

# FREQUENCY MIXERS

Surface Mount

## LEVEL 10 150 kHz to 6 GHz



+10 dBm LO, up to +5 dBm RF

| ◆<br>MODEL<br>NO. | FREQUENCY<br>MHz                        |         | CONVERSION LOSS<br>dB |          |                        |      | LO-RF ISOLATION<br>dB |      |           |      |      |      | LO-IF ISOLATION<br>dB |      |           |      |      |    | IP3@<br>center<br>band<br>Typ.<br>(dBm) | E<br>f<br>a<br>c<br>t<br>o<br>r | CASE<br>STYLE | CON<br>N<br>E<br>C<br>T<br>I<br>O<br>N | PCB<br>Lay-<br>out<br>PL- | PRICE<br>\$<br><br>Qty.<br>(1-9) |
|-------------------|-----------------------------------------|---------|-----------------------|----------|------------------------|------|-----------------------|------|-----------|------|------|------|-----------------------|------|-----------|------|------|----|-----------------------------------------|---------------------------------|---------------|----------------------------------------|---------------------------|----------------------------------|
|                   | LO/RF<br>f <sub>L</sub> -f <sub>U</sub> | IF      | Mid-Band              |          | Total<br>Range<br>Max. | L    |                       | M    |           | U    |      | L    |                       | M    |           | U    |      |    |                                         |                                 |               |                                        |                           |                                  |
|                   |                                         |         | $\bar{x}$             | $\sigma$ |                        | Typ. | Min.                  | Typ. | Min.      | Typ. | Min. | Typ. | Min.                  | Typ. | Min.      | Typ. | Min. |    |                                         |                                 |               |                                        |                           |                                  |
| JMS-1LH           | 2-500                                   | DC-500  | 5.75                  | .10      | 7.0                    | 8.0  | 67                    | 50   | 55        | 30   | 42   | 25   | 50                    | 40   | 45        | 25   | 32   | 20 | 21                                      | 1.1                             | BH292         | ht                                     | 052                       | 8.45                             |
| JMS-2LH           | 20-1000                                 | DC-1000 | 6.5                   | .10      | 7.5                    | 9.0  | 60                    | 40   | 48        | 25   | 37   | 20   | 45                    | 30   | 35        | 20   | 27   | 11 | 20                                      | 1.0                             | BH292         | ht                                     | 052                       | 9.45                             |
| JMS-5LH           | 5-1500                                  | DC-1000 | 6.0                   | .20      | 8.0                    | 9.5  | 60                    | 40   | 50        | 25   | 35   | 20   | 55                    | 40   | 35        | 14   | 15   | 6  | 16                                      | 0.6                             | BH292         | ht                                     | 052                       | 10.95                            |
| LRMS-1LHJ         | 2-500                                   | DC-500  | 5.36                  | .08      | 7.0                    | 8.0  | 58                    | 45   | 44        | 25   | 30   | 20   | 55                    | 40   | 40        | 25   | 28   | 17 | 18                                      | 0.8                             | QQQ569        | w                                      | 083                       | 7.95                             |
| LRMS-2LHJ         | 5-1000                                  | DC-1000 | 6.44                  | .10      | 8.0                    | 9.5  | 58                    | 40   | 39        | 20   | 22   | 16   | 52                    | 30   | 30        | 17   | 18   | 11 | 20                                      | 1.0                             | QQQ569        | w                                      | 083                       | 8.95                             |
| LRMS-5LHJ         | 10-1500                                 | DC-900  | 5.27                  | .09      | 8.0                    | 9.8  | 58                    | 35   | 38        | 20   | 25   | 18   | 56                    | 30   | 38        | 14   | 17   | 6  | 15                                      | 0.5                             | QQQ569        | w                                      | 083                       | 14.95                            |
| LRMS-20J          | 1500-2000                               | DC-500  | 5.0                   | .15      | —                      | 7.5  | 35 (Typ.)             |      | 22 (Min.) |      |      |      | 26 (Typ.)             |      | 18 (Min.) |      |      |    | 18                                      | 0.8                             | QQQ569        | w                                      | 083                       | 6.95                             |
| LRMS-25J          | 750-2500                                | DC-600  | 5.2                   | .15      | —                      | 9.5  | 35 (Typ.)             |      | 17 (Min.) |      |      |      | 20 (Typ.)             |      | 7 (Min.)  |      |      |    | 18                                      | 0.8                             | QQQ569        | w                                      | 083                       | 7.95                             |
| ADE-1LH**         | 0.5-500                                 | DC-500  | 5.0                   | 0.10     | 6.5                    | 8.2  | 65                    | 50   | 55        | 35   | 47   | 26   | 52                    | 40   | 45        | 22   | 34   | 20 | 15                                      | 0.5                             | CD636         | ht                                     | 052                       | 2.99                             |
| ADE-1LHW**        | 2-750                                   | DC-750  | 5.3                   | 0.1      | 6.8                    | 8.5  | 66                    | 50   | 52        | 35   | 46   | 27   | 64                    | 40   | 50        | 27   | 40   | 20 | 15                                      | 0.5                             | CD542         | ht                                     | 052                       | 4.95                             |
| MBA-15LH*         | 1200-2400                               | DC-600  | 5.6                   | 0.1      | —                      | 8.5  | 26 (Typ.)             |      | 17 (Min.) |      |      |      | 22 (Typ.)             |      | 10 (Min.) |      |      |    | 15                                      | 0.5                             | SM2           | ld                                     | 066                       | 6.95                             |
| MBA-18LH*         | 1600-3200                               | DC-500  | 5.8                   | 0.1      | —                      | 8.5  | 30 (Typ.)             |      | 17 (Min.) |      |      |      | 22 (Typ.)             |      | 10 (Min.) |      |      |    | 12                                      | 0.2                             | SM2           | ld                                     | 066                       | 6.95                             |
| MBA-25LH*         | 2200-3600                               | DC-500  | 7.0                   | 0.1      | —                      | 9.2  | 32 (Typ.)             |      | 21 (Min.) |      |      |      | 20 (Typ.)             |      | 10 (Min.) |      |      |    | 12                                      | 0.2                             | SM2           | ld                                     | 066                       | 6.95                             |
| MCA1-24LH*        | 300-2400                                | DC-700  | 6.5                   | 0.1      | —                      | 8.9  |                       |      | 40 25     |      |      |      | 22 12                 |      |           |      |      |    | 13                                      | 0.3                             | DZ885         | ld                                     | 045                       | 6.45                             |
| MCA1-42LH*        | 1000-4200                               | DC-1500 | 6.0                   | 0.1      | —                      | 8.9  |                       |      | 38 23     |      |      |      | 20 11                 |      |           |      |      |    | 12                                      | 0.2                             | DZ885         | ld                                     | 045                       | 7.45                             |
| MCA1-60LH*        | 1700-4400                               | DC-2000 | 6.6                   | 0.1      | —                      | 7.9  |                       |      | 35 23     |      |      |      | 17 —                  |      |           |      |      |    | 13                                      | 0.3                             | DZ885         | ld                                     | 045                       | 8.45                             |
|                   | 4400-6000                               | DC-2000 | 6.0                   | 0.1      | —                      | 8.3  |                       |      | 27 20     |      |      |      | 21 —                  |      |           |      |      |    | 11                                      | 0.1                             |               |                                        |                           |                                  |

