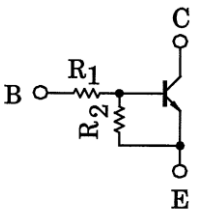
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN1314, RN1315, RN1316
RN1317, RN1318

Switching, Inverter Circuit, Interface Circuit and Driver Circuit

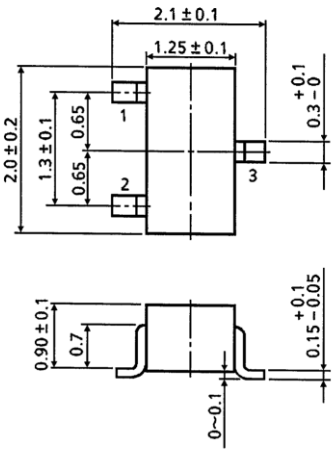
- With built-in bias resistors.
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process and miniaturize equipment.
- Various resistance values are available to suit various circuit designs.
- Complementary to RN2314 to RN2318

Equivalent Circuit and Bias Resistor Values



Part No.	R1 (kΩ)	R2 (kΩ)
RN1314	1	10
RN1315	2.2	10
RN1316	4.7	10
RN1317	10	4.7
RN1318	47	10

Unit: mm



1. BASE
2. EMITTER
3. COLLECTOR

USM

JEDEC	—
JEITA	SC-70
TOSHIBA	2-2E1A

Weight: 0.006g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1314 to RN1318	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1314	V_{EBO}	5	V
	RN1315		6	
	RN1316		7	
	RN1317		15	
	RN1318		25	
Collector current	RN1314 to RN1318	I_C	100	mA
Collector power dissipation		P_C	100	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

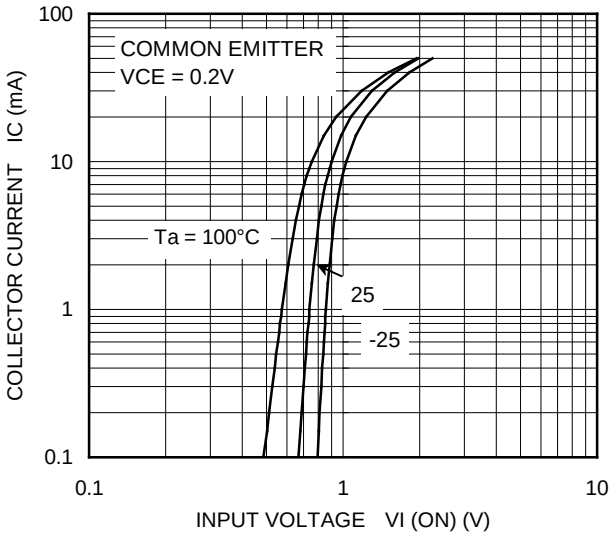
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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
2002-11

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1314 to 1318	I_{CBO}	—	V_{CB} = 50 V, I_E = 0 mA	—	—	100	nA
	RN1314 to 1318	I_{CEO}		V_{CE} = 50 V, I_B = 0 mA	—	—	500	nA
Emitter cut-off current	RN1314	I_{EBO}	—	V_{EB} = 5 V, I_C = 0 mA	0.35	—	0.65	mA
	RN1315			V_{EB} = 6 V, I_C = 0 mA	0.37	—	0.71	
	RN1316			V_{EB} = 7 V, I_C = 0 mA	0.36	—	0.68	
	RN1317			V_{EB} = 15 V, I_C = 0 mA	0.78	—	1.46	
	RN1318			V_{EB} = 25 V, I_C = 0 mA	0.33	—	0.63	
DC current gain	RN1314 to 16,18	h_{FE}	—	V_{CE} = 5 V, I_C = 10 mA	50	—	—	—
	RN1317				30	—	—	
Collector-emitter saturation voltage	RN1314 to 1318	$V_{CE\ (sat)}$	—	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1314	$V_{I\ (ON)}$	—	V_{CE} = 0.2 V, I_C = 5 mA	0.6	—	2.0	V
	RN1315				0.7	—	2.5	
	RN1316				0.8	—	2.5	
	RN1317				1.5	—	3.5	
	RN1318				2.5	—	10.0	
Input voltage (OFF)	RN1314	$V_{I\ (OFF)}$	—	V_{CE} = 5 V, I_C = 0.1 mA	0.3	—	0.9	V
	RN1315				0.3	—	1.0	
	RN1316				0.3	—	1.1	
	RN1317				0.3	—	2.3	
	RN1318				0.5	—	5.7	
Transition frequency	RN1314 to 1318	f_T	—	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector Output capacitance	RN1314 to 1318	C_{ob}	—	V_{CB} = 10 V, I_E = 0 mA, f = 1 MHz	—	3.0	6.0	pF
Input resistor	RN1314	R_1	—	—	0.7	1.0	1.3	kΩ
	RN1315				1.54	2.2	2.86	
	RN1316				3.29	4.7	6.11	
	RN1317				7.0	10.0	13.0	
	RN1318				32.9	47.0	61.1	
Resistor ratio	RN1314	R_1/R_2	—	—	—	0.1	—	—
	RN1315				—	0.22	—	
	RN1316				—	0.47	—	
	RN1317				—	2.13	—	
	RN1318				—	4.7	—	

RN1314 IC - VI (ON)



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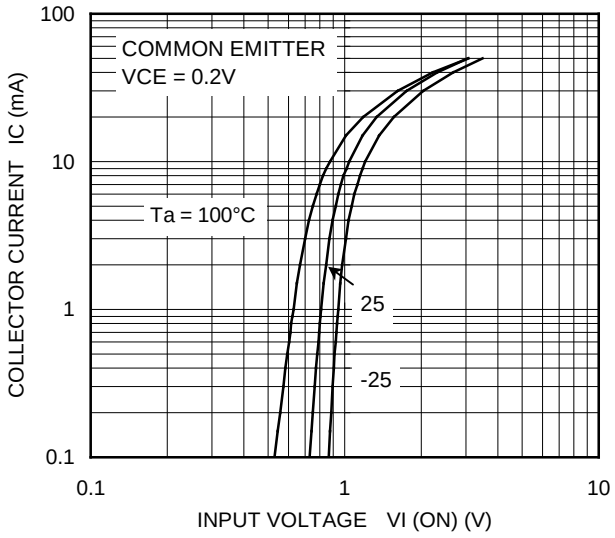

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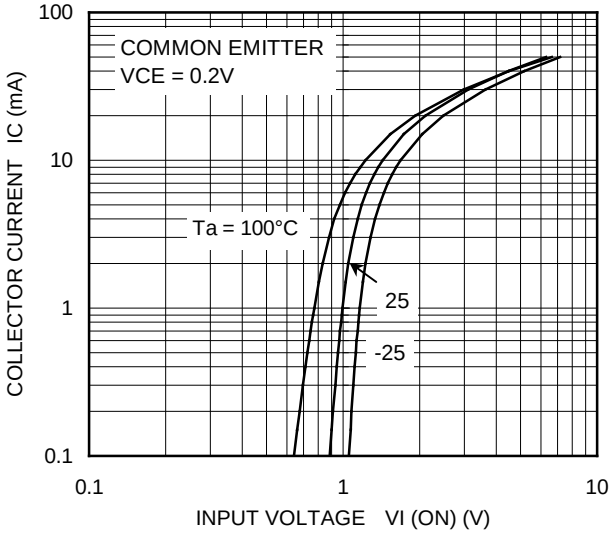

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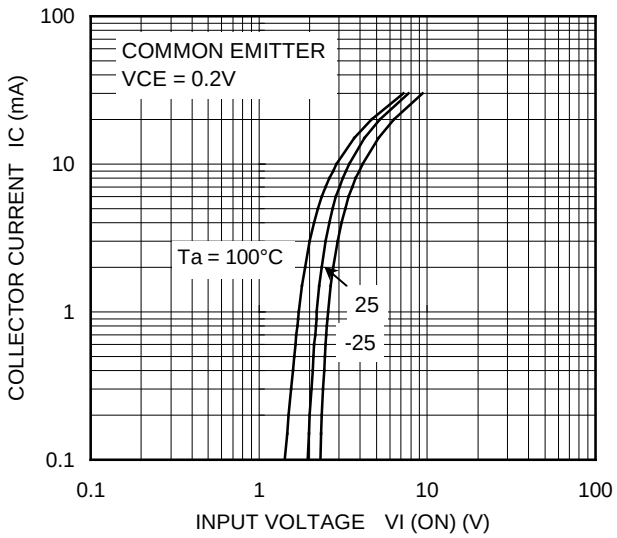

