



ON Semiconductor®

www.onsemi.com

Power-up and Power-down Characteristics for Digital Potentiometers (POTs)

This application note discusses what happens when power (V_{CC}) is applied or removed from a digital POT in an application circuit.

Turn-on and Power-on-Recall (POR): CAT5111–5113

Power-up means a bias supply voltage is applied to the digital POT's V_{CC} pin and it rises from 0 V to a final value. The range of operating values for V_{CC} is 2.5 V to 6 V. During power-up, an internal power on recall (POR) circuit transfers the stored wiper setting from nonvolatile memory to the wiper control register. Some of the industry's electronic potentiometers are designed such that their power on recall (POR) function will only be initiated if the slope of the applied V_{CC} voltage is linear, continuous, and falls between a certain minimum and maximum value. The POR circuit for ON Semiconductor's potentiometers (CAT5111–5113) will trip at a fixed voltage (1.2 V maximum) and is not rate/slope dependent.

For a successful turn-on operation, V_{CC} MUST start below 100 mV. When V_{CC} rises to 1.2 V, a power on reset condition (1 msec) is initiated in the digital POT during which time the contents of nonvolatile memory are transferred to the wiper control register.


APPLICATION NOTE

The digital POT is fully functional and will meet all data sheet specifications when V_{CC} is at 2.5 V AND 1 msec has elapsed after V_{CC} reached 1.2 V.

During power-up, $V_W, V_L, V_H < V_{CC}$.

Turn-off and Brown-out: CAT5111–5113

- (a) If V_{CC} drops below its nominal value (2.5 V–6 V) but stays above 1.2 V and then returns back to its nominal value, the device is fully functional and meets all specs.
- (b) If V_{CC} drops below its nominal value to a value between 0.1 V and 1.2 V, and then returns to its nominal value, the digital POT wiper will, more than likely, NOT return to its previous condition/state.
- (c) To ensure a successful re-start or a new power-up case, V_{CC} MUST be driven below 100mV and then brought up again.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative