Design information of ADB function:

LM3409QHV: Buck Constant Current Regulator

TPS92662: LED Matrix Manager for ADB

Osram LED: Dynamic resistor of each one is 0.46 ohm and Vf = 3.17V

There are 10 Osram LEDs which will be controlled by TPS92662 and I_led = 800mA is provided by LM3409QHV.

Input parameter:

Vin = 42 V, Vout = 31.6V, fsw = 400KHz, η= 0.9

ΔI_L-pp = 280 mA, ΔI_led-pp = 30mA

Calculation and my questions:

1. According to my calculation, L = 47uH and I_L-max = 932mA
   So, how much design margin of I_sat or I_R of Inductor should be reasonable?
2. As the datasheet of LM3409QHV mentioned, "a minimum inductor current ripple (ΔiL-PP) is necessary to maintain accurate ILED regulation."

   $$\Delta i_{L\text{-}PP\text{-}MIN} > \frac{24\ mV}{R_{SNS}}$$

   Now in my design, Rsns = 0.2 ohm, ΔiL-PP-min = 120mA,
   ΔI_L-pp = 264 mA @ 47uH > ΔiL-PP-min, is it OK?
   And how much of ratio is reasonable? (ΔI_L-pp = ratio * ΔiL-PP-min)
3. When the ADB function is active, some of 10 LEDs will be turn on and turn off dynamically. For example, 5 LEDs are ON and 5 LEDs are OFF. There are also two limit cases: 1 LED is ON and 9 LEDs are OFF; All LEDs are OFF.
   My question is that LM3409QHV could be fit or unfit for dynamical load, which parameters are calculated based on static condition that is all 10 LEDs are ON?
4. In my case, if all LEDs are off and the Roff2 should be considered for "maximum off-time occurs due to a shorted output".

   $$R_{OFF2} = \frac{R_{OFF1} \times V_{DD}}{I_{LED} \times R_{DS(on)}}$$

   Roff1 = 20 Kohm @ 414KHz, VDD = 5V is provided via LDO, I_led = 800mA
   According to TPS92662-Q1 datasheet,
   RDS(on) = 3 × RDS(on)-3LEDs + RDS(ON) = 3*0.5 + 0.2 = 1.7 ohm
   10 channels are connected with MOSFETs and other 2 channels are connected to GND directly. So, Roff2 = 20 * 5/(0.8 * 1.7) = 73.5 Kohm
   My understanding is correct or not?