



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



UNR221x Series (UN221x Series)

Silicon NPN epitaxial planar type

For digital circuits

■ Features

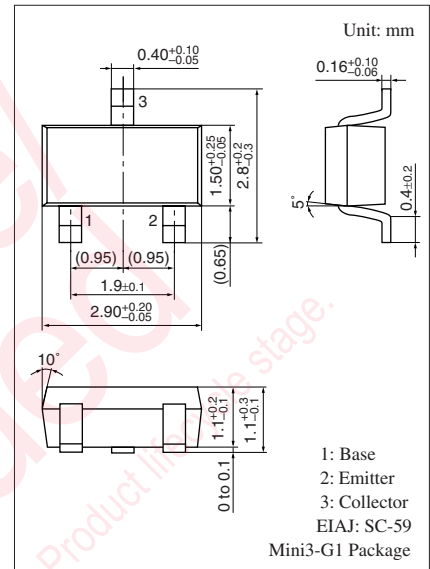
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- Mini type package allowing easy automatic insertion through tape packing and magazine packing

■ Resistance by Part Number

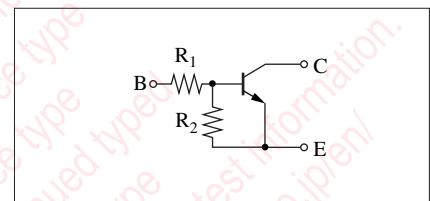
	Marking Symbol (R ₁)	(R ₂)
• UNR2210 (UN2210)	8L	47 kΩ —
• UNR2211 (UN2211)	8A	10 kΩ 10 kΩ
• UNR2212 (UN2212)	8B	22 kΩ 22 kΩ
• UNR2213 (UN2213)	8C	47 kΩ 47 kΩ
• UNR2214 (UN2214)	8D	10 kΩ 47 kΩ
• UNR2215 (UN2215)	8E	10 kΩ —
• UNR2216 (UN2216)	8F	4.7 kΩ —
• UNR2217 (UN2217)	8H	22 kΩ —
• UNR2218 (UN2218)	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}	$I_C = 10 \mu\text{A}, I_E = 0$	50			V	
Collector-emitter voltage (Base open)		V_{CEO}	$I_C = 2 \text{ mA}, I_B = 0$	50			V	
Collector-base cutoff current (Emitter open)		I_{CBO}	$V_{CB} = 50 \text{ V}, I_E = 0$			0.1	μA	
Collector-emitter cutoff current (Base open)		I_{CEO}	$V_{CE} = 50 \text{ V}, I_B = 0$			0.5	μA	
Emitter-base cutoff current (Collector open)	UNR2210/2215/2216/2217	I_{EBO}	$V_{EB} = -6 \text{ V}, I_C = 0$			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}	$V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$	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		$V_{CE(sat)}$	$I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA}$			0.25	V	
	UNR221V			$I_C = 10 \text{ mA}, I_B = 1.5 \text{ mA}$				
Output voltage high-level		V_{OH}	$V_{CC} = 5 \text{ V}, V_B = 0.5 \text{ V}, R_L = 1 \text{ k}\Omega$	4.9			V	
Output voltage low-level		V_{OL}	$V_{CC} = 5 \text{ V}, V_B = 2.5 \text{ V}, R_L = 1 \text{ k}\Omega$			0.2	V	
				UNR2213/221K	$V_{CC} = 5 \text{ V}, V_B = 3.5 \text{ V}, R_L = 1 \text{ k}\Omega$			
				UNR221D	$V_{CC} = 5 \text{ V}, V_B = 10 \text{ V}, R_L = 1 \text{ k}\Omega$			
				UNR221E	$V_{CC} = 5 \text{ V}, V_B = 6 \text{ V}, R_L = 1 \text{ k}\Omega$			
Transition frequency		f_T	$V_{CB} = 10 \text{ V}, I_E = -2 \text{ mA}, f = 200 \text{ MHz}$		150		MHz	
Input resistance	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

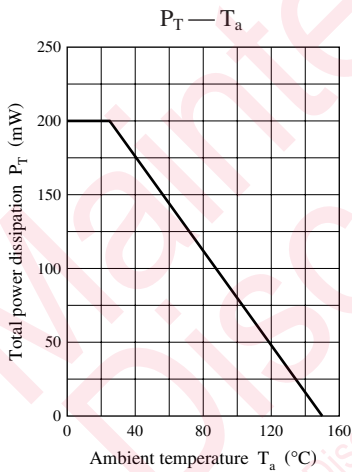
Rank	Q	R	S	No-rank
h_{FE}	160 to 260	210 to 340	290 to 460	160 to 460

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

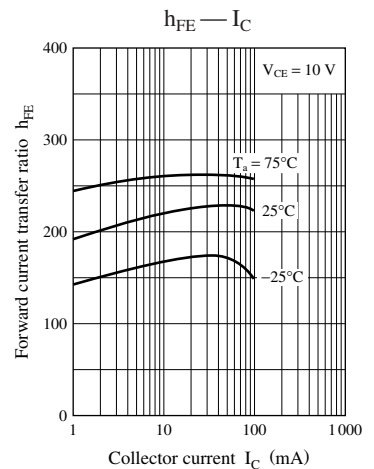
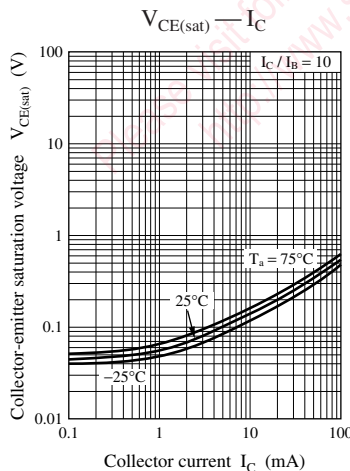
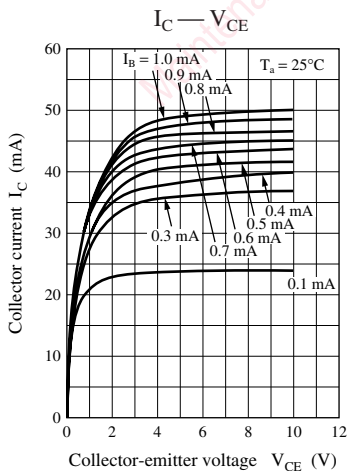
Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Resistance ratio	UNR221M	R_1/R_2			0.047		—
	UNR221N				0.1		
	UNR2218/2219			0.08	0.10	0.12	
	UNR221Z				0.21		
	UNR2214			0.17	0.21	0.25	
	UNR221T				0.47		
	UNR221F			0.37	0.47	0.57	
	UNR221V				1.0		
	UNR2211/2212/2213/221L			0.8	1.0	1.2	
	UNR221K			1.70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

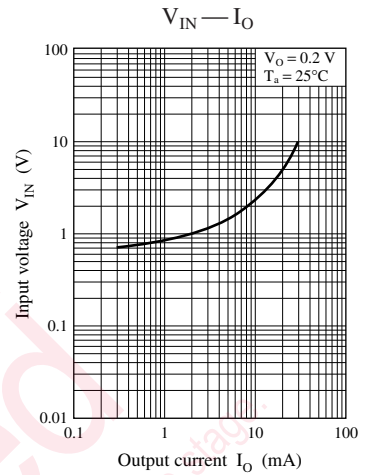
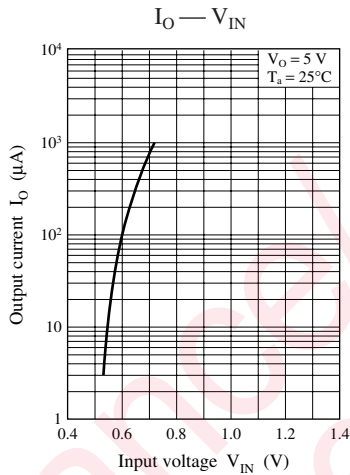
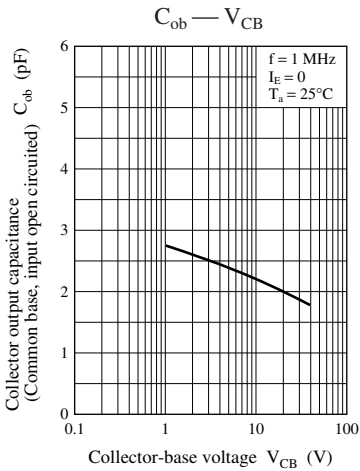
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Common characteristics chart

