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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

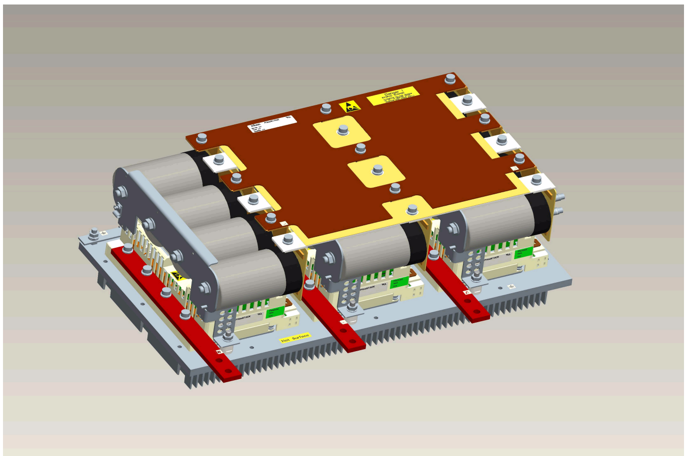
Preliminary data

General information

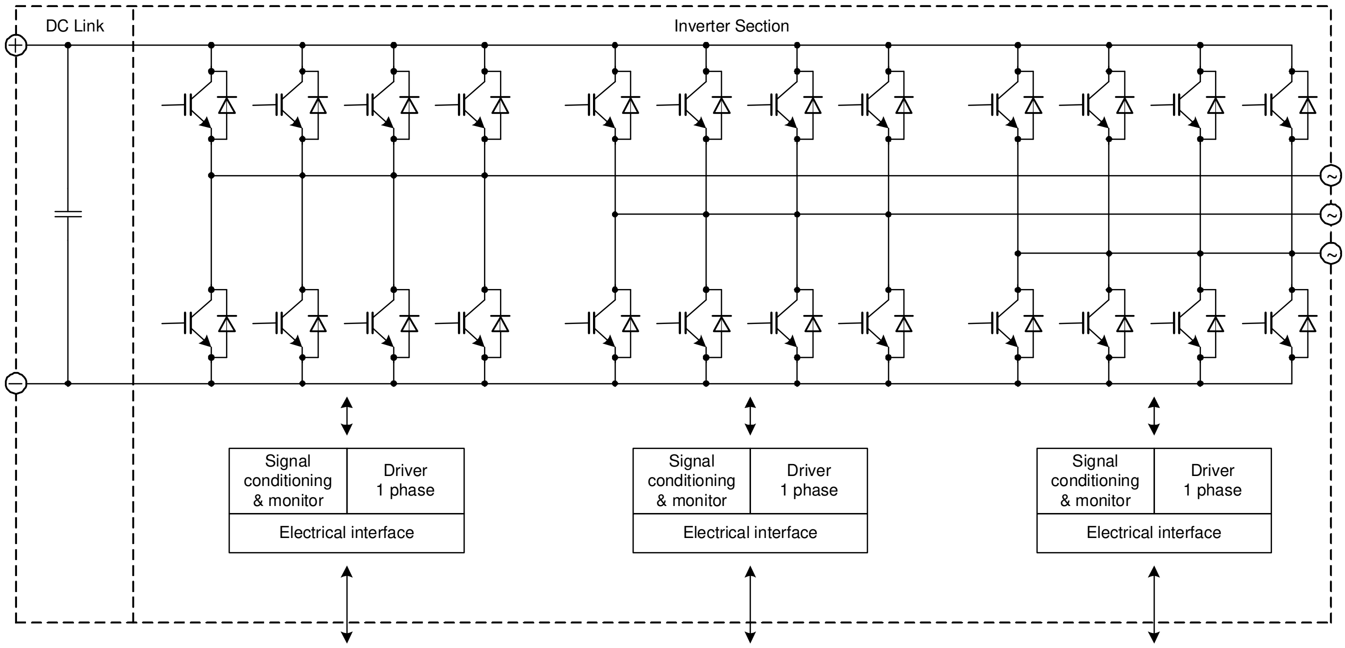
IGBT Stack for typical voltages of up to 400 V_{RMS}
Rated output current 729 A_{RMS}

