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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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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)	$I_{C(DC)}$		± 7.5	A
Collector current (pulse)	$I_{C(pulse)}$	$PW \leq 10 \text{ ms}$, duty cycle $\leq 2\%$	± 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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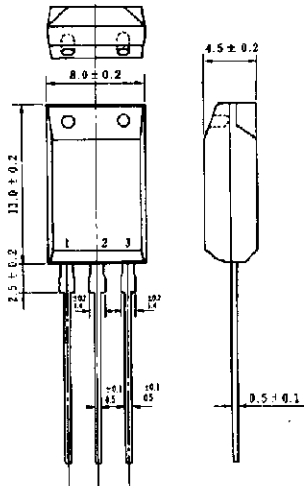
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	$V_{CB} = 100\text{ V}, I_E = 0$			10	μA
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}	$I_C = 5.0\text{ A}, I_{B1} = -I_{B2} = 100\text{ mA}$		0.5		μs
Storage time	t_{stg}	$R_L = 3.0\ \Omega, V_{CC} \cong 16\text{ V}$		2.0		μs
Fall time	t_f			0.5		μs
Diode order voltage	V_{DF}	$I_{DF} = 5.0\text{ A}$		1.4		V

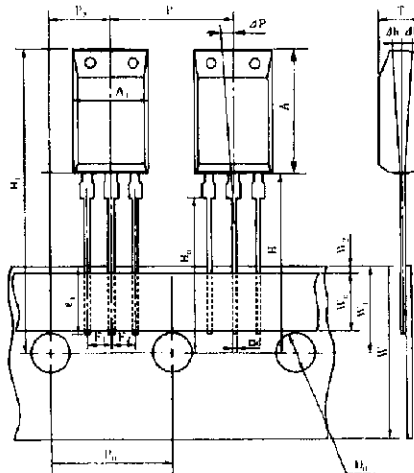
* Pulse test $PW \leq 350\ \mu\text{s}$, duty cycle $\leq 2\%$

PACKAGE DRAWING (UNIT: mm)

