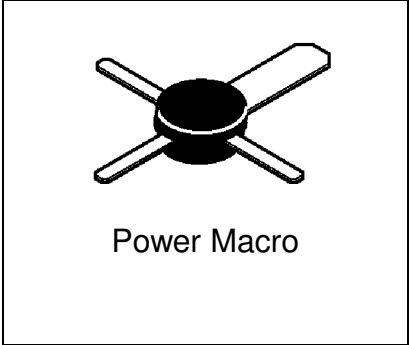


**MRF553**  
**MRF553G**

\* G Denotes RoHS Compliant, Pb Free Terminal Finish




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**RF & MICROWAVE DISCRETE  
LOW POWER TRANSISTORS**

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**Features**

- Specified @ 12.5 V, 175 MHz Characteristics
  - Output Power = 1.5 W
  - Minimum Gain = 11.5 dB
  - Efficiency 60% (Typ)
  - Cost Effective PowerMacro Package
  - Electroless Tin Plated Leads for Improved Solderability
- 

**DESCRIPTION:** Designed primarily for wideband large signal stages in the VHF frequency range.

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

| Symbol           | Parameter                 | Value | Unit |
|------------------|---------------------------|-------|------|
| V <sub>CEO</sub> | Collector-Emitter Voltage | 16    | Vdc  |
| V <sub>CBO</sub> | Collector-Base Voltage    | 36    | Vdc  |
| V <sub>EBO</sub> | Emitter-Base Voltage      | 4.0   | Vdc  |
| I <sub>C</sub>   | Collector Current         | 500   | mA   |

**Thermal Data**

|                |                                      |     |        |
|----------------|--------------------------------------|-----|--------|
| P <sub>D</sub> | Total Device Dissipation @ TC = 75°C | 3.0 | Watts  |
|                | Derate above 75°C                    | 40  | mW/ °C |

|                                 |
|---------------------------------|
| <b>MRF553</b><br><b>MRF553G</b> |
|---------------------------------|

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

| Symbol | Test Conditions   | Value |      |      | Unit |
|--------|---|-------|------|------|------|
|        |   | Min.  | Typ. | Max. |      |
| BVCEO  | Collector-Emitter Breakdown Voltage<br>(I <sub>C</sub> =10 mAdc, I <sub>B</sub> =0)     | 16    | -    | -    | Vdc  |
| BVCES  | Collector-Emitter Sustaining Voltage<br>(I <sub>C</sub> = 5.0 mAdc, I <sub>B</sub> = 0) | 36    | -    | -    | Vdc  |
| BVCBO  | Collector-Base Breakdown Voltage<br>(I <sub>E</sub> = 0, I <sub>C</sub> = 5 mAdc)       | 36    | -    | -    | Vdc  |
| BVEBO  | Emitter-Base Breakdown Voltage<br>(I <sub>E</sub> = 1 mAdc, I <sub>C</sub> = 0)         | 4.0   | -    | -    | Vdc  |
| ICES   | Collector Cutoff Current<br>(V <sub>CE</sub> = 15 Vdc, V <sub>BE</sub> = 0 Vdc)         | -     | -    | 5    | mA   |

**(on)**

|     |  |    |   |     |   |
|-----|--|----|---|-----|---|
| HFE | DC Current Gain<br>(I <sub>C</sub> = 250 mAdc, V <sub>CE</sub> = 5.0 Vdc) Both | 30 | - | 200 | - |
|-----|--|----|---|-----|---|

