

# LQV Series - Precision Crystal Clock Oscillators

## Multiple Synchronous Frequencies & Low Power Consumption - $f_o$ : 12 Hz to 8 MHz

### FEATURES

- 1) Up to 4 outputs (12 Hz to 8 MHz)
- 2) Mask programmable CMOS binary counter makes short lead times for prototypes and production.
- 3) Division of fundamental frequency up to  $2^{18}$ .

### LIST OF STANDARD FREQUENCIES (Source Oscillation)

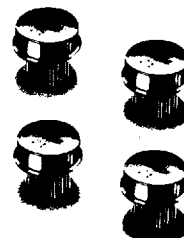
|             |            |
|-------------|------------|
| 3.20000 MHz | 4.8000 MHz |
| 3.27680 MHz | 4.9152 MHz |
| 3.68640 MHz | 5.0000 MHz |
| 3.93216 MHz | 5.1200 MHz |
| 4.00000 MHz | 6.0000 MHz |
| 4.09600 MHz | 6.1440 MHz |
| 4.19430 MHz | 8.0000 MHz |

### HOW TO ORDER

#### A. TTL Output

#### **LQV - 3M2768 - 3 C G R**

- ① Type
- ② Source Oscillation Frequency (MHz)  
(Exp: 3.2768 MHz)
- ③ Freq. Division Code  
(Exp.  $f_o/2^3 = 409.6$  KHz)
- ④ Freq. Division Code (if needed)  
(Exp.  $f_o/2^{12} = 800$  Hz)
- ⑤ Freq. Division Code (if needed)  
(Exp.  $f_o/2^{16} = 50$  Hz)
- ⑥ Reset or Frequency Code (if needed).



#### FREQUENCY DIVISION CODE NO.

|          |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |       |
|----------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|-------|
| n =      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | RESET |
| Code No. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A  | B  | C  | D  | E  | F  | G  | H  | J  | R     |

#### NOTE:

Position ② identifies fundamental crystal oscillation frequency only and does not identify an output. Positions ③ through ⑥ identify pin outputs. This means the fundamental frequency is used as an output frequency only when position ③ is a "0" (for  $2^0 = 1$ ).

### TYPE

| Type                 | Source Oscillation Frequency (Hz) | Output Frequency (Hz)        |
|----------------------|-----------------------------------|------------------------------|
| LQV-8M00<br>-012     | 8.000 MHz                         | 8.000M<br>4.000M<br>2.000M   |
| LQV-6M00<br>-012     | 6.000 MHz                         | 6.000M<br>3.000M<br>1.500M   |
| LQV-5M12<br>-234     | 5.120 MHz                         | 1.28M<br>640K<br>320K        |
| LQV-4M194304<br>-3GR | 4.194304 MHz                      | 524.288K<br>64<br>RESET      |
| LQV-3M93216<br>-01G  | 3.932160 MHz                      | 3.93216M<br>1.96608M<br>60   |
| LQV-3M2768<br>-3CGR  | 3.2768 MHz                        | 409.6K<br>800<br>50<br>RESET |

