

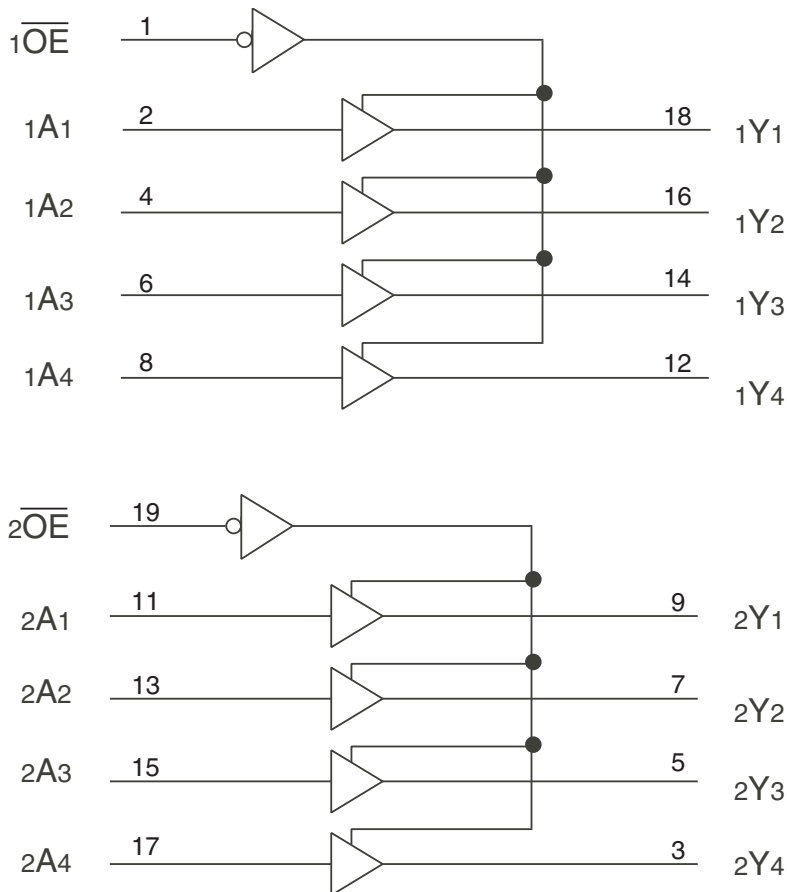
FEATURES:

- 0.5 MICRON CMOS Technology
- ESD > 2000V per MIL-STD-883, Method 3015; > 200V using machine model (C = 200pF, R = 0)
- $V_{CC} = 3.3V \pm 0.3V$, Normal Range
- $V_{CC} = 2.7V$ to $3.6V$, Extended Range
- CMOS power levels ($0.4\mu W$ typ. static)
- Rail-to-Rail output swing for increased noise margin
- Available in QSOP, SOIC, SSOP, and TSSOP packages

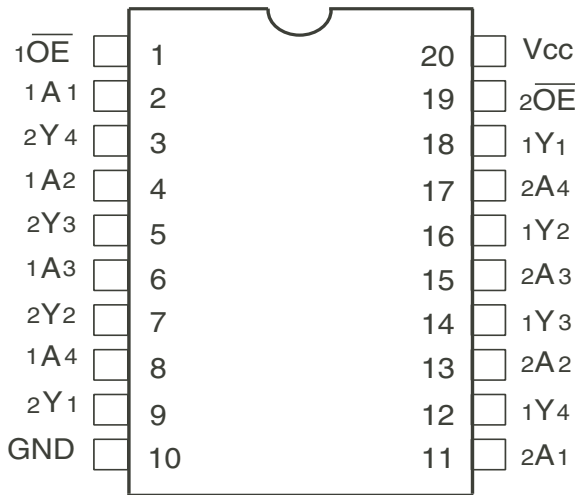
DESCRIPTION:

The FCT3244/A octal buffer/line drivers are built using advanced dual metal CMOS technology. These high-speed, low-power buffers are designed to be used as memory data and address drivers, clock drivers, and bus-oriented transmitter/receivers. The three-state controls are designed to operate these devices in a dual-nibble or single-byte mode. All inputs are designed with hysteresis for improved noise margin.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



TOP VIEW

Package Type	Package Code	Order Code
QSOP	PCG20	QG
SOIC	PSG20	SOG
TSSOP	PGG20	PGG
SSOP	PYG20	PYG

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Description	Max	Unit
VTERM ⁽²⁾	Terminal Voltage with Respect to GND	-0.5 to +4.6	V
VTERM ⁽³⁾	Terminal Voltage with Respect to GND	-0.5 to +7	V
VTERM ⁽⁴⁾	Terminal Voltage with Respect to GND	-0.5 to VCC+0.5	V
TSTG	Storage Temperature	-65 to +150	°C
IOUT	DC Output Current	-60 to +60	mA

NOTES:

- 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.
- VCC terminals.
- Input terminals.
- Outputs and I/O terminals.

CAPACITANCE (TA = +25°C, F = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Typ.	Max.	Unit
CIN	Input Capacitance	VIN = 0V	3.5	6	pF
COUT	Output Capacitance	VOUT = 0V	4	8	pF

NOTE:

- This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Pin Names	Description
xOE	3-State Output Enable Inputs (Active LOW)
xAx	Data Inputs
xYx	3-State Outputs

FUNCTION TABLE⁽¹⁾

Inputs		Outputs
xOE	xAx	xYx
L	L	L
L	H	H
H	X	Z

NOTE:

- H = HIGH Voltage Level
X = Don't Care
L = LOW Voltage Level
Z = High Impedance

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Industrial: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 2.7\text{V}$ to 3.6V

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit	
V _{IH}	Input HIGH Level (Input pins)	Guaranteed Logic HIGH Level		2	—	5.5	V	
	Input HIGH Level (I/O pins)			2	—	V _{CC} +0.5		
V _{IL}	Input LOW Level (Input and I/O pins)	Guaranteed Logic LOW Level		-0.5	—	0.8	V	
I _{IH}	Input HIGH Current (Input pins)	V _{CC} = Max.	V _I = 5.5V	—	—	±1	μA	
	Input HIGH Current (I/O pins)		V _I = V _{CC}	—	—	±1		
I _{IL}	Input LOW Current (Input pins)		V _I = GND	—	—	±1		
	Input LOW Current (I/O pins)		V _I = GND	—	—	±1		
I _{OZH}	High Impedance Output Current (3-State Output pins)	V _{CC} = Max.	V _O = V _{CC}	—	—	±1	μA	
			V _O = GND	—	—	±1		
V _{IK}	Clamp Diode Voltage	V _{CC} = Min., I _{IH} = -18mA		—	-0.7	-1.2	V	
I _{ODH}	Output HIGH Current	V _{CC} = 3.3V, V _{IN} = V _{IH} or V _{IL} , V _O = 1.5V ⁽³⁾		-36	-60	-110	mA	
I _{ODL}	Output LOW Current	V _{CC} = 3.3V, V _{IN} = V _{IH} or V _{IL} , V _O = 1.5V ⁽³⁾		50	90	200	mA	
V _{OH}	Output HIGH Voltage	V _{CC} = Min.	I _{OH} = -0.1mA	V _{CC} -0.2	—	—	V	
		V _{IN} = V _{IH} or V _{IL}	I _{OH} = -3mA	2.4	3	—		
			V _{CC} = 3V	I _{OH} = -8mA	2.4 ⁽⁵⁾	3		—
V _{OL}	Output LOW Voltage	V _{CC} = Min.	I _{OL} = 0.1mA	—	—	0.2	V	
			V _{IN} = V _{IH} or V _{IL}	I _{OL} = 16mA	—	0.2		0.4
				I _{OL} = 24mA	—	0.3		0.55
		V _{CC} = 3V	I _{OL} = 24mA	—	0.3	0.5		
I _{OS}	Short Circuit Current ⁽⁴⁾	V _{CC} = Max., V _O = GND ⁽³⁾		-60	-135	-240	mA	
V _H	Input Hysteresis	—		—	150	—	mV	
I _{CC1} I _{CC2} I _{CC3}	Quiescent Power Supply Current	V _{CC} = Max., V _{IN} = GND or V _{CC}		—	0.1	10	μA	

