Patch_errata for XDP™ XDPP114x-100C, XDPP1188-200C digital power controllers

RN091450

About this document

Scope and purpose

This document describes the *patch_errata* firmware patch for Infineon XDP™ XDPP114x-100C and XDPP1188-200C digital power controllers. The *patch_errata* provides fixes for issues discovered in the ROM firmware after silicon release.

Intended audience

The intended audiences for this document are design engineers, firmware engineers, application engineers, customer developing custom patch_user_app, FAEs, and support teams.

Supported products

The *patch_errata* is designed for the following products:

- XDPP1140-100C
- XDPP1148-100C
- XDPP1188-200C

Note: Access the corresponding errata document through myICP. Alternatively, contact your FAE for inquiries.

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1 Overview

The *patch_errata* is a mandatory firmware patch for the Infineon XDP™ XDPP1140, XDPP1148, and XDPP1188 digital power controllers.

Unlike the optional features patches, *patch_errata* contains essential fixes that ensure the device operates according to its datasheet specifications.

See XDPP114x-100C and XDPP1188-200C errata sheet for details of errata description.

1.1 Considerations

- The patch is mandatory for production deployment
- All customer applications should be built on top of *patch_errata*
- The patch is loaded automatically during the device bootup sequence
- The *patch_errata* should always reside in partition_1 of one-time programmable (OTP) (range 0x10024000-0x10025FFF)
- All *patch_user_app* should be built for partition_2 of OTP (range starting from 0x10026000 onwards)
- While compiling *patch_user_app*, ensure that the correct partitioning is mentioned in the code
- Always check the device partition before loading the patch to the device
- Do not store any *patch_user_app* in partition_1

1.2 Scope of fixes

The *patch_errata* addresses seven issues related to three core functional areas: regulation, telemetry, and fault management. Table 1 lists the errata with short description.

Table 1 List of errata fixes

Index	Errata #	Description
1	1	DISABLE_AUTOEXP: Disables or enables the auto-exponent feature for PMBus® READ_FAN_SPEED commands • 1 = Disables auto-exponent (manual READ_FAN_EXP must be used) • 0 = Enables auto-exponent (default setting)
2	3	IOUT temperature compensation is applied based on iout_src_sel configuration
3	4	Flux balance fault is not completely disabled in burst mode (affects Full-Bridge topology with voltage mode control)
4	5	Introduces the mechanism to disable burst mode during VID updates
5	6	Resolves the overflow issue in VOUT UV threshold calculations
6	8	Optimizes the PWM narrow-pulse mechanism and adds logic of getting the VID value during prebias startup
7	12	Resolves an issue where IOUT_TEMPERATURE_COMPENSATION does not read the APC value from PHASE1_IOUT_APC

1.3 Patch execution sequence

Figure 1 shows the *patch_errata* and *patch_user_app* execution. The *Patch_user_app* contains optional application-specific code/functionality.

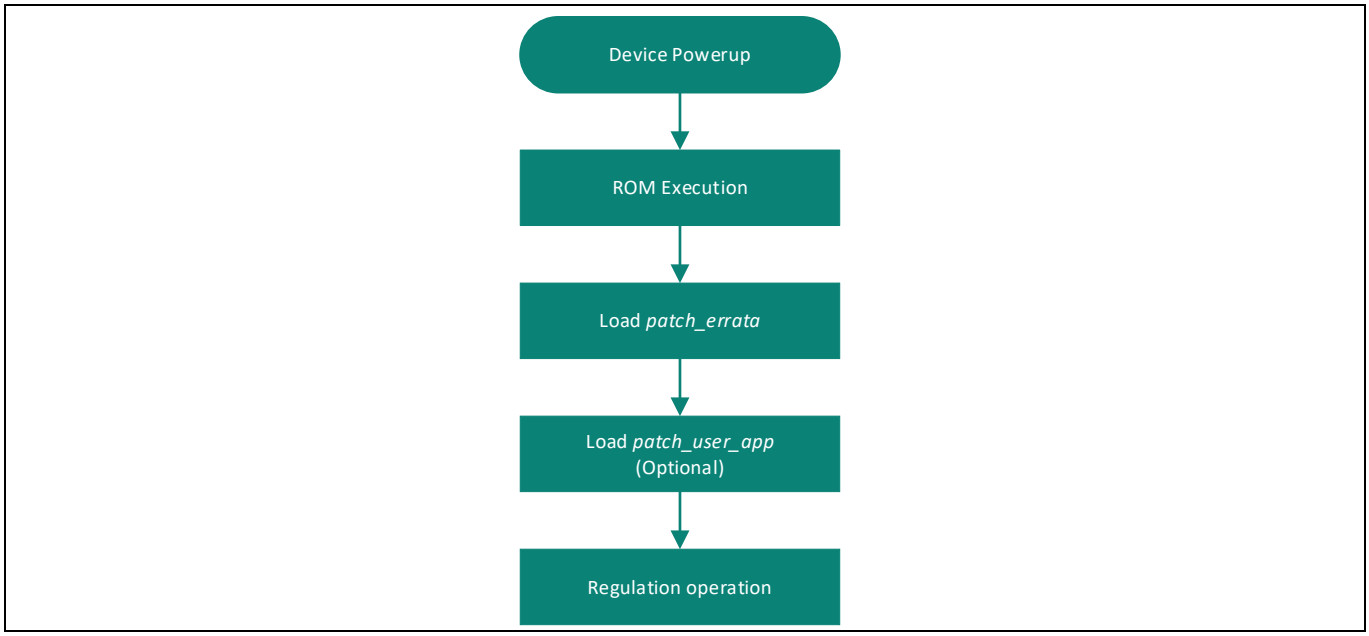

Figure 1 Device bootup sequence from patch_errata

Every device has a firmware ID. When *patch_errata* is loaded, the device's firmware ID changes and becomes the patch_errata firmware ID: 0x6983A953.

