

SILICON POWER TRANSISTOR 2SA1649, 1649-Z

PNP SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

DESCRIPTION

The 2SA1649 is a mold power transistor developed for high-speed switching and features a very low collector-to-emitter saturation voltage.

This transistor is ideal for use in switching regulators, DC/DC converters, motor drivers, solenoid drivers, and other low-voltage power supply devices, as well as for high-current switching.

FEATURES

- Available for high-current control in small dimension
- Z type is a lead processed product and is deal for mounting a hybrid IC.
- Mold package that does not require an insulating board or insulation bushing
- Low collector saturation voltage:
 $V_{CE(sat)} = -0.3 \text{ V MAX. (I}_c = -3 \text{ A)}$
- Fast switching speed:
 $t_f = 0.3 \mu\text{s MAX. (I}_c = -3 \text{ A)}$
- High DC current amplifiers and excellent linearity

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

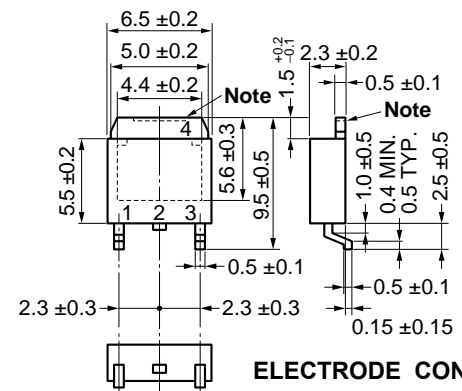
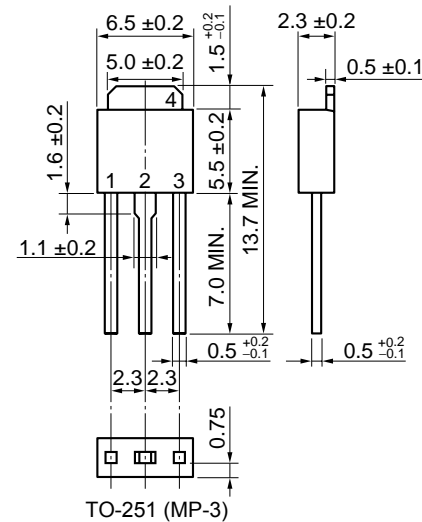
Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	-40	V
Collector to emitter voltage	V_{CEO}	-30	V
Emitter to base voltage	V_{EBO}	-7.0	V
Collector current (DC)	$I_{C(DC)}$	-10	A
Collector current (pulse)	$I_{C(pulse)}$ Note 1	-20	A
Base current (DC)	$I_{B(DC)}$	-3.5	A
Total power dissipation	P_T (Tc = 25 °C)	15	W
Total power dissipation	P_T (Ta = 25 °C)	1.0 Note 2 , 2.0 Note 3	W
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Notes 1. $PW \leq 300 \text{ ms}$, Duty Cycle $\leq 10\%$

2. Printing board mounted

3. $7.5 \text{ cm}^2 \times 0.7 \text{ mm}$ ceramic board mounted

<R> PACKAGE DRAWINGS (Unit: mm)



ELECTRODE CONNECTION

1. Base
2. Collector
3. Emitter
4. Collector Fin

Note The depth of notch at the top of the fin is from 0 to 0.2 mm.

