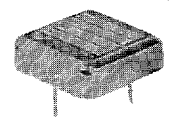


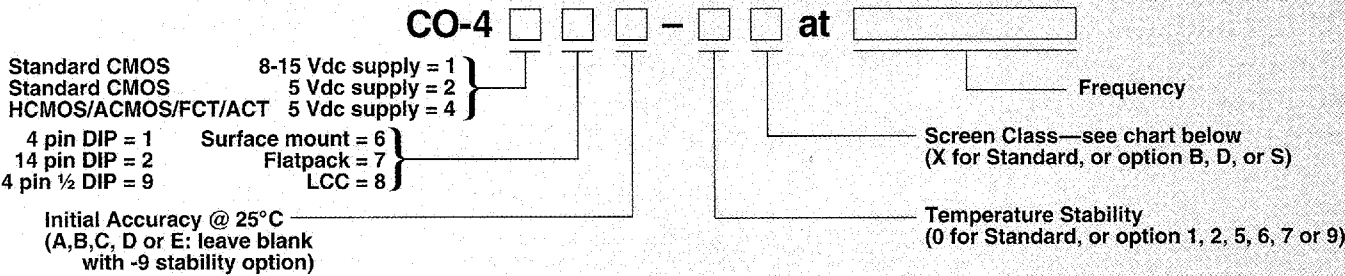
CMOS/HCMOS/ACMOS/FCT Clock Oscillators



LOW PROFILE RESISTANCE WELDED				LCC	PCB MOUNT	
	CMOS (8-15V)	CMOS (5V)	HCMOS/ACMOS/FCT/ACT (5V)	HCMOS (5V) CO-448	CMOS (5-15V) CO-236	
Series	CO-411: 4 PIN DIP CO-412: 14 PIN DIP CO-416: SURFACE MOUNT CO-417: FLATPACK CO-419: 4 PIN 1/2 DIP	CO-421: 4 PIN DIP CO-422: 14 PIN DIP CO-426: SURFACE MOUNT CO-427: FLATPACK CO-429: 4 PIN 1/2 DIP	CO-441: 4 PIN DIP CO-442: 14 PIN DIP CO-446: SURFACE MOUNT CO-447: FLATPACK CO-449: 4 PIN 1/2 DIP (to 100 MHz)		Packaged Crystal for best temperature stability Mechanical tuning available Best aging available	
Features	Standard CMOS, 8-15 Vdc supply.	Standard CMOS, 5 Vdc supply.	HCMOS to 50 MHz; ACMOS > 50 MHz; FCT > 100 MHz. Also drives TTL, 5V supply; 3.3V operation to 150 MHz.	Smallest size Lowest profile	Broadest range of frequencies and options Minimum current drain	
ELECTRICAL						
Frequency	1 Hz-15 MHz	1 Hz-8 MHz	1 Hz-175 MHz	100 KHz-50 MHz	.01 Hz-15 MHz	
Accuracy (maximum error at 25°C)	CO-41□A: ± 50 ppm CO-41□C: ± 25 ppm CO-41□D: ± 15 ppm CO-41□B: ± 10 ppm *CO-41□E: ± 1 ppm	CO-42□A: ± 50 ppm CO-42□C: ± 25 ppm CO-42□D: ± 15 ppm CO-42□B: ± 10 ppm *CO-42□E: ± 1 ppm	CO-44□A: ± 50 ppm CO-44□C: ± 25 ppm CO-44□D: ± 15 ppm CO-44□B: ± 10 ppm *CO-44□E: ± 1 ppm	CO-448A: ± 50 ppm CO-448C: ± 25 ppm	CO-236: ± 10 ppm *CO-236T: ± 1 ppm	
Available as QPL to MIL-O-55310/18B & 126B □ for 4 pin DIP, □ for 14 pin DIP, □ for surface mount, □ for flatpack, □ for 4 pin 1/2 DIP *Settability via external capacitor (<60 MHz only; see pin connections on page 20) CO-419E ≤15MHz, CO-429E ≤8MHz, CO-449E ≤20 MHz set to ±1 ppm via external capacitor CO-440 Series (not including CO-440) Tri-state output available Contact factory Enable/disable available to 50 MHz *Includes tuning adjustment with ± 1 ppm settability.						
Temperature Stability	STANDARD: 0°C to +70°C: ± 25 ppm Option 1: -55°C to +85°C: ± 50 ppm Option 2: -55°C to +125°C: ± 50 ppm (contact factory above 100 MHz) Option 3: 0°C to +50°C: ± 3 ppm (only available in CO-236) Option 4: 0°C to +50°C: ± 1 ppm (only available in CO-236 above 200 Hz; specify supply voltage) Option 5: 0°C to +50°C: ± 5 ppm Option 6: 0°C to +50°C: ± 10 ppm Option 7: -55°C to +125°C: ± 100 ppm (contact factory above 100 MHz) Option 9: -55°C to +200°C: ± 300 ppm (N/A in CO-236, CO-448 or above 20 MHz in CO-440 Series) *Specified stability includes initial accuracy: do not specify A, B, C, D or E accuracy				Improved accuracy/stability available on some models to, for example, to ± 7 ppm over 0°C to +50°C and to ± 10 ppm over 0°C to +70°C. Improvement also available over wider temperature ranges. Please contact factory.	
Aging Rate (typical after initial 30 days)	3 ppm first year 2ppm/ year thereafter				Standard: 5 ppm first year 3 ppm/year thereafter Option "Y": 1 ppm/year	
