

# SILICON POWER TRANSISTOR

## 2SB601

## PNP SILICON EPITAXIAL TRANSISTOR (DARLINGTON CONNECTION) FOR LOW-FREQUENCY POWER AMPLIFIERS AND LOW-SPEED SWITCHING

## FEATURES

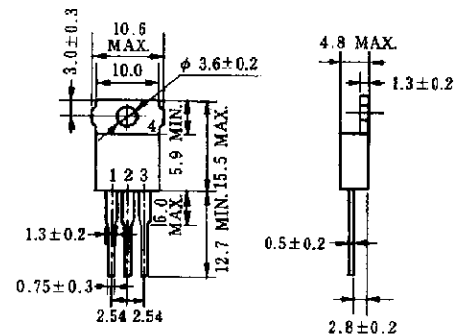
- High-DC current gain due to Darlington connection
- Low collector saturation voltage
- Low collector cutoff current
- Ideal for use in direct drive from IC output for magnet drivers such as terminal equipment or cash registers

### ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

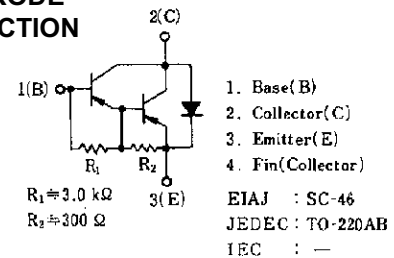
Parameter	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	−100	V
Collector to emitter voltage	$V_{CEO}$	−100	V
Emitter to base voltage	$V_{EBO}$	−7.0	V
Collector current	$I_{C(DC)}$	±5.0	A
Collector current	$I_{C(pulse)}^*$	±8.0	A
Base current	$I_{B(DC)}$	−0.5	A
Total power dissipation	$P_T$ ( $T_a = 25^\circ C$ )	1.5	W
Total power dissipation	$P_T$ ( $T_c = 25^\circ C$ )	30	W
Junction temperature	$T_j$	150	$^\circ C$
Storage temperature	$T_{stg}$	−55 to +150	$^\circ C$

\* PW  $\leq$  10 ms, duty cycle  $\leq$  50%

### PACKAGE DRAWING (UNIT: mm)



## ELECTRODE CONNECTION



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## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

