

TOSHIBA Transistor Silicon NPN Epitaxial Type

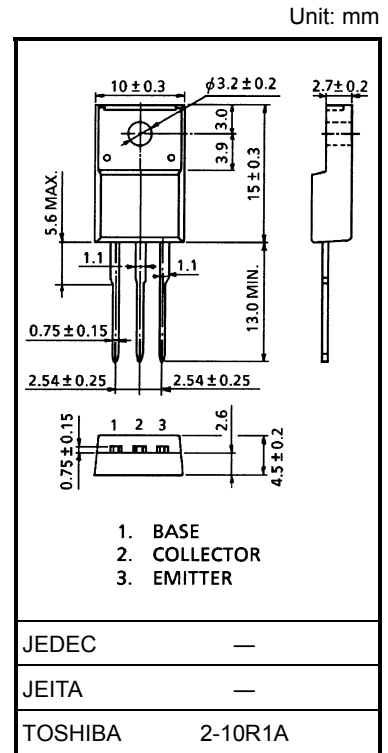
# 2SD1947A

High-Current Switching Applications  
Lamp, Solenoid Drive Applications

- High DC current gain:  $h_{FE} = 500$  to  $1500$  ( $I_C = 1$  A)
- Low collector saturation voltage:  $V_{CE(sat)} = 0.3$  V (max) ( $I_C = 5$  A)

### Absolute Maximum Ratings ( $T_c = 25^\circ\text{C}$ )

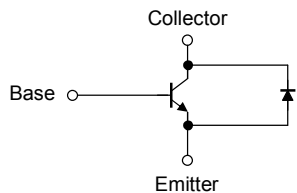
Characteristics		Symbol	Rating	Unit
Collector-base voltage		$V_{CBO}$	100	V
Collector-emitter voltage		$V_{CEO}$	100	V
Emitter-base voltage		$V_{EBO}$	7	V
Collector current	DC	$I_C$	10	A
	Pulse	$I_{CP}$	15	
Base current		$I_B$	2	A
Collector power dissipation	$T_a = 25^\circ\text{C}$	$P_C$	2.0	W
	$T_c = 25^\circ\text{C}$		40	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$



Weight: 1.7 g (typ.)

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).

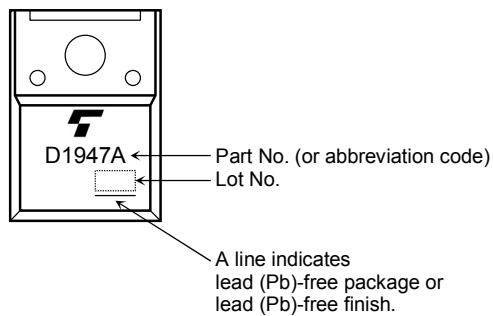
### Equivalent Circuit

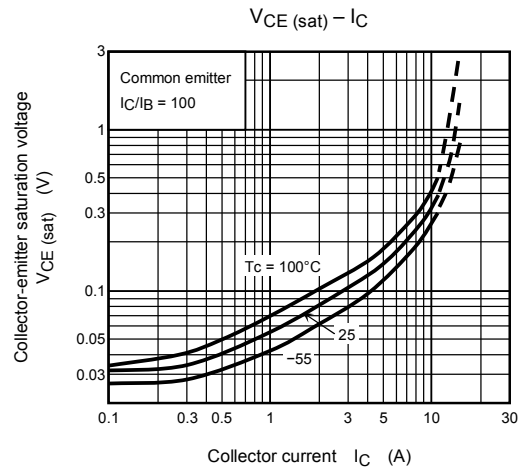
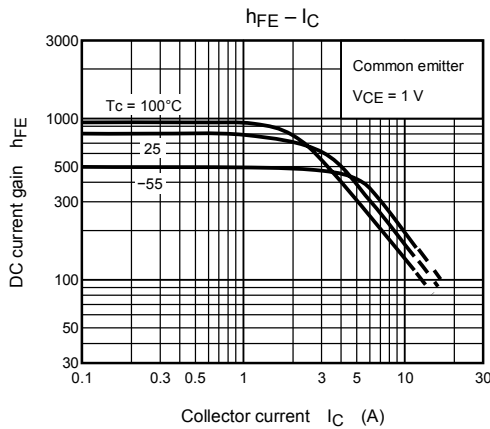
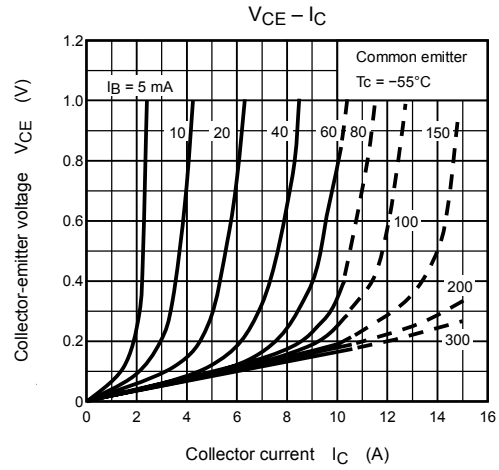
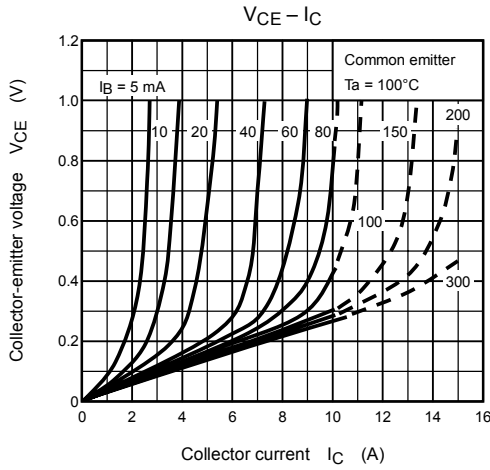
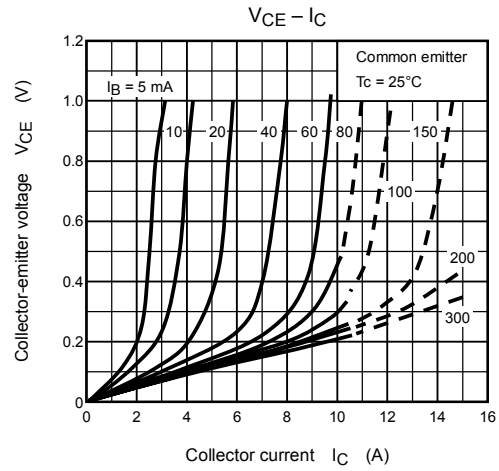
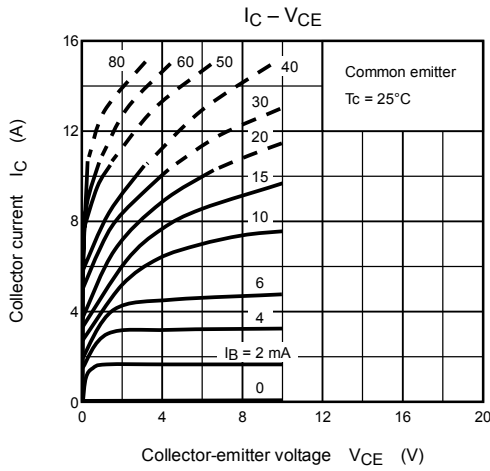


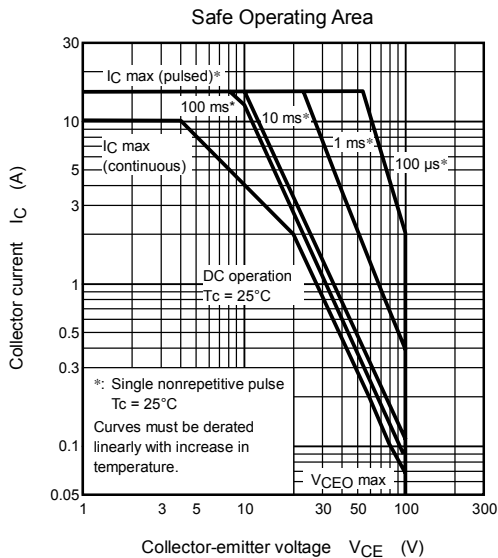
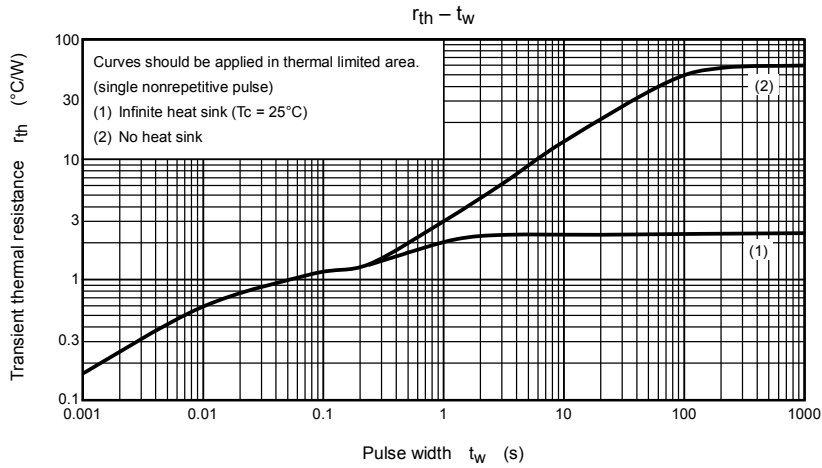
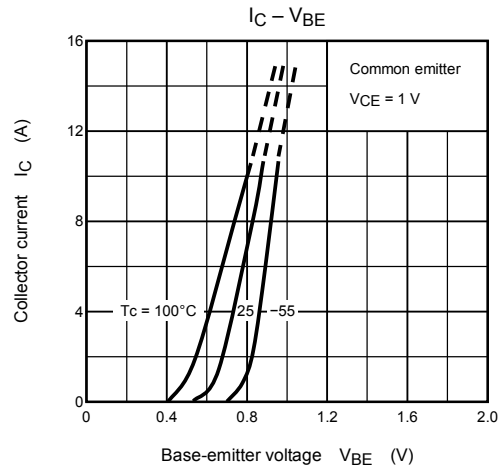
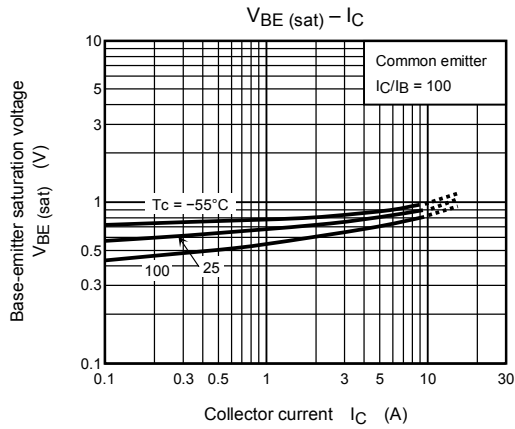
## Electrical Characteristics (Tc = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 100\text{ V}, I_E = 0$	—	—	10	$\mu\text{A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 7\text{ V}, I_C = 0$	—	—	10	$\mu\text{A}$
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = 50\text{ mA}, I_B = 0$	100	—	—	V
DC current gain		$h_{FE(1)}$	$V_{CE} = 1\text{ V}, I_C = 1\text{ A}$	500	—	1500	
		$h_{FE(2)}$	$V_{CE} = 1\text{ V}, I_C = 5\text{ A}$	150	—	—	
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 5\text{ A}, I_B = 0.05\text{ A}$	—	—	0.3	V
Base-emitter saturation voltage		$V_{BE(sat)}$	$I_C = 5\text{ A}, I_B = 0.05\text{ A}$	—	—	1.2	V
Collector-emitter forward voltage		$V_{ECF}$	$I_E = 5\text{ A}, I_B = 0$	—	—	2.0	V
Transition frequency		$f_T$	$V_{CE} = 5\text{ V}, I_C = 1\text{ A}$	—	70	—	MHz
Collector output capacitance		$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	160	—	pF
Switching time	Turn-on time	$t_{on}$	<p><math>I_{B1} = -I_{B2} = 0.05\text{ A}, \text{duty cycle} \leq 1\%</math></p>	—	0.5	—	$\mu\text{s}$
	Storage time	$t_{stg}$		—	6.0	—	
	Fall time	$t_f$		—	—	1.0	

## Marking







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