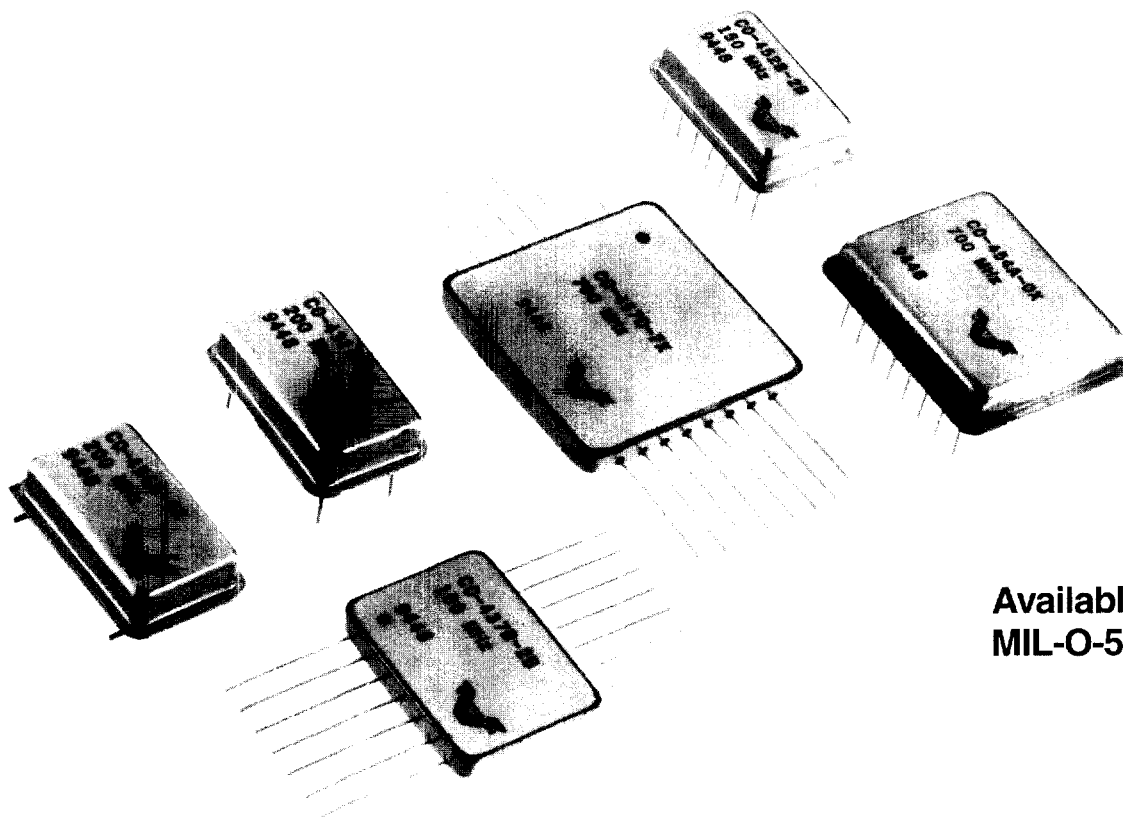


VECTRON *ECL Clock Oscillators*

FEATURES:

- Available 5 MHz thru 700 MHz
- 10K, 10KH, 100K, ECLinPS, 10E/EL & 100E/EL logic
- Temperature range from 0°C to +50°C thru -55°C to +125°C
- Stability to ± 3 ppm; accuracy to ± 1 ppm
- Commercial and MIL models
- DIP, ½ DIP, surface mount, flatpack and pcb mount models
- CO-431, CO-432 Type QPL'd per MIL-O-55310/25B
- Screen testing available to Class B or S of MIL-O-55310



