SMH4804 -48V Programmable Hot Swap Sequencing Power Controller

-48V Hot-Swap Controller Features Simple Software I²C Power-On/Off Interface

Introduction

Inrush current-limiting is employed in systems requiring live insertion or removal of printed circuit cards. Telecom systems are particularly sensitive to the live-insertion event, often requiring a fairly sophisticated means of limiting the card's in-rush current, sensing and reacting to undervoltage/overvoltage conditions, etc. Integrated circuits are rapidly replacing discrete solutions, offering many user-settable or user-programmable features thereby simplifying the circuit design and allowing simple tweaks to compensate for later system modifications or production variances.

Summit Microelectronics SMH4804: Non-Volatile, Quad Hot-Swap Controller

The SMH4804 Hot-Swap Controller monitors, manages and reacts to the printed circuit card's input current, input voltage and enables up to four DC-DC converters. Unlike other integrated circuit solutions, the SMH4804 contains on-board non-volatile EEPROM making it truly user programmable.

A unique feature of the SMH4804 allows the part to be shutdown via a simple software command thus allowing system cards to be removed from service during non-peak usage or for maintenance purposes. This same feature brings the system card back 'on-line' as required.

Configuring the NV Fault Register:

In systems requiring the –48V be shutdown in the event of a fault, the SMH4804 is configured as displayed in Figure 1. Highlight the 'Enabled' selection of the 'Non-Volatile Fault Latch Enable/Disable' drop-down menu and click on the 'Write Config' radio button to enable the internal fault-latching feature (Register 5, bit 3 = '0').

