

UNR521x Series (UN521x Series)

Silicon NPN epitaxial planar type

For digital circuits

■ Features

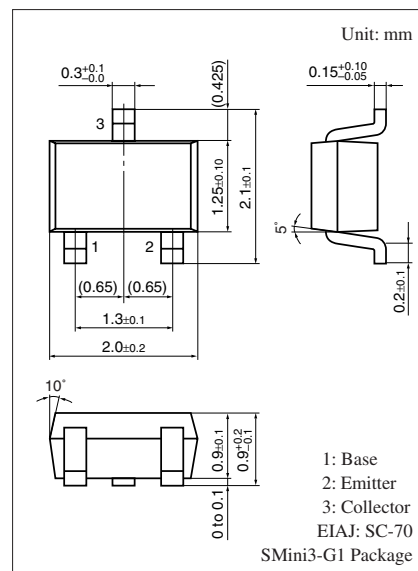
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts
- S-Mini type package, allowing automatic insertion through the tape packing and magazine packing

■ Resistance by Part Number

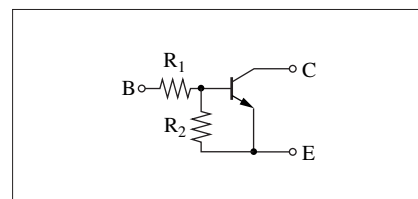
		Marking symbol (R ₁)	(R ₂)	
• UNR5210 (UN5210)	8L	47 kΩ	—	
• UNR5211 (UN5211)	8A	10 kΩ	10 kΩ	
• UNR5212 (UN5212)	8B	22 kΩ	22 kΩ	
• UNR5213 (UN5213)	8C	47 kΩ	47 kΩ	
• UNR5214 (UN5214)	8D	10 kΩ	47 kΩ	
• UNR5215 (UN5215)	8E	10 kΩ	—	
• UNR5216 (UN5216)	8F	4.7 kΩ	—	
• UNR5217 (UN5117)	8H	22 kΩ	—	
• UNR5218 (UN5218)	8I	0.51 kΩ	5.1 kΩ	
• UNR5219 (UN5219)	8K	1 kΩ	10 kΩ	
• UNR521D (UN521D)	8M	47 kΩ	10 kΩ	
• UNR521E (UN521E)	8N	47 kΩ	22 kΩ	
• UNR521F (UN521F)	8O	4.7 kΩ	10 kΩ	
• UNR521K (UN521K)	8P	10 kΩ	4.7 kΩ	
• UNR521L (UN521L)	8Q	4.7 kΩ	4.7 kΩ	
• UNR521M (UN521M)	EL	2.2 kΩ	47 kΩ	
• UNR521N (UN521N)	EX	4.7 kΩ	47 kΩ	
• UNR521T (UN521T)	EZ	22 kΩ	47 kΩ	
• UNR521V (UN521V)	FD	2.2 kΩ	2.2 kΩ	
• UNR521Z (UN521Z)	FF	4.7 kΩ	22 kΩ	

■ Absolute Maximum Ratings T_a = 25°C

Parameter	Symbol	Rating	Unit
Collector-base voltage (Emitter open)	V _{CBO}	50	V
Collector-emitter voltage (Base open)	V _{CEO}	50	V
Collector current	I _C	100	mA
Total power dissipation	P _T	150	mW
Junction temperature	T _j	150	°C
Storage temperature	T _{stg}	-55 to +150	°C



Internal Connection



Note) The part numbers in the parenthesis show conventional part number.

■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)		V_{CBO}	$I_{\text{C}} = 10\ \mu\text{A}$, $I_{\text{E}} = 0$	50			V
Collector-emitter voltage (Base open)		V_{CEO}	$I_{\text{C}} = 2\ \text{mA}$, $I_{\text{B}} = 0$	50			V
Collector-base cutoff current (Emitter open)		I_{CBO}	$V_{\text{CB}} = 50\ \text{V}$, $I_{\text{E}} = 0$			0.1	μA
Collector-emitter cutoff current (Base open)		I_{CEO}	$V_{\text{CE}} = 50\ \text{V}$, $I_{\text{B}} = 0$			0.5	
Emitter-base cutoff current (Collector open)	UNR5210/5215/5216/5217	I_{EBO}	$V_{\text{EB}} = 6\ \text{V}$, $I_{\text{C}} = 0$			0.01	mA
	UNR5213					0.1	
	UNR5212/5214/521D/ 521E/521M/521N/521T					0.2	
	UNR521Z					0.4	
	UNR5211					0.5	
	UNR521F/521K					1.0	
	UNR5219					1.5	
	UNR5218/521L/521V					2.0	
Forward current transfer ratio	UNR521V	h_{FE}	$V_{\text{CE}} = 10\ \text{V}$, $I_{\text{C}} = 5\ \text{mA}$	6		20	—
	UNR5218/521K/521L			20			
	UNR5219/521D/521F			30			
	UNR5211			35			
	UNR5212/521E			60			
	UNR521Z			60		200	
	UNR5213/5214/521M			80			
	UNR521N/521T			80		400	
	UNR5210*/5215*/5216*/5217*			160		460	
Collector-emitter saturation voltage		$V_{\text{CE(sat)}}$	$I_{\text{C}} = 10\ \text{mA}$, $I_{\text{B}} = 0.3\ \text{mA}$			0.25	V
UNR521V			$I_{\text{C}} = 10\ \text{mA}$, $I_{\text{B}} = 1.5\ \text{mA}$				
Output voltage high-level		V_{OH}	$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 0.5\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$	4.9			V
Output voltage low-level		V_{OL}	$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 2.5\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$			0.2	V
UNR5213/521K			$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 3.5\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$				
UNR521D			$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 10\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$				
UNR521E			$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 6.0\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$				
Transition frequency		f_{T}	$V_{\text{CB}} = 10\ \text{V}$, $I_{\text{E}} = -2\ \text{mA}$, $f = 200\ \text{MHz}$		150		MHz
Input resistance	UNR5218	R_{I}		-30%	0.51	+30%	$\text{k}\Omega$
	UNR5219				1.0		
	UNR521M/521V				2.2		
	UNR5216/521F/521L/521N UNR521Z				4.7		
	UNR5211/5214/5215/521K				10		
	UNR5212/5217/521T				22		
	UNR5210/5213/521D/521E				47		

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

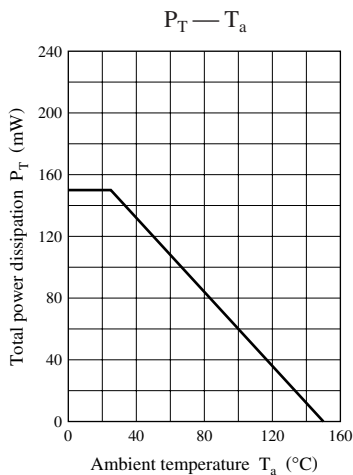
2. *: Rank classification

Rank	Q	R	S	No-rank
h_{FE}	160 to 260	210 to 340	290 to 460	160 to 460

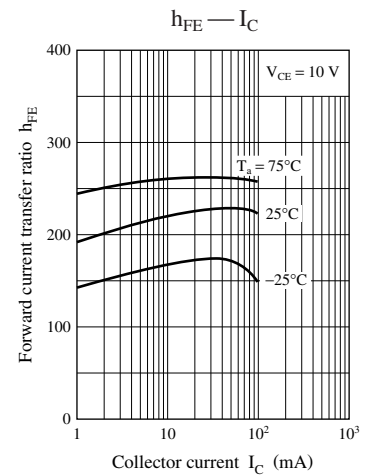
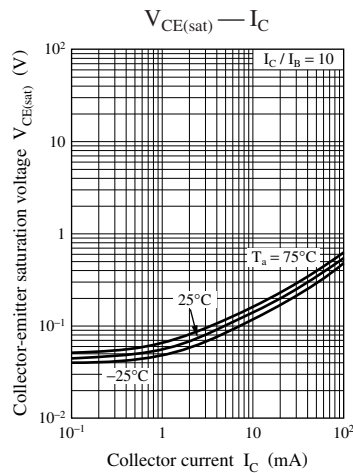
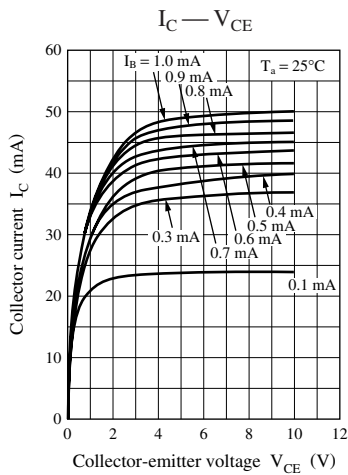
■ Electrical Characteristics (continued) $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

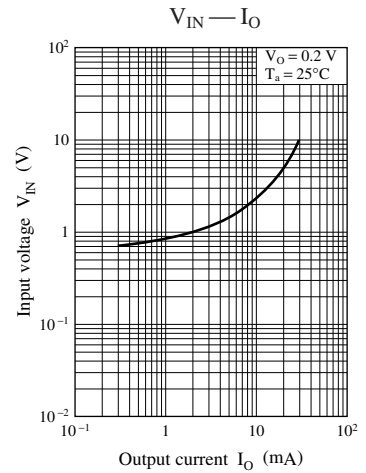
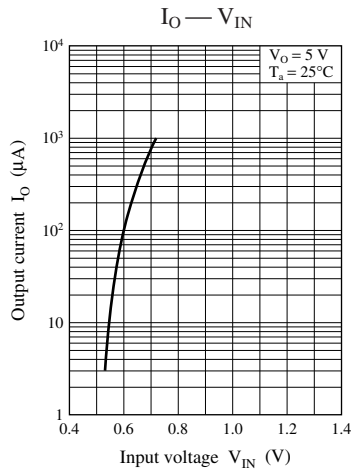
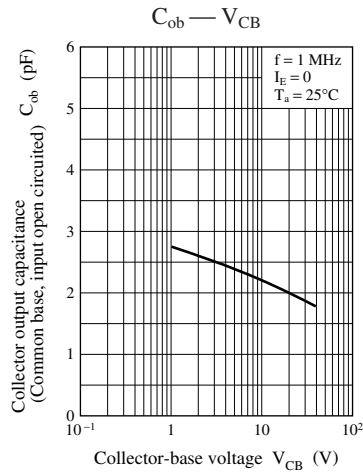
	Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Resistance ratio	UNR521M	R_1/R_2			0.047		—
	UNR521N				0.1		
	UNR5218/5219			0.08	0.10	0.12	
	UNR521Z				0.21		
	UNR5214			0.17	0.21	0.25	
	UNR521T				0.47		
	UNR521F			0.37	0.47	0.57	
	UNR521V				1.0		
	UNR5211/5212/5213/521L			0.8	1.0	1.2	
	UNR521K			1.70	2.13	2.60	
	UNR521E			1.70	2.14	2.60	
	UNR521D			3.7	4.7	5.7	

Common characteristics chart

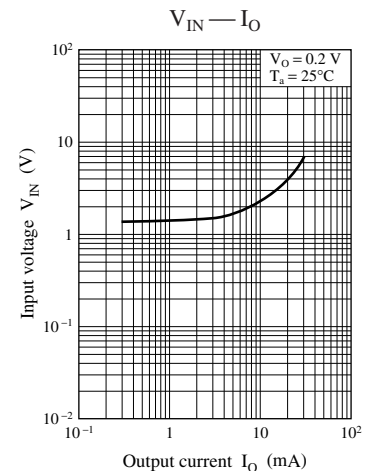
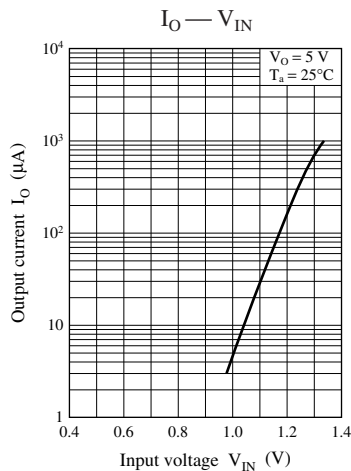
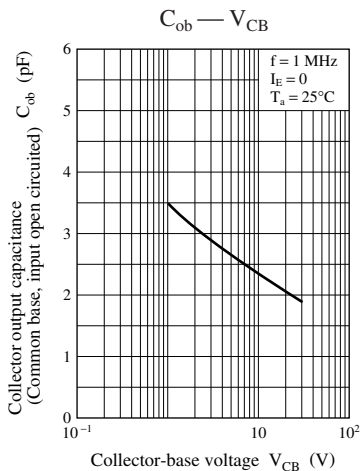
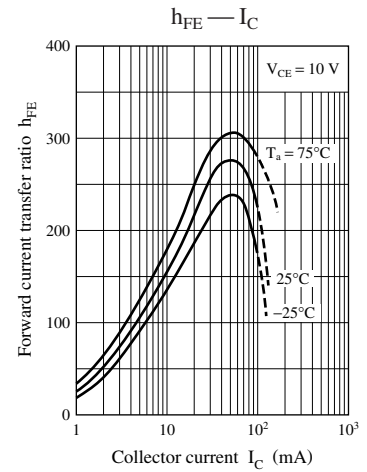
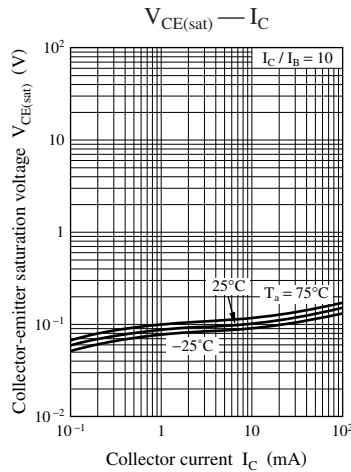
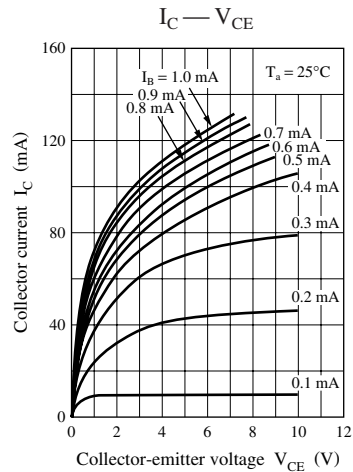


Characteristics charts of UNR5210

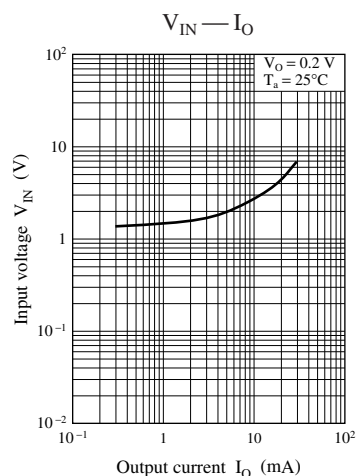
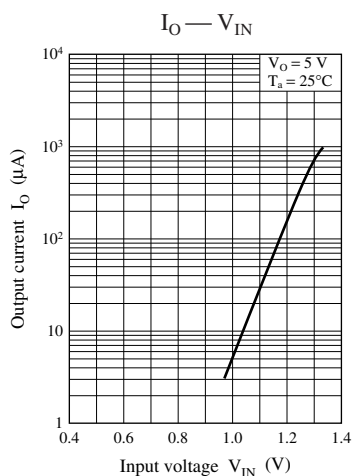
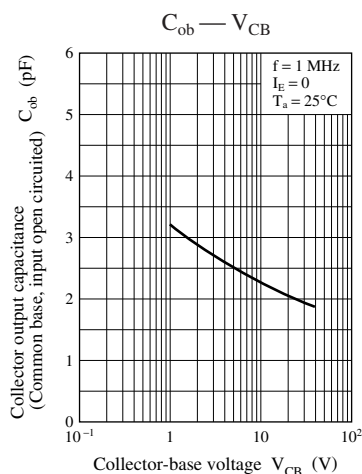
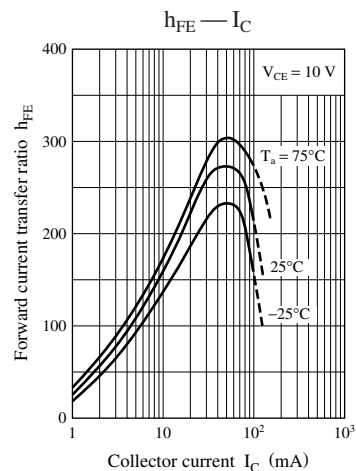
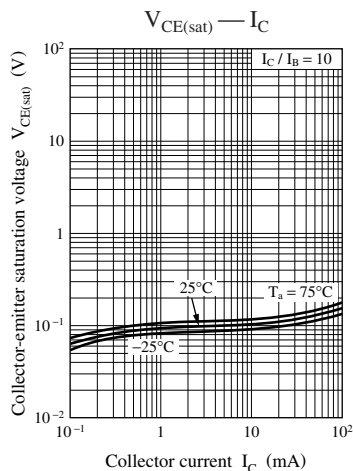
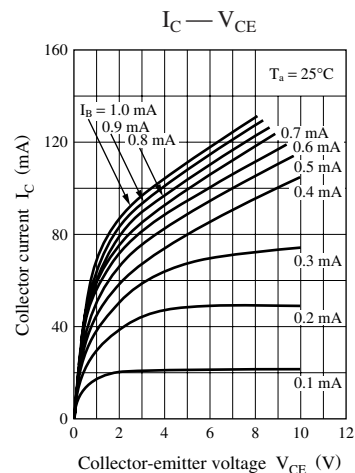




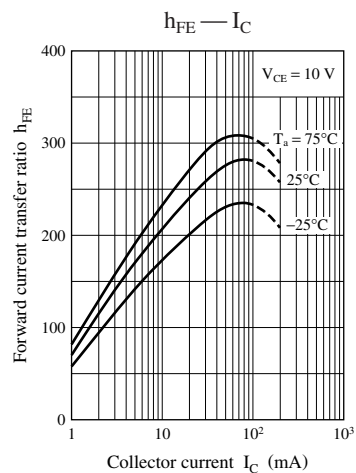
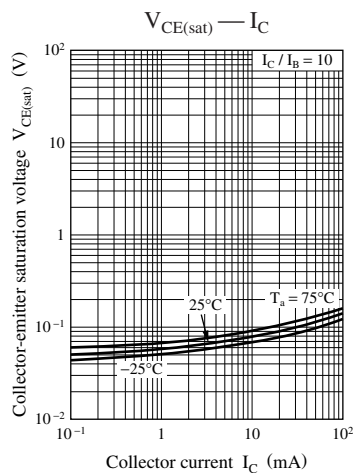
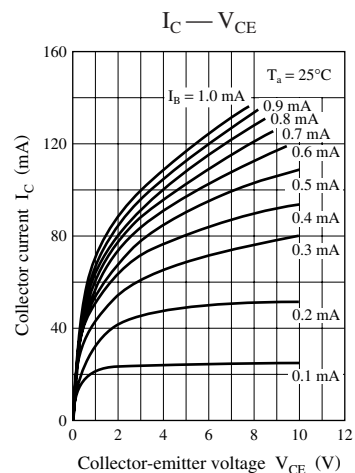
Characteristics charts of UNR5211

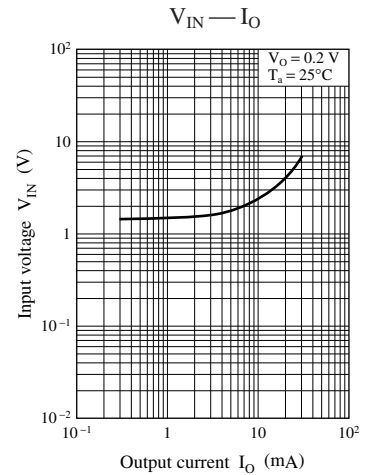
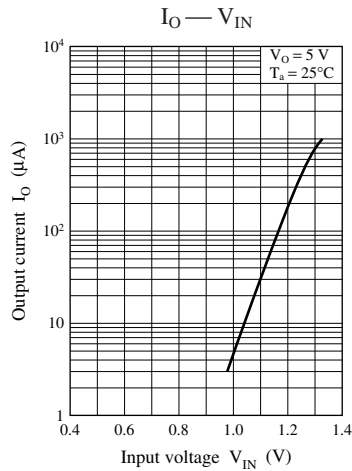
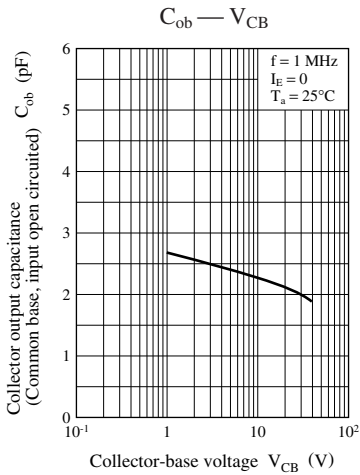


Characteristics charts of UNR5212

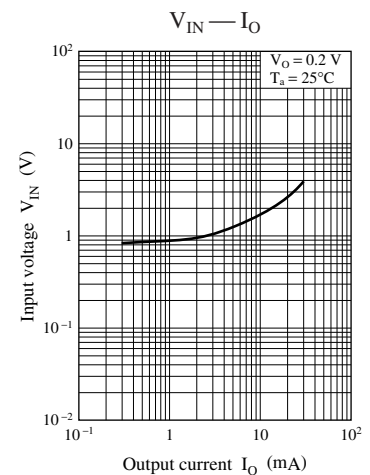
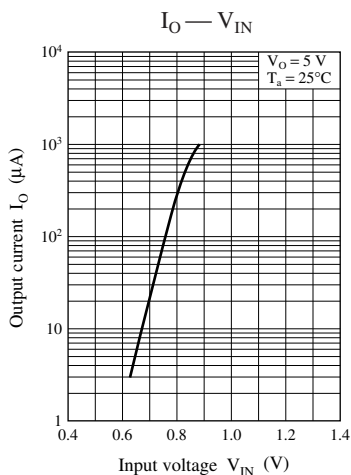
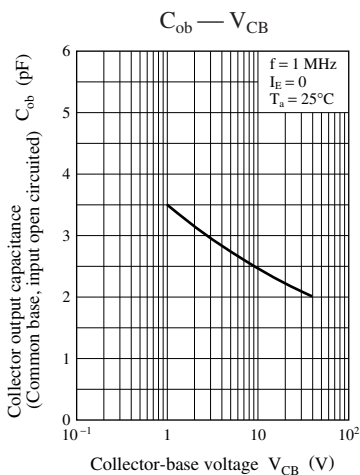
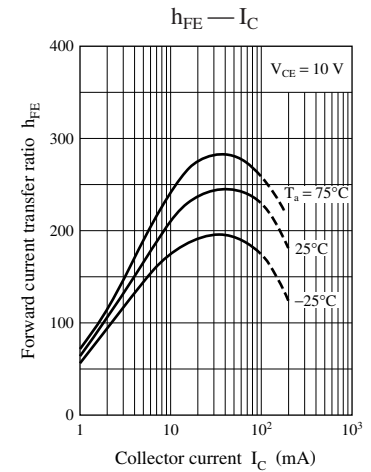
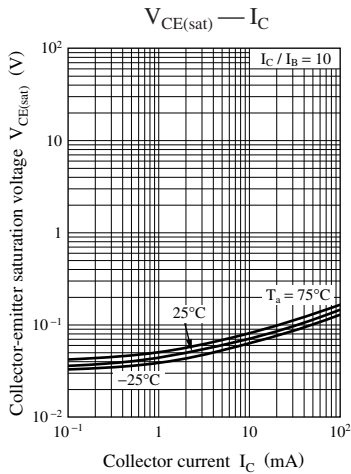
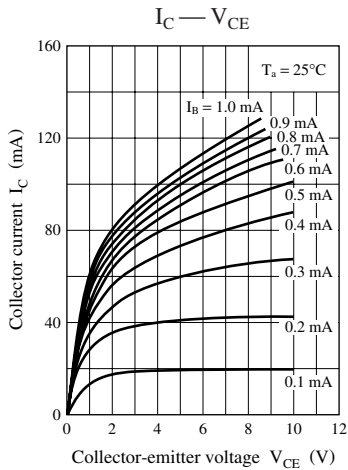


Characteristics charts of UNR5213

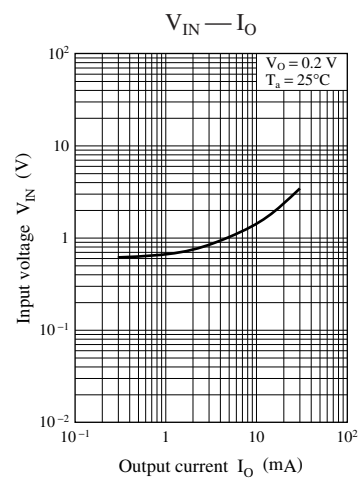
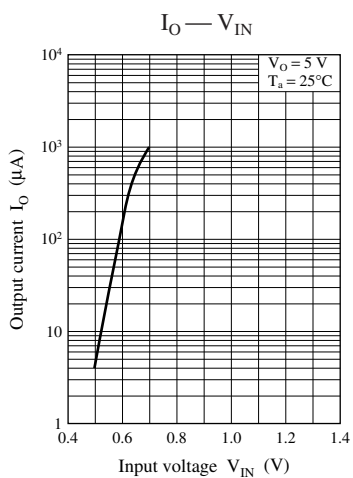
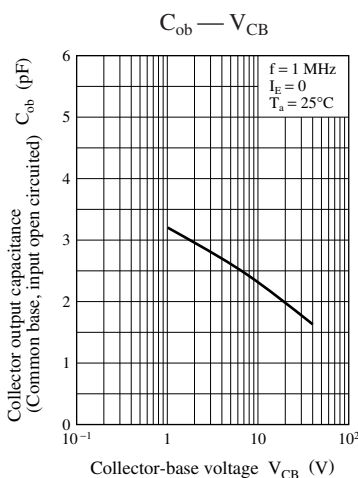
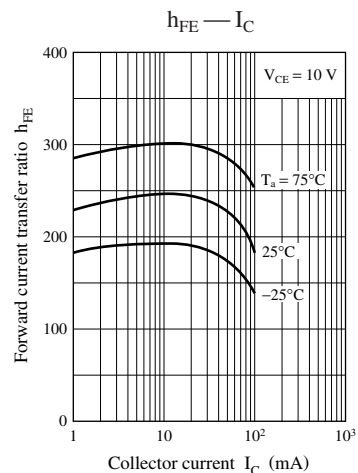
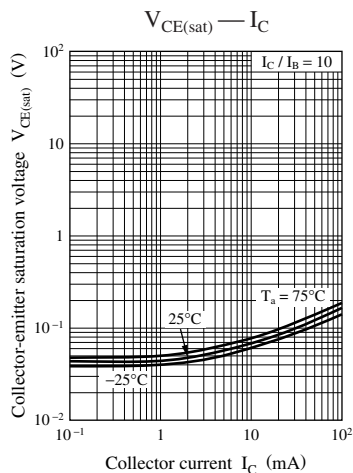
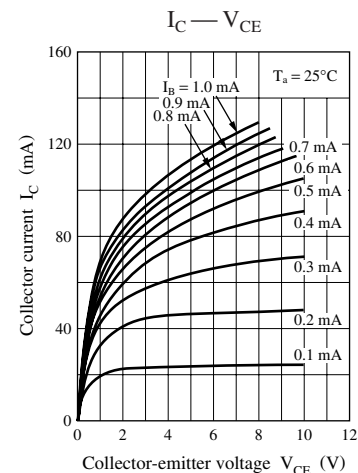




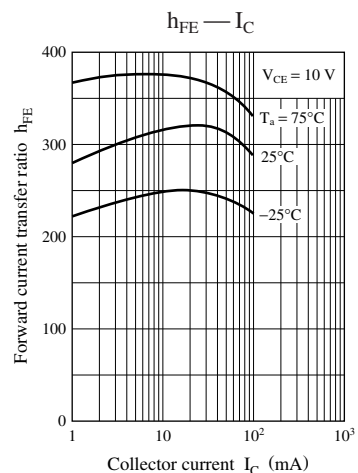
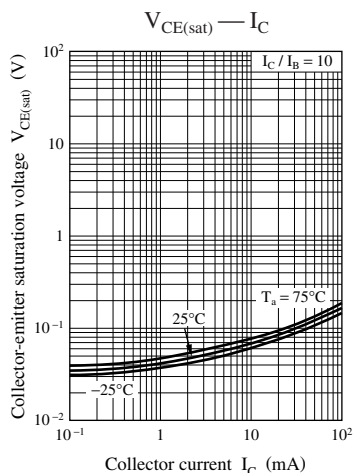
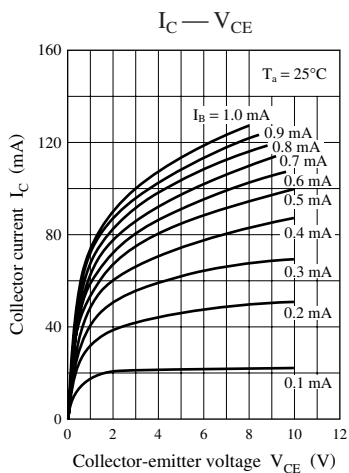
Characteristics charts of UNR5214

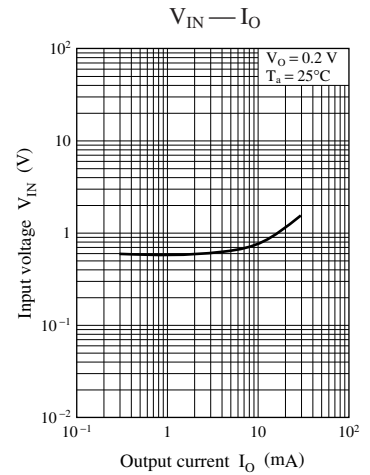
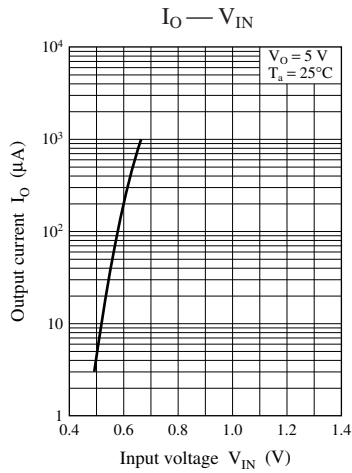
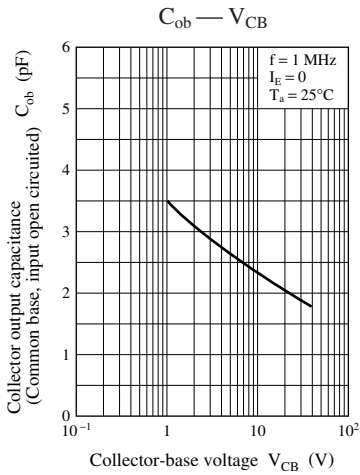


Characteristics charts of UNR5215

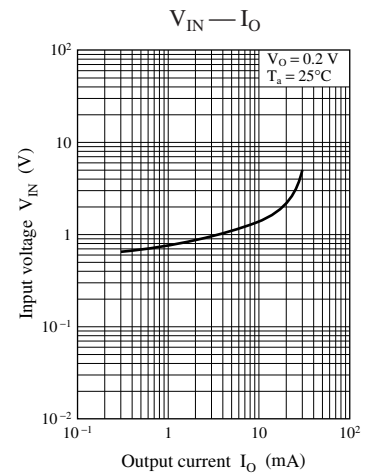
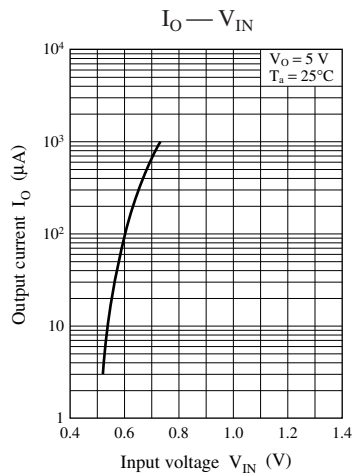
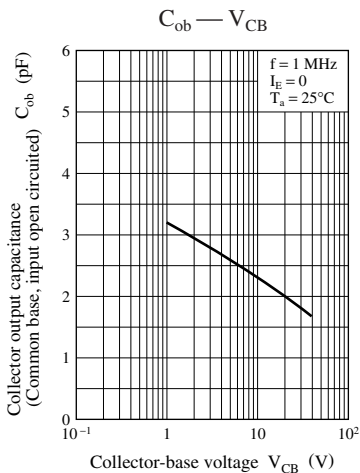
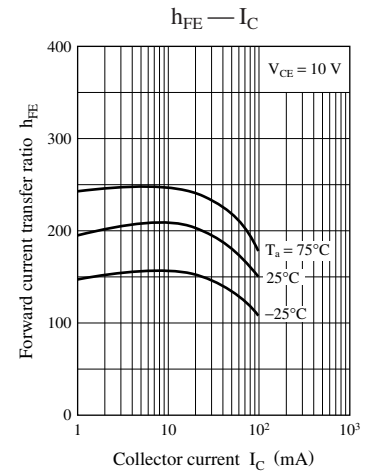
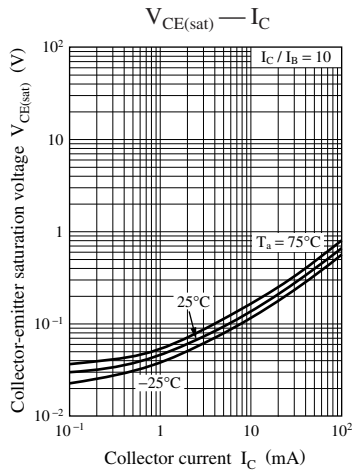
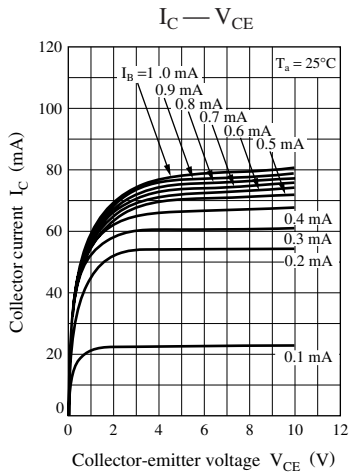


Characteristics charts of UNR5216

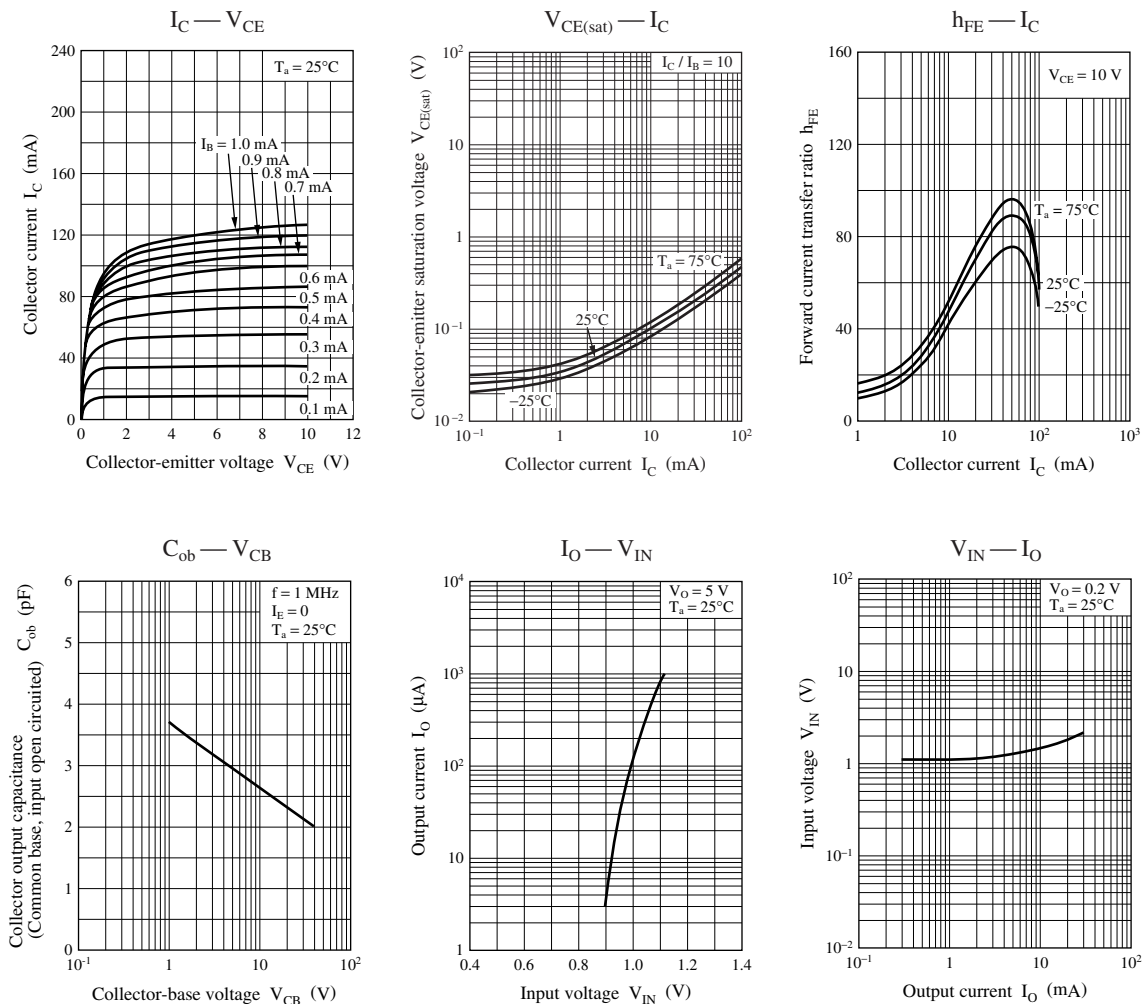




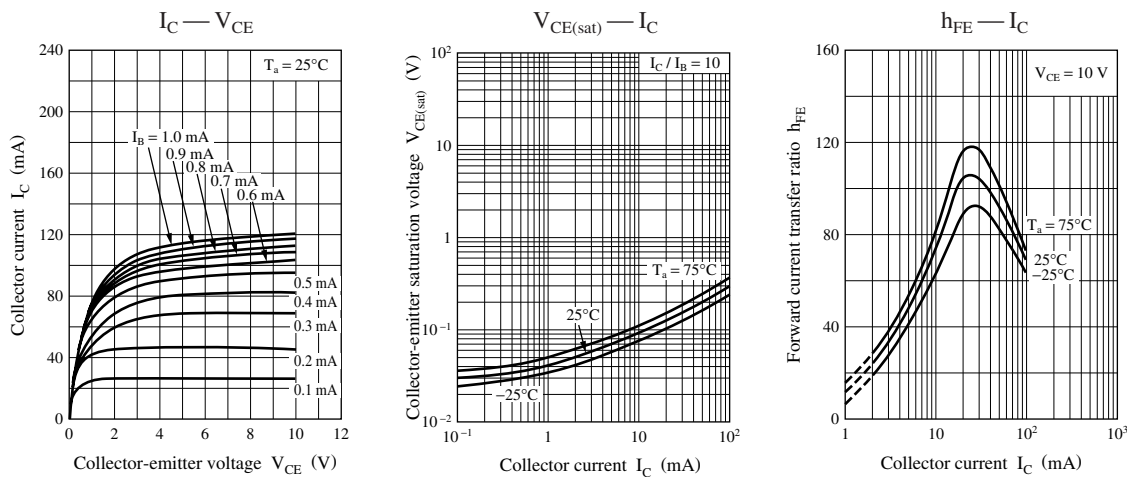
Characteristics charts of UNR5217

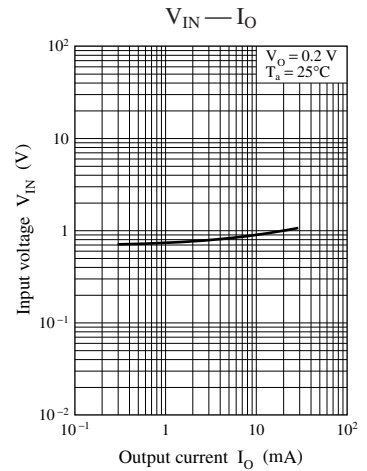
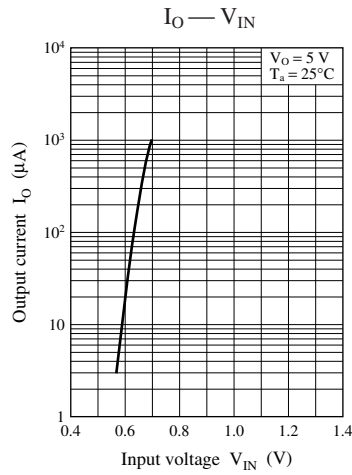
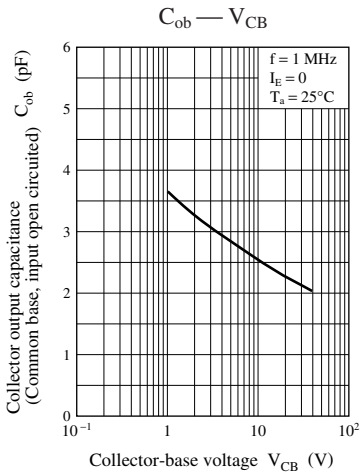


Characteristics charts of UNR5218

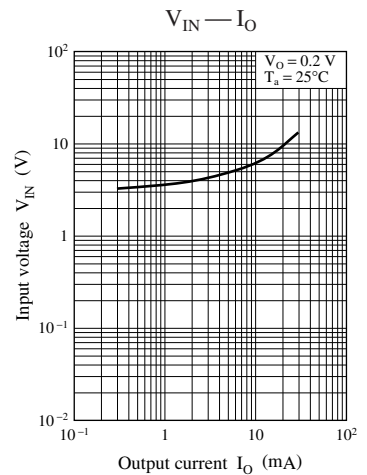
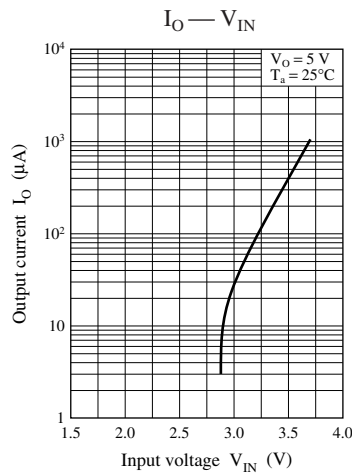
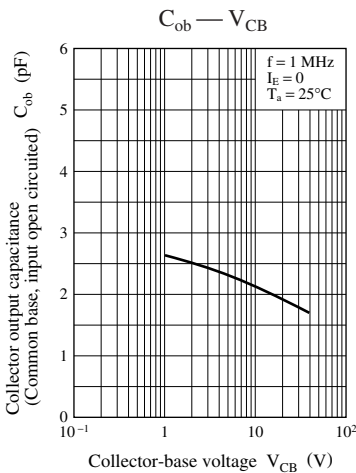
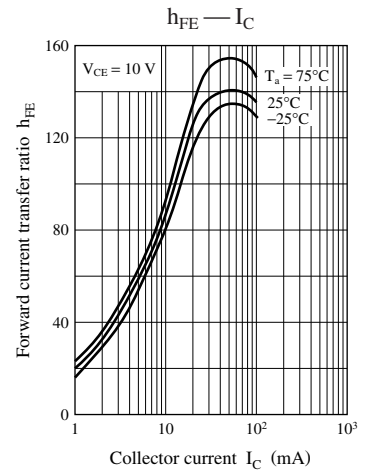
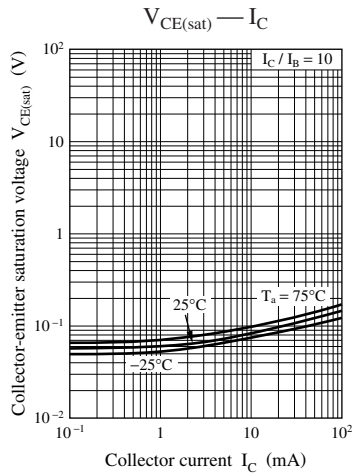
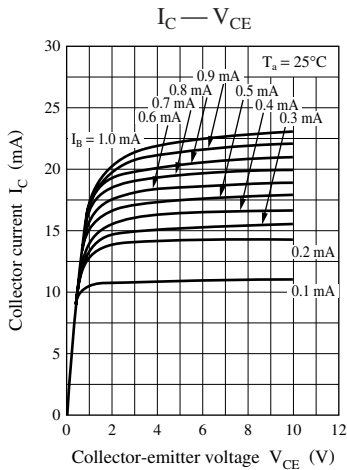


Characteristics charts of UNR5219

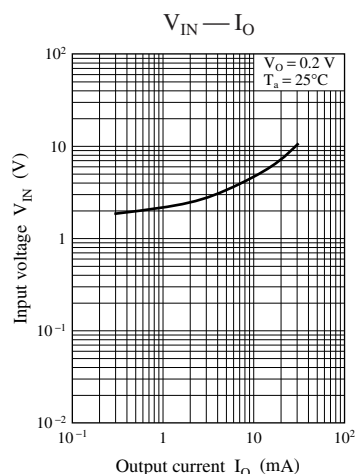
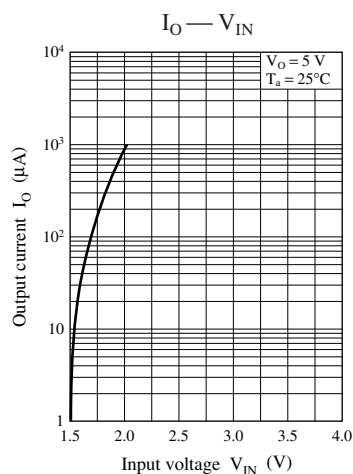
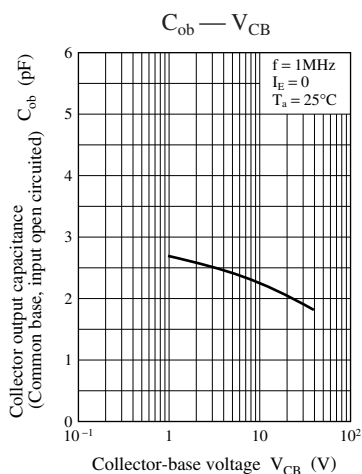
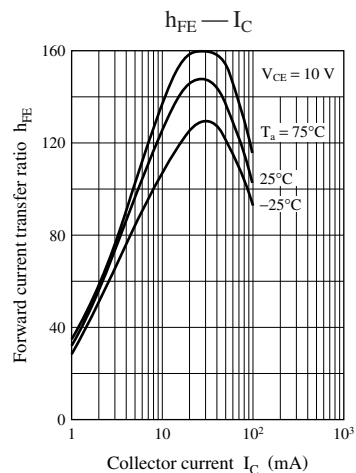
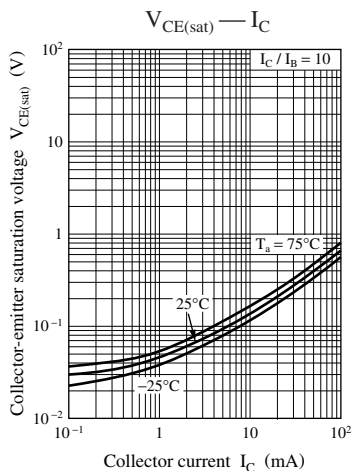
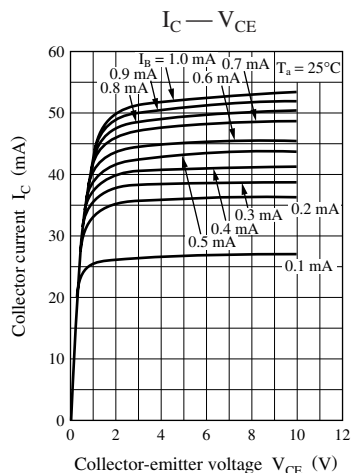




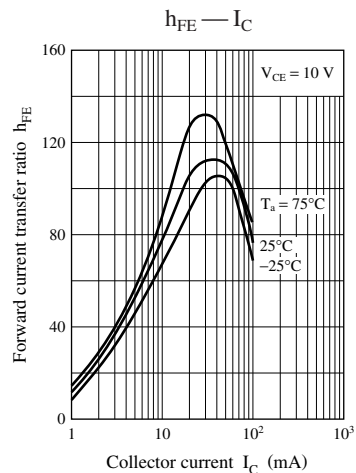
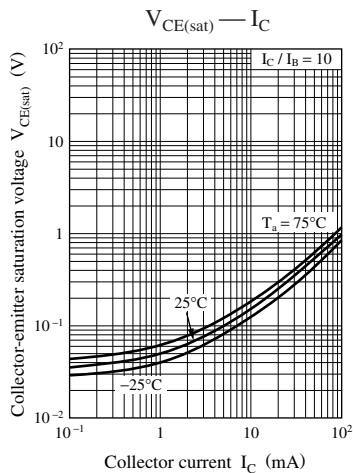
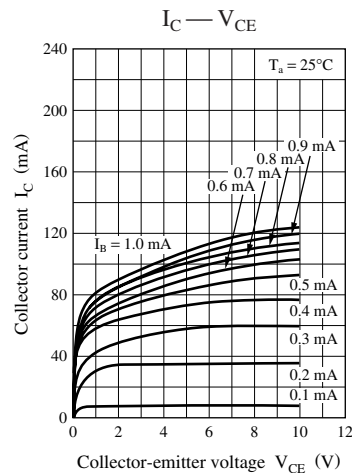
Characteristics charts of UNR521D

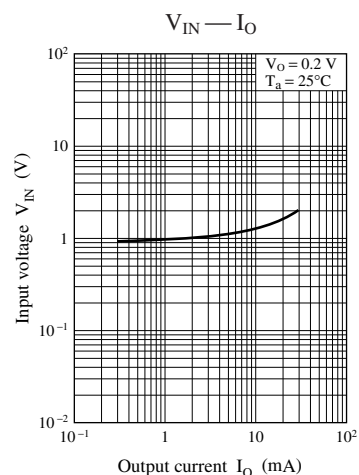
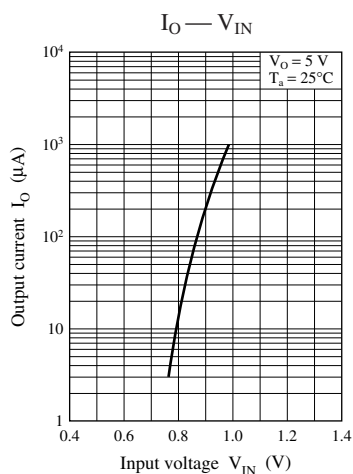
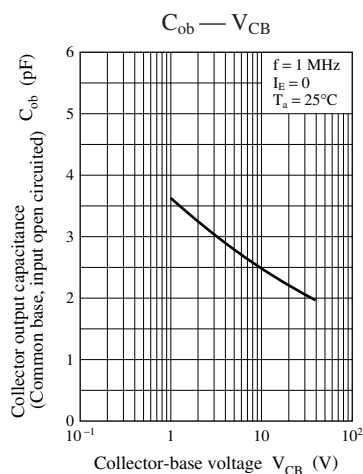


Characteristics charts of UNR521E

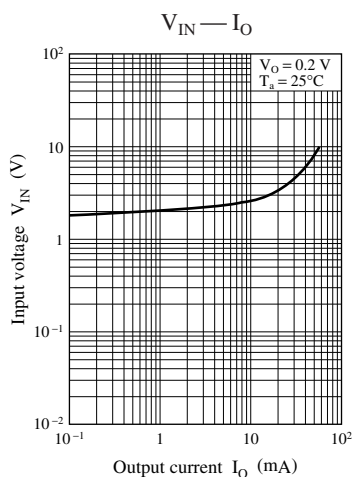
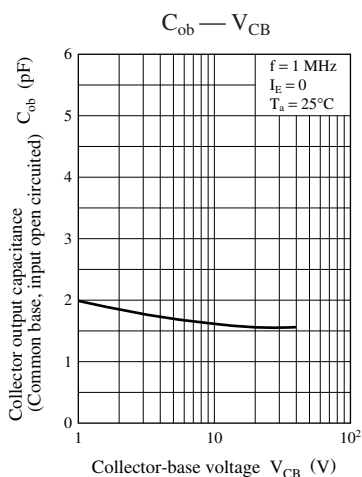
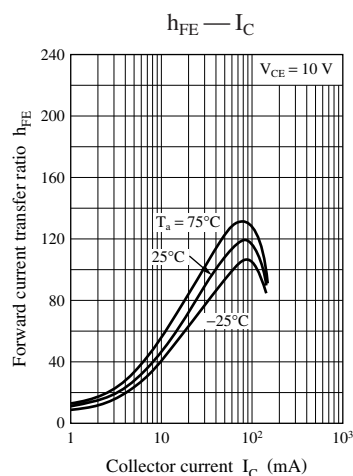
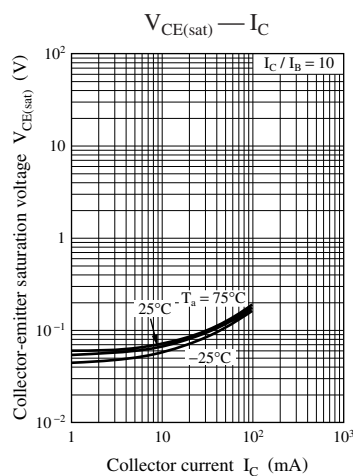
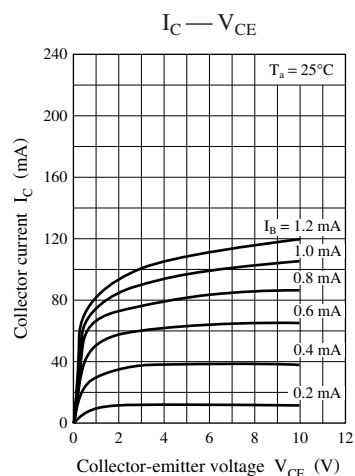


Characteristics charts of UNR521F

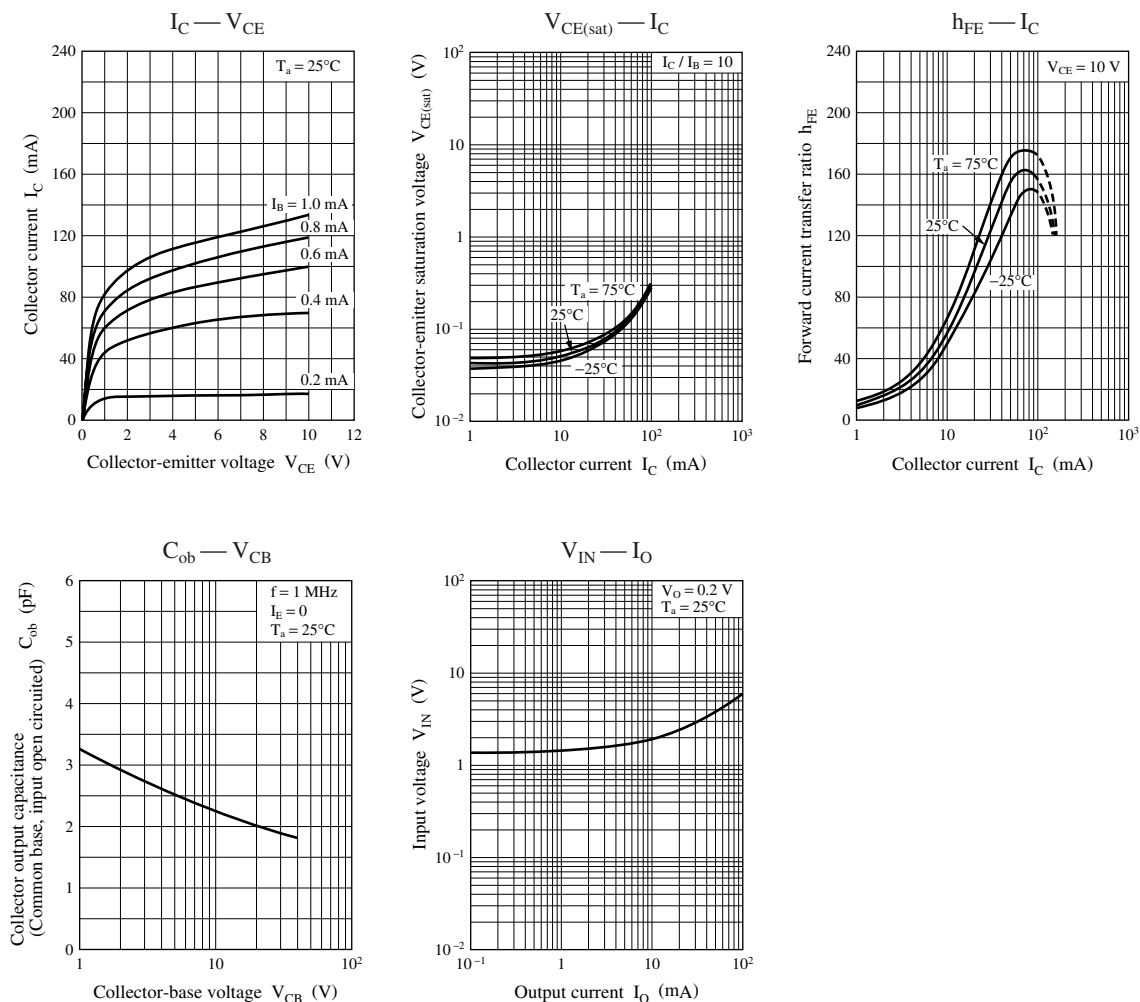




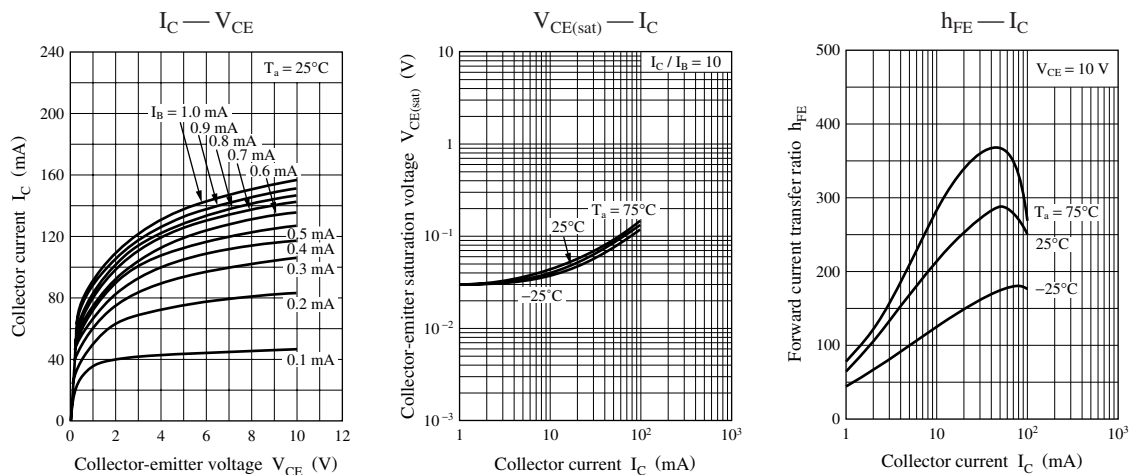
Characteristics charts of UNR521K

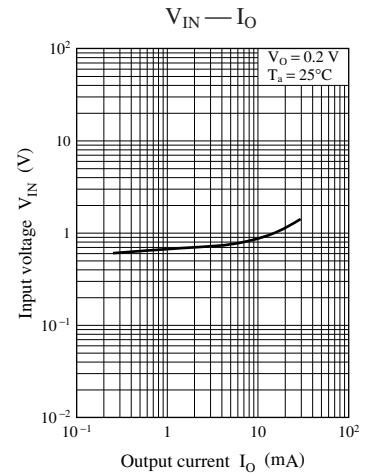
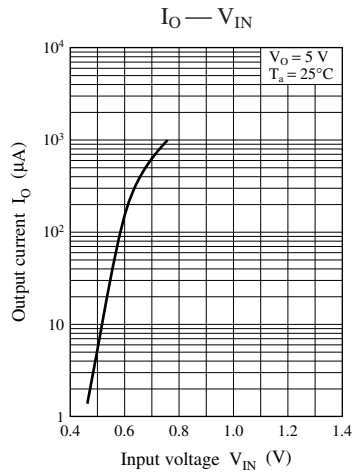
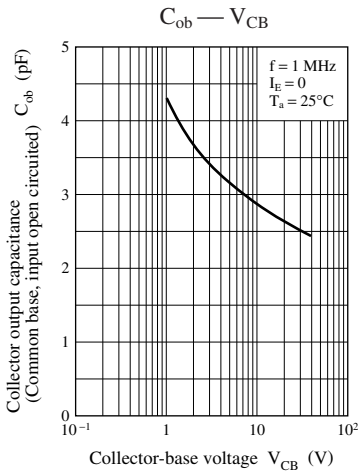


Characteristics charts of UNR521L

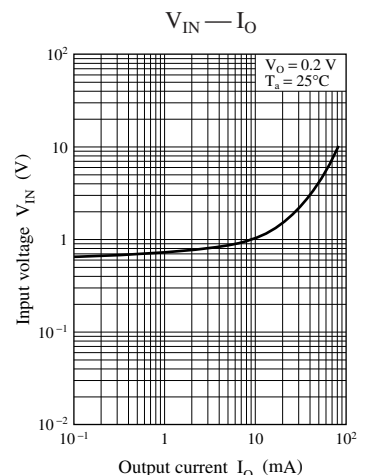
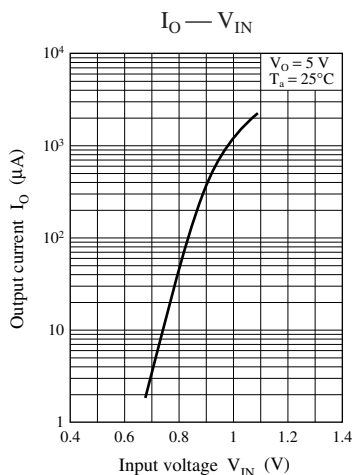
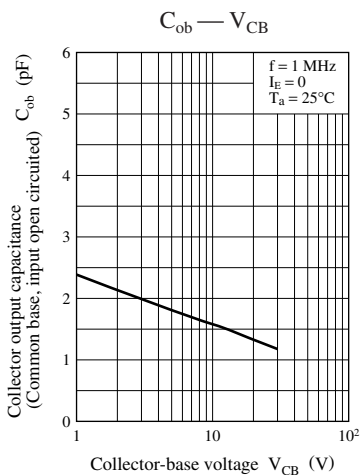
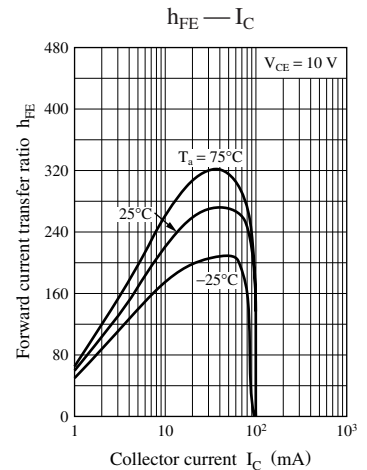
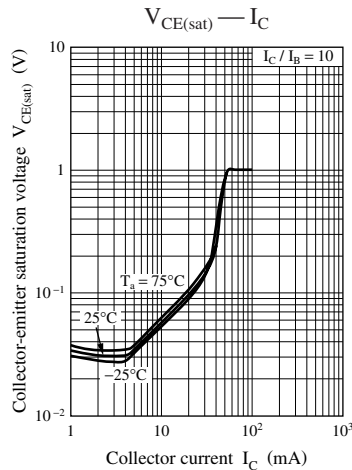
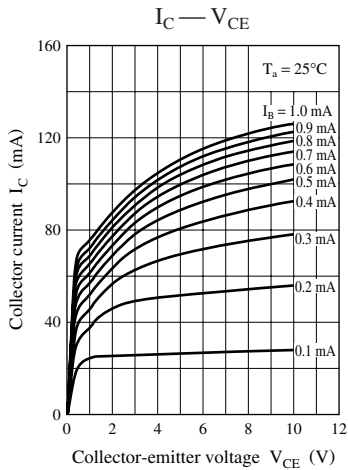


Characteristics charts of UNR521M

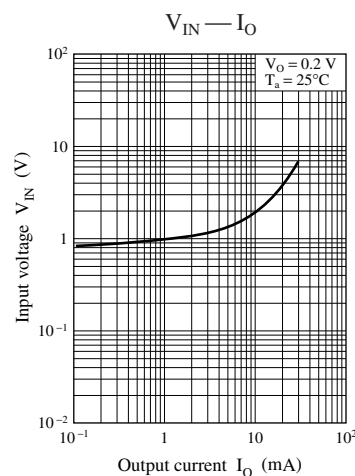
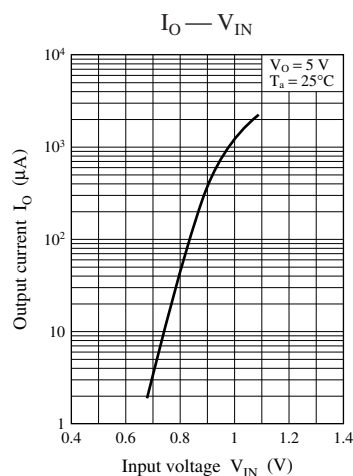
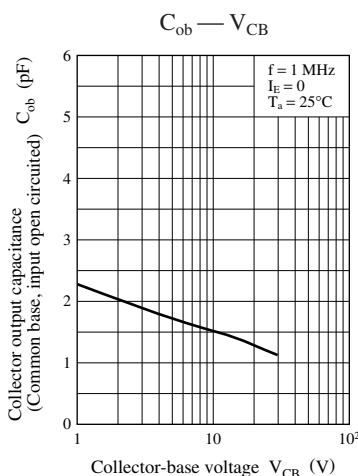
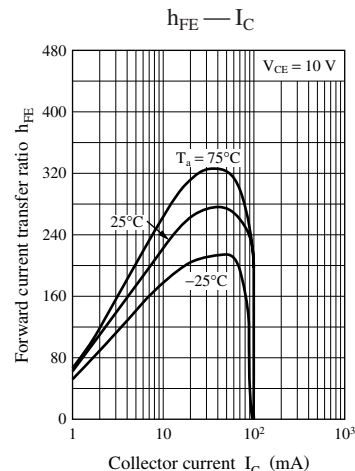
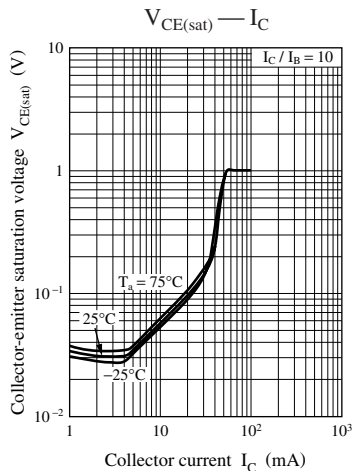
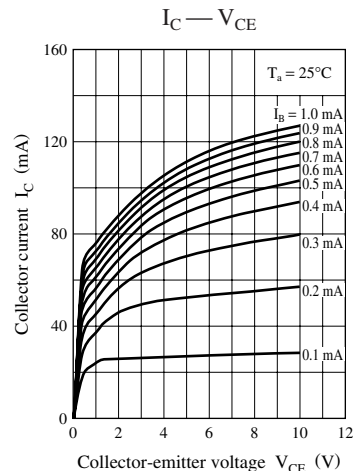




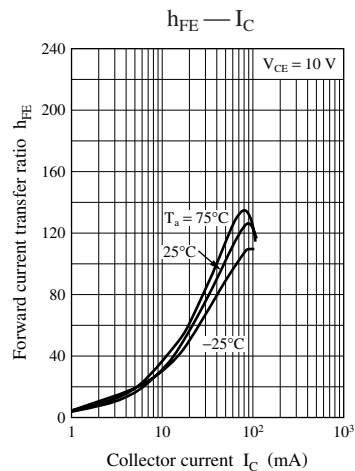
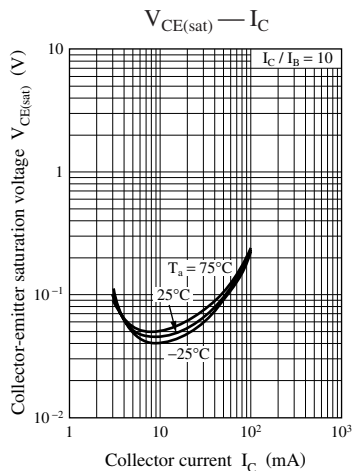
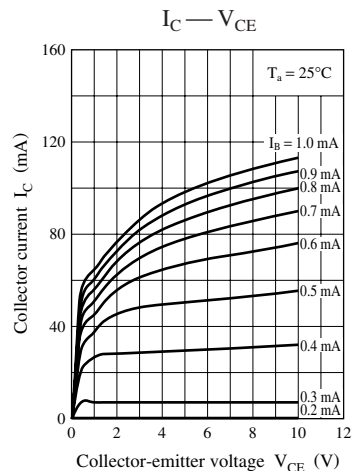
Characteristics charts of UNR521N

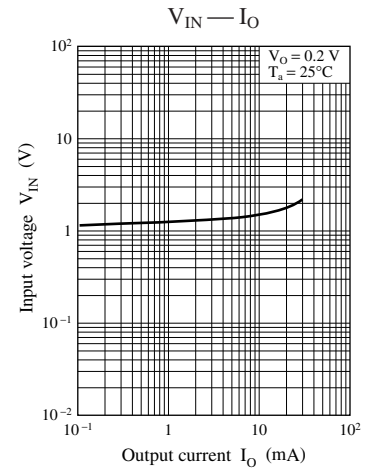
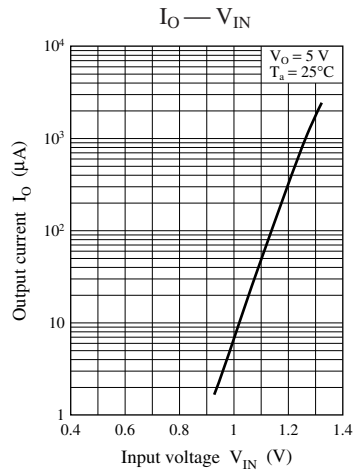
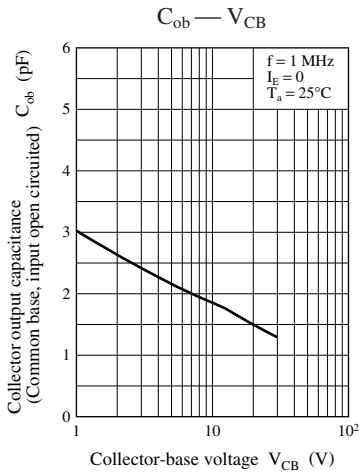


Characteristics charts of UNR521T

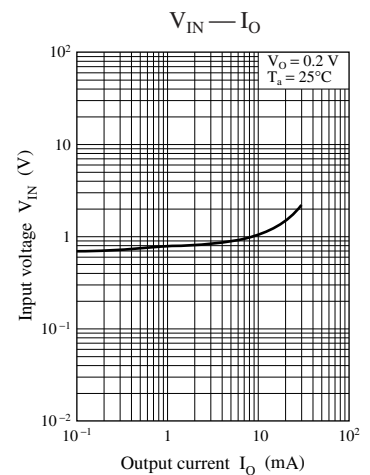
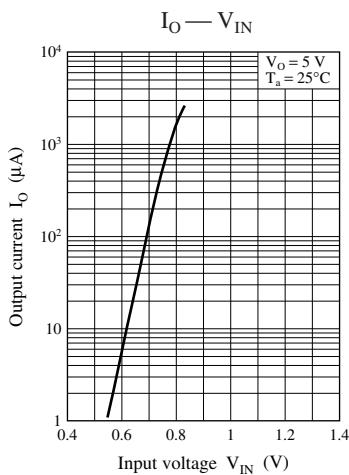
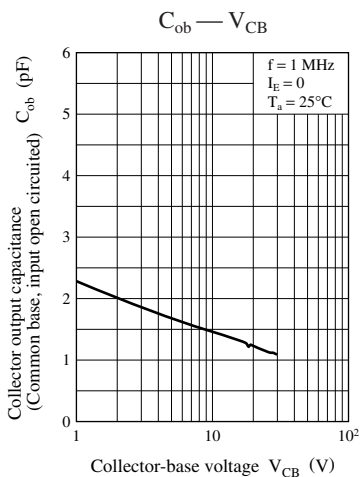
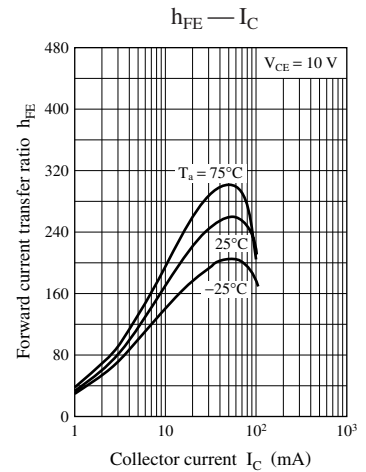
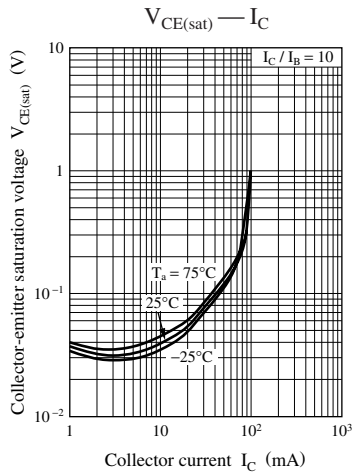
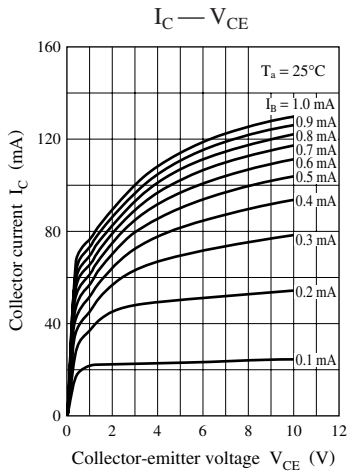


Characteristics charts of UNR521V





Characteristics charts of UNR521Z



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 technical information 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 circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.
- (3) We are not liable for the infringement of rights owned by a third party arising out of the use of the technical information as described in this material.
- (4) 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.
- (5) The products and product specifications described in this material are subject to change without notice for 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.
- (6) 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, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (7) When using products for which damp-proof packing is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.
- (8) This material may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.