

## RF & MICROWAVE DISCRETE LOW POWER TRANSISTORS

### Features

- Low Cost SO-8 Plastic Surface Mount Package.
- S-Parameter Characterization
- Tape and Reel Packaging Options Available
- Maximum Available Gain = 17 dB @ 300 MHz



R1 suffix—Tape and Reel, 500 units  
 R2 suffix—Tape and Reel, 2500 units

DESCRIPTION: Designed for general-purpose RF amplifier applications, such as; pre-drivers, Oscillators, etc.

### ABSOLUTE MAXIMUM RATINGS (T<sub>case</sub> = 25°C)

| Symbol           | Parameter                 | Value | Unit |
|------------------|---------------------------|-------|------|
| V <sub>CEO</sub> | Collector-Emitter Voltage | 30    | Vdc  |
| V <sub>CBO</sub> | Collector-Base Voltage    | 55    | Vdc  |
| V <sub>EBO</sub> | Emitter-Base Voltage      | 3.5   | Vdc  |
| I <sub>C</sub>   | Collector Current         | 400   | mA   |

### Thermal Data

|                |                                                           |          |                 |
|----------------|-----------------------------------------------------------|----------|-----------------|
| P <sub>D</sub> | Total Device Dissipation @ TC = 25°C<br>Derate above 25°C | 1.0<br>8 | Watts<br>mW/ °C |
|----------------|-----------------------------------------------------------|----------|-----------------|

ELECTRICAL SPECIFICATIONS (Tcase = 25°C)

STATIC

(off)

| Symbol | Test Conditions                                                               | Value |      |      | Unit |
|--------|-------------------------------------------------------------------------------|-------|------|------|------|
|        |                                                                               | Min.  | Typ. | Max. |      |
| BVCER  | Collector-Emitter Breakdown Voltage<br>(IC = 5.0 mAdc, IB = 0, rbe = 10 Ohms) | 55    | -    | -    | Vdc  |
| BVCBO  | Collector-Base Breakdown Voltage<br>(IC = 0.1 mAdc, IE = 0)                   | 55    | -    | -    | Vdc  |
| BVEBO  | Emitter-Base Breakdown Voltage<br>(IE = 0.1 mAdc, IC = 0)                     | 3.5   | -    | -    | Vdc  |
| ICEO   | Collector Cutoff Current<br>(VCE = 15 Vdc, VBE = 0 Vdc)                       | -     | -    | .02  | mA   |

(on)

|     |                                                                                    |           |        |            |  |
|-----|------------------------------------------------------------------------------------|-----------|--------|------------|--|
| HFE | DC Current Gain<br>(IC = 360 mAdc, VCE = 5.0 Vdc)<br>(IC = 50 mAdc, VCE = 5.0 Vdc) | 5.0<br>10 | -<br>- | 250<br>200 |  |
|-----|------------------------------------------------------------------------------------|-----------|--------|------------|--|

DYNAMIC

| Symbol | Test Conditions                                                             | Value |      |      | Unit |
|--------|-----------------------------------------------------------------------------|-------|------|------|------|
|        |                                                                             | Min.  | Typ. | Max. |      |
| COB    | Output Capacitance<br>(VCB = 30 Vdc, IE = 0, f = 1.0 MHz)                   | -     | 1.6  | 2.0  | pF   |
| Ftau   | Current-Gain Bandwidth Product<br>(IC = 50 mAdc, VCE = 15 Vdc, f = 200 MHz) | 800   | 1000 | -    | MHz  |

FUNCTIONAL

| Symbol       | Test Conditions                                                    | Value |      |      | Unit |
|--------------|--------------------------------------------------------------------|-------|------|------|------|
|              |                                                                    | Min.  | Typ. | Max. |      |
| $G_{U\max}$  | Maximum Unilateral Gain<br>IC = 50 mAdc, VCE = 15 Vdc, f = 300 MHz | -     | 15   | -    | dB   |
| MAG          | Maximum Available Gain<br>IC = 50 mAdc, VCE = 15 Vdc, f = 300 MHz  | -     | 17   | -    | dB   |
| $ S_{21} ^2$ | Insertion Gain<br>IC = 50 mAdc, VCE = 15 Vdc, f = 300 MHz          | 11.5  | 12.5 | -    | dB   |

