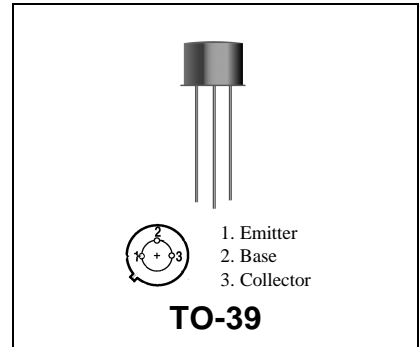


2N5109

**RF & MICROWAVE DISCRETE  
LOW POWER TRANSISTORS**

**Features**

- Silicon NPN, To-39 packaged VHF/UHF Transistor
- 1.2 GHz Current-Gain Bandwidth Product @ 50mA
- Maximum Unilateral Gain = 12dB (typ) @ 200 MHz



**DESCRIPTION:**

The 2N5109 is a silicon NPN transistor, designed for VHF and UHF equipment. Applications include amplifier; pre-driver, driver, and output stages. It is 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 Voltage	20	Vdc
V <sub>CBO</sub>	Collector-Base Voltage	40	Vdc
V <sub>EBO</sub>	Emitter-Base Voltage	3.0	Vdc
I <sub>C</sub>	Collector Current	400	mA

**Thermal Data**

<b>P<sub>D</sub></b>	Total Device Dissipation @ T <sub>C</sub> = 75°C (1)	2.5	Watts mW/ °C
	Derate above 25°C	20	

Note 1. Total Device dissipation at T<sub>A</sub> = 25°C is 1 Watt.

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

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
BVCEO(sus)	Collector-Emitter Sustaining Voltage (I <sub>C</sub> =5.0 mA <sub>dc</sub> , I <sub>B</sub> =0)	20	-	-	V <sub>dc</sub>
BVCER(sus)	Collector-Emitter Sustaining Voltage (I <sub>C</sub> = 5.0 mA <sub>dc</sub> , R <sub>BE</sub> = 10 ohms)	40	-	-	V <sub>dc</sub>
ICEO	Collector Cutoff Current (V <sub>CE</sub> = 15 V <sub>dc</sub> , I <sub>B</sub> = 0)	-	-	20	μA
IEBO	Emitter Cutoff Current (V <sub>EB</sub> = 3.0 V <sub>dc</sub> , I <sub>C</sub> = 0)	-	-	100	μA

**(on)**

HFE	DC Current Gain (I <sub>C</sub> = 360 mA <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> ) (I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>CE</sub> = 15.0 V <sub>dc</sub> )	5	-	-	-
		40	-	120	-

**DYNAMIC**

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
f <sub>T</sub>	Current-Gain - Bandwidth Product (I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>CE</sub> = 15 V <sub>dc</sub> , f = 200 MHz)	-	1200	-	MHz

**FUNCTIONAL**

Symbol	Test Conditions		Value			Unit
			Min.	Typ.	Max.	
$G_{U \max}$	Maximum Unilateral Gain (1)	IC = 50 mAdc, VCE = 15Vdc, f = 200 MHz	-	12	-	dB
MAG	Maximum Available Gain	IC = 50 mAdc, VCE = 15Vdc, f = 200 MHz	-	11.2	-	dB
$ S_{21} ^2$	Insertion Gain	IC = 50 mAdc, VCE = 15Vdc, f = 200 MHz	9.5	10.5	-	dB

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

f (MHz)	S11		S21		S12		S22	
	S11	$\angle \phi$	S21	$\angle \phi$	S12	$\angle \phi$	S22	$\angle \phi$
100	.082	167	6.77	87	.073	79	.347	-30
200	.255	172	3.56	71	.135	71	.259	-35
300	.288	132	2.39	61	.217	70	.247	-46
400	.298	137	1.91	50	.271	62	.216	-76
500	.368	126	1.61	41	.320	55	.172	-94
600	.404	121	1.38	33	.390	54	.174	-115
700	.462	116	1.28	27	.477	48	.163	-145
800	.503	110	1.21	18	.513	38	.190	176
900	.593	105	1.11	12	.535	33	.246	140
1000	.655	95	1.02	9.8	.604	35	.320	122

