ERICSSON

Technical Specification

BMR456 series Fully regulated Advanced Bus Converters Input 36-75 V, Output up to 39 A / 468 W	1/28701-FGC 101 1823 revD February 2013

Key Features

- Advanced Bus Converter Industry standard Quarter-brick with digital PMBus interface
  57.9 x 36.8 x 11.3 mm (2.28 x 1.45 x 0.445 in.)
- Optional industry standard 5-pins for intermediate bus architectures
- Industry-leading Power Density for Telecom and Datacom 127-141W / sq. in
- Ericsson DC/DC Energy Optimizer built-in
- High efficiency, typ. 96.4% at half load, 12 Vout
- Fully regulated Advanced Bus Converter from 36-75Vin
- 2250 Vdc input to output isolation
- Fast Feed forward regulation to manage line transients
- Optional baseplate for high temperature applications
- Droop Load Sharing with 10% current share accuracy
- Optional high capacitive load up to 15mF
- PMBus Revision 1.2 compliant
- 2.9 million hours MTBF
- ISO 9001/14001 certified supplier

Power Management

- Configurable soft start/stop
- Precision delay and ramp-up
- Voltage margining
- Voltage/current/temperature monitoring
- Configurable output voltage
- Configurable fault response
- Power good

PMBus

Safety Approvals

c UL us UL EU

Design for Environment

Pb RoHS compatible

Meets requirements in high-temperature lead-free soldering processes.

Contents

Ordering Information

Product program	Vin	Output
BMR456 0004/004	36 - 75	9 V / 35 A, 315 W
BMR456 0004/001	36 - 75	12 V / 35 A, 420 W
BMR456 0004/018	36 - 75	12 V / 35 A, 420 W
BMR456 0007/013	36 - 75	12 V / 35 A, 400 W
BMR456 0007/014	36 - 75	12.45 V / 35 A, 415 W
BMR456 0000/003	36 - 60	9 V / 39 A, 351 W
BMR456 0000/002	40 - 60	12 V / 39 A, 468 W
BMR456 0011/016	40 - 60	12 V / 39 A, 445 W
BMR456 0011/017	40 - 60	12.45 V / 39 A, 462 W

Product Number and Packaging

BMR456	n_1	n_2	n_3	n_4	/	n_5	n_6	n_7
Mechanical pin option	x				/			
Mechanical option		x			/			
Hardware option			x	x	/			
Configuration file					/	x	x x	

Optional designation	Description
n_1	0 = Standard pin length 5.33 mm(0.210 in.) 1 = Surface mount option [note 1] 2 = Lead length 3.69 mm(0.145 in.) (cut) 3 = Lead length 4.57 mm(0.180 in.) (cut) 4 = Lead length 2.79 mm(0.110 in.) (cut)
n_2	0 = Open frame 1 = Baseplate 2 = Baseplate with GND-pin
n_3 n_4	00 = 40-60 Vin, 4-13.2 Vout adjusted, with digital interface 01 = 40-60 Vin, 4-13.2 Vout adjusted, without digital interface 04 = 36-75 Vin, 4-13.2 Vout adjusted, with digital interface 05 = 36-75 Vin, 4-13.2 Vout adjusted, without digital interface 06 = 36-75 Vin, 4-13.2 Vout adjusted, Droop load sharing function for parallel operation, without digital interface 07 = 36-75 Vin, 4-13.2 Vout adjusted, Droop load sharing function for parallel operation, with digital interface 11 = 40-60 Vin, 4-13.2 Vout adjusted, Droop load sharing function for parallel operation, with digital interface 12 = 40-60 Vin, 4-13.2 Vout adjusted, Droop load sharing function for parallel operation, without digital interface
n_5 n_6 n_7	001 = 12 V Standard configuration for 36-75 Vin, n_3n_4 = 04 or 05 002 = 12 V Standard configuration for 40-60 Vin, n_3n_4 = 00 or 01 003 = 9 V Standard configuration for 36-60 Vin, n_3n_4 = 00 or 01 004 = 9 V Standard configuration for 36-60 Vin, n_3n_4 = 04 or 05 008 = 12 V with positive RC logic configuration for 36-75 Vin, n_3n_4 = 04 or 05 009 = 12 V with positive RC logic configuration for 40-60 Vin, n_3n_4 = 00 or 01 013 = 12 V with 0.6 V droop load sharing function configuration (36-75 Vin, n_3n_4 = 06 or 07) 014 = 12.45 V with 0.6V droop load sharing function configuration (36-75 Vin, n_3n_4 = 06 or 07) 016 = 12 V with 0.6 V droop load sharing function configuration (40-60 Vin, n_3n_4 = 11 or 12) 017 = 12.45 V with 0.6V droop load sharing function configuration (40-60 Vin, n_3n_4 = 11 or 12) 018 = 12 V Standard configuration for maximum 15mF capacitive load, 36-75 Vin, n_3n_4 = 04 or 05 xxx = Application Specific Configuration
Packaging	20 converters(through hole pin)/tray, PE foam dissipative 20 converters(surface mount pin)/tray, Antistatic PPE

Example: Product number BMR4562100/001 equals an Through hole mount lead length 3.69 mm (cut), baseplate, digital interface with 12 V standard configuration variant.

Note 1: No baseplate option

For application specific configurations contact your local Ericsson Power Modules sales representative.

General Information

Reliability

The failure rate (λ) and mean time between failures (MTBF= $1/\lambda$) is calculated at max output power and an operating ambient temperature (T_A) of +40°C. Ericsson Power Modules uses Telcordia SR-332 Issue 2 Method 1 to calculate the mean steady-state failure rate and standard deviation (σ).

Telcordia SR-332 Issue 2 also provides techniques to estimate the upper confidence levels of failure rates based on the mean and standard deviation.

Mean steady-state failure rate, λ	Std. deviation, σ
425 nFailures/h	60.9 nFailures/h

MTBF (mean value) for the BMR456 series = 2.9 Mh.
MTBF at 90% confidence level = 2.4 Mh

Compatibility with RoHS requirements

The products are compatible with the relevant clauses and requirements of the RoHS directive 2011/65/EU and have a maximum concentration value of 0.1% by weight in homogeneous materials for lead, mercury, hexavalent chromium, PBB and PBDE and of 0.01% by weight in homogeneous materials for cadmium.

