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Intelligent Power Switches (IPS)

Contents

Technology Overview

ST offers an industrial series of intelligent power switches (IPS) for high-side and low-side configurations. An IPS integrates a control part (logic interface, drivers, and protection) with a power stage.

IPS are based on the well-consolidated bipolar, multi-power BCD and VIPower®M0 technologies.

Devices in development are designed using the latest versions of the above technologies, thus offering state-of-the-art solutions in a wide range of applications.

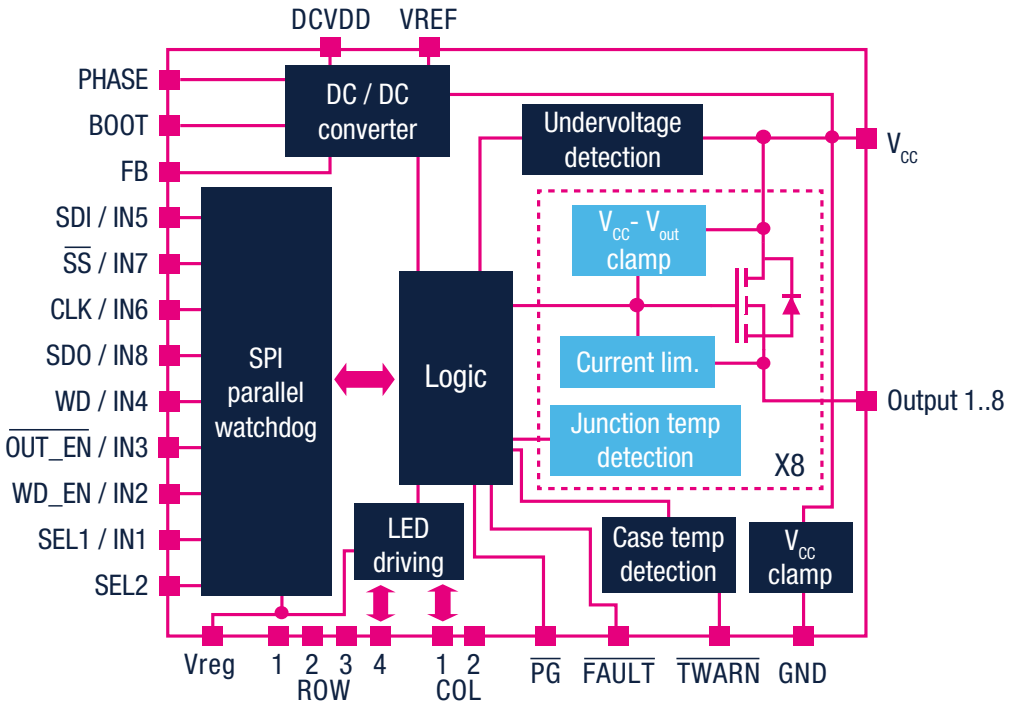
BENEFITS

- Increased system reliability
- Part count reduction
- Space saving
- Built-in protection
- System approach

FEATURES

- Galvanic isolation on chip
- Supply voltage up to 60 V
- Fast demagnetization of inductive loads
- Very low $R_{DS(ON)}$ supply current
- Short-circuit and overcurrent protection
- Undervoltage protection and overvoltage shutdown
- Loss of ground protection
- Thermal protection: junction and case
- Diagnostic output
- Open load detection
- Designed to meet IEC 61131-2 standards

Typical architecture of intelligent power switch (VNI8200XP)



International standards

IPS devices are designed to safely drive every kind of load in low-voltage applications (up to 60 V), handling data in and out of the microcontroller by means of status/input signals. IPS devices are designed to comply with the following international standards for EMC and PLC equipments:

- IEC 61000-4-4 (electrical fast transient/burst)
- IEC 61000-4-2 (ESD, immunity test contact/air)
- IEC 61000-4-5 (surge test immunity requirements)
- IEC 61000-4-6 (current injection test)
- IEC 61131-2 (programmable controller, equipment requirements and tests)

