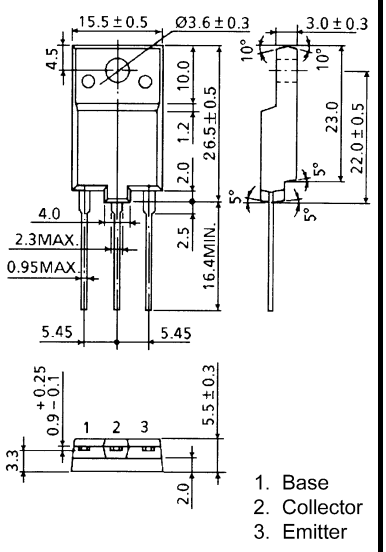
TOSHIBA Transistor Silicon NPN Triple-Diffused Mesa Type

2SD2716

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.
- TO-3P(H)IS package

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-16E3A

Weight: 5.5 g (typ.)

Absolute Maximum Ratings (T_a = 25°C)

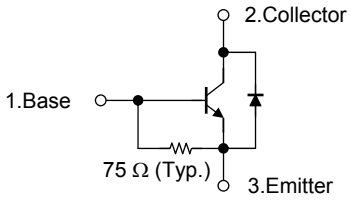
Characteristic		Symbol	Rating	Unit
Collector−base voltage		V_{CBO}	1500	V
Collector−emitter voltage		V_{CEO}	600	V
Emitter−base voltage		V_{EBO}	7	V
Collector current	DC	I_C	6	A
	Pulse	I_{CP}	12	
Base current		I_B	3	A
Collector power dissipation		P_C	50	W
Junction temperature		T_j	150	°C
Storage temperature 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).

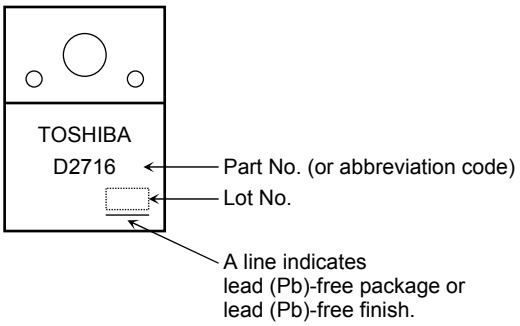
Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal resistance , junction to case (Tc = 25°C)	$R_{th\ (j\text{-}c)}$	2.5	°C/W

Equivalent Circuit



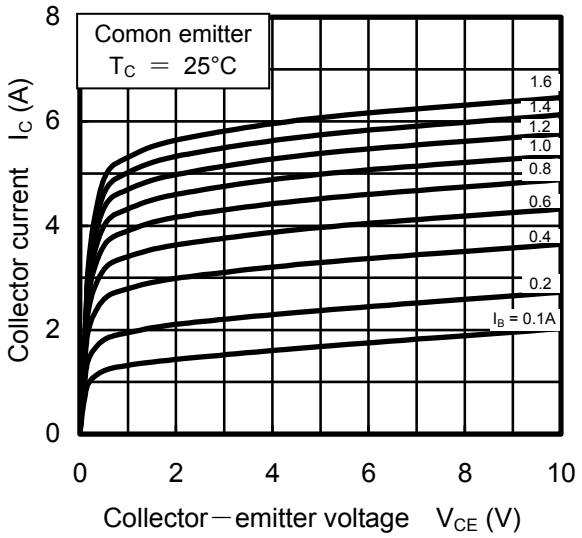
Marking



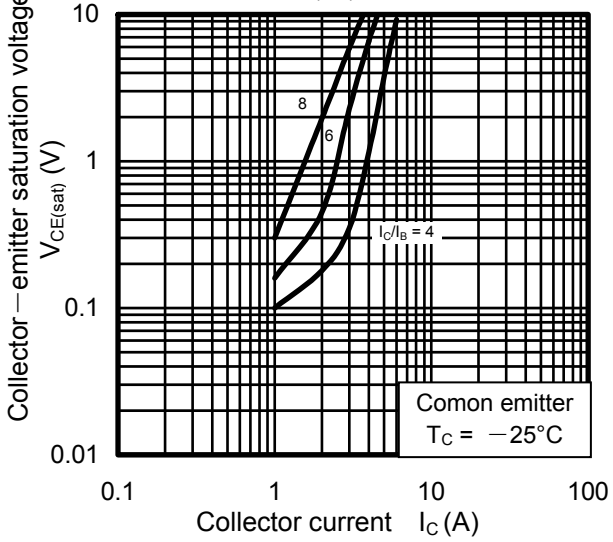
Electrical Characteristics (T_a = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current		I_{CBO}	V_{CB} = 1500 V, I_E = 0	—	—	1	mA
Emitter cutoff current		I_{EBO}	V_{EB} = 5 V, I_C = 0	50	—	125	mA
Emitter−base breakdown voltage		$V_{(BR)\ EBO}$	I_E = 400 mA, I_B = 0	5	—	—	V
DC current gain		$h_{FE\ (1)}$	V_{CE} = 5 V, I_C = 1 A	15	—	33	—
		$h_{FE\ (2)}$	V_{CE} = 5 V, I_C = 4 A	5	—	8.2	
Collector−emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 4A, I_B = 0.8 A	—	—	5	V
Base−emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 4 A, I_B = 0.8 A	—	0.92	1.05	V
Forward voltage (damper diode)		V_F	I_F = 6 A	—	1.35	1.6	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	—	63	—	pF
Switching time	Storage time	t_{stg}	I_{CP} = 4 A, I_{B1} (end) = 0.8 A f_H = 15.75 kHz	—	4.5	—	μs
	Fall time	t_f		—	0.3	—	

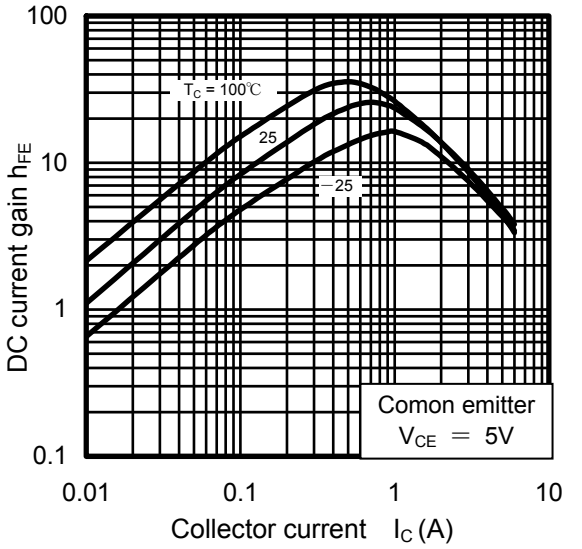
$I_C - V_{CE}$



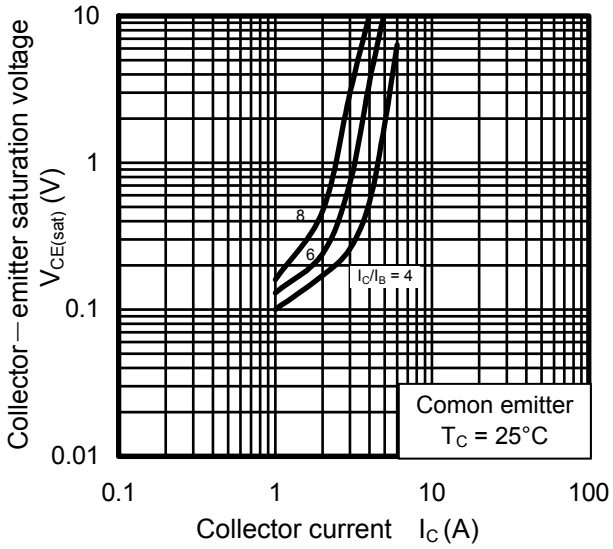
$V_{CE(sat)} - I_C$



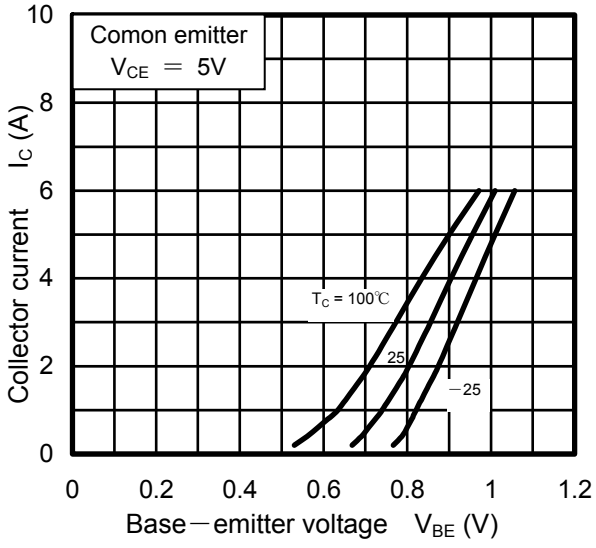
$h_{FE} - I_C$



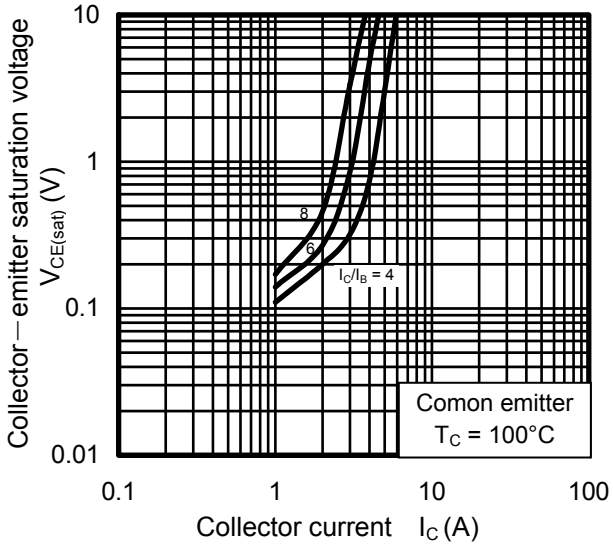
$V_{CE(sat)} - I_C$

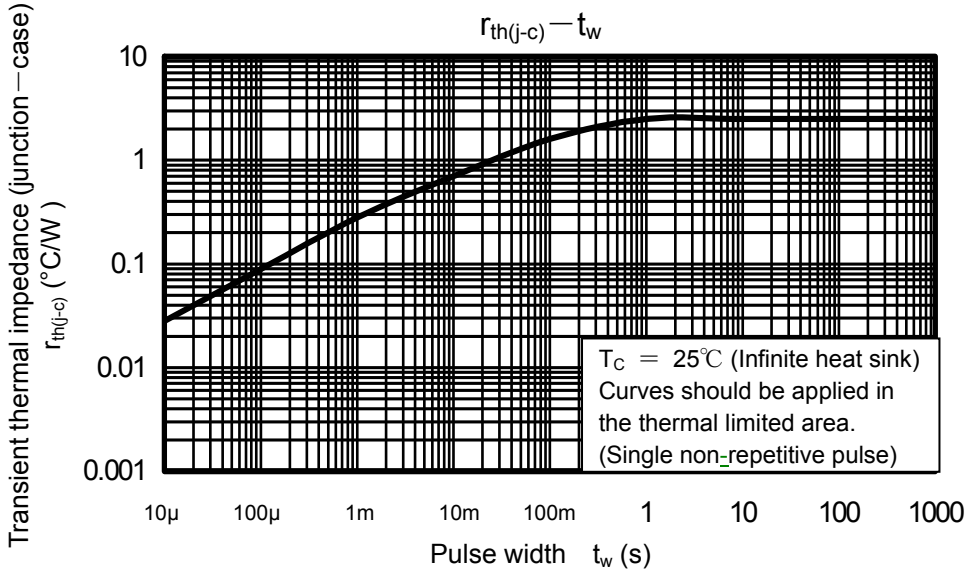


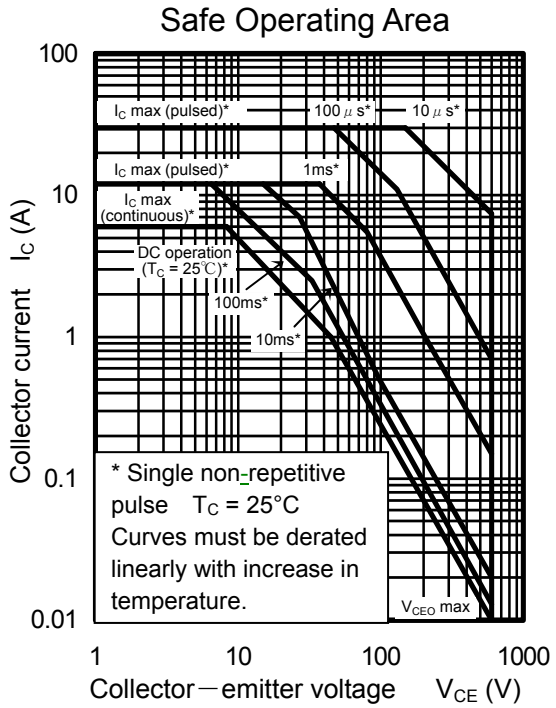
$I_C - V_{BE}$

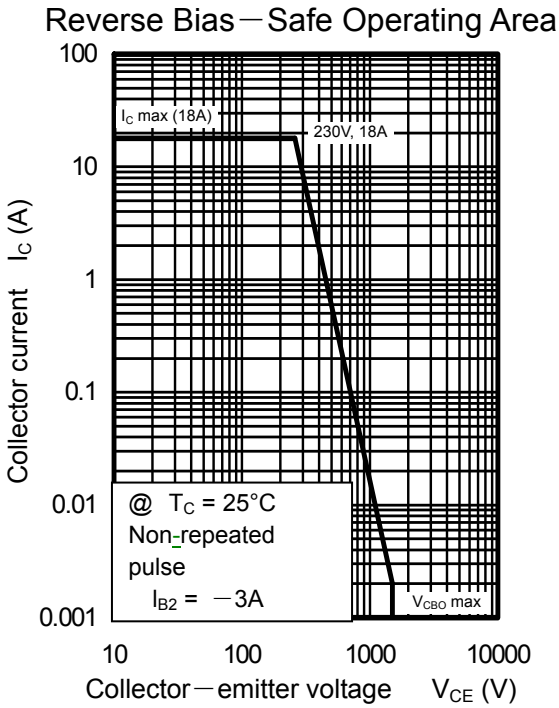


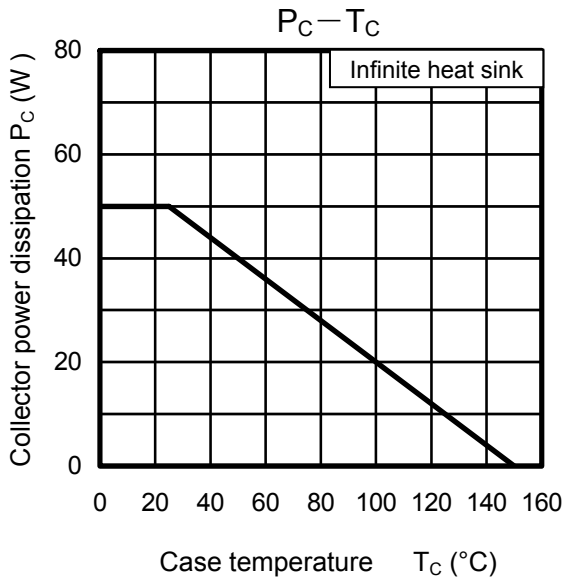
$V_{CE(sat)} - I_C$

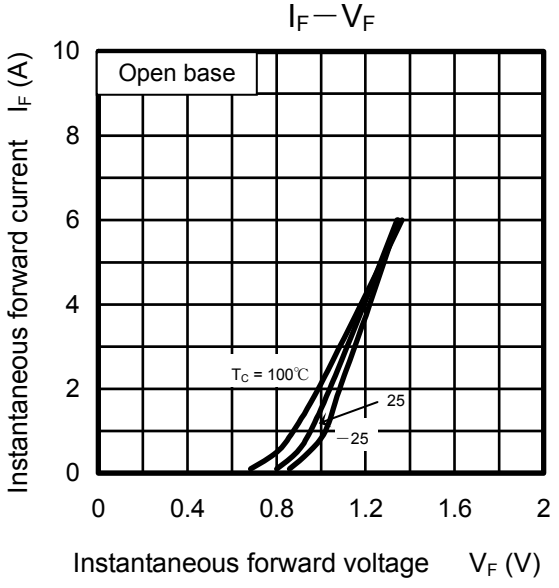



$r_{th(j-c)} - t_w$
Transient thermal impedance (junction－case) $r_{th(j-c)}$ (°C/W)
