

Low Power 3 Outputs XO 10MHz to 52MHz

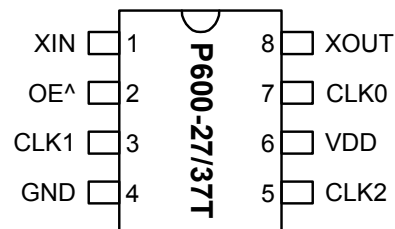
FEATURES

- 3 CMOS outputs with OE tri-state control
- Low current consumption:
P600-27T: <4.5mA @ 27MHz with standard CMOS buffer (3.3V)
P600-37T: <3.0mA @ 27MHz with CMOS compatible Clipped buffer, offering the lowest current consumption. (3.3V)
- 10 to 52MHz fundamental crystal input.
- Low phase noise (-130 dBc @ 10kHz offset).
- Low jitter (RMS): 2.5ps period jitter.
- 12mA drive capability at TTL output.
- 1.62V to 3.63V DC operation.
- Available in 8 pin SOIC or DIE.

DESCRIPTION

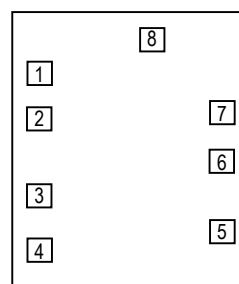
The P600-27T/-37T form a low cost family of XO IC's, designed to replace multiple XO solutions saving the cost and board space of clock distribution buffers. In addition, they provide among the lowest current on the market for the 10MHz to 52MHz range. They accept input crystals from 10 to 52MHz (fundamental resonant mode) and provide low phase noise (<-130dBc at 10kHz offset at 30MHz), and very low jitter (2.5 ps RMS period jitter) outputs.

PIN ASSIGNMENT (PACKAGE)

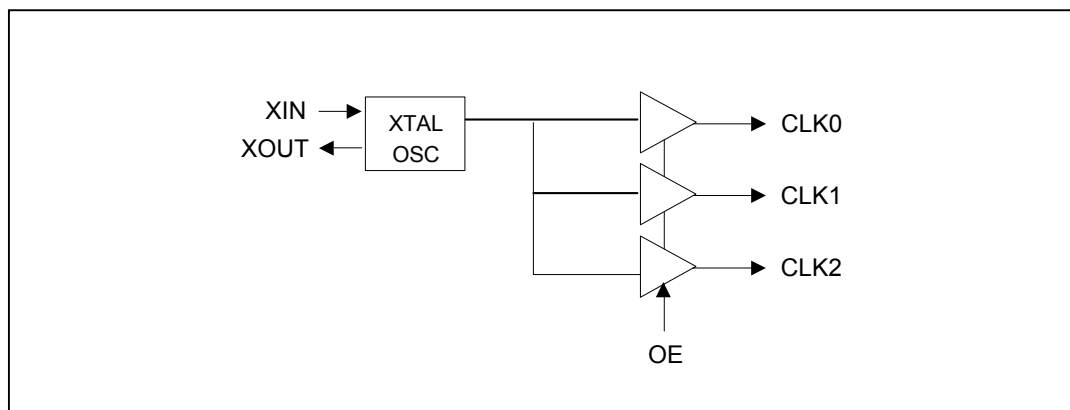


^: Denotes internal Pull-up

PAD ASSIGNMENT (DIE)



BLOCK DIAGRAM



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PIN DESCRIPTION

Name	Pin #	Die Pad Position		Type	Description
		X (μm)	Y (μm)		
XIN	1	94.183	768.599	I	Crystal input pin from 10~52MHz.
OE	2	94.157	605.029	I	Output Enable input pin. This pin has internal pull-up resistor. All outputs will be tri-stated when low.
CLK1	3	94.183	331.756	O	Output clock pin.
GND	4	94.193	140.379	P	Ground pin.
CLK2	5	715.472	203.866	O	Output clock pin.
VDD	6	715.307	455.726	P	VDD power supply pin.
CLK0	7	715.472	626.716	O	Output clock pin.
XOUT	8	476.906	888.881	I	Crystal output pin.

ELECTRICAL SPECIFICATIONS

1. Absolute Maximum Ratings

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage Range	V _{CC}	-0.5	7	V
Input Voltage Range	V _I	-0.5	V _{CC} +0.5	V
Output Voltage Range	V _O	-0.5	V _{CC} +0.5	V
Soldering Temperature			260	°C
Storage Temperature	T _S	-65	150	°C
Ambient Operating Temperature		0	70	°C

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. AC Electrical Specifications

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Crystal Frequency		10		52	MHz
Settling time	At power-up (Vdd reaches 1.62V)		10*		ms
Output Clock Rise/Fall Time	0.8V ~ 2.0V with 10 pF load		1.15		ns
	0.3V ~ 3.0V with 15 pF load		3.7		
VDD sensitivity	Frequency vs. VDD +/- 10%	0.8		0.8	ppm
Output Clock Duty Cycle	Measured @ 1.4V	45	50	55	%
Short Circuit Current			±50		mA

Note: (*) Preliminary Specifications still to be characterized.

