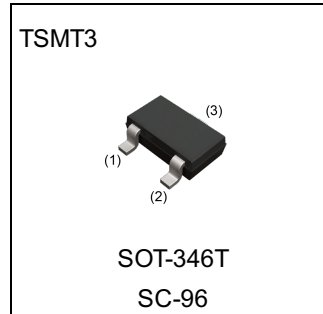


Parameter	Value
$V_{CEO}$	50V
$I_C$	1A

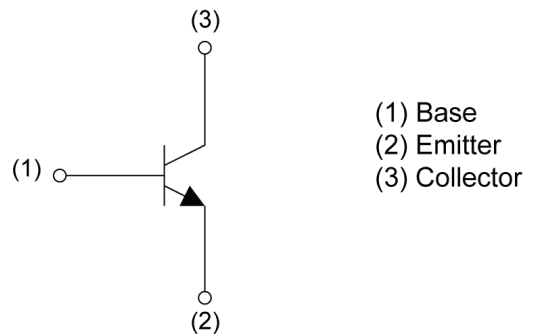
### ●Outline



### ●Features

- 1) Suitable for Middle Power Driver
- 2) Complementary PNP Types: 2SAR513R
- 3) Low  $V_{CE(sat)}$   
 $V_{CE(sat)} = 350\text{mV (Max.)}$   
 $(I_C/I_B = 500\text{mA}/25\text{mA})$

### ●Inner circuit



### ●Application

LOW FREQUENCY AMPLIFIER, HIGH SPEED SWITCHING

### ●Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	Marking
2SCR513R	TSMT3	2928	TL	180	8	3000	NC

● **Absolute maximum ratings** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Values	Unit
Collector-base voltage	$V_{\text{CBO}}$	50	V
Collector-emitter voltage	$V_{\text{CEO}}$	50	V
Emitter-base voltage	$V_{\text{EBO}}$	6	V
Collector current	$I_{\text{C}}$	1	A
	$I_{\text{CP}}^{*1}$	2	A
Power dissipation	$P_{\text{D}}^{*2}$	0.5	W
	$P_{\text{D}}^{*3}$	1.0	W
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Range of storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector-base breakdown voltage	$BV_{\text{CBO}}$	$I_{\text{C}} = 100\mu\text{A}$	50	-	-	V
Collector-emitter breakdown voltage	$BV_{\text{CEO}}$	$I_{\text{C}} = 1\text{mA}$	50	-	-	V
Emitter-base breakdown voltage	$BV_{\text{EBO}}$	$I_{\text{E}} = 100\mu\text{A}$	6	-	-	V
Collector cut-off current	$I_{\text{CBO}}$	$V_{\text{CB}} = 50\text{V}$	-	-	1.0	$\mu\text{A}$
Emitter cut-off current	$I_{\text{EBO}}$	$V_{\text{EB}} = 4\text{V}$	-	-	1.0	$\mu\text{A}$
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}^{*4}$	$I_{\text{C}} = 500\text{mA}, I_{\text{B}} = 25\text{mA}$	-	130	350	mV
DC current gain	$h_{\text{FE}}$	$V_{\text{CE}} = 2\text{V}, I_{\text{C}} = 50\text{mA}$	180	-	450	-
Transition frequency	$f_{\text{T}}^{*4}$	$V_{\text{CE}} = 10\text{V}, I_{\text{E}} = -200\text{mA}, f = 100\text{MHz}$	-	360	-	MHz
Output capacitance	$C_{\text{ob}}$	$V_{\text{CB}} = 10\text{V}, I_{\text{E}} = 0\text{A}, f = 1\text{MHz}$	-	7	-	pF
Turn-On time	$t_{\text{on}}$	$I_{\text{C}} = 500\text{mA}, I_{\text{B1}} = 50\text{mA}$	-	40	-	ns
Storage time	$t_{\text{stg}}$	$I_{\text{B2}} = -50\text{mA}, V_{\text{CC}} \approx 10\text{V}$	-	410	-	ns
Fall time	$t_{\text{f}}$	$R_{\text{L}} = 20\Omega$ See test circuit	-	75	-	ns

\*1  $P_{\text{W}}=10\text{ms}$  Single pulse

\*2 Each terminal mounted on a reference land.

\*3 Mounted on a ceramic board(40×40×0.7mm).

\*4 Pulsed

●Electrical characteristic curves( $T_a = 25^\circ\text{C}$ )

Fig.1 Ground Emitter Propagation Characteristics

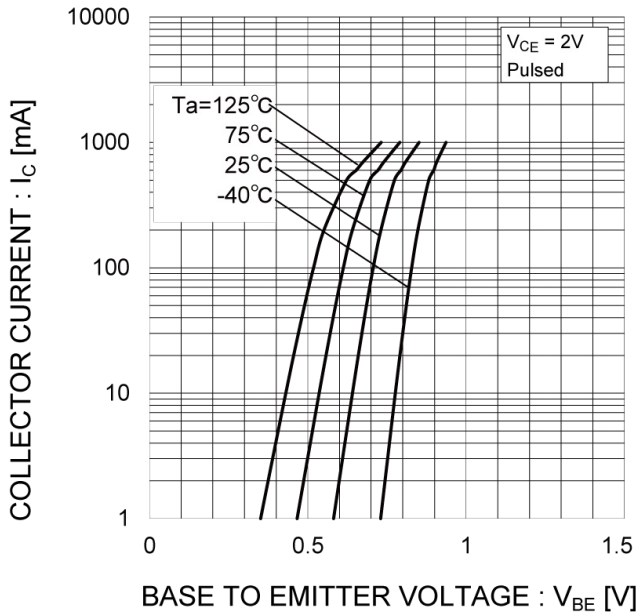


Fig.2 Typical Output Characteristics

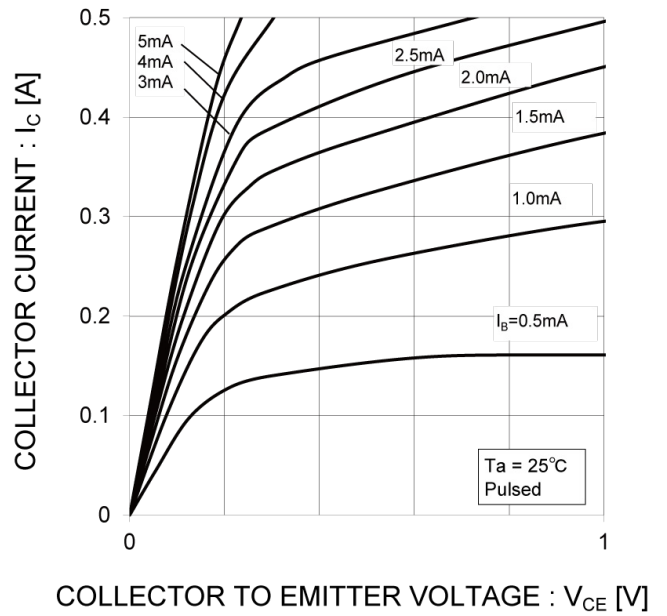


Fig.3 DC Current Gain vs. Collector Current (I)

