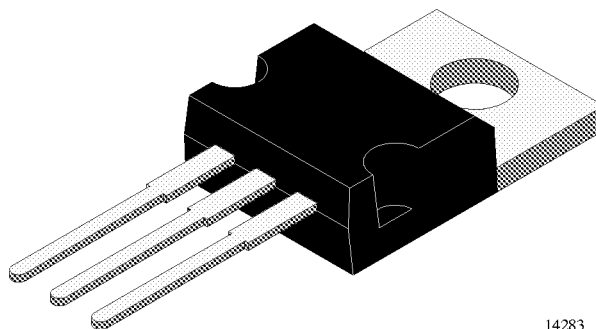


Silicon NPN High Voltage Switching Transistor

Features

- Simple-sWitch-Off Transistor (SWOT)
- HIGH SPEED technology
- Planar passivation
- 100 kHz switching rate
- Very low switching losses
- Very low dynamic saturation
- Very low operating temperature
- Optimized RBSOA
- High reverse voltage



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Applications

Electronic lamp ballast circuits
Switch-mode power supplies

Absolute Maximum Ratings

$T_{case} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Collector-emitter voltage		V_{CEO}	400	V
		V_{CEW}	500	V
		V_{CES}	700	V
Emitter-base voltage		V_{EBO}	9	V
Collector current		I_C	6	A
Collector peak current		I_{CM}	9	A
Base current		I_B	3	A
Base peak current		I_{BM}	4.5	A
Total power dissipation	$T_{case} \leq 25^{\circ}\text{C}$	P_{tot}	50	W
Junction temperature		T_j	150	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	-65 to +150	$^{\circ}\text{C}$

Maximum Thermal Resistance

$T_{case} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Junction case		R_{thJC}	2.5	K/W

Electrical Characteristics

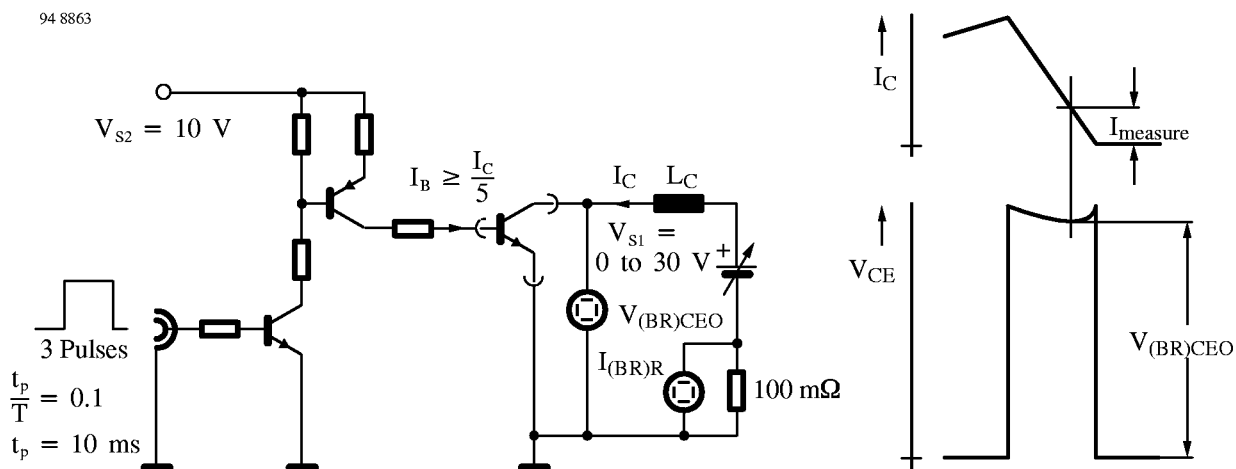
$T_{\text{case}} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Collector cut-off current	$V_{\text{CES}} = 700 \text{ V}$	I_{CES}			50	μA
	$V_{\text{CES}} = 700 \text{ V}; T_{\text{case}} = 150^{\circ}\text{C}$	I_{CES}			0.5	mA
Collector-emitter breakdown voltage (figure 1)	$I_{\text{C}} = 300 \text{ mA}; L = 125 \text{ mH}; I_{\text{measure}} = 100 \text{ mA}$	$V_{(\text{BR})\text{CEO}}$	400			V
Emitter-base breakdown voltage	$I_{\text{E}} = 1 \text{ mA}$	$V_{(\text{BR})\text{EBO}}$	9			V
Collector-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A}; I_{\text{B}} = 0.25 \text{ A}$	V_{CEsat}			0.2	V
	$I_{\text{C}} = 3 \text{ A}; I_{\text{B}} = 1 \text{ A}$	V_{CEsat}			0.4	V
Base-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A}; I_{\text{B}} = 0.25 \text{ A}$	V_{BEsat}			1	V
	$I_{\text{C}} = 3 \text{ A}; I_{\text{B}} = 1 \text{ A}$	V_{BEsat}			1.2	V
DC forward current transfer ratio	$V_{\text{CE}} = 2 \text{ V}; I_{\text{C}} = 10 \text{ mA}$	h_{FE}	15			
	$V_{\text{CE}} = 2 \text{ V}; I_{\text{C}} = 1 \text{ A}$	h_{FE}	15			
	$V_{\text{CE}} = 2 \text{ V}; I_{\text{C}} = 3 \text{ A}$	h_{FE}	7			
	$V_{\text{CE}} = 5 \text{ V}; I_{\text{C}} = 6 \text{ A}$	h_{FE}	4			
Collector-emitter working voltage	$V_{\text{S}} = 50 \text{ V}; L = 1 \text{ mH}; I_{\text{C}} = 6 \text{ A}; I_{\text{B1}} = 2 \text{ A}; -I_{\text{B2}} = 0.6 \text{ A}; -V_{\text{BB}} = 5 \text{ V}$	V_{CEW}	500			V
Dynamic saturation voltage	$I_{\text{C}} = 3 \text{ A}; I_{\text{B}} = 0.6 \text{ A}; t = 1 \mu\text{s}$	V_{CEsatdyn}		5	10	V
	$I_{\text{C}} = 3 \text{ A}; I_{\text{B}} = 0.6 \text{ A}; t = 3 \mu\text{s}$	V_{CEsatdyn}		1	2.5	V
Gain bandwidth product	$I_{\text{C}} = 500 \text{ mA}; V_{\text{CE}} = 10 \text{ V}; f = 1 \text{ MHz}$	f_{T}	4			MHz

Switching Characteristics

$T_{\text{case}} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Resistive load (figure 2)						
Turn on time	$I_C = 1\text{ A}; I_{B1} = 0.25\text{ A}; -I_{B2} = 0.5\text{ A}; V_S = 250\text{ V}$	t_{on}		0.15	0.25	μs
Storage time		t_s		2.2	3	μs
Fall time		t_f		0.3	0.4	μs
Turn on time	$I_C = 3\text{ A}; I_{B1} = 0.6\text{ A}; -I_{B2} = 1.5\text{ A}; V_S = 250\text{ V}$	t_{on}		0.35	0.5	μs
Storage time		t_s		1.2	2	μs
Fall time		t_f		0.1	0.15	μs
Inductive load (figure 3)						
Storage time	$I_C = 1\text{ A}; I_{B1} = 0.25\text{ A}; -I_{B2} = 0.5\text{ A}; V_{clamp} = 300\text{ V}; L = 200\text{ }\mu\text{H}$	t_s		2.3	3	μs
Fall time		t_f		0.2	0.3	μs
Storage time	$I_C = 3\text{ A}; I_{B1} = 0.6\text{ A}; -I_{B2} = 1.5\text{ A}; V_{clamp} = 300\text{ V}; L = 200\text{ }\mu\text{H}$	t_s		1.3	2	μs
Fall time		t_f		0.1	0.15	μs



