

KSC5020**NPN SILICON TRANSISTOR**

T-33-11

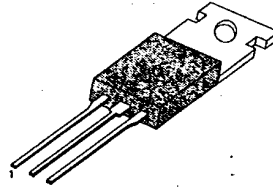
HIGH VOLTAGE, HIGH QUALITYHIGH SPEED SWITCHING: $t_r=0.1\mu\text{s}$

• WIDE SOA

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

| Characteristic | Symbol | Rating | Unit |
|---------------------------|-----------|---------|------------------|
| Collector-Base Voltage | V_{CB0} | 800 | V |
| Collector-Emitter Voltage | V_{CE0} | 500 | V |
| Emitter-Base Voltage | V_{EB0} | 7 | V |
| Collector Current (DC) | I_C | 3 | A |
| Collector Current (Pulse) | I_C | 6 | A |
| Base Current (DC) | I_B | 1 | A |
| Collector Dissipation | P_C | 40 | W |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55~150 | $^\circ\text{C}$ |

TO-220



1. Base 2. Collector 3. Emitter

3

ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$)

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|--------------------------------------|----------------|---|-----|-----|-----|---------------|
| Collector Base Breakdown Voltage | BV_{CB0} | $I_C=1\text{mA}, I_E=0$ | 800 | | | V |
| Collector Emitter Breakdown Voltage | BV_{CE0} | $I_C=5\text{mA}, R_{BE}=\infty$ | 500 | | | V |
| Emitter Base Breakdown Voltage | BV_{EB0} | $I_E=1\text{mA}, I_C=0$ | 7 | | | V |
| Collector Emitter Sustaining Voltage | $V_{CEX(SUS)}$ | $I_C=1.5A, I_B1=-I_B2=0.6A$ $L=2\text{mH}$, Clamped | 500 | | | V |
| Collector Cutoff Current | I_{CBO} | $V_{CB}=500V, I_E=0$ | | | 10 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=5V, I_C=0$ | | | 10 | μA |
| DC Current Gain | h_{FE1} | $V_{CE}=5V, I_C=0.3A$ | 15 | | 50 | |
| | h_{FE2} | $V_{CE}=5V, I_C=1.5A$ | 8 | | | |
| Collector Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=1.5A, I_B=0.3A$ | | | 1 | V |
| Base Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C=1.5A, I_B=0.3A$ | | | 1.5 | V |
| Output Capacitance | C_{ob} | $V_{CB}=10V, f=1\text{MHz}$ | | 50 | | pF |
| Current Gain Bandwidth Product | f_T | $V_{CE}=10V, I_C=0.3A$ | | 18 | | MHz |
| Turn On Time | t_{on} | $V_{CC}=200V$ | | | 0.5 | μs |
| Storage Time | t_s | $5I_B1=-2.5I_B2=I_C=2A$ | | | 3 | μs |
| Fall Time | t_f | $R_L=100\text{ohm}$ | | | 0.3 | μs |

 h_{FE} CLASSIFICATION

| Classification | R | O | Y |
|----------------|-------|-------|-------|
| h_{FE1} | 15-30 | 20-40 | 30-50 |

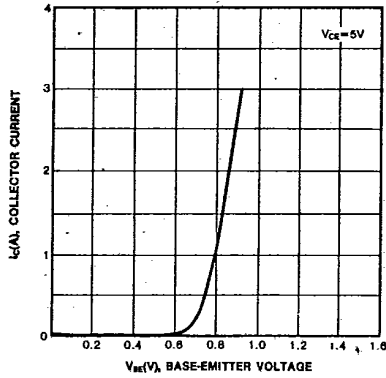


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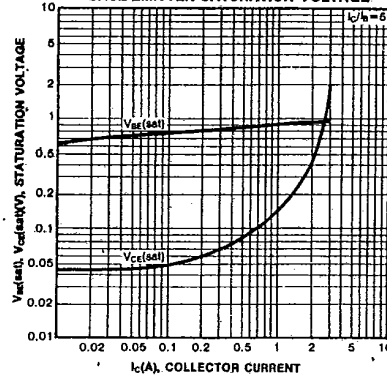
NPN SILICON TRANSISTOR

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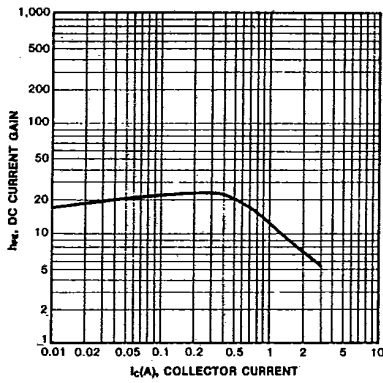
BASE-EMITTER ON VOLTAGE



