

UNR221x Series (UN221x Series)

Silicon NPN epitaxial planar type

For digital circuits

■ Features

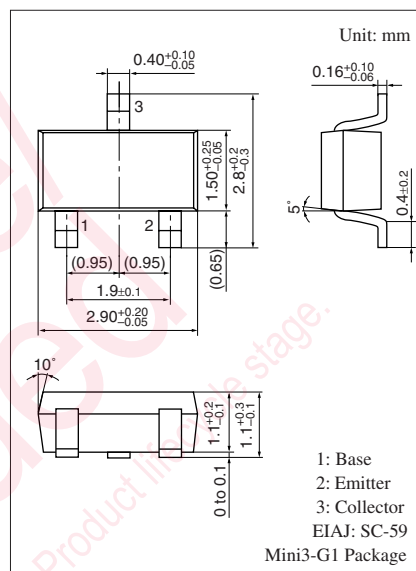
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- Mini type package allowing easy automatic insertion through tape packing and magazine packing

■ Resistance by Part Number

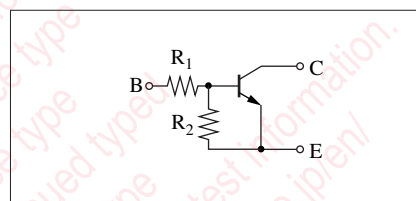
		Marking Symbol (R ₁)	(R ₂)
• UNR2210 (UN2210)	8L	47 kΩ	—
• UNR2211 (UN2211)	8A	10 kΩ	10 kΩ
• UNR2212 (UN2212)	8B	22 kΩ	22 kΩ
• UNR2213 (UN2213)	8C	47 kΩ	47 kΩ
• UNR2214 (UN2214)	8D	10 kΩ	47 kΩ
• UNR2215 (UN2215)	8E	10 kΩ	—
• UNR2216 (UN2216)	8F	4.7 kΩ	—
• UNR2217 (UN2217)	8H	22 kΩ	—
• UNR2218 (UN2218)	8I	0.51 kΩ	5.1 kΩ
• UNR2219 (UN2219)	8K	1 kΩ	10 kΩ
• UNR221D (UN221D)	8M	47 kΩ	10 kΩ
• UNR221E (UN221E)	8N	47 kΩ	22 kΩ
• UNR221F (UN221F)	8O	4.7 kΩ	10 kΩ
• UNR221K (UN221K)	8P	10 kΩ	4.7 kΩ
• UNR221L (UN221L)	8Q	4.7 kΩ	4.7 kΩ
• UNR221M (UN221M)	EL	2.2 kΩ	47 kΩ
• UNR221N (UN221N)	EX	4.7 kΩ	47 kΩ
• UNR221T (UN221T)	EZ	22 kΩ	47 kΩ
• UNR221V (UN221V)	FD	2.2 kΩ	2.2 kΩ
• UNR221Z (UN221Z)	FF	4.7 kΩ	22 kΩ

■ Absolute Maximum Ratings T_a = 25°C

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



Internal Connection



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

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

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)		V_{CBO}	$I_{\text{C}} = 10\ \mu\text{A}$, $I_{\text{E}} = 0$	50			V
Collector-emitter voltage (Base open)		V_{CEO}	$I_{\text{C}} = 2\ \text{mA}$, $I_{\text{B}} = 0$	50			V
Collector-base cutoff current (Emitter open)		I_{CBO}	$V_{\text{CB}} = 50\ \text{V}$, $I_{\text{E}} = 0$			0.1	μA
Collector-emitter cutoff current (Base open)		I_{CEO}	$V_{\text{CE}} = 50\ \text{V}$, $I_{\text{B}} = 0$			0.5	μA
Emitter-base cutoff current (Collector open)	UNR2210/2215/2216/2217	I_{EBO}	$V_{\text{EB}} = -6\ \text{V}$, $I_{\text{C}} = 0$			0.01	mA
	UNR2213					0.1	
	UNR2212/2214/221D/ 221E/221M/221N/221T					0.2	
	UNR221Z					0.4	
	UNR2211					0.5	
	UNR221F/221K					1.0	
	UNR2219					1.5	
	UNR2218/221L/221V					2.0	
Forward current transfer ratio	UNR221V	h_{FE}	$V_{\text{CE}} = 10\ \text{V}$, $I_{\text{C}} = 5\ \text{mA}$	6		20	—
	UNR2218/221K/221L			20			
	UNR2219/221D/221F			30			
	UNR2211			35			
	UNR2212/221E			60			
	UNR221Z			60		200	
	UNR2213/2214/221M			80			
	UNR221N/221T			80		400	
	UNR2210*/2215*/2216*/2217*			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
UNR221V			$I_{\text{C}} = 10\ \text{mA}$, $I_{\text{B}} = 1.5\ \text{mA}$				
Output voltage high-level		V_{OH}	$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 0.5\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$	4.9			V
Output voltage low-level		V_{OL}	$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 2.5\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$			0.2	V
UNR2213/221K			$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 3.5\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$				
UNR221D			$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 10\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$				
UNR221E			$V_{\text{CC}} = 5\ \text{V}$, $V_{\text{B}} = 6\ \text{V}$, $R_{\text{L}} = 1\ \text{k}\Omega$				
Transition frequency		f_{T}	$V_{\text{CB}} = 10\ \text{V}$, $I_{\text{E}} = -2\ \text{mA}$, $f = 200\ \text{MHz}$		150		MHz
Input resistance	UNR2218	R_{I}		-30%	0.51	+30%	k Ω
	UNR2219				1.0		
	UNR221M/211V				2.2		
	UNR2216/221F/221L/ 221N/221Z				4.7		
	UNR2211/2214/2215/221K				10		
	UNR2212/2217/221T				22		
	UNR2210/2213/221D/221E				47		

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

2. *: Rank classification

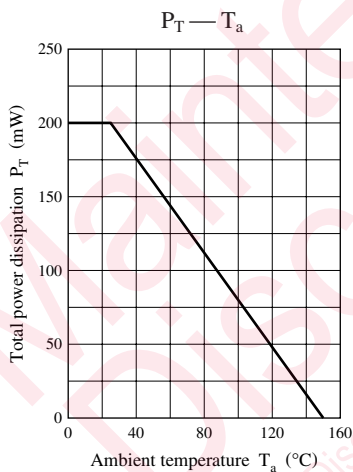
Rank	Q	R	S	No-rank
h_{FE}	160 to 260	210 to 340	290 to 460	160 to 460

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

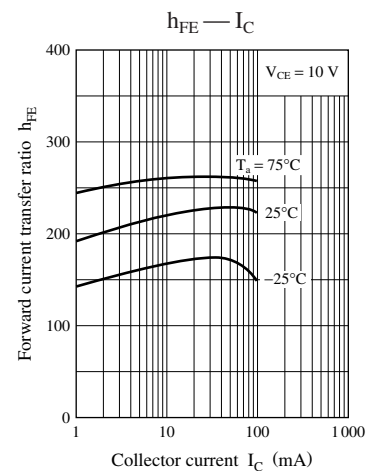
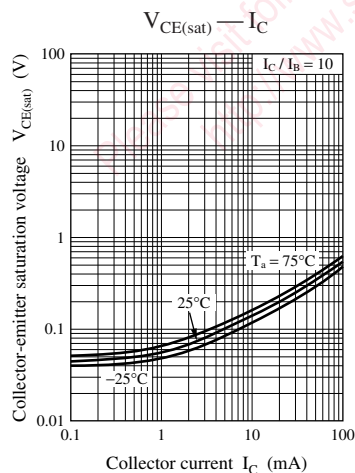
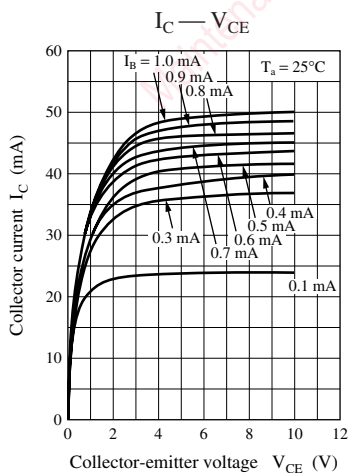
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Resistance ratio	UNR221M	R_1/R_2		0.047		—
	UNR221N			0.1		
	UNR2218/2219		0.08	0.10	0.12	
	UNR221Z			0.21		
	UNR2214		0.17	0.21	0.25	
	UNR221T			0.47		
	UNR221F		0.37	0.47	0.57	
	UNR221V			1.0		
	UNR2211/2212/2213/221L		0.8	1.0	1.2	
	UNR221K		1.70	2.13	2.60	
	UNR221E		1.70	2.14	2.60	
	UNR221D		3.7	4.7	5.7	