Exemptions in the RoHS directive utilized in Ericsson Power Modules products are found in the Statement of Compliance document.

Ericsson Power Modules fulfills and will continuously fulfill all its obligations under regulation (EC) No 1907/2006 concerning the registration, evaluation, authorization and restriction of chemicals (REACH) as they enter into force and is through product materials declarations preparing for the obligations to communicate information on substances in the products.

Quality Statement

The products are designed and manufactured in an industrial environment where quality systems and methods like ISO 9000, Six Sigma, and SPC are intensively in use to boost the continuous improvements strategy. Infant mortality or early failures in the products are screened out and they are subjected to an ATE-based final test. Conservative design rules, design reviews and product qualifications, plus the high competence of an engaged work force, contribute to the high quality of the products.

Warranty

Warranty period and conditions are defined in Ericsson Power Modules General Terms and Conditions of Sale.

Limitation of Liability

Ericsson Power Modules does not make any other warranties, expressed or implied including any warranty of merchantability or fitness for a particular purpose (including, but not limited to, use in life support applications, where malfunctions of product can cause injury to a person’s health or life).

Safety Specification

General information

Ericsson Power Modules DC/DC converters and DC/DC regulators are designed in accordance with the safety standards IEC 60950-1, EN 60950-1 and UL 60950-1 *Safety of Information Technology Equipment*.

IEC/EN/UL 60950-1 contains requirements to prevent injury or damage due to the following hazards:

- Electrical shock
- Energy hazards
- Fire
- Mechanical and heat hazards
- Radiation hazards
- Chemical hazards

On-board DC/DC converters and DC/DC regulators are defined as component power supplies. As components they cannot fully comply with the provisions of any safety requirements without “conditions of acceptability”. Clearance between conductors and between conductive parts of the component power supply and conductors on the board in the final product must meet the applicable safety requirements. Certain conditions of acceptability apply for component power supplies with limited stand-off (see Mechanical Information for further information). It is the responsibility of the installer to ensure that the final product housing these components complies with the requirements of all applicable safety standards and regulations for the final product.

Component power supplies for general use should comply with the requirements in IEC/EN/UL 60950-1 *Safety of Information Technology Equipment.* Product related standards, e.g. IEEE 802.3af *Power over Ethernet*, and ETS-300132-2 *Power interface at the input to telecom equipment, operated by direct current (dc)* are based on IEC/EN/UL 60950-1 with regards to safety.

Ericsson Power Modules DC/DC converters and DC/DC regulators are UL 60950-1 recognized and certified in accordance with EN 60950-1. The flammability rating for all construction parts of the products meet requirements for V-0 class material according to IEC 60695-11-10, *Fire hazard testing, test flames* – 50 W horizontal and vertical flame test methods.

Isolated DC/DC converters

Galvanic isolation between input and output is verified in an electric strength test and the isolation voltage (V_{iso}) meets the voltage strength requirement for basic insulation according to IEC/EN/UL 60950-1.

It is recommended to use a slow blow fuse at the input of each DC/DC converter. If an input filter is used in the circuit the fuse should be placed in front of the input filter. In the rare event of a component problem that imposes a short circuit on the input source, this fuse will provide the following functions:

- Isolate the fault from the input power source so as not to affect the operation of other parts of the system
- Protect the distribution wiring from excessive current and power loss thus preventing hazardous overheating

The DC/DC converter output is considered as safety extra low voltage (SELV) if one of the following conditions is met:

- The input source has double or reinforced insulation from the AC mains according to IEC/EN/UL 60950-1
- The input source has basic or supplementary insulation from the AC mains and the input of the DC/DC converter is maximum 60 Vdc and connected to protective earth according to IEC/EN/UL 60950-1
- The input source has basic or supplementary insulation from the AC mains and the DC/DC converter output is connected to protective earth according to IEC/EN/UL 60950-1

Non - isolated DC/DC regulators

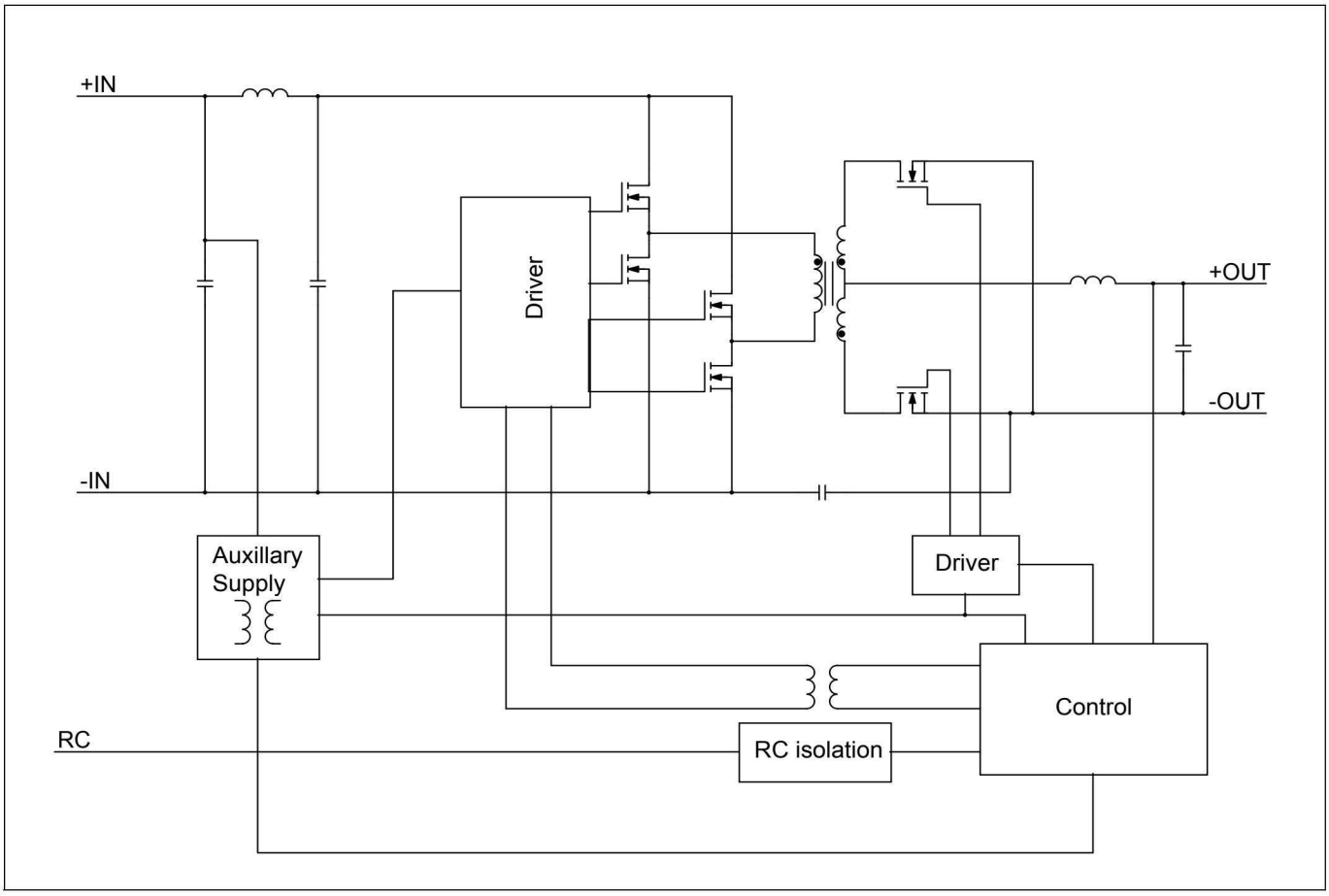
The DC/DC regulator output is SELV if the input source meets the requirements for SELV circuits according to IEC/EN/UL 60950-1.

