SGS-THOMSON MICROELECTRONICS

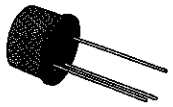
BCY78
BCY79

LOW NOISE AUDIO AMPLIFIERS

DESCRIPTION

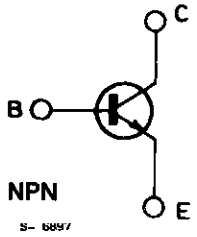
The BCY78 and BCY79 are silicon planar epitaxial PNP transistors in Jedec TO-18 metal case.They are designed for use in audio driver and low-noise input stages.

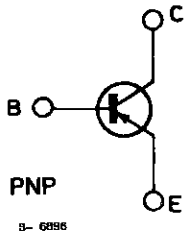
The complementary NPN types are respectively the BCY58 and BCY59.



TO-18

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 $T_{amb} \leq 25$ °C at $T_{case} \leq 45$ °C	390 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 **BCY78**					
		V_{CE} = – 25 V			– 2	– 20	nA
		V_{CE} = – 32 V				– 100	nA
		V_{CE} = – 25 V	T_{amb} = 150 °C			– 10	µA
		For **BCY79**					
		V_{CE} = – 35 V			– 2	– 20	nA
		V_{CE} = – 45 V				– 100	nA
		V_{CE} = – 35 V	T_{amb} = 150 °C			– 10	µA
I_{CEX}	Collector Cutoff Current (V_{BE} = 0.2 V)	For **BCY78**					
		V_{CE} = – 32 V	T_{amb} = 100 °C			– 20	µA
		For **BCY79**					
		V_{CE} = – 45 V	T_{amb} = 100 °C			– 20	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 µA	For **BCY78**	– 32			V
			For **BCY79**	– 45			V
$V_{(BR)CEO}$*	Collector-emitter Breakdown Voltage (I_B = 0)	I_C = – 2 mA					
			For **BCY78**	– 32			V
			For **BCY79**	– 45			V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage (I_C = 0)	I_E = – 1 µA		– 5			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_C = – 10 mA	I_B = - 0.25 mA		– 0.12	– 0.25	V
		I_C = – 100 mA	I_B = – 2.5 mA		– 0.4	– 0.8	V
V_{BE}*	Base-emitter Voltage	I_C = –10 µA	V_{CE} = – 5 V		– 0.55		V
		I_C = – 2 mA	V_{CE} = – 5 V	– 0.6	– 0.65	– 0.75	V
		I_C = –10 mA	V_{CE} = – 1 V		– 0.68		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	– 0.7	– 0.85	– 1.2	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 µA	V_{CE} = – 5 V				
			Gr.VII		140		
			Gr.VIII	30	200		
			Gr.IX	40	270		
		I_C = – 2 mA	V_{CE} = – 5 V				
			Gr.VII	120	170	220	
			Gr.VIII	180	250	310	
			Gr.IX	250	350	460	
		I_C = – 10 mA	V_{CE} = – 1 V				
			Gr.VII	80	180		
			Gr.VIII	120	260	400	
			Gr.IX	160	360	630	
		I_C = – 100 mA	V_{CE} = – 1 V				
			Gr.VII	40			
			Gr.VIII	45			
			Gr.IX	60			
		For **BCY78** Only					
			Gr.X				
		I_C = – 0.01 mA	V_{CE} = – 5 V	100	340		
		I_C = – 2 mA	V_{CE} = – 5 V	380	500	630	
		I_C = – 10 mA	V_{CE} = – 1 V	240	500	1000	
		I_C = – 100 mA	V_{CE} = – 1 V	60			
h_{fe}	Small Signal Current Gain	I_C = – 2 mA f = 1 kHz	V_{CE} = – 5 V				
			Gr.VII	125	200	250	
			Gr.VIII	175	260	350	
			Gr.IX	250	330	500	
		for **BCY78** Only					
			Gr.X	350	520	700	
f_T	Transition Frequency	I_C = – 10 mA f = 100 MHz	V_{CE} = – 5 V		180		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		4.5	7	pF
NF	Noise Figure	I_C = – 0.2 mA R_g = 2 kΩ	V_{CE} = – 5 V f = 1 kHz		2	6	dB
h_{ie}	Input Impedance	I_C = – 2 mA f = 1 kHz	V_{CE} = – 5 V				
			Gr.VII		2.7		kΩ
			Gr.VIII		3.6		kΩ
			Gr.IX		4.5		kΩ
		For **BCY78** Only					
			Gr.X		7.5		kΩ
h_{re}	Reverse Voltage Ratio	I_C = – 2 mA f = 1 kHz	V_{CE} = – 5 V				
			Gr.VII		$1.5x10^{-4}$		
			Gr.VIII		$2x10^{-4}$		
			Gr.IX		$2x10^{-4}$		
		For **BCY78** Only					
			Gr.X		$3x10^{-4}$		

