

### RESISTOR BUILT-IN TYPE NPN TRANSISTOR

#### FEATURES

- Compact package
- Resistors built-in type
- Complementary to GN4xxx

#### ORDERING INFORMATION

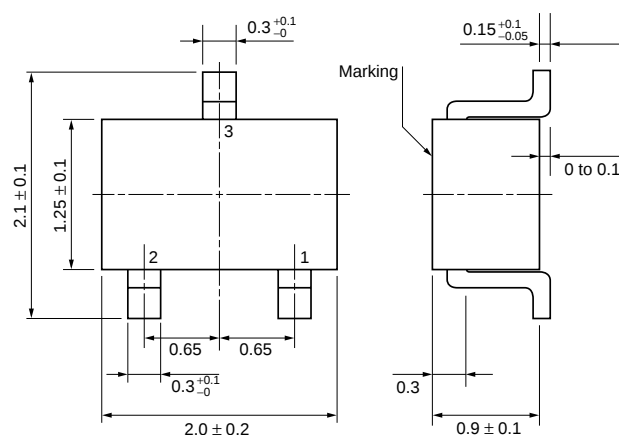
| PART NUMBER | PACKAGE |
|-------------|---------|
| GA4xxx      | SC-70   |

#### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

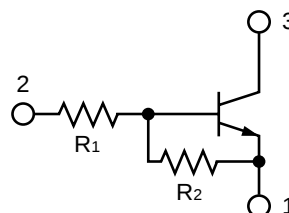
|                                           |                       |             |    |
|-------------------------------------------|-----------------------|-------------|----|
| Collector to Base Voltage                 | V <sub>CBO</sub>      | 60          | V  |
| Collector to Emitter Voltage              | V <sub>CEO</sub>      | 50          | V  |
| Emitter to Base Voltage                   | V <sub>EBO</sub>      | 5           | V  |
| Collector Current (DC)                    | I <sub>C</sub>        | 0.1         | A  |
| Collector Current (pulse) <sup>Note</sup> | I <sub>C(pulse)</sub> | 0.2         | A  |
| Total Power Dissipation                   | P <sub>T</sub>        | 0.2         | W  |
| Junction Temperature                      | T <sub>j</sub>        | 150         | °C |
| Storage Temperature                       | T <sub>stg</sub>      | -55 to +150 | °C |

**Note** PW ≤ 10 ms, Duty Cycle ≤ 50%

#### ★ PACKAGE DRAWING (Unit: mm)



#### ★ EQUIVALENT CIRCUIT ★ PIN CONNECTION



- 1: Emitter  
2: Base  
3: Collector

| PART NUMBER | MARK | R <sub>1</sub> | R <sub>2</sub> | UNIT |
|-------------|------|----------------|----------------|------|
| GA4A4M      | AA1  | 10.0           | 10.0           | kΩ   |
| GA4F4M      | AB1  | 22.0           | 22.0           | kΩ   |
| GA4L4M      | AC1  | 47.0           | 47.0           | kΩ   |
| GA4L3M      | AD1  | 4.7            | 4.7            | kΩ   |
| GA4L3N      | AE1  | 4.7            | 10.0           | kΩ   |
| GA4L3Z      | AF1  | 4.7            |                | kΩ   |
| GA4A3Q      | AG1  | 1.0            | 10.0           | kΩ   |
| GA4A4P      | AH1  | 10.0           | 47.0           | kΩ   |
| GA4F4N      | AJ1  | 22.0           | 47.0           | kΩ   |

| PART NUMBER | MARK | R <sub>1</sub> | R <sub>2</sub> | UNIT |
|-------------|------|----------------|----------------|------|
| GA4L4L      | AK1  | 47.0           | 22.0           | kΩ   |
| GA4A4Z      | AL1  | 10.0           |                | kΩ   |
| GA4F4Z      | AM1  | 22.0           |                | kΩ   |
| GA4L4Z      | AN1  | 47.0           |                | kΩ   |
| GA4F3M      | AP1  | 2.2            | 2.2            | kΩ   |
| GA4F3P      | AQ1  | 2.2            | 10.0           | kΩ   |
| GA4F3R      | AR1  | 2.2            | 47.0           | kΩ   |
| GA4A4L      | AS1  | 10.0           | 4.7            | kΩ   |
| GA4L4K      | AT1  | 47.0           | 10.0           | kΩ   |

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Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

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

| CHARACTERISTICS              | SYMBOL               | TEST CONDITIONS                                   | MIN.         | TYP. | MAX. | UNIT |
|------------------------------|----------------------|---------------------------------------------------|--------------|------|------|------|
| Collector Cut-off Current    | I <sub>CBO</sub>     | V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0        |              |      | 100  | nA   |
| DC Current Gain              | h <sub>FE1</sub>     | V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 5.0 mA  | <b>Note1</b> |      |      | -    |
|                              | h <sub>FE2</sub>     | V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 50 mA   | <b>Note1</b> |      |      | -    |
| Collector Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> = 5.0 mA, I <sub>B</sub> = 0.25 mA |              |      | 0.2  | V    |
| Low-level Input Voltage      | V <sub>IL</sub>      | V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 μA  | <b>Note2</b> |      |      | V    |
| High-level Input Voltage     | V <sub>IH</sub>      | V <sub>CE</sub> = 0.2 V, I <sub>C</sub> = 5.0 mA  | <b>Note2</b> |      |      | V    |
| Input Resistor               | R <sub>1</sub>       |                                                   | <b>Note3</b> |      |      | kΩ   |
| Emitter to Base Resistor     | R <sub>2</sub>       |                                                   | <b>Note3</b> |      |      | kΩ   |

**Note 1**

| PART NUMBER | h <sub>FE1</sub> |      |      | h <sub>FE2</sub> |      |      | UNIT |
|-------------|------------------|------|------|------------------|------|------|------|
|             | MIN.             | TYP. | MAX. | MIN.             | TYP. | MAX. |      |
| GA4A4M      | 35               |      | 100  | 80               |      |      | -    |
| GA4F4M      | 60               |      | 195  | 90               |      |      | -    |
| GA4L4M      | 85               |      | 340  | 95               |      |      | -    |
| GA4L3M      | 20               |      | 80   | 80               |      |      | -    |
| GA4L3N      | 35               |      | 100  | 80               |      |      | -    |
| GA4L3Z      | 135              |      | 600  | 100              |      |      | -    |
| GA4A3Q      | 35               |      | 100  | 80               |      |      | -    |
| GA4A4P      | 85               |      | 340  | 95               |      |      | -    |
| GA4F4N      | 85               |      | 340  | 95               |      |      | -    |
| GA4L4L      | 60               |      | 195  | 90               |      |      | -    |
| GA4A4Z      | 135              |      | 600  | 100              |      |      | -    |
| GA4F4Z      | 135              |      | 600  | 100              |      |      | -    |
| GA4L4Z      | 135              |      | 600  | 100              |      |      | -    |
| GA4F3M      | 8                |      | 50   | 50               |      |      | -    |
| GA4F3P      | 35               |      | 100  | 80               |      |      | -    |
| GA4F3R      | 85               |      | 340  | 95               |      |      | -    |
| GA4A4L      | 20               |      | 80   | 80               |      |      | -    |
| GA4L4K      | 35               |      | 100  | 80               |      |      | -    |

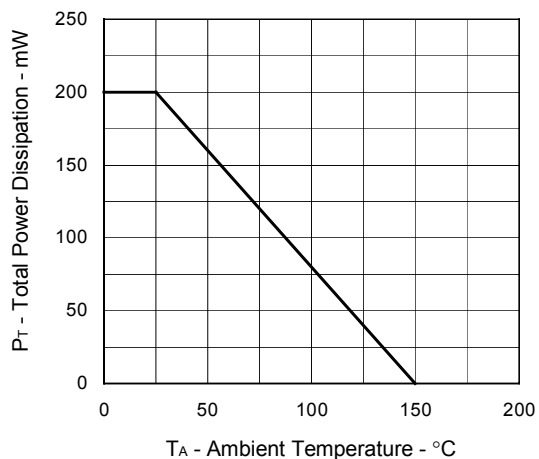
**Note 2**

| PART NUMBER | V <sub>IL</sub> |      |      | V <sub>IH</sub> |      |      | UNIT |
|-------------|-----------------|------|------|-----------------|------|------|------|
|             | MIN.            | TYP. | MAX. | MIN.            | TYP. | MAX. |      |
| GA4A4M      |                 |      | 0.8  | 3.0             |      |      | V    |
| GA4F4M      |                 |      | 0.8  | 4.0             |      |      | V    |
| GA4L4M      |                 |      | 0.8  | 5.0             |      |      | V    |
| GA4L3M      |                 |      | 0.8  | 3.0             |      |      | V    |
| GA4L3N      |                 |      | 0.6  | 3.0             |      |      | V    |
| GA4L3Z      |                 |      | 0.5  | 1.2             |      |      | V    |
| GA4A3Q      |                 |      | 0.5  | 2.0             |      |      | V    |
| GA4A4P      |                 |      | 0.5  | 3.0             |      |      | V    |
| GA4F4N      |                 |      | 0.6  | 3.0             |      |      | V    |
| GA4L4L      |                 |      | 0.9  | 6.0             |      |      | V    |
| GA4A4Z      |                 |      | 0.5  | 2.0             |      |      | V    |
| GA4F4Z      |                 |      | 0.5  | 3.0             |      |      | V    |
| GA4L4Z      |                 |      | 0.5  | 4.0             |      |      | V    |
| GA4F3M      |                 |      | 0.8  | 3.0             |      |      | V    |
| GA4F3P      |                 |      | 0.5  | 2.0             |      |      | V    |
| GA4F3R      |                 |      | 0.5  | 2.0             |      |      | V    |
| GA4A4L      |                 |      | 0.9  | 6.0             |      |      | V    |
| GA4L4K      |                 |      | 2.0  | 8.0             |      |      | V    |

