

Key data

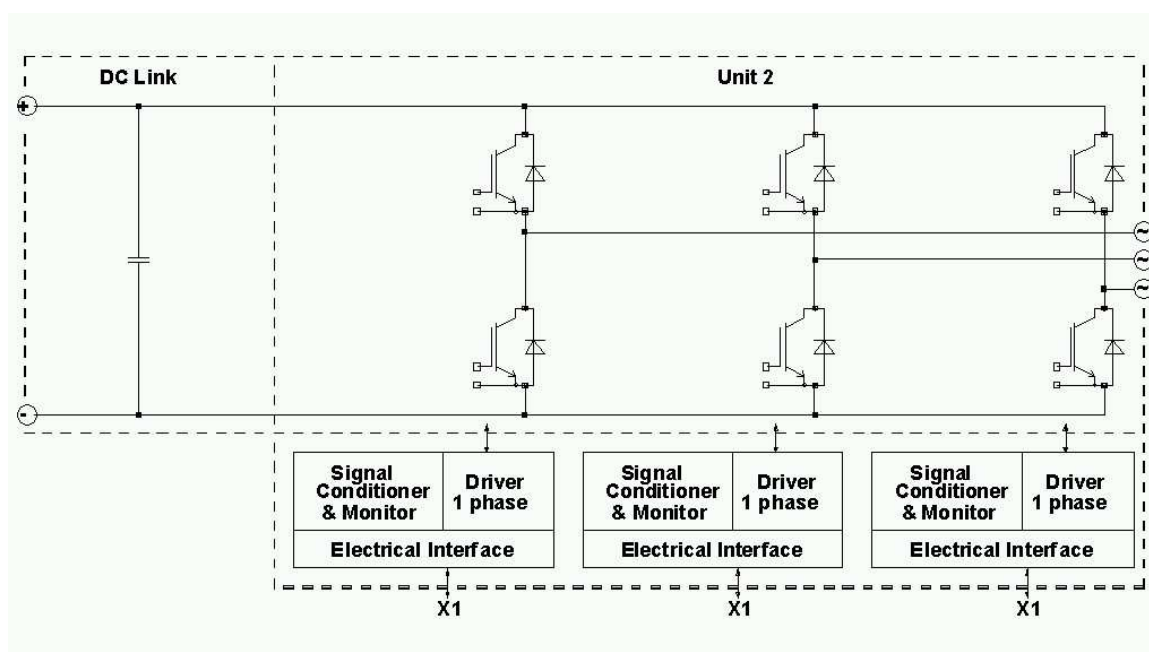
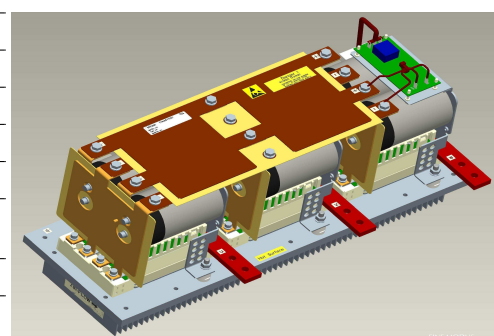
3x 306A rms at 400V rms, forced air (fan not implemented)

General information

Stacks for various inverter application. IGBT's, heat sinks, capacitors, drivers and sensors included.

Please read carefully the complete document and maintain the proper design environment!

Topology	B6I
Application / Modulation	Inverter / Sine
Load type	resistive, inductive
Cooling	forced air (fan not implemented)
Implemented sensors	current, voltage, temperature
Semicond. (Unit 1)	none
DC Link	2.4mF
Semicond. (Unit 2)	IGBT 6x FF200R12KE4
Driver signals IGBT	electrical CMOS 0 .. 15V
Standards	EN50178, UL94
Sales - name	6PS04012E4DG36022
Internal ID	36022
Mechanical drawing number	36022_MB
Electrical drawing number	2PS-CD-V



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Preliminary data

Notes

Overvoltage sensor is located only in the middle phase.

