NEC

SILICON POWER TRANSISTOR
2SA1650

PNP SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SA1650 is a mold power transistor developed for high-speed switching and features a very low collector-to-emitter saturation. This transistor is ideal for use in switching power supplies, DC/DC converters, motor drivers, solenoid drivers, and other low-voltage power supply devices, as well as for high-current switching.

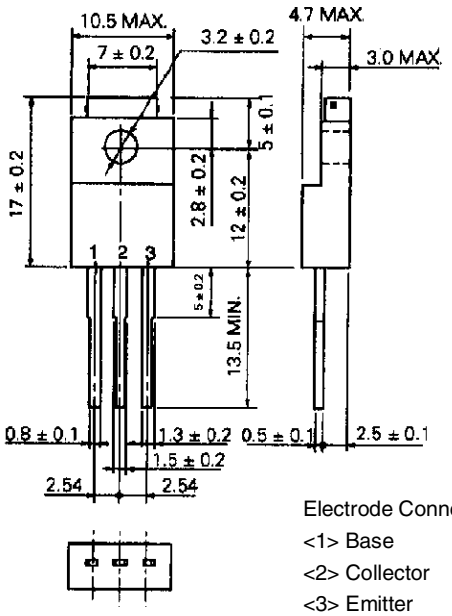
FEATURES

- Mold package that does not require an insulating board or insulation bushing
- Fast switching speed
- Low collector-to-emitter saturation voltage:
  $V_{CE(sat)} \leq -0.3$ V (MAX.) @ $I_C = -3$ A

QUALITY GRADES

- Standard
  Please refer to "Quality Grades on NEC Semiconductor Devices" (Document No. C11531E) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

PACKAGE DRAWING (UNIT: mm)



Electrode Connection
<1> Base
<2> Collector
<3> Emitter

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameter	Symbol	Conditions	Ratings	Unit
Collector to base voltage	V_{CBO}		−150	V
Collector to emitter voltage	V_{CEO}		−100	V
Emitter to base voltage	V_{EBO}		−7.0	V
Collector current	$I_{D(DC)}$		−5.0	A
Collector current	$I_{C(pulse)}$	PW ≤ 300 μs, duty cycle ≤ 10%	−10	A
Base current	$I_{B(DC)}$		−2.5	A
Total power dissipation	P_T	Tc = 25°C	25	W
Total power dissipation	P_T	Ta = 25°C	2.0	W
Junction temperature	T_j		150	°C
Storage temperature	T_{stg}		−55 to +150	°C

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

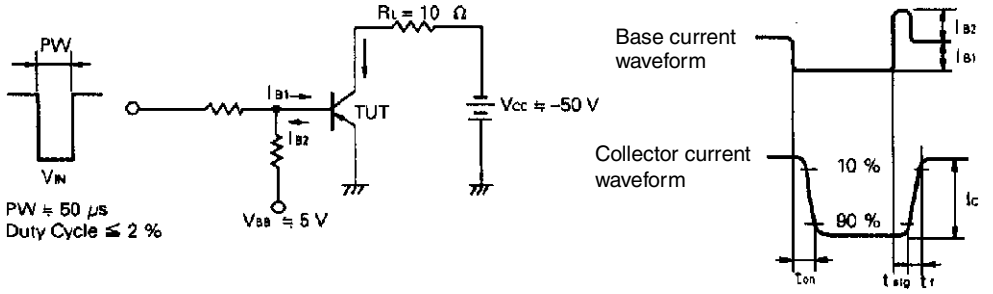
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –100 V, I_E = 0			–10	μA
Emitter cutoff current	I_{EBO}	V_{EB} = –5 V, I_C = 0			–10	μA
DC current gain	h_{FE1}*	V_{CE} = –2 V, I_C = –0.5 A	100			–
DC current gain	h_{FE2}*	V_{CE} = –2 V, I_C = –1 A	100		400	–
DC current gain	h_{FE3}*	V_{CE} = –2 V, I_C = –3 A	60			–
Collector saturation voltage	$V_{CE(sat)1}$*	I_C = –3 A, I_B = –0.15 A			–0.3	V
Collector saturation voltage	$V_{CE(sat)2}$*	I_C = –4 A, I_B = –0.2 A			–0.5	V
Base saturation voltage	$V_{BE(sat)1}$*	I_C = –3 A, I_B = –0.15 A			–1.2	V
Base saturation voltage	$V_{BE(sat)2}$*	I_C = –4 A, I_B = –0.2 A			–1.5	V
Gain bandwidth product	f_T	V_{CE} = –10 V, I_C = –0.5 A		150		MHz
Collector capacitance	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz		130		pF
Turn-on time	t_{on}	I_C = –3 A, I_{B1} = –I_{B2} = –0.15 A, R_L = 10 Ω, V_{CC} = –50 V Refer to the test circuit.		0.3		μs
Storage time	t_{stg}			1.5		μs
Fall time	t_f			0.4		μs

