

2N5835
2N5836
2N5837

The RF Line

NPN SILICON HIGH-FREQUENCY TRANSISTORS

... designed primarily for use in fact current-mode switching circuits in military and industrial equipment. Suitable for use in general high-frequency amplifier applications to 1.5 GHz.

- 2N5835 — 10 mAdc, 6.0 Vdc Characteristics
 $f_T = 2.5$ GHz (Min)
 $r_b' C_C = 5.0$ ps (Typ)
 $t_r = 250$ ps (Typ)
- 2N5836 — 50 mAdc, 6.0 Vdc Characteristics —
 $f_T = 2.0$ GHz (Min)
 $r_b' C_C = 6.0$ ps (Typ)
 $t_r = 320$ ps (Typ)
- 2N5837 — 100 mAdc, 3.0 Vdc Characteristics —
 $f_T = 1.7$ GHz (Min)
 $r_b' C_C = 6.0$ ps (Typ)
 $t_r = 650$ ps (Typ)
- MIL-S-19500 Processed Versions Available as MRF5836HX, MRF5836HXV

2.5 GHz @ 10 mAdc — 2N5835
 2.0 GHz @ 50 mAdc — 2N5836
 1.7 GHz @ 100 mAdc — 2N5837

HIGH FREQUENCY
TRANSISTORS

NPN SILICON



TO-206AB
2N5836
2N5837

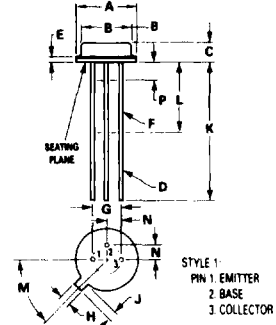


TO-206AF
2N5835

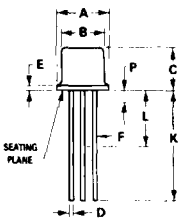
***MAXIMUM RATINGS**

Rating	Symbol	2N5835	2N5836	2N5837	Unit
Collector-Emitter Voltage	V_{CE0}	10	10	5.0	Vdc
Collector-Base Voltage	V_{CB0}	15	15	10	Vdc
Emitter-Base Voltage	V_{EB0}	3.5	3.5	3.5	Vdc
Collector Current - Continuous	I_C	15	200	300	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	200	300	300	mW
		1.14	—	—	mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 100^\circ\text{C}$ Derate above 100°C	P_D	—	0.75	0.75	Watts
		—	7.5	7.5	mW/ $^\circ\text{C}$
Storage Junction Temperature Range	T_{stg}	-65 to +200			$^\circ\text{C}$

* Indicates JEDEC Registered Data



STYLE 1
 PIN 1. EMITTER
 2. BASE
 3. COLLECTOR



STYLE 10
 PIN 1. EMITTER
 2. BASE
 3. COLLECTOR
 4. CASE

NOTE: ALL RULES AND NOTES ASSOCIATED WITH TO-72 OUTLINE SHALL APPLY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.53	0.016	0.021
E	—	0.76	—	0.030
F	0.41	0.48	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.91	1.17	0.036	0.046
J	0.71	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

CASE 20-03
TO-206AF
(TO-72)

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	1.85	2.18	0.085	0.085
D	0.406	0.533	0.016	0.021
E	—	1.02	—	0.040
F	0.305	0.483	0.012	0.019
G	2.54 BSC		0.100 BSC	
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

CASE 26-03
TO-206AB
(TO-46)

2N5835, 2N5836, 2N5837

* ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

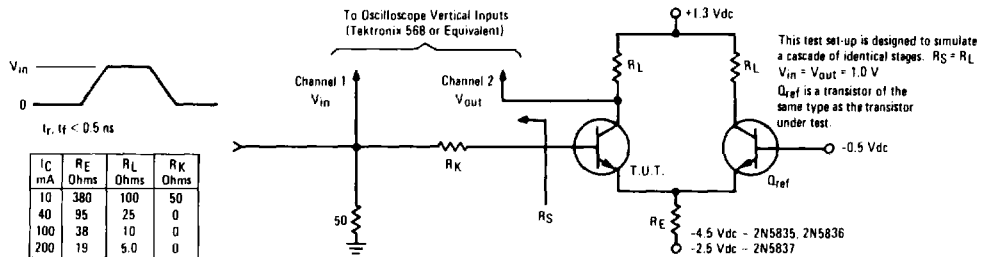
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{A dc}$, $I_E = 0$)	2N5835	15	—	—	Vdc
($I_C = 100 \mu\text{A dc}$, $I_E = 0$)	2N5836	15	—	—	
	2N5837	10	—	—	
Emitter-Base Breakdown Voltage ($I_E = 100 \mu\text{A dc}$, $I_C = 0$)		3.5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 7.5 \text{ Vdc}$, $I_E = 0$)	2N5835	—	—	0.01	$\mu\text{A dc}$
($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$)	2N5836	—	—	10	
($V_{CB} = 5.0 \text{ Vdc}$, $I_E = 0$)	2N5837	—	—	10	
Emitter Cutoff Current ($V_{EB} = 3.0 \text{ Vdc}$, $I_C = 0$)		—	—	100	$\mu\text{A dc}$
ON CHARACTERISTICS					
DC Current Gain ($I_C = 10 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$)	2N5835	25	—	—	—
($I_C = 50 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$)	2N5836	25	—	—	
($I_C = 100 \text{ mA dc}$, $V_{CE} = 3.0 \text{ Vdc}$)	2N5837	25	—	—	
Base-Emitter On Voltage ($I_C = 10 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$)	2N5835	—	—	0.9	Vdc
($I_C = 50 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$)	2N5836	—	—	0.9	
($I_C = 100 \text{ mA dc}$, $V_{CE} = 3.0 \text{ Vdc}$)	2N5837	—	—	0.9	
DYNAMIC CHARACTERISTICS					
Current-Gain-Bandwidth Product ① ($I_C = 10 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$, $f = 200 \text{ MHz}$)	2N5835	2.5	—	—	GHz
($I_C = 50 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$, $f = 200 \text{ MHz}$)	2N5836	2.0	—	—	
($I_C = 100 \text{ mA dc}$, $V_{CE} = 3.0 \text{ Vdc}$, $f = 200 \text{ MHz}$)	2N5837	1.7	—	—	
Collector-Base Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 0.1$ to 1.0 MHz)	2N5835	—	—	0.8	pF
	2N5836	—	—	3.5	
($V_{CB} = 5.0 \text{ Vdc}$, $I_E = 0$, $f = 0.1$ to 1.0 MHz)	2N5837	—	—	5.0	
Collector-Base Time Constant ② ($I_C = 10 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$, $f = 63.6 \text{ MHz}$)	2N5835	—	5.0	—	ps
($I_C = 50 \text{ mA dc}$, $V_{CE} = 6.0 \text{ Vdc}$, $f = 63.6 \text{ MHz}$)	2N5836	—	6.0	—	
($I_C = 100 \text{ mA dc}$, $V_{CE} = 3.0 \text{ Vdc}$, $f = 63.6 \text{ MHz}$)	2N5837	—	6.0	—	
SWITCHING CHARACTERISTICS ②					
Rise Time (See Figure 1)	($I_C = 10 \text{ mA dc}$)	2N5835	—	250	ps
	($I_C = 40 \text{ mA dc}$)	2N5836	—	320	
	($I_C = 100 \text{ mA dc}$)	2N5837	—	650	

