

## Worldwide Sales Offices

### CORPORATE HEADQUARTERS

200 Flynn Road  
Camarillo, California 93012  
Tel: (805) 498-2111  
Fax: (805) 498-3804

### SAN JOSE OFFICE

1111 Comstock Street  
Santa Clara, California 95054  
Tel: (408) 727-6562  
Fax: (408) 986-9059

### CENTRAL UNITED STATES

689 West Renner Road, Suite 107  
Richardson, Texas 75080  
Tel: (972) 437-0380  
Fax: (972) 437-0381

### NORTH CENTRAL UNITED STATES

637 Abbotsford Road  
Kenilworth, Illinois 60043  
Tel: (847) 853-8339  
Fax: (847) 853-8339

### NORTHWEST UNITED STATES

3000 North West Stucki Place, Suite 230  
Hillsboro, OR 97124  
Tel: (503) 629-2085  
Fax: (503) 629-8544

### SOUTHWEST UNITED STATES

14423 Spring Crest Drive  
Chino Hills, CA 91709  
Tel: (909) 590-4404  
Fax: (909) 590-7355

### EASTERN UNITED STATES

133 Southcenter Court, Suite 1000  
Morrisville, North Carolina 27560  
Tel: (919) 465-5700  
Fax: (919) 380-4053

### NORTHERN EUROPE/Semtech Ltd.

Units 2 and 3, Park Court  
Premier Way, Abbey Park Industrial Estate  
Romsey, Hampshire SO51 9DN  
United Kingdom  
Tel: 011-44-1794-527-600  
Fax: 011-44-1794-527-601

### SOUTHERN EUROPE/Semtech SARL

Immeuble "Le Mont-Royal"  
21 Avenue du Quebec  
F-91951 Courtaboeuf, France  
Tel: 011-33-169-28-22-00  
Fax: 011-33-169-28-12-98

### CENTRAL EUROPE/Semtech Germany GmbH

General-von-Nagel-Strasse 5  
85354 Freising, Germany  
Tel: 011-49-8161-140-123  
Fax: 011-49-8161-140-124

### SEMTECH ASIA PACIFIC

11F, No. 46, Lane 11  
Kuang Fu North Road  
Taipei, Taiwan, R.O.C. 105  
Tel: 011-886-2-2748-3380  
Fax: 011-886-2-2748-3390

### SEMTECH JAPAN

Okada Building 8F  
1-22-6 Higashigotanda  
Shinagawa-Ku, Tokyo 141-0022, Japan  
Tel: 011-81-3-6408-0950  
Fax: 011-81-3-6408-0951

### SEMTECH KOREA

Samsung Cheil Building, Suite 1218  
702-2 Yeoksam-Dong  
Kangman-Ku, Seoul 135-080, Korea  
Tel: 011-82-2-527-4377  
Fax: 011-82-2-527-4376

### SEMTECH CHINA

Shanghai Time Square, Unit 2508  
93 Huai Hai Middle Road  
Shanghai, 200021, China  
Tel: 011-86-21-6391-0830  
Fax: 011-86-21-6391-0831

Test and Measurement  
ECL PRODUCTS

## Test and Measurement

### ECL CLOCK AND LOGIC



**Semtech's strategy in ECL Clock and Logic Products** centers around three product families - the first two represent industry standard ECL products; Eclipse, Eclipse Light, and Eclipse Plus. The third, the Clockwise family, consists of proprietary ECL clock distribution products. Features common to these product families include excellent performance in low jitter, minimum pin-to-pin and part-to-part skew, low power, and high-reaching frequencies. Semtech's Eclipse, Eclipse Light, and Eclipse Plus products offer two key advantages over the competition's offerings; improved ESD protection and a single part with guaranteed performance over the full range of power supply voltages (3.3V to 5V). Semtech's Clockwise products offer additional features such as on-chip input and output termination, level translation, and performance up to 3GHz.

