

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 |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|--|--------------------|-----|-------------|-----|
| Collector-Emitter Sustaining Voltage* (1) ($I_C = 100$ mA, $I_B = 0$) | $V_{(BR)CEO(sus)}$ | 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 | mA |
| Emitter Cutoff Current ($V_{BE} = 5.0$ Vdc, $I_C = 0$) | I_{EBO} | — | 5.0 | mA |

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

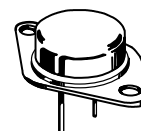
| | | | | |
|---|-------|-----|---|-----|
| Current-Gain — Bandwidth Product ($I_C = 200$ mA, $V_{CE} = 10$ Vdc, $f = 1.0$ MHz) | f_T | 2.5 | — | MHz |
|---|-------|-----|---|-----|

(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)

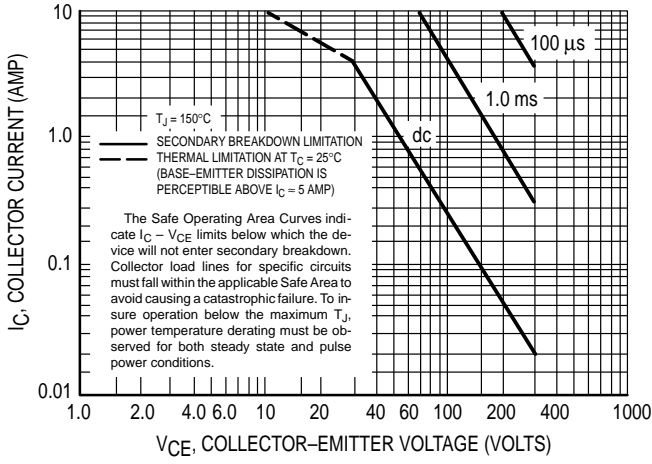


Figure 1. Active-Region Safe-Operating Area

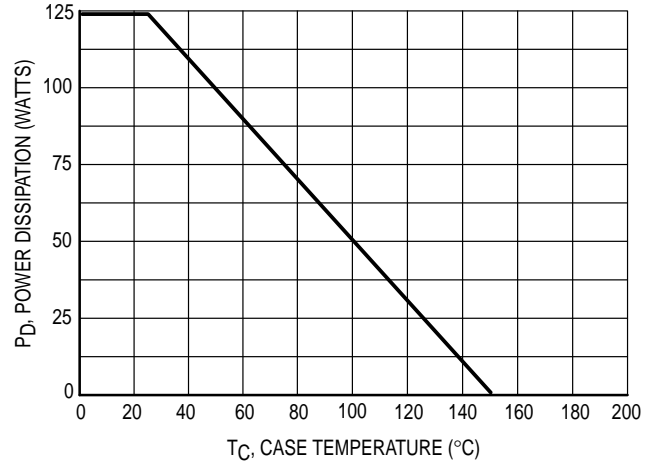


Figure 2. Power-Temperature Derating Curve

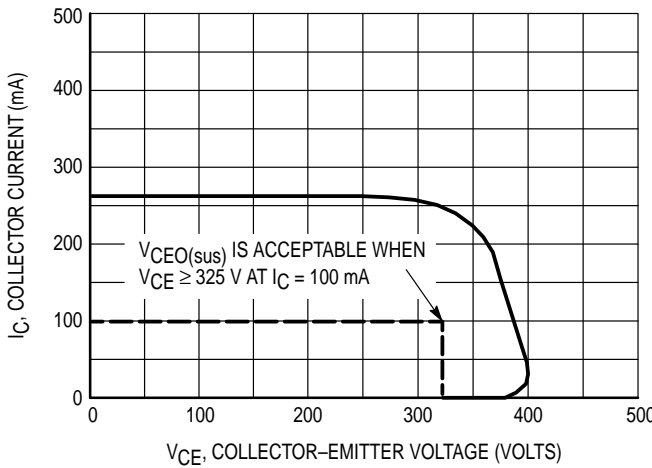


Figure 3. Sustaining Voltage Test Load Line

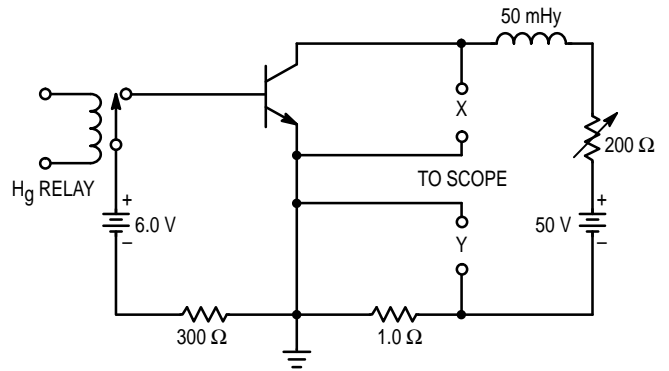


Figure 4. Sustaining Voltage Test Circuit

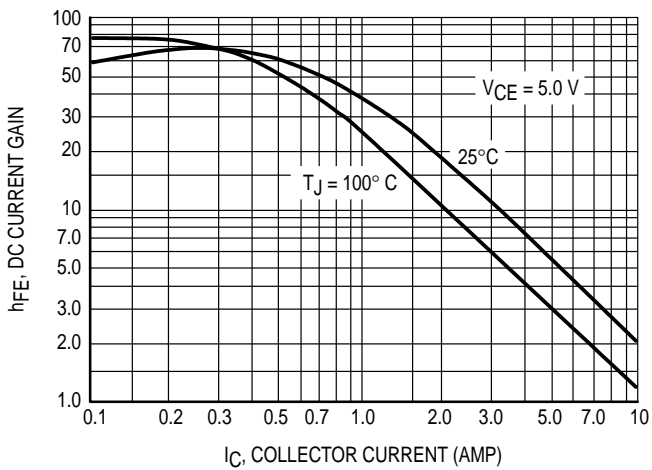


Figure 5. Current Gain

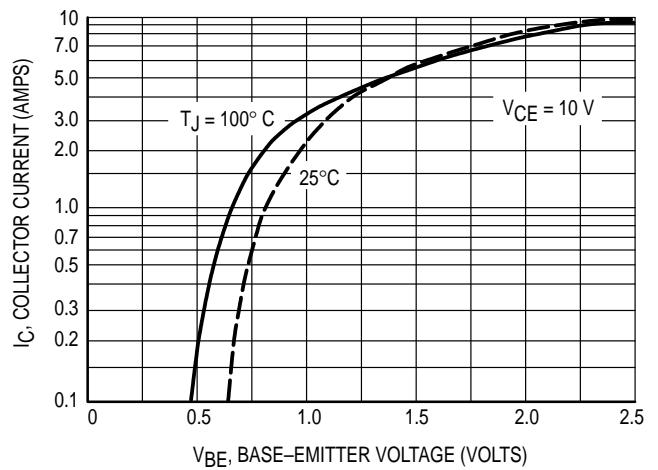


Figure 6. Transconductance

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