UNR9211/9212/9213/9214/9215/9216/9217/9218/9219/9210/921D/921E/921F/921K/921L/921M/921N/921AJ/921BJ/921CJ

(UN9211/9212/9213/9214/9215/9216/9217/9218/9219/9210/921D/921E/921F/921K/921L/921M/921N/921AJ/921BJ/921CJ)

Silicon NPN epitaxial planer transistor

For digital circuits

Features

- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- SS-Mini type package, allowing automatic insertion through tape packing and magazine packing.

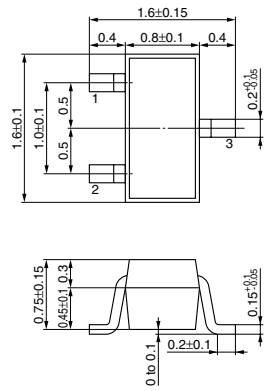
Resistance by Part Number

	Marking Symbol	(R_1)	(R_2)
● UNR9211	8A	10kΩ	10kΩ
● UNR9212	8B	22kΩ	22kΩ
● UNR9213	8C	47kΩ	47kΩ
● UNR9214	8D	10kΩ	47kΩ
● UNR9215	8E	10kΩ	—
● UNR9216	8F	4.7kΩ	—
● UNR9217	8H	22kΩ	—
● UNR9218	8I	0.51kΩ	5.1kΩ
● UNR9219	8K	1kΩ	10kΩ
● UNR9210	8L	47kΩ	—
● UNR921D	8M	47kΩ	10kΩ
● UNR921E	8N	47kΩ	22kΩ
● UNR921F	8O	4.7kΩ	10kΩ
● UNR921K	8P	10kΩ	4.7kΩ
● UNR921L	8Q	4.7kΩ	4.7kΩ
● UNR921M	EL	2.2kΩ	47kΩ
● UNR921N	EX	4.7kΩ	47kΩ
● UNR921AJ	8X	100kΩ	100kΩ
● UNR921BJ	8Y	100kΩ	—
● UNR921CJ	8Z	—	47kΩ

Absolute Maximum Ratings (Ta=25˚C)

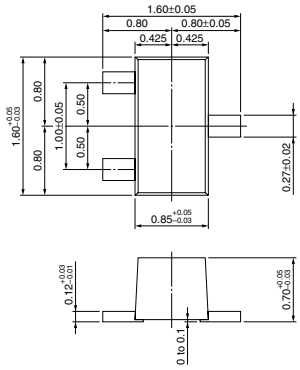
Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	50	V
Collector to emitter voltage	V_{CEO}	50	V
Collector current	I_C	100	mA
Total power dissipation	P_T	125	mW
Junction temperature	T_j	125	˚C
Storage temperature	T_{stg}	–55 to +125	˚C

Unit: mm



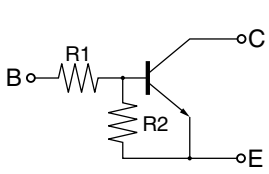
1 : Base
2 : Emitter
3 : Collector
SS–Mini Type Pakage

Unit: mm



1 : Base
2 : Emitter
3 : Collector
SS–Mini Flat Type Pakage (J type)

Internal Connection



Note.) The Part numbers in the Parenthesis show conventional part number.

Electrical Characteristics (Ta=25°C)

Parameter		Symbol	Conditions	min	typ	max	Unit
Collector cutoff current		I_{CBO}	V_{CB} = 50V, I_E = 0			0.1	μA
		I_{CEO}	V_{CE} = 50V, I_B = 0			0.5	μA
Emitter cutoff current	UNR9211	I_{EBO}	V_{EB} = 6V, I_C = 0			0.5	mA
	UNR9212/9214/921E/921D					0.2	
	UNR9213/UNR921M/921N/UNR921AJ					0.1	
	UNR9215/9216/9217/9210/UNR921BJ					0.01	
	UNR921F/921K					1.0	
	UNR9219					1.5	
	UNR9218/921L/UNR921CJ					2.0	
Collector to base voltage		V_{CBO}	I_C = 10μA, I_E = 0	50			V
Collector to emitter voltage		V_{CEO}	I_C = 2mA, I_B = 0	50			V
Forward current transfer ratio	UNR9211	h_{FE}	V_{CE} = 10V, I_C = 5mA	35			
	UNR9212/921E			60			
	UNR9213/9214/921M/UNR921AJ/921CJ			80			
	UNR9215*/9216*/9217*/9210*/UNR921BJ			160		460	
	UNR921F/921D/9219			30			
	UNR9218/921K/921L			20			
	UNR921N			80		400	
Collector to emitter saturation voltage		$V_{CE(sat)}$	I_C = 10mA, I_B = 0.3mA			0.25	V
Output voltage high level		V_{OH}	V_{CC} = 5V, V_B = 0.5V, R_L = 1kΩ	4.9			V
Output voltage low level		V_{OL}	V_{CC} = 5V, V_B = 2.5V, R_L = 1kΩ			0.2	V
	UNR9213/921K/UNR921BJ		V_{OC} = 5V, V_B = 3.5V, R_1 = 1kΩ			0.2	
	UNR921D		V_{CC} = 5V, V_B = 10V, R_1 = 1kΩ			0.2	
	UNR921E		V_{CC} = 5V, V_B = 6V, R_L = 1kΩ			0.2	
	UNR921AJ		V_{CC} = 5V, V_B = 5V, R_L = 1kΩ			0.2	
Transition frequency		f_T	V_{CB} = 10V, I_E = –2mA, f = 200MHz		150		MHz
Input resistance	UNR9211/9214/9215/921K	R_1		(–30%)	10	(+30%)	kΩ
	UNR9212/9217				22		
	UNR9213/921D/921E/9210				47		
	UNR9216/921F/921L/UNR921N				4.7		
	UNR9218				0.51		
	UN9219/UNR921M				1		
	UNR921AJ/921BJ				100		

* h_{FE} rank classification (UNR9215/9216/9217/9210)

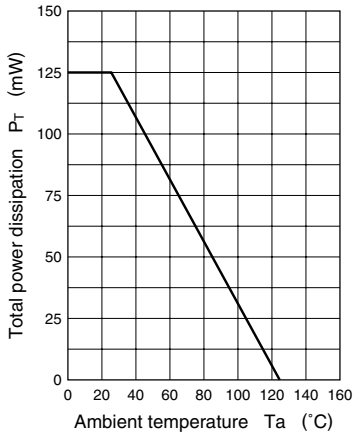
Rank	Q	R	S
h_{FE}	160 to 260	210 to 340	290 to 460

■ Electrical Characteristics (continued) (Ta=25˚C)

Parameter			Symbol	Conditions	min	typ	max	Unit
Resistance ratio	UNR9211/9212/9213/921L		R_1/R_2		0.8	1.0	1.2	
	UNR9214				0.17	0.21	0.25	
	UNR9218/9219				0.08	0.1	0.12	
	UNR921D					4.7		
	UNR921E					2.14		
	UNR921F					0. 47		
	UNR921K					2.13		
	UNR921M					0.047		
	UNR921N					0.1		
	UNR921AJ					1.0		
Resistance between Emitter to Base		UNR921CJ	R_2		–30%	47	30%	kΩ

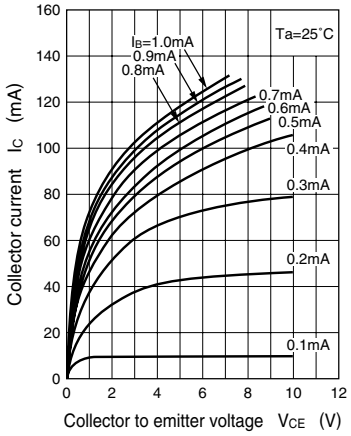
Common characteristics chart

P_T — Ta

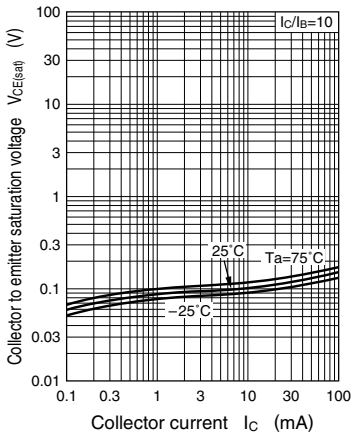


Characteristics charts of UNR9211

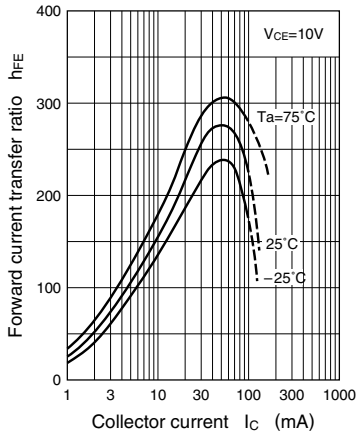
I_C — V_{CE}



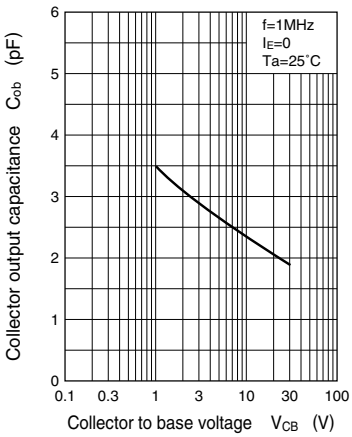
$V_{CE(sat)}$ — I_C



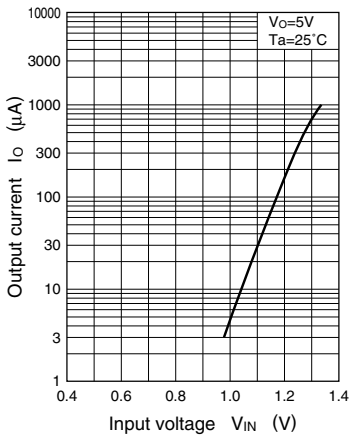
h_{FE} — I_C



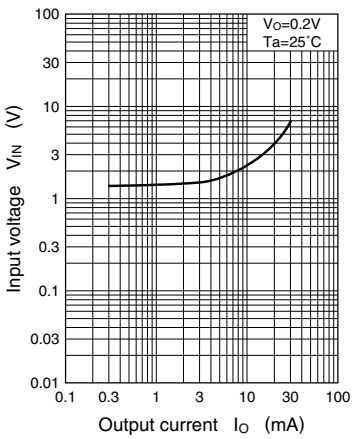
C_{ob} — V_{CB}



I_O — V_{IN}

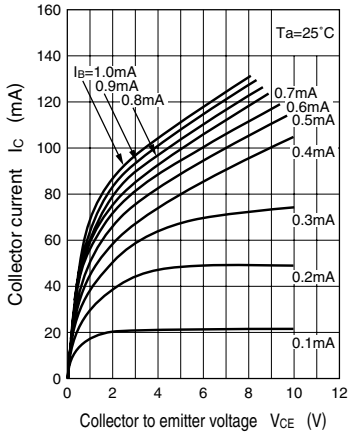


V_{IN} — I_O

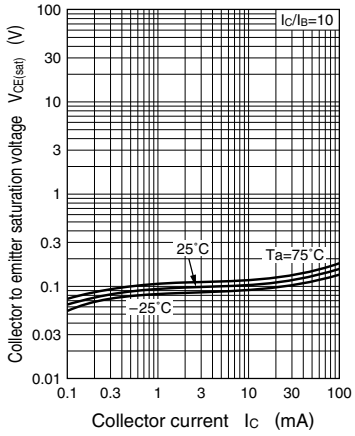


Characteristics charts of UNR9212

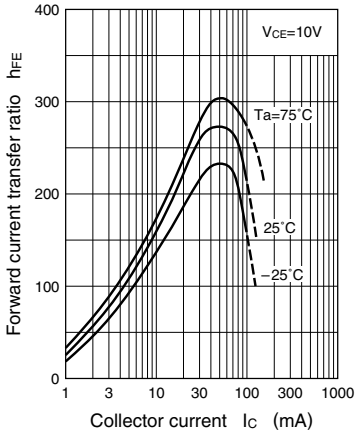
I_C — V_{CE}



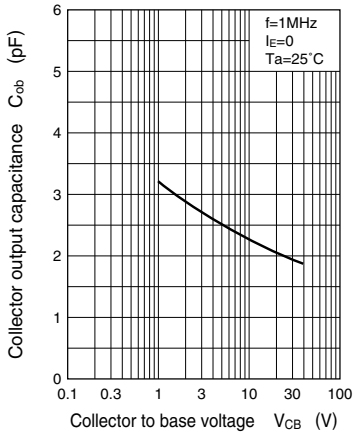
$V_{CE(sat)}$ — I_C



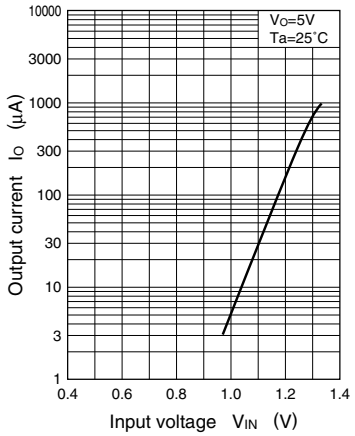
h_{FE} — I_C



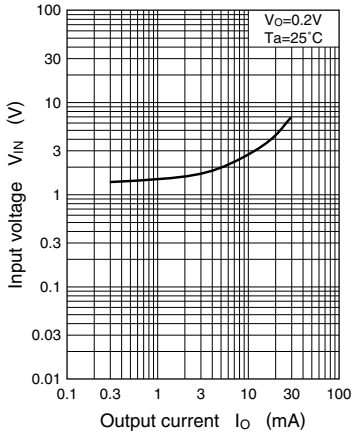
C_{ob} — V_{CB}



I_O — V_{IN}

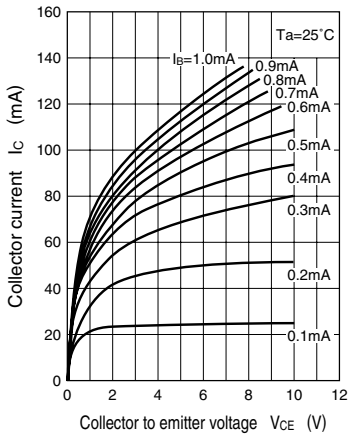


V_{IN} — I_O

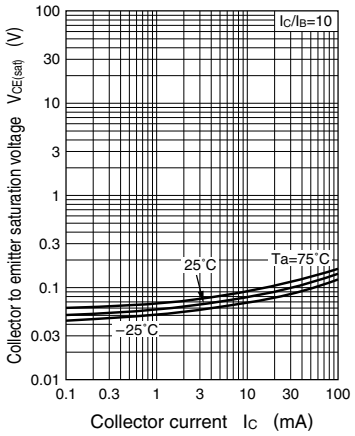


Characteristics charts of UNR9213

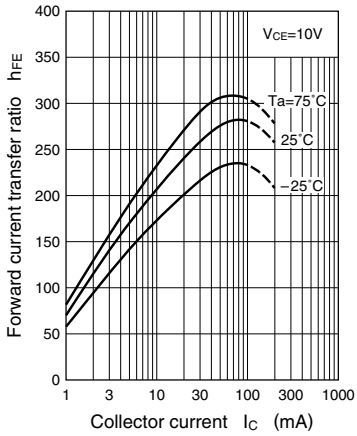
I_C — V_{CE}



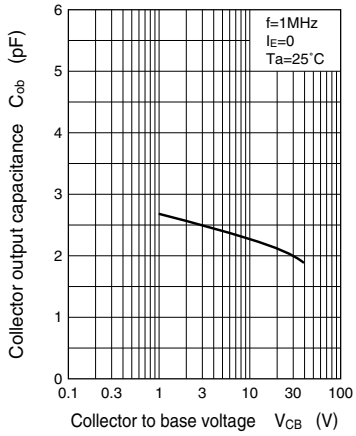
