Low Phase Noise Voltage Controlled Oscillators 2 - 18 GHz

MLO 40000 Series

V3.00

Features

- Low Phase Noise
- High Linearity Tuning
- Fast Tuning Speeds
- High Output Powers
- High Reliability

Description

M/A-COM's range of low phase noise voltage controlled oscillators (VCOs) provides excellent tuning linearity and phase noise over the moderate frequency bandwidths required for most systems applications.

These designs use a resonator stabilized silicon bipolar transistor as a negative resistance generator with a varactor diode serving as a voltage variable capacitor in a tuned circuit to vary the frequency of oscillation. This fundamental oscillator design is extended to 18 GHz with an integral frequency doubler. The MLO 40000 series has a silicon abrupt junction varactor diode for low phase noise performance. Careful selection of the varactor diodes, manufactured in-house by M/A-COM produces a very large capacitance change together with a high degree of linearity which greatly simplifies the external voltage driver circuit required.

M/A-COM VCOs are constructed using discrete chip devices integrated into a conventional alumina MIC with laser welding of the finished VCO package providing a hermetic seal. This compact, rugged construction makes these VCOs suitable for the most severe environmental conditions encountered in military and hi-rel applications. The coaxial packages have removable SMA connectors, allowing the devices to be integrated directly into microstrip or stripline circuits.

VCOs have a wide variety of applications where oscillators with very fast tuning speeds over up to octave frequency bandwidths are required. VCOs give improved LO frequency tuning speed and output power flatness in radar receivers and rapid generation of jamming signals in ECM transmitters. Where an oscillator of high frequency stability is required, as in radar and communications synthesizers or frequency converters the VCO can be used in a phase-locked loop circuit. This produces a frequency stability comparable to that of the reference crystal oscillator. The phase-locked loop circuit can be designed to stabilize a single output frequency or to vary the oscillator frequency either continuously or in discrete steps as small as required.

The standard VCOs described cover a range of commonly used bandwidths with a choice of three output powers. M/A-COM also manufactures a wide range of custom designs to meet specific system specifications and VCOs integrated with other components. To discuss your requirements in detail please contact the factory for applications assistance.

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SPECIFICATIONS (guaranteed -55°C to +85°C)

Centre Freq (GHz) Min/Max	Tuning Band (MHz) Min	Linearity (%) Max	Freq Drift (MHz) Max	Phase Noise @ +25°C (dBc/Hz) @100KHz Max	@1MHz Max	Harmon Related Outputs (dBc) Max	Output Power (dBm) Min	Output Power Var (dB) Max	Power Supplies @+15V (mA) Max	@-15V (mA) Max	Package Style	Part Number
4.0 - 5.69	100	±2.0	25	-110	-130	-20	+10	±1.5	55	75	VCOA	MLO 41100
							+15	±1.5	115	75	VCOB	MLO 41200
							+20	±1.5	200	75	VCOB	MLO 41300
	200	±5.0	25	-109	-129	-20	+10	±2.0	55	75	VCOA	MLO 42100
							+15	±2.0	115	75	VCOB	MLO 42200
							+20	±2.0	200	75	VCOB	MLO 42300
	500	±5.0	25	-108	-128	-20	+10	±2.5	55	75	VCOA	MLO 43100
							+15	±2.5	115	75	VCOB	MLO 43200
							+20	±2.5	200	75	VCOB	MLO 43300
5.7 - 7.49	100	±2.0	40	-105	-125	-20	+10	±1.5	55	75	VCOA	MLO 41100
							+15	±1.5	115	75	VCOB	MLO 41200
							+20	±1.5	200	75	VCOB	MLO 41300
	200	±5.0	40	-103	-123	-20	+10	±2.0	55	75	VCOA	MLO 42100
							+15	±2.0	115	75	VCOB	MLO 42200
							+20	±2.0	200	75	VCOB	MLO 42300
	500	±5.0	40	-102	-122	-20	+10	±2.5	55	75	VCOA	MLO 43100
							+15	±2.5	115	75	VCOB	MLO 43200
							+20	±2.5	200	75	VCOB	MLO 43300
7.5 - 9.49	200	±5.0	75	-102	-122	-25	+10	±1.5	75	75	VCOB	MLO 42100
							+15	±1.5	135	75	VCOB	MLO 42200
							+20	±1.5	225	75	VCOC	MLO 42300
	500	±5.0	75	-101	-121	-20	+10	±2.0	75	75	VCOB	MLO 43100
							+15	±2.0	135	75	VCOB	MLO 43200
							+20	±2.0	225	75	VCOC	MLO 43300
	1000	±10.0	75	-100	-120	-15	+10	±2.5	75	75	VCOB	MLO 44100
							+15	±2.5	135	75	VCOB	MLO 44200
							+20	±2.5	225	75	VCOC	MLO 44300
9.5 - 11.99	200	±2.0	50	-100	-120	-25	+10	±1.5	75	75	VCOB	MLO 42100
							+15	±1.5	135	75	VCOB	MLO 42200
							+20	±1.5	225	75	VCOC	MLO 42300
	500	±5.0	50	-100	-120	-20	+10	±2.0	75	75	VCOB	MLO 43100
							+15	±2.0	135	75	VCOB	MLO 43200
							+20	±2.0	225	75	VCOC	MLO 43300
	1000	±10.0	50	-99	-119	-15	+10	±2.5	75	75	VCOB	MLO 44100
							+15	±2.5	135	75	VCOB	MLO 44200
							+20	±2.5	225	75	VCOC	MLO 44300