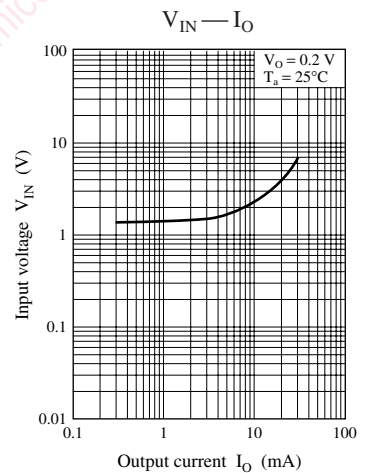
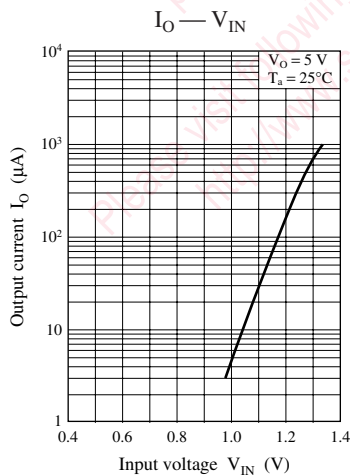
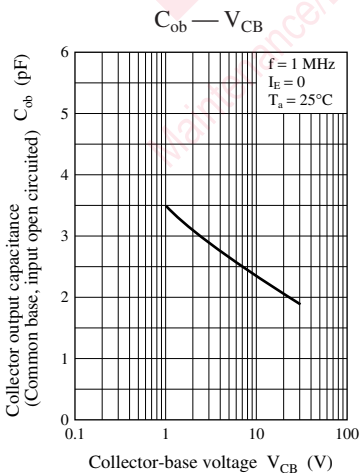
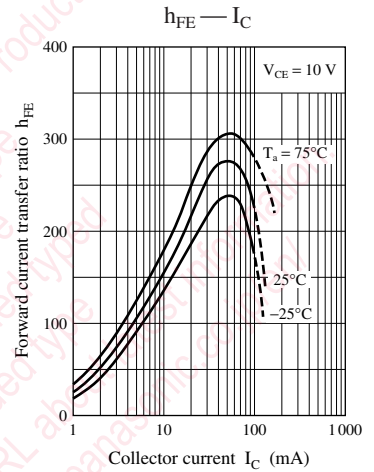
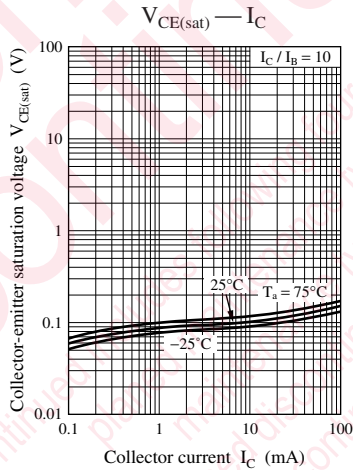
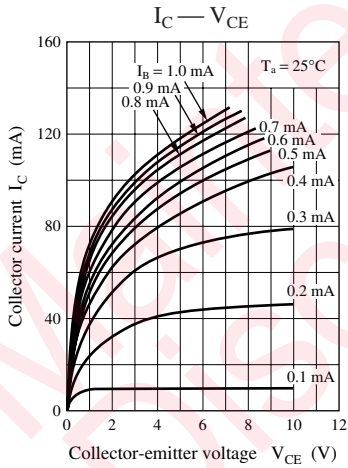


Characteristics charts of UNR2210

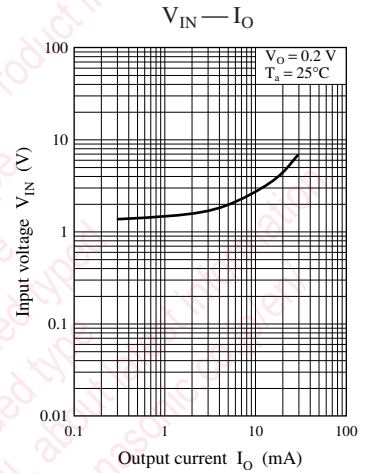
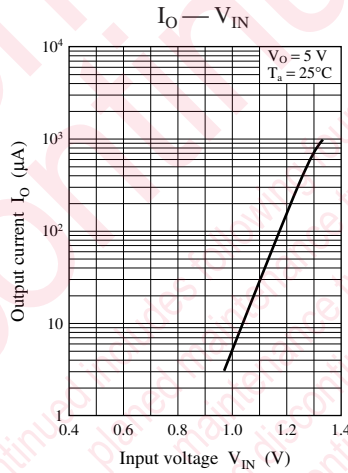
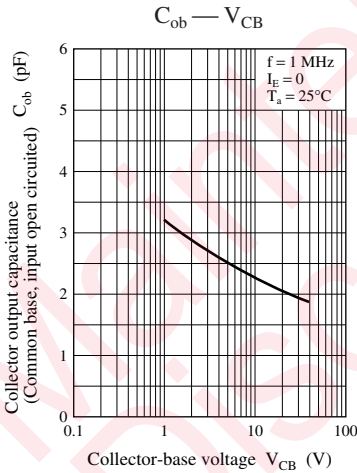
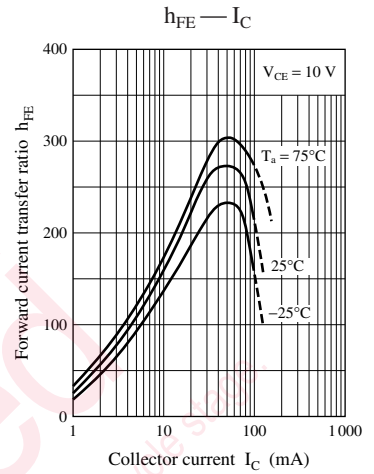
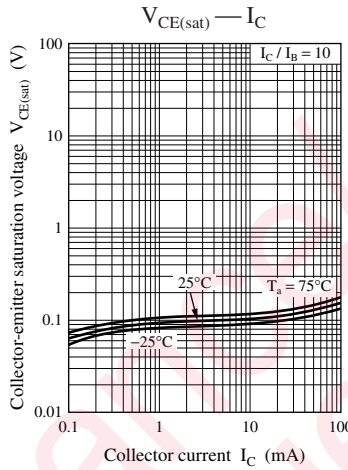
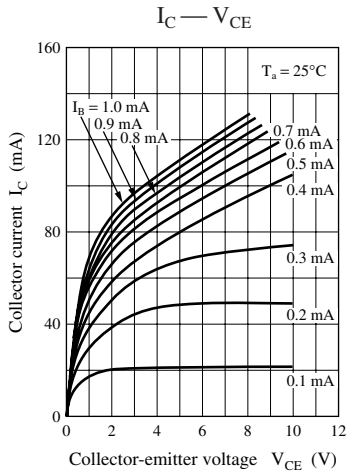




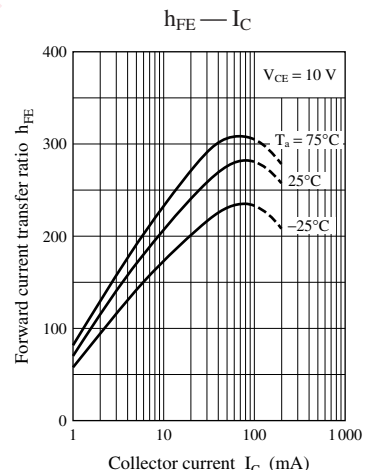
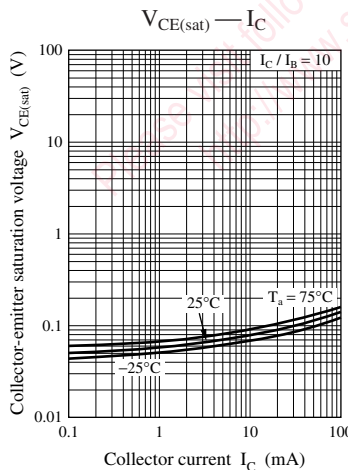
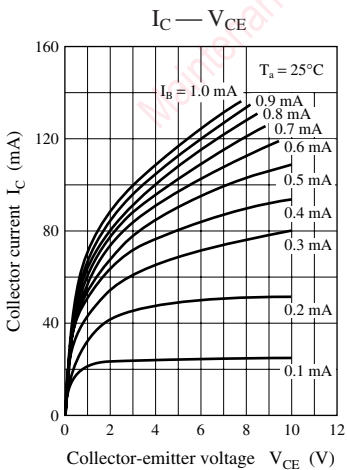
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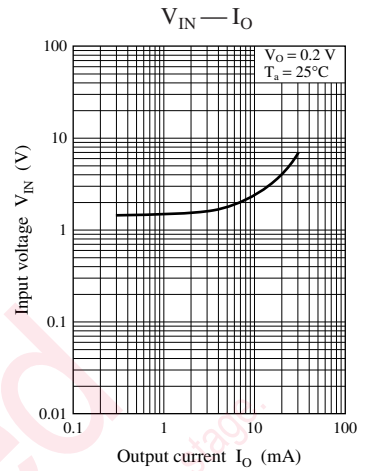
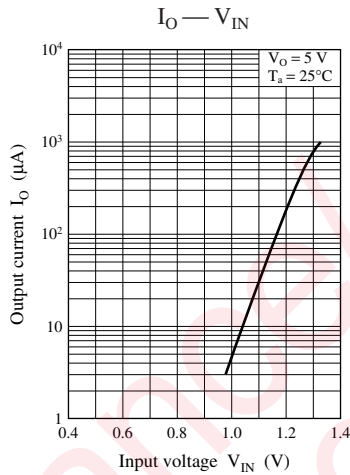
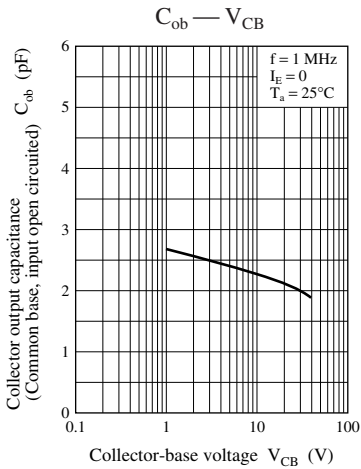


