



**THE DATASHEET OF
MC100ES6014EJR2**



The MC100ES6014 is a low skew 1-to-5 differential driver, designed with clock distribution in mind, accepting two clock sources into an input multiplexer. The ECL/PECL input signals can be either differential or single-ended (if the V_{BB} output is used). HSTL and LVDS inputs can be used when the ES6014 is operating under PECL conditions.

The ES6014 specifically guarantees low output-to-output skew. Optimal design, layout, and processing minimize skew within a device and from device to device.

To ensure that the tight skew specification is realized, both sides of any differential output need to be terminated identically into $50\ \Omega$ even if only one output is being used. If an output pair is unused, both outputs may be left open (unterminated) without affecting skew.

The common enable (EN) is synchronous, outputs are enabled/disabled in the LOW state. This avoids a runt clock pulse when the device is enabled/disabled as can happen with an asynchronous control. The internal flip flop is clocked on the falling edge of the input clock; therefore, all associated specification limits are referenced to the negative edge of the clock input.

The MC100ES6014, as with most other ECL devices, can be operated from a positive V_{CC} supply in PECL mode. This allows the ES6014 to be used for high performance clock distribution in +3.3 V or +2.5 V systems. Single ended CLK input pin operation is limited to a $V_{CC} \geq 3.0\ \text{V}$ in PECL mode, or $V_{EE} \leq -3.0\ \text{V}$ in ECL mode. Designers can take advantage of the ES6014's performance to distribute low skew clocks across the backplane or the board.

Features

- 25 ps Within Device Skew
- 400 ps Typical Propagation Delay
- Maximum Frequency > 2 GHz Typical
- The 100 Series Contains Temperature Compensation
- PECL and HSTL Mode: $V_{CC} = 2.375\ \text{V}$ to $3.8\ \text{V}$ with $V_{EE} = 0\ \text{V}$
- ECL Mode: $V_{CC} = 0\ \text{V}$ with $V_{EE} = -2.375\ \text{V}$ to $-3.8\ \text{V}$
- LVDS and HSTL Input Compatible
- Open Input Default State
- 20-Lead Pb-Free Package Available
- **Replacement part: ICS853S014I**

MC100ES6014



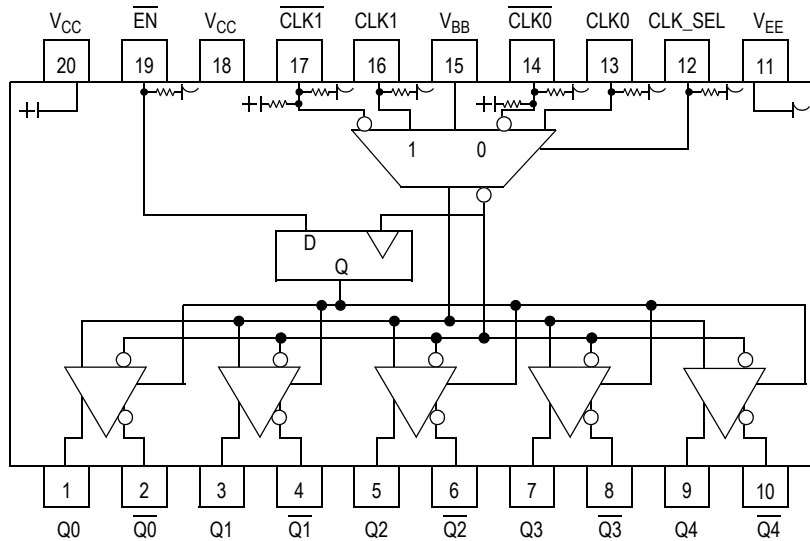
**DT SUFFIX
20-LEAD TSSOP PACKAGE
CASE 948E-03**



**EJ SUFFIX
20-LEAD TSSOP PACKAGE
Pb-FREE PACKAGE
CASE 948E-03**

ORDERING INFORMATION

Device	Package
MC100ES6014EJ	TSSOP-20 (Pb-Free)
MC100ES6014EJR2	TSSOP-20 (Pb-Free)



Warning: All V_{CC} and V_{EE} pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. 20-Lead Pinout (Top View) and Logic Diagram

Table 1. Pin Description

Pin	Function
CLK0*, CLK0**	ECL/PECL/HSTL CLK Input
CLK1*, CLK1**	ECL/PECL/HSTL CLK Input
Q0:4, Q0:4	ECL/PECL Outputs
CLK_SEL*	ECL/PECL Active Clock Select Input
EN*	ECL Sync Enable
V_{BB}	Reference Voltage Output
V_{CC}	Positive Supply
V_{EE}	Negative Supply

* Pins will default LOW when left open.

** Pins will default to $V_{CC}/2$ when left open.

Table 2. Function Table

CLK0	CLK1	CLK_SEL	EN	Q
L	X	L	L	L
H	X	L	L	H
X	L	H	L	L
X	H	H	L	H
X	X	X	H	L*

* On next negative transition of CLK0 or CLK1

Table 3. General specifications

Characteristics		Value
Internal Input Pulldown Resistor		75 k Ω
Internal Input Pullup Resistor		75 k Ω
ESD Protection	Human Body Model	> 2000 V
	Machine Model	> 200 V
	Charged Device Model	> 1500 V
Thermal Resistance (Junction-to-Ambient)	0 LFPM, 20 TSSOP	140°C/W
	500 LFPM, 20 TSSOP	100°C/W

Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test

Table 4. Absolute Maximum Ratings⁽¹⁾

Symbol	Characteristic	Conditions	Rating	Units
V _{SUPPLY}	Power Supply Voltage	Difference between V _{CC} & V _{EE}	3.9	V
V _{IN}	Input Voltage	V _{CC} - V _{EE} ≤ 3.6 V	V _{CC} + 0.3 V _{EE} - 0.3	V
I _{OUT}	Output Current	Continuous Surge	50 100	mA mA
I _{BB}	V _{BB} Sink/Source Current		±0.5	°C
T _A	Operating Temperature Range		-40 to +85	°C
T _{STG}	Storage Temperature Range		-65 to +150	°C

1. Absolute maximum continuous ratings are those maximum values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation at absolute-maximum-rated conditions is not implied.

Table 5. DC Characteristics (V_{CC} = 0 V, V_{EE} = -2.5 V ± 5% or V_{CC} = 2.5 V ± 5%, V_{EE} = 0 V)

Symbol	Characteristics	-40°C			0°C to 85°C			Unit
		Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		30	60		30	60	mA
V _{OH}	Output HIGH Voltage ⁽¹⁾	V _{CC} -1250	V _{CC} -990	V _{CC} -800	V _{CC} -1200	V _{CC} -960	V _{CC} -750	mV
V _{OL}	Output LOW Voltage ⁽¹⁾	V _{CC} -2000	V _{CC} -1550	V _{CC} -1150	V _{CC} -1925	V _{CC} -1630	V _{CC} -1200	mV
V _{outPP}	Output Peak-to-Peak Voltage	200			200			mV
V _{IH}	Input HIGH Voltage	V _{CC} -1165		V _{CC} -880	V _{CC} -1165		V _{CC} -880	mV
V _{IL}	Input LOW Voltage	V _{CC} -1810		V _{CC} -1475	V _{CC} -1810		V _{CC} -1475	mV
V _{BB}	Output Reference Voltage I _{BB} = 200 μA	V _{CC} -1400		V _{CC} -1200	V _{CC} -1400		V _{CC} -1200	mV
V _{PP}	Differential Input Voltage ⁽²⁾	0.12		1.3	0.12		1.3	mV
V _{CMR}	Differential Cross Point Voltage ⁽³⁾	V _{EE} +0.2		V _{CC} -1.0	V _{EE} +0.2		V _{CC} -1.0	mV
I _{IN}	Input Current			±150			±150	μA

1. Output termination voltage V_{TT} = 0 V for V_{CC} = 2.5 V operation is supported but the power consumption of the device will increase.
 2. V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.
 3. V_{CMR} (DC) is the crosspoint of the differential input signal. Functional operation is obtained when the crosspoint is within the V_{CMR} (DC) range and the input swing lies within the V_{PP} (DC) specification.

