

# SILICON POWER TRANSISTOR 2SA1646, 2SA1646-Z

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

The 2SA1646 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 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:  
 $V_{CE(sat)} = -0.3 \text{ V MAX. @ } I_c = -6 \text{ A}$

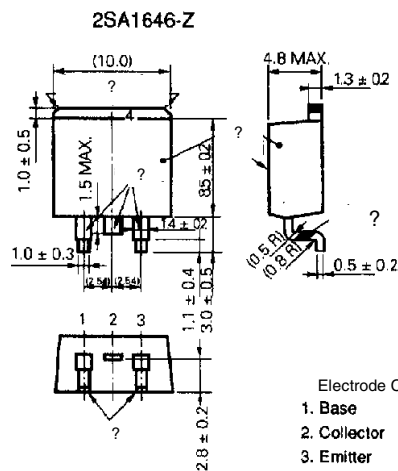
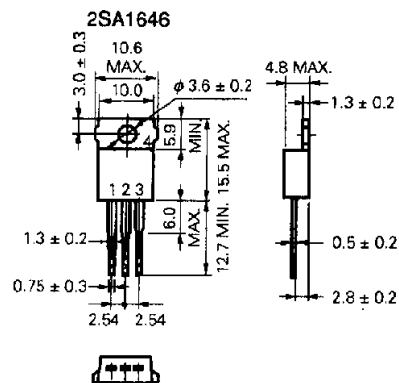
#### QUALITY GRADES

- 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.

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

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	$I_{B(DC)}$		-10	A
Collector current	$I_{C(pulse)}$	$PW \leq 300 \mu\text{s}$ , duty cycle $\leq 10\%$	-20	A
Base current	$I_{B(DC)}$		-6.0	A
Total power dissipation	$P_T$	$T_c = 25^\circ\text{C}$	40	W
Total power dissipation	$P_T$	$T_a = 25^\circ\text{C}$	1.5	W
Junction temperature	$T_j$		150	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

#### PACKAGE DRAWING (UNIT: mm)



- Electrode Connection
1. Base
  2. Collector
  3. Emitter
  4. Fin (Collector)
- EIAJ : SC-46  
JEDEC : TO-220AB  
IEC : —

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

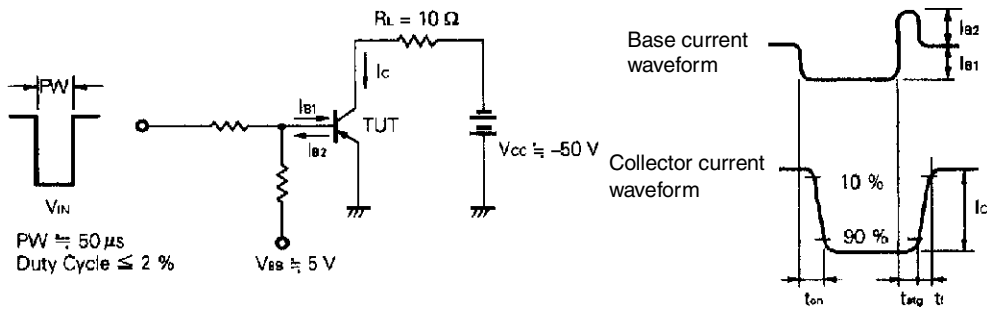
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = -100\text{ V}, I_E = 0$			-10	$\mu\text{A}$
Emitter cutoff current	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0$			-10	$\mu\text{A}$
DC current gain	$h_{FE1}^*$	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	100			-
DC current gain	$h_{FE2}^*$	$V_{CE} = -2\text{ V}, I_C = -2\text{ A}$	100		400	-
DC current gain	$h_{FE3}^*$	$V_{CE} = -2\text{ V}, I_C = -6\text{ A}$	60			-
Collector saturation voltage	$V_{CE(sat)1}^*$	$I_C = -6\text{ A}, I_B = -0.3\text{ A}$			-0.3	V
Collector saturation voltage	$V_{CE(sat)2}^*$	$I_C = -8\text{ A}, I_B = -0.4\text{ A}$			-0.5	V
Base saturation voltage	$V_{BE(sat)1}^*$	$I_C = -6\text{ A}, I_B = -0.3\text{ A}$			-1.2	V
Base saturation voltage	$V_{BE(sat)2}^*$	$I_C = -8\text{ A}, I_B = -0.4\text{ A}$			-1.5	V
Gain bandwidth product	$f_T$	$V_{CE} = -10\text{ V}, I_C = -0.5\text{ A}$		150		MHz
Collector capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$		250		pF
Turn-on time	$t_{on}$	$I_C = -6\text{ A}, I_{B1} = -I_{B2} = -0.3\text{ A},$ $R_L = 8.3\ \Omega, V_{CC} = -50\text{ V}$ Refer to the test circuit.		0.3		$\mu\text{s}$
Storage time	$t_{stg}$			1.5		$\mu\text{s}$
Fall time	$t_f$			0.4		$\mu\text{s}$

