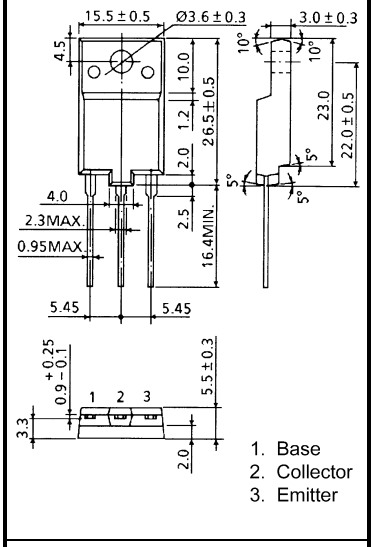
TOSHIBA TRANSISTOR SILICON NPN TRIPLE DIFFUSED MESA TYPE

2SD2539

HORIZONTAL DEFLECTION OUTPUT FOR COLOR TVs

- High Voltage : V_{CBO} = 1500 V
- Low Saturation Voltage : $V_{CE\ (sat)}$ = 5 V (Max.)
- High Speed : t_f = 0.3 μs (Typ.)
- Built-in Damper Type
- Collector Metal (Fin) is Fully Covered with Mold Resin

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-16E3A

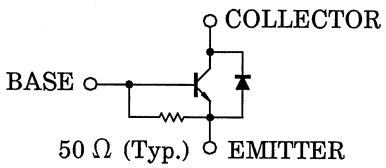
Weight: 5.5 g (typ.)

ABSOLUTE MAXIMUM RATINGS (Tc = 25°C)

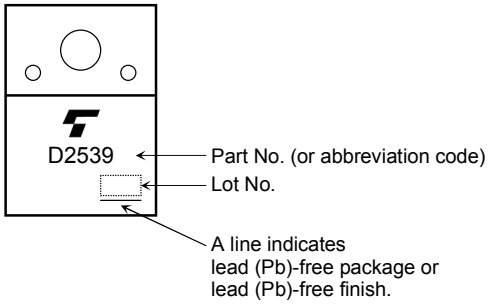
CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector−Base Voltage		V_{CBO}	1500	V
Collector−Emitter Voltage		V_{CEO}	600	V
Emitter−Base Voltage		V_{EBO}	5	V
Collector Current	DC	I_C	7	A
	Pulse	I_{CP}	14	
Base Current		I_B	3.5	A
Collector Power Dissipation		P_C	50	W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

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).

