

Low Phase Noise PECL VCXO (100MHz to 200MHz)
PAD ASSIGNMENT AND DESCRIPTION

| Pin # | Name | Description |
|-------|-----------|--|
| 1 | OSCOFFSEL | Oscillator Off Selection input pad. When low, turns off the oscillator when output is disabled. When high (default), oscillator running when output is disabled. Internal pull-up |
| 2 | GNDOSC | GND connection for oscillator circuitry. |
| 3 | VCON | Control Voltage input. Use this pin to change the output frequency by varying the applied Control Voltage. |
| 4 | XIN | Crystal oscillator input pin. |
| 5 | XOUT | Crystal oscillator output pin. |
| 6 | OCTRL | OE input pad. See table on page 1. |
| 7 | DNC | Do Not Connect. |
| 8 | GND | Ground connection. |
| 9 | GND | Ground connection. |
| 10 | Q | PECL Output. |
| 11 | QBAR | PECL complementary output. |
| 12 | VDDBUF | VDD connection for output buffer circuitry. VDDBUF should be separately decoupled from other VDDs whenever possible. |
| 13 | VDDANA | VDD connection for analog circuitry. VDDANA should be separately decoupled from other VDDs whenever possible. |
| 14 | OESEL | Selector input to choose the OE control logic. See table on page 1. |
| 15 | BUFZSEL | Output impedance selector |
| 16 | VDDOSC | VDD connection for oscillator circuitry. VDDOSC should be separately decoupled from other VDDs whenever possible. |

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ELECTRICAL SPECIFICATIONS

1. Absolute Maximum Ratings

| PARAMETERS | SYMBOL | MIN. | MAX. | UNITS |
|---|-----------------|----------------------|----------------------|-------|
| Supply Voltage | V _{DD} | | 4.6 | V |
| Input Voltage, dc | V _I | V _{SS} -0.5 | V _{DD} +0.5 | V |
| Output Voltage, dc | V _O | V _{SS} -0.5 | V _{DD} +0.5 | V |
| Storage Temperature | T _S | -65 | 150 | °C |
| Ambient Operating Temperature | T _A | 0 | 70 | °C |
| Junction Temperature | T _J | | 125 | °C |
| Lead Temperature (soldering, 10s) | | | 260 | °C |
| Input Static Discharge Voltage Protection | | | 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.

2. Crystal Specifications

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|-----------------------------|---------------------------------------|---------------------------|------|------|------|-------|
| Crystal Resonator Frequency | F _{XIN} | Parallel Fundamental Mode | 100 | | 200 | MHz |
| Crystal Loading Rating | C _{L (xtal)} | VCON = 1.65V | | 5.0 | | pF |
| Interelectrode Capacitance | C ₀ | | | | 3.5 | pF |
| Crystal Pullability | C ₀ /C _{1 (xtal)} | AT cut | | | 250 | - |
| Recommended ESR | R _E | AT cut | | | 30 | Ω |

3. Voltage Control Crystal Oscillator

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|--------------------------------|----------------------|---|------|------------|------|-------|
| VCXO Stabilization Time * | T _{VCXOSTB} | From power valid | | | 10 | ms |
| VCXO Tuning Range | | XTAL C ₀ /C ₁ < 250 | 250* | | | ppm |
| CLK output pullability | | VCON = 1.65V ± 1.65V at room temperature | | ±125* | | ppm |
| On-chip Varicaps control range | | VCON = 0 to 3.3V | | 3.3 – 8.8* | | pF |
| Linearity | | | | | 5* | % |
| VCXO Tuning Characteristic | | | | 70 | | ppm/V |
| VCON 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.

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4. General Electrical Specifications

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---------------------------------|-----------------|---------------------------------|------|------|------|-------|
| Supply Current (Loaded Outputs) | I _{DD} | at 3.3V @ 155MHz | | | 55 | mA |
| Output valid after OE enabled | | Oscillator off | | | 10 | ms |
| | | Oscillator on | | | 50 | ns |
| Operating Voltage | V _{DD} | | 2.25 | | 3.63 | V |
| Output Clock Duty Cycle | | @ V _{dd} – 1.3V (PECL) | 45 | 50 | 55 | % |
| Short Circuit Current | | | | ±50 | | mA |

