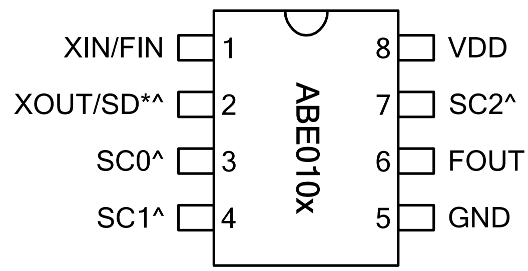
ABE0101/02/04/06

Low EMI Spread Spectrum Multiplier Clock

FEATURES

- Spread Spectrum Clock Generator with selectable multiplier from 1x to 6x outputs.
- Output frequency ranges: 10MHz to 180MHz.
- Accepts input from crystal or reference clock.
- Selectable Center, Down or Asymmetric Spread Modulation.
- Selectable Modulation rate.
- TTL/CMOS compatible outputs.
- 3.3V Operating Voltage.
- Low short term jitter.
- Available in 8-Pin 150mil SOIC.

PIN CONFIGURATION



XIN/FIN = 10 ~ 30 MHz

Note: ^: Internal pull-up resistor (120kΩ for SD, 30 kΩ for SC0-SC2).

*: The value of SD is latched upon power-up. The internal pull-up resistor results in a default high value when no pull-down resistor is connected to this pin (recommended external pull-down resistor of 27 kΩ).

DESCRIPTION

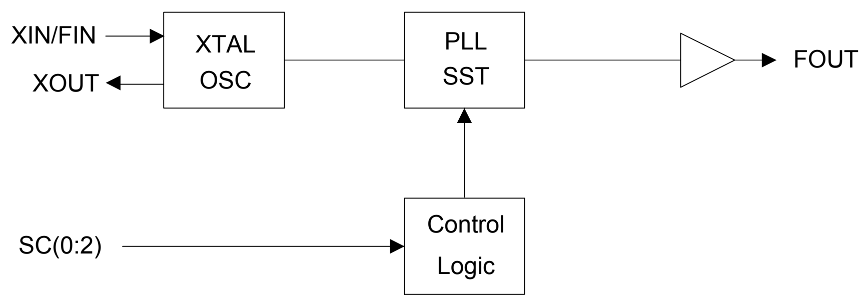
The ABE0101/02/04/06 are Spread Spectrum Clock Generators designed for the purpose of reducing EMI in high-speed digital systems. Any output frequency from 10 to 180MHz can be selected by programming 6 multiplier modes. The device is designed to operate from a crystal or reference clock input and provides 1x to 6x modulated clock outputs.

OUTPUT CLOCK (FOUT) SELECTION

SD	SC2	SC1	SC0	FOUT (01)	FOUT (02)	FOUT (04)	FOUT (06)	SST Modulation			
								Magnitude	Freq.	Type	
1	0	0	0	X1	X2	X4	X6	0.50%	Fin / 512	C	±0.25%
1	0	0	1	X1	X2	X4	X6	1.00%		C	±0.5%
0	0	0	1	X1	X2	X4	X6			D	-1.0%
1	0	1	0	X1	X2	X4	X6	1.50%		C	±0.75%
0	0	1	0	X1	X2	X4	X6			A	+0.25% ~ -1.25%
1	0	1	1	X1	X2	X4	X6	2.00%		C	±1.0%
0	0	1	1	X1	X2	X4	X6			A	+0.5% ~ -1.5%
1	1	0	0	X1	X2	X4	X6	2.50%		C	±1.25%
0	1	0	0	X1	X2	X4	X6			A	+0.75% ~ -1.75%
1	1	0	1	X1	X2	X4	X6	3.00%		C	±1.5%
0	1	0	1	X1	X2	X4	X6			A	+1.0% ~ -2.0%
1	1	1	0	X1	X2	X4	X6	3.50%		C	±1.75%
0	1	1	0	X1	X2	X4	X6			A	+1.25% ~ -2.25%
1	1	1	1	X1	X2	X4	X6	OFF			

Notes: C: Center Spread. A: Asymmetric Spread. D: Down Spread.

BLOCK DIAGRAM



PIN DESCRIPTIONS

Name	Number	Type	Description
XIN/FIN	1	I	Crystal input to be connected to fundamental parallel mode crystal.(C_L=18pF) or clock input.
XOUT/SD	2	B	At power-up, this pin is an input pin to select modulation type. After input sampling, this pin is crystal output. Has internal pull up resistor.
SC0	3	I	Digital control input to select modulation magnitude. Has internal pull-up.
SC1	4	I	Digital control input to select modulation magnitude. Has internal pull-up.
GND	5	P	Ground.
FOUT	6	O	Modulated Clock Frequency Output. The frequency before modulation is synthesized by multiplying the input frequency by 1X, 2X, 4X, 6X depending on the part number (ABE0101, 02, 04, 06).
SC2	7	I	Digital control input to select modulation magnitude. Has internal pull-up.
VDD	8	P	Power Supply.

FUNCTIONAL DESCRIPTION

Selectable spread spectrum and modulation magnitudes

The ABE0101/02/04/06 provides selectable spread spectrum modulation type, as well as selectable modulation magnitude. Selection is made by connecting specific pins to a logical “zero” or “one” according to the output clock selection table on page 1.

