Integrated Circuit Systems, Inc.

ICS8343I
LOW SKEW 1-TO-16 FANOUT BUFFER

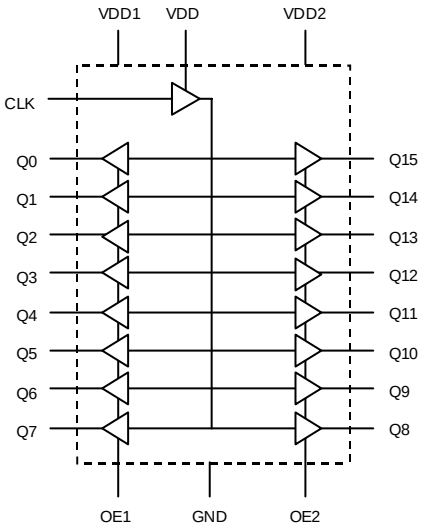
GENERAL DESCRIPTION

The ICS8343I is a low skew, 1-to-16 Fanout Buffer and a member of the HiPerClockS™ family of High Performance Clock Solutions from ICS. The ICS8343I is at 5.0V, 3.3V, 2.5V and mixed 3.3V input and 2.5V supply modes over the commercial temperature range. Guaranteed output and part-to-part skew characteristics make the ICS8343I ideal for those clock distribution applications demanding well defined performance and repeatability.

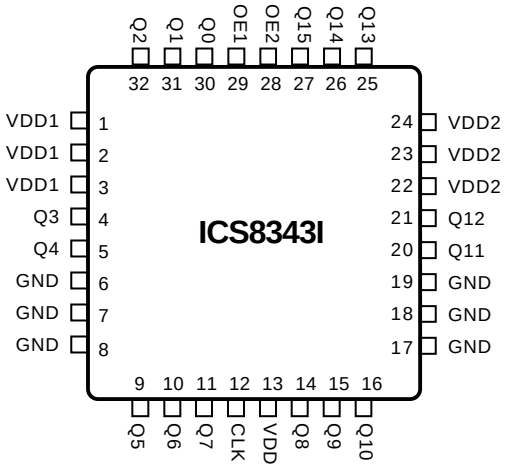
FEATURES

- 16 LVCMOS outputs
- Output frequency up to 200MHz
- 250ps output skew
- 700ps part to part
- CMOS compatible clock input at 5V, LVTTL and LVCMOS compatible at 3.3V and 2.5V
- LVTTL output enable inputs
- Dual output enable inputs facilitates 1-to-16 or 1-to-8 input to output modes
- 5.0V, 3.3V, 2.5V or mixed 3.3V, 2.5V from -40°C to 85°C ambient operating temperature
- 32 lead low-profile QFP(LQFP), 7mm x 7mm x 1.4mm package body, 0.8mm package lead pitch

BLOCK DIAGRAM



PIN ASSIGNMENT



32-Lead LQFP
Y package
Top View

TABLE 1. PIN DESCRIPTIONS

Number	Name	Type		Description
1, 2, 3	VDD1	Power		Output Q0 thru Q7 power supply. Connect to 5V, 3.3V or 2.5V.
4, 5	Q3, Q4	Output		Clock outputs. 14Ω typical output impedance.
6, 7, 8	GND	Power		Connect to ground.
9, 10, 11	Q5, Q6, Q7	Output		Clock outputs. 14Ω typical output impedance.
12	CLK	Input		Clock input.
13	VDD	Power		Input power supply. Connect to 5V, 3.3V or 2.5V
14, 15, 16	Q8, Q9, Q10	Output		Clock outputs. 14Ω typical output impedance.
17, 18, 19	GND	Power		Connect to ground.
20, 21	Q11, Q12	Output		Clock outputs. 14Ω typical output impedance.
22, 23, 24	VDD2	Power		Output Q8 thru Q15 power supply. Connect to 5V, 3.3V or 2.5V.
25, 26, 27	Q13, Q14, Q15	Output		Clock outputs. 14Ω typical output impedance.
28	OE2	Input	Pullup	Output enable. When low forces outputs Q8 thru Q15 to HiZ state.
29	OE1	Input	Pullup	Output enable. When low forces outputs Q0 thru Q7 to HiZ state.
30, 31, 32	Q0, Q1, Q2	Output		Clock outputs. 14Ω typical output impedance.