Table 6. DC Characteristics (V_{CC} = 0 V, V_{EE} = -3.8 V to -3.135 V or V_{CC} = 3.135 V to 3.8 V, V_{EE} = 0 V)

Symbol	Characteristics	-40°C			0°C to 85°C			Unit
		Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		30	60		30	60	mA
V _{OH}	Output HIGH Voltage ⁽¹⁾	V _{CC} -1150	V _{CC} -1020	V _{CC} -800	V _{CC} -1200	V _{CC} -970	V _{CC} -750	mV
V _{OL}	Output LOW Voltage ⁽¹⁾	V _{CC} -1950	V _{CC} -1620	V _{CC} -1250	V _{CC} -2000	V _{CC} -1680	V _{CC} -1300	mV
V _{outPP}	Output Peak-to-Peak Voltage	200			200			mV
V _{IH}	Input HIGH Voltage	V _{CC} -1165		V _{CC} -880	V _{CC} -1165		V _{CC} -880	mV
V _{IL}	Input LOW Voltage	V _{CC} -1810		V _{CC} -1475	V _{CC} -1810		V _{CC} -1475	mV
V _{BB}	Output Reference Voltage I _{BB} = 200 μA	V _{CC} -1400		V _{CC} -1200	V _{CC} -1400		V _{CC} -1200	mV
V _{PP}	Differential Input Voltage ⁽²⁾	0.12		1.3	0.12		1.3	V
V _{CMR}	Differential Cross Point Voltage ⁽³⁾	V _{EE} +0.2		V _{CC} -1.1	V _{EE} +0.2		V _{CC} -1.1	V
I _{IN}	Input Current			±150			±150	μA

1. Output termination voltage V_{TT} = 0 V for V_{CC} = 2.5 V operation is supported but the power consumption of the device will increase.
 2. V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.

3. V_{CMR} (DC) is the crosspoint of the differential input signal. Functional operation is obtained when the crosspoint is within the V_{CMR} (DC) range and the input swing lies within the V_{PP} (DC) specification.

Table 7. AC Characteristics ($V_{CC} = 0\text{ V}$, $V_{EE} = -3.8\text{ V}$ to -2.375 V or $V_{CC} = 2.375\text{ V}$ to 3.8 V , $V_{EE} = 0\text{ V}$)⁽¹⁾

Symbol	Characteristics	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{max}	Maximum Output Frequency	2			2			2			GHz
t_{PLH} t_{PHL}	Propagation Delay (Differential) CLK to Q, \bar{Q}	300	355	425	300	375	475	300	400	525	ps
t_{SKEW}	Within Device Skew ⁽²⁾ Device-to-Device Skew ⁽²⁾		23	45		23	45		23	45	ps ps
t_{JITTER}	Cycle-to-Cycle Jitter RMS (1σ)			1			1			1	ps
V_{PP}	Input Peak-to-Peak Voltage Swing (Differential)	200		1200	200		1200	200		1200	mV
V_{CMR}	Differential Cross Point Voltage	$V_{EE}+0.2$		$V_{CC}-1.2$	$V_{EE}+0.2$		$V_{CC}-1.2$	$V_{EE}+0.2$		$V_{CC}-1.2$	V
t_r/t_f	Output Rise/Fall Time (20%–80%)	70		225	70		250	70		275	ps

1. Measured using a 750 mV source, 50% duty cycle clock source. All loading with 50 ohms to $V_{CC}-2.0\text{ V}$.
2. Skew is measured between outputs under identical transitions.

