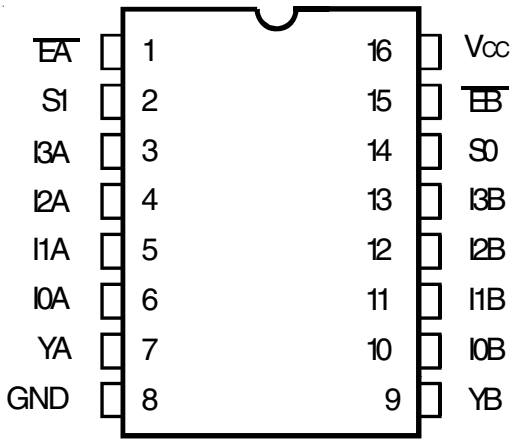
## PIN CONFIGURATION




QSOP
TOP VIEW

## 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 |
| — | Analog Input Voltage | –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 | 0.7 | 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 $V_{CC}$ .

## PIN DESCRIPTION

| Pin Names | I/O | Description |
|---|---|---|
| IxA | I/O | Demux Port A |
| IxB | I/O | Demux Port B |
| $\overline{EA}$, $\overline{EB}$ | I | Enable Inputs |
| $S_0$, $S_1$ | I | Select Inputs |
| YA, YB | I/O | Mux Port A, B |

## FUNCTION TABLE(1)

| Enable | | Select | | Mux/Demux Ports | | |
|---|---|---|---|---|---|---|
| $\overline{EA}$ | $\overline{EB}$ | $S_1$ | $S_0$ | YA | YB | Function |
| H | X | X | X | Z | X | Disable A |
| X | H | X | X | X | Z | Disable B |
| L | L | L | L | $1_0$A | $1_0$B | $S_1$ - 0 = 0 |
| L | L | L | H | $1_1$A | $1_1$B | $S_1$ - 0 = 1 |
| L | L | H | L | $1_2$A | $1_2$B | $S_1$ - 0 = 2 |
| L | L | H | H | $1_3$A | $1_3$B | $S_1$ - 0 = 3 |

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

# 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 |
|---|---|---|---|---|---|---|
| ***Analog Switch*** | | | | | | |
| $V_{IN}$ | Analog Signal Range(2) | | –0.5 | 1 | Vcc - 1 | V |
| $r_{DS(ON)}$ | Drain-source ON resistance(2,3) | Vcc = Min., $V_{IN}$ = 0V, $I_{ON}$ = 30mA | — | 5 | 7 | Ω |
| | | Vcc = Min., $V_{IN}$ = 2.4V, $I_{ON}$ = 15mA | — | 13 | 17 | |
| $I_{C(OFF)}$ | Channel Off Leakage Current | $I_N$ = Vcc or 0V; $Y_N$ = 0V or Vcc; $\overline{EA}$ = $\overline{EB}$ = Vcc | — | 2 | — | nA |
| $I_{C(ON)}$ | Channel On Leakage Current | $I_N$ = $Y_N$ = 0V (each channel is turned on sequentially) | — | 2 | — | nA |
| ***Digital Control*** | | | | | | |
| $V_{IH}$ | Input HIGH Voltage | Guaranteed Logic HIGH for Control Pins | 2 | — | — | V |
| $V_{IL}$ | Input LOW Voltage | Guaranteed Logic LOW for Control Pins | — | — | 0.8 | V |
| ***Dynamic Characteristics*** | | | | | | |
| $t_{TRANS}$ | Switching Time of Mux Sx to Y | $R_L$ = 1KΩ, $C_L$ = 100pF (See Transition Time) | 0.5 | — | 6.6 | ns |
| $t_{ON(\overline{EN})}$ | Enable Turn-On Time $\overline{EA}$ = $\overline{EB}$ to Y | $R_L$ = 1KΩ, $C_L$ = 100pF (See Switching Time) | 0.5 | — | 6 | ns |
| $t_{OFF(\overline{EN})}$ | Enable Turn-Off Time $\overline{EA}$ = $\overline{EB}$ to Y | $R_L$ = 1KΩ, $C_L$ = 100pF (See Switching Time) | 0.5 | — | 6 | ns |
| $t_{PD}$ | Group Delay(2,4) | $R_L$ = 1KΩ, $C_L$ = 100pF | — | — | 250 | ps |
| $f_{3dB}$ | -3dB Bandwidth | $V_{IN}$ = 1Vp-p, $R_L$ = 75Ω | — | 700 | — | MHz |
| | Off-isolation | $V_{IN}$ = 1Vp-p, $R_L$ = 75Ω, f = 5.5MHz | — | -60 | — | dB |
| $X_{TALK}$ | Crosstalk | $V_{IN}$ = 1Vp-p, $R_L$ = 75Ω, f = 5.5MHz | — | -68 | — | dB |
| $C_{MUX(OFF)}$ | Mux Off Capacitance | $\overline{EA}$ = $\overline{EB}$ = Vcc, $V_{IN}$ = $V_{OUT}$ = 0V | — | 5.6 | — | pF |
| $C_{DEMUX(OFF)}$ | Demux Off Capacitance | $\overline{EA}$ = $\overline{EB}$ = Vcc, $V_{IN}$ = $V_{OUT}$ = 0V | — | 7.4 | — | pF |
| $C_{MUX(ON)}$ | Mux On Capacitance | $\overline{EA}$ = $\overline{EB}$ = 0V, $V_{IN}$ = $V_{OUT}$ = 0V | — | 12 | — | pF |
| $C_{DEMUX(ON)}$ | Demux On Capacitance | $\overline{EA}$ = $\overline{EB}$ = 0V, $V_{IN}$ = $V_{OUT}$ = 0V | — | 15 | — | pF |
| $Q_{CI}$ | Charge Injection | | — | 1.5 | — | pC |

