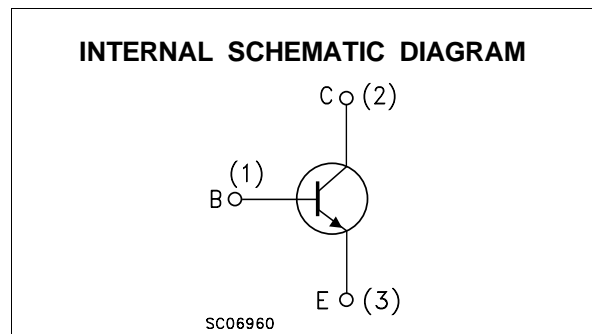
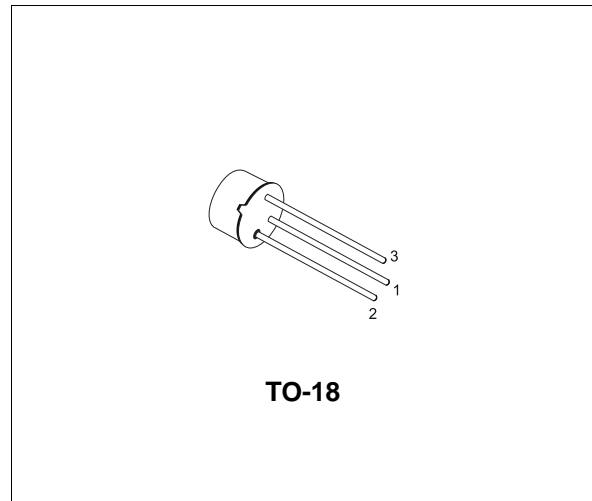


## SMALL SIGNAL NPN TRANSISTOR

### DESCRIPTION

The BCY59 is a silicon Planar Epitaxial NPN transistor in Jedec TO-18 metal case. It is intended for use in audio input stages, driver stages and low-noise input stages.

The PNP complementary type is BCY79.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	45	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	45	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	7	V
$I_C$	Collector Current	200	mA
$I_B$	Base Current	50	mA
$P_{tot}$	Total Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$ at $T_C \leq 25\text{ }^\circ\text{C}$	0.39	W
		1	W
$T_{stg}$	Storage Temperature	-55 to 175	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	175	$^\circ\text{C}$

# BCY59

## THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	150	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	384.6	°C/W

## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

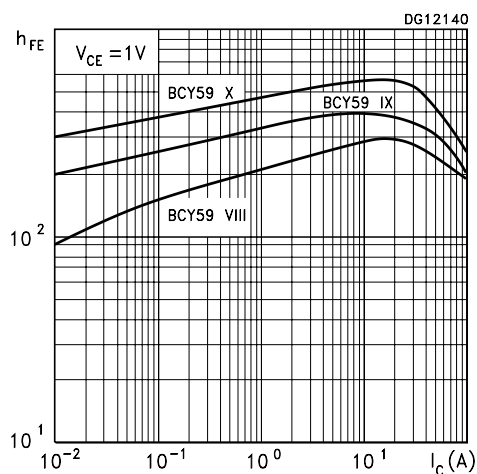
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 45 V		0.1	10	nA
		V <sub>CE</sub> = 45 V T <sub>C</sub> = 150 °C		0.1	10	μA
I <sub>CEX</sub>	Collector Cut-off Current (V <sub>BE</sub> = -0.2 V)	V <sub>CE</sub> = 45 V T <sub>C</sub> = 100 °C			20	μA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 5 V			10	nA
V <sub>(BR)CEO*</sub>	Collector-Emitter Breakdown Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 2 mA	45			V
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 μA	7			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 10 mA I <sub>B</sub> = 0.25 mA		0.12	0.35	V
		I <sub>C</sub> = 100 mA I <sub>B</sub> = 2.5 mA		0.4	0.7	V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 10 mA I <sub>B</sub> = 0.25 mA	0.6	0.7	0.85	V
		I <sub>C</sub> = 100 mA I <sub>B</sub> = 2.5 mA	0.75	0.9	1.2	V
V <sub>BE(on)*</sub>	Base-Emitter (on) Voltage	I <sub>C</sub> = 2 mA V <sub>CE</sub> = 5 V	0.55	0.65	0.7	V
		I <sub>C</sub> = 100 mA V <sub>CE</sub> = 1 V		0.75		V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 10 μA V <sub>CE</sub> = 5 V	Gr. VIII	20	140	
			Gr. IX	40	195	
			Gr. X	100	280	
		I <sub>C</sub> = 2 mA V <sub>CE</sub> = 5 V	Gr. VIII	180	250	310
			Gr. IX	250	350	460
			Gr. X	380	500	630
		I <sub>C</sub> = 10 mA V <sub>CE</sub> = 1 V	Gr. VIII	120	260	
			Gr. IX	160	365	
			Gr. X	240	520	
		I <sub>C</sub> = 100 mA V <sub>CE</sub> = 1 V	Gr. VIII	45		
			Gr. IX	60		
			Gr. X	60		
h <sub>fe*</sub>	Small Signal Current Gain	I <sub>C</sub> = 2 mA V <sub>CE</sub> = 5 V f = 1 KHz	Gr. VIII	175	350	
			Gr. IX	250	500	
			Gr. X	350	700	
f <sub>T</sub>	Transition Frequency	I <sub>C</sub> = 10 mA V <sub>CE</sub> = 5 V f = 100 MHz		200		MHz

