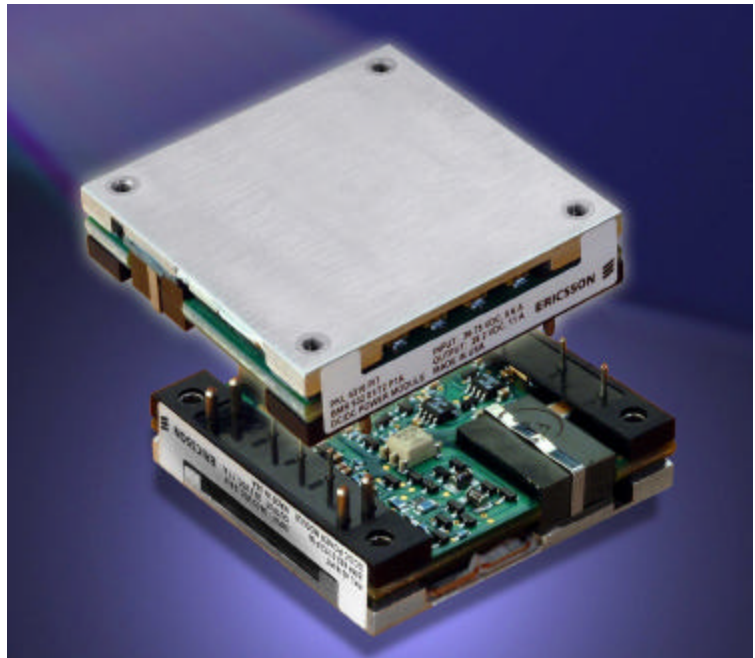


## Advanced Specification 50A - 60A DC/DC Power Module 48V Input, 3.3V Output

- High Efficiency, 92% Typ
- High Power Density, 68 W/in<sup>3</sup> (3.3V @ 60A)
- Fast Dynamic Response, 200 ms, ±250 mVpeak Typ.
- Low Output Ripple, 70mVp-p Typ.
- Wide input voltage range (36-75V)
- 1,500 Vdc isolation voltage
- Max. case temperature +100°C
- UL 1950/UL<sub>C</sub> 1950 Recognized
- TUV to EN 60950 Type Approved
- Demonstrated compliance with isolation requirements equivalent to Basic Insulation per UL 60950
- Patent Pending Paralleling Feature
- Heatsinks available as an option for extended operation



BAUART  
GEPRÜFT  
TYPE  
APPROVED



The PKL 4000 series represents another one of Ericsson's "industry first" achievements in the continuing development of our "Third Generation" of high-density, high-efficiency power modules. The PKL 4110A PI module packs 68W/in<sup>3</sup> at 92% efficiency (3.3V @ 60A) in an half-brick footprint that has been enhanced to include two additional output pins for motherboard connection reliability at this high power.

These breakthrough features come from using the most advanced patented topology utilizing integrated magnetics and synchronous rectification on a low-resistivity multilayer PCB.

This product features fast dynamic response times and low output ripple, which are important parameters when supplying low-voltage logics.

The PKL 4000 PI Series also is especially well suited for limited board space and high dynamic load applications.

Ericsson's PKL 4000 Series Power Modules address the converging "New Telecom" market, by specifying the input voltage range in accordance with ETSI specifications. The PKL 4000 Series also offers over-voltage protection, under-voltage protection, over-temperature protection, soft-start, paralleling, and short circuit protection.

These modules are manufactured on highly automated manufacturing lines. Ericsson's world-class quality commitment is reflected in our standard five year warranty. Ericsson Inc., Power Modules has been an ISO 9001 certified Supplier since 1991.

*For a complete product program, please reference the back page.*



# General

## Connections

Pin	Designation	Function
1	-INPUT	Negative input
2	CASE	Connected to base plate
3	REMOTE ON/OFF	Remote control (primary) to turn-on and turn-off the output
4	+INPUT	Positive input.
5, 10	-OUTPUT	Negative output (two pins)
6	-SENSE	Negative remote sense
7	TRIM	Output voltage adjust
8	+SENSE	Positive remote sense
9, 11	+OUTPUT	Positive output (two pins)

Note: If the remote sense is not needed the "-Sense" should be connected to "-Out" and the "+Sense" should be connected to "+Out."

## Weight

110 grams

## Case

Aluminum base plate with metal standoffs.

## Pins

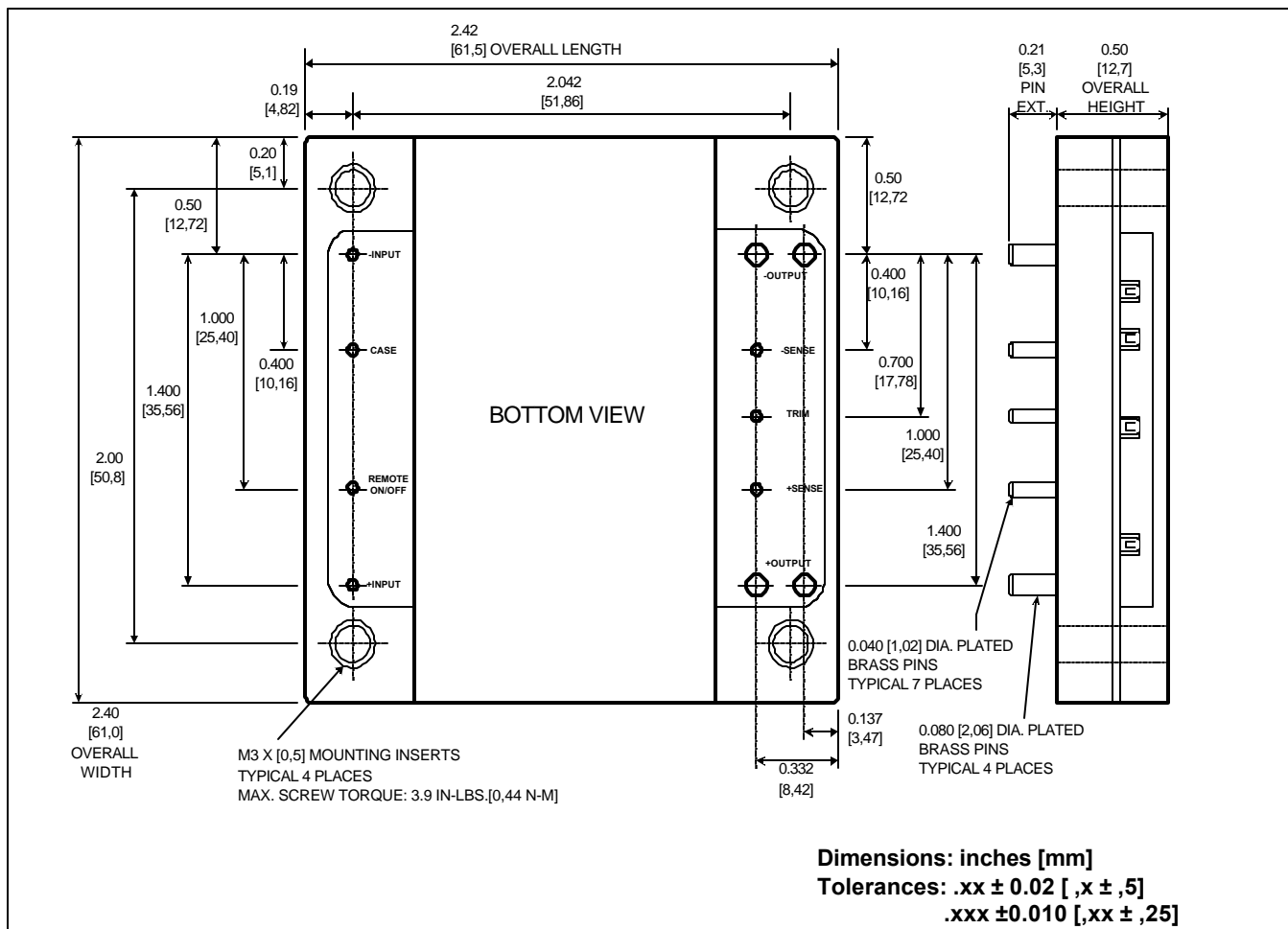
Pin Material: Brass

Pin Plating: Tin/Lead over Nickel

Input  $T_C < T_{Cmax}$  unless otherwise specified

Characteristics		Conditions	min	typ	max	Units
$V_I$	Input voltage range		36	75		$V_{dc}$
$V_{Ioff}$	Turn-off input voltage	Ramping from higher voltage	31	33		$V_{dc}$
$V_{Ion}$	Turn-on input voltage	Ramping from lower voltage		34	36	$V_{dc}$
$I_{I max}$	Max. Input Current	$V_I = V_{Imin} = 36 V$	PKL 4110A PI	6.5	PKL 4110 PI	$A_{dc}$
$I_{I rush}$	Inrush Current	Except Charging of $C_I$			1	$A_{dc}$
$C_I$	Input capacitance			3.5		$\mu F$
$P_{II}$	Input idling power	$I_o = 0, T_C = -30...+95^\circ C$		6		W
$P_{RC}$	Input stand-by power	$T_C = -30...+95^\circ C, RC$ Open		0.4	0.6	W

## Mechanical Data



# PKL 4110A PI / PKL 4110 PI

$T_C = -40...+100^{\circ}\text{C}$ ,  $V_I = 36...75\text{V}$  unless otherwise specified.

