

TOSHIBA TRANSISTOR SILICON NPN TRIPLE DIFFUSED MESA TYPE

## S2000N

COLOR TV HORIZONTAL OUTPUT APPLICATIONS  
 COLOR TV SWITCHING REGULATOR APPLICATIONS

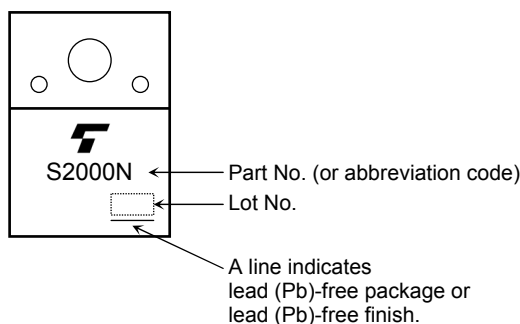
- High Voltage :  $V_{CES} = 1500\text{ V}$
- High Speed :  $t_f = 0.7\mu\text{s (Max.)}$
- Low Saturation Voltage :  $V_{CE(sat)} = 5\text{ V (Max.)}$
- Collector Metal (Fin) is Fully Covered with Mold Resin.

### ABSOLUTE MAXIMUM RATINGS ( $T_c = 25^\circ\text{C}$ )

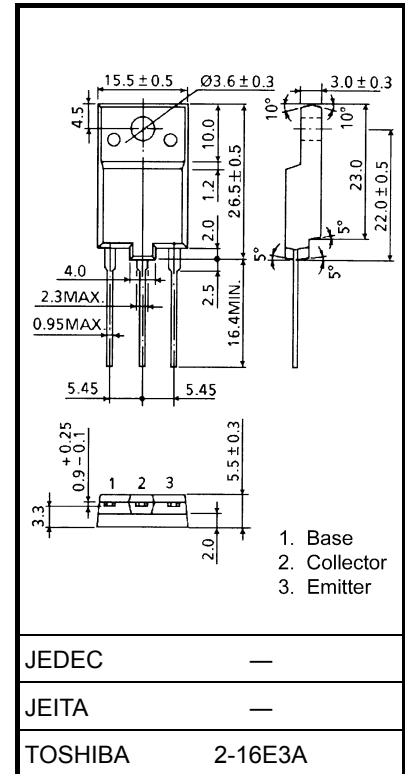
CHARACTERISTICS	SYMBOL	RATING	UNIT
Collector-Emmitter Voltage	$V_{CES}$	1500	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	DC	$I_C$	8
	Pulse	$I_{CP}$	15
Base Current	$I_B$	4	A
Collector Power Dissipation	$P_C$	50	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ\text{C}$
Thermal Resistance	$R_{th(j-c)}$	2.5	$^\circ\text{C/W}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.  
 Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

