



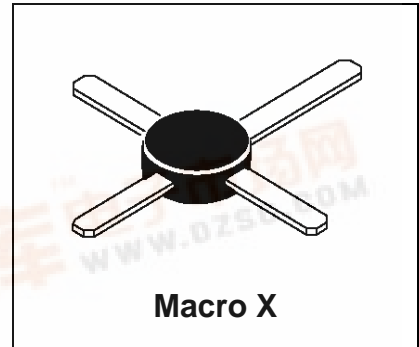
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MRF951

RF & MICROWAVE DISCRETE LOW POWER TRANSISTORS

Features

- Fully Implanted Base and Emitter Structure.
- High Gain, Gain at Optimum Noise Figure = 14 dB @ 1 GHz
- Low Noise Figure – 1.3dB @ 1GHz
- Ftau - 8.0 GHz @ 6v, 30mA
- Cost Effective Macro X Package



DESCRIPTION: Designed for use in high gain, low noise small-signal amplifiers.

ABSOLUTE MAXIMUM RATINGS (Tcase = 25°C)

| Symbol | Parameter | Value | Unit |
|------------------|---------------------------|-------|------|
| V _{CEO} | Collector-Emitter Voltage | 10 | Vdc |
| V _{CBO} | Collector-Base Voltage | 20 | Vdc |
| V _{EBO} | Emitter-Base Voltage | 1.5 | Vdc |
| I _C | Collector Current | 100 | mA |

Thermal Data

| | | | |
|-------------------|--------------------------------------|-------------|-------|
| P _D | Total Device Dissipation @ TC = 75°C | .475 | Watts |
| T _{stg} | Storage Junction Temperature Range | -65 to +150 | °C |
| T _{Jmax} | Maximum Junction Temperature | 150 | °C |

ELECTRICAL SPECIFICATIONS (Tcase = 25°C)

STATIC

(off)

| Symbol | Test Conditions | Value | | | Unit |
|--------|--|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| BVCEO | Collector-Emitter Breakdown Voltage (IC = 0.1 mAdc, IB = 0) | 10 | - | - | Vdc |
| BVCBO | Collector-Base Breakdown Voltage (IC = 0.1 mAdc, IE = 0) | 20 | - | - | Vdc |
| ICBO | Collector Cutoff Current (VCE = 10 Vdc, VBE = 0 Vdc) | - | - | 0.1 | μA |
| IEBO | Collector Cutoff Current (VCE = 1.0 Vdc, VBE = 0 Vdc) | - | - | 0.1 | μA |

(on)

| | | | | | |
|-----|---|----|---|-----|---|
| HFE | DC Current Gain (IC = 5.0 mAdc, VCE = 6.0 Vdc) | 50 | - | 200 | - |
|-----|---|----|---|-----|---|

DYNAMIC

| Symbol | Test Conditions | Value | | | Unit |
|--------|--|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| CCB | Collector-Base Capacitance (VCB = 10 Vdc, IE = 0, f = 1.0 MHz) | - | .45 | 1.0 | pF |
| Ftau | Current-Gain Bandwidth Product (IC = 30 mAdc, VCE = 6 Vdc, f = 1.0 GHz) | - | 8.0 | - | GHz |

MRF951

FUNCTIONAL

| Symbol | Test Conditions | Value | | | Unit |
|--------------|---|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| NFmin | Minimum Noise Figure (IC = 5 mAdc, VCE = 6 Vdc, f = 1 GHz) | - | 1.3 | - | dB |
| G_{NF} | Power Gain @ NFmin (IC = 5.0 mAdc, VCE = 6 Vdc, f = 1 GHz) | - | 14 | - | dB |
| $G_{U\ max}$ | Maximum Unilateral Gain (1) IC = 30 mAdc, VCE = 8 Vdc, f = 1 GHz | - | 17 | - | dB |
| $ S_{21} ^2$ | Insertion Gain IC = 30 mAdc, VCE = 6 Vdc, f = 1 GHz | 12 | 14.5 | - | dB |

Table 1. Common Emitter S-Parameters, @ VCE = 6 V, IC = 30 mA

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|------------|-----|---------------|-------|---------------|-----|---------------|-----|---------------|
| | S11 | $\angle \phi$ | S21 | $\angle \phi$ | S12 | $\angle \phi$ | S22 | $\angle \phi$ |
| 100 | .45 | -95 | 36.80 | 132 | .02 | 64 | .68 | -38 |
| 500 | .46 | -170 | 10.20 | 89 | .04 | 65 | .27 | -55 |
| 1000 | .47 | 169 | 5.30 | 72 | .08 | 66 | .22 | -62 |
| 1500 | .48 | 154 | 3.60 | 58 | .11 | 63 | .22 | -73 |
| 2000 | .50 | 142 | 2.80 | 45 | .15 | 58 | .23 | -86 |
| 2500 | .51 | 132 | 2.30 | 36 | .18 | 54 | .25 | -97 |
| 3000 | .53 | 119 | 1.90 | 23 | .22 | 47 | .28 | -113 |
| 3500 | .55 | 109 | 1.60 | 12 | .25 | 41 | .30 | -125 |
| 4000 | .57 | 99 | 1.50 | 2.0 | .29 | 35 | .33 | -137 |

