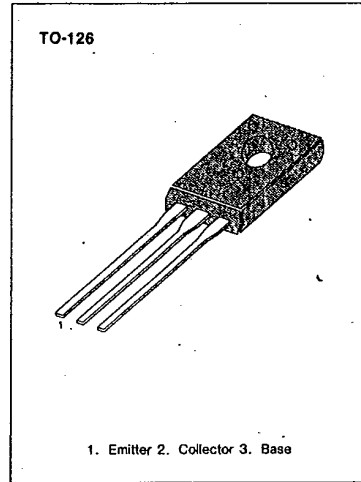


**NPN EPITAXIAL SILICON  
DARLINGTON TRANSISTOR**

**KSD986**  
SAMSUNG SEMICONDUCTOR INC

T-33-29

**LOW FREQUENCY POWER AMPLIFIER  
LOW SPEED SWITCHING  
INDUSTRIAL USE**



**ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub>=25°C)**

| Characteristic                               | Symbol           | Rating  | Unit |
|--|------------------|---------|------|
| Collector-Base Voltage                       | V <sub>CB0</sub> | 150     | V    |
| Collector-Emitter Voltage                    | V <sub>CE0</sub> | 80      | V    |
| Emitter-Base Voltage                         | V <sub>EB0</sub> | 8.0     | V    |
| Collector Current (DC)                       | I <sub>C</sub>   | ±1.5    | A    |
| *Collector Current (Pulse)                   | I <sub>C</sub>   | ±3.0    | A    |
| Base Current (DC)                            | I <sub>B</sub>   | 0.15    | A    |
| Collector Dissipation (T <sub>a</sub> =25°C) | P <sub>C</sub>   | 1.0     | W    |
| Collector Dissipation (T <sub>c</sub> =25°C) | P <sub>C</sub>   | 10      | W    |
| Junction Temperature                         | T <sub>J</sub>   | 150     | °C   |
| Storage Temperature                          | T <sub>stg</sub> | -55~150 | °C   |

\* PW≤300μs, Duty Cycle ≤10%

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub>=25°C)**

| Characteristic                        | Symbol               | Test Condition   | Min  | Typ | Max   | Unit |
|---------------------------------------|----------------------|--|------|-----|-------|------|
| Collector Cutoff Current              | I <sub>CB0</sub>     | V <sub>CB</sub> =80V, I <sub>E</sub> =0                                    |      |     | 10    | μA   |
| Collector Cutoff Current              | I <sub>CER</sub>     | V <sub>CE</sub> =80V, R <sub>BE</sub> =51Ω<br>T <sub>a</sub> =125°C        |      |     | 1.0   | mA   |
| Collector Cutoff Current              | I <sub>CEX1</sub>    | V <sub>CE</sub> =80V, V <sub>BE</sub> (off)=-1.5V                          |      |     | 10    | μA   |
| Collector Cutoff Current              | I <sub>CEX2</sub>    | V <sub>CE</sub> =80V, V <sub>BE</sub> (off)=-1.5V<br>T <sub>a</sub> =125°C |      |     | 1.0   | mA   |
| Emitter Cutoff Current                | I <sub>EB0</sub>     | V <sub>EB</sub> =5V, I <sub>C</sub> =0                                     |      |     | 1.0   | mA   |
| *DC Current Gain                      | h <sub>FE1</sub>     | V <sub>CE</sub> =2V, I <sub>C</sub> =0.5A                                  | 1000 |     |       |      |
|                                       | h <sub>FE2</sub>     | V <sub>CE</sub> =2V, I <sub>C</sub> =1A                                    | 2000 |     | 30000 |      |
| *Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =1A, I <sub>B</sub> =1mA                                    |      |     | 1.5   | V    |
| *Base-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> =1A, I <sub>B</sub> =1mA                                    |      |     | 2.0   | V    |
| Turn On Time                          | t <sub>on</sub>      | I <sub>C</sub> =1A, R <sub>L</sub> =50Ω                                    |      | 0.5 |       | μs   |
| Storage Time                          | t <sub>s</sub>       | I <sub>B1</sub> =-I <sub>B2</sub> =1mA                                     |      | 1.0 |       | μs   |
| Fall time                             | t <sub>f</sub>       | V <sub>CC</sub> ≈50V   |      | 1.0 |       | μs   |

