Application Transportation

PCIM 2014, Nuremberg
<table>
<thead>
<tr>
<th></th>
<th>Tram / Streetcar</th>
<th>Trolleybus</th>
<th>Metro Car / Underground</th>
<th>Passenger Coach / Suburban</th>
<th>High Speed Train</th>
<th>Locomotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical power</td>
<td>200kW – 400kW</td>
<td>100kW – 200kW</td>
<td>800kW</td>
<td>0.8MW – 2.0MW</td>
<td>8.0MW – 10MW</td>
<td>6.4MW – 9.6MW</td>
</tr>
<tr>
<td>Catenary voltage</td>
<td>600V DC</td>
<td>600V DC</td>
<td>600 VDC 750V DC 1500 VDC</td>
<td>Variable</td>
<td>Variable</td>
<td>Variable</td>
</tr>
<tr>
<td>IGBT product family</td>
<td>IHM and PrimePACK™</td>
<td>IHM and PrimePACK™</td>
<td>IHM / IHV and PrimePACK™</td>
<td>IHV</td>
<td>IHM / IHV</td>
<td>IHV</td>
</tr>
<tr>
<td>IFX Portfolio</td>
<td>1700V PrimePACK™</td>
<td>1200V IHM</td>
<td>1700V IHM</td>
<td>3300 V IHV</td>
<td>4500 V IHV</td>
<td>6500 V IHV</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Dual</td>
<td>450A – 1400A</td>
<td>400A – 1200A</td>
<td>400A – 1200A</td>
<td>200A, 400A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chopper</td>
<td>650A, 1000A</td>
<td>600A – 1600A</td>
<td>600A – 1600A</td>
<td>400A – 1500A</td>
<td>800A</td>
<td>400A, 500A</td>
</tr>
<tr>
<td>Diode</td>
<td>-</td>
<td>400A – 3600A</td>
<td>400A – 3600A</td>
<td>400A – 800A</td>
<td>400A – 1200A</td>
<td>250A – 750A</td>
</tr>
</tbody>
</table>

**Upgraded Inverter Power [kW]**

- **PrimePACK™ 1700V (450A - 1400A)**
- **IHV 6500V (200A - 750A)**
- **IHV 4500V (400A - 1200A)**
- **IHV 3300V (200A - 1500A)**
- **IHM 1200V/1700V (400A - 3600A)**
Continuous Product Upgrades

**Enhanced IHM-B 1700V**
- $R_{thJC}$ Improvement of ~17% by changing to AlN
- Improved Power Cycling (+100%) via optimized Chip Bond Connection
- Very low effort on requalification
- Role-out to the whole IHM AlSiC Product-range (Various Single Switches, Chopper- and Diode-Modules) till summer 2014

**Enhanced IHV-B 3.3kV**
- $R_{thJC}$ Improvement of ~13% by changing to AlN
- Very low effort on requalification
- In series production
Infineon provides the broadest Portfolio for CAV Applications

EconoDUAL™ 3 with automotive Qualification & PrimePACK™ 2 CAV
PrimePACK™ for CAV Application

CAV Modules

<table>
<thead>
<tr>
<th>Chopper</th>
<th>Half-bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF600R12IP4DV</td>
<td>FF600R12IE4V</td>
</tr>
<tr>
<td>DF900R12IP4DV</td>
<td>FF600R12IP4V</td>
</tr>
<tr>
<td>FD900R12IP4DV</td>
<td>FF650R17IE4V</td>
</tr>
<tr>
<td></td>
<td>FF900R12IE4V</td>
</tr>
<tr>
<td></td>
<td>FF900R12IP4V</td>
</tr>
<tr>
<td></td>
<td>FF900R12IP4DV</td>
</tr>
</tbody>
</table>

New Suffix CAV:

FFxxxR1xIx4V

Available from June 2014

Vibrational Robustness

- Sinusoidal Vibration Test
- Logarithmic Sweep from 10 ... 2000Hz
- Acceleration limit of 104,0m/sec² RMS (15g peak) from 70.5 ... 2000Hz

Sine sweep vibration
**Extended Reliability and Next Level of Traceability**

**Improved System Soldering** for extended Thermal Cycling capability

**Enhanced Traceability** by additional DMX Chip
- On substrate
- On frame

**Qualified according to automotive Standards**
- Extended Vibration Test
- 1000 Cycles Thermal Shock test
Infineon enables up to 250kW in a Briefcase

**ARADEX VECTOPower:**
- The allround Inverter
- 350kVA peak Power in a 10l housing
- Scalable up to 1.6MW
- Excellent Price/Power-ratio through Infineon Technology inside:
  - 3x FF600R12ME4_B11
    - Great Power Variety
    - Excellent Price/Power-ratio
  - 3x EiceDRIVER™
    - Good Isolation Class
    - High PWM Frequencies
- Certified for harsh Environment (IP65, IEC60068-2-64 and -27)

More Infos at: [www.aradex.com](http://www.aradex.com)
Infineon enables a perfect Hybrid-Drive
ARADEX VECTOPOWER

Application examples with VECTOPOWER
- Diesel-hybrid Town Busses
  - Easy-to-use Solutions
  - Up to 30% Energy Savings
- Diesel-hybrid Excavator
  - Up to 15% Time Reduction
  - Up to 25% Energy Savings

Customer benefits
- Excellent Price/Power-ratio through Infineon Products
- 6 Functions, one Device
  - AFE Function to the Grid
  - DC/DC SuperCap
  - Generator Function
  - Auxiliary Power Unit
  - DC/DC Battery Coupling
  - Traction Drive

More Infos at: www.aradex.com
Auxiliary Power Supplies

Customer Benefits

- Broad Portfolio
- High Reliable Pressure Contact Technology
- Isolated Base Plate
- High Blocking Voltages ($V_{RRM} / V_{DRM}$)

Typical Module Types

- TD305N16KOF
- DD435N36K
Decoupling Diodes

Customer benefits

- Broad portfolio
- High Reliable Pressure Contact Technology
- Modules with Isolated Base Plate
- High Blocking Voltages ($V_{RRM}$) available

D452N18E
D251N20B
D400K18B
D475N38B

ND89N18K
ND104N18K
ND350N18K

ND260N18K
ND261N26K
ND350N18K

DZ435N40K
DZ540N26K
DZ600N18K
DZ700N22K

DZ950N44K
DZ1070N26K

PCIM 2014

Copyright © Infineon Technologies AG 2014. All rights reserved.
AURIX™ in Commercial Vehicles – Setting Trends

AURIX™ – Safety joins Performance

**Performance**
- Clockrate up to 300MHz
- Multi-core Technology
- Floating-point Unit
- Ta: 145 °C
- Standby Control Unit

**Functional Safety and Security**
- ISO26262 Platform Safety Concept
- 32-bit Programmable Security Hardware
- HW/SW Safety Features

**Scalability**
- Up to 3 x TriCore™
- Up to 2.7MB SRA
- 512k – 8MB Flash
- 48k – 2.7MB RAM
- Pinout Compatibility

**Enablement**
- ACT Configuration Tool
- Free Tool Chain
- Preferred Design House Support
- Latest connectivity

**Automotive Quality Standards**

**Long-term Supply Availability and Supply Security**
24V Applications
High-side Switches & Low-side Switches

PROFET™
Key Features
- >58V Voltage Rating
- Current Limitation
- Protection against Loss of Battery and GND
- Reverse Battery Protection
- Short-circuit Protection
- Overtemperature Protection
- Overvoltage Protection
- ESD Protection
- (Partly) Proportional Load Current Sense
- Product range 2.5 – 1000mΩ

HITFET™
Key Features
- Innovative, robust and high-performance low side Switches
- Overcurrent & -temperature protection
- Overvoltage protection
- ESD protection
- Diagnostic feedback
- Switching speed controlled by design

Key Applications
- Relay Driver
- Small load driver

www.infineon.com/profet

www.infineon.com/hitfet
ENERGY EFFICIENCY
MOBILITY
SECURITY

Innovative semiconductor solutions for energy efficiency, mobility and security.