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

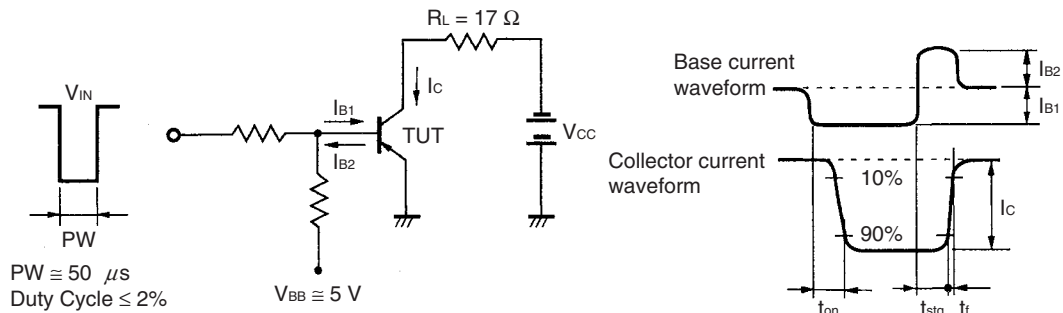
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	$V_{CE0(SUS)}$	$I_C = -4.0\text{ A}, I_B = -0.4\text{ A}, L = 1\text{ mH}$	-30			V
Collector to emitter voltage	$V_{CEX(SUS)}$	$I_C = -4.0\text{ A}, I_{B2} = -I_{B1} = -0.4\text{ A}, V_{BE(OFF)} = 1.5\text{ V}, L = 180\text{ }\mu\text{H}, \text{clamped}$	-40			V
Collector cutoff current	I_{CBO}	$V_{CE} = -30\text{ V}, I_E = 0$			-10	μA
Collector cutoff current	I_{CER}	$V_{CE} = -30\text{ V}, R_{BE} = 50\text{ }\Omega, T_a = 125^\circ\text{C}$			-1.0	mA
Collector cutoff current	I_{CEX1}	$V_{CE} = -30\text{ V}, V_{BE(OFF)} = 1.5\text{ V}$			-10	μA
Collector cutoff current	I_{CEX2}	$V_{CE} = -30\text{ V}, V_{BE(OFF)} = 1.5\text{ V}, T_a = 125^\circ\text{C}$			-1.0	mA
Emitter cutoff current	I_{EBO}	$V_{EB} = -5.0\text{ V}, I_C = 0$			-10	μA
DC current gain	h_{FE1} ^{Note}	$V_{CE} = -2.0\text{ V}, I_C = -0.5\text{ A}$	100			-
DC current gain	h_{FE2} ^{Note}	$V_{CE} = -2.0\text{ V}, I_C = -2.0\text{ A}$	100	200	400	-
DC current gain	h_{FE3} ^{Note}	$V_{CE} = -2.0\text{ V}, I_C = -4.0\text{ A}$	60			-
Collector saturation voltage	$V_{CE(sat)1}$ ^{Note}	$I_C = -3.0\text{ A}, I_B = -0.2\text{ A}$			-0.3	V
Collector saturation voltage	$V_{CE(sat)2}$ ^{Note}	$I_C = -4.0\text{ A}, I_B = -0.3\text{ A}$			-0.5	V
Base saturation voltage	$V_{BE(sat)1}$ ^{Note}	$I_C = -3.0\text{ A}, I_B = -0.2\text{ A}$			-1.2	V
Base saturation voltage	$V_{BE(sat)2}$ ^{Note}	$I_C = -4.0\text{ A}, I_B = -0.3\text{ A}$			-1.5	V
Collector capacitance	C_{ob}	$V_{CB} = -10\text{ V}, I_E = 0, f = 1.0\text{ MHz}$		250		pF
Gain bandwidth product	f_r	$V_{CE} = -10\text{ V}, I_C = -0.5\text{ A}$		120		MHz
Turn-on time	t_{on}	$I_C = -4.0\text{ A}, R_L = 5\text{ }\Omega, I_{B1} = -I_{B2} = -0.15\text{ A}, V_{CC} \cong -20\text{ V}$ Refer to the test circuit.			0.3	μs
Storage time	t_{stg}				1.5	μs
Fall time	t_f				0.3	μs

