



CIPOS™ IPM in washing machines

Infineon Technologies AG
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Intelligent Power Modules in appliances

Global trends are driving demand for new power semiconductor solutions



Energy efficiency



Reduction of energy consumption is needed, enabling systems that our lives and work greener. This requires inverterization which a the key field for IPMs

Integration of power semiconductors provides essential advantages compared to discrete solutions



Customer benefits



- Reduced development efforts & faster time-to-market
- Optimized system performance & less parts
- Higher system reliability compares to single components
- Full portfolio of new technologies upcoming (e.g. GaN, SiC)

- › Following slides are just an example of key requirements for WM, RAC and Fridges and possible IPM solutions from IFX and their key features and thermal performance measurement as one of the examples how we test our products to meet the customer requirements.
- › There are more requirements e.g. also customer specific ones as well additional measurements and comparison tables but all these documents are under NDA

Requirements for power stage in washing machines and dryers

General requirements



Energy savings



Reduced washing time



Good performance for multiple inverters



Peak current capability to handle high current at start-up



System size reduction

Specific requirements subsystems

Voltage class: 600 V

Current classes



Drum

- > 5 A
- > 10 A
- > 15 A



Heat pump (dryer)

- > 15A



Fan (dryer)

- > 5A



Drain pump

- > 2A

Product offerings



Drum

CIPOS™ Micro

- > IM241-L6T2B
- > IM241-L6S1B

CIPOS™ Mini:

- > IM523-S/M/L/X



Heat pump

CIPOS™ Mini:

- > IKCM15/20L60GA
- > IM535-U6D (30 A)



Fan (dryer)

CIPOS™ Micro

- > IM241 series
- 4/6A

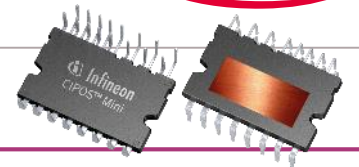


Drain pump

CIPOS™ Micro

- > IM241 series
- 2A

Why CIPOS™ Mini IPM in washing machine?



Key requirement

Values to customers

Market proven and reliable solution

Market proven solution based on historical high volume shipment to global leading washing machine OEMs/ODMs for various models, **such as multi-load washer, all-in-one washer dryer, and heat-pump dryer.**

Broad product portfolio

Broad portfolio from inverter (3ph) to PFC+ inverter in a single package enable customers to achieve the various requirements **from the new application trends for washing machines and dryers**, such as increased demand of active PFC.

Excellent energy saving

All-time trends for all home appliances
Application specific series (IKCM10/15H60GA) available with optimized performance for **washing machines and dryers.**

Peak current capability

Excellent peak current capability to handle high current at start-up based on **optimized electrical performance** and full line-up available for various inverters at washing machines and dryers.

High integration

High integration of bootstrap circuit, thermistor, as well as PFC enables customers **to minimize their system size & assembly process.** Further allow to improve manufacturability and system reliability.

Product line-up

Series	Product name	[A]	Package
3 phase inverter	IM523-S6A	6	DIP 36x21 (Fullpack)
	IM523-M6A	10	
	IM523-L6A	15	
	IM523-X6A	17	
	IKCM10H60GA	10	DIP 36x21D (DCB)
	IKCM15H60GA	15	
Single boost PFC + 3phase inverter	IFCM10S60GD (~20 kHz)	10	DIP 36x21D (DCB)
	IFCM10P60GD (~40 kHz)		
	IFCM15S60GD (~20 kHz)	15	
	IFCM15P60GD (~40 kHz)		
	IM564-X6D (>60 kHz, CoolMOS™)	20	

Why CIPOS™ Micro IPM in washing machine?

Key requirement

Values to customers

<p>Energy savings</p>	<p>High performance and efficiency for motor drives up to 500W. Optimized loss/EMI based for washing machines (e.g. IM241-xxxxJ: low EMI, IM241-xxxxB: low loss)</p>
<p>Peak current capability</p>	<p>Enough power capability to handle peak current during pull down condition 1Arms, nominal condition 0.5Arms</p>
<p>Humidity robustness</p>	<p>More demand to withstand under harsh environmental conditions. Micro has superior humidity robustness by H3TRB test qualified, reduce potential risk for installments on high humidity countries and longer lifetime guarantee</p>
<p>Small form factor</p>	<p>Enable to minimize system size as well as cost optimization through its compact package dimension (29x12mm)</p>

Product line-up

Package	Product	[A]	Speed [V/ns]
SOP 29x12	IM241-S6S1J	2	2
	IM241-S6S1B		5
	IM241-M6S1J	4	2
	IM241-M6S1B		5
DIP 29x12	IM241-L6S1B	6	5
	IM241-S6T2J	2	2
	IM241-S6T2B		5
	IM241-M6T2J	4	2
	IM241-M6T2B		5
	IM241-L6T2B	6	5



SOP
29 x 12 x 2.9 mm



DIP
29 x 12 x 2.9 mm



Part of your life. Part of tomorrow.