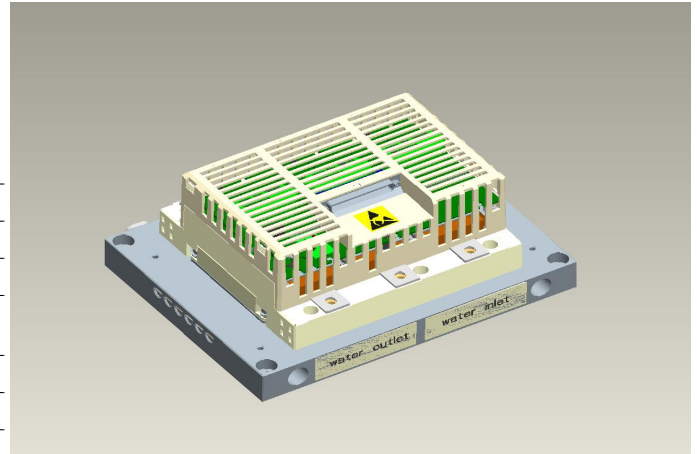


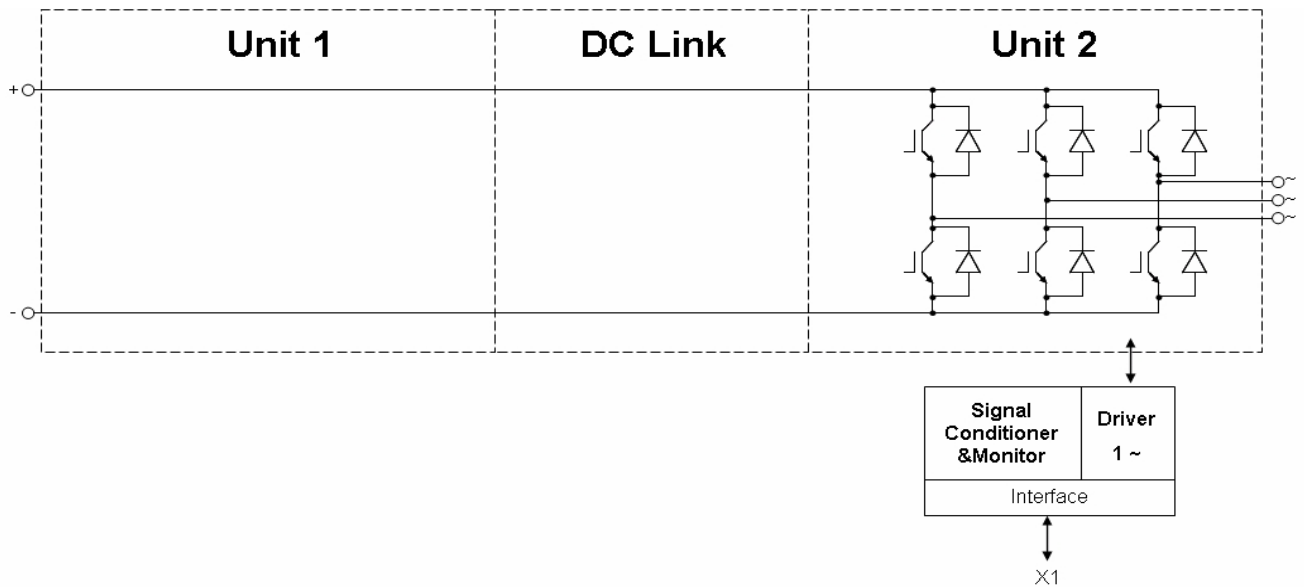
## General information

**IGBT Stack for typical voltages of up to 400 V<sub>RMS</sub>**  
**Rated output current 900 A<sub>RMS</sub>**

- Solar power
  - Motor drives
  - High power converter
- 
- 62mm power module
  - Trenchstop™ IGBT4



Topology	1/2 B2I
Application	Inverter
Load type	resistive, inductive
Semiconductor (Inverter Section)	3x FF450R12KE4
Heatsink	water cooled
Implemented sensors	current, voltage, temperature
Driver signals IGBT	Electrical
Design standards	EN 50178
Approvals	UL 508C
Sales - name	2PS13512E43W39689
SP - No.	SP001132612



