

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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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 |

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| | | | |
|--|-----------------------|-------------|----|
| Collector to Base Voltage | V _{CB0} | -60 | V |
| Collector to Emitter Voltage | V _{CE0} | -50 | V |
| <R> Emitter to Base Voltage | V _{EBO} | Note1 | V |
| Collector Current (DC) | I _C | -0.1 | A |
| Collector Current (pulse) ^{Note2} | 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 |

<R> Note 1.

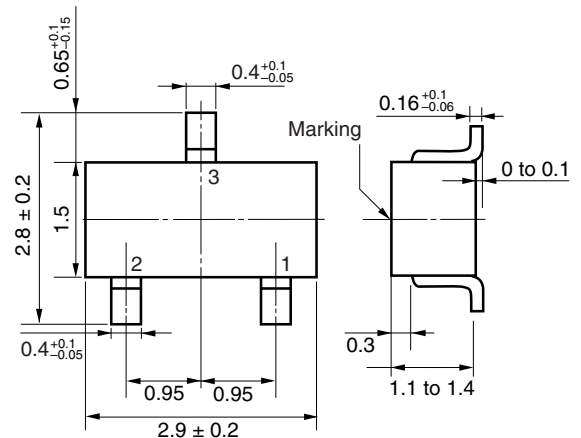
| PART NUMBER | V _{EBO} (V) | MARK | R ₁ (kΩ) | R ₂ (kΩ) |
|-------------|-------------------------|------|------------------------|------------------------|
| FN4A4M | -10 | NA1 | 10.0 | 10.0 |
| FN4F4M | -10 | NB1 | 22.0 | 22.0 |
| FN4L4M | -10 | NC1 | 47.0 | 47.0 |
| FN4L3M | -10 | ND1 | 4.7 | 4.7 |
| FN4L3N | -5 | NE1 | 4.7 | 10.0 |
| FN4L3Z | -5 | NF1 | 4.7 | |
| FN4A3Q | -5 | NG1 | 1.0 | 10.0 |
| FN4A4P | -5 | NH1 | 10.0 | 47.0 |
| FN4F4N | -5 | NJ1 | 22.0 | 47.0 |

Note 2. PW ≤ 10 ms, Duty Cycle ≤ 50%

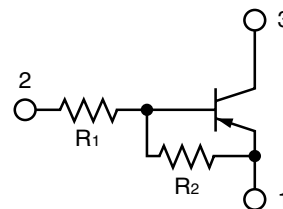
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PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT



PIN CONNECTION

- 1: Emitter
- 2: Base
- 3: Collector

| PART NUMBER | V _{EBO} (V) | MARK | R ₁ (kΩ) | R ₂ (kΩ) |
|-------------|-------------------------|------|------------------------|------------------------|
| FN4L4L | -15 | NK1 | 47.0 | 22.0 |
| FN4A4Z | -5 | NL1 | 10.0 | |
| FN4F4Z | -5 | NM1 | 22.0 | |
| FN4L4Z | -5 | NN1 | 47.0 | |
| FN4F3M | -10 | NP1 | 2.2 | 2.2 |
| FN4F3P | -5 | NQ1 | 2.2 | 10.0 |
| FN4F3R | -5 | NR1 | 2.2 | 47.0 |
| FN4A4L | -15 | NS1 | 10.0 | 4.7 |
| FN4L4K | -25 | NT1 | 47.0 | 10.0 |

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 μA | 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.

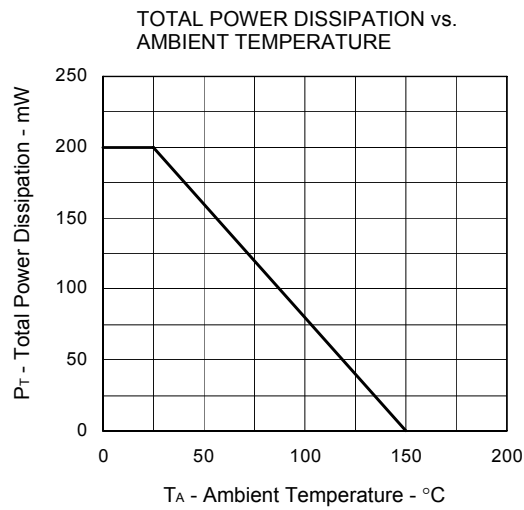
| PART NUMBER | h _{FE1} | | | h _{FE2} | | | UNIT |
|-------------|------------------|------|------|------------------|------|------|------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| FN4A4M | 35 | | 100 | 80 | | | - |
| FN4F4M | 60 | | 195 | 90 | | | - |
| FN4L4M | 85 | | 340 | 95 | | | - |
| 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 |

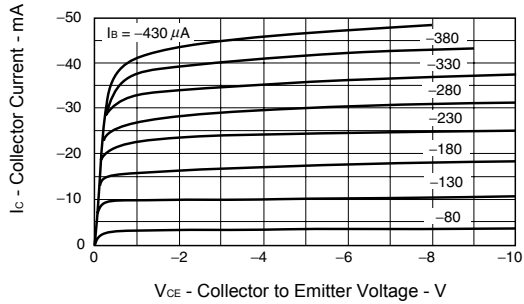
Note 3.

| 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 |

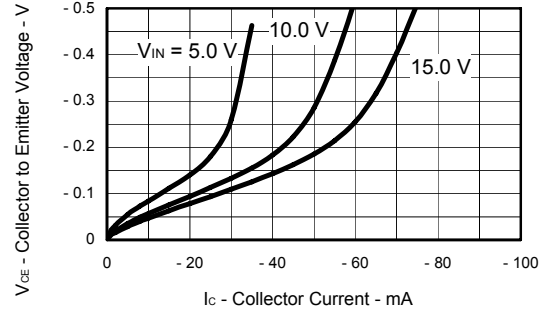


[FN4A4M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

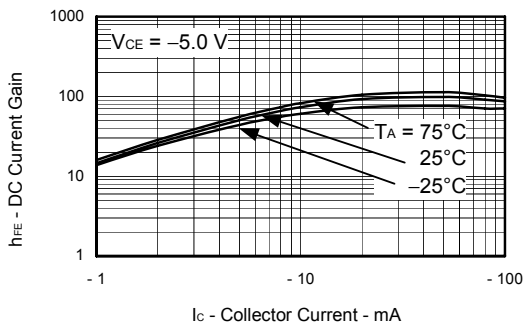
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



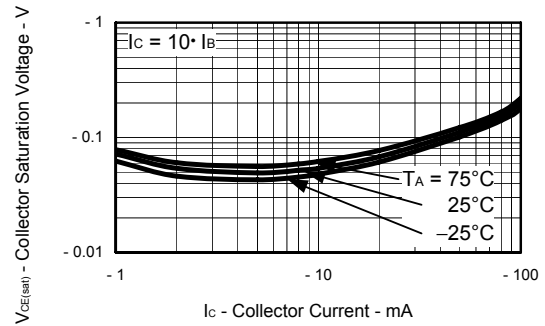
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



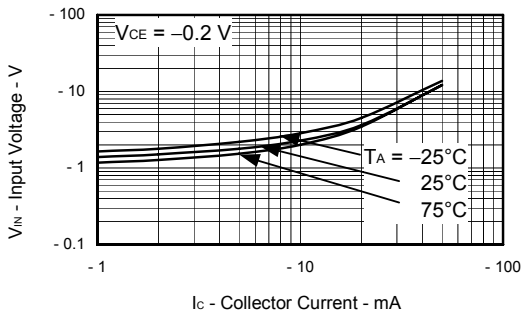
DC CURRENT GAIN vs. COLLECTOR CURRENT



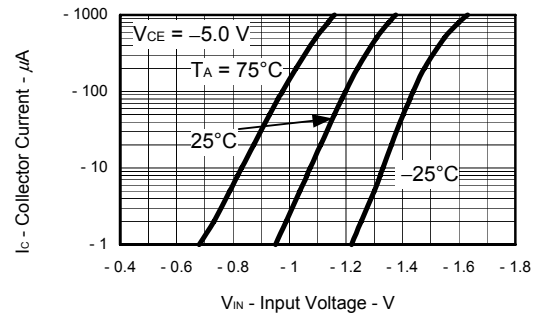
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



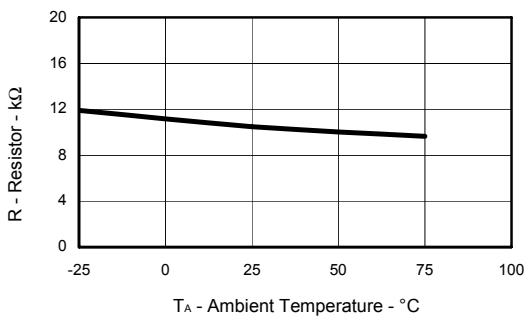
INPUT VOLTAGE vs. COLLECTOR CURRENT



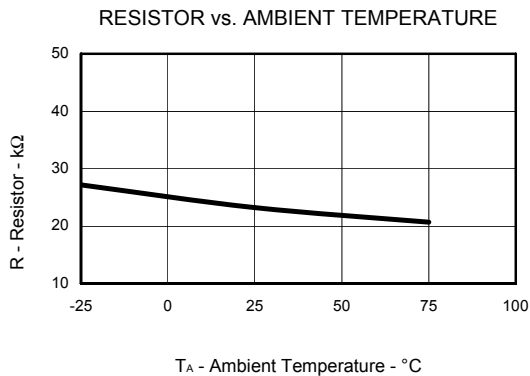
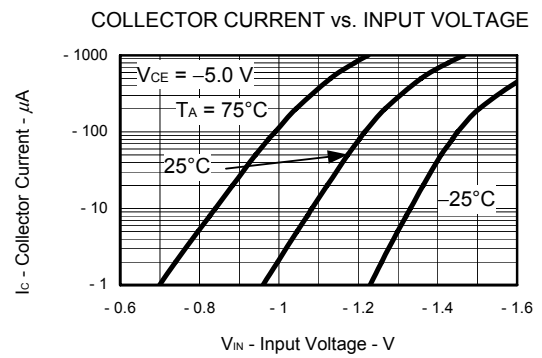
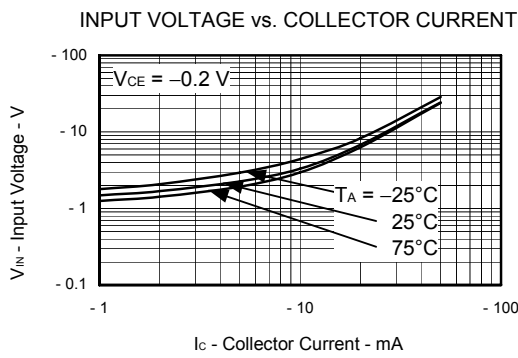
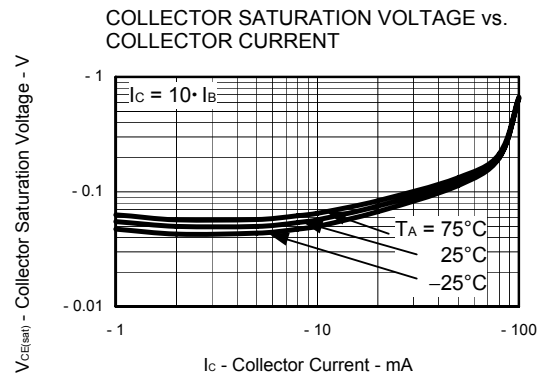
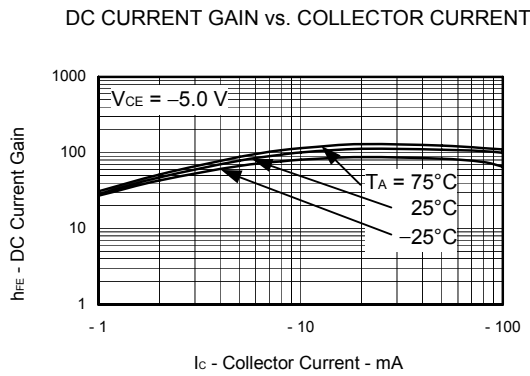
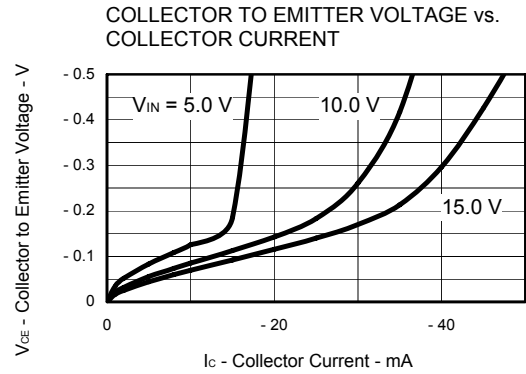
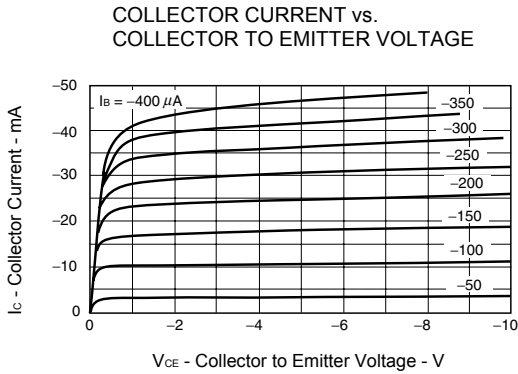
COLLECTOR CURRENT vs. INPUT VOLTAGE



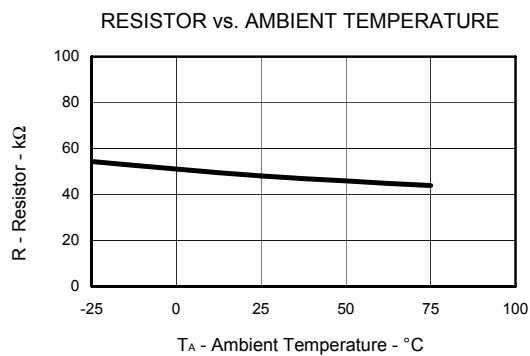
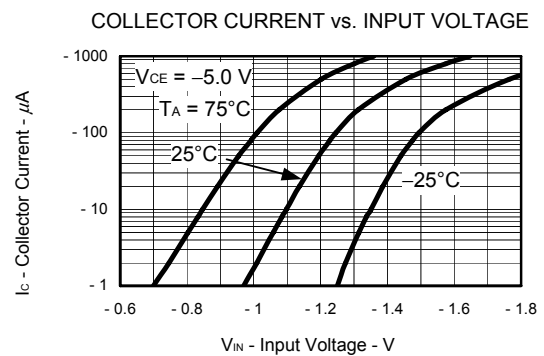
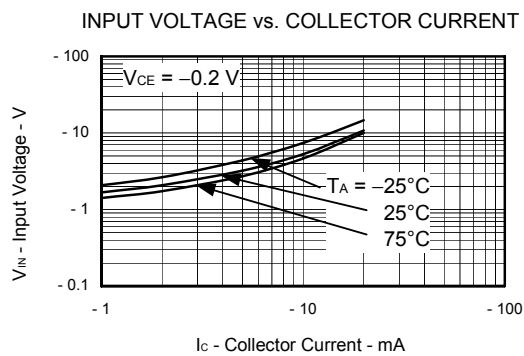
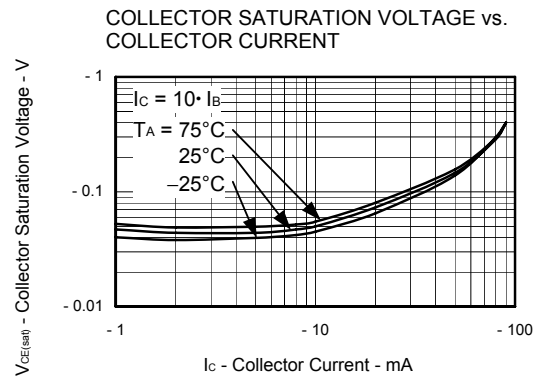
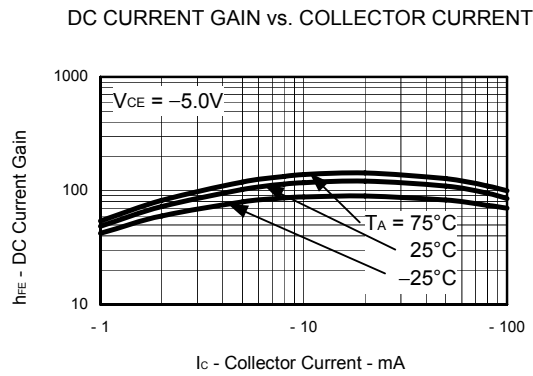
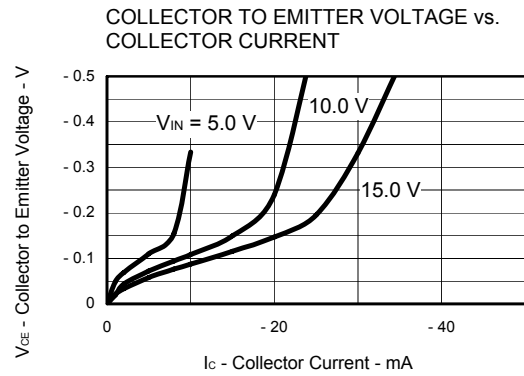
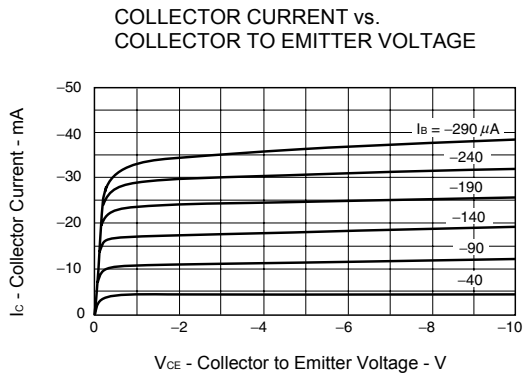
RESISTOR vs. AMBIENT TEMPERATURE



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

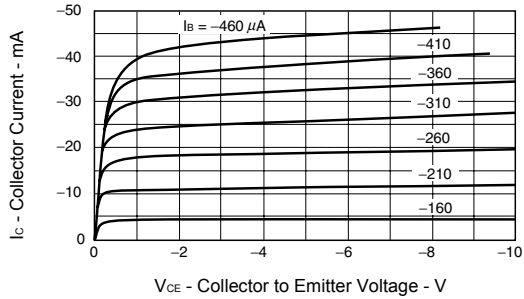


[FN4L4M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

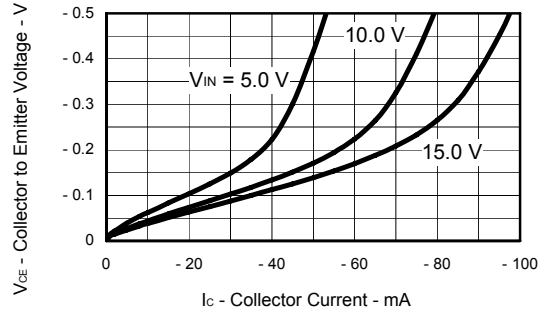


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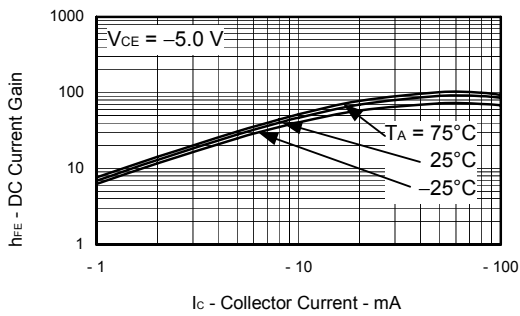
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



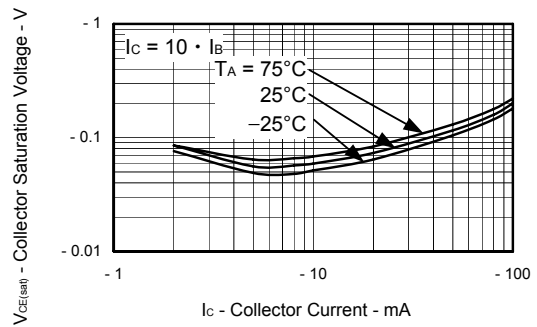
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



