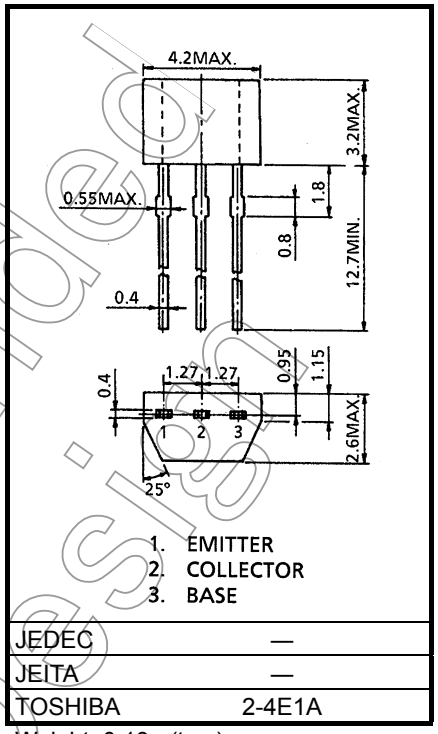
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process)

RN2221,RN2222,RN2223
RN2224,RN2225,RN2226,RN2227

Unit: mm

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

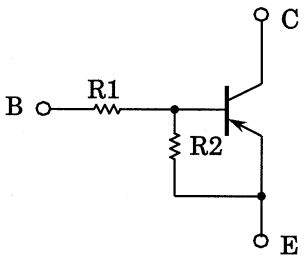
- High current type ($I_{C(MAX)}$ = −800mA)
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Low $V_{CE\ (sat)}$
- Complementary to RN1221~RN1227



JEDEC	—
JEITA	—
TOSHIBA	2-4E1A

Weight: 0.13g (typ.)

Equivalent Circuit



Bias Resistor Values

Type No.	R1 (kΩ)	R2 (kΩ)
RN2221	1	1
RN2222	2.2	2.2
RN2223	4.7	4.7
RN2224	10	10
RN2225	0.47	10
RN2226	1	10
RN2227	2.2	10

Absolute Maximum Ratings (Ta = 25°C)

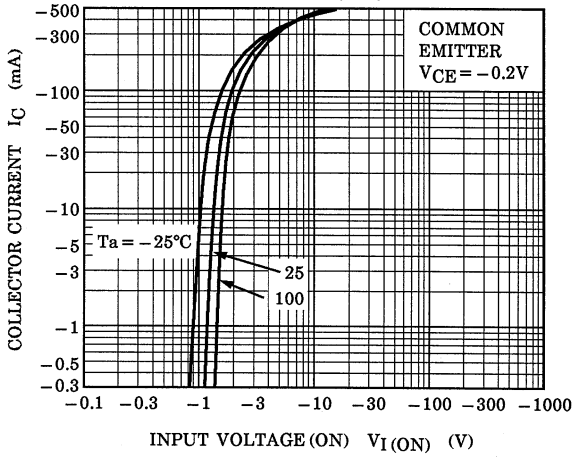
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2221~2227	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2221~2224	V_{EBO}	−10	V
	RN2225, 2226		−5	
	RN2227		−6	
Collector current	RN2221~2227	I_C	−800	mA
Collector power dissipation		P_C	300	mW
Junction temperature		T_j	150	°C
Storage temperature range		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).

