

EV ON-BOARD CHARGER + DC-DC CONVERTER



Features

- Universal AC input range
- High efficiency and high reliability
- Input and output protections
- Intelligent charging mode
- CAN2.0B interface (500kbps baud rate)
- Bootloader via CAN bus
- Compliance with SAE J1772/IEC 61851-1
- IP67 enclosure, liquid cooled

Electrical Specifications

These specifications are valid over the converter's full range of input voltage, output voltage, output current, and operating temperature unless noted otherwise.

Input Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit
OBC					
Input Voltage	AC input	85	220	265	Vac
Wakeup Voltage at "Wakeup in" Pin		9	12	16	Vdc
Bias Voltage		9	12	16	Vdc
Input Frequency		45	50	65	Hz
Input Current		-	-	32	A
Inrush Current		-	-	50	A
Current Draw by "Wakeup in" Pin		-	-	0.3	mA
Leakage Current		-	-	3	mA
Power Factor	≥50% load	0.99	-	-	-
DC-DC					
Input Voltage		200	-	480	Vdc
Input Current		-	-	10	A
Quiescent Current		-	-	20	mA

Output Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit
OBC					
Output Voltage		200	-	480	Vdc
Output Current		0	-	22.7	A
Output Power	With derating	-	-	6,600	W
Output Current Accuracy	Typical Vin, full load, Ta = 25°C	-0.4	-	+0.4	A
Output Ripple & Noise	20MHz bandwidth, with 0.1µF and 47µF capacitor, typical Vin	-	-	±3%	mVp-p
Efficiency	Typical Vin, full load, Ta = 25°C	-	-	94.0	%
DC-DC					
Output Voltage		12	-	15	Vdc
Rated Output Voltage		13.23	13.50	13.77	Vdc
Output Current		0	185	220	A
Output Power	With derating	-	2,500	-	W
Maximum Output Power	Less than 6 min.	-	-	3,000	W
Output Voltage Accuracy	Typical Vin, full load, Ta = 25°C	-1.0	-	+1.0	%Vo
Output Ripple & Noise	20MHz bandwidth, with 0.1µF and 47µF capacitor, typical Vin	-	-	400	mVp-p
Efficiency	Typical Vin, full load, Ta = 25°C	-	-	94.0	%
Quiescent Current		-	-	0.3	mA
Dynamic Response	Typical Vin, full load, Ta = 25°C	-	-	200	ms

Protection Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit
OBC					
Input Under-voltage Protection		75	80	85	Vac
Input Under-voltage Recovery	Auto-recovery	80	85	90	Vac
Input Over-voltage Protection		265	270	275	Vac
Input Over-voltage Recovery	Auto-recovery	260	265	270	Vac
Output Under-voltage Protection		190	195	200	Vdc
Output Under-voltage Recovery	Auto-recovery	195	200	205	Vdc
Output Over-voltage Protection		480	485	490	Vdc
Output Over-voltage Recovery	Auto-recovery	475	480	485	Vdc
Over Temperature Protection (coolant temperature)	Reduced output power	60	-	80	°C
	Shut down	80	-	-	°C
Output Short Circuit Protection	Shut down, auto-recovery				
DC-DC					
Input Under-voltage Protection		185	190	195	Vdc
Input Under-voltage Recovery	Auto-recovery	185	200	205	Vdc
Input Over-voltage Protection		480	485	490	Vdc
Input Over-voltage Recovery	Auto-recovery	475	480	485	Vdc
Output Under-voltage Protection		7.75	8.00	8.25	Vdc

Protection Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit
DC-DC					
Output Under-voltage Recovery	Auto-recovery	8.75	9.00	9.25	Vdc
Output Over-voltage Protection		16.75	17.00	17.25	Vdc
Output Over-voltage Recovery	Auto-recovery	15.75	16.00	16.25	Vdc
Over Temperature Protection (coolant temperature)	Reduced output power	65	-	85	°C
	Shut down	85	-	-	°C
Output Short Circuit Protection	Shut down, auto-recovery				

