

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# SILICON TRANSISTOR KN4xxx

## RESISTOR BUILT-IN TYPE PNP TRANSISTOR

### FEATURES

- Compact package
- Resistors built-in type
- Complementary to KA4xxx

### ORDERING INFORMATION

PART NUMBER	PACKAGE
KN4xxx	SC-75 (USM)

### 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>	Note1	V
Collector Current (DC)	I <sub>C</sub>	-0.1	A
Collector Current (pulse)	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 1.

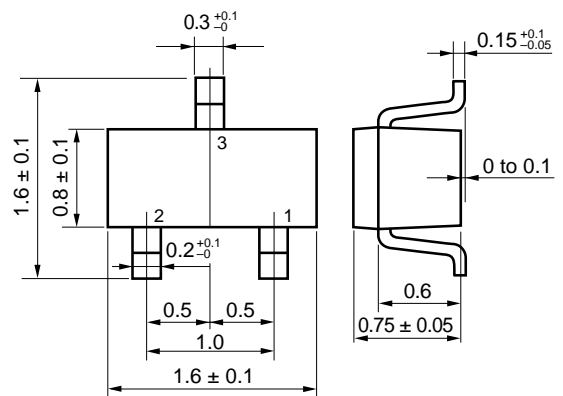
PART NUMBER	V <sub>EBO</sub> (V)	MARK	R <sub>1</sub> (kΩ)	R <sub>2</sub> (kΩ)
KN4A4M	-10	A7	10.0	10.0
KN4F4M	-10	B7	22.0	22.0
KN4L4M	-10	C7	47.0	47.0
KN4L3M	-10	D7	4.7	4.7
KN4L3N	-5	E7	4.7	10.0
KN4L3Z	-5	F7	4.7	
KN4A3Q	-5	G7	1.0	10.0
KN4A4P	-5	H7	10.0	47.0
KN4F4N	-5	X7	22.0	47.0

Note 2. PW ≤ 10 ms, Duty Cycle ≤ 50%

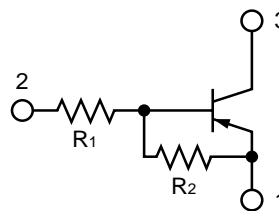
<R> Note 3. Mounted on ceramic substrate of 3.0 cm<sup>2</sup> x 0.64 mm

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### PACKAGE DRAWING (Unit: mm)



### EQUIVALENT CIRCUIT



### PIN CONNECTION

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

PART NUMBER	V <sub>EBO</sub> (V)	MARK	R <sub>1</sub> (kΩ)	R <sub>2</sub> (kΩ)
KN4L4L	-15	K7	47.0	22.0
KN4A4Z	-5	Y7	10.0	
KN4F4Z	-5	Z7	22.0	
KN4L4Z	-5	N7	47.0	
KN4F3M	-10	P7	2.2	2.2
KN4F3P	-5	Q7	2.2	10.0
KN4F3R	-5	R7	2.2	47.0
KN4A4L	-15	S7	10.0	4.7
KN4L4K	-25	T7	47.0	10.0

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I <sub>CB0</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				-
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				V
Input Resistor	R <sub>1</sub>		<b>Note3</b>			kΩ
Emitter to Base Resistor	R <sub>2</sub>					kΩ

**Note 1.**

PART NUMBER	h <sub>FE1</sub>			h <sub>FE2</sub>			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
KN4A4M	35		100	80			-
KN4F4M	60		195	90			-
KN4L4M	85		340	95			-
KN4L3M	20		80	80			-
KN4L3N	35		100	80			-
KN4L3Z	135		600	100			-
KN4A3Q	35		100	80			-
KN4A4P	85		340	95			-
KN4F4N	85		340	95			-
KN4L4L	60		195	90			-
KN4A4Z	135		600	100			-
KN4F4Z	135		600	100			-
KN4L4Z	135		600	100			-
KN4F3M	8		50	50			-
KN4F3P	35		100	80			-
KN4F3R	85		340	95			-
KN4A4L	20		80	80			-
KN4L4K	35		100	80			-

**Note 2.**

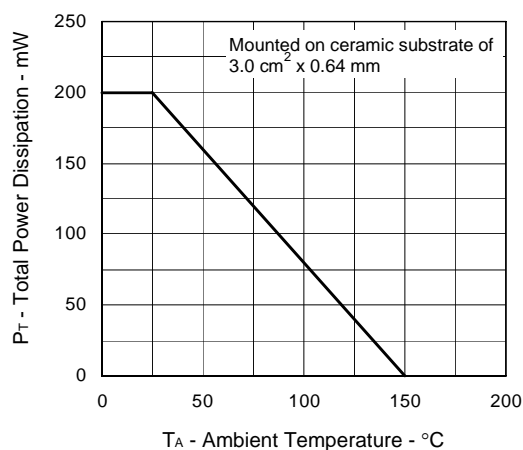
PART NUMBER	V <sub>IL</sub>			V <sub>IH</sub>			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
KN4A4M			-0.8	-3.0			V
KN4F4M			-0.8	-4.0			V
KN4L4M			-0.8	-5.0			V
KN4L3M			-0.8	-3.0			V
KN4L3N			-0.6	-3.0			V
KN4L3Z			-0.5	-1.2			V
KN4A3Q			-0.5	-2.0			V
KN4A4P			-0.5	-3.0			V
KN4F4N			-0.6	-3.0			V
KN4L4L			-0.9	-6.0			V
KN4A4Z			-0.5	-2.0			V
KN4F4Z			-0.5	-3.0			V
KN4L4Z			-0.5	-4.0			V
KN4F3M			-0.8	-3.0			V
KN4F3P			-0.5	-2.0			V
KN4F3R			-0.5	-2.0			V
KN4A4L			-0.9	-6.0			V
KN4L4K			-2.0	-8.0			V

Note 3.

PART NUMBER	R <sub>1</sub>			R <sub>2</sub>			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
KN4A4M	7.00	10.00	13.00	7.00	10.00	13.00	kΩ
KN4F4M	15.40	22.00	28.60	15.40	22.00	28.60	kΩ
KN4L4M	32.90	47.00	61.10	32.90	47.00	61.10	kΩ
KN4L3M	3.29	4.70	6.11	3.29	4.70	6.11	kΩ
KN4L3N	3.29	4.70	6.11	7.00	10.00	13.00	kΩ
KN4L3Z	3.29	4.70	6.11				kΩ
KN4A3Q	0.70	1.00	1.30	7.00	10.00	13.00	kΩ
KN4A4P	7.00	10.00	13.00	32.90	47.00	61.10	kΩ
KN4F4N	15.40	22.00	28.60	32.90	47.00	61.10	kΩ
KN4L4L	32.90	47.00	61.10	15.40	22.00	28.60	kΩ
KN4A4Z	7.00	10.00	13.00				kΩ
KN4F4Z	15.40	22.00	28.60				kΩ
KN4L4Z	32.90	47.00	61.10				kΩ
KN4F3M	1.54	2.20	2.86	1.54	2.20	2.86	kΩ
KN4F3P	1.54	2.20	2.86	7.00	10.00	13.00	kΩ
KN4F3R	1.54	2.20	2.86	32.90	47.00	61.10	kΩ
KN4A4L	7.00	10.00	13.00	3.29	4.70	6.11	kΩ
KN4L4K	32.90	47.00	61.10	7.00	10.00	13.00	kΩ

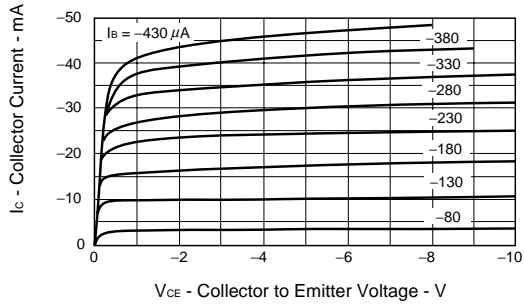
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TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE

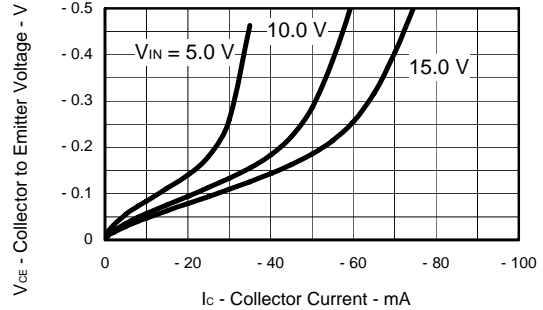


**[KN4A4M]**  
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

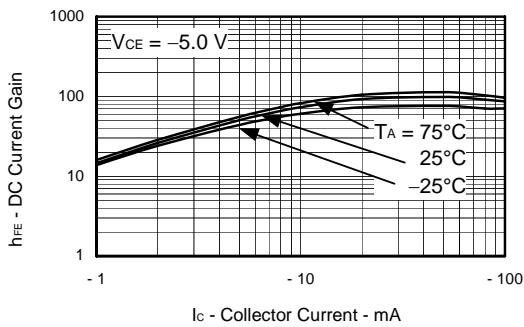
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



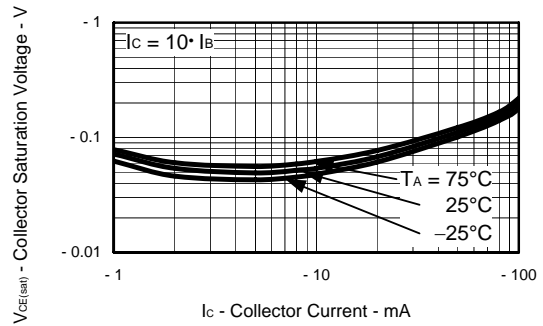
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



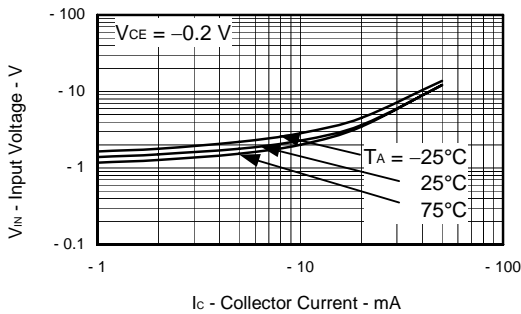
DC CURRENT GAIN vs. COLLECTOR CURRENT



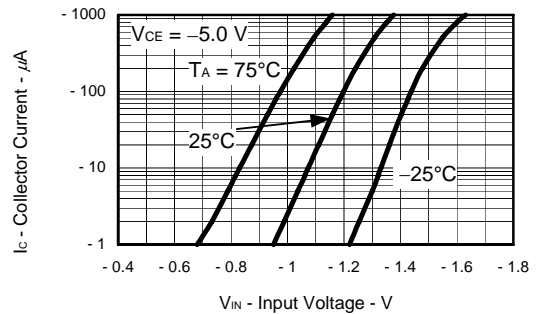
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



