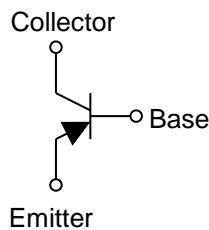


Parameter	Value
V_{CEO}	-50V
I_C	-1.0A

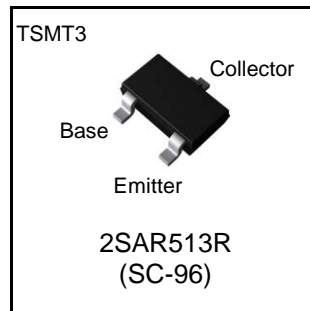
●Features

- 1) Suitable for Middle Power Driver
- 2) Complementary NPN Types : 2SCR513R
- 3) Low $V_{CE(sat)}$
 $V_{CE(sat)} = -0.4V(\text{Max.})$
 $(I_C/I_B = -500mA / -25mA)$
- 4) Lead Free/RoHS Compliant.

●Inner circuit



●Outline



●Applications

Motor driver , LED driver
Power supply

●Packaging specifications

Part No.	Package	Package size (mm)	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit (pcs)	Marking
2SAR513R	TSMT3	2928	TL	180	8	3,000	MC

●Absolute maximum ratings (Ta = 25°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	DC	I_C	-1.0
	Pulsed	I_{CP}^{*1}	-2.0
Power dissipation	P_D^{*2}	0.5	W
	P_D^{*3}	1.0	W
Junction temperature	T_j	150	°C
Range of storage temperature	T_{stg}	-55 to +150	°C

*1 Pw=10ms , single pulse

*2 Each terminal mounted on a reference land

*3 Mounted on a ceramic board (40x40x0.7mm)

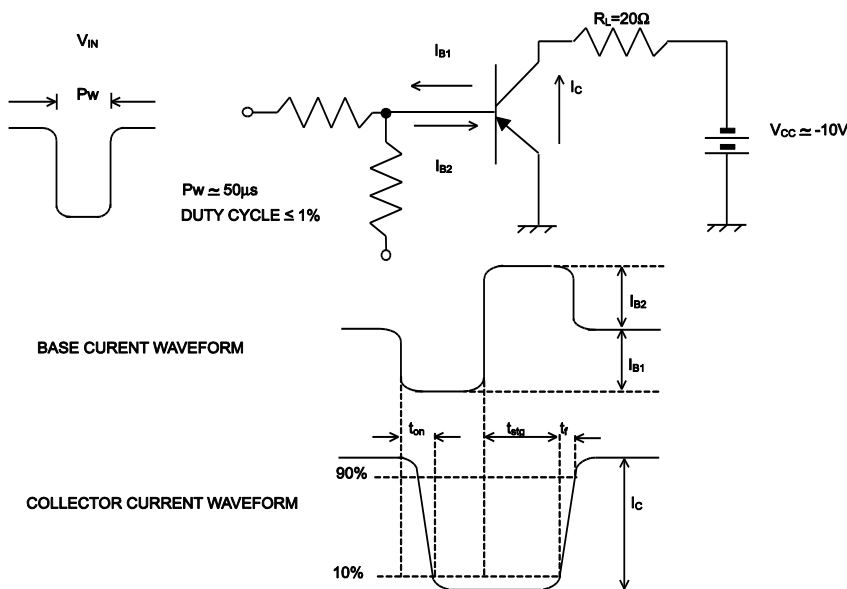
●Electrical characteristics(Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	BV_{CEO}	$I_C = -1mA$	-50	-	-	V
Collector-base breakdown voltage	BV_{CBO}	$I_C = -100\mu A$	-50	-	-	V
Emitter-base breakdown voltage	BV_{EBO}	$I_E = -100\mu A$	-6	-	-	V
Collector cut-off current	I_{CBO}	$V_{CB} = -50V$	-	-	-1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = -4V$	-	-	-1	μA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -500mA, I_B = -25mA$	-	-0.20	-0.40	V
DC current gain	h_{FE}	$V_{CE} = -2V, I_C = -50mA$	180	-	450	-
Transition frequency	f_T^{*1}	$V_{CE} = -10V, I_E = -200mA$ $f = 100MHz$	-	400	-	MHz
Output capacitance	C_{ob}	$V_{CB} = -10V, I_E = 0A,$ $f = 1MHz$	-	12	-	pF
Turn-on time	t_{on}^{*2}	$I_C = -0.5A$ $I_{B1} = -50mA$ $I_{B2} = 50mA$ $V_{CC} \approx -10V$	-	40	-	ns
Storage time	t_{stg}^{*2}		-	250	-	ns
Fall time	t_f^{*2}		-	35	-	ns

*1 Pulsed

*2 See switching time test circuit

●Switching time test circuit



●Electrical characteristic curves(Ta = 25°C)

Fig.1 Ground Emitter Propagation Characteristics

Fig.2 Typical Output Characteristics

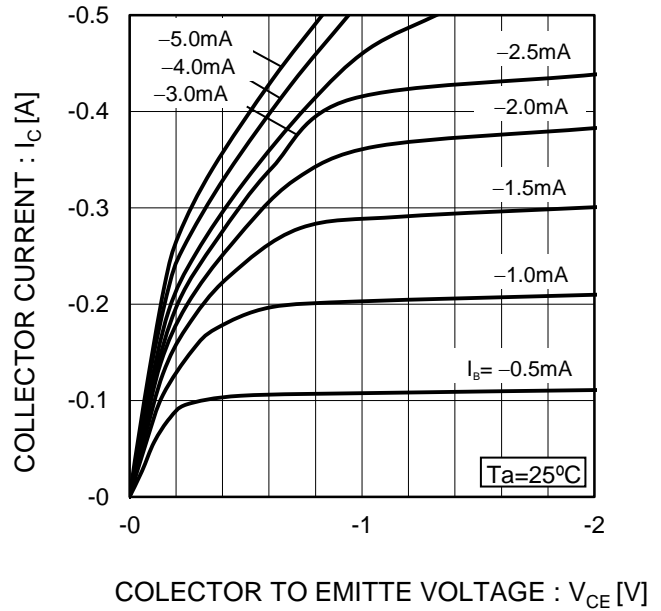
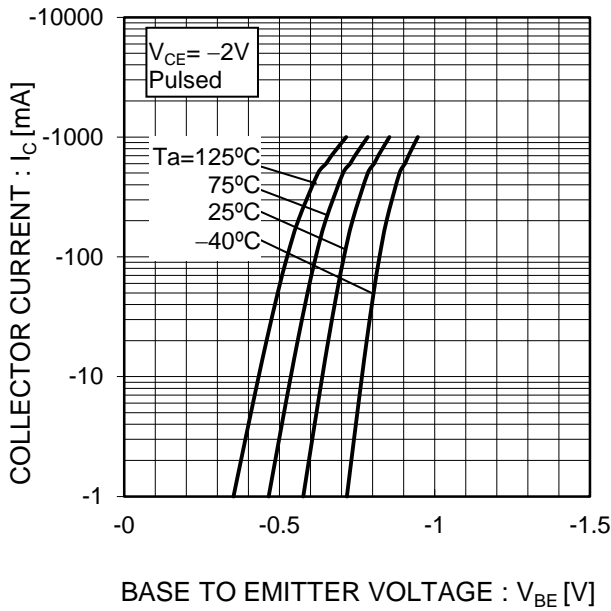
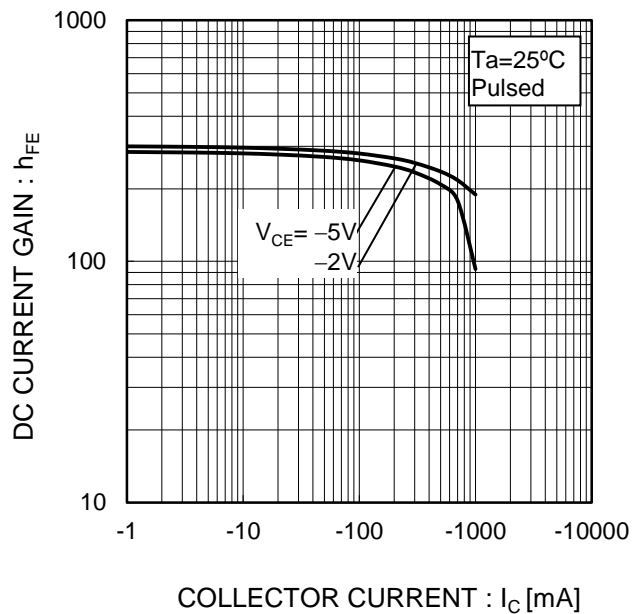
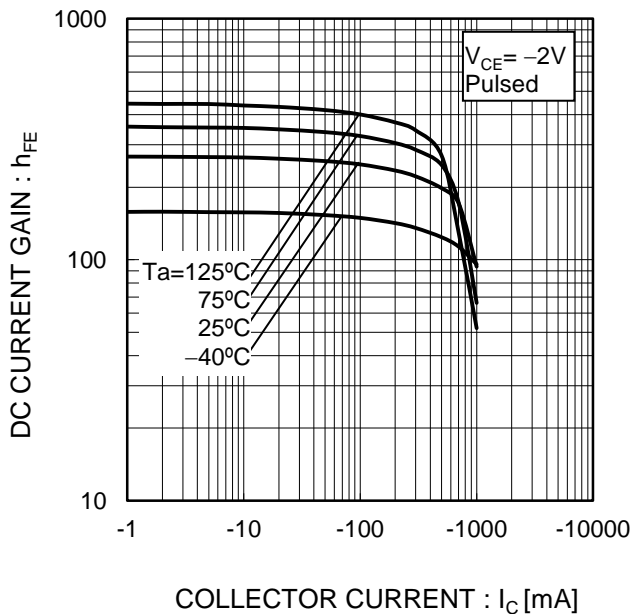