### MAXIMUM ABSOLUTE RATING:

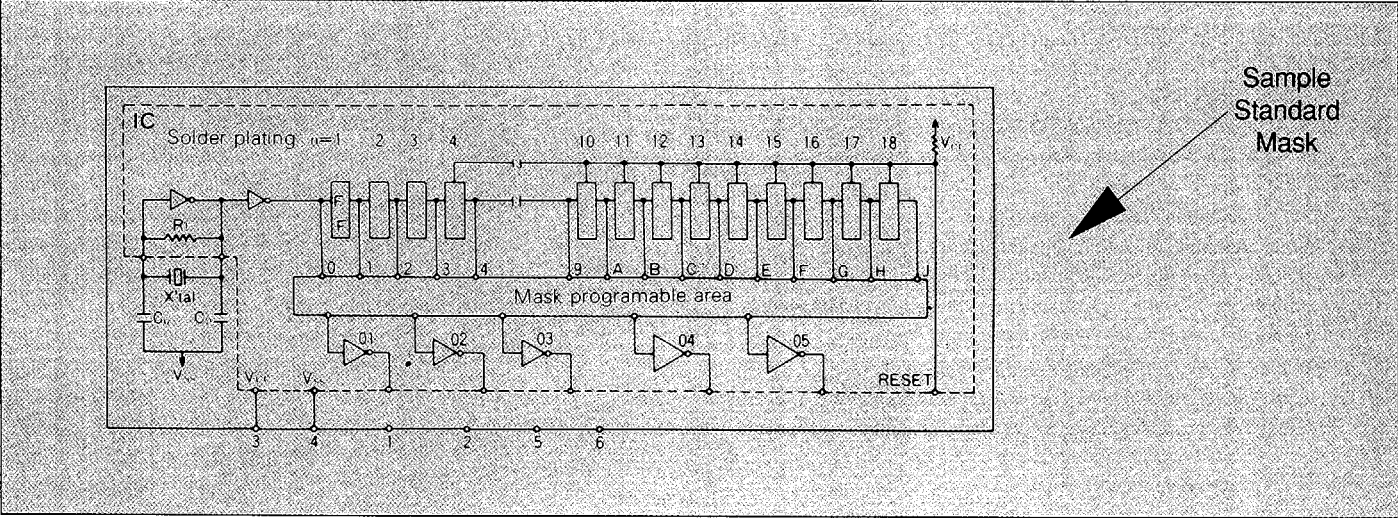
| Classification      | Code      | Rating       | Unit |
|---------------------|-----------|--------------|------|
| Voltage             | $V_{cc}$  | -0.3 to +7.0 | V    |
| Working Temperature | $T_{opr}$ | -35 to +85   | °C   |
| Storage Temperature | $T_{stg}$ | -40 to +90   | °C   |

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- CMOS IC is shown in dashed-line box . However, a selection of voluntary frequency comparison is possible due to mask-programmable wiring in solid line box. 
- Since the oscillator case has 6 pins and two are necessary for  $V_{DD}$  and  $V_{SS}$ , output is possible from a maximum of 4 pins.
- Resetting is also possible. In such a case, one pin is necessary for reset function, then the maximum number of outputs will be three. (Reset possible on divider stage 4 or higher.)
- Unnecessary pins become NC and should not be used as tie point terminals.

### FUNCTION BLOCK DIAGRAM:



### MASK PROGRAMS OF POSSIBLE FREQUENCY COMBINATIONS:

| Number of Output | PIN No.     | Output ratio) A = 10 steps B = 1 steps C = 12 steps<br>G = 16 steps (reset effective starting with 4th step)                                                                                                                                                                                                                  |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                | ⑤           | 1 0 1 2 3 4 5 6 7 8 9 A C<br>Reset Possible                                                                                                                                                                                                                                                                                   |
| 2                | ②<br>⑤<br>⑥ | 0 0 0 1 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4 5 5 6 7 7 7 8<br>1 2 C 2 7 8 9 C 3 4 5 C 4 5 6 8 C 5 6 7 8 A C 7 A 8 8 9 A 9<br>Reset Possible<br><br>0 1 1 2 2 3 3 3 4 4 4 4 5 5 6 7 7 8 9 A C<br>G A G 6 G 6 A G 6 A B G 6 B A A B A A B G<br>Reset Possible                                                                        |
| 3                | ②<br>⑤<br>⑥ | 0 0 0 0 0 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 5 5 5 6 7 7 7 7 8<br>1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 5 5 5 6 7 7 7 7 8<br>2 2 C C C G G C G G 8 9 A 9 A A 4 5 6 C G 5 6 C G 6 G 5 6 8 A C G 6 8 A G 6 7 A B 8 A A B A B G A B B A 9 A A B A<br>Reset Possible |
| 4                | ②<br>⑤<br>⑥ | 0 0 0 0 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 5 5 6 7 7 7 8<br>1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 5 5 5 6 7 7 7 8<br>2 2 C C C 8 8 9 9 4 4 4 4 5 C 5 C 5 6 6 8 C 8 7 7 A 8 A 9<br>C G G G G 9 A A A 5 6 C G 6 G 6 6 8 A A G A A B B A B B A                    |

