

TOSHIBA TRANSISTOR SILICON NPN TRIPLE DIFFUSED TYPE (DARLINGTON)

# 2SD2131

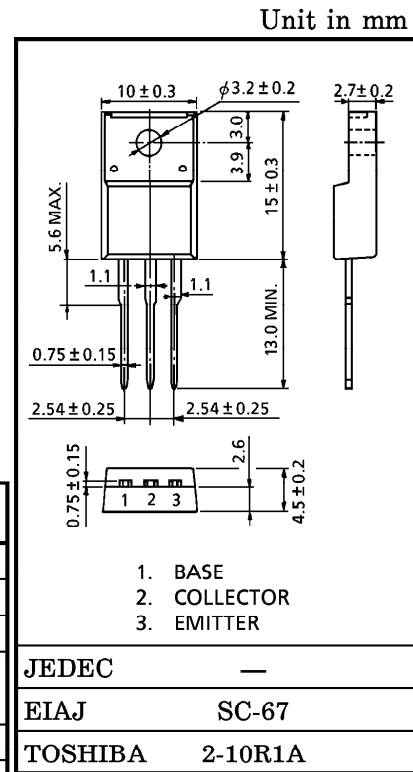
HIGH POWER SWITCHING APPLICATIONS

HAMMER DRIVE, PULSE MOTOR DRIVE APPLICATIONS

- High DC Current Gain  
:  $h_{FE} = 2000$  (Min.) ( $V_{CE} = 3V, I_C = 3A$ )
- Low Saturation Voltage  
:  $V_{CE(sat)} = 1.5V$  (Max.) ( $I_C = 3A$ )
- Zener Diode Included Between Collector and Base.
- Unclamped Inductive Load Energy :  $E = 150mJ$  (Min.)

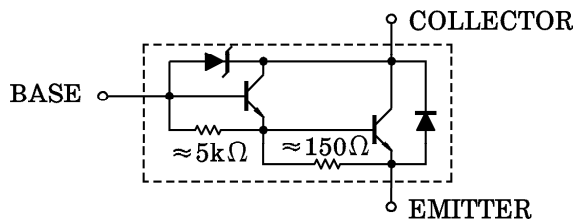
MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Base Voltage		$V_{CBO}$	$60 \pm 10$	V
Collector-Emitter Voltage		$V_{CEO}$	$60 \pm 10$	V
Emitter-Base Voltage		$V_{EBO}$	7	V
Collector Current	DC	$I_C$	5	A
	Pulse	$I_{CP}$	8	
Base Current		$I_B$	0.5	A
Collector Power Dissipation	$T_a = 25^\circ C$	$P_C$	2.0	W
	$T_c = 25^\circ C$		30	
Junction Temperature		$T_j$	150	$^\circ C$
Storage Temperature Range		$T_{stg}$	$-55 \sim 150$	$^\circ C$



Weight : 1.7g (Typ.)