Fig.3 DC Current Gain vs. Collector Current(I)

Fig.4 DC current gain vs. output current (II)



●Electrical characteristic curves(Ta = 25°C)

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

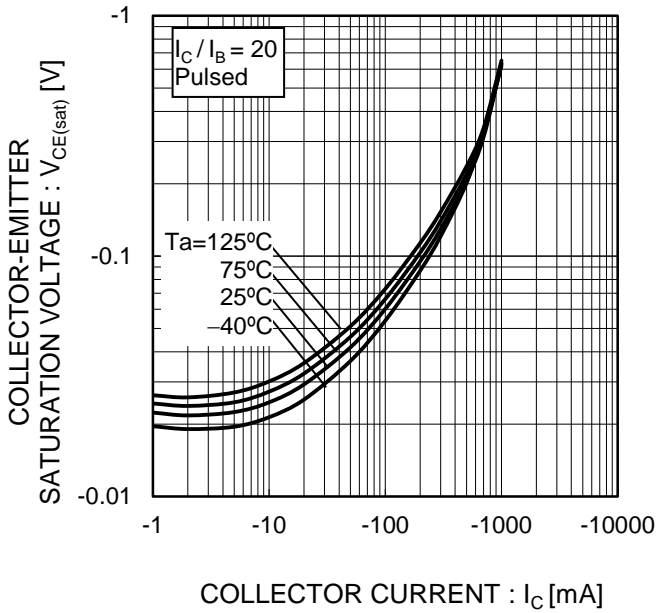


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

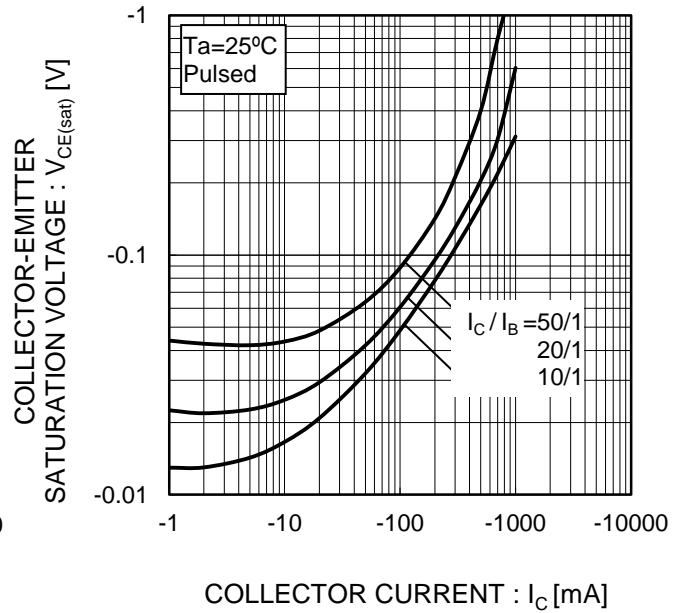


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

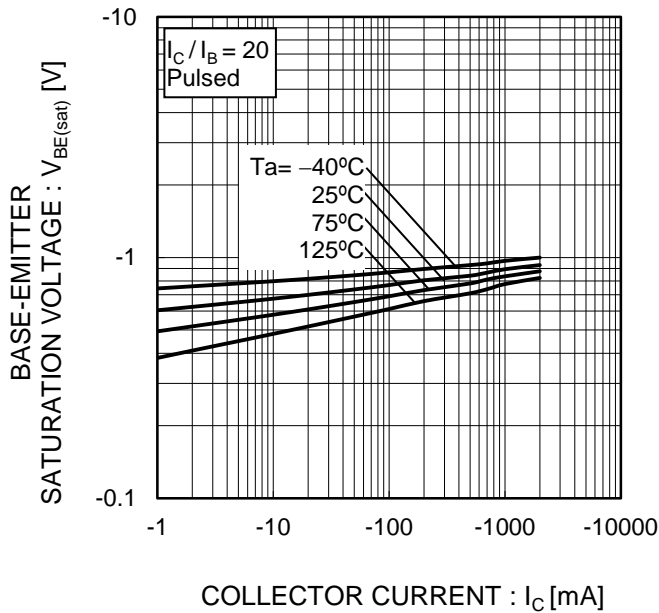
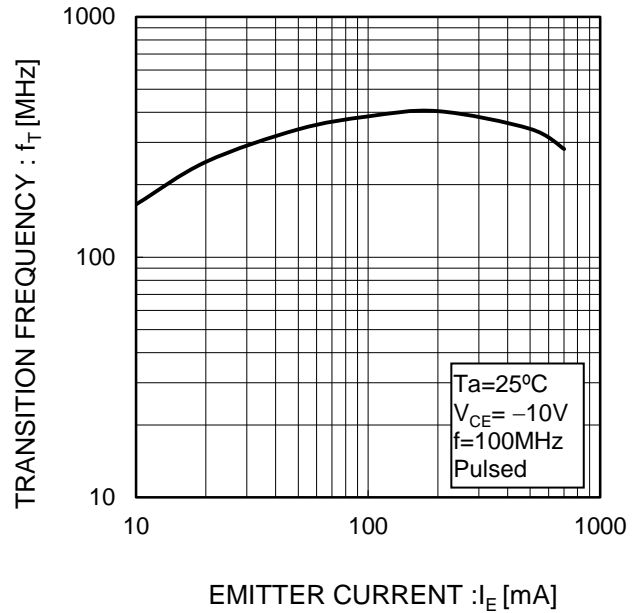


Fig.8 Gain Bandwidth Product vs. Emitter Current



●Electrical characteristic curves(Ta = 25°C)

Fig.9 Emitter input capacitance vs. Emitter-Base Voltage
Collector output capacitance vs. Collector-Base Voltage