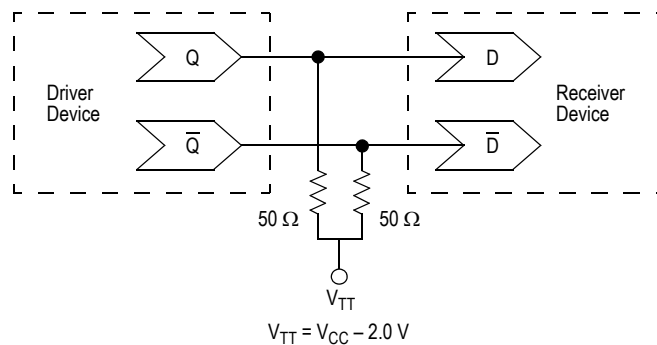
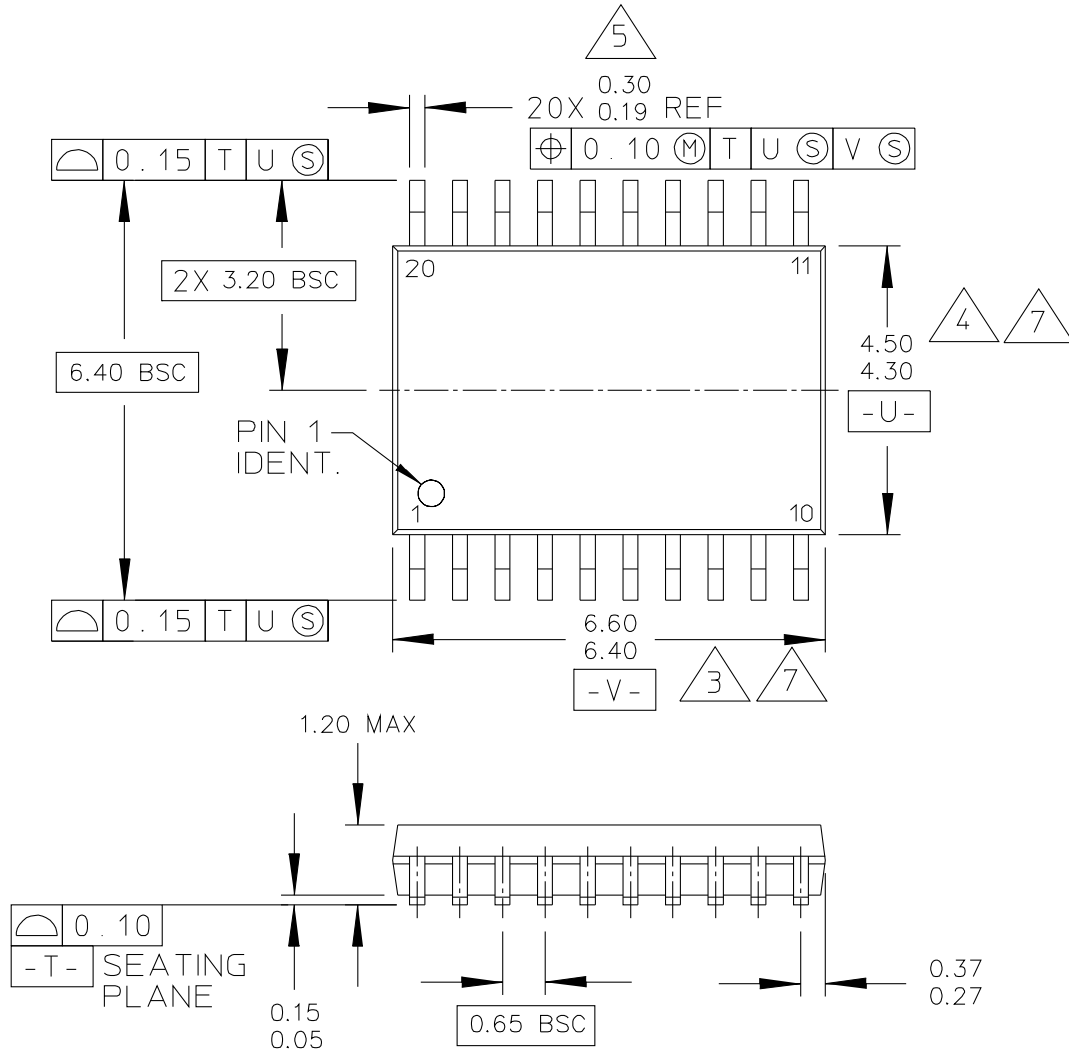


