

# UNR521x Series (UN521x Series)

## Silicon NPN epitaxial planar type

For digital circuits

### ■ Features

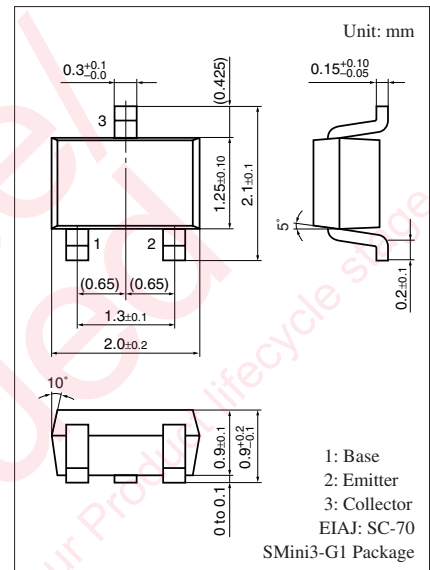
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts
- S-Mini type package, allowing automatic insertion through the tape packing and magazine packing

### ■ Resistance by Part Number

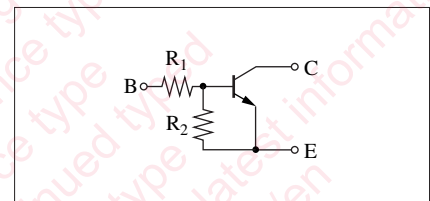
	Marking symbol (R <sub>1</sub> )	(R <sub>2</sub> )
• UNR5210 (UN5210)	8L	47 kΩ —
• UNR5211 (UN5211)	8A	10 kΩ 10 kΩ
• UNR5212 (UN5212)	8B	22 kΩ 22 kΩ
• UNR5213 (UN5213)	8C	47 kΩ 47 kΩ
• UNR5214 (UN5214)	8D	10 kΩ 47 kΩ
• UNR5215 (UN5215)	8E	10 kΩ —
• UNR5216 (UN5216)	8F	4.7 kΩ —
• UNR5217 (UN5117)	8H	22 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<sub>a</sub> = 25°C

Parameter	Symbol	Rating	Unit
Collector-base voltage (Emitter open)	V <sub>CBO</sub>	50	V
Collector-emitter voltage (Base open)	V <sub>CEO</sub>	50	V
Collector current	I <sub>C</sub>	100	mA
Total power dissipation	P <sub>T</sub>	150	mW
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-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)		$V_{CBO}$	$I_C = 10 \mu\text{A}, I_E = 0$	50			V	
Collector-emitter voltage (Base open)		$V_{CEO}$	$I_C = 2 \text{ mA}, I_B = 0$	50			V	
Collector-base cutoff current (Emitter open)		$I_{CBO}$	$V_{CB} = 50 \text{ V}, I_E = 0$			0.1	$\mu\text{A}$	
Collector-emitter cutoff current (Base open)		$I_{CEO}$	$V_{CE} = 50 \text{ V}, I_B = 0$			0.5		
Emitter-base cutoff current (Collector open)	UNR5210/5215/5216/5217	$I_{EBO}$	$V_{EB} = 6 \text{ V}, I_C = 0$			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	$h_{FE}$	$V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$	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			
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA}$			0.25	V	
UNR521V				$I_C = 10 \text{ mA}, I_B = 1.5 \text{ mA}$				
Output voltage high-level		$V_{OH}$	$V_{CC} = 5 \text{ V}, V_B = 0.5 \text{ V}, R_L = 1 \text{ k}\Omega$	4.9			V	
Output voltage low-level		$V_{OL}$	$V_{CC} = 5 \text{ V}, V_B = 2.5 \text{ V}, R_L = 1 \text{ k}\Omega$			0.2	V	
UNR5213/521K				$V_{CC} = 5 \text{ V}, V_B = 3.5 \text{ V}, R_L = 1 \text{ k}\Omega$				
UNR521D				$V_{CC} = 5 \text{ V}, V_B = 10 \text{ V}, R_L = 1 \text{ k}\Omega$				
UNR521E				$V_{CC} = 5 \text{ V}, V_B = 6.0 \text{ V}, R_L = 1 \text{ k}\Omega$				
Transition frequency		$f_T$	$V_{CB} = 10 \text{ V}, I_E = -2 \text{ mA}, f = 200 \text{ MHz}$		150		MHz	
Input resistance	UNR5218	$R_1$		-30%	0.51	+30%	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.

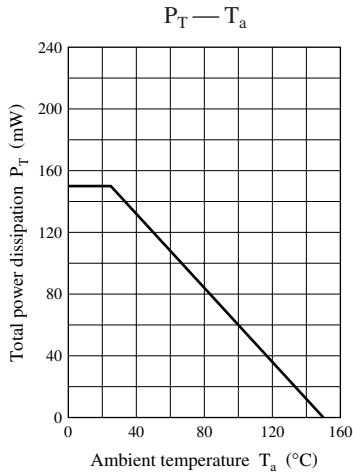
2. \*: Rank classification

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

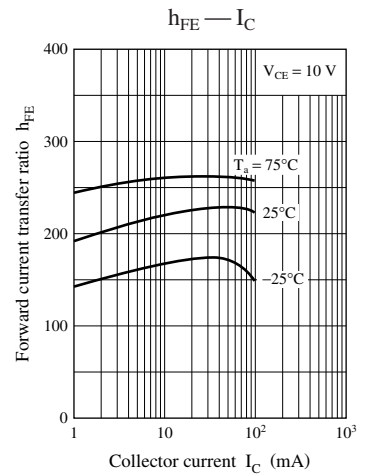
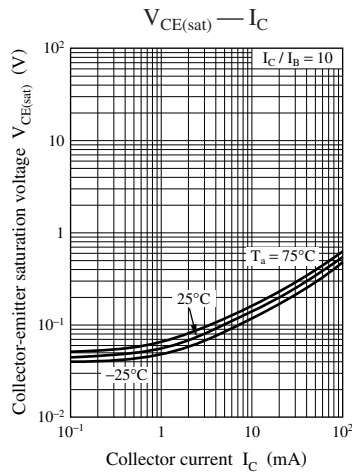
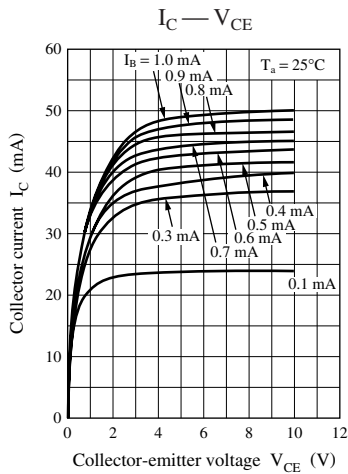
■ Electrical Characteristics (continued)  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

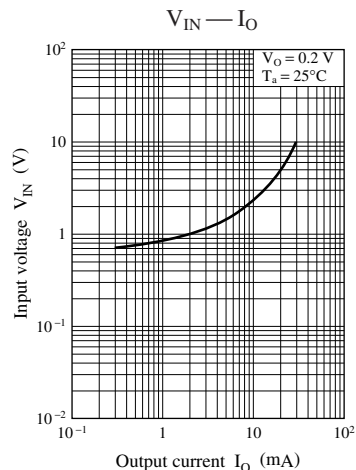
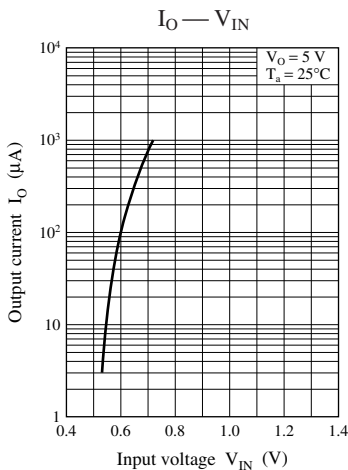
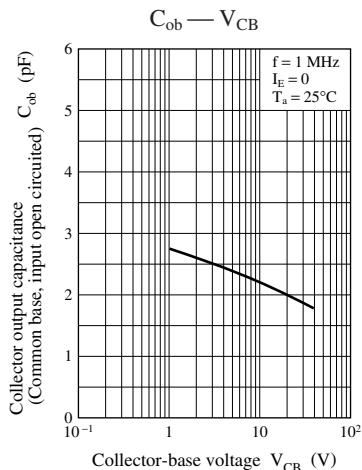
	Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Resistance ratio	UNR521M	$R_1/R_2$			0.047		—
	UNR521N				0.1		
	UNR5218/5219			0.08	0.10	0.12	
	UNR521Z				0.21		
	UNR5214			0.17	0.21	0.25	
	UNR521T				0.47		
	UNR521F			0.37	0.47	0.57	
	UNR521V				1.0		
	UNR5211/5212/5213/521L			0.8	1.0	1.2	
	UNR521K		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