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**Absolute maximum rated values**

Collector-emitter voltage	IGBT; $T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Repetitive peak reverse voltage	Diode; $T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
Insulation management	according to installation height of 2000 m	$V_{line}$	500	$V_{RMS}$
Insulation test voltage	according to EN50178, $f = 50\text{ Hz}$ , $t = 1\text{ s}$	$V_{ISOL}$	2.5	$kV_{RMS}$
Switching frequency inverter section		$f_{sw2}$	8	kHz

**Notes**

Further maximum ratings are specified in the following dedicated sections

**Characteristic values**

**DC Link**

			min.	typ.	max.	
Rated voltage		$V_{DC}$		650	850	V

**Notes**

The over voltage shutdown level is above the max. rated DC voltage. Therefore this function can not be used

**Inverter Section**

			min.	typ.	max.	
Rated continuous current	$V_{DC} = 650\text{ V}$ , $V_{AC} = 400\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 50\text{ Hz}$ , $f_{sw} = 5000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC}$			900	$A_{RMS}$
Continuous current at low frequency	$V_{DC} = 650\text{ V}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 0\text{ Hz}$ , $f_{sw} = 5000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ low}$			540	$A_{RMS}$
Rated continuous current for 150% overload capability	$I_{AC\ 150\%} = 1080\text{ A}_{RMS}$ , $t_{on\ over} = 60\text{ s}$ , $t_{recovery} = 600\text{ s}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ over1}$			720	$A_{RMS}$
Over current shutdown	within $15\ \mu\text{s}$	$I_{AC\ OC}$			1860	$A_{peak}$
Power losses	$I_{AC} = 900\text{ A}$ , $V_{DC} = 650\text{ V}$ , $V_{AC} = 400\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 50\text{ Hz}$ , $f_{sw} = 5000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$P_{loss}$			2940	W

**Notes**

Maximum junction temperature limited to  $125^{\circ}\text{C}$  under all operating conditions

**Controller interface**

Driver and interface board	ref. to separate Application Note		DR240			
			min.	typ.	max.	
Auxiliary voltage		$V_{aux}$	18	24	40	V
Auxiliary power requirement	$V_{aux} = 24\text{ V}$	$P_{aux}$			40	W
Digital input level	resistor to GND $10\text{ k}\Omega$ , capacitor to GND $1\text{ nF}$	$V_{in\ low}$	0		4	V
		$V_{in\ high}$	11		15	V
Digital output level	open collector, logic low = no fault, max. $15\text{ mA}$	$V_{out\ low}$	0		1.5	V
		$V_{out\ high}$		15		V
Analog current sensor output inverter section	load max $5\text{ mA}$ , @ $900\text{ A}_{RMS}$	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	4.8	4.9	5	V
Analog DC link voltage sensor output	load max $5\text{ mA}$ , @ $800\text{ V}$	$V_{DC\ ana}$	5.5	5.7	5.8	V
Analog temperature sensor output inverter section (Simulated)	load max $5\text{ mA}$ , @ $T_{NTC} = 55^{\circ}\text{C}$ , corresponds to $T_j = 125^{\circ}\text{C}$ at rated conditions	$V_{Theta\ sim2}$		4.5		V
Over temperature shutdown inverter section	@ $T_{NTC} = 81^{\circ}\text{C}$	$V_{Error\ OT2}$		10		V

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# Technical Information

PrimeSTACK™

# 2PS13512E43W39689



## Preliminary data

### System data

				min.	typ.	max.	
EMC robustness	according to IEC 61800-3 at named interfaces	power	$V_{Burst}$	2			kV
		control	$V_{Burst}$	1			kV
		aux (24V)	$V_{surge}$	1			kV
Storage temperature		$T_{stor}$	-40		80	°C	
Operational ambient temperature	PCB, DC link capacitor, bus bar, excluding cooling medium	$T_{op\ amb}$	-25		55	°C	
Cooling air velocity	PCB, DC link capacitor, bus bar, standard atmosphere	$V_{air}$	0.3			m/s	
Humidity	no condensation	Rel. F	0		85	%	
Vibration	according to IEC 60721				5	m/s <sup>2</sup>	
Shock	according to IEC 60721				40	m/s <sup>2</sup>	
Protection degree			IP00				
Pollution degree			2				
Dimensions	width x depth x height		260	280	120	mm	
Weight			7.7			kg	

### Heatsink water cooled

				min.	typ.	max.	
Water flow	according to coolant specification from Infineon	$\Delta V/\Delta t$	10				dm <sup>3</sup> /min
Water pressure				30			bar
Water pressure drop		$\Delta p$			8		mbar
Coolant inlet temperature		$T_{inlet}$	-40		70		°C
Cooling channel material			Aluminium				

#### Notes

Conditions are standard Infineon characterization for heatsinks.

