

SAMSUNG SEMICONDUCTOR INC

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KSC5020

NPN SILICON TRANSISTOR

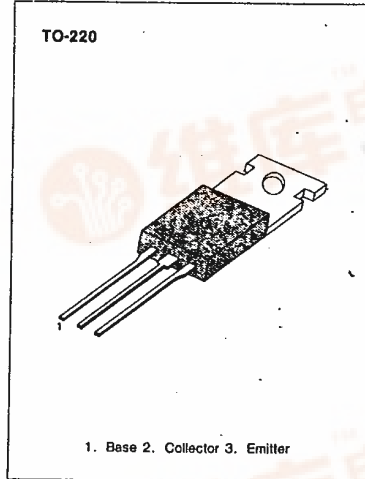
T-33-11

HIGH VOLTAGE, HIGH QUALITY

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

ABSOLUTE MAXIMUM RATINGS (T_a=25°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	°C
Storage Temperature	T _{stg}	-55~150	°C



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ELECTRICAL CHARACTERISTICS (T_a=25°C)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Collector Base Breakdown Voltage	BV _{CB0}	I _C =1mA, I _E =0	800			V
Collector Emitter Breakdown Voltage	BV _{CE0}	I _C =5mA, R _{BE} =∞	500			V
Emitter Base Breakdown Voltage	BV _{EB0}	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, Clamped	500			V
Collector Cutoff Current	I _{CB0}	V _{CB} =500V, I _E =0			10	μA
Emitter Cutoff Current	I _{EB0}	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=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	RL=100ohm			0.3	μs

h_{FE} CLASSIFICATION

Classification	R	O	Y
h _{FE1}	15-30	20-40	30-50

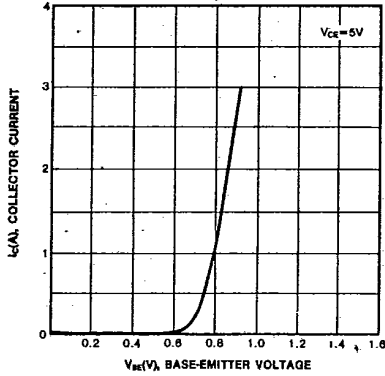


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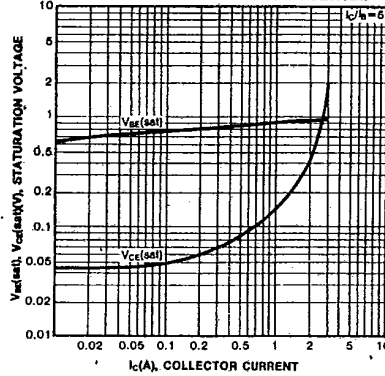
NPN SILICON TRANSISTOR

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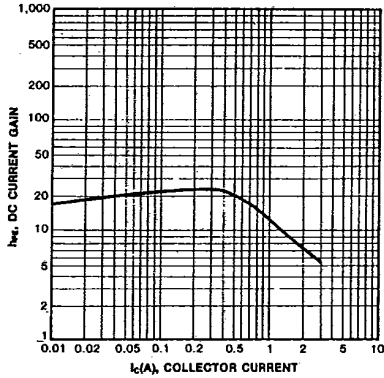
BASE-EMITTER ON VOLTAGE



