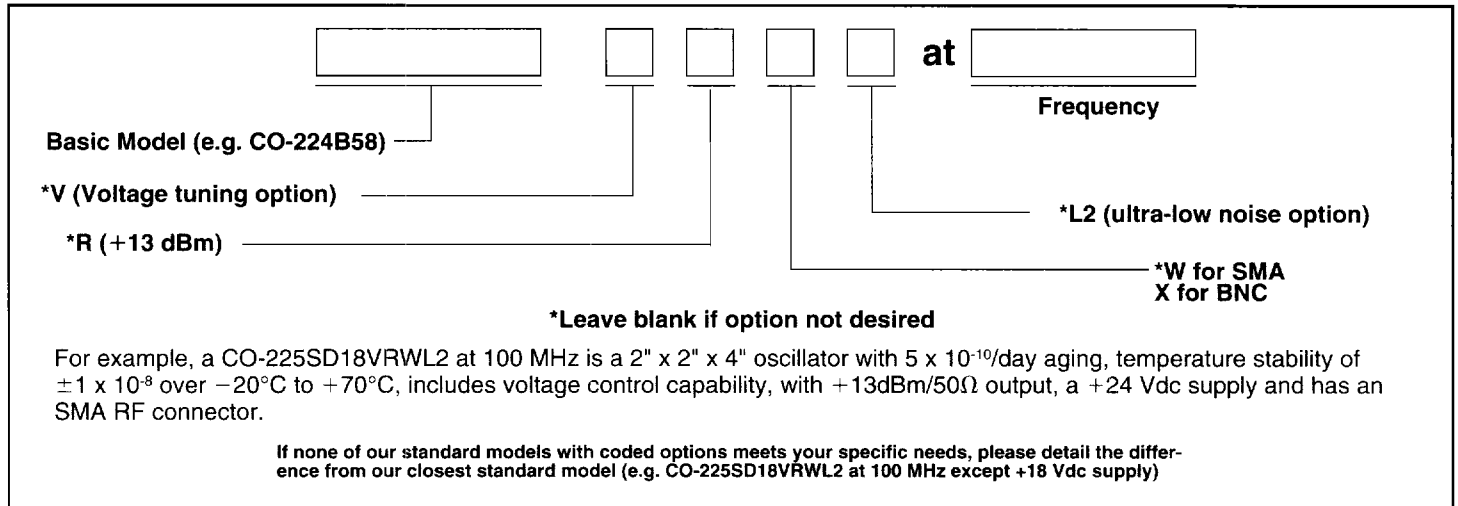


**Chassis Mount  
VHF Oven Controlled  
Crystal Oscillators**

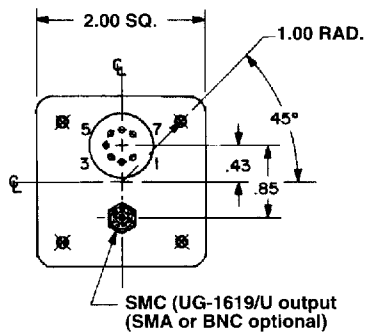
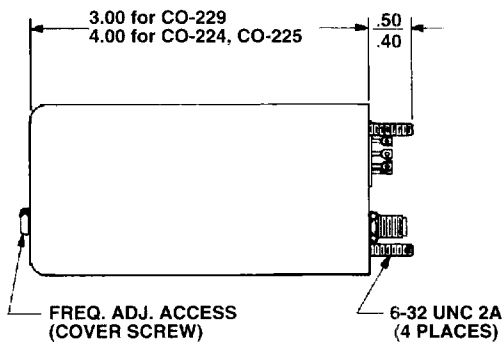
Basic Series	Most Economical CO-229 SERIES		Highest Frequency, Lowest Noise CO-224 SERIES		Highest Stability (to $5 \times 10^{-10}$ /day) CO-225 SERIES		CO-225S SERIES	
	<b>FREQUENCY</b> (for frequencies <25 MHz see pages 56, 58)	25 MHz to 200 MHz		25 MHz to 400 MHz		25 MHz to 200 MHz		
<b>STABILITY</b> Temperature (Temp. Range A) +15°C to +35°C:	CO-229 A38: $\pm 3 \times 10^{-8}$ CO-229 A59: $\pm 5 \times 10^{-9}$		CO-224 A38: $\pm 3 \times 10^{-8}$ CO-224 A59: $\pm 5 \times 10^{-9}$		CO-225 A18: $\pm 1 \times 10^{-8}$ CO-225 A19: $\pm 1 \times 10^{-9}$		CO-225SA18: $\pm 1 \times 10^{-8}$ CO-225SA19: $\pm 1 \times 10^{-9}$	
(Temp. Range B) 0°C to +50°C:	CO-229 B58: $\pm 5 \times 10^{-8}$ CO-229 B18: $\pm 1 \times 10^{-8}$		CO-224 B58: $\pm 5 \times 10^{-8}$ CO-224 B18: $\pm 1 \times 10^{-8}$		CO-225 B58: $\pm 5 \times 10^{-8}$ CO-225 B18: $\pm 1 \times 10^{-8}$ CO-225 B39: $\pm 3 \times 10^{-8}$		CO-225SB58: $\pm 5 \times 10^{-8}$ CO-225SB18: $\pm 1 \times 10^{-8}$ CO-225SB29: $\pm 2 \times 10^{-8}$	
(Temp. Range D) -20°C to +70°C:	CO-229 D17: $\pm 1 \times 10^{-7}$ CO-229 D38: $\pm 3 \times 10^{-8}$		CO-224 D17: $\pm 1 \times 10^{-7}$ CO-224 D38: $\pm 3 \times 10^{-8}$		CO-225 D38: $\pm 3 \times 10^{-8}$ CO-225 D18: $\pm 1 \times 10^{-8}$ CO-225 D59: $\pm 5 \times 10^{-8}$		CO-225SD38: $\pm 3 \times 10^{-8}$ CO-225SD18: $\pm 1 \times 10^{-8}$ CO-225SD39: $\pm 3 \times 10^{-8}$	
(Temp. Range G) -55°C to +75°C:	CO-229 G27: $\pm 2 \times 10^{-7}$ CO-229 G58: $\pm 5 \times 10^{-8}$		CO-224 G27: $\pm 2 \times 10^{-7}$ CO-224 G58: $\pm 5 \times 10^{-8}$		CO-225 G17: $\pm 1 \times 10^{-7}$ CO-225 G38: $\pm 3 \times 10^{-8}$		CO-225SG17: $\pm 1 \times 10^{-7}$ CO-225SG28: $\pm 2 \times 10^{-8}$	
(Temp. Range F) -55°C to +85°C:							CO-225SF38: $\pm 3 \times 10^{-8}$	
