

TEST AND MEASUREMENT PRODUCTS

Description

The SK1302 is a high speed PECL / LVPECL to CML (Current Mode Logic) translator. The output current I_{OUT} , also called the modulation current, I_{MOD} , is a DC current controlled by I_{RSET} , current through the resistor R_{SET} . Refer to the formula (1) for R_{SET} calculation based on a desired I_{OUT} value. The output OUT is HIGH when the EN^* is HIGH.

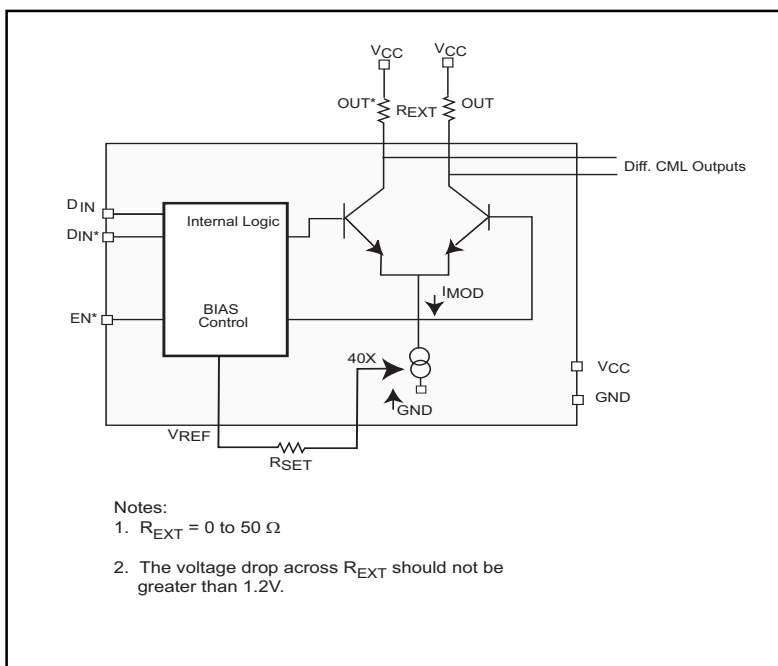
The device incorporates complementary open collector outputs with a capability of driving peak current of 30mA. The resistor R_{EXT} must be placed between OUT / OUT* and VCC for CML output termination. Pin 9 and 10 should be connected together to achieve better performance.

Under open input condition, the pulldown on D_{IN} and pullup and pulldown on D_{IN}^* will force the OUT output low and OUT* output high.

Features

- Extended Supply Voltage Range: ($V_{CC} = 3.0V$ to $5.5V$; $GND = 0V$)
- Up to 2.5Gbps operation
- 30mA Output peak current
- Differential inputs for data
- Internal Input Resistors; Pulldown on D_{IN} , Pulldown and Pullup on D_{IN}^*
- ESD Protection > 4000V
- Specified Over Industrial Temperature Range: $-40^{\circ}C$ to $85^{\circ}C$
- Available in 10 pin MSOP Package

