DATA SHEET

NEC

SILICON TRANSISTOR
FA4xxx

RESISTOR BUILT-IN TYPE NPN TRANSISTOR

FEATURES

- Compact package
- Resistors built-in type
- Complementary to FN4xxx

ORDERING INFORMATION

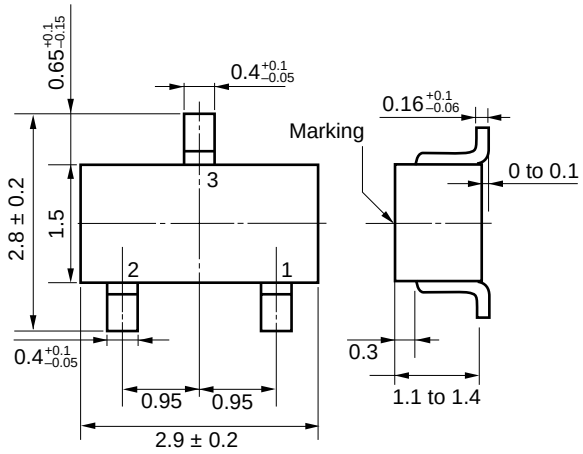
PART NUMBER	PACKAGE
FA4xxx	SC-59

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

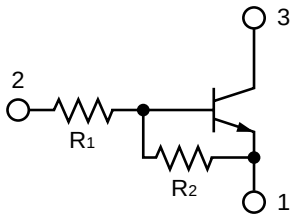
Collector to Base Voltage	V_{CBO}	60	V
Collector to Emitter Voltage	V_{CEO}	50	V
Emitter to Base Voltage	V_{EBO}	5	V
Collector Current (DC)	I_C	0.1	A
Collector Current (pulse) Note	$I_{C(pulse)}$	0.2	A
Total Power Dissipation	P_T	0.2	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–55 to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

Note PW ≤ 10 ms, Duty Cycle ≤ 50%

★ PACKAGE DRAWING (Unit: mm)



★ EQUIVALENT CIRCUIT



★ PIN CONNECTION

1: Emitter
2: Base
3: Collector

PART NUMBER	MARK	R_1	R_2	UNIT
FA4A4M	AA1	10.0	10.0	kΩ
FA4F4M	AB1	22.0	22.0	kΩ
FA4L4M	AC1	47.0	47.0	kΩ
FA4L3M	AD1	4.7	4.7	kΩ
FA4L3N	AE1	4.7	10.0	kΩ
FA4L3Z	AF1	4.7		kΩ
FA4A3Q	AG1	1.0	10.0	kΩ
FA4A4P	AH1	10.0	47.0	kΩ
FA4F4N	AJ1	22.0	47.0	kΩ

PART NUMBER	MARK	R_1	R_2	UNIT
FA4L4L	AK1	47.0	22.0	kΩ
FA4A4Z	AL1	10.0		kΩ
FA4F4Z	AM1	22.0		kΩ
FA4L4Z	AN1	47.0		kΩ
FA4F3M	AP1	2.2	2.2	kΩ
FA4F3P	AQ1	2.2	10.0	kΩ
FA4F3R	AR1	2.2	47.0	kΩ
FA4A4L	AS1	10.0	4.7	kΩ
FA4L4K	AT1	47.0	10.0	kΩ

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The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 50 V, I_E = 0			100	nA
DC Current Gain	h_{FE1}	V_{CE} = 5.0 V, I_C = 5.0 mA	**Note1**			-
	h_{FE2}	V_{CE} = 5.0 V, I_C = 50 mA	**Note1**			-
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	**Note2**			V
Input Resistor	R_1		**Note3**			kΩ
Emitter to Base Resistor	R_2		**Note3**			kΩ

Note 1

PART NUMBER	h_{FE1}			h_{FE2}			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
FA4A4M	35		100	80			-
FA4F4M	60		195	90			-
FA4L4M	85		340	95			-
FA4L3M	20		80	80			-
FA4L3N	35		100	80			-
FA4L3Z	135		600	100			-
FA4A3Q	35		100	80			-
FA4A4P	85		340	95			-
FA4F4N	85		340	95			-
FA4L4L	60		195	90			-
FA4A4Z	135		600	100			-
FA4F4Z	135		600	100			-
FA4L4Z	135		600	100			-
FA4F3M	8		50	50			-
FA4F3P	35		100	80			-
FA4F3R	85		340	95			-
FA4A4L	20		80	80			-
FA4L4K	35		100	80			-

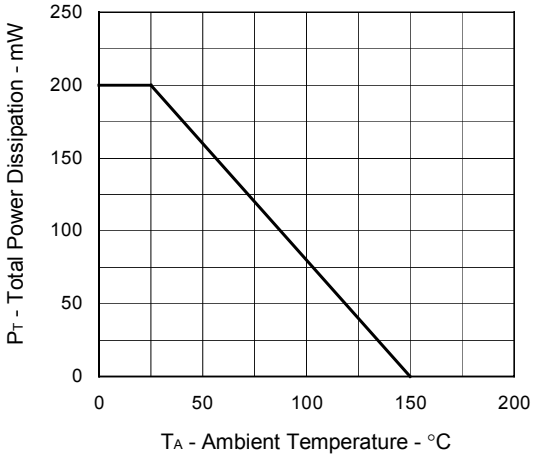
Note 2

PART NUMBER	V_{IL}			V_{IH}			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
FA4A4M			0.8	3.0			V
FA4F4M			0.8	4.0			V
FA4L4M			0.8	5.0			V
FA4L3M			0.8	3.0			V
FA4L3N			0.6	3.0			V
FA4L3Z			0.5	1.2			V
FA4A3Q			0.5	2.0			V
FA4A4P			0.5	3.0			V
FA4F4N			0.6	3.0			V
FA4L4L			0.9	6.0			V
FA4A4Z			0.5	2.0			V
FA4F4Z			0.5	3.0			V
FA4L4Z			0.5	4.0			V
FA4F3M			0.8	3.0			V
FA4F3P			0.5	2.0			V
FA4F3R			0.5	2.0			V
FA4A4L			0.9	6.0			V
FA4L4K			2.0	8.0			V

Note 3

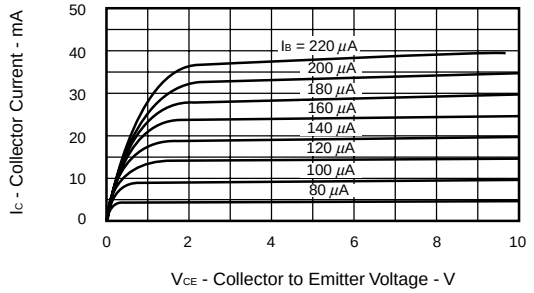
PART NUMBER	R_1			R_2			UNIT
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
FA4A4M	7.00	10.00	13.00	7.00	10.00	13.00	kΩ
FA4F4M	15.40	22.00	28.60	15.40	22.00	28.60	kΩ
FA4L4M	32.90	47.00	61.10	32.90	47.00	61.10	kΩ
FA4L3M	3.29	4.70	6.11	3.29	4.70	6.11	kΩ
FA4L3N	3.29	4.70	6.11	7.00	10.00	13.00	kΩ
FA4L3Z	3.29	4.70	6.11				kΩ
FA4A3Q	0.70	1.00	1.30	7.00	10.00	13.00	kΩ
FA4A4P	7.00	10.00	13.00	32.90	47.00	61.10	kΩ
FA4F4N	15.40	22.00	28.60	32.90	47.00	61.10	kΩ
FA4L4L	32.90	47.00	61.10	15.40	22.00	28.60	kΩ
FA4A4Z	7.00	10.00	13.00				kΩ
FA4F4Z	15.40	22.00	28.60				kΩ
FA4L4Z	32.90	47.00	61.10				kΩ
FA4F3M	1.54	2.20	2.86	1.54	2.20	2.86	kΩ
FA4F3P	1.54	2.20	2.86	7.00	10.00	13.00	kΩ
FA4F3R	1.54	2.20	2.86	32.90	47.00	61.10	kΩ
FA4A4L	7.00	10.00	13.00	3.29	4.70	6.11	kΩ
FA4L4K	32.90	47.00	61.10	7.00	10.00	13.00	kΩ

TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE

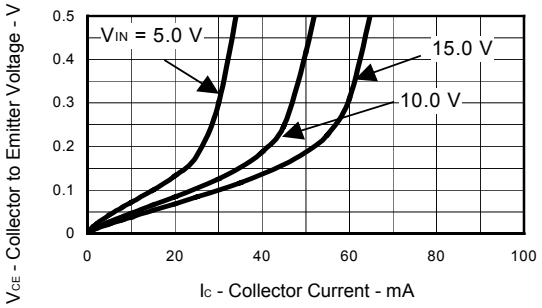


[FA4A4M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

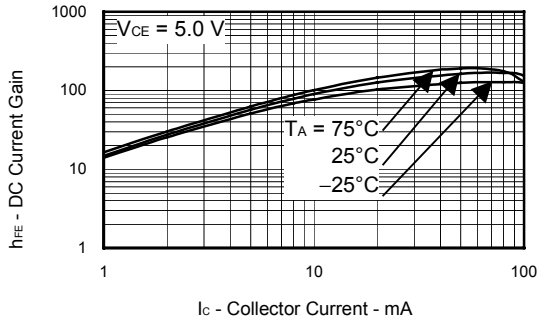
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



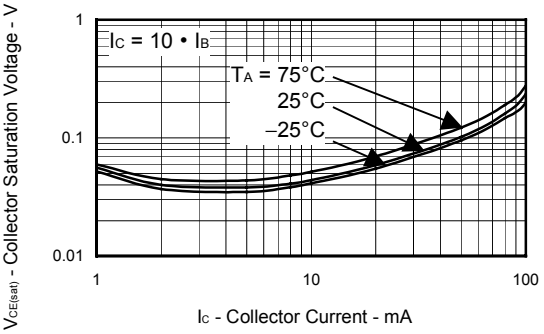
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



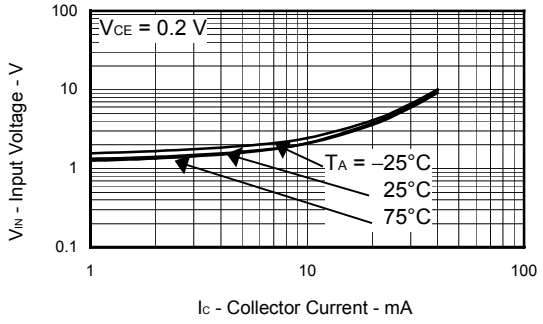
DC CURRENT GAIN vs. COLLECTOR CURRENT



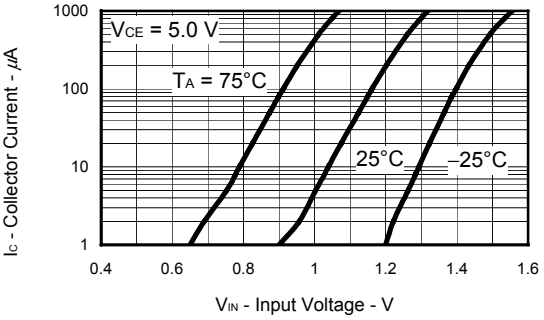
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