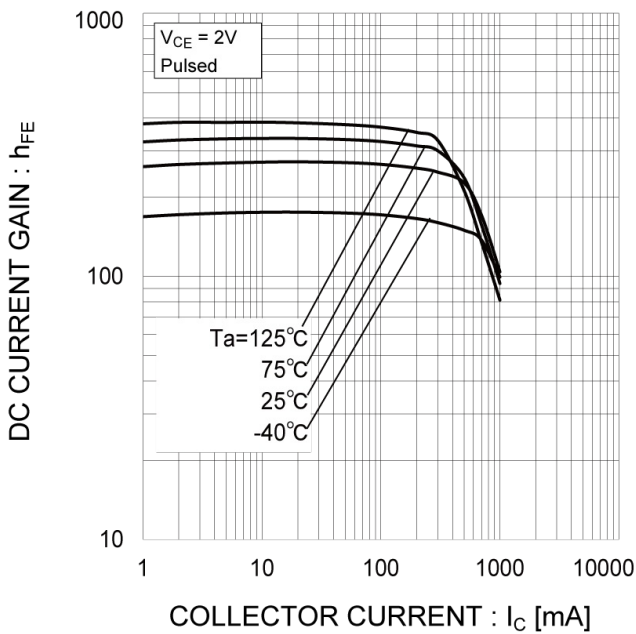
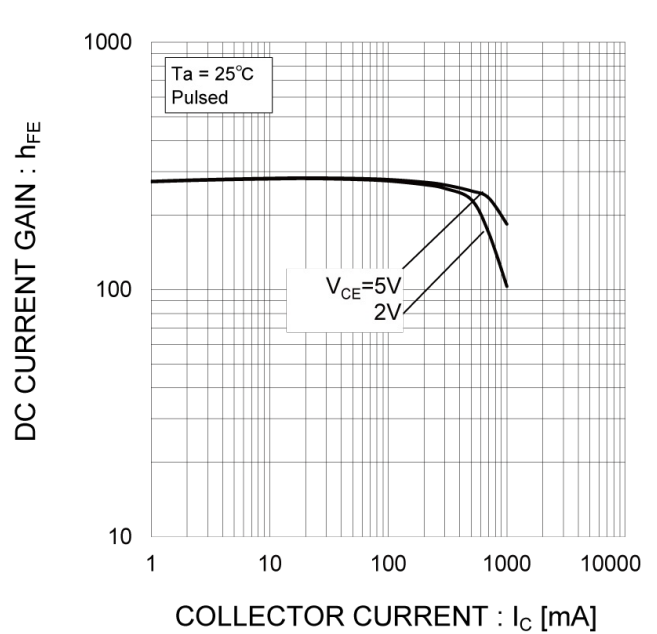


Fig.4 DC Current Gain vs. Collector Current (II)



● Electrical characteristic curves ( $T_a = 25^\circ\text{C}$ )

Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (I)

