PKM 4000A

Advanced Specification
25-30A DC/DC Power Modules
48 V Input; 1.5V, 1.8V, 2.5V, and 3.3V Outputs

- *High Efficiency 90% Typ at full load*
- *Fast Dynamic Response, 100us, +/- 150 mVpeak Typ*
- *Low Output Ripple, 60mV$_{p-p}$ Typ*
- *High power density, 56.9 W/in^3*
- *Wide input voltage range (36-75V)*
- *Industry standard footprint & pin-out*
- *1,500 Vdc isolation voltage*
- *Max case temperature +100°C*
- *UL 1950/UL$_C$ 1950 Recognized*
- *Basic Isolation Rating per EN60 950 (December 2000) verified by Underwriters Laboratory*
- *TUV to EN60 950 Type Approved*

TÜV Rheinland Product Safety — BAUART GEPRÜFT — TYPE APPROVED

c UL us

The PKM 4000A series of DC/DC power modules represents another Ericsson "industry first" achievement in the continued development of our "third generation" of high density, high efficiency DC/DC power modules in an industry standard quarter brick package with unparalleled performance. These breakthrough features have been achieved by using the most advanced patented topology, ultilizing integrated magnetics and synchronous rectification on a low resistivity multilayer PCB.

The product features fast dynamic response times and low output ripple, which are important parameters when supplying low voltage logics. The PKM 4000A series is especially suited for limited board space and high dynamic load applications such as demanding microprocessors.

Ericsson's PKM 4000A Power Modules address the converging "New Telecoms" market by specifying the input voltage range in accordance with ETSI specifications. The PKM 4000A series also offers over-voltage protection, under voltage protection, over temperature protection, soft-start, and is short circuit proof.

These modules are manufactured using highly automated manufacturing lines with a world-class quality commitment and a five-year warranty. Ericsson Inc., Microelectronics has been an ISO 9001 certified supplier since 1991.

For a complete product program please reference the back cover.

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General

Connections

Pin	Designation	Function
1	- IN	Negative Input
2	ON/OFF	Remote control (primary). To turn on and turn off the output.
3	+ IN	Positive Input.
4	- OUT	Negative Output.
5	- SEN	Negative Remote Sense
6	Trim	Output Voltage Adjust
7	+ SEN	Positive Remote Sense
8	+ OUT	positive Output

Weight

Maximum 55 g

Case

Aluminum baseplate with metal standoffs.

Pins

Pin material: Brass

Pin plating: Tin/Lead over Nickel.

