

SILICON POWER TRANSISTOR

2SA1649, 2SA1649-Z

PNP SILICON EPITAXIAL POWER TRANSISTOR FOR HIGH-SPEED SWITCHING

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)

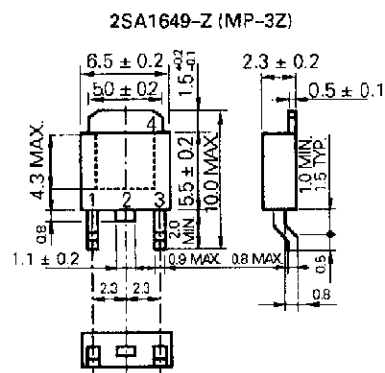
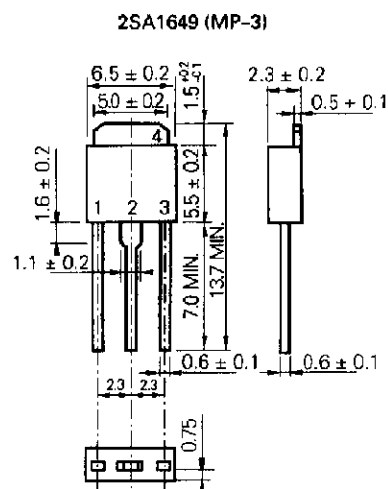
Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	-40	V
Collector to emitter voltage	V_{CEO}	-30	V
Emitter to base voltage	V_{EBO}	-7.0	V
Collector current (DC)	$I_{C(DC)}$	-10	A
Collector current (pulse)	$I_{C(pulse)^*}$	-20	A
Base current (DC)	$I_{B(DC)}$	-3.5	A
Total power dissipation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

*: $PW \leq 300 \mu\text{s}$, duty cycle $\leq 10\%$

** : Printing board mounted

***: $7.5 \text{ mm}^2 \times 0.7 \text{ mm}$ ceramic board mounted

PACKAGE DRAWING (UNIT: mm)



Electrode Connection
 1. Base
 2. Collector
 3. Emitter
 4. Fin (collector)

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

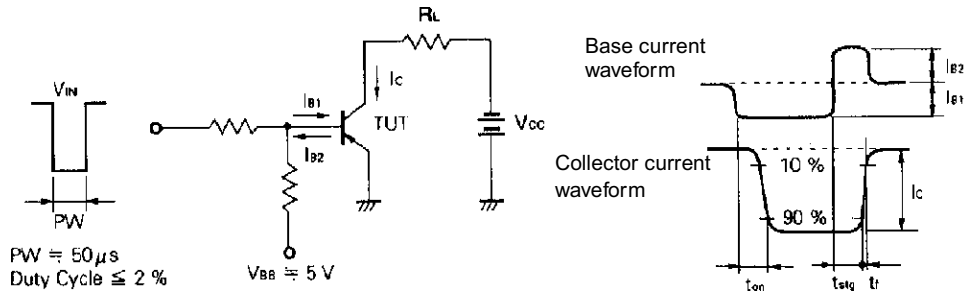
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	V _{CEO(SUS)}	I _C = -4.0 A, I _B = -0.4 A, L = 1 mH	-30			V
Collector to emitter voltage	V _{CEX(SUS)}	I _C = -4.0 A, I _{B2} = -I _{B1} = -0.4 A, V _{BE(OFF)} = 1.5 V, L = 180 μH, clamped	-40			V
