CIPOS™
Intelligent Power Modules (IPM)

Selection guide 2019

www.infineon.com/ipm

Infineon CIPOS™ IPMs are families of highly integrated, compact power modules designed to drive motors in applications ranging from home appliances, fans, pumps to general purpose drives.

Contents

CIPOS™ IPM family overview	**4**
CIPOS™ Nano	5
CIPOS™ Micro	6
CIPOS™ Tiny	7
CIPOS™ Mini	8
CIPOS™ Maxi	9
Major applications	**11**
Variable speed refrigerators	12
Washing machines	14
Room air conditioners	15
Variable speed fans	17
Product portfolio	**18**
CIPOS™ Nano	18
CIPOS™ Micro	19
CIPOS™ Tiny	20
CIPOS™ Mini	21
CIPOS™ Maxi	22
New product highlights	**24**
CIPOS™ Micro IM231 Series	24
CIPOS™ Mini IM51x Series	25
iMOTION™ Smart IPM IMM100 Series	26
IPM support tools	**27**

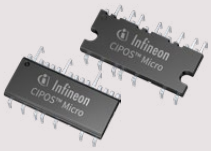
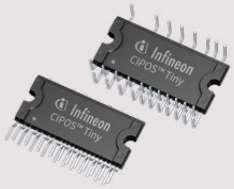
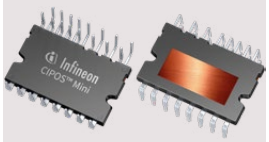
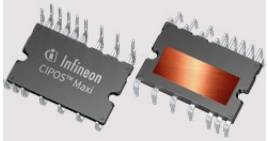
CIPOS™ IPM family overview

Control Integrated Power System (CIPOS™) Intelligent Power Modules (IPM)

Depending on the level of integration and power required, Infineon offers a variety of IPMs comprised of semiconductors and drivers in numerous packages options, covering a large range of voltage and current classes. CIPOS™ IPMs are families of highly integrated, compact power modules designed to drive motors in applications ranging from home appliances to fans, pumps, and general-purpose drives.

Energy-efficient CIPOS™ IPMs integrate the latest power semiconductors and control IC technology, leveraging Infineon's advanced IGBTs, MOSFETs, next-generation gate driver ICs and state-of-the-art thermo-mechanical technology.

Product lineup

CIPOS™ Nano	CIPOS™ Micro	CIPOS™ Tiny	CIPOS™ Mini	CIPOS™ Maxi
MOSFET 40/100/250/500 V	MOSFET: 250/500 V IGBT: 600 V	IGBT: 600 V	IGBT: 600 V MOSFET: 600 V	IGBT: 1200 V
				

Compact IPM → Standard IPM → Performance IPM

Motor current

0.1 A_{rms} ⟶ **20 A_{rms}**

Key benefits

- Shorter time-to-market
- Increased reliability
- Reduced system cost
- Reduced space
- Improved manufacturability

CIPOS™ Nano overview

Ultra compact three-phase or half-bridge MOSFET IPMs

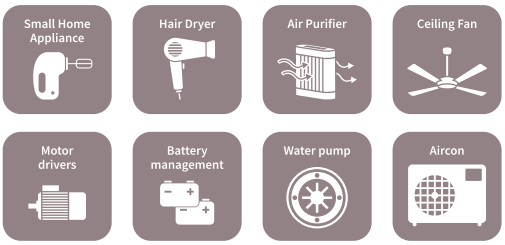
CIPOS™ Nano is a family of highly integrated, ultra-compact IPMs for high efficiency appliance and light industrial applications. This includes the rectifier, converter, and inverter stage in power management circuits and motor drives for applications like hair dryer, air purifier, ceiling fan, circulation pump and ventilator. By implementing an innovative packaging solution, CIPOS™ Nano family delivers a new benchmark in device size, offering up to a 60 percent smaller footprint than existing three-phase motor control power IPMs.

CIPOS™ Nano IPM series is comprised of fully integrated three-phase or half-bridge surface-mount motor control circuit solutions. The advanced QFN package is designed to utilize PCB copper traces to dissipate heat from the module, providing cost savings through a smaller package design and even eliminating the need for an external heat sink.

Key features

- 3-phase or half-bridge MOSFET configurations with gate driver
- Current rating from 0.15 A to 10 A, power rating up to 300 W
- Integrated bootstrap functionality
- Motor drive-optimized fast recovery FETs
- Heat sink-less operation
- Additional space saving with iMOTION™ Smart IPM
- Wide range of footprint compatible parts
- Sensorless FOC algorithm included in iMOTION™ Smart IPM – no programming is required

Major applications



Key benefits

- Cost savings from smaller footprint and reduced PCB space
- Reduced R&D time and cost for both hardware and software (MOTION™ Smart IPM)
- IPMs distribute heat dissipation and enable elimination of heat sink
- Same PCB footprint to address multiple application markets (100-230 V_{AC})

Package overview

QFN 12x12 (12 x 12 x 0.9 mm)	QFN 8x9 (8 x 9 x 0.9 mm)	QFN 7x8 (7 x 8 x 0.9 mm)

CIPOS™ Micro overview

Solution for low power motor drive applications

CIPOS™ Micro is a family of compact IPMs for low power motor drive applications including ventilation fans, washing machine & dishwasher pumps, hydronic circulators, window shutters, air purifiers and refrigerator compressor drives.

CIPOS™ Micro IPMs offer a cost effective power solution by leveraging industry standard footprints and processes compatible with various PCB substrates. The family features rugged and efficient high voltage MOSFETs and IGBTs specifically optimized for variable frequency drives with voltage ratings of 250-600 V.

Internally, the power switches are paired with advanced high voltage driver ICs tuned to achieve optimal balance between EMI and switching losses. The family offers DC current ratings ranging up to 6 A, driving motors up to 100 W without heatsink and up to 450 W with heatsink. These IPMs are available in both through-hole and surface mount package options.

Key features

- 3-phase MOSFET or IGBT configurations including gate drivers
- Current rating from 0.25 A to 2.3 A, power rating up to 450 W
- Advance input filter with shoot-through protection
- Optimized dV/dt for loss and EMI tradeoff
- Under-voltage lockout for all channels
- Matched propagation delay for all channels
- Separate low-side emitter pins for single or leg-shunt current sensing
- UL-certified NTC thermistor

Major applications

Key benefits

- Ease of design and fast time-to-market
- Address 20 W to 450 W with the same footprint
- Wide range of modules for 110 VAC or 230 VAC applications in same footprint
- Lower losses than similar modules in the market

Package overview

DIP 29x12F (29 x 12 x 3.1 mm)	SOP 29x12F (29 x 12 x 3.1 mm)	DIP 29x12 (29 x 12 x 3.1 mm)	SOP 29x12 (29 x 12 x 3.1 mm)

CIPOS™ Tiny overview

Maximum efficiency and design flexibility

The CIPOS™ Tiny family of three-phase inverter modules is Infineon's newest generation of IPMs ideal for advanced appliance motor drives. This includes applications such as washing machines, air conditioners, refrigerators, and industrial drives ranging from 6 A to 20 A current requirements. In addition, system mechanical design flexibility is also considered by offering both CIPOS™ Tiny SIP and DIP form factors.

By utilizing Infineon's latest generation low $V_{CE(on)}$ TRENCHSTOP™ IGBT technology, optimized for best trade-off between conduction and switching losses, and a level-shifting high voltage high speed driver, CIPOS™ Tiny is able to achieve max efficiency and ruggedness in a fully-isolated thermally-enhanced package.

