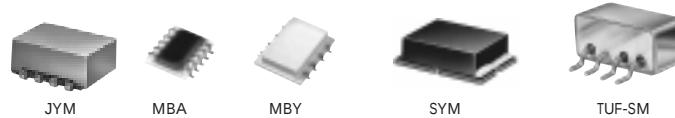


# FREQUENCY MIXERS

Surface Mount

## LEVEL 17 150 kHz to 6 GHz



+17 dBm LO, up to +10 dBm RF

| MODEL NO.  | FREQUENCY MHz                           |         | CONVERSION LOSS dB |            |      |                  | LO-RF ISOLATION, dB |           |           |                | LO-IF ISOLATION, dB |           |           |                | IP3@ center band Typ. (dBm) | CASE STYLE | CONNECTION | PRICE \$ |           |        |    |          |
|------------|-----------------------------------------|---------|--------------------|------------|------|------------------|---------------------|-----------|-----------|----------------|---------------------|-----------|-----------|----------------|-----------------------------|------------|------------|----------|-----------|--------|----|----------|
|            | LO/RF<br>f <sub>L</sub> -f <sub>U</sub> | IF      | Mid-Band           |            |      | Total Range Max. | L<br>Typ. Min.      | M         |           | U<br>Typ. Min. | L<br>Typ. Min.      | M         |           | U<br>Typ. Min. |                             |            |            |          |           |        |    |          |
|            |                                         |         | $\bar{x}$          | m $\sigma$ | Max. |                  |                     | Typ. Min. | Typ. Min. |                |                     | Typ. Min. | Typ. Min. |                |                             |            |            |          | Typ. Min. |        |    |          |
| JYM-20H    | 2-2000                                  | 4-700   | 5.7                | .20        | 8.5  | 9.0              | 40                  | 30        | 44        | 28             | 40                  | 25        | 40        | 35             | 40                          | 22         | 29         | 15       | —         | BJ293  | hp | 17.95    |
| JYM-28H    | 400-2800                                | 4-700   | 6.3                | .20        | 8.0  | 9.0              | 40 (Typ.)           | 25 (Min.) |           |                |                     |           | 30 (Typ.) | 15 (Min.)      |                             |            |            |          | —         | BJ293  | hp | 21.95    |
| JYM-30H    | 2-3000                                  | 4-1400  | 6.0                | .20        | 8.9  | 10.6             | 40                  | 30        | 40        | 25             | 30                  | 25        | 40        | 35             | 30                          | 20         | 22         | 15       | —         | BJ293  | hp | 23.95    |
| ◆ MBA-9H*  | 800-1000                                | DC-200  | 6.4                | .30        | —    | 9.0              | 30 (Typ.)           | 18 (Min.) |           |                |                     |           | 17 (Typ.) | 12 (Min.)      |                             |            |            |          | 18        | SM2    | lc | 9.95***  |
| ◆ MBA-12H* | 800-2500                                | DC-500  | 6.8                | .20        | —    | 9.5              | 30 (Typ.)           | 18 (Min.) |           |                |                     |           | 13 (Typ.) | 7 (Min.)       |                             |            |            |          | 18        | SM2    | lc | 9.95***  |
| ◆ MBY-20H* | 1700-2200                               | DC-700  | 5.5                | .07        | —    | 8.5              | 31 (Typ.)           | 24 (Min.) |           |                |                     |           | 30 (Typ.) | 23 (Min.)      |                             |            |            |          | 23        | SM18   | hp | 11.95*** |
| SYM-11H    | 50-2000                                 | 50-1950 | 6.3                | .10        | 7.5  | 9.0              | 45                  | 35        | 40        | 25             | 37                  | 25        | 40        | 25             | 32                          | 20         | 30         | 20       | —         | TTT167 | x  | 17.95    |
| TUF-18DHSM | 100-1800                                | 50-750  | 7.3                | .15        | 8.5  | 9.0              | 41 (Typ.)           | 23 (Min.) |           |                |                     |           | 33 (Typ.) | 20 (Min.)      |                             |            |            |          | 27        | NNN150 | z  | 23.95    |