Collector cutoff current	I _{CBO}	V _{CE} = -30 V, I _E = 0			-10	μA
Collector cutoff current	I _{CER}	V _{CE} = -30 V, R _{BE} = 50 Ω, Ta = 125°C			-1.0	mA
Collector cutoff current	I _{CEx1}	V _{CE} = -30 V, V _{BE(OFF)} = 1.5 V			-10	μA
Collector cutoff current	I _{CEx2}	V _{CE} = -30 V, V _{BE(OFF)} = 1.5 V, Ta = 125°C			-1.0	mA
Emitter cutoff current	I _{EBO}	V _{EB} = -5.0 V, I _C = 0			-10	μA
DC current gain	h _{FE1} *	V _{CE} = -2.0 V, I _C = -0.5 A	100			-
DC current gain	h _{FE2} *	V _{CE} = -2.0 V, I _C = -2.0 A	100	200	400	-
DC current gain	h _{FE3} *	V _{CE} = -2.0 V, I _C = -4.0 A	60			-
Collector saturation voltage	V _{CE(sat)1} *	I _C = -3.0 A, I _B = -0.2 A			-0.3	V
Collector saturation voltage	V _{CE(sat)2} *	I _C = -4.0 A, I _B = -0.3 A			-0.5	V
Base saturation voltage	V _{BE(sat)1} *	I _C = -3.0 A, I _B = -0.2 A			-1.2	V
Base saturation voltage	V _{BE(sat)2} *	I _C = -4.0 A, I _B = -0.3 A			-1.5	V
Collector capacitance	C _{ob}	V _{CB} = -10 V, I _E = 0, f = 1.0 MHz		250		pF
Gain bandwidth product	f _T	V _{CE} = -10 V, I _C = -0.5 A		120		MHz
Turn-on time	t _{on}	I _C = -4.0 A, R _L = 5 Ω, I _{B1} = -I _{B2} = -0.15 A, V _{CC} ≅ -20 V Refer to the test circuit.			0.3	μs
Storage time	t _{stg}				1.5	μs
Fall time	t _f				0.3	μs