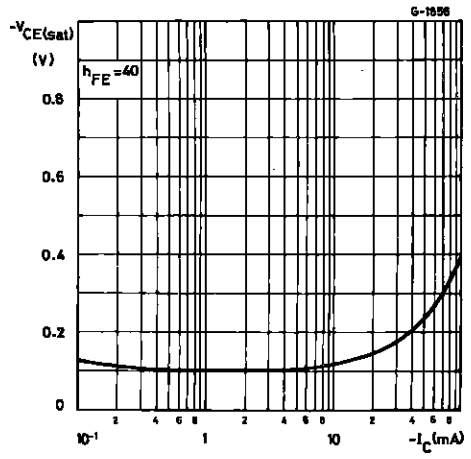
* Pulsed : pulse duration = 300 µs, duty cycle = 1 %.

ELECTRICAL CHARACTERISTICS (continued)

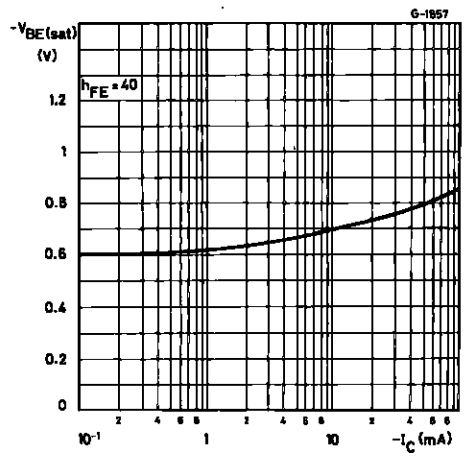
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
h_{oe}	Output Admittance	I_C = – 2 mA V_{CE} = – 5 V f = 1 kHz				
		Gr.VII		18	30	µS
		Gr.VIII		24	50	µS
		Gr.IX		30	60	µS
		For **BCY78** Only				
		Gr.X		50	100	µS
t_d	Delay Time	I_C = – 10 mA V_{CC} = – 10 V I_{B1} = – 1 mA		35		ns
		I_C = – 100 mA V_{CC} = – 10 V I_{B1} = – 10 mA		5		ns
t_r	Rise Time	I_C = – 10 mA V_{CC} = – 10 V I_{B1} = – 1 mA		50		ns
		I_C = – 100 mA V_{CC} = – 10 V I_{B1} = – 10 mA		50		ns
t_s	Storage Time	I_C = – 10 mA V_{CC} = – 10 V I_{B1} = – I_{B2} = – 1 mA		400		ns
		I_C = – 100 mA V_{CC} = – 10 V I_{B1} = – I_{B2} = – 10 mA		250		ns
t_f	Fall Time	I_C = – 10 mA V_{CC} = – 10 V I_{B1} = – I_{B2} = – 1 mA		80		ns
		I_C = – 100 mA V_{CC} = – 10 V I_{B1} = – I_{B2} = – 10 mA		200		ns
t_{on}	Turn-on Time	I_C = – 10 mA V_{CC} = – 10 V I_{B1} = – 1 mA		85	150	ns
		I_C = – 100 mA V_{CC} = – 10 V I_{B1} = – 10 mA		55	150	ns
t_{off}	Turn-off Time	I_C = – 10 mA V_{CC} = – 10 V I_{B1} = – I_{B2} = – 1 mA		480	800	ns
		I_C = – 100 mA V_{CC} = – 10 V I_{B1} = – I_{B2} = – 10 mA		450	800	ns

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

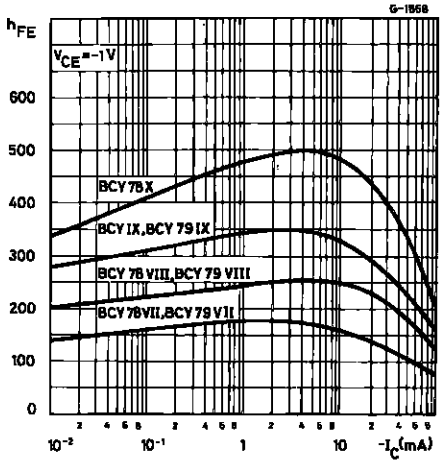
Collector-emitter Saturation Voltage.



