

## RN2901/02/03/04/05/06

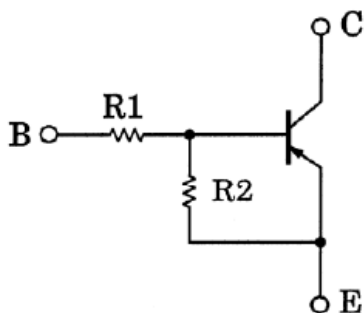
### 1. Applications

- Switching
- Inverter Circuits
- Interfacing
- Driver Circuits

### 2. Features

- (1) AEC-Q101 qualified (Please see the orderable part number list)
- (2) Small package (Dual type)
- (3) The integrated bias resistor reduces the number of external parts required, making it possible to reduce system size and assembly time.
- (4) Toshiba offers transistors with a wide range of resistance to accommodate various circuit designs.
- (5) Complementary to RN1901 to RN1906

### 3. Equivalent Circuit

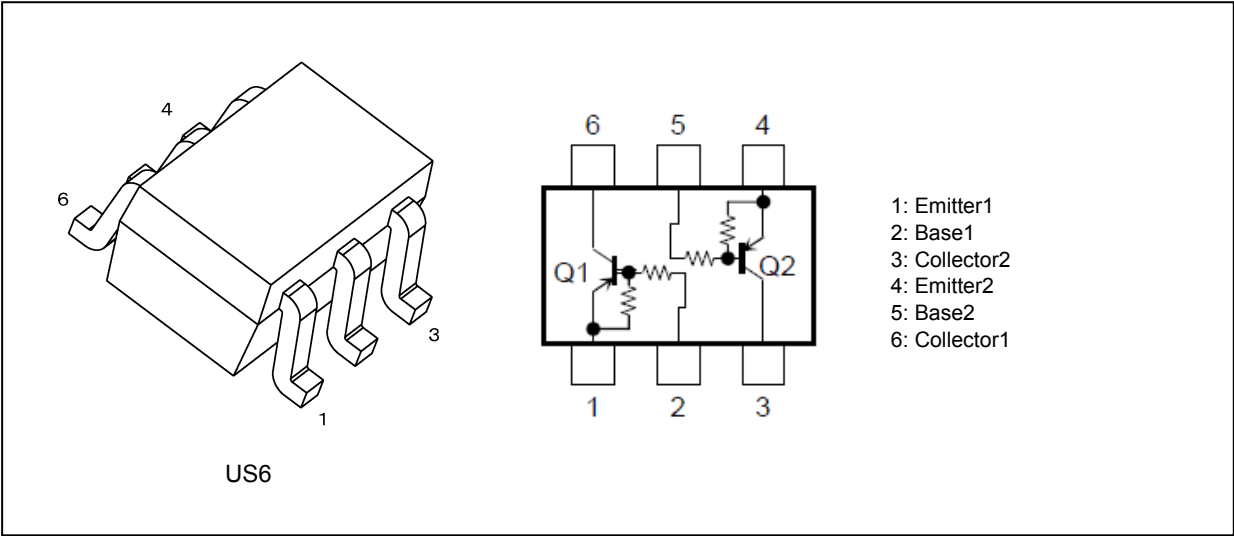


### 4. Bias Resistor Values

Part No.	R1 (k $\Omega$ )	R2 (k $\Omega$ )
RN2901	4.7	4.7
RN2902	10	10
RN2903	22	22
RN2904	47	47
RN2905	2.2	47
RN2906	4.7	47

Start of commercial production  
1990-12

5. Packaging and Pin Assignment



6. Orderable part number

Orderable part number		AEC-Q101	Note
RN2901	RN2901,LF	—	General Use
	RN2901,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN2901,LXHF	YES	Automotive Use
RN2902	RN2902,LF	—	General Use
	RN2902,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN2902,LXHF	YES	Automotive Use
RN2903	RN2903,LF	—	General Use
	RN2903,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN2903,LXHF	YES	Automotive Use
RN2904	RN2904,LF	—	General Use
	RN2904,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN2904,LXHF	YES	Automotive Use
RN2905	RN2905,LF	—	General Use
	RN2905,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN2905,LXHF	YES	Automotive Use
RN2906	RN2906,LF	—	General Use
	RN2906,LXGF	YES (Note 1)	Unintended Use (Note 1)
	RN2906,LXHF	YES	Automotive Use

Note 1: For more information, please contact our sales or use the inquiry form on our website.

## 7. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$ ) (Q1, Q2 Common)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2901~RN2906	$V_{CBO}$	-50	V
Collector-emitter voltage		$V_{CEO}$	-50	
Emitter-base voltage	RN2901~RN2904	$V_{EBO}$	-10	
	RN2905,RN2906		-5	
Collector current	RN2901~RN2906	$I_C$	-100	mA
Collector power dissipation (Note 1)		$P_C$	200	mW
Junction temperature		$T_j$	150	$^{\circ}\text{C}$
Storage temperature		$T_{stg}$	-55 to 150	

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.).

Note 1: Total rating

### 8. Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$ ) (Q1, Q2 Common)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901~RN2906	$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0\text{ mA}$	—	—	-100	nA
		$I_{CEO}$	$V_{CE} = -50\text{ V}, I_B = 0\text{ mA}$	—	—	-500	
Emitter cut-off current	RN2901	$I_{EBO}$	$V_{EB} = -10\text{ V}, I_C = 0\text{ mA}$	-0.82	—	-1.52	mA
	RN2902			-0.38	—	-0.71	
	RN2903			-0.17	—	-0.33	
	RN2904			-0.082	—	-0.15	
	RN2905	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0\text{ mA}$	-0.078	—	-0.145	
	RN2906			-0.074	—	-0.138	
DC current gain	RN2901	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	—
	RN2902			50	—	—	
	RN2903			70	—	—	
	RN2904			80	—	—	
	RN2905			80	—	—	
	RN2906			80	—	—	
Collector-emitter saturation voltage	RN2901~RN2906	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2901	$V_{I(ON)}$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-1.1	—	-2.0	V
	RN2902			-1.2	—	-2.4	
	RN2903			-1.3	—	-3.0	
	RN2904			-1.5	—	-5.0	
	RN2905			-0.6	—	-1.1	
	RN2906			-0.7	—	-1.3	
Input voltage (OFF)	RN2901~RN2904	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.5	V
	RN2905, RN2906			-0.5	—	-0.8	
Transition frequency	RN2901~RN2906	$f_T$	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance		$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$	—	3	6	pF
Input resistance	RN2901	$R_1$	-	3.29	4.7	6.11	k $\Omega$
	RN2902			7	10	13	
	RN2903			15.4	22	28.6	
	RN2904			32.9	47	61.1	
	RN2905			1.54	2.2	2.86	
	RN2906			3.29	4.7	6.11	
Resistor ratio	RN2901~RN2904	R1/R2	-	0.9	1.0	1.1	—
	RN2905			0.0421	0.0468	0.0515	
	RN2906			0.09	0.1	0.11	

