

Sinewave 50 Hz-2.6 GHz

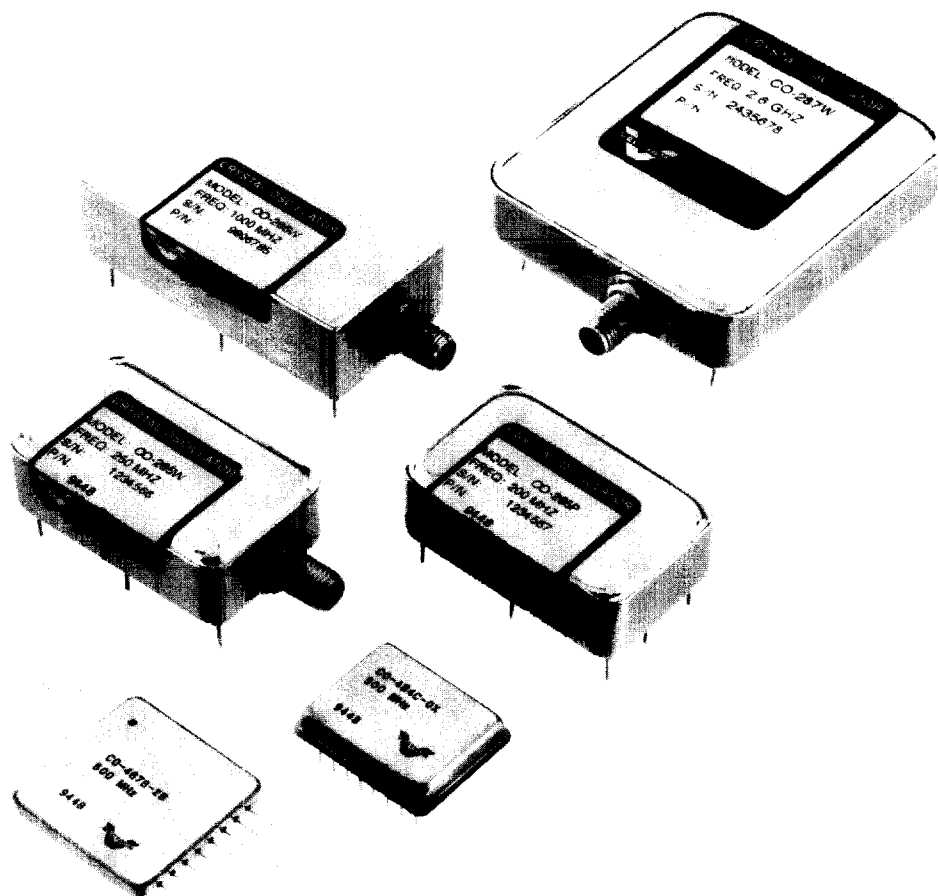
VECTRON

Crystal Oscillators

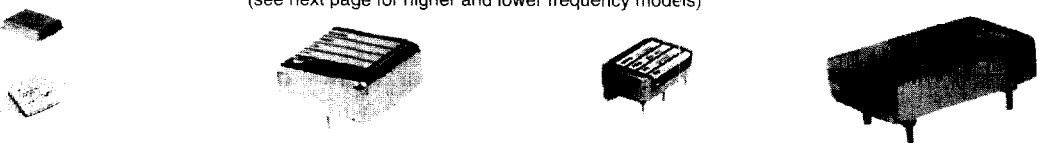
(Moderate Stability)

FEATURES

- Frequency from 50 Hz to 2.6 GHz
- Stability to 1×10^{-6}
- Low phase noise
- PC board, hybrid DIP and chassis mount models