Concerning ISO8200B, ISO8200AQ and ISO8200BQ, they are designed to comply with the following international standards for isolation characteristics and tests:

- UL 1577 (isolation voltage)
- IEC 61000-4-8 (power frequency magnetic field immunity test)
- IEC 60747-5-2 (optoelectronic devices characteristics)
- I/O Safety limits according to VDE V 0884-11
- UL 508 (Standard for Safety for Industrial Control Equipment)

Packages

Technological evolution has led to smaller IPS devices, housed in tiny, flat, no-lead plastic packages (DFN, QFN). The high thermal capacitance of the power packages such as PowerSO-36, PowerSSO36, PowerSSO24, PowerSSO12 and HTSSOP20, allows the absorption of high-energy pulses when an inductive load is driven without any external freewheeling diode.

IPS solutions
Product range

Output Stage	Part number	Output Chan-nels	Output current / Channel (Inom) (A)	Typ. $R_{DS(on)}$ Ohm	Supply voltage (V) AMR max.	Supply voltage (V) min.	Note	Package	Evaluation Board	Application Note/ User Manual
High-side	IPS160H	1	2	0.06	65	8	Open Load Diag	PowerSSO-12	STEVAL-IFP028V1	AN4781
	IPS160HF (*)						Open Load Diag	PowerSSO-12	X-NUCLEO-OUT08A1	UM2715
	IPS161H		0.5	0.06	65	8	Open Load Diag	PowerSSO-12	STEVAL-IFP034V1	AN4998
	IPS161HF (*)						Open Load Diag	PowerSSO-12	X-NUCLEO-OUT10A1	UM2716
	L6370D		2	0.1	50	9.5	Adjustable I_{OUT}	PowerSO-20		
	L6375D		0.5	0.4	50	8		SO-20		
	L6375S							SO-8		
	L6377D						Adjustable I_{OUT}	SO-14		
	TDE1747FP		< 0.5		60	8	Adjustable I_{OUT}	SO-14		
	TDE1798DP		0.5		50	6		mini-DIP8		
	TDE1897RFPT			0.4	50	18		SO-20		AN453
	TDE1898CFP							SO-20		AN453
	TDE3247FP		< 0.5		36	8	Adjustable I_{OUT}	SO-14		
	VN540SP-E		2	0.05	45	10		PowerSO-10		
	VN751PT			0.06	45	5.5	Open Load Diag	PPAK	STEVAL-IFP005V2	
	VN751S			0.06			Open Load Diag	SO-8		
	VNI2140J	2	1	0.06	45	9	Open Load Diag	PowerSSO-12	STEVAL-IFP010V3	AN2985
	L6376D	4	0.5	0.64	50	9.5		PowerSO-20		
	VN330SP-E			0.2	45	10		PowerSO-10		
	VN340SP-33-E		1	0.2	45	10		PowerSO-10		AN2208
	VN340SP-E		0.5	0.2	45	10	Per Channel Diag	PowerSO-10		AN2208
	VNI4140K			0.08	41	10.5	Per Channel Diag	PowerSO-24		AN2684
	VNI4140K-32		1	0.08	41	10.5	Per Channel Diag	PowerSO-24	STEVAL-IFP019V1	AN4009
	VNQ860-E		< 0.5	0.27	41	5.5	Per Channel Diag	SO-20		
	VNQ860SP-E				41	5.5	Per Channel Diag	PowerSO-10		
	ISO8200AQ (**)	8	0.5	0.11	45	10.5	Isolated, SPI, Per Channel Diag	QFN 9x11	X-NUCLEO-OUT02A1	UM2507
	ISO8200B (**)			0.11	45	10.5	Isolated	PowerSO-36	STEVAL-IFP015V2	AN4373, UM2209
	ISO8200BQ (**)		0.5	0.11	45	10.5	Isolated	QFN 9x11	STEVAL-IFP033V1 X-NUCLEO-OUT01A1	AN4373, UM2209
	VN808-32-E		1	0.15	45	10.5		PowerSO-36		AN2443, AN2208
	VN808CM-32-E			0.16	45	10.5		PowerSO-36	STEVAL-IFP001V1	AN2443, AN2208
	VN808CM-E		0.5	0.16	45	10.5	Logic level Inputs	PowerSO-36		AN2443, AN2208
	VN808-E			0.15	45	10.5		PowerSO-36		AN2443, AN2208
	VNI8200XP			0.11	45	10.5	LED Matrix Driver, DCDC, SPI, Per Channel Diag	PowerSO-36	STEVAL-IFP022V1 X-NUCLEO-PLC01A1	AN4284, UM1918
	VNI8200XP-32		1	0.11	45	10.5	LED Matrix Driver, DCDC, SPI, Per Channel Diag	PowerSSO-36	STEVAL-IFP032V1	AN4862
High & Low side	TDE1708DFT (***)	1	< 0.5		50	6		DFN 8L 4x4	STEVAL-IFS006V2	AN2679, AN2813
	TDE1707BFP (***)		0.5		50	6		SO-8		AN1213, AN495
Low side	IPS4260L	4	0.5	0.26	55	8	Adjustable I_{OUT}, Open Load / Per Channel Diag	HTSSOP-20	STEVAL-IFP029V1	UM2297
Push-Pull	L6374FP		< 0.5	4	50	10.8	Push-Pull Line Driver	SO-20		

Notes : (*) Satisfy SIL applications requirements for interface type C (or D) Class 3
(**) Galvanic Isolated
(***) The TDE1707 and TDE1708 are specific IPS developed to match all types of industrial detectors. They can be coupled with inductive, capacitive, ultra-sonic or optical detectors and can be used in high-side or in low-side driver configuration in 3-wire networks.

Single Channel

IPS160H

STEVAL-IFP028V1

IPS161H

STEVAL-IFP034V1

IPS160HF

X-NUCLEO-OUT08A1

IPS161HF

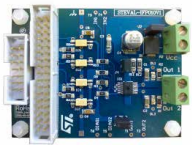
X-NUCLEO-OUT10A1

VN751PT

STEVAL-IFP005V2

Dual Channel

VNI2140J



STEVAL-IFP010V3

Quad Channel

IPS4260L

STEVAL-IFP029V1

VNI4140K-32

STEVAL-IFP019V1

Octal Channel

VNI8200XP

STEVAL-IFP022V1

VNI8200XP

X-NUCLEO-PLC01A1

VNI8200XP -32

STEVAL-IFP032V1

Isolated IPS

ISO8200B

STEVAL-IFP015V2

ISO8200BQ

STEVAL-IFP033V1

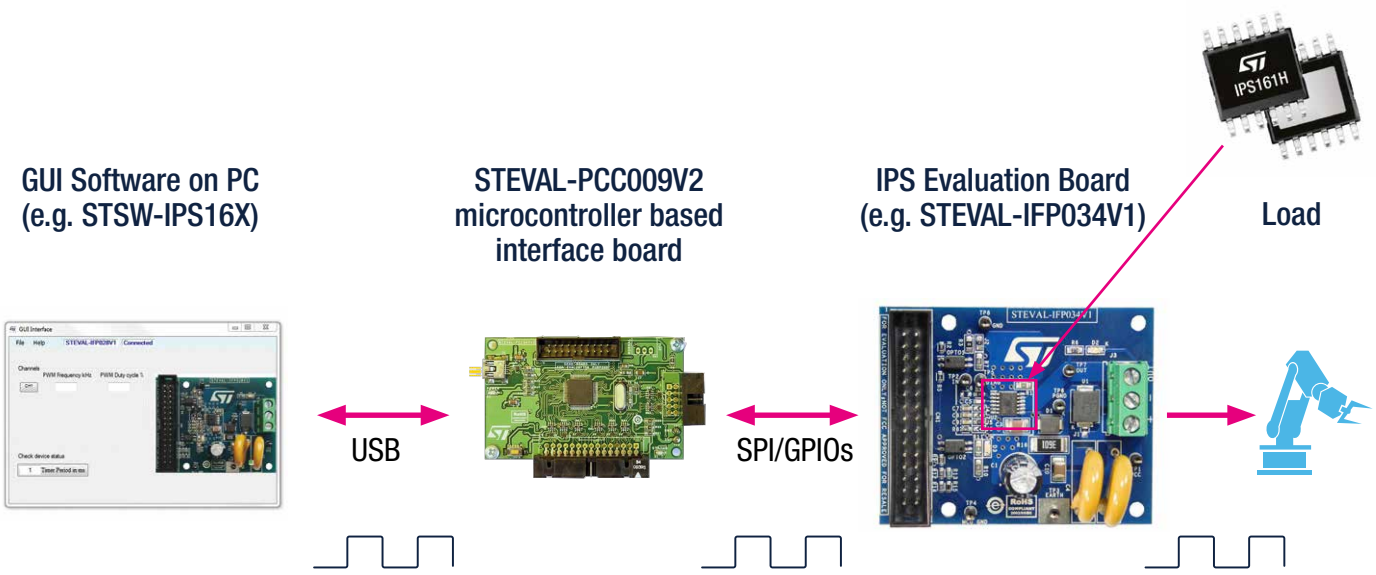
ISO8200BQ

X-NUCLEO-OUT01A1

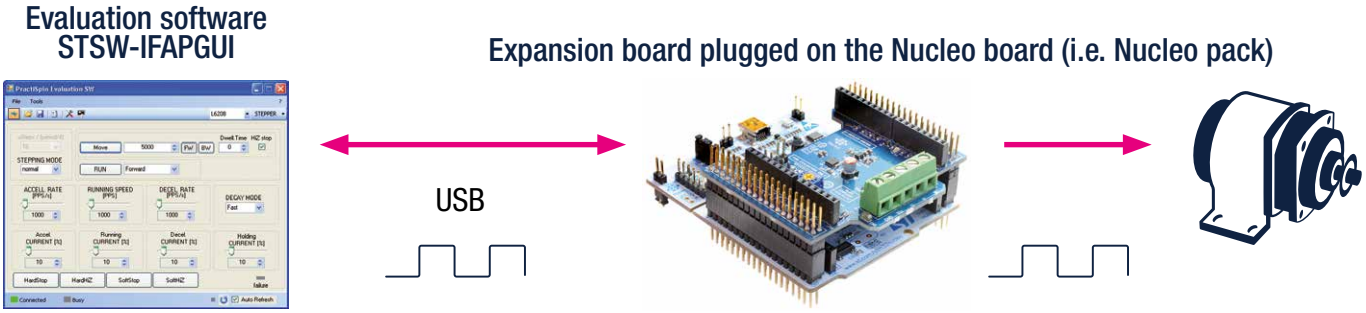
ISO8200AQ

X-NUCLEO-OUT02A1

EVALUATION BOARD BASIC SETUP



NUCLEO BOARD SETUP



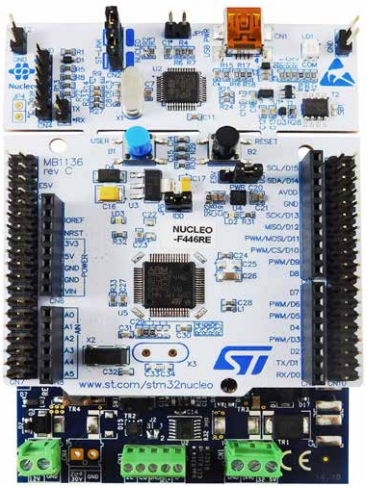
IPS Solutions
Transceiver ICs

Industrial transceiver ICs for IO-LINK and SIO mode

By using a state-of-the-art technology (MultiPower BCD) that allows the design of the logic part and robust LV power MOSFETs allowing hundreds kHz switching frequency in the same chip, ST offers an efficient, compact and cost-effective solution to drive any 3-wire digital sensor. Modern sensors and actuators require:

- remote service
- standardization
- sensor functionality verification
- diagnostics
- monitoring

The L6360, L6362A and L6364 I/O industrial transceiver ICs meet all these requirements. These ICs offer the market IO-LINK sensors/actuators that work without special cables. They feature an advanced solution that can even be integrated in old systems, that is neutral to any field bus, and keeps the point-to-point communication. Industrial transceiver ICs are designed in order to guarantee EMC immunity (burst/fast transient, ESD contact/air, surge pulse, RF emission/conduced), according to the IO-LINK specification and SIO mode requirements.



Industrial transceiver IC product range

Part number	Supply voltage (V)	V_{DD} (V)	Output current (A)	Imax linear reg. (mA)	Technology	Output channels	Input channels	Package
L6360 (Master)	18 to 32.5	3.3/5	0.5	65	MultiBCD	2	2	QFN 26L 3.5 x 5 mm
L6362A (Device)	7 to 36	3.3/5	0.22	10	MultiBCD	1	1	DFN 12L 3 x 3 mm
L6364Q (Device)	6 to 35	3.3/5	0.25/0.5(**)	50	MultiBCD	2	2	QFN 20L 4 x 4 mm
L6364W (Device)(*)	6 to 35	3.3/5	0.25/0.5(**)	50	MultiBCD	2	2	CSP 19 2.5 x 2.5 mm

Notes: (*) available end of Q4 2020 (**) join mode

IO-Link evaluation boards

Order code	Description	Application note / User manual
STEVAL-IDP004V2	IO-Link master multi-port evaluation board based on L6360	AN5041
STEVAL-IOM001V1	IO-Link master evaluation board based on L6360 equipped with ST morpho connectors for STM32 Nucleo	UM2414
STEVAL-IDP003V1	IO-Link industrial modular sensor board based on L6362A	AN5041
STEVAL-IOD003V1	IO-Link (PHY) device evaluation board based on L6362A with Arduino connectors for STM32 Nucleo	UM2424
P-NUCLEO-IOM01M1	STM32 Nucleo pack for IO-Link master based on L6360 device with IO-Link v1.1 (PHY and stack)	UM2421
P-NUCLEO-IOD01A1	STM32 Nucleo pack for IO-Link device based on L6362A device fully compatible with IO-Link v1.1.3 (PHY and stack)	UM2425
X-NUCLEO-IOD02A1	Expansion board IO-Link device based on L6364Q device fully compatible with IO-Link v1.1 (PHY and stack)	UM2741
P-NUCLEO-IOD02A1(*)	STM32 Nucleo pack for IO-Link device based on L6364 device fully compatible with IO-Link v1.1 (PHY and stack)	UM2782
STEVAL-BFA001V2B	Multi-sensor predictive maintenance kit with L6362A and IO-Link stack v.1.1	UM2663