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

h_{FE} CLASSIFICATION

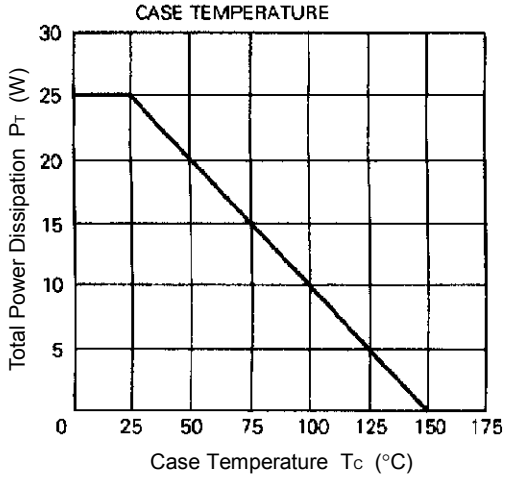
Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

SWITCHING TIME TEST CIRCUIT

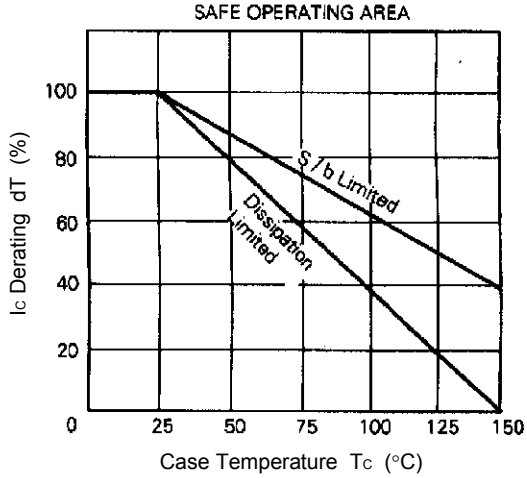


TYPICAL CHARACTERISTICS (Ta = 25°C)

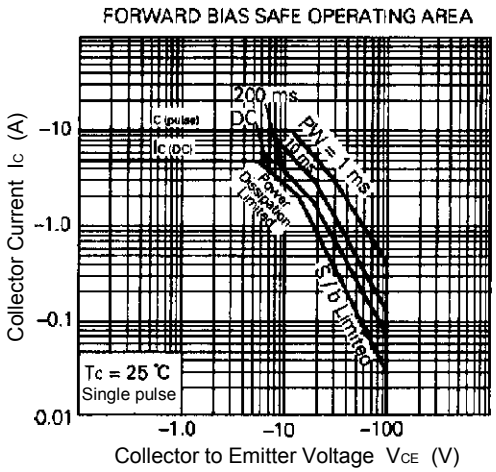
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



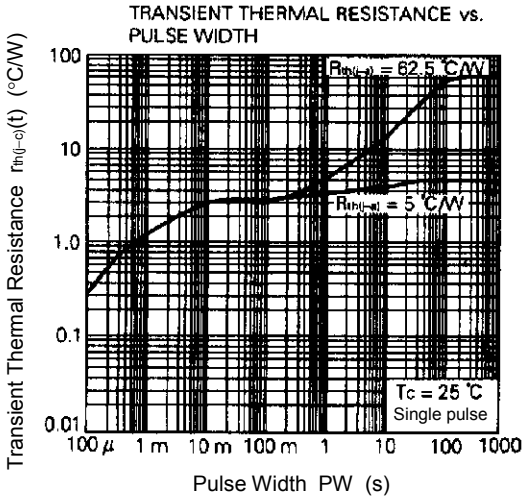
DERATING CURVE OF SAFE OPERATING AREA



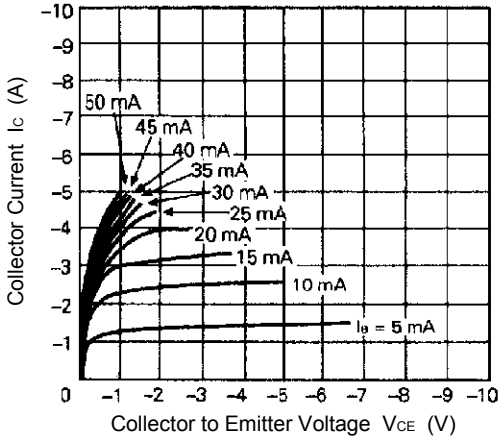
FORWARD BIAS SAFE OPERATING AREA



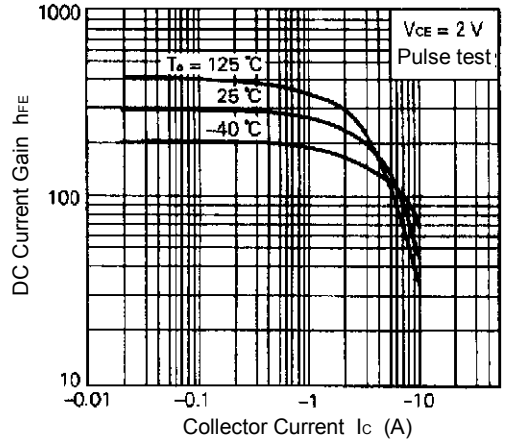
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