5. Jitter specifications

| PARAMETERS | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|--|------|------|------|-------|
| Period jitter RMS at 155MHz | At 155.52MHz, with capacitive decoupling between VDD and GND. Over 10,000 cycles | | 2.5 | | ps |
| Period jitter peak-to-peak at 155MHz | | | 18.5 | 20 | |
| Accumulated jitter RMS at 155MHz | At 155.52MHz, with capacitive decoupling between VDD and GND. Over 1,000,000 cycles. | | 2.5 | | ps |
| Accumulated jitter peak-to-peak at 155MHz | | | 24 | 27 | |
| Random Jitter | “RJ” measured on Wavecrest SIA 3000 | | 2.5 | | ps |
| Integrated jitter RMS at 155MHz | Integrated 12 kHz to 20 MHz | | 0.25 | 0.35 | ps |

Measured on Wavecrest SIA 3000

6. Phase noise specifications

| PARAMETERS | FREQUENCY | 10Hz | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz | UNITS |
|---------------------------------|-----------|------|-------|------|-------|--------|------|--------|
| Phase Noise relative to carrier | 155.52MHz | -75 | -100 | -125 | -140 | -145 | -150 | dBc/Hz |

Note: Phase Noise measured at VCON = 0V

Low Phase Noise PECL VCXO (100MHz to 200MHz)

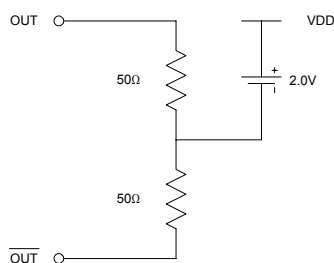
7. PECL Electrical Characteristics

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | MAX. | UNITS |
|---------------------|----------|--|------------------|------------------|-------|
| Output High Voltage | V_{OH} | $R_L = 50 \Omega$ to $(V_{DD} - 2V)$ (see figure) | $V_{DD} - 1.025$ | | V |
| Output Low Voltage | V_{OL} | | | $V_{DD} - 1.620$ | V |

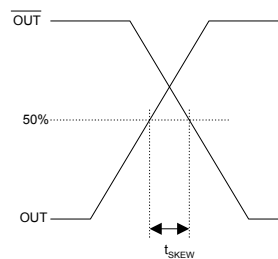
8. PECL Switching Characteristics

| PARAMETERS | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|-----------------|--------|----------------|------|------|------|-------|
| Clock Rise Time | t_r | @20/80% - PECL | | 0.6 | 1.5 | ns |
| Clock Fall Time | t_f | @80/20% - PECL | | 0.5 | 1.5 | ns |

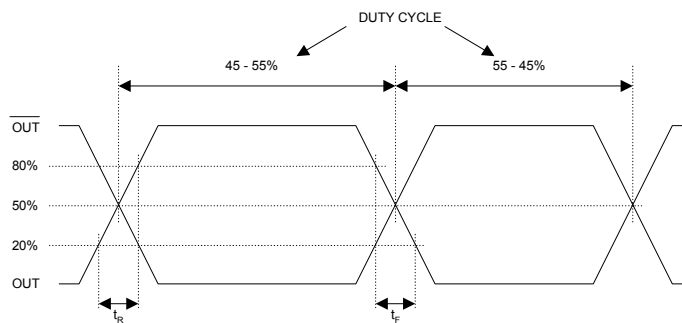
PECL Levels Test Circuit



PECL Output Skew



PECL Transition Time Waveform



Low Phase Noise PECL VCXO (100MHz to 200MHz)

PACKAGE INFORMATION

16 PIN Narrow SOIC, TSSOP (mm)

| Symbol | SOIC | | TSSOP | |
|--------|----------|-------|----------|------|
| | Min. | Max. | Min. | Max. |
| A | 1.35 | 1.75 | - | 1.20 |
| A1 | 0.10 | 0.25 | 0.05 | 0.15 |
| B | 0.33 | 0.51 | 0.19 | 0.30 |
| C | 0.19 | 0.25 | 0.09 | 0.20 |
| D | 9.80 | 10.00 | 4.90 | 5.10 |
| E | 3.80 | 4.00 | 4.30 | 4.50 |
| H | 5.80 | 6.20 | 6.40 BSC | |
| L | 0.40 | 1.27 | 0.45 | 0.75 |
| e | 1.27 BSC | | 0.65 BSC | |

ORDERING INFORMATION

PART NUMBER

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

P521-23 **D C**

PART NUMBER ———

TEMPERATURE
C=COMMERCIAL

PACKAGE TYPE
D=Die
O=TSSOP

| Order Number | Marking | Package Option |
|--------------|------------|-----------------------|
| P521-23DC | P521-23DC | Die – Waffle Pack |
| P521-23OC-R | P521-23 OC | TSSOP – Tape and Reel |
| P521-23OC | P521-23 OC | TSSOP – Tube |

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