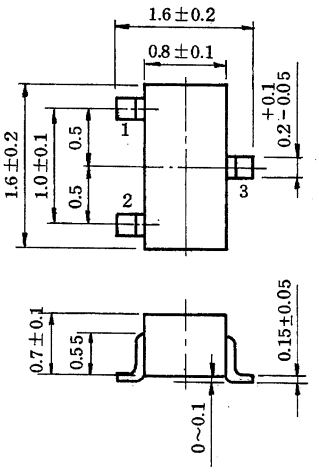
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

RN1107, RN1108, RN1109

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- With built-in bias resistors.
- Simplified circuit design
- Reduced number of parts and simplified manufacturing process
- Complementary to RN2107~2109

Unit: mm

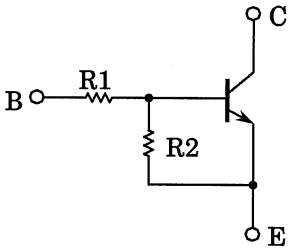


1. BASE
2. EMITTER
3. COLLECTOR

SSM	
JEDEC	—
EIAJ	—
TOSHIBA	2-2H1A

Weight: 2.4mg

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1107	10	47
RN1108	22	47
RN1109	47	22

Absolute Maximum Ratings (Ta = 25°C)

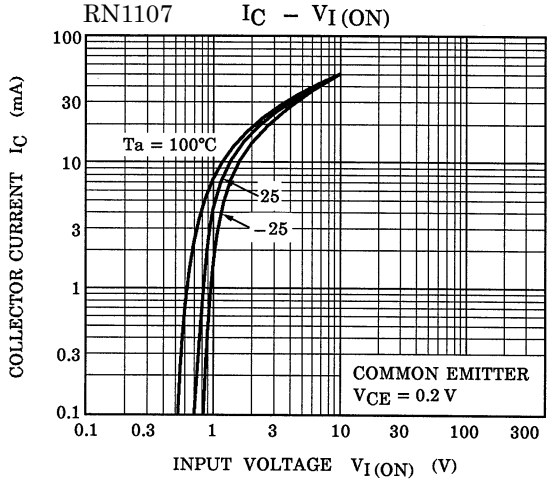
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1107~1109	V_{CBO}	50	V
Collector-emitter voltage	RN1107~1109	V_{CEO}	50	V
Emitter-base voltage	RN1107	V_{EBO}	6	V
	RN1108		7	
	RN1109		15	
Collector current	RN1107~1109	I_C	100	mA
Collector power dissipation	RN1107~1109	P_C	100	mW
Junction temperature	RN1107~1109	T_j	150	°C
Storage temperature range	RN1107~1109	T_{stg}	−55~150	°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).