Absolute Maximum Ratings

Characteristics		min	typ	max	Unit
T_{P1}	Operating Temperature (see Thermal Consideration section)	-40		+125	°C
T_S	Storage temperature	-55		+125	°C
V_I	Input voltage	-0.5		+80 +65*	V
V_{iso}	Isolation voltage (input to output test voltage), see note 1			2250	Vdc
V_{tr}	Input voltage transient according to ETSI EN 300 132-2 and Telcordia GR-1089-CORE			+100 +80*	V
V_{RC}	Remote Control pin voltage	-0.3		18	V
V Logic I/O	SALERT, CTRL, SCL, SDA, SA0, SA1	-0.3		3.6	V

Stress in excess of Absolute Maximum Ratings may cause permanent damage. Absolute Maximum Ratings, sometimes referred to as no destruction limits, are normally tested with one parameter at a time exceeding the limits of Output data or Electrical Characteristics. If exposed to stress above these limits, function and performance may degrade in an unspecified manner.
Note 1: Isolation voltage (input/output to base-plate) max 750 Vdc.
*) Apply for the narrow input version V_I= 40-60 V

Fundamental Circuit Diagram



Functional Description

T_{P1}, T_{P3} = -40 to +90ºC, V_I = 36 to 75 V, sense pins connected to output pins unless otherwise specified under Conditions.
Typical values given at: T_{P1}, T_{P3} = +25°C, V_I= 53 V, max I_O , unless otherwise specified under Conditions
Configuration File: 190 10-CDA 102 0314/001

Characteristics		Conditions	min	typ	max	Unit
PMBus monitoring accuracy						
VIN_READ	Input voltage		-2	±0.2	2	%
VOUT_READ	Output voltage	V_I = 53 V	-1.0	±0.1	1.0	%
IOUT_READ	Output current	V_I = 53 V, 50-100% of max I_O	-6	±0.15	6	%
IOUT_READ	Output current	V_I = 53 V, 10% of max I_O	-0.6	-	0.6	A
TEMP_READ	Temperature		-5	±3.5	5	ºC
Fault Protection Characteristics						
Input Under Voltage Lockout, UVLO	Factory default		-	33	-	V
	Setpoint accuracy		-2	-	2	%
	Hysteresis	Factory default	-	2	-	V
		Configurable via PMBus of threshold range, Note 1	0	-	-	V
	Delay		-	300	-	µs
(Output voltage) Over/Under Voltage Protection, OVP/UVP	VOUT_UV_FAULT_LIMIT	Factory default	-	0	-	V
		Configurable via PMBus, Note 1	0	-	16	V
	VOUT_OV_FAULT_LIMIT	Factory default	-	15.6	-	V
		Configurable via PMBus, Note 1	V_{OUT}	-	16	V
	fault response time		-	200	-	µs
Over Current Protection, OCP	Setpoint accuracy	Io	-6		6	%
	IOUT_OC_FAULT_LIMIT	Factory default	-	41	-	A
		Configurable via PMBus, Note 1	0	-	100	
	fault response time		-	200	-	µs
Over Temperature Protection, OTP	OTP_FAULT_LIMIT	Factory default	-	125	-	°C
		Configurable via PMBus, Note 1	-50		125	
	OTP hysteresis	Factory default		10		
		Configurable via PMBus, Note 1	0		125	
	fault response time		-	300	-	µs
Logic Input/Output Characteristics						
Logic input low (V_{IL})		CTRL, SA0, SA1, PG, SCL, SDA,	-	-	1.1	V
Logic input high (V_{IH})			2.1	-	-	V
Logic output low (V_{OL})		CTRL, PG, SALERT, SCL, SDA I_{OL} = 6 mA	-	-	0.25	V
Logic output high (V_{OH})		CTRL, PG, SALERT, SCL, SDA I_{OH} = -6 mA	2.7	-	-	V
Bus free time T(BUF)		Note 2	1.3	-		µs

Note 1: See Operating Information section.

Note 2: PMBus timing parameters according to PMBus spec.