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SPECIFICATIONS (guaranteed -55°C to +85°C)

Centre Freq (GHz) Min/Max	Tuning Band (MHz) Min	Linearity (%) Max	Freq Drift (MHz) Max	Phase Noise @ +25°C (dBc/Hz) @100KHz Max	Phase Noise @ +25°C (dBc/Hz) @1MHz Max	Harmon Related Outputs (dBc) Max	Output Power (dBm) Min	Output Power Var (dB) Max	Power Supplies @+15V (mA) Max	Power Supplies @-15V (mA) Max	Package Style	Part Number
12.0 - 14.99	200	±2.0	75	-99	-119	-25	+10	±1.5	75	75	VCOB	MLO 42100
							+15	±1.5	135	75	VCOB	MLO 42200
							+20	±1.5	225	75	VCOC	MLO 42300
	500	±5.0	75	-96	-116	-20	+10	±2.0	75	75	VCOB	MLO 43100
							+15	±2.0	135	75	VCOB	MLO 43200
							+20	±2.0	225	75	VCOC	MLO 43300
	1000	±10.0	75	-94	-114	-15	+10	±2.5	75	75	VCOB	MLO 44100
							+15	±2.5	135	75	VCOB	MLO 44200
							+20	±2.5	225	75	VCOC	MLO 44300
15.0 - 18.0	200	±2.0	150	-91	-111	-25	+10	±1.5	75	75	VCOB	MLO 42100
							+15	±1.5	135	75	VCOB	MLO 42200
							+20	±1.5	225	75	VCOC	MLO 42300
	500	±5.0	150	-88	-108	-20	+10	±2.0	75	75	VCOB	MLO 43100
							+15	±2.0	135	75	VCOB	MLO 43200
							+20	±2.0	225	75	VCOC	MLO 43300
	1000	±10.0	150	-86	-106	-15	+10	±2.5	75	75	VCOB	MLO 44100
							+15	±2.5	135	75	VCOB	MLO 44200
							+20	±2.5	225	75	VCOC	MLO 44300

NOTES

1) Frequency pushing — 100 KHz/V maximum for voltages -13 to -18V

2) Frequency pulling — ±0.01% maximum into a 1.5:1 VSWR load all phases

3) Spurious outputs — -60dBc maximum

4) Tuning voltage in the range 0 to +20V, or other if required, an additional fine tune control is available as an option, please contact the factory for details.

5) Typical settling time: — 1us from 50% VT to ±1 MHz (bandwidth up to 500 MHz)
1us from 50% VT to ±3 MHz (bandwidths over 500 MHz)

6) Operating temperature range — -55°C to +85°C
Storage temperature range — -55°C to +100°C

Alternative 0°C to +65°C operating temperature range available, please contact the factory for details.

7) All devices are supplied with removable SMA female connectors for RF output and tuning voltage and solder pins for dc supplies and ground. For other combinations contact the factory.

8) When ordering please specify the centre frequency required in MHz as a 5 digit suffix to the part number above e.g. for a centre frequency of 13500 MHz, bandwidth of 500 MHz and output power of +10dBm the part number would be MLO 43100-13500.