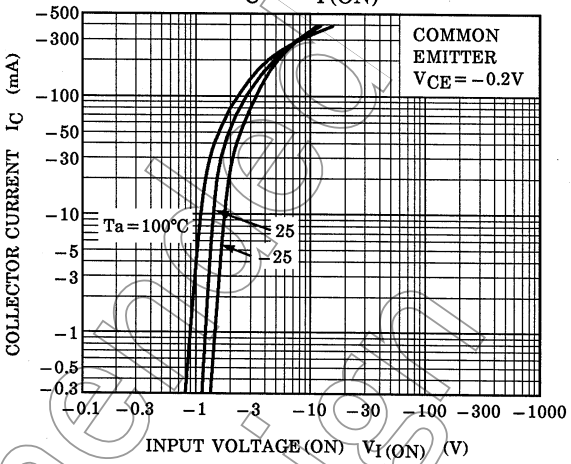
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2221~2227	—	—	V_{CB} = −50V, I_E = 0	—	—	−100	nA
		—	—	V_{CE} = −50V, I_B = 0	—	—	−500	
Emitter cut-off current	RN2221	I_{EBO}	—	V_{EB} = −10V, I_E = 0	−3.85	—	−7.14	mA
	RN2222		—		−1.75	—	−3.25	
	RN2223		—		−0.82	—	−1.52	
	RN2224		—		−0.38	—	−0.71	
	RN2225		—	V_{EB} = −5V, I_C = 0	−0.365	—	−0.682	
	RN2226		—		−0.35	—	−0.65	
	RN2227		—	V_{EB} = −6V, I_C = 0	−0.378	—	−0.703	
DC current gain	RN2221	h_{FE}	—	V_{CE} = −1V, I_C = −100mA	60	—	—	—
	RN2222		—		65	—	—	
	RN2223		—		70	—	—	
	RN2224		—		90	—	—	
	RN2225		—		90	—	—	
	RN2226		—		90	—	—	
	RN2227		—		90	—	—	
Collector-emitter saturation voltage	RN2221	$V_{CE\ (sat)}$	—	I_C = −50mA, I_B = −2mA	—	—	−0.25	V
	RN2222~2227			I_C = −50mA, I_B = −1mA				
Input voltage (ON)	RN2221	$V_{I\ (ON)}$	—	V_{CE} = −0.2V I_C = −100mA	−1.0	—	−3.5	V
	RN2222		—		−1.4	—	−4.5	
	RN2223		—		−2.0	—	−6.5	
	RN2224		—		−3.0	—	−12.0	
	RN2225		—		−0.6	—	−2.0	
	RN2226		—		−0.7	—	−2.5	
	RN2227		—		−1.0	—	−3.0	
Input voltage (OFF)	RN2221~2224	$V_{I\ (OFF)}$	—	V_{CE} = −5V, I_C = −0.1mA	−0.8	—	−1.3	V
	RN2225, 2226		—		−0.4	—	−0.8	
	RN2227		—		−0.5	—	−1.0	
Translation frequency	RN2221~2227	f_T	—	V_{CE} = −5V, I_C = −20mA	—	200	—	MHz
Collector output capacitance	RN2221~2227	C_{ob}	—	V_{CB} = −10V, I_E = 0 f = 1MHz	—	13	—	pF
Input resistor	RN2221	R1	—	—	0.7	1.0	1.3	kΩ
	RN2222		—		1.54	2.2	2.86	
	RN2223		—		3.29	4.7	6.11	
	RN2224		—		7	10	13	
	RN2225		—		0.329	0.47	0.61	
	RN2226		—		0.7	1.0	1.3	
	RN2227		—		1.54	2.2	2.86	
Resistor ratio	RN2221~2224	R1/R2	—	—	0.9	1.0	1.1	—
	RN2225		—		0.0423	0.047	0.0517	
	RN2226		—		0.09	0.1	0.11	
	RN2227		—		0.2	0.22	0.24	

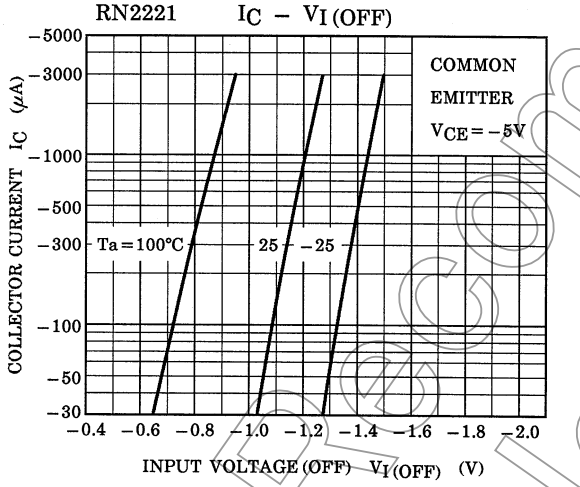
RN2221 $I_C - V_{I(ON)}$



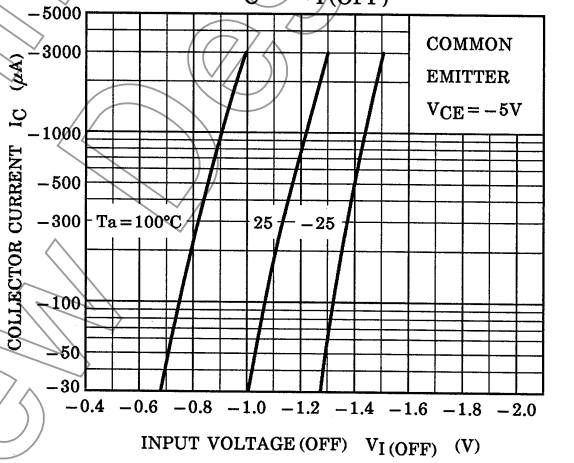
RN2222 $I_C - V_{I(ON)}$



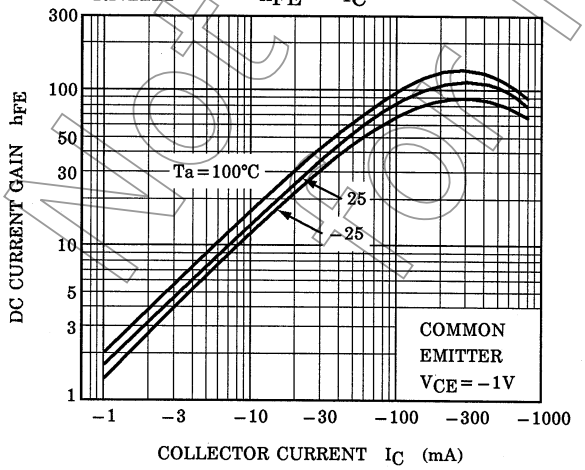
RN2221 $I_C - V_{I(OFF)}$



RN2222 $I_C - V_{I(OFF)}$



RN2221 $h_{FE} - I_C$



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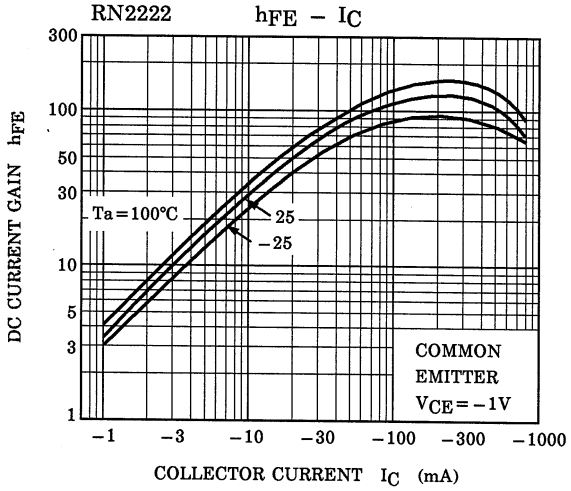
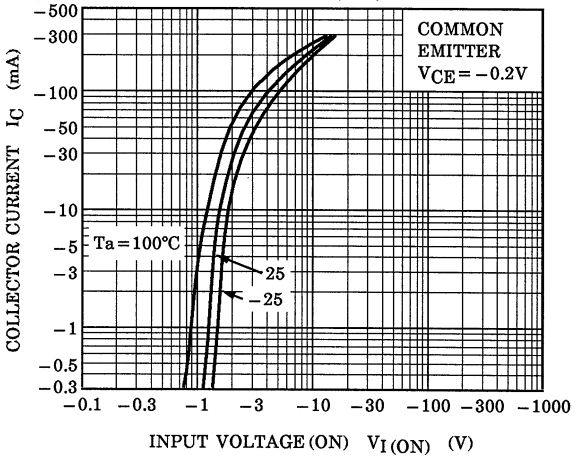
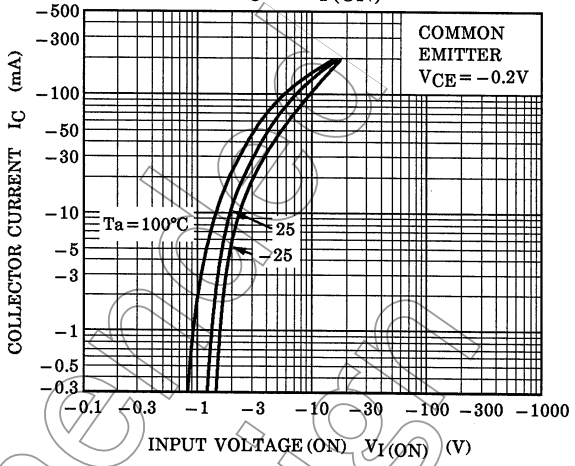


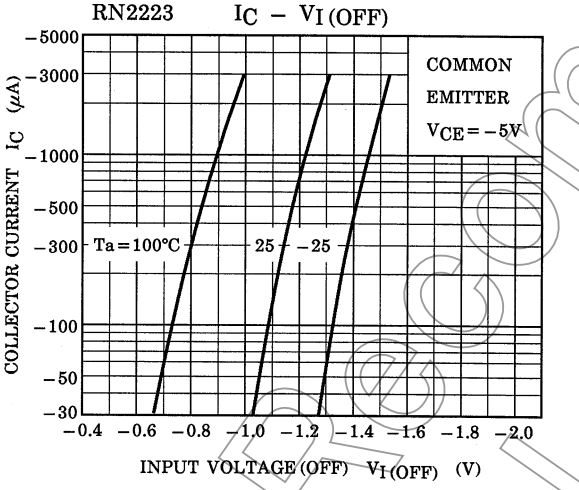
RN2223 $I_C - V_{I(ON)}$



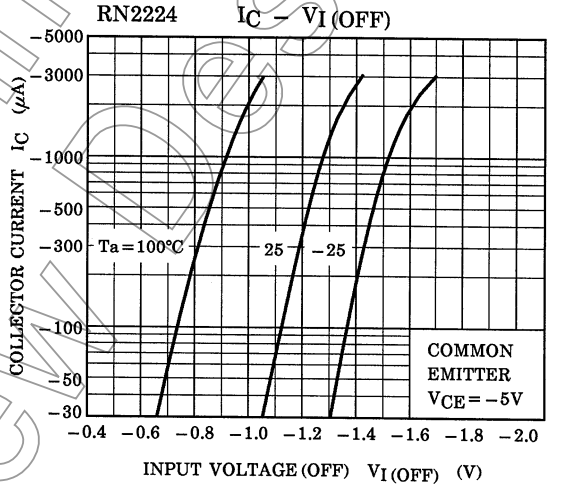
RN2224 $I_C - V_{I(ON)}$



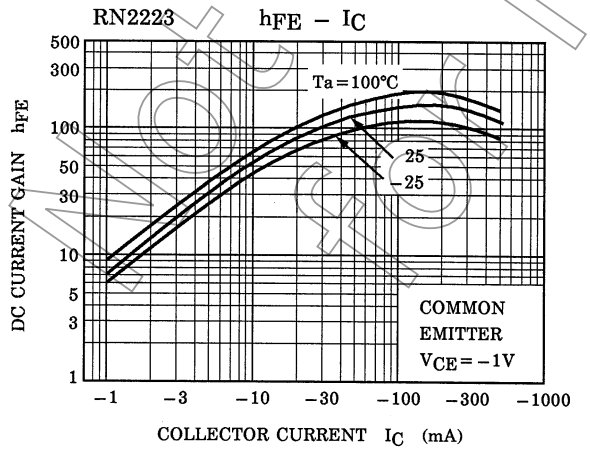
RN2223 $I_C - V_{I(OFF)}$



RN2224 $I_C - V_{I(OFF)}$



RN2223 $h_{FE} - I_C$



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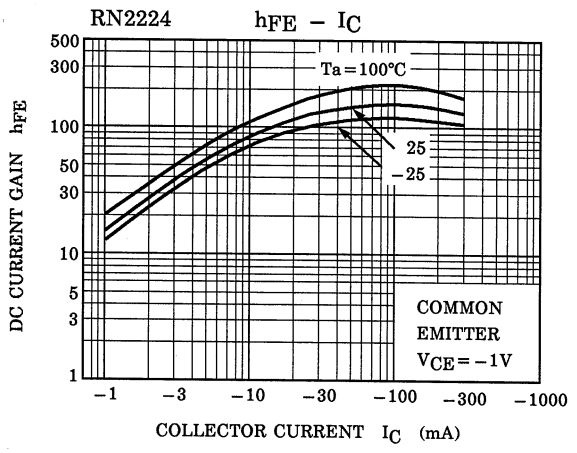
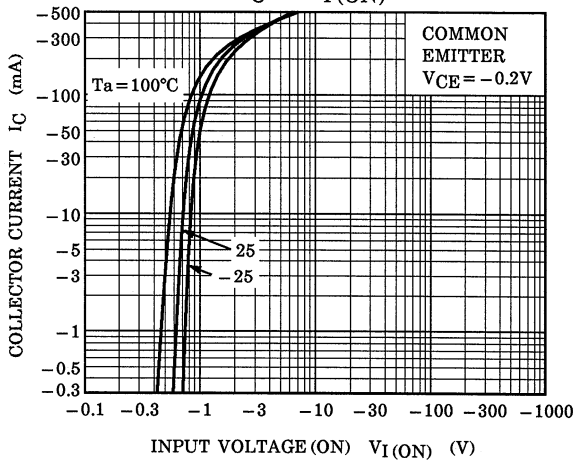
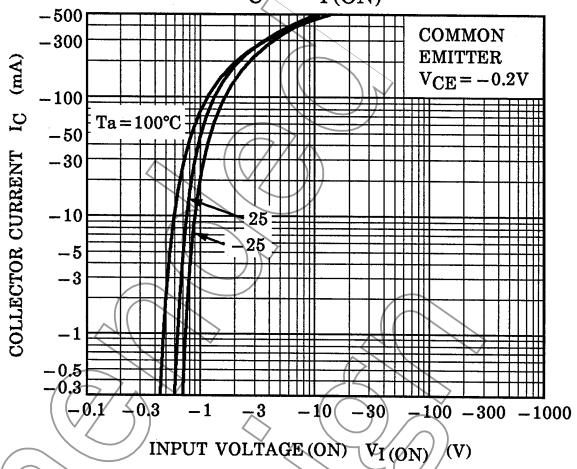