\* Pulsed: Pulse duration = 300 μs, duty cycle ≤ 1 %

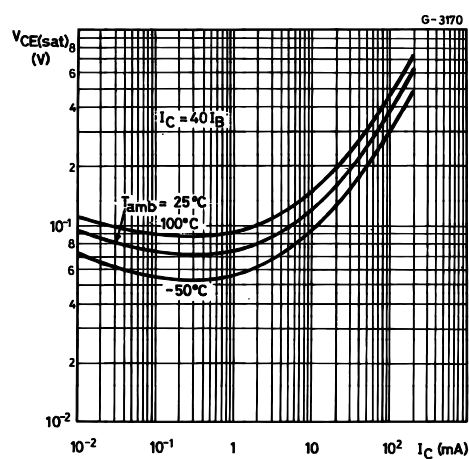
**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$C_{CBO}$	Collector-Base Capacitance	$I_E = 0$ $V_{CB} = 10\text{ V}$ $f = 1\text{ MHz}$		3.5	6	pF
$C_{EBO}$	Emitter-Base Capacitance	$I_C = 0$ $V_{EB} = 0.5\text{ V}$ $f = 1\text{ MHz}$		11	15	pF
NF	Noise Figure	$I_C = 0.2\text{ mA}$ $V_{CE} = 5\text{ V}$ $f = 1\text{ KHz}$ $R_g = 2\text{ K}\Omega$ $\Delta f = 200\text{ Hz}$		2	6	dB
$t_{on}$	Turn-on Time	$I_C = 10\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = 1\text{ mA}$ $I_C = 100\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = 10\text{ mA}$		85	150	ns
$t_{off}$	Turn-off Time	$I_C = 10\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = -I_{B2} = 1\text{ mA}$ $I_C = 100\text{ mA}$ $V_{CC} = 10\text{ V}$ $I_{B1} = -I_{B2} = 10\text{ mA}$		480	800	ns

