

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 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 1st, 2010
Renesas Electronics Corporation

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

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(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

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.

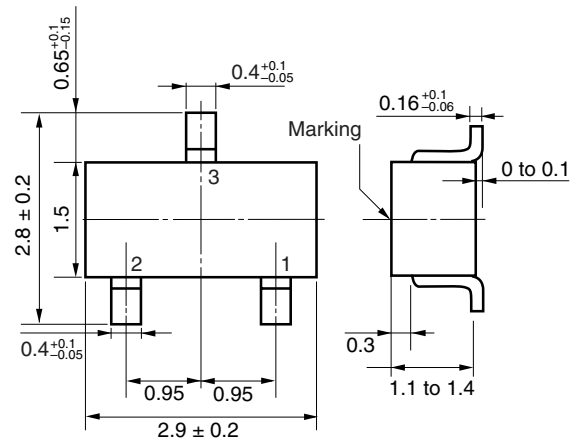
PART NUMBER	V _{EBO} (V)	MARK	R ₁ (kΩ)	R ₂ (kΩ)
FN4A4M	-10	NA1	10.0	10.0
FN4F4M	-10	NB1	22.0	22.0
FN4L4M	-10	NC1	47.0	47.0
FN4L3M	-10	ND1	4.7	4.7
FN4L3N	-5	NE1	4.7	10.0
FN4L3Z	-5	NF1	4.7	
FN4A3Q	-5	NG1	1.0	10.0
FN4A4P	-5	NH1	10.0	47.0
FN4F4N	-5	NJ1	22.0	47.0

Note 2. PW ≤ 10 ms, Duty Cycle ≤ 50%

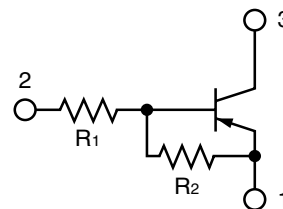
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PACKAGE DRAWING (Unit: mm)



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} = -5.0 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.

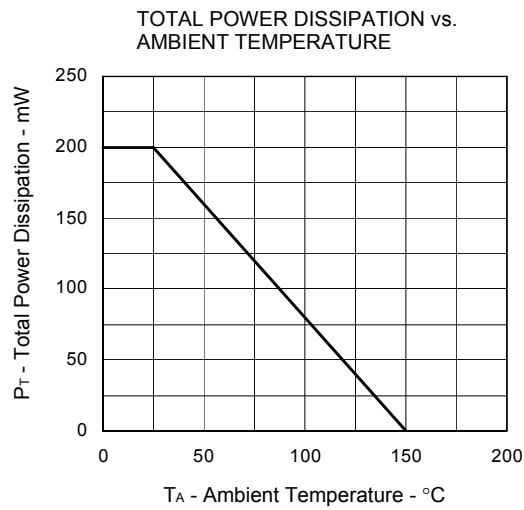
PART NUMBER	h _{FE1}			h _{FE2}			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
FN4A4M	35		100	80			-
FN4F4M	60		195	90			-
FN4L4M	85		340	95			-
FN4L3M	20		80	80			-
FN4L3N	35		100	80			-
FN4L3Z	135		600	100			-
FN4A3Q	35		100	80			-
FN4A4P	85		340	95			-
FN4F4N	85		340	95			-
FN4L4L	60		195	90			-
FN4A4Z	135		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

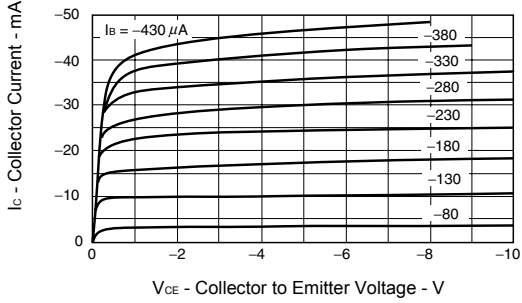
Note 3.

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

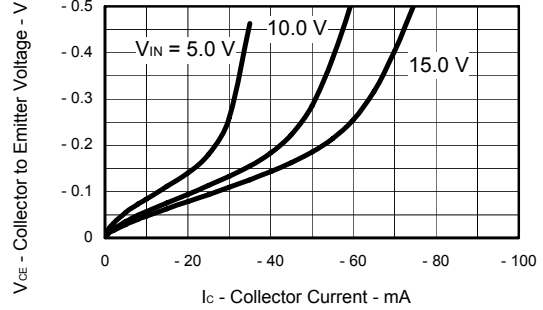


[FN4A4M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

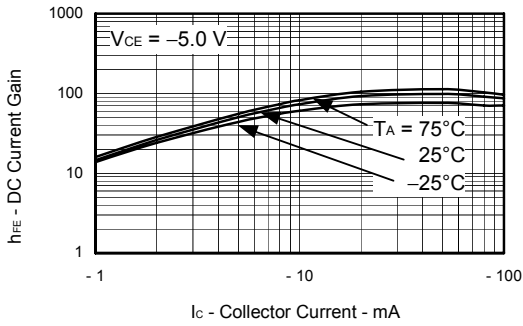
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



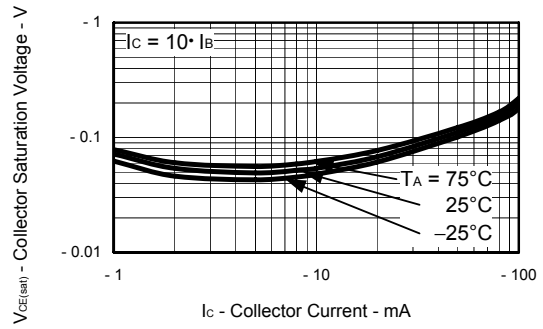
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



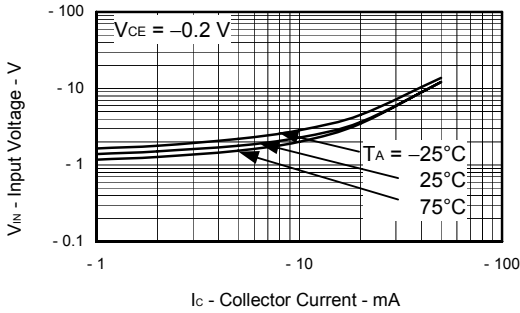
DC CURRENT GAIN vs. COLLECTOR CURRENT



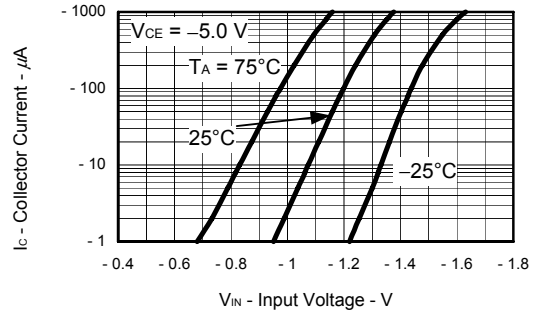
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



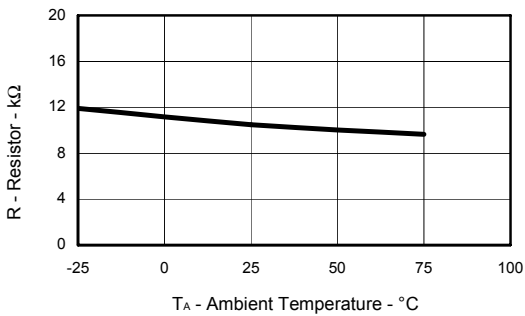
INPUT VOLTAGE vs. COLLECTOR CURRENT



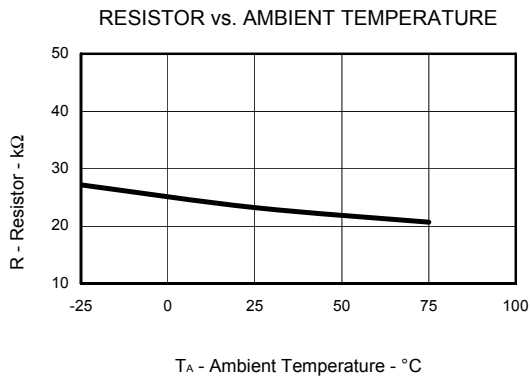
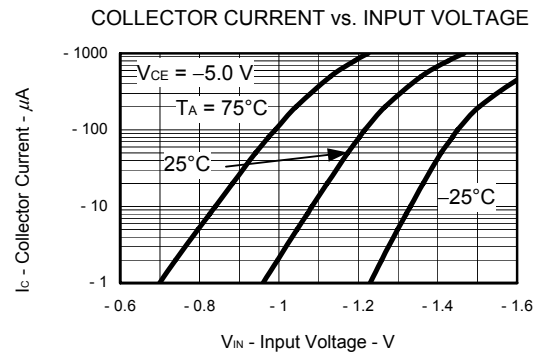
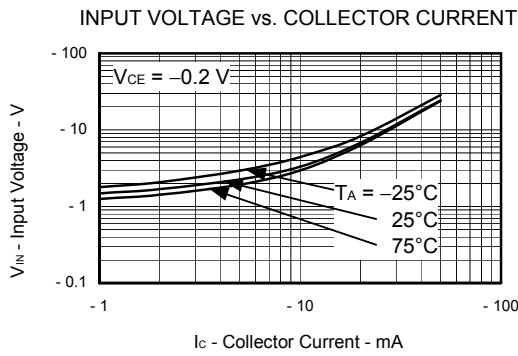
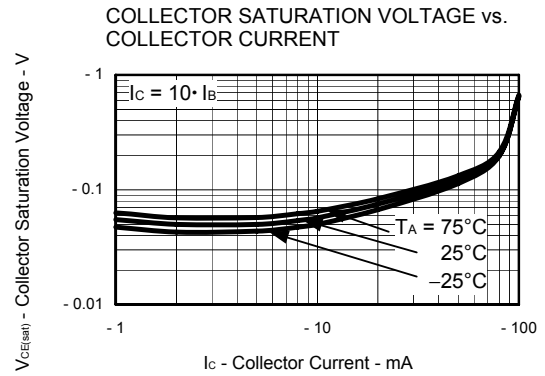
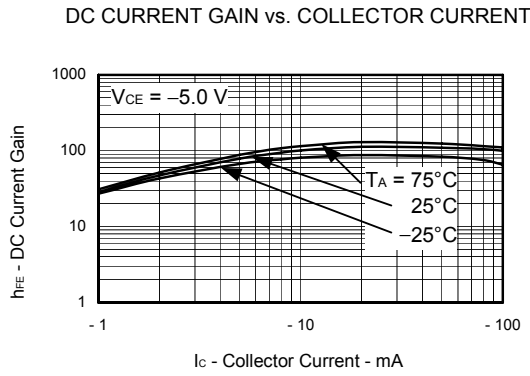
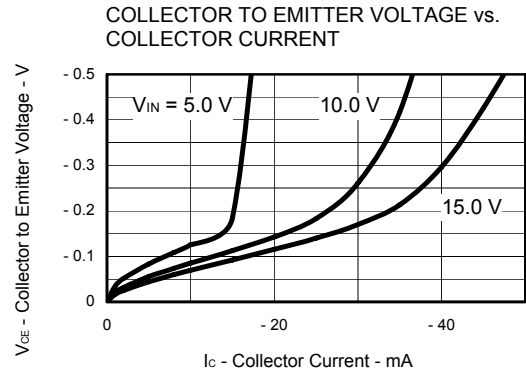
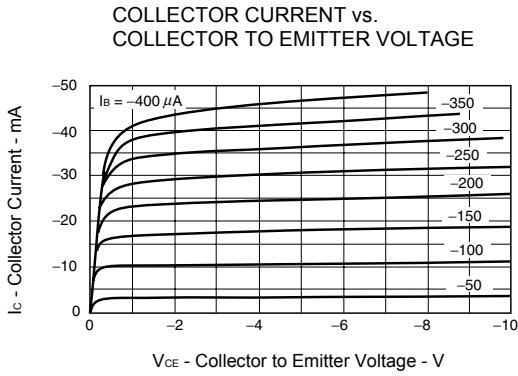
COLLECTOR CURRENT vs. INPUT VOLTAGE