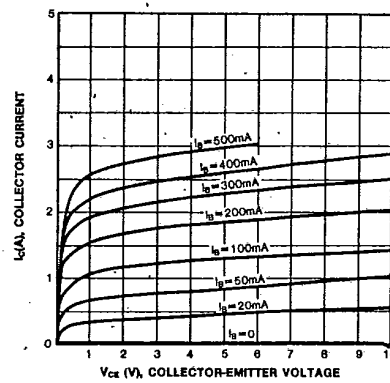
COLLECTOR-EMITTER SATURATION VOLTAGE
BASE-EMITTER SATURATION VOLTAGE



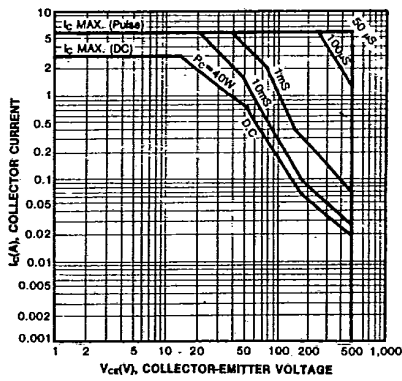
DC CURRENT GAIN



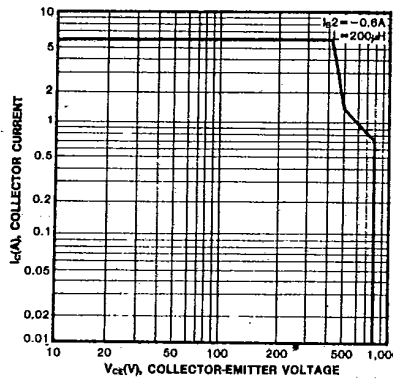
STATIC CHARACTERISTIC



FORWARD BIAS SAFE OPERATING AREA



REVERSE BIAS SAFE OPERATING AREA

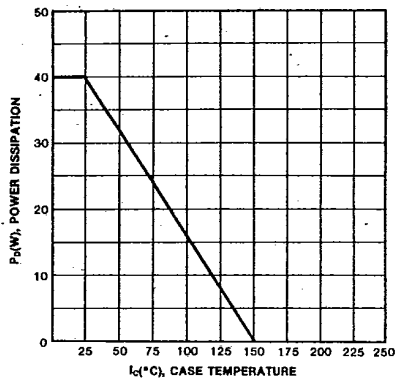


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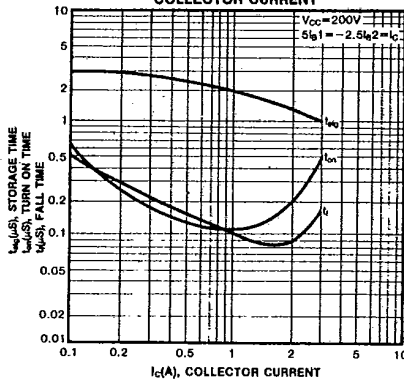
NPN SILICON TRANSISTOR

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POWER DERATING



TURN ON, STORAGE AND FALL TIME vs. COLLECTOR CURRENT



3

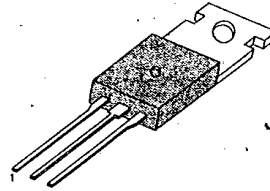
KSC5021**NPN SILICON TRANSISTOR**

T-33-11

HIGH VOLTAGE AND HIGH RELIABILITYHIGH SPEED SWITCHING: $t_f = 0.1 \mu\text{s}$ (Typ)
WIDE SOA**ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)**

| Characteristic | Symbol | Rating | Unit |
|---------------------------|-----------|---------|------------------|
| Collector-Base Voltage | V_{CBO} | 800 | V |
| Collector-Emitter Voltage | V_{CEO} | 500 | V |
| Emitter-Base Voltage | V_{EBO} | 7 | V |
| Collector Current (DC) | I_C | 5 | A |
| Collector Current (Pulse) | I_C | 10 | A |
| Base Current | I_B | 2 | A |
| Collector Dissipation | P_C | 50 | W |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55~150 | $^\circ\text{C}$ |

