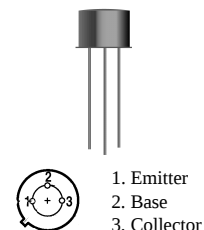


**2N4427****RF & MICROWAVE DISCRETE  
LOW POWER TRANSISTORS****Features**

- Silicon NPN, To-39 packaged VHF/UHF Transistor
- 
- 1 Watt Minimum Power Output @ 175 MHz
- 
- 500 MHz Current-Gain Bandwidth Product @ 50mA
- 
- Power Gain,  $G_{PE} = 10\text{dB (Min)}$  @ 175 MHz

**TO-39****DESCRIPTION:**

Silicon NPN transistor, designed for VHF and UHF equipment. Applications include amplifier; pre-driver, driver, and output stages. Also suitable for oscillator and frequency-multiplier functions.

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

| Symbol           | Parameter              | Value | Unit |
|------------------|------------------------|-------|------|
| V <sub>CEO</sub> | Collector-Emitter      | 20    | Vdc  |
| V <sub>CBO</sub> | Collector-Base Voltage | 40    | Vdc  |
| V <sub>EBO</sub> | Emitter-Base Voltage   | 2.0   | Vdc  |
| I <sub>C</sub>   | Collector Current      | 400   | mA   |

**Thermal Data**

|                |                                                                       |             |                 |
|----------------|-----------------------------------------------------------------------|-------------|-----------------|
| P <sub>D</sub> | Total Device Dissipation @ T <sub>A</sub> = 25°C<br>Derate above 25°C | 1.0<br>5.71 | Watts<br>mW/ °C |
|----------------|-----------------------------------------------------------------------|-------------|-----------------|

## ELECTRICAL SPECIFICATIONS (Tcase = 25°C)

### STATIC

(off)

| Symbol | Test Conditions                                                                      | Value |      |      | Unit            |
|--------|--------------------------------------------------------------------------------------|-------|------|------|-----------------|
|        |                                                                                      | Min.  | Typ. | Max. |                 |
| BVCER  | Collector-Emitter Sustaining Voltage<br>(IC = 5.0 mA <sub>dc</sub> , RBE = 10 ohms)  | 40    | -    | -    | V <sub>dc</sub> |
| BVCEO  | Collector-Emitter Sustaining Voltage<br>(IC=5.0 mA <sub>dc</sub> , IB=0)             | 20    | -    | -    | V <sub>dc</sub> |
| ICEO   | Collector Cutoff Current<br>(VCE = 12 V <sub>dc</sub> , IB = 0)                      | -     | -    | 20   | μA              |
| ICEX   | Collector Cutoff Current<br>(VCE = 40 V <sub>dc</sub> , VBE = -1.5 V <sub>dc</sub> ) | -     | -    | 100  | μA              |
| IEBO   | Emitter Cutoff Current<br>(VEB = 2.0 V <sub>dc</sub> , IC = 0)                       | -     | -    | 100  | μA              |

(on)

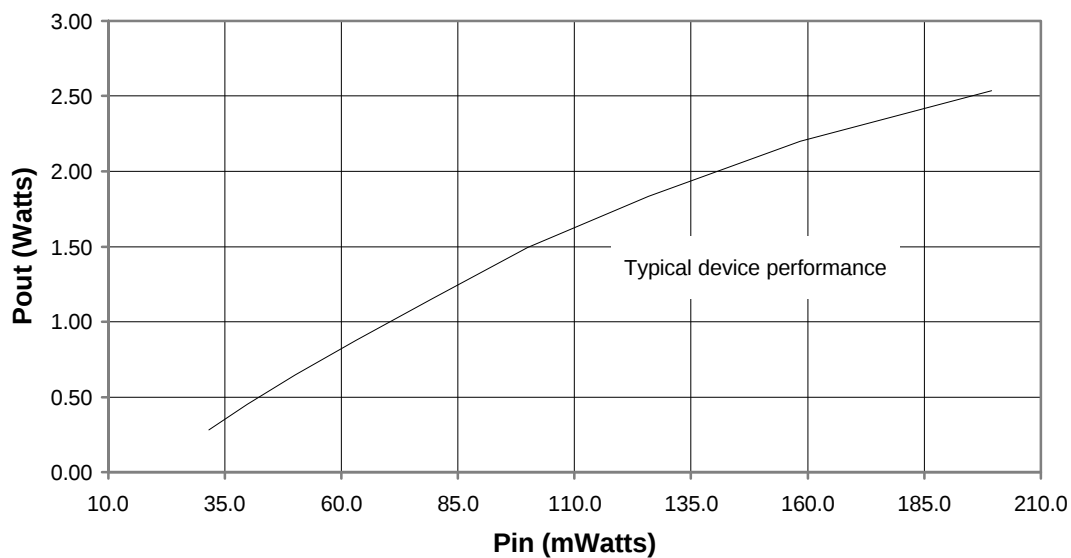
|          |                                                                                                                                         |    |   |     |                 |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------|----|---|-----|-----------------|
| HFE      | DC Current Gain<br>(IC = 100 mA <sub>dc</sub> , VCE = 5.0 V <sub>dc</sub> )<br>(IC = 360 mA <sub>dc</sub> , VCE = 5.0 V <sub>dc</sub> ) | 10 | - | 200 | -               |
|          |                                                                                                                                         | 5  | - | -   | -               |
| VCE(sat) | Collector-Emitter Saturation Voltage<br>(IC = 100 mA <sub>dc</sub> , IB = 20 mA <sub>dc</sub> )                                         | -  | - | 0.5 | V <sub>dc</sub> |