In order to reduce the number of pins on the chip, the ABE0101/02/04/06 uses pin 2 (XOUT/SD) as a bi-directional pin. The pin serves as modulation type selector input (SD) upon power-up (see output clock selection table on page 1), and as XOUT crystal connection as soon as the input has been latched.
Pins 3 (SC0), 4 (SC1), and 7 (SC2) are used as inputs to select the spread spectrum modulation magnitude as shown on the output clock selection table (page 1).

Connecting a selection pin to a logical “one”

All selection pins have an internal pull-up resistor (30kΩ for pins 3, 4, 7, and 120kΩ for pin 2). This internal pull-up resistor will pull the input value to a logical “one” (pull-up) by default, i.e. when no resistive load is connected between the pin and GND. No external pull-up resistor is therefore required for connecting a logical “one” upon power-up.

Connecting a selection pin to a logical “zero”

For an input only pin, i.e. pins 3 (SC0), 4 (SC1), and 7 (SC2), the pin simply needs to be grounded to pull the input down to a logical “zero”. Connecting the bi-directional pin (SD) to a logical “zero” will however require the use of a 27kΩ loading resistor between the pin and GND.

ELECTRICAL SPECIFICATIONS

1. Absolute Maximum Ratings

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	V_{DD}		4.6	V
Input Voltage, dc	V_I	-0.5	V_{DD}+0.5	V
Output Voltage, dc	V_O	-0.5	V_{DD}+0.5	V
Storage Temperature	T_S	-65	150	°C
Ambient Operating Temperature*	T_A	-40	85	°C
Junction Temperature	T_J		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.

2. Timing Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Rise Time	T_r	Measured at 0.8V ~ 2.0V @ 3.3V	0.8	0.95	1.1	ns
Fall Time	T_f	Measured at 2.0V ~ 0.8V @ 3.3V	0.78	0.85	0.9	ns
Output Duty Cycle	D_T		45	50	55	%
Cycle to Cycle Jitter	$T_{cyc\text{-}cyc}$	FOUT=48MHz @ 3.3V			100	ps
Cycle to Cycle Jitter	$T_{cyc\text{-}cyc}$	FOUT=72MHz @ 3.3V			100	ps

3. DC/AC Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Voltage	V_{DD}		2.97		3.63	V
Input High Voltage	V_{IH}		0.7*VDD			V
Input Low Voltage	V_{IL}				0.3*VDD	V
Input High Current	I_{IH}				100	μA
Input Low Current	I_{IL}				100	μA
Output High Voltage	V_{OH}	I_{OH}=5mA, VDD=3.3V	2.4			
Output Low Voltage	V_{OL}	I_{OL}=6mA, VDD=3.3V			0.4	
Input Frequency	F_{XIN}	When using a crystal	10		30	MHz
	F_{IN}	When using reference clock	10		30	MHz
Maximum interruption of F_{IN}		When using reference clock			100	μs
Load Capacitance	C_L	Between Pin XIN and XOUT*		18		pF
Pull-up Resistor	R_{up}	PIN 2		120		kΩ
Pull-up Resistor	R_{up}	PIN 3, 4, 7		30		kΩ
Short Circuit Current	I_{sc}			50		mA
3.3V Dynamic Supply Current	I_{CC}	No Load		20		mA

***Note:** Pin XIN and XOUT each has a 36pF capacitance. When used with a XTAL, the two capacitors combined load the crystal with 18pF. If driving XIN with a reference clock signal, the load capacitance will be 36pF (typical).

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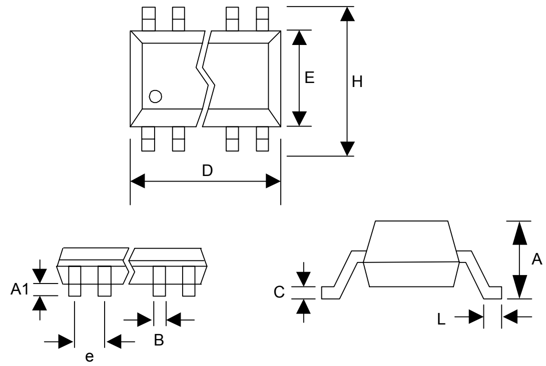
PACKAGE INFORMATION

8 PIN Narrow SOIC (mm)

	SOIC	
Symbol	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 Device number, Package type and Operating temperature range

ABE010x x C

PART NUMBER

TEMPERATURE
C=COMMERCIAL
I=INDUSTRIAL

PACKAGE TYPE
S=SOIC

Order Number	Marking	Package Option
ABE0101SC-R	ABE0101SC	SOIC -Tape and Reel
ABE0101SC	ABE0101SC	SOIC -Tube
ABE0102SC-R	ABE0102SC	SOIC -Tape and Reel
ABE0102SC	ABE0102SC	SOIC -Tube
ABE0104SC-R	ABE0104SC	SOIC -Tape and Reel
ABE0104SC	ABE0104SC	SOIC -Tube
ABE0106SC-R	ABE0106SC	SOIC -Tape and Reel
ABE0106SC	ABE0106SC	SOIC -Tube