TO-220



1. Base 2. Collector 3. Emitter

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|--------------------------------------|----------------|---|-----|-----|-----|---------------|
| Collector Base Breakdown Voltage | BV_{CBO} | $I_C = 1\text{mA}, I_E = 0$ | 800 | | | V |
| Collector Emitter Breakdown Voltage | BV_{CEO} | $I_C = 5\text{mA}, R_{BE} = \infty$ | 500 | | | V |
| Emitter Base Breakdown Voltage | BV_{EBO} | $I_E = 1\text{mA}, I_C = 0$ | 7 | | | V |
| Collector Emitter Sustaining Voltage | $V_{CEX(SUS)}$ | $I_C = 2.5\text{A}, I_{B1} = -I_{B2} = 1\text{A}$ $L = 1\text{mH}$, Clamped | 500 | | | V |
| Collector Cutoff Current | I_{CBO} | $V_{CB} = 500\text{V}, I_E = 0$ | | | 10 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB} = 5\text{V}, I_C = 0$ | | | 10 | μA |
| DC Current Gain | h_{FE1} | $V_{CE} = 5\text{V}, I_C = 0.6\text{A}$ | 15 | | 50 | |
| | h_{FE2} | $V_{CE} = 5\text{V}, I_C = 3\text{A}$ | 8 | | | |
| Collector Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 3\text{A}, I_B = 0.6\text{A}$ | | | 1 | V |
| Base Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = 3\text{A}, I_B = 0.6\text{A}$ | | | 1.5 | V |
| Output Capacitance | C_{ob} | $V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$ | | 80 | | pF |
| Current Gain Bandwidth Product | f_T | $V_{CE} = 10\text{V}, I_C = 0.6\text{A}$ | | 18 | | MHz |
| Turn On Time | t_{on} | $V_{CC} = 200\text{V}$ | | | 0.5 | μs |
| Storage Time | t_S | $5I_{B1} = -2.5I_{B2} = I_C = 4\text{A}$ | | | 3 | μs |
| Fall Time | t_f | $RL = 50\Omega$ | | | 0.3 | μs |

 h_{FE} (1) CLASSIFICATION

| Classification | R | O | Y |
|----------------|-------|-------|-------|
| $h_{FE} 1$ | 15-30 | 20-40 | 30-50 |



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NPN SILICON TRANSISTOR

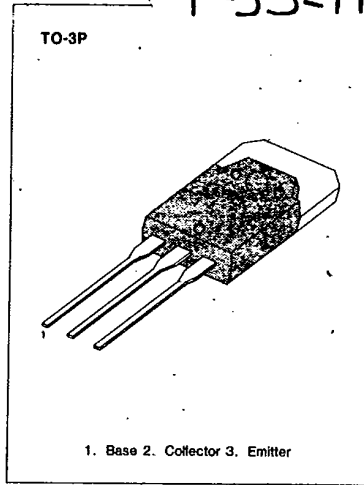
HIGH VOLTAGE AND HIGH RELIABILITY

HIGH SPEED SWITCHING: $t_r = 0.1 \mu s$ (Typ)
WIDE SOA

T-33-11

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

| Characteristic | Symbol | Rating | Unit |
|---------------------------|-----------|---------|------------|
| Collector-Base Voltage | V_{CBO} | 800 | V |
| Collector-Emitter Voltage | V_{CEO} | 500 | V |
| Emitter-Base Voltage | V_{EBO} | 7 | V |
| Collector Current (DC) | I_C | 4 | A |
| Collector Current (Pulse) | I_C | 8 | A |
| Base Current | I_B | 1.5 | A |
| Collector Dissipation | P_C | 80 | W |
| Junction Temperature | T_J | 150 | $^\circ C$ |
| Storage Temperature | T_{stg} | -55~150 | $^\circ C$ |



3

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

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|--------------------------------------|---------------|--|-----|-----|-----|---------|
| Collector Base Breakdown Voltage | BV_{CBO} | $I_C = 1mA, I_E = 0$ | 800 | | | V |
| Collector Emitter Breakdown Voltage | BV_{CEO} | $I_C = 5mA, R_{BE} = \infty$ | 500 | | | V |
| Emitter Base Breakdown Voltage | BV_{EBO} | $I_E = 1mA, I_C = 0$ | 7 | | | V |
| Collector Emitter Sustaining Voltage | $V_{CE(sus)}$ | $I_C = 1.5A, I_{B1} = -I_{B2} = 0.6A$ $L = 1mH, \text{Clamped}$ | 500 | | | V |
| Collector Cutoff Current | I_{CBO} | $V_{CB} = 500V, I_E = 0$ | | | 10 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB} = 5V, I_C = 0$ | | | 10 | μA |
| DC Current Gain | h_{FE1} | $V_{CE} = 5V, I_C = 0.3A$ | 15 | | 50 | |
| | h_{FE2} | $V_{CE} = 5V, I_C = 1.5A$ | 8 | | | |
| Collector Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 1.5A, I_B = 0.3A$ | | | 1 | V |
| Base Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = 1.5A, I_B = 0.3A$ | | | 1.5 | V |
| Output Capacitance | C_{ob} | $V_{CB} = 10V, I_E = 0, f = 1MHz$ | | 50 | | pF |
| Current Gain Bandwidth Product | f_T | $V_{CE} = 10V, I_C = 0.3A$ | | 18 | | MHz |
| Turn On Time | t_{on} | $V_{CC} = 200V$ | | | 0.5 | μs |
| Storage Time | t_s | $5I_{B1} = -2.5I_{B2} = I_C = 2A$ | | | 3 | μs |
| Fall Time | t_f | $R_L = 100\Omega$ | | | 0.3 | μs |

