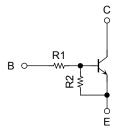
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN1701JE, RN1702JE, RN1703JE RN1704JE, RN1705JE, RN1706JE

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (5 pin) package.
- Incorporating a bias resistor into a transistor reduces parts count.
 Reducing the parts count enables the manufacture of ever more compact equipment and lowers assembly cost.
- A wide range of resistor values is available for use in various circuit designs.
- Complementary to RN2701JE to RN2706JE

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN1701JE	4.7	4.7
RN1702JE	10	10
RN1703JE	22	22
RN1704JE	47	47
RN1705JE	2.2	47
RN1706JE	4.7	47

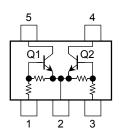
		Unit: mm
1.0±0.05	2.EMITTER (E	32)
ESV	5.COLLECTOR1 (C	C1)
JEDEC		
JEITA		
TOSHIB	3A 2-2P1D	

Weight: 0.003 g (typ.)

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

Characteristics		Symbol	Rating	Unit	
Collector-base voltage	RN1701JE	V_{CBO}	50	V	
Collector-emitter voltage	to 1706JE	V _{CEO}	50	V	
Emitter-base voltage	RN1701JE to 1704JE	V _{EBO}	10	· >	
Emilier-base voltage	RN1705JE RN1706JE	VEBO	5		
Collector current		IC	100	mA	
Collector power dissipation	RN1701JE	P _C (Note 1)	100	mW	
Junction temperature	to 1706JE	Tj	150	°C	
Storage temperature range		T _{stg}	-55 to 150	°C	

Equivalent Circuit (top view)



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

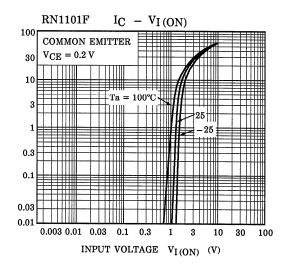
Start of commercial production 2000-06

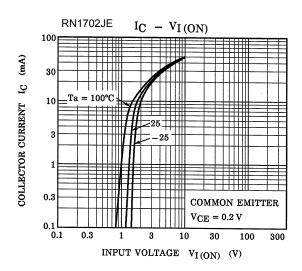


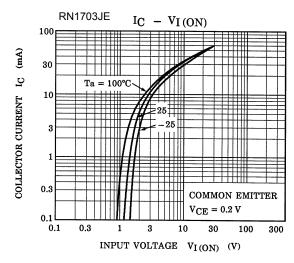
Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

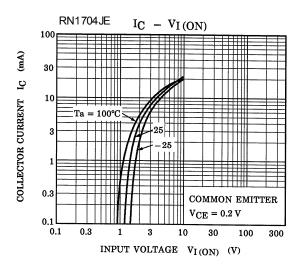
Characteristics		Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	RN1701JE to RN1706JE	I _{CBO}	$V_{CB} = 50 \text{ V}, I_{E} = 0$	_	_	100	nA
	KINT/UTJE (U KINT/UOJE	I _{CEO}	$V_{CE} = 50 \text{ V}, I_B = 0$	_		500	11/7
	RN1701JE	- I _{EBO}	V _{EB} = 10 V, I _C = 0	0.82	_	1.52	- mA
	RN1702JE			0.38		0.71	
Emitter cut-off current	RN1703JE			0.17	_	0.33	
Limiter cut-on current	RN1704JE			0.082	_	0.15	
	RN1705JE		V _{EB} = 5 V, I _C = 0	0.078	_	0.145	
	RN1706JE			0.074	_	0.138	
	RN1701JE			30	_	_	
	RN1702JE			50		_	
DC ourrent gain	RN1703JE	h	\\ E\\ - 10 mA	70	_	_	
DC current gain	RN1704JE	h _{FE}	$V_{CE} = 5 \text{ V}, I_{C} = 10 \text{ mA}$	80	_	_	
	RN1705JE			80		_	
	RN1706JE			80	_	_	
Collector-emitter saturation voltage	RN1701JE to RN1706JE	V _{CE} (sat)	$I_C = 5 \text{ mA},$ $I_B = 0.25 \text{ mA}$	_	0.1	0.3	V
	RN1701JE	VI (ON)	$V_{CE} = 0.2 \text{ V}, I_{C} = 5 \text{ mA}$	1.1	_	2.0	V
	RN1702JE			1.2		2.4	
liament continues (ONI)	RN1703JE			1.3		3.0	
Input voltage (ON)	RN1704JE			1.5		5.0	
	RN1705JE			0.6		1.1	
	RN1706JE			0.7		1.3	
	RN1701JE to RN1704JE	V _{I (OFF)}	V _{CE} = 5 V, I _C = 0.1 mA	1.0	_	1.5	· V
Input voltage (OFF)	RN1705JE, RN1706JE			0.5	_	0.8	
Transition frequency	RN1701JE to RN1706JE	f _T	V _{CE} = 10 V, I _C = 5 mA	_	250	_	MHz
Collector output capacitance	RN1701JE to RN1706JE	C _{ob}	V _{CB} = 10 V, I _E = 0, f = 1 MHz	_	3	6	pF
	RN1701JE	R1	_	3.29	4.7	6.11	- kΩ
	RN1702JE			7	10	13	
Input resistor	RN1703JE			15.4	22	28.6	
	RN1704JE			32.9	47	61.1	
	RN1705JE			1.54	2.2	2.86	
	RN1706JE			3.29	4.7	6.11	
Resistor ratio	RN1701JE to RN1704JE	R1/R2	_	0.9	1.0	1.1	
	RN1705JE			0.0421	0.0468	0.0515	
	RN1706JE			0.09	0.1	0.11	

