



POWER MODULES

12S1800 12S2300

ICEstart® is a product line of supercapacitor-based power modules offering unprecedented characteristics and advantages.

PURPOSE

Power modules (model 12S1800 and model 12S2300) are designed to feed electric starter of the internal combustion engine (ICE) when the vehicle starts.

- Model 12S1800 is designed for vehicles with engines up to 2.5L.
- Model 12S2300 is designed for vehicles with engines up to 4L.

ADVANTAGES

- Usable power increases at sub-zero conditions which guarantees a reliable start at winter.
- The modules are perfect for START-STOP systems:
 - They ensure “gentle” switch-on of the starter which greatly reduces mechanical stress and increases starter’s lifetime tenfold.
 - They allow to reduce the volume of lead-acid batteries by a factor of three while doubling their lifetime.
 - There is no need for replacement, maintenance or repairs of the modules during the entire ICE lifetime.

MODE OF FUNCTIONING

The module (Fig. 1) contains a supercapacitor, a DC/DC converter and a controller. The supercapacitor acts as an electric power storage. As opposed to the accumulator, the supercapacitor is not a chemical source of the current and it provides more power while being smaller and lighter.

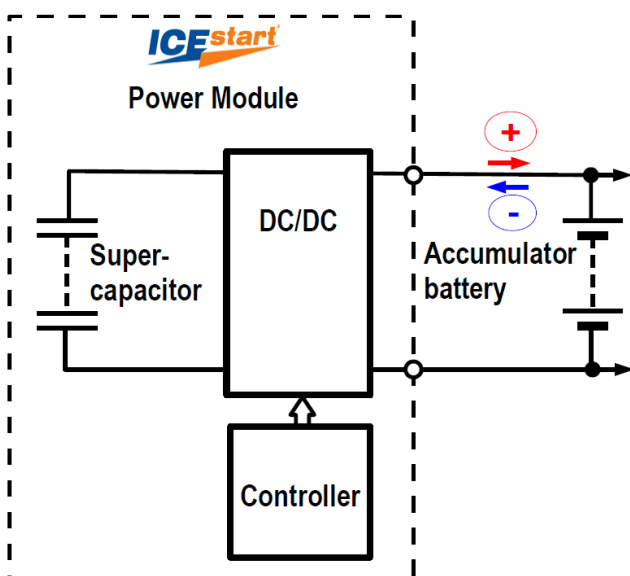


Fig. 1 Functional Block Diagram

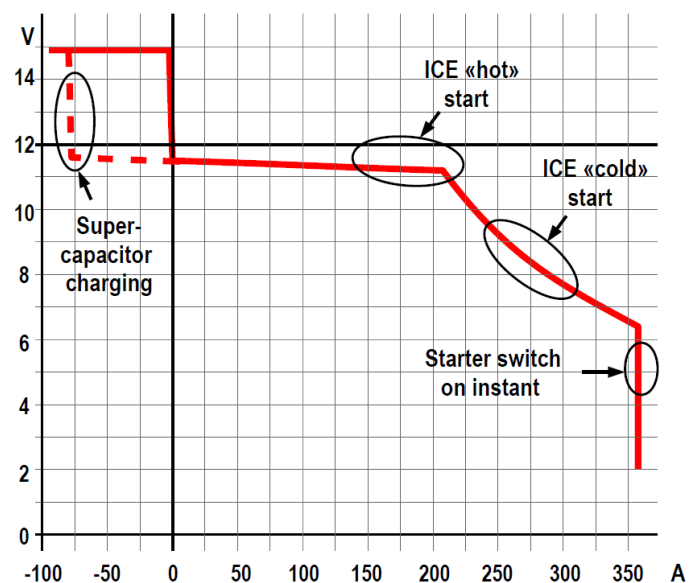


Fig. 2 I-V curve

The voltage of the supercapacitor changes as it is being charged or discharged. DC/DC converter maintains necessary voltage and current at the outputs regardless of those changes.

Digital controller regulates DC/DC converter's operating modes, so the module is a smart energy storage.

The I-V curve of the module (Fig. 2) is formed in a way that improves module's performance:

- The module is switched off during long parking. It switches on automatically when any element of the electric equipment actuates, for example, the central lock. The supercapacitor starts to charge, which corresponds to the negative current of the module (the direction of the current is shown in fig. 1 as the blue arrow). When the supercapacitor is charged and the current equals zero the module is ready to start the ICE.
- While the starter is switched on, the module's current is positive (the direction of the current is shown in fig. 1 as the red arrow). The current is set in a way that does not overload the starter but is enough to provide dynamic cranking.
- In the sub-zero conditions, when the engine is "cold", the start of the ICE runs on the part of the I-V curve which corresponds to maximum usable power. Joint discharge of the accumulator and the capacitor provides cranking long enough for a reliable start.
- When the ICE starts frequently and is "hot" (START-STOP) the cranking is done with the DC voltage close to the accumulator voltage. It almost entirely eliminates battery discharge and provides quick ICE start.

CHARACTERISTICS

- Recommended accumulator capacity, A*h _____ 20 ÷ 40
- Average charging time, s :
 after long time parking _____ 7 ÷ 15
 at frequent starts (START-STOP) _____ 2 ÷ 3
- Maximum usable power, W
 for 12S1800 _____ 1 800
 for 12S2300 _____ 2 300
- Current at the switch-on instant, A
 for 12S1800 _____ 240
 for 12S2300 _____ 360
- Operating ambient temperature, °C _____ -40 ÷ +60
- Dimensions, mm _____ 82*175*190
- Weight, kg
 for 12S1800 _____ 2.6
 for 12S2300 _____ 2.9
- Cycle Life _____ 500 000

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