Other Specifications
General Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit
Operating Temperature	Automatically reduces the output power when the coolant temperature goes over 65°C.	-40	-	+85	°C
Storage Temperature		-40	-	+105	°C
Relative Humidity	No condensation	5	-	95	%
Altitude		-	-	5,000	m
Ingress Protection	IP67				
Dimension (including terminal)	428.0 x 326.3 x 76.5				mm
Weight		-	8.4	-	kg

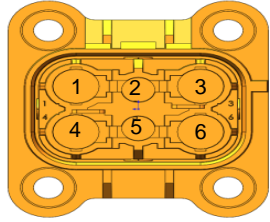
General Specifications

Parameter	Notes
Cooling Style	Liquid cooled
Coolant Medium/Mixture	50/50 Ethylene Glycol/Water
Coolant Flow (typical)	5L
Coolant Pressure	-101kPa ~ 250kPa
Pressure Drop	See Figure 8

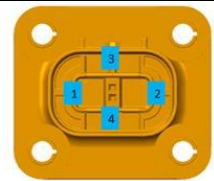
Safety Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit
Isolation Voltage	Input-Output, 1 min.	2,000	-	-	Vac
		2,800	-	-	Vdc
Insulation Resistance		20	-	-	MΩ
Grounding Resistance	Case-Ground	-	-	0.1	Ω
Input Discharge	The voltage at the input terminal drops below 60V within 1s after the input power is removed.				


Input Connector Descriptions

Pin No.	Name	Description	Rated Voltage/ Maximum Current	Module: 35048139	Mating Connector: 13879046/ 13879048
				Supplier: Aptiv	
1	NC	No connection	/		
2	Interlock in	High voltage interlock in	12V/0.1A		
3	AC (L1)	Line 1	220V/32A		
4	AC (N/L2)	Neutral / Line 2	220V/32A		
5	Interlock out	High voltage interlock out	12V/0.1A		
6	NC	No connection	/		


High Voltage Output Connector Descriptions

Pin No.	Name	Description	Rated Voltage/ Current	Module: 2310540-1	Mating Connector: 4-2103177-1
				Supplier: TE	
1	Vout -	Negative output voltage	350V/24A		
2	Vout +	Positive output voltage	350V/24A		
3	Interlock 1	High voltage interlock 1	12V/0.1A		
4	Interlock 2	High voltage interlock 2	12V/0.1A		

Low Voltage Output Connector Descriptions

Pin No.	Name	Description	Rated Voltage/ Current	Supplier: NetPower
1	Vout +	Positive output voltage	13.5V/185A	

Signal Connector Descriptions

Pin No.	Name	Description	Rated Voltage/ Current	Module: 477256010	Mating Connector: 334721206
				Supplier: Molex	
1	CAN_H	CAN high	5V/0.05A		
2	NC	No connection	/		
3	NC	No connection	/		
4	PP	Proximity detection	12V/0.1A		
5	NC	No connection	/		
6	CP	Control pilot	12V/0.1A		
7	CAN_L	CAN low	5V/0.05A		
8	NC	No connection	/		
9	Wakeup in	Wakeup signal	12V/0.1A		
10	12Vin -	Low voltage battery input -	12V/1.7A		
11	12Vin +	Low voltage battery input +	12V/1.7A		
12	NC	No connection	/		



Characteristic Curves

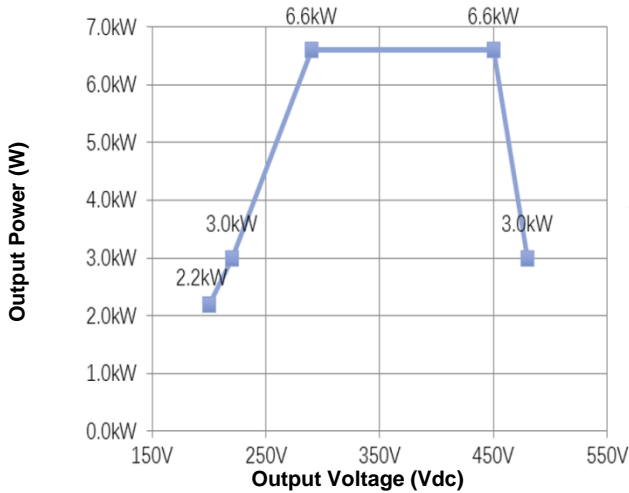


Figure 1. Output Power vs. Output Voltage (OBC)

