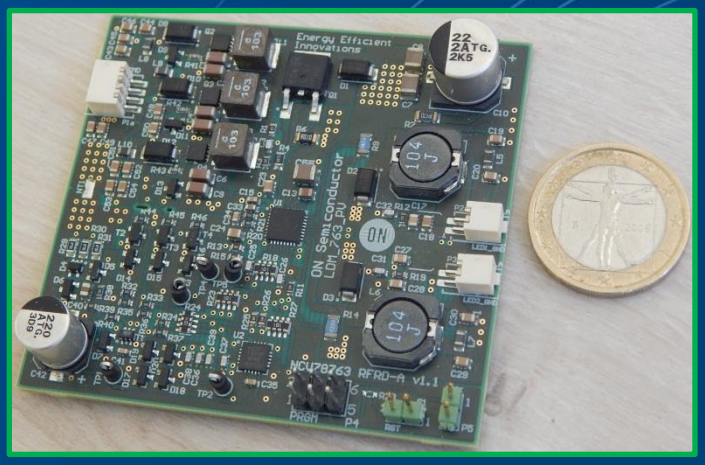
ON Semiconductor

Is Now

To learn more about onsemi™, please visit our website at
www.onsemi.com

onsemi and onsemi and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi** product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.



ON Semiconductor®

LED FRONTLIGHTING SOLUTIONS APG/A

NCV78763 LDM A – REFERENCE DESIGN K

QUICK START GUIDE & SYSTEM OVERVIEW

Document version 1.6– 29th of Aug 2016

Christiam Gasparini
System Application Engineer
Automotive APG/AAB BU - Belgium

Confidential

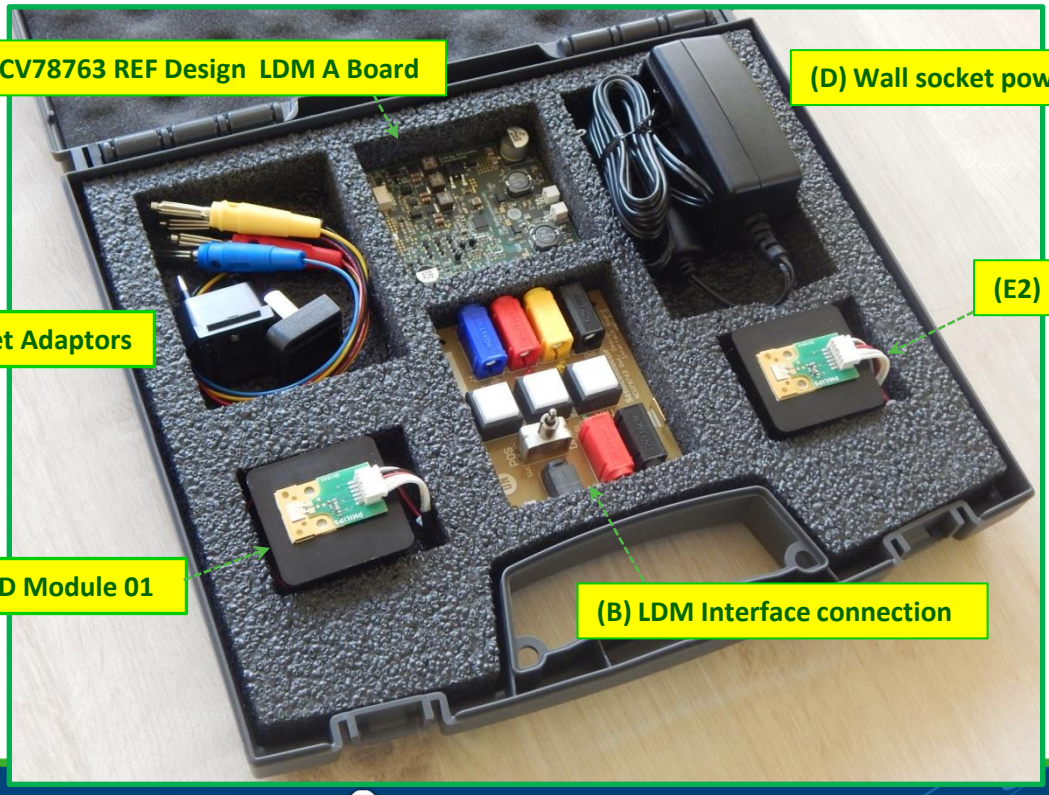
NCV78763 LDM A v1.1

Quick Start Guide

KIT OVERVIEW

NCV78763 REF DES LDM A – KIT OVERVIEW

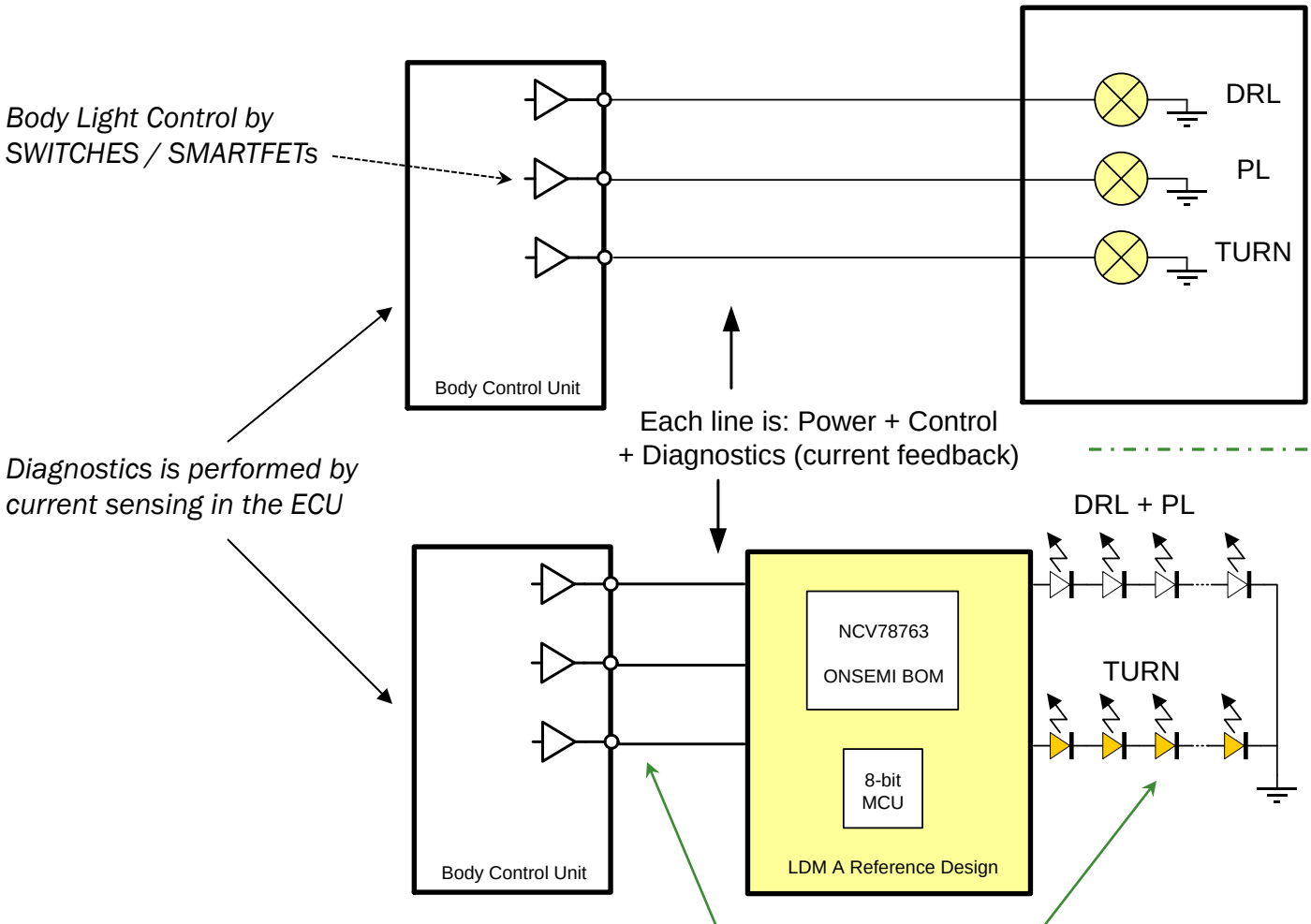
- The **NCV78763 REF Design LDM A KIT v1.1** is meant for **Autom Front Lighting Advanced Applications** for Day Time Running Li Position Light (PL) and Turn Indicator (TURN), aimed for equivalent system replacement and migration to Power LEDS.



NCV78763 REF DES LDM A – Main Features sheet

- The **NCV78763 REF Design LDM A system solution** is based on NCV78763 Power LED Driver for Front Lighting (APG/AAB BU), v **ONSEMI BOM portfolio for external power devices.**
- The module features **failure diagnostics** as open load detection, shor protection and thermal protection lock out. A low pin count 8-bit micr is embedded on board for such monitoring and control.
- The LED strings (DRL/PL) are driven according to **advanced dimming techniques** including **logarithmic** ramps analog and digital modulatio enhanced human eye sensitivity smoothness perception. The implem fully exploits the SPI bus and LED Driver settings.
- Other **key characteristics** of the NCV78763 LDM A include: **com electronics**, compatibility target with automotive bulb architectu **ONSEMI Platform design approach** for:
  a) Compatibility with a wide range of LED strings configuration without B
  b) Easily customizable to the specific system requirements.
  c) Wide supply VBAT Operating range from 5V to 20V or higher.

