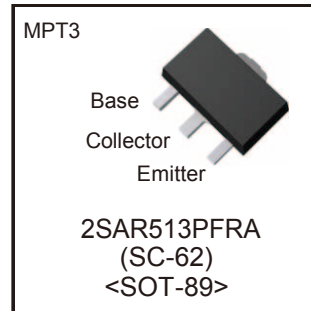


Parameter	Value
V_{CEO}	-50V
I_C	-1.0A

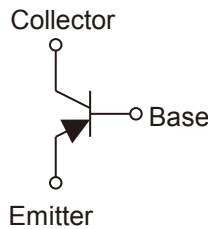
●Features

- 1) Suitable for Middle Power Driver
- 2) Complementary NPN Types : 2SCR513PFRA
- 3) Low $V_{CE(sat)}$
 $V_{CE(sat)} = -0.4V(\text{Max.})$
 $(I_C/I_B = -500mA / -25mA)$
- 4) Lead Free/RoHS Compliant.

●Outline



●Inner circuit



●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
2SAR513PFRA	MPT3	4540	T100	180	12	1,000	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}	2.0	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 (40×40×0.7mm)

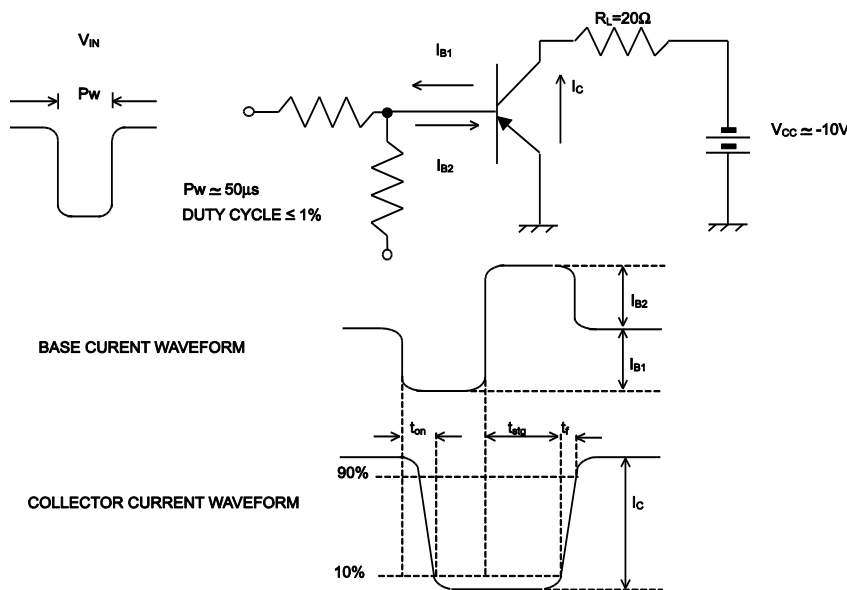
●Electrical characteristics(Ta = 25°C)

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	$V_{CE(sat)}^{*1}$	$I_C = -500mA, I_B = -25mA$	-	-0.20	-0.40	V
DC current gain	h_{FE}	$V_{CE} = -2V, I_C = -50mA$	180	-	450	-
Transition frequency	f_T	$V_{CE} = -10V, I_E = -200mA$ $f = 100MHz$	-	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

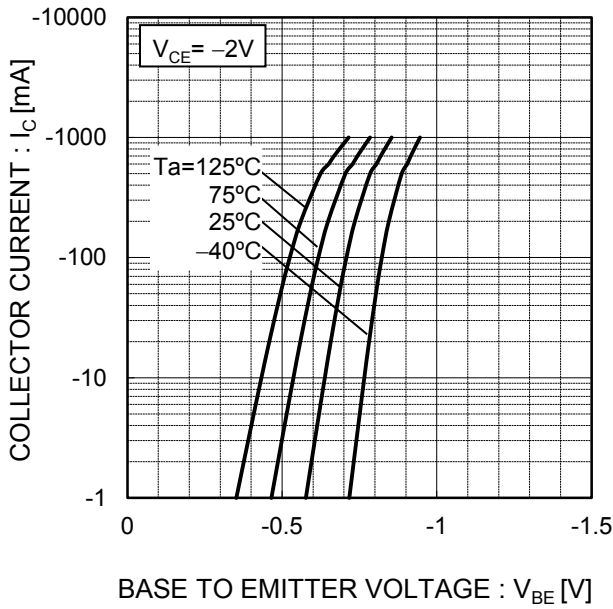


Fig.2 Typical Output Characteristics

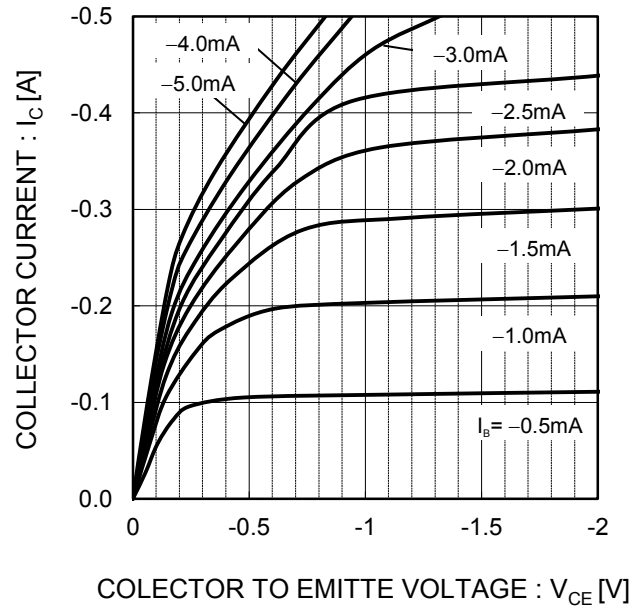


Fig.3 DC Current Gain vs. Collector Current(I)

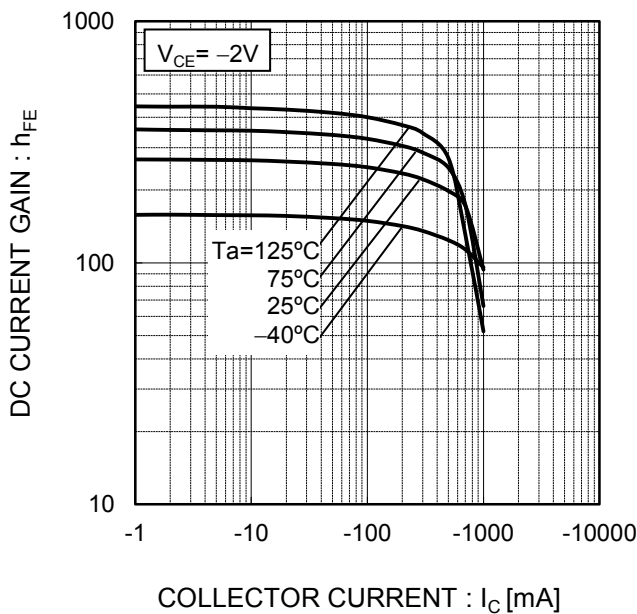
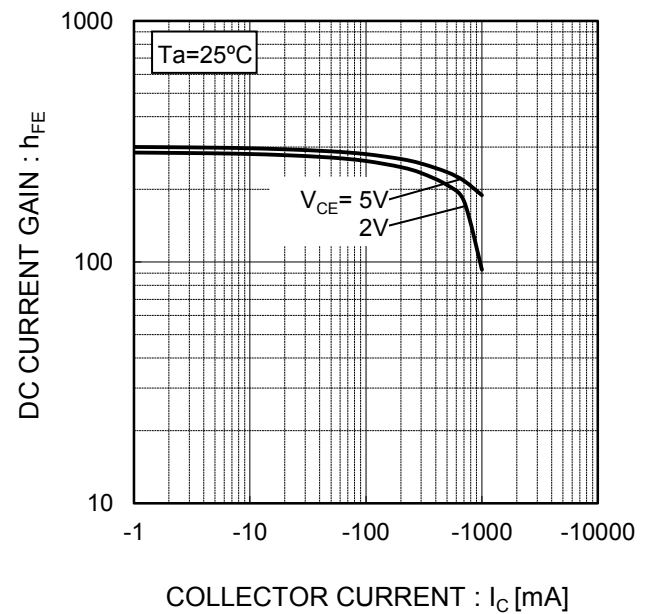


Fig.4 DC current gain vs. output current (II)



●Electrical characteristic curves(Ta = 25°C)

