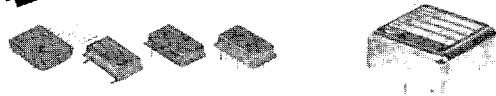


ECL Clock Oscillators

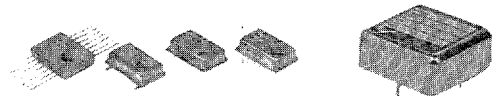
+3.3V and +5V PECL available. Contact Factory

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



SONET/SDH frequencies available: 38.88 through 622.08 MHz

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 	<ul style="list-style-type: none"> CO-233ME CO-233MEH (pcb mount) <p>Packaged crystal for best temperature stability and aging.</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 	<ul style="list-style-type: none"> CO-233KEQ (pcb mount) <p>Packaged crystal for best temperature stability. Mechanical tuning available. Best aging available.</p>
ELECTRICAL	<p>Frequency</p> <ul style="list-style-type: none"> 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>CO-233ME: 5-149.9 MHz CO-233MEH: 150-200.0 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)	<ul style="list-style-type: none"> 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>5-149.9 MHz models</p> <ul style="list-style-type: none"> CO-233ME: ± 10 ppm CO-233MEH: ± 1 ppm <p>*Includes tuning adjust with ± 5 ppm nominal range, settable to ± 1 ppm via internal capacitor</p>	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> CO-233KEQ: ± 10 ppm CO-233KEQT: ± 1 ppm <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</p> <p>*-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	<p>Size (see drawings on page 24)</p> <ul style="list-style-type: none"> 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>1.5" x 1.5" x 0.625" CO-233ME: 4 pin base CO-233MEH: 5 pin base</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	<p>Vibration</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>	
Humidity	<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, when requested.</p>	

• Available as QPL to MIL-0-55310/25B

- 1 4 pin DIP
 - 2 14 pin DIP
 - 3 double DIP
 - 4 surface mount
 - 5 flatpack
 - 6 4 pin 1/2 DIP
- *E = set to ± 1 ppm via external capacitor (≤ 60 MHz in CO-432 and ≤ 240 MHz in CO-434 and CO-437. N/A in a CO-431, CO-436 or CO-439 package.

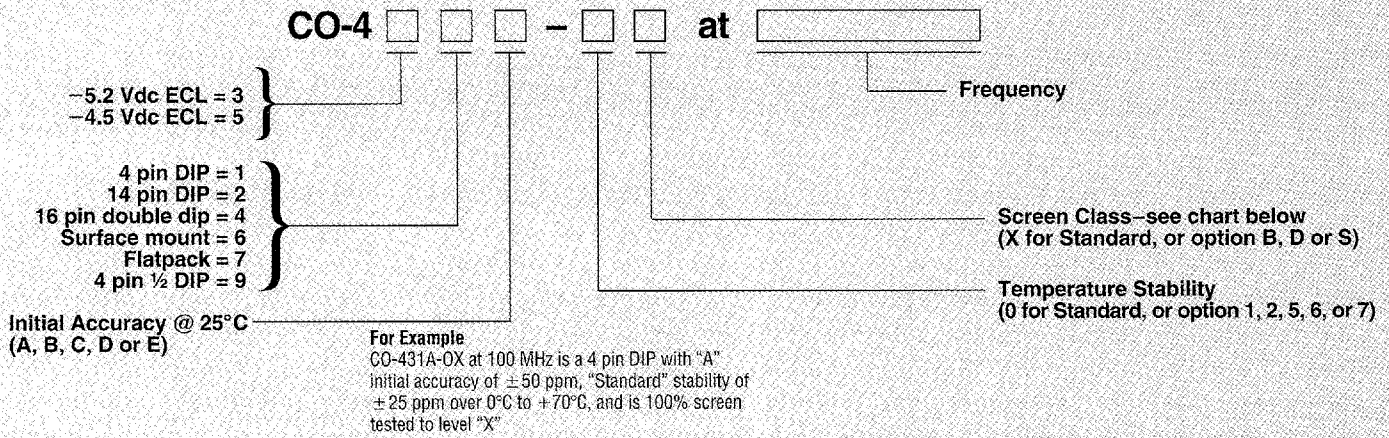
150-200 MHz models:
CO-233MEHA: ± 50 ppm
CO-233MEHB: ± 10 ppm

- 1 4pin DIP
 - 2 14pin DIP
 - 3 double DIP
 - 4 surface mount
 - 5 flatpack
 - 6 4 pin 1/2 DIP
- *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.

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.

