

### NPN SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SC4813 is a power transistor developed for high-speed switching and features high  $h_{FE}$  and low  $V_{CE(sat)}$ . This transistor is ideal for use as a driver in DC/DC converters and actuators.

In addition, this transistor features a package that can be auto-mounted in radial taping specifications, thus contributing to mounting cost reduction.

#### FEATURES

- Low  $V_{CE(sat)}$ :  $V_{CE(sat)} \leq 0.3 \text{ V}$  @  $I_C = 3.0 \text{ A}$ ,  $I_B = 30 \text{ mA}$
- High  $h_{FE}$ :  $h_{FE} = 450 \text{ to } 2,000$  @  $V_{CE} = 2.0 \text{ V}$ ,  $I_C = 3.0 \text{ A}$
- On-chip dumper-diode
- Auto-mounting possible in radial taping specifications

#### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	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 (DC)	$I_{C(DC)}$		$\pm 7.5$	A
Collector current (pulse)	$I_{C(pulse)}$	$PW \leq 10 \text{ ms}$ , duty cycle $\leq 2\%$	$\pm 10$	A
Base current (DC)	$I_{B(DC)}$		2.0	A
Total power dissipation	$P_T$	$T_a = 25^\circ\text{C}$	1.8	W
Junction temperature	$T_j$		150	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

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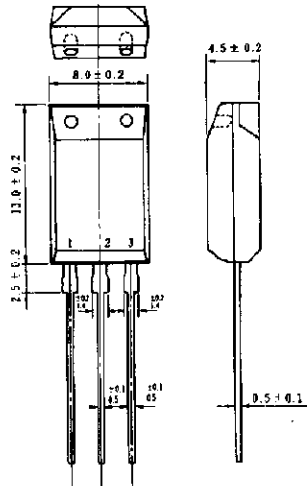
**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = 100\text{ V}, I_E = 0$			10	$\mu\text{A}$
Emitter cutoff current	$I_{EBO}$	$V_{EB} = 5.0\text{ V}, I_C = 0$			17	mA
DC current gain	$h_{FE1}^*$	$V_{CE} = 2.0\text{ V}, I_C = 3.0\text{ A}$	450		2,000	–
DC current gain	$h_{FE2}^*$	$V_{CE} = 2.0\text{ V}, I_C = 5.0\text{ A}$	150			–
Collector saturation voltage	$V_{CE(sat)1}^*$	$I_C = 3.0\text{ A}, I_B = 60\text{ mA}$		0.1	0.2	V
Collector saturation voltage	$V_{CE(sat)2}^*$	$I_C = 3.0\text{ A}, I_B = 30\text{ mA}$		0.15	0.3	V
Collector saturation voltage	$V_{CE(sat)3}^*$	$I_C = 5.0\text{ A}, I_B = 100\text{ mA}$			0.4	V
Collector saturation voltage	$V_{CE(sat)4}^*$	$I_C = 5.0\text{ A}, I_B = 50\text{ mA}$			0.55	V
Base saturation voltage	$V_{BE(sat)}^*$	$I_C = 5.0\text{ A}, I_B = 50\text{ mA}$			1.2	V
Gain bandwidth product	$f_T$	$V_{CE} = 5.0\text{ V}, I_C = 1.0\text{ A}$		150		MHz
Collector capacitance	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$		110		pF
Turn-on time	$t_{on}$	$I_C = 5.0\text{ A}, I_{B1} = -I_{B2} = 100\text{ mA}$ $R_L = 3.0\ \Omega, V_{CC} \cong 16\text{ V}$		0.5		$\mu\text{s}$
Storage time	$t_{stg}$			2.0		$\mu\text{s}$
Fall time	$t_f$			0.5		$\mu\text{s}$
Diode order voltage	$V_{DF}$	$I_{DF} = 5.0\text{ A}$		1.4		V