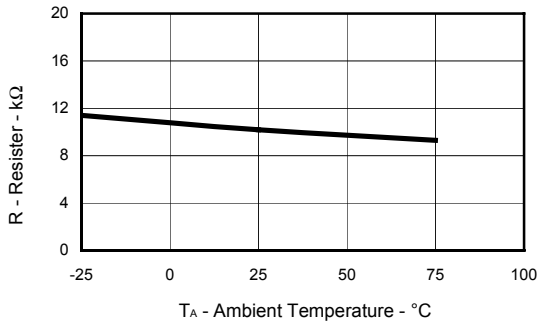
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

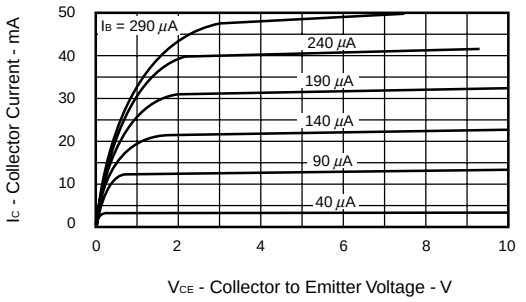


RESISTER vs. AMBIENT TEMPERATURE

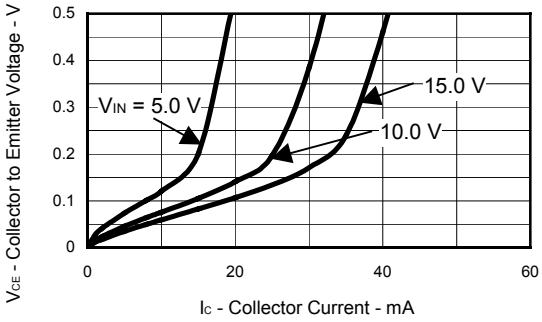


[FA4F4M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

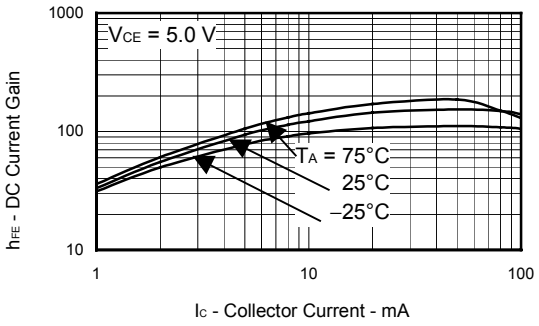
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



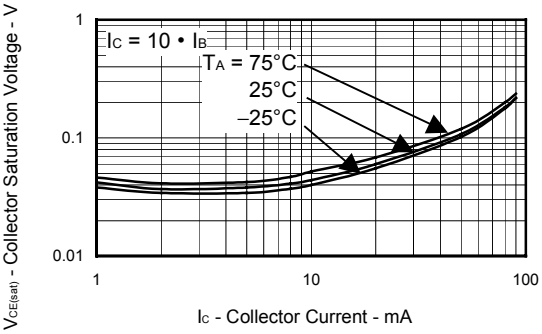
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



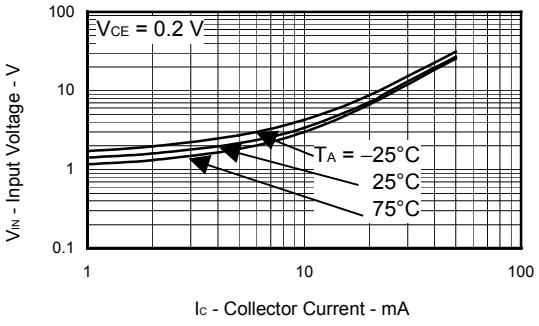
DC CURRENT GAIN vs. COLLECTOR CURRENT



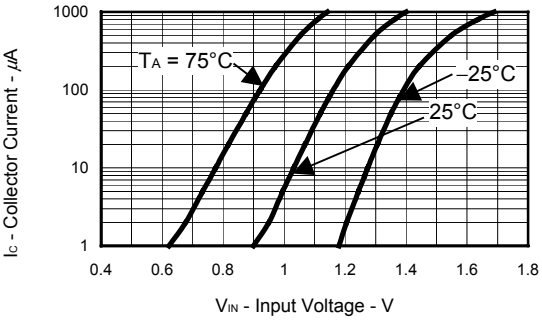
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



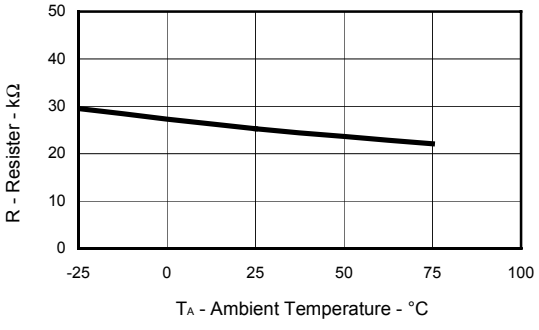
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

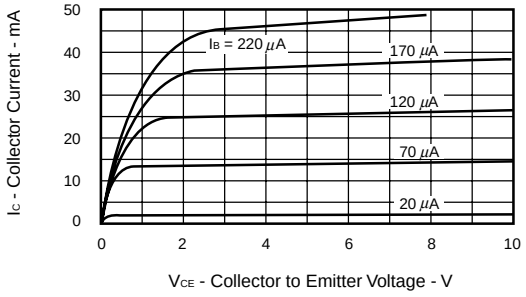


RESISTER vs. AMBIENT TEMPERATURE

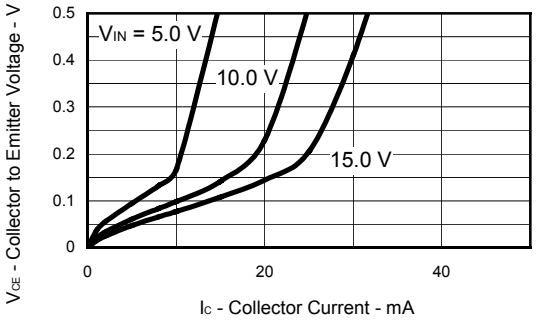


[FA4L4M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

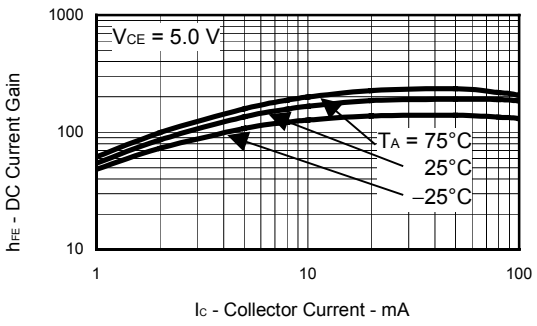
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



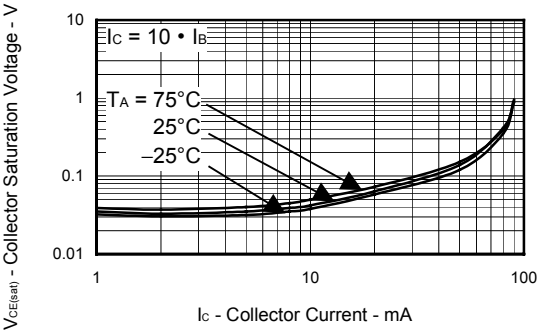
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



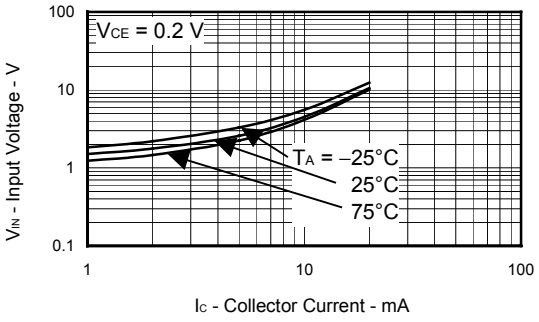
DC CURRENT GAIN vs. COLLECTOR CURRENT



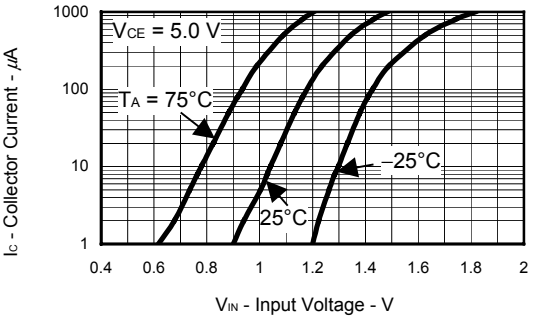
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



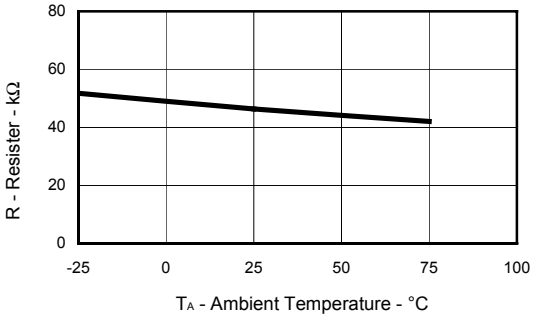
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

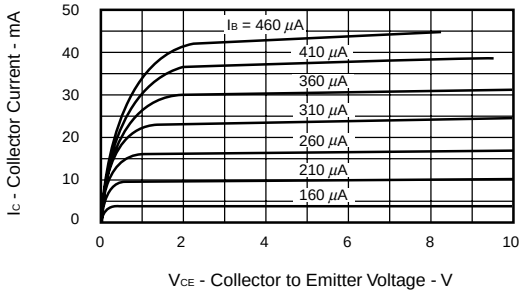


RESISTER vs. AMBIENT TEMPERATURE

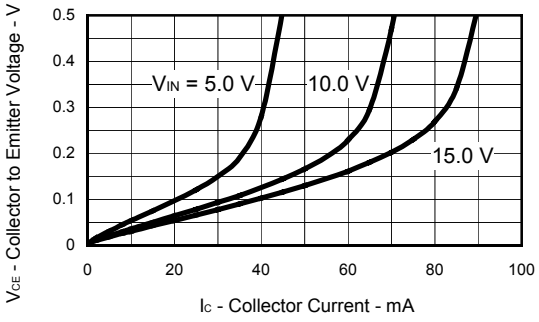


[FA4L3M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

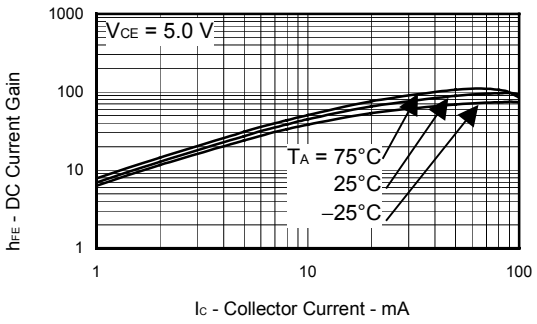
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



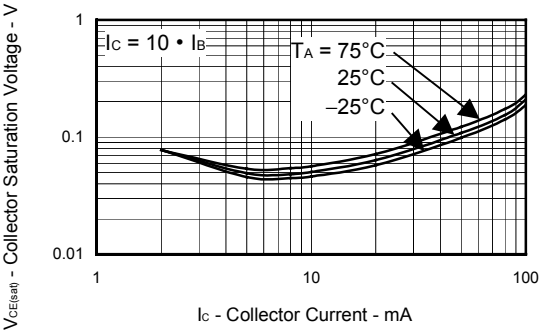
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



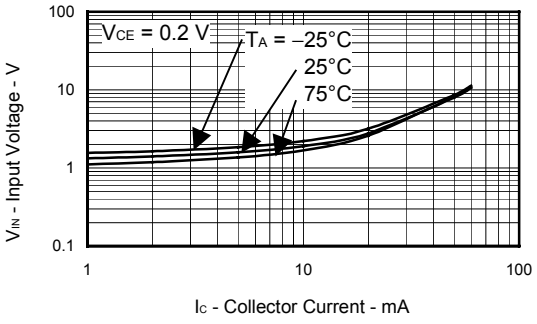
DC CURRENT GAIN vs. COLLECTOR CURRENT



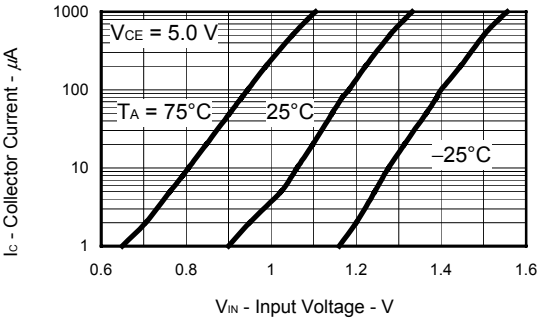
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



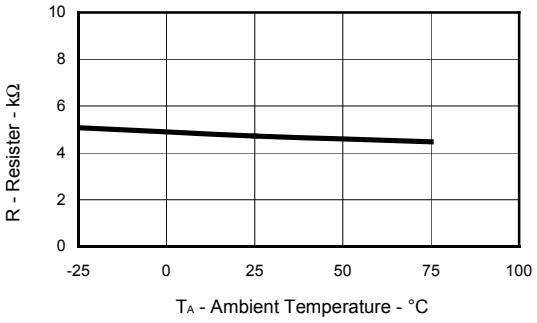
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

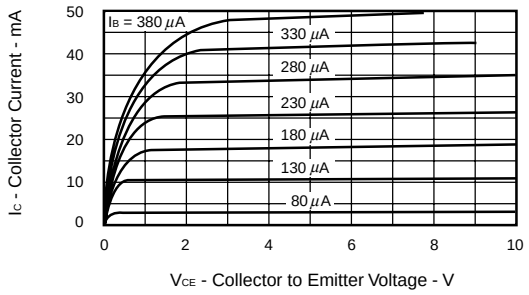


RESISTER vs. AMBIENT TEMPERATURE

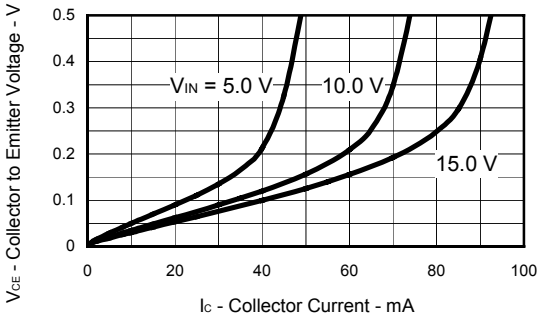


[FA4L3N]
TYPICAL CHARACTERISTICS (T_A = 25°C)

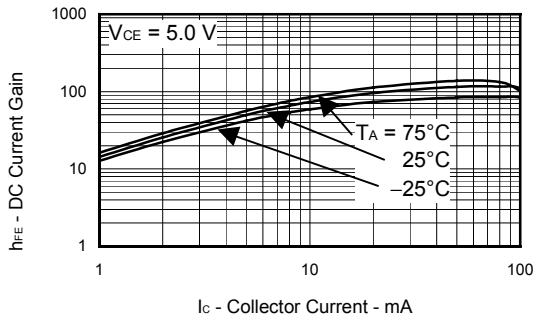
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



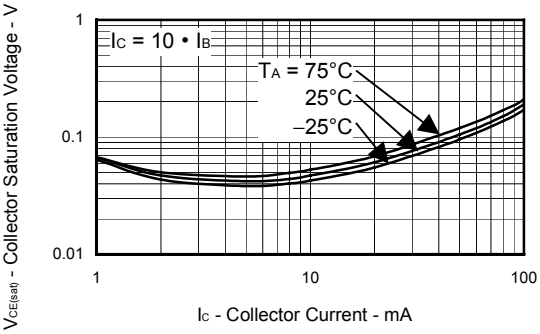
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



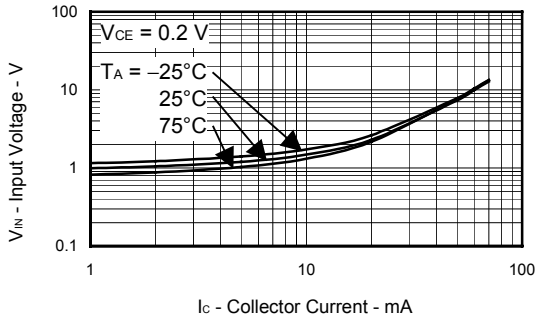
DC CURRENT GAIN vs. COLLECTOR CURRENT



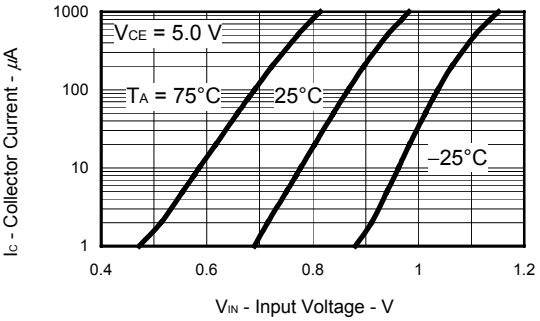
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



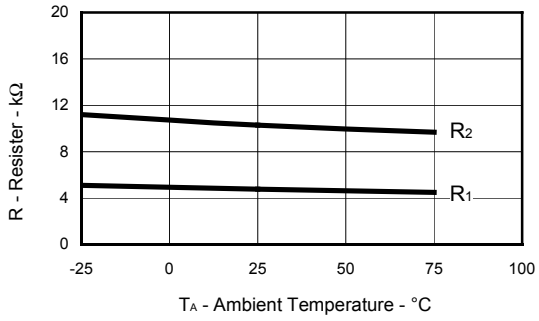
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

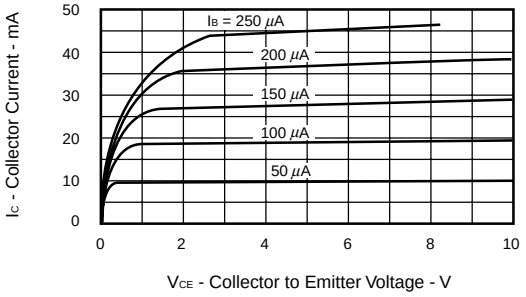


RESISTER vs. AMBIENT TEMPERATURE

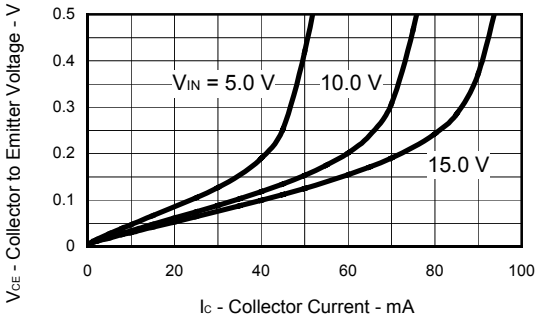


[FA4L3Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

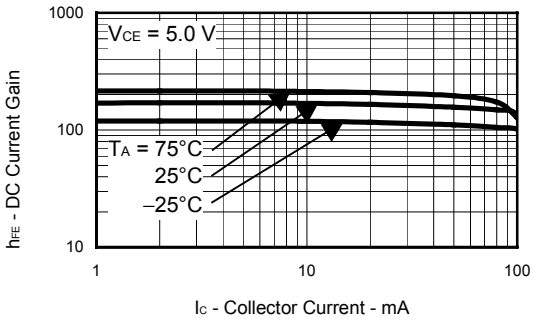
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



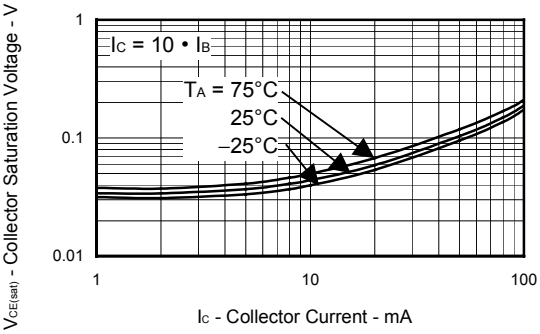
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



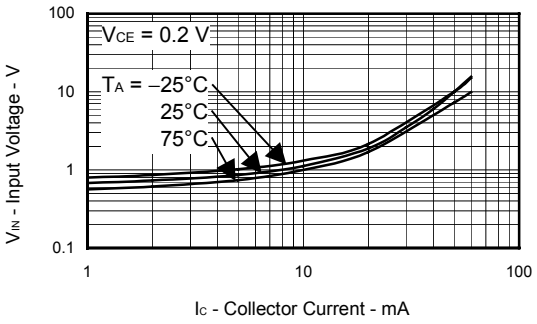
DC CURRENT GAIN vs. COLLECTOR CURRENT



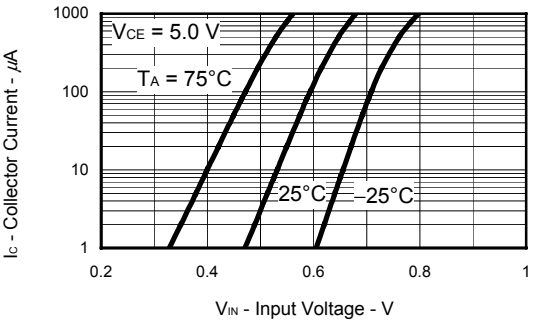
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



