

**KSC5020**

**NPN SILICON TRANSISTOR**

T-33-11

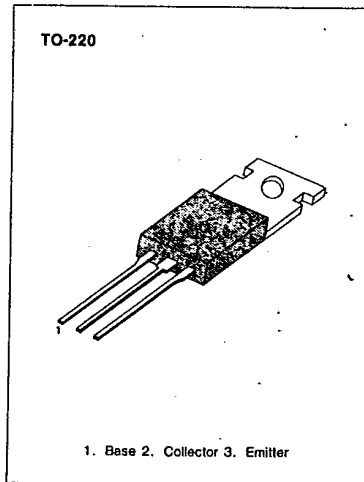
**HIGH VOLTAGE, HIGH QUALITY**

HIGH SPEED SWITCHING:  $t_r=0.1\mu s$

• WIDE SOA

**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)	$I_C$	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	$^\circ C$
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	$BV_{CEO}$	$I_C=5mA, R_{\theta E}=\infty$	500			V
Emitter Base Breakdown Voltage	$BV_{EBO}$	$I_E=1mA, I_C=0$	7			V
Collector Emitter Sustaining Voltage	$V_{CEX(SUS)}$	$I_C=1.5A, I_B1=-I_B2=0.6A$ $L=2mH, \text{Clamped}$	500			V
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=500V, I_E=0$			10	$\mu A$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=5V, I_C=0$			10	$\mu A$
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	$C_{ob}$	$V_{CB}=10V, f=1MHz$		50		pF
Current Gain Bandwidth Product	$f_r$	$V_{CE}=10V, I_C=0.3A$		18		MHz
Turn On Time	$t_{on}$	$V_{CC}=200V$			0.5	$\mu s$
Storage Time	$t_s$	$5I_B1=-2.5I_B2=I_C=2A$			3	$\mu s$
Fall Time	$t_f$	$R_L=100\Omega$			0.3	$\mu s$

**$h_{FE}$  CLASSIFICATION**

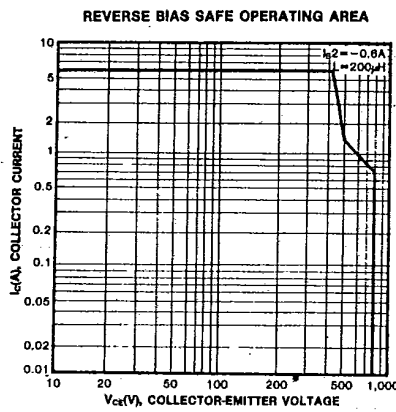
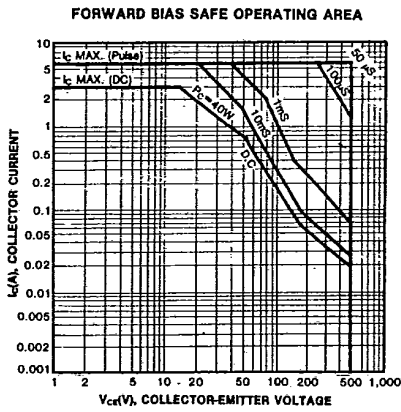
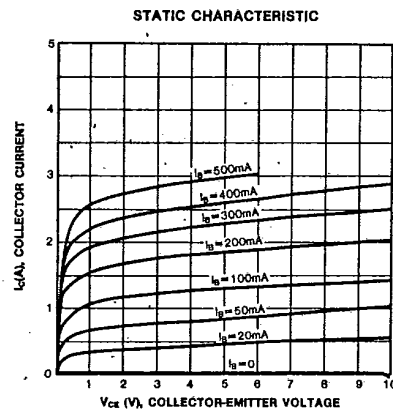
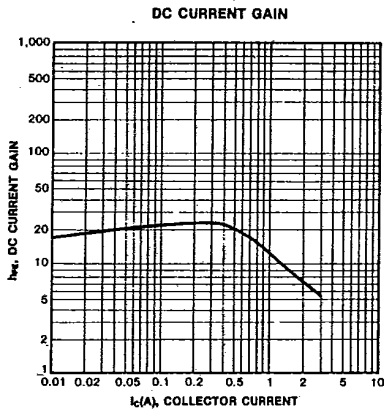
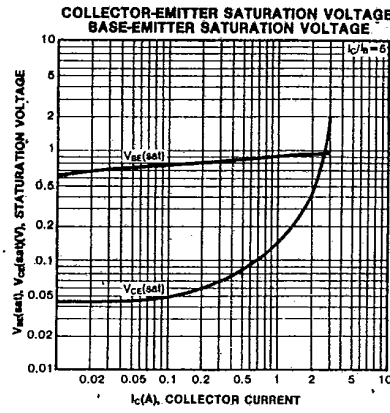
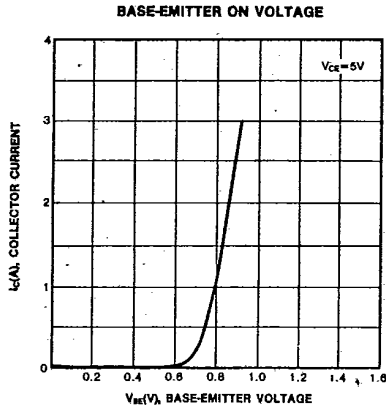
Classification	R	O	Y
$h_{FE1}$	15-30	20-40	30-50



