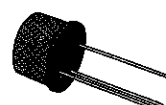


LOW NOISE AUDIO AMPLIFIERS

DESCRIPTION

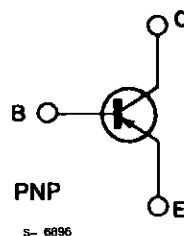
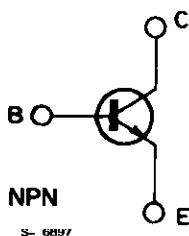
The BCY58 and BCY59 are silicon planar epitaxial NPN transistors in Jedec TO-18 metal case.

They are intended for use in audio input stages, driver stages and low-noise input stages. The complementary PNP types are respectively the BCY78 and BCY79.



TO-18

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BCY58	BCY59	
V_{CES}	Collector-emitter Voltage ($V_{BE} = 0$)	32	45	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	32	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 Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$ at $T_{case} \leq 45^\circ\text{C}$	0.39 1		mW W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200		$^\circ\text{C}$

BCY58-BCY59

THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	150	°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	450	°C/W

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	For BCY58 $V_{CE} = 32\text{ V}$ $V_{CE} = 32\text{ V}$ $T_{amb} = 150\text{ °C}$ For BCY59 $V_{CE} = 45\text{ V}$ $V_{CE} = 45\text{ V}$ $T_{amb} = 150\text{ °C}$		0.1 0.1 0.1 0.1	10 10 10 10	nA μA nA μA
I_{CEX}	Collector Cutoff Current ($V_{BE} = -0.2\text{ V}$)	For BCY58 $V_{CE} = 32\text{ V}$ $T_{amb} = 100\text{ °C}$ For BCY59 $V_{CE} = 45\text{ V}$ $T_{amb} = 100\text{ °C}$			20 20	μA μA
I_{EBO}	Emitter cutoff Current ($I_C = 0$)	$V_{EB} = 5\text{ V}$			10	nA
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = 2\text{ mA}$ For BCY58 For BCY59	32 45			V V
$(BR)EBO^*$	Emitter-base Breakdown Voltage ($I_C = 0$)	$I_E = 10\text{ }\mu\text{A}$	7			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 10\text{ mA}$ $I_B = 0.25\text{ mA}$ $I_C = 100\text{ mA}$ $I_B = 2.5\text{ mA}$		0.12 0.4	0.35 0.7	V V
V_{BE}	Base-emitter Voltage	$I_C = 2\text{ mA}$ $V_{CE} = 5\text{ V}$ $I_C = 100\text{ mA}$ $V_{CE} = 1\text{ V}$	0.55	0.65 0.75	0.7	V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 10\text{ mA}$ $I_B = 0.25\text{ mA}$ $I_C = 100\text{ mA}$ $I_B = 2.5\text{ mA}$	0.6 0.75	0.7 0.9	0.85 1.2	V V
h_{FE}^*	DC Current Gain	$I_C = 10\text{ }\mu\text{A}$ $V_{CE} = 5\text{ V}$ Gr.VII Gr.VIII Gr.IX Gr.X $I_C = 2\text{ mA}$ $V_{CE} = 5\text{ V}$ Gr.VII Gr.VIII Gr.IX Gr.X $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ Gr.VII Gr.VIII Gr.IX Gr.X $I_C = 100\text{ mA}$ $V_{CE} = 1\text{ V}$ Gr.VII Gr.VIII Gr.IX Gr.X	 20 40 100 120 120 180 250 380 80 80 120 160 240 40 40 45 60 60	195 100 140 195 280 350 170 250 350 500 365 175 260 365 520	630 220 310 460 630	

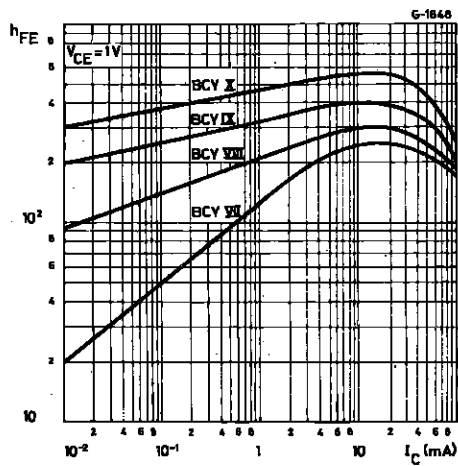
* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

ELECTRICAL CHARACTERISTICS (continued)