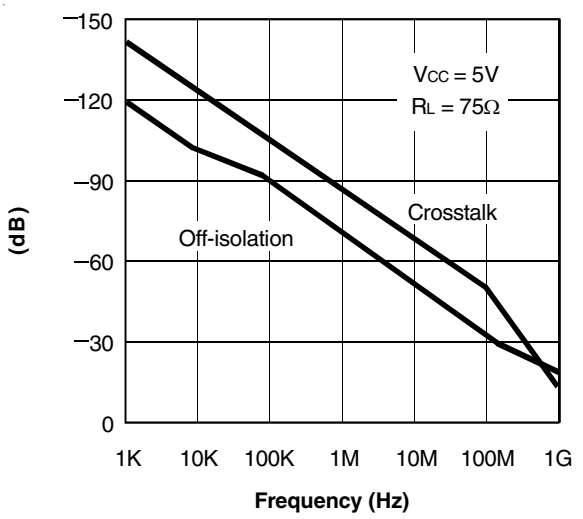
**NOTES:**

1. Typical values are at $V_{CC}$ = 5.0V, $T_A$ = 25°C.
2. Max value is guaranteed but not production tested.
3. Measured by voltage drop between A and C pins or B and D pins at indicated current through the switch. ON resistance is determined by the lower of the voltages on the two (I, Y) pins.
4. The bus switch contributes no group delay other than the RC delay of the ON resistance of the switch and load capacitance. Group 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.

# POWER SUPPLY CHARACTERISTICS

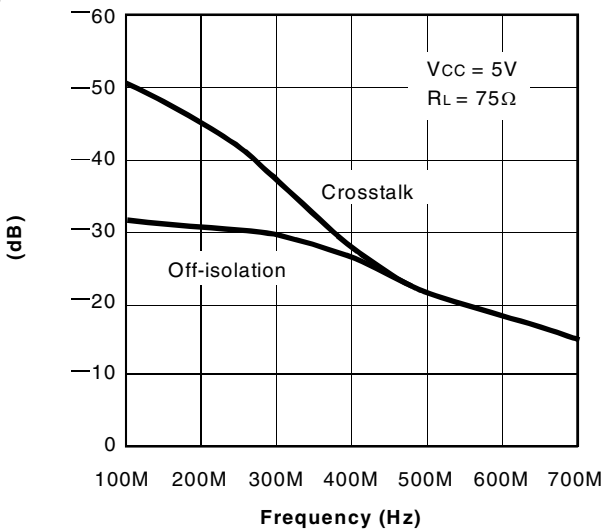
| Symbol | Parameter | Test Conditions | Max. | Unit |
|---|---|---|---|---|
| $I_{CCQ}$ | Quiescent Power | $V_{CC}$ = Max., $V_{IN}$ = GND or $V_{CC}$, f = 0 | 3 | µA |

