flow NPC 0 — NPC Application — 650 V / 50 A

General conditions

BUCK		
V_{GEon}	=	15 V
V_{GEoff}	=	-15 V
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

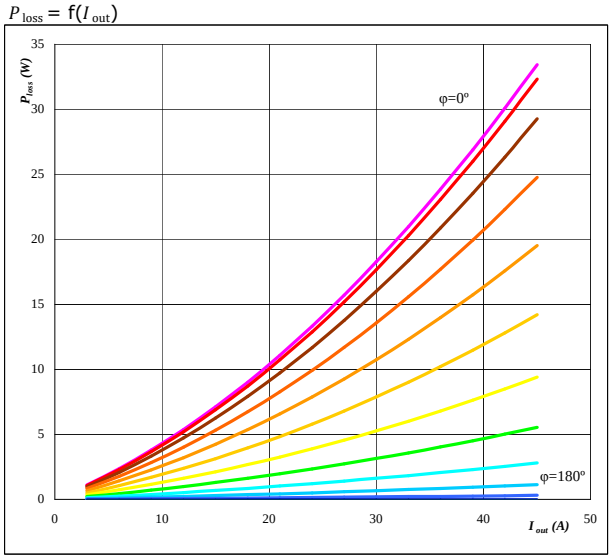
V_{out} = 230 VAC

BOOST		
V_{GEon}	=	15 V
V_{GEoff}	=	-15 V
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. **Buck IGBT**

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

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

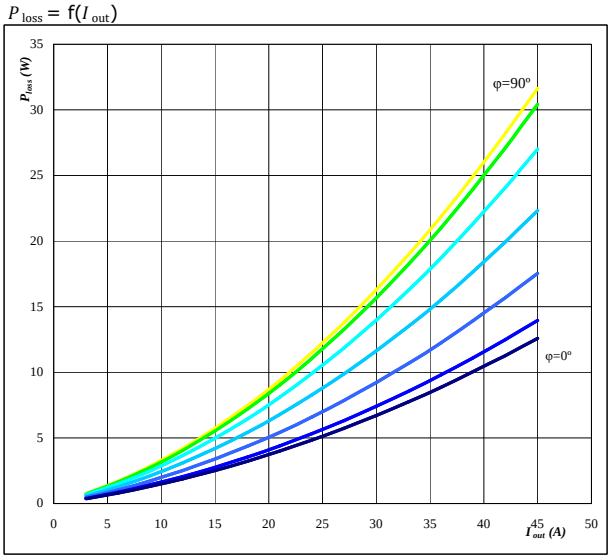


Conditions T_j = 125 °C
parameter **φ** from 0° to 180°
in 12 steps

figure 2. **Buck FWD**

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

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

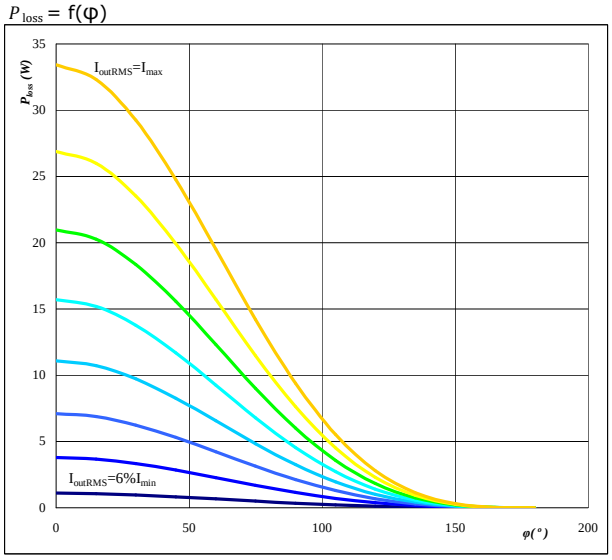


Conditions T_j = 125 °C
parameter **φ** from 0° to 180°
in 12 steps

figure 3. **Buck IGBT**

Typical average static loss as a function of phase displacement φ

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

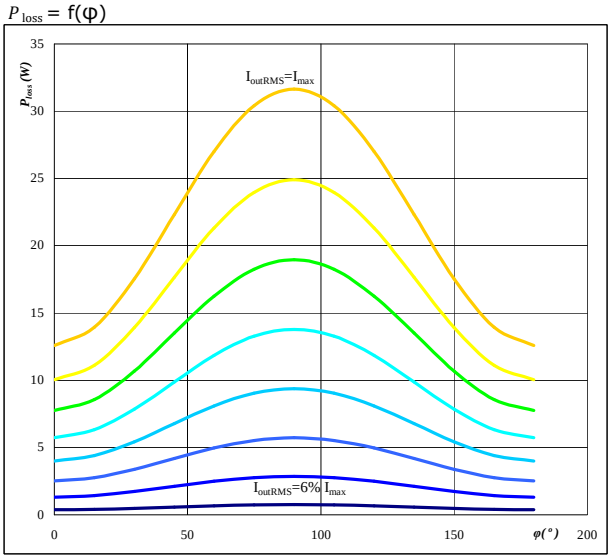


Conditions T_j = 125 °C
parameter I_{oRMS} from 3 A to 45 A
in steps of 6 A

figure 4. **Buck FWD**

Typical average static loss as a function of phase displacement φ

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

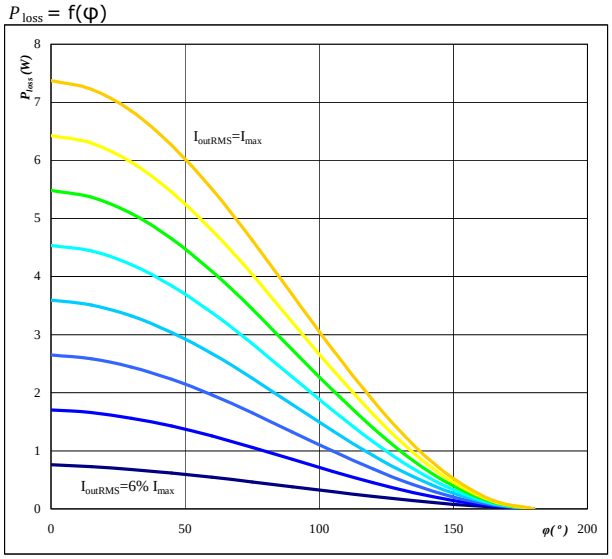


Conditions T_j = 125 °C
parameter I_{oRMS} from 3 A to 45 A
in steps of 6 A

figure 5. **Buck IGBT**

Typical average switching loss as a function of phase displacement φ

P_{loss} = f(φ)

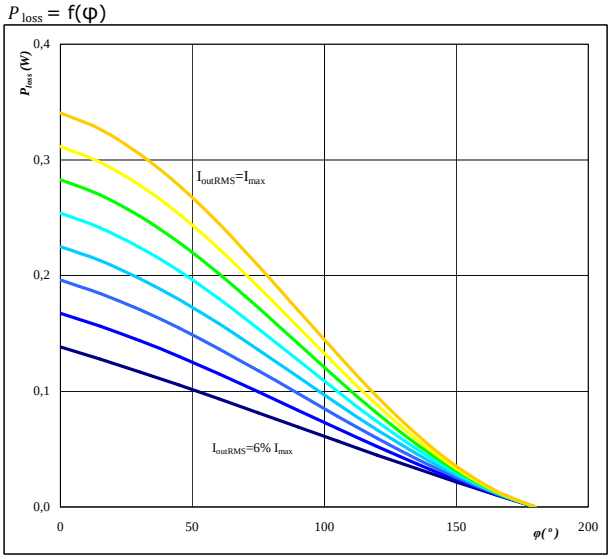


Conditions	T_j =	125	°C
	f_{sw} =	20	kHz
	DC link =	700	V
parameter	I_{oRMS}	from 3 A	to 45 A
		in steps of 6	A

figure 6. **Buck FWD**

Typical average switching loss as a function of phase displacement φ

P_{loss} = f(φ)

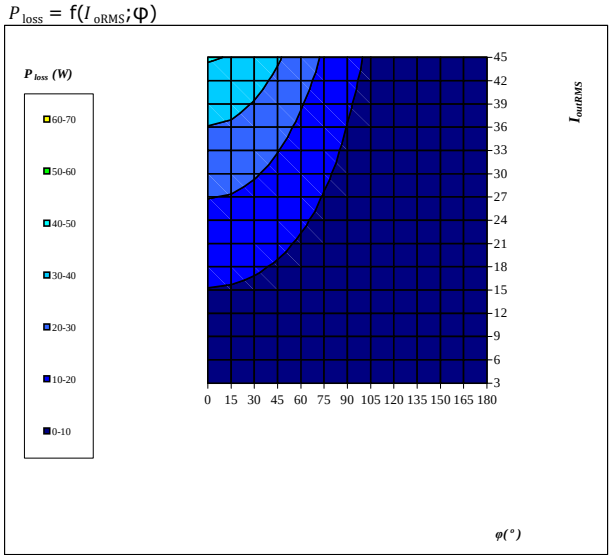


Conditions	T_j =	125	°C
	f_{sw} =	20	kHz
	DC link =	700	V
parameter	I_{oRMS}	from 3 A	to 45 A
		in steps of 6	A

figure 7. **Buck IGBT**

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

P_{loss} = f(I_{oRMS};φ)

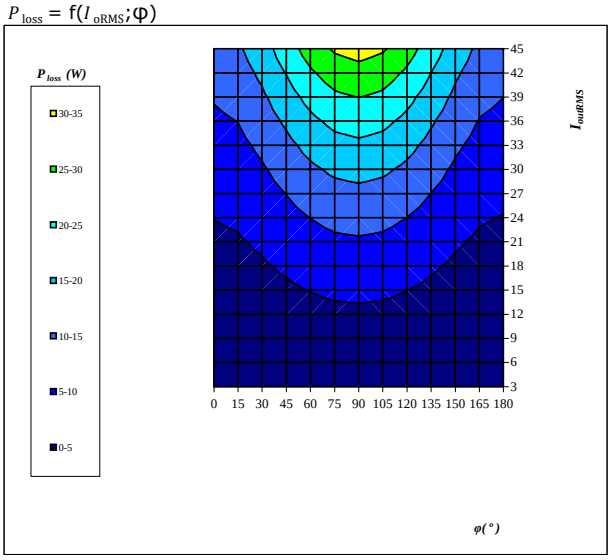


Conditions	T_j =	125	°C
	DC link =	700	V
	f_{sw} =	20	kHz

figure 8. **Buck FWD**

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

P_{loss} = f(I_{oRMS};φ)



Conditions	T_j =	125	°C
	DC link =	700	V
	f_{sw} =	20	kHz

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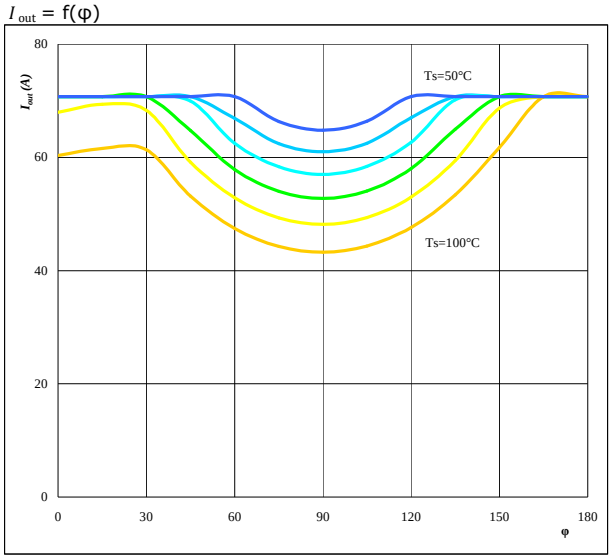
figure 9. **for Buck IGBT+FWD**

Typical available output current as a function of phase displacement φ

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

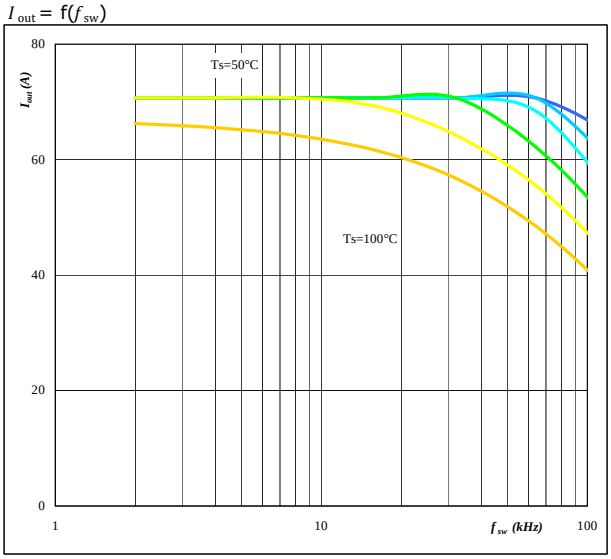


Conditions T_j = T_{jmax}-25 °C f_{sw} = 20 kHz
DC link = 700 V
parameter: Heatsink temp.
T_s from 50 °C to 100 °C
in 10 °C steps

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

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

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

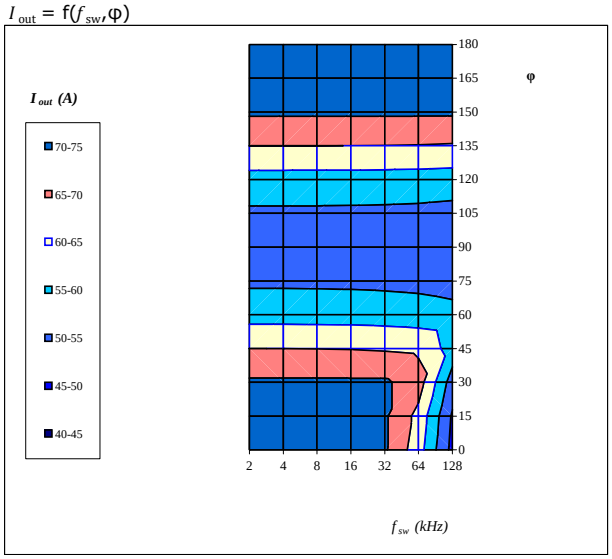


Conditions T_j = T_{jmax}-25 °C φ= 0 °
DC link = 700 V
parameter Heatsink temp.
T_s from 50 °C to 100 °C
in 10 °C steps

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

Typical available 50Hz output current as a function of fsw and phase displacement φ

