

Bidirectional DC DC Converter 48/96Vdc to 380Vdc @ 4kW/8kW

DESCRIPTION

The DMI1703 and DMI1704 are high efficiency, bidirectional DC DC converters capable of delivering 4kW or 8kW of power in either direction. In boost (battery discharge) mode, the DMI1703 operates from 48-58Vdc and boosts the output to 380Vdc (nominal). In buck (battery charge) mode the DMI1704 4001 operates from 380Vdc (nominal) to 48-58Vdc. In boost (battery discharge) mode, the DMI1704 operates from 96-106Vdc and boosts the output to 380Vdc (nominal). In buck (battery charge) mode the DMI1704 operates from 380Vdc (nominal) to 96-106Vdc.

The converters use the bus voltage to determine whether to charge or discharge. When excess power is available and the bus is high the batteries can be charged. Similarly, when the bus goes low, power flows from the batteries to meet the power draw. Additionally, external bit-signalling from a BMS or other such controller can be received via serial data I/O allow user control of the power flow direction. This is especially useful to prevent circular power flow between batteries when multiple battery packs equipped with the converters are operating on the same bus.

The converters are battery chemistry agnostic and will work with virtually all types. Even dissimilar battery types can be paralleled and replacement batteries do not have to match the original batteries. When paired with the BMS001 circuit, complete control over the battery's functionality is achieved.

Galvanic isolation provides safe operation between the battery and the HVDC bus, ensuring that the batteries never see voltages higher than their native terminal voltages.

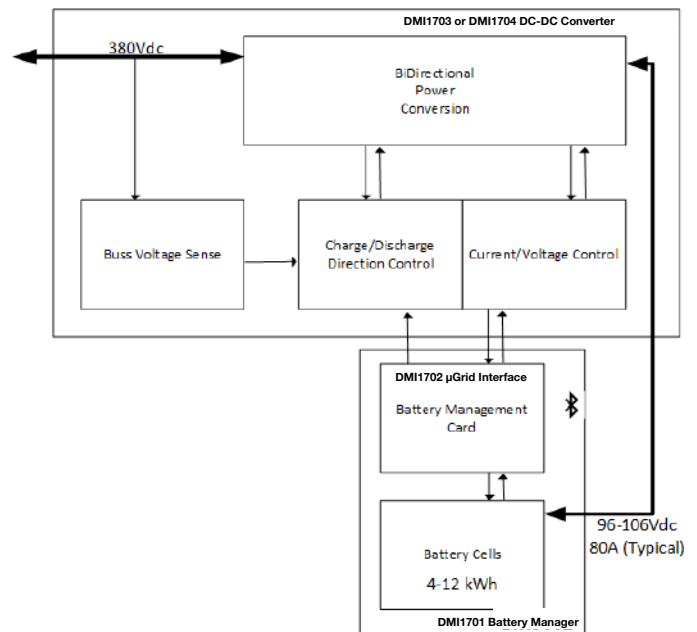
An optional uGrid communications link provides access to the converter and battery BMS data for analysis and presentation.

FEATURES & BENEFITS

- 380Vdc to 48Vdc Bidirectional converter
- 4kW or 8kW power delivery
- Autonomous power flow direction operation
- Unlimited parallel connections for kW to MW sites

- Galvanic isolation between high and low voltage sides
- State of the art silicon carbide (SiC) devices for high efficiency
- Built-in protection: under-voltage, over-voltage, over current, over temperature
- Serial Interface to BMS or controller
- Battery chemistry agnostic. Lilon (LFP, LTO, NMC) and lead acid types.
- Charge/Discharge rates configurable through the BMS

BLOCK DIAGRAM



APPLICATIONS

- Solar plus Storage Installations
- Fuel Cell voltage conversion
- Pico, Nano and Microgrids
- Generator Optimization
- Rural Electrification
- Mobile Power Units

SPECIFICATIONS

DMI1703 DC-DC Converter

DMI1704 DC-DC Converter

Maximum Continuous power	4000W	8000W
Low Side Voltage Range	47 - 58 Vdc	96-106 Vdc
High Side Voltage Range	320 - 400 Vdc	320 - 400 Vdc
High Side Maximum Continuous Current	10A	20A
High Side Maximum Surge Current (3 seconds)	20A	25A
Low Side Maximum Continuous Current	88A	
Low Side Maximum Surge Current (3 seconds)	110A	
Charge Profile	CC CV	
Charge Rate (Typical)	0.5 - 1.0C	
Discharge Rate (Typical)	0.5 - 1.0C	
Charge/Discharge Mode Transition	Bus voltage level triggering	
Charge to Discharge Mode Transition Time	100ms	
Discharge to Charge Mode Transition Time	100ms	
Software Controlled Functions	Global Charge/Discharge and Enable/Disable, Charge/Discharge Limits	
Switching Frequency (fsw)	180kHz	
Conversion Efficiency	>95% Each Way	
Data Reported to BMS	Voltage, Current	
BMS Interface	Serial I/O	
Protection	OverVoltage, OverCurrent, OverTemperature, Short Circuit, Fused Hi/Lo	
Compliance (Pending)	UL1741, FCC Part 15 Class B	
Connector Options	MC4, Anderson Power Connectors	
Units in parallel on the same HVDC bus	Limited by wire ampacity	
Isolation HVDC and Battery Terminals	Galvanic Isolation	
Cooling	Temperature controlled forced convection with heatsinks	
Temperature Operating Range	-55 to + 600C	
Humidity	0 - 100% (Non-condensing)	
Circuit Board Dimensions	20cm X 28cm X 7cm	
Weight	2.5kg	

MICROGRID APPLICATION

- PV Array w/vBoost at 380Vdc (kW to MW)
- HVDC Buss at 380Vdc
- 6kWh/4kW Battery plus converter at 380Vdc, multiple units can be paralleled
- 16 kW, 240Vac AC DC Rectifier with 380Vdc output, multiple units can be paralleled
- 16kW, 120/240Vac, 50/60Hz off-grid inverter, multiple units can be paralleled

UGRID LINK

The microgrid link is a communications module that provides a

data link between the various components in the microgrid using a variety of communications protocols including Bluetooth LE, RS485, SPI, and UART.

INTERFACE WITH BATTERY MANAGEMENT SYSTEMS

The bi-directional DC DC converters integrate seamlessly with other power products from the Digital Microgrid. The battery management system (BMS) from DMI is designed to work with virtually all battery types and provides battery management functions such as cell optimization, cell balancing, charge and discharge rate control, safety and data reporting. For BMS cards other than DMI's, please contact the company for compatibility.