



# 2SC3991

## 500V/50A Switching Regulator Applications

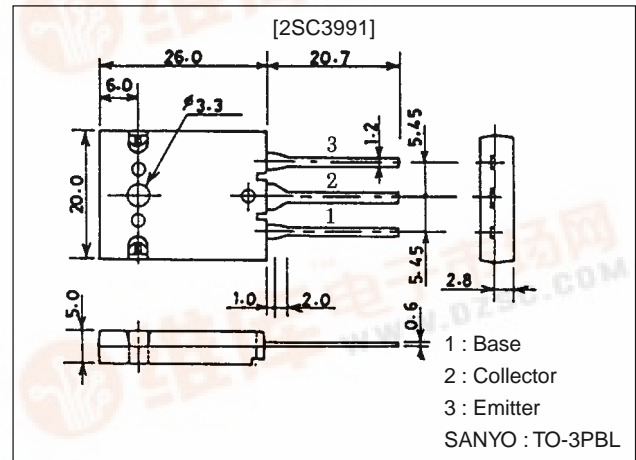
### Features

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

### Package Dimensions

unit:mm

2048B



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ C$

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

#### Electrical Characteristics at $T_a = 25^\circ C$

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

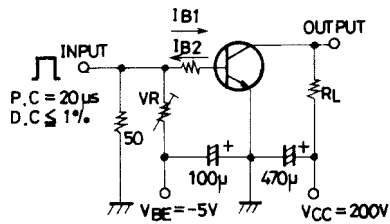
15	L	30	20	M	40	30	N	50
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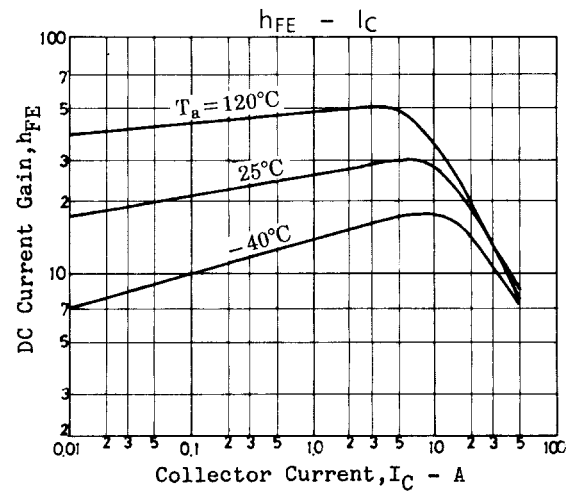
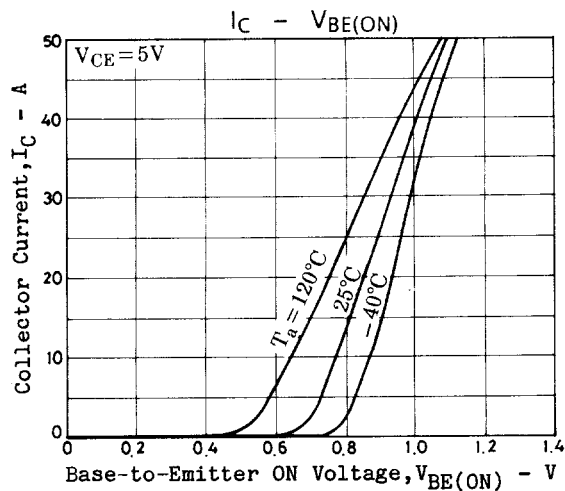
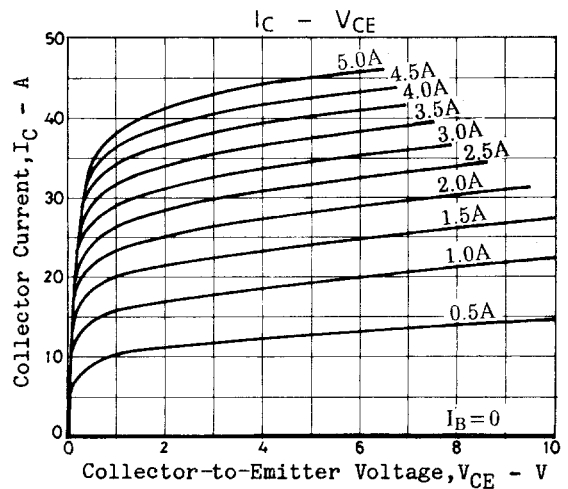
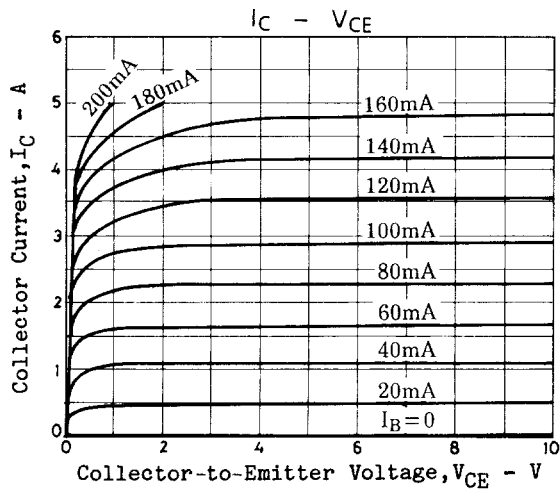
# 2SC3991