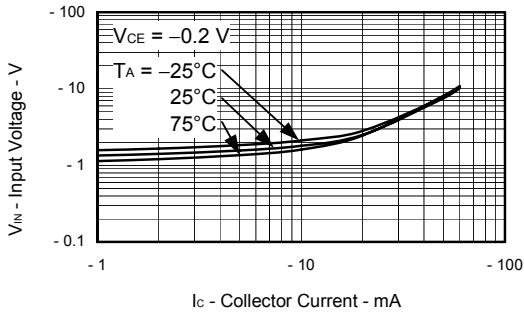
DC CURRENT GAIN vs. COLLECTOR CURRENT



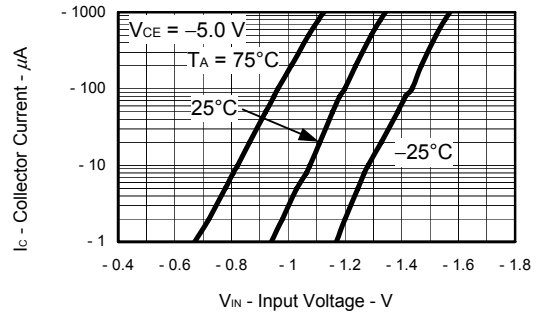
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



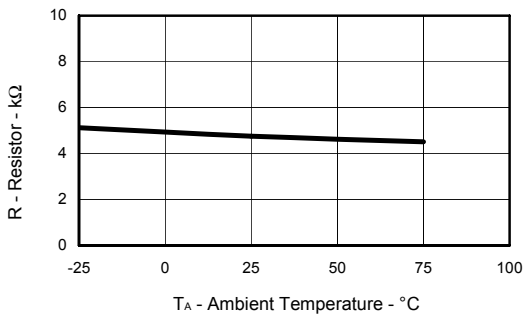
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

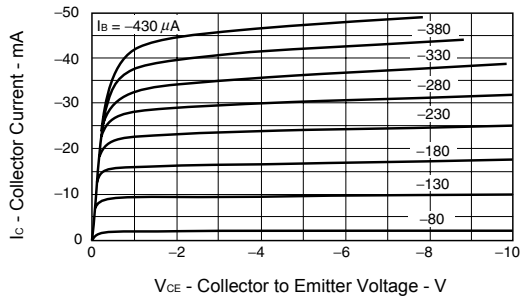


RESISTOR vs. AMBIENT TEMPERATURE

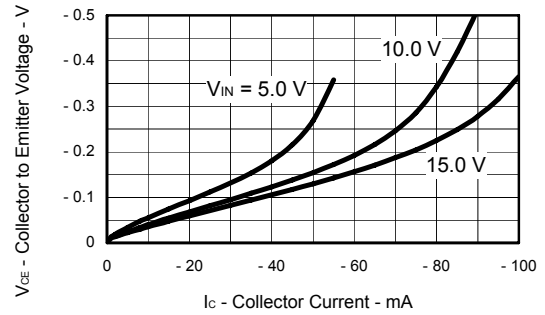


[FN4L3N]
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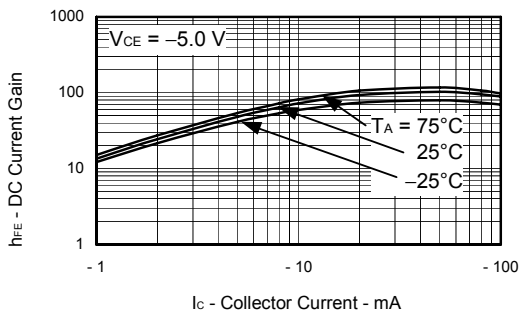
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



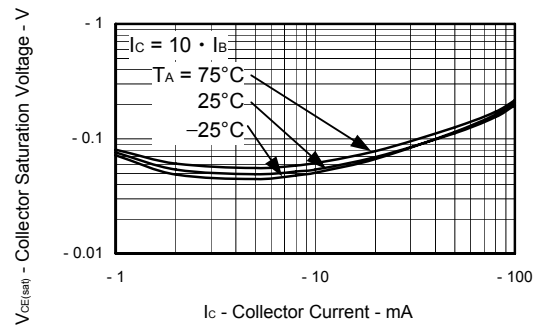
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



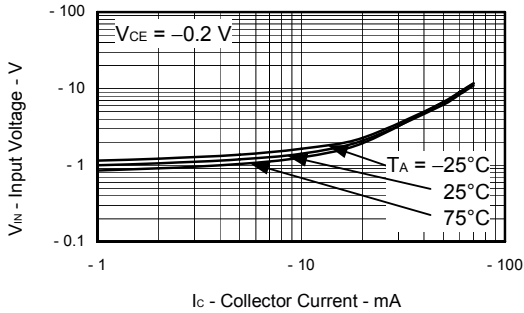
DC CURRENT GAIN vs. COLLECTOR CURRENT



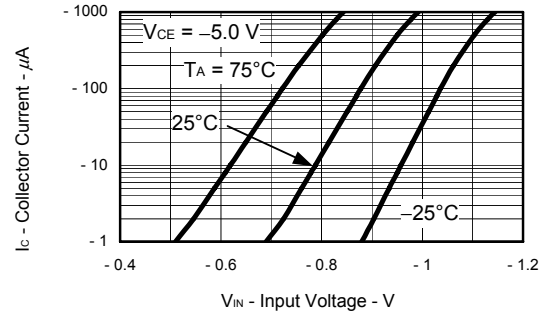
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



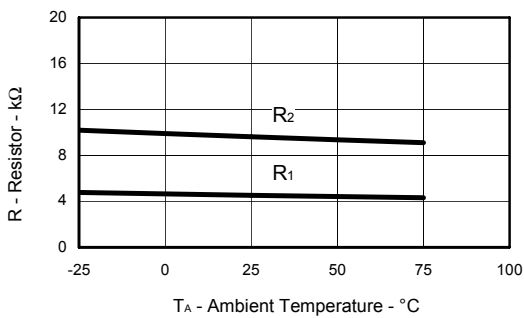
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

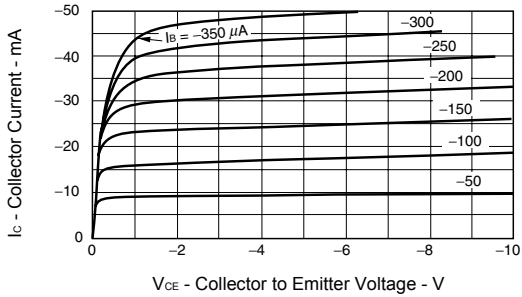


RESISTOR vs. AMBIENT TEMPERATURE

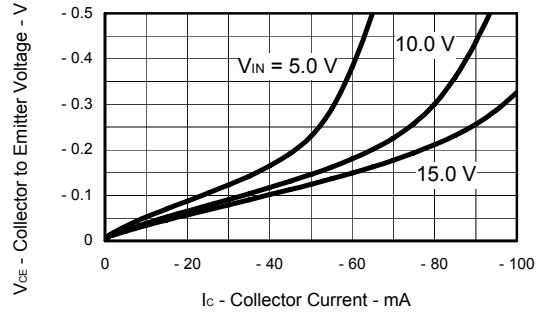


[FN4L3Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

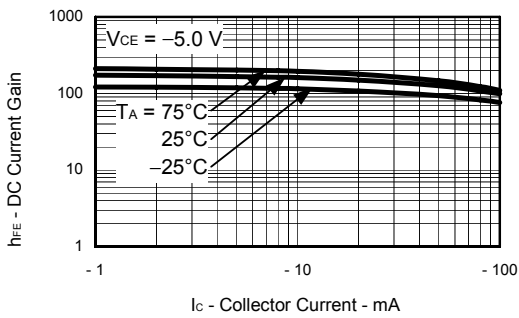
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



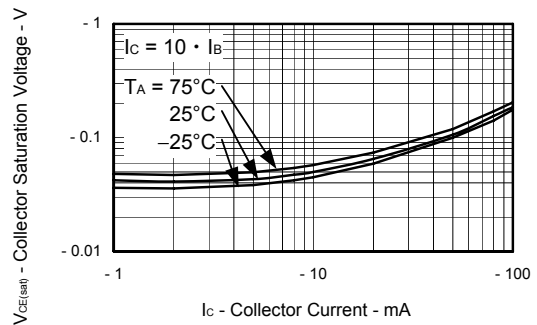
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



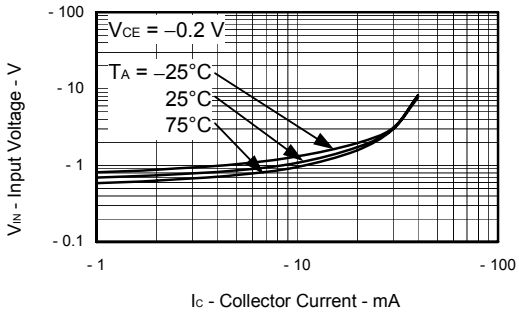
DC CURRENT GAIN vs. COLLECTOR CURRENT



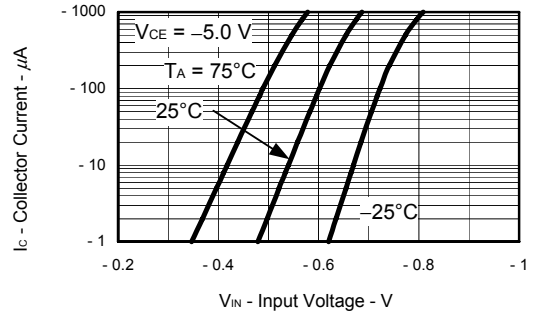
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



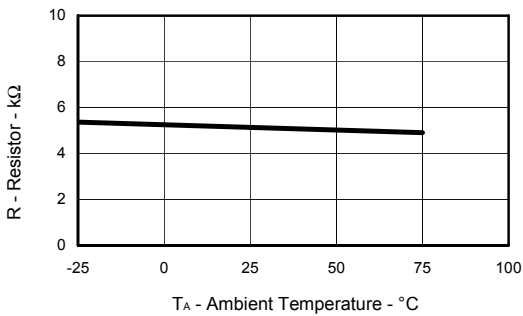
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

