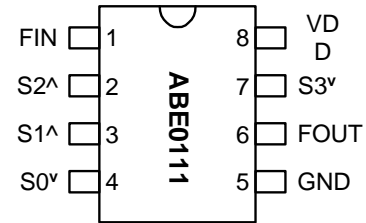


## Low EMI Spread Spectrum Multiplier Clock

### FEATURES

- Spread Spectrum Clock Generator with selectable multiplier ( 1x, 2x and 4x ).
- Output frequency ranges: 24MHz to 240MHz.
- Selectable center spread modulation rate.
- TTL/CMOS compatible outputs.
- 3.3V Operating Voltage.
- Low short term jitter.
- Available in 8-Pin 150mil SOIC.

### PIN CONFIGURATION



FIN = 24 ~ 120 Mhz

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

### DESCRIPTION

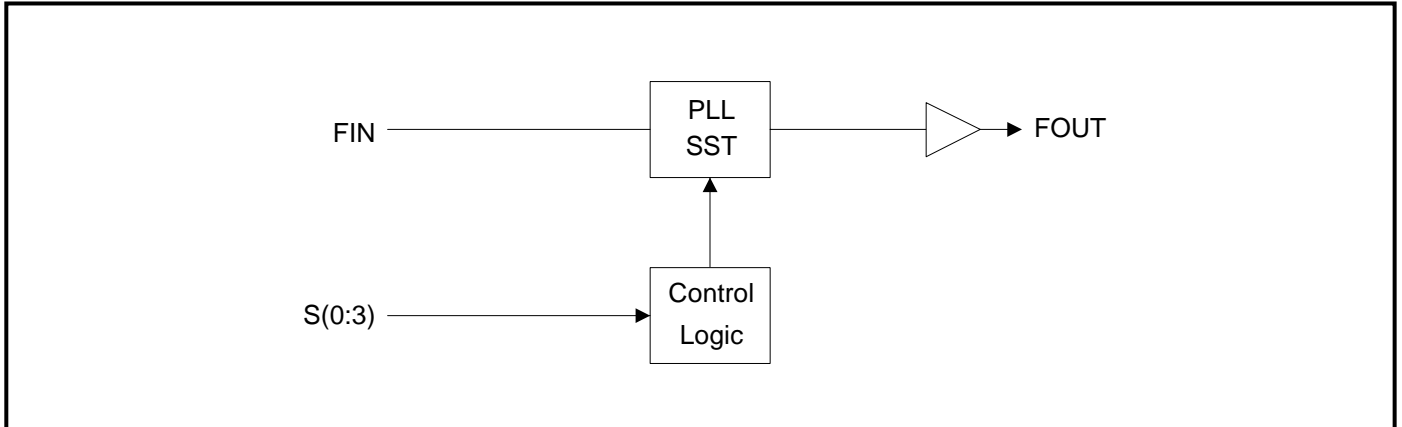
The ABE0111 is a Spread Spectrum Clock Generator designed for the purpose of reducing EMI in high-speed digital systems, with the selectable Center Spread modulation amplitude (see table below). The output frequency is selected by programming 4 multiplier modes. The device operates over a very wide range of input frequencies and provides 1x to 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  | 24 - 60         | X1   | Fin / 1024                 | ±0.75%    |
| 0  | 0  | 0  | 1  | 24 - 60         | X1   |                            | ±1.00%    |
| 0  | 0  | 1  | 0  | 24 - 60         | X1   |                            | ±1.25%    |
| 0  | 0  | 1  | 1  | 24 - 60         | X1   |                            | ±1.50%    |
| 0  | 1  | 0  | 0  | 24 - 60         | X2   |                            | ±0.25%    |
| 0  | 1  | 0  | 1  | 24 - 60         | X2   |                            | ±0.50%    |
| 0  | 1  | 1  | 0  | 24 - 60         | X2   |                            | ±0.75%    |
| 0  | 1  | 1  | 1  | 24 - 60         | X2   |                            | ±1.00%    |
| 1  | 0  | 0  | 0  | 24 - 60         | X2   |                            | ±1.25%    |
| 1  | 0  | 0  | 1  | 24 - 60         | X2   |                            | ±1.50%    |
| 1  | 0  | 1  | 0  | 24 - 60         | X4   |                            | ±0.25%    |
| 1  | 0  | 1  | 1  | 24 - 60         | X4   |                            | ±0.50%    |
| 1  | 1  | 0  | 0  | 60 - 120        | X1   |                            | ±0.25%    |
| 1  | 1  | 0  | 1  | 60 - 120        | X1   |                            | ±0.50%    |
| 1  | 1  | 1  | 0  | 60 - 120        | X1   |                            | ±0.75%    |
| 1  | 1  | 1  | 1  | 60 - 120        | X1   |                            | ±1.00%    |

