

New Product Introduction

infineon

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(BL)DC Motor Control Shield with IFX007T

<u>CIPOS™ Tiny</u>— Next generation 3-phase inverter module

Evaluation boards for CIPOS™ Tiny IM393 series

Evaluation board for CIPOS™ Micro IM231 series

1200 V CoolSiC[™] Schottky diode G5 TO247-2 package

650 V TRENCHSTOP™ 5 S5 in TO-220-3

OptiMOS™ 6 power MOSFET 40 V family

BLDC Shield TLE9879

Smart high-side switch PROFET™ family for industrial applications

New evaluation boards for barometric pressure sensor DPS422

(BL)DC Motor Control Shield with IFX007T

The (BL)DC motor control shield from Infineon Technologies is a high current motor control board compatible with Arduino and Infineon's XMC1100 Boot Kit. It is equipped with three smart IFX007T half-bridges. The (BL)DC motor control shield is capable to drive two unidirectional (BL)DC motors (half-bridge configuration) or one bi-directional DC motor (H-Bridge configuration). The implemented integrated IFX007T NovalithIC[™] half-bridges can be controlled by a PWM via the IN Pin.

Interfacing to a microcontroller is made easy by the integrated driver IC which features logic level inputs, diagnosis with current sense, slew rate adjustment, and dead time generation. The three IFX007T half-bridges are also fully protected against over-temperature, under-voltage, overcurrent and short circuit events.

Features

- > Equipped with three IFX007T
- > Compatible with Arduino Uno R3
- > Capable of high frequency PWM e.g. 30kHz
- > Adjustable slew rates for optimized EMI by changing external resistor
- > Driver circuit with logic level inputs
- > Diagnosis with current sense
- > Protection e.g. against over-temperature and overcurrent

Benefits

- > Fast and inexpensive prototyping of (BL)DC motor control
- > Easy testing of half- and full-bridge motor control
- > Status flag diagnosis with current sense capability
- > Over-temperature shut down with latch behavior and under-voltage shut down

Target Applications

- > Brushed and brushless DC motor control up to 300W continuous load
- > 8–40V nominal input voltage (optimized for 24V)
- > Average motor current 30A restricted due to PCB (IFX007T current limitation @ 55A min.)

Can be used to drive motors in various industrial applications like:

- > Power Tools
- > Healthcare (e.g., hospital beds)
- > Robots
- > Multicopter
- > <u>CAV</u>
- > Vacuum cleaners
- > Home & garden
- > 3D printer
- > Industrial automation

Competitive advantage of the IFX007T

Easy of use

- > Only 3 general purpose I/O needed to control full H-bridge,
- > Logic-Level inputs enable direct connection to μ C,
- Integrated approach saves layout and manufacturing effort while reducing stray inductances and external components

Enables functional safety

- Integrated self-protection, including over temperature, even if the microcontroller is lost
- > Built-in cross-current protection offloads the microcontroller
- > Half-bridge approach provides logic redundancy if one device fails, the other can stop the motor

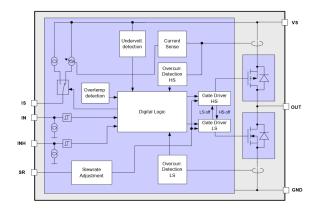
Flexible motor control

- > PWM capability ≤30kHz enables motor speed control, from either high side or low side
- > Active freewheeling from either high side or low side reduces PDISS

Cost optimized through system level savings

> Compared to a discrete solution, the NovalithIC[™] saves PCB-area and pick & place costs, requiring less passive external components via integrated diagnosis and protection functions.