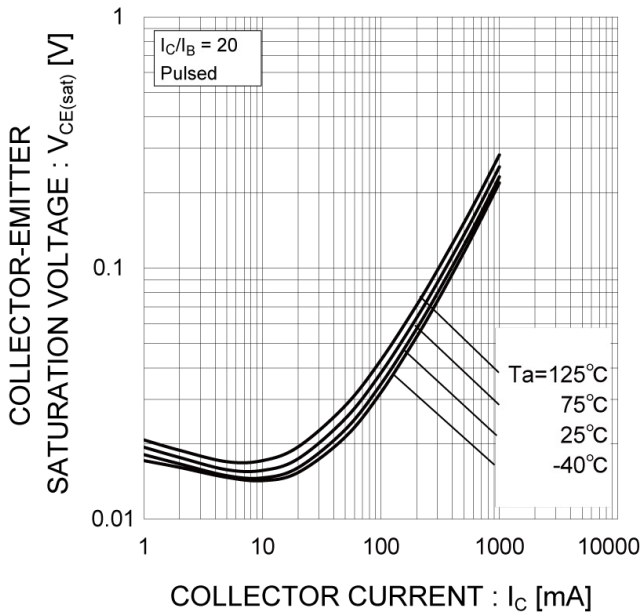


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

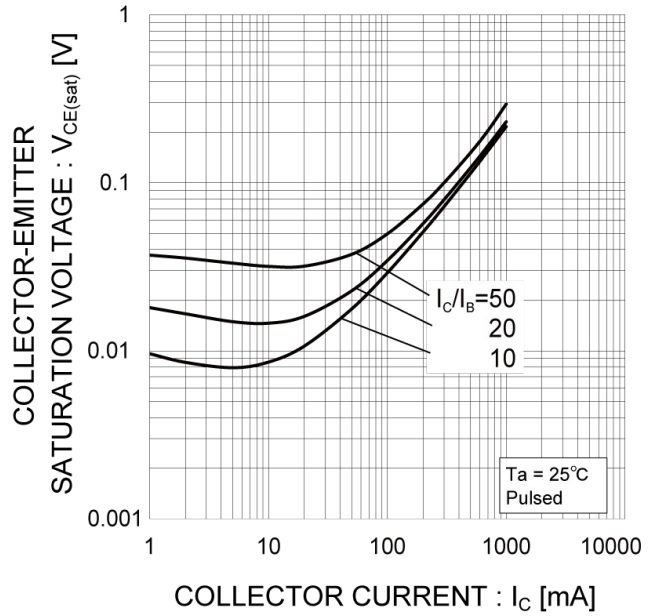


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

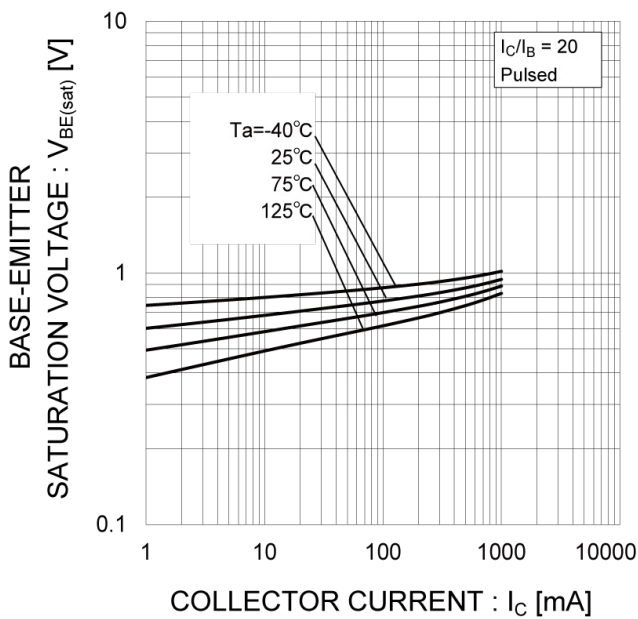
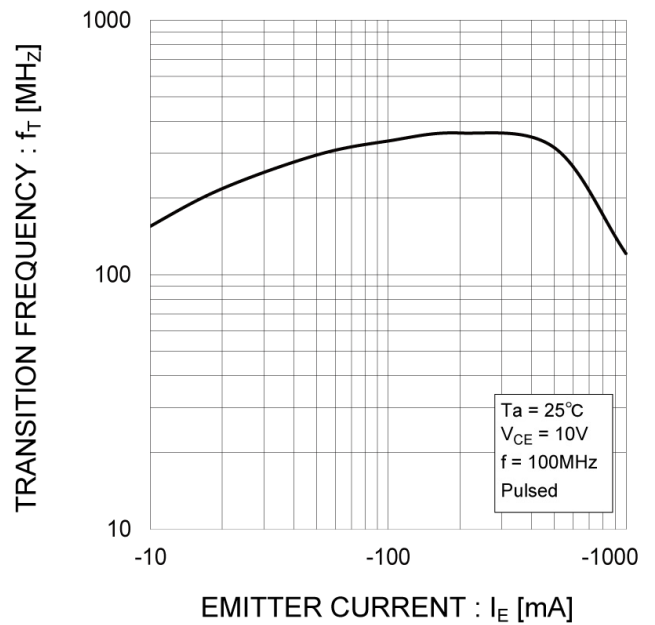


Fig.8 Gain Bandwidth Product vs. Emitter Current



● Electrical characteristic curves ( $T_a = 25^\circ\text{C}$ )

Fig.9 Emitter Input Capacitance vs. Emitter-Base Voltage  
Collector Output Capacitance vs. Collector-Base Voltage

