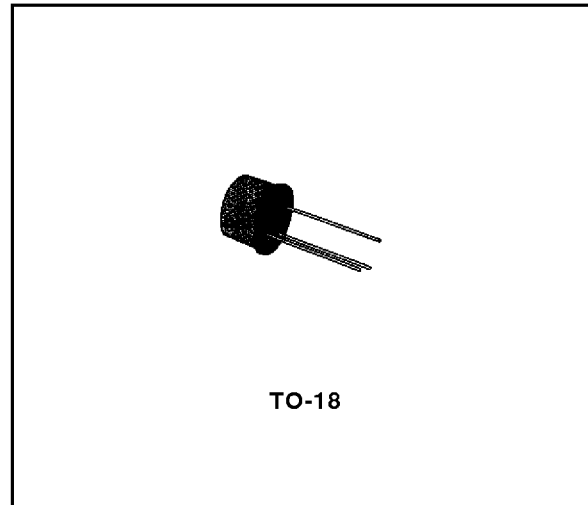


LOW NOISE AUDIO AMPLIFIERS

DESCRIPTION

The BCY78 and BCY79 are silicon planar epitaxial PNP transistors in Jedec TO-18 metal case. They are designed for use in audio driver and low-noise input stages.

The complementary NPN types are respectively the BCY58 and BCY59.



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BCY78	BCY79	
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 ($I_C = 0$)	- 5		V
I_C	Collector Current	- 200		mA
I_B	Base Current	- 20		mA
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$ at $T_{case} \leq 45^\circ\text{C}$	390 1		mW W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200		$^\circ\text{C}$

BCY78-BCY79

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 BCY78 $V_{CE} = -25\ V$ $V_{CE} = -32\ V$ $V_{CE} = -25\ V$ $T_{amb} = 150^{\circ}C$ For BCY79 $V_{CE} = -35\ V$ $V_{CE} = -45\ V$ $V_{CE} = -35\ V$ $T_{amb} = 150^{\circ}C$		- 2	- 20 - 100 - 10	nA nA μA
I_{CEX}	Collector Cutoff Current ($V_{BE} = 0.2\ V$)	For BCY78 $V_{CE} = -32\ V$ $T_{amb} = 100^{\circ}C$ For BCY79 $V_{CE} = -45\ V$ $T_{amb} = 100^{\circ}C$			- 20 - 20	μA μA
I_{EBO}	Emitter Cutoff Current ($I_C = 0$)	$V_{EB} = -4\ V$			- 20	nA
$V_{(BR)CES}$	Collector-emitter Breakdown Voltage ($V_{BE} = 0$)	$I_C = -10\ \mu A$ For BCY78 For BCY79	- 32 - 45			V V
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = -2\ mA$ For BCY78 For BCY79	- 32 - 45			V V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage ($I_C = 0$)	$I_E = -1\ \mu A$	- 5			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = -10\ mA$ $I_B = -0.25\ mA$ $I_C = -100\ mA$ $I_B = -2.5\ mA$		- 0.12 - 0.4	- 0.25 - 0.8	V V
V_{BE}^*	Base-emitter Voltage	$I_C = -10\ \mu A$ $V_{CE} = -5\ V$ $I_C = -2\ mA$ $V_{CE} = -5\ V$ $I_C = -10\ mA$ $V_{CE} = -1\ V$ $I_C = -100\ mA$ $V_{CE} = -1\ V$	- 0.6	- 0.55 - 0.65 - 0.68 - 0.75	- 0.75	V V V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = -10\ mA$ $I_B = -0.25\ mA$ $I_C = -100\ mA$ $I_B = -2.5\ mA$	- 0.6 - 0.7	- 0.7 - 0.85	- 0.85 - 1.2	V V

