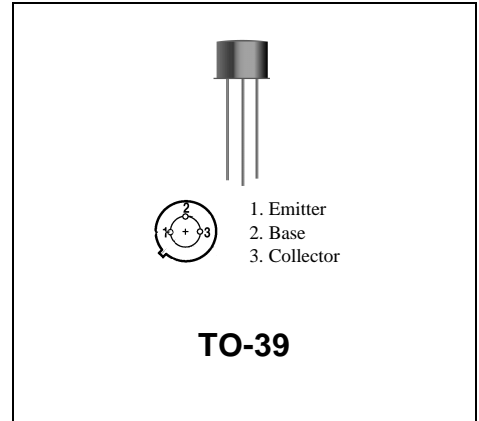


2N4427

**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



**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 |
|-----------|------------------------|-------|------|
| $V_{CEO}$ | Collector-Emitter      | 20    | Vdc  |
| $V_{CBO}$ | Collector-Base Voltage | 40    | Vdc  |
| $V_{EBO}$ | Emitter-Base Voltage   | 2.0   | Vdc  |
| $I_C$     | Collector Current      | 400   | mA   |

**Thermal Data**

|       |  |             |                 |
|-------|--|-------------|-----------------|
| $P_D$ | Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above 25°C | 1.0<br>5.71 | Watts<br>mW/ °C |
|-------|--|-------------|-----------------|

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

(off)

| Symbol | Test Conditions  | Value |      |      | Unit            |
|--------|--|-------|------|------|-----------------|
|        |  | Min.  | Typ. | Max. |                 |
| BVCER  | Collector-Emitter Sustaining Voltage<br>(I <sub>C</sub> = 5.0 mA <sub>dc</sub> , R <sub>BE</sub> = 10 ohms)  | 40    | -    | -    | V <sub>dc</sub> |
| BVCEO  | Collector-Emitter Sustaining Voltage<br>(I <sub>C</sub> =5.0 mA <sub>dc</sub> , I <sub>B</sub> =0)           | 20    | -    | -    | V <sub>dc</sub> |
| ICEO   | Collector Cutoff Current<br>(V <sub>CE</sub> = 12 V <sub>dc</sub> , I <sub>B</sub> = 0)                      | -     | -    | 20   | μA              |
| ICEX   | Collector Cutoff Current<br>(V <sub>CE</sub> = 40 V <sub>dc</sub> , V <sub>BE</sub> = -1.5 V <sub>dc</sub> ) | -     | -    | 100  | μA              |
| IEBO   | Emitter Cutoff Current<br>(V <sub>EB</sub> = 2.0 V <sub>dc</sub> , I <sub>C</sub> = 0)                       | -     | -    | 100  | μA              |

(on)

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

**DYNAMIC**

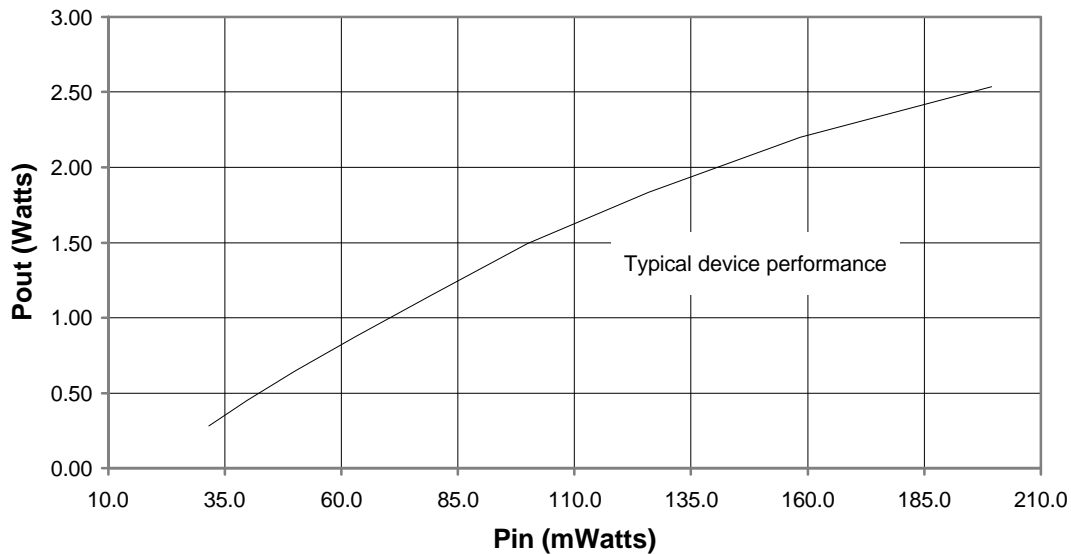
| Symbol         | Test Conditions   | Value |      |      | Unit |
|----------------|---|-------|------|------|------|
|                |   | Min.  | Typ. | Max. |      |
| f <sub>T</sub> | Current-Gain - Bandwidth Product<br>(I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>CE</sub> = 15 V <sub>dc</sub>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

