XN09D61

Silicon PNP epitaxial planar type (Tr)
Silicon epitaxial planar type (SBD)

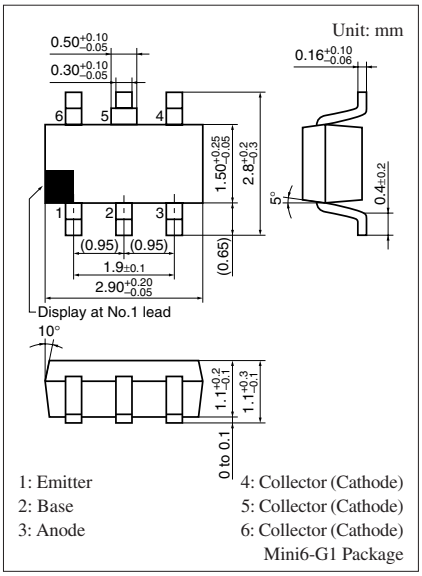
For DC-DC converter

■ Features

- Two elements incorporated into one package (Tr + SBD)
- Reduction of the mounting area and assembly cost by one half
- Low collector-emitter saturation voltage $V_{CE(sat)}$

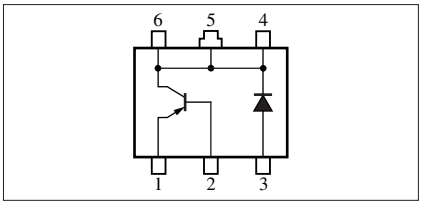
■ Basic Part Number

- 2SA2046 + MA3ZD12



Marking Symbol: RA

Internal Connection



■ Absolute Maximum Ratings $T_a = 25°C$

Parameter		Symbol	Rating	Unit
Tr	Collector-base voltage (Emitter open)	V_{CBO}	−15	V
	Collector-emitter voltage (Base open)	V_{CEO}	−15	V
	Emitter-base voltage (Collector open)	V_{EBO}	−5	V
	Collector current	I_C	−1.5	A
	Peak collector current	I_{CP}	−3	A
SBD	Reverse voltage	V_R	20	V
	Repetitive peak reverse voltage	V_{RRM}	25	V
	Forward current (Average)	$I_{F(AV)}$	700	mA
	Non-repetitive peak forward surge current	I_{FSM}	2	A
Overall	Total power dissipation *	P_T	600	mW
	Junction temperature	T_j	125	°C
	Storage temperature	T_{stg}	−55 to +125	°C

Note) ∗: Measuring on ceramic substrate at 15 mm × 15 mm × 0.6 mm

■ Electrical Characteristics $T_a = 25°C \pm 3°C$

- Tr

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	V_{CBO}	$I_C = -10$ µA, $I_E = 0$	−15			V
Collector-emitter voltage (Base open)	V_{CEO}	$I_C = -1$ mA, $I_B = 0$	−15			V
Emitter-base voltage (Collector open)	V_{EBO}	$I_E = -10$ µA, $I_C = 0$	−5			V
Collector-base cutoff current (Emitter open)	I_{CBO}	$V_{CB} = -10$ V, $I_E = 0$			− 0.1	µA
Forward current transfer ratio *	h_{FE}	$V_{CE} = -2$ V, $I_C = -100$ mA	160		560	—
Collector-emitter saturation voltage *	$V_{CE(sat)}$	$I_C = -750$ mA, $I_B = -15$ mA		−90	−200	mV
		$I_C = -1.5$ A, $I_B = -50$ mA		−130		

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.
2. ∗: Pulse measurement

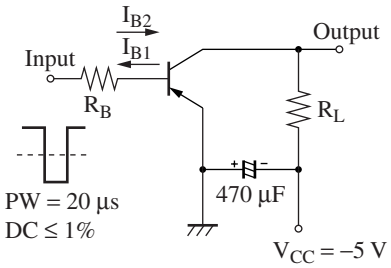
■ Electrical Characteristics (continued) $T_a = 25°C \pm 3°C$

• Tr (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector output capacitance (Common base, input open circuited)	C_{ob}	$V_{CB} = -10$ V, $I_E = 0$, f = 1 MHz		25	35	pF
Transition frequency	f_T	$V_{CB} = -2$ V, $I_E = 100$ mA, f = 200 MHz		270		MHz
Turn-on time	t_{on}	Refer to the switching time measurement circuit		25		ns
Storage time	t_{stg}			70		ns
Turn-off time	t_{off}			15		ns

Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Switching time measurement circuit



$-20I_{B1} = 20I_{B2} = I_C = -750$ mA

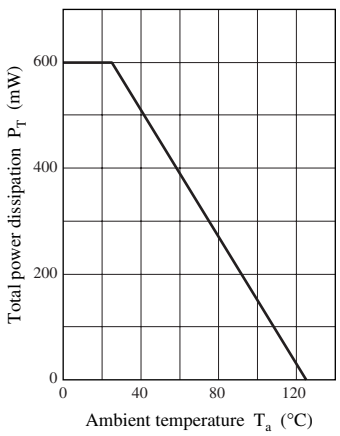
• SBD

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Forward voltage	V_F	$I_F = 700$ mA			0.45	V
Reverse current	I_R	$V_R = 20$ V			200	µA
Terminal capacitance	C_t	$V_R = 0$, f = 1 MHz		100		pF
Reverse recovery time	t_{rr}	$I_F = I_R = 100$ mA, $I_{rr} = 10$ mA, $R_L = 100\ \Omega$		7		ns

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7031 Measuring methods for diodes.
2. Schottky barrier diode is frail with static electricity, and it should be kept in safety from shock of static electricity and static electricity level.