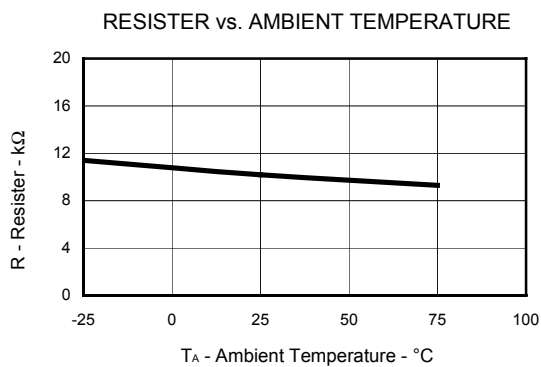
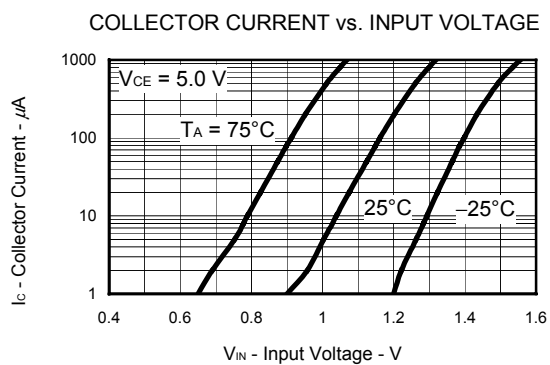
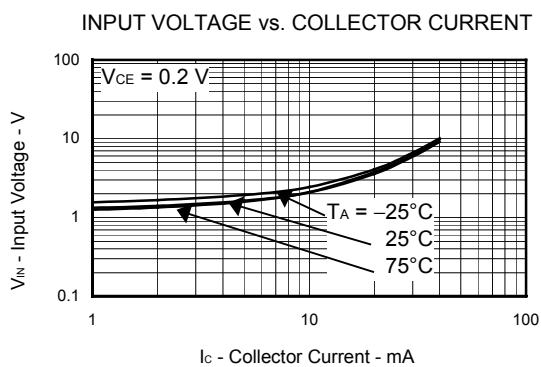
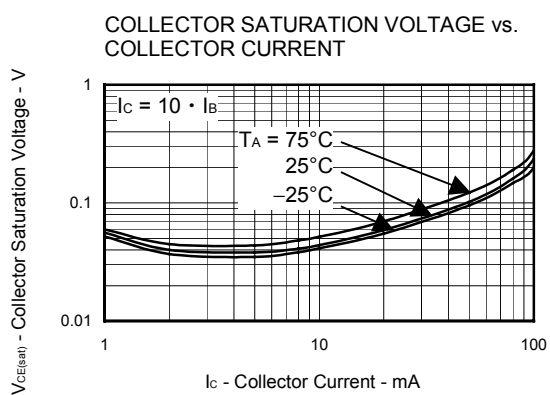
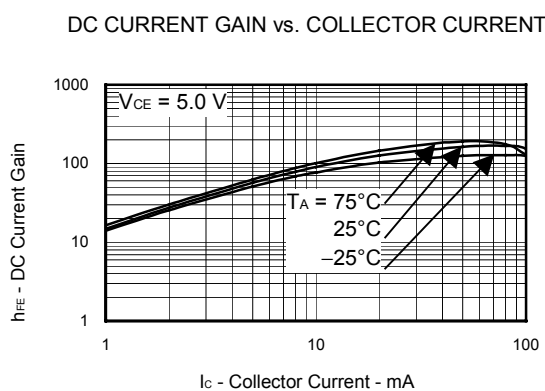
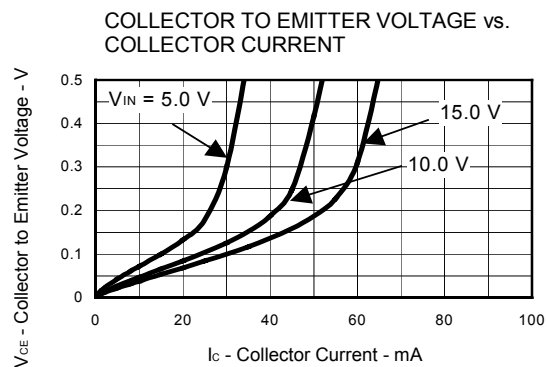
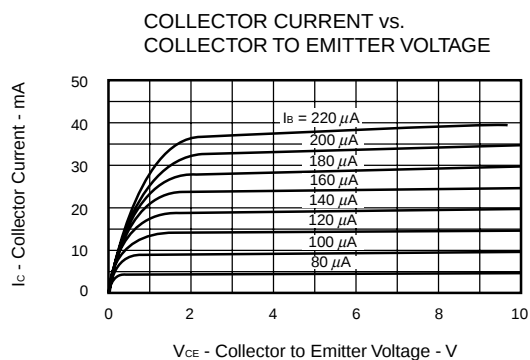
Note 3

| PART NUMBER | R <sub>1</sub> |       |       | R <sub>2</sub> |       |       | UNIT |
|-------------|----------------|-------|-------|----------------|-------|-------|------|
|             | MIN.           | TYP.  | MAX.  | MIN.           | TYP.  | MAX.  |      |
| GA4A4M      | 7.00           | 10.00 | 13.00 | 7.00           | 10.00 | 13.00 | kΩ   |
| GA4F4M      | 15.40          | 22.00 | 28.60 | 15.40          | 22.00 | 28.60 | kΩ   |
| GA4L4M      | 32.90          | 47.00 | 61.10 | 32.90          | 47.00 | 61.10 | kΩ   |
| GA4L3M      | 3.29           | 4.70  | 6.11  | 3.29           | 4.70  | 6.11  | kΩ   |
| GA4L3N      | 3.29           | 4.70  | 6.11  | 7.00           | 10.00 | 13.00 | kΩ   |
| GA4L3Z      | 3.29           | 4.70  | 6.11  |                |       |       | kΩ   |
| GA4A3Q      | 0.70           | 1.00  | 1.30  | 7.00           | 10.00 | 13.00 | kΩ   |
| GA4A4P      | 7.00           | 10.00 | 13.00 | 32.90          | 47.00 | 61.10 | kΩ   |
| GA4F4N      | 15.40          | 22.00 | 28.60 | 32.90          | 47.00 | 61.10 | kΩ   |
| GA4L4L      | 32.90          | 47.00 | 61.10 | 15.40          | 22.00 | 28.60 | kΩ   |
| GA4A4Z      | 7.00           | 10.00 | 13.00 |                |       |       | kΩ   |
| GA4F4Z      | 15.40          | 22.00 | 28.60 |                |       |       | kΩ   |
| GA4L4Z      | 32.90          | 47.00 | 61.10 |                |       |       | kΩ   |
| GA4F3M      | 1.54           | 2.20  | 2.86  | 1.54           | 2.20  | 2.86  | kΩ   |
| GA4F3P      | 1.54           | 2.20  | 2.86  | 7.00           | 10.00 | 13.00 | kΩ   |
| GA4F3R      | 1.54           | 2.20  | 2.86  | 32.90          | 47.00 | 61.10 | kΩ   |
| GA4A4L      | 7.00           | 10.00 | 13.00 | 3.29           | 4.70  | 6.11  | kΩ   |
| GA4L4K      | 32.90          | 47.00 | 61.10 | 7.00           | 10.00 | 13.00 | kΩ   |

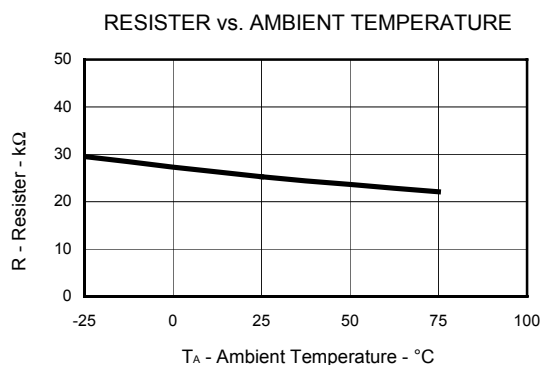
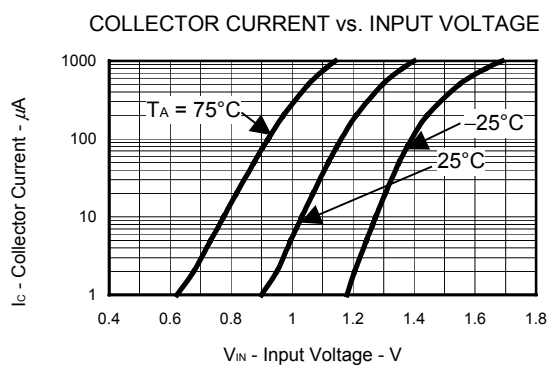
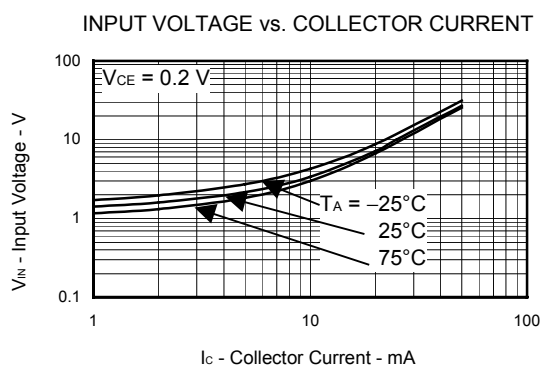
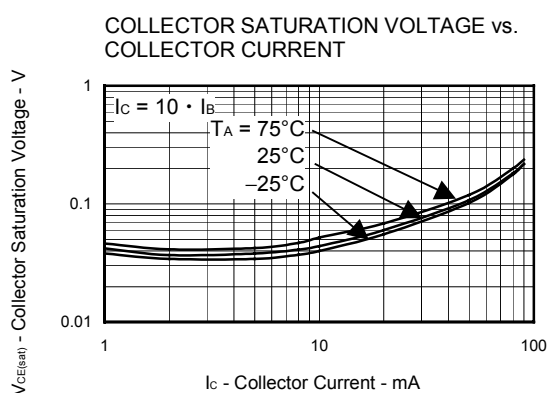
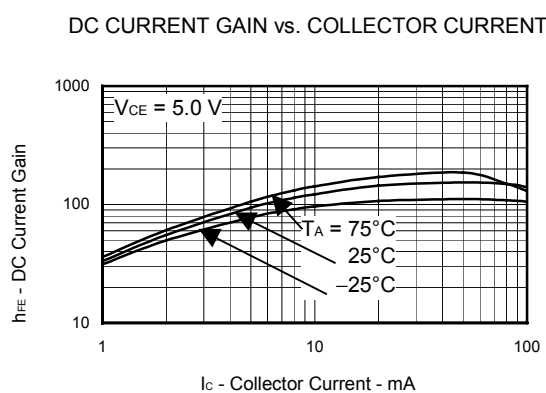
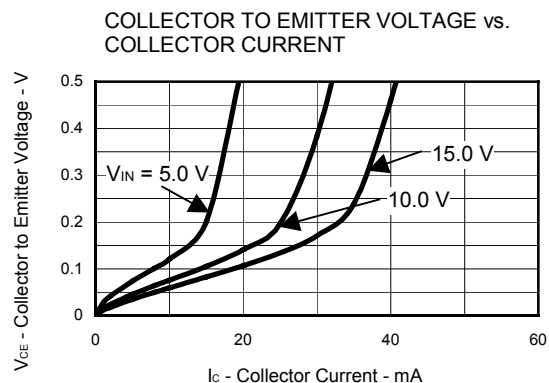
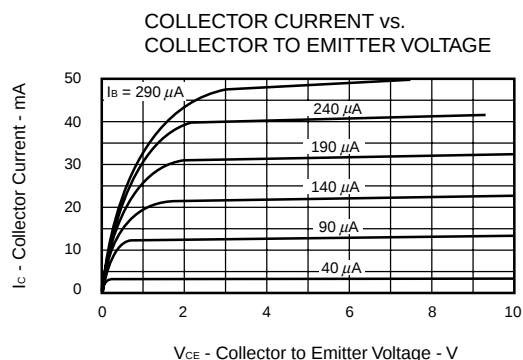
TOTAL POWER DISSIPATION vs.  
AMBIENT TEMPERATURE



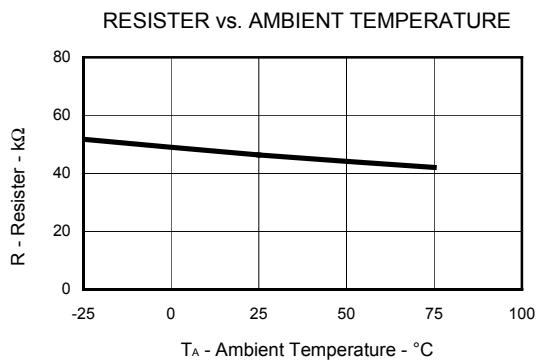
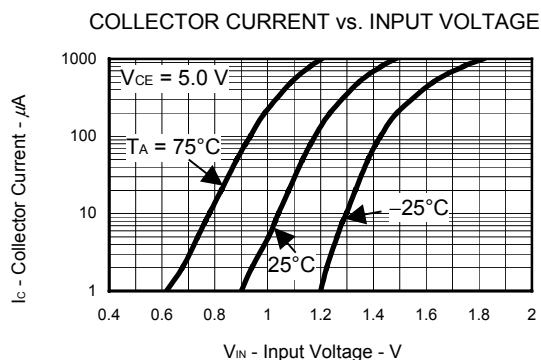
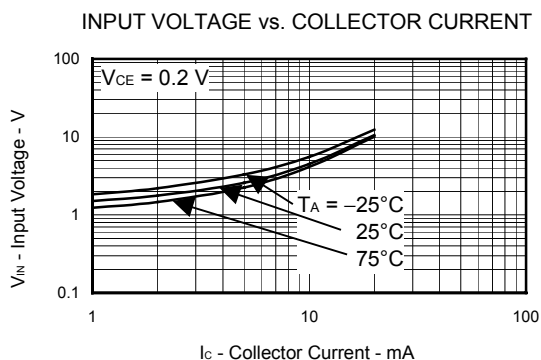
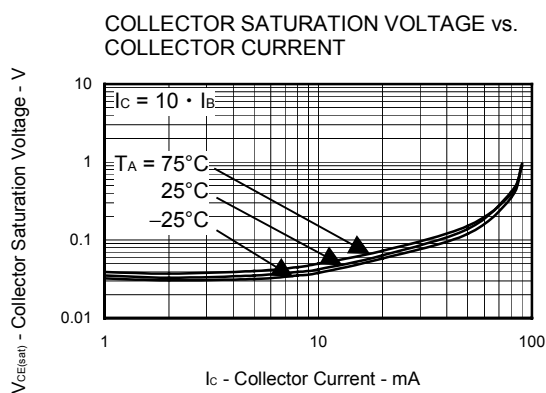
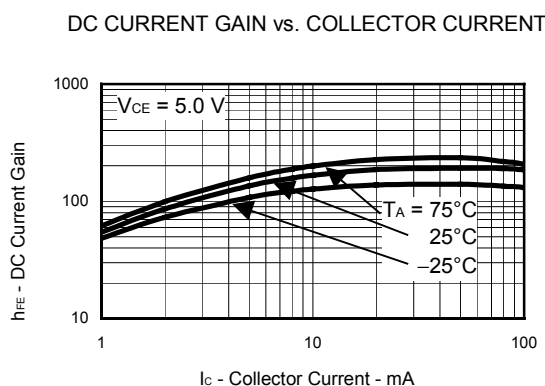
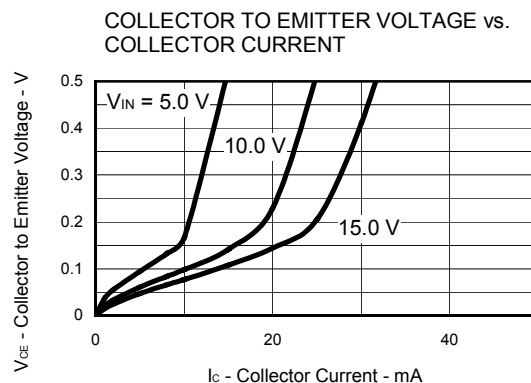
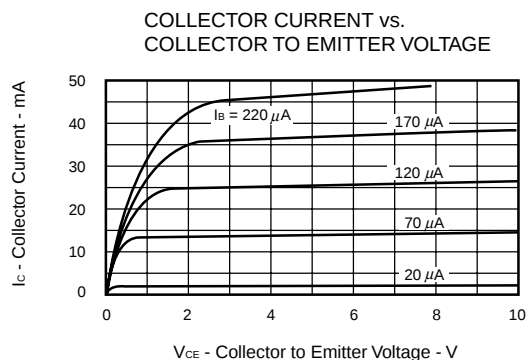
[GA4A4M]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



