

## Low Phase Noise VCXO (96MHz to 200MHz)

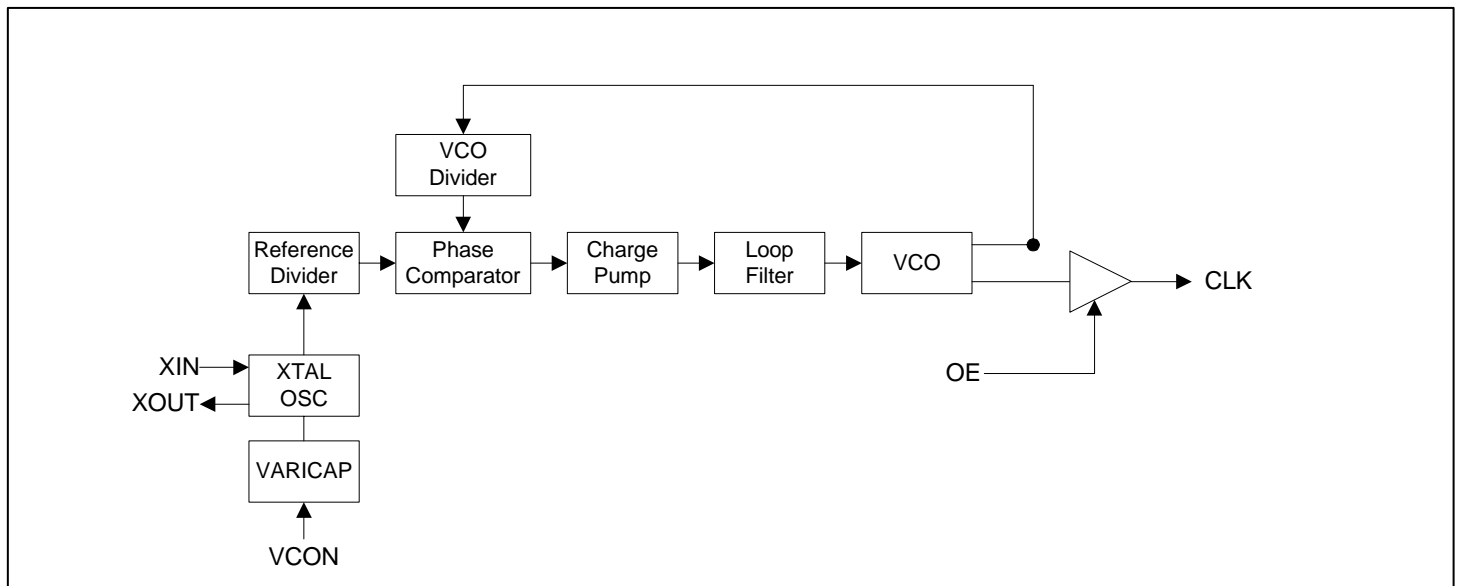
### FEATURES

- VCXO output for the 96MHz to 200MHz range
- Low phase noise.
- CMOS output.
- 12 to 25MHz crystal input.
- Integrated variable capacitors.
- Selectable High Drive (30mA) or Standard Drive (10mA) output.
- Wide pull range (+/- 250 ppm).
- Low jitter (RMS): 4ps period.
- 3.3V operation.
- Available in 8-Pin SOIC.

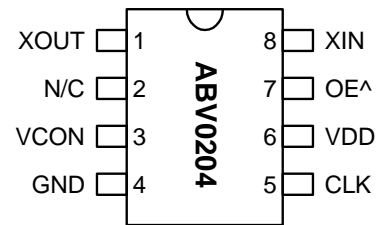
### DESCRIPTION

The ABV0204 is a low cost, high performance and low phase noise VCXO for the 96 to 200MHz range. The very low jitter (4ps RMS period jitter at 155.52MHz) makes this chip ideal for applications requiring voltage controlled frequency sources in CMOS. Input crystal can range from 12 to 25MHz (fundamental resonant mode).