Notes: (*) Available end Q4 2020

L6360

P-NUCLEO-IOM01M1

L6362A

P-NUCLEO-IOD01A1

L6360

STEVAL-IOM001V1

L6362A

STEVAL-IOD003V1

L6364Q

X-NUCLEO-IOD02A1

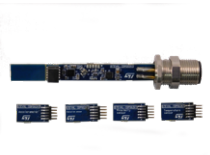
L6360

STEVAL-IDP004V2

L6362A

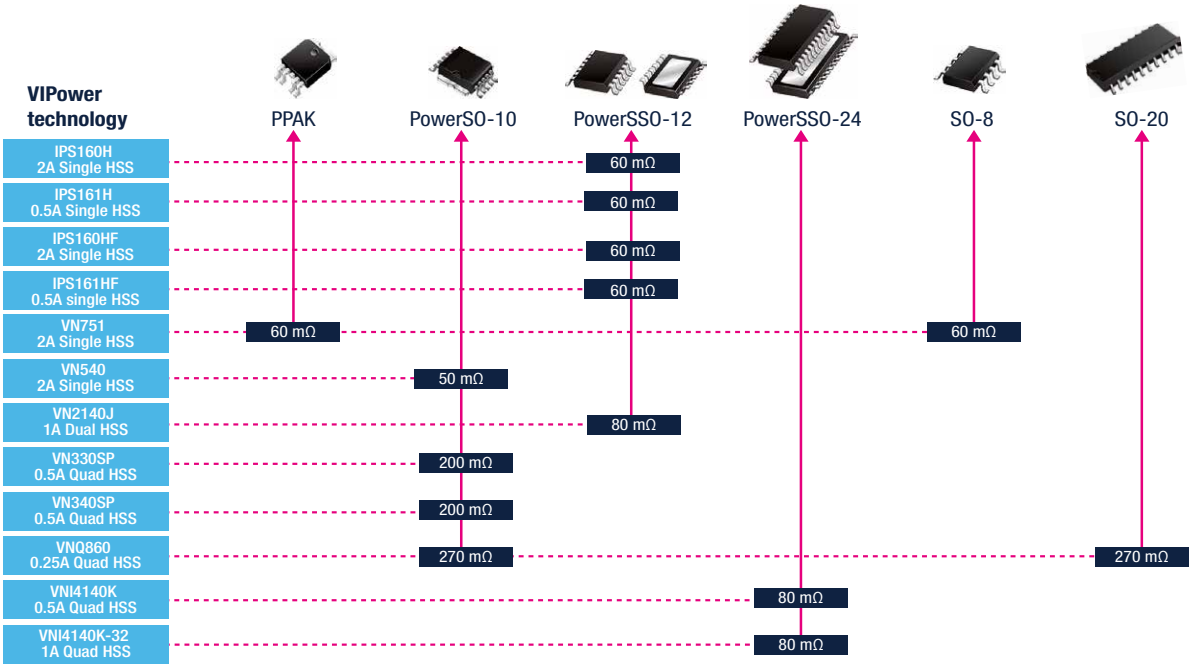
STEVAL-BFA001V2B

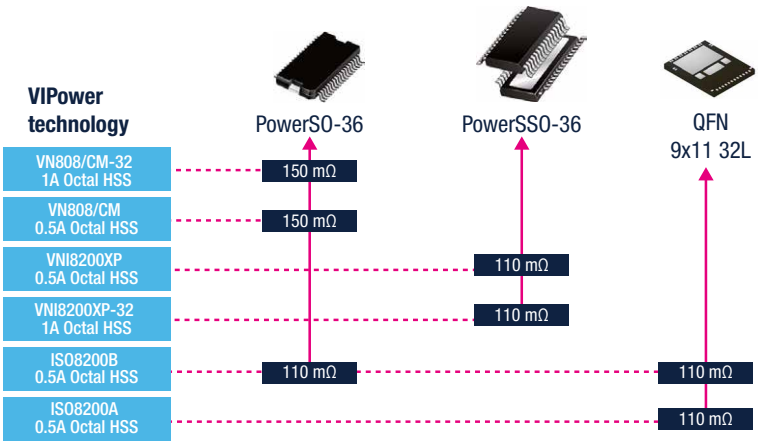
L6362A