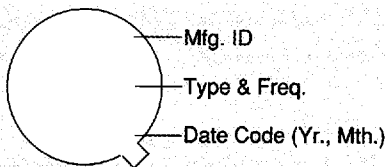
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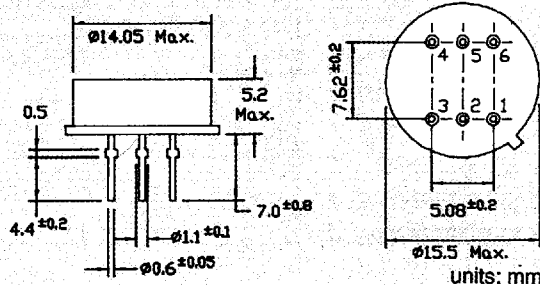
## SPECIFICATIONS: (LQV Series)

| Classification                       | Code                      | Rating             | Unit      | Remarks                                                                         |
|--------------------------------------|---------------------------|--------------------|-----------|---------------------------------------------------------------------------------|
| Output frequency                     | $f_{out}$                 | 12 to 8M           | Hz        | Sine Wave 50% Duty                                                              |
| Frequency precision                  | $\Delta f/f$ (25°C)       | 0: $\pm 10$        | ppm       |                                                                                 |
|                                      |                           | 1: $\pm 50$        | ppm       |                                                                                 |
|                                      |                           | 2: $\pm 100$       | ppm       |                                                                                 |
|                                      |                           | 3: $\pm 0.2$       | %         |                                                                                 |
| Frequency temperature Characteristic | $\Delta f/f$ (T)          | $\pm 20$ Max       | ppm       | -10°C -- +60°C range based on $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{V}$ |
| Voltage characteristic               | $\Delta f/f$ ( $V_{CC}$ ) | $\pm 2$ Typical    | ppm/V     | -                                                                               |
| Operating temperature range          | $T_{opr}$                 | -20 to +70         | °C        | -                                                                               |
| Voltage                              | $V_{CC}$                  | $+5.0 \pm 0.5$     | V         | DC                                                                              |
| Current consumption (at no load)     | $I_C$                     | 0.5 Max to 5.0 Max | mA        | Varies with source freq. & output freq.                                         |
| Output current                       | 01, 02, 03                | $I_{OH}$           | -0.08 Min | $V_{CC} = 5.0\text{V}$ , $V_{OH} = 4.6\text{V}$                                 |
|                                      |                           | $I_{OL}$           | 0.51 Min  | $V_{CC} = 5.0\text{V}$ , $V_{OL} = 0.4\text{V}$                                 |
|                                      | 04, 05                    | $I_{OH}$           | -0.51 Min | $V_{CC} = 5.0\text{V}$ , $V_{OH} = 4.6\text{V}$                                 |
|                                      |                           | $I_{OL}$           | 0.51 Min  | $V_{CC} = 5.0\text{V}$ , $V_{OL} = 0.4\text{V}$                                 |
| Fan Out                              | n                         | LS TTL 1 gate      |           |                                                                                 |

### MARKING:



### DIMENSIONS:



### PIN CONNECTION:

| PIN No. | 1     | 2     | 3        | 4        | 5           | 6             |
|---------|-------|-------|----------|----------|-------------|---------------|
|         | OUT 2 | OUT 1 | $V_{CC}$ | $V_{SS}$ | OUT 4 RESET | OUT 3         |
|         |       |       |          |          |             | NO CONNECTION |

## PERFORMANCE CHARACTERISTICS:

