

# UNR5211/5212/5213/5214/5215/5216/5217/5218/5219/5210/ 521D/521E/521F/521K/521L/521M/521N/521T/521V/521Z (UN5211/5212/5213/5214/5215/5216/5217/5218/5219/5210/521D/521E/ 521F/521K/521L/521M/521N/521T/521V/521Z)

Silicon NPN epitaxial planer transistor

For digital circuits

## Features

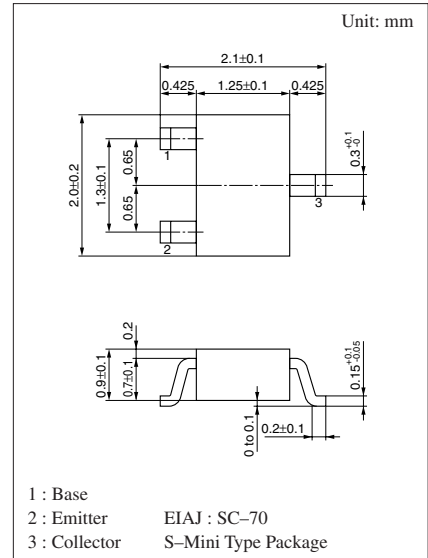
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- S-Mini type package, allowing automatic insertion through tape packing and magazine packing.

## Resistance by Part Number

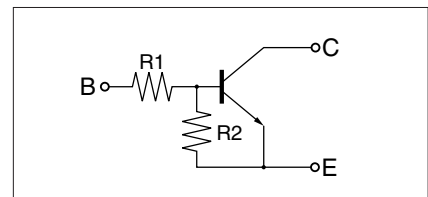
	Marking Symbol	(R <sub>1</sub> )	(R <sub>2</sub> )
● UNR5211	8A	10kΩ	10kΩ
● UNR5212	8B	22kΩ	22kΩ
● UNR5213	8C	47kΩ	47kΩ
● UNR5214	8D	10kΩ	47kΩ
● UNR5215	8E	10kΩ	—
● UNR5216	8F	4.7kΩ	—
● UNR5217	8H	22kΩ	—
● UNR5218	8I	0.51kΩ	5.1kΩ
● UNR5219	8K	1kΩ	10kΩ
● UNR5210	8L	47kΩ	—
● UNR521D	8M	47kΩ	10kΩ
● UNR521E	8N	47kΩ	22kΩ
● UNR521F	8O	4.7kΩ	10kΩ
● UNR521K	8P	10kΩ	4.7kΩ
● UNR521L	8Q	4.7kΩ	4.7kΩ
● UNR521M	EL	2.2kΩ	47kΩ
● UNR521N	EX	4.7kΩ	47kΩ
● UNR521T	EZ	22kΩ	47kΩ
● UNR521V	FD	2.2kΩ	2.2kΩ
● UNR521Z	FF	4.7kΩ	22kΩ

## Absolute Maximum Ratings (T<sub>a</sub>=25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V <sub>CBO</sub>	50	V
Collector to emitter voltage	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>sig</sub>	-55 to +150	°C



## Internal Connection



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

UNR5211/5212/5213/5214/5215/5216/5217/5218/5219/5210/  
**Transistors with built-in Resistor 521D/521E/521F/521K/521L/521M/521N/521T/521V/521Z**

**Electrical Characteristics** (T<sub>a</sub>=25°C)

Parameter		Symbol	Conditions	min	typ	max	Unit	
Collector cutoff current		I <sub>CBO</sub>	V <sub>CB</sub> = 50V, I <sub>E</sub> = 0			0.1	μA	
		I <sub>CEO</sub>	V <sub>CE</sub> = 50V, I <sub>B</sub> = 0			0.5	μA	
Emitter cutoff current	UNR5211	I <sub>EBO</sub>	V <sub>EB</sub> = 6V, I <sub>C</sub> = 0			0.5	mA	
	UNR5212/5214/521E/521D/521M/521N/521T					0.2		
	UNR5213					0.1		
	UNR5215/5216/5217/5210					0.01		
	UNR521F/521K					1.0		
	UNR5219					1.5		
	UNR5218/521L/521V					2.0		
	UNR521Z					0.4		
Collector to base voltage		V <sub>CBO</sub>	I <sub>C</sub> = 10μA, I <sub>E</sub> = 0	50			V	
Collector to emitter voltage		V <sub>CEO</sub>	I <sub>C</sub> = 2mA, I <sub>B</sub> = 0	50			V	
Forward current transfer ratio	UNR5211	h <sub>FE</sub>	V <sub>CE</sub> = 10V, I <sub>C</sub> = 5mA	35				
	UNR5212/521E			60				
	UNR5213/5214/521M			80				
	UNR5215*/5216*/5217*/5210*			160		460		
	UNR521F/521D/5219			30				
	UNR5218/521K/521L			20				
	UNR521N/521T			80		400		
	UNR521V			6		20		
UNR521Z	60		200					
Collector to emitter saturation voltage		V <sub>CE(sat)</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA			0.25	V	
		UNR521V	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.5mA			0.25	V	
Output voltage high level		V <sub>OH</sub>	V <sub>CC</sub> = 5V, V <sub>B</sub> = 0.5V, R <sub>L</sub> = 1kΩ	4.9			V	
Output voltage low level		V <sub>OL</sub>	V <sub>CC</sub> = 5V, V <sub>B</sub> = 2.5V, R <sub>L</sub> = 1kΩ			0.2	V	
			UNR5213/521K	V <sub>OC</sub> = 5V, V <sub>B</sub> = 3.5V, R <sub>L</sub> = 1kΩ				0.2
			UNR521D	V <sub>CC</sub> = 5V, V <sub>B</sub> = 10V, R <sub>L</sub> = 1kΩ				0.2
			UNR521E	V <sub>CC</sub> = 5V, V <sub>B</sub> = 6V, R <sub>L</sub> = 1kΩ				0.2
Transition frequency		f <sub>T</sub>	V <sub>CB</sub> = 10V, I <sub>E</sub> = -2mA, f = 200MHz		150		MHz	
Input resistance	UNR5211/5214/5215/521K	R <sub>I</sub>		(-30%)	10	(+30%)	kΩ	
	UNR5212/5217/521T				22			
	UNR5213/521D/521E/5210				47			
	UNR5216/521F/521L/521N/521Z				4.7			
	UNR5218				0.51			
	UNR5219				1			
	UNR521M/521V				2.2			

\* h<sub>FE</sub> rank classification (UNR5125/5216/5217/5210)

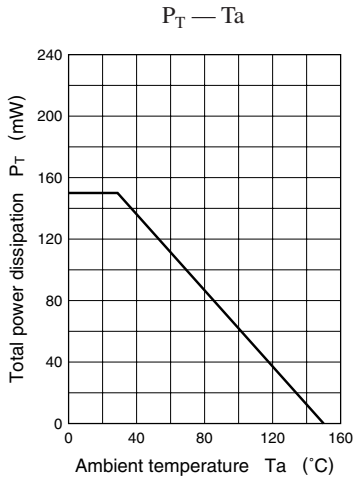
Rank	Q	R	S
h <sub>FE</sub>	160 to 260	210 to 340	290 to 460

UNR5211/5212/5213/5214/5215/5216/5217/5218/5219/5210/  
 Transistors with built-in Resistor 521D/521E/521F/521K/521L/521M/521N/521T/521V/521Z

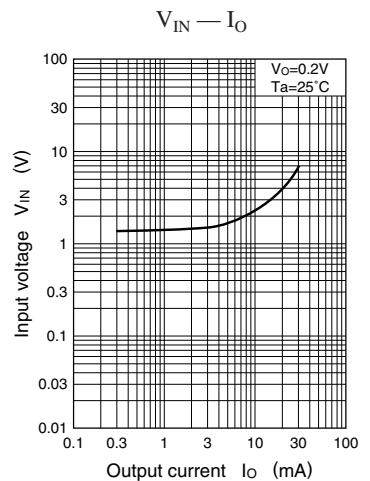
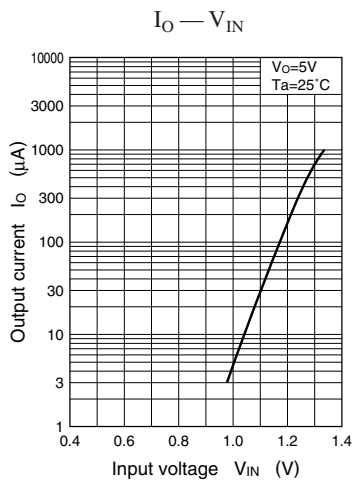
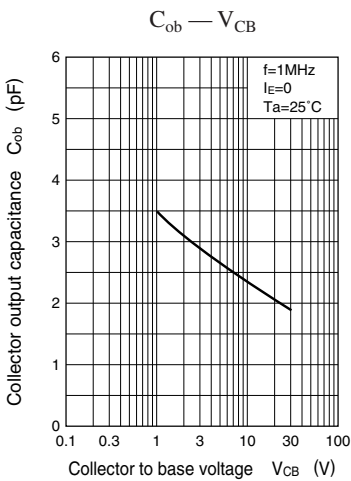
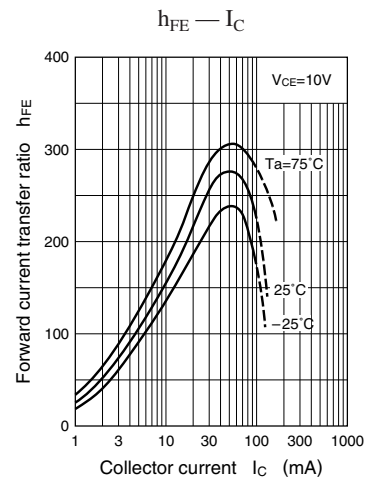
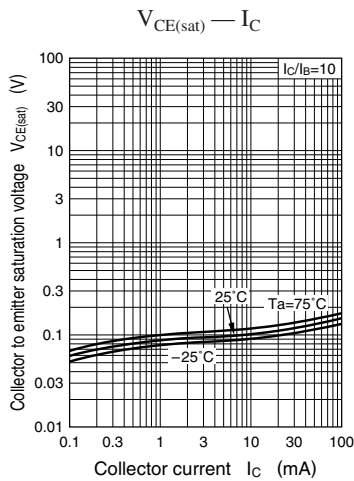
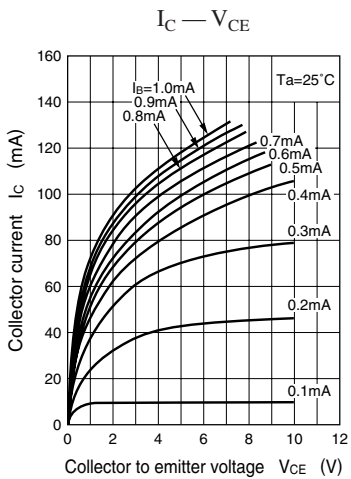
■ Electrical Characteristics (continued) (Ta=25°C)