## 9. Marking

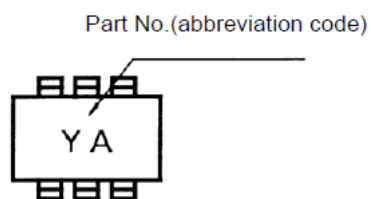


Fig. 9.1 Mraking RN2901

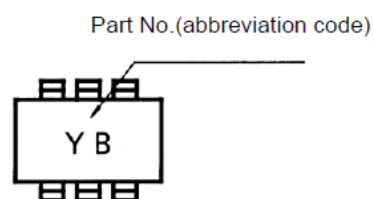


Fig. 9.2 Mraking RN2902

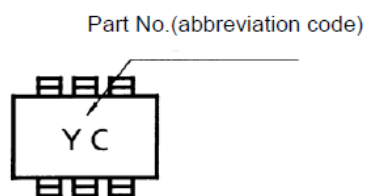


Fig. 9.3 Mraking RN2903

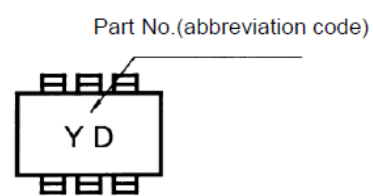


Fig. 9.4 Mraking RN2904

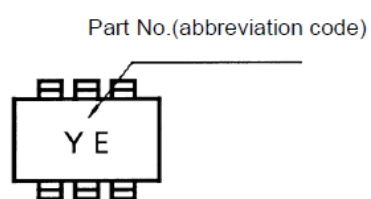


Fig. 9.5 Mraking RN2905

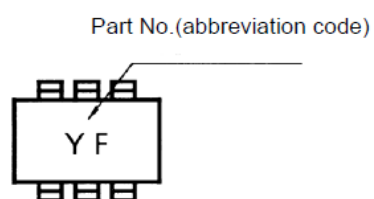


Fig. 9.6 Mraking RN2906

