

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

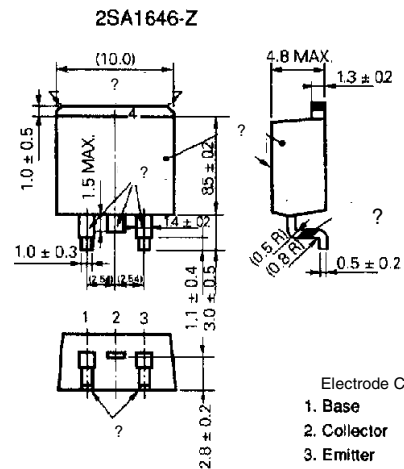
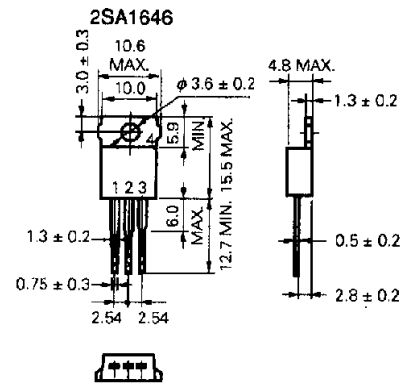
QUALITY GRADES

- 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)

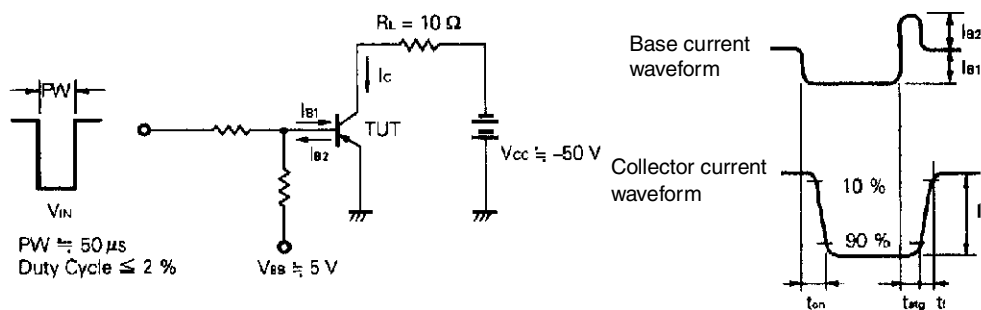
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------|------------------|--|------|------|------|---------------|
| Collector cutoff current | I_{CBO} | $V_{CB} = -100\text{ V}, I_E = 0$ | | | -10 | μA |
| Emitter cutoff current | I_{EBO} | $V_{EB} = -5\text{ V}, I_C = 0$ | | | -10 | μA |
| 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 | | μs |
| Storage time | t_{stg} | | | 1.5 | | μs |
| Fall time | t_f | | | 0.4 | | μs |