12.0 V, 35 A / 420 W Electrical Specification — BMR 456 0004/001

T_{P1}, T_{P3} = -40 to +90ºC, V_I = 36 to 75 V, sense pins connected to output pins unless otherwise specified under Conditions.
Typical values given at: T_{P1}, T_{P3} = +25°C, V_I = 53 V, max I_O, unless otherwise specified under Conditions.
Additional C_{In} = 0.1 mF, C_{out} = 3.5 mF, Configuration File: 19010-CDA 102 0314/001

Characteristics		Conditions	min	typ	max	Unit
V_I	Input voltage range		36		75	V
V_{Ioff}	Turn-off input voltage	Decreasing input voltage	32	33	34	V
V_{Ion}	Turn-on input voltage	Increasing input voltage	34	35	36	V
C_I	Internal input capacitance			18		µF
P_O	Output power		0		420	W
η	Efficiency	50% of max I_O		96.2		%
		max I_O		95.5		
		50% of max I_O , V_I = 48 V		96.4		
		max I_O , V_I = 48 V		95.5		
P_d	Power Dissipation	max I_O		19.8	29.5	W
P_{li}	Input idling power	I_O = 0 A, V_I = 53 V		3.3		W
P_{RC}	Input standby power	V_I = 53 V (turned off with RC)		0.4		W
f_s	Default switching frequency	0-100% of max I_O	133	140	147	kHz

V_{Oi}	Output voltage initial setting and accuracy	T_{P1} = 25°C, V_I = 53 V, I_O = 35 A	11.88	12.0	12.12	V
V_O	Output adjust range	See operating information	4.0		13.2	V
	Output voltage tolerance band	0-100% of max I_O	11.76		12.24	V
	Line regulation	max I_O		21	55	mV
	Load regulation	V_I = 53 V, 0-100% of max I_O		6	40	mV
V_{tr}	Load transient voltage deviation	V_I = 53 V, Load step 25-75-25% of max I_O, di/dt = 1 A/µs		±0.4		V
t_{tr}	Load transient recovery time			150		µs
t_r	Ramp-up time (from 10−90% of V_{Oi})	10-100% of max I_O, T_{P1}, T_{P3} = 25ºC, V_I = 53 V		8		ms
t_s	Start-up time (from V_I connection to 90% of V_{Oi})			24		ms
t_f	Vin shutdown fall time (from V_I off to 10% of V_O)	max I_O		3.6		ms
		I_O = 0 A, C_O = 0 mF		7		s
t_{RC}	RC start-up time	max I_O		12		ms
	RC shutdown fall time (from RC off to 10% of V_O)	max I_O		5.1		ms
		I_O = 0 A, C_O = 0 mF		7		s
I_O	Output current		0		35	A
I_{lim}	Current limit threshold	V_O = 10.8 V, T_{P1}, T_{P3} < max T_{P1}, T_{P3}	37	41	44	A
I_{sc}	Short circuit current	T_{P1}, T_{P3} = 25ºC, see Note 1		12		A
C_{out}	Recommended Capacitive Load	T_{P1}, T_{P3} = 25ºC, see Note 2	0.1	3.5	6	mF
V_{Oac}	Output ripple & noise	See ripple & noise section, max I_O , see Note 3		60	150	mVp-p
OVP	Over voltage protection	T_{P1}, T_{P3} = 25°C, V_I = 53 V, 10-100% of max I_O		15.6		V
RC	Sink current, see Note 4	See operating information			0.7	mA
	Trigger level	Decreasing / Increasing RC-voltage		2.6 / 2.9		V

Note 1: OCP in hic-up mode

Note 2: Low ESR-value

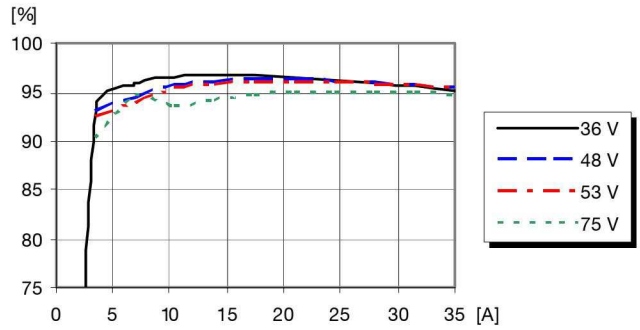
Note 3: Cout = 100 µF, external capacitance

Note 4: Sink current drawn by external device connected to the RC pin. Minimum sink current required guaranteeing activated RC function.

Typical Characteristics
12.0 V, 35 A / 420 W

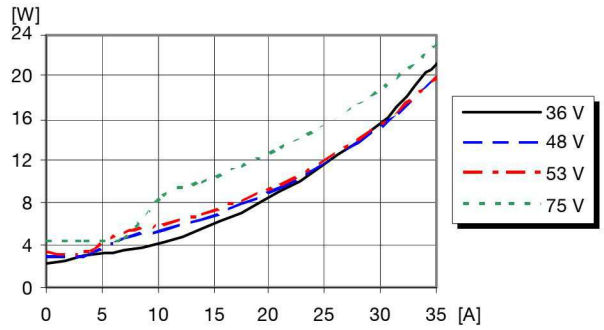
BMR 456 0004/001

Efficiency



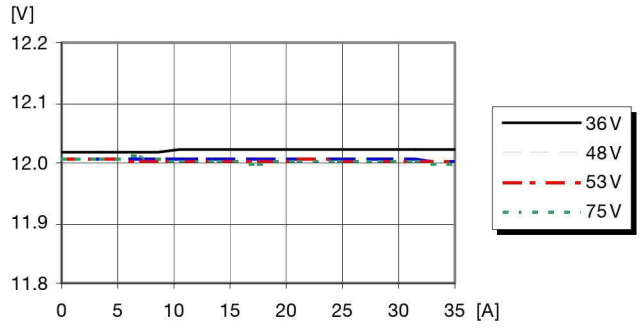
Efficiency vs. load current and input voltage at T_{P1}, T_{P3} = +25°C