## 10. Characteristics Curves (Note)(Q1, Q2 Common)

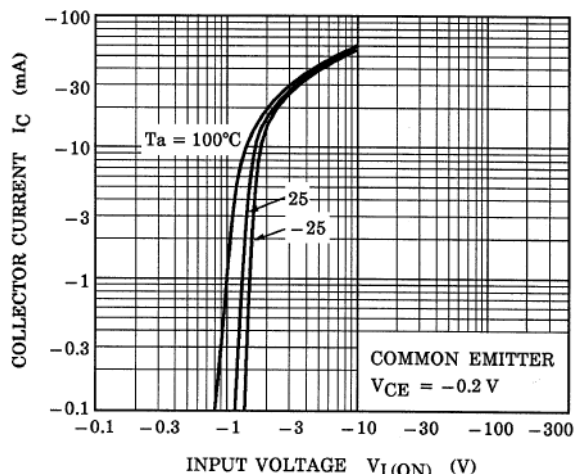


Fig. 10.1 RN2901  $I_C$ - $V_{I(ON)}$

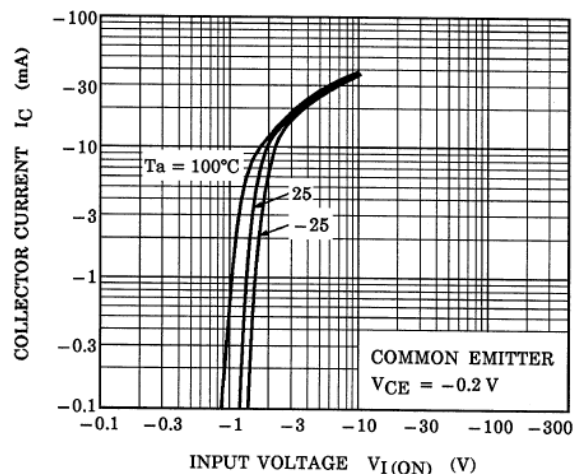


Fig. 10.2 RN2902  $I_C$ - $V_{I(ON)}$

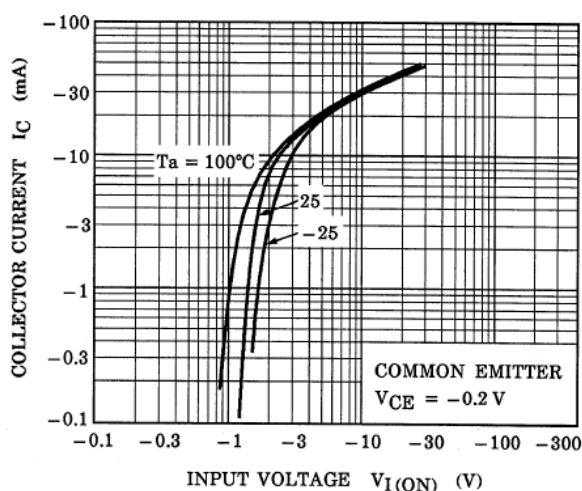


Fig. 10.3 RN2903  $I_C$ - $V_{I(ON)}$

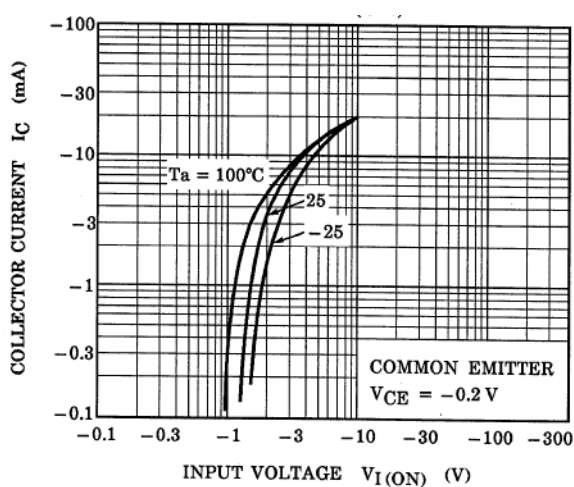


Fig. 10.4 RN2904  $I_C$ - $V_{I(ON)}$

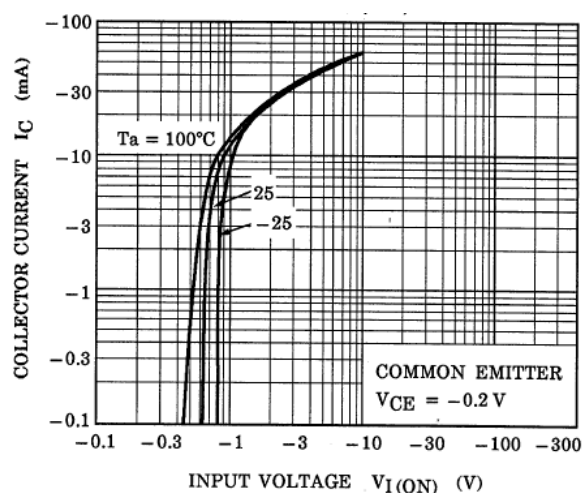


Fig. 10.5 RN2905  $I_C$ - $V_{I(ON)}$