Common characteristics chart

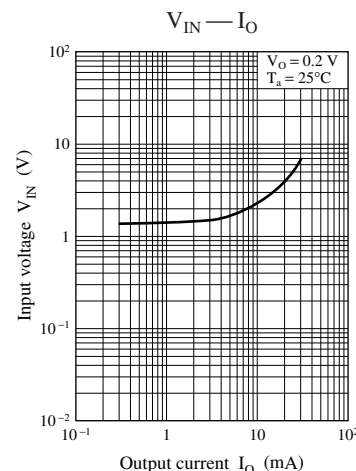
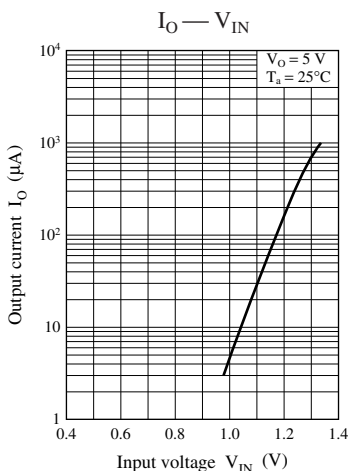
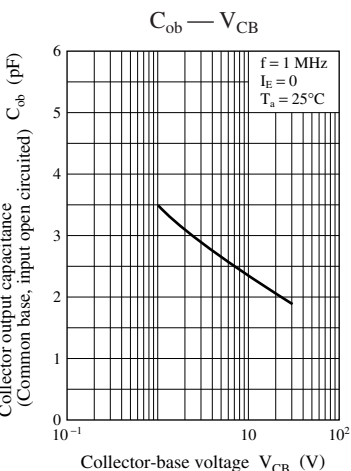
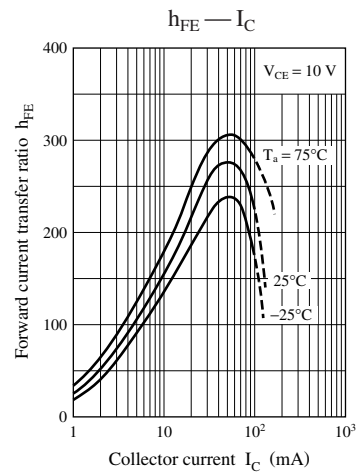
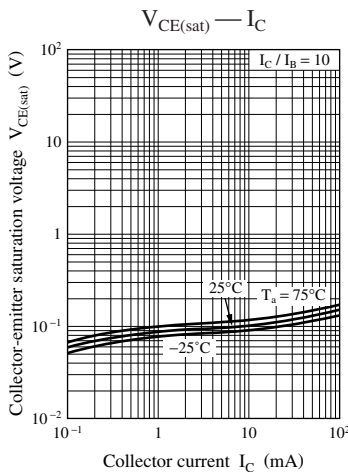
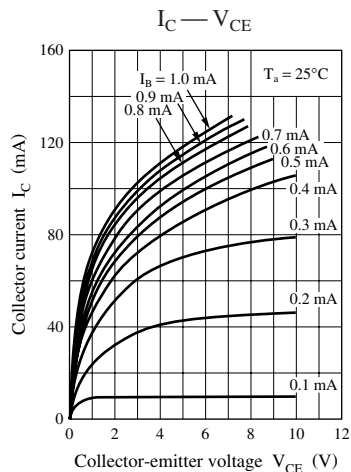


Characteristics charts of UNR5210

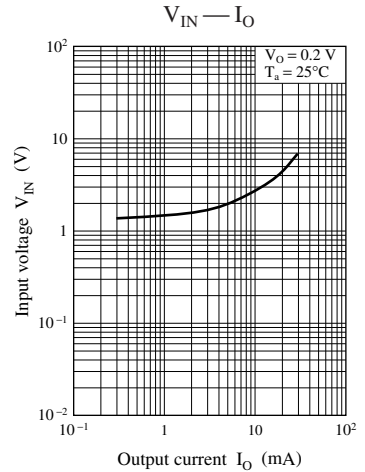
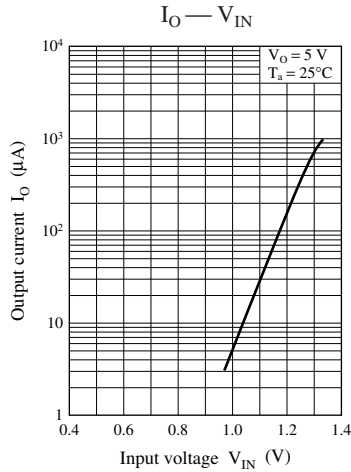
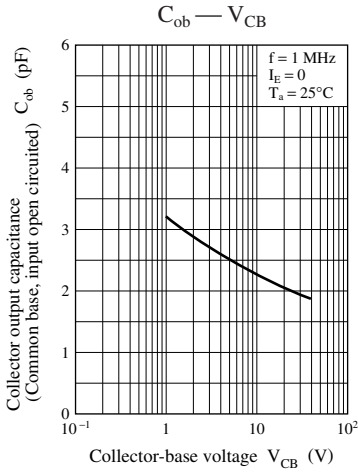
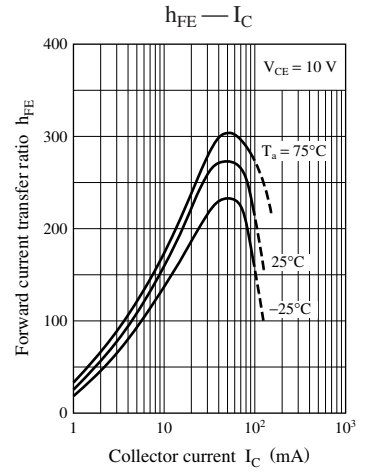
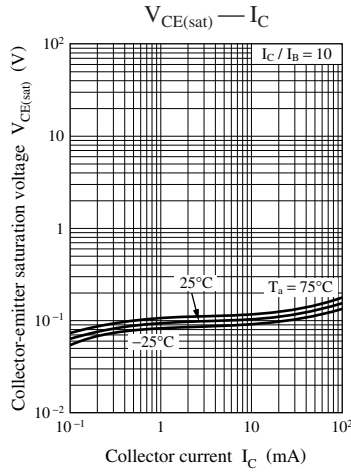
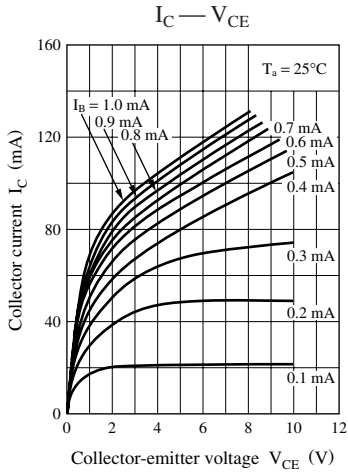




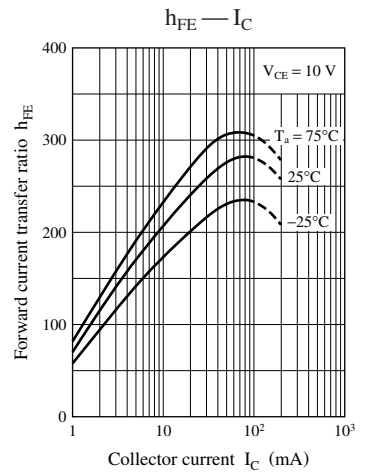
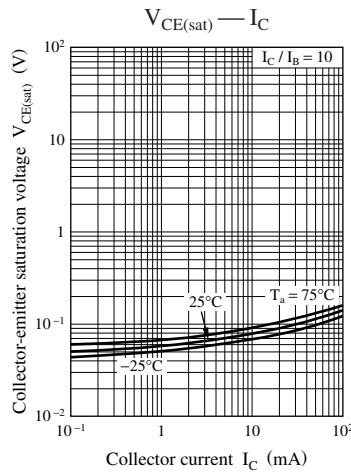
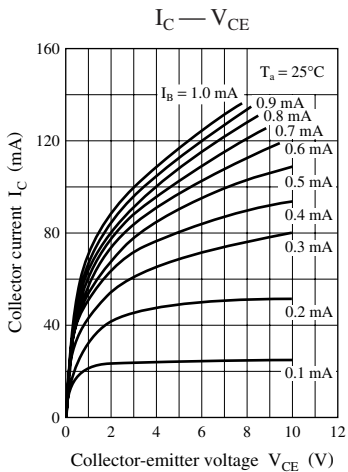
Characteristics charts of UNR5211

