2N5229
2N5230
2N5231

CASE 26-03, STYLE 1
TO-46 (TO-206AB)

LOW POWER CHOPPER TRANSISTOR

PNP SILICON

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MAXIMUM RATINGS

Rating	Symbol	2N5229	2N5230	2N5231	Unit
Emitter-Collector Voltage	V_{ECO}	10	20	30	Vdc
Collector-Base Voltage	V_{CBO}	15	30	50	Vdc
Emitter-Base Voltage	V_{EBO}	15	30	50	Vdc
Collector Current — Continuous	I_C	50			mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.5 2.86			Watt mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	2.0 12			Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200			°C

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Emitter-Collector Breakdown Voltage (I_E = 10 μAdc, I_B ≈ 0)	 2N5229 2N5230 2N5231	$V_{(BR)ECO}$	 10 20 30	 — — —	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	 2N5229 2N5230 2N5231	$V_{(BR)CBO}$	 15 30 50	 — — —	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	 2N5229 2N5230 2N5231	$V_{(BR)EBO}$	 15 30 50	 — — —	Vdc
Collector Cutoff Current (V_{CB} = 12 Vdc, I_E = 0) (V_{CB} = 25 Vdc, I_E = 0) (V_{CB} = 40 Vdc, I_E = 0)	 2N5229 2N5230 2N5231	I_{CBO}	 — — —	 1.0 1.0 1.0	nAdc
Emitter Cutoff Current (V_{EB} = 12 Vdc, I_C = 0) (V_{EB} = 25 Vdc, I_C = 0) (V_{EB} = 40 Vdc, I_C = 0)	 2N5229 2N5230 2N5231	I_{EBO}	 — — —	 1.0 1.0 1.0	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 μAdc, V_{CE} = 1.0 Vdc) (I_C = 200 μAdc, V_{CE} = 0.5 Vdc) (Inverted Connection)		h_{FE}	 50 15	 — —	—
Offset Voltage (I_B = 100 μAdc, I_E = 0) (I_B = 1.0 mAdc, I_E = 0)	 2N5229, 2N5230, 2N5231 2N5229, 2N5230, 2N5231	$V_{EC(ofs)}$	 — — — —	 0.5 0.8 0.8 1.0	mVdc
SMALL-SIGNAL CHARACTERISTICS					
Collector-Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 140 kHz)		C_{cb}	—	5.0	pF
Emitter-Base Capacitance (V_{EB} = 10 Vdc, I_C = 0, f = 140 kHz)		C_{eb}	—	4.0	pF
Small Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 4.0 MHz)		h_{fe}	2.0	—	—

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

Characteristic		Symbol	Min	Max	Unit
"ON" Series Resistance (I_B = 1.0 mAdc, I_E = 0, I_e = 100 μA RMS, f = 1.0 kHz)	2N5229	$r_{ec(on)}$	1.0	6.0	Ohms
	2N5230		2.0	8.0	
	2N5231		2.0	10	

