

UN2211/2212/2213/2214/2215/2216/2217/2218/2219/2210/ 221D/221E/221F/221K/221L/221M/221N/221T/221V/221Z

Silicon NPN epitaxial planer transistor

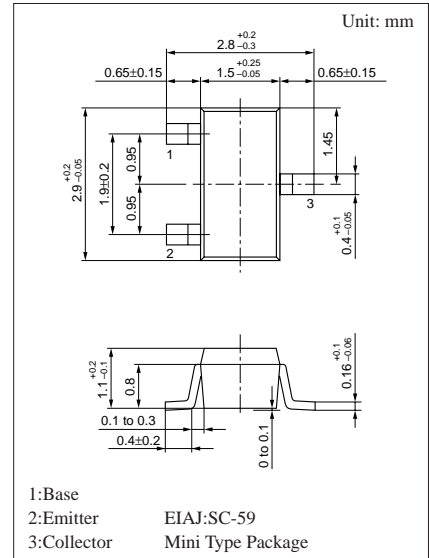
For digital circuits

Features

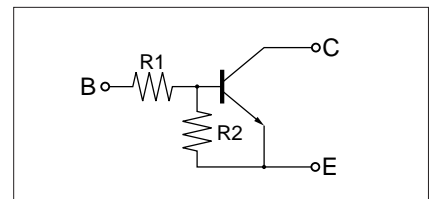
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- Mini type package, allowing downsizing of the equipment and automatic insertion through tape packing and magazine packing.

Resistance by Part Number

	Marking Symbol	(R ₁)	(R ₂)
• UN2211	8A	10kΩ	10kΩ
• UN2212	8B	22kΩ	22kΩ
• UN2213	8C	47kΩ	47kΩ
• UN2214	8D	10kΩ	47kΩ
• UN2215	8E	10kΩ	—
• UN2216	8F	4.7kΩ	—
• UN2217	8H	22kΩ	—
• UN2218	8I	0.51kΩ	5.1kΩ
• UN2219	8K	1kΩ	10kΩ
• UN2210	8L	47kΩ	—
• UN221D	8M	47kΩ	10kΩ
• UN221E	8N	47kΩ	22kΩ
• UN221F	8O	4.7kΩ	10kΩ
• UN221K	8P	10kΩ	4.7kΩ
• UN221L	8Q	4.7kΩ	4.7kΩ
• UN221M	EL	2.2kΩ	47kΩ
• UN221N	EX	4.7kΩ	47kΩ
• UN221T	EZ	22kΩ	47kΩ
• UN221V	FD	2.2kΩ	2.2kΩ
• UN221Z	FF	4.7kΩ	22kΩ



Internal Connection



Absolute Maximum Ratings (T_a=25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V _{CBO}	50	V
Collector to emitter voltage	V _{CEO}	50	V
Collector current	I _C	100	mA
Total power dissipation	P _T	200	mW
Junction temperature	T _j	150	°C
Storage temperature	T _{stg}	-55 to +150	°C

UN2211/2212/2213/2214/2215/2216/2217/2218/2219/2210/
Transistors with built-in Resistor 221D/221E/221F/221K/221L/221M/221N/221T/221V/221Z

Electrical Characteristics (T_a=25°C)

Parameter		Symbol	Conditions	min	typ	max	Unit	
Collector cutoff current		I _{CBO}	V _{CB} = 50V, I _E = 0			0.1	μA	
		I _{CEO}	V _{CE} = 50V, I _B = 0			0.5	μA	
Emitter cutoff current	UN2211	I _{EBO}	V _{EB} = 6V, I _C = 0			0.5	mA	
	UN2212/2214/221E/221D/221M/221N/221T					0.2		
	UN2213					0.1		
	UN2215/2216/2217/2210					0.01		
	UN221F/221K					1.0		
	UN2219					1.5		
	UN2218/221L/221V					2.0		
	UN221Z					0.4		
Collector to base voltage		V _{CBO}	I _C = 10μA, I _E = 0	50			V	
Collector to emitter voltage		V _{CEO}	I _C = 2mA, I _B = 0	50			V	
Forward current transfer ratio	UN2211	h _{FE}	V _{CE} = 10V, I _C = 5mA	35			—	
	UN2212/221E			60				
	UN2213/2214/221M			80				
	UN2215*/2216*/2217*/2210*			160		460		
	UN221F/221D/2219			30				
	UN2218/221K/221L			20				
	UN221N/221T			80		400		
	UN221V			60		200		
Collector to emitter saturation voltage		V _{CE(sat)}	I _C = 10mA, I _B = 0.3mA			0.25	V	
				UN221V	I _C = 10mA, I _B = 1.5mA			0.04
Output voltage high level		V _{OH}	V _{CC} = 5V, V _B = 0.5V, R _L = 1kΩ	4.9			V	
Output voltage low level		V _{OL}	V _{CC} = 5V, V _B = 2.5V, R _L = 1kΩ			0.2	V	
			UN2213/221K	V _{CC} = 5V, V _B = 3.5V, R _L = 1kΩ				0.2
			UN221D	V _{CC} = 5V, V _B = 10V, R _L = 1kΩ				0.2
			UN221E	V _{CC} = 5V, V _B = 6V, R _L = 1kΩ				0.2
Transition frequency		f _T	V _{CB} = 10V, I _E = -2mA, f = 200MHz		150		MHz	
Input resistance	UN2211/2214/2215/221K	R _I		(-30%)		10	(+30%)	kΩ
	UN2212/2217/221T					22		
	UN2213/221D/221E/2210					47		
	UN2216/221F/221L/221N/221Z					4.7		
	UN2218					0.51		
	UN2219					1		
	UN221M/221V					2.2		

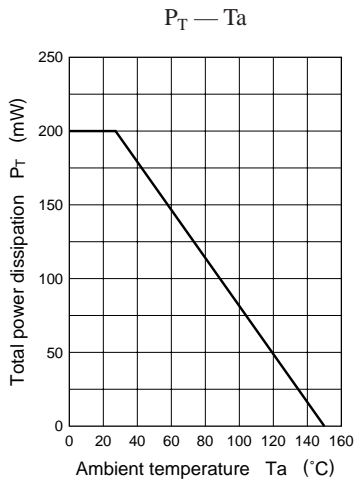
* h_{FE} rank classification (UN2215/2216/2217/2210)

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

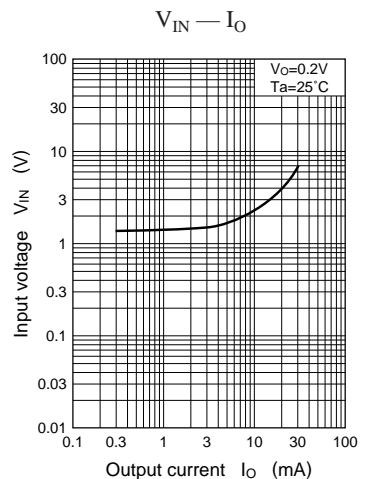
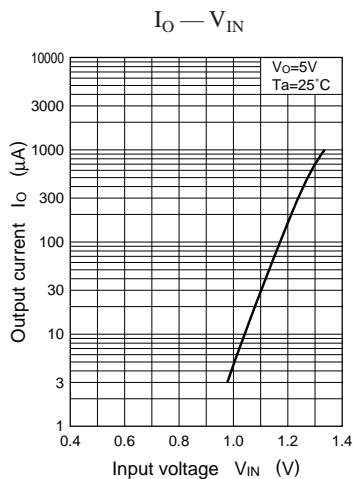
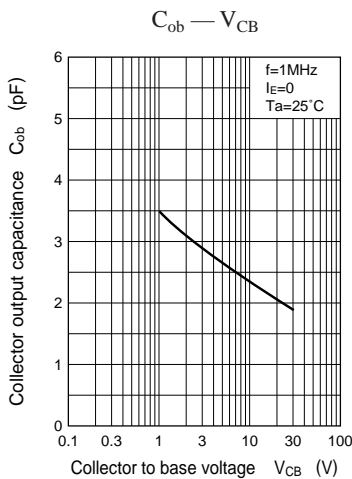
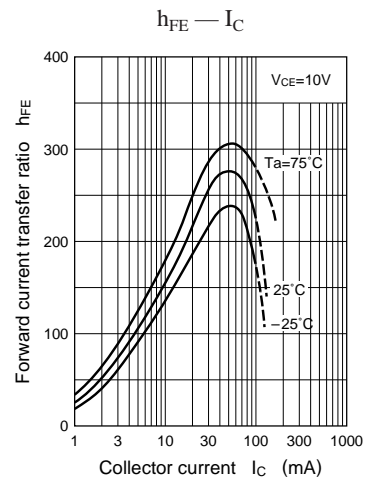
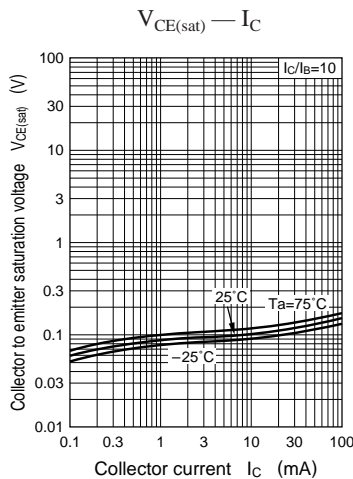
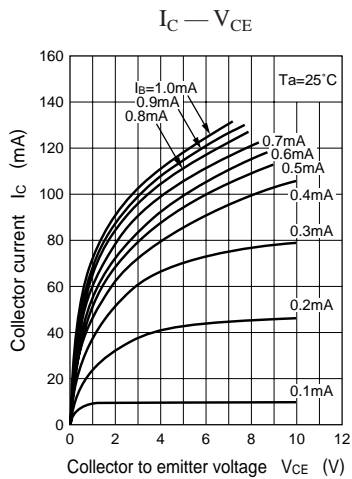
■ Electrical Characteristics (continued) (Ta=25°C)