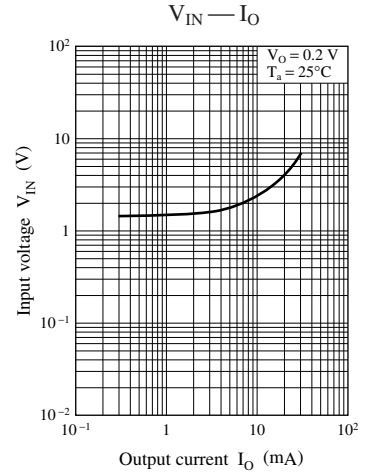
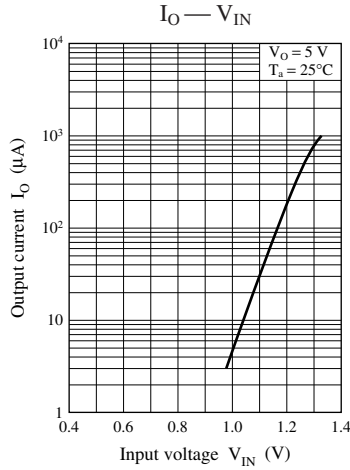
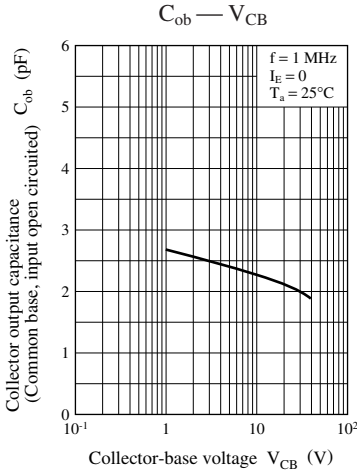


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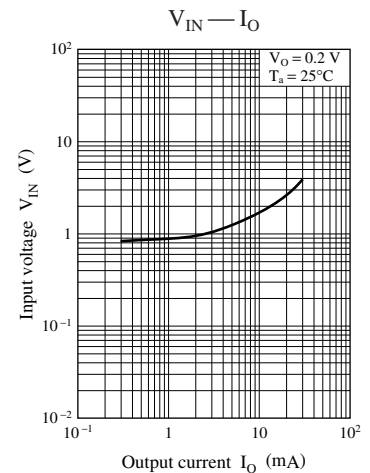
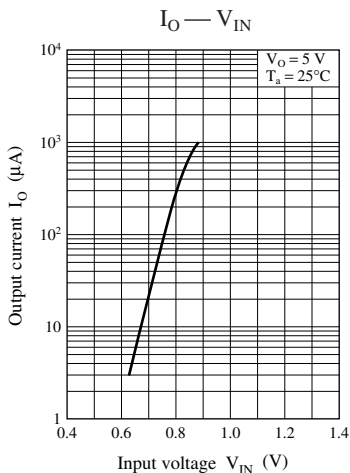
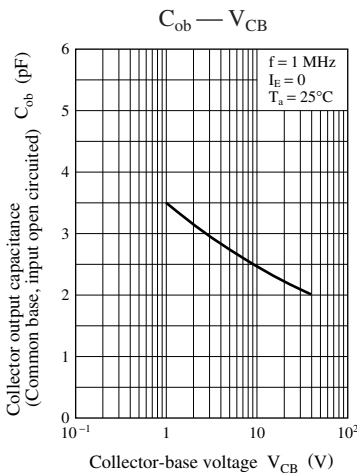
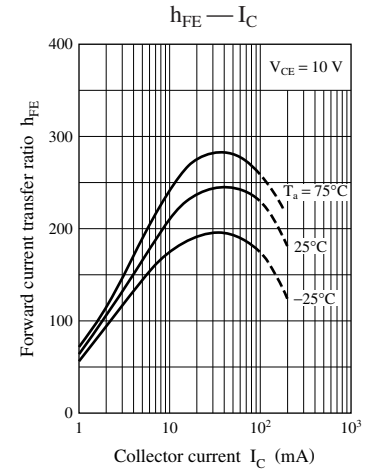
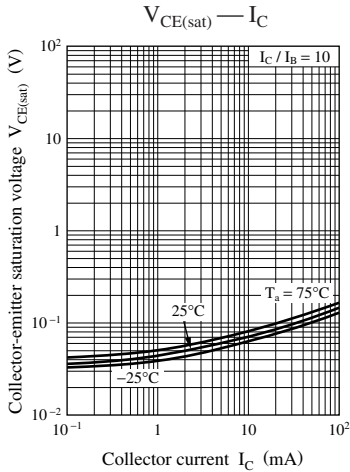
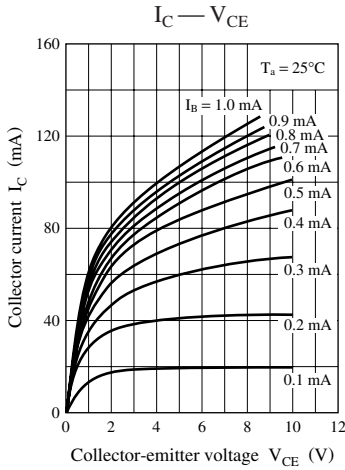


**Characteristics charts of UNR5213**

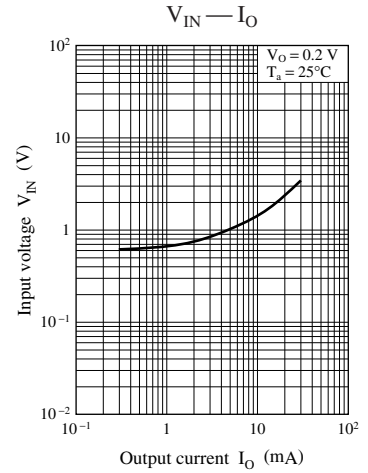
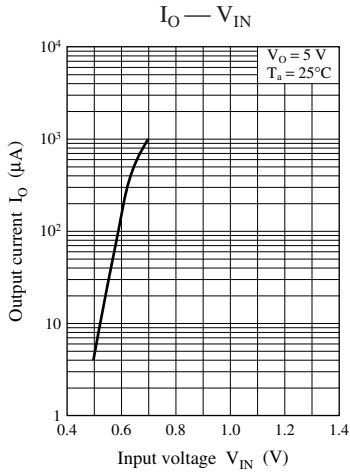
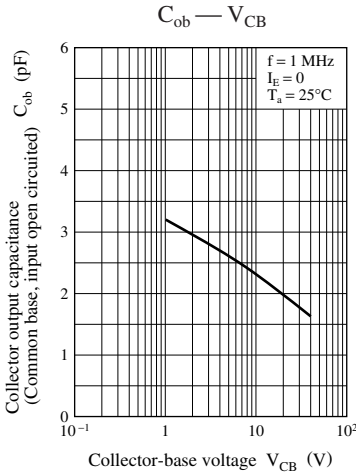
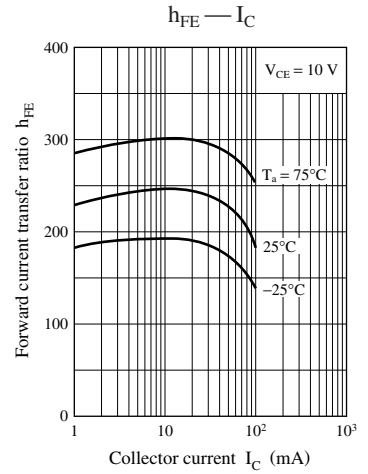
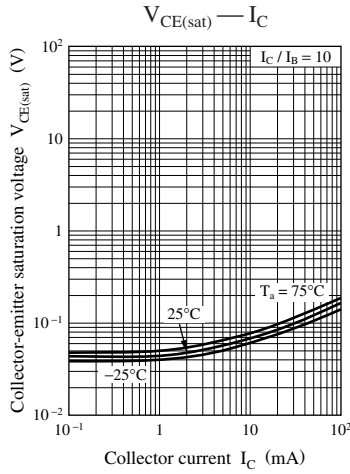
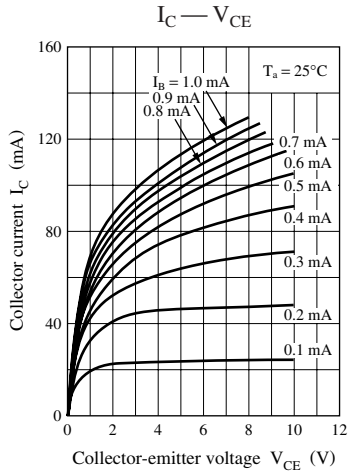




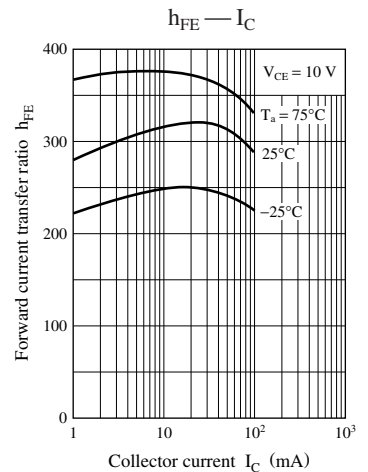
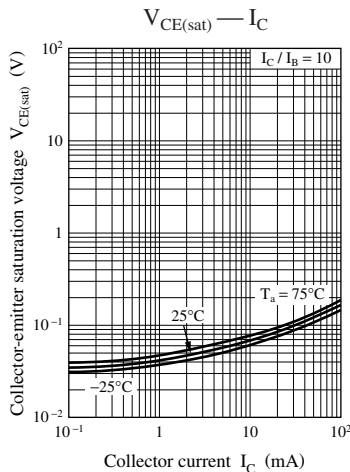
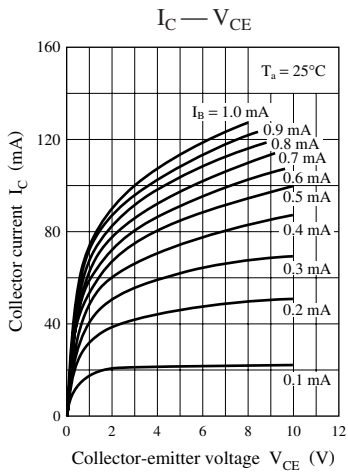
Characteristics charts of UNR5214

