High Voltage Switching Transistor (400V, 2A)

2SC3969 / 2SC5161

●Features

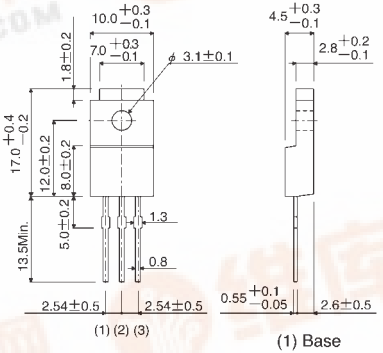
1) Low $V_{CE(sat)}$.
   $V_{CE(sat)}$ = 0.15V (Typ.)
   (I_C / I_B = 1A / 0.2A)
2) High breakdown voltage.
   V_{CEO} = 400V
3) Fast switching.
   t_f = 1.0µs
   (I_C = 0.8A)

●Structure

Three-layer, diffused planar type
NPN silicon transistor

●External dimensions (Units: mm)

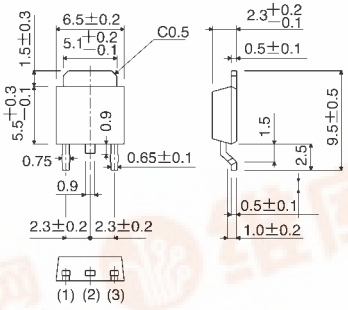
2SC3969



ROHM : TO-220FP
EIAJ : SC-67

(1) Base
(2) Collector
(3) Emitter

2SC5161



ROHM : CPT 3
EIAJ : SC-63

(1) Base
(2) Collector
(3) Emitter

●Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CBO}	400	V
Collector-emitter voltage		V_{CEO}	400	V
Emitter-base voltage		V_{EBO}	7	V
Collector current		I_C	2	A (DC)
		I_{CP}	4	A (Pulse) ✻
Collector power dissipation	2SC3969	P_C	2	W
			20	W (Tc=25℃)
	2SC5161		1	W
			10	W (Tc=25℃)
Junction temperature		Tj	150	℃
Storage temperature		Tstg	−55～+150	℃

✻ Single pulse Pw=10ms

●Electrical characteristics (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV_{CBO}	400	—	—	V	I_C=50 μA
Collector-emitter breakdown voltage	BV_{CEO}	400	—	—	V	I_C=1mA
Collector-emitter voltage	$V_{CEO(SUS)}$	400	—	—	V	I_C=1.0A, I_{B1}=0.1A, L=1mH ✻2
Emitter-base breakdown voltage	BV_{EBO}	7	—	—	V	I_E=50 μA
Collector cutoff current	I_{CBO}	—	—	10	μA	V_{CB}=400V
Emitter cutoff current	I_{EBO}	—	—	10	μA	V_{EB}=7V
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	1	V	I_C/I_B=1A/0.2A
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	1.5	V	I_C/I_B=1A/0.2A
DC current transfer ratio	h_{FE}	25	—	50	—	V_{CE}=5V, I_C=0.1A
Transition frequency	f_T	—	10	—	MHz	V_{CE}=10V, I_E=−0.1A, f=5MHz ✻1
Output capacitance	Cob	—	30	—	pF	V_{CB}=10V, I_E=0A, f=1MHz
Turn-on time	t_{ON}	—	—	1	μs	I_C=0.8A, R_L=250Ω I_{B1}=−I_{B2}=0.08A V_{CC}≒200V Refer to measurement circuit diagram
Storage time	t_{stg}	—	—	2.5	μs	
Fall time	t_f	—	—	1	μs	

✻1 Measured using pulse current
✻2 2SC3969

●Packaging specifications and h_{FE}

Type	h_{FE}	Package name	Bulk	Taping
		Code		TL
		Basic ordering unit (pieces)	500	2500
2SC3969	B		○	—
2SC5161	B		—	○

h_{FE} values are classified as follows :

Item	B
h_{FE}	25～50

●Electrical characteristic curves

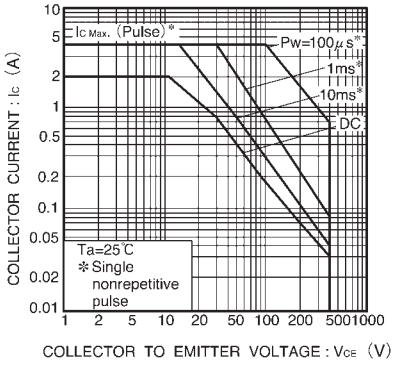


Fig.1 Safe operating area (2SC3969)

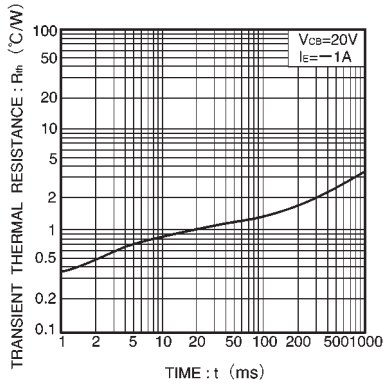


Fig.2 Transient thermal resistance (2SC3969)

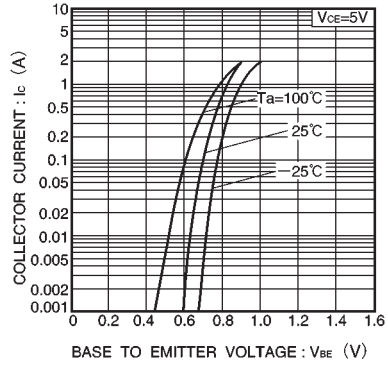


Fig.3 Grounded emitter propagation characteristics

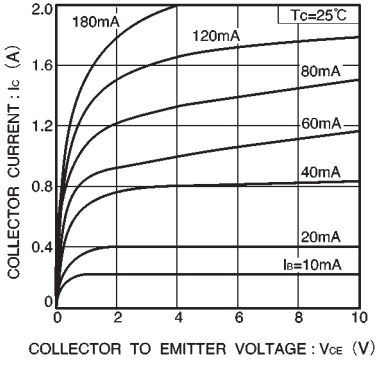


Fig.4 Grounded emitter output characteristics

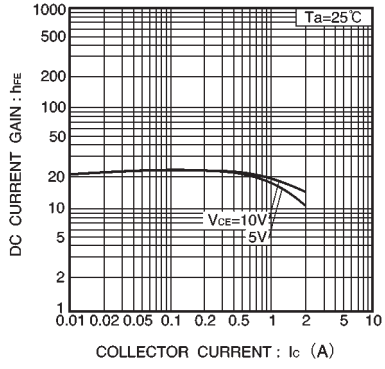


Fig.5 DC current gain vs. collector current (Ⅰ)

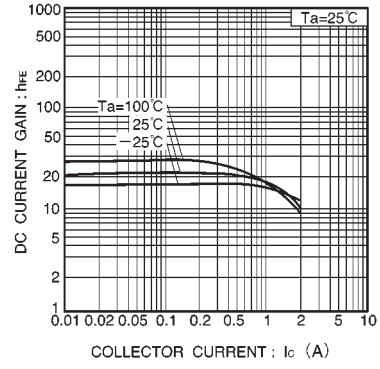


Fig.6 DC current gain vs. collector current (Ⅱ)

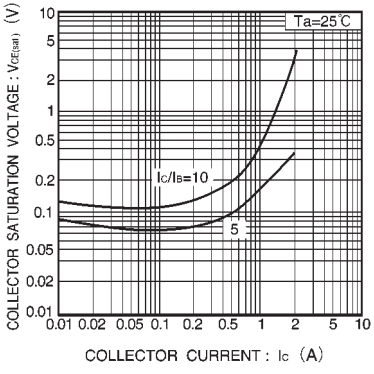


Fig.7 Collector-emitter saturation voltage vs. collector current

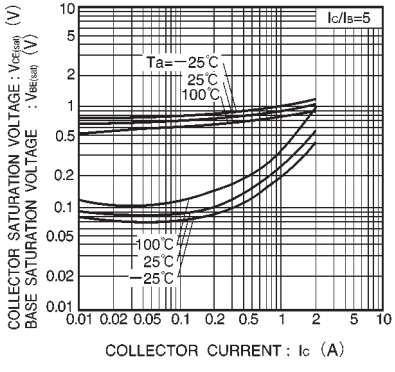


Fig.8 Collector-emitter saturation voltage vs. collector current
Base-emitter saturation voltage vs. collector current

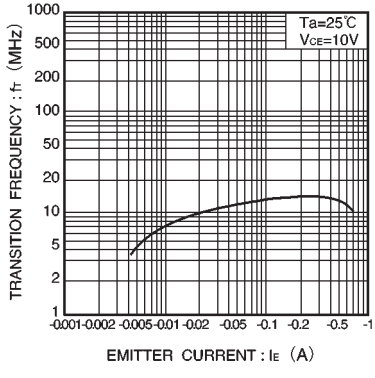


Fig.9 Gain bandwidth product vs. emitter current

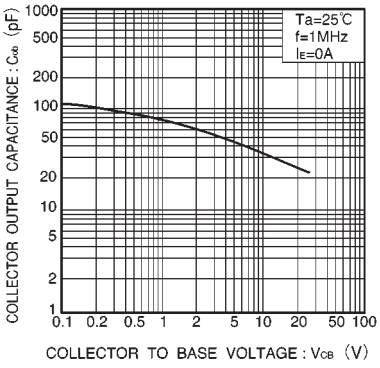


Fig.10 Collector output capacitance vs. collector-base voltage

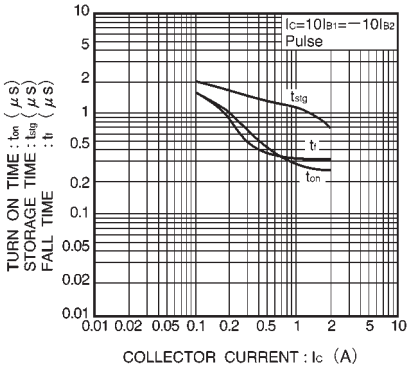


Fig.11 Switching time vs. collector current

●Switching characteristics measurement circuit