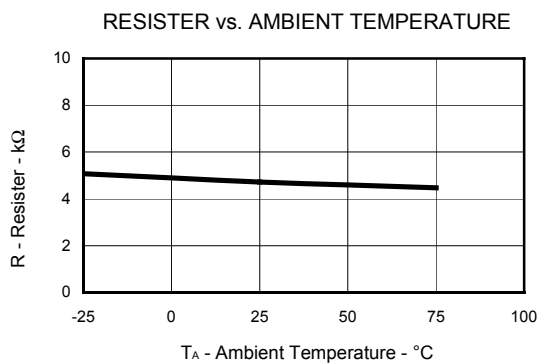
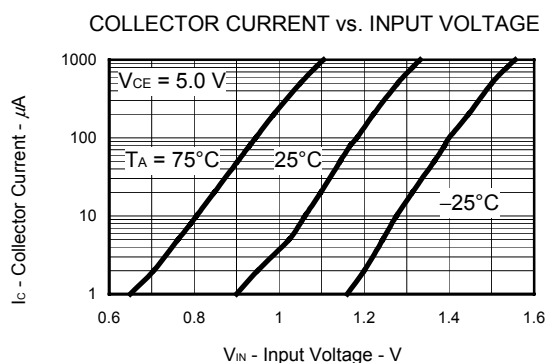
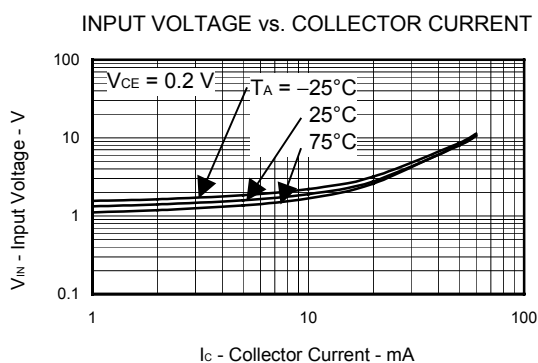
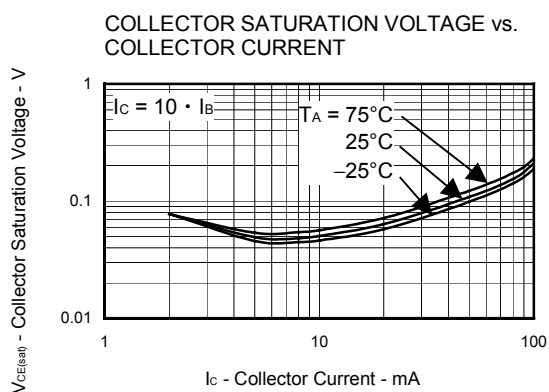
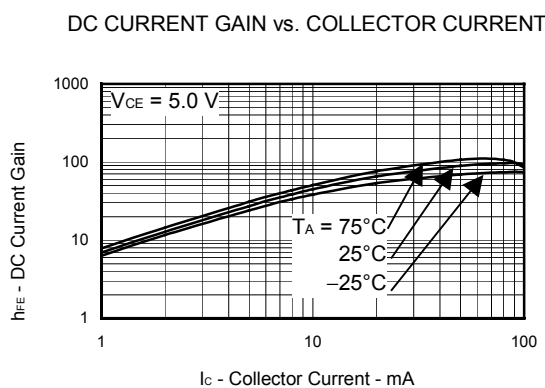
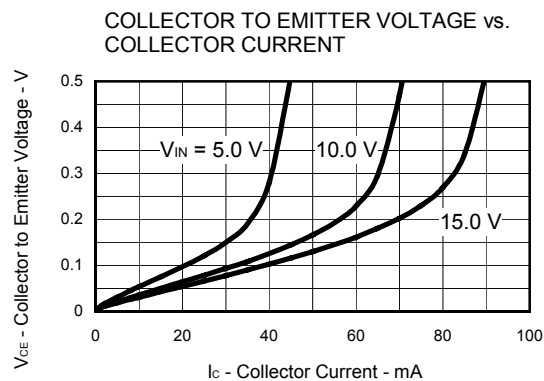
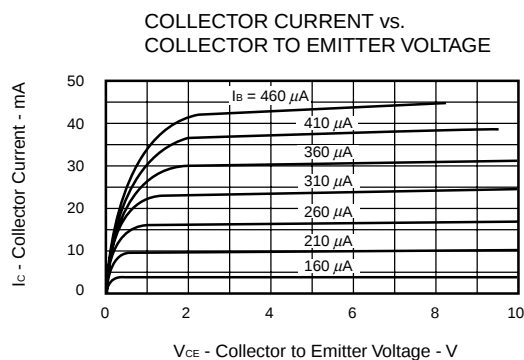
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TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



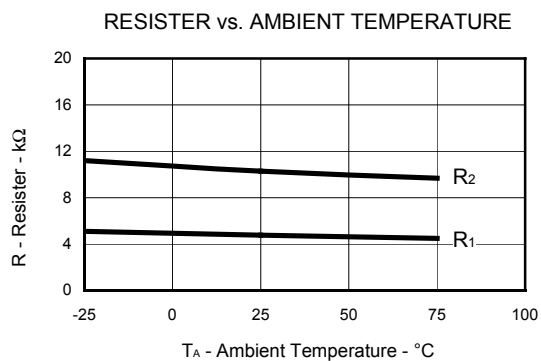
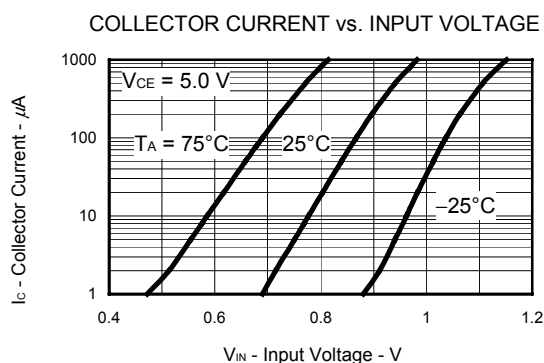
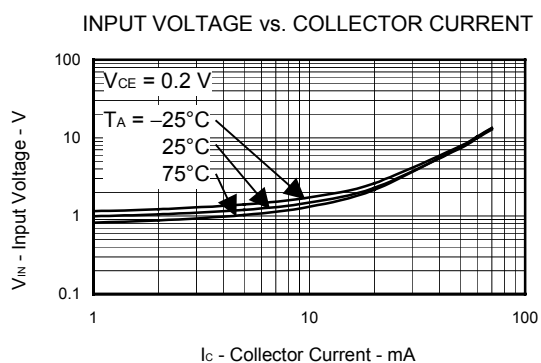
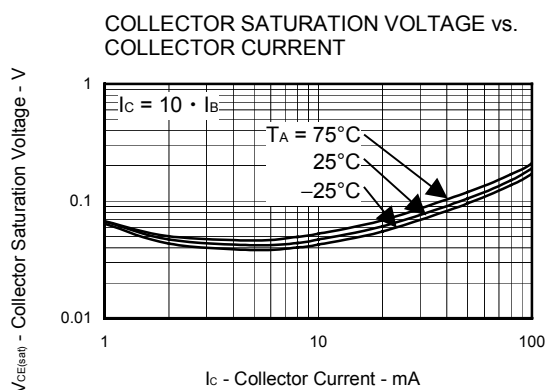
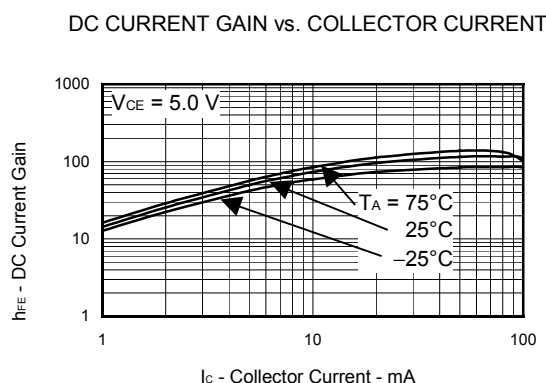
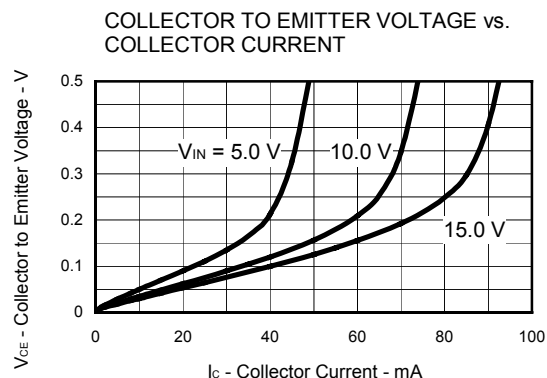
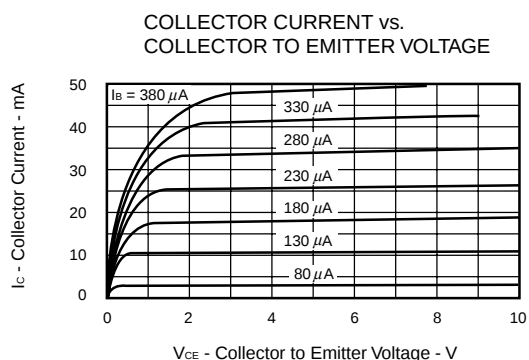
**[GA4L4M]**  
**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**



