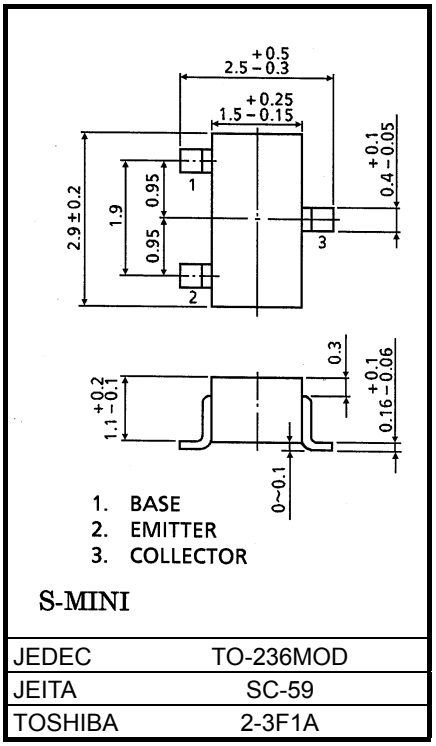
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2414, RN2415, RN2416, RN2417, RN2418

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN1414 to RN1418

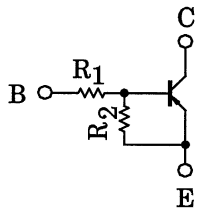
Unit: mm



JEDEC	TO-236MOD
JEITA	SC-59
TOSHIBA	2-3F1A

Weight: 0.012g (typ.)

Equivalent Circuit and Bias Resistor Values



Type No.	R_1 (kΩ)	R_2 (kΩ)
RN2414	1	10
RN2415	2.2	10
RN2416	4.7	10
RN2417	10	4.7
RN2418	47	10

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2414 to 2418	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2414	V_{EBO}	−5	V
	RN2415		−6	
	RN2416		−7	
	RN2417		−15	
	RN2418		−25	
Collector current	RN2414 to 2418	I_C	−100	mA
Collector power dissipation		P_C	200	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

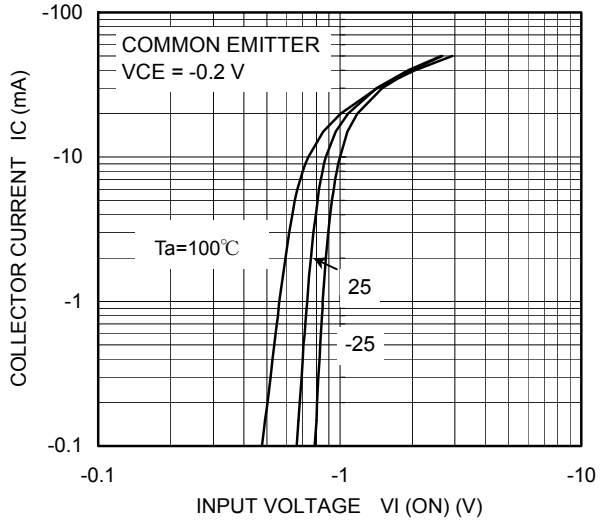
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Start of commercial production
1994-08

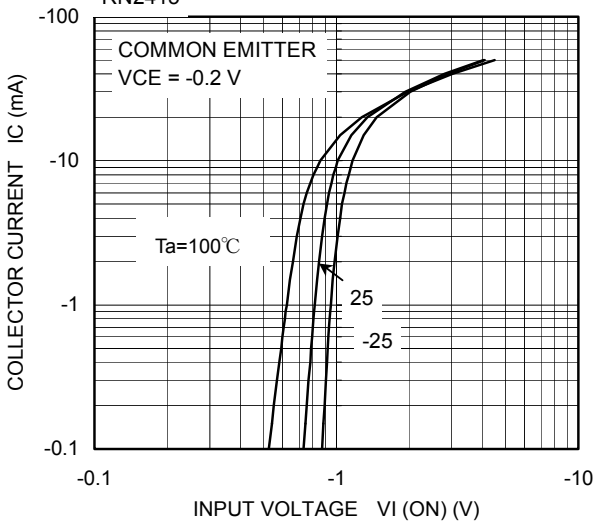
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2414 to 2418	I_{CBO}	—	V_{CB} = −50 V, I_E = 0	—	—	−100	nA
	RN2414 to 2418	I_{CEO}	—	V_{CE} = −50 V, I_B = 0	—	—	−500	nA
Emitter cut-off current	RN2414	I_{EBO}	—	V_{EB} = −5 V, I_C = 0	−0.35	—	−0.65	mA
	RN2415		—	V_{EB} = −6 V, I_C = 0	−0.37	—	−0.71	
	RN2416		—	V_{EB} = −7 V, I_C = 0	−0.36	—	−0.68	
	RN2417		—	V_{EB} = −15 V, I_C = 0	−0.78	—	−1.46	
	RN2418		—	V_{EB} = −25 V, I_C = 0	−0.33	—	−0.63	
DC current gain	RN2414 to 16 RN2418	h_{FE}	—	V_{CE} = −5 V, I_C = −10 mA	50	—	—	—
	RN2417		—		30	—	—	
Collector-emitter saturation voltage	RN2414 to 2418	$V_{CE\ (sat)}$	—	I_C = −5 mA, I_B = −0.25 mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2414	$V_{I\ (ON)}$	—	V_{CE} = −0.2 V, I_C = −5 mA	−0.5	—	−2.0	V
	RN2415		—		−0.6	—	−2.5	
	RN2416		—		−0.7	—	−2.5	
	RN2417		—		−1.5	—	−3.5	
	RN2418		—		−2.5	—	−10.0	
Input voltage (OFF)	RN2414	$V_{I\ (OFF)}$	—	V_{CE} = −5 V, I_C = −0.1 mA	−0.3	—	−0.9	V
	RN2415		—		−0.3	—	−1.0	
	RN2416		—		−0.3	—	−1.1	
	RN2417		—		−0.3	—	−3.0	
	RN2418		—		−0.5	—	−5.7	
Translation frequency	RN2414 to 2418	f_T	—	V_{CE} =−10 V, I_C = −5 mA	—	200	—	MHz
Collector output capacitance	RN2414 to 2418	C_{ob}	—	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	3.0	6.0	pF
Input resistor	RN2414	R_1	—	—	0.7	1.0	1.3	kΩ
	RN2415		—		1.54	2.2	2.86	
	RN2416		—		3.29	4.7	6.11	
	RN2417		—		7.0	10.0	13.0	
	RN2418		—		32.9	47.0	61.1	
Resistor ratio	RN2414	R_1/R_2	—	—	—	0.1	—	—
	RN2415		—		—	0.22	—	
	RN2416		—		—	0.47	—	
	RN2417		—		—	2.13	—	
	RN2418		—		—	4.7	—	

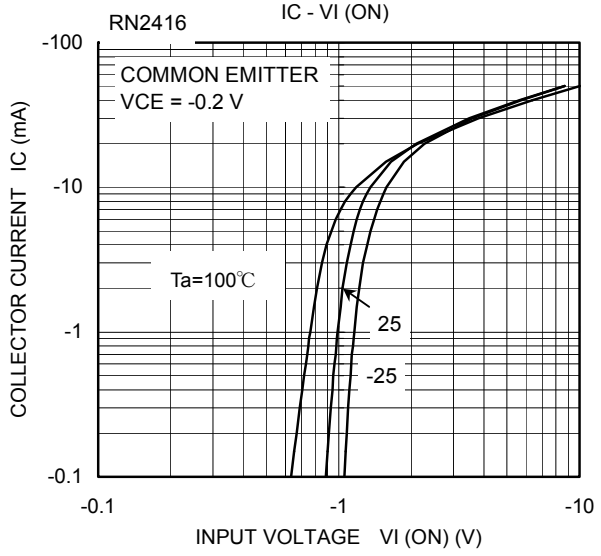
RN2414 IC - VI (ON)



RN2415 IC - VI (ON)



RN2416 IC - VI (ON)



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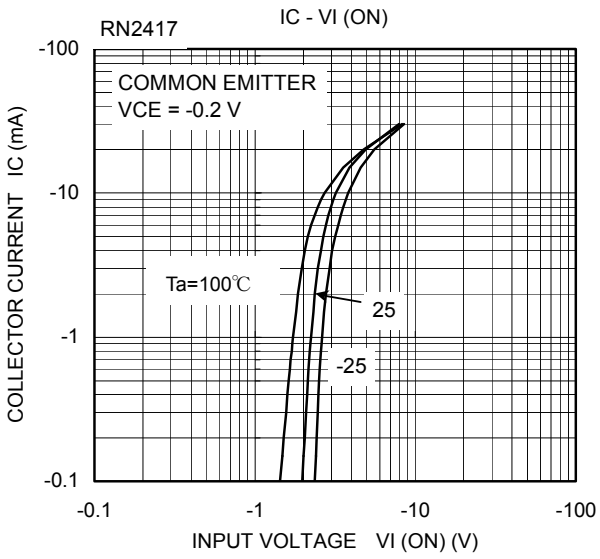
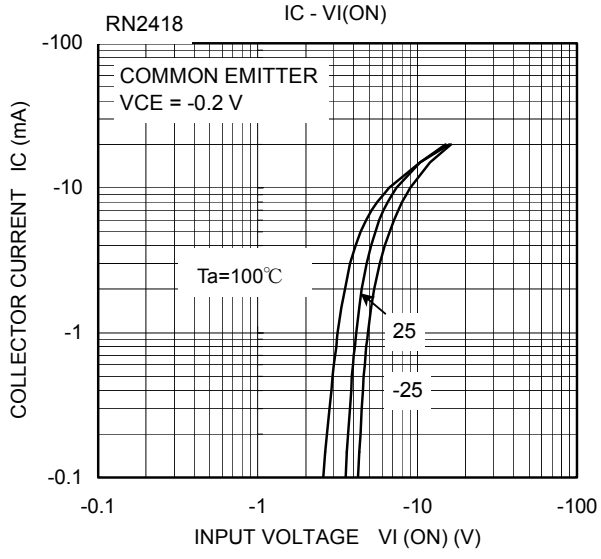
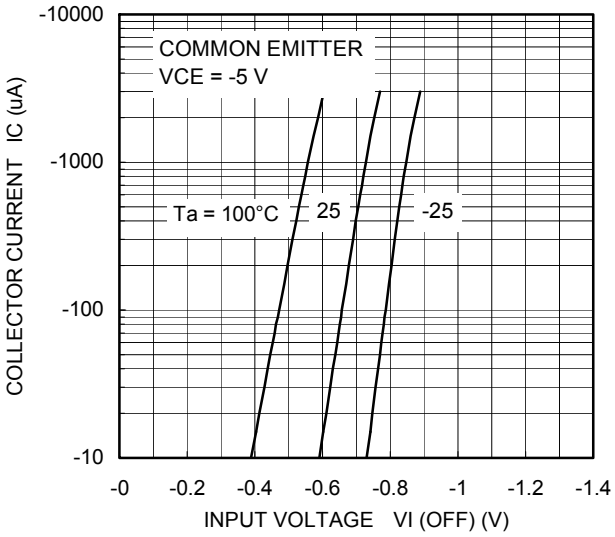


RN2418 IC - VI(ON)



RN2414 IC - VI (OFF)



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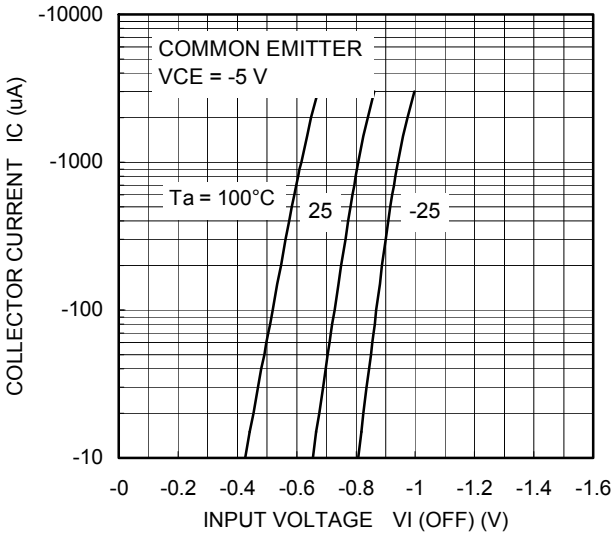