Parameter		Symbol	Conditions	min	typ	max	Unit
Resis- tance ratio	UNR5211/5212/5213/521L	$R_1/R_2$		0.8	1.0	1.2	
	UNR5214			0.17	0.21	0.25	
	UNR5218/5219			0.08	0.1	0.12	
	UNR521D				4.7		
	UNR521E				2.14		
	UNR521F/521T				0.47		
	UNR521K				2.13		
	UNR521M				0.047		
	UNR521N				0.1		
	UNR521V				1.0		
	UNR521Z				0.21		

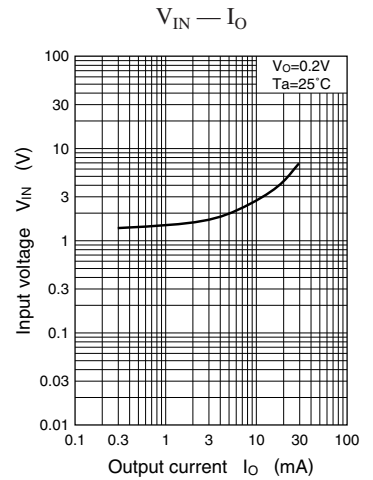
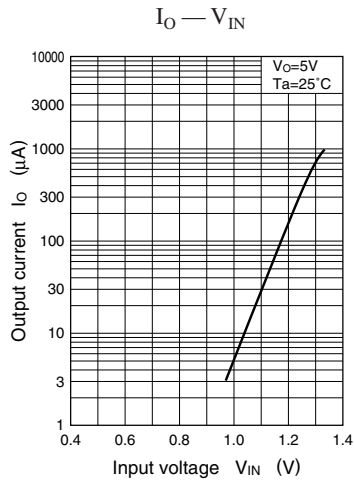
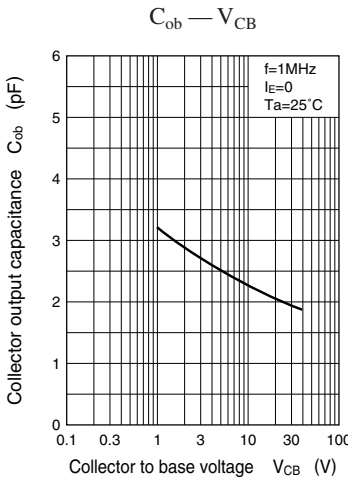
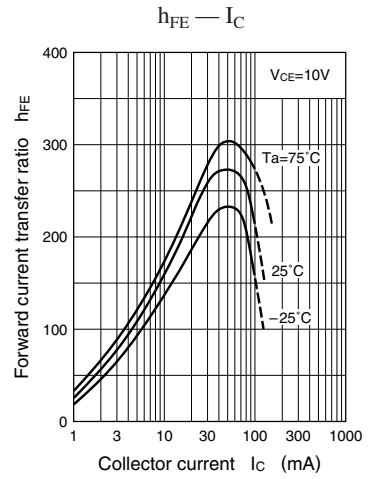
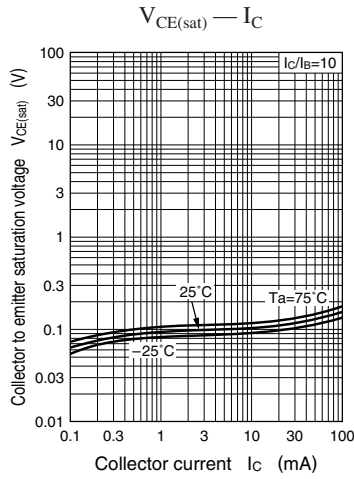
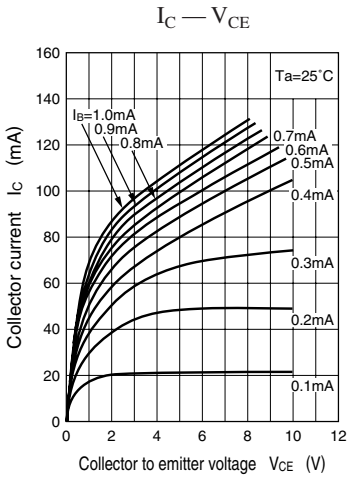
Common characteristics chart



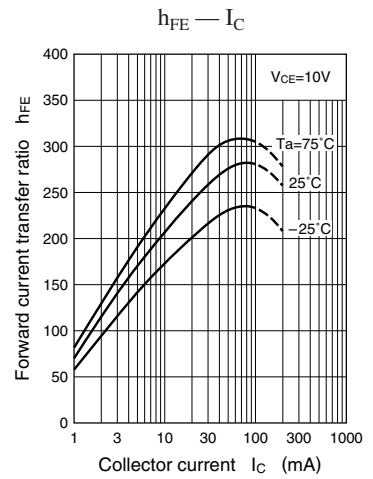
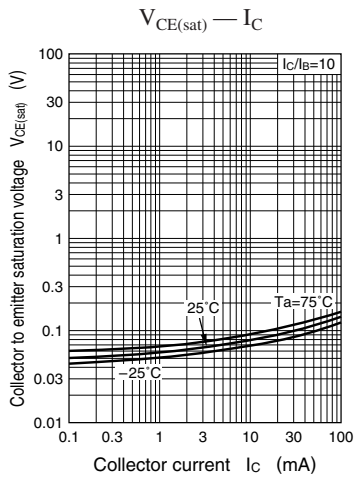
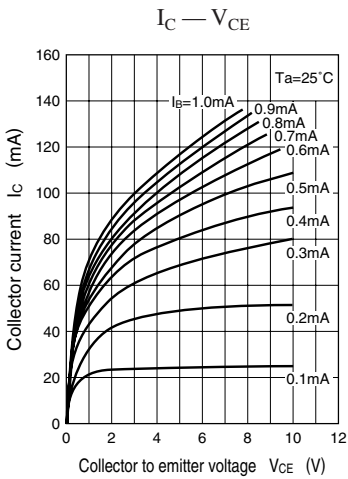
Characteristics charts of UNR5211

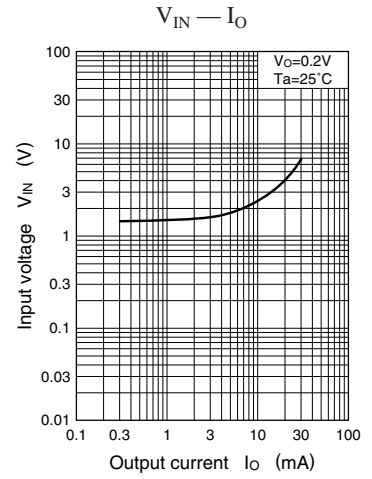
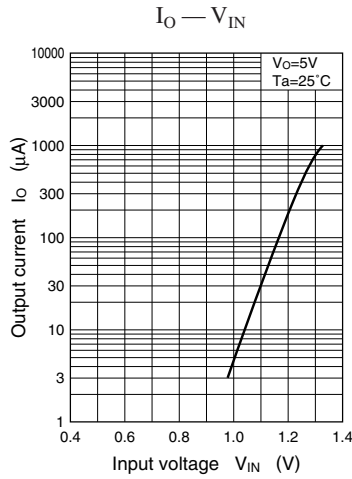
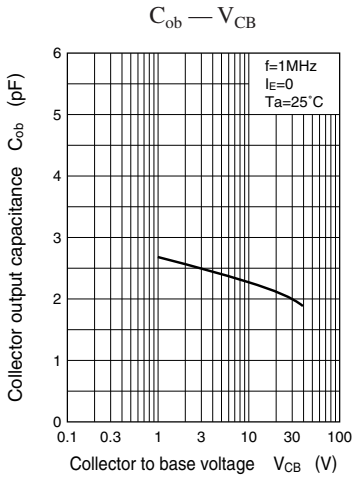