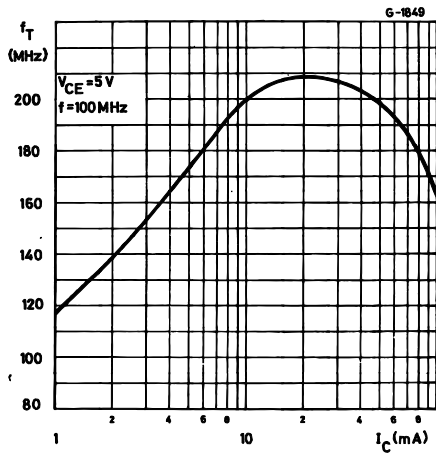
DC Current Gain



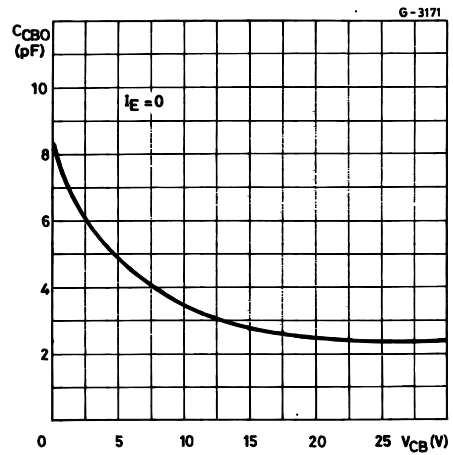
Collector-Emitter Saturation Voltage



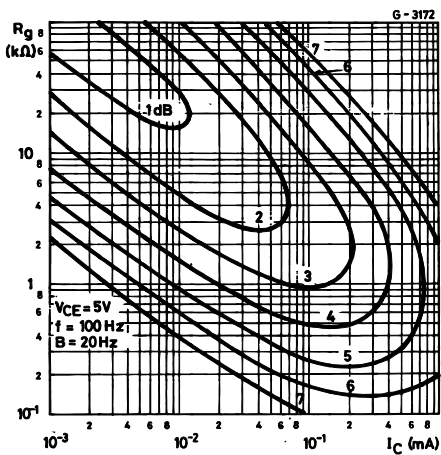
Transition Frequency



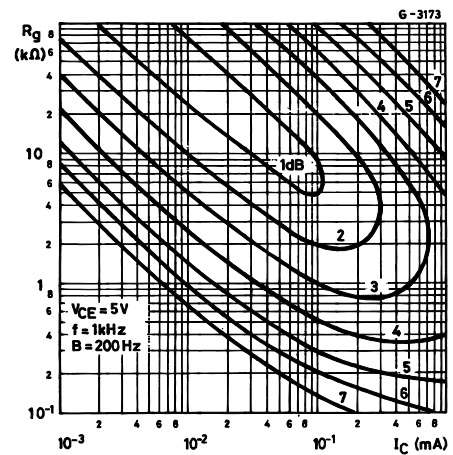
Collector-Base Capacitance



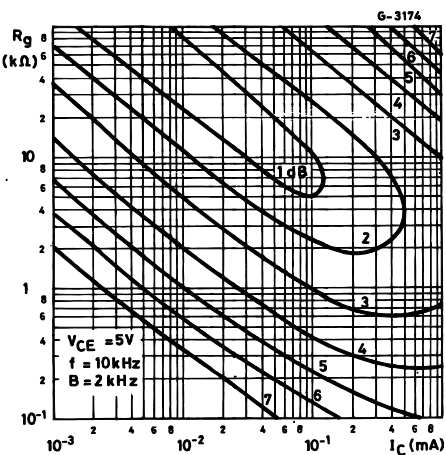
Noise Figure (f = 100 Hz)



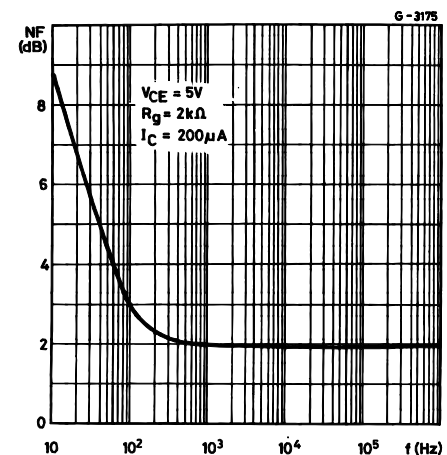
Noise Figure (f = 1 KHz)



Noise Figure (f = 10 KHz)

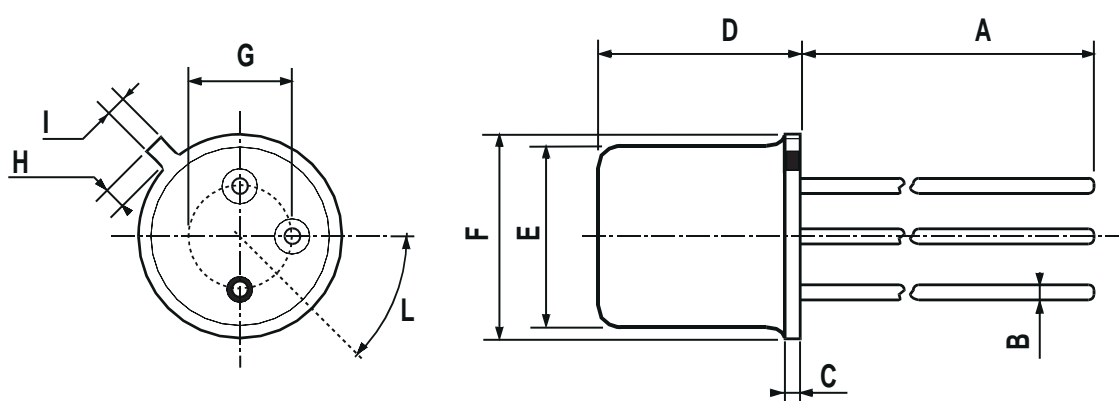


Noise Figure vs. Frequency



## TO-18 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



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