NEC

# SILICON TRANSISTOR
# FN4xxx

## RESISTOR BUILT-IN TYPE PNP TRANSISTOR

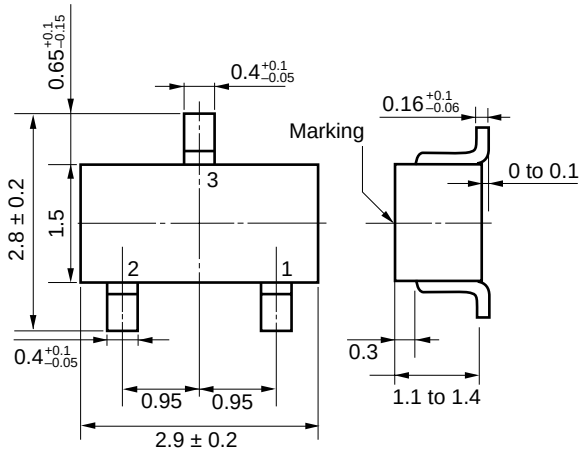
### FEATURES

- Compact package
- Resistors built-in type
- Complementary to FA4xxx

### ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|---|---|
| FN4xxx | SC-59 |

### ★ PACKAGE DRAWING (Unit: mm)

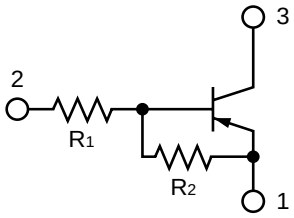



### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

| | | | |
|---|---|---|---|
| Collector to Base Voltage | $V_{CBO}$ | –60 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | –50 | V |
| Emitter to Base Voltage | $V_{EBO}$ | –5 | V |
| Collector Current (DC) | $I_C$ | –0.1 | A |
| Collector Current (pulse) Note | $I_{C(pulse)}$ | –0.2 | A |
| Total Power Dissipation | $P_T$ | 0.2 | W |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +150 | °C |

**Note** PW ≤ 10 ms, Duty Cycle ≤ 50%

### ★ EQUIVALENT CIRCUIT




### ★ PIN CONNECTION

1: Emitter
2: Base
3: Collector

| PART NUMBER | MARK | $R_1$ | $R_2$ | UNIT |
|---|---|---|---|---|
| FN4A4M | NA1 | 10.0 | 10.0 | kΩ |
| FN4F4M | NB1 | 22.0 | 22.0 | kΩ |
| FN4L4M | NC1 | 47.0 | 47.0 | kΩ |
| FN4L3M | ND1 | 4.7 | 4.7 | kΩ |
| FN4L3N | NE1 | 4.7 | 10.0 | kΩ |
| FN4L3Z | NF1 | 4.7 | | kΩ |
| FN4A3Q | NG1 | 1.0 | 10.0 | kΩ |
| FN4A4P | NH1 | 10.0 | 47.0 | kΩ |
| FN4F4N | NJ1 | 22.0 | 47.0 | kΩ |

| PART NUMBER | MARK | $R_1$ | $R_2$ | UNIT |
|---|---|---|---|---|
| FN4L4L | NK1 | 47.0 | 22.0 | kΩ |
| FN4A4Z | NL1 | 10.0 | | kΩ |
| FN4F4Z | NM1 | 22.0 | | kΩ |
| FN4L4Z | NN1 | 47.0 | | kΩ |
| FN4F3M | NP1 | 2.2 | 2.2 | kΩ |
| FN4F3P | NQ1 | 2.2 | 10.0 | kΩ |
| FN4F3R | NR1 | 2.2 | 47.0 | kΩ |
| FN4A4L | NS1 | 10.0 | 4.7 | kΩ |
| FN4L4K | NT1 | 47.0 | 10.0 | kΩ |



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**The mark ★ shows major revised points.**

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = –50 V, $I_E$ = 0 | | | –100 | nA |
| DC Current Gain | $h_{FE1}$ | $V_{CE}$ = –5.0 V, $I_C$ = –5.0 mA | **Note1** | | | - |
| | $h_{FE2}$ | $V_{CE}$ = –5.0 V, $I_C$ = –50 mA | | | | - |
| Collector Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = –5.0 mA, $I_B$ = –0.25 mA | | | –0.2 | V |
| Low-level Input Voltage | $V_{IL}$ | $V_{CE}$ = –5.0 V, $I_C$ = –100 $\mu$A | **Note2** | | | V |
| High-level Input Voltage | $V_{IH}$ | $V_{CE}$ = –0.2 V, $I_C$ = –5.0 mA | | | | V |
| Input Resistor | $R_1$ | | **Note3** | | | kΩ |
| Emitter to Base Resistor | $R_2$ | | | | | kΩ |

**Note 1.**

| PART NUMBER | $h_{FE1}$ | | | $h_{FE2}$ | | | UNIT |
|---|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| FN4A4M | 35 | | 100 | 80 | | | - |
| FN4F4M | 60 | | 195 | 90 | | | - |
| FN4L4M | 85 | | 340 | 95 | | | - |
| FN4L3M | 20 | | 80 | 80 | | | - |
| FN4L3N | 35 | | 100 | 80 | | | - |
| FN4L3Z | 135 | | 600 | 100 | | | - |
| FN4A3Q | 35 | | 100 | 80 | | | - |
| FN4A4P | 85 | | 340 | 95 | | | - |
| FN4F4N | 85 | | 340 | 95 | | | - |
| FN4L4L | 60 | | 195 | 90 | | | - |
| FN4A4Z | 135 | | 600 | 100 | | | - |
| FN4F4Z | 135 | | 600 | 100 | | | - |
| FN4L4Z | 135 | | 600 | 100 | | | - |
| ★ FN4F3M | 8 | | 50 | 50 | | | - |
| FN4F3P | 35 | | 100 | 80 | | | - |
| FN4F3R | 85 | | 340 | 95 | | | - |
| FN4A4L | 20 | | 80 | 80 | | | - |
| FN4L4K | 35 | | 100 | 80 | | | - |

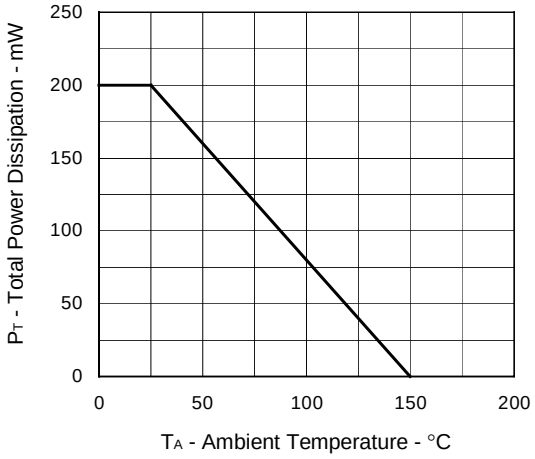
**Note 2.**

| PART NUMBER | $V_{IL}$ | | | $V_{IH}$ | | | UNIT |
|---|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| FN4A4M | | | –0.8 | –3.0 | | | V |
| FN4F4M | | | –0.8 | –4.0 | | | V |
| FN4L4M | | | –0.8 | –5.0 | | | V |
| FN4L3M | | | –0.8 | –3.0 | | | V |
| FN4L3N | | | –0.6 | –3.0 | | | V |
| FN4L3Z | | | –0.5 | –1.2 | | | V |
| FN4A3Q | | | –0.5 | –2.0 | | | V |
| FN4A4P | | | –0.5 | –3.0 | | | V |
| FN4F4N | | | –0.6 | –3.0 | | | V |
| FN4L4L | | | –0.9 | –6.0 | | | V |
| FN4A4Z | | | –0.5 | –2.0 | | | V |
| FN4F4Z | | | –0.5 | –3.0 | | | V |
| FN4L4Z | | | –0.5 | –4.0 | | | V |
| FN4F3M | | | –0.8 | –3.0 | | | V |
| FN4F3P | | | –0.5 | –2.0 | | | V |
| FN4F3R | | | –0.5 | –2.0 | | | V |
| FN4A4L | | | –0.9 | –6.0 | | | V |
| FN4L4K | | | –2.0 | –8.0 | | | V |

**Note 3.**

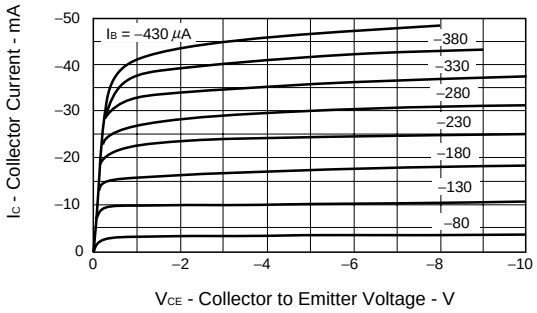
| PART NUMBER | $R_1$ | | | $R_2$ | | | UNIT |
|---|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| FN4A4M | 7.00 | 10.00 | 13.00 | 7.00 | 10.00 | 13.00 | kΩ |
| FN4F4M | 15.40 | 22.00 | 28.60 | 15.40 | 22.00 | 28.60 | kΩ |
| FN4L4M | 32.90 | 47.00 | 61.10 | 32.90 | 47.00 | 61.10 | kΩ |
| FN4L3M | 3.29 | 4.70 | 6.11 | 3.29 | 4.70 | 6.11 | kΩ |
| FN4L3N | 3.29 | 4.70 | 6.11 | 7.00 | 10.00 | 13.00 | kΩ |
| FN4L3Z | 3.29 | 4.70 | 6.11 | | | | kΩ |
| FN4A3Q | 0.70 | 1.00 | 1.30 | 7.00 | 10.00 | 13.00 | kΩ |
| FN4A4P | 7.00 | 10.00 | 13.00 | 32.90 | 47.00 | 61.10 | kΩ |
| FN4F4N | 15.40 | 22.00 | 28.60 | 32.90 | 47.00 | 61.10 | kΩ |
| FN4L4L | 32.90 | 47.00 | 61.10 | 15.40 | 22.00 | 28.60 | kΩ |
| FN4A4Z | 7.00 | 10.00 | 13.00 | | | | kΩ |
| FN4F4Z | 15.40 | 22.00 | 28.60 | | | | kΩ |
| FN4L4Z | 32.90 | 47.00 | 61.10 | | | | kΩ |
| FN4F3M | 1.54 | 2.20 | 2.86 | 1.54 | 2.20 | 2.86 | kΩ |
| FN4F3P | 1.54 | 2.20 | 2.86 | 7.00 | 10.00 | 13.00 | kΩ |
| FN4F3R | 1.54 | 2.20 | 2.86 | 32.90 | 47.00 | 61.10 | kΩ |
| FN4A4L | 7.00 | 10.00 | 13.00 | 3.29 | 4.70 | 6.11 | kΩ |
| FN4L4K | 32.90 | 47.00 | 61.10 | 7.00 | 10.00 | 13.00 | kΩ |

TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE

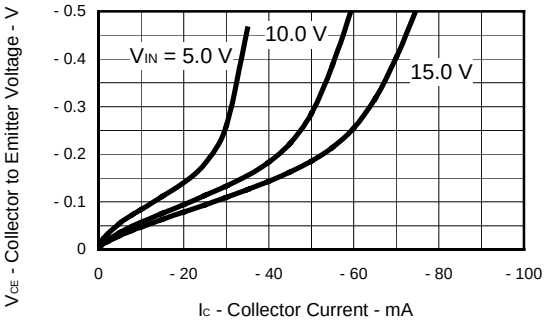


## [FN4A4M]
## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

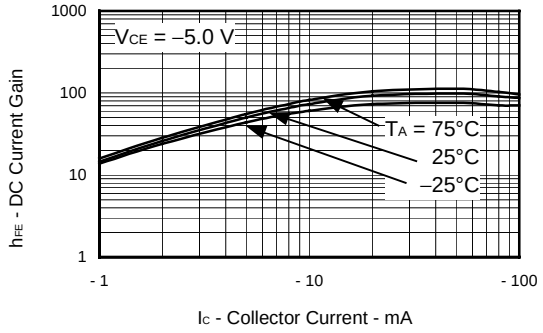
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



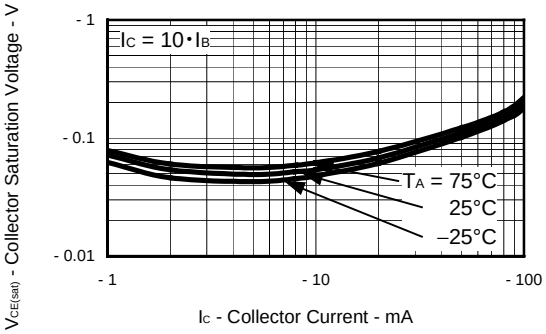

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



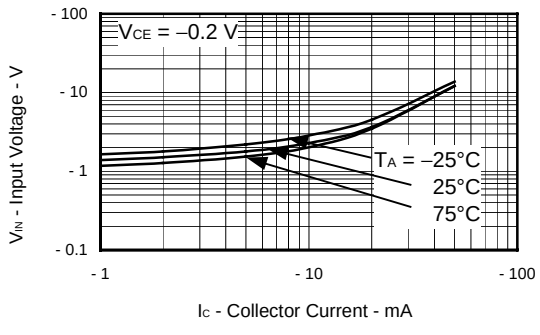

DC CURRENT GAIN vs. COLLECTOR CURRENT



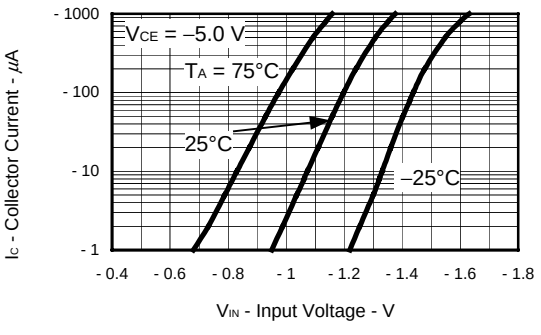

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



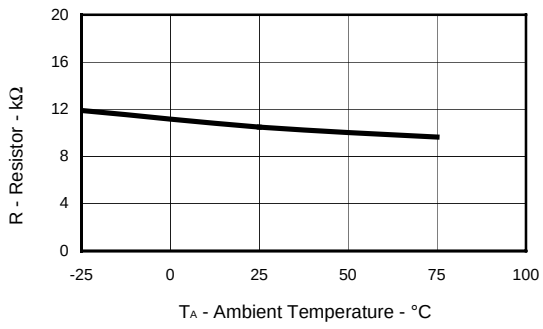

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

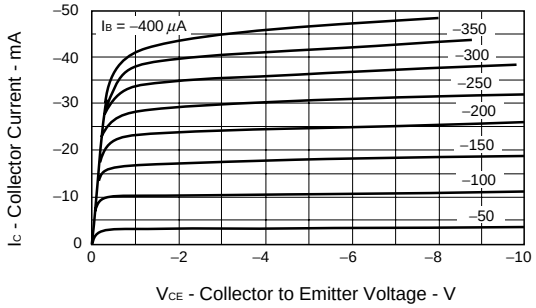



RESISTOR vs. AMBIENT TEMPERATURE

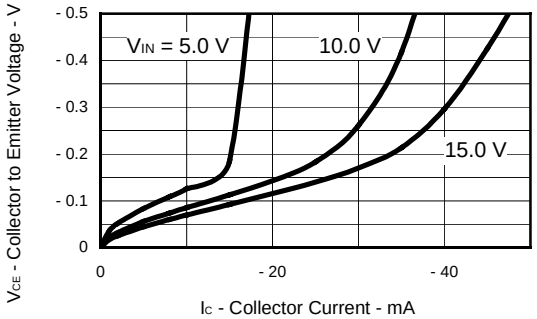


**[FN4F4M]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

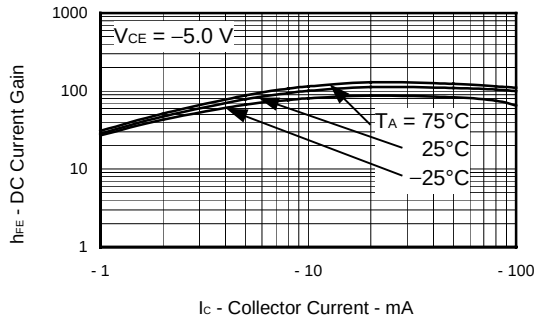
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



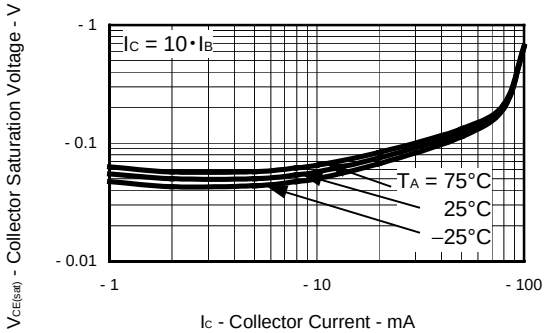

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



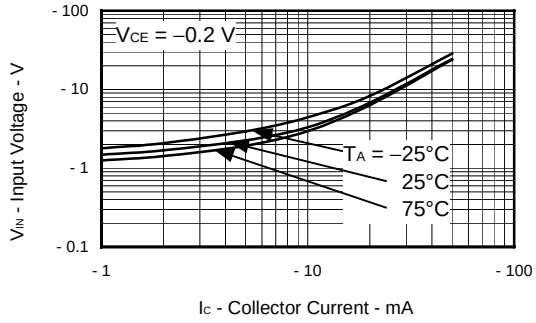

DC CURRENT GAIN vs. COLLECTOR CURRENT



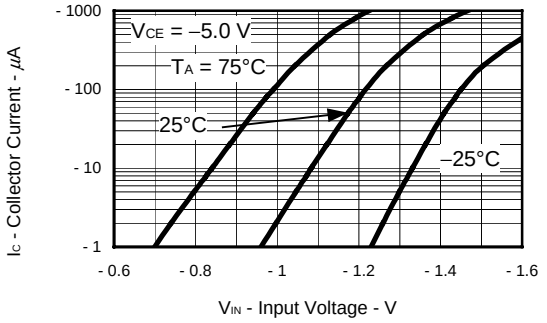

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



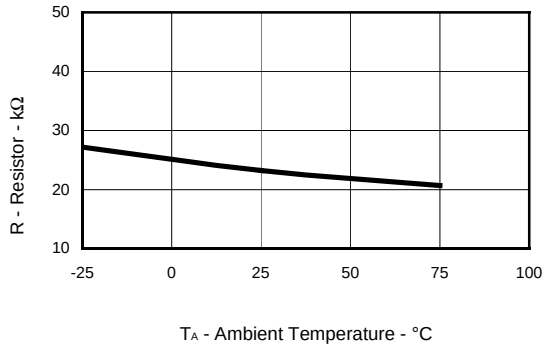

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

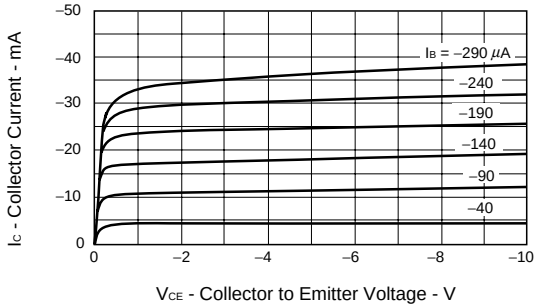



RESISTOR vs. AMBIENT TEMPERATURE

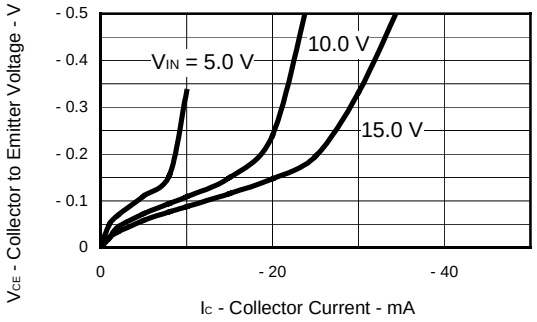


**[FN4L4M]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

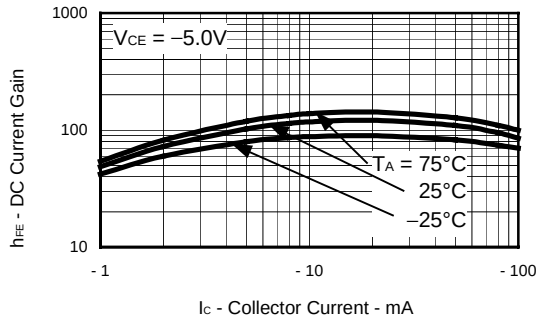
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



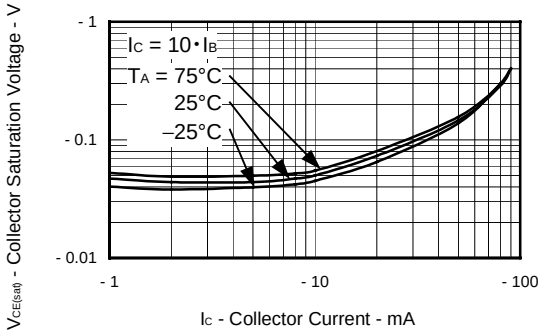

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



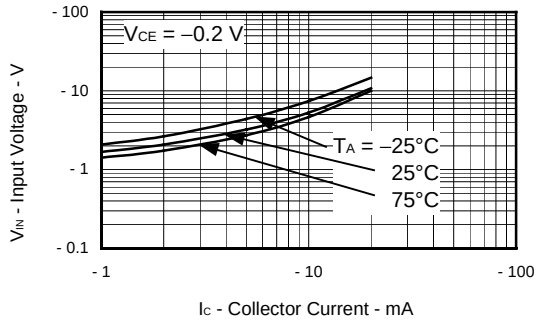

DC CURRENT GAIN vs. COLLECTOR CURRENT



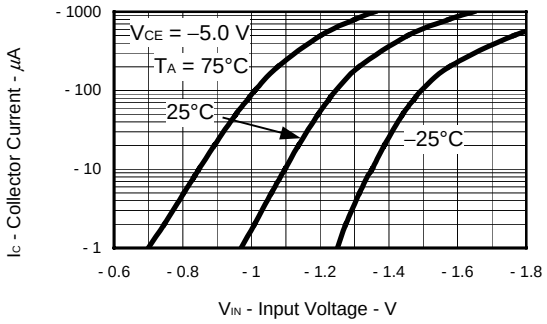

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



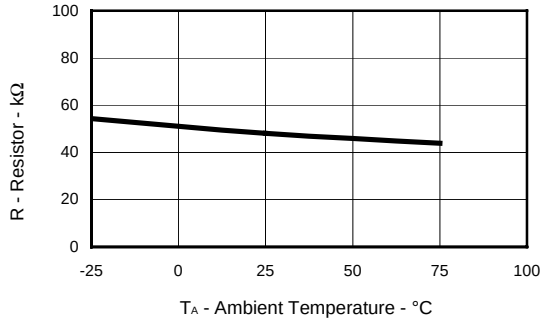

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

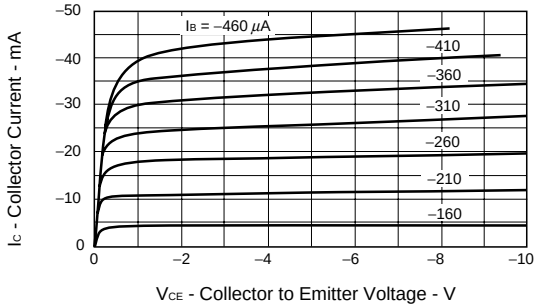



RESISTOR vs. AMBIENT TEMPERATURE

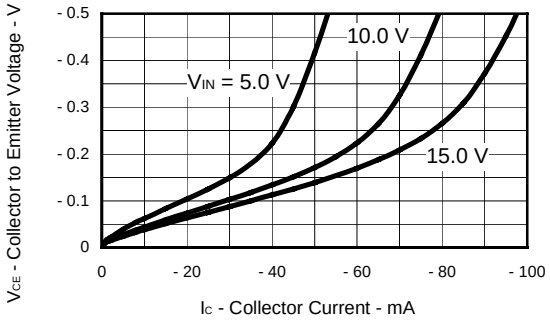


**[FN4L3M]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

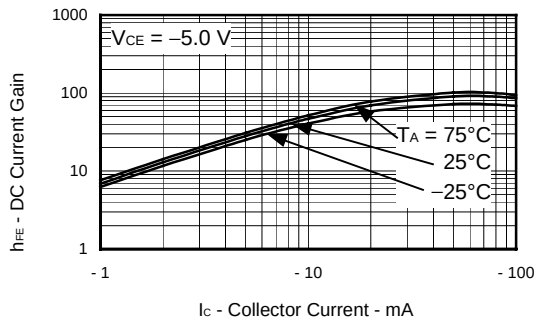
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



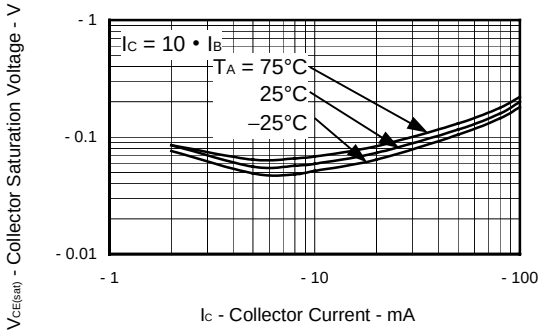

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



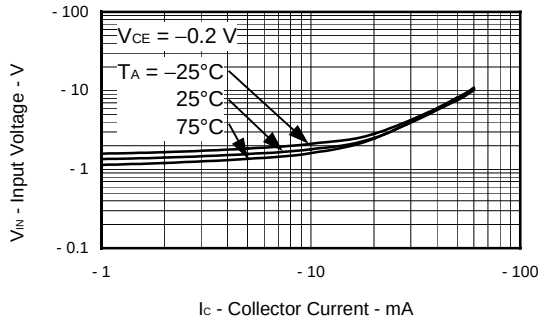

DC CURRENT GAIN vs. COLLECTOR CURRENT



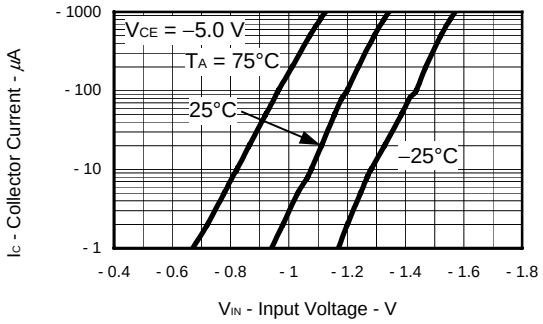

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



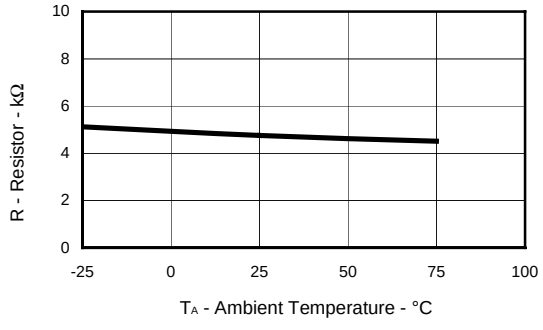

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

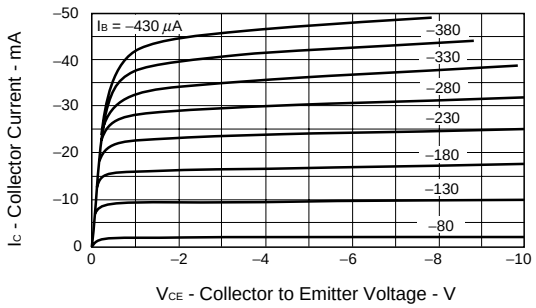



RESISTOR vs. AMBIENT TEMPERATURE

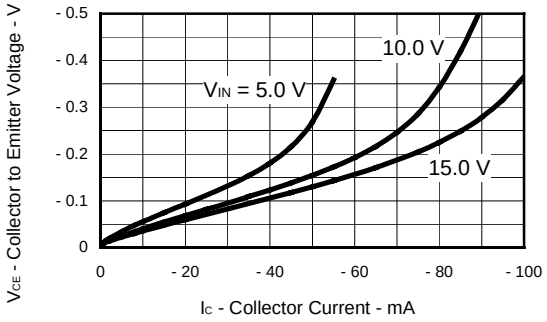


**[FN4L3N]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

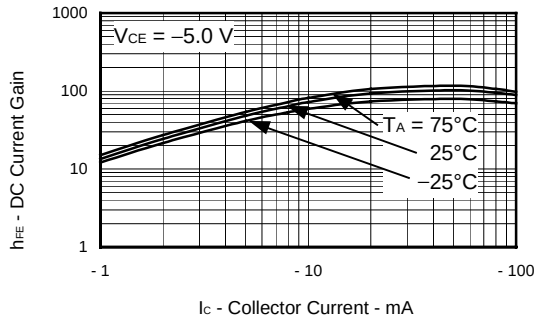
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



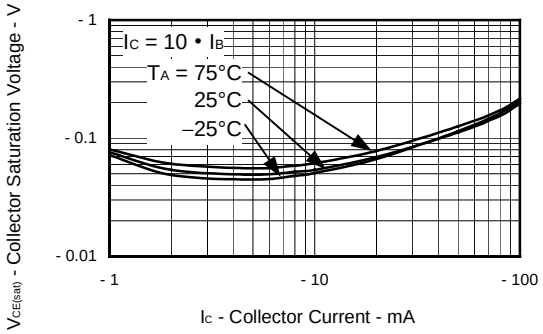

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



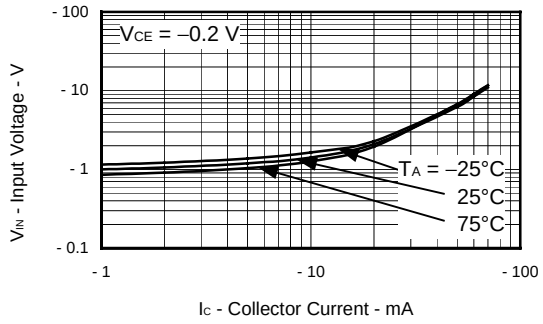

DC CURRENT GAIN vs. COLLECTOR CURRENT



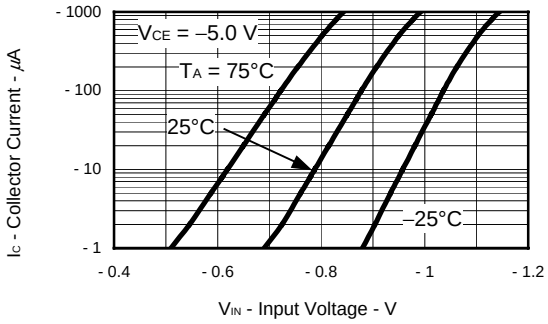

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



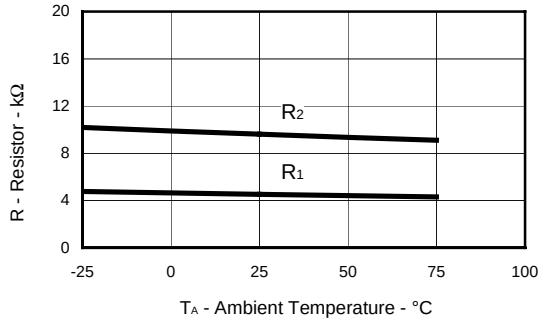

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

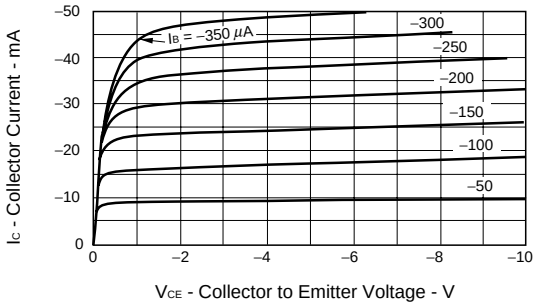



RESISTOR vs. AMBIENT TEMPERATURE

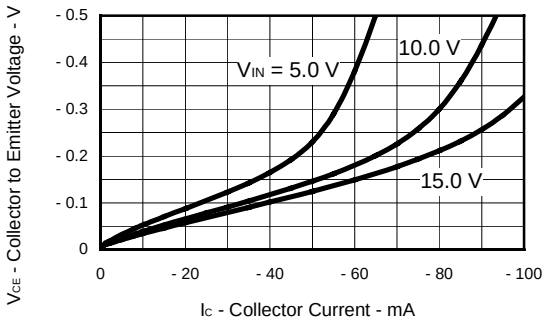


**[FN4L3Z]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

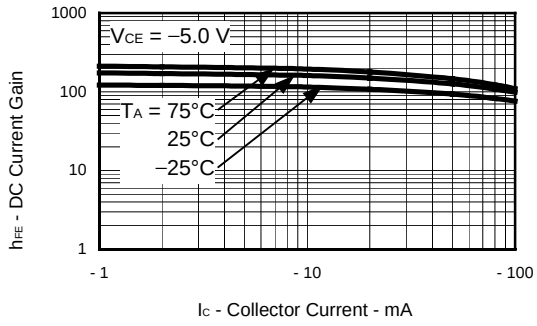
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