Power Dissipation



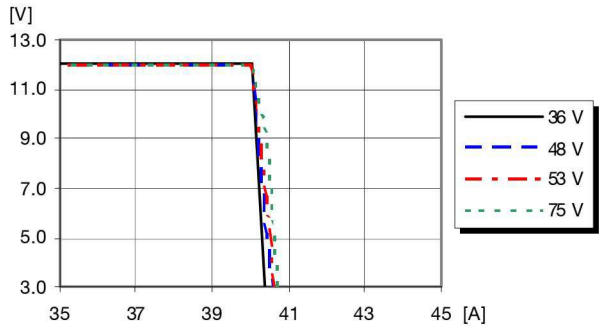
Dissipated power vs. load current and input voltage at T_{P1}, T_{P3} = +25°C

Output Characteristics



Output voltage vs. load current at T_{P1}, T_{P3} = +25°C

Current Limit Characteristics

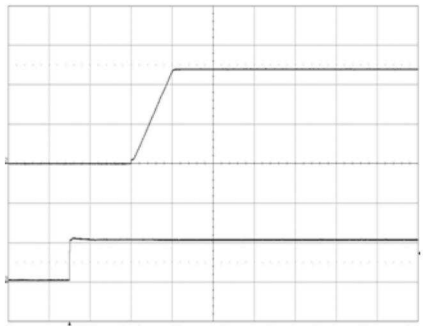


Output voltage vs. load current at I_O > max I_O , T_{P1}, T_{P3} = +25°C

Typical Characteristics
12.0 V, 35 A / 420 W

BMR 456 0004/001

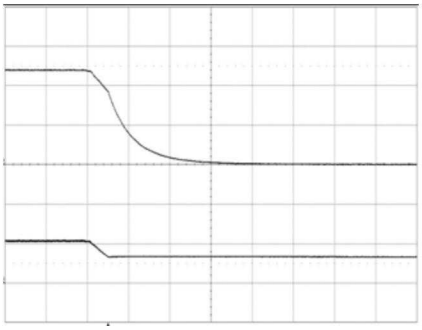
Start-up



Start-up enabled by connecting V_I at:
T_{P1}, T_{P3} = +25°C, V_I = 53 V,
I_O = 35 A resistive load.

Top trace: output voltage (5 V/div.).
Bottom trace: input voltage (50 V/div.).
Time scale: (10 ms/div.).

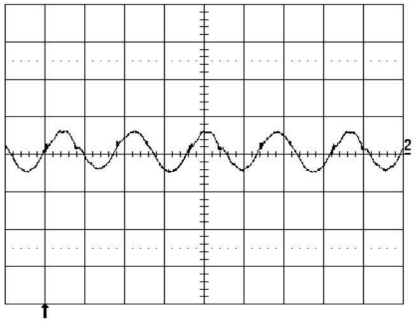
Shut-down



Shut-down enabled by disconnecting V_I at:
T_{P1}, T_{P3} = +25°C, V_I = 53 V,
I_O =35 A resistive load.

Top trace: output voltage (5 V/div.).
Bottom trace: input voltage (50 V/div.).
Time scale: (2 ms/div.).

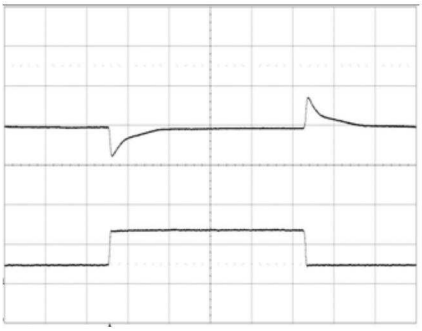
Output Ripple & Noise



Output voltage ripple at:
T_{P1}, T_{P3} = +25°C, V_I = 53 V,
I_O = 35 A resistive load.

Trace: output voltage (50 mV/div.).
Time scale: (2 µs/div.).

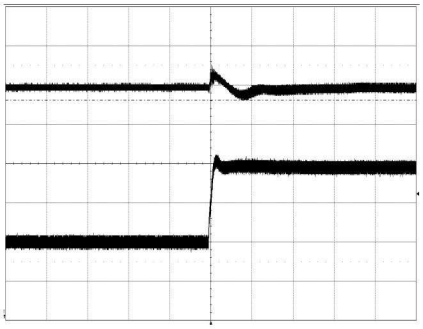
Output Load Transient Response



Output voltage response to load current step-change (8.75-26.25-8.75 A) at:
T_{P1}, T_{P3} =+25°C, V_I = 53 V, C_O = 3.5 mF.

Top trace: output voltage (0.5 V/div.).
Bottom trace: output current (20 A/div.).
Time scale: (0.5 ms/div.).

Input Voltage Transient Response



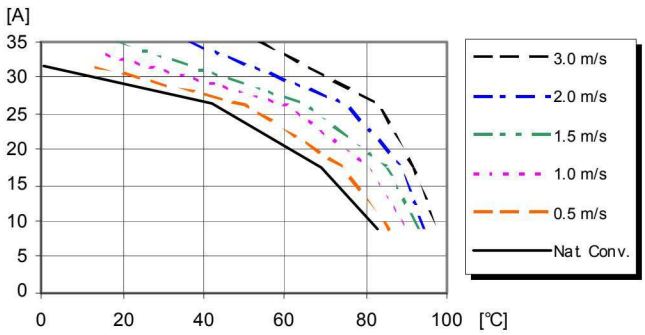
Output voltage response to input voltage transient at: T_{P1}, T_{P3} = +25°C, V_I = 36-75 V,
I_O = 17 A resistive load, C_O = 3.5 mF

Top trace: output voltage (2 V/div.).
Bottom trace: input voltage (20 V/div.).
Time scale: (0.5 ms/div.).

