FEATURES:

- Std., A, and C grades
- Low input and output leakage ≤1µA (max.)
- CMOS power levels
- True TTL input and output compatibility:
  - V_{OH} = 3.3V (typ.)
  - V_{OL} = 0.3V (typ.)
- High Drive outputs (-15mA I_{OH}, 64mA I_{OL})
- Meets or exceeds JEDEC standard 18 specifications
- Military product compliant to MIL-STD-883, Class B and DESC listed (dual marked)
- Power off disable outputs permit "live insertion"
- Available in the following packages:
  - Industrial: SOIC, SSOP, QSOP, TSSOP
 - Military: CERDIP, LCC

DESCRIPTION:

The IDT octal buffer/line driver is built using an advanced dual metal CMOS technology. The FCT244T is designed to be employed as a memory and address driver, clock driver, and bus-oriented transmitter/ receiver which provides improved board density.

FUNCTIONAL BLOCK DIAGRAM
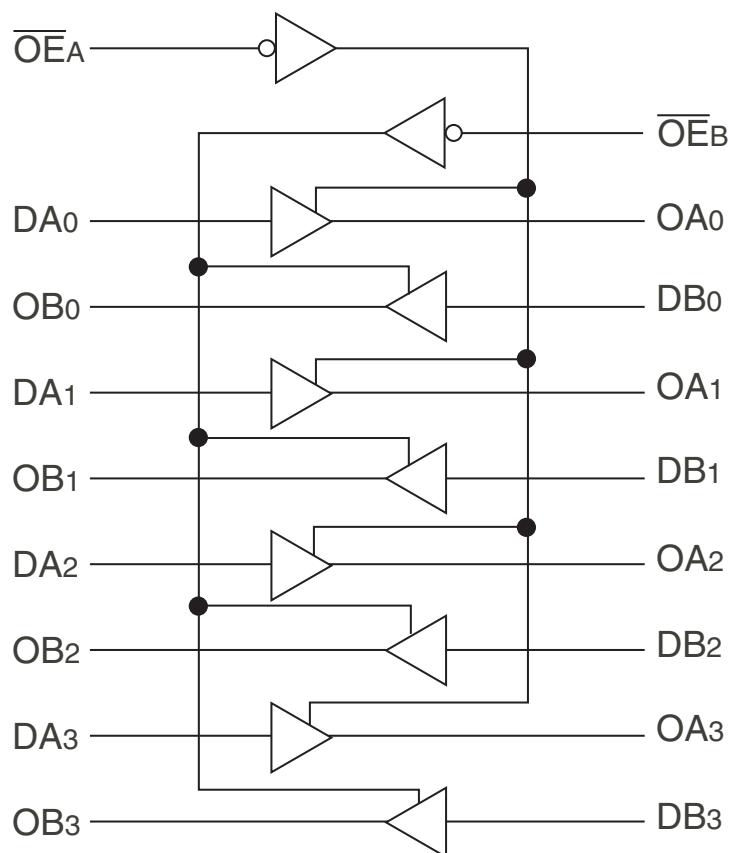
MILITARY AND INDUSTRIAL TEMPERATURE RANGES

DECEMBER 2016

DSC-5586/5

PIN CONFIGURATION

$\overline{OE}_A$ — 1	20 — VCC
DA0 — 2	19 — $\overline{OE}_B$
OB0 — 3	18 — OA0
DA1 — 4	17 — DB0
OB1 — 5	16 — OA1
DA2 — 6	15 — DB1
OB2 — 7	14 — OA2
DA3 — 8	13 — DB2
OB3 — 9	12 — OA3
GND — 10	11 — DB3
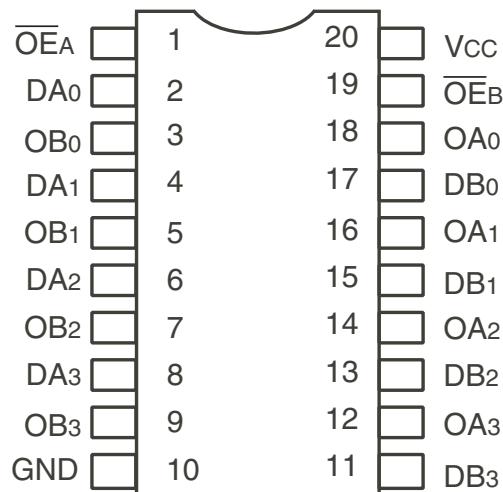
CERDIP/ SOIC/ SSOP/ QSOP/ TSSOP
TOP VIEW