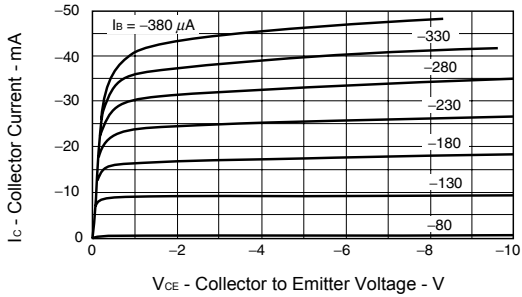


RESISTOR vs. AMBIENT TEMPERATURE

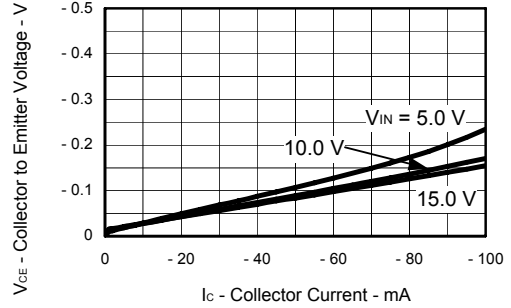


[FN4A3Q]
TYPICAL CHARACTERISTICS (T_A = 25°C)

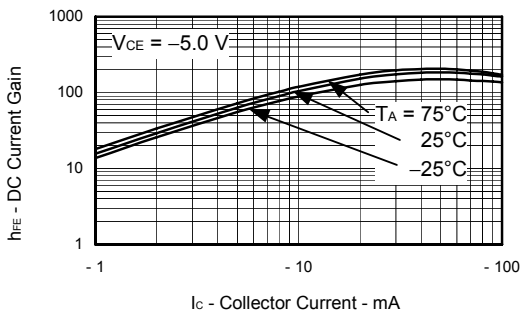
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



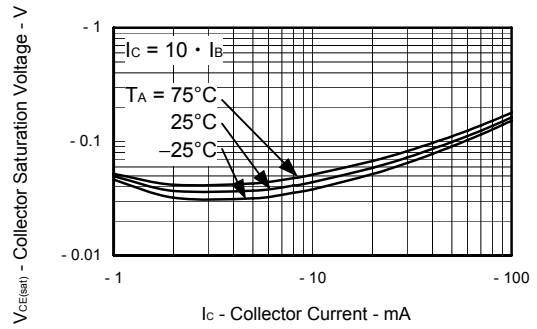
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



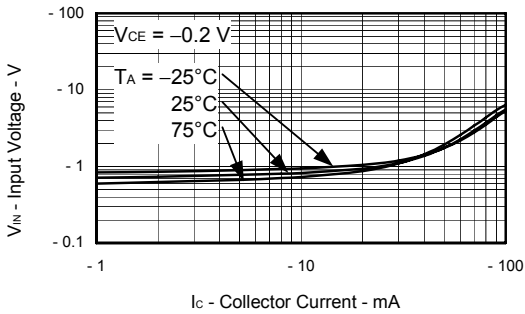
DC CURRENT GAIN vs. COLLECTOR CURRENT



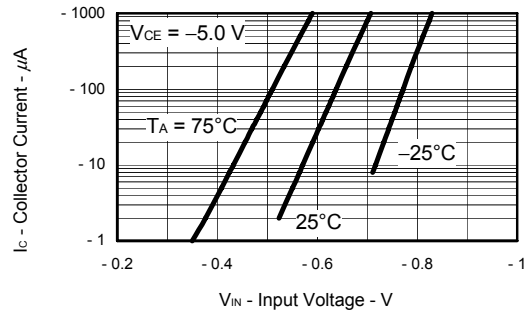
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



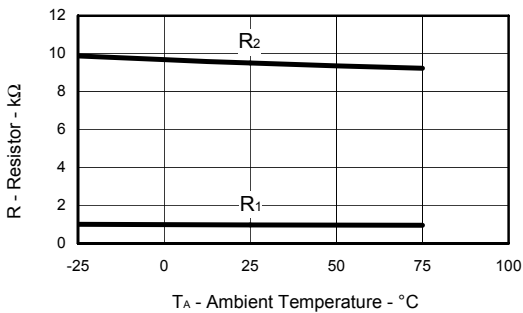
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

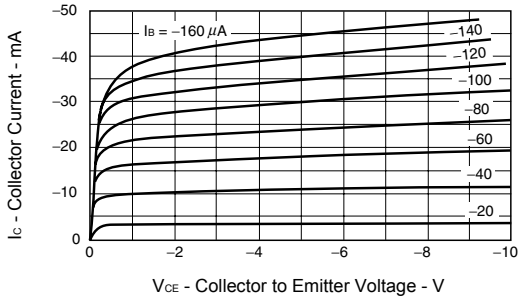


RESISTOR vs. AMBIENT TEMPERATURE

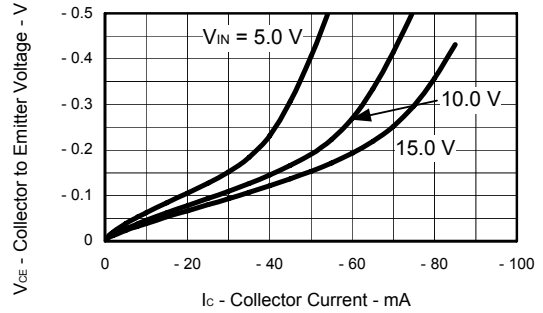


[FN4A4P]
TYPICAL CHARACTERISTICS (T_A = 25°C)

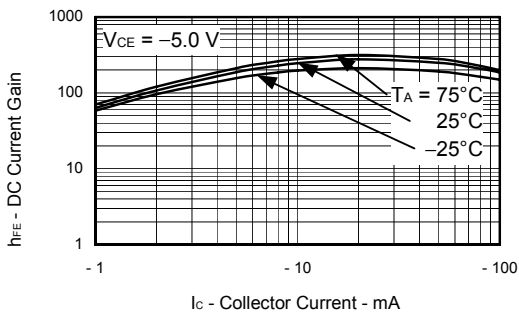
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



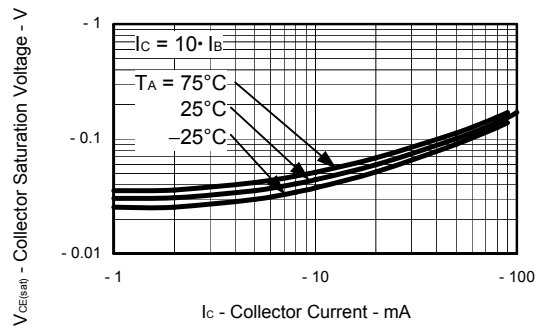
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



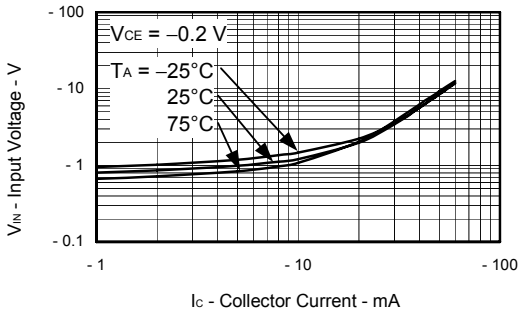
DC CURRENT GAIN vs. COLLECTOR CURRENT



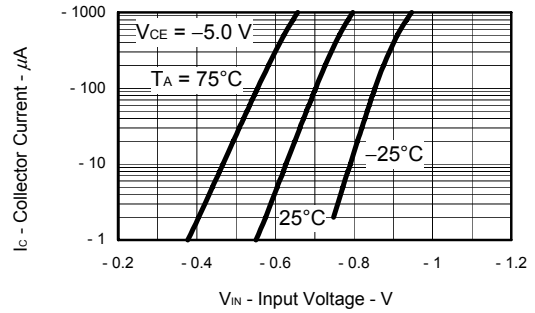
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



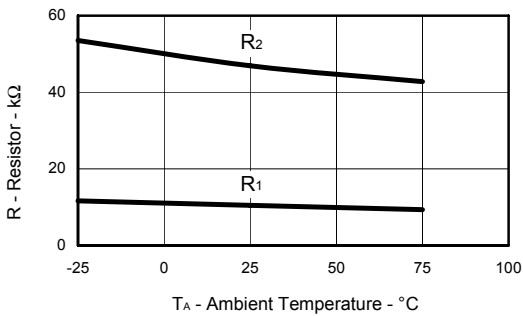
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

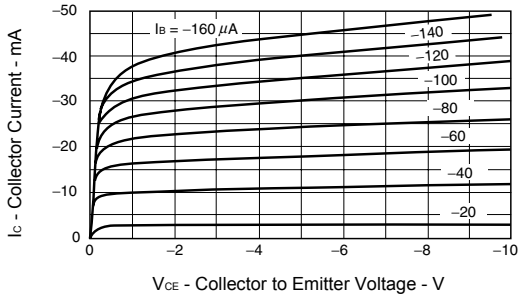


RESISTOR vs. AMBIENT TEMPERATURE

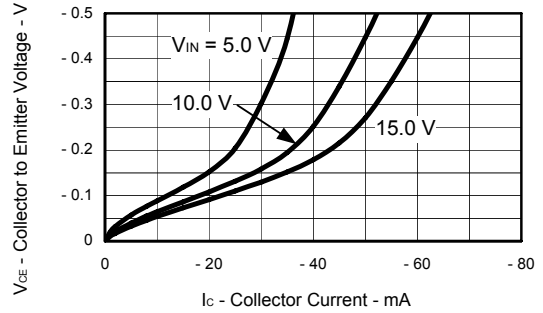


[FN4F4N]
TYPICAL CHARACTERISTICS (T_A = 25°C)

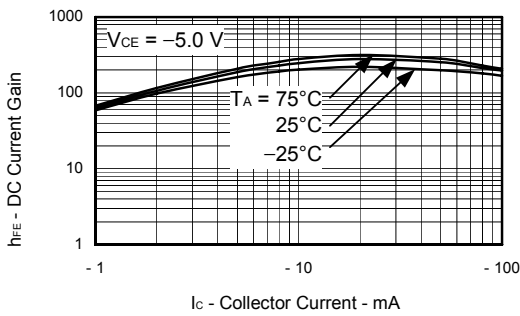
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



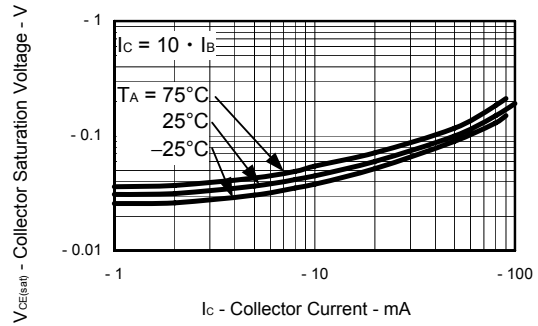
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



