This product complies with the RoHS Directive (EU 2002/95/EC).

UP03397G

Silicon NPN epitaxial planar type (Tr1)
Silicon PNP epitaxial planar type (Tr2)

For digital circuits

■ Features

- Two elements incorporated into one package (Transistors with built-in resistor)
- Reduction of the mounting area and assembly cost by one half

■ Basic Part Number

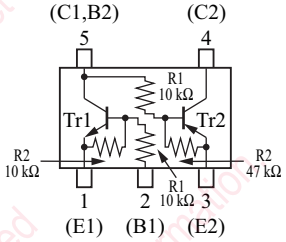
- UNR2154 + UNR2211

■ Package

- Code
  SSMini5-F3
- Pin Name
  1: Emitter (Tr1) 4: Collector (Tr2)
  2: Base (Tr1) 5: Collector (Tr1)
  3: Emitter (Tr2) Base (Tr2)

■ Marking Symbol: 3M

■ Internal Connection



■ Absolute Maximum Ratings $T_a = 25°C$

Parameter		Symbol	Rating	Unit
Tr1	Collector-base voltage (Emitter open)	V_{CBO}	50	V
	Collector-emitter voltage (Base open)	V_{CEO}	50	V
	Collector current	I_C	100	mA
Tr2	Collector-base voltage (Emitter open)	V_{CBO}	–30	V
	Collector-emitter voltage (Base open)	V_{CEO}	–30	V
	Collector current	I_C	–100	mA
Overall	Total power dissipation	P_T	125	mW
	Junction temperature	T_j	125	°C
	Storage temperature	T_{stg}	–55 to +125	°C

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

- Tr1

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	V_{CBO}	$I_C = 10\ \mu A$, $I_E = 0$	50			V
Collector-emitter voltage (Base open)	V_{CEO}	$I_C = 2$ mA, $I_B = 0$	50			V
Collector-base cutoff current (Emitter open)	I_{CBO}	$V_{CB} = 50$ V, $I_E = 0$			0.1	μA
Collector-emitter cutoff current (Base open)	I_{CEO}	$V_{CE} = 50$ V, $I_B = 0$			0.5	μA
Emitter-base cutoff current (Collector open)	I_{EBO}	$V_{EB} = 6$ V, $I_C = 0$			0.5	mA
Forward current transfer ratio	h_{FE}	$V_{CE} = 10$ V, $I_C = 5$ mA	35			—
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 10$ mA, $I_B = 0.3$ mA			0.25	V
Output voltage high-level	V_{OH}	$V_{CC} = 5$ V, $V_B = 0.5$ V, $R_L = 1$ kΩ	4.9			V
Output voltage low-level	V_{OL}	$V_{CC} = 5$ V, $V_B = 2.5$ V, $R_L = 1$ kΩ			0.2	V
Input resistance	R_1		–30%	10	+30%	kΩ
Resistance ratio	R_1 / R_2		0.8	1.0	1.2	—
Transition frequency	f_T	$V_{CB} = 10$ V, $I_E = -2$ mA, $f = 200$ MHz		150		MHz

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

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• Tr2

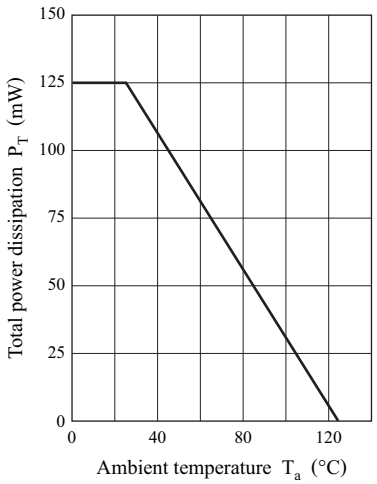
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	V_{CBO}	I_C = –10 µA, I_E = 0	–30			V
Collector-emitter voltage (Base open)	V_{CEO}	I_C = –2 mA, I_B = 0	–30			V
Collector-base cutoff current (Emitter open)	I_{CBO}	V_{CB} = –30 V, I_E = 0			– 0.1	µA
Collector-emitter cutoff current (Base open)	I_{CEO}	V_{CE} = –30 V, I_B = 0			– 0.5	µA
Emitter-base cutoff current (Collector open)	I_{EBO}	V_{EB} = –3 V, I_C = 0			– 0.1	mA
Forward current transfer ratio	h_{FE}	V_{CE} = –10 V, I_C = –5 mA	80			—
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = –50 mA, I_B = – 0.33 mA			–1.2	V
Output voltage high-level	V_{OH}	V_{CC} = –5 V, V_B = – 0.5 V, R_L = 1 kΩ	–4.9			V
Output voltage low-level	V_{OL}	V_{CC} = –5 V, V_B = –2.5 V, R_L = 1 kΩ			– 0.2	V
Input resistance	R_1		–30%	10	+30%	kΩ
Resistance ratio	R_1 / R_2			0.213		—
Transition frequency	f_T	V_{CB} = –10 V, I_E = 1 mA, f = 200 MHz		80		MHz

