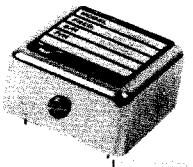
Low Profile PC Board Mount OCXOs

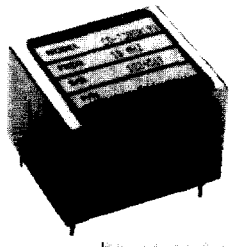


FEATURES:

- **Superior Aging**
- **Lowest Cost**
- **Excellent Temperature Stabilities**

	CO-711 SERIES *(AT Cut Crystal)*	CO-718S SERIES *(SC/IT Cut Crystal)*
FREQUENCY	5 MHz and 10 MHz standard. Other frequencies available in 4-25 MHz range with sine output and in 65 kHz-17 MHz range with logic output. See Series CO-724 for 25-400 MHz and CO-725 for 25-200 MHz.	
STABILITY Temperature		
(Temp. Range **A**) +15°C to +35°C:	**CO-71 □ A38:** $\pm 3 \times 10^{-8}$ **CO-71 □ A59:** $\pm 5 \times 10^{-9}$ ****CO-71 □ A29:** $\pm 2 \times 10^{-9}$	**CO-718SA28:** $\pm 2 \times 10^{-8}$ **CO-718SA39:** $\pm 3 \times 10^{-9}$ ****CO-718SA19:** $\pm 1 \times 10^{-9}$
(Temp. Range **B**) 0°C to +50°C:	**CO-71 □ B58:** $\pm 5 \times 10^{-8}$ **CO-71 □ B18:** $\pm 1 \times 10^{-8}$ ****CO-71 □ B59:** $\pm 5 \times 10^{-9}$	**CO-718SB38:** $\pm 3 \times 10^{-8}$ **CO-718SB59:** $\pm 5 \times 10^{-9}$ ****CO-718SB29:** $\pm 2 \times 10^{-9}$
(Temp. Range **D**) −20°C to +70°C:	**CO-71 □ D17:** $\pm 1 \times 10^{-7}$ **CO-71 □ D38:** $\pm 3 \times 10^{-8}$ ****CO-71 □ D28:** $\pm 2 \times 10^{-8}$	**CO-718SD58:** $\pm 5 \times 10^{-8}$ **CO-718SD18:** $\pm 1 \times 10^{-8}$ ****CO-718SD59:** $\pm 5 \times 10^{-9}$
(Temp. Range **G**) −55°C to +75°C:	**CO-71 □ G27:** $\pm 2 \times 10^{-7}$ **CO-71 □ G58:** $\pm 5 \times 10^{-8}$ ****CO-71 □ G38:** $\pm 3 \times 10^{-8}$	**CO-718SG17:** $\pm 1 \times 10^{-7}$ **CO-718SG38:** $\pm 3 \times 10^{-8}$ ****CO-718SG28:** $\pm 2 \times 10^{-8}$
(Temp. Range **F**) −55°C to +85°C:	*Not available with L2 option **Uses TO-8 Crystal	*CO-718SF27: $\pm 2 \times 10^{-7}$ *CO-718SF58: $\pm 5 \times 10^{-8}$ *‡CO-718SF38: $\pm 3 \times 10^{-8}$
Aging Rate	**4:** 1×10^{-8}/day (2×10^{-6}/year) **5:** 5×10^{-9}/day (1.5×10^{-6}/year) **6:** 3×10^{-9}/day (1×10^{-6}/year) **7:** 1×10^{-9}/day (3×10^{-7}/year)	5×10^{-10}/day (1×10^{-7}/year) (5×10^{-8}/year optional at some frequencies; 2×10^{-8}/year optional at 5 MHz)
Supply (±5%)	5×10^{-9} per percent 7×10^{-9} per percent for Option N with TO-8: 2×10^{-9} per percent	2×10^{-9} per percent with TO-8: 5×10^{-10} per percent
Short Term (Allan Variance)	5×10^{-11} per second	1×10^{-11} per second