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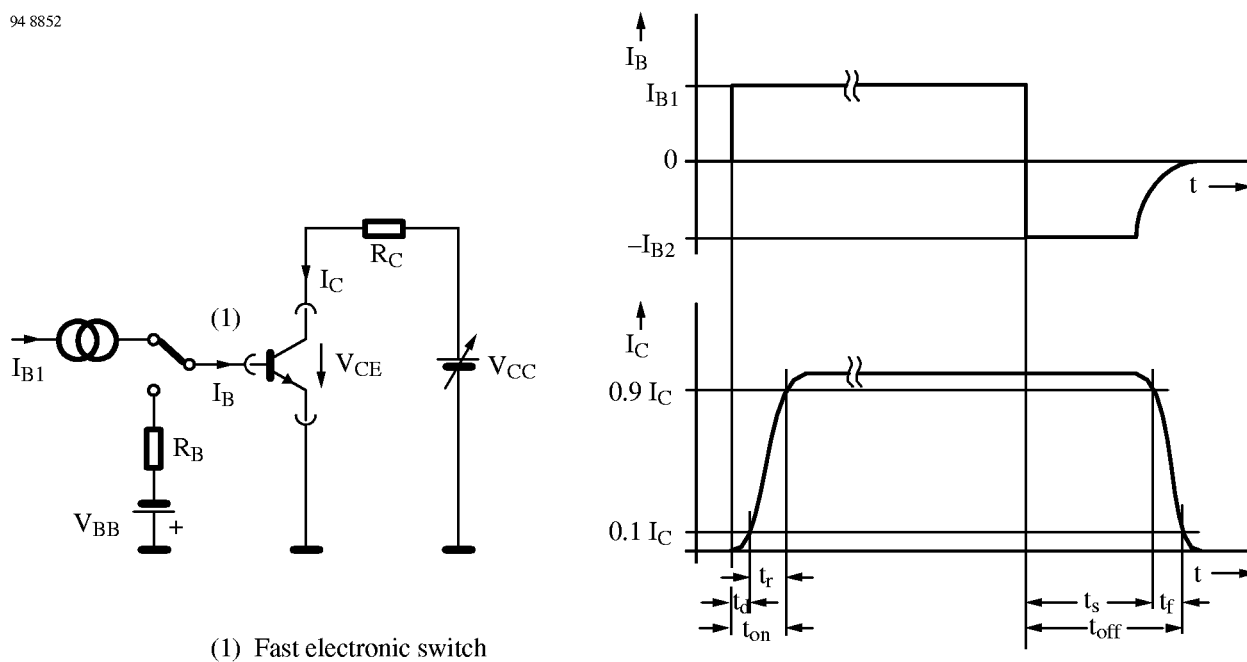


Figure 2. Test circuit for switching characteristics – resistive load

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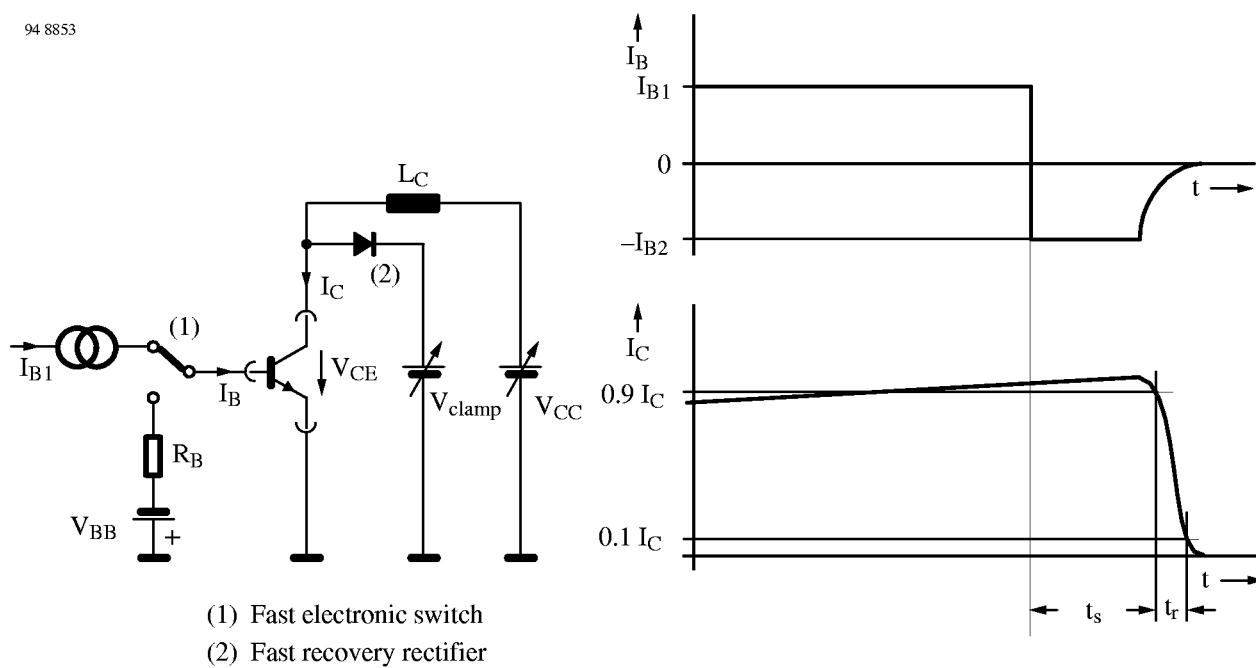