TABLE 2. PIN CHARACTERISTICS

Symbol	Parameter		Test Conditions	Minimum	Typical	Maximum	Units
CIN	Input Capacitance	CLK					pF
		OE1, OE2					pF
CPD	Power Dissipation Capacitance (per output)		VDD1, VDD2 = 5.25V		15		pF
			VDD1, VDD2 = 3.47V		11		pF
			VDD1, VDD2 = 2.63V		9.5		pF
RPULLUP	Input Pullup Resistor						pF
RPULLDOWN	Input Pulldown Resistor						pF
ROUT							

TABLE 3. FUNCTION TABLE

Inputs		Outputs	
OE1	OE2	Q0 thru Q7	Q8 thru Q15
0	0	Hi Z	Hi Z
1	0	Active	Hi Z
0	1	Hi Z	Active
1	1	Active	Active

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	7V
Inputs	-0.5V to VDD+0.5 V
Outputs	-0.5V to VDD+0.5V
Ambient Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress specifications only and functional operation of the device at these or any conditions beyond those listed in the *DC Characteristics* or *AC Characteristics* is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

TABLE 4A. POWER SUPPLY DC CHARACTERISTICS, VDD = VDD1 = VDD2 = 5V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
VDD, VDD1, VDD2	Operating Supply Voltage		4.75	5.0	5.25	V
IDD	Input Operating Supply Current	VDD = VDDx = 5.25V			110	µA

TABLE 4B. LVCMOS DC CHARACTERISTICS, VDD = VDD1 = VDD2 = 5V±5%, T_A = -40° TO 85°C

Symbol	Parameter		Test Conditions	Minimum	Typical	Maximum	Units
VIH	Input High Voltage	CLK	VDD = 4.75V	3.32		5.05	V
			VDD = 5.25V	3.67		5.55	V
		OEx	VDD = 5.25V	2		VDD + 0.3	V
VIL	Input Low Voltage	CLK	VDD = 4.75V	-0.3		1.42	V
			VDD = 5.25V	-0.3		1.57	V
		OEx	VDD = 4.75V	-0.3		0.8	V
IIH	Input High Current	CLK	VDD = VIN = 5.25V			1	µA
		OEx	VDD = VIN = 5.25			1	µA
IIL	Input Low Current	CLK	VDD = 5.25V, VIN = 0V	-40			µA
		OEx	VDD = 5.25V, VIN = 0V	-40			µA
VOH	Output High Voltage		VDDx = 4.75V, IOH = -25mA	4			V
VOL	Output Low Voltage		VDDx = 4.75V, IOL = 25mA			0.8	V
IOZH	High Impedance Leakage Current		OEx = 0V, VOUT = VDDx			1	µA
IOZL	High Impedance Leakage Current		OEx = 0V, VOUT = 0V	-1			µA

TABLE 5A. AC CHARACTERISTICS, VDD = VDD1 = VDD2 = 5V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
fMAX	Maximum Input Frequency				66	MHz
tpLH	Propagation Delay, Low-to-High	0 < f ≤ 66MHz	0.9	1.4	1.8	ns
tpHL	Propagation Delay, High-to-Low	0< f ≤ 66MHz	0.9	1.4	1.9	ns
tsk(o)	Output Skew; NOTE 3	Measured on rising edge @VDDx/2			350	ps
tsk(pp)	Part-to-Part Skew; NOTE 4	Measured on rising edge @VDDx/2			700	ps
tR	Output Rise Time	Measured from 0.8V to 2.0V		0.3	0.5	ns
tF	Output Fall Time	Measured from 2.0V to 0.8V		0.3	0.4	ns
tPW	Output Pulse Width		tCYCLE/2 - 0.75	tCYCLE/2	tCYCLE/2 + 0.75	ns

NOTE 1: All parameters measured at fMAX unless noted otherwise.
NOTE 2: Outputs terminated with 50Ω resistor connected to VDDx/2.
NOTE 3: Defined as skew across outputs at the same supply voltages and with equal load conditions.
NOTE 4: Defined as skew at different outputs on different devices operating at the same supply voltages and with equal load conditions.

TABLE 4C. POWER SUPPLY DC CHARACTERISTICS, VDD = VDD1 = VDD2 = 3.3V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
VDD, VDD1, VDD2	Operating Supply Voltage		3.135	3.3	3.465	V
IDD	Input Operating Supply Current				100	µA

TABLE 4D. LVCMOS DC CHARACTERISTICS, VDD = VDD1 = VDD2 = 3.3V±5%, T_A = -40° TO 85°C

Symbol	Parameter		Test Conditions	Minimum	Typical	Maximum	Units
VIH	Input High Voltage	CLK	VDD = 3.465V	2		VDD + 0.3	V
		OEx	VDD = 3.465V	2		VDD + 0.3	V
VIL	Input Low Voltage	CLK	VDD = 3.135V	-0.3		0.8	V
		OEx	VDD = 3.135V	-0.3		0.8	V
IIH	Input High Current	CLK	VIN =VDD			1	µA
		OEx	VIN =VDD			1	µA
IIL	Input Low Current	CLK	VIN = 0V	-15			µA
		OEx	VIN = 0V	-15			µA
VOH	Output High Voltage		VDD = 3.135V, IOH = -25mA	2.4			V
VOL	Output Low Voltage		VDD = 3.135V, IOL = 25mA			0.8	V
IOZH	High Impedance Leakage Current		OEx = 0V, VOUT = VDD			1	µA
IOZL	High Impedance Leakage Current		OEx = 0V, VOUT = 0V	-1			µA

TABLE 5B. AC CHARACTERISTICS, VDD = VDD1 = VDD2 = 3.3V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
fMAX	Maximum Input Frequency				200	MHz
tpLH	Propagation Delay, Low-to-High	0 ≤ f ≤ 200MHz	1.0	2.1	3.1	ns
tpHL	Propagation Delay, High-to-Low	0 ≤ f ≤ 200MHz	1.1	2.0	2.8	ns
tsk(o)	Output Skew; NOTE 3	Measured on rising edge @VDDx/2			250	ps
tsk(pp)	Part-to-Part Skew; NOTE 4	Measured on rising edge @VDDx/2			700	ps
tR	Output Rise Time	0 ≤ f ≤ 200MHz		0.5	0.8	ns
tF	Output Fall Time	0 ≤ f ≤ 200MHz		0.9	1.7	ns
tPW	Output Pulse Width		tCYCLE/2 - 0.5	tCYCLE/2	tCYCLE/2 + 0.5	ns

NOTE 1: All parameters measured at fMAX unless noted otherwise.
NOTE 2: Outputs terminated with 50Ω resistor connected to VDDx/2.
NOTE 3: Defined as skew across outputs at the same supply voltages and with equal load conditions.
NOTE 4: Defined as skew at different outputs on different devices operating at the same supply voltages and with equal load conditions.

TABLE 4E. DC POWER SUPPLY CHARACTERISTICS, VDD = 3.3V±5%, VDD1 = VDD2 = 2.5V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
VDD	Input Operating Supply Voltage		3.135	3.3	3.465	V
VDD1, VDD2	Out Operating Supply Voltage		2.375	2.5	2.625	V
IDD	Input Operating Supply Current				100	µA

