

High-Voltage NPN Silicon Transistors

... designed for medium-to-high voltage inverters, converters, regulators and switching circuits.

- High Voltage — $V_{CEX} = 400$ Vdc
- Gain Specified to 3.5 Amp
- High Frequency Response to 2.5 MHz

MAXIMUM RATINGS

Rating	Symbol	MJ413	MJ423	Unit
Collector-Emitter Voltage	V_{CEX}	400	400	Vdc
Collector-Base Voltage	V_{CB}	400	400	Vdc
Emitter-Base Voltage	V_{EB}	5.0	5.0	Vdc
Collector Current — Continuous	I_C	10	10	Adc
Base Current	I_B	2.0	2.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	125 1.0		Watts W/ $^\circ\text{C}$
Operating Junction Temperature Range	T_J	-65 to +150		$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	1.0	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage* (1) ($I_C = 100$ mAdc, $I_B = 0$)	$V_{(BR)CEO(sus)}$	325	—	Vdc
Collector Cutoff Current ($V_{CE} = 400$ Vdc, $V_{EB(off)} = 1.5$ Vdc) ($V_{CE} = 400$ Vdc, $V_{EB(off)} = 1.5$ Vdc, $T_C = 125^\circ\text{C}$)	I_{CEX}	—	0.25 0.5	mAdc
Emitter Cutoff Current ($V_{BE} = 5.0$ Vdc, $I_C = 0$)	I_{EBO}	—	5.0	mAdc

ON CHARACTERISTICS

DC Current Gain(1) ($I_C = 0.5$ Adc, $V_{CE} = 5.0$ Vdc) MJ413 ($I_C = 1.0$ Adc, $V_{CE} = 5.0$ Vdc) MJ423 ($I_C = 1.0$ Adc, $V_{CE} = 5.0$ Vdc) MJ423 ($I_C = 2.5$ Adc, $V_{CE} = 5.0$ Vdc)	h_{FE}	20 15 30 10	80 — 90 —	—
Collector-Emitter Saturation Voltage (1) ($I_C = 0.5$ Adc, $I_B = 0.05$ Adc) MJ413 ($I_C = 1.0$ Adc, $I_B = 0.10$ Adc) MJ423	$V_{CE(sat)}$	—	0.8 0.8	Vdc
Base-Emitter Saturation Voltage ($I_C = 0.5$ Adc, $I_B = 0.05$ Adc) MJ413 ($I_C = 1.0$ Adc, $I_B = 0.1$ Adc) MJ423	$V_{BE(sat)}$	—	1.25 1.25	Vdc

DYNAMIC CHARACTERISTICS

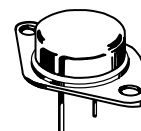
Current-Gain — Bandwidth Product ($I_C = 200$ mAdc, $V_{CE} = 10$ Vdc, $f = 1.0$ MHz)	f_T	2.5	—	MHz
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(1) $PW \leq 300 \mu\text{s}$ Duty Cycle $\leq 2.0\%$.

REV 7

MJ413
MJ423

10 AMPERE
POWER TRANSISTORS
NPN SILICON
400 VOLTS
125 WATTS



CASE 1-07
TO-204AA
(TO-3)

