

GENERAL DESCRIPTION

The M675S02 is a single frequency/single output SAW-based VCSO for low-jitter clock generation. The SAW (surface acoustic wave) delay line serves as a high-Q resonator and the low noise SiGe VCSO IC provides a low noise floor and low 1/f phase noise. The combination of the SAW delay line and the custom IC result in very low phase noise and jitter performance. The M675S02 is available in frequencies from 500 to 1000 MHz with a guaranteed minimum pull-range of ± 120 ppm. Industry-standard K_{vco} (VCO Gain) provides full replacement compatibility for most designs. The M675S02 is well suited for phase-locked loop applications, clock and data recovery circuits and other timing applications in telecom and optical fiber networking systems.

FEATURES

- ◆ Integrated SAW device
- ◆ Low phase jitter 0.2ps rms typical for the M675S02 (50kHz to 80MHz) - Design Target
- ◆ Output frequencies from 500 to 1000 MHz (Specify center frequencies at time of order)
- ◆ Industry-standard K_{vco} for full compatibility
- ◆ Differential 3.3V LVPECL output
- ◆ Single 3.3V power supply
- ◆ Small 5 x 7.5mm SMT (surface mount) package
- ◆ Pb-free / Compliant to EC RoHS Directive (RoHS 5/6)

BLOCK DIAGRAM

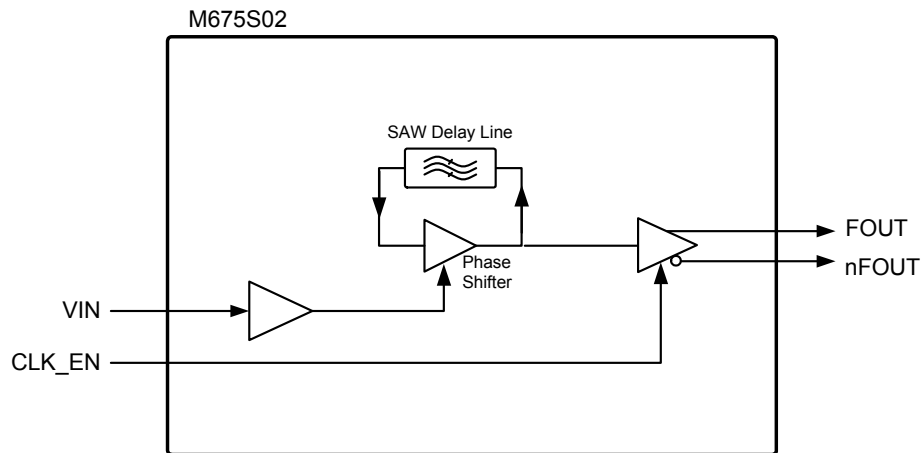


Figure 2: Block Diagram

PIN ASSIGNMENT (5 x 7.5mm SMT)

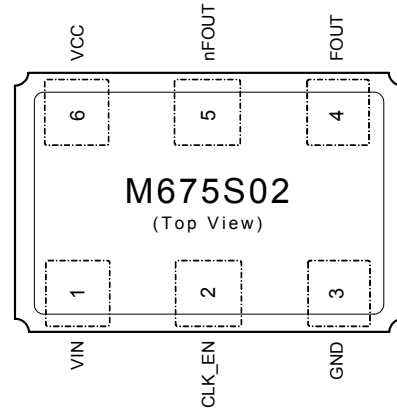


Figure 1: Pin Assignment

Sample of Available Output Frequencies

VCSO Center Frequencies ¹ (MHz)	Applications
622.0800	SONET/SDH
625.0000	Gigabit Ethernet
644.5313	GbE FEC
669.3266	SONET/SDH FEC

Table 1: Sample of Available Output Frequencies

Note 1: Specify VCSO center frequency at time of order

PIN DESCRIPTIONS

Number	Name	I/O	Configuration	Description
1	VIN	Input		Frequency control input.
2	CLK_EN	Input	Internal pull-up resistor ¹	Clock Enable Logic 1 enables normal operation. Logic 0 stops the output clock; nFOUT is held high, FOUT is held low.
3	GND	Ground		Power supply ground connection.
4	FOUT	Output	No internal terminator	Clock output pair. Differential LVPECL.
5	nFOUT			
6	VCC	Power		Power supply connection, connect to +3.3V.

Table 2: Pin Descriptions

Note 1: See "Clock Enable Pull-up" in Table 5 (DC Characteristics for M675S02 on pg. 3).