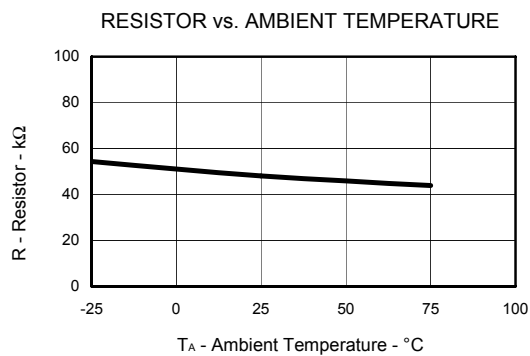
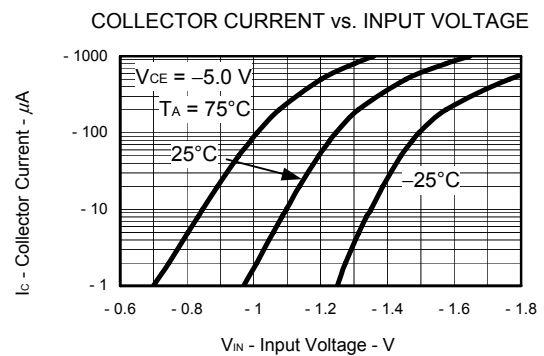
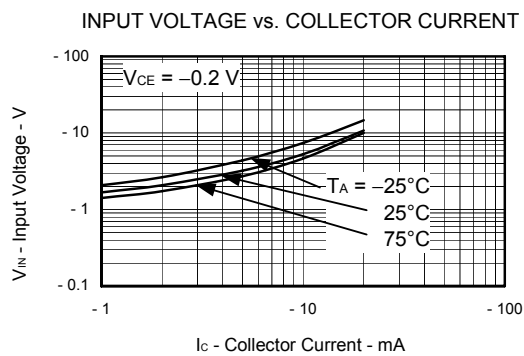
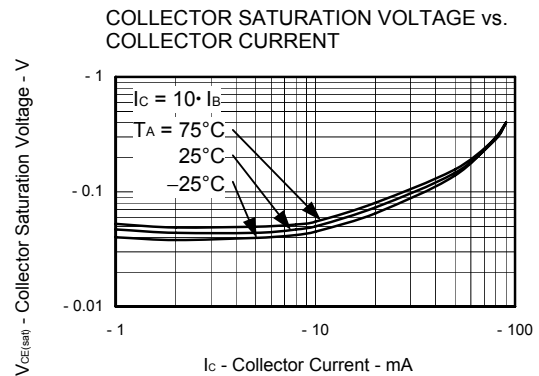
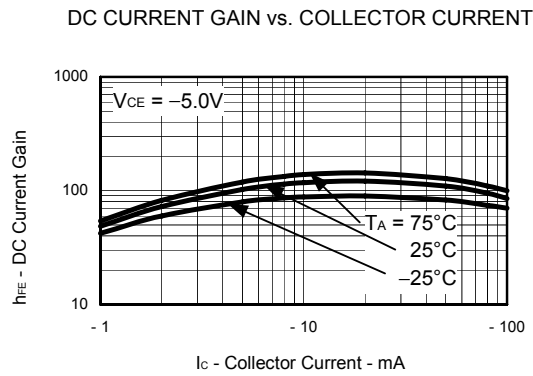
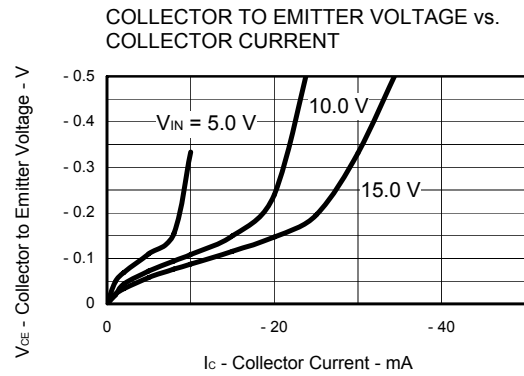
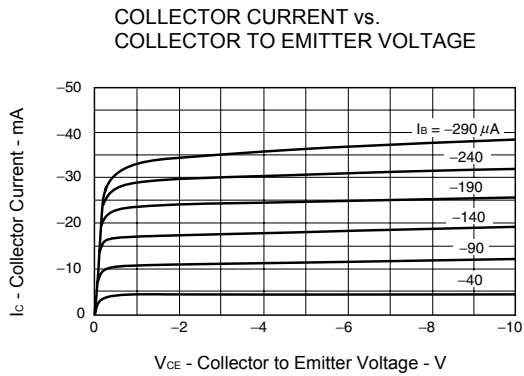
RESISTOR vs. AMBIENT TEMPERATURE



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

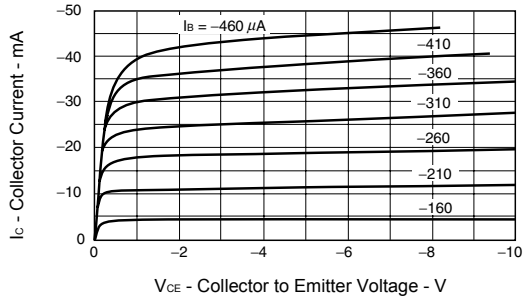


[FN4L4M]
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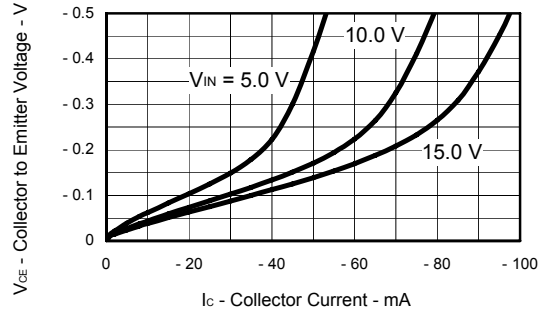


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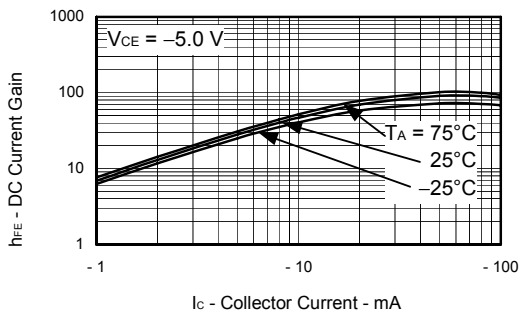
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



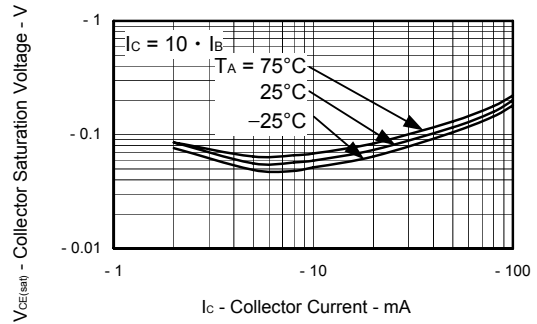
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



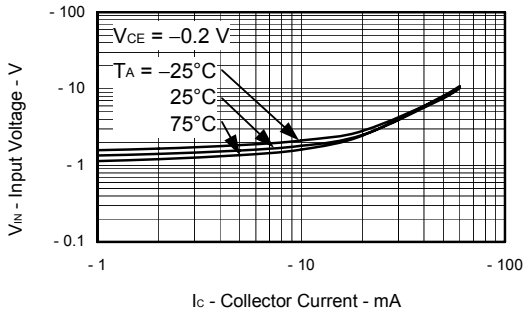
DC CURRENT GAIN vs. COLLECTOR CURRENT



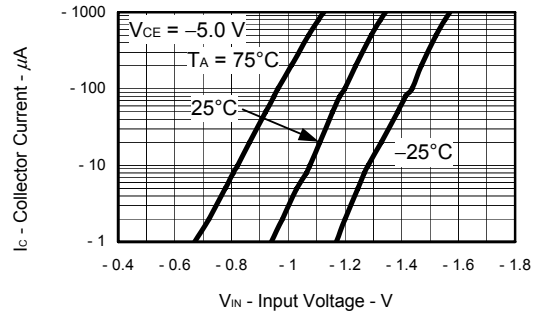
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