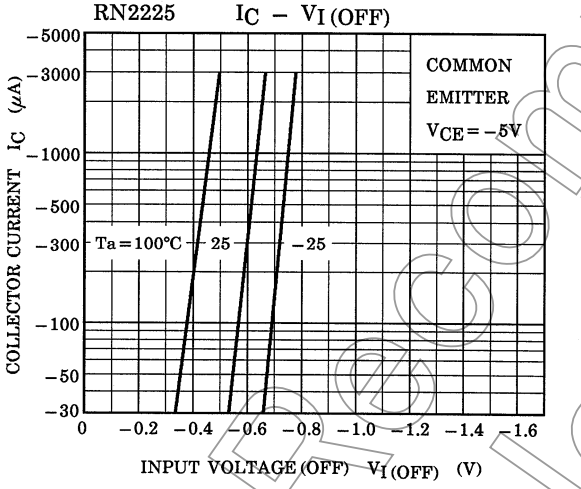
RN2225 $I_C - V_{I(ON)}$



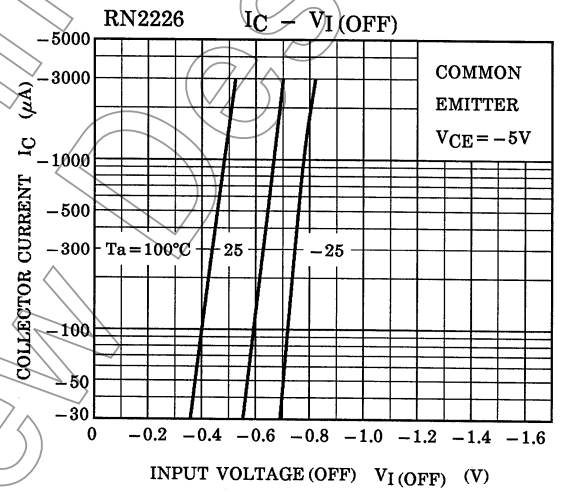
RN2226 $I_C - V_{I(ON)}$



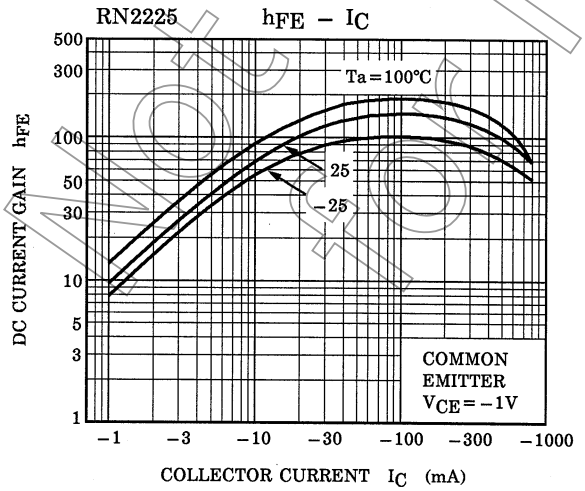
RN2225 $I_C - V_{I(OFF)}$



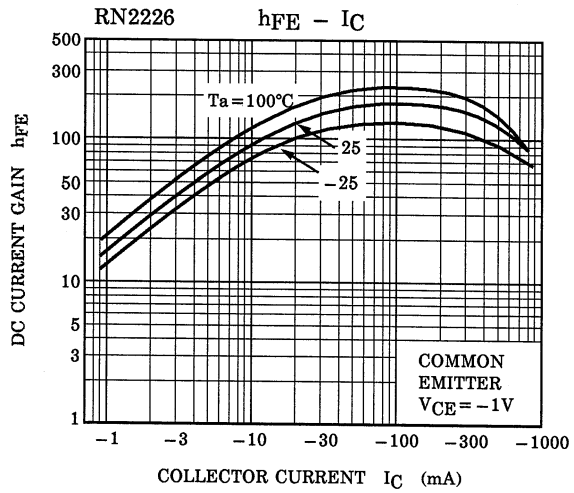
RN2226 $I_C - V_{I(OFF)}$



