SIEMENS

NPN Silicon Switching Transistor

SXT 3904

● High current gain: 0.1 mA to 100 mA
● Low collector-emitter saturation voltage
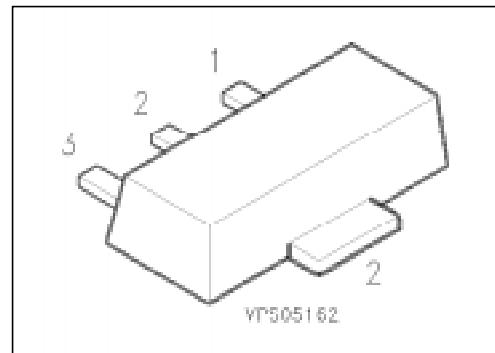
Type	Marking	Ordering Code (tape and reel)	Pin Configuration			Package[1]
			1	**2**	**3**	
SXT 3904	1A	Q68000-A8396	B	C	E	SOT-89

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CE0}	40	V
Collector-base voltage	V_{CB0}	60	
Emitter-base voltage	V_{EB0}	6	
Collector current	I_C	200	mA
Total power dissipation, $T_S = 95\,°C$	P_{tot}	1	W
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	$-65 \dots +150$	

Thermal Resistance

Junction - ambient[2]	$R_{th\,JA}$	≤ 125	K/W
Junction - soldering point	$R_{th\,JS}$	≤ 55	

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[1] For detailed information see chapter Package Outlines.

[2] Package mounted on epoxy pcb 40 mm $\times$ 40 mm $\times$ 1.5 mm/6 cm^2 Cu.

Electrical Characteristics

at $T_A = 25\ ^{\circ}$C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Collector-emitter breakdown voltage $I_C = 1$ mA	$V_{(BR)CE0}$	40	–	–	V
Collector-base breakdown voltage $I_C = 10\ \mu$A	$V_{(BR)CB0}$	60	–	–	
Emitter-base breakdown voltage $I_E = 10\ \mu$A	$V_{(BR)EB0}$	6	–	–	
Collector-base cutoff current $V_{CB} = 30$ V	I_{CB0}	–	–	50	nA
Collector-emitter cutoff current $V_{CE} = 30$ V, $V_{BE} = 3$ V	I_{CEV}	–	–	50	
DC current gain $I_C = 100\ \mu$A, $V_{CE} = 1$ V $I_C =\quad 1$ mA, $V_{CE} = 1$ V $I_C =\quad 10$ mA, $V_{CE} = 1$ V $I_C =\quad 50$ mA, $V_{CE} = 1$ V $I_C = 100$ mA, $V_{CE} = 1$ V	h_{FE}	40 70 100 60 30	– – – – –	– – 300 – –	–
Collector-emitter saturation voltage[1] $I_C = 10$ mA, $I_B = 1$ mA $I_C = 50$ mA, $I_B = 5$ mA	V_{CEsat}	– –	– –	0.2 0.3	V
Base-emitter saturation voltage[1] $I_C = 10$ mA, $I_B = 1$ mA $I_C = 50$ mA, $I_B = 5$ mA	V_{BEsat}	0.65 –	– –	0.85 0.95	

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[1] Pulse test conditions: $t \le 300\ \mu$s, $D \le 2$ %.

Electrical Characteristics

at $T_A = 25$ ˚C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

AC characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Transition frequency $I_C = 10$ mA, $V_{CE} = 20$ V, $f = 100$ MHz	f_f	300	–	–	MHz
Output capacitance $V_{CB} = 5$ V, $f = 1$ MHz	C_{obo}	–	–	4	pF
Input capacitance $V_{EB} = 0.5$ V, $f = 1$ MHz	C_{ibo}	–	–	8	
Input impedance $I_{CE} = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	h_{ie}	1	–	10	kΩ
Voltage feedback ratio $I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	h_{re}	0.5	–	8	10^{-4}
Small-signal current gain $I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	h_{fe}	100	–	400	–
Output admittance $I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	h_{oe}	1	–	40	µS
Noise figure $I_C = 0.1$ mA, $V_{CE} = 5$ V, $f = 10$ Hz to 15 kHz $R_S = 1$ kΩ	NF	–	–	5	dB
Switching times $V_{CC} = 3$ V, $V_{BE} = 0.5$ V, $I_C = 10$ mA, $I_{B1} = 1$ mA	t_d t_r	– –	– –	35 35	ns ns
$V_{CC} = 3$ V, $I_C = 10$ mA, $I_{B1} = I_{B2} = 1$ mA	t_s t_f	– –	– –	200 50	ns ns

Test circuits

Delay and rise time

300ns — $D = 2\%$
+10.9V
0
−0.5V
<1.0ns
+3.0V
275 Ω
10kΩ
C
<4.0pF
EHN00063

Storage and fall time

$10 < t_1 < 500 \mu s$
t_1 — $D = 2\%$
+10.9V
0
−9.1V
<1.0ns
+3.0V
275 Ω
10kΩ
C
<4.0pF
1N916
EHN00064
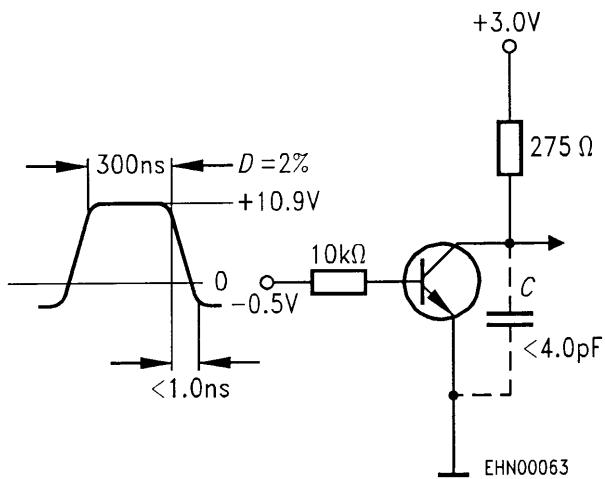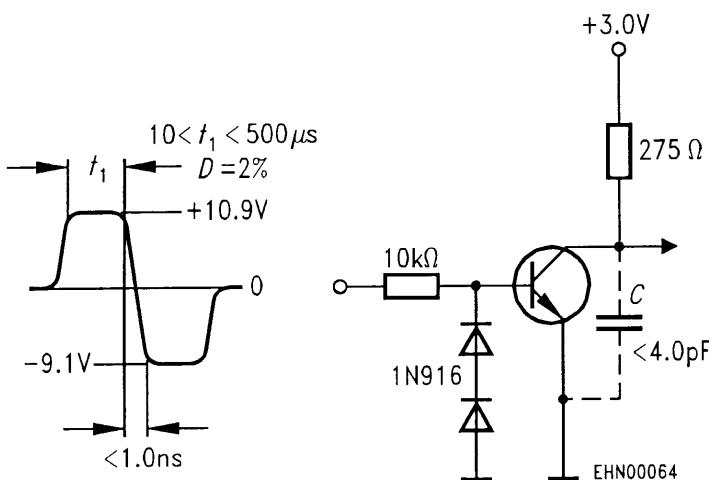
**Total power dissipation** $P_{tot} = f(T_A^*; T_S)$
* Package mounted on epoxy
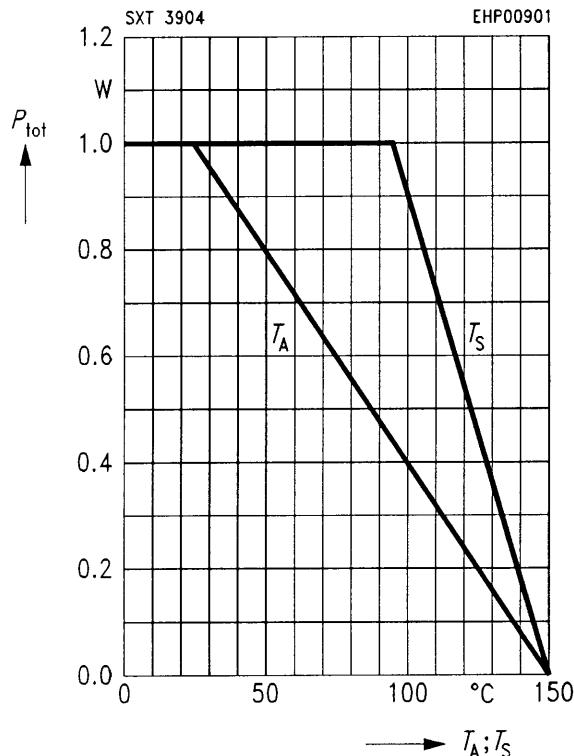

