ModSTACK

Data Sheet: 2B6I 500/800-400G M, S Preliminary Data

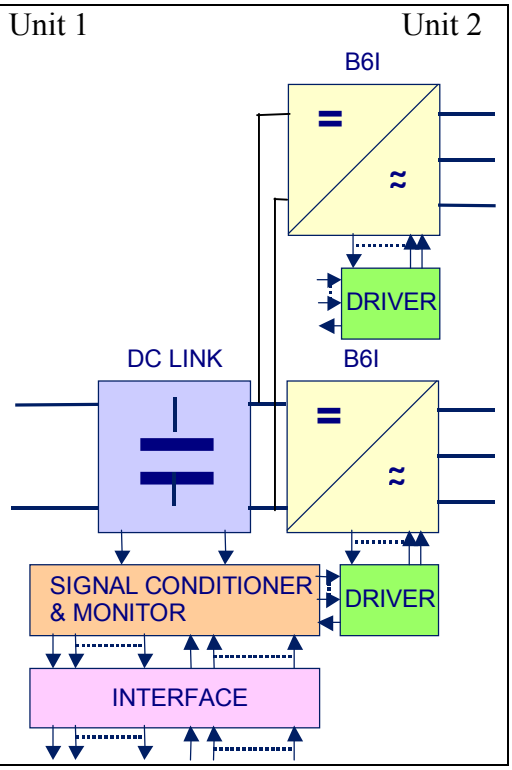
Key Data

2 x 3 x 400A AC at 500V AC, air cooled

General Information

Stack with IGBT's, heatsinks, capacitors, drivers and sensors for several inverter applications. These are only technical data! Please read heedful the complete documentation and attend the adopted design environment! Especially the EMC environment and the controller functionality are important.

Topology		DC Link + 2B6I
Load Type		Resistive, inductive load
Cooling		Forced air, Fan excluded
Target Application		Solar
Extra		Available in Master [M] or Slave [S] Configuration
Driver core		Scale Driver
Monitors		Current-, Voltage-, Temperature-Monitoring
Module (Unit1)		n.a.
Module (Unit2)	IGBT	6x FF800R12KL4C
Interface		Electrical, opt. optical
Standards		EN50178, UL94, prepared for UL508C
Product ID (eupec)		Master 24967 Slave 24969
Drawing No.		38000020_MB
Circuit Diagram No.		57000002



Electrical Data

	Parameter		Min.	Typical	Max.	
Dedicated Line Voltage	For Isolation Management	V_{Line}		500		V_{RMS}
DC Link Voltage		V_{DC}	275	675	880	Vav
DC Link Over Voltage Shutdown	Within 100µs			V_{DCmax}		V
DC Link Current	At I_{Unit2}, V_{Unit2}, cos_φUnit2	I_{DCLink} Input	800	890		Aav
Voltage Unit1		V_{Unit1}		-		V_{RMS}
Continuous Current Unit1	$\vartheta=\vartheta_{air\_inlet}$	I_{Unit1}			-	A_{RMS}
Short-time Current Unit1	10s, every 180s, initial load = I_{Unit1}	I_{Unit1_10}			-	A_{RMS}