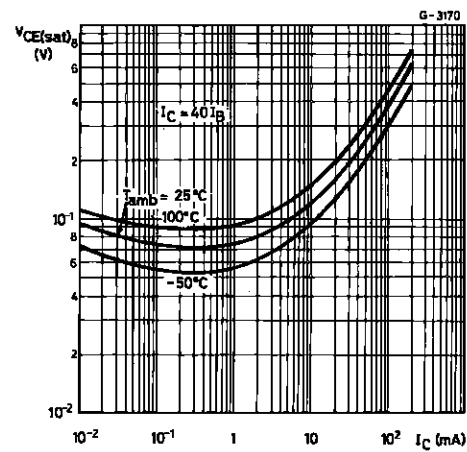
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
h_{fe}	Small Signal Current Gain	$I_C = 2 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $f = 1 \text{ kHz}$ Gr.VII Gr.VIII Gr.IX Gr.X	125 125 175 250 350		250 350 500 700	
f_T	Transition Frequency	$I_C = 10 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $f = 100 \text{ MHz}$		200		MHz
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = 0.5 \text{ V}$ $f = 1 \text{ MHz}$		11	15	pF
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = 10 \text{ V}$ $f = 1 \text{ MHz}$		3.5	6	pF
NF	Noise Figure	$I_C = 0.2 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $R_g = 2 \text{ k}\Omega$ $f = 1 \text{ kHz}$		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 55	150 150	ns ns
t_{off}	Turn-off Time	$I_C = 10 \text{ mA}$ $V_{CC} = 10 \text{ V}$ $I_{B1} = -I_{B2} = 1 \text{ mA}$ $I_C = 100 \text{ mA}$ $V_{CC} = 10 \text{ V}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$		480 480	800 800	ns ns

* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

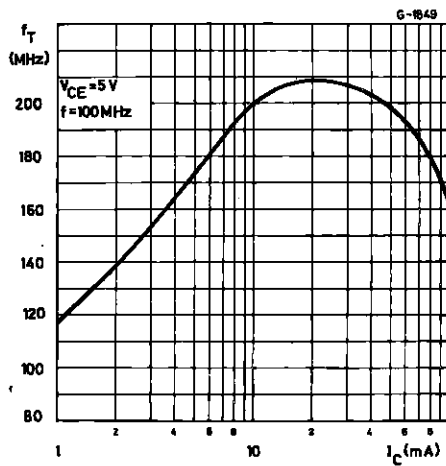
DC Current Gain.



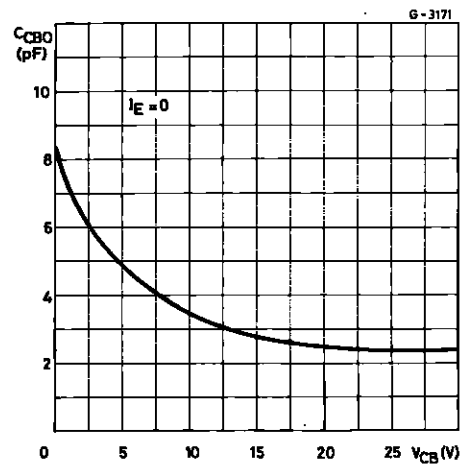
Collector-emitter Saturation Voltage.



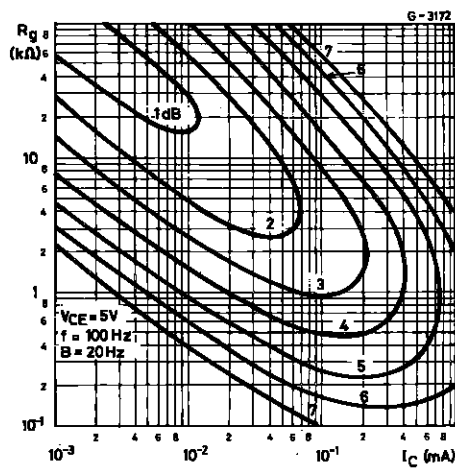
Transition Frequency.



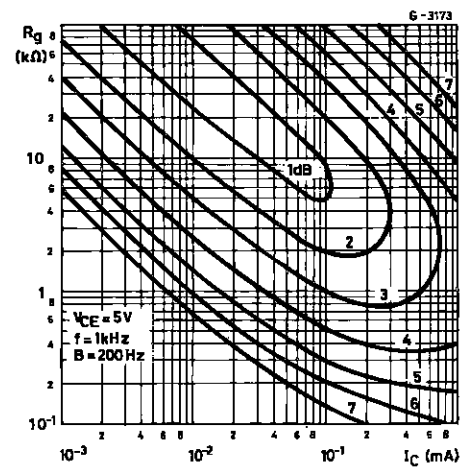
Collector-base Capacitance.