Supply Voltage	8-15 Vdc	5 Vdc ± 5%	5 Vdc ± 5% (Available with 3 Vdc input below 20 MHz)	5 Vdc ± 5%	5-15 Vdc to 6 MHz 10-15 Vdc to 15 MHz	
Current Drain (typical)	10 Vdc (≤5 MHz): 7 mA 15 Vdc (≤5 MHz): 12 mA	1.5 mA to 4 mA depending on frequency	(10 MHz): 10mA (50 MHz): 40mA (125 MHz): 50mA	<35 mA	6 Vdc (≤5 MHz): 1.5 mA 10 Vdc (≤5 MHz): 4 mA 15 Vdc (≤5 MHz): 8 mA	
Output	CMOS compatible 0:<0.1 Vdd 1:>0.9 Vdd	CMOS compatible 0:<0.1 Vdd 1:>0.9 Vdd	HCMOS compatible ≤50 MHz: output from HCMOS device >50 to 100 MHz: output from ACMOS device >100 MHz: output from FCT device 0:<0.1 Vdd; 1:>0.9 Vdd to 100 MHz >100 MHz: FCT output	HCMOS compatible 0:<0.1 Vdd 1:>0.9 Vdd	CMOS compatible 0:<0.1 Vdd 1:>0.8 Vdd	
Rise/Fall Time (10-90%) (15pf load)	10V: <40 ns 15V: <30 ns	<70 ns	3-10 ns, depending upon frequency	3-10 ns, depending upon frequency	5V: 75 ns 10V: 45 ns 15V: 35 ns	
Symmetry (@50% Vdd)	≥4 MHz: 60/40 to 40/60 <4 MHz: 55/45 to 45/55	≥2 MHz: 60/40 to 40/60 <2 MHz: 55/45 to 45/55	60/40 to 40/60 (improved symmetry optional)	60/40 to 40/60	65/35 to 35/65 >3 MHz 60/40 to 40/60 <3 MHz	
MECHANICAL						
Size (see drawings on page 20)	†CO-411/421/441: 0.5" x 0.8" x 0.2" (12.7 x 20.3 x 5.1 mm) CO-412/422/442: 0.5" x 0.8" x 0.2" (12.7 x 20.3 x 5.1 mm) CO-416/426/446: 0.5" x 0.8" x 0.25" (12.7 x 20.3 x 6.4 mm) ††CO-417/427/447: 0.6" x 0.8" x 0.17" (15.3 x 20.3 x 4.2 mm) ††0.12" (3.1 mm) height available <20 MHz †CO-419/429/449: 0.5" x 0.5" x 0.23" (with insulated standoffs)			0.480"x 0.480"x 0.085" (12.2 x 12.2 x 2.2 mm)	1.5" x 1.5" x 0.5" (38 x 38 x 12.7 mm)	
Case	Resistance welded case (flatpack is seam welded) 4 pin DIP Series available with insulated standoffs; height increases to 0.23" (5.8 mm) 4 pin 1/2 DIP Series available in surface mount; height increases to 0.25" (6.4 mm)			Sealed ceramic leadless chip carrier	Metal can, epoxy base *C option: Solder sealed metal case, height 0.68" (17.3 mm)	
ENVIRONMENTAL						
Vibration	20 g to 2 kHz sine per MIL-STD-202, Method 204, Condition D. 20 grms to 2 kHz random per MIL-STD-202, Method 214, Conditions I-F.				Standard: 5g to 500 Hz Optional: 20 g to 2 kHz	
Shock	100 g, 6 ms per MIL-STD-202, Method 213, Conditions C and I.				Standard: 30 g, 11 ms Optional: 100 g, 6 ms	
Humidity	100%, rh per MIL-STD-202, Method 103, Condition B.				Standard: 95% rh, no condensation *C option: 100% rh	
Seal	Hermetic per MIL-STD-883, Method 1014, Condition A2.				Standard: N/A *C option: Available Per MIL-STD-202 Method 112, Cond D, when requested	
OTHER OPTIONS						
Other mechanical configurations and stability specifications tailored to customer's specific needs. Voltage frequency control (VCXO), see page 73 Tri-state output available in CO-441 thru CO-447 series. Enable/disable available to 50 MHz						
HOW TO ORDER						
see page 19						

