

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

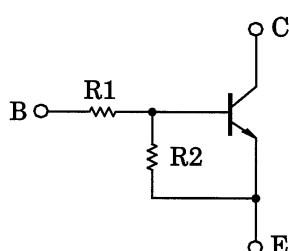
# RN1407, RN1408, RN1409

Switching, Inverter Circuit, Interface Circuit  
and Driver Circuit Applications

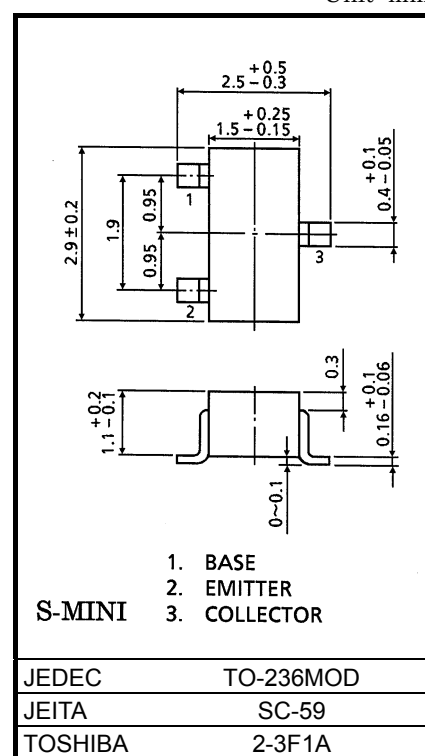
Unit: mm

- With built-in bias resistors
- Simplified circuit design
- Reduce a quantity of parts and manufacturing process
- Complementary to RN2407~RN2409

## Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1407	10	47
RN1408	22	47
RN1409	47	22



