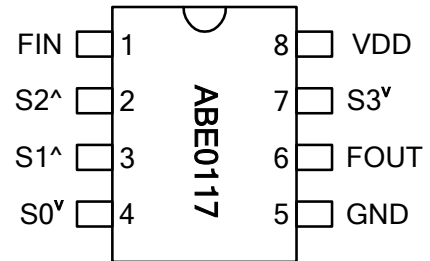


## Low EMI Spread Spectrum Multiplier Clock

### FEATURES

- Spread Spectrum Clock Generator with selectable multiplier ( 1x, 2x, 2.94x and 4x ).
- Output frequency ranges: 16MHz to 200MHz.
- Center Spread Modulation.
- TTL/CMOS compatible outputs.
- 3.3V Operating Voltage.
- Low short term jitter.
- Available in 8-Pin 150mil SOIC.

### PIN CONFIGURATION



FIN = 16 ~ 60 Mhz

Note: v: 30kΩ Internal Pull down. ^: 30kΩ Internal Pull up.

### DESCRIPTION

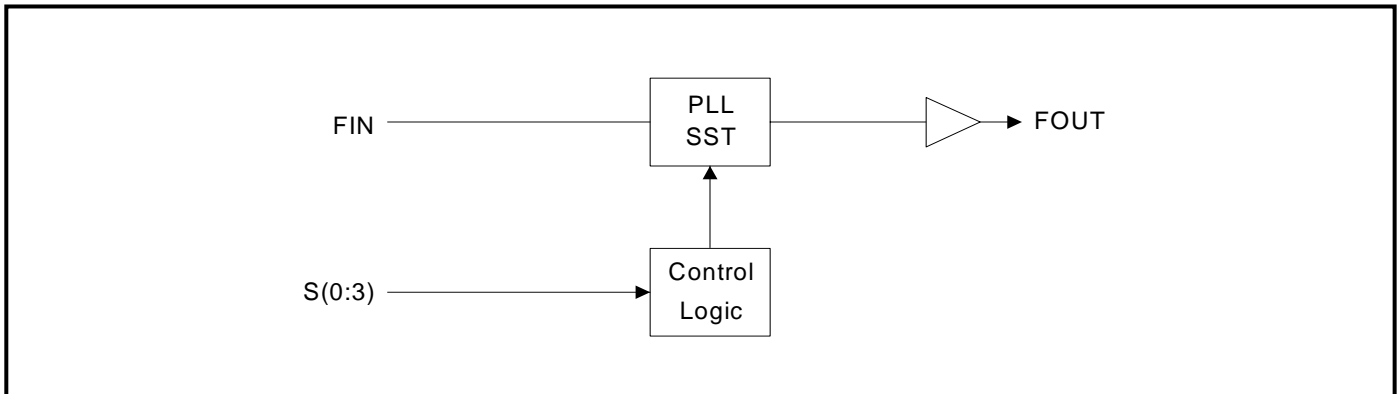
The ABE0117 is a Spread Spectrum Clock Generator designed for the purpose of reducing EMI in high-speed digital systems, with selectable Center Spread modulation magnitude (see table below). The multiplication factor can be selected from 4 multiplier modes. The device operates over a wide range of input frequencies and provides 1x, 2x, 2.94x and 4x modulated clock outputs.

### OUTPUT CLOCK (FOUT) SELECTION

S3	S2	S1	S0	FIN Range (MHz)	FOUT	Spread Spectrum Modulation	
						Frequency	Magnitude
0	0	0	0	16 - 40	X1	Fin / 512	±0.75%
0	0	0	1	16 - 40	X1		±1.00%
0	0	1	0	16 - 40	X1		±1.25%
0	0	1	1	16 - 40	X1		±1.50%
0	1	0	0	16 - 40	X2	Fin / 512	±0.25%
0	1	0	1	16 - 40	X2		±0.50%
0	1	1	0	16 - 40	X2		±0.75%
0	1	1	1	16 - 40	X2		±1.00%
1	0	0	0	24 - 60	X2	Fin / 1024	±1.25%
1	0	0	1	24 - 60	X2		±1.50%
1	0	1	0	24 - 50	X4		±0.25%
1	0	1	1	24 - 50	X4		±0.50%
1	1	0	0	16 - 40	X2.94	Fin / 1000	±0.25%
1	1	0	1	16 - 40	X2.94		±0.50%
1	1	1	0	16 - 40	X2.94		±0.75%
1	1	1	1	16 - 40	X2.94		±1.00%