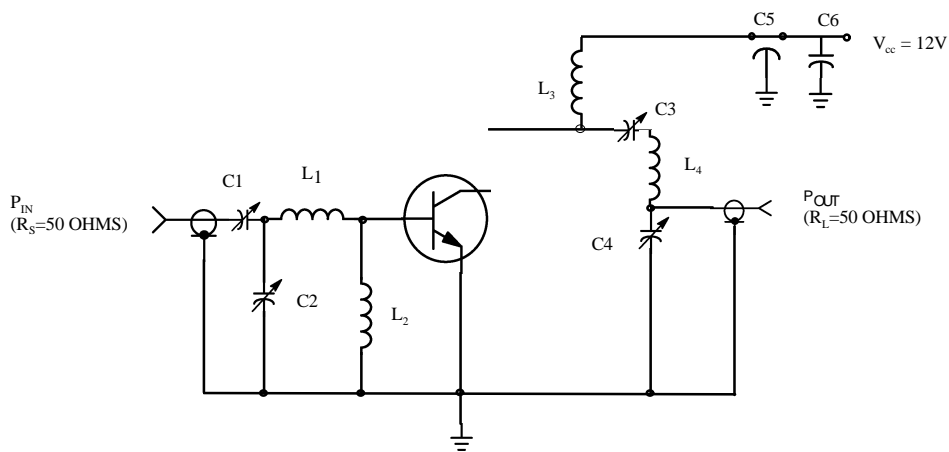
# 2N4427

## 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<sub>1</sub>: 2 TURNS No. 16 wire, 3/16" ID, 1/4" long

L<sub>3</sub>: 2 TURNS No. 16 wire, 1/4" ID, 1/4" long

Capacitor values in pF unless

L<sub>2</sub>: Ferrite choke, Z=450 ohms

L<sub>4</sub>: 4 TURNS No. 16 wire, 3/8" ID, 3/8" long

Tuning capacitors are air variable otherwise indicated.

# 2N4427

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

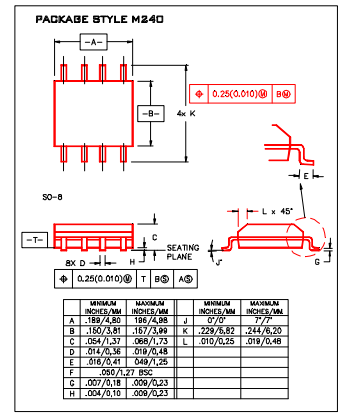
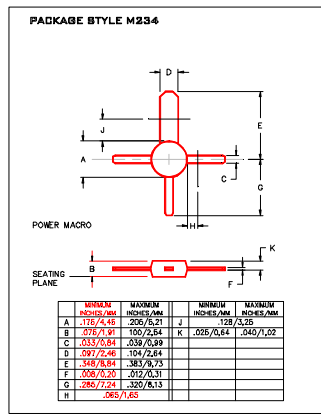
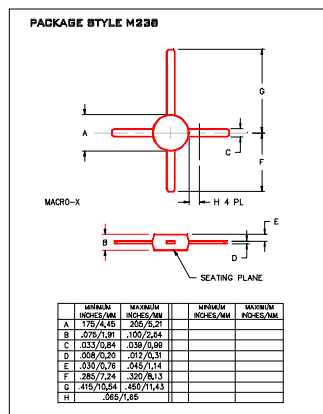
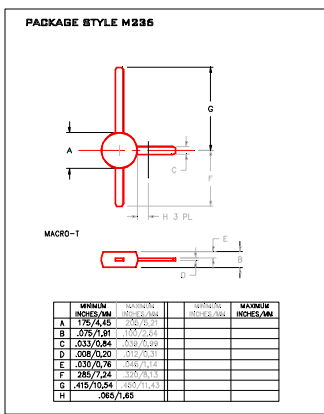
| Packane     | Device          | Type | GPE Freq (MHz) | Pout (watts) | GPE (dB) | Efficiency (%) | GPE VCC | BVCEO | IC max (mA) |
|-------------|-----------------|------|----------------|--------------|----------|----------------|---------|-------|-------------|
| SO-8        | MRF4427, R2     | NPN  | 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 @ 100mA | 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



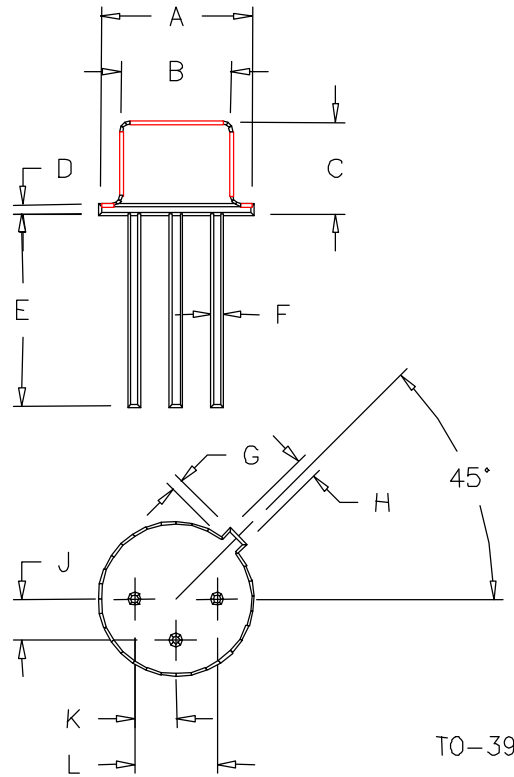
Macro T

Macro X

Power

SO-8

PACKAGE STYLE M246



|   | 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            |   |                      |                      |