Table 1. Common Emitter S-Parameters, @ VCE = 15 V, IC = 50 mA

| f<br>(MHz) | S11  |               | S21   |               | S12  |               | S22  |               |
|------------|------|---------------|-------|---------------|------|---------------|------|---------------|
|            | S11  | $\angle \phi$ | S21   | $\angle \phi$ | S12  | $\angle \phi$ | S22  | $\angle \phi$ |
| 100        | .632 | -164          | 12.94 | 93            | .018 | 53            | .315 | -27           |
| 300        | .683 | -179          | 4.33  | 75            | .039 | 61            | .307 | -29           |
| 500        | .710 | 171           | 2.57  | 62            | .056 | 61            | .346 | -43           |
| 700        | .717 | 162           | 1.82  | 51            | .071 | 62            | .393 | -58           |
| 1000       | .715 | 158           | 1.24  | 36            | .092 | 65            | .455 | -72           |

RF Low Power PA, LNA, and General Purpose Discrete Selector Guide

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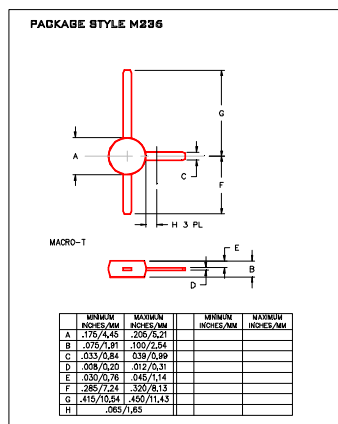
| Package     | Device          | Type | Freq (MHz) | Pout (watts) | GPE (dB) | Efficiency (%) | GPE VCC | BVCEO | IC max (mA) |
|-------------|-----------------|------|------------|--------------|----------|----------------|---------|-------|-------------|
| SO-8        | MRF4427, R2     | NPN  | 175        | 0.15         | 18       | 60             | 12      | 20    | 400         |
| TO-39       | 2N4427          | NPN  | 175        | 1            | 10       | 50             | 12      | 20    | 400         |
| POWER MACRO | MRF553          | NPN  | 175        | 1.5          | 11.5     | 60             | 12.5    | 16    | 500         |
| POWER MACRO | MRF553T         | NPN  | 175        | 1.5          | 11.5     | 50             | 12.5    | 16    | 500         |
| TO-39       | MRF607          | NPN  | 175        | 1.75         | 11.5     | 50             | 12.5    | 16    | 330         |
| TO-39       | 2N6255          | NPN  | 175        | 3            | 7.8      | 50             | 12.5    | 18    | 1000        |
| TO-72       | 2N5179          | NPN  | 200        |              | 20       |                | 6       | 12    | 50          |
| MACRO X     | MRF559          | NPN  | 512        | 0.5          | 10       | 65             | 7.5     | 16    | 150         |
| MACRO X     | MRF559          | NPN  | 512        | 0.5          | 13       | 60             | 12.5    | 16    | 150         |
| TO-39       | 2N3866A         | NPN  | 400        | 1            | 10       | 45             | 28      | 30    | 400         |
| SO-8        | MRF3866, R1, R2 | NPN  | 400        | 1            | 10       | 45             | 28      | 30    | 400         |
| POWER MACRO | MRF555          | NPN  | 470        | 1.5          | 11       | 50             | 12.5    | 16    | 400         |
| POWER MACRO | MRF555T         | NPN  | 470        | 1.5          | 11       | 50             | 12.5    | 16    | 400         |
| MACRO X     | MRF559          | NPN  | 870        | 0.5          | 6.5      | 70             | 7.5     | 16    | 150         |
| MACRO X     | MRF559          | NPN  | 870        | 0.5          | 9.5      | 65             | 12.5    | 16    | 150         |
| SO-8        | MRF8372, R1, R2 | NPN  | 870        | 0.75         | 8        | 55             | 12.5    | 16    | 200         |
| POWER MACRO | MRF557          | NPN  | 870        | 1.5          | 8        | 55             | 12.5    | 16    | 400         |
| POWER MACRO | MRF557T         | NPN  | 870        | 1.5          | 8        | 55             | 12.5    | 16    | 400         |