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

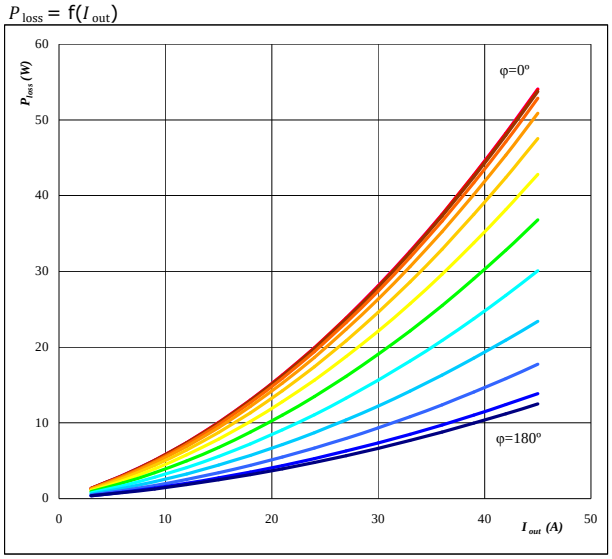


Conditions T_j = T_{jmax}-25 °C
DC link = 700 V
T_s = 80 °C

figure 12. **Boost IGBT**

Typical average static loss as a function of output current

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

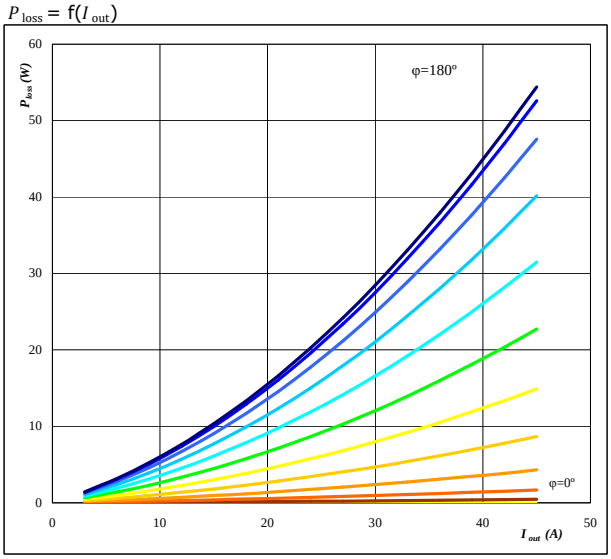


Conditions T_j = 125 °C
parameter **φ** from 0° to 180°
in 12 steps

figure 13. **Boost FWD**

Typical average static loss as a function of output current

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

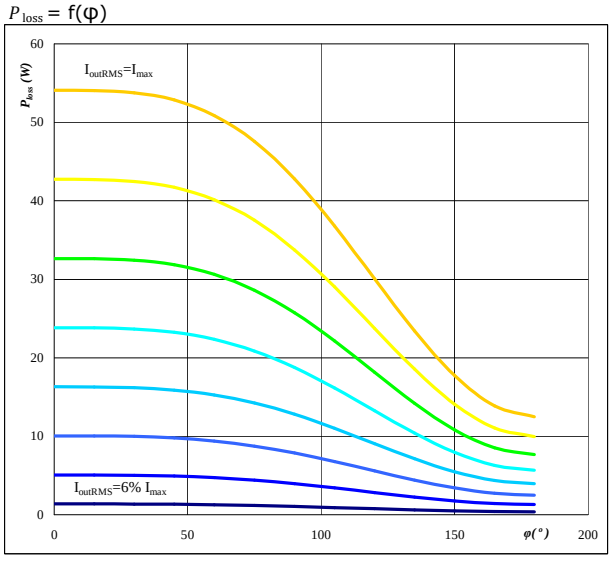


Conditions T_j = 125 °C
parameter **φ** from 0° to 180°
in 12 steps

figure 14. **Boost IGBT**

Typical average static loss as a function of phase displacement

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

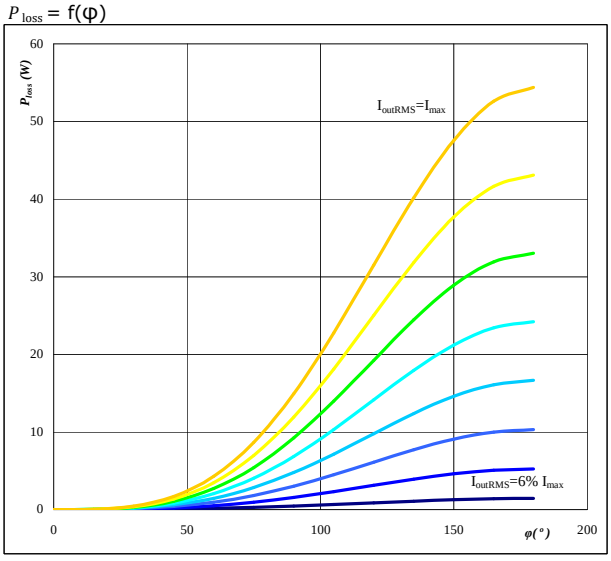


Conditions T_j = 125 °C
parameter I_{oRMS} from 3 A to 45 A
in steps of 6 A

figure 15. **Boost FWD**

Typical average static loss as a function of phase displacement

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

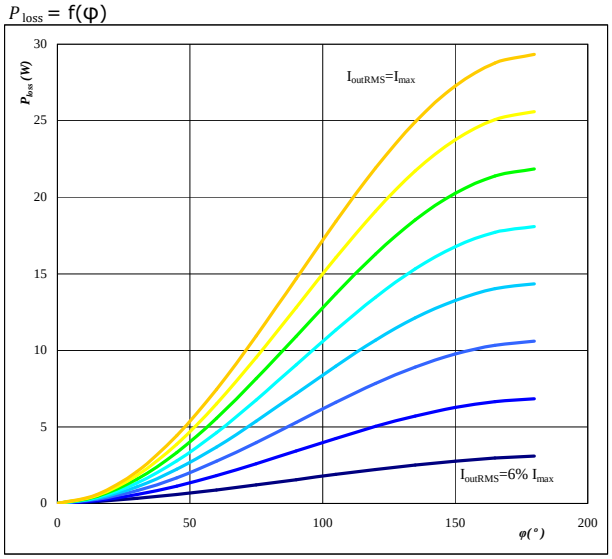


Conditions T_j = 125 °C
parameter I_{oRMS} from 3 A to 45 A
in steps of 6 A

figure 16. **Boost IGBT**

Typical average switching loss as a function of phase displacement

P_{loss} = f(φ)

