Solid State Division

RF Power Transistors

2N5180

JEDEC TO-72 H-1299

Silicon N-P-N Epitaxial Planar Transistor

For VHF Applications in Industrial and Commercial Equipment

Features:

- High gain-bandwidth product
- Low noise figure
- High unneutralized power gain
- Hermetically sealed four-lead metal package
- All active elements insulated from case
- Low collector-to-base feedback

RCA-2N5180* is an epitaxial planar transistor of the silicon n-p-n type with characteristics which make it extremely useful as a general-purpose RF amplifier at vhf frequencies. These characteristics include an exceptionally low noise figure at high frequencies, low leakage current, and a high gain-bandwidth product.

The 2N5180 utilizes a hermetically sealed four-lead metal package in which all active elements of the transistor are insulated from the case. The case may be grounded by means of a fourth lead in applications requiring minimum feedback capacitance, shielding of the device, or both.

* Formerly Dev. No. TA7303.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

*COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	30	V
*COLLECTOR-TO-EMITTER VOLTAGE	V_{CEO}	15	V
*EMITTER-TO-BASE VOLTAGE	V_{EBO}	2	V
*CONTINUOUS COLLECTOR CURRENT	I_C	limited by dissipation	
*TRANSISTOR DISSIPATION:	P_T		
At ambient temperatures up to 25°C		180	mW
At ambient temperatures above 25°C		See Fig.2	
*TEMPERATURE RANGE:			
Storage & Operating (Junction)		−65 to 175	°C
*LEAD TEMPERATURE (During Soldering):			
At distances $\geq$ 1/32 in. (0.8 mm) from seating plane for 10 s max.		265	°C

* In accordance with JEDEC registration data format JS-9 RDF-1.

ELECTRICAL CHARACTERISTICS, at $T_A = 25^oC$

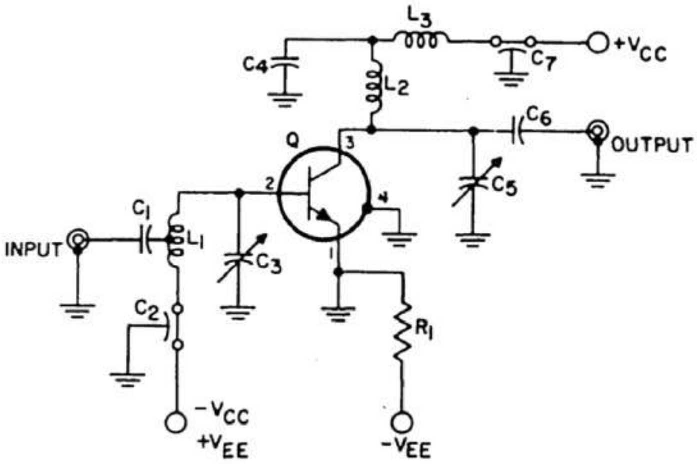
	Characteristics	Symbols	TEST CONDITIONS					LIMITS			Units
			Frequency f	DC Collector-to-Base Voltage V_{CB}	DC Collector-to-Emitter Voltage V_{CE}	DC Emitter Current I_E	DC Collector Current I_C	Type 2N5180			
			MHz	V	V	mA	mA	Min.	Typ.	Max.	
*	Collector-Cutoff Current	I_{CBO}		8		0		-	-	0.5	μA
*	Collector-to-Base Breakdown Voltage	BV_{CBO}				0	0.001	30	-	-	V
*	Collector-to-Emitter Breakdown Voltage	BV_{CEO}					0.001	15	-	-	V
*	Emitter-to-Base Breakdown Voltage	BV_{EBO}				-0.001	0	2	-	-	V
*	Static Forward-Current Transfer Ratio	h_{FE}			8		2	20	-	200	
*	Magnitude of Small-Signal Forward-Current Transfer Ratio	$\|h_{fe}\|^a$	100		8		2	6.5	9	17	
*	Collector-to-Base Feedback Capacitance	C_{cb}^b	0.1 to 1	8		0		-	-	1	pF
*	Small-Signal, Common-Emitter Power Gain in Unneutralized Amplifier Circuit (See Fig. 1)	G_{PE}^a	200		10		2	12	-	19	dB
	VHF Noise Figure (See Fig. 1)	NF^a $NF^{a,c}$	200 60		8 8		2 1	- -	- 2.5	4.5	dB dB
*	Collector-Base Time Constant	$r_b'C_c$	31.9	8		-2		2	—	16	ps
*	Real Part of Common-Emitter Small-Signal Short-Circuit Input Impedance	$R_\alpha(h_{ie})$	200		10		2	60	—	240	Ω
*	Bandwidth	BW	200		10		2	650	—	1700	MHz

[a]Fourth lead (case) grounded.

[b]C_{cb} is a three terminal measurement of the collector-to-base capacitance with the emitter and case connected to the guard terminal.

[c]Source Resistance, $R_s = 400$ ohms.

