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***Homomorphic images of  $\mathbb{R}$ -factorizable groups***

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**Abstract:** It is well known that every  $\mathbb{R}$ -factorizable group is  $\omega$ -narrow, but not vice versa. One of the main problems regarding  $\mathbb{R}$ -factorizable groups is whether this class of groups is closed under taking continuous homomorphic images or, alternatively, whether every  $\omega$ -narrow group is a continuous homomorphic image of an  $\mathbb{R}$ -factorizable group. Here we show that the second hypothesis is definitely false. This result follows from the theorem stating that if a continuous homomorphic image of an  $\mathbb{R}$ -factorizable group is a  $P$ -group, then the image is also  $\mathbb{R}$ -factorizable.

**Keywords:**  $\mathbb{R}$ -factorizable, totally bounded,  $\omega$ -narrow, complete, Lindelöf,  $P$ -space, realcompact, Dieudonné-complete, pseudo- $\omega_1$ -compact

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