Block diagram

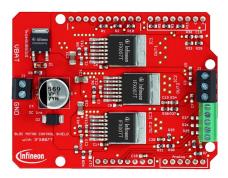


Product overview incl. data sheet link

Product collaterals / Online support

> (BL)DC Motor Control Shield with IFX007T product $\underline{\text{page}}$ > User $\underline{\text{manual}}$

OPN	SP Number	Package
BLDCSHIELDIFX007TTOBO1	SP004475088	Container



CIPOS™ Tiny— Next generation 3-phase inverter module

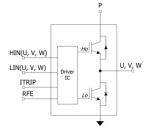
CIPOS[™] Tiny 3-phase inverter module is the newest generation of IPM to offer the highest power density variable speed motor drive. By using our latest generation of IGBTs, it is possible to realize maximum efficiency with minimum footprint. In addition, system mechanical design flexibility is also considered by offering both CIPOS[™] Tiny SIP and DIP form factors. Ideal applications for the IPM include high efficiency washing machine, air conditioning, fan, compressors, and industrial drives ranging from 6 A to 20 A current requirements.

This advanced IPM is a compact and fully isolated thermally enhanced package. With an integrated high precision temperature monitor, over-current protection feature, and under-voltage lockout function, delivers high system level protection and fail-safe operation. Utilizing our newest TRENCHSTOP™ 6 IGBTs and levelshifting driver HVIC, we are able to realize highest efficiency and ruggedness

Features

- > Smallest IPM with current rating up to 20 A
- > Offered in both DIP and SIP package
- > Integrated bootstrap function
- > Up to 20 A 600 V ratings
- >33% smaller footprint than CIPOS™ Mini
- >Rated max Tcase of 125 °C
- > Ideal for 250 W to >1.5 kW applications.
- > Ideal platform for future SiC/GaN IPM solutions
- > Current consumption < 2.5 mA/ch.
- > Benchmark cranking voltage capability down to 3.1 V
- >≤ 5% current sense accuracy (kILIS)
- > Technology enables miniturization

Diagram



Product overview incl. data sheet link

OPN	SP Number	Package	
IM393L6EXKLA1	SP001675722	PG-MDIP-30	
IM393L6E2XKLA1	SP001720368	PG-MDIP-30	
IM393L6E3XKLA1	SP001786902	PG-MDIP-30	
IM393L6FXKLA1	SP001675712	PG-MSIP-22	
IM393M6EXKLA1	SP001675704	PG-MDIP-30	
IM393M6E2XKLA1	SP001720364	PG-MDIP-30	
IM393M6E3XKLA1	SP001786896	PG-MDIP-30	
IM393M6FXKLA1	SP001675696	PG-MSIP-22	
IM393S6EXKLA1	SP001675688	PG-MDIP-30	
IM393S6E2XKLA1	SP001720362	PG-MDIP-30	
IM393S6E3XKLA1	SP001786890	PG-MDIP-30	
IM393S6FXKLA1	SP001675680	PG-MSIP-22	
IM393X6EXKLA1	SP001675742	PG-MDIP-30	
IM393X6E2XKLA1	SP001720370	PG-MDIP-30	
IM393X6E3XKLA1	SP001786910	PG-MDIP-30	
IM393X6FXKLA1	SP001675732	PG-MSIP-22	

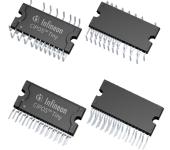
Benefits

- > Enables cost and size reduction for home appliance motor drives
- > SIP option allows PCB size reduction and alternative heatsink mounting
- > UL certified package and temp sensor
- > Enables PCB area savings, due to its size but also by reducing the number of components needed in the BOM
- > Overall reduces the system cost, without having to compromise on the technical performance, the protection and the diagnostic

Target applications

- > Motor Drives
- > Washing machines
- > Room air conditioning
- > <u>Range hood</u>
- > Industrial and commercial fans

- > Product family page
- > Online simulation



Evaluation boards for CIPOS™ Tiny IM393 series

Compact and flexible 3-phase motor drive evaluation platform: New power boards now available featuring CIPOS[™] Tiny (IM393 series)

These new evaluation boards were developed to support customers during their first steps of applications with the IM393 series CIPOS[™] Tiny IPM. In combination with control-boards equipped with the M1 20pin interface connector, like EVAL-M1-101T or EVAL-M1-099M, the kit offers a complete system to demonstrate Infineon's CIPOS[™] Tiny IPM technology in motor drives.



