

PNP SILICON TRIPLE DIFFUSED TRANSISTOR  
MP-3

## DESCRIPTION

2SA1412-Z is designed for High Voltage Switching, especially in Hybrid Integrated Circuits.

## FEATURES

- High Voltage :  $V_{CE0} = -400$  V
- High Speed :  $t_r \leq 0.7$   $\mu$ s
- Complement to 2SC3631-Z

## QUALITY GRADE

Standard

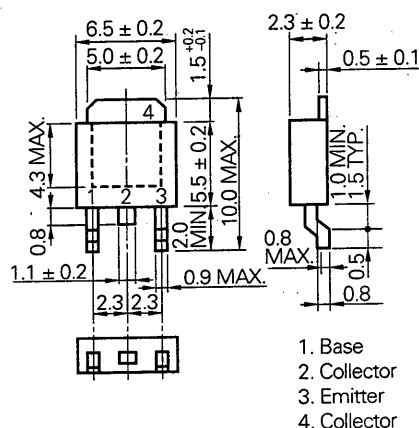
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS ( $T_a = 25$  °C)

Collector to Base Voltage	$V_{CBO}$	-400	V
Collector to Emitter Voltage	$V_{CEO}$	-400	V
Emitter to Base Voltage	$V_{EBO}$	-7	V
Collector Current (DC)	$I_c$	-2.0	A
Collector Current (Pulse)*	$I_c$	-4.0	A
Total Power Dissipation ( $T_a = 25$ °C)**	$P_T$	2.0	W
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-55 to +150	°C

\*  $PW \leq 10$  ms, Duty Cycle  $\leq 50$  %

\*\* When mounted on ceramic substrate of  $7.5 \text{ cm}^2 \times 0.7$  mm

PACKAGE DIMENSIONS  
(in millimeters)