\*Pulse Test: PW≤350μs, Duty Cycle≤2%

**h<sub>FE</sub>(2) CLASSIFICATION**

| Classification      | R         | O          | Y          |
|---------------------|-----------|------------|------------|
| h <sub>FE</sub> (2) | 2000-5000 | 4000-10000 | 8000-30000 |

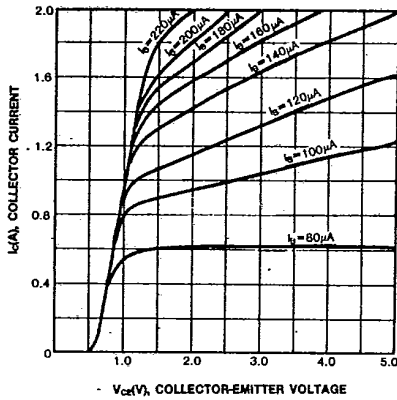
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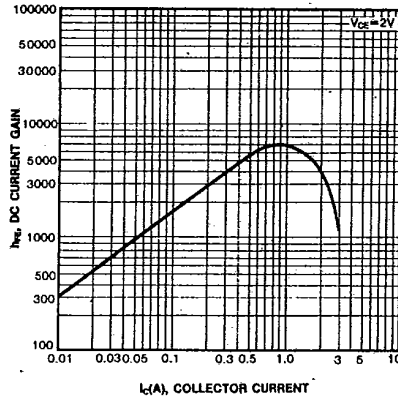
# NPN EPITAXIAL SILICON DARLINGTON TRANSISTOR

T-33-29

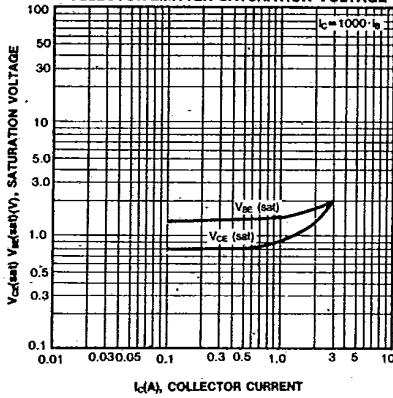
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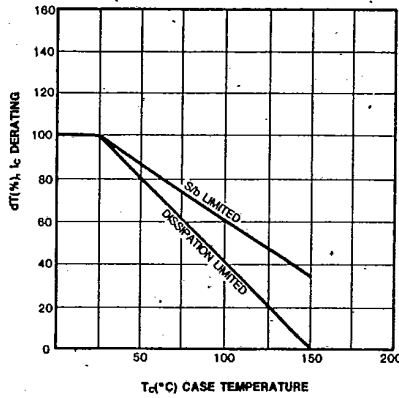
DC CURRENT GAIN



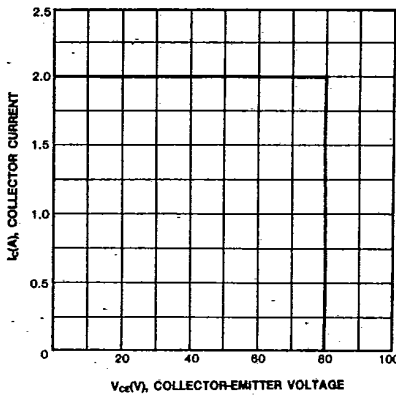
BASE-EMITTER SATURATION VOLTAGE  
COLLECTOR-EMITTER SATURATION VOLTAGE



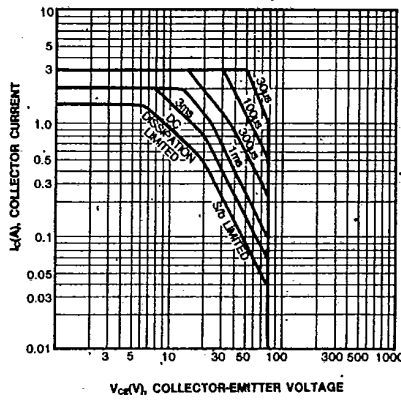
DERATING CURVE OF SAFE OPERATING AREAS



REVERSE BIAS SAFE OPERATING AREAS



SAFE OPERATING AREA

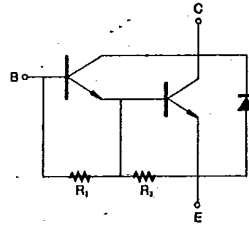
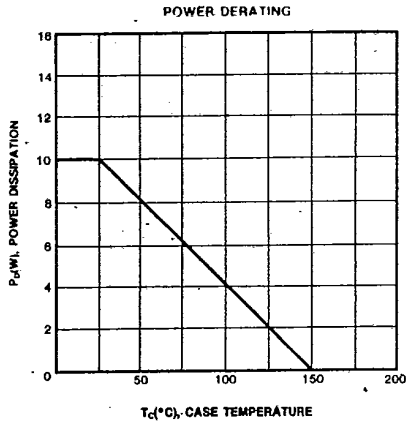