Electrical data

DC Link			min	typ	max	units
Voltage		V_{DC}		650	850	V
Overvoltage shutdown	within 5000µs			850		V

Unit 2 AC			min	typ	max	units
Voltage	depending on controller	V_{Unit2}		400		V_{RMS}
Continuous current	$V_{Unit2} = 400V_{RMS}$, $V_{DC} = 650V$, $T_{inlet} = 40^{\circ}C$, $T_J \leq 125^{\circ}C$, $f_{Unit2} = 50Hz$, $f_{sw2} = 5000Hz$, $\cos(\phi) = 0,85$	I_{Unit2}			306	A_{RMS}
Continuous current overload cap.	$T_{inlet} = 40^{\circ}C$, for overload capability 150% for 60s			217		A_{RMS}
DC current	no rotating field, $T_{inlet} = 40^{\circ}C$	$I_{Unit2 DC}$			159,0	A_{av}
Overcurrent shutdown	within 15µs			640		A_{peak}
Switching frequency		f_{sw2}			20000	Hz
Power losses	$V_{Unit2} = 400V$, $V_{DC} = 650V$, $T_{inlet} = 40^{\circ}C$, $T_J \leq 125^{\circ}C$, $f_{Unit2} = 50Hz$, $f_{sw2} = 5000Hz$, $\cos(\phi) = 0,85$, $I_{Unit2} = 306A_{RMS}$	P_{loss2}		3030		W
Power factor		$\cos(\phi)_{Unit2}$	-1,00		1,00	

General data			min	typ	max	units
Power losses (PCB)		$P_{loss aux}$			40	W
EMC test	according to IEC61800-3 at named interfaces	power	V_{Burst}	2		kV
		control	V_{Burst}	1		kV
		aux (24V)	V_{Surge}	1		kV
Insulation management is designed for		V_{Line}		690		V_{RMS}
Insulation test voltage	according to EN50178, $f = 50Hz$, $t = 60s$	V_{isol}		2,5		kV_{RMS}

Important component data			min	typ	max	units
DC Link capacitor		C_{DC}		2,40		mF
		type		Foil		
Temperature range			-40		+85	$^{\circ}C$
Rated voltage	per device	U_R		1100		V_{DC}
Rated capacitance	per device	C_R		400		μF
Capacitance tolerance	per device	Tol	-10		+10	%
Maximum ripple current	per device, $T_{amb} = 55^{\circ}C$	I_{Rmax}			45	A_{RMS}
wiring system	series, parallel			1s, 6p		
Balance or discharge resistors	per DC Link unit	R_b		164,0		kΩ

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Controller interface data

			min	typ	max	units
Auxiliary voltage		V_{aux}	13	24	30	V_{av}
Auxiliary power requirement	$V_{aux} = 24V_{av}$	P_{aux}	120			W
Driver and interface board	see separate technical information		3 x DR240			
Driver core			EiceDRIVER 2ED300C17-S			
Digital input level	resistor to GND 10,0kΩ, capacitor to GND 1nF, high = on, min 15mA	V_{in}	0,0		15,0	V
Digital output level	open collector, low = ok, max 15mA	V_{out}	0,0		30,0	V
Analog current outputs Unit 2	load max 1mA; at 306A	$V_{ana out}$	4,80	4,90	5,00	V
Analog DC Link voltage output	load max 1mA; at 850V	$V_{DC out}$	8,33	8,50	8,67	V
Analog temperature output	load max 1mA; at $T_{NTC} = 75^{\circ}C$ correspond to $T_j = 125^{\circ}C$	$V_{T out}$		8,70		V
Overtemperature shutdown	at $T_{NTC} = 81^{\circ}C$ correspond to $T_j = 135^{\circ}C$	$V_{T out OT}$		10		V

Heat sink air cooled / Thermal data

			min	typ	max	units
Airflow	$T_{Air} = 20^{\circ}C$, $P_{air} = 1013hPa$, dry- and dust free, measured on side of heat sink. according to DIN 41882	$\Delta V/\Delta t_{Air}$	1710			m³/h
Air pressure drop		Δp_{Air}		135		Pa
Cooling air inlet temperature	heat sink temperature < $-25^{\circ}C$	T_{inlet}	-40		60	$^{\circ}C$

