

### TEST AND MEASUREMENT PRODUCTS

#### Description

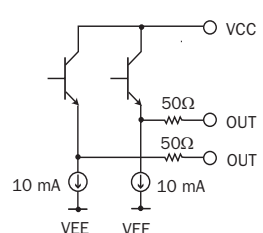
The SK4429 is an extremely fast, stable and accurate low skew quad buffer or cable driver / receiver. It can asynchronously pass four distinct signals, or it can resynchronize them to a common clock. In addition, all four outputs may be asynchronously enabled or disabled. All of the D flip-flops are triggered on the rising edge of the CLK input. It is also capable of receiving inputs of any technology or voltage level.

The SK4429 uses 50Ω outputs with sink/source capability, and is optimized for applications that require:

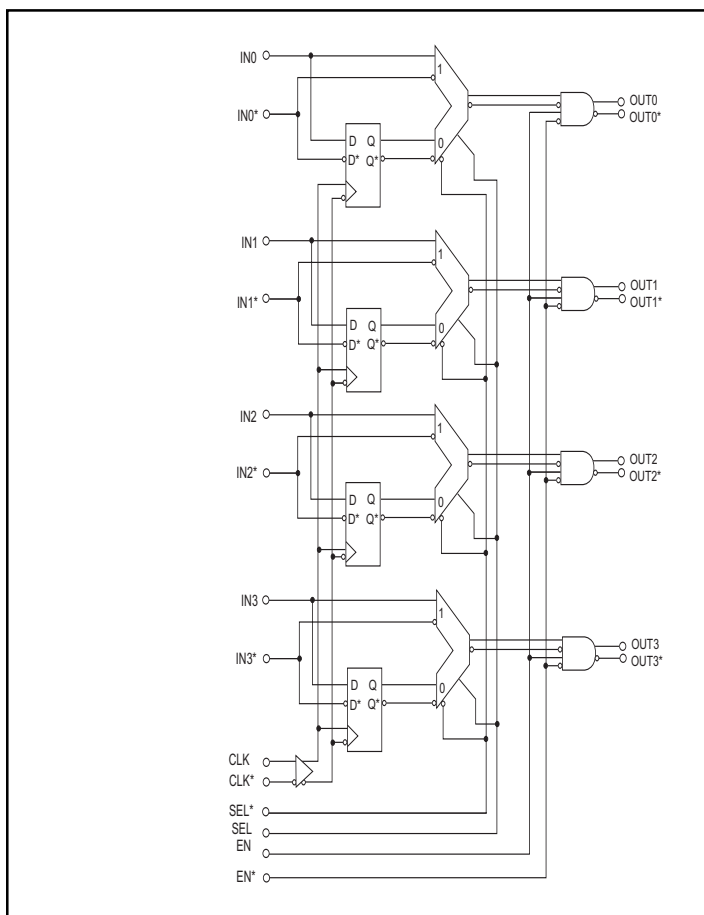
- Point to point, double terminated, timing critical lines
- Point to point, series terminated, timing critical lines

#### Features

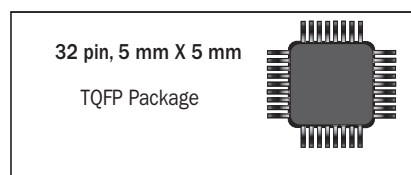
- Quad Buffer/Receiver
- 3 GHz Fmax
- Anything to PECL Translation
- Available in 32 lead, 5mm X5mm, TQFP Package

| Input Options | Output Options                                                                      |
|---------------|-------------------------------------------------------------------------------------|
| Open          | 50Ω Source / Sink                                                                   |
| IN<0 - 3>     |  |
| IN<0 - 3>*    |                                                                                     |

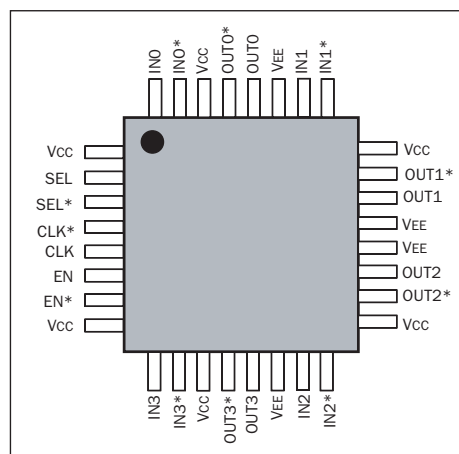
#### Functional Block Diagram

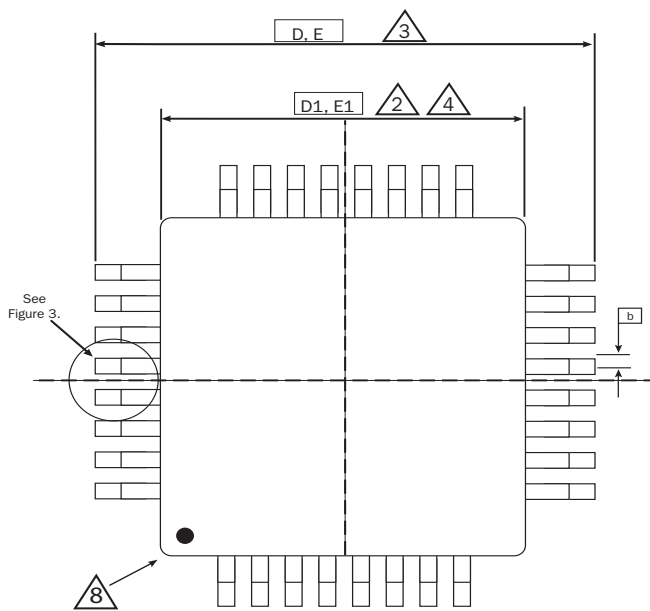


#### Package Information

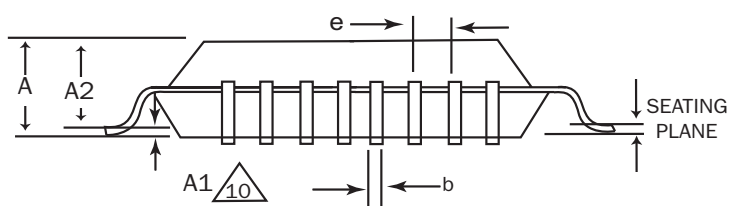


#### Pin Description



**32 Pin, 5mm x 5mm TQFP Package**


Top View



Side View

### 32 Pin, 5mm x 5mm TQFP Package

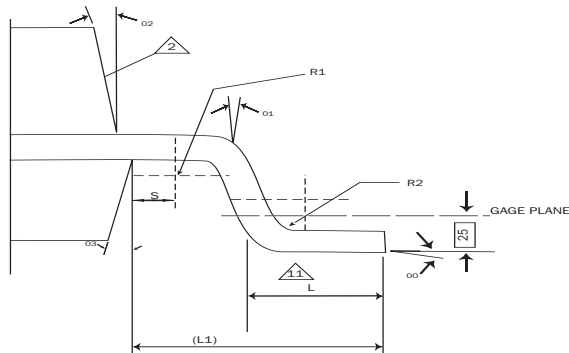


Figure 1.

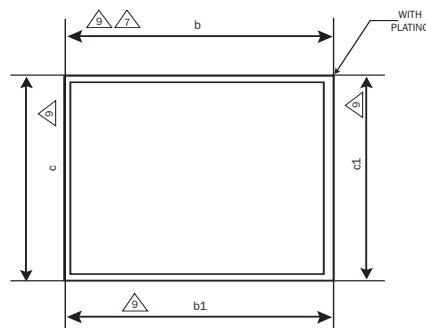


Figure 2.

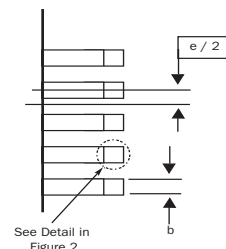


Figure 3.

1. All dimensions and tolerancing conforms to ANSI Y14.5M-1982.
2. The top package body size may be smaller than the bottom package body size by as much as 0.15 mm.
3. To be determined at seating plane.
4. Dimensions D1 and E1 do not include mold protrusion. Allowable protrusion is 0.25 mm per side. D1 and E1 are maximum plastic body size dimensions including mold mismatch.
5. Details of Pin 1 identifier optional, but must be located within the zone indicated.
6. All dimensions are in millimeters.
7. Dimension b does not include Dambar protrusion. Allowable Dambar protrusion shall not cause the lead width to exceed the maximum b dimension by more than 0.08 mm. Dambar cannot be located on the lower radius or the foot. Minimum space between protrusion and an adjacent lead is 0.07 mm for 0.4 mm and 0.5 mm pitch packages.
8. Exact shape of each corner is optional.
9. These dimensions apply to the flat section of the lead between 0.10 mm and 0.25 mm from the lead tip.
10. A1 is defined as the distance from the seating plane to the lowest point of the package body.

