Bipolar Transistors Silicon NPN Epitaxial Type (PCT Process)(Bias Resistor built-in Transistor)

RN1114/15/16/17/18

1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

2. Features

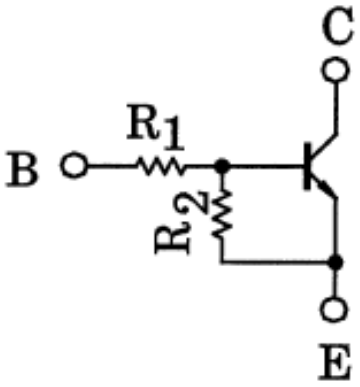
(1) AEC-Q101 qualified (Please see the orderable part number list)

(2) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.

(3) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.

(4) Complementary to RN2114 to RN2118

3. Equivalent Circuit

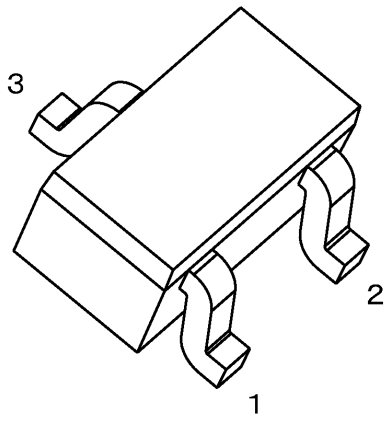


4. Bias Resistor Values

Part No.	R1 (kΩ)	R2 (kΩ)
RN1114	1	10
RN1115	2.2	10
RN1116	4.7	10
RN1117	10	4.7
RN1118	47	10

Start of commercial production
1994-08

5. Packaging and Pin Assignment



1: Base
2: Emitter
3: Collector

SSM

6. Orderable part number

Orderable part number		AEC-Q101	Note	Note	
RN1114	RN1114,LF	—		General Use	
	RN1114,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
RN1115	RN1115,LF	—		General Use	
	RN1115,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1115,LXHF	YES		Automotive Use	
RN1116	RN1116,LF	—		General Use	
	RN1116,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	RN1116,LXHF	YES		Automotive Use	
RN1117	RN1117(TE85L,F)	—		General Use	
	—	YES	(Note 1)	Unintended Use	(Note 1)
RN1118	RN1118(TE85L,F)	—		General Use	
	—	YES	(Note 1)	Unintended Use	(Note 1)

Note 1: For more information, please contact our sales or use the inquiry form on our website.

7. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN1114～RN1118	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	
Emitter-base voltage	RN1114	V_{EBO}	5	V
	RN1115		6	
	RN1116		7	
	RN1117		15	
	RN1118		25	
Collector current	RN1114～RN1118	I_C	100	mA
Collector power dissipation		P_C	100	mW
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	-55 to 150	

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).

8. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1114～RN1118	I_{CBO}	V_{CB} = 50 V, I_E = 0 mA	—	—	100	nA
		I_{CEO}	V_{CE} = 50 V, I_B = 0 mA	—	—	500	
Emitter cut-off current	RN1114	I_{EBO}	V_{EB} = 5 V, I_C = 0 mA	0.35	—	0.65	mA
	RN1115		V_{EB} = 6 V, I_C = 0 mA	0.37	—	0.71	
	RN1116		V_{EB} = 7 V, I_C = 0 mA	0.36	—	0.68	
	RN1117		V_{EB} = 15 V, I_C = 0 mA	0.78	—	1.46	
	RN1118		V_{EB} = 25 V, I_C = 0 mA	0.33	—	0.63	
DC current gain	RN1114 ~ RN1116, RN1118	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	50	—	—	—
	RN1117			30	—	—	
Collector-emitter saturation voltage	RN1114～RN1118	$V_{CE(sat)}$	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1114	$V_{I(ON)}$	V_{CE} = 0.2 V, I_C = 5 mA	0.6	—	2.0	V
	RN1115			0.7	—	2.5	
	RN1116			0.8	—	2.5	
	RN1117			1.5	—	3.5	
	RN1118			2.5	—	10.0	
Input voltage (OFF)	RN1114	$V_{I(OFF)}$	V_{CE} = 5 V, I_C = 0.1 mA	0.3	—	0.9	V
	RN1115			0.3	—	1.0	
	RN1116			0.3	—	1.1	
	RN1117			0.3	—	2.3	
	RN1118			0.5	—	5.7	
Transition frequency	RN1114～RN1118	f_T	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1114～RN1118	C_{ob}	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	3.0	6.0	pF
Input resistance	RN1114	R_1	—	0.7	1.0	1.3	kΩ
	RN1115			1.54	2.2	2.86	
	RN1116			3.29	4.7	6.11	
	RN1117			7.0	10.0	13.0	
	RN1118			32.9	47.0	61.1	
Resistor ratio	RN1114	R1/R2	—	—	0.1	—	—
	RN1115			—	0.22	—	
	RN1116			—	0.47	—	
	RN1117			—	2.13	—	
	RN1118			—	4.7	—	