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

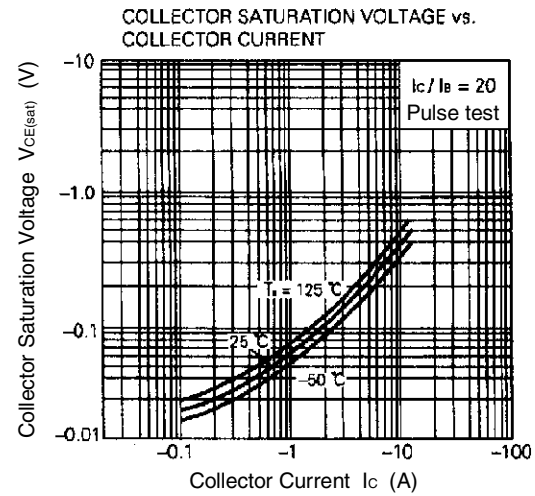
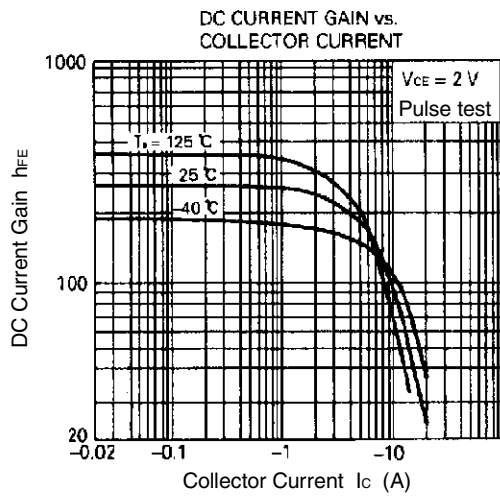
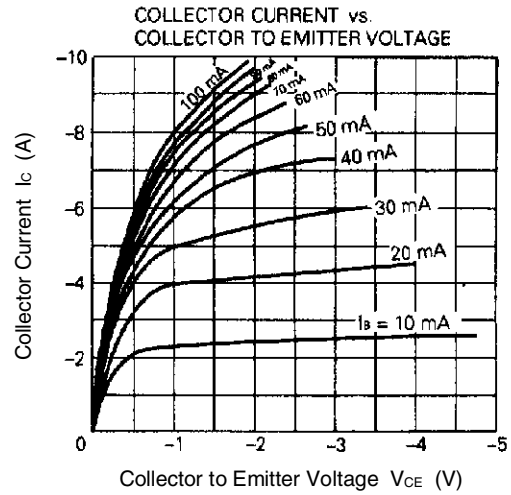
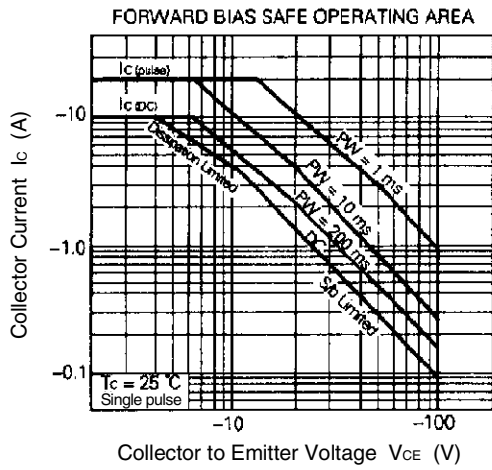
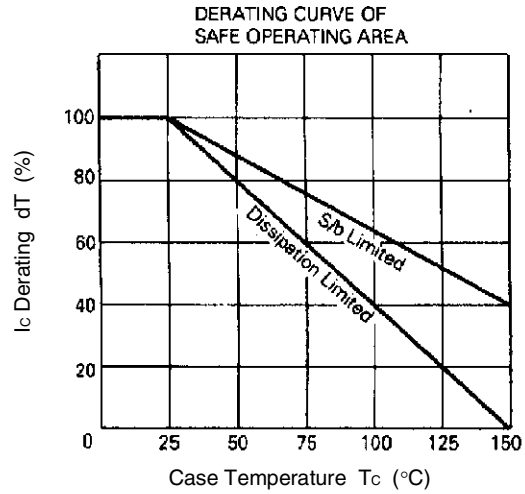
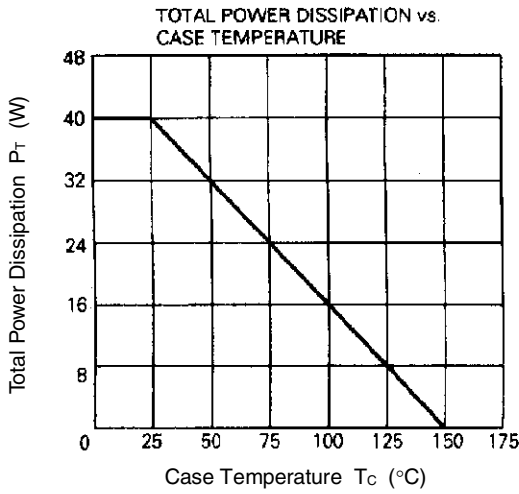
**$h_{FE}$  CLASSIFICATION**

