1. Title:

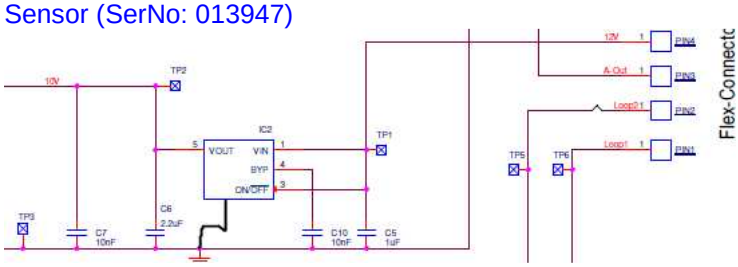
LP2985-10DBVR high Current after slow rising Vcc

2. Carried out by:

R.Pieper

3. Object of research:

Sensor (SerNo: 013947)



LDO LP2985-10DBVR

4. Reason of research:

During the mass production there was a high rate of failure parts which are connected to batch with of LDO's date code 1649.

5. Outcome & conclusion:

We think that there is a failure in the voltage regulator. Nothing was changed, only the date code of the LDO. After we have used parts with a new date code the error was present. With LDO's of the old date codes it was not possible to generate this failure.

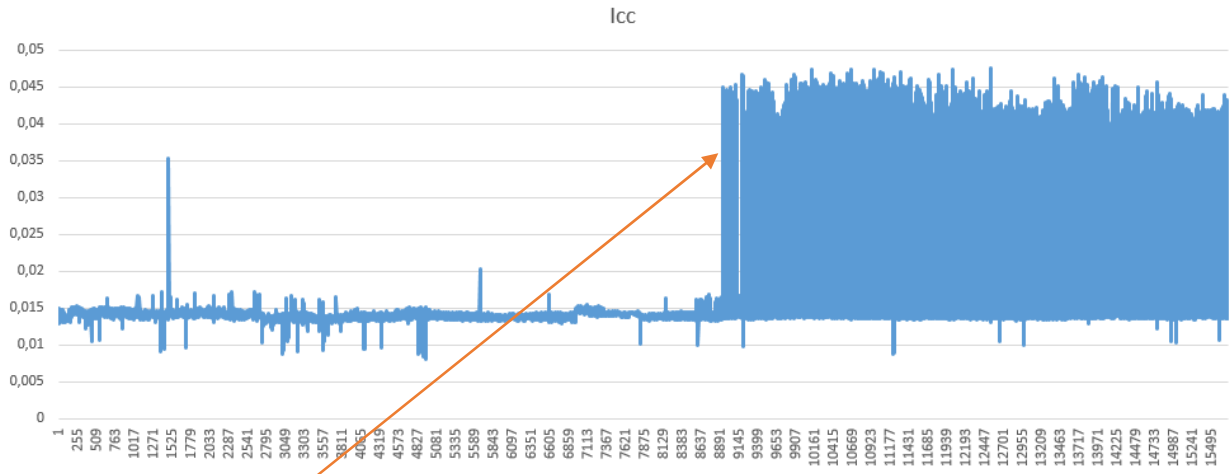
6. Distribution

AB, SL, TD, StM, MiK
TI-Support-Team

7. Execution & results:

Data analysis of production data

During the End test we apply a ramp up voltage which increases to 12V DC. After this ramp we log the current Icc.

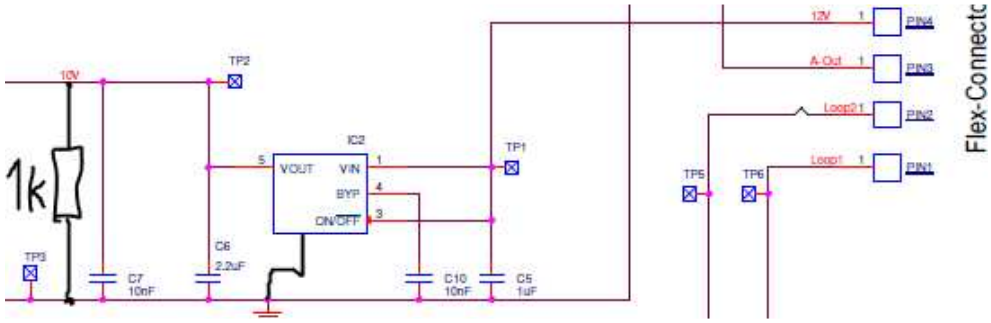


In this figure we see the input-current of approx. 15k Sensors, shown over time.
At the 20th of February we have seen this failure with a current of approx. 40mA the first time.
When we do an second run on the test system with the same sensor we often see a normal operation.