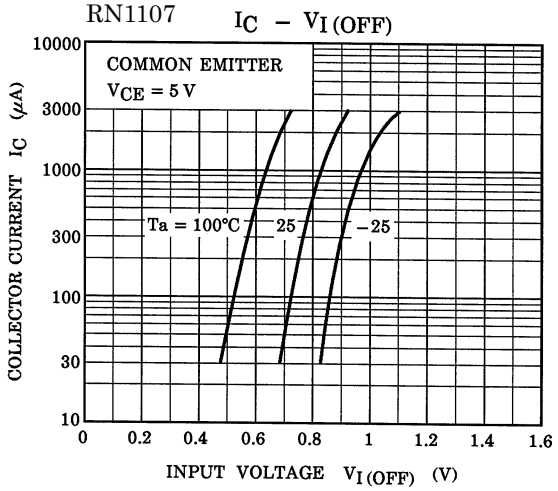
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut off current	RN1107~1109	I_{CBO}	—	V_{CB} = 50 V, I_E = 0	—	—	100	nA
		I_{CEO}	—	V_{CE} = 50 V, I_B = 0	—	—	500	nA
Emitter cut-off current	RN1107	I_{EBO}	—	V_{EB} = 6 V, I_C = 0	0.081	—	0.15	mA
	RN1108		—	V_{EB} = 7 V, I_C = 0	0.078	—	0.145	
	RN1109		—	V_{EB} = 15 V, I_C = 0	0.167	—	0.311	
DC current gain	RN1107	h_{FE}	—	V_{CE} = 5 V, I_C = 10 mA	80	—	—	—
	RN1108		—		80	—	—	
	RN1109		—		70	—	—	
Collector-emitter saturation voltage	RN1107~1109	$V_{CE\ (sat)}$	—	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1107	$V_{I\ (ON)}$	—	V_{CE} = 0.2 V, I_C = 5 mA	0.7	—	1.8	V
	RN1108		—		1.0	—	2.6	
	RN1109		—		2.2	—	5.8	
Input voltage (OFF)	RN1107	$V_{I\ (OFF)}$	—	V_{CE} = 5 V, I_C = 0.1 mA	0.5	—	1.0	V
	RN1108		—		0.6	—	1.16	
	RN1109		—		1.5	—	2.6	
Translation frequency	RN1107~1109	f_T	—	V_{CE} =10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1107~1109	C_{ob}	—	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input Resistor	RN1107	R1	—	—	7	10	13	kΩ
	RN1108		—		15.4	22	28.6	
	RN1109		—		32.9	47	61.1	
Resistor Ratio	RN1107	R1/R2	—	—	0.191	0.213	0.232	—
	RN1108		—		0.421	0.468	0.515	
	RN1109		—		1.92	2.14	2.35	