**DYNAMIC**

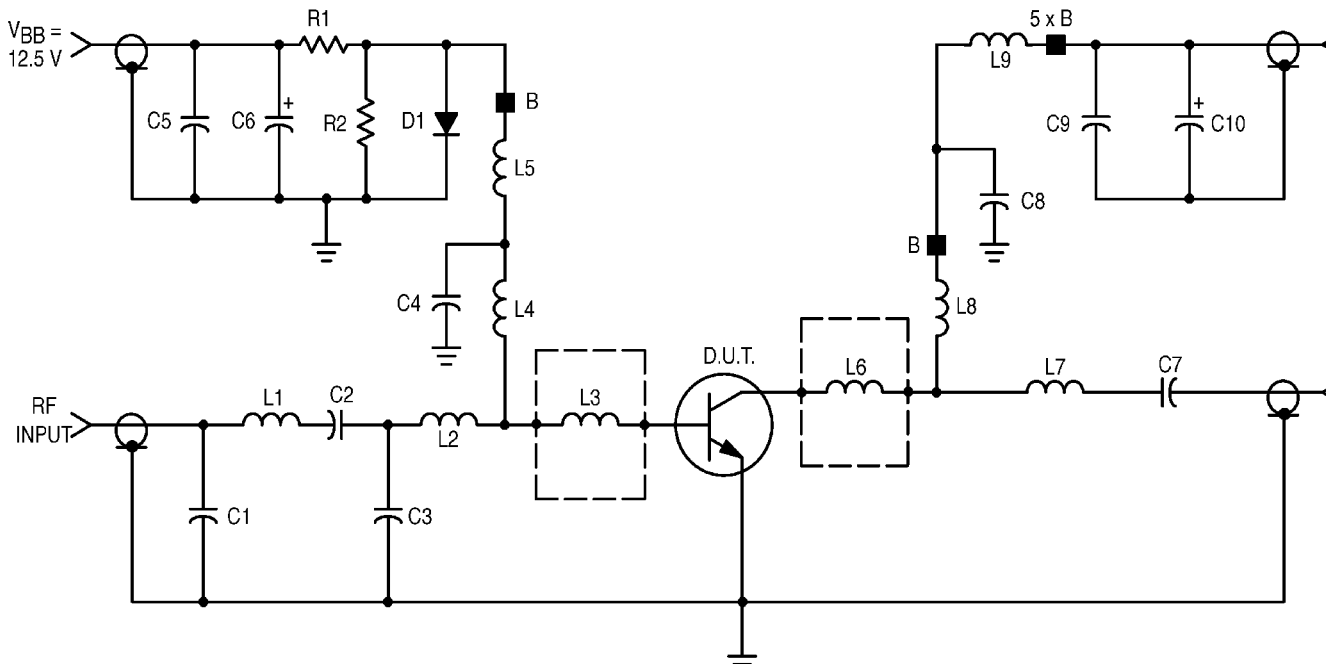
| Symbol | Test Conditions   | Value |      |      | Unit |
|--------|---|-------|------|------|------|
|        |   | Min.  | Typ. | Max. |      |
| COB    | Output Capacitance<br>(V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz) | -     | 12   | 20   | pF   |

# MRF553

# MRF553G

**FUNCTIONAL**

| Symbol   | Test Conditions                                    |  | Value                          |      |      | Unit |
|----------|--|--|--------------------------------|------|------|------|
|          |  |  | Min.                           | Typ. | Max. |      |
| $G_{PE}$ | Power Gain   | Test Circuit-Figure 1<br>Pout = 1.5 W, VCE =12.5Vdc<br>f = 175 MHz | 11.5                           | 13   | -    | dB   |
| $\eta$   | Collector Efficiency                               | Test Circuit-Figure 1<br>Pout = 1.5 W, VCE =12.5Vdc<br>f = 175 MHz | 50                             | 60   | -    | %    |
| $\Psi$   | Load Mismatch<br>VSWR $\geq$ 10:1 All Phase Angles | Test Circuit-Figure 1<br>Pout = 1.5 W, VCE =12.5Vdc<br>f = 175 MHz | No Degradation in Output Power |      |      | -    |


**Figure 1. 140–175 MHz Broadband Circuit Schematic.**

- |   |   |
|---|---|
| C1 — 36 pF Mini Underwood   | C2 — 47 pF Mini Underwood                         |
| C3 — 91 pF Mini Underwood   | C4 — 68 pF Mini Underwood                         |
| C5, C9 — 1.0 $\mu$ F Erie Red Cap Capacitor                         | C6, C10 — 0.1 $\mu$ F, 35 V Tantalum              |
| C7 — 470 pF Chip Capacitor  | C8 — 2200 pF Chip Capacitor                       |
| R1 — 4.7 k $\Omega$ , 1/4 W   | R2 — 100 $\Omega$ , 1/4 W                         |
| D1 — 1N4148 Diode   |   |
| L2, L4, L7 — 0.62., #18 AWG Wire Bent into "V"                      | L1 — 3 Turns, #18 AWG, 0.210, ID, 3/16, Length    |
| L5 — 12 $\mu$ H Molded Choke  | L3, L6 — 60 x 125 x 250 Mils Copper Pad on 27Mils |
| L9 — 1.0., #18 AWG Wire with 5 Ferrite Beads                        | L8 — 7 Turns, #18 AWG, 0.170, ID, 7/16, Length    |
| Thick Alumina Substrate   | B — Ferrite Bead                                  |
| Board Material — Glass Teflon, $\epsilon_r = 2.56$ , $t = 0.0625$ , |   |

# MRF553

# MRF553G

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

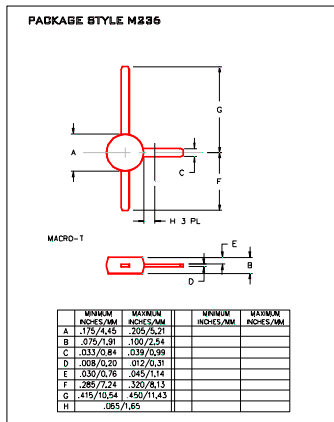
| Package     | Device          | Type | GPE Freq (MHz) | Pout (watts) | GPE (dB) | Efficiency (%) | GPE VCC | BVCEO | IC max (mA) |
|-------------|-----------------|------|----------------|--------------|----------|----------------|---------|-------|-------------|
| SO-8        | MRF4427, R2     | NPN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

| Package | Device          | Type | Freq (MHz) | NF (dB) | NF IC (mA) | NF VCE | GN (dB) | Gu Max (dB) | Ftau (MHz) | Cob(pF) | BVCEO | IC max (mA) |    |
|---------|-----------------|------|------------|---------|------------|--------|---------|-------------|------------|---------|-------|-------------|----|
| TO-39   | 2N5109          | NPN  | 200        | 3       | 10         | 15     |         |             |            |         |       |             |    |
| 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         |    |

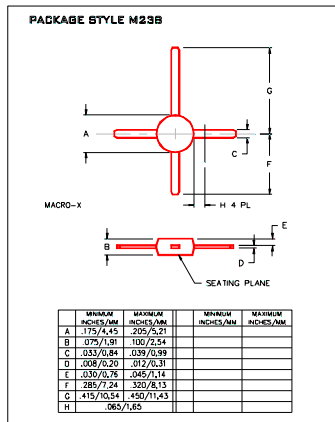
RF (Low Power PA / General Purpose) Selection Guide

RF (LNA / General Purpose) Selection Guide

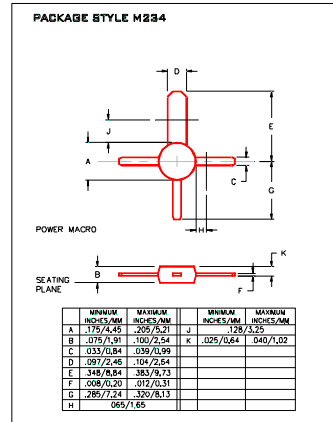
### Low Cost RFPlastic Package Options



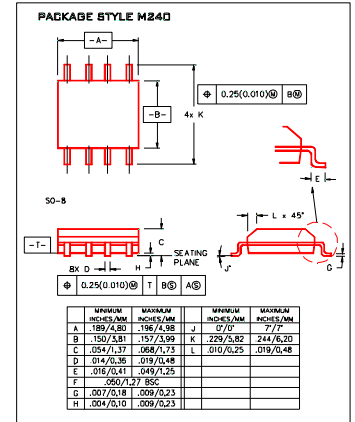
Macro T



Macro X



Power Macro

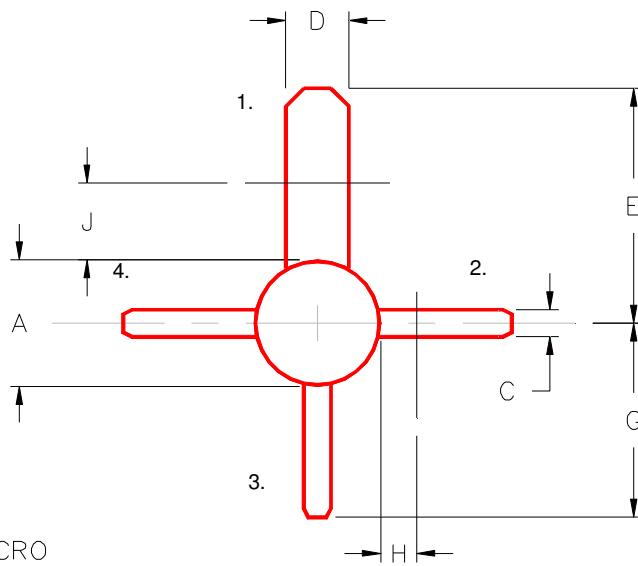


SO-8

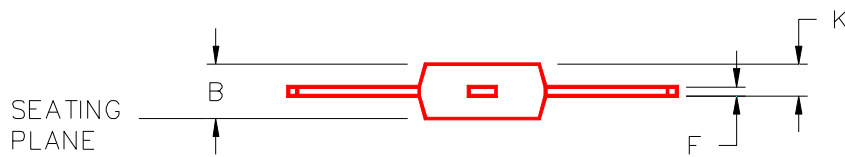
**MRF553  
MRF553G**

PACKAGE STYLE M234

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



POWER MACRO



|   | MINIMUM<br>INCHES/MM | MAXIMUM<br>INCHES/MM |   | MINIMUM<br>INCHES/MM | MAXIMUM<br>INCHES/MM |
|---|----------------------|----------------------|---|----------------------|----------------------|
| A | .175/4,45            | .205/5,21            | J | .128/3,25            |                      |
| B | .075/1,91            | .100/2,54            | K | .025/0,64            | .040/1,02            |
| C | .033/0,84            | .039/0,99            |   |                      |                      |
| D | .097/2,46            | .104/2,64            |   |                      |                      |
| E | .348/8,84            | .383/9,73            |   |                      |                      |
| F | .008/0,20            | .012/0,31            |   |                      |                      |
| G | .285/7,24            | .320/8,13            |   |                      |                      |
| H | .065/1,65            |                      |   |                      |                      |