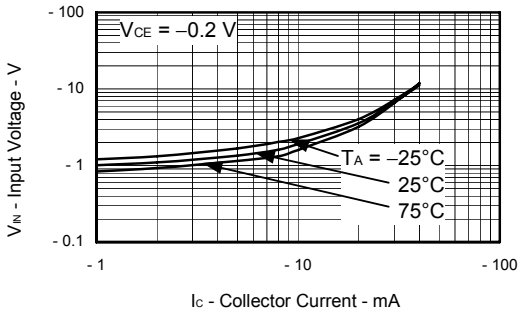
DC CURRENT GAIN vs. COLLECTOR CURRENT



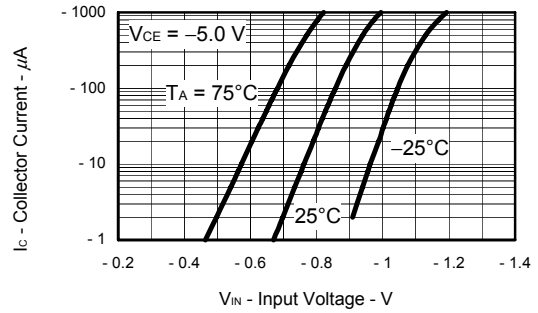
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



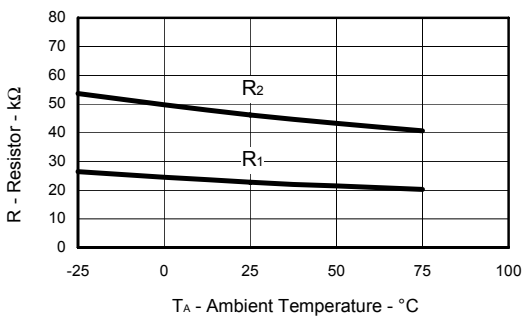
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

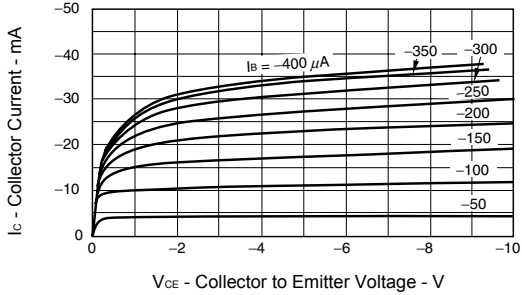


RESISTOR vs. AMBIENT TEMPERATURE

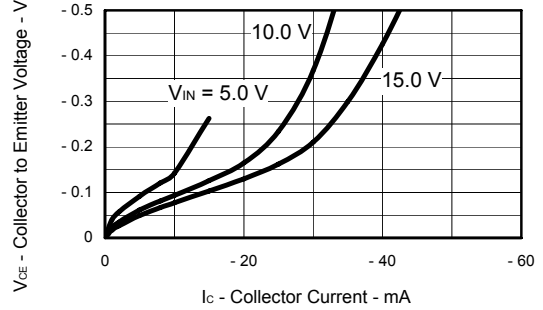


[FN4L4L]
TYPICAL CHARACTERISTICS (T_A = 25°C)

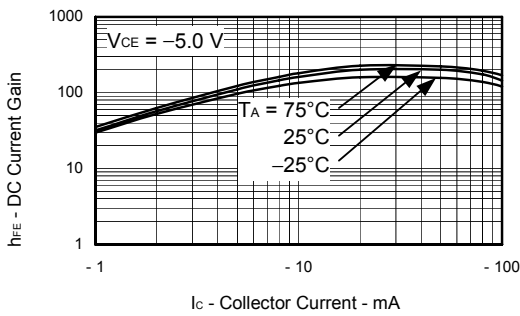
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



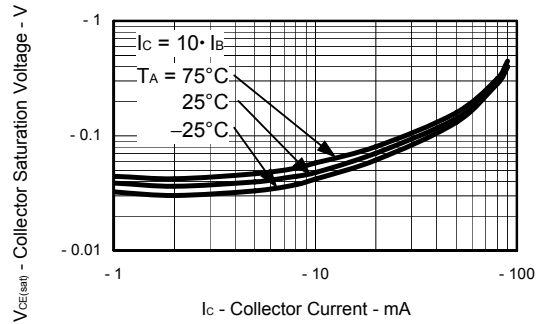
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



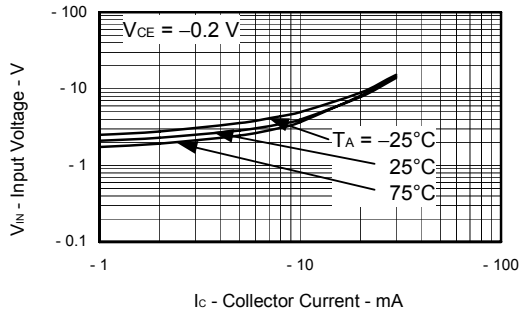
DC CURRENT GAIN vs. COLLECTOR CURRENT



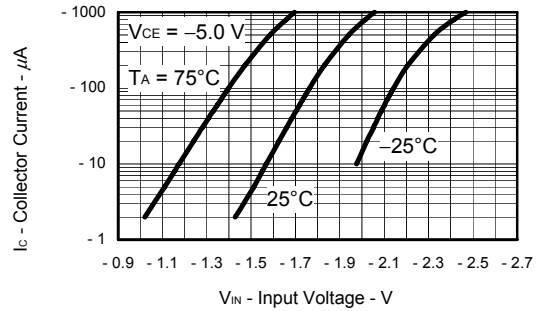
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



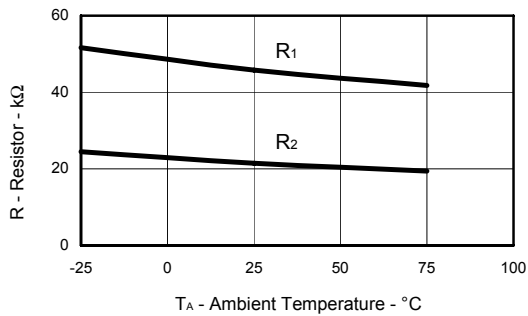
INPUT VOLTAGE vs. COLLECTOR CURRENT



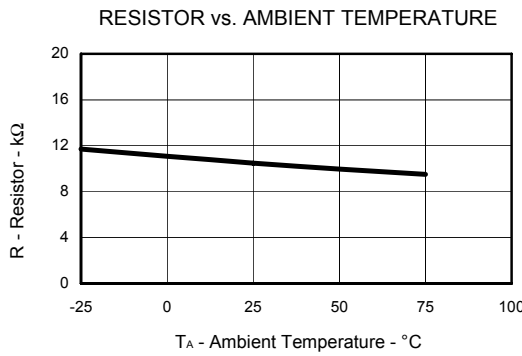
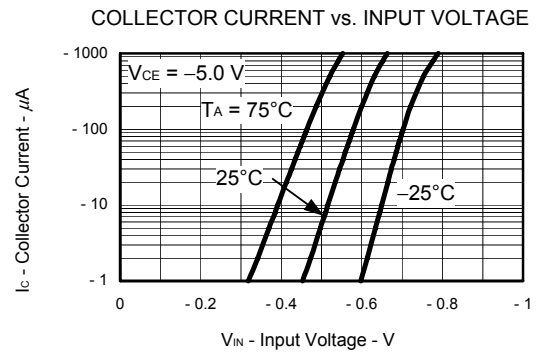
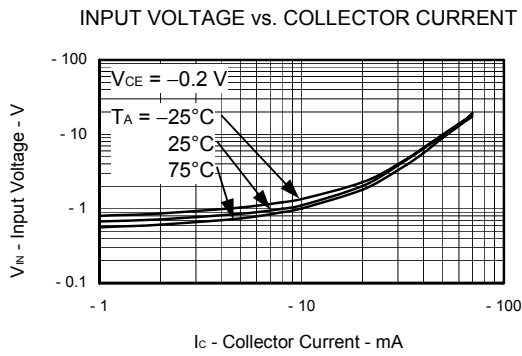
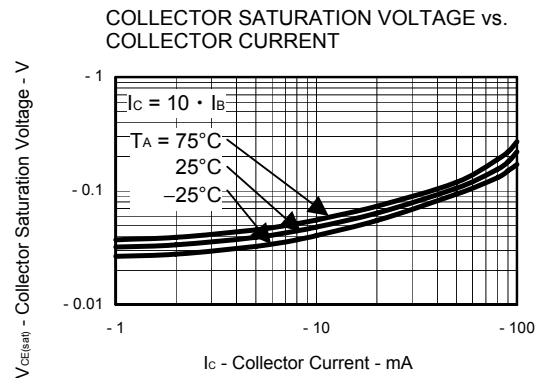
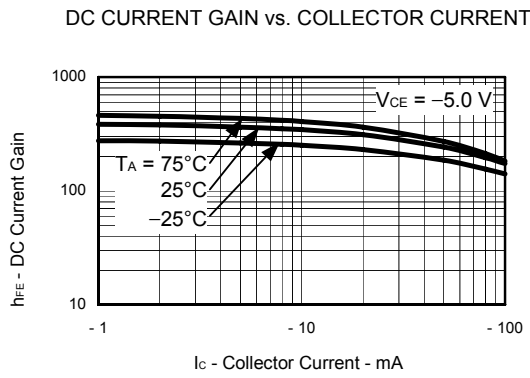
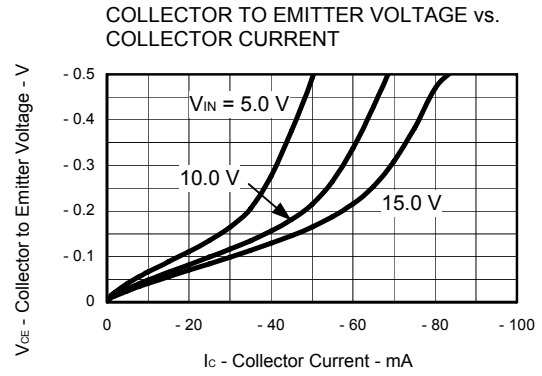
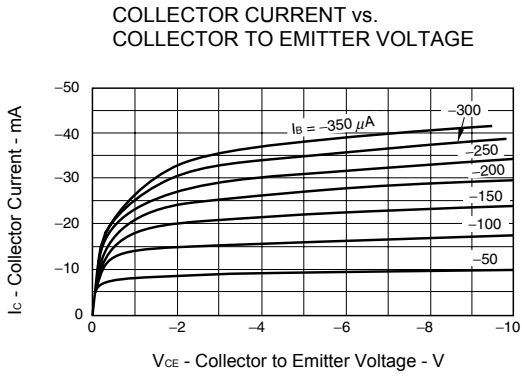
COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE

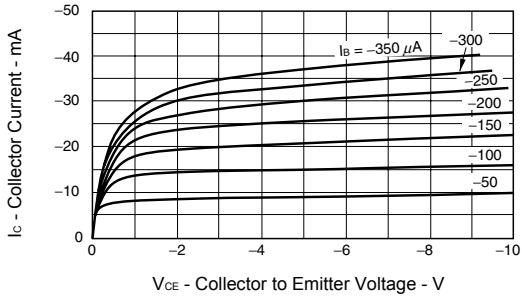


[FN4A4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

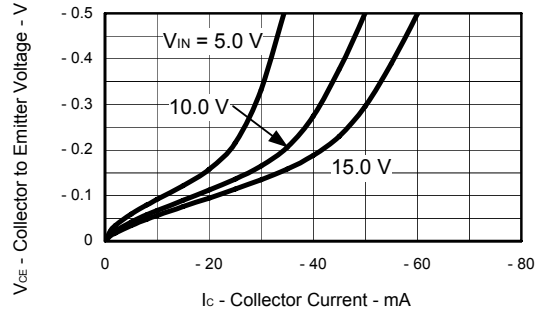


[FN4F4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

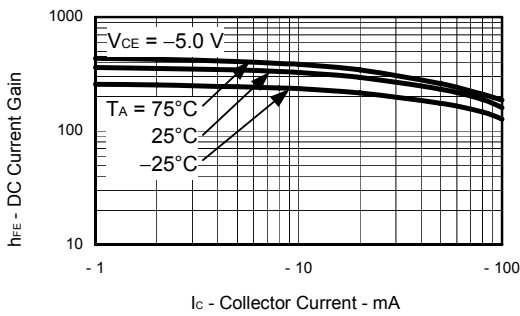
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



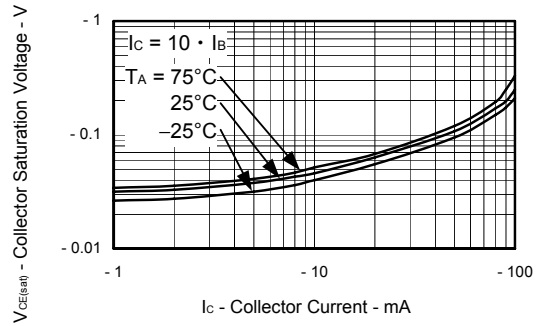
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



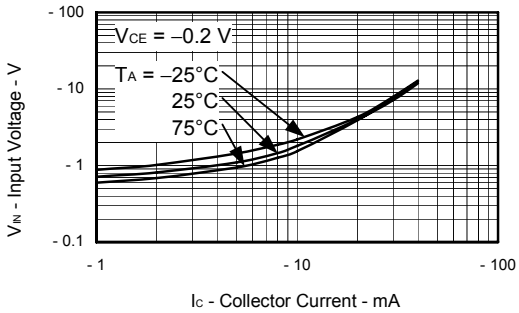
DC CURRENT GAIN vs. COLLECTOR CURRENT



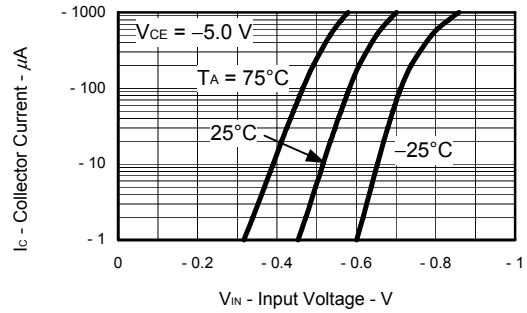
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



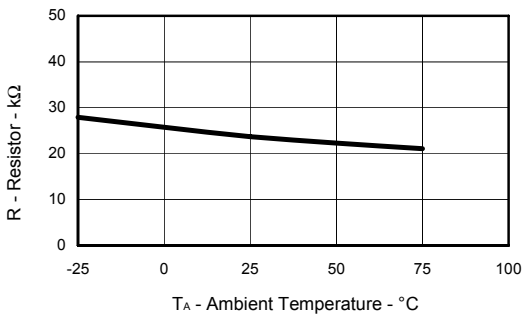
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

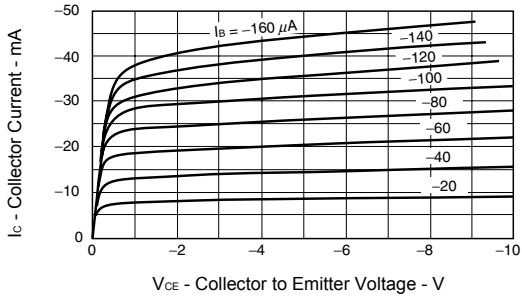


RESISTOR vs. AMBIENT TEMPERATURE

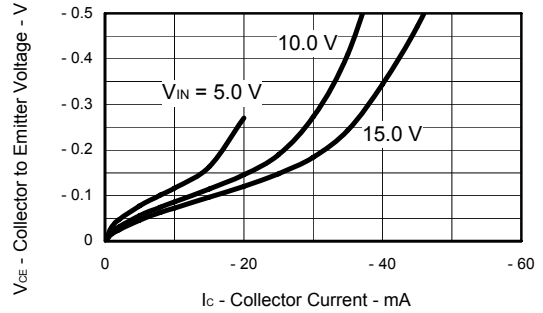


[FN4L4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

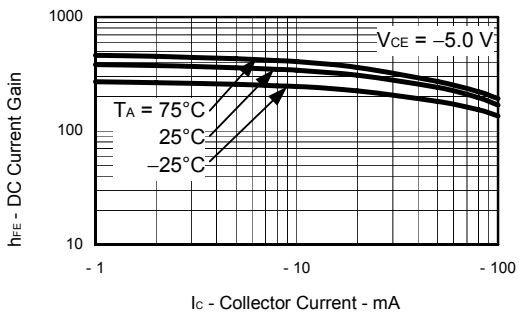
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



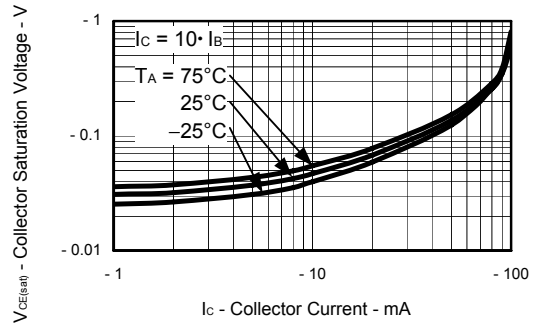
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



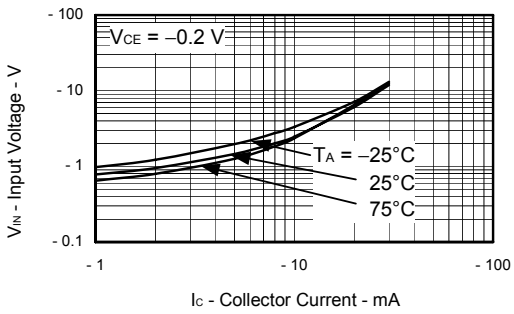
DC CURRENT GAIN vs. COLLECTOR CURRENT



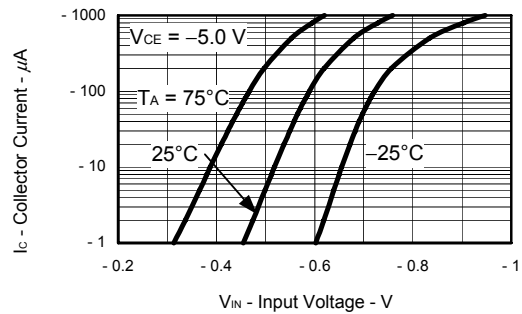
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



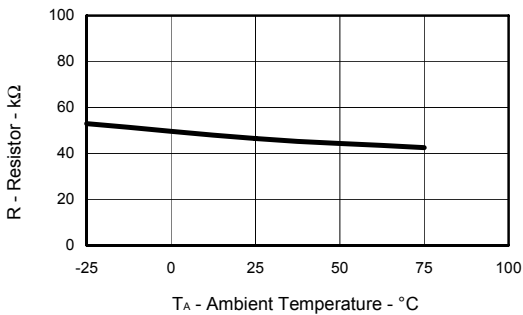
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

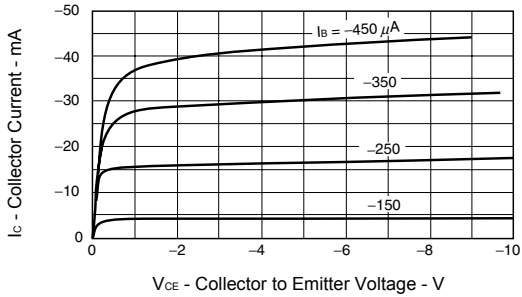


RESISTOR vs. AMBIENT TEMPERATURE

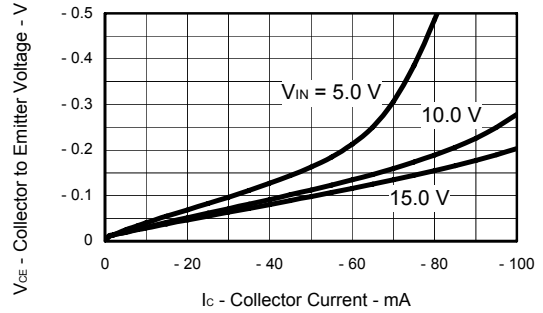


[FN4F3M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

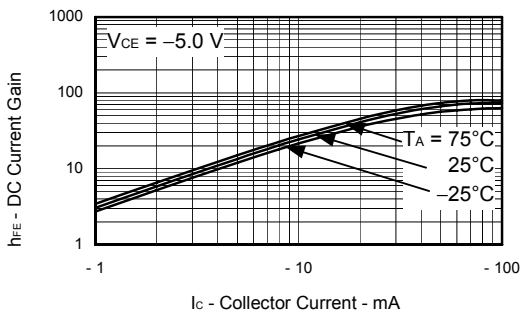
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