Key features

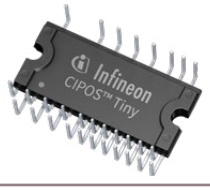
- 3-phase IGBT configuration including gate driver
- Current rating from 6A to 20 A, power rating up to 1.5 kW
- Integrated bootstrap functionality
- Fully isolated thermally enhanced package.
- Low $V_{CE(on)}$ TRENCHSTOP™ IGBT technology
- Both Single / Dual-in-line transfer molded package available
- Under-voltage lockout for all channels
- Matched propagation delay for all channels
- Isolation 2000 V_{RMS} min and CTI > 600
- UL certified package and NTC thermistor

Major applications

Key benefits

- Single platform possible from 6 A to 20 A
- Compact package, allowing for reduced PCB space
- SIP package option allows for alternative heatsink mounting
- Multiple lead-length options available for design flexibility

Package overview

DIP 34x15 (34 x 15 x 4.45 mm)	SIP 34x15 (34 x 15 x 4.45 mm)
	

CIPOS™ Mini overview

Broad range of applications from PFC to inverter

The energy efficient CIPOS™ Mini IPMs integrate various power and control components to increase reliability and optimize PCB size and system cost. This simplifies the power design and significantly reduces the time-to-market.

Utilizing multiple configurations, CIPOS™ Mini IPMs are designed to control AC motors in variable speed drives for applications such as air conditioners, washing machines, refrigerators, vacuum cleaners, compressors, and industrial drives up to 3 kW. The configurations offered within the CIPOS™ Mini family are 2-phase MOSFET, 3-phase MOSFET and IGBT, integrated PFC, and 2-phase and 3-phase interleaved PFC. All options include an integrated gate driver and NTC thermistor.

CIPOS™ Mini IPM's package concept is specially adapted to power applications that need good thermal conduction and electrical isolation but also EMI-safe control, innovative FAULT indication, and overload protection. Infineon's TRENCHSTOP™ IGBT, reverse conducting IGBT, and CoolMOS™ are combined with newly optimized Infineon SOI gate driver IC for excellent electrical performance. To enhance thermal performance, CIPOS™ Mini family offers IPMs with an embedded DCB substrate, improving heat transfer to heatsink.

Key features

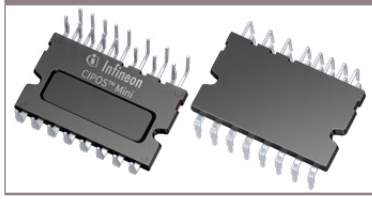
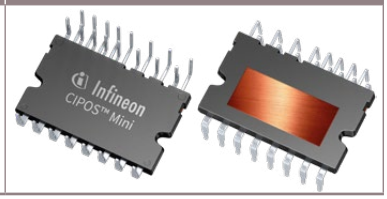
- 2-phase, 3-phase and PFC configurations including gate driver
- Current rating from 4 A to 30 A, power rating up to 3 kW
- Integrated bootstrap functionality
- Dual-in-line transfer molded package
- Under-voltage lockout for all channels
- Rugged SOI gate driver IC technology
- Advanced protection features
- UL-certified NTC thermistor

Major applications

Key benefits

- Easy power extension from 300 W to 3 kW
- Optimized performance for each application
- Enhanced robustness of the advanced IGBT and gate driver IC technology
- High power density
- Two substrate types provide a cost efficient solution for home appliances

Package overview

DIP 36x21 (36 x 21 x 3.1 mm)	DIP 36x21D (36 x 21 x 3.1 mm)
	

CIPOS™ Maxi overview

Solutions for high reliability and performance application

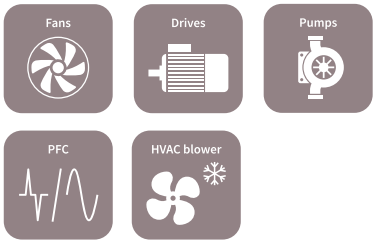
CIPOS™ Maxi IPMs integrate multiple power and control components to increase reliability, optimize PCB size and system costs. They are designed to control three-phase AC motors and permanent magnet motors in variable speed drives applications such as low-power motor drives, pumps, fans, and active filters for HVAC (heating, ventilation, and air conditioning).

This new portfolio includes 1200 V, 5 A and 10 A options for up to a 1.8 kW motor drive solution. CIPOS™ Maxi has achieved the smallest package in the 1200 V IPM class while still offering high power density and best performance.

Key features

- 3-phase IGBT configuration including gate driver
- Current rating from 5 A to 10 A, power rating up to 1.8 kW
- Fully isolated dual in-line molded module with DCB
- 1200 V TRENCHSTOP™ IGBT 4
- Rugged 1200 V SOI gate driver technology
- Under-voltage lockout for all channels
- All of six switches turn-off during protection
- Cross-conduction prevention
- Programmable fault clear timing

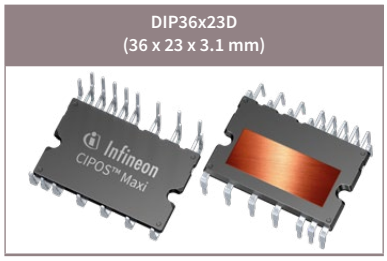
Major applications



Key benefits

- Smallest package size in 1200 V IPM class with high power density and best performance
- Enhanced robustness of gate driver technology for excellent protection
- Adapted to high switching application with lower power loss
- Simplified design and manufacturing

Package overview



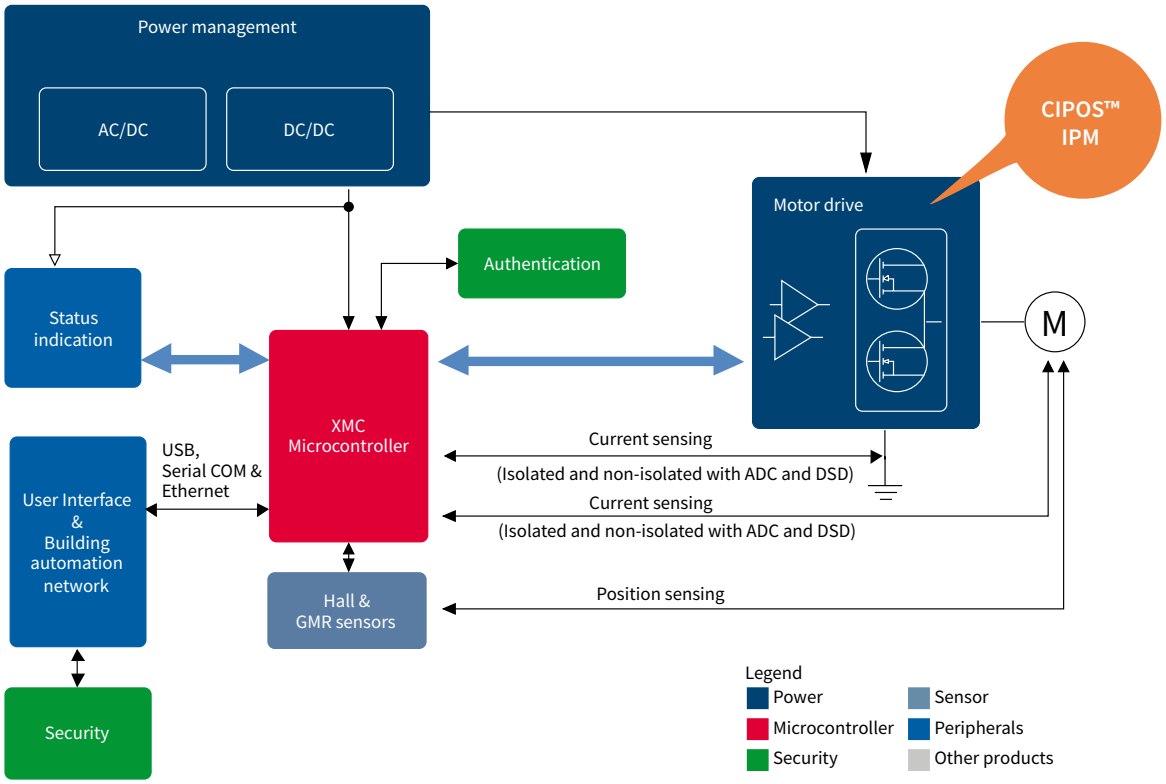
CIPOS™ IPM's major applications

High performance products with seamless functionality

Home appliances perform tasks essential to make busy everyday life easier – whether it be aid in cleaning with a washing machine or increased comfort with an air conditioning system. Historically home appliances have been big energy consumers, but at an age of heightened awareness for the environment and financial costs, the demand for energy-efficient systems is rapidly growing. At the same time, consumers expect the sleekest, quietest, most compact and visually appealing home appliances available. In addition, advanced connectivity between an increasing number of devices requires a fallback for user privacy.

With all this in mind, product designers are continuously being challenged in terms of form and function. They must deliver smaller, smarter, and more secure solutions with the most power and highest energy efficiency possible.

Industry-leading technology and manufacturing expertise from Infineon helps customers overcome these unique challenges of designing major home appliances. Our line of CIPOS™ IPMs meets and exceeds even the most rigorous requirements for reliability, quality, security and energy efficiency. Explore applications of interest to learn more about innovative design options and to find dedicated CIPOS™ IPM solutions.



Buzzword: inverterization

More and more home appliances like refrigerators, freezers, washers, dryers and air conditioning units are getting a boost in the motor drive stage. Moving away from fixed speed drives, inverter-based motor control is becoming ever more popular. This form of control can vary the speed and torque of the motor instead of just turning the motor on and off like fixed speed drives. While this type of control clearly has its benefits in terms of efficiency, consumers also benefit from the inverterization trend: appliances with digital inverters have longer lifetimes, make less noise, consume less energy, and ultimately save consumers' money.

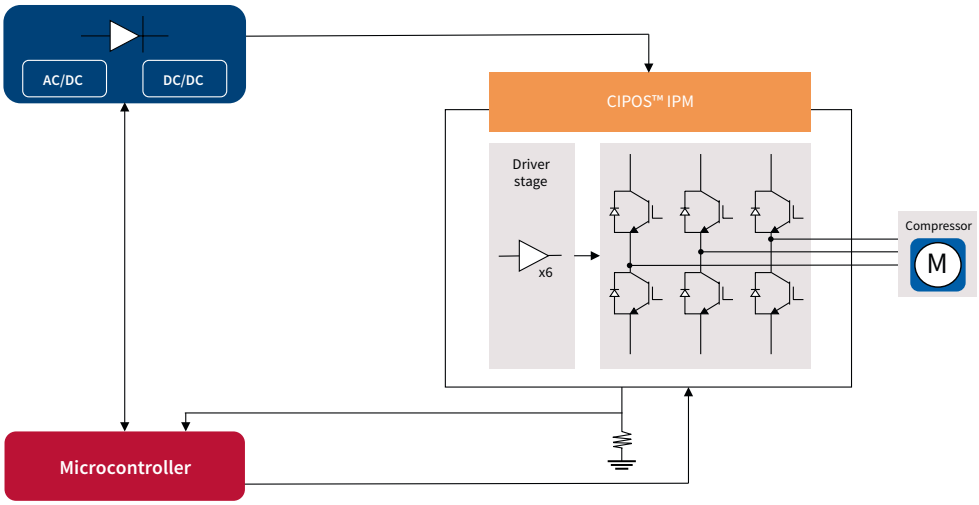
Variable speed refrigerators

Less noise, better efficiency – just what consumers want

When the time comes to select a new refrigerator, today's consumers typically focus on two aspects: more energy efficiency, and reduction or even suppression of audible noise. Compact design is a third factor that frequently comes into play. Meanwhile, refrigerator manufacturers currently face more stringent regulations of the appliance's form factor and are under constant pressure to reduce costs.

Infineon's products and expertise will allow engineers to embed all these expectations into the design of a variable speed refrigerator. The result is an advanced technical solution for the consumer that meets target cost constraints.

Variable speed refrigerators – 3-phase IPM solutions



IPM solution for variable speed refrigerators

Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	$R_{DS(on)}$ max. [Ω]	Configuration	Product name
CIPOS™ Nano	MOSFET	250	QFN 8x9	-	0.15	Half-bridge	IRSM808-204MH
			QFN 12x12	-	0.45 / 1.05 / 2.20	3-phase inverter	IRSM836-084MA / IRSM836-044MA IRSM836-024MA
		500	QFN 8x9	-	0.8 / 1.7	Half-bridge	IRSM807-105MH / IRSM807-045MH
CIPOS™ Micro	IGBT	600	DIP 29x12	4 / 6	-	3-phase inverter	IM231-M6T2B / IM231-L6T2B
			SOP 29x12	4 / 6	-		IM231-M6S1B / IM231-L6S1B
CIPOS™ Tiny	IGBT	600	DIP 34X15	6		3-phase inverter	IM393-S6Ex / IM393-M6Ex / IM393-L6Ex [1]
			SIP 34X15	6			IM393-S6Fx / IM393-M6Fx / IM393-L6Fx [1]
CIPOS™ Mini	MOSFET	600	DIP 36x21	-	0.33	2-phase inverter	IM512-L6A
				-	0.33	3-phase inverter	IM513-L6A
	IGBT	600	DIP 36x21	4 / 6		3-phase inverter	IGCM04F60GA / IGCM04G60HA IGCM04G60GA / IGCM06F60GA IGCM06G60GA

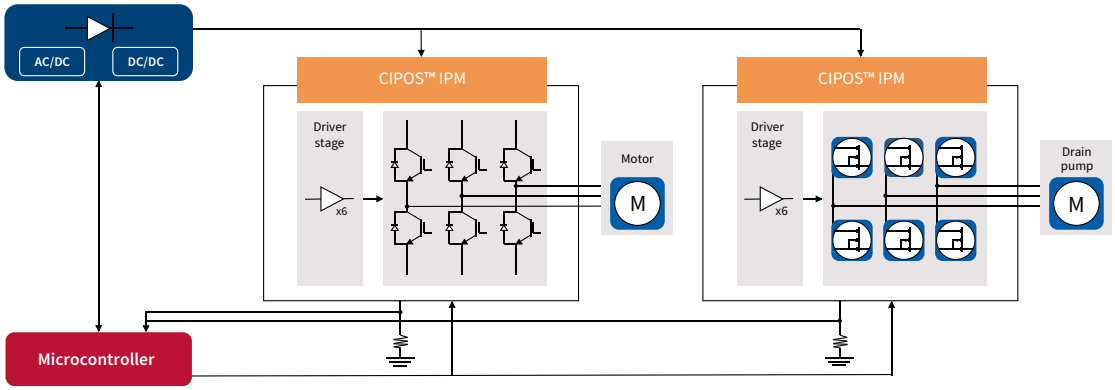
1) x = black (5.55 mm), x = 2 (2.90 mm) x = 3 (3.60 mm)

Washing machines

From inverterization to smart appliances

Washing machines have become an essential appliance that people can no longer imagine life without. Today's consumers seek quiet, highly efficient systems with enhanced features and multiple washing options. Like all commodities, washing machine designs require electrical components with an attractive price-performance ratio while still providing high reliability and energy efficiency. Furthermore, new features and design innovations can now reduce vibration and noise when handling heavy or light loads.

Variable speed washing machine system diagram



IPM solution for variable speed washing machines

IPMs for motor / compressor

Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	Configuration	Product name
CIPOS™ Tiny	IGBT	600	DIP 34X15	6 / 10 / 15	3-phase inverter	IM393-S6Ex / IM393-M6Ex / IM393-L6Ex [1]
			SIP 34X15	6 / 10 / 15		IM393-S6Fx / IM393-M6Fx / IM393-L6Fx [1]
CIPOS™ Mini	IGBT	600	DIP 36x21	6 / 10 / 15		IGCM06F60GA / IGCM06G60GA / IGCM10F60GA IKCM10H60GA / IKCM10L60GA / IGCM15F60GA IKCM15H60GA / IKCM15F60GA / IKCM15L60GA

1) x = black (5.55mm), x = 2 (2.90mm) x = 3 (3.60mm)

IPMs for drain pump

Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	$R_{DS(on)}$ max. [Ω]	Configuration	Product name
CIPOS™ Nano	MOSFET	250	QFN 12x12	-	0.45 / 1.05 / 2.20	3-phase inverter	IRSM836-084MA / IRSM836-044MA IRSM836-024MA
		500	QFN 12x12	-	1.70 ~ 6.00		IRSM836-045MA
CIPOS™ Micro	MOSFET	250	DIP 29 x12F	-	0.45 / 1.05 / 2.20		IRSM5y5-084DA / IRSM5y5-044DA [1] IRSM5y5-024DA [1]
			SOP 29x12F	-	0.45 / 1.05 / 2.20		IRSM5y5-084PA / IRSM5y5-044PA [1] IRSM5y5-024PA [1]
		500	DIP 29 x12F	-	1.3 ~ 6.0		IRSM5y5-065DA / IRSM5y5-055DA [1] IRSM5y5-035DA / IRSM5y5-025DA [1] IRSM5y5-015DA [1]
			SOP 29x12F	-	1.3 ~ 6.0		IRSM5y5-065PA / IRSM5y5-055PA [1] IRSM5y5-035PA / IRSM5y5-025PA [1] IRSM5y5-015PA [1]
	IGBT	600	DIP 29x12F	3 / 4	-		IM240-S6YaB [2] / IM240-M6YaB [2] IRSM5y6-076DA [1]
			DIP 29x12	4 / 6	-		IM231-M6T2B / IM231-L6T2B
			SOP 29x12F	3 / 4	-		IM240-S6Z1B / IM240-M6Z1B IRSM5y6-076PA [1]
			SOP 29x12	4 / 6	-		IM231-M6S1B / IM231-L6S1B

1) y = 0 (with NTC), y = 1 (without NTC)
2) a = 1 (standard package), a = 2 (clearance distance improved package)

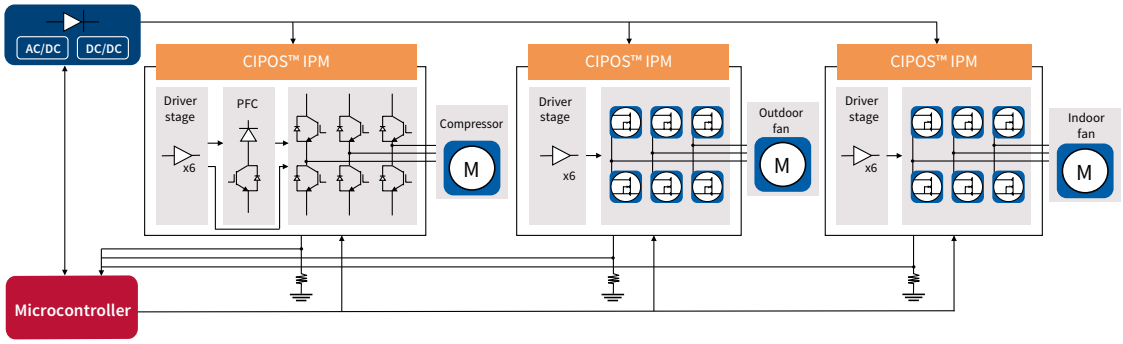
Room air conditioners

Quiet, stable, and smooth

Smarter and smaller, more powerful and energy-efficient: today's room air conditioning units must fulfill a growing list of demands. Because most are used in private homes, quiet air conditioning systems are highly sought after. Functions such as a smooth start and variable operating speeds round out the list of must-haves.

Designing room air conditioners that boast such capabilities requires everything from low-vibration components and a low acoustic noise compressor to reliable fan and sensor-less field-oriented control. Not only this, but semiconductor solutions must also be energy-efficient and reflect the increasing demand for small form factors.

Air conditioning systems diagram



IPM solution for room air conditioners

IPMs for compressor / PFC

Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	Configuration	Product name
CIPOS™ Tiny	IGBT	600	DIP 34X15	10 / 15 / 20	3-phase inverter	IM393-M6Ex / IM393-L6Ex / IM393-X6Ex [1]
			SIP 34X15	10 / 15 / 20		IM393-M6Fx / IM393-L6Fx / IM393-X6Fx [1]
CIPOS™ Mini	IGBT	600	DIP 36x21	10 ~ 30	3-phase inverter	IGCM10F60GA / IKCM10L60GA IGCM15F60GA / IKCM15F60GA / IKCM15L60GA IGCM20F60GA / IKCM20L60GA IKCM30F60GA
			DIP 36x21D	15 / 20 /30	3-phase inverter	IKCM15L60GD / IKCM20L60GD / IKCM30F60GD
				10 / 15	3-phase inverter + PFC	IFCM10z60GD / IFCM15z60GD [2]
		650	DIP 36x21D	20 / 30	2-phase Interleaved PFC	IFCM20T65GD / IFCM30T65GD
				20 / 30	3-phase Interleaved PFC	IFCM20U65GD / IFCM30U65GD

1) z = A (3-phase open source), z = B (3-phase common)
2) y = 0 (with NTC), y = 1 (without NTC)

IPMs for outdoor fans

Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	$R_{DS(on)}$ max. [Ω]	Configuration	Product name
CIPOS™ Micro	MOSFET	250	DIP 29 x12F	-	0.45 / 1.05 / 2.20	3-phase inverter	IRSM5y5-084DA / IRSM5y5-044DA [1] IRSM5y5-024DA [1]
			SOP 29x12F	-	0.45 / 1.05 / 2.20	3-phase inverter	IRSM5y5-084PA / IRSM5y5-044PA [1] IRSM5y5-024PA [1]
		500	DIP 29 x12F	-	1.3 ~ 4.0	3-phase inverter	IRSM5y5-065DA / IRSM5y5-055DA [1] IRSM5y5-035DA / IRSM5y5-025DA [1]
			SOP 29x12F	-	1.3 ~ 4.0	3-phase inverter	IRSM5y5-065PA / IRSM5y5-055PA [1] IRSM5y5-035PA / IRSM5y5-025PA [1]
	IGBT	600	DIP 29x12F	3 / 4	-	3-phase inverter	IM240-S6YaB [2] IM240-M6YaB [2] / IRSM5y6-076DA [1]
			DIP 29x12	4 / 6	-		IM231-M6T2B / IM231-L6T2B
			SOP 29x12F	3 / 4	-	3-phase inverter	IM240-S6Z1B IM240-M6Z1B / IRSM5y6-076PA [1]
			SOP 29x12	4 / 6	-		IM231-M6S1B / IM231-L6S1B
CIPOS™ Tiny	IGBT	600	DIP 34X15	6	-	3-phase inverter	IM393-S6Ex [2]
			SIP 34X15	6	-		IM393-S6Fx [2]

1) y = 0 (with NTC), y = 1 (without NTC)
2) x = black (5.55mm), x = 2 (2.90mm), x = 3 (3.60mm)
3) a = 1 (Standard package), a = 2 (Clearance distance improved package)

IPMs for indoor fan

Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	$R_{DS(on)}$ max. [Ω]	Configuration	Product name
iMOTION™ Smart IPM	MOSFET	500	QFN 12x12	-	6.0	3-phase inverter	IMM101T-015M
		600	QFN 12x12	-	1.4 / 0.95	3-phase inverter	IMM101T-046M / IMM101T-056M
CIPOS™ Nano	MOSFET	250	QFN 8x9	-	0.15	Half-bridge	IRSM808-204MH
			QFN 12x12	-	0.45 / 1.05 / 2.20	3-phase inverter	IRSM836-084MA / IRSM836-044MA IRSM836-024MA
		500	QFN 8x9	-	0.8 / 1.7	Half-bridge	IRSM807-105MH / IRSM808-105MH IRSM807-045MH
			QFN 12x12	-	1.7 ~ 6.0	3-phase inverter	IRSM836-045MA / IRSM836-035Mz [1] IRSM836-025MA / IRSM836-015MA
CIPOS™ Micro	MOSFET	500	DIP 29x12F	-	1.3 ~ 6.0	3-phase inverter	IRSM5y5-065DA / IRSM5y5-055DA [2] IRSM5y5-035DA / IRSM5y5-025DA [2] IRSM5y5-015DA [2]
			SOP 29x12F	-	1.3 ~ 6.0	3-phase inverter	IRSM5y5-065PA / IRSM5y5-055PA [2] IRSM5y5-035PA / IRSM5y5-025PA [2] IRSM5y5-015PA [2]
	IGBT	600	DIP 29x12F	3 / 4	-	3-phase inverter	IM240-S6YaB [3] IM240-M6YaB [3] / IRSM5y6-076DA [1]
			DIP 29x12	4 / 6	-		IM231-M6T2B / IM231-L6T2B
			SOP 29x12F	3 / 4	-	3-phase inverter	IM240-S6Z1B IM240-M6Z1B / IRSM5y6-076PA [1]
			SOP 29x12	4 / 6	-		IM231-M6S1B / IM231-L6S1B

1) z = A (3-phase open source), z = B (3-phase common)
2) y = 0 (with NTC), y = 1 (without NTC)
3) a = 1 (standard package), a = 2(clearance distance improved package)

Variable speed fans

Efficiency, power density, and reliability

What are today's consumers looking for in a fan? Less noise and energy consumption, increased power, and smart features. Low acoustic noise is highly desirable in a fan motor, as well as functions such as stable and smooth starting, having a wide range of operating speeds, and vibration suppression.