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

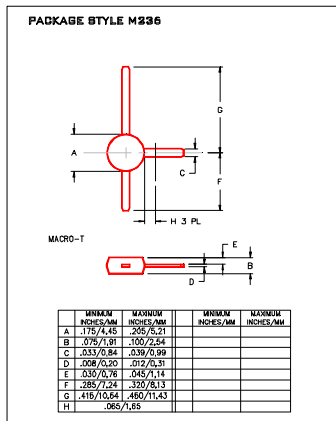
Package	Device	Type	GPE Freq (MHz)	Pout (watts)	GPE (dB)	Efficiency (%)	GPE VCC	BYCEO	IC max (mA)
SO-8	MRF4427, R2	NPN	175	0.15	18	60	12	20	400
TO-39	2N4427	NPN	175	1	10	50	12	20	400
POWER MACRO	MRF553	NPN	175	1.5	11.5	60	12.5	16	500
POWER MACRO	MRF553T	NPN	175	1.5	11.5	50	12.5	16	500
TO-39	MRF607	NPN	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

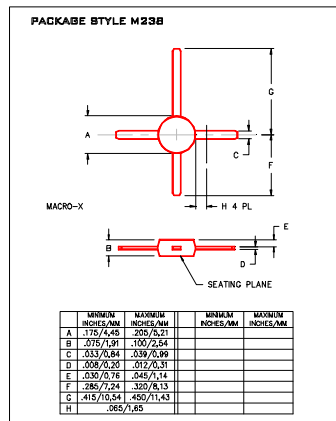
Package	Device	Type	Freq (MHz)	NF (dB)	NF IC (mA)	NF VCE	GN (dB)	Gu Max (dB)	Ftau (MHz)	Ccb(pF)	BYCEO	IC max (mA)
TO-39	2N5109	NPN	200	3	10	15		12	1200	3.5	20	400
TO-39	MRF5943C	NPN	200	3.4	30	15		11.4	1000		30	400
SO-8	MRF5943, R1, R2	NPN	200	3.4	30	15		11.4	1300		30	400
TO-72	2N5179	NPN	200	4.5	1.5	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	BFR90	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

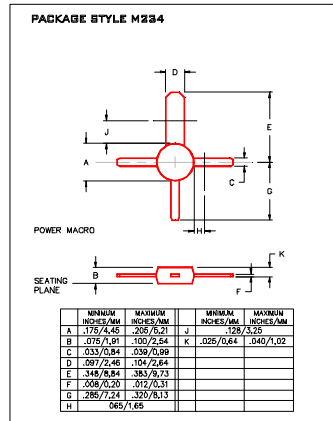
### Low Cost RF Plastic Package Options



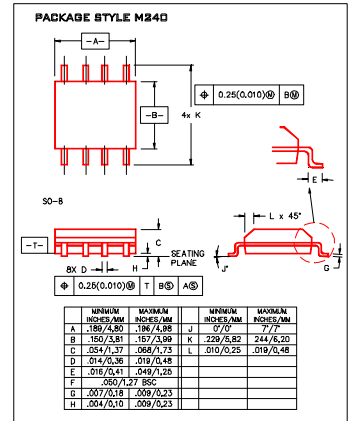
Macro T



Macro X

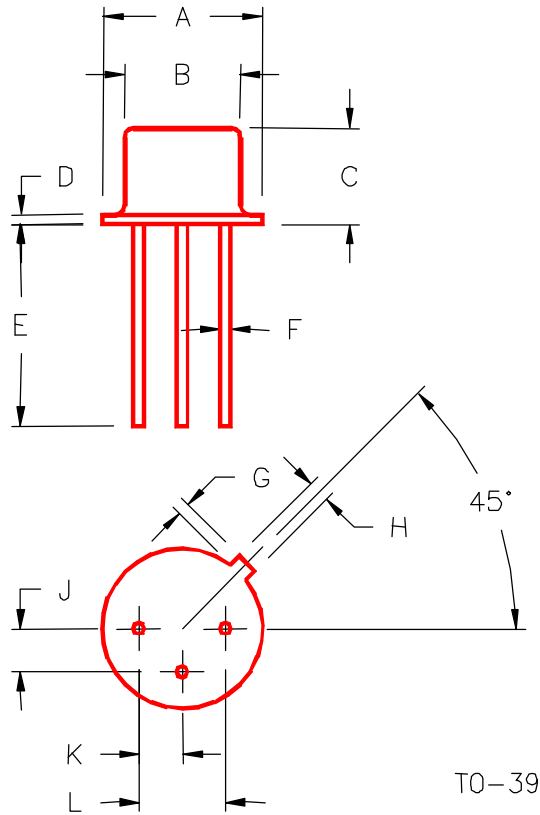


Power Macro



SO-8

PACKAGE STYLE M246



	MINIMUM INCHES/MM	MAXIMUM INCHES/MM		MINIMUM INCHES/MM	MAXIMUM 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			