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

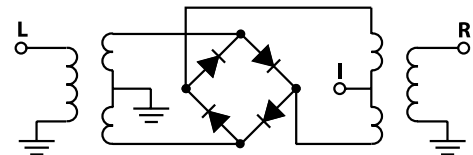
M = mid range [10  $f_L$  to  $f_U/2$ ]

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

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

### NOTES:

- Average of conversion loss at center of mid-band frequency ( $f_L + f_U/4$ )
- $\sigma$  Standard deviation
- ◆ Aqueous washable. For non-aqueous washable 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.
- †† Conversion loss increases 0.5 dB when IF is above 150 MHz.
- \* 15 dB min. over 1500-1800MHz
- + Conversion loss measured at IF frequency between 10 and 1300 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
- \*\*\* Prices 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 200mW
  - 1b. Peak IF current, 40mA



### pin connections

see case style outline drawings

| PORT       | w     | x     | z | hp        | ht <sup>1</sup> | je        | jv    | jw    | ka             | lc        | lp    |
|------------|-------|-------|---|-----------|-----------------|-----------|-------|-------|----------------|-----------|-------|
| LO         | 1     | 2     | 4 | 5         | 6               | 1         | 6     | 4     | 11             | 10        | 3     |
| RF         | 4     | 1     | 1 | 1         | 3               | 5         | 4     | 6     | 5              | 5         | 1     |
| IF         | 5     | 3     | 2 | 7         | 2               | 7         | 3     | 3     | 2              | 3         | 2     |
| GND EXT.   | 2,3,6 | 4,5,6 | 3 | 2,3,4,6,8 | 1,4,5           | 2,3,4,6,8 | 1,2,5 | 1,2,5 | all other pins | 1,4,7,8,9 | 4,5,6 |
| CASE GND   | —     | —     | — | —         | —               | —         | —     | —     | —              | —         | —     |
| ISOLATE    | —     | —     | — | —         | —               | —         | —     | —     | —              | 2,6       | —     |
| DEMO BOARD | TB-44 | TB-12 | — | TB-11     | TB-03           | TB-11     | TB-02 | TB-02 | —              | TB-117    | TB-12 |

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

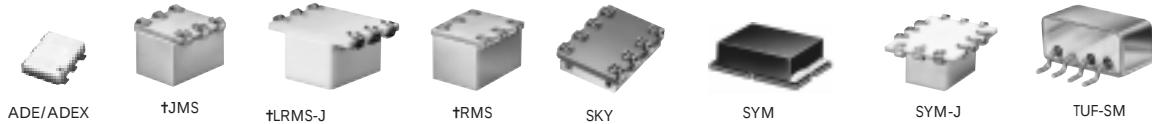
### NSN GUIDE

MCL NO. NSN  
SYM-18H 5895-01-483-0503



Distribution Centers NORTH AMERICA 800-654-7949 • 417 335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