NOTES:

1. For conditions shown as Min. or Max., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 3.3V, +25°C ambient and maximum loading.
3. Not more than one output should be tested at one time. Duration of the test should not exceed one second.
4. This parameter is guaranteed but not tested.
5. V_{OH} = V_{CC} - 0.6V at rated current.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
I _{CC}	Quiescent Power Supply Current	V _{CC} = Max.	V _{IN} = V _{CC} - 0.6V	—	2	30	μA
I _{CCD}	Dynamic Power Supply Current ⁽⁴⁾	V _{CC} = Max. Outputs Open x \overline{OE} = GND One Input Toggling 50% Duty Cycle	V _{IN} = V _{CC} V _{IN} = GND	—	60	85	μA/ MHz
I _C	Total Power Supply Current ⁽⁶⁾	V _{CC} = Max. Outputs Open f _i = 10MHz 50% Duty Cycle x \overline{OE} = GND One Bit Toggling	V _{IN} = V _{CC} V _{IN} = GND	—	0.6	0.9	mA
			V _{IN} = V _{CC} - 0.6V V _{IN} = GND	—	0.6	0.9	
		V _{CC} = Max. Outputs Open f _i = 2.5MHz 50% Duty Cycle x \overline{OE} = GND Eight Bits Toggling	V _{IN} = V _{CC} V _{IN} = GND	—	1.2	1.7 ⁽⁵⁾	
			V _{IN} = V _{CC} - 0.6V V _{IN} = GND	—	1.2	1.8 ⁽⁵⁾	

NOTES:

1. For conditions shown as Min. or Max., use appropriate value specified under Electrical Characteristics for the applicable device type.

2. Typical values are at V_{CC} = 3.3V, +25°C ambient.

3. Per TTL driven input. All other inputs at V_{CC} or GND.

4. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.

5. Values for these conditions are examples of ΔI_{CC} formula. These limits are guaranteed but not tested.

6. I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}

I_C = I_{CC} + ΔI_{CC} D_HN_T + I_{CCD} (f_{CP}N_{CP}/2 + f_iN_i)

I_{CC} = Quiescent Current (I_{CC}, I_{CCH}, and I_{CCZ})

ΔI_{CC} = Power Supply Current for a TTL High Input

D_H = Duty Cycle for TTL Inputs High

N_T = Number of TTL Inputs at D_H

I_{CCD} = Dynamic Current caused by an Input Transition Pair (HLH or LHL)

f_{CP} = Clock Frequency for register devices (zero for non-register devices)

N_{CP} = Number of clock inputs at f_{CP}

f_i = Input Frequency

N_i = Number of Inputs at f_i

SWITCHING CHARACTERISTICS OVER OPERATING RANGE⁽¹⁾

Symbol	Parameter	Condition ⁽²⁾	74FCT3244		74FCT3244A		Unit
			Min. ⁽³⁾	Max.	Min. ⁽³⁾	Max.	
t _{PLH}	Propagation Delay	C _L = 50pF R _L = 500Ω	1.5	6.5	1.5	4.8	ns
t _{PHL}	xAx to xYx						
t _{PZH}	Output Enable Time		1.5	8	1.5	6.2	
t _{PZL}							
t _{PHZ}	Output Disable Time	1.5	7	1.5	5.6	ns	
t _{PLZ}							

NOTES:

1. Propagation Delays and Enable/Disable times are with V_{CC} = 3.3V ±0.3V, Normal Range. For V_{CC} = 2.7V to 3.6V, Extended Range, all Propagation Delays and Enable/Disable times should be degraded by 20%.