TAPING SPECIFICATION

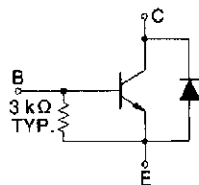


Electrode Connection
1. Base 2. Collector 3. Emitter

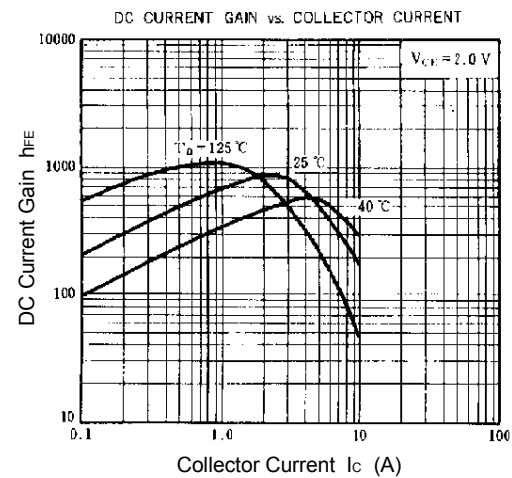
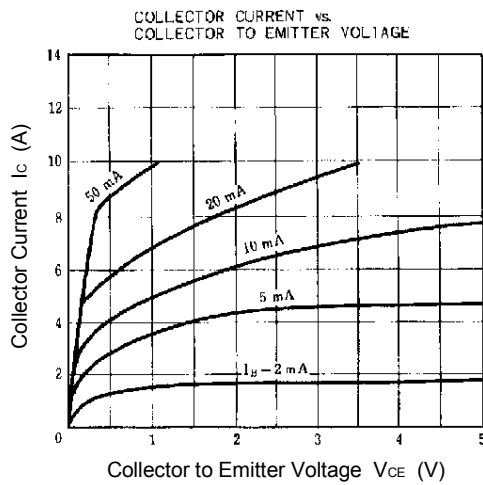
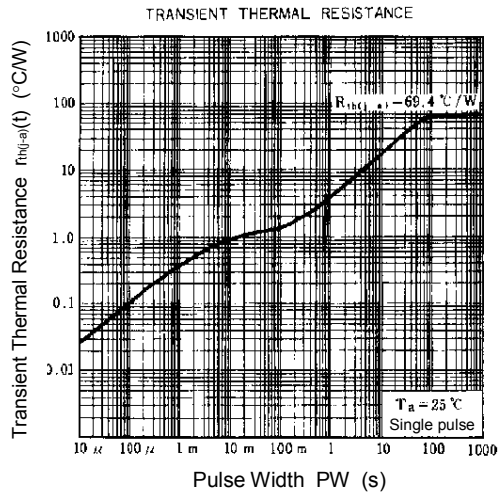
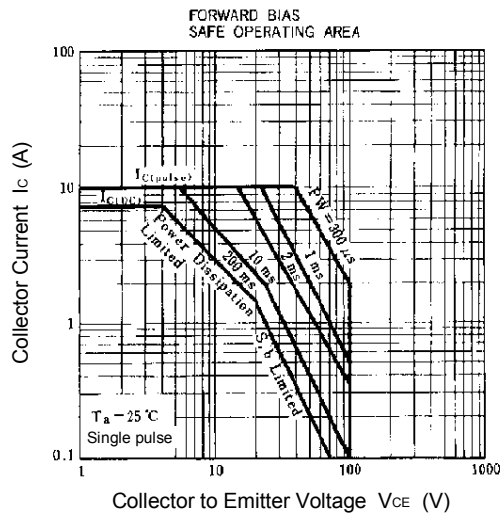
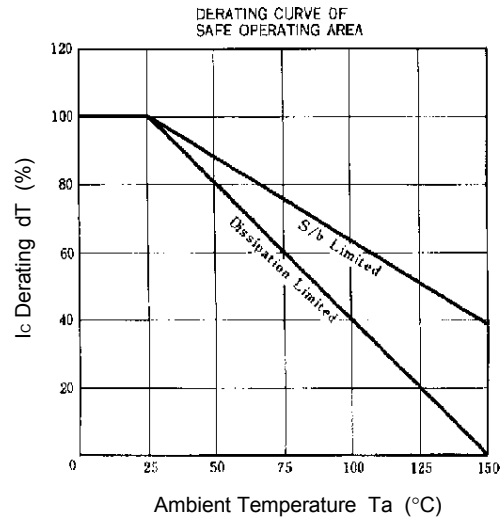
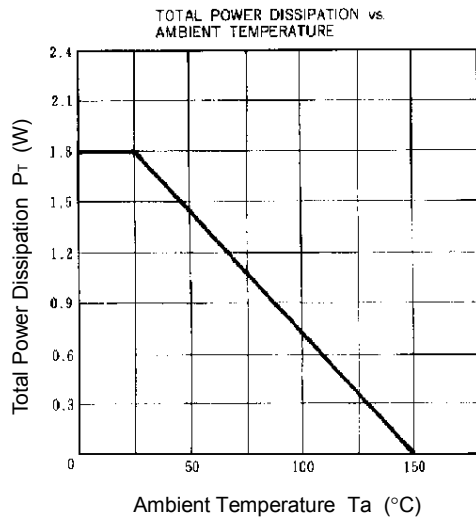