Functional Block Diagram

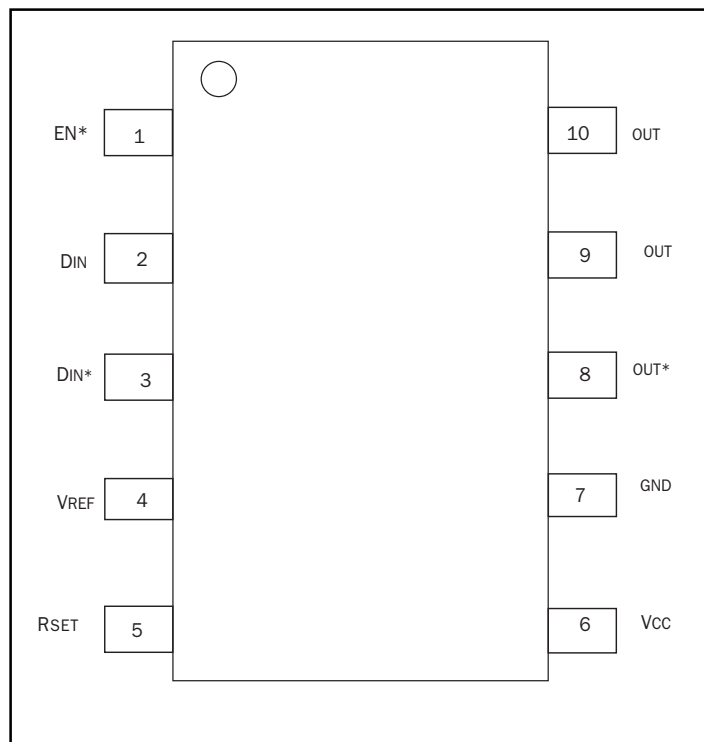


TEST AND MEASUREMENT PRODUCTS
Truth Table

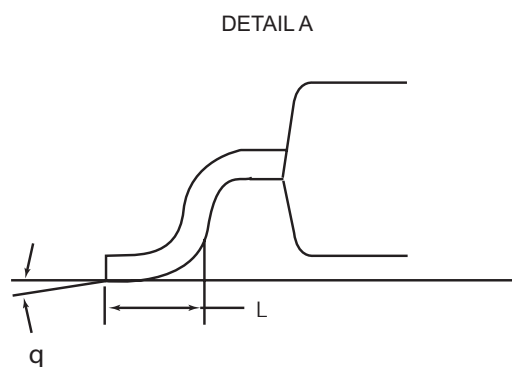
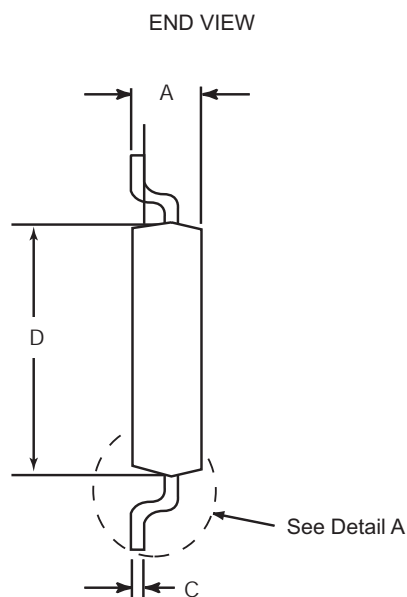
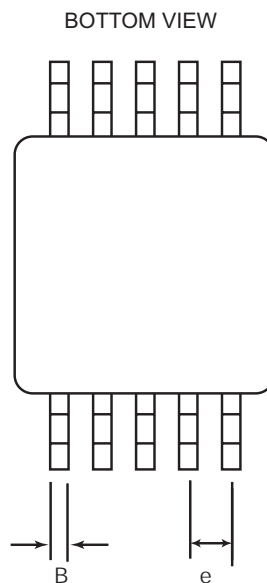
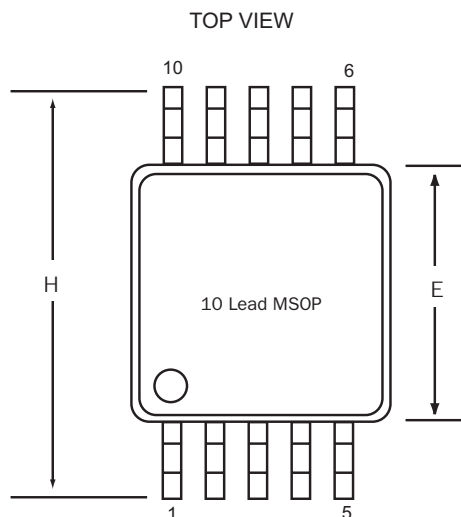
D	D*	EN*	OUT ⁽²⁾	OUT*
L	H	L	L	H
H	L	L	H	L
X	X	H	L	H

