

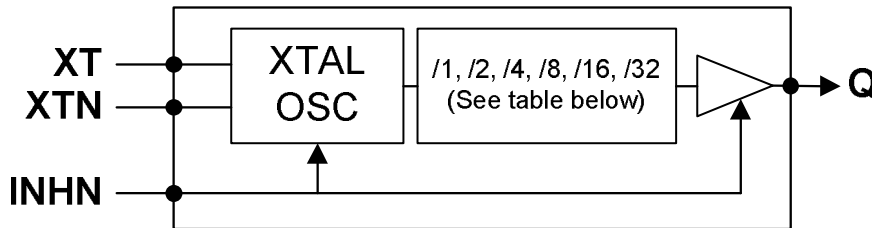
**FEATURES**

- Single IC to cover up to 60MHz output frequency.
- Direct oscillation operation
- Input Frequency: Fundamental crystal:
  - 10MHz to 60MHz
- Output Frequency: LVCMOS
  - 312.5kHz to 60MHz (2.5V & 3.3V)
  - 312.5kHz to 40MHz (1.8V)
- Very low Jitter
- High impedance standby function, <5uA
- Low current consumption
- Single 1.8V to 3.3V ± 10% power supply
- Operating temperature range from -40°C to 85°C

**DESCRIPTION**

The SVD920-6X is a family of high performance general purpose to cover outputs from 156.25kHz up to 60MHz. Designed to fit in a small 2.0x1.6mm, or larger substrates, the SVD920-6X offer the best phase noise and jitter performance, smallest die size, and lowest power consumption of any comparable IC. With its Standby function the part draws <5uA.

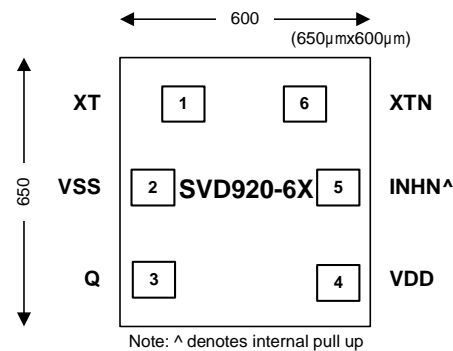
**BLOCK DIAGRAM**



**DIE SPECIFICATION**

Parameter	Value
Chip size	0.65x 0.60mm
Chip thickness	130um, ±15um
Pad size	90µm
Chip base	GND level
Die back coating	Optional (see ordering information)

**PAD ASSIGNMENT**



**SVD920-6X FAMILY CONFIGURATIONS**

Part Number	Operating Voltage	Input Frequency	Output Frequency
SVD920-61	1.8V to 3.3V, ±10%	$F_{XT} = 10\text{MHz to }60\text{MHz}$ (3.3V & 2.5V) $F_{XT} = 10\text{MHz to }40\text{MHz}$ (1.8V)	$Q = F_{XT}$
SVD920-62			$Q = F_{XT}/2$
SVD920-63			$Q = F_{XT}/4$
SVD920-64			$Q = F_{XT}/8$
SVD920-65			$Q = F_{XT}/16$
SVD920-66			$Q = F_{XT}/32$

**PAD DESCRIPTIONS** (Pad measurements are from die center)

Pad #	Pad Name	Pad Center Spacing		Description
		X	Y	
1	XT	-177	231	Crystal input pad
2	VSS	-215	41	GND connection
3	Q	-215	-186	Clock output
4	VDD	215	-186	VDD connection
5	INH N	215	41	Output control input. When activated ( Logic "0" ) INHN will Tristate (HiZ) the output and disable the oscillator. 10M $\Omega$ internal pull up resistor.
6	XTN	177	231	Crystal output pad

**ELECTRICAL SPECIFICATIONS**
**ABSOLUTE MAXIMUM RATINGS**

PARAMETERS	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage Range	V <sub>DD</sub>	-0.5	4.6	V
Input Voltage Range	V <sub>I</sub>	-0.5	V <sub>DD</sub> +0.5	V
Output Voltage Range	V <sub>O</sub>	-0.5	V <sub>DD</sub> +0.5	V
Storage Temperature	T <sub>S</sub>	-65	150	°C
Ambient Operating Temperature*		-40	85	°C
ESD Protection, Human Body Model		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. \*Operating temperature is guaranteed by design. Parts are tested to commercial grade only.

**CRYSTAL SPECIFICATIONS**

PARAMETERS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Fundamental Crystal Resonator Frequency (2.5V & 3.3V)	F <sub>XT</sub>	10		60	MHz
Fundamental Crystal Resonator Frequency (1.8V)				40	
Crystal Loading Rating	C <sub>L (xtal)</sub>		12		pF
Maximum Sustainable Drive Level				100	$\mu$ W
Operating Drive Level			25		$\mu$ W
Crystal Shunt Capacitance	C <sub>0</sub>			3	pF
Effective Series Resistance, Fundamental, (See MTC-4)	ESR			50	$\Omega$

**AC SPECIFICATIONS**

PARAMETERS	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Crystal Input Frequency (XT)	Fundamental Crystal (2.5V & 3.3V)	10		60	MHz
	Fundamental Crystal (1.8V)			40	
Output Frequency	3.3V & 2.5V operation	0.3125		60	MHz
	1.8V operation			40	
Settling Time	At power-up ( $V_{DD} > 90\%V_{DD}$ )			2	ms
Standby Enable Time	INH N Function; $T_a=25^\circ\text{C}$ , 15pF Load. Add one clock period for a useable output.			2	ms
$V_{DD}$ Sensitivity	Frequency vs. $V_{DD}$ , +/-10%	-0.5		0.5	ppm
Output Rise/Fall Time (See MTC-1)	3.3V, 15pF Load, 10/90% $V_{DD}$		1.2	1.7	ns
Output Rise/Fall Time (See MTC-1)	2.5V, 15pF Load, 10/90% $V_{DD}$		1.7	2	ns
Output Rise/Fall Time (See MTC-1)	1.8V, 15pF Load, 10/90% $V_{DD}$		2.6	3	ns
Output Rise/Fall Time (See MTC-1)	3.3V, 50pF Load, 10/90% $V_{DD}$		3	4.5	ns
Output Rise/Fall Time (See MTC-1)	2.5V, 50pF Load, 10/90% $V_{DD}$		3.5	5	ns
Output Rise/Fall Time (See MTC-1)	1.8V, 50pF Load, 10/90% $V_{DD}$		5	8	ns
Duty Cycle* (See MTC-1)		45	50	55	%

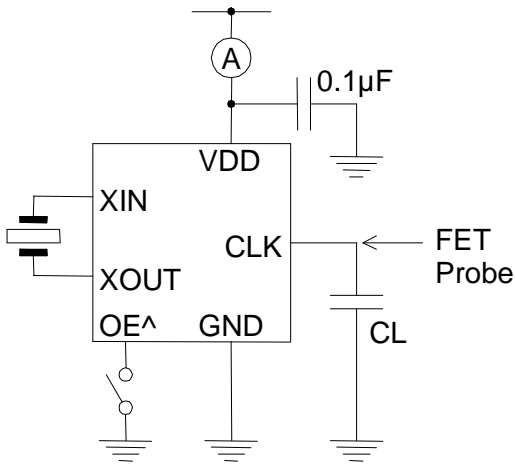
\* For 1.8V operation, the 50%  $\pm$ 5% duty cycle is guaranteed for frequencies  $\leq$ 40MHz.

**DC SPECIFICATIONS**

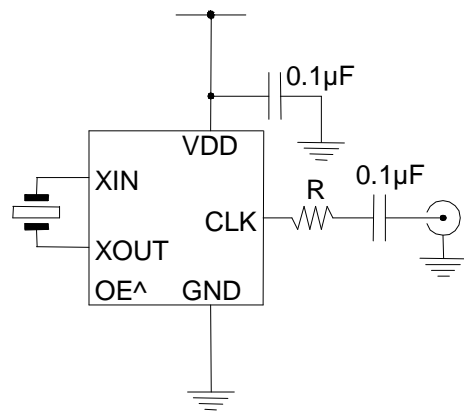
PARAMETERS	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Supply Current, Dynamic	$I_{DD}$	@ $V_{DD}=3.3\text{V}$ , 26MHz, No Load		1.2		mA
		@ $V_{DD}=3.3\text{V}$ , 40MHz, No Load		1.65		
		@ $V_{DD}=1.8\text{V}$ , 26MHz, No Load		0.58		
		@ $V_{DD}=1.8\text{V}$ , 40MHz, No Load		0.9		
Standby Supply Current	$I_{DD\_SB}$	INH N="0", 3.3V			5	$\mu\text{A}$
Operating Voltage	$V_{DD}$		1.62		3.63	V
Power Supply Ramp	$t_{PU}$	Time for $V_{DD}$ to reach 90% $V_{DD}$ . Power ramp must be monotonic.	.001		100	ms
Output Low Voltage	$V_{OL}$	$I_{OL} = +4\text{mA}$ Standard Drive			0.4	V
Output High Voltage	$V_{OH}$	$I_{OH} = -4\text{mA}$ Standard Drive	$V_{DD} - 0.4$			V
Output Current(See MCT-2)	$I_{OHD}$	$V_{OL} = 0.4\text{V}$ , $V_{OH} = 2.4\text{V}$	16			mA