3. Jitter and Phase Noise specification

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
RMS Period Jitter (1 sigma – 1000 samples)	With capacitive decoupling between VDD and GND.		2.1	2.5	ps
Phase Noise relative to carrier	30MHz @100Hz offset		-80		dBc/Hz
Phase Noise relative to carrier	30MHz @1kHz offset		-110		dBc/Hz
Phase Noise relative to carrier	30MHz @10kHz offset		-130		dBc/Hz
Phase Noise relative to carrier	30MHz @100kHz offset		-138		dBc/Hz
Phase Noise relative to carrier	30MHz @1MHz offset		-145		dBc/Hz

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4. DC Specification

PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic, with Loaded Outputs (at VDD = 3.3V) Respectively for P600-27T/-37T	I _{DD}	At 10MHz, Cload=15pF		2.0* / 1.5*	2.5* / 2.0*	mA
		At 13.5MHz, Cload=15pF		2.4* / 1.6*	3.0* / 2.0*	
		At 17.7MHz, Cload=15pF		3.0* / 2.0*	3.5* / 2.5*	
		At 27MHz, Cload=15pF		4.0* / 2.5*	4.5* / 3.0*	
		At 48MHz, Cload=15pF		7.0* / 4.0*	7.5* / 4.5*	
Supply Current in tri-state	I _{DD}	Output disabled			520	μA
Operating Voltage	V _{DD}		1.62		3.63	V
Output High Voltage	V _{OH}	-27T I _{OH} = -12mA ⁽¹⁾ (3.3V)	2.4			V
		-37T ⁽¹⁾ , I _{OH} = -12mA ⁽¹⁾ (3.3V)	2.4	2.9		V
Output Low Voltage	V _{OL}	-27T I _{OL} = 12mA ⁽¹⁾ (3.3V)			0.4	V
		-37T ⁽¹⁾ , I _{OL} = 12mA ⁽¹⁾ (3.3V)		0.32	0.4	V
Output High Voltage at CMOS level (P600-27T)	V _{OHC}	I _{OH} = -4mA	V _{DD} - 0.4			V
Output drive current (P600-27T)		At TTL level (3.3V)	12	17		mA
Short Circuit Current		(3.3V)		±50		mA
ESD Protection		Human Body Model	3000			V

* Note: Preliminary I_{DD} values, to be measured.

(1): P600-37T has non-standard CMOS V_{OH} and V_{OL} levels for lower current consumption, but meets CMOS input stage needs. P600-37T should be used to drive pure capacitive loads only.

5. Crystal Specifications

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Crystal Resonator Frequency	F _{XIN}	10		52	MHz
Crystal Loading Rating	C _L (xtal)		8.5		pF
Maximum Sustainable Drive Level				200	μW
Operating Drive Level			50		μW
C0 (for frequencies below 30MHz)				5	pF
C0 (for frequencies above 30MHz)				4	pF
ESR	R _s			30	Ω

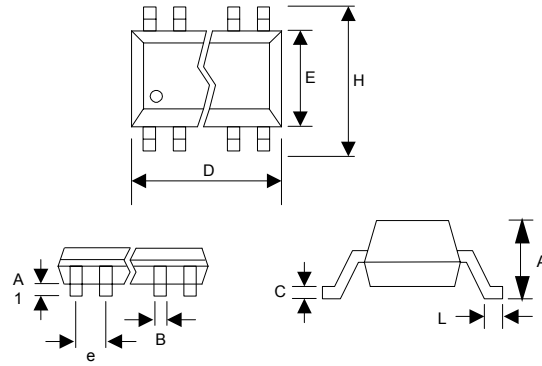
Note: A detailed crystal specification document is also available for this part

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PACKAGE INFORMATION

8 PIN (dimensions in mm)

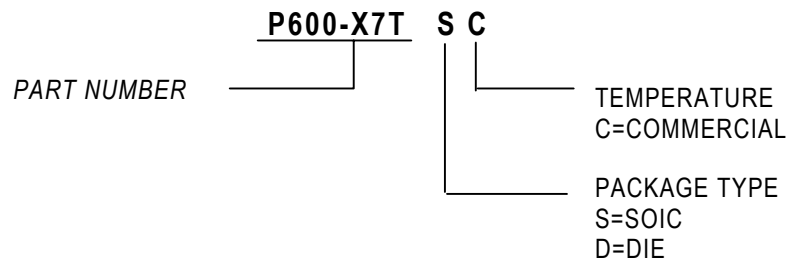
Narrow SOIC		
Symbol	Min.	Max.
A	1.47	1.73
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	4.95
E	3.80	4.00
H	5.80	6.20
L	0.38	1.27
e	1.27 BSC	



ORDERING INFORMATION

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
P600-27T SC	P600-27T SC	8 SOIC - Tubes
P600-27T SC-R	P600-27T SC	8 SOIC - Tape and Reel
P600-27T DC	P600-27T	Die - Waffe Pack
P600-37T SC	P600-37T SC	8 SOIC - Tubes
P600-37T SC-R	P600-37T SC	8 SOIC - Tape and Reel
P600-37T DC	P600-37T	Die - Waffe Pack

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