

## Voltage Controlled Oscillator

MOS-828-219+

5V Tuning for PLL IC's 824 to 828 MHz

## Features

- linear tuning characteristics
- low phase noise
- low pulling
- low pushing
- aqueous washable

## Applications

- wireless communications
- WiMAX



CASE STYLE: CZ682

PRICE: \$ 20.45 ea. QTY (5-49)

## +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## Electrical Specifications

| MODEL NO. | FREQ. (MHz) |      | POWER OUTPUT (dBm) | PHASE NOISE dBc/Hz SSB at offset frequencies,kHz |   |    |     | TUNING |                   |                       |               |                                 | NON HARMONIC SPURIOUS (dBc) | HARMONICS (dBc) |      | PULLING pk-pk @ 12 dB (MHz) | PUSHING (MHz/V) | DC OPERATING POWER |      |             |              |
|-----------|-------------|------|--------------------|--------------------------------------------------|---|----|-----|--------|-------------------|-----------------------|---------------|---------------------------------|-----------------------------|-----------------|------|-----------------------------|-----------------|--------------------|------|-------------|--------------|
|           | Min.        | Max. |                    | Typ.                                             | 1 | 10 | 100 | 1000   | VOLTAGE RANGE (V) | SENSI- TIVITY (MHz/V) | PORT CAP (pF) | 3 dB MODULATION BANDWIDTH (MHz) |                             | Typ.            | Max. |                             |                 | Typ.               | Max. | Vcc (volts) | Current (mA) |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |
|           |             |      |                    |                                                  |   |    |     |        |                   |                       |               |                                 |                             |                 |      |                             |                 |                    |      |             |              |

## Pin Connections

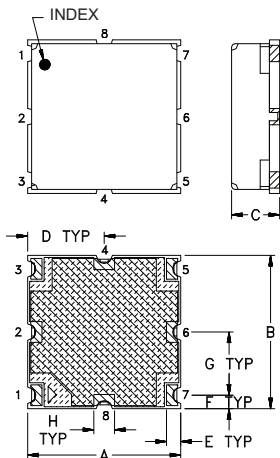
|        |           |
|--------|-----------|
| RF OUT | 5         |
| VCC    | 3         |
| V-TUNE | 1         |
| GROUND | 2,4,6,7,8 |

## Maximum Ratings

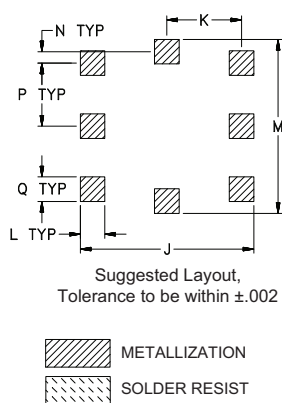
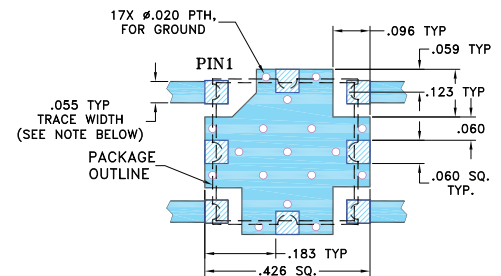
|                                      |                |
|--------------------------------------|----------------|
| Operating Temperature                | -55°C to 85°C  |
| Storage Temperature                  | -55°C to 100°C |
| Absolute Max. Supply Voltage (Vcc)   | 6V             |
| Absolute Max. Tuning Voltage (Vtune) | 7V             |
| All specifications                   | 50 ohm system  |

Permanent damage may occur if any of these limits are exceeded.

## Outline Drawing



## PCB Land Pattern

Demo Board MCL P/N: TB-128  
Suggested PCB Layout (PL-023)

- NOTE: 1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS  $0.030 \pm 0.002$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## Outline Dimensions (inch mm)

| A    | B    | C    | D    | E    | F    | G    | H    | J     | K    | L    | M     | N    | P    | Q    | wt. grams |
|------|------|------|------|------|------|------|------|-------|------|------|-------|------|------|------|-----------|
| .375 | .375 | .131 | .188 | .035 | .033 | .154 | .050 | .425  | .183 | .060 | .425  | .028 | .154 | .060 | .60       |
| 9.52 | 9.52 | 3.33 | 4.77 | 0.89 | 0.84 | 3.91 | 1.27 | 10.80 | 4.65 | 1.52 | 10.80 | 0.71 | 3.91 | 1.52 |           |



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Search Engine Provides ACTUAL Data Instantly at [minicircuits.com](http://minicircuits.com)

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp).