* Pulse test PW ≤ 350 μs, duty cycle ≤ 2%/pulsed

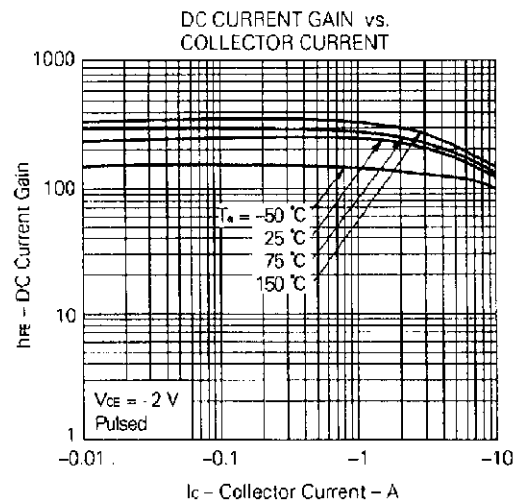
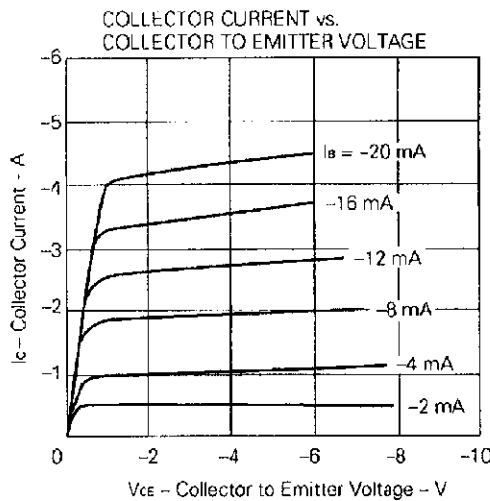
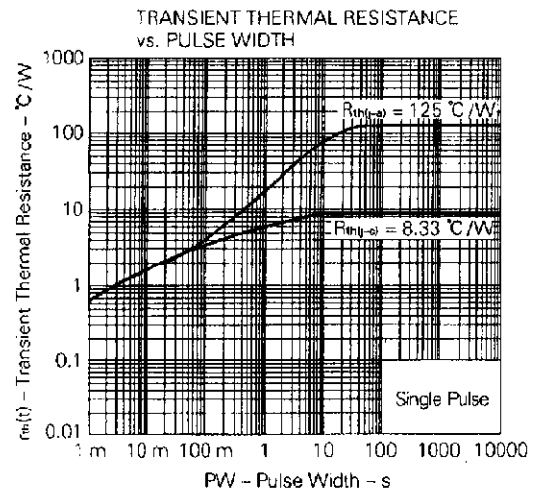
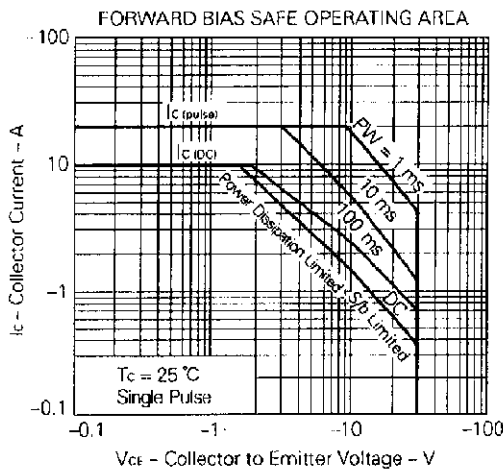
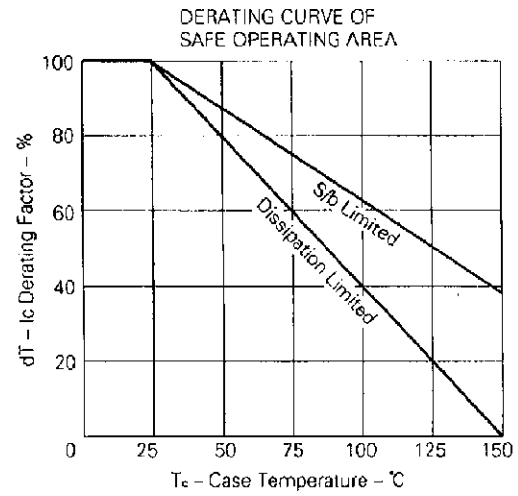
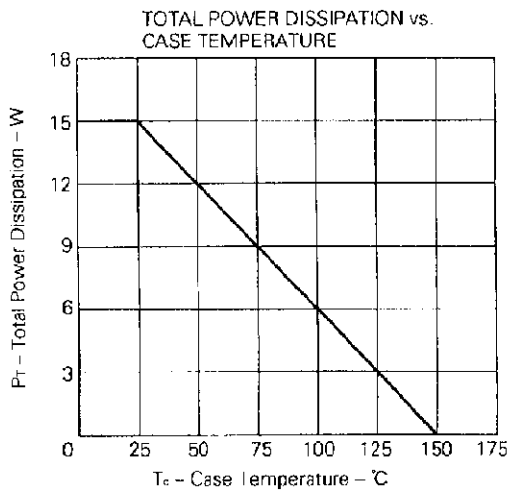
h_{FE} CLASSIFICATION