Warm-up (Restabilization) (frequency relative to that two hours after turn-on following 24 hour off-time at +25°C)	1×10^{-6}: 6 minutes 1×10^{-7}: 9 minutes 3×10^{-8}: 12 minutes 1×10^{-8}: 30 minutes faster warm-up with increased turn-on power	Turn-on Power: / Standard / 6W (optional) / *7.5W ("Q" option) 1×10^{-6} / 4 minutes / 2 minutes / 1 minute 1×10^{-7} / 7 minutes / 4 minutes / 1½ minutes 3×10^{-8} / 10 minutes / 7 minutes / — 1×10^{-8} / 15 minutes / 10 minutes / 2½ minutes (If the maximum operating temperature exceeds 70°C warm-up time will increase somewhat.) *Available with sinewave output 5-20 MHz, N/A with L2 option, 15V min.
OUTPUT / SUPPLY Output	Output / Supply ±5% Standard: ≥0.5 Vrms into 50Ω (+7 dBm) / *+15 Vdc ≥1.0 Vrms into 50Ω (+13 dBm) with L2 Low Noise option Option "J": **HCMOS/TTL / *+15 Vdc & +5 Vdc Option "N": **HCMOS/TTL / -5 Vdc (Special order if N option and TO-8 crystal required) * Any voltage in 12-24 Vdc range optional; supply below 15 Vdc results in reduced output level and some degradation of phase noise for L2 option. ** Drives 3 TTL loads, 10 LSTTL loads or HCMOS; output is from HCMOS gate	
Harmonics (Sinewave output)	20 dB below desired output. If internal multiplication is used, subharmonics are also −20 dBc. Harmonics and subharmonic attenuation can be improved on special order.	
Input Power	4 watts at turn-on; less than 2 watts stabilized at +25°C. Higher power required for temperature beyond −20/+70°C and lower power needed for 0/50°C. Lower power option available.	
PHASE NOISE (typical) **(Sinewave output, 4-12 MHz)**	Offset / Standard / *Option L2 10 Hz / −105 dBc/Hz / −120 dBc/Hz 100 Hz / −135 dBc/Hz / −145 dBc/Hz 1 kHz / −145 dBc/Hz / −160 dBc/Hz 10 kHz / −148 dBc/Hz / −165 dBc/Hz 50 kHz / −150 dBc/Hz / −165 dBc/Hz *10 MHz lower frequency limit, Contact Factory for lower frequencies.	Offset / Standard / *Option L2 10 Hz / −115 dBc/Hz / −130 dBc/Hz 100 Hz / −140 dBc/Hz / −155 dBc/Hz 1 kHz / −145 dBc/Hz / −163 dBc/Hz 10 kHz / −148 dBc/Hz / −166 dBc/Hz 50 kHz / −150 dBc/Hz / −168 dBc/Hz *4 MHz lower frequency limit, Contact Factory for lower frequencies.
FREQUENCY ADJUSTMENT Mechanical	Range for 10 years of crystal aging settable to 1×10^{-8}	Range for 10 years of crystal aging settable to 5×10^{-9}
Option "V"; Electronic Tuning	3×10^{-7} for 0 to 6V control voltage	1×10^{-7} for 0 to 6V control voltage
MECHANICAL Size	2" x 2" x 1" (51 x 51 x 25.4 mm) reduced height available	
(See page 50) Configuration	pins for pc board mounting (for SMA rf output connector version, see page 56)	
ENVIRONMENTAL	See general environmental specifications on page 98.	
HOW TO ORDER	See page 50	