# TYPICAL CHARACTERISTICS



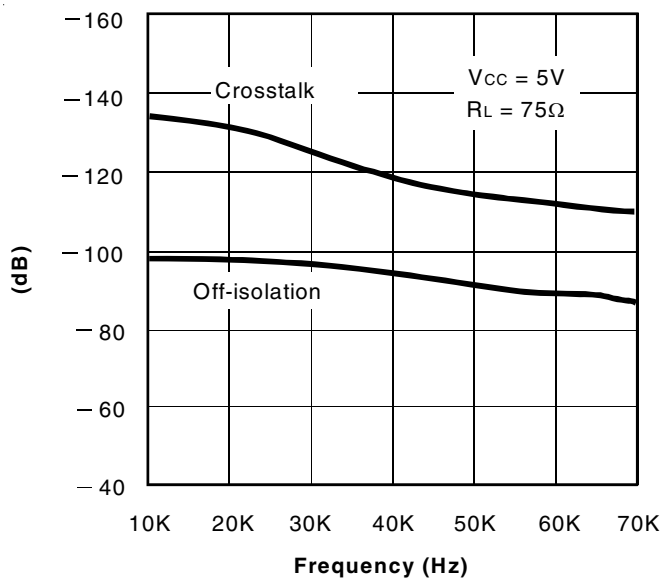

*Off-isolation and Crosstalk vs. Frequency*

**NOTES:**
1. Crosstalk = 20 log |Vo/Vs|
2. Off-isolation = 20 log |Vo/Vs|



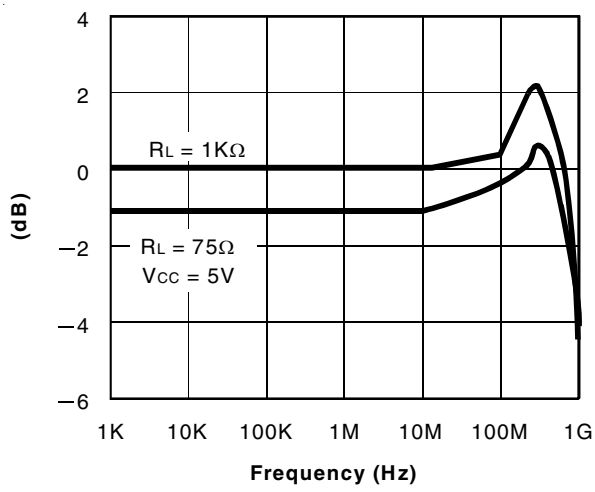

*Off-isolation and Crosstalk vs. Frequency*

**NOTES:**
1. Crosstalk = 20 log |Vo/Vs|
2. Off-isolation = 20 log |Vo/Vs|




*Off-isolation and Crosstalk vs. Frequency*

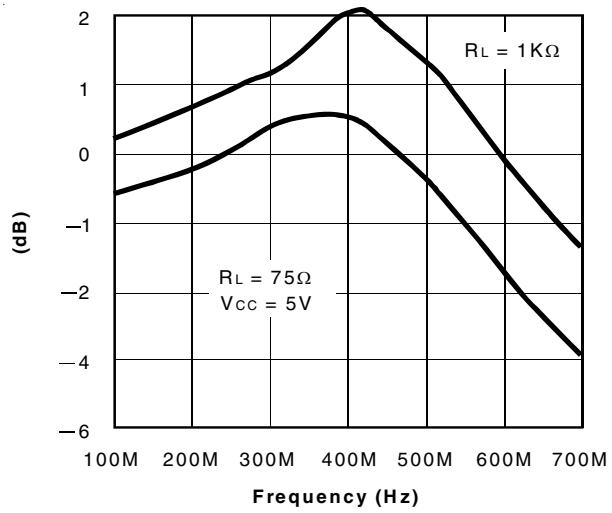
**NOTES:**
1. Crosstalk = 20 log |Vo/Vs|
2. Off-isolation = 20 log |Vo/Vs|