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

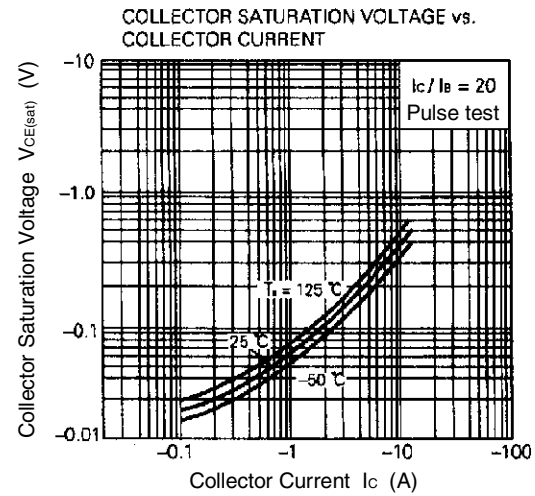
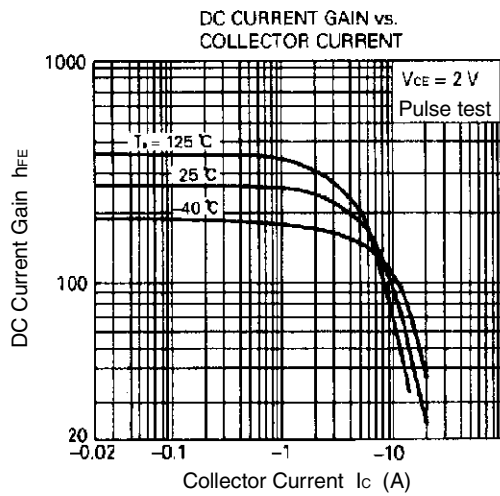
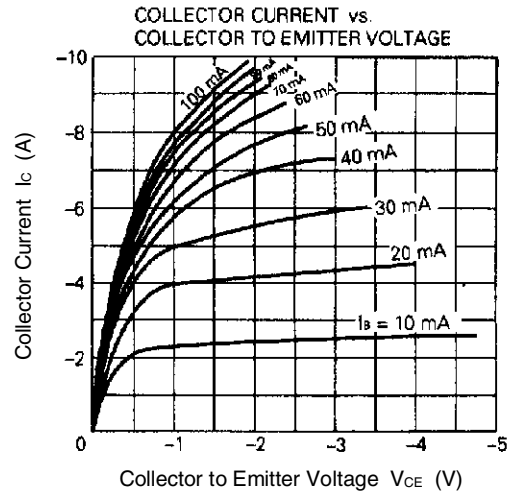
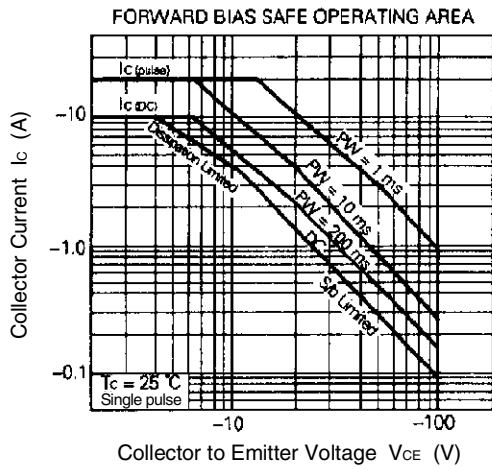
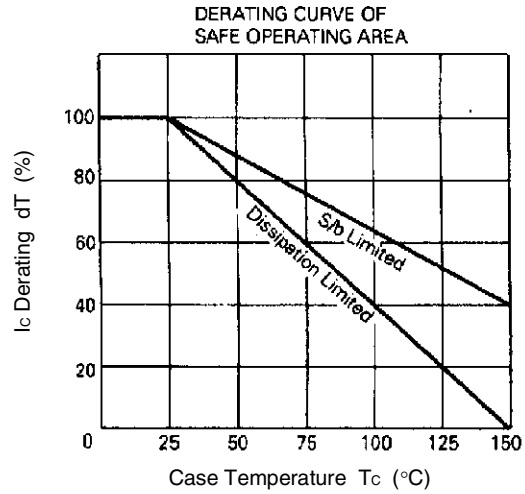
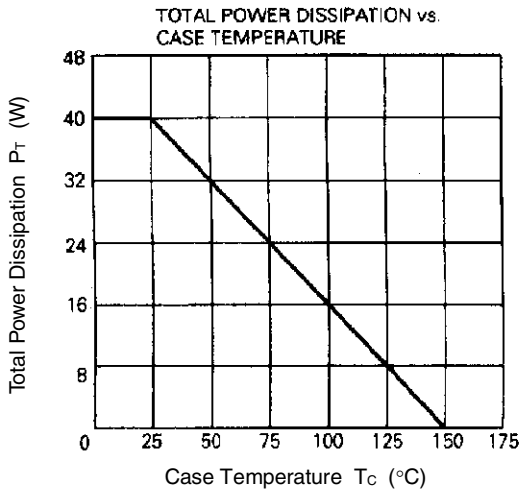
h_{FE} CLASSIFICATION