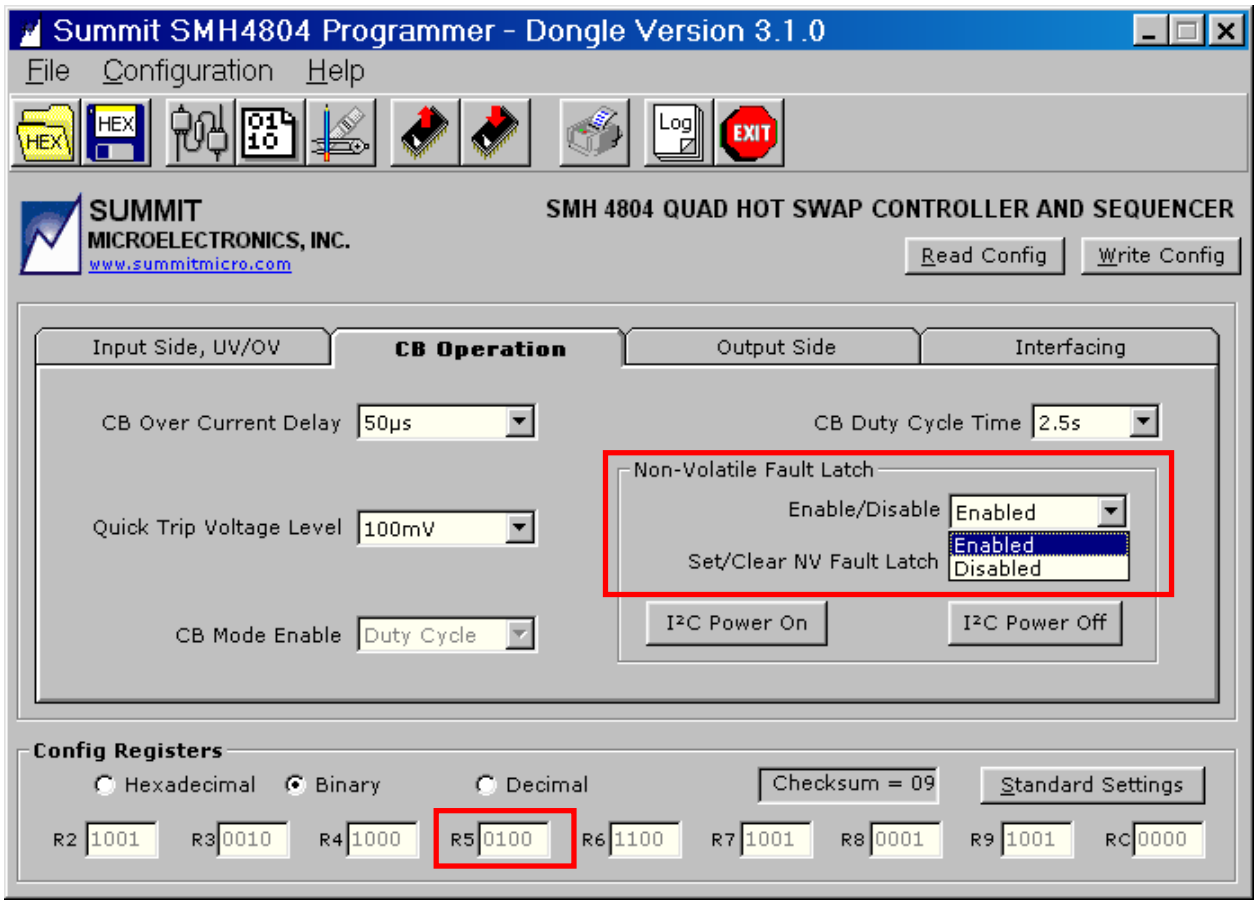

Figure 1 – Configuring the SMH4804 to Record Fault Events.

Once fault latching is enabled and an overcurrent fault occurs, the SMH4804 sets the non-volatile fault latch (Figure 2) bit (Register C, bit 0) to a '1'. Once this bit is set, the SMH4804 shuts down gate drive to the external MOSFET thus removing power from the system.

The SMH4804 remains in a 'powered-down' state until the fault bit is cleared (Figure 3) and the fault is removed. Remember to click the 'Write Config' radio button to commit the new setting (fault bit cleared) to the non-volatile register location (Register C, bit 0).

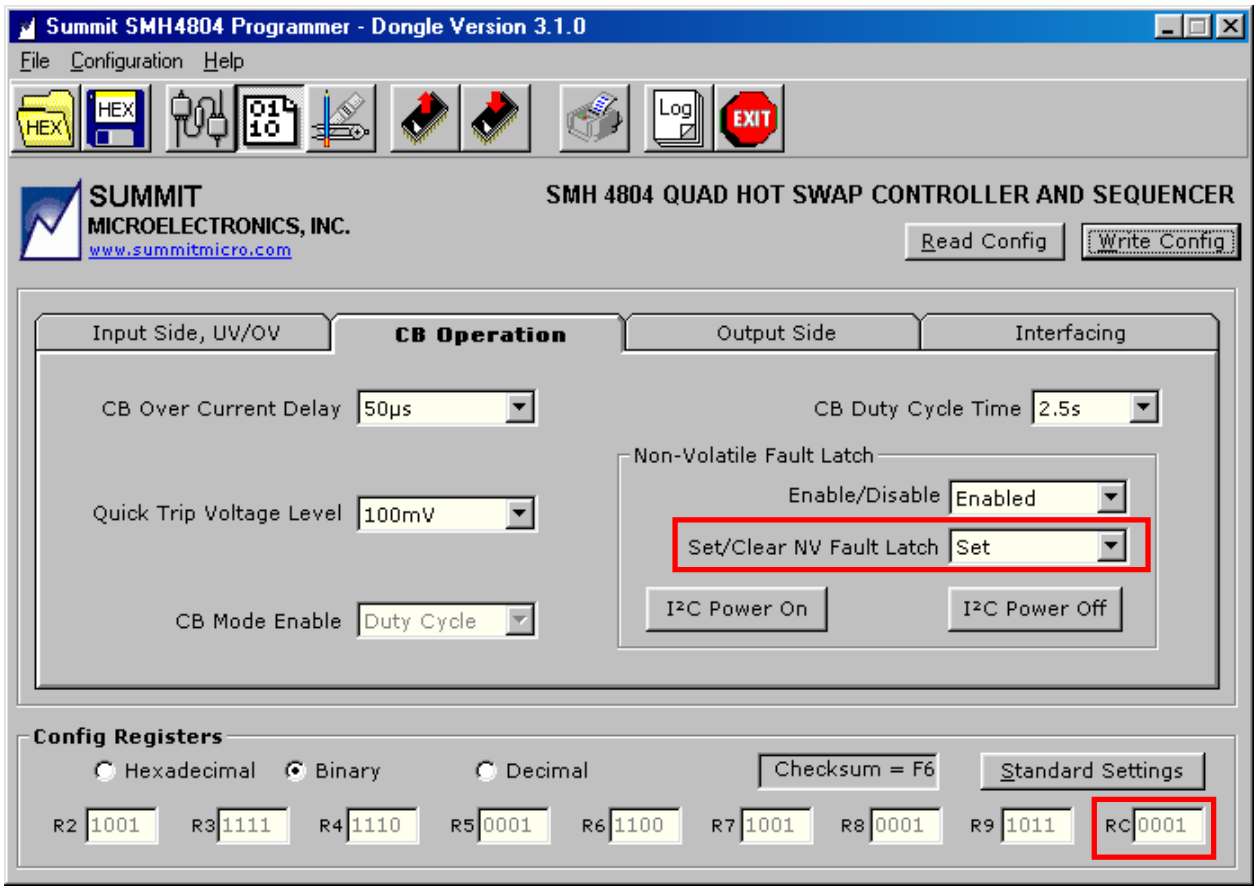

Figure 2: Fault Event Recorded by the SMH4804.

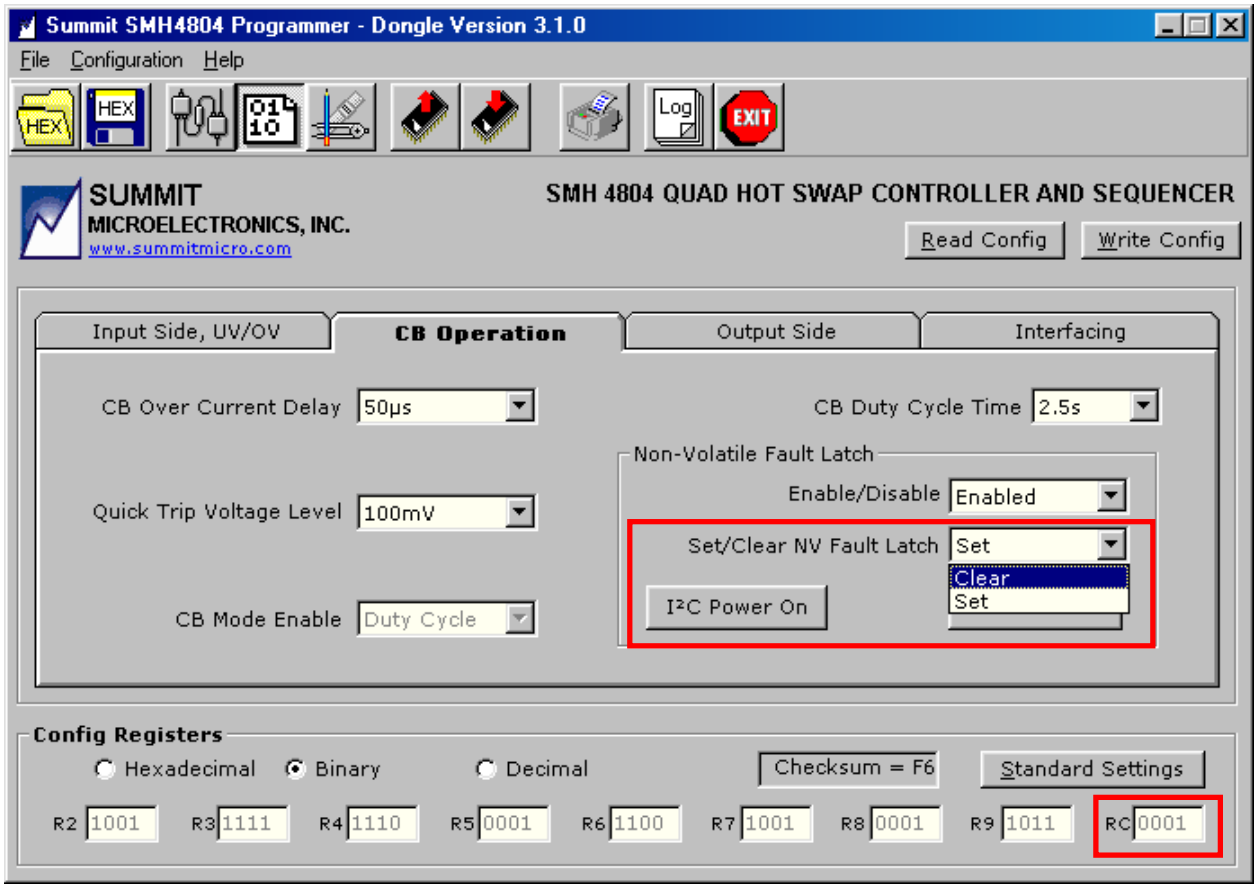

Figure 3: Clearing the Fault Bit.

