

FEATURES

- 2.5GHz min f_{max}
- 2.3V to 5.7V power supply
- Single bit latch
- Stores or flows through 1 bit of data
- Optimized to work with SuperLite™ family
- Fully differential
- Source terminated CML outputs for fast edge rates
- Accepts CML, PECL, LVPECL input logic levels
- Available in a tiny 10-pin MSOP



SuperLite™

DESCRIPTION

The SY55853U is a latch. Its differential output will flow through the input while it's enable is high. The output will remain static while the enable is low. In addition, an asynchronous, level sensitive reset is provided.

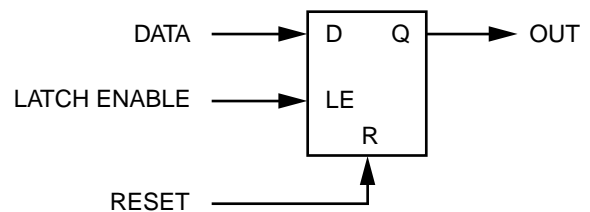
SY55853U inputs can be terminated with a single resistor between the true and the complement pins of a given input.

The SY55853U is a member of Micrel's SuperLite™ family of high-speed CML logic. This family features very small packaging and 2.3V to 5.7V operation.

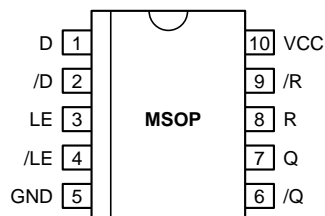
APPLICATIONS

- High-speed logic
- OC-48 communication systems

FUNCTIONAL BLOCK DIAGRAM



PACKAGE/ORDERING INFORMATION



10-Pin MSOP (K10-1)

Ordering Information⁽¹⁾

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|--------------------------------|--------------|-----------------|--|----------------|
| SY55853UKC | K10-1 | Commercial | 55853U | Sn-Pb |
| SY55853UKCTR ⁽²⁾ | K10-1 | Commercial | 55853U | Sn-Pb |
| SY55853UKI | K10-1 | Industrial | 55853U | Sn-Pb |
| SY55853UKITR ⁽²⁾ | K10-1 | Industrial | 55853U | Sn-Pb |
| SY55853UKG ⁽³⁾ | K10-1 | Industrial | 55853U with Pb-Free bar line indicator | NiPdAu Pb-Free |
| SY55853UKGTR ^(2, 3) | K10-1 | Industrial | 55853U with Pb-Free bar line indicator | NiPdAu Pb-Free |

Notes:

1. Contact factory for die availability. Dice are guaranteed at T_A = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package recommended for new designs.

PIN DESCRIPTION

| Pin Number | Pin Name | Pin Function |
|------------|----------|---|
| 1, 2 | D, /D | CML/PECL/LVPECL Input (Differential): This is the single bit of data that gets clocked in and remembered. |
| 3, 4 | LE, /LE | CML/PECL/LVPECL Latch Enable Input (Differential): The rising edge of this signal is the clock signal that determines when the Boolean value at the data input gets stored. |
| 5 | GND | Ground. |
| 6, 7 | Q, /Q | CML Output (Differential): This is the output of the flip-flop. |
| 8, 9 | R, /R | CML/PECL/LVPECL Reset Input (Differential): This is an asynchronous active high level reset, that forces the flip-flop into a known state, namely zero. |
| 10 | VCC | Power Supply. |

TRUTH TABLE

| D | LE | R | Q | /Q |
|---|----|---|------------------------|------------------------|
| X | 0 | 0 | Latched ⁽¹⁾ | Latched ⁽¹⁾ |
| 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| X | X | 1 | 0 | 1 |

Note 1. Retains data before LE falling transition.

FUNCTIONAL DESCRIPTION

Establishing Static Logic Inputs

The true pin of an input pair is internally biased to ground through a 75kΩ resistor. The complement pin of an input pair is internally biased halfway between V_{CC} and ground by a voltage divider consisting of two 75kΩ resistors. To keep an input at static logic zero at $V_{CC} > 3.0V$, leave both inputs unconnected. For $V_{CC} \leq 3.0V$, connect the

complement input to V_{CC} and leave the true input unconnected. To make an input static logic one, connect the true input to V_{CC} , leave the complement input unconnected. These are the only safe ways to cause inputs to be at a static value. In particular, no input pin should be directly connected to ground. All NC (no connect) pins should be unconnected.

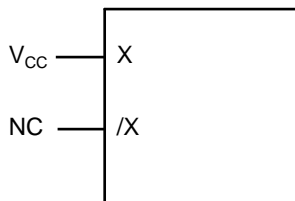


Figure 1. Hard Wiring A Logic “1” (1)

Note 1. X is either D, LE, R input. /X is either /D, /LE, /R input.

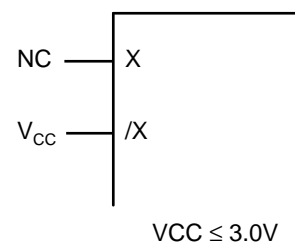
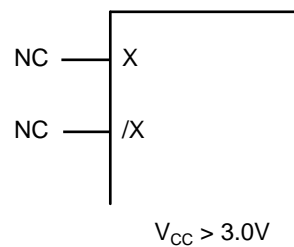


Figure 2. Hard Wiring A Logic “0” (1)

Absolute Maximum Ratings^(Note 1)

| | |
|---------------------------------------|----------------------------------|
| Supply Voltage (V_{CC}) | -0.5V to +6.0V |
| CML Output Voltage | $V_{CC} - 1.0$ to $V_{CC} + 0.5$ |
| Lead Temperature (soldering, 20 sec.) | 260°C |
| Storage Temperature (T_S) | -65°C to +150°C |

Operating Ratings^(Note 2)

| | |
|-------------------------------|-------------------------|
| Supply Voltage (V_{IN}) | -0.5 to $V_{CC} + 0.5V$ |
| Ambient Temperature (T_A) | -40°C to +85°C |
| Package Thermal Resistance | |
| MSOP (θ_{JA}) | |
| Still-Air | 113°C/W |
| 500lfpm | 96°C/W |

Note 1. 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 rating conditions for extended periods may affect device reliability.

Note 2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.

DC ELECTRICAL CHARACTERISTICS^(Note 1)

$V_{CC} = 2.3V$ to $5.7V$; $GND = 0V$; $T_A = -40^\circ C$ to $+85^\circ C$; unless noted.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|----------|----------------------|-----------|-----|-----|-----|-------|
| V_{CC} | Power Supply Voltage | | 2.3 | | 5.7 | V |
| I_{CC} | Power Supply Current | | | | 37 | mA |

Note 1. The device is guaranteed to meet the DC specifications, shown in the table above, after thermal equilibrium has been established. The device is tested in a socket such that transverse airflow of ≥ 500 lfpm is maintained.

CML DC ELECTRICAL CHARACTERISTICS^(Note 1)

$V_{CC} = 2.3V$ to $5.7V$; $GND = 0V$; $T_A = -40^\circ C$ to $+85^\circ C$; unless noted.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|-------------|----------------------------|---|------------------|-------------------------|------------------|-------|
| V_{ID} | Differential Input Voltage | | 100 | | | mV |
| V_{IH} | Input HIGH Voltage | Note 2 | 1.6 | — | V_{CC} | V |
| V_{IL} | Input LOW Voltage | Note 2 | 1.5 | — | $V_{CC} - 0.1$ | V |
| V_{OH} | Output HIGH Voltage | No Load | $V_{CC} - 0.020$ | $V_{CC} - 0.010$ | V_{CC} | V |
| V_{OL} | Output LOW Voltage | No Load | $V_{CC} - 0.97$ | $V_{CC} - 0.825$ | $V_{CC} - 0.660$ | V |
| V_{OS} | Output Voltage Swing | No Load, Note 3 100Ω Environment, Note 4 50Ω Environment, Note 5 | 0.660 | 0.800 0.400 0.200 | 0.950 | V |
| R_{DRIVE} | Output Source Impedance | | 80 | 100 | 120 | Ω |

Note 1. The device is guaranteed to meet the DC specifications, shown in the table above, after thermal equilibrium has been established. The device is tested in a socket such that transverse airflow of ≥ 500 lfpm is maintained.

Note 2. Inputs must be biased to logic LOW or HIGH when V_{CC} is less than 3.0V.

Note 3. Actual voltage levels and differential swing will depend on customer termination scheme. Typically, a 400mV swing is available in the 100Ω environment and a 200mV swing in the 50Ω environment. Refer to the “CML Termination” diagram for more details.

Note 4. See Figure 4.

Note 5. See Figure 3a and 3b.

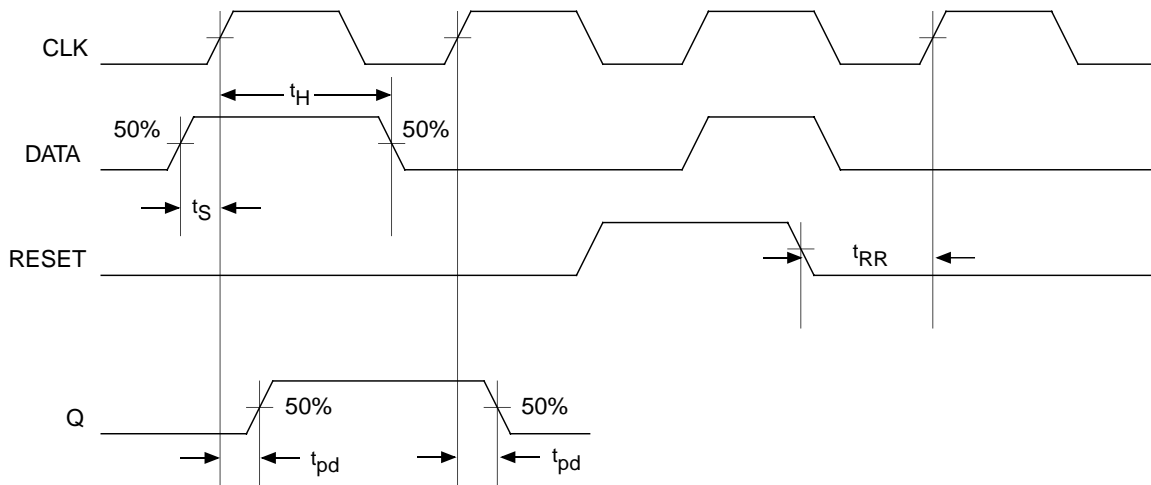
AC ELECTRICAL CHARACTERISTICS(Note 1)

V_{CC} = 2.3V to 5.7V; GND = 0V; T_A = -40°C to +85°C; unless noted.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|---------------------------------|--|-----------------------------|------------|-----|-------------------|----------------|
| f _{MAX} | Max. Operating Frequency | | 2.5 | | | GHz |
| t _{pd} | Propagation Delay | D to Q LE to Q R to Q | | | 400 400 500 | ps ps ps |
| t _S | Set-Up Time | D to LE D to R | 70 | | | ps |
| t _H | Hold Time | LE to D | 40 | | | ps |
| t _{RR} | Reset Recovery | | 400 | | | ps |
| t _{PW} | Minimum Pulse Width | LE High R High | 160 250 | | | ps |
| t _r , t _f | CML Output Rise/Fall Times (20% to 80%) | -40°C to 0°C 0°C to 85°C | 35 | | 175 160 | ps |

Note 1. Tested using environment of Figure 3b, 50Ω load CML output.

TIMING DIAGRAMS



CML TERMINATION

All inputs accept the output from any other member of this family. All outputs are source terminated 100Ω CML differential drivers as shown in Figures 3 and 4. SY55853U expects the inputs to be terminated, and that good high

speed design practices be adhered to. SY55853U inputs are designed to accept a termination resistor between the true and complement inputs of a differential pair. 0402 form factor chip resistors will fit with some trace fanout.

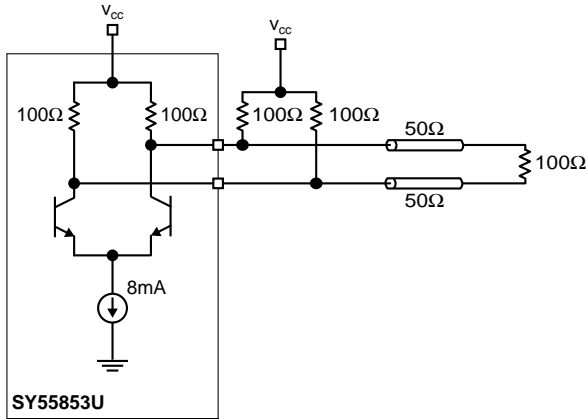


Figure 3a. Differentially Terminated (50Ω Load CML Output)

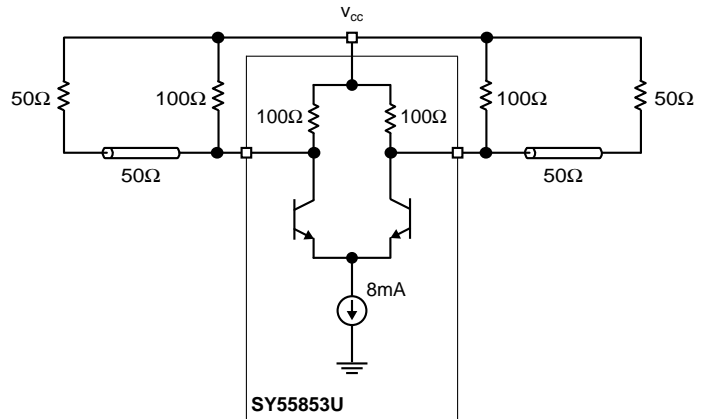


Figure 3b. Individually Terminated (50Ω Load CML Output)

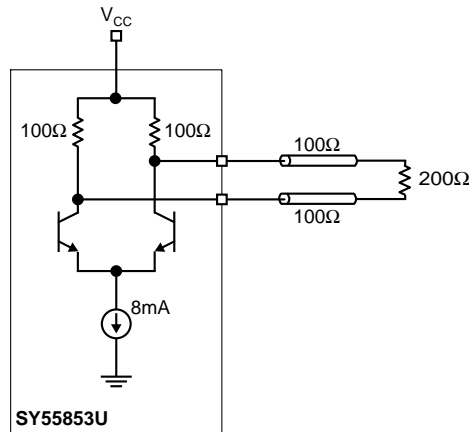
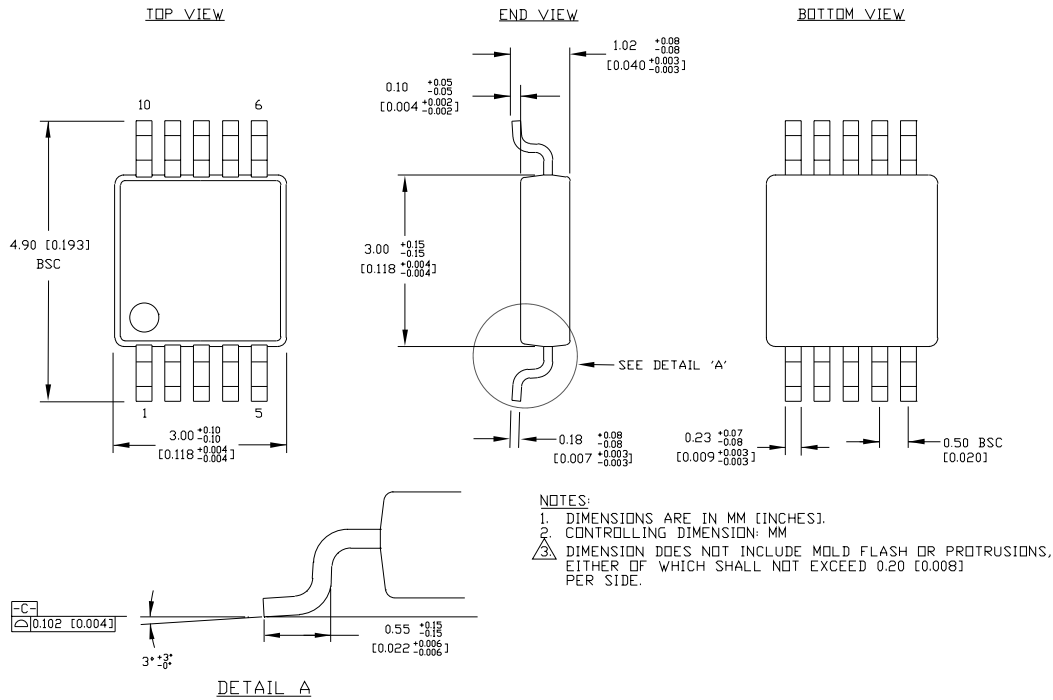


Figure 4. 100Ω Load CML Output

10-PIN MSOP (K10-1)



Rev. 00

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