

# High-voltage Switching Transistor (-400V, -0.5A)

## 2SA1812 / 2SA1727 / 2SA1776

### ●Features

- 1) High breakdown voltage,  $BV_{CEO} = -400V$ .
- 2) Low saturation voltage, typically  $V_{CE(sat)} = -0.3V$  at  $I_C / I_B = -100mA / -10mA$ .
- 3) High switching speed, typically  $t_f : 1\mu s$  at  $I_C = -100mA$ .
- 4) Wide SOA (safe operating area).

### ●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		$I_C$	-0.5	A (DC)
			-1.0	A (Pulse) *1
Collector power dissipation	2SA1812	$P_C$	0.5	W
			2	W *2
	2SA1727		1	W
			10	W (Tc=25°C)
2SA1776	1	W *3		
Junction temperature		$T_j$	150	°C
Storage temperature		$T_{stg}$	-55 to +150	°C

\*1 Single pulse \*2 When mounted on a 40×40×0.7mm ceramic board.

\*3 When  $t = 1.7mm$  and the foil collector area on the PC board is  $1cm^2$  or greater.

### ●Packaging specifications and hFE

Type	2SA1812	2SA1727	2SA1776
Package	MPT3	CPT3	ATV
hFE	PQ	PQ	PQ
Marking	AJ*	—	—
Code	T100	TL	TV2
Basic ordering unit (pieces)	3000	3000	2500

\* Denotes hFE

### ●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	-400	—	—	V	$I_C = -50\mu A$
Collector-emitter breakdown voltage	$BV_{CEO}$	-400	—	—	V	$I_C = -1mA$
Emitter-base breakdown voltage	$BV_{EBO}$	-7	—	—	V	$I_E = -50\mu A$
Collector cutoff current	$I_{CBO}$	—	—	-10	$\mu A$	$V_{CB} = -400V$
Emitter cutoff current	$I_{EBO}$	—	—	-10	$\mu A$	$V_{EB} = -6V$
DC current transfer ratio	hFE	82	150	270	—	$V_{CE} = -5V, I_C = 50mA$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	-1	V	$I_C / I_B = -100mA / -10mA$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	-1.2	V	$I_C / I_B = -100mA / -10mA$
Transition frequency	$f_T$	—	12	—	MHz	$V_{CB} = -5V, I_E = 50mA, f = 5MHz$
Output capacitance	$C_{ob}$	—	18	—	pF	$V_{CE} = -10V, I_E = 0A, f = 1MHz$
Turn-on time	$t_{on}$	—	0.6	—	$\mu s$	$I_C = -100mA, R_L = 1.5k\Omega$ $I_{B1} = -I_{B2} = -10mA$ $V_{CC} \underline{to} -150V$
Storage time	$t_{stg}$	—	2.7	—	$\mu s$	
Fall time	$t_f$	—	1	—	$\mu s$	

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● Electrical characteristic curves

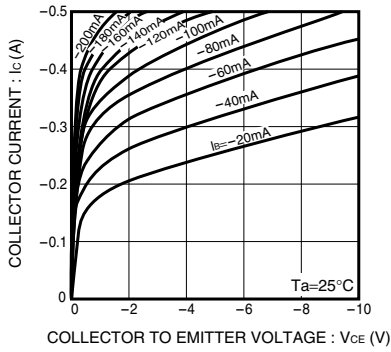


Fig.1 Grouded emitter output characteristics

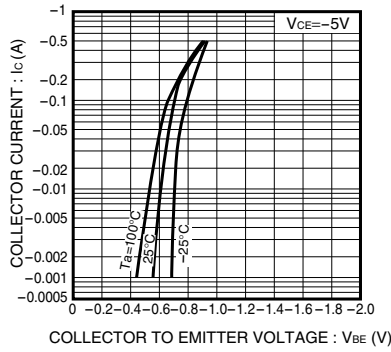


Fig.2 Grouded emitter propagation characteristics

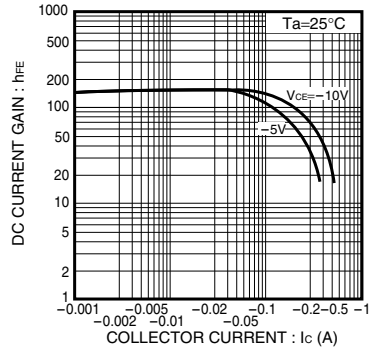


Fig.3 DC current gain vs. collector current (I)

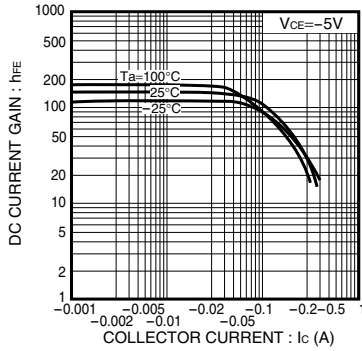


Fig.4 DC current gain vs. collector current (II)

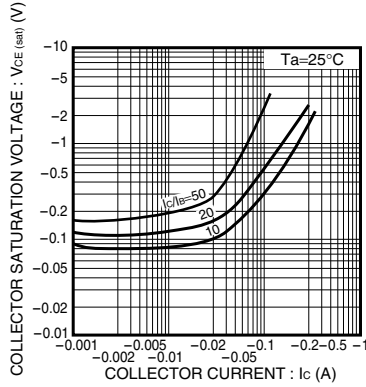


Fig.5 Collector-emitter saturation voltage vs. collector current

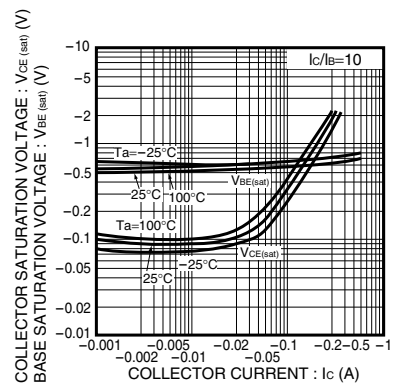


Fig.6 Collector-emitter saturation voltage vs. collector current Base-emitter saturation voltage vs. collector current