EVAL-M1-CTE610N3 Evaluation board for IM393-M6E

EVAL-M1-CTF610N3 (see figure on left-side) Evaluation board for IM393-M6F Features

- > Ready-to-use power stage with 600 V IGBT blocking voltage
- > Output power up to 600~W
- > 600 V blocking voltage
- > 10 A installted chip current

EVAL-M1-CTE620N3 Evaluation board for IM393-X6E

EVAL-M1-CTF620N3 (see figure on left-side) Evaluation board for IM393X6F

Features

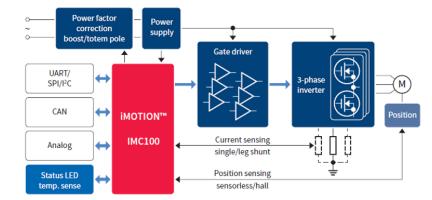
- > Ready-to-use power stage with 600 V IGBT blocking voltage
- > Output power up to 1200 W
- > 600 V blocking voltage
- > 20 A installed chip current

Benefits

Block diagram

- > Easy to start evaluation shorter cycle time to final product
- > UL certified package and temperature sensor inside each Tiny IPM
- > Smaller foot print to allow smaller PCB
- > High efficiency to save energy

- **Target applications**
- > <u>Motor drives</u>
- > Washing machines
- > Room air conditioning
- > Range hood
- > Industrial and commercial fans



Product overview incl. data sheet link

OPN	SP Number	Package
EVALM1CTE610N3TOBO1	SP003127466	Container
EVALM1CTF610N3TOBO1	SP003127462	Container
EVALM1CTE620N3TOBO1	SP003127470	Container
EVALM1CTF620N3TOBO1	SP003127474	Container

- > MADK family page
- > CIPOS™ Tiny family page
- > Online simulation

Evaluation board for CIPOS™ Micro IM231 series

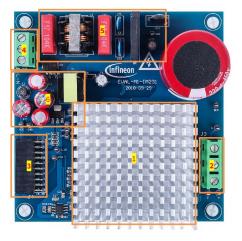
The evaluation board EVAL-M1-IM231 was developed to support customers during their first steps of applications with the IM231 series CIPOS[™] Micro IPM. In combination with control-boards equipped with the M1 20pin interface connector, like EVAL-M1-101T or EVAL-M1-099M, the kit offers a complete system to demonstrate Infineon's CIPOS[™] Micro IPM technology in motor drives.

The evaluation board EVAL-M1-IM231 features IM231-L6S1B, which includes a 600V IGBT-based 3-phase inverter with integrated gate drivers and is designed for highefficiency motor drive applications such as circulator/drain/hydronic pumps, airconditioning fans and refrigerator compressors.



Board components

Block diagram



CIPOS[™] Micro IPM and Heatsink. Motor phase connector

- (J2) 3. J3-20 pin iMOTION[™] MADK-M1 interface
- connector for controller board 4. AC line input connector
- (J1)
- EMI filter and rectifier group
- 6. Auxiliary power supply

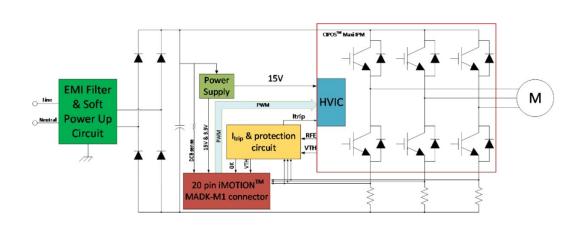
Features

- > Input voltage 265 VAC
- > Maximum 400 W motor power output
- > Output current 2.2 Arms
- > On board EMI filter
- > Current sensing for each phase configured by default
- > Auxiliary power supply with 15 V, 3.3 V
- > Over-current protection
- > Over-temperature protection
- > Sensing of DC-link voltage
- > Thermistor output
- > Fault diagnostic output
- > Measurement test-points compatible to standard oscilloscope probes
- > PCB is 100 mm × 100 mm and has two layers with 35 μm copper each
- > RoHS complaint

Target applications

> Motor control and drives

- > Home appliance
- > Consumer
- > <u>Hood fan</u>
- > Refrigerator
- > Washing machine



