DIGITRON™ Semiconductors

High-reliability discrete products
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2N5109

NPN SILICON LOW POWER TRANSISTORS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

Parameters		Symbol	Value	Unit
Collector-Base Voltage		V_{CBO}	40	V
Collector-Emitter Boltage		V_{CEO}	20	V
Emitter-Base Voltage		V_{EBO}	3	V
Collector Current		I_C	400	mA
Continuous Base Current		I_B	400	mA
Power Dissipation	T_A = 25°C T_C = 75°C	P_D	1.0 2.5	W
Storage Temperature Range		t_{stg}	-65 to +200	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Collector Emitter Breakdown Voltage	I_B = 5.00, R_{BE} = 10Ω	$V_{BR(CER)}$ (1)	40	-	-	V
Collector Emitter Sustaining Voltage	I_C = 5.0mA, I_B = 0	$V_{(BR)CEO}$	20	-	-	
Collector Cutoff Current	V_{CE} = 15V, I_B = 0	I_{CEO}	-	-	20	µA
Collector Cutoff Current	V_{CE} = 15V, V_{BE} = -1.5V, T_C = 150°C	I_{CEX}	-	-	5.0	mA
Collector Cutoff Current	V_{CE} = 35V, V_{BE} = -1.5V	I_{CEX}	-	-	5.0	mA
Emitter Cutoff Current	V_{CE} = 3.0V, I_C = 0	I_{EBO}	-	-	100	µA
DC Current Gain	I_C = 360mA, V_{CE} = 5.0V I_C = 50mA, V_{CE} = 15V	h_{FE}	5.0 40	- -	- 120	-
Current Gain – Bandwidth Product	I_C = 50mA, V_{CE} = 15V, f = 200MHz	F_T	1200	-	-	MHz
Collector Base Capacitance	V_{CB} = 15V, I_E = 0, f = 1MHz	C_{Cb}	-	1.8	3.5	pF
Noise Figure	V_{CE} = 15V, I_C = 10mA, f = 1.0MHz	NF	-	3.0	-	dB
Common Emitter Amplifier Voltage Gain	I_C = 50mA, V_{CC} = 15V, f = 50 to 216MHz	G_{VE}	11	-	-	dB
Power Input	I_C = 50mA, V_{CC} = 15V, R_S = 50Ω, P_{out} = 1.26mW, f = 200MHz	P_{in}	-	-	0.1	mW

Note 1: Pulsed t_p = 300µs, duty cycle ≤ 2%.

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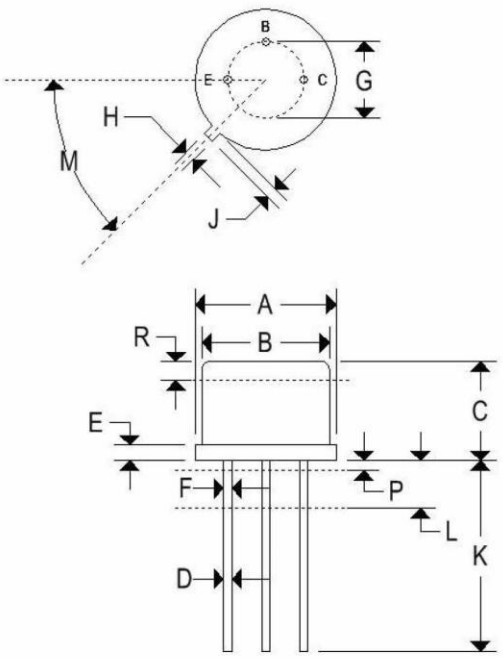
MECHANICAL CHARACTERSITICS

Case	TO-39
Marking	Alpha-numeric
Polarity	See below



	TO-39			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.350	0.370	8.890	9.400
B	0.315	0.335	8.000	8.510
C	0.240	0.260	6.10	6.60
D	0.016	0.021	0.406	0.533
E	0.009	0.125	0.2269	3.180
F	0.016	0.019	0.406	0.533
G	0.190	0.210	4.830	5.33
H	0.028	0.034	0.711	0.864
J	0.029	0.040	0.737	1.020
K	0.500	-	12.700	-
L	0.250	-	6.350	-
M	45° NOM		45° NOM	
P	-	0.050	-	1.270
Q	90° NOM		90° NOM	
R	0.100	-	2.540	-

