3.3V CMOS OCTAL IDT74FCT3245/A

BIDIRECTIONAL TRANSCEIVER

FFATURFS:

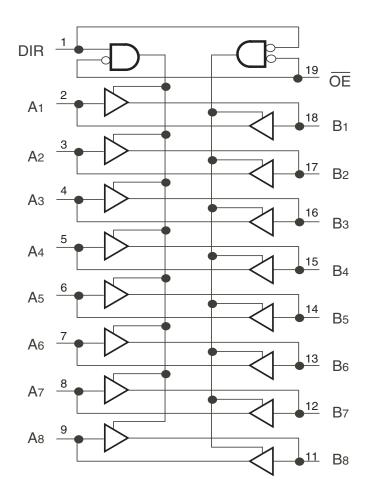
- 0.5 MICRON CMOS Technology
- ESD > 2000V per MIL-STD-883, Method 3015; > 200V using machine model (C = 200pF, R = 0)
- Vcc = 3.3V ±0.3V, Normal Range
- Vcc = 2.7V to 3.6V, Extended Range
- CMOS power levels (0.4µW typ. static)
- · Rail-to-Rail output swing for increased noise margin
- · Available in QSOP and TSSOP packages

DESCRIPTION:

The FCT3245/A octal transceivers are built using advanced dual metal CMOS technology. These high-speed, low-power transceivers are ideal for asynchronous communication between two buses (A and B). The direction control pin (DIR) controls the direction of data flow. The output enable pin (\overline{OE}) overrides the direction control and disables both ports. All inputs are designed with hysteresis for improved noise margin.

The FCT3245/A has series current limiting resistors. These offer low ground bounce, minimal undershoot, and controlled output fall times-reducing the need for external series terminating resistors.

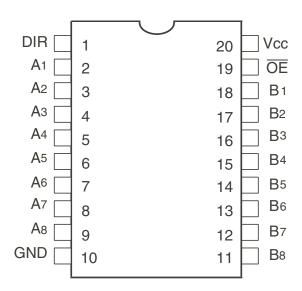
FUNCTIONAL BLOCK DIAGRAM



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MAY 2018

PIN CONFIGURATION



QSOP/TSSOP TOP VIEW

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
lout	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.
- 2. Vcc terminals.
- 3. Input terminals.
- 4. Outputs and I/O terminals.

CAPACITANCE (TA = +25°C, F = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Тур.	Max.	Unit
CIN	Input Capacitance	VIN = 0V	3.5	6	pF
Соит	Output Capacitance	Vout = 0V	4	8	pF

NOTE:

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

PIN DESCRIPTION

Pin Names	Description
ŌĒ	3-State Output Enable Inputs (Active LOW)
DIR	Direction Control Output
Ax	Side A Inputs or 3-State Outputs
Вх	Side B Inputs or 3-State Outputs

FUNCTION TABLE(1)

Inp	outs	
ŌĒ	DIR	Outputs
L	L	Bus B Data to Bus A
L H		Bus A Data to Bus B
Н	Х	High Z State

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, $V_{CC} = 2.7V$ to 3.6V

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
VIH	Input HIGH Level (Input pins)	Guaranteed Logic HIGH Level		2		5.5	V
	Input HIGH Level (I/O pins)	1		2	_	Vcc+0.5	
VIL	Input LOW Level	Guaranteed Logic LOW Level		-0.5	_	0.8	V
	(Input and I/O pins)						
lін	Input HIGH Current (Input pins)	Vcc = Max.	VI = 5.5V		_	±1	μΑ
	Input HIGH Current (I/O pins)	1	VI = VCC	_	_	±1	
lıL	Input LOW Current (Input pins)	1	VI = GND	_	-	±1	
	Input LOW Current (I/O pins)	1	VI = GND	_	-	±1	
lozh	High Impedance Output Current	Vcc = Max.	Vo = Vcc	_	_	±1	μΑ
lozL	(3-State Output pins)		Vo = GND		_	±1	
Vik	Clamp Diode Voltage	VCC = Min., IIN = -18mA		_	-0.7	-1.2	V
lodh	Output HIGH Current	$VCC = 3.3V$, $VIN = VIH or VIL$, $VO = 1.5V^{(3)}$		-36	-60	-110	mA
lodl	Output LOW Current	VCC = 3.3V, VIN = VIH or VIL, VO =	= 1.5V ⁽³⁾	50	90	200	mA
Vон	Output HIGH Voltage	Vcc = Min.	IOH = -0.1mA	Vcc-0.2	_	_	V
		VIN = VIH or VIL	IOH = -3mA	2.4	3	_	
		Vcc = 3V	Іон = –8mА	2.4 ⁽⁵⁾	3	_	
		VIN = VIH or VIL					
Vol	Output LOW Voltage	Vcc = Min.	IOL = 0.1mA	_	_	0.2	V
		VIN = VIH or VIL	IOL = 16mA	_	0.2	0.4	
			IOL = 24mA	_	0.3	0.55	
		Vcc = 3V	IOL = 24mA		0.3	0.5	
		VIN = VIH or VIL					
los	Short Circuit Current ⁽⁴⁾	Vcc = Max., Vo = GND ⁽³⁾		-60	-135	-240	mA
VH	Input Hysteresis	_		_	150	_	mV
ICCL ICCH ICCZ	Quiescent Power Supply Current	Vcc = Max., Vin = GND or Vcc		_	0.1	10	μΑ