NCV78763 REF DES LDM A & Bulb Systems Compati



NCV78763 LDM A as Bulb to LED migration adaptor
The module inputs to outputs functionality is configurable via the embedded MCU

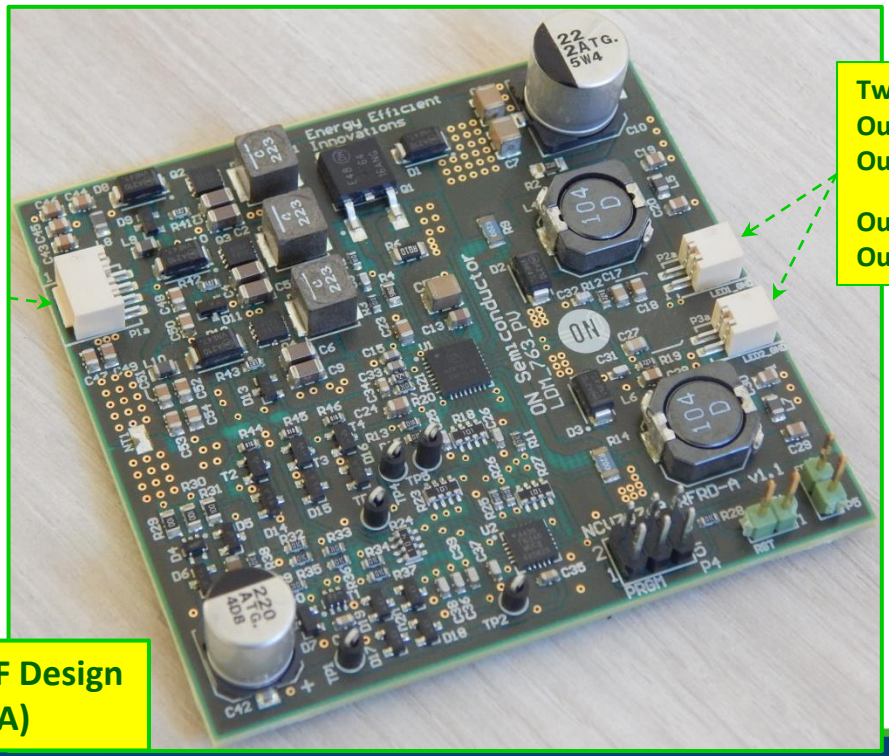
NCV78763 LDM A v1.1

Quick Start Guide

HW SETUP

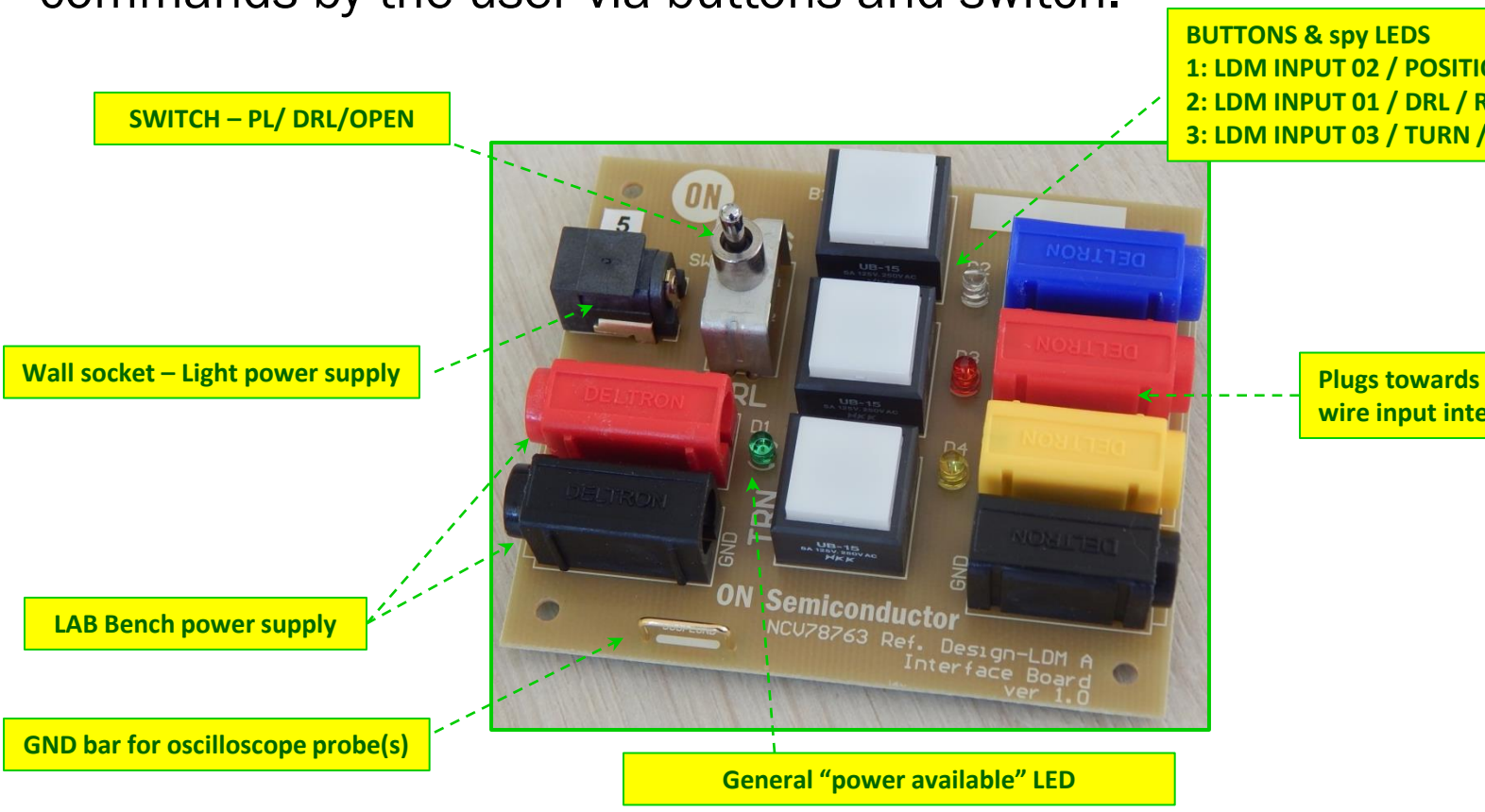
NCV78763 LDM A REF DES KIT: Main board LDM

- The **NCV78763 LDM A Board**, core of the system, is shown hereby. It
  sized to allow the outputs to drive LED strings for a total power of ab
  and up to 60V voltage.
- LED Chan 01 is dedicated to DRL and PL, controlled via logarithmic
  slopes ramp, while channel 02 performs the turn indicator (blinker) fu



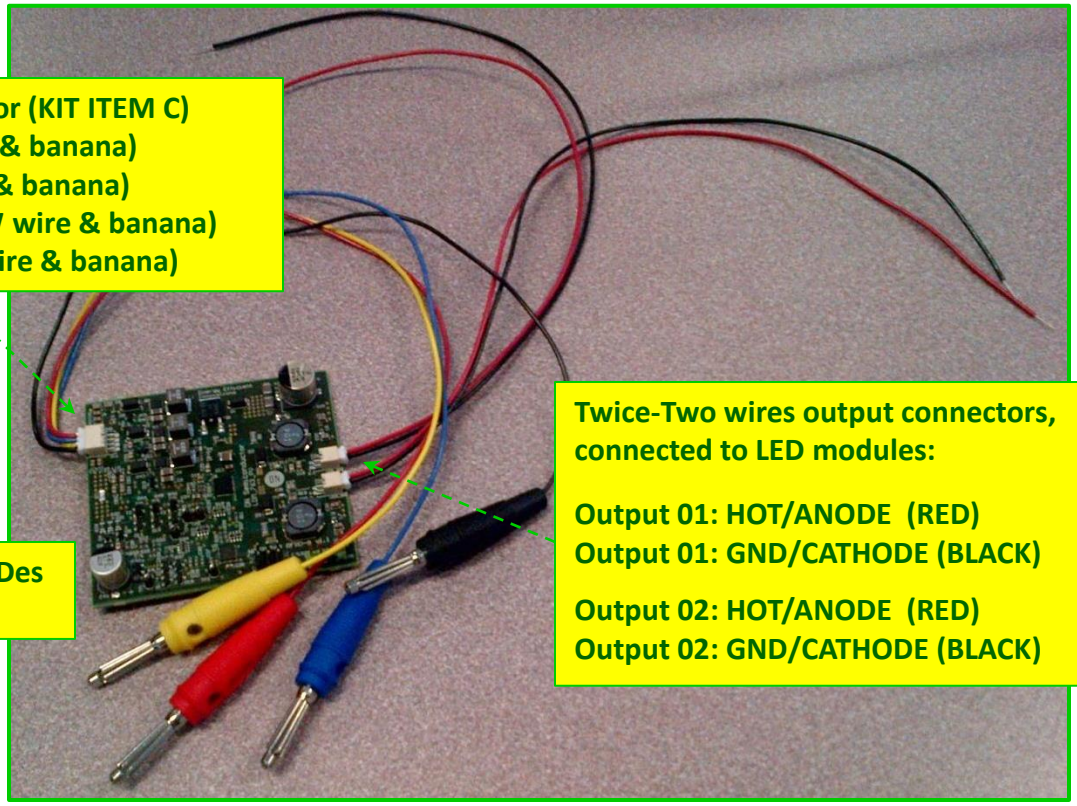
NCV78763 LDM A REF DES KIT: the LDM Interface

- The LDM REF Design A Interface (ITEM B) grants additional
  for use of an wall socket power supply and allows straigh
  commands by the user via buttons and switch.



NCV78763 LDM A REF DES KIT: Cabling & connectio

- The NCV78763 LDM A KIT modules come equipped with cab
  ITEM C) for easy interface towards a **standard bench power s**
  the official LDM REF Design A interface (KIT ITEM B):



Four wires input connector (KIT ITEM C)
Input 01 / DRL (RED wire & banana)
Input 02 / PL (BLUE wire & banana)
Input 03 / TURN (YELLOW wire & banana)
Input 04 / GND (BLACK wire & banana)

NCV78763 LDM A – REF Des Board (KIT ITEM A)

Twice-Two wires output connectors, connected to LED modules:

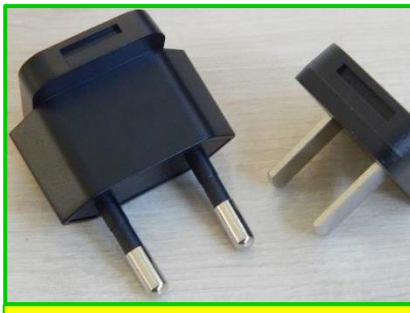
Output 01: HOT/ANODE (RED)
Output 01: GND/CATHODE (BLACK)

Output 02: HOT/ANODE (RED)
Output 02: GND/CATHODE (BLACK)

NCV78763 LDM A REF DES KIT: Power Supply and plug a

- The provided power supply can be directly plugged in the LDM int
absence of a bench power supply, or for highly portable ready-to-go d