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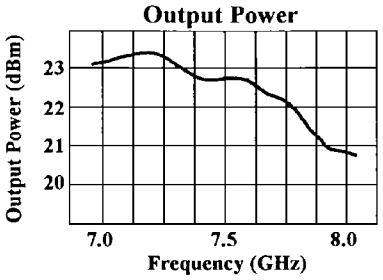
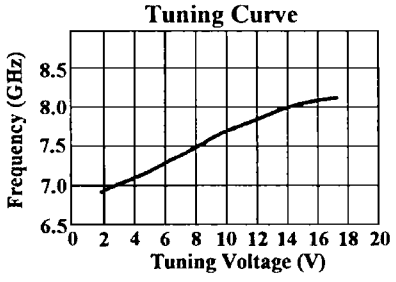
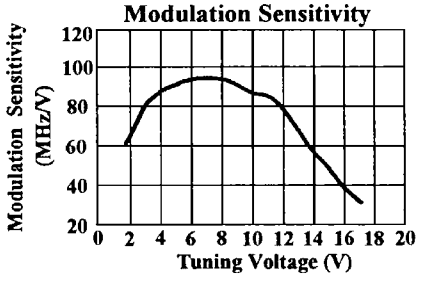
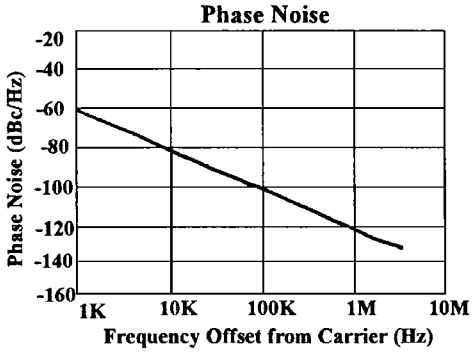
TYPICAL PERFORMANCE

PART NO. MLO44300-07500









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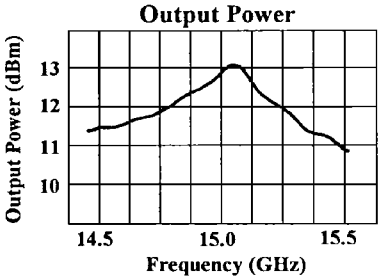

