Vincotech

flow **NPC 1** | **NPC Application** | **600 V / 100 A**

General conditions

BUCK		
V_{GEon}	=	15 V
V_{GEoff}	=	-15 V
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

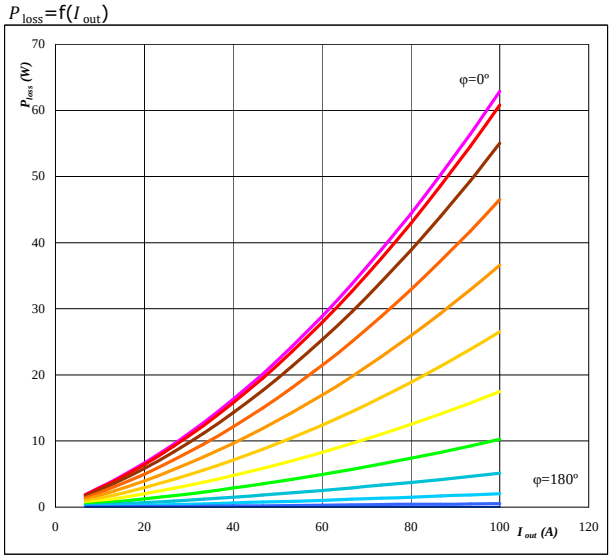
V_{out} = 230 VAC

BOOST		
V_{GEon}	=	15 V
V_{GEoff}	=	-15 V
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

Figure 1. **Buck IGBT**

Typical average static loss as a function of output current I_{oRMS}

P_{loss}=f(I_{out})

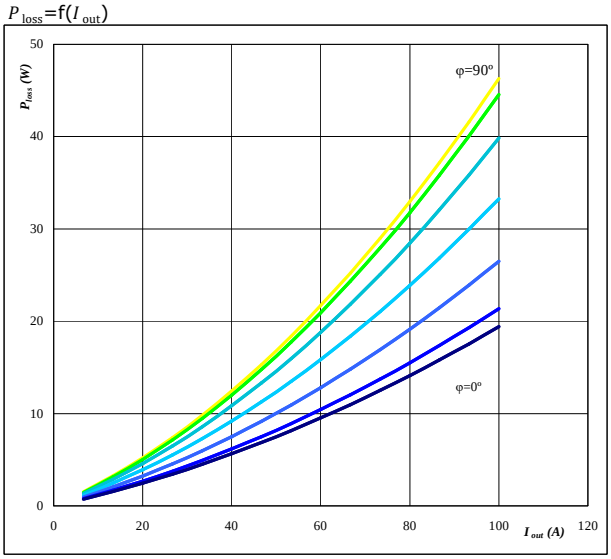


Conditions T_j= 150 °C
parameter φ from 0° to 180°
in 12 steps

Figure 2. **Buck FWD**

Typical average static loss as a function of output current I_{oRMS}

P_{loss}=f(I_{out})

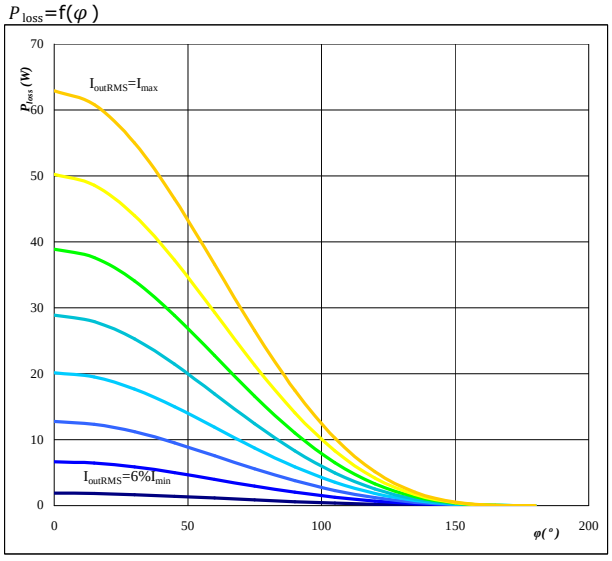


Conditions T_j= 150 °C
parameter φ from 0° to 180°
in 12 steps

Figure 3. **Buck IGBT**

Typical average static loss as a function of phase displacement φ

P_{loss}=f(φ)

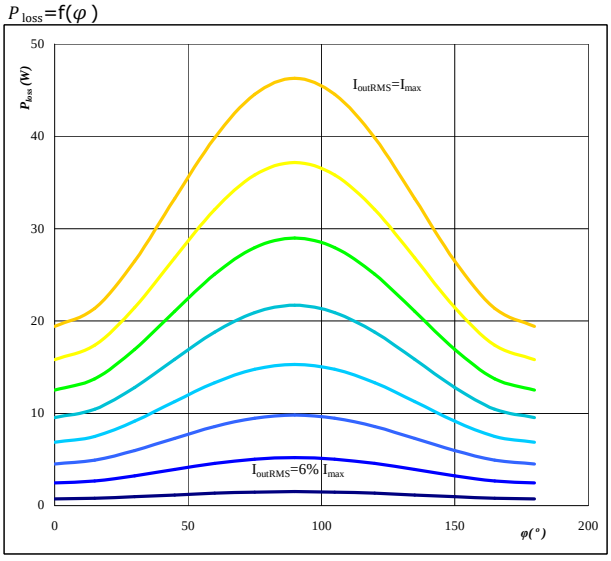


Conditions T_j= 150 °C
parameter I_{oRMS} from 6,67 A to 100 A
in steps of 13 A

Figure 4. **Buck FWD**

Typical average static loss as a function of phase displacement φ

P_{loss}=f(φ)