Parameter		Symbol	Conditions	min	typ	max	Unit
Resis- tance ratio	UN2211/2212/2213/221L	R ₁ /R ₂		0.8	1.0	1.2	
	UN2214			0.17	0.21	0.25	
	UN2218/2219			0.08	0.1	0.12	
	UN221D				4.7		
	UN221E				2.14		
	UN221F/221T				0.47		
	UN221K				2.13		
	UN221M				0.047		
	UN211N				0.1		
	UN211V				1.0		
	UN211Z				0.21		

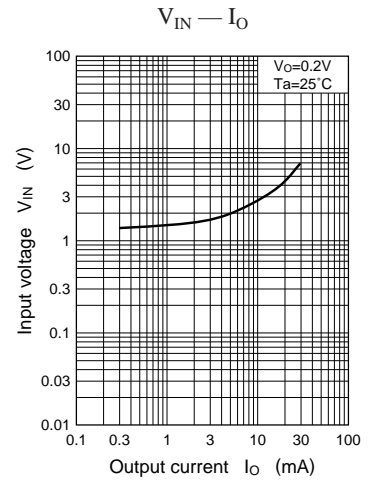
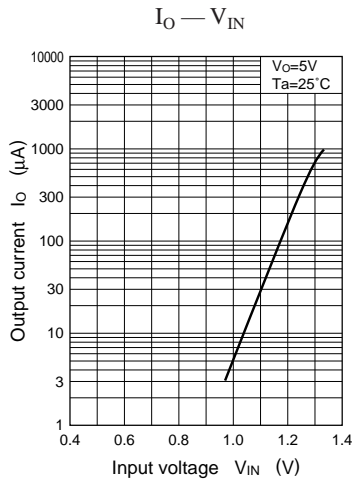
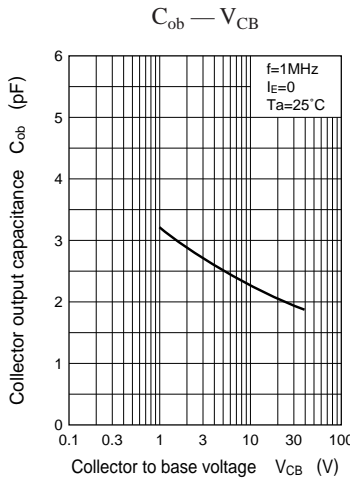
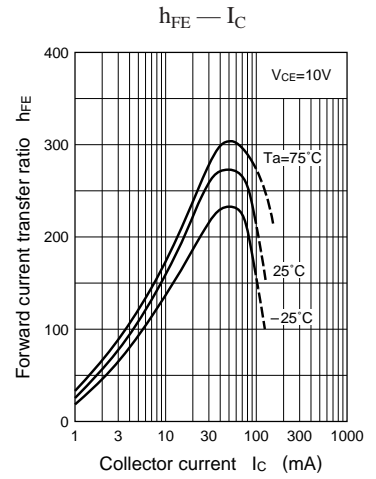
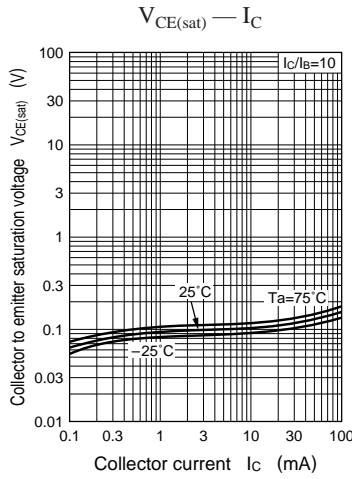
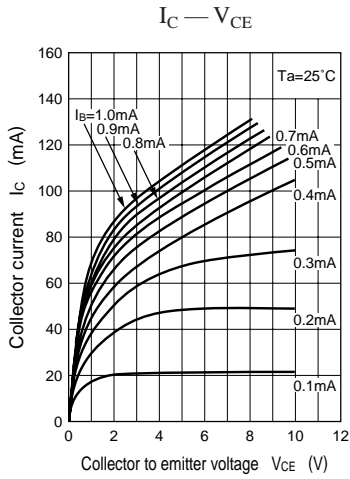
Common characteristics chart



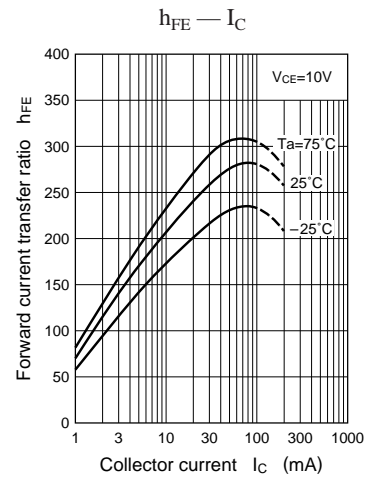
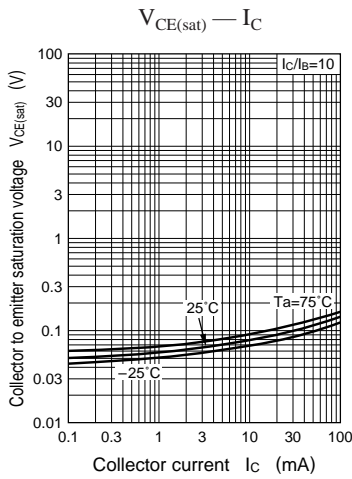
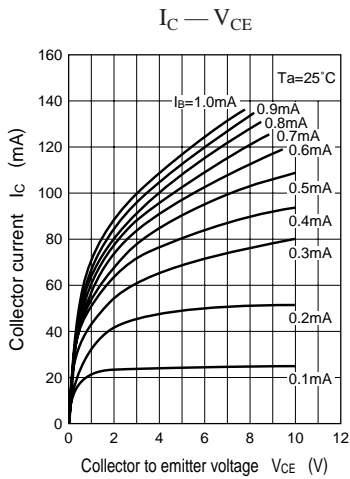
Characteristics charts of UN2211

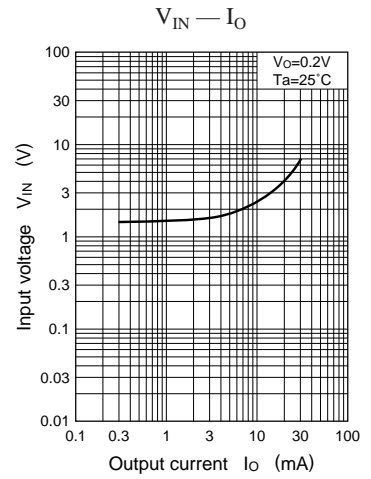
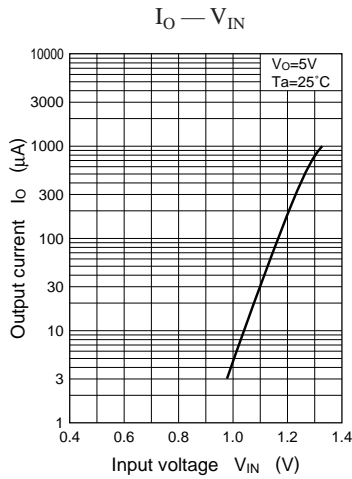
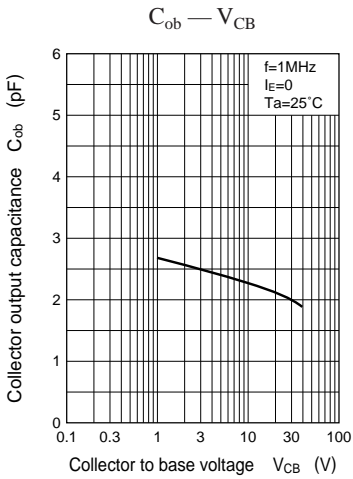


