SPACE DRIVE II

The innovative control system for vehicles
SPACE DRIVE is a digital control system in a modular design for operation of gas & brake, and / or steering by multi-channel technology. The inputs of the driver will be implemented by the control units (CPUs PARAVAN) and actuators (Gas-/Brake- servo motors & steering servo motors).

Basis of the safety concept is the active redundancy in all components including cable sets. Each servo motor will be controlled by the PARAVAN CPU, equipped with multiple processors which operating simultaneously. A separate backup power system take care for a safety run anytime.
With the official approval and homologation for road service according to ECE-R-13/ECE-R-79/ECE-R-10
PARAVAN SPACE DRIVE II
drive by wire - ECU

Plug & connectors
- encoded plug systems IP 65
- Protected against unintended loosening, pull and vibration
- Extended surrounding temperatures (-40° - 105°)

High performance processors
- 3x 128 MHz
- Int. 992 kB Flash, 60 kB RAM, 32 kB Data flash

10 Layer HW-printed circuit board
- 100 Amp. performance

Redundant power supply
- Galvanically isolated
- 2x VCC Bat1
- 2x VCC Bat2
- 4x GND

Communication
- 2x CAN BUS
- 2x LIN BUS
- 2x FlexRay

Aluminum body
- Shock resistant
- Alu pressure casting case
- Robust, massive, IP 67

Motor power out
- per 4x 35Amp. Contacts
- 30 Amp. Permanent load
- 60 Amp. Peak load
SPACE DRIVE II is a perfectly coordinated operation system including hard- and software with a revolutionary safety concept. The system can be adapted individually to different drive-by-wire applications e.g.:

Cars, Trucks, Vans, Roadsters, Transporters
The PARAVAN SPACE DRIVE II®-System

PARAVAN “SPACE DRIVE II®“ Hardware (CPU)

PARAVAN “SPACE DRIVE II®“ Software (regulation software)

The innovation:
worldwide unique fail-safe motor control unit
## Operating specifications of PARAVAN SPACE DRIVE II®:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°C to +125°C</td>
</tr>
<tr>
<td>Operating voltage 12V</td>
<td>+9V dc to +16V dc</td>
</tr>
<tr>
<td>Operating voltage 24V</td>
<td>+18V dc to +32V dc</td>
</tr>
<tr>
<td>Typical load</td>
<td>ca. 7A per Module</td>
</tr>
<tr>
<td>continuous load</td>
<td>30A per Motor / 60A peak load</td>
</tr>
<tr>
<td>Power limit</td>
<td>100 Amp.</td>
</tr>
<tr>
<td>Cycle time</td>
<td>10ms – 140ms (150ms time out)</td>
</tr>
<tr>
<td>Start Time to Ready</td>
<td>1 sec. - 10 sec. dep. on appl.</td>
</tr>
<tr>
<td>BUS Systems</td>
<td>2x CAN, 2x FlexRay, 2x LIN</td>
</tr>
<tr>
<td>Safety</td>
<td>3-fach Redundant</td>
</tr>
<tr>
<td>Diagnostic / Car Interface</td>
<td>DTC Connector / OBD-II</td>
</tr>
<tr>
<td>Language</td>
<td>DE, EN, FR, IT, NL, ES, ... and more</td>
</tr>
<tr>
<td>Digital I/O</td>
<td>8 - (2 I/O with Timer function)</td>
</tr>
<tr>
<td>Size</td>
<td>B: 225 / H: 60 / T: 144</td>
</tr>
<tr>
<td>Weight</td>
<td>2200 Gramm</td>
</tr>
<tr>
<td>Environmental test</td>
<td>ISO16750 – Part5</td>
</tr>
<tr>
<td>EMC</td>
<td>CISPR 25, ECE R10, ISO 11542-4</td>
</tr>
<tr>
<td>Electronic discharge</td>
<td>ISO 10605</td>
</tr>
<tr>
<td>EMP</td>
<td>E=50kV/m, H=133A/m</td>
</tr>
<tr>
<td>Cooling</td>
<td>Passive cooling with cooling fins</td>
</tr>
<tr>
<td>Plugs &amp; connectors</td>
<td>Coded &amp; Automotive compliant</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>All voltage inputs</td>
</tr>
<tr>
<td>Power supply</td>
<td>2 separate power sources</td>
</tr>
<tr>
<td>Micro Controller</td>
<td>3 independent CPUs (128MHz)</td>
</tr>
<tr>
<td>ISO 1939 CAN Protocol</td>
<td>High Speed CAN, 500kb, 11/29 Bit</td>
</tr>
<tr>
<td>Standards</td>
<td>AEC-Q100, Q101, Q200</td>
</tr>
<tr>
<td>Tests</td>
<td>ECE-R13 R79, ISO 26262 (in process)</td>
</tr>
</tbody>
</table>
PARAVAN SPACE DRIVE II

safety concept

3x input signal
3x motor position signal
3x processors
3x H-bridges

2x CAN
2x LIN
2x FlexRay

2x separate motor output layer
2x separate motor outputs
PARAVAN SPACE DRIVE II
Control command

Analog:

3x analog input (0V - +5V)

3x analog input (0V - +5V) – evaluator port

Digital:

CAN 1

CAN 2
PARAVAN SPACE DRIVE II
Diagnostic tool

- System status (current values, vehicle data) in real time
- Status display of the position sensors of the input devices and engines in real time
- Transferring parameters during operation (without rebooting the system)
- Fault memory entries with description and additional information's
- One click support, Data set of all settings and values via Email
- Automatic Download of the latest software modules for uploading to the SpaceDrive controller
- Graphical support for parameter settings

PC Software
WIN7 / 8      32/64 bit
System status, updates, settings, diagnosis, database, secondary applications, etc..

The new "Diagnostic Tester" from Paravan opens up countless possibilities, such as using only two clicks, all system information will be sent by mail directly to the PARAVAN technology center and now the technicians and engineers have all relevant data for a professional assistance and system diagnostics!
PARAVAN SPACE DRIVE II
system & components

- CAN harness
- Fusebox
- Servo motors
- ECU
- Harness
- Input device
- Display
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