Available as QPL
MIL-O-55310/25B

ECL Clock Oscillators

+3.3V and +5V PECL Available. Contact Factory

SONET/SDH Frequencies Available: 33.98 through 622.08 MHz

**5 MHz to 700 MHz
10K, 10KH, ECLinPS 10E/EL**

**5 MHz to 700 MHz
100K ECL, ECLinPS 100E/EL**



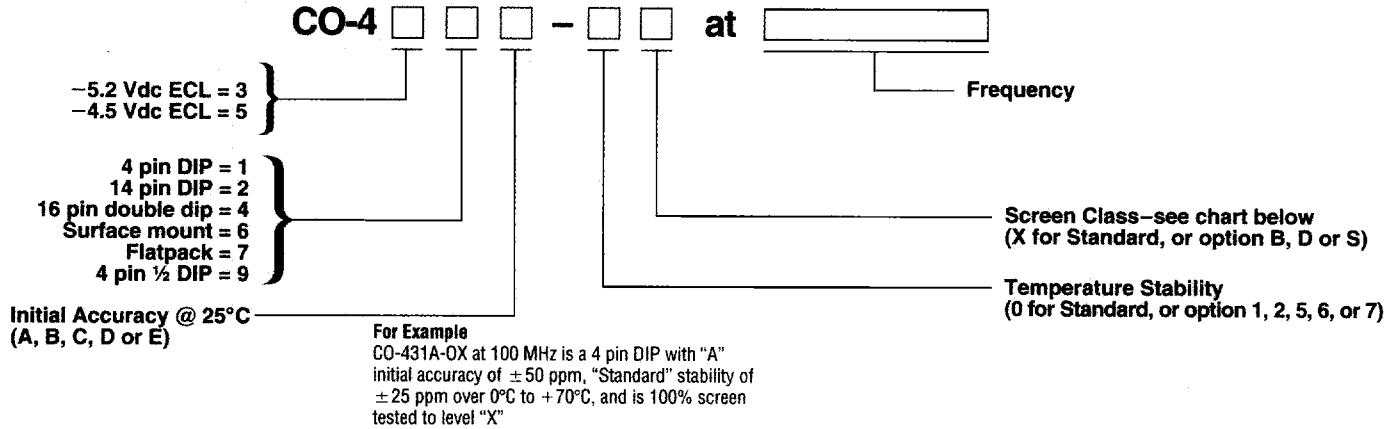
Series	<ul style="list-style-type: none"> CO-431: 4 PIN DIP CO-432: 14 PIN DIP CO-434: 16 PIN DOUBLE DIP CO-436: SURFACE MOUNT CO-437: FLATPACK CO-439: 4 PIN 1/2 DIP 	<p>CO-233ME CO-233MEH (pcb mount)</p> <p><i>Packaged crystal for best temperature stability and aging.</i></p>	<ul style="list-style-type: none"> CO-451: 4 PIN DIP CO-452: 14 PIN DIP CO-454: 16 PIN DOUBLE DIP CO-456: SURFACE MOUNT CO-457: FLATPACK CO-459: 4 PIN 1/2 DIP 	<p>CO-233KEQ (pcb mount)</p> <p><i>Packaged crystal for best temperature stability. Mechanical tuning available. Best aging available.</i></p>
ELECTRICAL Frequency	<p>CO-431, 432, 436: 5 MHz to 200 MHz CO-439: 10MHz to 100 MHz CO-434: 200.1 MHz to 700 MHz CO-437: 5 MHz to 700 MHz</p>	<p>CO-233ME: 5-149.9 MHz CO-233MEH: 150-200.0 MHz</p>	<p>CO-451, 452, 456: 5 MHz to 200 MHz CO-459: 10MHz to 100 MHz CO-454: 200.1 MHz to 700 MHz CO-457: 5 MHz to 700 MHz</p>	<p>150-700 MHz</p>
Output (see note on page 24)	<p>Output taken directly from 10K, 10KH, ECLinPS or ECLinPS Lite gate, depending on temperature and frequency range. For CO-439, output taken directly from 10EL gate. Complementary outputs standard in CO-434; optional in CO-432 and CO-437.</p>		<p>Output taken directly from 100K, ECLinPS or ECLinPS Lite gate, depending on temperature and frequency range. For CO-459, output taken directly from 100EL gate. Complementary outputs standard in CO-233KEQ & CO-454; optional in CO-452 and CO-457.</p>	
Supply	<p>-5.2 Vdc ± 5% < 45 mA to 110 MHz < 70 mA above 110 MHz Note: CO-439 < 50 mA</p>		<p>Standard: -4.5 Vdc ± 5% at < 60 mA Note: CO-459 < 50 mA Option F: -5.2 Vdc ± 5% at < 70 mA Available in CO-233KEQ</p>	
Accuracy (at 25°C)	<p>CO-43 □ A: ± 50 ppm CO-43 □ C: ± 25 ppm CO-43 □ D: ± 15 ppm CO-43 □ B: ± 10 ppm CO-43 □ E: ± 1 ppm</p> <p>① 4 pin DIP ② 14 pin DIP ③ double DIP ④ surface mount ⑤ flatpack ⑥ 4 pin 1/2 DIP</p> <p>*E = set to ± 1 ppm via external capacitor (≤ 60 MHz in CO-432 and and < 240 MHz in CO-434 and CO-437. N/A in a CO-431, CO-436 or CO-439 package.</p>	<p>5-149.9 MHz models CO-233ME: ± 10 ppm *CO-233MET: ± 1 ppm</p> <p>*Includes tuning adjust with ± 5 ppm nominal range, settable to ± 1 ppm via internal capacitor</p> <p>150-200 MHz models: CO-233MEHA: ± 50 ppm CO-233MEHB: ± 10 ppm</p>	<p>CO-45 □ A: ± 50 ppm CO-45 □ C: ± 25 ppm CO-45 □ D: ± 15 ppm CO-45 □ B: ± 10 ppm CO-45 □ E: ± 1 ppm</p> <p>① 4pin DIP ② 14pin DIP ③ double DIP ④ surface mount ⑤ flatpack ⑥ 4 pin 1/2 DIP</p> <p>*E = set to ± 1 ppm via external capacitor (≤ 60 MHz in CO-452 and < 240 MHz in CO-454 and CO-457. N/A in a CO-451, CO-456 or CO-459 package.</p>	<p>CO-233KEQ: ± 10 ppm *CO-233KEQT: ± 1 ppm</p> <p>*Includes tuning adjust with ± 5 ppm nominal range, settable to ± 1 ppm via internal capacitor; available to 500 MHz</p>