## [GA4L3M]

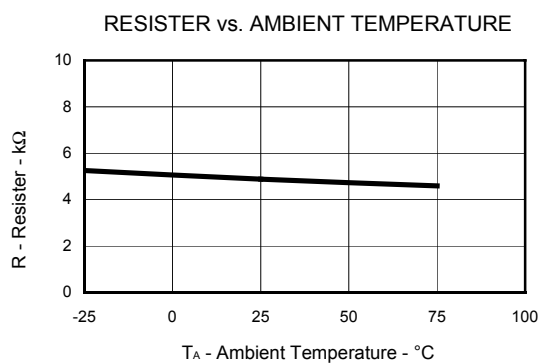
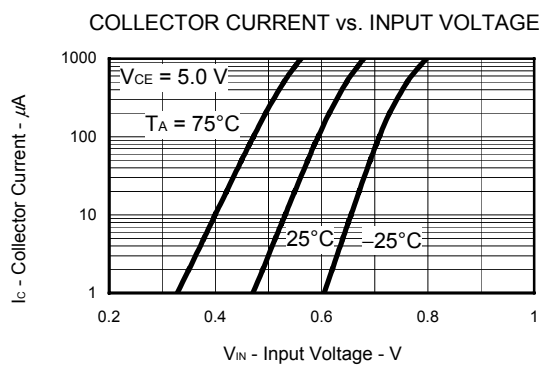
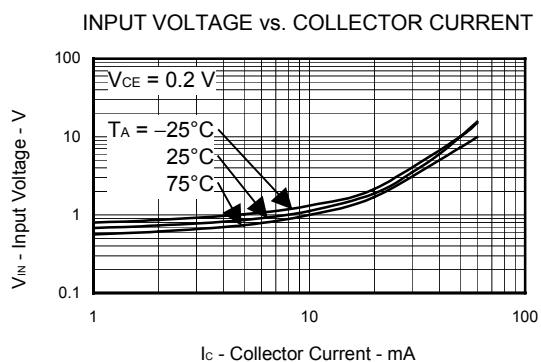
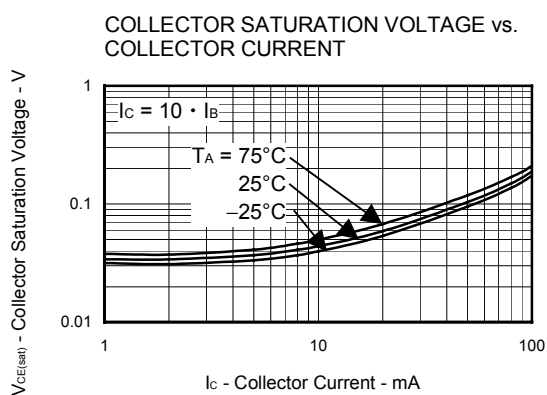
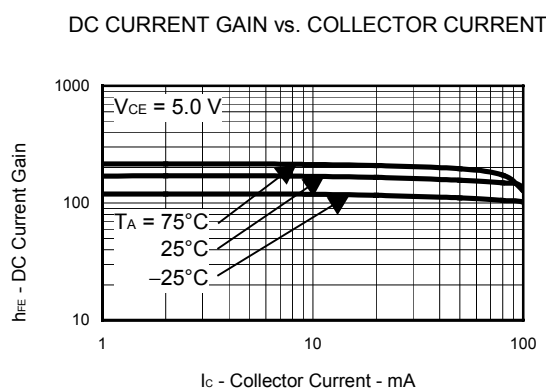
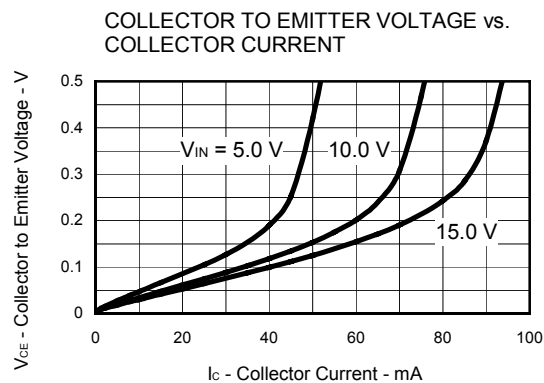
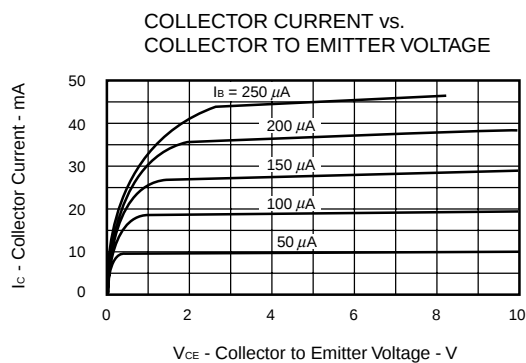
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

[GA4L3N]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

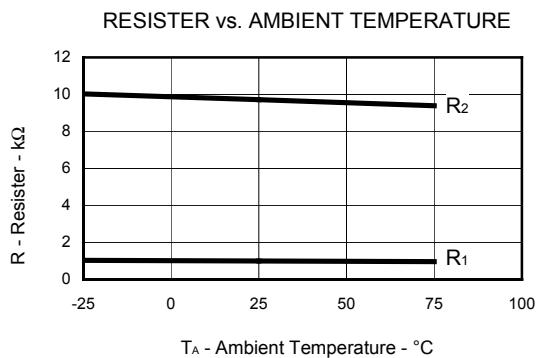
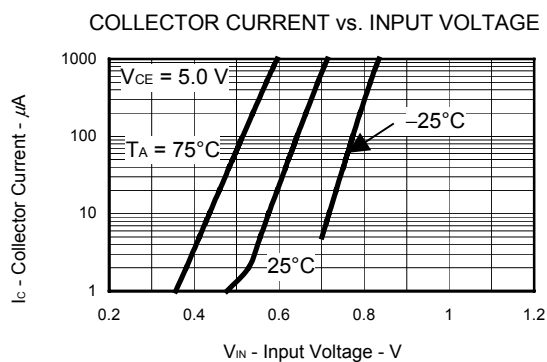
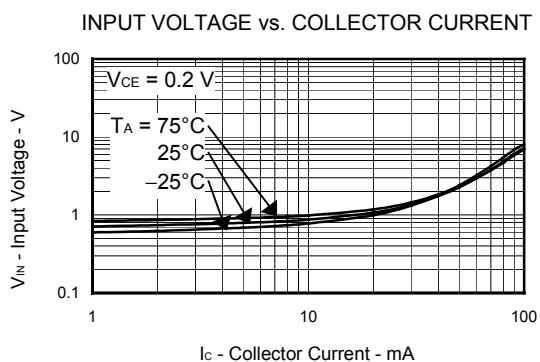
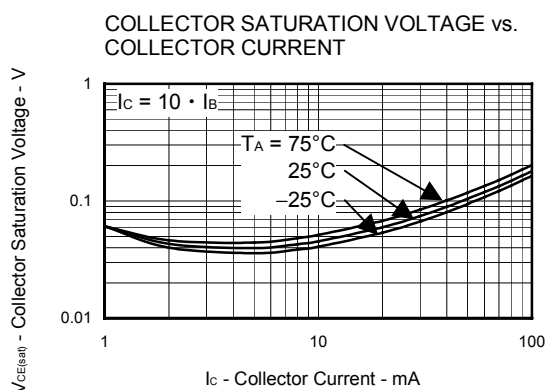
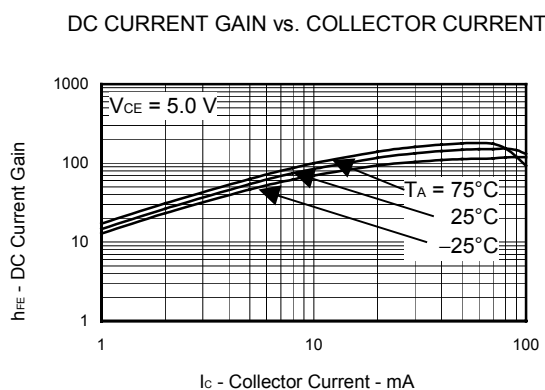
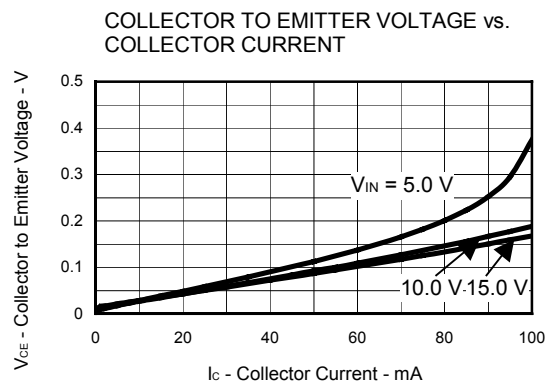
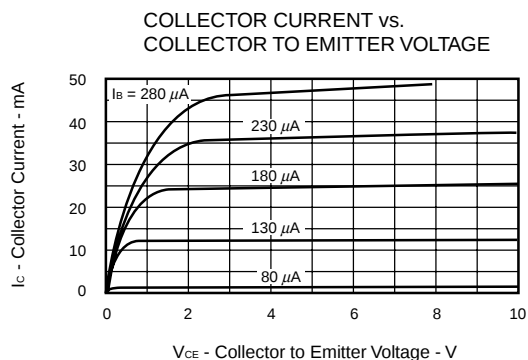


[GA4L3Z]

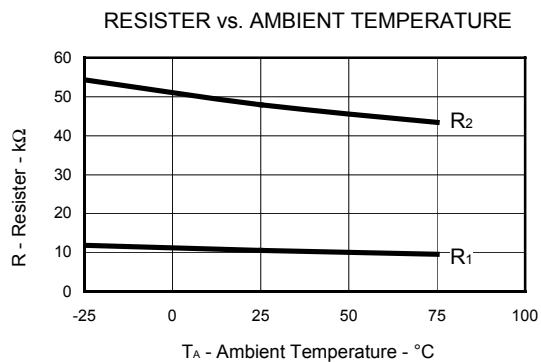
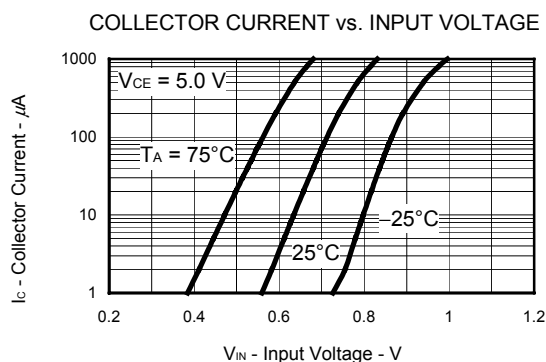
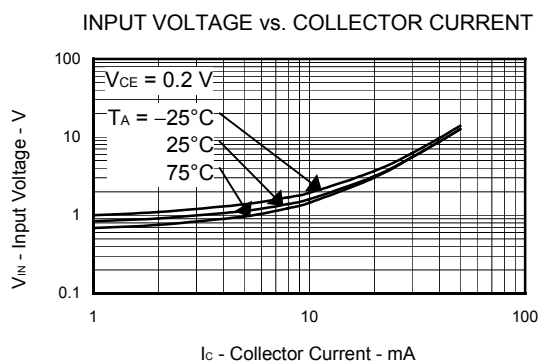
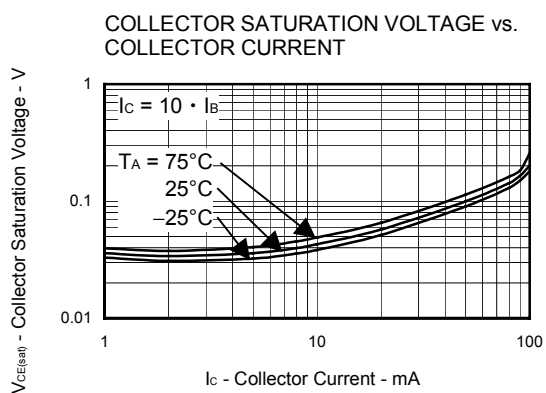
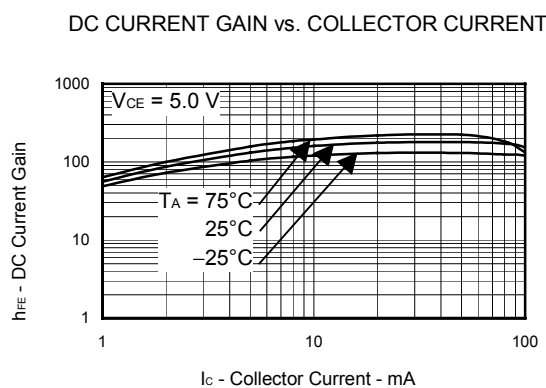
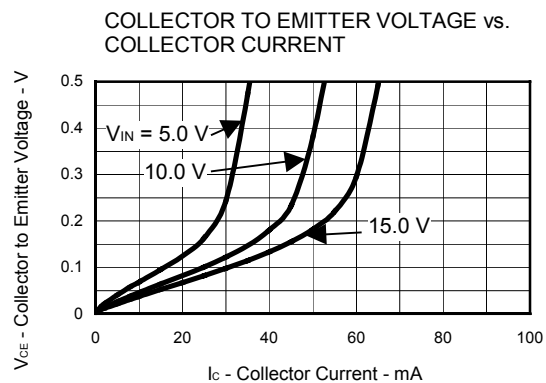
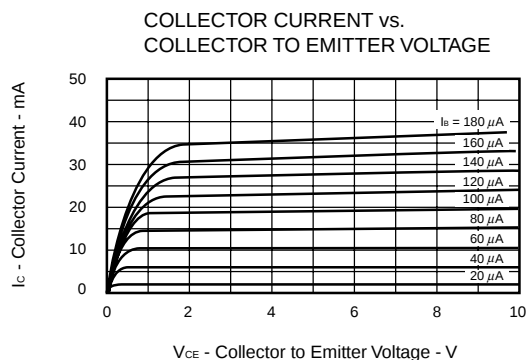
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