**MEASUREMENT TEST CIRCUITS (MTC)**

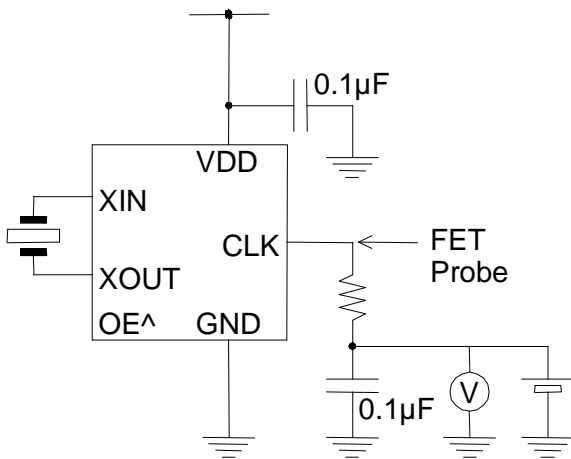
**MTC-1: Rise Time, Fall Time, Duty Cycle, VOL, VOH, I<sub>dd</sub>, Power Down Current, Output Enable/Disable**



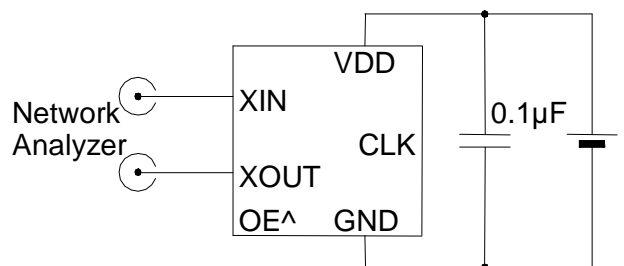
**MTC-3: Jitter and Phase Noise**



**MTC-2: Output Drive Current and Output Impedance**

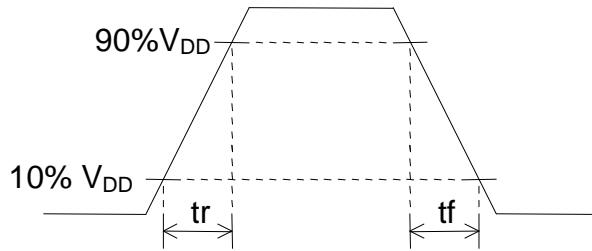


**MTC-4: Negative Resistance**

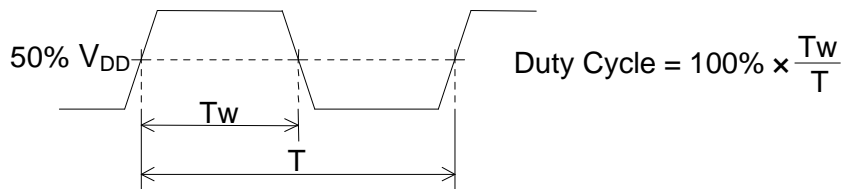


**WAVEFORM SWITCHING CHARACTERISTICS**

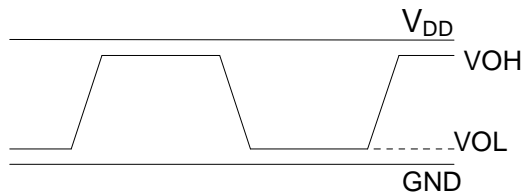
**Rise and Fall times:**



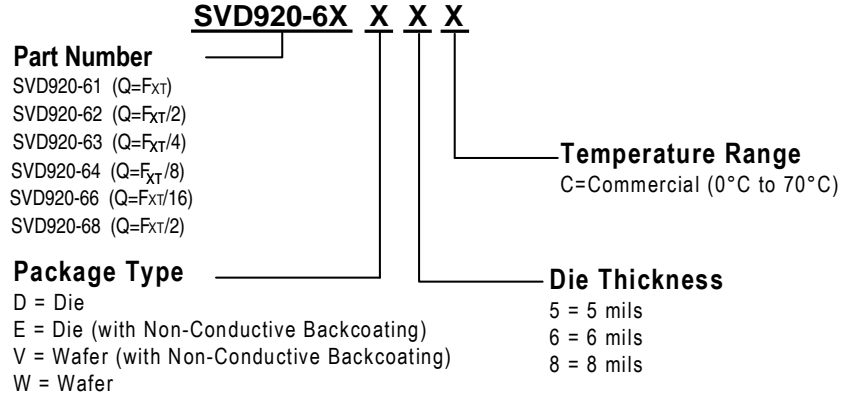
**Duty Cycle:**



**VOH, VOL:**



**ORDERING INFORMATION**



Part / Order Number	Package Option	Temperature
SVD920-6XDXC	Die (Waffle Pack)	0°C to +70°C
SVD920-6XEC	Die (Waffle Pack)	0°C to +70°C
SVD920-6XVXC	Wafer	0°C to +70°C
SVD920-6XWXC	Wafer	0°C to +70°C