Characteristics charts of UNR5212

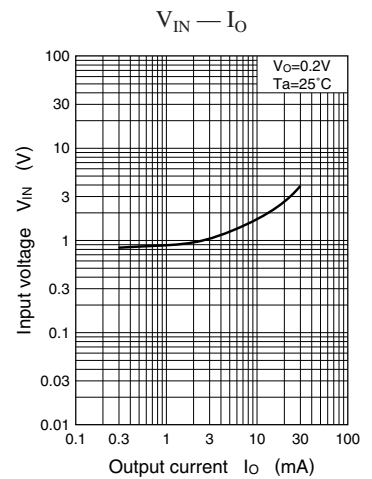
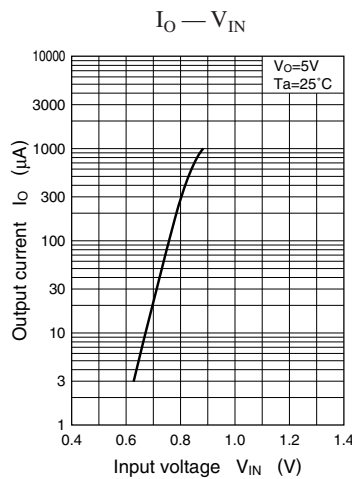
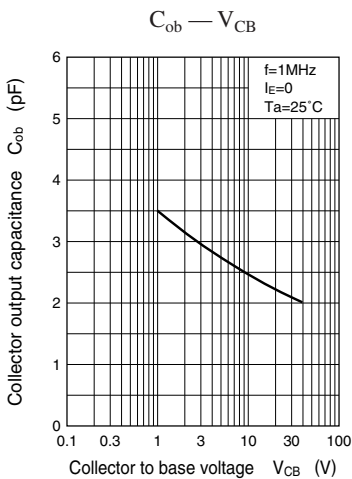
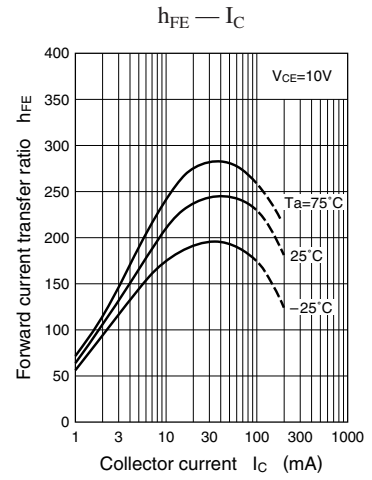
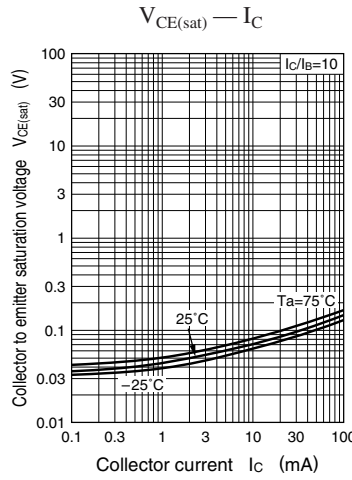
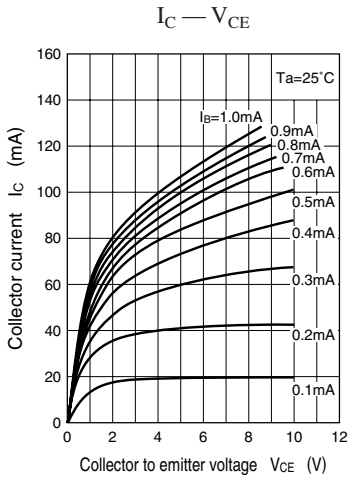


Characteristics charts of UNR5213

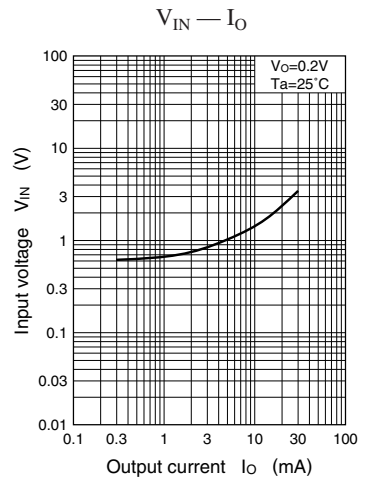
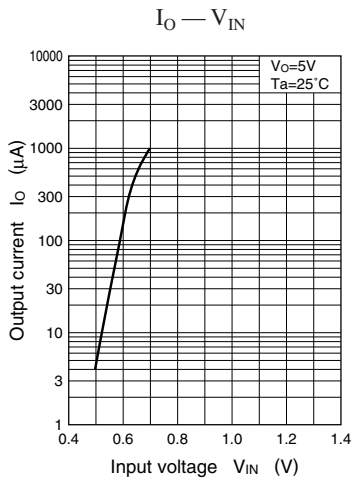
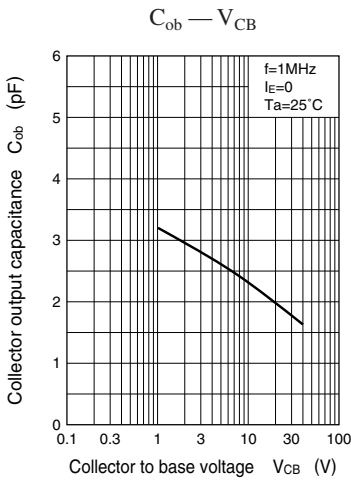
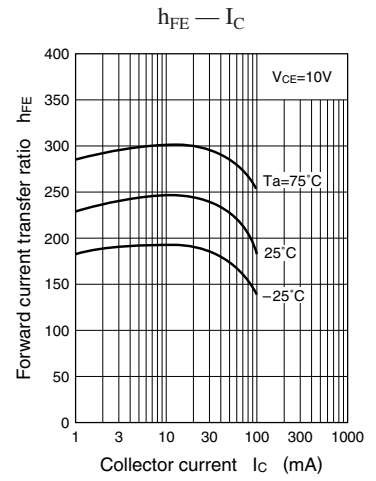
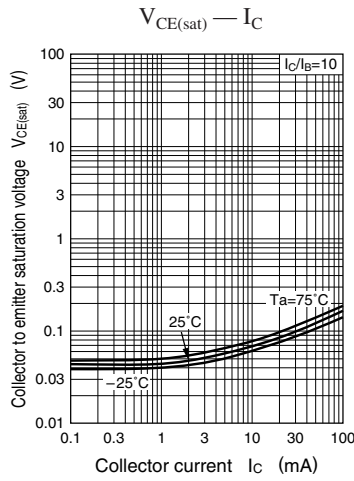
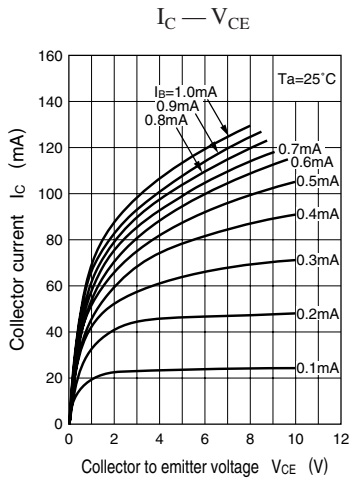




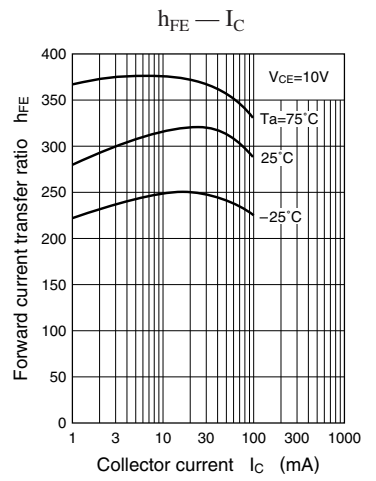
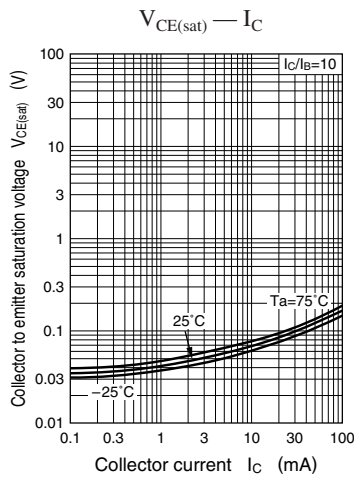
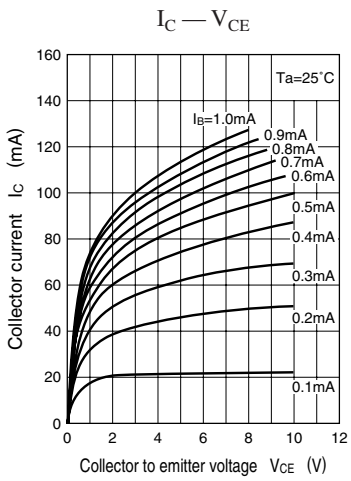
Characteristics charts of UNR5214

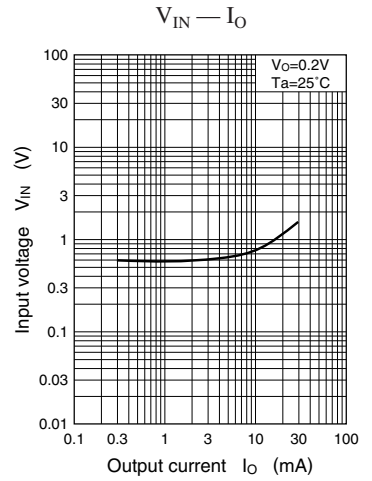
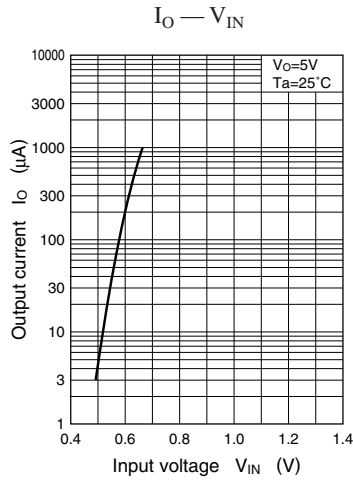
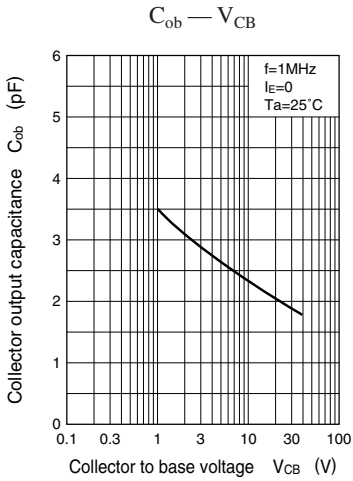