EQUIVALENT CIRCUIT



961001EAA2

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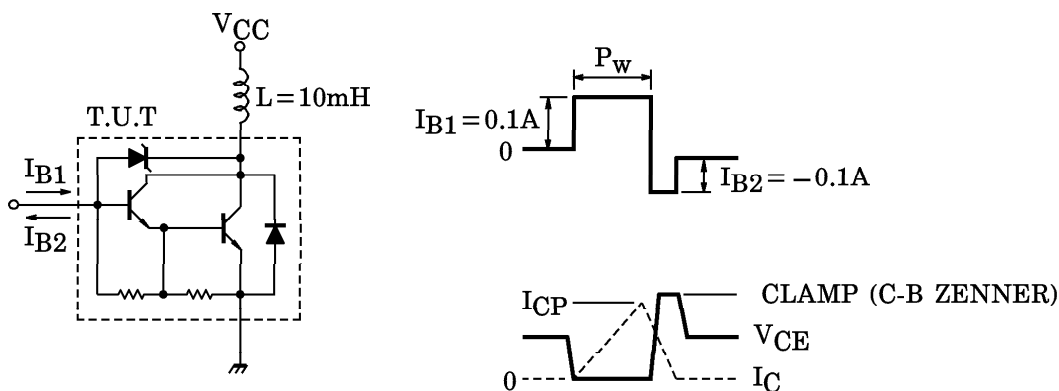
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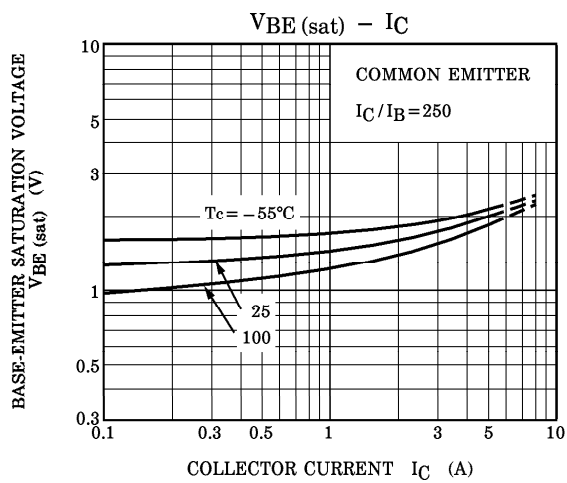
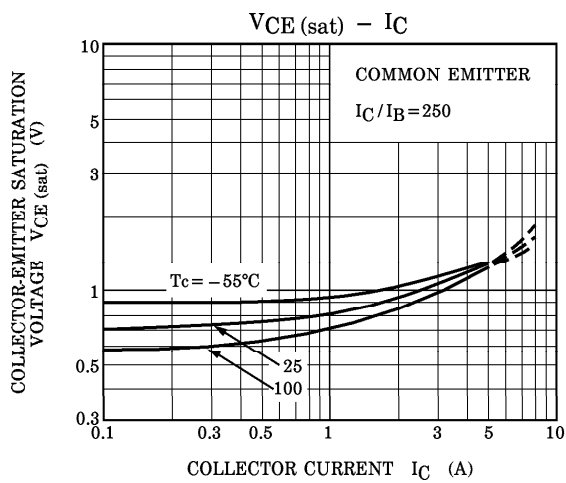
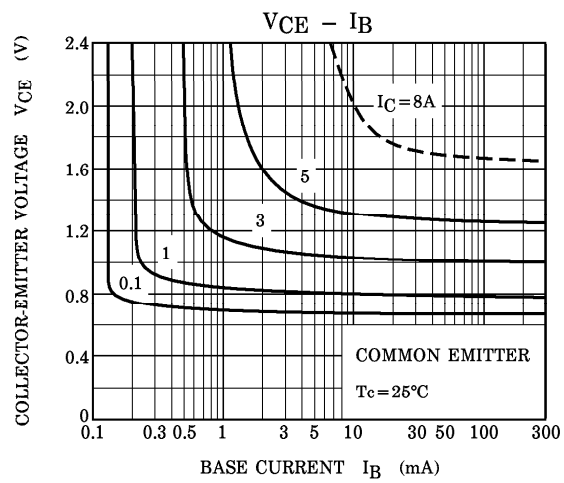
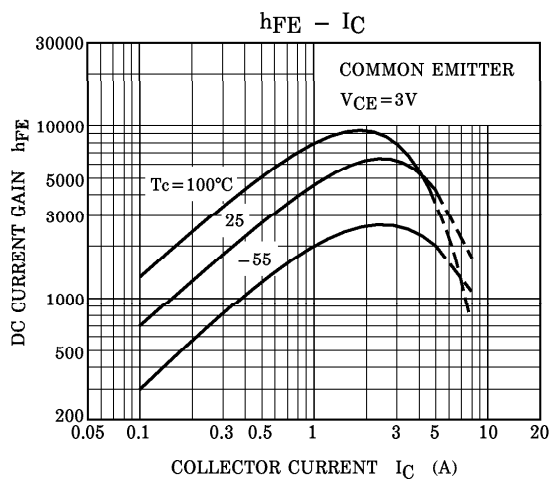
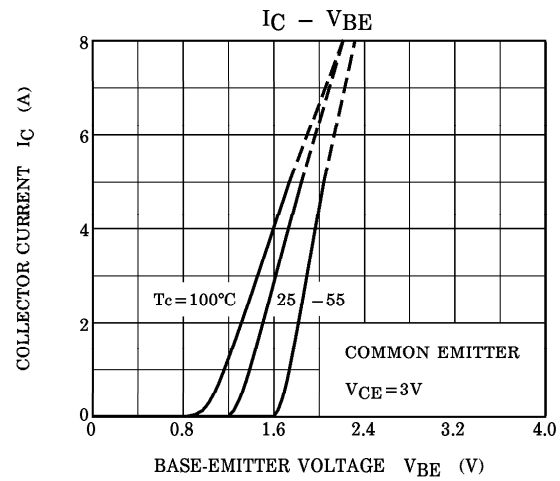
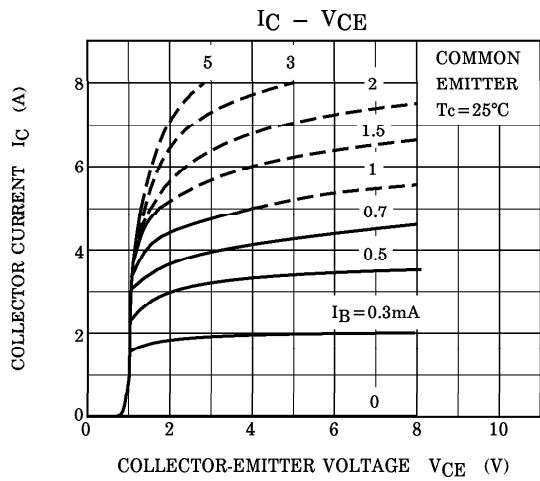
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		ICBO	V <sub>CB</sub> = 45V, I <sub>E</sub> = 0	—	—	10	μA
Collector Cut-off Current		ICEO	V <sub>CE</sub> = 45V, I <sub>B</sub> = 0	—	—	10	μA
Emitter Cut-off Current		IEBO	V <sub>EB</sub> = 6V, I <sub>C</sub> = 0	—	—	2.5	mA
Collector-Base Breakdown Voltage		V <sub>(BR) CBO</sub>	I <sub>C</sub> = 1mA, I <sub>E</sub> = 0	50	60	70	V
Collector-Emitter Breakdown Voltage		V <sub>(BR) CEO</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0	50	60	70	V
DC Current Gain		h <sub>FE</sub> (1)	V <sub>CE</sub> = 3V, I <sub>C</sub> = 3A	2000	—	15000	
		h <sub>FE</sub> (2)	V <sub>CE</sub> = 3V, I <sub>C</sub> = 5A	1000	—	—	
Collector-Emitter Saturation Voltage		V <sub>CE (sat)</sub> (1)	I <sub>C</sub> = 3A, I <sub>B</sub> = 6mA	—	1.1	1.5	V
		V <sub>CE (sat)</sub> (2)	I <sub>C</sub> = 5A, I <sub>B</sub> = 20mA	—	1.3	2.5	
Base-Emitter Saturation Voltage		V <sub>BE (sat)</sub>	I <sub>C</sub> = 3A, I <sub>B</sub> = 6mA	—	1.7	2.5	V
Unclamped Inductive Load Energy		E <sub>S</sub> / B	(Note 1)	150	—	—	mJ
Switching Time	Turn-on Time	t <sub>on</sub>		—	1.0	—	μs
	Storage Time	t <sub>stg</sub>		—	4.0	—	
	Fall Time	t <sub>f</sub>		I <sub>B1</sub> = -I <sub>B2</sub> = 6mA, DUTY CYCLE ≤ 1%	—	2.5	