### MARKING



Unit: mm

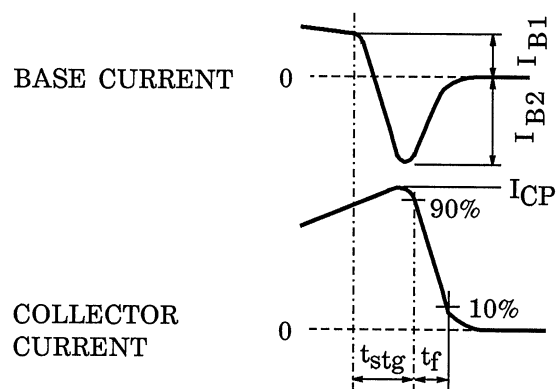
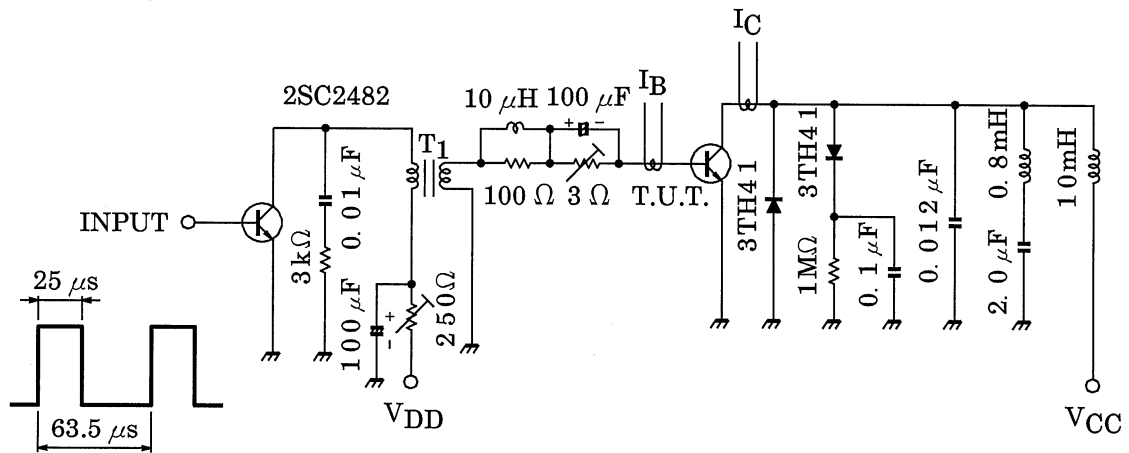


Weight: 5.5 g (typ.)