### Overview of optional components

	Unit 1	Inverter Section	Unit 3
Parallel interface board			
Optical interface board			
Chopper controller			
Voltage sensor		×	
Current sensor		×	
Temperature sensor		×	
DC link capacitors			

#### Notes

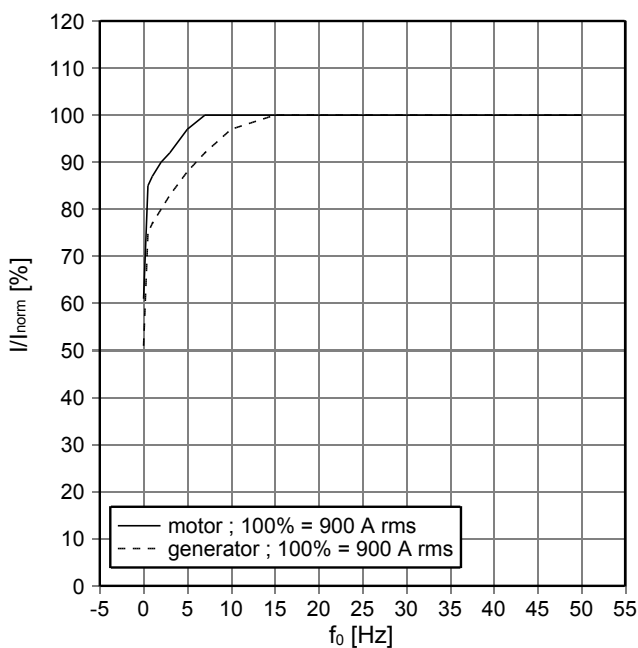
Setting of Active Clamping TVS-Diodes:  $V_z = 824\text{ V}$

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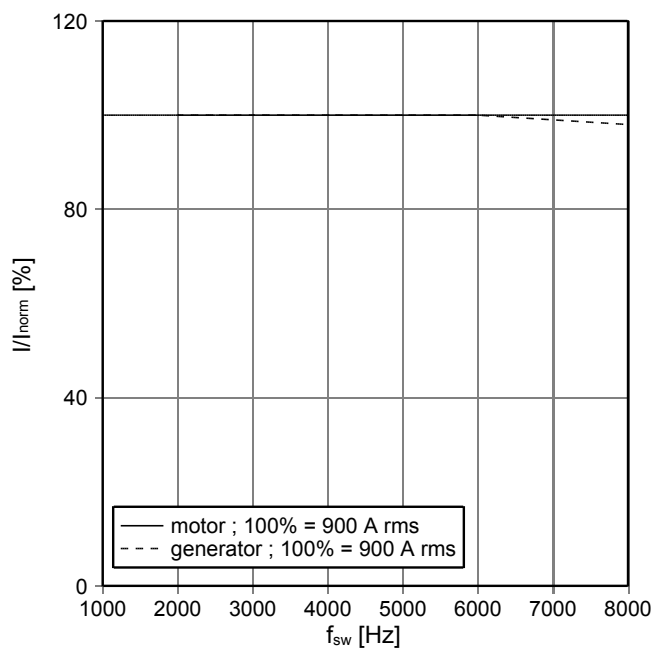