Saturation voltage $I_C = f(V_{BE\ sat}, V_{CE\ sat})$
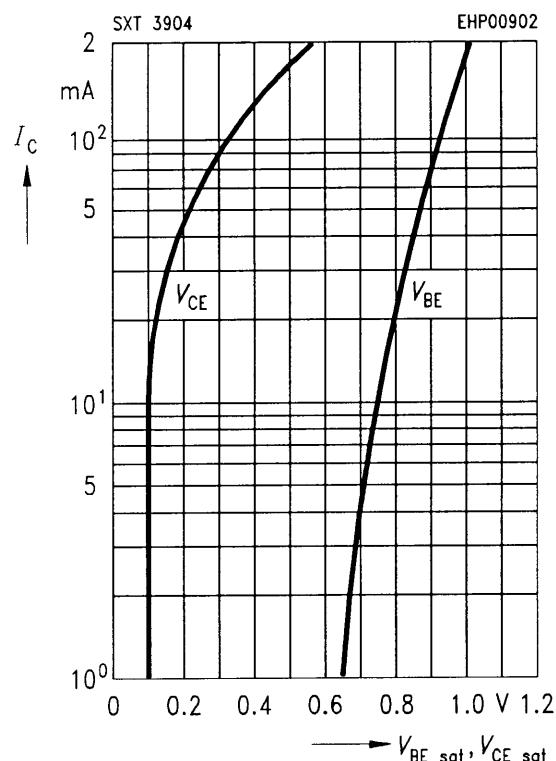
Permissible pulse load $P_{tot\ max}/P_{tot\ DC} = f(t_p)$
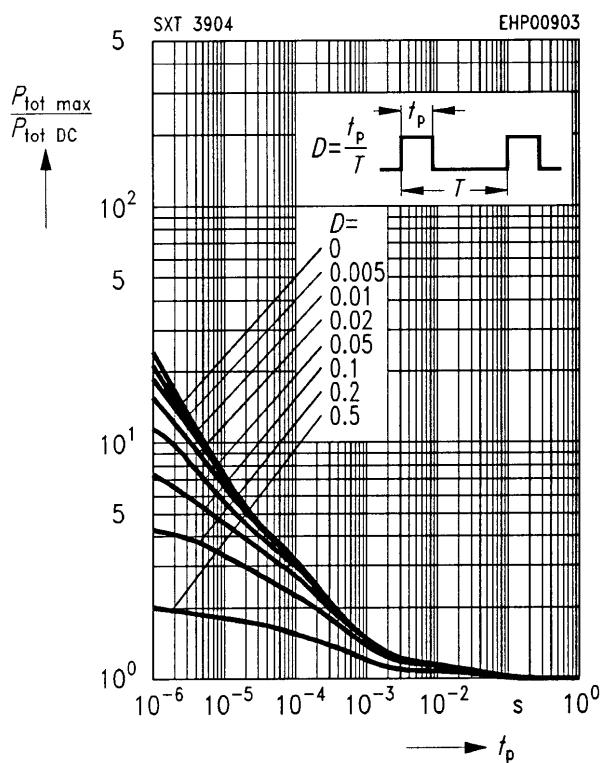
Open-circuit reverse voltage transfer ratio
$h_{12e} = f(I_C)$
$V_{CE} = 10$ V, $f = 1$ kHz