Pulse Current Unit1	Sine half wave 20ms				-	Apeak
DC Current at Unit1	No rotating field, $\vartheta=\vartheta_{air\_inlet}$,	I_{Unit1_DC}			-	Aav
Over Current Shutdown Unit1	Percentage of I_{Unit1}. within 15µs			-		%
Switching Freq. Unit1		f_{sw1}			-	Hz
Power Losses Unit1	$V=V_{unit1\_min}$, $I=I_{Unit1}$, $f_{sw}=f_{sw1}$	P_{loss1}		-		W
Voltage Unit2	Depending on Controller	V_{Unit2}		500	550	V_{RMS}
Displacement factor		$\cos\_\varphi_{Unit2}$	-0,9		+0,9	
Continuous Current Unit2	$\vartheta=\vartheta_{air\_inlet}$, ϑ_{chip} <= 125°C f_{Unit2}>5Hz Both B6I connected in parallel (1U1 ->2U1..)	I_{Unit2}			800	A_{RMS}
Short-time Current Unit2	ϑ_{water_inlet}<=40°C, 10s, every 180s, initial load = I_{Unit2}	I_{Unit2_10}			960	A_{RMS}
Pulse Current Unit2	Sine half wave 20ms, starting from I_{Unit2}.	$I_{Unit2peak}$			-	Apeak
DC Current at Unit2	No rotating field, $\vartheta=\vartheta_{air\_inlet}$,	I_{Unit2_DC}			0,4* I_{Unit2}	ADC
Over Current Shutdown Unit2	Percentage of I_{Unit2}. within 15µs			125		%
Switching Freq. Unit2		f_{sw2}			3000	Hz
Power Losses Unit2	$I=I_{Unit2}$, $f_{sw}=f_{sw2}$	P_{loss2}		6521		W
Power Losses (PCB and Capacitor)		P_{loss_aux}			400	W
Filter resistors at Output Unit2	Applicable for Sine wave filters (damping, optionally)	R_{Filter}		-		Ohm
		$P_{RFilter}$		-		Watt
Auxiliary Voltage		V_{aux}	18	24	30	Vav
Auxiliary Power Demand	V_{aux}=24 Vav, to feed with B6U	P_{aux}		80		W
EMC Test	According EN61800-3 at named interfaces — Power	V_{Burst}		2		kV
	Control	V_{Burst}		1		
	Aux (24V)	V_{Surge}		1		kV
Insulation Test Voltage	According EN50178 f=50Hz, t=1min	V_{isol}		1,8		kV_{RMS}

Important Component Data

DC Link Capacitor		C_{DC}		23,5		mF
DC Link Capacitor		Type		Elcap		
Capacitor Design	Load cycle for: Wind	L_{TD}		-		Year

Lifetime (eupec approximation)	Load cycle for: Solar	L_{TD}		t.b.d.		Year
	Load cycle for: Industrial Drive (ϑ_{air}=35°C, I=0,8, Duration=24h/Day)	L_{TD}		-		Year

Requirements to the Power Source

Assumed Inductance Of Feeding Power Source	(Necessary inductance not included, feeded by B6U)	L_{Feed}		80		µH

Fan Data (requirements when not implemented)

Fan Type	Assumed		2pcs Ziehl-Abegg RF22P-2DK.3F.1R			
Fan Voltage		V_{Fan}		400		V_{RMS}
Fan Frequency		f_{Fan}		50		Hz
Fan Current		I_{Fan}		1,95		A_{RMS}
Fan Air Pressure	Assumed	Δp_{AirFan}		700		Pa

Controller Interface Data

Driver	See Data Sheets	PCB	TR10x			
Paralleling Interface	Master (only first B6I)	PCB	SAD101			
	Slave		-			
	See Data Sheet					
Optical Interface	Master (only first B6I) (optional)	PCB	OEA101			
	Slave		-			
	See Data Sheet					
Digital Input Level	Resistor to Gnd (1,8k) High = on min 15mA	V_{in}	0		15	V
Digital Output Level	Open collector Low = ok max 15mA	V_{out}	0		15	V
Analog Current Outputs Unit1	Load max 1mA at I_{Unit1}			-		V
Analog Current Outputs Unit2	Load max 1mA at I_{Unit2}			4		V
Analog DC Link Voltage Output	Load max 1 mA At V_{DCmax}	V_{DCout}		9		V
Analog Temperature Out	Load max 1mA At ϑ_j=125°C	$V_{\vartheta out}$		9		V
Optical Input Level	optionally		12			µW
Optical Output Level	optionally				60	µW