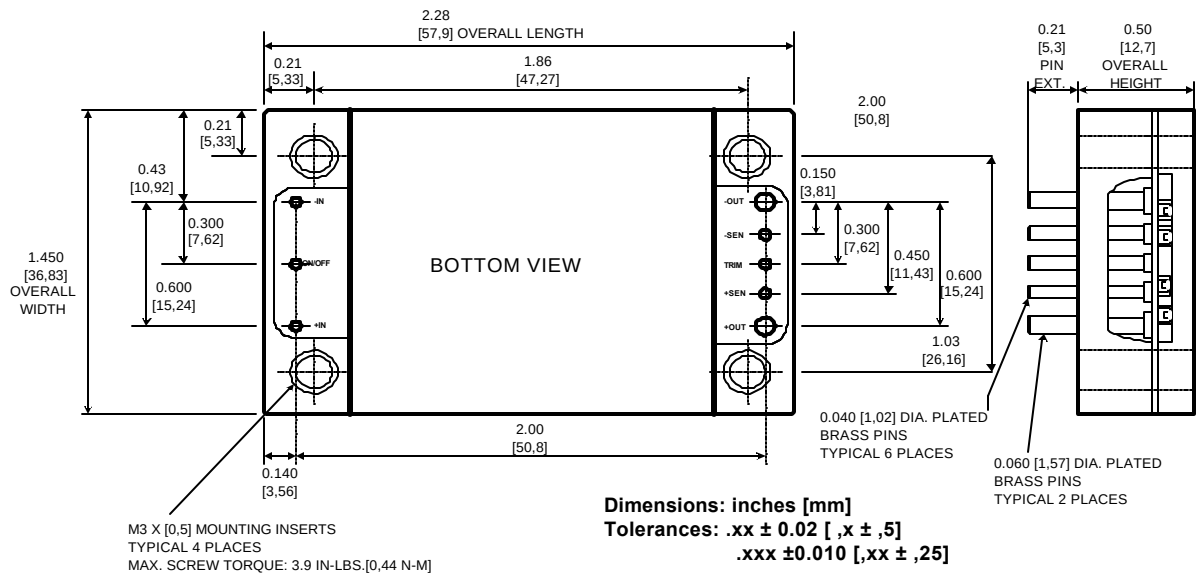
Input $T_C < T_{C\,max}$

Characteristics		Conditions	min	typ	max	Unit
V_I	Input voltage range[1)]		36		75	Vdc
V_{Ioff}	Turn-off input voltage	Ramping from higher voltage	31	33		Vdc
V_{Ion}	Turn-on input voltage	Ramping from lower voltage		34	36	Vdc
C_I	Input capacitance			1.5		µF
I_{Iac}	Reflected ripple current	5 Hz to 20 MHz		10		mA_{p-p}
$I_{I\,max}$	Maximum input current	$V_I = V_{Imin}$, V_I = 53V PKM 4418A PIOA PKM 4518A PI PKM 4719A PI PKM 4810A PI			 1.6 1.8 2.6 3.8	 A A A A
P_{Ii}	Input idling power	I_O=0, V_I = 53 V		2.6	4.6	W
P_{RC}	Input stand-by power (turned off with RC)	V_I=53V, RC open		0.4	0.6	W
VTRIM	Maximum input				6	Vdc

Note:

1) The input voltage range 36...75 V meets the requirements in the European Telecom Standard prETS 300 132-2 for Normal input voltage range in 48 V and 60 V DC power systems, –40.5...–57.0 V and –50.0...–72.0 V respectively.

Mechanical Data



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PKM 4418A PIOA (45W)

T_C = –40…+100°C, V_I = 36 ...75V unless otherwise specified.

Output

Characteristics		Conditions	Output			Unit
			min	typ	max	
V_{Oi}	Output voltage initial setting and accuracy	T_C =+25°C, V_I = 53 V, I_O =I_{Omax}	1.48	1.5	1.52	V
	Output adjust range	I_O =I_{Omax}	1.2		1.66	V
V_O	Output voltage tolerance band	I_O=0 to I_{Omax}	1.43		1.58	V
	Line regulation	I_O=I_{Omax}		3	10	mV
	Load regulation	V_I = 53V, I_O=0 to I_{Omax},		3	10	mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 x I_{Omax} di/dt = 1A/us		+/-150		mV
t_{tr}	Load transient recovery time			100		µs
t_s	Start-up time	From V_I connection to V_O= 0.9 × V_{Onom}		25	40	ms
I_O	Output current		0		30	A
P_{Omax}	Max output power	At V_O = V_{Onom}			45	W
I_{lim}	Current limit threshold	V_O = 0.96 V_{Onom} @ T_C <100°C	31	36	39	A
I_{sc}	Short circuit current			38	40	A
V_{Oac}	Output ripple & noise	I_O=I_{Omax}, f < 20 MHz		70	150	mV_{p-p}
SVR	Supply voltage rejection (ac)	f < 1kHz	-53			dB
OVP	Over voltage protection	V_I= 50 V	2.2	2.5	2.8	V

Miscellaneous

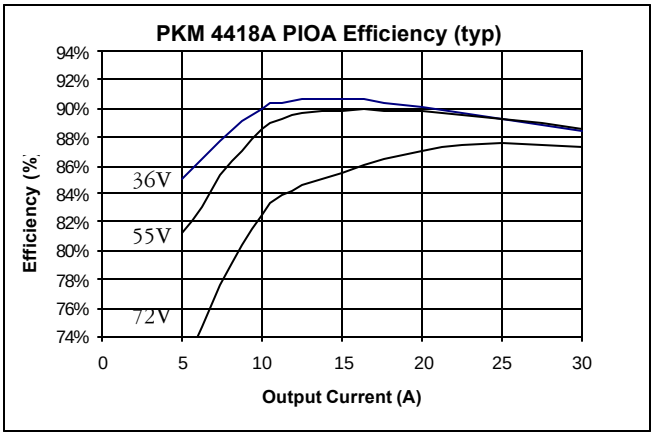
Characteristics		Conditions	min	typ	max	Unit
η	Efficiency	I_O = I_{Omax}, V_I = 53V, T_C = +25°C		89		%
P_d	Power dissapation	I_O = I_{Omax}, V_I = 53V, T_C = +25°C		5.6		W
f_s	Switching frequency	I_O = 0...1.0 x I_{Omax}		200		kHz

Absolute Maximum Ratings

Characteristics		min	max	Unit
T_C	Maximum Operating Case Temperature	-40	+100	°C
T_S	Storage temperature	-40	+125	°C
V_I	Input voltage	-0.5	+80	V dc
V_{ISO}	Isolation voltage	1,500		V dc
V_{RC}	Remote control voltage		12	Vdc
I^2t	Inrush transient		1	A^2s

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.

Thermal Data



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PKM 4518A PI (54W)

T_C = –40…+100°C, V_I = 36 ...75V unless otherwise specified.

Output

Characteristics		Conditions	Output			Unit
			min	typ	max	
V_{Oi}	Output voltage initial setting and accuracy	T_C =+25°C, V_I = 53 V, I_O =I_{Omax}	1.77	1.8	1.83	V
	Output adjust range	I_O =I_{Omax}	1.44		2.0	V
V_O	Output voltage tolerance band	I_O=0 to I_{Omax}	1.71		1.89	V
	Line regulation	I_O=I_{Omax}		3	10	mV
	Load regulation	V_I = 53V, I_O=0 to I_{Omax},		3	10	mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 x I_{Omax} di/dt = 1A/us		+/-150		mV
t_{tr}	Load transient recovery time			100		µs
t_s	Start-up time	From V_I connection to V_O= 0.9 × V_{Onom}		25	40	ms
I_O	Output current		0		30	A
P_{Omax}	Max output power	At V_O = V_{Onom}			54	W
I_{lim}	Current limit threshold	V_O = 0.96 V_{Onom} @ T_C <100°C	31	36	39	A
I_{sc}	Short circuit current			36	40	A
V_{Oac}	Output ripple & noise	I_O=I_{Omax}, f < 20 MHz		70	150	mV_{p-p}
SVR	Supply voltage rejection (ac)	f < 1kHz	-53			dB
OVP	Over voltage protection	V_I= 50 V	2.5	2.8	3.0	V

Miscellaneous

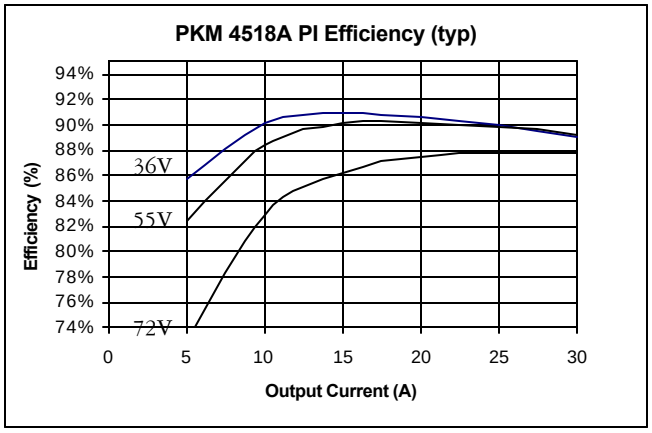
Characteristics		Conditions	min	typ	max	Unit
η	Efficiency	I_O = I_{Omax}, V_I = 53V, T_c = +25°C		89		%
P_d	Power dissapation '	I_O = I_{Omax}, V_I = 53V, T_c = +25°C		6.7		W
f_s	Switching frequency	I_O = 0...1.0 x I_{Omax}		200		kHz

Absolute Maximum Ratings

Characteristics		min	max	Unit
T_C	Maximum Operating Case Temperature	-40	+100	°C
T_S	Storage temperature	-40	+125	°C
V_I	Input voltage	- 0.5	+80	V dc
V_{ISO}	Isolation voltage	1,500		V dc
V_{RC}	Remote control voltage		12	Vdc
I^2t	Inrush transient		1	A^2s

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.

