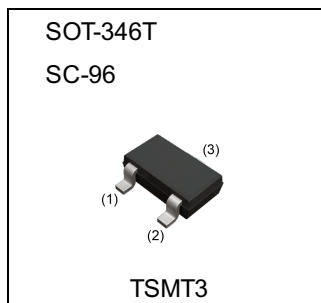


Parameter	Value
V_{CEO}	-50V
I_C	-1A

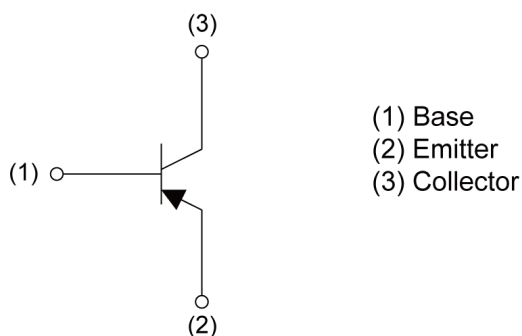
●Outline



●Features

- 1) Suitable for Middle Power Driver
- 2) Complementary NPN Types: 2SCR513R
- 3) Low $V_{CE(sat)}$
 $V_{CE(sat)} = -400\text{mV (Max.)}$
 $(I_C/I_B = -500\text{A/-25mA})$

●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
2SAR513R	SOT-346T (TSMT3)	2928	TL	180	8	3000	MC

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

Parameter	Symbol	Values	Unit
Collector-base voltage	V_{CBO}	-50	V
Collector-emitter voltage	V_{CEO}	-50	V
Emitter-base voltage	V_{EBO}	-6	V
Collector current	I_{C}	-1	A
	I_{CP}^{*1}	-2	A
Power dissipation	P_{D}^{*2}	0.5	W
	P_{D}^{*3}	1.0	W
Junction temperature	T_{j}	150	$^\circ\text{C}$
Range of storage temperature	T_{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_{CBO}	$I_{\text{C}} = -100\mu\text{A}$	-50	-	-	V
Collector-emitter breakdown voltage	BV_{CEO}	$I_{\text{C}} = -1\text{mA}$	-50	-	-	V
Emitter-base breakdown voltage	BV_{EBO}	$I_{\text{E}} = -100\mu\text{A}$	-6	-	-	V
Collector cut-off current	I_{CBO}	$V_{\text{CB}} = -50\text{V}$	-	-	-1.0	μA
Emitter cut-off current	I_{EBO}	$V_{\text{EB}} = -4\text{V}$	-	-	-1.0	μA
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}^{*4}$	$I_{\text{C}} = -500\text{mA}$, $I_{\text{B}} = -25\text{mA}$	-	-200	-400	mV
DC current gain	h_{FE}	$V_{\text{CE}} = -2\text{V}$, $I_{\text{C}} = -50\text{mA}$	180	-	450	-
Transition frequency	f_{T}^{*4}	$V_{\text{CE}} = -10\text{V}$, $I_{\text{E}} = 200\text{mA}$, $f = 100\text{MHz}$	-	400	-	MHz
Output capacitance	C_{ob}	$V_{\text{CB}} = -10\text{V}$, $I_{\text{E}} = 0\text{A}$, $f = 1\text{MHz}$	-	12	-	pF
Turn-On time	t_{on}	$I_{\text{C}} = -500\text{mA}$, $I_{\text{B1}} = -50\text{mA}$, $I_{\text{B2}} = 50\text{mA}$, $V_{\text{CC}} \approx -10\text{V}$, $R_{\text{L}} = 20\Omega$ See test circuit	-	40	-	ns
Storage time	t_{stg}		-	250	-	ns
Fall time	t_{f}		-	35	-	ns

*1 PW=10ms ,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

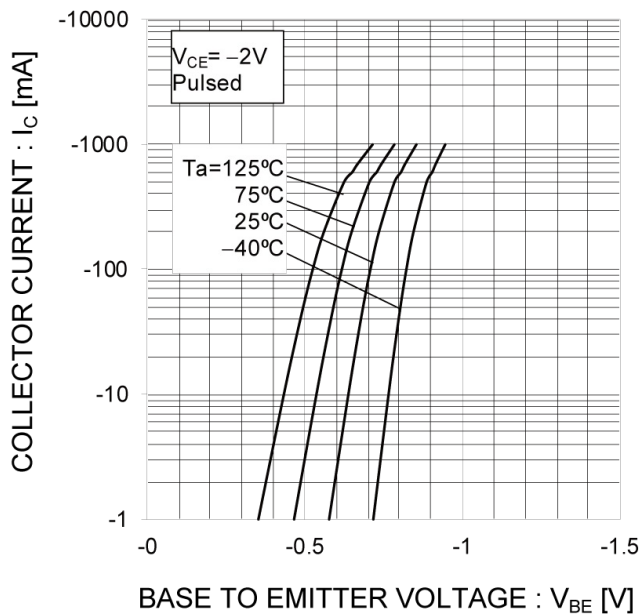


Fig.2 Typical Output Characteristics

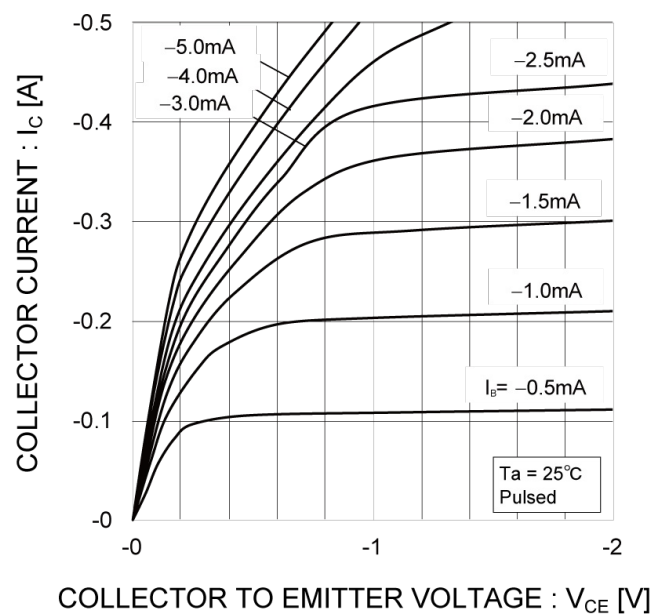


Fig.3 DC Current Gain vs. Collector Current (I)

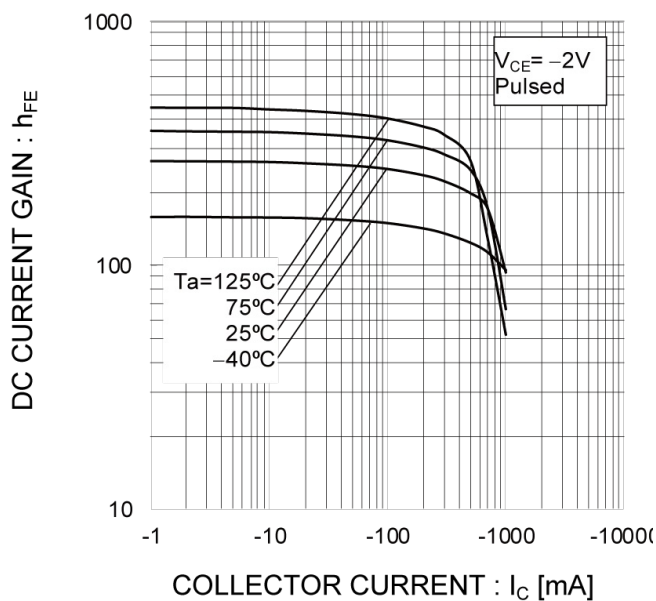
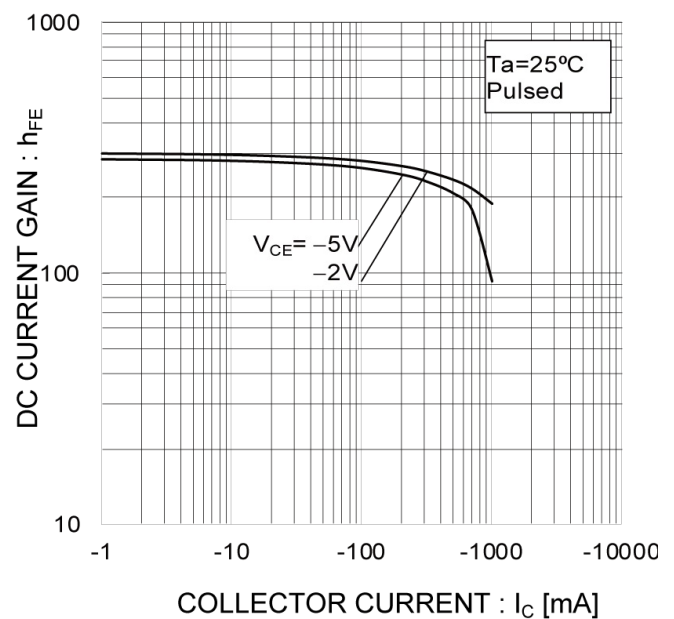


Fig.4 DC Current Gain vs. Collector Current (II)



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

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

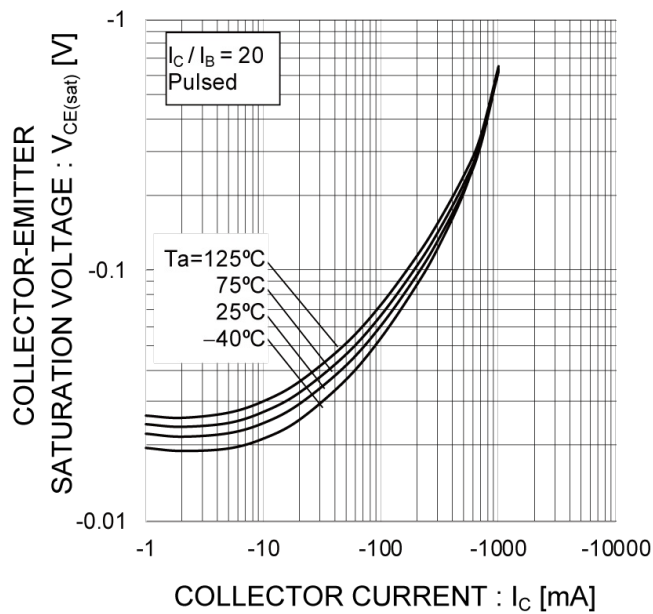


Fig.6 Collector-Emitter Saturation
Voltage vs. Collector Current (II)