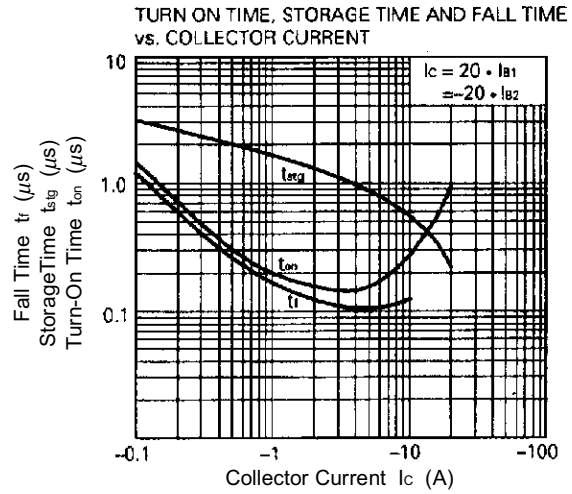
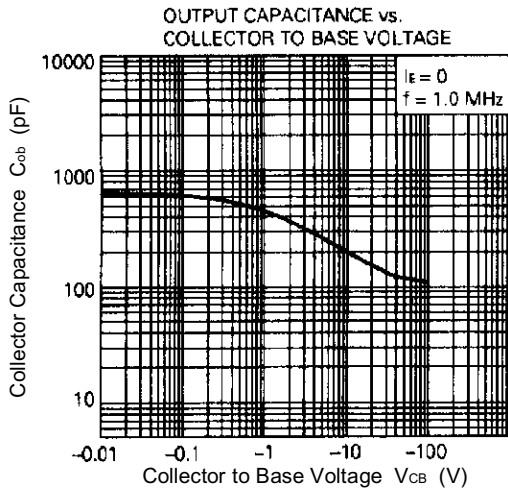
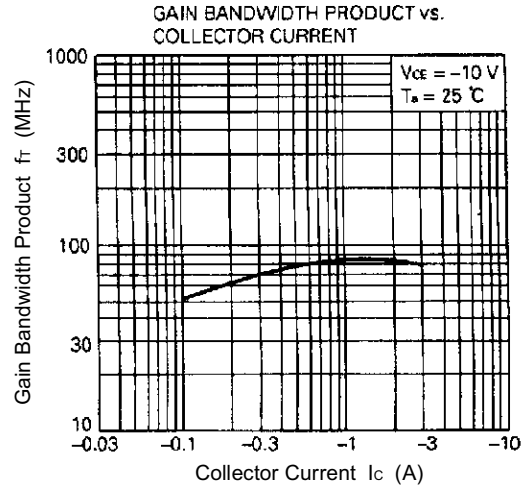
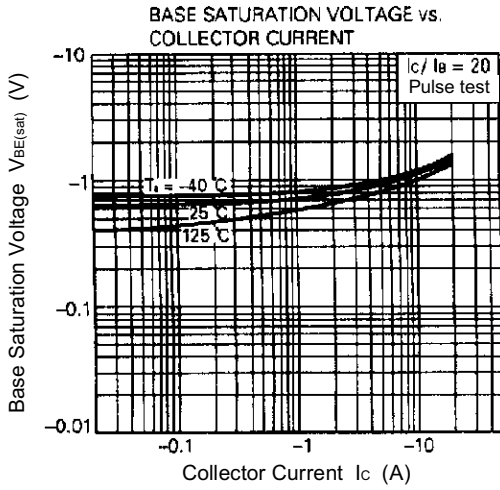
Marking	M	L	K
$h_{FE2}$	100 to 200	150 to 300	200 to 400

**SWITCHING TIME TEST CIRCUIT**



TYPICAL CHARACTERISTICS (Ta = 25°C)





[MEMO]

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