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)
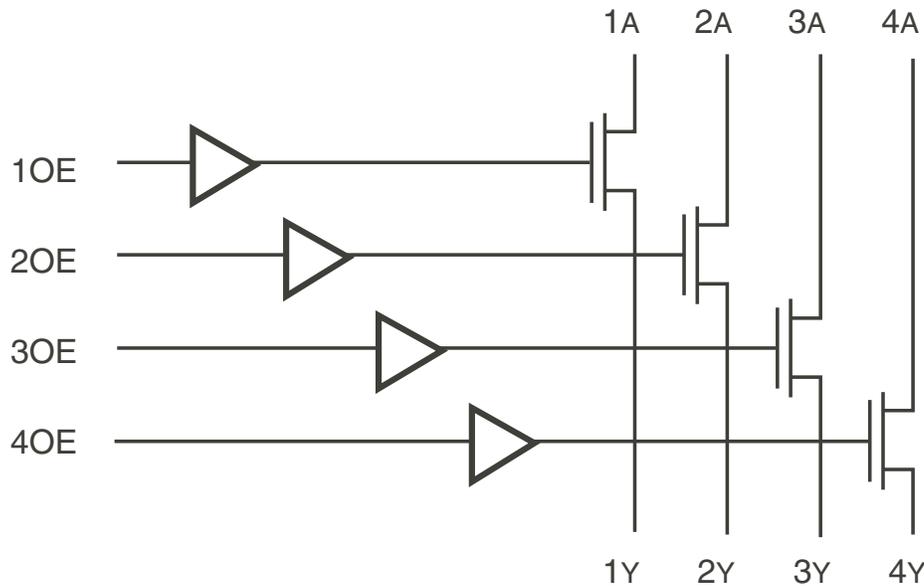- Clock gating
- Bus isolation

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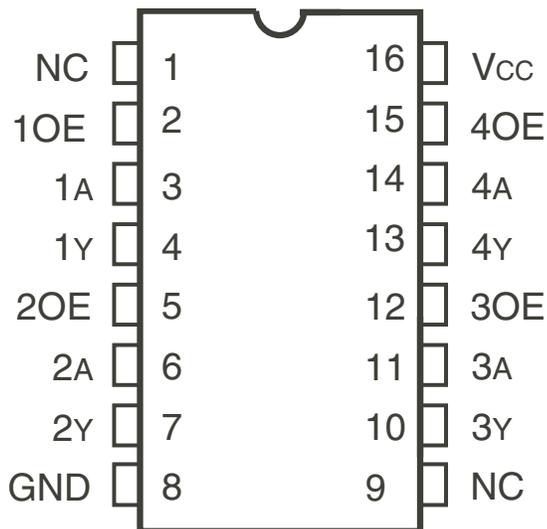
QuickSwitch devices provide an order of magnitude faster speed than conventional logic devices.

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

FUNCTIONAL BLOCK DIAGRAM

INDUSTRIAL TEMPERATURE RANGE

MAY 2019

DSC-5599/7

PIN CONFIGURATION

```
        NC  [ 1        16 ]  VCC
       1OE  [ 2        15 ]  4OE
        1A  [ 3        14 ]  4A
        1Y  [ 4        13 ]  4Y
       2OE  [ 5        12 ]  3OE
        2A  [ 6        11 ]  3A
        2Y  [ 7        10 ]  3Y
       GND  [ 8         9 ]  NC
```

TOP VIEW

Package Type	Package Code	Order Code
QSOP	PCG16	QG

```
       1OE  [ 1        14 ]  VCC
        1A  [ 2        13 ]  4OE
        1Y  [ 3        12 ]  4A
       2OE  [ 4        11 ]  4Y
        2A  [ 5        10 ]  3OE
        2Y  [ 6         9 ]  3A
       GND  [ 7         8 ]  3Y
```