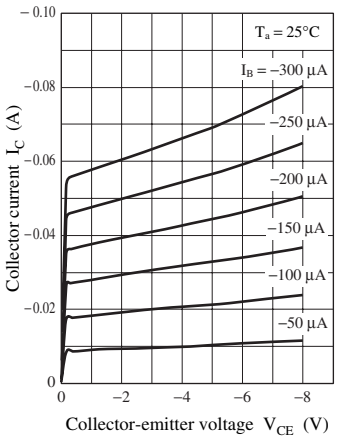
Common characteristics chart

P_T — T_a

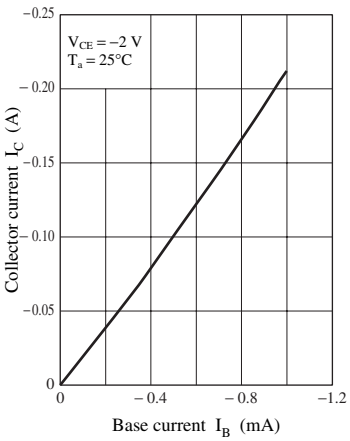


Characteristics charts of Tr

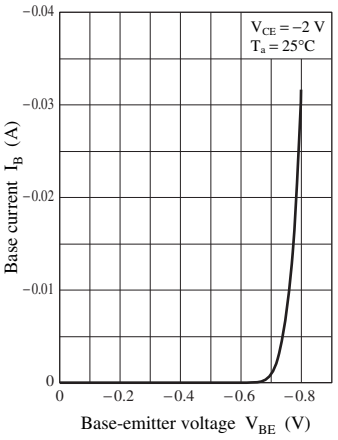
I_C — V_{CE}



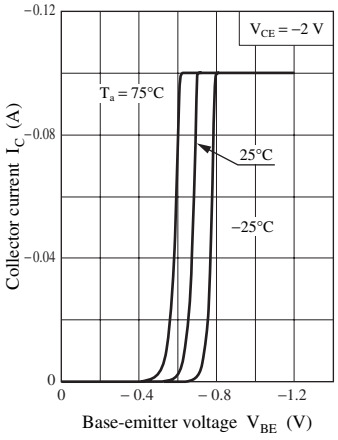
I_C — I_B



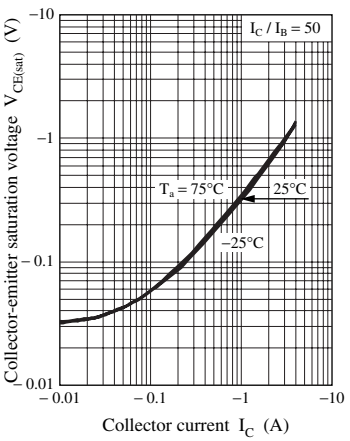
I_B — V_{BE}



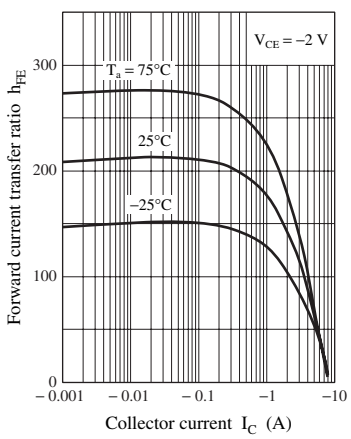
I_C — V_{BE}



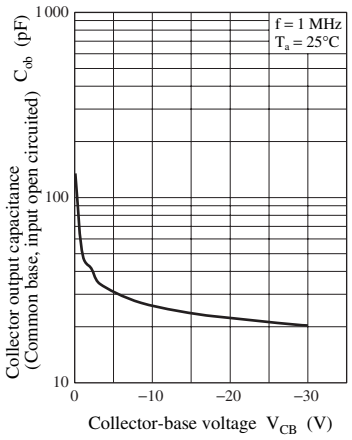
$V_{CE(sat)}$ — I_C



h_{FE} — I_C

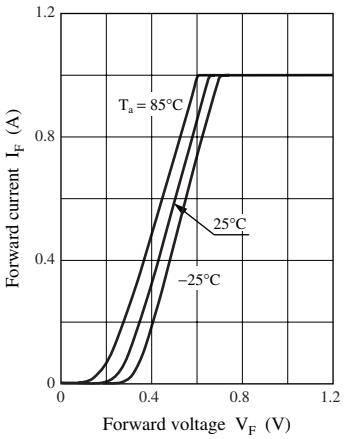


C_{ob} — V_{CB}

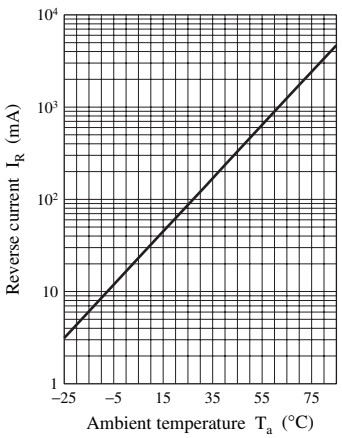


Characteristics charts of SBD

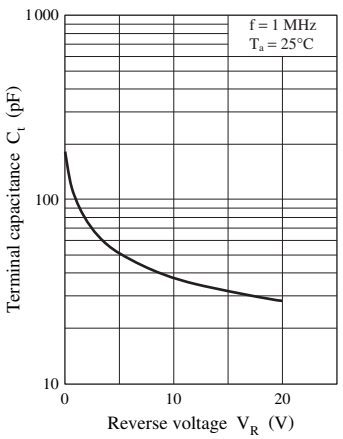
I_F — V_F



I_R — T_a



C_t — V_R



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