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 tf : 1μs 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		Tj	150	°C
Storage temperature		Tstg	−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 1cm² 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 (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV_{CBO}	−400	—	—	V	I_C = − 50μA
Collector-emitter breakdown voltage	BV_{CEO}	−400	—	—	V	I_C = − 1mA
Emitter-base breakdown voltage	BV_{EBO}	−7	—	—	V	I_E = − 50μA
Collector cutoff current	I_{CBO}	—	—	−10	μA	V_{CB} = − 400V
Emitter cutoff current	I_{EBO}	—	—	−10	μA	V_{EB} = − 6V
DC current tranfer 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	Cob	—	18	—	pF	V_{CE} = − 10V , I_E = 0A , f = 1MHz
Turn-on time	t_{on}	—	0.6	—	μs	I_C = −100mA, R_L=1.5kΩ I_{B1} = − I_{B2} = −10mA V_{CC} to −150V
Storage time	t_{stg}	—	2.7	—	μs	
Fall time	t_f	—	1	—	μs	

● **Electrical characteristic curves**

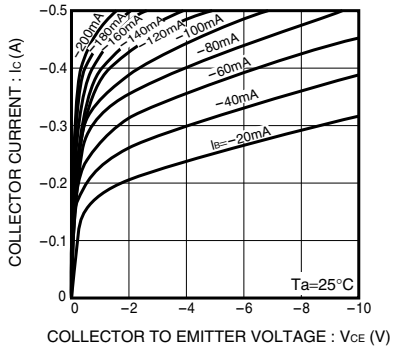


Fig.1 Grouded emitter output characteristics

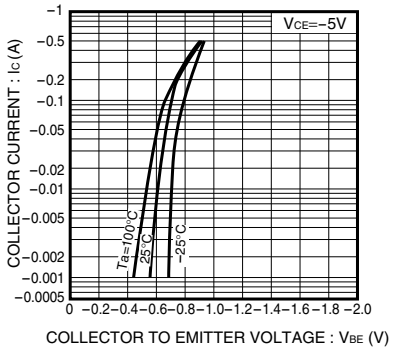


Fig.2 Grounded emitter propagation characteristics

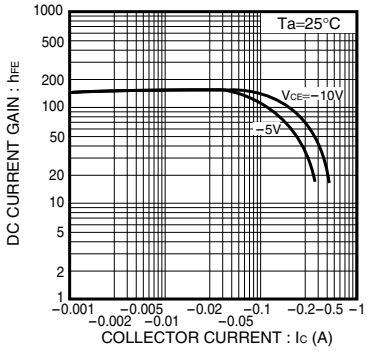


Fig.3 DC current gain vs. collector current (I)

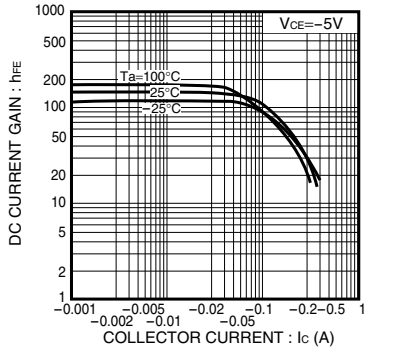


Fig.4 DC current gain vs. collector current (II)

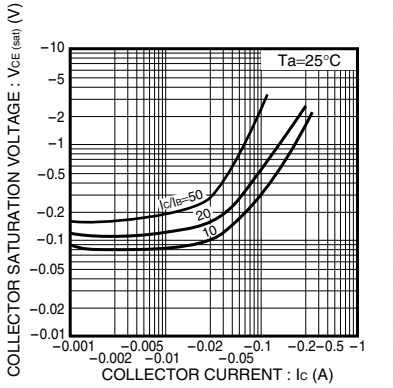


Fig.5 Collector-emitter saturation voltage vs. collector current

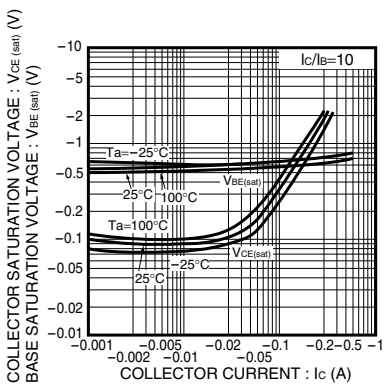


Fig.6 Collector-emitter saturation voltage vs. collector current Base-emitter saturation voltage vs. collector current