For detailed performance specs  
& shopping online see web site

REV. A  
M123576  
EDR-8670/1F1  
MOS-828-219+  
RAV  
121009  
Page 1 of 2

# Performance Data & Curves\*

# MOS-828-219+

| V<br>TUNE | TUNE<br>SENS<br>(MHz/V) | FREQUENCY<br>(MHz) |       |       | POWER OUTPUT<br>(dBm) |       |       | Icc<br>(mA) | HARMONICS (dBc) |       |       | FREQ.<br>PUSH<br>(MHz/V) | FREQ.<br>PULL<br>(MHz) | PHASE NOISE (dBc/Hz)<br>at offsets |        |        |        | FREQ<br>OFFSET<br>(KHz) | PHASE<br>NOISE at<br>826 MHz<br>(dBc/Hz) |
|-----------|-------------------------|--------------------|-------|-------|-----------------------|-------|-------|-------------|-----------------|-------|-------|--------------------------|------------------------|------------------------------------|--------|--------|--------|-------------------------|------------------------------------------|
|           |                         | -55°C              | +25°C | +85°C | -55°C                 | +25°C | +85°C |             | F2              | F3    | F4    |                          |                        | 1KHz                               | 10KHz  | 100KHz | 1MHz   |                         |                                          |
| 0.00      | 13.65                   | 797.7              | 794.0 | 791.1 | 2.60                  | 2.30  | 1.95  | 21.46       | -28.8           | -23.2 | -38.5 | 0.06                     | 0.36                   | -87.5                              | -112.9 | -133.6 | -153.9 | 1.0                     | -88.94                                   |
| 0.25      | 12.41                   | 801.0              | 797.4 | 794.7 | 2.60                  | 2.29  | 1.95  | 21.47       | -29.1           | -23.1 | -38.0 | 0.01                     | 0.40                   | -87.3                              | -112.1 | -133.3 | -154.2 | 2.0                     | -96.95                                   |
| 0.50      | 11.74                   | 804.1              | 800.5 | 797.8 | 2.59                  | 2.28  | 1.95  | 21.48       | -29.4           | -23.1 | -37.9 | 0.01                     | 0.44                   | -88.7                              | -112.7 | -133.3 | -152.9 | 3.5                     | -102.73                                  |
| 0.80      | 11.34                   | 807.5              | 804.0 | 801.4 | 2.58                  | 2.27  | 1.94  | 21.48       | -29.7           | -23.0 | -37.8 | 0.03                     | 0.49                   | -89.8                              | -112.9 | -133.7 | -153.5 | 6.0                     | -107.81                                  |
| 1.00      | 11.19                   | 809.8              | 806.3 | 803.7 | 2.57                  | 2.26  | 1.93  | 21.48       | -29.9           | -23.0 | -37.8 | 0.03                     | 0.52                   | -90.0                              | -112.6 | -133.5 | -153.8 | 8.5                     | -111.18                                  |
| 1.25      | 11.11                   | 812.6              | 809.1 | 806.5 | 2.56                  | 2.25  | 1.92  | 21.48       | -30.2           | -22.9 | -37.9 | 0.03                     | 0.55                   | -90.7                              | -112.6 | -133.2 | -152.6 | 10.0                    | -112.56                                  |
| 1.50      | 11.11                   | 815.4              | 811.8 | 809.2 | 2.55                  | 2.24  | 1.91  | 21.49       | -30.5           | -22.9 | -38.0 | 0.03                     | 0.59                   | -89.8                              | -113.3 | -133.6 | -153.9 | 20.8                    | -119.32                                  |
| 1.75      | 11.15                   | 818.2              | 814.6 | 812.0 | 2.55                  | 2.23  | 1.90  | 21.50       | -30.8           | -22.9 | -38.2 | 0.03                     | 0.62                   | -91.1                              | -112.9 | -133.2 | -153.1 | 35.5                    | -124.14                                  |