Typical Characteristics
12.0 V, 35 A / 420 W

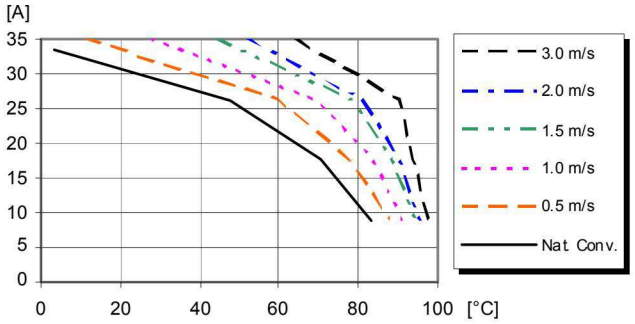
BMR 456 0004/001

Output Current Derating – Open frame



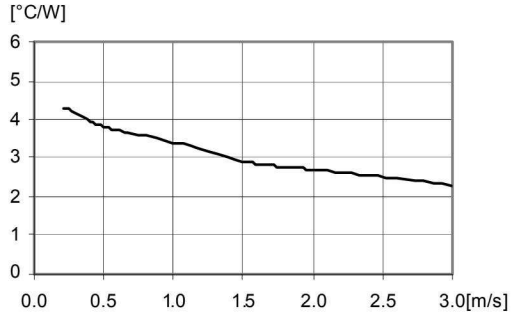
Available load current vs. ambient air temperature and airflow at V_I = 53 V. See Thermal Consideration section.

Output Current Derating – Base plate



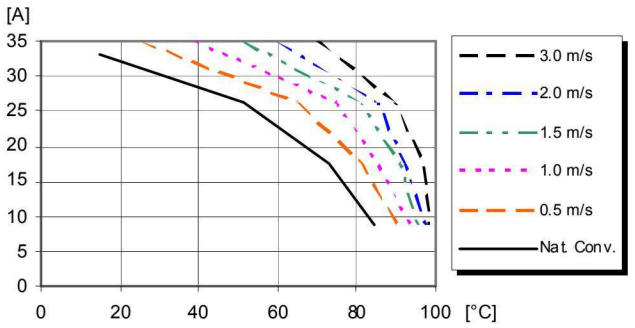
Available load current vs. ambient air temperature and airflow at V_I = 53 V. See Thermal Consideration section.

Thermal Resistance – Base plate



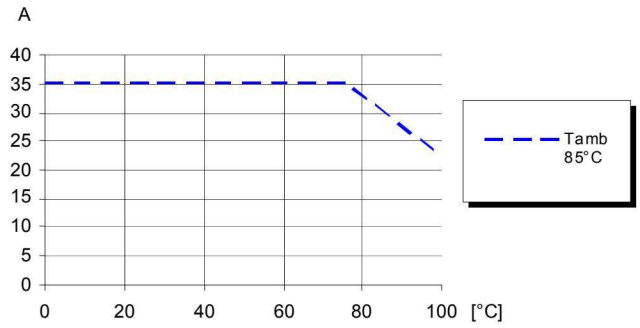
Thermal resistance vs. airspeed measured at the converter. Tested in wind tunnel with airflow and test conditions as per the Thermal consideration section. V_I = 53 V.

Output Current Derating – Base plate + Heat sink



Available load current vs. ambient air temperature and airflow at V_I = 53 V. See Thermal Consideration section. Tested with Plate Fin Transverse heatsink, height 0.23 In, P0114 Thermal Pad.

Output Current Derating – Cold wall sealed box



Available load current vs. base plate temperature at 85°C ambient. V_I = 53 V. See Thermal Consideration section.

12.0 V, 35 A / 420 W Electrical Specification — BMR 456 0004/018

T_{P1}, T_{P3} = -40 to +90ºC, V_I = 36 to 75 V, sense pins connected to output pins unless otherwise specified under Conditions.
Typical values given at: T_{P1}, T_{P3} = +25°C, V_I = 53 V, max I_O, unless otherwise specified under Conditions.
Additional C_{In} = 0.1 mF, C_{out} = 3.5 mF, Configuration File: 19010-CDA 102 0314/018

Characteristics		Conditions	min	typ	max	Unit
V_I	Input voltage range		36		75	V
V_{Ioff}	Turn-off input voltage	Decreasing input voltage	32	33	34	V
V_{Ion}	Turn-on input voltage	Increasing input voltage	34	35	36	V
C_I	Internal input capacitance			18		µF
P_O	Output power		0		420	W
η	Efficiency	50% of max I_O		96.2		%
		max I_O		95.5		
		50% of max I_O , V_I = 48 V		96.4		
		max I_O , V_I = 48 V		95.5		
P_d	Power Dissipation	max I_O		19.8	29.5	W
P_{Ii}	Input idling power	I_O = 0 A, V_I = 53 V		3.3		W
P_{RC}	Input standby power	V_I = 53 V (turned off with RC)		0.4		W
f_s	Default switching frequency	0-100% of max I_O	133	140	147	kHz

V_{Oi}	Output voltage initial setting and accuracy	T_{P1} = 25°C, V_I = 53 V, I_O = 35 A	11.88	12.0	12.12	V
V_O	Output adjust range	See operating information	4.0		13.2	V
	Output voltage tolerance band	0-100% of max I_O	11.76		12.24	V
	Line regulation	max I_O		21	55	mV
	Load regulation	V_I = 53 V, 0-100% of max I_O		6	40	mV
V_{tr}	Load transient voltage deviation	V_I = 53 V, Load step 25-75-25% of max I_O, di/dt = 1 A/µs		±0.4		V
t_{tr}	Load transient recovery time			150		µs
t_r	Ramp-up time (from 10−90% of V_{Oi})	10-100% of max I_O, T_{P1}, T_{P3} = 25ºC, V_I = 53 V		20		ms
t_s	Start-up time (from V_I connection to 90% of V_{Oi})			38		ms
t_f	Vin shutdown fall time (from V_I off to 10% of V_O)	max I_O		3.6		ms
		I_O = 0 A, C_O = 0 mF		7		s
t_{RC}	RC start-up time	max I_O		25		ms
	RC shutdown fall time (from RC off to 10% of V_O)	max I_O		5.1		ms
		I_O = 0 A, C_O = 0 mF		7		s
I_O	Output current		0		35	A
I_{lim}	Current limit threshold	V_O = 10.8 V, T_{P1}, T_{P3} < max T_{P1}, T_{P3}	37	41	44	A
I_{sc}	Short circuit current	T_{P1}, T_{P3} = 25ºC, see Note 1		12		A
C_{out}	Recommended Capacitive Load	T_{P1}, T_{P3} = 25ºC, see Note 2	0.1	3.5	15	mF
V_{Oac}	Output ripple & noise	See ripple & noise section, max I_O , see Note 3		60	150	mVp-p
OVP	Over voltage protection	T_{P1}, T_{P3} = 25°C, V_I = 53 V, 10-100% of max I_O		15.6		V
RC	Sink current, see Note 4	See operating information			0.7	mA
	Trigger level	Decreasing / Increasing RC-voltage		2.6 / 2.9		V