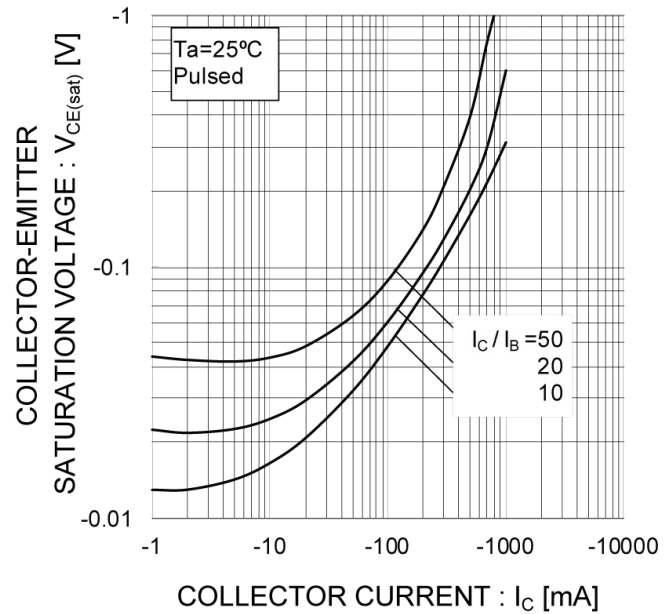


Fig.7 Base-Emitter Saturation Voltage
vs. Collector Current

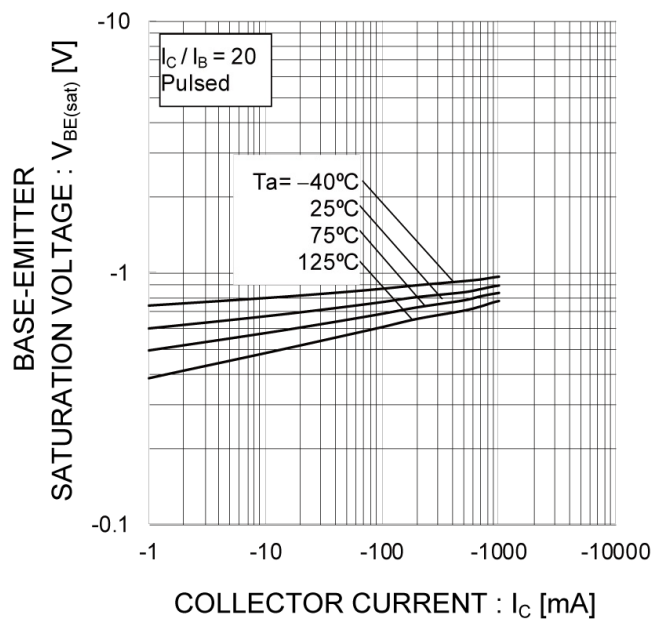
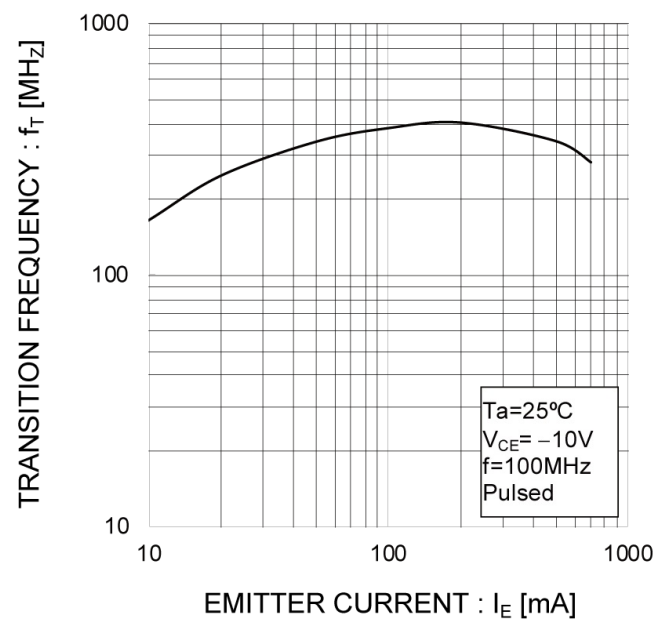


Fig.8 Gain Bandwidth Product vs.
Emitter Current



●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

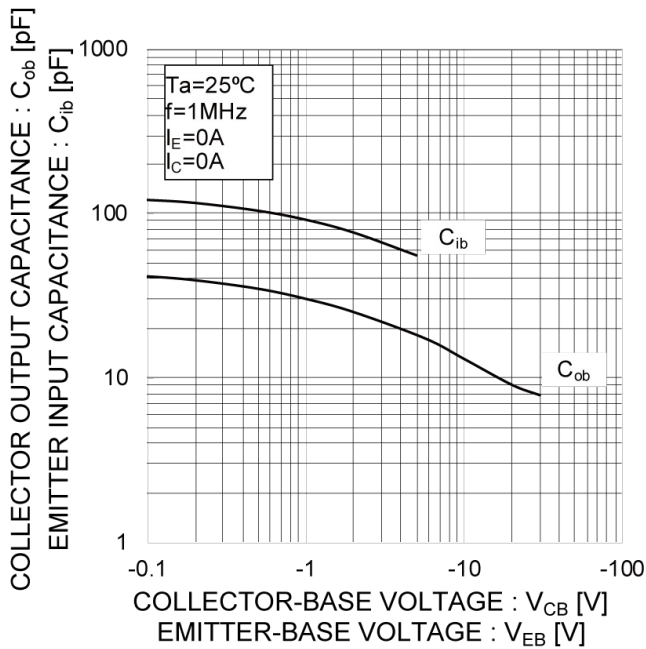
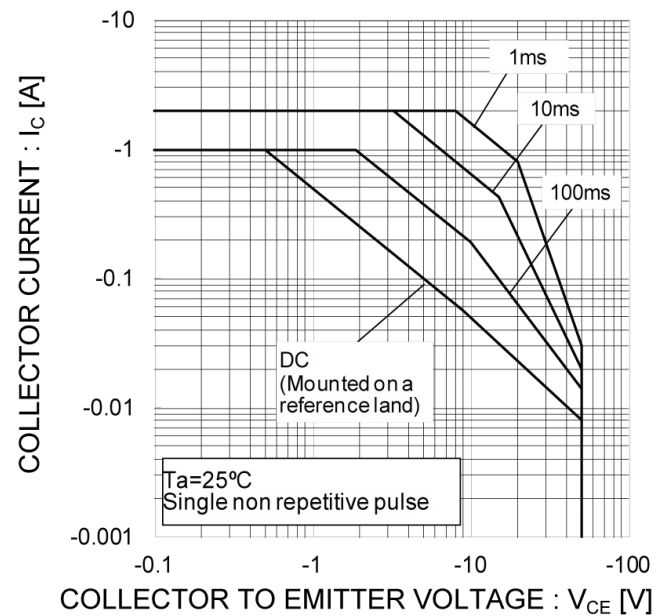


Fig.10 Safe Operating Area



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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