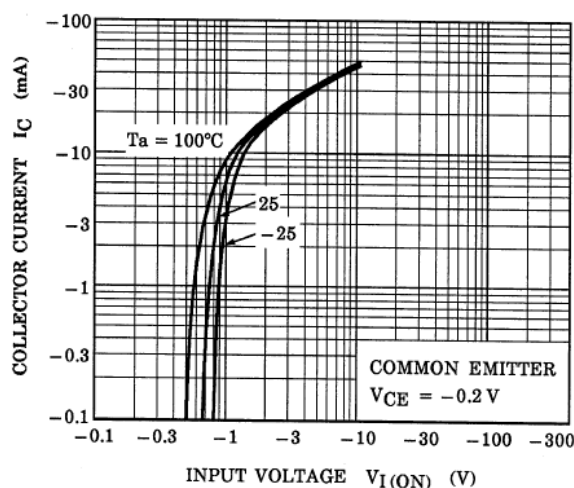


Fig. 10.6 RN2906  $I_C$ - $V_{I(ON)}$

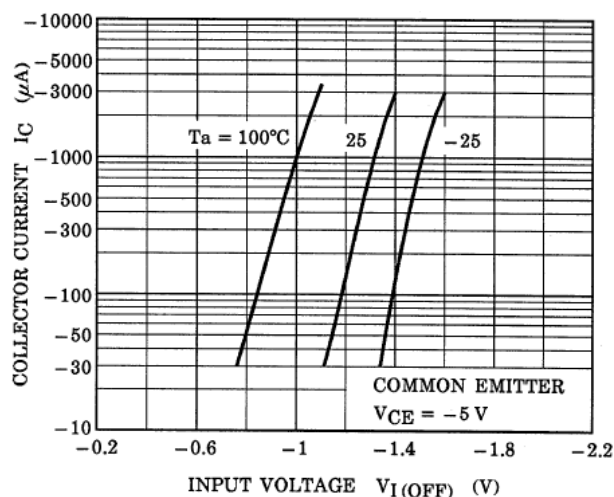


Fig. 10.7 RN2901  $I_C$ - $V_{I(OFF)}$

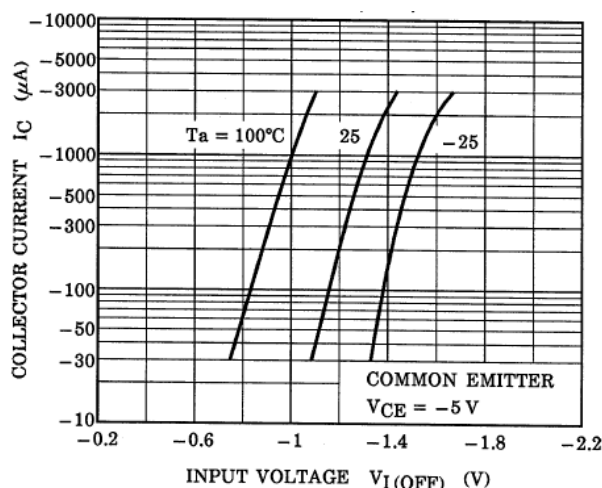


Fig. 10.8 RN2902  $I_C$ - $V_{I(OFF)}$

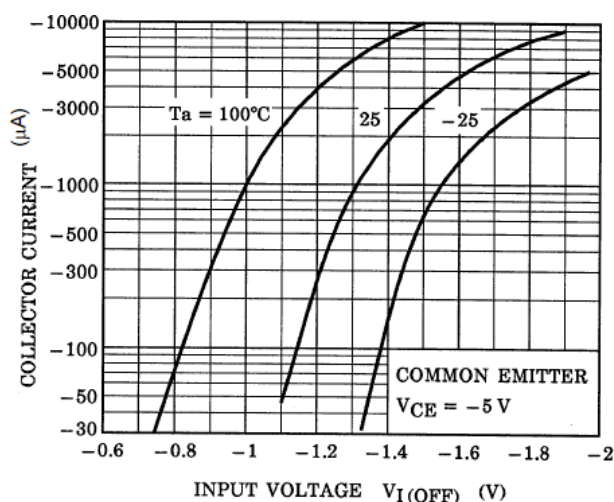


Fig. 10.9 RN2903  $I_C$ - $V_{I(OFF)}$

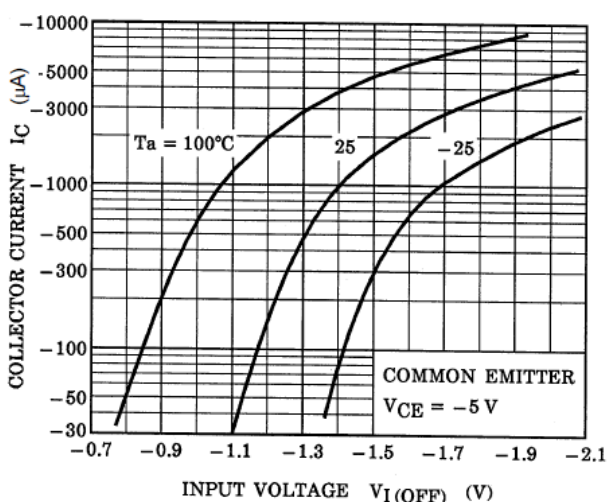


Fig. 10.10 RN2904  $I_C$ - $V_{I(OFF)}$

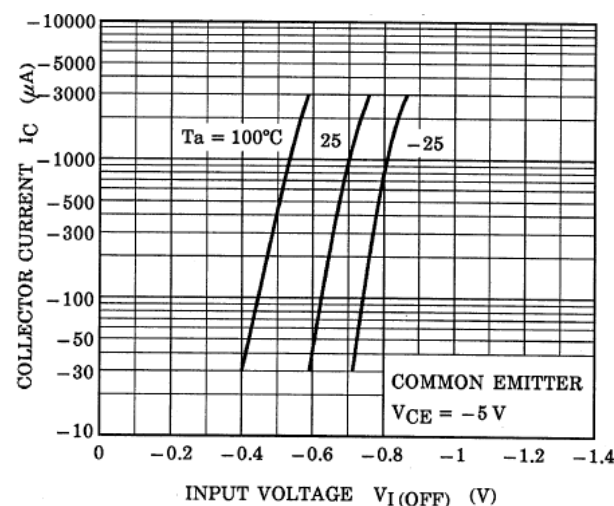


Fig. 10.11 RN2905  $I_C$ - $V_{I(OFF)}$

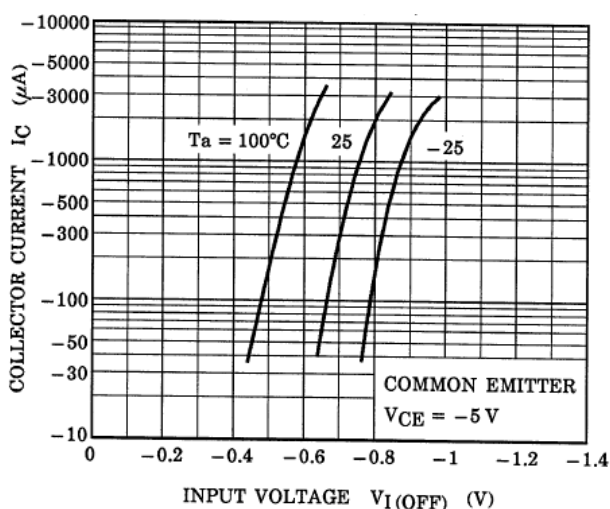


Fig. 10.12 RN2906  $I_C$ - $V_{I(OFF)}$

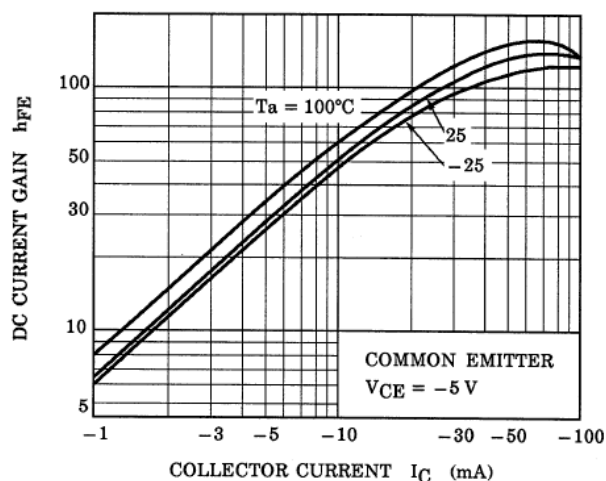


Fig. 10.13 RN2901  $h_{FE}-I_C$

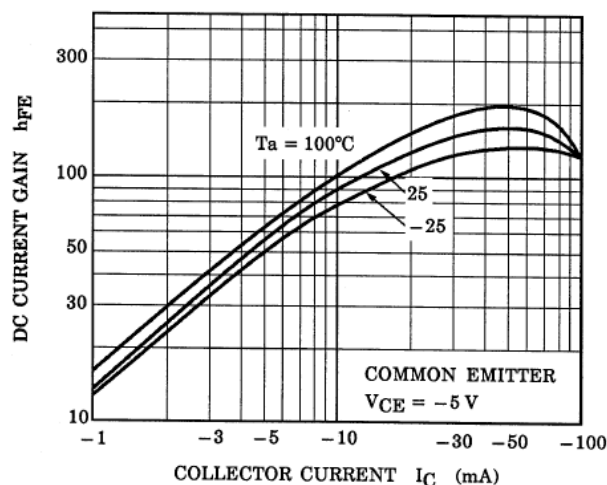


Fig. 10.14 RN2902  $h_{FE}-I_C$

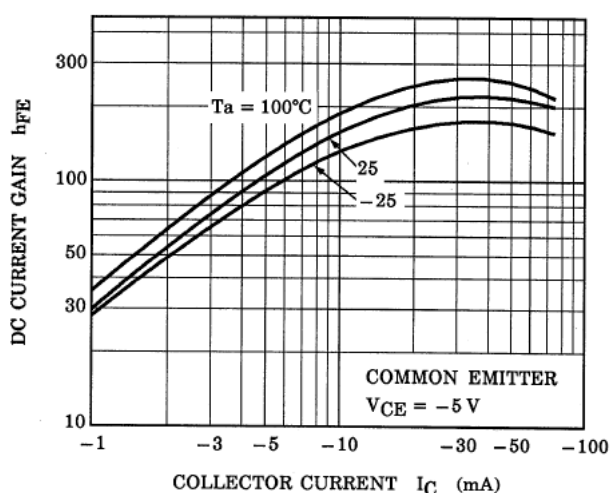


Fig. 10.15 RN2903  $h_{FE}-I_C$

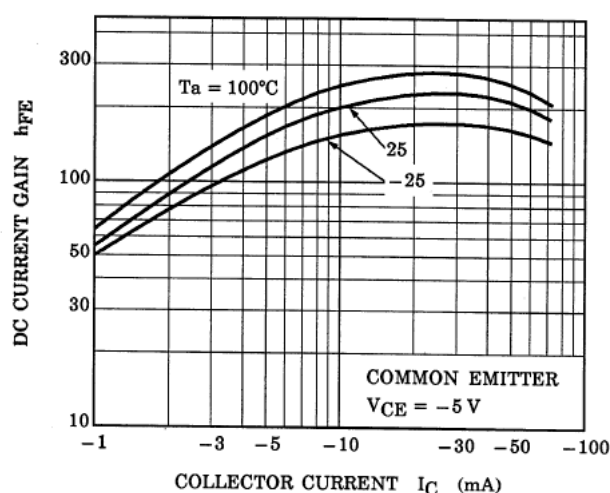


Fig. 10.16 RN2904  $h_{FE}-I_C$