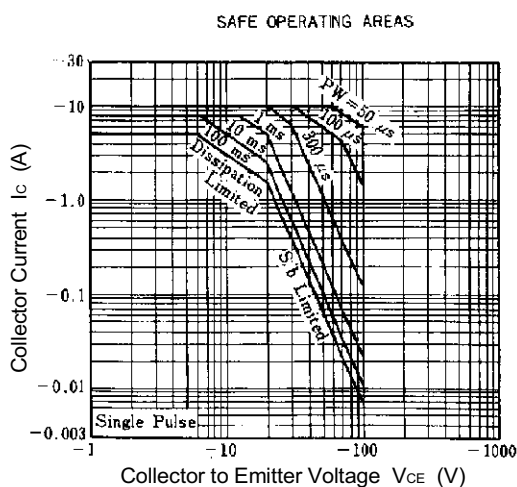
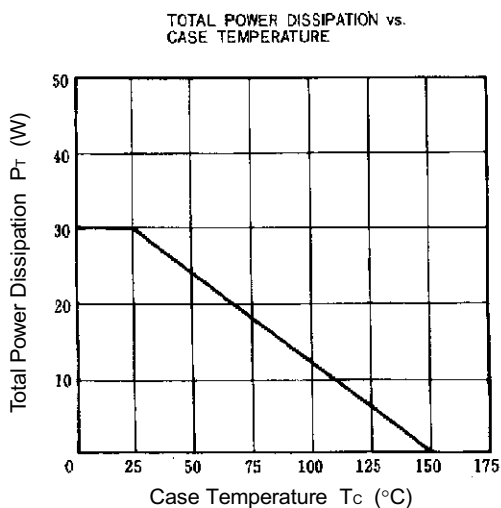
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	$V_{CE0(SUS)}$	$I_C = -3\text{ A}$ , $I_{B1} = -3\text{ mA}$ , $L = 1\text{ mH}$	-100			V
Collector to emitter voltage	$V_{CEX(SUS)1}$	$I_C = -3\text{ A}$ , $I_{B1} = -I_{B2} = -3\text{ mA}$ , $V_{BE(OFF)} = 5.0\text{ V}$ , $L = 180\text{ }\mu\text{H}$ , clamped	-100			V
Collector to emitter voltage	$V_{CEX(SUS)2}$	$I_C = -6\text{ A}$ , $I_{B1} = -12\text{ mA}$ , $I_{B2} = 3\text{ mA}$ , $V_{BE(OFF)} = 5.0\text{ V}$ , $L = 180\text{ }\mu\text{H}$ , clamped	-100			V
Collector cutoff current	$I_{CBO}$	$V_{CB} = -100\text{ V}$ , $I_E = 0$			-10	$\mu\text{A}$
Collector cutoff current	$I_{CER}$	$V_{CE} = -100\text{ V}$ , $R_{BE} = 51\text{ }\Omega$ , $T_a = 125^\circ\text{C}$			-1.0	mA
Collector cutoff current	$I_{CEX1}$	$V_{CE} = -100\text{ V}$ , $V_{BE(OFF)} = 1.5\text{ V}$			-10	$\mu\text{A}$
Collector cutoff current	$I_{CEX2}$	$V_{CE} = -100\text{ V}$ , $V_{BE(OFF)} = 1.5\text{ V}$ , $T_a = 125^\circ\text{C}$			-1.0	mA
Emitter cutoff current	$I_{EBO}$	$V_{EB} = -5.0\text{ V}$ , $I_C = 0$			-3.0	mA
DC current gain	$h_{FE1}^*$	$V_{CE} = -2.0\text{ V}$ , $I_C = -3.0\text{ A}$	2,000		15,000	
DC current gain	$h_{FE2}^*$	$V_{CE} = -2.0\text{ V}$ , $I_C = -5.0\text{ A}$	500			
Collector saturation voltage	$V_{CE(sat)}^*$	$I_C = -3.0\text{ A}$ , $I_B = -3.0\text{ mA}$			-1.5	V
Base saturation voltage	$V_{BE(sat)}^*$	$I_C = -3.0\text{ A}$ , $I_B = -3.0\text{ mA}$			-2.0	V
Turn-on time	$t_{on}$	$I_C = -3.0\text{ A}$ , $R_L = 17\text{ }\Omega$ , $I_{B1} = -I_{B2} = -3.0\text{ mA}$ , $V_{CC} \cong -50\text{ V}$ Refer to the test circuit.		0.5		$\mu\text{s}$
Storage time	$t_{stg}$			1.0		$\mu\text{s}$
Fall time	$t_f$			1.0		$\mu\text{s}$

\* Pulse test  $PW \leq 350\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ 

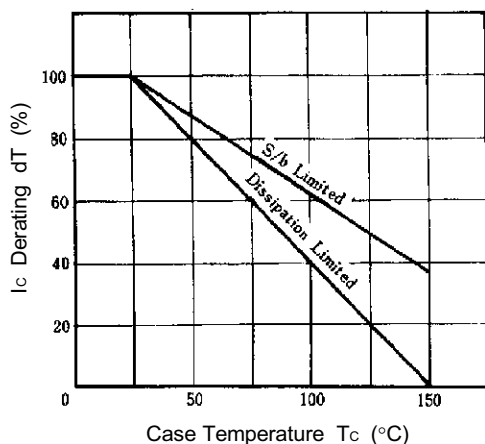
## hFE CLASSIFICATION

Marking	M	L	K
$h_{FE1}$	2,000 to 5,000	3,000 to 7,000	5,000 to 15,000

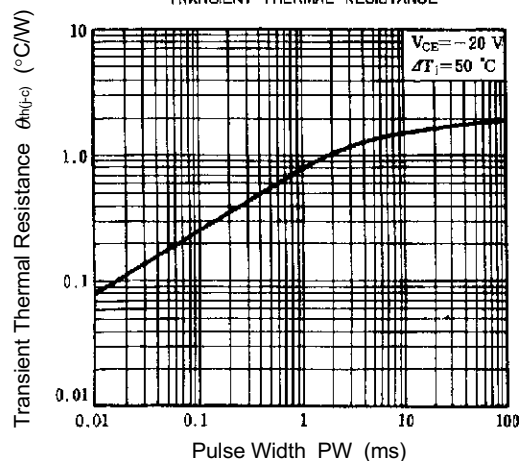
## TYPICAL CHARACTERISTICS (Ta = 25°C)



