USB Supply Demonstrator Board

Introduction

- The following slides shall give You a brief introduction to the USB Supply Demonstrator Board
- Layout
- Schematic
- Quickstart
- Background

- The demonstrator board is equipped with a TLF51801 as 5 V regulator
- Please refer to TLF51801 data sheet
USB Supply Demonstrator Board
The Board (What You have in front of You, top view)
USB Supply Demonstrator Board
Mounting Plan
USB Supply Demonstrator Board
Layout Top Layer
USB Supply Demonstrator Board
Layout Bottom Layer
USB Supply Demonstrator Board
Schematic

RSENSE is mounted with 3.3 kOhm
USB Supply Demonstrator Board
Quick Start

LED indicates output voltage

USB Ports 1&2

V_{IN}, EN, GND
Connect GND to Ground
Connect $V_{IN}$ to battery voltage (12 V)
To start the board connect Enable to $V_{IN}$
Green LED indicates output voltage
The current limitation of TLF51801 is set to ~ 5.5A and may be adjusted by modifying $R_{\text{SENSE}}$. 

RSENSE
USB Supply Demonstrator Board
Adjustment of TLF51801 current limitation

Please refer to Infineon IPG20N06S2L-35A data sheet
USB Supply Demonstrator Board
Adjustment of TLF51801 current limitation

› The TLF51801 current limitation is done in RDSON-configuration, which is less accurate than Shunt-configuration, of course depending on application needs both configurations are possible (Rdson-configuration saves the expensive Shunt resistor)

› Equation taken from TLF51801 data sheet (naming different than USB Supply Demonstrator board!)

\[ I_{\text{limit}} = I_{OC\text{, lim, ref}} \times \frac{R_{\text{SENSE}}}{R_{\text{DSON}}} \]

› Desired current limitation value is 5.2 A

› With
  – \( RDSON = 35 \, \text{mΩ} \) (value taken from datasheet of MosFET)
  – \( IOC_{\text{,lim,ref}} = 95 \, \mu\text{A} \)

› \( R_{\text{SENSE}} = 1.915 \, \text{kΩ} \)

› Due to spread of RDSON of the MosFET the current limitation was found far below 5.2 A

› A new value for setting the current limitation was found by testing, now set to 5.8 A:

› \( R_{\text{SENSE}} = 3.300 \, \text{kΩ} \)

› The current limitation in RDSON-configuration is a protection of the regulator, if a more accurate value is necessary, Shunt-configuration is recommended.
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