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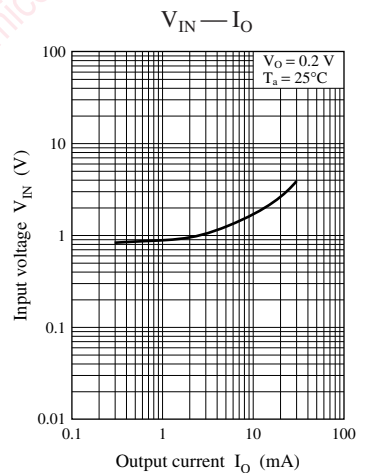
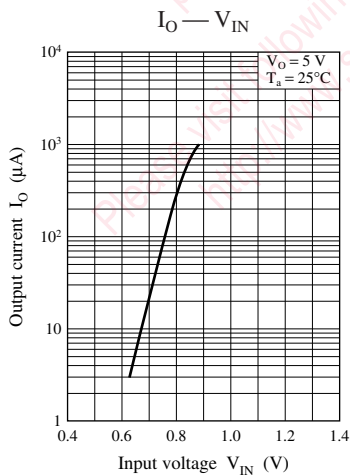
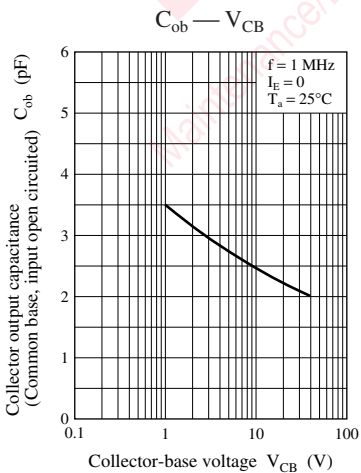
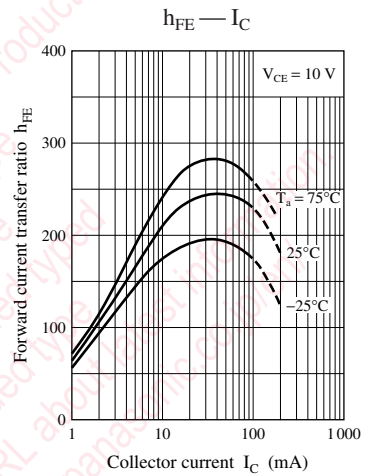
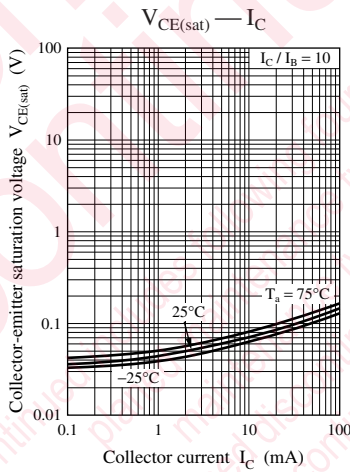
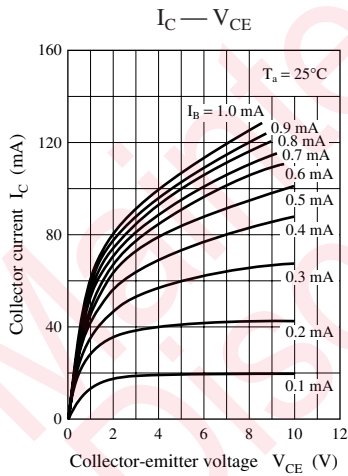


Characteristics charts of UNR2213

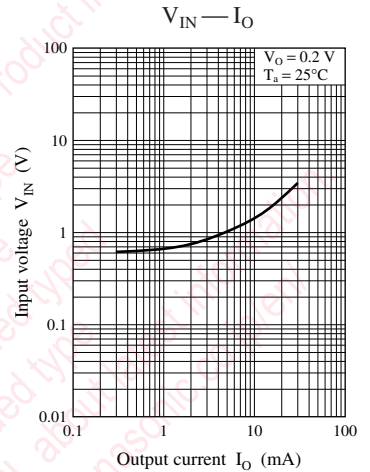
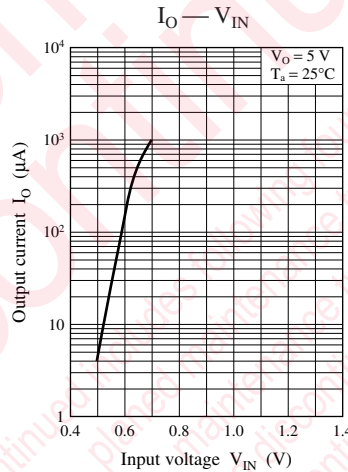
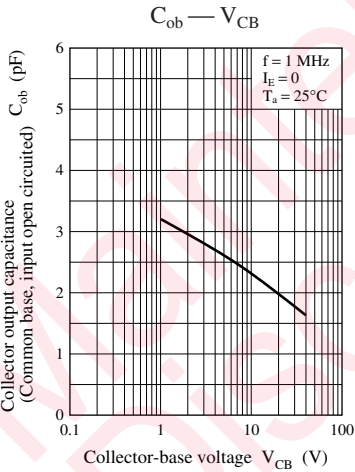
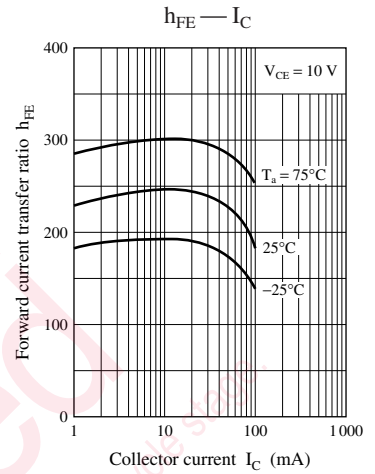
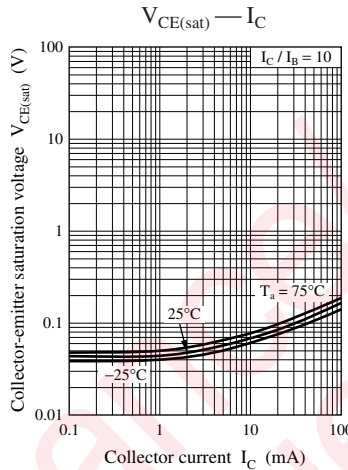
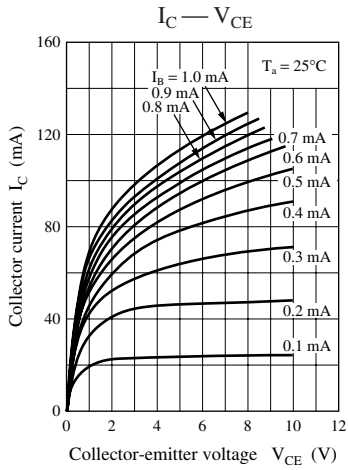




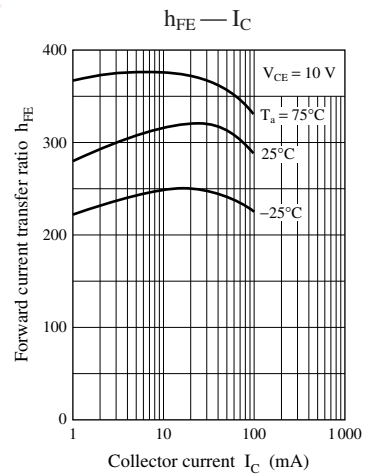
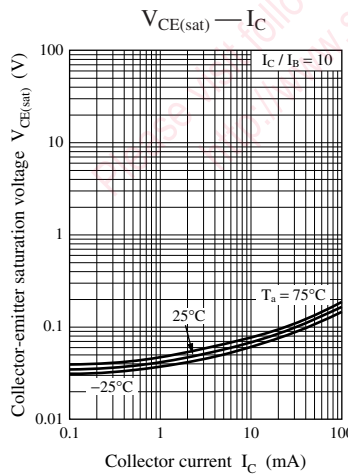
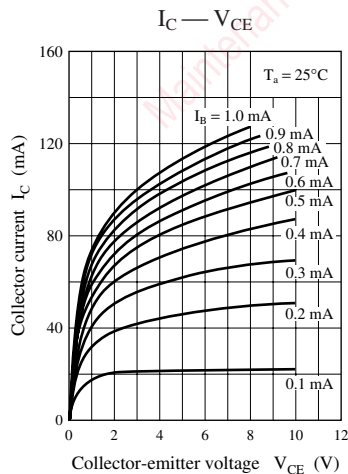
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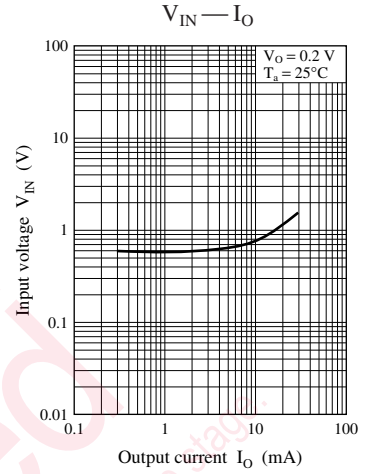
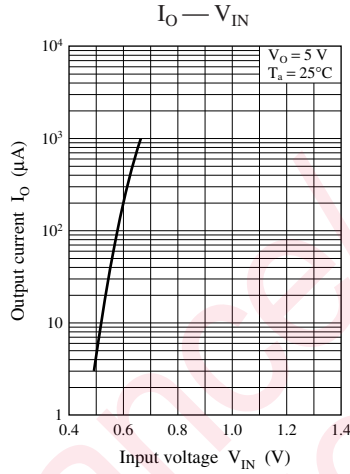
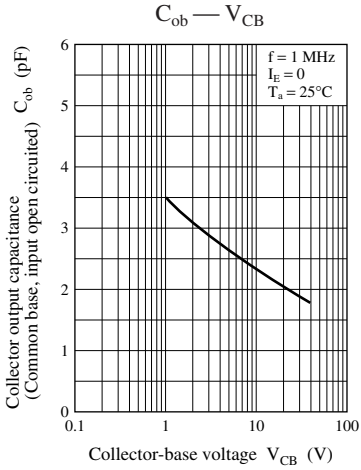


Characteristics charts of UNR2215

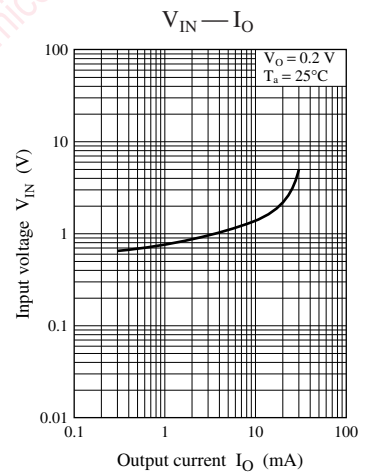
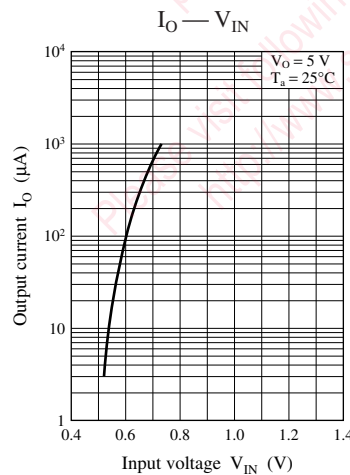
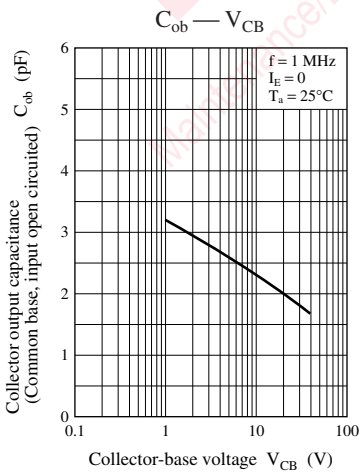
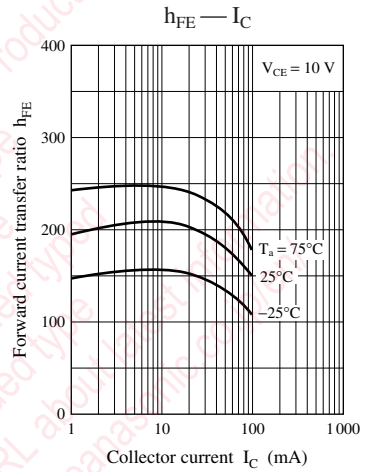
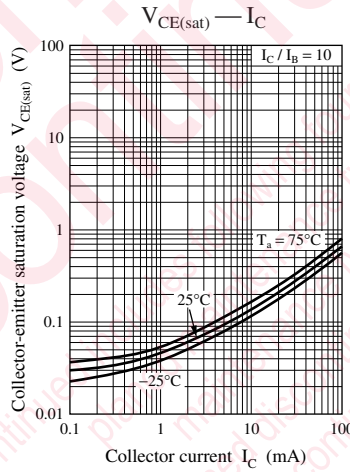
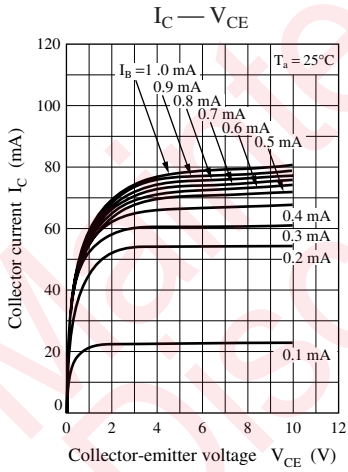


Characteristics charts of UNR2216

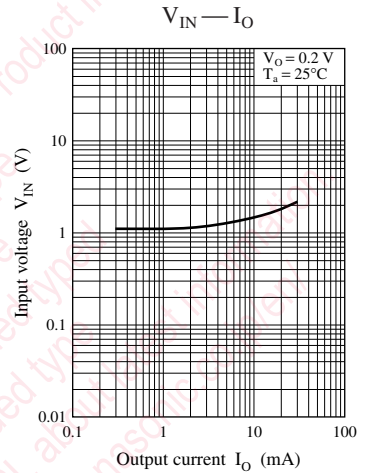
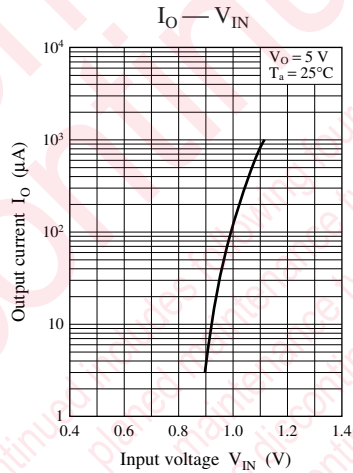
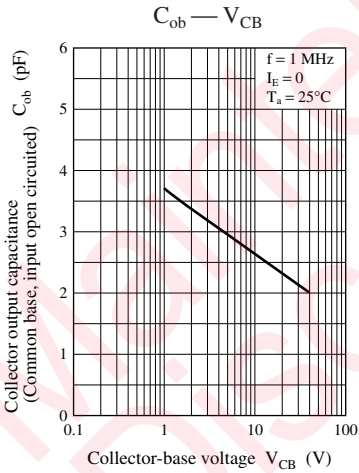
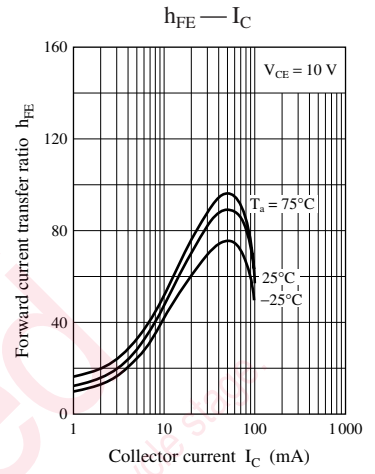
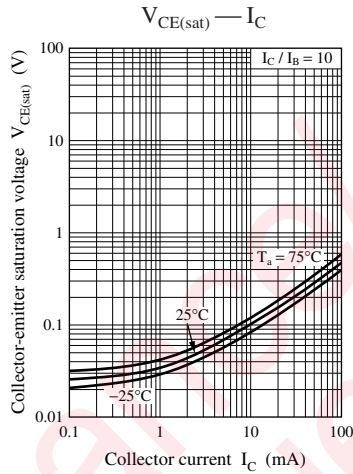
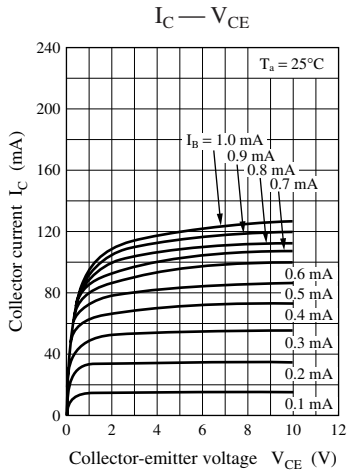