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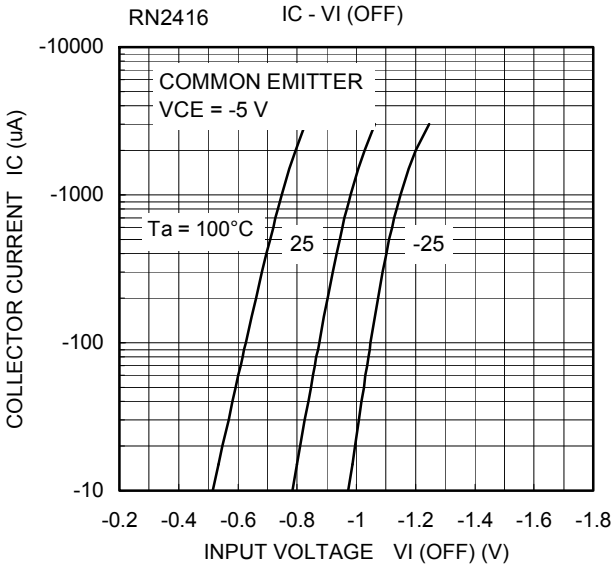

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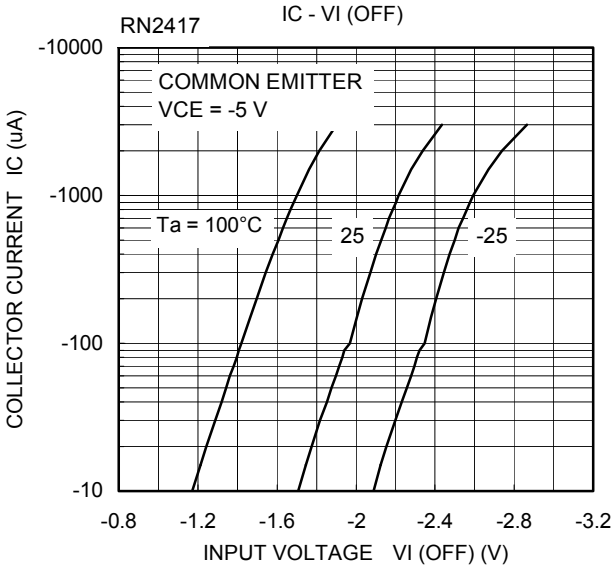
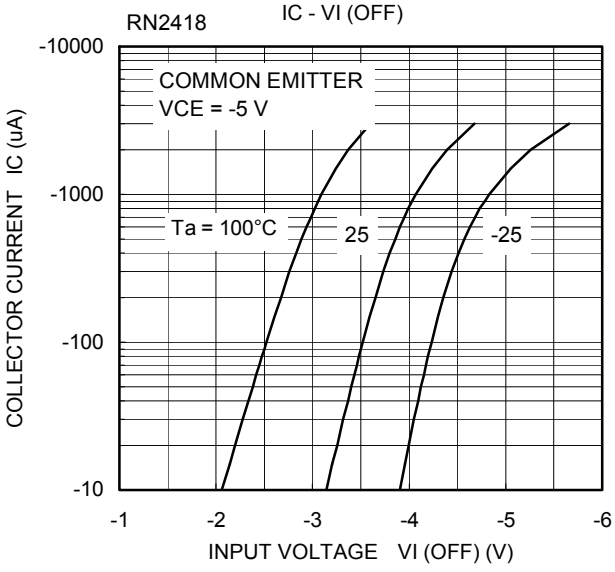
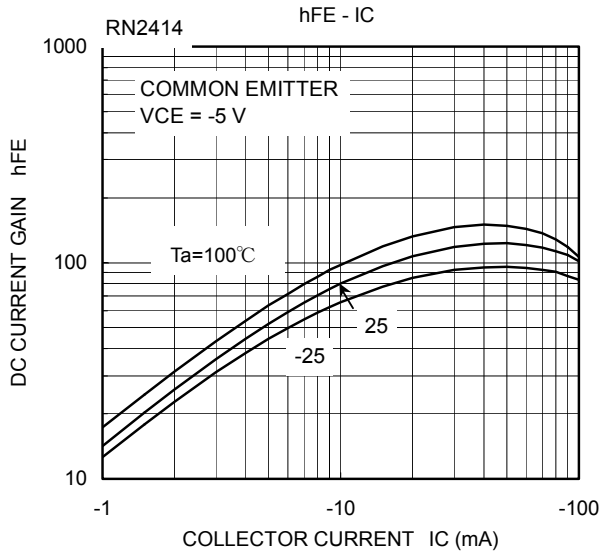
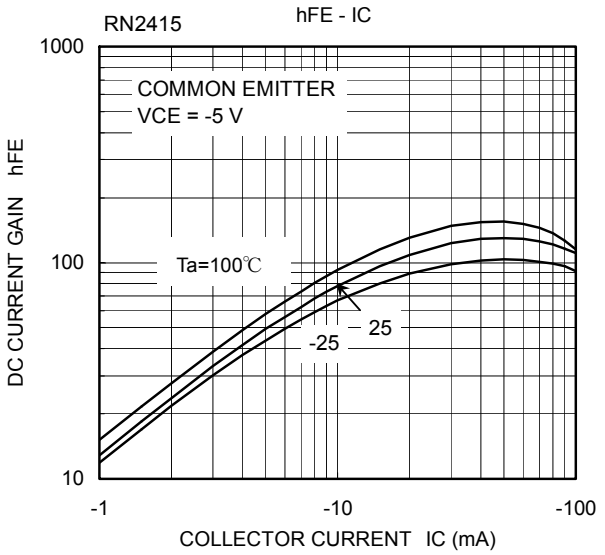
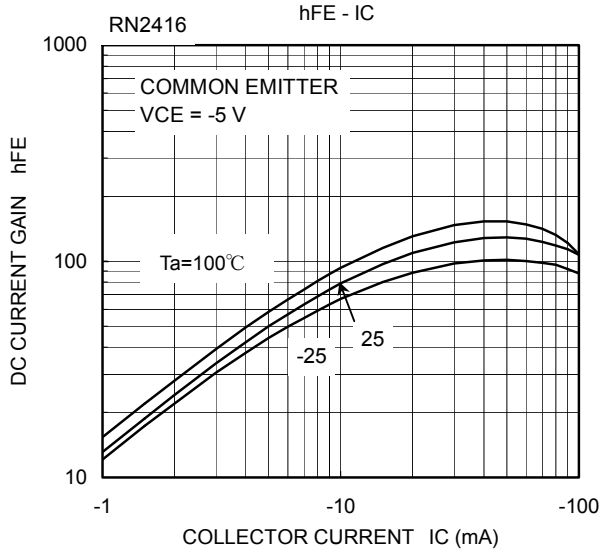


