BCY58
BCY59

CASE 22-03, STYLE 1
TO-18 (TO-206AA)

TRANSISTOR

NPN SILICON

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MAXIMUM RATINGS

Rating	Symbol	BCY 58	BCY 59	Unit
Collector-Emitter Voltage	V_{CEO}	32	45	Vdc
Collector-Emitter Voltage (R_{BE} = 10 Ohms)	V_{CES}	32	45	Vdc
Emitter-Base Voltage	V_{EBO}	7		Vdc
Collector Current – Continuous	I_C	0.2		Amp
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.6 2.2B		Watt mW/°C
Total Device Dissipation @ T_C = 25°C T_C = 100°C Derate above 25°C	P_D	1 6.67		Watt mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	150	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	450	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Type	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 10 mAdc, I_C = 0)	BCY5B BCY59	$V_{(BR)CEO}$	32 45			Vdc
Emitter-Base Breakdown Voltage (I_E = 1μAdc, I_C = 0)	all	$V_{(BR)EBO}$	7			Vdc
Collector Cutoff Current						nAdc
(V_{CE} = 32 V)	BCY5B	I_{CES}		0.2	10	
(V_{CE} = 45 V)	BCY59			0.2	10	
(V_{CE} = 32 V, T_A = 100°C, V_{BE} = 0.2 V)	BCY5B	I_{CEX}			20	μAdc
(V_{CE} = 45 V, T_A = 100°C, V_{BE} = 0.2 V)	BCY59				20	
(V_{CE} = 32 V, T_A = 150°)	BCY5B	I_{CES}		0.2	10	μAdc
(V_{CE} = 45 V, T_A = 150°)	BCY59			0.5	10	
Emitter Base Cutoff Current (V_{EB} = 5 V)	all	I_{EBO}			10	nAdc
ON CHARACTERISTICS						
DC Current Gain		h_{FE}				
(I_C = 10 μAdc, V_{CE} = 5 Vdc)	BCY59-VII, BCY58-VII					
	BCY59-VIII, BCY58-VIII		20	145		
	BCY59-IX, BCY58-IX		40	220		
	BCY59-X, BCY58-X		100	300		
(I_C = 2 mAdc, V_{CE} = 5 Vdc)	BCY59-VII, BCY58-VII		120	170	220	
	BCY59-VIII, BCY5B-VIII		1B0	250	310	
	BCY59-IX, BCY5B-IX		250	350	460	
	BCY59-X, BCY5B-X		3B0	500	630	
(I_C = 10 mAdc, V_{CE} = 1 Vdc)	BCY59-VII, BCY58-VII		80	190		
	BCY59-VIII, BCY5B-VIII		120	260	400	
	BCY59-IX, BCY58-IX		160	3B0	630	
	BCY59-X, BCY58-X		240	550	1000	
(I_C = 100 mAdc, V_{CE} = 1 Vdc)	BCY59-VII, BCY58-VII		40			
	BCY59-VIII, BCY5B-VIII		45			
	BCY59-IX, BCY58-IX		60			
	BCY59-X, BCY5B-X		60			
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$				Vdc
(I_C = 100 mAdc, I_B = 2.5 mAdc)	all		0.15	0.30	0.70	
(I_C = 10 mAdc, I_B = 0.25 mA)			0.05	0.12	0.35	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$				Vdc
(I_C = 10 mA, I_B = 0.25 mA)	all		0.6	0.70	0.B5	
(I_C = 100 mA, I_B = 2.5 mA)			0.75	0.90	1.2	
Base-Emitter on Voltage		$V_{BE(on)}$				Vdc
(I_C = 2 mAdc, V_{CE} = 5 Vdc)	all		0.55	0.62	0.70	

ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic	Type	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS SMALL SIGNAL CHARACTERISTICS						
Current Gain-Bandwidth Product (I_C = 10 mAdc, V_{CE} = 5 V, f = 100 MHz)	all	f_T	125	200		MHz
Output Capacitance (V_{CE} = 10 Vdc, I_C = 0, f = 1 MHz)	all	C_{ob}		3.5	6	pF
Input Capacitance (V_{BE} = 0.5 V, I_C = 0, f = 1 MHz)	all	C_{ib}		8	15	pF
Small Signal Current Gain (I_C = 2 mAdc, V_{CE} = 5 Vdc, f = 1 kHz)	BCY58-VII, BCY59-VII BCY58-VIII, BCY59-VIII BCY58-IX, BCY59-IX BCY58-X, BCY59-X	h_{fe} (h_{21e})	125 175 250 350	200 260 330 520	250 350 500 700	
Output Admittance (I_C = 2 mAdc, V_{CE} = 5 Vdc, f = 1 kHz)	BCY58-VII, BCY59-VII BCY58-VIII, BCY59-VIII BCY58-IX, BCY59-IX BCY58-X, BCY59-X	h_{oe} (h_{22e})			30 50 60 100	µmhos
Input Impedance (I_C = 2 mAdc, V_{CE} = 5 Vdc, f = 1 kHz)	BCY58-VII, BCY59-VII BCY58-VIII, BCY59-VIII BCY58-IX, BCY59-IX BCY58-X, BCY59-X	h_{ie} (h_{11e})	1.6 2.5 3.2 4.5		4.5 6 8.5 12	Kohms
Voltage Feedback Ratio (I_C = 2 mAdc, V_{CE} = 5 Vdc, f = kHz)	BCY58-VII, BCY59-VII BCY58-VIII, BCY59-VIII BCY58-IX, BCY59-IX BCY58-X, BCY59-X	h_{re} (h_{12e})		1.5 2 2 3		$\times 10^{-4}$
Noise Figure (I_C = 0.2 mAdc, V_{CE} = 5 Vdc, R_S = 2 Kohms; f = 1 kHz)	all	N_F		2	6	dB
SWITCHING CHARACTERISTICS						
I_C = 10 mA, I_{B1} = 1 mA, I_{B2} = 1 mA V_{BB} = 3.6 V, R_1 = R_2 = 5 KΩ R_L = 990 ohms * See test circuit.		td t_r t_{on} t_s t_f t_{off}		35 50 85 400 80 480	 150 800	nS
I_C = 100 mA, I_{B1} = 10 mA, I_{B2} = 10 mA V_{BB} = 5 V, R_1 = 500 Ω, R_2 = 700 Ω R_L = 98 ohms * See test circuit.		t_d t_r t_{on} t_s t_f t_{off}		5 50 55 250 200 450	 150 800	nS

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TEST CIRCUIT

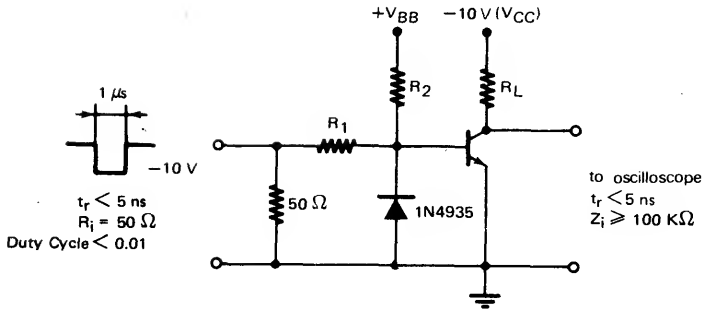

FIGURE 1 – CURRENT GAIN (BCY58-VII/BCY59-VII)

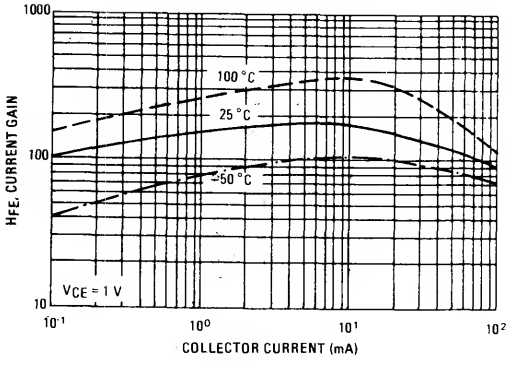

FIGURE 2 – CURRENT GAIN (BCY58-VIII/BCY59-VIII)

