SGS-THOMSON
MICROELECTRONICS

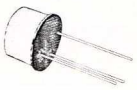
BCY58
BCY59

LOW NOISE AUDIO AMPLIFIERS

DESCRIPTION

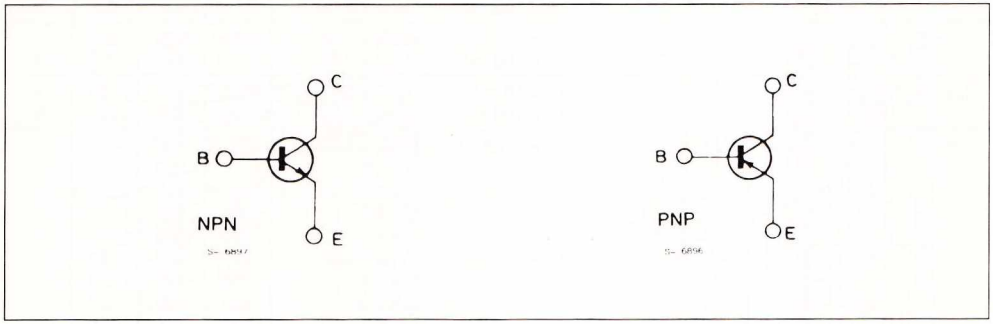
The BCY58 and BCY59 are silicon planar epitaxial NPN transistors in Jedec TO-18 metal case.

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 $T_{amb} \leq 25$ °C at $T_{case} \leq 45$ °C	0.39 1		mW W
T_{stg}, T_j	Storage and Junction Temperature	– 65 to 200		°C

THERMAL DATA

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

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °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			0.1	10	nA
		V_{CE} = 32 V	T_{amb} = 150 °C		0.1	10	µA
		For **BCY59**					
		V_{CE} = 45 V			0.1	10	nA
		V_{CE} = 45 V	T_{amb} = 150 °C		0.1	10	µA
I_{CEX}	Collector Cutoff Current (V_{BE} = − 0.2 V)	For **BCY58**					
		V_{CE} = 32 V	T_{amb} = 100 °C			20	µA
		For **BCY59**					
		V_{CE} = 45 V	T_{amb} = 100 °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**	32			V
			For **BCY59**	45			V
$_{(BR)EBO}$*	Emitter-base Breakdown Voltage (I_C = 0)	I_E = 10 µA		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 µA	V_{CE} = 5 V		195		
			Gr.VII		100		
			Gr.VIII	20	140		
			Gr.IX	40	195		
			Gr.X	100	280		
		I_C = 2 mA	V_{CE} = 5 V	120	350	630	
			Gr.VII	120	170	220	
			Gr.VIII	180	250	310	
			Gr.IX	250	350	460	
			Gr.X	380	500	630	
		I_C =10 mA	V_{CE} = 1 V	80	365		
			Gr.VII	80	175		
			Gr.VIII	120	260		
			Gr.IX	160	365		
			Gr.X	240	520		
		I_C =100 mA	V_{CE} =1 V	40			
			Gr.VII	40			
			Gr.VIII	45			
			Gr.IX	60			
			Gr.X	60			

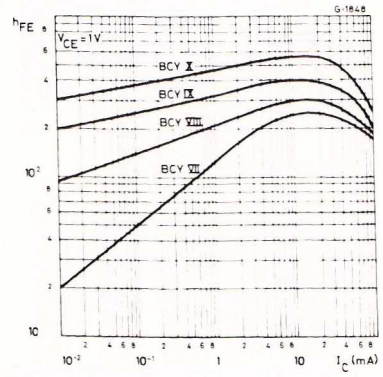
* Pulsed : pulse duration = 300 µs, duty cycle = 1 %.

ELECTRICAL CHARACTERISTICS (continued)

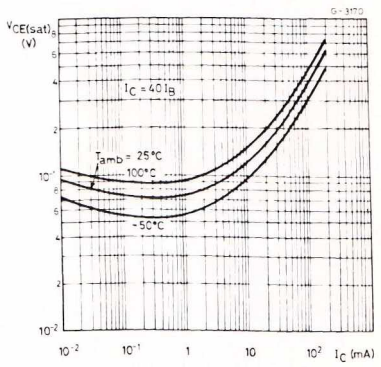
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
h_{fe}	Small Signal Current Gain	I_C = 2 mA f = 1 kHz	V_{CE} = 5 V				
				125			
			Gr.VII	125		250	
			Gr.VIII	175		350	
			Gr.IX	250		500	
			Gr.X	350		700	
f_T	Transition Frequency	I_C =10 mA f = 100 MHz	V_{CE} = 5 V		200		MHz
C_{EBO}	Emitter-base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

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

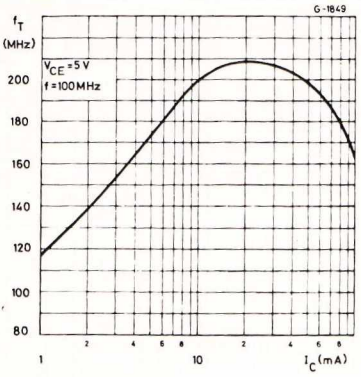
DC Current Gain.



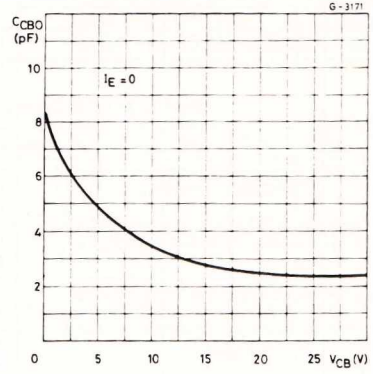
Collector-emitter Saturation Voltage.



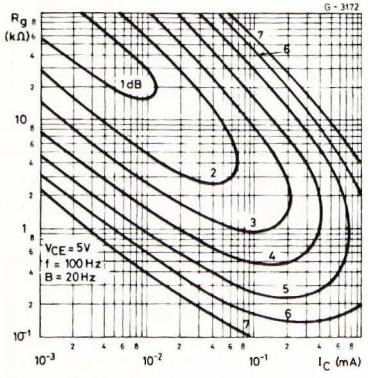
Transition Frequency.



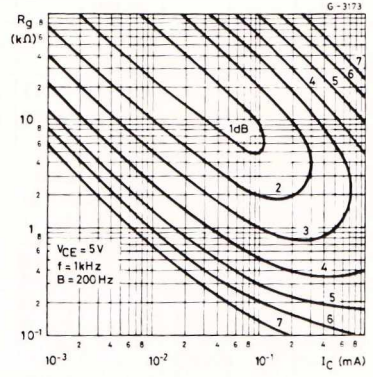
Collector-base Capacitance.



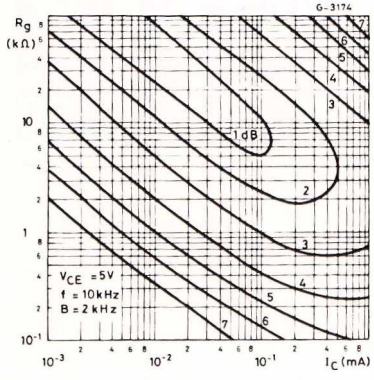
Noise Figure (f = 100 Hz).



Noise Figure (f = 1 kHz).



Noise Figure (f = 10 kHz).



Noise Figure vs. Frequency.