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

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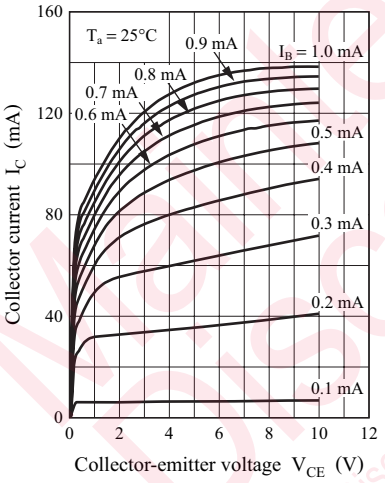
Common characteristics chart

P_T — T_a

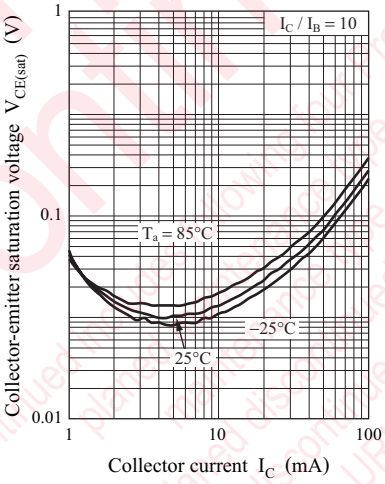


Characteristics charts of Tr1

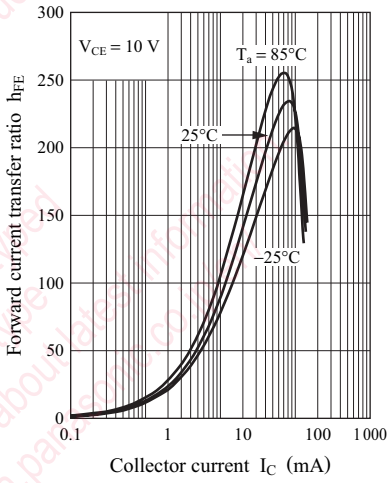
I_C — V_{CE}



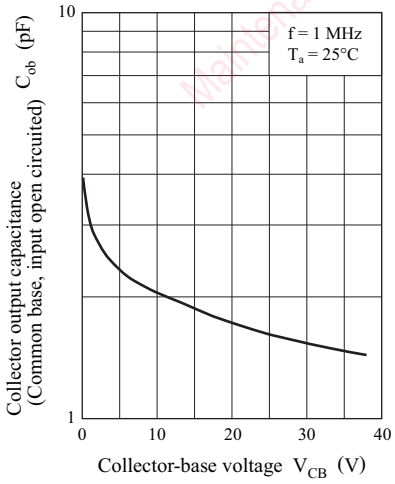
$V_{CE(sat)}$ — I_C



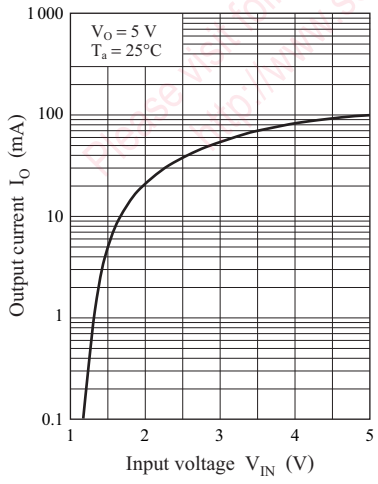
h_{FE} — I_C



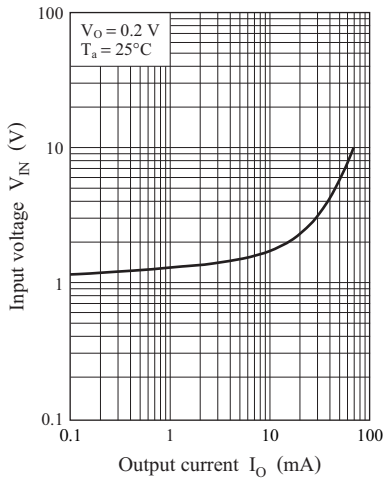
C_{ob} — V_{CB}



I_O — V_{IN}



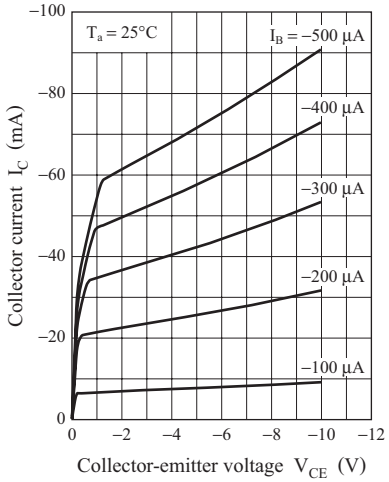
V_{IN} — I_O



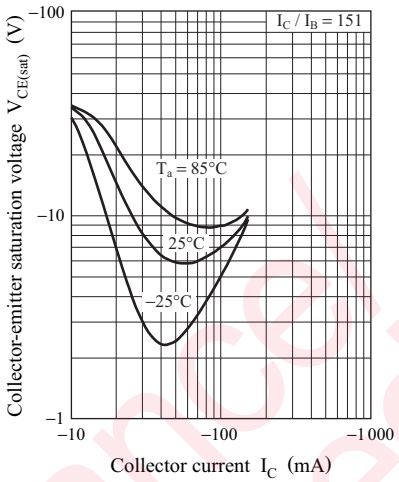
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Characteristics charts of Tr2