Figure 2. Typical Termination for Output Driver and Device Evaluation

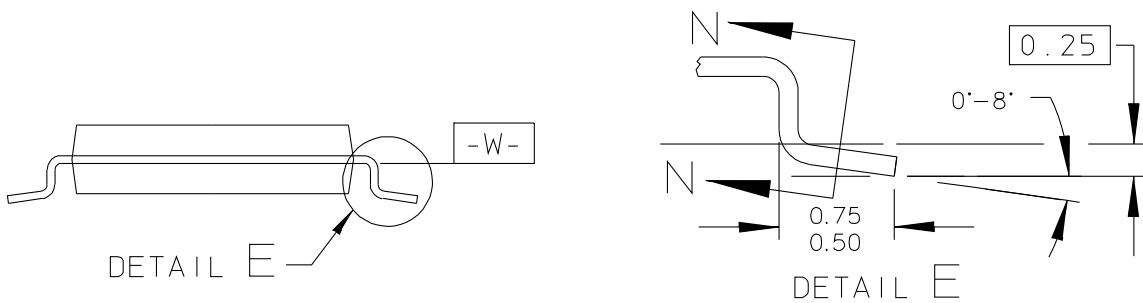
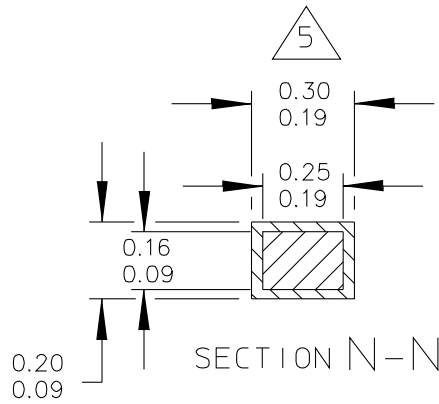
PACKAGE DIMENSIONS



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: 20 LD TSSOP, PITCH 0.65MM	DOCUMENT NO: 98ASH70169A	REV: B	
	CASE NUMBER: 948E-03	09 MAR 2005	
	STANDARD: JEDEC		

**CASE 948E-03
ISSUE B
20-LEAD TSSOP PACKAGE**

PACKAGE DIMENSIONS



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: 20 LD TSSOP, PITCH 0.65MM	DOCUMENT NO: 98ASH70169A	REV: B	
	CASE NUMBER: 948E-03	09 MAR 2005	
	STANDARD: JEDEC		

**CASE 948E-03
ISSUE B
20-LEAD TSSOP PACKAGE**

PAGE 2 OF 3

PACKAGE DIMENSIONS

NOTES:

1. CONTROLLING DIMENSION: MILLIMETER
2. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M-1982.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.
4. DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 PER SIDE.
5. DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF THE DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSIONS ARE TO BE DETERMINED AT DATUM PLANE -W-.

© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: 20 LD TSSOP, PITCH 0.65MM	DOCUMENT NO: 98ASH70169A	REV: B	
	CASE NUMBER: 948E-03	09 MAR 2005	
	STANDARD: JEDEC		

**CASE 948E-03
ISSUE B
20-LEAD TSSOP PACKAGE**

PAGE 3 OF 3

We've Got Your Timing Solution



6024 Silver Creek Valley Road
San Jose, California 95138

Sales

800-345-7015 (inside USA)
+408-284-8200 (outside USA)
Fax: 408-284-2775
www.IDT.com/go/contactIDT

Technical Support

netcom@idt.com
+480-763-2056

DISCLAIMER Integrated Device Technology, Inc. (IDT) and its subsidiaries reserve the right to modify the products and/or specifications described herein at any time and at IDT's sole discretion. All information in this document, including descriptions of product features and performance, is subject to change without notice. Performance specifications and the operating parameters of the described products are determined in the independent state and are not guaranteed to perform the same way when installed in customer products. The information contained herein is provided without representation or warranty of any kind, whether express or implied, including, but not limited to, the suitability of IDT's products for any particular purpose, an implied warranty of merchantability, or non-infringement of the intellectual property rights of others. This document is presented only as a guide and does not convey any license under intellectual property rights of IDT or any third parties.

IDT's products are not intended for use in applications involving extreme environmental conditions or in life support systems or similar devices where the failure or malfunction of an IDT product can be reasonably expected to significantly affect the health or safety of users. Anyone using an IDT product in such a manner does so at their own risk, absent an express, written agreement by IDT.

Integrated Device Technology, IDT and the IDT logo are registered trademarks of IDT. Other trademarks and service marks used herein, including protected names, logos and designs, are the property of IDT or their respective third party owners.

Copyright 2012. All rights reserved.

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View MC100ES6014EJR2 on WIN SOURCE](#)
- ⊖ [IDT, Integrated Device Technology Inc Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management