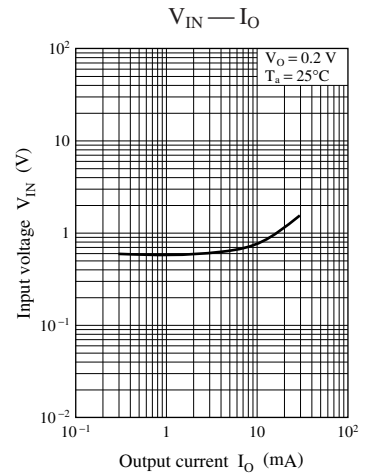
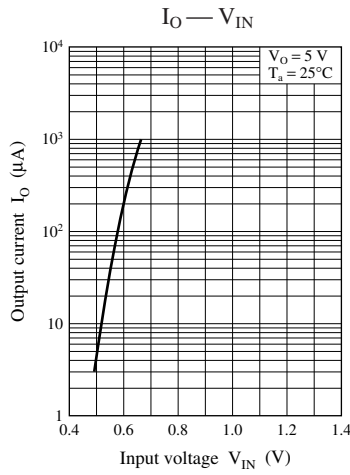
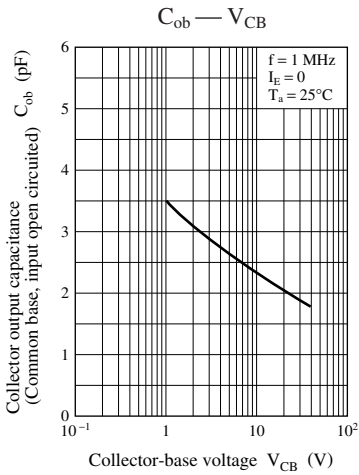


**Characteristics charts of UNR5215**

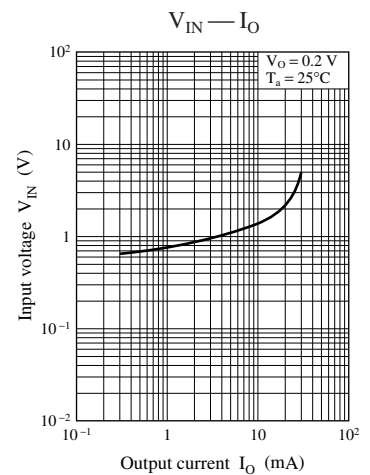
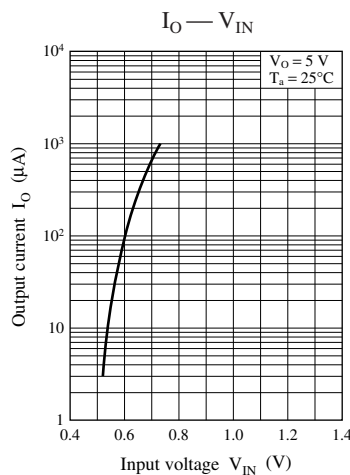
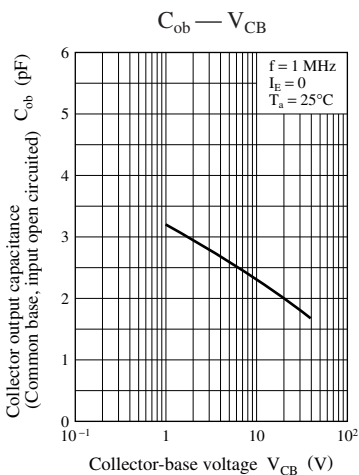
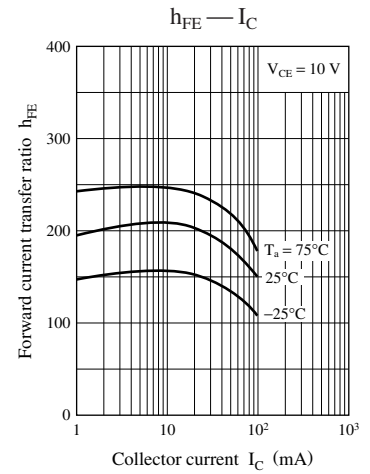
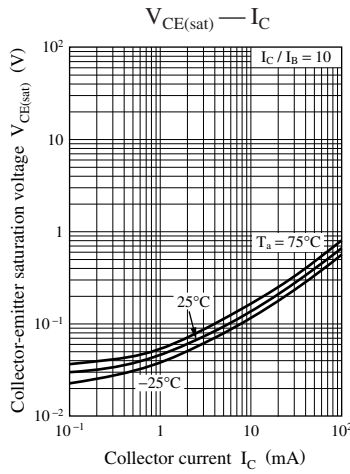
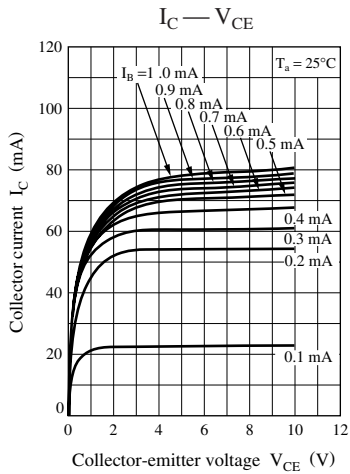


**Characteristics charts of UNR5216**



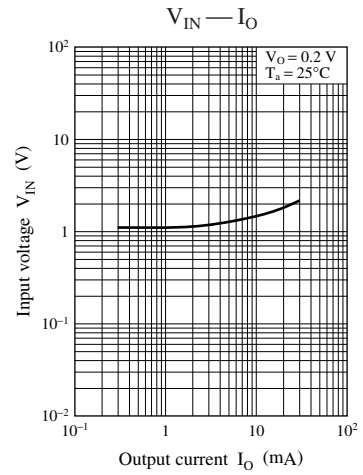
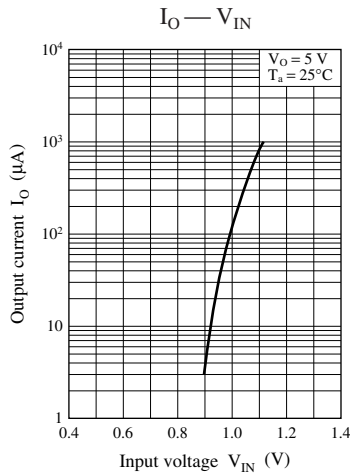
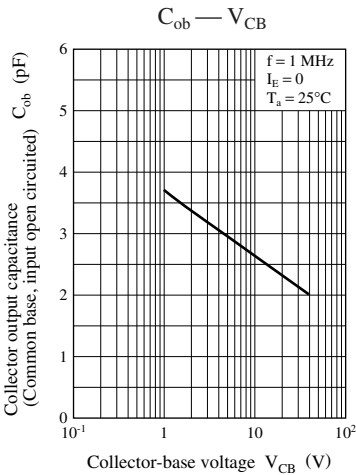
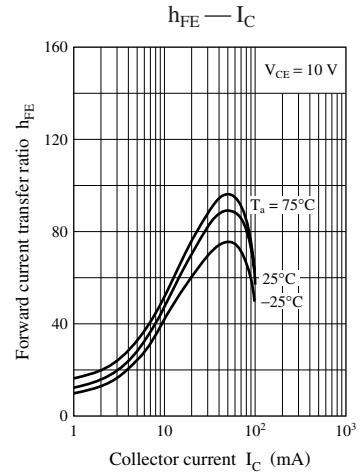
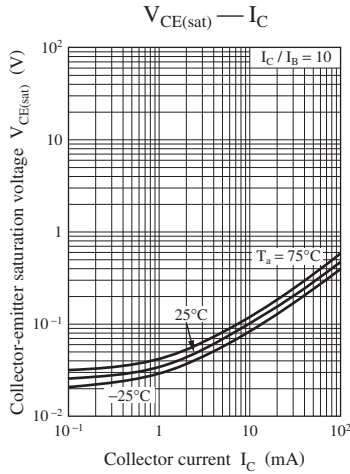
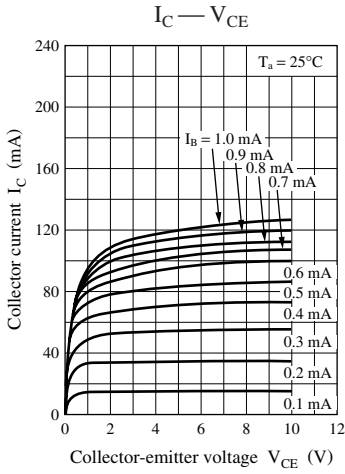