OTHER OPTIONS Other mechanical configurations and stability specifications tailored to customer's specific needs.
HOW TO ORDER Voltage frequency control (VCXO)—see page 73
see page 23

CO-430, CO-450 SERIES

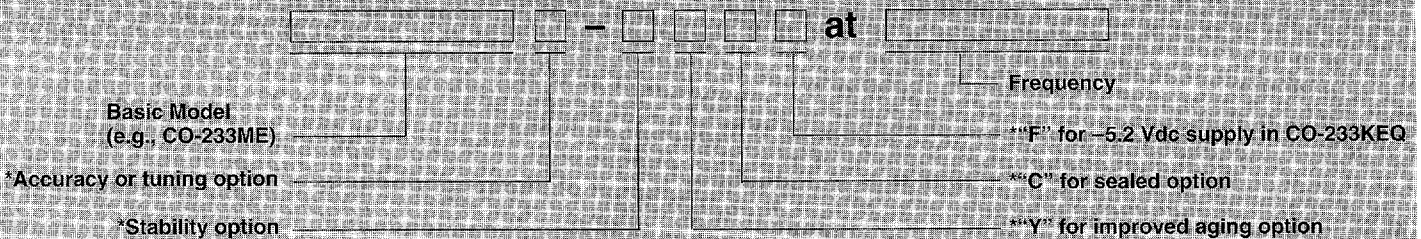


SCREEN TESTING OF ABOVE MODELS

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 Y ₁ 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

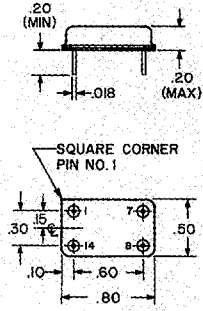
CO-233ME/MEH, CO-233KEQ SERIES



*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.

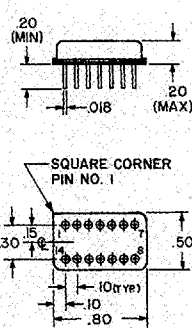
**CO-431
CO-451**



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

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

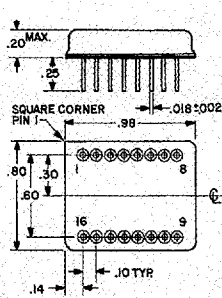
**CO-432
CO-452**



#*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.

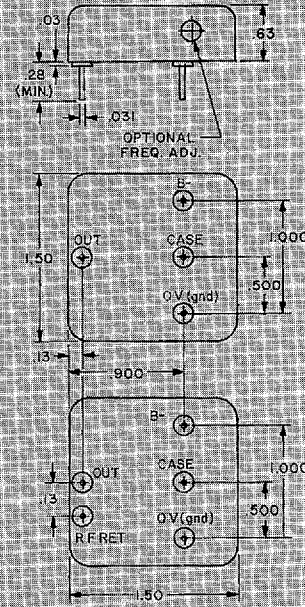
**CO-434
CO-454**



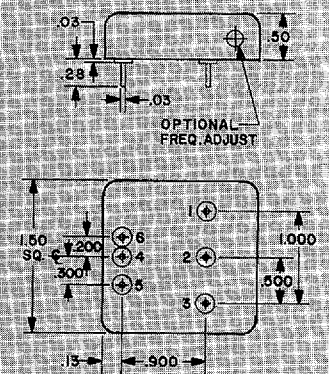
#*Pin	Function
8	Supply (-)
9	Output (Q)
10	Output (Q̄)
11	rf return, case
16	OV, case

#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

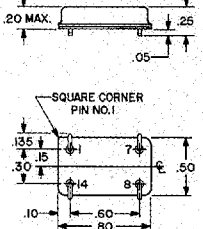


CO-233KEQ



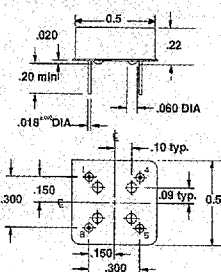
Pin	Function
1	Supply (-)
2	Case
3	OV, case
4	RF out, Q
5	RF return, case
6	RF out, Q̄

**CO-436
CO-456**



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

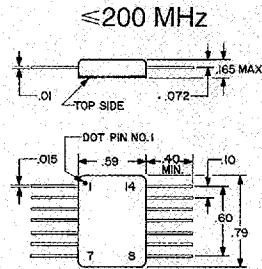
**CO-439
CO-459**



Pin	Function
1	N/C
4	-5.2V (439)
4	-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.

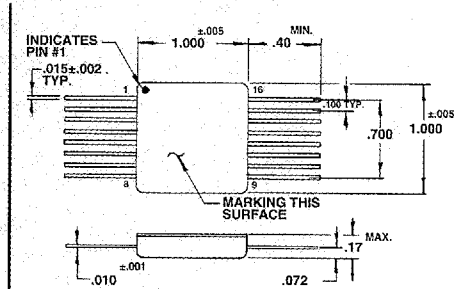
CO-437/457



*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

>200 MHz



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

*Unlisted pins may be used internally

#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.