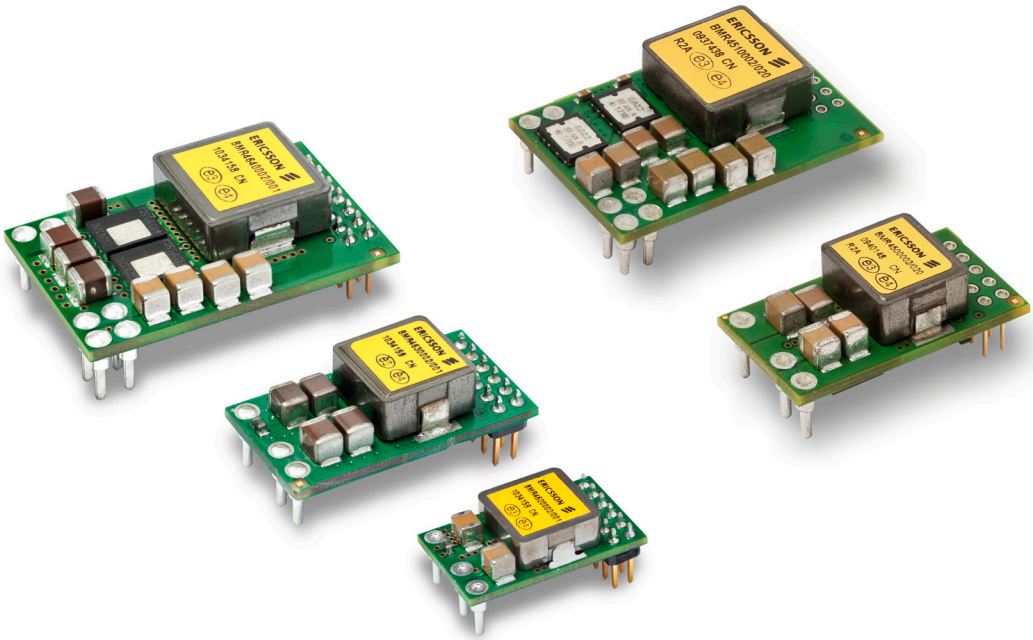
APPLICATION NOTE 314

Ericsson Power Modules



FIRST AND SECOND GENERATION 3E POL REGULATORS - A COMPARISON

ABSTRACT

This application note provides an overview of the differences and compatibility between the first and second generation of 3E digital point-of-load (POL) regulators. This useful information applies both when considering the choice of regulator for a new design and when updating BMR450/451 with BMR462/463/464 in an existing design.

This application note presents the hardware differences. Above this there are also differences in the default configuration of the products, e.g. fault thresholds. Consult the technical specifications of each product and application note AN302 for further details.

Throughout this application note the differences between BMR450 and BMR463 and between BMR451 and BMR464 are highlighted in blue.

INTRODUCTION

The first generation 3E POL regulators include BMR450 and BMR451, where BMR450 is a 20 A product and BMR451 is a 40 A product.

The second generation 3E POL regulators include BMR462, BMR463 and BMR464 where BMR462 is a 12 A product, BMR463 is a 20 A product and BMR464 is a 40 A product.

In updating a design including BMR450 and/or BMR451 it is of interest to the designer to investigate the advantages with updating the design with the second generation 20 A and 40 A products, BMR463 and BMR464.

CONTENTS

Introduction	2
Electrical properties	4
Mechanical properties	4
Footprint	5
Digital connector pinning	6
PMBus communication	7
Differences in PMBus Commands	8

ELECTRICAL PROPERTIES

Product	Max output current (A)	Output voltage range (V)	Input voltage range (V)
BMR462	12	0.6-5.0	4.5-14
BMR450	20	0.7-5.0	4.5-14
BMR463	20	0.6-3.3	4.5-14
BMR451	40	0.7-3.3	4.5-14
BMR464	40	0.6-3.3	4.5-14

MECHANICAL PROPERTIES

Product	Footprint *	Length (mm)	Width (mm)	Height (mm)
BMR4620002	TH	21	12.7	8.2
BMR4621002	SMD			
BMR4622002	SIP	20.8	7.6	15.6
BMR4500002	TH	25.65	12.9	8.2
BMR4501002	SMD			
BMR4630002	TH	25.65	13.8	8.2
BMR4631002	SMD			
BMR4632002	SIP	26.3	7.6	15.6
BMR4510002	TH	30.85	20	8.2
BMR451 002	SMD			
BMR4640002	TH	30.85	20	8.2
BMR4641002	SMD			
BMR4642002	SIP	33	7.6	18.1

* TH = Through Hole mount, SMD = Surface Mount, SIP = Single in Line mount

FOOTPRINT

The footprint of the through hole and SMD versions of the second generation 3E POL, BMR462, BMR463 and BMR464 have a digital compatibility except for two extra pins on BMR464, see figure 1.

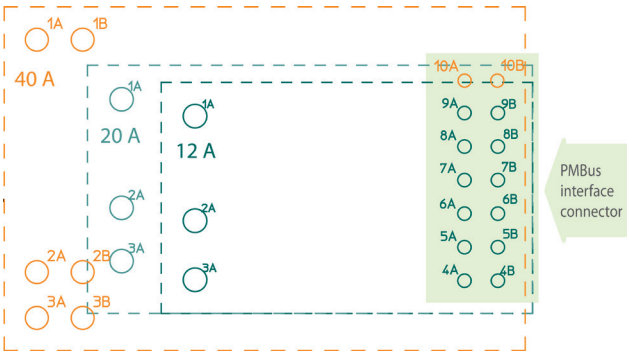


Figure 1. BMR462, BMR463 and BMR464 footprint

In the same way there is a footprint compatibility for the first generation 3E POL, BMR450 and BMR451, see figure 2.

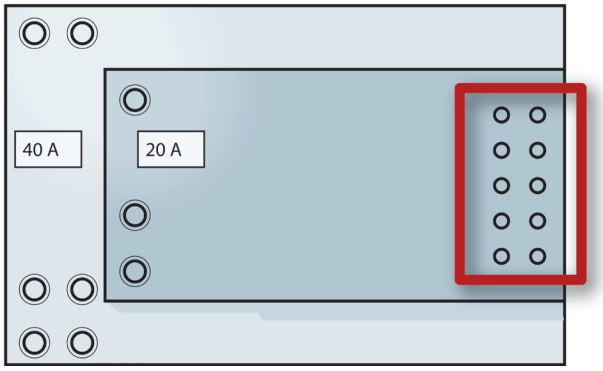


Figure 2 . BMR450 and BMR451 footprint

Between the first and the second generation of 3E POL regulators there is footprint compatibility only to some extent, see figure 3 and 4 (figures are not to scale)

BMR463 has two extra pins compared to BMR450.

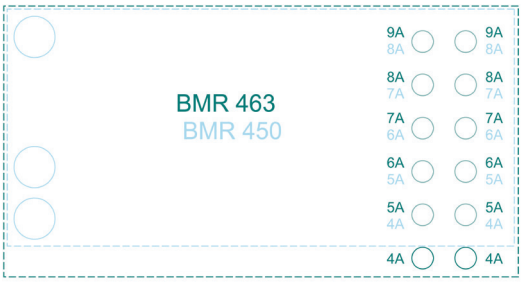


Figure 3. BMR463 and BMR450.

BMR464 has four extra pins compared to BMR451.

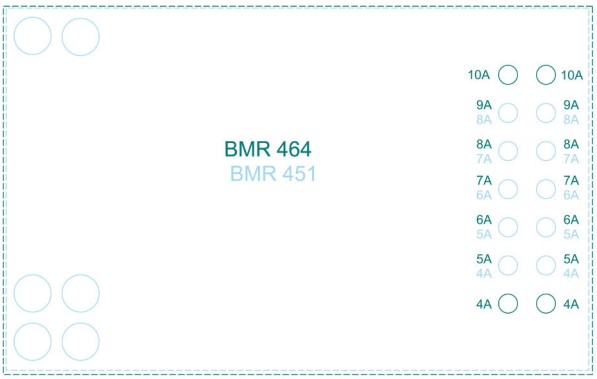


Figure 4. BMR464 and BMR451.

The pinning dimensions are the same for all products of the same footprint style (through hole, SMD or SIP).

DIGITAL CONNECTOR PINNING

Below table shows a comparison of the digital pin functionality of the first and the second generation 3E POL regulators. The technical specification for each product should be consulted in order to consider possible design conflicts due to the differences.

When replacing the BMR450/451 with the BMR463/464 one must consider the pin strapping. Different resistor values are used to set a certain output voltage. For PMBus address pin strap the same resistor values are used but the BMR462 and the BMR463 (except SIP version) have only one SA0 address pin. For those products the SA1 setting is fixed on the module which limits the possible PMBus address range.

For BMR450/451 the pin strap resistors connect to the –S pin while for the BMR462/463/464 they connect to the PREF pin.