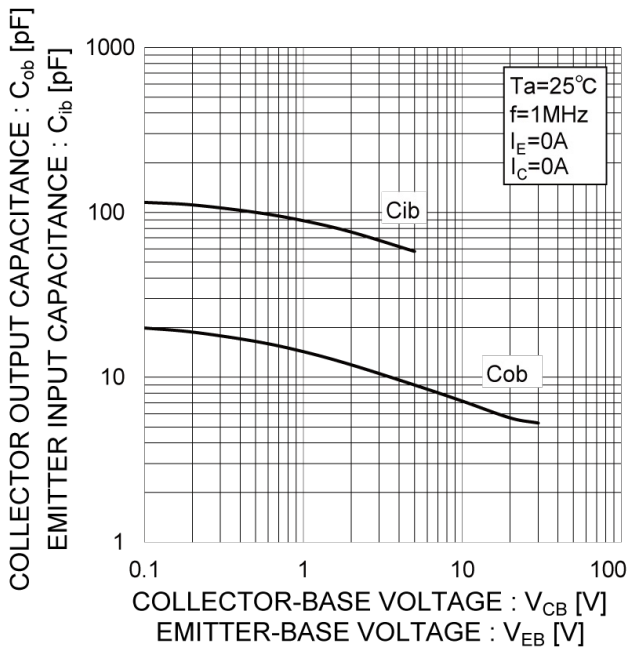
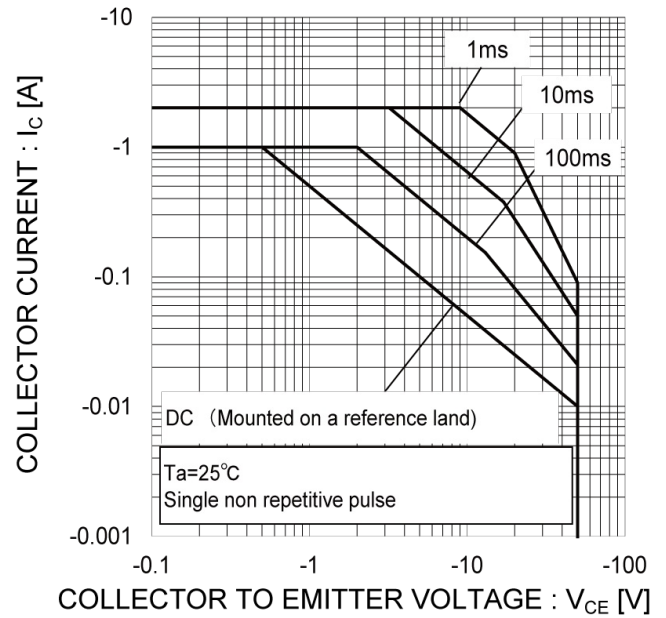
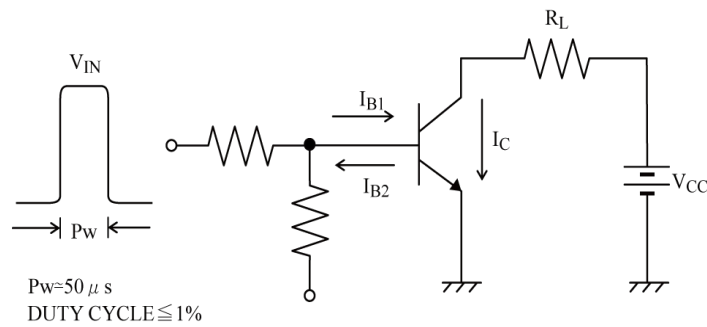


Fig.10 Safe Operating Area



SWITCHING TIME TEST CIRCUIT



●Dimensions

TSMT3



Pattern of terminal position areas  
[Not a recommended pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	1.00	-	0.039
A1	0.00	0.10	0.000	0.004
A2	0.75	0.95	0.030	0.037
A3	0.25		0.010	
b	0.35	0.50	0.014	0.020
c	0.10	0.26	0.004	0.010
D	2.80	3.00	0.110	0.118
E	1.50	1.80	0.059	0.071
e	0.95		0.037	
HE	2.60	3.00	0.102	0.118
L1	0.30	0.60	0.012	0.024
Lp	0.40	0.70	0.016	0.028
Q	0.05	0.25	0.002	0.010
x	-	0.20	-	0.008

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.70	-	0.028
e1	2.10		0.083	
l1	-	0.90	-	0.035

Dimension in mm/inches

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