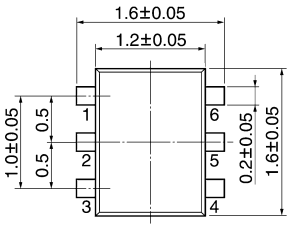
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor Built-in Transistor)

RN2901FE, RN2902FE, RN2903FE RN2904FE, RN2905FE, RN2906FE

Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications

- Two devices are incorporated into an Extreme-Super-Mini (6-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.
- Complementary to RN1901FE to RN1906FE

Unit: mm



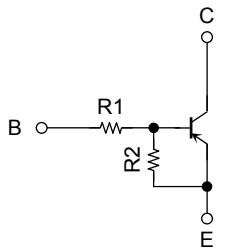
1. EMITTER1 (E1)
2. BASE1 (B1)
3. COLLECTOR2 (C2)
4. EMITTER2 (E2)
5. BASE2 (B2)
6. COLLECTOR1 (C1)

ES6

JEDEC	—
JEITA	—
TOSHIBA	2-2N1G

Weight:0.003 g (typ.)

Equivalent Circuit and Bias Resistor Values

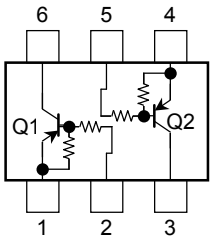


Type No.	R1 (kΩ)	R2 (kΩ)
RN2901FE	4.7	4.7
RN2902FE	10	10
RN2903FE	22	22
RN2904FE	47	47
RN2905FE	2.2	47
RN2906FE	4.7	47

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2901FE to 2906FE	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2901FE to 2904FE	V_{EBO}	−10	V
	RN2905FE RN2906FE		−5	
Collector current	RN2901FE to 2906FE	I_C	−100	mA
Collector power dissipation		P_C (Note 1)	100	mW
Junction temperature		T_j	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

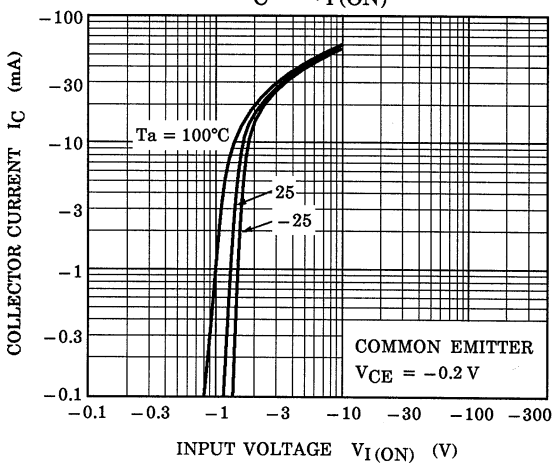
Start of commercial production
2000-05

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

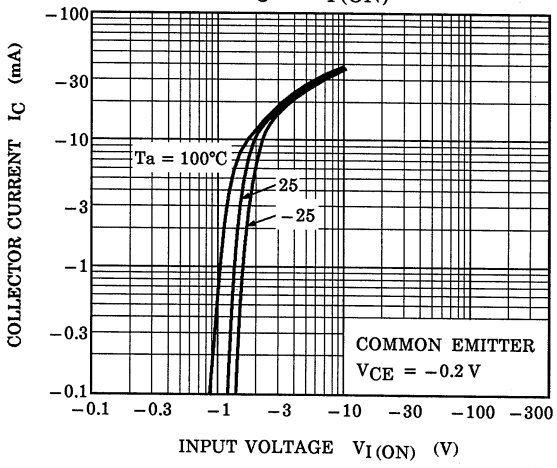
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2901FE to 2906FE	I_{CBO}	V_{CB} = –50 V, I_E = 0	—	—	–100	nA
		I_{CEO}	V_{CE} = –50 V, I_B = 0	—	—	–500	
Emitter cut-off current	RN2901FE	I_{EBO}	V_{EB} = –10 V, I_C = 0	–0.82	—	–1.52	mA
	RN2902FE			–0.38	—	–0.71	
	RN2903FE			–0.17	—	–0.33	
	RN2904FE			–0.082	—	–0.15	
	RN2905FE		V_{EB} = –5 V, I_C = 0	–0.078	—	–0.145	
	RN2906FE			–0.074	—	–0.138	
DC current gain	RN2901FE	h_{FE}	V_{CE} = –5 V, I_C = –10 mA	30	—	—	
	RN2902FE			50	—	—	
	RN2903FE			70	—	—	
	RN2904FE			80	—	—	
	RN2905FE			80	—	—	
	RN2906FE			80	—	—	
Collector-emitter saturation voltage	RN2901FE to 2906FE	$V_{CE\ (sat)}$	I_C = –5 mA, I_B = –0.25 mA	—	–0.1	–0.3	V
Input voltage (ON)	RN2901FE	$V_{I\ (ON)}$	V_{CE} = –0.2 V, I_C = –5 mA	–1.1	—	–2.0	V
	RN2902FE			–1.2	—	–2.4	
	RN2903FE			–1.3	—	–3.0	
	RN2904FE			–1.5	—	–5.0	
	RN2905FE			–0.6	—	–1.1	
	RN2906FE			–0.7	—	–1.3	
Input voltage (OFF)	RN2901FE to 2904FE	$V_{I\ (OFF)}$	V_{CE} = –5 V, I_C = –0.1 mA	–1.0	—	–1.5	V
	RN2905FE, RN2906FE			–0.5	—	–0.8	
Transition frequency	RN2901FE to 2906FE	f_T	V_{CE} = –10 V, I_C = –5 mA	—	200	—	MHz
Collector output capacitance	RN2901FE to 2906FE	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1 MHz	—	3	6	pF
Input resistor	RN2901FE	R1	—	3.29	4.7	6.11	kΩ
	RN2902FE			7	10	13	
	RN2903FE			15.4	22	28.6	
	RN2904FE			32.9	47	61.1	
	RN2905FE			1.54	2.2	2.86	
	RN2906FE			3.29	4.7	6.11	
Resistor ratio	RN2901FE to 2904FE	R1/R2	—	0.9	1.0	1.1	
	RN2905FE			0.0421	0.0468	0.0515	
	RN2906FE			0.09	0.1	0.11	