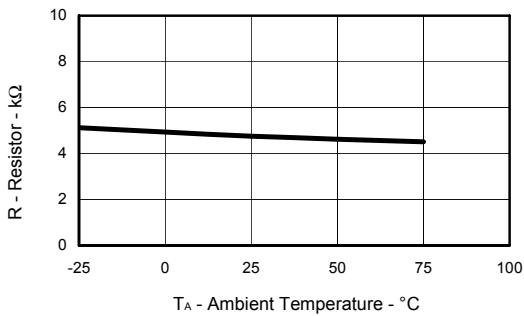
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

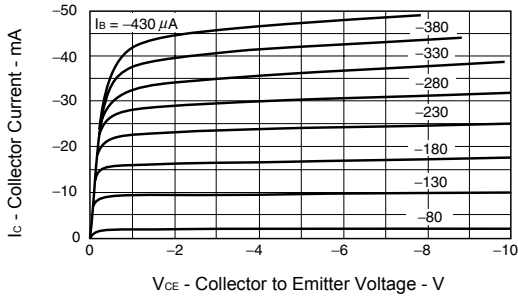


RESISTOR vs. AMBIENT TEMPERATURE

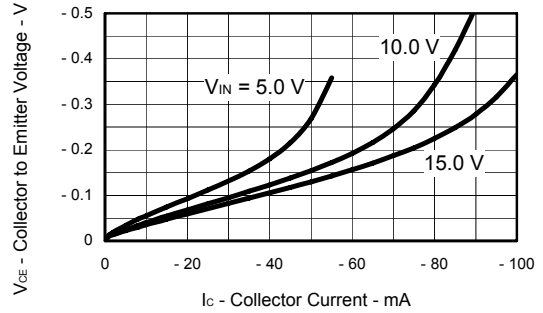


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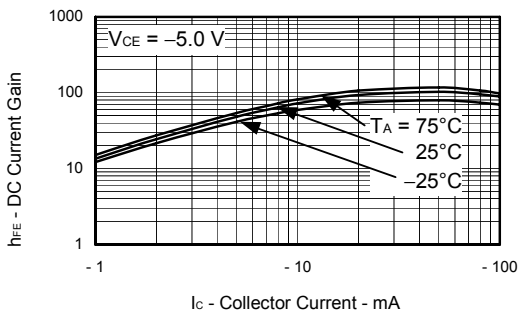
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



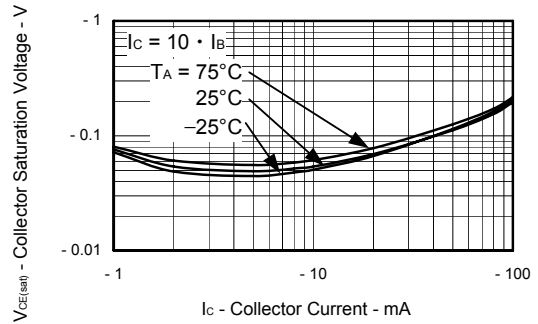
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



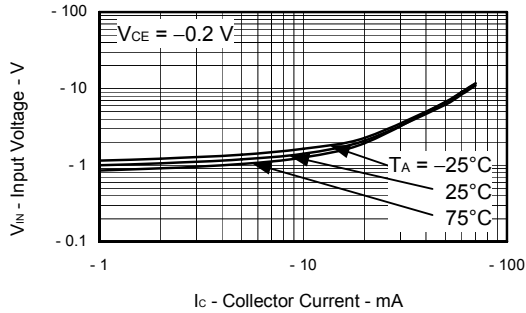
DC CURRENT GAIN vs. COLLECTOR CURRENT



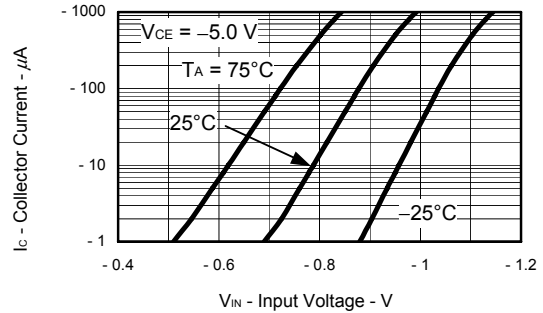
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



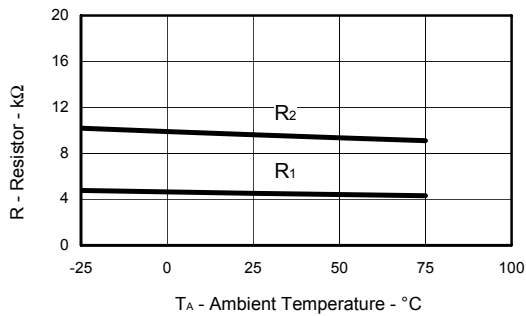
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

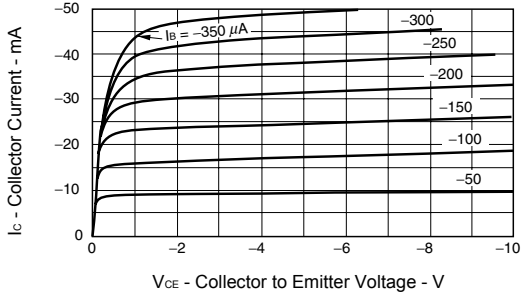


RESISTOR vs. AMBIENT TEMPERATURE

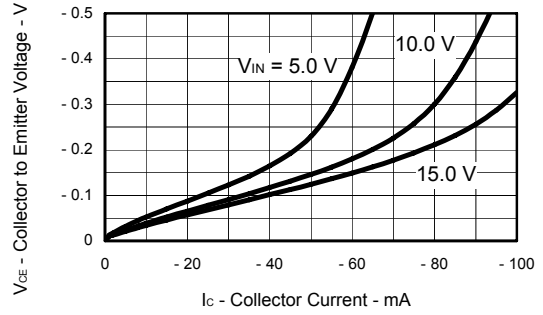


[FN4L3Z]
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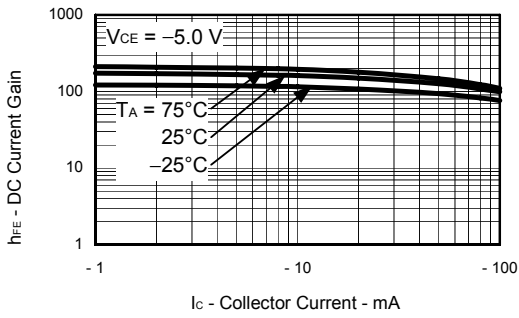
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



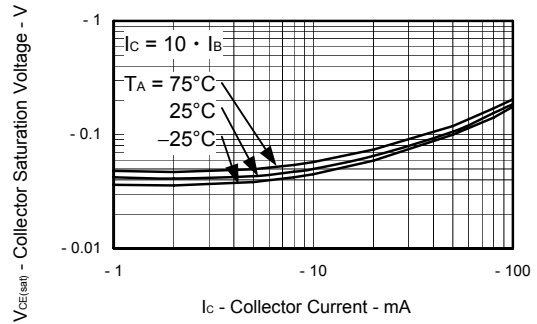
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



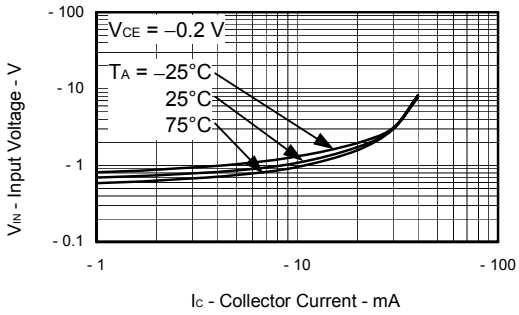
DC CURRENT GAIN vs. COLLECTOR CURRENT



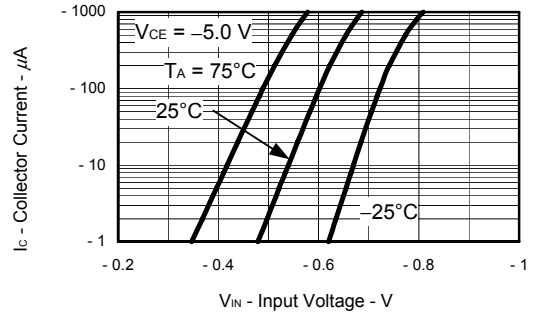
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



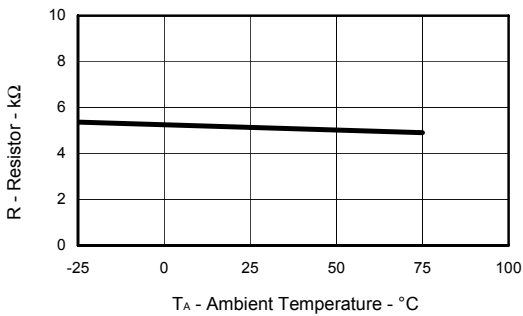
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

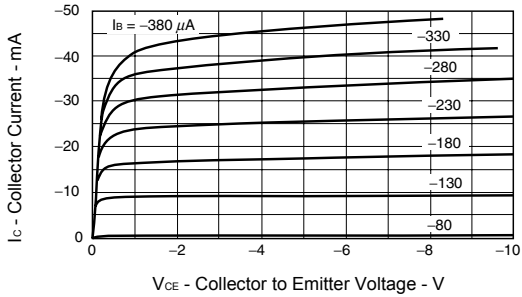


RESISTOR vs. AMBIENT TEMPERATURE

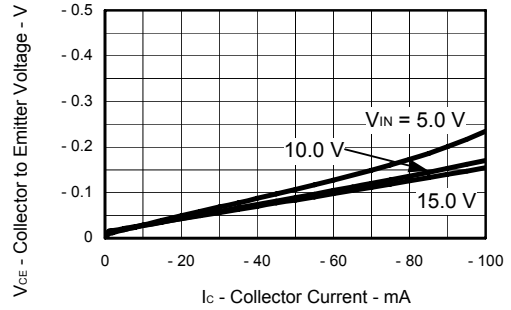


[FN4A3Q]
TYPICAL CHARACTERISTICS (T_A = 25°C)