<b>Aging Rate</b>	Standard: $1 \times 10^{-9}$ /day, $2 \times 10^{-9}$ /year Optional: $5 \times 10^{-9}$ /day, $1 \times 10^{-9}$ /year Option "S": $2 \times 10^{-9}$ /day, $5 \times 10^{-7}$ /year		Standard: $1 \times 10^{-9}$ /day, $2 \times 10^{-9}$ /year Optional: $5 \times 10^{-9}$ /day, $1 \times 10^{-9}$ /year Option "S": $2 \times 10^{-9}$ /day, $5 \times 10^{-7}$ /year		$1 \times 10^{-9}$ /day, $3 \times 10^{-7}$ /year		$5 \times 10^{-10}$ /day, $1 \times 10^{-7}$ /year	
<b>Supply <math>\pm 5\%</math></b>	$5 \times 10^{-9}$ /percent				$1 \times 10^{-9}$ /percent		$5 \times 10^{-10}$ /percent	
<b>Short Term (Allan Variance)</b>	$5 \times 10^{-11}$ /second				$3 \times 10^{-11}$ /second		$5 \times 10^{-12}$ /second	
<b>OUTPUT / SUPPLY</b>	<b>OUTPUT LEVEL</b> Standard: $>0.5$ Vrms/50 $\Omega$ (+7 dBm) Option: TTL (to 100 MHz)	<b>SUPPLY</b> *24 Vdc $\pm 5\%$ **12-28 Vdc	<b>OUTPUT LEVEL</b> Standard: $>1$ Vrms/50 $\Omega$ (+13 dBm) Option: ECL (to 200 MHz)	<b>SUPPLY</b> *24 Vdc $\pm 5\%$ **12-28 Vdc	<b>OUTPUT LEVEL</b> Standard: $>0.5$ Vrms/50 $\Omega$ (+7 dBm) Option "R": $>1.0$ Vrms/50 $\Omega$ (+13 dBm) Option: TTL, ECL		<b>SUPPLY</b> *24 Vdc $\pm 5\%$ **12-28 Vdc	
	* Operation from any specified supply in 12-28 Vdc range optional, subject to reduction in output for <15 Vdc supply. ** Additional +5 Vdc desired for TTL; additional -5.2 Vdc desired for ECL.							
<b>Harmonics and Subharmonics (sine output)</b>	$>20$ dB below output. If internal multiplication is used (generally above 70 MHz), sub-harmonics are also $>-20$ dBc.				$>35$ dB below output. Crystal frequency is typically in the 8-12.5 MHz range			
	Harmonic and sub-harmonic levels can be further reduced. Other spurious $>-80$ dBc.							
<b>Phase Noise</b>	See below for standard specification and ultra-low noise option.							
<b>Input Power</b>	$<6$ watts at turn-On over $-20^\circ\text{C}$ to $+70^\circ\text{C}$ . $<3$ watts stabilized at $25^\circ\text{C}$ .							
<b>FREQUENCY ADJUSTMENT</b>	Multi-turn screwdriver adjust, settable to $<1 \times 10^{-6}$ nominal.							