Characteristics charts of UN2212

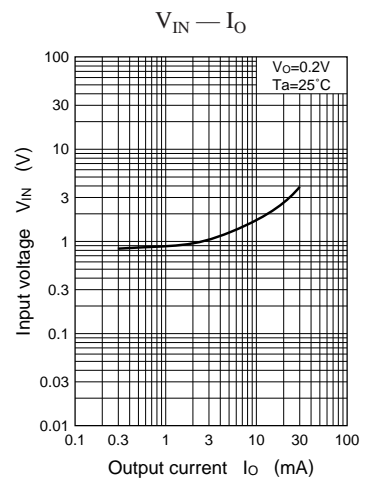
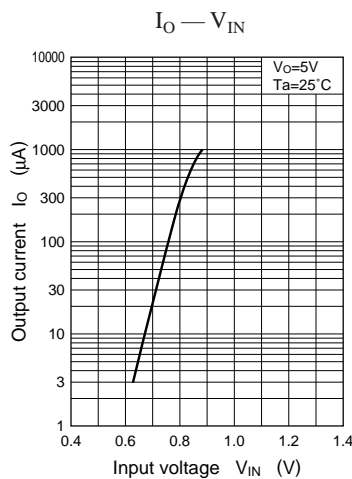
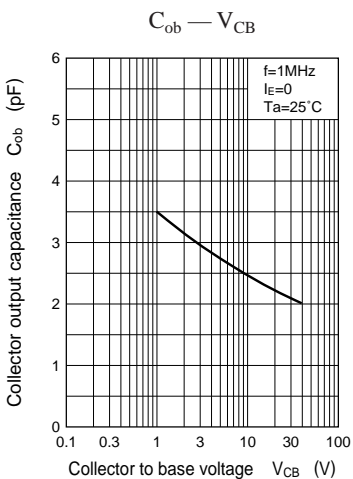
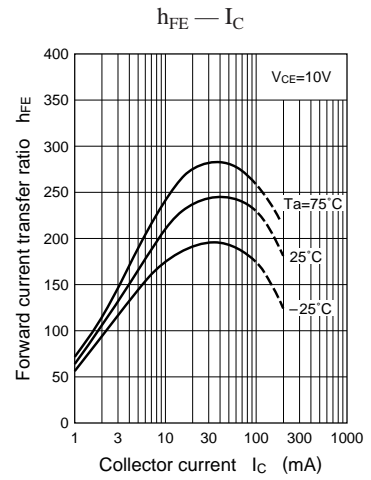
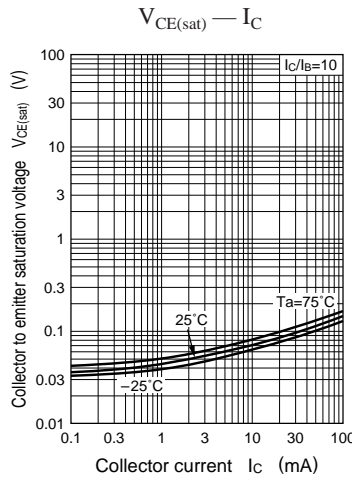
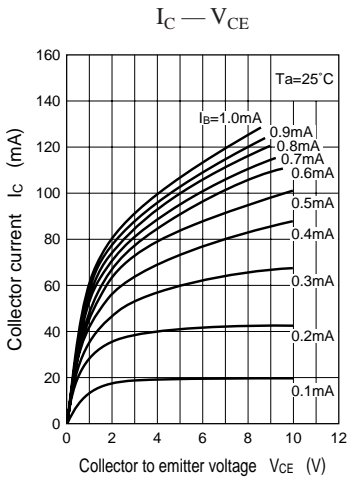


Characteristics charts of UN2213

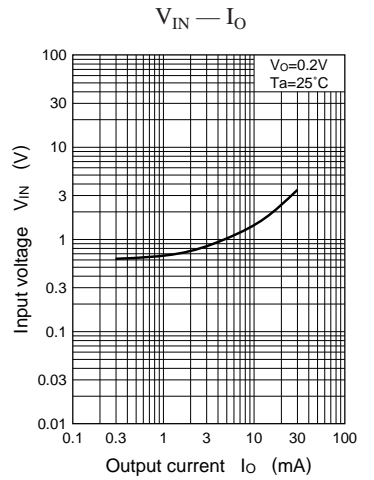
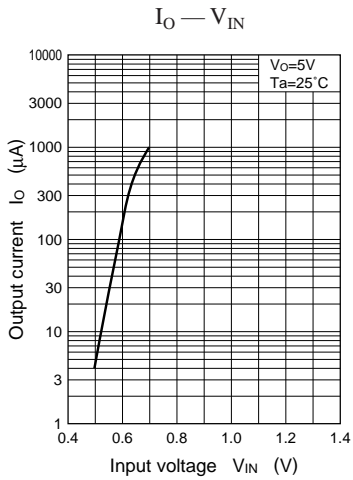
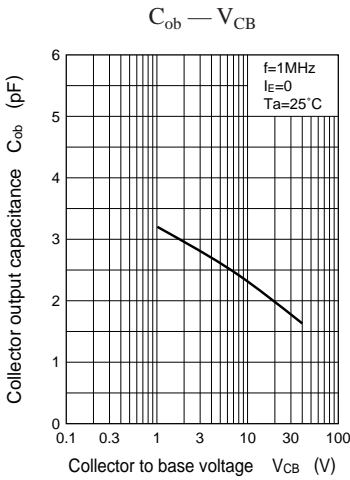
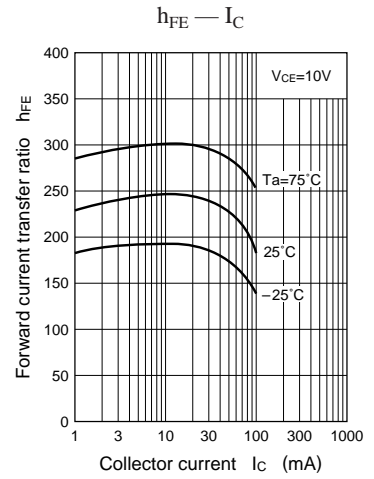
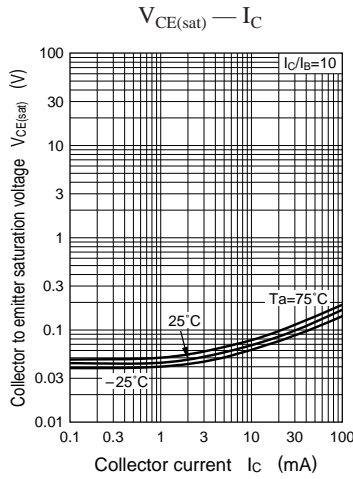
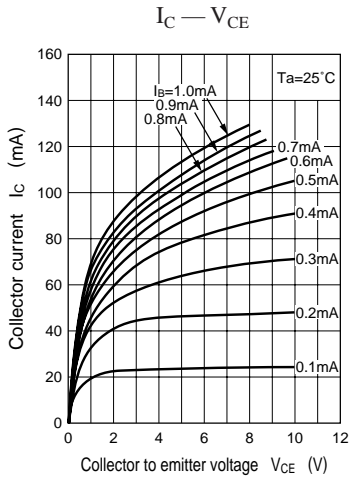




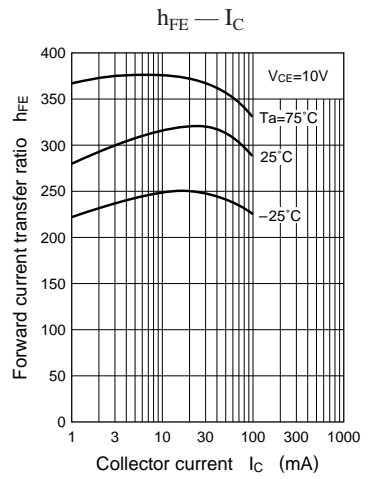
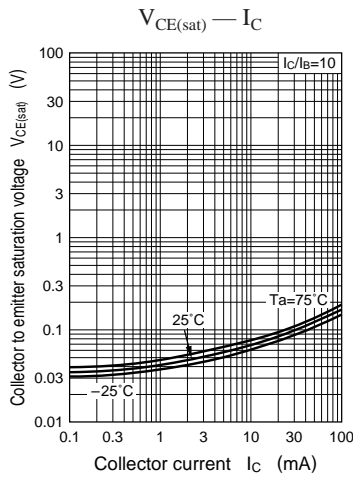
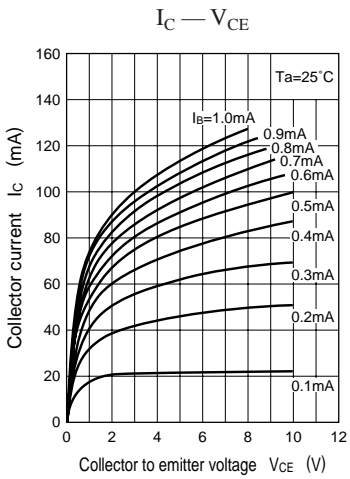
Characteristics charts of UN2214

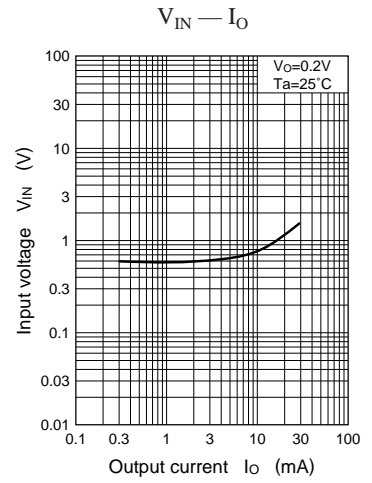
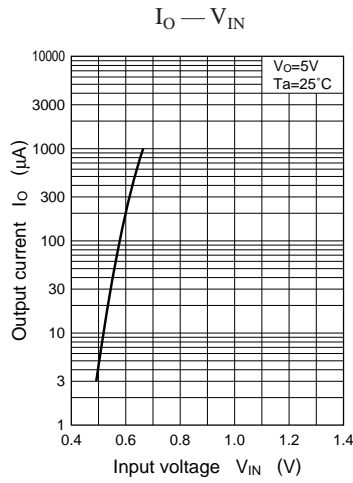
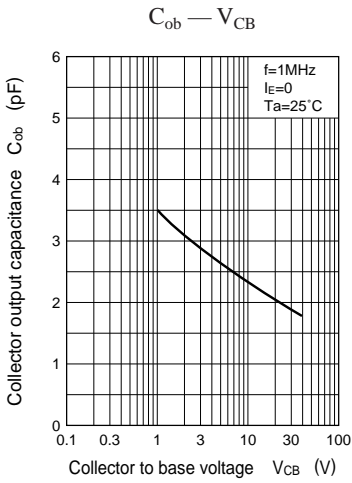