### BLOCK DIAGRAM



### PIN CONFIGURATION



Note: ^ denotes internal pull up

### OUTPUT RANGE

| MULTIPLIER | FREQUENCY RANGE | OUTPUT BUFFER |
|------------|-----------------|---------------|
| X8         | 96 - 200MHz     | CMOS          |

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### PIN DESCRIPTIONS

| Name | Number | Type | Description   |
|------|--------|------|---|
| XOUT | 1      | I    | Crystal output. See Crystal Specifications on page 3.   |
| N/C  | 2      | -    | Not connected.  |
| VCON | 3      | I    | Voltage Control input.  |
| GND  | 4      | P    | Ground.   |
| CLK  | 5      | O    | Output clock.   |
| VDD  | 6      | P    | +3.3V power supply.   |
| OE   | 7      | I    | Output enable input. Disables (tri-state) output when low. Internal pull-up enables output by default if pin is not connected to low. |
| XIN  | 8      | I    | Crystal input. See Crystal Specifications on page 3.  |

### 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 Electrical Specifications

| PARAMETERS                                   | SYMBOL   | CONDITIONS   | MIN. | TYP. | MAX. | UNITS |
|--|----------|--|------|------|------|-------|
| Supply Current, Dynamic, with Loaded Outputs | $I_{DD}$ | $F_{XIN} = 12 - 25\text{MHz}$<br>Output load of 10pF |      | 20   | 25   | mA    |
| Operating Voltage                            | $V_{DD}$ |  | 2.97 |      | 3.63 | V     |
| Output drive current (High Drive)            | $I_{OH}$ | $V_{OH} = V_{DD}-0.4\text{V}$ , $V_{DD}=3.3\text{V}$ | 30   |      |      | mA    |
|  | $I_{OL}$ | $V_{OL} = 0.4\text{V}$ , $V_{DD} = 3.3\text{V}$      | 30   |      |      | mA    |
| Output drive current (Standard Drive)        | $I_{OH}$ | $V_{OH} = V_{DD}-0.4\text{V}$ , $V_{DD}=3.3\text{V}$ | 10   |      |      | mA    |
|  | $I_{OL}$ | $V_{OL} = 0.4\text{V}$ , $V_{DD} = 3.3\text{V}$      | 10   |      |      | mA    |
| Short Circuit Current                        |          |  |      | ±50  |      | mA    |
| VCXO Control Voltage                         | VCON     |  | 0    |      | 3.3  | V     |

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### 3. AC Electrical Specifications

| PARAMETERS                                   | SYMBOL | CONDITIONS                     | MIN. | TYP. | MAX. | UNITS |
|--|--------|--------------------------------|------|------|------|-------|
| Input Crystal Frequency                      |        |                                | 12   |      | 25   | MHz   |
| Output Clock Rise/Fall Time (Standard Drive) |        | 0.3V ~ 3.0V with 15 pF load    |      | 2.4  |      | ns    |
| Output Clock Rise/Fall Time (High Drive)     |        | 0.3V ~ 3.0V with 15 pF load    |      | 1.2  |      |       |
| Output Clock Duty Cycle                      |        | Measured @ 50% V <sub>DD</sub> | 45   | 50   | 55   | %     |

### 4. Voltage Control Crystal Oscillator

| PARAMETERS                 | SYMBOL               | CONDITIONS  | MIN. | TYP. | MAX. | UNITS |
|----------------------------|----------------------|---|------|------|------|-------|
| VCXO Stabilization Time *  | T <sub>VCXOSTB</sub> | From power valid  |      |      | 10   | ms    |
| VCXO Tuning Range          |                      | F <sub>XIN</sub> = 12 – 25MHz;<br>XTAL C <sub>0</sub> /C <sub>1</sub> < 250<br>0V ≤ VCON ≤ 3.3V |      | 500  |      | ppm   |
| CLK output pullability     |                      | VCON=1.65V, ±1.65V  | ±200 |      |      | ppm   |
| VCXO Tuning Characteristic |                      |   |      | 150  |      | ppm/V |
| Pull range linearity       |                      |   |      |      | 10   | %     |
| VCON pin input impedance   |                      |   | 2000 |      |      | kΩ    |
| VCON modulation BW         |                      | 0V ≤ VCON ≤ 3.3V, -3dB  | 25   |      |      | kHz   |

Note: Parameters denoted with an asterisk (\*) represent nominal characterization data and are not production tested to any specific limits.