Characteristics charts of UNR5215

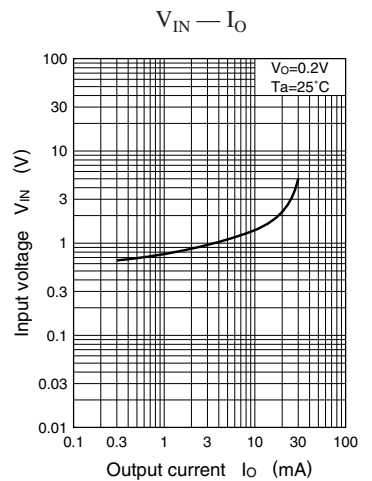
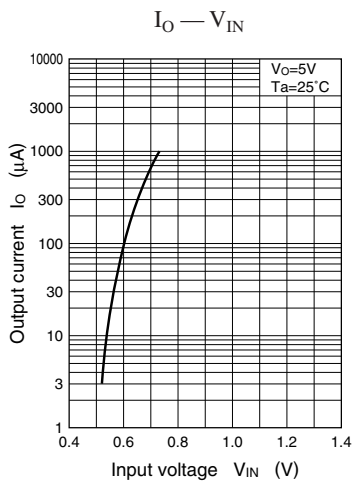
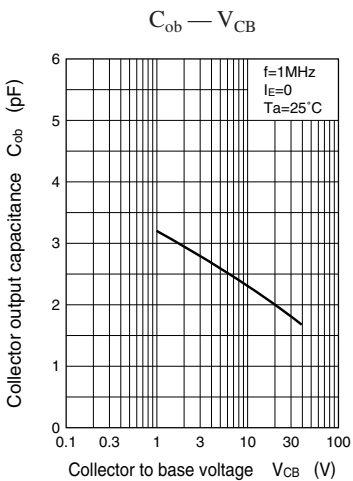
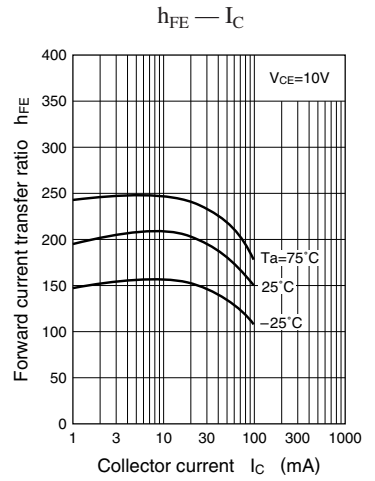
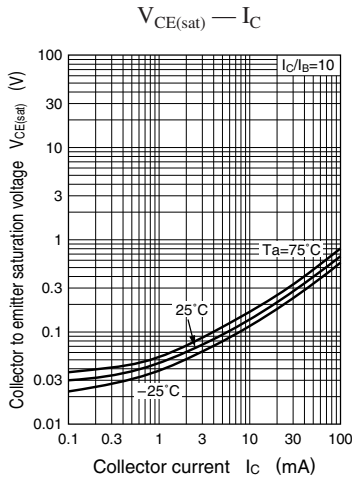
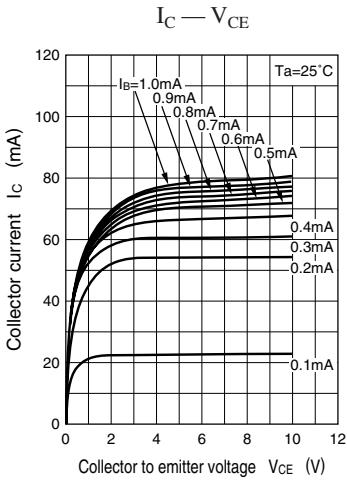


Characteristics charts of UNR5216



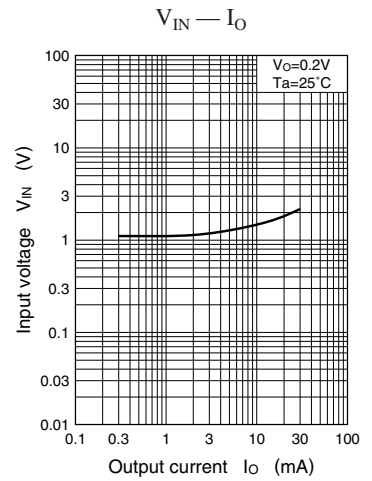
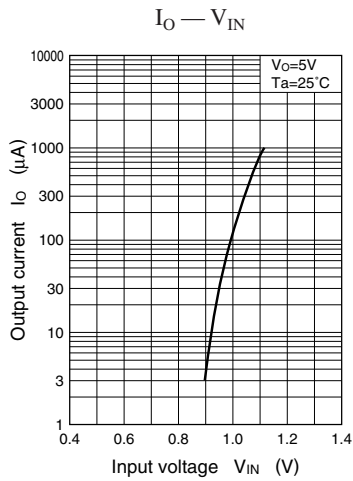
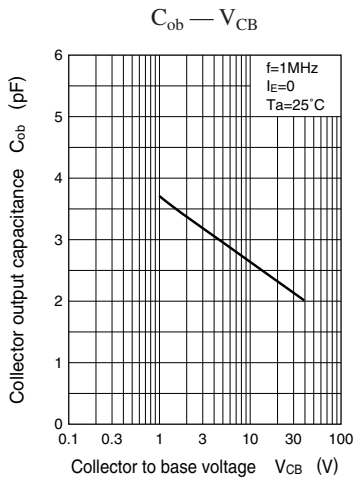
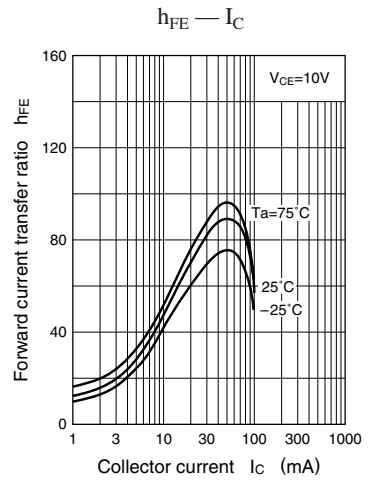
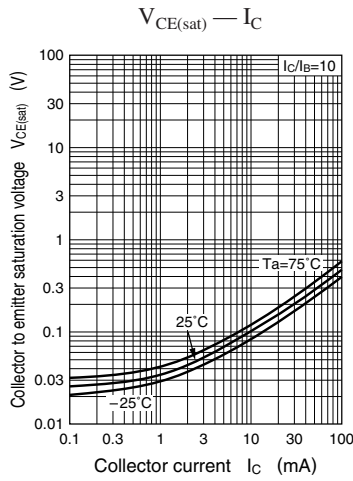
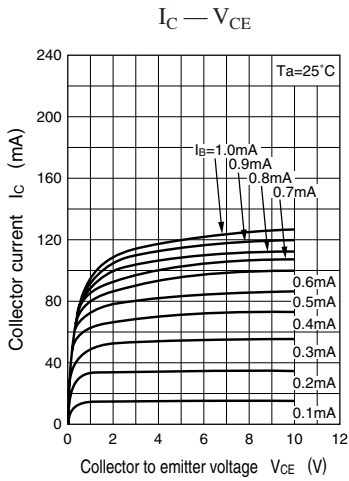


Characteristics charts of UNR5217

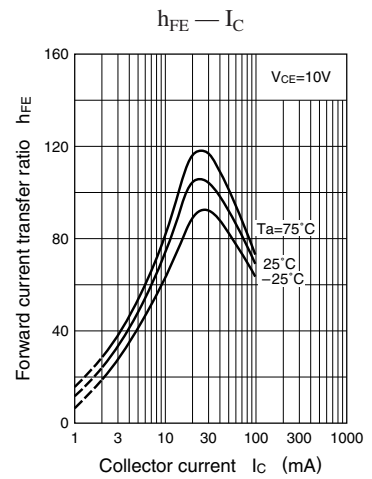
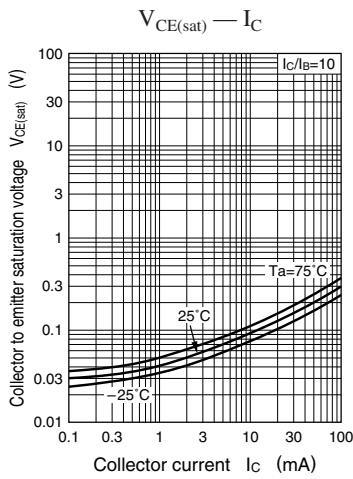
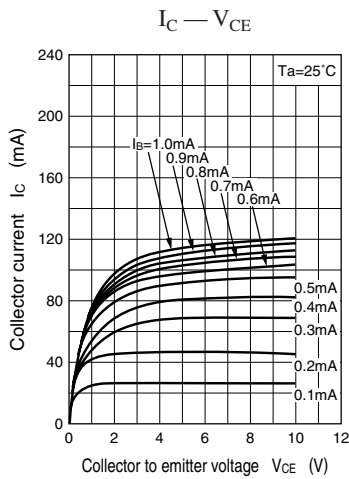


