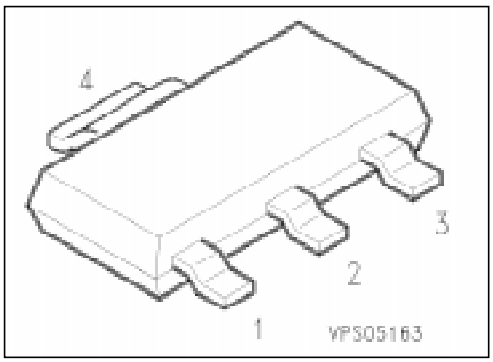
SIEMENS

NPN Silicon Switching Transistor — PZT 3904

- High DC current gain 0.1 mA to 100 mA
- Low collector-emitter saturation voltage
- Complementary type: PZT 3906 (PNP)



Type	Marking	Ordering Code (tape and reel)	Pin Configuration 1	2	3	4	Package[1]
PZT 3904	ZT 3904	Q62702-Z2029	B	C	E	C	SOT-223

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 = 72 °C	P_{tot}	1.5	W
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	– 65 … + 150	

Thermal Resistance

Junction - ambient[2]	$R_{th\ JA}$	≤ 122	K/W
Junction - soldering point	$R_{th\ JS}$	≤ 52	

1) For detailed information see chapter Package Outlines.

2) Package mounted on epoxy pcb 40 mm × 40 mm × 1.5 mm/6 cm² Cu.

Electrical Characteristics
at T_A = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC characteristics					
Collector-emitter breakdown voltage I_C = 1 mA, I_B = 0	$V_{(BR)CE0}$	40	–	–	V
Collector-base breakdown voltage I_C = 10 µA, I_B = 0	$V_{(BR)CB0}$	60	–	–	
Emitter-base breakdown voltage I_E = 10 µA, I_C = 0	$V_{(BR)EB0}$	6	–	–	
Collector-base cutoff current V_{CB} = 30 V, I_E = 0	I_{CB0}	–	–	50	nA
Collector-emitter cutoff current V_{CE} = 30 V, – V_{BE} = 0.5 V	I_{CEV}	–	–	50	
Base-emitter cutoff current V_{CE} = 30 V, – V_{BE} = 0.5 V	I_{BEV}	–	–	50	
DC current gain[1)] I_C = 0.1 mA, V_{CE} = 1 V I_C = 1 mA, V_{CE} = 1 V I_C = 10 mA, V_{CE} = 1 V I_C = 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_C = 1 mA I_C = 50 mA, I_C = 5 mA	V_{BEsat}	 – –	 – –	 0.85 0.95	

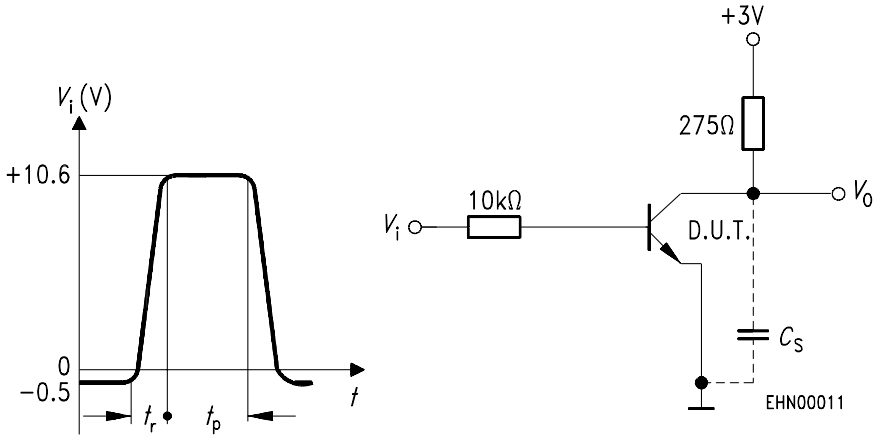
1) Pulse test conditions: $t \leq 300$ µs, D = 2 %