NOTES:

1. L =LOW = Output Transistor is ON,
H = HIGH = Output Transistor is Off,
X = Don't Care
2. H = $I_{OUT} = 0$ mA

Pin Descriptions

Pin Names

Pin Name	Function
VCC	Most positive power supply input.
GND	Ground
DIN, DIN*	These differential PECL 100K compatible inputs receive NRZ data.
EN*	This PECL 100K compatible input enables Laser Driver. Modulation current goes to zero when asserted HIGH.
OUT, OUT*	Open collector outputs from the modulation buffer drive these differential current outputs.
VREF	Voltage reference for use with RSET.
RSET	An external resistor sets up the source current for output current I_{OUT} .

10 Pin MSOP Packaging


DIM	MILLIMETERS	
	MIN	MAX
A	0.94	1.1
B	0.15	0.3
C	0.13	0.23
D	2.9	3.1
E	2.9	3.1
e	0.5	BSC
H	4.75	5.1
L	0.40	0.7
θ	0°	6°

NOTES:

1. Dimensions are in mm
2. Controlling dimensions: mm
3. Dimension does not include mold flash or protrusions, either of which shall not exceed 0.20

TEST AND MEASUREMENT PRODUCTS
Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{EE}	Power Supply ($V_{CC} = 0V$)	-6.0 to 0	V
V_{CC}	Power Supply ($V_{EE} = 0V$)	6.0 to 0	V
V_I	Input Voltage ($V_{CC} = 0V$, V_I not more negative than V_{EE})	-6.0 to 0	V
V_I	Input Voltage ($V_{EE} = 0V$, V_I not more positive than V_{CC})	6.0 to 0	V
I_{OUT}	Output Current Continuous Surge	50 100	mA mA
T_A	Operating Temperature Range	-40 to +85	°C
T_{stg}	Storage Temperature	-65 to +150	°C
θ_{JA} for MSOP	Thermal Resistance (Junction-to-Ambient) Still Air	113.1	°C/W
θ_{JC} for MSOP	Thermal Resistance (Junction-to-Case)	42	°C/W
T_{sol}	Solder Temperature (<2 to 3 seconds: 245°C desired)	265	°C

* Maximum Ratings are those values beyond which damage to the device may occur.

Note 1: Use for inputs of same package only.

TEST AND MEASUREMENT PRODUCTS
DC Characteristics
SK1302 DC Electrical Characteristics
 $(V_{CC} = 3.0V \text{ to } 5.5V; GND = 0V)$

Symbol	Characteristic	TA = - 40°C		TA = 0°C		TA = + 25°C		TA = + 85°C		Unit	Condition
		Min	Max	Min	Max	Min	Max	Min	Max		
I _{IN}	Input Current	- 150	150	- 150	150	- 150	150	- 150	150	μA	
V _{IH}	Input High Voltage	3835 2135	4120 2420	3835 2135	4120 2420	3835 2135	4120 2420	3835 2135	4120 2420	mV mV	V _{CC} = 5.0V V _{CC} = 3.3V
V _{IL}	Input Low Voltage	3190 1490	3525 1825	3190 1490	3525 1825	3190 1490	3525 1825	3190 1490	3525 1825	mV mV	V _{CC} = 5.0V V _{CC} = 3.3V
V _{REF}	Reference Voltage	2.2	2.9	2.2	2.9	2.2	2.9	2.2	2.9	V	
I _{OL}	Output Low Current		200		200		200		200	mA	EN* = HIGH
I _{OUT}	Output Current	4 9	15 31	4 9	15 31	4 9	15 31	4 9	15 31	mA mA	R _{SET} = 5KΩ R _{SET} = 1KΩ
I _{RSET}	Modulation Control	155	790	155	790	155	790	155	790	mA	
A _{RSET}	= I _{OUT} / I _{RSET}	34	56	34	56	34	56	34	56		
I _{EE}	Total Supply Current		60		60		60		60	mA	I _{EE} = I _{CC} +I _{OUT}
I _{CC}	Core Supply Current		29		29		29		29	mA	I _{OUT} = 25mA