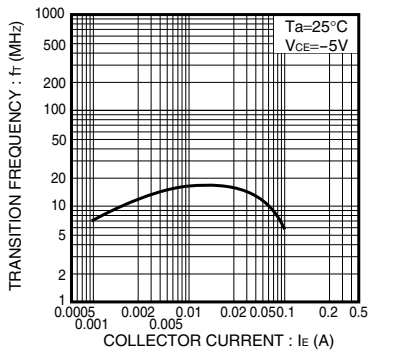


Fig.7 TRANSITION FREQUENCY vs. EMITTER CURRENT

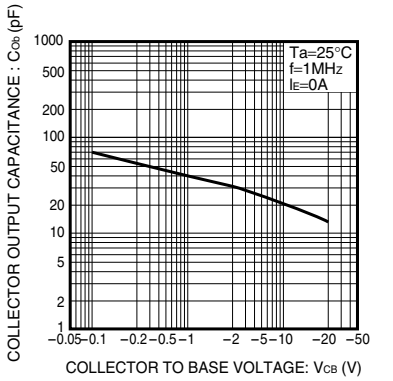


Fig.8 Collector output capacitance vs. collector-base voltage

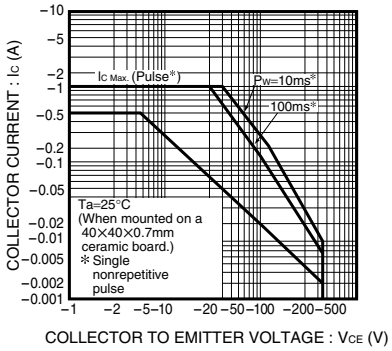


Fig.9 Safe operating area (2SA1812)

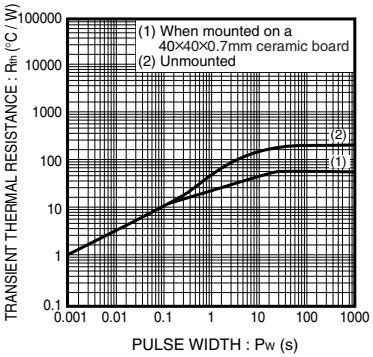


Fig.10 TRANSIENT THERMAL RESISTANCE (2SA1812)

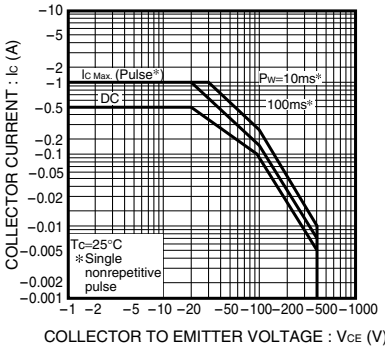


Fig.11 Safe operating area (2SA1727)

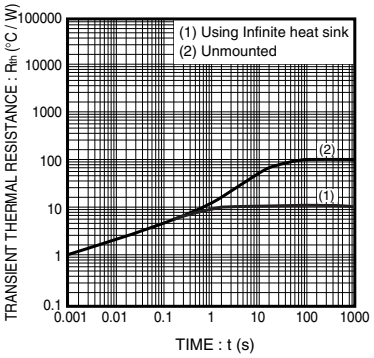


Fig.12 TRANSIENT THERMAL RESISTANCE (2SA1727)

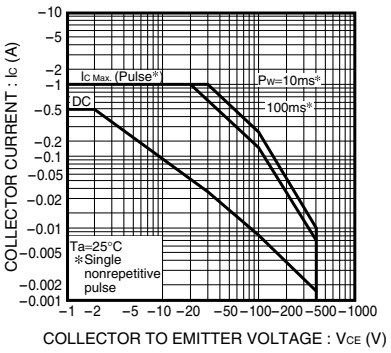


Fig.13 Safe operating area (2SA1776)

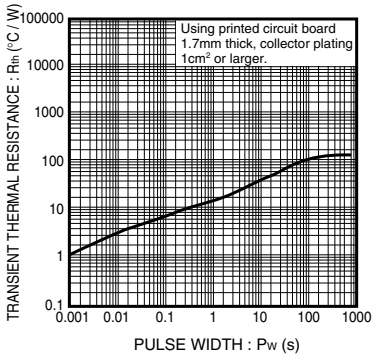


Fig.14 TRANSIENT THERMAL RESISTANCE (2SA1776)

●Switching characteristic measurement circuit

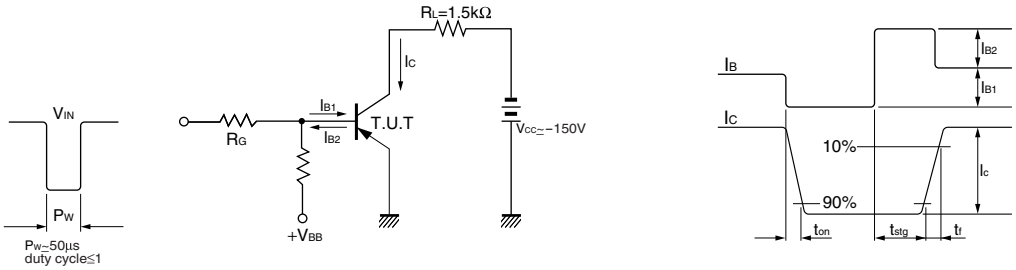


Fig.15 Switching characteristic measurement circuit

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