

# UNR521x Series (UN521x Series)

## Silicon NPN epitaxial planar type

For digital circuits

### ■ Features

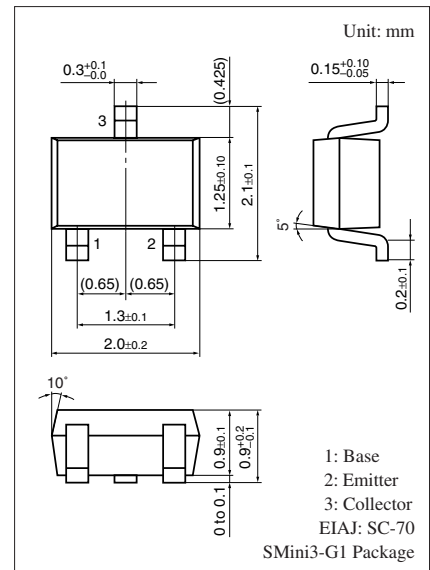
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts
- S-Mini type package, allowing automatic insertion through the tape packing and magazine packing

### ■ Resistance by Part Number

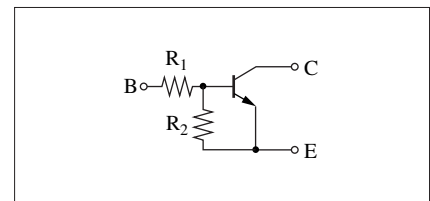
	Marking symbol (R <sub>1</sub> )	(R <sub>2</sub> )
• UNR5210 (UN5210)	8L	47 kΩ —
• UNR5211 (UN5211)	8A	10 kΩ 10 kΩ
• UNR5212 (UN5212)	8B	22 kΩ 22 kΩ
• UNR5213 (UN5213)	8C	47 kΩ 47 kΩ
• UNR5214 (UN5214)	8D	10 kΩ 47 kΩ
• UNR5215 (UN5215)	8E	10 kΩ —
• UNR5216 (UN5216)	8F	4.7 kΩ —
• UNR5217 (UN5117)	8H	22 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)		$V_{\text{CBO}}$	$I_{\text{C}} = 10 \mu\text{A}, I_{\text{E}} = 0$	50			V
Collector-emitter voltage (Base open)		$V_{\text{CEO}}$	$I_{\text{C}} = 2 \text{ mA}, I_{\text{B}} = 0$	50			V
Collector-base cutoff current (Emitter open)		$I_{\text{CBO}}$	$V_{\text{CB}} = 50 \text{ V}, I_{\text{E}} = 0$			0.1	$\mu\text{A}$
Collector-emitter cutoff current (Base open)		$I_{\text{CEO}}$	$V_{\text{CE}} = 50 \text{ V}, I_{\text{B}} = 0$			0.5	
Emitter-base cutoff current (Collector open)	UNR5210/5215/5216/5217	$I_{\text{EBO}}$	$V_{\text{EB}} = 6 \text{ V}, I_{\text{C}} = 0$			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	$h_{\text{FE}}$	$V_{\text{CE}} = 10 \text{ V}, I_{\text{C}} = 5 \text{ mA}$	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		$V_{\text{OH}}$	$V_{\text{CC}} = 5 \text{ V}, V_{\text{B}} = 0.5 \text{ V}, R_{\text{L}} = 1 \text{ k}\Omega$	4.9			V
Output voltage low-level		$V_{\text{OL}}$	$V_{\text{CC}} = 5 \text{ V}, V_{\text{B}} = 2.5 \text{ V}, R_{\text{L}} = 1 \text{ k}\Omega$			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		$f_{\text{T}}$	$V_{\text{CB}} = 10 \text{ V}, I_{\text{E}} = -2 \text{ mA}, f = 200 \text{ MHz}$		150		MHz
Input resistance	UNR5218	$R_{\text{I}}$		-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.

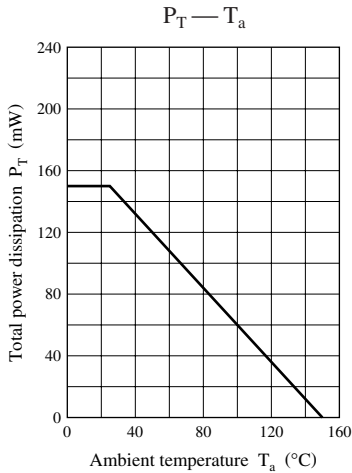
2. \*: Rank classification

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

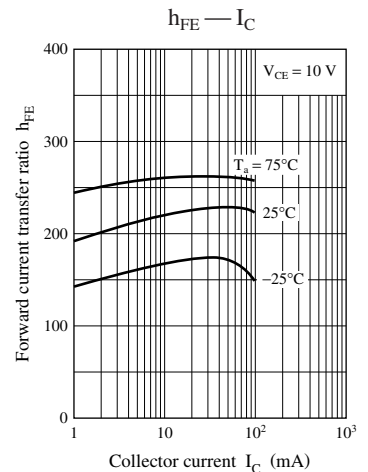
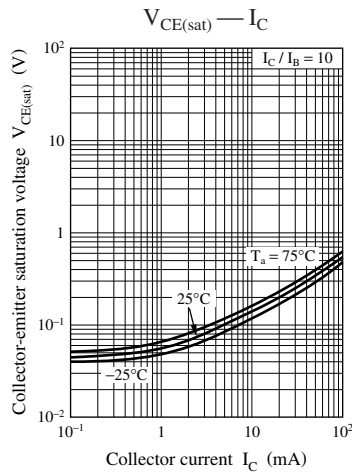
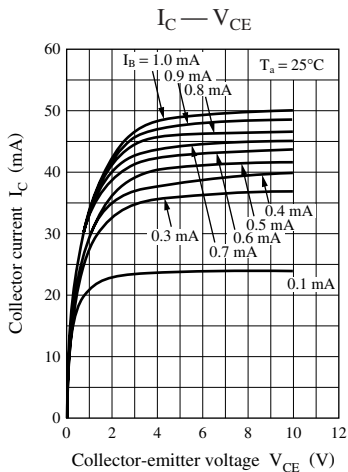
■ Electrical Characteristics (continued)  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

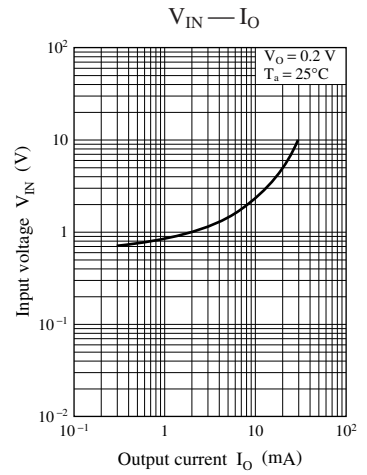
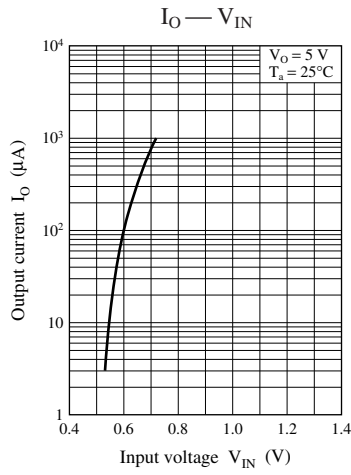
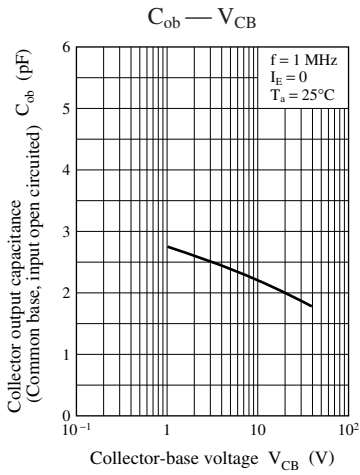
	Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Resistance ratio	UNR521M	$R_1/R_2$			0.047		—
	UNR521N				0.1		
	UNR5218/5219			0.08	0.10	0.12	
	UNR521Z				0.21		
	UNR5214			0.17	0.21	0.25	
	UNR521T				0.47		
	UNR521F			0.37	0.47	0.57	
	UNR521V				1.0		
	UNR5211/5212/5213/521L			0.8	1.0	1.2	
	UNR521K		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

