

Low Phase Noise, LVPECL XO (for 120MHz to 170MHz 3rd Overtone Crystals)

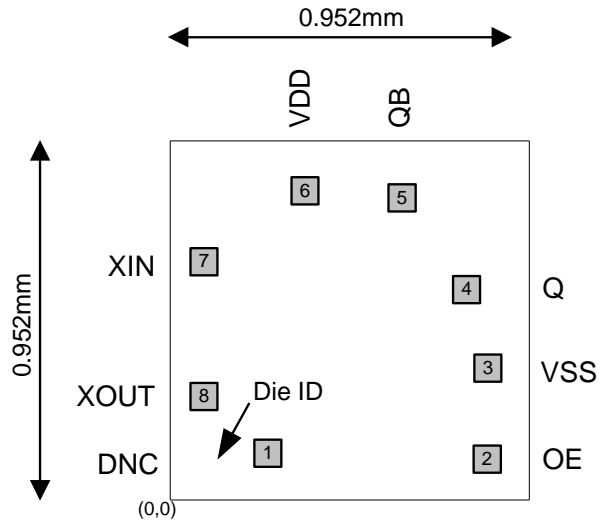
FEATURES

- Advanced non multiplier XO Design for High Performance Crystal Oscillators
- Input/Output Range: 120MHz to 170MHz
- Uses external resistor for 3rd overtone selection
- Ultra Low Phase Noise: -80dBc @10Hz at 156.25MHz
- Ultra Low Phase Jitter: <60fs RMS
- Complementary LVPECL Outputs
- Power Supply: 3.3V ±10%
- Available in Die or Wafer Form

DESCRIPTION

The PL686-35 is a non-multiplier XO IC specifically designed for 3rd overtone crystals from 120MHz to 170MHz. The phase noise performance, with <60fs phase jitter, makes this an ideal solution for all high end clocking applications such as SONET, WiMax, CPRI, OBSAI, Fiber Channel, and any application where performance and quality are required.

DIE CONFIGURATION



DIE SPECIFICATIONS

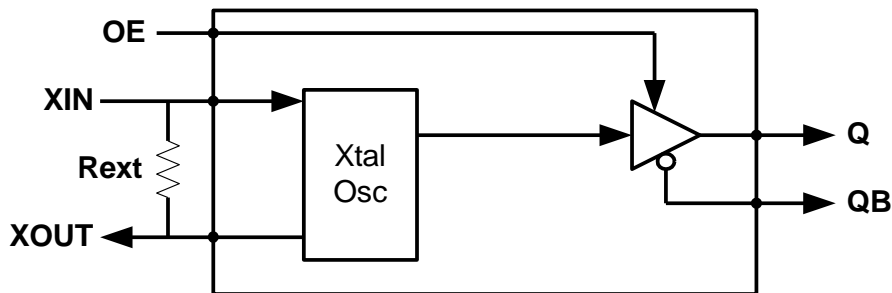
Name	Value
Size	952 micron x 952 micron
Reverse side	GND
Pad dimensions	80 micron x 80 micron
Thickness	8 mil

OUTPUT ENABLE LOGIC

OE State* (Pad 4)	Output Buffers State
0	Outputs Tri-Stated
1 (Default)	Outputs Enabled

* Internal 60KΩ pull-up resistor

BLOCK DIAGRAM



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PAD ASSIGNMENT

Pad #	Name	X (μm)*	Y (μm)*	Description
1	DNC	-194	-365	Do Not Connect
2	OE	373	-373	Output enable pin. Internal pull up resistor.
3	VSS	373	-127	GND connection
4	Q	315	75	LVPECL output
5	QB	140	315	Complementary LVPECL output
6	VDD	-117	329	V _{DD} connection
7	XIN	-372	158	Crystal input connection
8	XOUT	-372	-190	Crystal output connection

* **Note:** Referenced to center of the die.

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	-40	85	°C
HBM ESD Protection		2,000		V

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. *Operating temperature is guaranteed by design. Parts are tested to commercial grade only.