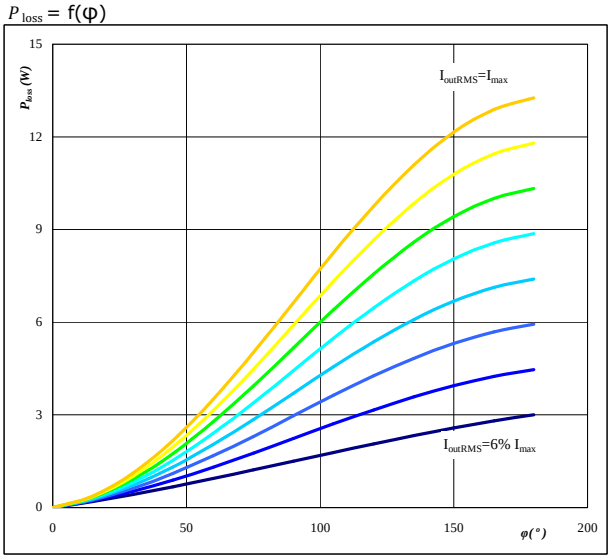


Conditions	T_j =	125	°C	f_{sw} =	20	kHz
	DC link =	700	V			
parameter	I_{oRMS}	from	3 A	to	45 A	
		in steps of	6 A		A	

figure 17. **Boost FWD**

Typical average switching loss as a function of phase displacement

P_{loss} = f(φ)

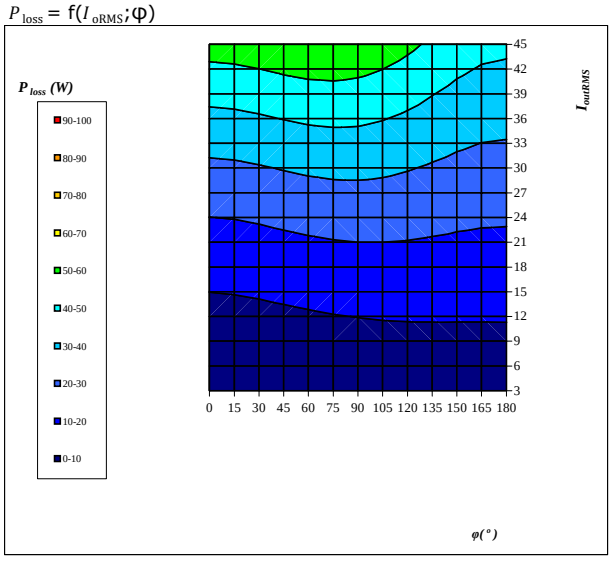


Conditions	T_j =	125	°C	f_{sw} =	20	kHz
	DC link =	700	V			
parameter	I_{oRMS}	from	3 A	to	45 A	
		in steps of	6 A		A	

figure 18. **Boost IGBT**

Typical total loss as a function of phase displacement and Iout$_{RMS}$

P_{loss} = f(I_{oRMS};φ)

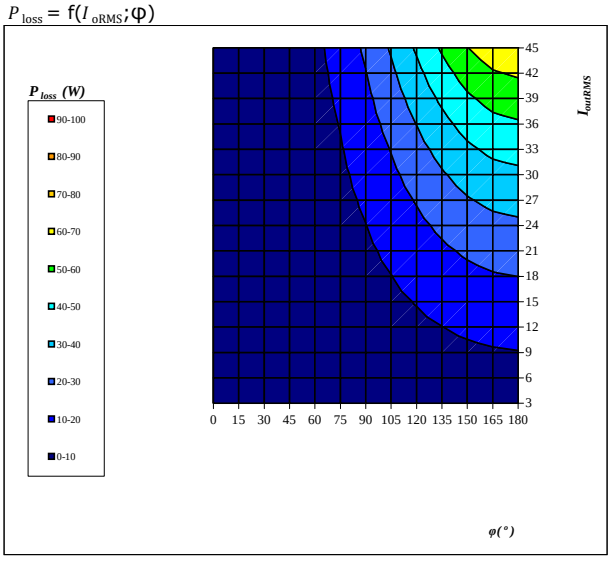


Conditions	T_j =	125	°C
	DC link =	700	V
	f_{sw} =	20	kHz

figure 19. **Boost FWD**

Typical total loss as a function of phase displacement and Iout$_{RMS}$

P_{loss} = f(I_{oRMS};φ)

