

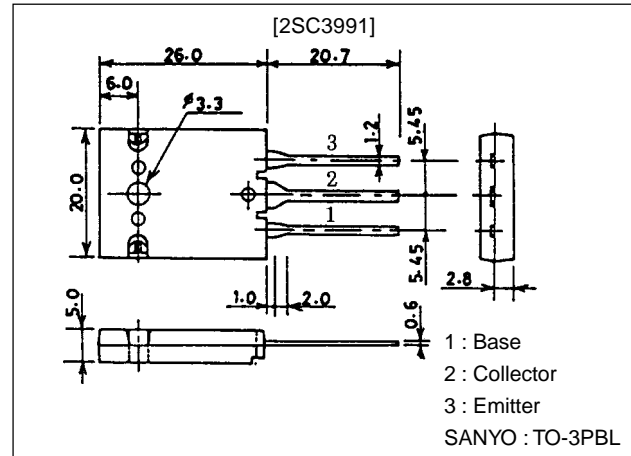
**2SC3991****500V/50A Switching Regulator Applications****Features**

- High breakdown voltage, high reliability.
- Fast switching speed ( $t_f=0.1\mu\text{s}$  typ).
- Wide ASO.
- Adoption of MBIT process.

**Package Dimensions**

unit:mm

2048B

**Specifications****Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$** 

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CB0}$		800	V
Collector-to-Emitter Voltage	$V_{CE0}$		500	V
Emitter-to-Base Voltage	$V_{EB0}$		7	V
Collector Current	$I_C$		50	A
Collector Current (Pulse)	$I_{CP}$	$PW \leq 300\mu\text{s}$ , duty cycle $\leq 10\%$	70	A
Base Current	$I_B$		14	A
Collector Dissipation	$P_C$		3.5	W
		$T_c = 25^\circ\text{C}$	300	W
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

**Electrical Characteristics at  $T_a = 25^\circ\text{C}$** 

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CB0}$	$V_{CB}=500\text{V}$ , $I_E=0$			10	$\mu\text{A}$
Emitter Cutoff Current	$I_{EB0}$	$V_{EB}=5\text{V}$ , $I_C=0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE1}^*$	$V_{CE}=5\text{V}$ , $I_C=4.8\text{A}$	15		50	
	$h_{FE2}$	$V_{CE}=5\text{V}$ , $I_C=24\text{A}$	8			
Gain-Bandwidth Product	$f_T$	$V_{CE}=10\text{V}$ , $I_C=4.8\text{A}$		18		MHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		560		pF

\* : The  $h_{FE1}$  of the 2SC3991 is classified as follows. When specifying the  $h_{FE1}$  rank, specify two ranks or more in principle.