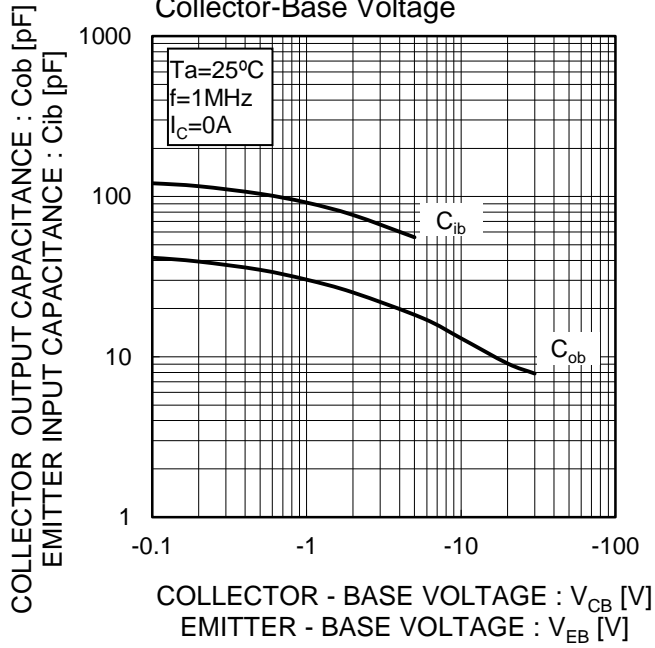
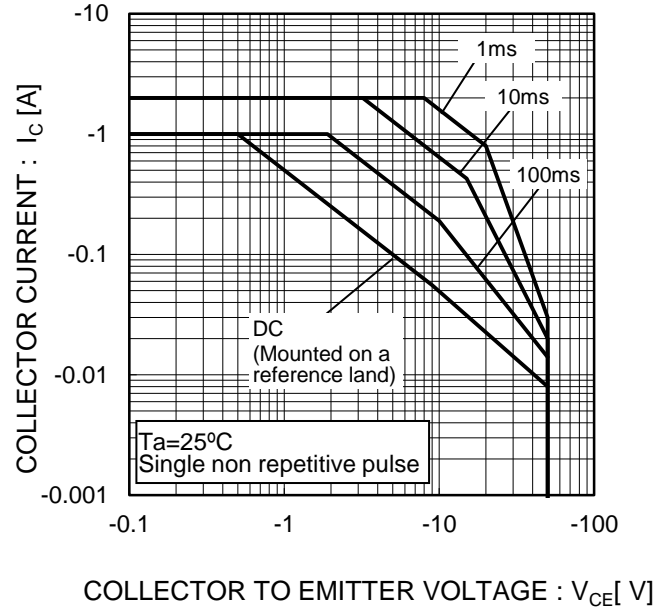
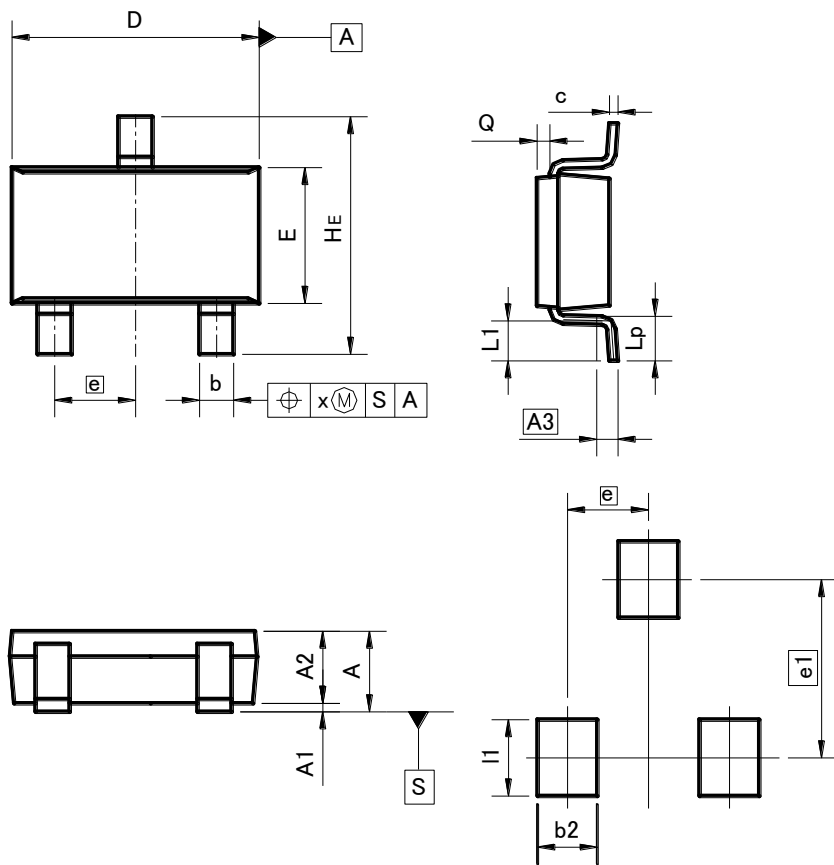


Fig.10 Safe Operating Area



●Dimensions (Unit : mm)

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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