# XP03390

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

### For digital circuits

#### ■ Features

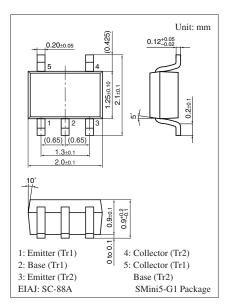
- Two elements incorporated into one package (Transistors with built-in resistor)
- Reduction of the mounting area and assembly cost by one half

#### ■ Basic Part Number

• UNR2213 + UNR2114

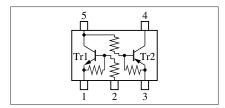
## ■ Absolute Maximum Ratings $T_a = 25$ °C

	Parameter	Symbol	Rating	Unit	
Tr1	Collector-base voltage (Emitter open)	V <sub>CBO</sub>	50	V	
	Collector-emitter voltage	V <sub>CEO</sub>	50	V	
	(Base open)				
	Collector current	$I_{C}$	100	mA	
Tr2	Collector-base voltage (Emitter open)	V <sub>CBO</sub>	-50	V	
	Collector-emitter voltage (Base open)	V <sub>CEO</sub>	-50	V	
	Collector current	$I_C$	-100	mA	
Overall	Total power dissipation	$P_{T}$	150	mW	
	Junction temperature	$T_{j}$	150	°C	
	Storage temperature	T <sub>stg</sub>	-55 to +150	°C	



Marking Symbol: EX

#### Internal Connection





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

## • Tr1

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
Collector-base voltage (Emitter open)	V <sub>CBO</sub>	$I_C = 10 \mu\text{A},  I_E = 0$	50			V
Collector-emitter voltage (Base open)	V <sub>CEO</sub>	$I_C = 2 \text{ mA}, I_B = 0$	50			V
Collector-base cutoff current (Emitter open)	$I_{CBO}$	$V_{CB} = 50 \text{ V}, I_{E} = 0$			0.1	μΑ
Collector-emitter cutoff current (Base open)	$I_{CEO}$	$V_{CE} = 50 \text{ V}, I_{B} = 0$			0.5	μΑ
Emitter-base cutoff current (Collector open)	$I_{EBO}$	$V_{EB} = 6 \text{ V}, I_C = 0$			0.1	mA
Forward current transfer ratio	$h_{FE}$	$V_{CE} = 10 \text{ V}, I_{C} = 5 \text{ mA}$	80			_
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	$I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA}$			0.25	V
Output voltage high-level	V <sub>OH</sub>	$V_{CC} = 5 \text{ V}, V_{B} = 0.5 \text{ V}, R_{L} = 1 \text{ k}\Omega$	4.9			V
Output voltage low-level	V <sub>OL</sub>	$V_{CC} = 5 \text{ V}, V_{B} = 3.5 \text{ V}, R_{L} = 1 \text{ k}\Omega$			0.2	V
Input resistance	R <sub>1</sub>		-30%	47	+30%	kΩ
Resistance ratio	R <sub>1</sub> / R <sub>2</sub>		0.8	1.0	1.2	
Transition frequency	$f_T$	$V_{CB} = 10 \text{ V}, I_E = -2 \text{ mA}, f = 200 \text{ MHz}$		150		MHz

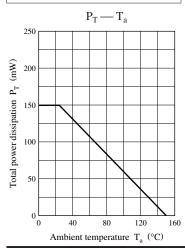
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

#### • Tr2

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
Collector-base voltage (Emitter open)	V <sub>CBO</sub>	$I_C = -10 \ \mu A, I_E = 0$	-50			V
Collector-emitter voltage (Base open)	V <sub>CEO</sub>	$I_C = -2 \text{ mA}, I_B = 0$	-50			V
Collector-base cutoff current (Emitter open)	$I_{CBO}$	$V_{CB} = -50 \text{ V}, I_E = 0$			- 0.1	μΑ
Collector-emitter cutoff current (Base open)	$I_{CEO}$	$V_{CE} = -50 \text{ V}, I_{B} = 0$			- 0.5	μΑ
Emitter-base cutoff current (Collector open)	$I_{EBO}$	$V_{EB} = -6 \text{ V}, I_C = 0$			- 0.2	mA
Forward current transfer ratio	$h_{FE}$	$V_{CE} = -10 \text{ V}, I_{C} = -5 \text{ mA}$	80			_
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	$I_C = -10 \text{ mA}, I_B = -0.3 \text{ mA}$			- 0.25	V
Output voltage high-level	V <sub>OH</sub>	$V_{CC} = -5 \text{ V}, V_B = -0.5 \text{ V}, R_L = 1 \text{ k}\Omega$	-4.9			V
Output voltage low-level	V <sub>OL</sub>	$V_{CC} = -5 \text{ V}, V_B = -2.5 \text{ V}, R_L = 1 \text{ k}\Omega$			- 0.2	V
Input resistance	$R_1$		-30%	10	+30%	kΩ
Resistance ratio	R <sub>1</sub> / R <sub>2</sub>		0.17	0.21	0.25	_
Transition frequency	$f_T$	$V_{CB} = -10 \text{ V}, I_E = 1 \text{ mA}, f = 200 \text{ MHz}$		80		MHz

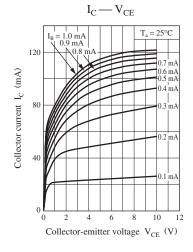
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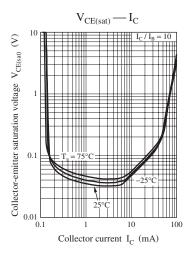
#### Common characteristics chart

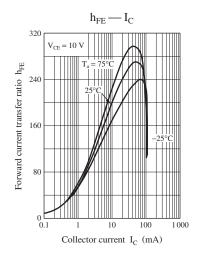


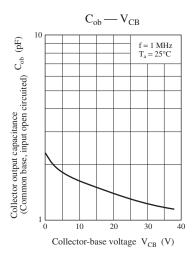
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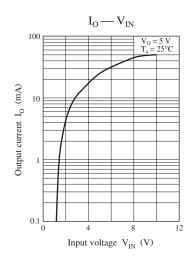
#### Characteristics charts of Tr1

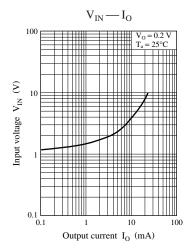








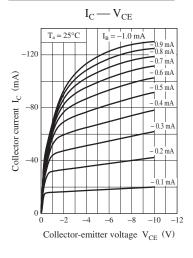


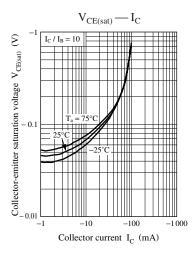


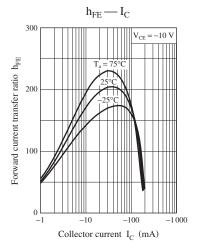
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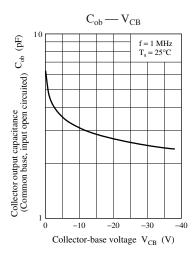
# **Panasonic**

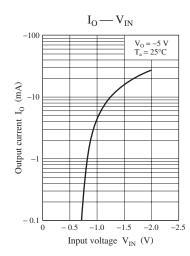
## Characteristics charts of Tr2

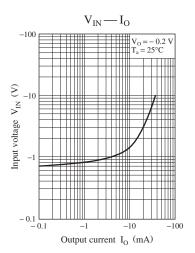












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