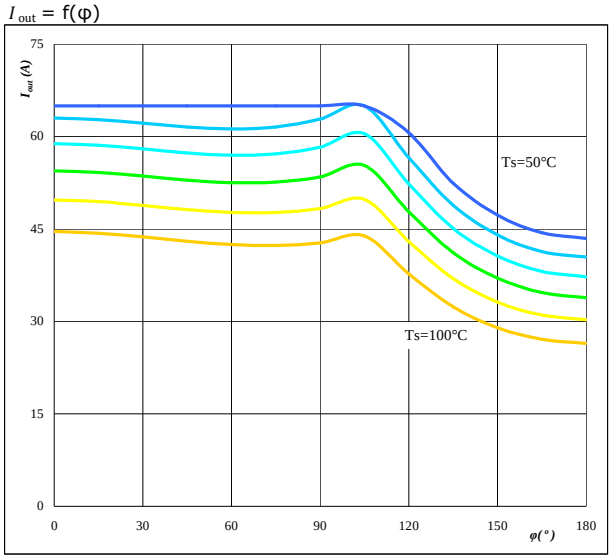


Conditions	T_j =	125	°C
	DC link =	700	V
	f_{sw} =	20	kHz

figure 20. **Boost IGBT+FWD**

Typical available output current as a function of of phase displacement

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

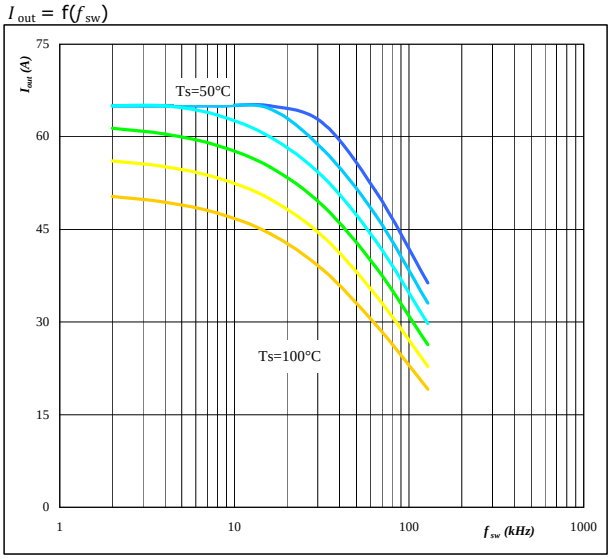


Conditions	T_j =	T_{jmax}-25	°C		f_{sw} =	20	kHz
	DC link =	700	V				
parameter:	Heatsink temp.						
	T_s from	50	°C to	100		°C	
	in	10	°C	steps			

figure 21. **Boost IGBT+FWD**

Typical available output current as a function of switching frequency

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

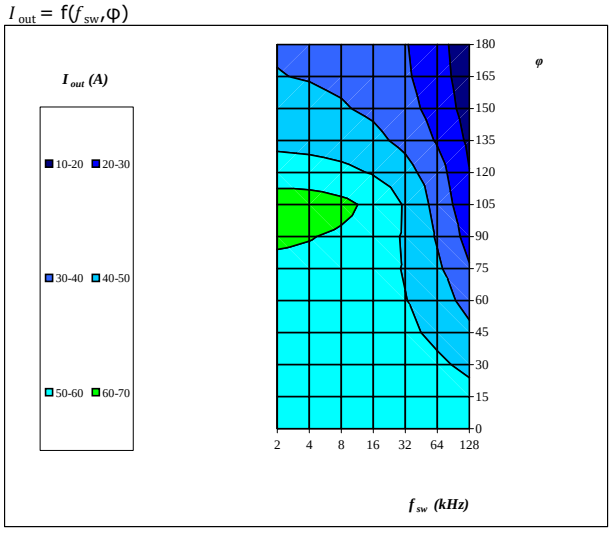


Conditions	T_j =	T_{jmax}-25	°C		φ =	90°	
	DC link =	700	V				
parameter:	Heatsink temp.						
	T_s from	50	°C to	100		°C	
	in	10	°C	steps			

figure 22. **Boost IGBT+FWD**

Typical available 50Hz output current as a function of fsw and phase displacement