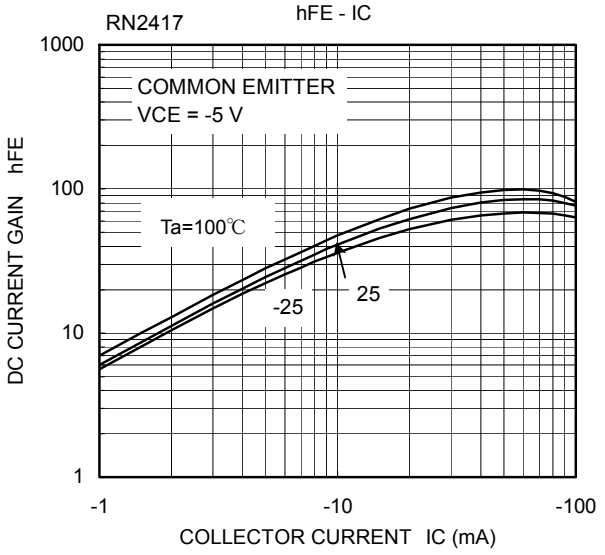
RN2418 IC - VI (OFF)

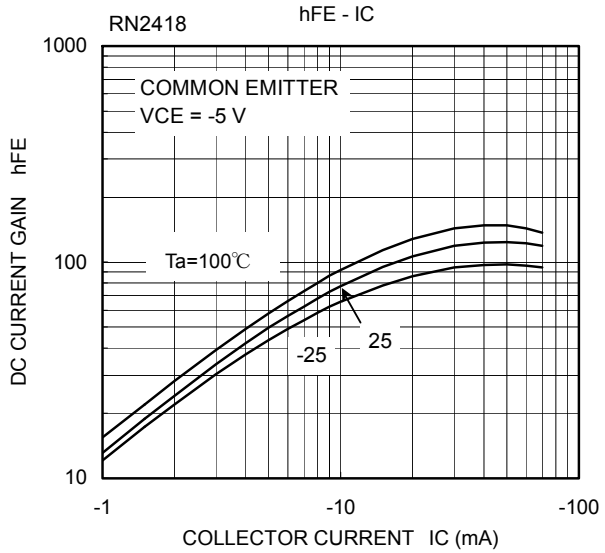



RN2414
hFE - IC
COMMON EMITTER
VCE = -5 V
Ta=100℃
25
-25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
-1
-10
-100

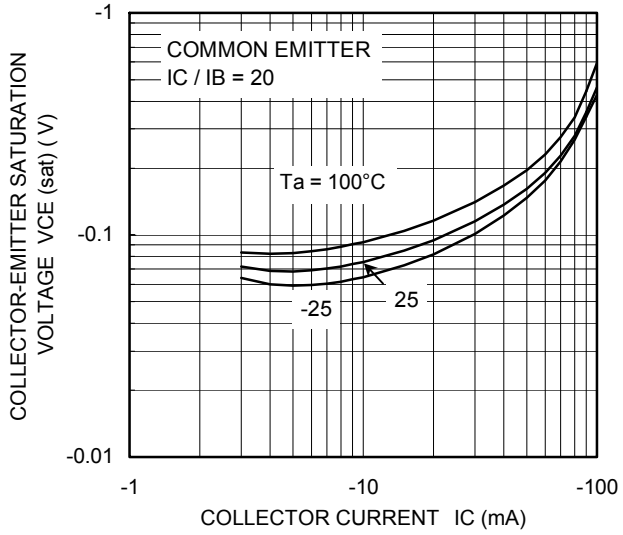

RN2415
hFE - IC
COMMON EMITTER
VCE = -5 V
Ta=100℃
25
-25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
-1
-10
-100


RN2416
hFE - IC
COMMON EMITTER
VCE = -5 V
Ta=100℃
25
-25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
-1
-10
-100

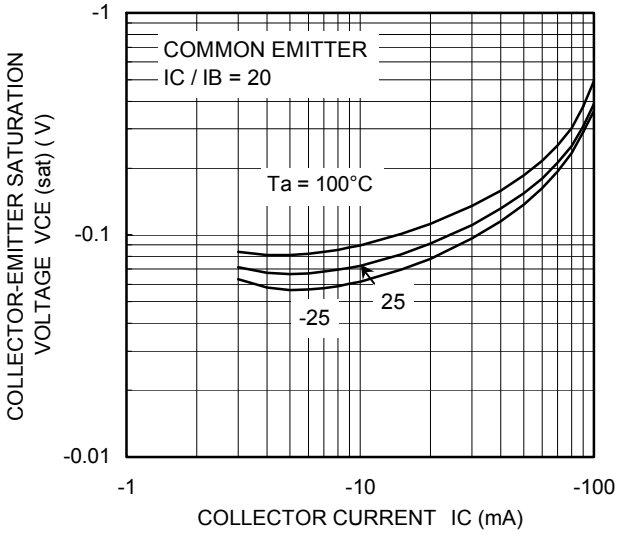

RN2417
hFE - IC
COMMON EMITTER
VCE = -5 V
Ta=100℃
25
-25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
1
-1
-10
-100


RN2418
hFE - IC
COMMON EMITTER
VCE = -5 V
Ta=100℃
25
-25
DC CURRENT GAIN hFE
COLLECTOR CURRENT IC (mA)
1000
100
10
-1
-10
-100