Deploying the Power-On/Off Feature

Having write access to the fault register bit allows the user the option of powering the system using a simple I^2C write command via the Windows GUI (Figure 4) and on-board I^2C interface.

Power-On/Off Without Fault Recording

The 'I^2C Power On/Off' radio buttons allow the user to power-on/off the SMH4804 by simply clicking either button. This action is the equivalent of performing an I^2C write sequence to Register C, bit 0. This feature is easily implemented on a system card, requiring only a simple I^2C hardware interface to the SMH4804. See the SMH4804 Data Sheet for hardware and software details.

Power-On/Off With Fault Recording

The I^2C Power On/Off feature is also available when Fault Recording is enabled (Figure 5). The performance is virtually unaffected except the SMH4804 will shutdown upon the occurrence of an over-current fault.

Note, the SMH4804 will not restart until the fault is removed and the fault bit cleared (Register C, bit 0).

Performance Comparison Summary

The SMH4804 VGATE voltage was monitored to measure any difference in performance during the power-on/off events using live-insertion or the I^2C Power On/Off feature (Figures 6-9). As the oscilloscope photos demonstrate, the SMH4804 reacts identically to either 'event'.

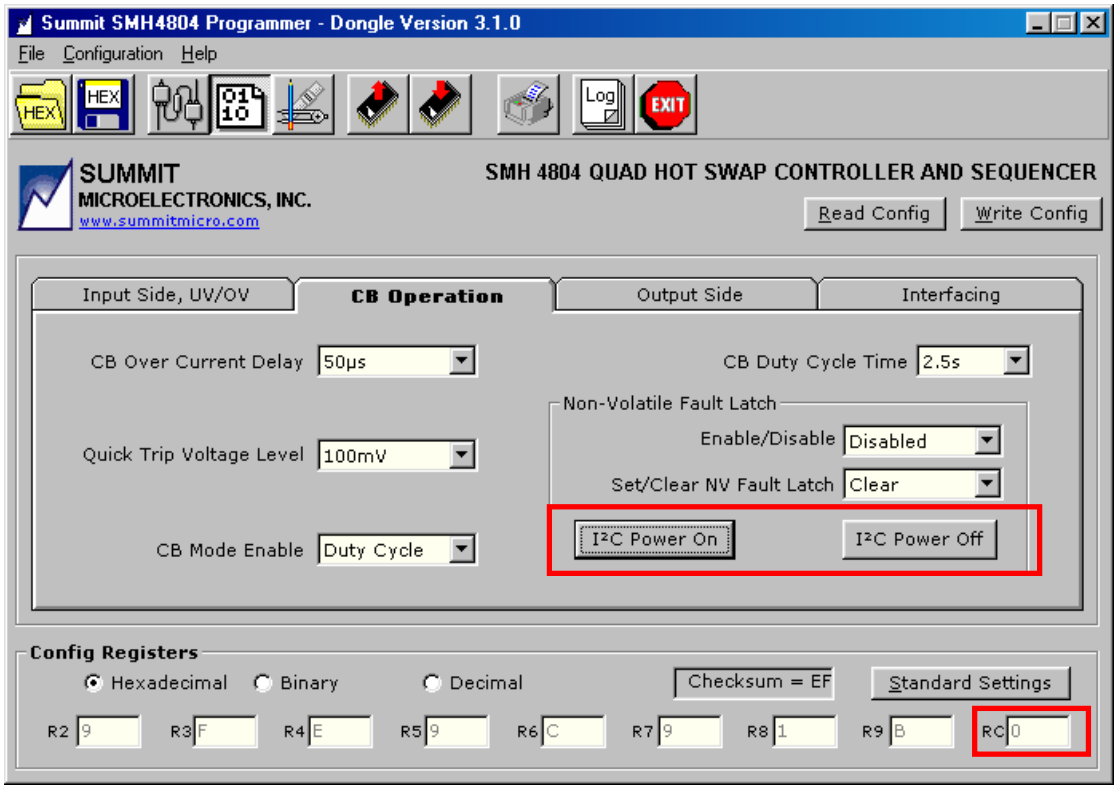

Figure 4: -48V Power-On/Off 'Point and Click' I²C Commands (without Fault Recording).