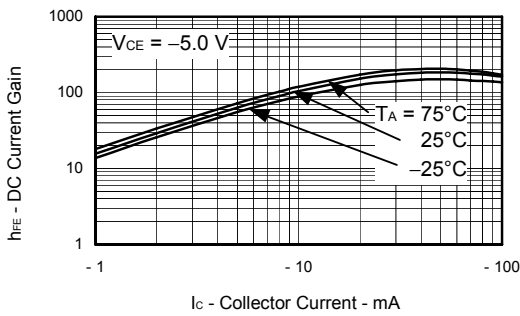
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



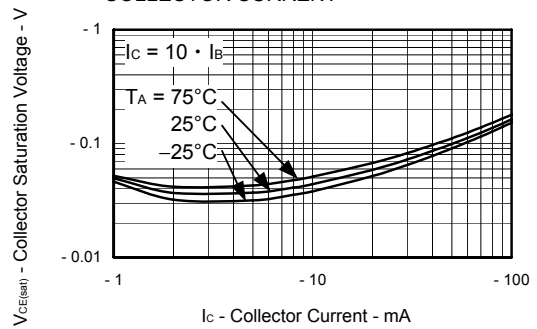
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



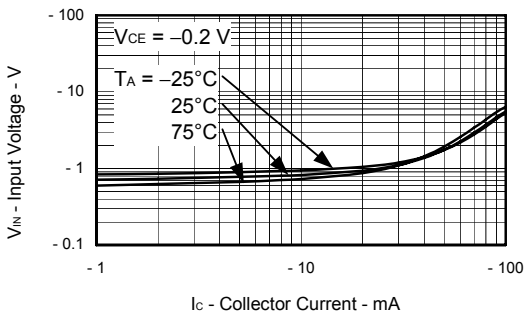
DC CURRENT GAIN vs. COLLECTOR CURRENT



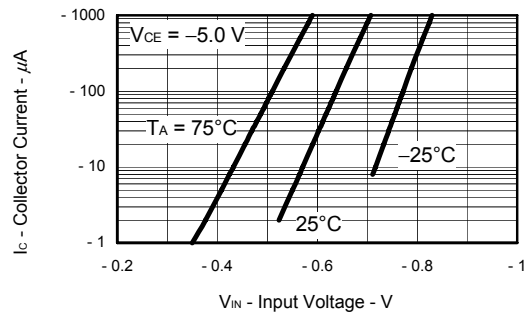
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



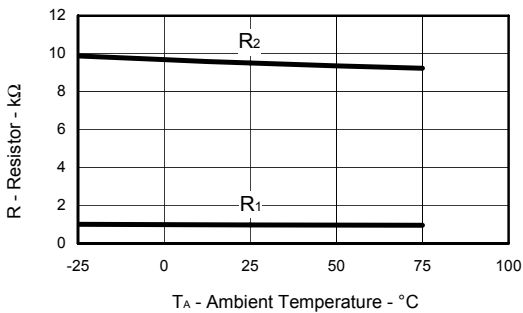
INPUT VOLTAGE vs. COLLECTOR CURRENT



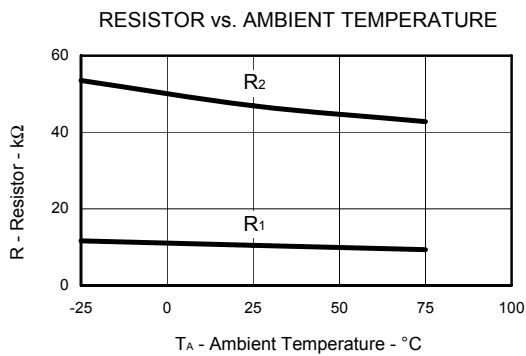
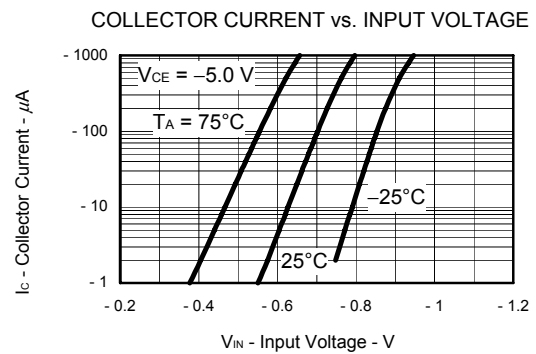
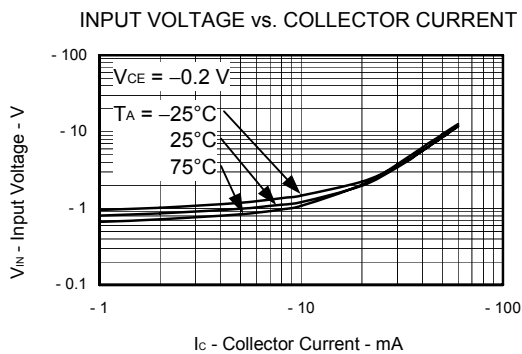
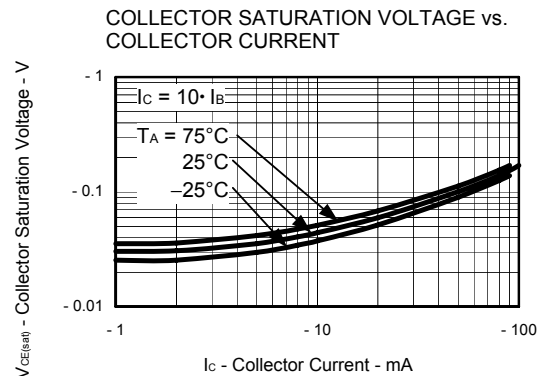
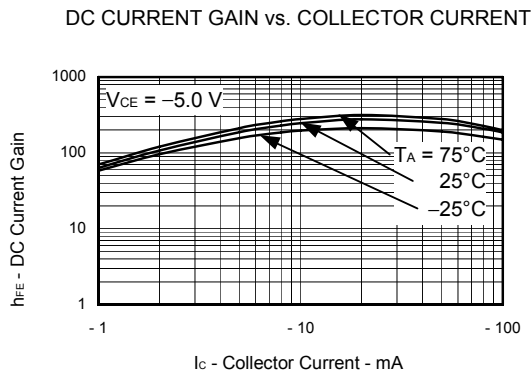
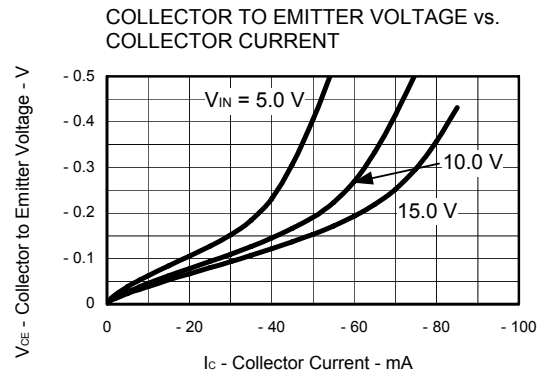
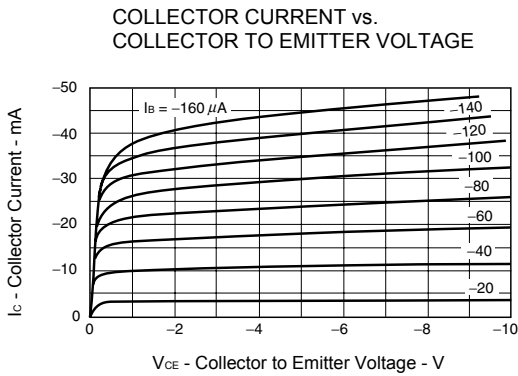
COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE

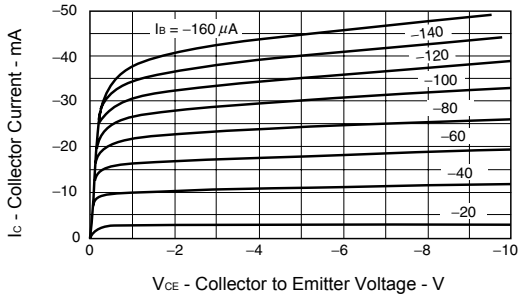


[FN4A4P]
TYPICAL CHARACTERISTICS (T_A = 25°C)

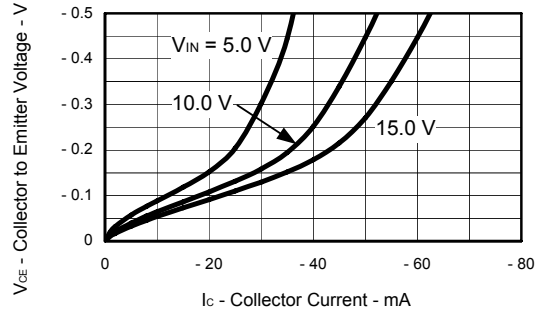


[FN4F4N]
TYPICAL CHARACTERISTICS (T_A = 25°C)

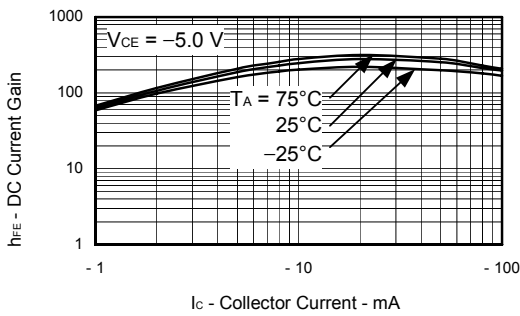
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



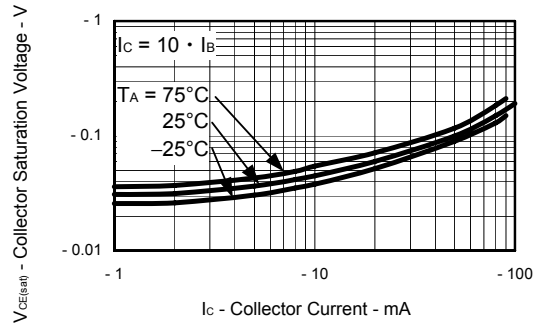
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



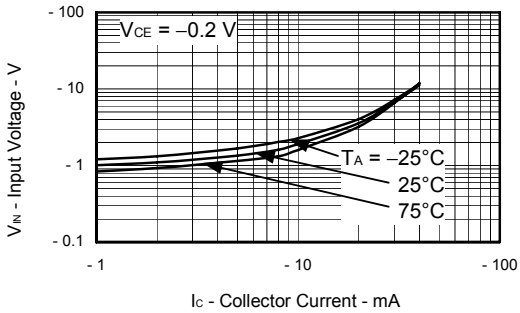
DC CURRENT GAIN vs. COLLECTOR CURRENT



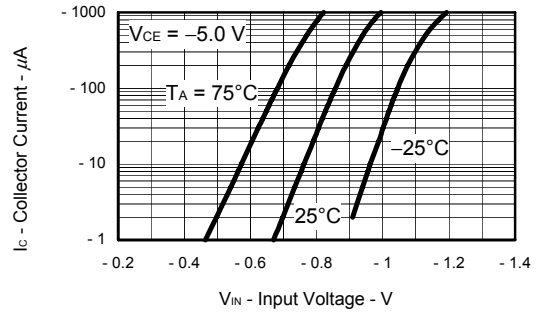
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



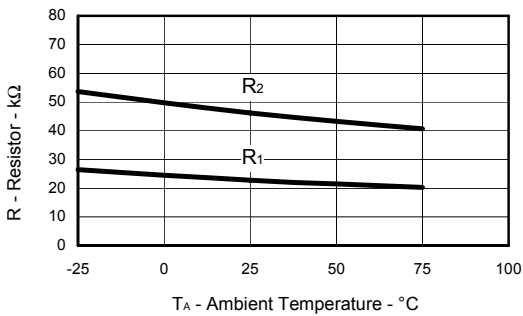
INPUT VOLTAGE vs. COLLECTOR CURRENT



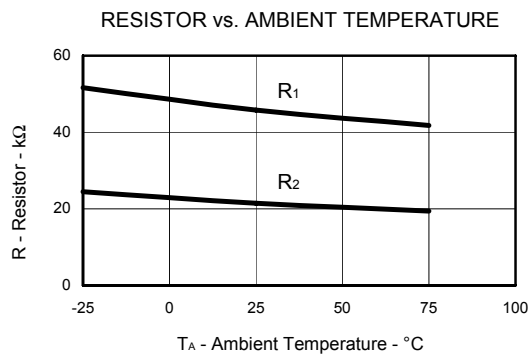
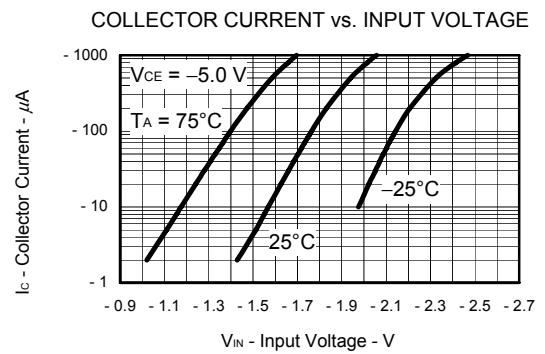
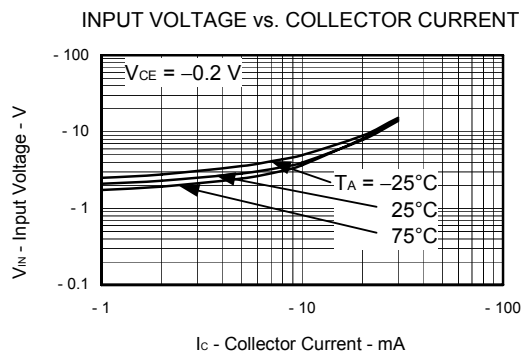
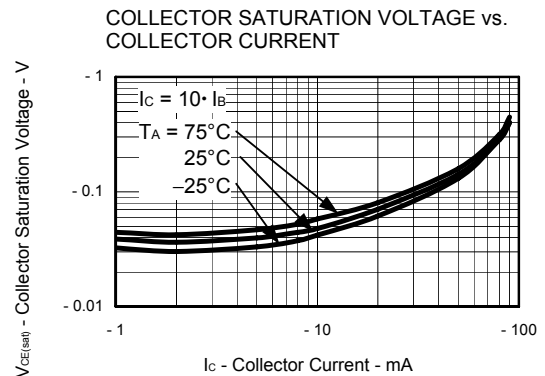
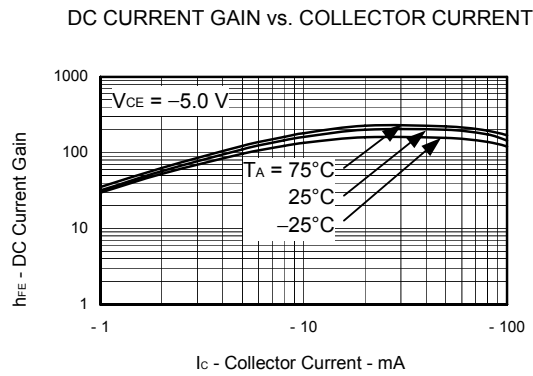
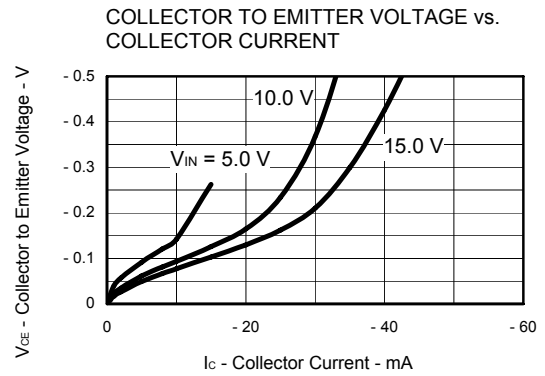
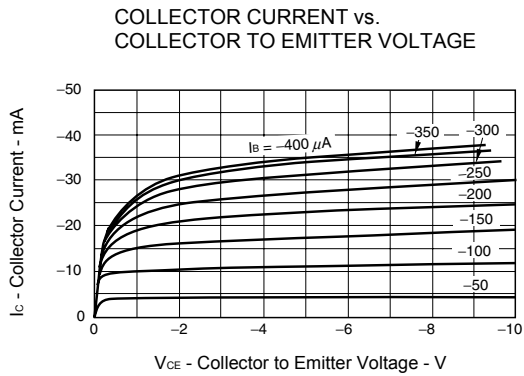
COLLECTOR CURRENT vs. INPUT VOLTAGE



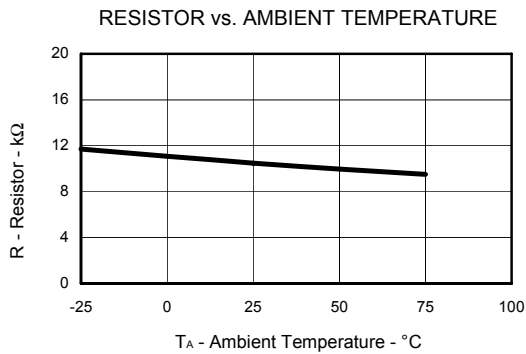
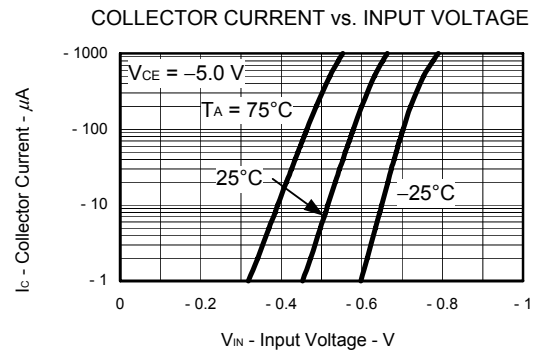
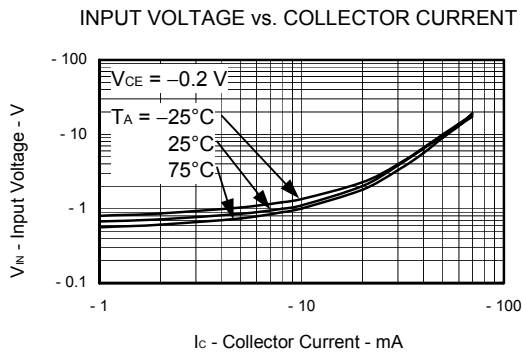
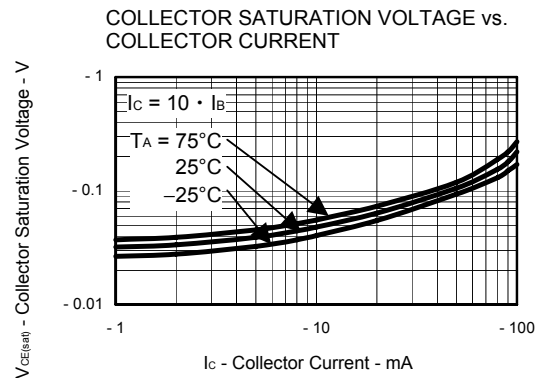
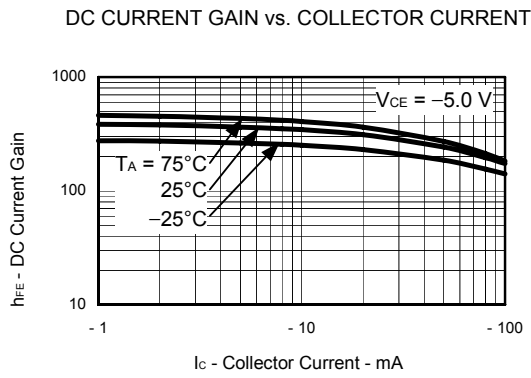
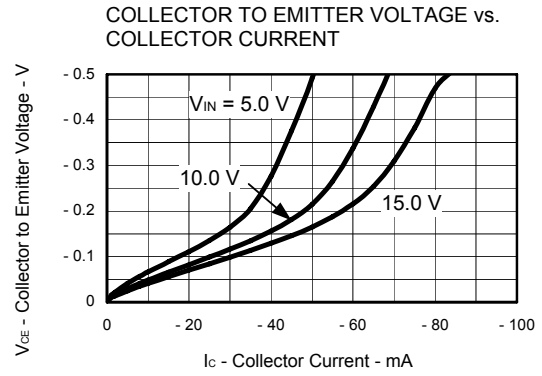
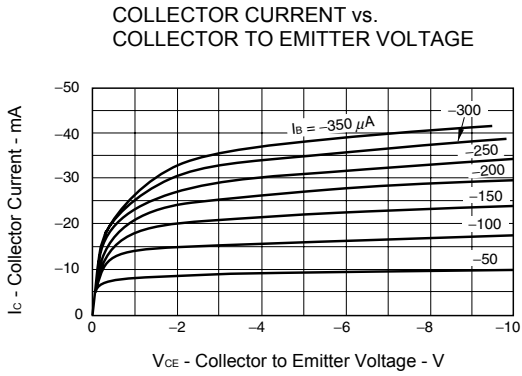
RESISTOR vs. AMBIENT TEMPERATURE