### 5. Jitter and Phase Noise Specification

| PARAMETERS                                 | CONDITIONS  | MIN. | TYP. | MAX. | UNITS  |
|--|---|------|------|------|--------|
| RMS Period Jitter (1 sigma – 1000 samples) | At 155MHz with capacitive decoupling between VDD and GND. |      | 4    |      | ps     |
| Phase Noise relative to carrier            | 155.52MHz @100Hz offset                                   |      | -95  |      | dBc/Hz |
| Phase Noise relative to carrier            | 155.52MHz @1kHz offset                                    |      | -120 |      | dBc/Hz |
| Phase Noise relative to carrier            | 155.52MHz @10kHz offset                                   |      | -128 |      | dBc/Hz |
| Phase Noise relative to carrier            | 155.52MHz @100kHz offset                                  |      | -122 |      | dBc/Hz |
| Phase Noise relative to carrier            | 155.52MHz @1MHz offset                                    |      | -120 |      | dBc/Hz |

### 6. Crystal Specifications

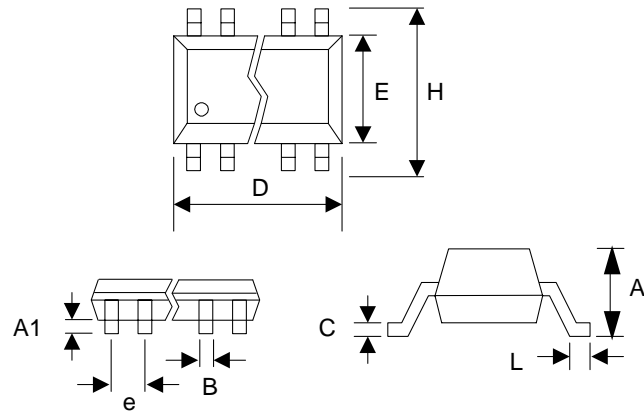
| PARAMETERS                         | SYMBOL                | MIN. | TYP. | MAX. | UNITS |
|------------------------------------|-----------------------|------|------|------|-------|
| Crystal Resonator Frequency        | F <sub>XIN</sub>      | 12   |      | 25   | MHz   |
| Crystal Loading Capacitance Rating | C <sub>L</sub> (xtal) |      | 9.5  |      | pF    |
| C <sub>0</sub> /C <sub>1</sub>     |                       |      |      | 250  | -     |
| ESR                                | R <sub>S</sub>        |      |      | 30   | Ω     |

Note: Crystal Loading rating: 9.5pF is the loading the crystal sees from the VCXO chip at VCON = 1.65V. It is assumed that the crystal will be at nominal frequency at this load. If the crystal requires more load to be at nominal frequency, the additional load must be added externally. This however may reduce the pull range.

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### PACKAGE INFORMATION

| 8 PIN SOIC (in mm) |          |      |
|--------------------|----------|------|
| 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 |      |

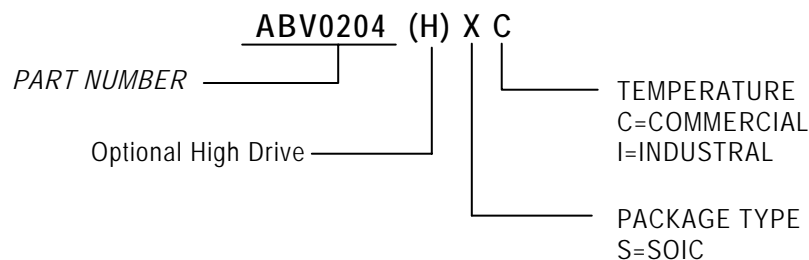


### ORDERING INFORMATION

*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 the following:  
 Device number, Package type and Operating temperature range



| Order Number  | Marking    | Package Option             |
|---------------|------------|----------------------------|
| ABV0204SC     | ABV0204SC  | 8-Pin SOIC (Tube)          |
| ABV0204SC -T  | ABV0204SC  | 8-Pin SOIC (Tape and Reel) |
| ABV0204HSC    | ABV0204HSC | 8-Pin SOIC (Tube)          |
| ABV0204HSC -T | ABV0204HSC | 8-Pin SOIC (Tape and Reel) |

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