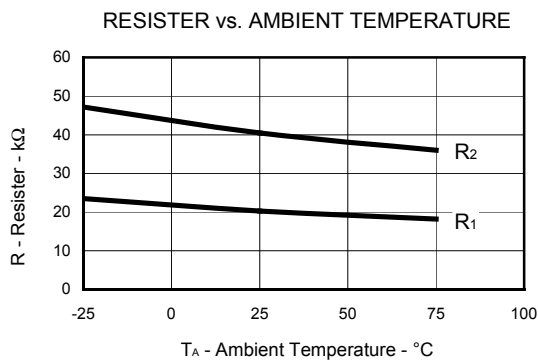
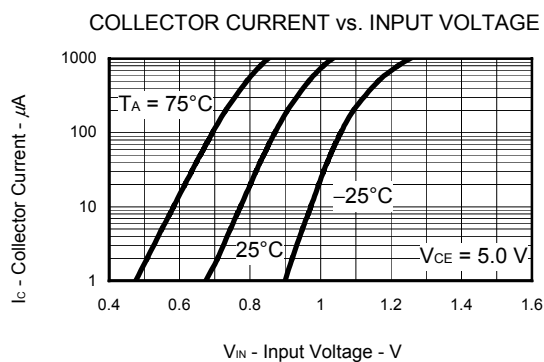
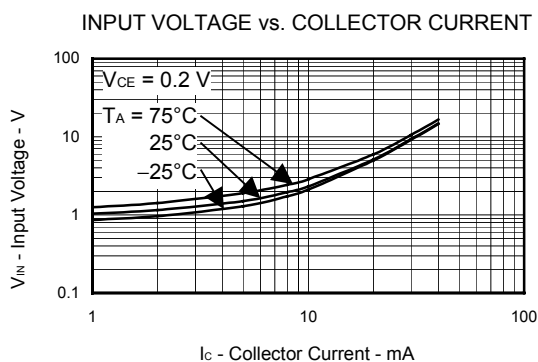
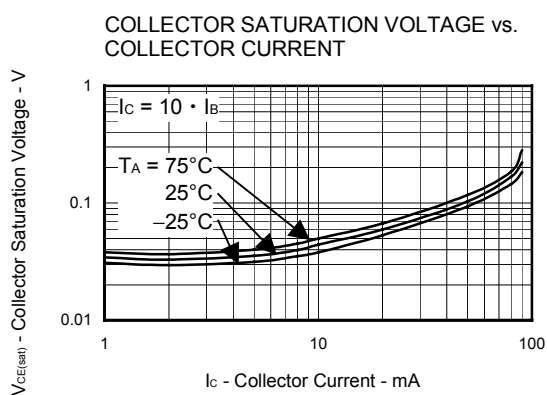
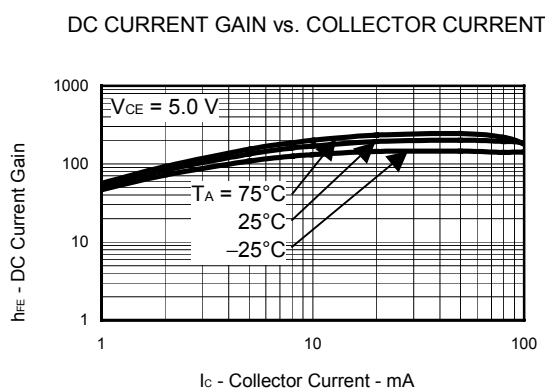
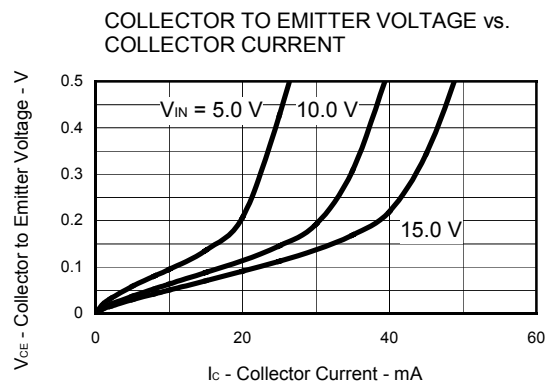
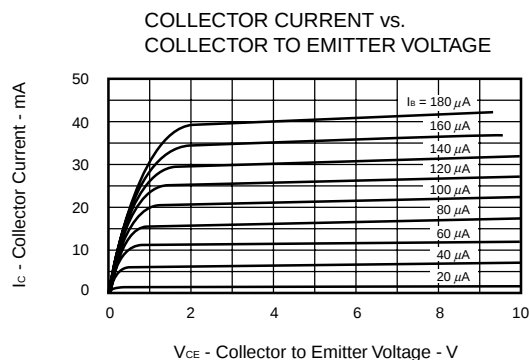
[GA4A3Q]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



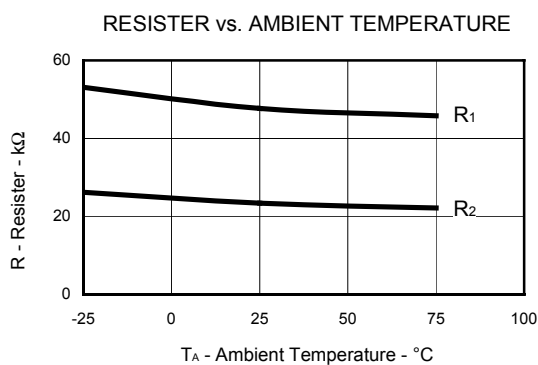
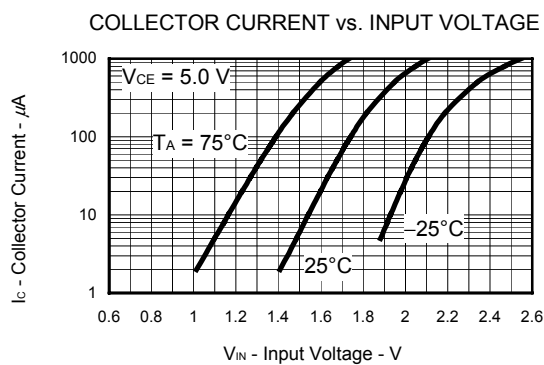
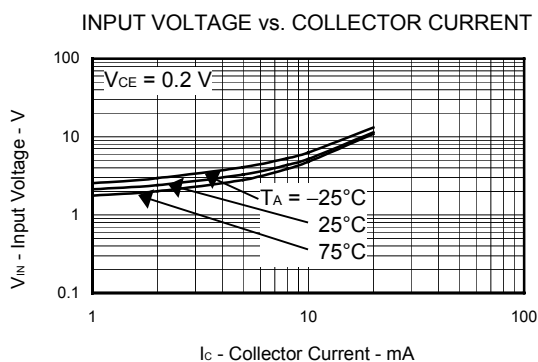
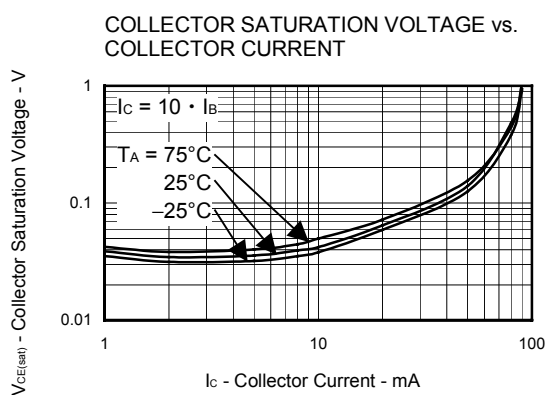
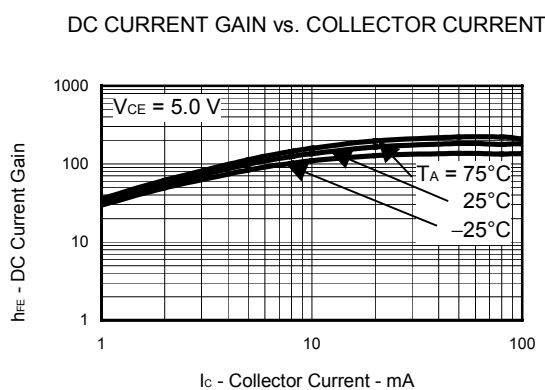
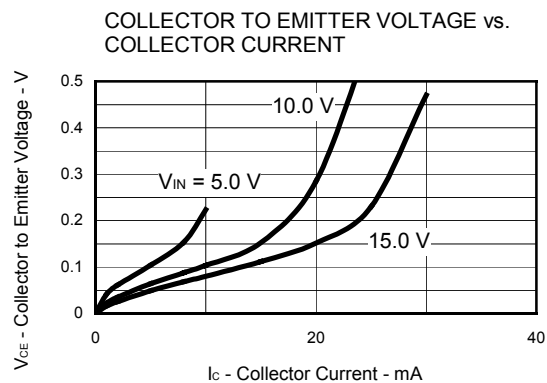
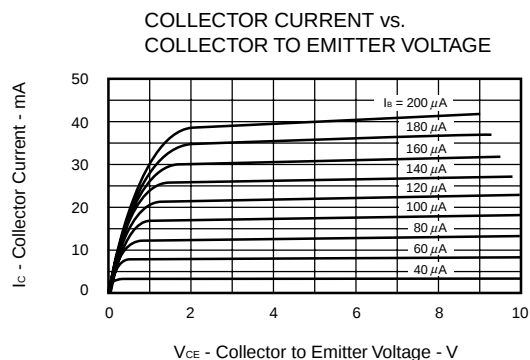
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**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**