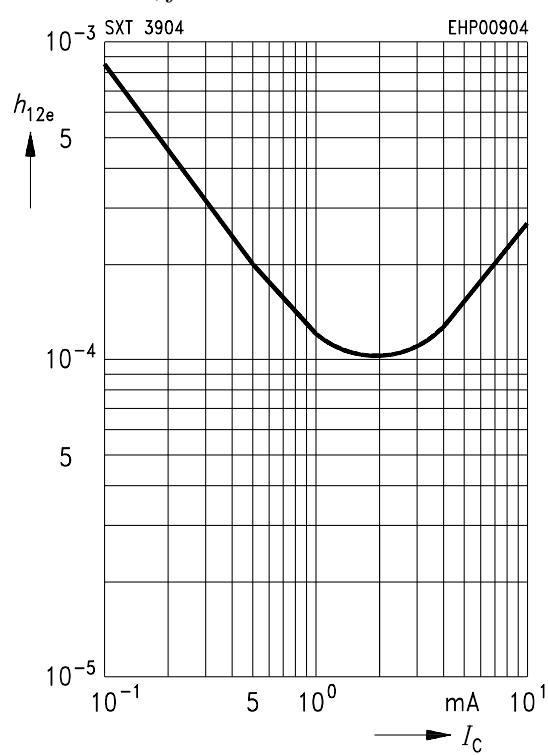
Small-signal current gain
$h_{fe} = f(I_C)$
$V_{CE} = 10$ V, $f = 1$ MHz
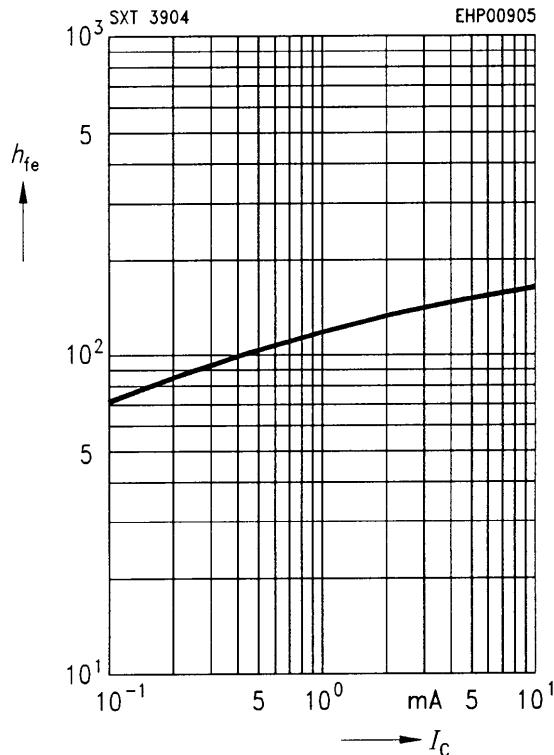
Output admittance
$h_{22e} = f(I_C)$
$V_{CE} = 10$ V, $f = 1$ MHz
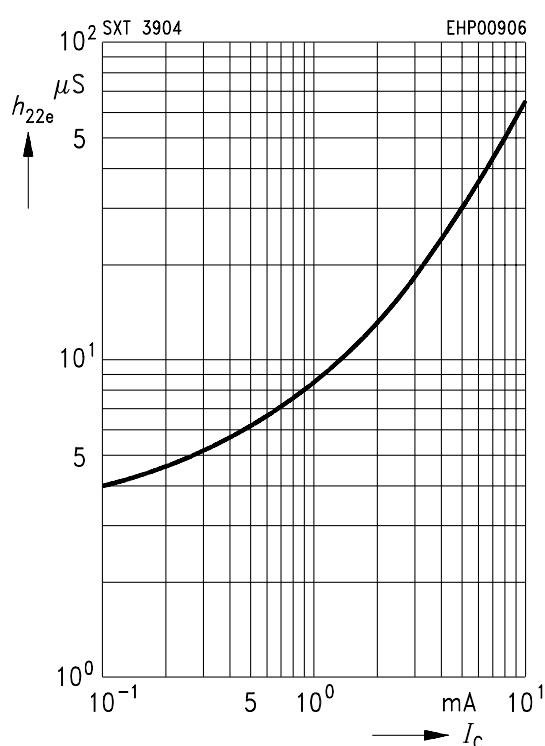
## Delay time $t_d = f(I_C)$
Rise time $t_r = f(I_C)$
