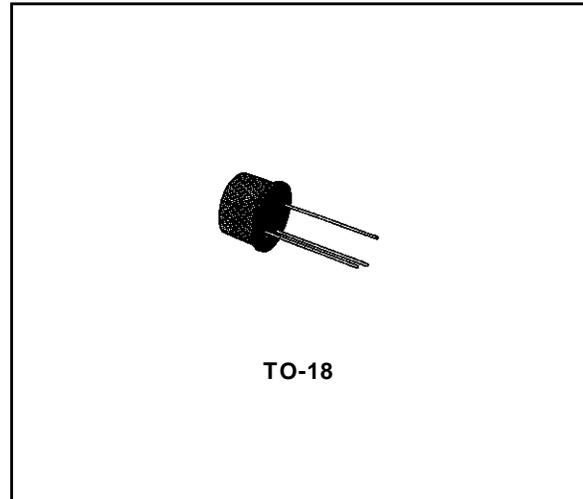# SGS-THOMSON MICROELECTRONICS
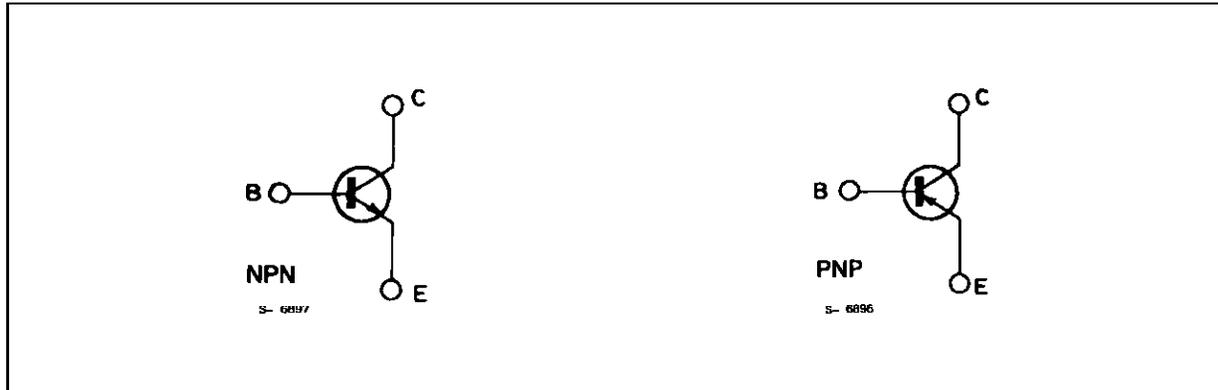
BCY58
BCY59

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

NPN
S- 6897

PNP
S- 6896

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 V_{CE} = 32 V	T_{amb} = 150 °C		0.1 0.1	10 10	nA µA
		For **BCY59** V_{CE} = 45 V V_{CE} = 45 V	T_{amb} = 150 °C		0.1 0.1	10 10	nA 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** For **BCY59**	32 45			V 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_C = 100 mA	I_B = 0.25 mA I_B = 2.5 mA		0.12 0.4	0.35 0.7	V V
V_{BE}	Base-emitter Voltage	I_C = 2 mA I_C = 100 mA	V_{CE} = 5 V V_{CE} = 1 V	0.55	0.65 0.75	0.7	V V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	I_C = 10 mA I_C = 100 mA	I_B = 0.25 mA I_B = 2.5 mA	0.6 0.75	0.7 0.9	0.85 1.2	V V
h_{FE}*	DC Current Gain	I_C = 10 µA	V_{CE} = 5 V Gr.VII Gr.VIII Gr.IX Gr.X	20 40 100	195 100 140 195 280		
		I_C = 2 mA	V_{CE} = 5 V Gr.VII Gr.VIII Gr.IX Gr.X	120 120 180 250 380	350 170 250 350 500	630 220 310 460 630	
		I_C = 10 mA	V_{CE} = 1 V Gr.VII Gr.VIII Gr.IX Gr.X	80 80 120 160 240	365 175 260 365 520		
		I_C = 100 mA	V_{CE} = 1 V Gr.VII Gr.VIII Gr.IX Gr.X	40 40 45 60 60			

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

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ELECTRICAL CHARACTERISTICS (continued)

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

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

DC Current Gain.
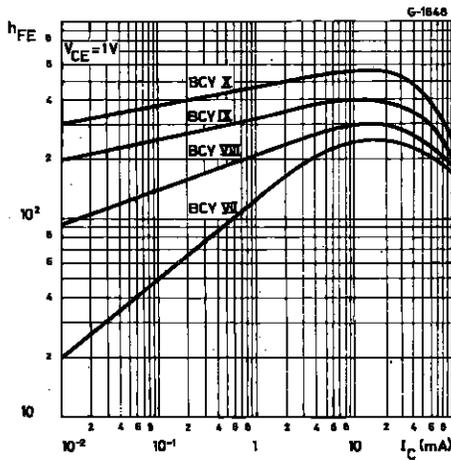
Collector-emitter Saturation Voltage.
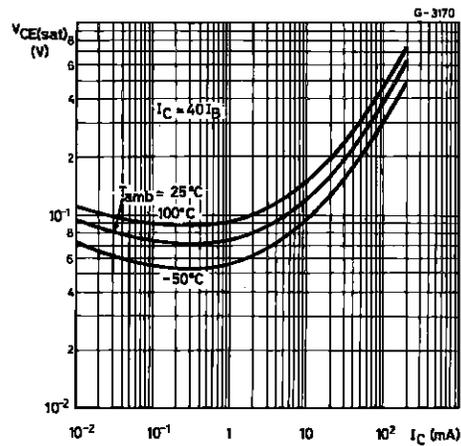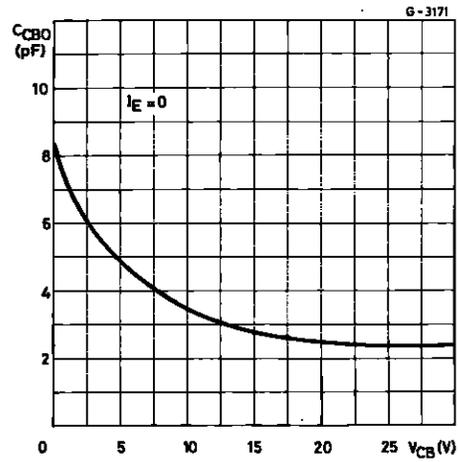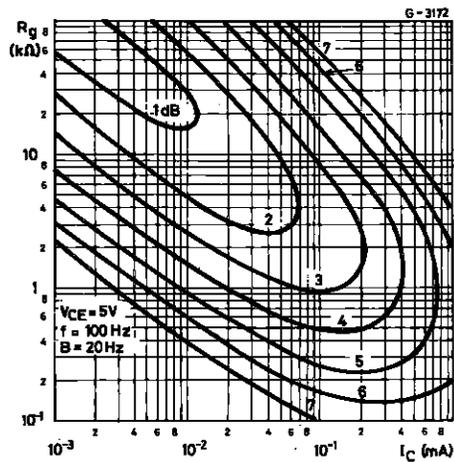
Transition Frequency.
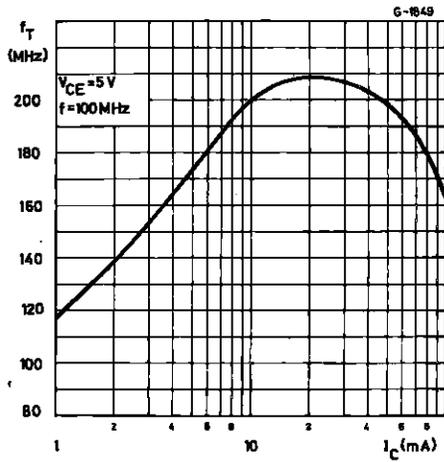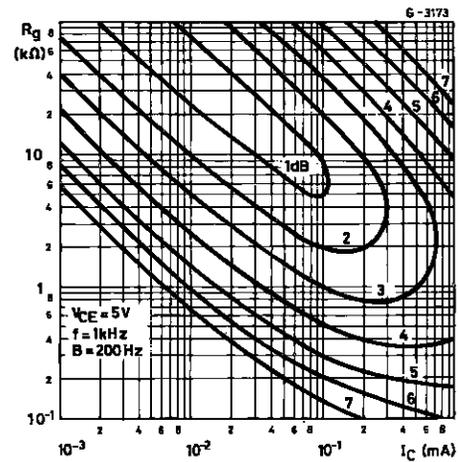

Collector-base Capacitance.

Noise Figure (f = 100 Hz).

Noise Figure (f = 1 kHz).

Noise Figure (f = 10 kHz).
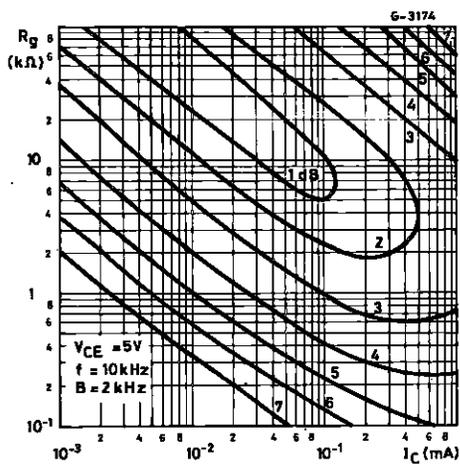
Noise Figure vs. Frequency.

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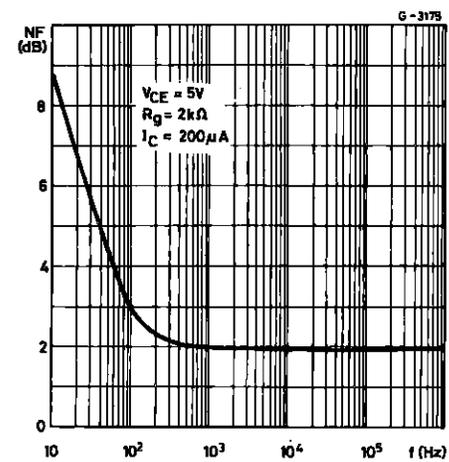
TO-18 MECHANICAL DATA

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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