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IGBT data unit 2

			min	typ	max	units
Type	assumed					
collector-emitter saturation voltage	$I_c = 200A$; $V_{ge} = 15V$; $T_{vj} = 150^\circ C$	$V_{CE sat}$		2,05		V
parameter for linear model	$T_{vj} = 25^\circ C$	V_{ce1}		0,944		V
parameter for linear model	$T_{vj} = 25^\circ C$	r_{ce1}		4,031		mΩ
parameter for linear model	$T_{vj} = 150^\circ C$	V_{ce2}		0,89		V
parameter for linear model	$T_{vj} = 150^\circ C$	r_{ce2}		5,799		mΩ
turn-on / turn-off energy loss per pulse	$T_{vj} = 25^\circ C$	E_1		10 / 17		mJ
turn-on / turn-off energy loss per pulse	$T_{vj} = 150^\circ C$	E_2		17 / 29		mJ
thermal resistance, junction to case	per IGBT	R_{thjc}		0,135		K/W
thermal resistance, case to heatsink	per IGBT	R_{thch}		0,034		K/W

Diode data unit 2

			min	typ	max	units
Type	assumed					
forward voltage	$I_F = 200A$; $V_{ge} = 0V$; $T_{vj} = 150^\circ C$	V_F		1,65		V
parameter for linear model	$T_{vj} = 25^\circ C$	V_{F1}		1,06		V
parameter for linear model	$T_{vj} = 25^\circ C$	r_{F1}		2,951		mΩ
parameter for linear model	$T_{vj} = 150^\circ C$	V_{F2}		0,833		V
parameter for linear model	$T_{vj} = 150^\circ C$	r_{F2}		4,084		mΩ
reverse recovery energy	$T_{vj} = 25^\circ C$	E_{rec1}		9		mJ
reverse recovery energy	$T_{vj} = 150^\circ C$	E_{rec2}		17,5		mJ
thermal resistance, junction to case	per Diode	R_{thjc}		0,2		K/W
thermal resistance, case to heatsink	per Diode	R_{thch}		0,05		K/W

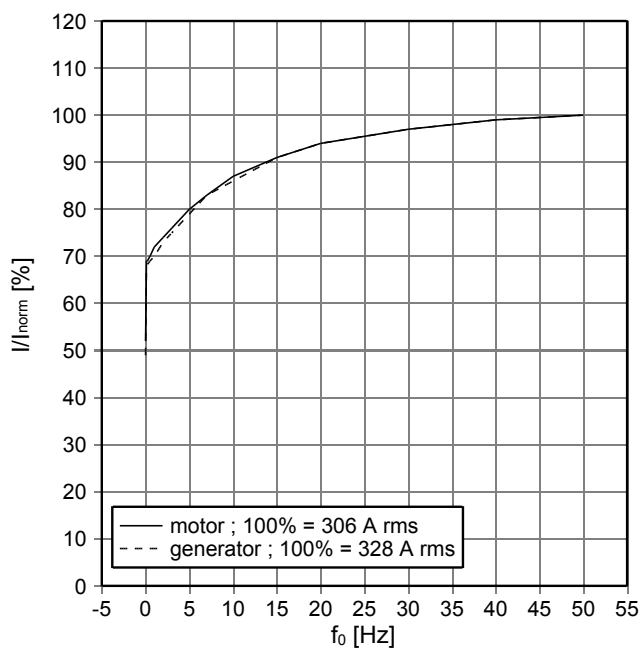
Environmental conditions

			min	typ	max	units
Storage temperature		T_{stor}	-40		80	°C
Ambient temperature		T_{amb}	-25		55	°C
Operating temperature	see chapter Heat sink air cooled / Thermal data					
Cooling air velocity (PCB)		$V_{Air PCB}$	2,0			m/s
Air pressure	standard atmosphere	p_{Air}	900		1100	hPa
Humidity	no condensation	Rel. F	5		85	%
Installation height			0		1000	m
Vibration	according to IEC60721				5	m/s²
Shock	according to IEC60721				40	m/s²
Protection degree				IP00		
Pollution degree				2		
Torque at DC Terminals		M_{DC}	6,0		10,0	Nm
Torque at AC Terminals		M_{AC}	16,0		20,0	Nm
Dimensions	width × depth × height		645	276	298	mm
Weight with heat sink	approximation			35,0		kg