Conditions T_j= 150 °C
parameter I_{oRMS} from 6,67 A to 100 A
in steps of 13 A

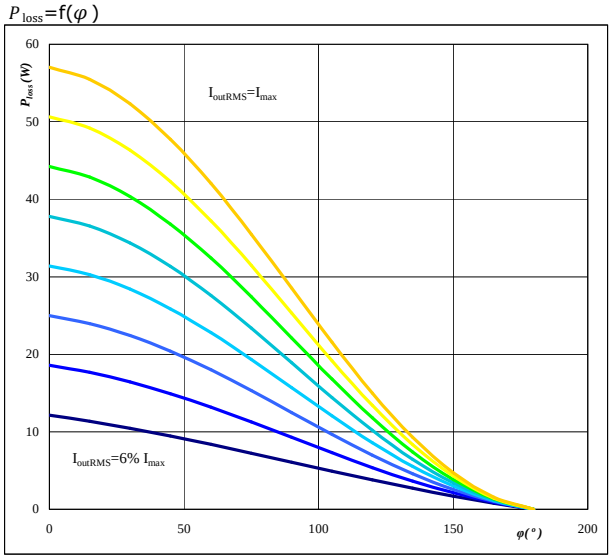
Vincotech

flow **NPC 1** | **NPC Application** | **600 V / 100 A**

Figure 5. **Buck IGBT**

Typical average switching loss as a function of phase displacement φ

$P_{loss}=f(\varphi)$

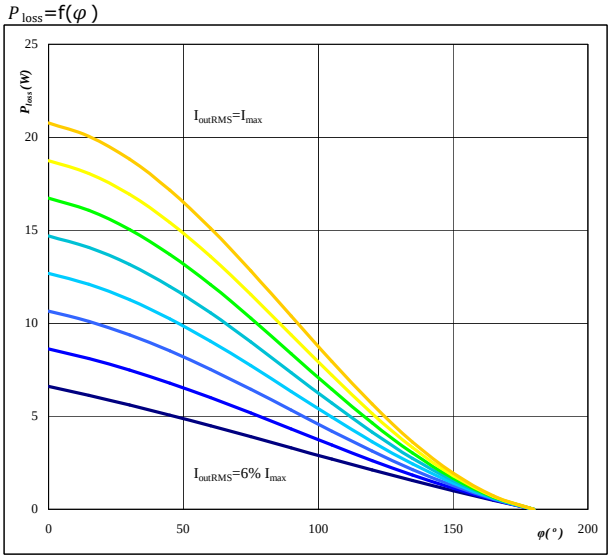


Conditions T_j= 150 °C
f_{sw}= 20 kHz
DC link= 700 V
parameter I_{oRMS} from 6,67 A to 100 A
in steps of 13 A

Figure 6. **Buck FWD**

Typical average switching loss as a function of phase displacement φ

$P_{loss}=f(\varphi)$

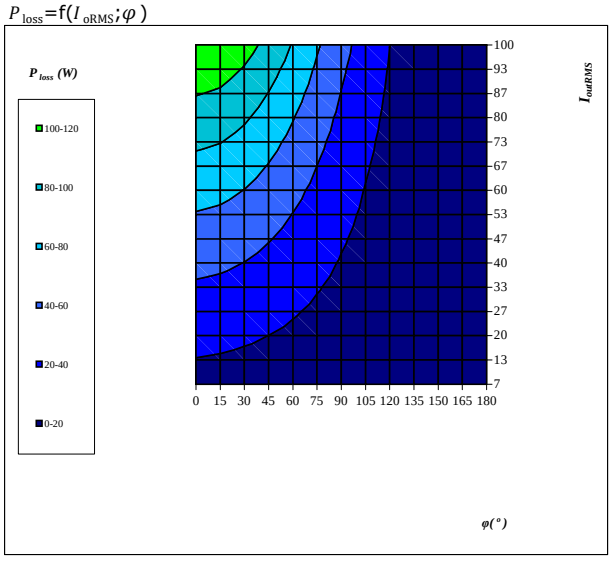


Conditions T_j= 150 °C
f_{sw}= 20 kHz
DC link= 700 V
parameter I_{oRMS} from 6,67 A to 100 A
in steps of 13 A

Figure 7. **Buck IGBT**

Typical total loss as a function of phase displacement φ and output current I_{oRMS}

$P_{loss}=f(I_{oRMS};\varphi)$

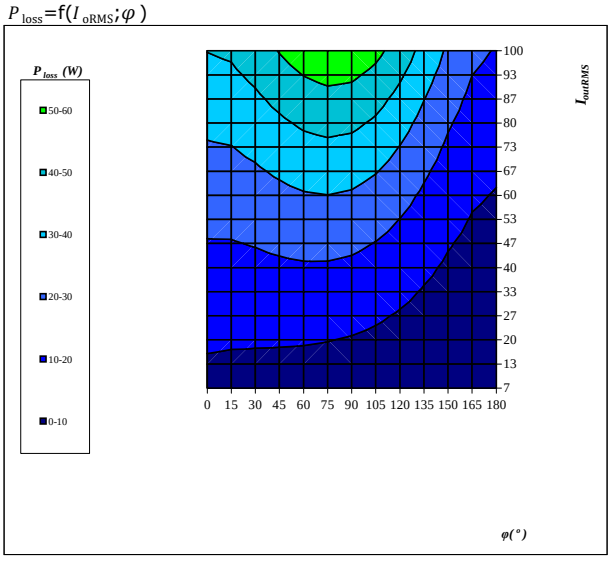


Conditions T_j= 150 °C
DC link= 700 V
f_{sw}= 20 kHz

Figure 8. **Buck FWD**

Typical total loss as a function of phase displacement φ and output current I_{oRMS}