## Low EMI Spread Spectrum Multiplier Clock

### BLOCK DIAGRAM



### PIN DESCRIPTIONS

Name	Number	Type	Description
FIN	1	I	Input Clock connection. 16MHz to 60MHz.
S2	2	I	Digital control input to select multiplication factor and SST modulation amplitude. Has internal pull-up.
S1	3	I	Digital control input to select multiplication factor and SST modulation amplitude. Has internal pull-up.
S0	4	I	Digital control input to select multiplication factor and SST modulation amplitude. Has internal pull-down.
GND	5	P	Ground connection.
FOUT	6	O	SST Modulated Clock Output. The frequency before modulation is synthesized by multiplying the input frequency by 1X, 2X, 2.94X or 4X, depending on S(0:3).
S3	7	I	Digital control input to select multiplication factor and SST modulation amplitude. Has internal pull-down.
VDD	8	P	3.3V Power Supply connection.

### ELECTRICAL SPECIFICATIONS

#### 1. Absolute Maximum Ratings

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	V <sub>DD</sub>		4.6	V
Input Voltage, dc	V <sub>I</sub>	-0.5	V <sub>DD</sub> +0.5	V
Output Voltage, dc	V <sub>O</sub>	-0.5	V <sub>DD</sub> +0.5	V
Storage Temperature	T <sub>S</sub>	-65	150	°C
Ambient Operating Temperature*	T <sub>A</sub>	-40	85	°C
Junction Temperature	T <sub>J</sub>		125	°C
Lead Temperature (soldering, 10s)			260	°C
ESD Protection, Human Body Model			2	kV

Exposure of the device under conditions beyond the limits specified by Maximum Ratings for extended periods may cause permanent damage to the device and affect product reliability. These conditions represent a stress rating only, and functional operations of the device at these or any other conditions above the operational limits noted in this specification is not implied.

\* Note: Operating Temperature is guaranteed by design for all parts (COMMERCIAL and INDUSTRIAL), but tested for COMMERCIAL grade only.

## Low EMI Spread Spectrum Multiplier Clock

### 2. DC/AC Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Voltage	$V_{DD}$		2.97		3.63	V
Supply Current	$I_{DD}$	15pF Load, FOUT=16MHz		9		mA
		5pF Load, FOUT=200MHz		25		mA
Input High Voltage	$V_{IH}$		$0.7 * V_{DD}$			V
Input Low Voltage	$V_{IL}$				$0.3 * V_{DD}$	V
Input High Current	$I_{IH}$				100	$\mu$ A
Input Low Current	$I_{IL}$				100	$\mu$ A
Output High Voltage	$V_{OH}$	$I_{OH}=5mA, V_{DD} =3.3V$	2.4			
Output Low Voltage	$V_{OL}$	$I_{OL}=6mA, V_{DD} =3.3V$			0.4	
Input Frequency	$F_{IN}$	S3=0 or S3-S2=1-1	16		40	MHz
		S3-S2-S1=1-0-1	24		50	MHz
		S3-S2-S1=1-0-0	24		60	MHz
Recovery from interruption of $F_{IN}$				1		ms
Input Capacitance	$C_{in1}$			3		pF
Pull-up Resistor	$R_{pu}$	PIN 2, 3		30		k $\Omega$
Pull-down Resistor	$R_{pd}$	PIN 4, 7		30		k $\Omega$
Short Circuit Current	$I_{sc}$			50		mA
3.3V Dynamic Supply Current	$I_{DD}$	No Load, FOUT=16MHz		7		mA
		No Load, FOUT=200MHz		21		mA