Reliable and energy-efficient components are key to a fan motor that is synchronized with consumer needs. Additionally, new form factors to achieve smaller designs are essential and the price-performance ratio needs to be just right. In a world where applications are becoming smarter, an ideal solution must enable feature novelties that render a fan an intelligent appliance. CIPOS™ IPMs go beyond just connectivity and gives consumers a reliable and highly efficient solution.

IPM solution for fan motors

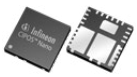
Product family	Switch type	Voltage class [V]	Package name	Rated current [A]	$R_{DS(on)}$ max. [Ω]	Configuration	Product name
iMOTION™ Smart IPM	MOSFET	500	QFN 12x12	-	6.0	3-phase inverter	IMM101T-015M
		600	QFN 12x12	-	1.4 / 0.95	3-phase inverter	IMM101T-046M / IMM101T-056M
CIPOS™ Nano	MOSFET	40	QFN 7x8	-	0,05	Half-bridge	IRSM005-301MH
		100	QFN 7x8	-	0,02	Half-bridge	IRSM005-800MH
		250	QFN 8x9	-	0,15	Half-bridge	IRSM808-204MH
			QFN 12x12	-	0.45 / 1.05 / 2.20	3-phase inverter	IRSM836-084MA / IRSM836-044MA IRSM836-024MA
		500	QFN 8x9	-	0.8 / 1.7	Half-bridge	IRSM807-105MH / IRSM808-105MH IRSM807-045MH
			QFN 12x12	-	1.7 ~ 6.0	3-phase inverter	IRSM836-045MA / IRSM836-035Mz [1] IRSM836-025MA / IRSM836-015MA
CIPOS™ Micro	MOSFET	500	DIP 29x12F	-	1.3 ~ 6.0	3-phase inverter	IRSM5y5-065DA / IRSM5y5-055DA [2] IRSM5y5-035DA / IRSM5y5-025DA [2] IRSM5y5-015DA [2]
			SOP 29x12F	-	1.3 ~ 6.0	3-phase inverter	IRSM5y5-065PA / IRSM5y5-055PA [2] IRSM5y5-035PA / IRSM5y5-025PA [2] IRSM5y5-015PA [2]
	IGBT	600	DIP 29x12F	3 / 4	-	3-phase inverter	IM240-S6YaB [3] IM240-M6Y1aB [3] / IRSM5y6-076DA [2]
			DIP 29x12	4 / 6	-		IM231-M6T2B / IM231-L6T2B
			SOP 29x12F	3 / 4	-	3-phase inverter	IM240-S6Z1B IM240-M6Z1B / IRSM5y6-076PA [2]
			SOP 29x12	4 / 6	-		IM231-M6S1B / IM231-L6S1B
CIPOS™ Tiny	IGBT	600	DIP 34x15	6 ~ 20	-	3-phase inverter	IM393-S6Ex / IM393-M6Ex [4] IM393-L6Ex / IM393-X6Ex [4]
			SIP 34x15	6 ~ 20	-		IM393-S6Fx / IM393-M6Fx [4] IM393-L6Fx / IM393-X6Fx [4]
CIPOS™ Mini	MOSFET	600	DIP 36x21	-	0,33	2-phase inverter	IM512-L6A
				-	0,33	3-phase inverter	IM513-L6A
	IGBT	600	DIP 36x21	6 ~ 30	-	3-phase inverter	IGCM04F60GA / IGCM04G60HA / IGCM04G60GA IGCM06F60GA / IGCM06G60GA IGCM10F60GA / IKCM10H60GA / IKCM10L60GA IGCM15F60GA / IKCM15H60GA / IKCM15L60GA IGCM20F60GA / IKCM20L60GA / IKCM30F60GA
			DIP 36x21D	15 / 20 / 30	-	3-phase inverter	IKCM15L60GD / IKCM20L60GD / IKCM30F60GD

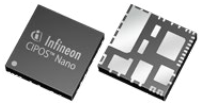
1) z = A (3-phase open source), x = B (3-phase common)
2) y = 0 (with NTC), y = 1 (without NTC)
3) a = 1 (standard package), a = 2(clearance distance improved package)
4) x = black (5.55mm), x = 2 (2.90mm) x = 3 (3.60mm)

Product portfolio

Infineon's CIPOS™ IPM solutions are the expert's choice. With more than 100 reliable and efficient IPM solutions, Infineon provides a comprehensive portfolio for virtually any application. To ease the selection process, this overview is structured along the CIPOS™ families.

CIPOS™ Nano





Switch type	Voltage class [V]	$R_{DS(on)}$ max. [Ω]	P_{mot} [W][1]	Product name	Configuration			Package			Others
					Half-bridge	3-phase open source	3-phase common source	QFN 7x8	QFN 8x9	QFN 12x12	Built in NTC
MOSFET	40	0.05	165	IRSM005-800MH	●			●			
	100	0.02	165	IRSM005-301MH	●			●			
	250	0.15	205	IRSM808-204MH	●			●			
		0.45	84	IRSM836-084MA		●				●	
		1.05	60	IRSM836-044MA		●				●	
		2.20	40	IRSM836-024MA		●				●	
	500	0.80	205	IRSM807-105MH	●				●		
		0.80	205	IRSM808-105MH	●				●		
		1.70	80	IRSM836-045MA		●				●	
		1.70	130	IRSM807-045MH	●				●		
		2.20	70	IRSM836-035MA		●				●	
		2.20	70	IRSM836-035MB			●			●	
		4.00	55	IRSM836-025MA		●				●	
		6.00	50	IRSM836-015MA		●				●	

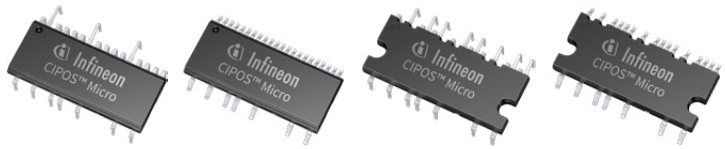
1) P_{mot} (16 kHz) without heatsink

iMOTION™ Smart IPM

Switch type	Voltage class [V]	$R_{DS(on)}$ max. [Ω]	P_{mot} [W][1]	Product name	Configuration		Package	Others
					3-phase inverter	3-phase inverter + PFC	QFN 12x12	MCE 2.0
MOSFET	500	6.00	30	IMM101T-015M	●		●	●
				IMM102T-015M		●	●	●
	600	0.95	80	IMM101T-056M	●		●	●
				IMM102T-056M		●	●	●
		1.40	60	IMM101T-046M	●		●	●
				IMM102T-046M		●	●	●