E= [IP3(dBm)-LO Power(dBm)]/10

L = low range [ $f_L$  to  $10 f_L$ ]

M = mid range [ $10 f_L$  to  $f_U/2$ ]  
m = mid band [ $2 f_L$  to  $f_U/2$ ]

U = upper range [ $f_U/2$  to  $f_U$ ]

### NOTES:

- ⌘ Average of conversion loss at center of mid-band frequency ( $f_L + f_U/4$ )
- σ Standard deviation
- ◆ Aqueous washable. For non-aqueous requirements, LRMS units available in case style QQQ130.
- † Phase detection, positive polarity.
- ‡ Conversion loss increases up to 6 dB higher as IF frequency decreases from 5 MHz to DC.
- ☆ L=50-100 MHz, M=100-500 MHz
- \* BLUE CELL™ mixers protected by U.S. Patents 5,534,830 5,640,132 5,640,134 5,640,699
- \*\* Protected under U.S. Patent 6133525
- \*\*\* Price for quantities 10-49
- A. Environmental specifications and re-flow soldering information available in General Information Section.
- B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. RF power 50mW
  - 1b. Peak IF current, 40mA



+10 dBm LO, up to +5 dBm RF

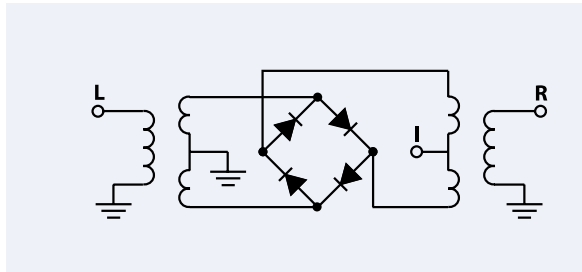
| ◆<br>MODEL NO. | FREQUENCY MHz       |         | CONVERSION LOSS dB |          |      |                  | LO-RF ISOLATION dB  |             |             |    |    |    | LO-IF ISOLATION dB  |             |             |    |    |    | IP3@ center band Typ. (dBm) | E factor | CASE STYLE | CONNECTION | PCB Lay-out PL- | PRICE \$ Qty. (1-9) |
|----------------|---------------------|---------|--------------------|----------|------|------------------|---------------------|-------------|-------------|----|----|----|---------------------|-------------|-------------|----|----|----|-----------------------------|----------|------------|------------|-----------------|---------------------|
|                | LO/RF $f_L$ - $f_U$ | IF      | Mid-Band $\bar{x}$ | $\sigma$ | Max. | Total Range Max. | L Typ. Min.         | M Typ. Min. | U Typ. Min. |    |    |    | L Typ. Min.         | M Typ. Min. | U Typ. Min. |    |    |    |                             |          |            |            |                 |                     |
| RMS-1LH        | 2-500               | DC-500  | 5.36               | .08      | 7.0  | 8.0              | 58                  | 45          | 44          | 25 | 30 | 20 | 55                  | 40          | 40          | 25 | 28 | 17 | 15                          | 0.5      | TT240      | w          | 052             | 7.95                |
| RMS-2LH        | 5-1000              | DC-1000 | 6.44               | .10      | 8.0  | 9.5              | 58                  | 40          | 39          | 20 | 22 | 16 | 52                  | 30          | 30          | 17 | 18 | 11 | 18                          | 0.8      | TT100      | w          | 052             | 8.95                |
| RMS-5LH        | 10-1500             | DC-900  | 5.27               | .09      | 8.0  | 9.8              | 58                  | 35          | 38          | 20 | 25 | 18 | 56                  | 30          | 38          | 14 | 17 | 6  | 16                          | 0.6      | TT240      | w          | 052             | 14.95               |
| SCM-2500LH     | 500-2500            | DC-500  | 5.6                | .20      | 6.8  | 10.0             | 35 (Typ.) 20 (Min.) |             |             |    |    |    | 18 (Typ.) 10 (Min.) |             |             |    |    |    | 16                          | 0.6      | YY101      | r          |                 | 13.95               |
| SKY-53LHR      | 2800-5300           | DC-500  | 5.7                | .20      | —    | 9.5              | 28 (typ.) 15 (min.) |             |             |    |    |    | 12 (typ.) 8 (min.)  |             |             |    |    |    | 14                          | 0.4      | BJ398      | hp         |                 | 16.95               |
| SKY-60LH       | 2500-6000           | DC-1500 | 6.2                | .20      | —    | 9.7              | 28 (typ.) 17 (min.) |             |             |    |    |    | 14 (typ.) 8 (min.)  |             |             |    |    |    | 15                          | 0.5      | BJ398      | je         |                 | 16.95               |
| SYM-11LH       | 1-2000              | 10-600  | 7.0                | .10      | 8.3  | 9.85             | 60                  | 40          | 45          | 25 | 37 | 25 | 59                  | 40          | 33          | 20 | 25 | 20 | 14                          | 0.4      | TTT167     | x          |                 | 11.95               |
| NEW SYM-25DLHW | 40-2500             | DC-1000 | 6.3                | .10      | 7.5  | 8.8              | 48                  | 28          | 40          | 25 | 38 | 22 | 36                  | 25          | 33          | 25 | 39 | 21 | 22                          | 1.2      | TTT167     | x          |                 | 7.95***             |
| SYM-30LH       | 800-3000            | 1-300   | 6.5                | .25      | —    | 8.8              | —                   | —           | 35          | 20 | —  | —  | —                   | —           | 35          | 20 | —  | —  | 21                          | 1.1      | TTT167     | x          |                 | 11.95               |
| TUF-1LHSM      | 2-600               | DC-600  | 6.0                | .17      | 7.0  | 8.0              | 70                  | 50          | 50          | 30 | 42 | 25 | 65                  | 45          | 50          | 30 | 41 | 22 | 17                          | 0.7      | NNN150     | z          |                 | 7.25                |
| TUF-2LHSMI     | 50-1000             | DC-1000 | 5.2                | .30      | 7.0  | 8.5              | 58                  | 40          | 44          | 30 | 39 | 25 | 60                  | 35          | 50          | 25 | 38 | 20 | 17                          | 0.7      | NNN150     | z          |                 | 8.20                |
| TUF-3LHSM      | 0.15-400            | DC-400  | 4.8                | .37      | 7.0  | 8.0              | 67                  | 50          | 51          | 30 | 40 | 25 | 67                  | 40          | 45          | 25 | 34 | 20 | 14                          | 0.4      | NNN150     | z          |                 | 9.10                |
| TUF-5LHSM      | 20-1500             | DC-1000 | 6.9                | .27      | 8.5  | 9.0              | 53                  | 40          | 42          | 30 | 38 | 25 | 40                  | 25          | 30          | 18 | 22 | 8  | 14                          | 0.4      | NNN150     | z          |                 | 12.45               |
| TUF-11ALHSM    | 1400-1900           | 40-500  | 7.0                | .20      | 8.6  | 8.6              | 36 (Typ.) 20 (Min.) |             |             |    |    |    | 28 (Typ.) 15 (Min.) |             |             |    |    |    | 10                          | 0        | NNN150     | z          |                 | 19.95               |