Miniature PC Board Mount OCXOs (32 kHz-50 MHz)

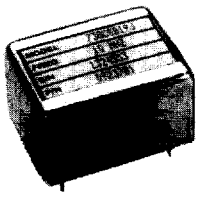


Features:

- ❑ Superior aging
- ❑ Ultra-high temperature stability
- ❑ Very fast warm-up
- ❑ 1.5" x 1.25" x 0.86"

	CO-734, CO-737 SERIES (AT Cut Crystal)	CO-738S SERIES (SC/IT Cut Crystal)
FREQUENCY	5 MHz and 10 MHz standard. Other frequencies available in 4-50 MHz range with sine output and in 32 kHz-17 MHz range with logic output. See Series CO-724 for 50-400 MHz and CO-725 for 50-200 MHz.	
STABILITY Temperature		
(Temp Range **A**) +15°C to +35°C	**CO-73❑A38:** ±3 x 10^{-8} **CO-73❑A59:** ±5 x 10^{-9} ***CO-73❑A29:** ±2 x 10^{-9}	**CO-738SA19:** ±1 x 10^{-9} **CO-738SA510:** ±5 x 10^{-10} ***CO-738SA310:** ±3 x 10^{-10}
(Temp Range **B**) 0°C to +50°C	**CO-73❑B58:** ±5 x 10^{-8} **CO-73❑B18:** ±1 x 10^{-8} ***CO-73❑B59:** ±5 x 10^{-9}	**CO-738SB18:** ±1 x 10^{-8} **CO-738SB19:** ±1 x 10^{-9} ***CO-738SB510:** ±5 x 10^{-10}
(Temp Range **D**) −20°C to −70°C	**CO-73❑D17:** ±1 x 10^{-7} **CO-73❑D38:** ±3 x 10^{-8} ***CO-73❑D18:** ±1 x 10^{-8}	**CO-738SD18:** ±1 x 10^{-8} ***CO-738SD59:** ±5 x 10^{-9} **CO-738SD29:** ±2 x 10^{-9}
(Temp Range **E**) −40°C to +75°C	**CO-73❑E27:** ±2 x 10^{-7} **CO-73❑E58:** ±5 x 10^{-8} ***CO-73❑E28:** ±2 x 10^{-8}	**CO-738SE58:** ±5 x 10^{-8} **CO-738SE18:** ±1 x 10^{-8} ***CO-738SE59:** ±5 x 10^{-9}
	*Uses TO-8 Crystal. Available 5 MHz and up.	
Aging Rate	**4:** 1 x 10^{-8}/day (2 x 10^{-6}/year) **7:** 1 x 10^{-9}/day (3 x 10^{-7}/year) (5 x 10^{-10}/day available at some frequencies)	5 x 10^{-10}/day (1 x 10^{-7}/year) 4 to 32 MHz only 5 x 10^{-9}/year optional at some frequencies 2 x 10^{-8}/year at 5 MHz optional
Supply	5 x 10^{-9} per percent with TO-8: 2 x 10^{-9} per percent	1 x 10^{-9} per percent with TO-8: 5 x 10^{-10} per percent
Short Term (Allan Variance)	5 x 10^{-11} per second	5 x 10^{-12} per second
Warm-up (Restabilization) (frequency relative to that two hours after turn-on following 24 hours off time at +25°C)	1 x 10^{-6}: 5 minutes 1 x 10^{-7}: 7 minutes 3 x 10^{-8}: 10 minutes 1 x 10^{-8}: 30 minutes	1 x 10^{-6}: 2 minutes 1 x 10^{-7}: 2.5 minutes 3 x 10^{-8}: 3 minutes 1 x 10^{-8}: 4 minutes
	(If maximum operating temperature exceeds 70°C, warm-up time will increase)	
OUTPUT / SUPPLY **Output**	Output / Supply (±5%) Standard: >0.5 Vrms into 50Ω(+7dBm) / +15 Vdc* Option "**R**": >1.0 Vrms into 50Ω(+13dBm) / +15 Vdc* Option "**J**": **HCMOS/TTL / * +15 Vdc and +5 Vdc * Any voltage in +12-24 Vdc range optional; supply below 15 Vdc results in reduced sinewave ouput level. ** Drives 3 TTL loads. 10 LSTTL loads or HCMOS; output is from HCMOS gate.	
Harmonics (Sinewave Output)	20 dB below desired output. If internal multiplication is used, generally above 12 MHz, subharmonics are also -20 dBc. Harmonic and subharmonic attenuation can be improved on special order.	
Input Power	6 watts at turn-on; less than 2 watts stabilized at +25°C. Higher power required for temperature beyond -20 to +70°C and lower power needed for 0 to +50°C.	
PHASE NOISE (typical) **(Sinewave Output 4-12 MHz)**	Offset / Phase Noise 10 Hz -100 dBc/ Hz 100 Hz -135 dBc/ Hz 1 kHz -145 dBc/ Hz 10 kHz -150 dBc/ Hz 50 kHz -150 dBc/ Hz	Offset / Phase Noise 10 Hz -120 dBc/ Hz 100 Hz -140 dBc/ Hz 1 kHz -145 dBc/ Hz 10 kHz -150 dBc/ Hz 50 kHz -150 dBc/ Hz
FREQUENCY ADJUST Tuning via external potentiometer	10 x 10^{-6} minimum range for 0 to 6V control	2 x 10^{-6} range for 0 to 6V control
MECHANICAL PACKAGE (see page 50)	1.5" x 1.25" x 0.86" (38 x 32 x 22 mm); Pins for PC board mounting. Option "**C**": European CO-08 package: see page 49	
ENVIRONMENTAL	See general environmental specifications on page 98	
HOW TO ORDER	See page 50	

