

Description

The SK1302 is a high speed current switch for driving a semiconductor laser diode in optical transmission applications. The output current, or modulation current I_{MOD} is DC current controlled by I_{RSET} , current through the resistor R_{SET} . The output OUT is HIGH when output enables 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* and VCC to dissipate the worst case power. R_{SER} is recommended to compensate for laser diode matching issues. Pin 9 and 10 should be connected together to achieve better performance. See Figure 1 for the DC response of I_{OH} vs. R_{SET} .

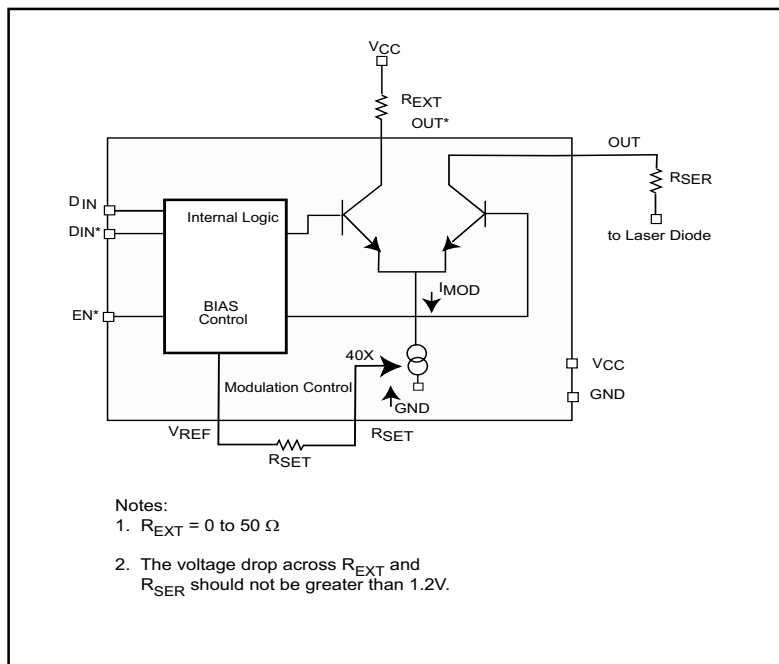
SK1302 can also be used as a high speed PECL/LVPECL to CML translator. The output current is DC current controlled by I_{RSET} , current through the resistor R_{SET} .

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: (VCC = 3.0V to 5.5V; VEE = 0V)
- Up to 2.5Gbps operation
- 30mA modulation current
- Separate modulation control
- Separate output enable for laser safety
- 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°C to 85°C
- Available in 10 pin MSOP Package
- flammability
- moisture sensitivity