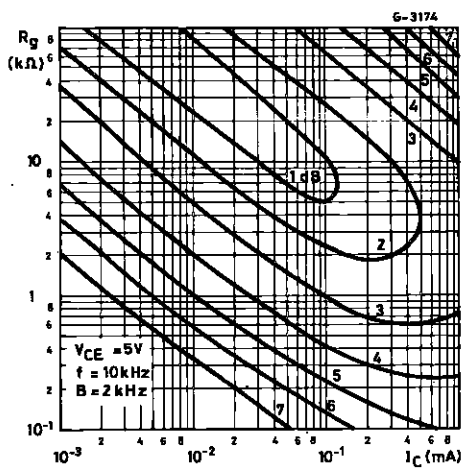
Noise Figure ($f = 100\text{ Hz}$).



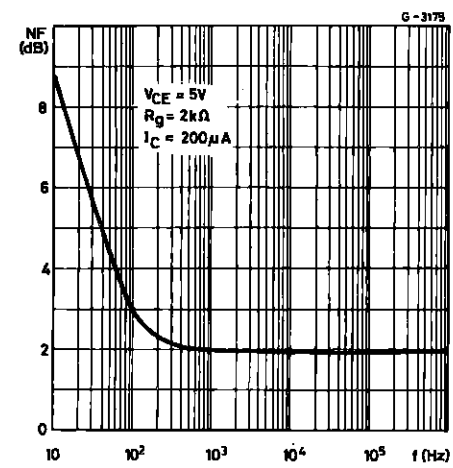
Noise Figure ($f = 1\text{ kHz}$).



Noise Figure ($f = 10\text{ kHz}$).

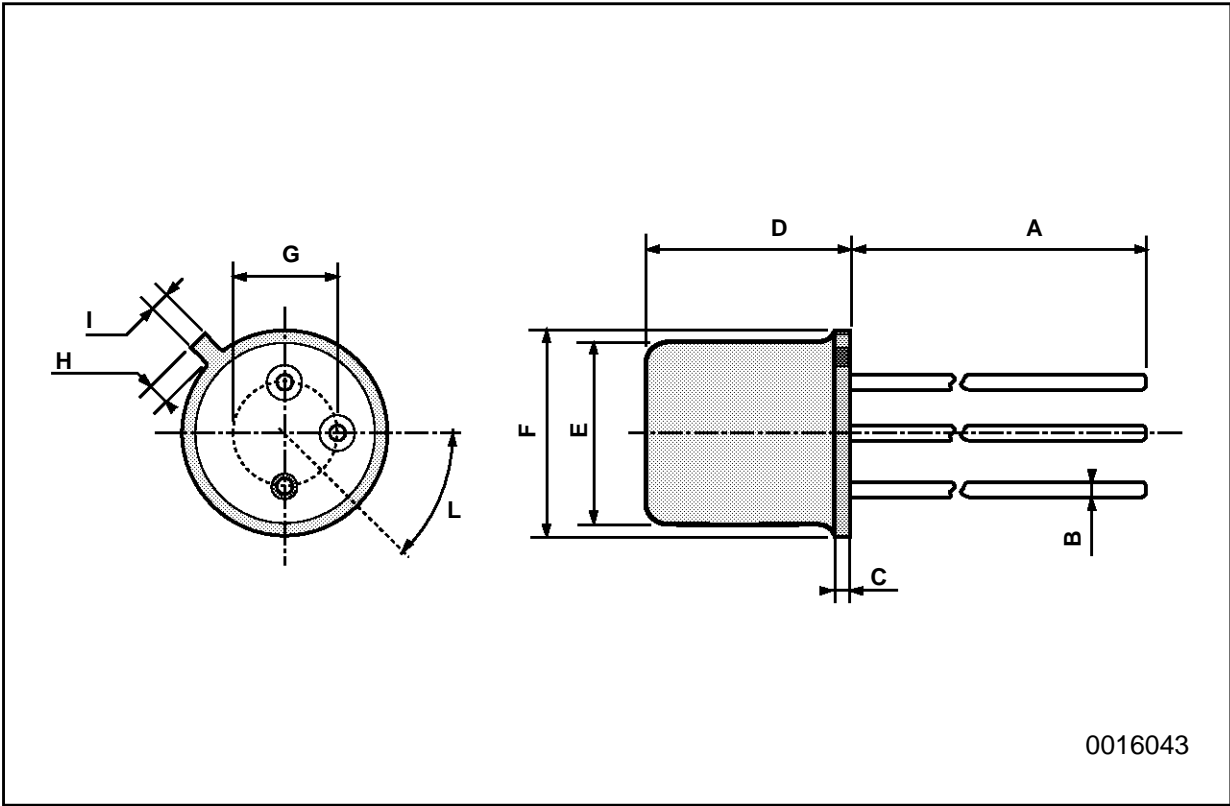


Noise Figure vs. Frequency.



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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