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2. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F _{XIN}	3 rd Overtone, AT cut	120		170	MHz
Crystal Loading Rating	C _{L (xtal)}			5		pF
External Resistor	R _{EXT}	For 156.25MHz Connect between XIN and XOUT.		2200		Ω
Shunt Capacitance	C ₀				2.5	pF
Recommended ESR	R _E	C ₀ ≤ 2.5pF, R _{EXT} = 2.2KΩ			30	Ω
		C ₀ ≤ 2.0pF, R _{EXT} = 2.2KΩ			40	Ω

3. General Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current	I _{DD}	Standard LVPECL Loading (See LVPECL Levels Test Circuit, page 4)			50	mA
Operating Voltage	V _{DD}		2.97	3.3	3.63	V
Output Clock Duty Cycle		@ V _{DD} – 1.3V (See LVPECL Transition Time Waveform, page 4)	45	50	55	%
Short Circuit Current				±50		mA

4. Jitter Specifications

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Period Jitter RMS	At 156.25MHz, with capacitive decoupling between V _{DD} and GND. Over 10,000 cycles		2.3		ps
Period Jitter pk-to-pk			18		
Integrated Jitter RMS at 156.25MHz	Integrated 12 kHz to 20 MHz		55		fs

5. Phase Noise Specifications

PARAMETERS	FREQUENCY	@10Hz	@100Hz	@1kHz	@10kHz	@100kHz	@1MHz	@10MHz	UNITS
Phase Noise, relative to carrier	156.25MHz	-80	-112	-140	-152	-157	-159	-162	dBc/Hz

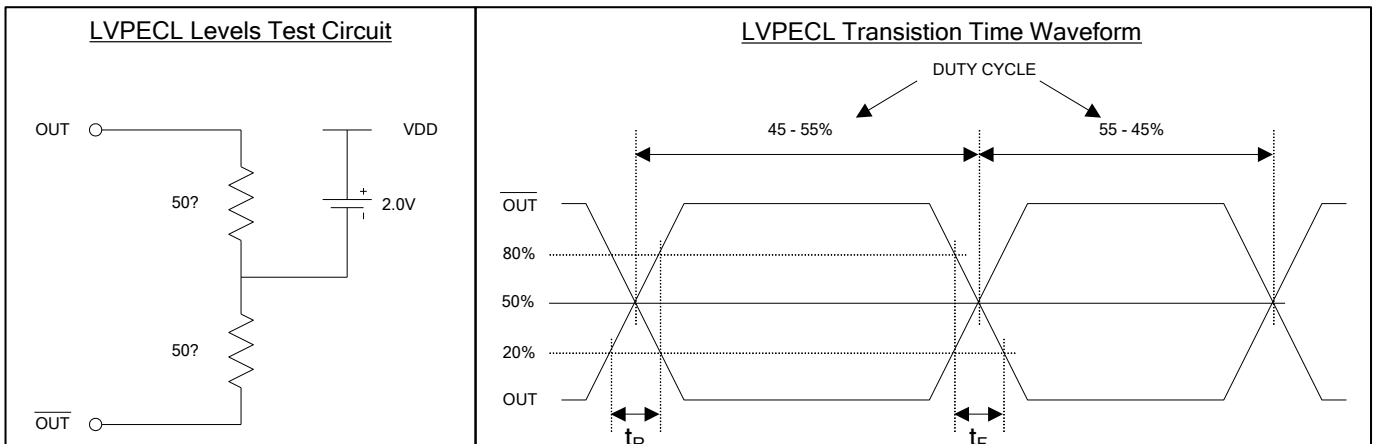
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6. LVPECL Electrical Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output High Voltage	V_{OH}	$R_L = 50 \Omega$ to $(V_{DD} - 2V)$ (see figure)	$V_{DD} - 1.025$	$V_{DD} - 0.950$	$V_{DD} - 0.880$	V
Output Low Voltage	V_{OL}		$V_{DD} - 1.810$	$V_{DD} - 1.700$	$V_{DD} - 1.620$	V

7. LVPECL Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Clock Rise Time	t_r	@20/80% of output waveform		200	300	ps
Clock Fall Time	t_f	@80/20% of output waveform		200	300	ps





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ORDERING INFORMATION

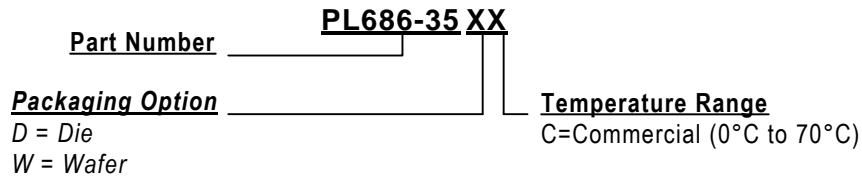
For part ordering, please contact our Sales Department:

2180 Fortune Drive, San Jose, CA 95131, USA

Tel: (408) 944-0800 Fax: (408) 474-1000

PART NUMBER

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



Order Number	Packaging
PL686-35DC	Die – Waffle Pack
PL686-35WC	Wafer

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