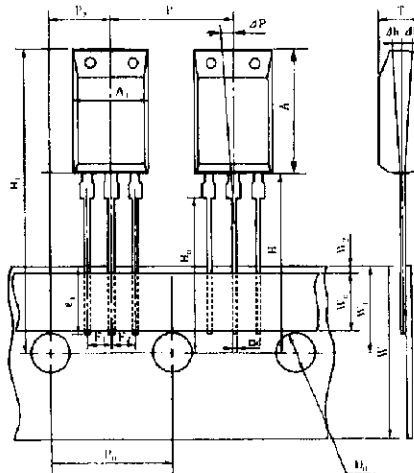
\* Pulse test  $PW \leq 350\ \mu\text{s}$ , duty cycle  $\leq 2\%$

**PACKAGE DRAWING (UNIT: mm)**

**TAPING SPECIFICATION**

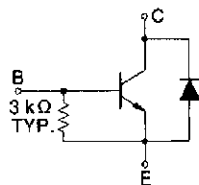


Electrode Connection  
1. Base 2. Collector 3. Emitter

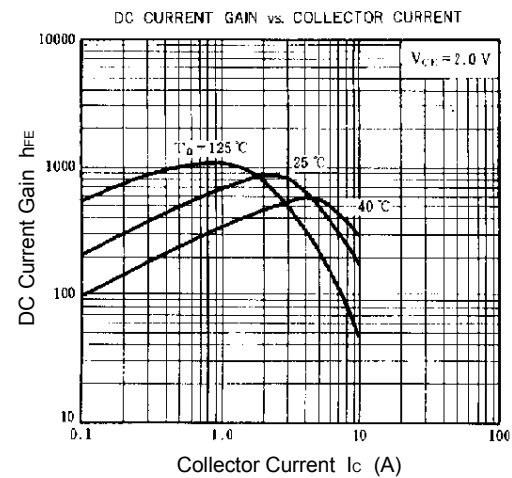
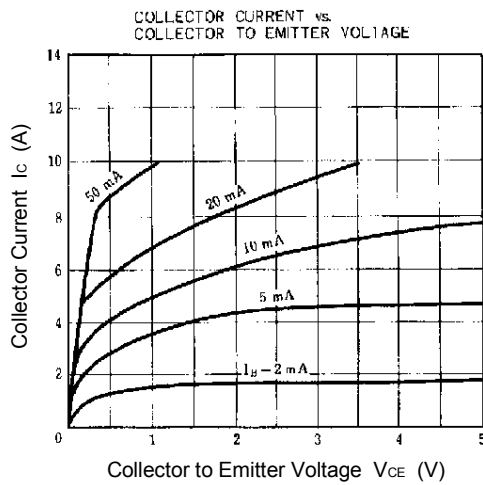
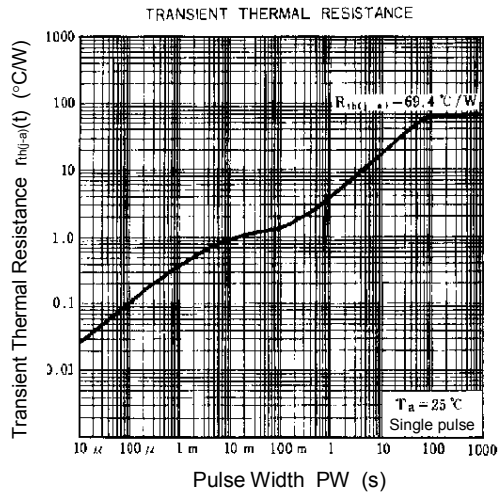
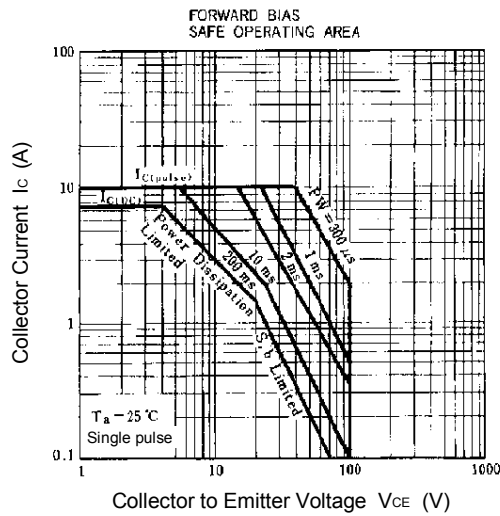
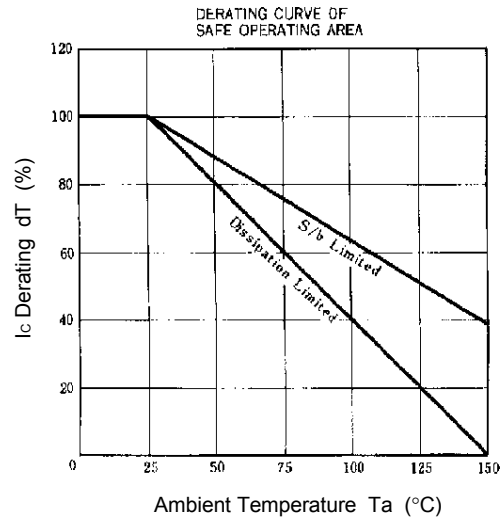
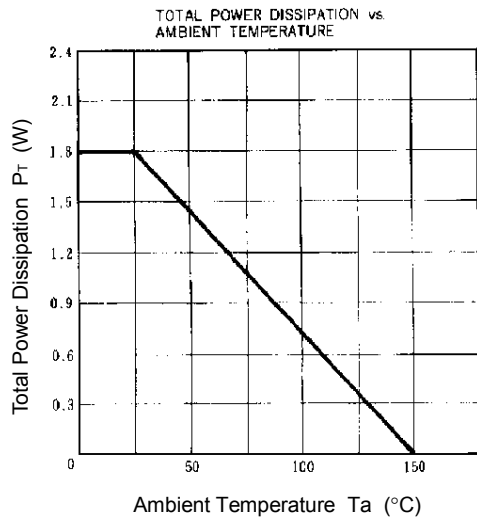


