Q1:

Regarding the inrush part, based on your reply, it is recommended to connect the public version to the actual load and verify the effect.

When verifying the inrush function, use an electronic load machine in CC Mode or CR Mode, and you may not be able to verify the actual effect because it will be different from the actual load.

At this time, if I want to verify the effect of DVDT on suppressing inrush, my testing method should be to increase the output capacitance on the public version instead of using an electronic load machine.

Yes, testing using capacitive load will help if you want to test for inrush current. You can use different dvdt cap and check the charging speed of output capacitor. You will see the capacitor current is C*dv/dt which will change by changing the dvdt cap setting

This is my understanding of the inrush testing method. Is it correct?

Q2:

I would like to ask a few questions again about dvdt.

For capacitive loads, dvdt is effective. Does the capacitive load at this time have a maximum load value?

For resistive loads, dvdt is not helpful at this time because from the perspective of the load, the current rises with the voltage?

dvdt helps in controlling the slew rate of startup. resistive load draws constant current and capacitive load draws some inrush current at start and then once they are charged, do not draw current. slew rate control helps here by preventing too much current drawn at start (inrush current)

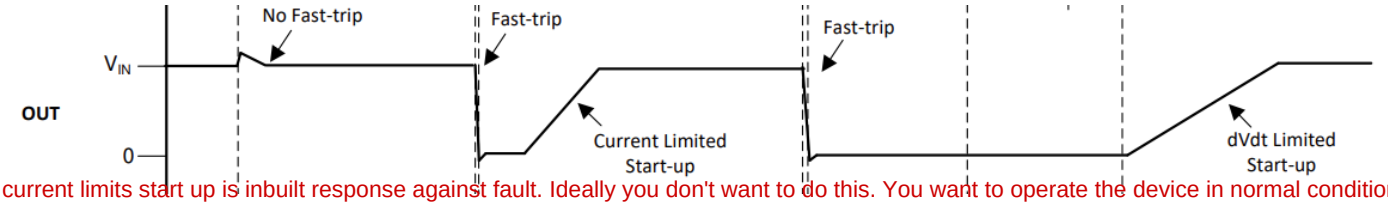
Q3:

After triggering the protection, I see there is a Current Limited Start-up.

I would like to ask about Current Limited Start-up. Under what circumstances is this mode usually started?

If the load is very heavy during startup, should I use the Current Limited Start-up method?

If Current Limited Start-up is started, does this mean that the dvdt is invalid at this time?



current limits start up is inbuilt response against fault. Ideally you don't want to do this. You want to operate the device in normal conditions. In case there is a fault and device go into circuit breaker, it will perform restart in current limited mode to prevent excess current being drawn.
In case of heavy load, you can increase the slew rate (dvdt) to allow startup. Yes, during current limited startup, dvdt slew rate won't be followed

Q4:

I would like to ask, for this type of efuse, is there any detailed test report on the testing methods or testing steps that I can refer to?

Just like the test method written in the Data sheet of TPS259827LEVM.

Our company's electrical verification unit uses Power ic and Adapter testing methods for testing, but I always feel that these two testing methods are very different from efuse testing methods.

So I want to know if there are correct test steps, including inrush, dynamic load, auto-retry and other correct test steps.

Can you share test methods used by your company. I am not aware of the test methods you mentioned. I can go through them and tell if they will work for eFuse or not.

Let me see if it is possible to provide you a document regarding the testing method. I am not aware of any test methodology document for eFuse. I will have to make full document and that will require lot of bandwidth from my side.

Q5

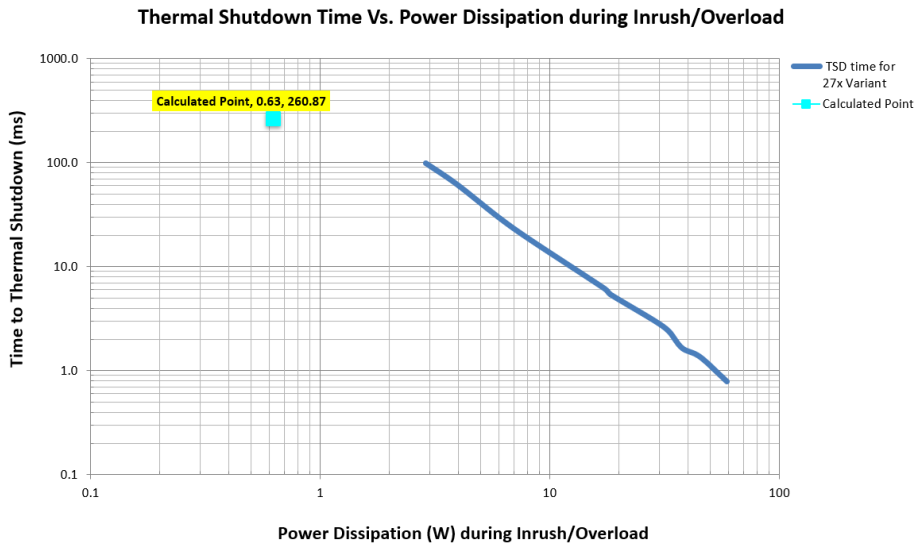
Regarding the Excel of TPS25982, is the version currently on the website the latest? I saw that the last version is from 2019. release date doesn't matter. It should work. We update the release only if there is any bug.

In your application, there must be some output resistive load and some capacitance load. You enter those value here in these entries.

Rlstart Does the resistance calculated here refer to all ESR and R on the circuit?

If it is a purely capacitive circuit, how should I fill it out here?

Cout	Load Capacitance	1400.0	uF
Rlstart	Load at start-up (assumed to be resistive), Refer to Section 9.2.2.5.2 in Datasheet	10.0	Ohm



Pd (W)	Tstart (ms)
0.63	260.87

In addition, I would like to ask one last question, is the design of this EXCEL table using the calculation method of no-load power-on? Because if it is powered on with load, after some data is input, it seems to be different from the actual corresponding one.

excel sheet helps in finding BOM values. It does consider the load value as load will be a factor during the startup. I do not fully understand what you mean by above mentioned point.

Q6:

Regarding the Q3 part I asked about in this article, which is the auto-retry function, let me add testing methods and pictures.

1.Do you perform the output shortly after startup is complete or during startup?

Ans: I short-circuited the TPS25982 after it was started.

2.Did you maintain a short circuit state for a long time and did the device try again while the short circuit state was still applied?

Ans: In the short-circuit state, I only maintained it for a short time. At this time, the Load of the load machine was kept on. I saw the following waveform.

The configuration tested is: Vin 12V.，Iout 14A，CH1:VIN，CH2:VO，CH4:Iout

The wave pattern I got is the second picture, please ignore CH3 first.

From here, I can see that Efuse is constantly trying to restart. At this time, the short circuit state has been lifted, and only the load machine remains started.

So, it looks like device is performing the auto retry as desired. Yes, >100W is very high load for startup and is causing thermal shutdown.

Let me first say sorry, I have not tested it in CR MODE, only the test pictures in CC MODE.

The power consumption calculation during auto-retry should be (VI-VOUT)*ILIM?

Because the load machine is still on, the power consumption at startup is too high, causing the SOA protection to be triggered?