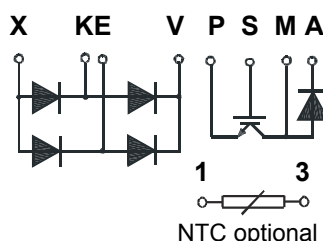


## Rectifier Module for Power Factor Correction

### Fast Single Phase Rectifier Ultra Fast Boost Chopper

Preliminary Data Sheet

## PSBI 33/06



|             |          |
|-------------|----------|
| $I_{C25}$   | = 44 A   |
| $V_{CES}$   | = 600 V  |
| $I_{FAV25}$ | = 15 A   |
| $V_{RRM}$   | = 1200 V |



for exact pin configuration see  
final development

## IGBT

| Symbol       | Test Conditions                                                                                                                 | Maximum Ratings                                   |
|--------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| $V_{CES}$    | $T_{VJ} = 25\text{ °C to }150\text{ °C}$                                                                                        | 600 V                                             |
| $V_{GES}$    | continuous                                                                                                                      | ±20 V                                             |
| $I_{C25}$    | $T_C = 25\text{ °C}$                                                                                                            | 44 A                                              |
| $I_{C80}$    | $T_S = 80\text{ °C}$                                                                                                            | 30 A                                              |
| <b>RBSOA</b> | $V_{CE} = 600\text{ V}, R_G = 10\text{ }\Omega, T_{VJ} = 125\text{ °C}$<br>clamped inductive load, $L = 100\text{ }\mu\text{H}$ | $I_{CM} = 100\text{ A}$<br>$V_{CEK} \leq V_{CES}$ |
| $t_{SC}$     | $V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_G = 10\text{ }\Omega,$<br>$T_{VJ} = 125\text{ °C}, \text{ non-repetitive}$  | 10 $\mu\text{s}$                                  |

| Symbol                                                      | Test Conditions                                                                                                                              | Characteristic Values |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| $T_{VJ} = 25\text{ °C}, \text{ unless otherwise specified}$ |                                                                                                                                              |                       |
| $V_{CE(sat)}$                                               | $V_{GE} = 15\text{ V}, I_C = 10\text{ A}, T_{VJ} = 25\text{ °C}$                                                                             | max. 1.8 V            |
| $V_{CE(sat)}$                                               | $V_{GE} = 15\text{ V}, I_C = 10\text{ A}, T_{VJ} = 25\text{ °C}$                                                                             | typ. 1.5 V            |
| $V_{CE(sat)}$                                               | $T_{VJ} = 125\text{ °C}$                                                                                                                     | typ. 1.6 V            |
| $V_{GE(th)}$                                                | $V_{GE} = V_{CE}, I_C = 1\text{ mA}$                                                                                                         | min. 3 V              |
| $V_{GE(th)}$                                                | $V_{GE} = V_{CE}, I_C = 1\text{ mA}$                                                                                                         | max. 5 V              |
| $I_{CES}$                                                   | $V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_{VJ} = 25\text{ °C}$                                                                               | max. 0.04 mA          |
| $I_{CES}$                                                   | $T_{VJ} = 125\text{ °C}$                                                                                                                     | typ. 1 mA             |
| $I_{GES}$                                                   | $V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$                                                                                              | max. 100 nA           |
| $t_{d(on)}$                                                 | inductive load, $T_{VJ} = 125\text{ °C}$<br>$V_{CE} = 400\text{ V}, I_C = 10\text{ A}$<br>$V_{GE} = \pm 15\text{ V}, R_G = 10\text{ }\Omega$ | typ. 31 ns            |
| $t_r$                                                       |                                                                                                                                              | typ. 50 ns            |
| $t_{d(off)}$                                                |                                                                                                                                              | typ. 291 ns           |
| $t_f$                                                       |                                                                                                                                              | typ. 70 ns            |
| $E_{on}$                                                    |                                                                                                                                              | typ. 0.60 mJ          |
| $E_{off}$                                                   |                                                                                                                                              | typ. 0.31 mJ          |
| $C_{ies}$                                                   | $V_{CE} = 25\text{ V}, f = 1\text{ MHz}, V_{GE} = 0\text{ V}$                                                                                | typ. 1600 pF          |
| $Q_{Gon}$                                                   | $V_{CE} = 480\text{ V}, I_C = 10\text{ A}, V_{GE} = 15\text{ V}$                                                                             | typ. 140 nC           |
| $R_{thJC}$                                                  |                                                                                                                                              | max. 0.96 K/W         |
| $R_{thJH}$                                                  |                                                                                                                                              | max. tbd K/W          |

## Module

| Symbol        | Test Conditions                                  | Maximum Ratings |
|---------------|--------------------------------------------------|-----------------|
| $T_{VJ}$      |                                                  | -40...+150 °C   |
| $T_{JM}$      |                                                  | 150 °C          |
| $T_{stg}$     |                                                  | -40...+150 °C   |
| $V_{isol}$    | 50/60 Hz $t = 1\text{ min}$                      | 3000 V~         |
|               | $I_{isol} \leq 1\text{ mA} \quad t = 1\text{ s}$ | 3600 V~         |
| $M_d$         | Mounting torque (M 4)                            | 1.5-2.0 Nm      |
| <b>Weight</b> | typ.                                             | 24 g            |

## Features

- Package with DCB ceramic base plate and soldering pins for PCB mounting
- Isolation voltage over 3000 V~
- Planar glasspassivated chips
- high level of integration- only one power semiconductor module required for the whole PFC rectifier
- standard PFC control ICs usable
- fast rectifier diodes for enhanced EMC behaviour
- NPT IGBT with low saturation voltage, ultra fast switching capability, high RBSOA and short circuit ruggedness
- internally series connected HiPerFRED free wheeling diode For fast and soft reverse recovery at high switching frequency
- leads suitable for PC board soldering
- UL registered, E 148688

## Applications

- single phase rectification with power factor correction (PFC)
- low harmonic content of mains current
- mains current and voltage in phase
- wide input voltage range, controlled output voltage

**Caution:** These Devices are sensitive to electrostatic discharge. Users should observe proper ESD handling precautions.