Characteristics charts of UN2215

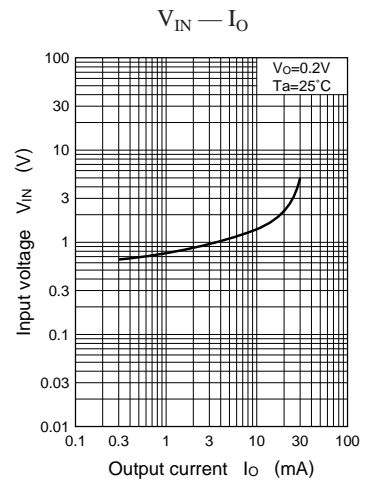
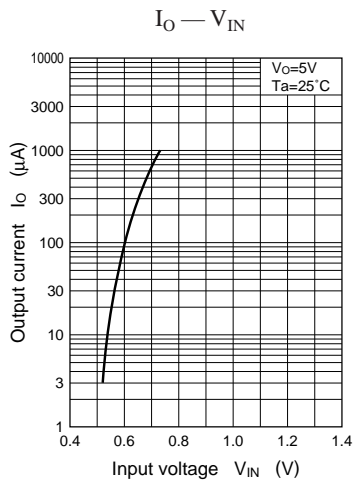
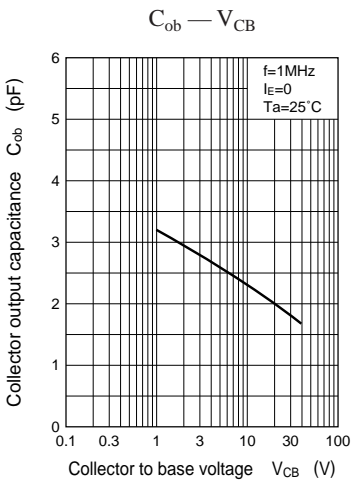
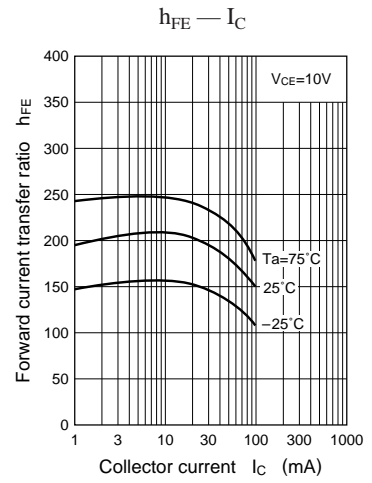
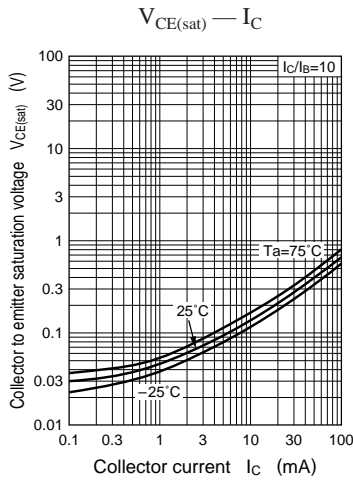
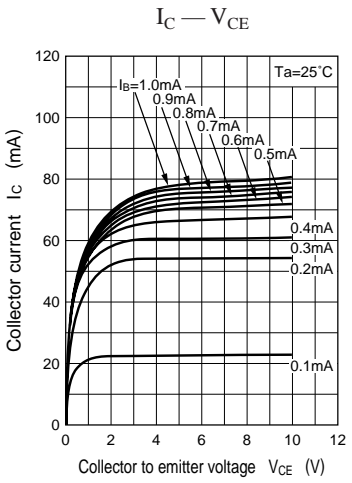


Characteristics charts of UN2216

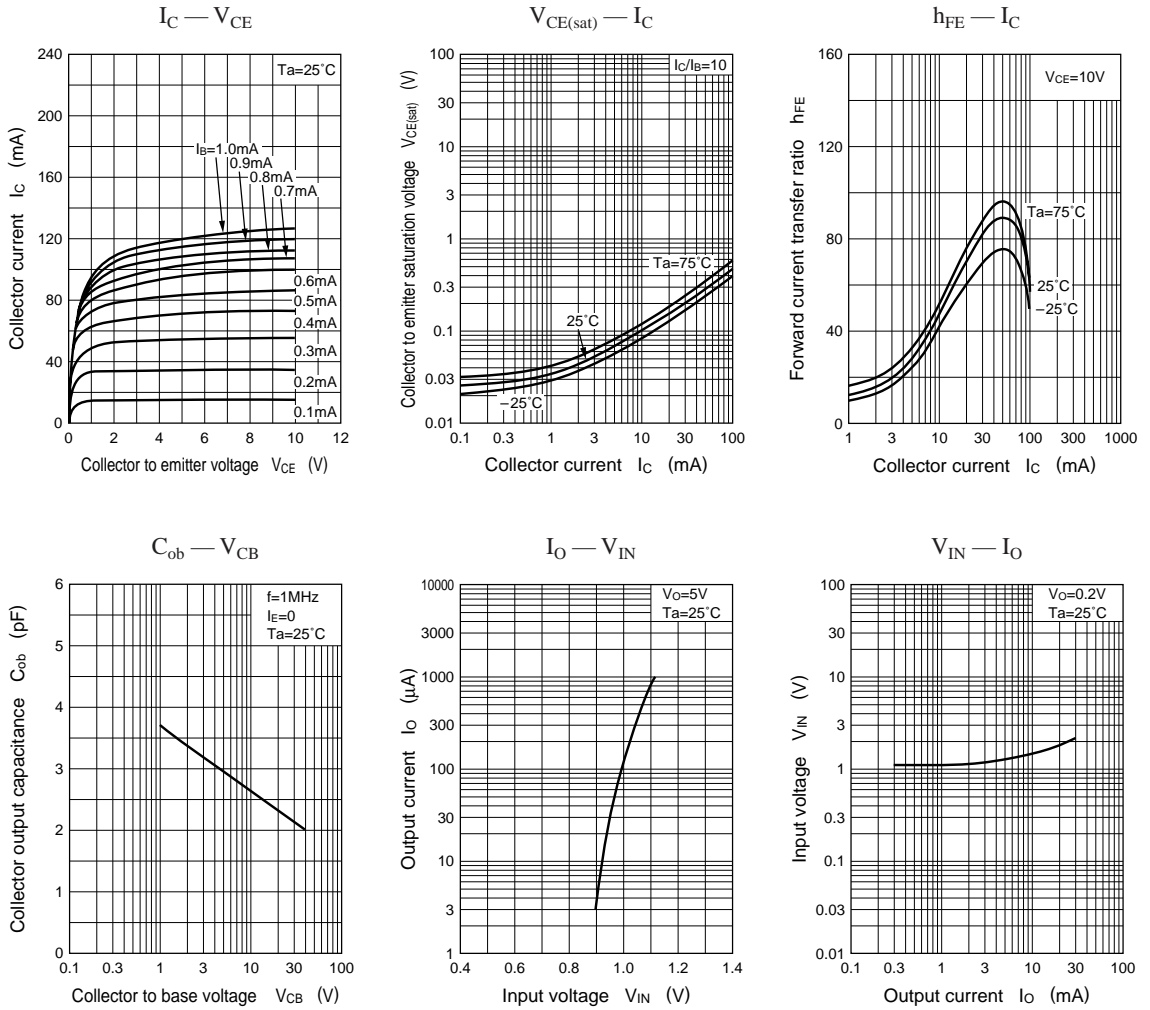




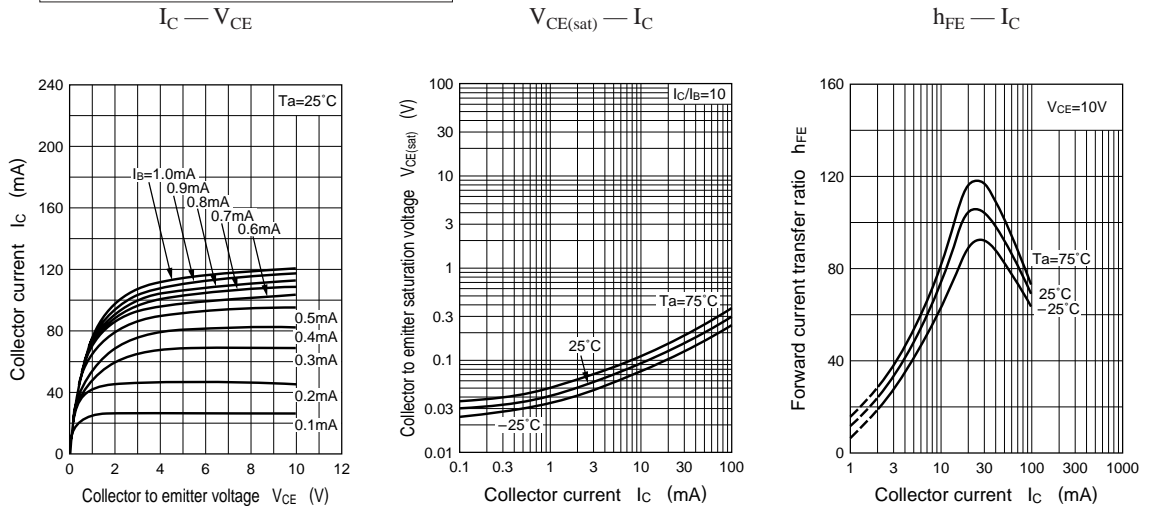
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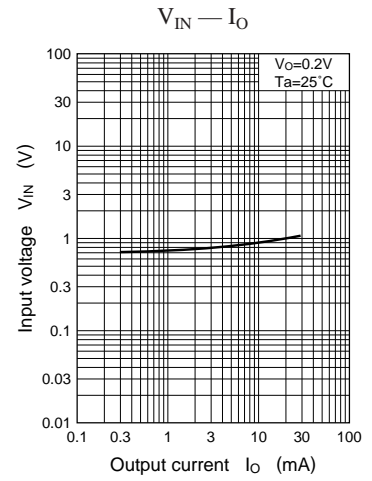
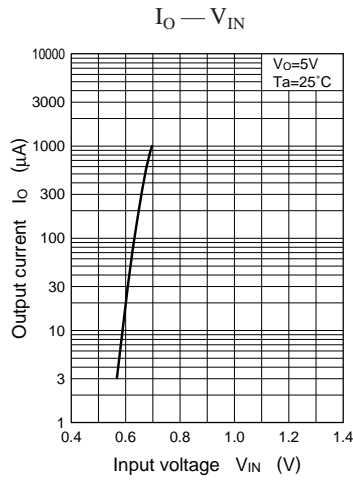
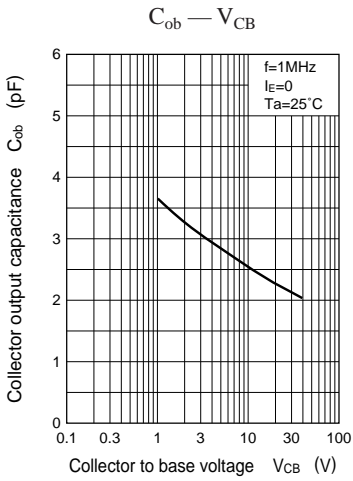


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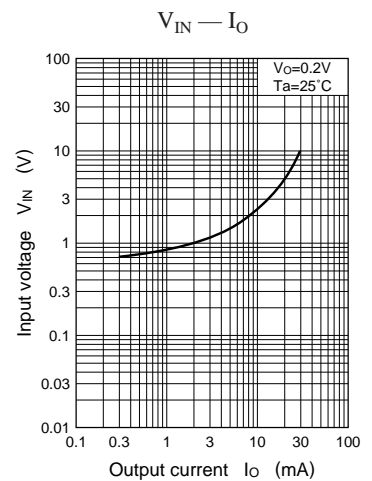
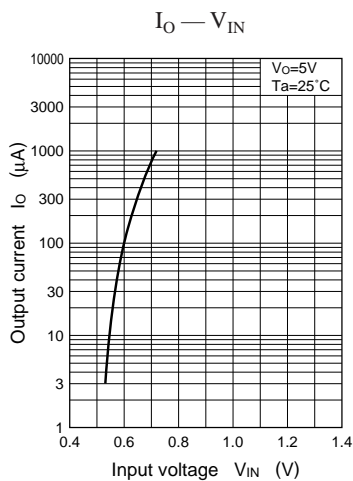
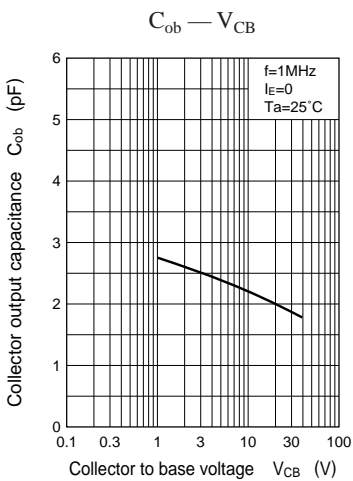
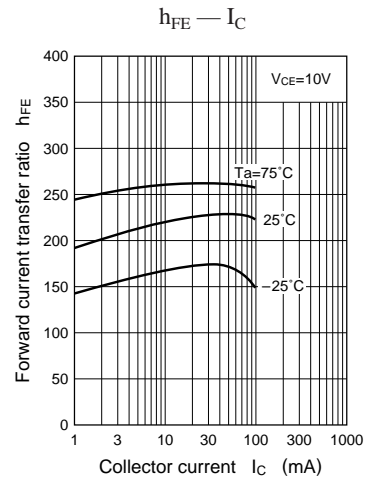
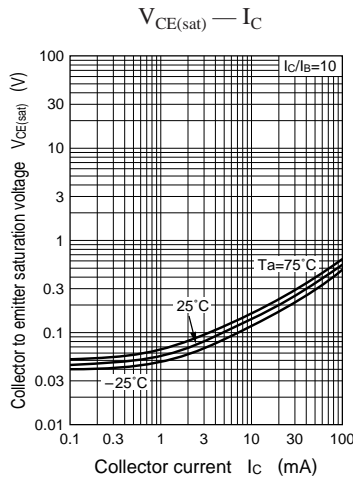
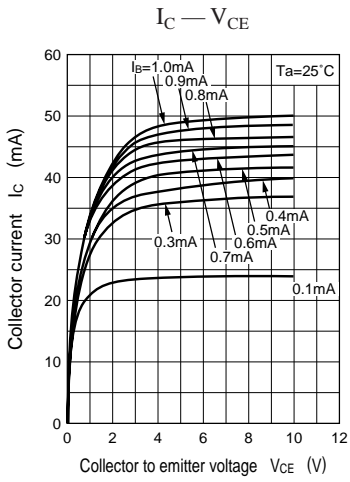


Characteristics charts of UN2219

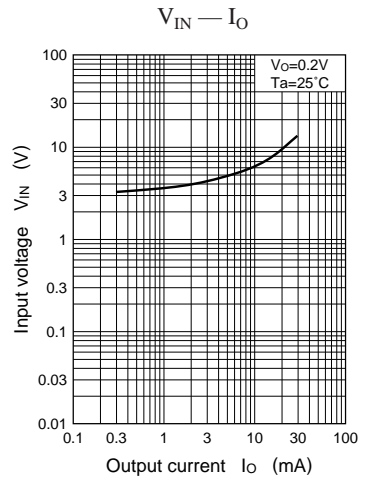
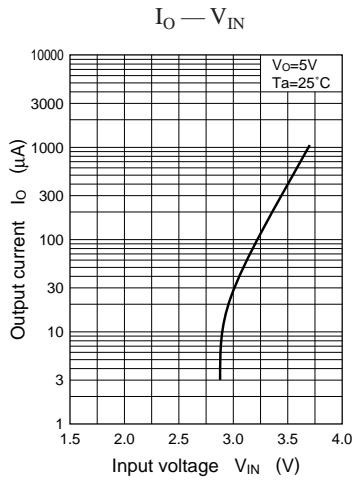
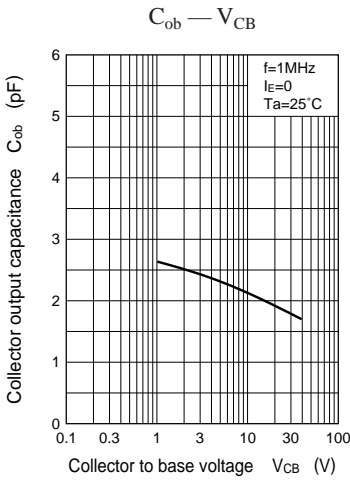
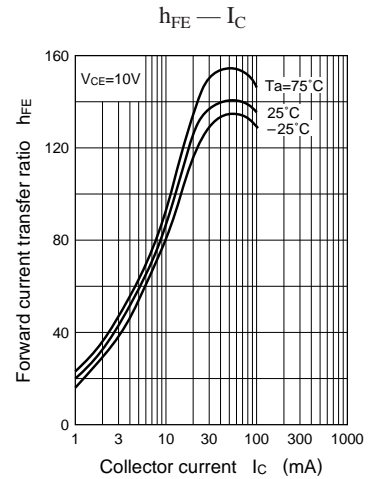
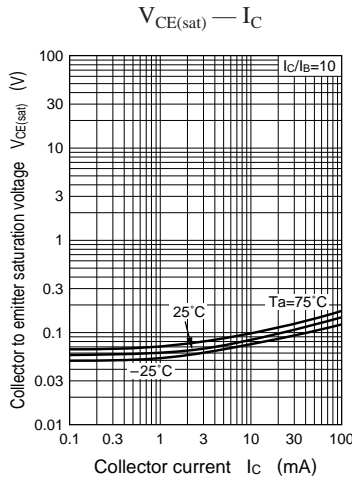
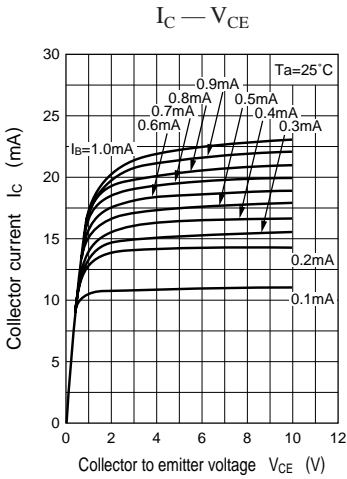




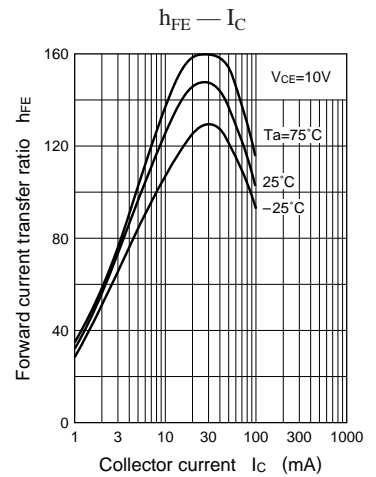
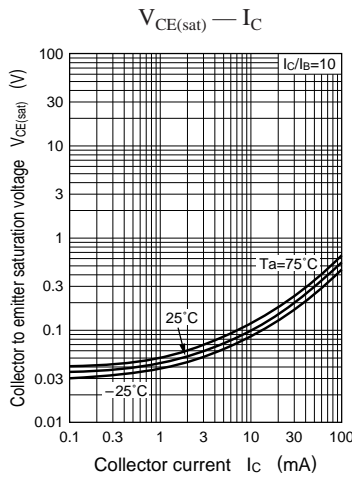
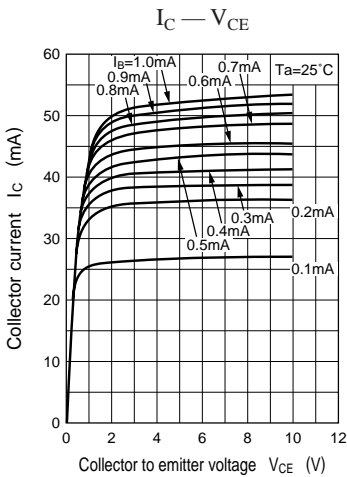
Characteristics charts of UN2210

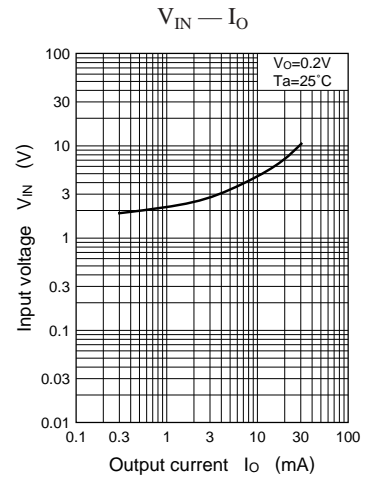
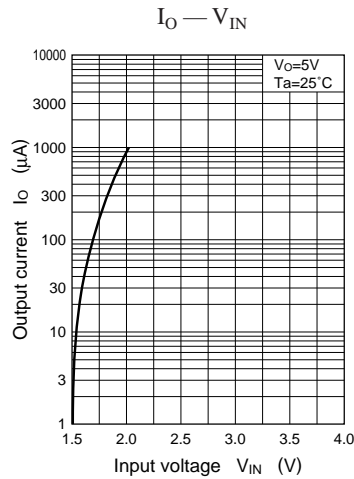
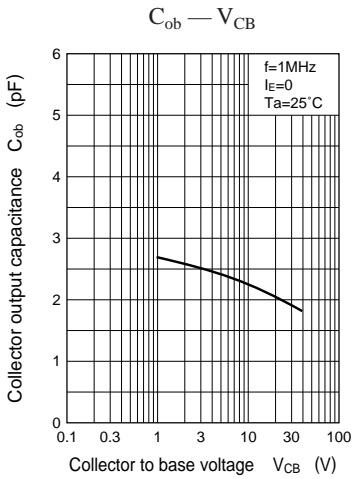


Characteristics charts of UN221D

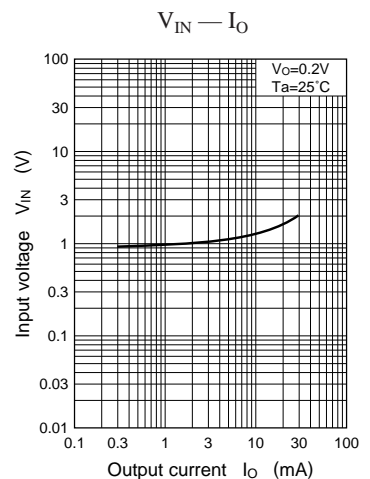
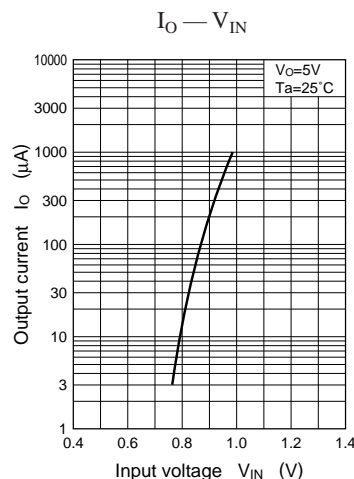
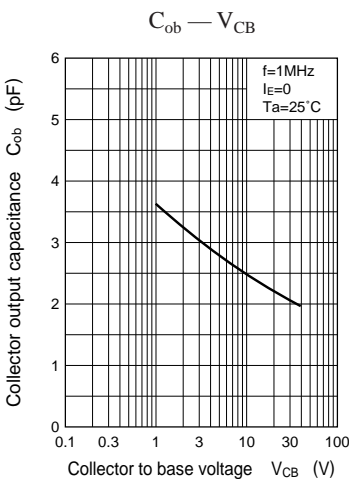
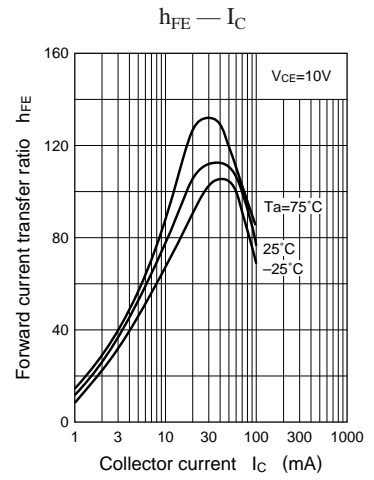
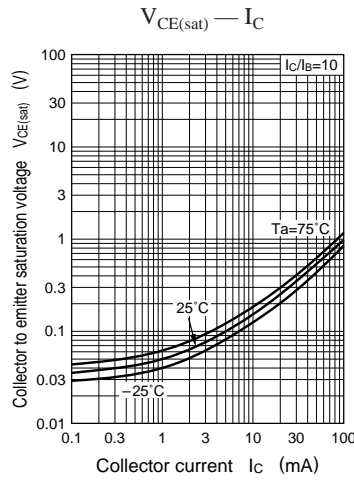
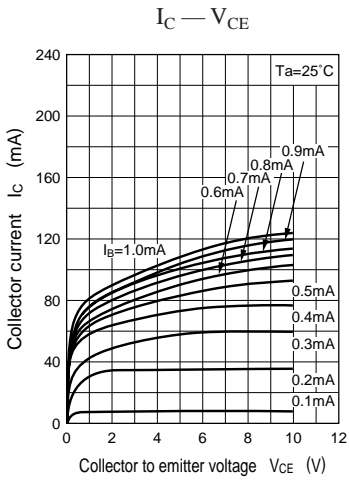


Characteristics charts of UN221E

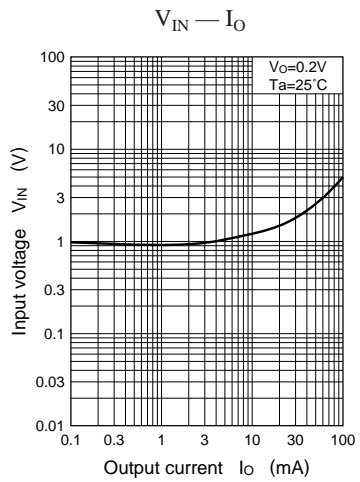
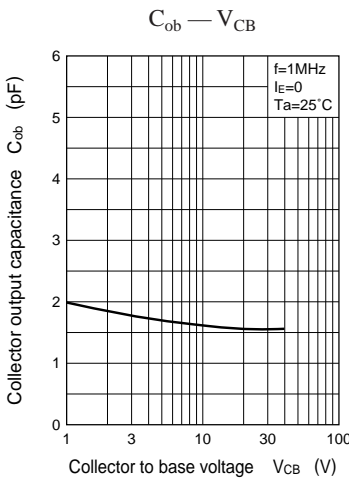
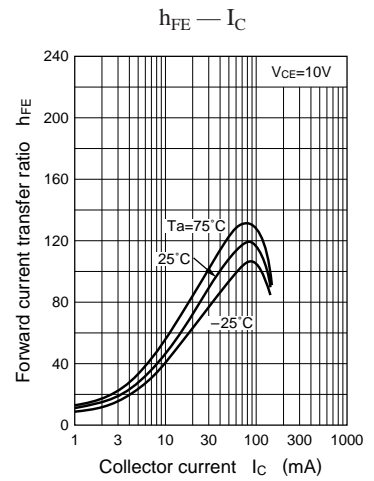
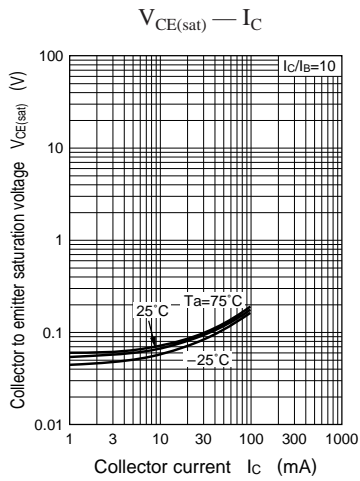
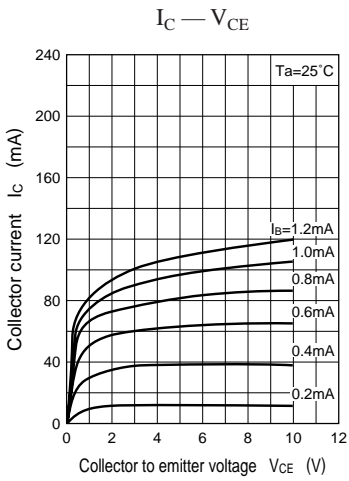