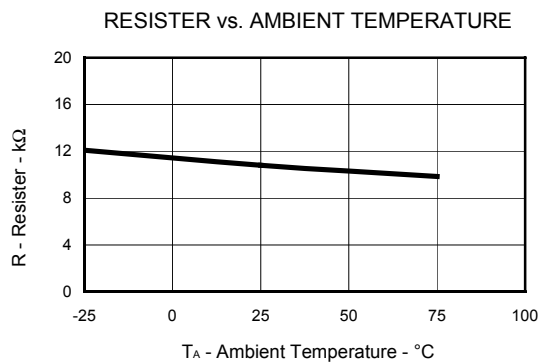
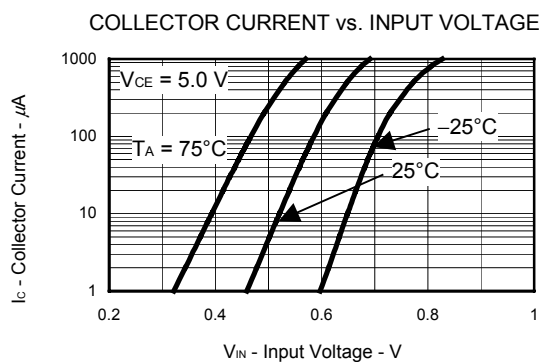
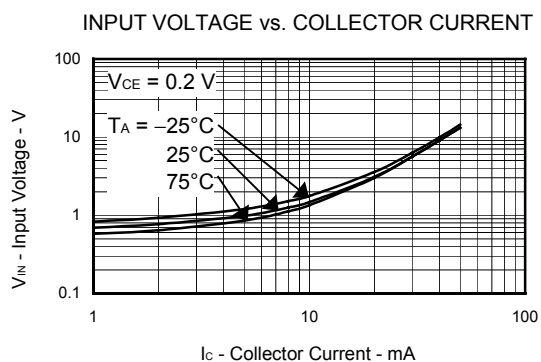
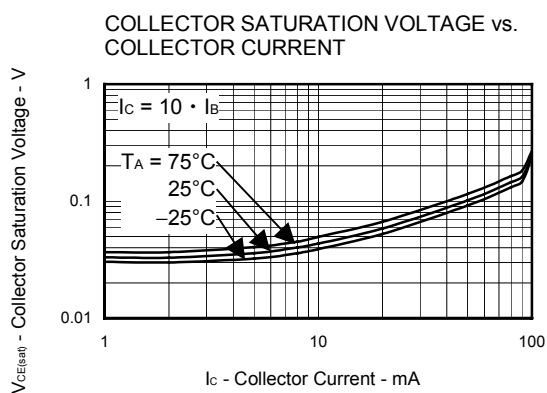
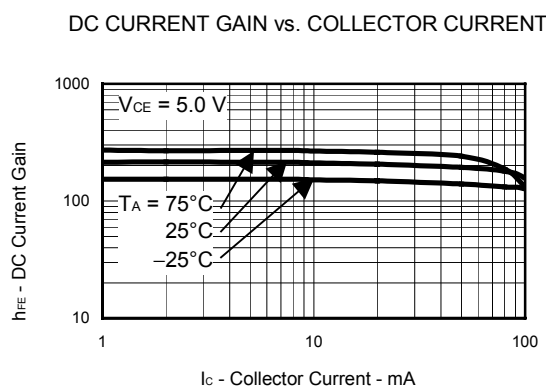
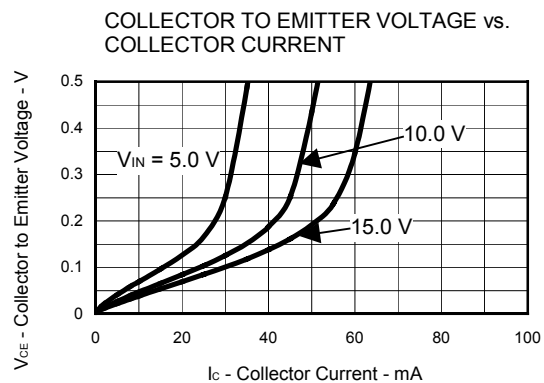
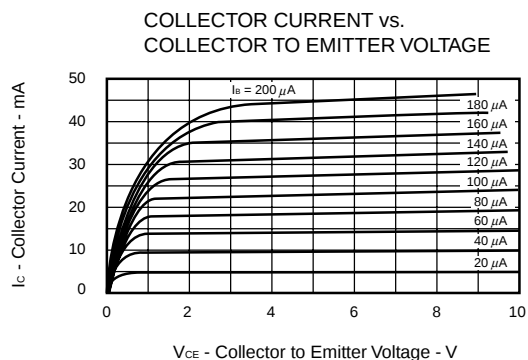
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**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**



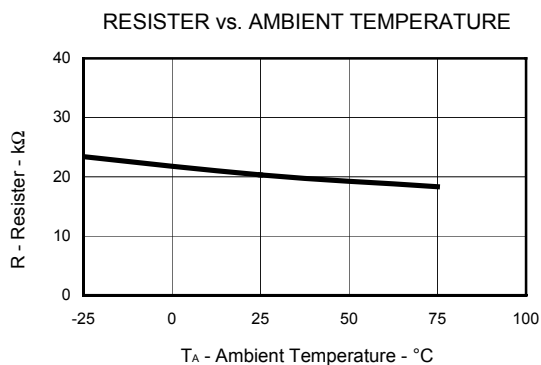
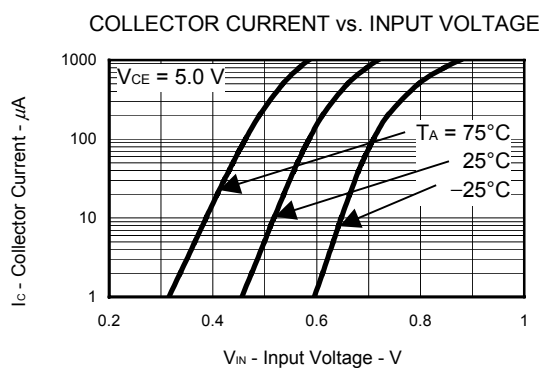
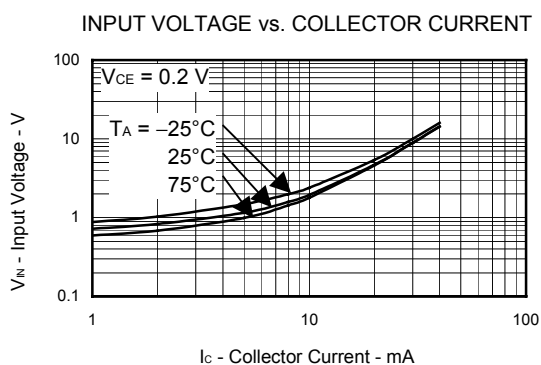
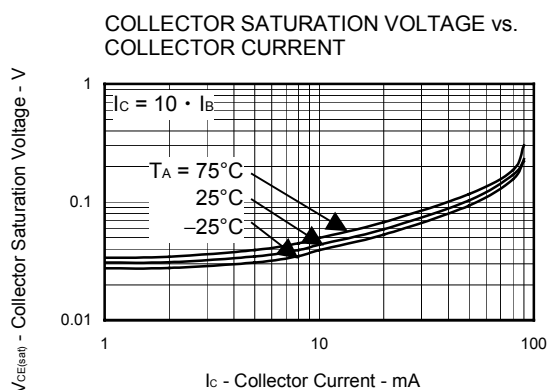
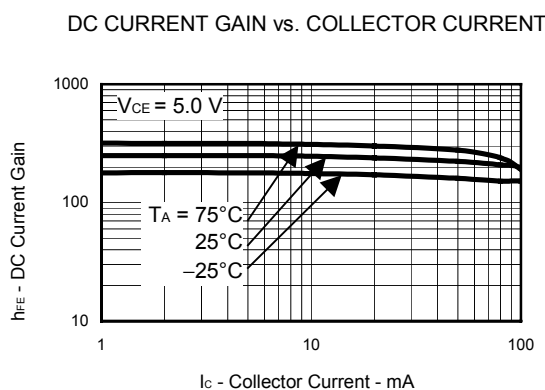
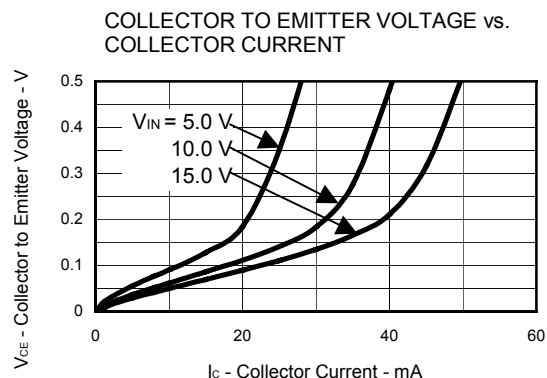
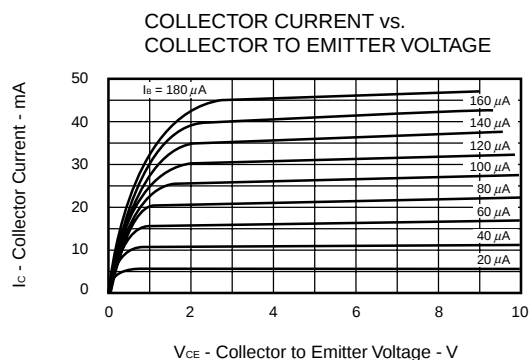
[GA4L4L]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



[GA4A4Z]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

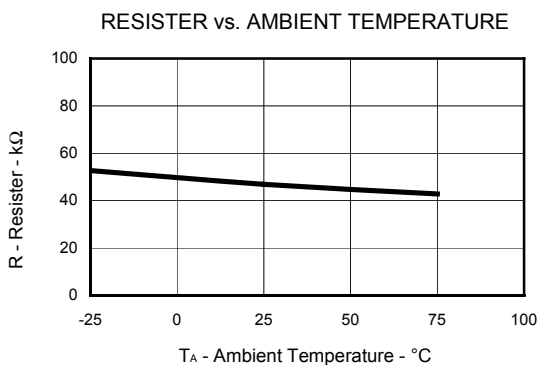
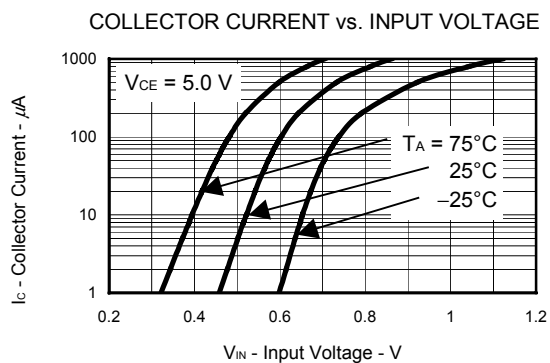
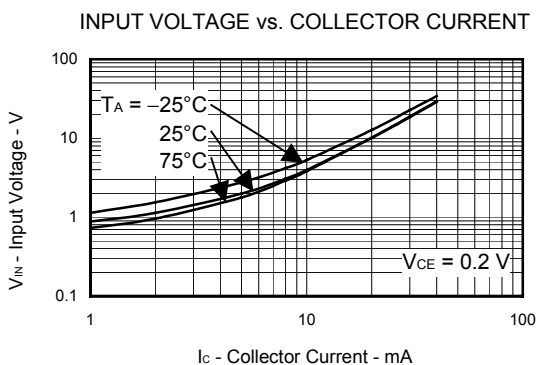
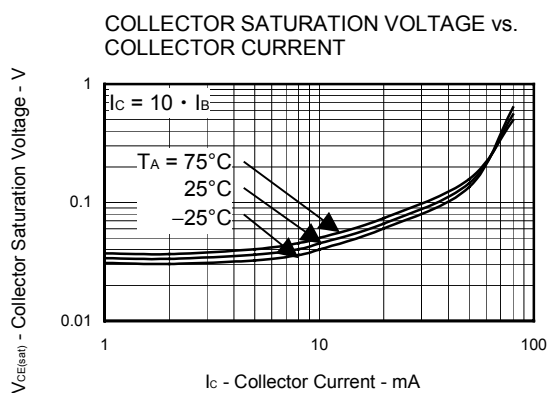
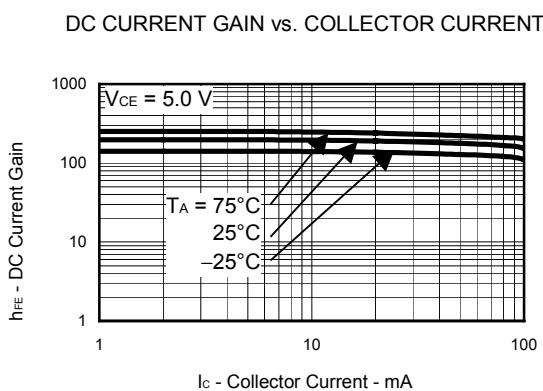
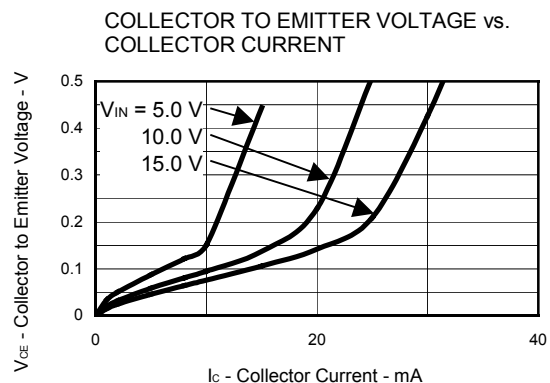
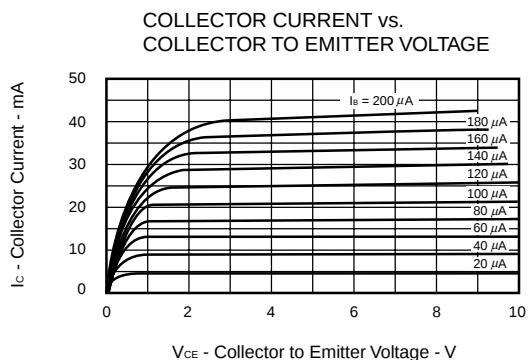