1) P_{mot} (16 kHz) without heatsink

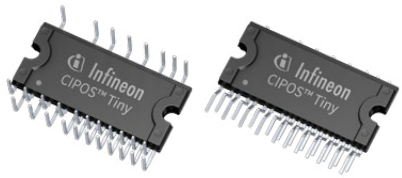
CIPOS™ Micro



Switch type	Voltage class [V]	$R_{DS(on)}$ max. [Ω]	Rated current [A]	P_{mot} [W][1]	Product name	Configuration		Package				Others
						3-phase open emitter	3-phase open source	SOP 29x12F	SOP 29x12	DIP 29x12F	DIP 29x12	Built in NTC
IGBT	600	-	4.00	320	IM231-M6S1B	●			●			●
		-	4.00	320	IM231-M6T2B	●					●	●
		-	4.00	105	IRSM506-076DA	●			●			●
		-	4.00	105	IRSM506-076PA	●					●	●
		-	4.00	105	IRSM516-076DA	●			●			
		-	4.00	105	IRSM516-076PA	●					●	
		-	6.00	400	IM231-L6S1B	●			●			●
		-	6.00	400	IM231-L6T2B	●					●	●
MOSFET	250	0.45	-	95	IRSM505-084DA		●			●		
		0.45	-	95	IRSM505-084PA		●	●				
		0.45	-	95	IRSM515-084DA		●			●		
		0.45	-	95	IRSM515-084PA		●	●				
		1.05	-	65	IRSM505-044DA		●			●		
		1.05	-	65	IRSM505-044PA		●	●				
		1.05	-	65	IRSM515-044DA		●			●		
		1.05	-	65	IRSM515-044PA		●	●				
		2.20	-	40	IRSM505-024DA		●			●		
		2.20	-	40	IRSM505-024PA		●	●				
		2.20	-	40	IRSM515-024DA		●			●		
		2.20	-	40	IRSM515-024PA		●	●				
	500	1.30	-	85	IRSM505-065DA		●					
		1.30	-	85	IRSM505-065PA		●					
		1.30	-	85	IRSM515-065DA		●					
		1.30	-	85	IRSM515-065PA		●					
		1.70	-	85	IRSM505-055DA		●					
		1.70	-	85	IRSM505-055PA		●					
		1.70	-	85	IRSM515-055DA		●					
		1.70	-	85	IRSM515-055PA		●					
		2.20	-	75	IRSM505-035DA		●					
		2.20	-	75	IRSM505-035PA		●					
		2.20	-	75	IRSM515-035DA		●					
		2.20	-	75	IRSM515-035PA		●					
		4.00	-	60	IRSM505-025DA		●					
		4.00	-	60	IRSM505-025PA		●					
		4.00	-	60	IRSM515-025DA		●					
		4.00	-	60	IRSM515-025PA		●					
		6.00	-	50	IRSM505-015DA		●					
		6.00	-	50	IRSM505-015PA		●					
		6.00	-	50	IRSM515-015DA		●					
		6.00	-	50	IRSM515-015PA		●					

1) P_{mot} (16 kHz) without heatsink

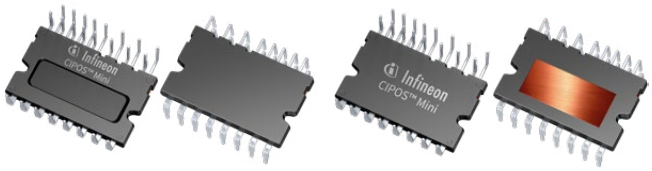
CIPOS™ Tiny



Switch type	Voltage class [V]	$R_{DS(on)}$ max. [Ω]	P_{mot} [W][1)]	Product name	Config.	Package			Others
					3-phase open source	DIP 34x15	SIP 34x15	Lead length options	Built in NTC
IGBT	600	6.0	400	IM393-S6E	●	●		●	●
		6.0	400	IM393-S6F	●		●		●
		10.0	600	IM393-M6E	●	●		●	●
		10.0	600	IM393-M6F	●		●		●
		15.0	750	IM393-L6E	●	●		●	●
		15.0	750	IM393-L6F	●		●		●
		20.0	1200	IM393-X6E	●	●		●	●
		20.0	1200	IM393-X6F	●		●		●

1) P_{mot} (16 kHz) without heatsink

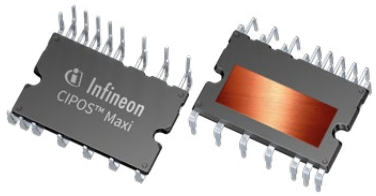
CIPOS™ Mini



Switch type	Voltage class [V]	$R_{DS(on)}$ max. [Ω]	Rated current [A]	P_{mot} [W][1)]	Product name	Configuration								Package		Others
						2-phase Open Source	3-phase Open Source	3-phase Closed Emitter	3-phase Open Emitter	2-phase Interleaved PFC	3-phase Interleaved PFC	2-phase Asymmetric Inverter	PFC Integrated	DIP 36x21D	DIP 36x21	Built in NTC
IGBT	600	-	10.0	1200	IFCM10P60GD								●	●		●
		-	10.0	1200	IFCM10S60GD								●	●		●
		-	15.0	1800	IFCM15P60GD								●	●		●
		-	15.0	1800	IFCM15S60GD								●	●		●
	650	-	20.0	3600	IFCM20T65GD					●				●		●
		-	20.0	4400	IFCM20U65GD						●			●		●
		-	30.0	5400	IFCM30T65GD					●				●		●
		-	30.0	6400	IFCM30U65GD						●			●		●
	600	-	4.0	600	IGCM04G60GA			●							●	●
		-	4.0	600	IGCM04G60HA			●							●	
		-	6.0	800	IGCM06G60GA			●							●	●
		-	4.0	600	IGCM04F60GA				●						●	●
		-	6.0	800	IGCM06F60GA				●						●	●
		-	10.0	1000	IGCM10F60GA				●						●	●
		-	15.0	1200	IGCM15F60GA				●						●	●
		-	20.0	1600	IGCM20F60GA				●						●	●
		-	10.0	1000	IKCM10H60GA				●						●	●
		-	10.0	1200	IKCM10L60GA				●						●	●
		-	15.0	1600	IKCM15F60GA				●						●	●
		-	15.0	1200	IKCM15H60GA				●						●	●
		-	15.0	1600	IKCM15L60GA				●						●	●
		-	15.0	2200	IKCM15L60GD				●					●		●
		-	20.0	1800	IKCM20L60GA				●						●	●
		-	20.0	2400	IKCM20L60GD				●					●		●
		-	30.0	2000	IKCM30F60GA				●						●	●
		-	30.0	2600	IKCM30F60GD				●					●		●
		-	15.0	2200	IKCM15R60GD							●		●		●
		-	20.0	2400	IKCM20R60GD							●		●		●
MOSFET	600	0.33	-	400	IM512-L6A	●										●
		0.33	-	600	IM513-L6A		●									●

1) P_{mot} (16 kHz) without heatsink

CIPOS™ Maxi



Switch type	Voltage class [V]	Rated current [A]	P_{mot} [W][1)]	Product name	Config.	Package	Others
					3-phase Open Emitter	DIP 36x23D	Built in NTC
Maxi	1200	5.0	1200	IM818-SCC	●	●	●
		10.0	1800	IM818-MCC	●	●	●

1) P_{mot} (16 kHz) without heatsink

New product highlights

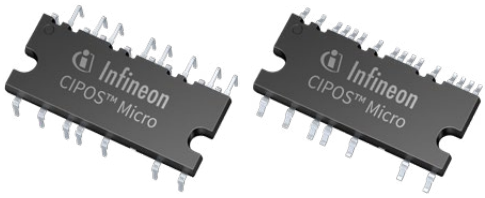
600 V 4/6 A IM231 Series

Optimized solution for system cost savings in a small footprint

IM231 series are designed for high-efficiency appliance motor drives such as air-conditioner fans and refrigerator compressors. These advanced IPMs, available in both surface mount and through-hole configurations, offer a combination of low $V_{CE(sat)}$ TRENCHSTOP™ IGBT6 technology and the industry benchmark rugged half-bridge drivers. The IPMs have various protection features including precise overcurrent protection and temperature feedback.

