



**MOTOROLA**

**K1100AM™  
K1114AM™, K1115AM™, K1116AM™  
K1145AM™**

# Crystal Clock Oscillators

250 kHz to 70 MHz

TTL COMPATIBLE OUTPUT

ALL METAL WELDED PACKAGE

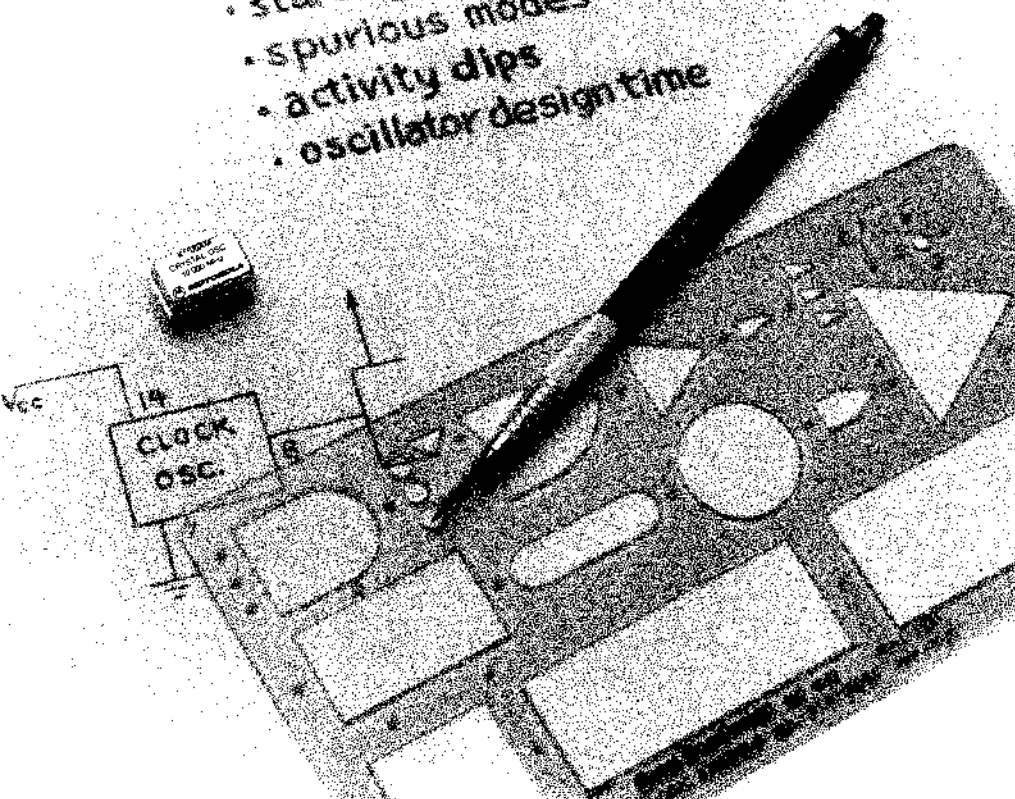
CASE GROUND MINIMIZES E.M.I.

REPRESENTED BY  
KOTTMEIER ASSOCIATES, INC.  
2470 WINCHESTER BLVD., SUITE B  
CAMPBELL, CA 95008  
(408) 866-5153

## THE PACKAGED CRYSTAL OSCILLATOR

saves critical board  
space and eliminates:

- matching crystals/components
- starting resistance
- spurious modes
- activity dips
- oscillator design time



## Features

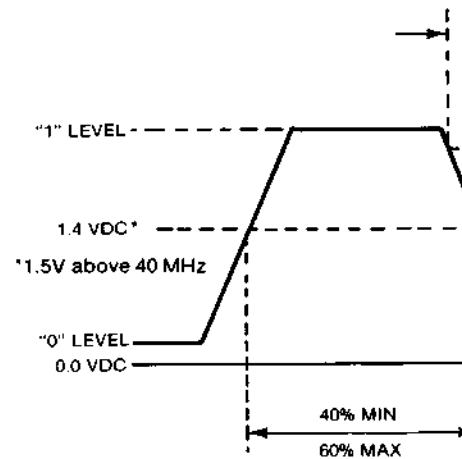
**ALL-METAL, WELDED PACKAGE** — offers full hermetic seal to provide excellent resistance to extremes of heat/humidity. With pin 7 case ground, the all-metal package also offers improved shielding to minimize RF radiation, helping to meet FCC EMI specifications. The oscillator can be soldered in standard wave-line operations without damage; insulated stand-offs permit proper de-fluxing. Can also be plugged into a DIP socket. Takes up only .820" x .520" on a circuit board, and its seated height of .270" lets you use standard logic boards with no loss of spacing.

■ **TTL COMPATIBLE**—uses standard +5V dc input, drives standard TTL logic.

■ **±0.01% FREQUENCY STABILITY (K1100AM)** — over the range of 0°C to 70°C, suitable for most applications in data communication logic timing. The K1145AM has ±0.005% stability over the same operating range. This specification is inclusive of calibration tolerance, stability vs. input voltage change, stability vs. load change, aging, and stability vs. shock and vibration.

■ **RELAXED SPECS, RELAXED PRICES** — for applications where frequency stability is not a primary requisite, Models K1114AM (±0.05%), K1115AM (±0.1%), and K1116AM (±1%) are ideal. They are cost-effective with discrete components and crystals. To the user of multi-vibrator, RC and LC circuits, they offer orders of magnitude better stability and reliability at minimum cost. Economies of scale plus relaxed design and manufacturing tolerances result in cost savings which are passed on to you.

■ **RUGGED, RELIABLE** — maximum reliability at minimum cost results from Motorola's extensive experience



CRYSTAL CLOCK OSC

in quartz crystal technology and in thick film hybrid IC processing. High precision crystals and clean-room processing testify that no short-cuts are taken that might diminish reliability. Environmental testing proves the effectiveness of the rugged design for those applications in which shock and vibration are common hazards.

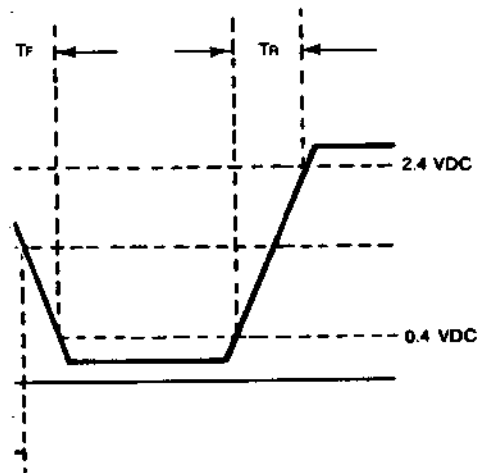
■ **YOUR TIMING NEEDS IN ONE PACKAGE** —

The oscillators use essentially the same components to generate any discrete frequency from 250 kHz to 70 MHz; only the frequency-determining elements and laser-trim settings change. The manufacturing savings inherent in this design are passed on to you, simplifying your make vs. buy decision. The single package oscillator saves you the board space required by discrete components, and eliminates production man-hours wasted analyzing oscillator circuits and matching crystal parameters to circuit components. And with a packaged oscillator, you eliminate source-hunting and source-qualifying for its components, cut down on direct labor for parts insertion, cut down on overhead costs for Receiving, Incoming Inspection, Purchasing and Accounts Payable.

■ **COMPLETE PROCESS CONTROL** —

Motorola is a totally integrated manufacturer of quartz frequency control devices. Full control of all the processes from growing, sawing, lapping, and finishing quartz to combining it with other components into an electronic product — CRYSTAL CLOCK OSCILLATORS.

■ **VOLUME PRODUCTION** — Modern automated production techniques are used to provide Motorola's high volume, high quality crystal clock oscillators.



OSCILLATOR WAVE SHAPE

# specifications

■ **FREQUENCY RANGE:** 250 kHz–70 MHz  
(K1145AM not available above 50 MHz)

■ **FREQUENCY STABILITY:**

K1145AM,  $\pm 0.005\%$ ; K1100AM,  $\pm 0.01\%$ ; K1114AM,  $\pm 0.05\%$ ; K1115AM,  $\pm 0.1\%$ ; K1116AM,  $\pm 1.0\%$   
(Inclusive of calibration tolerance at 25°C, operating temperature range, input voltage change, load change, aging, shock, and vibration).

■ **TEMPERATURE RANGE:**

**OPERATING:** 0°C to 70°C  
**STORAGE:** -55°C to +125°C

■ **INPUT VOLTAGE:** +5V dc  $\pm 0.5V$

■ **INPUT CURRENT:**

	MAX. @ 25°C	MAX. OVER TEMP
250-999.999 kHz	105 mA	115 mA
1.0-3.999 MHz	90 mA	100 mA
4.0-8.999 MHz	40 mA	50 mA
9.0-20.0 MHz	60 mA	70 mA
20.01-70 MHz	50 mA	60 mA

**CURRENT, OUTPUT SHORTED:** (1 sec. max.) 18 mA min. 100 mA max.

■ **TTL OUTPUT (0°C to 70°C):**

**SYMMETRY:** 60/40% @ 1.4V dc level\*  
(\*1.5V level above 40 MHz)

**RISE AND FALL TIMES:** 15 ns max.  
(.4 -2.4V dc levels)  
250 kHz-8.999 MHz  
10 ns max.  
9.0 MHz-31.999 MHz  
6 ns max.

32.0-54.999 MHz  
4 ns max.  
55-70 MHz

"0" LEVEL: +0.4V max.

"1" LEVEL: +2.4V min.

"0" SINK CURRENT:  
250 kHz-20 MHz:  
20.001 MHz-70 MHz:  
16 mA min.  
20 mA min.