Requirements to the Controller

EMC Protection	According EN61800-3 at auxiliary power and control interface		1			kV
EMC Environment			Shielding concept with TE (True Earth) separated from PE, HF conform installation			
Drive Pulse Time		ton_min	10			µs
Block out Time		tpause	10			µs
Over Voltage Shutdown Reaction Time	After over voltage message by ModSTACK interface				50	µs
Over Current Shutdown Reaction Time	After over current message by ModSTACK interface				10	µs

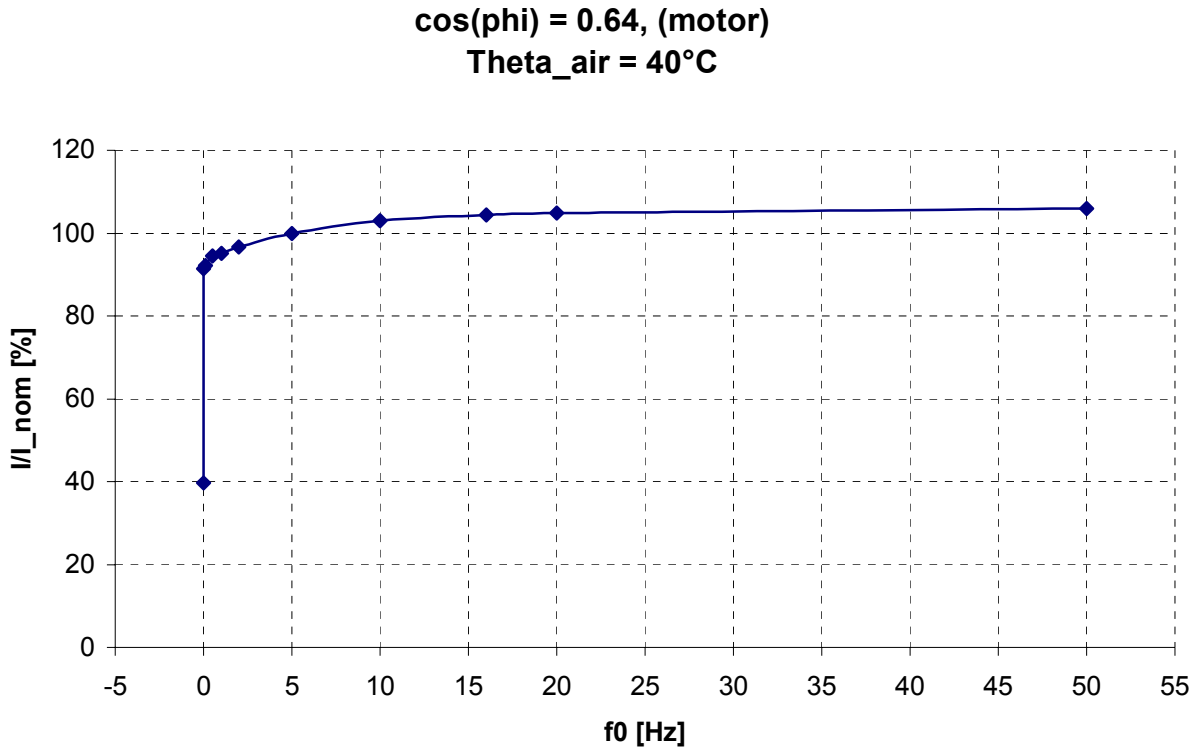
Mechanical Data

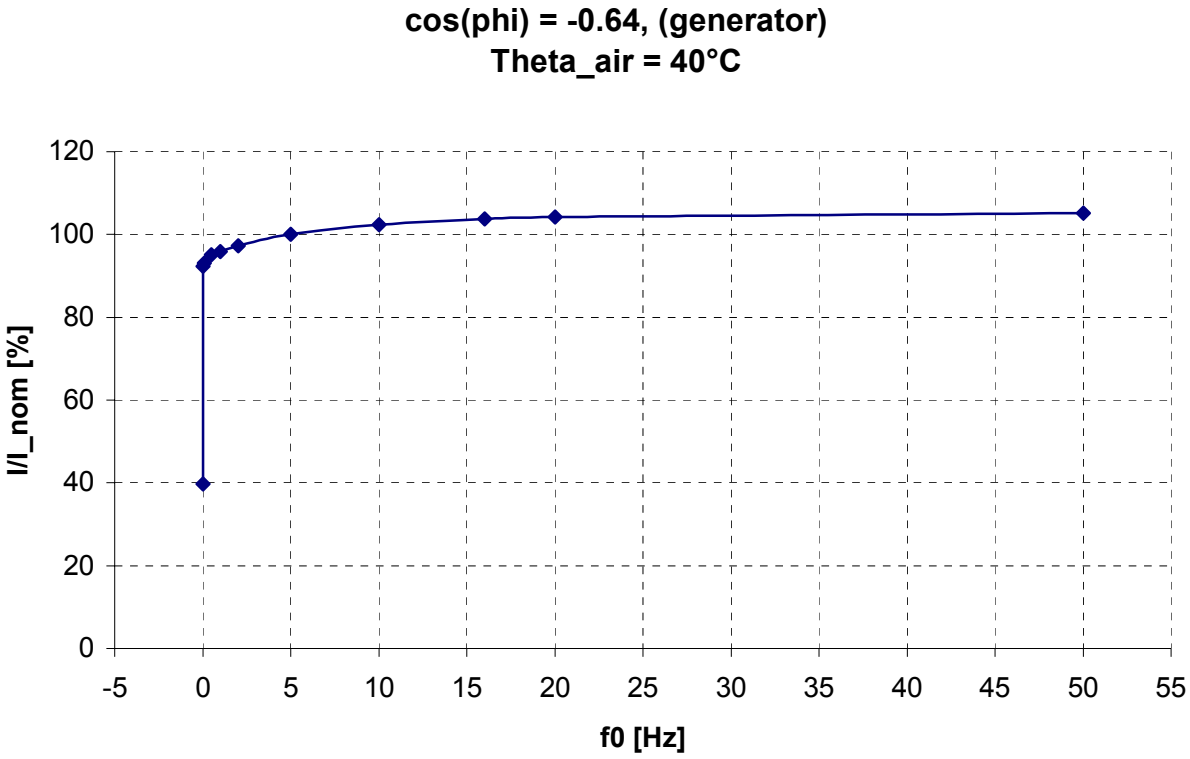
Air Velocity	ϑ_{Air}=20°C	vAir		12		m/s
Air Flow/ heatsink	Pair=1013 hPa	dV/dtAir	-	2200		m³/h
Air Pressure Drop/ heatsink	Dry- and dustfree, measured outside of heatsink. According DIN 41882	ΔpAir		700		Pa
Water Flow/ heatsink	According Coolingwater Specification from eupec for copper tubes	dV/dt Water	-			l/min
Water Pressure Drop/ heatsink		ΔpWater		-		Pa
Water connection						
Dimensions	Width x Depth x Height		1090	600	305	mm
Mass	Approximation			101		kg
Storage Temperature Range		ϑ_{stor}	-40		+65	°C
Operating Temperature range (PCB and Capacitor)	Minimal 0 °C for optional optical interface	ϑ_{op}	-25 (0)		+55	°C
Cooling Air Inlet Temperature (Heatsink)		ϑ_{air_inlet}	-25		+40	°C
	Heatsink temperature > -25°C		-40			
Cooling Water Inlet Temperature (Heatsink)		ϑ_{water_inlet}	-		-	°C
Cooling Air Velocity (PCB and Capacitor)		vAir_PCB	2			m/s
Air Pressure	Standard atmosphere	pAir	900		1100	hPa