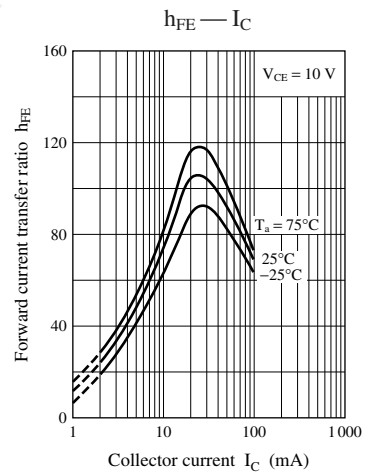
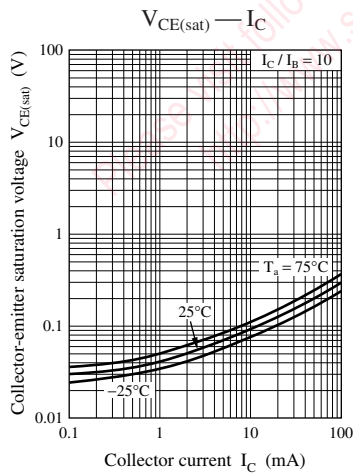
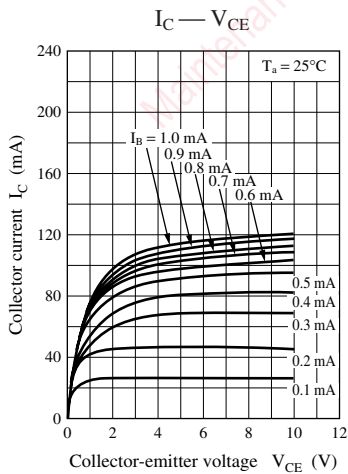
Characteristics charts of UNR2217

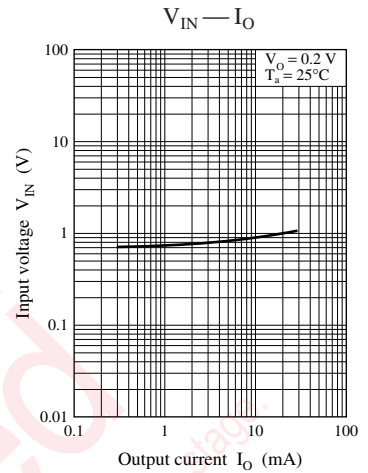
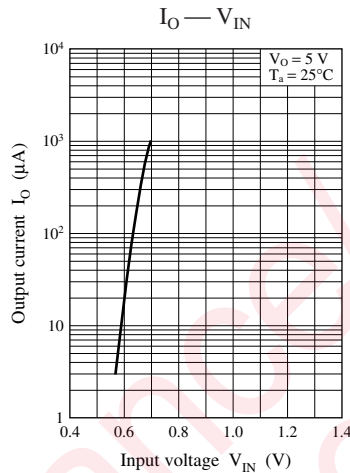
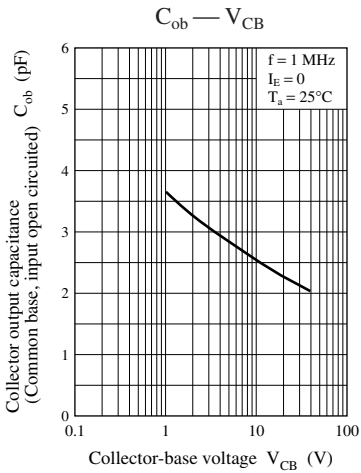


Characteristics charts of UNR2218

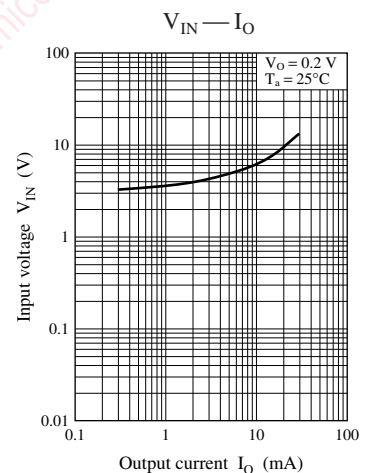
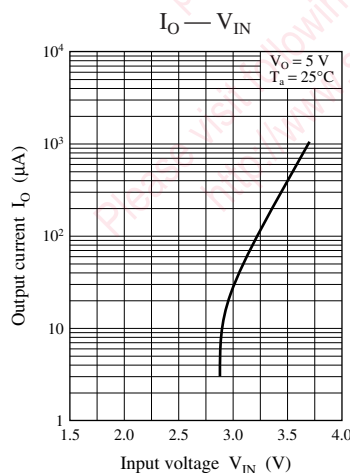
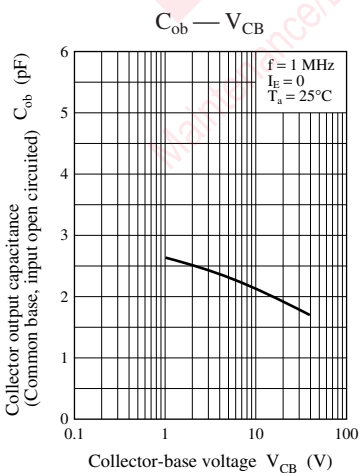
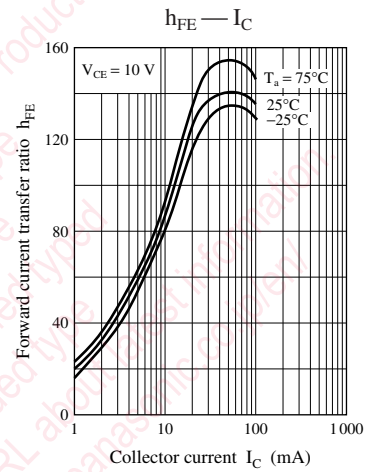
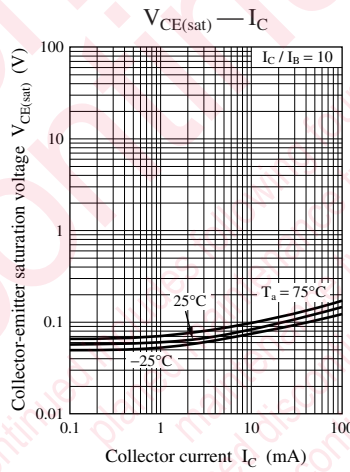
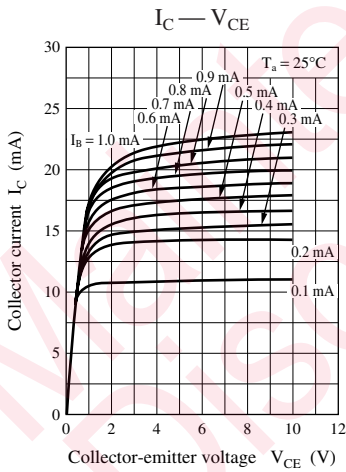


Characteristics charts of UNR2219

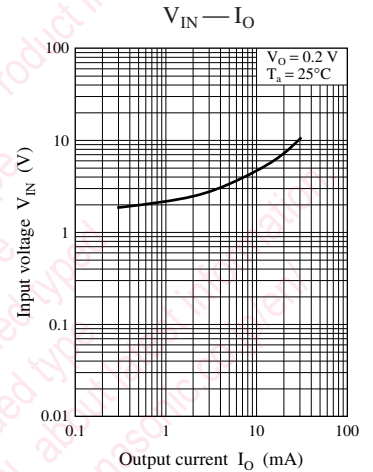
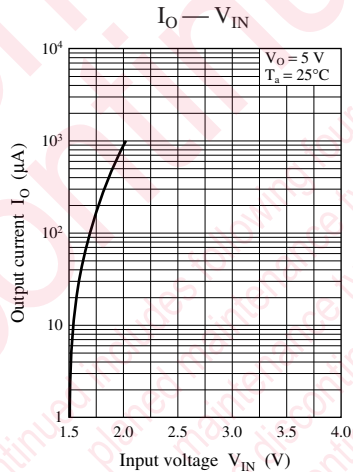
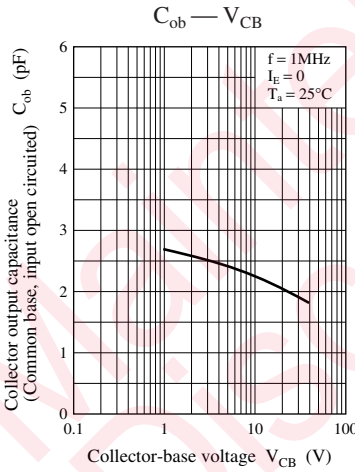
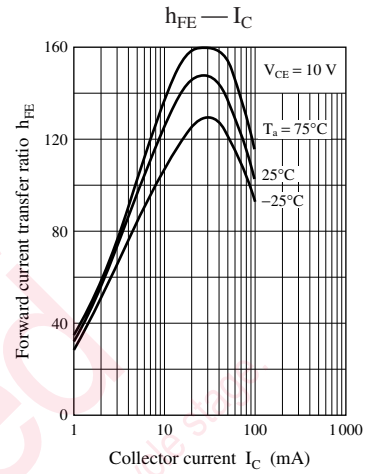
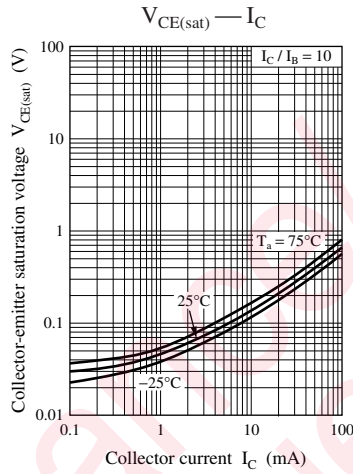
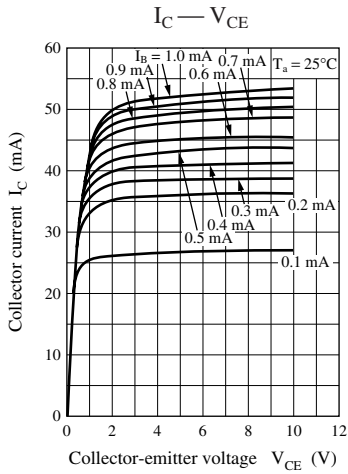