Characteristics charts of UNR5217

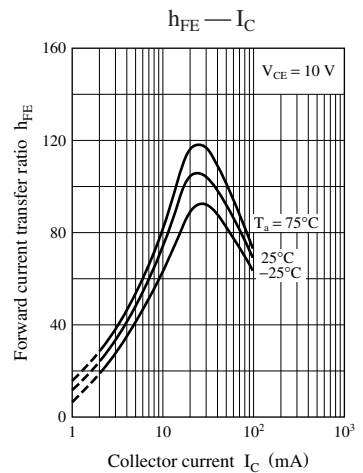
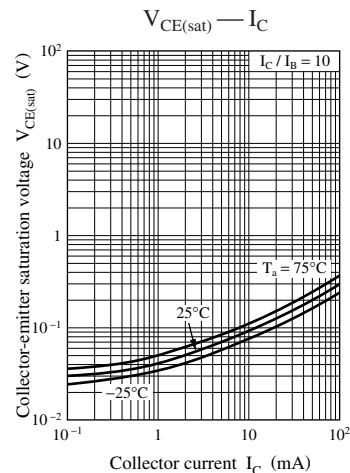
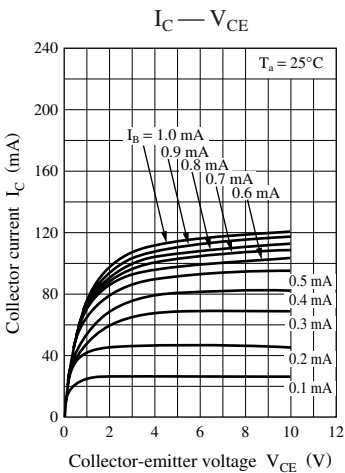


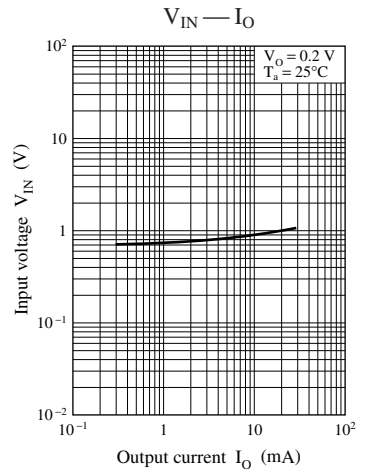
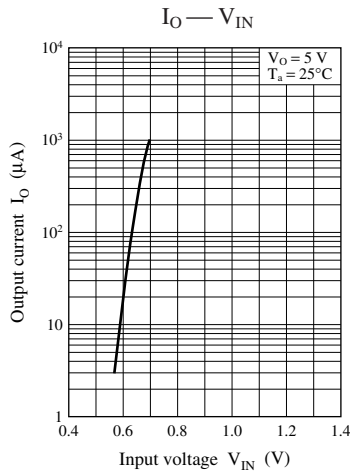
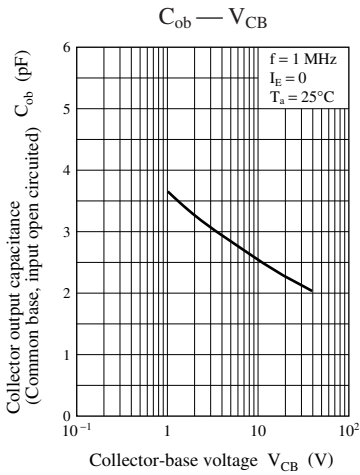


Characteristics charts of UNR5218

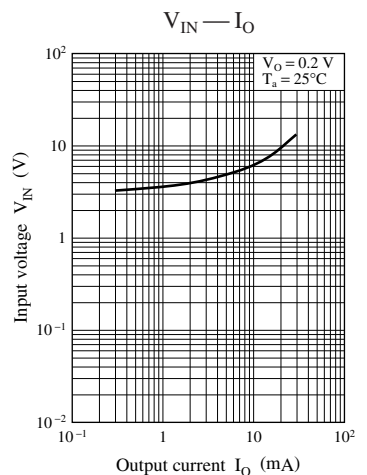
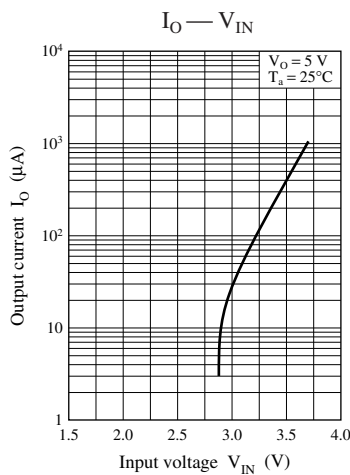
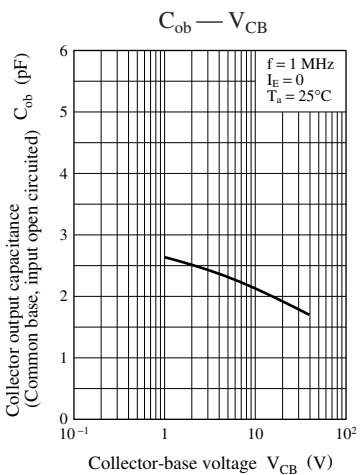
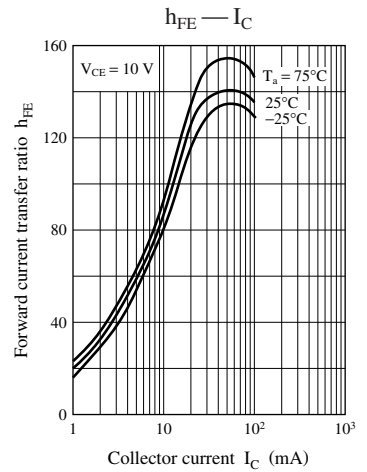
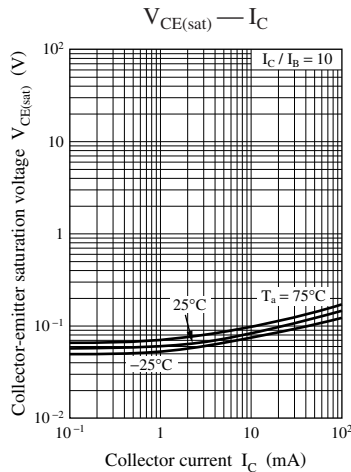
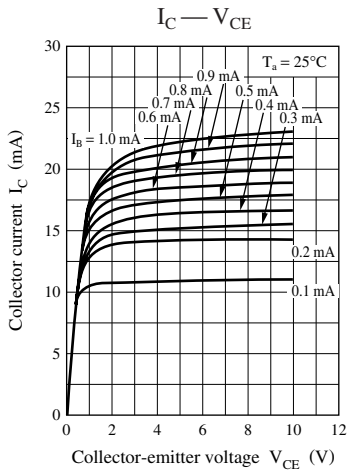


Characteristics charts of UNR5219

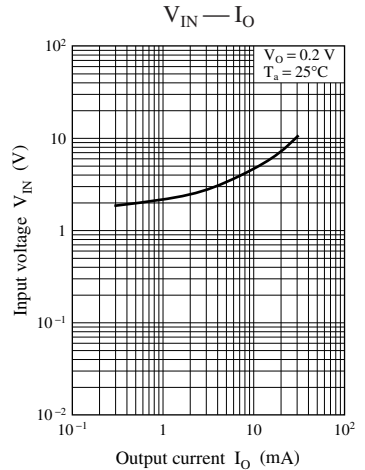
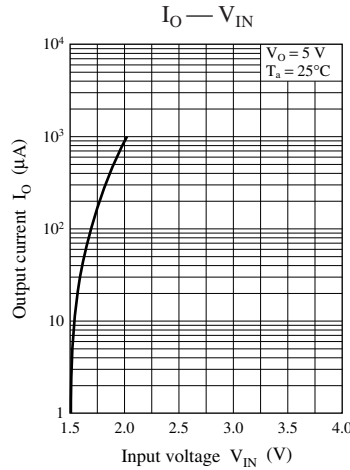
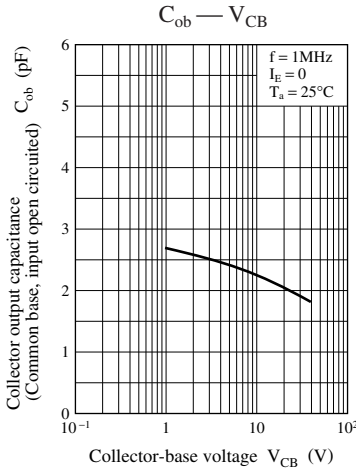
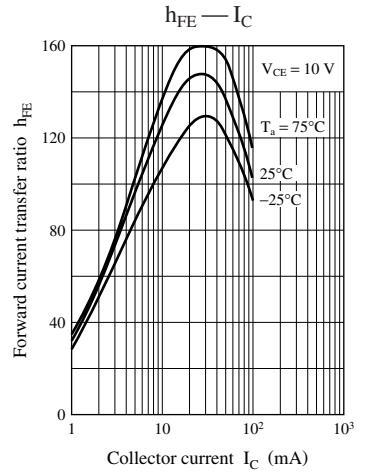
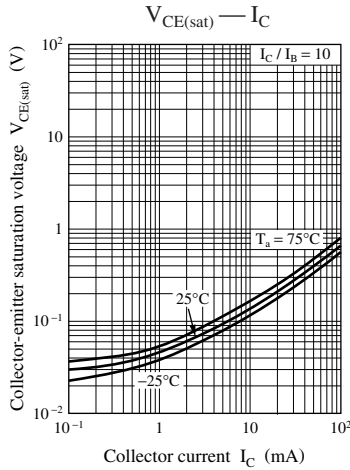
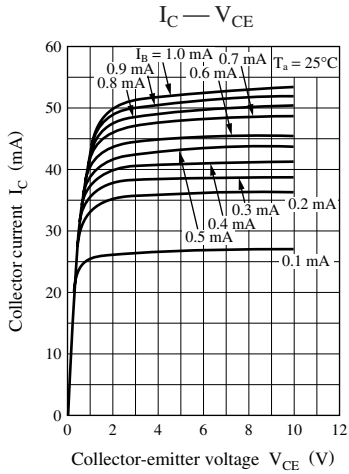