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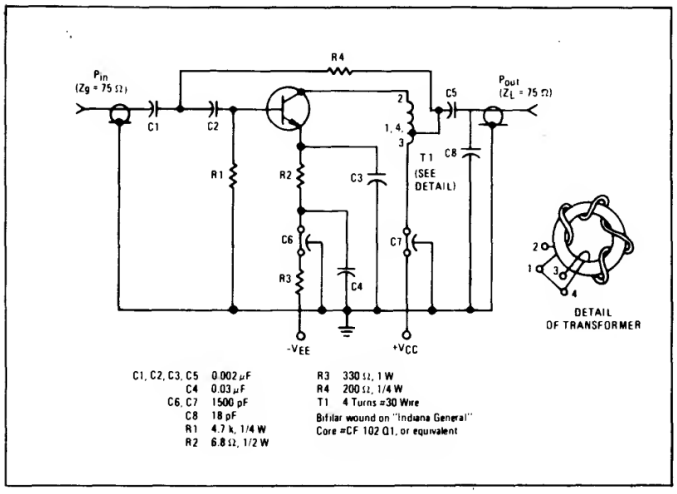
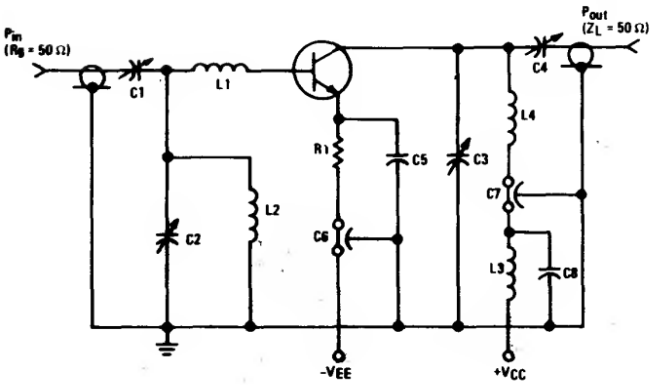
FIGURE 1 – RF AMPLIFIER FOR VOLTAGE GAIN TEST CIRCUIT



C1, C2, C3, C5 0.002 μF
C4 0.03 μF
C6, C7 1500 pF
C8 18 pF
R1 4.7 k, 1/4 W
R2 6.8 Ω, 1/2 W
R3 330 Ω, 1 W
R4 200 Ω, 1/4 W
T1 4 Turns #30 Wire
Bifilar wound on "Indiana General" Core #CF 102 Q1, or equivalent

FIGURE 2 – 200 MHz TEST CIRCUIT



C1, C2, C3 1.0 – 30 pF
C4 1.0 – 20 pF
C5 10,000 pF
C6, C7 1,000 pF
C8 0.01 μF
L1 4-1/2 turns, No. 22 wire, 3/16" I.D.
L4 3-1/2 turns, No. 22 wire, 3/16" I.D.
L2, L3 0.82 μH RFC
R1 240 OHMS, 2 WATTS

FIGURE 3 – CURRENT-GAIN – BANDWIDTH PRODUCT

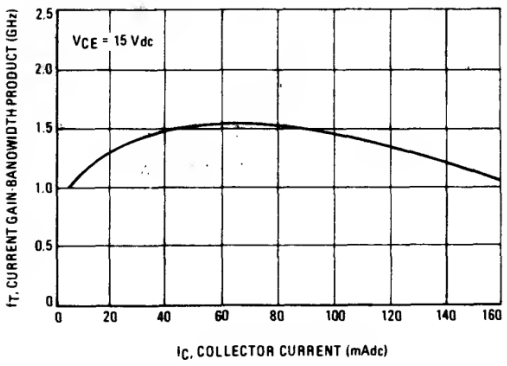


FIGURE 4 – COLLECTOR-BASE TIME CONSTANT

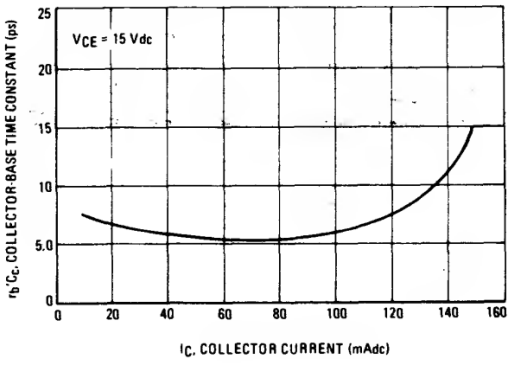


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FIGURE 5 – SATURATION VOLTAGES