Temperature Stability	<p>STANDARD: 0°C to +70°C: ± 25 ppm *Option 1: -55°C to +85°C: ± 50 ppm (lower limit -40°C in CO-439/459) *Option 2: -55°C to +125°C: ± 50 ppm (N/A for model CO-439/459) Option 3: 0°C to +50°C: ± 3 ppm (Only available in Model CO-233ME and CO-233KEQ) 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 *-1, -2, -7 restricted to -30/+85°C above 110 MHz in CO-233ME</p>		<p>Improved accuracy/stability available on some models to, for example, fo ± 7 ppm over 0°C to + 50°C and fo ± 10 ppm over 0°C to + 70°C. Improvement also available over wider temperature ranges. Please contact factory.</p>	
Aging Rate (typical after 30 days)	<p>3 ppm first year 2 ppm/year thereafter</p>	<p>5 ppm first year 3 ppm/year thereafter Option "Y": 1 ppm/year</p>	<p>3 ppm first year 2 ppm/year thereafter</p>	<p>5 ppm first year 3 ppm/year thereafter Option "Y": 1 ppm/year</p>
MECHANICAL Size (see drawings on page 24)	<p>*CO-431: 0.5" x 0.8" x 0.2" CO-432: 0.5" x 0.8" x 0.2" CO-434: 0.8" x 1.0" x 0.2" CO-436: 0.5" x 0.8" x 0.25" CO-437: ≤ 200 MHz: 0.6" x 0.8" x 0.17", 14 pin flatpack > 200 MHz: 1" x 1" x 0.17", 16 pin flatpack **CO-439: 0.5" x 0.5" x 0.23"</p>	<p>1.5" x 1.5" x 0.625" CO-233ME: 4 pin base CO-233MEH: 5 pin base</p>	<p>*CO-451: 0.5" x 0.8" x 0.2" CO-452: 0.5" x 0.8" x 0.2" CO-454: 0.8" x 1.0" x 0.2" CO-456: 0.5" x 0.8" x 0.25" CO-457: ≤ 200 MHz: 0.6" x 0.8" x 0.17", 14 pin flatpack > 200 MHz: 1" x 1" x 0.17", 16 pin flatpack **CO-459: 0.5" x 0.5" x 0.23"</p>	<p>1.5" x 1.5" x 0.5"</p>
Case	<p>resistance welded metal case *CO-431 available with insulated standoffs; increases height to 0.23" **CO-439 available in surface mount; increases height to 0.25"</p>	<p>metal case "C" option; meets gross leak test</p>	<p>resistance welded metal case. *CO-451 available with insulated standoffs; increases height to 0.23" **CO-459 available in surface mount; increases height to 0.25"</p>	<p>metal case "C" option; meets gross leak test</p>
ENVIRONMENTAL Vibration	<p>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, Condition I-F.</p>	<p>Standard: 5 g to 500 Hz Optional: 20 g to 2 kHz</p>	<p>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, Condition I-F.</p>	<p>Standard: 5 g to 500 Hz Optional: 20 g to 2 kHz</p>
Shock	<p>100 g, 6 ms per MIL-STD-202, Method 213, Condition C and I.</p>	<p>Standard: 30 g, 11 ms Optional: 100 g, 6 ms</p>	<p>100 g, 6 ms per MIL-STD-202, Method 213, Conditions C and I.</p>	<p>Standard: 30 g, 11 ms Optional: 100 g, 6 ms</p>
Humidity	<p>100 % rh per MIL-STD-202, Method 103, Condition B.</p>	<p>Standard: 95% rh no condensation "C" option: 100% rh</p>	<p>100 % rh per MIL-STD-202, Method 103, Condition B.</p>	<p>Standard: 95% rh no condensation "C" option: 100% rh</p>
Seal	<p>Hermetic per MIL-STD-883, Method 1014, Condition A2.</p>	<p>Standard: N/A "C" option: per MIL-STD-202, Method 112, Condition D.</p>	<p>Hermetic per MIL-STD-883, Method 1014, Condition A2.</p>	<p>Standard: N/A "C" option: Available per MIL-STD-202, Method 112, Condition D, when requested.</p>