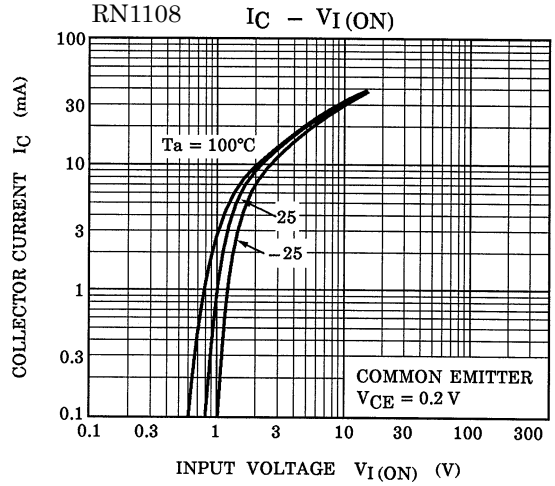
RN1107 I_C – $V_{I(ON)}$



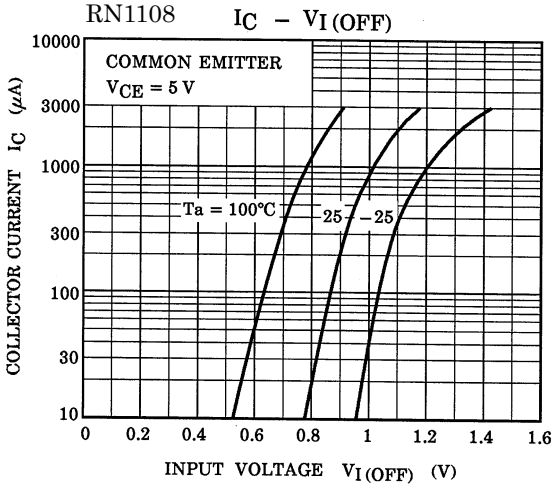
RN1107 I_C – $V_{I(OFF)}$



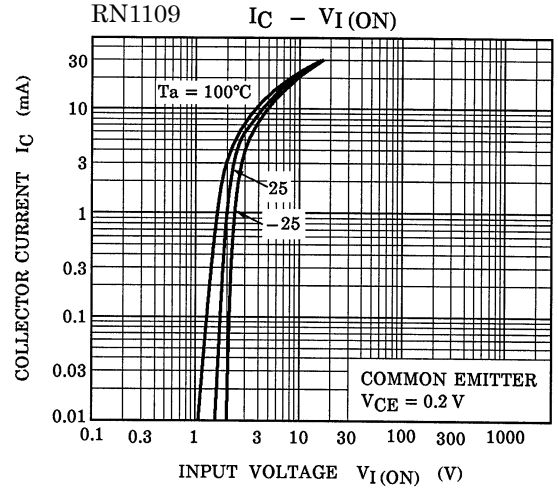
RN1108 I_C – $V_{I(ON)}$



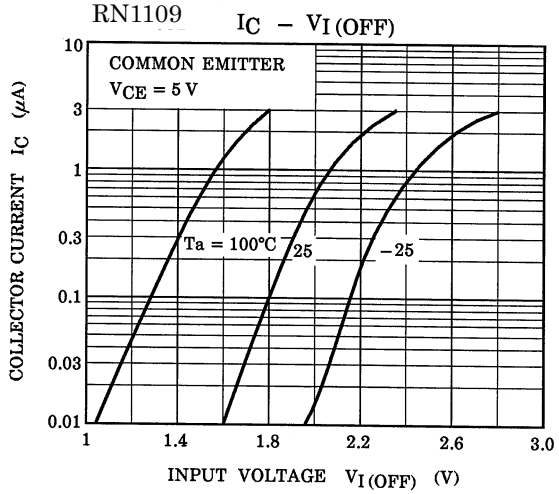
RN1108 I_C – $V_{I(OFF)}$



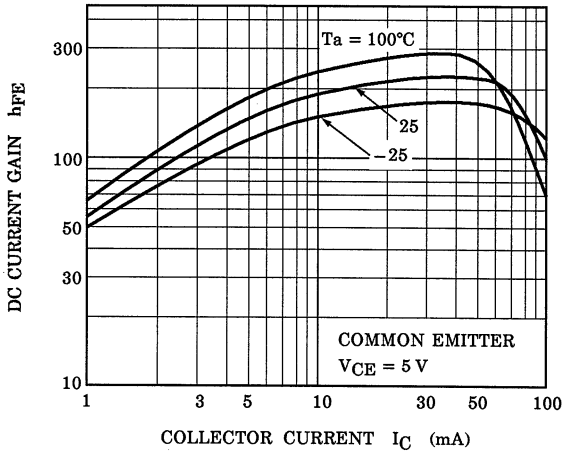
RN1109 I_C – $V_{I(ON)}$



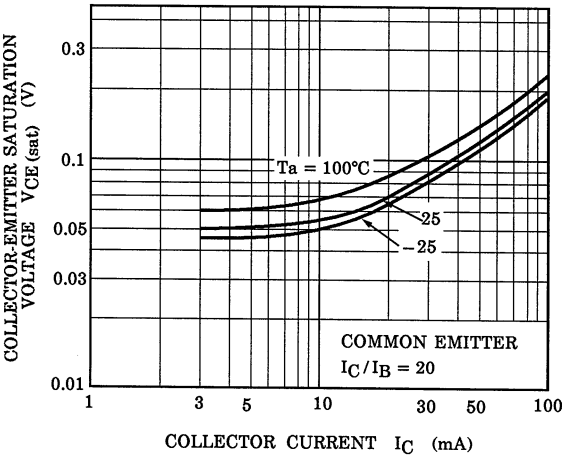
RN1109 I_C – $V_{I(OFF)}$



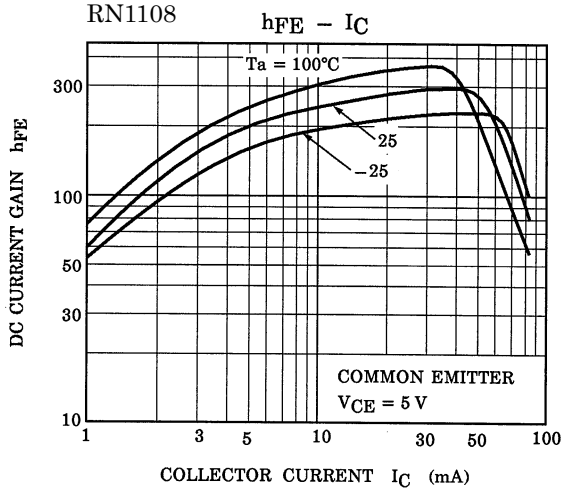
RN1107 h_{FE} – I_C



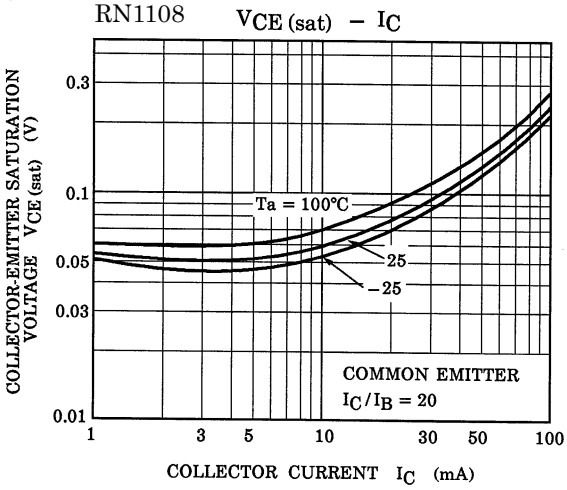
RN1107 $V_{CE\,(sat)}$ – I_C