Functional Block Diagram

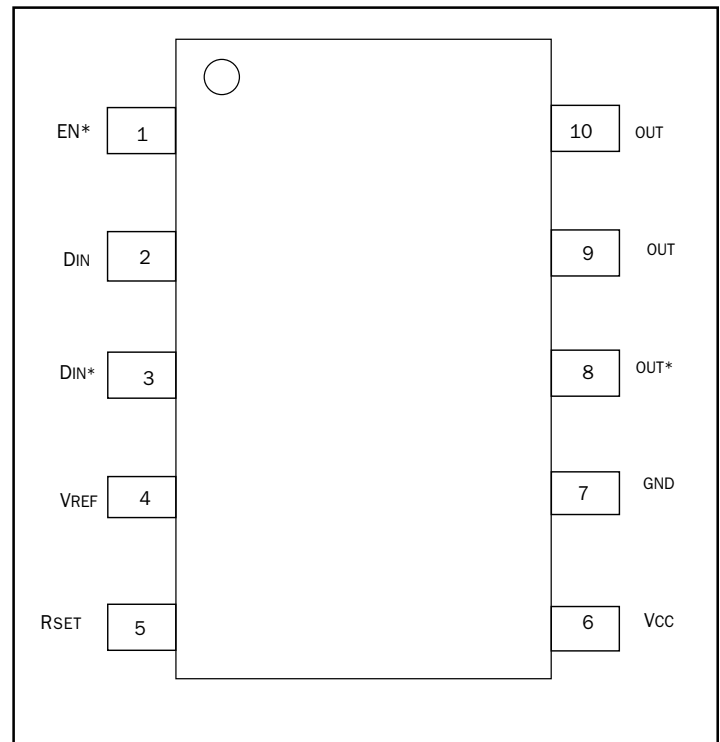


TRUTH TABLE

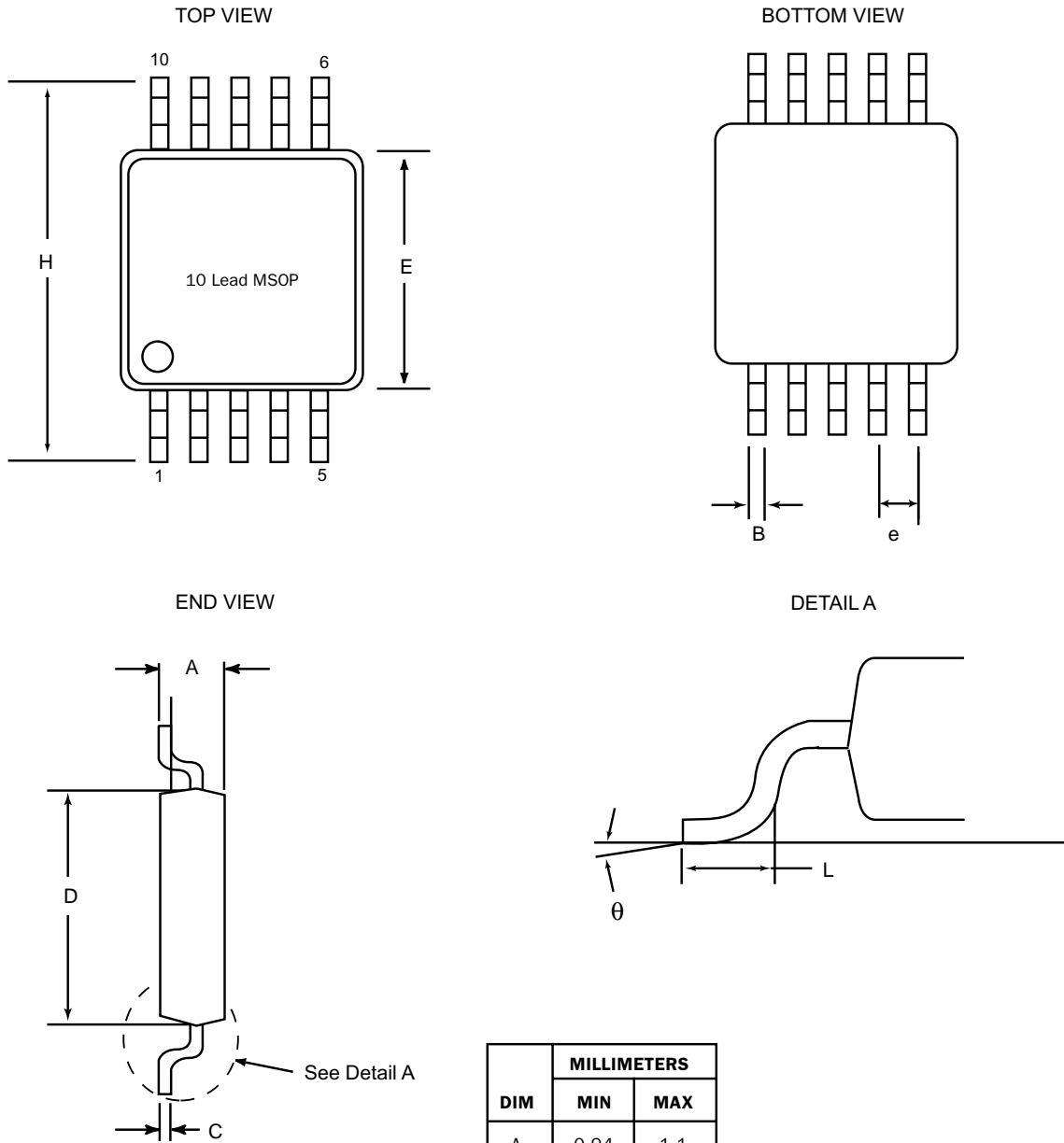
| D | D* | EN* | OUT ⁽²⁾ | OUT* |
|---|----|-----|--------------------|------|
| L | H | L | H | L |
| H | L | L | L | H |
| X | X | H | H | L |

NOTES:

1. L =LOW, H = HIGH , x = don't care
2. H = $I_{OUT} = 0m A$

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 modulation I_{MOD} . |

Package Information
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

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.

