

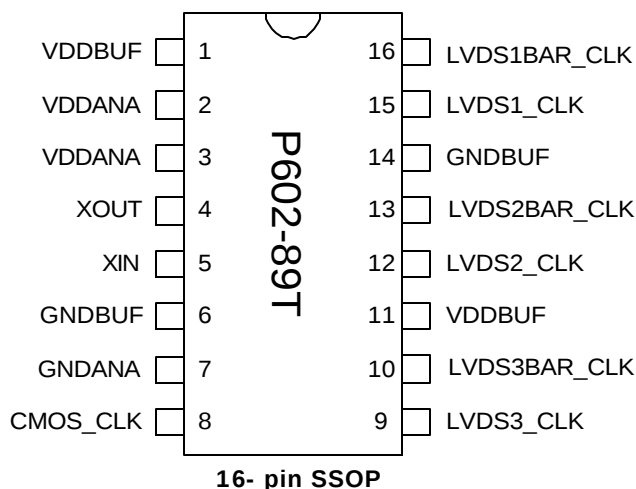
12-27 MHz XO IC with 3 Pairs of LVDS and 1 CMOS Outputs

FEATURES

- Low jitter XO for the 12MHz to 27MHz range.
- Integrated crystal load capacitor: no external load capacitor required.
- 3 pairs of LVDS outputs and 1 CMOS output.
- 12-27 MHz fundamental crystal input.
- Low jitter (RMS): 4.5 ps period jitter (1 sigma).
- 3.3V operation.
- Available in 16-Pin SSOP package.

PIN CONFIGURATION

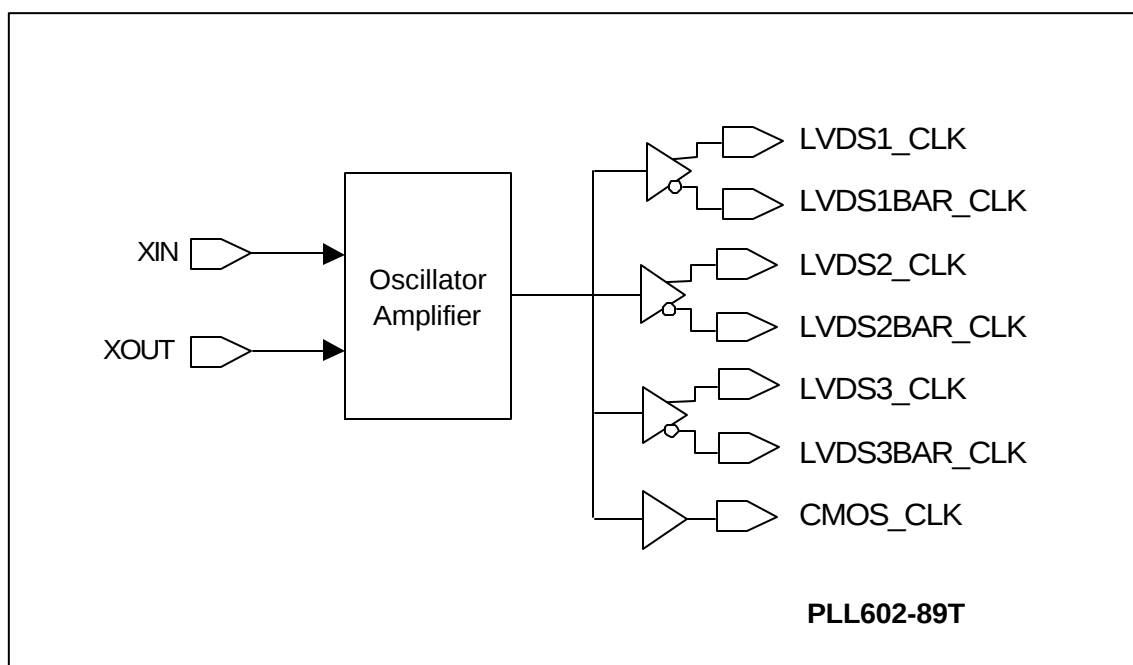
(Top View)



DESCRIPTION

The P602-89T is a high performance multiple output XO IC chip. It provides 3 pairs of LVDS and 1 CMOS outputs. The chip combines a crystal oscillator (XO) with a multiple-output buffer. It accepts a low cost fundamental parallel resonant mode crystal from 12MHz to 27MHz, which is reproduced at the outputs. The very low jitter (4.5 ps RMS period jitter) makes this chip ideal for data and telecommunication applications.