Key features

- 600V 3-phase inverter including gate drivers
- Low $V_{CE(sat)}$ TRENCHSTOP™ IGBT6
- Fault reporting and programmable fault clear
- Advanced input filter with shoot-through protection
- Open-emitter for single and leg-shunt current sensing
- UL-certified NTC thermistor



Key benefits

- Multiple markets (AC100 V – AC230 V) coverage with small footprint
- Multiple package options available
- Easy to design-in – fast time to market
- Best optimized solution for system cost saving

Product portfolio

Product name	Voltage class [V]	[A]	Configuration	Package name
IM231-M6T2B	600	4	3-phase inverter	DIP 29x12
IM231-L6T2B	600	6	3-phase inverter	DIP 29x12
IM231-M6S1B	600	4	3-phase inverter	SOP 29x12
IM231-L6S1B	600	6	3-phase inverter	SOP 29x12

New product highlights

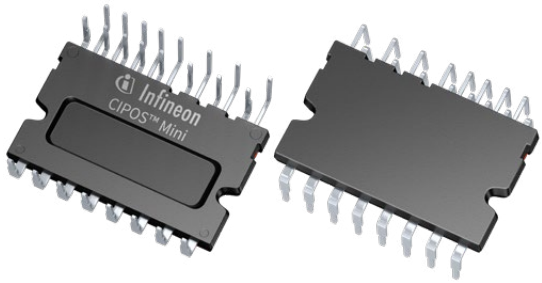
600 V 0.33 Ω IM51x Series

High efficiency solution for low power motor drives

IM51x series are high efficient intelligent power modules (IPM) to control AC motors for low power motor drives up to 600 W. Optimized to operate under light load conditions, the integrated CoolMOS™ MOSFETs significantly improve power efficiency when compared to IGBT based IPMs. This enables overall system energy and cost savings through reduced power consumption.

Key features

- 2-phase and 3-phase inverter including gate drivers
- Rugged SOI gate driver technology with stability against transient
- and negative voltage
- Based on CoolMOS™ CFD2 Power MOSFETs
- Integrated bootstrap circuit
- Under-voltage lockout at all channels
- Over-current protection
- Cross-conduction prevention



Key benefits

- Easy to design-in, fast time to market
- Excellent light load efficiency improves overall power consumption
- Allow system cost savings through thinner insulation panel usage

Product portfolio

Product name	Voltage class [V]	$R_{DS(on)}$ [Ω]	Configuration	Package name
IM512-L6A	600	0.33	2-phase inverter	DIP 36x21
IM513-L6A	600	0.33	3-phase inverter	DIP 36x21

New product highlights

500/600 V iMOTION™ Smart IPM IMM100 Series

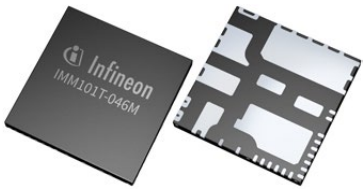
Fully integrated iMOTION™ Smart IPM for BLDC motor control

iMOTION™ IMM100 is a series of fully integrated Smart IPMs implementing sensorless Field Oriented Control (FOC) of a Permanent Magnet Synchronous Motor (PMSM).

The combination of the iMOTION™ Motion Control Engine ("T"- variants) with the gate driver and six MOSFETs offers a complete motor drive system in a compact 12 x 12 mm^2 surface mount package, minimizing external components count and PCB area.

Key features

- Fully integrated 3-phase driver with motor control IC
- 3 different MOSFET options
- Multiple sensing topology options – sensored and sensorless
- Integrated bootstrap diodes
- Sensorless FOC algorithm included – No programming required
- Optional PFC control on IMM102 devices
- Integrated protection features



Key benefits

- Lowest BOM count
- PCB size and system cost saving
- No heatsink up to 80 W required
- Fast time-to-market
- Reduced hardware and software R&D costs

Product portfolio

Product name	Voltage class [V]	$R_{DS(on)}$ max. [Ω]	Features	Configuration	Package name
IMM101T-015M	500	6.00	MCE 2.0	3-phase inverter	QFN 12x12
IMM101T-046M	600	1.40	MCE 2.0	3-phase inverter	QFN 12x12
IMM101T-056M	600	0.95	MCE 2.0	3-phase inverter	QFN 12x12
IMM102T-016M	500	6.00	MCE 2.0	3-phase inverter + PFC	QFN 12x12
IMM102T-046M	600	1.40	MCE 2.0	3-phase inverter +PFC	QFN 12x12
IMM102T-056M	600	0.95	MCE 2.0	3-phase inverter +PFC	QFN 12x12

IPM support tools

CIPOS™ IPM simulation tool (motor drive and PFC boost)

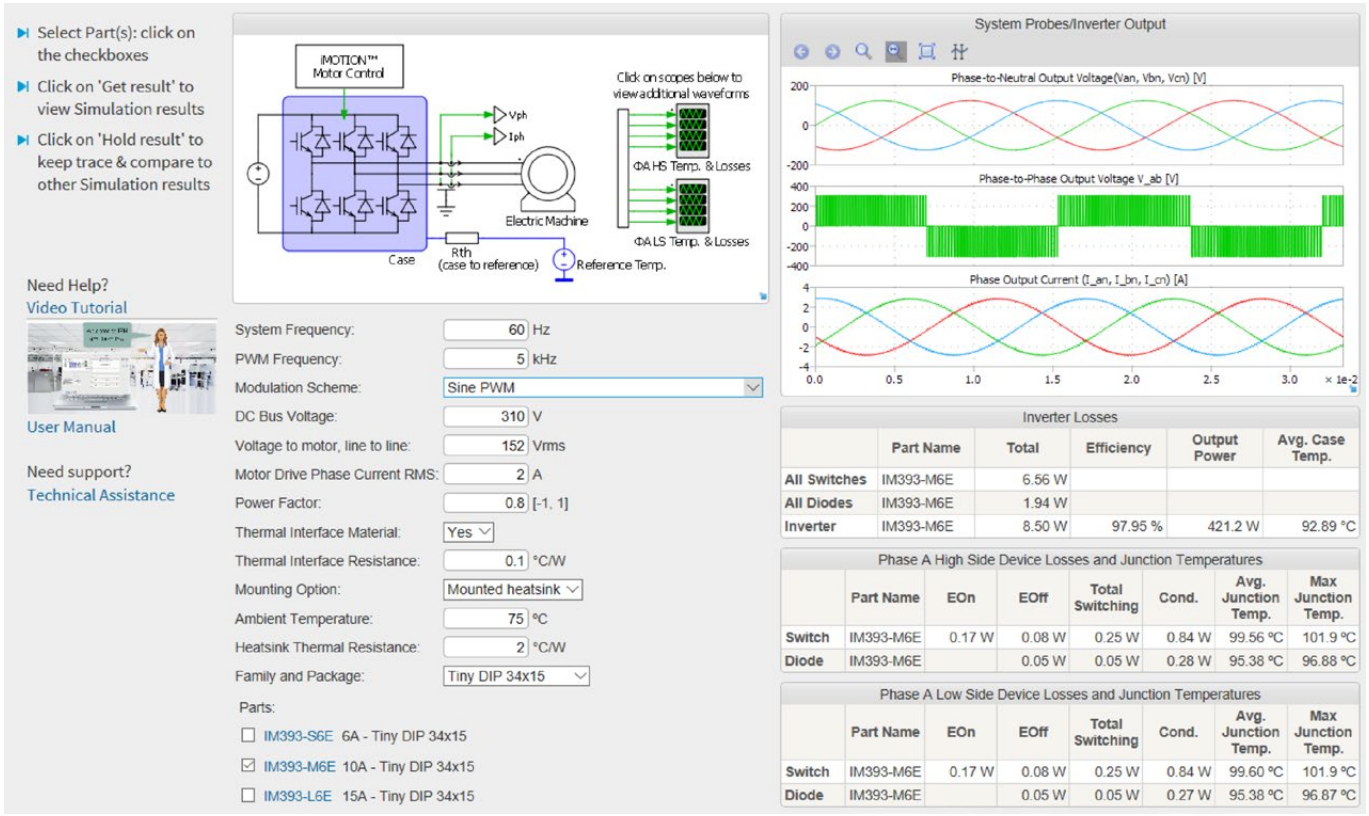
The CIPOS™ IPM simulation tool allows the user to simulate and compare IPMs under user-specified application conditions to help determine which part will best suit their needs. Currently, there are two simulation applications available: 3-phase inverter motor drive and PFC boost.

IPM Motor Drive Simulation Tool:
https://plex.infineon.com/plexim/ipmmotor.html

IPM PFC Boost Simulation Tool:
https://plex.infineon.com/plexim/ipmpfcboost.html

Both tools shows expected temperature of the selected IPM, the approximate losses of the IPM, and waveforms corresponding to the output voltage, output current, junction temperature, and power losses.

For aid in getting started, a video tutorial and detailed user manual are available on both simulation tool webpages.



IPM evaluation boards

Motor running in less than 1 hour!

IPM evaluation boards, also known as IPM Modular Application Design Kits (MADKs), are available at www.infineon.com/ipm. These boards are a full motor drive solution providing quick and easy evaluation of CIPOS™ IPMs without requiring the customer to spend time on system design. All MADKs are designed to work with iMOTION™ motor control ICs allowing the customer to get their motor running in less than 1 hour without the need for any coding.

EVAL–M1-05-65D
- IPM: IRSM505-065DA
- Power rating: 250 W
- Max output current: 0.65 Arms

EVAL-M1-05-84D
- IPM: IRSM505-084DA
- Power rating: 250 W
- Max output current: 1.0 Arms

EVAL-M1-05F804
- IPM: IRSM005-800MH
- Power rating: 165 W
- Max output current: 10.5 Arms

EVAL-M1-05F310
- IPM: IRSM005-310MH
- Power rating: 165 W
- Max output current: 5.5 Arms

EVAL-M1-36-45A
- IPM: IRSM836-045MA
- Power rating: 85 W
- Max output current: 0.5 Arms

EVAL-M1-36-84A
- IPM: IRSM836-084MA
- Power rating: 150 W
- Max output current: 1.0 Arms

EVAL-M1-CM610N3
- IPM: IKCM10H60GA
- Power rating: 750 W
- Max output current: 2.7 Arms

EVAL-M3-CM615PN
- IPM: IFCM15S60GD
- Power rating: 650 W
- Max output current: 3.0 Arms

EVAL-M1-CTE/F610N3
- IPM: IM393-M6E
- Power rating: 600 W
- Max output current: 3.6 Arms

EVAL-M1-CTE/F620N3
- IPM: IM393-X6E
- Power rating: 1200 W
- Max output current: 6.8 Arms

EVAL-M1-IM818-A
- IPM: IM818-MCC
- Power rating: 2600 W
- Max output current: 4.0 Arms

EVAL-M1-IM231-A
- IPM: IM231-L6S1B
- Power rating: 350 W
- Max output current: 1.5 Arms

EVAL–M1-IM240
- IPM: IM240-S6
- Power rating: 200W
- Max output current: 1.5 Arms

EVAL-IMM101T-015
- IPM: IMM101T-015M
- Power rating*: 30 W
- Max output current: 0.28 Arms

EVAL-IMM101T-046
- IPM: IMM101T-046M
- Power rating*: 60 W
- Max output current: 0.43 Arms

*Nominal value. Actual power rating and max output current depend on the switing frequency, modulation type and external temperature

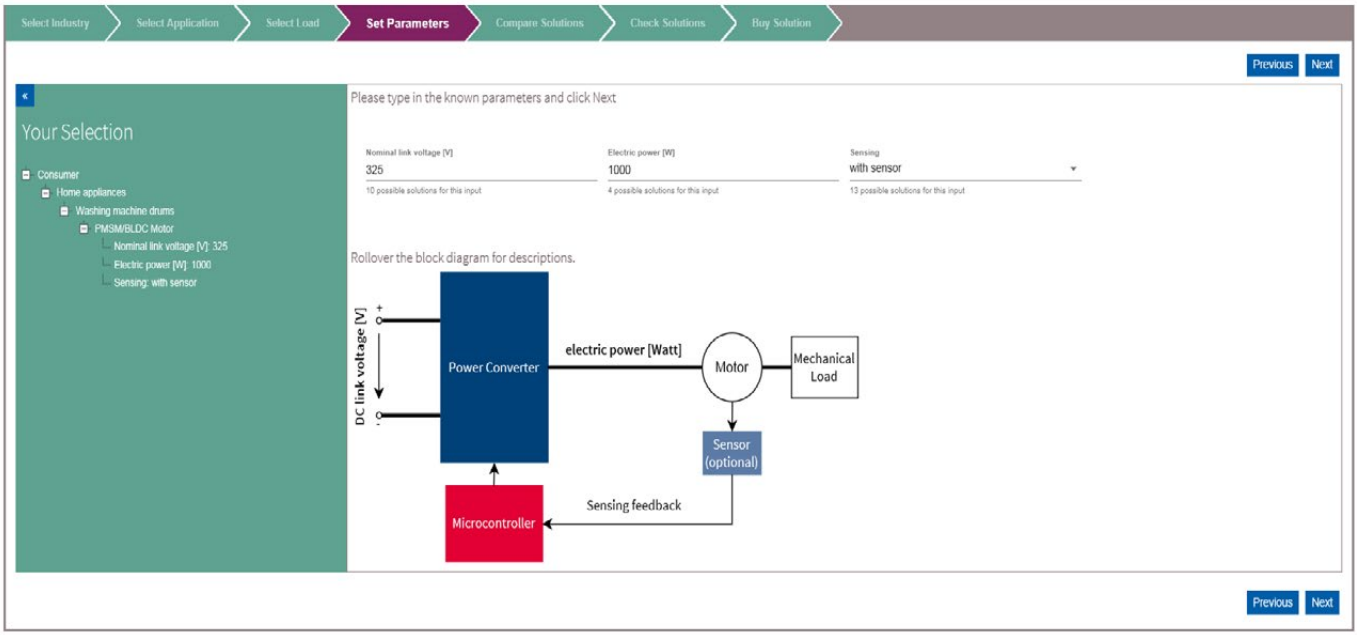
Solution Finder

Use Solution Finder to compare and purchase IPMs for your project

Infineon Solution Finder is an easy to use online tool for finding, comparing and buying semiconductor products in an application context visualized by block diagrams and combined with electrical and thermal simulations powered by Infineon Designer, PLECS and PowerEsim.

You can already access solutions for motor control and drives, power supplies and lighting applications with this tool.

Infineon Solution Finder:
https://solutionfinder.infineon.com/application/en



Notes

Notes

Where to buy

Infineon distribution partners and sales offices:
www.infineon.com/WhereToBuy

Service hotline

Infineon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

- Germany ..... 0800 951 951 951 (German/English)
- China, mainland ..... 4001 200 951 (Mandarin/English)
- India ..... 000 800 4402 951 (English)
- USA ..... 1-866 951 9519 (English/German)
- Other countries ..... 00* 800 951 951 951 (English/German)
- Direct access ..... +49 89 234-0 (interconnection fee, German/English)

* Please note: Some countries may require you to dial a code other than "00" to access this international number.
Please visit www.infineon.com/service for your country!

Mobile product catalog

Mobile app for iOS and Android.

www.infineon.com

Published by
Infineon Technologies Austria AG
9500 Villach, Austria

© 2017 Infineon Technologies AG.
All rights reserved.

Order number: B159-I0827-V1-7600-EU-EC-P
Date: 05 / 2019

Please note!
THIS DOCUMENT IS FOR INFORMATION PURPOSES ONLY AND ANY INFORMATION GIVEN HEREIN SHALL IN NO EVENT BE REGARDED AS A WARRANTY, GUARANTEE OR DESCRIPTION OF ANY FUNCTIONALITY, CONDITIONS AND/OR QUALITY OF OUR PRODUCTS OR ANY SUITABILITY FOR A PARTICULAR PURPOSE. WITH REGARD TO THE TECHNICAL SPECIFICATIONS OF OUR PRODUCTS, WE KINDLY ASK YOU TO REFER TO THE RELEVANT PRODUCT DATA SHEETS PROVIDED BY US. OUR CUSTOMERS AND THEIR TECHNICAL DEPARTMENTS ARE REQUIRED TO EVALUATE THE SUITABILITY OF OUR PRODUCTS FOR THE INTENDED APPLICATION.

WE RESERVE THE RIGHT TO CHANGE THIS DOCUMENT AND/OR THE INFORMATION GIVEN HEREIN AT ANY TIME.

Additional information
For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office (www.infineon.com).

Warnings
Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by us in a written document signed by authorized representatives of Infineon Technologies, our products may not be used in any life-endangering applications, including but not limited to medical, nuclear, military, life-critical or any other applications where a failure of the product or any consequences of the use thereof can result in personal injury.

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А