12V/3A light power supply – KIT ITEM D



Flexible overall use wall sock
adaptation (E.G. EU/US plug

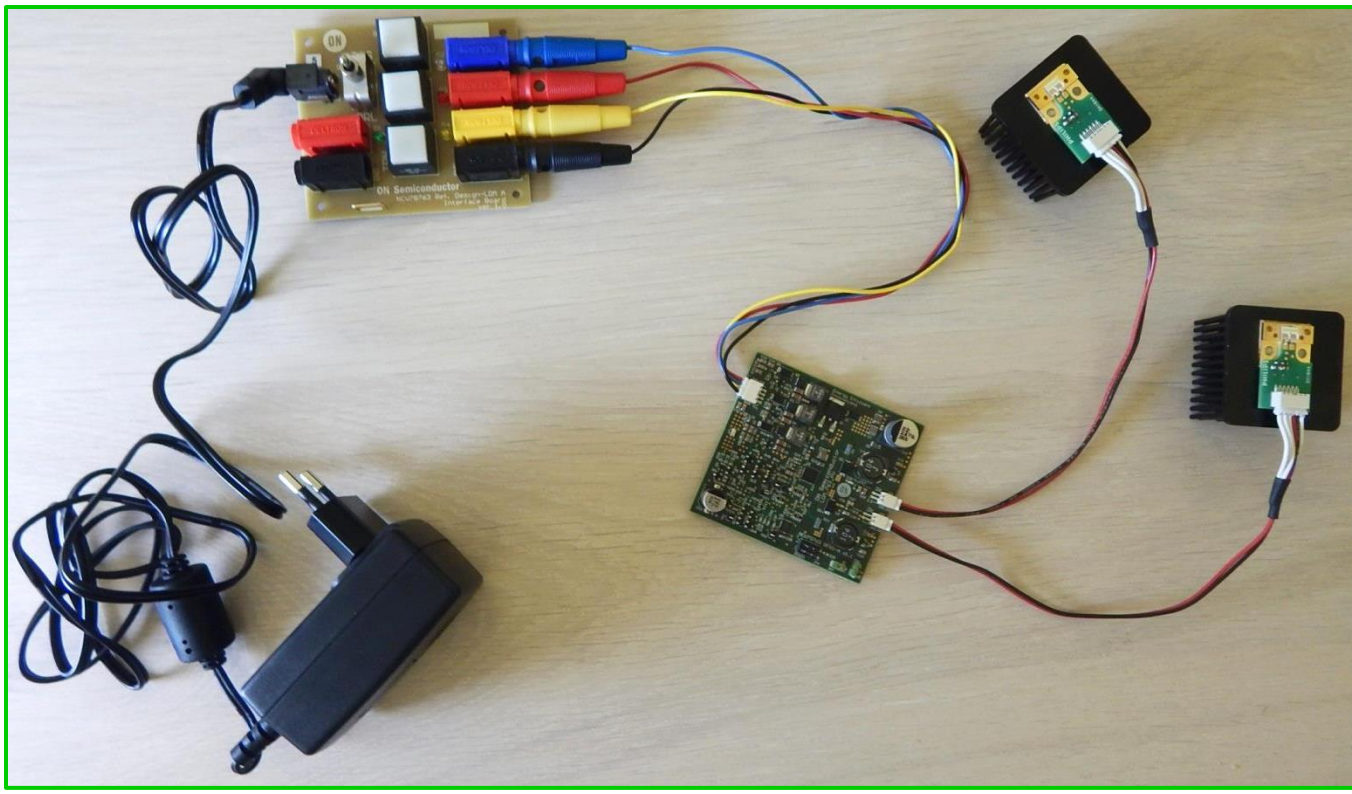
NCV78763 LDM A REF DES KIT: Power LED Modules

- For reference and immediate use, the KIT contains commercial Au
  LED Modules (Philips – GH1644). Two samples are available per KIT
  plates are equipped a customized compact heatsink and cabli
  plugged to the NCV78763 LDM A.

Power LED Modules – KIT ITEMS E1/E2

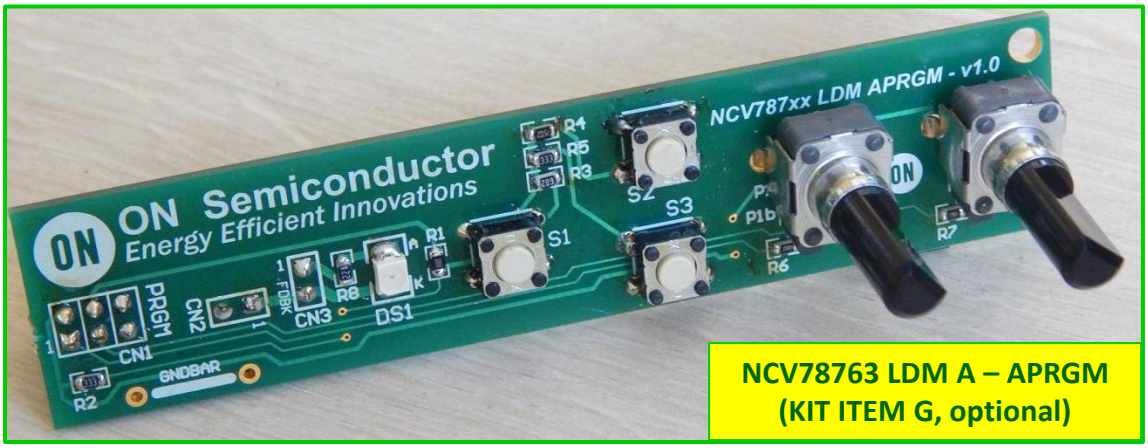
NCV78763 LDM A REF DES KIT: the entire setup system

- The connections of all previous elements brings to the following



NCV78763 LDM A REF DES KIT: The APRGM (optional)

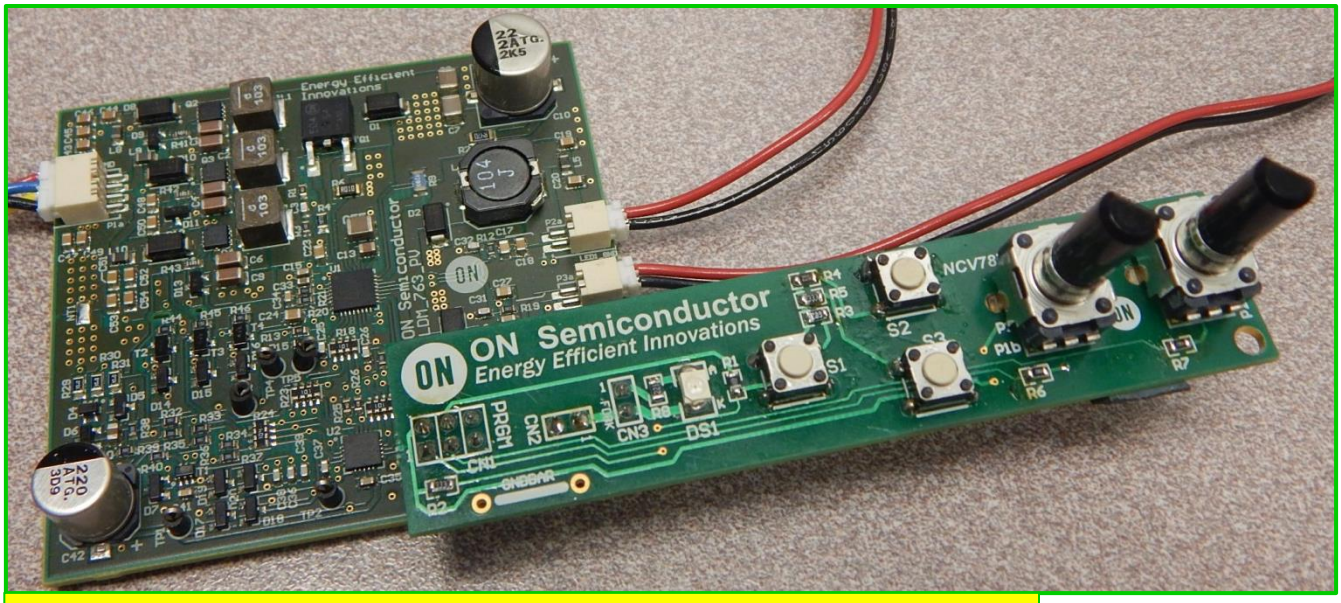
- The standard **factory firmware** is set to drive the default KIT LED mo 10W power in steady state (around 580mA DC current). Using a diffe string below 22V, the same current will be applied.
- **The system embeds enhanced feature**, allowing to adapt paran **completely different string and/or headlight** per means of the pro shown (APRGM). The current levels for channels 01 and 02 are adj the two respective trimmers. The microcontroller takes care of safet items such as power level and voltage adjustments, current limita EEPROM memory save.



NCV78763 LDM A – APRGM
(KIT ITEM G, optional)

NCV78763 LDM A REF DES KIT: APRGM – Setup

- In order to allow the current and LED strings programming proce APRGM board, when the system is in **power off**, must first be plugge three **LDM A main board** connectors “P4” “S1” and “P5” (respecti CN2 and CN3 in APRGM).



NCV78763 LDM A – APRGM: LED current programming procedure setup

NCV78763 LDM A REF DES KIT: APRGM – Procedure #1

- After setup, the LED current programming procedure is actually enter
  powering up the system, the button S3 is kept pressed. Details on the proc
  reported below.

1. When entering programming procedure, the **LED DS1 will start blinking**
   button S3. Before driving current into the LED strings, the microcontroller wi
   the user brings the trimmers P1 and P2 (current setting knobs) to the
   position (counter-clock-wise) to preselect the minimum current level: whe
   position is attained, the LDM will drive currents in both LED strings. At any
   sequence can be exited without save by pressing “S2”;
2. Adjust the current in the LEDs. The right setting can be found by hum
   perception such as lighting of a dark room (never look directly in the LED
   potential avoid health hazard or dazzling!), light intensity measurement,
   measurement probe, or series multimeter in current sensing mode;
3. Once the desired current is found, new settings are save by pressing “S1”;
4. As an alternative, original factory settings can always be restored with the“S3

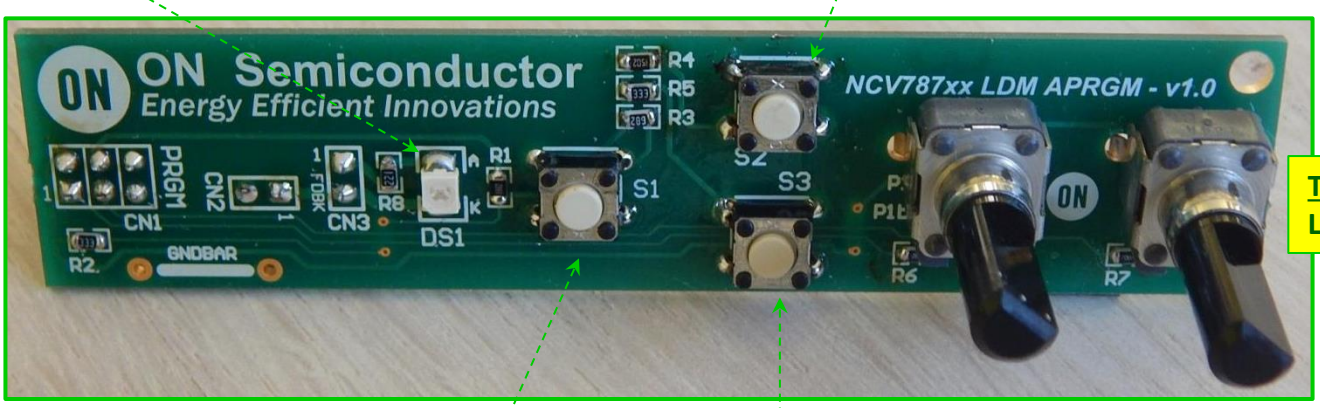
Please note that **any LED string between 2V and 60V** can be used. The firmwar
the current so that 10W maximum per channel can be delivered.

NCV78763 LDM A REF DES KIT: APRGM – Procedure #2

- Please refer to the following picture for a graphical explanation o current setting programming procedure.

LED DS1:
- User feedback (blink code)

Button S2:
- Exit immediately without saving when programming procedure is



Trimmer P
LED Chan

Button S1:
- Exit programming feature and Save new user settings

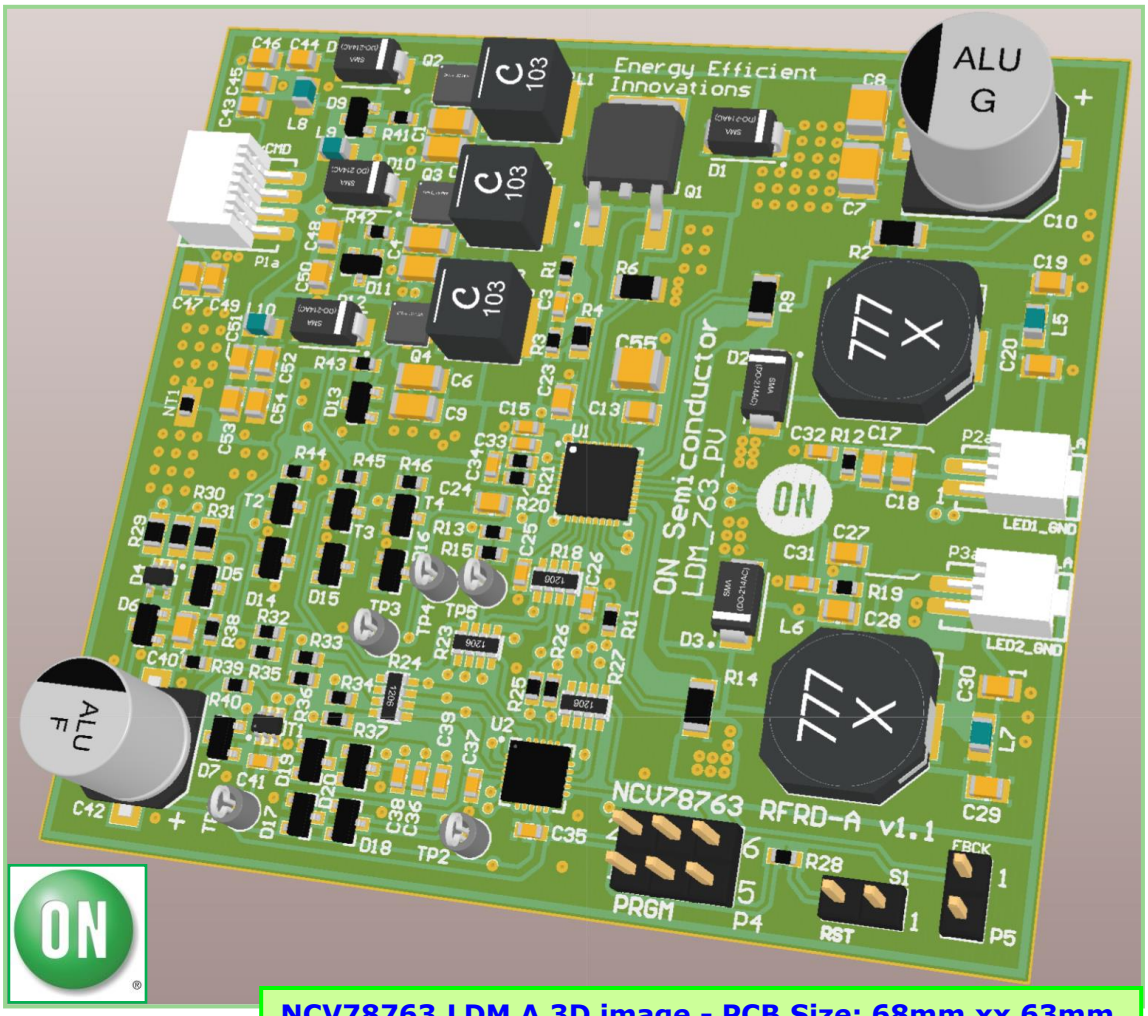
Button S3:
- Enter procedure while powering up
- Save factory settings when programming procedure is r

NCV78763 LDM A v1.1

System Overview

Design

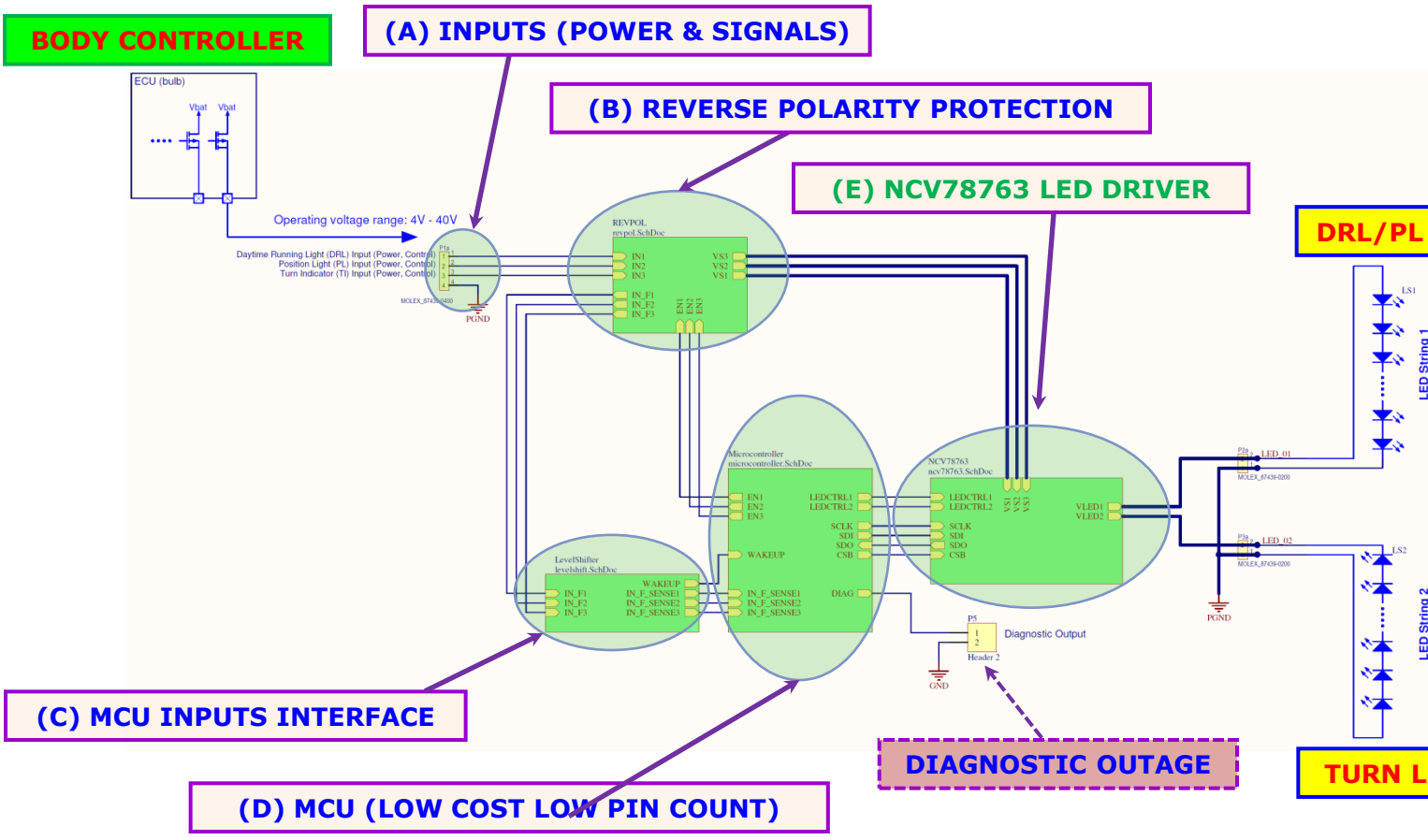
NCV78763 LDM A REF DES: PCB Board 3D Overview



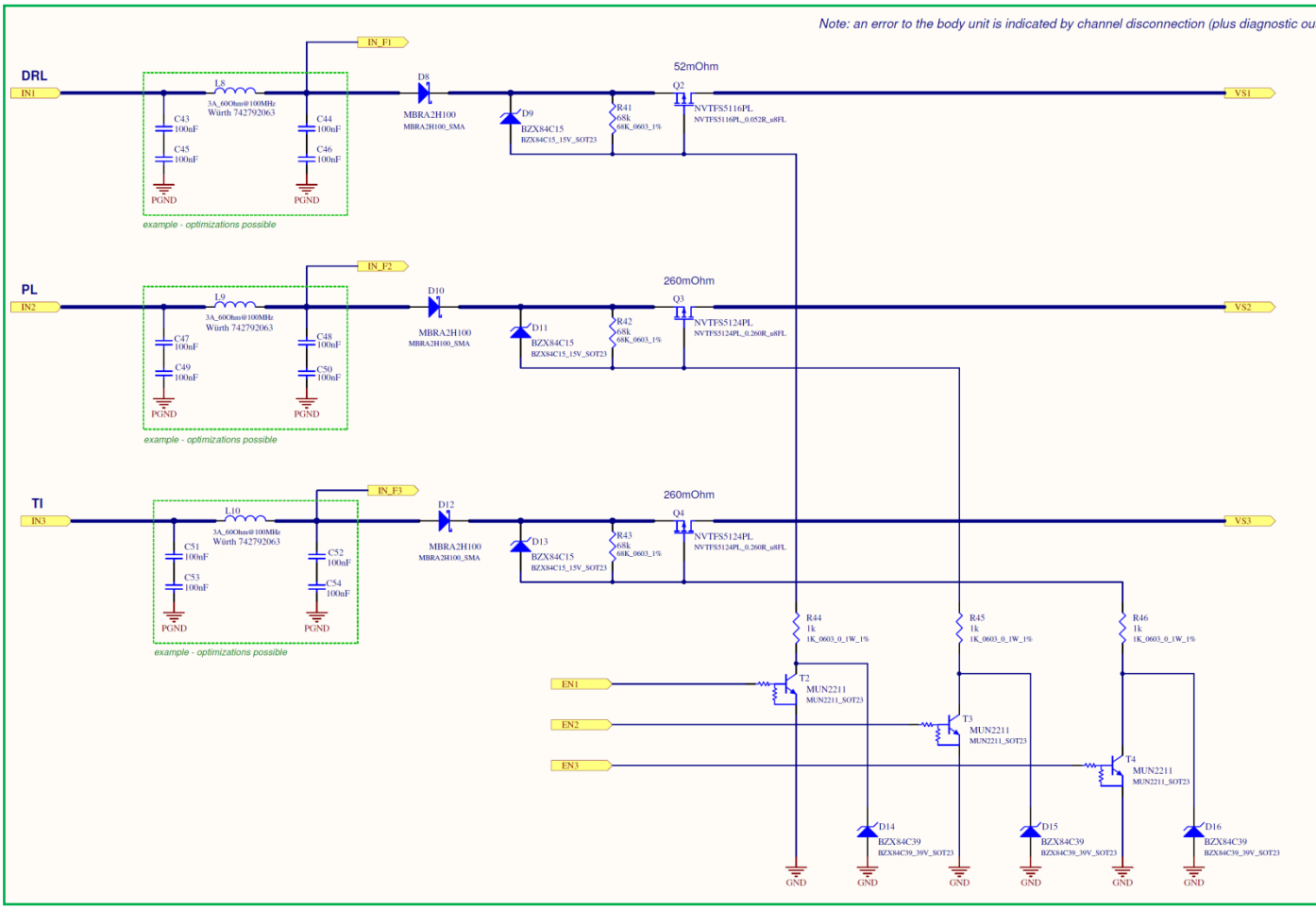
NCV78763 LDM A 3D image - PCB Size: 68mm xx 63mm

NCV78763 LDM A REF DES: Schematics (top-level view

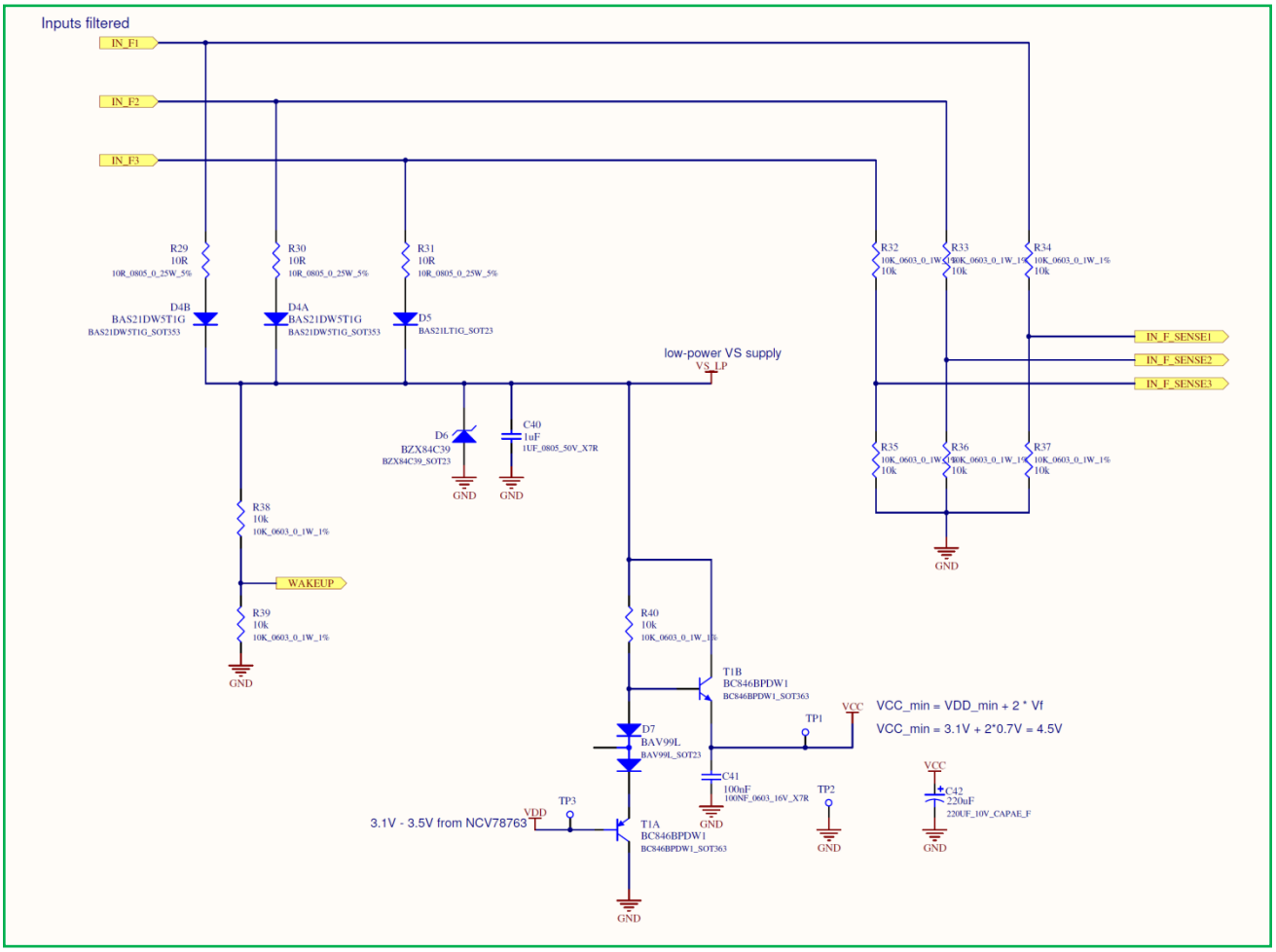
The LDM A REF DES v1.1 top level block schematics view is shown be



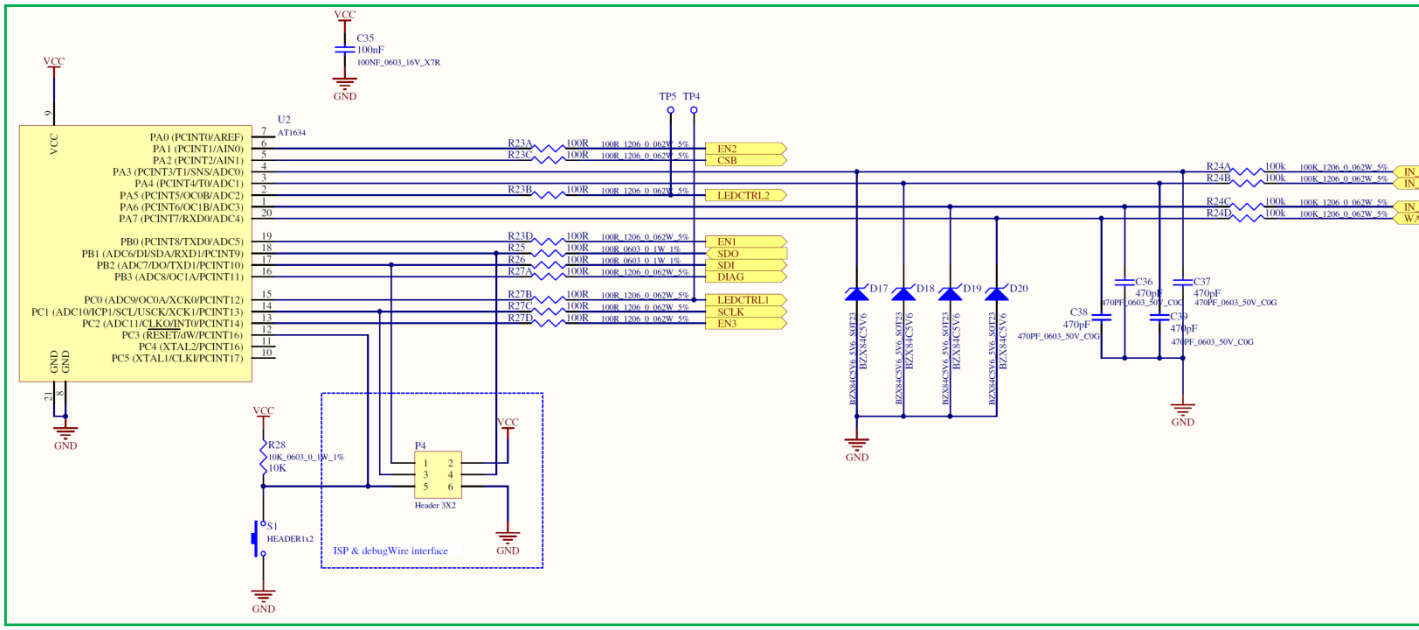
NCV78763 LDM A REF DES: sub-circuit #B: reverse b



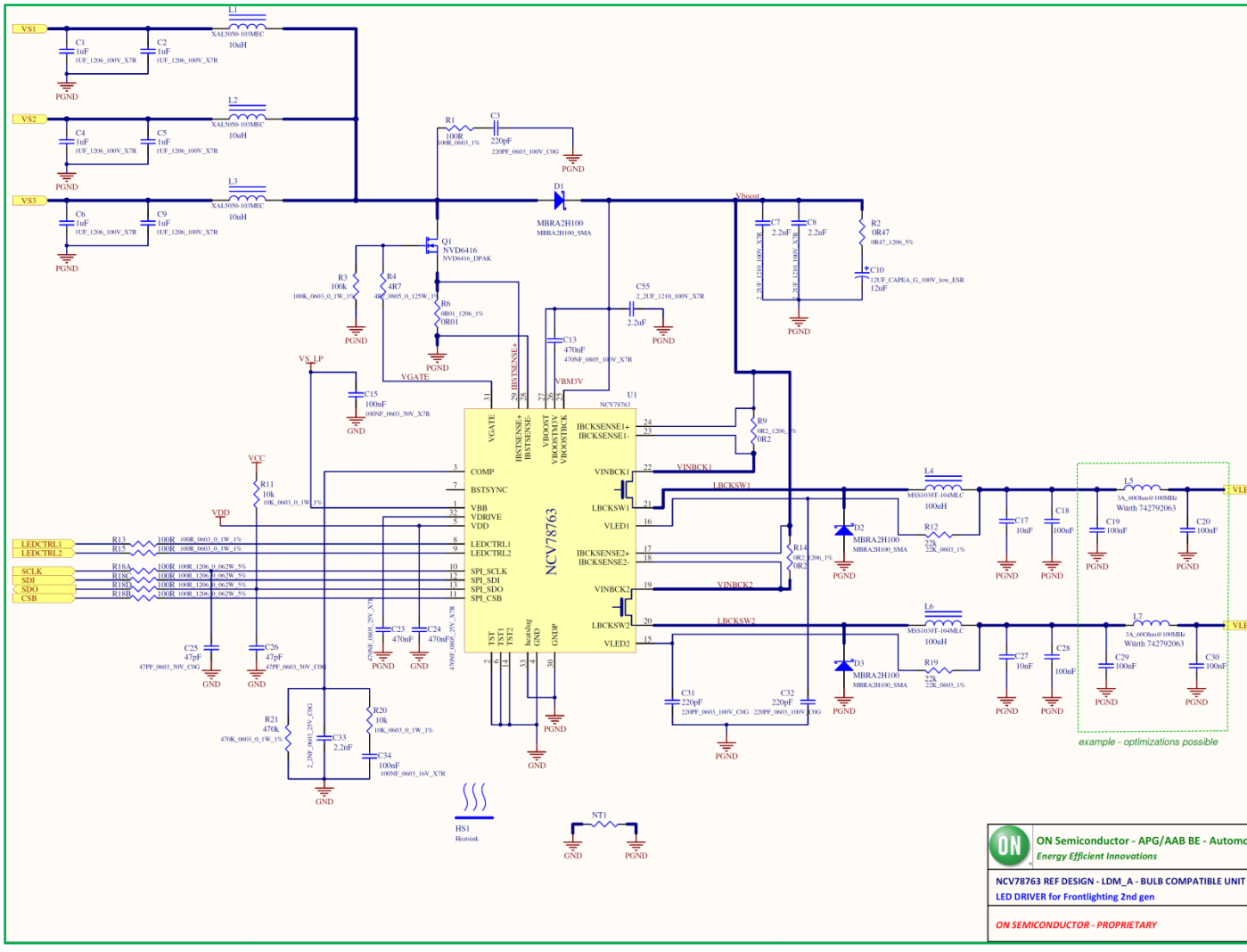
NCV78763 LDM A REF DES: sub-circuit #C: MCU inte



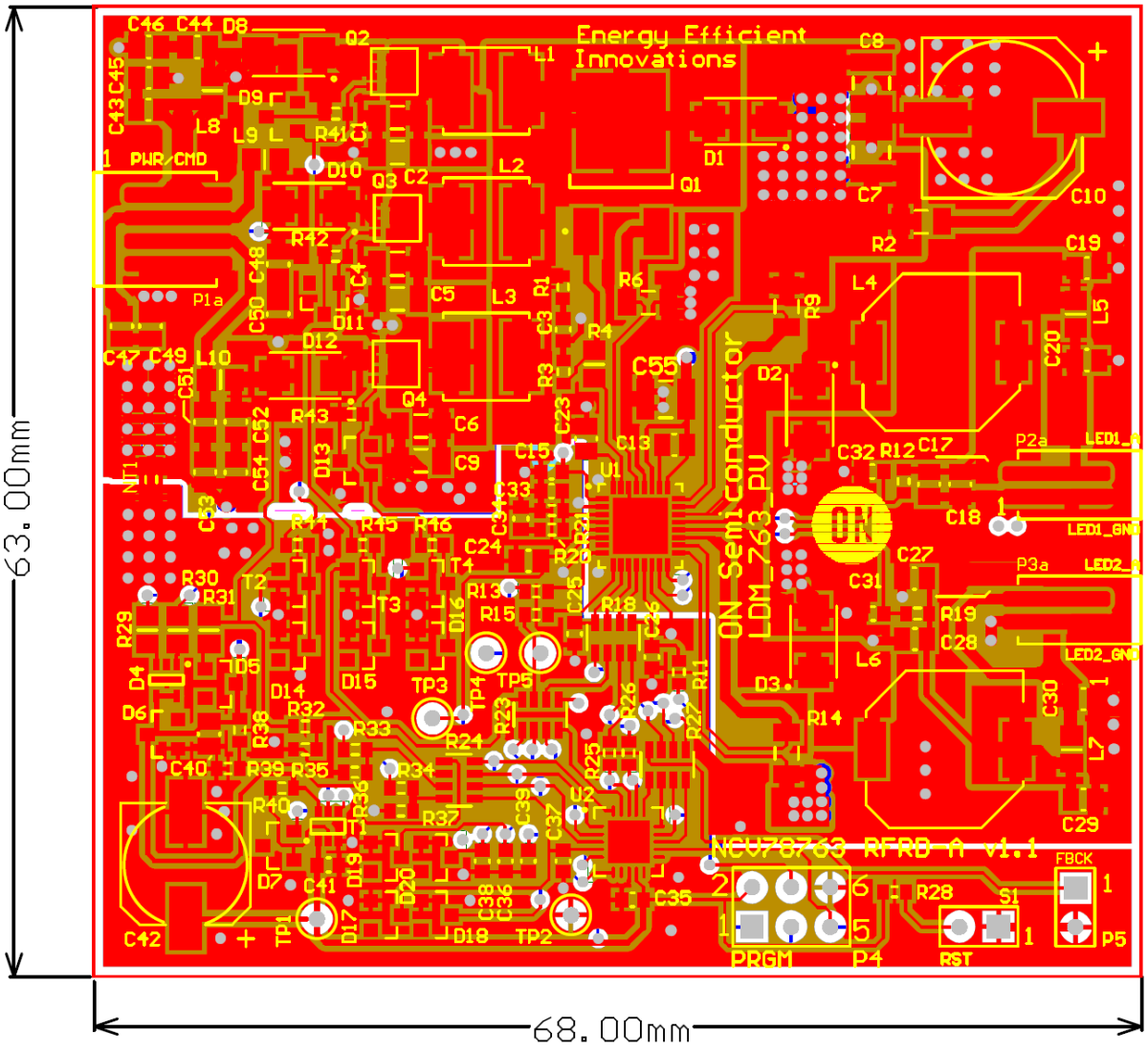
NCV78763 LDM A REF DES: sub-circuit #D: MCU



NCV78763 LDM A REF DES: sub-circuit #E: NCV7876



NCV78763 LDM A REF DES: PCB (top side)



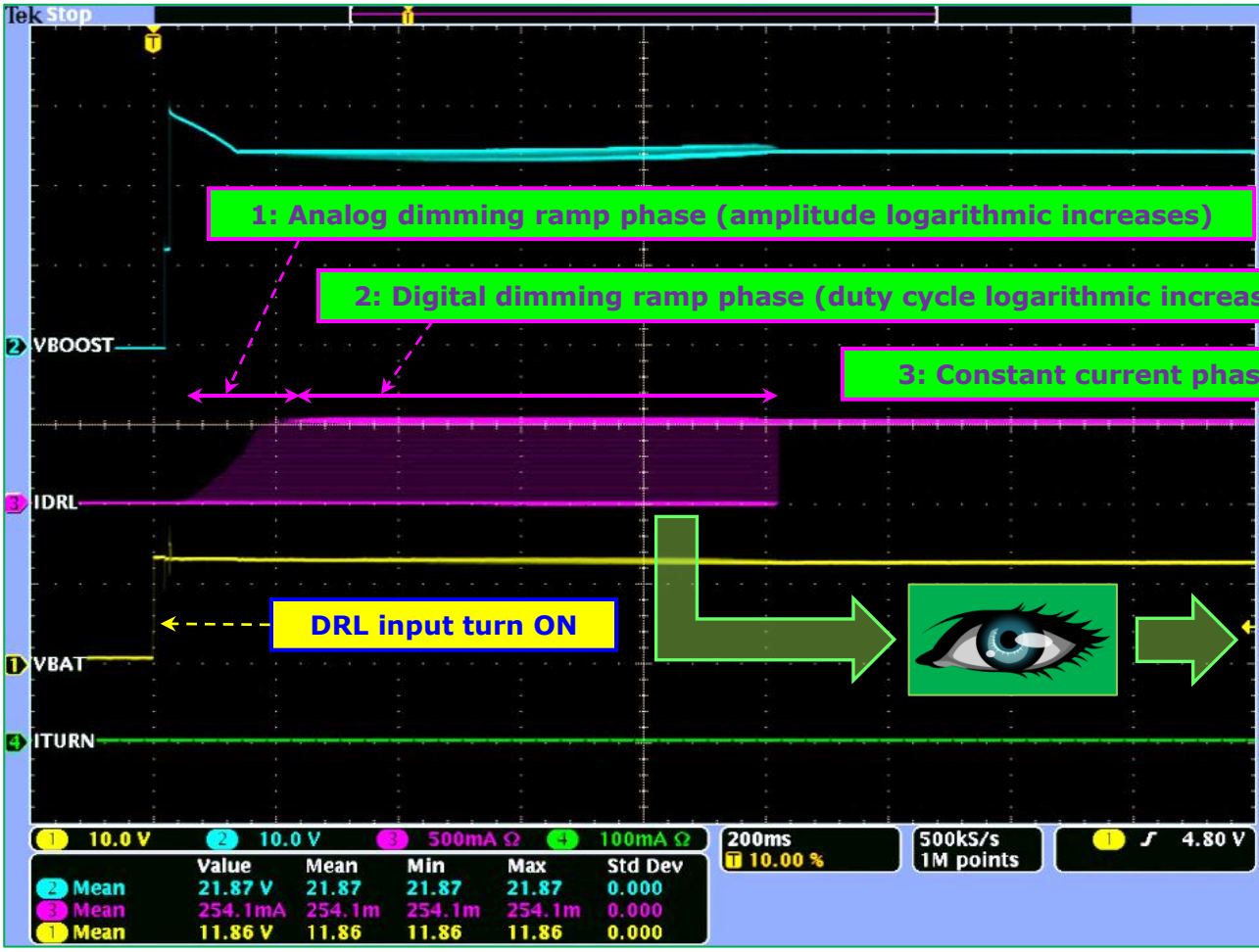
NCV78763 LDM A v1.1

System Overview

Measurement Report

Measurement report: *DRL ramp turn-o*

- At power on (line #1 = DRL input), the DRL led string is ramped to the nomin value by combining analog and digital dimming (logarithmic mode is shown).



System steady state stability (low VBAT = 7

System steady state stability (nom VBAT =

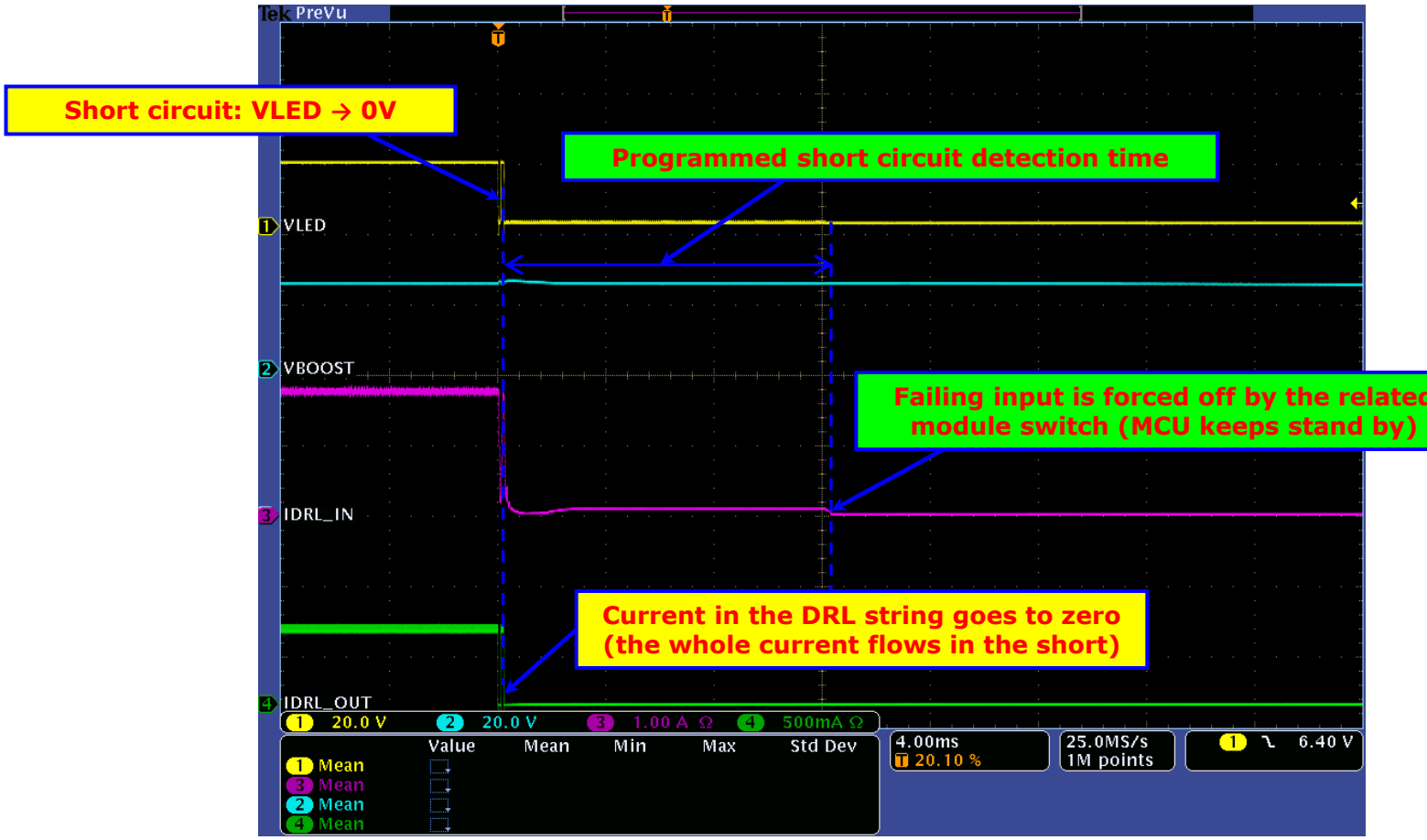
System steady state stability (nom VBAT =

PSRR stability (VBAT = 10V >>> 20V)

PSRR stability (VBAT = 20V >>> 10V)

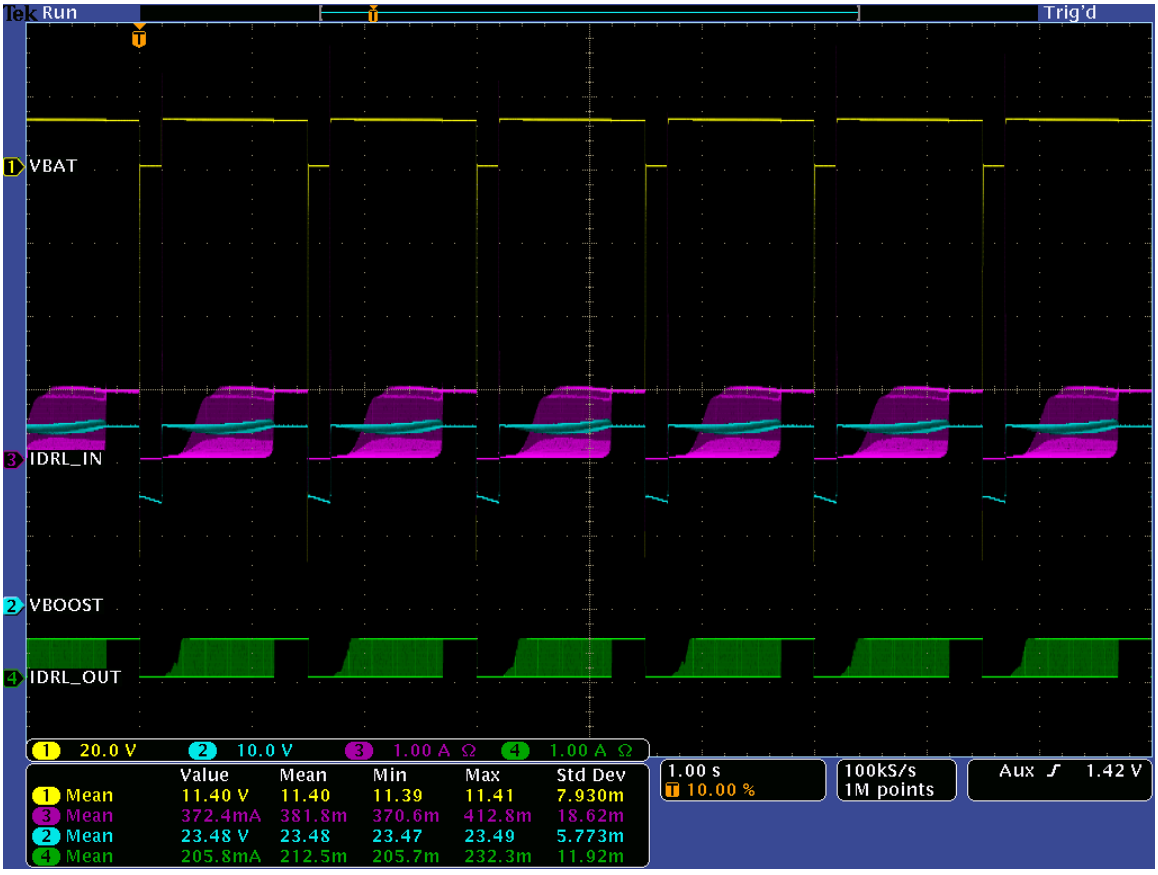
Diagnostic & specific input turn-off

- In this diagnostic detection example, the output VLED is shorted to G
- The module turns off the input to flag to the body controller the failu



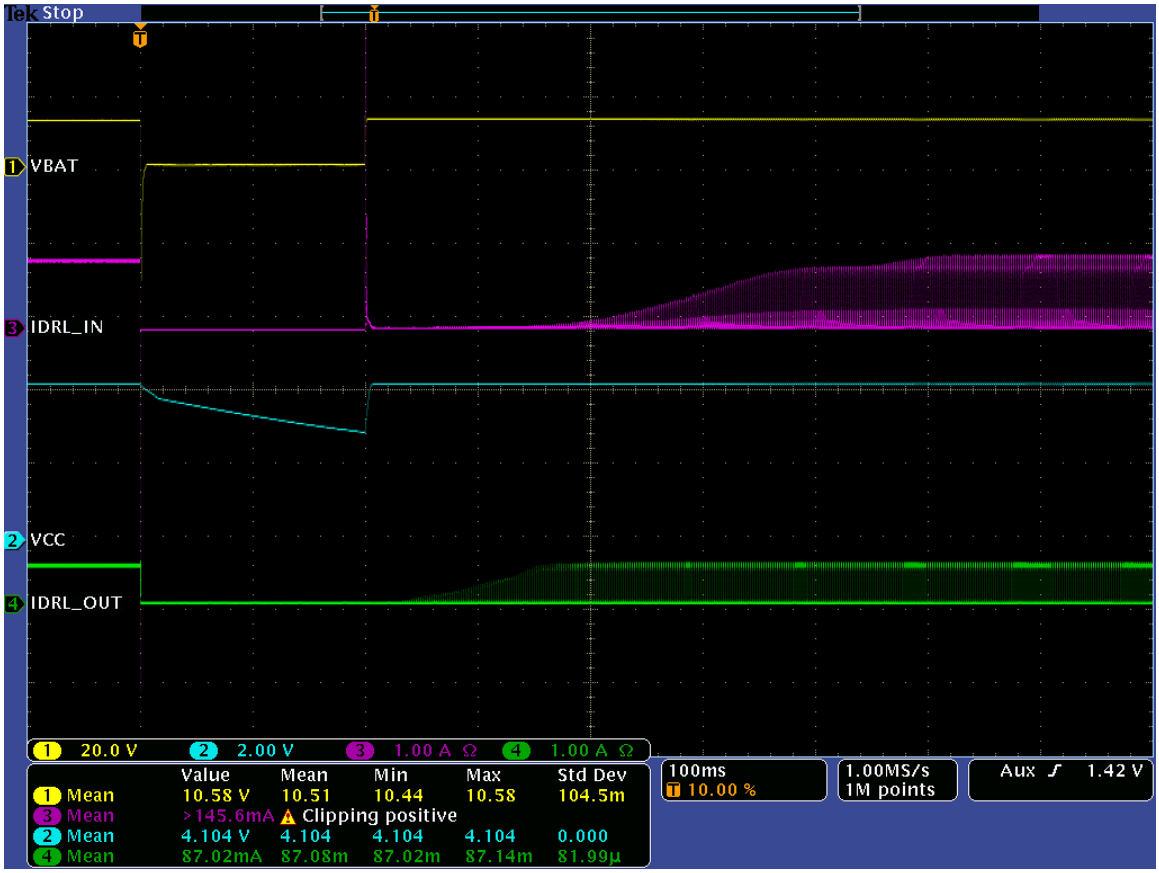
ISO 7637 pulses (type 1)

- The LDM A module is validated through the standard ISO 7637 pulses
  concerns pulse type 1, it is shown how it correctly restarts normal op
  each pulse iteration.



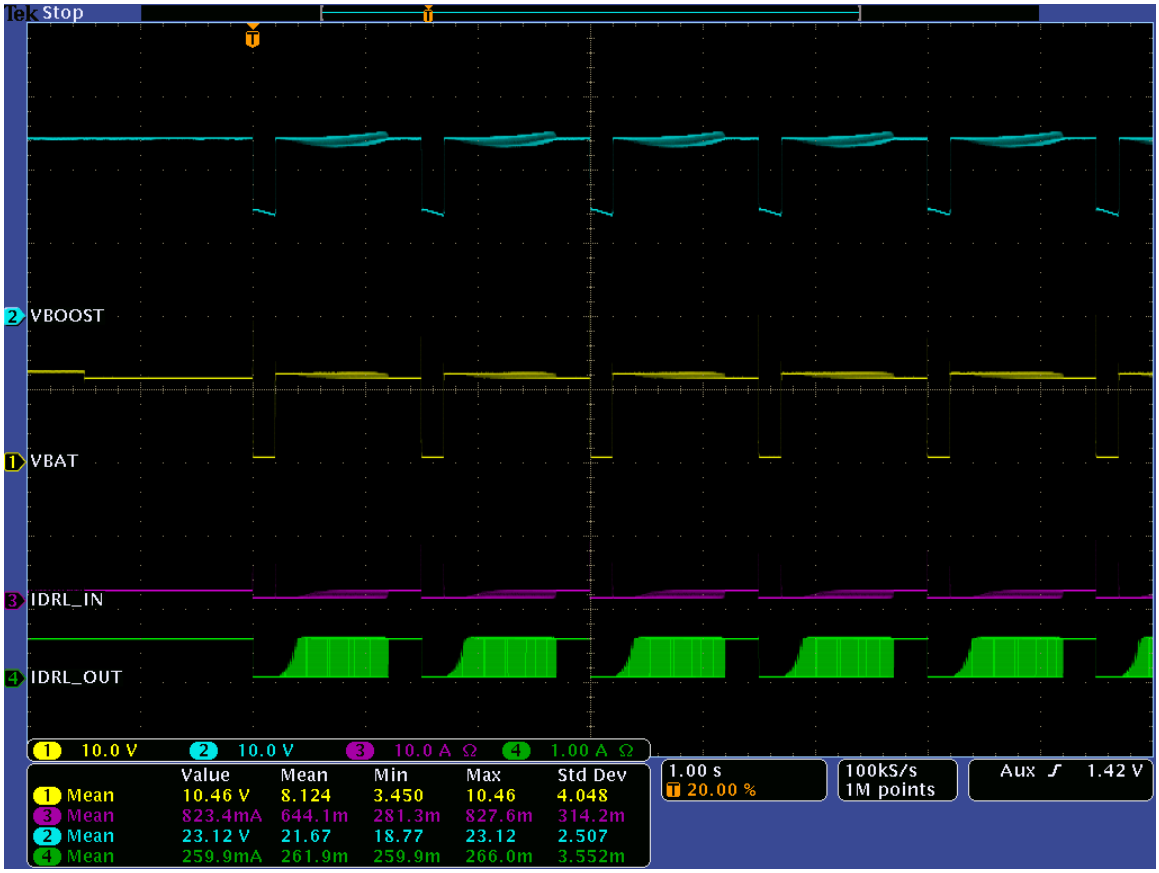
ISO 7637 pulses (type 1 - ZOOM)

- The module correctly restarts normal operation at each pulse
  Note: No reset from the MCU.