ISO 9001 CERTIFIED



+17 dBm LO, up to +14 dBm RF

| MODEL NO.        | FREQUENCY MHz                           |          | CONVERSION LOSS dB |          |      |                  | LO-RF ISOLATION, dB |           |           |             |             | LO-IF ISOLATION, dB |           |             |           |     | IP3@ center band Typ. (dBm) | CASE STYLE | CONNECTION | PRICE \$ |         |         |
|------------------|-----------------------------------------|----------|--------------------|----------|------|------------------|---------------------|-----------|-----------|-------------|-------------|---------------------|-----------|-------------|-----------|-----|-----------------------------|------------|------------|----------|---------|---------|
|                  | LO/RF<br>f <sub>L</sub> -f <sub>U</sub> | IF       | Mid-Band           |          |      | Total Range Max. | L Typ. Min.         | M         |           | U Typ. Min. | L Typ. Min. | M                   |           | U Typ. Min. |           |     |                             |            |            |          |         |         |
|                  |                                         |          | $\bar{x}$          | $\sigma$ | Max. |                  |                     | Typ. Min. | Typ. Min. |             |             | Typ. Min.           | Typ. Min. |             | Typ. Min. |     |                             |            |            |          |         |         |
| ◆ ADE-1H**       | 0.5-500                                 | DC-500   | 5.3                | .10      | 6.8  | 8.0              | 65                  | 50        | 52        | 35          | 40          | 26                  | 53        | 40          | 42        | 25  | 32                          | 20         | 23         | CD636    | ht      | 4.95*** |
| ◆ ADE-1HW**      | 5-750                                   | DC-750   | 6.0                | .10      | 7.2  | 8.8              | 64                  | 45        | 48        | 35          | 42          | 28                  | 50        | 35          | 40        | 30  | 30                          | 18         | 26         | CD542    | ht      | 6.45*** |
| ◆ ADE-10H**      | 400-1000                                | DC-500   | 7.0                | .10      | —    | 8.5              | 39 (Typ.)           | 29 (Min.) | —         | —           | —           | —                   | 25 (Typ.) | 17 (Min.)   | —         | —   | —                           | —          | 30         | CD542    | jw      | 7.95*** |
| ◆ ADE-12H**      | 500-1200                                | DC-250   | 6.7                | .20      | —    | 8.2              | 34 (Typ.)           | 25 (Min.) | —         | —           | —           | —                   | 28 (Typ.) | 20 (Min.)   | —         | —   | —                           | —          | 28         | CD542    | jv      | 8.95*** |
| ◆ ADE-17H**      | 100-1700                                | 50-1500  | 7.2                | .10      | 8.5  | 9.5              | 32                  | 20        | —         | —           | 36          | 22                  | 32        | 20          | —         | —   | 37                          | 22         | 25         | CD542    | ht      | 8.95*** |
| ◆ ADE-20H**      | 1500-2000                               | DC-300   | 5.2                | .20      | —    | 7.8              | 29 (Typ.)           | 22 (Min.) | —         | —           | —           | —                   | 31 (Typ.) | 20 (Min.)   | —         | —   | —                           | —          | 24         | CD542    | jv      | 8.95*** |
| NEW ◆ ADEX-10H** | 10-1000                                 | DC-800   | 7.0                | .10      | 8.5  | 9.5              | 68                  | 55        | 55        | 40          | 47          | 31††                | 46        | 30          | 32        | 20  | 26                          | 13         | 22         | CD542    | ht      | 3.45*** |
| JMS-1H           | 2-500                                   | DC-500   | 5.90               | .10      | 7.0  | 8.5              | 60                  | 45        | 50        | 25          | 37          | 22                  | 55        | 45          | 50        | 25  | 37                          | 22         | —          | BH292    | ht      | 11.45   |
| JMS-2H           | 20-1000                                 | DC-1000  | 7.00               | .15      | 8.4  | 9.5              | 63                  | 40        | 50        | 28          | 35          | 20                  | 56        | 30          | 47        | 22  | 37                          | 20         | —          | BH292    | ht      | 12.45   |
| JMS-5H           | 5-1500                                  | DC-1000  | 5.90               | .10      | 8.0  | 9.5              | 70                  | 50        | 50        | 25          | 35          | 20                  | 60        | 40          | 35        | 18  | 20                          | 8          | —          | BH292    | ht      | 12.95   |