[GA4F4Z]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

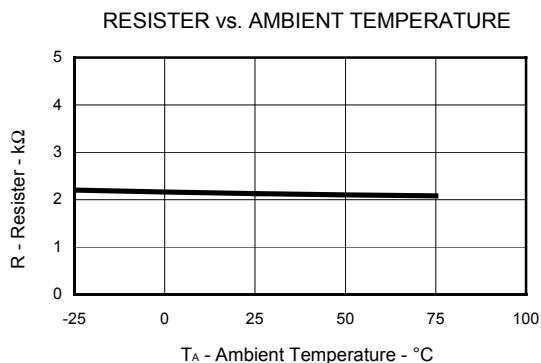
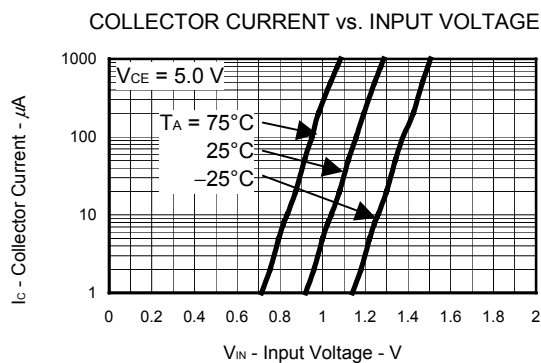
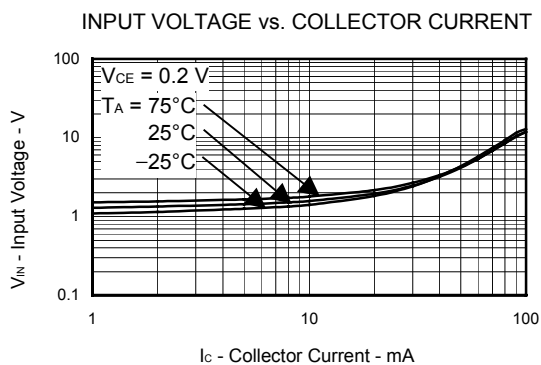
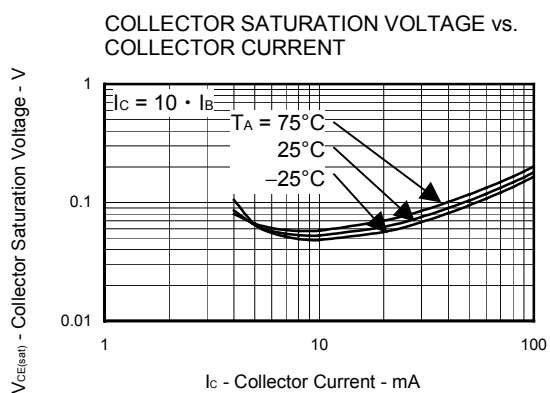
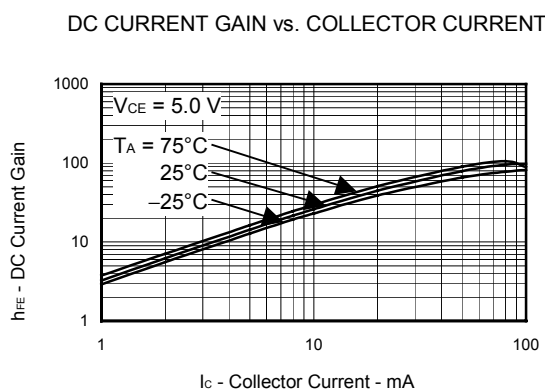
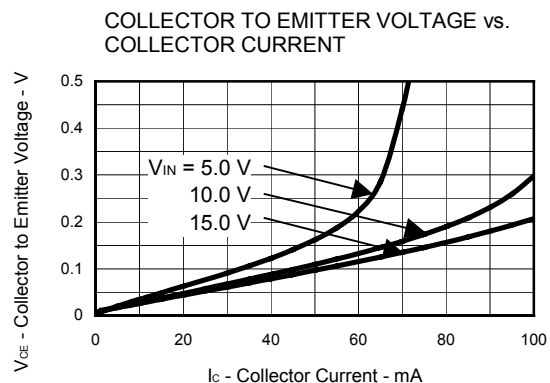
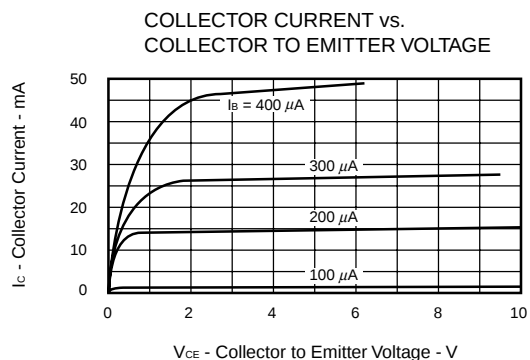


[GA4L4Z]

TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

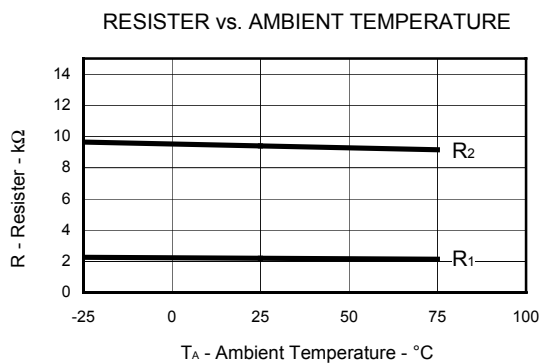
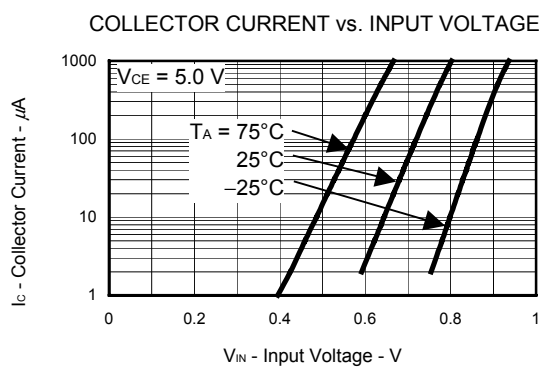
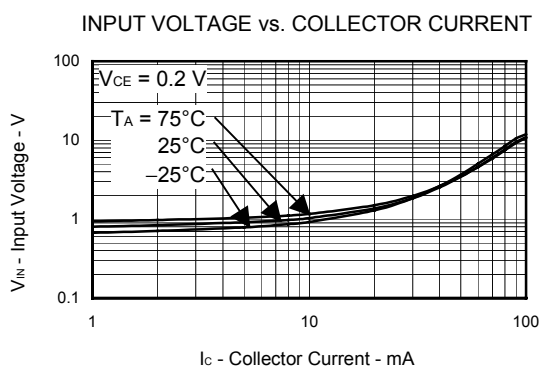
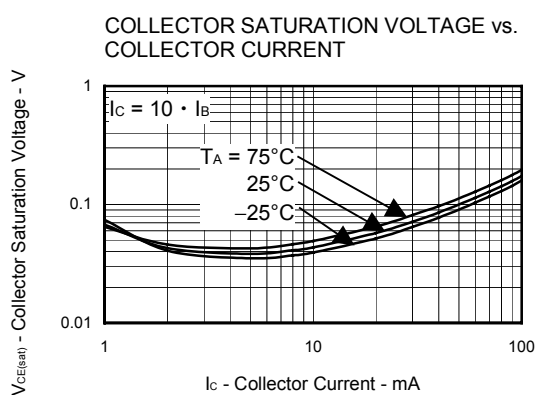
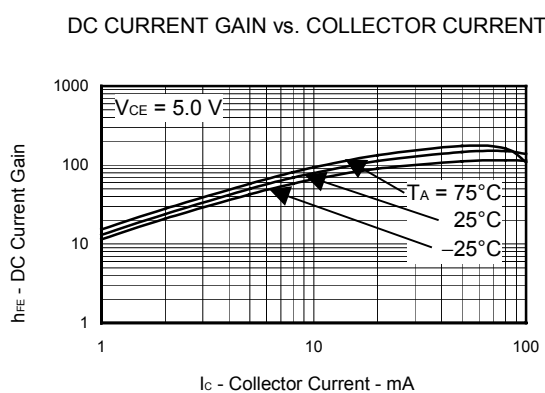
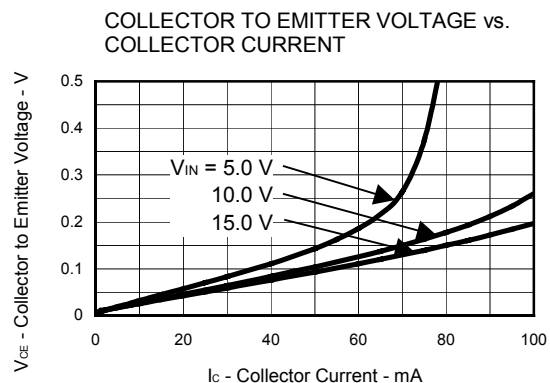
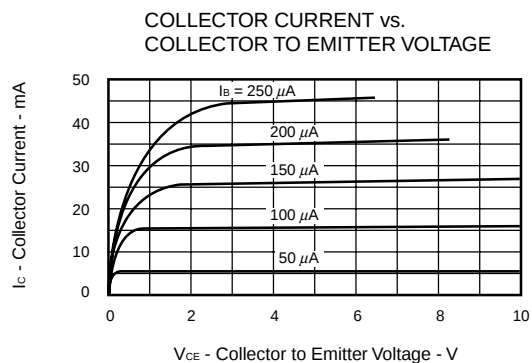