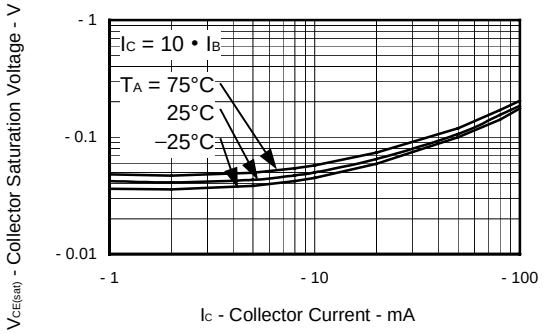

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



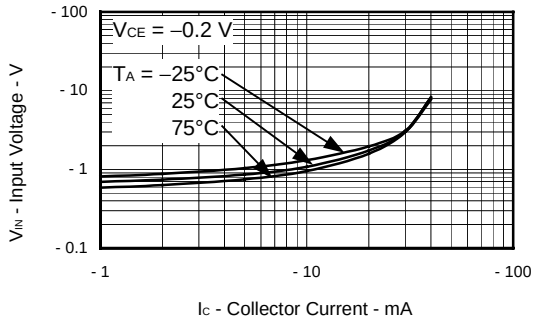

DC CURRENT GAIN vs. COLLECTOR CURRENT



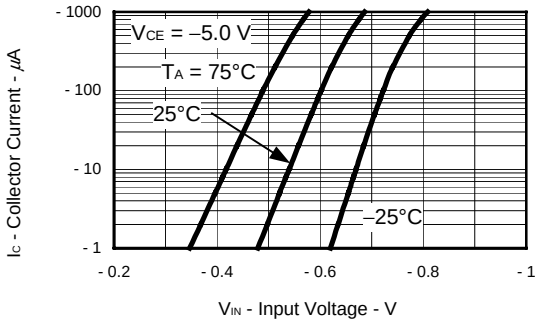

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



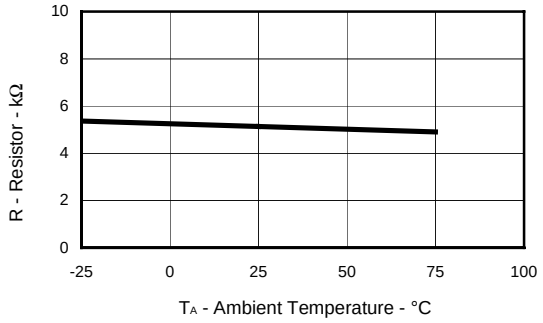

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

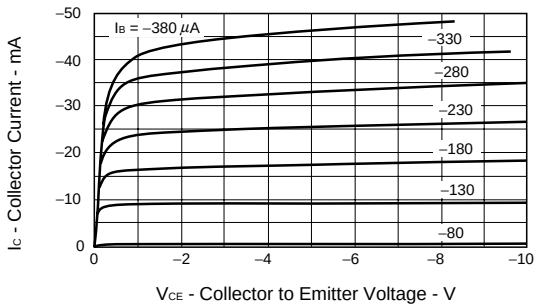



RESISTOR vs. AMBIENT TEMPERATURE

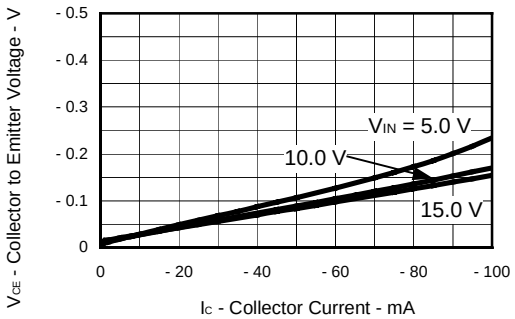


## [FN4A3Q]
## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

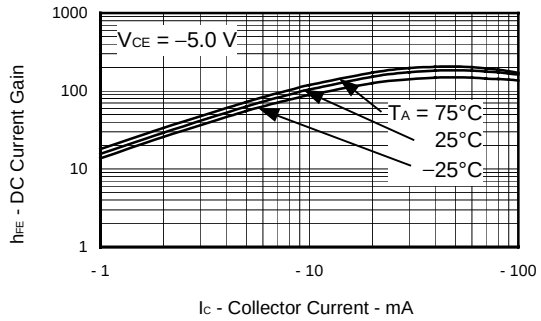
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



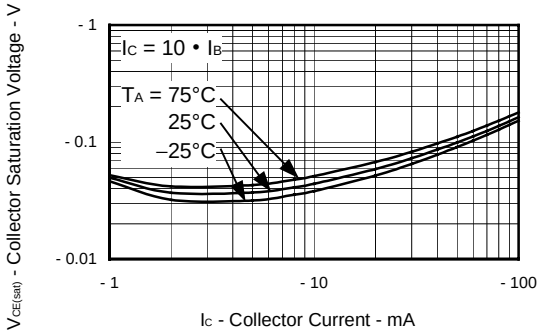

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



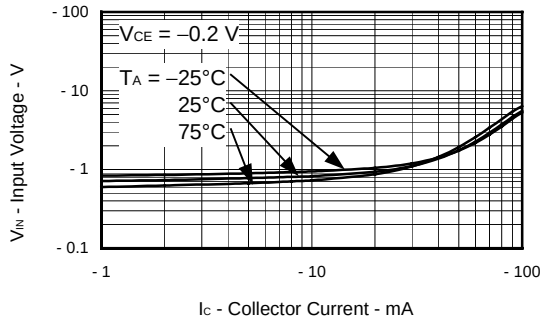

DC CURRENT GAIN vs. COLLECTOR CURRENT



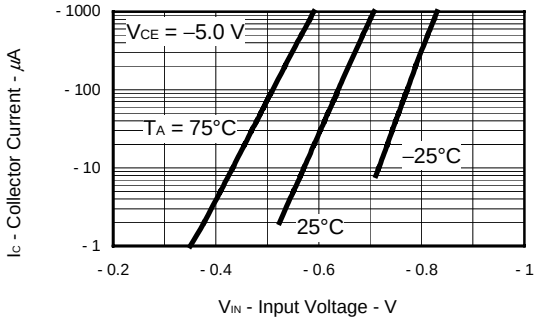

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



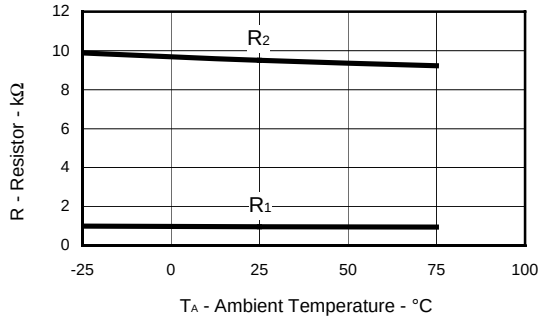

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

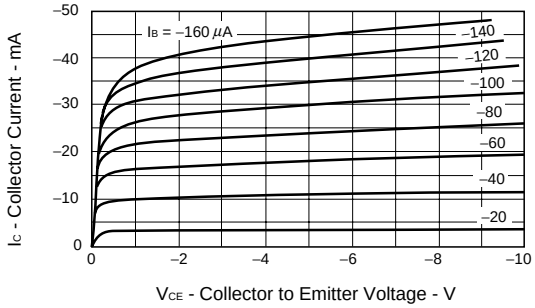



RESISTOR vs. AMBIENT TEMPERATURE

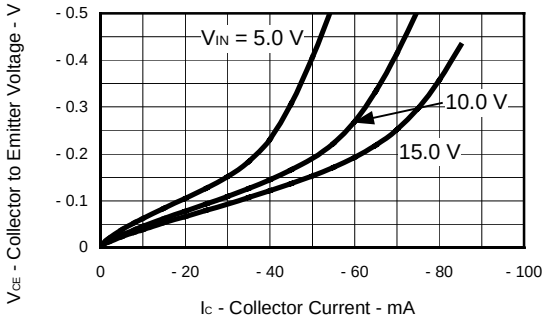


**[FN4A4P]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

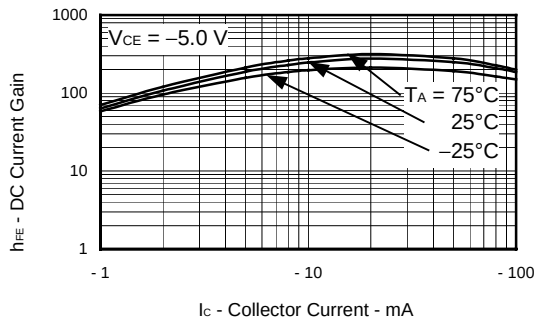
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



