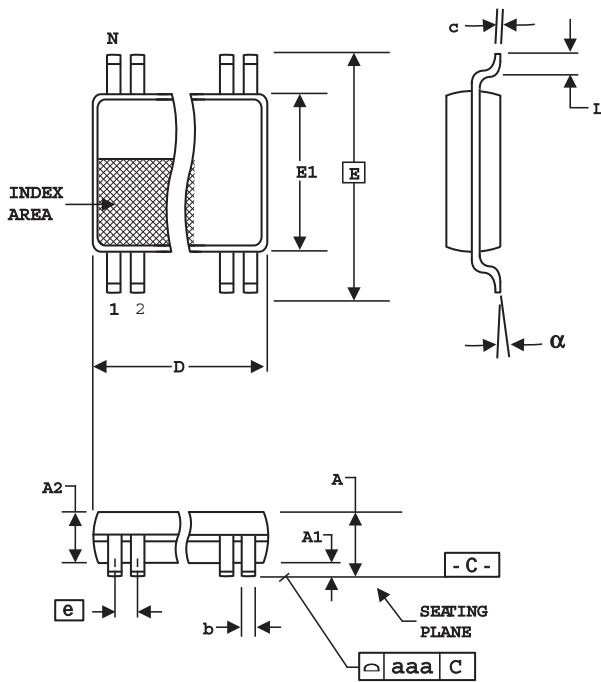
20-pin SSOP Package Drawing and Dimensions



20-Lead, 150 mil SSOP (QSOP)

SYMBOL	In Millimeters		In Inches	
	COMMON DIMENSIONS		COMMON DIMENSIONS	
	MIN	MAX	MIN	MAX
A	1.35	1.75	.053	.069
A1	0.10	0.25	.004	.010
A2	--	1.50	--	.059
b	0.20	0.30	.008	.012
c	0.18	0.25	.007	.010
D	SEE VARIATIONS		SEE VARIATIONS	
E	5.80	6.20	.228	.244
E1	3.80	4.00	.150	.157
e	0.635 BASIC		0.025 BASIC	
L	0.40	1.27	.016	.050
N	SEE VARIATIONS		SEE VARIATIONS	
a	0°	8°	0°	8°
ZD	SEE VARIATIONS		SEE VARIATIONS	

20-pin TSSOP Package Drawing and Dimensions



20-Lead, 4.40 mm. Body, 0.65 mm. Pitch TSSOP

SYMBOL	(173 mil)		(25.6 mil)	
	In Millimeters		In Inches	
	MIN	MAX	MIN	MAX
A	--	1.20	--	.047
A1	0.05	0.15	.002	.006
A2	0.80	1.05	.032	.041
b	0.19	0.30	.007	.012
c	0.09	0.20	.0035	.008
D	SEE VARIATIONS		SEE VARIATIONS	
E	6.40 BASIC		0.252 BASIC	
E1	4.30	4.50	.169	.177
e	0.65 BASIC		0.0256 BASIC	
L	0.45	0.75	.018	.030
N	SEE VARIATIONS		SEE VARIATIONS	
a	0°	8°	0°	8°
aaa	--	0.10	--	.004

VARIATIONS

N	D mm.		D (inch)	
	MIN	MAX	MIN	MAX
20	6.40	6.60	.252	.260

Reference Doc.: JEDEC Publication 95, MO-153

10-0035

Ordering Information

Part / Order Number	Shipping Packaging	Package	Temperature
9DB233AFLF	Tubes	20-pin SSOP	0 to +70°C
9DB233AFLFT	Tape and Reel	20-pin SSOP	0 to +70°C
9DB233AFILF	Tubes	20-pin SSOP	-40 to +85°C
9DB233AFILFT	Tape and Reel	20-pin SSOP	-40 to +85°C
9DB233AGLF	Tubes	20-pin TSSOP	0 to +70°C
9DB233AGLFT	Tape and Reel	20-pin TSSOP	0 to +70°C
9DB233AGILF	Tubes	20-pin TSSOP	-40 to +85°C
9DB233AGILFT	Tape and Reel	20-pin TSSOP	-40 to +85°C

"LF" after the package code are the Pb-Free configuration and are RoHS compliant.

"A" is the device revision designator (will not correlate to the datasheet revision).

Revision History

Rev.	Who	Issue Date	Description	Page #
0.1	RDW	4/28/2010	1. Initial Release	
0.2	RDW	6/3/2010	1. Updated Pin names to match other 9DB devices CLKREQ# becomes OE# and PCIEXyy becomes DIF_yy 2. Updated maximum rise/fall time to 550ps from 700ps. This translates to a minimum slew rate of 0.67V/ns thus meeting the PCIe spec of 0.6V/ns. 3. Updated phase jitter tables to remove references to QPI. 4. Reformatted DS to have common format amongst all 9DBx33 DS. 5. Updated block diagram to match item 1	6
0.3	RDW	6/25/2010	1. Updated electrical tables to new standard format for 9DB devices. 2. Cleaned up front page text.	1, 3-6
A	RDW	6/30/2010	Released to final	
B	RDW	7/12/2010	1. Changed PWD to Default in SMBus tables.	10,11
C	RDW	4/20/2011	Changed pull down indicator from '***' to 'v '.	

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