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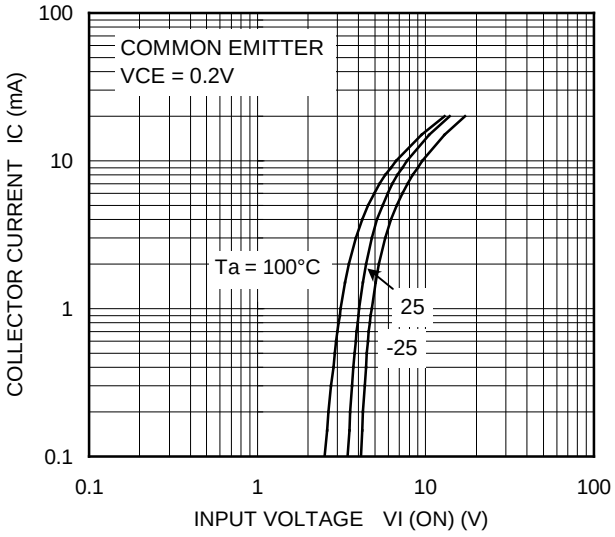

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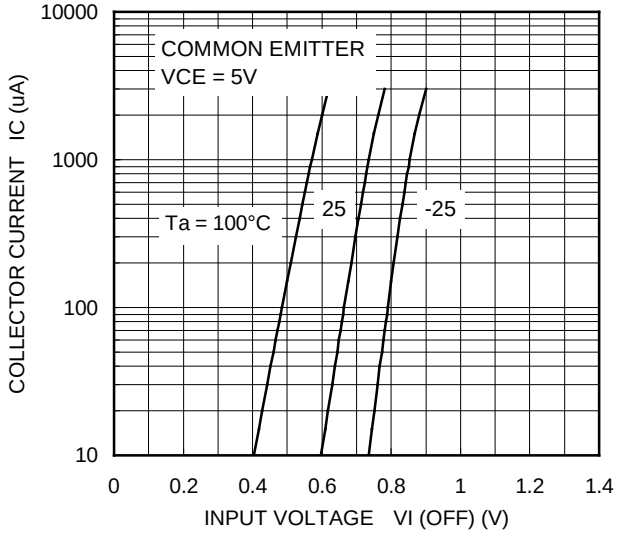

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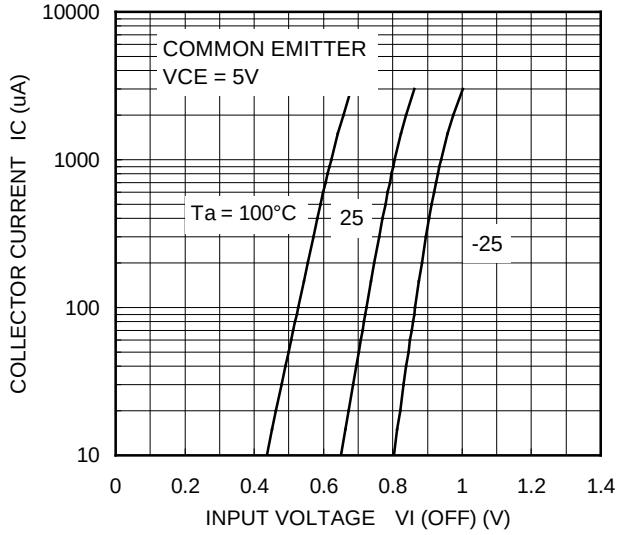