Measurements at a defect sensor (SerNo: 013947)

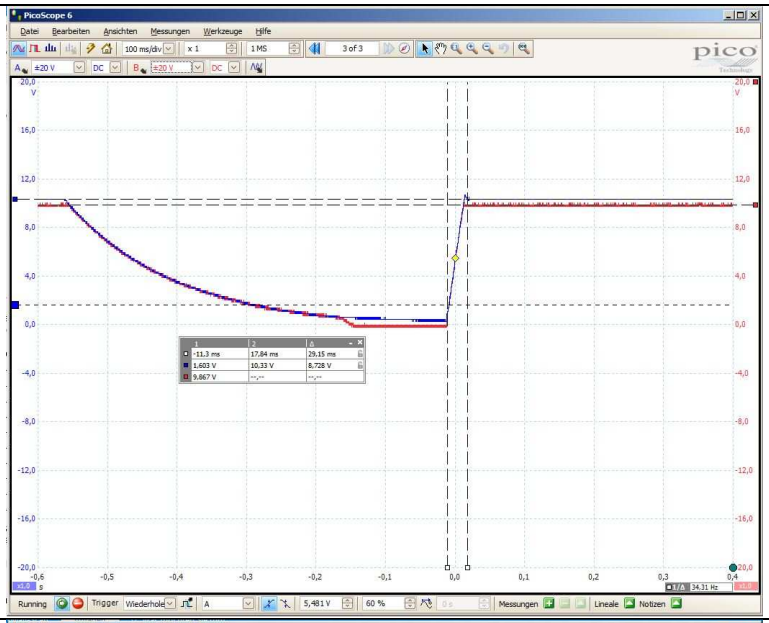
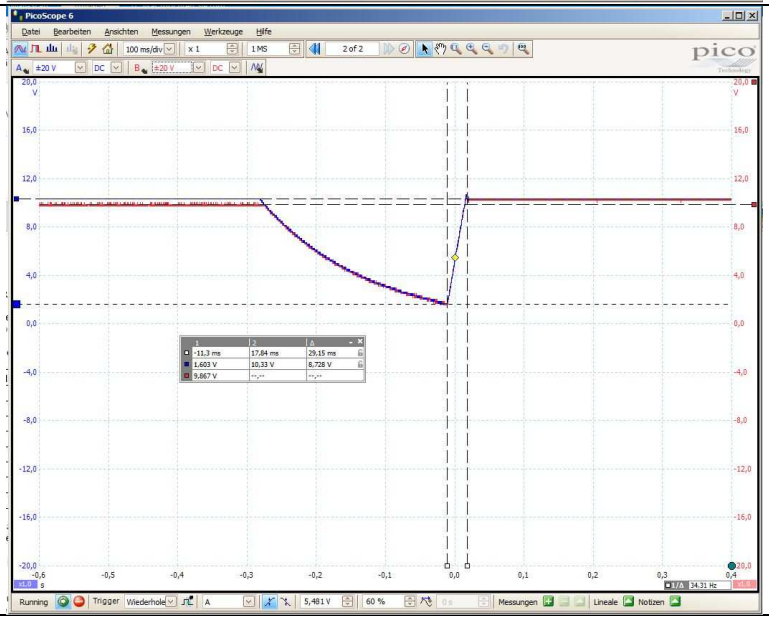
Setup:

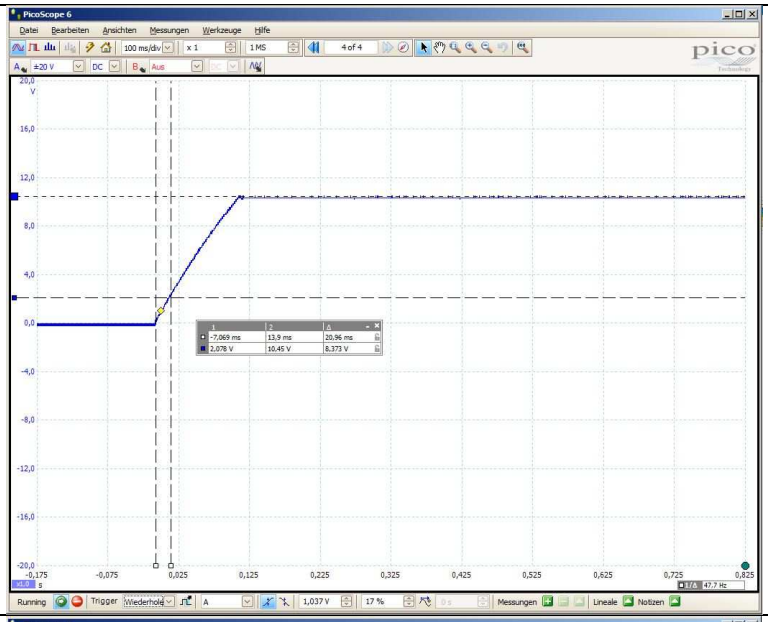
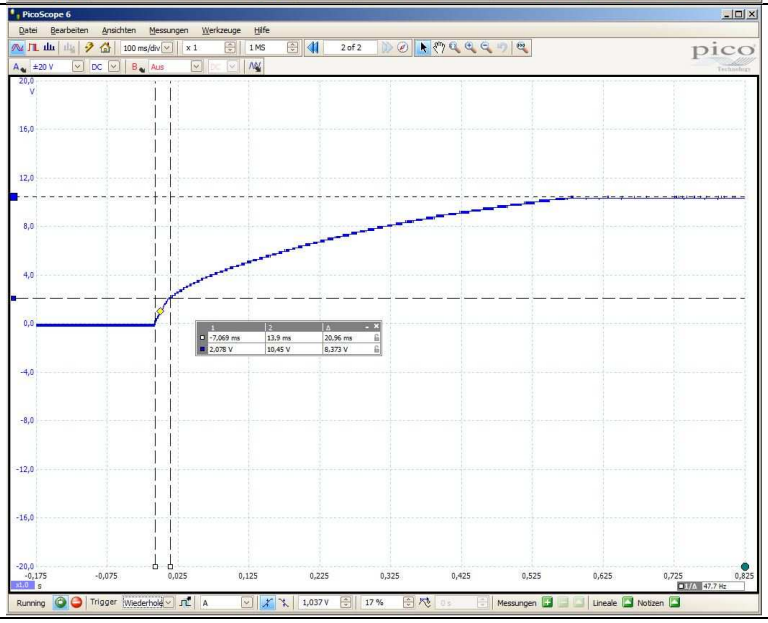
- Supply Vcc=10,5V
- Blue = Input Voltage (TP1)
- Red = Output Voltage (TP2)
- The output to the sensor electronic was disconnected and was replaced with an working resistance of 1k ohm.

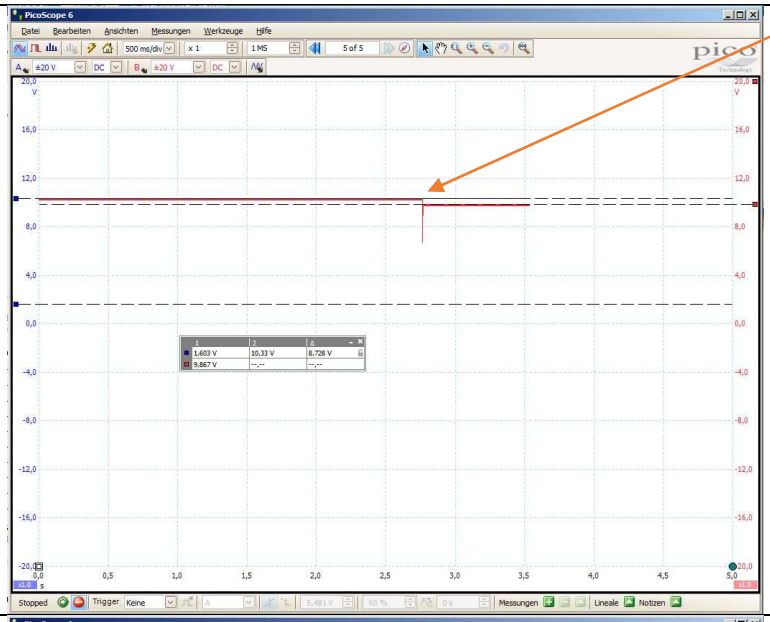
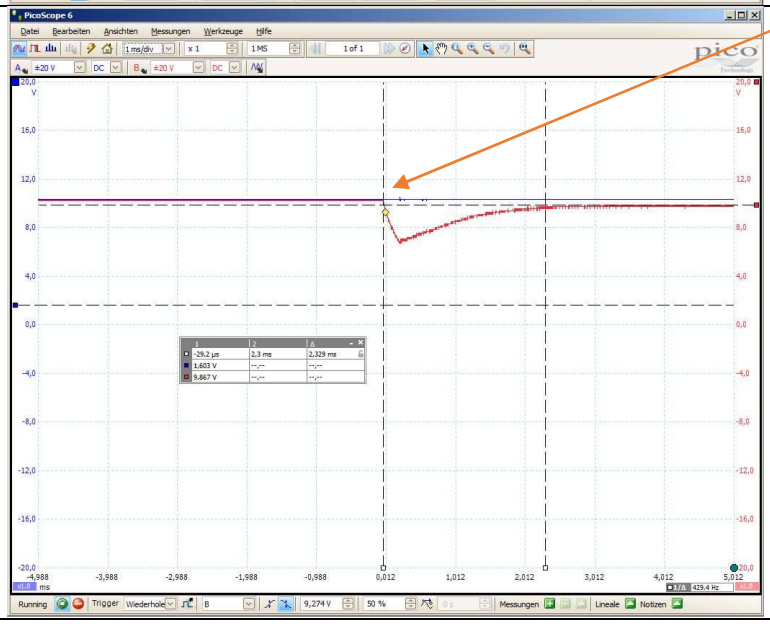


(Pin2 is not shown in the schematic because GND-Pins are automatically connected)

After many start-ups we see two states of working:

Start-up OK Power supply current limit of 150mA		Output is OK (10V) Input current = 10mA
Start-up not OK Power supply current limit of 150mA		The Output is nearly the same as the Input. This happens nearly every time when the Input voltage comes back when the input voltage is approx. 1,6V. Before Voltage drop: Input current = 10mA Output Volt.= 10V After the Voltage drop: Input current = 30mA Output Volt.= 10,45V

Start-up OK Power supply current limit of 40mA		The curve is nearly linear and normal. Input current = 10mA Output Volt.= 10V
Start-up not OK Power supply current limit of 40mA		After the input voltage reaches a level of 2V, an additional current inside the LDO begins to flow. Input current = 30mA Output Volt.= 10,45V

LDO in fail state		We applied a cooling spray to the LDO. With a short cooling the LDO switches to normal operation.
LDO in fail state With a higher resolution		With a short cooling the LDO switches to normal operation.

Then we have connected the On/OFF-Pin to an external Voltage of 5V. But this configuration shows the same bad results.

The parts that have been used during the production at the EMS:

Incoming @ EMS	Date Code TI	quantity
15.03.2017	1649	3.000
15.03.2017	1649	3.000
19.01.2017	1649	3.000
12.01.2017	1649	3.000
04.01.2017	1610	3.000
17.04.2015	1501	3.000
17.04.2015	1436	3.000
24.03.2015	1436	3.000

We think that the first failure part was built with the new batch with date code 1649.

Chip marking of the LP2985 with date code 1649: