



ILIM Max Proposal

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Presentation Objectives

- To propose a range for ILIM that is economically feasible

Sense Resistor Limitations

- 1% resistor tolerances are typically de-rated to 3% when used in automotive applications
- The range of 1% AEC-Q200 values available from a major distributor are shown here:

0.03	
0.033	10.0%
0.036	9.1%
0.039	8.3%
0.043	10.3%
0.047	9.3%
0.05	6.4%
0.051	2.0%
0.056	9.8%
0.062	10.7%
0.068	9.7%
0.075	10.3%
0.082	9.3%
0.091	11.0%
0.1	9.9%
0.11	10.0%
0.12	9.1%
0.13	8.3%
0.15	15.4%
0.16	6.7%
0.169	5.6%
0.18	6.5%

0.187	3.9%
0.2	7.0%
0.22	10.0%
0.221	0.5%
0.24	8.6%
0.249	3.8%
0.25	0.4%
0.261	4.4%
0.27	3.4%
0.28	3.7%
0.3	7.1%
0.301	0.3%
0.316	5.0%
0.33	4.4%
0.332	0.6%
0.348	4.8%
0.357	2.6%
0.36	0.8%
0.374	3.9%
0.39	4.3%
0.4	2.6%
0.43	7.5%
0.47	9.3%

Red values are non E-24 values

Analysis of ILIM Tolerance

- Assumed $50\text{mV} \pm 10\%$ for current limit voltage.
- Assumed $\pm 3\%$ tolerance for sense resistor values.
- Chose value of sense resistor that yielded $\text{ILIM}(\text{min})$ closest to $\text{IPI}(\text{max})$ for each power class.

Analysis Spreadsheet

Table 104-1	12V				24V				48V	
	unregulated		regulated		unregulated		regulated		regulated	
Class Code	0	1	2	3	4	5	6	7	8	9
I_{PI} (max) (A)	0.101	0.227	0.249	0.471	0.097	0.339	0.215	0.461	0.735	1.36
P_{PD} (W)	0.5	1	3	5	1	3	5	10	30	50

R_{SNS} (chosen) =	0.43	0.187	0.169	0.091	0.43	0.12	0.20	0.091	0.056	0.030	ohms
Possible PoDL PSE Design:											
V_{SNS1} (min) =	45										Tolerance
V_{SNS1} (typ) =	50	mV									10%
V_{SNS1} (max) =	55										
I_{LIM} (min) =	0.102	0.234	0.259	0.480	0.102	0.364	0.218	0.480	0.780	1.456	A
I_{LIM} (typ) =	0.116	0.267	0.296	0.549	0.116	0.417	0.250	0.549	0.893	1.667	A
I_{LIM} (max) =	0.132	0.303	0.336	0.623	0.132	0.473	0.284	0.623	1.013	1.890	A
I_{LIM} / I_{PI} (min) =	0.6%	2.9%	3.8%	1.9%	4.7%	7.4%	1.6%	4.1%	6.1%	7.1%	
I_{LIM} / I_{PI} (max) =	30.6%	33.6%	34.7%	32.3%	35.9%	39.4%	31.9%	35.2%	37.8%	39.0%	

Proposal

- Increase ILIM max from $1.22 \times I_{PI_Class(max)}$ to $1.4 \times I_{PI_Class(max)}$ which translates to $\pm 17\%$ tolerance.