Figure 3. Test circuit for switching characteristics – inductive load

Typical Characteristics ($T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise specified)

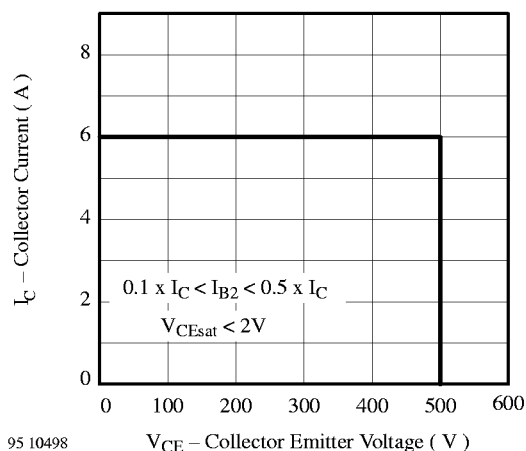


Figure 4. V_{CEW} - Diagram

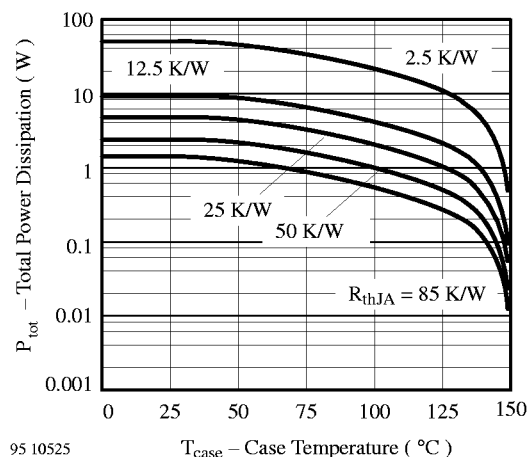


Figure 7. P_{tot} vs. T_{case}

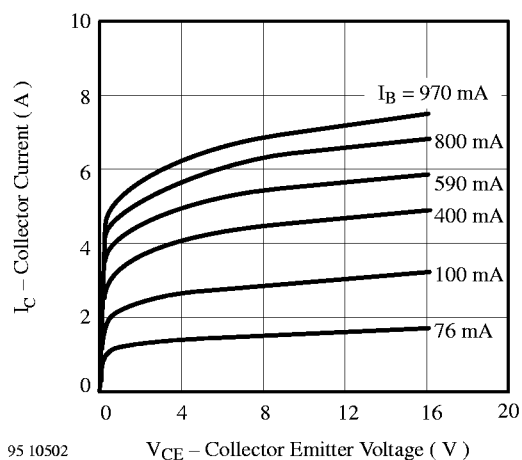


Figure 5. I_C vs. V_{CE}

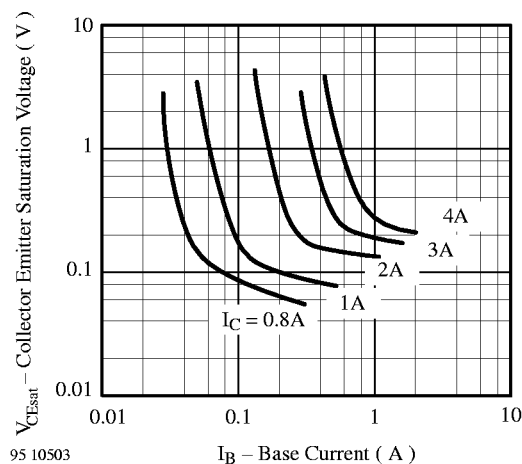


Figure 8. V_{CEsat} vs. I_B