$V_{CE(sat)}$ — I_C



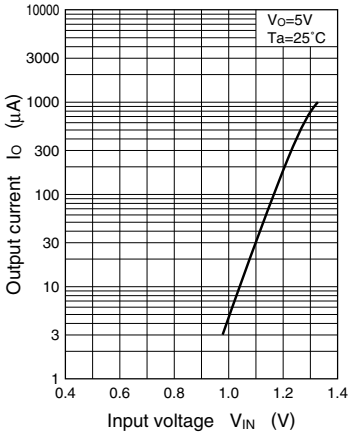
h_{FE} — I_C



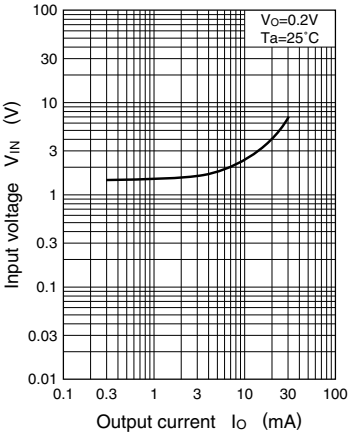
C_{ob} — V_{CB}



I_O — V_{IN}

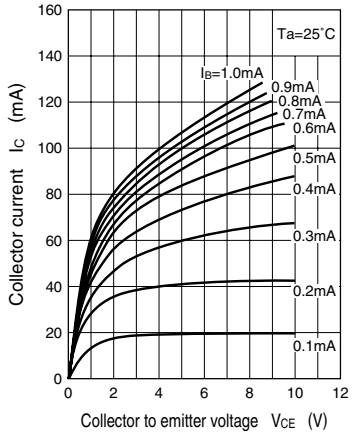


V_{IN} — I_O

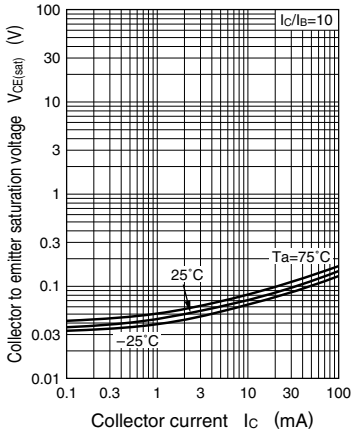


Characteristics charts of UNR9214

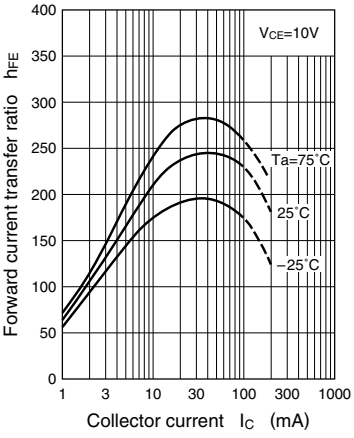
I_C — V_{CE}



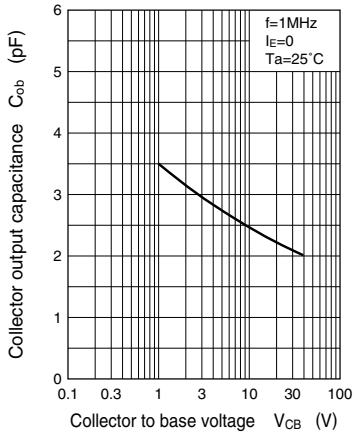
$V_{CE(sat)}$ — I_C



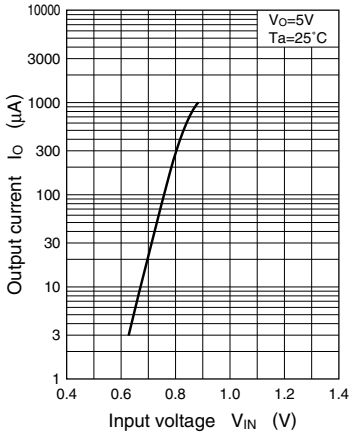
h_{FE} — I_C



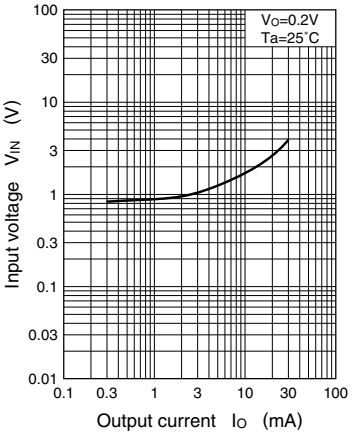
C_{ob} — V_{CB}



I_O — V_{IN}

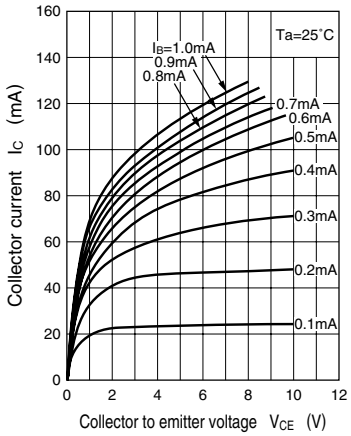


V_{IN} — I_O

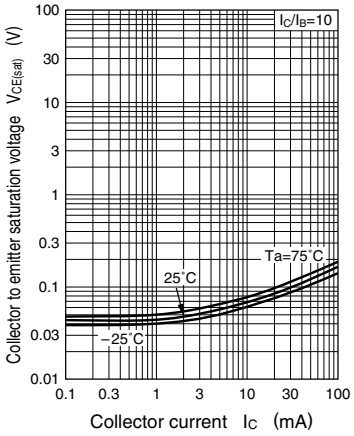


Characteristics charts of UNR9215

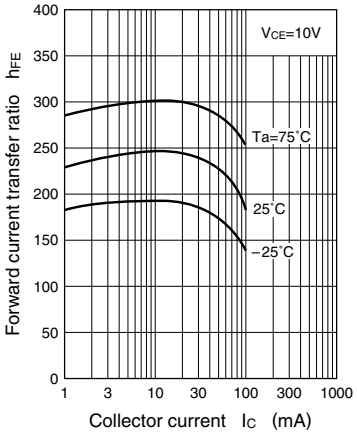
I_C — V_{CE}



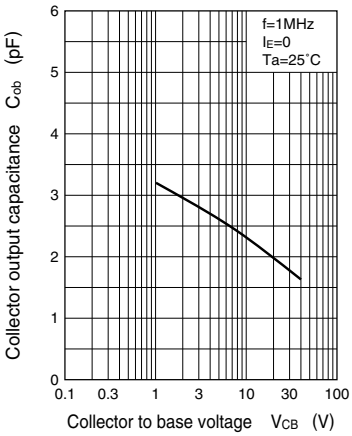
$V_{CE(sat)}$ — I_C



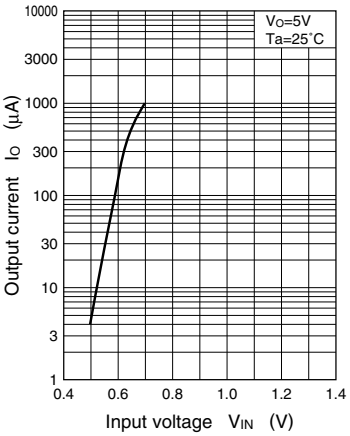
h_{FE} — I_C



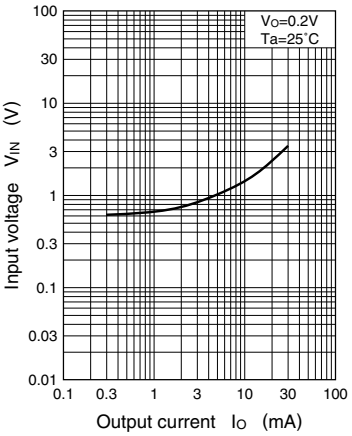
C_{ob} — V_{CB}



I_O — V_{IN}

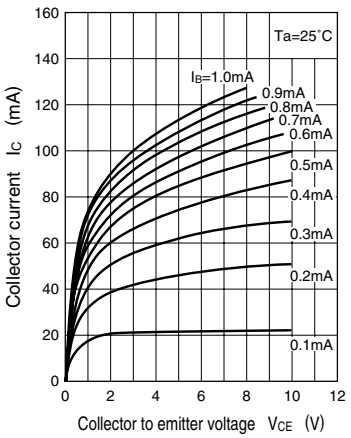


V_{IN} — I_O

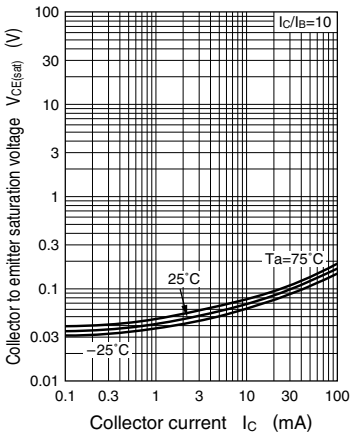