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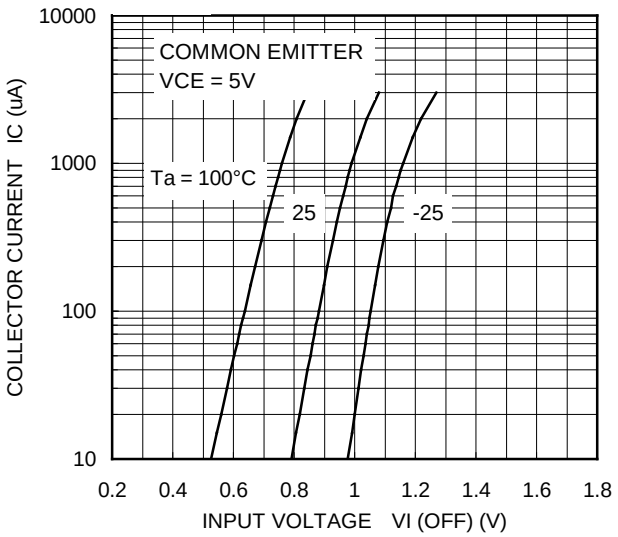

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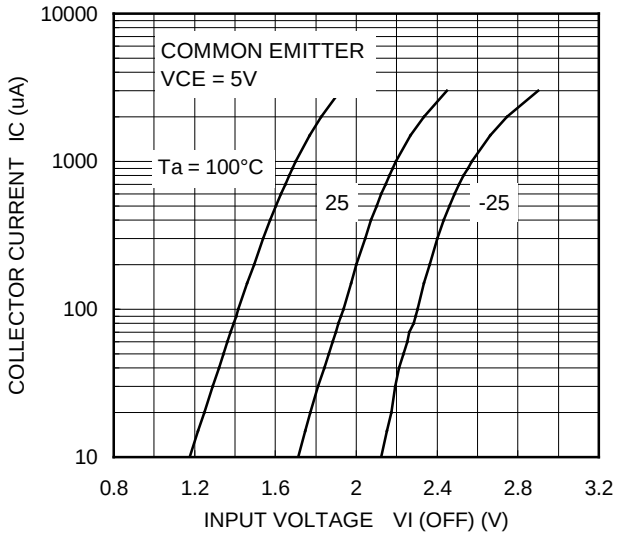

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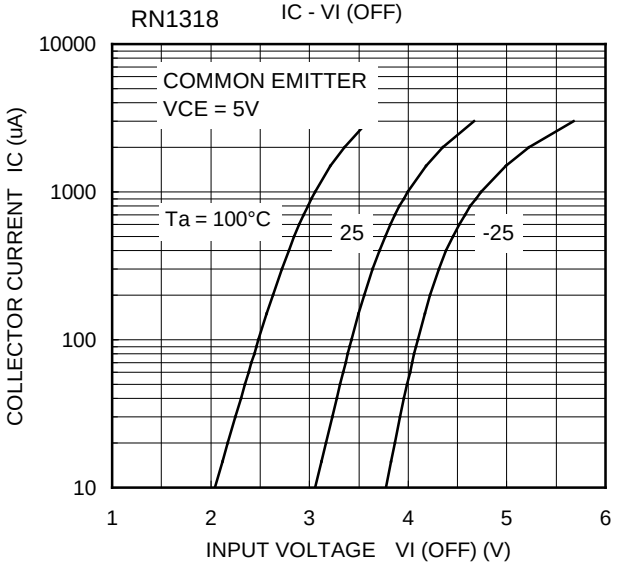

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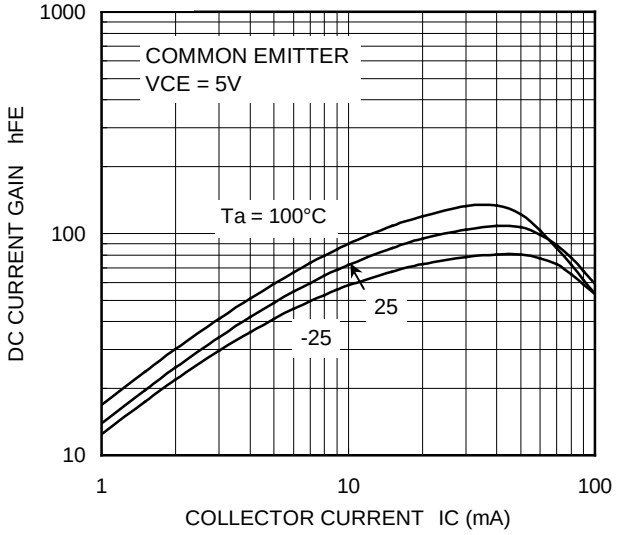
RN1314 hFE - IC



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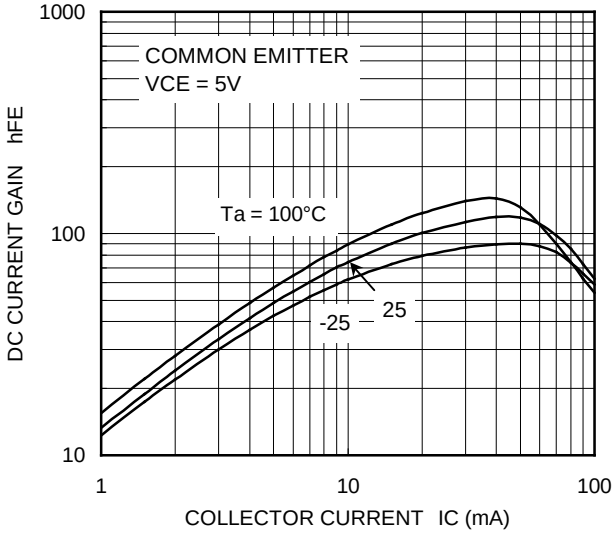

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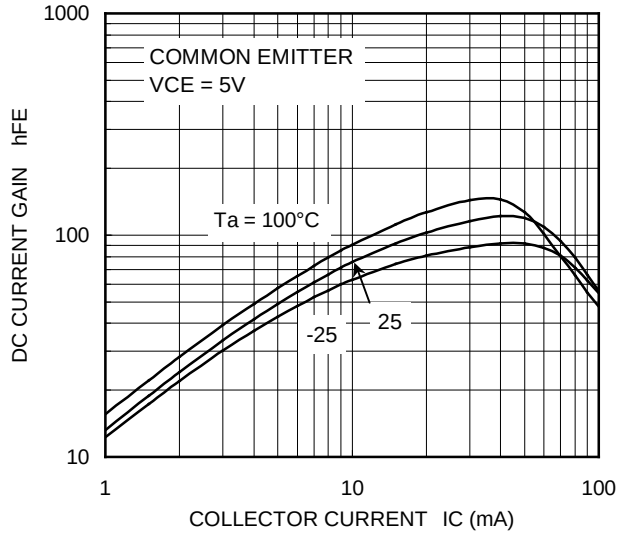

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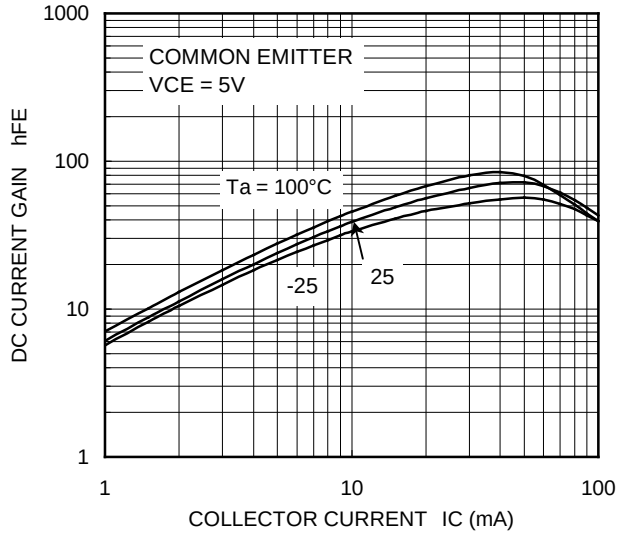