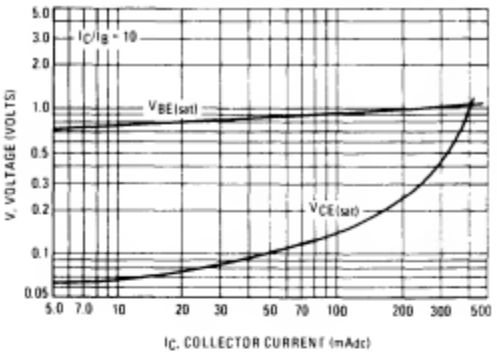

FIGURE 6 – CAPACITANCES versus REVERSE VOLTAGE

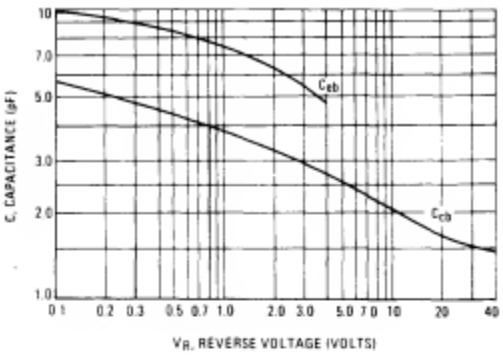

FIGURE 7 – INPUT ADMITTANCE versus FREQUENCY

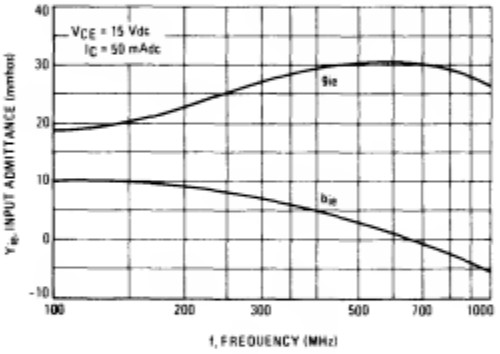

FIGURE 8 – INPUT ADMITTANCE versus COLLECTOR CURRENT

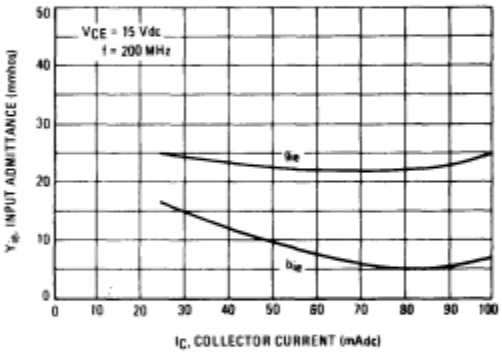

FIGURE 9 – REVERSE TRANSFER ADMITTANCE versus FREQUENCY

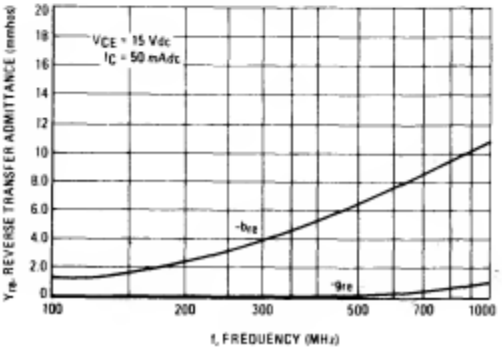

FIGURE 10 – REVERSE TRANSFER ADMITTANCE versus COLLECTOR CURRENT

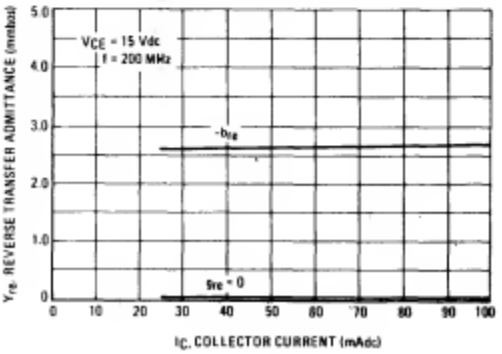

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FIGURE 11 – FORWARD TRANSFER ADMITTANCE versus FREQUENCY