JEDEC	—
JEITA	—
TOSHIBA	2-16E3A

## ELECTRICAL CHARACTERISTICS (T<sub>c</sub> = 25°C)

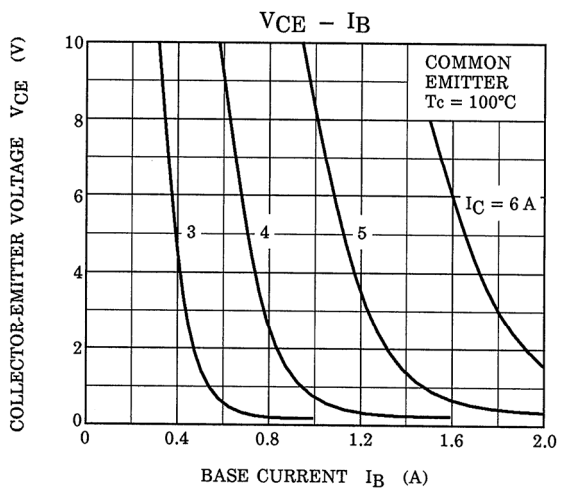
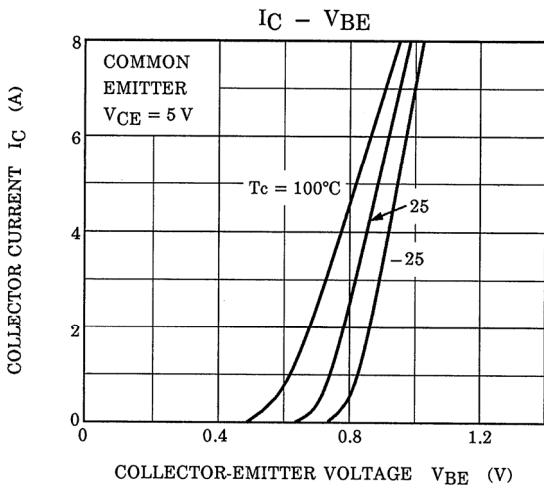
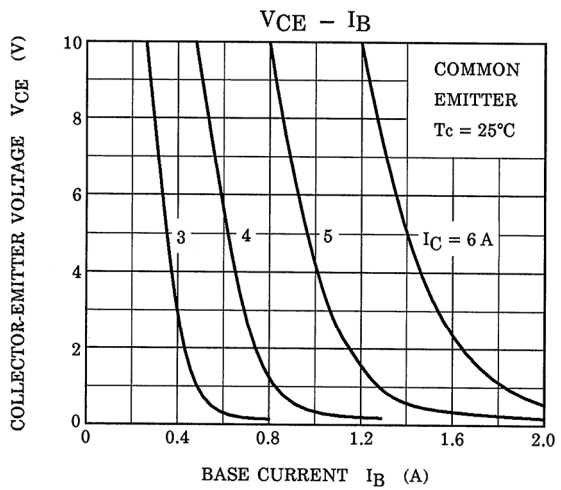
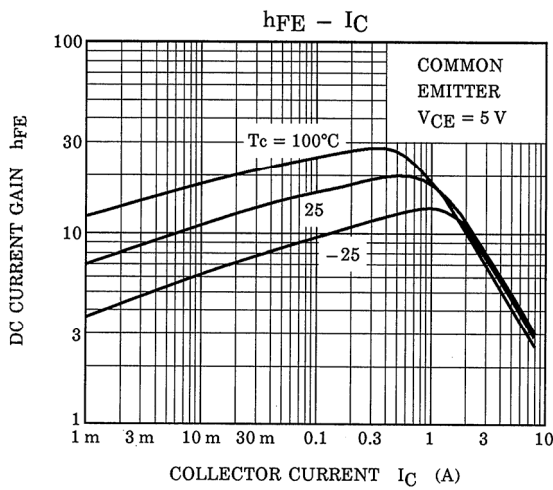
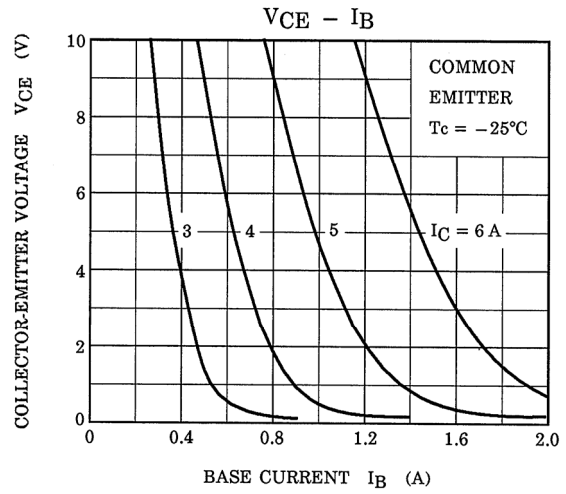
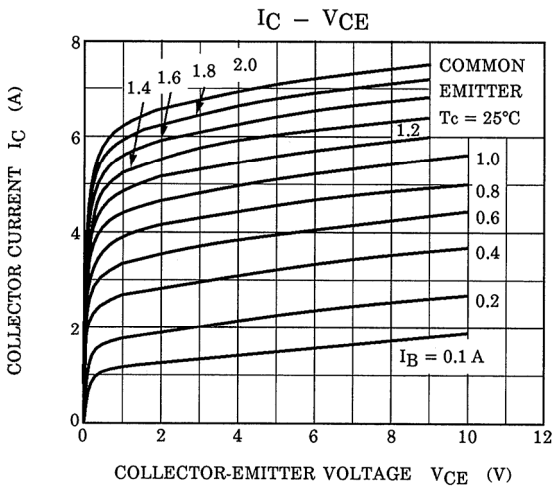
CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 1500 V, V <sub>BE</sub> = 0	—	—	1	mA
Emitter-Base Breakdown Voltage	V <sub>(BR) EBO</sub>	I <sub>E</sub> = 1 mA, I <sub>C</sub> = 0	5	—	—	V
DC Current Gain	h <sub>FE</sub> (1)	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 1 A	10	—	30	—
	h <sub>FE</sub> (2)	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 4.5 A	4.5	—	9	
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 4.5 A, I <sub>B</sub> = 2 A	—	—	1	V
		I <sub>C</sub> = 4.5 A, I <sub>B</sub> = 1 A	—	—	5	
Base-Emitter Saturation Voltage	V <sub>BE</sub> (sat)	I <sub>C</sub> = 4.5 A, I <sub>B</sub> = 1 A	—	0.9	1.2	V
Collector-Emitter Sustain Voltage	V <sub>CEX</sub> (sus)	L = 40 mH, I <sub>B</sub> = 500 mA V <sub>BE</sub> = -1.7 V	700	—	—	V
Transition Frequency	f <sub>T</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 0.1 A	—	2	—	MHz
Collector Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz	—	95	—	pF
Switching Time (Fig. 1)	Storage Time	I <sub>CP</sub> = 4.5 A, I <sub>B1</sub> (end) = 1 A f <sub>H</sub> = 15.75 kHz	—	8	12	μs
	Fall Time		—	0.4	0.7	