Humidity	No Condensation	Rel. F	0		95	%
Installation Height			0		1000	m
Vibration	EN60068-2-6, Fc 10..59Hz 0,075mm				10	m/s²
Permanence Vibration	EN60068-2-6, Fc 10-150Hz, 20 Cycles				20	m/s²
Shock	EN60068-2-27, Ea Half sine 11ms, 3 pulses				100	m/s²
Protection Degree			IP00			
Pollution Degree			2			
Over Voltage Category			III			

Derating Curves *(IGBT Part)*

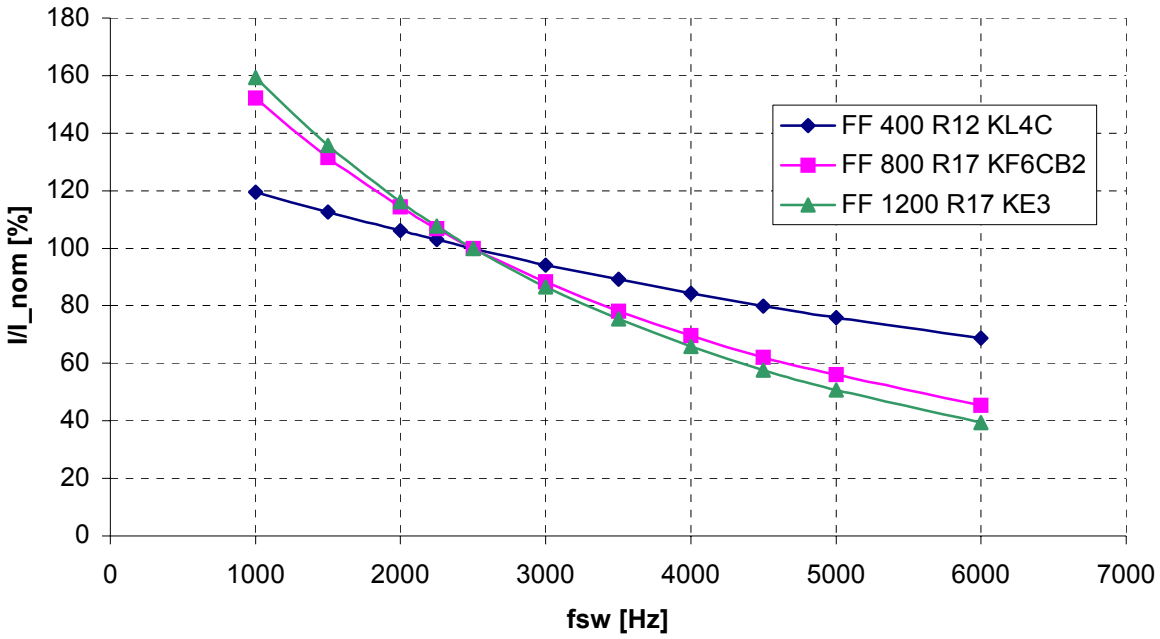
Current derating at low rotating field frequency (f0). **Maximal 100% current is allowed.**



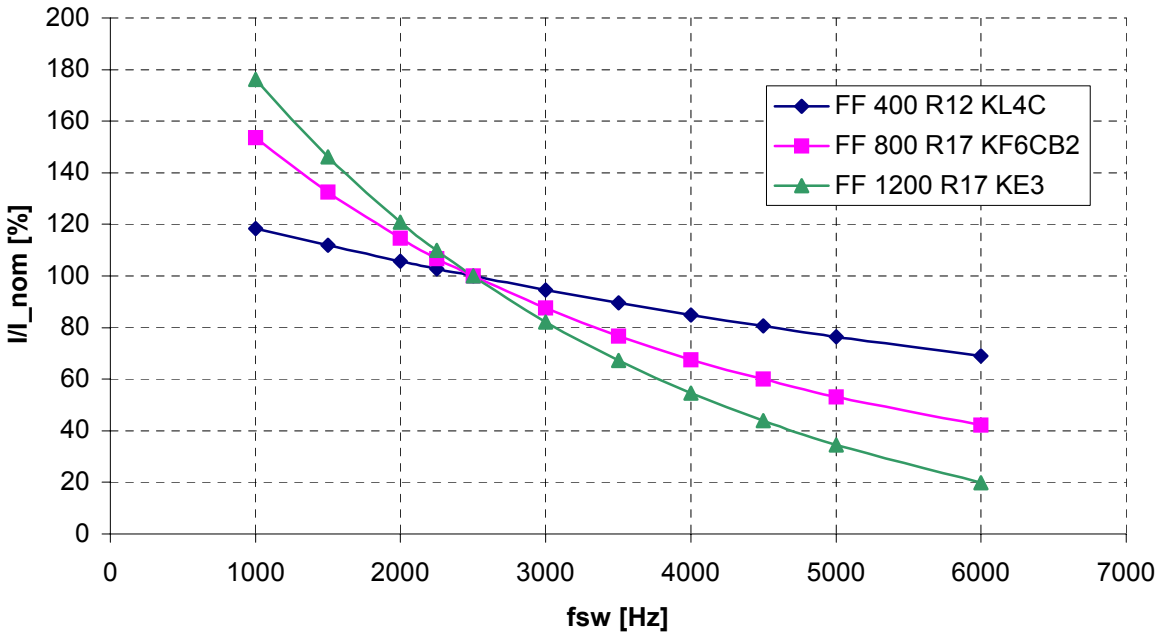

cos(phi) = -0.64, (generator)
Theta_air = 40°C
I/I_nom [%]
120
100
80
60
40
20
0
-5
0
5
10
15
20
25
30
35
40
45
50
55
f0 [Hz]

Current derating at different switching frequencies. See datatable for nominal switching frequency. In this drawing 2500Hz is assumed. **Maximal 100% current is allowed.**