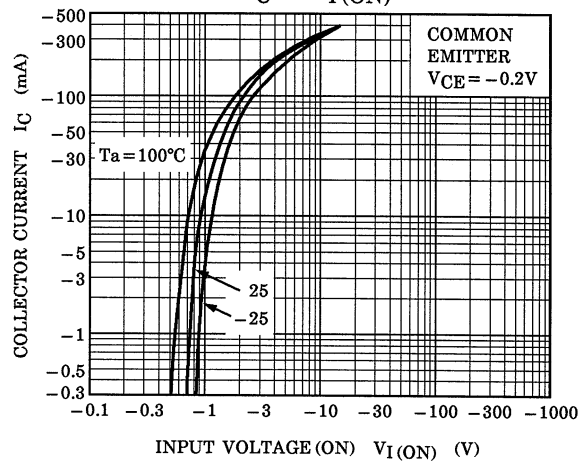
RN2225 $h_{FE} - I_C$



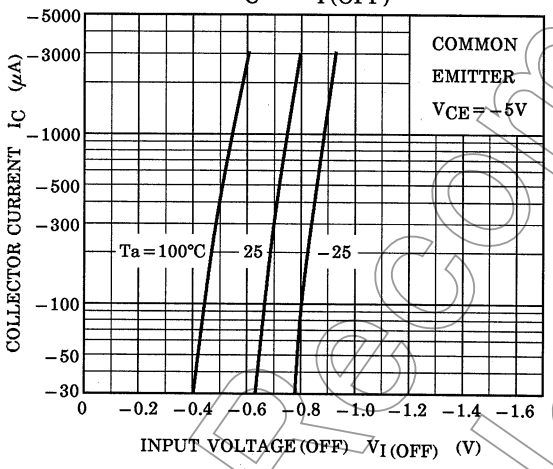
RN2226 $h_{FE} - I_C$



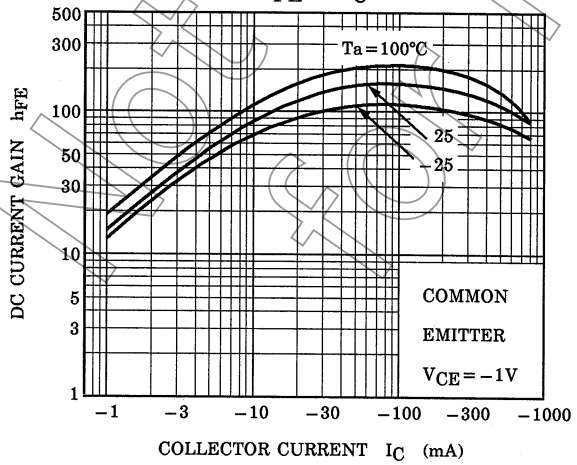
RN2227 $I_C - V_{I(ON)}$



RN2227 $I_C - V_{I(OFF)}$



RN2227 $h_{FE} - I_C$



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