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

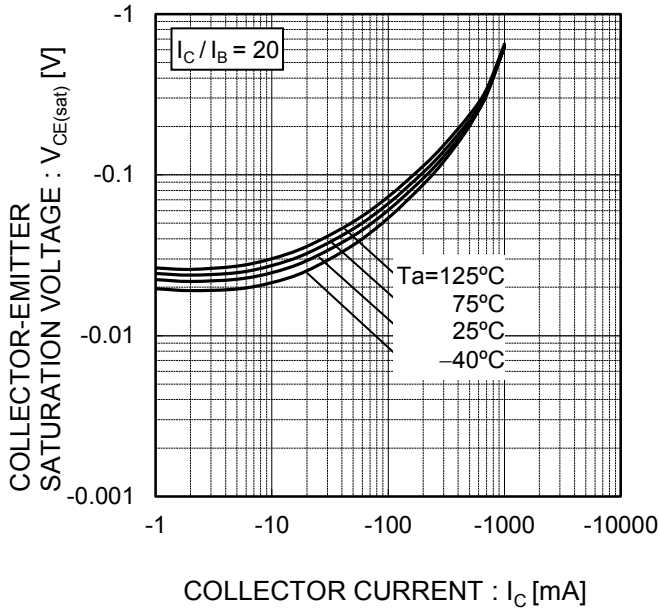


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

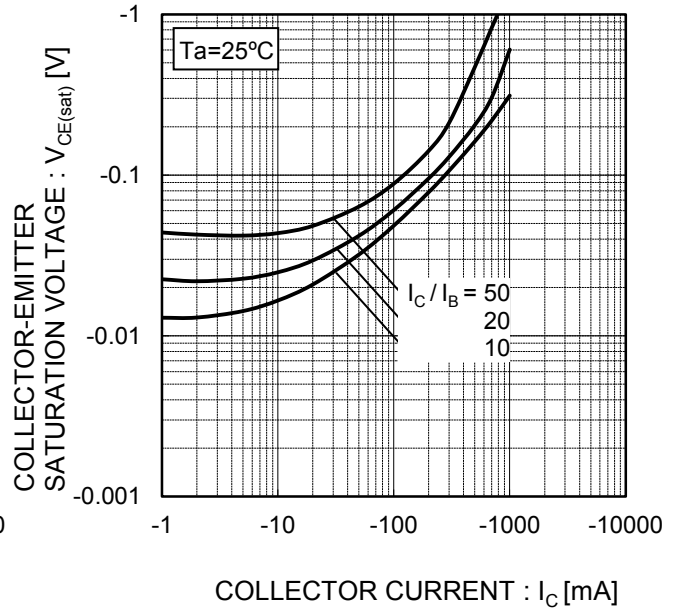


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

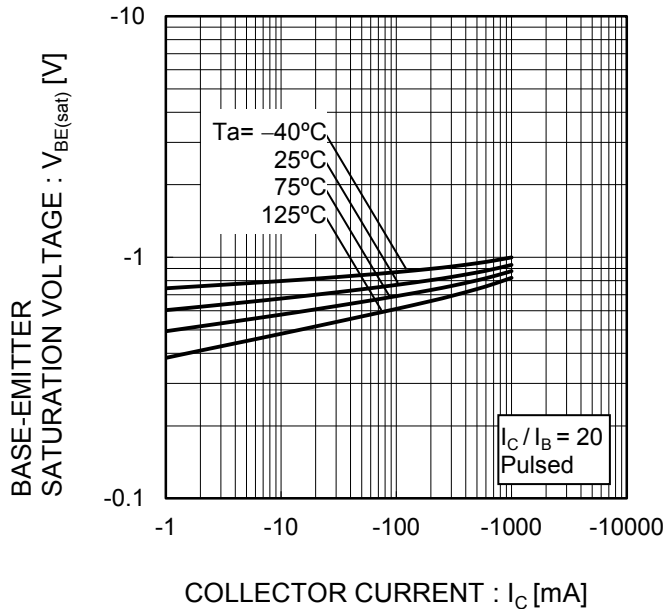
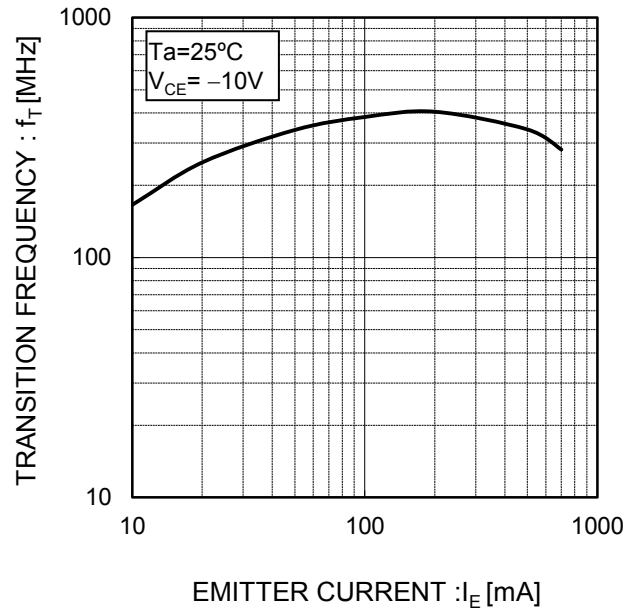


Fig.8 Gain Bandwidth Product vs. Emitter Current



●Electrical characteristic curves(Ta = 25°C)

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

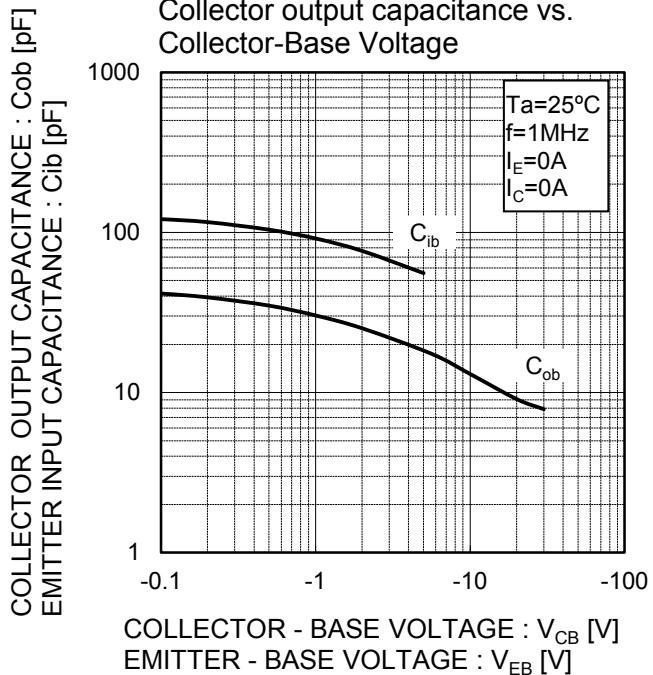
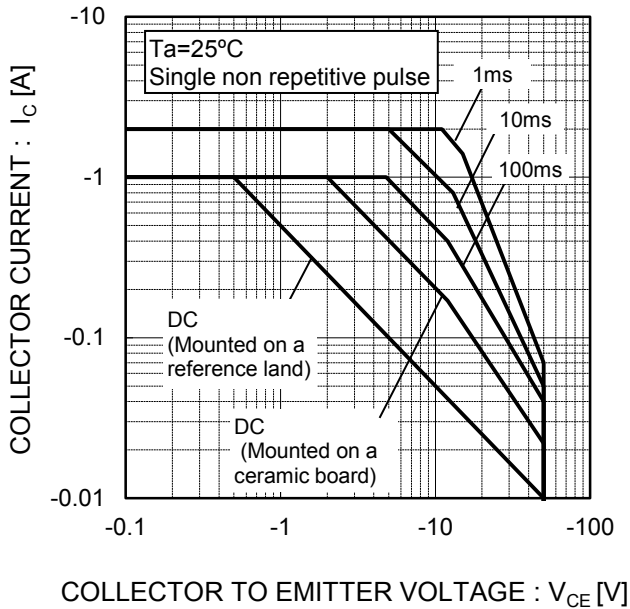
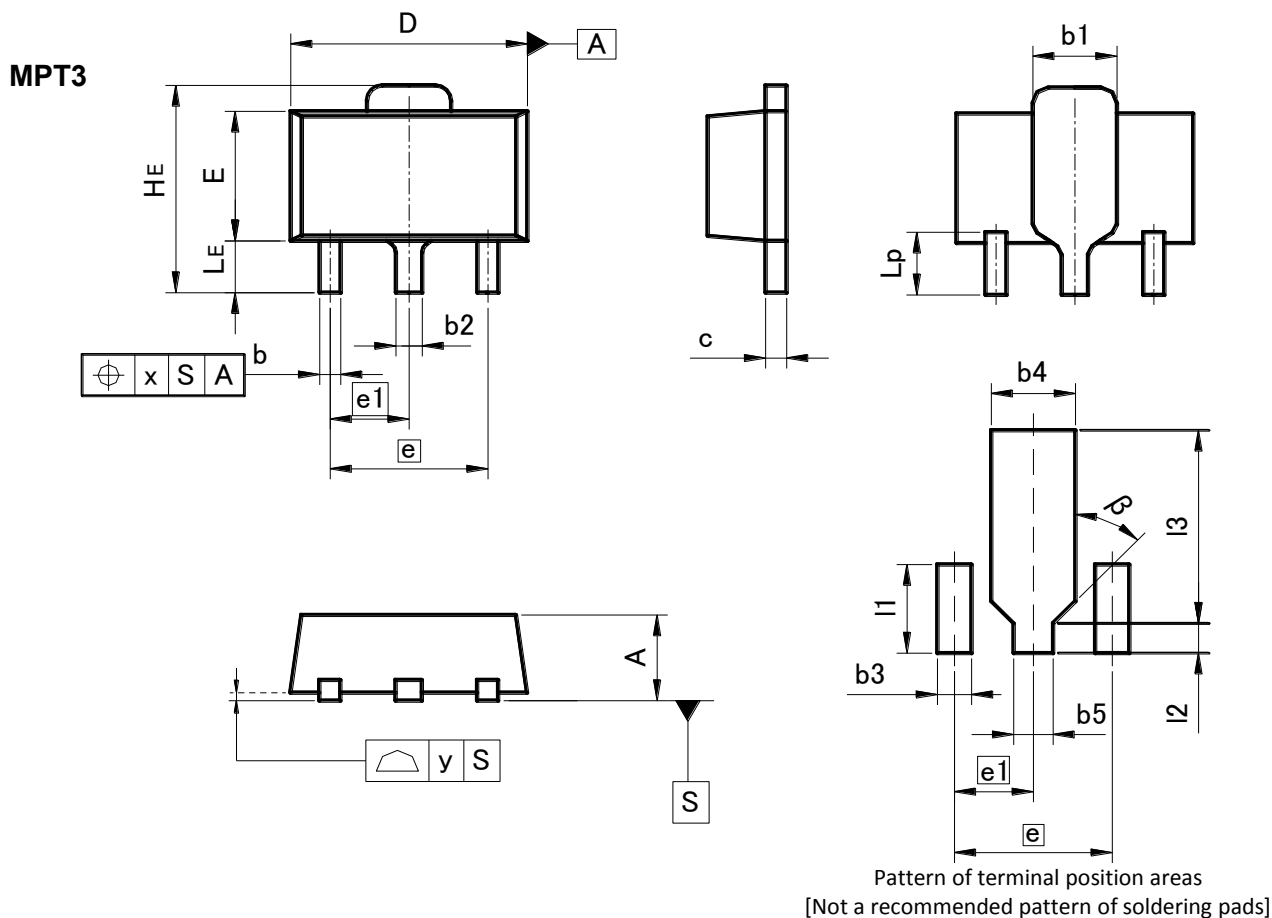


Fig.10 Safe Operating Area



●Dimensions (Unit : mm)



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.40	1.50	0.055	0.059
b	0.30	0.50	0.012	0.020
b1	1.50	1.70	0.059	0.067
b2	0.40	0.60	0.016	0.024
c	0.35	0.50	0.014	0.020
D	4.40	4.70	0.173	0.185
E	2.40	2.70	0.094	0.106
e	3.00		0.118	
e1	1.50		0.059	
HE	3.70	4.30	0.146	0.169
LE	0.80	1.20	0.031	0.047
Lp	1.01	1.41	0.040	0.056
x	-	0.15	-	0.006
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b3	-	0.65	-	0.026
b4	-	1.70	-	0.067
b5	-	0.75	-	0.030
I1	-	1.71	-	0.067
I2	-	0.58	-	0.023
I3	-	3.72	-	0.146
β	45°		45°	

Dimension in mm / inches

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