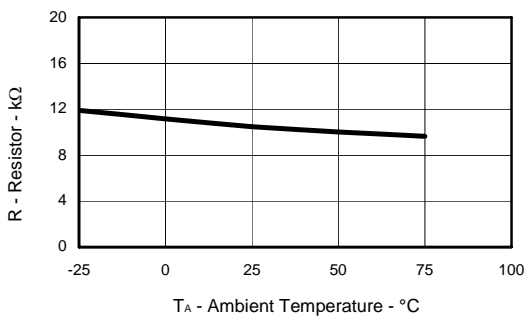
INPUT VOLTAGE vs. COLLECTOR CURRENT



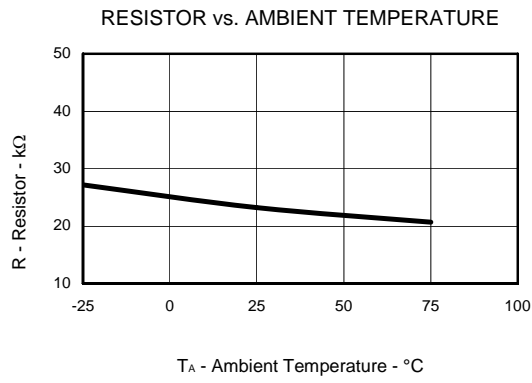
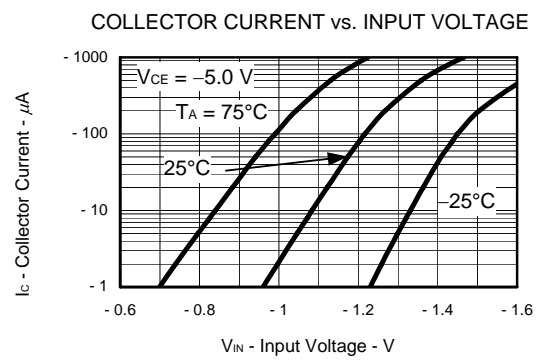
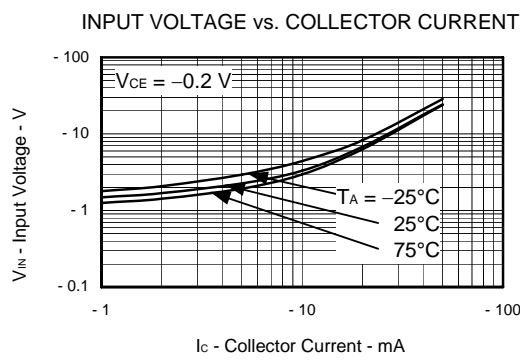
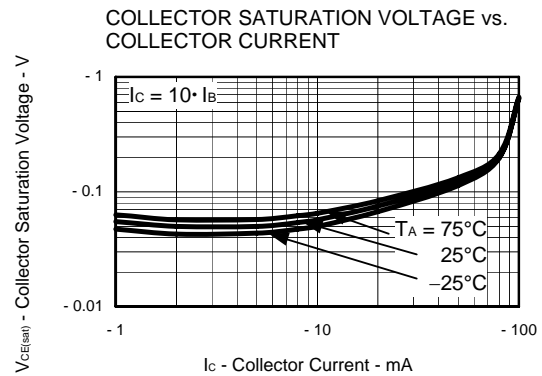
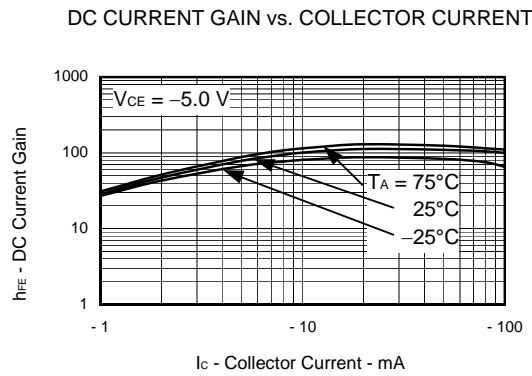
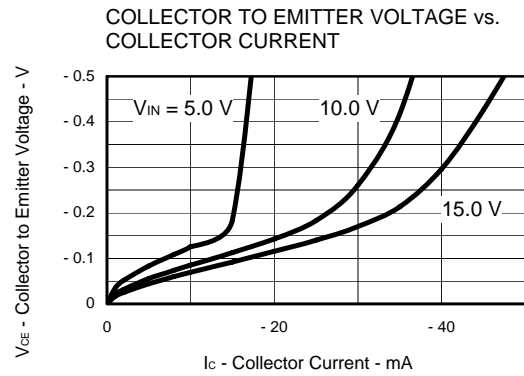
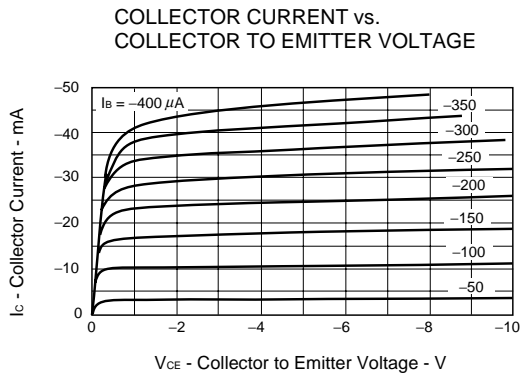
COLLECTOR CURRENT vs. INPUT VOLTAGE



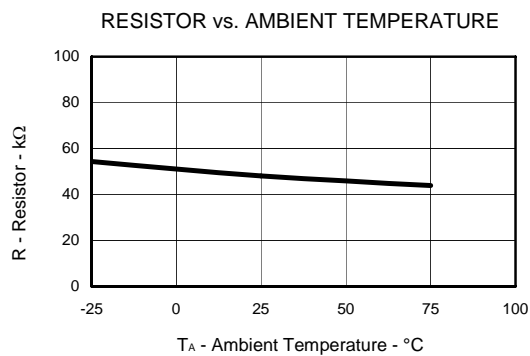
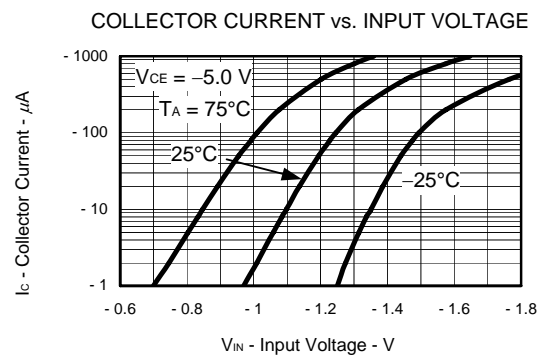
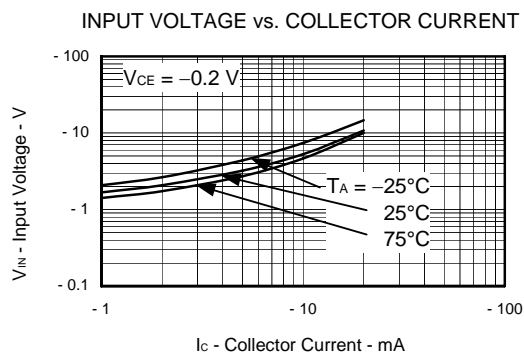
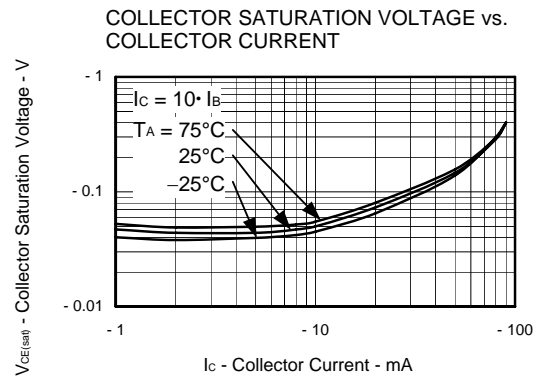
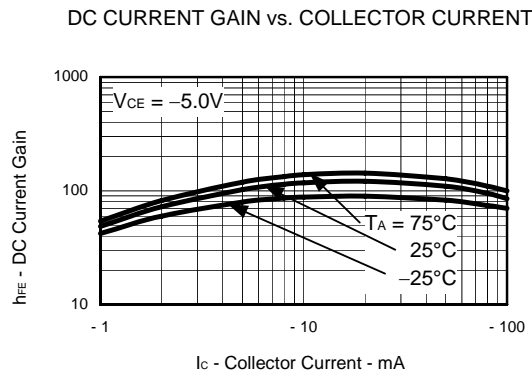
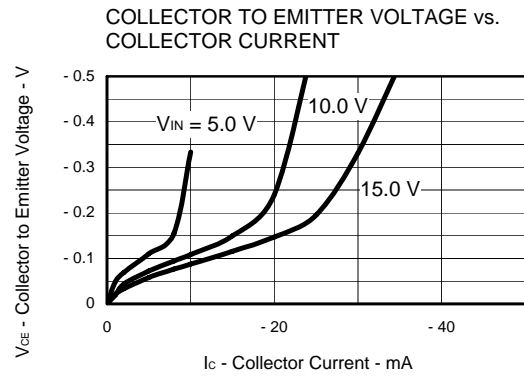
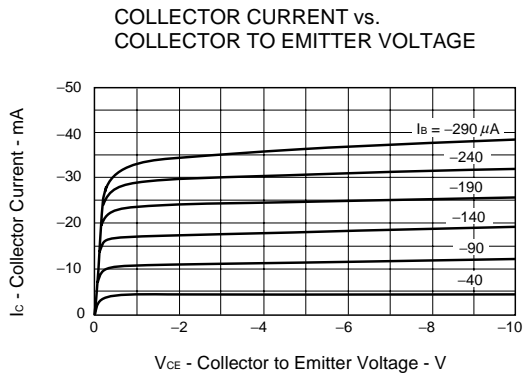
RESISTOR vs. AMBIENT TEMPERATURE