9. Marking

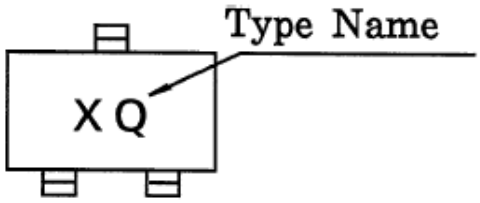


Fig. 9.1 Marking RN1114

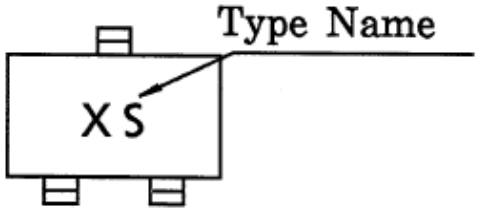


Fig. 9.2 Marking RN1115

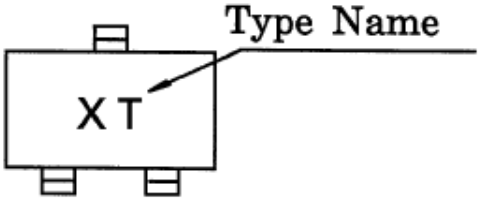


Fig. 9.3 Marking RN1116

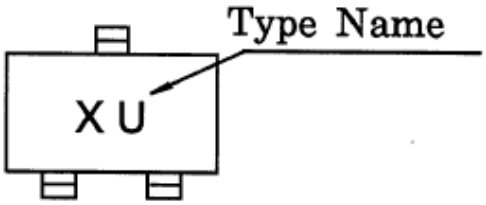


Fig. 9.4 Marking RN1117