## Output

Characteristics		Conditions	Device	Output			Unit
				min	typ	max	
$V_{O_i}$	Output voltage initial setting and accuracy	$T_C = +25^{\circ}\text{C}$ , $V_I = 53\text{V}$ , $b = I_{O_{max}}$	All	3.25	3.3	3.35	V
	Output adjust range	$I_O = I_{O_{max}}$	All	2.64		3.63	V
$V_O$	Output voltage tolerance band	$I_O = 0$ to $I_{O_{max}}$	All	3.2		3.4	V
	Line regulation	$I_O = I_{O_{max}}$	All		5	15	mV
	Load regulation	$V_I = 53\text{V}$ , $I_O = 0$ to $I_{O_{max}}$ ,	All		5	15	mV
$V_{t_r}$	Load transient voltage deviation	Load step = $0.25 \times I_{O_{max}}$ $di/dt = 1\text{A}/\mu\text{s}$	All		+/-250		mV
$t_{t_r}$	Load transient recovery time		All		200		$\mu\text{s}$
$t_s$	Start-up time	From $V_I$ connection to $V_O = 0.9 \times V_{O_{nom}}$	All		10	15	ms
$I_O$	Output current		PKL 4110A PI	0		60	A
			PKL 4110 PI	0		50	
$P_{O_{max}}$	Max output power	At $V_O = V_{O_{nom}}$	PKL 4110A PI			198	W
			PKL 4110 PI			165	
$I_{lim}$	Current limit threshold	$V_O = 0.96 V_{O_{nom}}$ @ $T_C < 100^{\circ}\text{C}$	PKL 4110A PI	61.0	64.8	72.0	A
			PKL 4110 PI	51.0	54.5	62.0	
$I_{sc}$	Short circuit current		PKL 4110A PI		65	74	A
			PKL 4110 PI		55	64	
$V_{O_{ac}}$	Output ripple & noise	$I_O = I_{O_{max}}$ , $f < 20\text{MHz}$	All		70	150	mVp-p
SVR	Supply voltage rejection (ac)	$f < 1\text{kHz}$	All	-50			dB
OVP	Over voltage protection	$V_I = 53\text{V}$ ,	All	3.9	4.4	5.0	V

## Miscellaneous

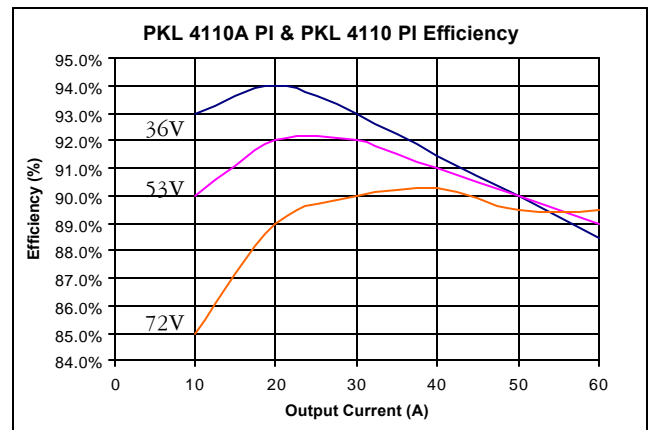
Characteristics		Conditions	Device	min	typ	max	Unit
$\eta$	Efficiency	$I_O = I_{O_{max}}$ , $V_I = 53\text{V}$ , $T_C = +25^{\circ}\text{C}$	All		92		%
$P_d$	Power dissipation	$I_O = I_{O_{max}}$ , $V_I = 53\text{V}$ , $T_C = +25^{\circ}\text{C}$	PKL 4110A PI		17.2		W
			PKL 4110 PI		14.3		
$f_s$	Switching frequency	$I_O = 0...1.0 \times I_{O_{max}}$	All		150		kHz

## Absolute Maximum Ratings

Characteristics		min	max	Unit
$T_C$	Maximum Operating Case Temperature	-40	+100	$^{\circ}\text{C}$
$T_S$	Storage temperature	-40	+125	$^{\circ}\text{C}$
$V_I$	Input voltage: Continuous	-0.5	+80	V dc
	Transient (100ms)		+100	V dc
$V_{ISO}$	Isolation voltage (input to output test voltage)	1,500		V dc
$V_{RC}$	Remote control voltage		12	V dc
$I^2t$	Inrush transient		1	$\text{A}^2\text{s}$

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.

## Typical Characteristics



## Product Program

$V_i$	$V_o/I_o$	$P_{o\max}$	Ordering Number
48/60V	3.3V/60A	198W	PKL 4110A PI
48/60V	3.3V/50A	165W	PKL 4110 PI

The PKL 4000 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	-	PKL 4110A PI
Industry Standard Trim (i.e. $V_o$ Adjust)	T	PKL 4110A PIT
Positive remote on/off logic	P	PKL 4110A PIP
Lead length $0.145" \pm 0.010"$	LA	PKL 4110A PILA

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**Advanced Specification**

EN/LZT 108 5167 R1b  
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