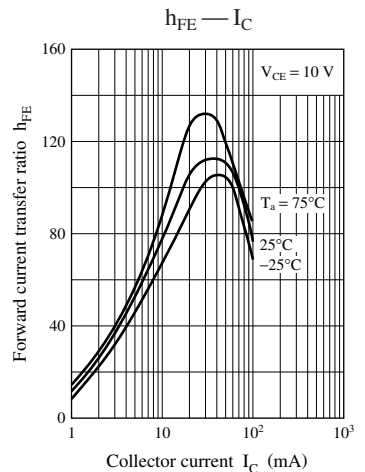
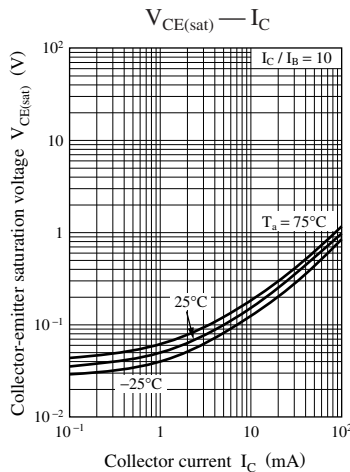
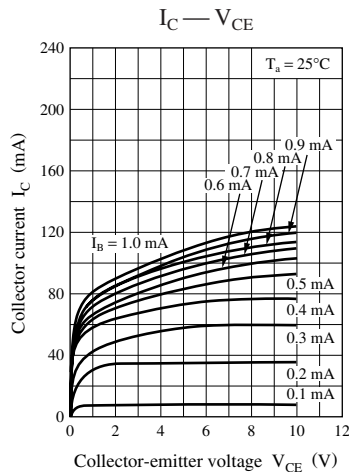
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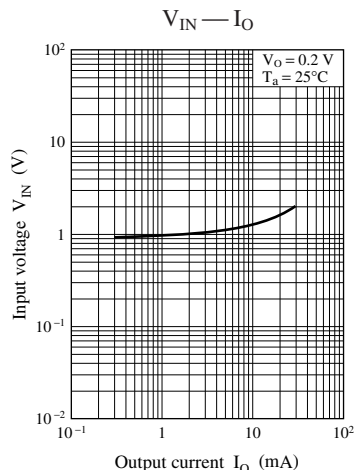
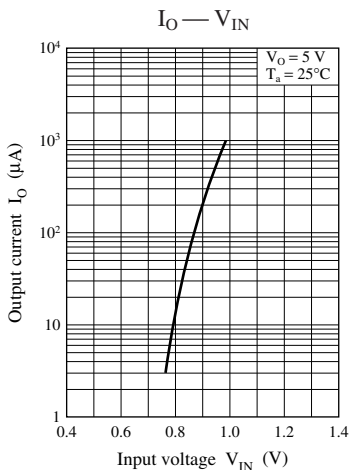
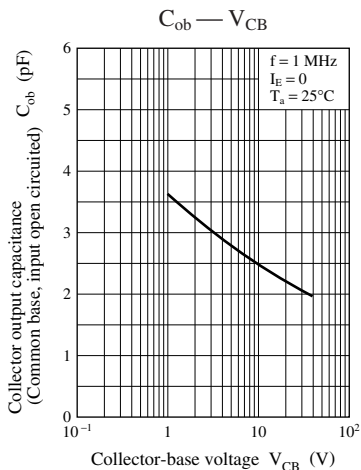


Characteristics charts of UNR521E

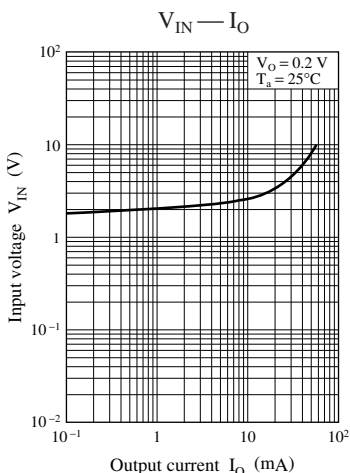
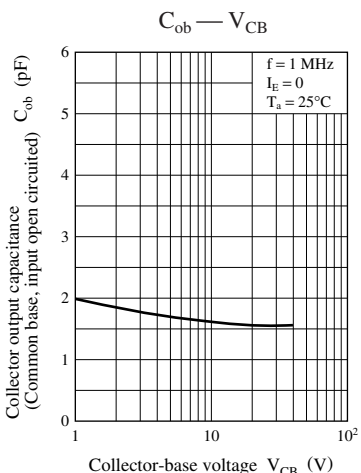
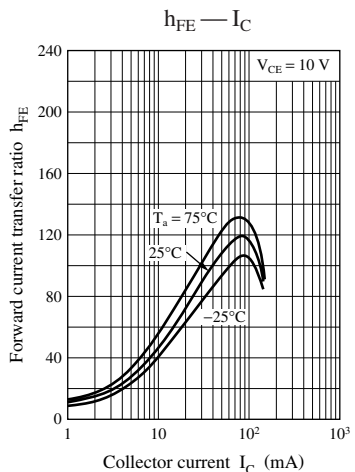
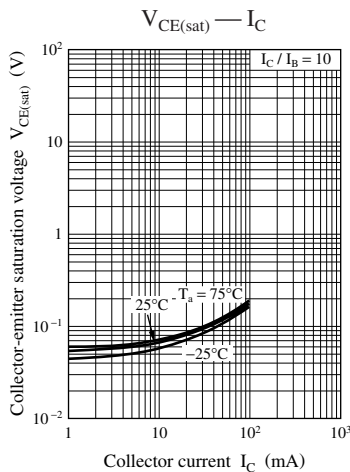
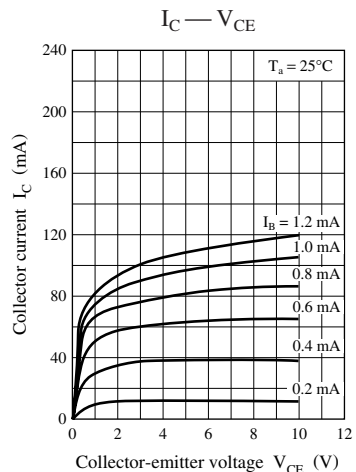


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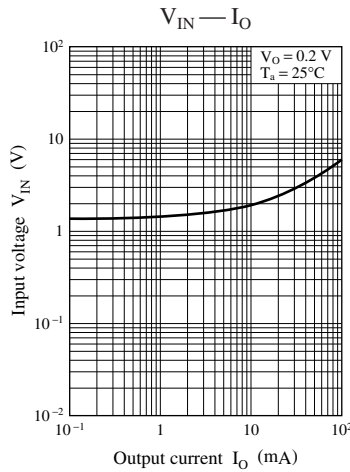
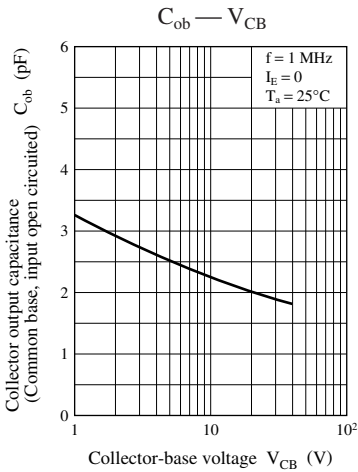
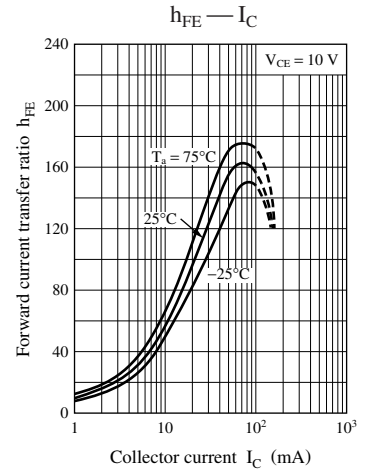
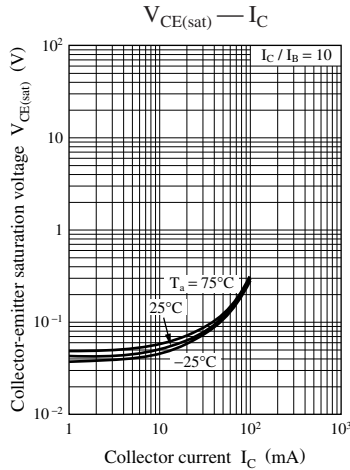
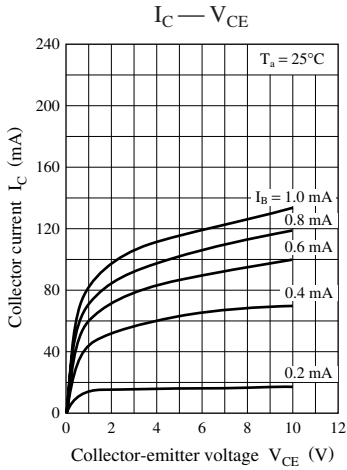