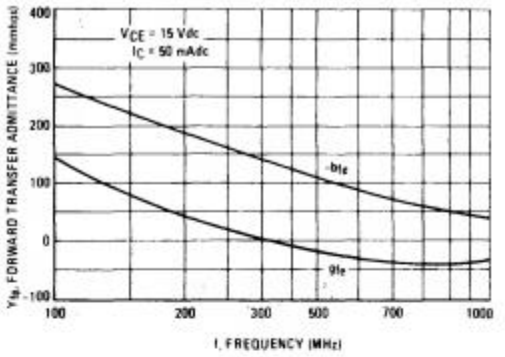

FIGURE 12 – FORWARD TRANSFER ADMITTANCE versus COLLECTOR CURRENT

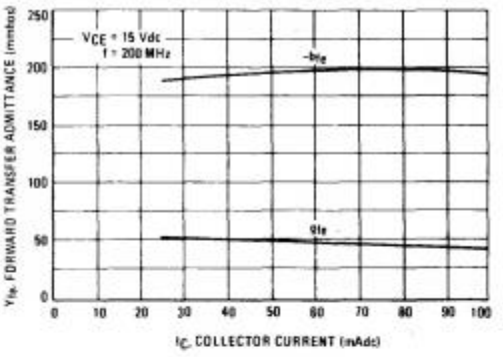

FIGURE 13 – OUTPUT ADMITTANCE versus FREQUENCY

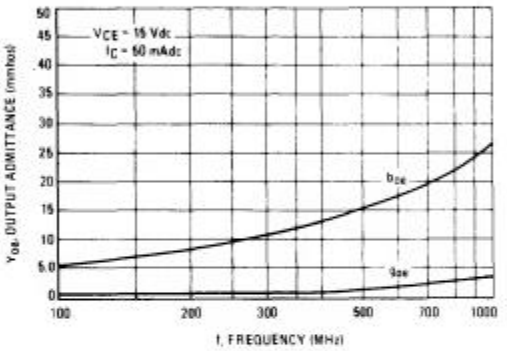

FIGURE 14 – OUTPUT ADMITTANCE versus COLLECTOR CURRENT

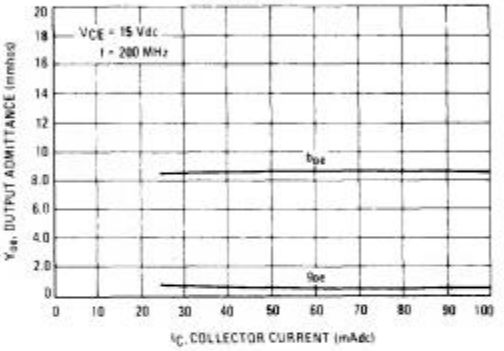

FIGURE 15 – INPUT REFLECTION COEFFICIENT versus FREQUENCY

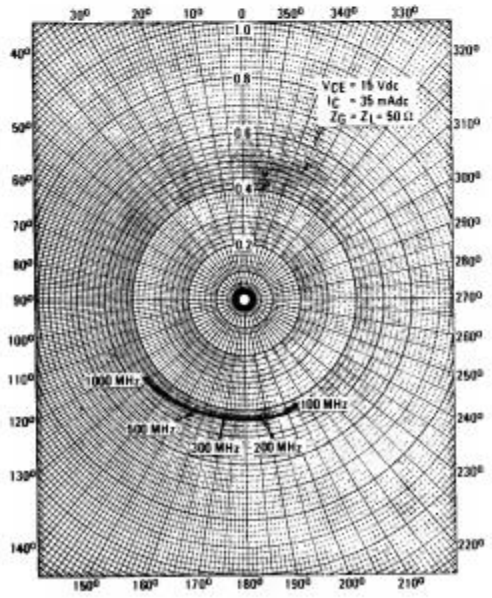