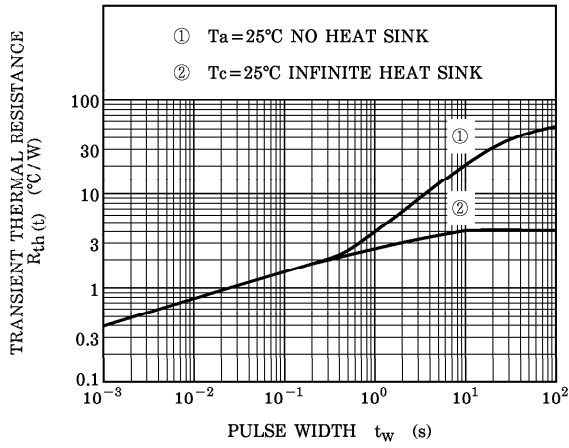
(Note 1) Measurement circuit of unclamped inductive load energy.



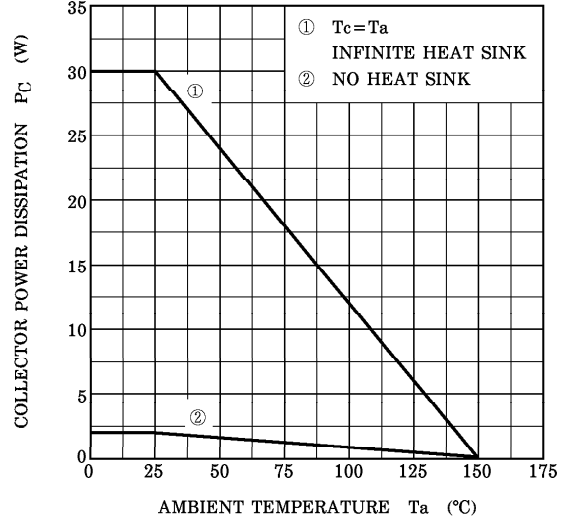
(Note 2) ① Pulse width adjusted for desired I<sub>CP</sub> (I<sub>CP</sub> = 5.47A MIN.)  
 ② E = 1/2 L I<sub>CP</sub><sup>2</sup>



$R_{th}(t) - t_w$



$P_C - T_a$



SAFE OPERATING AREA