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

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
h_{FE}^*	DC Current Gain	$I_C = -10 \mu A$ $V_{CE} = -5 V$ Gr.VII Gr.VIII Gr.IX $I_C = -2 mA$ $V_{CE} = -5 V$ Gr.VII Gr.VIII Gr.IX $I_C = -10 mA$ $V_{CE} = -1 V$ Gr.VII Gr.VIII Gr.IX $I_C = -100 mA$ $V_{CE} = -1 V$ Gr.VII Gr.VIII Gr.IX For BCY78 Only Gr.X $I_C = -0.01 mA$ $V_{CE} = -5 V$ $I_C = -2 mA$ $V_{CE} = -5 V$ $I_C = -10 mA$ $V_{CE} = -1 V$ $I_C = -100 mA$ $V_{CE} = -1 V$	 30 40 120 180 250 80 120 160 40 45 60 100 380 240 60	 140 200 270 170 250 350 180 260 360 340 500 500	 220 310 460 400 630 630 1000	
h_{fe}	Small Signal Current Gain	$I_C = -2 mA$ $V_{CE} = -5 V$ $f = 1 kHz$ Gr.VII Gr.VIII Gr.IX for BCY78 Only Gr.X	 125 175 250 350	 200 260 330 520	 250 350 500 700	
f_T	Transition Frequency	$I_C = -10 mA$ $V_{CE} = -5 V$ $f = 100 MHz$		180		MHz
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = -0.5 V$ $f = 1 MHz$		11	15	pF
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = -10 V$ $f = 1 MHz$		4.5	7	pF
NF	Noise Figure	$I_C = -0.2 mA$ $V_{CE} = -5 V$ $R_g = 2 k\Omega$ $f = 1 kHz$		2	6	dB
h_{ie}	Input Impedance	$I_C = -2 mA$ $V_{CE} = -5 V$ $f = 1 kHz$ Gr.VII Gr.VIII Gr.IX For BCY78 Only Gr.X		2.7 3.6 4.5 7.5		$k\Omega$ $k\Omega$ $k\Omega$ $k\Omega$
h_{re}	Reverse Voltage Ratio	$I_C = -2 mA$ $V_{CE} = -5 V$ $f = 1 kHz$ Gr.VII Gr.VIII Gr.IX For BCY78 Only Gr.X		1.5×10^{-4} 2×10^{-4} 2×10^{-4} 3×10^{-4}		

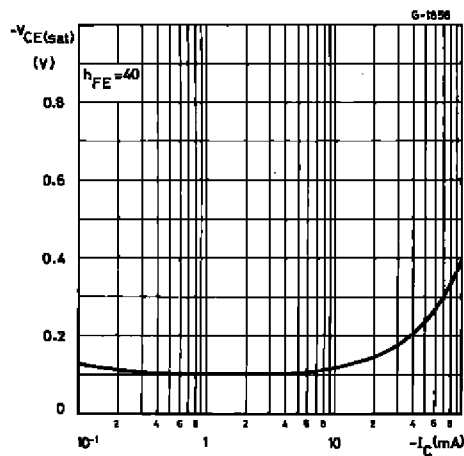
* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

ELECTRICAL CHARACTERISTICS (continued)

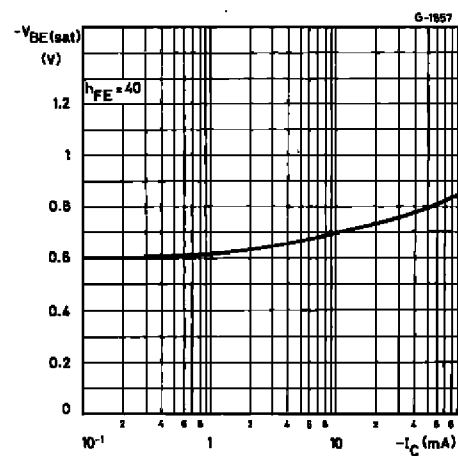
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
h_{oe}	Output Admittance	$I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ kHz}$ Gr.VII Gr.VIII Gr.IX For BCY78 Only Gr.X		18 24 30 50	30 50 60 100	μS μS μS μS
t_d	Delay Time	$I_C = -10 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -1 \text{ mA}$ $I_C = -100 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -10 \text{ mA}$		35 5		ns ns
t_r	Rise Time	$I_C = -10 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -1 \text{ mA}$ $I_C = -100 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -10 \text{ mA}$		50 50		ns ns
t_s	Storage Time	$I_C = -10 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -I_{B2} = -1 \text{ mA}$ $I_C = -100 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -I_{B2} = -10 \text{ mA}$		400 250		ns ns
t_f	Fall Time	$I_C = -10 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -I_{B2} = -1 \text{ mA}$ $I_C = -100 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -I_{B2} = -10 \text{ mA}$		80 200		ns ns
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	$I_C = -10 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -I_{B2} = -1 \text{ mA}$ $I_C = -100 \text{ mA}$ $V_{CC} = -10 \text{ V}$ $I_{B1} = -I_{B2} = -10 \text{ mA}$		480 450	800 800	ns ns

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

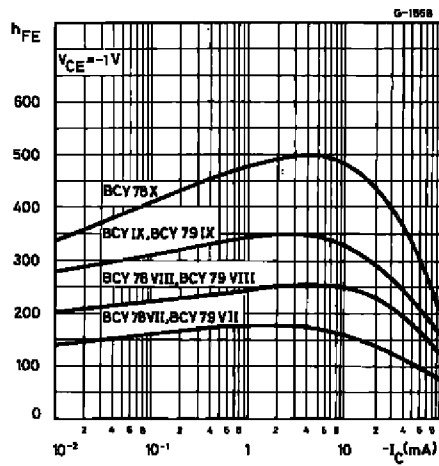
Collector-emitter Saturation Voltage.



