

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 ($T_a = 25^\circ C$)

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 ($T_c=25^{\circ}C$)
	2SA1776		1	W *3
Junction temperature		T_j	150	$^{\circ}C$
Storage temperature		T_{stg}	−55 to +150	$^{\circ}C$

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

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

●Packaging specifications and h_{FE}

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

* Denotes h_{FE}

●Electrical characteristics ($T_a = 25^\circ C$)

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	μA	$V_{CB} = -400V$
Emitter cutoff current	I_{EBO}	—	—	−10	μA	$V_{EB} = -6V$
DC current transfer ratio	h_{FE}	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	—	μs	$I_C = -100mA, R_L = 1.5k\Omega$ $I_{B1} = -I_{B2} = -10mA$ $V_{CC} \rightarrow -150V$
Storage time	t_{stg}	—	2.7	—	μs	
Fall time	t_f	—	1	—	μs	

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● Electrical characteristic curves

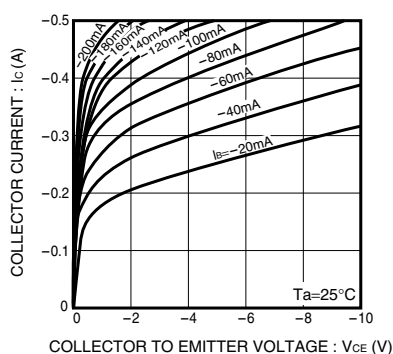


Fig.1 Grouded emitter output characteristics

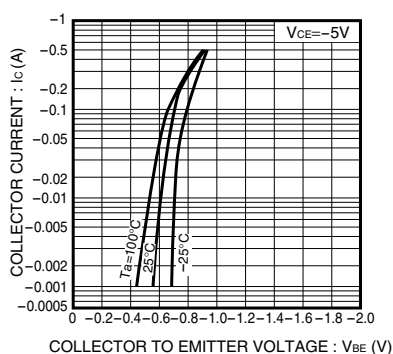


Fig.2 Grouded emitter propagation characteristics

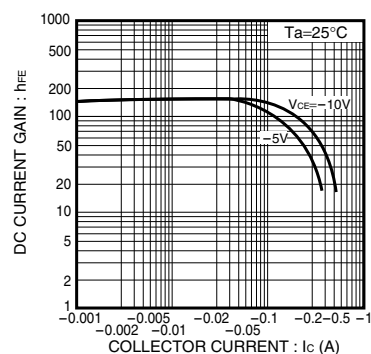


Fig.3 DC current gain vs. collector current (I)

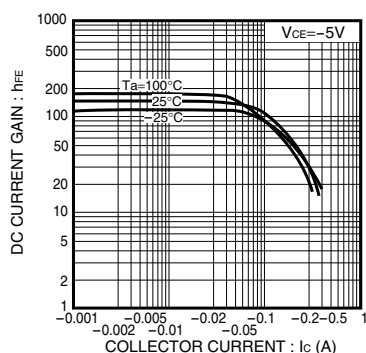


Fig.4 DC current gain vs. collector current (II)

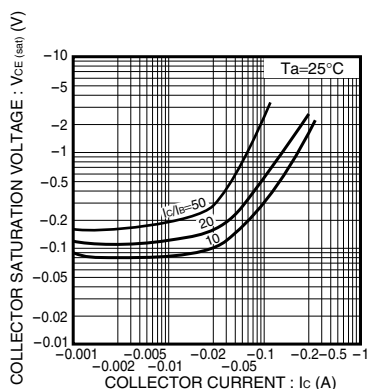


Fig.5 Collector-emitter saturation voltage vs. collector current

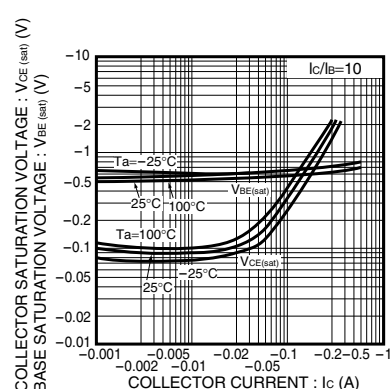


Fig.6 Collector-emitter saturation voltage vs. collector current Base-emitter saturation voltage vs. collector current