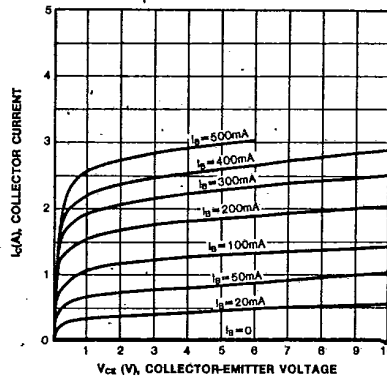
COLLECTOR-EMITTER SATURATION VOLTAGE
BASE-EMITTER SATURATION VOLTAGE



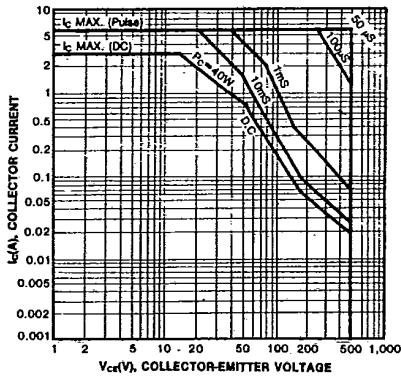
DC CURRENT GAIN



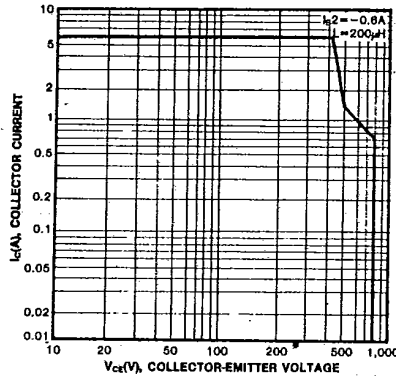
STATIC CHARACTERISTIC



FORWARD BIAS SAFE OPERATING AREA



REVERSE BIAS SAFE OPERATING AREA

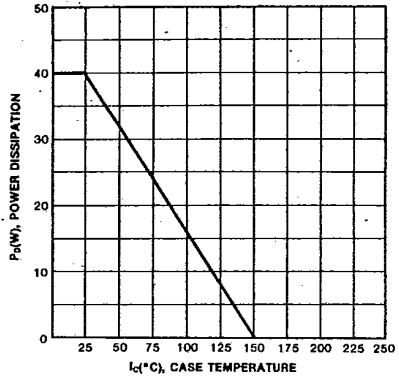


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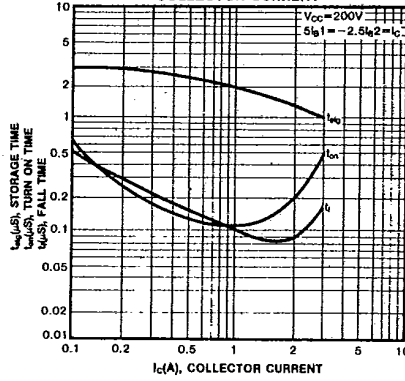
NPN SILICON TRANSISTOR

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POWER DERATING



TURN ON, STORAGE AND FALL TIME vs. COLLECTOR CURRENT



3

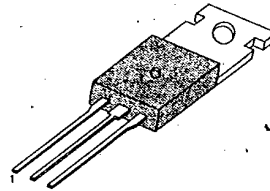
KSC5021**NPN SILICON TRANSISTOR**

T-33-11

HIGH VOLTAGE AND HIGH RELIABILITYHIGH SPEED SWITCHING: $t_r = 0.1 \mu\text{s}$ (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	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_{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	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	$RL = 50\Omega$			0.3	μs

 h_{FE} (1) CLASSIFICATION

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

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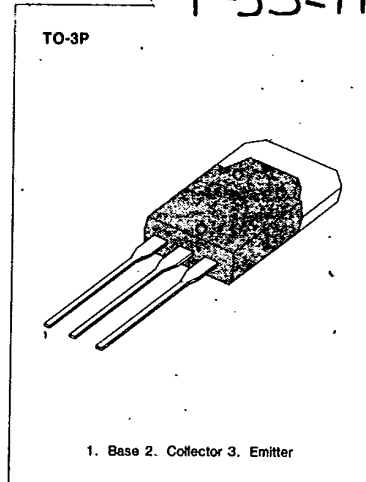
NPN SILICON TRANSISTOR

HIGH VOLTAGE AND HIGH RELIABILITY

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

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
Trun 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

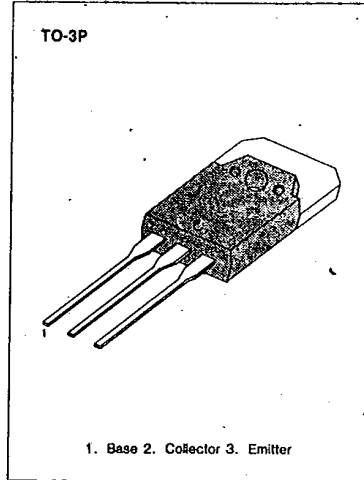
Classification	R	O	Y
$h_{FE} 1$	15-30	20-40	30-50

KSC5023**NPN SILICON TRANSISTOR**

T-33-13

HIGH VOLTAGE AND HIGH RELIABILITYHIGH 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	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
Trun On Time	t_{on}	$V_{CC} = 200\text{V}$			0.5	μs
Storage Time	t_s	$I_B1 = -2.5I_B2 = I_C = 4\text{A}$			3	μs
Fall Time	t_f	$R_L = 50\Omega$			0.3	μs

 h_{FE} (1) CLASSIFICATION

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