

# UP03312

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

For digital circuits

## ■ Features

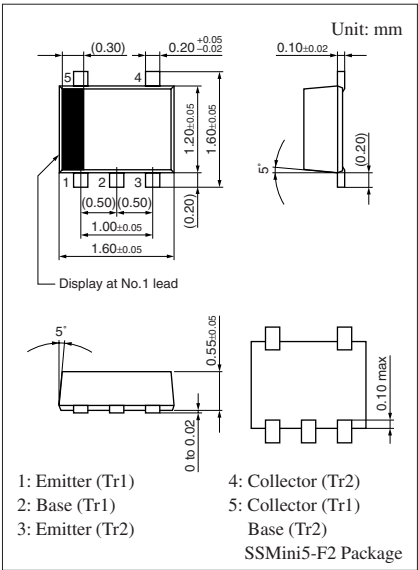
- Two elements incorporated into one package  
(Transistors with built-in resistor)
- Reduction of the mounting area and assembly cost by one half

## ■ Basic Part Number

- UNR1112 + UNR1212

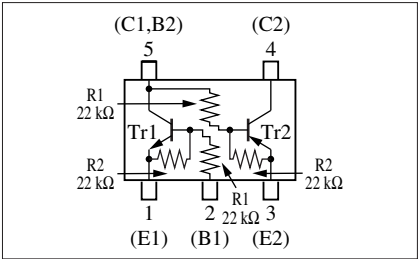
## ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

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)	$V_{CBO}$	-50	V
	Collector-emitter voltage (Base open)	$V_{CEO}$	-50	V
	Collector current	$I_C$	-100	mA
Overall	Total power dissipation	$P_T$	125	mW
	Junction temperature	$T_j$	125	$^\circ\text{C}$
	Storage temperature	$T_{stg}$	-55 to +125	$^\circ\text{C}$



Marking Symbol: 4P

Internal Connection



# ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

## • Tr1

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	$V_{\text{CBO}}$	$I_{\text{C}} = 10\ \mu\text{A}$ , $I_{\text{E}} = 0$	50			V
Collector-emitter voltage (Base open)	$V_{\text{CEO}}$	$I_{\text{C}} = 2\ \text{mA}$ , $I_{\text{B}} = 0$	50			V
Collector-base cutoff current (Emitter open)	$I_{\text{CBO}}$	$V_{\text{CB}} = 50\ \text{V}$ , $I_{\text{E}} = 0$			0.1	$\mu\text{A}$
Collector-emitter cutoff current (Base open)	$I_{\text{CEO}}$	$V_{\text{CE}} = 50\ \text{V}$ , $I_{\text{B}} = 0$			0.5	$\mu\text{A}$
Emitter-base cutoff current (Collector open)	$I_{\text{EBO}}$	$V_{\text{EB}} = 6\ \text{V}$ , $I_{\text{C}} = 0$			0.2	mA
Forward current transfer ratio	$h_{\text{FE}}$	$V_{\text{CE}} = 10\ \text{V}$ , $I_{\text{C}} = 5\ \text{mA}$	60			—
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}$	$I_{\text{C}} = 10\ \text{mA}$ , $I_{\text{B}} = 0.3\ \text{mA}$			0.25	V
Output voltage high-level	$V_{\text{OH}}$	$V_{\text{CC}} = 5\ \text{V}$ , $V_{\text{B}} = 0.5\ \text{V}$ , $R_{\text{L}} = 1\ \text{k}\Omega$	4.9			V
Output voltage low-level	$V_{\text{OL}}$	$V_{\text{CC}} = 5\ \text{V}$ , $V_{\text{B}} = 2.5\ \text{V}$ , $R_{\text{L}} = 1\ \text{k}\Omega$			0.2	V
Input resistance	$R_{\text{I}}$		-30%	22	+30%	$\text{k}\Omega$
Resistance ratio	$R_{\text{I}} / R_{\text{2}}$		0.8	1.0	1.2	—
Transition frequency	$f_{\text{T}}$	$V_{\text{CB}} = 10\ \text{V}$ , $I_{\text{E}} = -2\ \text{mA}$ , $f = 200\ \text{MHz}$		150		MHz

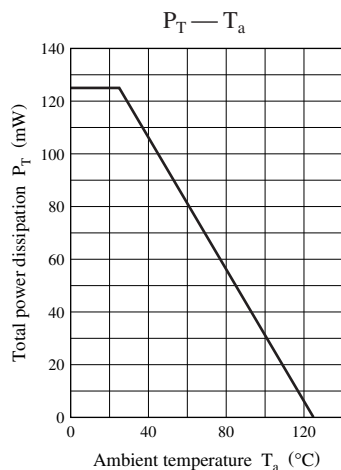
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