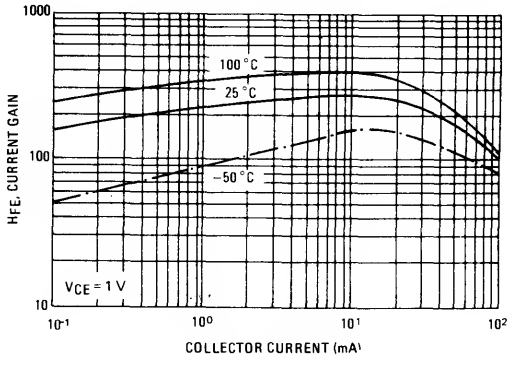

FIGURE 3 – CURRENT GAIN (BCY58-IX/BCY59-IX)

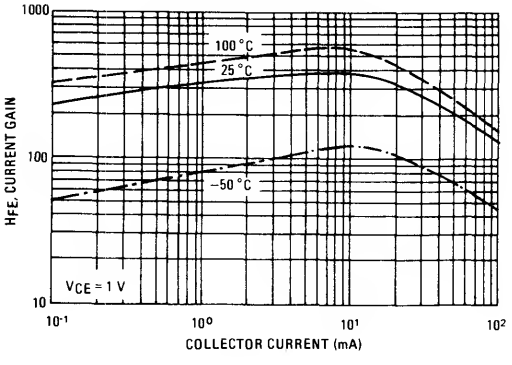

FIGURE 4 – CURRENT GAIN (BCY58-X/BCY59-X)

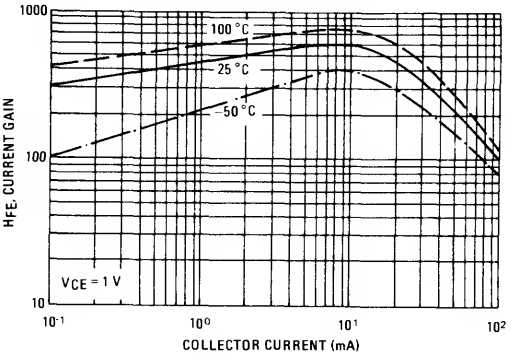

FIGURE 5 – SATURATION VOLTAGE

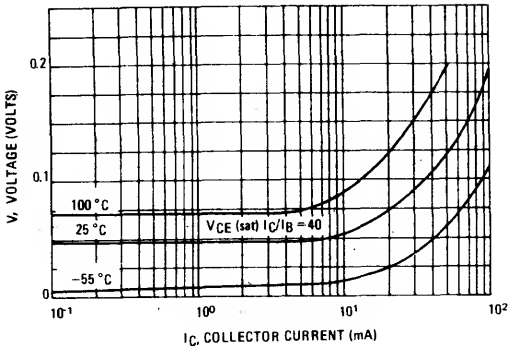

FIGURE 6 – SATURATION VOLTAGE

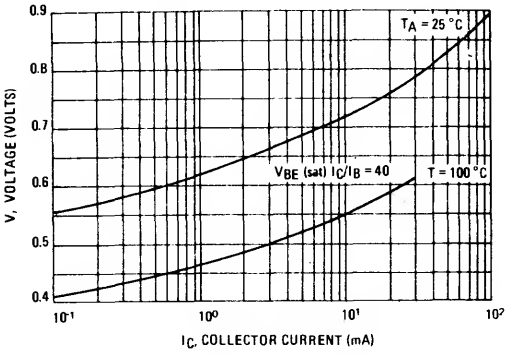

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FIGURE 7 – INPUT CHARACTERISTIC (COMMON EMITTER CIRCUIT)

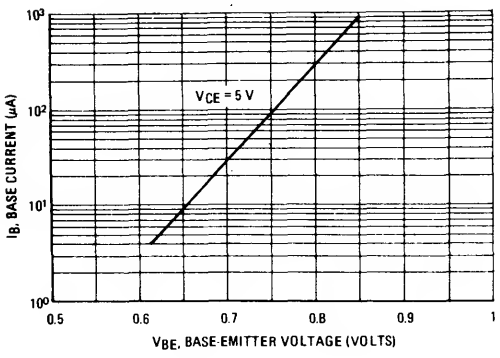

FIGURE 8 – OUTPUT CHARACTERISTIC (COMMON EMITTER CIRCUIT)

