

# BF959

## VHF Transistor

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	20	Vdc
Collector-Base Voltage	$V_{CBO}$	30	Vdc
Emitter-Base Voltage	$V_{EBO}$	3.0	Vdc
Collector Current - Continuous	$I_C$	100	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.5 12	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

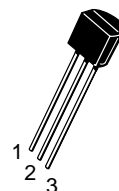
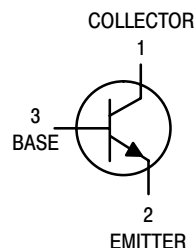
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



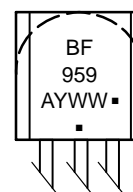
ON Semiconductor®

<http://onsemi.com>



TO-92  
CASE 29  
STYLE 21

#### MARKING DIAGRAM



BF959 = Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
BF959	TO-92	5000 Units/Box
BF959G	TO-92 (Pb-Free)	5000 Units/Box
BF959RL1	TO-92	2000/Tape & Reel
BF959RL1G	TO-92 (Pb-Free)	2000/Tape & Reel
BF959ZL1	TO-92	2000/Ammo Pack
BF959ZL1G	TO-92 (Pb-Free)	2000/Ammo Pack

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# BF959

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage ( $I_C = 1.0\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	20	–	–	Vdc
Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	30	–	–	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	3.0	–	–	Vdc
Collector Cutoff Current ( $V_{CB} = 20\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	100	nAdc
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 5.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 20\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )	$h_{FE}$	35 40	– –	– –	–
Collector–Emitter Saturation Voltage ( $I_C = 30\text{ mA}$ , $I_B = 2.0\text{ mA}$ )	$V_{CE(sat)}$	–	–	1.0	Vdc
Base–Emitter Saturation Voltage ( $I_C = 30\text{ mA}$ , $I_B = 2.0\text{ mA}$ )	$V_{BE(sat)}$	–	–	1.0	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>					
Current–Gain – Bandwidth Product ( $I_C = 20\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ ) ( $I_C = 30\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	700 600	– –	– –	MHz
Common Emitter Feedback Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $P_f = 0$ , $f = 10\text{ MHz}$ )	$C_{re}$	–	0.65	–	pF
Noise Figure ( $I_C = 4.0\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $R_S = 50\text{ }\Omega$ , $f = 200\text{ MHz}$ )	$N_f$	–	3.0	–	dB

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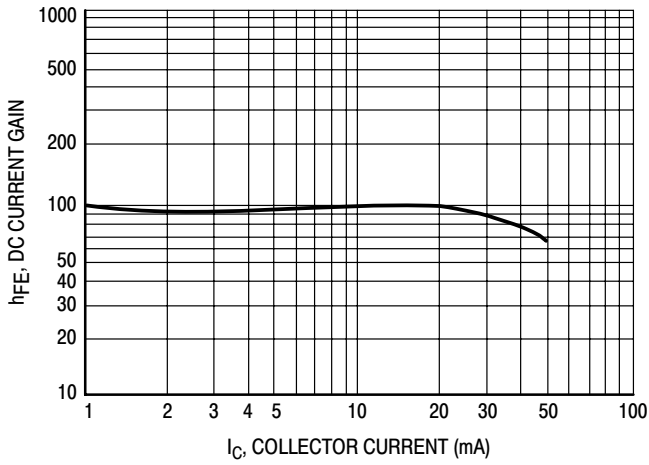