15	L	30	20	M	40	30	N	50
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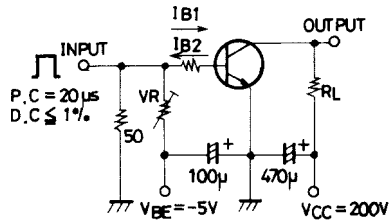
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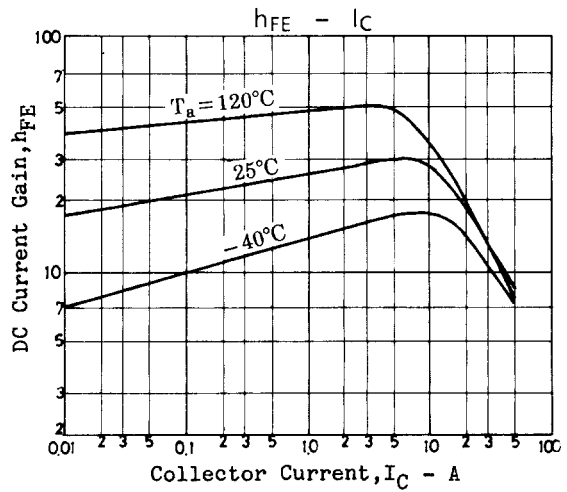
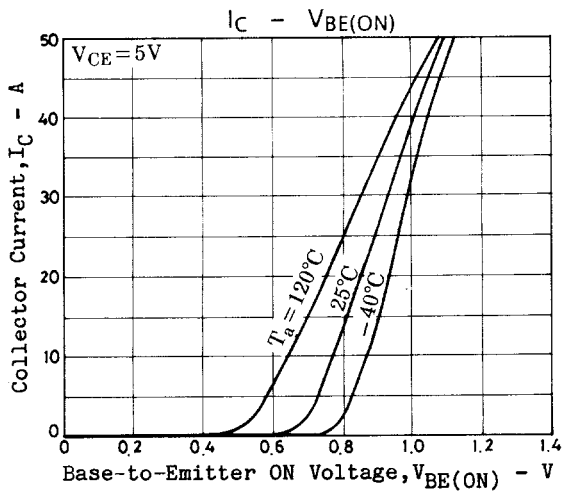
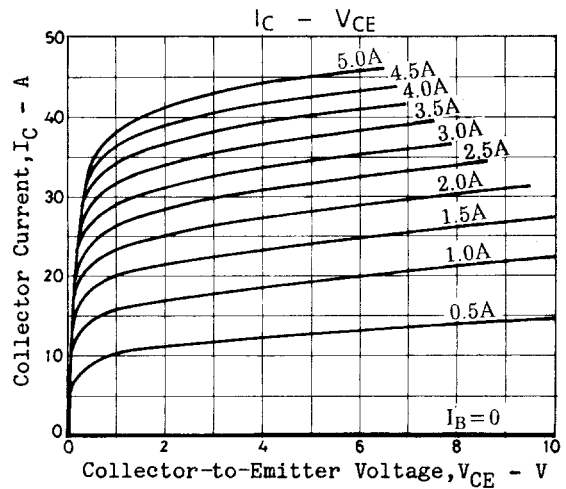
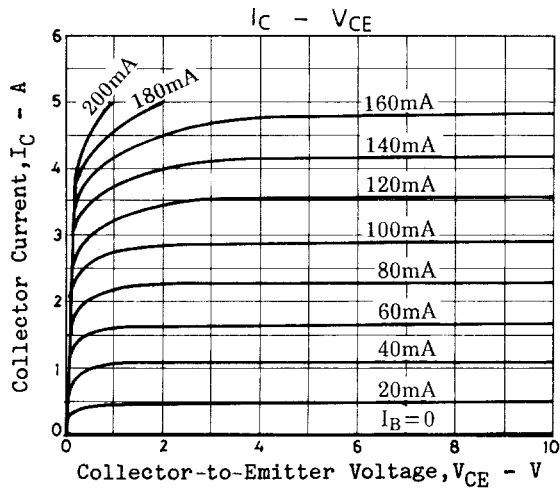
# 2SC3991

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=24A, I_B=4.8A$			1.0	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=24A, I_B=4.8A$			1.5	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=1mA, I_E=0$	800			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=10mA, R_{BE}=\infty$	500			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=1mA, I_C=0$	7			V
Collector-to-Emitter Sustain Voltage	$V_{CEX(sus)}$	$I_C=15A, I_{B1}=-I_{B2}=-2A, L=100\mu H, \text{clamped}$	500			V
Turn-ON Time	$t_{on}$	$V_{CC}=200V, 5I_{B1}=-2.5I_{B2}=I_C=26A, R_L=7.7\Omega$			0.5	$\mu s$
Storage Time	$t_{stg}$	$V_{CC}=200V, 5I_{B1}=-2.5I_{B2}=I_C=26A, R_L=7.7\Omega$			3.0	$\mu s$
Fall Time	$t_f$	$V_{CC}=200V, 5I_{B1}=-2.5I_{B2}=I_C=26A, R_L=7.7\Omega$			0.3	$\mu s$

