

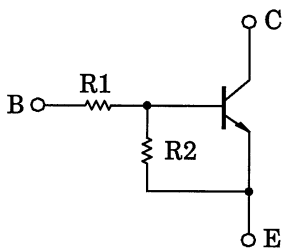
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN1961, RN1962, RN1963 RN1964, RN1965, RN1966

Switching, Inverter Circuit, Interface Circuit and Driver Circuit

- Including two devices in US6 (ultra super mini type 6 leads)
- 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 RN2961 to RN2966

Equivalent Circuit and Bias Resistor Values



Part No.	R1 (kΩ)	R2 (kΩ)
RN1961	4.7	4.7
RN1962	10	10
RN1963	22	22
RN1964	47	47
RN1965	2.2	47
RN1966	4.7	47

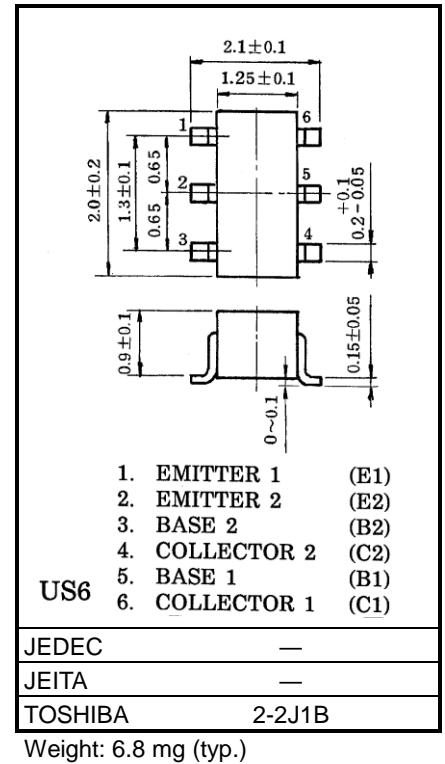
Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1961 to 1966	VCBO	50	V
Collector-emitter voltage		VCEO	50	V
Emitter-base voltage	RN1961 to 1964	VEBO	10	V
	RN1965, 1966		5	
Collector current	RN1961 to 1966	IC	100	mA
Collector power dissipation		PC*	200	mW
Junction temperature		Tj	150	°C
Storage temperature range		Tstg	-55 to 150	°C

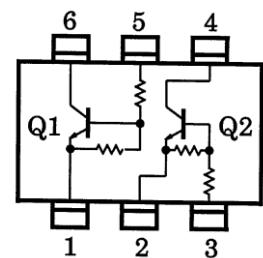
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

*: Total rating

Unit: mm



Equivalent Circuit (Top View)