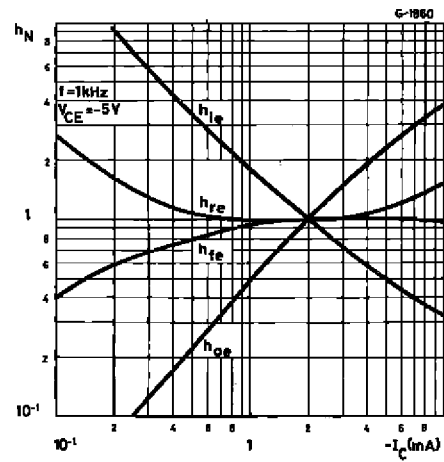
Base-emitter Saturation Voltage.



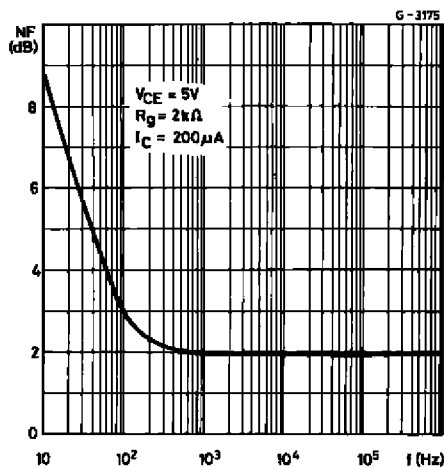
DC Current Gain.



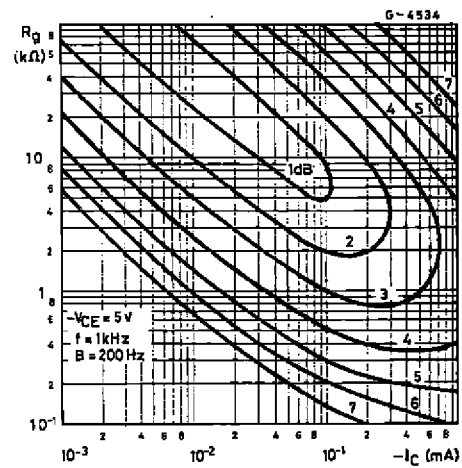
Normalized h Parameters.



Noise Figure vs. Frequency.

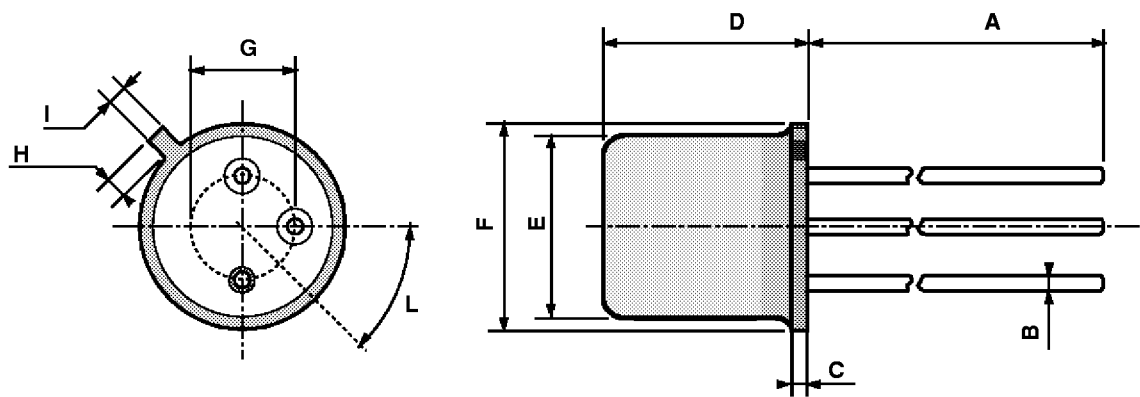


Noise Figure ($f = 1$ kHz).



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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