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

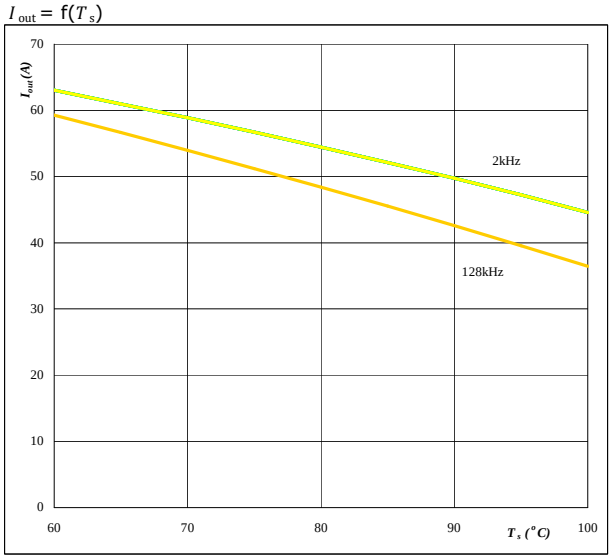


Conditions	T_j =	T_{jmax}-25	°C	
	DC link=	700	V	
	T_s =	80	°C	

figure 23. **per MODULE**

Typical available output current as a function of heat sink temperature

$I_{out} = f(T_s)$

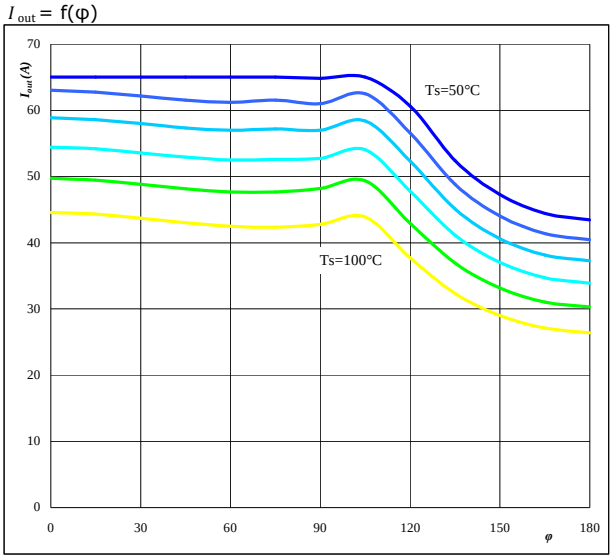


Conditions	T_j =	T_{jmax}-25	°C		
	DC link=	700	V		
	φ=	0	°		
parameter:	Switching freq.				
	f_{sw} from	2	kHz to	128	kHz
	in steps of factor 2				

figure 24. **per MODULE**

Typical available output current as a function of phase displacement

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

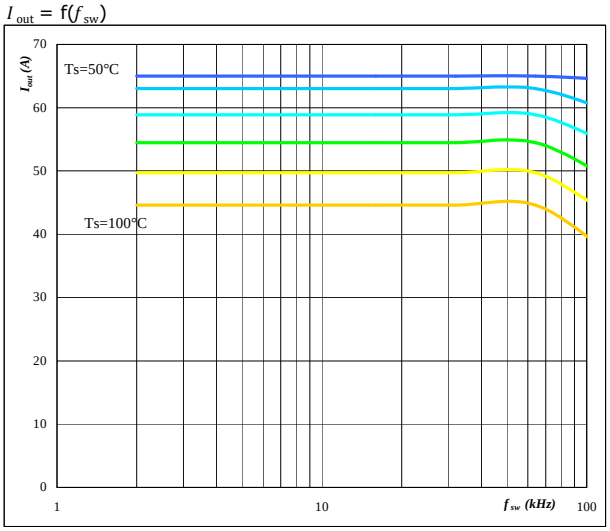


Conditions	T_j =	T_{jmax}-25	°C		
	DC link=	700	V		
	f_{sw} =	20	kHz		
parameter:	Heatsink temp.				
	T_s from	50	°C to	100	
	in	10	°C	steps	

figure 25. **per MODULE**

Typical available output current as a function of switching frequency

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

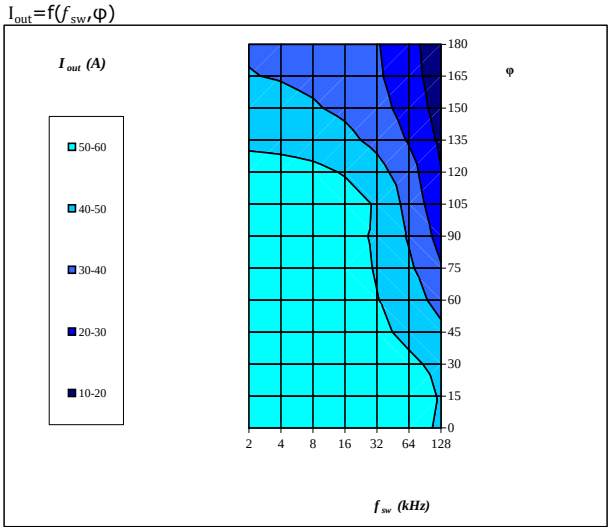


Conditions	T_j =	T_{jmax}-25	°C	φ=	0	°	
	DC link =	700	V				
parameter:	Heatsink temp.						
	T_s from	50	°C to	100			
	in	10	°C	steps			

figure 26. **per MODULE**

Typical available 50Hz output current as a function of fsw and phase displacement