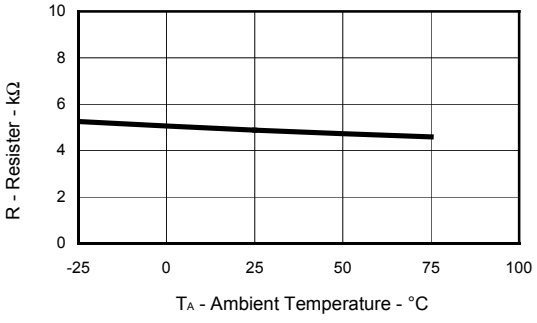
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

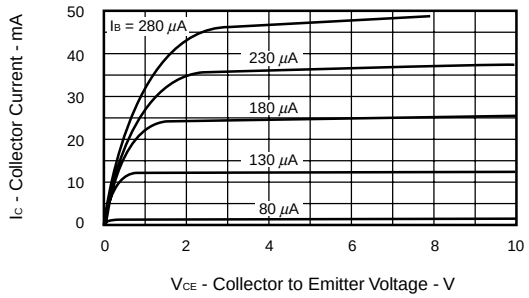


RESISTER vs. AMBIENT TEMPERATURE

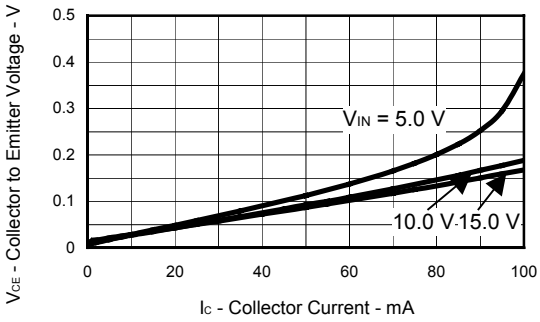


[FA4A3Q]
TYPICAL CHARACTERISTICS (T_A = 25°C)

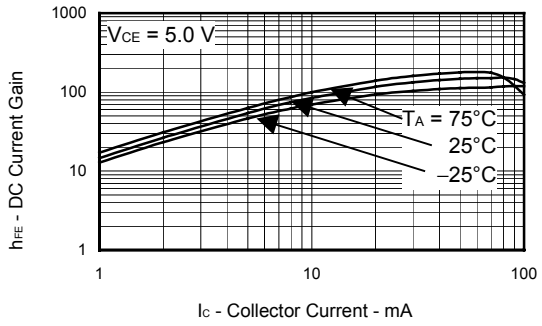
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



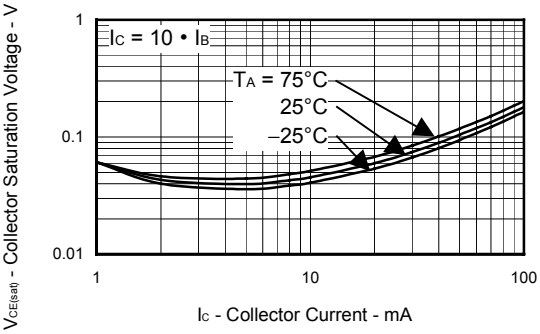
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



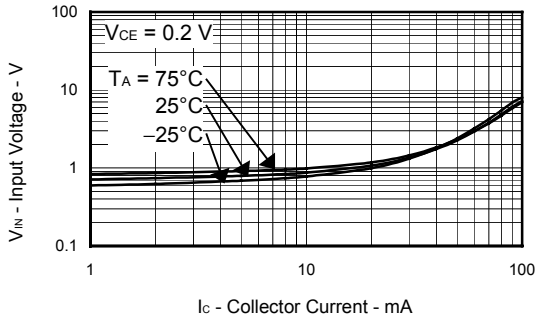
DC CURRENT GAIN vs. COLLECTOR CURRENT



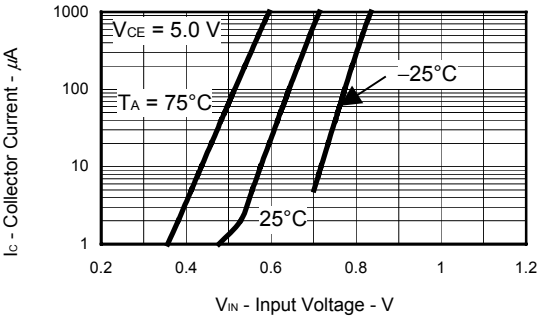
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



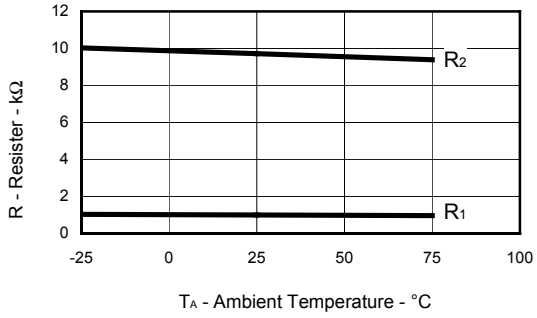
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

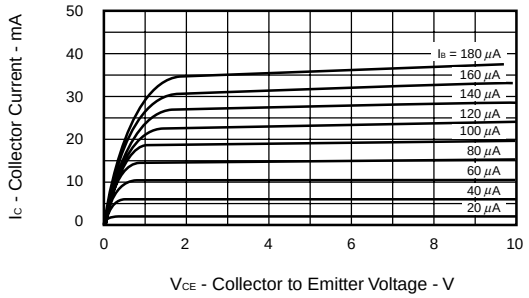


RESISTER vs. AMBIENT TEMPERATURE

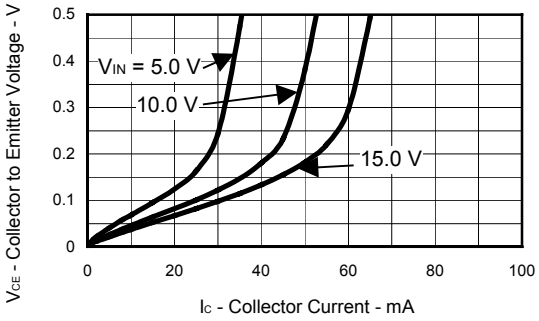


[FA4A4P]
TYPICAL CHARACTERISTICS (T_A = 25°C)

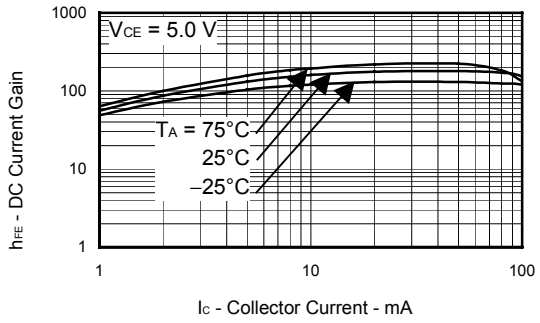
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



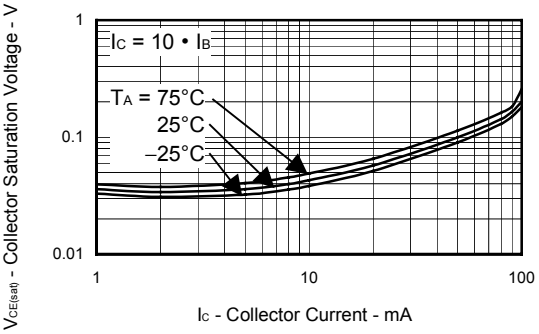
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



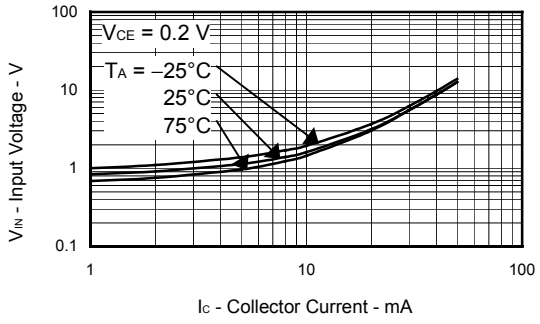
DC CURRENT GAIN vs. COLLECTOR CURRENT



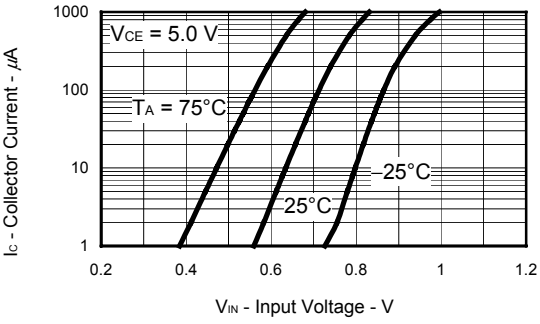
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



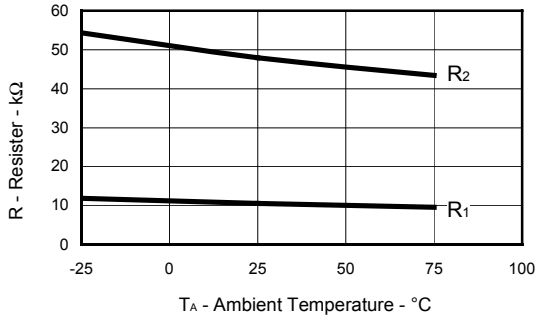
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

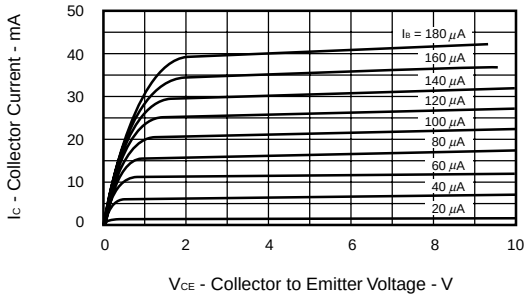


RESISTER vs. AMBIENT TEMPERATURE

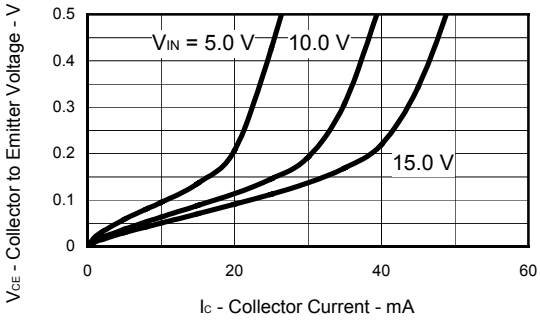


[FA4F4N]
TYPICAL CHARACTERISTICS (T_A = 25°C)

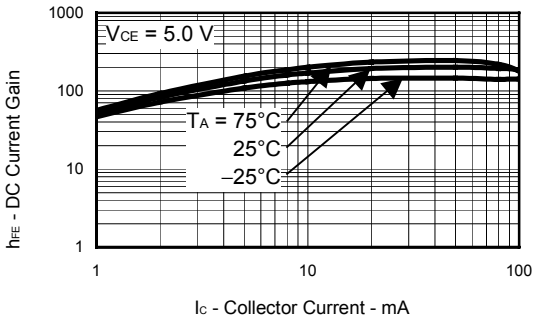
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



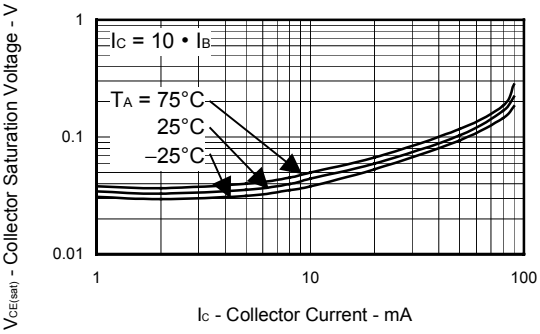
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



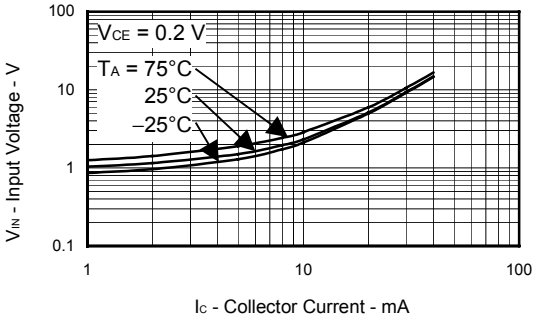
DC CURRENT GAIN vs. COLLECTOR CURRENT



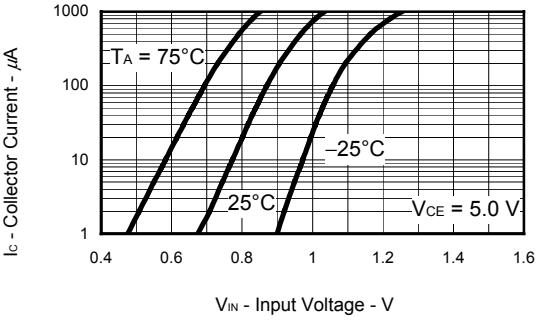
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



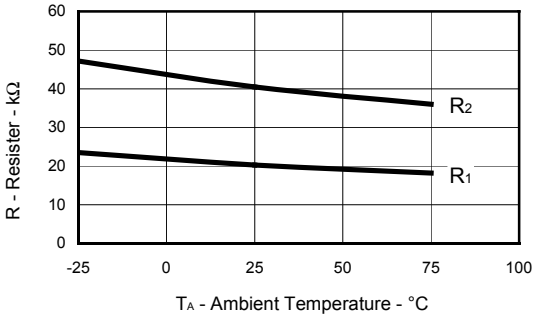
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

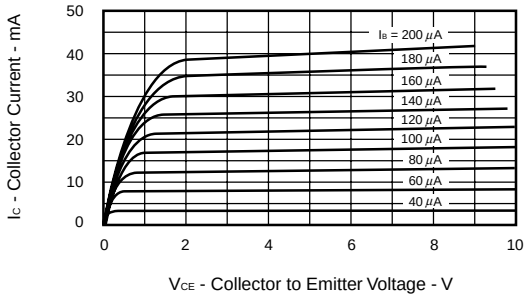


RESISTER vs. AMBIENT TEMPERATURE

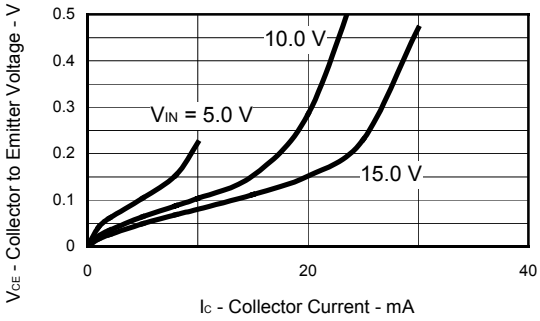


[FA4L4L]
TYPICAL CHARACTERISTICS (T_A = 25°C)

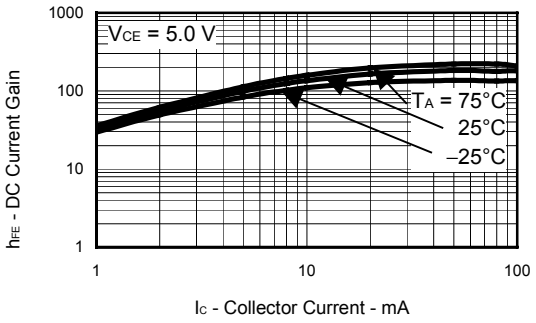
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



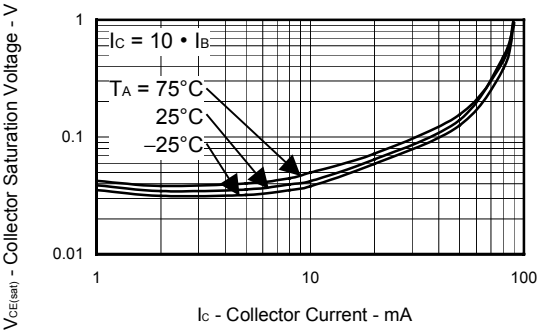
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



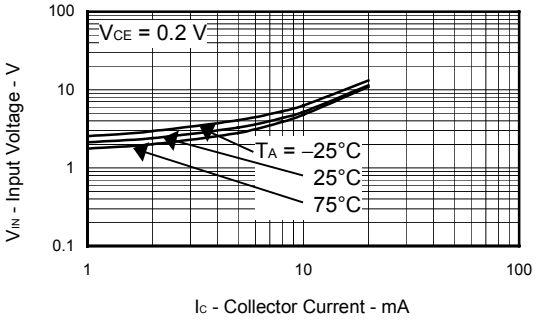
DC CURRENT GAIN vs. COLLECTOR CURRENT



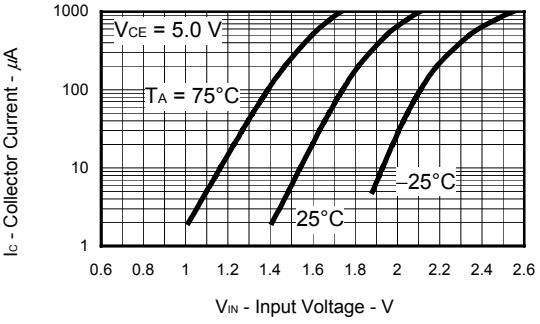
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



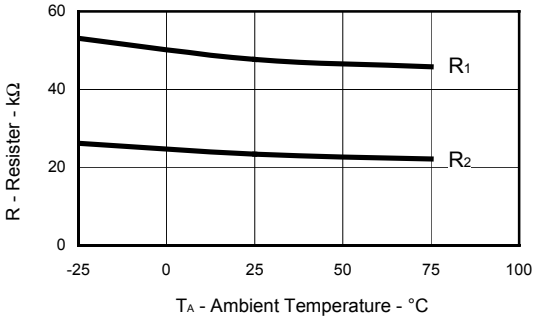
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

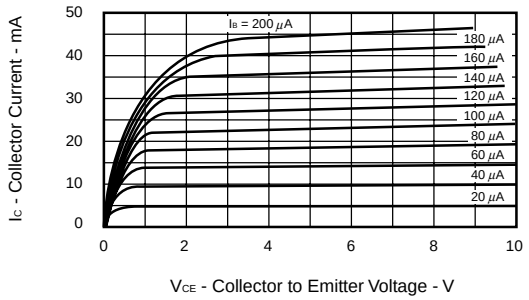


RESISTER vs. AMBIENT TEMPERATURE

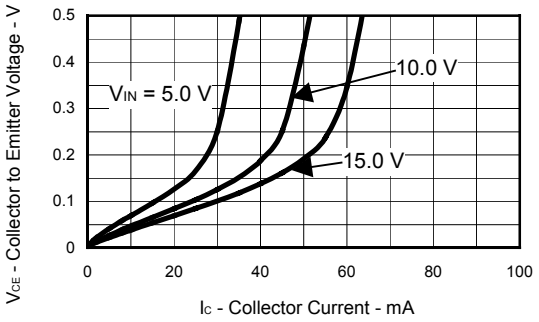


[FA4A4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

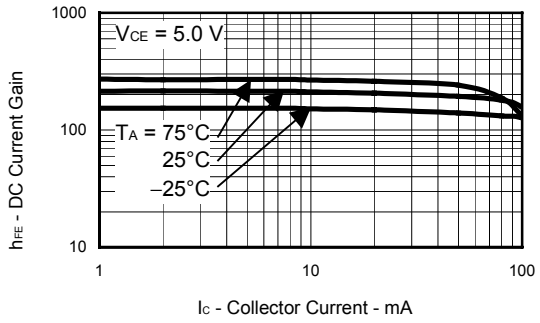
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



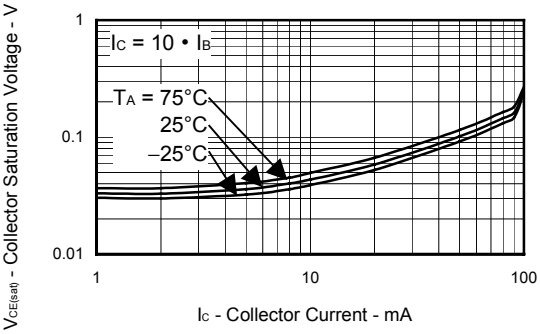
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



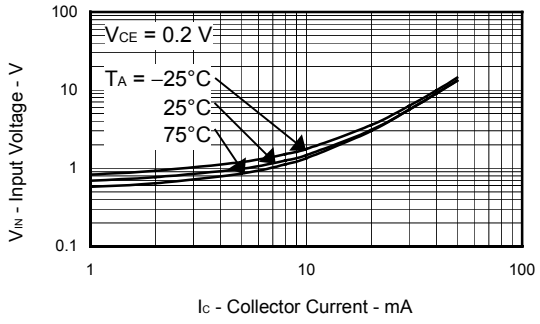
DC CURRENT GAIN vs. COLLECTOR CURRENT



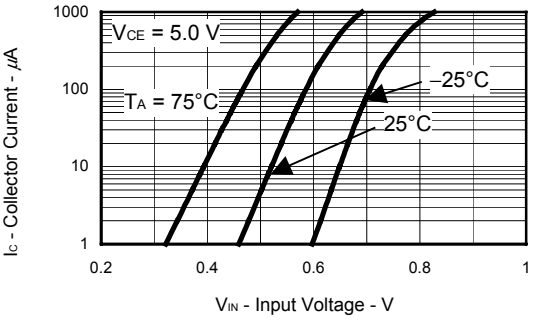
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



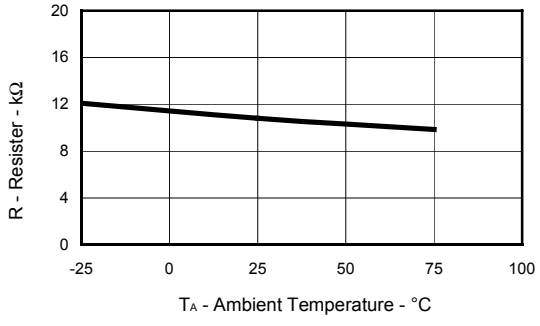
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

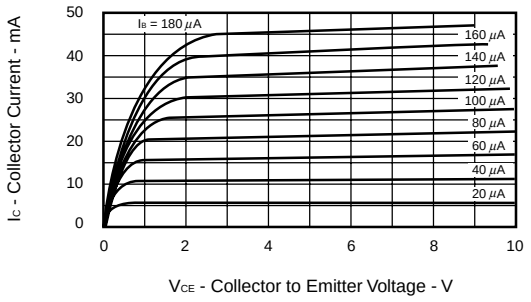


RESISTER vs. AMBIENT TEMPERATURE

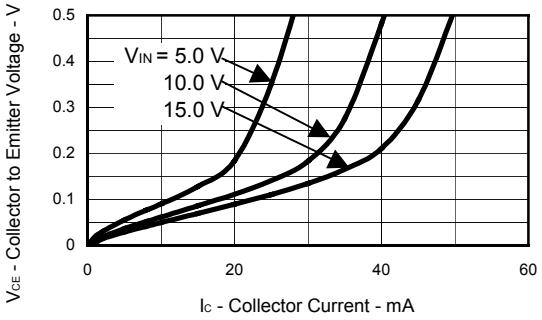


[FA4F4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

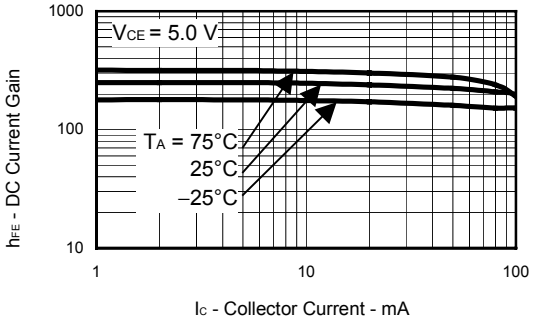
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



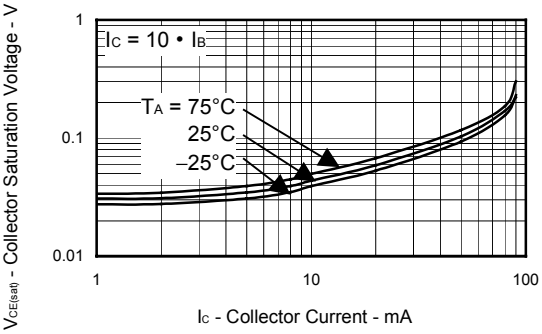
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



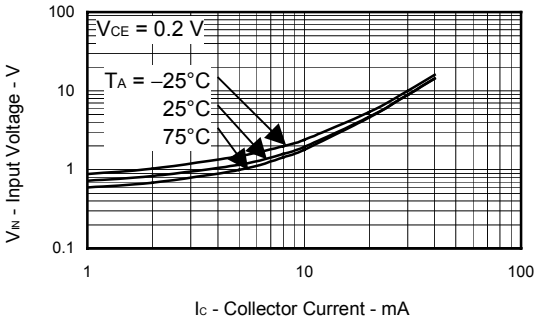
DC CURRENT GAIN vs. COLLECTOR CURRENT



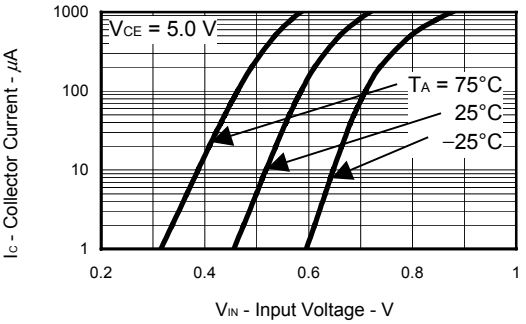
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



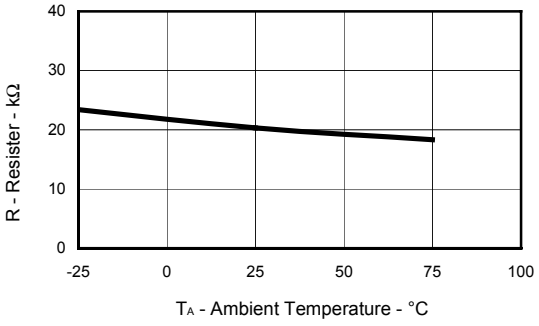
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

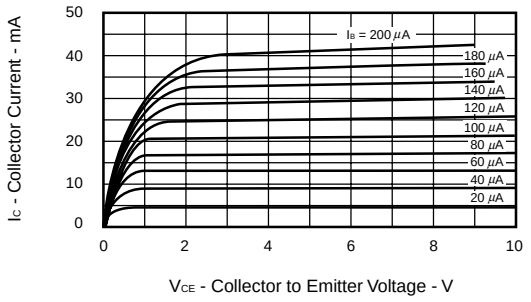


RESISTER vs. AMBIENT TEMPERATURE

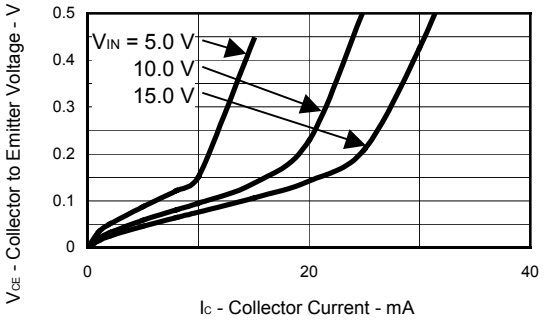


[FA4L4Z]
TYPICAL CHARACTERISTICS (T_A = 25°C)

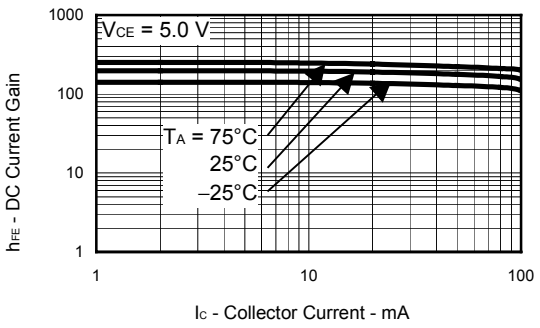
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



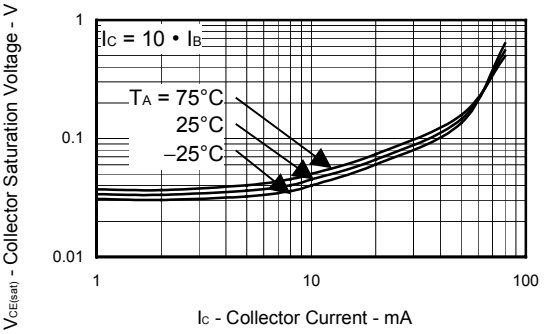
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



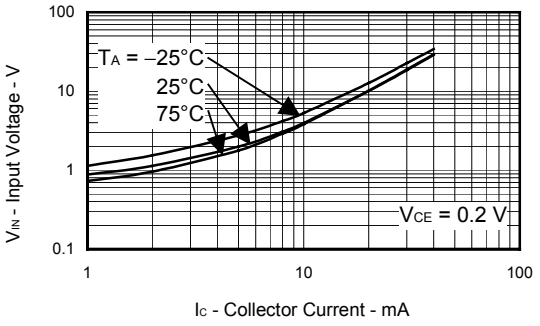
DC CURRENT GAIN vs. COLLECTOR CURRENT



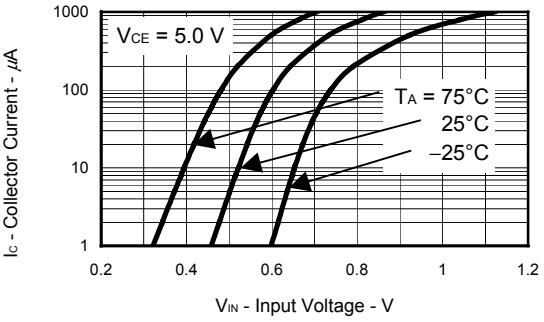
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



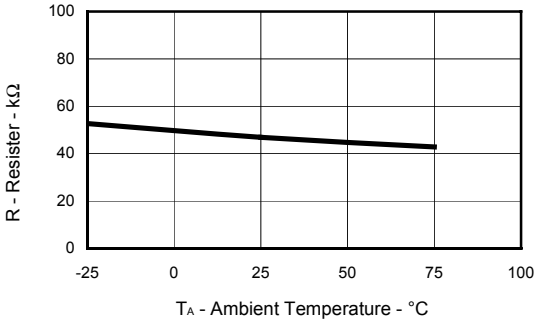
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

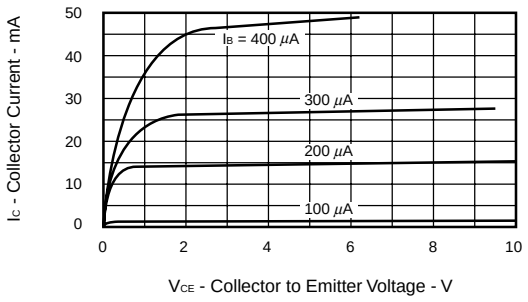


RESISTER vs. AMBIENT TEMPERATURE

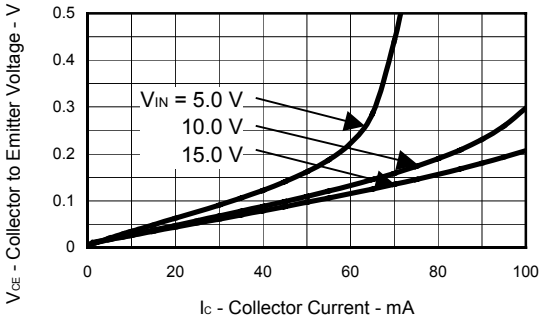


[FA4F3M]
TYPICAL CHARACTERISTICS (T_A = 25°C)

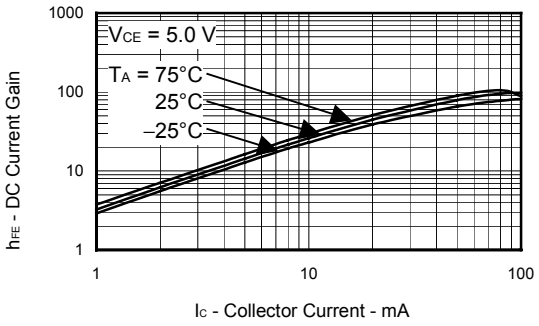
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



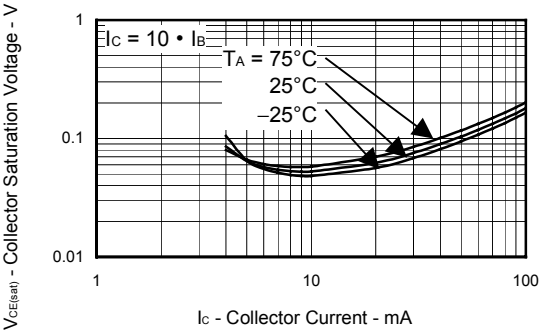
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



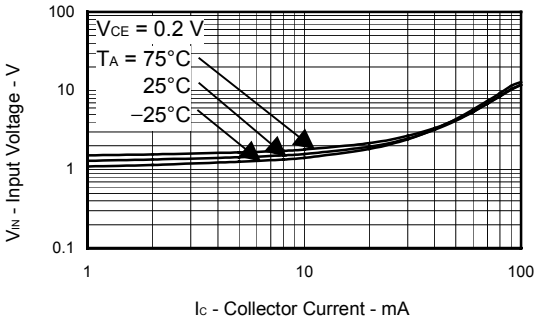
DC CURRENT GAIN vs. COLLECTOR CURRENT



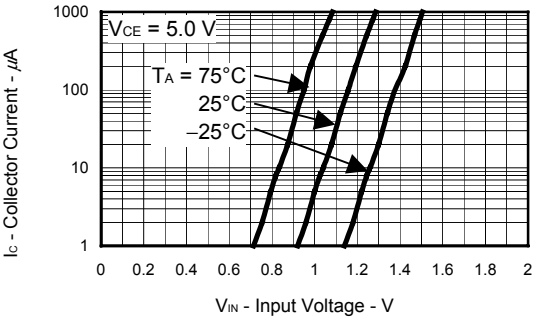
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



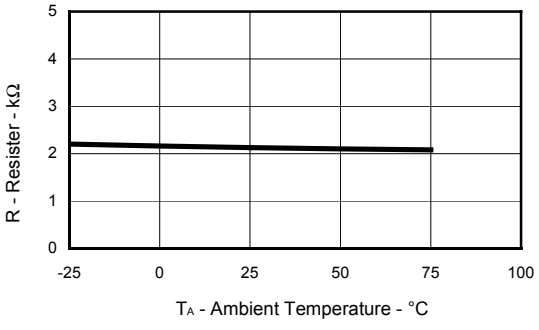
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

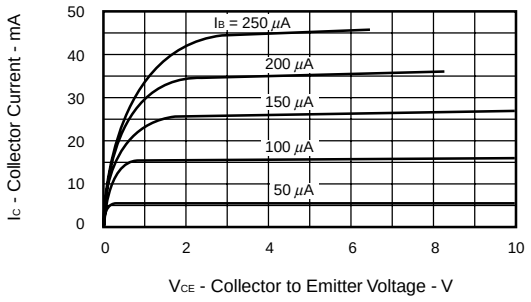


RESISTER vs. AMBIENT TEMPERATURE

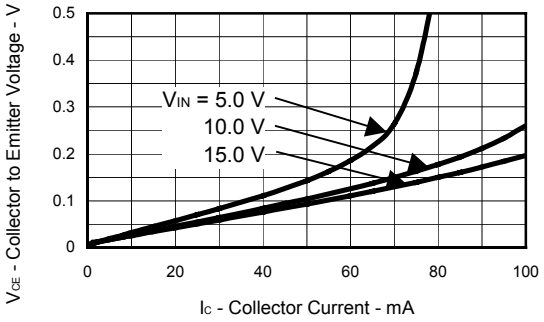


[FA4F3P]
TYPICAL CHARACTERISTICS (T_A = 25°C)

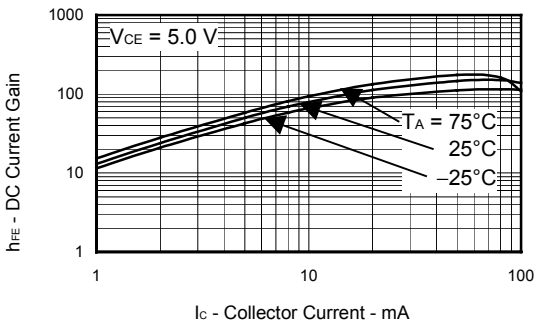
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



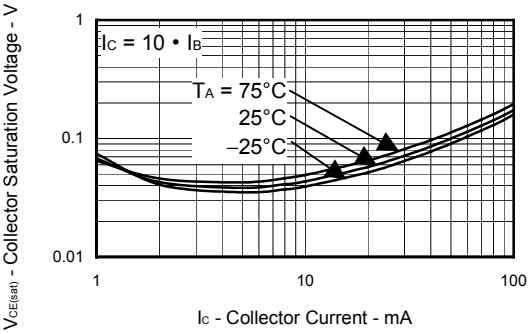
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



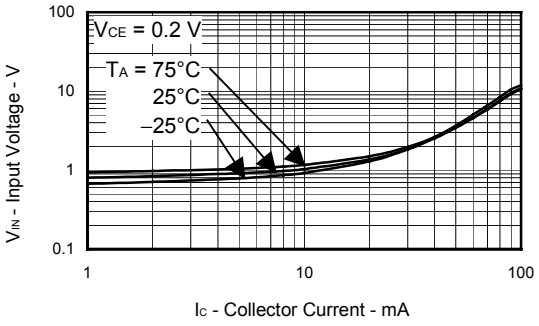
DC CURRENT GAIN vs. COLLECTOR CURRENT



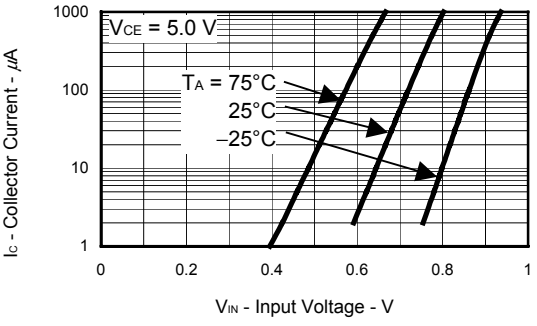
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



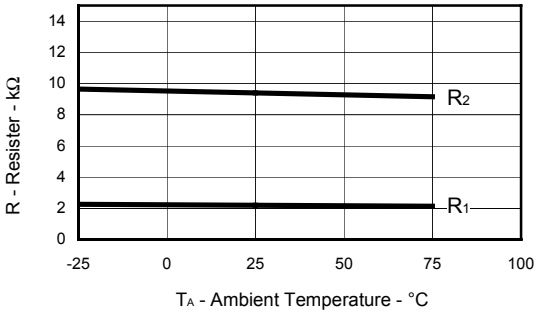
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

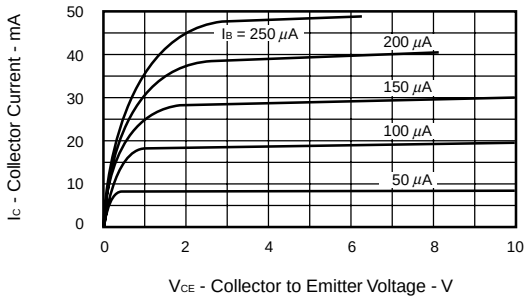


RESISTER vs. AMBIENT TEMPERATURE

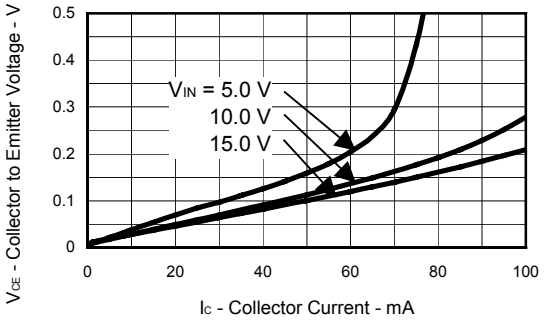


[FA4F3R]
TYPICAL CHARACTERISTICS (T_A = 25°C)

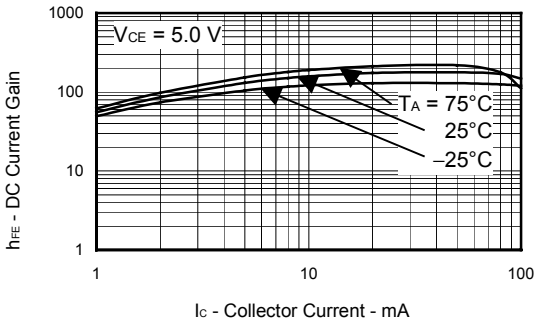
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



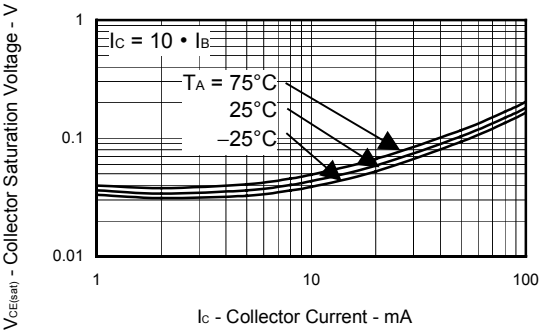
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