[KN4F4M]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



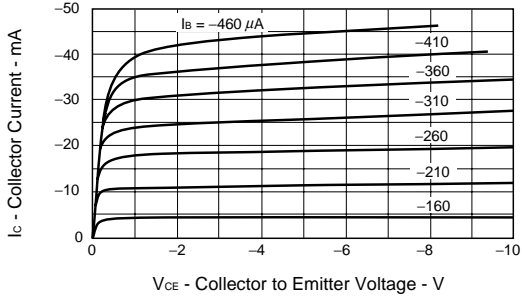
**[KN4L4M]**  
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**



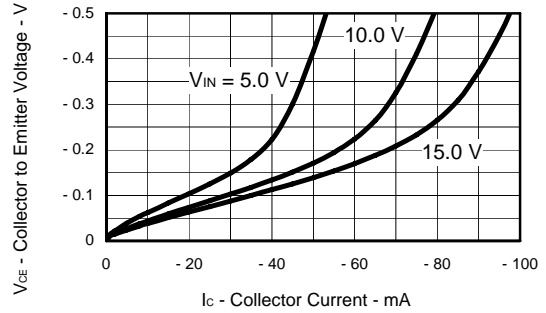


**[KN4L3M]**  
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

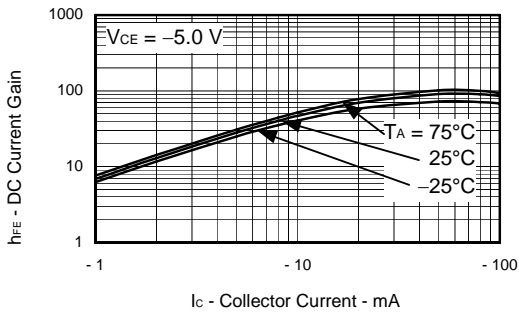
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



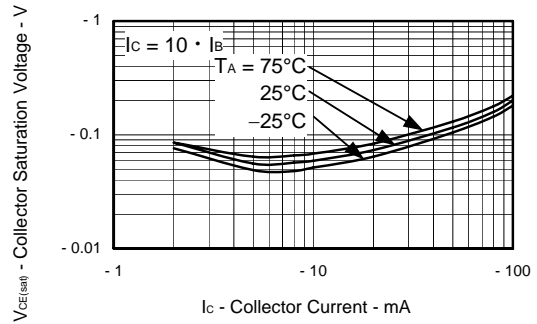
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



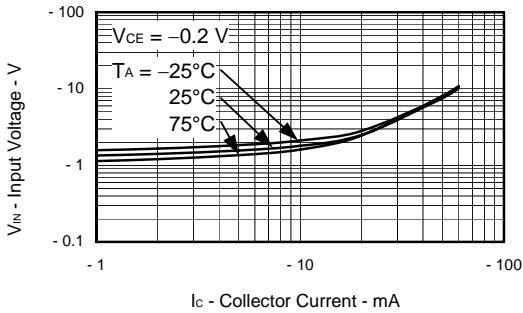
DC CURRENT GAIN vs. COLLECTOR CURRENT



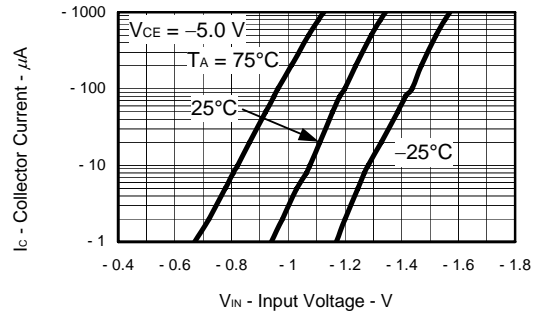
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



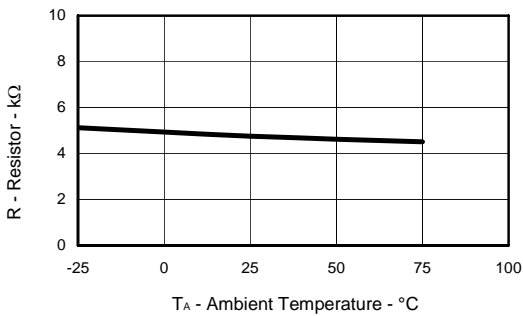
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

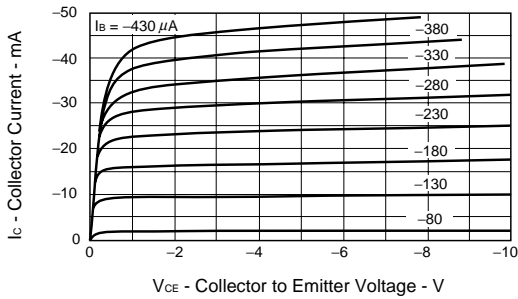


RESISTOR vs. AMBIENT TEMPERATURE

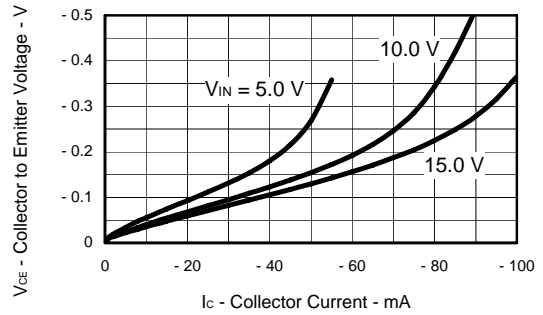


[KN4L3N]  
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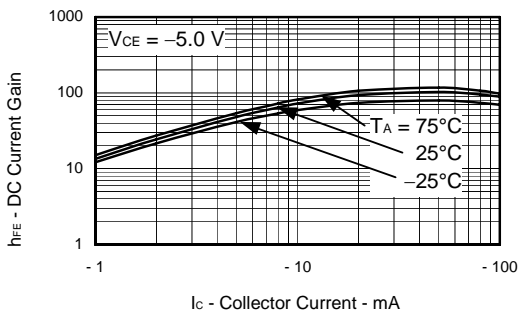
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



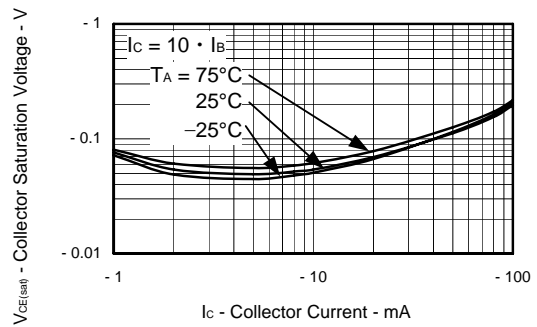
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



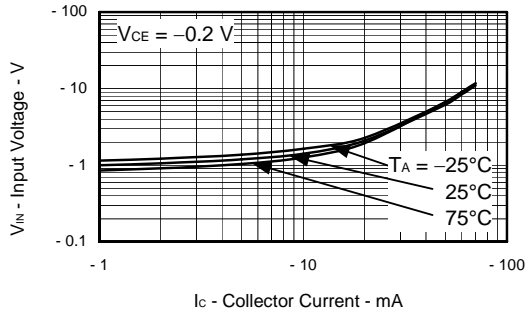
DC CURRENT GAIN vs. COLLECTOR CURRENT



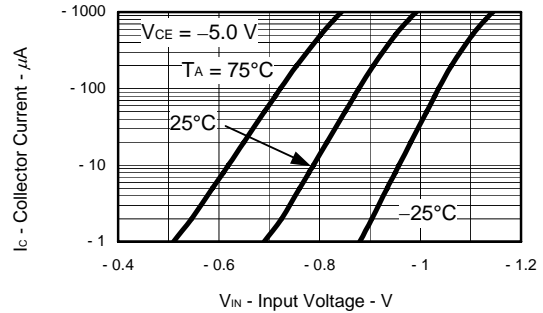
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



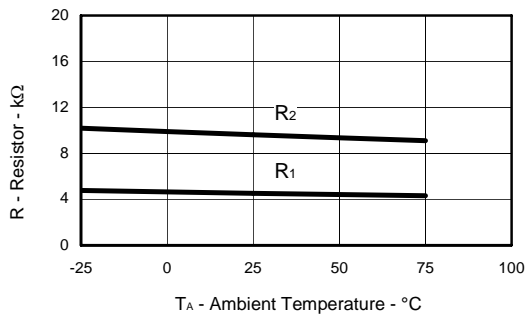
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

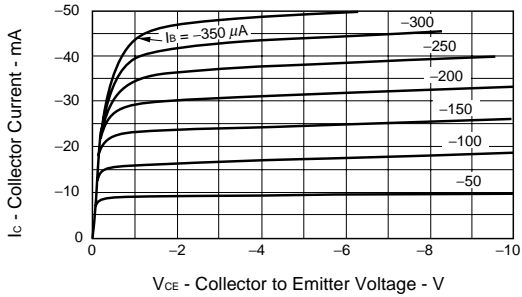


RESISTOR vs. AMBIENT TEMPERATURE

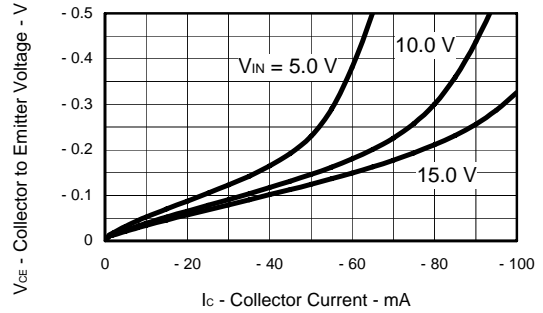


[KN4L3Z]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

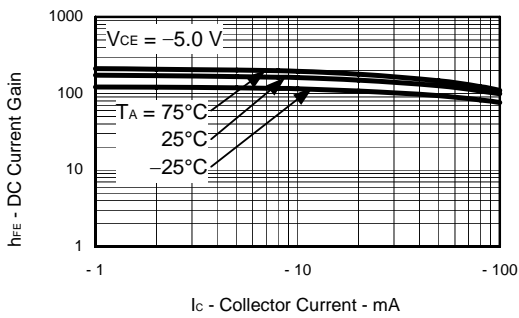
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



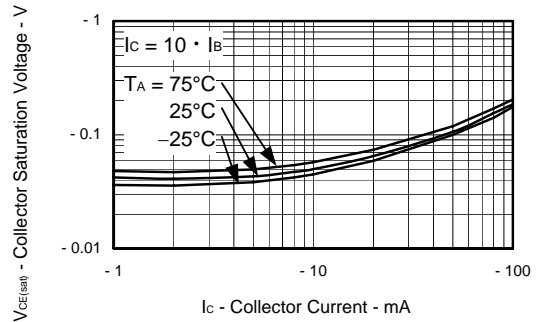
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