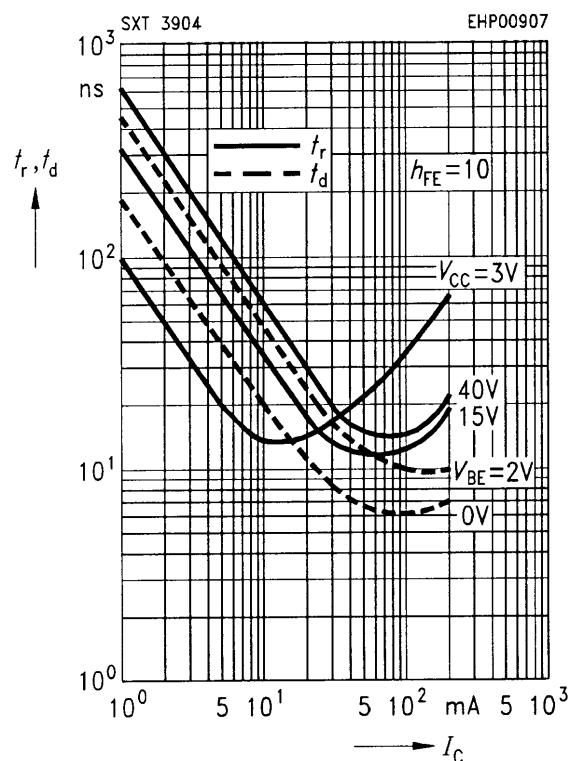
Storage time $t_s = f(I_C)$
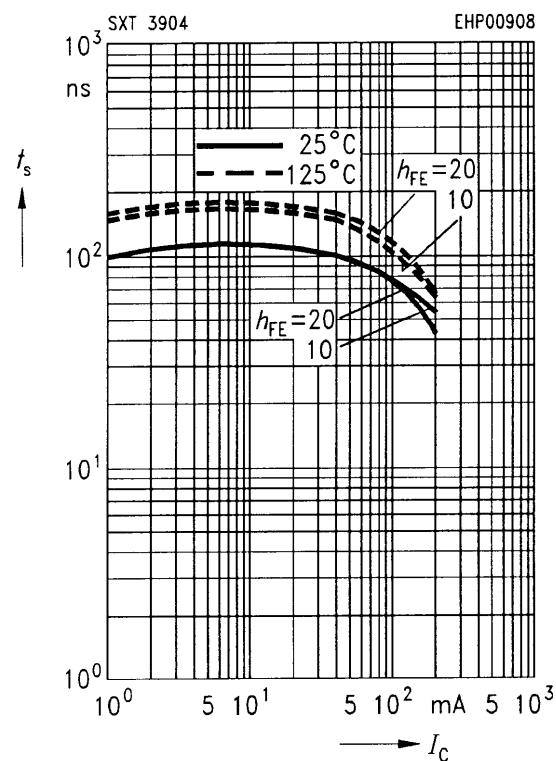
**Fall time** $t_f = f(I_C)$
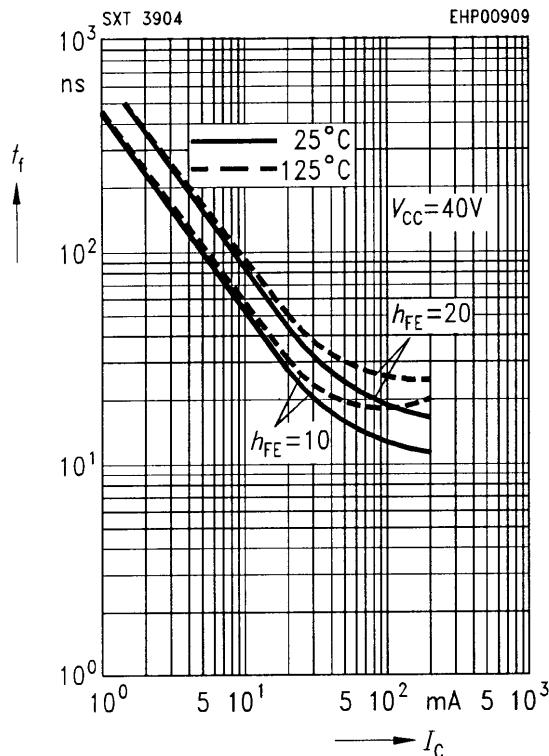
Rise time $t_r = f(I_C)$
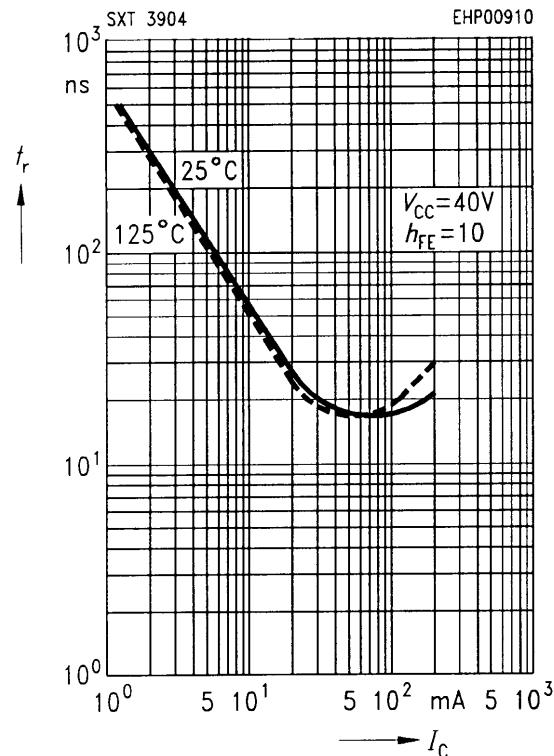
DC current gain $h_{FE} = f(I_C)$
$V_{CE} = 1\ V$ (standardized)