Vectron is a QPL source
for DIP CMOS and HCMOS
Clock Oscillators per
M55310/18 & 26B.

CO-400 SERIES



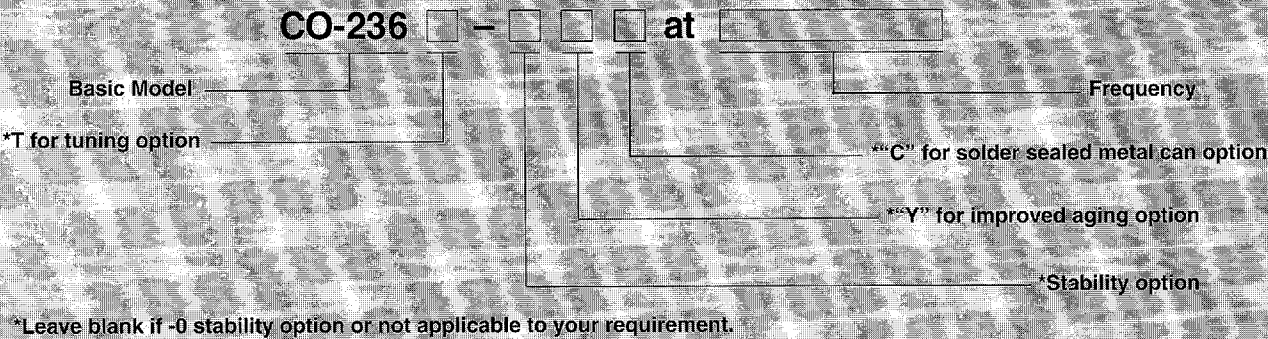
For Example:
CO-441A-0X at 50 MHz has a high speed CMOS output
and operates from 5 Vdc input. It is a 4 pin DIP with "A"
initial accuracy of ±50 ppm, "Standard" stability of
±25 ppm over 0°C to +70°C, and is 100% screen
tested to level "X"

CO-412E-2B at 100 kHz has a standard CMOS output and
operates from 8-15 Vdc input. It has a 14 pin base with "E"
accuracy remotely settable to ±1 ppm, "-2" temperature
stability of ±50 ppm over -55°C to +125°C, and is 100%
screen tested to level "B"

SCREEN TESTING OF ABOVE MODELS

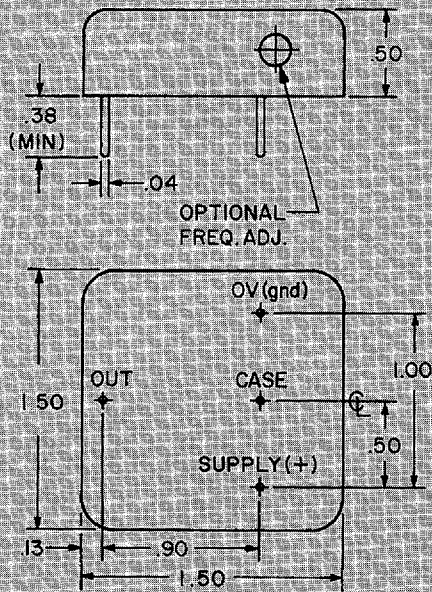
SCREEN TEST	MIL-STD-883 METHOD	Standard	Options		
		CLASS X	CLASS D	CLASS B	CLASS S
Stabilization Bake (150°C)	—	X	X	X	Class S screen test requirements include 24 hour additional bake-out, 80 hour additional burn-in, thermal shock, PIND test and radiographic inspection in addition to Class B Screening. Has major cost impact.
Seal Test (Gross and Fine)	1014, Cond A2	X	X	X	
Temperature Cycling (Thermal Shock)	1010, Cond B		X	X	
Burn-in, operating 160 hours @125°C	—		X	X	
Acceleration (5000g in Y1 axis)	2001, Cond A			X	