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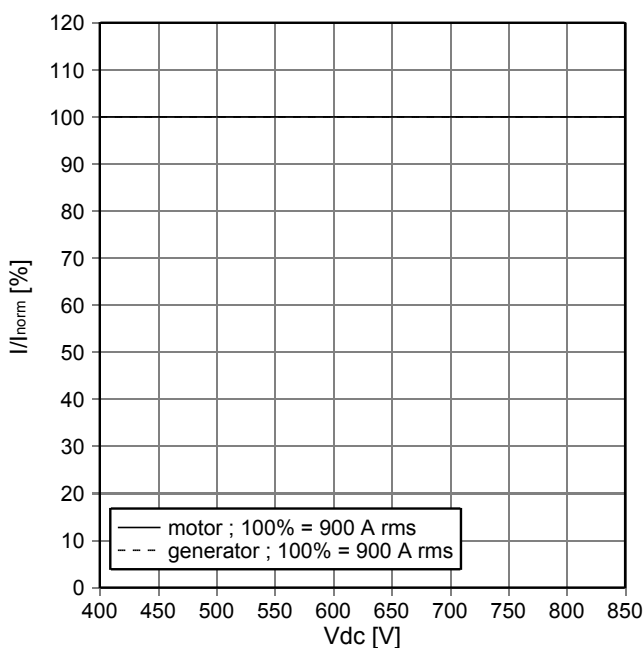
fo - derating curve IGBT (motor), Diode (generator)  
 cos(phi) = ± 0,85  
 T<sub>cool medium</sub> = 40°C



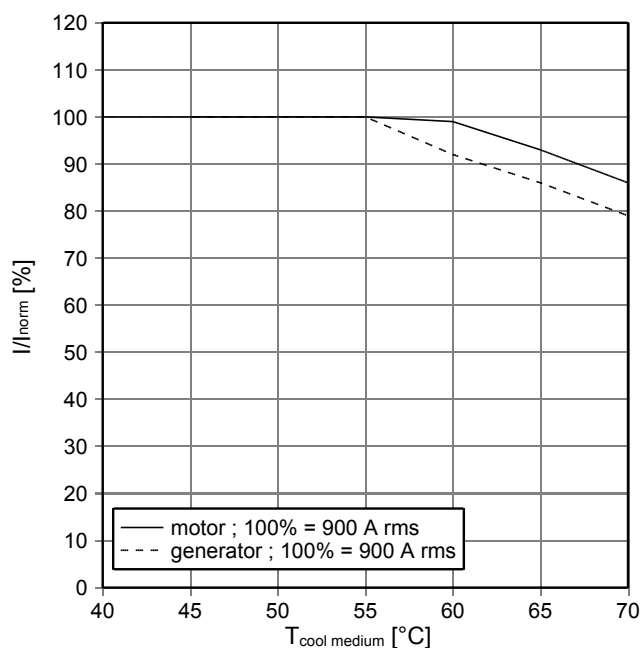
fsw - derating curve IGBT (motor), Diode (generator)  
 cos(phi) = ± 0,85  
 T<sub>cool medium</sub> = 40°C



Continuous current derating curves vs. dc link voltage  
 cos(phi) = ± 0,85  
 T<sub>cool medium</sub> = 40°C

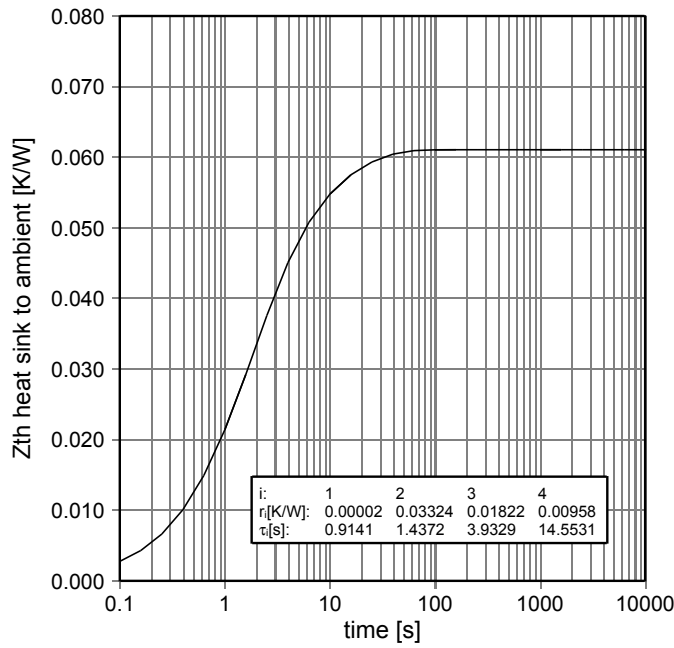


Continuous current derating curves vs. T<sub>cool medium</sub>  
 cos(phi) = ± 0,85



