

Silicon revision mask N58A, N13J, N65K, MC24XS4 and MC36XSD errata

Introduction

This errata sheet applies to the following products:

Automotive MC24XS4	Number of outputs	R_{DS(on)} (mΩ)	Package
MC06XS4200FK	Dual	2 X 6.0	PQFN 23
MC10XS4200BAFK MC10XS4200BFK MC10XS4200FK	Dual	2 X 10.0	PQFN 23
MC20XS4200BAFK MC20XS4200BFK MC20XS4200FK	Dual	2 X 20.0	PQFN 23
MC22XS4200BEK	Dual	2 X 22.0	SOIC 32
MC50XS4200BEK	Dual	2 X 50.0	SOIC 32

Industrial MC36XSD	Number of outputs	R_{DS(on)} (mΩ)	Package
MC06XSD200FK	Dual	2 X 6.0	PQFN
MC10XSD200FK	Dual	2 X 10.0	PQFN
MC16XSD200FK	Dual	2 X 16.0	PQFN
MC22XSD200BEK	Dual	2 X 22.0	SOIC 32
MC50XSD200BEK	Dual	2 X 50.0	SOIC 32

Note: Products may have been shipped with PC prefix or R2 suffix indicating Tape and Reel.

1 Device part number prefixes

Some device samples are marked with a PC prefix. A PC prefix indicates a prototype device which has undergone basic testing only. After full characterization and qualification, devices will be marked with the MC prefix.

2 Device build information/date code

Device markings indicate build information containing the week and year of manufacture. The date is coded with the last four characters of the nine character build information code (e.g. "CTZW1025"). The date is coded as four numerical digits, where the first two digits indicate the year and the last two digits indicate the week. For instance, the date code "1025" indicates the 25th week of the year 2010.

3 Description

The following table provides the general definitions of the errata severity in this document.

Table 1. Definitions of errata severity

Errata severity level	Meaning
High	Failure mode that severely inhibits the use of the device for all or a majority of intended applications
Medium	Failure mode that might restrict or limit the use of the device for all or a majority of intended applications
Low	Unexpected behavior that does not cause significant problems for the intended applications of the device
Enhancement	Improvement made to the device due to previously found issues on the design

General description

This errata document applies to the dual 24 V - 36 V high-side switches family.

ER01 - ECU ground disconnection

Severity level – high

Description of problem

If ECU ground is disconnected when $V_{PWR} \geq |V_{CL}|$ power MOSFETs can conduct due to negative output clamp activation.

Customer impact or symptoms

The device can suffer from extreme power dissipation when ECU ground is disconnected with the limitation that the battery (i.e. VPWR) has to be higher than the absolute value of negative clamp voltage.

Workaround

The recommendation is to connect a freewheeling diode on the output to avoid lift-up of ECU's ground and clamp activation.

Fix plan

All references have been improved with a negative clamp voltage increased from -28 V to -32 V except for the following references: MC06XS4200FK, MC10XS4200FK, MC20XS4200FK.

ER02 - OLOFF disable pull-up current

Severity level – low

Description of problem

When OLOFF detection is disabled through the SPI, pull-up current source is fully deactivated when $V_{HSX} > 2.5$ V (typ.)

Customer impact or symptoms

Additional consumption observed, the current IOLD (OFF) remains injected on the load (30 uA to 100 uA).

Workaround

No workaround identified.

Fix plan

All references have been fixed except the following references:

MC06XS4200FK, MC10XS4200FK, MC20XS4200FK

ER03 - track and hold mode

Severity level – low

Description of problem

When Track & Hold is used to sense the temperature and then to sense a current, the value of the current on the output pin CSNS is refreshed incorrectly.

Customer impact or symptoms

The value of the current on the high-side switch is incorrect when the previous measurement on CSNS is a temperature measurement and the aforementioned high-side switch is OFF.

Workaround

The recommendation is to switch ON & OFF the Track & Hold function after the temperature measurement.

The following is a workaround sequence:

- HS0 selection
- HS1 selection
- Temperature selection
- Track & Hold OFF then ON
- HS0 selection
- HS1 selection
- Temperature selection
- Track & Hold OFF then ON
- Etc.

Fix plan

No fix scheduled.

ER04 - reverse voltage protection on VPWR

Severity level – low

Description of problem

In the chapter "PROTECTION AND DIAGNOSTIC FEATURES", in paragraph "Reverse Voltage Protection on VPWR", the sentence "The device can withstand reverse supply voltages on VPWR down to -28 V" applies only to part numbers MC06XS4200FK, MC10XS4200FK, and MC20XS4200FK."

For all other part numbers, the sentence is as follows: "The device can withstand reverse supply voltages on VPWR down to -32 V for B and BA versions".

Customer impact or symptoms

None, all tables have correct data.

Workaround

N/A.

Fix plan

No fix scheduled.

ER05 – diagnostics

Severity level – medium

Devices: MC06XS4200, MC10XS4200, MC20XS4200, MC22XS4200, MC50XS4200

Description of problem

In the respective product data sheets, Table 5. “Available diagnostics functions over duty cycle and switching frequency” refers to high-current mode (CSNS_ratio_s=0) only. Contact local support for details on low current mode (CSNS_ratio_s=1).

The device can operate over the full duty cycle range (0% to 100%) in Low-current mode (CSNS_ratio_s=1). Nonetheless, the open load detection may be corrupted for high duty cycles (close to 100%).

Customer impact or symptoms

The device returns a short to battery instead of open load.

Workaround

A 171 μ s minimum OFF time is recommended for open load detection in CSNS=1 mode.

Example: for 200 Hz, max. duty cycle is $(1-171 \mu\text{s} \times 200) = 96.6\%$ (for $V_{PWR} = 14 \text{ V}$, 10 nF output capacitor)

Contact local support for details and recommended off time versus voltage and frequency.

Fix plan

The device datasheet will be updated.

ER06 – Open load detection in low current mode 100% duty cycle

Severity level – medium

Devices: MC06XS4200, MC10XS4200, MC20XS4200

Description of problem

When running the device in 100% PWM mode, the open load detection can be corrupted in Low-current mode (CSNS_ratio_s=1).

Customer impact or symptoms

The device returns a short to battery instead of open load.

Workaround

A 171 μ s minimum OFF time is recommended to be sent by the ECU for robust open load detection. A proposed sequence is shown in [Figure 1](#).

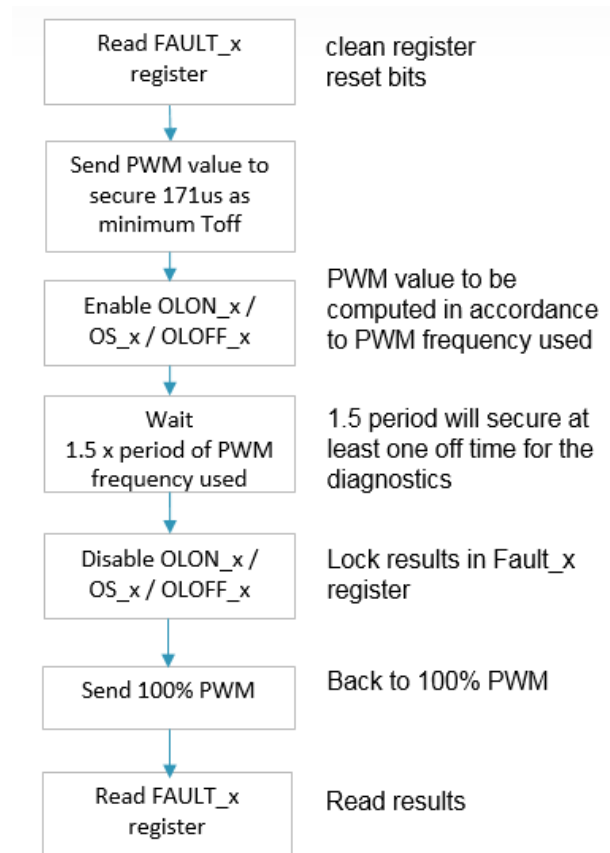


Figure 1. Proposed off time sequence

Fix plan

Under evaluation.

4 Revision history

Revision	Date	Description of changes
1.0	9/2012	Initial Release
2.0	11/2014	Made major updates
	3/2015	Updated format
3.0	4/2015	Added Section , ER05 – diagnostics and Section , ER06 – Open load detection in low current mode 100% duty cycle
	8/2016	<ul style="list-style-type: none">• Updated to NXP document form and style

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