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	$\mu s$

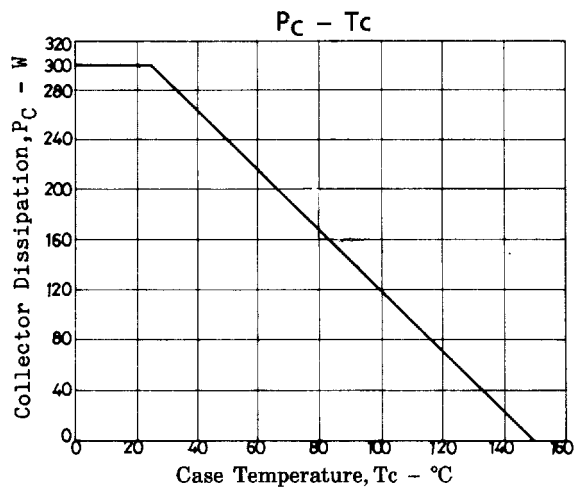
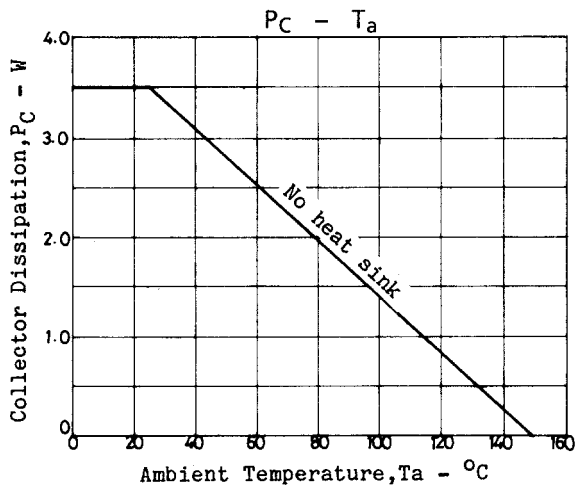
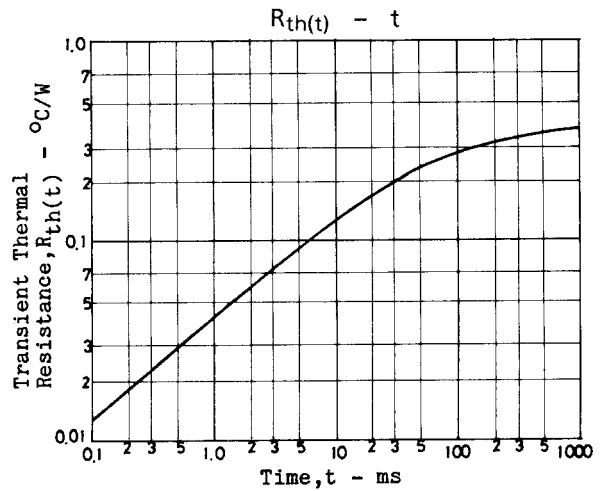
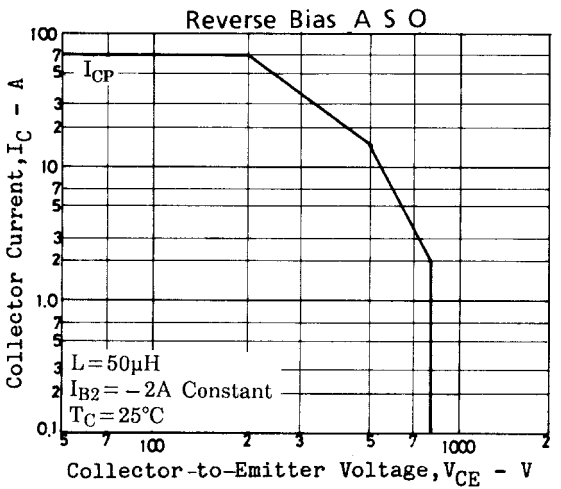
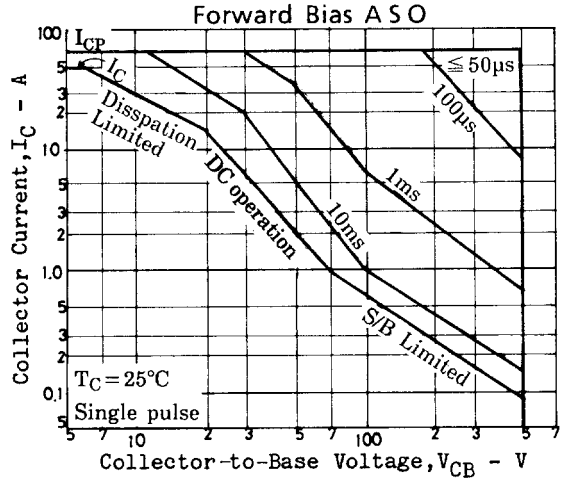
