MAX17271 Programmer's Guide

UG7534; Rev 0; 11/21

Abstract

The MAX17271 is a low quiescent current, 3-channel power supply solution which uses a discontinuous-conduction mode (DCM), single-inductor multiple-output (SIMO) architecture. While the device data sheet lists the electrical characteristics and full register map, this guide provides the general guidance to control the MAX17271 through digital communication.

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Register Reset Conditions

All registers except the ERCFLAG register reset if one of the following events occur:

- Undervoltage-lockout (UVLO)/Overvoltage-lockout (OVLO)/Overtemperature-lockout (OTLO)
- Manual Reset (refer to the On Pin Control and Power Sequencer section in the **MAX17271** data sheet)

Interrupts Registers

The interrupt register GLBL_INT has flags which indicate whether a fault or event occurred in the past. For more information on each interrupt bit, refer to the Register Map section in the **MAX17271** data sheet.

Interrupts

When an interrupt register is read, the interrupt flags in that register are cleared.

The interrupts can be configured to pull IRQB LOW when they are set or, in other words, unmasked. This is typically used as an external interrupt for a host controller. After detecting the interrupt, the host controller then reads the GLBL_INT register to determine which event occurred. To unmask the interrupts, set the appropriate bits in the GLBL_INTM register. The interrupt flags update continuously in the register even if they are masked.

Example Pseudocode

```
// Set up channel faults to assert the IRQB pin.
i2c.write(slave, 0x11, 0xF1); // Unmask the POKBx flags.
//…
void IRQB_handler(){
   // Read the GLBL_INT register to see which interrupt occurred.
   int_type interrupts = i2c.read(slave, 0x10);
   if (interrupts.POKB1){ // OUT1 had a fault.
      //…
   }
   //…
}
```

Global Management

Configuring Auto-Restart

Auto-restart is used to save power by allowing the system to shut down and automatically wake up after some time. To set the device to automatically wake up every 100ms, set GLBL_CNFG.SWR = 1.

SIMO Regulator

Setting Output Voltage

Set the output voltage of OUTx with CNFG_BBx_A.TVSIMOx[6:0]. Calculate the value with the following:

$$TVSIMOx[6:0] = \frac{V_{OUTx} - 0.8V}{0.025V}$$

For higher output voltages, set CNFG_BBx_A.TVSIMOx[7] = 1, which applies a 1.2V offset, so the conversion becomes:

$$TVSIMOx[6:0] = \frac{V_{OUTx} - 2.0V}{0.025V}$$

Example Pseudocode

```
// Set OUT1/2/3 to 5.0V, 3.3V, and 1.8V, respectively.
int slave = 0x48;
i2c.write(slave, 0x29, 0x88); // Apply 1.2V offset, so OUT1 = 5.0V.
i2c.write(slave, 0x2B, 0x64); // No offset. Set OUT2 = 3.3V.
i2c.write(slave, 0x2D, 0x28); // No offset. Set OUT3 = 1.8V.
```

Optimizing Maximum Output Current, Ripple, and Efficiency

Use the CNFG_BBx_B.ILIM[1:0] bit fields to adjust maximum output current, ripple, and efficiency. ILIM[1:0] sets the inductor peak current limit (I_{P_OUTx}) or the maximum current that the inductor current rises too. Table 1 shows how the higher or lower peak current limits affect the ripple, efficiency, etc. For more details, refer to the **MAX17271** data sheet.

Table 1. Effects of Higher or Lower I_{P_OUTx}

Tradeoff	Lower I_{P_OUTx}	Higher I_{P_OUTx}
Maximum Output Current	Lower	Higher
Ripple	Lower	Higher
Efficiency	Higher (except for I_{P_OUTx} = 0.4A)	Lower

Power Sequencing and Enabling/Disabling Regulators

Each output can be force enabled or placed in a power sequence slot. To force enable an output, set CNFG_BBx_B.ENCTL[0] = 1. To set a regulator in a power sequence slot, write the slot number to EN_OUTx[4:3]. Slot numbers range from 0 to 3. In addition, the delay for the power-down sequence can be disabled by setting ENCTL[2] = 0. To remove an output from the power sequence, set ENCTL[1] = 0.

Example Pseudocode

```
// Force enable OUT1. Set OUT2 in slot 2.
int slave = 0x48;
i2c.write(slave, 0x2A, 0x81); // Force enable OUT1.
i2c.write(slave, 0x2C, 0x92); // Set OUT2 in slot 2.
```

Active Discharge

Each channel has an active discharge resistor to quickly drop the voltage to 0V when the regulator is disabled. To enable a regulator's active discharge resistor, set CNFG_BBx_B.ADE = 1.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/21	Initial release	—