## • Tr2

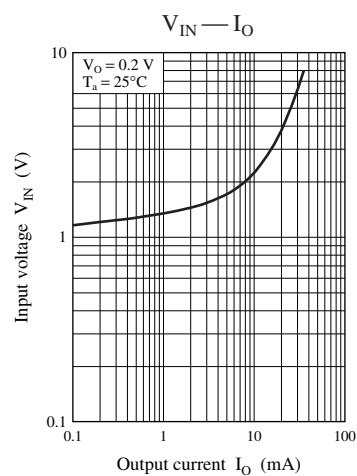
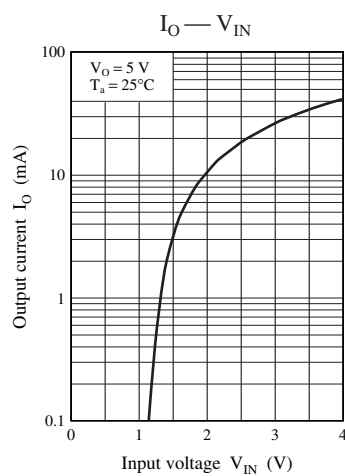
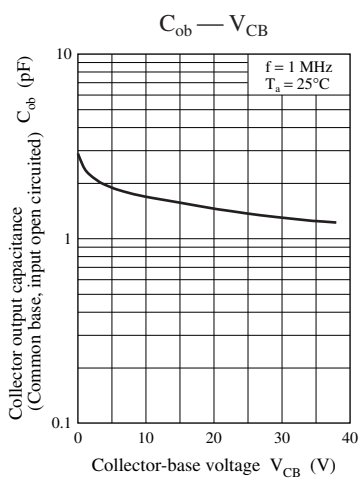
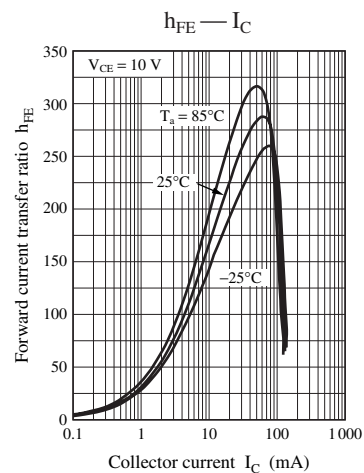
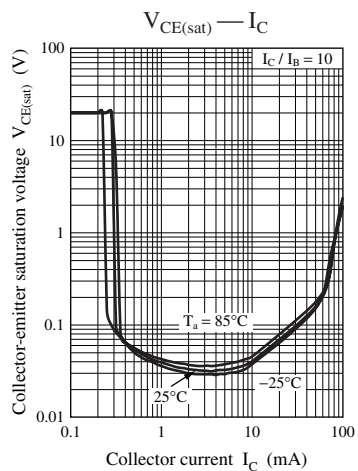
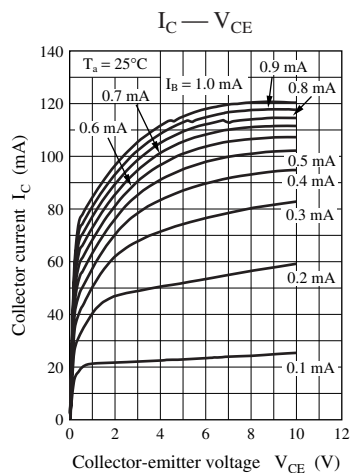
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	$V_{\text{CBO}}$	$I_{\text{C}} = -10\ \mu\text{A}$ , $I_{\text{E}} = 0$	-50			V
Collector-emitter voltage (Base open)	$V_{\text{CEO}}$	$I_{\text{C}} = -2\ \text{mA}$ , $I_{\text{B}} = 0$	-50			V
Collector-base cutoff current (Emitter open)	$I_{\text{CBO}}$	$V_{\text{CB}} = -50\ \text{V}$ , $I_{\text{E}} = 0$			-0.1	$\mu\text{A}$
Collector-emitter cutoff current (Base open)	$I_{\text{CEO}}$	$V_{\text{CE}} = -50\ \text{V}$ , $I_{\text{B}} = 0$			-0.5	$\mu\text{A}$
Emitter-base cutoff current (Collector open)	$I_{\text{EBO}}$	$V_{\text{EB}} = -6\ \text{V}$ , $I_{\text{C}} = 0$			-0.2	mA
Forward current transfer ratio	$h_{\text{FE}}$	$V_{\text{CE}} = -10\ \text{V}$ , $I_{\text{C}} = -5\ \text{mA}$	60			—
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}$	$I_{\text{C}} = -10\ \text{mA}$ , $I_{\text{B}} = -0.3\ \text{mA}$			-0.25	V
Output voltage high-level	$V_{\text{OH}}$	$V_{\text{CC}} = -5\ \text{V}$ , $V_{\text{B}} = -0.5\ \text{V}$ , $R_{\text{L}} = 1\ \text{k}\Omega$	-4.9			V
Output voltage low-level	$V_{\text{OL}}$	$V_{\text{CC}} = -5\ \text{V}$ , $V_{\text{B}} = -2.5\ \text{V}$ , $R_{\text{L}} = 1\ \text{k}\Omega$			-0.2	V
Input resistance	$R_{\text{I}}$		-30%	22	+30%	$\text{k}\Omega$
Resistance ratio	$R_{\text{I}} / R_{\text{2}}$		0.8	1.0	1.2	—
Transition frequency	$f_{\text{T}}$	$V_{\text{CB}} = -10\ \text{V}$ , $I_{\text{E}} = 1\ \text{mA}$ , $f = 200\ \text{MHz}$		80		MHz

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

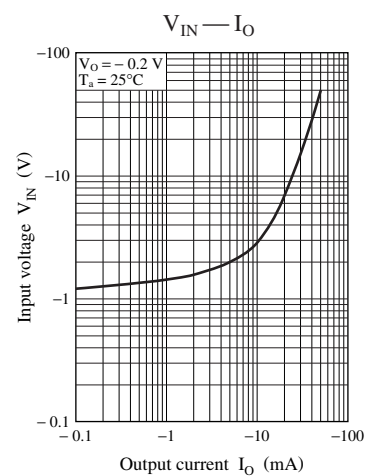
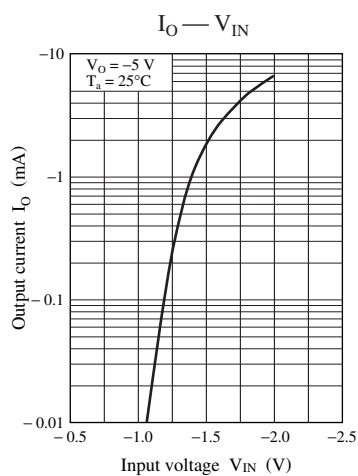
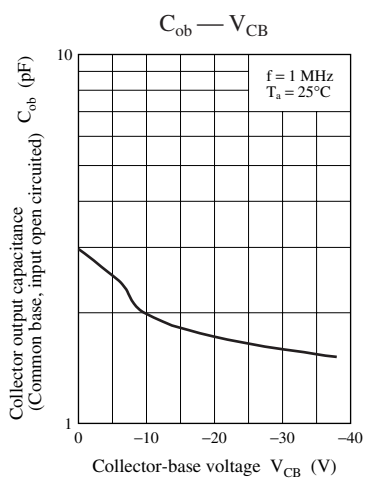
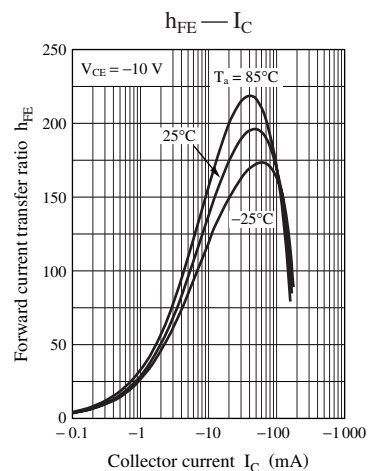
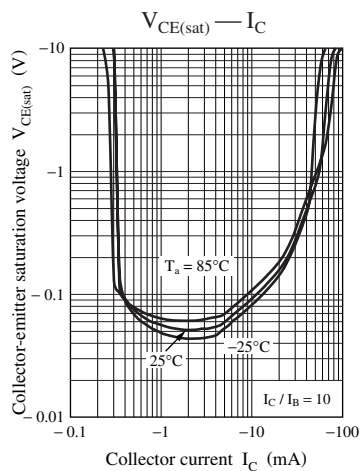
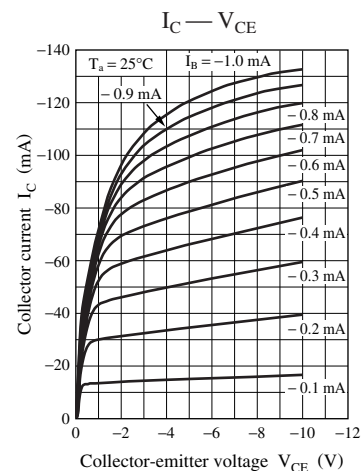
## Common characteristics chart



## Characteristics charts of Tr1



## Characteristics charts of Tr2



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