| JEDEC Variation<br>All Dimensions in Millimeters |          |      |      |      |                          |
|--------------------------------------------------|----------|------|------|------|--------------------------|
| Symbol                                           | MIN      | NOM  | MAX  | Note | Comments                 |
| A                                                | 1.00     | 1.10 | 1.20 |      | Package Stand Off Height |
| A1                                               | 0.05     | 0.10 | 0.15 |      | Air Gap                  |
| A2                                               | 0.95     | 1.00 | 1.05 |      | Package Body Thickness   |
| D                                                | 7.00 BSC |      |      | 3    |                          |
| D1                                               | 5.00 BSC |      |      | 4, 2 | Package Body Length      |
| E                                                | 7.00 BSC |      |      | 3    |                          |
| E1                                               | 5.00 BSC |      |      | 4, 2 | Package Body Width       |
| N                                                | 32       |      |      |      | Lead Count               |
| e                                                | 0.50 BSC |      |      |      | Lead Pitch               |
| b                                                | 0.17     | 0.22 | 0.27 | 7    | Lead Thickness           |
| b1                                               | 0.17     | 0.20 | 0.23 |      |                          |
| R1                                               | 0.08     | -    | -    |      |                          |
| R2                                               | 0.08     | -    | 0.20 |      |                          |
| 00                                               | 0°       | 3.5° | 7°   |      |                          |
| 01                                               | 0°       | -    | -    |      |                          |
| 02                                               | 11°      | 12°  | 13°  |      |                          |
| 03                                               | 11°      | 12°  | 13°  |      |                          |
| S                                                | 0.20     | -    | -    |      |                          |
| c                                                | 0.09     | -    | 0.20 |      |                          |
| c1                                               | 0.09     | -    | 0.16 |      |                          |
| L                                                | 0.45     | 0.60 | 0.75 |      |                          |
| L1                                               | 1.00 REF |      |      |      |                          |
| aaa                                              | 0.20     |      |      |      |                          |
| bbb                                              | 0.20     |      |      |      |                          |
| ccc                                              | 0.08     |      |      |      |                          |
| ddd                                              | 0.08     |      |      |      |                          |

**TEST AND MEASUREMENT PRODUCTS**
**Absolute Maximum Ratings\***

| Symbol    | Parameter                                                     | Value                         | Unit        |
|-----------|---------------------------------------------------------------|-------------------------------|-------------|
| $V_{EE}$  | Power Supply ( $V_{CC} = 0V$ )                                | -8.0 to 0                     | V           |
| $V_{CC}$  | Power Supply ( $V_{EE} = 0V$ )                                | +8.0 to 0                     | V           |
| $V_I$     | Input Voltage                                                 | $V_{CC} \geq V_I \geq V_{EE}$ | V           |
| $I_{OUT}$ | Output Current<br>Continuous<br>Surge                         | 50<br>100                     | mA<br>mA    |
| $T_{stg}$ | Storage Temperature                                           | -65 to +150                   | $^{\circ}C$ |
| $T_{sol}$ | Solder Temperature (<2 to 3 seconds: 245 $^{\circ}C$ desired) | 265                           | $^{\circ}C$ |

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

*Note 1:* Device is ESD sensitive and requires protective handling.

**TEST AND MEASUREMENT PRODUCTS**
**DC Characteristics**

( $V_{CC} = 2.0V$  to  $3.6V$ ;  $V_{EE} = -3.6V$  to  $-3.0V$ ;  $T_A = 0^{\circ}C$  to  $70^{\circ}C$ )