FIGURE 16 – OUTPUT REFLECTION COEFFICIENT versus FREQUENCY

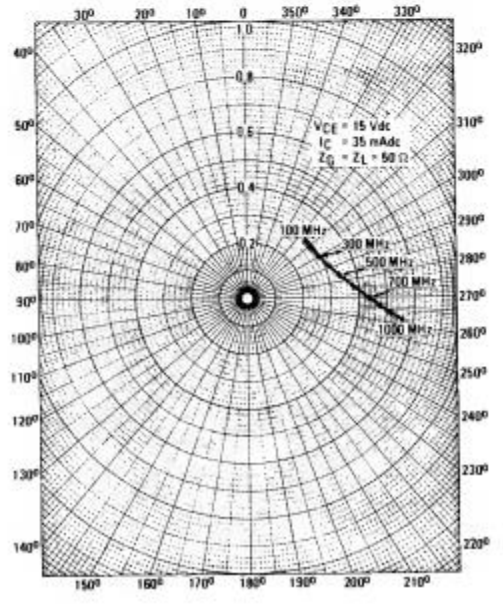

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FIGURE 17 – REVERSE TRANSMISSION COEFFICIENT versus FREQUENCY

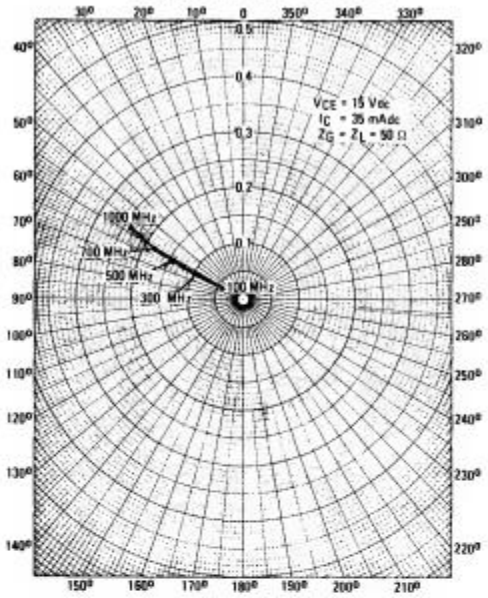


FIGURE 18 – FORWARD TRANSMISSION COEFFICIENT versus FREQUENCY

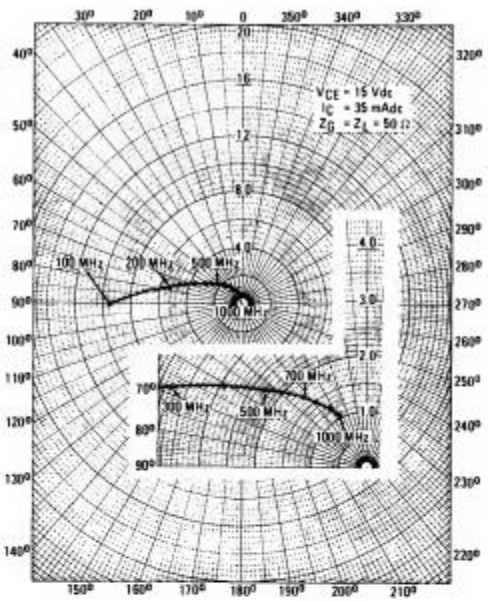
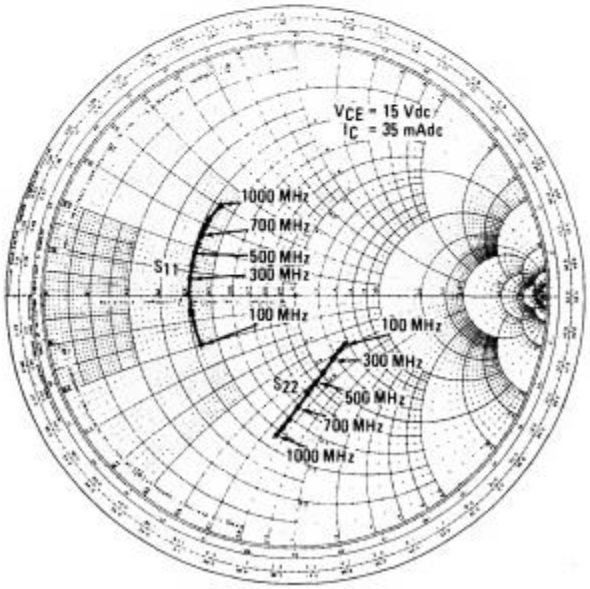


FIGURE 19 – INPUT REFLECTION COEFFICIENT AND OUTPUT REFLECTION COEFFICIENT versus FREQUENCY



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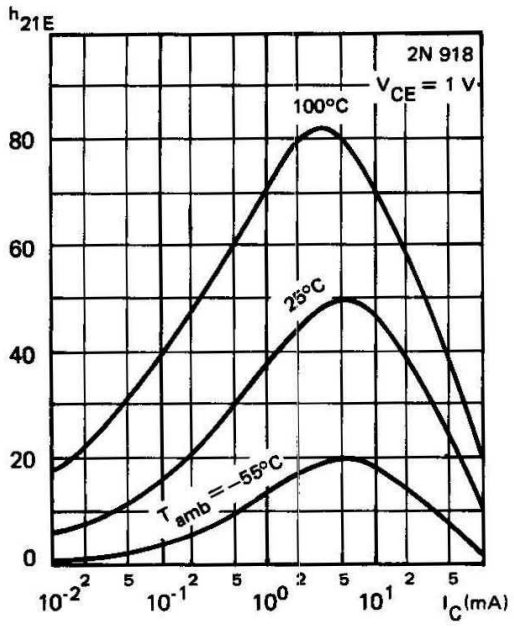

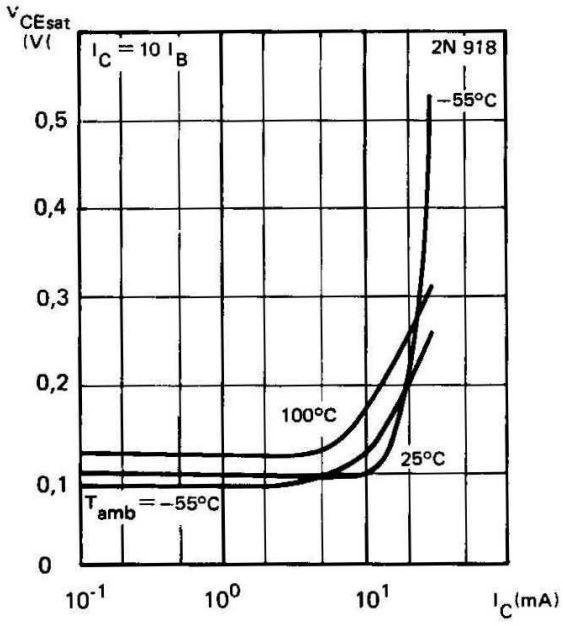

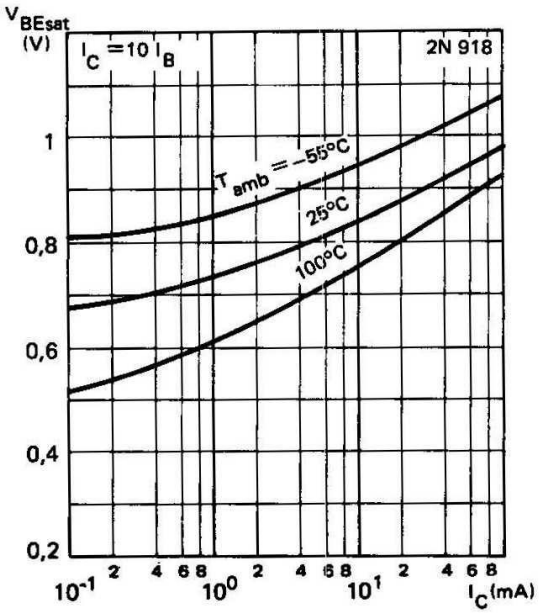

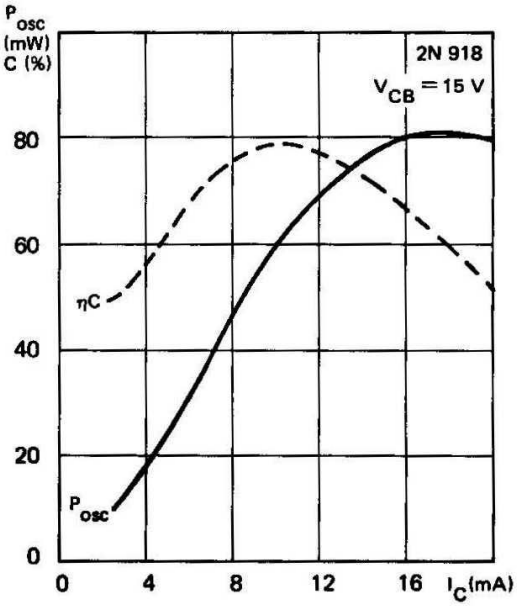

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