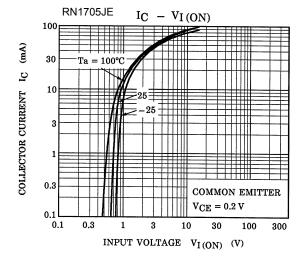
Q1, Q2 Common

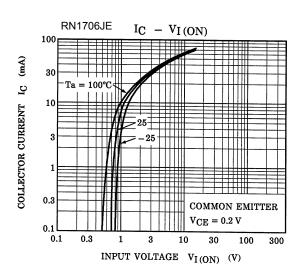




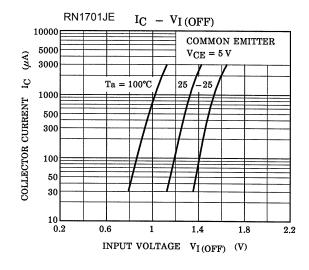


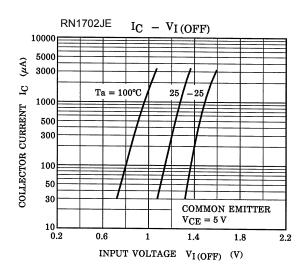


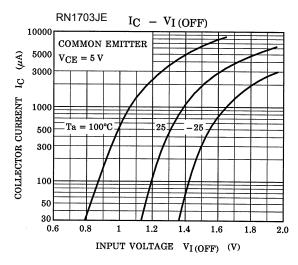


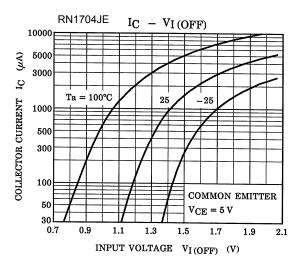


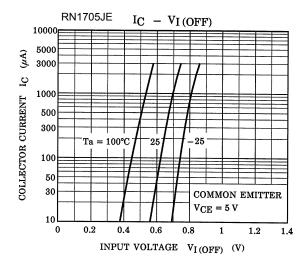
Q1, Q2 Common

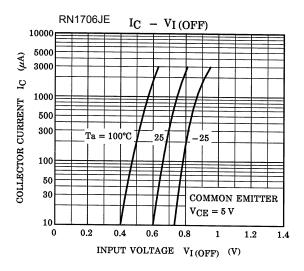


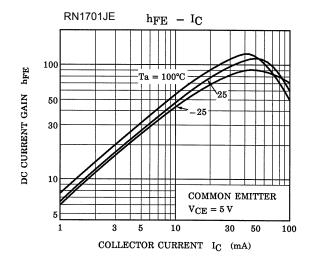


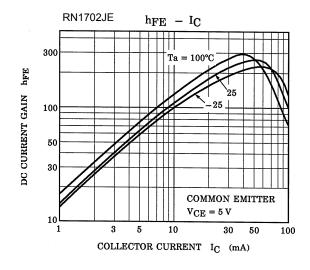


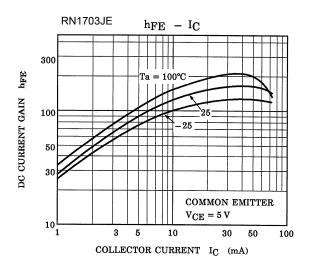


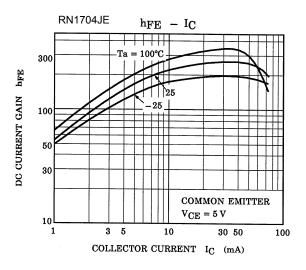


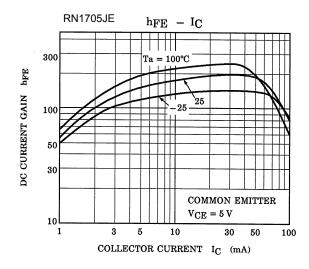


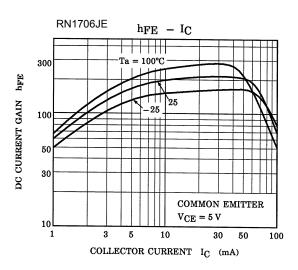


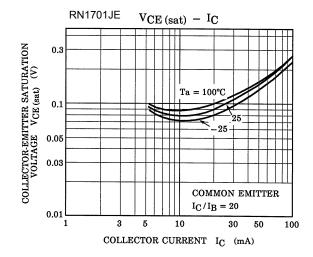


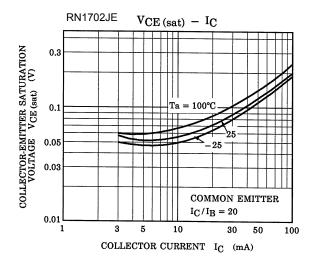


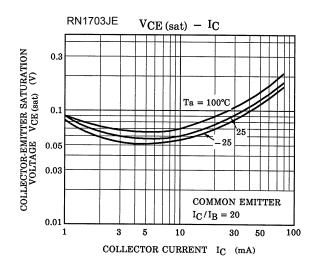


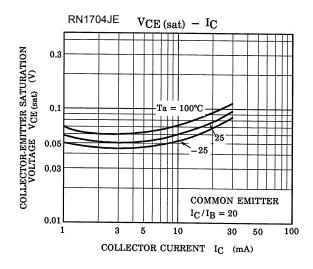


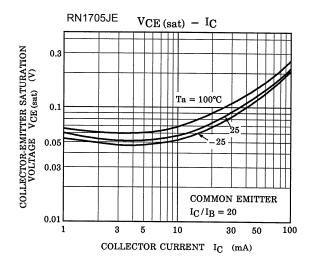


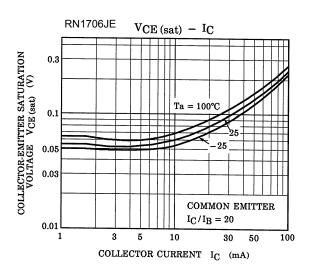












Type Name	Marking
RN1701JE	Type name X A
RN1702JE	Type name XB
RN1703JE	Type name XC
RN1704JE	Type name X D
RN1705JE	Type name X E
RN1706JE	Type name XF

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