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Zth heat sink to ambient per switch

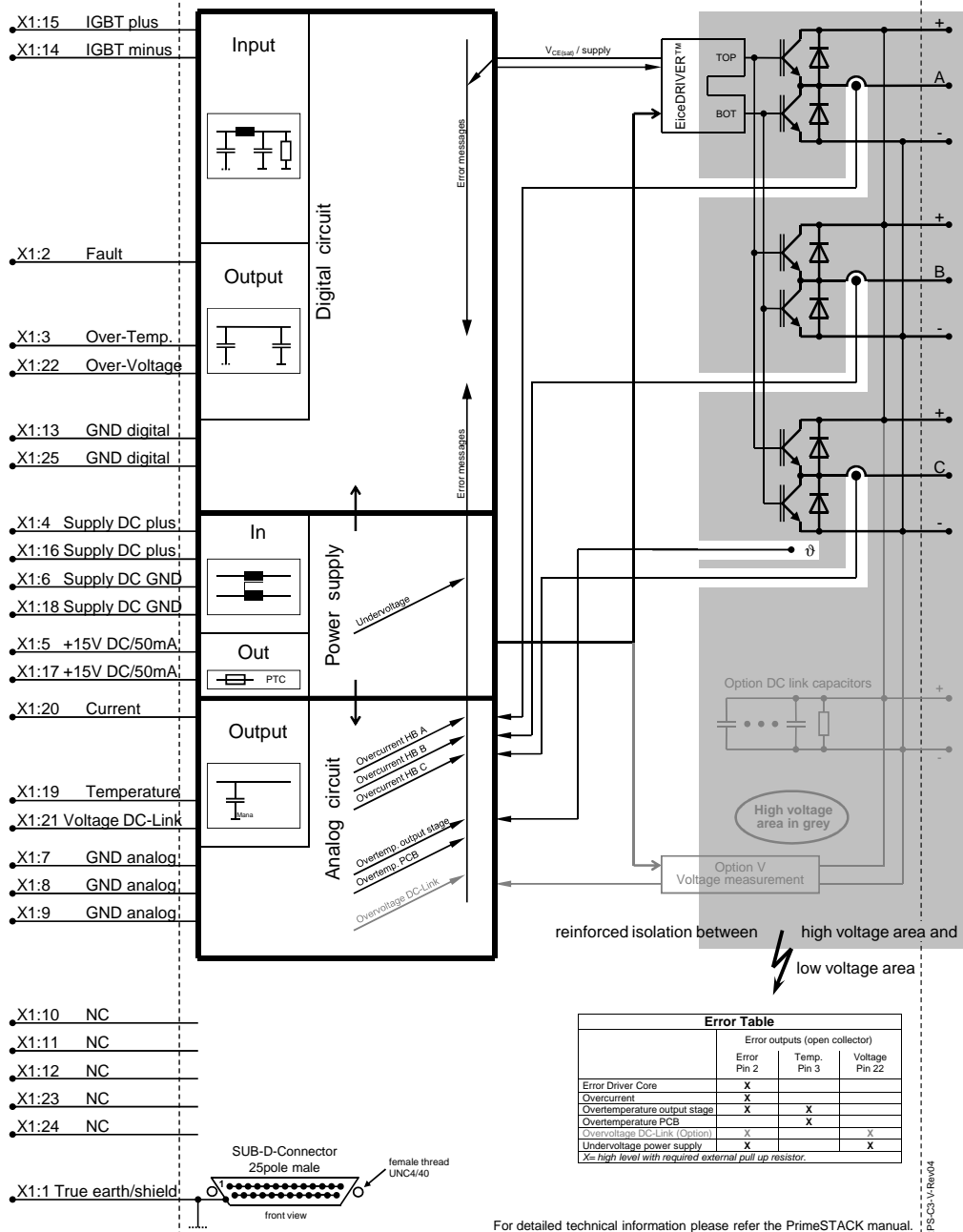


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Circuit diagram

Circuit diagram



For detailed technical information please refer the PrimeSTACK manual.

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