Q1, Q2 Common

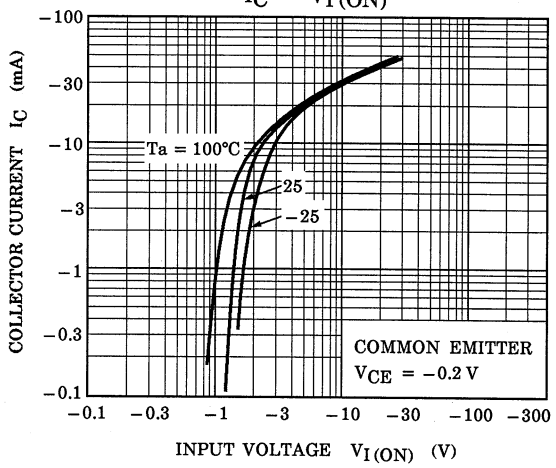
RN2901FE $I_C - V_{I(ON)}$



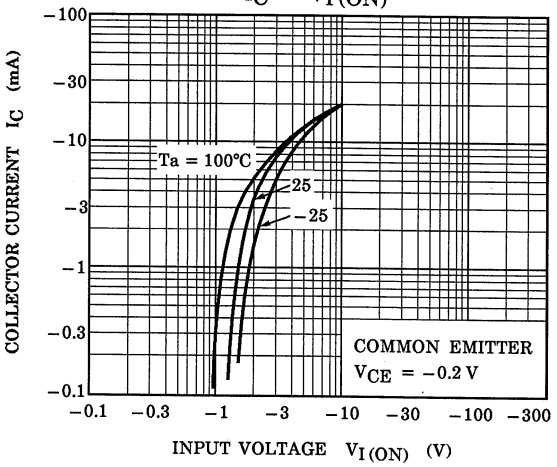
RN2902FE $I_C - V_{I(ON)}$



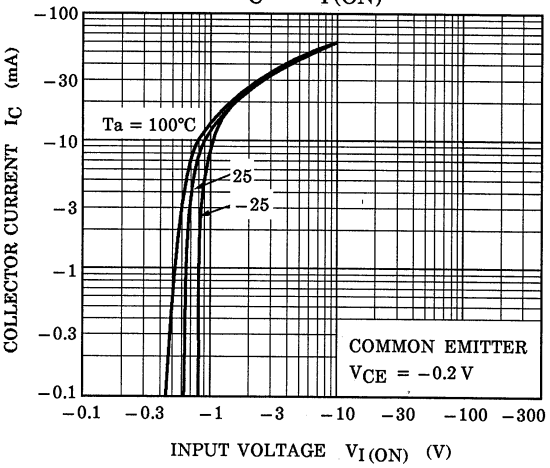
RN2903FE $I_C - V_{I(ON)}$



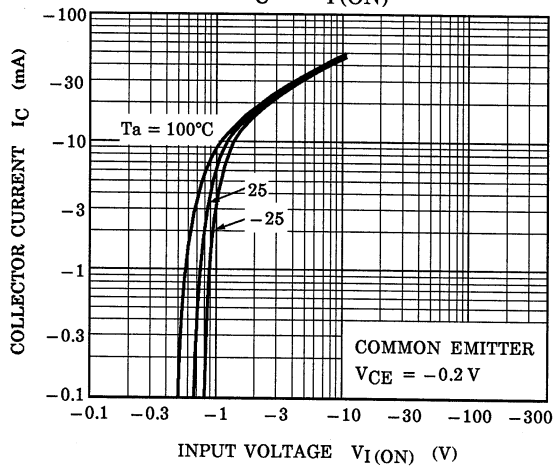
RN2904FE $I_C - V_{I(ON)}$



RN2905FE $I_C - V_{I(ON)}$

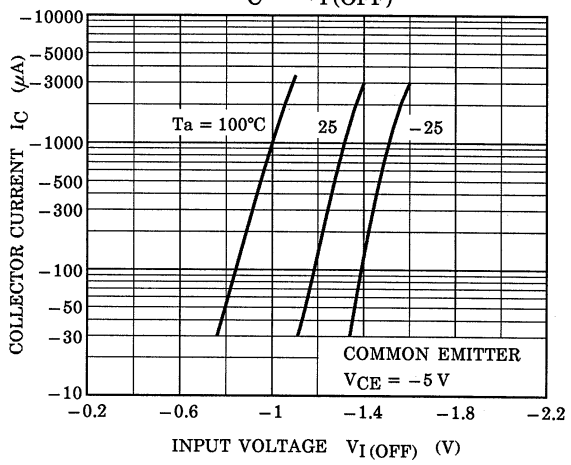


RN2906FE $I_C - V_{I(ON)}$

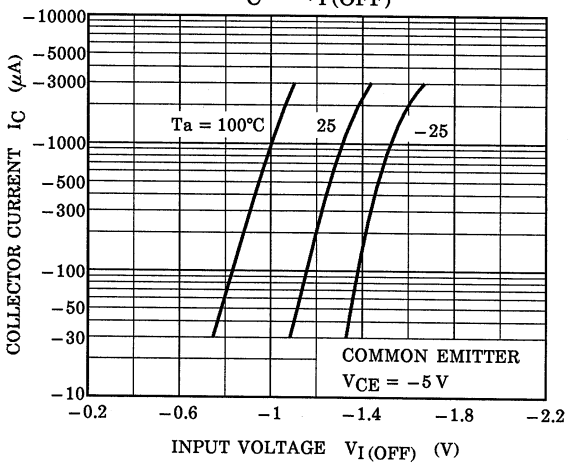


Q1, Q2 Common

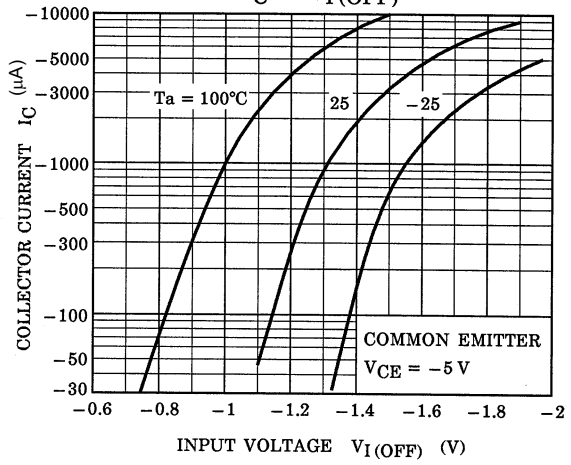
RN2901FE $I_C - V_{I(OFF)}$



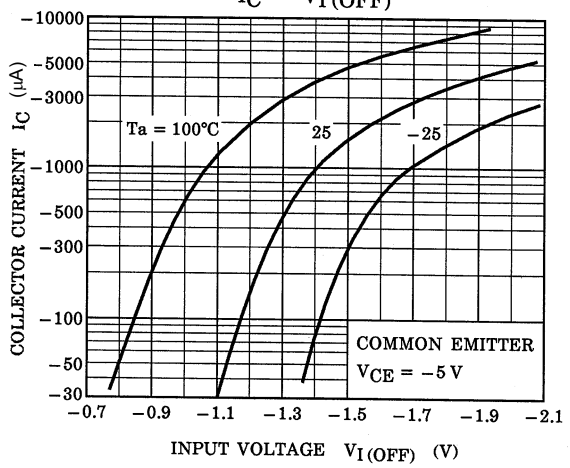
RN2902FE $I_C - V_{I(OFF)}$



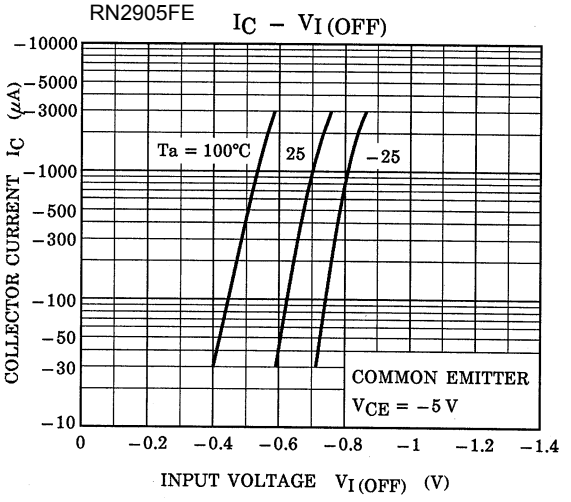
RN2903FE $I_C - V_{I(OFF)}$



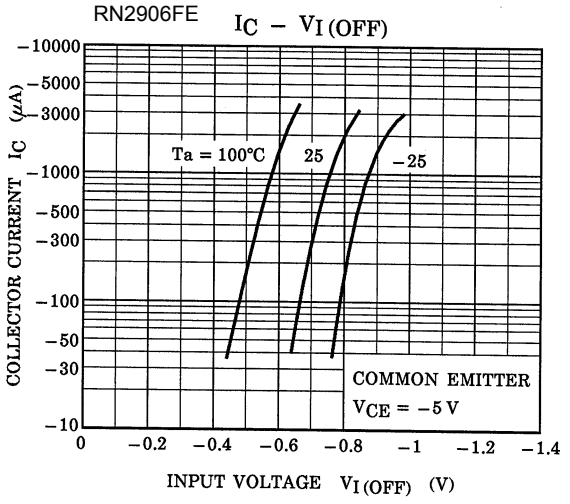
RN2904FE $I_C - V_{I(OFF)}$



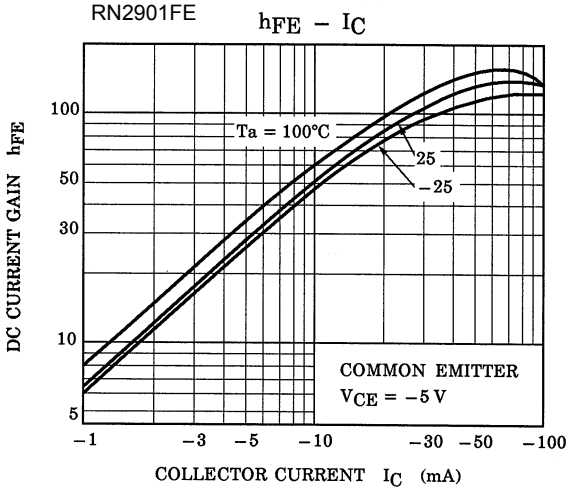
RN2905FE $I_C - V_{I(OFF)}$



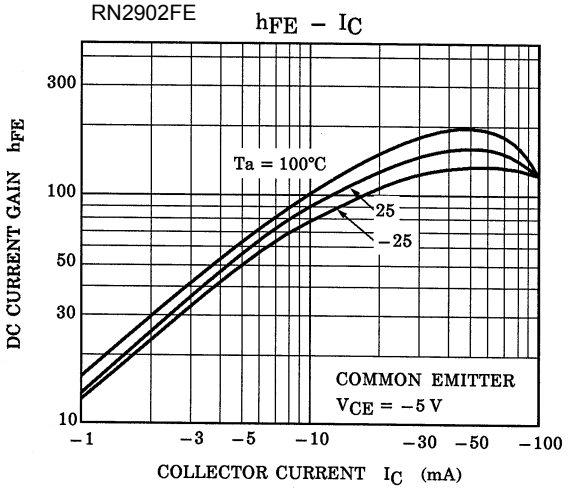
RN2906FE $I_C - V_{I(OFF)}$



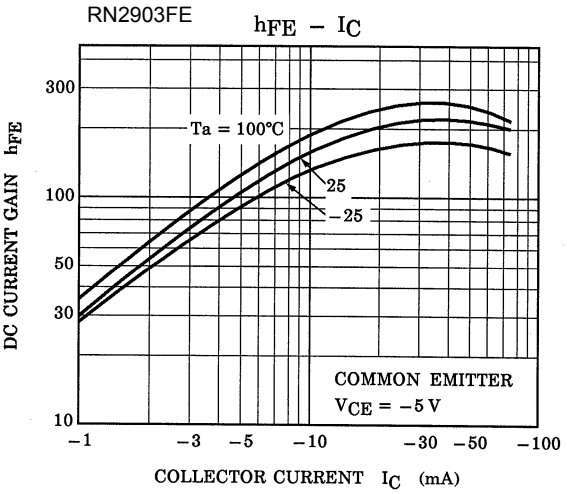
RN2901FE



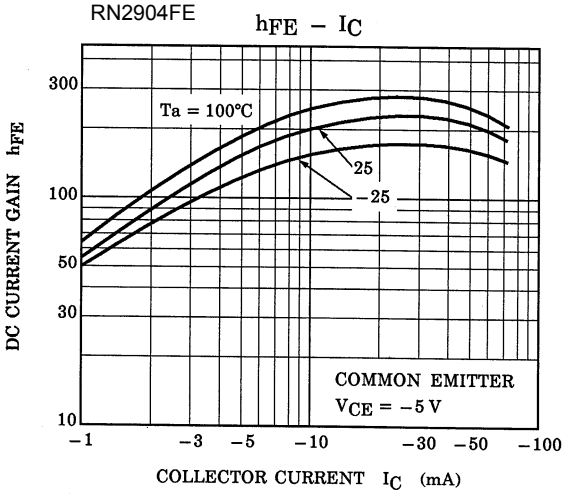
RN2902FE



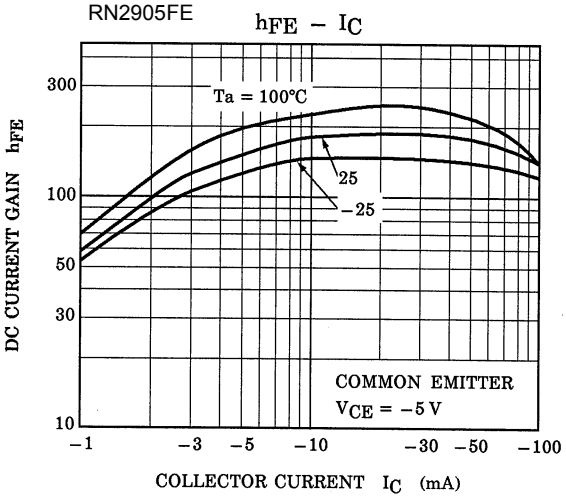
RN2903FE



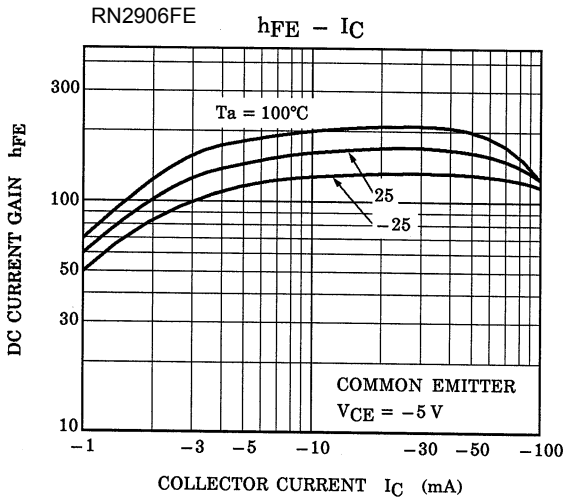
RN2904FE



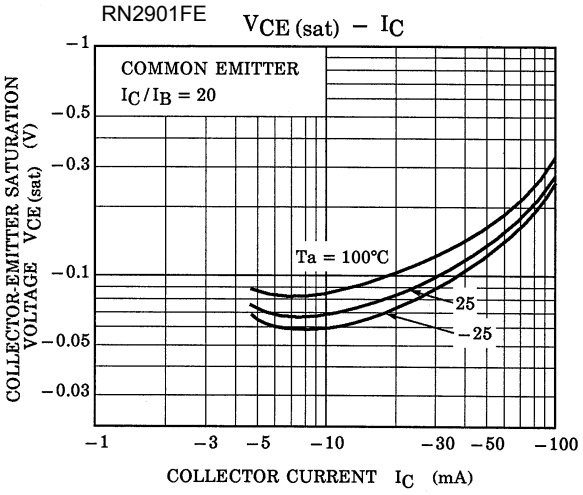
RN2905FE



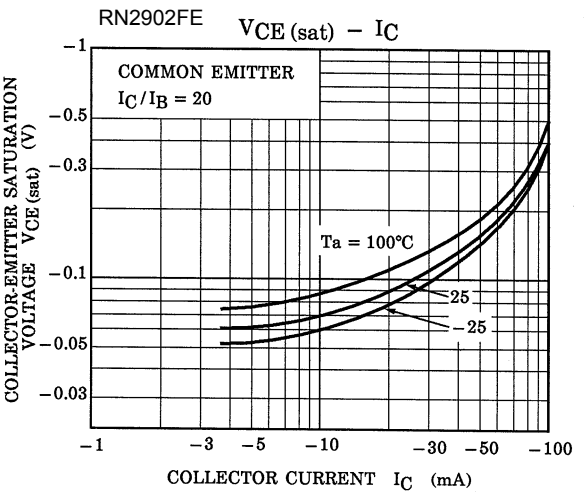
RN2906FE



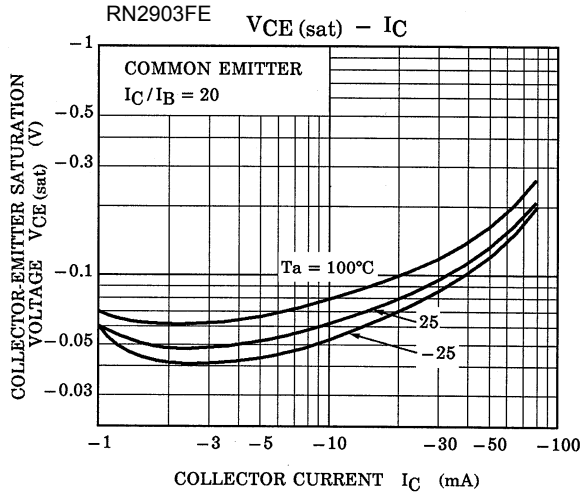
RN2901FE



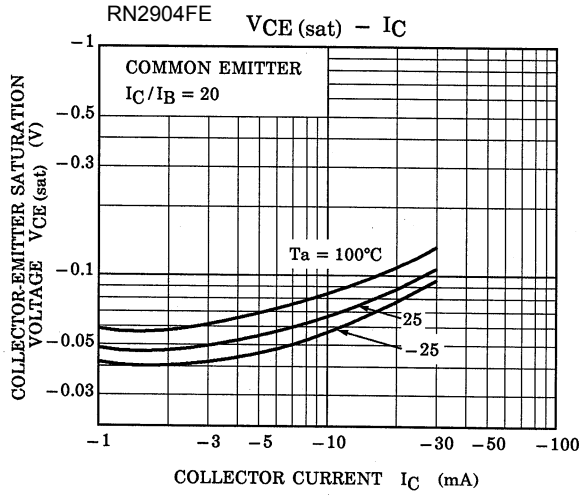
RN2902FE



