

Multiplier XO IC Die for 12 to 25MHz Parallel Resonant Crystals

FEATURES

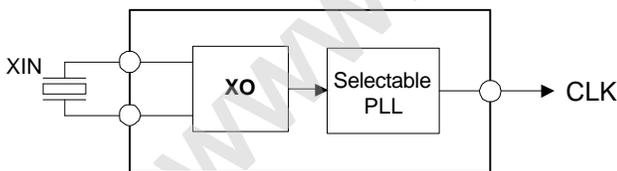
- Integrated crystal oscillator circuitry (XO).
- Low phase noise (-135dBc @ 10kHz offset) selectable frequency multipliers (x2, x4, x1, x8 as bonding options).
- 3.3V supply voltage.
- Uses inexpensive fundamental-mode parallel resonant crystals (from 12 to 25MHz).
- 12mA output drive capability at TTL level.
- Selectable High Drive or Standard CMOS.
- Available in DIE (65 mil x 62 mil).

DESCRIPTION

The PLL602-00 is a monolithic low jitter and low phase noise (-135dBc @10kHz offset), high performance CMOS XO IC Die, using a low cost crystal (12-25MHz).

The same die can be used as a XO with output frequencies ranging from $F_{XIN} \times 1$ to $F_{XIN} \times 8$ thanks to selector pads allowing bonding options (see Divider Selection Table on this page). This makes the PLL602-00 ideal for a wide range of applications from 12MHz to 200MHz (including 50MHz, 77.76MHz, 125MHz and 155.52MHz, etc.).

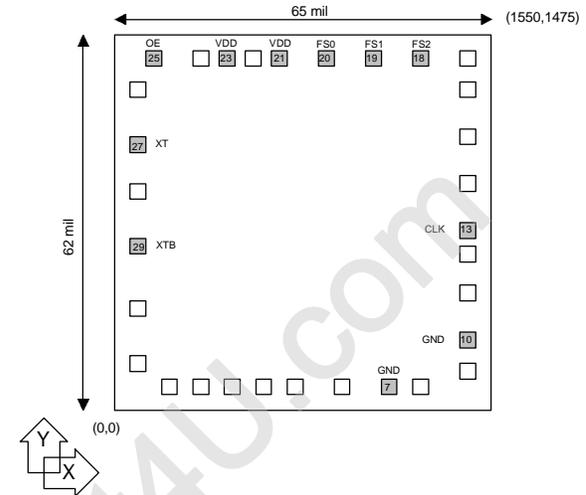
BLOCK DIAGRAM



DIE SPECIFICATIONS

Name	Value
Size	62 x 65 mil
Reverse side	GND
Pad dimensions	80 micron x 80 micron
Thickness	10 mil

DIE CONFIGURATION



MULTIPLIER SELECTION

SELECTION			F_{XIN}	CLK (MHz)
S2	S1	S0		
0	0	0	12MHz – 25MHz	$F_{XIN} \times 2$
0	0	1		$F_{XIN} \times 4$
0	1	0		$F_{XIN} \times 1$
1	0	0		$F_{XIN} \times 8$
0	1	1		$F_{XIN} \times 2^*$
1	1	0		$F_{XIN} \times 4^*$
1	0	1		$F_{XIN} \times 1^*$
1	1	1		$F_{XIN} \times 8^*$

Note: - Selector pads default to '0', wire bond to VDD to set to '1'
 - (*) High-drive CMOS output

PAD DESCRIPTION

Name	Number	Description
XT	27	Crystal input connection.
XTB	29	Crystal connection.
GND	7,10	Ground.
CLK	13	Clock Output.
FS[0:2]	18,19,20	Frequency selection pad
VDD	21,22,23	3.3V Power Supply.
OE	25	Output Enable: '0' to disable (tri-state output), '1' (default value when not connected) to enabled the output.

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ELECTRICAL SPECIFICATIONS
1. Absolute Maximum Ratings

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage	V_{DD}		7	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	-10	85	°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. DC Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic, with Loaded Outputs	I_{DD}	$F_{XIN} = 12 - 25\text{MHz}$ Output load of 10pF		10		mA
Operating Voltage	V_{DD}		2.97		3.63	V
Output High Voltage	V_{OH}	$I_{OH} = -12\text{mA}$	2.4			V
Output Low Voltage	V_{OL}	$I_{LO} = 12\text{mA}$			0.4	V
Output High Voltage at CMOS level	V_{OHC}	$I_{OH} = -4\text{mA}$	$V_{DD} - 0.4$			V
Output drive current		At TTL level (High drive)	36	51		mA
		At TTL level (Low drive)	12	17		mA
Short Circuit Current				±50		mA
ESD Protection		Human Body Model, all pads except XT and XTB	3000			V
		Human Body Model, XT and XTB pads	2000			

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3. AC Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency			12		25	MHz
Output Clock Rise Time		0.8V ~ 2.0V with 10 pF load			1.5	ns
		0.3V ~ 3.0V with 15 pF load		3.7	5	
Output Clock Fall Time		2.0V ~ 0.8V with 10 pF load			1.5	
		3.0V ~ 0.3V with 15pF load		3.7	5	
Output Clock Duty Cycle		Measured @ 1.4V	45	50	55	%
Max Absolute Jitter		Short Term		100		ps
Short Circuit Current				±50		mA

4. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F_{XIN}	Parallel Fundamental Mode	12		25	MHz
Crystal Loading Rating	$C_L (xtal)$			20		pF
Recommended ESR	R_E	AT cut			30	Ω

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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.		12		ps
	at 80MHz, with capacitive decoupling between VDD and GND.		9		
	at 44MHz, with capacitive decoupling between VDD and GND.		7		
Phase Noise relative to carrier	44MHz @100Hz offset		-80		dBc/Hz
Phase Noise relative to carrier	44MHz @1kHz offset		-110		dBc/Hz
Phase Noise relative to carrier	44MHz @10kHz offset		-135		dBc/Hz
Phase Noise relative to carrier	44MHz @100kHz offset		-130		dBc/Hz
Phase Noise relative to carrier	44MHz @1MHz offset		-132		dBc/Hz
Phase Noise relative to carrier	155MHz @100Hz offset		-80		dBc/Hz
Phase Noise relative to carrier	155MHz @1kHz offset		-110		dBc/Hz
Phase Noise relative to carrier	155MHz @10kHz offset		-125		dBc/Hz
Phase Noise relative to carrier	155MHz @100kHz offset		-120		dBc/Hz
Phase Noise relative to carrier	155MHz @1MHz offset		-125		dBc/Hz

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PAD ASSIGNMENT

Pad #	Name	X (μm)	Y (μm)
7	GND	1042	109
10	GND	1400	259
13	CLK	1400	716
18	FS2	1232	1365
19	FS1	1042	1365
20	FS0	854	1365
21	VDD	659	1365
23	VDD	459	1365
25	OE	194	1365
27	XT	109	1017
29	XTB	109	646

ORDERING INFORMATION

For part ordering, please contact our Sales Department:

47745 Fremont Blvd., Fremont, CA 94538, USA
Tel: (510) 492-0990 Fax: (510) 492-0991

PART NUMBER

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

PLL602-00 D C

PART NUMBER

TEMPERATURATRE
C=COMMERCIAL
M=MILITARY
I=INDUSTRAL
PACKAGE TYPE
D=DIE

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