BLOCK DIAGRAM



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PIN DESCRIPTION

Name	Pin Number	Type	Description
VDD	1,2,3,11	P	+3.3V VDD connection. VDDANA and VDDBUF should be decoupled separately.
XOUT	4	I	Crystal out connector. This is the output of the crystal oscillator circuitry. The crystal should be mounted as close to the IC as possible, with minimum parasitic capacitance.
XIN	5	I	Crystal in connector. This is the input of the crystal oscillator circuitry. The crystal should be mounted as close to the IC as possible, with minimum parasitic capacitance.
GND	6,7,14	P	Ground connection.
CMOS_CLK	8	O	CMOS output signal.
LVDS3_CLK	9	O	LVDS output.
LVDS3BAR_CLK	10	O	LVDS complementary output.
LVDS2_CLK	12	O	LVDS output.
LVDS2BAR_CLK	13	O	LVDS complementary output.
LVDS1_CLK	15	O	LVDS output.
LVDS1BAR_CLK	16	O	LVDS complementary output.

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	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.

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2. Crystal Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F_{XIN}	Parallel Fundamental Mode	12		27	MHz
Crystal Loading Rating	$C_{L(xtal)}$			21.5		pF
Recommended ESR	R_E				30	?

3. General Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic (with Loaded Outputs)	I_{DD}	CMOS outputs loaded with 15pF, LVDS outputs loaded at 100 Ω				mA
		$F_{out} = 12 \text{ MHz}^*$		20*	25*	
		$F_{out} = 25 \text{ MHz}^*$		25*	30*	
Operating Voltage	V_{DD}		3.13		3.47	V
Short Circuit Current				± 50		mA

* To be measured.

4. AC Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency			12		27	MHz
Output Clock Rise Time		0.8V ~ 2.0V with 10 pF load			1.5	ns
		0.3V ~ 3.0V with 15 pF load		2	5	
Output Clock Fall Time		2.0V ~ 0.8V with 10 pF load			1.5	
		3.0V ~ 0.3V with 15pF load		2	5	
Output Clock Duty Cycle		Measured @ 1.25 V (LVDS)	45	50	55	%
		Measured @ $V_{DD}/2$ (CMOS)	45	50	55	
Short Circuit Current				± 50		MA

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5. Jitter specifications

PARAMETERS	CONDITIONS	FREQUENCY	MIN.	TYP.	MAX.	UNITS
Period jitter RMS	With capacitive decoupling between VDD and GND.	25MHz		4.5	9	ps
Peak to Peak jitter	With capacitive decoupling between VDD and GND. Over 10,000 cycles.	25MHz		30	60	ps

6. CMOS Output Electrical Specifications

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output High Voltage	V_{OH}	$I_{OH} = -12mA$	2.4			V
Output Low Voltage	V_{OL}	$I_{OL} = 12mA$			0.4	V
Output High Voltage at CMOS level	V_{OHC}	$I_{OH} = -4mA$	$V_{DD} - 0.4$			V
Output drive current		At TTL level	12	17		mA

7. CMOS Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Clock Rise/Fall Time (Standard Drive)		0.8V ~ 2.0V with 10 pF load		1.15		ns
		0.3V ~ 3.0V with 15 pF load		3.7		
Output Clock Rise/Fall Time (High Drive)		0.8V ~ 2.0V with 10 pF load		0.5		
		0.3V ~ 3.0V with 15 pF load		1.5		