### 3. TIMING CHARACTERISTICS

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Rise Time	$T_r$	10%~90%VDD, 15pF Load, FOUT $\leq$ 100MHz		2	3	ns
		10%~90%VDD, 10pF Load, FOUT $\leq$ 150MHz		1.5	2	ns
		10%~90%VDD, 5pF Load, FOUT $\leq$ 200MHz		1	1.5	ns
Fall Time	$T_f$	90%~10%VDD, 15pF Load, FOUT $\leq$ 100MHz		2	3	ns
		90%~10%VDD, 10pF Load, FOUT $\leq$ 150MHz		1.5	2	ns
		90%~10%VDD, 5pF Load, FOUT $\leq$ 200MHz		1	1.5	ns
Output Duty Cycle	$D_T$	Measured at 50%VDD	45	50	55	%
Cycle to Cycle Jitter	$T_{cyc-cyc}$	Over output frequency range @ 3.3V			100	ps peak

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**Low EMI Spread Spectrum Multiplier Clock**

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**FUNCTIONAL DESCRIPTION****Selectable spread spectrum and modulation frequency and magnitude**

The ABE0117 provides selectable spread spectrum modulation frequency, as well as selectable modulation magnitude. Selection is made by connecting pins 2 (S2), 3 (S1), 4 (S0), and 7 (S3) to a logical “zero” or “one”, according to the output clock selection table on (page 1).

**Default values for S(0:3) through internal pull-up and pull-down resistor**

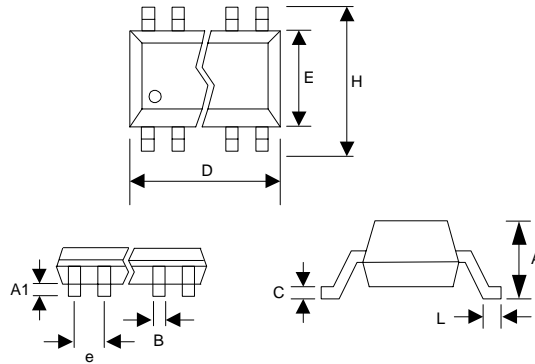
Selection pins 4 and 7 (S0 and S3) have an internal pull-down resistor of 30k $\Omega$  while pins 2 and 3 (S1 and S2) have an internal pull-up resistor of 30k $\Omega$ . This internal pull-down (or pull-up) resistor will pull the input value to a logical “zero” (or “one” respectively) by default, i.e. when no connection is made between the pin and VDD (GND respectively). In order to override the internal pull-down (pull-up), the pin has to be connected to VDD (GND respectively).

## Low EMI Spread Spectrum Multiplier Clock

### PACKAGE INFORMATION

8 PIN Narrow SOIC ( mm )

Symbol	SOIC	
	Min.	Max.
A	1.47	1.73
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	4.95
E	3.80	4.00
H	5.80	6.20
L	0.38	1.27
e	1.27 BSC	

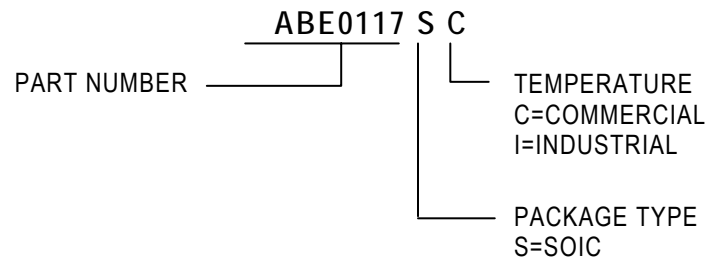


### ORDERING INFORMATION

*For part ordering, please contact our Sales Department:*  
 30332 Esperanza., Rancho Santa Margarita, Ca 92688  
 Ph: 949-546-8000 Fax: 949-546-8001

#### PART NUMBER

The order number for this device is a combination of the following:  
 Device number, Package type and Operating temperature range



Order Number	Marking	Package Option
ABE0117SC-T	ABE0117SC	SOIC -Tape and Reel
ABE0117SC	ABE0117SC	SOIC -Tube

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