To order additional Reference Guides,  
e-mail [sales@semtech.com](mailto:sales@semtech.com) and refer to:  
Part Number: ECL-PRG-0702

  
**SEMTECH**

PRODUCT REFERENCE GUIDE 2002

## ECL Logic

Part Number	Part Description	Operating Voltage	Features	Package
SK100E016PJ	8-bit synchronous binary up counter	+4.2V to +5.5V	700MHz minimum count frequency; 1000ps CLK to Q, TC*; internal TC* feedback (gated); fully synchronous counting and TC* generation asynchronous master reset	28-pin PLCC
SK10E116PJ & SK100E116PJ	Quint differential line receiver	+4.2V to +5.5V	Low skew; guaranteed skew spec; differential design; V <sub>BB</sub> output; enable input; 400ps maximum propagation delay	28-pin PLCC
SK10E131PJ & SK100E131PJ	4-bit D flip-flop	+4.2V to +5.5V	1100MHz minimum toggle frequency; individual and common clocks; individual resets (asynchronous); paired sets (asynchronous)	28-pin PLCC
SK100E142PJ	9-bit shift register	+4.2V to +5.5V	700MHz minimum shift frequency; 9-bit for byte-parity applications; asynchronous master reset; dual clocks	28-pin PLCC
SK100E151PJ	6-bit D register	+4.2V to +5.5V	1100MHz toggle frequency; asynchronous master reset; dual clocks	28-pin PLCC
SK10E445PJ & SK100E445PJ	4-bit serial/parallel converter	+4.2V to +5.5V	On-chip $\div 4$ and $\div 8$ clocks; 2.0Gb/s data rate capability; differential clock & serial inputs; asynchronous data synchronization; mode select to expand to 8-bits	28-pin PLCC

## ClockWise™ Clock Distribution

SK10EL32W & SK100EL32W	$\div 2$ divider	-5.5V to -3.0V or +3.0V to +5.5V	405ps propagation delay; 3GHz toggle frequency	8-pin SOIC
SK100EL33W	$\div 4$ divider	-5.5V to -3.0V or +3.0V to +5.5V	560ps propagation delay; 4.0GHz toggle frequency; V <sub>BB</sub> output	8-pin SOIC
SK100EL34WD	$\div 2$ , $\div 4$ , $\div 8$ clock generation chip	-5.5V to -3.0V or +3.0V to +5.5V	50ps output-to-output skew; synchronous enable/disable; master reset for synchronization	16-pin SOIC
SK100EL38WD	$\div 2$ , $\div 4/6$ clock generation chip	-5.5V to -3.0V or +3.0V to +5.5V	50ps output-to-output skew; master reset for synchronization	20-pin SOIC
SK100EL39WD	$\div 2/4$ , $\div 4/6$ clock generation chip	-5.5V to -3.0V or +3.0V to +5.5V	50ps output-to-output skew; synchronous enable/disable; master reset for synchronization	20-pin SOIC
SK10E111PJ & SK100E111PJ	1:9 differential clock driver	+4.2V to +5.5V	V <sub>BB</sub> output; enable input	28-pin PLCC
SK100EP111LF	Low voltage 1:10 differential LVECL/LVPECL/HSTL clock driver	+2.375V to +3.8V	50ps part-to-part skew; 20ps output-to-output skew; V <sub>BB</sub> output	32-pin LQFP
SK2200LF	LVPECL/HSTL to HSTL 1:9 high speed transceiver logic bus clock driver	+3.135V to +3.465V or +1.6V to +2.0V	200ps part-to-part skew; 50ps output-to-output skew; low voltage HSTL output buffer; 500MHz maximum clock frequency	32-pin LQFP
SK100LVE111PJ	1:9 differential LVECL/LVPECL clock driver	+3.0V to +3.8V or -3.0V to -3.8V	200ps part-to-part skew; internal 50ps output-to-output skew; V <sub>BB</sub> output	28-pin PLCC
SK100LVE111EPJ	1:9 differential LVECL/LVPECL clock driver w/enable input	+3.0V to +3.8V or -3.0V to -3.8V	200ps part-to-part skew; 50ps output-to-output skew; V <sub>BB</sub> output; enable input	28-pin PLCC
SK100EL14WD	1:5 clock distribution chip	+3.0V to +5.5V or -3.0V to -5.5V	Maximum 50ps output-to-output skew; V <sub>BB</sub> output; synchronous enable/disable; multiplexed clock input; 75kW internal input pulldown resistors; new differential input common mode range	20-pin SOIC
SK100EL15WD	1:4 clock distribution chip	+3.0V to +5.5V or -3.0V to -5.5V	50ps output-to-output skew; synchronous enable/disable; multiplexed clock input	16-pin SOIC
SK12429	High frequency PLL clock synthesizer	+3.0V to +5.5V	25 to 400MHz differential PECL outputs; $\pm 25$ ps peak-to-peak output jitter; fully integrated phase locked loop; minimal frequency overshoot; synthesized architecture; serial 3-wire interface; parallel interface for power-up; quartz crystal interface	28-pin PLCC