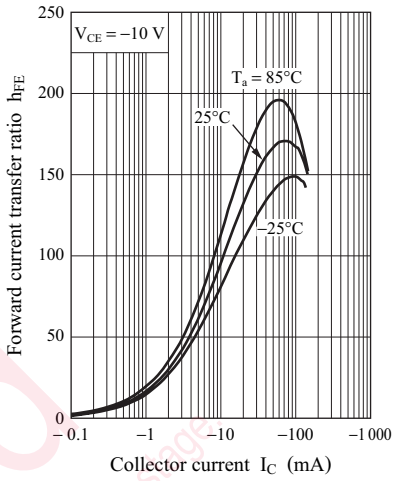
I_C — V_{CE}



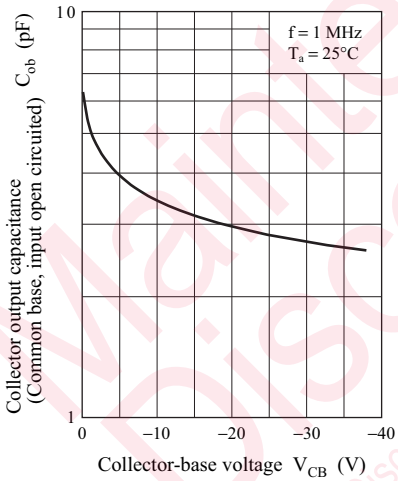
$V_{CE(sat)}$ — I_C



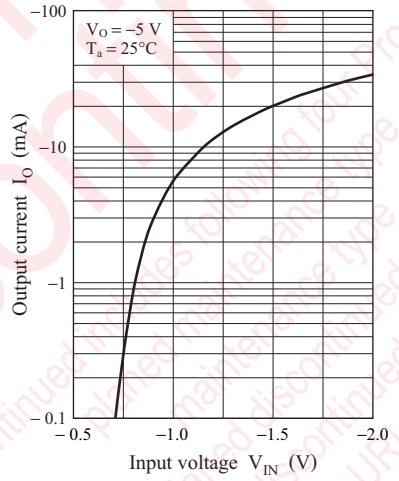
h_{FE} — I_C



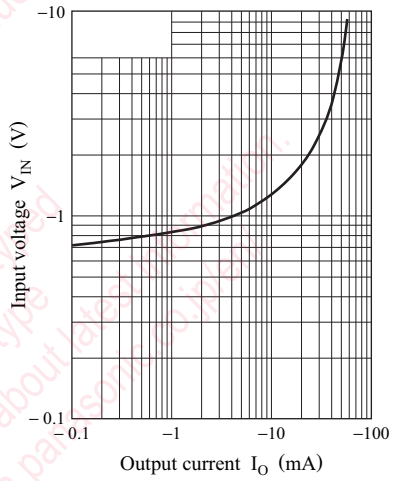