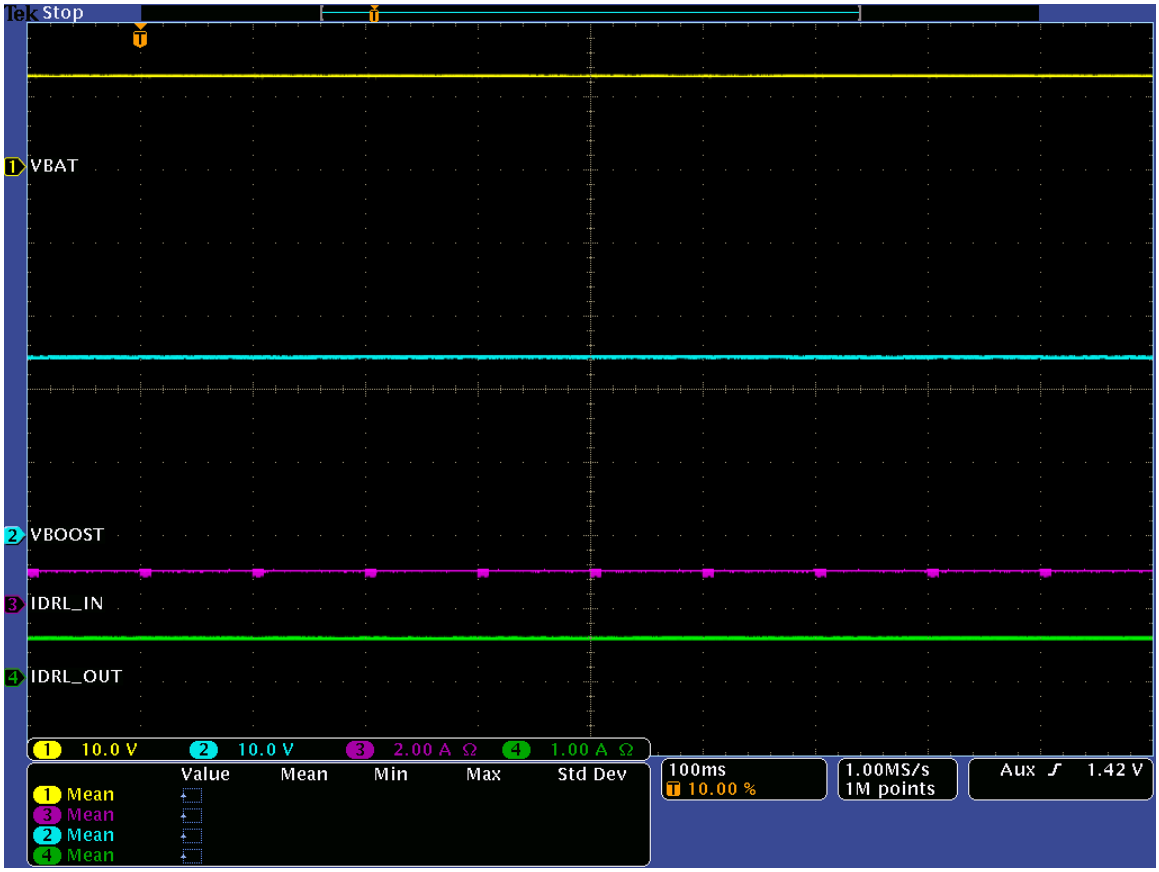
ISO 7637 pulses (type 2a)

- Also in this case, the module correctly restarts normal operation at pulse iteration.



ISO 7637 pulses (type 3a)

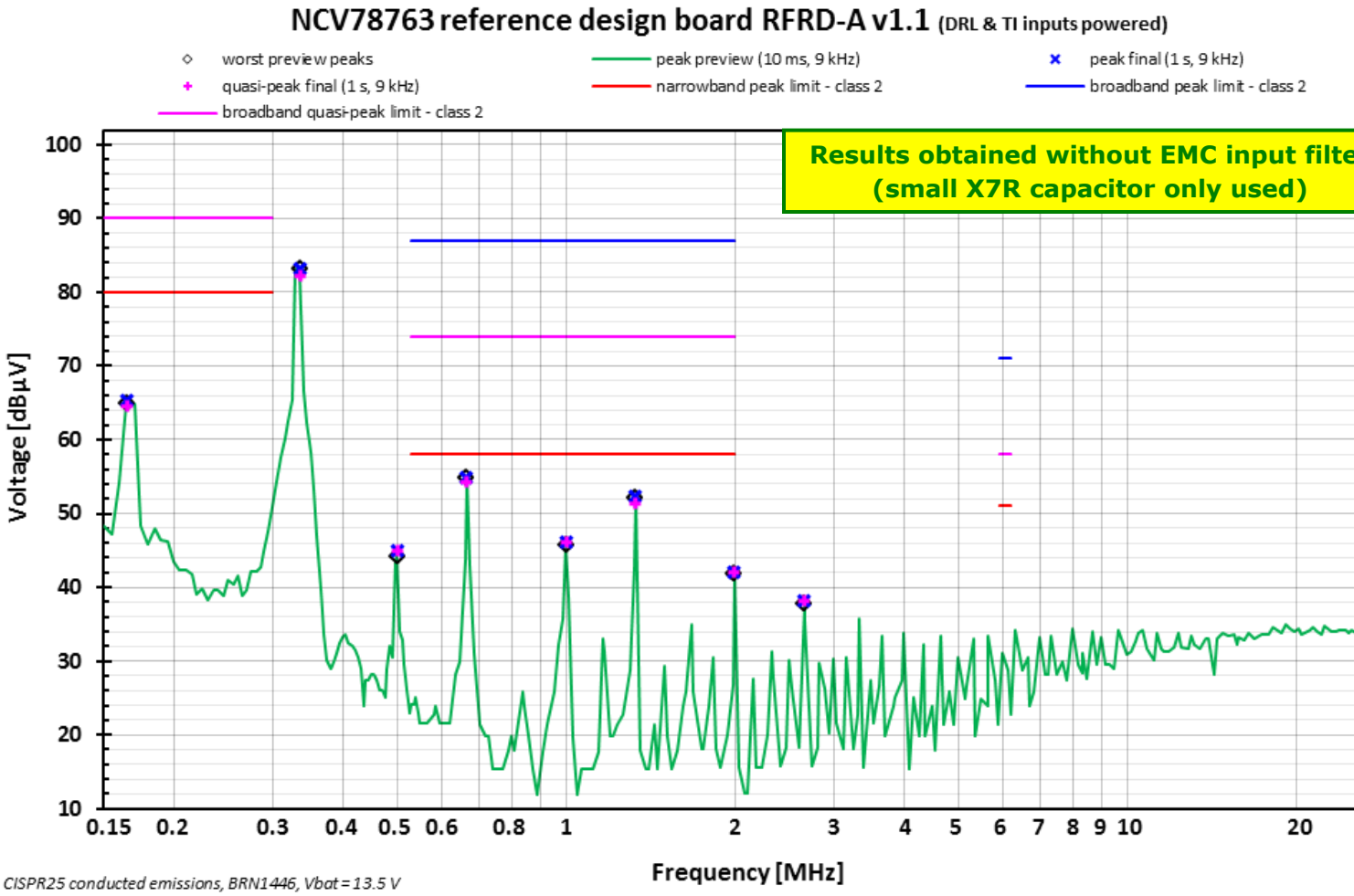
- The highest amplitude disturbance (-150V) does not minimally affe module operation.



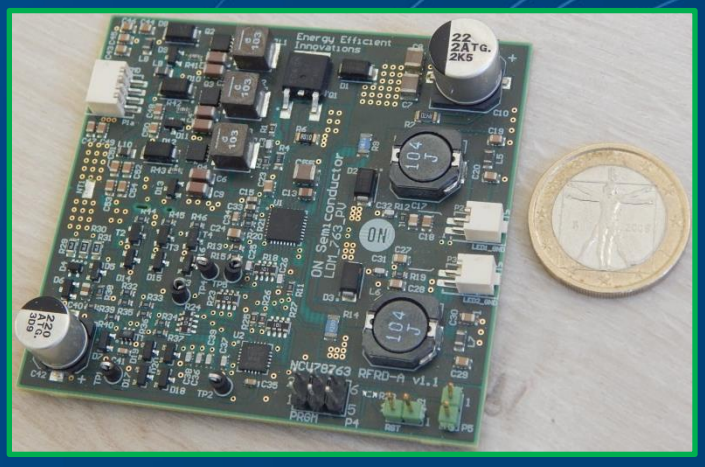
ISO 7637 pulses (type 3b)

- The highest disturbance (+150V) does not affect at all the module c

EMC conducted emission CISPR25



CISPR25 conducted emissions, BRN1446, Vbat = 13.5 V



ON Semiconductor®

LED FRONTLIGHTING SOLUTIONS AAE

NCV78763 LDM A – QUICK START GUIDE - OVER

Any question or advice?

Our staff will be glad to provide all necessary information and colle
your valuable inputs.

Confidential

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for LED Lighting Development Tools ***category:***

Click to view products by ON Semiconductor ***manufacturer:***

Other Similar products are found below :

MIC2870YFT EV ADP8860DBCP-EVALZ LM3404MREVAL ADM8843EB-EVALZ TDGL014 ISL97682IRTZEVALZ LM3508TLEV EA6358NH MAX16826EVKIT MAX16839EVKIT+ TPS92315EVM-516 MAX6956EVKIT+ OM13321,598 DC986A DC909A DC824A STEVAL-LLL006V1 IS31LT3948-GRLS4-EB 104PW03F PIM526 PIM527 MAX6946EVKIT+ MAX20070EVKIT# MAX21610EVKIT# MAX6951EVKIT MAX20090BEVKIT# MAX20092EVSYS# PIM498 AP8800EV1 ZXLD1370/1EV4 MAX6964EVKIT TLC59116EVM-390 1216.1013 TPS61176EVM-566 TPS61197EVM TPS92001EVM-628 1270 1271.2004 1272.1030 1273.1010 1278.1010 1279.1002 1279.1001 1282.1000 1293.1900 1293.1800 1293.1700 1293.1500 1293.1100 1282.1400