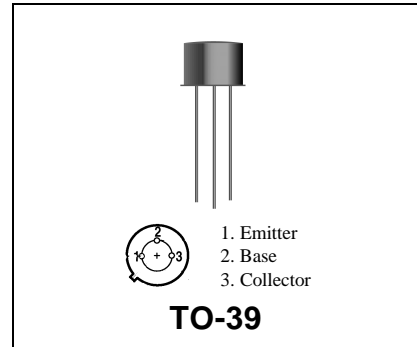


2N5109

**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_{case} = 25°C)

Symbol	Parameter	Value	Unit
V _{CEO}	Collector-Emitter Voltage	20	Vdc
V _{CBO}	Collector-Base Voltage	40	Vdc
V _{EBO}	Emitter-Base Voltage	3.0	Vdc
I _C	Collector Current	400	mA

Thermal Data

P_D	Total Device Dissipation @ T _C = 75°C (1)	2.5	Watts mW/ °C
	Derate above 25°C	20	

Note 1. Total Device dissipation at T_A = 25°C is 1 Watt.

ELECTRICAL SPECIFICATIONS (T_{case} = 25°C)
**STATIC
(off)**

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
BVCEO(sus)	Collector-Emitter Sustaining Voltage (I _C =5.0 mA _{dc} , I _B =0)	20	-	-	V _{dc}
BVCER(sus)	Collector-Emitter Sustaining Voltage (I _C = 5.0 mA _{dc} , R _{BE} = 10 ohms)	40	-	-	V _{dc}
ICEO	Collector Cutoff Current (V _{CE} = 15 V _{dc} , I _B = 0)	-	-	20	μA
IEBO	Emitter Cutoff Current (V _{EB} = 3.0 V _{dc} , I _C = 0)	-	-	100	μA

(on)

HFE	DC Current Gain (I _C = 360 mA _{dc} , V _{CE} = 5.0 V _{dc}) (I _C = 50 mA _{dc} , V _{CE} = 15.0 V _{dc})	5	-	-	-
		40	-	120	-

DYNAMIC

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
f _T	Current-Gain - Bandwidth Product (I _C = 50 mA _{dc} , V _{CE} = 15 V _{dc} , 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

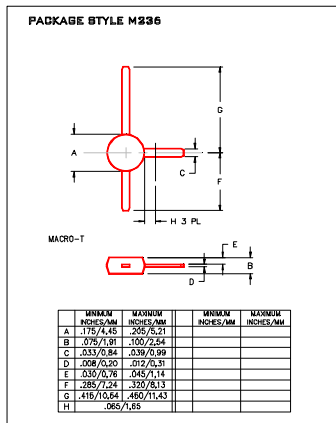
Package	Device	Type	GPE Freq (MHz)	Pout (watts)	GPE (dB)	Efficiency (%)	GPE VCC	BYCEO	IC max (mA)
SO-8	MRF4427, R2	NPN	175	0.15	18	60	12	20	400
TO-39	2N4427	NPN	175	1	10	50	12	20	400
POWER MACRO	MRF553	NPN	175	1.5	11.5	60	12.5	16	500
POWER MACRO	MRF553T	NPN	175	1.5	11.5	50	12.5	16	500
TO-39	MRF607	NPN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

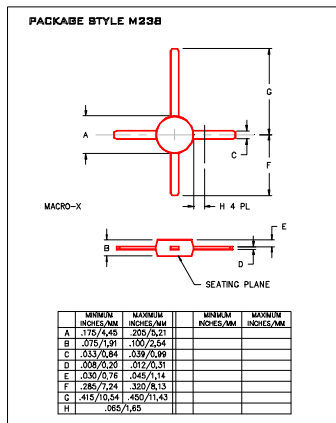
Package	Device	Type	Freq (MHz)	NF (dB)	NF IC (mA)	NF VCE	GN (dB)	Gu Max (dB)	Ftau (MHz)	Ccb(pF)	BYCEO	IC max (mA)
TO-39	2N5109	NPN	200	3	10	15		12	1200	3.5	20	400
TO-39	MRF5943C	NPN	200	3.4	30	15		11.4	1000		30	400
SO-8	MRF5943, R1, R2	NPN	200	3.4	30	15		11.4	1300		30	400
TO-72	2N5179	NPN	200	4.5	1.5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

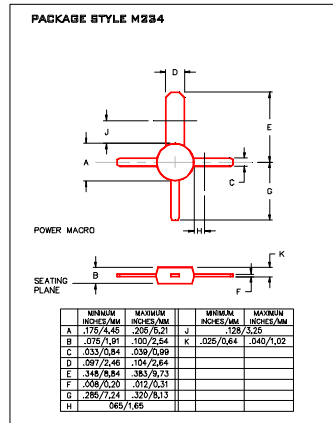
Low Cost RF Plastic Package Options



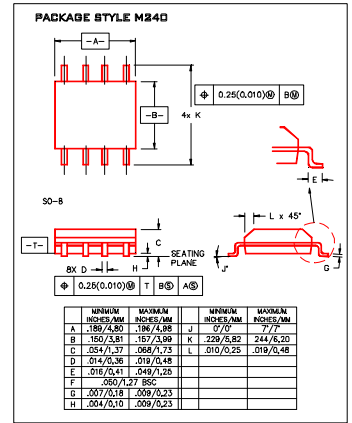
Macro T



Macro X

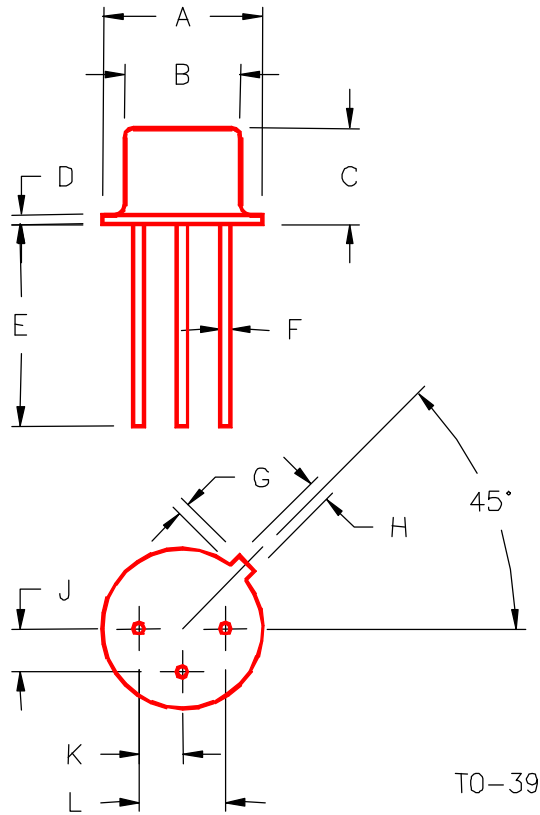


Power Macro



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			