h_{FE} (1) CLASSIFICATION

| Classification | R | O | Y |
|----------------|-------|-------|-------|
| $h_{FE} 1$ | 15-30 | 20-40 | 30-50 |

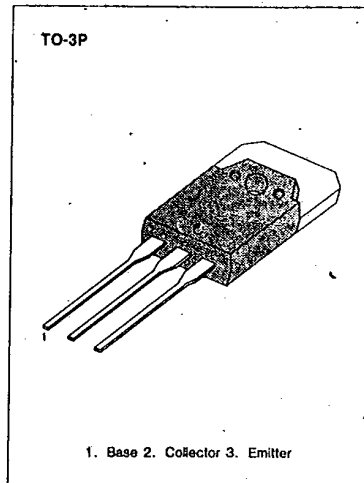
KSC5023**NPN SILICON TRANSISTOR****HIGH VOLTAGE AND HIGH RELIABILITY**

HIGH SPEED SWITCHING: $t_r = 0.1 \mu\text{s}$ (Typ)
WIDE SOA

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

| Characteristic | Symbol | Rating | Unit |
|---------------------------|-----------|---------|------------------|
| Collector-Base Voltage | V_{CB0} | 800 | V |
| Collector-Emitter Voltage | V_{CE0} | 500 | V |
| Emitter-Base Voltage | V_{EB0} | 7 | V |
| Collector Current (DC) | I_C | 7 | A |
| Collector Current (Pulse) | I_C | 14 | A |
| Base Current | I_B | 3 | A |
| Collector Dissipation | P_C | .80 | W |
| Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55~150 | $^\circ\text{C}$ |

T-33-13

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

| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|--------------------------------------|----------------|---|-----|-----|-----|---------------|
| Collector Base Breakdown Voltage | BV_{CB0} | $I_C = 1\text{mA}, I_E = 0$ | 800 | | | V |
| Collector Emitter Breakdown Voltage | BV_{CE0} | $I_C = 5\text{mA}, R_{BE} = \infty$ | 500 | | | V |
| Emitter Base Breakdown Voltage | BV_{EB0} | $I_E = 1\text{mA}, I_C = 0$ | 7 | | | V |
| Collector Emitter Sustaining Voltage | $V_{CEX(SUS)}$ | $I_C = 2.5\text{A}, I_B1 = -I_B2 = 1\text{A}$ $L = 1\text{mH}, \text{Clamped}$ | 500 | | | V |
| Collector Cutoff Current | I_{CB0} | $V_{CB} = 500\text{V}, I_E = 0$ | | | 10 | μA |
| Emitter Cutoff Current | I_{EB0} | $V_{EB} = 5\text{V}, I_C = 0$ | | | 10 | μA |
| DC Current Gain | h_{FE1} | $V_{CE} = 5\text{V}, I_C = 0.6\text{A}$ | 15 | | 50 | |
| | h_{FE2} | $V_{CE} = 5\text{V}, I_C = 3\text{A}$ | 8 | | | |
| Collector Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 3\text{A}, I_B = 0.6\text{A}$ | | | 1 | V |
| Base Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = 3\text{A}, I_B = 0.6\text{A}$ | | | 1.5 | V |
| Output Capacitance | C_{ob} | $V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$ | | 80 | | pF |
| Current Gain Bandwidth Product | f_T | $V_{CE} = 10\text{V}, I_C = 0.6\text{A}$ | | 18 | | MHz |
| Turn On Time | t_{on} | $V_{CC} = 200\text{V}$ | | | 0.5 | μs |
| Storage Time | t_S | $5I_B1 = -2.5I_B2 = I_C = 4\text{A}$ | | | 3 | μs |
| Fall Time | t_f | $R_L = 50\Omega$ | | | 0.3 | μs |

 h_{FE} (1) CLASSIFICATION

| Classification | R | O | Y |
|----------------|-------|-------|-------|
| $h_{FE} 1$ | 15-30 | 20-40 | 30-50 |