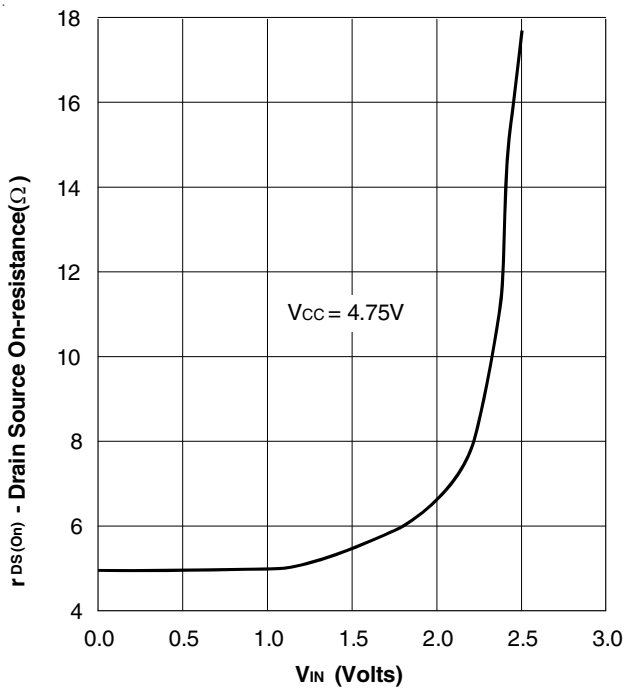

*Insertion Loss vs. Frequency*

**NOTE:**
1. Insertion Loss = 20 log |Vo/Vs|

## TYPICAL CHARACTERISTICS (CONTINUED)




*Insertion Loss vs. Frequency*

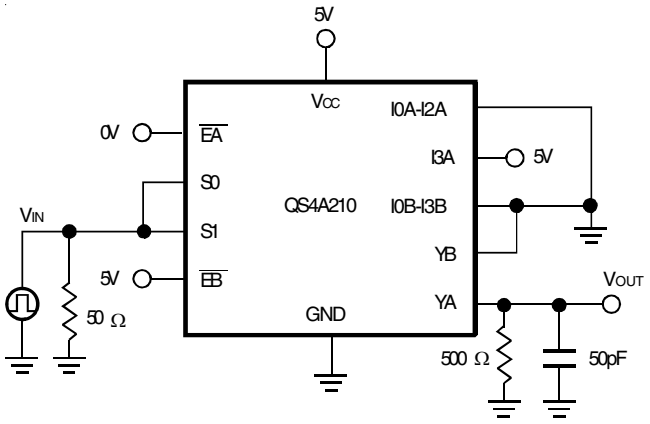


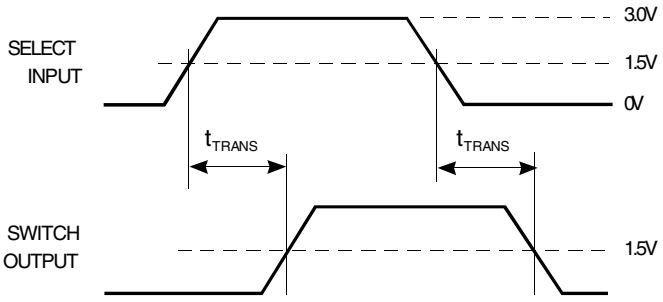

**NOTE:**
1. Insertion Loss = 20 log |Vo/Vs|

RON LINK

*On-Resistance vs. VIN*

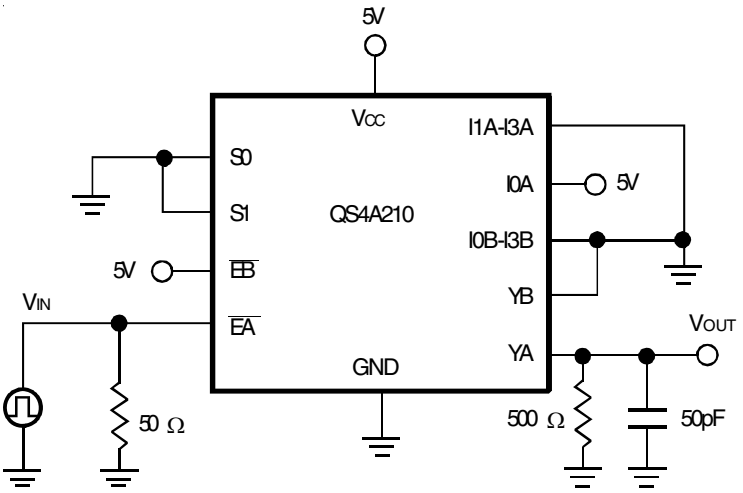
## TEST CIRCUITS

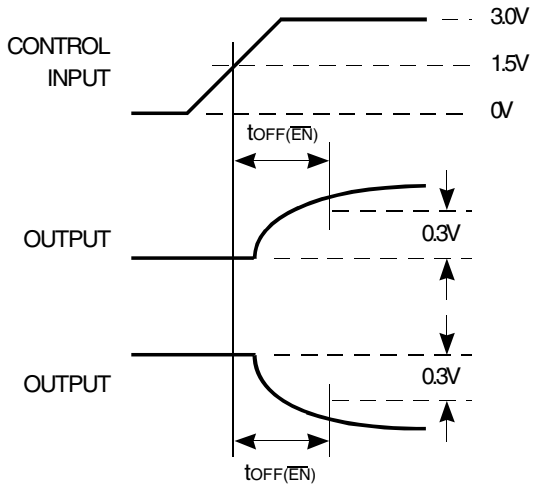