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 Vcc = 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. VoH = Vcc 0.6V at rated current.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
Icc	Quiescent Power Supply Current	Vcc = Max.	VIN = VCC - 0.6V	_	2	30	μΑ
ICCD	Dynamic Power Supply Current ⁽⁴⁾	Vcc = Max. Outputs Open OE = DIR = GND	VIN = VCC VIN = GND		60	85	μΑ/ MHz
		One Input Toggling 50% Duty Cycle					
Ic	Total Power Supply Current ⁽⁶⁾	Vcc = Max. Outputs Open fi = 10MHz	VIN = VCC VIN = GND		0.6	0.9	mA
		50% Duty Cycle OE = DIR = GND	VIN = VCC - 0.6V VIN = GND		0.6	0.9	
		One Bit Toggling					
		Vcc = Max. Outputs Open fi = 2.5MHz	VIN = VCC VIN = GND	1	1.2	1.7 ⁽⁵⁾	
		50% Duty Cycle OE = DIR = GND Eight Bits Toggling	VIN = VCC - 0.6V VIN = 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 Vcc = 3.3V, +25°C ambient.
- 3. Per TTL driven input. All other inputs at Vcc 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 Δ Icc formula. These limits are guaranteed but not tested.
- 6. IC = IQUIESCENT + INPUTS + IDYNAMIC
 - $IC = ICC + \Delta ICC DHNT + ICCD (fcpNcp/2 + fiNi)$
 - Icc = Quiescent Current (Icc, IccH, and Iccz)
 - Δlcc = Power Supply Current for a TTL High Input
 - DH = Duty Cycle for TTL Inputs High
 - NT = Number of TTL Inputs at DH
 - ICCD = Dynamic Current caused by an Input Transition Pair (HLH or LHL)
 - fcp = Clock Frequency for register devices (zero for non-register devices)
 - NCP = Number of clock inputs at fCP
 - fi = Input Frequency
 - Ni = Number of Inputs at fi

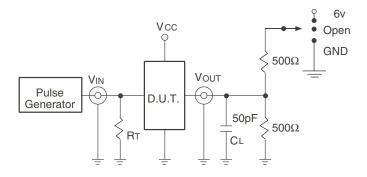
SWITCHING CHARACTERISTICS OVER OPERATING RANGE⁽¹⁾

			74FC	T3245	74FCT	3245A	
Symbol	Parameter	Condition ⁽²⁾	Min. ⁽³⁾	Max.	Min. ⁽³⁾	Max.	Unit
tplh	Propagation Delay	CL = 50pF	1.5	7	1.5	4.6	ns
tphl	A to B, B to A	$RL = 500\Omega$					
tpzh	Output Enable Time		1.5	9.5	1.5	6.2	ns
tpzL	OE to A or B						
tphz	Output Disable Time		1.5	7.5	1.5	5	ns
tPLZ	OE to A or B						
tpzh	Output Enable Time		1.5	9.5	1.5	6.2	ns
tpzL	DIR to A or B ⁽⁴⁾						
tphz	Output Disable Time		1.5	7.5	1.5	5	ns
tPLZ	DIR to A or B ⁽⁴⁾						

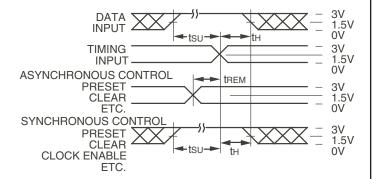
NOTES

- 1. Propagation Delays and Enable/Disable times are with Vcc = 3.3V ±0.3V, Normal Range. For Vcc = 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.
- 4. This parameter is guaranteed but not tested.

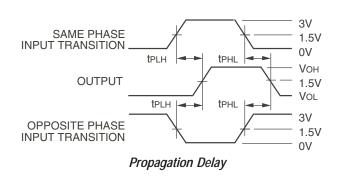
TEST CIRCUITS AND WAVEFORMS



Test Circuits for All Outputs



Set-Up, Hold, and Release Times



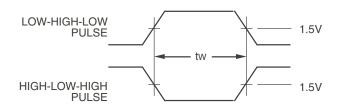
SWITCH POSITION

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

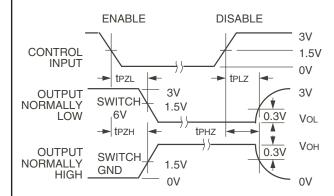
DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.

RT = Termination resistance: should be equal to ZouT of the Pulse Generator.



Pulse Width

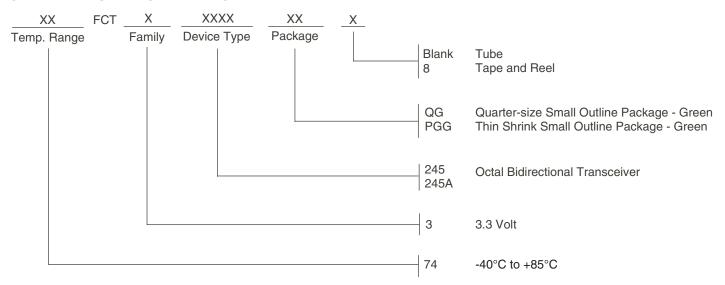


Enable and Disable Times

NOTES:

- 1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.
- 2. Pulse Generator for All Pulses: Rate \leq 1.0MHz; Zo \leq 50 Ω ; tr \leq 2.5ns; tr \leq 2.5ns.
- 3. If Vcc is below 3V, input voltage swings should be adjusted not to exceed Vcc.

ORDERING INFORMATION



Datasheet Document History

10/03/2009 Pg. 6 Updated the ordering information by removing the "IDT" notation and non RoHS part.

05/10/2018 Pg. 6 Updated the ordering information by adding Tape and Reel.

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