ABSOLUTE MAXIMUM RATINGS¹

Symbol	Parameter	Rating	Unit
V _I	Inputs	-0.5 to V _{CC} +0.5	V
V _O	Outputs	-0.5 to V _{CC} +0.5	V
V _{CC}	Power Supply Voltage	4.0	V
T _S	Storage Temperature	-55 to +125	°C

Table 3: Absolute Maximum Ratings

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress specifications only. Functional operation of product at these conditions or any conditions beyond those listed in Recommended Conditions of Operation, DC Characteristics, or AC Characteristics is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

RECOMMENDED CONDITIONS OF OPERATION

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Positive Supply Voltage	2.97	3.3	3.63	V
T _A	Ambient Operating Temperature	-40		+85	°C

Table 4: Recommended Conditions of Operation

ELECTRICAL SPECIFICATIONS

DC Characteristics for M675S02

Unless stated otherwise, $V_{CC} = 3.3 \text{ Volts} \pm 10\%$, $T_{CASE} = -40 \text{ to } 85^\circ\text{C}$, VCSO Frequency = 622.08, Outputs terminated with 50Ω to $V_{CC}-2.0\text{V}$ ground

	Symbol	Parameter	Pin	Min	Typ	Max	Unit
Power Supply	V_{CC}	Positive Supply Voltage	VCC	2.97	3.3	3.63	V
	I_{CC}	Power Supply Current			100	120	mA
Control Voltage	V_{IN}	Input Control Voltage Range	VIN	0		3.3	V
		V_{IN} Input Impedence		20			k Ω
Clock Enable Pull-up	V_{IH}	Input High Voltage		2		$V_{CC} + 0.3$	V
	V_{IL}	Input Low Voltage		-0.3		0.8	V
	I_{IH}	Input High Current	F_SEL			70	μA
	I_{IL}	Input Low Current		-150			μA
	R_{pullup}	Internal Pull-up Resistor			51		k Ω
Differential Outputs	V_{OH}	Output High Voltage		$V_{CC} - 0.98$		$V_{CC} - 0.75$	V
	V_{OL}	Output Low Voltage		$V_{CC} - 1.95$		$V_{CC} - 1.63$	V
	V_{P-P}	Peak to Peak Output Voltage ¹	FOUT, nFOUT	0.45	0.625	0.85	V_{P-P}
	I_{OUT}	Output Current				20	mA

Note 1: Single-ended measurement. See Figure 3, Output Rise and Fall Time, on pg. 4.

Table 5: DC Characteristics for M675S02

AC Characteristics for M675S02

Unless stated otherwise, $V_{CC} = 3.3 \text{ Volts} \pm 10\%$, $T_{CASE} = -40 \text{ to } 85^\circ\text{C}$, VCSO Frequency = 622.08, Outputs terminated with 50Ω to $V_{CC}-2.0\text{V}$ ground

	Symbol	Parameter	Min	Typ	Max	Unit	Notes
Control Voltage	V_{IN}	Modulation Bandwidth		600		kHz	
Output	F_{OUT}	Output Center Frequency Range	500		1000	MHz	
	APR	Absolute (Guaranteed) Pull-Range ¹	± 120			ppm	
	f_{STAB}	Frequency Stability		± 120		ppm p-p	At any given V_{IN}
	L_{IN}	Tuning Linearity		± 10		%	$V_{IN} = 0.3 \text{ to } 3.0\text{V}$
	K_{VCO}	VCO Gain	@622.08MHz		330		ppm/V $V_{IN} = 0.3 \text{ to } 3.0\text{V}$
		Non-harmonic Spurious				-60	dBc
	Φ_n		100Hz Offset		-55		dBc/Hz
	SSB (single sideband) Phase Noise, offset from carrier @622.08MHz		1kHz Offset		-85		dBc/Hz
			10kHz Offset		-110		dBc/Hz
			100kHz Offset		-130		dBc/Hz
			1MHz Offset		-143		dBc/Hz
			10MHz Offset		-147		dBc/Hz
	J(t)	Jitter (rms)	12kHz to 20MHz		0.155		ps rms
		@622.08MHz		0.170		ps rms	
odc	Output Duty Cycle ²		45		55	%	
t_R	Output Rise Time ²	for FOUT, nFOUT		200	300	ps	20% to 80%
t_F	Output Fall Time ²	for FOUT, nFOUT		200	300	ps	20% to 80%

Note 1: Also fully meets ± 50 ppm minimum pull-range specification that is commonly required.
Note 2: See Parameter Measurement Information on pg. 4.