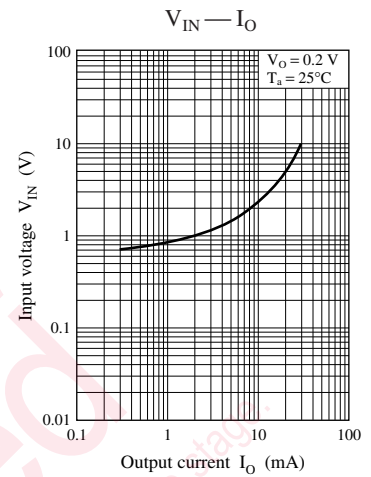
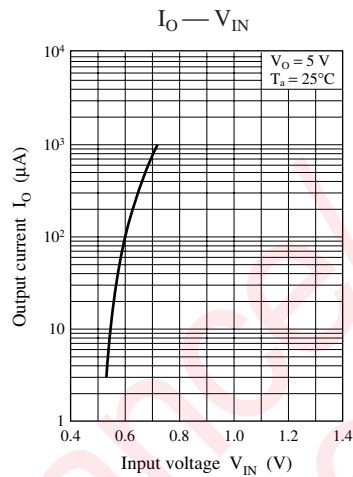
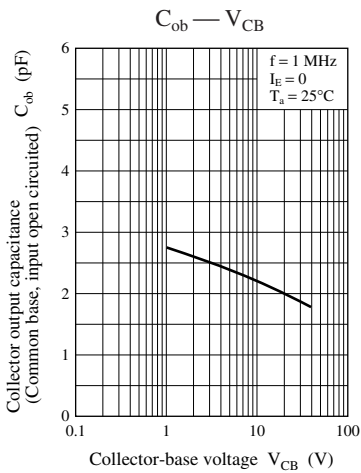
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Common characteristics chart

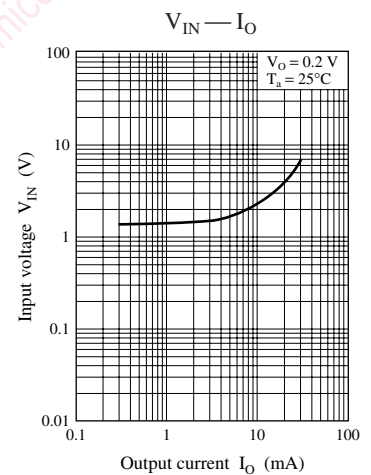
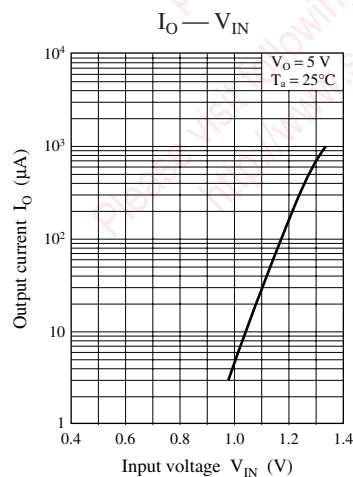
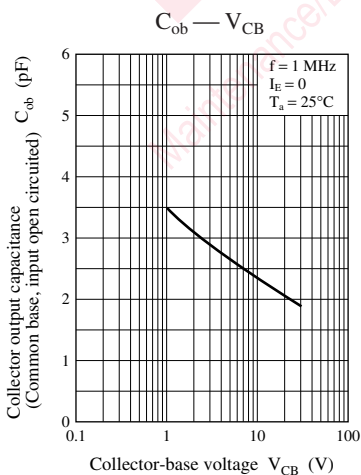
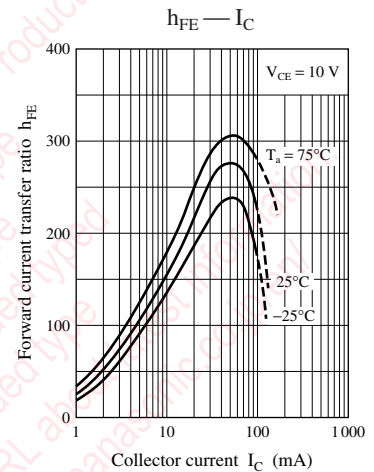
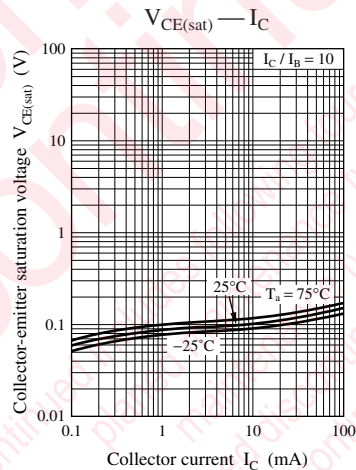
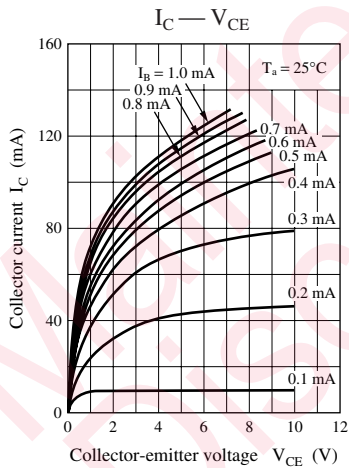


