

B6;129S6-Igs7 *tm3(tetO-Optopatch3,CAG-tTA)Acoh* /J

Stock No: **029679** | Optopatch3 Ai155

 Targeted Mutation

Typically mice are recovered in 10-14 weeks. Contact Customer Service to place an order or for more information.

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optical perturbation and optical measurement of membrane voltage. Conditional expression is dependent on cre-mediated excision of a floxed Stop cassette.

Donating Investigator

Adam E. Cohen, Harvard University

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GENETIC OVERVIEW

Genetic Background

Generation

Igs7^{*tm3(tetO-Optopatch3,CAG-tTA)Acoh*}

Allele Type

Gene Symbol

Gene Name

Targeted (Conditional ready (e.g. floxed), Reporter, Inducible)

Igs7

intergenic site 7

VIEW GENETICS

RESEARCH APPLICATIONS

Neurobiology Research

Research Tools

VIEW ALL RESEARCH APPLICATIONS

BASE PRICE

Starting at:

\$2,854.50 Domestic price Cryo Recovery

V I E W P R I C E L I S T

Details

Detailed Description

Ai155 is a cre recombinase-dependent mouse line that conditionally expresses Optopatch3, an improved optogenetic construct which enables simultaneous perturbation and optical readout of membrane potential. The animals express a blue-shifted channelrhodopsin actuator (CheRiff) and a near infrared Archaelhodopsin-derived voltage indicator (QuasAr3-mCitrine) via a targeted tetracycline responsive element (TRE; tetO), floxed Stop, and tetracycline-controlled transactivator (tTA) knock-in of the *Igs7* (intergenic site 7; also called TIGRE) locus. Cre recombinase expression is required to achieve Optopatch3 expression. Constitutive expression of tTA removes the requirement for intersectional expression of tTA.

Optopatch3 mice represent an improved version of Optopatch2 (as found in Stock Nos. [029677](#) and [029678](#)) by virtue of an additional QuasAr point mutation and modifications to the trafficking sequences. QuasAr3's bright mCitrine replaces QuasAr2's dark mOrange fusion protein. The EGFP fusion to CheRiff found in Optopatch2 has been removed in Optopatch3. The mCitrine component indicates the location and expression of QuasAr3.

The CheRiff optogenetic actuator is optimally excited by light with a wavelength between 450–490 nm, reaching 50% of maximum photocurrent at an illumination intensity of 25 mW/cm² (488 nm). CheRiff has an opening time of 4.5 ms, twofold faster than that of ChR2 H134R and fourfold faster than that of ChIEF. CheRiff has a closing time of 16 ms, similar to that of ChIEF and 1.5-fold faster than ChR2 H134R. Details of the engineering and characterization of the CheRiff are in: Hochbaum, Daniel R., et al. "All-optical electrophysiology in mammalian neurons using engineered microbial rhodopsins." *Nature Methods* 11.8 (2014): 825-833 ([PMID 24952910](#)).

The QuasAr3 voltage indicator is optimally excited with a wavelength between 630–640 nm, and emits in a broad band from 660–760 nm. The fluorescence quantum yield of QuasAr3 is low (~1%), so excitation must be provided via a high intensity laser (>100 W/cm²) and detection must be through a high numerical aperture objective and onto a highly sensitive camera (e.g. scientific CMOS or EMCCD). To detect single action potentials requires imaging at >500 frames/s. QuasAr3 reports membrane voltage with a sensitivity of $\Delta F/F \sim 90\%/100$ mV and a response time of ~1.5 ms. Expression and membrane localization of QuasAr3 can be verified via fluorescence of the mCitrine fusion, but one must remember that blue light used to excite mCitrine fluorescence will also activate CheRiff.

Ai155 has been tested with *Camk2a*-cre, somatostatin (*Sst*)-cre, *Rbp4*-cre and *Scn10a* (Na_v1.8)-cre; all show the predicted expression patterns.

Development

Expression Data

Control Suggestions

[+ Selected References](#)

[- Genetics](#)

[+ *Igs7^{tm3\(tetO-Optopatch3, CAG-tTA\)Acoh}*](#)

[- Disease/Phenotype](#)

[+ Disease Terms](#)

[+ Research Areas By Phenotype](#)

[+ Mammalian Phenotype Terms by Genotype](#)

[+ References](#)

[- Technical Support](#)

C O N T A C T T E C H N I C A L S U P P O R T

Genotyping Protocols

Separated PCR:[Igs7](#)

[Genotyping resources and troubleshooting](#)

Breeding Considerations

Homozygotes and heterozygotes are viable and fertile.

[Additional Breeding and Husbandry Support](#)

Mating System

Homozygote x Homozygote

Citation

When using the Optopatch3 Ai155 mouse strain in a publication, please [cite the originating article\(s\)](#) and include JAX stock #029679 in your Materials and Methods section.

Animal Health Reports

Facility Barrier Level Descriptions

Production of mice from cryopreserved embryos or sperm occurs in a maximum barrier room, [G200](#)

➔ Pricing & Availability



Cryo
Recovery

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Cryo Recovery	Heterozygous or wildtype for $Igs7^{tm3(tetO-Optopatch3, CAG-tTA)Acoh}$	\$2,854.50

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Frozen Mouse Embryo	B6;129S6- $Igs7^{tm3(tetO-Optopatch3, CAG-tTA)Acoh}$ /J Frozen Emb	\$2595.00
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