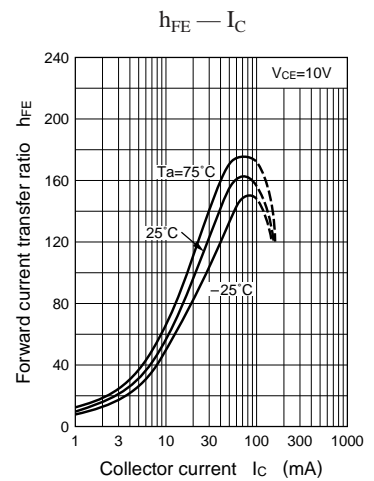
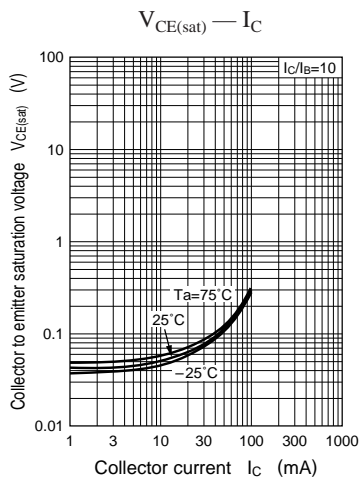
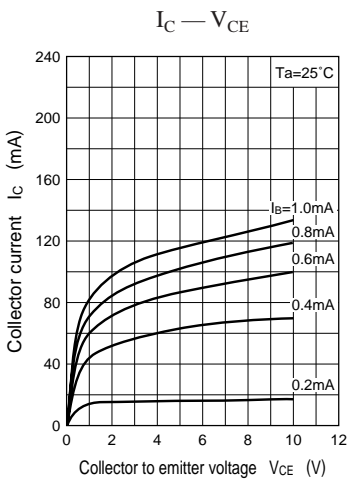
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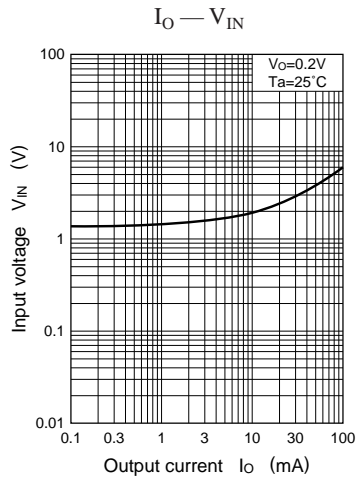
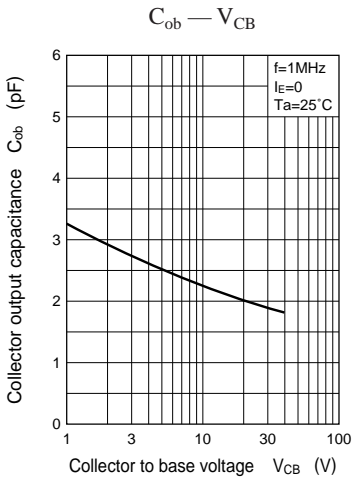


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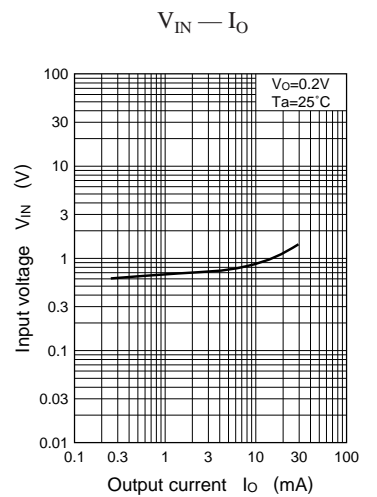
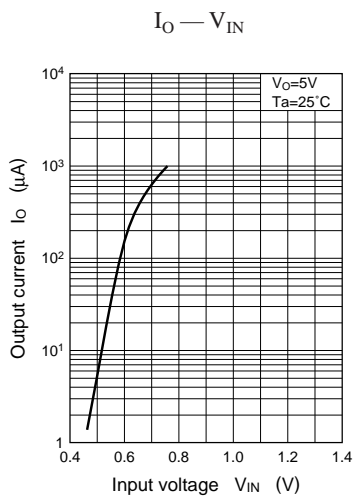
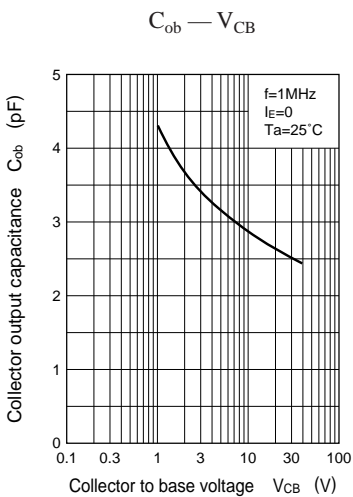
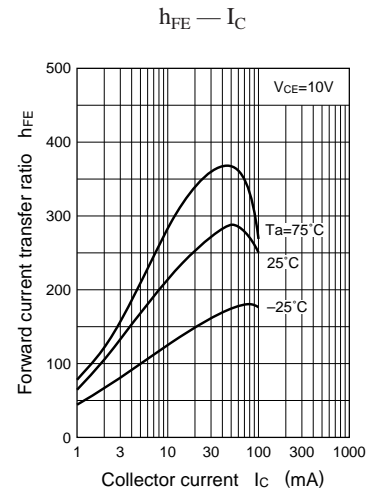
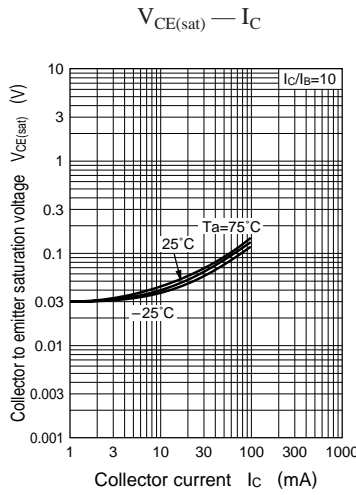
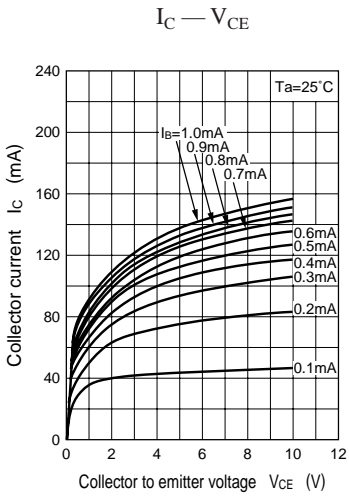


Characteristics charts of UN221L

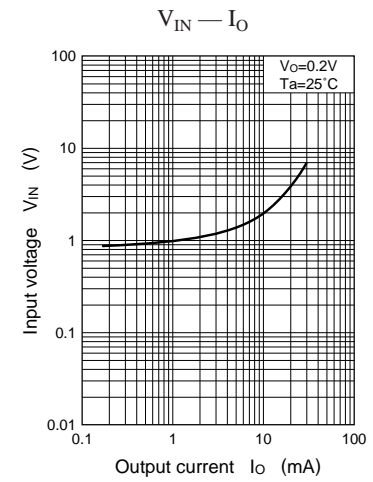
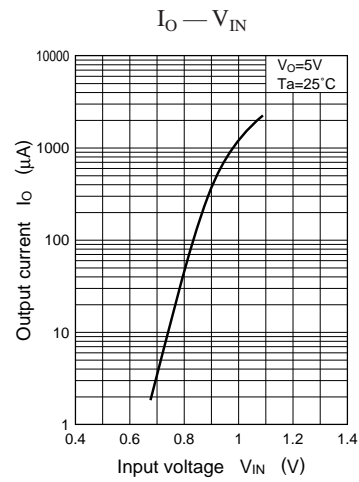
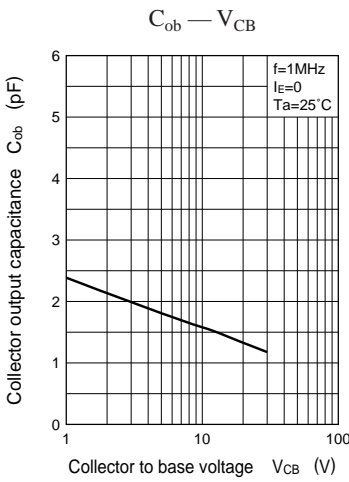
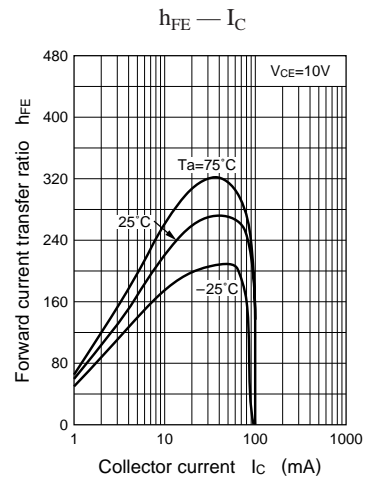
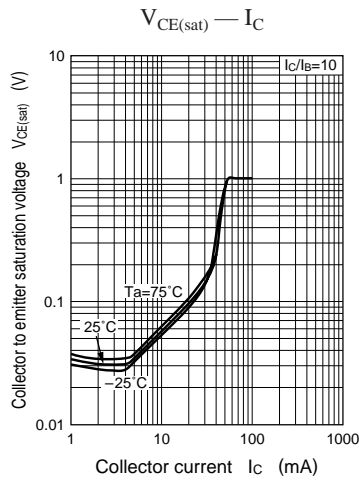
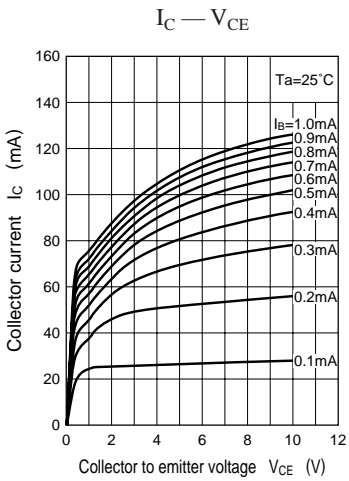