* Indicates JEDEC Registered Data

① f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

② Typical values shown in addition to JEDEC Registered Data

FIGURE 1 — SWITCHING TIME TEST CIRCUIT



2N5835, 2N5836, 2N5837

FIGURE 2 - SWITCHING TIME

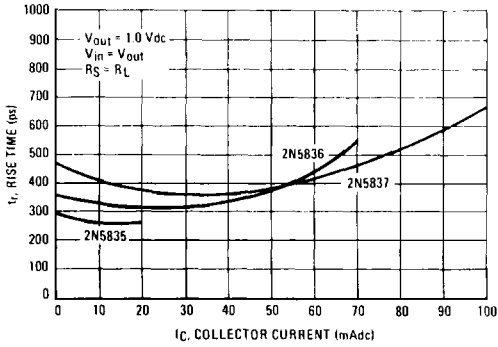


FIGURE 3 - CURRENT-GAIN-BANDWIDTH PRODUCT

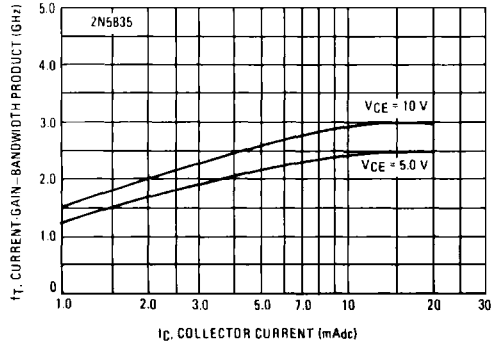


FIGURE 4 - CURRENT-GAIN-BANDWIDTH PRODUCT

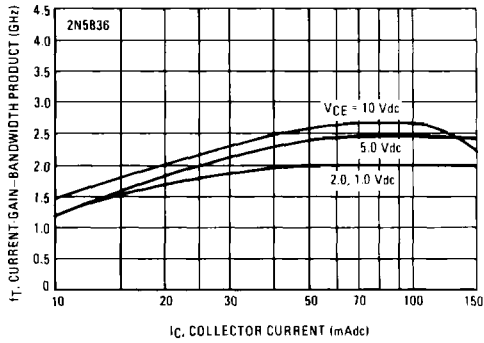


FIGURE 5 - CURRENT-GAIN-BANDWIDTH PRODUCT

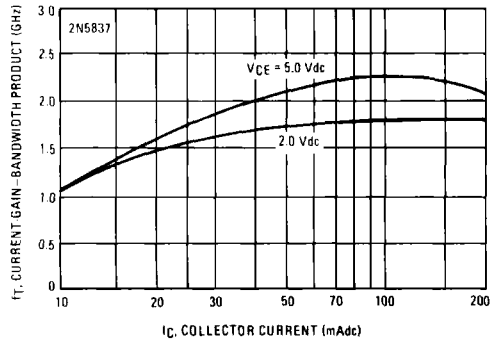


FIGURE 6 - COLLECTOR-BASE TIME CONSTANT

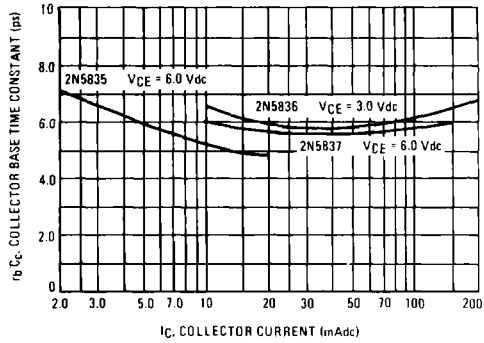
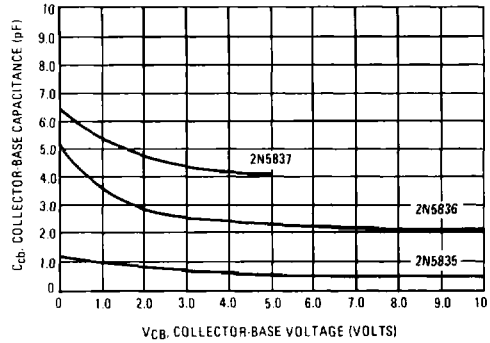


FIGURE 7 - COLLECTOR-BASE CAPACITANCE



2N5835, 2N5836, 2N5837

2N5835 SCATTERING PARAMETERS
 (I_C = 5.0 mA_{dc}, V_{CE} = 6.0 V_{dc}, Z_G = Z_L = 50 Ohms)

2

FIGURE 8 - S₁₁, INPUT REFLECTION COEFFICIENT

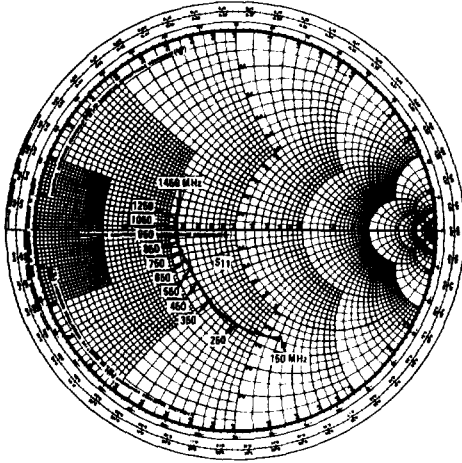


FIGURE 9 - S₂₂, OUTPUT REFLECTION COEFFICIENT

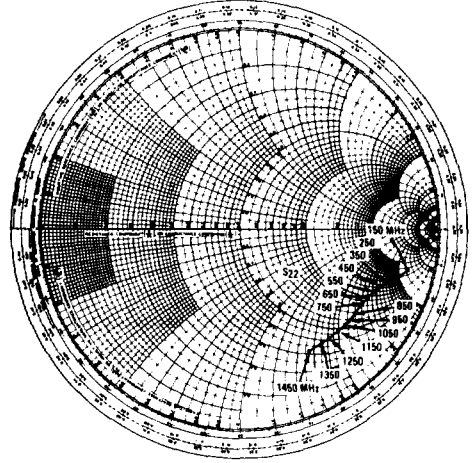


FIGURE 10 - S₁₂, REVERSE TRANSMISSION COEFFICIENT

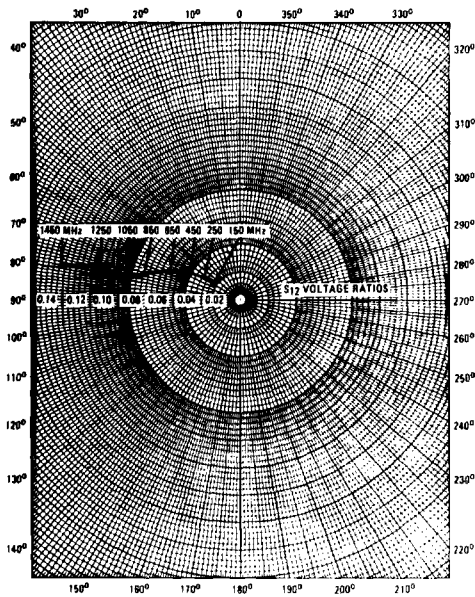
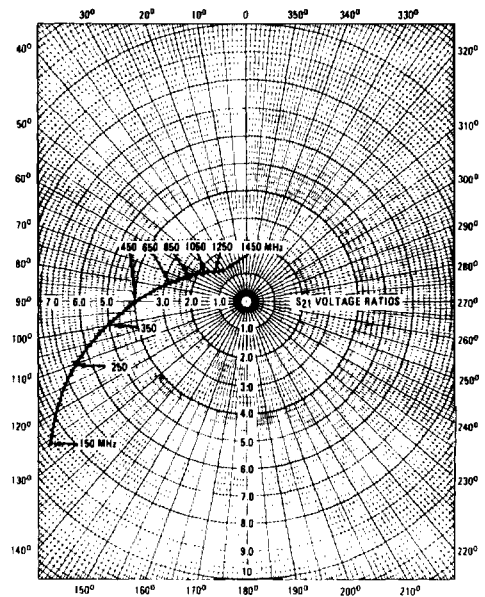


FIGURE 11 - S₂₁, FORWARD TRANSMISSION COEFFICIENT



2N5835, 2N5836, 2N5837

2N5836 SCATTERING PARAMETERS
 ($I_C = 100 \text{ mA dc}$, $V_{CE} = 10 \text{ V dc}$, $Z_G = Z_L = 50 \text{ Ohms}$)

FIGURE 12 – S_{11} , INPUT REFLECTION COEFFICIENT

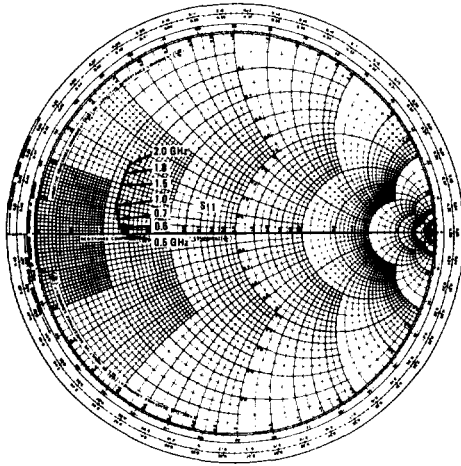


FIGURE 13 – S_{22} , OUTPUT REFLECTION COEFFICIENT

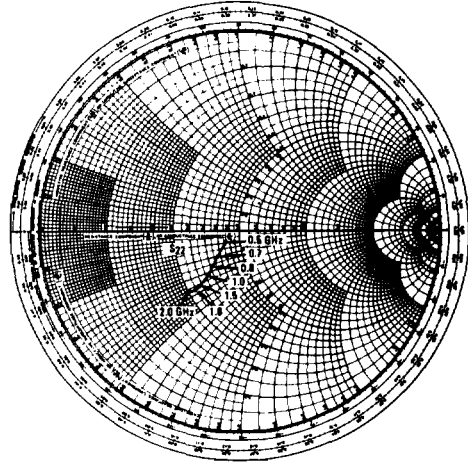


FIGURE 14 – S_{12} , REVERSE TRANSMISSION COEFFICIENT

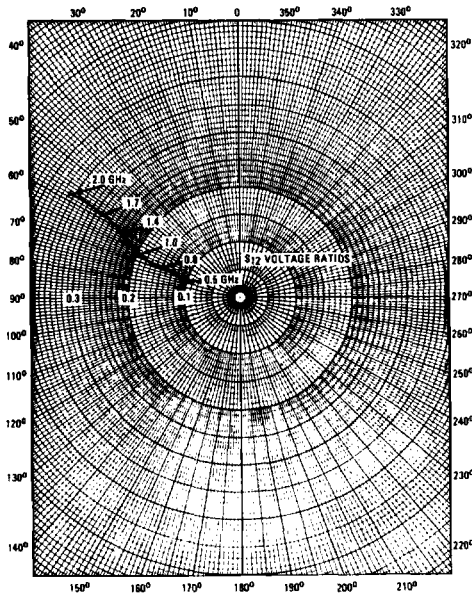
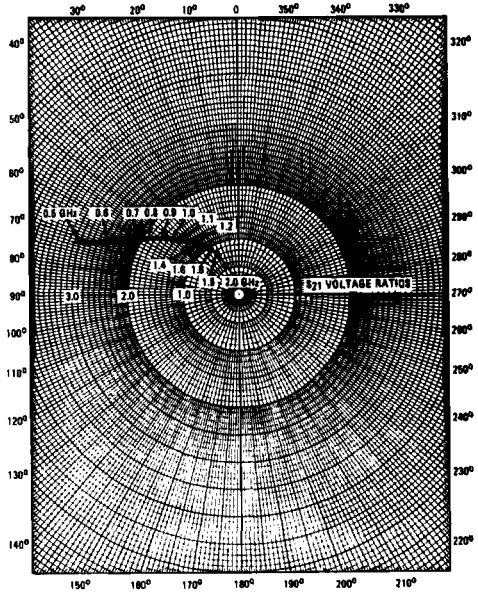


FIGURE 15 – S_{21} , FORWARD TRANSMISSION COEFFICIENT



2N5835, 2N5836, 2N5837

2N5837 SCATTERING PARAMETERS

($I_C = 100 \text{ mA dc}$, $V_{CE} = 3.0 \text{ V dc}$, $Z_G = Z_L = 50 \text{ Ohms}$)

FIGURE 16 - S_{11} , INPUT REFLECTION COEFFICIENT

FIGURE 17 - S_{22} , OUTPUT REFLECTION COEFFICIENT

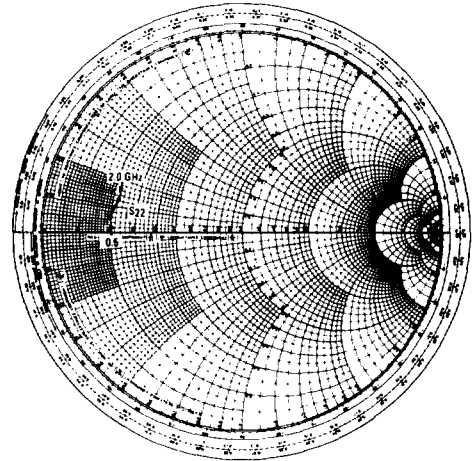
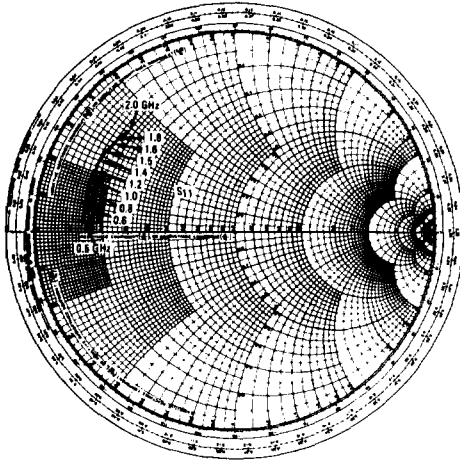


FIGURE 18 - S_{12} , REVERSE TRANSMISSION COEFFICIENT

FIGURE 19 - S_{21} , FORWARD TRANSMISSION COEFFICIENT