Data according to IEC 60747 refer to a single diode unless otherwise stated

### Fast Recovery Diode

| Symbol    | Test Conditions                          | Maximum Ratings |   |
|-----------|------------------------------------------|-----------------|---|
| $V_{RRM}$ | $T_{VJ} = 25\text{ °C to }150\text{ °C}$ | 600             | V |
| $I_{F25}$ | $T_C = 25\text{ °C}$                     | 30              | A |
| $I_{F80}$ | $T_C = 80\text{ °C}$                     | 19              | A |

Package style and outline  
under development

| Symbol                                              | Test Conditions                                                                  |                          | Characteristic Values |      |     |
|-----------------------------------------------------|----------------------------------------------------------------------------------|--------------------------|-----------------------|------|-----|
| T <sub>VJ</sub> = 25 °C, unless otherwise specified |                                                                                  |                          |                       |      |     |
| V <sub>F</sub>                                      | I <sub>F</sub> = 10 A,                                                           | T <sub>VJ</sub> = 25 °C  | max.                  | 3.2  | V   |
|                                                     |                                                                                  | T <sub>VJ</sub> = 25 °C  | typ.                  | 2.2  | V   |
|                                                     |                                                                                  | T <sub>VJ</sub> = 125 °C | max.                  | 2.4  | V   |
| I <sub>R</sub>                                      | V <sub>R</sub> = V <sub>RRM</sub> ,                                              | T <sub>VJ</sub> = 25 °C  | max.                  | 0.1  | mA  |
|                                                     |                                                                                  | T <sub>VJ</sub> = 125 °C | typ.                  | 0.1  | mA  |
| I <sub>RM</sub>                                     | I <sub>F</sub> = 10 A, di <sub>F</sub> /dt = -400 A/μs, T <sub>VJ</sub> = 125 °C |                          |                       | tbd  | A   |
| t <sub>rr</sub>                                     | V <sub>R</sub> = 400 V                                                           |                          |                       | tbd  | ns  |
| R <sub>thJC</sub>                                   |                                                                                  |                          | max.                  | 1.15 | K/W |
| R <sub>thJH</sub>                                   | with heat transfer paste                                                         |                          |                       | tbd  | K/W |

### Rectifier Diodes

| Symbol      | Test Conditions                                     | Maximum Ratings |   |
|-------------|-----------------------------------------------------|-----------------|---|
| $V_{RRM}$   |                                                     | 1200            | V |
| $I_{FAV25}$ | $T_C = 25\text{ °C}$ , sine $180^\circ$             | 33              | A |
| $I_{FAV80}$ | $T_C = 80\text{ °C}$ , sine $180^\circ$             | 22              | A |
| $I_{FSM}$   | $T_{VJ} = 25\text{ °C}$ , $T = 10\text{ ms}$ (50Hz) | 60              | A |

| Symbol                                              | Test Conditions                                                | Characteristic Values    |      |      |    |
|-----------------------------------------------------|----------------------------------------------------------------|--------------------------|------|------|----|
| T <sub>VJ</sub> = 25 °C, unless otherwise specified |                                                                |                          |      |      |    |
| V <sub>F</sub>                                      | I <sub>F</sub> = 10 A,                                         | T <sub>VJ</sub> = 25 °C  | max. | 1.8  | V  |
|                                                     |                                                                | T <sub>VJ</sub> = 25 °C  | typ. | 1.4  | V  |
|                                                     |                                                                | T <sub>VJ</sub> = 125 °C | typ. | 1.6  | V  |
| I <sub>R</sub>                                      | V <sub>R</sub> = V <sub>RRM</sub> ,                            | T <sub>VJ</sub> = 25 °C  | max. | 0.05 | mA |
|                                                     |                                                                | T <sub>VJ</sub> = 125 °C | typ. | 0.5  | mA |
| t <sub>rr</sub>                                     | V <sub>R</sub> = 100 V, I <sub>F</sub> = 10 A, -di/dt = 5 A/μs | typ.                     | 1    | μs   |    |
| R <sub>thJC</sub>                                   | per diode                                                      | max.                     | 2.5  | K/W  |    |
| R <sub>thJH</sub>                                   | with heat transfer paste                                       |                          | tbd  | K/W  |    |

### Module

| Symbol   | Test Conditions              | Characteristic Values |                |
|----------|------------------------------|-----------------------|----------------|
| $d_s$    | Creeping distance on surface | 11.2                  | mm             |
| $d_A$    | Creeping distance in air     | 5                     | mm             |
| $a$      | Max. allowable acceleration  | 50                    | $\text{m/s}^2$ |
| $R_{25}$ | NTC @ $25\text{ °C}$         | 5.000                 | $\Omega$       |