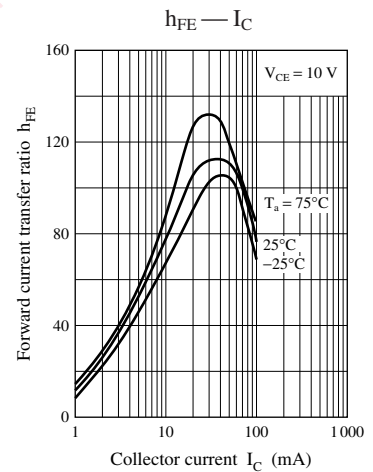
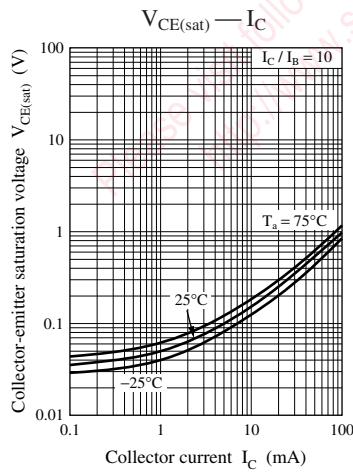
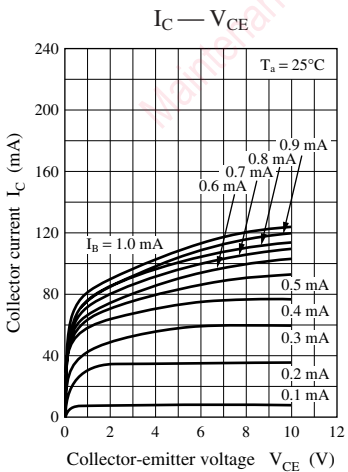
Characteristics charts of UNR221D

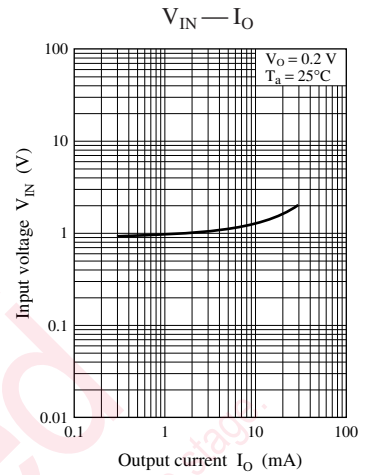
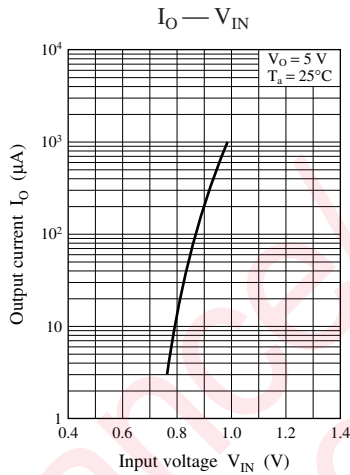
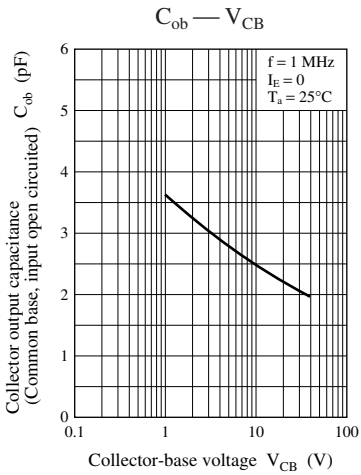


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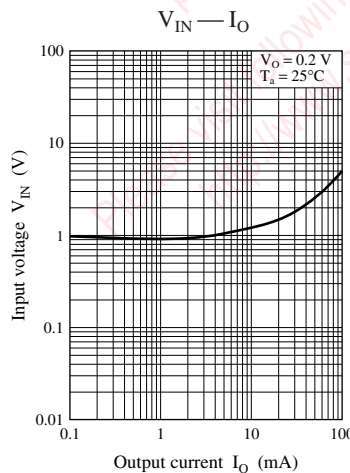
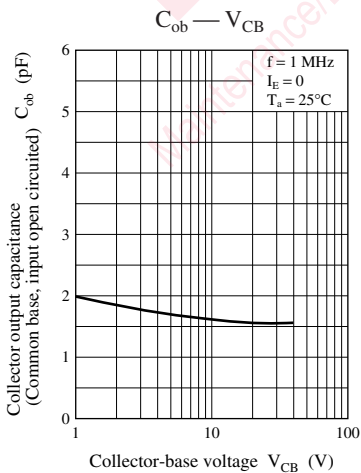
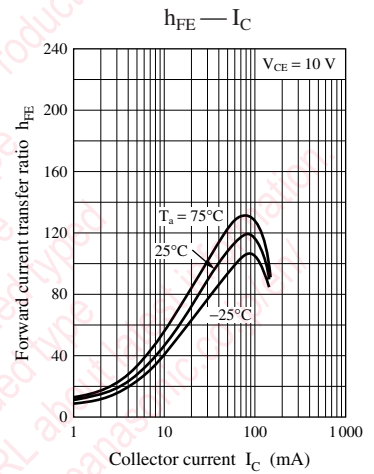
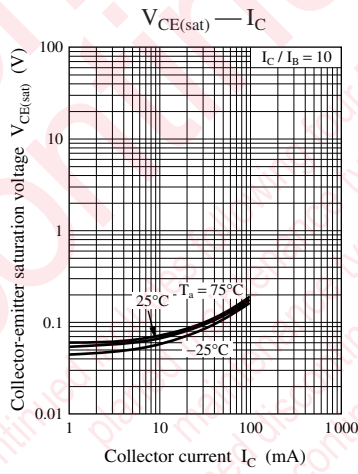
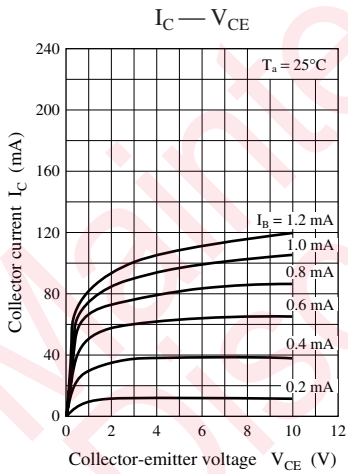


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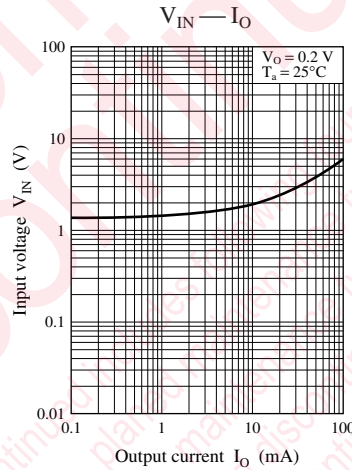
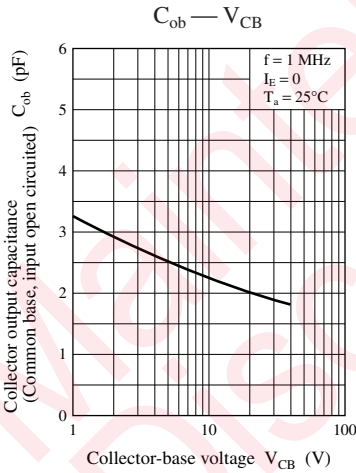
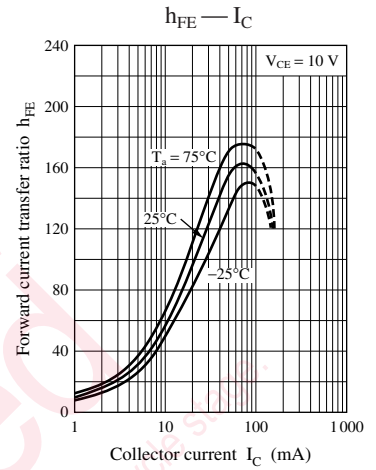
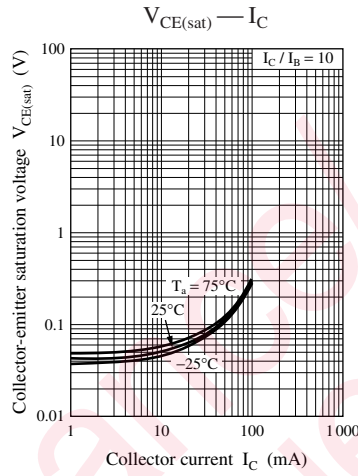
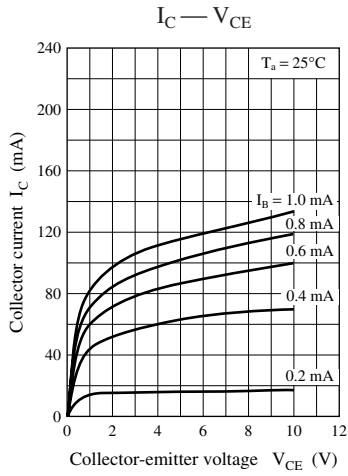




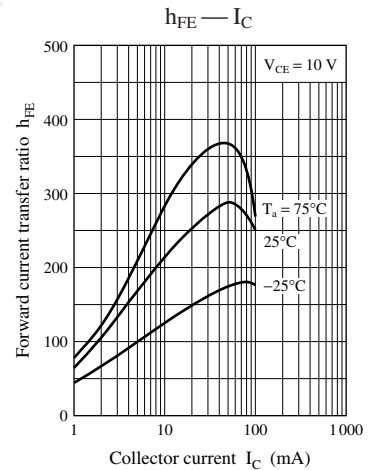
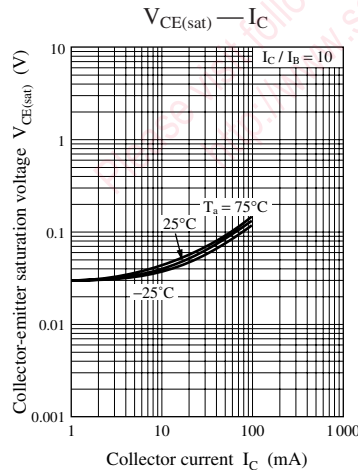
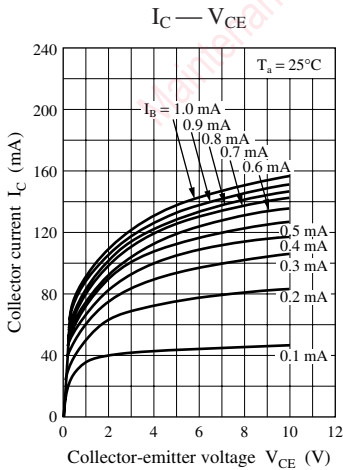
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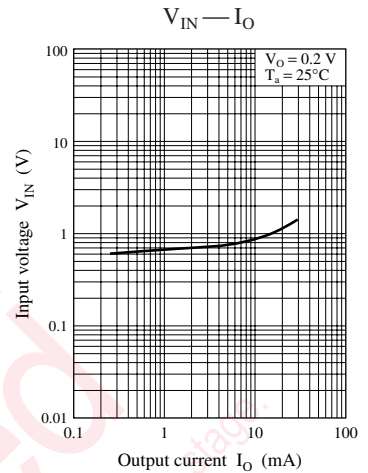
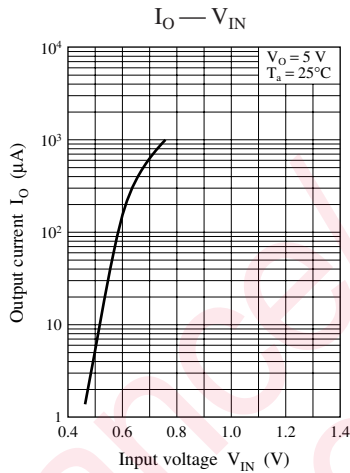
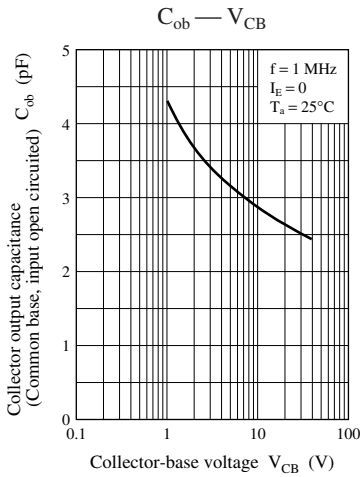


Characteristics charts of UNR221L

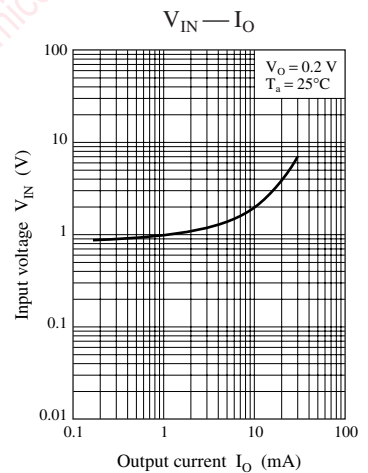
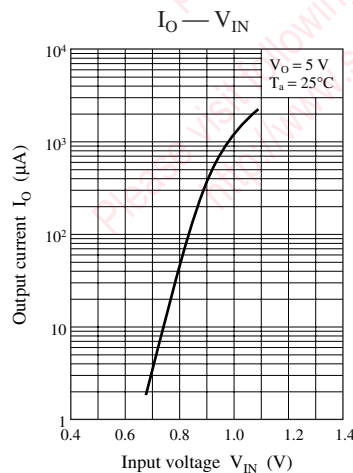
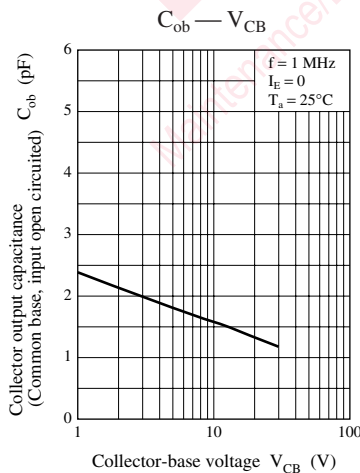
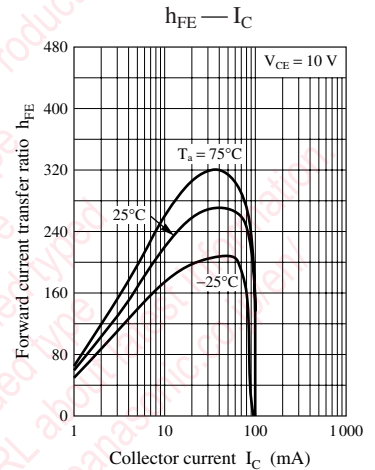
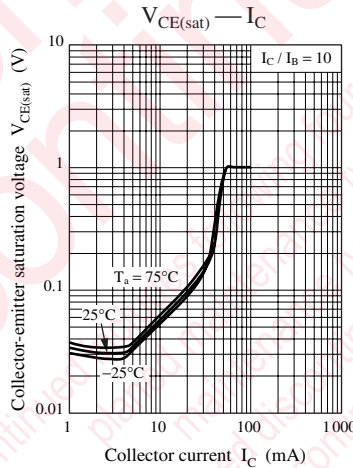
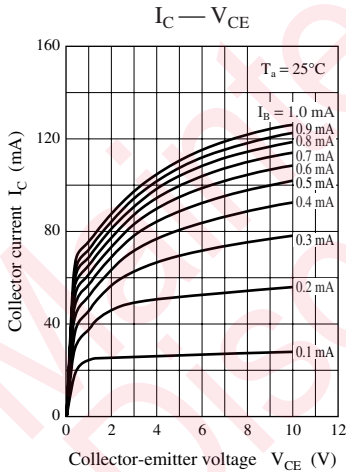