Product overview incl. data sheet link

OPN	SP Number	Package
EVALM1IM231TOBO1	SP004091412	Container
EVALM1101TTOBO1	SP001780036	Container

- > CIPOS™ Micro family page
- > MADK family page
- > Online simulation

1200 V CoolSiC[™] Schottky diode G5 in TO247-2 package

1200 V CoolSiC[™] Schottky diodes G5 now available in a TO-247 real 2-pin package, for easy exchange of bipolar Si diodes commonly used today. The expanded 8.7 mm creepage and clearance distances in the new package offer extra safety in high-pollution environments. Combined with a Si IGBT or super-junction MOSFET, for example in a Vienna rectifier stage or PFC boost stage used in 3-phase conversion systems, a CoolSiC[™] diode raises efficiency up to 1% compared to next best Si diode alternative.



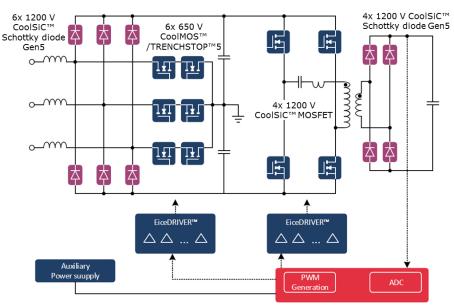
Features

- > No reverse recovery current, no forward recovery voltage
- > Temperature-independent switching behavior
- > Low forward voltage even at high operating temperature
- > Tight forward voltage distribution
- > High surge current capability
- > Real two-pin package with 8.7 mm creepage and clearance distances

Target applications

- > EV-Charging
- > <u>Welding</u>
- > <u>CAV</u>
- > Solutions for solar energy systems
- > Motor and control drives
- > <u>UPS</u>
- > Industrial SMPS

Block diagram EV DC charging



Product overview incl. data sheet link

OPN	SP Number	Package
IDWD10G120C5XKSA1	SP001687162	PG-TO247-2
IDWD15G120C5XKSA1	SP001687164	PG-TO247-2
IDWD20G120C5XKSA1	SP001687166	PG-TO247-2
IDWD30G120C5XKSA1	SP001687168	PG-TO247-2
IDWD40G120C5XKSA1	SP001687170	PG-TO247-2

Benefits

- $> \ensuremath{\mathsf{Easy}}$ plug and play with silicon diodes
- > System efficiency improvement over Si diodes
- > Enabling higher frequency / increased power density solutions
- > System reliability improvement

- > Product family page
- > Product brief
- > <u>Videos</u>

650 V TRENCHSTOP™ 5 S5 in TO-220-3

650 V TRENCHSTOP[™] 5 is recognized leading IGBT thin-wafer technology. Now also available in small footprint packages like TO-220-3 enables higher power designs in a compact size. Apart from high current density in small package low losses of the TRENCHSTOP[™] 5 benefits to low junction temperature of the device, consequently less cooling, longer operational cycles and high life time expectancy.

The 650 V, 28/39 A hard-switching TRENCHSTOP™ 5 S5 IGBT addresses applications switching between 10 kHz and 40 kHz to deliver high current density, high efficiency, faster time-to-market cycles, circuit design complexity reduction and PCB bill of material cost optimization.

Features

- > Very low VCEsat of 1.35 V at 25°C, 20% lower than TRENCHSTOP™ 5 H5
- > 4 times Ic pulse current (100°C Tc)
- > Soft current fall characteristics with no tail current
- > Symmetrical, low voltage overshoot
- > Gate voltage under control (no oscillation). No risk of unwanted turn -on of device and no need for gate clamping
- > Maximum junction temperature Tvj = 175°C
- > Qualified according to JEDEC standards

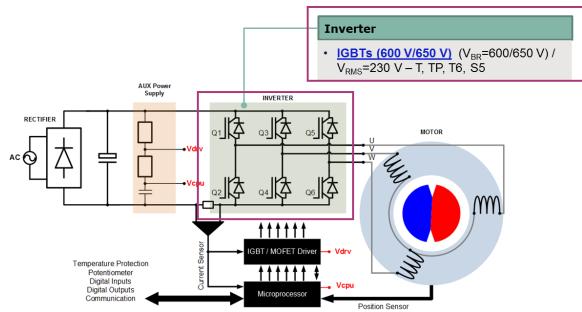
Target applications

- > Corded power tools
- > Motor control and drives



- > Easy plug and play with silicon diodes
- > System efficiency improvement over Si diodes
- > Enabling higher frequency / increased power density solutions
- > System reliability improvement

Application diagram high voltage corded power tools



Product overview incl. data sheet link

OPN	SP Number	Package
IKP28N65ES5XTMA1	SP002655502	PG-TO220-3
IKP39N65ES5XTMA1	SP002882512	PG-TO220-3

Product collaterals / Online support

> Product family page

> Application note



OptiMOS™ 6 power MOSFET 40 V family

The OptiMOSTM 6 power MOSFET 40 V family is optimized for a variety of applications and circuits, such as synchronous rectification in switched mode power supplies (SMPS) in servers, desktop PCs, wireless chargers, quick chargers and ORing circuits. Improvements in on-state resistance ($R_{DS(on)}$) and figure of merits (FOM - $R_{DS(on)} \times Q_g$ and Q_{gd}) enable designers to increase efficiency, allowing easier thermal design and less paralleling, leading to system cost reduction.



Features

- $> R_{\text{DS(on)}}$ reduced by 30% compared to alternative products
- > Improved FOM $Q_g \; x \; R_{\text{DS(on)}} \, by \; 29\%$
- > Improved FOM $Q_{gd} \: x \: R_{DS(on)} \: by \: 46\%$
- > Optimized for synchronous rectification
- > Suited for ORing circuits
- > RoHS compliant halogen free
- > MSL1 ratedModular concept for simplified paralleling

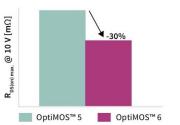
R_{DS(on)} comparison

available R_{DS(on)}

FOM comparison

FOM Q_g/Q_{gd}

FOM @ V_{GS} = 0 to 10 V



Comparison of FOM Q_g and FOM Q_{gd} between OptiMOS[™] 6 and previous generation

Benefits

- > Highest system efficiency
- > Less paralleling required
- > Increased power density
- > Very low voltage overshoot
- > Reduced need for snubber circuit
- > System cost reduction

 OptiMOS™ 5
 OptiMOS™ 6
 FOM Qg

 Comparison between OptiMOS™ 6
 Comparison of I

 and previous generation of lowest
 between OptiMO

Target applications

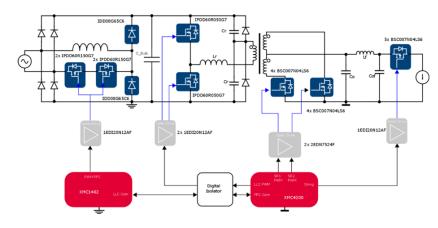
> <u>SMPS</u>

46%

FOM Q_{gd}

- > <u>Server</u>
- > <u>Telecom</u>
- > <u>Charger</u>
- > <u>Drives</u>
- > <u>Multicopter</u>

Application diagram: Server power supply



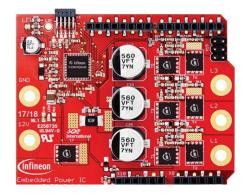
Product overview incl. data sheet link

OPN	SP Number	Package
BSC059N04LS6ATMA1	SP001687052	PG-TDSON-8
BSC007N04LS6ATMA1	SP001629650	PG-TDSON-8
BSC022N04LS6ATMA1	SP001720024	PG-TDSON-8
BSC010N04LS6ATMA1	SP001687044	PG-TDSON-8
EVAL1K6WPSUG7DDTOBO1	SP002594296	Container

- > Product family page
- > Product selection guide
- > Product brief
- > Simulation models
- > Market <u>news</u>

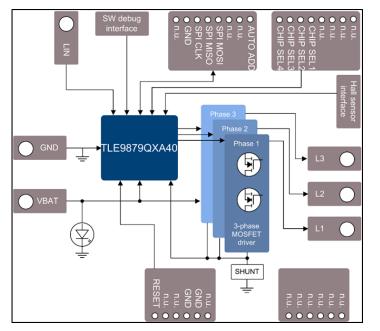
BLDC Shield TLE9879

BLDC Shield for Arduino with TLE9879QXA40 is designed to drive BLDC motors in combination with an arduino compatible baseboard. The shield is flased with several motor control algorithms (sensorless FOC, hall sensor based block commutation) The shield is controlled from the baseboard via SPI.