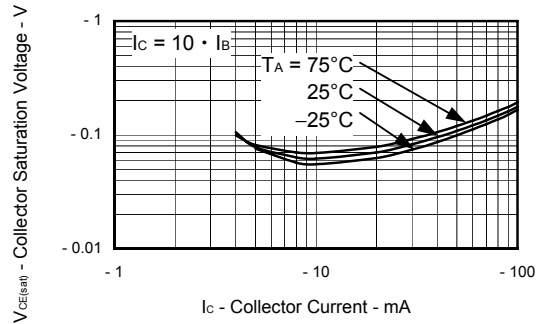
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



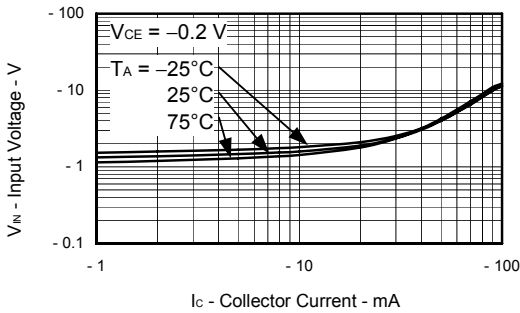
DC CURRENT GAIN vs. COLLECTOR CURRENT



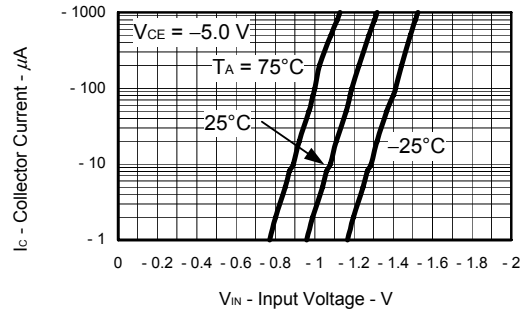
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



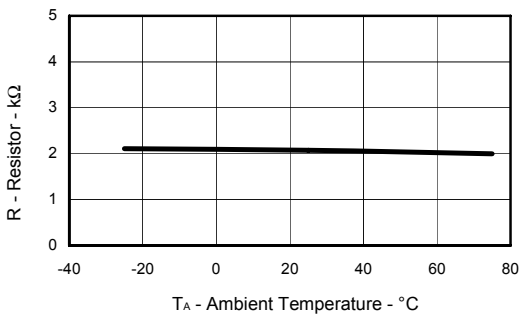
INPUT VOLTAGE vs. COLLECTOR CURRENT



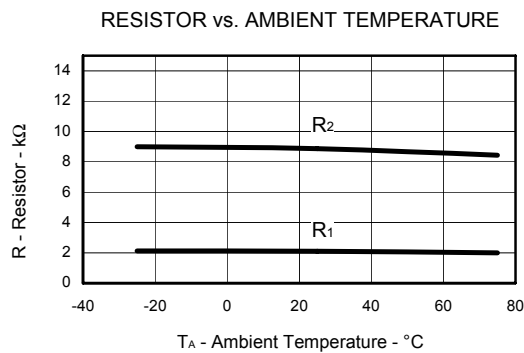
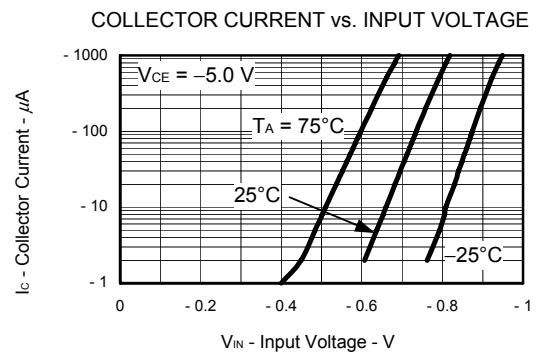
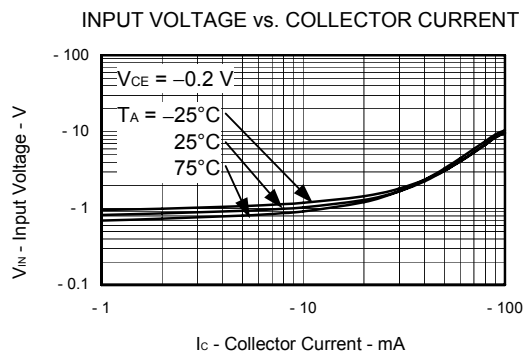
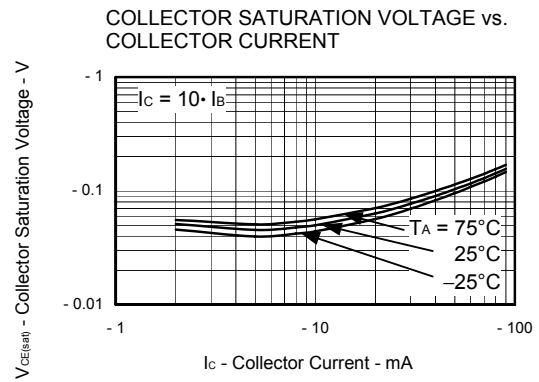
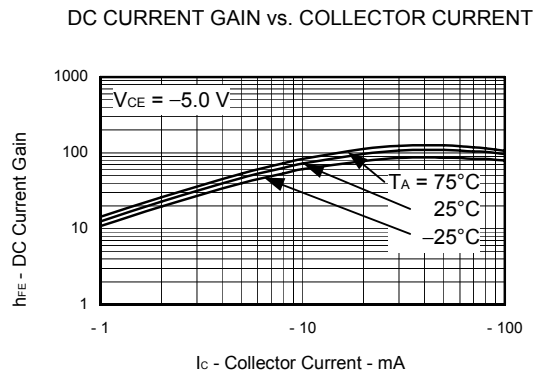
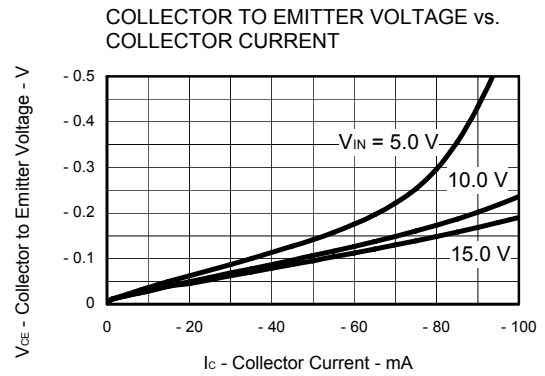
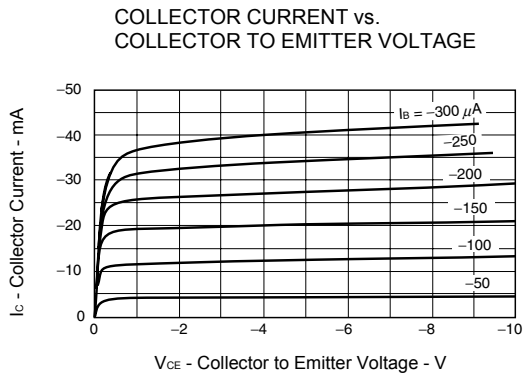
COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE

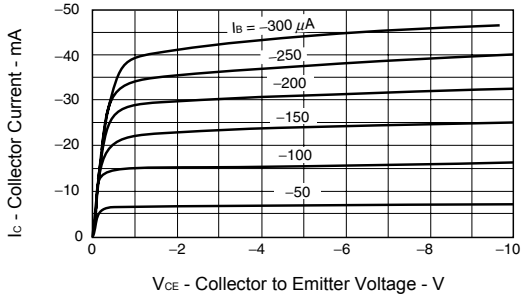


[FN4F3P]
TYPICAL CHARACTERISTICS (T_A = 25°C)

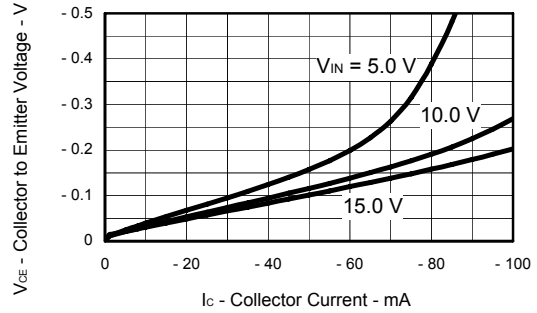


[FN4F3R]
TYPICAL CHARACTERISTICS (T_A = 25°C)

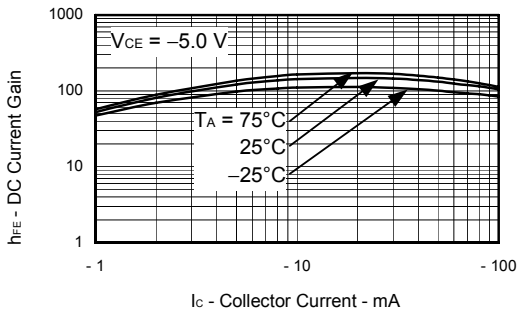
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



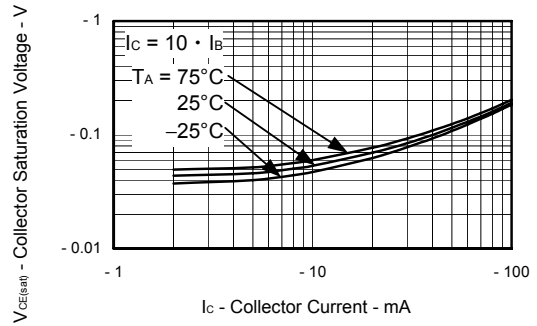
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



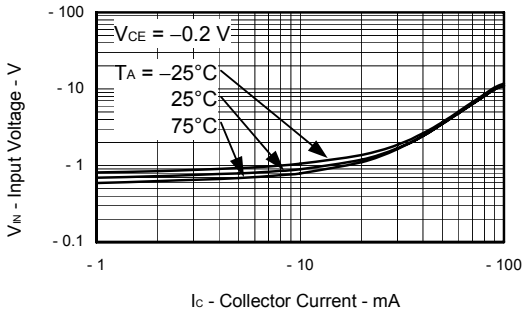
DC CURRENT GAIN vs. COLLECTOR CURRENT



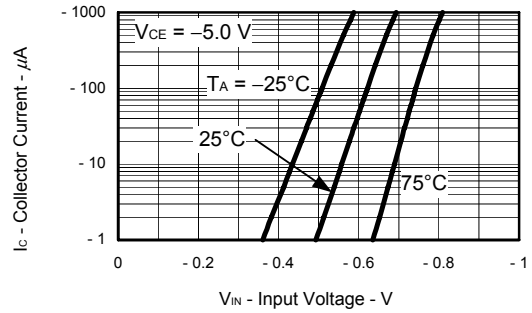
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



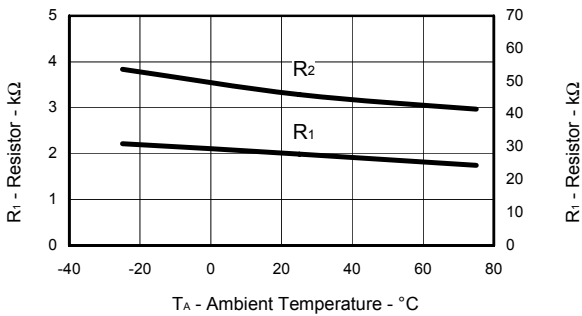
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

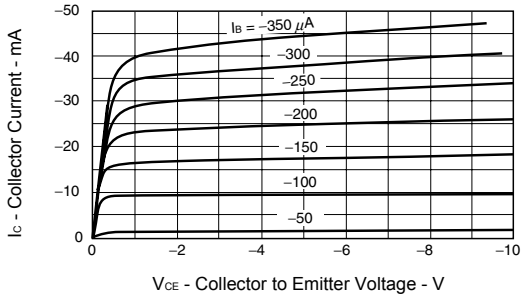


RESISTOR vs. AMBIENT TEMPERATURE

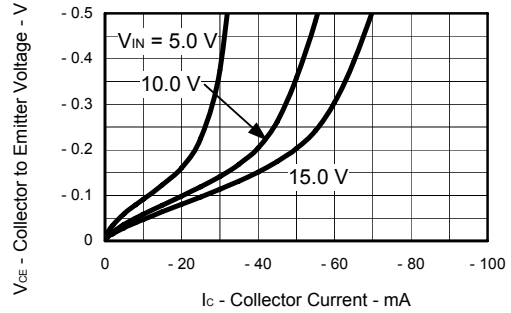


[FN4A4L]
TYPICAL CHARACTERISTICS (T_A = 25°C)

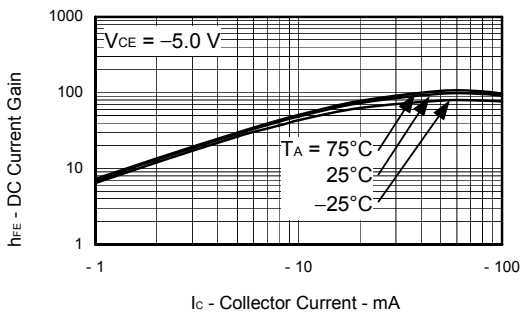
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



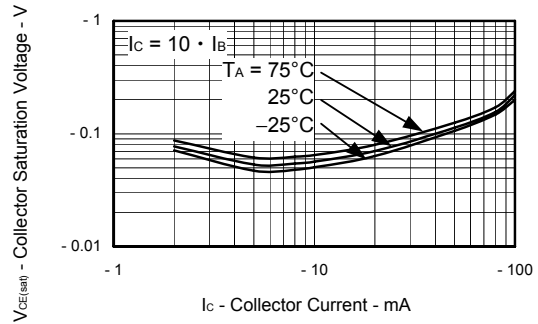
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



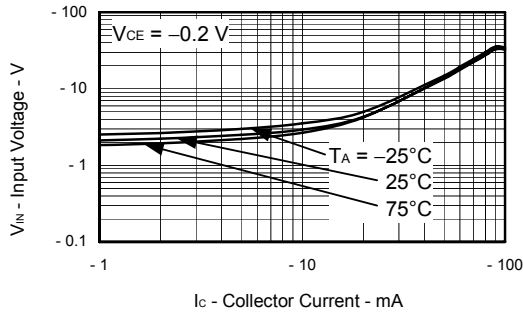
DC CURRENT GAIN vs. COLLECTOR CURRENT



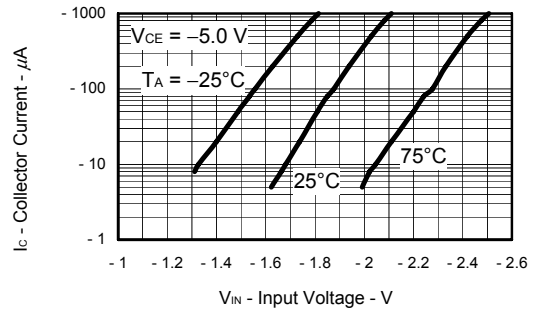
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



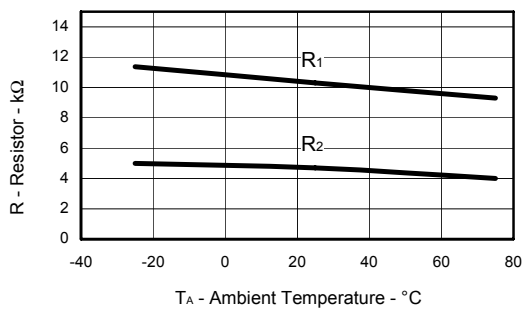
INPUT VOLTAGE vs. COLLECTOR CURRENT



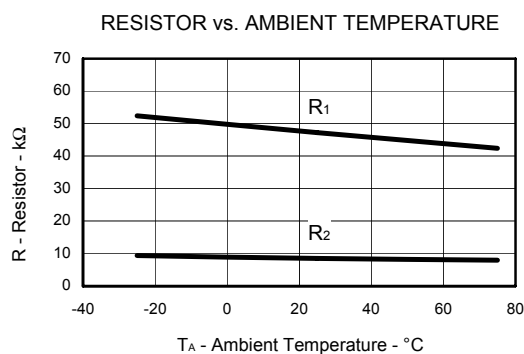
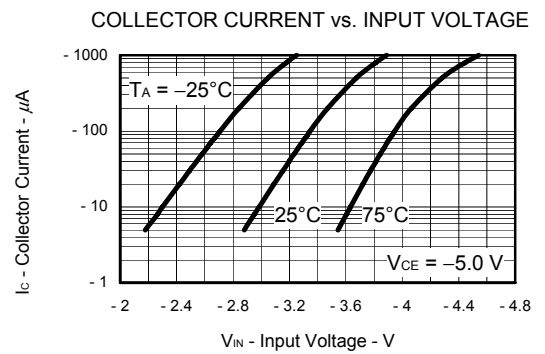
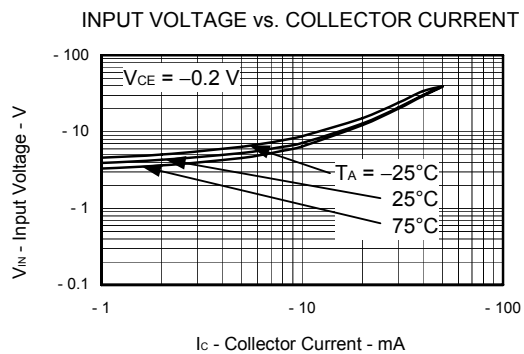
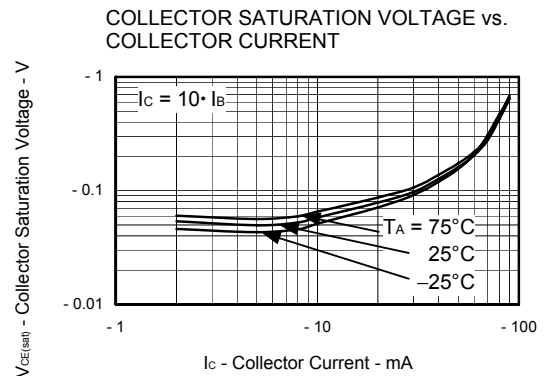
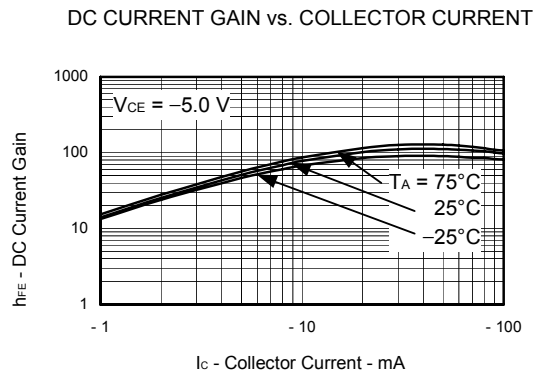
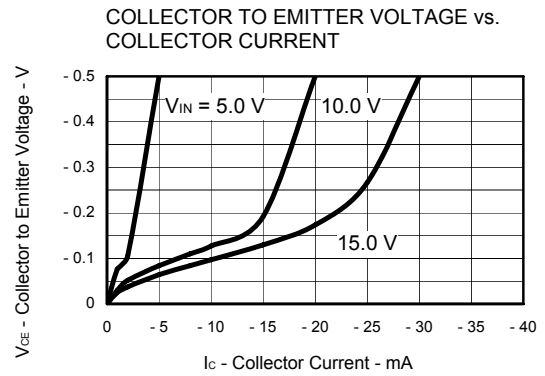
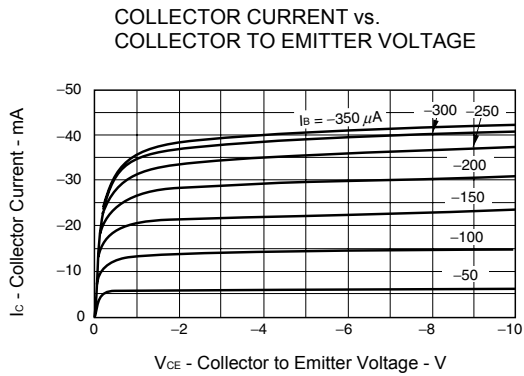
COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE



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



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