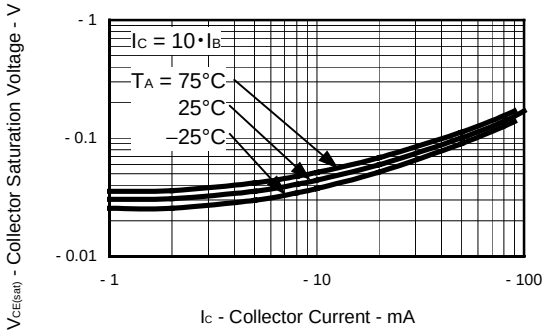

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



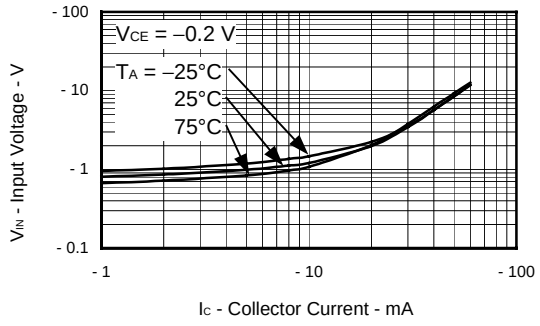

DC CURRENT GAIN vs. COLLECTOR CURRENT



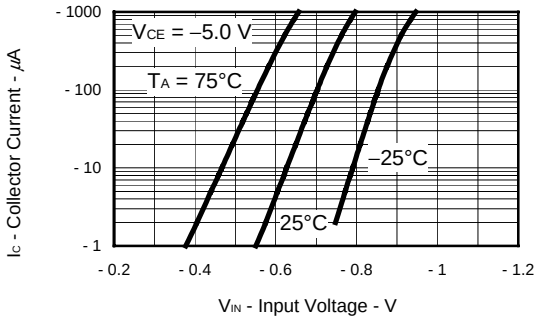

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



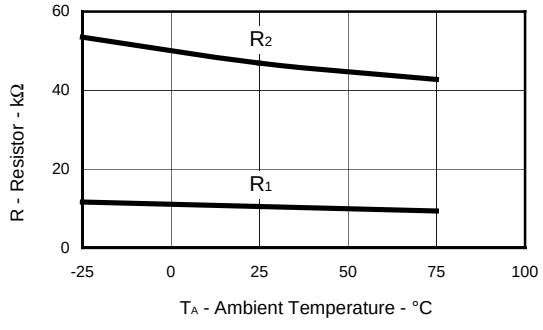

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

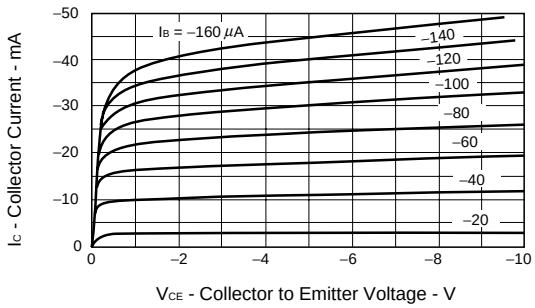



RESISTOR vs. AMBIENT TEMPERATURE

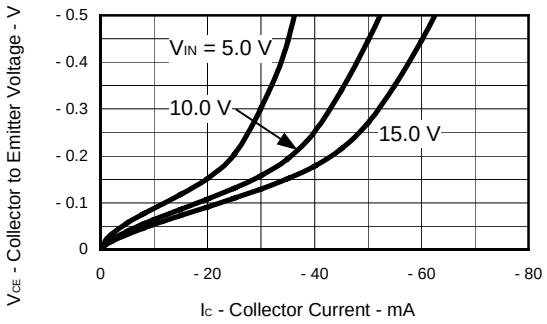


**[FN4F4N]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

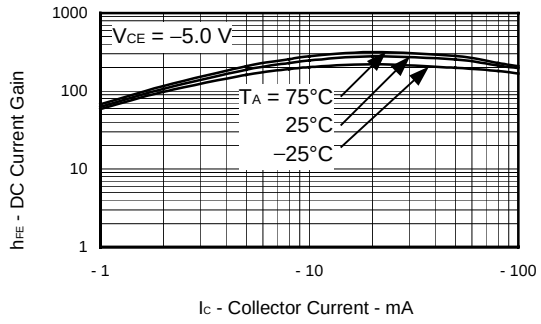
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



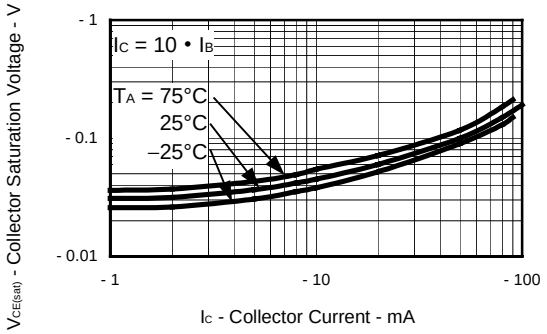

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



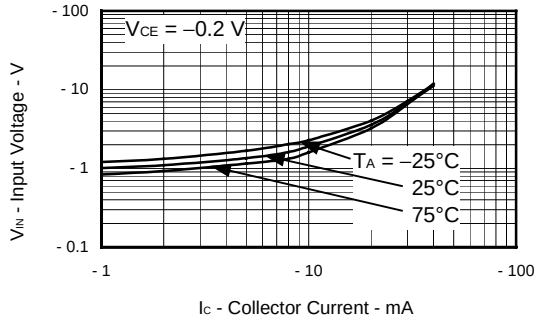

DC CURRENT GAIN vs. COLLECTOR CURRENT



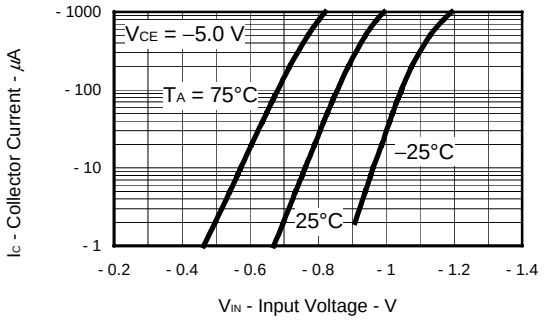

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



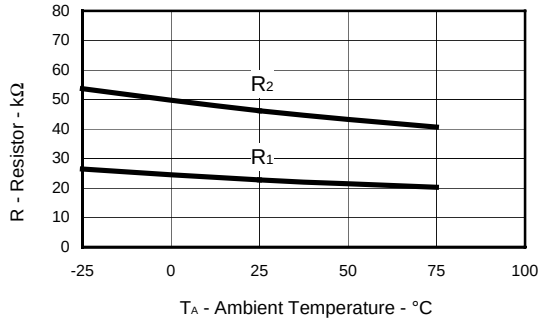

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

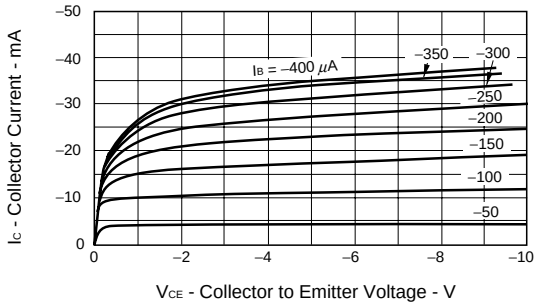



RESISTOR vs. AMBIENT TEMPERATURE

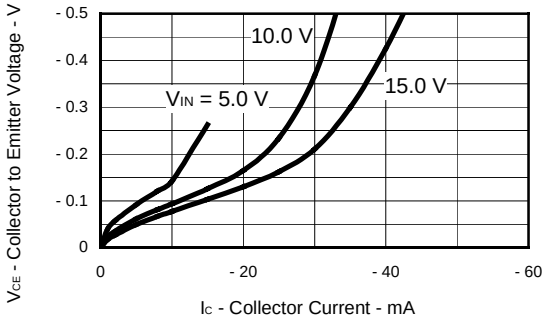


**[FN4L4L]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

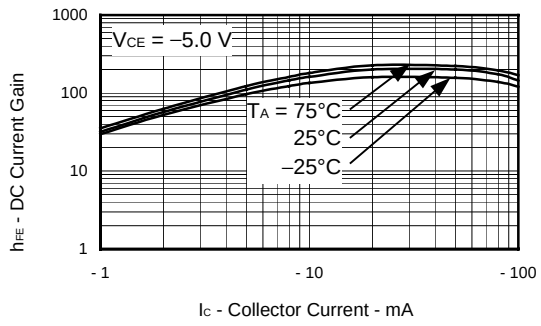
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



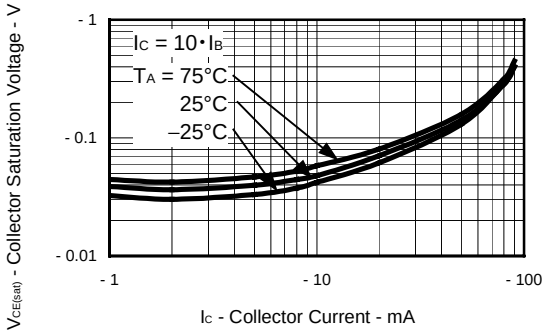

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



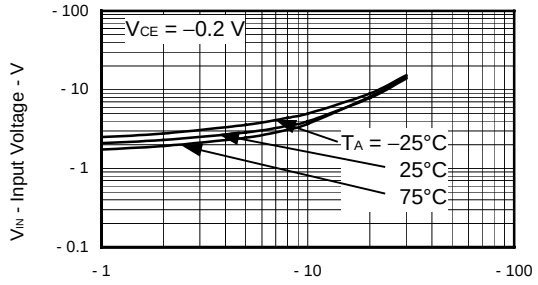

DC CURRENT GAIN vs. COLLECTOR CURRENT



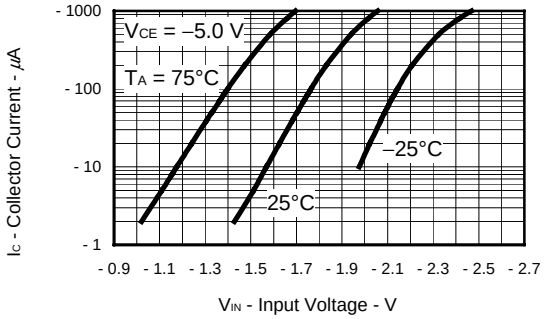

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



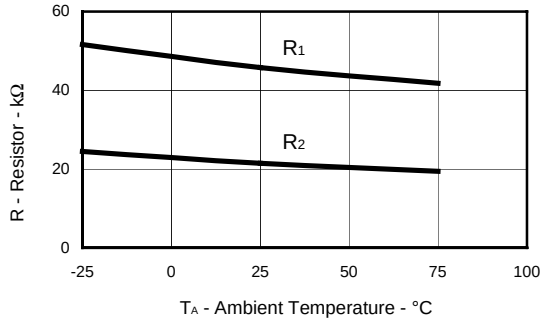

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

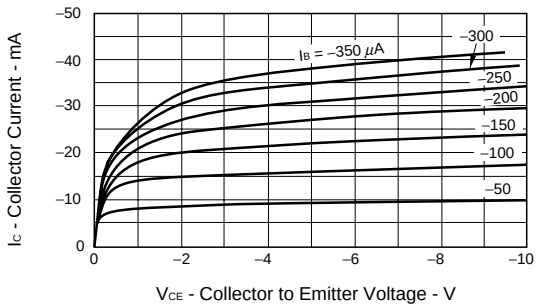



RESISTOR vs. AMBIENT TEMPERATURE

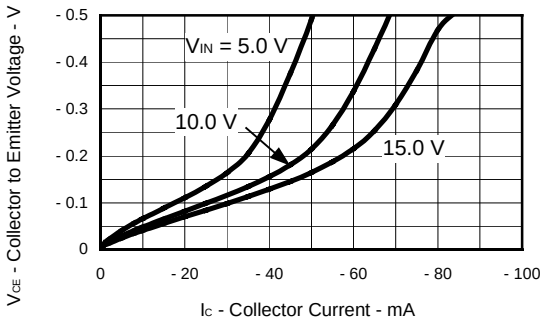


**[FN4A4Z]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

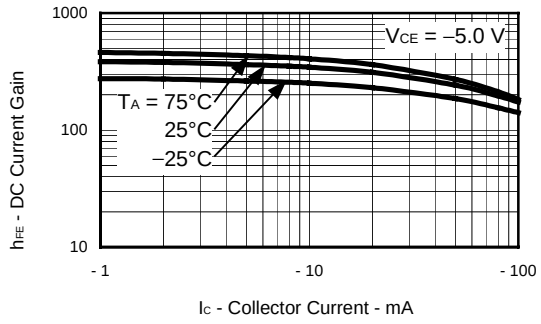
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