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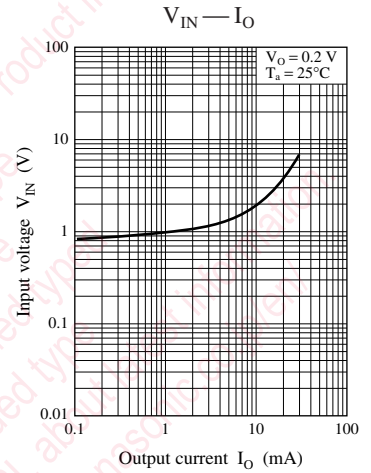
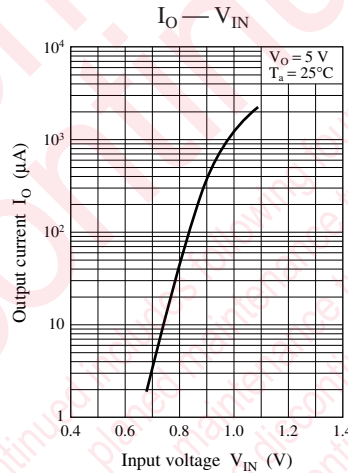
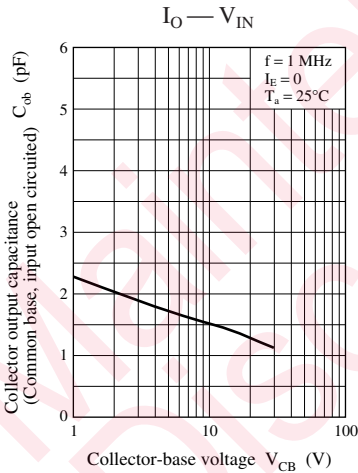
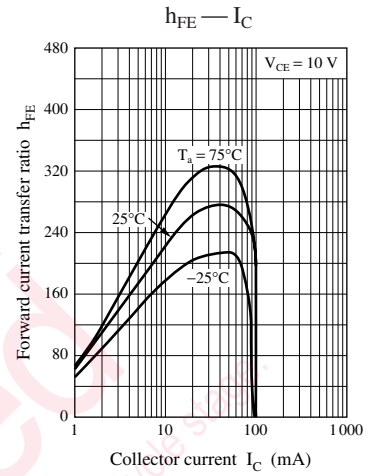
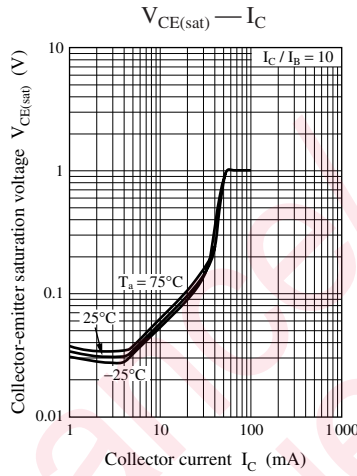
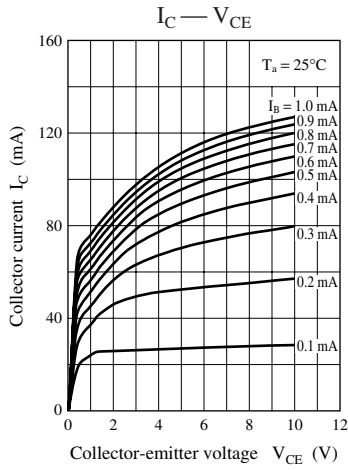




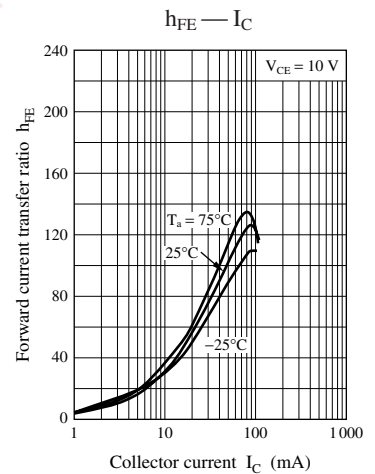
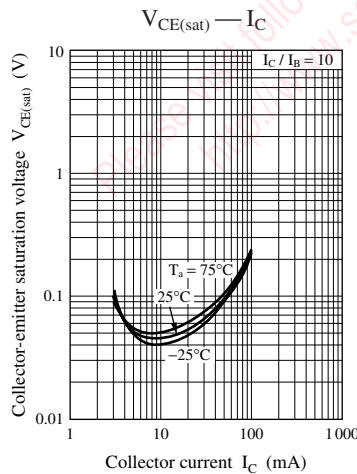
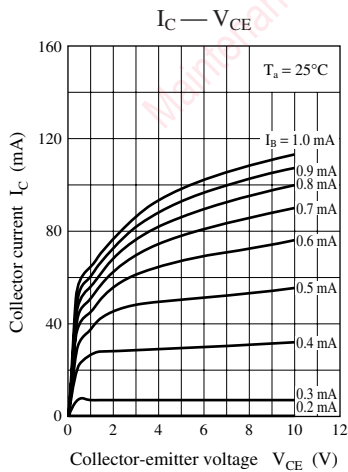
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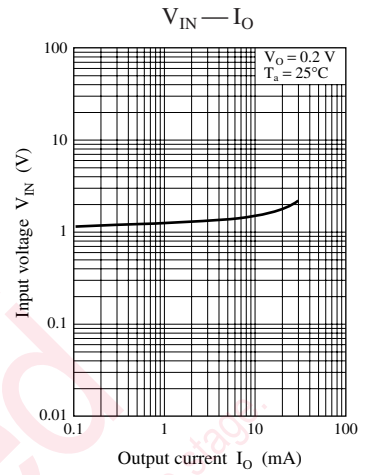
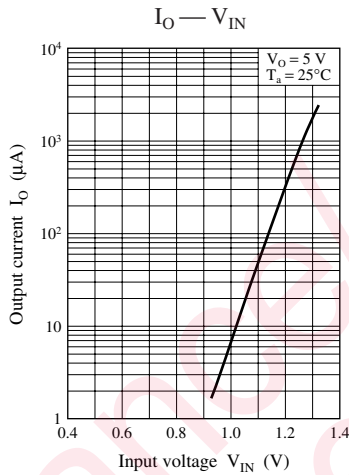
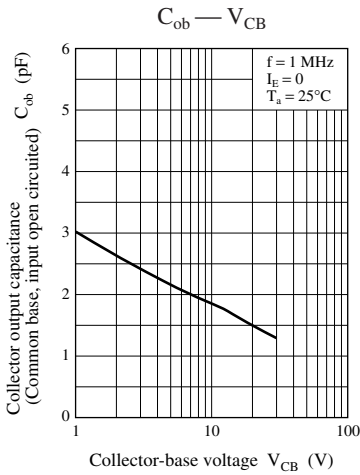


Characteristics charts of UNR221T

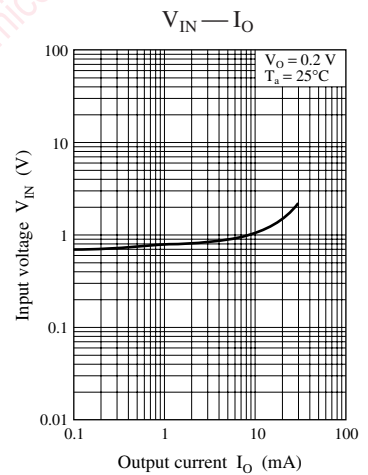
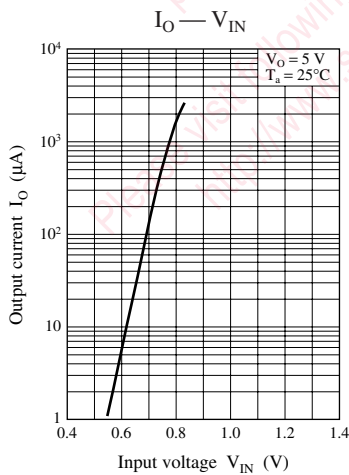
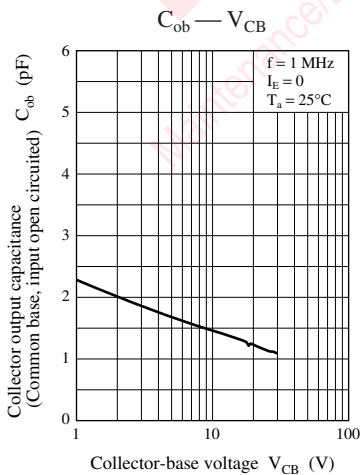
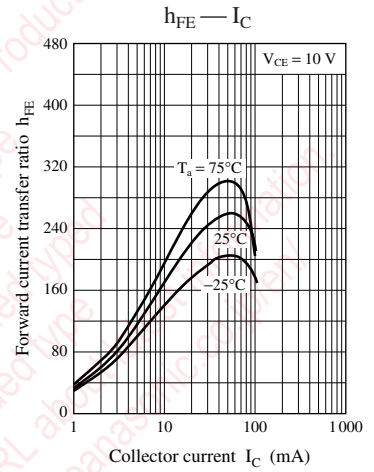
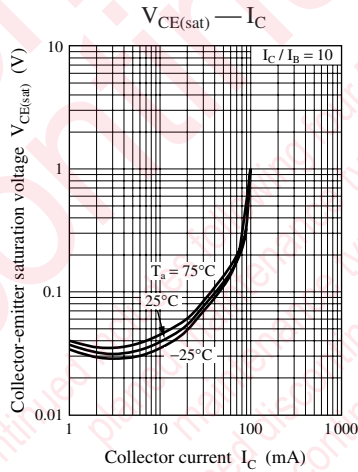
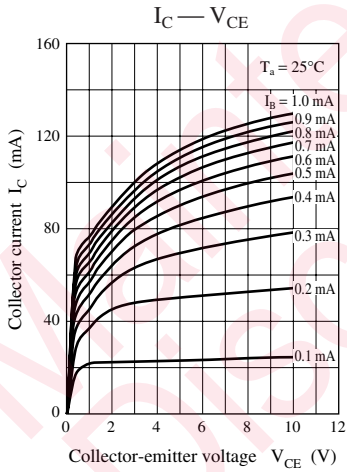


Characteristics charts of UNR221V





Characteristics charts of UNR221Z



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