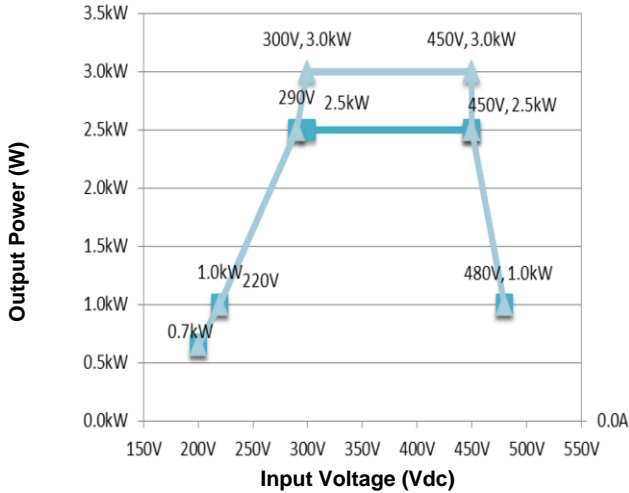


Figure 3. Output Power vs. Input Voltage (DC/DC)

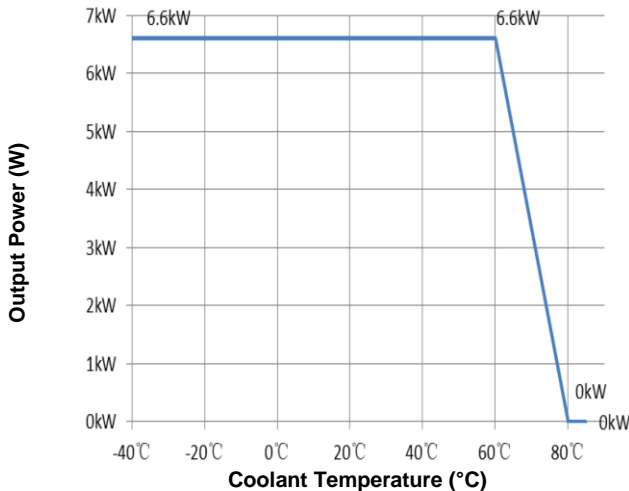


Figure 5. Output Power vs. Temperature (OBC)

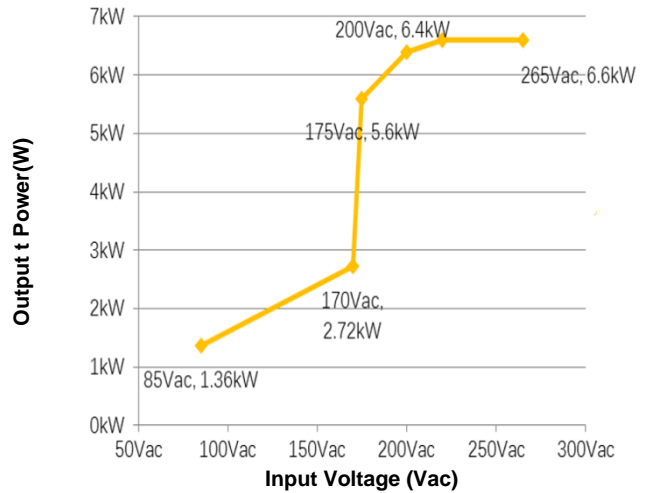


Figure 2. Output Power vs. Input Voltage (OBC)

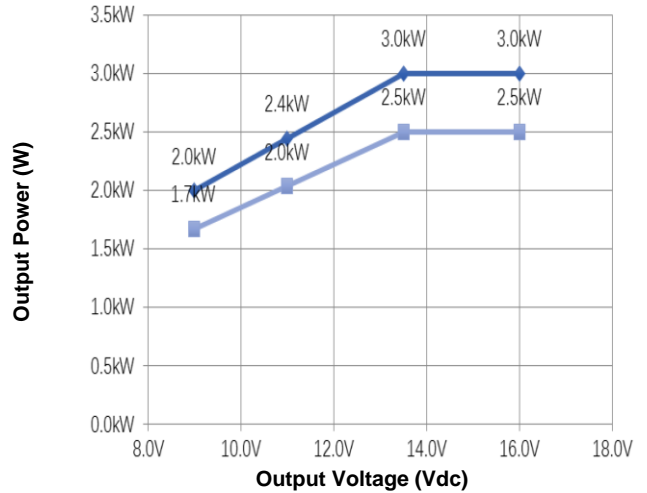


Figure 4. Output Power vs. Output Voltage (DC/DC)

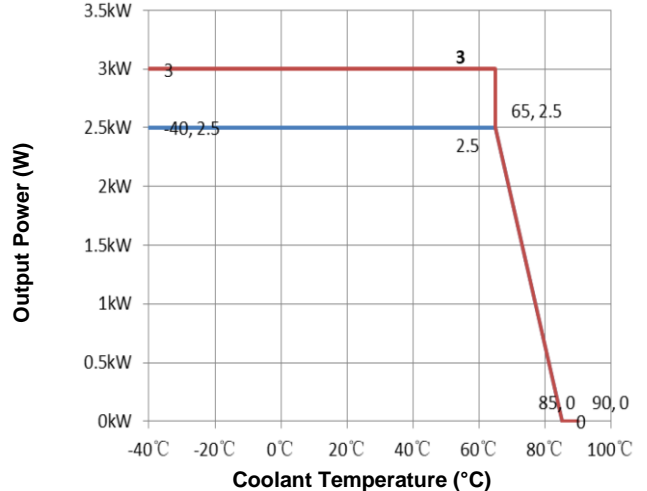


Figure 6. Output Power vs. Temperature (DC/DC)

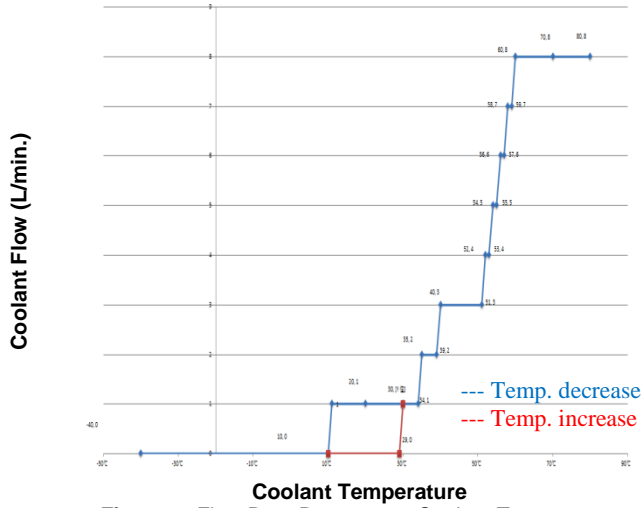


Figure 7: Flow Rate Request vs. Coolant Temperature

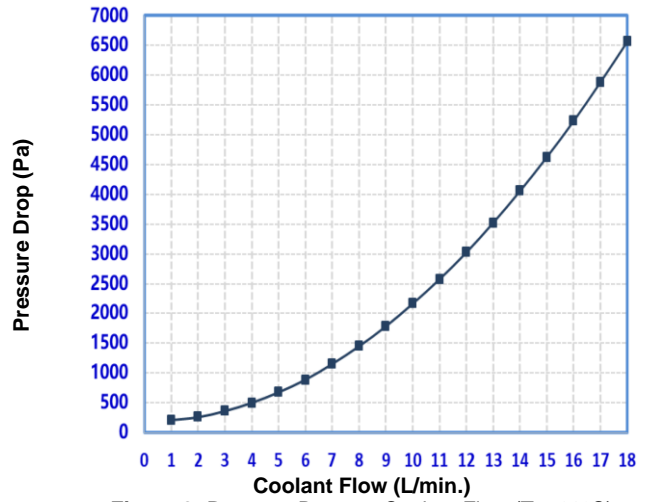


Figure 8: Pressure Drop vs. Coolant Flow (Ta=30°C)



Mechanical Drawing

Unit: mm