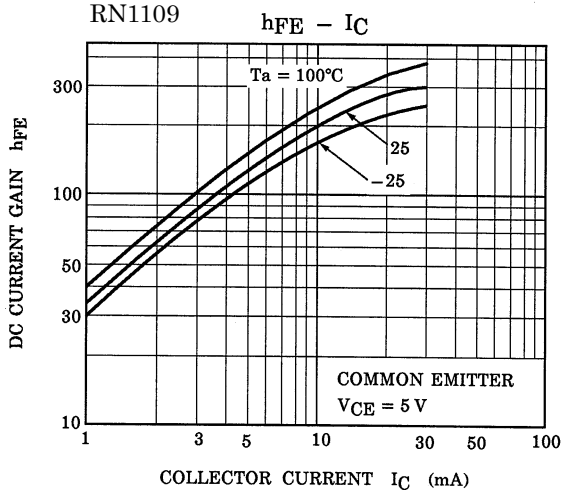
RN1108 h_{FE} – I_C



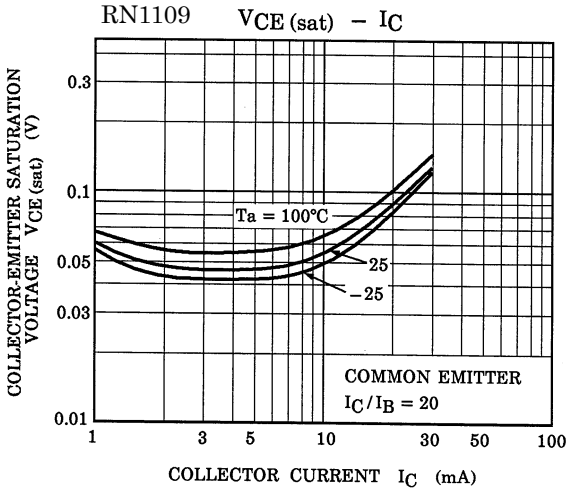
RN1108 $V_{CE\,(sat)}$ – I_C

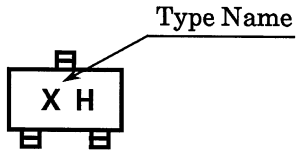
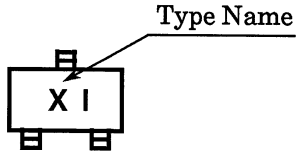
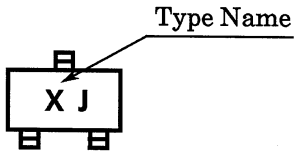


RN1109 h_{FE} – I_C



RN1109 $V_{CE\,(sat)}$ – I_C



Type Name	Marking
RN1107	
RN1108	
RN1109	

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.).These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in his document shall be made at the customer’s own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.