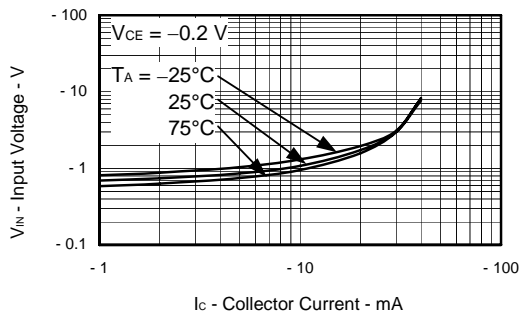
DC CURRENT GAIN vs. COLLECTOR CURRENT



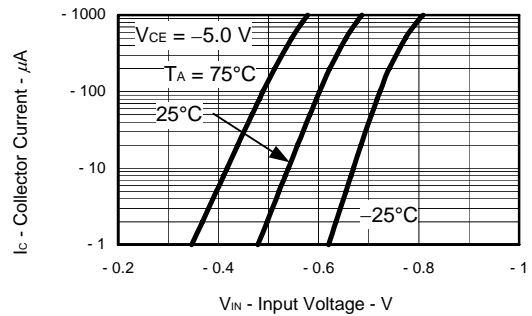
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



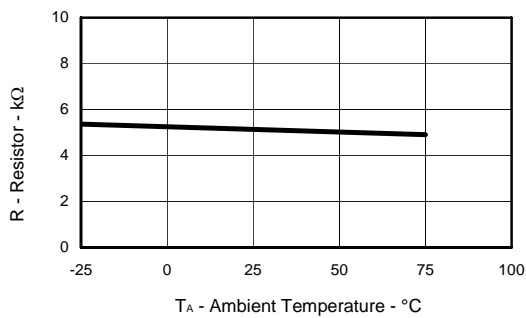
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

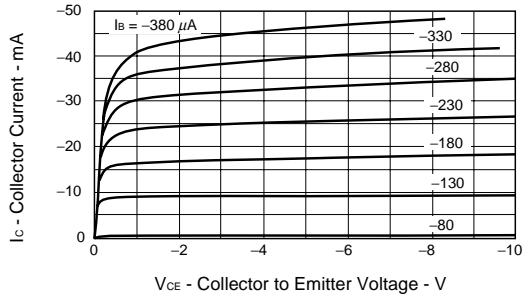


RESISTOR vs. AMBIENT TEMPERATURE

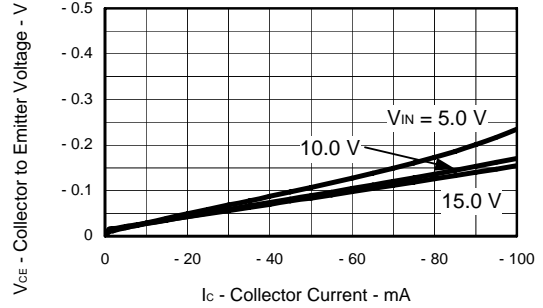


[KN4A3Q]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

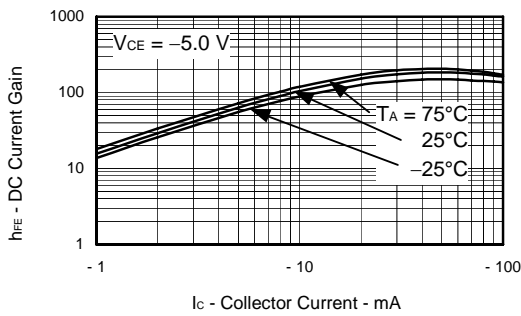
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



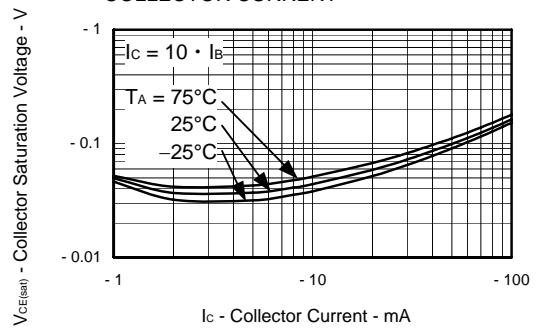
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



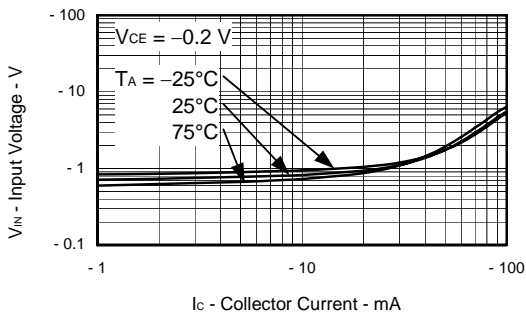
DC CURRENT GAIN vs. COLLECTOR CURRENT



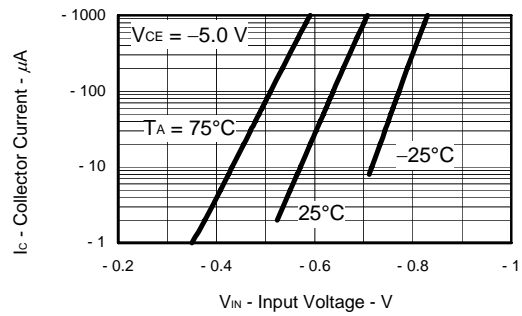
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



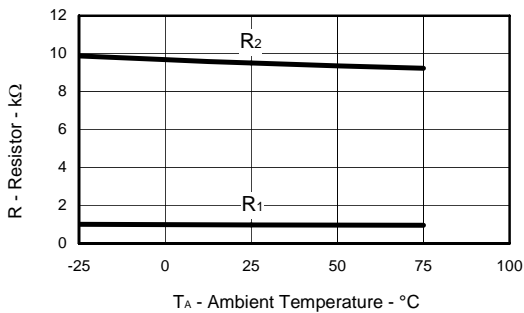
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

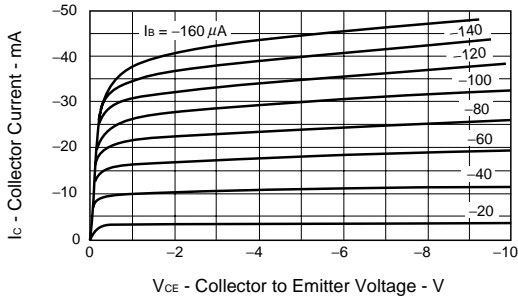


RESISTOR vs. AMBIENT TEMPERATURE

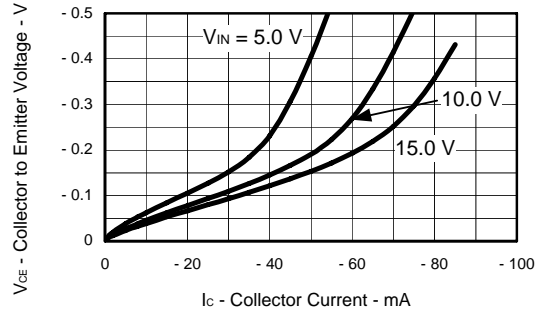


[KN4A4P]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

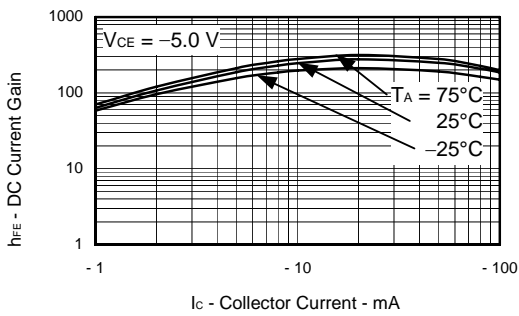
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



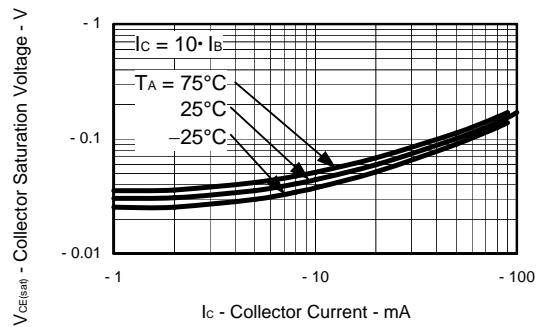
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



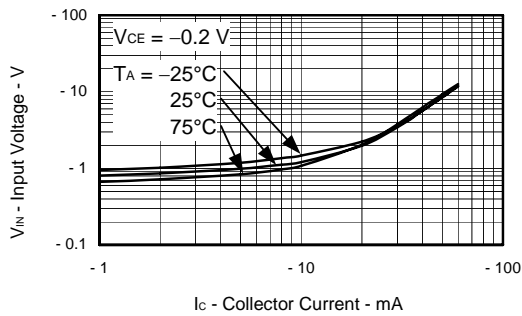
DC CURRENT GAIN vs. COLLECTOR CURRENT



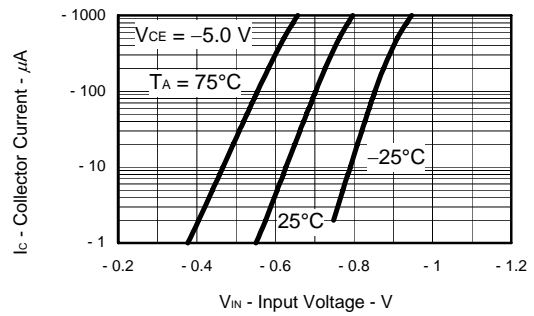
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



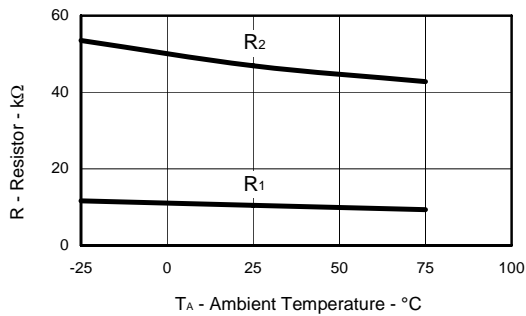
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

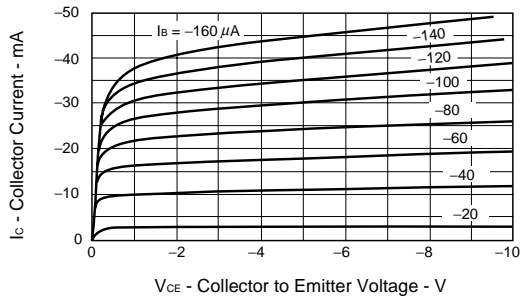


RESISTOR vs. AMBIENT TEMPERATURE

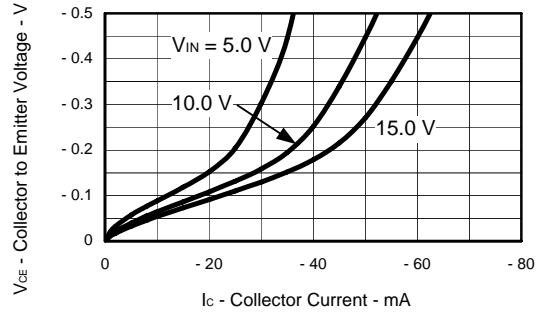


**[KN4F4N]**  
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

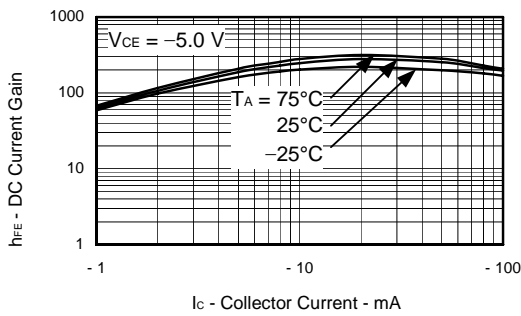
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



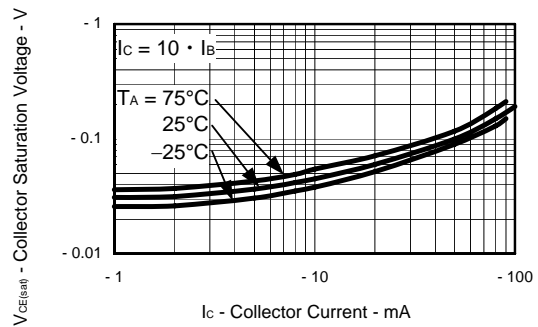
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



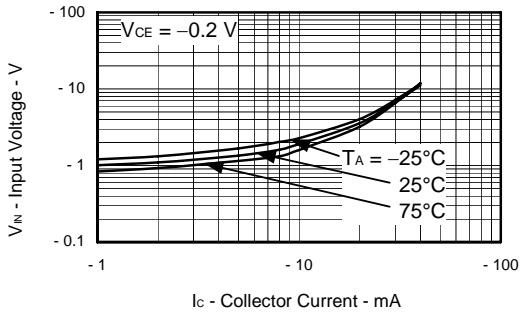
DC CURRENT GAIN vs. COLLECTOR CURRENT



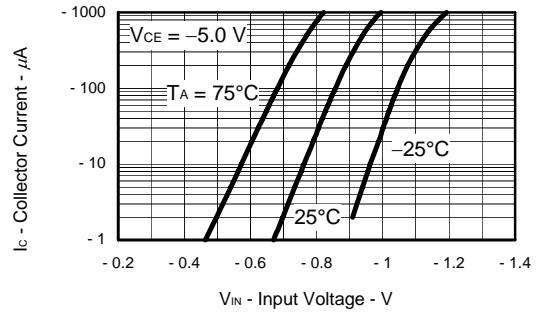
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



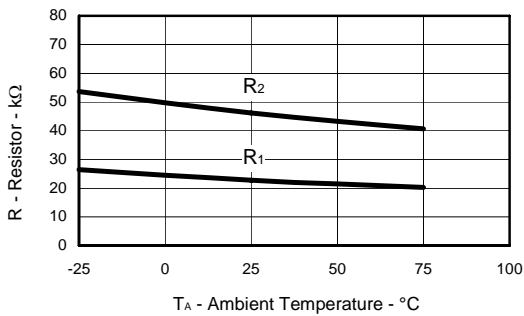
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

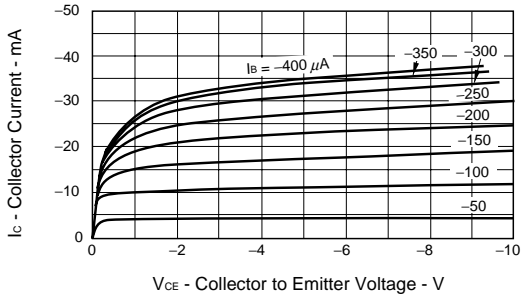


RESISTOR vs. AMBIENT TEMPERATURE

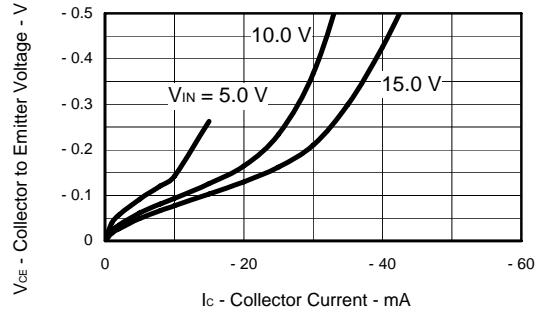


[KN4L4L]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

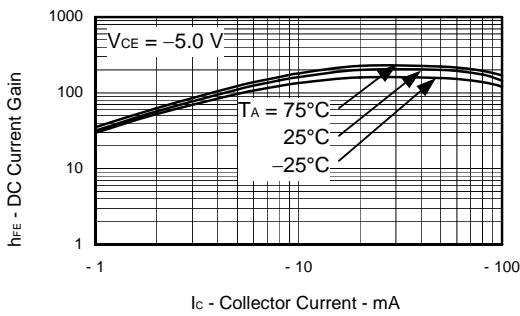
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



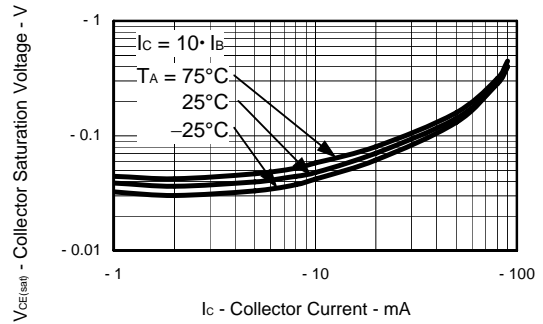
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



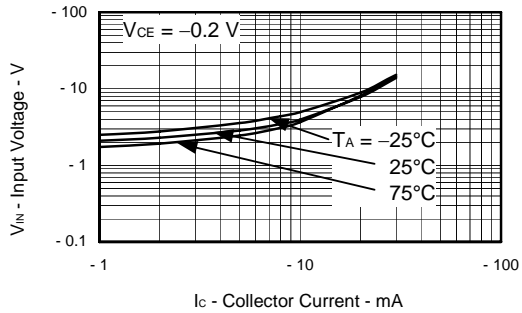
DC CURRENT GAIN vs. COLLECTOR CURRENT



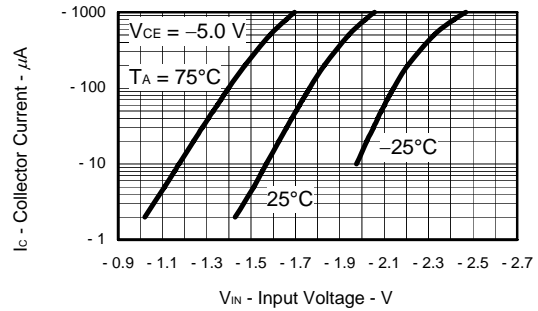
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



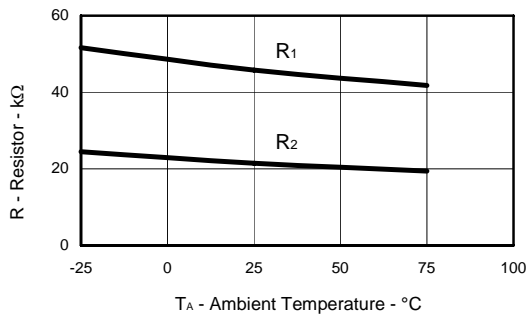
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

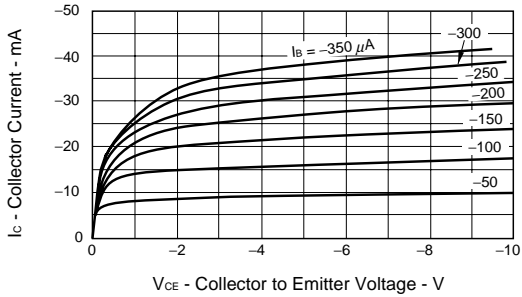


RESISTOR vs. AMBIENT TEMPERATURE

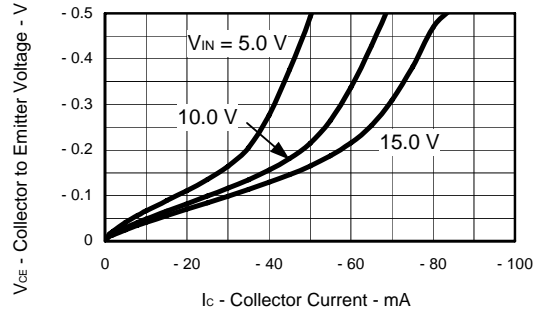


[KN4A4Z]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

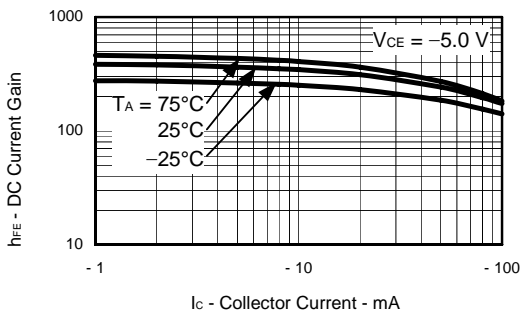
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



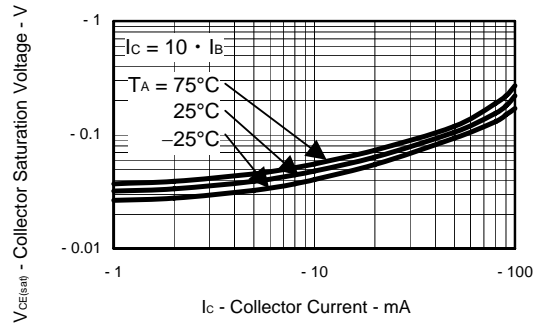
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