EQUIVALENT CIRCUIT



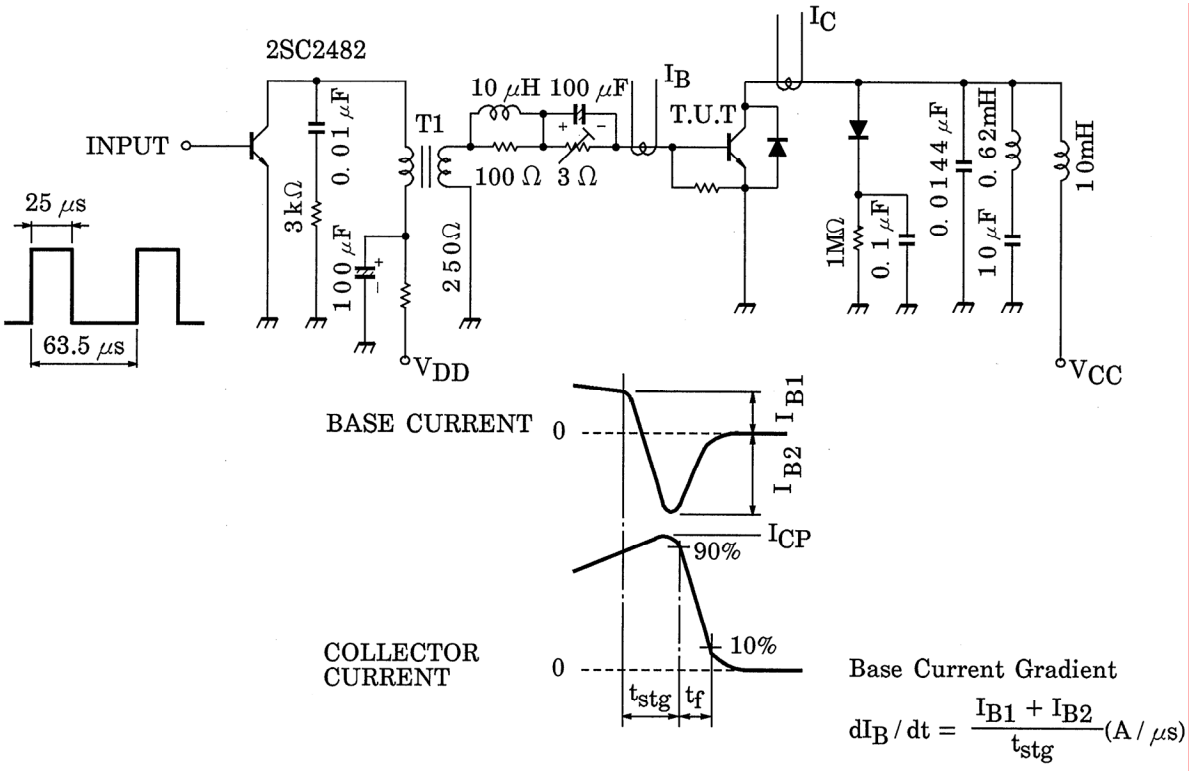
MARKING



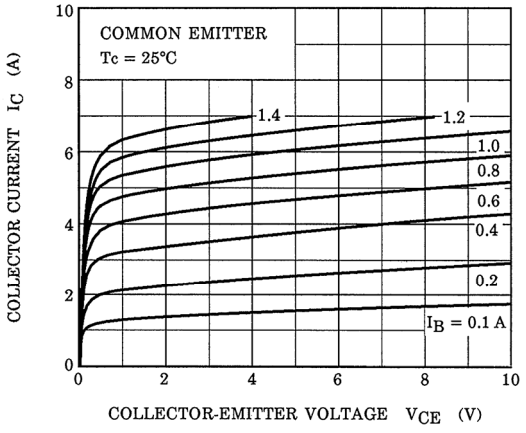
ELECTRICAL CHARACTERISTICS (Tc = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Collector Cut−off Current		I_{CBO}	V_{CB} = 1500 V, I_E = 0	—	—	1	mA
Emitter Cut−off Current		I_{EBO}	V_{EB} = 5 V, I_C = 0	66	—	200	mA
Emitter−Base Breakdown Voltage		$V_{(BR)\ EBO}$	I_C = 400 mA, I_B = 0	5	—	—	V
DC Current Gain		$h_{FE\ (1)}$	V_{CE} = 5 V, I_C = 1 A	8	—	28	—
		$h_{FE\ (2)}$	V_{CE} = 5 V, I_C = 5A	5	—	9	
Collector−Emitter Saturation Voltage		$V_{CE\ (sat)}$	I_C = 5 A, I_B = 1.0 A	—	—	5	V
Base−Emitter Saturation Voltage		$V_{BE\ (sat)}$	I_C = 5 A, I_B = 1.0 A	—	1.0	1.3	V
Forward Voltage (Damper Diode)		V_F	I_F = 5 A	—	1.6	2.0	V
Transition Frequency		f_T	V_{CE} = 10 V, I_C = 0.1 A	—	2	—	MHz
Collector Output Capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	115	—	pF
Switching Time	Storage Time	t_{stg}	I_{CP} = 5 A, I_{B1} (end) = 1.0 A f_H = 15.75 kHz	—	6	9	μs
	Fall Time	t_f		—	0.3	0.6	