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)**

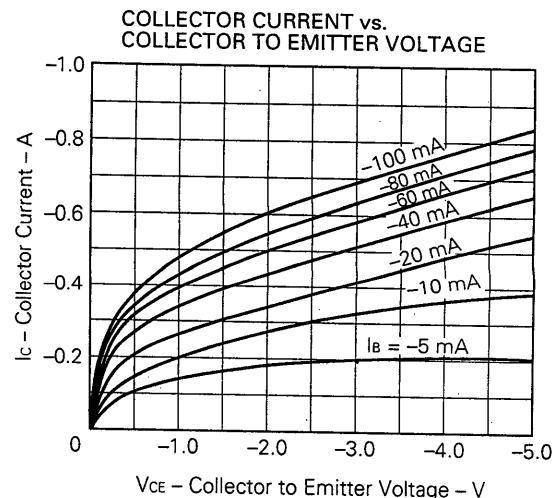
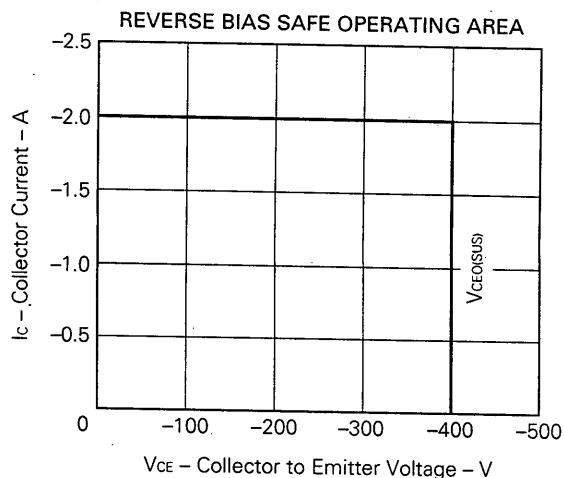
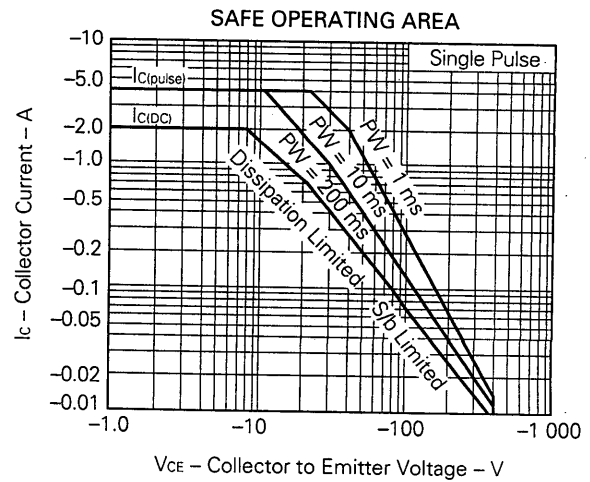
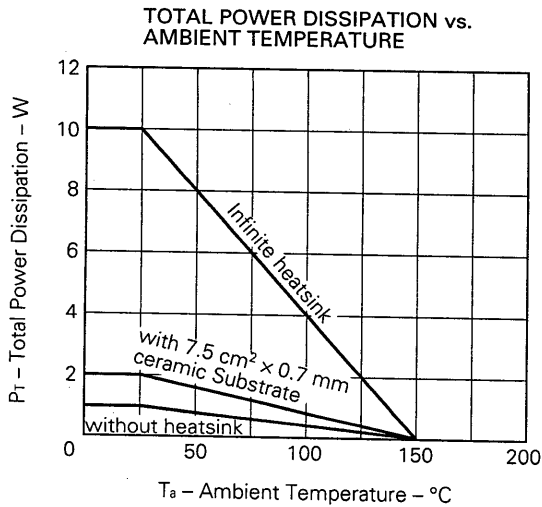
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>cBO</sub>			-10	μA	V <sub>CB</sub> = -400 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>			-10	μA	V <sub>EB</sub> = -5.0 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE1</sub> *	40	60	120		V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -0.1 A
DC Current Gain	h <sub>FE2</sub> *	10	22			V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -1.0 A
Collector Saturation Voltage	V <sub>CE(sat)</sub> *		-0.25	-0.5	V	I <sub>C</sub> = -0.5 A, I <sub>B</sub> = -0.1 A
Base Saturation Voltage	V <sub>BE(sat)</sub> *		-0.85	-1.2	V	I <sub>C</sub> = -0.5 A, I <sub>B</sub> = -0.1 A
Gain Bandwidth Product	f <sub>T</sub>		40		MHz	V <sub>CE</sub> = -10 V, I <sub>E</sub> = -100 mA
Output Capacitance	C <sub>ob</sub>		30		pF	V <sub>CB</sub> = -10 V, I <sub>E</sub> = 0, f = 1.0 MHz
Turn-on Time	t <sub>on</sub>		0.03	0.5	μs	I <sub>C</sub> = -1.0 A, R <sub>L</sub> = 150 Ω I <sub>B1</sub> = -I <sub>B2</sub> = -0.2 A, V <sub>CC</sub> = -150 V
Storage Time	t <sub>stg</sub>		1.4	2.0	μs	
Fall time	t <sub>r</sub>		0.1	0.7	μs	

\* Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2 %

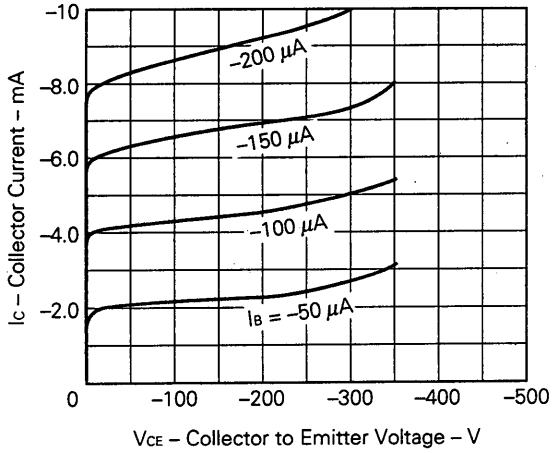
**h<sub>FE</sub> Classification**

MARKING	L	K
h <sub>FE1</sub>	40 to 80	60 to 120

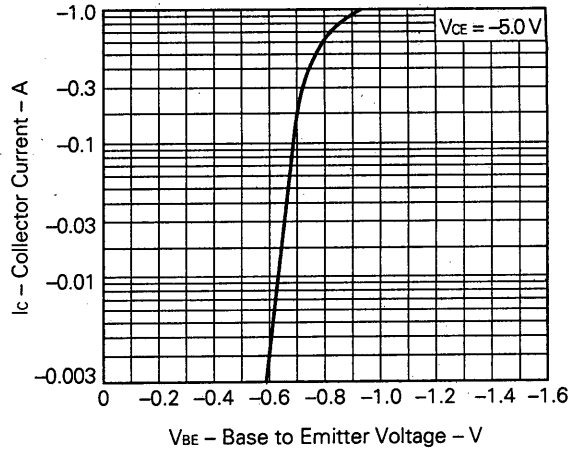
**TYPICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)**



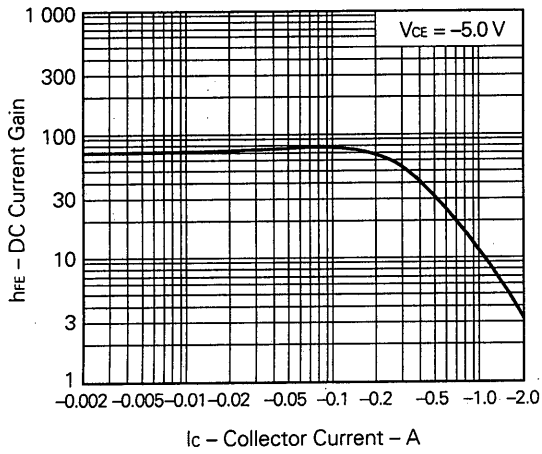
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



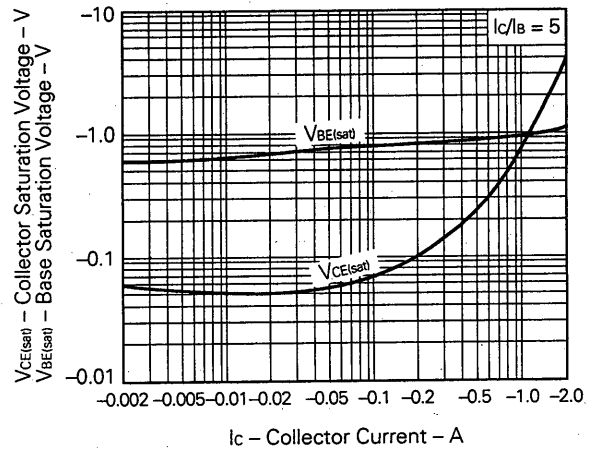
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



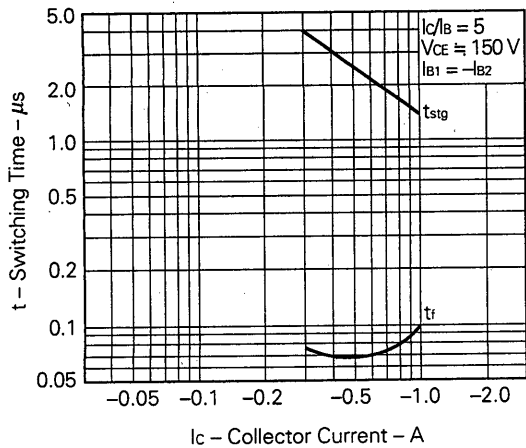
DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



TURN-OFF TIME vs. COLLECTOR CURRENT



**Reference**

Application note name	No.
Quality control of NEC semiconductors devices.	TEI-1202
Quality control guide of semiconductors devices.	MEI-1202
Assembly manual of semiconductors devices.	IEI-1207
Design of Push-Pull Type Switching Regulators (Basic).	TEB-1002
Design of Push-Pull Type Switching Regulators (Applications).	TEB-1003
Optimum Base Drive Conditions of Switching Power Transistors.	TEB-1014

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Application examples recommended by NEC Corporation.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.