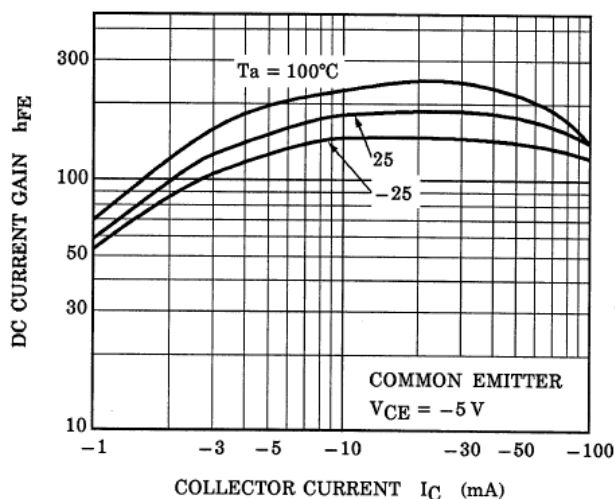


Fig. 10.17 RN2905  $h_{FE}-I_C$

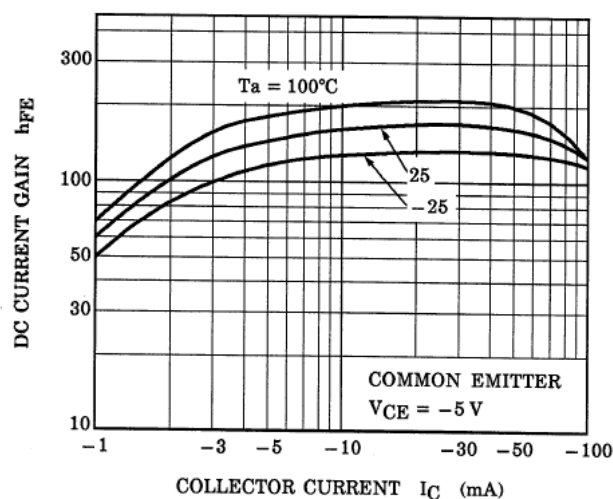


Fig. 10.18 RN2906  $h_{FE}-I_C$

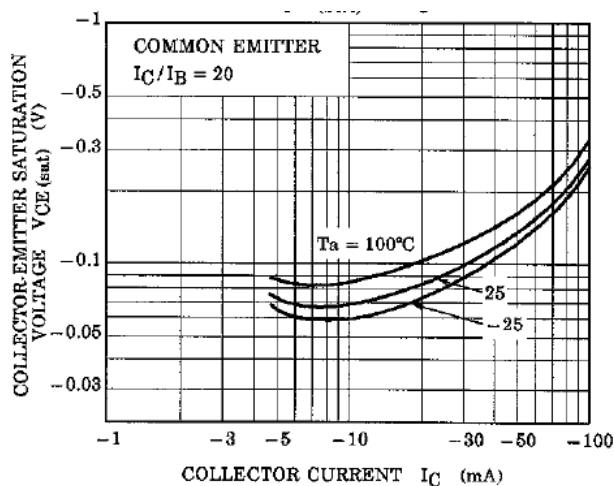


Fig. 10.19 RN2901  $V_{CE(sat)}-I_C$

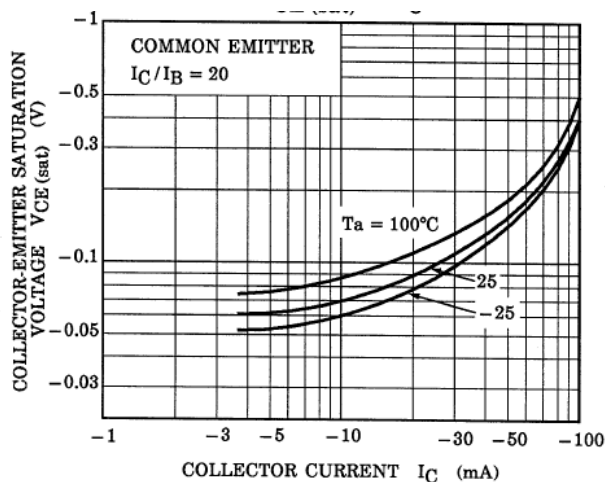


Fig. 10.20 RN2902  $V_{CE(sat)}-I_C$

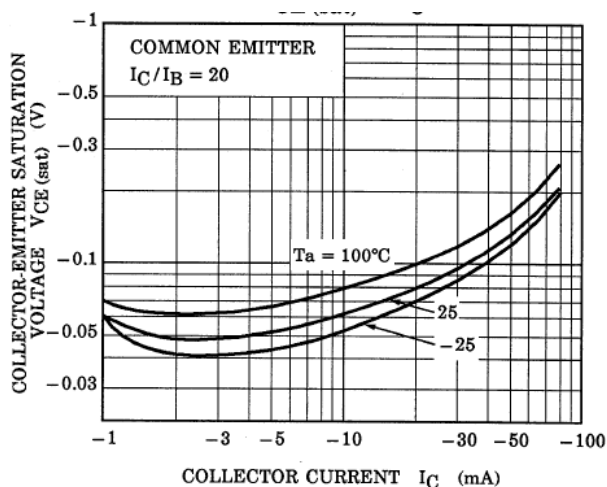


Fig. 10.21 RN2903  $V_{CE(sat)}-I_C$

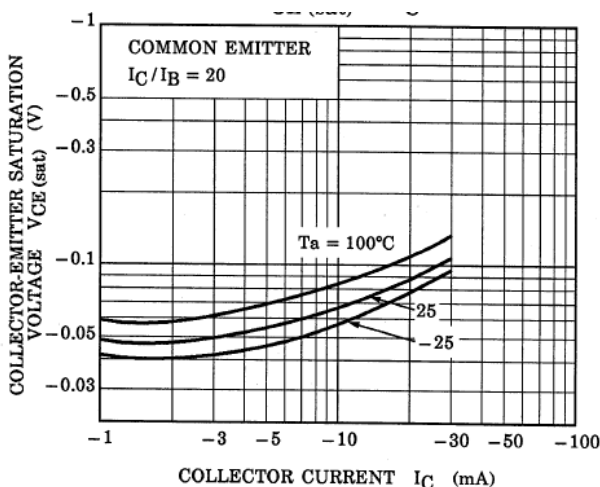