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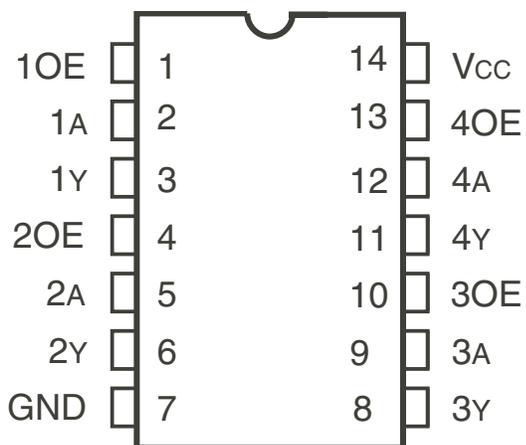1. This parameter is guaranteed but not production tested.

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%
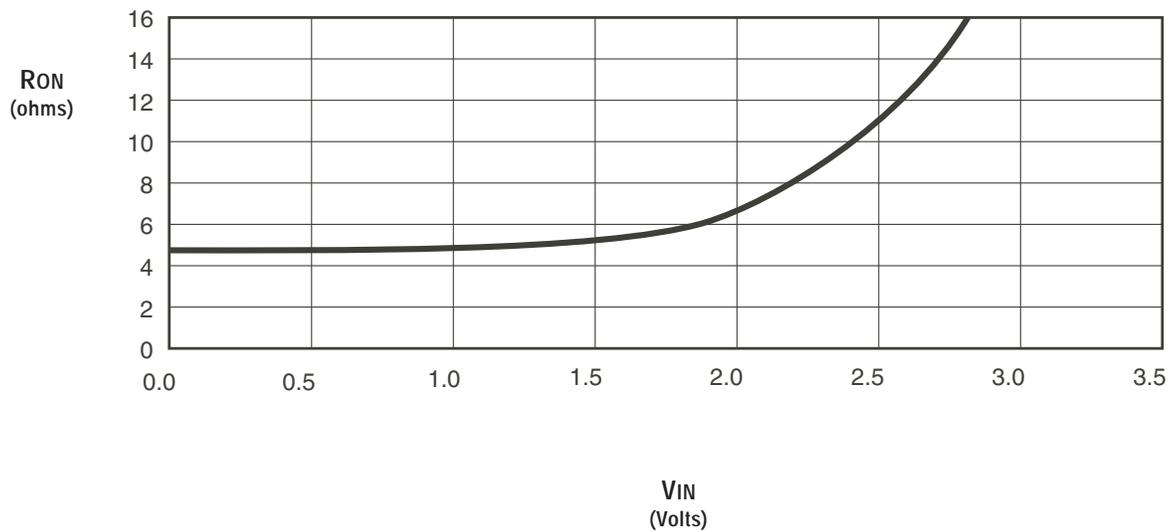
Symbol	Parameter	Test Conditions	Min.	Typ.[1]	Max.	Unit
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH for Control Inputs	2	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW for Control Inputs	—	—	0.8	V
I_{IN}	Input Leakage Current (Control Inputs)	$0V \leq V_{IN} \leq V_{CC}$	—	—	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	$0V \leq V_{OUT} \leq V_{CC}$, 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

© 2019 Renesas Electronics Corporation

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
ΔI_{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 ΔI_{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

