# UNR3210/3213/3216/321L/321N

## Silicon NPN epitaxial planar transistor

### For digital circuits

#### ■ Features

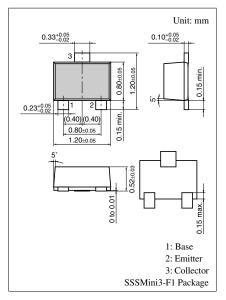
- Optimum for downsizing of the equipment and high-density mounting
- Contribute for low power consumption

### ■ Resistance by Part Number

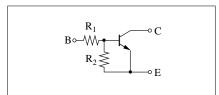
		Marking symbol	$(\mathbf{R}_1)$	$(R_2)$
•	UNR3210	8L	$47~\mathrm{k}\Omega$	_
•	UNR3213	8C	$47~\mathrm{k}\Omega$	$47~\mathrm{k}\Omega$
•	UNR3216	8F	$4.7~\mathrm{k}\Omega$	_
•	UNR321L	8Q	$4.7~\mathrm{k}\Omega$	$4.7~\mathrm{k}\Omega$
•	UNR321N	EX	$4.7~\mathrm{k}\Omega$	$47~\mathrm{k}\Omega$

## ■ Absolute Maximum Ratings $T_a = 25$ °C

Parameter	Symbol	Symbol Rating	
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	$P_{T}$	100	mW
Junction temperature	T <sub>j</sub>	125	°C
Storage temperature	$T_{stg}$	-55 to +125	°C



#### Internal Connection



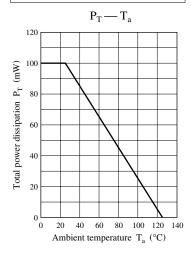
## ■ Electrical Characteristics $T_a = 25$ °C $\pm 3$ °C

Parameter		Symbol	Conditions	Min	Тур	Max	Unit
Collector cutoff current		$I_{CBO}$	$V_{CB} = 50 \text{ V}, I_{E} = 0$			0.1	μΑ
		$I_{CEO}$	$V_{CE} = 50 \text{ V}, I_{B} = 0$			0.5	
Emitter cutoff	UNR3210/3216	$I_{EBO}$	$V_{EB} = 6 \text{ V}, I_{C} = 0$			0.01	mA
current	UNR3213					0.1	
	UNR321N					0.2	
	UNR321L					2.0	
Collector to base voltage		$V_{CBO}$	$I_C = 10 \mu\text{A},  I_E = 0$	50			V
Collector to emitter voltage		$V_{CEO}$	$I_C = 2 \text{ mA}, I_B = 0$	50			V
Forward current	UNR321L	$h_{FE}$	$V_{CE} = 10 \text{ V}, I_{C} = 5 \text{ mA}$	20			
transfer ratio	UNR3213			80			
	UNR321N			80		400	
	UNR3210/3216			160		460	
Collector to emitter saturation voltage		V <sub>CE(sat)</sub>	$I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA}$			0.25	V

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

F	arameter	Symbol	Conditions	Min	Тур	Max	Unit
High-level output voltage		$V_{OH}$	$V_{CC} = 5 \text{ V}, V_B = 0.5 \text{ V}, R_L = 1 \text{ k}\Omega$	4.9			V
Low-level output voltage		$V_{OL}$	$V_{CC} = 5 \text{ V}, V_B = 2.5 \text{ V}, R_L = 1 \text{ k}\Omega$			0.2	V
	UNR3213		$V_{CC} = 5 \text{ V}, V_B = 3.5 \text{ V}, R_L = 1 \text{ k}\Omega$				
Transition frequency		$f_T$	$V_{CB} = 10 \text{ V}, I_E = -2 \text{ mA}, f = 200 \text{ MHz}$		150		MHz
Input	UNR3216/321L/321N	$R_1$		-30%	4.7	+30%	kΩ
resistance	UNR3210/3213				47		
Resistance ratio		$R_1/R_2$		0.8	1.0	1.2	
	UNR321N				0.1		

## Common characteristics chart



2 SJH00048AED

# Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this book and controlled under the "Foreign Exchange and Foreign Trade Law" is to be ex-ported or taken out of Japan.
- (2) The technical information described in this book is limited to showing representative characteristics and applied circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.
- (3) We are not liable for the infringement of rights owned by a third party arising out of the use of the product or technologies as described in this book.
- (4) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
  - Consult our sales staff in advance for information on the following applications:
  - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
  - Any applications other than the standard applications intended.
- (5) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (6) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage, and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
  Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (7) When using products for which damp-proof packing is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.
- (8) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.