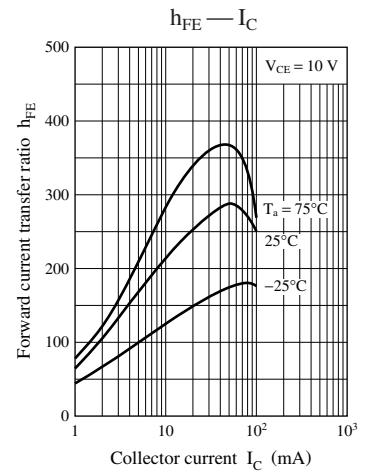
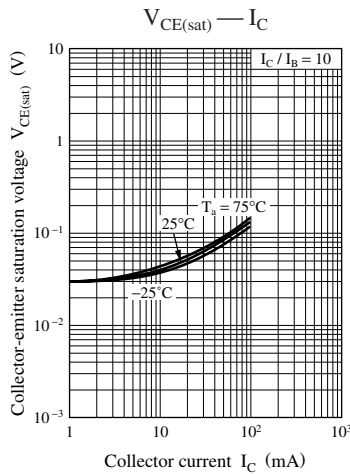
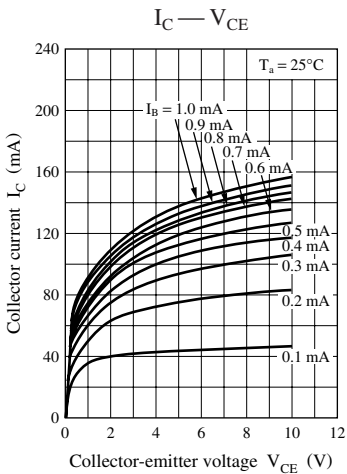
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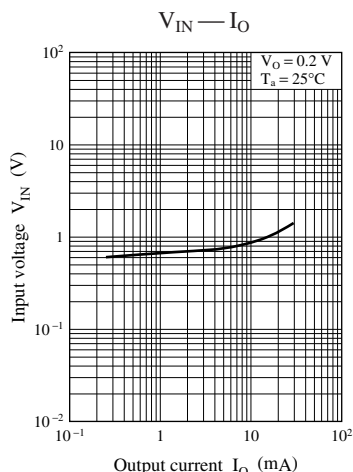
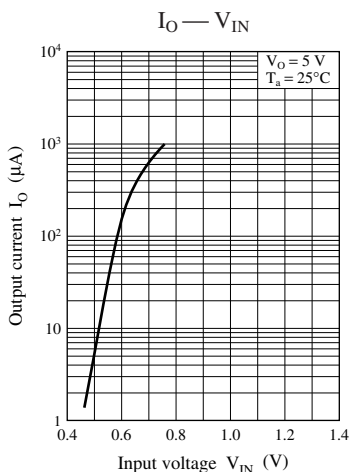
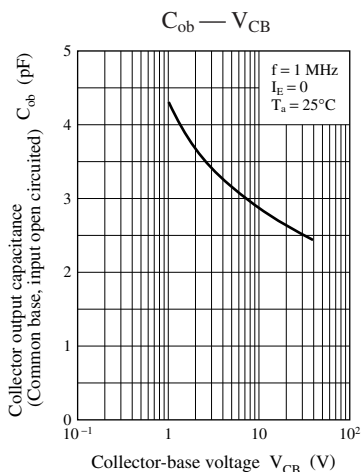


Characteristics charts of UNR521L

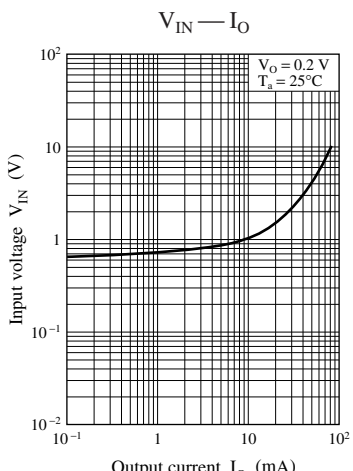
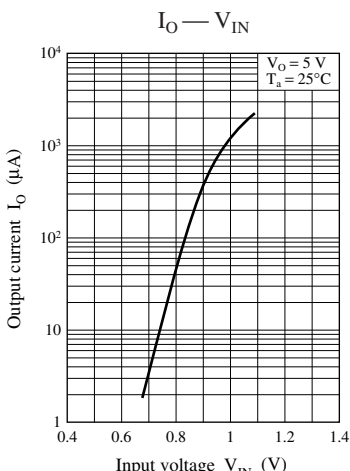
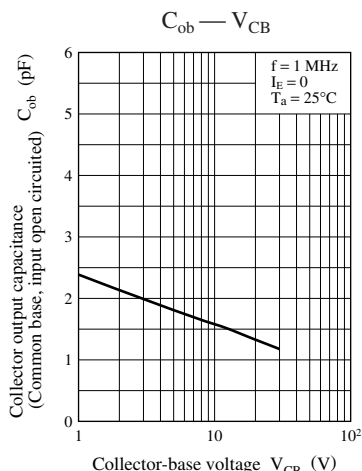
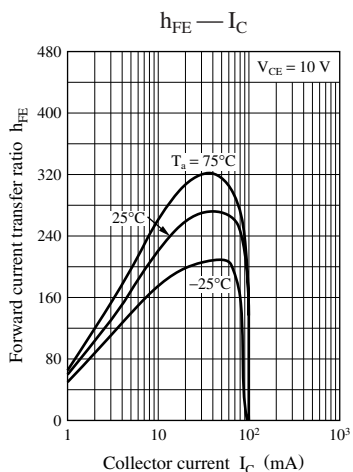
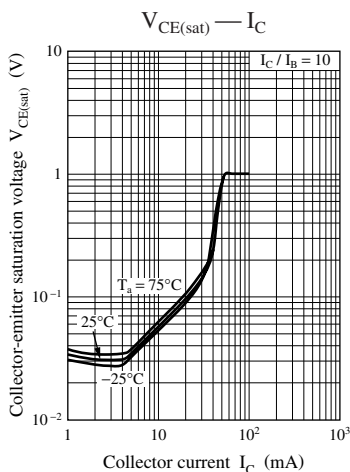
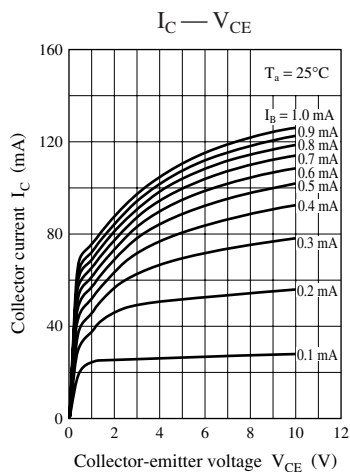