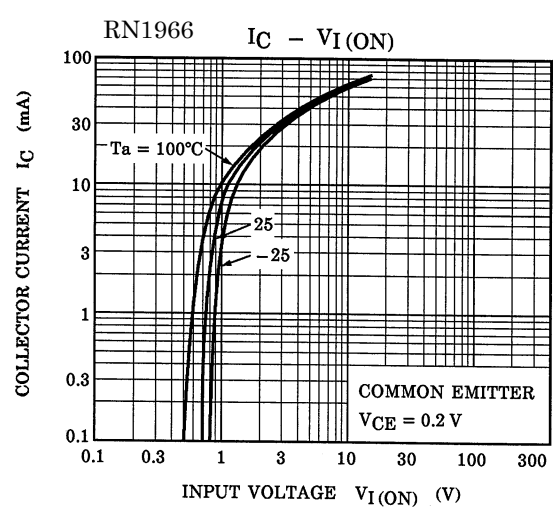
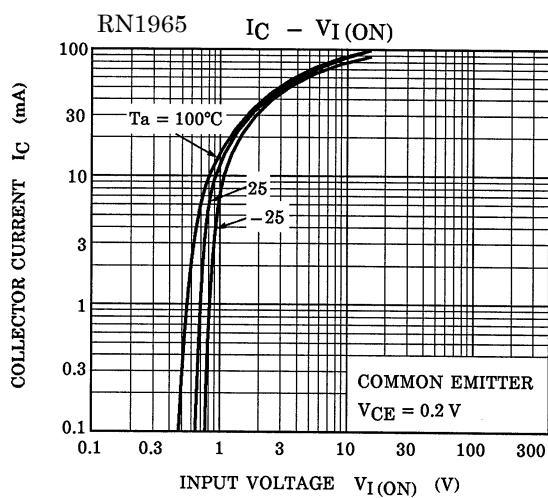
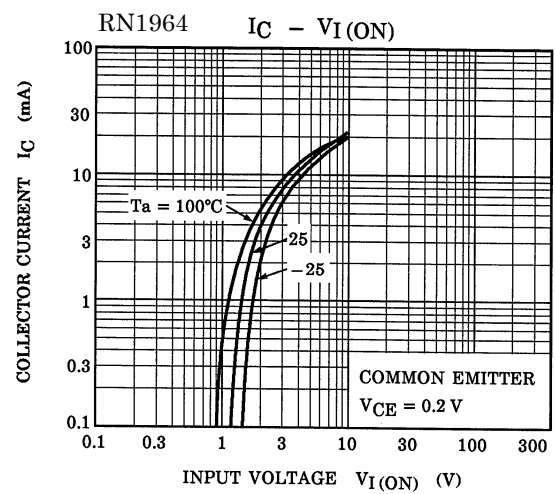
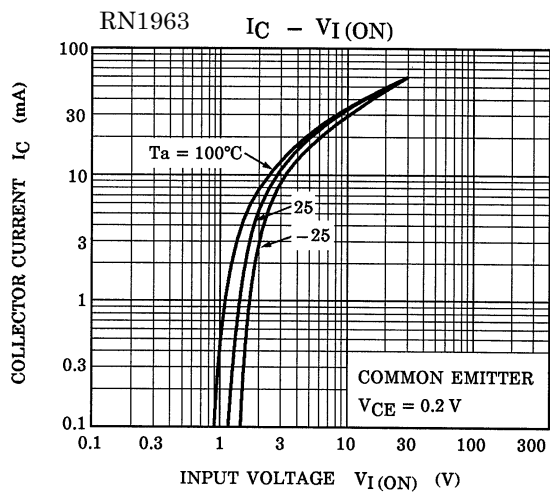
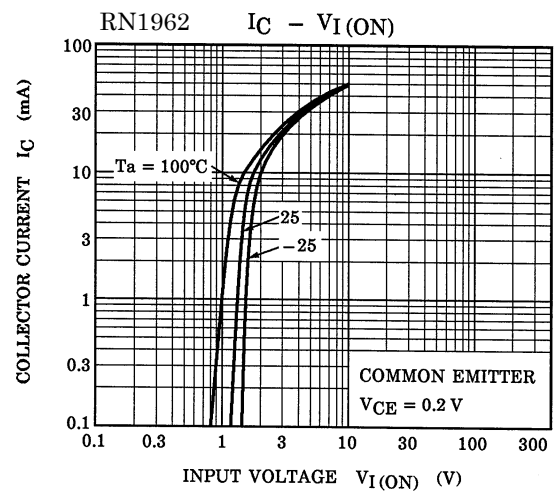
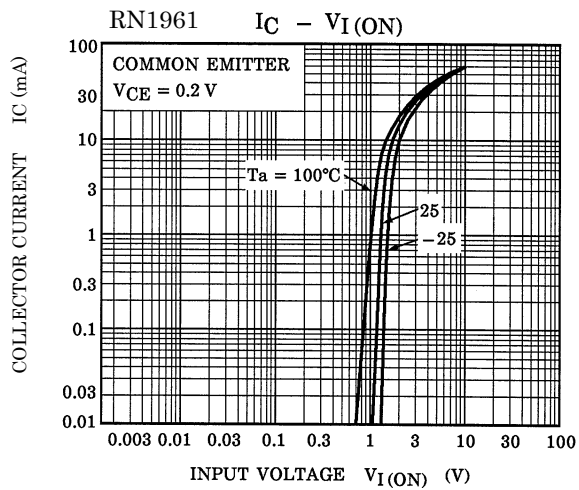


Start of commercial production
1992-01

Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

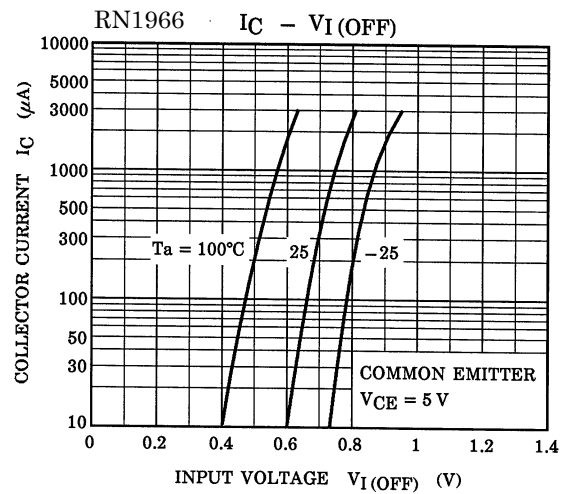
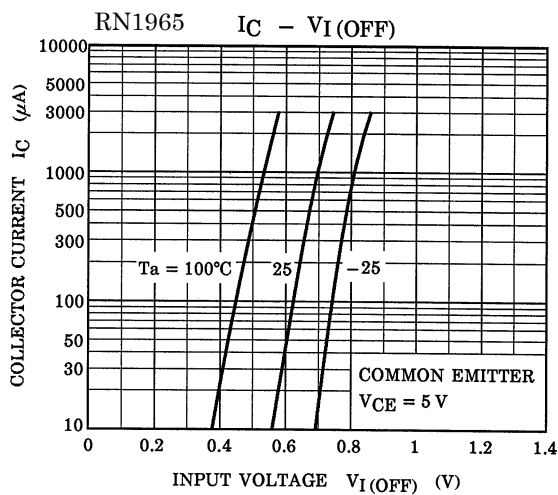
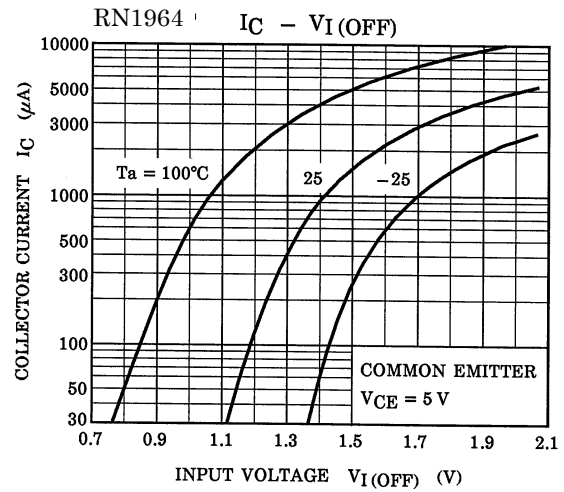
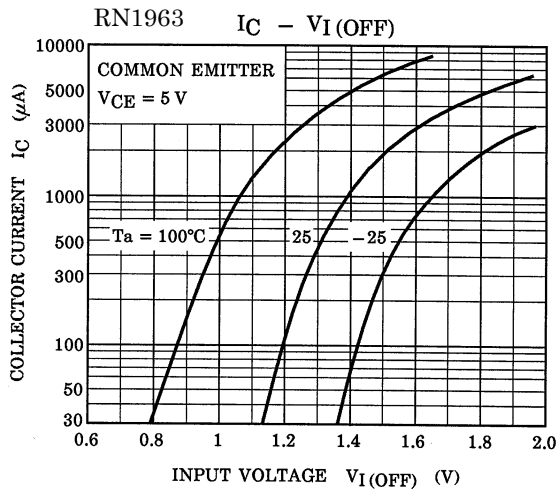
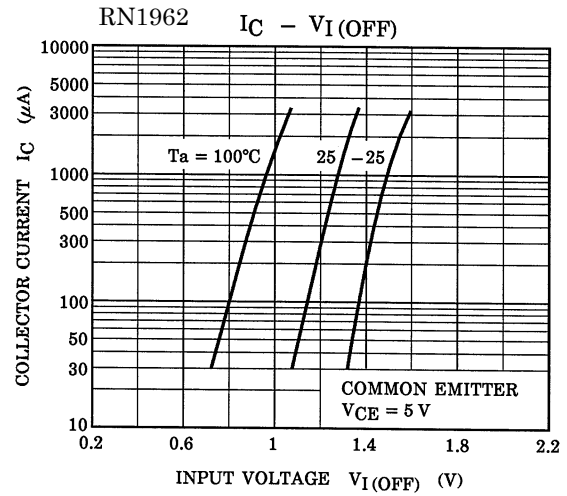
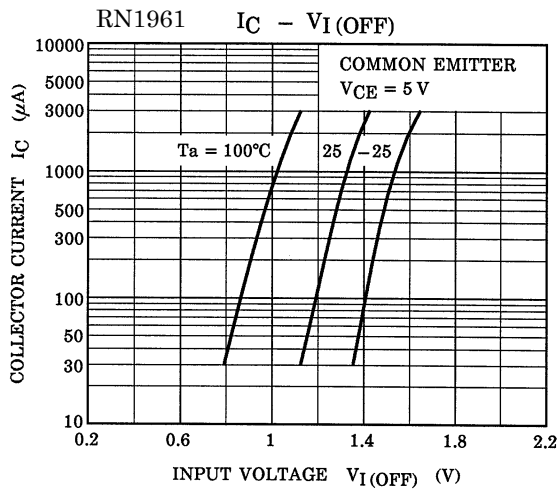
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1961 to 1966	ICBO	V _{CB} = 50 V, I _E = 0 mA	—	—	100	nA
		ICEO	V _{CE} = 50 V, I _B = 0 mA	—	—	500	
Emitter cut-off current	RN1961	IEBO	V _{EB} = 10 V, I _C = 0 mA	0.82	—	1.52	mA
	RN1962			0.38	—	0.71	
	RN1963			0.17	—	0.33	
	RN1964		0.082	—	0.15		
	RN1965		V _{EB} = 5 V, I _C = 0 mA	0.078	—	0.145	
	RN1966			0.074	—	0.138	
DC current gain	RN1961	h _{FE}	V _{CE} = 5 V, I _C = 10 mA	30	—	—	—
	RN1962			50	—	—	
	RN1963			70	—	—	
	RN1964			80	—	—	
	RN1965			80	—	—	
	RN1966			80	—	—	
Collector-emitter saturation voltage	RN1961 to 1966	V _{CE (sat)}	I _C = 5 mA, I _B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	RN1961	V _{I (ON)}	V _{CE} = 0.2 V, I _C = 5 mA	1.1	—	2.0	V
	RN1962			1.2	—	2.4	
	RN1963			1.3	—	3.0	
	RN1964			1.5	—	5.0	
	RN1965			0.6	—	1.1	
	RN1966			0.7	—	1.3	
Input voltage (OFF)	RN1961 to 1964	V _{I (OFF)}	V _{CE} = 5 V, I _C = 0.1 mA	1.0	—	1.5	V
	RN1965, 1966			0.5	—	0.8	
Transition frequency	RN1961 to 1966	f _T	V _{CE} = 10 V, I _C = 5 mA	—	250	—	MHz
Collector output capacitance	RN1961 to 1966	C _{ob}	V _{CB} = 10 V, I _E = 0 mA, f = 1 MHz	—	3	6	pF
Input resistor	RN1961	R1	—	3.29	4.7	6.11	kΩ
	RN1962			7	10	13	
	RN1963			15.4	22	28.6	
	RN1964			32.9	47	61.1	
	RN1965			1.54	2.2	2.86	
	RN1966			3.29	4.7	6.11	
Resistor ratio	RN1961 to 1964	R1/R2	—	0.9	1.0	1.1	—
	RN1965			0.0421	0.0468	0.0515	
	RN1966			0.09	0.1	0.11	

Characteristics Curves (Q1, Q2 Common)



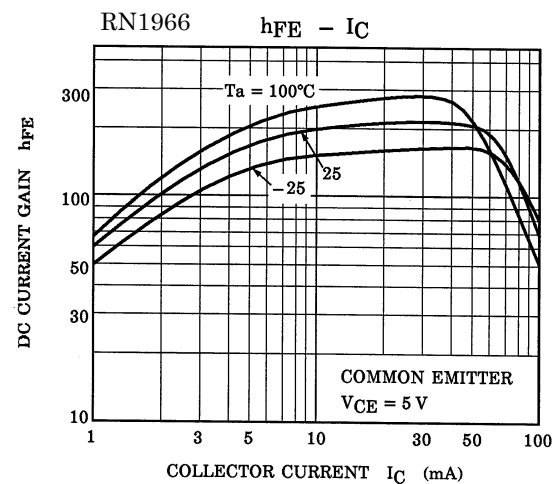
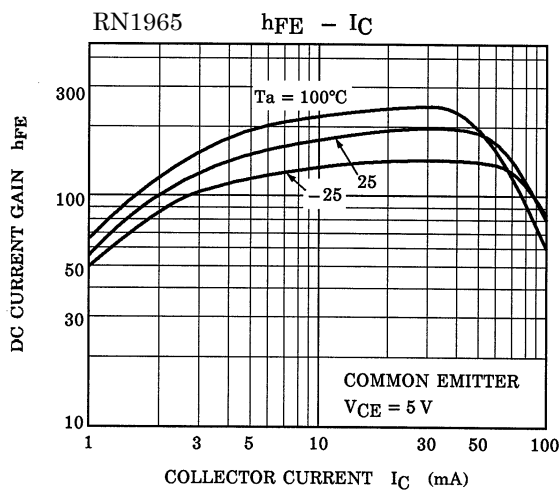
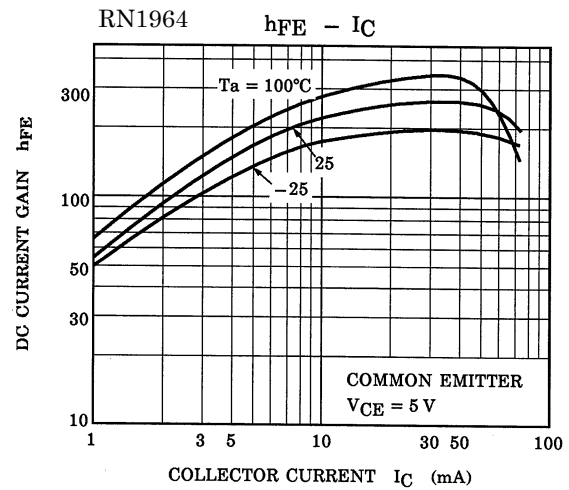
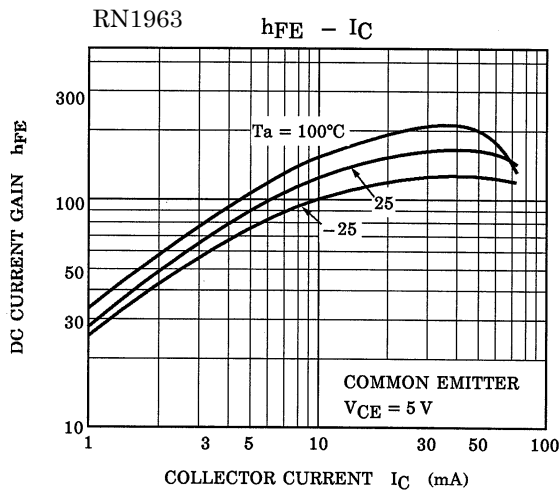
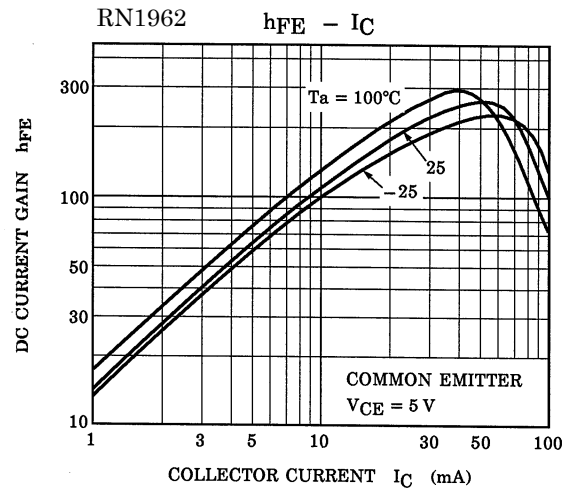
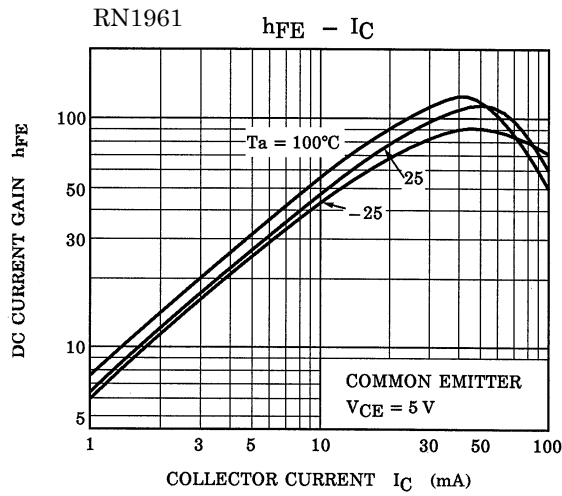
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Characteristics Curves (Q1, Q2 Common)



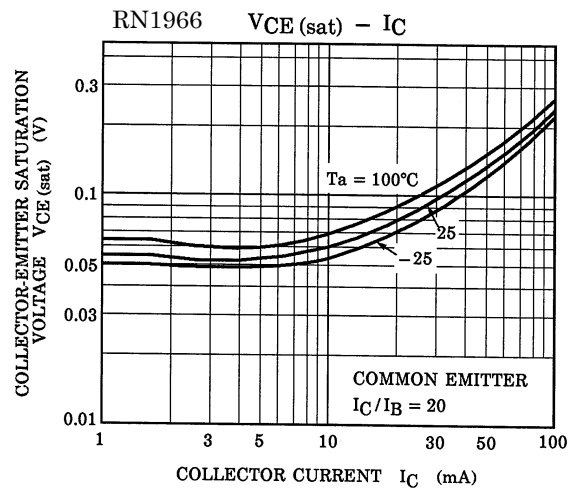
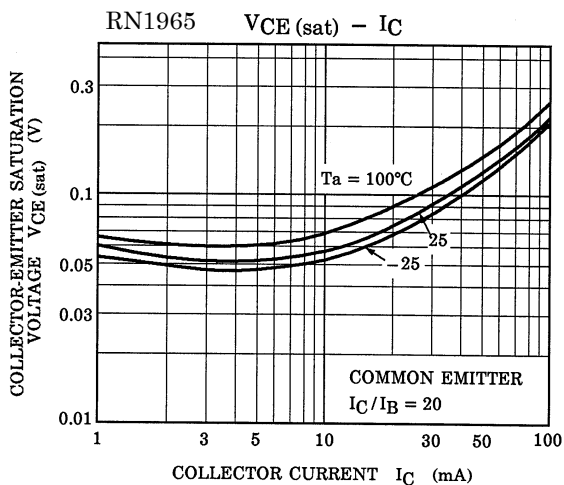
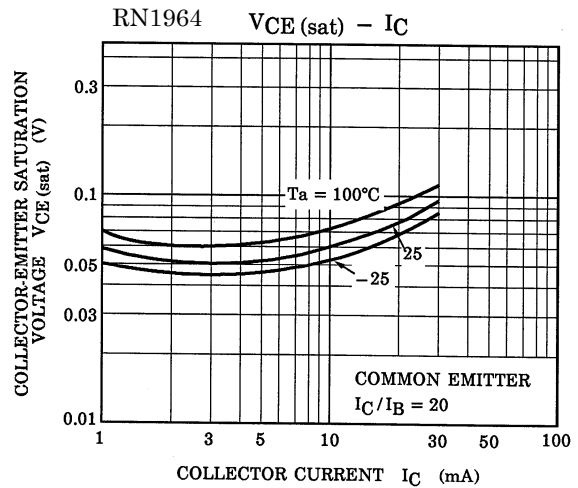
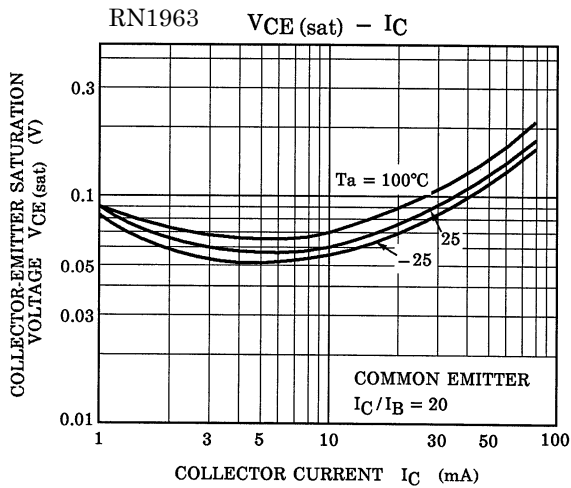
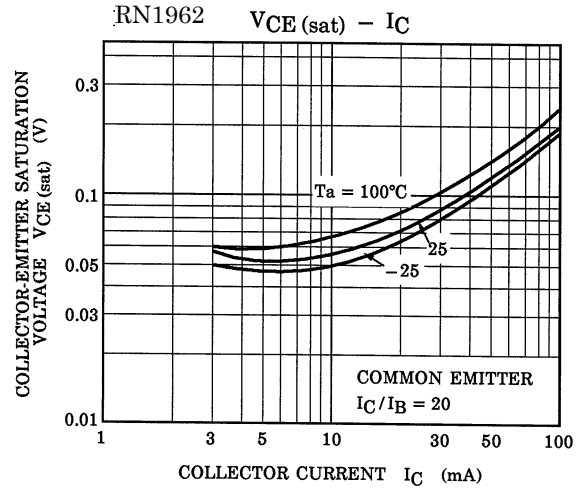
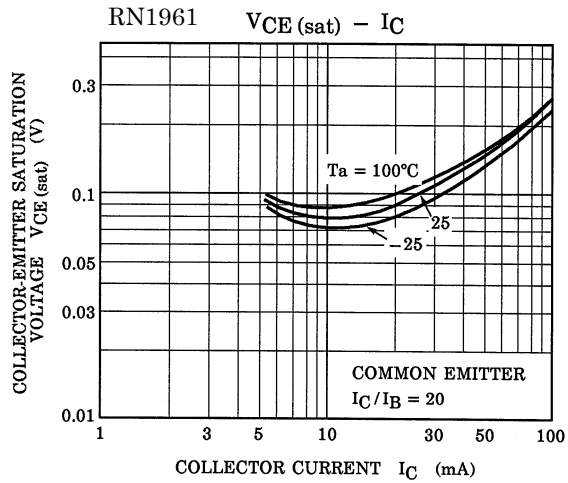
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Characteristics Curves (Q1, Q2 Common)

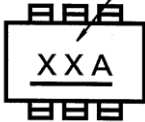
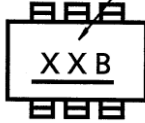
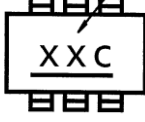
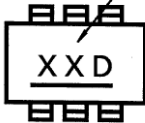




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Characteristics Curves (Q1, Q2 Common)



Marking

Part No.	Marking
RN1961	<p data-bbox="571 338 836 365">Part No.(abbreviation code)</p> 
RN1962	<p data-bbox="571 575 836 602">Part No.(abbreviation code)</p> 
RN1963	<p data-bbox="571 804 836 831">Part No.(abbreviation code)</p> 
RN1964	<p data-bbox="571 1032 836 1059">Part No.(abbreviation code)</p> 
RN1965	<p data-bbox="571 1261 836 1288">Part No.(abbreviation code)</p> 
RN1966	<p data-bbox="571 1489 836 1516">Part No.(abbreviation code)</p> 

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