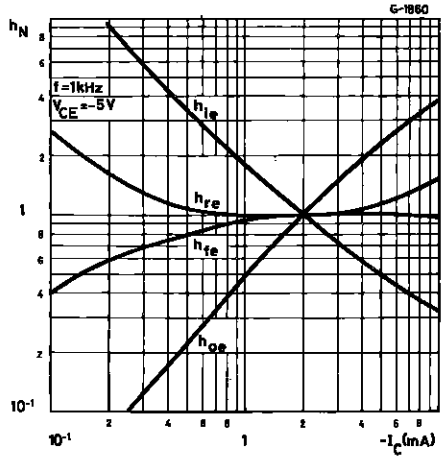
Base-emitter Saturation Voltage.



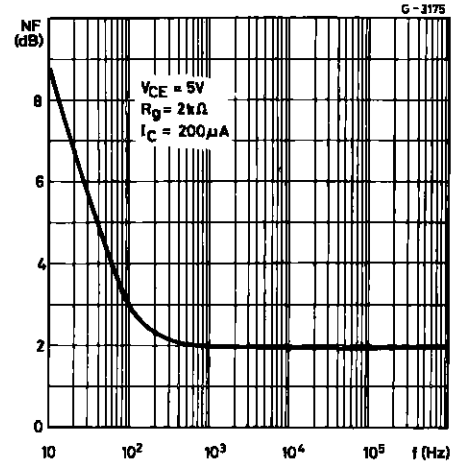
DC Current Gain.



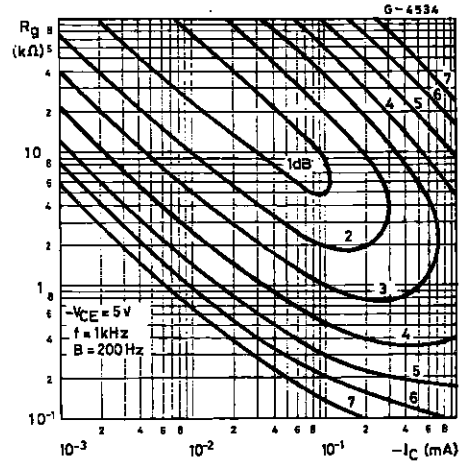
Normalized h Parameters.



Noise Figure vs. Frequency.

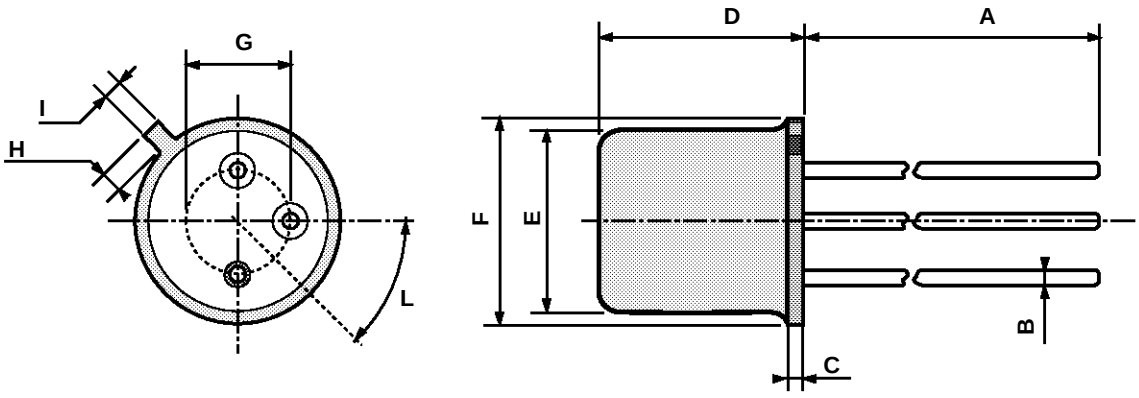


Noise Figure (f = 1 kHz).



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^o			45^o		



0016043