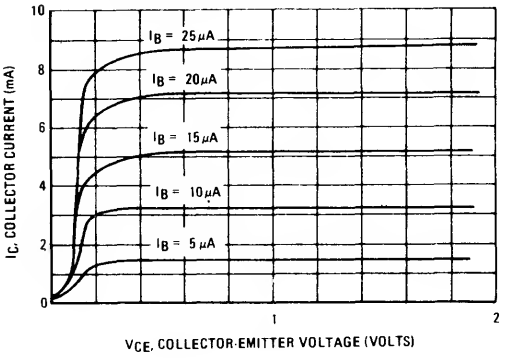

FIGURE 9 – OUTPUT CHARACTERISTIC (COMMON EMITTER CIRCUIT)

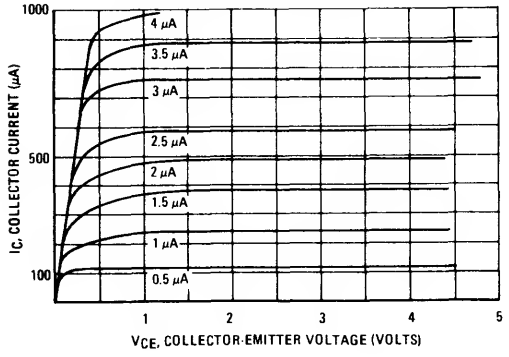

FIGURE 10 – OUTPUT CHARACTERISTIC (COMMON EMITTER CIRCUIT)

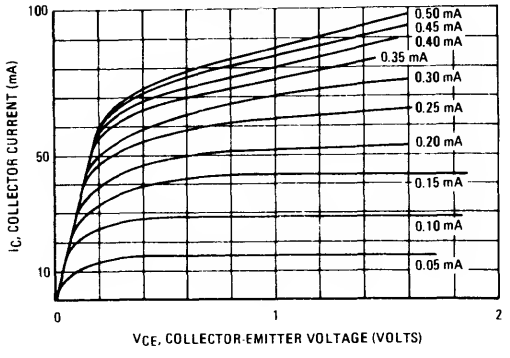

FIGURE 11 – OUTPUT CHARACTERISTIC
(COMMON EMITTER CIRCUIT)

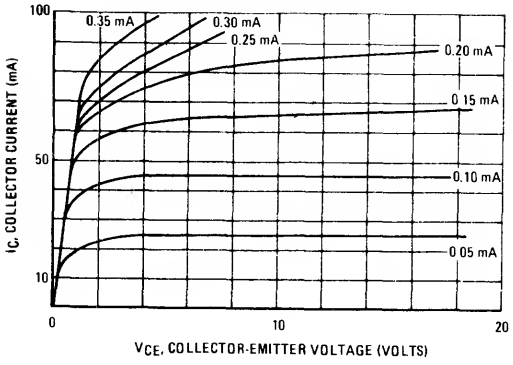

FIGURE 12 – EMITTER-BASE CAPACITANCE
COLLECTOR-BASE CAPACITANCE

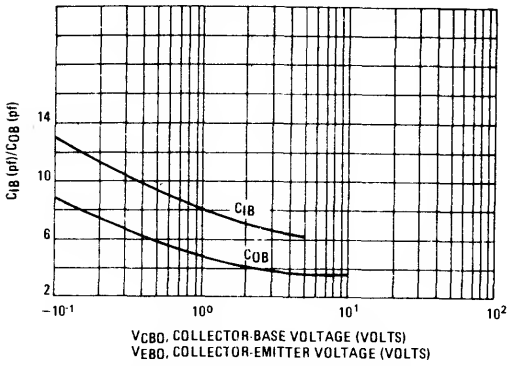

FIGURE 13 – CURRENT GAIN – BANDWIDTH PRODUCT

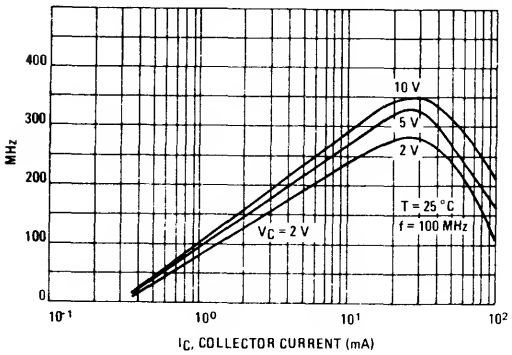

FIGURE 14 – TOTAL PERMISSIBLE POWER
DISSIPATION (BCY58/BCY59)