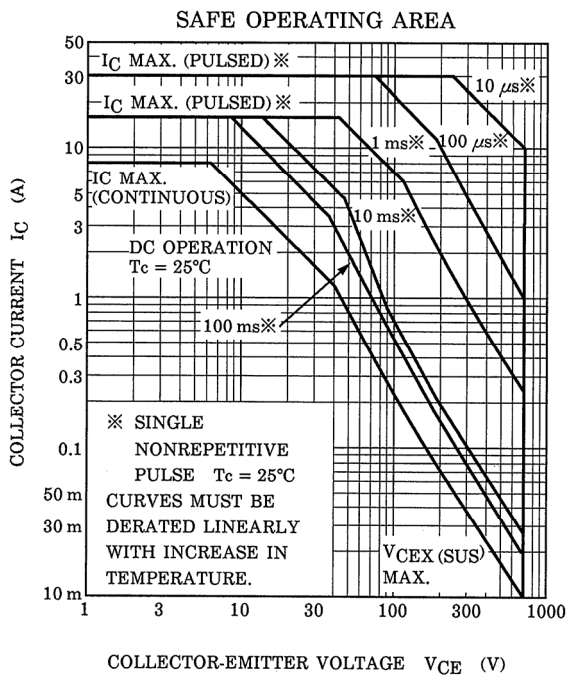
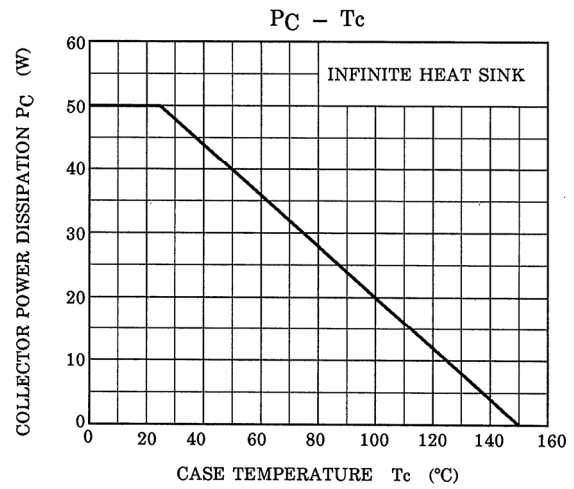
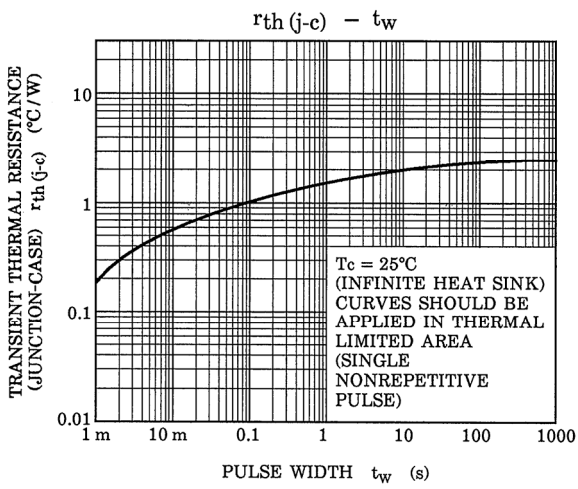


Base Current Gradient

$$dI_B / dt = \frac{I_{B1} + I_{B2}}{t_{stg}} \text{ (A/}\mu\text{s)}$$

**Fig. 1 SWITCHING TIME TEST CIRCUIT**





**RESTRICTIONS ON PRODUCT USE**

20070701-EN

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