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		4 MHz to 500 MHz (see next page for higher and lower frequency models)			
		 Hybrid	PCB Mount	Connector Type	High Power
		CO-484 16 pin Double DIP CO-487 Flatpack	CO-233, CO-233H, CO-233F, CO-285P) (See configuration section below)	CO-233FW CO-285W	CO-284W
FREQUENCY		4 MHz to 500 MHz			
OUTPUT Level		Standard: >0.5 Vrms into 50Ω (+7 dBm) *Option R: >1 Vrms into 50Ω (+13 dBm) *Not available above 100 MHz in CO-233FW with L2 option			>1 Watt/50Ω (+30 dBm) (above +70°C level derates to +27 dBm minimum) lower output levels optional
Harmonics and sub-harmonics		>20 dB below desired output. If internal multiplier is used (generally above 100 MHz), subharmonics are also -20 dBc. -30 dBc and -40 dBc optional, except for models CO-484R above 200 MHz, CO-233 and CO-233H.			
Phase Noise (typical to 100 MHz)		Offset from Carrier	Standard	*Option L1	** Option L2
		100 Hz	-100 dBc/Hz	-115 dBc/Hz	-120 dBc/Hz
		1 kHz	-125 dBc/Hz	-140 dBc/Hz	-145 dBc/Hz
		10 kHz	-140 dBc/Hz	-150 dBc/Hz	-160 dBc/Hz
		50 kHz	-145 dBc/Hz	-155 dBc/Hz	-160 dBc/Hz
		Noise degrades by 6 dB per octave above 100 MHz. * L1 Option is available in all models except CO-484, CO-487 or CO-284W ** L2 Option is available only in CO-233FW and is limited to 200 MHz; above 100 MHz output of CO-233FWL2 is restricted to +7dBm.			
STABILITY Initial Accuracy (at 25°C)		A: ± 50 ppm C: ± 25 ppm D: ± 15 ppm B: ± 10 ppm E: ± 1 ppm set via external capacitor	± 10 ppm "T" option: tuning with ± 1 ppm settability		± 10 ppm "T" option: tuning with ± 1 ppm settability
Temperature		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 (Not available in CO-284W) Option 3: 0°C to +50°C: ± 3 ppm (Not available in CO-484, CO-487, or CO-284W) Option 5: 0°C to +50°C: ± 5 ppm Option 6: 0°C to +50°C: ± 10 ppm For higher stability, see sections describing Vectron TCXOs and oven-controlled types.			
Aging		3 ppm first year 2 ppm per year thereafter	Standard: 5 ppm first year, 3 ppm per year thereafter Option Y: 2 ppm first year, 1 ppm per year thereafter		Standard: 5 ppm first year 3 ppm per year thereafter Option Y: 2 ppm first year 1 ppm per year thereafter
SUPPLY Voltage		+15 Vdc ±5% (Any supply in +12-24 Vdc range optional; supply less than +15 Vdc subject to reduced output level)			+15 Vdc ±5% (+18-24 Vdc optional with output level 3 dB below standard) Supply voltage below +15 Vdc results in reduced level
Current		15-40 mA, depending upon frequency			100-300 mA, depending upon frequency
MECHANICAL Size		0.8" x 1.0" x 0.20" (20.3 x 25.4 x 5.1 mm) flatpack: 1" x 1" x 0.17"	CO-233, CO-233H: 1 1/2" x 1 1/2" x 5/8" (38 x 38 x 16 mm) CO-233F: 2" x 2" x 3/4" (51 x 51 x 19 mm) CO-285P: 1.0" x 1.6" x 0.5" (25.4 x 40.7 x 12.7 mm)	CO-233FW: 2" x 2" x 3/4" (51 x 51 x 19 mm) CO-285W: 1.0" x 1.6" x 0.5" (25.4 x 40.7 x 12.7 mm)	2" x 3" x 3/4" (51 x 76 x 19 mm)
Configuration (see drawings on page 28)		CO-484: 0.8" x 1.0" x 0.2" (20.3 x 25.4 x 5.1 mm) 16 pin Double DIP CO-487: 1" x 1" x 0.17" (25.4 x 25.4 x 4.3 mm) 16 pin Flatpack	CO-233: (4-149 MHz) pcb mount CO-233H: (150-300 MHz) pcb mount CO-233F: (4-500 MHz) pcb mount CO-285P: pcb mount without SMA connector	CO-233FW: (4-500 MHz) SMA connector, terminals and studs on base. For SMC, replace "W" with "U". For BNC, replace "W" with "X". CO-285W: SMA on side; Terminals on base	SMA and EMI filter capacitor on side surface; mounting studs on base. For SMC, replace "W" with "U" For BNC, replace "W" with "X"
ENVIRONMENTAL		See general environmental specifications on page 93.			
OPTIONS		Screen testing of CO-484 per chart on page 15 Other stability characteristics and other mechanical configurations Voltage frequency control (VCXO); see page 71.			
HOW TO ORDER		See page 28			

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		500.1 MHz to 2.6 GHz		(4-500 MHz on prior page)	50 Hz to 4 MHz																												
					 Low Frequency with good temperature stability																												
		 CO-286W, CO-286P		 CO-287W	CO-281																												
FREQUENCY		500.1 MHz to 1.3 GHz		1.31 GHz to 2.6 GHz																													
OUTPUT	Level	Standard: >0.5 Vrms/50Ω (+7 dBm) Option R: >1.0 Vrms/50Ω (+13 dBm) High output: ≥ +20 dBm/50Ω in 2" x 3" x 3/4" package		Standard: >0.5 Vrms/50Ω (+7 dBm) Option R: >1.0 Vrms/50Ω (+13 dBm)																													
	Harmonics and Sub-harmonics	-20 dBc standard -30 dBc and -40 dBc optional		-25 dBc standard -40 dBc optional																													
	Phase Noise (typical at 500 MHz)	<table><tr><th>Offset from Carrier</th><th>Standard</th><th>Option L1</th></tr><tr><td>100 Hz</td><td>-88 dBc/Hz</td><td>-103 dBc/Hz</td></tr><tr><td>1 kHz</td><td>-113 dBc/Hz</td><td>-128 dBc/Hz</td></tr><tr><td>10 kHz</td><td>-128 dBc/Hz</td><td>-138 dBc/Hz</td></tr><tr><td>50 kHz</td><td>-133 dBc/Hz</td><td>-143 dBc/Hz</td></tr></table> Noise degrades by 6 dB per octave above 500 MHz.		Offset from Carrier	Standard	Option L1	100 Hz	-88 dBc/Hz	-103 dBc/Hz	1 kHz	-113 dBc/Hz	-128 dBc/Hz	10 kHz	-128 dBc/Hz	-138 dBc/Hz	50 kHz	-133 dBc/Hz	-143 dBc/Hz															
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STABILITY	Initial Accuracy (at 25°C)	± 10 ppm "T" option: tuning with ± 1 ppm settability		± 10 ppm "T" option: tuning with ± 1 ppm settability																													
	Temperature	<table><tr><td>Standard:</td><td>0°C to</td><td>+70°C:</td><td>± 25 ppm</td></tr><tr><td>Option 1:</td><td>-55°C to</td><td>+85°C:</td><td>± 50 ppm</td></tr><tr><td>Option 2:</td><td>-55°C to</td><td>+125°C:</td><td>± 50 ppm (Not available in CO-287W)</td></tr><tr><td>Option 3:</td><td>0°C to</td><td>+50°C:</td><td>± 3 ppm (Not available in CO-287W)</td></tr><tr><td>Option 4:</td><td>0°C to</td><td>+50°C:</td><td>± 1 ppm (only in CO-281)</td></tr><tr><td>Option 5:</td><td>0°C to</td><td>+50°C:</td><td>± 5 ppm</td></tr><tr><td>Option 6:</td><td>0°C to</td><td>+50°C:</td><td>± 10 ppm</td></tr></table> For higher stability, see sections describing Vectron TXCOs and oven-controlled types.				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 (Not available in CO-287W)	Option 3:	0°C to	+50°C:	± 3 ppm (Not available in CO-287W)	Option 4:	0°C to	+50°C:	± 1 ppm (only in CO-281)	Option 5:	0°C to	+50°C:	± 5 ppm	Option 6:	0°C to	+50°C:	± 10 ppm
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	Aging	Standard: 5 ppm first year, 3 ppm per year thereafter Option Y: 2 ppm first year, 1 ppm per year thereafter																															
SUPPLY	Voltage	+15 Vdc ±5% (Any supply in +12-24 Vdc range optional; supply less than +15 Vdc subject to reduced output level)		+15 Vdc ±5% standard +12 Vdc ±5% optional																													
	Current	<80 mA		<100 mA																													
MECHANICAL	Size	CO-286W(P): 1" x 2" x 0.6" (25.4 x 51 x 15.3 mm) High output option: 2" x 3" x 3/4" (51 x 76 x 19 mm)		2" x 2 1/4" x 1 1/2" (51 x 57.2 x 12.7 mm) Reduced size models available																													
	Configuration (see drawings on page 28)	CO-286W: SMA on 1" x 0.6" side terminals on base CO-286P: pcb mount without rf output connector High output opt.: SMA and terminals on 2" x 3/4" side; studs on base.		SMA on side terminals on base																													
ENVIRONMENTAL		See general environmental specifications on page 98.																															
OPTIONS		Other stability characteristics Other mechanical configurations Voltage frequency control (VCXO): see page 71.																															
HOW TO ORDER		See page 28																															

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How to specify CO-484 Series

CO-484 - at

Accuracy A, B, C, D, E

Frequency

Temperature Stability
("O" for Standard or 1, 2, 5, 6)

"R" for +13 dBm output leave blank, if not required

Screen Test
("X" for Standard;
"B" for Screening per chart on page 15).

