

# Technical Briefing



## MCS-32, MCS-16 and MCS-8 Output Protection Circuitry

### 1. Operating temperature range of MCS-32, MCS-16 and MCS-8 units

Although Operating Range is stated as -20°C to +50°C MCS devices (32,16 & 8) are rated for in-vehicle installation, they are not designed for an engine bay, etc. The MCS-32 itself can operate at +75° safely. It has its own internal temperature sensor which will shut down the outputs when it gets too hot (>75°C). It also has an internal fan which activates as required.

### 2. High-Power Outputs - How circuit protection is achieved.

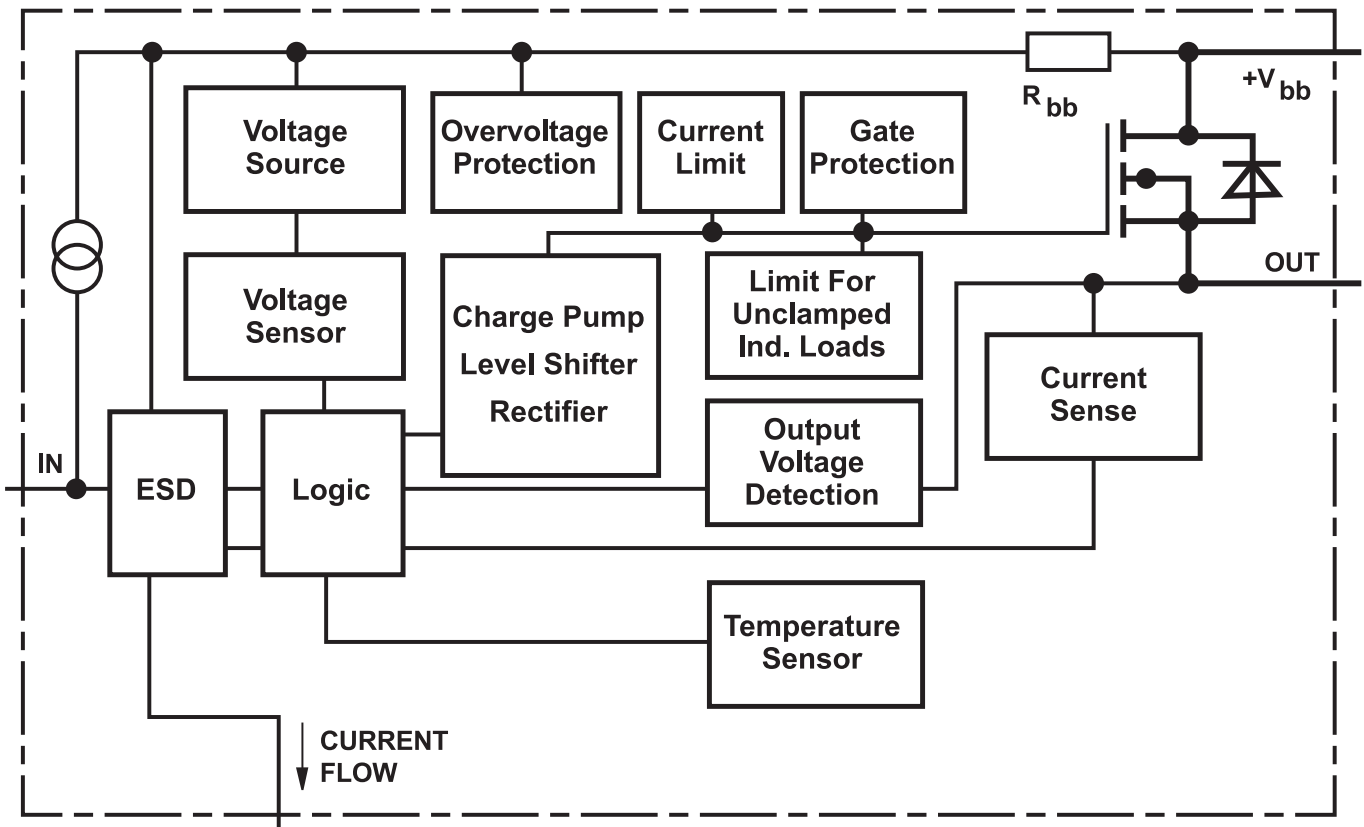
Protected circuits are monitored by 2 independent systems:

a) The software monitors the current set by the configuration, and if the output current exceeds that setting for 400ms then the output is disabled until reset or power cycling.

b) The hardware has its own internal protection circuitry, as shown in this diagram:

Each output has the following protections built in:

- Short circuit protection
- Current limitation
- Overload protection
- Thermal shutdown
- Overvoltage protection (including load dump)
- Loss of ground protection
- Loss of V<sub>bb</sub> protection (with external diode for charged inductive loads)
- Electrostatic discharge (ESD) protection
- Optimized static electromagnetic compatibility (EMC)
- AEC Qualified. (Automotive Electronics Council)



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**3. Low and Medium Power Outputs:**

**MCS-32**

4 x Medium Power Outputs (data and medium drives):

These have 2.5 Amp delivery capability.

The 4 x Medium Power Outputs are protected in 2 ways:

- a) Hardware protection as per the high power outputs but with less thermal heat sinking
- b) Internal 2.5A PTC Resettable Polyfuse. As denoted by the Medium Power Protection Logo found on the controller label:



Prior to the introduction of MPP (April 2020) medium power outputs should be fitted with fuses if driving devices rated at >100mA.

12 x Low Power Outputs:

600mA continuous (1 Amp peak) delivery capability but with some protection by shutting down before 2Amps is reached. Therefore, if there is a fault on equipment being driven the MCS could potentially deliver 600mA to 1Amp before failing. This means if the interconnecting wire is not rated at more than 600mA it will overheat and potentially catch fire. That said generally all wire used in installs is rated at well over this (at least 2.0 Amps).

**MCS-16**

4 x Medium Power Outputs (data and medium drives):

These have 2.5 Amp delivery capability.

The 4 x Medium Power Outputs are protected in 2 ways:

- a) Hardware protection as per the high power outputs but with less thermal heat sinking
- b) Internal 2.5A PTC Resettable Polyfuse. As denoted by the Medium Power Protection Logo found on the controller label:



Prior to the introduction of MPP (April 2020) medium power outputs should be fitted with fuses if driving devices rated at >100mA.

6 x Low Power Outputs:

600mA continuous (1 Amp peak) delivery capability but with some protection by shutting down before 2Amps is reached. Therefore, if there is a fault on equipment being driven the MCS could potentially deliver 600mA to 1Amp before failing. This means if the interconnecting wire is not rated at more than 600mA it will overheat and potentially catch fire. That said generally all wire used in installs is rated at well over this (at least 2.0 Amps).

**MCS-8**

4 x Medium Power Outputs (data and medium drives):

These have 2.5 Amp delivery capability.

The 4 x Medium Power Outputs are protected in 2 ways:

- a) Hardware protection as per the high power outputs but with less thermal heat sinking
- b) Internal 2.5A PTC Resettable Polyfuse. As denoted by the Medium Power Protection Logo found on the controller label:



Prior to the introduction of MPP (April 2020) medium power outputs should be fitted with fuses if driving devices rated at >100mA.

**4. Operating Voltage**

Operating voltage range compliance with OEM standards, regarding how the units cope with voltage spikes, e.g. jump starts.

Full VCA 12V & 24V Type Approvals and NP1A 12V & 24V approvals, which include the following standard pulses on the power lines:

- Pulse 1, -75V, 1000@0.5s
- Pulse 2a, +37V, 1000@0.2s
- Pulse 2b, +10, 10@0.5s
- Pulse 3a, -112v, 10 mins
- Pulse 3b, +75V, 10 mins
- Pulse 4, Us = -6V, 1 pulse