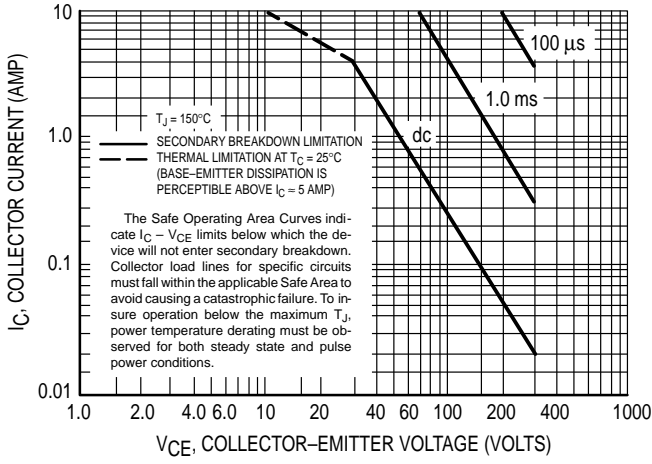


Figure 1. Active-Region Safe-Operating Area

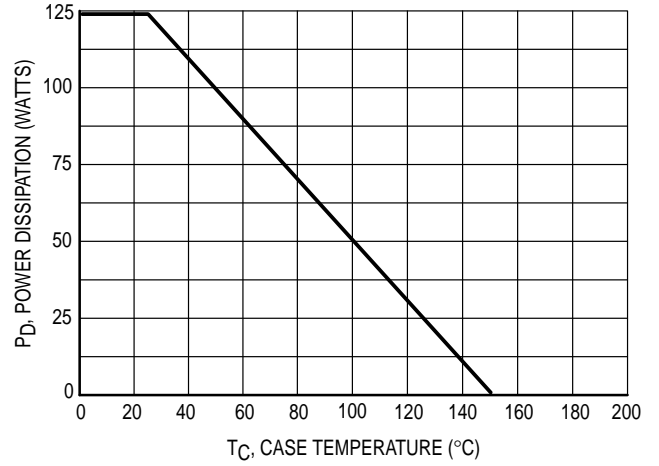


Figure 2. Power-Temperature Derating Curve

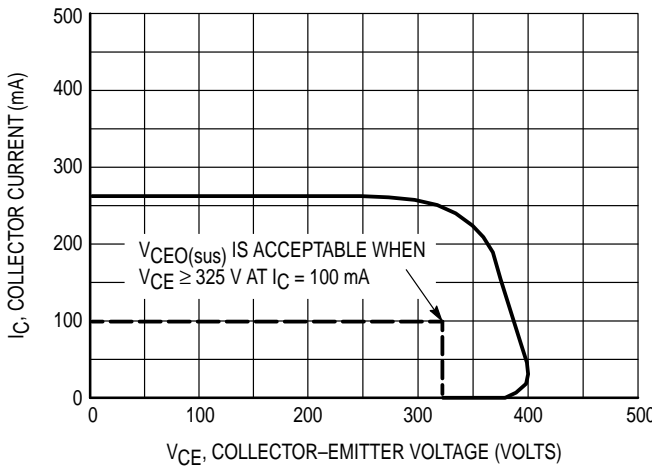


Figure 3. Sustaining Voltage Test Load Line

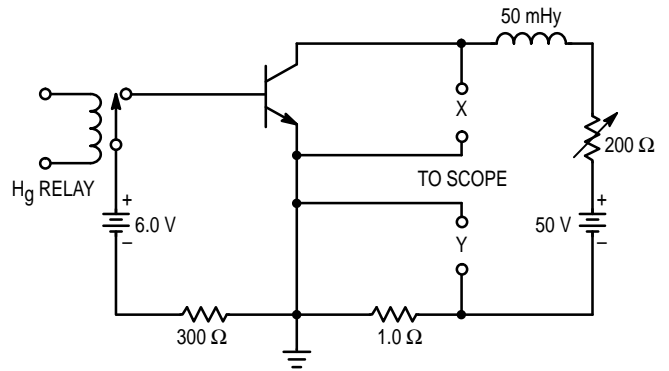


Figure 4. Sustaining Voltage Test Circuit

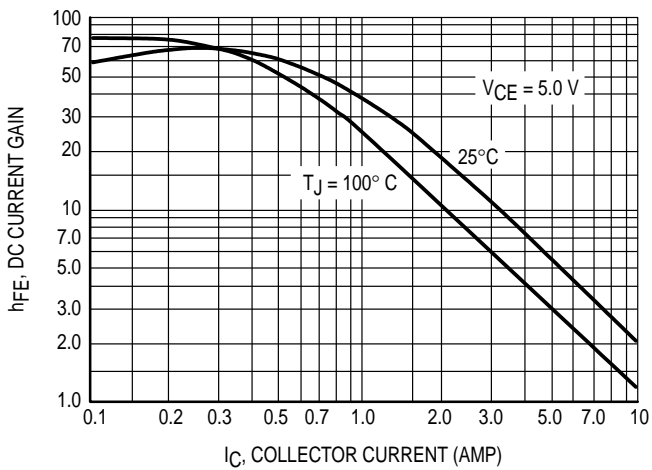


Figure 5. Current Gain

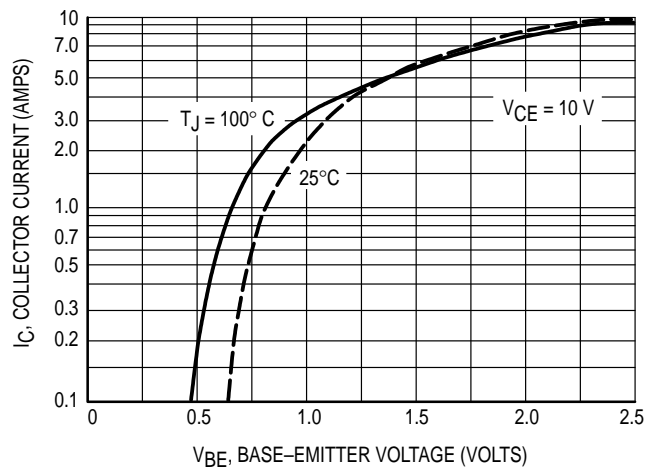
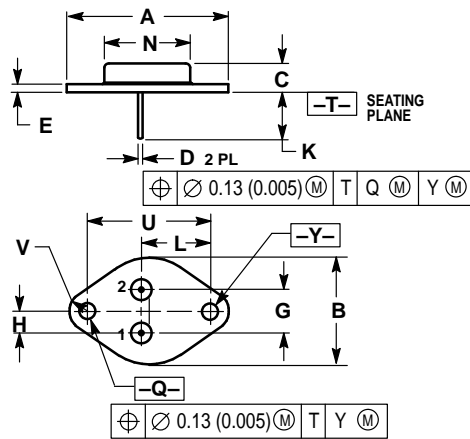


Figure 6. Transconductance

PACKAGE DIMENSIONS




- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.550 REF		39.37 REF	
B	—	1.050	—	26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
E	0.055	0.070	1.40	1.77
G	0.430 BSC		10.92 BSC	
H	0.215 BSC		5.46 BSC	
K	0.440	0.480	11.18	12.19
L	0.665 BSC		16.89 BSC	
N	—	0.830	—	21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
V	0.131	0.188	3.33	4.77

STYLE 1:
 PIN 1. BASE
 2. EMITTER
 CASE: COLLECTOR

CASE 1-07
 TO-204AA (TO-3)
 ISSUE Z

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How to reach us:

USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244-6609
INTERNET: <http://Design-NET.com>

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