$P_{loss}=f(I_{oRMS};\varphi)$

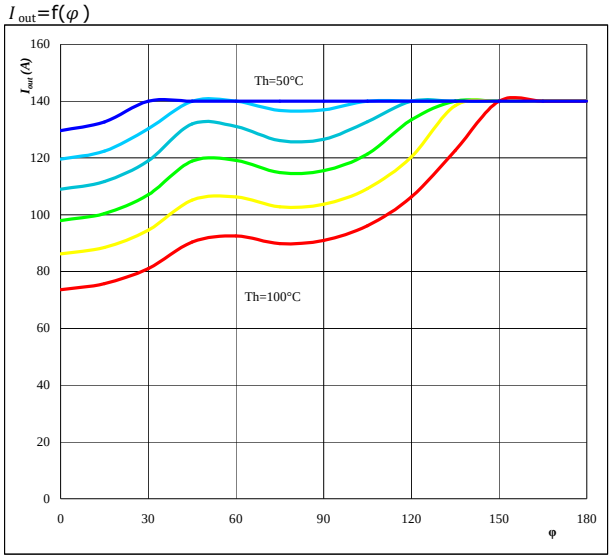


Conditions T_j= 150 °C
DC link= 700 V
f_{sw}= 20 kHz

Figure 9. **for Buck IGBT+FWD**

Typical available output current as a function of phase displacement φ

$I_{out}=f(\varphi)$

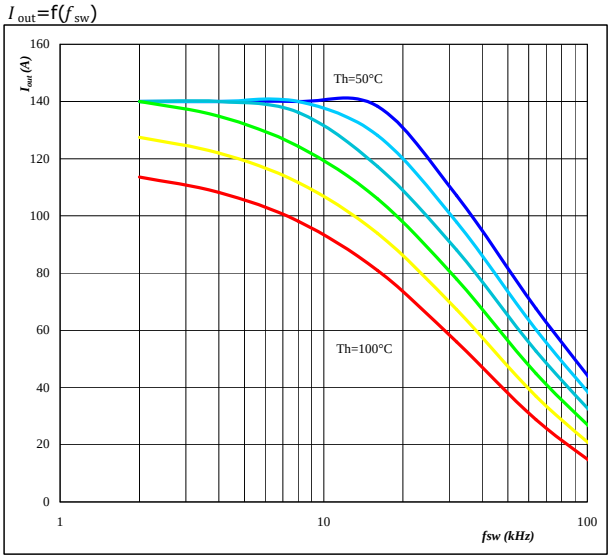


Conditions	T_j=	T_{jmax}-25	°C	f_{sw}=	20	kHz
	DC link=	700	V			
parameter:	Heatsink temp.					
	T_h from	50	°C to	100	°C	
	in	10	°C	steps		

Figure 10. **for Buck IGBT+FWD**

Typical available output current as a function of switching frequency f_{sw}

$I_{out}=f(f_{sw})$

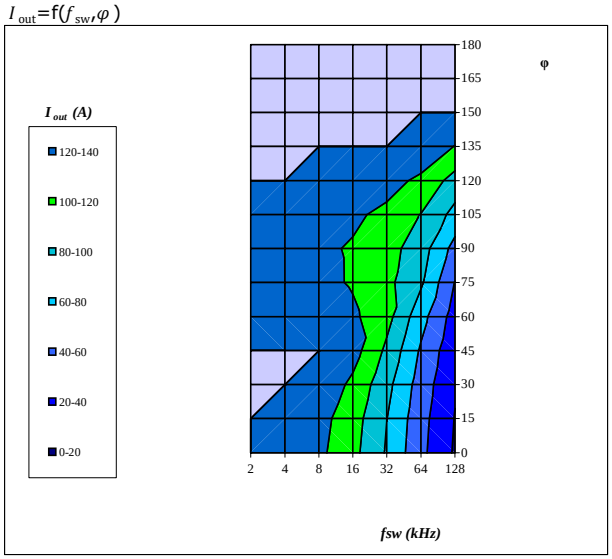


Conditions	T_j=	T_{jmax}-25	°C	φ =	0	°
	DC link=	700	V			
parameter	Heatsink temp.					
	T_h from	50	°C to	100	°C	
	in	10	°C	steps		

Figure 11. **for Buck IGBT+FWD**

Typical available 50Hz output current as a function of f_{sw} and phase displacement φ