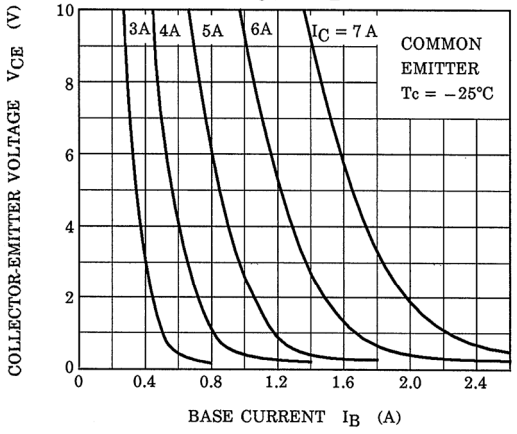
Fig.1 SWITCHING TIME TEST CIRCUIT



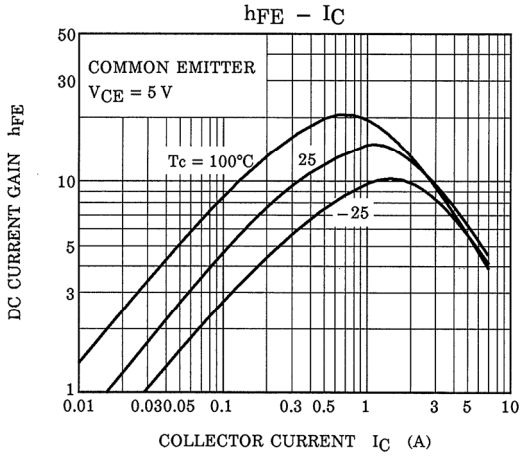
I_C – V_{CE}



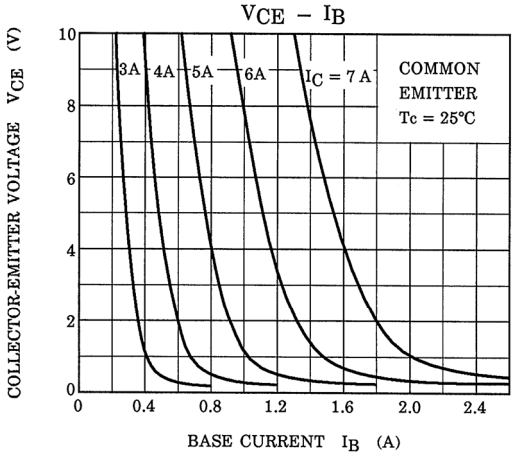
V_{CE} – I_B



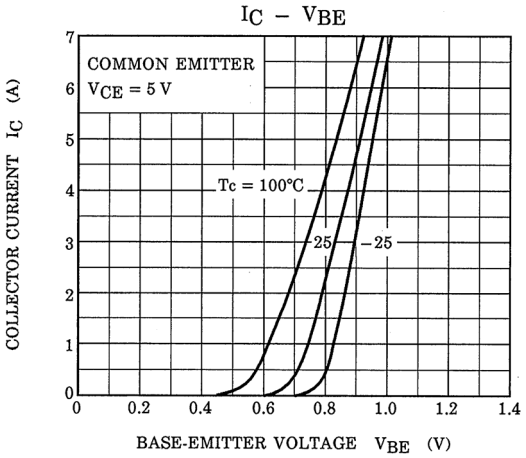
h_{FE} – I_C



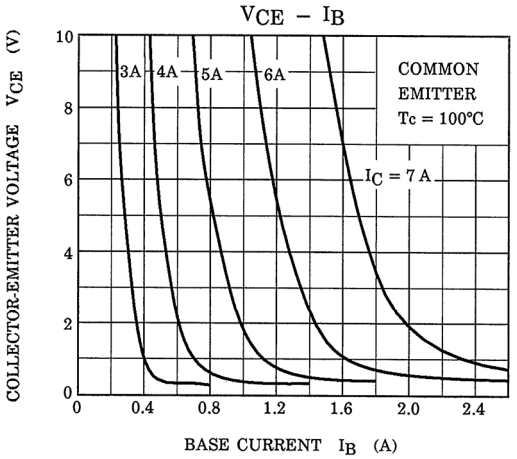
V_{CE} – I_B

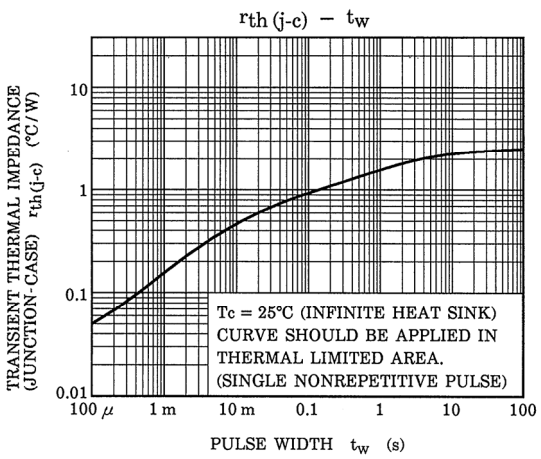


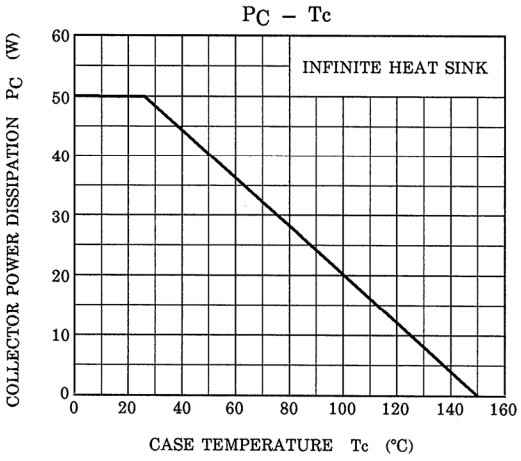
I_C – V_{BE}

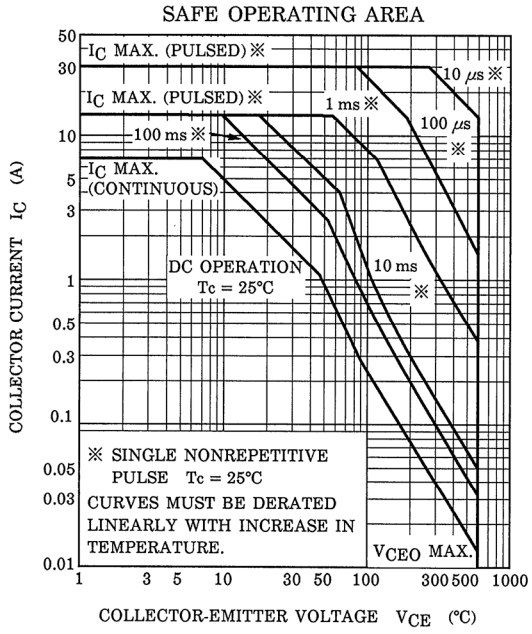


V_{CE} – I_B




rth (j-c) – tw
TRANSIENT THERMAL IMPEDANCE (JUNCTION-CASE) rth(j-c) (°C/W)
10
1
0.1
0.01
Tc = 25°C (INFINITE HEAT SINK)
CURVE SHOULD BE APPLIED IN
THERMAL LIMITED AREA.
(SINGLE NONREPETITIVE PULSE)
100 μ
1 m
10 m
0.1
1
10
100
PULSE WIDTH tw (s)


PC – Tc
COLLECTOR POWER DISSIPATION PC (W)
60
50
40
30
20
10
0
INFINITE HEAT SINK
0
20
40
60
80
100
120
140
160
CASE TEMPERATURE Tc (°C)


SAFE OPERATING AREA
COLLECTOR CURRENT IC (A)
50
30
10
5
3
1
0.5
0.3
0.1
0.05
0.03
0.01
IC MAX. (PULSED) ※
IC MAX. (PULSED) ※
100 ms ※
IC MAX.
(CONTINUOUS)
DC OPERATION
Tc = 25°C
10 μs ※
1 ms ※
100 μs ※
10 ms ※
※ SINGLE NONREPETITIVE
PULSE Tc = 25°C
CURVES MUST BE DERATED
LINEARLY WITH INCREASE IN
TEMPERATURE.
VCEO MAX.
1
3
5
10
30
50
100
300
500
1000
COLLECTOR-EMITTER VOLTAGE VCE (°C)

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