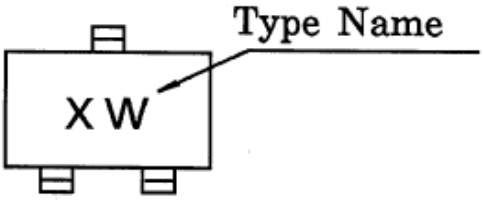


Fig. 9.5 Marking RN1118

10. Characteristics Curves (Note)

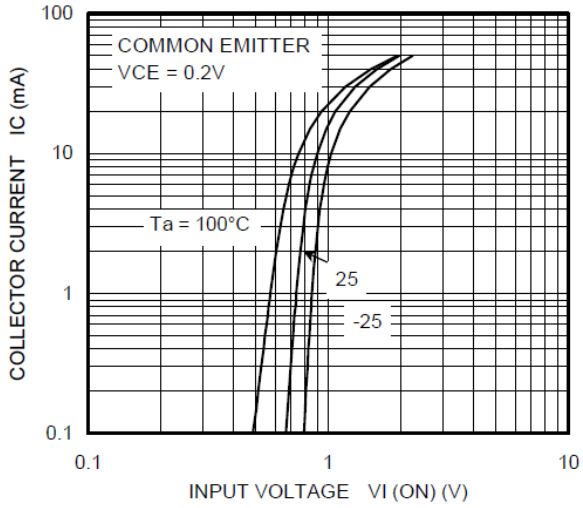


Fig. 10.1 RN1114 I_C-$V_{I(ON)}$

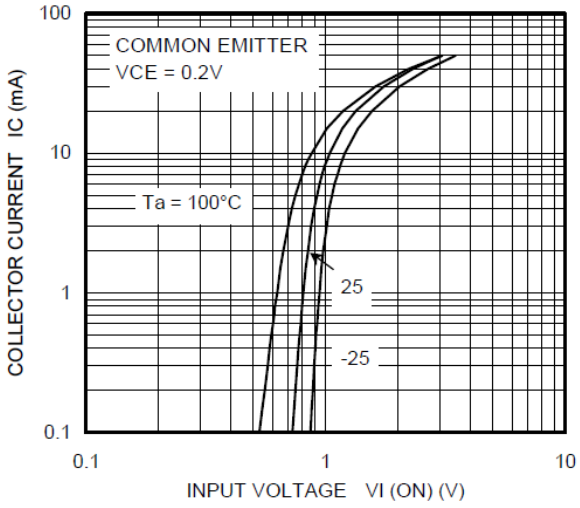


Fig. 10.2 RN1115 I_C-$V_{I(ON)}$

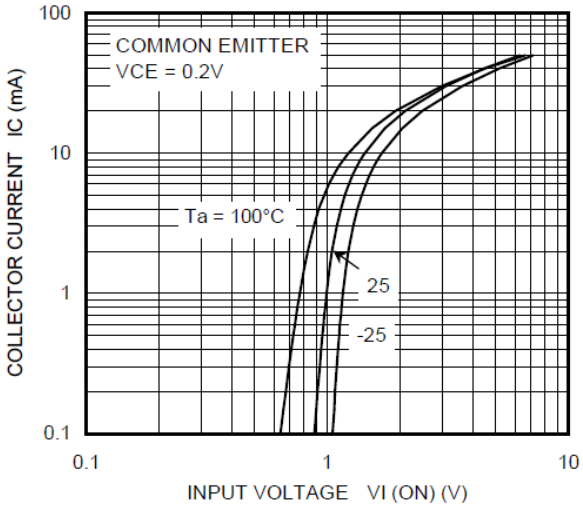


Fig. 10.3 RN1116 I_C-$V_{I(ON)}$

