P802.3ch PHY Power and PoDL

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IEEE P802.3ch

Typical Automotive ECU Power

- Automotive ECUs are typically powered directly by the vehicle 12 V battery

- Protection is added to this input to prevent failures due to reverse connected batteries (adds ≈ 1.2 V drop)

- Filtering (capacitors) are added to prevent large voltage swings due to ECU current draw; however, these are not sufficient to hold up the battery voltage during Crank

- There are two types of Crank
  - Cold Crank: When the driver starts the engine from an "off" state
  - AutoStart Crank: When the vehicle restarts the engine after shutting it off when the vehicle is stopped

- The battery voltage can dip as low as 4.5V during a Cold Crank. Communication is generally not required during this Crank; however, ECUs should not reset.

- The battery voltage doesn't dip below 6.5 V during an AutoStart Crank and communication is required during this Crank.

Typical ECU PoDL Classes - ICE

➤ Most ECUs in vehicles with ICEs (Internal Combustion Engines) will only support PoDL classes 0 and 1.

Table 104–1—Class power requirements matrix for PSE, PI, and PD

	12 V unregulated PSE		12 V regulated PSE		24 V unregulated PSE		24 V regulated PSE		48 V regulated PSE	
Class	0	1	2	3	4	5	6	7	8	9
$V_{PSE(max)}$ (V)[a]	18	18	18	18	36	36	36	36	60	60
$V_{PSE\_OC(min)}$ (V)[b]	6	6	14.4	14.4	12	12	26	26	48	48
$V_{PSE(min)}$ (V)	5.6	5.77	14.4	14.4	11.7	11.7	26	26	48	48
$I_{PI(max)}$ (mA)[c]	101	227	249	471	97	339	215	461	735	1 360
$P_{Class(min)}$ (W)[d]	0.566	1.31	3.59	6.79	1.14	3.97	5.59	12	35.3	65.3
$V_{PD(min)}$ (V)	4.94	4.41	12	10.6	10.3	8.86	23.3	21.7	40.8	36.7
$P_{PD(max)}$ (W)[e]	0.5	1	3	5	1	3	5	10	30	50

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Typical ECU PoDL Classes - EV

➢ Typical ECUs in EVs (Electric vehicles) will be powered by a regulated 12 V supply and will support PoDL classes 2 and 3.

Table 104–1—Class power requirements matrix for PSE, PI, and PD

	12 V unregulated PSE		12 V regulated PSE		24 V unregulated PSE		24 V regulated PSE		48 V regulated PSE	
Class	0	1	2	3	4	5	6	7	8	9
$V_{PSE(max)}$ (V)[a]	18	18	18	18	36	36	36	36	60	60
$V_{PSE\_OC(min)}$ (V)[b]	6	6	14.4	14.4	12	12	26	26	48	48
$V_{PSE(min)}$ (V)	5.6	5.77	14.4	14.4	11.7	11.7	26	26	48	48
$I_{PI(max)}$ (mA)[c]	101	227	249	471	97	339	215	461	735	1 360
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$V_{PD(min)}$ (V)	4.94	4.41	12	10.6	10.3	8.86	23.3	21.7	40.8	36.7
$P_{PD(max)}$ (W)[e]	0.5	1	3	5	1	3	5	10	30	50

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Multi-Gig Automotive Ethernet PHY Power

- 2.5GBASE-T1, 5GBASE-T1 and 10GBASE-T1 PHYs should require 0.5W or less to enable PoDL in traditional ICE vehicles or the PHY will require more power than can be provided by PoDL

- 2.5GBASE-T1, 5GBASE-T1 and 10GBASE-T1 PHYs should require 1.0W or less to enable PoDL in EVs

- This is needed to meet objective 14: Support optional Clause 104 power over data lines on appropriate media.

THANK YOU