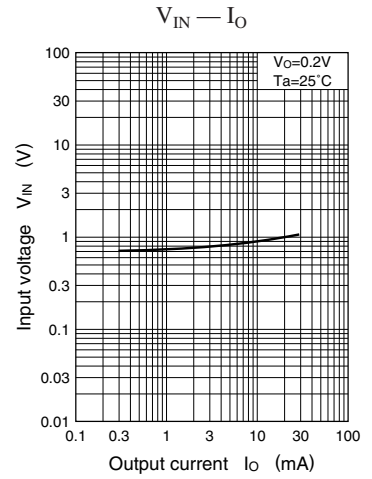
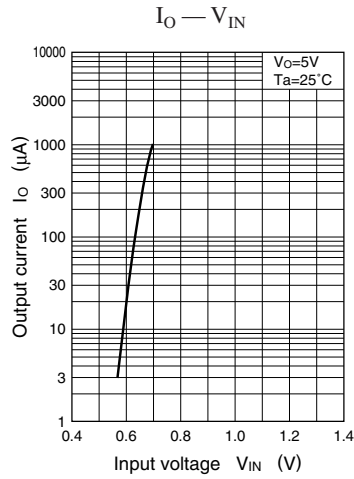
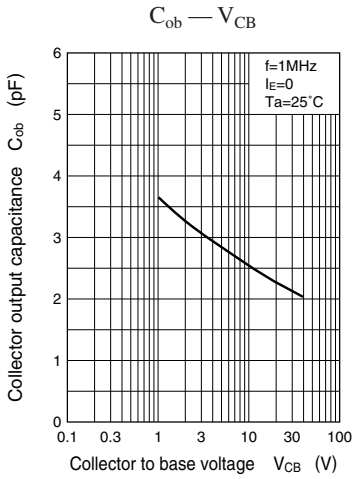


Characteristics charts of UNR5218

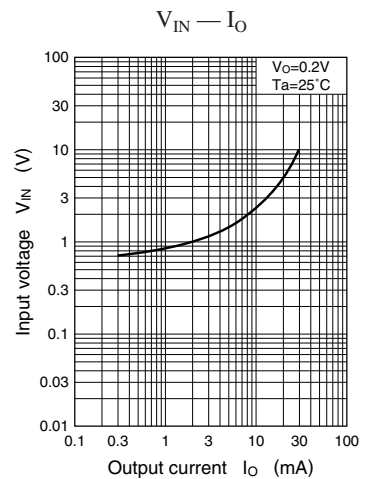
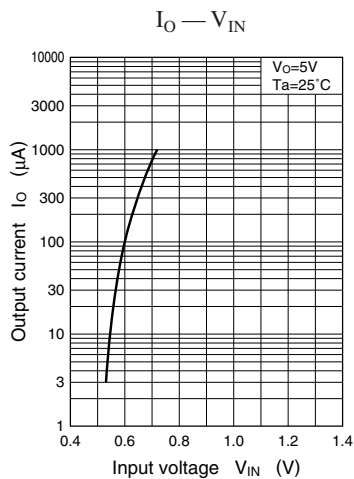
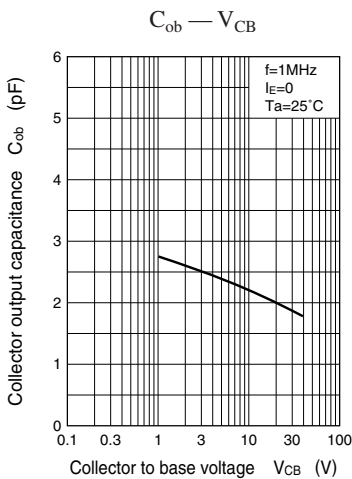
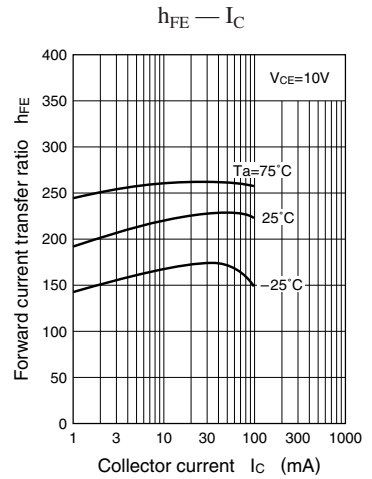
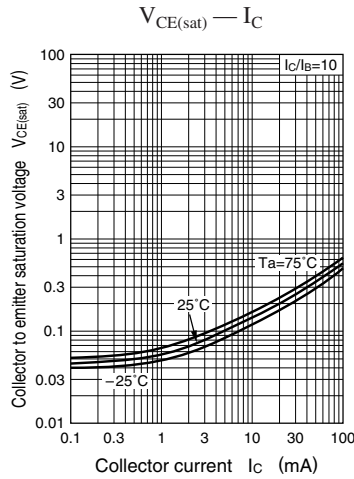
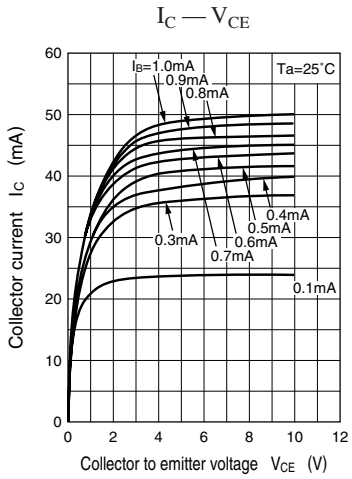


Characteristics charts of UNR5219

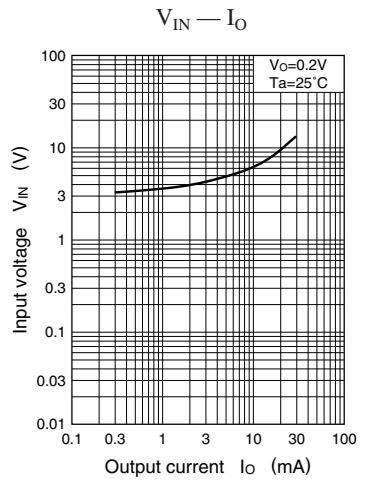
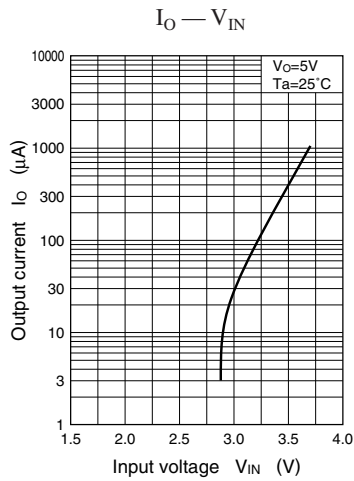
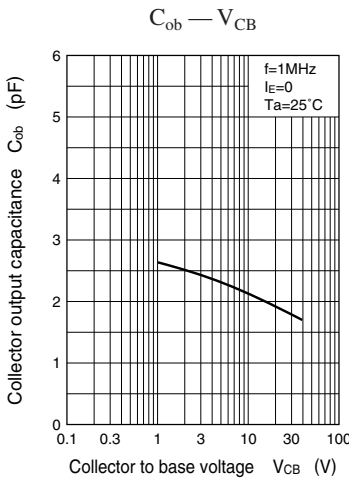
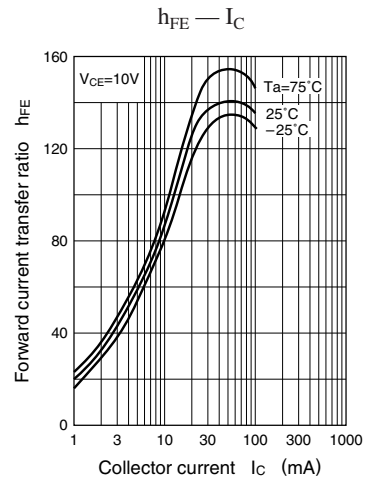
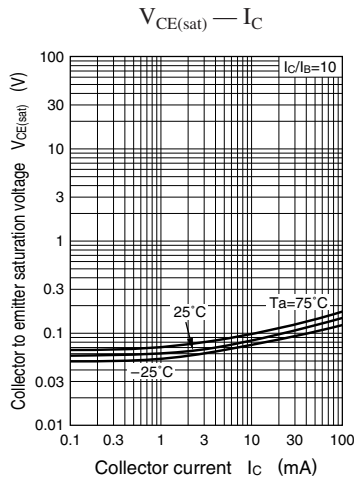
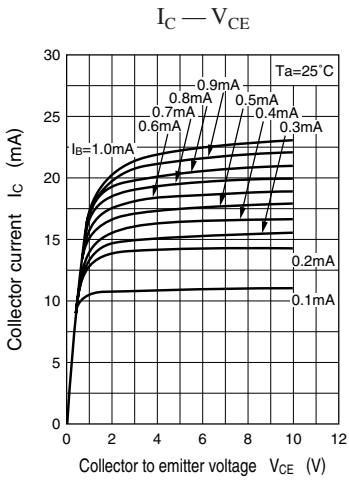