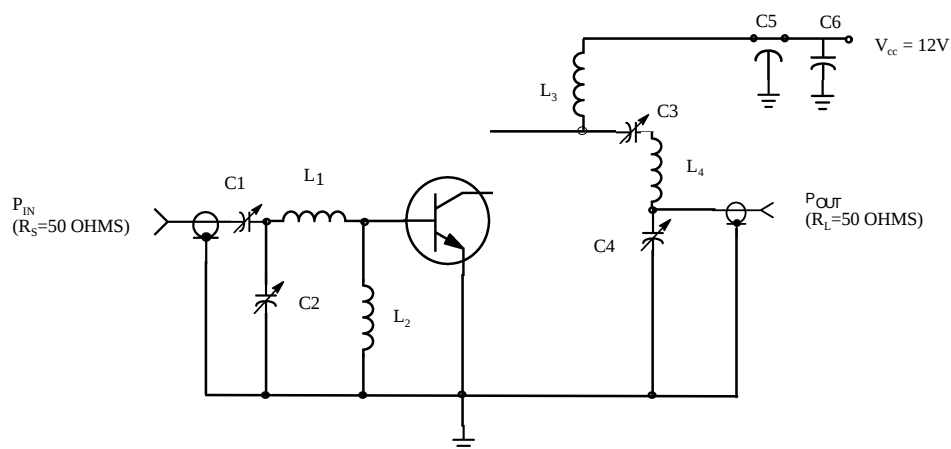
### DYNAMIC

| Symbol         | Test Conditions                                                                                         | Value |      |      | Unit |
|----------------|---------------------------------------------------------------------------------------------------------|-------|------|------|------|
|                |                                                                                                         | Min.  | Typ. | Max. |      |
| f <sub>T</sub> | Current-Gain - Bandwidth Product<br>(IC = 50 mA <sub>dc</sub> , VCE = 15 V <sub>dc</sub> , f = 200 MHz) | 500   | -    | -    | MHz  |
| COB            | Output Capacitance<br>(VCB = 12 V <sub>dc</sub> , IE = 0, f = 1.0 MHz)                                  | -     | 4.0  | -    | pF   |

**ELECTRICAL SPECIFICATIONS (T<sub>case</sub> = 25°C)**
**FUNCTIONAL**

| Symbol           | Test Conditions      |                                                                  | Value |      |      | Unit  |
|------------------|----------------------|------------------------------------------------------------------|-------|------|------|-------|
|                  |                      |                                                                  | Min.  | Typ. | Max. |       |
| G <sub>PE</sub>  | Power Gain           | Test Circuit-Figure 1<br>Pin = 0.1 W, VCE = 12Vdc<br>f = 175 MHz | 10    | -    | -    | dB    |
| P <sub>out</sub> | Output Power         | Test Circuit-Figure 1<br>Pin = 0.1 W, VCE = 12Vdc<br>f = 175 MHz | 1.0   | -    | -    | Watts |
| η <sub>c</sub>   | Collector Efficiency | Test Circuit-Figure 1<br>Pin = 0.1 W, VCE = 12Vdc<br>f = 175 MHz | 45    | -    | -    | %     |





**Figure 1 - 175 MHz RF AMPLIFIER CIRCUIT FOR  $G_{PE}$ ,  $P_{OUT}$ , AND EFFICIENCY SPECIFICATIONS.**

$L_1$ : 2 TURNS No. 16 wire, 3/16" ID, 1/4" long

$L_3$ : 2 TURNS No. 16 wire, 1/4" ID, 1/4" long

Capacitor values in pF unless

$L_2$ : Ferrite choke,  $Z=450$  ohms

$L_4$ : 4 TURNS No. 16 wire, 3/8" ID, 3/8" long

Tuning capacitors are air variable  
otherwise indicated.