Weight: 0.012g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

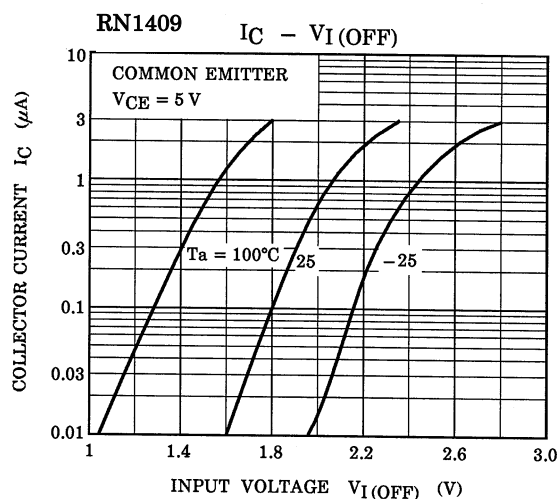
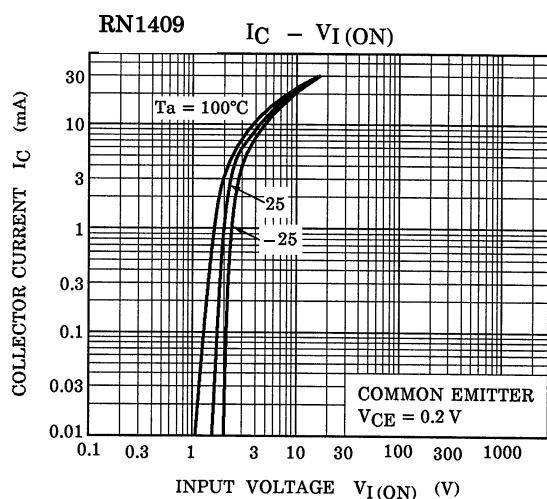
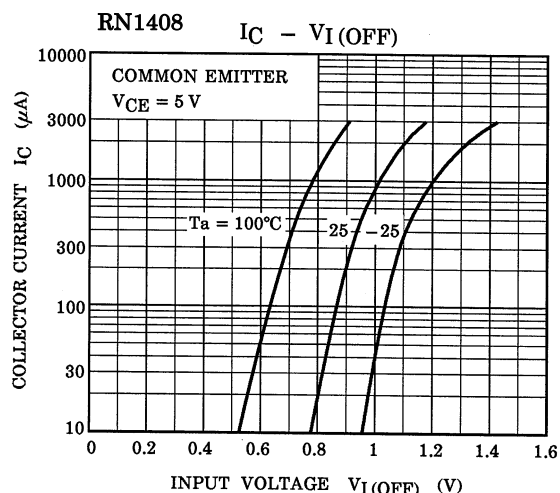
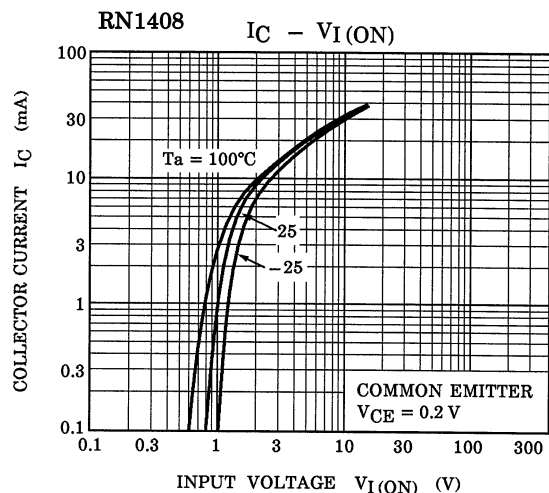
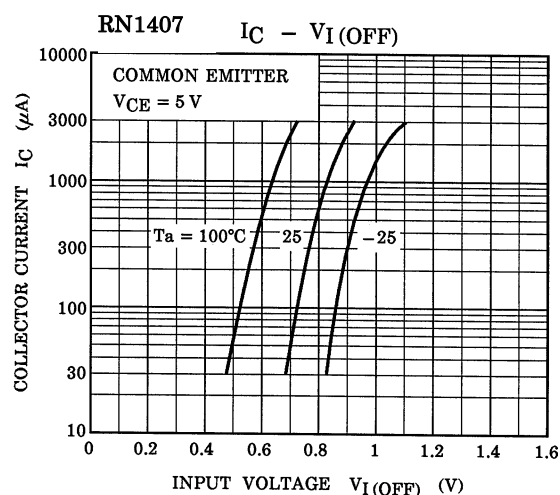
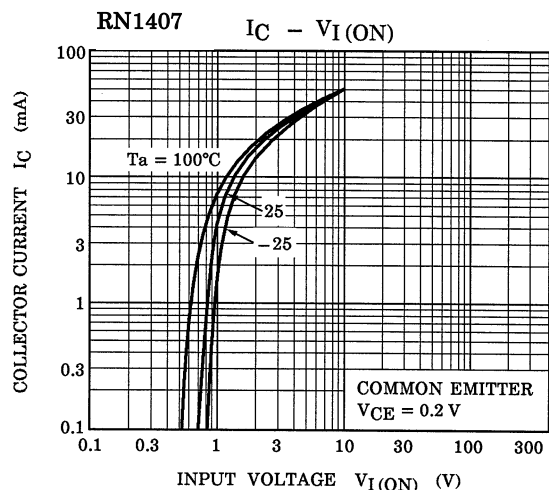
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1407~RN1409	$V_{CBO}$	50	V
Collector-emitter voltage	RN1407~RN1409	$V_{CEO}$	50	V
Emitter-base voltage	RN1407	$V_{EBO}$	6	V
	RN1408		7	
	RN1409		15	
Collector current	RN1407~RN1409	$I_C$	100	mA
Collector power dissipation	RN1407~RN1409	$P_C$	200	mW
Junction temperature	RN1407~RN1409	$T_j$	150	°C
Storage temperature range	RN1407~RN1409	$T_{stg}$	-55~150	°C