| ◆ LRMS-1HJ       | 2-500                                   | DC-500   | 6.25               | .034     | 7.0  | 8.5              | 55                  | 44        | 44        | 25          | 33          | 20                  | 50        | 34          | 45        | 25  | 37                          | 22         | —          | QQQ569   | w       | 10.95   |
| ◆ LRMS-1WHJ      | 10-750                                  | DC-750   | 7.00               | .11      | 8.5  | 8.8              | 55                  | 40        | 43        | 22          | 28          | 20                  | 52        | 30          | 38        | 22  | 29                          | 20         | —          | QQQ569   | w       | 11.95   |
| ◆ LRMS-2HJ       | 5-1000                                  | DC-900   | 6.98               | .054     | 8.5  | 9.3              | 55                  | 40        | 39        | 22          | 33          | 20                  | 52        | 30          | 45        | 22  | 30                          | 17         | —          | QQQ569   | w       | 11.95   |
| ◆ LRMS-2UHJ      | 10-1000                                 | 10-750   | 7.10               | .083     | 9.2  | 9.9              | 50                  | 40        | 38        | 30          | 30          | 23                  | 50        | 30          | 40        | 25  | 34                          | 22         | —          | QQQ569   | w       | 14.45   |
| ◆ LRMS-5HJ       | 10-1500                                 | DC-900   | 6.36               | .05      | 8.0  | 9.8              | 65                  | 40        | 36        | 20          | 22          | 15                  | 50        | 30          | 30        | 18  | 17                          | 7          | —          | QQQ569   | w       | 17.95   |
| RMS-1H           | 2-500                                   | DC-500   | 6.25               | .034     | 7.0  | 8.5              | 55                  | 44        | 44        | 25          | 33          | 20                  | 50        | 34          | 45        | 25  | 37                          | 22         | —          | TT240    | w       | 10.95   |
| RMS-1WH          | 10-750                                  | DC-750   | 7.00               | .11      | 8.5  | 8.8              | 55                  | 40        | 43        | 22          | 28          | 20                  | 52        | 30          | 38        | 22  | 29                          | 20         | —          | TT240    | w       | 11.95   |
| RMS-2H           | 5-1000                                  | DC-900   | 6.98               | .054     | 8.5  | 9.3              | 55                  | 40        | 39        | 22          | 33          | 20                  | 52        | 30          | 45        | 22  | 30                          | 17         | —          | TT240    | w       | 11.95   |
| RMS-5H           | 10-1500                                 | DC-900   | 6.36               | .05      | 8.0  | 9.8              | 65                  | 40        | 36        | 20          | 22          | 15                  | 50        | 30          | 30        | 18  | 17                          | 7          | —          | TT240    | w       | 17.95   |
| SKY-53HR         | 2800-5300                               | DC-500   | 5.70               | .20      | —    | 9.5              | 28 (Typ.)           | 15 (Min.) | —         | —           | —           | —                   | 12 (Typ.) | 8 (Min.)    | —         | —   | —                           | —          | —          | BJ398    | hp      | 18.95   |
| SKY-60H          | 2500-6000                               | DC-1500  | 6.20               | .20      | —    | 9.7              | 28 (Typ.)           | 17 (Min.) | —         | —           | —           | —                   | 14 (Typ.) | 8 (Min.)    | —         | —   | —                           | —          | —          | BJ398    | je      | 18.95   |
| SYM-10DH         | 800-1000                                | 20-200   | 7.6                | —        | —    | 9.3              | 45 (Typ.)           | 34 (Min.) | —         | —           | —           | —                   | 29 (Typ.) | 20 (Min.)   | —         | —   | —                           | —          | 31         | TTT167   | x       | 9.95*** |
| SYM-10DHW        | 50-1000                                 | 20-800   | 7.0                | —        | 8.5  | 9.8              | 48 (Typ.)           | 30 (Min.) | —         | —           | —           | —                   | 29 (Typ.) | 20 (Min.)   | —         | —   | —                           | —          | 25         | TTT167   | x       | 16.95   |
| SYM-14H          | 100-1370                                | 10-1000  | 6.50               | .20      | 7.4  | 8.9              | 36 (Typ.)           | 28 (Min.) | —         | —           | —           | —                   | 30 (Typ.) | 24 (Min.)   | —         | —   | —                           | —          | 30         | TTT167   | x       | 9.95*** |