| 2.00      | 11.21                   | 821.0              | 817.4 | 814.8 | 2.54                  | 2.22  | 1.89  | 21.49       | -31.0           | -22.9 | -38.5 | 0.02                     | 0.65                   | -89.6                              | -112.2 | -133.2 | -153.7 | 60.7                    | -128.73                                  |
| 2.25      | 11.27                   | 823.8              | 820.2 | 817.6 | 2.54                  | 2.21  | 1.88  | 21.50       | -31.5           | -22.8 | -38.7 | 0.00                     | 0.68                   | -88.3                              | -112.1 | -133.1 | -153.3 | 86.7                    | -131.92                                  |
| 2.50      | 11.32                   | 826.6              | 823.0 | 820.4 | 2.53                  | 2.21  | 1.88  | 21.50       | -31.8           | -22.8 | -38.6 | 0.02                     | 0.70                   | -88.6                              | -112.4 | -133.2 | -153.0 | 100.0                   | -133.12                                  |
| 2.75      | 11.35                   | 829.4              | 825.9 | 823.2 | 2.52                  | 2.20  | 1.87  | 21.51       | -32.2           | -22.7 | -38.4 | 0.04                     | 0.73                   | -88.7                              | -112.1 | -133.4 | -153.2 | 148.1                   | -136.51                                  |
| 3.00      | 11.35                   | 832.3              | 828.7 | 826.0 | 2.50                  | 2.18  | 1.86  | 21.51       | -32.6           | -22.6 | -38.3 | 0.06                     | 0.76                   | -86.9                              | -113.1 | -133.4 | -152.6 | 177.0                   | -138.06                                  |
| 3.25      | 11.31                   | 835.1              | 831.5 | 828.9 | 2.49                  | 2.16  | 1.84  | 21.52       | -32.9           | -22.5 | -38.3 | 0.09                     | 0.79                   | -89.1                              | -113.0 | -133.3 | -153.5 | 211.6                   | -139.63                                  |
| 3.50      | 11.22                   | 837.9              | 834.4 | 831.7 | 2.48                  | 2.15  | 1.83  | 21.52       | -33.2           | -22.5 | -38.5 | 0.13                     | 0.82                   | -87.9                              | -112.8 | -133.6 | -152.6 | 302.4                   | -142.72                                  |
| 3.75      | 11.10                   | 840.8              | 837.2 | 834.5 | 2.47                  | 2.14  | 1.81  | 21.52       | -33.5           | -22.6 | -38.6 | 0.16                     | 0.85                   | -89.3                              | -113.2 | -132.8 | -153.7 | 361.5                   | -144.38                                  |
| 4.00      | 10.94                   | 843.5              | 839.9 | 837.3 | 2.46                  | 2.12  | 1.80  | 21.53       | -33.9           | -22.6 | -38.6 | 0.19                     | 0.87                   | -87.6                              | -112.2 | -133.1 | -153.7 | 507.5                   | -147.33                                  |
| 4.25      | 10.75                   | 846.3              | 842.7 | 840.0 | 2.45                  | 2.11  | 1.79  | 21.54       | -34.2           | -22.6 | -38.3 | 0.22                     | 0.88                   | -88.4                              | -113.2 | -133.0 | -153.0 | 606.7                   | -148.95                                  |
| 4.50      | 10.54                   | 848.9              | 845.4 | 842.7 | 2.45                  | 2.10  | 1.77  | 21.54       | -34.5           | -22.6 | -38.0 | 0.25                     | 0.89                   | -88.1                              | -112.8 | -133.2 | -152.8 | 851.6                   | -152.03                                  |
| 4.80      | 10.25                   | 852.1              | 848.5 | 845.9 | 2.43                  | 2.09  | 1.76  | 21.55       | -34.7           | -22.7 | -37.6 | 0.28                     | 0.89                   | -88.5                              | -112.5 | -133.2 | -153.4 | 1000.0                  | -153.19                                  |

\*at 25°C unless mentioned otherwise