When developing *patch_user_app*, ensure that the version base is the same as *patch_errata*. Otherwise, the device will not load the *patch_user_app* in OTP or RAM.

1.4 Configuration for patch_errata

Additionally, three firmware config spare registers are used to allow further optimization. These three parameters are applicable to only Errata #4 and Errata #5, while the remaining erratas are not affected.

1.4.1 Errata #5

Errata #5 addresses the issue of long Vout transition time in burst mode after a change in target Vout. Two firmware config registers are used in the `Disable_burtst_mode_vout_transition()` function: fw_config_spare12 and fw_config_spare13 registers as shown in Table 2 and Table 3 respectively.

Table 2 fw_config_spare12 register configuration

Register	Value/description
fw_config_spare12	Used for Errata #5 in the `Disable_burtst_mode_vout_transition()` function
Purpose	Sets minimum IOUT threshold below which a temporary offset current is injected to force burst mode exit
LSB	62.5 mA (Range/Resolution: S10.4)
Default value	16'd (= 1A)

Register	Value/description
Example	When fw_config_spare12 = 16'd (1 A): If IOUT < 1A at the time of a Vout command change, the patch injects an offset current to force burst mode exit

Table 3 fw_config_spare13 register configuration

Register	Value/description
fw_config_spare13	Used for Errata #5 in the `Disable_burtst_mode_vout_transition()` function
Purpose	Sets the temporary injected offset current to IOUT to force burst mode exit. The offset current is computed as fw_config_spare13 – IOUT
LSB	62.5 mA (Range/Resolution: S10.4)
Default value	80'd (= 5 A)
Example	When fw_config_spare13 = 80'd (5 A) If measured IOUT = 1 A, the offset current is 5 – 1 = 4 A, which triggers burst mode exit

1.4.2 Errata #4

Errata #4 fixes the issue that the flux balance fault is not completely disabled in burst mode. The patch utilizes an IOUT threshold, below which the flux balance fault is disabled. This threshold is the maximum value of DCM threshold (fbal_dcm_thresh) and burst mode entry current threshold (pid_burst_mode_ith). For re-enabling the flux balance fault, hysteresis is added to prevent oscillation. This hysteresis is defined by fw_config_spare14 register.

Table 4 fw_config_spare14 register configuration

Register	Value/description
fw_config_spare14	Used for Errata #4 in the `dec_irq_threshold_set()` function
Purpose	Sets the hysteresis of the current threshold for re-enabling flux balance fault
LSB	0.125 A (Range/Resolution: U5.3)
Default value	4'd (=0.5 A)
Example	When fw_config_spare14 = 4'd (0.5 A), assuming the IOUT threshold is 2 A, flux balance fault is disabled when Iout < 2 A, and re-enabled when Iout > 2.5 A

2 Implementing patch_user_app

The *patch_errata* modifies seven ROM functions. When developing a custom patch (*patch_user_app*) with the need to patch any of these same functions, the existing patch errata code must be included in the *patch_user_app*, as the same function is overwritten by *patch_user_app*. Patching the same functions without including the existing *patch_errata* code completely overwrites and disables the patch errata fixes, potentially causing issues with the device.

Note: Do not patch any functions that patch_errata already patches as listed in Table 5. If you must, then copy the complete patch_errata functions implementation, and then add your modifications.

Table 5 Functions patched in patch_errata

Function name	Type	Errata #	Description
patch_Telemetry_get_fan_speed	ROM	1	Corrects fan speed exponent calculation for RPM >1023
patch_iout_temperature_compensation	ROM	2	Applies temperature compensation to correct ISEN block based on source selection
patch_Regulation_Shutdown_Sequence	ROM	3, 7	patch_Regulation_Shutdown_Sequence
patch_Telemetry_VOUT_UV_TON_MAX_DISABLE_Irq_Threshold_Set	ROM	5	Prevents overflow in VOUT UV threshold calculation with two-step math
patch_Regulation_Set_Prebias	ROM	4, 6	Handles prebias voltage with unfiltered measurement and immediate load
patch_Regulation_Power_Mode	ROM	3, 4, 6, 7	Manages power mode transitions, flux balance, burst mode, and RAMP_MIN_PW_STATE
patch_Regulation_Update_Vid	ROM	3, 4, 6	Updates VID with proper sequencing for burst mode and prebias
Telemetry_IRQ_Fbal_fault_HANDLE	Supporting	3	IRQ handler for dynamic flux balance fault enable/disable
TON_DELAY_TIME_REACHED	Supporting	3	Enables flux balance monitoring after startup delay
dcm_irq_threshold_set	Supporting	3	Configures current threshold for flux balance monitoring
check_power_mode_0x08	Supporting	3	Checks if POWER_MODE is 0x08 (max efficiency with burst)
Disable_burst_mode_during_vid_update	Supporting	4	Waits for VOUT transition completion and restores burst mode
Disable_burst_mode_vout_transition	Supporting	4	Forces burst mode exit before voltage transition

References

[1] Infineon Technologies AG: *Digital power controllers webpage*; Available online

[2] Infineon Technologies AG: *XDPP1188-200C datasheet*; Available online

[3] Infineon Technologies AG: *XDPP114x-100B/C XDP™ digital power controller*; Available online

Revision history

Document revision	Date	Description of changes
V 1.0	2026-06-17	Initial release

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