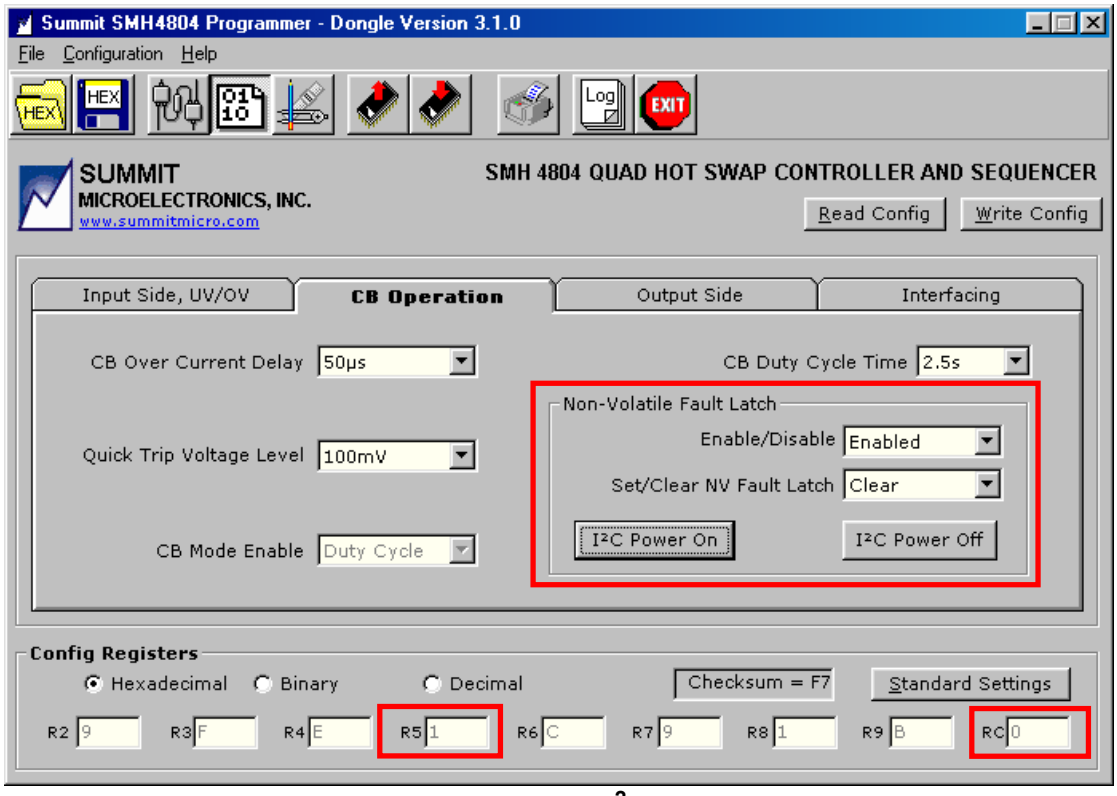

Figure 5: -48V Power-On/Off Point and Click I²C Commands (with Fault Recording).