Electrical Characteristics
at T_A = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC characteristics					
Transition frequency I_C = 10 mA, V_{CE} = 20 V, f = 100 MHz	f_T	300	–	–	MHz
Collector-base 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	
Noise figure I_C = 100 µA, V_{CE} = 5 V, R_S = 1 kΩ, f = 10 Hz to 15.7 kHz	F	–	–	5	dB
Input impedance I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz	h_{11e}	1	–	10	kΩ
Open-circuit reverse voltage transfer ratio I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz	h_{12e}	0.5	–	8	10^{-4}
Short-circuit forward current transfer ratio I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz	h_{21e}	100	–	400	–
Open-circuit output admittance I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz	h_{22e}	1	–	40	µS
V_{CC} = 3 V, I_C = 10 mA, I_{B1} = 1 mA $V_{BE(off)}$ = 0.5 V Delay time Rise time V_{CC} = 3 V, I_C = 10 mA, I_{B1} = I_{B2} = 1 mA Storage time Fall time (see diagrams)	 t_d t_r t_{stg} t_f	 – – – –	 – – – –	 35 35 200 50	 ns ns ns ns

Switching Times

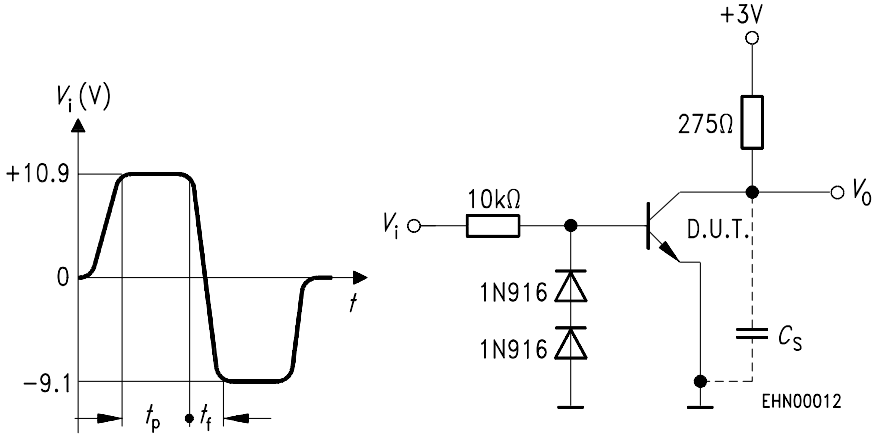
Turn-on time when switched from – V_{BEoff} = 0.5 V to V_{BEon} = 10.6 V, I_{Con} = 10 mA; I_{Bon} = 1 mA



Input waveform; t_r < 1 ns; t_p = 300 ns; δ = 0.02.

Delay and rise time test circuit; total shunt capacitance of test jig and connectors C_S < 4 pF; scope impedance = 10 MΩ.

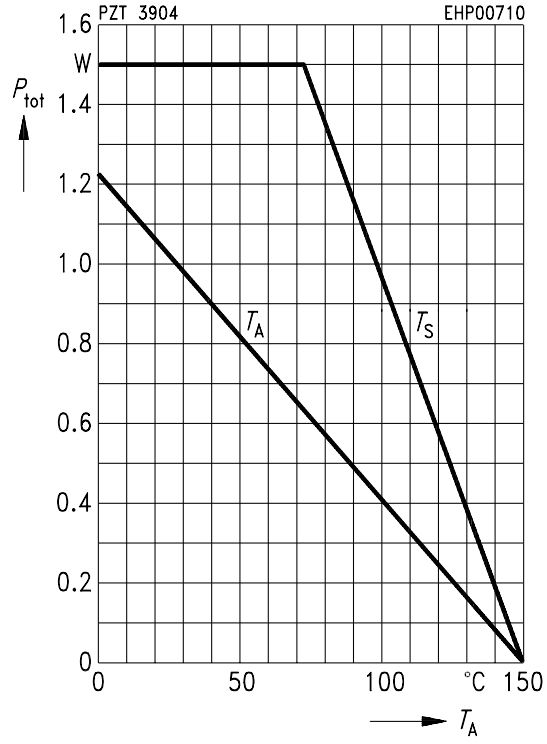
Turn-off time I_{Con} = 10 mA; I_{Bon} = – I_{Boff} = 1 mA