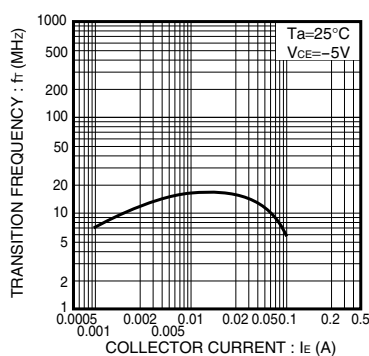


Fig.7 TRANSITION FREQUENCY vs. EMITTER CURRENT

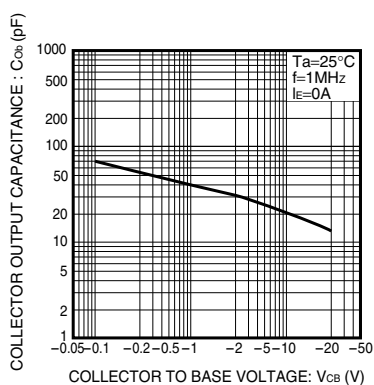


Fig.8 Collector output capacitance vs. collector-base voltage

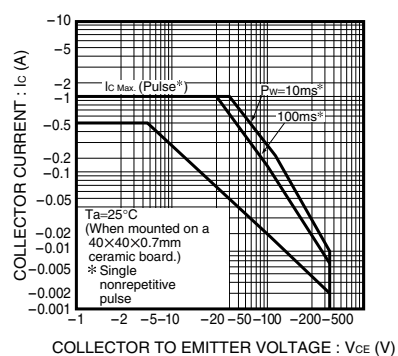


Fig.9 Safe operating area (2SA1812)

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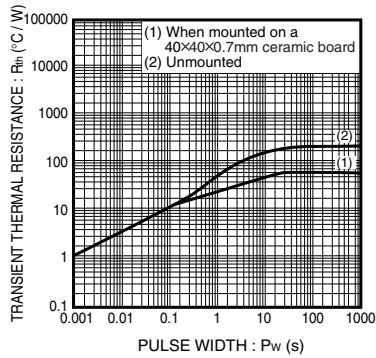


Fig.10 TRANSIENT THERMAL RESISTANCE (2SA1812)

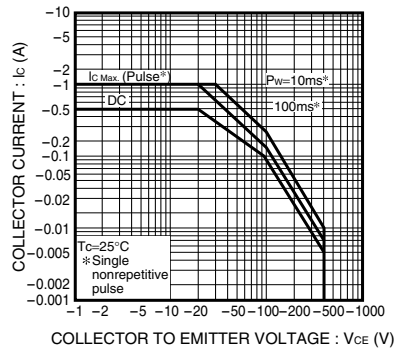


Fig.11 Safe operating area (2SA1727)

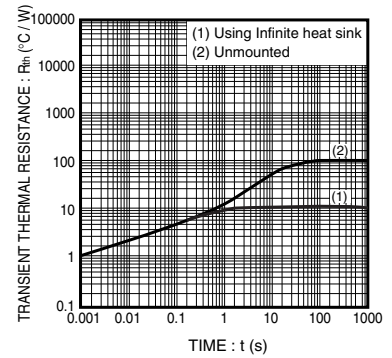


Fig.12 TRANSIENT THERMAL RESISTANCE (2SA1727)

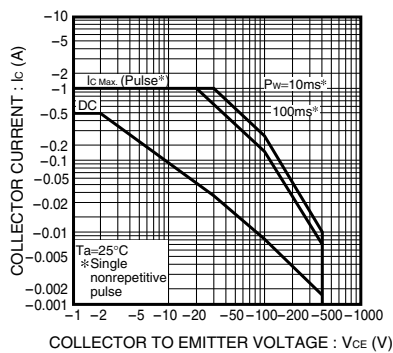


Fig.13 Safe operating area (2SA1776)

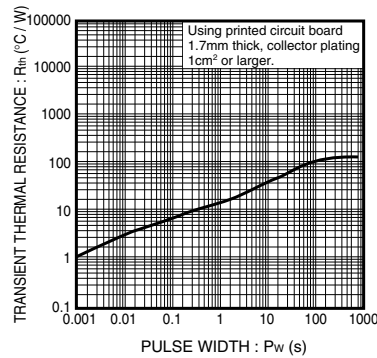


Fig.14 TRANSIENT THERMAL RESISTANCE (2SA1776)

●Switching characteristic measurement circuit

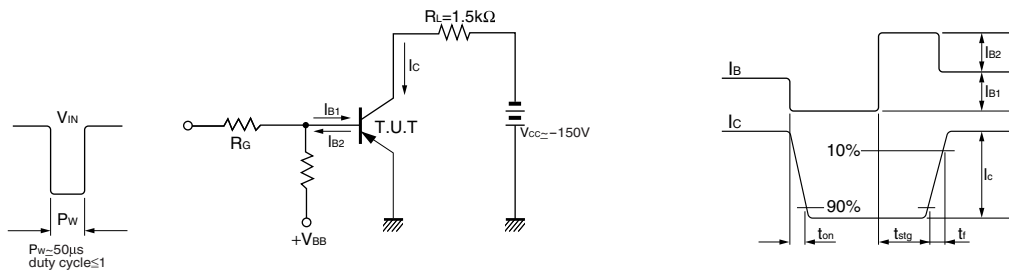


Fig.15 Switching characteristic measurement circuit

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