$I_{out}=f(f_{sw},\varphi)$

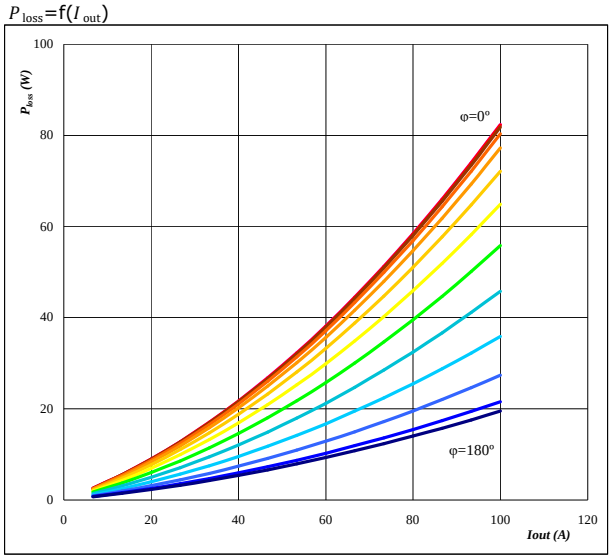


Conditions	T_j=	T_{jmax}-25	°C	
	DC link=	700	V	
	T_h=	80	°C	

Figure 12. **Boost IGBT**

Typical average static loss as a function of output current

$P_{loss}=f(I_{out})$

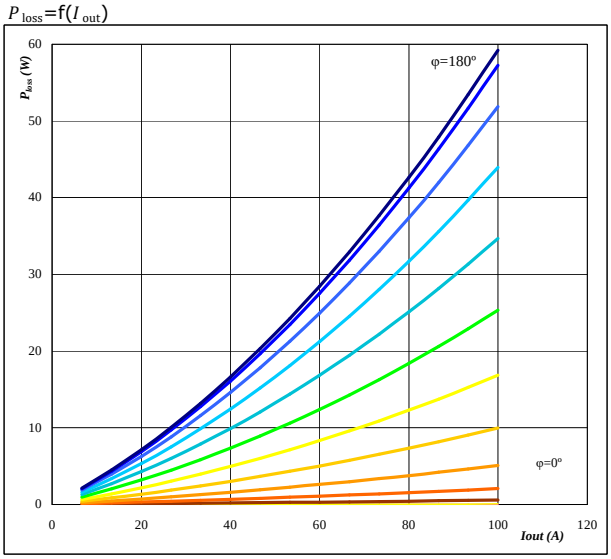


Conditions T_j= 150 °C
parameter φ from 0° to 180°
in 12 steps

Figure 13. **Boost FWD**

Typical average static loss as a function of output current

$P_{loss}=f(I_{out})$

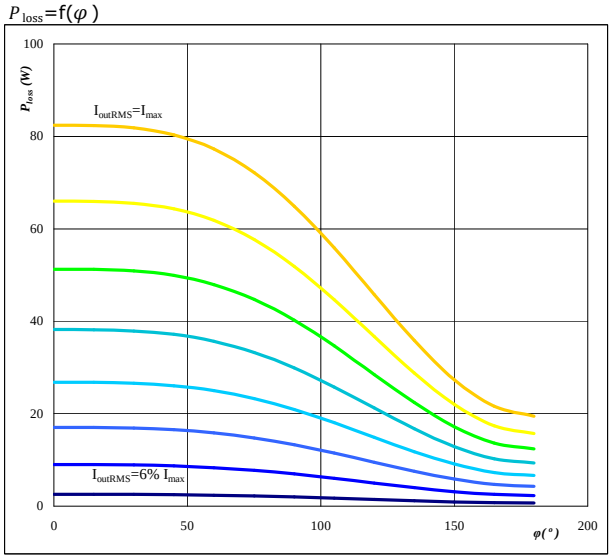


Conditions T_j= 150 °C
parameter φ from 0° to 180°
in 12 steps

Figure 14. **Boost IGBT**

Typical average static loss as a function of phase displacement

$P_{loss}=f(\varphi)$

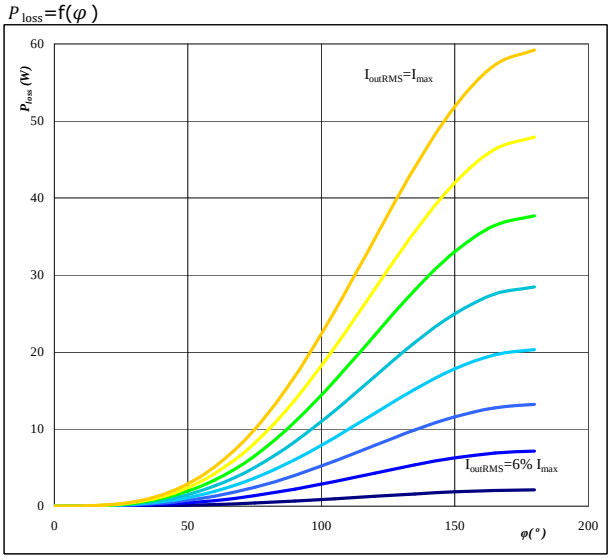


Conditions T_j= 150 °C
parameter I_{oRMS} from 7 A to 100 A
in steps of 13 A

Figure 15. **Boost FWD**

Typical average static loss as a function of phase displacement

$P_{loss}=f(\varphi)$

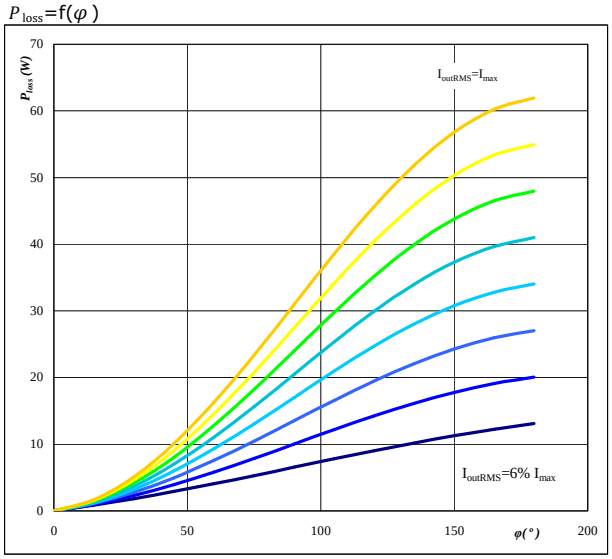


Conditions T_j= 150 °C
parameter I_{oRMS} from 7 A to 100 A
in steps of 13 A

Figure 16. **Boost IGBT**

Typical average switching loss as a function of phase displacement

$P_{loss}=f(\varphi)$

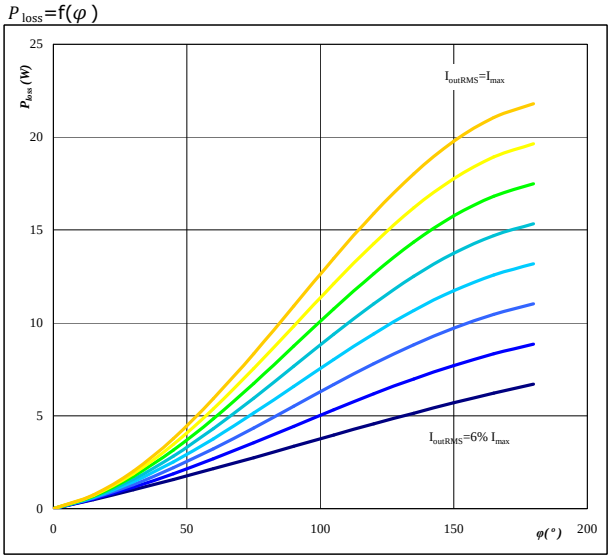


Conditions	T_j=	150	°C	f_{sw}=	20	kHz
	DC link=	700	V			
parameter	I_{oRMS}	from	7 A	to	100	A
		in steps of	13 A		A	

Figure 17. **Boost FWD**

Typical average switching loss as a function of phase displacement

$P_{loss}=f(\varphi)$

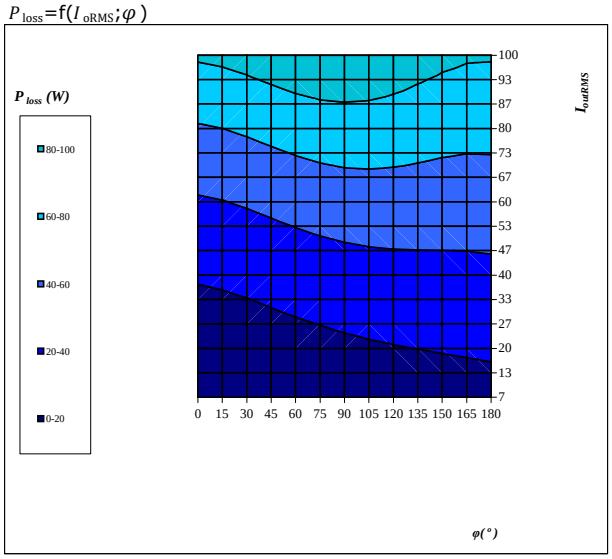


Conditions	T_j=	150	°C	f_{sw}=	20	kHz
	DC link=	700	V			
parameter	I_{oRMS}	from	7 A	to	100	A
		in steps of	13 A		A	