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

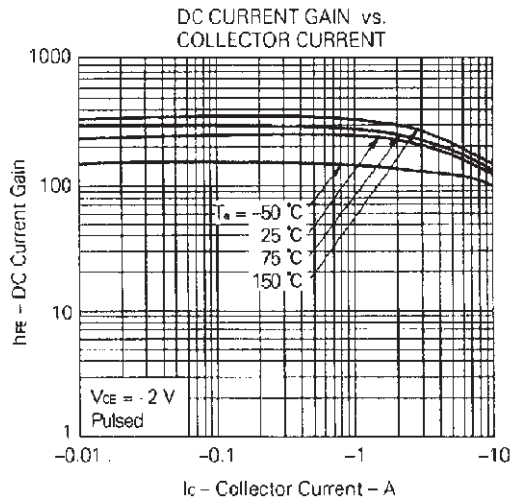
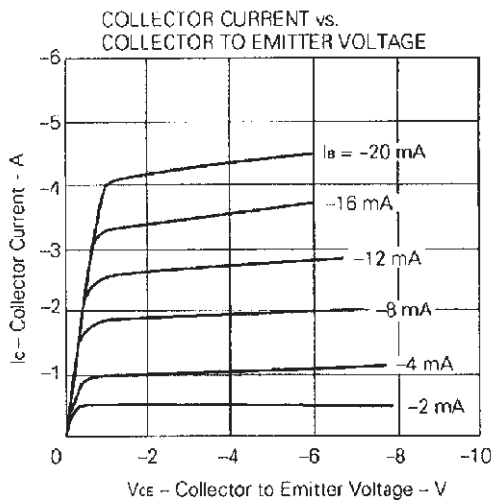
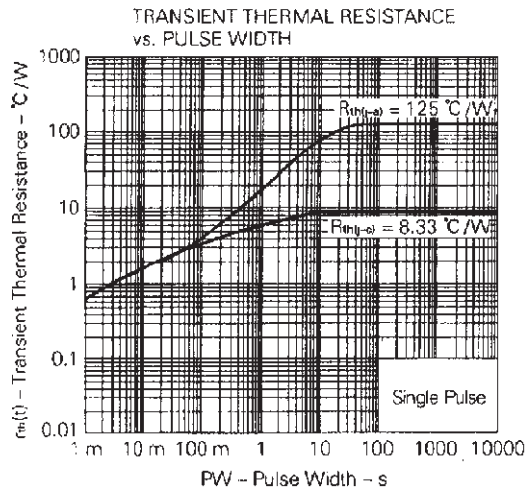
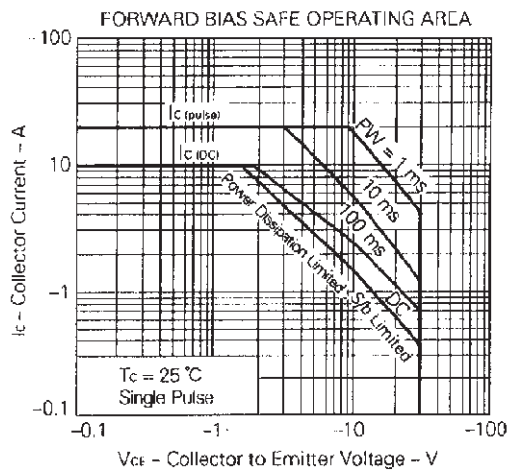
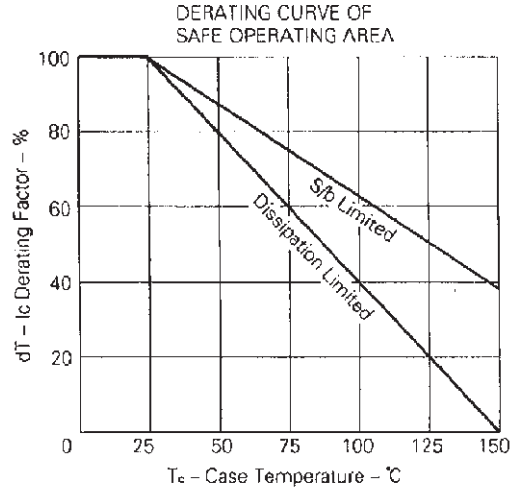
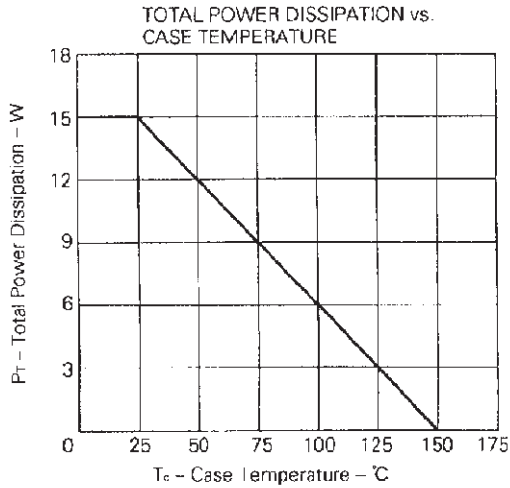
hFE CLASSIFICATION

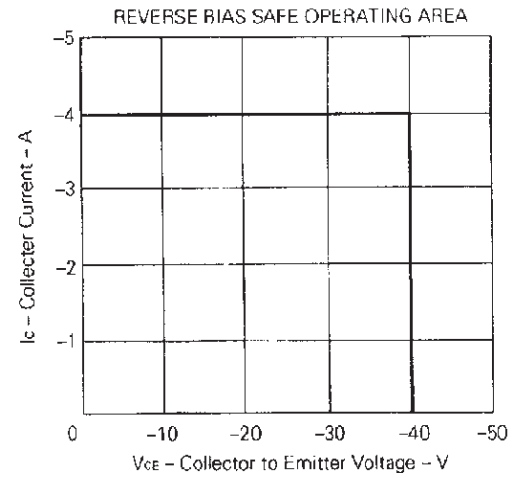
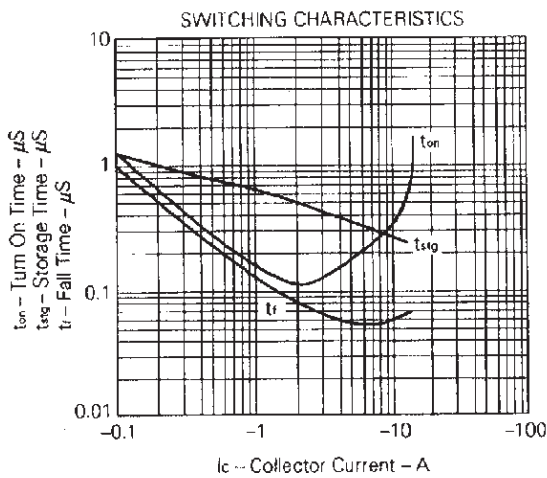
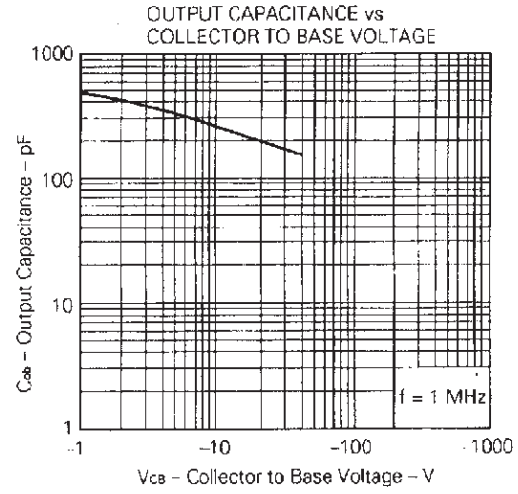
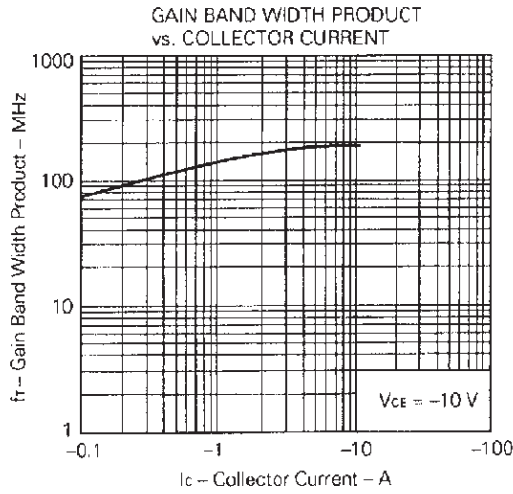
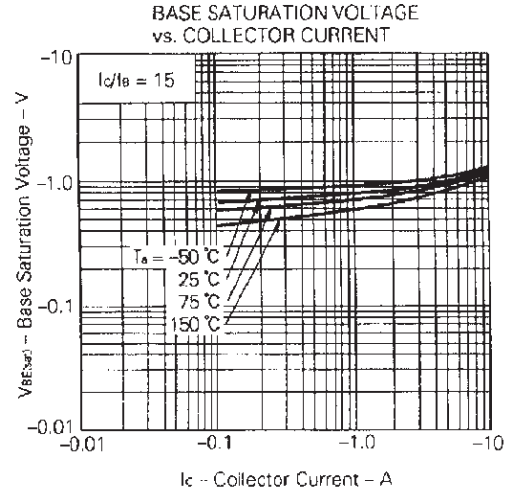
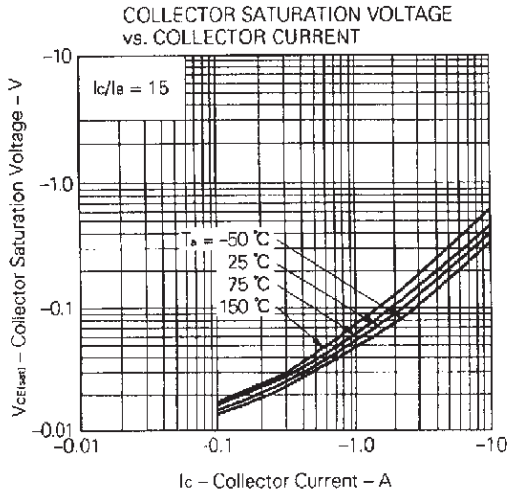
Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

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



TYPICAL CHARACTERISTICS (T_A = 25°C)





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