| Parameter                                                                     | Symbol              | Min            | Typ            | Max            | Units    |
|-------------------------------------------------------------------------------|---------------------|----------------|----------------|----------------|----------|
| Inputs                                                                        |                     |                |                |                |          |
| Input High                                                                    | $V_{IH}$            | $V_{EE} + 2.0$ |                | $V_{CC}$       | V        |
| Input Low                                                                     | $V_{IL}$            | $V_{EE}$       |                | $V_{CC} - 0.2$ | V        |
| (IN - IN*, CLK - CLK*,<br>EN - EN*, SEL - SEL*)<br>Differential Input Voltage | $ V_{IH} - V_{IL} $ | 0.2            |                | 4.3            | V        |
| Timing Inputs (CLK / CLK*)                                                    |                     |                |                |                |          |
| Input High Current                                                            | $I_{IH}$            | -5.0           | +8.0           | +25            | $\mu A$  |
| Input Low Current                                                             | $I_{IL}$            | -1             | <0.5           | +1             | $\mu A$  |
| Timing Inputs (IN / IN*)                                                      |                     |                |                |                |          |
| Input High Current, Input Low Current                                         | $I_{IH}, I_{IL}$    | -20            | <40            | 80             | $\mu A$  |
| Functional Inputs (EN / EN*, SEL /<br>SEL*) Input Current                     | $I_{IH}, I_{IL}$    | -500           | <200           | +500           | $\mu A$  |
| Outputs                                                                       |                     |                |                |                |          |
| Digital Output Voltage                                                        | $ OUT - OUT^* $     | 600            | 780            |                | mV       |
| Output Common Mode Range                                                      | $(OUT + OUT^*) / 2$ | $V_{CC} - 1.5$ | $V_{CC} - 1.3$ | $V_{CC} - 1.1$ | V        |
| Internal Current Source                                                       | $I_{SINK}$          | 8.0            | 10.5           | 13.5           | mA       |
| Output Impedance                                                              | $R_{OUT}$           | 40             | 50             | 60             | $\Omega$ |
| Power Supply                                                                  |                     |                |                |                |          |
| Power Supply Current                                                          | $I_{EE}$            |                | 170            | 235            | mA       |

DC Test Conditions: Outputs unterminated.

**AC Characteristics**

( $V_{CC} = 2.0V$  to  $3.6V$ ;  $V_{EE} = -3.6V$  to  $-3.0V$ ;  $T_A = 0^{\circ}C$  to  $70^{\circ}C$ )

| Parameter                                           | Symbol                     | Min | Typ | Max | Units            |
|-----------------------------------------------------|----------------------------|-----|-----|-----|------------------|
| High Performance Option                             |                            |     |     |     |                  |
| Propagation Delay                                   |                            |     |     |     |                  |
| IN[0:3] to OUT[0:3] (SEL = 1)                       | $T_{pd}$                   | 200 | 350 | 550 | ps               |
| CLK to OUT[0:3] (SEL = 0)                           | $T_{pd}$                   | 430 | 580 | 780 | ps               |
| SEL to OUT [0:3]                                    | $T_{pd}$                   | 300 | 450 | 650 | ps               |
| EN to OUT [0:3]                                     | $T_{pd}$                   | 250 | 350 | 600 | ps               |
| Channel to Channel Skew                             |                            |     | 15  | 40  | ps               |
| Maximum Operating Frequency <sup>1</sup>            | $F_{max}$                  | 3   |     |     | GHz              |
| Minimum Pulse Width <sup>1</sup>                    | PW min                     | 250 |     |     | ps               |
| IN to CLK                                           |                            |     |     |     |                  |
| Set Up Time                                         | $T_s$                      | 120 |     |     | ps               |
| Hold Time                                           | $T_h$                      | 120 |     |     | ps               |
| Output Rise and Fall Times (20% / 80%) <sup>1</sup> | $T_r / T_f$                |     | 125 | 165 | ps               |
| Temperature Coefficient <sup>1</sup>                | $\Delta T_{pd} / \Delta T$ |     | <1  |     | ps / $^{\circ}C$ |

AC Test Conditions: Outputs terminated with  $50\Omega$  to  $V_{CC} - 2V$

Note 1: Guaranteed by characterization. Not production tested.

**TEST AND MEASUREMENT PRODUCTS****Ordering Information**

| Ordering Code | Package ID                |
|---------------|---------------------------|
| SK4429ATF     | 32 Pin - TQFP<br>5 X 5 mm |
| S4429ATF-T    | Tape and Reel             |

*Notes:*

1. For Tape and Reel information, see TMD Part Ordering Information Data Sheet.

**Application Notes**

AN1001 - EPIC Family Product Line

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

AN1004 - Interfacing Between LVDS and  
ECL / LVECL / PECL / LVPECL

**Contact Information**

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