AC Characteristics
SK1302 AC Electrical Characteristics
 $(V_{CC} = 3.0V \text{ to } 5.5V; GND = 0V), I_{OUT} = 10 \text{ mA}, R_{EXT} = 25 \Omega$

Symbol	Characteristic	TA = - 40°C			TA = 0°C			TA = +25°C			TA = +85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t _{PLH} t _{PHL}	Propagation Delay D to Q EN* to Q	180 290	240 350	300 410	190 300	250 360	310 420	190 320	255 380	320 440	200 370	410 435	340 500	ps ps
V _{CMR}	Common Mode Range ¹	VEE + 1.5		V _{CC}	VEE + 1.5		V _{CC}	VEE + 1.5		V _{CC}	VEE + 1.5		V _{CC}	V
t _r , t _f	Output Rise/Fall Time	50	100	150	50	95	140	50	95	140	60	110	160	ps
I _{OR}	Output Current Ringing ²			<10			<10			<10			<10	%
DJ	Deterministic Jitter (RMS) ³			2			2			2			2	ps

TEST AND MEASUREMENT PRODUCTS**AC Characteristics***Notes*

1. CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the high level falls within the specified range and the peak-to-peak voltage lies between $V_{PP(min)}$ and 1V. The lower end of the CMR range varies 1:1 with VEE and is equal to $VEE + 1.5V$.
2. $I_{OUT} = 5$ to 30 mA.
3. $I_{OUT} = 10mA$, 2.5 Gbps, 2⁷-1 pattern.

Application Information

To calculate the appropriate value for the R_{SET} based on a desired output current, I_{OUT} , refer to the equation below (1), where typically:

1. $V_{BE} = 0.8 V$
2. $V_{REF} = 2.5 V$
3. $A_{RSET} = 40$

$$I_{OUT} = A_{RSET} \left[\frac{(V_{REF} - 2 \times V_{BE})}{R_{SET} + 425} \right] \quad (1)$$

Application Notes

AN1003 - Termination Techniques for ECL / LVECL / PECL / LVPECL Devices

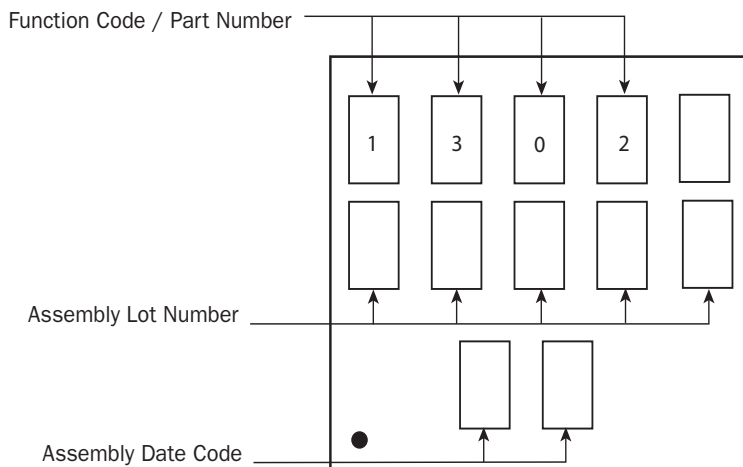
AN1008 - Interfacing with CML

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TEST AND MEASUREMENT PRODUCTS**Ordering Information**

Ordering Code	Package ID
SK1302MS	10-MSOP
SK1302MST	10-MSOP

Note: The letter “T” stands for tape and reel. For tape and reel information refer to the TMD Part Ordering Information Data Sheet.

Marking Information**10 PIN MSOP PACKAGE****Contact Information**

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