<b>Electrical</b>	Option "V": VCXO operation permits remote frequency adjustment or locking onto an external frequency source. Nominal range with 0 to 6V control is $1 \times 10^{-6}$ (wider deviation available); however, with L2 option range is $5 \times 10^{-7}$ and in CO-225S Series range is $1 \times 10^{-7}$ .							
<b>MECHANICAL</b> (see page 65)	<b>Size</b>	2" x 2" x 3" (51 x 51 x 76 mm)		2" x 2" x 4" (51 x 51 x 104 mm)		2" x 2" x 4" (51 x 51 x 104 mm)		
	<b>Base</b>	Standard: SMC (UG-1619/U) output connector, 7 pin solder header and 4 studs. Option "W": SMA output connector, 7 pin solder header and 4 studs. Option "X": BNC output connector, 7 pin solder header and 4 studs.						
<b>PHASE NOISE</b> (typical)	<b>Phase Noise</b> typical with sine output in 75-125 MHz range		<b>Offset from Carrier</b>		<b>Standard</b>		<b>Ultra* Low Noise Option (L2)</b>	
	Offset from Carrier		Standard		Ultra* Low Noise Option (L2)		Offset from Carrier	
	100 Hz		-120 dBc/Hz		100 Hz		-105 dBc/Hz	
	1 kHz		-135 dBc/Hz		1 kHz		-115 dBc/Hz	
	10 kHz		-140 dBc/Hz		10 kHz		-120 dBc/Hz	
	50 kHz		-145 dBc/Hz		50 kHz		-125 dBc/Hz	
	Ultra-low noise option not available				*With L2 Option, output level is $\geq +10$ dBm to 300 MHz and $\geq +7$ dBm above 300 MHz			
<b>ENVIRONMENTAL</b>	See general environmental specifications on page 98.							
<b>HOW TO ORDER</b>	See page 65.							

## HOW TO ORDER



## OUTLINE DRAWINGS

### CO-229, CO-224, CO-225(S)



Pin	Function
1	N/C
2	Case (0 Volts)
3	Case (0 Volts)
4	Supply (+)
*5	VCXO Supply
*6	VCXO Input
*7	VCXO Return-Case

\* Only for units with electronic tuning; otherwise, these are No Connection. For fine tuning adjustment of units with VCXO, connect ends of 20K $\Omega$  wirewound pot to pins 5 and 7, with wiper arm to pin 6.

Markings do not appear on oscillators; they are for reference only. Dimensions are in inches. Case dimension tolerances are  $\pm .02$ "



Immediate need? Please call.

(203) 853-4433

Let our staff of application engineers assist you in placing your order.