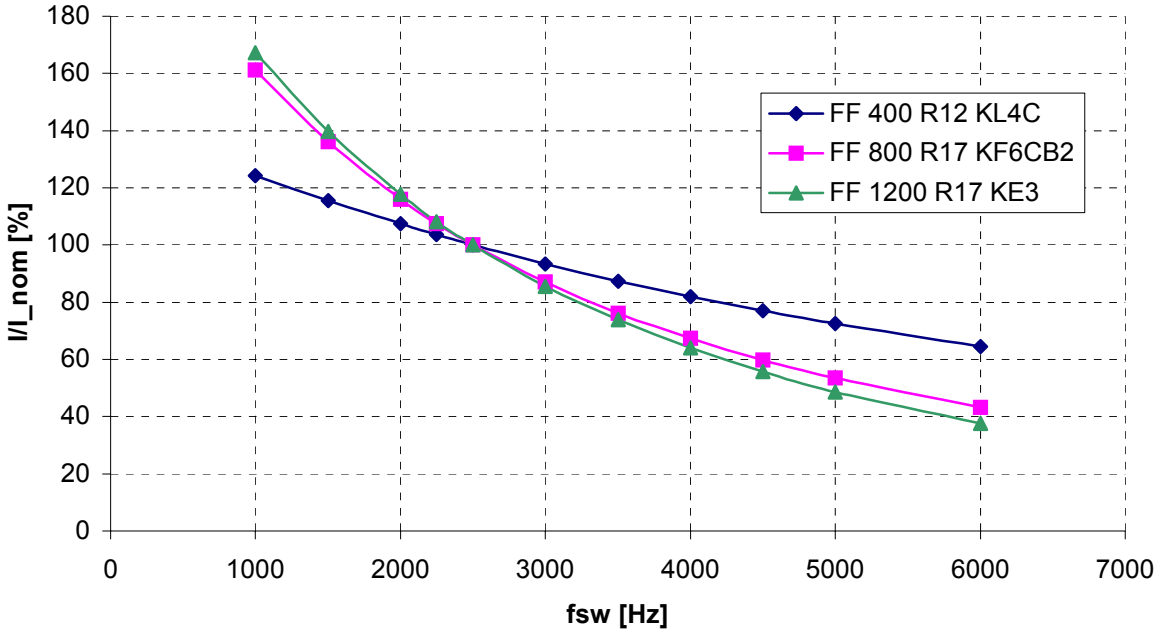
IGBT, cos(phi) = 0.64
Theta_air = 40°C



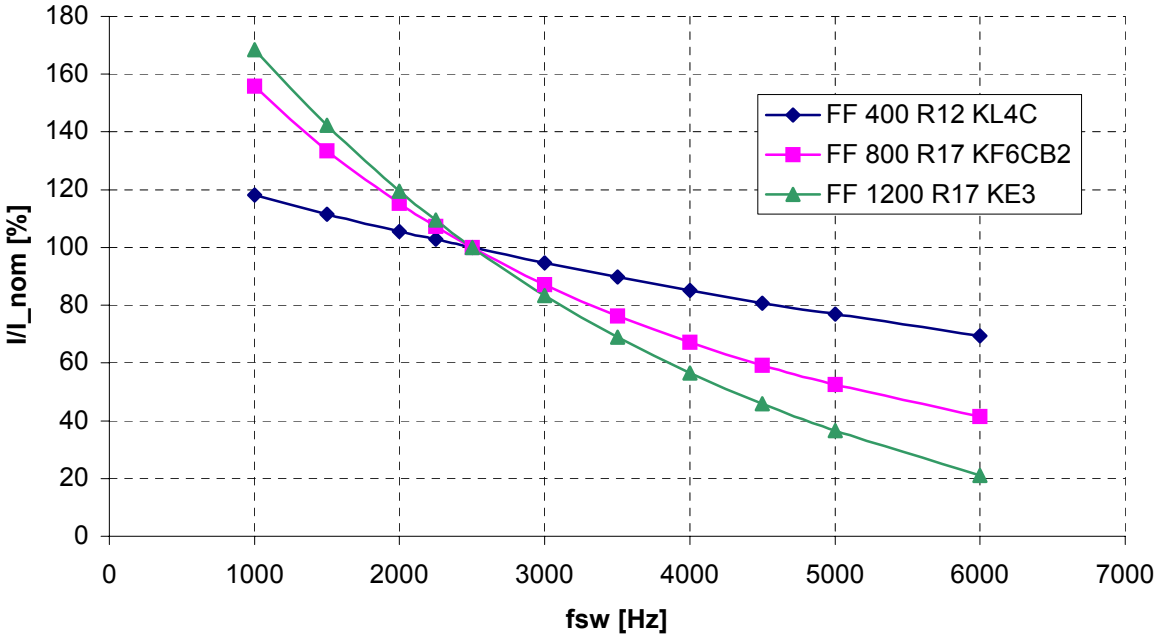
Diode, cos(phi) = 0.64
Theta_air = 40°C



IGBT, cos(phi) = - 0.64
Theta_air = 40°C



Diode, cos(phi) = -0.64
Theta_air = 40°C



Miscellaneous

This technical information specifies semiconductor stacks but promises no characteristics. It is valid in combination with the belonging technical notes.
This document may be changed without prior notice.

Warning!

Prior to installation and commissioning 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 missing or damaged signs are replaced.

The safety instructions have to be strictly adhered to.
The manual contains detailed information on all technical topics with regard to the eupec ModSTACK. For further details regarding publications of the eupec ModSTACK and information on other publications in the area of ModSTACKs please contact your nearest eupec branch or visit our website: http://www.eupec.com.