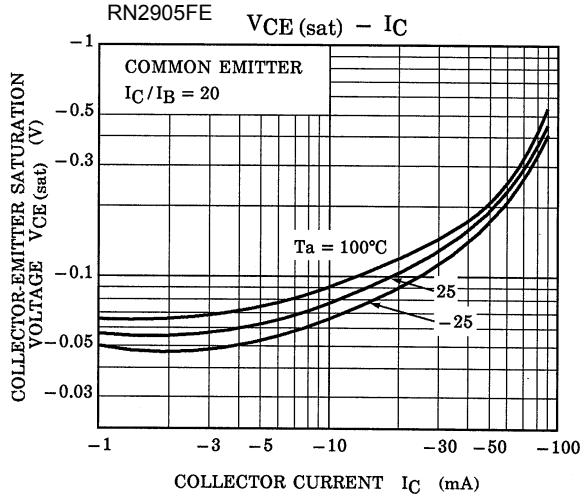
RN2903FE



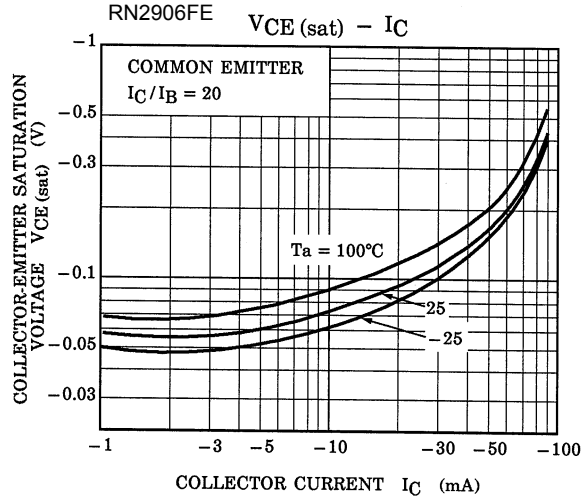
RN2904FE

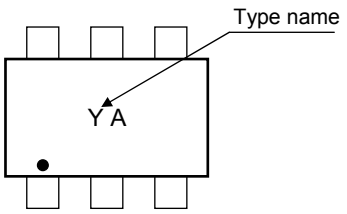
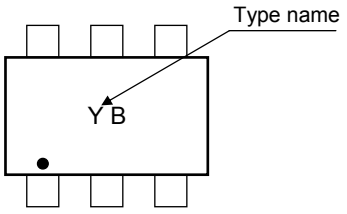
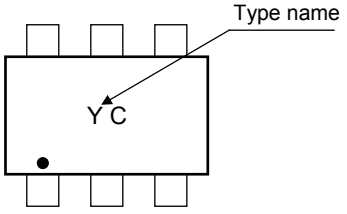
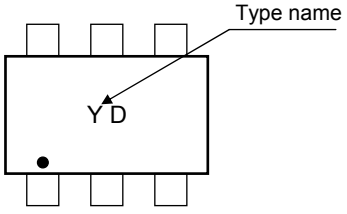
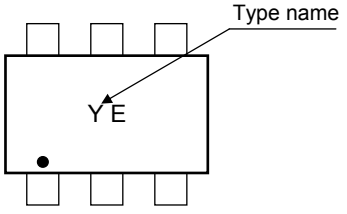
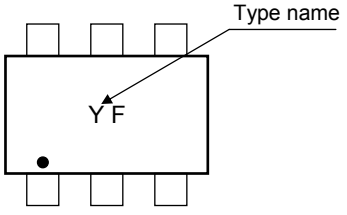


RN2905FE



RN2906FE



Type Name	Marking
RN2901FE	
RN2902FE	
RN2903FE	
RN2904FE	
RN2905FE	
RN2906FE	

RESTRICTIONS ON PRODUCT USE

- Toshiba Corporation, and its subsidiaries and affiliates (collectively "TOSHIBA"), reserve the right to make changes to the information in this document, and related hardware, software and systems (collectively "Product") without notice.
- This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
- Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
- **PRODUCT IS NEITHER INTENDED NOR WARRANTED FOR USE IN EQUIPMENTS OR SYSTEMS THAT REQUIRE EXTRAORDINARILY HIGH LEVELS OF QUALITY AND/OR RELIABILITY, AND/OR A MALFUNCTION OR FAILURE OF WHICH MAY CAUSE LOSS OF HUMAN LIFE, BODILY INJURY, SERIOUS PROPERTY DAMAGE AND/OR SERIOUS PUBLIC IMPACT ("UNINTENDED USE").** Except for specific applications as expressly stated in this document, Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. **IF YOU USE PRODUCT FOR UNINTENDED USE, TOSHIBA ASSUMES NO LIABILITY FOR PRODUCT.** For details, please contact your TOSHIBA sales representative.
- Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the applicable export laws and regulations including, without limitation, the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. **TOSHIBA ASSUMES NO LIABILITY FOR DAMAGES OR LOSSES OCCURRING AS A RESULT OF NONCOMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.**

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Bipolar Transistors - Pre-Biased ***category:***

Click to view products by Toshiba ***manufacturer:***

Other Similar products are found below :

RN1607(TE85L,F) DTA124GKAT146 DTA144WETL DTA144WKAT146 DTC113EET1G DTC115TETL DTC115TKAT146 DTC124TETL DTC144ECA-TP DTC144VUAT106 MUN5241T1G BCR158WH6327XTSA1 NSBA114TDP6T5G NSBA143ZF3T5G NSBC114YF3T5G NSBC123TF3T5G SMUN5235T1G SMUN5330DW1T1G SSVMUN5312DW1T2G RN1303(TE85L,F) RN4605(TE85L,F) TTEPROTOTYPE79 DDTC114EUAQ-7-F EMH15T2R SMUN2214T3G NSBC114TF3T5G NSBC143ZPDP6T5G NSVMUN5113DW1T3G SMUN5230DW1T1G SMUN5133T1G SMUN2214T1G DTC114EUA-TP NSBA144EF3T5G NSVDTA114EET1G 2SC2223-T1B-A 2SC3912-TB-E SMUN5237DW1T1G SMUN5213DW1T1G SMUN5114DW1T1G SMUN2111T1G NSVDTC144EM3T5G DTC124ECA-TP DTC123TM3T5G DTA114ECA-TP DTA113EM3T5G DCX115EK-7-F DTC113EM3T5G NSVMUN5135DW1T1G NSVMUN2237T1G NSVDTC143ZM3T5G