Characteristics charts of UNR521M

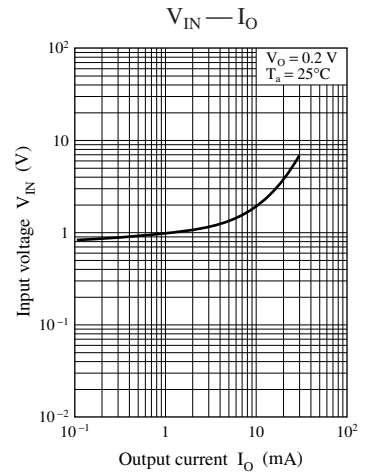
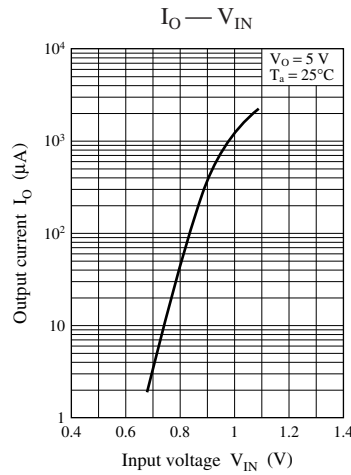
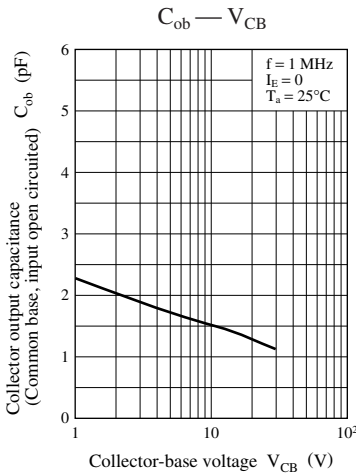
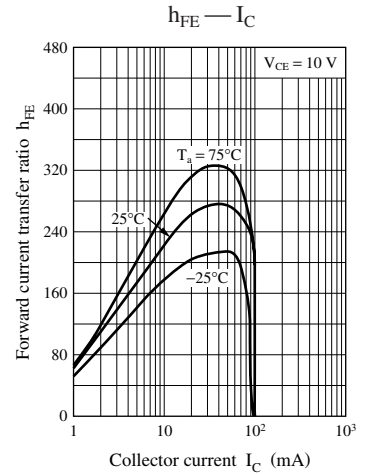
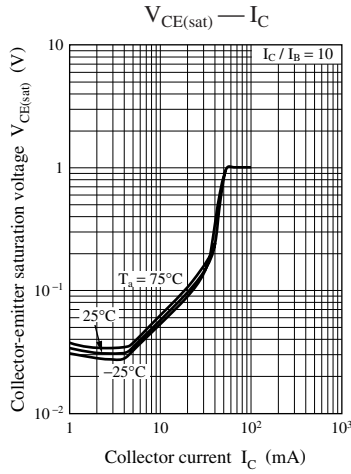
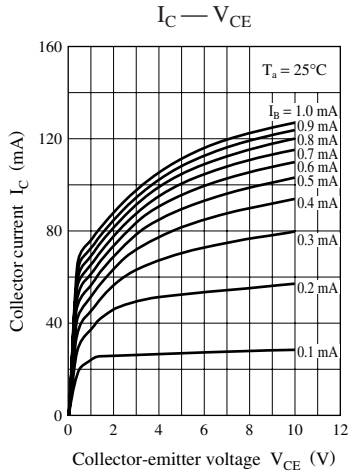




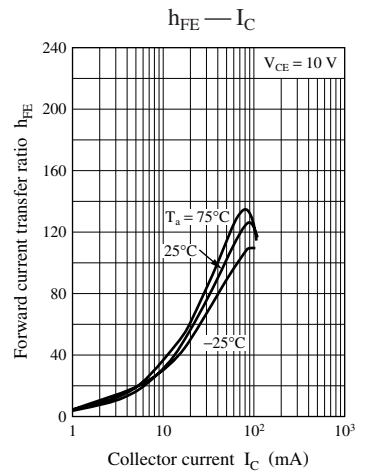
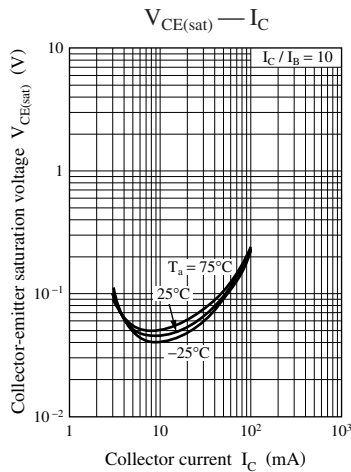
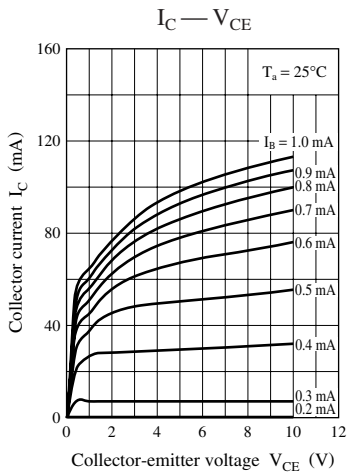
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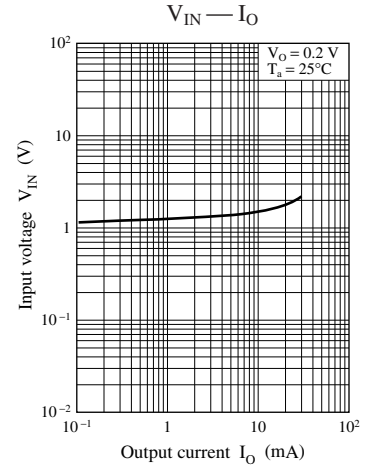
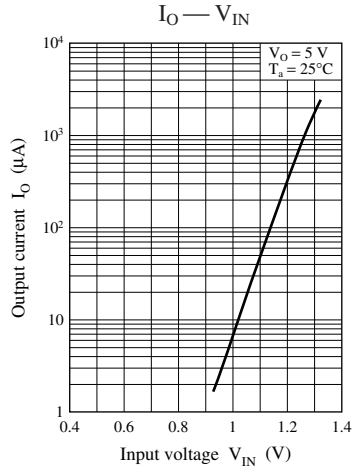
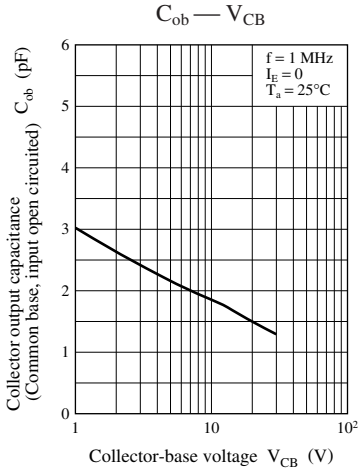


**Characteristics charts of UNR521T**

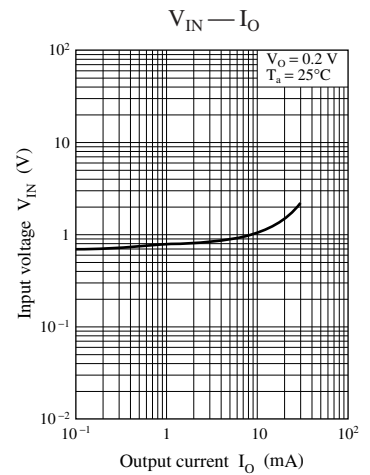
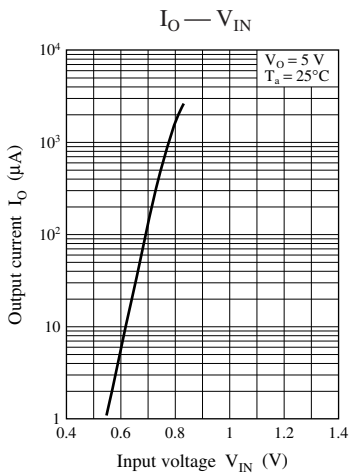
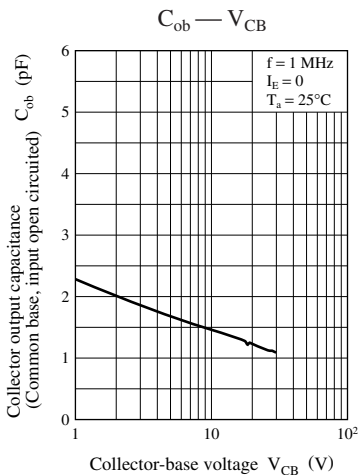
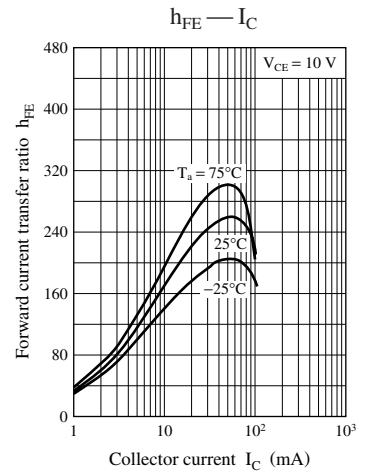
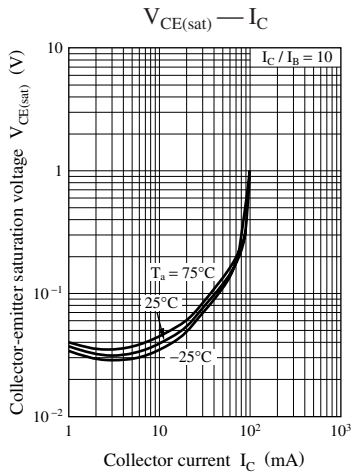
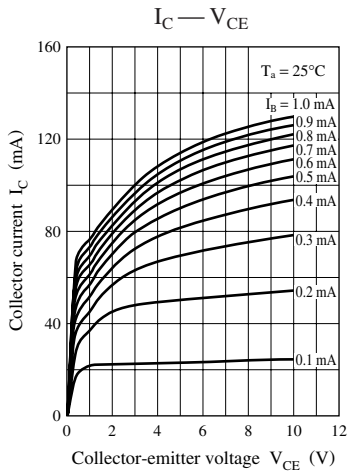


**Characteristics charts of UNR521V**





Characteristics charts of UNR521Z





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