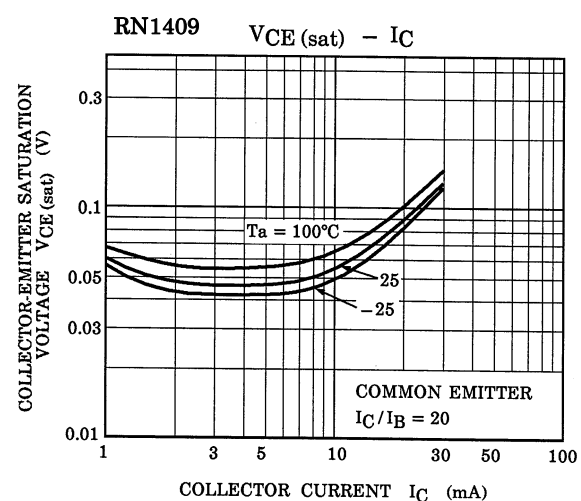
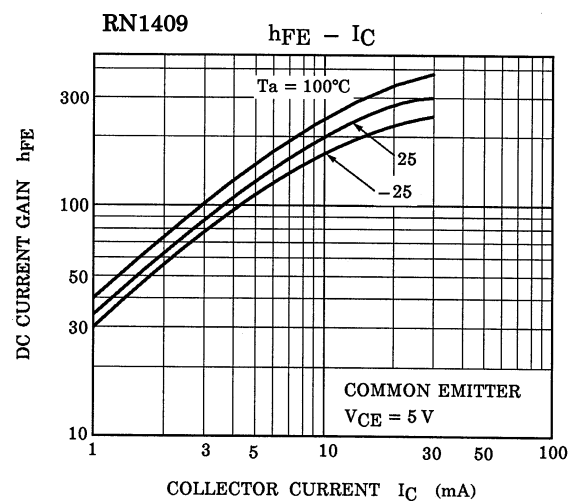
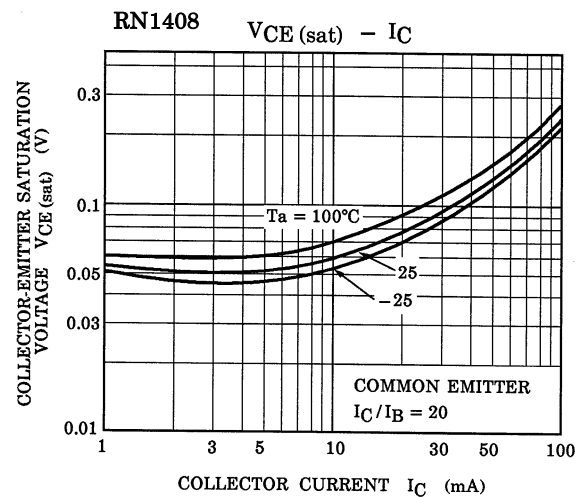
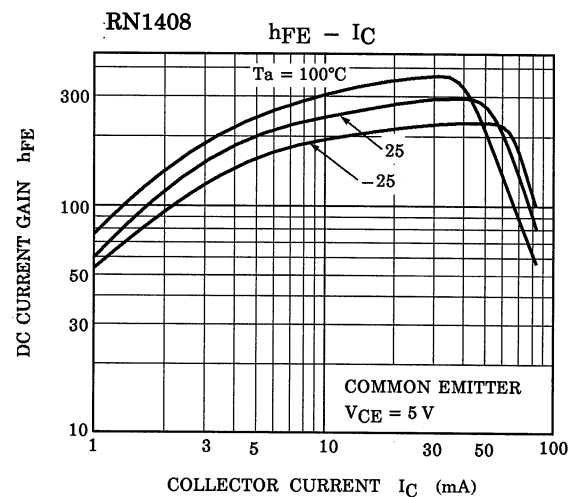
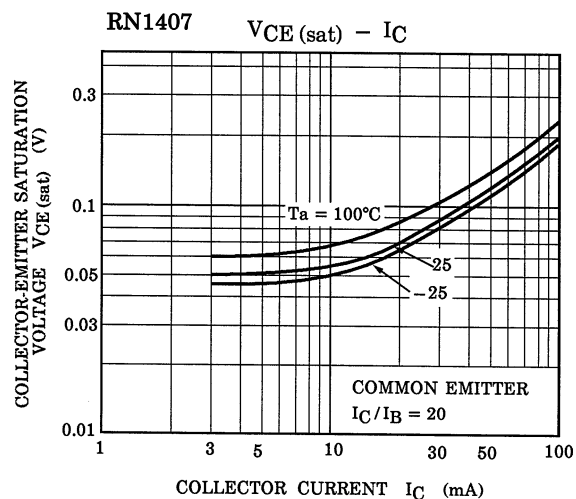
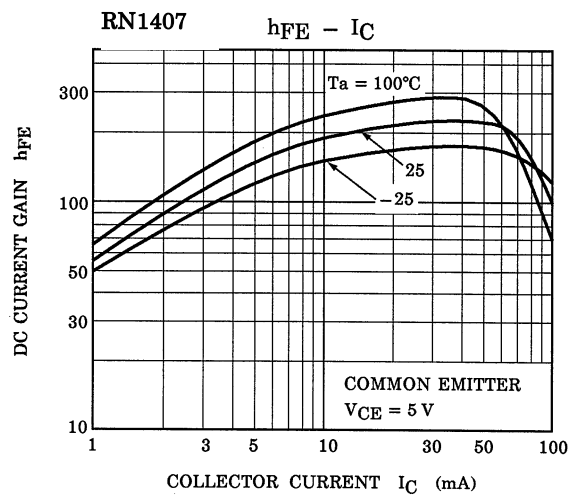
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

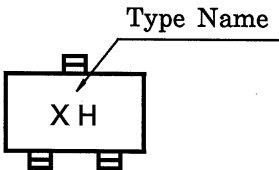
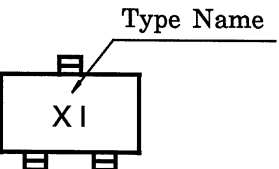
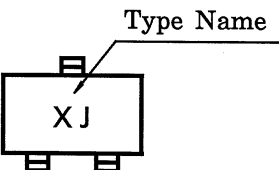
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

**Electrical Characteristics (Ta = 25°C)**

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1407~1409	$I_{CBO}$	—	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
		$I_{CEO}$		$V_{CE} = 50\text{ V}, I_B = 0$	—	—	500	
Emitter cut-off current	RN1407	$I_{EBO}$	—	$V_{EB} = 6\text{ V}, I_C = 0$	0.081	—	0.15	mA
	RN1408			$V_{EB} = 7\text{ V}, I_C = 0$	0.078	—	0.145	
	RN1409			$V_{EB} = 15\text{ V}, I_C = 0$	0.167	—	0.311	
DC current gain	RN1407	$h_{FE}$	—	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	80	—	—	—
	RN1408				80	—	—	
	RN1409				70	—	—	
Collector-emitter saturation voltage	RN1407~1409	$V_{CE(sat)}$	—	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	RN1407	$V_I(\text{ON})$	—	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	0.7	—	1.8	V
	RN1408				1.0	—	2.6	
	RN1409				2.2	—	5.8	
Input voltage (OFF)	RN1407	$V_I(\text{OFF})$	—	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	0.5	—	1.0	V
	RN1408				0.6	—	1.16	
	RN1409				1.5	—	2.6	
Transition frequency	RN1407~1409	$f_T$	—	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector Output capacitance	RN1407~1409	$C_{ob}$	—	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN1407	R1	—	—	7	10	13	kΩ
	RN1408				15.4	22	28.6	
	RN1409				32.9	47	61.1	
Resistor ratio	RN1407	R1/R2	—	—	0.191	0.213	0.232	—
	RN1408				0.421	0.468	0.515	
	RN1409				1.92	2.14	2.35	





Type No.	Marking
RN1407	
RN1408	
RN1409	

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