Features

- > Six current programmable drivers with charge pump for N-Channel MOSFET
- > Integrated LIN transceiver compatible with LIN 2.2 and SAEJ2602
- > Two synchronous serial channel (SSC)
- > On-chip OSC and PLL for clock generation
- > One high voltage monitoring input with wake up functionality> High speed operational amplifier for motor current sensing via
- shunt
- > Measurement unit:
 - 8-bit ADC module with 10 multiplexed inputs 10-bit ADC module with 8 multiplexed inputs, 5 external
 - analog inputs
 - On chip temperature and battery voltage measurement unit
- > Independent programmable window watchdog
- > 5V/1.5V Internal supplies
- > External supply (VDDEXT): 5V+/-2% @ 20mA
- > Power saving modes:
 - MCU slow-down mode
 - Sleep and stop mode
 - Cyclic wake-up sleep mode



Target applications

> Engine Cooling Fan

> Auxiliary pumps (water/fuel/oil)

Product collaterals / Online support

- > Product page
- > Product brief
- > Quick start guide
- > User <u>manual</u>
- > <u>Toolchain</u>
- > <u>Video</u>

Product overview incl. data sheet link

OPN	SP Number	Package
BLDCSHIELDTLE9879TOBO1	SP003549500	Container
TLE9879QXA40XUMA2	SP001583434	PG-VQFN-48

Smart high-side switch PROFET™ family for industrial applictions

The industrial PROFET[™] ITS4040D/4075Q/4090Q/4130Q are Dual/Quad Channel Smart High-Side Power Switches providing integrated protection functions and a diagnosis feedback. With very low typical RDS(ON) values and the small PG-TSDSO-14 exposed pad package it combines high current capability with minimum space requirements. The exposed pad of the thermally enhanced PG-TSDSO-14 package allows a very efficient heat transfer from the device to inner layers of the PCB by means of thermal vias. The ITS4040D/4075Q/4090Q/4130Q are specifically designed to switch resistive, inductive or capacitive loads in harsh industrial environments and are is equipped with essential protection features that make it extremely robust.



Features

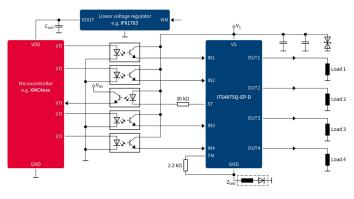
Benefits

- > Dual/Quad channel Smart High-Side Power Switch with integrated protection and diagnosis
- > Maximum RDS(ON) 40/75/90/130m Ω per channel at Tj = 25°C
- > High output current capability: nominal current up to
- 2.6/2.6/0.750/0.650 A > Low and accurate current limitation: 4.1/4.1/1.5/1.25 A (± 20 %)
- > Extended supply voltage range up to 45 V
- > All control inputs 24 V capable and support direct interface to optocouplers
- > All control inputs 3.3 V and 5 V logic level compatible
- > 4 kV electrostatic discharge protection (ESD)
- > Optimized electromagnetic compatibility
- > Very small, thermally enhanced TSDSO-14 package
- > Device robustness validated by extended qualification according to JEDEC standard "JESD47J

Competitive advantage

- > Easy-to-understand and easy-to-design-in product family
- > Four products with the same package, footprint, pinning, features, diagnostics
- > Saving your System costs by using cheaper, or even no external components
- > Industrial Mission profile 24h/365d/15y