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

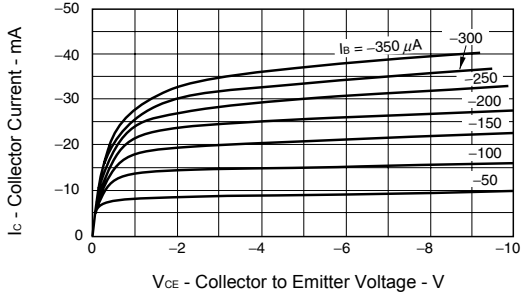


[FN4A4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

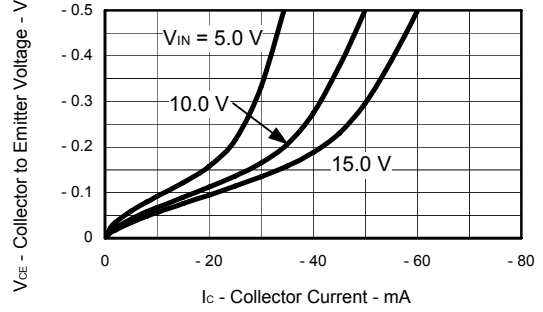


[FN4F4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

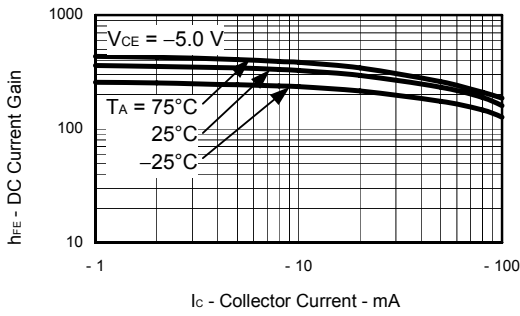
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



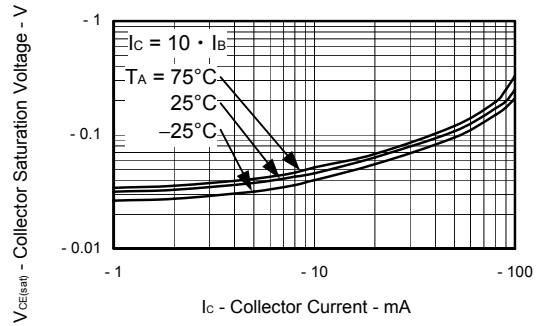
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



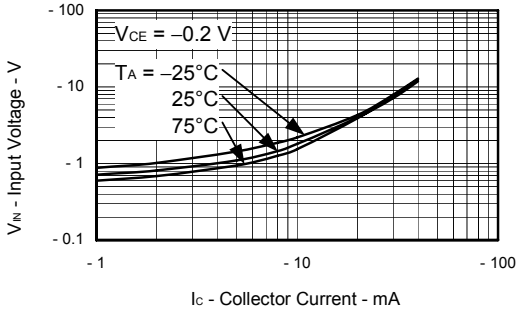
DC CURRENT GAIN vs. COLLECTOR CURRENT



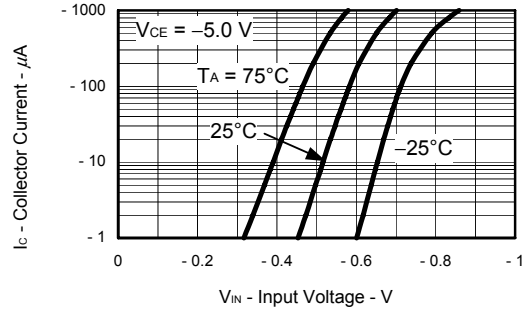
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



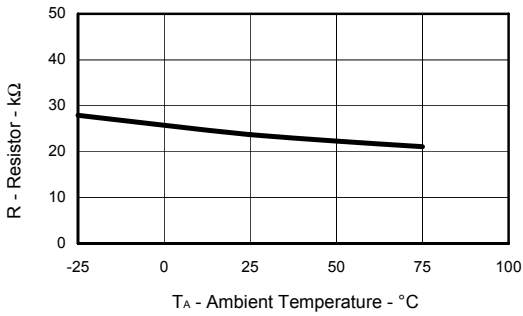
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

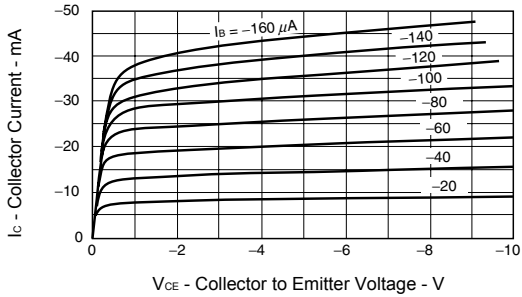


RESISTOR vs. AMBIENT TEMPERATURE

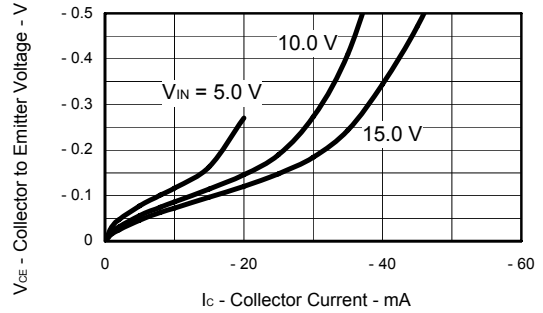


[FN4L4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

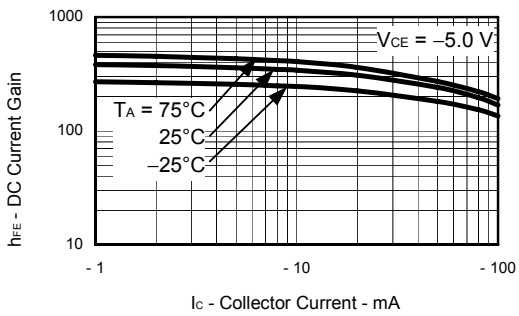
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



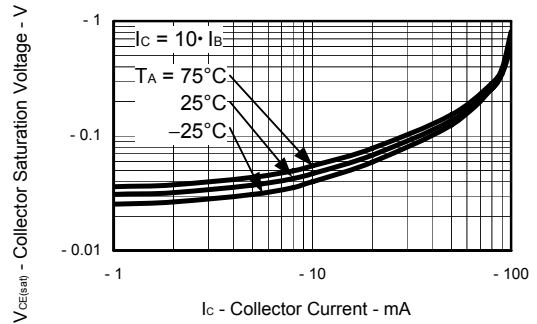
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



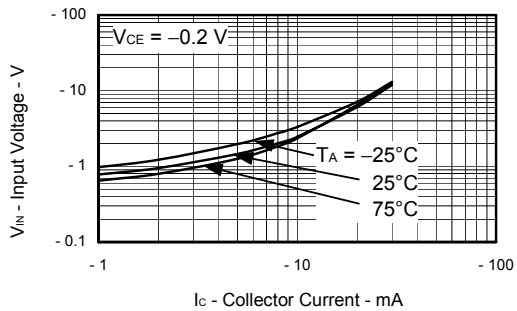
DC CURRENT GAIN vs. COLLECTOR CURRENT



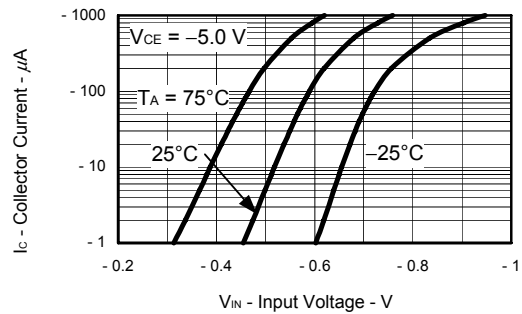
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



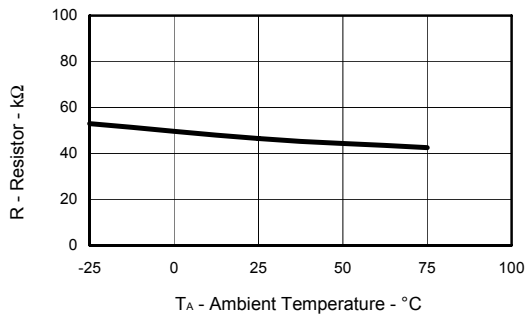
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

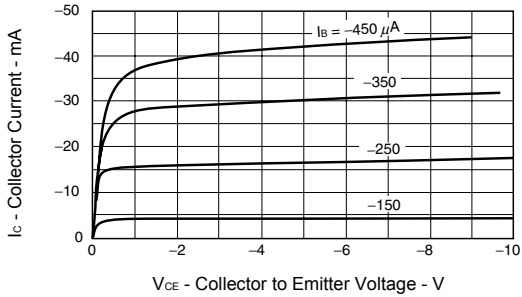


RESISTOR vs. AMBIENT TEMPERATURE

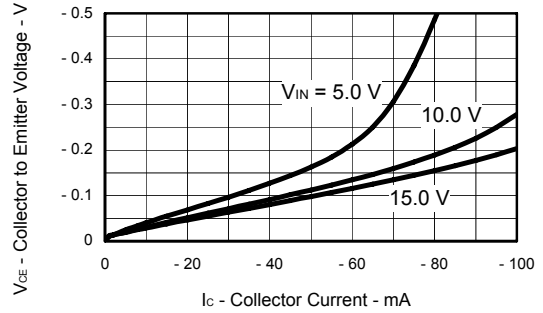


[FN4F3M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

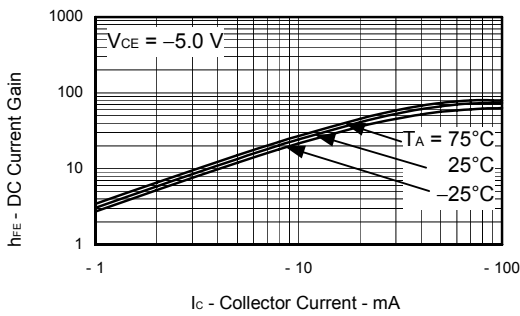
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