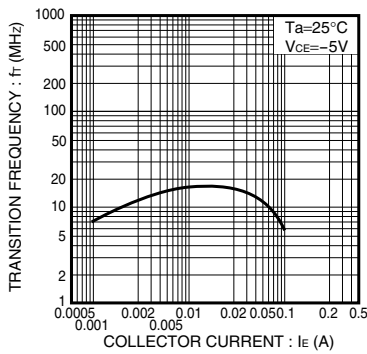


Fig.7 TRANSITION FREQUENCY vs. EMITTER CURRENT

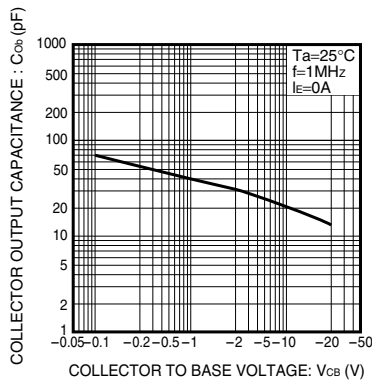


Fig.8 Collector output capacitance vs. collector-base voltage

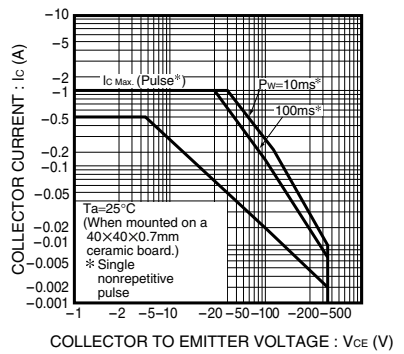


Fig.9 Safe operating area (2SA1812)

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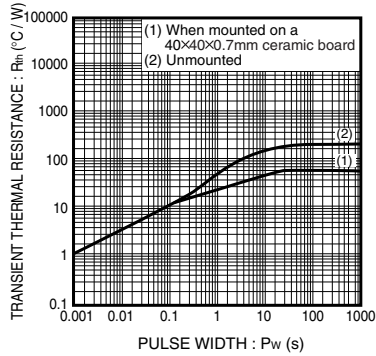


Fig.10 TRANSIENT THERMAL RESISTANCE (2SA1812)

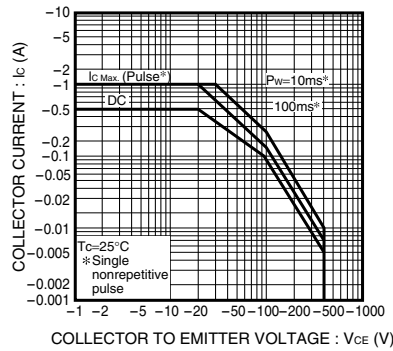


Fig.11 Safe operating area (2SA1727)

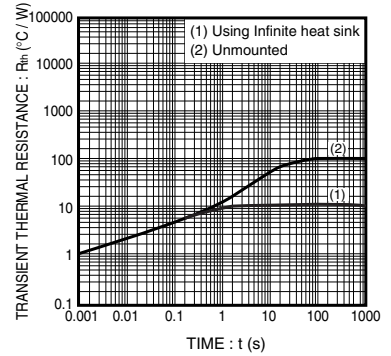


Fig.12 TRANSIENT THERMAL RESISTANCE (2SA1727)

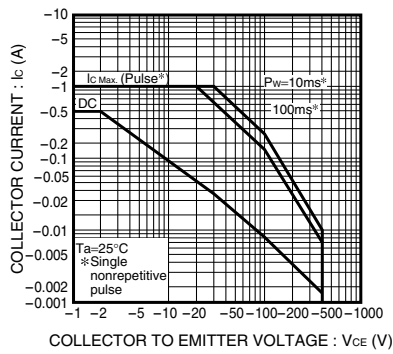


Fig.13 Safe operating area (2SA1776)

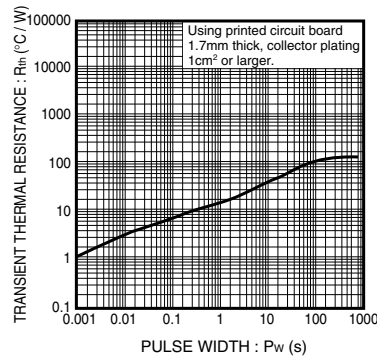


Fig.14 TRANSIENT THERMAL RESISTANCE (2SA1776)

●Switching characteristic measurement circuit

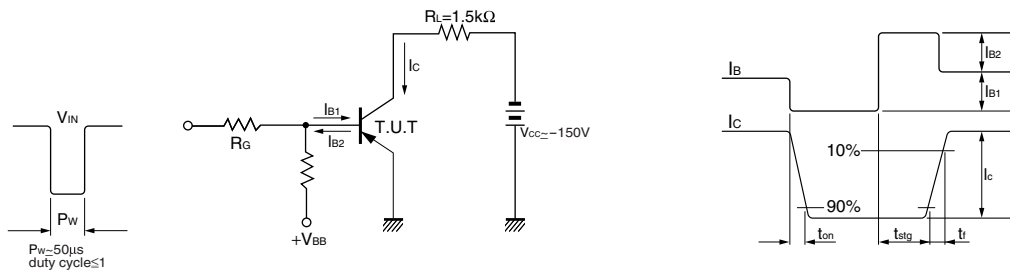


Fig.15 Switching characteristic measurement circuit

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