European CO-08 Package

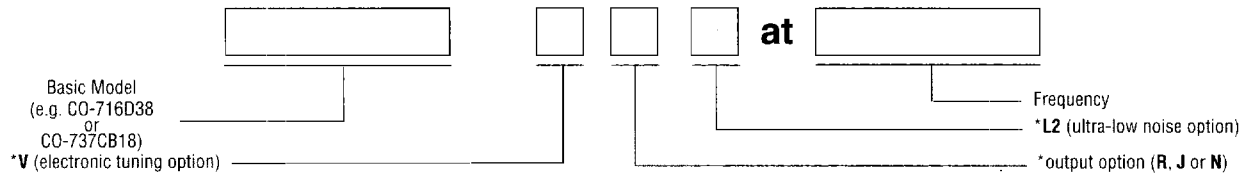


Features:

- ❑ Superior aging
- ❑ Ultra-high temperature stability
- ❑ Very fast warm-up
- ❑ 1.4" x 1.06" x 0.76"

	CO-734C, CO-737C SERIES *(AT Cut Crystal)*	CO-738CS SERIES *(SC/IT Cut Crystal)*
FREQUENCY	5 MHz and 10 MHz standard. Other frequencies available in 5 MHz to 50 MHz range with sine output and in 5 MHz to 17 MHz range with logic output. See Series CO-724 for 50-400 MHz and CO-725 for 50-200 MHz.	
STABILITY Temperature		
(Temp Range **A**) +15°C to +35°C	**CO-73☐CA18:** $\pm 1 \times 10^{-8}$ **CO-73☐CA59:** $\pm 5 \times 10^{-9}$	**CO-738CSA19:** $\pm 1 \times 10^{-9}$ **CO-738CSA610:** $\pm 6 \times 10^{-10}$
(Temp Range **B**) 0°C to +50°C	**CO-73☐CB38:** $\pm 3 \times 10^{-8}$ **CO-73☐CB18:** $\pm 1 \times 10^{-8}$	**CO-738CSB39:** $\pm 3 \times 10^{-9}$ **CO-738CSB19:** $\pm 1 \times 10^{-9}$
(Temp Range **D**) −20°C to +70°C	**CO-73☐CD58:** $\pm 5 \times 10^{-8}$ **CO-73☐CD28:** $\pm 2 \times 10^{-8}$	**CO-738CSD18:** $\pm 1 \times 10^{-8}$ **CO-738CSD59:** $\pm 5 \times 10^{-9}$
(Temp Range **E**) −40°C to +75°C	**CO-73☐CE17:** $\pm 1 \times 10^{-7}$ **CO-73☐CE58:** $\pm 5 \times 10^{-8}$	**CO-738CSE28:** $\pm 2 \times 10^{-8}$ **CO-738CSE18:** $\pm 1 \times 10^{-8}$
Aging Rate	**4**: 1×10^{-9}/day (2×10^{-6}/year) **7**: 1×10^{-9}/day (3×10^{-7}/year) (5×10^{-10}/day available at some frequencies)	5×10^{-10}/day (1×10^{-7}/year) 5 to 32 MHz only 5×10^{-9}/year optional at some frequencies 2×10^{-8}/year at 5 MHz optional
Supply	3×10^{-9} per percent	1×10^{-9} per percent
Short Term (Allan Variance)	5×10^{-11} per second	5×10^{-12} per second
Warm-up (Restabilization) (frequency relative to that two hours after turn-on following 24 hours off time at −25°C with max ambient of ≤ +70°C)	1×10^{-6}: 6 minutes 1×10^{-7}: 8 minutes 3×10^{-8}: 10 minutes 1×10^{-8}: 30 minutes	1×10^{-6}: 3 minutes 1×10^{-7}: 3.5 minutes 3×10^{-8}: 4 minutes 1×10^{-8}: 5 minutes
OUTPUT / SUPPLY (±5%)	Output — Supply Standard: >0.5 Vrms into 50Ω(+7dBm) — +15 Vdc* Option "**R**": >1.0 Vrms into 50Ω(+13dBm) — +15 Vdc* Option "**J**": **HCMOS/TTL — * +15 Vdc and +5 Vdc *Any voltage in 12-24 Vdc range optional; supply below 15 Vdc results in reduced sinewave output level. ** Drives 3 TTL loads. 10 LSTTL loads or HCMOS; output is from HCMOS gate.	
Harmonics (Sinewave Output)	20 dB below desired output. If internal multiplication is used, generally above 12-16 MHz, subharmonics are also -20 dBc. Harmonic and subharmonic attenuation can be improved on special order.	
Input Power	6 watts at turn-on; less than 2.5 watts stabilized at +25°C. Higher power and longer warm-up required for temperature beyond −20°C to +70°C; lower power needed for 0°C to +50°C.	
PHASE NOISE (typical) **(Sinewave Output 5-12 MHz)**	Offset — Phase Noise 10 Hz -100 dBc/ Hz 100 Hz -135 dBc/ Hz 1 kHz -145 dBc/ Hz 10 kHz -150 dBc/ Hz 50 kHz -150 dBc/ Hz	Offset — Phase Noise 10 Hz -120 dBc/ Hz 100 Hz -140 dBc/ Hz 1 kHz -145 dBc/ Hz 10 kHz -150 dBc/ Hz 50 kHz -150 dBc/ Hz
FREQUENCY ADJUST Tuning via ext potentiometer	10×10^{-6} minimum range for 0 to 6V control	2×10^{-6} range for 0 to 6V control
CONFIGURATION/ MECHANICAL PACKAGE (see pg. 50)	European CO-08: 1.4" x 1.06" x 0.76" (35.3 x 26.9 x 19.4 mm)	
ENVIRONMENTAL	see general environmental specifications on page 98	
HOW TO ORDER	see page 50	

HOW TO ORDER



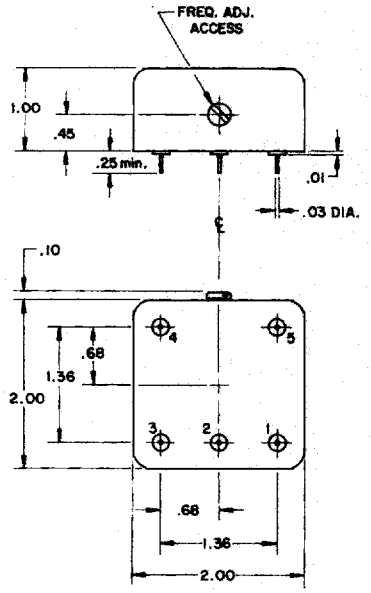
*Leave blank if not applicable or option not desired.