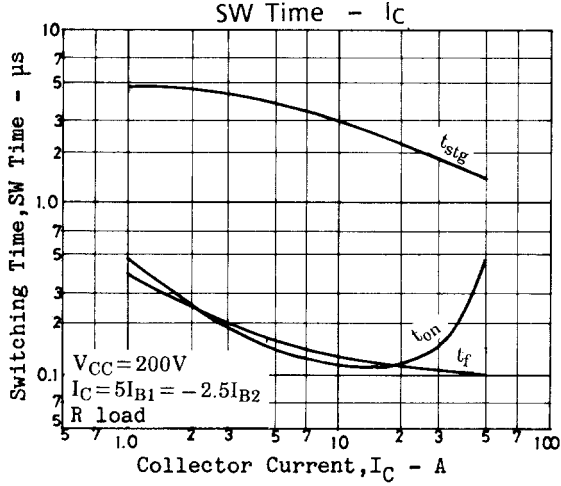
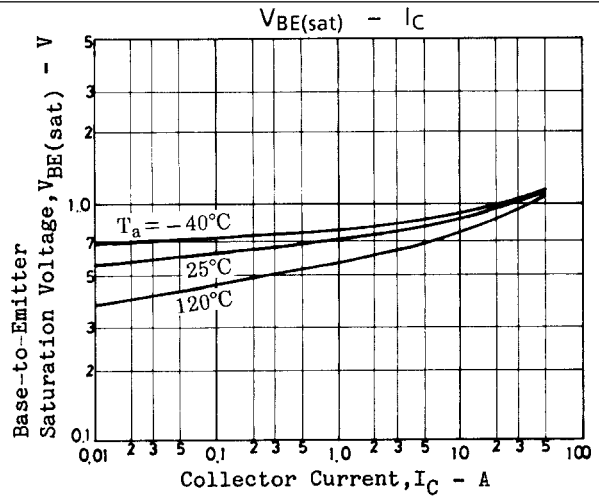
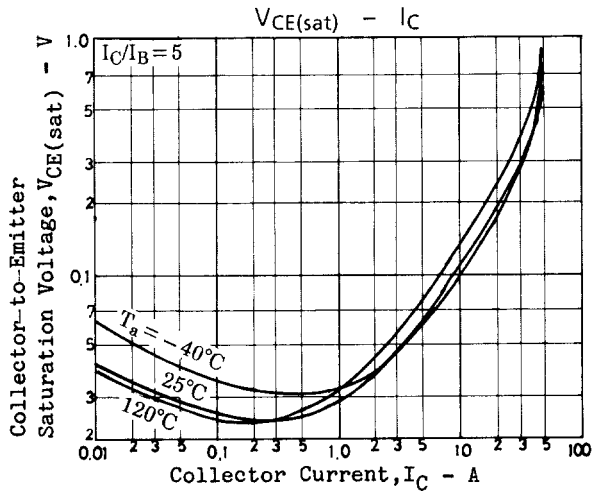
## Switching Time Test Circuit



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



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