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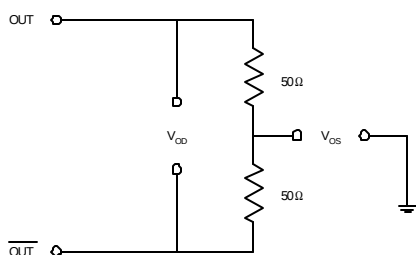
8. LVDS Electrical Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Differential Voltage	V_{OD}	$R_L = 100\ \Omega$ (see figure)	247	355	454	mV
V_{DD} Magnitude Change	ΔV_{OD}		-50		50	mV
Output High Voltage	V_{OH}			1.4	1.6	V
Output Low Voltage	V_{OL}		0.9	1.1		V
Offset Voltage	V_{OS}		1.125	1.2	1.375	V
Offset Magnitude Change	ΔV_{OS}		0	3	25	mV
Power-off Leakage	I_{OXD}	$V_{out} = V_{DD}$ or GND $V_{DD} = 0V$		± 1	± 10	μA
Output Short Circuit Current	I_{OSD}			-5.7	-8	mA

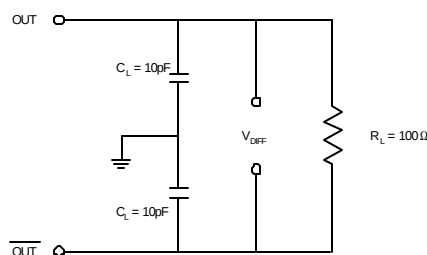
9. LVDS Switching Characteristics

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Differential Clock Rise Time	t_r	$R_L = 100\ \Omega$ $C_L = 10\ pF$ (see figure)	0.2	0.7	1.0	ns
Differential Clock Fall Time	t_f		0.2	0.7	1.0	ns

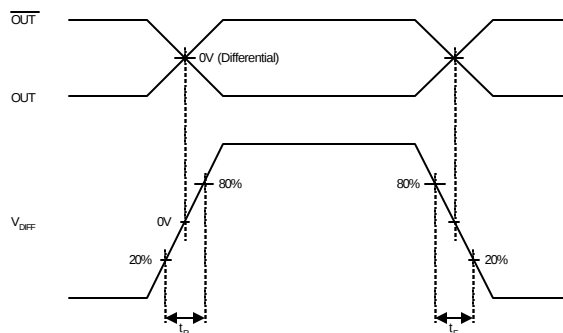
LVDS Levels Test Circuit



LVDS Switching Test Circuit



LVDS Transition Time Waveform

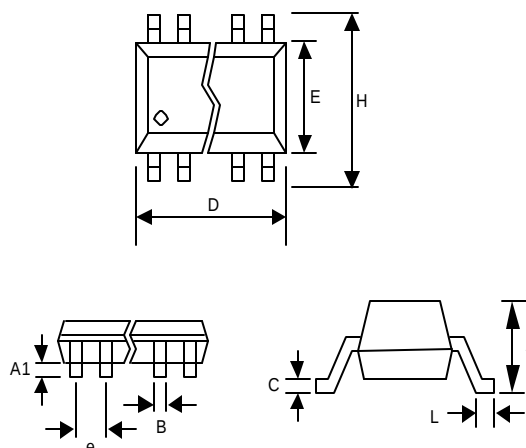


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PACKAGE INFORMATION

16 PIN SSOP (inch)

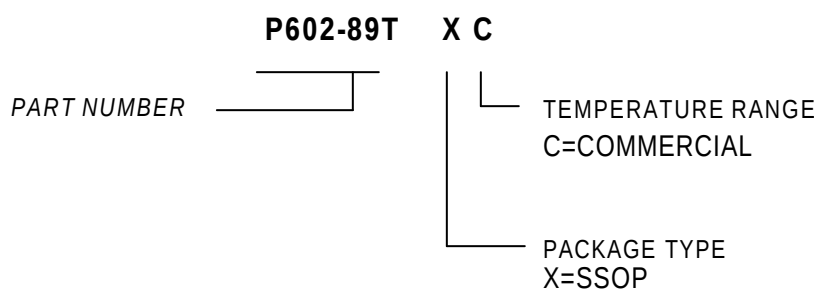
	SSOP		
Symbol	Min.	Nom.	Max.
A	.053	.064	.069
A1	.004	.006	.010
B	.008	-	.012
C	.007	-	.010
D	.189	.193	.197
E	.150	.154	.157
H	.228	.236	.244
L	.016	.025	.050
e	.025 BASIC		



ORDERING INFORMATION

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
P602-89TXC-R	P602-89T XC	SSOP - Tape and Reel
P602-89TXC	P602-89T XC	SSOP - Tube

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