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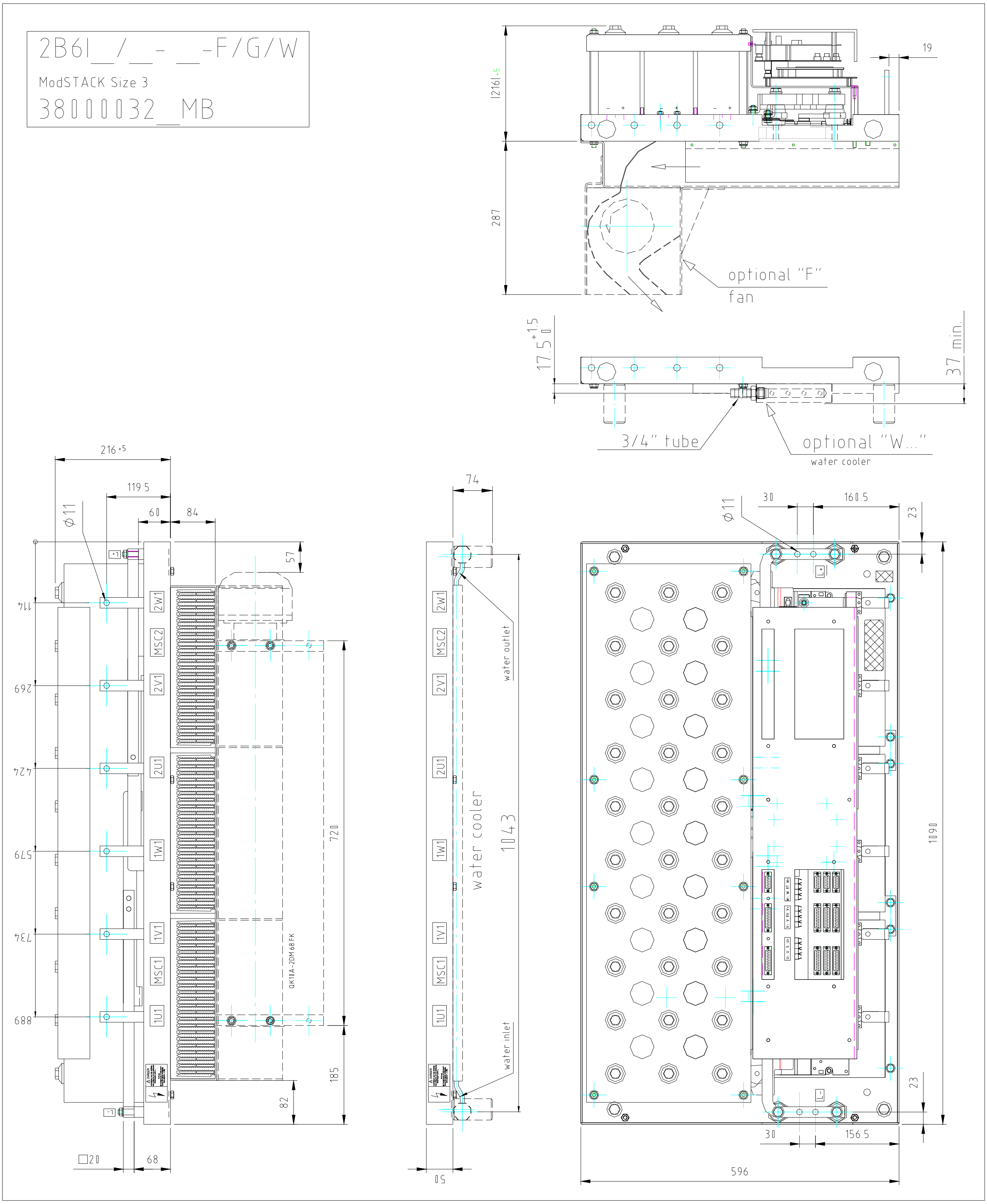
2B6I__/__-__-F/G/W
ModSTACK Size 3
38000032__MB
optional "F"
fan
3/4" tube
optional "W..."
water cooler
water outlet
water inlet
water cooler
1043
1090
596
720
185
82
2W1
MSC2
2V1
2U1
1W1
1V1
MSC1
1U1