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L = low range [ $f_L$  to  $10 f_L$ ]

M = mid range [ $10 f_L$  to  $f_U/2$ ]  
m = mid band [ $2f_L$  to  $f_U/2$ ]

U = upper range [ $f_U/2$  to  $f_U$ ]



pin and coaxial connections see case style outline drawings for pin locations

| PORT       | r         | w     | x     | z | ht <sup>1</sup> | hp        | je        | ld                           |
|------------|-----------|-------|-------|---|-----------------|-----------|-----------|------------------------------|
| LO         | 1         | 1     | 2     | 4 | 6               | 5         | 1         | 10                           |
| RF         | 8         | 4     | 1     | 1 | 3               | 1         | 5         | 5                            |
| IF         | 3         | 5     | 3     | 2 | 2               | 7         | 7         | 3                            |
| GND EXT.   | 2,4,5,6,7 | 2,3,6 | 4,5,6 | 3 | 1,4,5           | 2,3,4,6,8 | 2,3,4,6,8 | 1,2,4,6,7,8,9                |
| CASE GND   | —         | —     | —     | 3 | —               | —         | —         | —                            |
| NOT USED   | —         | —     | —     | — | —               | —         | —         | —                            |
| DEMO BOARD | —         | TB-03 | TB-12 | — | TB-03           | TB-11     | TB-11     | TB-99 (MBA)<br>TB-144 (MCA1) |

<sup>1</sup> pin connection physically same as w