KSC5020

NPN SILICON TRANSISTOR

T-33-11

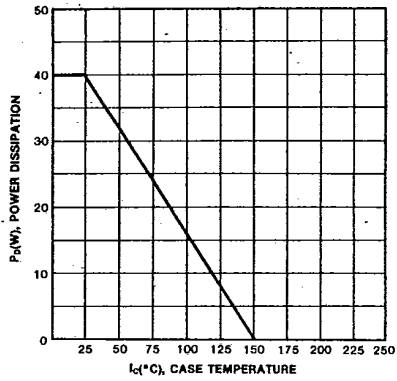


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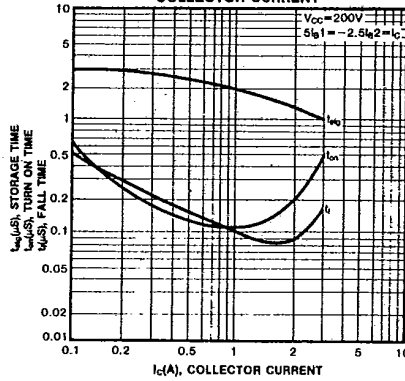
NPN SILICON TRANSISTOR

T-33-11

POWER DERATING



TURN ON, STORAGE AND FALL TIME vs. COLLECTOR CURRENT



3

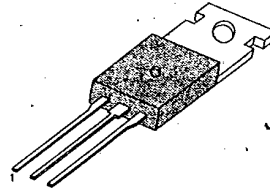
**KSC5021****NPN SILICON TRANSISTOR**

T-33-11

**HIGH VOLTAGE AND HIGH RELIABILITY**HIGH 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	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 5\text{V}, I_C = 0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE1}$	$V_{CE} = 5\text{V}, I_C = 0.6\text{A}$	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	$\mu\text{s}$
Storage Time	$t_S$	$5I_{B1} = -2.5I_{B2} = I_C = 4\text{A}$			3	$\mu\text{s}$
Fall Time	$t_f$	$RL = 50\Omega$			0.3	$\mu\text{s}$

 **$h_{FE}$  (1) CLASSIFICATION**

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

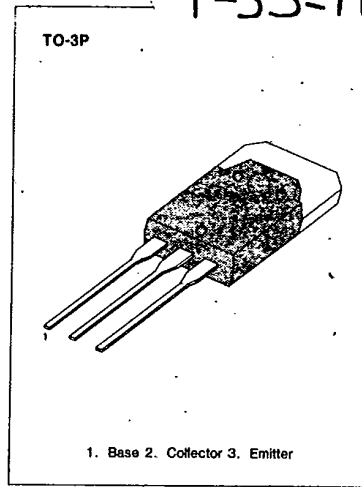


**KSC5022****NPN SILICON TRANSISTOR****HIGH VOLTAGE AND HIGH RELIABILITY**

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)	$I_C$	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	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55~150	$^\circ\text{C}$



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	$V_{CE(sus)}$	$I_C = 1.5\text{A}, I_{B1} = -I_{B2} = 0.6\text{A}$ $L = 1\text{mH}$ , Clamped	500			V
Collector Cutoff Current	$I_{CB0}$	$V_{CB} = 500\text{V}, I_E = 0$			10	$\mu\text{A}$
Emitter Cutoff Current	$I_{EB0}$	$V_{EB} = 5\text{V}, I_C = 0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE1}$	$V_{CE} = 5\text{V}, I_C = 0.3\text{A}$	15		50	
	$h_{FE2}$	$V_{CE} = 5\text{V}, I_C = 1.5\text{A}$	8			
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 1.5\text{A}, I_B = 0.3\text{A}$			1	V
Base Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 1.5\text{A}, I_B = 0.3\text{A}$			1.5	V
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$		50		pF
Current Gain Bandwidth Product	$f_T$	$V_{CE} = 10\text{V}, I_C = 0.3\text{A}$		18		MHz
Turn On Time	$t_{on}$	$V_{CC} = 200\text{V}$			0.5	$\mu\text{s}$
Storage Time	$t_s$	$5I_{B1} = -2.5I_{B2} = I_C = 2\text{A}$			3	$\mu\text{s}$
Fall Time	$t_f$	$R_L = 100\Omega$			0.3	$\mu\text{s}$

 **$h_{FE}$  (1) CLASSIFICATION**

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

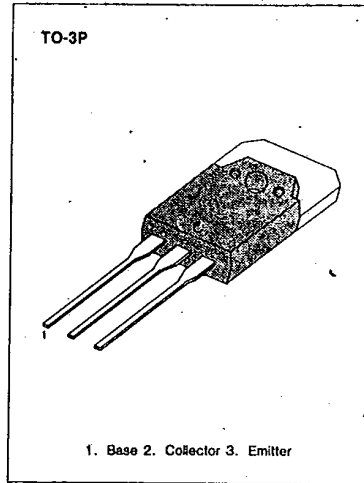


**KSC5023****NPN SILICON TRANSISTOR**

T-33-13

**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	$^\circ\text{C}$

**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	$V_{CEX(SUS)}$	$I_C = 2.5\text{A}, I_B1 = -I_B2 = 1\text{A}$ $L = 1\text{mH}$ , Clamped	500			V
Collector Cutoff Current	$I_{CB0}$	$V_{CB} = 500\text{V}, I_E = 0$			10	$\mu\text{A}$
Emitter Cutoff Current	$I_{EB0}$	$V_{EB} = 5\text{V}, I_C = 0$			10	$\mu\text{A}$
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	$\mu\text{s}$
Storage Time	$t_S$	$5I_B1 = -2.5I_B2 = I_C = 4\text{A}$			3	$\mu\text{s}$
Fall Time	$t_f$	$RL = 50\Omega$			0.3	$\mu\text{s}$

 **$h_{FE}$  (1) CLASSIFICATION**

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