## ClockWise™ LVDS Family

PART NUMBER	PART DESCRIPTION	OPERATING VOLTAGE	FEATURES	PACKAGE
SK1303ATF	Differential LVDS receiver/driver	+3.0V to +5.5V	>800MHz toggle frequency, 100Ωon-chip input termination	8-pin SOIC 8-pin MSOP
SK2111ATF	1 to 10 differential LVDS clock driver	+3.0V to +3.6V	Part-to-part skew 100ps (maximum), output channel-to-channel skew 35ps (maximum)	32-pin LQFP

## ClockWise™ Clock Distribution: SK15xx Clock/Data Family 1:5 Signal Distribution, 3GHz, Synch/Asynch Operation, 32-Pin TQFP Package

LOGIC FAMILY				LOGIC/TRANSLATION FAMILY			
PART NUMBER	OUTPUT	OPERATING VOLTAGE	OUTPUT CONFIGURATION	PART NUMBER	TRANSLATION	OPERATING VOLTAGE	OUTPUT CONFIGURATION
SK1500ATF	ECL/PECL	+3.0V to +5.5V	Open emitter	SK1525ATF	Anything to PECL	+6.0V to +7.2V	Open emitter
SK1501ATF	Double swing/TTL	+4.2V to +5.5V	Open emitter	SK1526ATF	Anything to ECL	+6.0V to +7.2V	Open emitter
SK1502ATF	ECL/PECL	+3.0V to +5.5V	50Ωdouble termination	SK1527ATF	Anything to PECL	+6.0V to +7.2V	50Ωdouble termination
SK1503ATF	ECL/PECL	+3.0V to +5.5V	Internal current sink (double termination)	SK1528ATF	Anything to ECL	+6.0V to +7.2V	50Ωdouble termination
SK1504ATF	ECL/PECL	+3.0V to +5.5V	50Ωsource termination	SK1529ATF	Anything to PECL	+6.0V to +7.2V	50Ωsource termination
OPEN COLLECTOR LOGIC FAMILY							
PART NUMBER	OUTPUT CURRENT	OPERATING VOLTAGE	OUTPUT CONFIGURATION	SK1530ATF	Anything to ECL	+6.0V to +7.2V	50Ωsource termination
SK1599ATF	12mA	+3.0V to +5.5V	Open collector				

## ClockWise™ Clock Distribution: SK19xx Clock/Data Family 1:9 Signal Distribution, 3GHz, Synch/Asynch Operation, 32-Pin TQFP Package

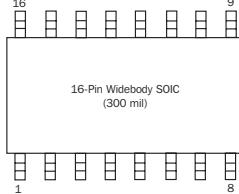
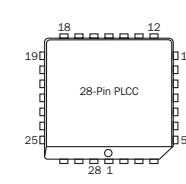
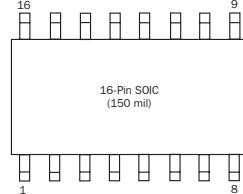
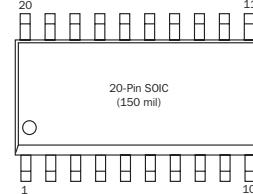
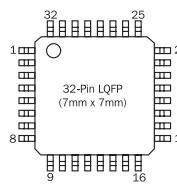
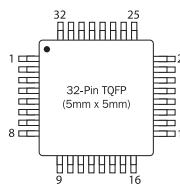
LOGIC FAMILY				LOGIC/TRANSLATION FAMILY			
PART NUMBER	OUTPUT	OPERATING VOLTAGE	OUTPUT CONFIGURATION	PART NUMBER	TRANSLATION	OPERATING VOLTAGE	OUTPUT CONFIGURATION
SK1900ATF	ECL/PECL	+3.0V to +5.5V	Open emitter	SK1925ATF	Anything to PECL	+6.0V to +7.2V	Open emitter
SK1901ATF	Double swing/TTL	+4.2V to +5.5V	Open emitter	SK1926ATF	Anything to ECL	+6.0V to +7.2V	Open emitter
SK1902ATF	ECL/PECL	+3.0V to +5.5V	50Ωdouble termination	SK1927ATF	Anything to PECL	+6.0V to +7.2V	50Ωdouble termination
SK1903ATF	ECL/PECL	+3.0V to +5.5V	Internal current sink (double termination)	SK1928ATF	Anything to ECL	+6.0V to +7.2V	50Ωdouble termination
SK1904ATF	ECL/PECL	+3.0V to +5.5V	50Ωsource termination	SK1929ATF	Anything to PECL	+6.0V to +7.2V	50Ωsource termination
OPEN COLLECTOR LOGIC FAMILY							
PART NUMBER	OUTPUT CURRENT	OPERATING VOLTAGE	OUTPUT CONFIGURATION	SK1930ATF	Anything to ECL	+6.0V to +7.2V	50Ωsource termination
SK1999ATF	12mA	+3.0V to +5.5V	Open collector				