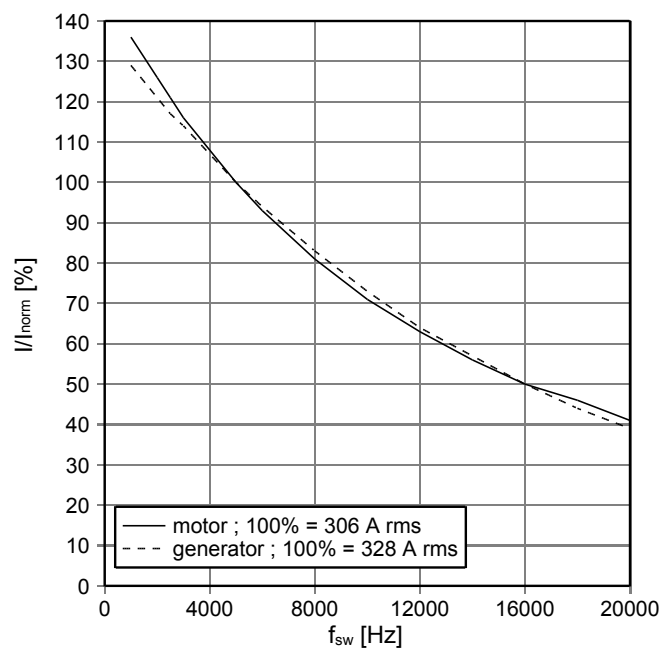
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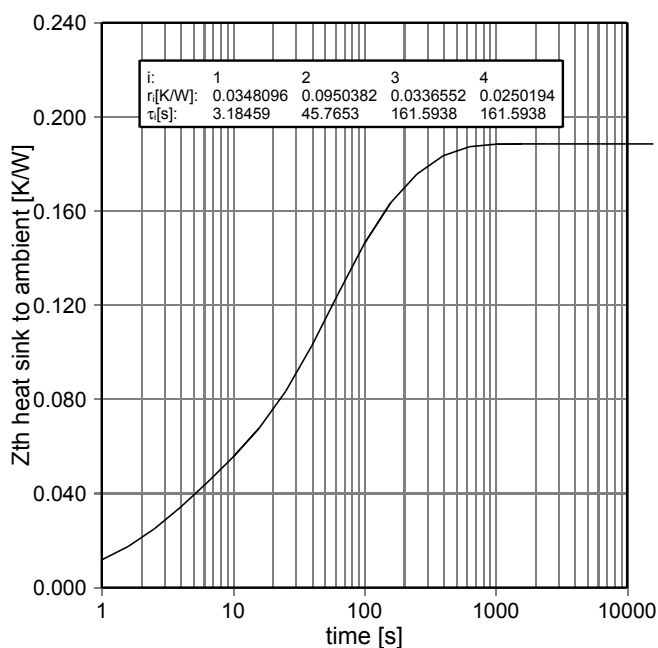
f_o - derating curve IGBT (motor), Diode (generator)
 $\cos(\phi) = \pm 0,85$
 $T_{cool\ medium} = 40^\circ C$



f_{sw} - derating curve IGBT (motor), Diode (generator)
 $\cos(\phi) = \pm 0,85$
 $T_{cool\ medium} = 40^\circ C$