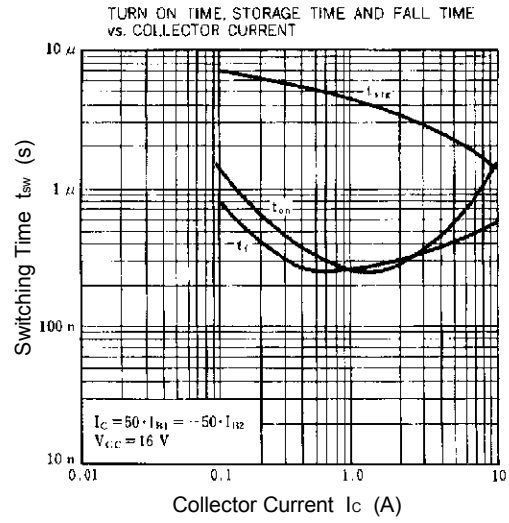
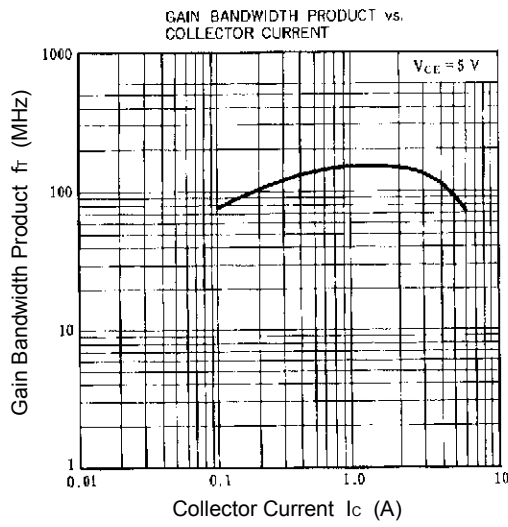
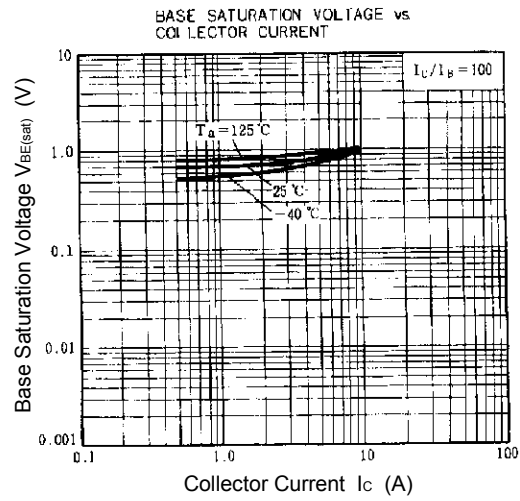
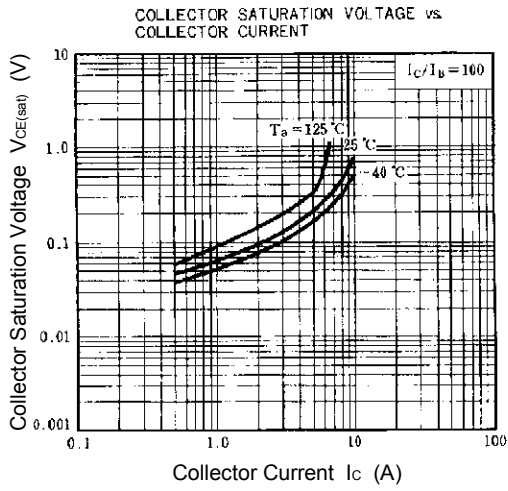
$A_1$	$8.0 \pm 0.2$
$A$	$13.0 \pm 0.2$
$D_0$	$\phi 4.0 \pm 0.2$
$d$	$0.5 \pm 0.1$
$F_1$	$2.5^{+0.1}$
$F_2$	$2.5^{+0.1}$
$H$	20.0 MAX.
$H_0$	$16.0 \pm 0.5$
$H_1$	32.2 MAX.
$\Delta h$	$0 \pm 1.0$
$e_1$	2.5 MIN.
$P$	$12.7 \pm 1.0$
$P_0$	$12.7 \pm 0.3$
$P_1$	$6.35 \pm 0.5$
$\Delta P$	$0 \pm 1.3$
$T$	$4.5 \pm 0.2$
$W$	$18.0^{+1.0}$
$W_0$	5.0 MIN.
$W_1$	$9.0 \pm 0.5$
$W_2$	0.7 MAX.

**EQUIVALENT CIRCUIT**

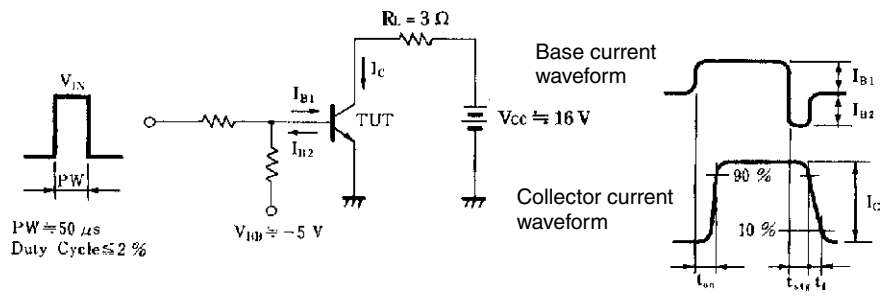


TYPICAL CHARACTERISTICS (Ta = 25°C)





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



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