Characteristics charts of UNR9216

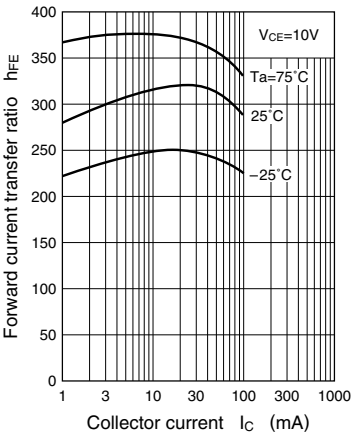
I_C — V_{CE}



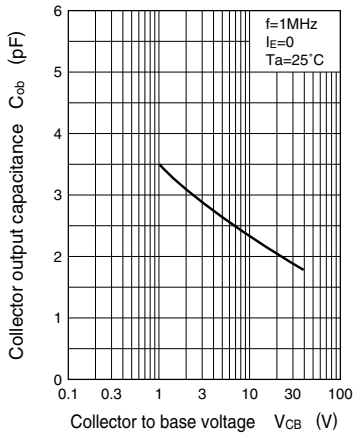
$V_{CE(sat)}$ — I_C



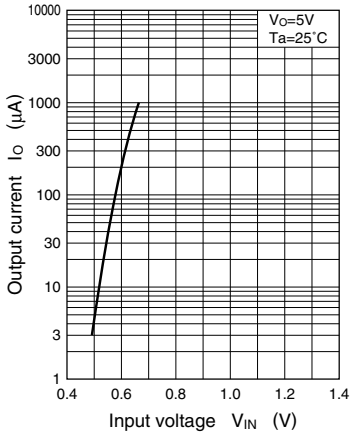
h_{FE} — I_C



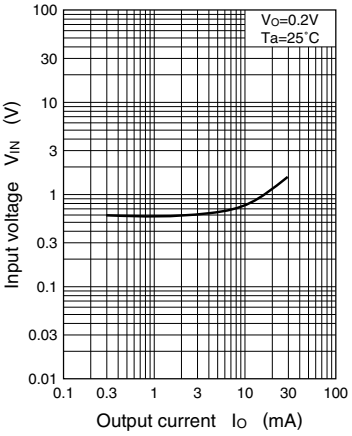
C_{ob} — V_{CB}



I_O — V_{IN}

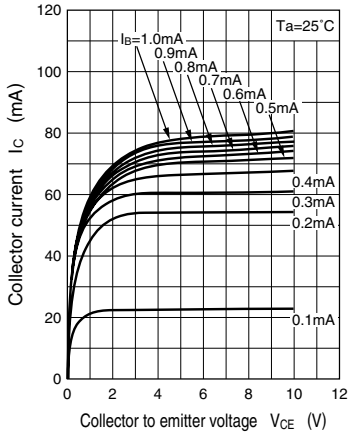


V_{IN} — I_O

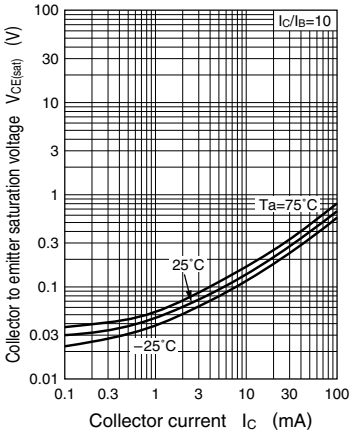


Characteristics charts of UNR9217

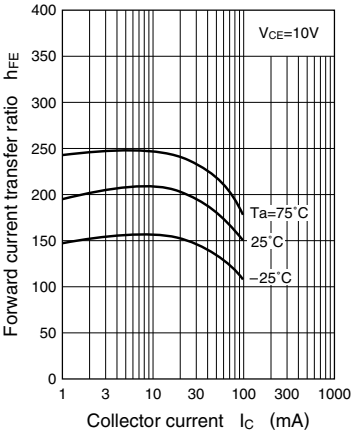
I_C — V_{CE}



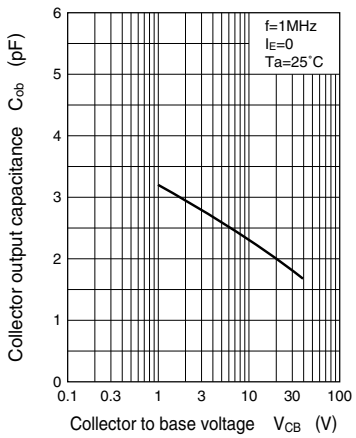
$V_{CE(sat)}$ — I_C



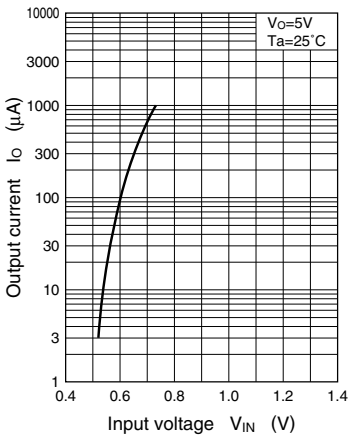
h_{FE} — I_C



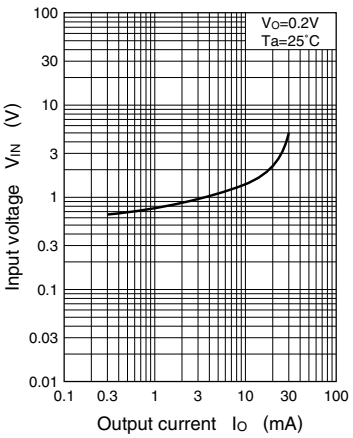
C_{ob} — V_{CB}



I_O — V_{IN}

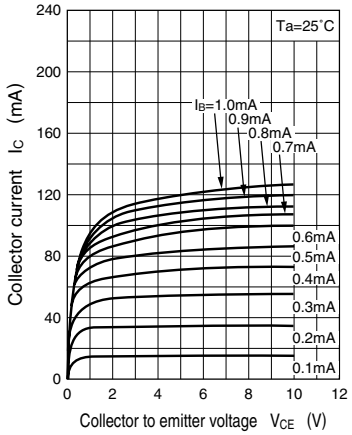


V_{IN} — I_O

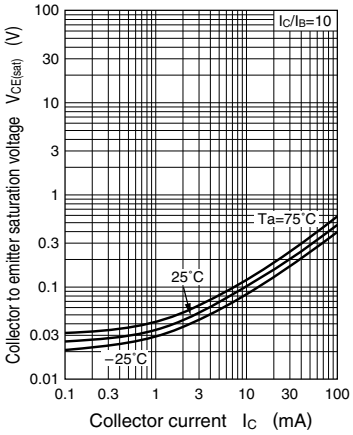


Characteristics charts of UNR9218

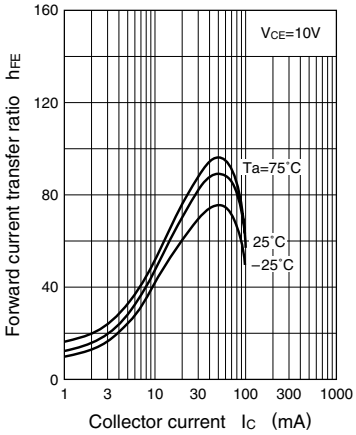
I_C — V_{CE}



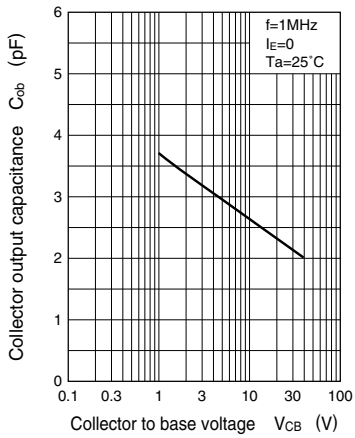
$V_{CE(sat)}$ — I_C



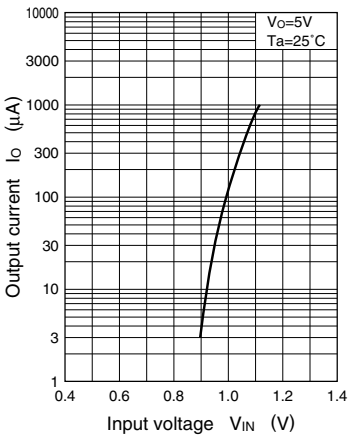
h_{FE} — I_C



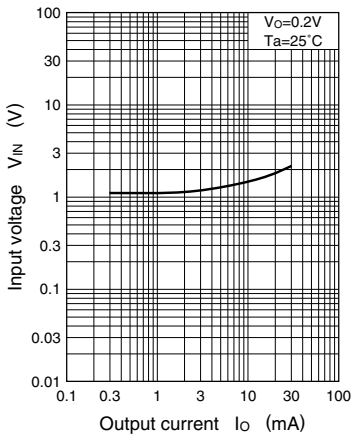
C_{ob} — V_{CB}



I_O — V_{IN}

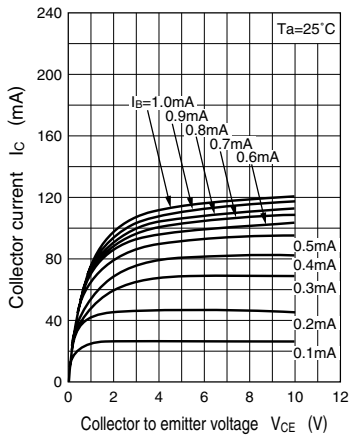


V_{IN} — I_O

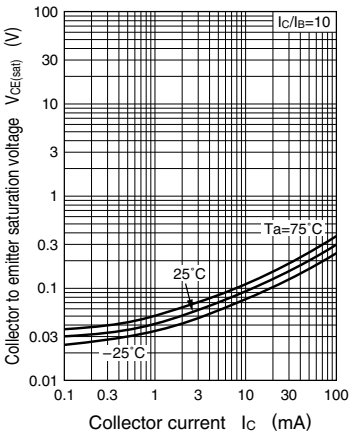


Characteristics charts of UNR9219

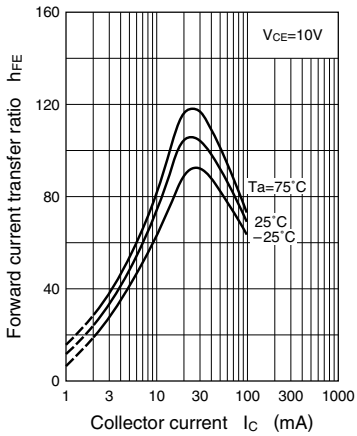
I_C — V_{CE}



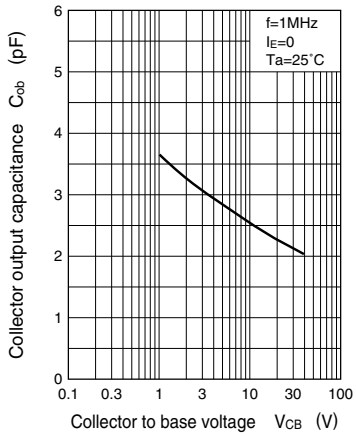
$V_{CE(sat)}$ — I_C



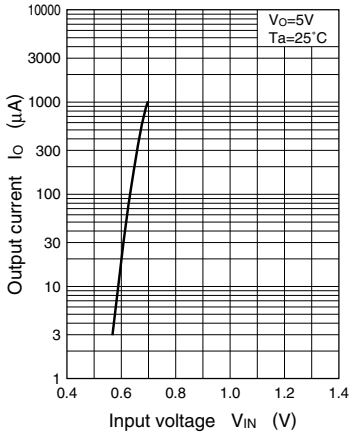
h_{FE} — I_C



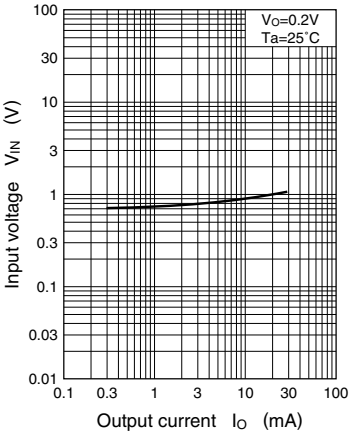
C_{ob} — V_{CB}



I_O — V_{IN}

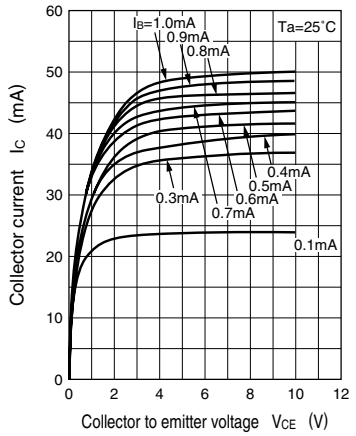


V_{IN} — I_O

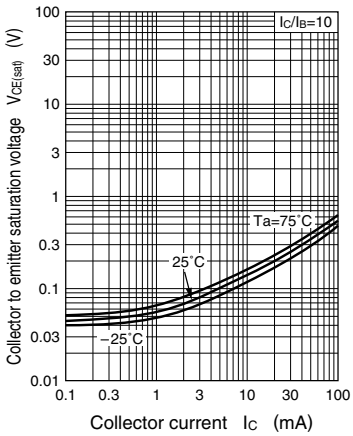


Characteristics charts of UNR9210

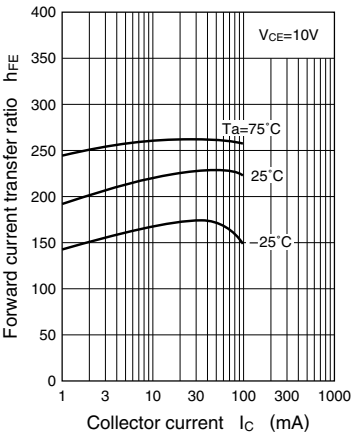
I_C — V_{CE}



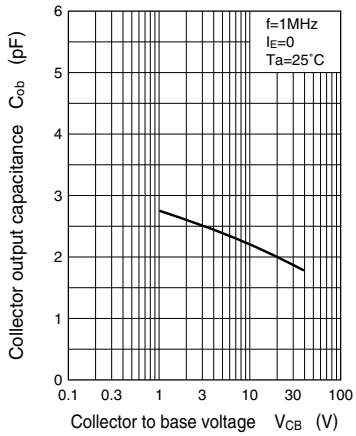
$V_{CE(sat)}$ — I_C



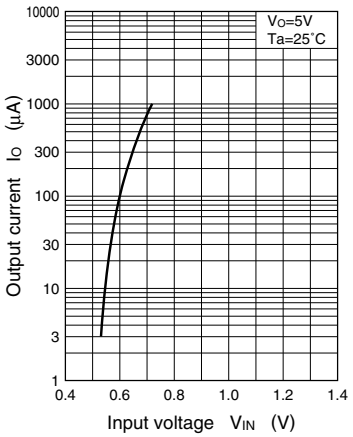
h_{FE} — I_C



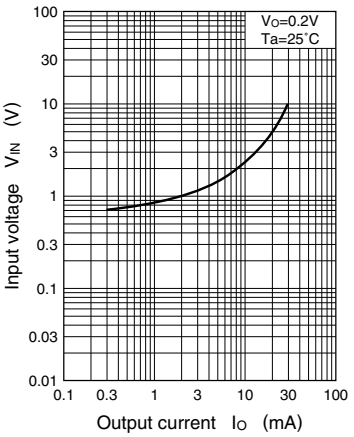
C_{ob} — V_{CB}



I_O — V_{IN}

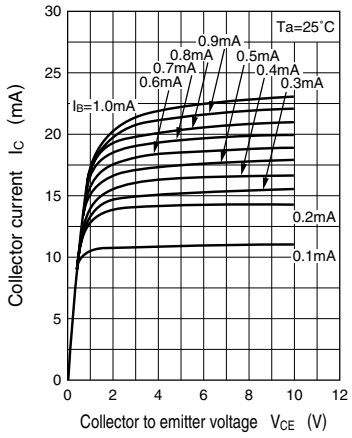


V_{IN} — I_O

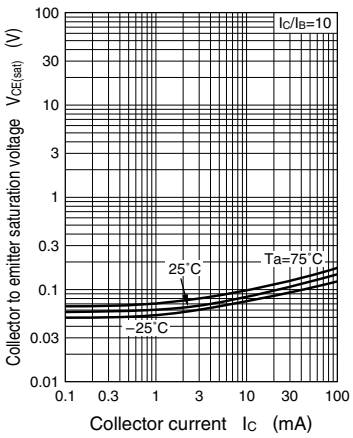


Characteristics charts of UNR921D

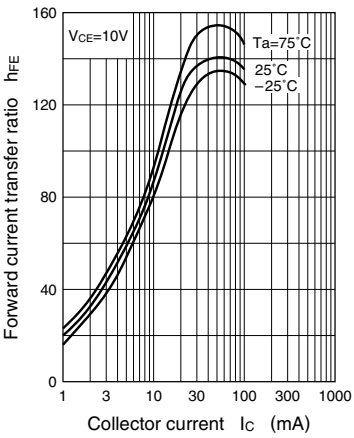
I_C — V_{CE}