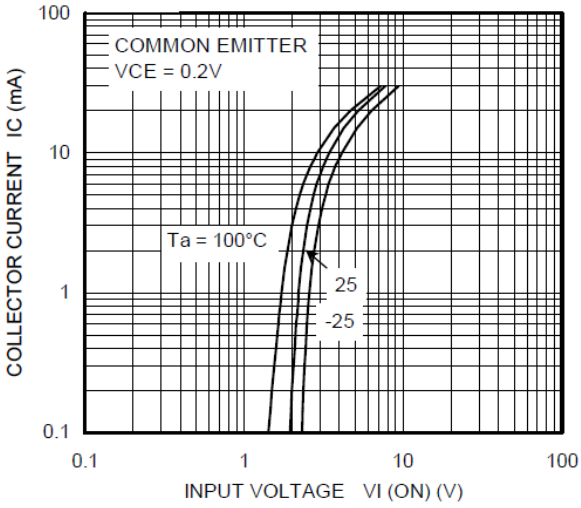


Fig. 10.4 RN1117 I_C-$V_{I(ON)}$

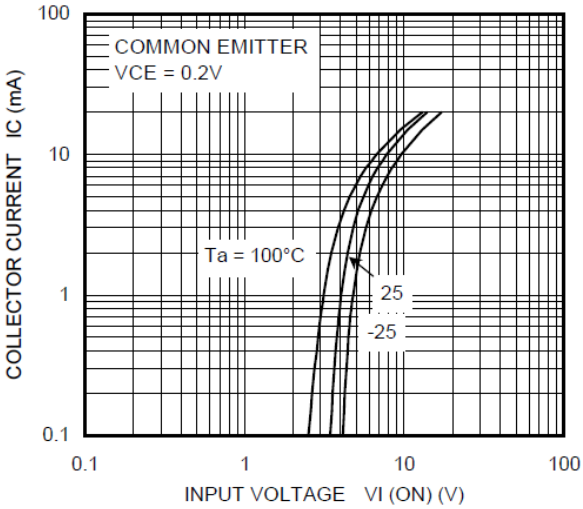


Fig. 10.5 RN1118 I_C-$V_{I(ON)}$

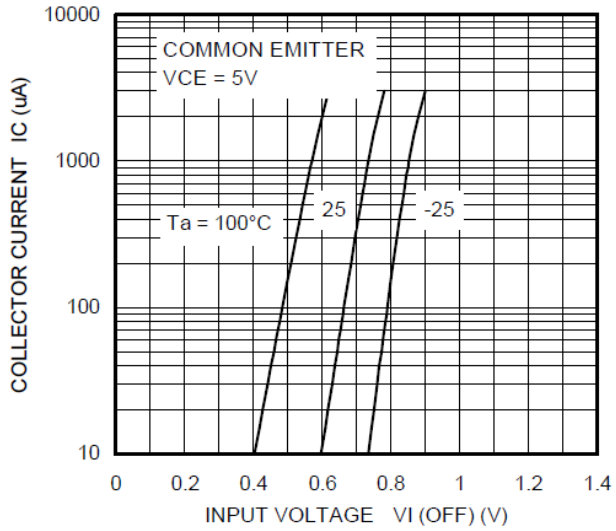


Fig. 10.6 RN1114 I_C-$V_{I(OFF)}$

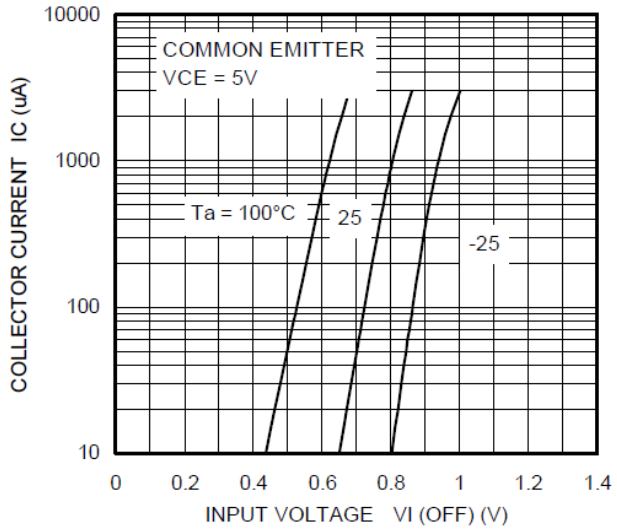


Fig. 10.7 RN1115 I_C-$V_{I(OFF)}$

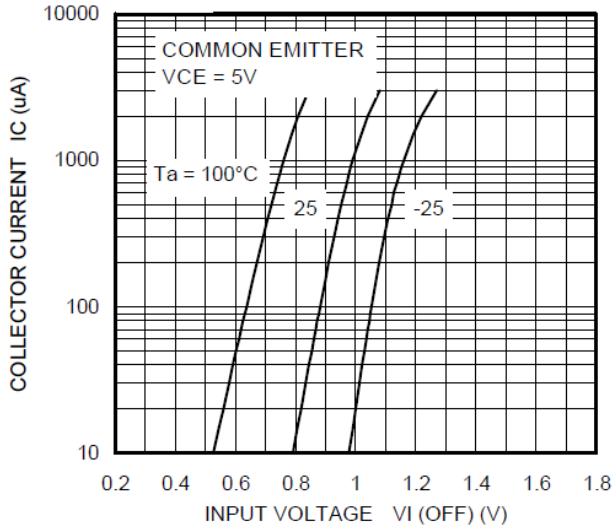


Fig. 10.8 RN1116 I_C-$V_{I(OFF)}$

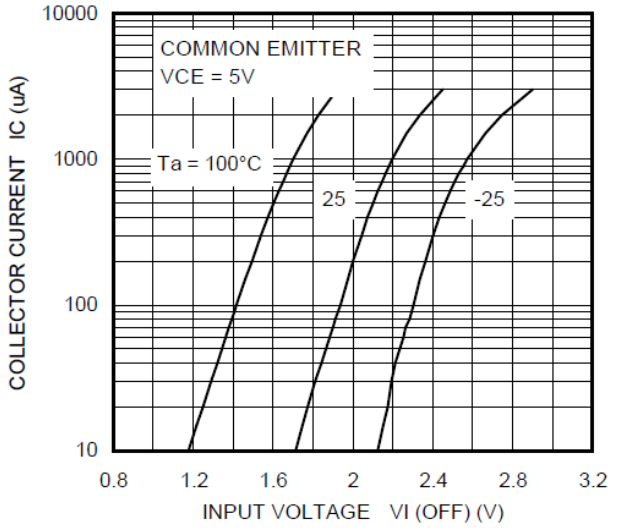


Fig. 10.9 RN1117 I_C-$V_{I(OFF)}$

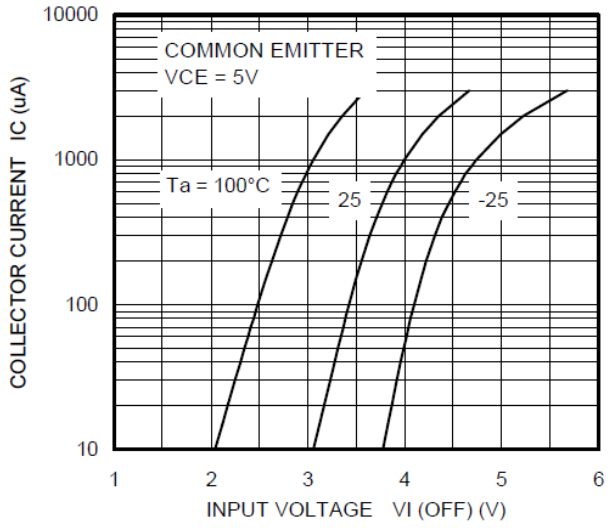


Fig. 10.10 RN1118 I_C-$V_{I(OFF)}$

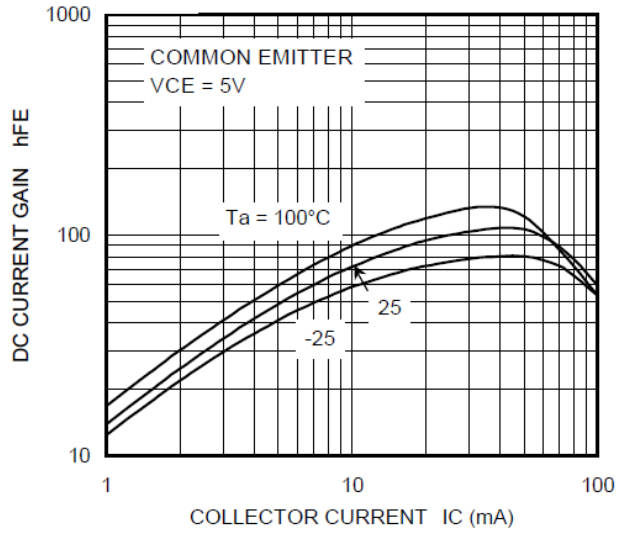


Fig. 10.11 RN1114 h_{FE}-I_C