Figure 1.  $h_{FE}$  at 10 V

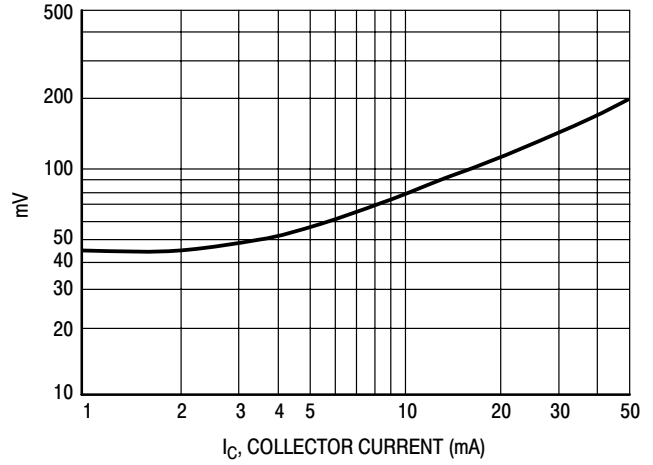


Figure 2.  $V_{CE(sat)}$  at  $I_C/I_B = 10$

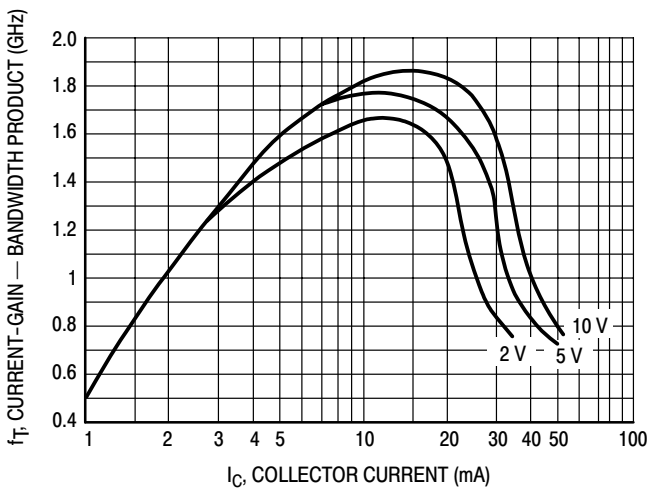


Figure 3. Current-Gain - Bandwidth Product

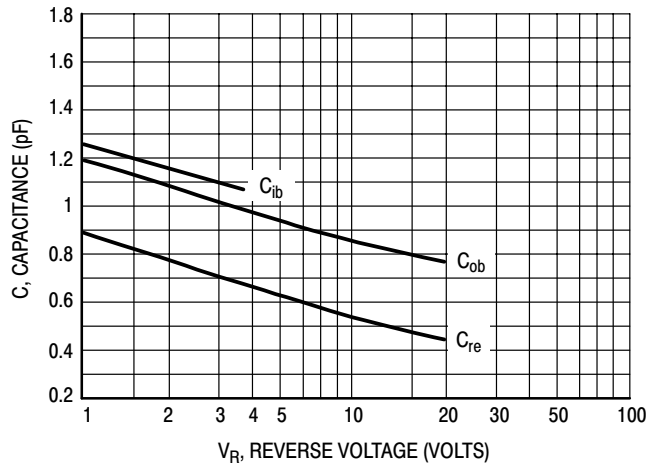


Figure 4. Capacitances

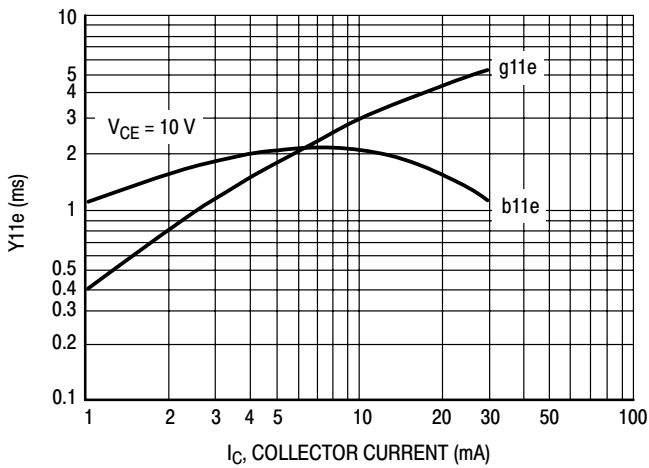


Figure 5. Input Impedance at 30 MHz

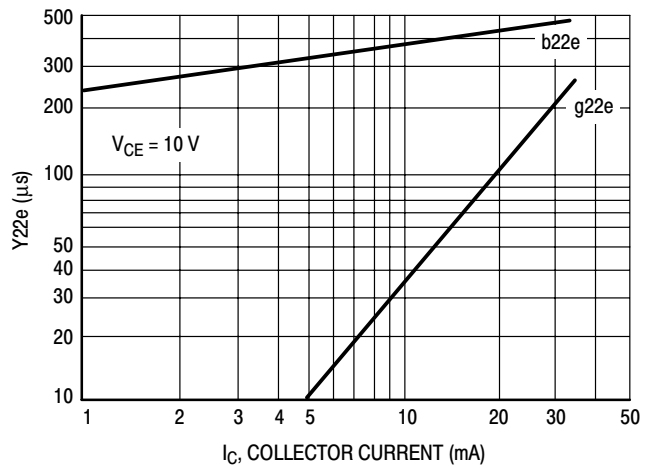
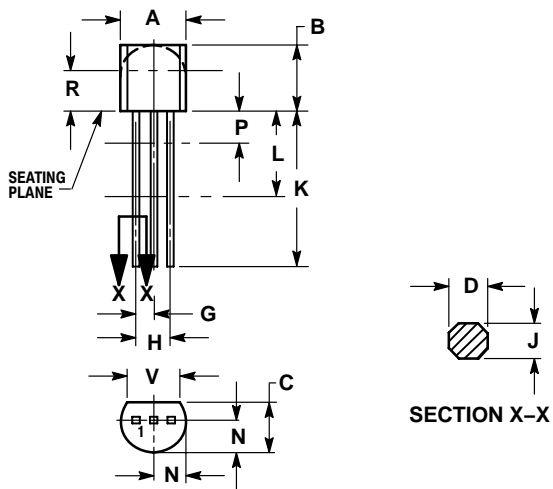


Figure 6. Output Impedance at 30 MHz

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## PACKAGE DIMENSIONS

TO-92  
TO-226AA  
CASE 29-11  
ISSUE AL




### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

### STYLE 21:

1. COLLECTOR
2. EMITTER
3. BASE

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