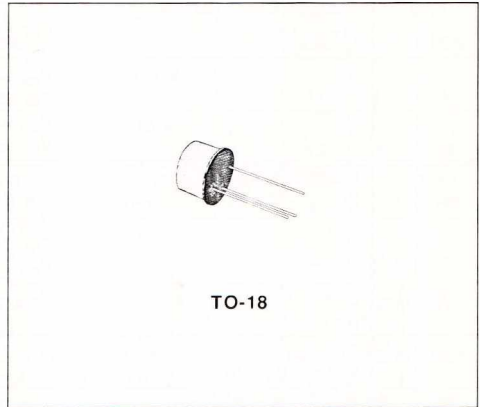


LOW NOISE AUDIO AMPLIFIERS

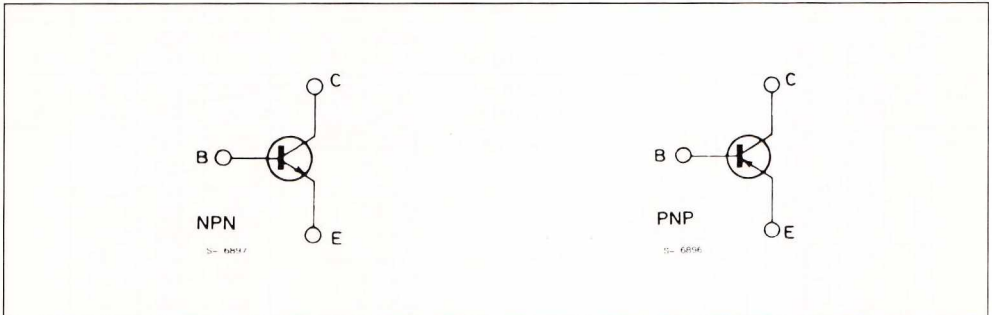
DESCRIPTION

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.



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		mW
		1		W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200		$^\circ\text{C}$

THERMAL DATA

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

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

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

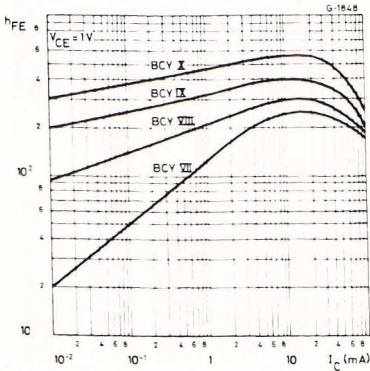
* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

ELECTRICAL CHARACTERISTICS (continued)

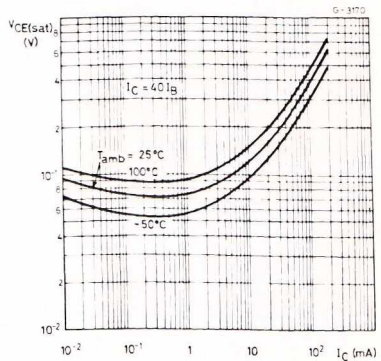
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
h_{ie}	Small Signal Current Gain	$I_C = 2 \text{ mA}$ $f = 1 \text{ kHz}$	$V_{CE} = 5 \text{ V}$ Gr.VII Gr.VIII Gr.IX Gr.X	125 125 175 250 350		250 350 500 700	
f_T	Transition Frequency	$I_C = 10 \text{ mA}$ $f = 100 \text{ MHz}$	$V_{CE} = 5 \text{ V}$		200		MHz
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $f = 1 \text{ MHz}$	$V_{EB} = 0.5 \text{ V}$		11	15	pF
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $f = 1 \text{ MHz}$	$V_{CB} = 10 \text{ V}$		3.5	6	pF
NF	Noise Figure	$I_C = 0.2 \text{ mA}$ $R_g = 2 \text{ k}\Omega$	$V_{CE} = 5 \text{ V}$ $f = 1 \text{ kHz}$		2	6	dB
t_{on}	Turn-on Time	$I_C = 10 \text{ mA}$ $I_{B1} = 1 \text{ mA}$ $I_C = 100 \text{ mA}$ $I_{B1} = 10 \text{ mA}$	$V_{CC} = 10 \text{ V}$ $V_{CC} = 10 \text{ V}$		85 55	150 150	ns ns
t_{off}	Turn-off Time	$I_C = 10 \text{ mA}$ $I_{B1} = -I_{B2} = 1 \text{ mA}$ $I_C = 100 \text{ mA}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$	$V_{CC} = 10 \text{ V}$ $V_{CC} = 10 \text{ V}$		480 480	800 800	ns ns

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

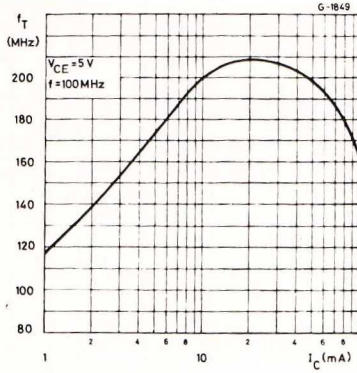
DC Current Gain.



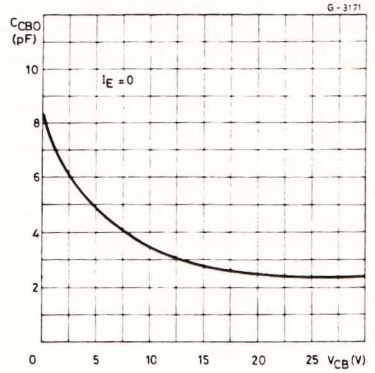
Collector-emitter Saturation Voltage.



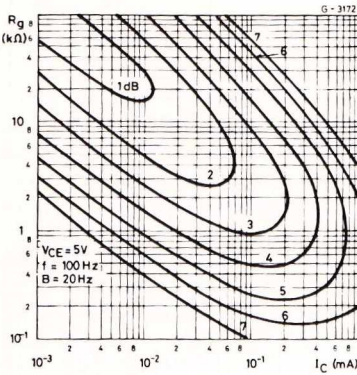
Transition Frequency.



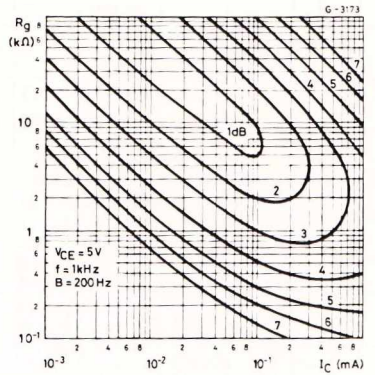
Collector-base Capacitance.



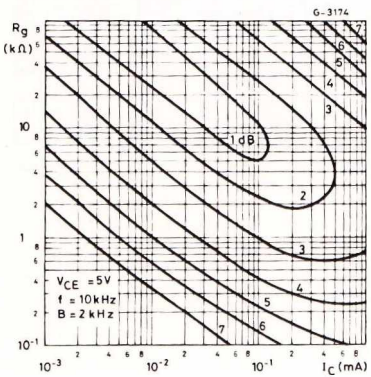
Noise Figure ($f = 100$ Hz).



Noise Figure ($f = 1$ kHz).



Noise Figure ($f = 10$ kHz).



Noise Figure vs. Frequency.