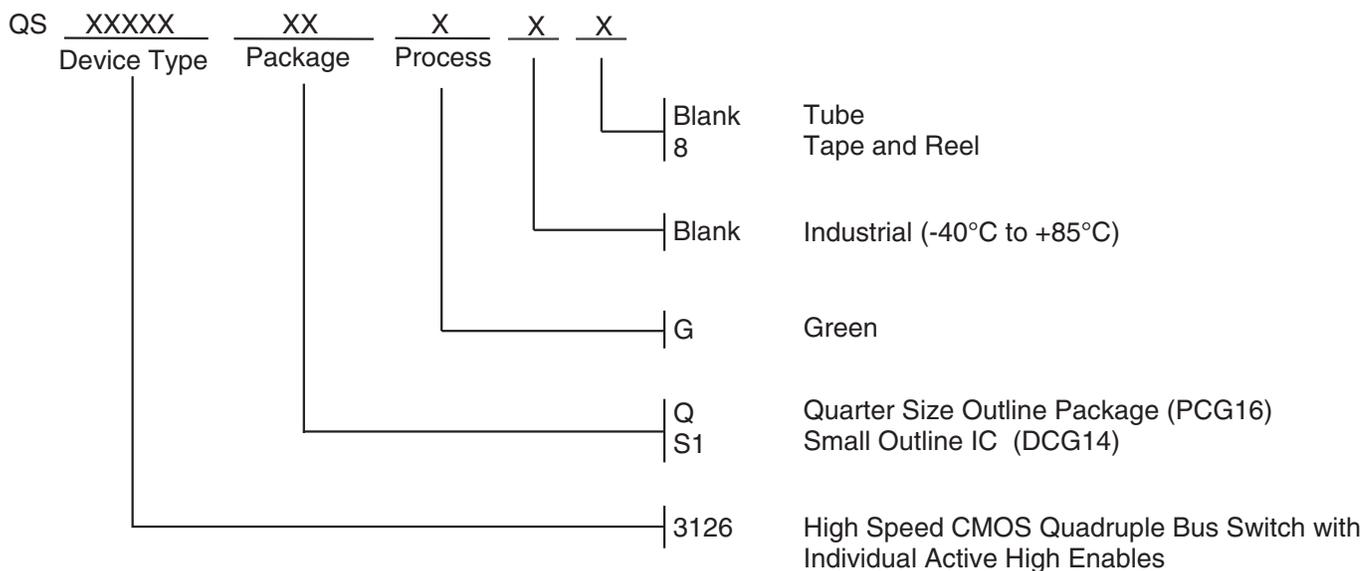T_A = -40°C to +85°C, V_{CC} = 5V ± 5%

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

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

QS   <u>XXXXX</u>   <u>XX</u>   <u>X</u>   <u>X</u>   <u>X</u>

     Device Type   Package   Process

Blank	Tube
8	Tape and Reel
Blank	Industrial (-40°C to +85°C)
G	Green
Q	Quarter Size Outline Package (PCG16)
S1	Small Outline IC (DCG14)
3126	High Speed CMOS Quadruple Bus Switch with Individual Active High Enables

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.

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES ("RENESAS") PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers skilled in the art designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only for development of an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising out of your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Rev.1.0 Mar 2020)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Digital Bus Switch ICs *category:*

Click to view products by Renesas *manufacturer:*

Other Similar products are found below :

MT8986AE1 TC7MPB9307FT(EL) MT8985AE1 MT8986AP1 PI3CH800LE PI3C32X384BE ZL50023GAG2 MT8986AL1 MT8981DP1 PI3VT3245-ALE PI3CH800QE MT90823AB1 PI3VT3245-AQE PI3CH800QEX PI3C3384QE PI3C3305UEX PI3B3861QE PI3B3245QEX PI3B3245QE PI3CH1000LE PI3CH401LE PI3CH401LEX TC7WBL3305CFK(5L,F 74CB3Q3125DBQRE4 TC7WBL3305CFK,LF SN74CBT16245CDGGR PI5C3245QE 72V90823PQFG PI3B3861QEX PI3C3126QEX PI3C3245QE PI5C3384QE PI3CH281QE QS3VH16244PAG8 PI3CH400LE PI3B3245LEX PI3B3245LE PI3C3306LEX PI5C3245LEX PI5C3306LEX PI3B3126LE PI3B3125LEX 72V73273BBG 74CBTLV3862PGG QS3126QG QS32245QG QS3244QG QS3245SOG8 QS32X384Q1G QS3VH126QG