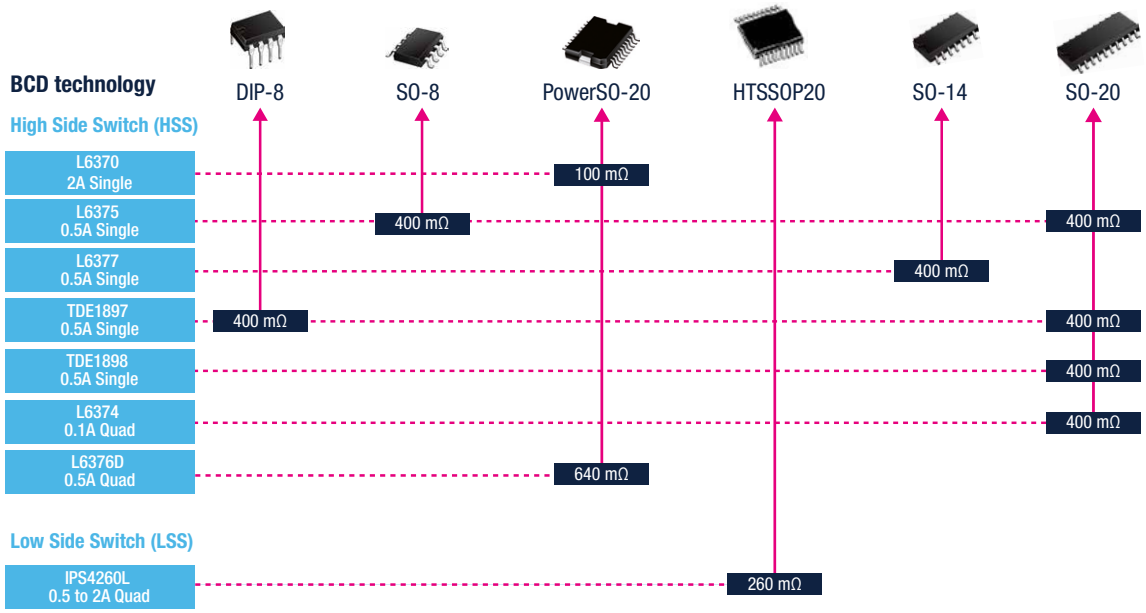


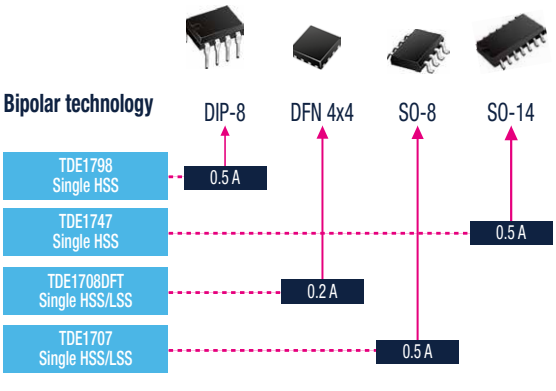
STEVAL-IDP003V1

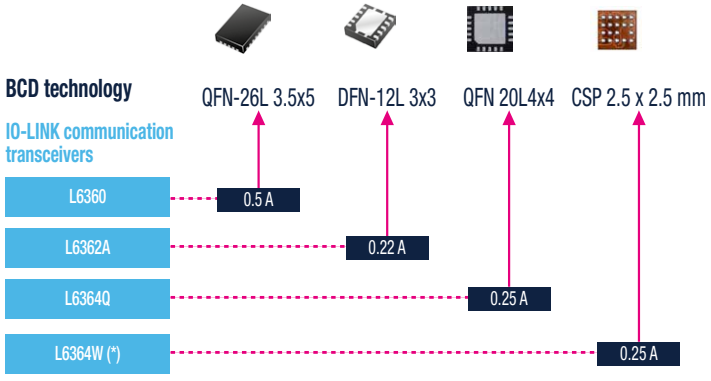
IPS Solutions
Power stage characteristics



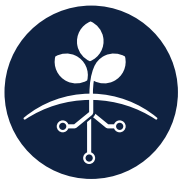








Notes: (*) Available end Q4 2020



Order code: BRIPS0920

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