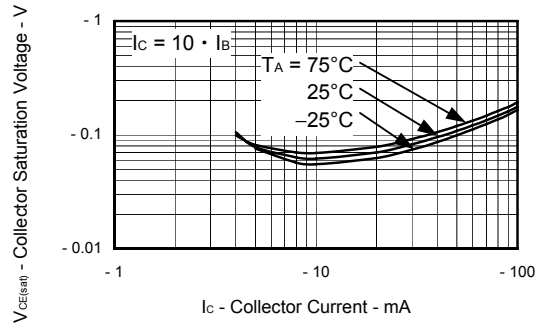
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



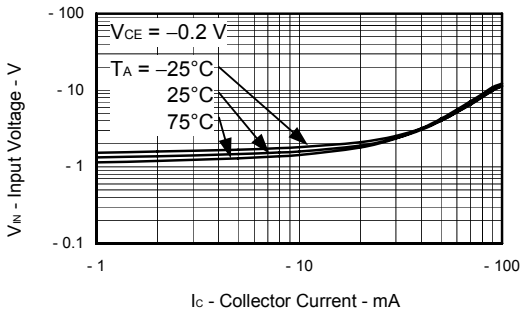
DC CURRENT GAIN vs. COLLECTOR CURRENT



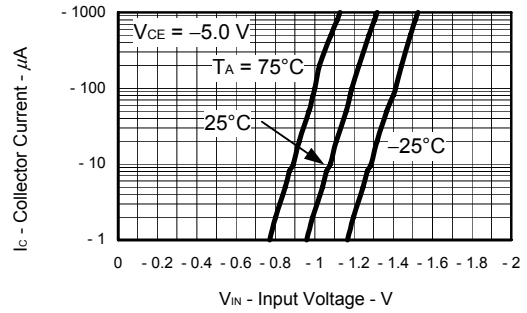
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



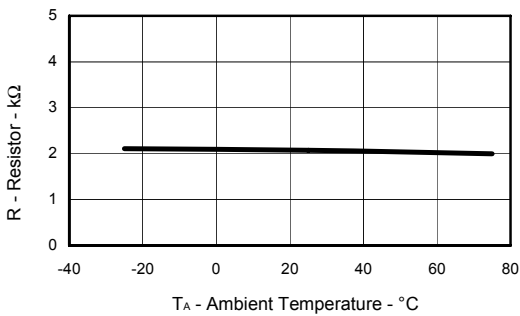
INPUT VOLTAGE vs. COLLECTOR CURRENT



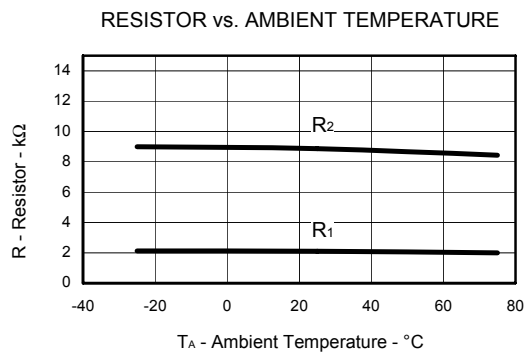
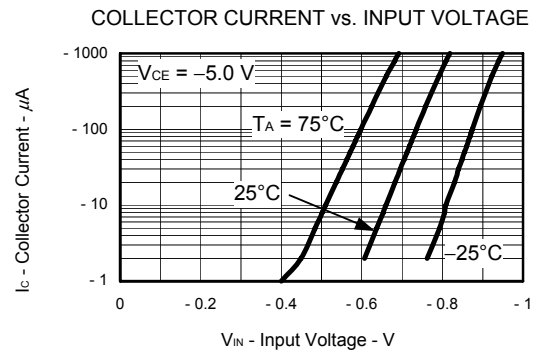
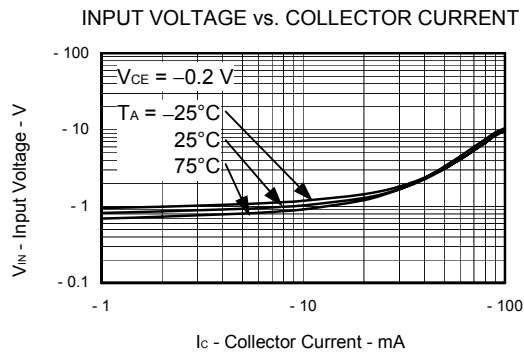
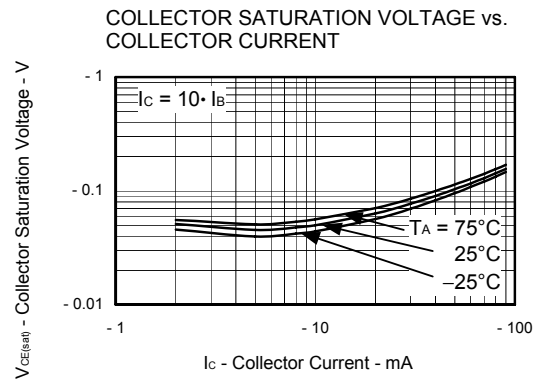
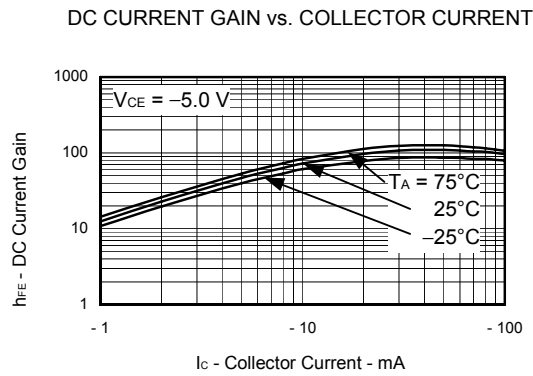
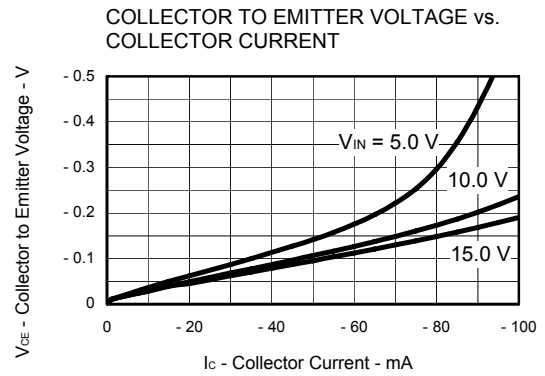
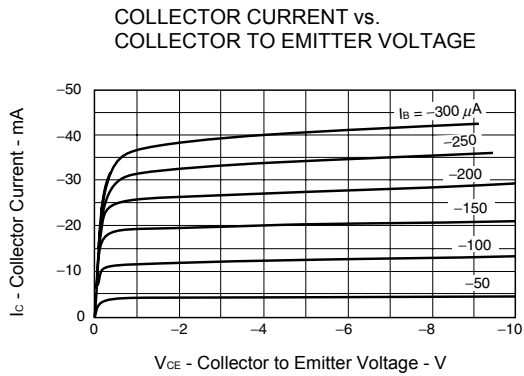
COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE

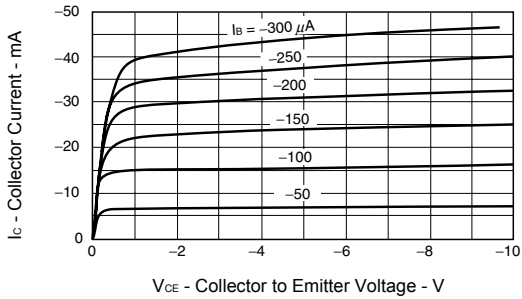


[FN4F3P]
TYPICAL CHARACTERISTICS (T_A = 25°C)

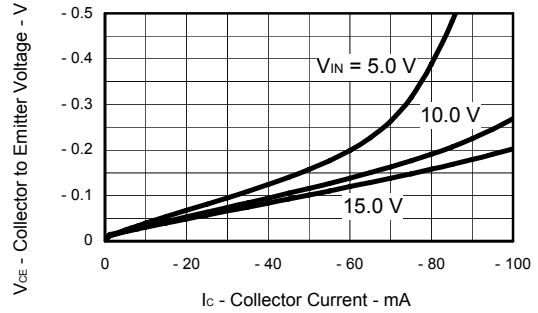


[FN4F3R]
TYPICAL CHARACTERISTICS (T_A = 25°C)

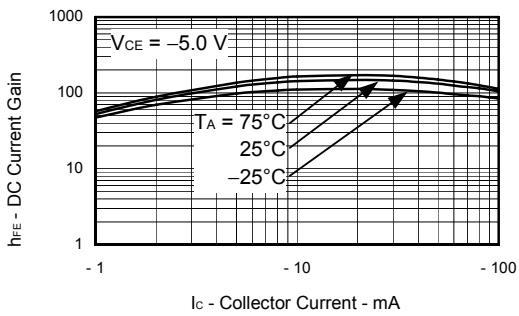
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



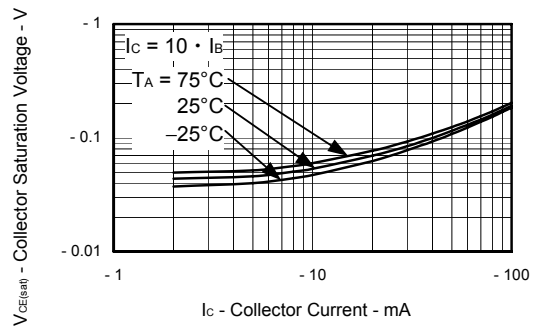
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