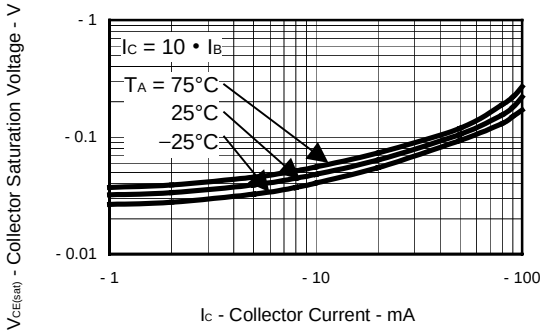

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



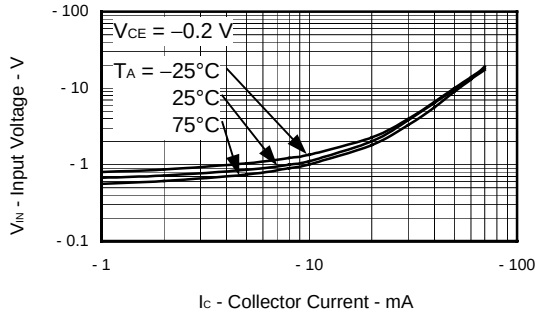

DC CURRENT GAIN vs. COLLECTOR CURRENT



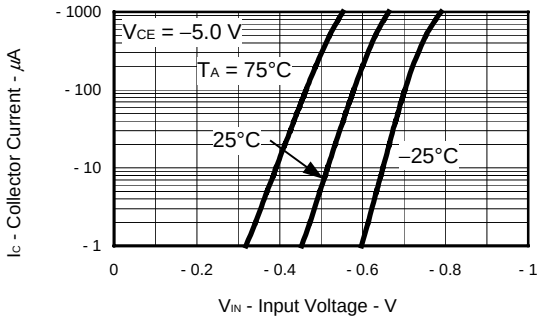

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



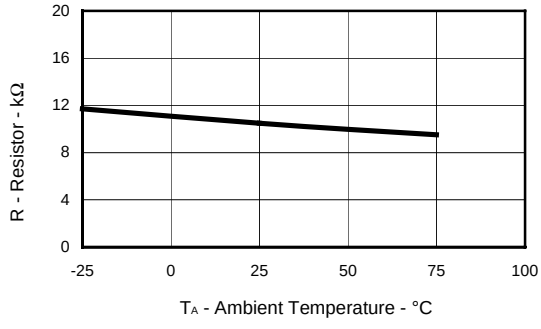

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

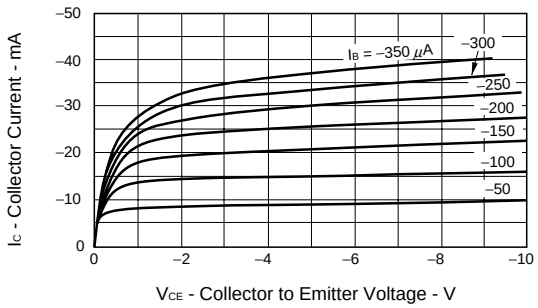



RESISTOR vs. AMBIENT TEMPERATURE

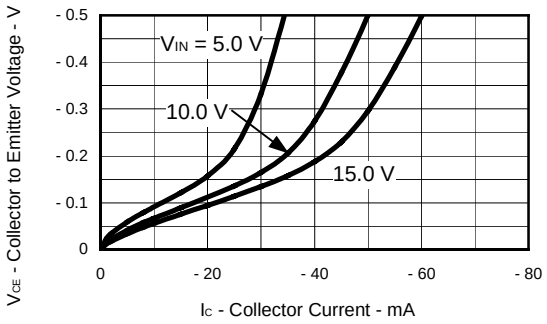


**[FN4F4Z]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

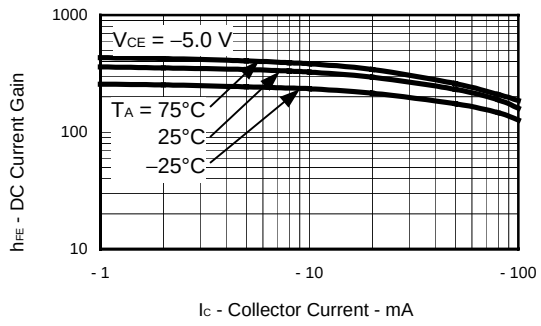
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



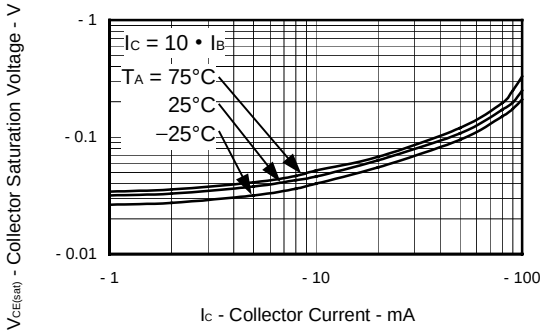

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



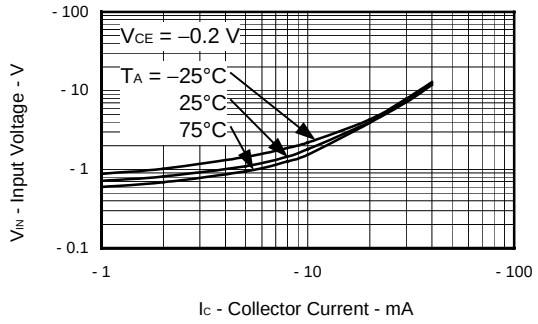

DC CURRENT GAIN vs. COLLECTOR CURRENT



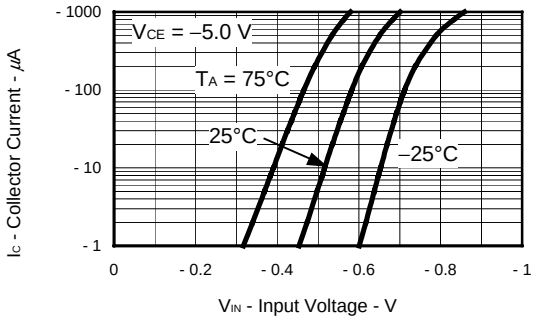

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



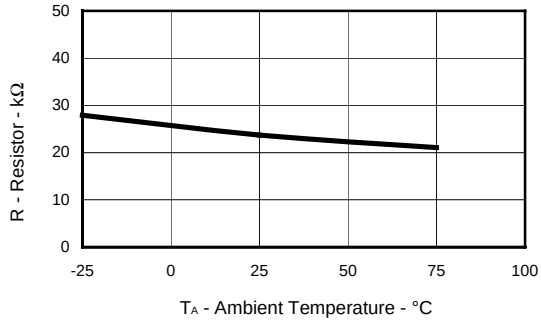

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

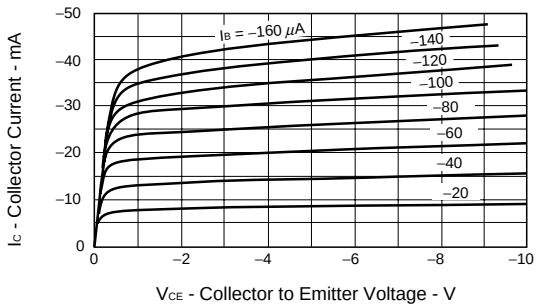



RESISTOR vs. AMBIENT TEMPERATURE

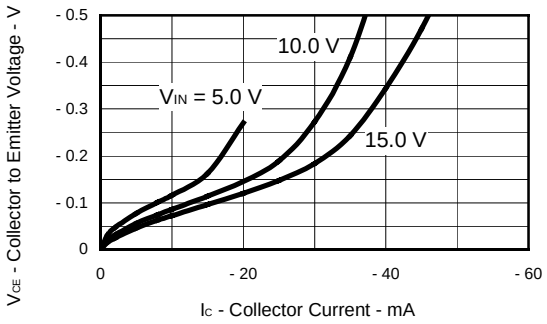


**[FN4L4Z]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

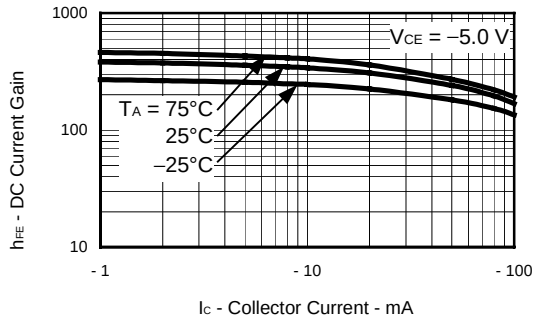
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