If none of our standard models with coded options meets your specific needs, please detail the difference from our closest standard model (e.g. CO-734CB18 at 8.192 MHz except +18 Vdc supply)

OUTLINE/INSTALLATION DRAWINGS

CO-711/CO-718S Series

Standard (pc board mount)

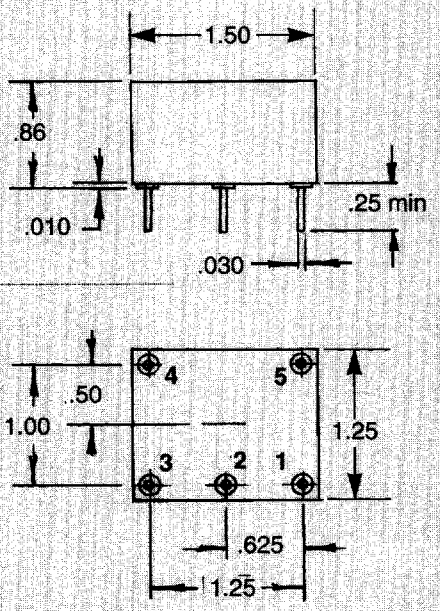


Pin	Function
*1	VCXO Input
**2	N/C
3	RF Output
4	0 Volts, Case
5	Supply (+)

* Only with electronic tuning option; otherwise, pin is No Connection. For fine tuning adjustment with the "V" option, connect one end of a 20kΩ wirewound potentiometer to a stable reference voltage, the other end to 0V, Case and wiper arm to VCXO input.

** +5 Vdc input for logic output option.

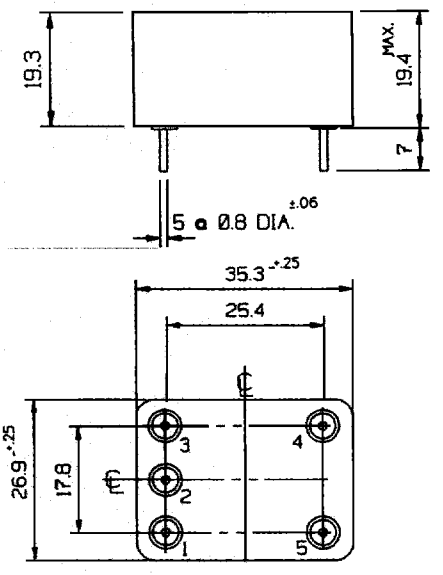
CO-734/737/738S Series



(Dimensions in inches)

Pin	Function
1	Elect. Freq. Adj
2	+5V for logic, N/C if sine output
3	Output
4	GND
5	B+

European CO-08; CO-734C/737C/738CS Series



(Dimensions in mm)

Pin	Function
1	Elect. Freq. Adj
2	+5V for logic, N/C if sine output
3	B+
4	Output
5	GND

Markings do not appear on oscillators; they are for reference only.

APPLICATION NOTES FOR CO-734 SERIES*

EXT +6V

TERM	FUNCTION
1	VCXO IN
2	+5V for logic, N/C for sine
3	RF OUT
4	CASE, RF RET. 0V
5	SUPPLY (+)

< STANDARD CONFIGURATION >

This hookup requires an external +6 Vdc supply.

< OPTIONAL CONFIGURATION >

TERM	FUNCTION
1	VCXO IN
2	+5V FOR LOGIC
3	RF OUT
4	CASE, RF RET. 0V
5	SUPPLY (+)

This hookup requires no external voltage for VCXO but oscillator may not have the correct frequency or may not operate at all unless the potentiometer is in place. This configuration can be used for Sine or Logic output.

APPLICATION NOTES FOR EUROPEAN CO-8; CO-734C SERIES*

< STANDARD CONFIGURATION >

This hookup requires an external +6 Vdc supply.

EXT +6V

TERM	FUNCTION
1	VCXO IN
2	+5V for logic, N/C for sine
3	SUPPLY (+)
4	OUTPUT
5	CASE, RF RET. 0V

< OPTIONAL CONFIGURATION >

TERM	FUNCTION
1	VCXO IN
2	+5V FOR LOGIC
3	SUPPLY (+)
4	OUTPUT
5	CASE, 0V

* Internal VCXO reference voltage is available on special order for single supply operation.