Figure 18. **Boost IGBT**

Typical total loss as a function of phase displacement and I_{outRMS}

$P_{loss}=f(I_{oRMS};\varphi)$

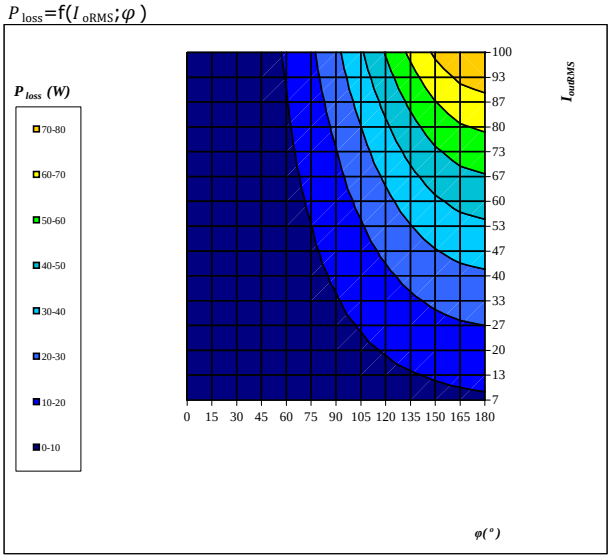


Conditions	T_j=	150	°C
	DC link=	700	V
	f_{sw}=	20	kHz

Figure 19. **Boost FWD**

Typical total loss as a function of phase displacement and I_{outRMS}

$P_{loss}=f(I_{oRMS};\varphi)$

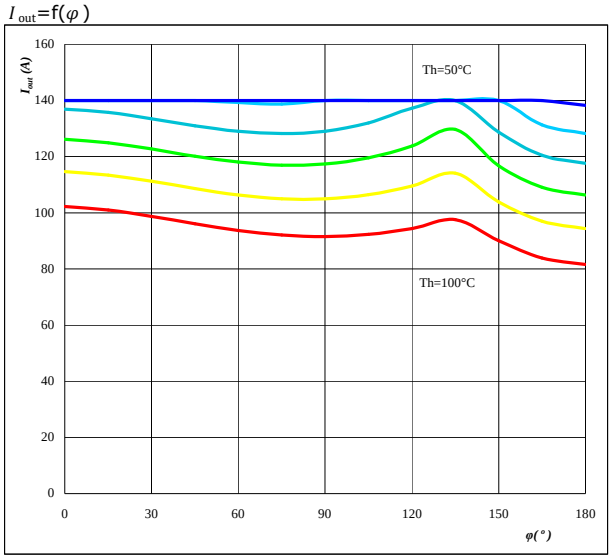


Conditions	T_j=	150	°C
	DC link=	700	V
	f_{sw}=	20	kHz

Figure 20. **Boost IGBT+FWD**

Typical available output current as a function of of phase displacement

$I_{out}=f(\varphi)$

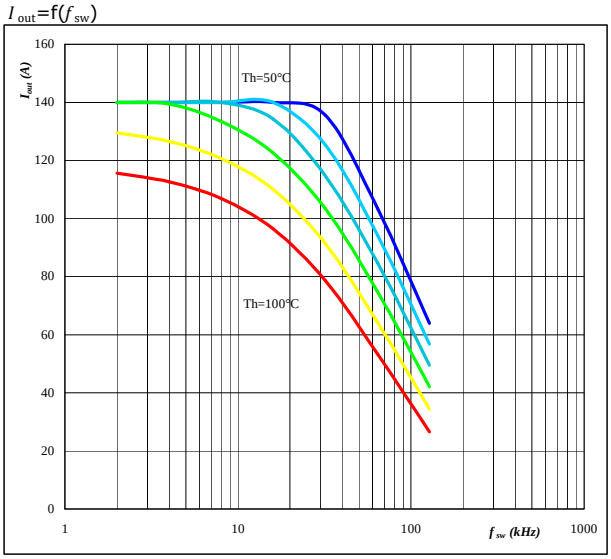


Conditions	T_j=	T_{jmax}-25	°C	f_{sw}=	20	kHz
	DC link=	700	V			
parameter:	Heatsink temp.					
	T_h from	50	°C to	100		°C
	in	10	°C	steps		

Figure 21. **Boost IGBT+FWD**

Typical available output current as a function of switching frequency

$I_{out}=f(f_{sw})$

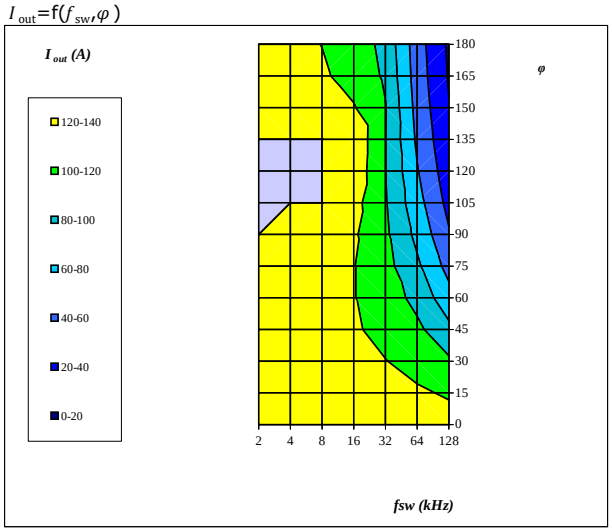


Conditions	T_j=	T_{jmax}-25	°C	φ =	90°	
	DC link=	700	V			
parameter:	Heatsink temp.					
	T_h from	50	°C to	100		°C
	in	10	°C	steps		

Figure 22. **Boost IGBT+FWD**

Typical available 50Hz output current as a function of f_{sw} and phase displacement

$I_{out}=f(f_{sw},\varphi)$

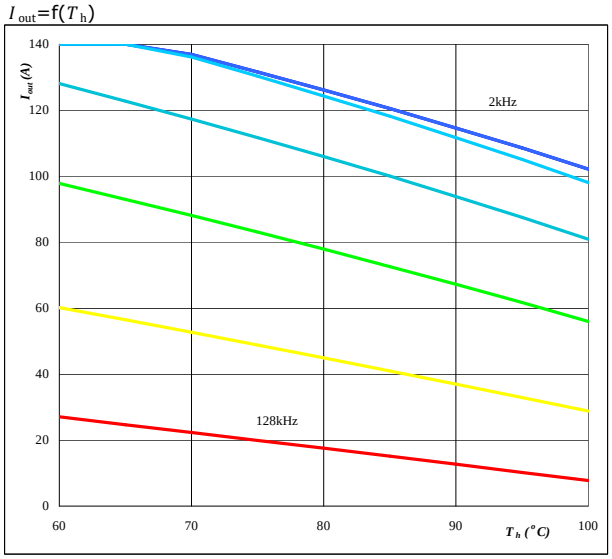


Conditions	T_j=	T_{jmax}-25	°C
	DC link=	700	V
	T_h=	80	°C

Figure 23. per MODULE

Typical available output current as a function of heat sink temperature

$I_{out}=f(T_h)$

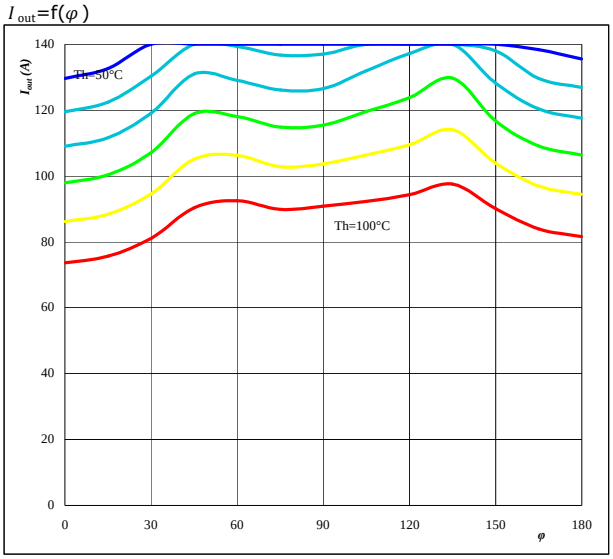


Conditions	T_j=	T_{jmax}-25	°C			
	DC link=	700	V			
	φ =	0	°			
parameter:	Switching freq.					
	f_{sw} from	2	kHz to	128	kHz	
	in steps of factor 2					