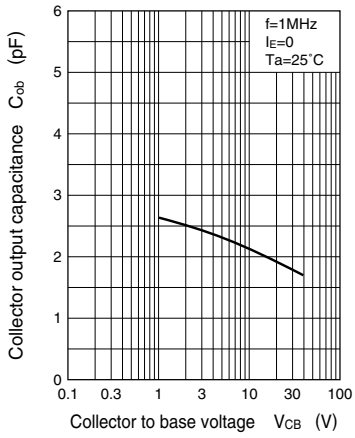
$V_{CE(sat)}$ — I_C



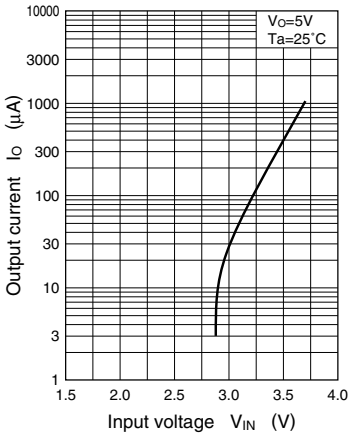
h_{FE} — I_C



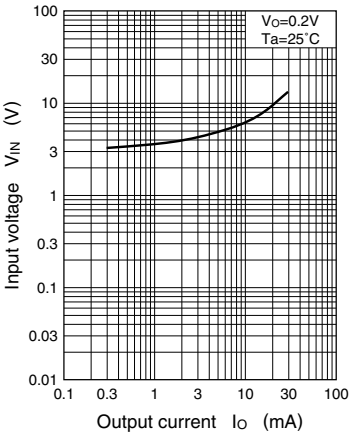
C_{ob} — V_{CB}



I_O — V_{IN}

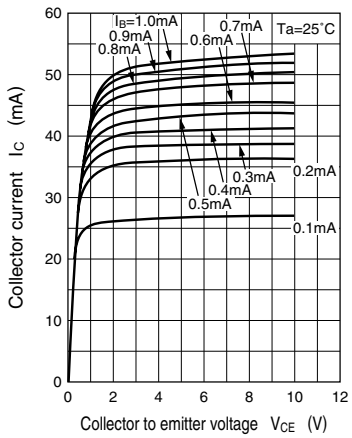


V_{IN} — I_O

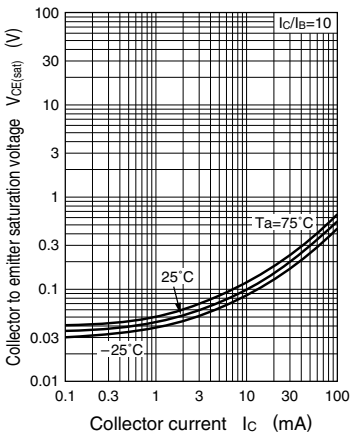


Characteristics charts of UNR921E

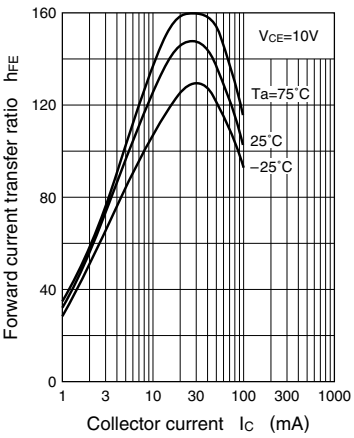
I_C — V_{CE}



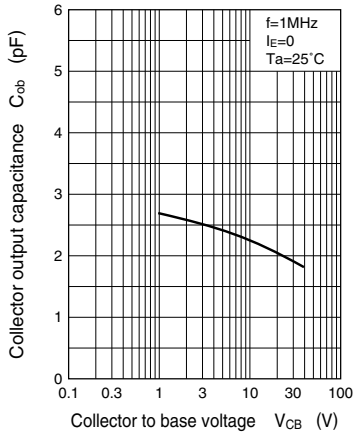
$V_{CE(sat)}$ — I_C



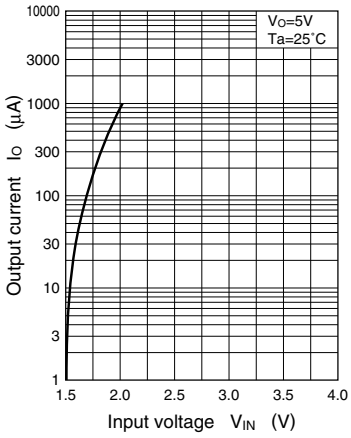
h_{FE} — I_C



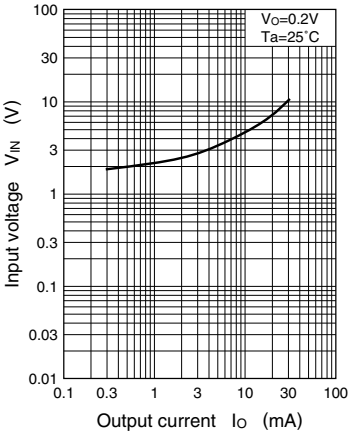
C_{ob} — V_{CB}



I_O — V_{IN}

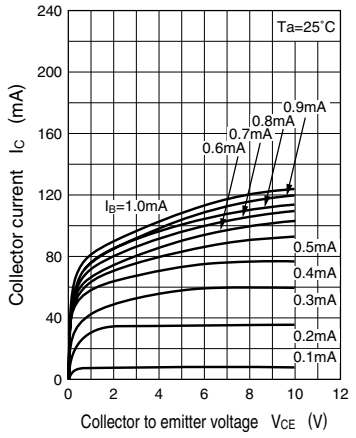


V_{IN} — I_O

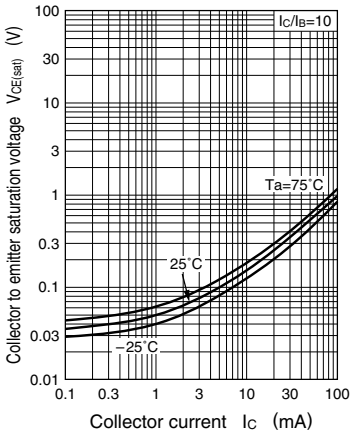


Characteristics charts of UNR921F

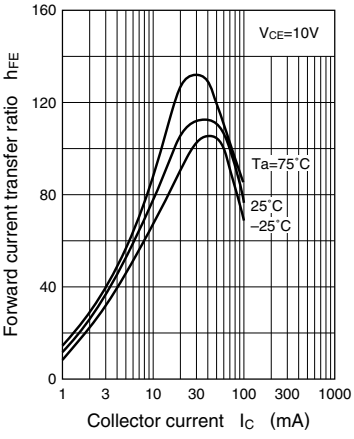
I_C — V_{CE}



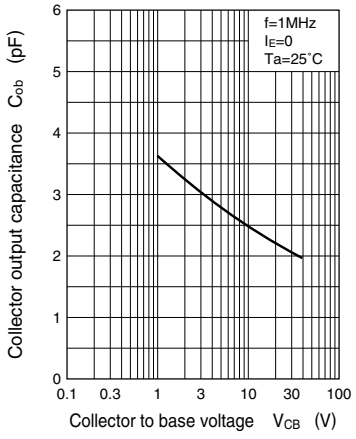
$V_{CE(sat)}$ — I_C



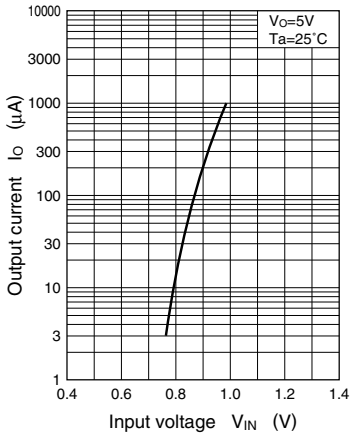
h_{FE} — I_C



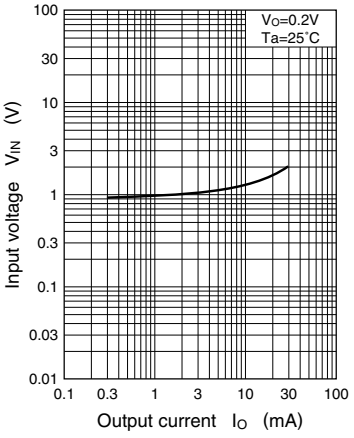
C_{ob} — V_{CB}



I_O — V_{IN}

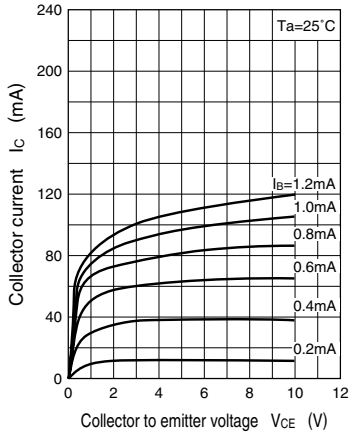


V_{IN} — I_O

