

TEC Controller Hardware

1 General Terms

This document summarizes all TEC Controller hardware changes. For additional information, please contact Meerstetter Engineering GmbH.

Notations:

- All Dates have the Format "Day.Month.Year".
- **DS** means Datasheet
- **Release Date** is the first date where this version has been or will be delivered.

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|---|--------------------------------|-------------------|----------------------------|-------------------------------|
|  | TEC Controller Hardware | TEC-Family | 16.06.16 ML 13.08.19 ML | Seite 1 (7) 5204J |
|---|--------------------------------|-------------------|----------------------------|-------------------------------|

2 Hardware Changes Overview

2.1 Changes till April 2019

| Change | TEC-1092 | TEC-1091 | TEC-1089-SV | TEC-1090-HV | TEC-1122-SV | TEC-1123-HV | Detail |
|---|--|--|--|--|--|--|---------------|
| | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | |
| Inductor for Object Temperature measurement power filter replaced by an equivalent successor. Impact for the customer: None | Not affected | Not affected | HW v2.10 February 2019 5133V | HW v1.90 End of 2018 5165P | HW v2.00 Mid 2019 5132V | HW v2.00 Mid 2019 5144V | |
| Power capacitors distance to M4 terminals enlarged to protect capacitors from mechanical stress. Impact for the customer: None | Not affected | Not affected | HW v2.10 February 2019 5133U | HW v1.90 End of 2018 5165O | Not affected | Not affected | |

2.2 Changes March 2018

| Change | TEC-1092 HW Version Release Date Corresponding DS | TEC-1091 HW Version Release Date Corresponding DS | TEC-1089-SV HW Version Release Date Corresponding DS | TEC-1090-HV HW Version Release Date Corresponding DS | TEC-1122-SV HW Version Release Date Corresponding DS | TEC-1123-HV HW Version Release Date Corresponding DS | Detail |
|---|---|---|--|--|--|--|---------------|
| Output Stage optimized to reduce the power dissipation at very high output voltages (high duty cycle). Impact for the customer: None | Not affected | Not affected | HW v2.00 March 2018 5133S | Not affected | HW v2.00 May 2018 5132S | Not affected | |

2.3 Changes October 2017

| Change | TEC-1092 HW Version Release Date Corresponding DS | TEC-1091 HW Version Release Date Corresponding DS | TEC-1089-SV HW Version Release Date Corresponding DS | TEC-1090-HV HW Version Release Date Corresponding DS | TEC-1122-SV HW Version Release Date Corresponding DS | TEC-1123-HV HW Version Release Date Corresponding DS | Detail |
|---|---|---|--|--|--|--|---------------|
| PCB Silkscreen of EVL-1093 changed: RS232 → RS232 TTL RX and TX swapped | EVL-1093: v1.01 January 2018 5209B | Not affected | Not affected | Not affected | Not affected | Not affected | |
| Thermal pad replacement with equivalent successor. | Not affected | Not affected | Not affected | HW v1.90 June 2018 5165M | Not affected | HW v1.90 February 2018 5144R | |

2.4 Changes July 2017

| Change | TEC-1092 | TEC-1091 | TEC-1089-SV | TEC-1090-HV | TEC-1122-SV | TEC-1123-HV | Detail |
|--|--|--|--|--|--|--|--------|
| | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | |
| Enhancement of the EMV test burst immunity. Object Temperature measurement circuit GND isolations removed. | Not affected | HW v1.80 Middle 2018 5175H | HW v1.80 October 2017 5133R | HW v1.80 Nov 2017 5165M | HW v1.80 February 2018 5132R | HW v1.80 February 2018 5144R | 3.1 |
| SPI flash memory alternative added: 100% compatible one from a different manufacturer. | Not affected | HW v1.80 Middle 2018 5175H | HW v1.80 October 2017 5133R | HW v1.80 Nov 2017 5165M | HW v1.80 February 2018 5132R | HW v1.80 February 2018 5144R | 3.2 |