| Package | Device          | Type | Freq (MHz) | NF (dB) | NF IC (mA) | NF VCE | GN (dB) | Gu Max (dB) | Ftau (MHz) | Ccb(pF) | BVCEO | IC max (mA) |
|---------|-----------------|------|------------|---------|------------|--------|---------|-------------|------------|---------|-------|-------------|
| TO-39   | 2N5109          | NPN  | 200        | 3       | 10         | 15     |         | 12          | 1200       | 3.5     | 20    | 400         |
| TO-39   | MRF5943C        | NPN  | 200        | 3.4     | 30         | 15     |         | 11.4        | 1000       |         | 30    | 400         |
| SO-8    | MRF5943, R1, R2 | NPN  | 200        | 3.4     | 30         | 15     |         | 15          | 1300       |         | 30    | 400         |
| TO-72   | 2N5179          | NPN  | 200        | 4.5     | 1.5        | 6      |         | 17          | 900        | 1       | 12    | 50          |
| TO-72   | 2N2857          | NPN  | 300        | 5.5     | 50         | 6      |         | 13          | 1600       | 1       | 15    | 40          |
| TO-39   | MRF517          | NPN  | 300        | 7.5     | 50         | 15     |         | 5.5         | 4600       | 3       | 25    | 150         |
| TO-72   | MRF904          | NPN  | 450        | 1.5     | 5          | 6      |         | 11          | 4000       | 1       | 15    | 30          |
| TO-72   | 2N6304          | NPN  | 450        | 5       | 2          | 5      |         | 14          | 1400       | 1       | 15    | 50          |
| MACRO T | BFR91           | NPN  | 500        | 1.9     | 2          | 5      | 11      | 16.5        | 5000       | 1       | 12    | 35          |
| MACRO T | BFR96           | NPN  | 500        | 2       | 10         | 10     |         | 14.5        | 500        | 2.6     | 15    | 100         |
| SO-8    | MRF5812, R1, R2 | NPN  | 500        | 2       | 50         | 10     | 15.5    | 17.8        | 5000       |         | 15    | 200         |
| MACRO X | MRF581A         | NPN  | 500        | 2       | 50         | 10     | 14      | 15          | 5000       |         | 15    | 200         |
| Macro   | BFR90           | NPN  | 500        | 2.4     | 2          | 10     | 15      | 18          | 5000       | 1       | 15    | 30          |
| TO-72   | BFY90           | NPN  | 500        | 2.5     | 2          | 5      |         | 20          | 1300       |         | 15    | 50          |
| TO-72   | MRF914          | NPN  | 500        | 2.5     | 5          | 10     |         | 15          | 4500       |         | 12    | 40          |
| MACRO X | MRF581          | NPN  | 500        | 2.5     | 50         | 10     | 15      | 17.8        | 5000       |         | 16    | 200         |
| TO-39   | MRF586          | NPN  | 500        | 3       | 90         | 15     | 11      | 14.5        | 4500       | 2.2     | 17    | 200         |
| MACRO X | MRF951          | NPN  | 1000       | 1.3     | 5          | 6      | 14      | 17          | 8000       | 0.45    | 10    | 100         |
| MACRO X | MRF571          | NPN  | 1000       | 1.5     | 10         | 6      | 10      |             | 8000       | 1       | 10    | 70          |
| MACRO T | BFR91           | NPN  | 1000       | 2.5     | 2          | 5      | 8       | 11          | 5000       | 1       | 12    | 35          |
| MACRO T | BFR90           | NPN  | 1000       | 3       | 2          | 10     | 10      | 12.5        | 5000       | 1       | 15    | 30          |
| TO-39   | MRF545          | PNP  |            |         |            |        |         | 14          | 1400       | 2       | 70    | 400         |
| TO-39   | MRF544          | NPN  |            |         |            |        |         | 13.5        | 1500       |         | 70    | 400         |

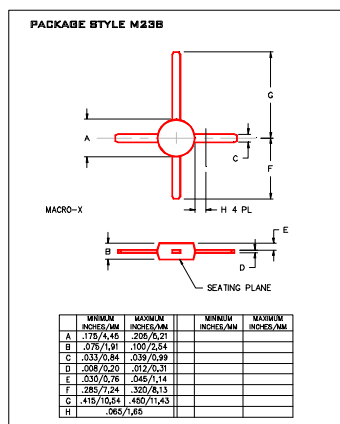
RF (Low Power PA / General Purpose) Selection Guide

RF (LNA / General Purpose) Selection Guide

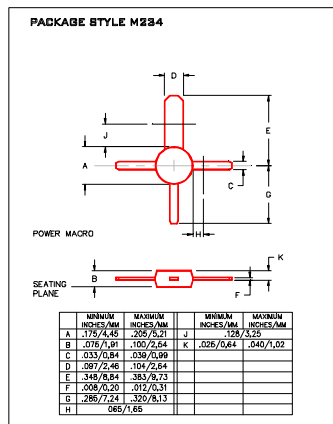
Low Cost RF Plastic Package Options



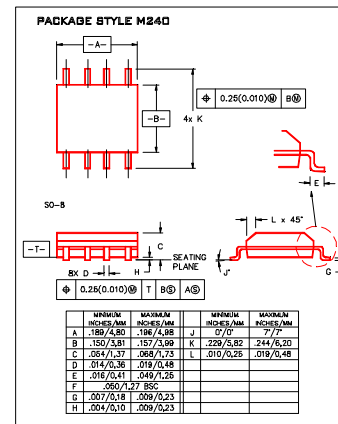
Macro T



Macro X



Power Macro



SO-8

**MRF3866, R1, R2**

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