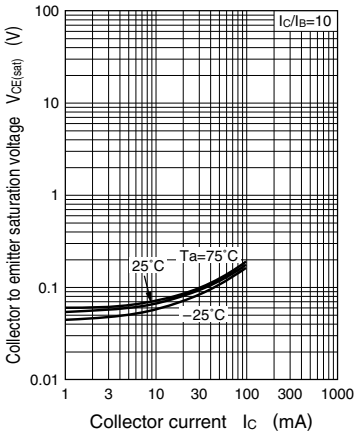


Characteristics charts of UNR921K

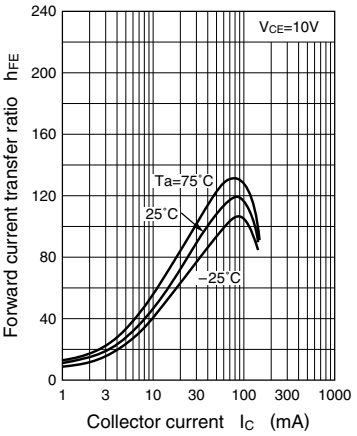
I_C — V_{CE}



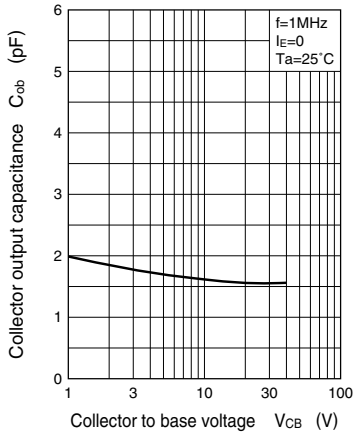
$V_{CE(sat)}$ — I_C



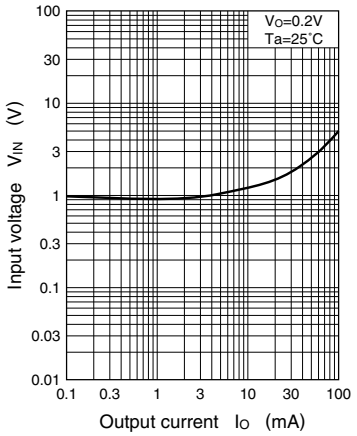
h_{FE} — I_C



C_{ob} — V_{CB}

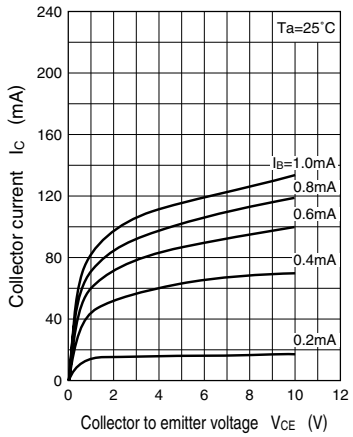


V_{IN} — I_O

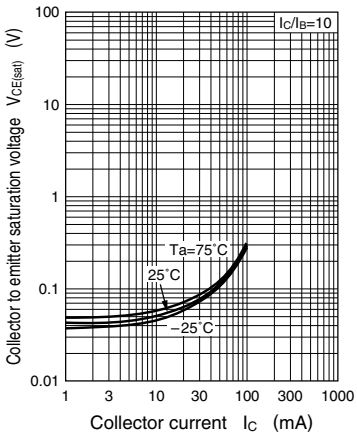


Characteristics charts of UNR921L

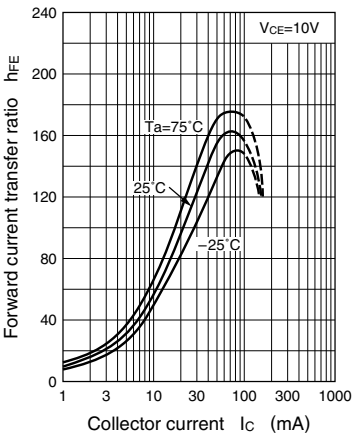
I_C — V_{CE}



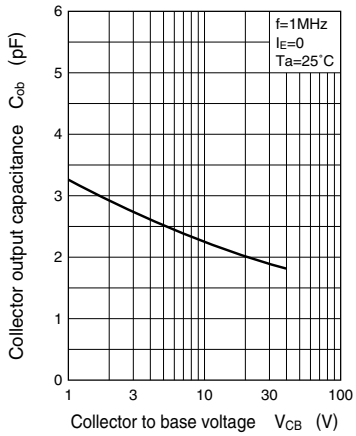
$V_{CE(sat)}$ — I_C



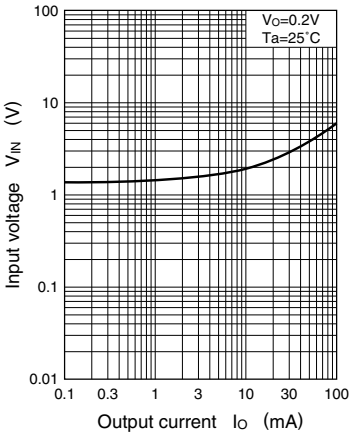
h_{FE} — I_C



C_{ob} — V_{CB}

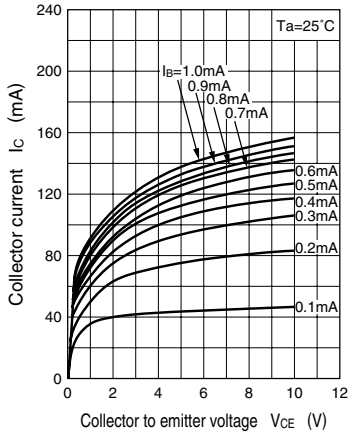


I_O — V_{IN}

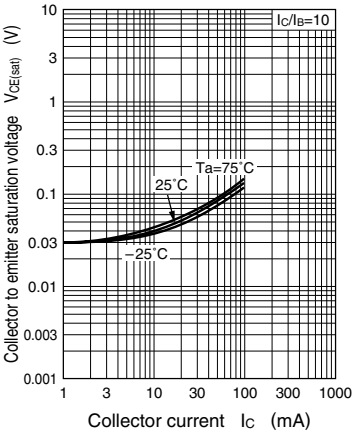


Characteristics charts of UNR921M

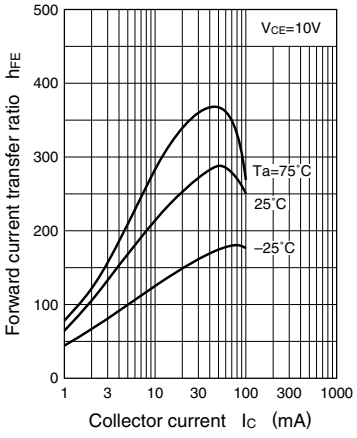
I_C — V_{CE}



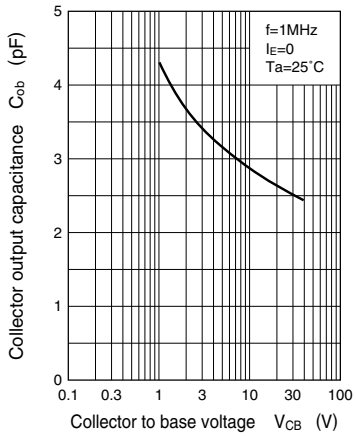
$V_{CE(sat)}$ — I_C



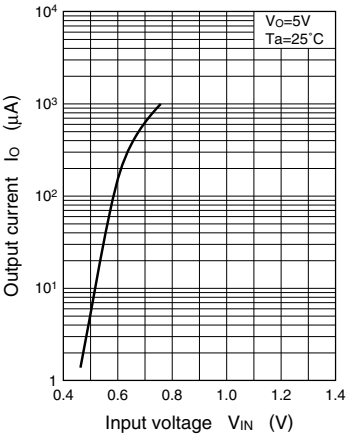
h_{FE} — I_C



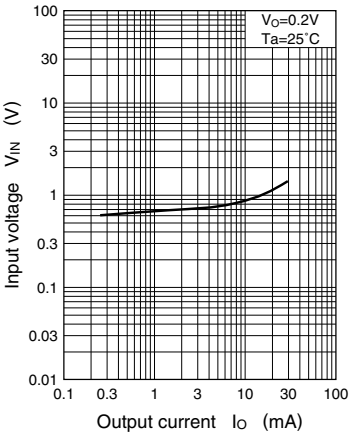
C_{ob} — V_{CB}



I_O — V_{IN}

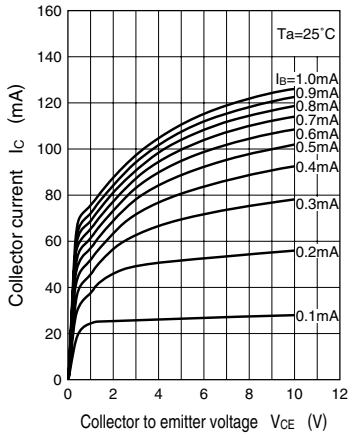


V_{IN} — I_O

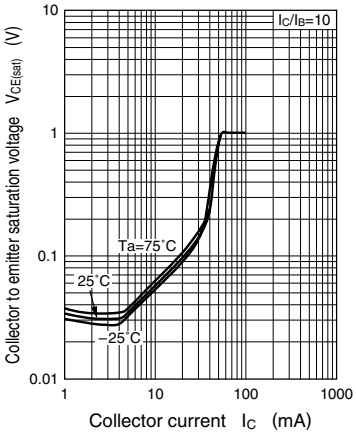


Characteristics charts of UNR921N

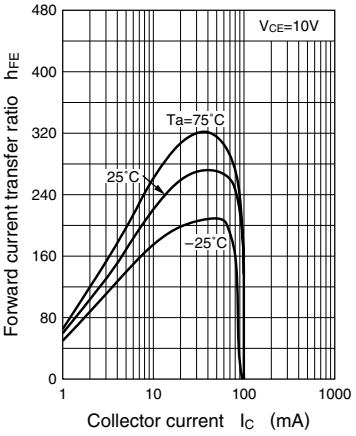
I_C — V_{CE}



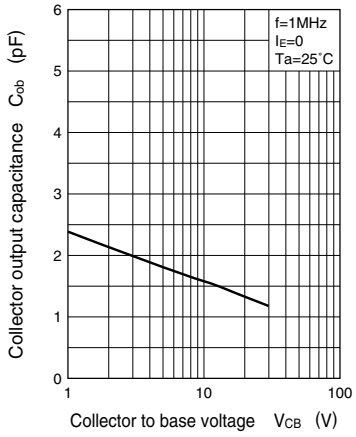
$V_{CE(sat)}$ — I_C



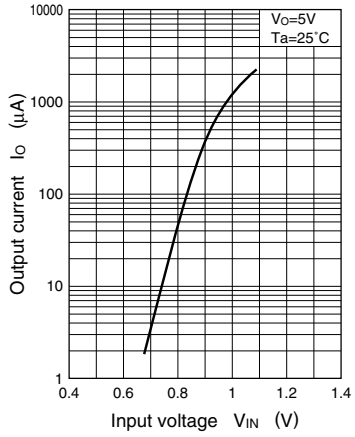
h_{FE} — I_C



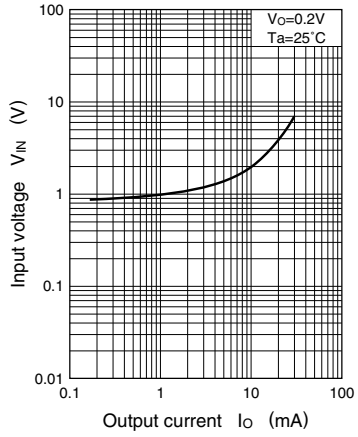
C_{ob} — V_{CB}



I_O — V_{IN}



V_{IN} — I_O



Request for your special attention and precautions in using the technical information and semiconductors described in this material

(1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

(2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.

(3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
- Any applications other than the standard applications intended.

(4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.

(6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.

(7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.

B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.

C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.

2001 MAR