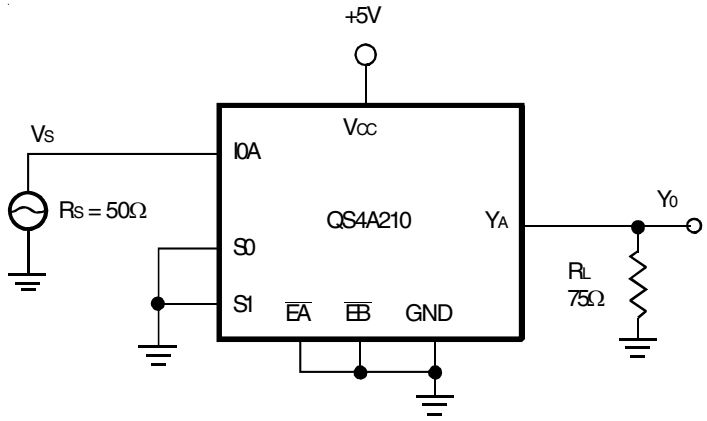

*Transition Time*

# TEST CIRCUITS (CONTINUED)



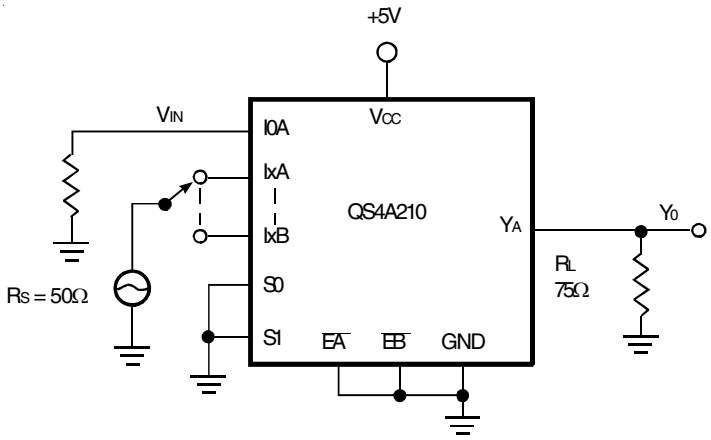




***Enable Switching Time***



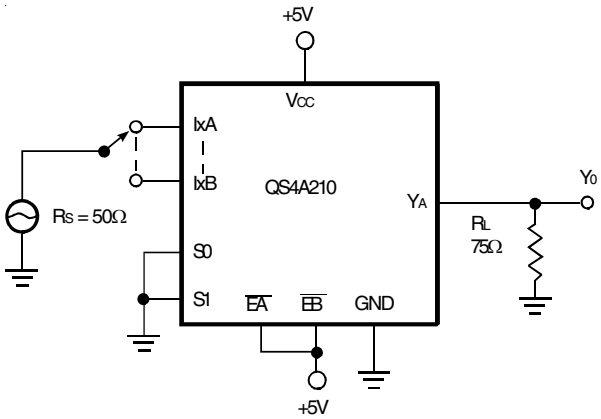

***Insertion Loss***

**NOTE:**
1. Insertion Loss = 20 log |Vo/Vs|




***Crosstalk***

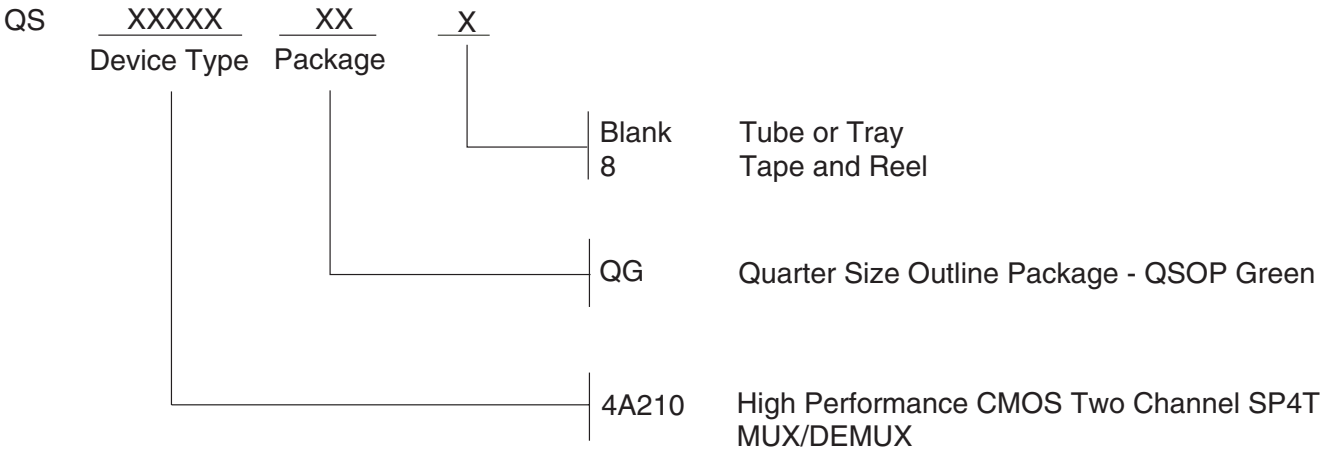
**NOTE:**
1. Crosstalk = 20 log |Vo/Vs|




***Off-Isolation***

**NOTE:**
1. Off-isolation = 20 log |Vo/Vs|

## ORDERING INFORMATION




## DATASHEET DOCUMENT HISTORY

| | | |
|---|---|---|
| 04/13/2014 | Pg. 7 | Updated the Ordering Information by removing non green package version, the "IDT" notation and Adding Tape and Reel information. |

## 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

### 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/


### Trademarks

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

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Renesas Electronics:

QS4A210QG QS4A210QG8