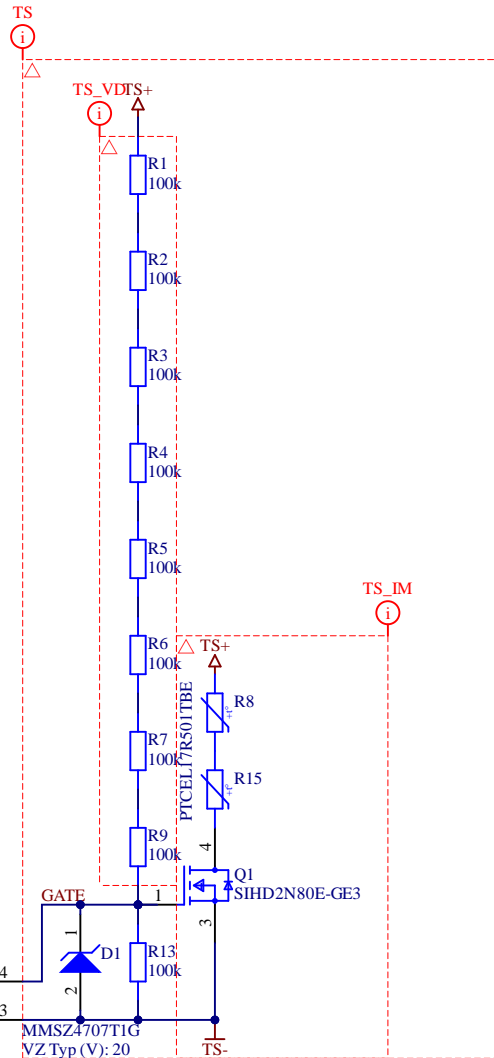
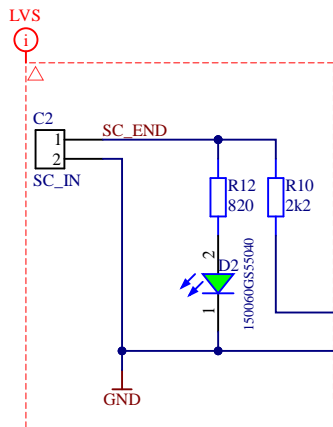
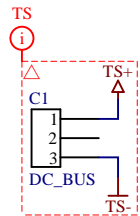


# Discharge Circuit

SC connector connected to end of shutdowncircuit (AIR input) and LV\_GND through fusebox.  
DC bus connected through C1.  
Both connectors are Molex MicroFit (600V)

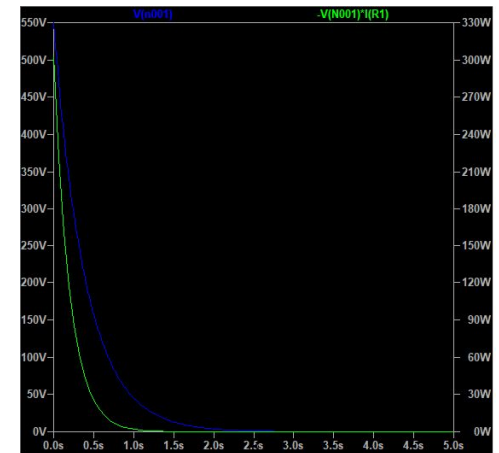


Peak current at 556V (Limited by PTCs' R25):  $556V / (2 * 500\Omega) = 0.55A$   
Tolerance of PTCEL = 30% -> Peakcurrent at least resistance:  $0.55 / 0.7 = 0.79A$   
MOSFET cont. current: 1.8A at 100°C die-temp  
MOSFET pulsed current: 5A

$1/2 * (550V)^2 * 2 * 200\mu F = 62J$   
(DTI Inverter has 200uF DC bus, two are installed; other capacitances in the vehicle are negligible)  
Two PCTEL are going to be used in series, so each absorb's half the bus energy (31J):  
According to datasheet table "CONSECUTIVE ENERGY / LOAD-DUMPS AT DIFFERENT TAMB FOR PTCEL17/13":  
PTCEL13: 3.7 consecutive dumps at 55°C, 31J  
PTCEL17: 6 consecutive dumps at 55°C, 31J  
This ensures three consecutive dumps in the 15 seconds required for EV4.9.1 using either resistor.