## ClockWise™ Clock Distribution: SK44xx Clock/Data Family Quad Buffer Receiver, 3GHz, Synch/Asynch Operation, 32-Pin TQFP Package

LOGIC FAMILY					LOGIC/TRANSLATION FAMILY				
PART NUMBER	OUTPUT SWING	OPERATING VOLTAGE	INPUT TERMINATION	OUTPUT CONFIGURATION	PART NUMBER	TRANSLATION	OPERATING VOLTAGE	INPUT TERMINATION	OUTPUT CONFIGURATION
SK4400ATF	ECL/PECL	+3.0V to +5.5V	Open	Open emitter	SK4425ATF	Anything to PECL	+6.0V to +7.2V	Open	Open emitter
SK4401ATF	Double swing/TTL	+4.2V to +5.5V	Open	Open emitter	SK4426ATF	Anything to ECL	+6.0V to +7.2V	Open	Open emitter
SK4404ATF	ECL/PECL	+3.0V to +5.5V	Open	50Ωoutput	SK4429ATF	Anything to PECL	+6.0V to +7.2V	Open	50Ωoutput
SK4410ATF	ECL/PECL	+3.0V to +5.5V	100Ω	Open emitter	SK4430ATF	Anything to ECL	+6.0V to +7.2V	Open	50Ωoutput
SK4411ATF	Double swing/TTL	+3.0V to +5.5V	100Ω	Open emitter	SK4435ATF	Anything to PECL	+6.0V to +7.2V	100Ω	Open emitter
SK4414ATF	ECL/PECL	+3.0V to +5.5V	100Ω	50Ωoutput	SK4436ATF	Anything to ECL	+6.0V to +7.2V	100Ω	Open emitter
					SK4439ATF	Anything to PECL	+6.0V to +7.2V	100Ω	50Ωoutput
					SK4440ATF	Anything to ECL	+6.0V to +7.2V	100Ω	50Ωoutput