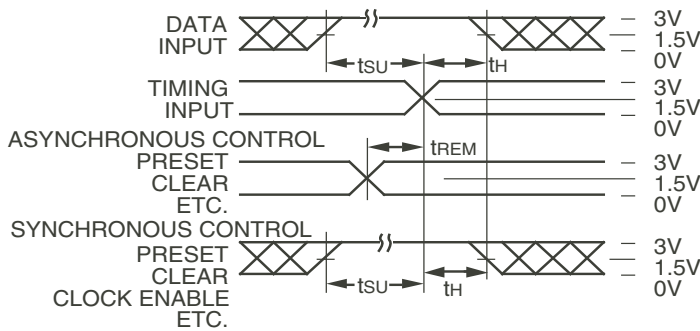
2. See test circuit and waveforms.

3. Minimum limits are guaranteed but not tested on Propagation Delays.

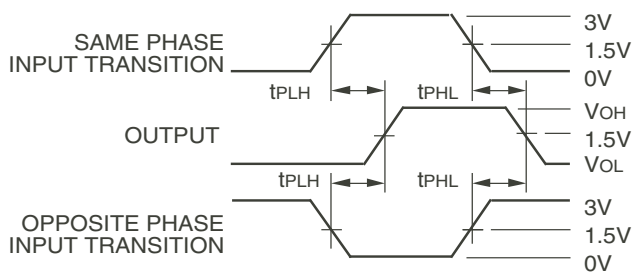
TEST CIRCUITS AND WAVEFORMS



Test Circuits for All Outputs



Set-Up, Hold, and Release Times



Propagation Delay

SWITCH POSITION

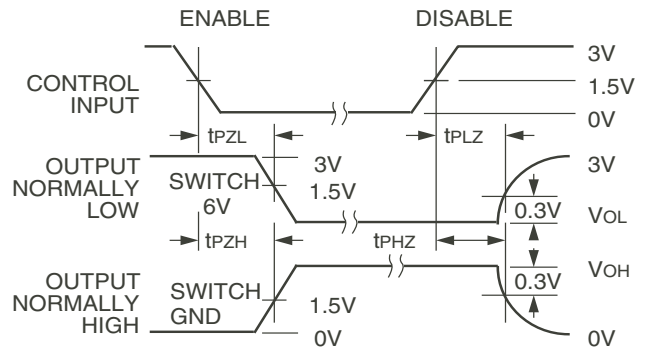
Test	Switch
Open Drain Disable Low Enable Low	6V
Disable High Enable High	GND
All Other Tests	Open

DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.
RT = Termination resistance: should be equal to ZOUT of the Pulse Generator.