Fig. 10.22 RN2904  $V_{CE(sat)}-I_C$

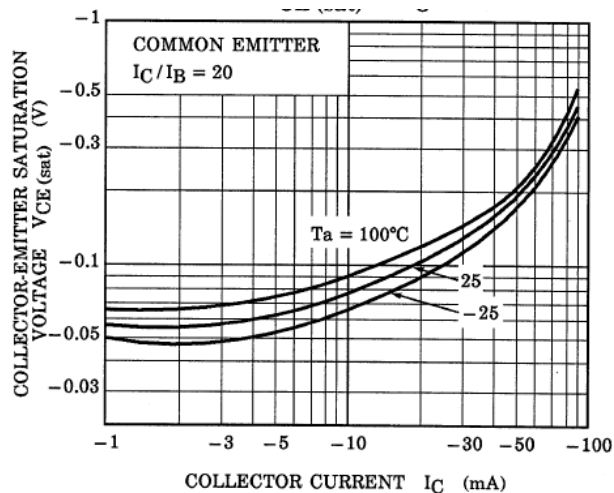


Fig. 10.23 RN2905  $V_{CE(sat)}-I_C$

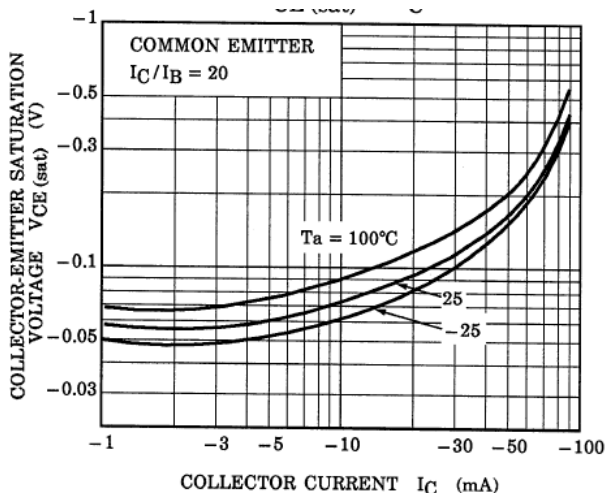
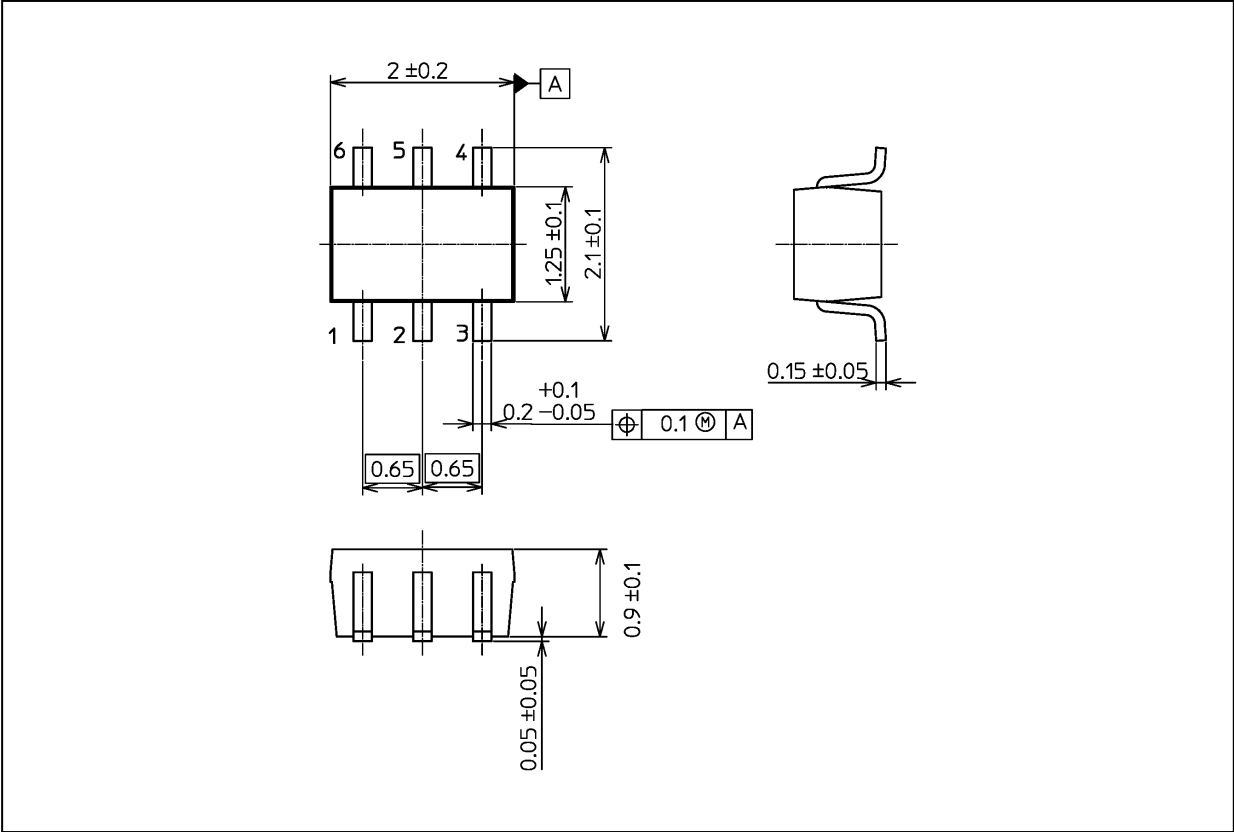


Fig. 10.24 RN1206  $V_{CE(sat)}-I_C$

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

Package Dimensions

Unit: mm



Weight: 6.8 mg (typ.)

Package Name(s)
TOSHIBA: 1-2T1S
Nickname: US6

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