BMR450/451		BMR462/463/464 *		Function
1A	Vin	Vin	1A	Input voltage
1B			1B	Input voltage (BMR451/464 only)
2A	GND	GND	2A	Power Ground
2B			2B	Power Ground (BMR451/464 only)
3A	VOUT	VOUT	3A	Output voltage
3B			3B	Output voltage (BMR451/464 only)
-	-	VTRK	4A	Voltage tracking input
-	-	PREF	4B	Pin-strap reference
4A	+S	+S	5A	Positive sense
4B	-S	-S	5B	Negative sense
5A	SA0	SA0	6A	Address pin 0
5B	SA1	GCB	6B	BMR450/451: Address pin 1 BMR462/463/464: Group Communication Bus
6A	SCL	SCL	7A	PMBus Clock
6B	SDA	SDA	7B	PMBus Data
7A	FLEX	VSET	8A	BMR450/451: Voltage adjust / synchronization BMR462/463/464: Output voltage pinstrap
7B	DGND	SYNC	8B	BMR450/451: PMBus Ground BMR462/463/464: Synchronization I/O
8A	SALERT	SALERT	9A	PMBus Alert
8B	CTRL	CTRL	9B	Remote Control
-	-	PG	10A	Power Good (BMR464 and BMR463 SIP only)
-	-	SA1	10B	Address pin 1 (BMR464 and BMR463 SIP only)

* Pin numbers for BMR462, BMR463 and BMR464 in the table are valid only for through hole and SMD versions.

PMBUS COMMUNICATION

BMR462 and BMR463 (non SIP) have a limited address range due to an internal SA1 address pin strap (only one SA0 address pin in the digital connector).

Product	PMBus address range
BMR462	100-124
BMR450	0-124
BMR463 Through hole/SMD	75-99
BMR463 SIP	0-124
BMR451	0-124
BMR464	0-124

DIFFERENCES IN PMBUS COMMANDS

The table below lists and explains all PMBus commands that differ between the first and second generation 3E POL regulators.

Application note AN302 provides detailed information about these commands and the differences between the BMR450/451 and the BMR462/463/464.

Command	BMR450/451	BMR462/463/464	Description
STATUS_MFR_SPECIFIC		X	Status of clocking and switch period.
SNAPSHOT		X	Provides the possibility to store a set of current information about the operation of the product to the flash memory.
SNAPSHOT_CONTROL		X	
DEVICE_ID		X	Information about the controller device of the product.
USER_DATA_00		X	Memory space for user data.
MFR_CONFIG	X	X	The BMR462/463/464 support additional ramp and sync control bits.
USER_CONFIG	X	X	The BMR450/451 support SMBus master operation control bits. The BMR462/463/464 support additional duty cycle, ramp and sync control bits.
MISC_CONFIG		X	Control of functions such as broadcast enable and margining, compensation, ramp, and switch operation.
PID_TAPS_CALC		X	Can be used to store customized PID settings.
POLA_VADJ_CONFIG	X		Configures the FLEX pin of the BMR450/451.
NLR_CONFIG	X	X	The specification of the NLR_CONFIG bits and the NLR functionality in general is different between the BMR450/451 and the BMR462/463/464.
SEQUENCE	X	X	The specification of the SEQUENCE bits and the sequence functionality is different between the BMR450/451 and the BMR462/463/464. The former use the PMBus for inter-module communication while the latter use the Group Communication Bus (GCB).
DEADTIME_MAX		X	Sets the maximum deadtime value for the adaptive deadtime mode.
TRACK_CONFIG		X	Configures the voltage tracking function.
GCB_CONFIG		X	Configures the Group Communication Bus (GCB).
GCB_GROUP		X	
ISHARE_CONFIG		X	Configures parallel operation with current sharing.
PHASE_CONTROL		X	
STORE_USER_ALL		X	Provides control over a second non-volatile memory bank. It can be used to store customized settings without overwriting the default settings.
RESTORE_USER_ALL		X	
PRIVATE_PASSWORD		X	Provides more possibilities of security levels.

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Formed in the late seventies, Ericsson Power Modules is a division of Ericsson AB that primarily designs and manufactures isolated DC/DC converters and non-isolated voltage products such as point-of-load units ranging in output power from 1 W to 700 W. The products are aimed at (but not limited to) the new generation of ICT (information and communication technology) equipment where systems' architects are designing boards for optimized control and reduced power consumption.

Power Modules – Americas
Telephone: +1-972-583-5254
+1-972-583-6910

Power Modules – Asia/Pacific
Telephone: +852-2590-2453

Ericsson AB, Power Modules
SE-164 80 Stockholm, Sweden
Telephone: +46 10 716 9620

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Ericsson AB, Power Modules
SE-164 80 Stockholm, Sweden
Telephone +46 10 716 9620
www.ericsson.com/powermodules

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