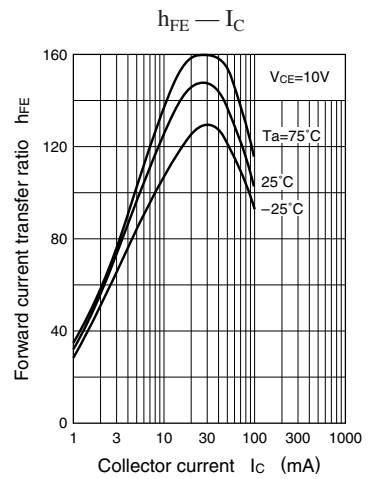
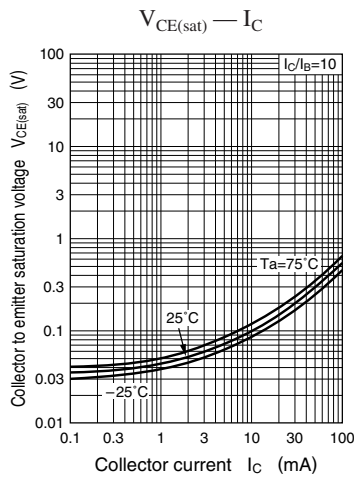
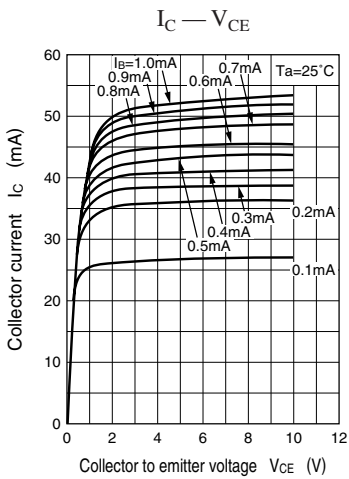
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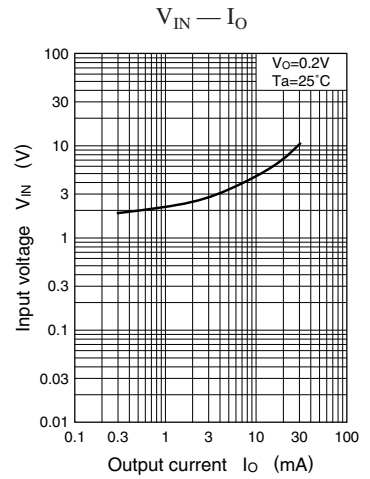
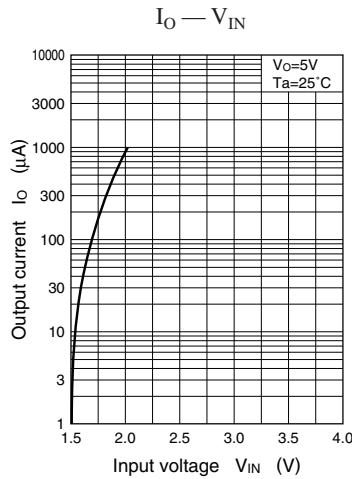
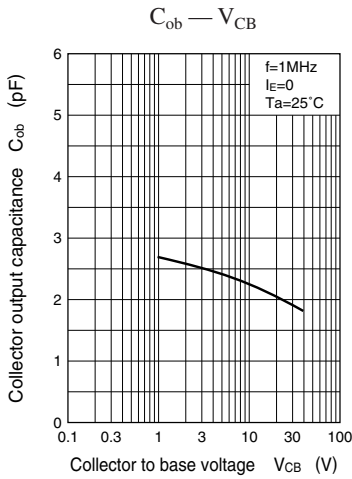


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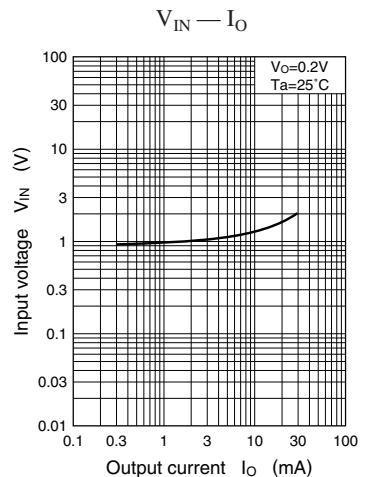
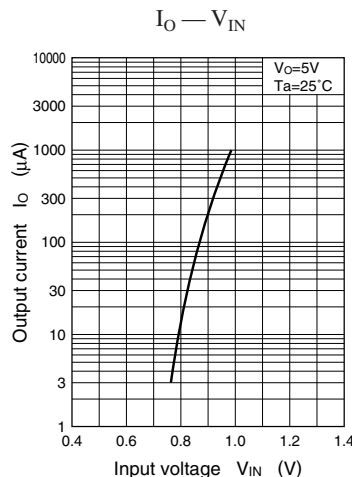
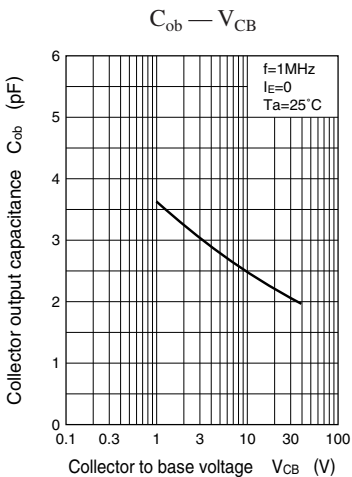
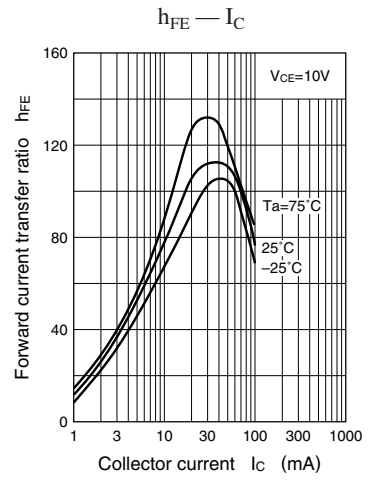
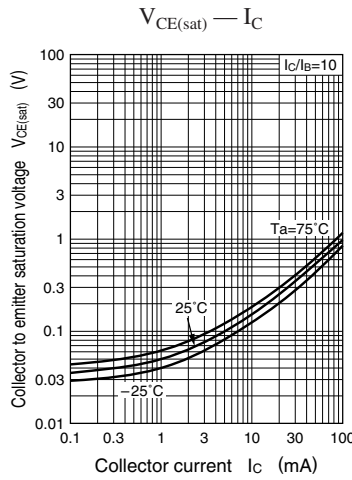
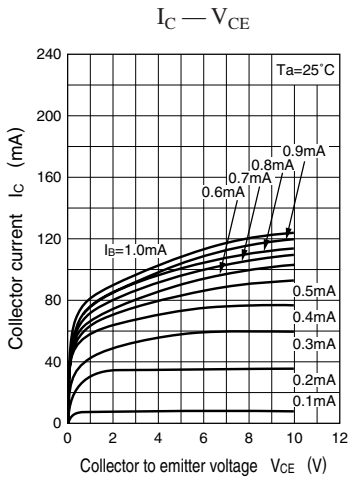


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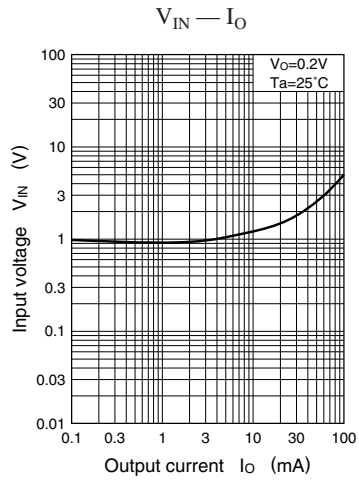
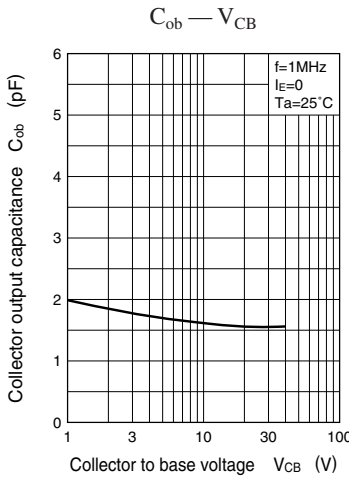
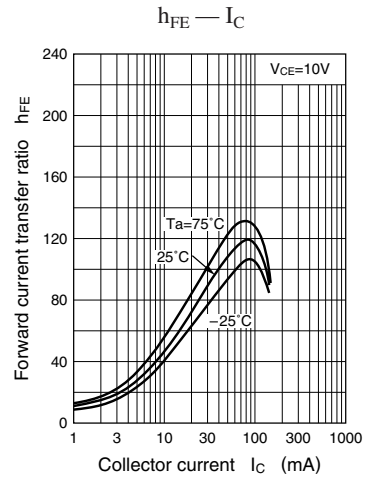
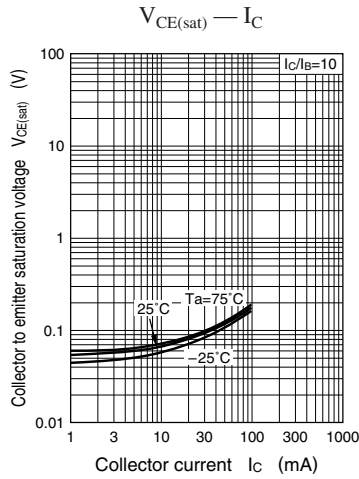
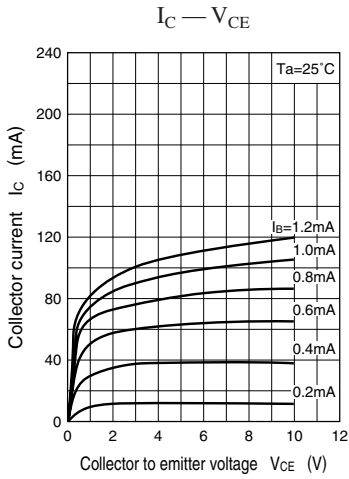




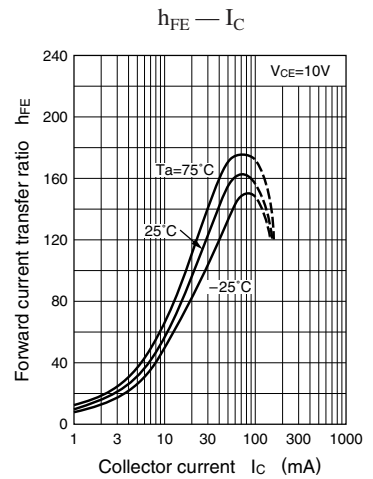
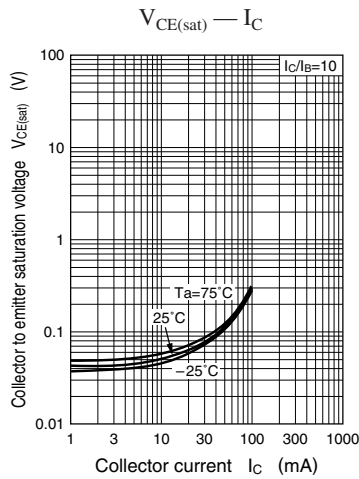
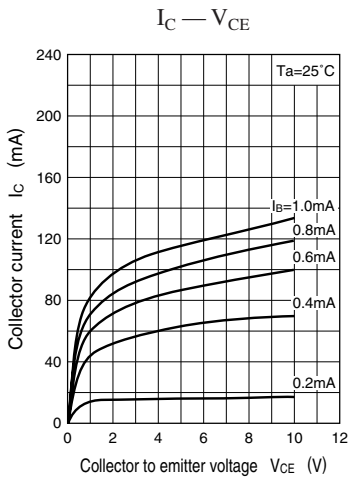
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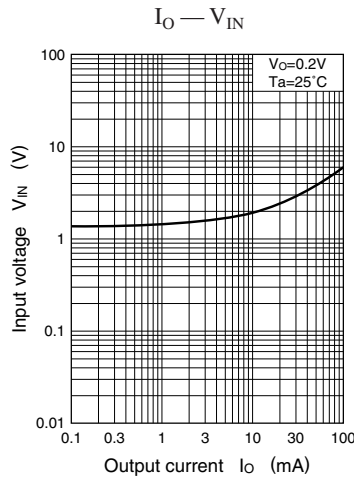
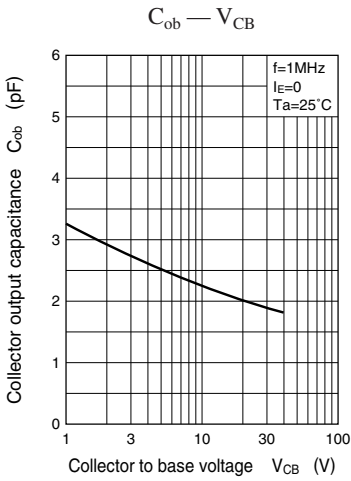


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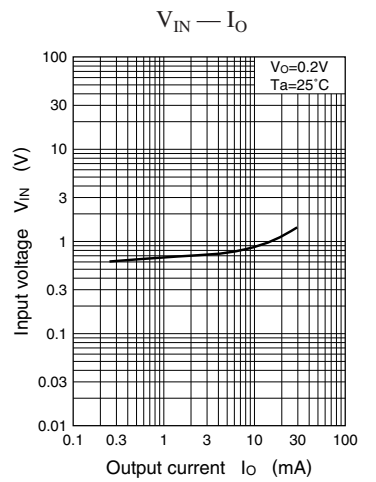
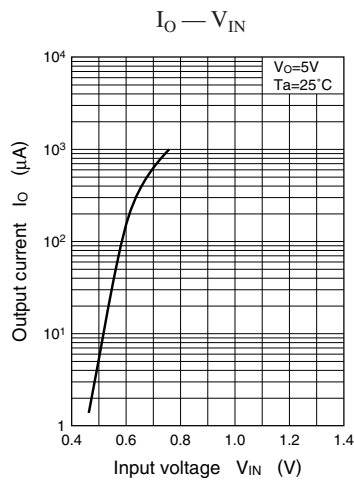
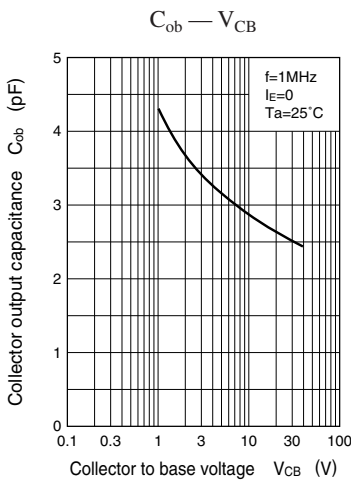
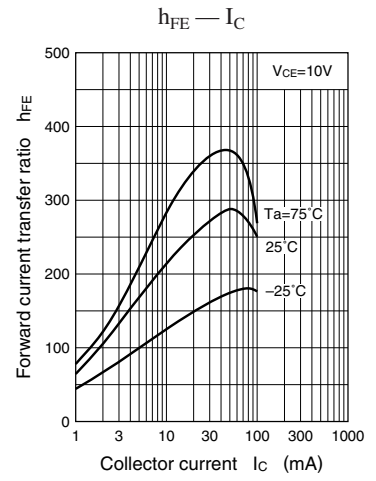
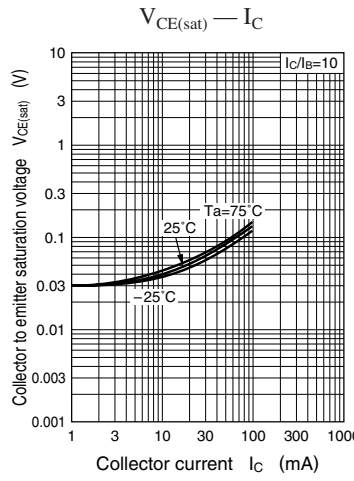
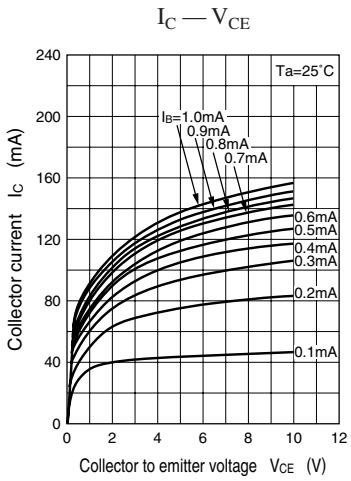


Characteristics charts of UNR521L

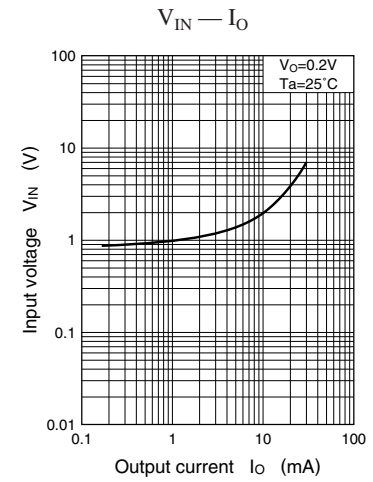
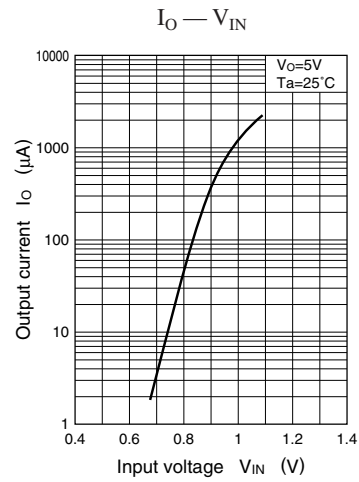
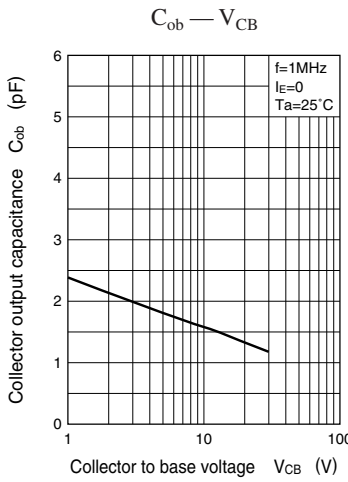
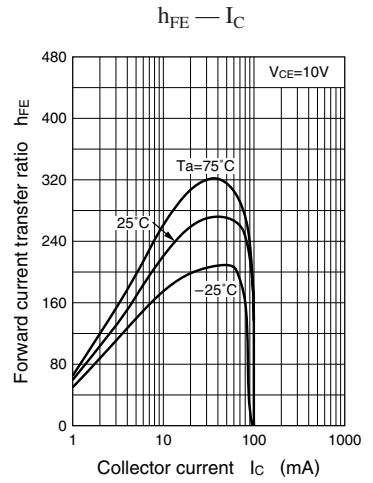
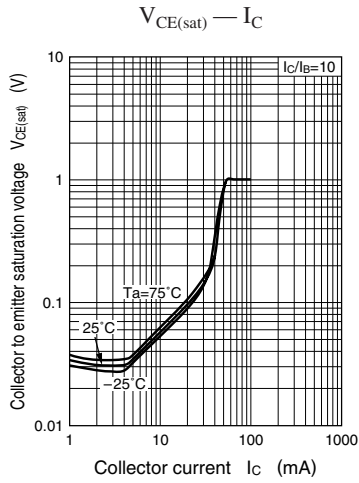
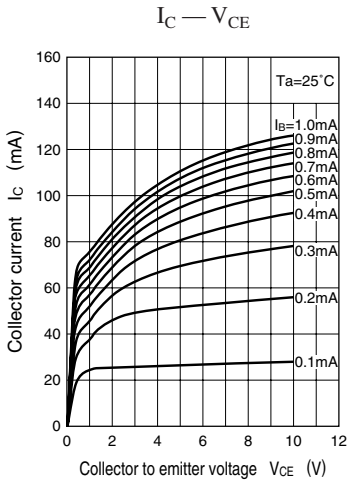