| SYM-18H          | 5-1800                                  | 10-1500  | 5.75               | .10      | 7.6  | 8.9+             | 50                  | 28        | 45        | 35          | 40          | 24                  | 39        | 22          | 50        | 30  | 30                          | 22         | 30         | TTT167   | x       | 9.95*** |
| SYM-20DH         | 1700-2000                               | 10-300   | 6.70               | .16      | —    | 8.2              | 35 (Typ.)           | 22 (Min.) | —         | —           | —           | —                   | 34 (Typ.) | 22 (Min.)   | —         | —   | —                           | —          | 32         | TTT167   | x       | 9.95*** |
| SYM-20DHW        | 10-2000                                 | 10-1800  | 6.20               | .10      | 7.5  | 8.8              | 33                  | 20        | 40        | 25          | 37          | 22                  | 44        | 30          | 42        | 28  | 34                          | 22         | 27         | TTT167   | x       | 17.95   |
| SYM-22H          | 1500-2200                               | DC-200   | 5.6                | .30      | —    | 8.8              | 33 (Typ.)           | 22 (Min.) | —         | —           | —           | —                   | 38 (Typ.) | 22 (Min.)   | —         | —   | —                           | —          | 30         | TTT167   | x       | 9.95*** |
| SYM-24DH         | 1400-2400                               | 10-250   | 7.0                | .20      | —    | 9.3              | 32 (Typ.)           | 22 (Min.) | —         | —           | —           | —                   | 36 (Typ.) | 23 (Min.)   | —         | —   | —                           | —          | 29         | TTT167   | x       | 9.95*** |
| SYM-25DHW        | 80-2500                                 | DC-1000† | 6.40               | .10      | 8.0  | 8.6              | 46                  | 29        | 37        | 25          | 35          | 20                  | 38        | 26          | 33        | 24  | 36                          | 20         | 30         | TTT167   | x       | 9.95*** |
| SYM-25H          | 10-2400                                 | 1-1100   | 6.1                | .10      | 8.5  | 9.2              | 38                  | 20        | 40        | 20          | 30          | 18                  | 54        | 40          | 40        | 22  | 33                          | 20         | 25         | TTT167   | lp      | 21.95   |
| SYM-36H          | 1500-3600                               | DC-600   | 6.3                | .40      | —    | 9.0              | —                   | —         | 30        | 20          | —           | —                   | —         | —           | 34        | 20* | —                           | —          | 25         | TTT167   | x       | 21.95   |
| ◆ SYM-10HJ       | 400-1000                                | DC-400   | 6.6                | .10      | —    | 8.0              | 46 (Typ.)           | 33 (Min.) | —         | —           | —           | —                   | 32 (Typ.) | 18 (Min.)   | —         | —   | —                           | —          | CG581      | ka       | 9.95*** |         |
| TUF-1HSM         | 2-600                                   | DC-600   | 5.90               | .18      | 7.0  | 8.0              | 68                  | 50        | 50        | 30          | 43          | 25                  | 62        | 45          | 48        | 30  | 33                          | 22         | —          | NNN150   | z       | 10.20   |
| TUF-2HSM         | 50-1000                                 | DC-1000  | 6.20               | .22      | 7.5  | 9.0              | 58                  | 40        | 47        | 30          | 42          | 25                  | 58        | 35          | 44        | 25  | 28                          | 18         | —          | NNN150   | z       | 11.20   |
| TUF-3HSM         | 0.15-400                                | DC-400   | 5.00               | .33      | 7.0  | 8.0              | 60                  | 50        | 50        | 35          | 40          | 30                  | 60        | 40          | 45        | 25  | 35                          | 20         | —          | NNN150   | z       | 12.45   |
| TUF-5HSM         | 20-1500                                 | DC-1000  | 7.50               | .17      | 8.5  | 9.0              | 62                  | 55        | 50        | 40          | 38          | 25                  | 40        | 25          | 29        | 18  | 20                          | 8          | —          | NNN150   | z       | 15.45   |
| TUF-11AHS        | 1400-1900                               | 40-500   | 7.30               | .28      | 9.0  | 9.0              | 35 (Typ.)           | 25 (Min.) | —         | —           | —           | —                   | 30 (Typ.) | 15 (Min.)   | —         | —   | —                           | —          | —          | NNN150   | z       | 23.95   |

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

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

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

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