Characteristics charts of UNR2210

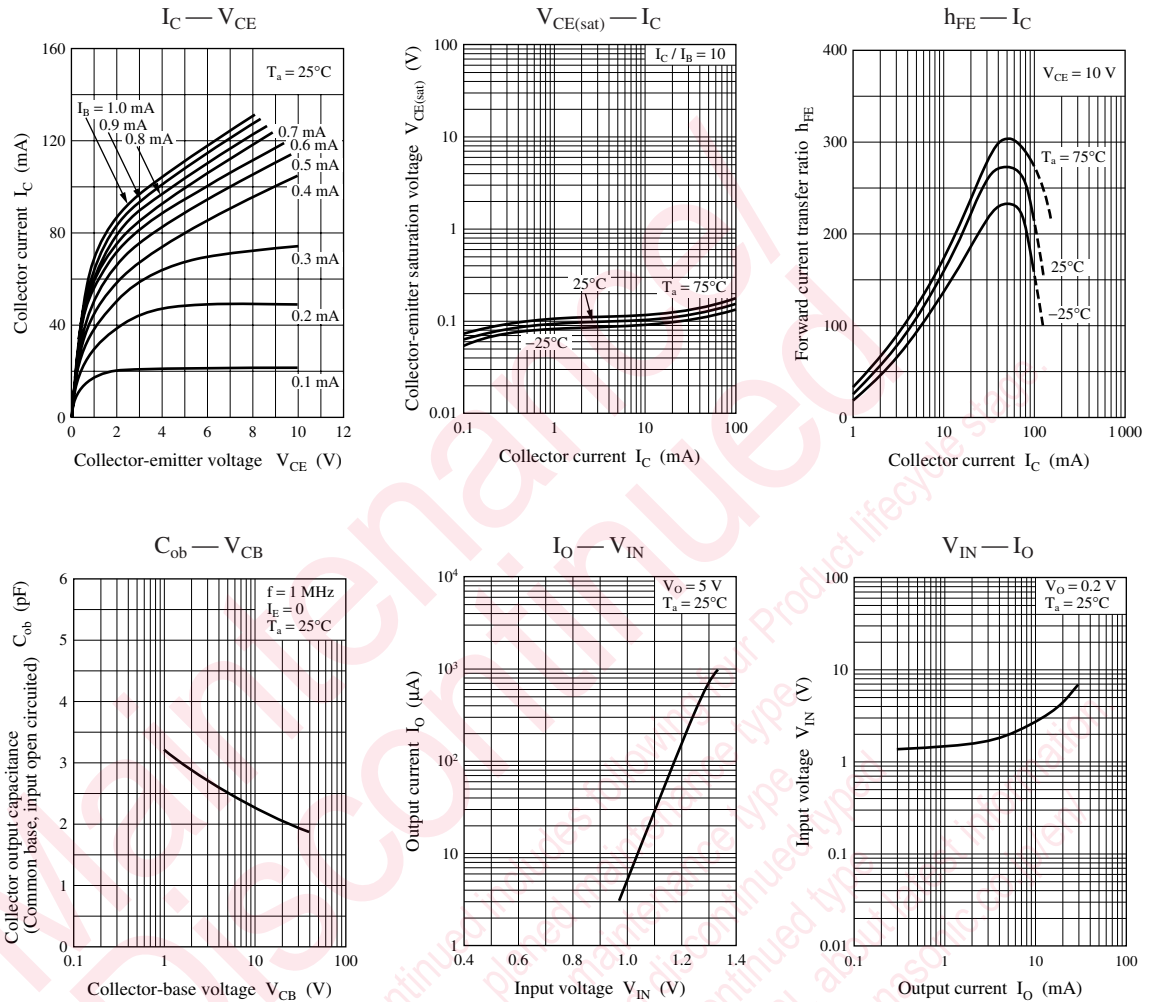




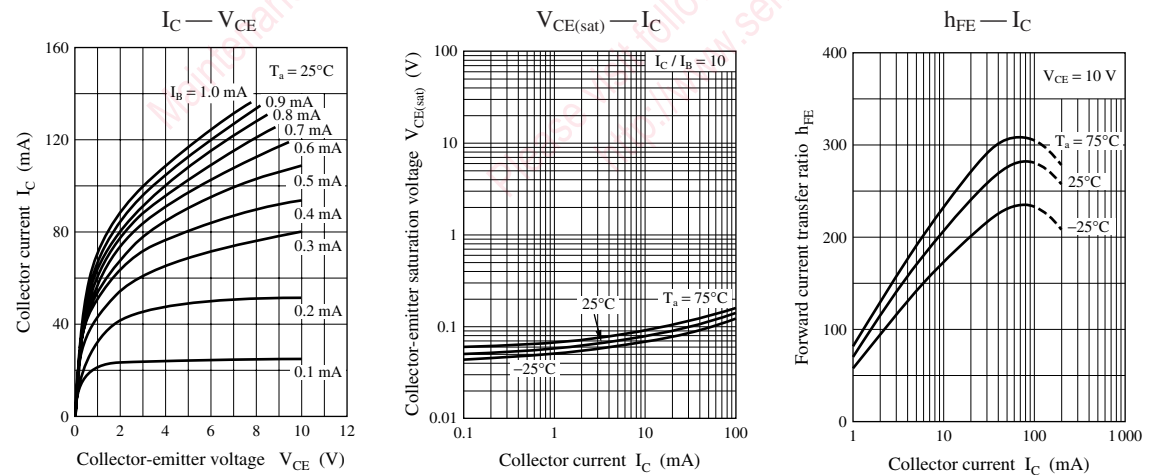
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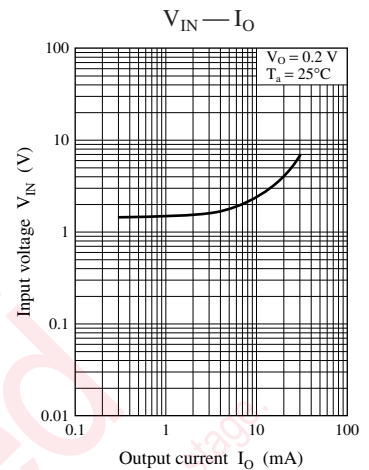
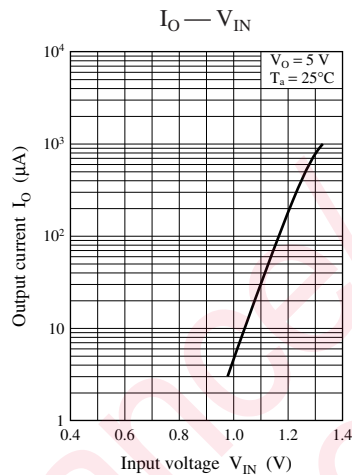
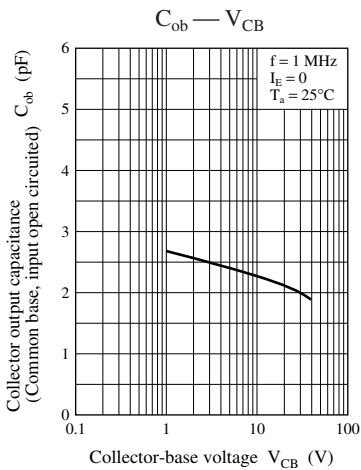


Characteristics charts of UNR2212

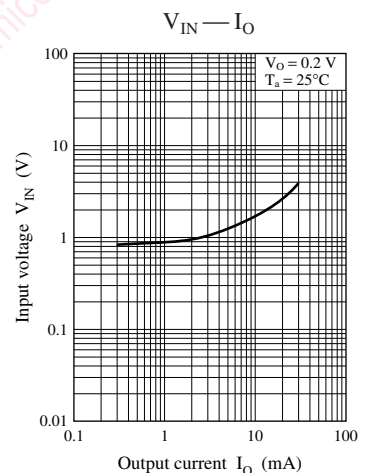
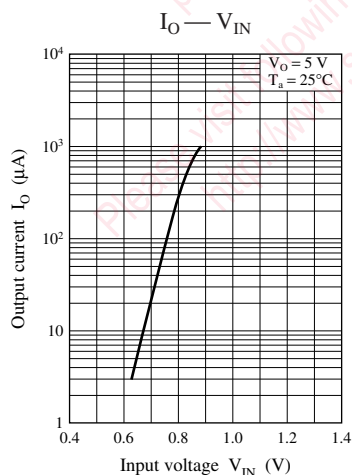
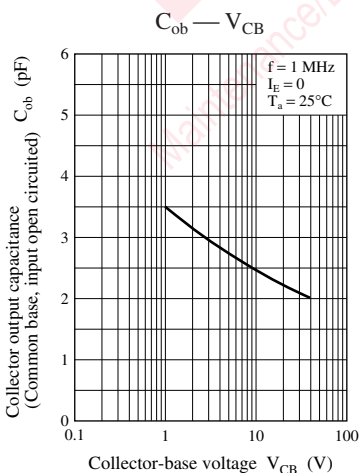
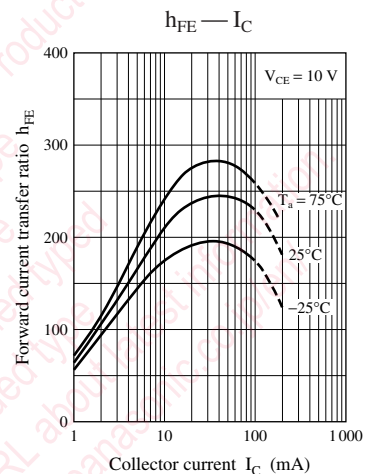
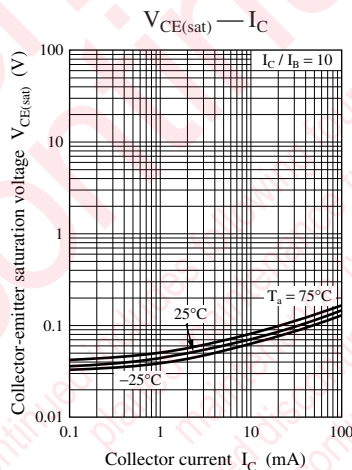
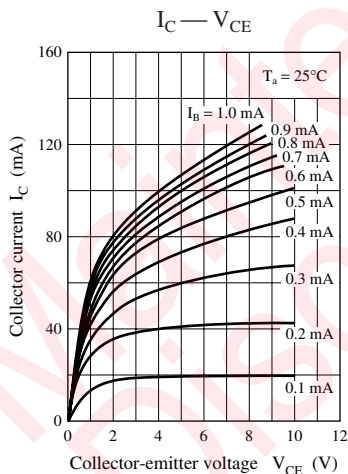


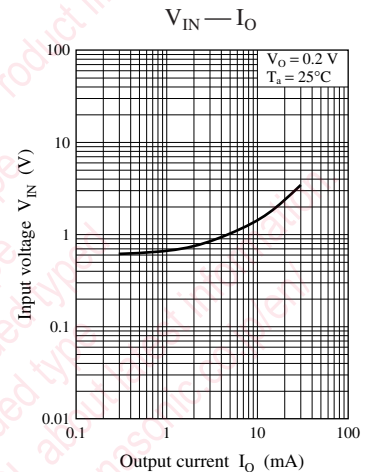
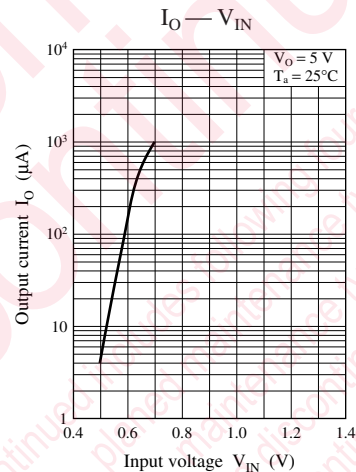
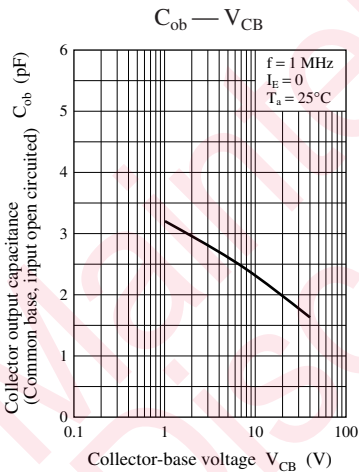
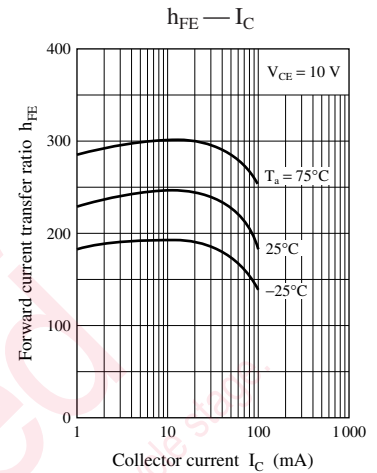
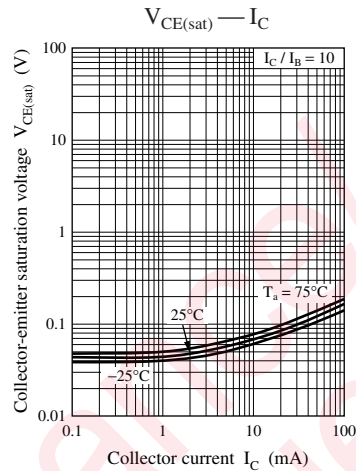
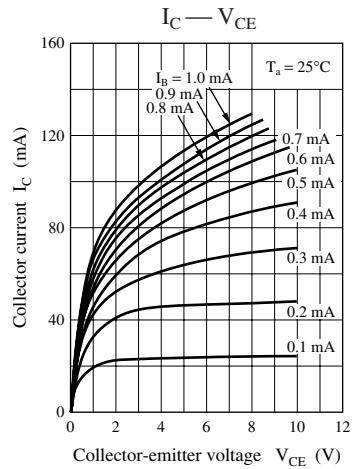
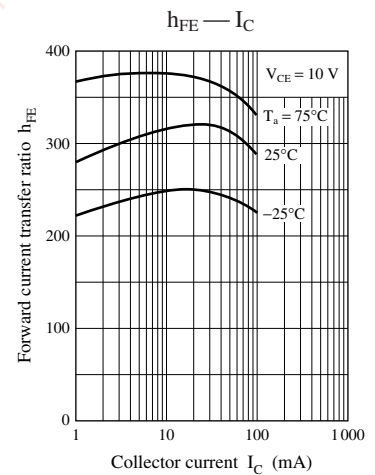
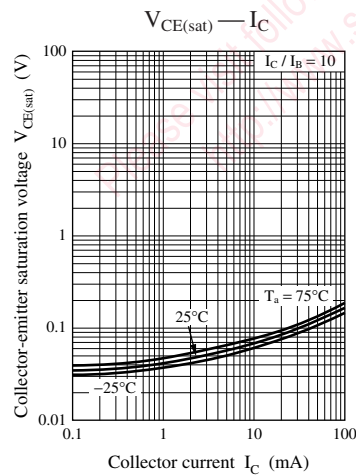
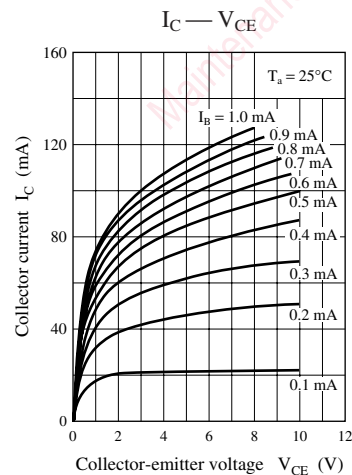
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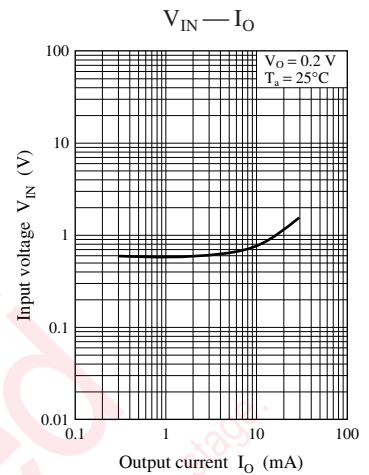
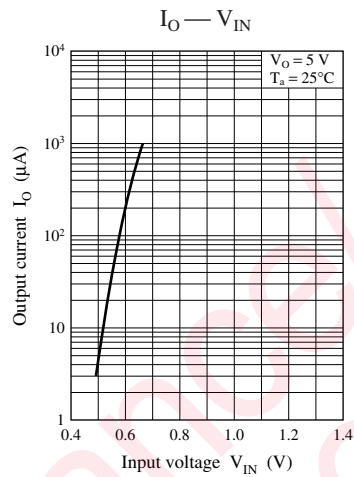
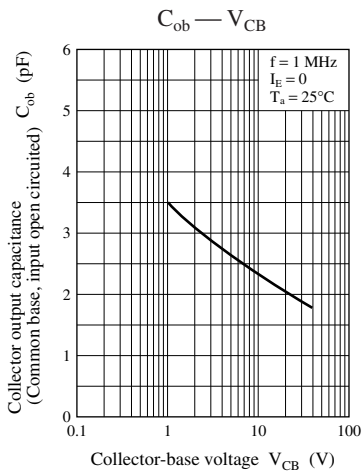




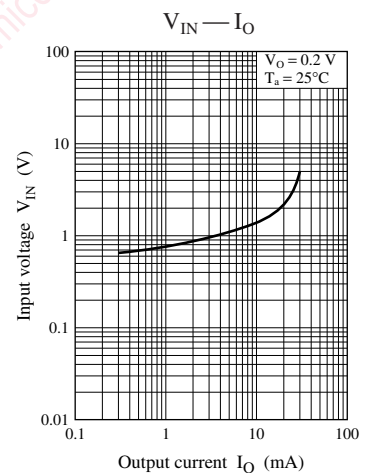
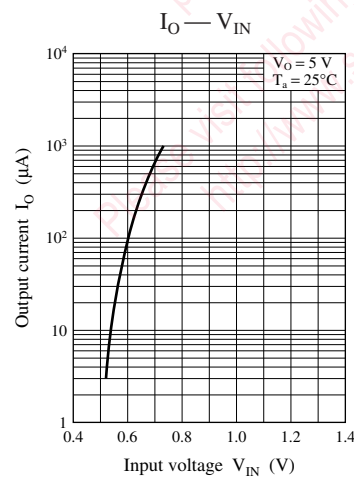
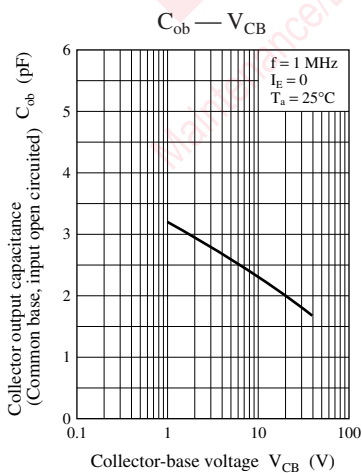
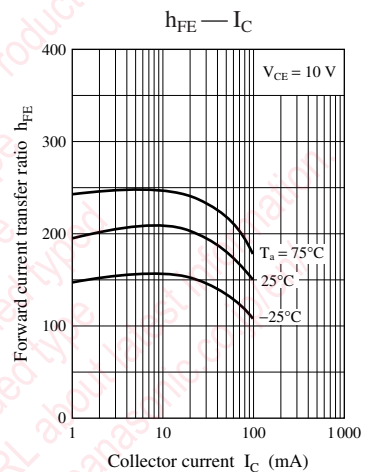
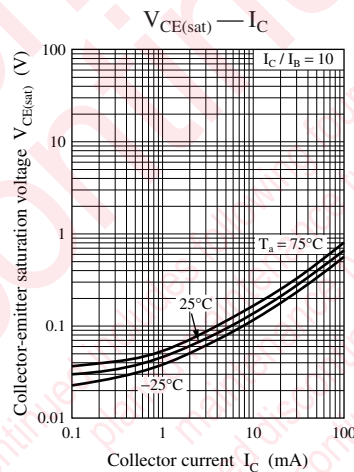
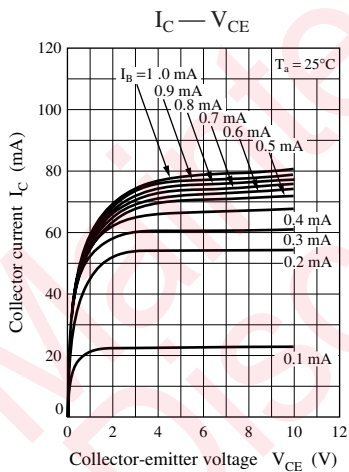
Characteristics charts of UNR2214



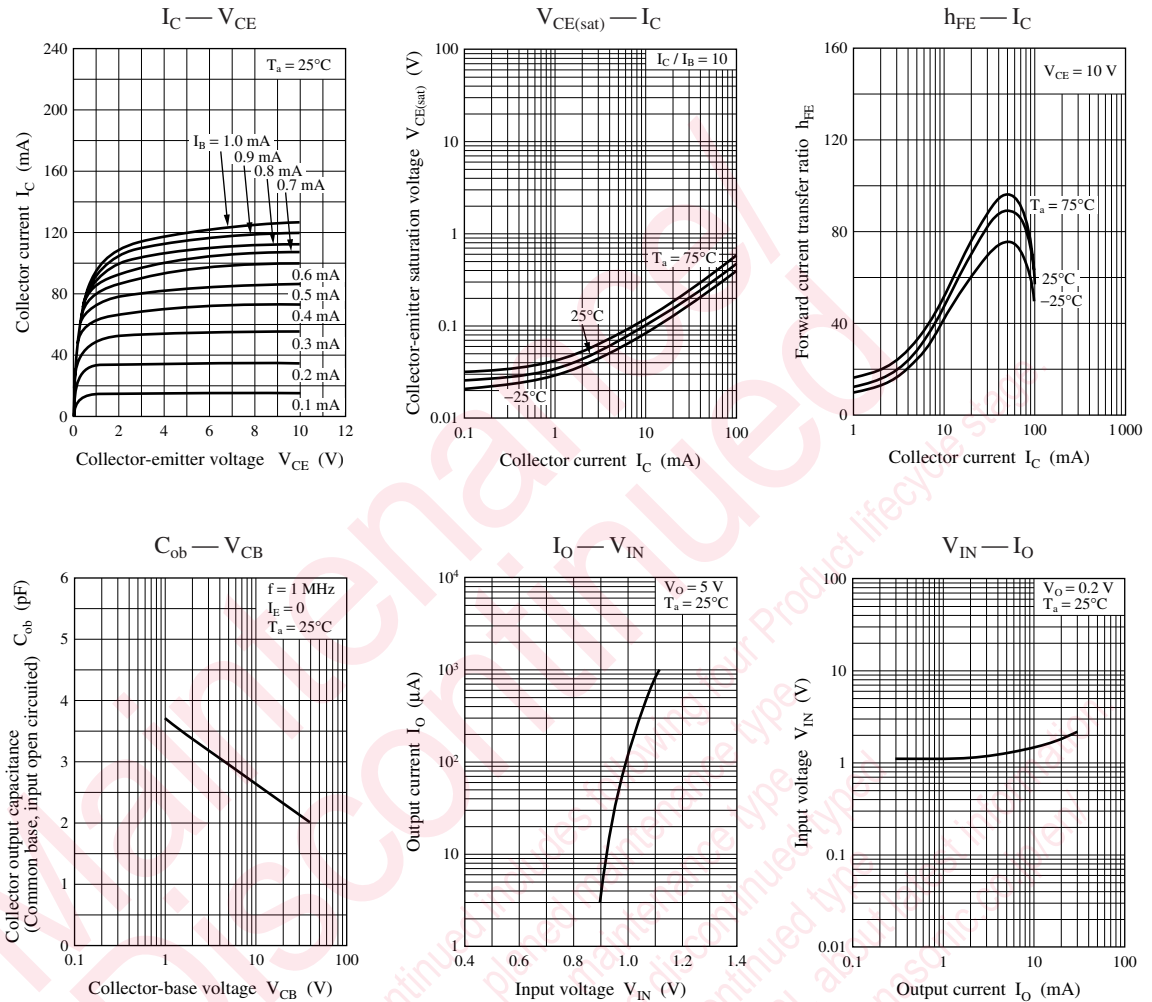
Characteristics charts of UNR2215**Characteristics charts of UNR2216**