Common characteristics chart

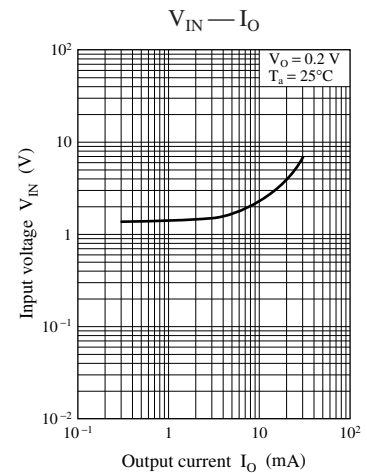
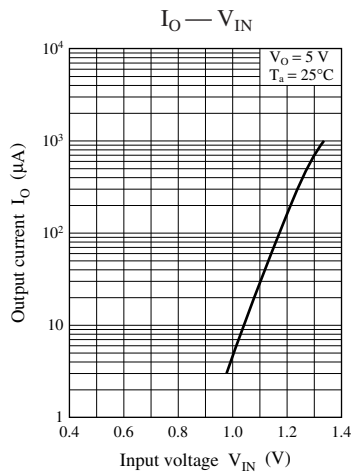
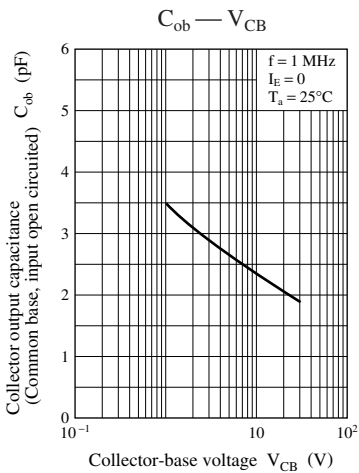
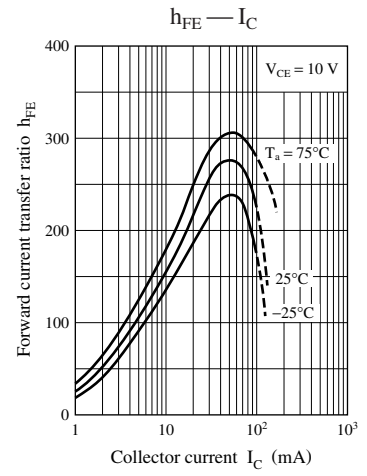
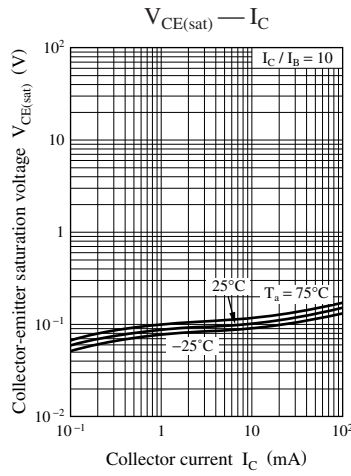
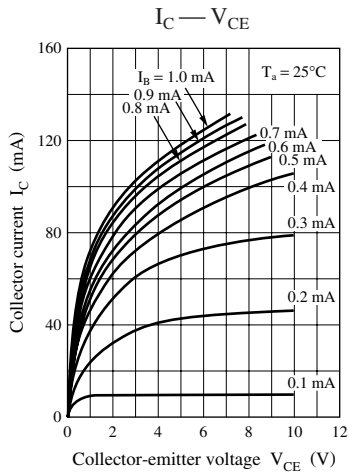


Characteristics charts of UNR5210

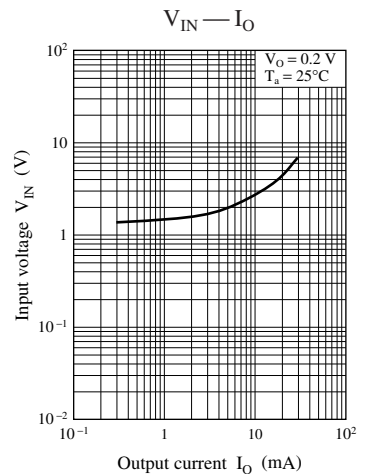
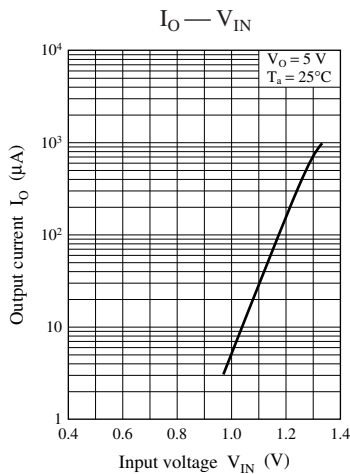
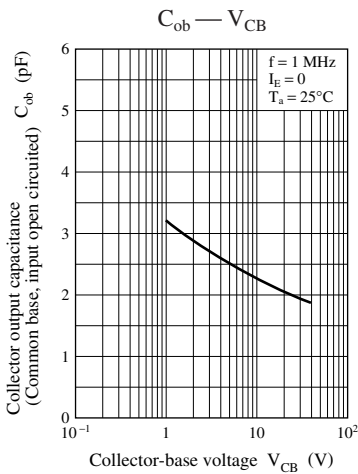
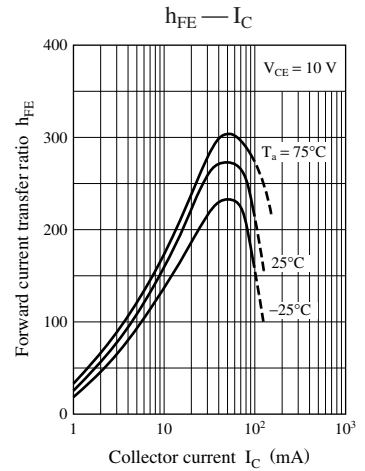
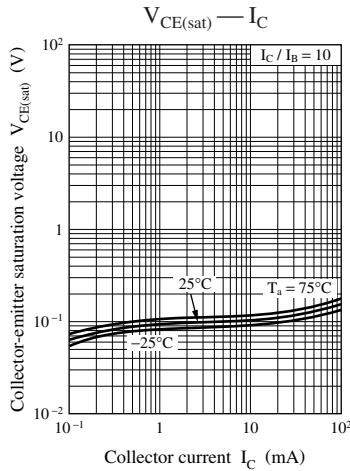
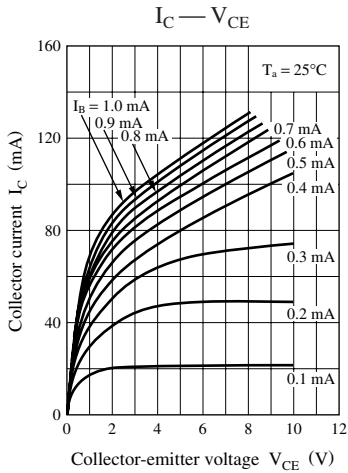




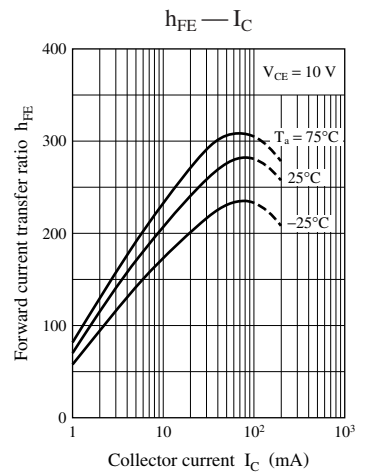
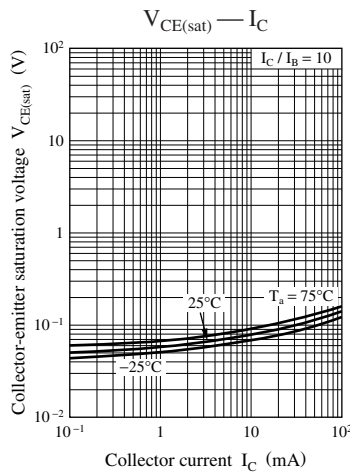
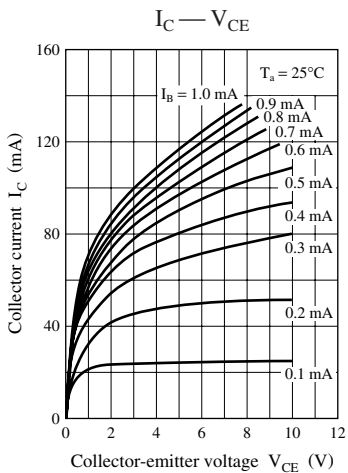
Characteristics charts of UNR5211

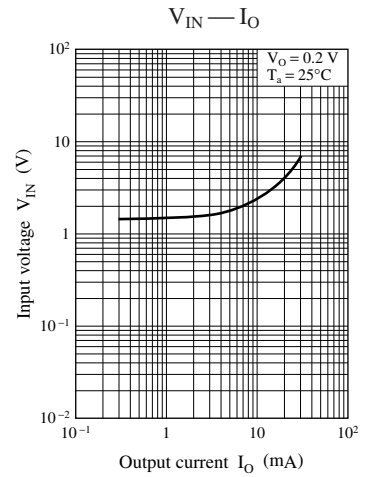
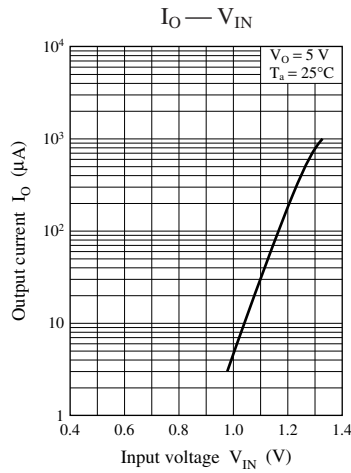
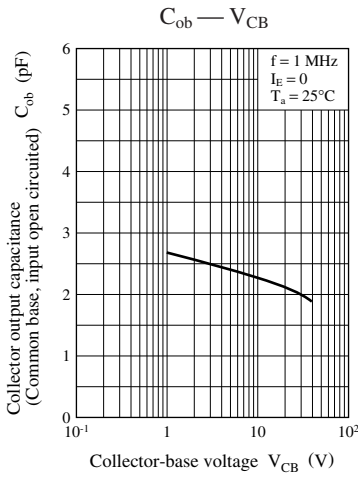