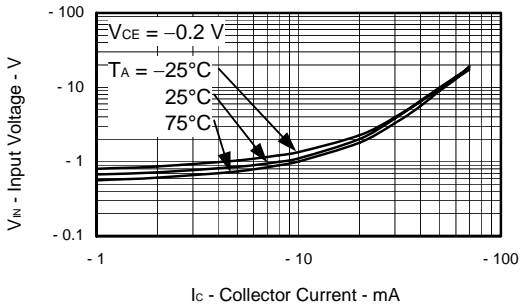
DC CURRENT GAIN vs. COLLECTOR CURRENT



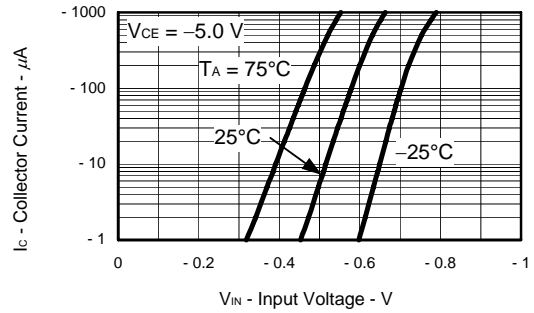
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



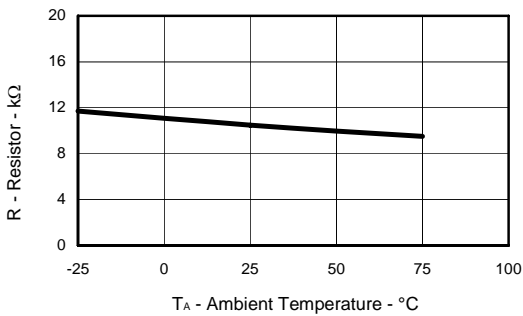
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE



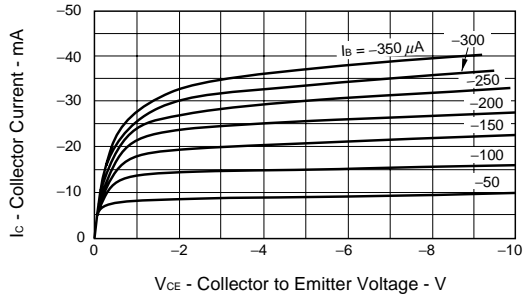
RESISTOR vs. AMBIENT TEMPERATURE



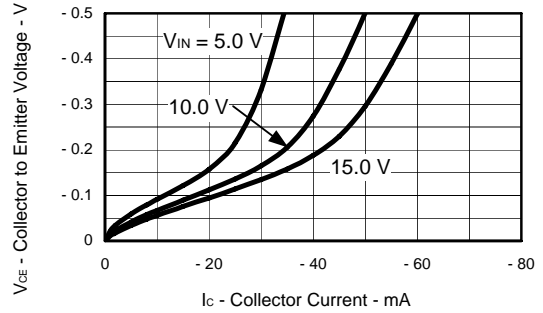


[KN4F4Z]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

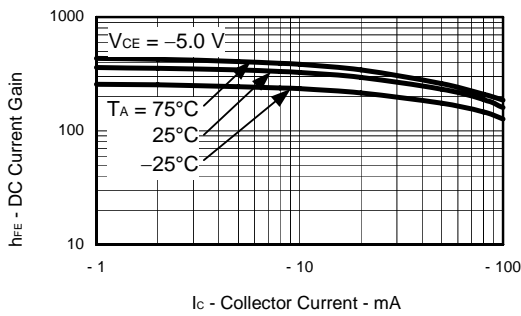
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



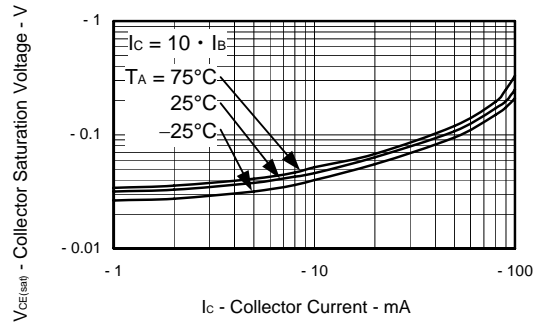
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



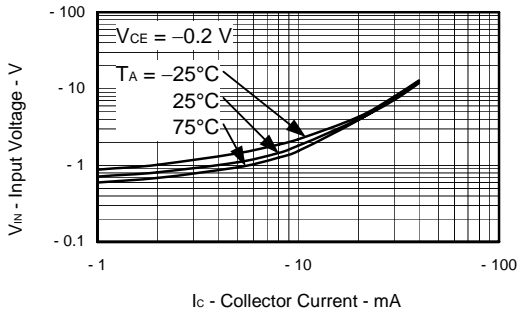
DC CURRENT GAIN vs. COLLECTOR CURRENT



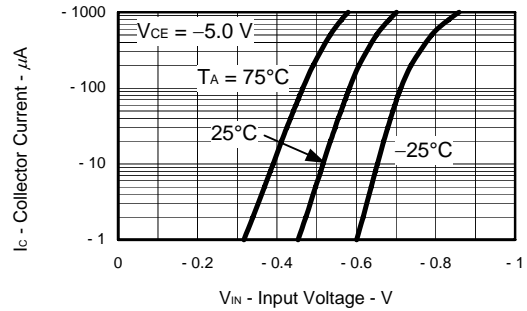
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



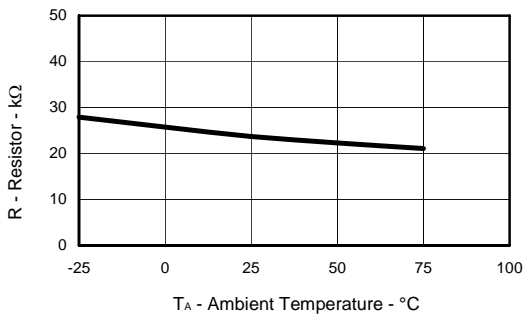
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

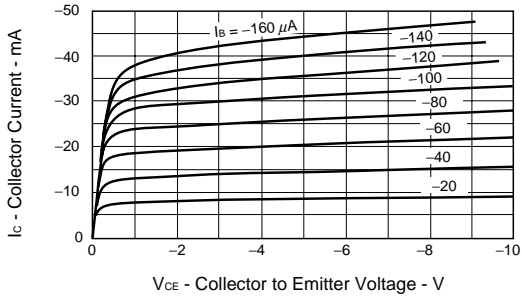


RESISTOR vs. AMBIENT TEMPERATURE

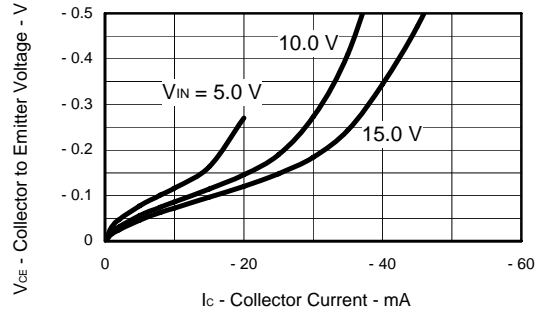


[KN4L4Z]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

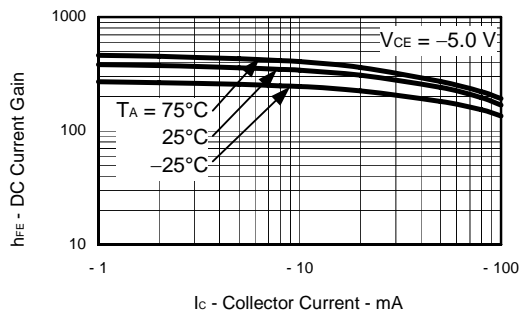
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



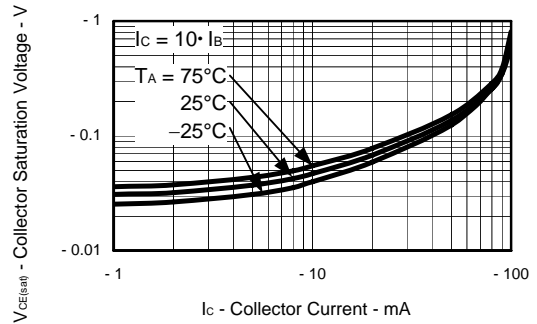
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



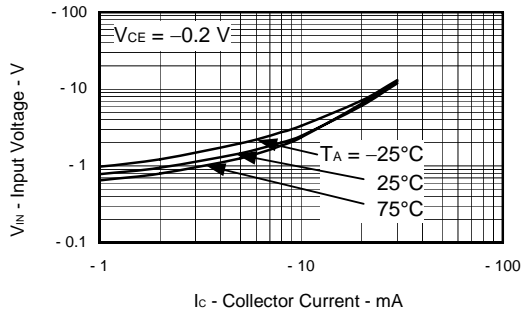
DC CURRENT GAIN vs. COLLECTOR CURRENT



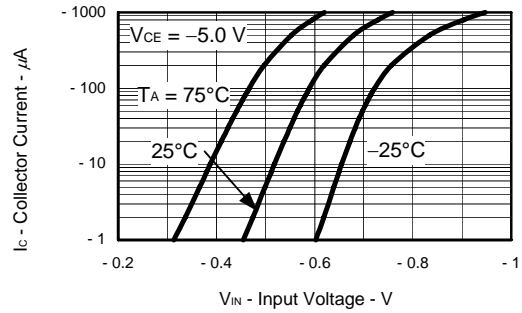
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



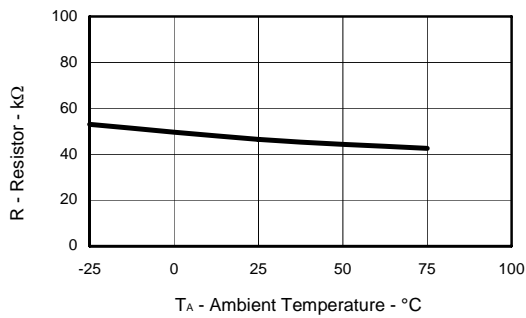
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

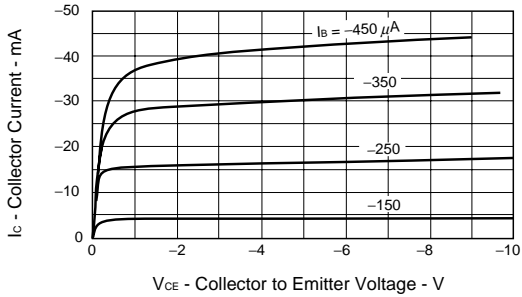


RESISTOR vs. AMBIENT TEMPERATURE

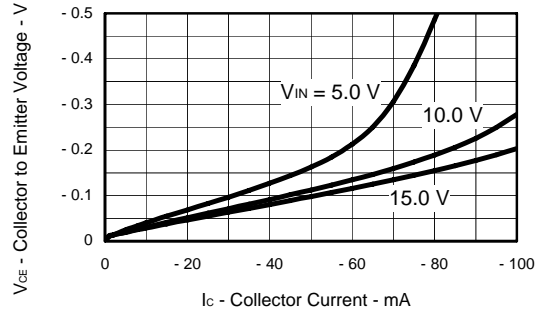


[KN4F3M]  
 TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

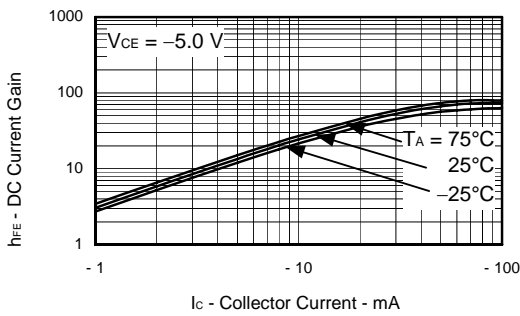
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



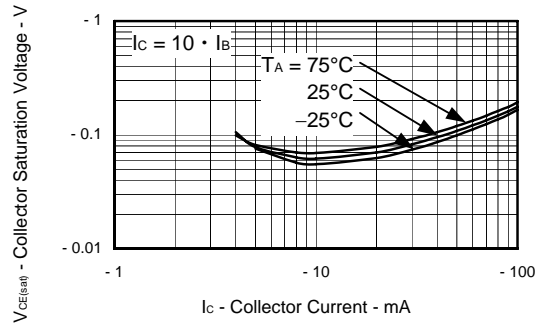
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



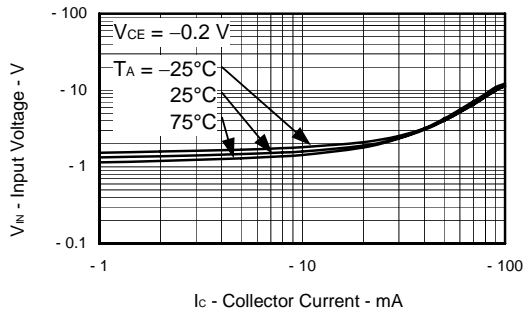
DC CURRENT GAIN vs. COLLECTOR CURRENT



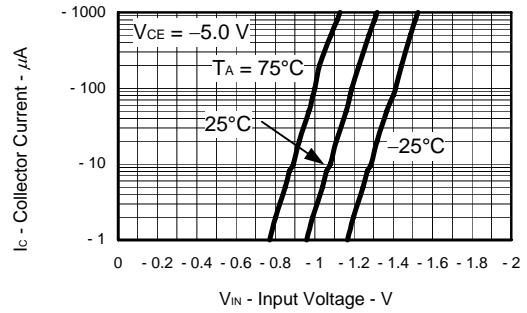
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



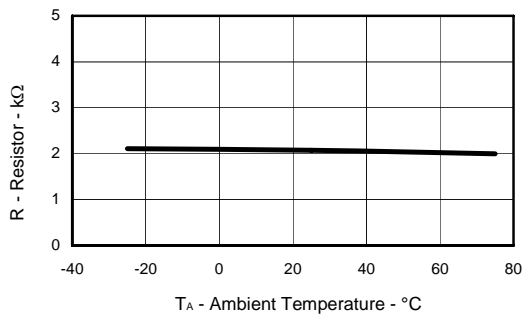
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

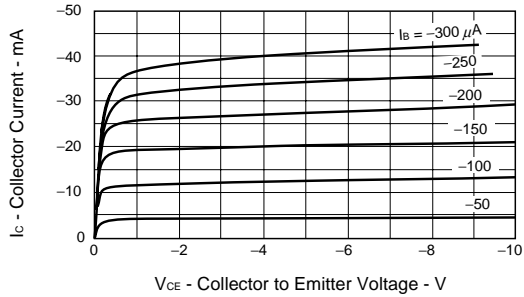


RESISTOR vs. AMBIENT TEMPERATURE

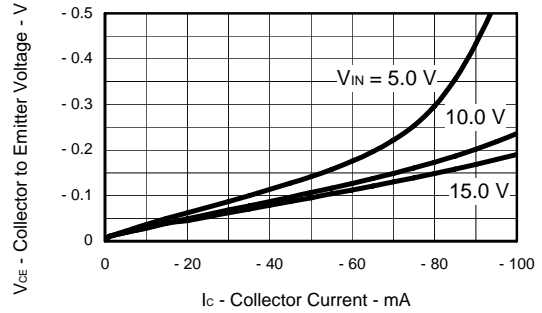


[KN4F3P]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

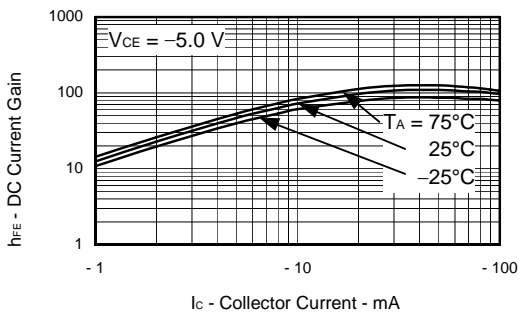
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



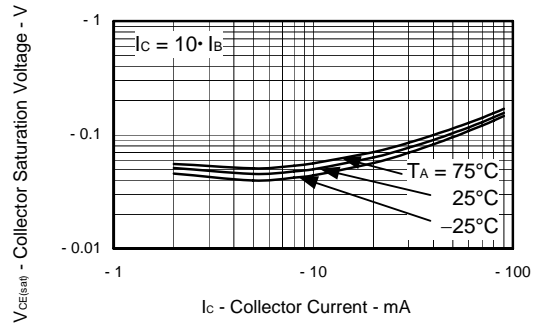
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



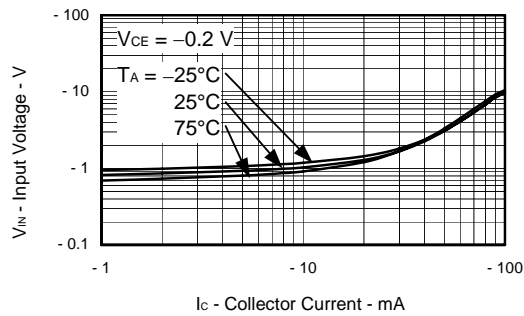
DC CURRENT GAIN vs. COLLECTOR CURRENT



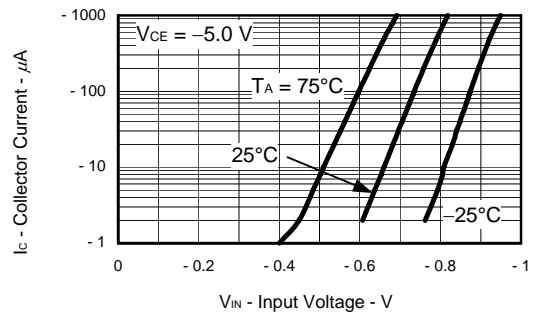
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



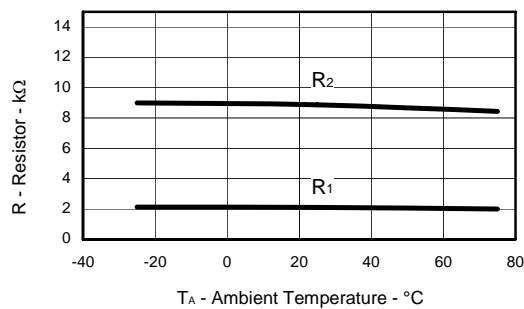
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

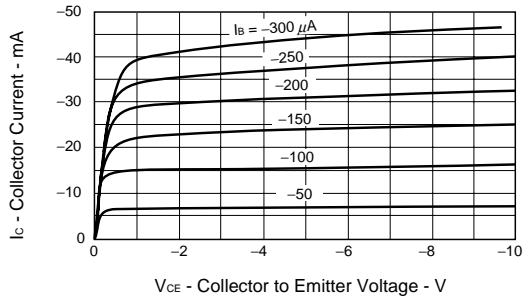


RESISTOR vs. AMBIENT TEMPERATURE

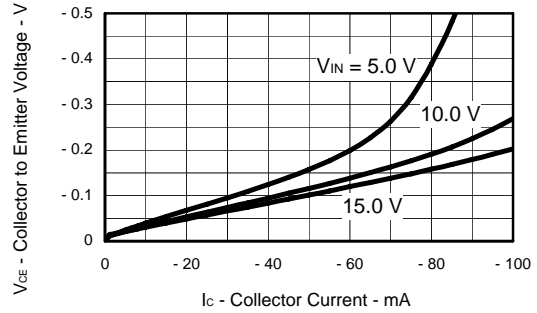


[KN4F3R]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

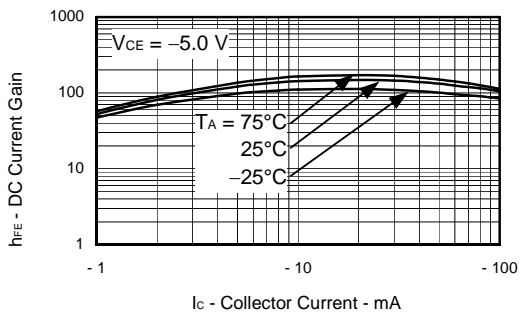
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



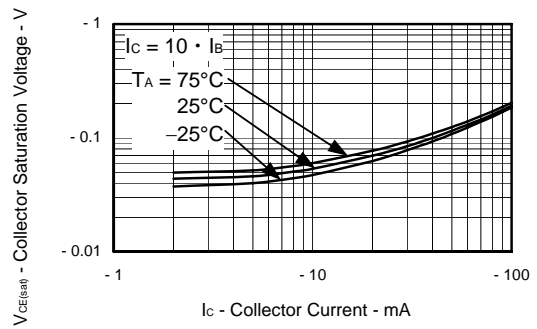
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



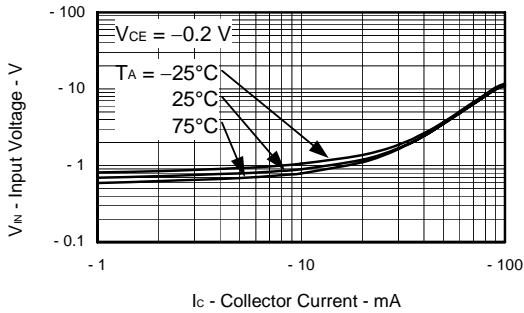
DC CURRENT GAIN vs. COLLECTOR CURRENT



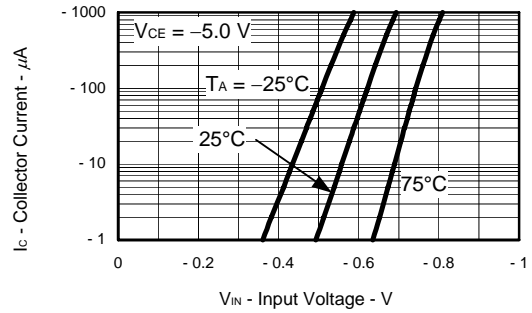
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



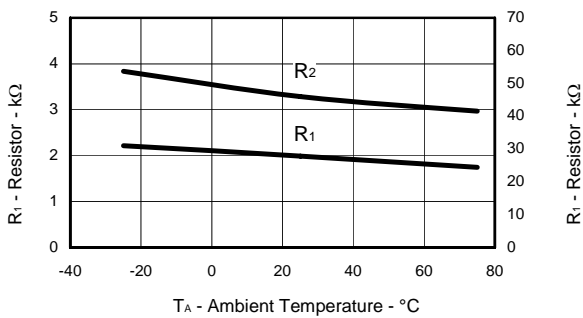
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

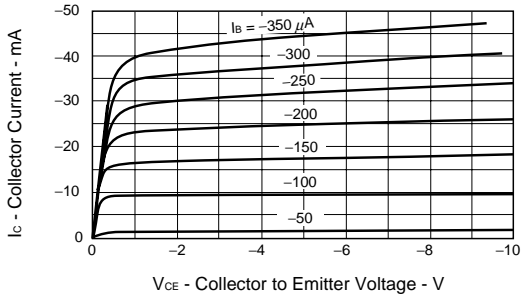


RESISTOR vs. AMBIENT TEMPERATURE

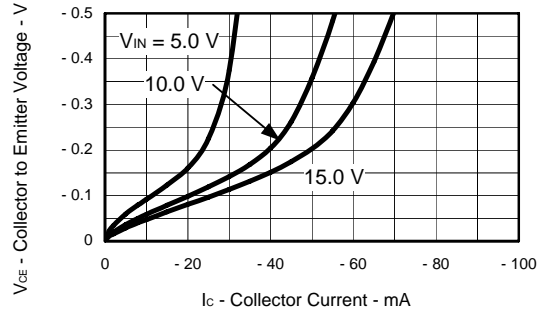


[KN4A4L]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

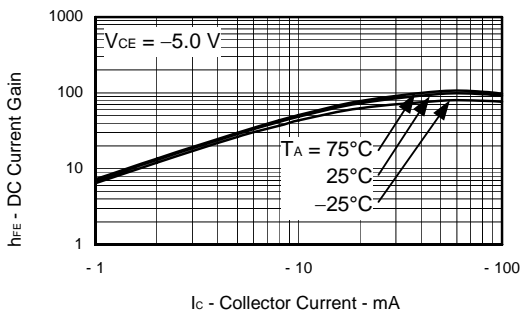
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



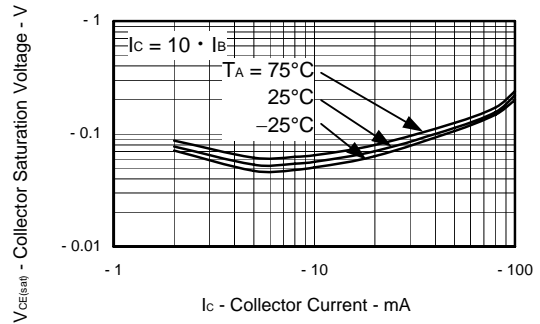
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



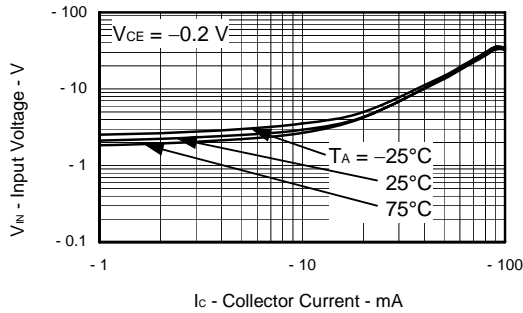
DC CURRENT GAIN vs. COLLECTOR CURRENT



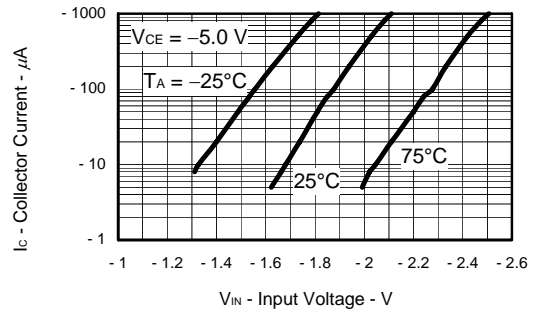
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



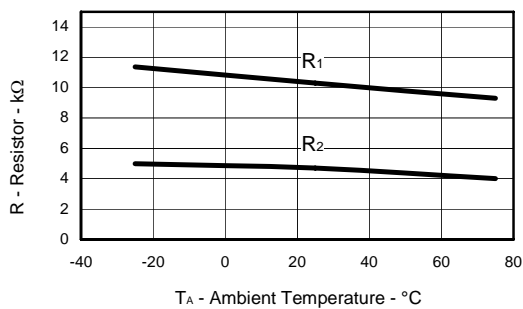
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

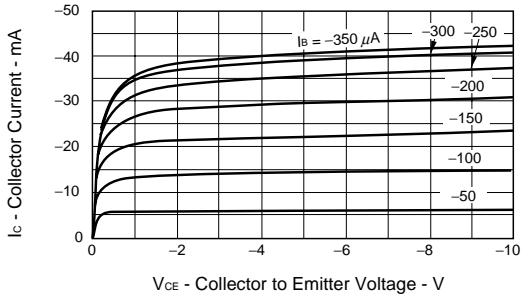


RESISTOR vs. AMBIENT TEMPERATURE

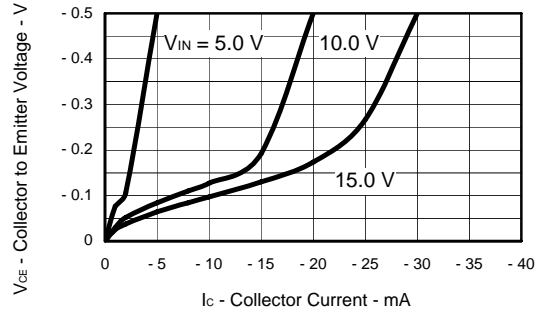


[KN4L4K]  
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

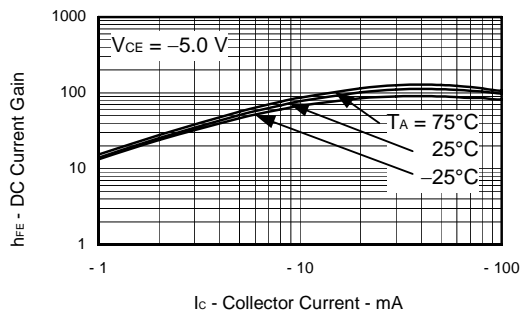
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



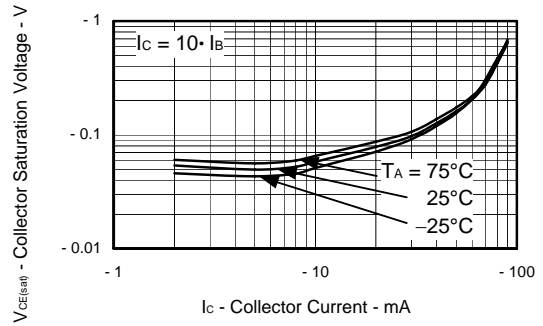
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



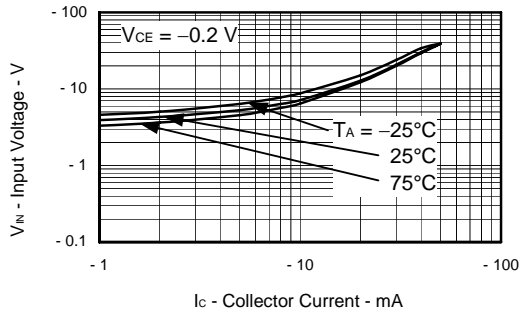
DC CURRENT GAIN vs. COLLECTOR CURRENT



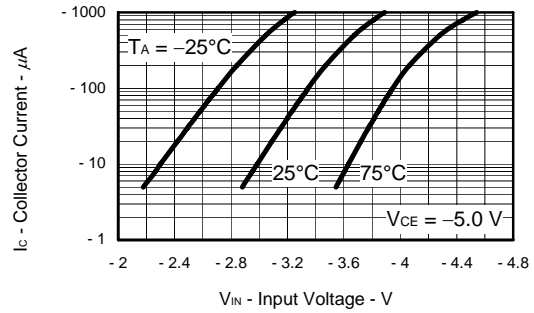
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



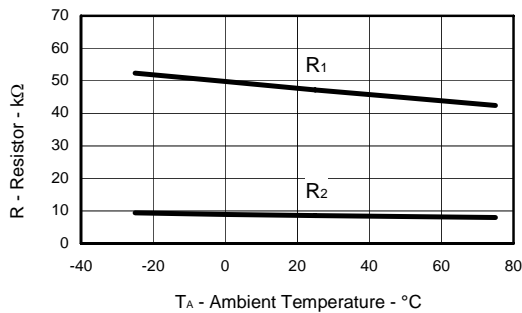
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE



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