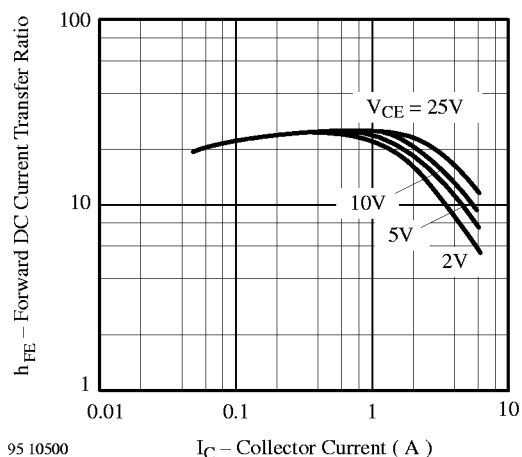


Figure 6. h_{FE} vs. I_C

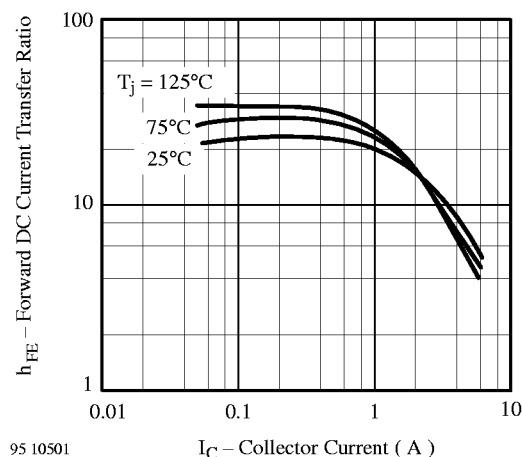


Figure 9. h_{FE} vs. I_C

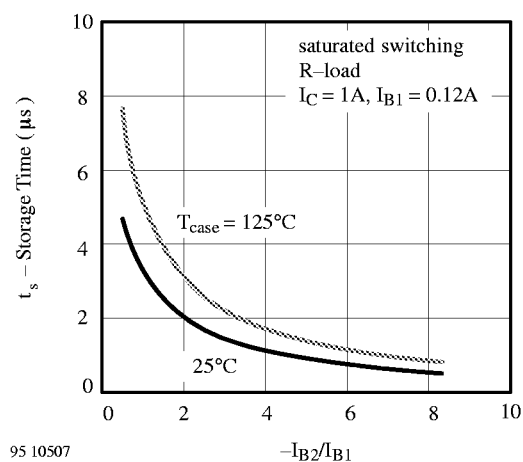


Figure 10. t_s vs. $-I_{B2}/I_{B1}$

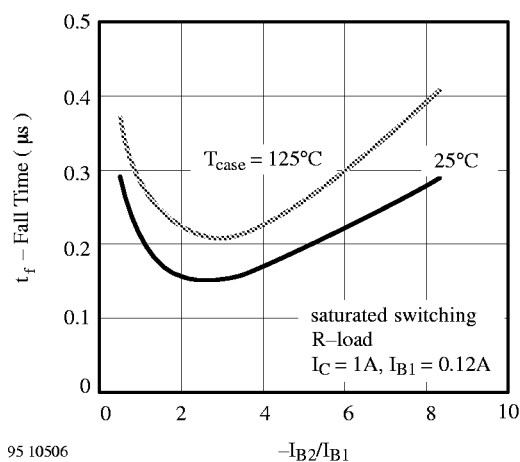


Figure 12. t_f vs. $-I_{B2}/I_{B1}$

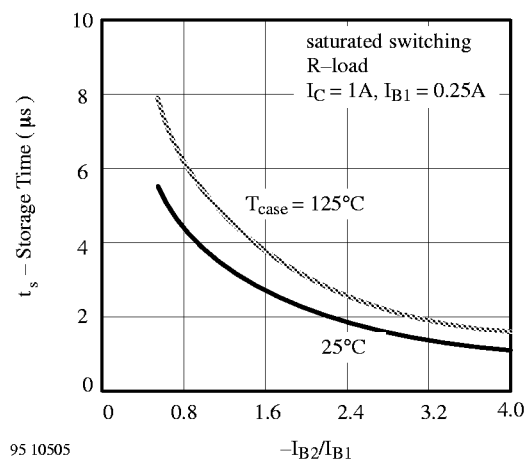


Figure 11. t_s vs. $-I_{B2}/I_{B1}$

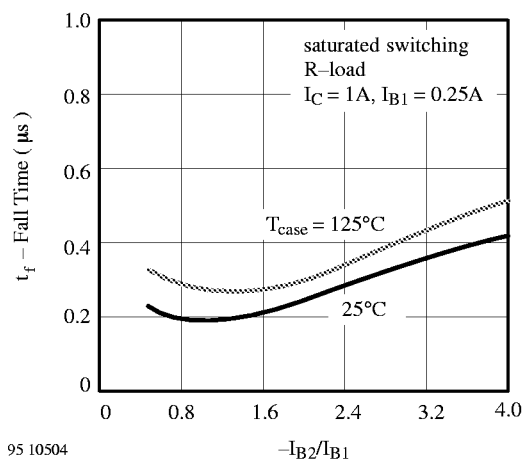


Figure 13. t_f vs. $-I_{B2}/I_{B1}$

Dimensions in mm