Gate-voltage-divider:  
 $V_{gsmax} = +30V$   
 $V_{gsthmax} = 4V$ , Good conduction at 6V (Fig 3 of MOSFET Datasheet)  
->  $V_g$  at 60V should be 6V to discharge below 60V  
 $V_g$  at 556V =  $4V * 556V / 60V = 64.2V$  -> Clip with zener diode  
Voltage divider divide 60V to 6V  
 $60 * 100 / (100 + 8 * 100) = 6.66V$

Resistor optocoupler:  
 $V_{fmax} = 1.6V$ ,  $I_f = 10mA$   
 $R = (24V - 1.6V) / 10mA = 2240\Omega \rightarrow 2200\Omega$  (E12)  
Resistor LED:



Title: discharge-circuit

Projekt: hv-distribution-board.PrjPcb

Author: Leon Loeser

Checked by: UNCHECKED

Rules: EV4.9

Sheet 1 of 3

Revision: 1.1

Baltic Racing  
Zur Schwedenschanze 15  
Haus 18  
18435 Stralsund

Date: 26.01.2023 Time: 18:45:40

**BALTIC RACING**  
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TS\_COMP



TS+

S1MB-13-F



D3

1

D4

SZMMSZ5261BT1G

VZ Typ (V): 47

2

3

M1

IXTA08N100D2HV

1

2

R18

2k2

1

2

U2

TCLT1000

1

2

3

4

+24V

HV\_PRSNT

HV\_PRSNT

C4

1

2

TSAL

TS-

# $\Delta$ Calculations:

Intended current:  $I = 1\text{mA}$

$V_{GS}(\text{off}) = 2\text{V} \dots 4\text{V}$

$R_{SG} = V_{GS}(\text{off}) / I = 2\text{k} \dots 4\text{k}\Omega$

Chosen R:  $2\text{k}2 \rightarrow I = 0.9\text{mA} \dots 1.8\text{mA}$

A depletion-mode N-Channel-MOSFET acts as a current source in this configuration as the shunt-resistor causes a negative Gate voltage. The Zener diode set's a minimum voltage of  $47\text{V}$  ( $+V_{be} + V_{th}$ ) before a significant current can flow. After that, a constant current of  $1\text{mA}$  flows through the opto-LED, presenting  $24\text{V}$  at the optos' emitter.

Title: **voltage-detection**

Projekt: **hv-distribution-board.PrjPcb**

Author: **Leon Loeser**

Checked by: **UNCHECKED**

Rules: **EV4.10.2**

Sheet **2** of **3**

Size: **A4**

Revision: **1.1**

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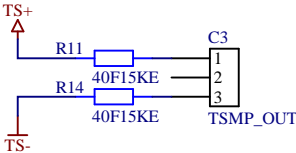
Date: **26.01.2023** Time: **18:45:40**

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TSMP protection resistors

⚠ This board is located in the HV distribution. The BUS-connector connect's directly to the input of the inverter (dc bus), the TSMP connector connect's to the TSMPs.

Failure check: If the inverter is connected properly, the TSMPs should read a resistance of 30kOhm (2\*15k in series). You have to take the first value upon measurement since the bus capacitors are a short circuit in the first few ms. Alternatively measure from TS- to TS+ as the flyback diodes of the inverter will conduct this way.



|                       |                              |   |                |
|-----------------------|------------------------------|---|----------------|
| Title: tsmv-resistors |                              | <div><div>BALTIC RACING</div><div>ENGINEERED FOR SUCCESS</div></div>  |                |
| Projekt:              | hv-distribution-board.PrjPcb | Revision: 1.0   |                |
| Author:               | Leon Loeser                  | Baltic Racing<br>Zur Schwedenschanze 15<br>Haus 18<br>18435 Stralsund |                |
| Checked by:           | UNCHECKED                    |   |                |
| Rules:                | EV4.7.6                      |   |                |
| Sheet 3 of 3          | Size: A4                     | Date: 26.01.2023  | Time: 18:45:40 |

**PCB must be conformally coated  
for clearances to be rule-compliant!**