TABLE 4F. LVCMOS DC CHARACTERISTICS, VDD = 3.3V±5%, VDD1 = VDD2 = 2.5V±5%, T_A = -40° TO 85°C

Symbol	Parameter		Test Conditions	Minimum	Typical	Maximum	Units
VIH	Input High Voltage	CLK	VDD = 3.465V	2		VDD + 0.3	V
		OEx	VDD = 3.465V	2		VDD + 0.3	V
VIL	Input Low Voltage	CLK	VDD = 3.135V	-0.3		0.8	V
		OEx	VDD = 3.135V	-0.3		0.8	V
IIH	Input High Current	CLK	VIN =VDD			1	µA
		OEx	VIN =VDD			1	µA
IIL	Input Low Current	CLK	VIN = 0V	-15			µA
		OEx	VIN = 0V	-15			µA
VOH	Output High Voltage		VDD = 2.375V, IOH = -25mA	1.5			V
VOL	Output Low Voltage		VDD = 2.375V, IOL = 25mA			0.8	V
IOZH	High Impedance Leakage Current		OEx = 0V, VOUT = VDD			1	µA
IOZL	High Impedance Leakage Current		OEx = 0V, VOUT = 0V	-1			µA

TABLE 5C. AC CHARACTERISTICS, VDD = 3.3V±5%, VDD1 = VDD2 = 2.5V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
fMAX	Maximum Input Frequency				200	MHz
tpLH	Propagation Delay, Low-to-High	0 ≤ f ≤ 200MHz	1.0	2.3	3.2	ns
tpHL	Propagation Delay, High-to-Low	0 ≤ f ≤ 200MHz	1.4	2.3	3.2	ns
tsk(o)	Output Skew; NOTE 3	Measured on rising edge @VDDx/2			250	ps
tsk(pp)	Part-to-Part Skew; NOTE 4	Measured on rising edge @VDDx/2			700	ps
tR	Output Rise Time	0 ≤ f ≤ 200MHz		0.5	0.8	ns
tF	Output Fall Time	0 ≤ f ≤ 200MHz		0.9	1.7	ns
tPW	Output Pulse Width		tCYCLE/2 - 0.5	tCYCLE/2	tCYCLE/2 + 0.5	ns

NOTE 1: All parameters measured at fMAX unless noted otherwise.
NOTE 2: Outputs terminated with 50Ω resistor connected to VDDx/2.
NOTE 3: Defined as skew across outputs at the same supply voltages and with equal load conditio
NOTE 4: Defined as skew at different outputs on different devices operating at the same supply voltages and with equal load conditions.

TABLE 4G. POWER SUPPLY DC CHARACTERISTICS, VDD = VDD1 = VDD2 = 2.5V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
VDD, VDD1, VDD2	Operating Supply Voltage		2.375	2.5	2.625	V
IDD	Input Operating Supply Current				100	µA

TABLE 4H. LVCMOS DC CHARACTERISTICS, VDD = VDD1 = VDD2 = 2.5V±5%, T_A = -40° TO 85°C

Symbol	Parameter		Test Conditions	Minimum	Typical	Maximum	Units
VIH	Input High Voltage	CLK	VDD = 2.625V	2		VDD + 0.3	V
		OEx	VDD = 2.625V	2		VDD + 0.3	V
VIL	Input Low Voltage	CLK	VDD = 2.375V	-0.3		0.8	V
		OEx	VDD = 2.375V	-0.3		0.8	V
IIH	Input High Current	CLK	VIN =VDD			1	µA
		OEx	VIN =VDD			1	µA
IIL	Input Low Current	CLK	VIN = 0V	-10			µA
		OEx	VIN = 0V	-10			µA
VOH	Output High Voltage		VDD = 2.375V, IOH = -25mA	1.5			V
VOL	Output Low Voltage		VDD = 2.375V, IOL = 25mA			0.8	V
IOZH	High Impedance Leakage Current		OEx = 0V, VOUT = VDD			1	µA
IOZL	High Impedance Leakage Current		OEx = 0V, VOUT = 0V	-1			µA

TABLE 5D. AC CHARACTERISTICS, VDD = VDD1 = VDD2 = 2.5V±5%, T_A = -40° TO 85°C

Symbol	Parameter	Test Conditions	Minimum	Typical	Maximum	Units
fMAX	Maximum Input Frequency				133	MHz
tpLH	Propagation Delay, Low-to-High	0 ≤ f ≤ 133MHz	1.0	2.5	3.7	ns
tpHL	Propagation Delay, High-to-Low	0 ≤ f ≤ 133MHz	1.4	2.6	3.5	ns
tsk(o)	Output Skew; NOTE 3	Measured on rising edge @VDDx/2			250	ps
tsk(pp)	Part-to-Part Skew; NOTE 4	Measured on rising edge @VDDx/2			750	ps
tR	Output Rise Time			0.5	0.8	ns
tF	Output Fall Time			0.9	1.7	ns
tPW	Output Pulse Width		tCYCLE/2 - 0.75	tCYCLE/2	tCYCLE/2 + 0.75	ns

NOTE 1: All parameters measured at fMAX unless noted otherwise.
NOTE 2: Outputs terminated with 50Ω resistor connected to VDDx/2.
NOTE 3: Defined as skew across outputs at the same supply voltages and with equal load conditions.
NOTE 4: Defined as skew at different outputs on different devices operating at the same supply voltages and with equal load conditions.

PACKAGE OUTLINE - Y SUFFIX

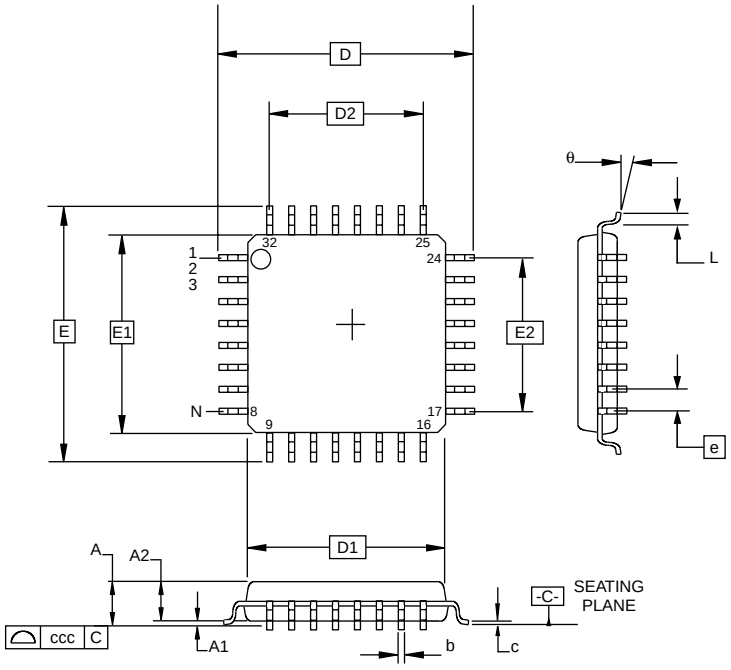


TABLE 6. PACKAGE DIMENSIONS

JEDEC VARIATION ALL DIMENSIONS IN MILLIMETERS			
SYMBOL	**BBA**		
	MINIMUM	**NOMINAL**	**MAXIMUM**
N		32	
A			1.60
A1	0.05		0.15
A2	1.35	1.40	1.45
b	0.30	0.37	0.45
c	0.09		0.20
D		9.00 BASIC	
D1		7.00 BASIC	
D2		5.60	
E		9.00 BASIC	
E1		7.00 BASIC	
E2		5.60	
e		0.80 BASIC	
L	0.45	0.60	0.75
θ	0°		7°
ccc			0.10

Reference Document: JEDEC Publication 95, MS-026

TABLE 7. ORDERING INFORMATION

Part/Order Number	Marking	Package	Count	Temperature
ICS8343YI	ICS8343YI	32 Lead LQFP	250 per tray	-40°C to 85°C
ICS8343YIT	ICS8343YI	32 Lead LQFP on Tape and Reel	2000	-40°C to 85°C

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