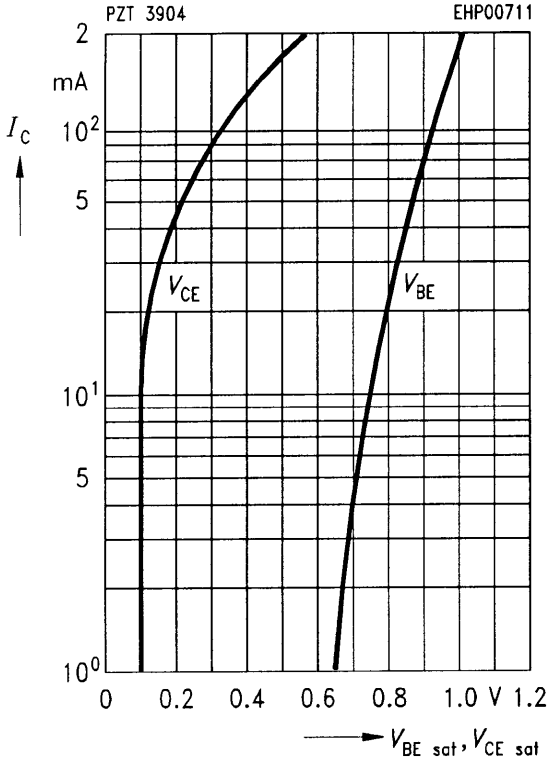
Input waveform; t_f < 1 ns; 10 µs < t_p ≤ 500 µs; δ = 0.02.

Storage and fall time test circuit; total shunt capacitance of test jig and connectors C_S < 4 pF; scope impedance = 10 MΩ.

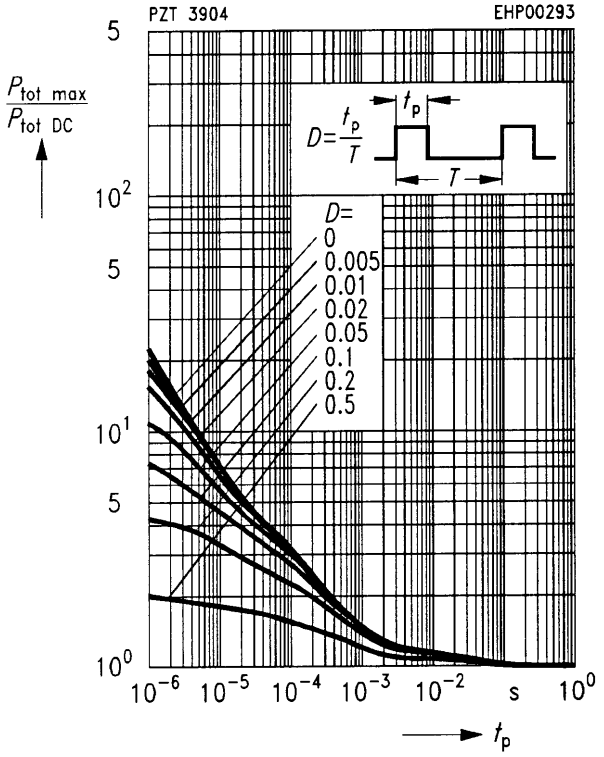
Total power dissipation $P_{tot} = f(T_A^*; T_S)$
* Package mounted on epoxy



Saturation voltage $I_C = f(V_{BEsat}, V_{CEsat})$
$h_{FE} = 10$



Permissible pulse load $P_{tot\,max} / P_{tot\,DC} = f(t_p)$



DC current gain $h_{FE} = f(I_C)$
V_{CE} = 10 V, normalized