[GA4F3M]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

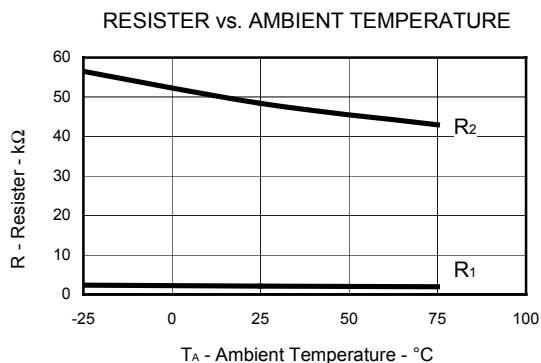
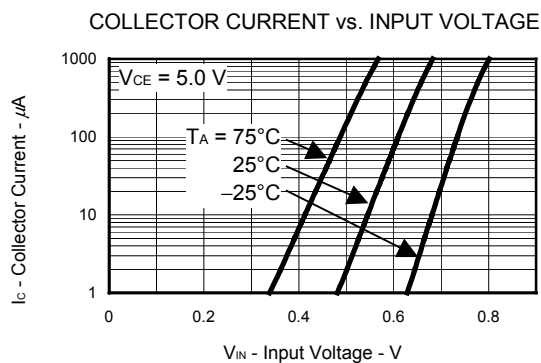
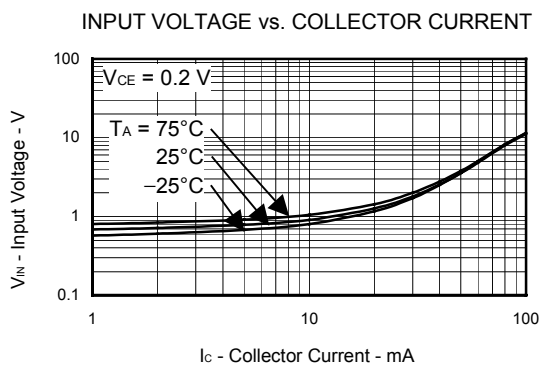
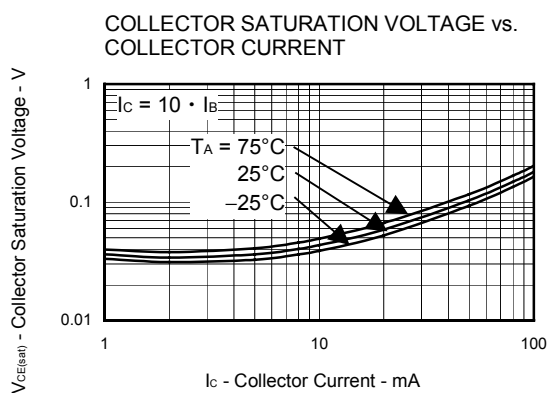
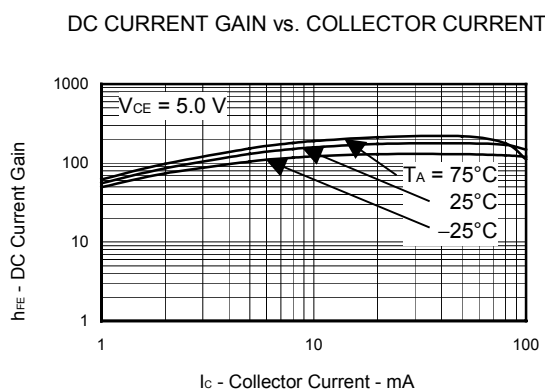
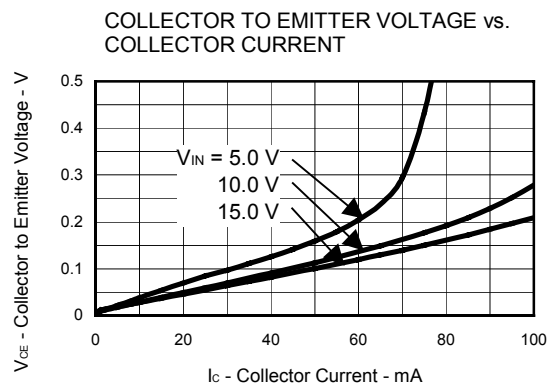
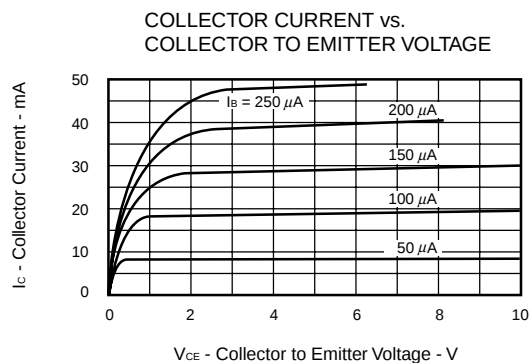


[GA4F3P]

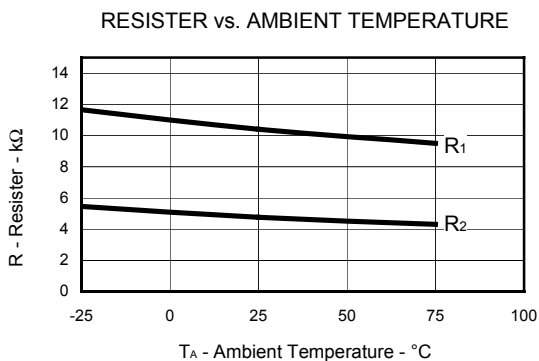
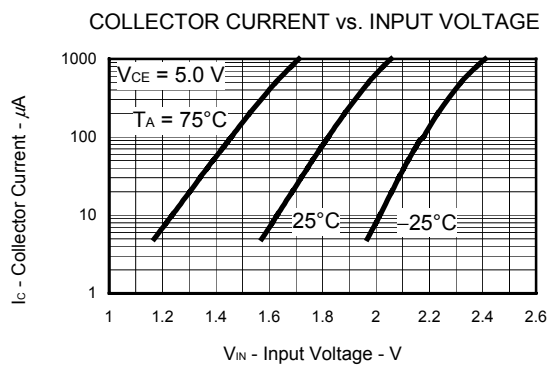
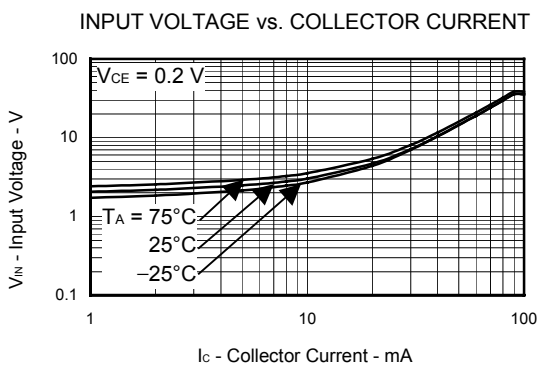
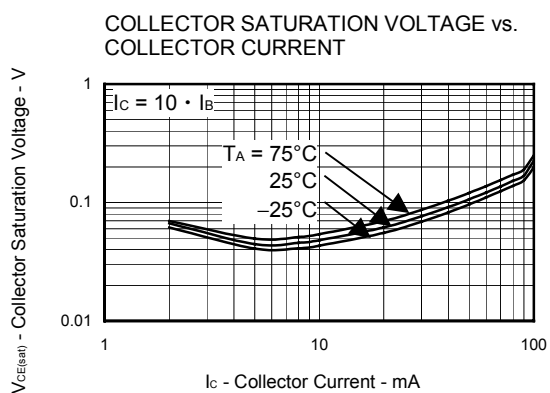
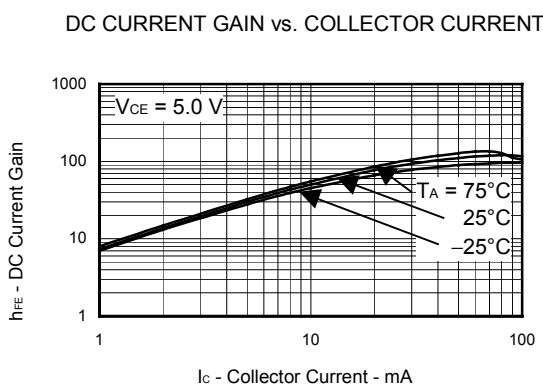
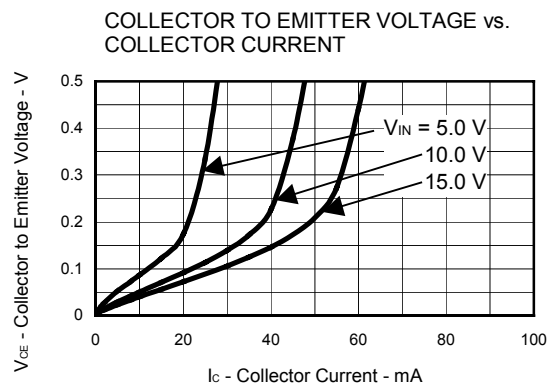
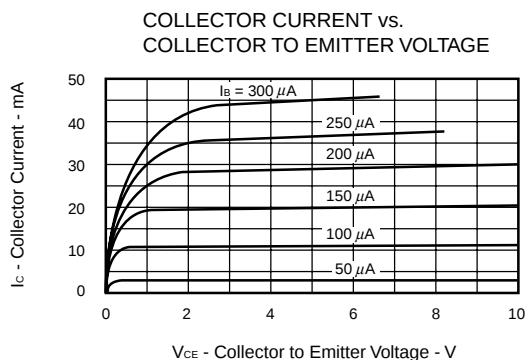
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



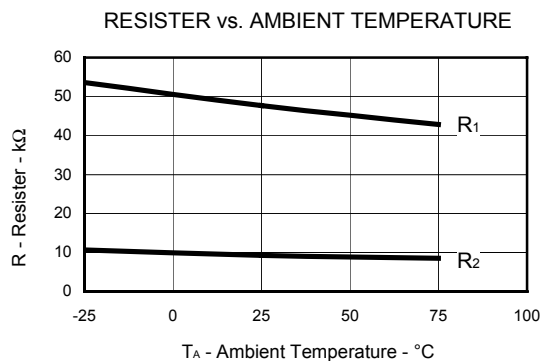
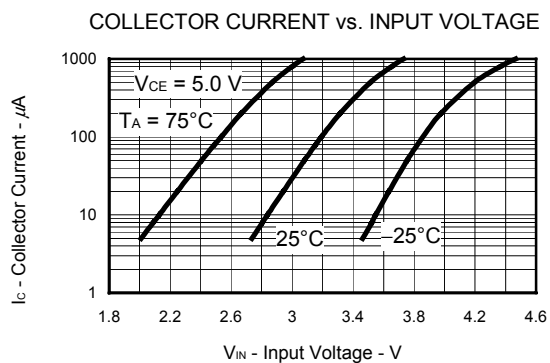
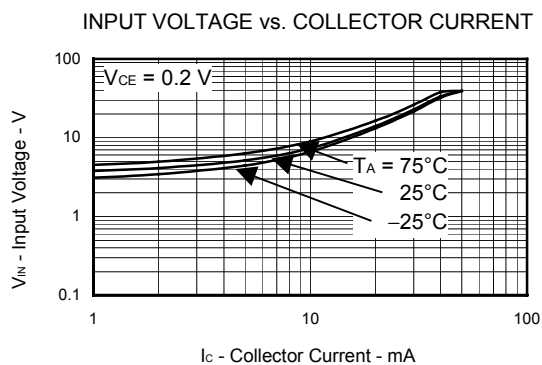
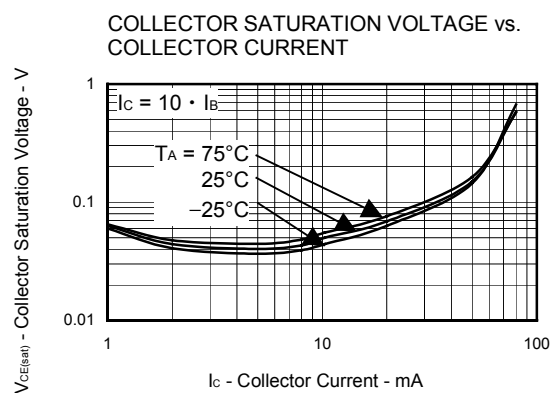
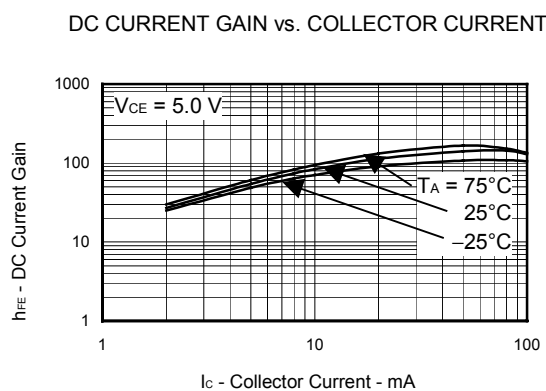
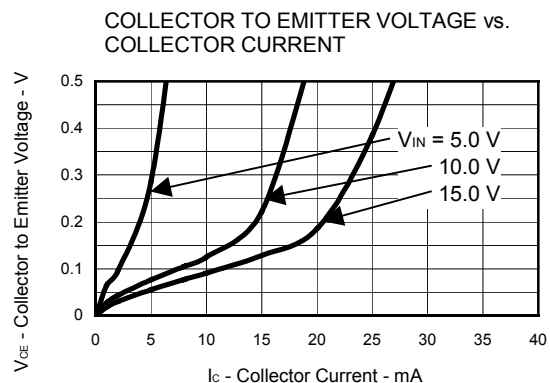
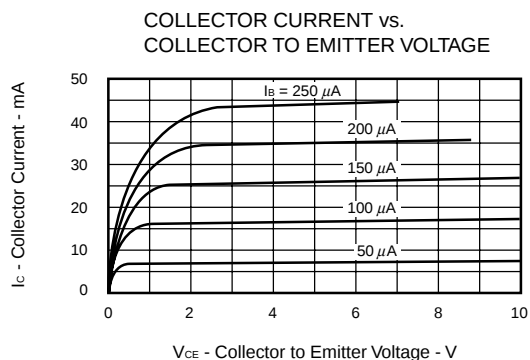
[GA4F3R]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



**[GA4A4L]**  
**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**



[GA4L4K]  
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



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