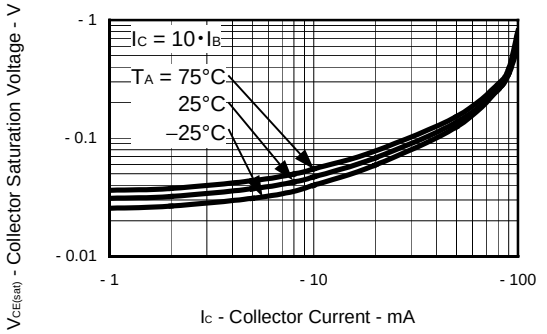

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



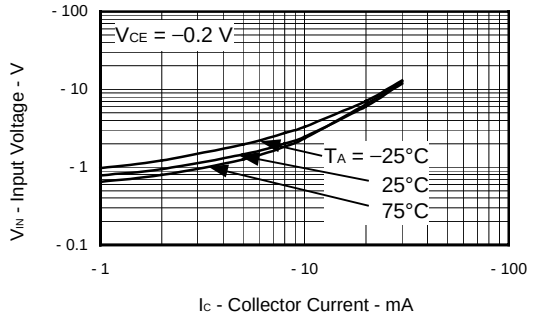

DC CURRENT GAIN vs. COLLECTOR CURRENT



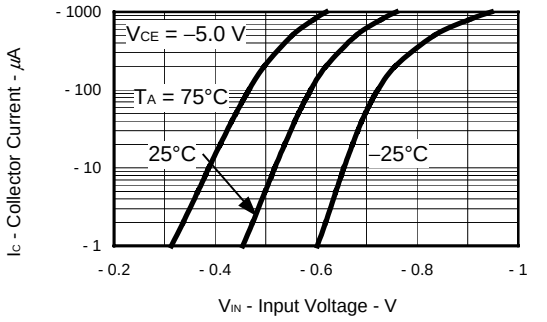

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



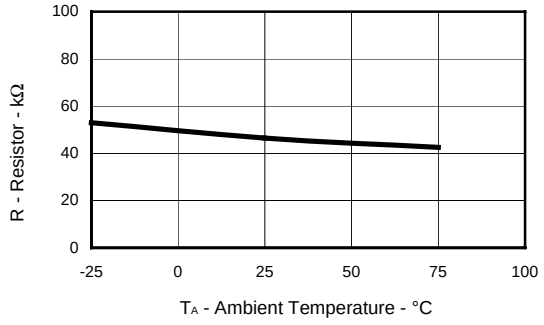

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

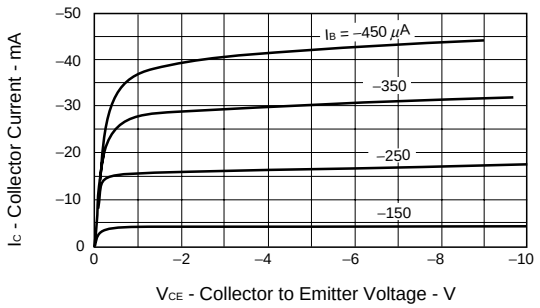



RESISTOR vs. AMBIENT TEMPERATURE

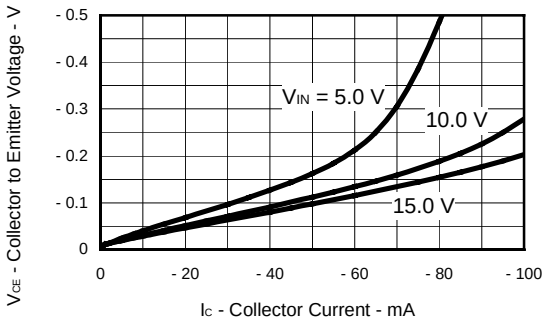


**[FN4F3M]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

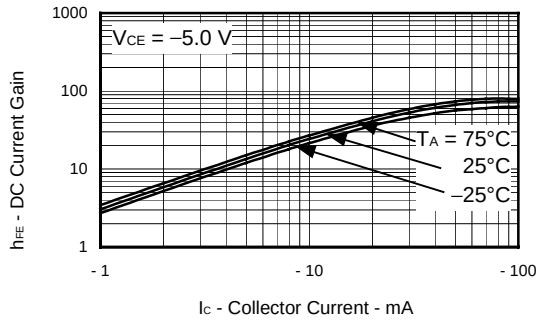
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



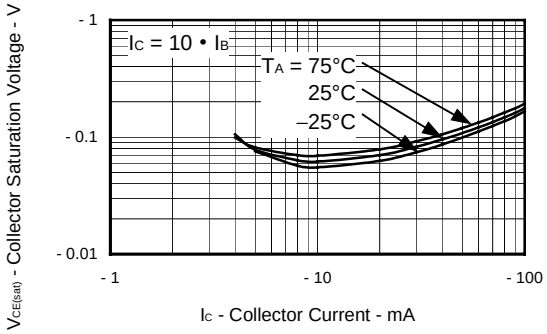

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



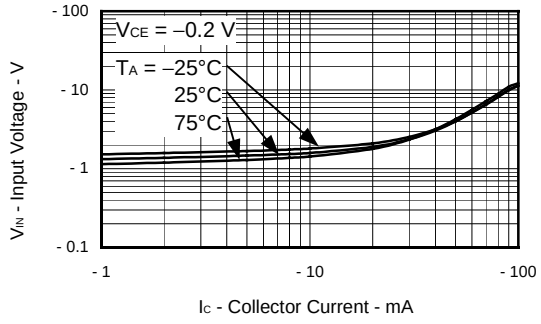

DC CURRENT GAIN vs. COLLECTOR CURRENT



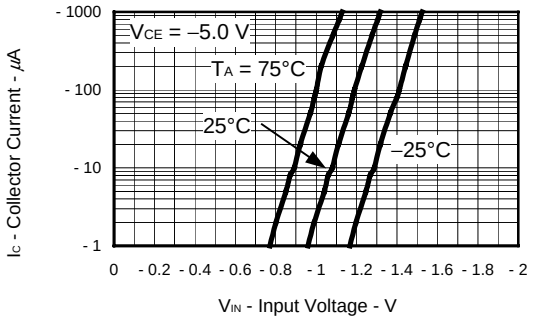

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



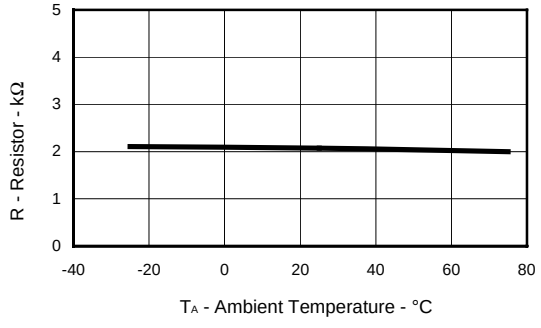

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

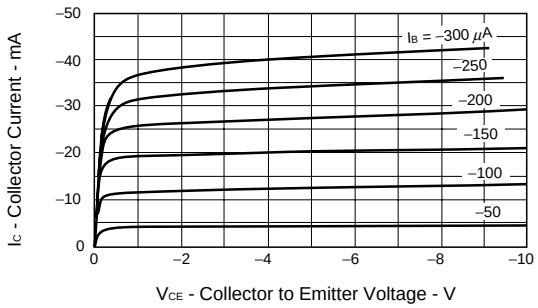



RESISTOR vs. AMBIENT TEMPERATURE

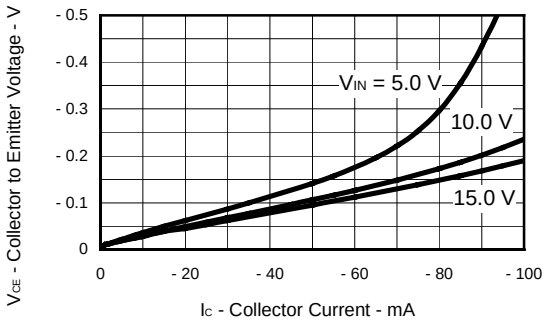


**[FN4F3P]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

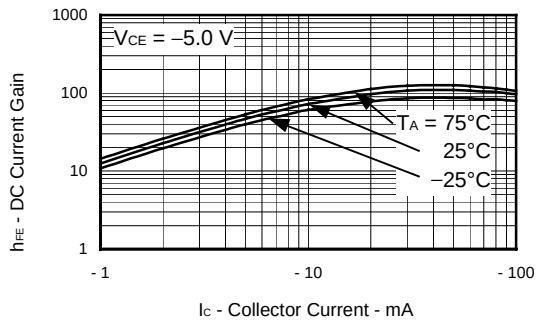
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



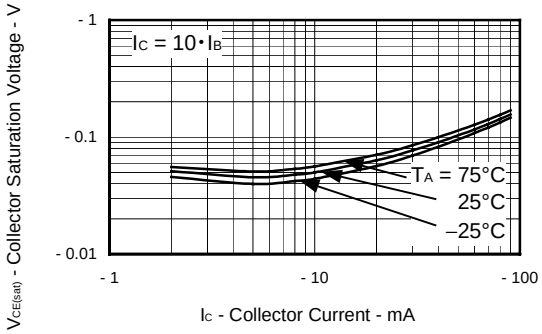

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



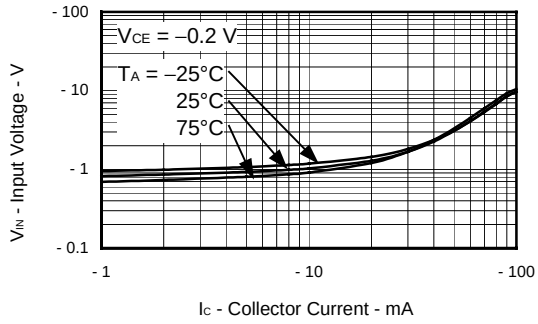

DC CURRENT GAIN vs. COLLECTOR CURRENT



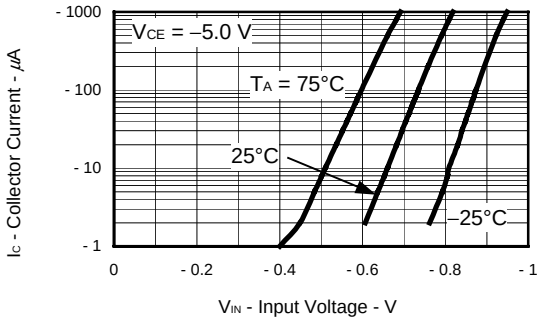

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



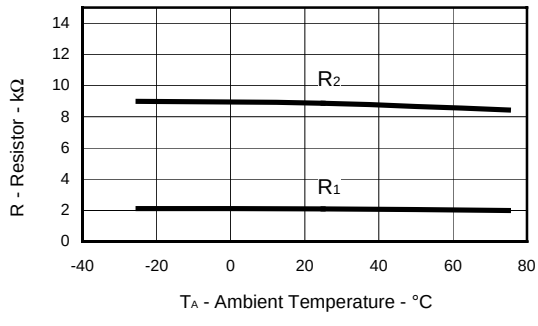

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

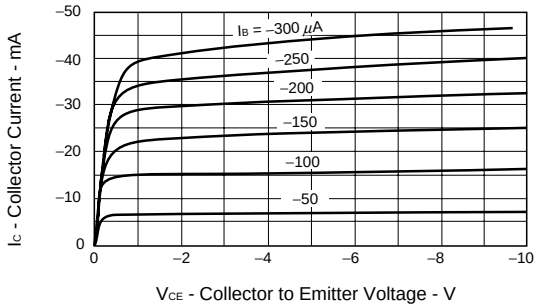



RESISTOR vs. AMBIENT TEMPERATURE

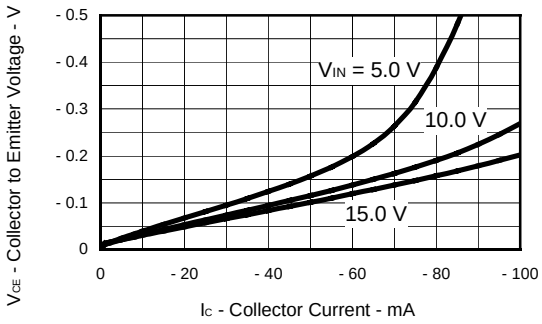


**[FN4F3R]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

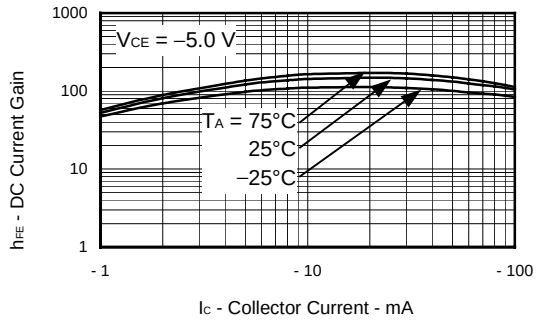
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