* In accordance with JEDEC registration data format JS-9 RDF-1.



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C_1, C_4 = 510pF
C_2, C_7 = 2300pF
C_3, C_5 = 2-25pF
C_6 = 10pF
R_1 = 2000 ohms
Q = 2N5180
L_1 = ½ Turn #14 Formvar● center tapped; length = 2 inches

L_2 = ½ Turn #14 Formvar●; length = 1½ inches
L_3 = 1μH RF choke
Source (Generator) Resistance R_S = 50 ohms
Load Resistance R_L = 50 ohms
● Trademark, Shawinidan Products Corporation.

Fig.1 — 200 MHz power gain and noise figure test circuit for type 2N5180

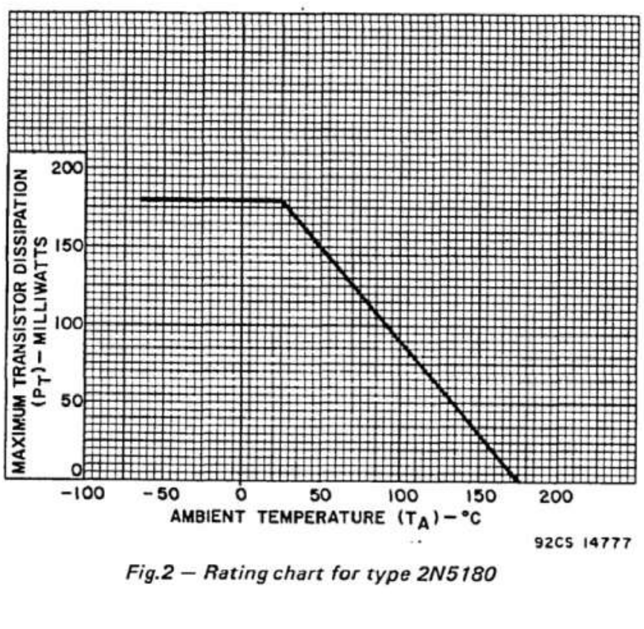

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Fig.2 — Rating chart for type 2N5180

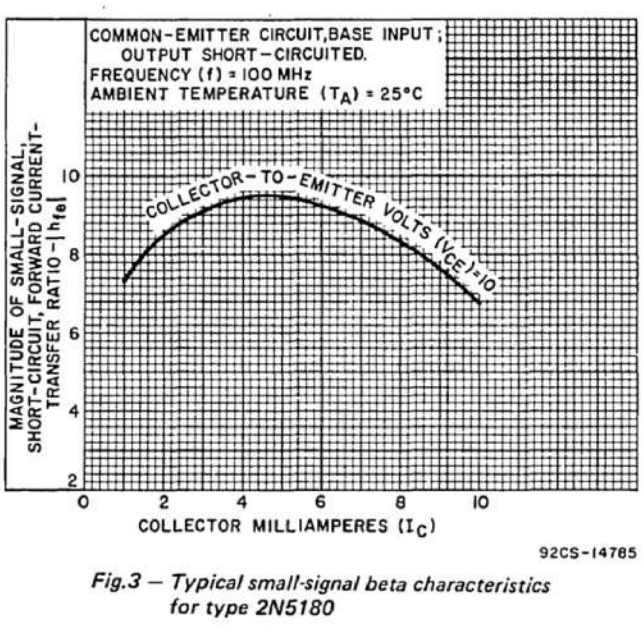

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Fig.3 — Typical small-signal beta characteristics for type 2N5180

TYPICAL y PARAMETER CHARACTERISTICS

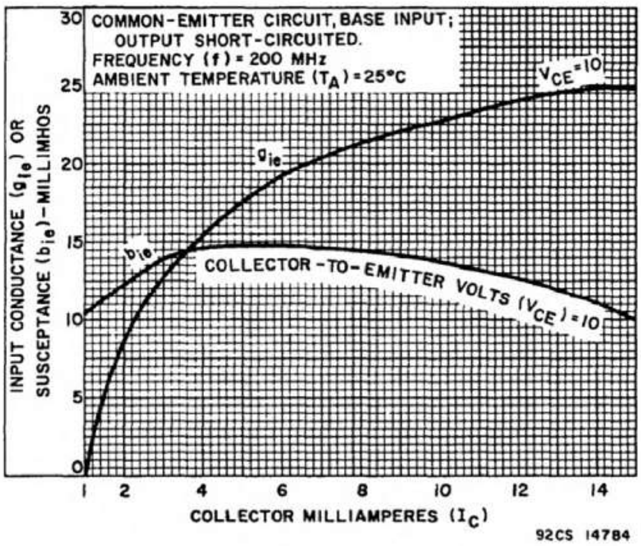

Fig.4 – Input admittance (y_{ie}) vs collector current (I_C)

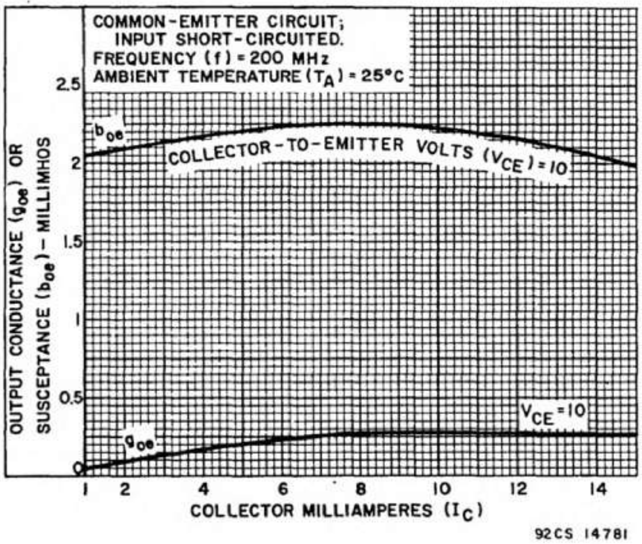

Fig.5 – Output admittance (y_{oe}) vs collector current (I_C)

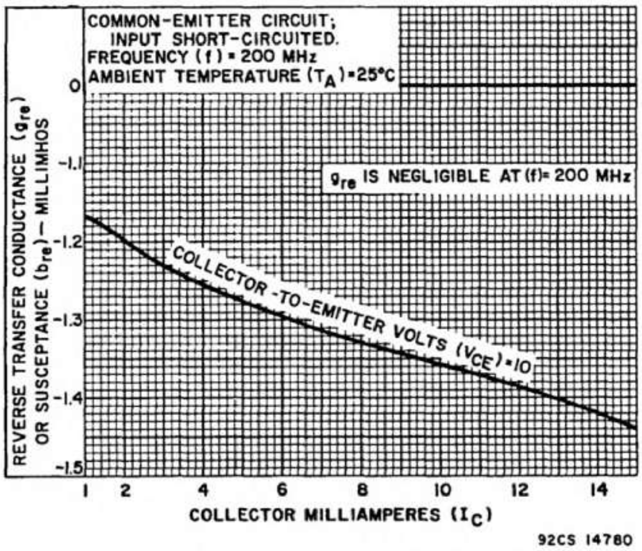

Fig.6 – Reverse transadmittance (y_{re}) vs collector current (I_C)

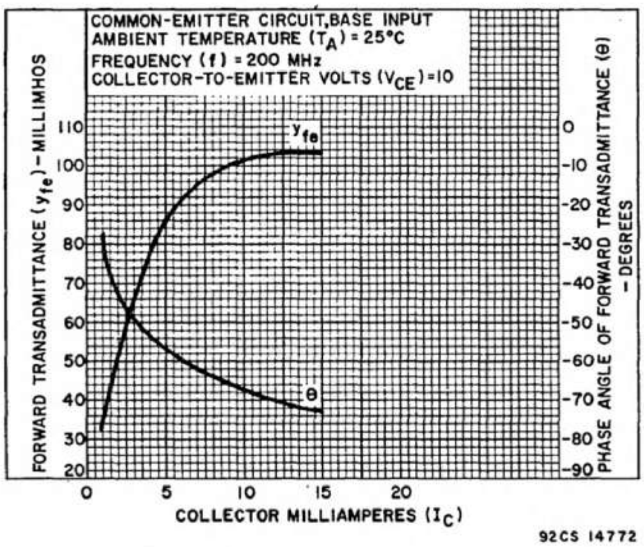

Fig.7 – Forward transadmittance (y_{ie}, $\angle\theta$) vs collector current (I_C)

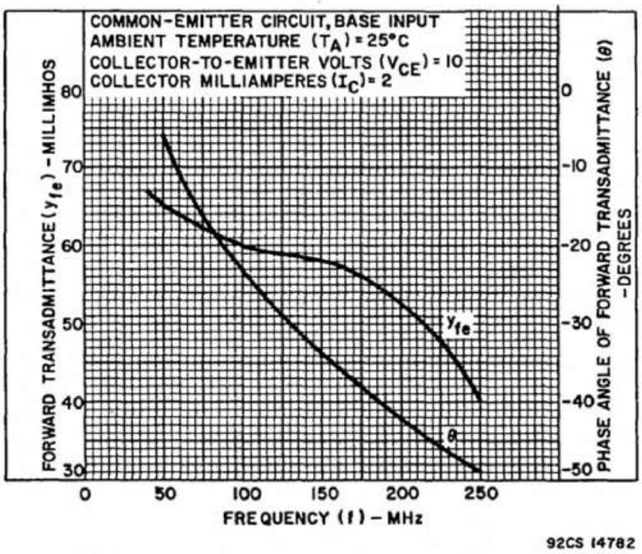

Fig.8 – Forward transadmittance (y_{ie}, $\angle\theta$) vs. frequency (f)

TERMINAL CONNECTIONS

Lead 1 – Emitter
Lead 2 – Base
Lead 3 – Collector
Lead 4 – Connected to case