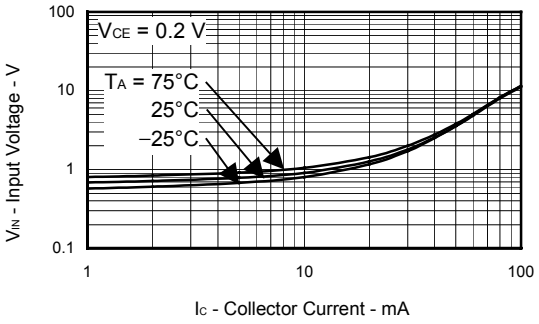
DC CURRENT GAIN vs. COLLECTOR CURRENT



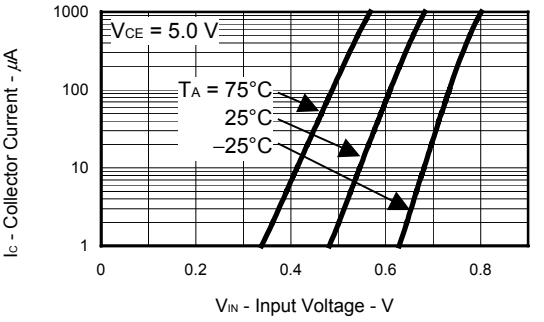
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



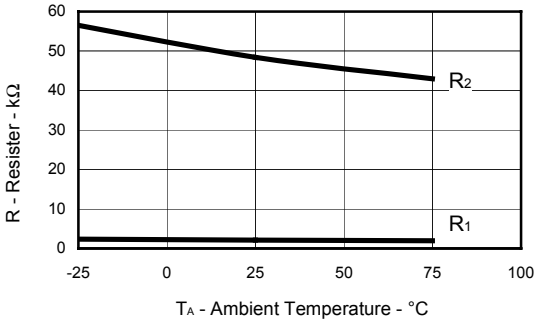
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

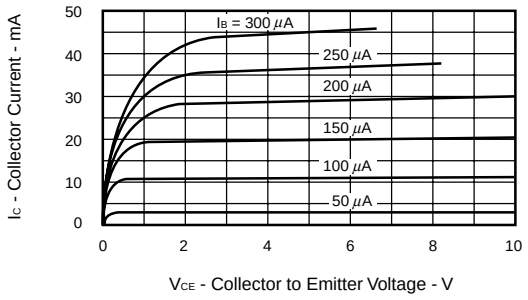


RESISTER vs. AMBIENT TEMPERATURE

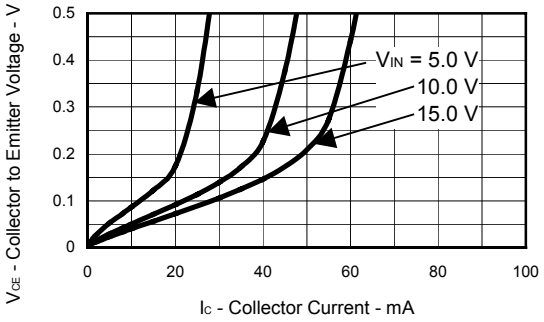


[FA4A4L]
TYPICAL CHARACTERISTICS (T_A = 25°C)

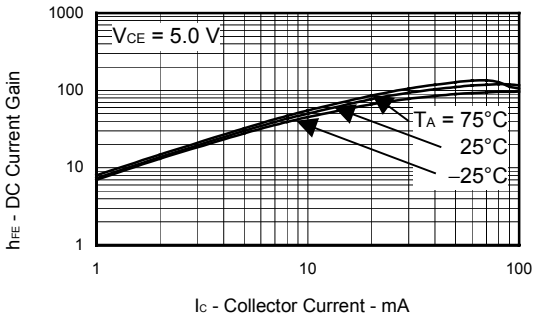
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



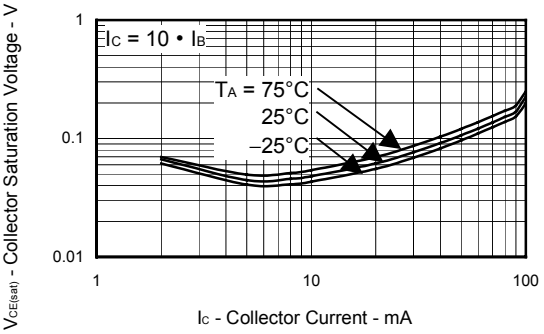
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



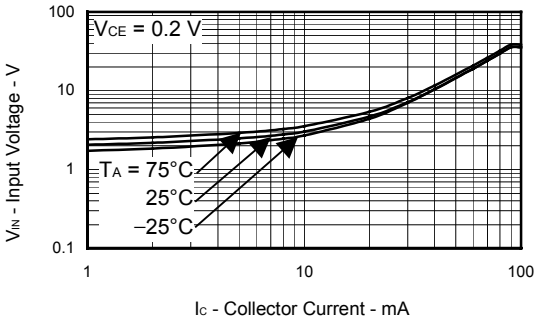
DC CURRENT GAIN vs. COLLECTOR CURRENT



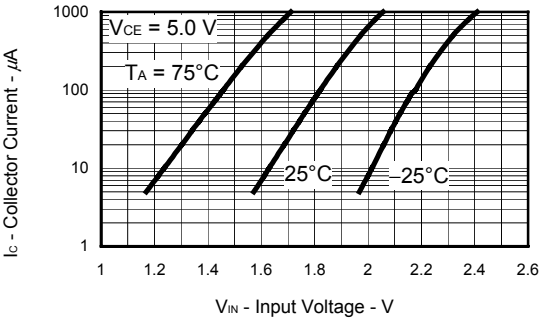
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



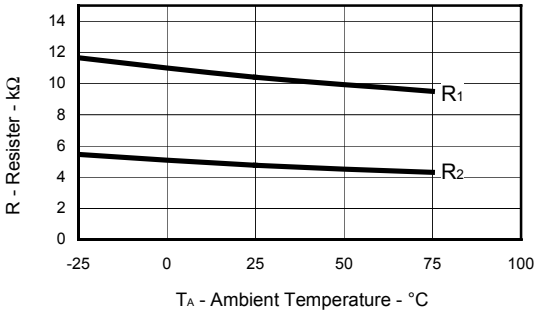
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE

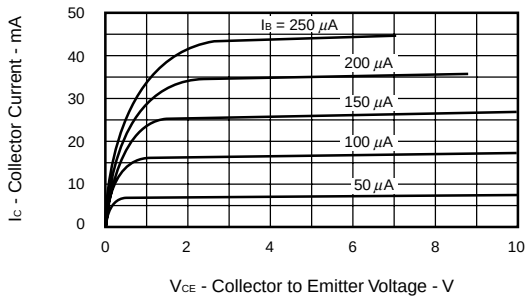


RESISTER vs. AMBIENT TEMPERATURE

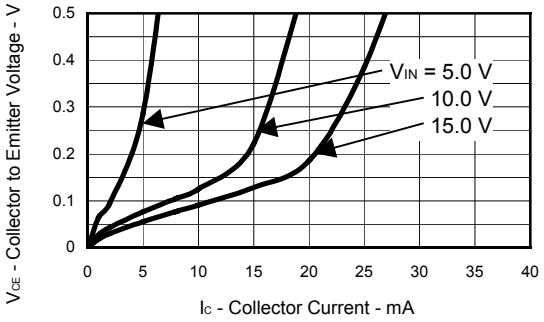


[FA4L4K]
TYPICAL CHARACTERISTICS (T_A = 25°C)

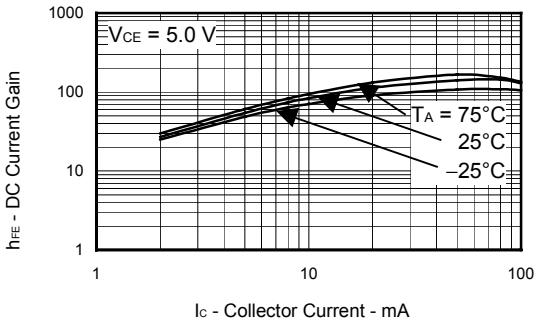
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



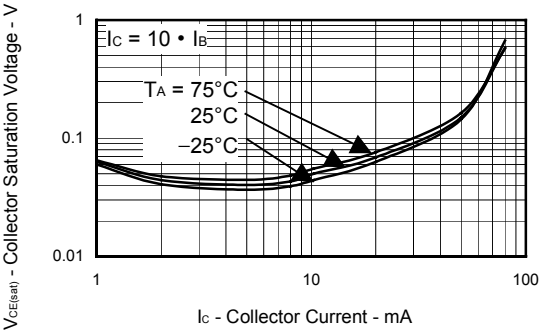
COLLECTOR TO EMITTER VOLTAGE vs.
COLLECTOR CURRENT



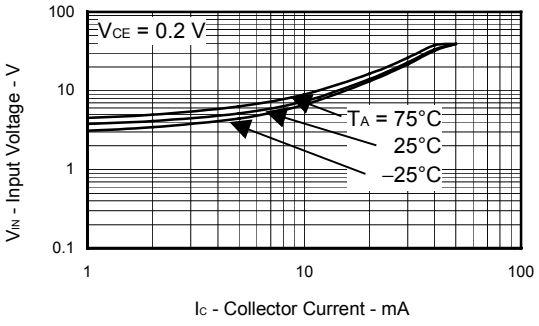
DC CURRENT GAIN vs. COLLECTOR CURRENT



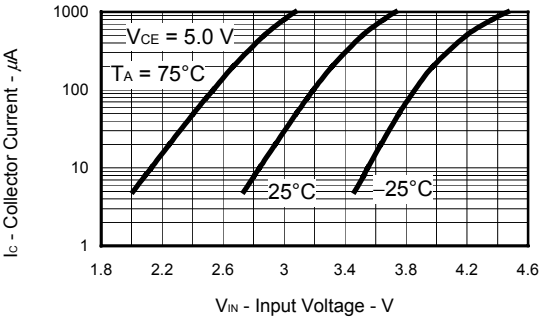
COLLECTOR SATURATION VOLTAGE vs.
COLLECTOR CURRENT



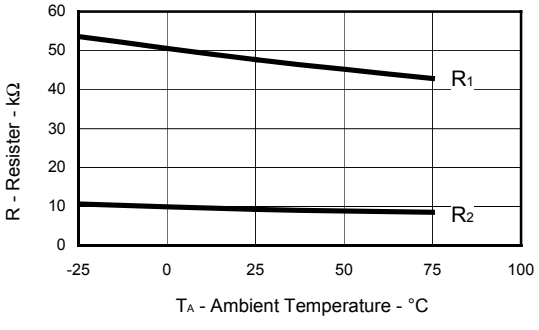
INPUT VOLTAGE vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. INPUT VOLTAGE



RESISTER vs. AMBIENT TEMPERATURE



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