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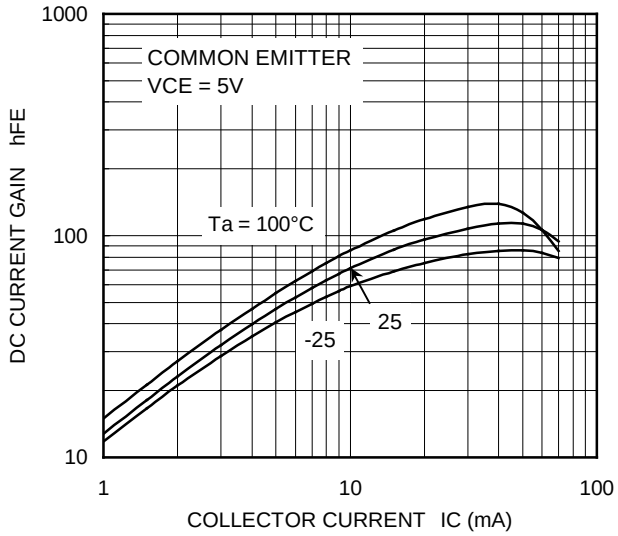

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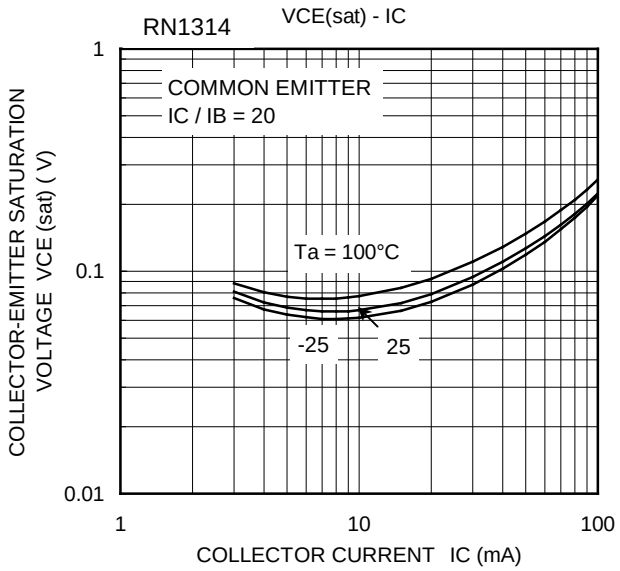