Application diagram



Product overview incl. data sheet link

OPN	SP Number	Package
ITS4040DEPDXUMA1	SP001588408	PG-TSDSO-14
ITS4075QEPDXUMA1	SP001355734	PG-TSDSO-14
ITS4090QEPDXUMA1	SP001621718	PG-TSDSO-14
ITS4130QEPDXUMA1	SP001623930	PG-TSDSO-14

- > Industrial mission profile/robustness
- > Family concept for max R&D synergies at customer
- > Fine tuning parameters on End Equipment
- > Reduced system Power loss
- > Reduced occupation area impact

Target applications

- > Digital output modules (PLC applications, factory automation)
- > Industrial peripheral switches and power distribution
- > Switching resistive, inductive and capacitive loads in harsh industrial environments
- > Replacement for electromechanical relays, fuses and discrete circuits
- > Most suitable for loads that require a precise current limit

Value proposition

- > High system reliability
- > Broadliner Easy to design products
- > Reduced system costs
- > Highest efficiency and power density

Qualification

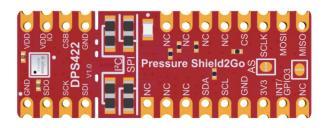
> Industrial

- > Product Family page
- > Product brief
- > Simulation

New evaluation boards for barometric pressure sensor DPS422

The DPS422 is a miniaturized digital barometric air pressure and temperature sensor with high accuracy and low current consumption. Pressure sensing is carried out using a capacitive sensor element, guaranteeing high accuracy over temperature. The small 2.0 x 2.5 x 0.73 mm package makes the DPS422 ideal for mobile applications and wearable devices.





Sensor Hub Nano DPS422 (EVAL SHNBV01 DPS422) Infineon Sensor Hub Nano hosts one DPS422 barometric pressure sensor and XMC1100 32-bit ARM Cortex-M0 MCU. The Sensor Hub Nano can communicate to PC or Android[™] smart phone wirelessly, thanks to integrated Bluetooth[™] 4.0 and battery. It can be used for quick testing and evaluation of DPS422 in the final application and it works as a platform to develop Android apps. It is compatible with Infineon Sensor Software Analyzer (SES2G) and Infineon apps. (Size: 30 × 15 × 10 mm, incl. battery)

Features DPS422

- > Package dimensions: 8-pin LGA, 2.0 x 2.5 x 0.73 mm (typ)
- > Operation range: Pressure: 300 -1200 hPa. Temperature: -40°C +85 °C
- > Pressure sensor precision: ± 0.005 hPa (or ±5 cm)
- > Relative accuracy: ± 0.06 hPa (or ±50 cm)
- > Absolute accuracy: ± 1 hPa (or ±8 m)
- > Temperature accuracy: ± 0.4°C
- > Measurement time: Typical: 27.6 ms for standard mode (16x) Minimum: 3.6 ms for low precision mode
- > Average current consumption: 1.7 μA for pressure measurement, 2μA for temperature measurement @1Hz sampling rate, Standby: <1 μA</p>

Shield2Go DPS422 (S2GO PRESSURE DPS422)

Infineon's Shield2Go boards offer a unique customer and evaluation experience – the boards are equipped with one DPS422 barometric pressure sensor and come with a ready to use Arduino library. Customers can now develop their own system solutions by combining Shield2Go boards together with Infineon My IoT adapters. My IoT adapters are gateways to external hardware solutions like Arduino and Raspberry PI, which are popular IoT hardware platforms. All this enables the fastest evaluation and development of IoT system.



Target Applications

- > Smart home
- > Health and fitness
- > Multicopter and drones
- > Local weather station and thermostat
- > Air flow control
- > Outdoor/Indoor navigation
- > IoT applications

Product overview incl. data sheet link

OPN	SP Number	Package
EVALSHNBV01DPS422TOBO1	SP003119254	Container
S2GOPRESSUREDPS422TOBO1	SP002983204	Container
MYIOTADAPTERTOBO1	SP002434972	Container
DPS422XTSA1	SP001402096	PG-WLGA-8

- > EVAL SHNBV01 DPS422 product page / guide
- > S2GO PRESSURE DPS422 product page / guide
- > DPS422 product page