· High power converter
· Solar power
· Motor drives

· 62mm power module
· Trenchstop™ IGBT4



Topology	B6I
Application	Inverter
Load type	Resistive, inductive
Semiconductor (Inverter Section)	12x FF450R12KE4
DC Link	4.8 mF
Heatsink	Forced air cooled (fan not included)
Implemented sensors	Current, voltage, temperature
Design standards	UL 94, prepared for UL 508C
Sales - name	6PS18012E4FG35689
SP - No.	SP000885246



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Absolute maximum rated values

Collector-emitter voltage	IGBT; T_{vj} = 25°C	V_{CES}	1200	V
Repetitive peak reverse voltage	Diode; T_{vj} = 25°C	V_{RRM}	1200	V
DC link voltage		V_{DC}	850	V
Insulation management	according to installation height of 2000 m	V_{line}	500	V_{RMS}
Insulation test voltage	according to EN 50178, f = 50 Hz, t = 1 s	V_{ISOL}	2.5	kV_{RMS}
Repetitive peak collector current inverter section (IGBT)	t_p = 1 ms	I_{CRM2}	2500	A
Repetitive peak forward current inverter section (Diode)	t_p = 1 ms	I_{FRM2}	2440	A
I²t-value inverter section (Diode)	V_R = 0 V, t_p = 10 ms, T_{vj} = 125 °C	I²t	122	kA²s
Continuous current inverter section		I_{AC2}	800	A_{RMS}
Junction temperature	under switching conditions	T_{vjop}	150	°C

Notes
Further maximum ratings are specified in the following dedicated sections

Characteristic values

DC Link

			min.	typ.	max.	
Rated voltage		V_{DC}		650	800	V
Over voltage shutdown	within 5000 µs			850		V
Capacitor	1 s, 12 p	C_{DC}		4.8		mF
		type		Foil		
Maximum ripple current	per device, T_{amb} = 55 °C	I_{ripple}			49	A_{RMS}
Balance or discharge resistor	per DC link unit	R_b		82		kΩ

Inverter Section

			min.	typ.	max.	
Rated continuous current	V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40°C, $T_j \leq$ 125 °C	I_{AC}		729		A_{RMS}
Continuous current at low frequency	V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 0 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	$I_{AC\ low}$		360		A_{RMS}
Rated continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 925 A_{RMS}, $t_{on\ over}$ = 3 s, $T_j \leq$ 125 °C	$I_{AC\ over1}$		617		A_{RMS}
Rated continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 803 A_{RMS}, $t_{on\ over}$ = 60 s, $T_j \leq$ 125 °C	$I_{AC\ over2}$		535		A_{RMS}
Over current shutdown	within 15 µs	$I_{AC\ OC}$		2500		A_{peak}
Power losses	I_{AC} = 729 A, V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	P_{loss}		6790		W

Notes
Maximum junction temperature limited to 125 °C under all operating conditions

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Controller interface

Driver and interface board	ref. to separate Application Note			DR240			
			min.	typ.	max.		
Auxiliary voltage		V_{aux}	18	24	30	V
Auxiliary power requirement	V_{aux} = 24 V	P_{aux}			120	W
Digital input level	resistor to GND 10 kΩ, capacitor to GND 1 nF	$V_{in\ low}$	0		4	V
		$V_{in\ high}$	11		15	V
Digital output level	open collector, logic low = no fault, max. 15 mA	$V_{out\ low}$	0		1.5	V
		$V_{out\ high}$		15		V
Analog current sensor output inverter section	load max 1 mA, @ 729 A_{RMS}	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	2.9	3	3.1	V
Analog DC link voltage sensor output	load max 1 mA, @ 850 V	$V_{DC\ ana}$	8.3	8.5	8.7	V
Analog temperature sensor output inverter section (NTC)	load max 1 mA, @T_{NTC} = 81 °C	$V_{Theta\ NTC2}$		10		V
Over temperature shutdown inverter section	load max 1 mA, @T_{NTC} = 86 °C	$V_{Error\ OT2}$		10.9		V

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}	2			m/s
Humidity	no condensation		Rel. F	5		85	%
Protection degree					IP00		
Pollution degree					2		
Dimensions	width x depth x height			658	438	302	mm
Weight					50		kg