Thermal Data



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PKM 4719A PI (75W)

T_C = –40…+100°C, V_I = 36 ...75V unless otherwise specified.

Output

Characteristics		Conditions	Output			Unit
			min	typ	max	
V_{Oi}	Output voltage initial setting and accuracy	T_C =+25°C, V_I = 53 V, I_O =I_{Omax}	2.45	2.5	2.55	V
	Output adjust range	I_O =I_{Omax}	2.0		2.75	V
V_O	Output voltage tolerance band	I_O=0 to I_{Omax}	2.4		2.6	V
	Line regulation	I_O=I_{Omax}		3	10	mV
	Load regulation	V_I = 53V, I_O=0 to I_{Omax},		3	10	mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 x I_{Omax} di/dt = 1A/us		+/-150		mV
t_{tr}	Load transient recovery time			100		µs
t_s	Start-up time	From V_I connection to V_O= 0.9 × V_{Onom}		25	40	ms
I_O	Output current		0		30	A
P_{Omax}	Max output power	At V_O = V_{Onom}			75	W
I_{lim}	Current limit threshold	V_O = 0.96 V_{Onom} @ T_C <100°C	31	36	39	A
I_{sc}	Short circuit current			36	40	A
V_{Oac}	Output ripple & noise	I_O=I_{Omax}, f < 20 MHz		60	100	mV_{p-p}
SVR	Supply voltage rejection (ac)	f < 1kHz	-53			dB
OVP	Over voltage protection	V_I= 50 V	3.2	3.7	4.2	V

Miscellaneous

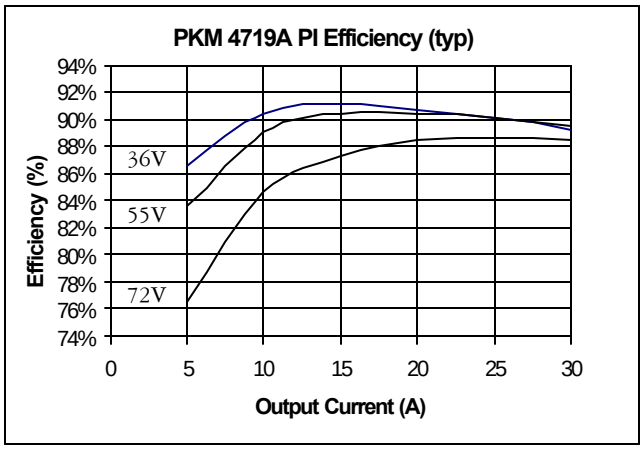
Characteristics		Conditions	min	typ	max	Unit
η	Efficiency	I_O = I_{Omax}, V_I = 53V, T_C = +25°C		90		%
P_d	Power dissapation	I_O = I_{Omax}, V_I = 53V, T_C = +25°C		8.3		W
f_s	Switching frequency	I_O = 0...1.0 x I_{Omax}		150		kHz

Absolute Maximum Ratings

Characteristics		min	max	Unit
T_C	Maximum Operating Case Temperature	-40	+100	°C
T_S	Storage temperature	-40	+125	°C
V_I	Input voltage	-0.5	+80	V dc
V_{ISO}	Isolation voltage	1,500		V dc
V_{RC}	Remote control voltage		12	Vdc
I^2t	Inrush transient		1	A^2s

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.

Thermal Data



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PKM 4810A PI (82.5W)

T_C = –40…+100°C, V_I = 36 ...75V unless otherwise specified.

Output

Characteristics		Conditions	Output			Unit
			min	typ	max	
V_{Oi}	Output voltage initial setting and accuracy	T_C =+25°C, V_I = 53 V, I_O =I_{Omax}	3.25	3.30	3.35	V
	Output adjust range	I_O =I_{Omax}	2.64		3.36	V
V_O	Output voltage tolerance band	I_O=0 to I_{Omax}	3.2		3.4	V
	Line regulation	I_O=I_{Omax}		3	10	mV
	Load regulation	V_I = 53V, I_O=0 to I_{Omax},		3	10	mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 x I_{Omax} di/dt = 1A/us		+/-150		mV
t_{tr}	Load transient recovery time			100		µs
t_s	Start-up time	From V_I connection to V_O= 0.9 × V_{Onom}		25	40	ms
I_O	Output current		0		25	A
P_{Omax}	Max output power	At V_O = V_{Onom}			82.5	W
I_{lim}	Current limit threshold	V_O = 0.96 V_{Onom} @ T_C <100°C	26	30	33	A
I_{sc}	Short circuit current			30	34	A
V_{Oac}	Output ripple & noise	I_O=I_{Omax}, f < 20 MHz		60	100	mV_{p-p}
SVR	Supply voltage rejection (ac)	f < 1kHz	-53			dB
OVP	Over voltage protection	V_I= 50 V	3.9	4.4	5.0	V