CO-236 SERIES



For Example:
CO-236 at 60 Hz with ±.0001% accuracy (via tuning adjust) and
±.001% over 0/50°C = CO-236T-6 at 60 Hz

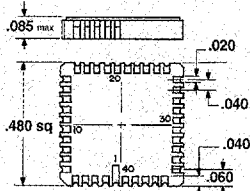
CO-236



CO-236C

Same as above except height is 0.68" and pin diameter is 0.03"

CO-448



Function	Pad
+5Vdc	4
+5Vdc	10
Ground	31
Ground	37
Output	39
N/C	Other

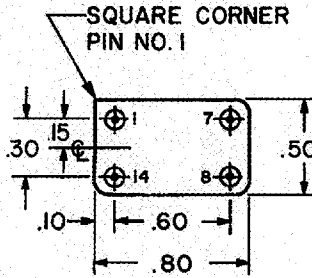
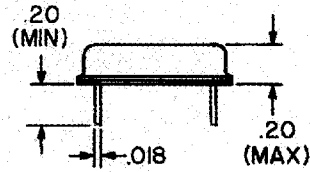
Markings do not appear on units — for reference only.
Dimensions are in inches. Case dimension tolerances are $\pm .02$ "



(203)853-4433

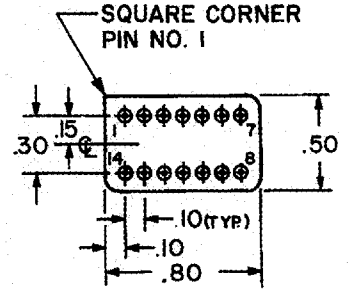
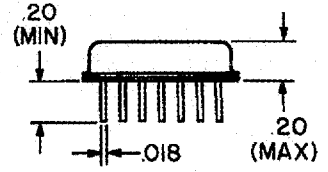
Immediate need? Please call.
We maintain a broad inventory of clock oscillators at numerous frequencies.

CO-411/421/441

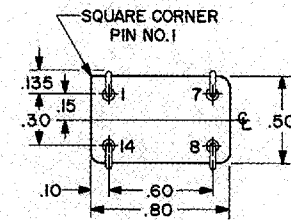
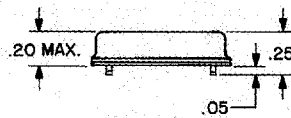


Available with insulated standoffs; increases height to 0.23" maximum

CO-412/422/442



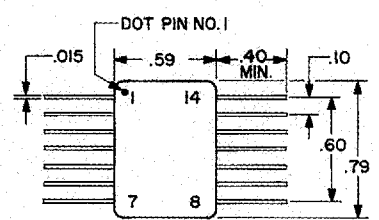
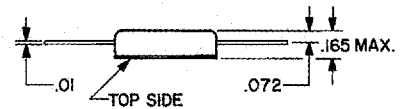
CO-416/426/446



All Above Models

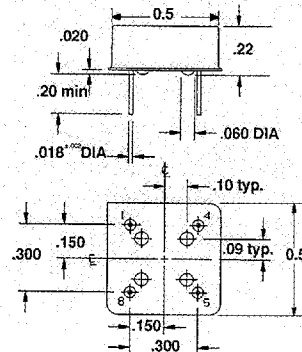
Function	Pin
*N/C	1
OV, case, gnd	7
Output	8
Supply +	14
N/C	Other

CO-417/427/447



*For external tuning, "E" accuracy, connect variable capacitor with nominal range of 5 to 30 pf from pin 1 to pin 7.

CO-419/429/449



Function	Pin
N/C	1
OV, case, gnd	4
Output	5
B+	8