

# Product updates

## BiMOS and BiPolar

Products in the pipeline	Voltage V	Current A	Housing	Description
5SFG 0580B12000x	1200	2 x 580	RoadPak	Phase-leg MOSFET
5SFG 0780B12000x	1200	2 x 780	RoadPak	Phase-leg MOSFET
5SFG 0980B12000x	1200	2 x 980	RoadPak	Phase-leg MOSFET
5SNG 0900R120500	1200	2 x 900	LoPak1 phase-leg module	Trench Fine Pattern chipset in LoPak1 phase-leg module
5SNG 0600R120500	1200	2 x 600	LoPak1 phase-leg module	Trench Fine Pattern chipset in LoPak1 phase-leg module
5SNG 0450Q120500	1200	2 x 450	62Pak phase-leg module	Trench Fine Pattern chipset in 62Pak phase-leg module
5SNG 1500X170500	1700	2 x 1500	LinPak phase-leg module	Trench chipset in HV LinPak housing
5SNG 0550Z330400	3300	2 x 550	LinPak phase-leg module	Trench chipset in HV LinPak housing
5SNG 0300Z650300	6500	2 x 300	LinPak phase-leg module	SPT++ chipset in HV LinPak housing
5SET 0540T1800	1800	540	60Pak, 60 mm, industry standard	Thyristor module
5SHZ 60L2500	2500	6000	L size, 85 mm	Reverse blocking IGCT
5SHX 36L4520	4500	1050	L size, 85 mm	HPT+ RC-IGCT, optimized for low switching losses
5SHX 36L4521	4500	1300	L size, 85 mm	HPT+ RC-IGCT, optimized for low on-state losses
5SHY 65L4522	4500	2260	L size, 85 mm	HPT+ AS-IGCT, optimized for low switching losses
5SHY 65L4521	4500	2660	L size, 85 mm	HPT+ AS-IGCT, optimized for low on-state losses
5STP 40N6500	6500	3780	N size, 100 mm	High-end thyristor
5SDD 57N6500	6500	5700	N size, 100 mm	High-end diode

### Product features

#### 1200 V RoadPak module now available

The key benefit is the high-current rating in a small package that is enabled by the use of SiC, combined with very small stray inductance. RoadPak applications include amongst others main drive train for xEVs, e-trucks, e-busses, traction auxiliary converters, as well as power electronics for xEV-charging.

RoadPak features:

- Compact design
- Half bridge configuration with two MOSFET switches
- Pin-Fin structure for lowest thermal resistance
- Lowest loss enabled by SiC chipset
- Lowest stray inductance
- Current 580, 780 and 980 A

#### 1200 V 600 and 900 A, LoPak1 modules with Trench Fine Pattern (TFP) chipset

A new LoPak with 1200 V voltage class is now available. It completes the LoPak portfolio with a high current of 2 x 600 and 2 x 900 A and can be used in various applications due to its compact and optimized high-performance design. Module features:

- Pre-applied TIM (Thermal Interface Material) that helps to increase reliability over the drive's lifetime
- It benefits of the next generation of ultra-low-loss, rugged Trench IGBT devices

- Capability to switch higher current densities using an optimized operation point, with ideal characteristics for alternative power (wind and PV) and industrial (motor driver) applications
- It enables new and existing designs to be upgraded to higher power ratings using the familiar LoPak module package

#### **1700 V 1500 A / 3300 V 550 A / 6500 V 300 A HV LinPak modules**

The high voltage (HV) LinPak is extending the already established low voltage (LV) LinPak platform with isolation voltages up to 10.2 kV. It offers an industry standard housing with highest current rating. Specially designed for best switching characteristics and no current de-rating in parallel operation. The chipsets are adapted from latest launches in the HiPak platform. The modules are intended for applications like traction and industrial drives.

#### **Thyristor module**

Our thyristor module features industry standard housing and very low losses together with the highest operating temperatures. Typical applications are AC motor soft starters, variable speed drives and renewable energies. Features within high-power semiconductors are also used in our module product line. The benefits of these features include highest performance, outstanding reliability, increased overload capability and many more. After successful qualification of the 60Pak diode-diode (DD) module with 2200 V, the next module in the pipeline is a thyristor module (TT) with 1800 V. The lineup will be expanded rapidly to different voltages and configurations in the coming years.

#### **2500 V Reverse-Blocking IGCT (RB-IGCT)**

Reverse Blocking-Integrated Gate Commutated Thyristor (RB-IGCT) designed and optimized for extreme low conduction losses and highest turn-off current capability.

- Record low on-state losses of below 1 kW at 1 kA, enables customer to design applications with highest efficiency ratings
- Highest robustness and reliability well-known from Hitachi ABB Power Grid's IGCT platform
- Optimized for DC Solid State Circuit Breaker (SSCB) application. The IGCT based SSCB allows to interrupt extreme currents faster than ever before (around 100 times faster than traditional electro-mechanical breakers). Samples are available now.

#### **4500 V Reverse-Conducting (RC-IGCT) and Asymmetric (AS-IGCT)**

The new IGCT devices have been developed to meet the ever-increasing demand for higher power capability coupled with lower operating losses. New devices offer more active area, larger controllable current, higher junction temperature and better cooling efficiency than the existing products. The devices are available in two variants, one optimized for medium switching frequency application, such as medium voltage drives and wind power converter, the second optimized for low switching frequency intended for use in Multi-Level Modular Converter (MMC) for e.g. static synchronous compensators (STATCOM) or pumped hydro plants. Design features:

- Device diameter increase within same footprint by making better use of raw silicon wafer
- Gate-circuit impedance minimization by changing to a gate contact infrastructure placed at the device periphery and by improving routing of the gate contact through the housing
- Moving the gate contact to the periphery for better cooling, as the pole piece trenches for conveying the gate signal no longer needed
- Increasing the maximum controllable current by adjusting the HPT<sup>+</sup> platform for use with the IGCT process flow. Samples are available now.

#### **High-end thyristor and diode**

Our next generation high-end industrial thyristor and diode will improve device current performance significantly. The first products, a thyristor and a diode, rated 6.5 kV in N-housing with 100 mm pole piece, offer a performance increase by more than 25% compared to actual devices. The new thyristor uses leading Snowflake gate design structure and latest backend technology features. Samples are available now.

New qualified products	Voltage V	Current A	Housing	Description
5SNG 0225R170390	1700	2 x 225	LoPak1	LoPak phase-leg module
5SNG 0300R170390	1700	2 x 300	LoPak1	LoPak phase-leg module
5SNG 0450R170390	1700	2 x 450	LoPak1	LoPak phase-leg module
5SNA 1200N330400	3300	1200	HiPak1	HiPak single enhanced Trench IGBT module
5SNA 1800E330400	3300	1800	HiPak2	HiPak single enhanced Trench IGBT module
5SNA 1500G450300	4500	1500	HiPak2	HiPak single, SPT++ technology
5SNA 1000G450300	4500	1000	HiPak1	HiPak single, SPT++ technology
5SNA 1800G330400	3300	1800	HiPak2	HiPak single enhanced, high Iso housing Trench IGBT module
5SNA 1000G650300	6500	1000	HiPak2	HiPak single enhanced planar IGBT module
5SED 0890T2240	2200	890	60Pak, 60 mm, industry standard	Diode module
5SDD 75Y8500	8500	7500	Y, 140 mm	Standard rectifier diode

## Product features

### 1700 V 225 to 450 A, LoPak1 modules with pre-applied TIM

The use of the pre-applied Thermal Interface Material (TIM) improves the module reliability by providing a stable interface between the module base plate and the cooler over the module's lifetime.

- Reduces module's thermal resistance "case to ambient" by 11%
- It allows higher current densities
- Offers homogenous thermal contact between module and cooler
- Available for all LoPak1 current ratings 225A, 300A and 450A, with "390" special article number denomination.

### 3300 V 1800 A HiPak2 and 1200 A HiPak1 modules

Hitachi ABB Power Grids' TSPT+ enhanced Trench cell IGBT technology combines the merits of our unique enhanced planar cell with trench IGBT design.

- TSPT+ chipset with lowest losses enable 20% higher current rating
- 20% larger diode area with FCE technology for improved surge current, lower losses and soft recovery behavior
- High-voltage trench cell with excellent dynamic avalanche robustness
- Available in standard and high isolation housing

### 4500 V 1000A, 1500 A HiPak modules with 150 °C junction operation temperature

The SPT++ enhanced planar cell sets a new benchmark in lowest losses and highest ruggedness.

- Up to 150 °C junction operation temperature enables customers to increase their inverter rating or develop more compact designs
- SPT++ chipset tuned for an optimal trade-off between switching and conduction losses enabling an optimal IGBT usage
- Lowest overall losses allow a significant increase in current density
- The enhanced planar cell represents the most robust and easiest to use technology available

### 6500 V 1000 A HiPak2 module with 150 °C junction operation temperature

The SPT++ enhanced planar cell design of the 2<sup>nd</sup> generation sets a new benchmark in lowest losses and highest ruggedness.

- Up to 150 °C junction operation temperature enables customers to increase their inverter rating or develop more compact designs
- SPT++ chipset tuned for an optimal trade-off between switching and conduction losses enabling an optimal IGBT usage
- Lowest overall losses allow an increase in current density of more than 30%
- The enhanced planar cell represents the most robust and easiest to use technology available on the market for the 6500 V class

### Diode module

Our diode module features industry standard housing and very low losses together with the highest operating temperature. Typical applications are DC power supplies, variable speed drives and renewable energies. Features within high-power semiconductors are also used in our module product line. The benefits of these features include highest performance, outstanding reliability, increased overload capability and many more. The 60Pak diode-diode (DD) module with 2200 V is our first qualified module and available in large quantities now. The lineup will be expanded rapidly to different voltages and configurations in the coming years.

### 8500 V Standard rectifier diode

Hitachi ABB Power Grids' six Inch 8.5 kV diode sets new record standard in its class.

- Lowest on state and switching losses
- Designed for highest surge current performance
- First choice in many demanding applications.
- Now fully qualified and available in large quantities.

Process change notifications	Part no.	Subject	PCN issuing date
IGBT 21-02	Wafer dies	New package for wafer dies	2020-03-08
IGBT 21-03	1700V chip set	New stepper for 1700 V	2020-03-10

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