DC Characteristics
SK1302 DC Electrical Characteristics

 (V_{CC} = 3.0V to 5.5V; V_{EE} = 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 _{IH} | Input High Current | | 100 | | 100 | | 100 | | 100 | μA | |
| I _{IL} | Input Low Current | 0.5 -300 | | 0.5 -300 | | 0.5 -300 | | 0.5 -300 | | μA μA | V = V _{IL} (min) |
| 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 | 2.7 | 2.2 | 2.7 | 2.2 | 2.7 | 2.2 | 2.7 | V | |
| I _{OL} | Output Low Current | | 200 | | 200 | | 200 | | 200 | μA | |
| I _{OUT} | Modulation Current | 8 17 | 15 30 | 8 17 | 15 30 | 8 17 | 15 30 | 8 17 | 15 30 | mA mA | R _{SET} = 5KΩ R _{SET} = 1KΩ |
| I _{RSET} | Modulation Control | 155 | 790 | 155 | 790 | 155 | 790 | 155 | 790 | μA | |
| A _{RSET} | = I _{OUT} / I _{RSET} | 38 | 47 | 38 | 47 | 38 | 47 | 38 | 47 | | |
| I _{EE} | Power Supply Current | | 60 | | 60 | | 60 | | 60 | mA | |
| I _{CC} | Core Supply Current | | 29 | | 29 | | 29 | | 29 | mA | I _{MOD} = 25mA |

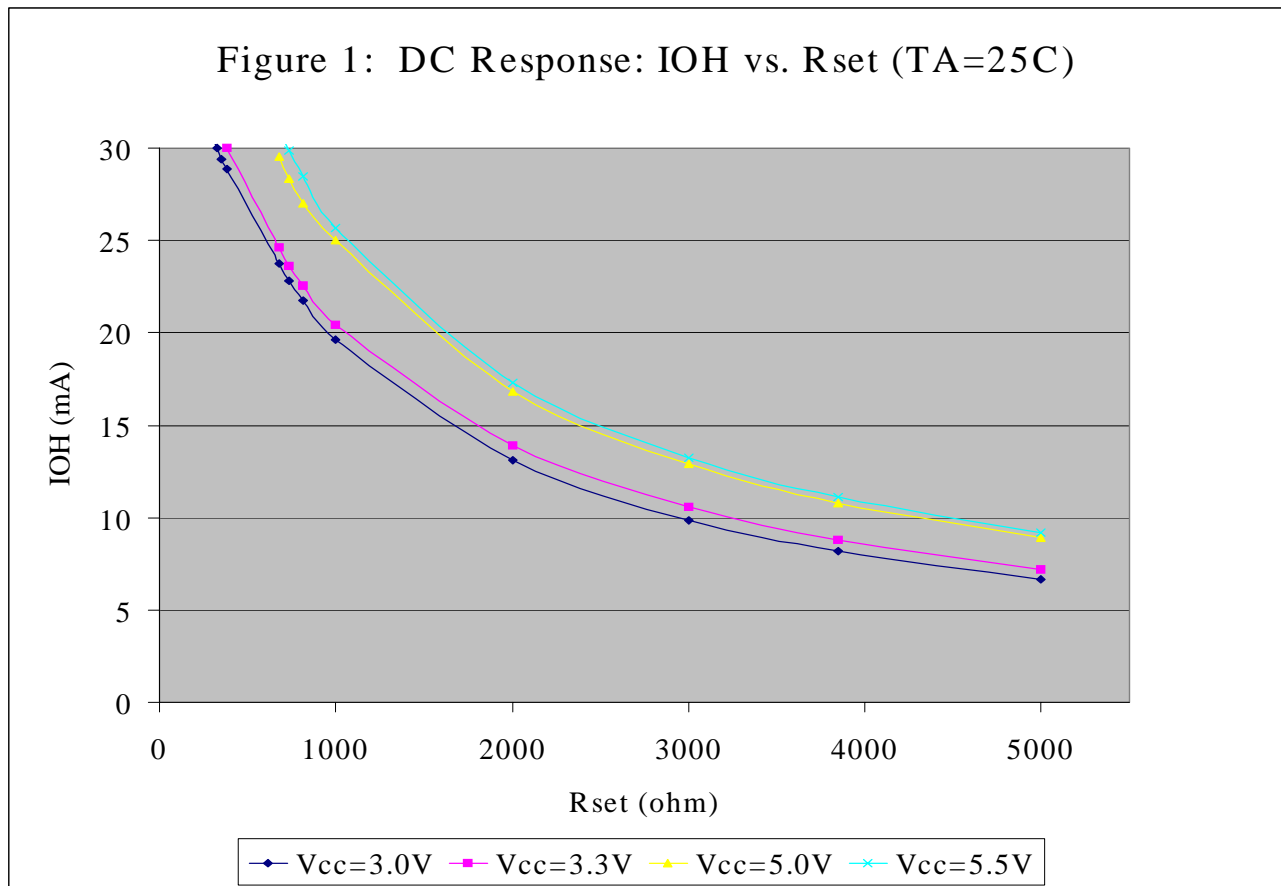
AC Characteristics
SK1302 AC Electrical Characteristics