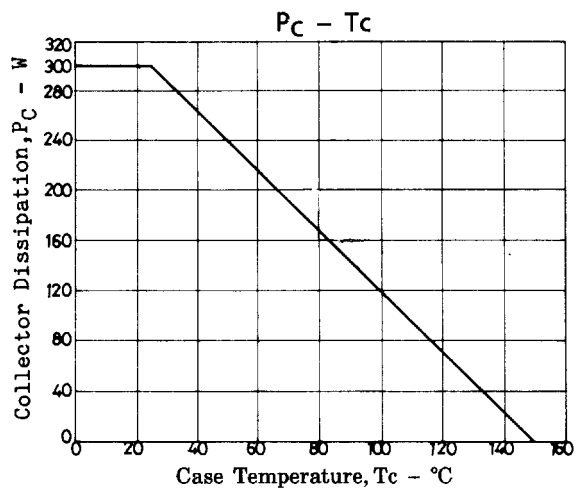
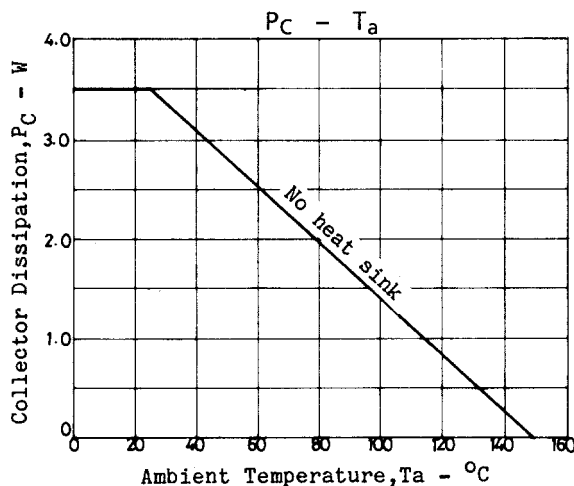
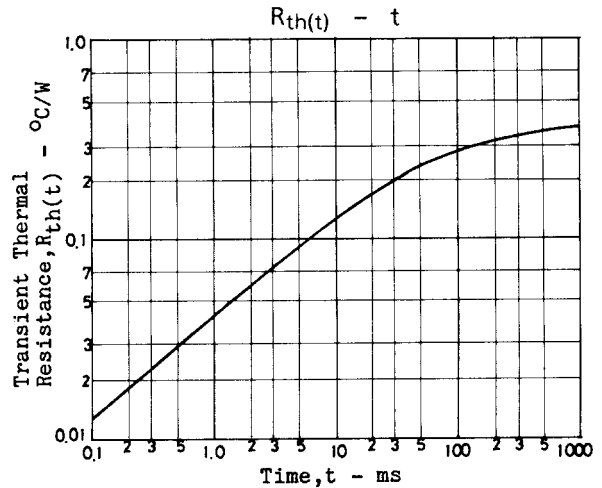
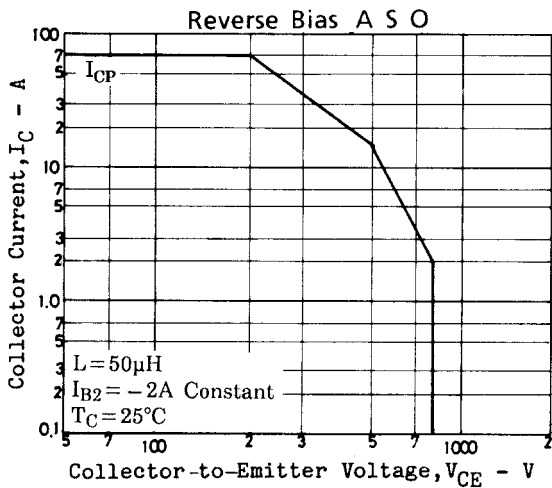
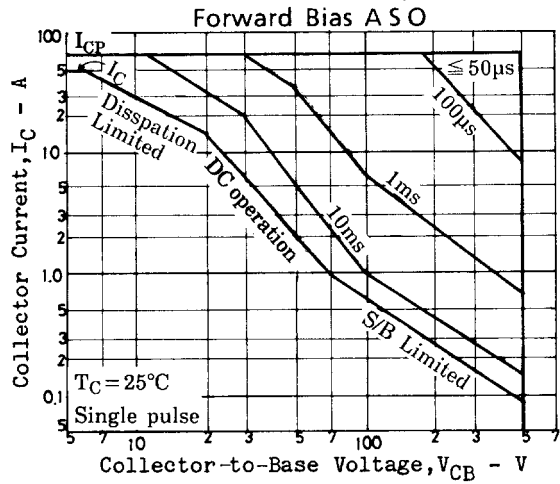
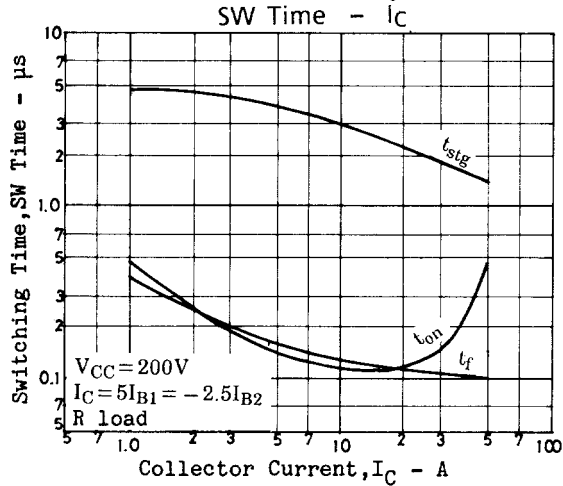