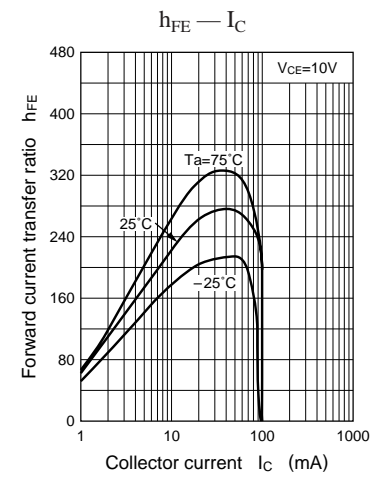
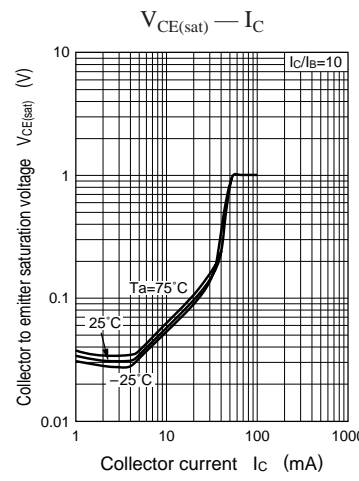
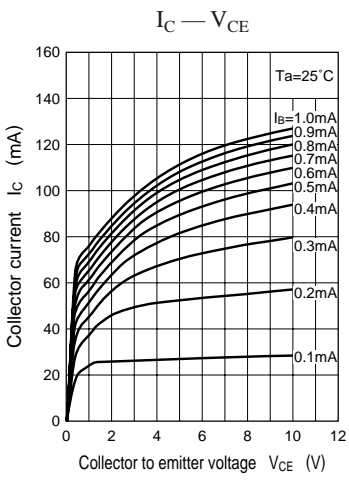
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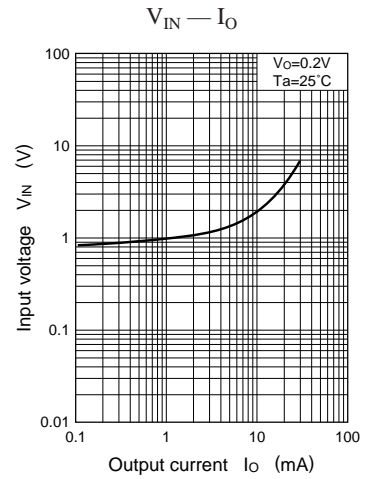
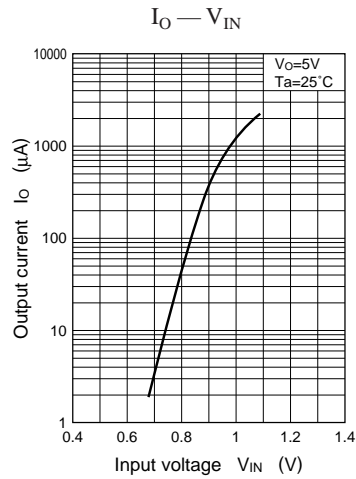
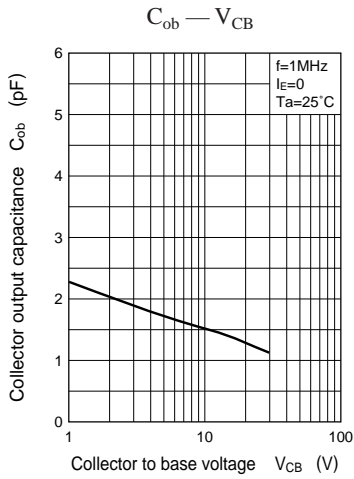


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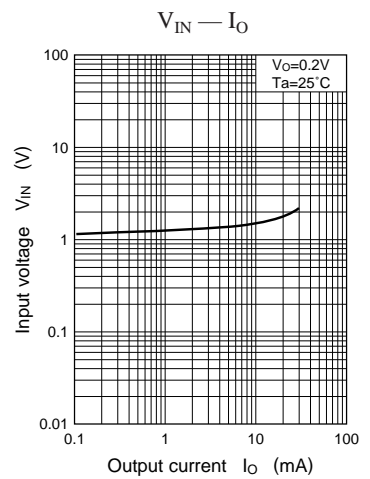
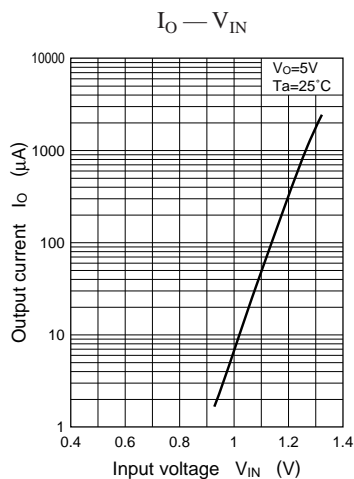
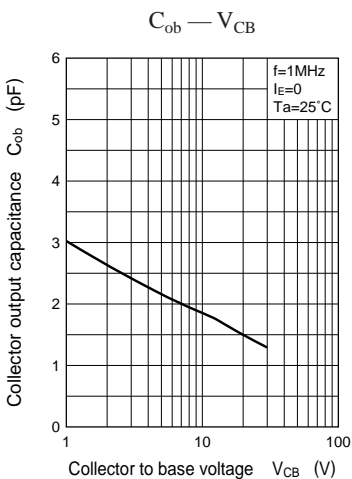
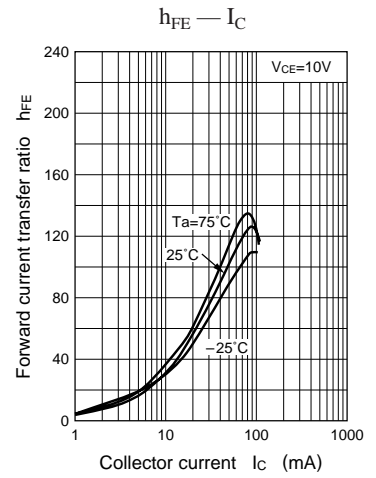
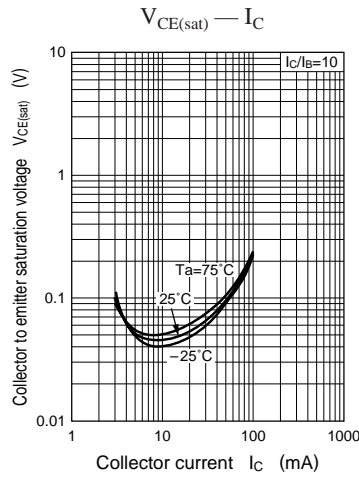
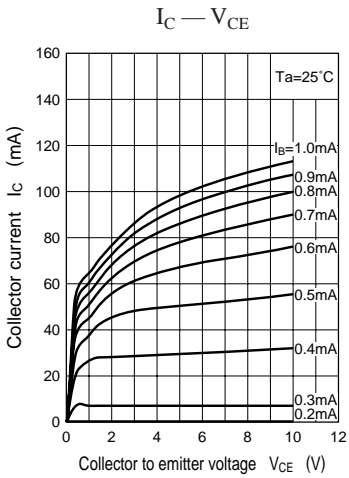


Characteristics charts of UN221T



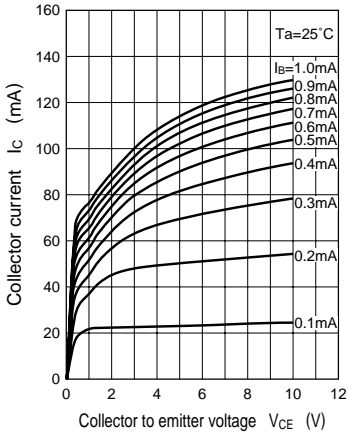


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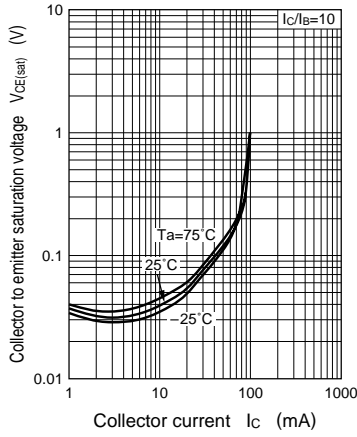


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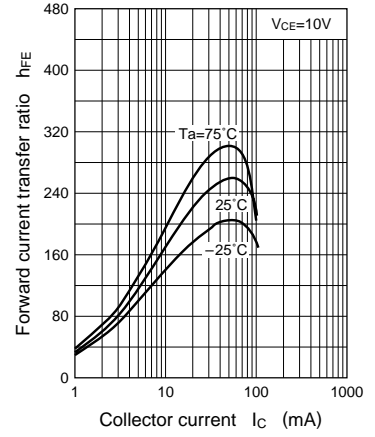
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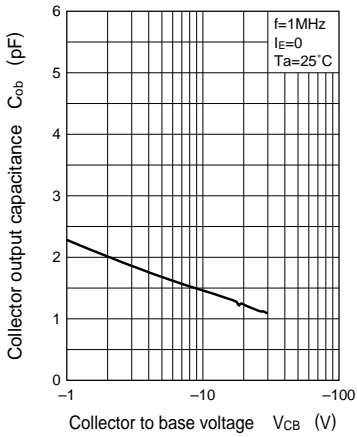
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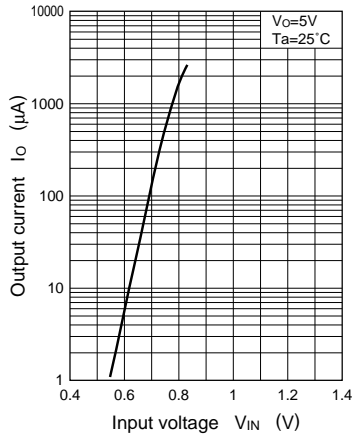
$h_{FE} - I_C$



$C_{ob} - V_{CB}$



$I_O - V_{IN}$



$V_{IN} - I_O$