Transient thermal impedance per switch
 $T_{cool\ medium} = 40^\circ C$



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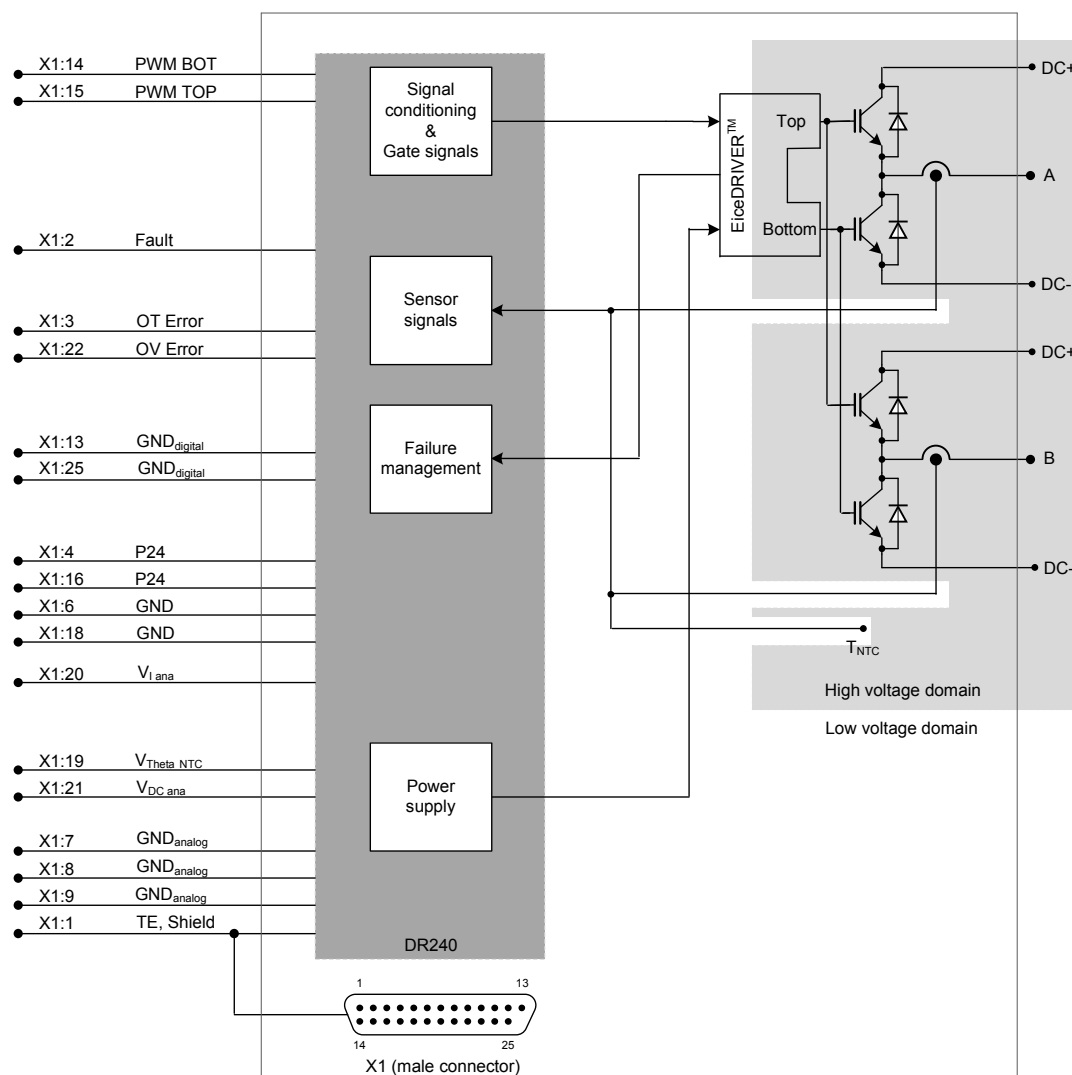


Mechanical drawing



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Circuit diagram



Error Table			
	Error outputs (open collector)		
	X1:2	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			
Under voltage power supply	X		X

X = high level with external pull up resistor

Voltage option only installed in the middle phase v

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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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