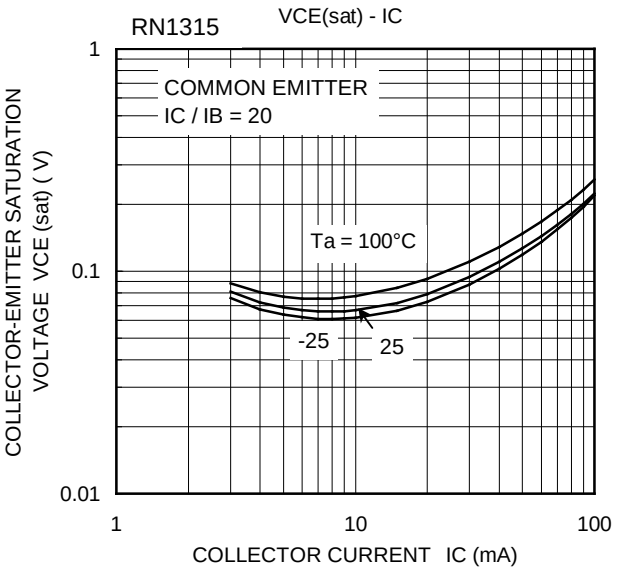

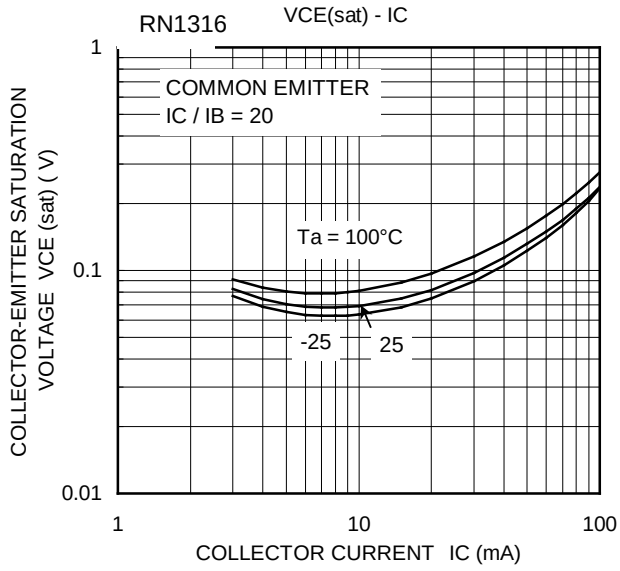

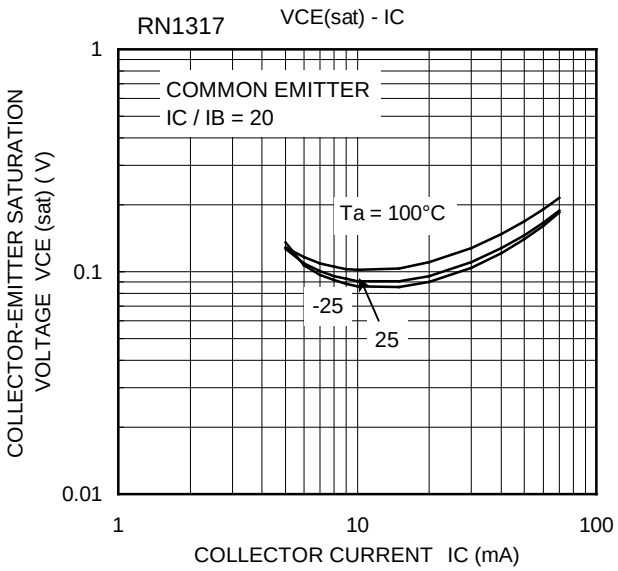

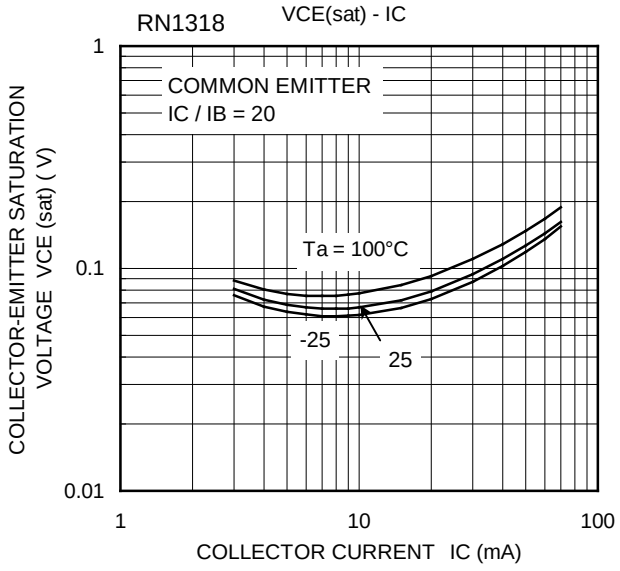

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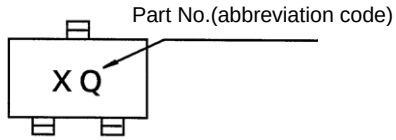
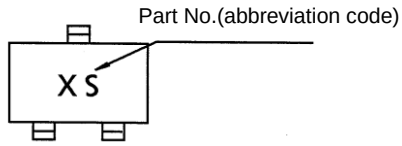
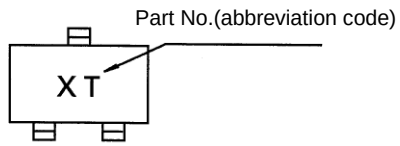
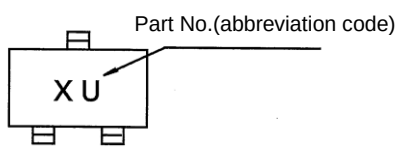
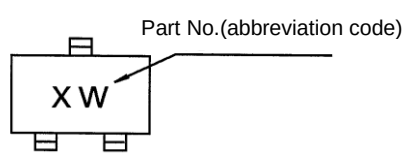
Marking

Part No.	Marking
RN1314	
RN1315	
RN1316	
RN1317	
RN1318	

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