"1" SOURCE CURRENT: -400  $\mu$ A minimum

**OUTPUT LOAD:** 250 kHz-3.999 MHz  
1 to 10 TTL gates  
4 MHz-70 MHz  
1 to 5 TTL gates

■ **ENVIRONMENTAL:**

**TEMPERATURE CYCLE:**  $\pm 5$  ppm max., 0 to 120°C, 3 cycles, 2 hrs.  
max. each, 25  $\pm 2$ °C ref.

**SHOCK:** 1000 G's 0.35 millisecon, 1/2 sine wave;  
3 shocks each plane

**VIBRATION:** 10-55 Hz, .060" D.A., 55 Hz-2000 Hz  
35 G's. Duration time—12 hours

**HUMIDITY:** 85% Relative humidity, @ +85°C, 500 hrs.

■ **MECHANICAL:**

**GROSS LEAK TEST:** All units 100% leak tested  
in de-ionized H<sub>2</sub>O.

**HERMETICALLY SEALED PACKAGE:** Mass spectrometer leak rate less  
than  $2 \times 10^{-6}$  atmos. cc/sec. of  
helium

**SEAL STRENGTH:** 20 lbs. max. force perpendicular  
to top and bottom

**BEND TEST:** Pins will withstand maximum bend of  
90° reference to base for 2 bends.

**MARKING INK:** Epoxy, heat cured

**SOLVENT RESISTANCE:** Isopropyl alcohol, Trichloroethane  
Freon TMC

No marking or seal destruction  
Dipped 1 minute @ +25°C  $\pm 5$ °C in solvent

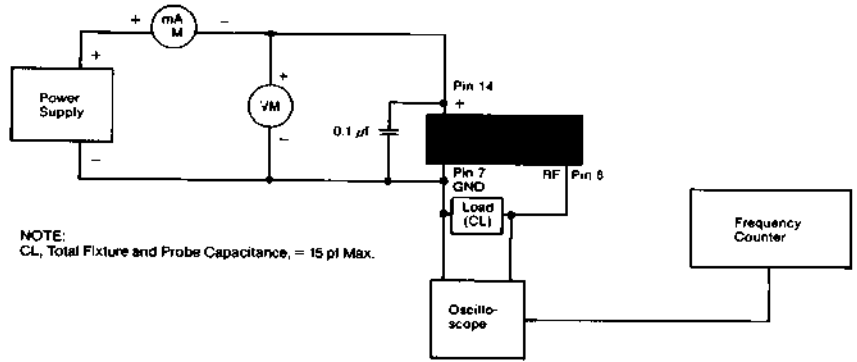
Note: (1) Unit can be cleaned by only one type solvent listed.

Note: (2) Ultrasonic degreaser not to be used.

Specifications subject to change without notice.

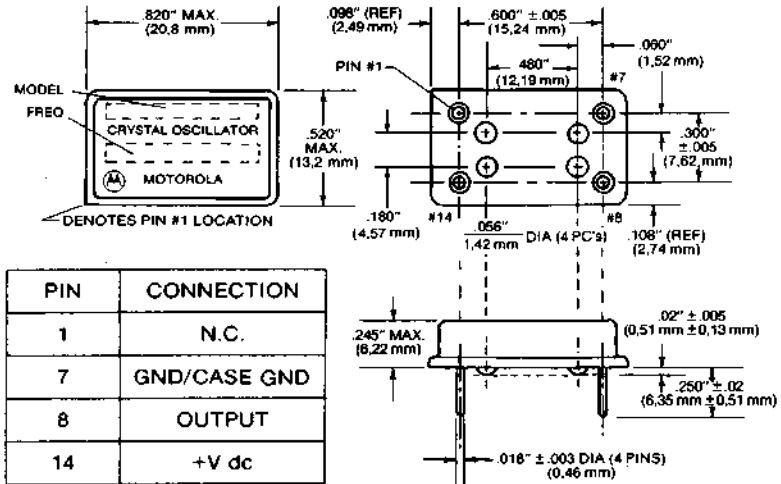
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NOTE:  
CL, Total Fixture and Probe Capacitance, = 15 pF Max.

**Clock Oscillator Test Circuit**



## solderability specifications

■ **MATERIALS:**

**SOLDER:** 60% tin and 40% lead  
**FLUX:** Fully activated rosin base type such as  
Kester 1544 or Alpha 809.

■ **PROCEDURE:**

**PREPARATION:** No wiping, cleaning, scraping, or  
abrading shall be performed on the leads.

**SOLDER BATH:** The solder bath shall be maintained at  
265  $\pm 5$ °C.

**SOLDERABILITY:** Dip the terminals into room temperature  
flux, to a maximum of .020" from the unit  
base, for 5 to 10 seconds. Withdraw from  
the flux and dip the terminals to the same  
depth in the molten solder from 5 to 7  
seconds. Flux residue may be removed with  
Freon rinse, or with soft swab moistened  
with isopropyl alcohol or Freon.

■ **REQUIREMENTS:**

**EVALUATION:** All leads must exhibit a maximum of 90%  
continuous solder coating over their  
entire length beyond .020" from the unit  
base. Pinholes or voids may not be  
concentrated in any one area and are not  
to exceed 10% of the total area under  
examination.

**MOTOROLA INC.**  
**Component Products**

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