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

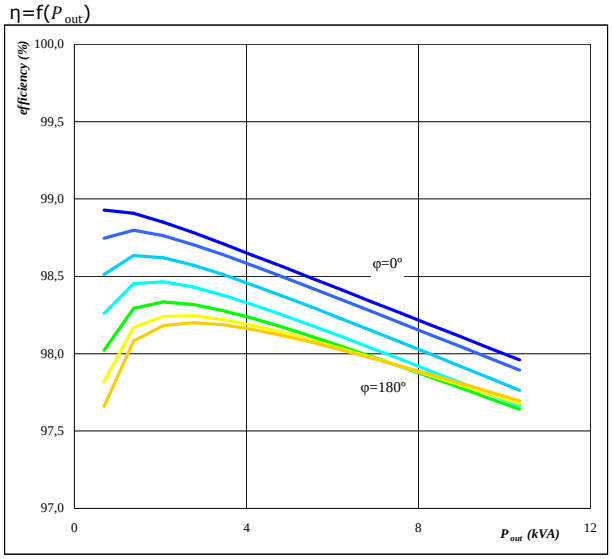


Conditions	T_j =	T_{jmax}-25	°C		
	DC link =	700	V		
	T_s =	80	°C		

figure 27. **per MODULE**

Typical efficiency as a function of output power

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

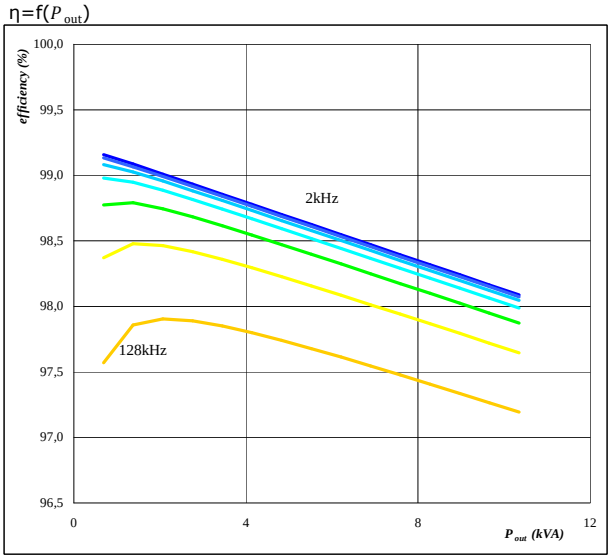


Conditions T_j = 125 °C
f_{sw} = 20 kHz
DC link = 700 V
parameter: phase displacement
φ from 0 ° to 180 °
in steps of 30 °

figure 28. **per MODULE**

Typical efficiency as a function of output power

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

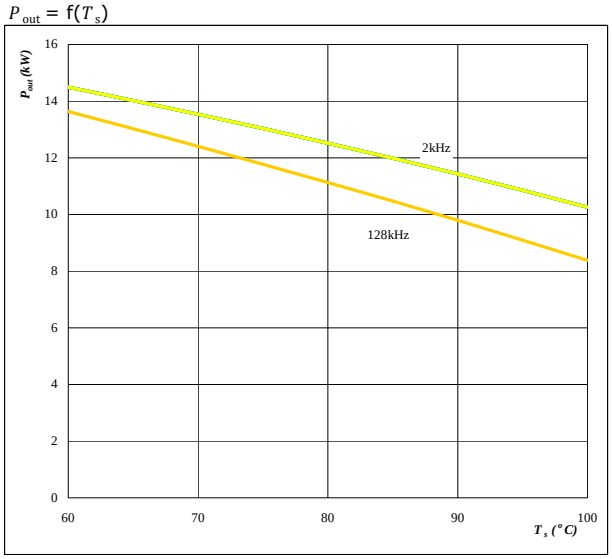


Conditions T_j = 125 °C φ= 0 °
DC link = 700 V
parameter: Switching freq.
f_{sw} from 2 kHz to 128 kHz
in steps of factor 2

figure 29. **per MODULE**

Typical available output power as a function of heat sink temperature

$P_{out} = f(T_s)$

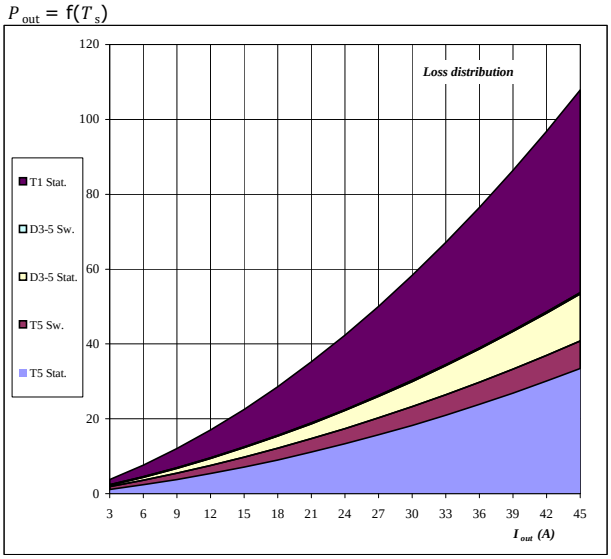


Conditions T_j = T_{jmax}-25 °C
DC link = 700 V
φ = 0 °
parameter: Switching freq.
f_{sw} from 2 kHz to 128 kHz
in steps of factor 2

figure 30. **per MODULE**

Typical loss distribution as a function of output current

$P_{out} = f(T_s)$

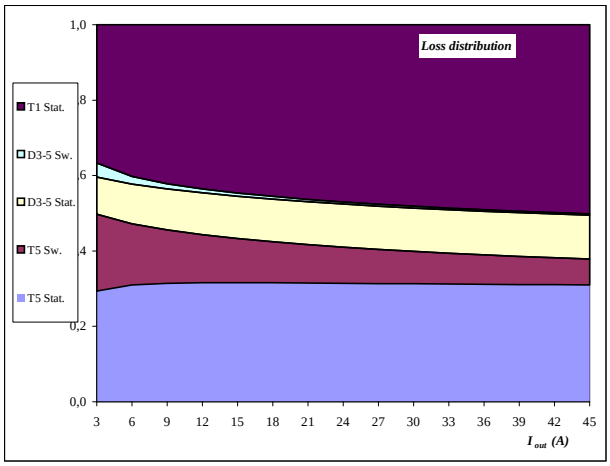


Conditions T_j = 125 °C
f_{sw} = 20 kHz
DC link = 700 V
φ = 0 °

figure 31. **per MODULE**

Typical relativ loss distribution as a function of output current

$P_{out} = f(T_s)$



Conditions			
	T_j =	125	°C
	f_{sw} =	20	kHz
	DC link =	700	V
	φ =	0 °