Table 6: AC Characteristics for M675S02

PARAMETER MEASUREMENT INFORMATION

Output Rise and Fall Time

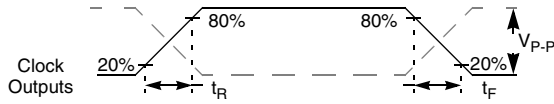


Figure 3: Output Rise and Fall Time

Output Duty Cycle

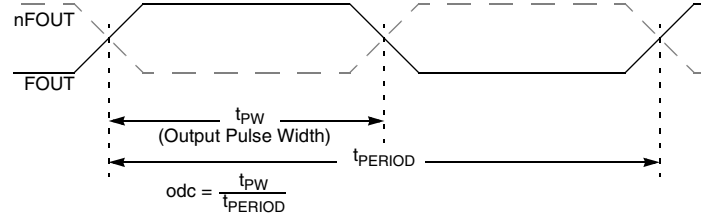
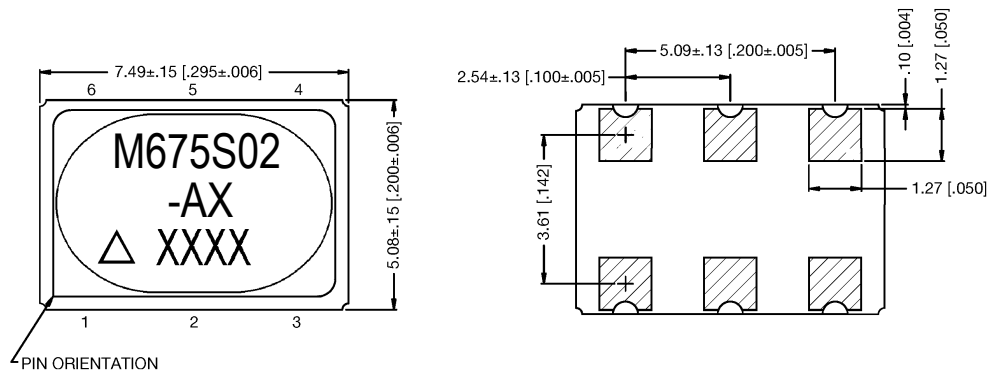


Figure 4: Output Duty Cycle

DEVICE PACKAGE - 5 x 7.5mm SMT (Surface Mount) Package

Mechanical Dimensions:



Dimensions are in mm;
 dimensions in [] are in inches
 Unless otherwise specified, all
 dimensions are ±0.13 [0.005]

Figure 5: Device Package - 5 x 7.5mm SMT (Surface Mount) Package

ORDERING INFORMATION

Part Numbering Scheme

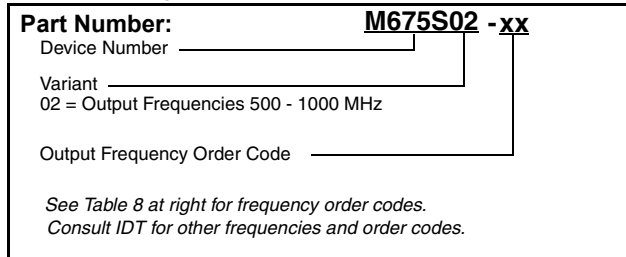


Figure 6: Part Numbering Scheme

Example Order Numbers

For Output Frequencies (MHz) <i>Frequency</i>	Order Part Number <i>M675S02-xx</i>
622.0800	M675S02-AA
625.0000	M675S02-AB

Table 7: Example Order Numbers

Consult IDT for the availability of other frequencies

M675S02 Standard Output Frequencies & Order Codes

500.0000 CA	693.4830 AL
622.0800 AA	657.4219 AM
625.0000 AB	614.4000 AO
627.3296 AC	475.0000 AP
644.5313 AD	707.3527 AQ
666.5143 AE	624.7048 AR
669.1281 AF	777.6000 AS
669.3120 AG	699.5175 AT
669.3266 AH	696.6149 AU
670.8386 AI	698.8123 AV
672.1627 AJ	873.5154 AY
690.5692 AK	873.8115 AZ

Table 8: M675S02 Standard Output Frequencies & Order Codes