Characteristics charts of UNR5212

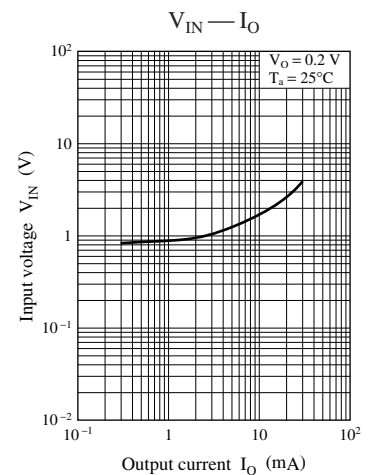
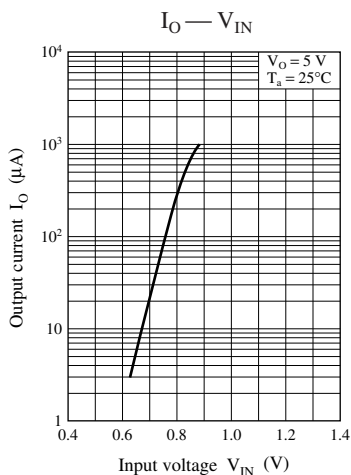
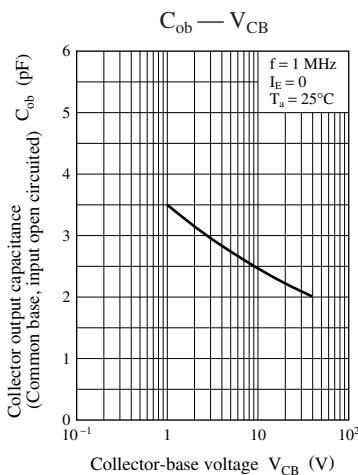
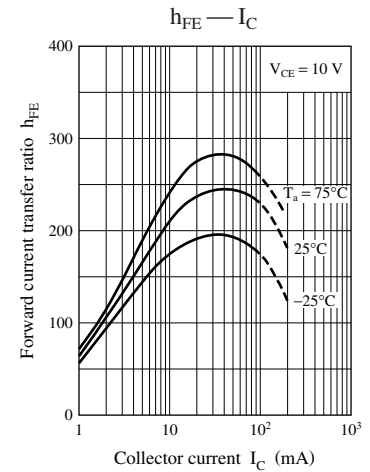
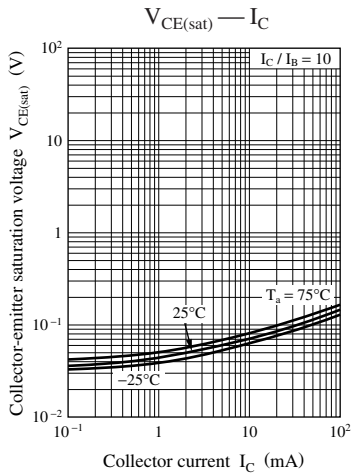
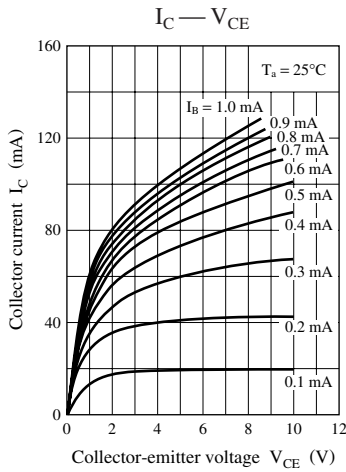


Characteristics charts of UNR5213

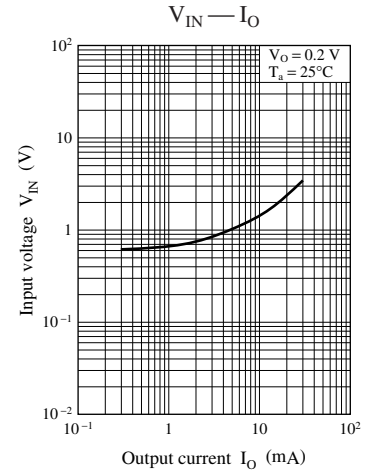
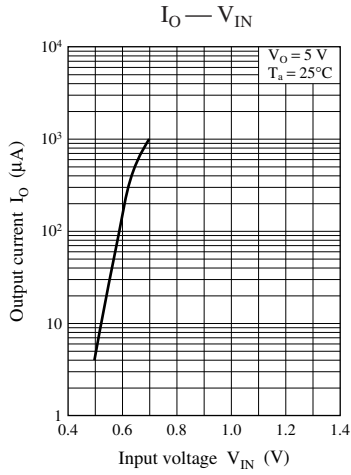
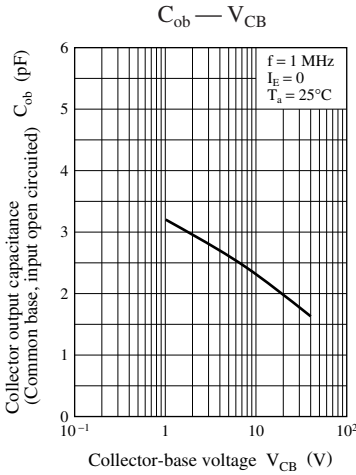
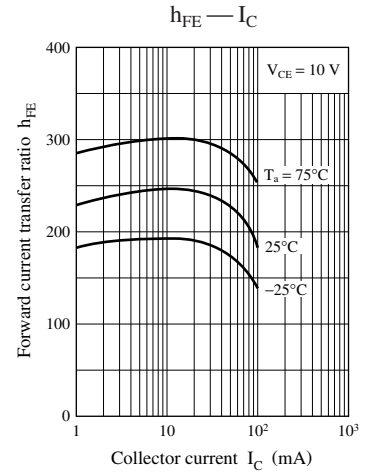
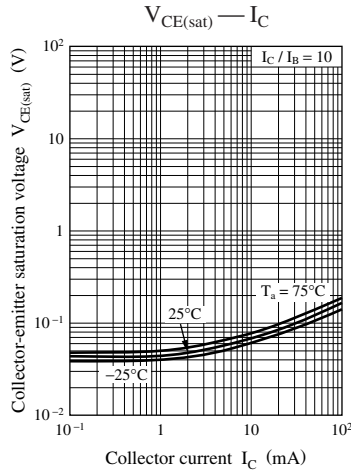
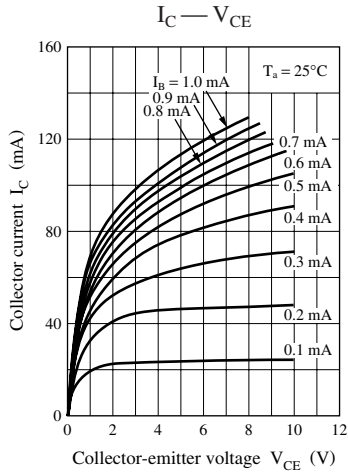




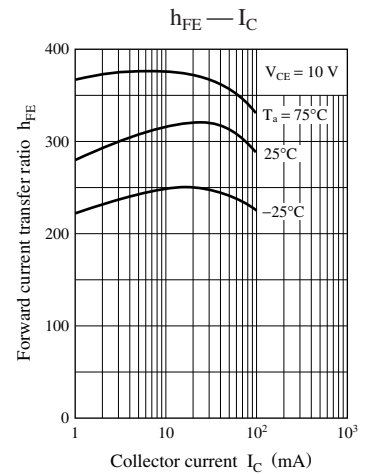
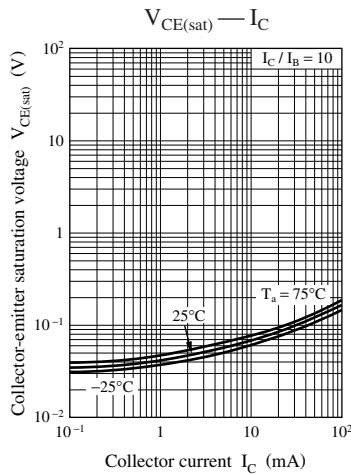
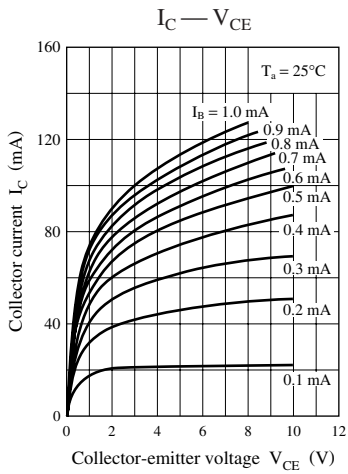
Characteristics charts of UNR5214