Available as QPL to MIL-D-55310/25B

OTHER OPTIONS Other mechanical configurations and stability specifications tailored to customer's specific needs.
Voltage frequency control (VCXO)—see page 73

HOW TO ORDER see page 23

CO-430, CO-450 SERIES

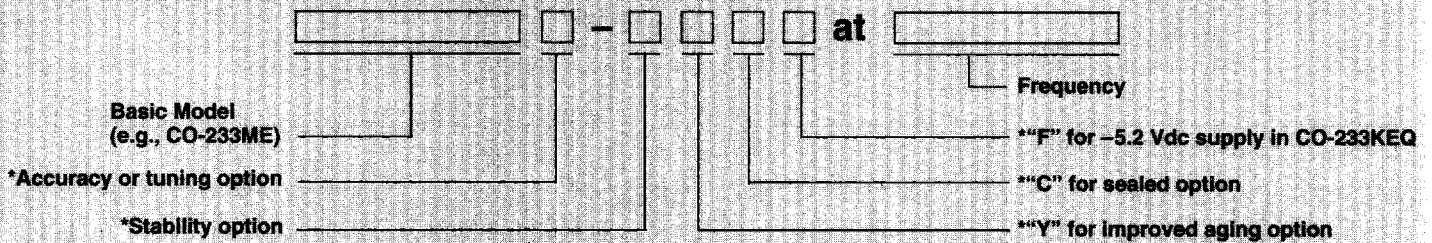


SCREEN TESTING OF ABOVE MODELS

SCREEN TEST	MIL-STD-883 METHOD	Options			
		Standard 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	—		X	X	
Acceleration (5000g in Y1 axis)	2001, Cond A			X	

**Burn-in is performed at the maximum specified operating temperature of the ECL device used, not to exceed +125°C

CO-233ME/MEH, CO-233KEQ SERIES

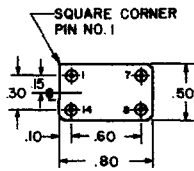
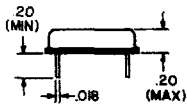


*Leave blank if not applicable to your requirement.

For Example:
CO-233KEQT-5Y at 400 MHz is a pc board mount 100K ECL compatible oscillator with -4.5 Vdc supply, tuning option, temperature stability of ± 5 ppm over 0°C + 50°C and 1 ppm/year aging.

ECL Clock Oscillators

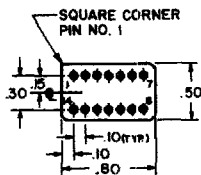
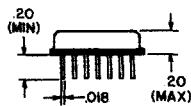
**CO-431
CO-451**



Pin	Function
7	Supply (-)
8	Output
14	OV, case
1	N/C

Available with insulated standoffs; increases height to 0.23" max.