2.5 Changes January 2017

| Change | TEC-1092 | TEC-1091 | TEC-1089-SV | TEC-1090-HV | TEC-1122-SV | TEC-1123-HV | Detail |
|--|--|--|--|--|--|--|--------|
| | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | |
| An additional resistor has been placed between GND and the base plate. | Not affected | Not affected | HW v1.71 10.01.17 5133Q | HW v1.61 15.02.17 5165L | HW v1.51 Middle 2017 5132Q | HW v1.51 Middle 2017 5144Q | 3.3 |

2.6 Changes April 2015 – September 2016

| Change | TEC-1092 | TEC-1091 | TEC-1089-SV | TEC-1090-HV | TEC-1122-SV | TEC-1123-HV | Detail |
|--|--|--|--|--|--|--|---------------|
| | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | HW Version Release Date Corresponding DS | |
| Lower operating temperature Range enhanced. Changed from 0°C to -40°C. | Not affected | HW v1.10 30.06.16 5175E | HW v1.70 01.03.16 5133N | HW v1.60 01.03.16 5165I | HW v1.50 30.09.16 5132L | HW v1.50 07.04.16 5144K | 3.4 |
| Lower operating temperature Range enhanced. Changed from 0°C to -40°C. Hand made quick fix for older series. | Not affected | Not affected | Not affected | HW v1.54 02.02.16 5165I | Not affected | Not affected | 3.4 |
| Input fuse replaced by an UL-248-14 compliant one. | Not affected | From beginning compliant | HW v1.70 01.03.16 5133N | From beginning compliant | HW v1.40 11.02.16 5132K | From beginning compliant | |
| Power Stage FETs replaced by the direct successor because the old one was discontinued. | Not affected | Not affected | HW v1.70 01.03.16 5133N | Not affected | HW v1.50 30.09.16 5132L | Not affected | |
| PCB Vias below the big coils insulated. This prevents rarely happened shorts between the coil and the Vias. | Not affected | HW v1.10 30.06.16 5175E | Not affected | Not affected | Not affected | Not affected | |
| PCB Vias below the big coils insulated. This prevents rarely happened shorts between the coil and the Vias. Hand made quick fix for older series. | Not affected | HW v1.01 27.4.15 5175D | Not affected | Not affected | Not affected | Not affected | |

3 Additional Detailed Descriptions

3.1 Enhancement of the EMV test burst immunity

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|-------------------------|--|
| Problem | During EMV Burst Test, the TEC Controller threw error 131. (Object Temperature Measurement Circuit failure: Configuration read back failed.) |
| Cause | The SPI communication between the MCU and the ADS1247 (ADC) has faulted, because the GND of the ADC circuit is decoupled by ferrite beads and a filter coil. The burst caused a voltage shirt between the two grounds. |
| Solution | Removing the two filter components which decouple the GNDs. The GND is now hard connected. |
| Impact for the customer | Better EMV immunity, slightly more noise on the object temperature during normal operation. We recommend to connect the GND of the TEC controller directly to the earth to lower the measurement noise. |

3.2 Flash memory replaced

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|-------------------------|--|
| Problem | The SPI flash memory which is being used to save all the setting is not available anymore. |
| Cause | It is discontinued by the manufacturer. |
| Solution | Assembly alternative added: W25Q16JVSNIQ from Winbond Electronics. |
| Impact for the customer | None, because its 100% compatible for the used application. |

3.3 Discharge Current between GND and base plate

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|-------------------------|---|
| Problem | Depending on the external power supply, a static electric charge may build up between the base plate and the GND if the board is not mounted to a heatsink. |
| Cause | The 10K Ohm resistor which should prevent from this charging is connected to an optional customer mounting hole. |
| Solution | An additional 10 KOhm discharging resistor is added to a mounting hole that is directly screwed to the base plate. |
| Impact for the customer | The resistance between GND and the base plate is lower than before. |

3.4 Lower operating temperature Range enhanced

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|-------------------------|--|
| Problem | The device was not compatible for ambient temperatures till -40°C |
| Cause | The crystal is only specified till -20°C and the input over voltage and reverse polarity protection diode has a too big temperature coefficient and may start to protect the device too early at -40°C. |
| Solution | Input over voltage and reverse polarity protection diode has been replaced one with a higher protection voltage. Unfortunately, this has the disadvantage that the overvoltage protection is less effective. |
| Impact for the customer | The device is now compatible till -40° but it has now a little bit less effective over voltage protection. |