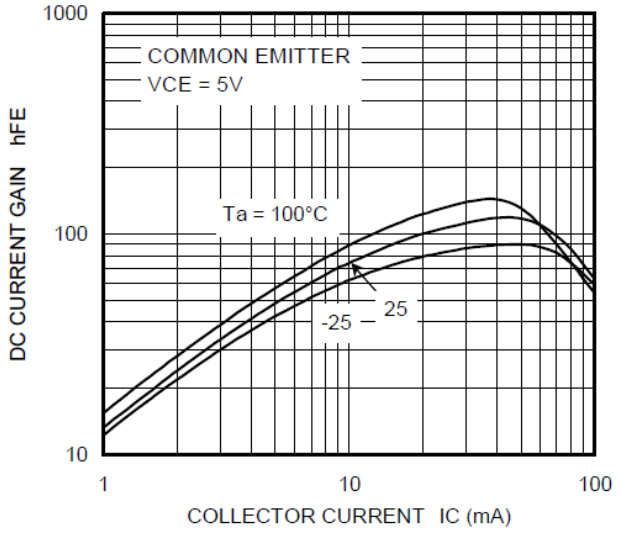


Fig. 10.12 RN1115 h_{FE}-I_C

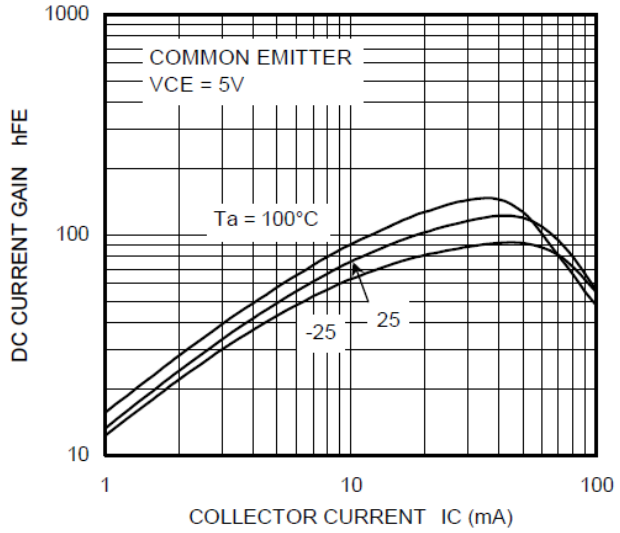


Fig. 10.13 RN1116 h_{FE}-I_C

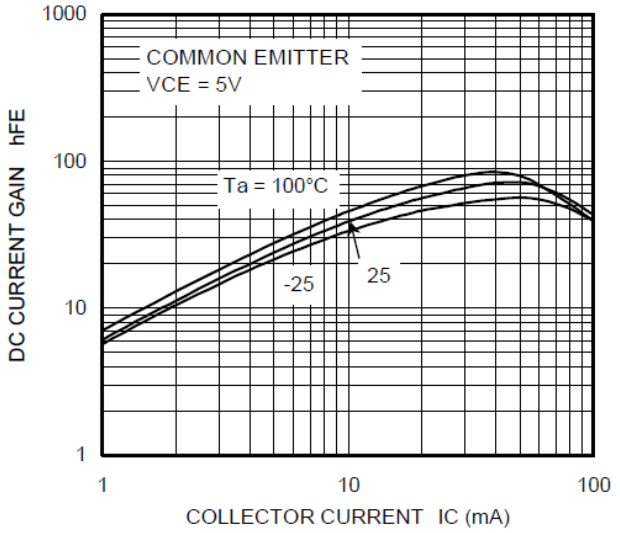


Fig. 10.14 RN1117 h_{FE}-I_C

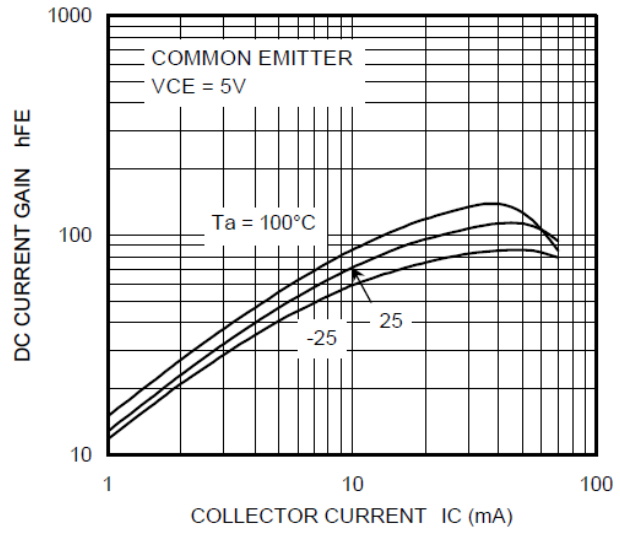


Fig. 10.15 RN1118 h_{FE}-I_C

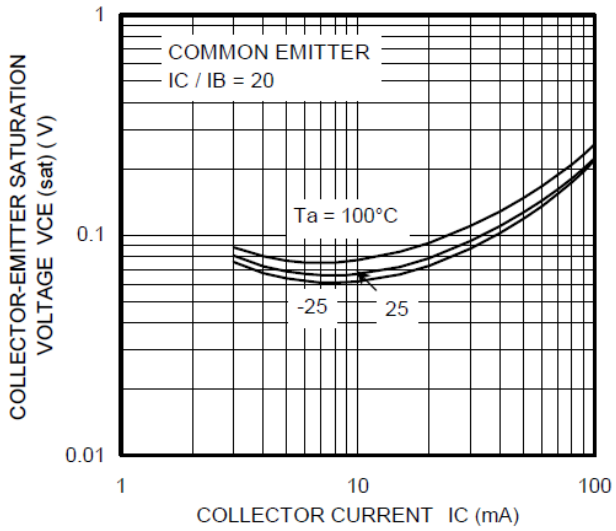


Fig. 10.16 RN1114 $V_{CE(sat)}$-I_C

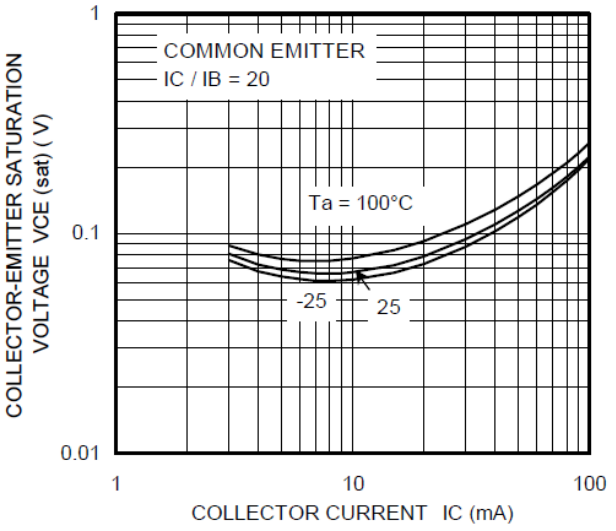


Fig. 10.17 RN1115 $V_{CE(sat)}$-I_C

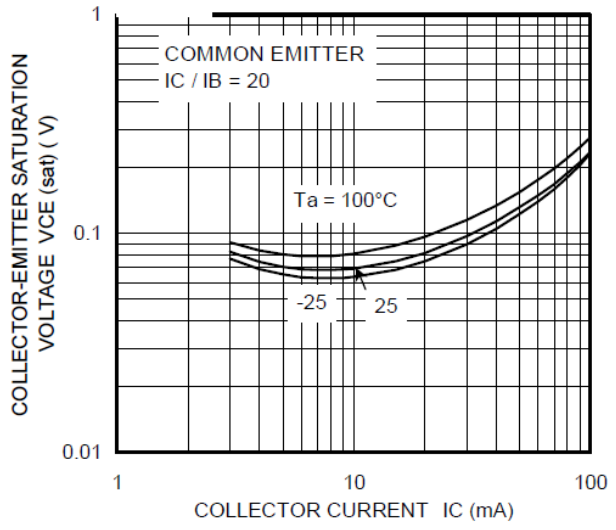


Fig. 10.18 RN1116 $V_{CE(sat)}$-I_C

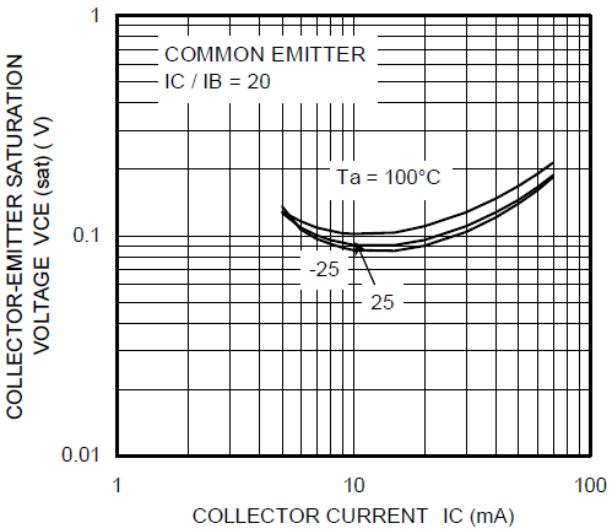


Fig. 10.19 RN1117 $V_{CE(sat)}$-I_C