# NPN EPITAXIAL SILICON DARLINGTON TRANSISTOR

**KSD986**

SAMSUNG SEMICONDUCTOR INC

T-33-29



R<sub>1</sub>=10kΩ  
R<sub>2</sub>=500Ω

**KSD1691**

**NPN EPITAXIAL SILICON TRANSISTOR**

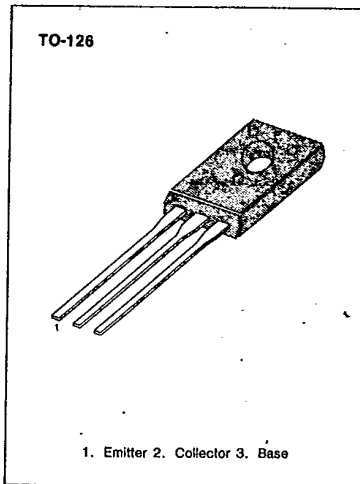
T-33-09

**LOW COLLECTOR SATURATION VOLTAGE  
LARGE CURRENT**

HIGH POWER DISSIPATION :  $P_T = 1.3W$  ( $T_a = 25^\circ C$ )  
Complementary to KSB1151

**ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ C$ )**

| Characteristic                               | Symbol    | Rating  | Unit       |
|--|-----------|---------|------------|
| Collector-Base Voltage                       | $V_{CBO}$ | 60      | V          |
| Collector-Emitter Voltage                    | $V_{CEO}$ | 60      | V          |
| Emitter-Base Voltage                         | $V_{EBO}$ | 7       | V          |
| Collector Current (DC)                       | $I_C$     | 5       | A          |
| *Collector Current (Pulse)                   | $I_C$     | 8       | A          |
| Base Current (DC)                            | $I_B$     | 1       | A          |
| Collector Dissipation ( $T_a = 25^\circ C$ ) | $P_C$     | 1.3     | W          |
| Collector Dissipation ( $T_c = 25^\circ C$ ) | $P_C$     | 20      | W          |
| Junction Temperature                         | $T_J$     | 150     | $^\circ C$ |
| Storage Temperature                          | $T_{stg}$ | -55~150 | $^\circ C$ |



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\*  $PW \leq 10mS$ , duty cycle  $\leq 50\%$

**ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ C$ )**

| Characteristic                        | Symbol        | Test Condition                      | Min | Typ | Max | Unit    |
|---------------------------------------|---------------|-------------------------------------|-----|-----|-----|---------|
| Collector Cutoff Current              | $I_{CBO}$     | $V_{CB} = 50V, I_E = 0$             |     |     | 10  | $\mu A$ |
| Emitter Cutoff Current                | $I_{EBO}$     | $V_{EB} = 7V, I_C = 0$              |     |     | 10  | $\mu A$ |
| *DC Current Gain                      | $h_{FE1}$     | $V_{CE} = 1V, I_C = 0.1A$           | 60  |     |     |         |
|                                       | $h_{FE2}$     | $V_{CE} = 1V, I_C = 2A$             | 100 |     | 400 |         |
|                                       | $h_{FE3}$     | $V_{CE} = 1V, I_C = 5A$             | 50  |     |     |         |
| *Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 2A, I_B = 0.2A$              |     | 0.1 | 0.3 | V       |
| *Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = 2A, I_B = 0.2A$              |     | 0.9 | 1.2 | V       |
| Turn On Time                          | $t_{on}$      | $I_C = 2A, I_{B1} = -I_{B2} = 0.2A$ |     | 0.2 | 1   | $\mu S$ |
| Storage Time                          | $t_{stg}$     | $R_L = 5\Omega, V_{CC} = 10V$       |     | 1.1 | 2.5 | $\mu S$ |
| Fall Time                             | $t_f$         |                                     |     | 0.2 | 1   | $\mu S$ |