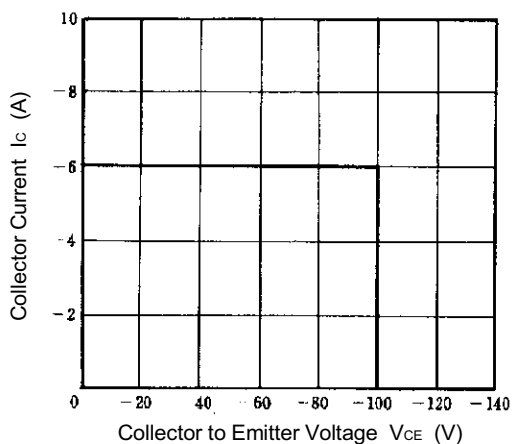
DERATING CURVE OF SAFE  
OPERATING AREA



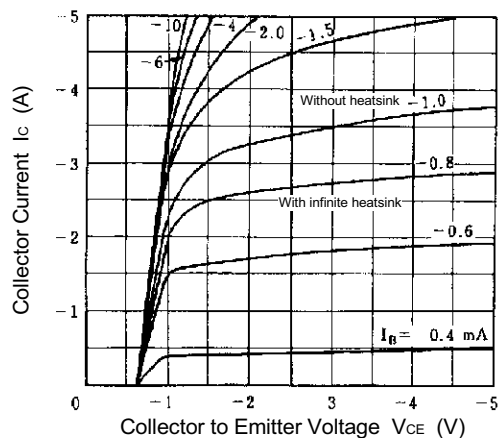
TRANSIENT THERMAL RESISTANCE



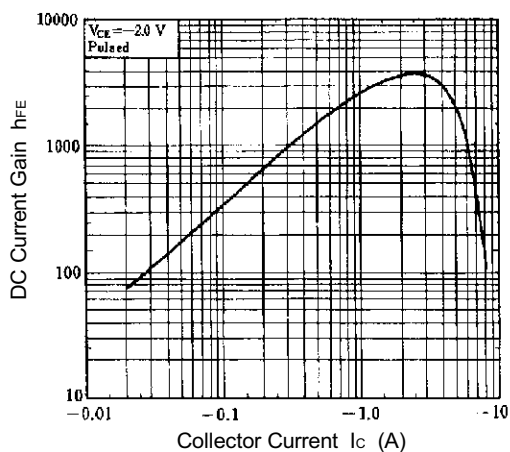
REVERSE BIAS SAFE OPERATING AREAS



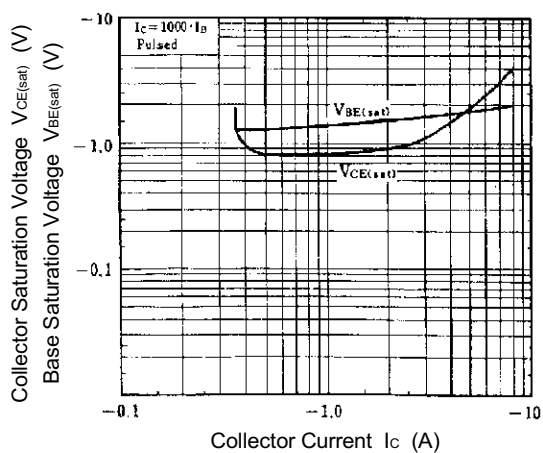
COLLECTOR CURRENT vs. COLLECTOR TO  
EMITTER VOLTAGE



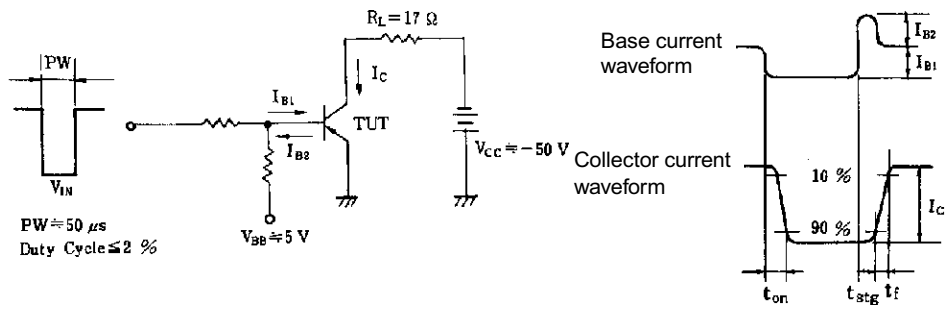
DC CURRENT GAIN vs. COLLECTOR CURRENT



BASE AND COLLECTOR SATURATION  
VOLTAGE vs. COLLECTOR CURRENT



SWITCHING TIME ( $t_{on}$ ,  $t_{stg}$ ,  $t_f$ ) TEST CIRCUIT



[MEMO]

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