Heatsink air cooled

			min.	typ.	max.	
Air flow	T_{air} = 20 °C, P_{air} = 1013 hPa, dry and dust free, measured at the side of the heat sink according to DIN 41882	$\Delta V/\Delta t$	1500			m³/h
Air pressure drop	at min. air flow	Δp		200		Pa
Air inlet temperature		T_{inlet}	-40		55	°C

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Preliminary data

Overview of optional components

	Unit 1	Inverter Section	Unit 3
Parallel interface board			
Optical interface board			
Voltage sensor		×	
Current sensor		×	
Temperature sensor		×	
DC link capacitors		×	
Data cable for control signals		×	
Fan			
Collector-emitter Active Clamping		×	

Notes
Setting of Active Clamping TVS-Diodes: V_Z = 824 V

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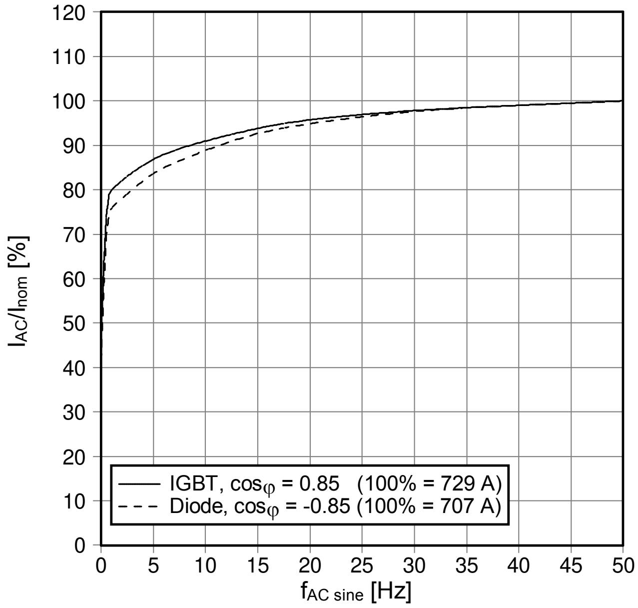
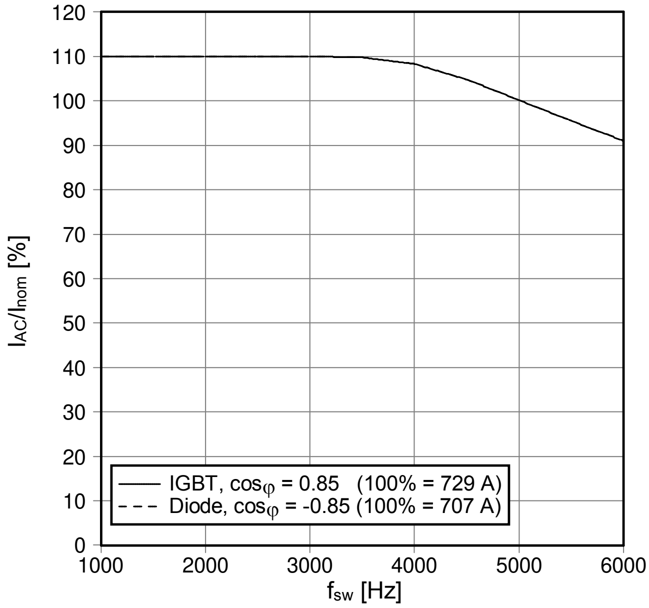
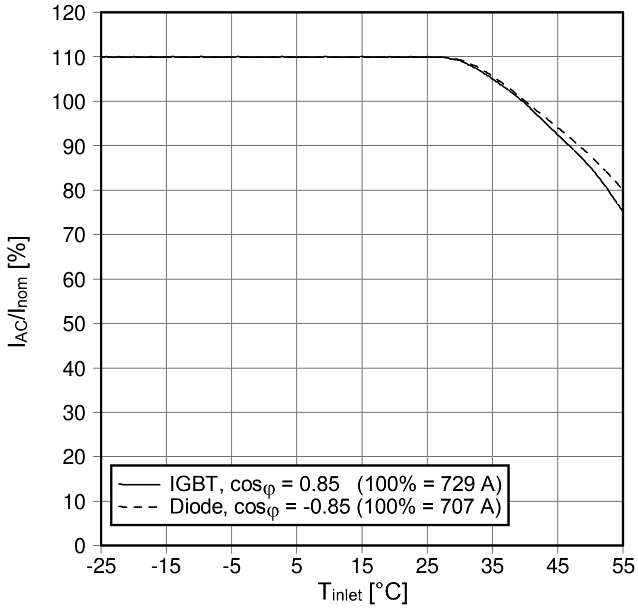
$f_{AC\ sine}$ - derating curve IGBT (motor), Diode (generator)
V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, f_{sw} = 5 kHz, $\cos_\varphi$ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



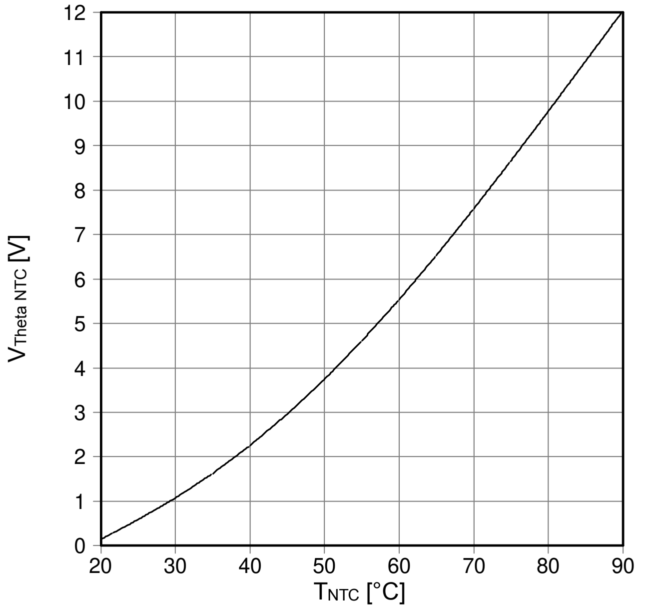
f_{sw} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, $\cos_\varphi$ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



T_{inlet} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, f_{sw} = 5 kHz, $f_{AC\ sine}$ = 50 Hz,
$\cos_\varphi$ = ±0.85 and nom. cooling conditions



Analog temperature sensor output $V_{Theta\ NTC}$
Sensing NTC of heatsink



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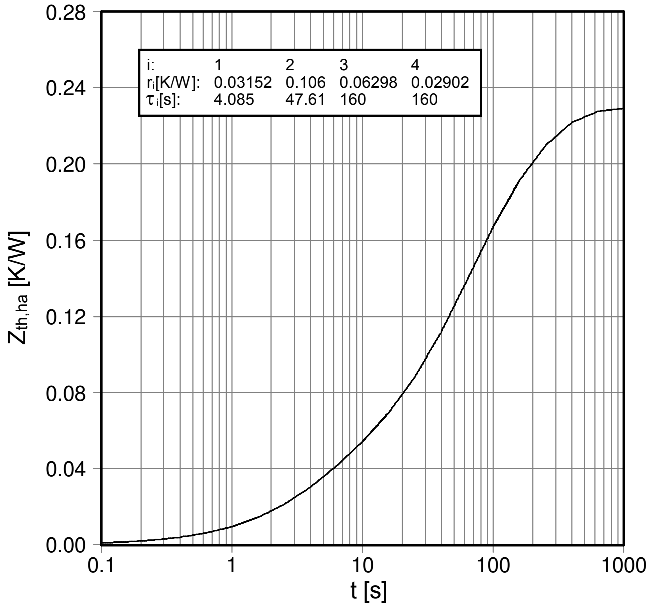
$Z_{th,ha}$ - thermal impedance heatsink to ambient per switch
nom. cooling conditions



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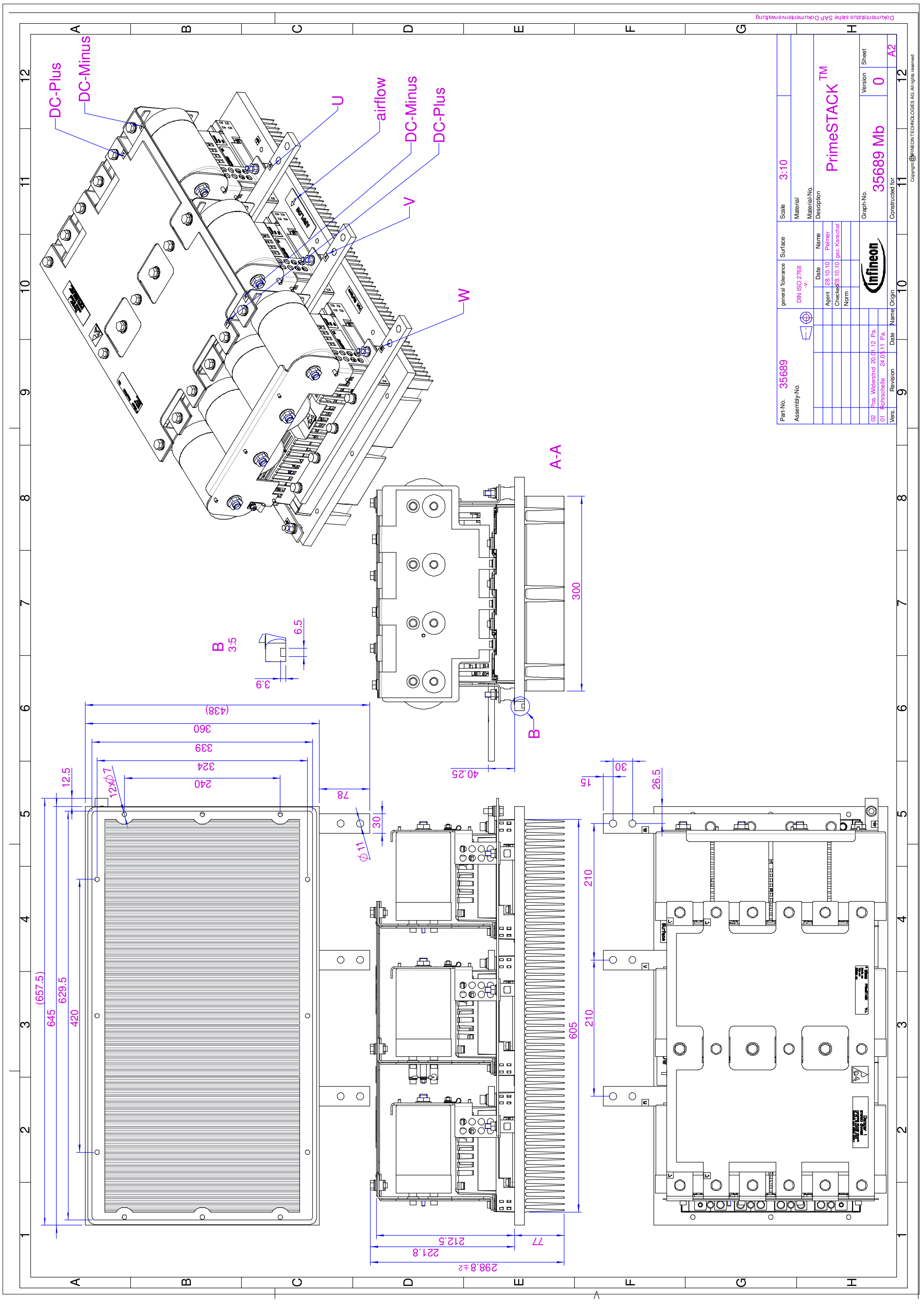
Mechanical drawing



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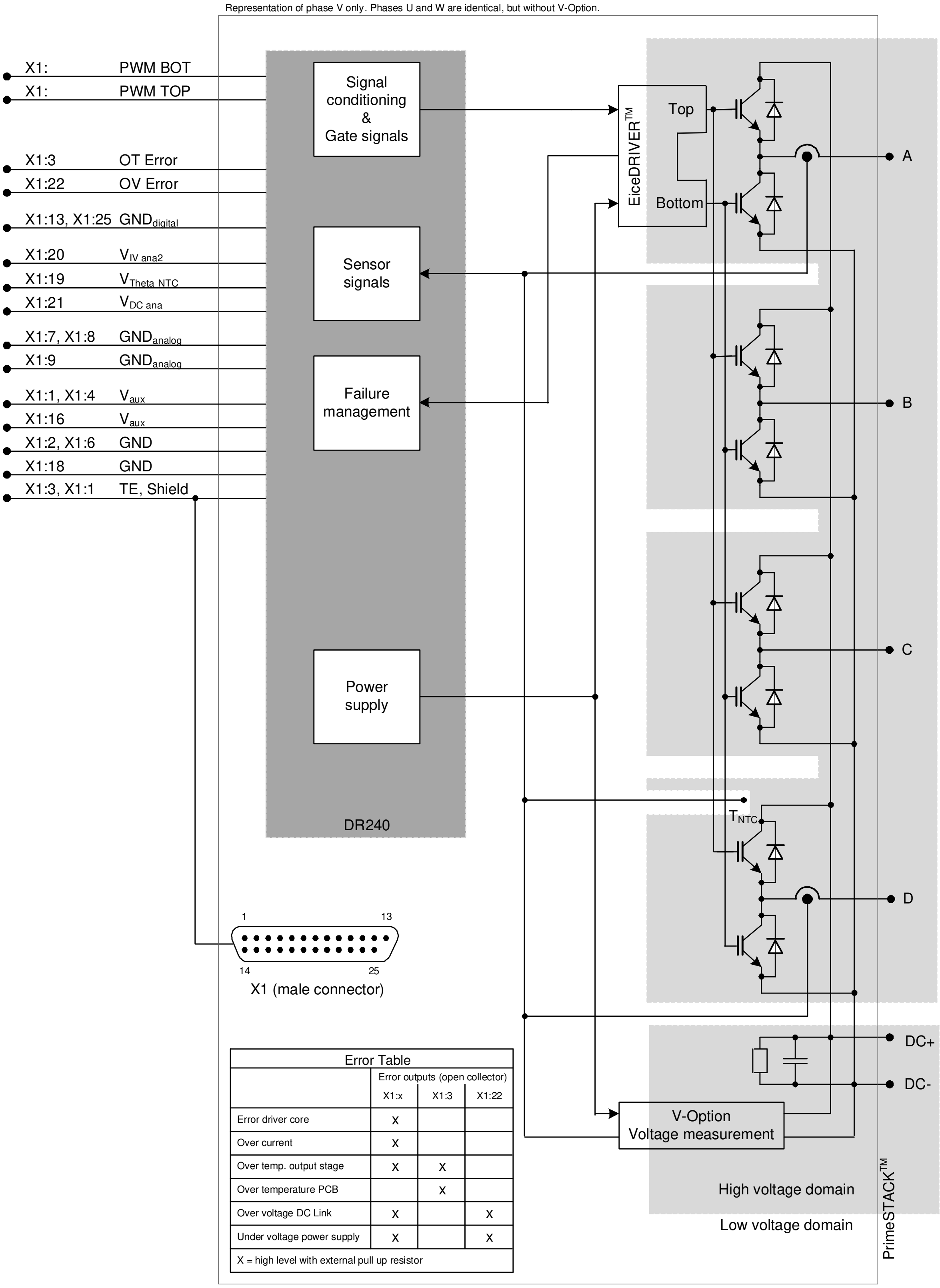
Circuit diagram

Representation of phase V only. Phases U and W are identical, but without V-Option.



Error Table			
	Error outputs (open collector)		
	X1:x	X1:3	X1:22
Error driver core	x		
Over current	x		
Over temp. output stage	x	x	
Over temperature PCB		x	
Over voltage DC Link	x		x
Under voltage power supply	x		x

X = high level with external pull up resistor

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Prior to installation and operation, all safety notices and warnings and all warning signs attached to the equipment have to be carefully read. Make sure that all warning signs remain in a legible condition and that missing or damaged signs are replaced. To installation and operation, all safety notices and warnings and all warning signs attached to the equipment have to be carefully read. Make sure that all warning signs remain in a legible condition and that missing or damaged signs are replaced.

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