C_{ob} — V_{CB}



I_O — V_{IN}



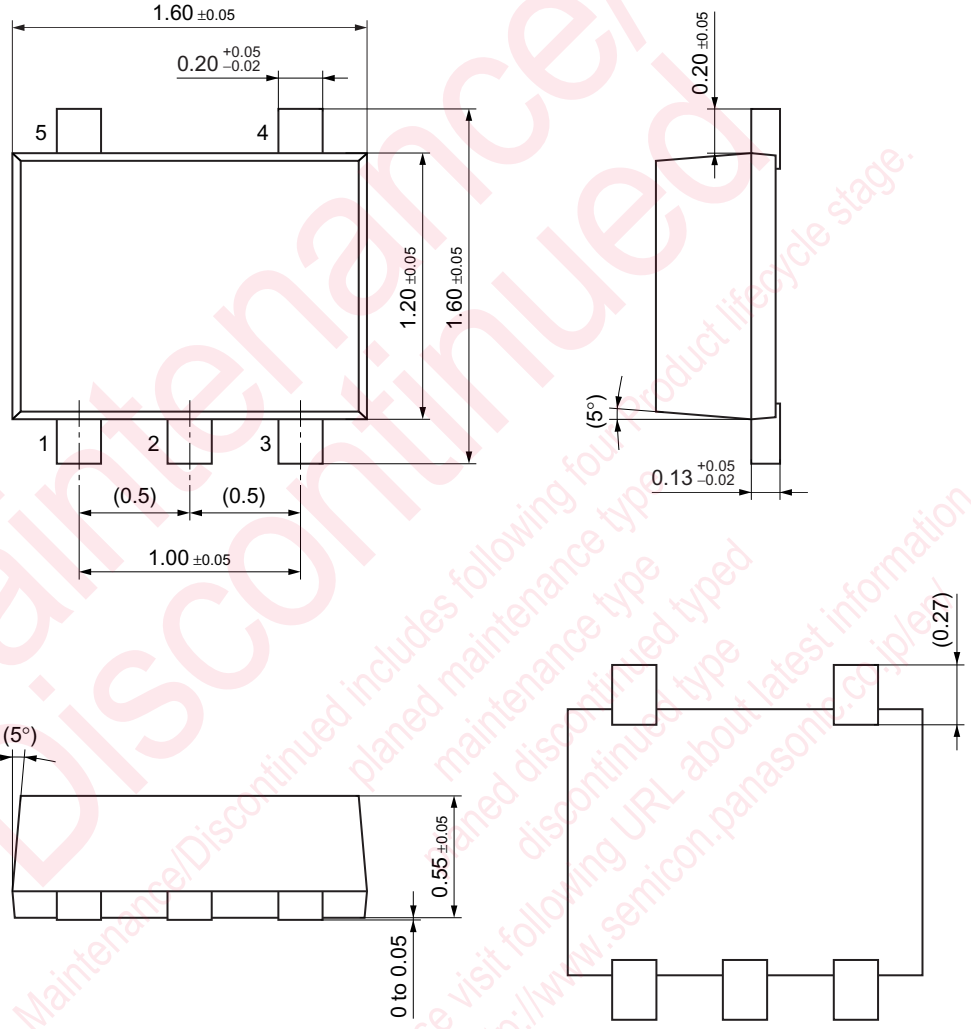
V_{IN} — I_O



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SSMini5-F3

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