10
1
0.1
0.01
0.001
T_C = 25℃ (Infinite heat sink)
Curves should be applied in the thermal limited area.
(Single non-repetitive pulse)
10μ 100μ 1m 10m 100m 1 10 100 1000
Pulse width t_w (s)


Safe Operating Area
I_C max (pulsed)*
100 μ s*
10 μ s*
1ms*
I_C max (continuous)*
DC operation (T_C = 25℃)*
100ms*
10ms*
* Single non-repetitive pulse T_C = 25°C
Curves must be derated linearly with increase in temperature.
V_{CEO} max
Collector current I_C (A)
100
10
1
0.1
0.01
1 10 100 1000
Collector－emitter voltage V_{CE} (V)


Reverse Bias－Safe Operating Area
I_C max (18A)
230V, 18A
@ T_C = 25°C
Non-repeated pulse
I_{B2} = －3A
V_{CBO} max
Collector current I_C (A)
100
10
1
0.1
0.01
0.001
10 100 1000 10000
Collector－emitter voltage V_{CE} (V)


$P_C - T_C$
Infinite heat sink
Collector power dissipation P_C (W)
80
60
40
20
0
0 20 40 60 80 100 120 140 160
Case temperature T_C (°C)


$I_F - V_F$
Open base
Instantaneous forward current I_F (A)
10
8
6
4
2
0
T_C = 100℃
25
－25
0 0.4 0.8 1.2 1.6 2
Instantaneous forward voltage V_F (V)

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