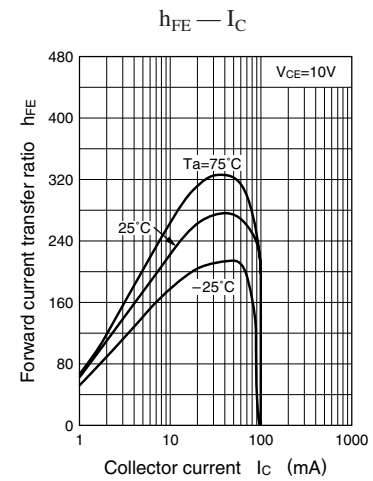
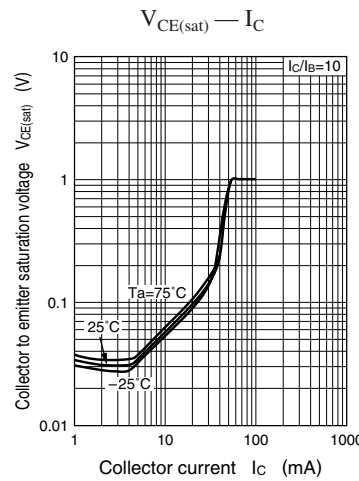
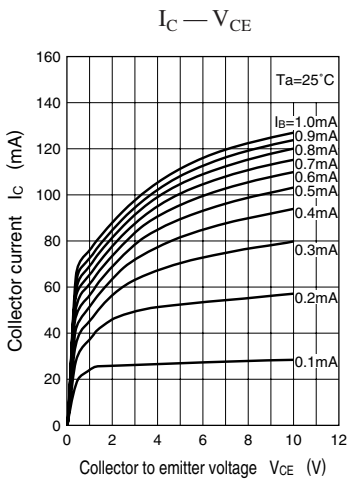
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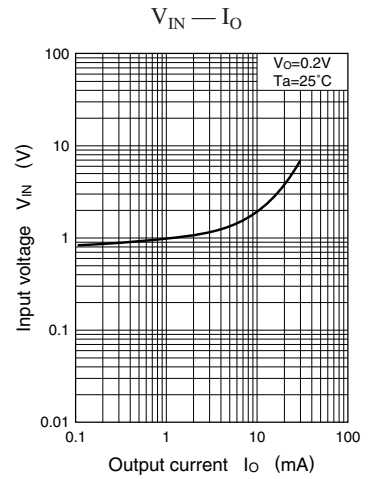
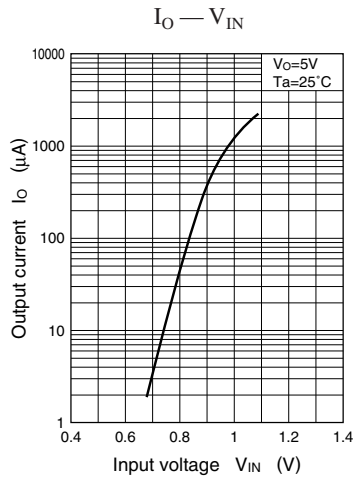
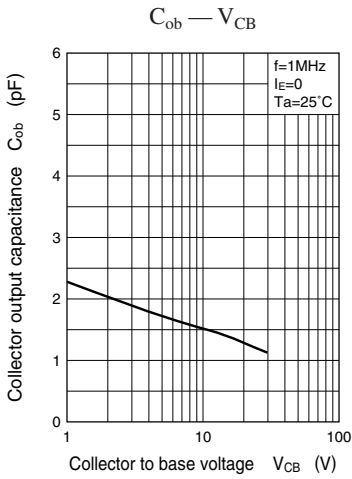


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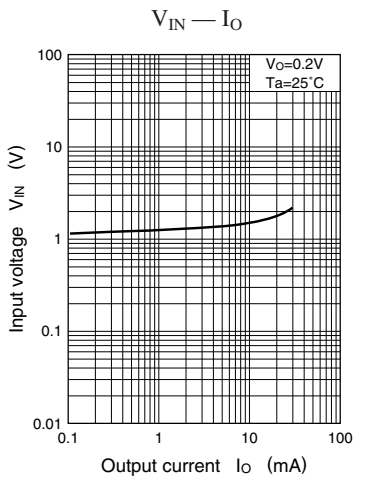
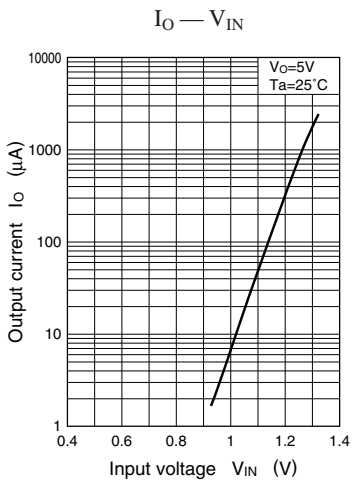
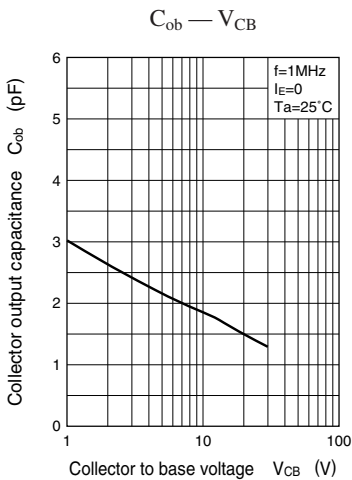
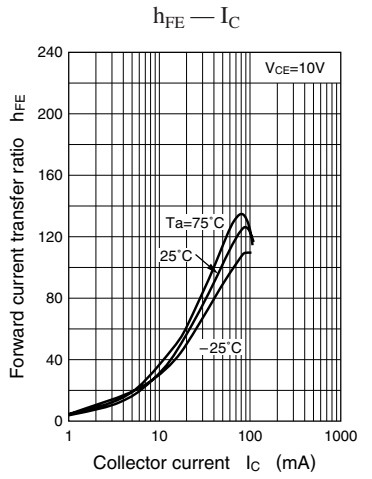
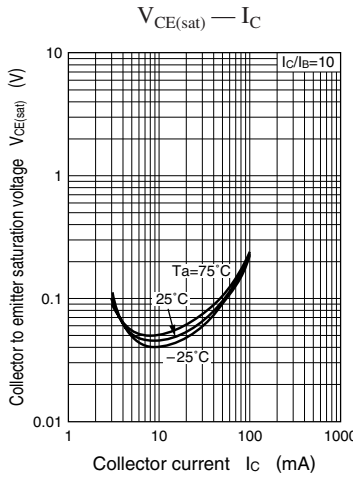
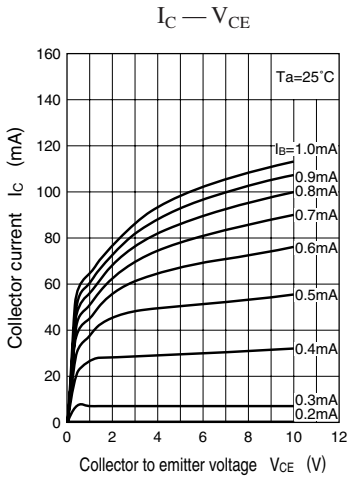


Characteristics charts of UNR521T



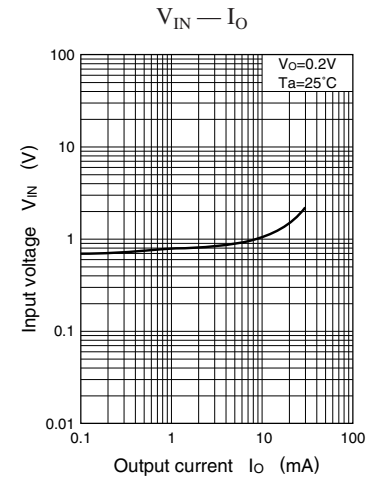
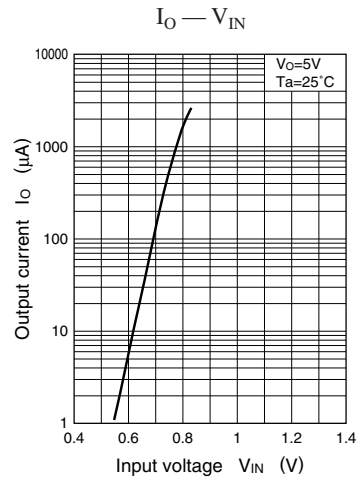
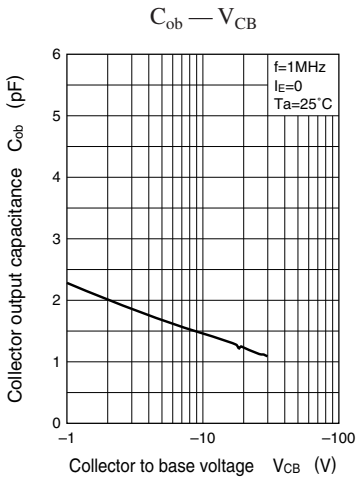
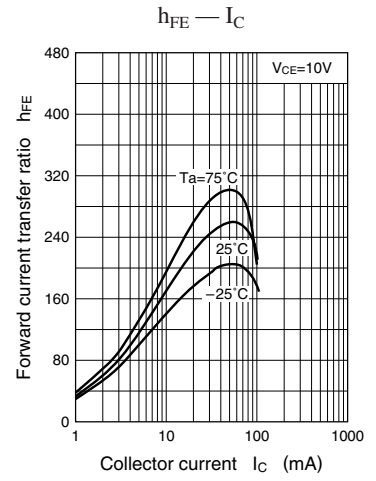
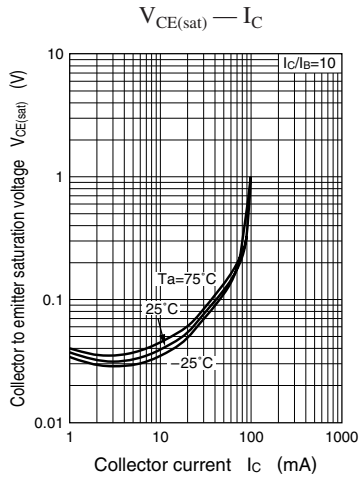
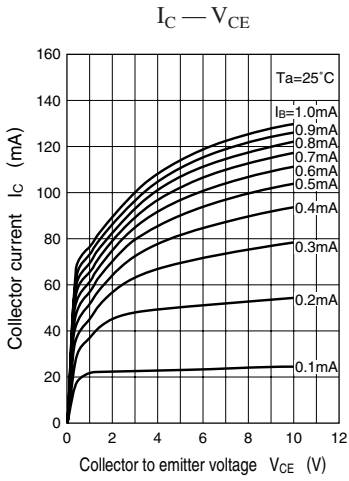


Characteristics charts of UNR521V





Characteristics charts of UNR521Z



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