\* Pulse test:  $PW < 350\mu s$ , duty cycle  $< 2\%$  Pulsed

**$h_{FE}$  (2) CLASSIFICATION**

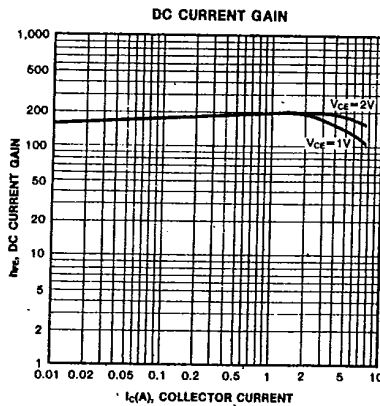
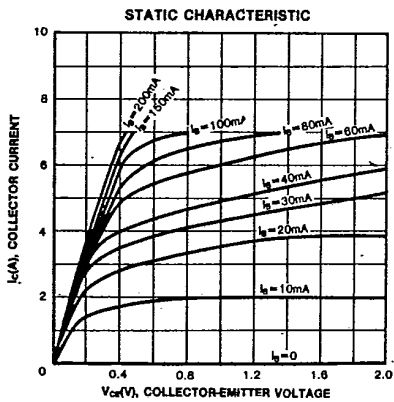
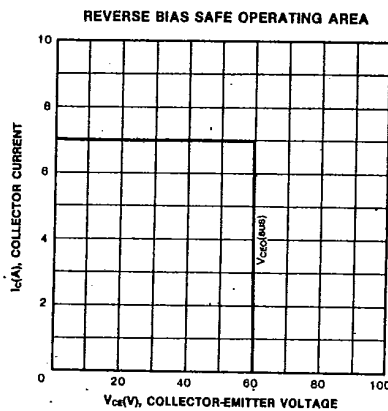
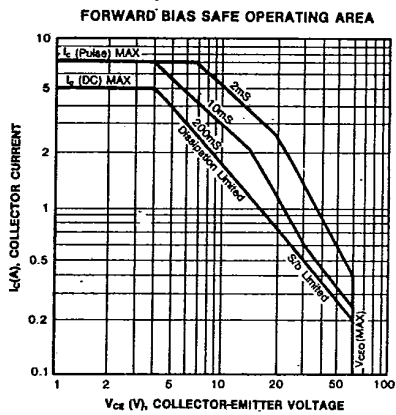
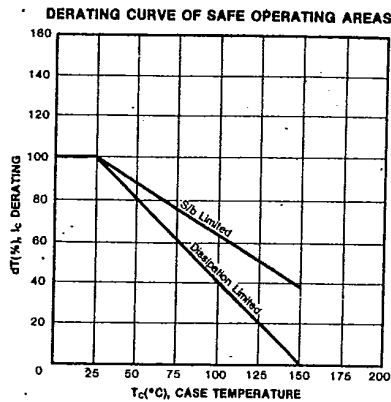
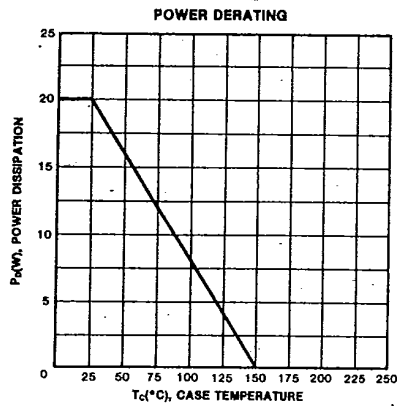
| Classification | O       | Y       | G       |
|----------------|---------|---------|---------|
| $h_{FE} 2$     | 100-200 | 160-320 | 200-400 |



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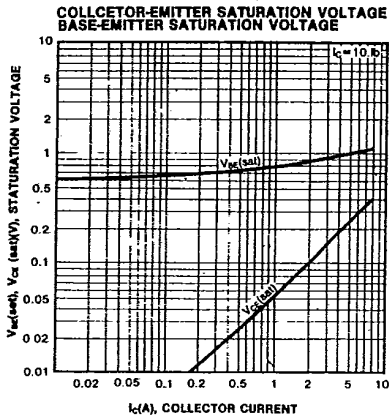
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