 ($V_{CC} = 3.0V$ to $5.5V$; $V_{EE} = 0V$)

| Symbol | Characteristic | TA = -40°C | | TA = 0°C | | TA = +25°C | | TA = +85°C | | Unit |
|------------------------|---|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| t_{PLH} t_{PHL} | Propagation Delay D to Q EN* to Q | 270 345 | 295 465 | 275 365 | 310 465 | 280 380 | 315 470 | 295 400 | 325 485 | ps ps |
| V_{CMR} | Common Mode Range ¹ | $V_{EE} + 1.5$ | VCC | $V_{EE} + 1.5$ | VCC | $V_{EE} + 1.5$ | VCC | $V_{EE} + 1.5$ | VCC | V |
| t_r, t_f | Output Rise/Fall Time | 70 | 115 | 70 | 120 | 75 | 120 | 75 | 125 | ps |
| I_{OR} | Output Current Ringing ² | | <10 | | <10 | | <10 | | <10 | % |
| DJ | Deterministic Jitter (RMS) ³ | | 2 | | 2 | | 2 | | 2 | ps |

Notes

- 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 V_{EE} and is equal to $V_{EE} + 1.5V$.
- $I_{OH} = 5$ to 30 mA.
- $I_{MOD} = 10mA$, 2.5 Gbps, 2⁷-1 pattern.

Figure 1: DC Response: IOH vs. Rset (TA=25C)


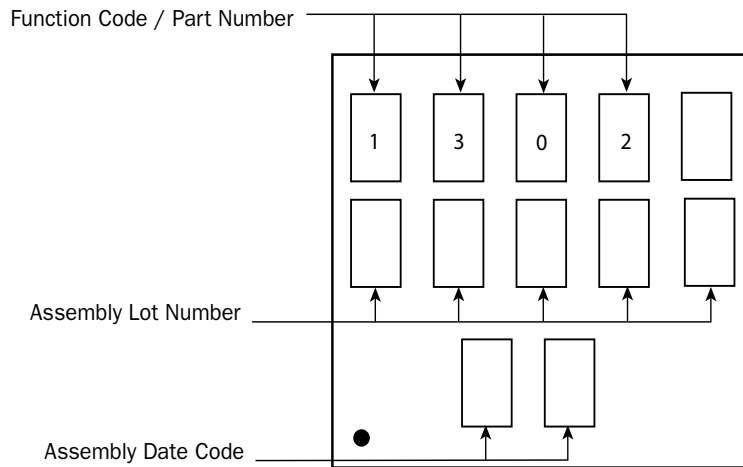
Ordering Information

| Ordering Code | Package ID | Temperature Range |
|---------------|------------|-------------------|
| SK1302MS | 10-MSOP | Industrial |
| SK1302MST | 10-MSOP | Industrial |

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

Marking Information

10 PIN MSOP PACKAGE



Contact Information

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