# THE DATASHEET OF

# IDTQS3126QG8

www.win-source.net 0086-755-83957316

# QUICKSWITCH® PRODUCTS HIGH-SPEED CMOS QUADRUPLE BUS SWITCH WITH INDIVIDUAL ACTIVE HIGH ENABLES

**QS3126**

## FEATURES:

- **Enhanced N channel FET with no inherent diode to Vcc**
- **Bidirectional switches connect inputs to outputs**
- **Pin compatible with the 74'126 function**
- **Zero propagation delay, zero ground bounce**
- **Undershoot clamp diodes on all switch and control inputs**
- **Available in QSOP and SOIC packages**

## APPLICATIONS:

- **Active high enabling**
- **Hot-swapping, hot-docking**
- **Voltage translation (5V to 3.3V)**
- **Power conservation**
- **Capacitance reduction and isolation (mass storage, work stations)**
- **Logic replacement (data processing)**
- **Clock gating**
- **Bus isolation**

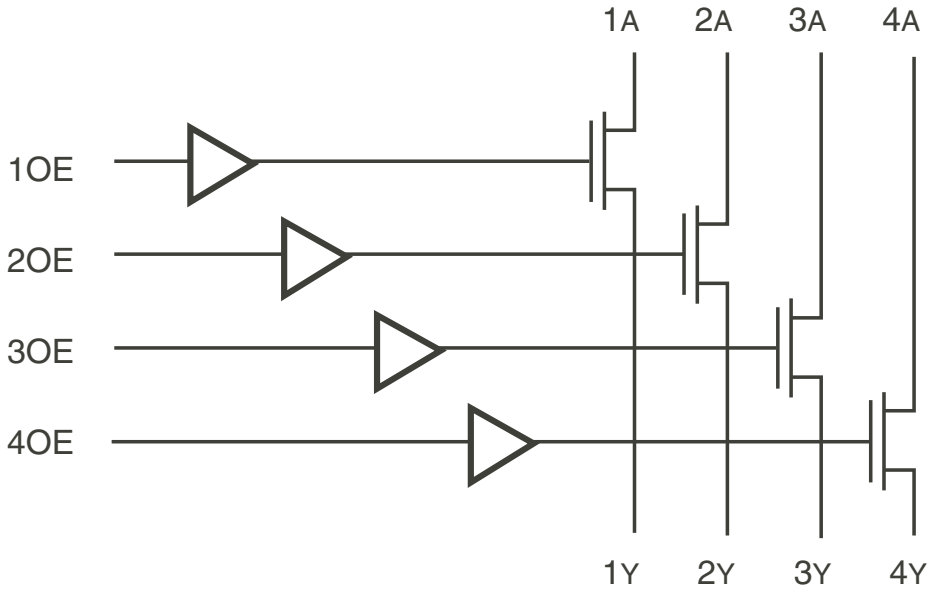
## DESCRIPTION:

The QS3126 provides a set of four high-speed CMOS switches connecting inputs to outputs. The low ON resistance of the QS3126 allows inputs to be connected to outputs without propagation delay and without generating additional ground bounce noise. Individual active high enables (OE) are used to turn the switches on. The QS3126 is ideal for signal and control switching since the device adds no noise, ground bounce, propagation delay, or significant power consumption to the system.

QuickSwitch devices provide an order of magnitude faster speed than conventional logic devices.

The QS3126 is characterized for operation at -40°C to +85°C.