## Low EMI Spread Spectrum Multiplier Clock

### BLOCK DIAGRAM



### PIN DESCRIPTIONS

| Name | Number | Type | Description  |
|------|--------|------|--|
| FIN  | 1      | I    | Input Clock Frequency, 24MHz to 120MHz.  |
| 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.  |
| FOUT | 6      | O    | SST Modulated Clock Frequency Output. The frequency before modulation is synthesized by multiplying the input frequency by 1X, 2X, 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.   |

## Low EMI Spread Spectrum Multiplier Clock

### 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. DC/AC Specifications

| PARAMETERS                       | SYMBOL    | CONDITIONS                | MIN.               | TYP. | MAX.               | UNITS     |
|----------------------------------|-----------|---------------------------|--------------------|------|--------------------|-----------|
| Supply Voltage                   | $V_{DD}$  |                           | 2.97               |      | 3.63               | V         |
| Input High Voltage               | $V_{IH}$  |                           | $0.7 \cdot V_{DD}$ |      |                    | V         |
| Input Low Voltage                | $V_{IL}$  |                           |                    |      | $0.3 \cdot V_{DD}$ | 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                  | $F_{IN}$  |                           | 24                 |      | 120                | MHz       |
| Maximum interruption of $F_{IN}$ |           |                           |                    |      | none               | $\mu s$   |
| Input Capacitance                | $C_{in1}$ |                           |                    | 4    |                    | 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      | $I_{CC}$  | No Load                   |                    | 20   |                    | mA        |

## Low EMI Spread Spectrum Multiplier Clock

### 3. 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   | %     |
| Input to Output Delay |               |                                    | 2    |      | 4    | ns    |
| Cycle to Cycle Jitter | $T_{cyc-cyc}$ | Over output frequency range @ 3.3V |      |      | 100  | ps    |

### FUNCTIONAL DESCRIPTION

#### Selectable spread spectrum and modulation rates

The ABE0111 provides selectable spread spectrum modulation, as well as selectable modulation rate. Selection is made by connecting specific pins to a logical "zero" or "one", according to the output clock selection table and modulation rate selection table on page 1.

Pins 2 (S2), 3 (S1), 4 (S0), and 7 (S3) are used as inputs to select the spread spectrum modulation and multiplication factor as shown on the output clock selection table (page 1).

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

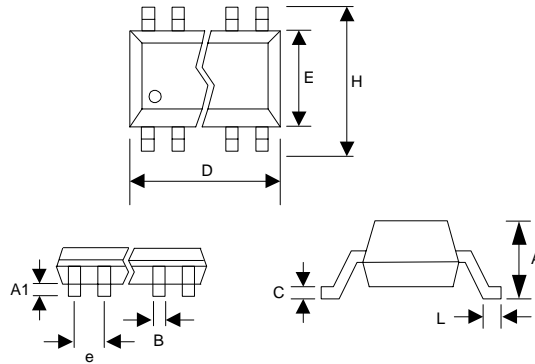
Selection pins S0 and S3 have an internal pull-down resistor of 30k $\Omega$ , pins 2 and 3 (S1 and S2) have an internal pull-up resistor of 30k $\Omega$ . This internal pull-up (or pull-down) resistor will pull the input value to a logical "one" (or "zero" respectively) by default, i.e. when no resistive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

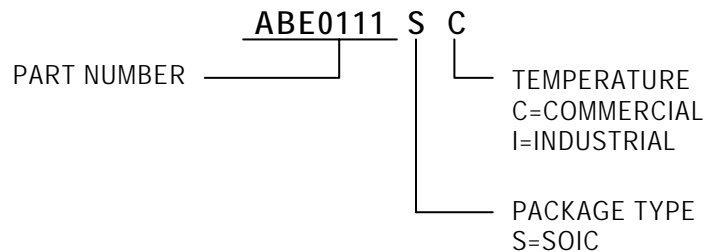


### ORDERING INFORMATION

*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      |
|--------------|-----------|---------------------|
| ABE0111SC-T  | ABE0111SC | SOIC -Tape and Reel |
| ABE0111SC    | ABE0111SC | SOIC -Tube          |

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