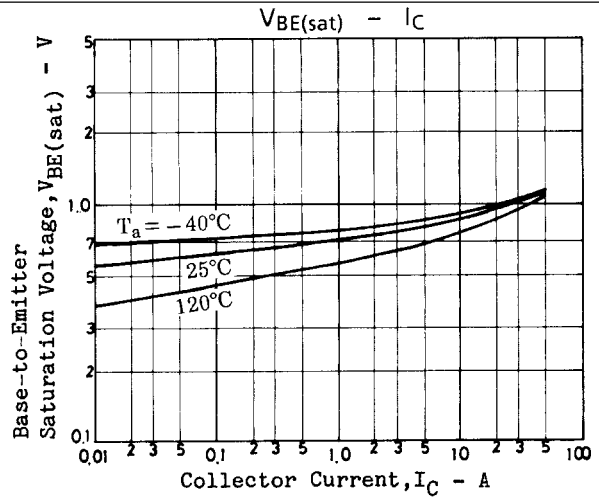
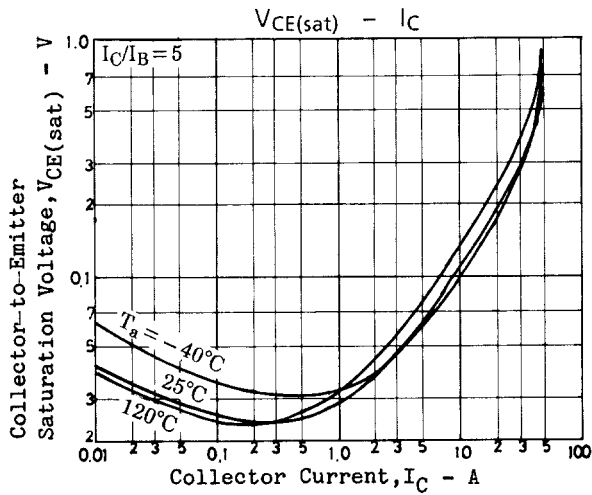
## Switching Time Test Circuit



Unit (resistance :  $\Omega$ , capacitance : F)



# 2SC3991



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