## FUNCTIONAL BLOCK DIAGRAM

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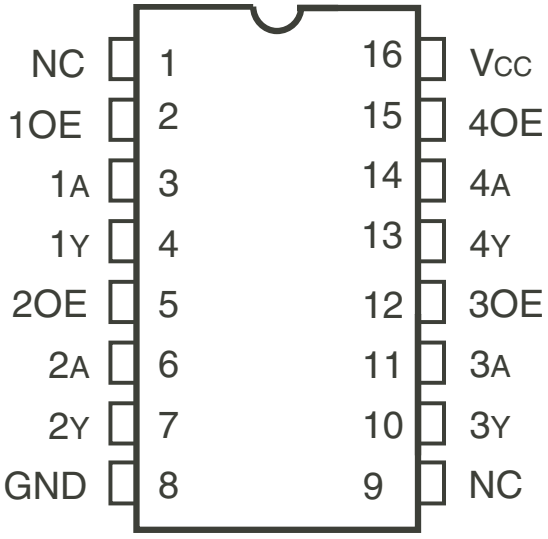
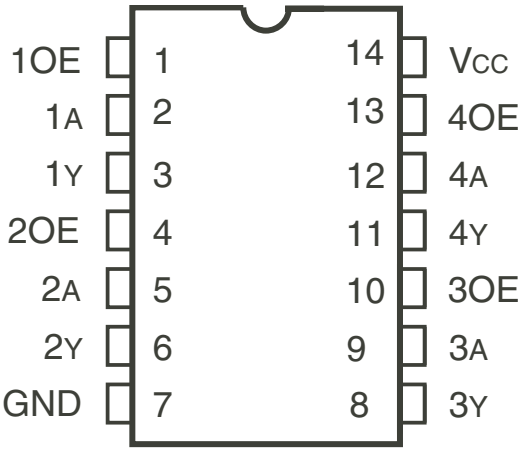
## PIN CONFIGURATION




**TOP VIEW**

| Package Type | Package Code | Order Code |
|---|---|---|
| QSOP | PCG16 | QG |




**TOP VIEW**

| Package Type | Package Code | Order Code |
|---|---|---|
| SOIC | DCG14 | S1G |

## ABSOLUTE MAXIMUM RATINGS(1)

| Symbol | Description | Max | Unit |
|---|---|---|---|
| $V_{TERM}$(2) | Supply Voltage to Ground | –0.5 to +7 | V |
| $V_{TERM}$(3) | DC Switch Voltage $V_S$ | –0.5 to +7 | V |
| $V_{TERM}$(3) | DC Input Voltage $V_{IN}$ | –0.5 to +7 | V |
| $V_{AC}$ | AC Input Voltage (pulse width ≤20ns) | –3 | V |
| $I_{OUT}$ | DC Output Current | 120 | mA |
| $P_{MAX}$ | Maximum Power Dissipation ($T_A$ = 85°C) | 0.5 | W |
| $T_{STG}$ | Storage Temperature | –65 to +150 | °C |

**NOTES:**
1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
2. $V_{CC}$ terminals.
3. All terminals except $V_{CC}$ .

## CAPACITANCE ($T_A$ = +25°C, f = 1MHz, $V_{IN}$ = 0V, $V_{OUT}$ = 0V)

| Pins | Typ. | Max.(1) | Unit |
|---|---|---|---|
| Control Inputs | 3 | 5 | pF |
| Quickswitch Channels (Switch OFF) | 5 | 7 | pF |

**NOTE:**
1. This parameter is guaranteed but not production tested.

## PIN DESCRIPTION

| Pin Names | I/O | Description |
|---|---|---|
| 1A - 4A | I/O | Bus A |
| 1Y - 4Y | I/O | Bus Y |
| 1OE - 4OE | I | Bus Switch Enable |

## FUNCTION TABLE(1)

| xOE | xA | xY | Function |
|---|---|---|---|
| H | H | H | Connect |
| H | L | L | Connect |
| L | X | X | Disconnect |

**NOTE:**
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   X = Don't Care

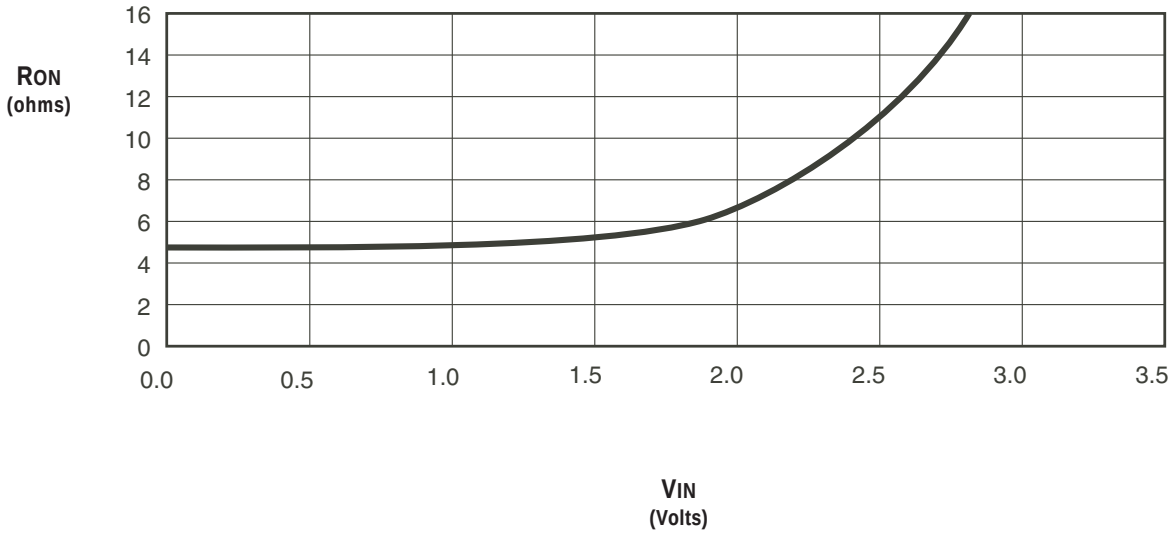
## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: $T_A$ = –40°C to +85°C, $V_{CC}$ = 5V ± 5%