INDEX

Top pins: OB0, DA0, $\overline{OE}_A$, VCC, $\overline{OE}_B$ (3, 2, 1, 20, 19)

Left		Right	
DA1	4	18	OA0
OB1	5	17	DB0
DA2	6	16	OA1
OB2	7	15	DB1
DA3	8	14	OA2

Bottom pins: 9, 10, 11, 12, 13 — OB3, GND, DB3, OA3, DB2
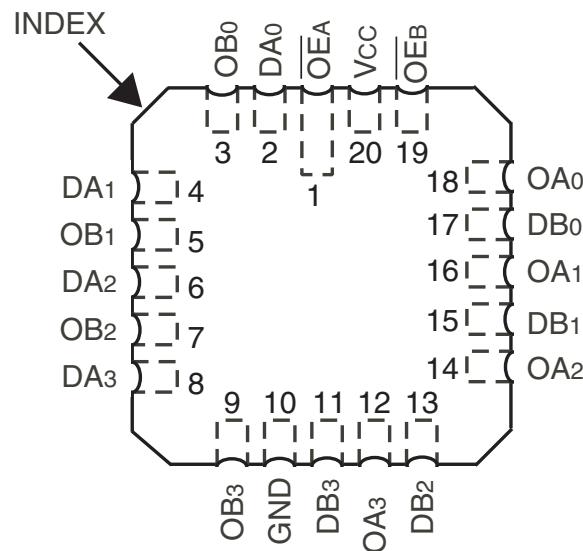
LCC
TOP VIEW

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Description	Max	Unit
VTERM[2]	Terminal Voltage with Respect to GND	–0.5 to +7	V
VTERM[3]	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 +120	mA

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. No terminal voltage may exceed Vcc by +0.5V unless otherwise noted.
2. Inputs and Vcc terminals only.
3. Output and I/O terminals only.

CAPACITANCE (TA = +25°C, F = 1.0MHz)

Symbol	Parameter[1]	Conditions	Typ.	Max.	Unit
CIN	Input Capacitance	VIN = 0V	6	10	pF
COUT	Output Capacitance	VOUT = 0V	8	12	pF

NOTE:
1. This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Pin Names	Description
$\overline{OE}_A$, $\overline{OE}_B$	3-State Output Enable Inputs (Active LOW)
Dxx	Inputs
Oxx	Outputs

FUNCTION TABLE[1]

Inputs			Outputs
$\overline{OE}_A$	$\overline{OE}_B$	D	
L	L	L	L
L	L	H	H
H	H	X	Z

NOTE:
1. 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°C to +85°C, V_{CC} = 5.0V ±5%; Military: T_A = –55°C to +125°C, V_{CC} = 5.0V ±10%

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
V_{IH}	Input HIGH Level	Guaranteed Logic HIGH Level		2	—	—	V
V_{IL}	Input LOW Level	Guaranteed Logic LOW Level		—	—	0.8	V
I_{IH}	Input HIGH Current[4]	V_{CC} = Max.	V_I = 2.7V	—	—	±1	µA
I_{IL}	Input LOW Current[4]	V_{CC} = Max.	V_I = 0.5V	—	—	±1	µA
I_{OZH}	High Impedance Output Current	V_{CC} = Max	V_O = 2.7V	—	—	±1	µA
I_{OZL}	(3-State output pins)[4]		V_O = 0.5V	—	—	±1	
I_I	Input HIGH Current[4]	V_{CC} = Max., V_I = V_{CC} (Max.)		—	—	±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min, I_{IN} = -18mA		—	–0.7	–1.2	V
V_H	Input Hysteresis	—		—	200	—	mV
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}		—	0.01	1	mA

OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC} = Min V_{IN} = V_{IH} or V_{IL}	I_{OH} = –6mA MIL I_{OH} = –8mA IND	2.4	3.3	—	V
			I_{OH} = –12mA MIL I_{OH} = –15mA IND	2	3	—	
V_{OL}	Output LOW Voltage	V_{CC} = Min V_{IN} = V_{IH} or V_{IL}	I_{OL} = 48mA MIL I_{OL} = 64mA IND	—	0.3	0.55	V
I_{OS}	Short Circuit Current	V_{CC} = Max., V_O = GND[3]		–60	–120	–225	mA

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} = 5.0V, +25°C ambient.
3. Not more than one output should be tested at one time. Duration of the test should not exceed one second.
4. The test limit for this parameter is ±5µA at T_A = –55°C.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	V_{CC} = Max. V_{IN} = 3.4V[3]		—	0.5	2	mA
I_{CCD}	Dynamic Power Supply Current[4]	V_{CC} = Max. Outputs Open $\overline{OE}_A = \overline{OE}_B$ = GND One Input Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ V_{IN} = GND	—	0.15	0.25	mA/ MHz
I_C	Total Power Supply Current[6]	V_{CC} = Max. Outputs Open f_i = 10MHz	$V_{IN} = V_{CC}$ V_{IN} = GND	—	1.5	3.5	mA
		50% Duty Cycle $\overline{OE}_A = \overline{OE}_B$ = GND One Bit Toggling	V_{IN} = 3.4V V_{IN} = GND	—	1.8	4.5	
		V_{CC} = Max. Outputs Open f_i = 2.5MHz	$V_{IN} = V_{CC}$ V_{IN} = GND	—	3	6[5]	
		50% Duty Cycle $\overline{OE}_A = \overline{OE}_B$ = GND Eight Bits Toggling	V_{IN} = 3.4V V_{IN} = GND	—	5	14[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} = 5.0V, +25°C ambient.
3. Per TTL driven input; (V_{IN} = 3.4V). 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. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$
   I_{CC} = Quiescent Current
   ΔI_{CC} = Power Supply Current for a TTL High Input (V_{IN} = 3.4V)
   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)
   f_i = Output Frequency
   N_i = Number of Outputs at f_i
All currents are in milliamps and all frequencies are in megahertz.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Symbol	Parameter	Condition[1]	54FCT244T Mil. Min.[2]	54FCT244T Mil. Max.	54/74FCT244AT Ind. Min.[2]	54/74FCT244AT Ind. Max.	54/74FCT244AT Mil. Min.[2]	54/74FCT244AT Mil. Max.	54/74FCT244CT Ind. Min.[2]	54/74FCT244CT Ind. Max.	54/74FCT244CT Mil. Min.[2]	54/74FCT244CT Mil. Max.	Unit
t_{PLH} t_{PHL}	Propagation Delay Dx to Ox	C_L = 50pF R_L = 500Ω	1.5	7	1.5	4.8	1.5	5.1	1.5	4.1	1.5	4.6	ns
t_{PZH} t_{PZL}	Output Enable Time		1.5	8.5	1.5	6.2	1.5	6.5	1.5	5.8	1.5	6.5	ns
t_{PHZ} t_{PLZ}	Output Disable Time		1.5	7.5	1.5	5.6	1.5	5.9	1.5	5.2	1.5	5.7	ns

NOTES:
1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.