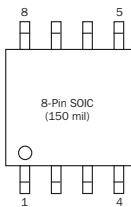
## ECL Lite

PART NUMBER	PART DESCRIPTION	OPERATING VOLTAGE	FEATURES	PACKAGE
SK10EL31WD & SK100EL31WD	D flip-flop with set and reset	+3.0V to +5.5V	350ps propagation delay; 2.9GHz toggle frequency	8-pin SOIC
SK10EL52WD & SK100EL52WD	Differential data and clock D flip-flop	+3.0V to +5.5V	365ps propagation delay; 2.0GHz toggle frequency	8-pin SOIC
SK10EL11WD/MS & SK100EL11WD/MS	1:2 differential fanout buffer	+3.0V to +5.5V	330ps propagation delay; 5ps skew between outputs	8-pin SOIC/MSOP
SK100EL56WD	Dual 2:1 differential multiplexer	+3.0V to +5.5V	500ps propagation delay; V <sub>BB</sub> output	20-pin SOIC
SK100EL57WD	4:1 differential multiplexer	+3.0V to +5.5V	420ps propagation delay; useful as either a 4:1 or 2:1 multiplexer; V <sub>BB</sub> output	16-pin SOIC
SK100EL58WD	2:1 multiplexer	+3.0V to +5.5V	450ps typical propagation delay	8-pin SOIC
SK10EL16BD/MS & SK100EL16BD/MS	Differential receiver with monitoring output	+3.0V to +5.5V	300ps propagation delay; single-ended mounting output	8-pin SOIC/MSOP
SK10EL16WD/MS & SK100EL16WD/MS	Differential receiver	+3.0V to +5.5V	300ps propagation delay	8-pin SOIC/MSOP
SK10EL16VD/MS & SK100EL16VD/MS	Differential receiver with variable output swing	+3.0V to +5.5V	300ps propagation delay; VCTRL input to control the amplitude of the differential outputs	8-pin SOIC
SK100EL17WD	Quad differential receiver	+3.0V to +5.5V	325ps typical propagation delay	20-pin SOIC
SK100EL16YD/MS	High gain differential receiver with variable output swing	+3.0V to +5.5V	400ps propagation delay; VCTRL input to control the amplitude of the differential high gain outputs	8-pin SOIC/MSOP
SK10EL16XWAD/MS & SK100EL16XWAD/MS	High gain differential receiver	+3.0V to +5.5V	300ps propagation delay; high gain outputs: pin-to-pin compatible with SK101100EL16W	8-pin SOIC/MSOP
SK10EL16XWBD/MS & SK100EL16XWBD/MS	High gain differential receiver with monitoring output	+3.0V to +5.5V	300ps propagation delay; pin-to-pin compatible with SK10/100EL16B with the exception of differential high gain outputs; single-ended monitoring output	8-pin SOIC/MSOP
SK10EL16XWCD/MS & SK100EL16XWCD/MS	High gain differential receiver	+3.0V to +5.5V	300ps propagation delay; D* input internally connected to V <sub>BB</sub> ; enable-input; single-ended monitoring output	8-pin SOIC/MSOP
SK10EL16XWDMS & SK100EL16XWDMS	High gain differential receiver	+3.0V to +5.5V	300ps propagation delay; differential monitor outputs and high gain outputs; enable-input pin	10-pin MSOP
SK10EL16XWED/MS & SK100EL16XWED/MS	High gain differential receiver	+3.0V to +5.5V	300ps propagation delay; differential monitor outputs and high gain outputs	8-pin SOIC/MSOP
SK10EL16XWFD/MS & SK100EL16XWFD/MS	High gain differential receiver	+3.0V to +5.5V	300ps propagation delay; enable option; single ended monitor output; differential high gain outputs	8-pin SOIC/MSOP
SK10EL16XWGD/MS & SK100EL16XWGD/MS	High gain differential receiver with variable output swing	+3.0V to +5.5V	300ps propagation delay; differential high gain outputs; VCTRL input controls amplitude of QHG and QHG outputs	8-pin SOIC/MSOP