Pulse Width

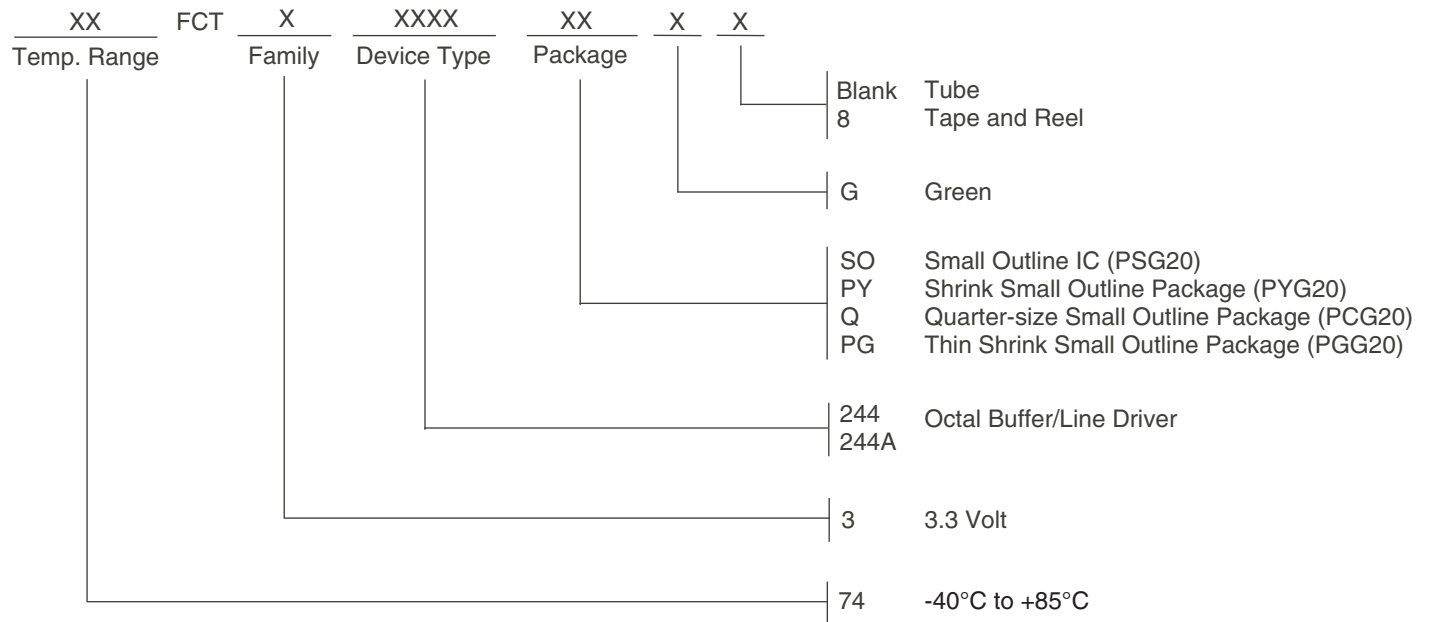


Enable and Disable Times

NOTES:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
2. Pulse Generator for All Pulses: Rate $\leq 1.0\text{MHz}$; $Z_o \leq 50\Omega$; $t_r \leq 2.5\text{ns}$; $t_f \leq 2.5\text{ns}$.
3. If Vcc is below 3V, input voltage swings should be adjusted not to exceed Vcc.

ORDERING INFORMATION



Orderable Part Information

Speed (ns)	Orderable Part ID	Pkg. Code	Pkg. Type	Temp. Grade
A	74FCT3244APGG	PGG20	TSSOP	I
	74FCT3244APGG8	PGG20	TSSOP	I
	74FCT3244APYG	PYG20	SSOP	I
	74FCT3244APYG8	PYG20	SSOP	I
	74FCT3244AQG	PCG20	QSOP	I
	74FCT3244AQG8	PCG20	QSOP	I
	74FCT3244ASOG	PSG20	SOIC	I
	74FCT3244ASOG8	PSG20	SOIC	I

Speed (ns)	Orderable Part ID	Pkg. Code	Pkg. Type	Temp. Grade
	74FCT3244PGG	PGG20	TSSOP	I
	74FCT3244PGG8	PGG20	TSSOP	I
	74FCT3244PYG	PYG20	SSOP	I
	74FCT3244PYG8	PYG20	SSOP	I
	74FCT3244QG	PCG20	QSOP	I
	74FCT3244QG8	PCG20	QSOP	I
	74FCT3244SOG	PSG20	SOIC	I
	74FCT3244SOG8	PSG20	SOIC	I

Datasheet Document History

09/30/2009	Pg. 6	Updated the ordering information by removing the "IDT" notation and non RoHS part.
08/31/2011	Pg. 6	Added PGG to ordering information.
07/31/2017	Pg. 2, 6	Added table under pin configuration diagram with detailed package information. Updated the ordering information diagram adding Tube, Tape and Reel. Added new table of orderable part information.
05/23/2018	Pg. 6	Updated new table of orderable part information.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.
 - "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.
 - "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

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.