For example: CO-484B-OB at 100 MHz has ± 10 ppm accuracy at 25°C, stability ± 25 ppm over 0-70°C and is Class B screened.

How to Specify Other Models

- at

Basic Model

Frequency

"T" for tuning option

"L1" or "L2" option

*Temperature stability option

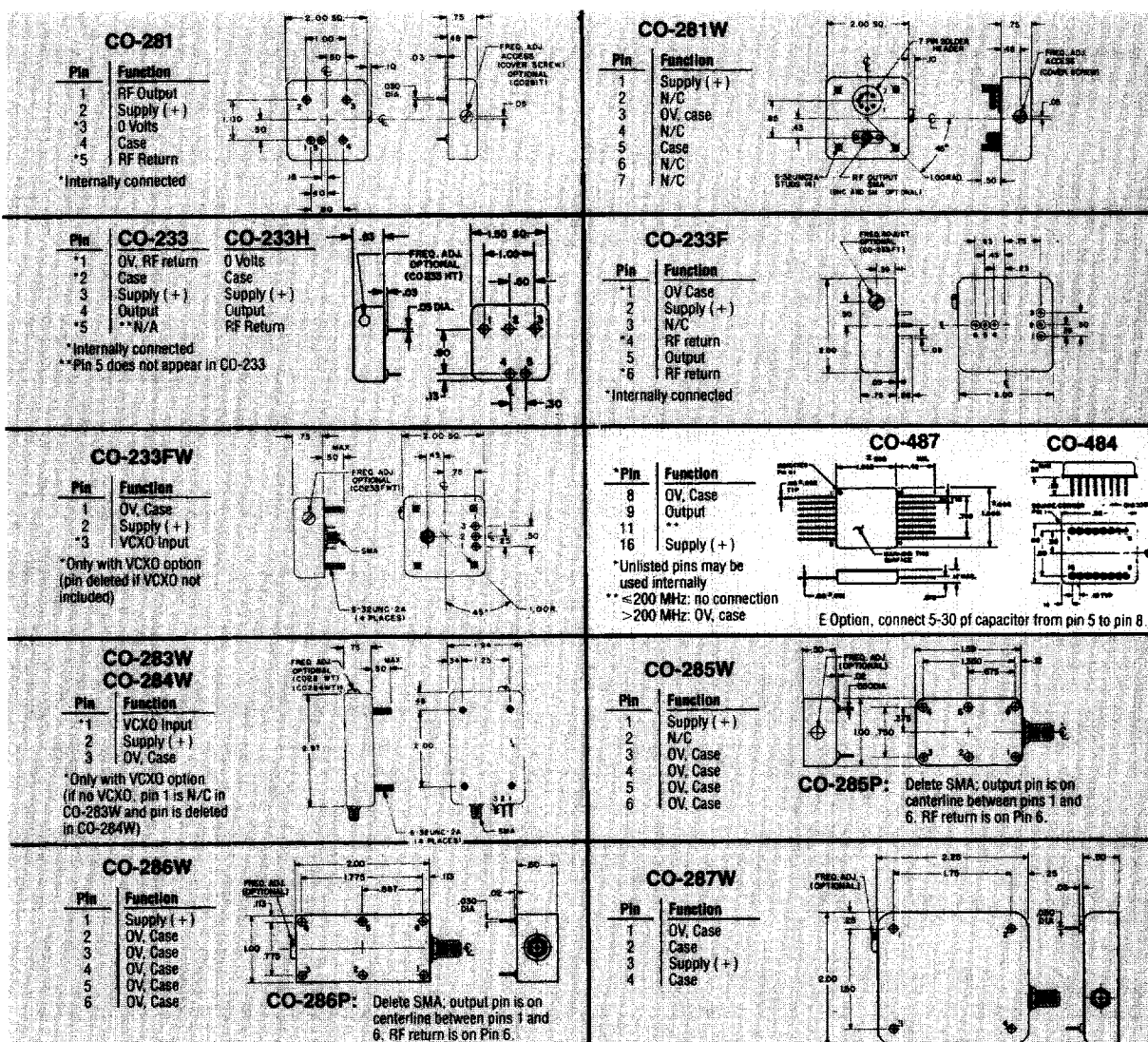
"R" for +13 dBm output

**"Y" for improved aging option

*Leave blank if not applicable to your requirement.

For example: CO-233FWT-1R at 200 MHz includes tuning adjust for 1 ppm settability, has temperature stability ± 50 ppm over -55°C to +85°C and provides +13 dBm output.

OUTLINE/INSTALLATION DRAWINGS



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