Figure 24. per MODULE

Typical available output current as a function of phase displacement

$I_{out}=f(\varphi)$

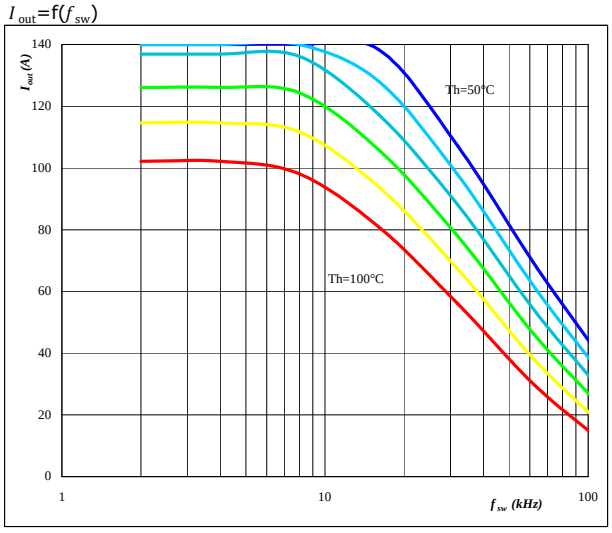


Conditions	T_j=	T_{jmax}-25	°C			
	DC link=	700	V			
	f_{sw}=	20	kHz			
parameter:	Heatsink temp.					
	T_h from	50	°C to	100		
	in	10	°C	steps		

Figure 25. per MODULE

Typical available output current as a function of switching frequency

$I_{out}=f(f_{sw})$

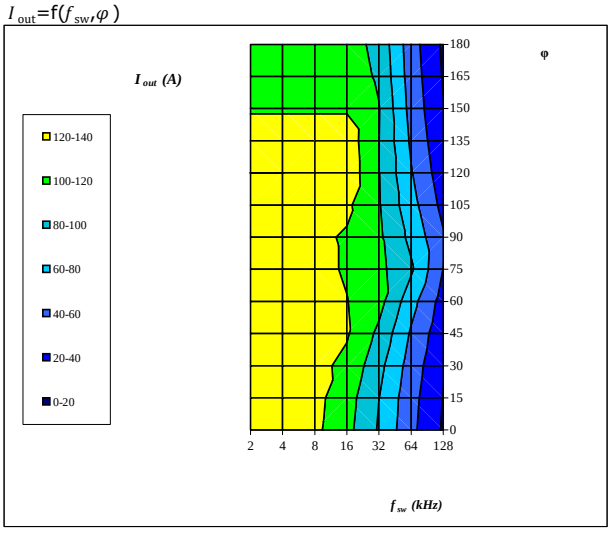


Conditions	T_j=	T_{jmax}-25	°C	φ =	0	°		
	DC link=	700	V					
parameter:	Heatsink temp.							
	T_h from	50	°C to	100				
	in	10	°C	steps				

Figure 26. per MODULE

Typical available 50Hz output current as a function of f_{sw} and phase displacement

$I_{out}=f(f_{sw},\varphi)$

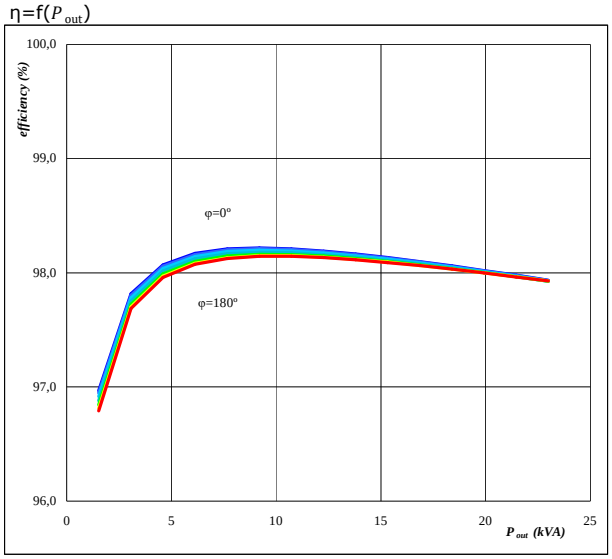


Conditions	T_j=	T_{jmax}-25	°C			
	DC link=	700	V			
	T_h=	80	°C			

Figure 27. per MODULE

Typical efficiency as a function of output power

$\eta=f(P_{out})$

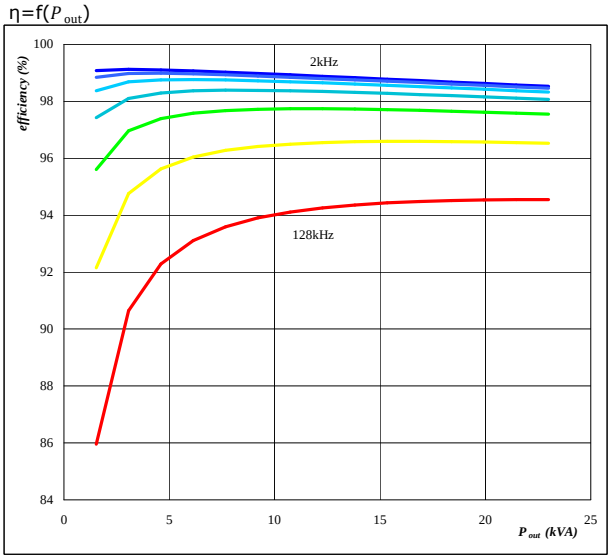


Conditions T_j= 150 °C
f_{sw}= 20 kHz
DC link= 700 V
parameter: phase displacement
φ from 0 ° to 180 °
in steps of 30 °

Figure 28. per MODULE

Typical efficiency as a function of output power

$\eta=f(P_{out})$

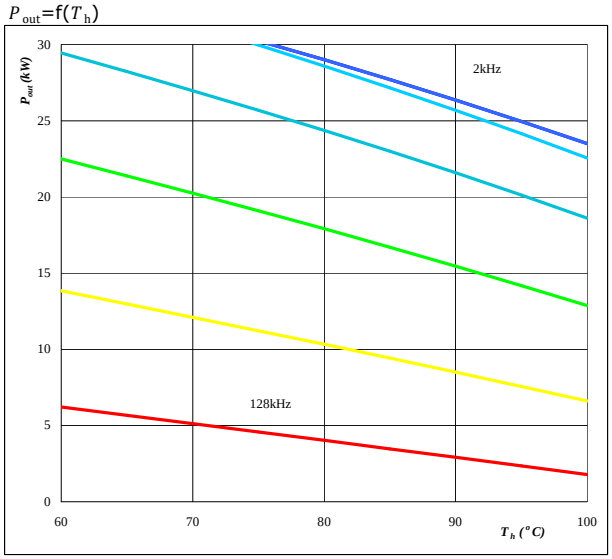


Conditions T_j= 150 °C φ = 0 °
DC link= 700 V
parameter: Switching freq.
f_{sw} from 2 kHz to 128 kHz
in steps of factor 2

Figure 29. per MODULE

Typical available output power as a function of heat sink temperature

$P_{out}=f(T_h)$



Conditions T_j= T_{jmax}-25 °C
DC link= 700 V
φ = 0 °
parameter: Switching freq.
f_{sw} from 2 kHz to 128 kHz
in steps of factor 2

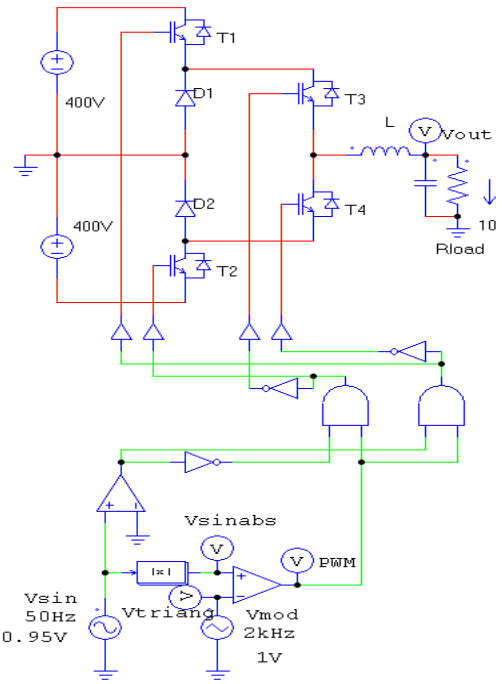
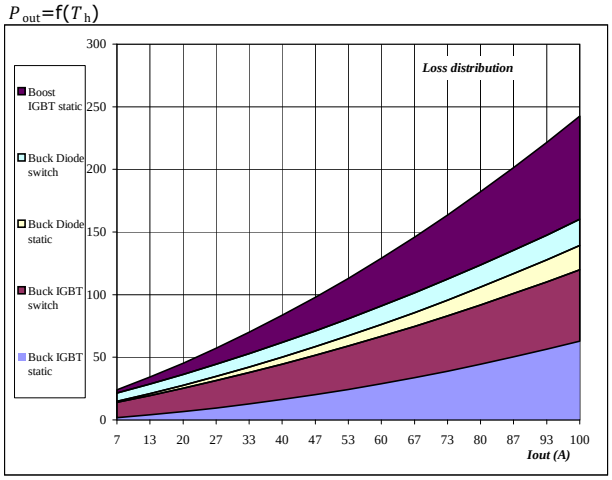


Figure 30. per MODULE

Typical loss distribution as a function of output current

$P_{out}=f(T_h)$

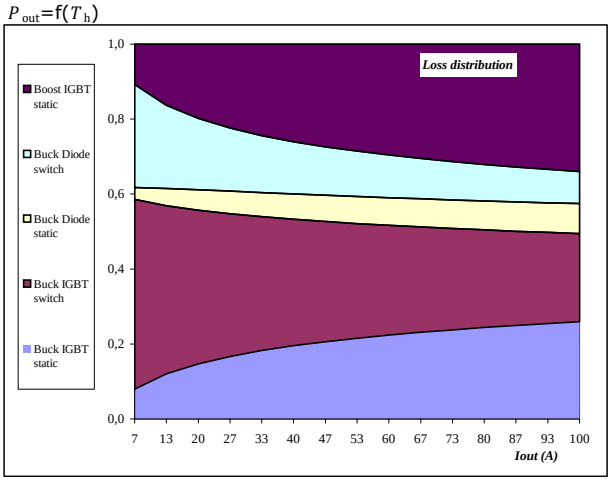


Conditions			
	T_j=	150	°C
	f_{sw}=	20	kHz
	DC link=	700	V
	φ =	0	°

Figure 31. per MODULE

Typical relativ loss distribution as a function of output current

$P_{out}=f(T_h)$



Conditions			
	T_j=	150	°C
	f_{sw}=	20	kHz
	DC link=	700	V
	φ =	0	°