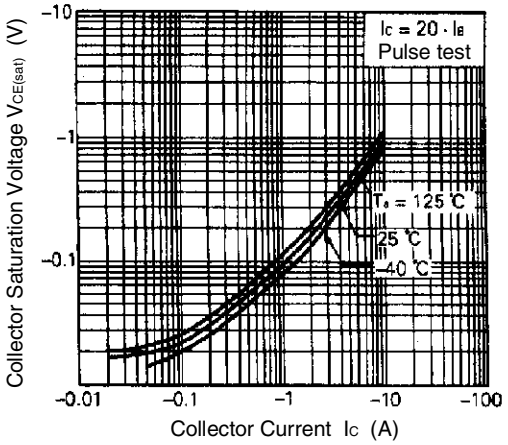
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



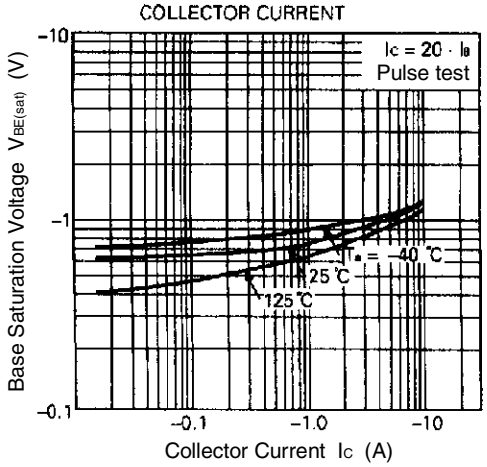
DC CURRENT GAIN vs. COLLECTOR CURRENT



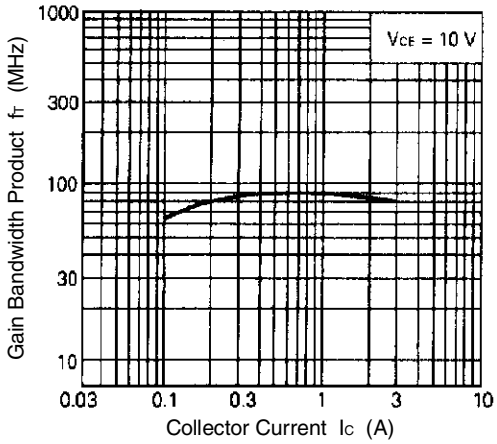
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



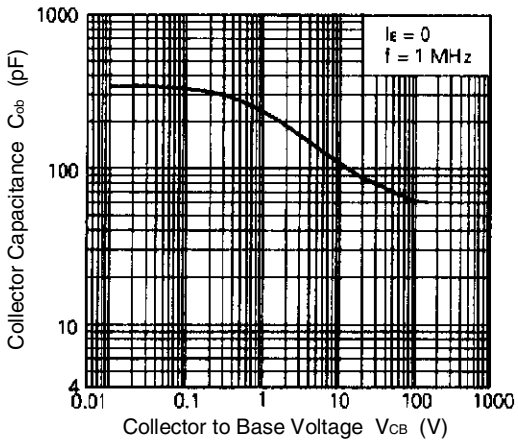
BASE SATURATION VOLTAGE vs.
COLLECTOR CURRENT



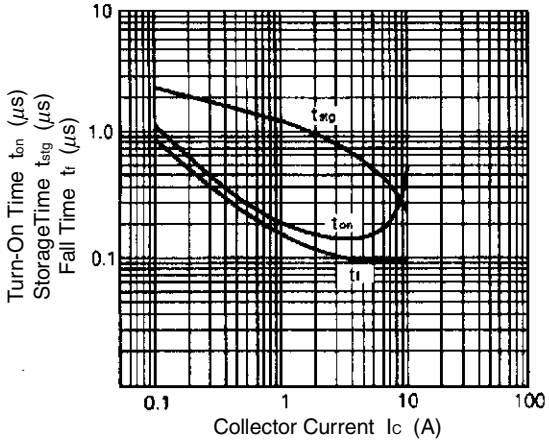
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



TURN ON TIME , STORAGE TIME AND
FALL TIME vs. COLLECTOR CURRENT



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