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

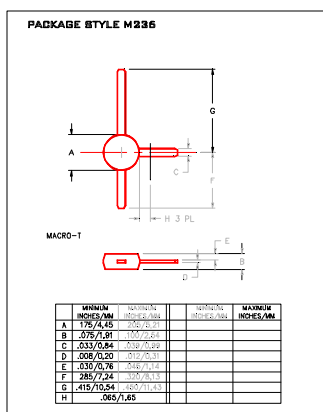
| Package     | Device          | Type | GPE Freq (MHz) | Pout (watts) | GPE (dB) | Efficiency (%) | GPE VCC | BVCEO | IC max (mA) |
|-------------|-----------------|------|----------------|--------------|----------|----------------|---------|-------|-------------|
| SO-8        | MRF4427, R2     | NPN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

| Packag  | Device          | Type | Freq (MHz) | NF  | 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   | BFY 90          | 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         |     |

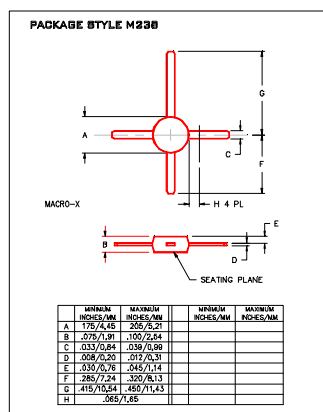
### RF (Low Power PA / General Purpose) Selection Guide

### RF (LNA / General Purpose) Selection Guide

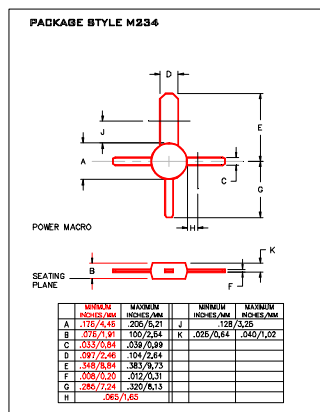
## Low Cost RF Plastic Package Options



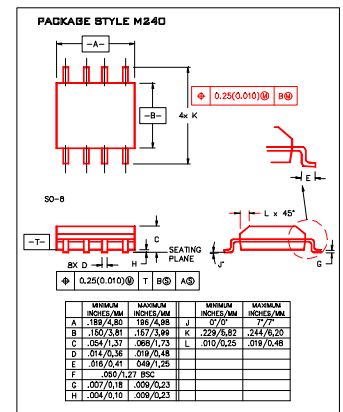
Macro T



Macro X

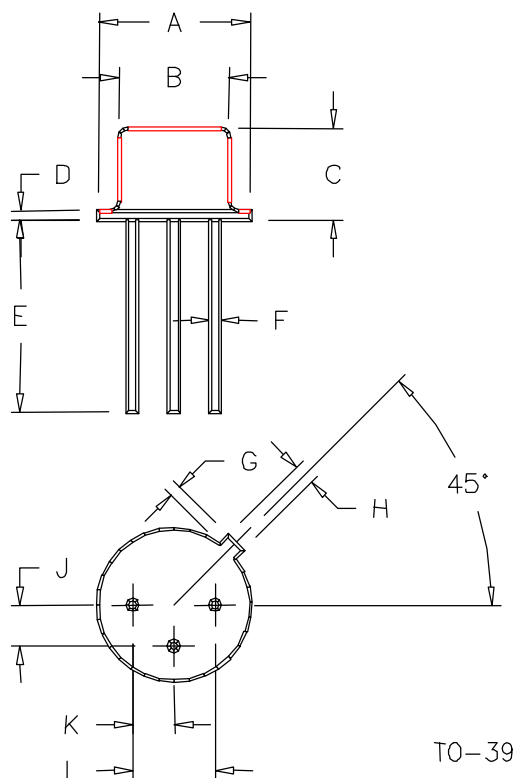


Power



SO-8

**PACKAGE STYLE M246**



TO-39

|   | MINIMUM<br>INCHES/MM | MAXIMUM<br>INCHES/MM |   | MINIMUM<br>INCHES/MM | MAXIMUM<br>INCHES/MM |
|---|----------------------|----------------------|---|----------------------|----------------------|
| A | .350/8,89            | .370/9,40            | J | .095/2,41            | .105/2,67            |
| B | .315/8,00            | .335/8,51            | K | .095/2,41            | .105/2,67            |
| C | .240/6,10            | .260/6,60            | L | .190/4,83            | .210/5,33            |
| D | .015/0,38            | .045/1,14            |   |                      |                      |
| E | .500/12,70           |                      |   |                      |                      |
| F | .016/0,41            | .019/0,48            |   |                      |                      |
| G | .029/0,74            | .040/1,02            |   |                      |                      |
| H | .028/0,71            | .034/0,86            |   |                      |                      |

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