| Symbol | Parameter | Test Conditions | Min. | Typ.[1] | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{IH}$ | Input HIGH Voltage | Guaranteed Logic HIGH for Control Inputs | 2 | — | — | V |
| $V_{IL}$ | Input LOW Voltage | Guaranteed Logic LOW for Control Inputs | — | — | 0.8 | V |
| $I_{IN}$ | Input Leakage Current (Control Inputs) | 0V ≤ $V_{IN}$ ≤ $V_{CC}$ | — | — | ±1 | µA |
| $I_{OZ}$ | Off-State Current (Hi-Z) | 0V ≤ $V_{OUT}$ ≤ $V_{CC}$, Switches OFF | — | — | ±1 | µA |
| $R_{ON}$ | Switch ON Resistance[2] | $V_{CC}$ = Min., $V_{IN}$ = 0V, $I_{ON}$ = 30mA | — | 5 | 7 | Ω |
| | | $V_{CC}$ = Min., $V_{IN}$ = 2.4V, $I_{ON}$ = 15mA | — | 10 | 15 | |
| $V_P$ | Pass Voltage[3] | $V_{IN}$ = $V_{CC}$ = 5V, $I_{OUT}$ = -5µA | 3.7 | 4 | 4.2 | V |

**NOTES:**
1. Typical values are at $V_{CC}$ = 5V and $T_A$ = 25°C.
2. $R_{ON}$ is guaranteed but not production tested.
3. Pass voltage is guaranteed but not production tested.

## TYPICAL ON RESISTANCE vs $V_{IN}$ AT $V_{CC}$ = 5V



## POWER SUPPLY CHARACTERISTICS

| Symbol | Parameter | Test Conditions[1] | Max. | Unit |
|---|---|---|---|---|
| $I_{CCQ}$ | Quiescent Power Supply Current | $V_{CC}$ = Max., $V_{IN}$ = GND or $V_{CC}$, f = 0 | 3 | µA |
| $\Delta I_{CC}$ | Power Supply Current per Input HIGH[2] | $V_{CC}$ = Max., $V_{IN}$ = 3.4V, f = 0 | 1.25 | mA |
| $I_{CCD}$ | Dynamic Power Supply Current per MHz [3] | $V_{CC}$ = Max., A and Y Pins Open, Control Inputs Toggling @ 50% Duty Cycle | 0.25 | mA/MHz |

**NOTES:**
1. For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
2. Per TTL-driven input ($V_{IN}$ = 3.4V, control inputs only). A and Y pins do not contribute to $\Delta I_{CC}$.
3. This current applies to the control inputs only and represents the current required to switch internal capacitance at the specified frequency. The A and Y inputs generate no significant AC or DC currents as they transition. This parameter is guaranteed but not production tested.