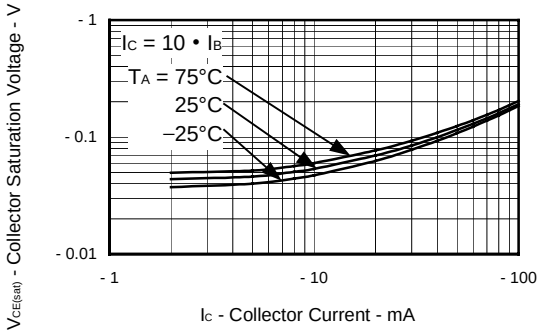

COLLECTOR TO EMITTER VOLTAGEvs.
COLLECTOR CURRENT



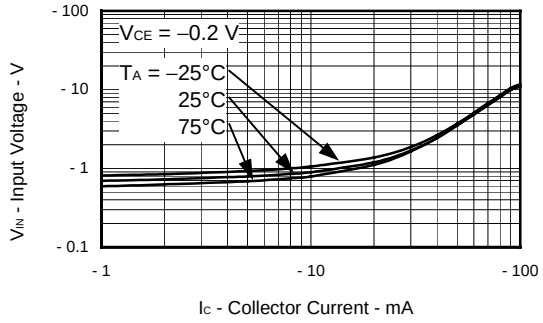

DC CURRENT GAIN vs. COLLECTOR CURRENT



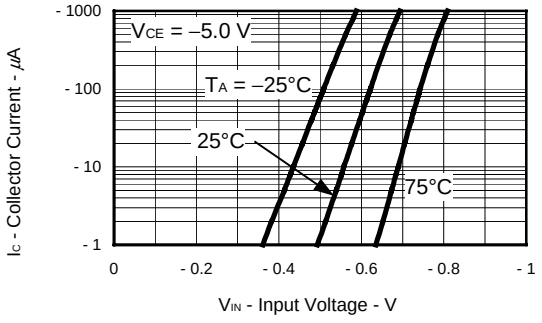

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



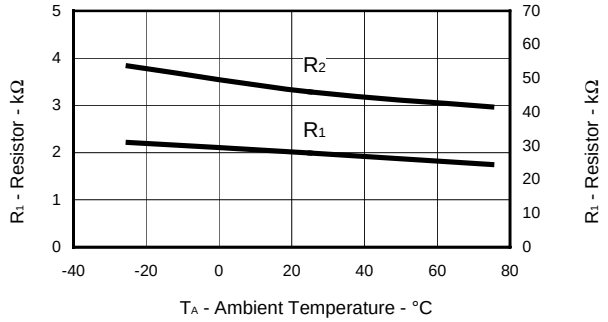

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

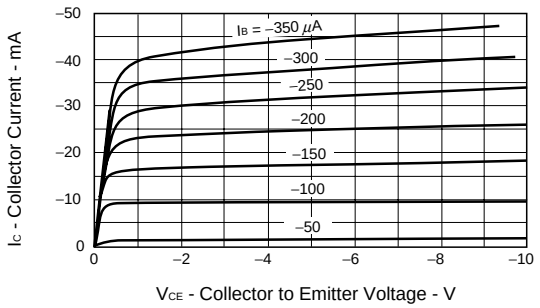



RESISTOR vs. AMBIENT TEMPERATURE

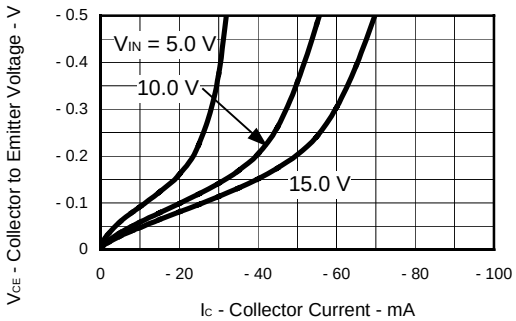


**[FN4A4L]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

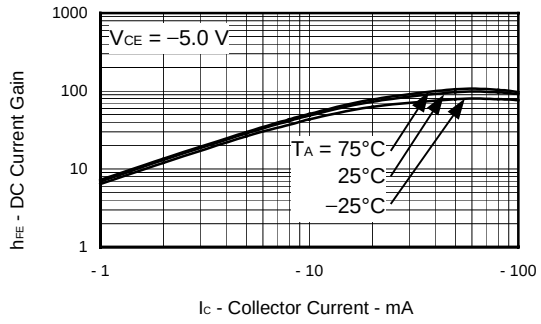
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



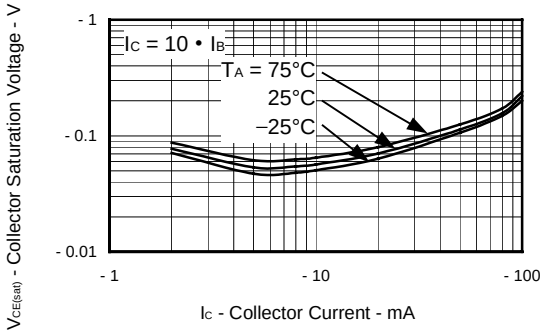

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



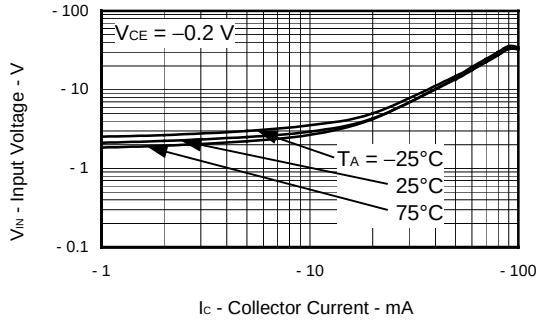

DC CURRENT GAIN vs. COLLECTOR CURRENT



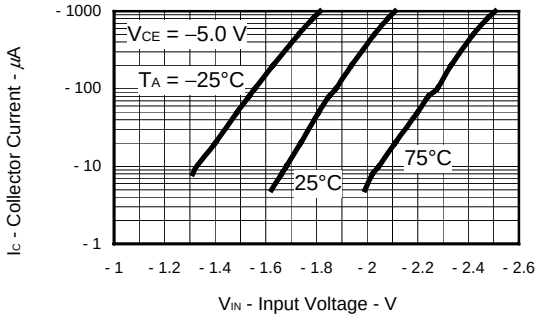

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



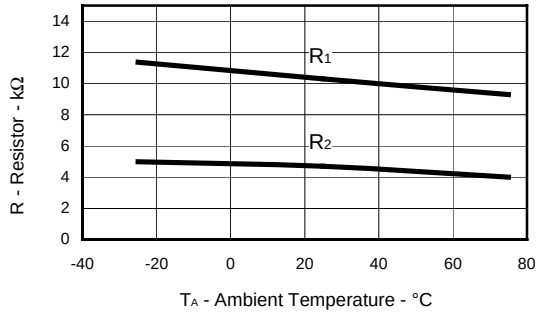

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE

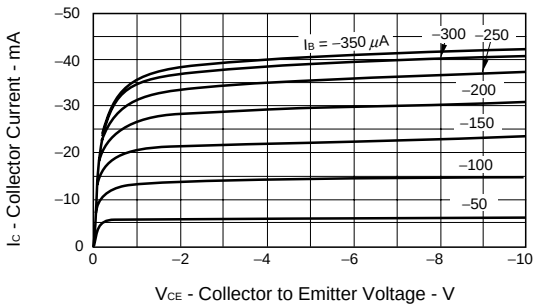



RESISTOR vs. AMBIENT TEMPERATURE

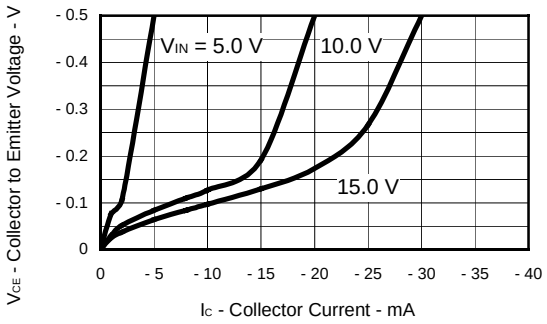


**[FN4L4K]**
**TYPICAL CHARACTERISTICS ($T_A$ = 25°C)**

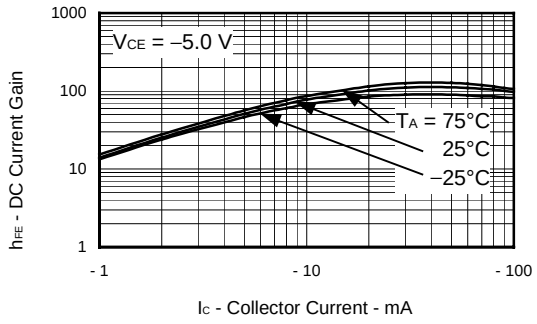
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



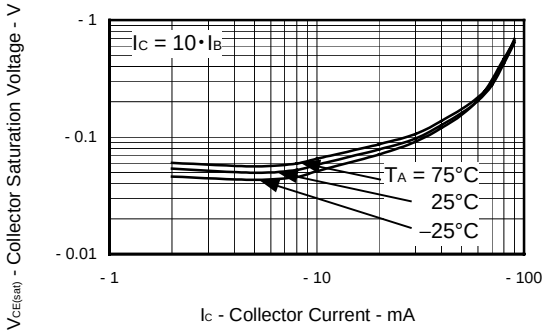

COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



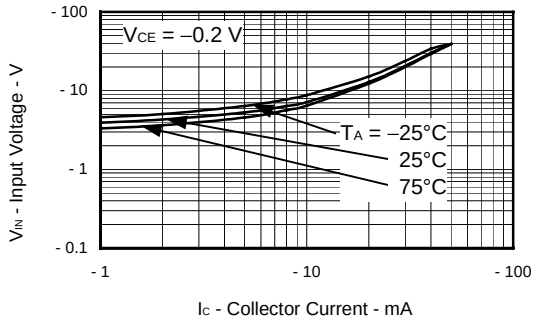

DC CURRENT GAIN vs. COLLECTOR CURRENT



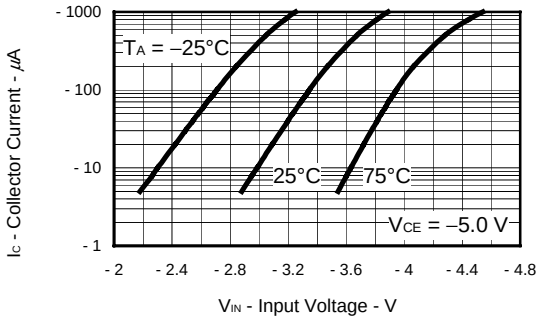

COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



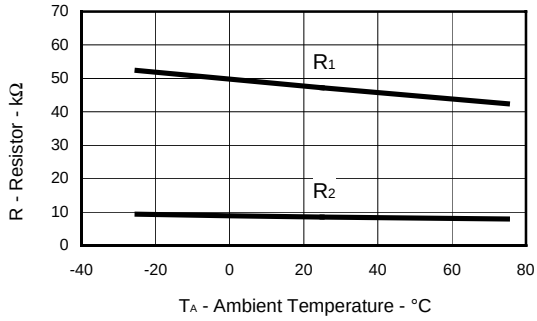

INPUT VOLTAGE vs. COLLECTOR CURRENT




COLLECTOR CURRENT vs. INPUT VOLTAGE




RESISTOR vs. AMBIENT TEMPERATURE



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