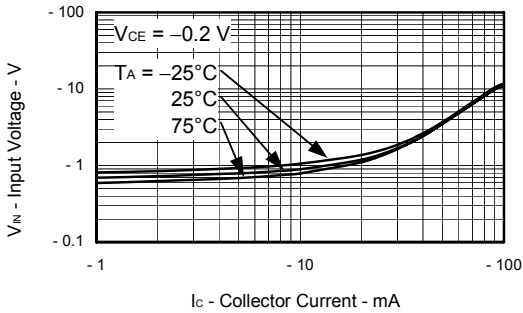
DC CURRENT GAIN vs. COLLECTOR CURRENT



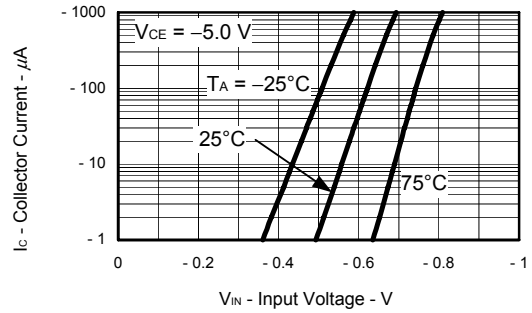
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



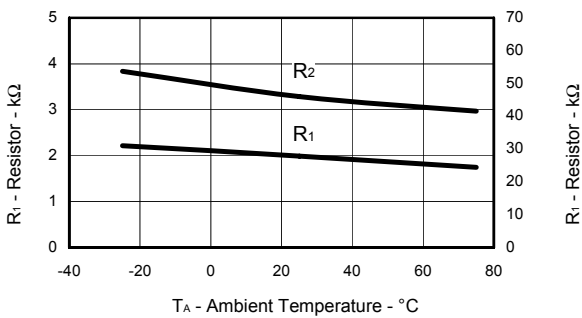
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

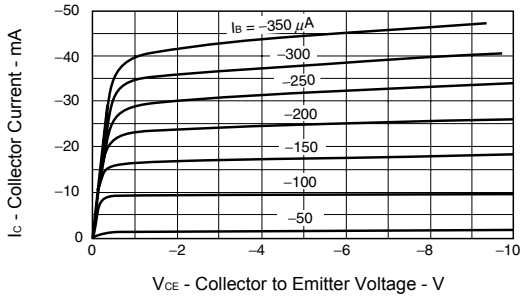


RESISTOR vs. AMBIENT TEMPERATURE

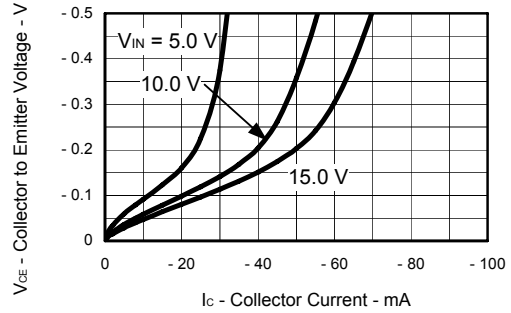


[FN4A4L]
TYPICAL CHARACTERISTICS (T_A = 25°C)

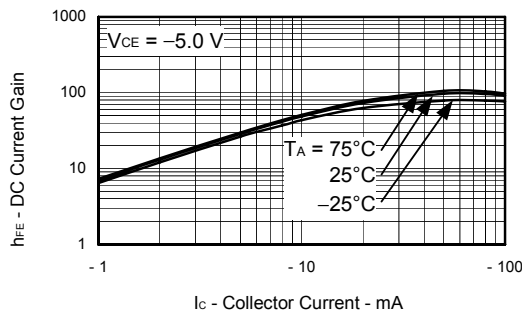
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



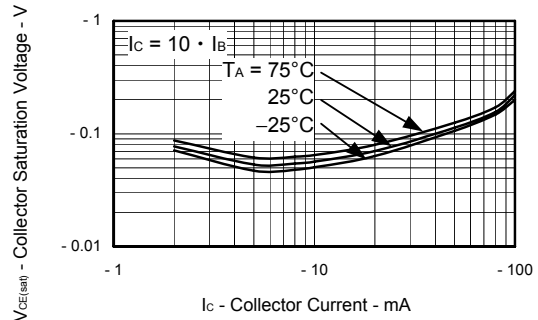
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



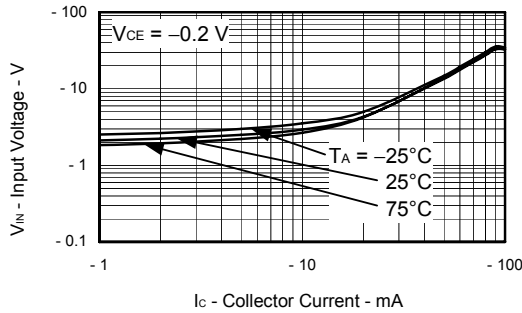
DC CURRENT GAIN vs. COLLECTOR CURRENT



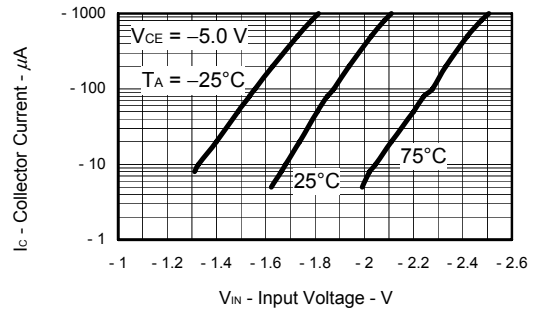
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



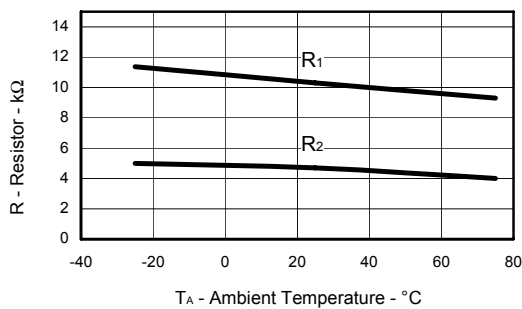
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

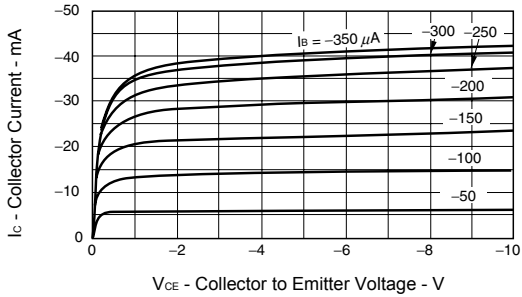


RESISTOR vs. AMBIENT TEMPERATURE

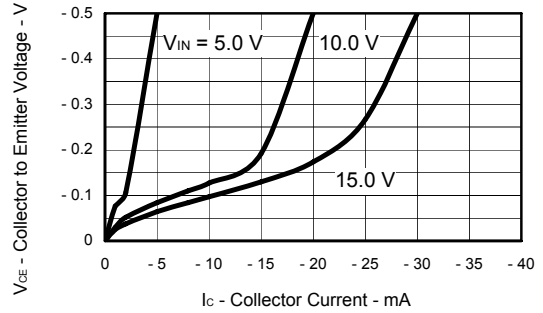


[FN4L4K]
TYPICAL CHARACTERISTICS (T_A = 25°C)

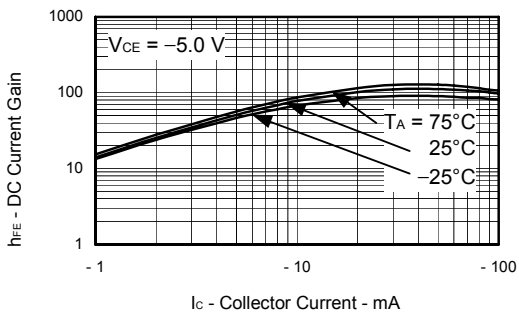
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



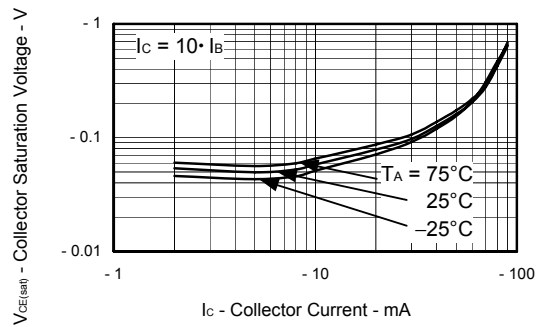
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



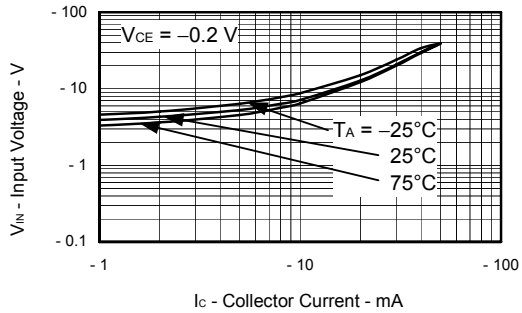
DC CURRENT GAIN vs. COLLECTOR CURRENT



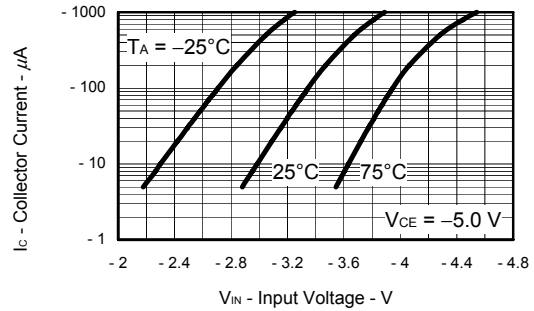
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



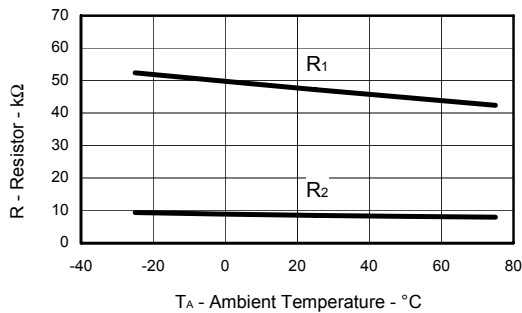
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTOR vs. AMBIENT TEMPERATURE



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