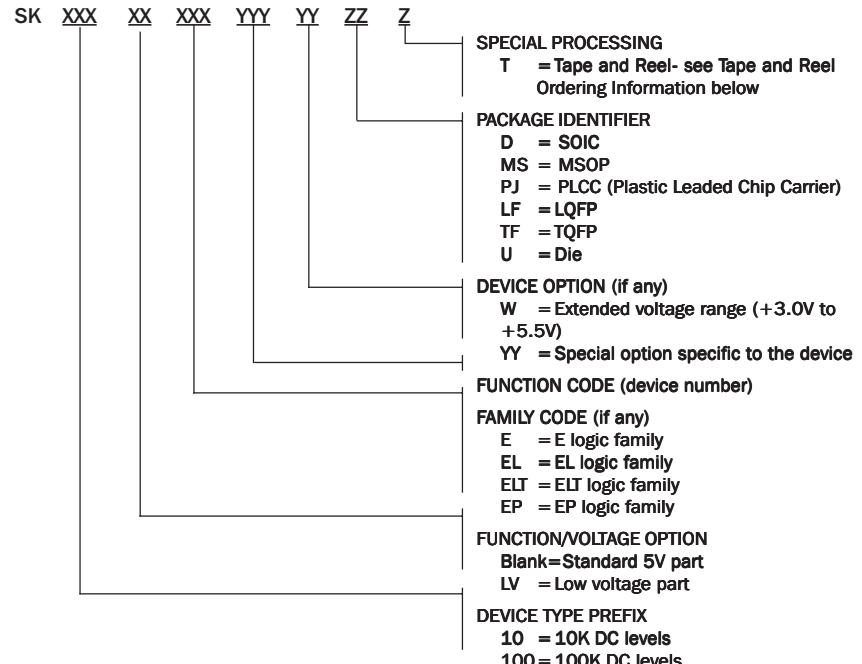


## Translators

PART NUMBER	OPERATING VOLTAGE		TRANSLATION FROM	TRANSLATION TO								PACKAGE	
	+3.0V to +5.5V	-3.0V to -5.5V		ECL	LVECL	PECL	LVPECL	TTL	LVTTL	CMOS	LVCMOS	LVDS	
SK100EL90W	■	■	ECL			■	■						SOIC-8
SK100ELT25W	■	■	ECL					■		■			SOIC-8
SK100EL90W	■	■	LVECL		■	■							SOIC-20
SK100ELT25W	■	■	LVECL					■		■			SOIC-8
SK100EL91W	■	■	PECL	■	■								SOIC-20
SK100ELT21W	■		PECL				■	■					SOIC-8
SK100ELT23W	■		PECL				■	■	■				SOIC-8
SK1300	■		PECL						■				MSOP-8, SOIC-8
SK1302	■		PECL							■			MSOP-10
SK100EL91W	■	■	LVPECL	■	■								SOIC-20
SK100ELT21W	■		LVPECL				■	■	■	■			SOIC-8
SK100ELT23W	■		LVPECL				■	■	■	■			SOIC-8
SK1300	■		LVPECL					■					MSOP-8, SOIC-8
SK1302	■		LVPECL						■				MSOP-10
SK100ELT20W	■		TTL		■								MSOP-8, SOIC-8
SK100ELT22W	■		TTL		■								MSOP-8, SOIC-8
SK100ELT24W	■	■	TTL	■									MSOP-8, SOIC-8
SK100ELT20W	■		LVTTL			■							MSOP-8, SOIC-8
SK100ELT22W	■		LVTTL			■							MSOP-8, SOIC-8
SK100ELT24W	■	■	LVTTL	■									MSOP-8, SOIC-8
SK100ELT20W	■		CMOS		■								MSOP-8, SOIC-8
SK100ELT22W	■		CMOS		■								MSOP-8, SOIC-8
SK100ELT24W	■	■	CMOS	■									MSOP-8, SOIC-8
SK100ELT20W	■		LVCMOS			■							MSOP-8, SOIC-8
SK100ELT22W	■		LVCMOS			■							MSOP-8, SOIC-8
SK100ELT24W	■	■	LVCMOS	■									MSOP-8, SOIC-8
SK1301	■		LVDS		■	■							MSOP-8, SOIC-8



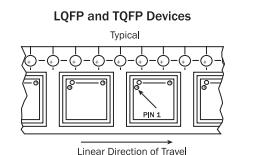
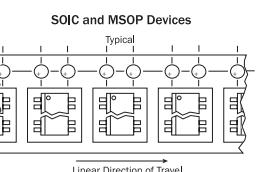
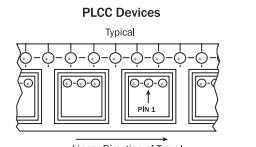
## Part Identification Information



## Tape and Reel Information

Semtech's tape and reel packaging fully conforms to the latest EIA-481-1A and EIA-481-2A specifications. The antistatic embossed tape provides a secure cavity sealed with a peel-back tape.

Device Type	Tape Width (mm)	Maximum (Device/Reel)	Reel Size (Inch)	Maximum (Device/Tube)
PLCC-28	<b>24</b>	<b>750</b>	<b>13</b>	<b>38</b>
SOIC-8	<b>12</b>	<b>2,500</b>	<b>13</b>	<b>98</b>
SOIC-16	<b>16</b>	<b>2,500</b>	<b>13</b>	<b>49</b>
SOIC-20	<b>24</b>	<b>1,000</b>	<b>13</b>	<b>38</b>
MSOP-8	<b>12</b>	<b>2,500</b>	<b>13</b>	<b>50</b>
MSOP-10	<b>12</b>	<b>2,500</b>	<b>13</b>	<b>50</b>
LQFP-32 (7 x 7mm)	<b>16</b>	<b>1,000</b>	<b>13</b>	<b>250 (tray)</b>
TQFP-32 (7 x 7mm)	<b>16</b>	<b>1,000</b>	<b>13</b>	<b>250 (tray)</b>
TQFP-32 (5 x 5mm)	<b>16</b>	<b>1,000</b>	<b>13</b>	<b>360 (tray)</b>



### Ordering Information:

To order devices which are to be delivered in tape and reel, add the suffix T to the device number being ordered.

All Viewed from Tape Side