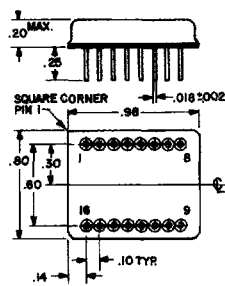
**CO-432
CO-452**



#*Pin	Function
7	Supply (-)
8	Output
14	OV, case
Other	* N/C

#For external tuning, "E" accuracy, connect variable capacitor with nominal range of 5-30 pF from pin 2 to pin 3.

**CO-434
CO-454**

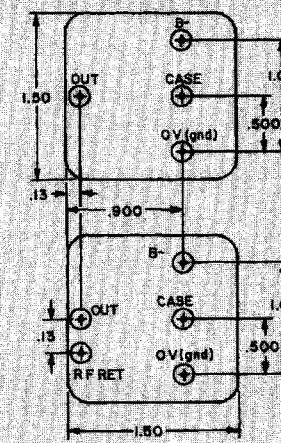
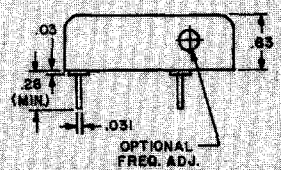


#*Pin	Function
8	Supply (-)
9	Output (Q)
10	Output (Q̄)
11	r return, case
16	OV, case

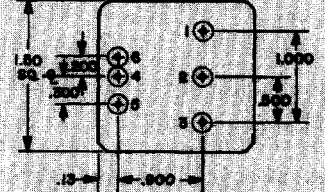
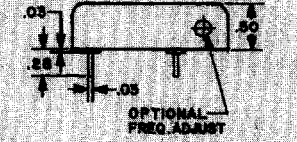
#For external tuning, "E" accuracy, connect variable capacitor with nominal range of 5-30 pF from pin 1 to pin 5.

* Unlisted pins may be used internally

CO-233ME/MEH

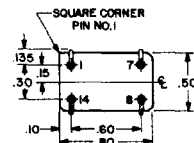


CO-233KEQ



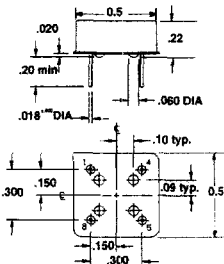
Pin	Function
1	Supply (-)
2	Case
3	OV, case
4	RF out, Q
5	RF return, case
6	RF out, Q̄

**CO-436
CO-456**



Pin	Function
7	Supply (-)
8	Output
14	OV, case
1	N/C

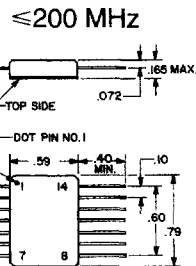
**CO-439
CO-459**



Pin	Function
1	N/C
4	-5.2V (439) -4.5V (459)
5	Output
8	OV, case

#For external tuning, "E" accuracy, connect variable capacitor with nominal range of 5-30 pF from pin 2 to pin 3.

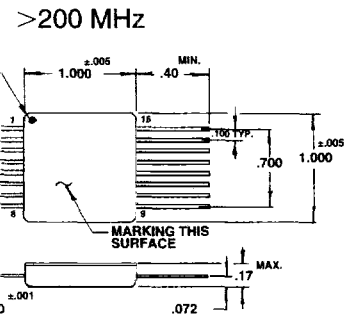
CO-437/457



* Complementary output option is available on pin 9 in CO-432/CO-452 and CO-437/CO-457

#*Pin	Function
7	Supply (-)
8	Output
14	OV, case
Other	* N/C

* Unlisted pins may be used internally



#*Pin	Function
8	Supply (-)
9	Output (Q)
10	Output (Q̄)
11	r return, case
16	OV, case

#For external tuning, "E" accuracy, connect variable capacitor with nominal range of 5-30 pF from pin 1 to pin 5.

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



(203)853-4433

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

Internal pull-down resistors permit testing the oscillator unterminated but restrict the output level at very high frequencies. The inclusion of pull-down resistors in Vectron ECL clock oscillators is charted below:

Model	Pull down resistor vs type output	
	Single ended	Complementary
CO-431, 432, 436, 437, 439	680Ω	* none
CO-434	N/A	** none
CO-233ME, MEH	560Ω	560Ω
CO-451, 452, 456, 457, 459	680Ω	* none
CO-454	N/A	** none
CO-233KEQ	N/A	** none

* Complementary output option, available in 14 pin DIP and flatpack models. has no pull down resistor.

** Complementary output is standard; pull down resistors omitted to maximize speed and level; the distance between output terminal and load should be minimized.