TYPICAL CHARACTERISTICS

FIGURE 1 – EMITTER-COLLECTOR VOLTAGE versus BASE CURRENT

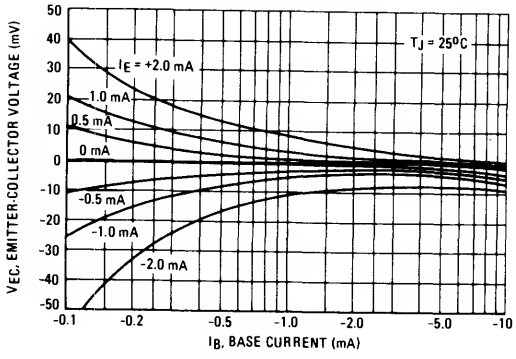

FIGURE 2 – EMITTER-COLLECTOR VOLTAGE versus JUNCTION TEMPERATURE

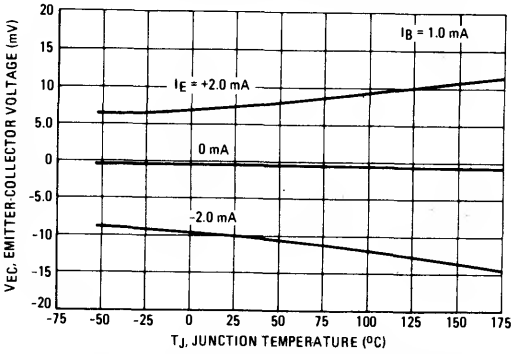

FIGURE 3 – EMITTER-COLLECTOR "ON" RESISTANCE versus BASE CURRENT

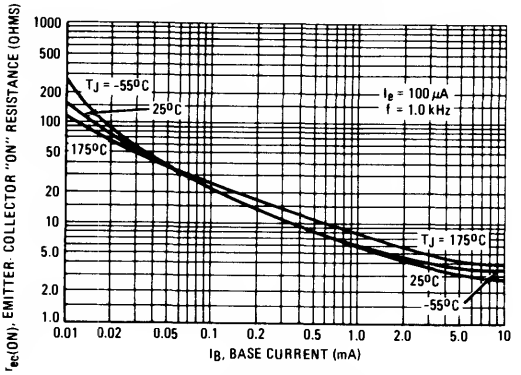

FIGURE 4 – EMITTER-COLLECTOR "ON" RESISTANCE TEMPERATURE COEFFICIENT versus BASE CURRENT

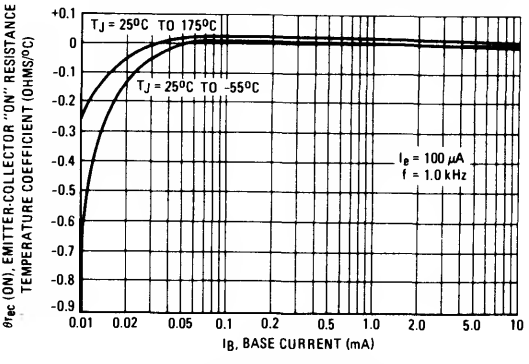

FIGURE 5 – CURRENT GAIN versus COLLECTOR CURRENT

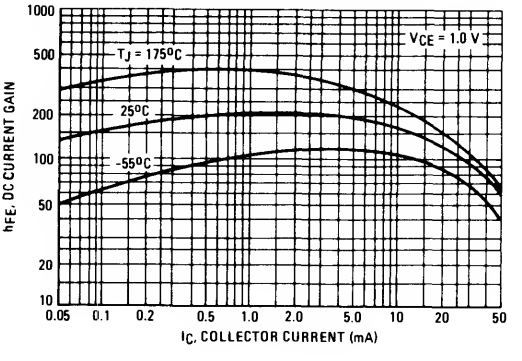

FIGURE 6 – CURRENT GAIN (Inverted Connection) versus EMITTER CURRENT

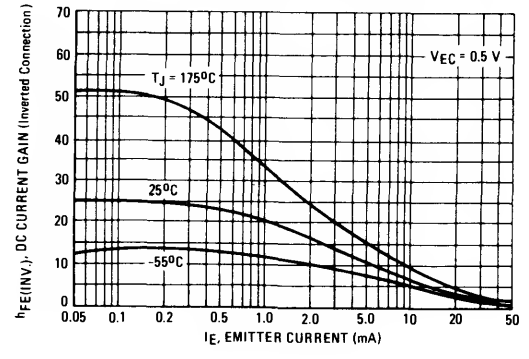

FIGURE 7 – COLLECTOR CUTOFF CURRENT versus JUNCTION TEMPERATURE

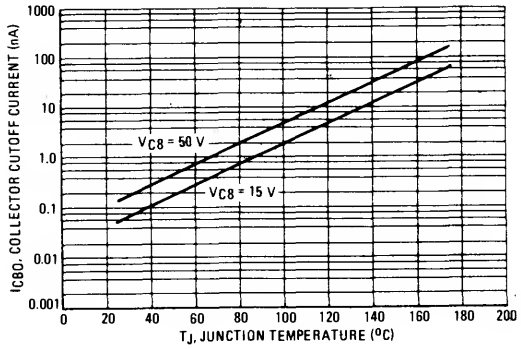

FIGURE 8 – EMITTER CUTOFF CURRENT versus JUNCTION TEMPERATURE

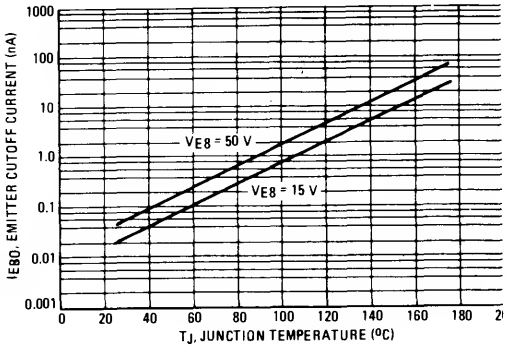

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FIGURE 9 – COLLECTOR-EMITTER SATURATION VOLTAGE versus COLLECTOR CURRENT

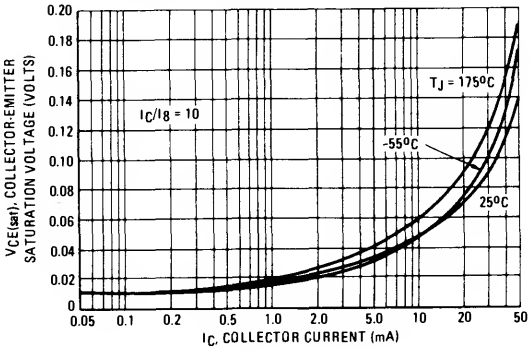

FIGURE 10 – JUNCTION CAPACITANCE versus REVERSE BIAS VOLTAGE