Miscellaneous

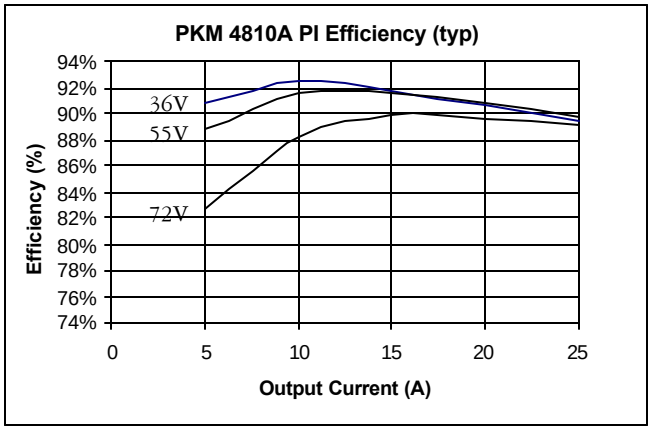
Characteristics		Conditions	min	typ	max	Unit
η	Efficiency	I_O = I_{Omax}, V_I = 53V, T_c = +25°C		90		%
P_d	Power dissapation '	I_O = I_{Omax}, V_I = 53V, T_c = +25°C		9.2		W
f_s	Switching frequency	I_O = 0...1.0 x I_{Omax}		150		kHz

Absolute Maximum Ratings

Characteristics		min	max	Unit
T_C	Maximum Operating Case Temperature	-40	+100	°C
T_S	Storage temperature	-40	+125	°C
V_I	Input voltage	- 0.5	+80	V dc
V_{ISO}	Isolation voltage	1,500		V dc
V_{RC}	Remote control voltage		12	Vdc
I^2t	Inrush transient		1	A^2s

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.

Thermal Data



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Quality

Reliability

The calculated Meantime Between Failure (MTBF) is greater than (>) 2.5 million hours using BellcoreTR-332 methodology. The calculation is valid for a 90°C baseplate temperature.

Quality Statement

The power modules are designed and manufactured in an industrial environment where quality systems and methods like ISO 9000, 6s and SPC, are intensively in use to boost the continuous improvements strategy. Infant mortality or early failures in the products are screened out by a burn-in procedure and an ATE-based final test.
Conservative design rules, design reviews and product qualifications, as well as high competence of an engaged work force, contribute to the high quality of our products.

Warranty

Ericsson Microelectronics warrants to the original purchaser or end user that the products conform to this Advanced Specification and are free from material and workmanship defects for a period of five (5) years from the date of manufacture, if the product is used within specified conditions and not opened.
In case the product is discontinued, claims will be accepted up to three (3) years from the date of the discontinuation.
For additional details on this limited warranty we refer to Ericsson Inc., Microelectronics "General Terms and Conditions of Sales," EKA 950701, or individual contract documents.

Limitation of Liability

Ericsson Inc., Microelectronics 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).

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Product Program

V_I	V_O/I_O max	P_O max	Ordering No.
48/60 V	1.5V/30A 1.8V/30A 2.5V/30A 3.3V/25A	45 W 54 W 75 W 82.5 W	PKM 4418A PIOA PKM 4518A PI PKM 4719A PI PKM 4810A PI

The PKM 4000A DC/DC power modules will be available with the different options listed in the Product Options Table

Please check with the factory for availability.

Product Options

Option	Suffix	Example
Negative remote on/off logic, Industry Standard trim (i.e. V_o Adjust)	-	PKM 4418A PI
Positive remote on/off logic	P	PKM 4418A PIP
Lead length 0.145"± 0.010"	LA	PKM 4418A PILA

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