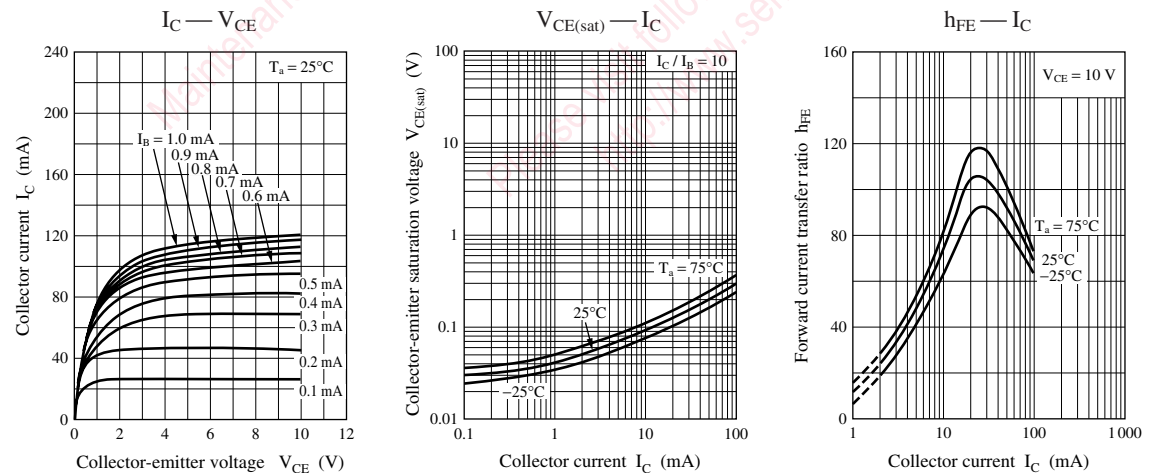
Characteristics charts of UNR2217

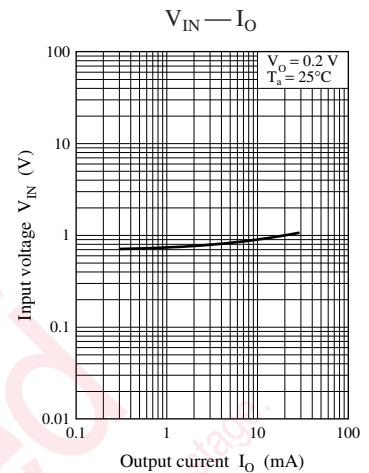
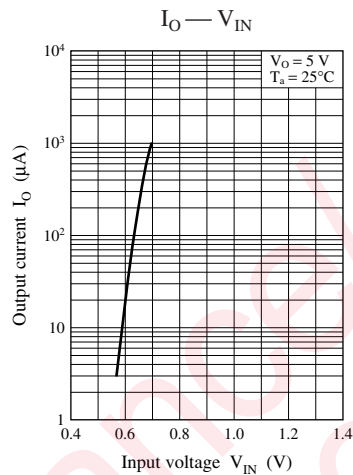
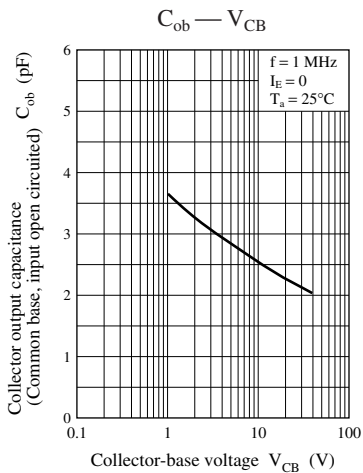


Characteristics charts of UNR2218

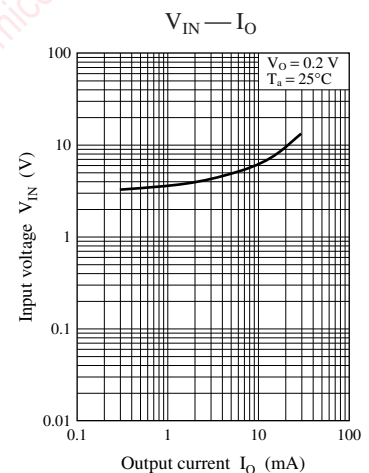
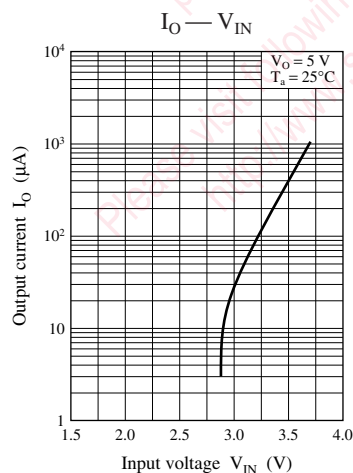
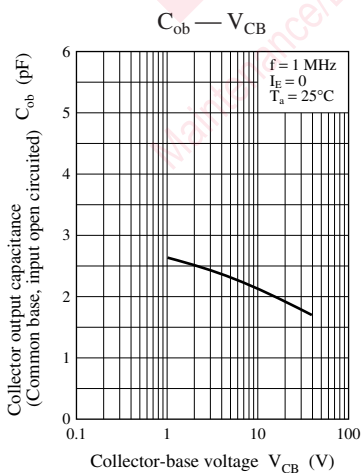
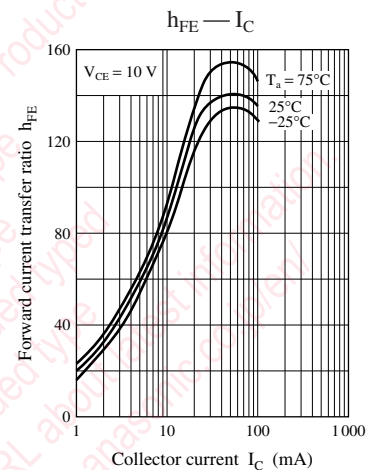
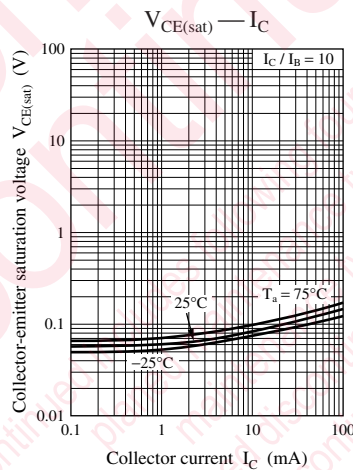
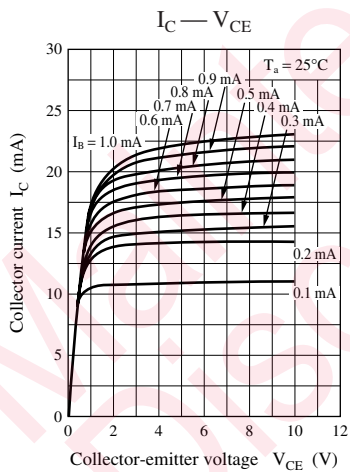


Characteristics charts of UNR2219

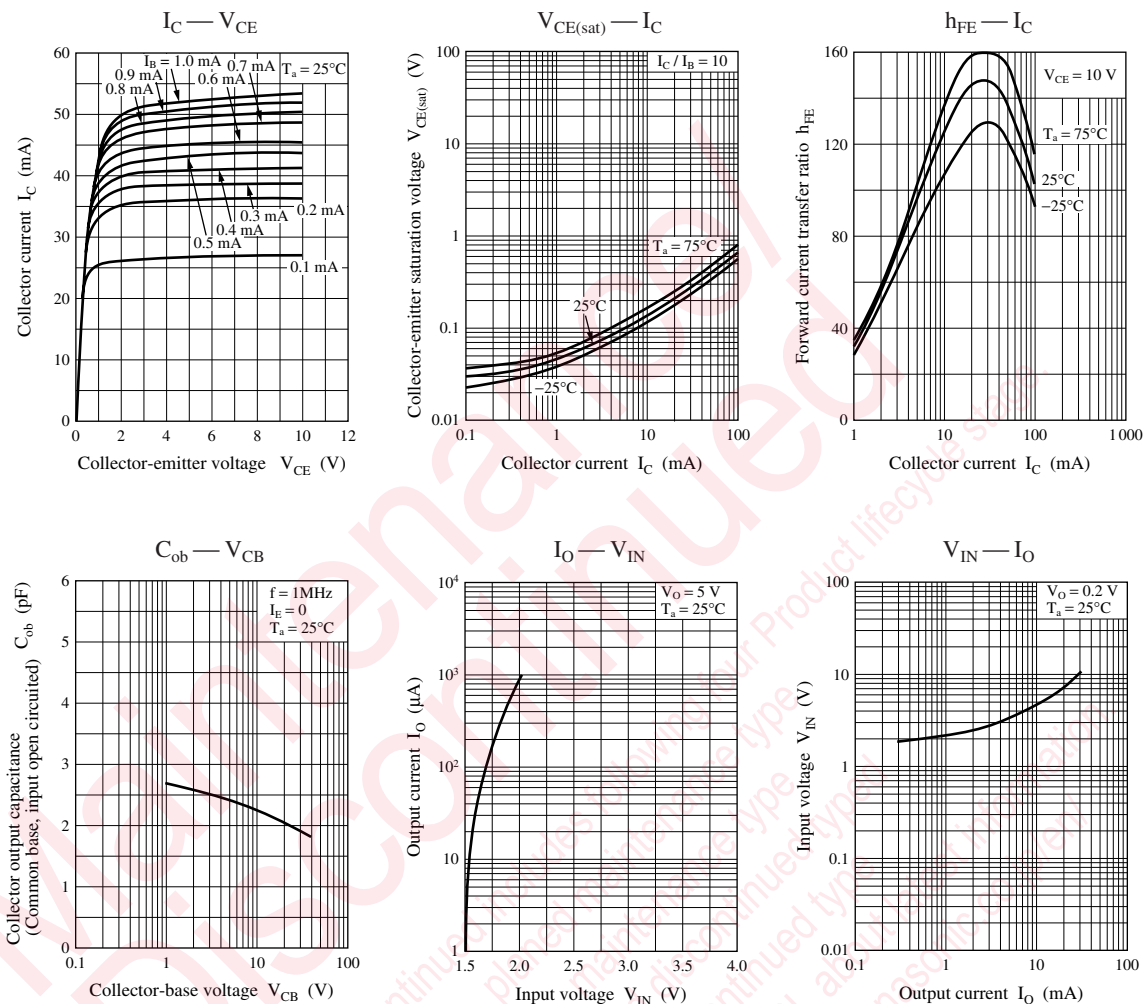




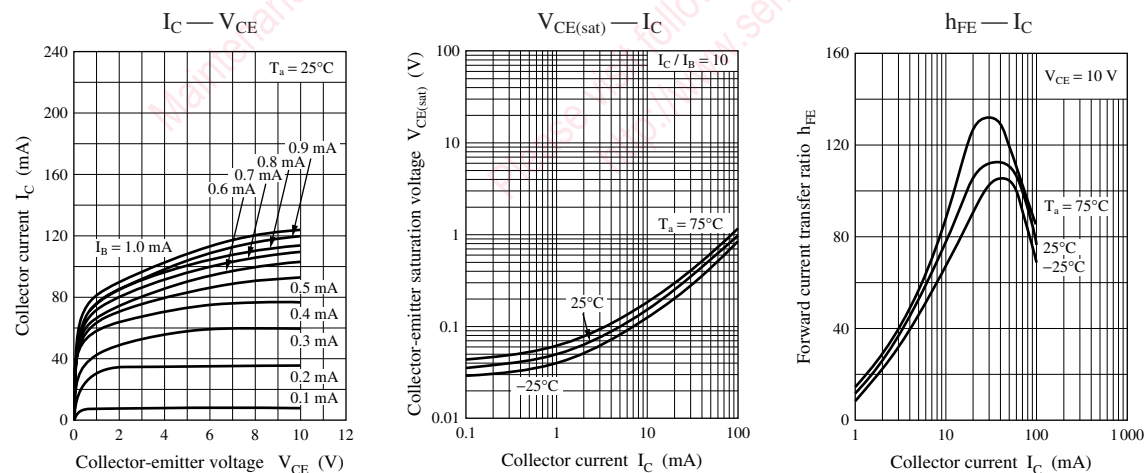
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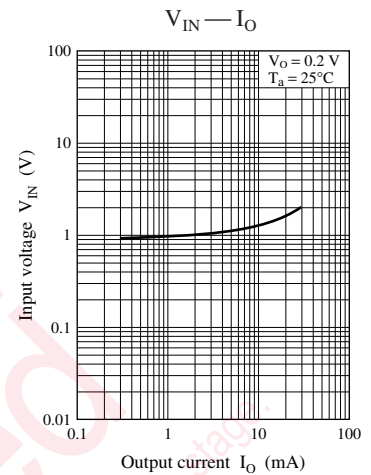
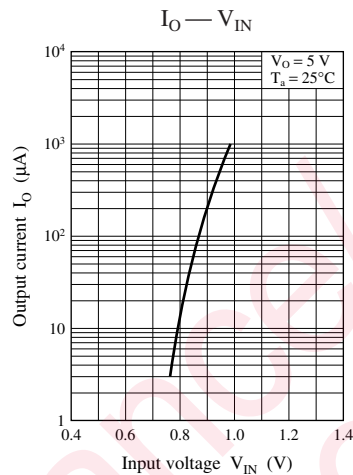
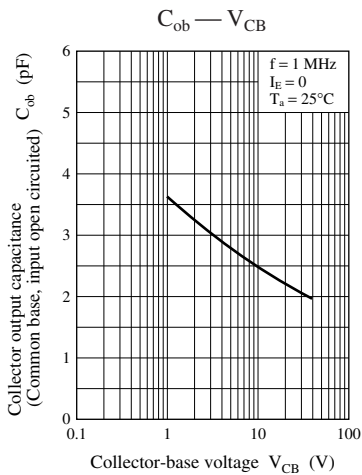


Characteristics charts of UNR221E

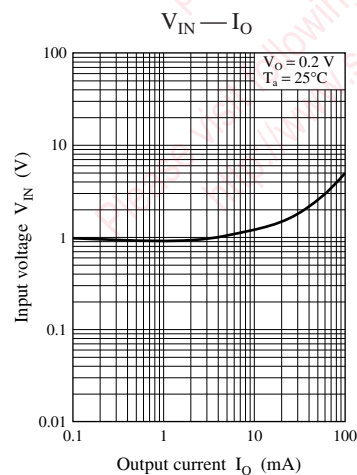
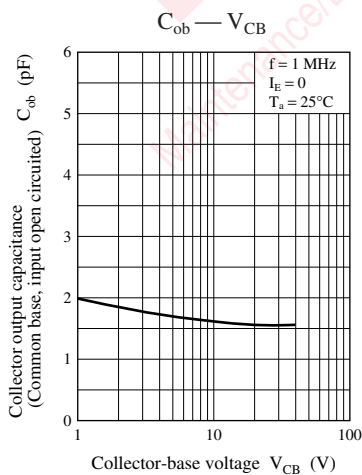
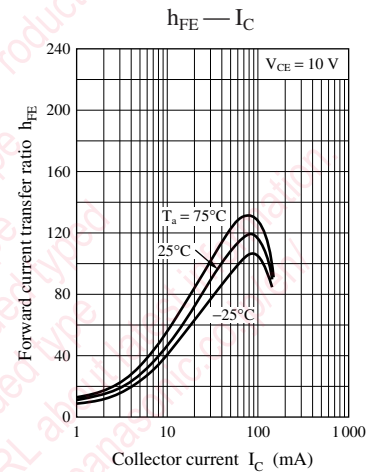
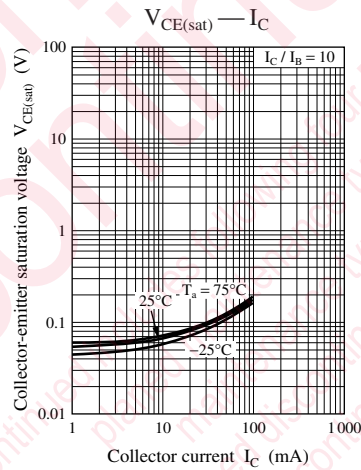
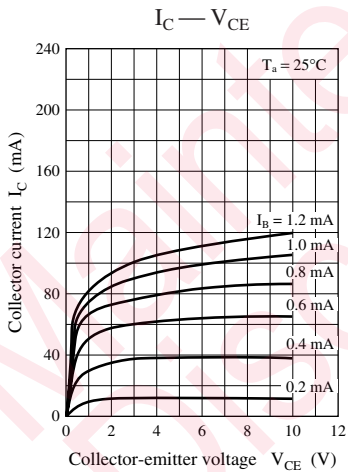


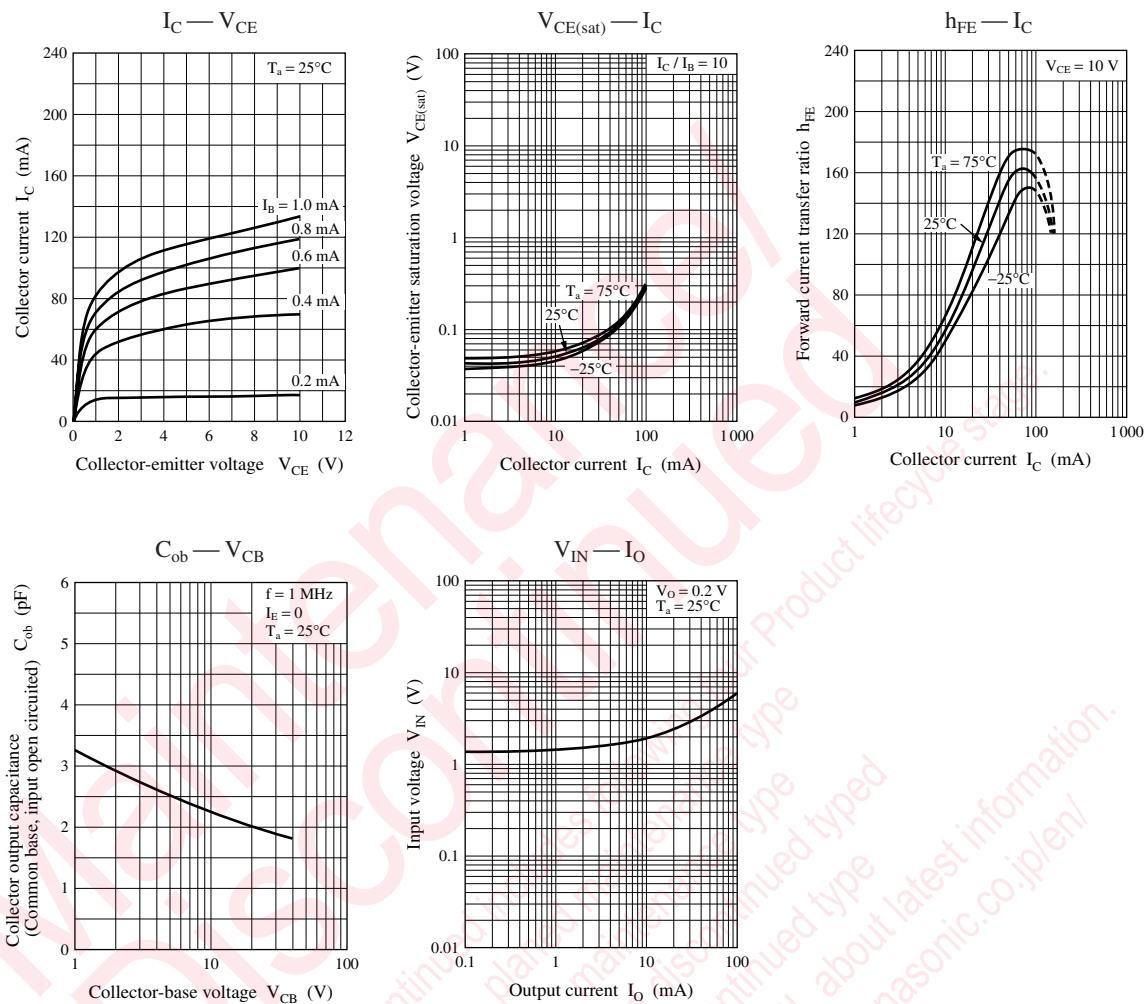
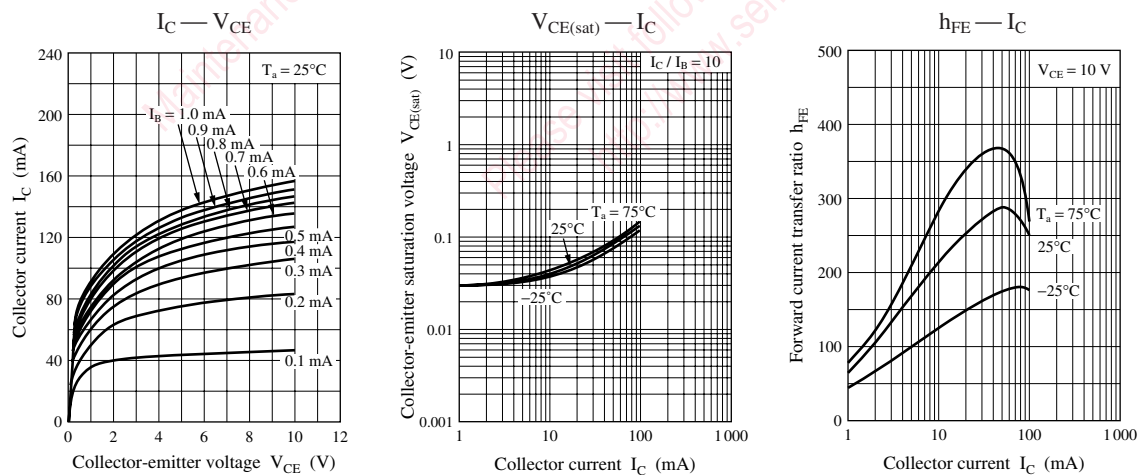
Characteristics charts of UNR221F

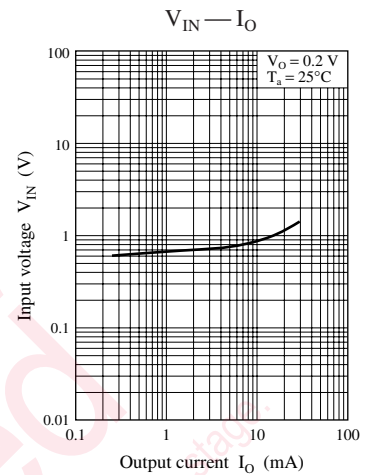
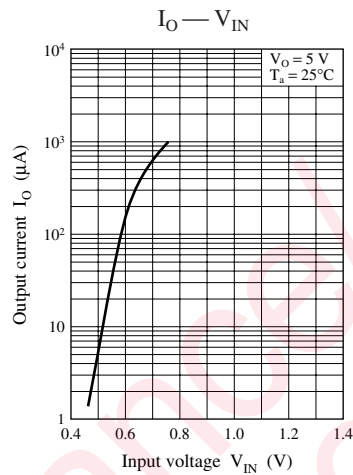
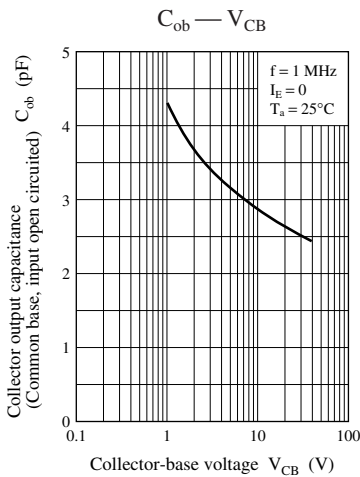




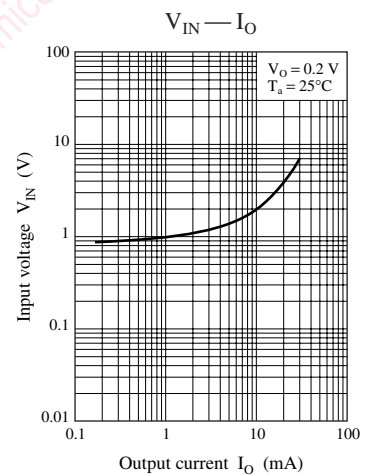
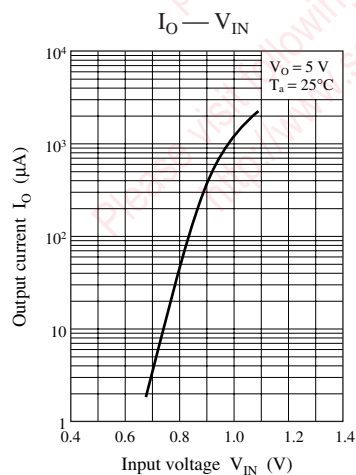
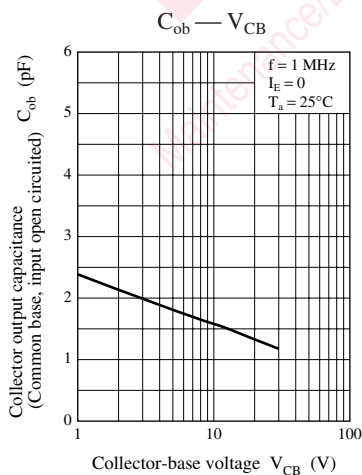
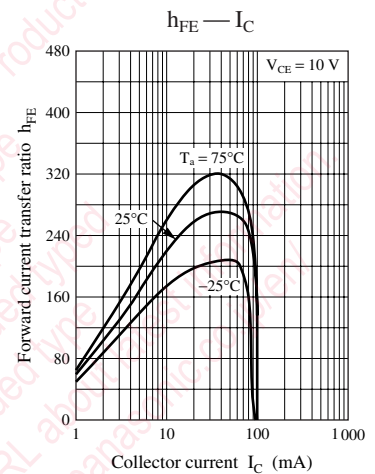
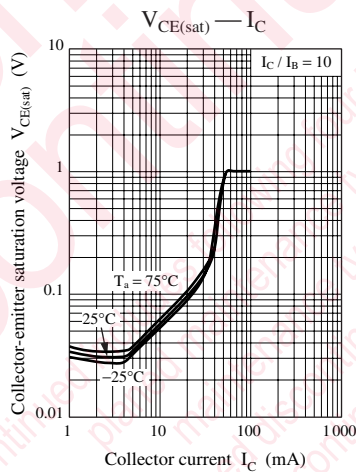
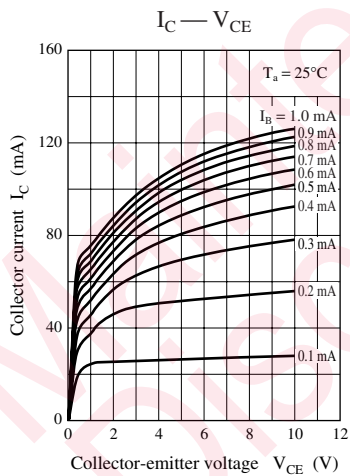
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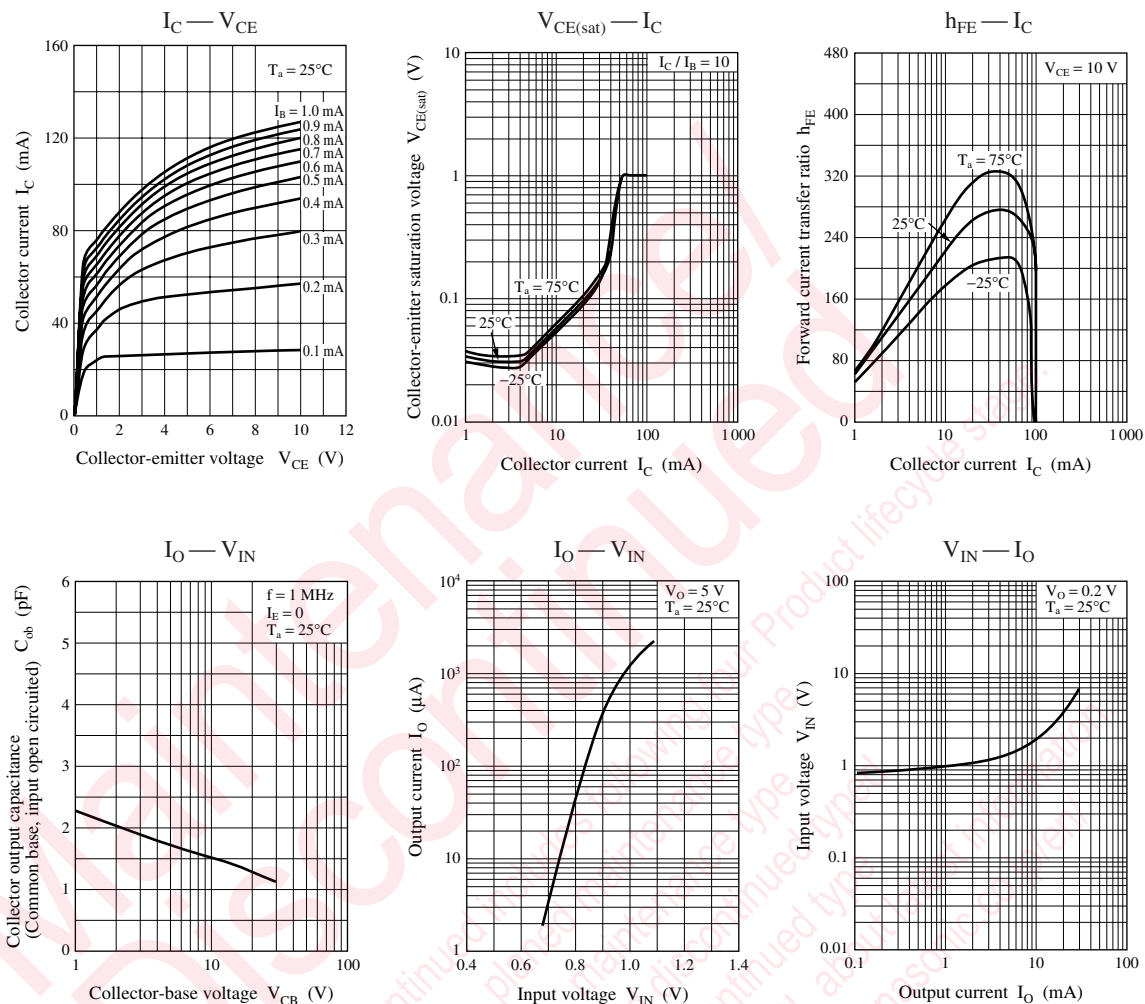
Characteristics charts of UNR221L**Characteristics charts of UNR221M**



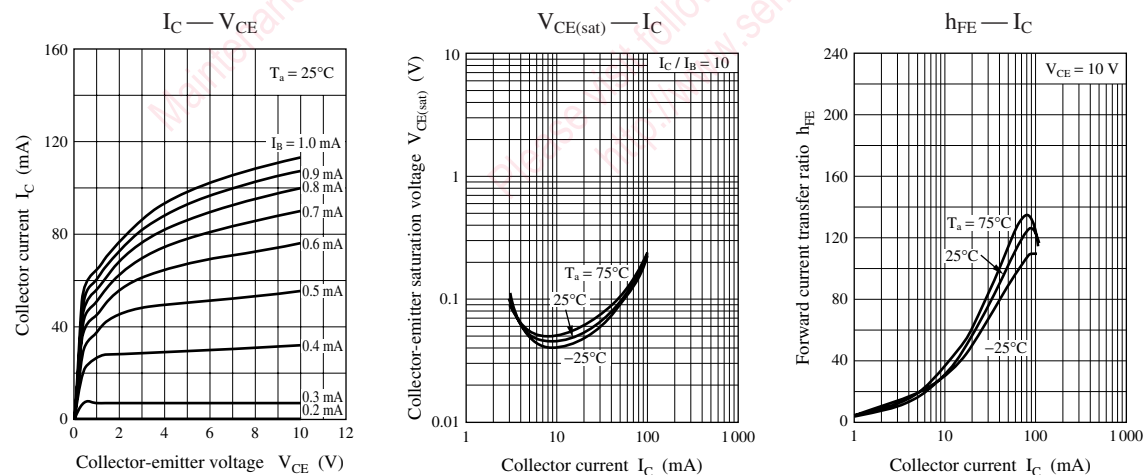
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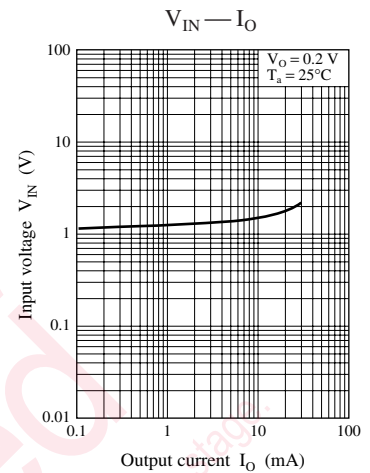
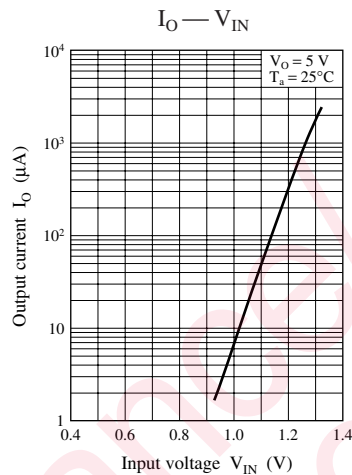
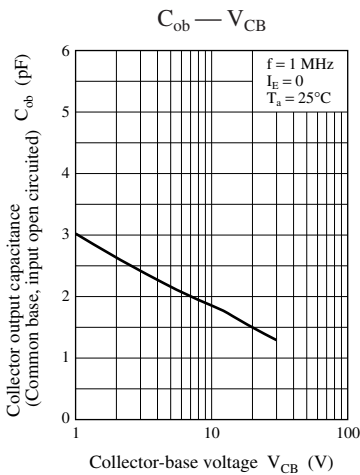


Characteristics charts of UNR221T

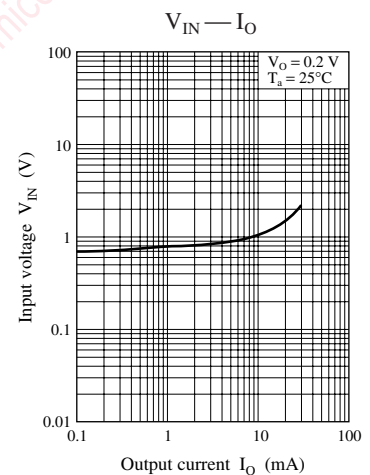
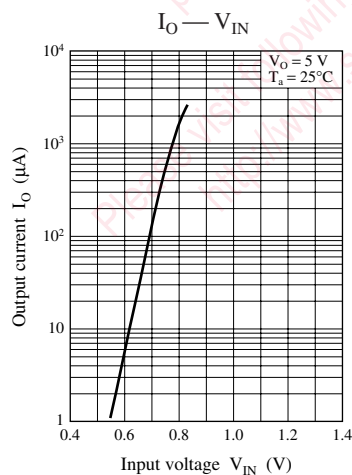
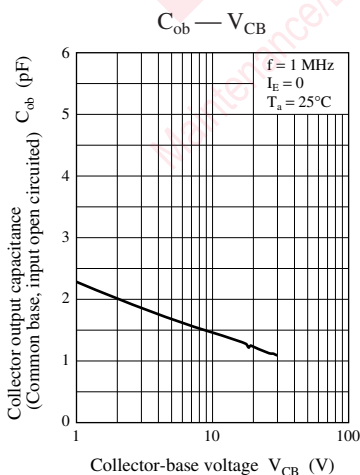
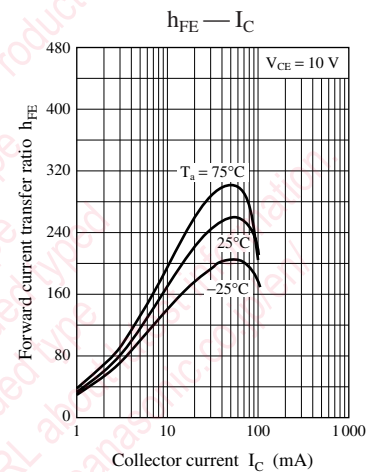
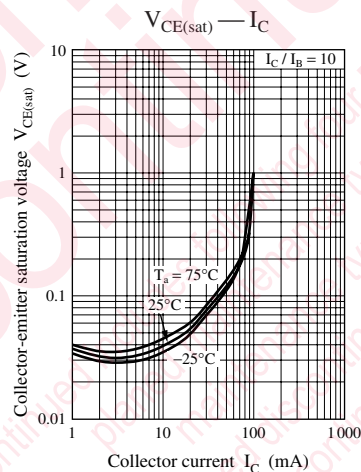
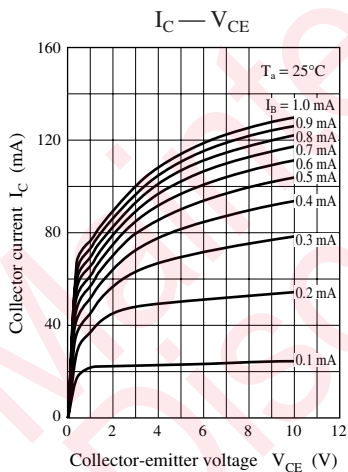


Characteristics charts of UNR221V





Characteristics charts of UNR221Z



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