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

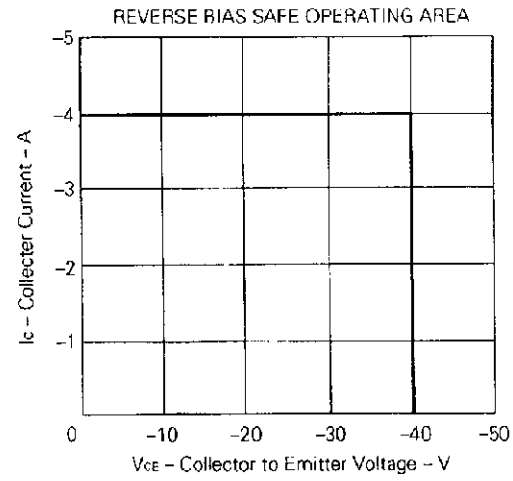
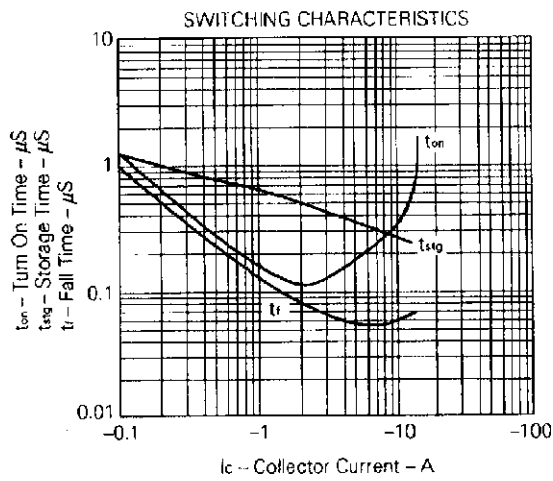
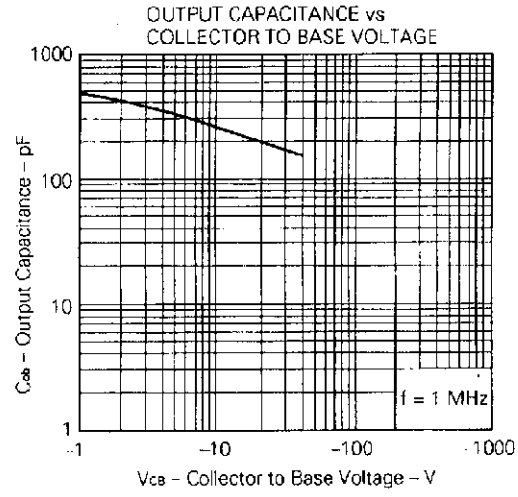
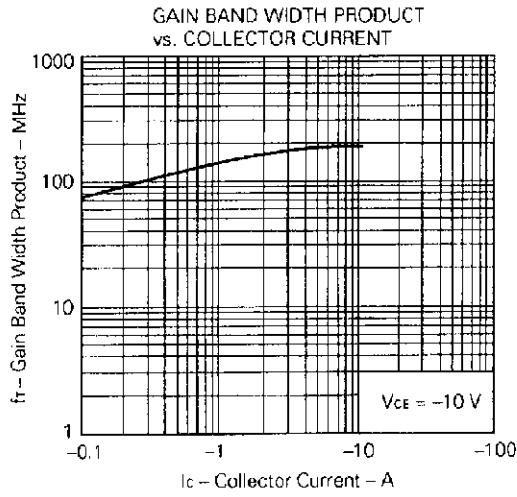
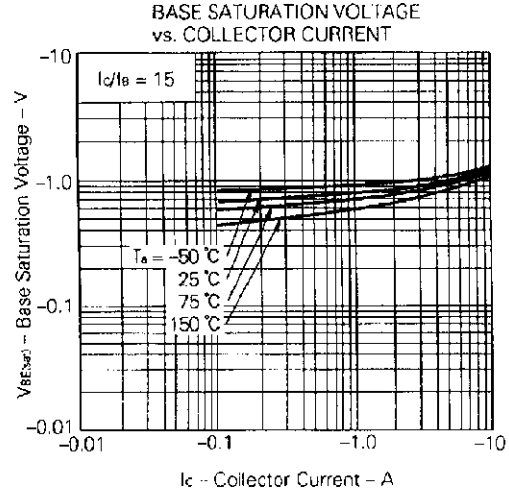
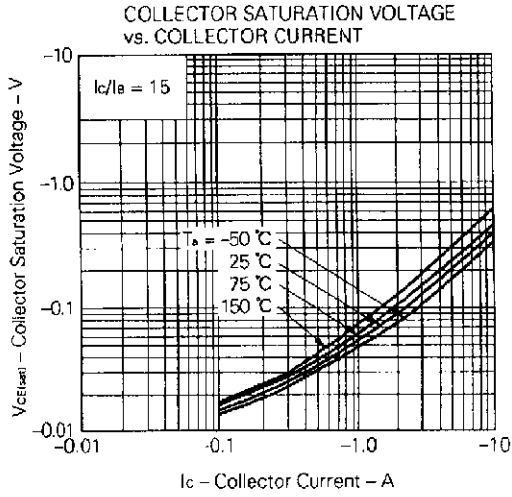
SWITCHING TIME (t_{on}, t_{stg}, t_f) TEST CIRCUIT



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