RN2414 VCE(sat) - IC



RN2415 VCE(sat) - IC



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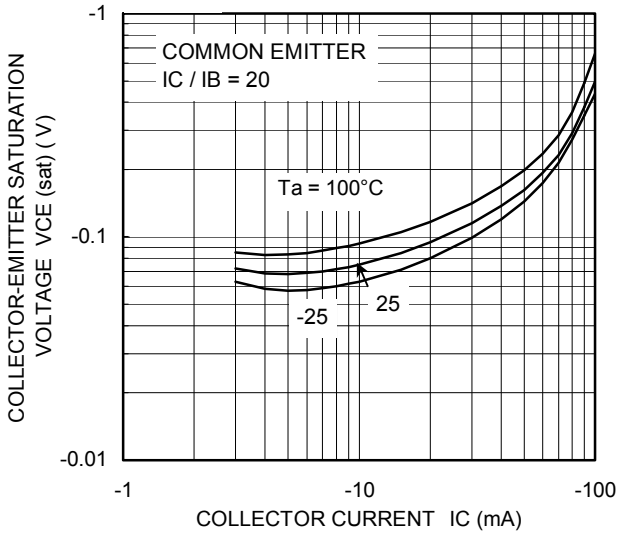
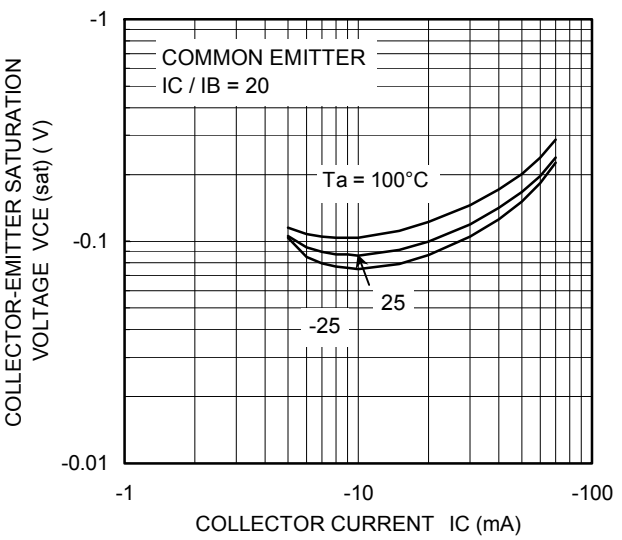
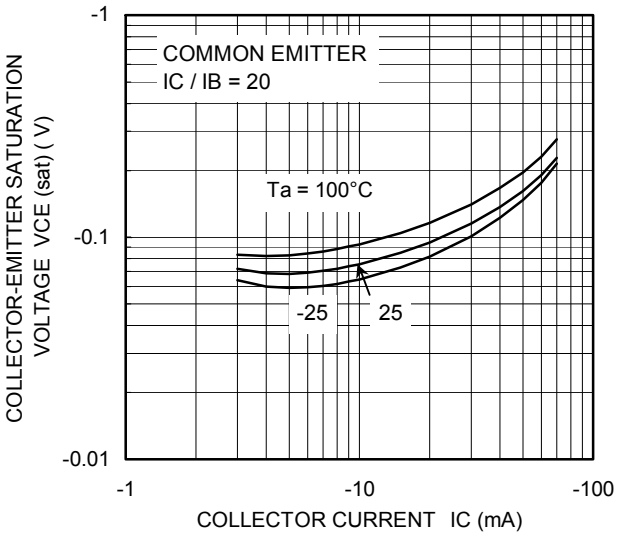


RN2417 VCE(sat) - IC



RN2418 VCE(sat) - IC



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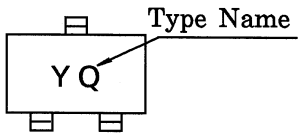
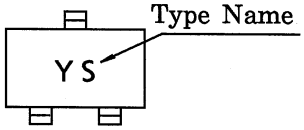
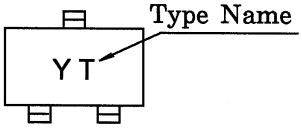
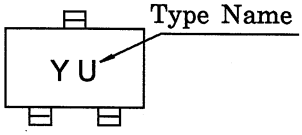
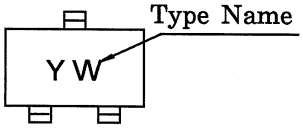
RN2414	
RN2415	
RN2416	
RN2417	
RN2418	

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