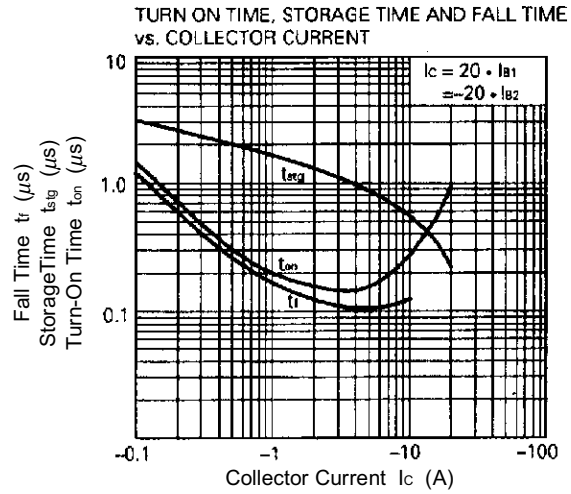
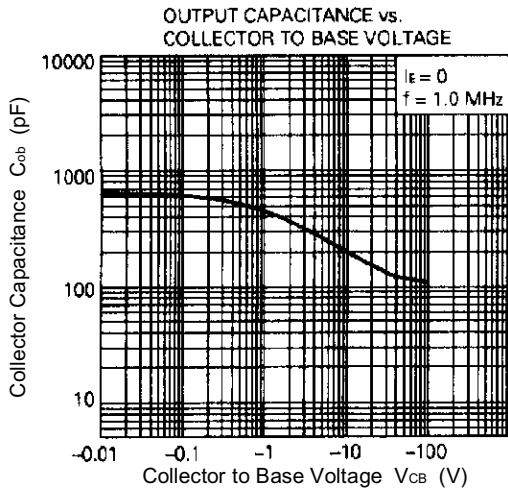
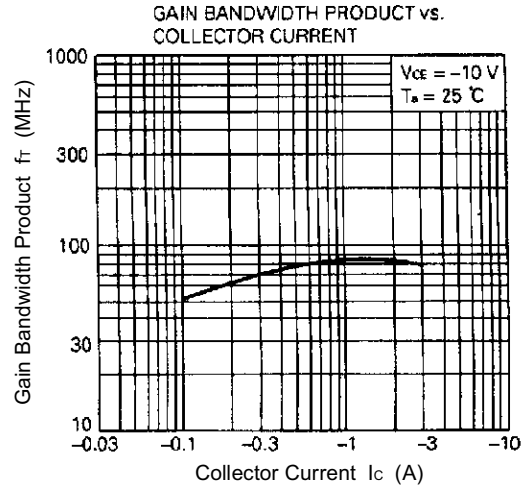
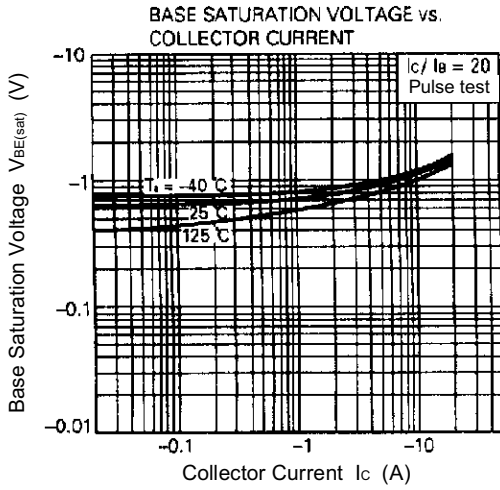
| Marking | M | L | K |
|-----------|------------|------------|------------|
| h_{FE2} | 100 to 200 | 150 to 300 | 200 to 400 |

SWITCHING TIME TEST CIRCUIT



TYPICAL CHARACTERISTICS (Ta = 25°C)





[MEMO]

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