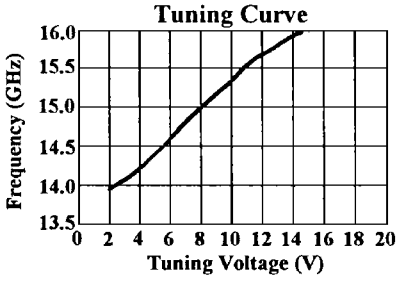

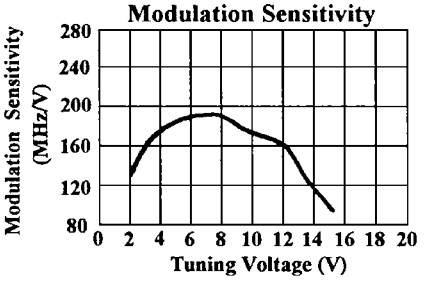

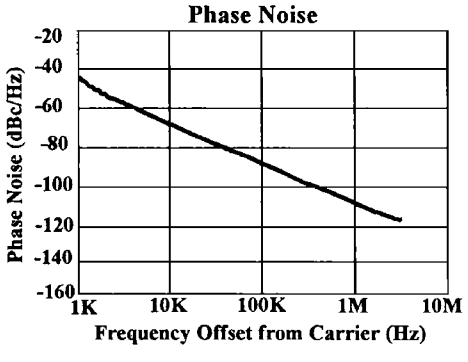

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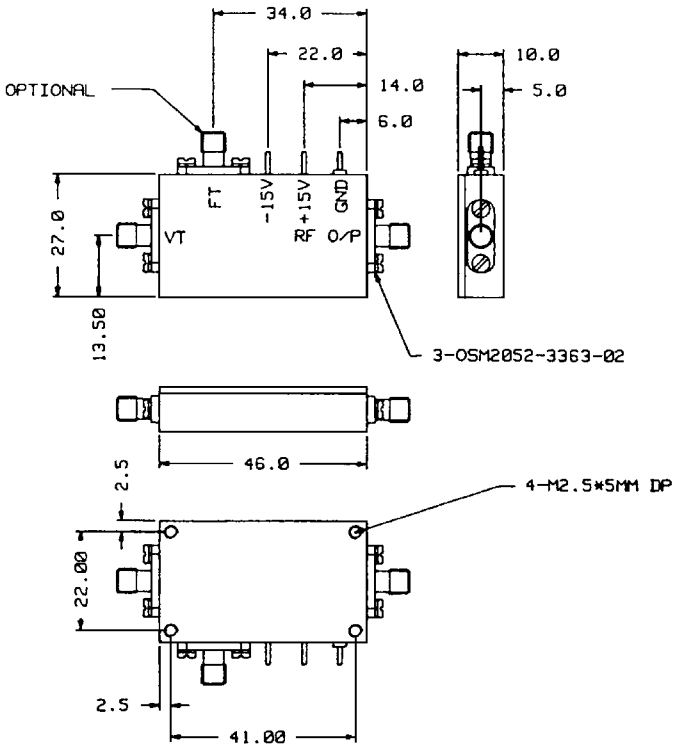
OUTLINE DRAWINGS

Package Style VCO A



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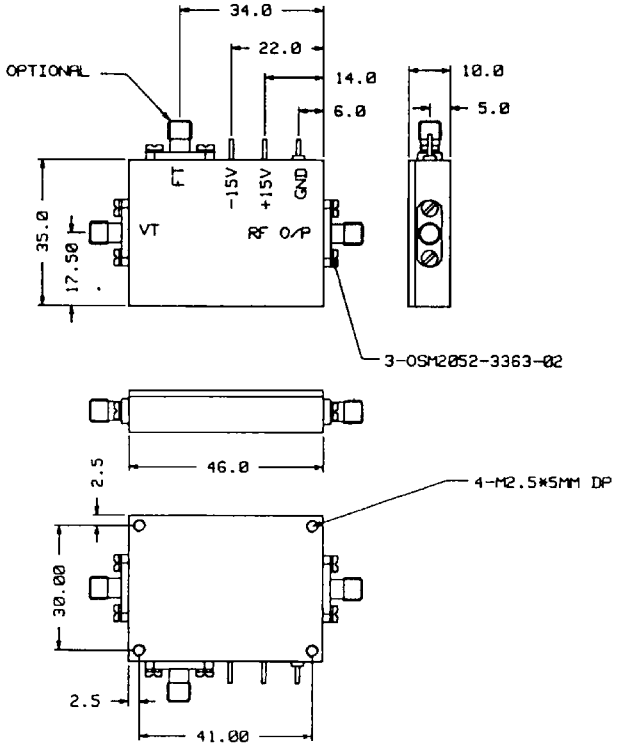

OUTLINE DRAWINGS

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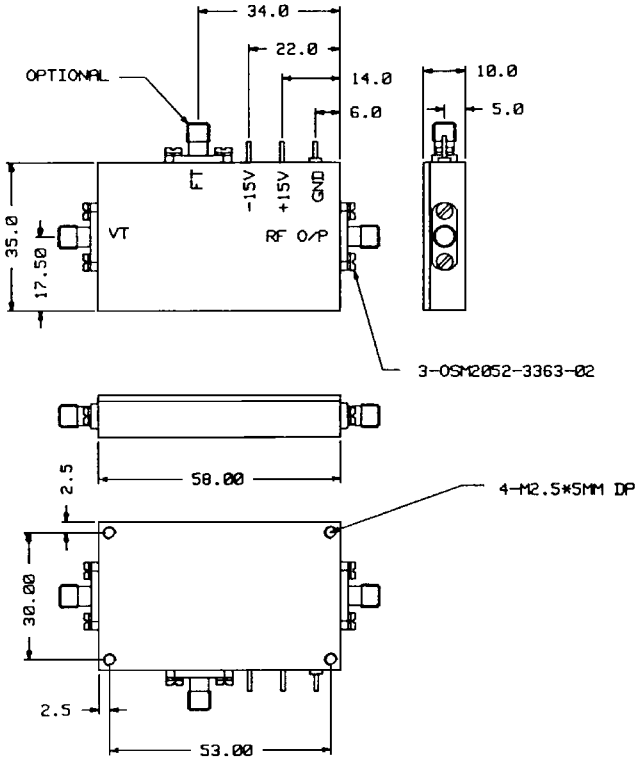

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