TEST CIRCUITS AND WAVEFORMS
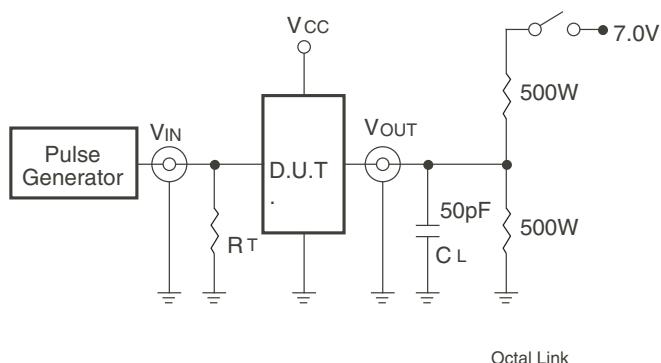
Test Circuits for All Outputs
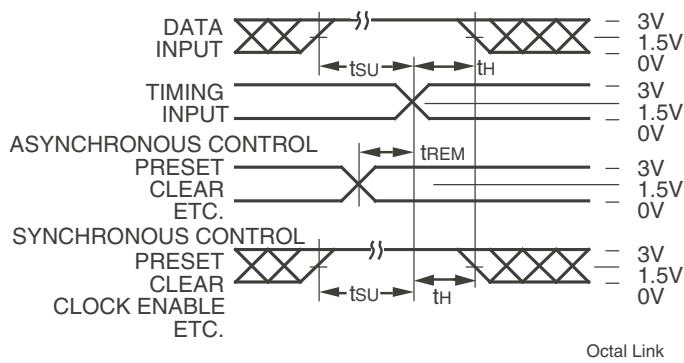
Set-Up, Hold, and Release Times
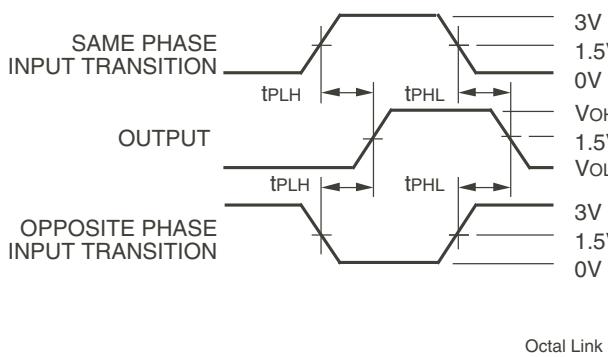
Propagation Delay

SWITCH POSITION

Test	Switch
Open Drain Disable Low Enable Low	Closed
All Other Tests	Open

DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.

R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.
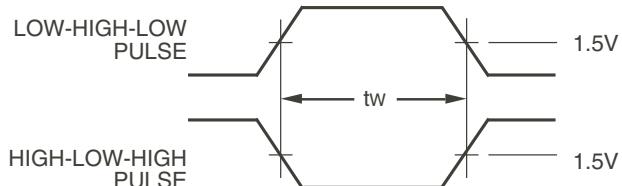
Pulse Width
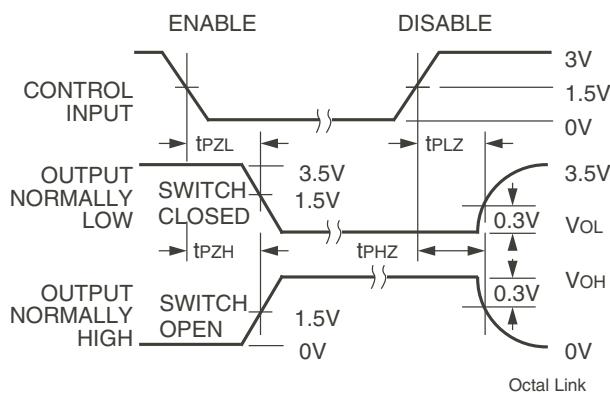
*Enable and Disable Times*

NOTES:
1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.

ORDERING INFORMATION

<u>XX</u>	FCT	<u>XXXX</u>	<u>XX</u>	<u>X</u>	X	X
Temp. Range		Device Type	Package	Process		

Blank	Tube
8	Tape and Reel

G	Green

Blank	Industrial
B	MIL-STD-883, Class B

<u>Industrial Options</u>
SO	Small Outline IC (PSG20)
PY	Shrink Small Outline Package (PYG20)
Q	Quarter-size Small Outline Package (PCG20)
PG	Thin Shrink Small Outline Package (PGG20)

<u>Military Options</u>
D	CERDIP (CD20)
L	Leadless Chip Carrier (LC20)

244T	Fast CMOS Octal Buffer/Line Driver
244AT	
244CT	

54	−55°C to +125°C
74	−40°C to +85°C

Datasheet Document History

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 who are 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 to develop 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 from 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.

(Disclaimer Rev.1.01)

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-us/.