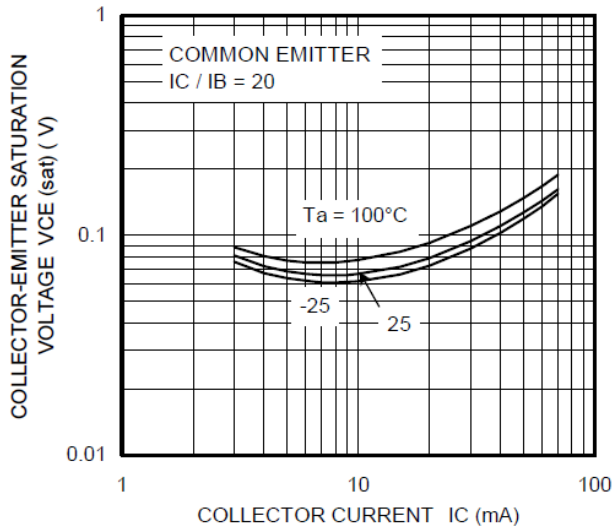
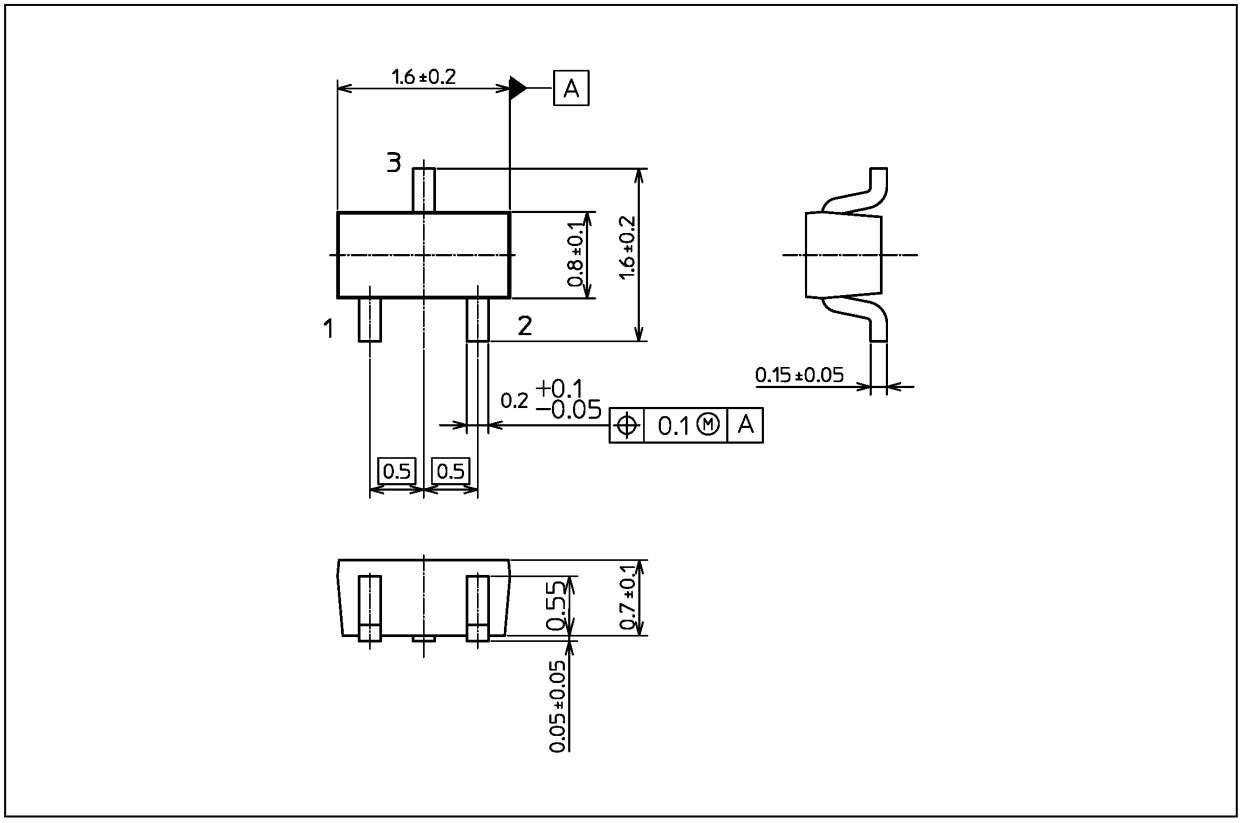


Fig. 10.20 RN1118 $V_{CE(sat)}$-I_C

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 2.4 mg (typ.)

Package Name(s)
TOSHIBA: 2-2H1S
Nickname: SSM

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