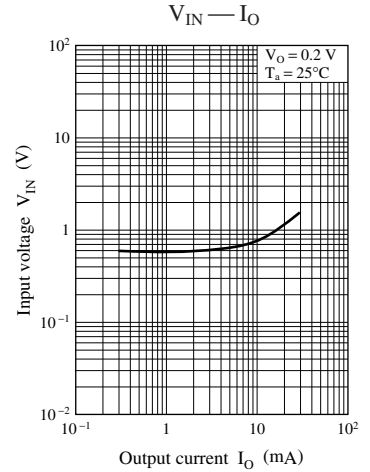
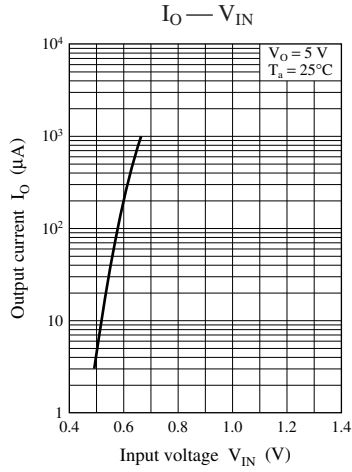
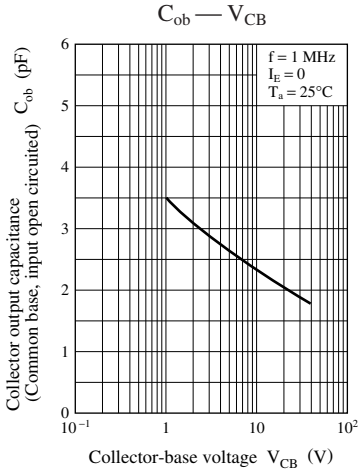


Characteristics charts of UNR5215

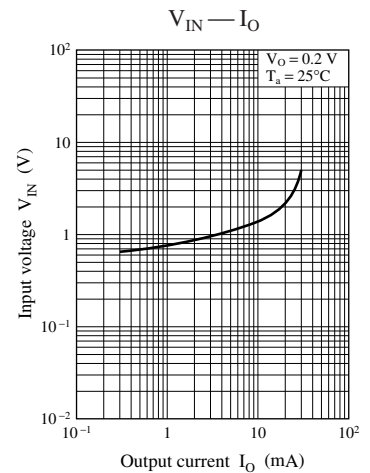
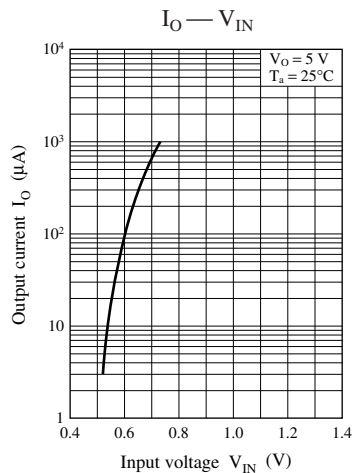
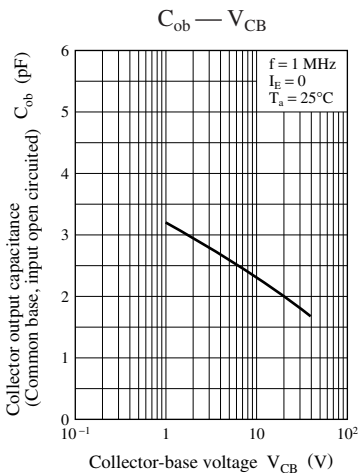
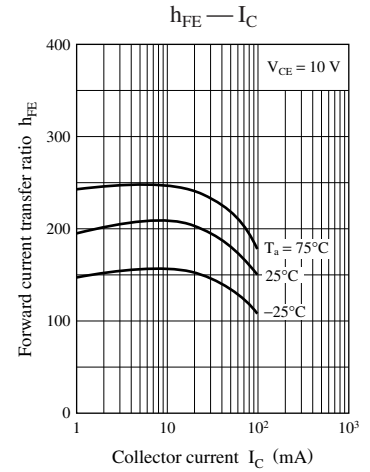
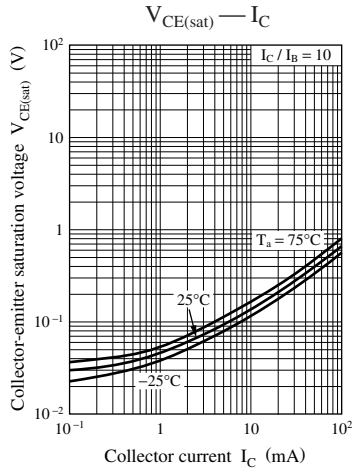
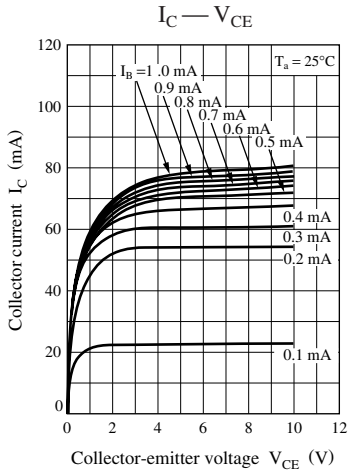


Characteristics charts of UNR5216



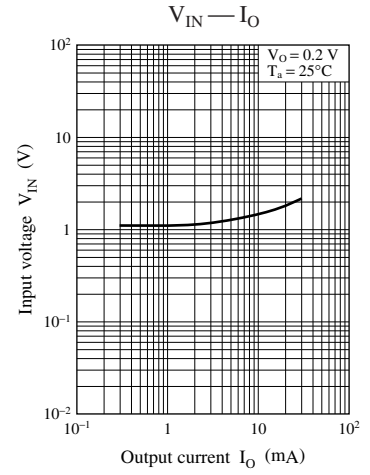
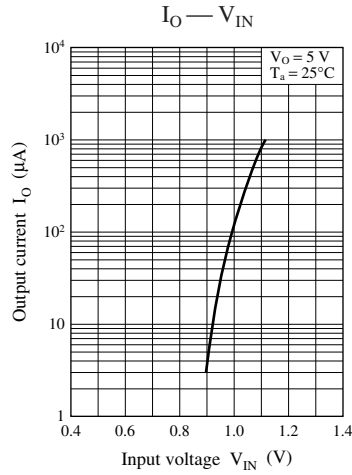
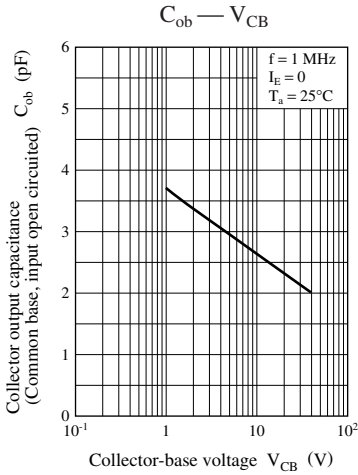
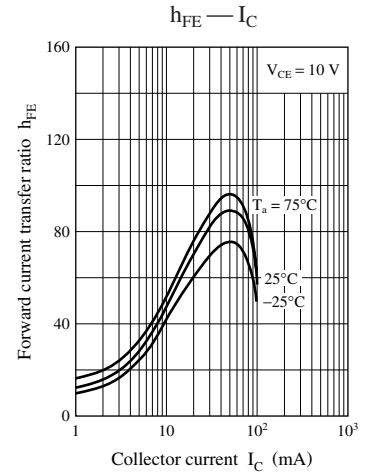
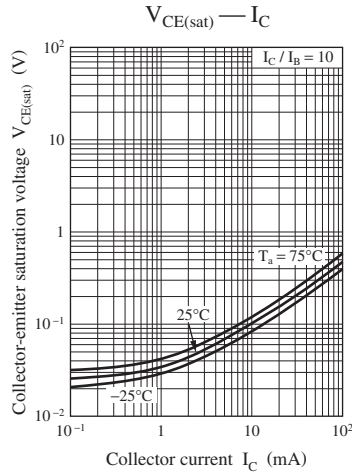
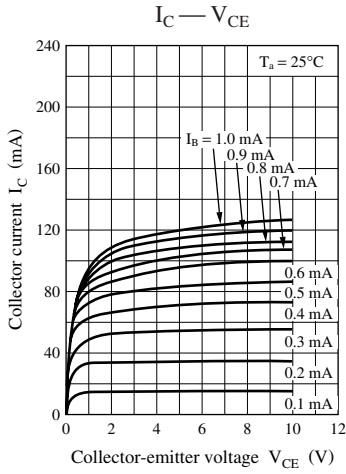


Characteristics charts of UNR5217

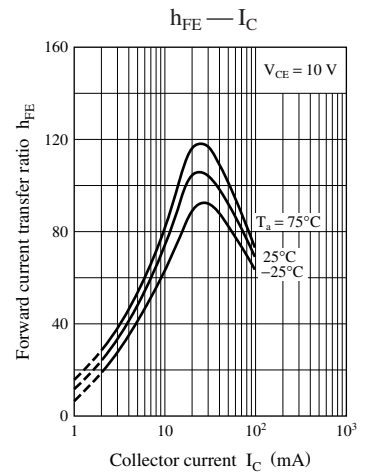
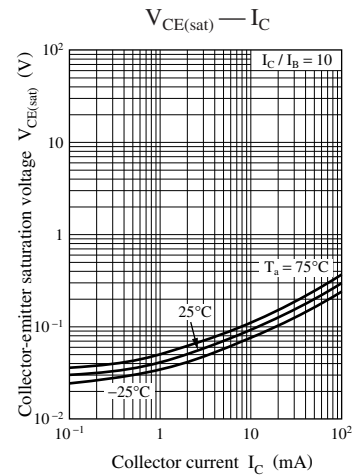
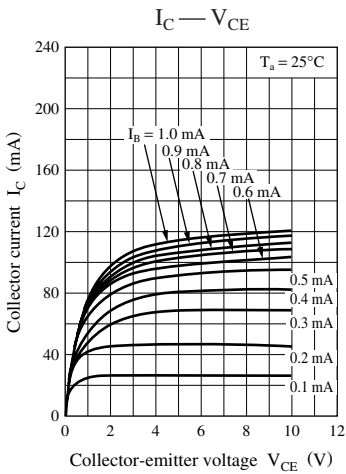


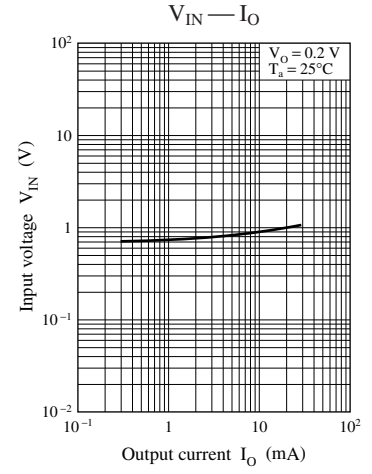
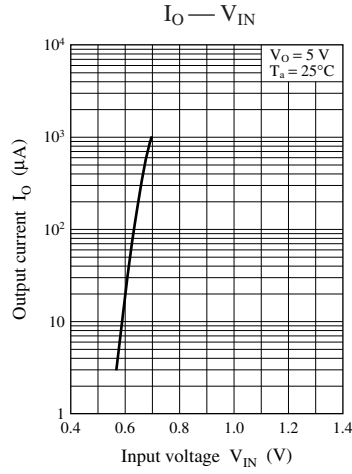
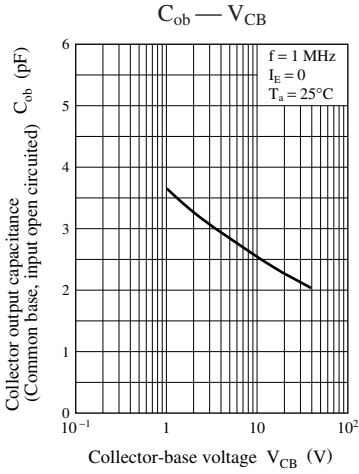


Characteristics charts of UNR5218

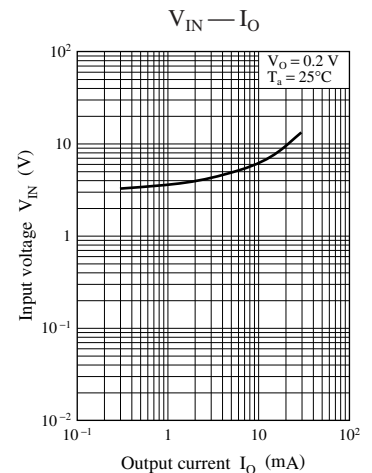
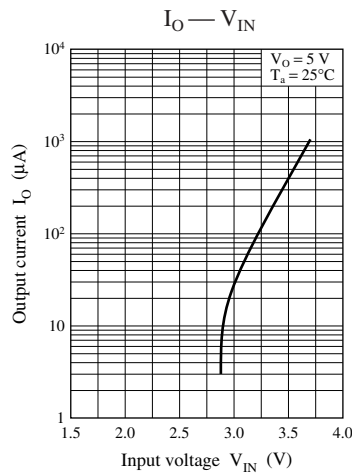
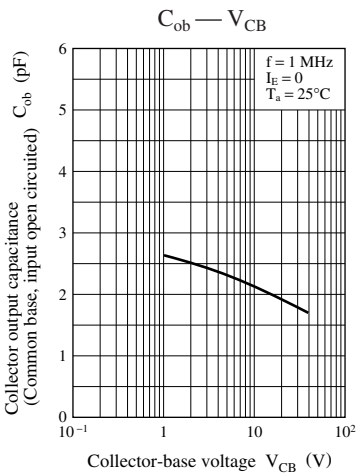
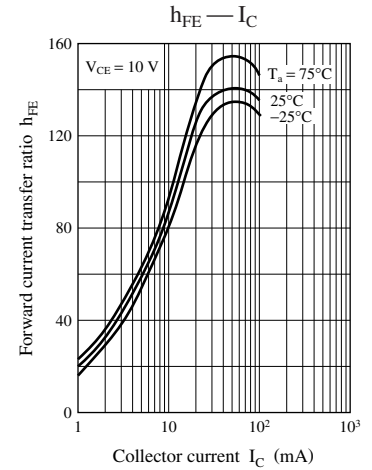
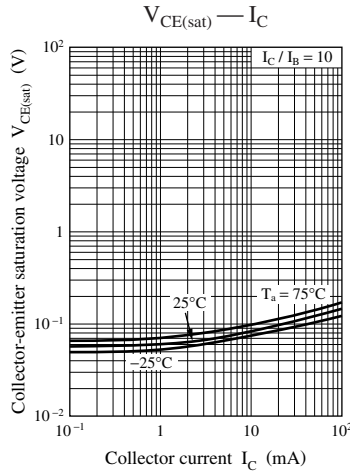
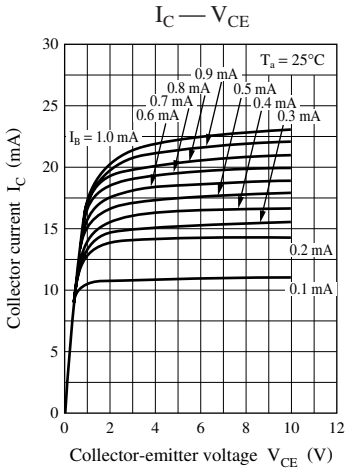


Characteristics charts of UNR5219

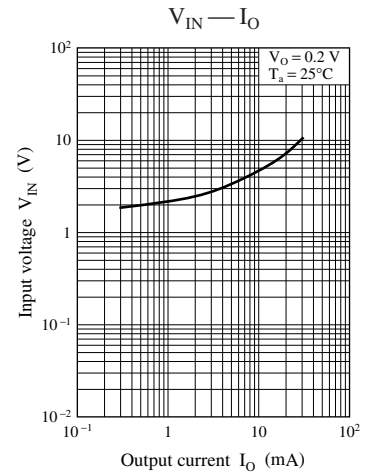
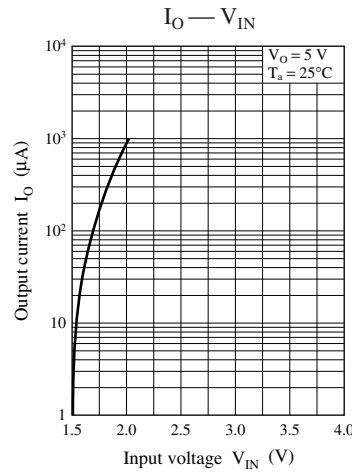
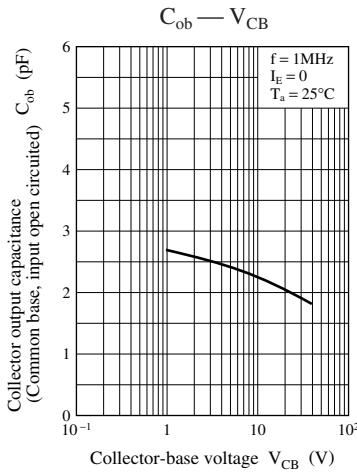
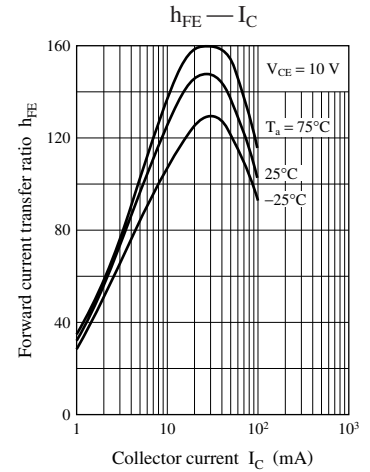
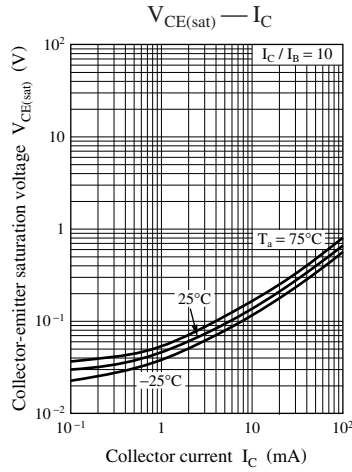
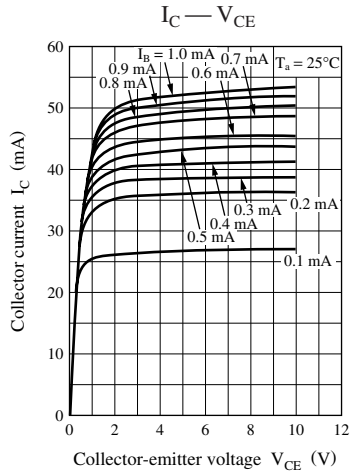




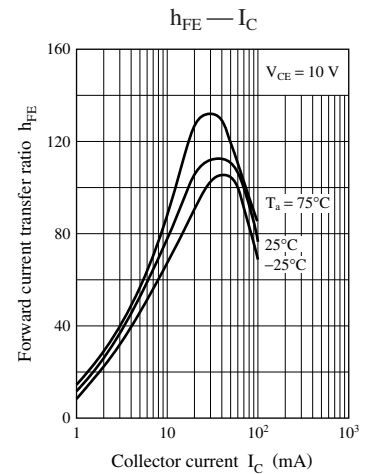
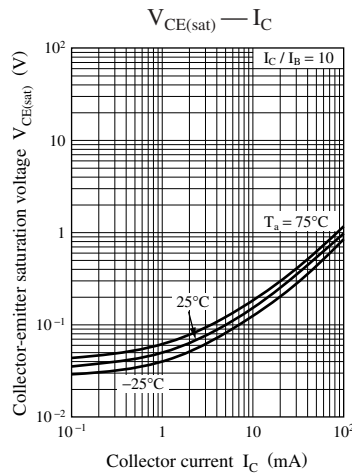
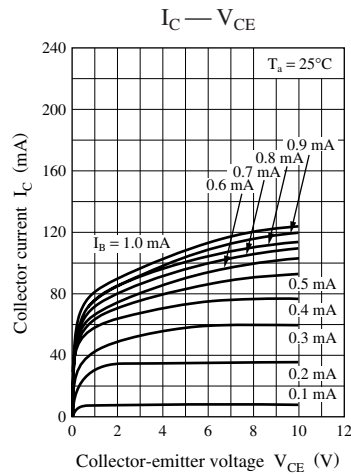
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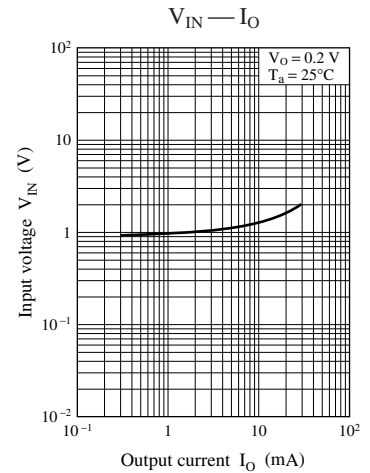
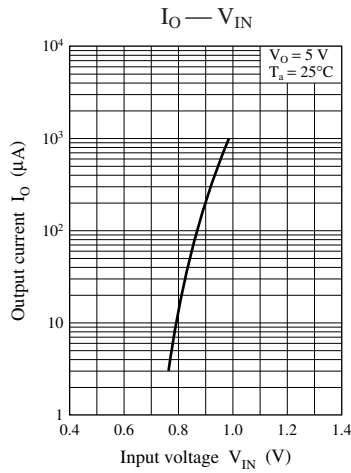
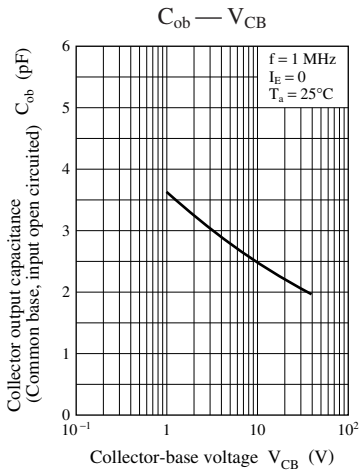


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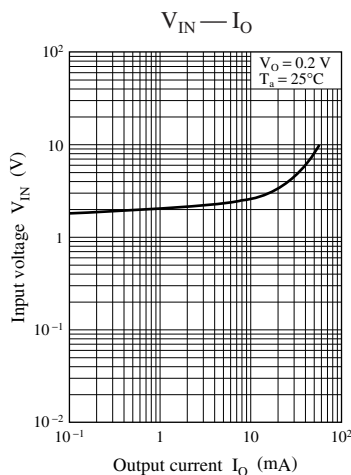
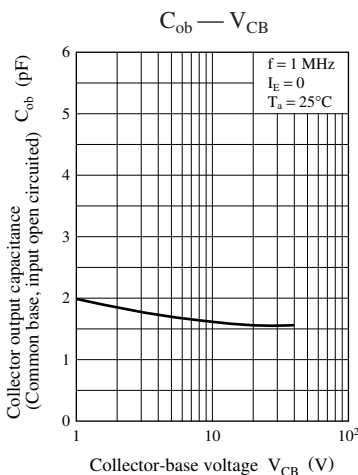
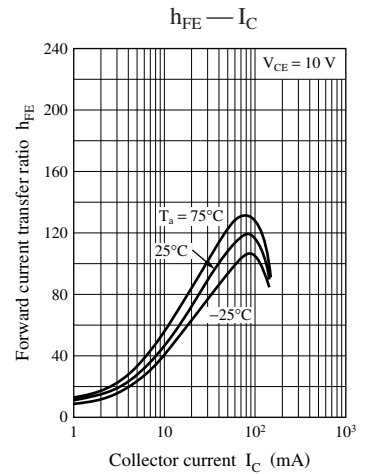
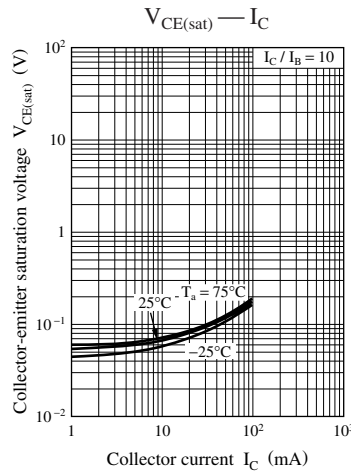
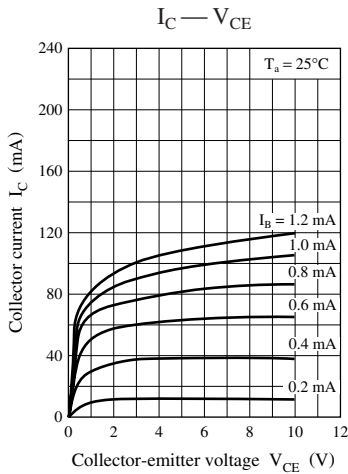


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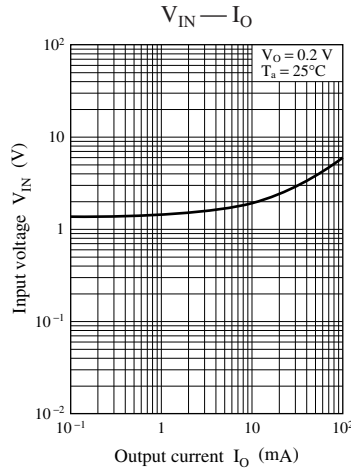
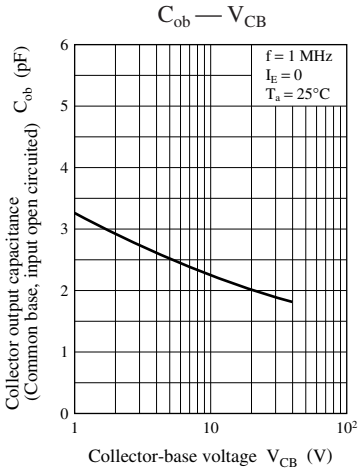
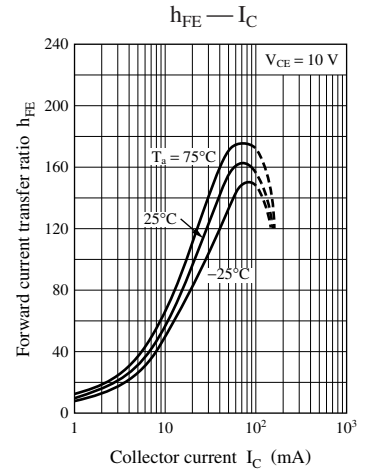
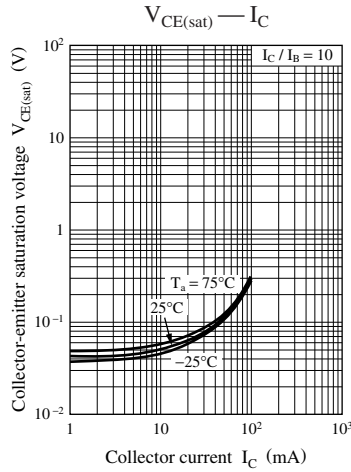
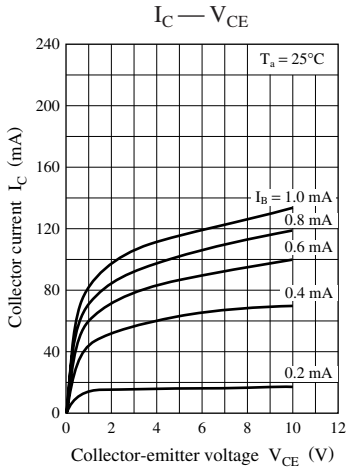




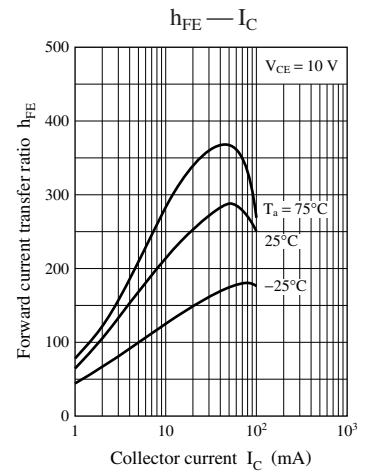
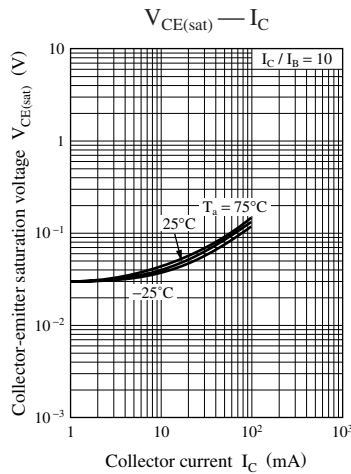
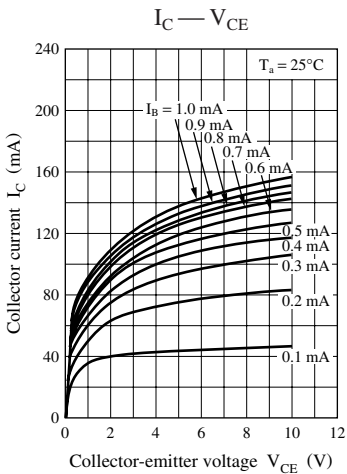
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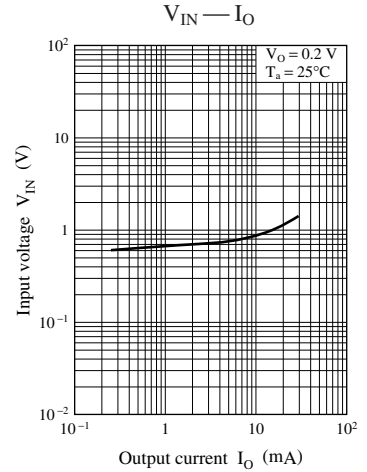
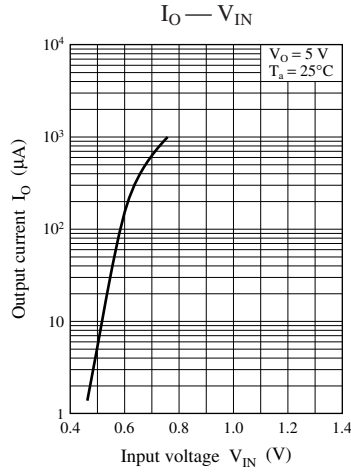
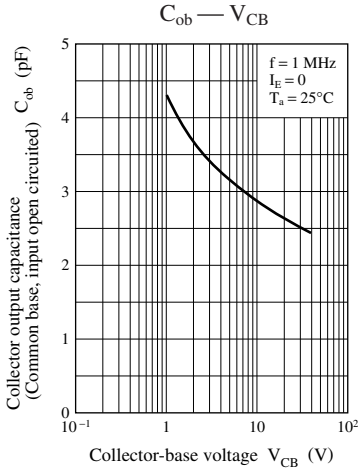


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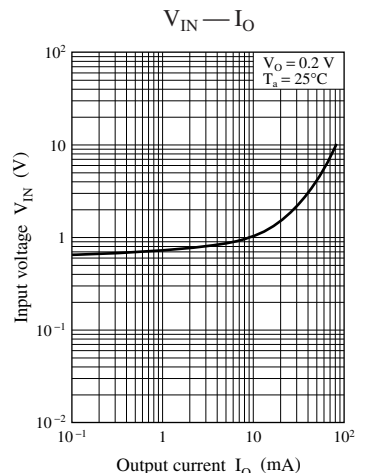
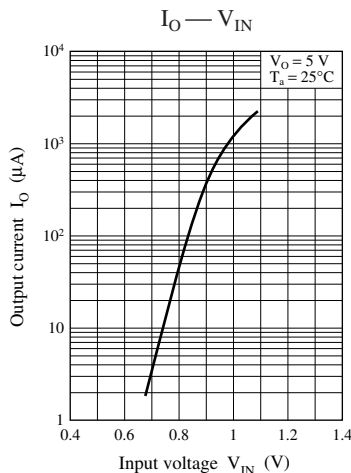
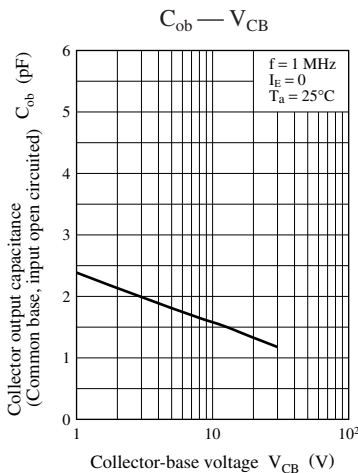
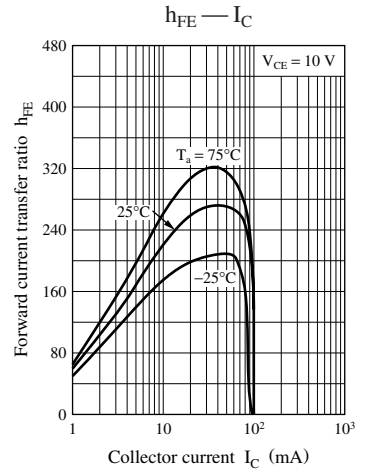
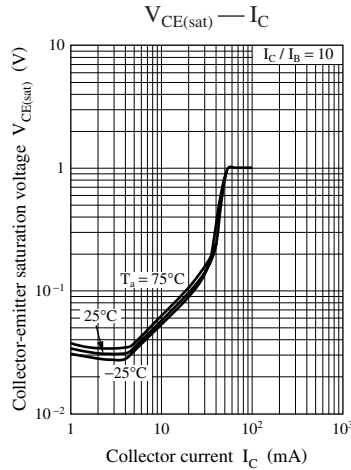
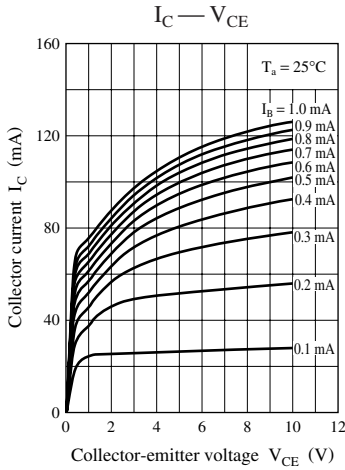


Characteristics charts of UNR521M

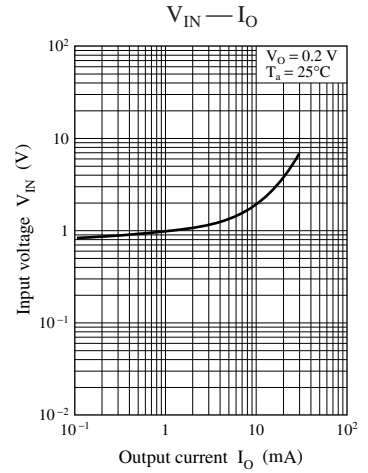
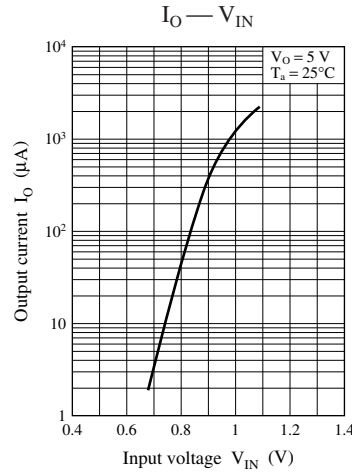
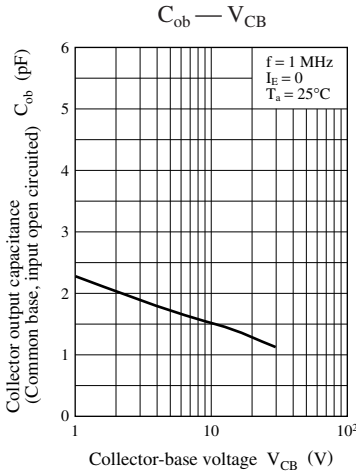
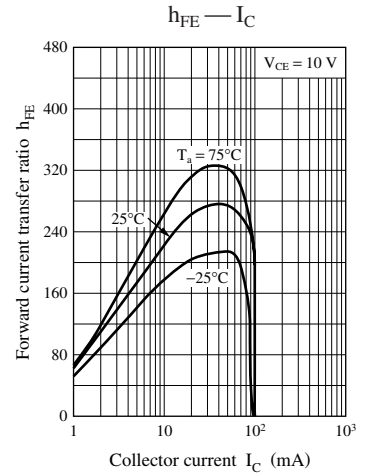
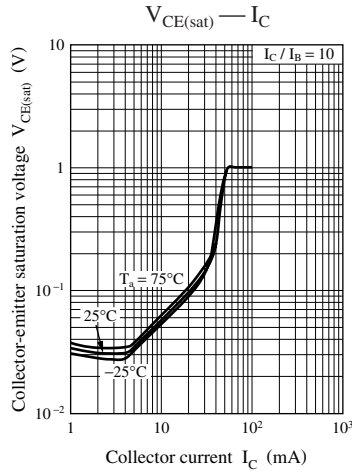
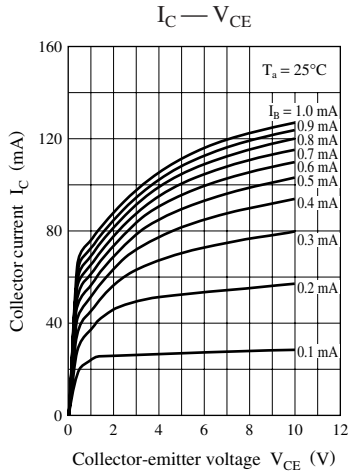




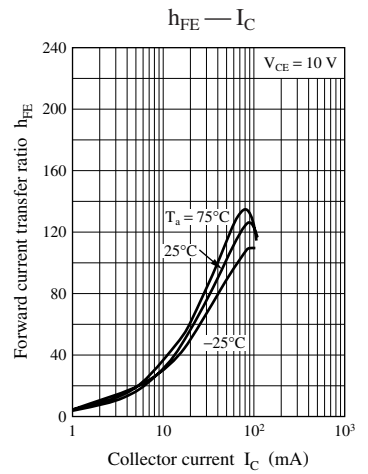
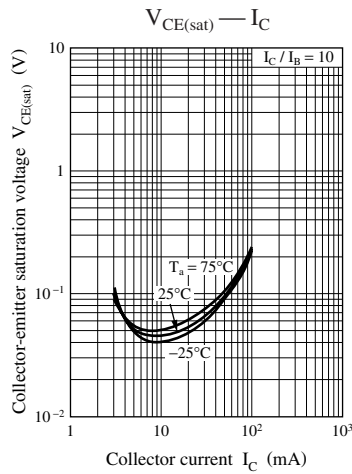
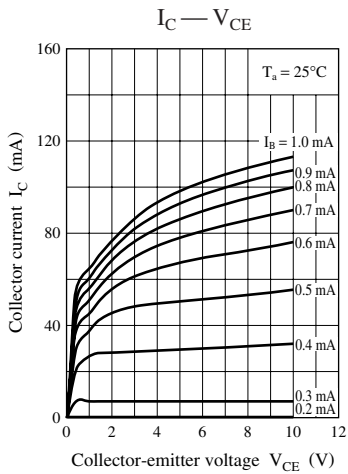
Characteristics charts of UNR521N

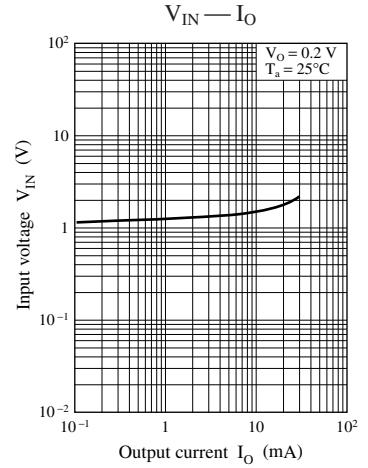
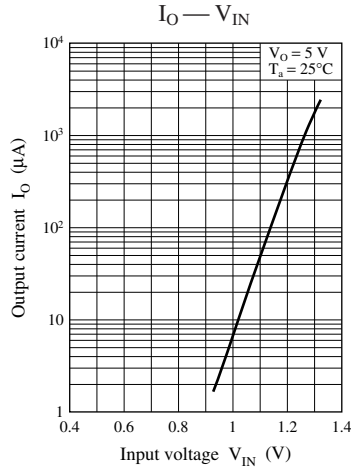
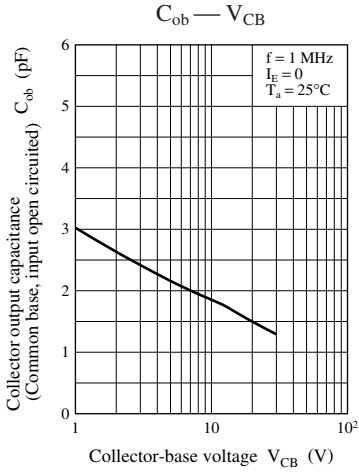


Characteristics charts of UNR521T

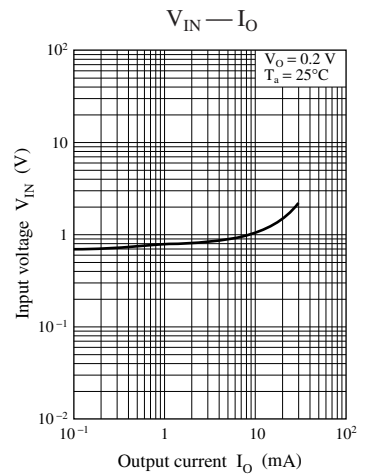
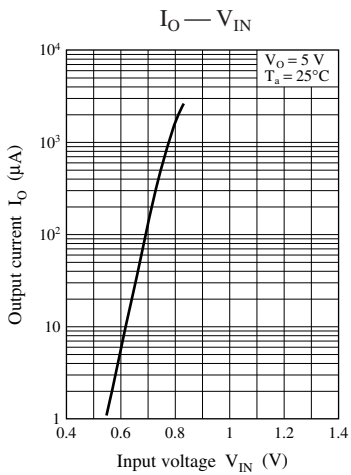
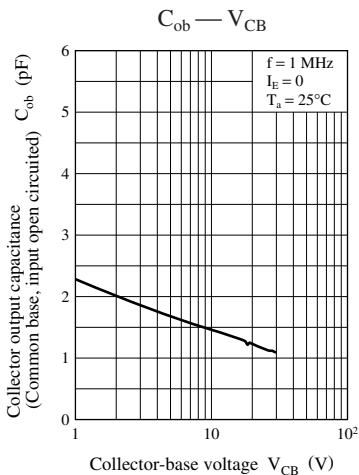
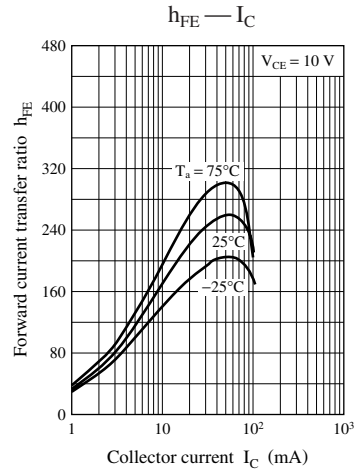
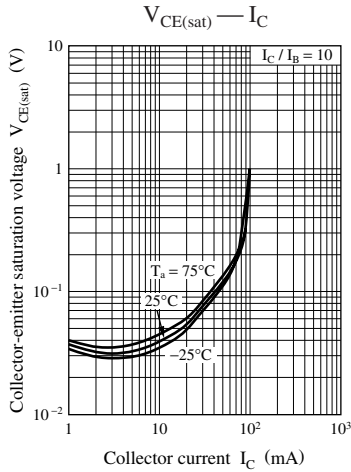
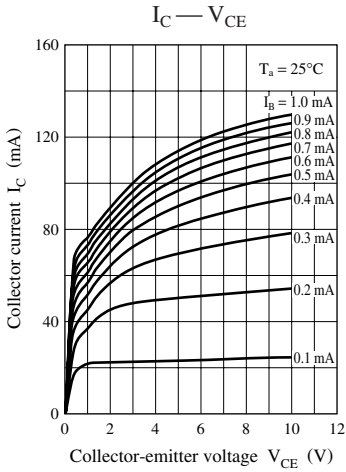


Characteristics charts of UNR521V





Characteristics charts of UNR521Z





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