MRF951

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

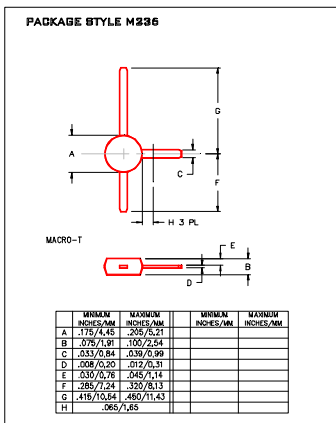
| Package | Device | Type | Freq (MHz) | Pout (watts) | GPE (dB) | Efficiency (%) | GPE VCC | BVCEO | IC max (mA) |
|-------------|-----------------|------|------------|--------------|----------|----------------|---------|-------|-------------|
| SO-8 | MRF4427, R2 | NPN | 175 | 0.15 | 18 | 60 | 12 | 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 |

RF (Low Power PA / General Purpose) Selection Guide

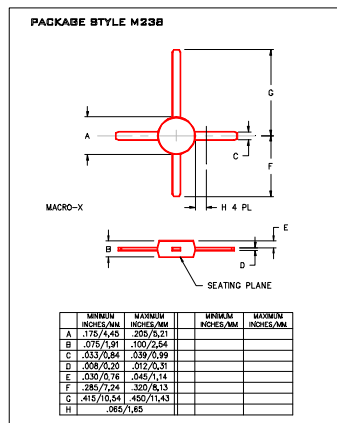
| Package | Device | Type | Freq (MHz) | NF (dB) | NF IC (mA) | NF VCE | GN (dB) | Gu Max (dB) | Ftau (MHz) | Ccb (pF) | BVCEO | IC max (mA) |
|---------|-----------------|------|------------|---------|------------|--------|---------|-------------|------------|----------|-------|-------------|
| TO-39 | 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 (LNA / General Purpose) Selection Guide

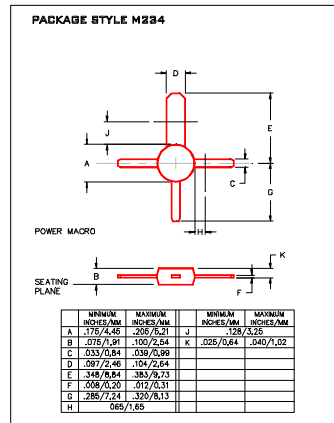
Low Cost RF Plastic Package Options



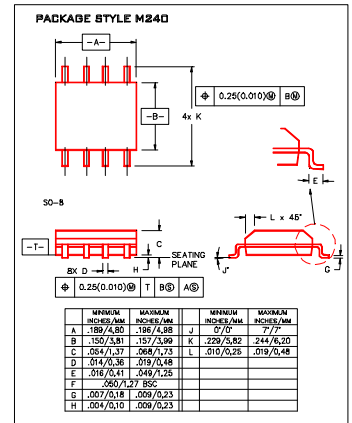
Macro T



Macro X



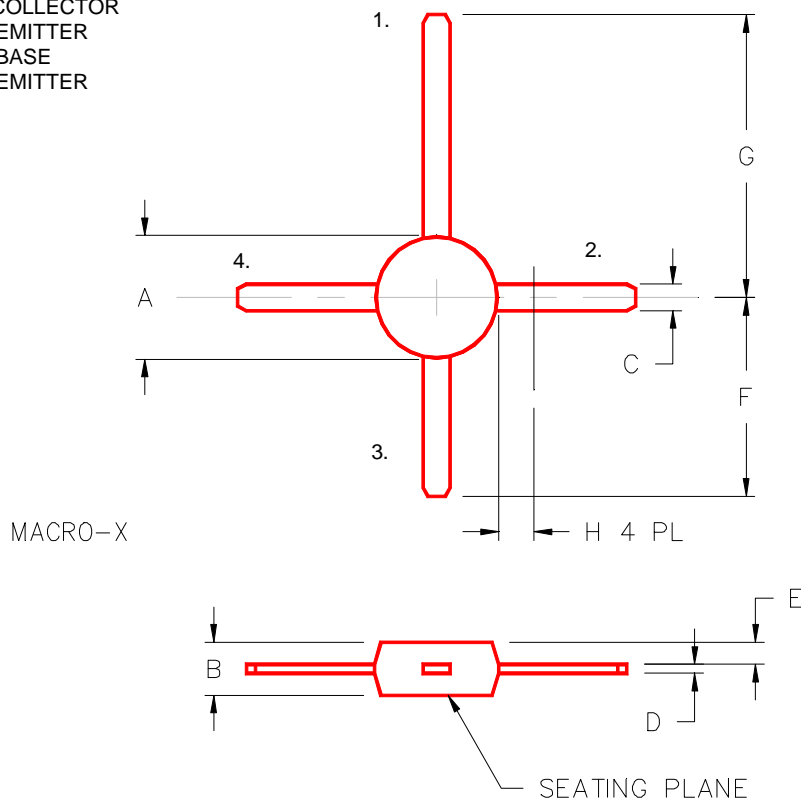
Power Macro



SO-8

PACKAGE STYLE M238

- PIN 1. COLLECTOR
- 2. EMITTER
- 3. BASE
- 4. EMITTER



| | MINIMUM INCHES/MM | MAXIMUM INCHES/MM | | MINIMUM INCHES/MM | MAXIMUM INCHES/MM |
|---|----------------------|----------------------|--|----------------------|----------------------|
| A | .175/4,45 | .205/5,21 | | | |
| B | .075/1,91 | .100/2,54 | | | |
| C | .033/0,84 | .039/0,99 | | | |
| D | .008/0,20 | .012/0,31 | | | |
| E | .030/0,76 | .045/1,14 | | | |
| F | .285/7,24 | .320/8,13 | | | |
| G | .415/10,54 | .450/11,43 | | | |
| H | .065/1,65 | | | | |