Note 1: OCP in hic-up mode

Note 2: Low ESR-value

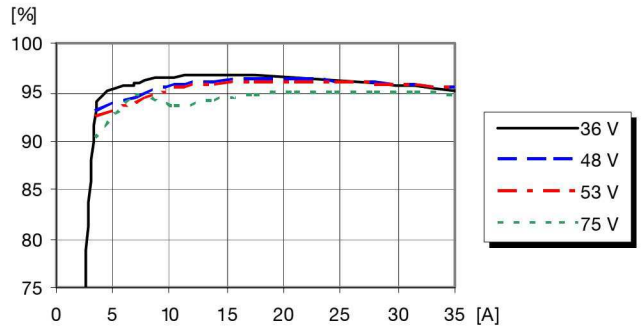
Note 3: Cout = 100 µF, external capacitance

Note 4: Sink current drawn by external device connected to the RC pin. Minimum sink current required guaranteeing activated RC function.

Typical Characteristics
12.0 V, 35 A / 420 W

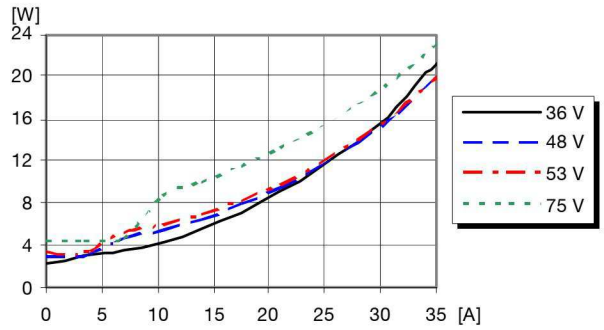
BMR 456 0004/018

Efficiency



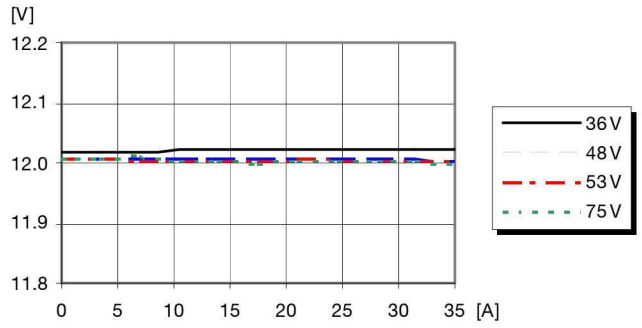
Efficiency vs. load current and input voltage at T_{P1}, T_{P3} = +25°C

Power Dissipation



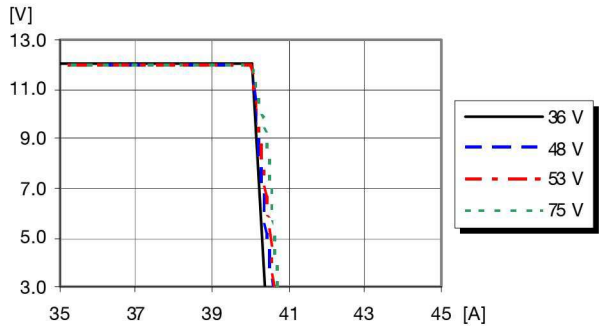
Dissipated power vs. load current and input voltage at T_{P1}, T_{P3} = +25°C

Output Characteristics



Output voltage vs. load current at T_{P1}, T_{P3} = +25°C

Current Limit Characteristics

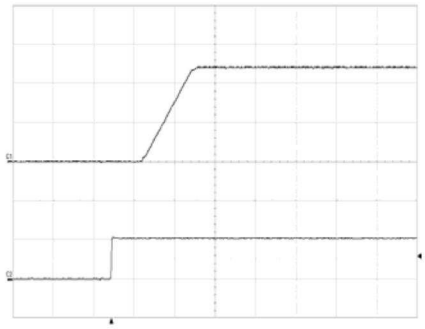


Output voltage vs. load current at I_O > max I_O , T_{P1}, T_{P3} = +25°C

Typical Characteristics
12.0 V, 35 A / 420 W

BMR 456 0004/018

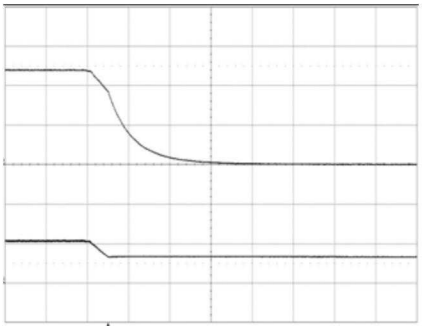
Start-up



Start-up enabled by connecting V_I at:
T_{P1}, T_{P3} = +25°C, V_I = 53 V,
I_O = 35 A resistive load.

Top trace: output voltage (5 V/div.).
Bottom trace: input voltage (50 V/div.).
Time scale: (20 ms/div.).

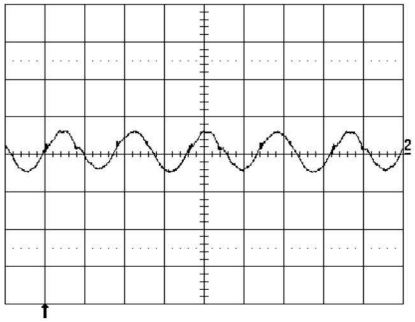
Shut-down



Shut-down enabled by disconnecting V_I at:
T_{P1}, T_{P3} = +25°C, V_I = 53 V,
I_O =35 A resistive load.

Top trace: output voltage (5 V/div.).
Bottom trace: input voltage (50 V/div.).
Time scale: (2 ms/div.).