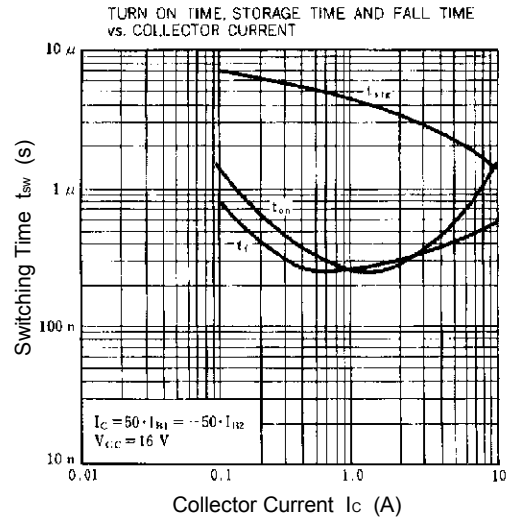
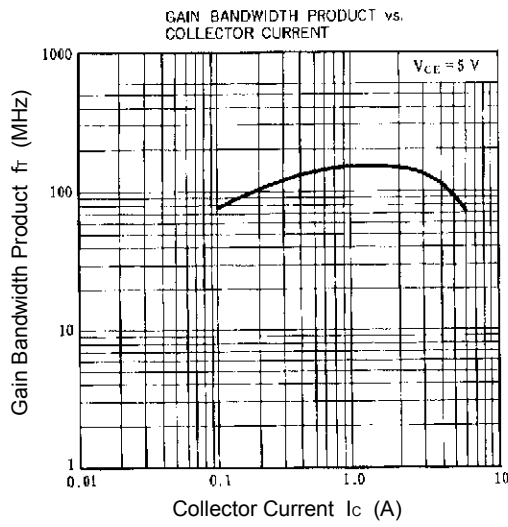
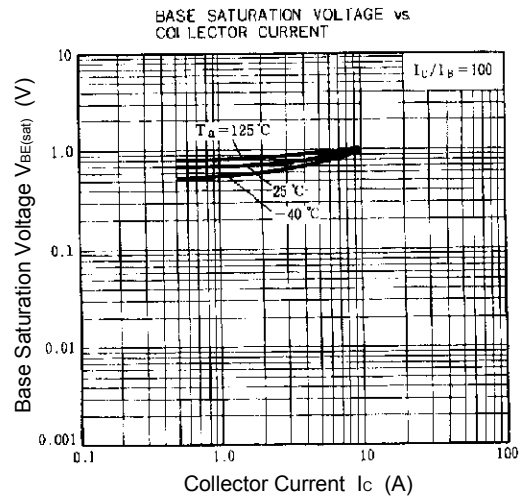
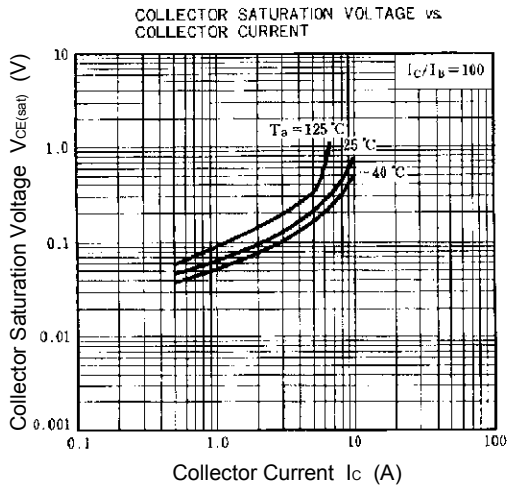
A ₁	8.0 ± 0.2
A	13.0 ± 0.2
D ₀	4.0 ± 0.2
d	0.5 ± 0.1
F ₁	2.5 ± 0.1
F ₂	2.5 ± 0.1
H	20.0 MAX.
H ₀	16.0 ± 0.5
H ₁	32.2 MAX.
Δh	0 ± 1.0
e ₁	2.5 MIN.
P	12.7 ± 1.0
P ₀	12.7 ± 0.3
P ₁	6.35 ± 0.5
ΔP	0 ± 1.3
T	4.5 ± 0.2
W	18.0 ± 0.5
W ₀	5.0 MIN.
W ₁	9.0 ± 0.5
W ₂	0.7 MAX.

EQUIVALENT CIRCUIT

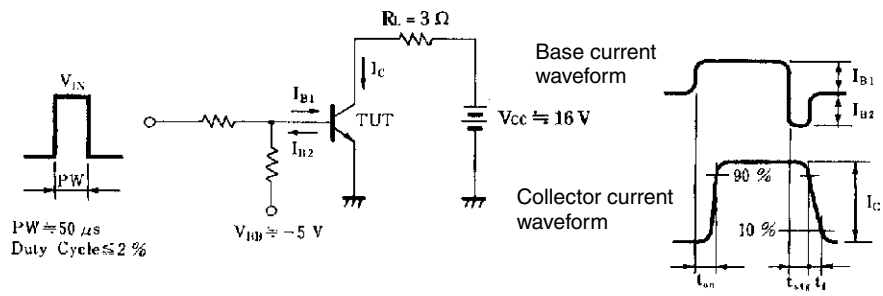


TYPICAL CHARACTERISTICS (Ta = 25°C)





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



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