## SWITCHING CHARACTERISTICS OVER OPERATING RANGE

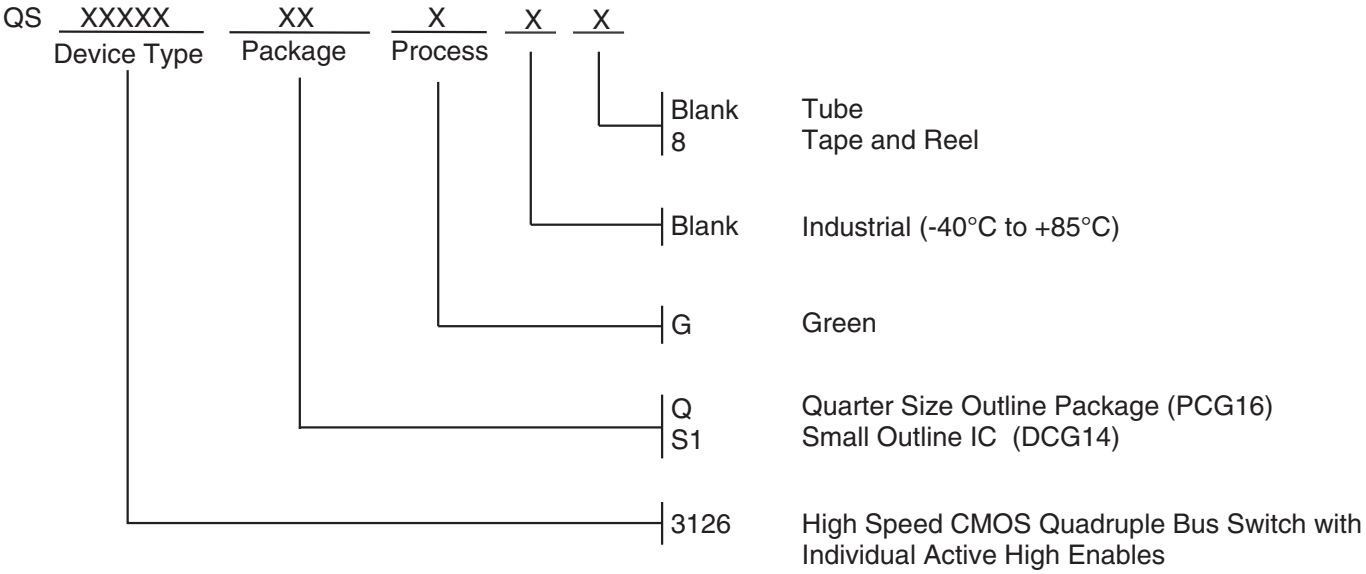
$T_A$ = -40°C to +85°C, $V_{CC}$ = 5V ± 5%

$C_{LOAD}$ = 50pF, $R_{LOAD}$ = 500Ω unless otherwise noted.

| Symbol | Parameter | Min.[1] | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $t_{PLH}$<br>$t_{PHL}$ | Data Propagation Delay[2]<br>A to Y | — | — | 0.25[3] | ns |
| $t_{PZL}$<br>$t_{PZH}$ | Switch Turn-On Delay<br>OE to xA/xY | 1.5 | — | 6.5 | ns |
| $t_{PLZ}$<br>$t_{PHZ}$ | Switch Turn-Off Delay[2]<br>OE to xA/xY | 1.5 | — | 5.5 | ns |

**NOTES:**
1. Minimums are guaranteed but not production tested.
2. This parameter is guaranteed but not production tested.
3. The bus switch contributes no propagation delay other than the RC delay of the ON resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns at $C_L$ = 50pF. Since this time constant is much smaller than the rise and fall times of typical driving signals, it adds very little propagation delay to the system. Propagation delay of the bus switch, when used in a system, is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

## ORDERING INFORMATION




## Orderable Part Information

| Speed (ns) | Orderable Part ID | Pkg. Code | Pkg. Type | Temp. Grade |
|---|---|---|---|---|
| | QS3126QG | PCG16 | QSOP | I |
| | QS3126QG8 | PCG16 | QSOP | I |
| | QS3126S1G | DCG14 | SOIC | I |
| | QS3126S1G8 | DCG14 | SOIC | I |

## Datasheet Document History

| | | |
|---|---|---|
| 02/08/2011 | Pg. 5 | Updated the ordering information by removing the "IDT" notation, non RoHS part and by adding Tape and Reel information. |
| 06/02/2011 | Pg. 1,2 | Corrected $\overline{OE}$ to OE as in previous revision. |
| 05/06/2019 | Pg. 2,6 | Added table under pin configuration diagram with detailed package information and orderable part information table. Updated the ordering information diagram in clearer detail. |

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