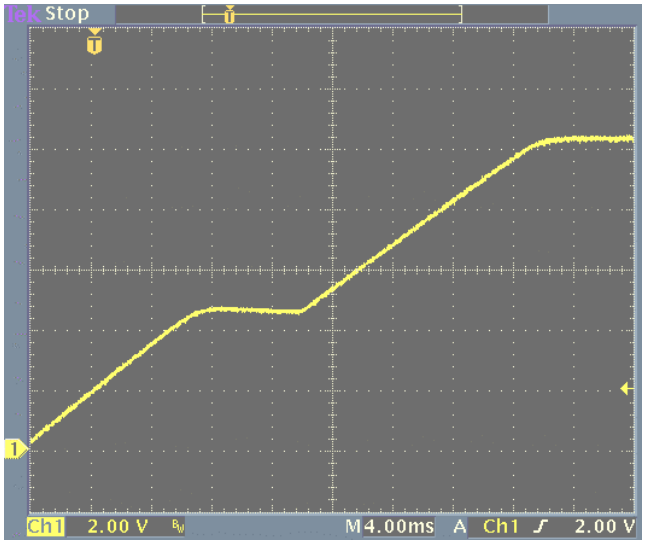

Figure 6: Gate Voltage Waveform: Hot-Swap

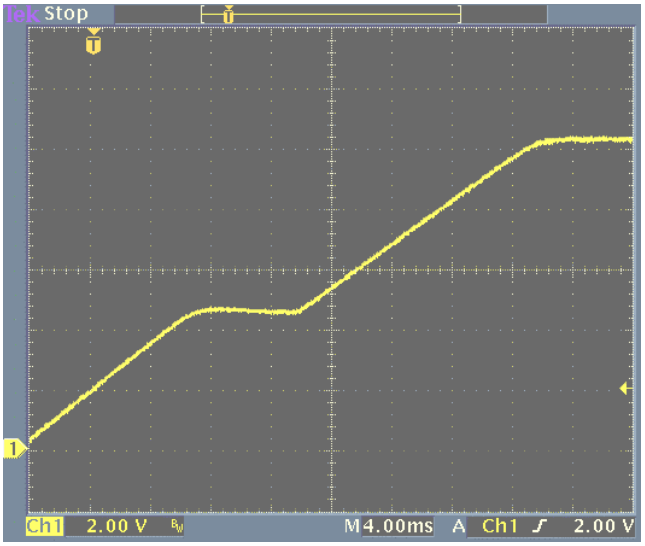

Figure 7: Gate Voltage Waveform: I²C Command

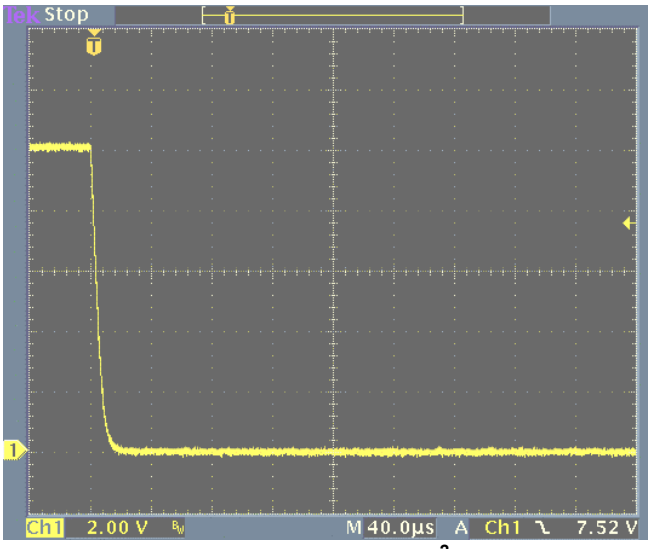

Figure 8: Gate Voltage Waveform: I²C Hot-Swap

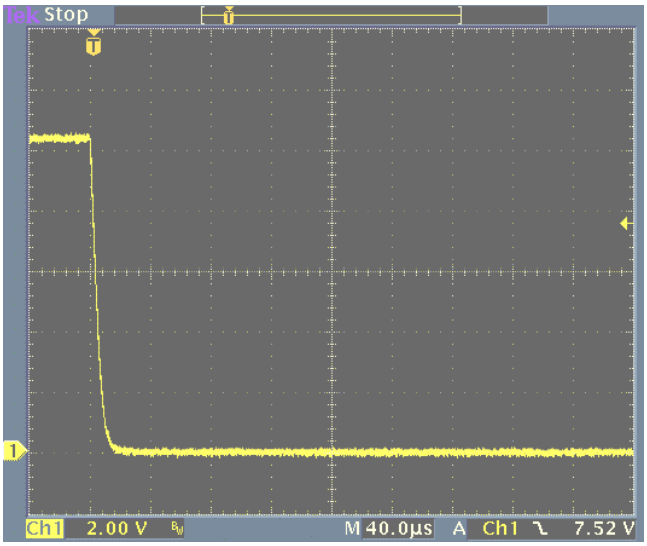

Figure 9: Gate Voltage Waveform: I²C Command

Revision 1.0 - This document supersedes all previous versions and covers Windows GUI revision 2.3.0 and later. Please check the Summit Microelectronics, Inc. web site at www.summitmicro.com for updates.

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