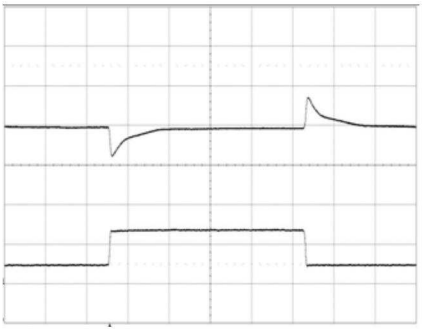
Output Ripple & Noise



Output voltage ripple at:
T_{P1}, T_{P3} = +25°C, V_I = 53 V,
I_O = 35 A resistive load.

Trace: output voltage (50 mV/div.).
Time scale: (2 µs/div.).

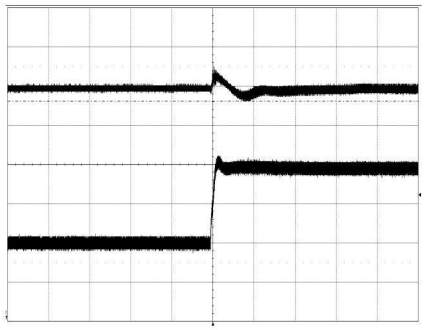
Output Load Transient Response



Output voltage response to load current step-change (8.75-26.25-8.75 A) at:
T_{P1}, T_{P3} =+25°C, V_I = 53 V, C_O = 3.5 mF.

Top trace: output voltage (0.5 V/div.).
Bottom trace: output current (20 A/div.).
Time scale: (0.5 ms/div.).

Input Voltage Transient Response



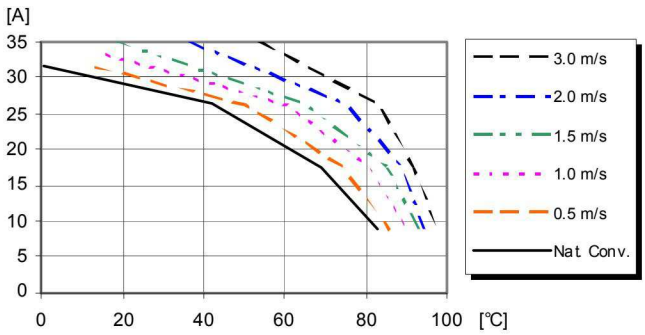
Output voltage response to input voltage transient at: T_{P1}, T_{P3} = +25°C, V_I = 36-75 V,
I_O = 17 A resistive load, C_O = 3.5 mF

Top trace: output voltage (2 V/div.).
Bottom trace: input voltage (20 V/div.).
Time scale: (0.5 ms/div.).

Typical Characteristics
12.0 V, 35 A / 420 W

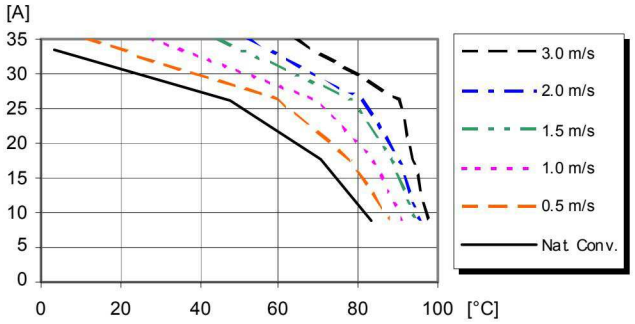
BMR 456 0004/018

Output Current Derating – Open frame



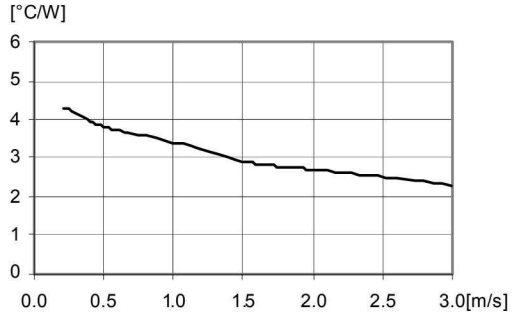
Available load current vs. ambient air temperature and airflow at V_I = 53 V. See Thermal Consideration section.

Output Current Derating – Base plate



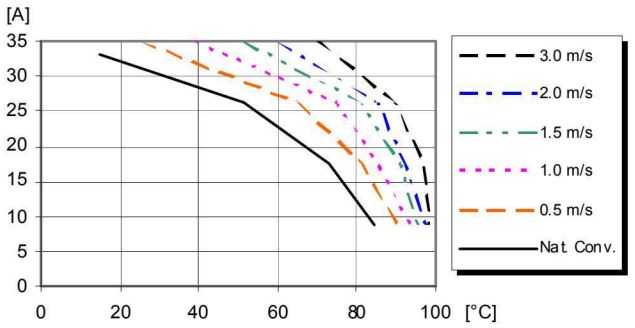
Available load current vs. ambient air temperature and airflow at V_I = 53 V. See Thermal Consideration section.

Thermal Resistance – Base plate



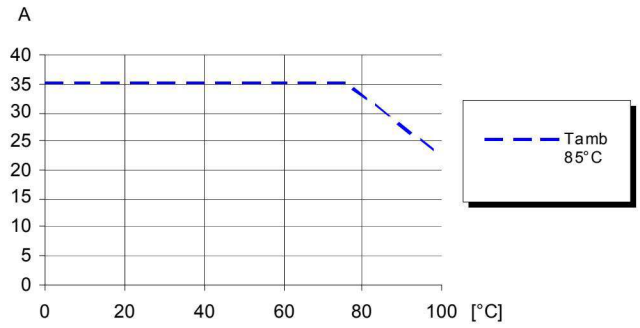
Thermal resistance vs. airspeed measured at the converter. Tested in wind tunnel with airflow and test conditions as per the Thermal consideration section. V_I = 53 V.

Output Current Derating – Base plate + Heat sink



Available load current vs. ambient air temperature and airflow at V_I = 53 V. See Thermal Consideration section. Tested with Plate Fin Transverse heatsink, height 0.23 In, P0114 Thermal Pad.

Output Current Derating – Cold wall sealed box



Available load current vs. base plate temperature at 85°C ambient. V_I = 53 V. See Thermal Consideration section.