flow NPC 0 — NPC Application — 650 V / 75 A

General conditions

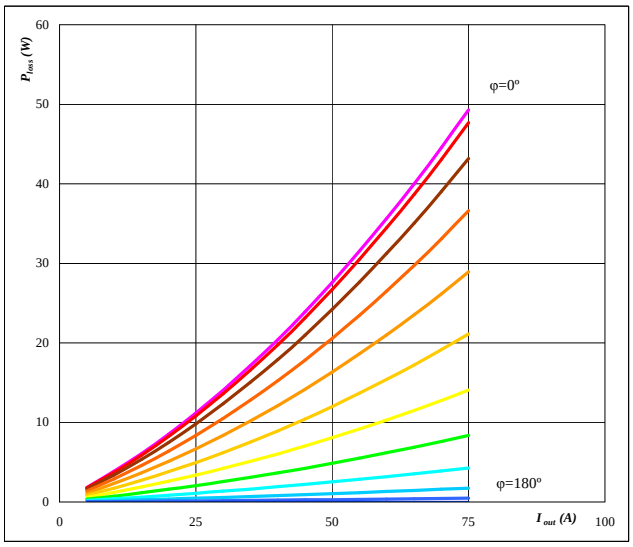
BUCK		
V_{GEon}	=	15 V
V_{GEoff}	=	-5 V
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

Vout= 230 V_{AC}
Vout $_{SC}$= 1 V_{AC}

BOOST		
V_{GEon}	=	15 V
V_{GEoff}	=	-5 V
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

Figure 1. **Buck IGBT**

Typical average static loss as a function of

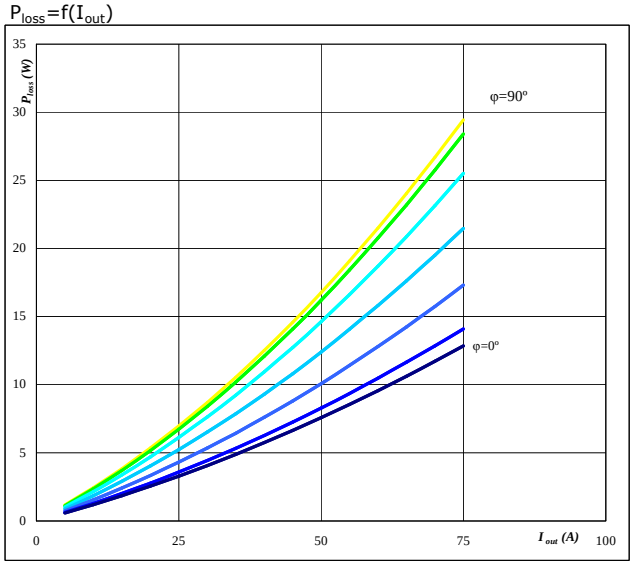


Conditions T_j= 150 °C
parameter **φ** from 0° to 180°
in 12 steps

Figure 2. **Buck FWD**

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

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

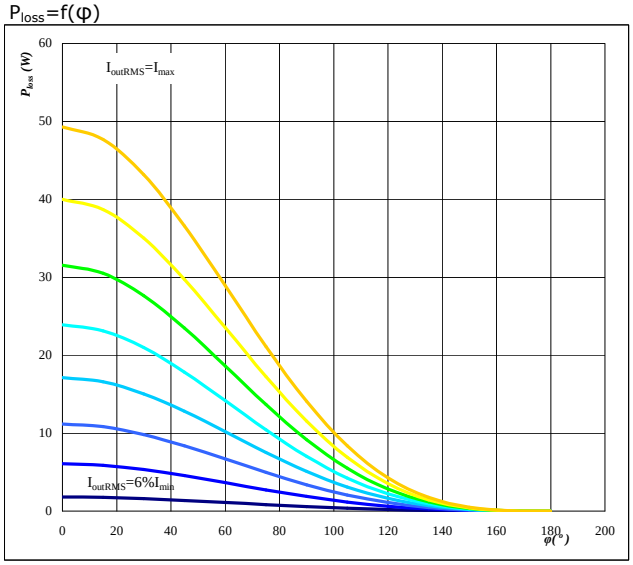


Conditions T_j= 150 °C
parameter **φ** from 0° to 180°
in 12 steps

Figure 3. **Buck IGBT**

Typical average static loss as a function of phase displacement φ

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

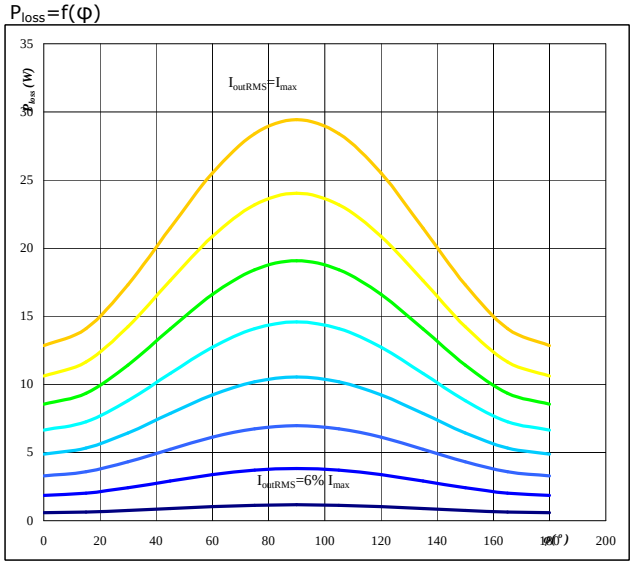


Conditions T_j= 150 °C
parameter I_{oRMS} from 5 A to 75 A
in steps of 10 A

Figure 4. **Buck FWD**

Typical average static loss as a function of phase displacement φ

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

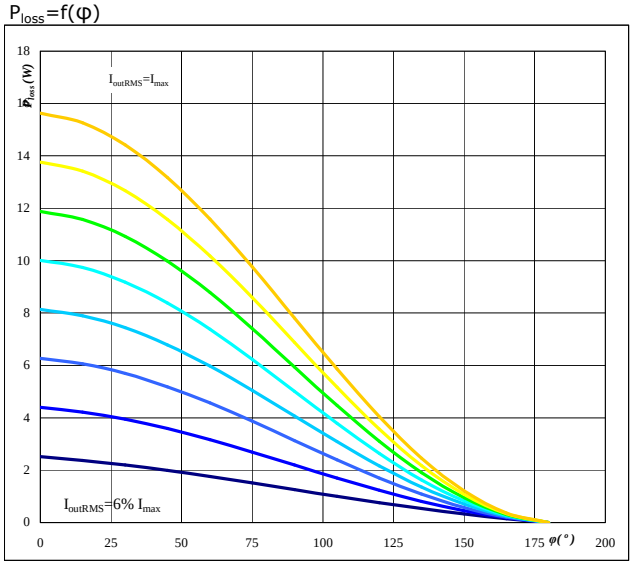


Conditions T_j= 150 °C
parameter I_{oRMS} from 5 A to 75 A
in steps of 10 A

Figure 5. **Buck IGBT**

Typical average switching loss as a function of phase displacement φ

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

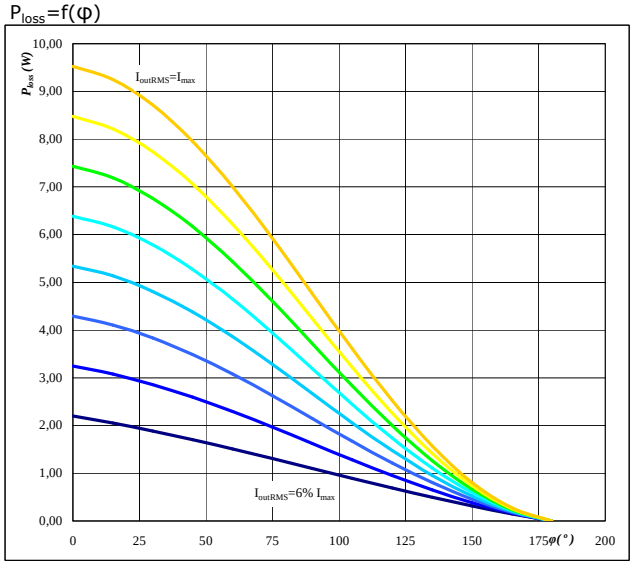


Conditions	T_j=	150	°C	
	f_{sw}=	20	kHz	
	DC link=	700	V	
parameter	I_{oRMS}	from	5 A	to 75 A
		in steps of	10 A	

Figure 6. **Buck FWD**

Typical average switching loss as a function of phase displacement φ

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

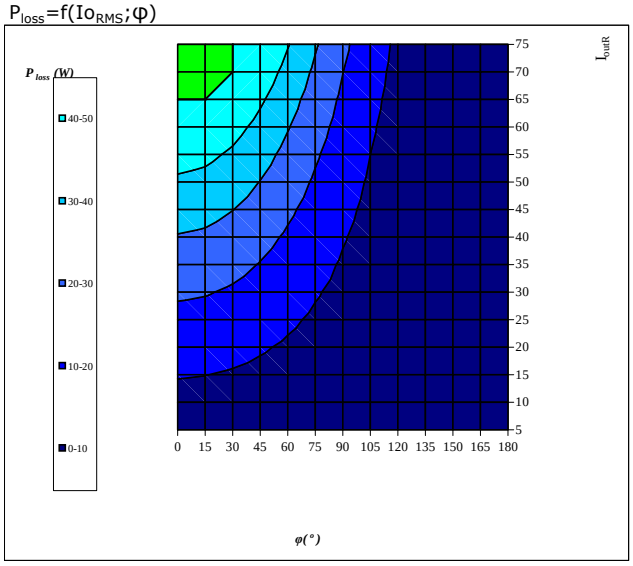


Conditions	T_j=	150	°C	
	f_{sw}=	20	kHz	
	DC link=	700	V	
parameter	I_{oRMS}	from	5 A	to 75 A
		in steps of	10 A	

Figure 7. **Buck IGBT**

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

$P_{loss}=f(Io_{RMS};\varphi)$

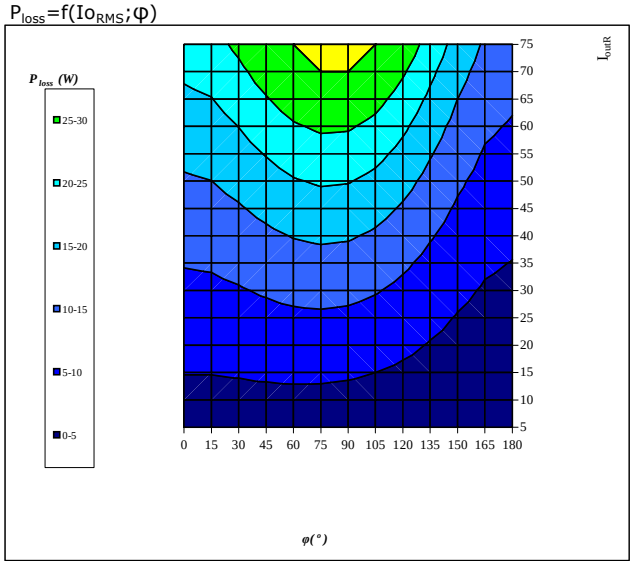


Conditions	T_j=	150	°C
	DC link=	700	V
	f_{sw}=	20	kHz

Figure 8. **Buck FWD**

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

$P_{loss}=f(Io_{RMS};\varphi)$

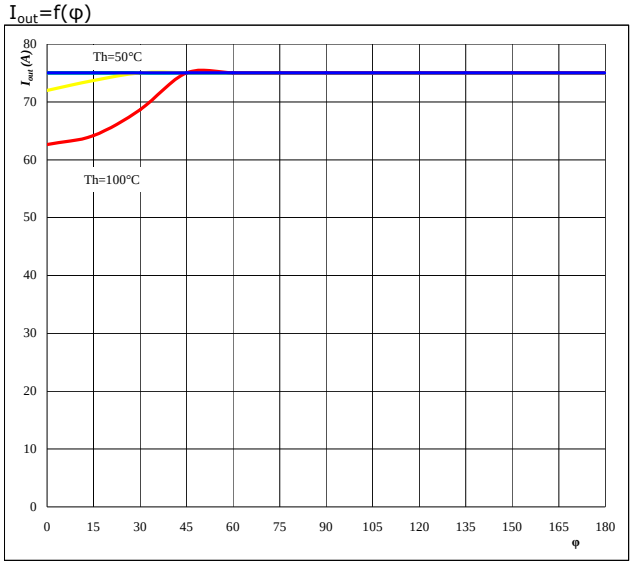


Conditions	T_j=	150	°C
	DC link=	700	V
	f_{sw}=	20	kHz

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

Typical available output current as a function of phase displacement φ

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

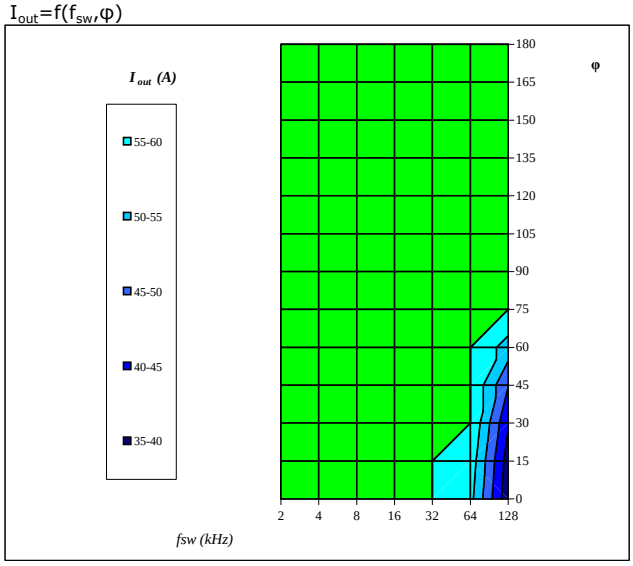


Conditions T_j= Tjmax-25 °C f_{sw}= 20 kHz
DC link= 700 V
parameter: Heatsink temp.
T_h from 50 °C to 100 °C
in 10 °C steps

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

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

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

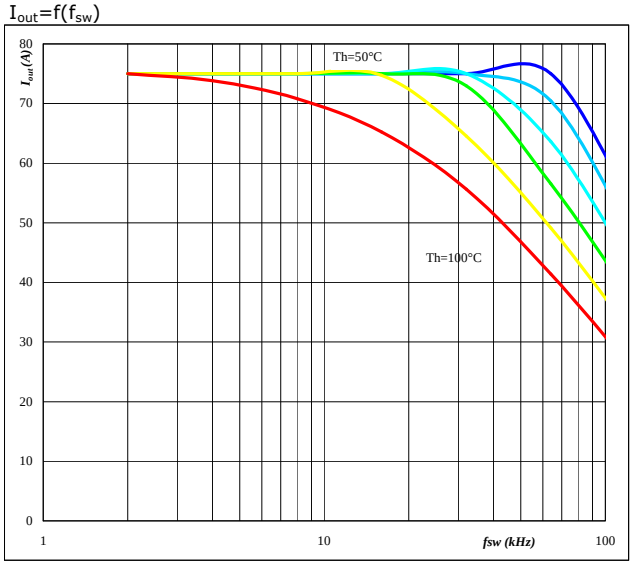


Conditions T_j= Tjmax-25 °C
DC link= 700 V
T_h= 80 °C

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

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

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

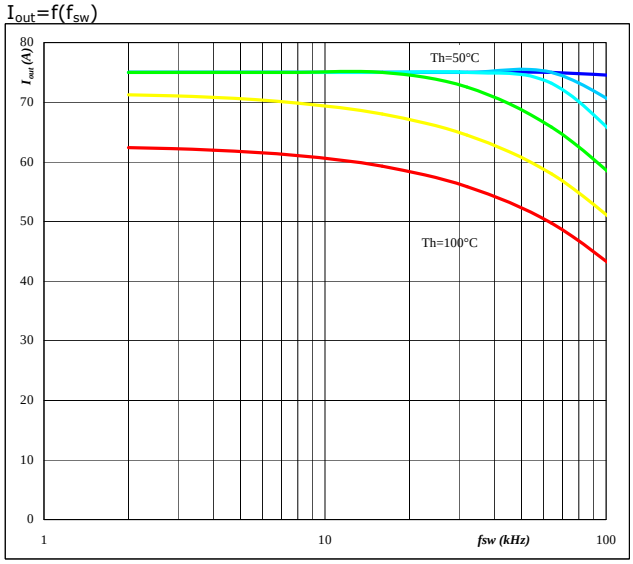


Conditions T_j= Tjmax-25 °C φ= 0 °
DC link= 700 V
parameter Heatsink temp.
T_h from 50 °C to 100 °C
in 10 °C steps

Figure 12. **for Buck IGBT+FWD**

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

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

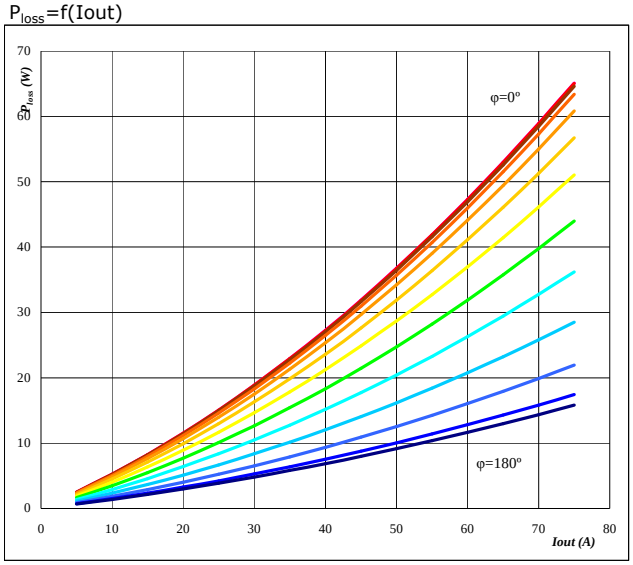


Conditions T_j= Tjmax-25 °C φ= 90 °
DC link= 700 V Vout $_{SC}$= 1 V
parameter Heatsink temp.
T_h from 50 °C to 100 °C
in 10 °C steps

Figure 13. **Boost IGBT**

Typical average static loss as a function of output current

P_{loss}=f(Iout)

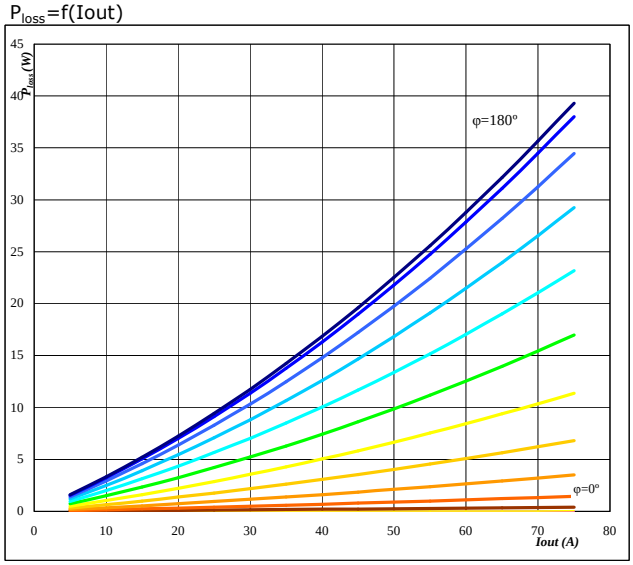


Conditions T_j= 150 °C
parameter **φ** from 0° to 180°
in 12 steps

Figure 14. **Boost FWD**

Typical average static loss as a function of output current

P_{loss}=f(Iout)

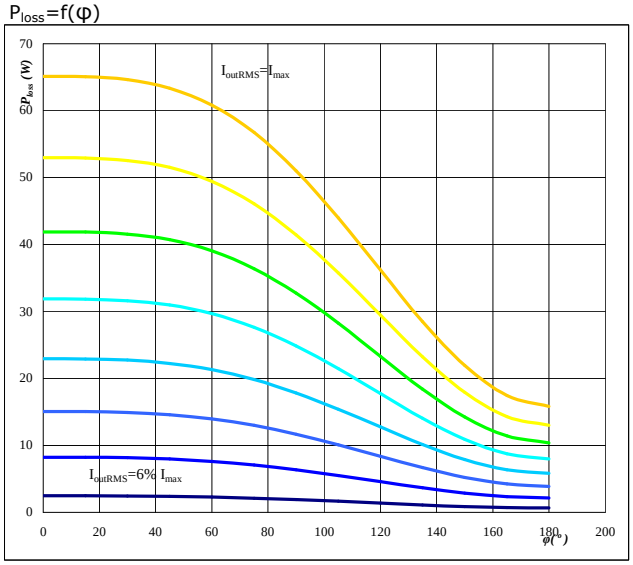


Conditions T_j= 150 °C
parameter **φ** from 0° to 180°
in 12 steps

Figure 15. **Boost IGBT**

Typical average static loss as a function of phase displacement

P_{loss}=f(φ)

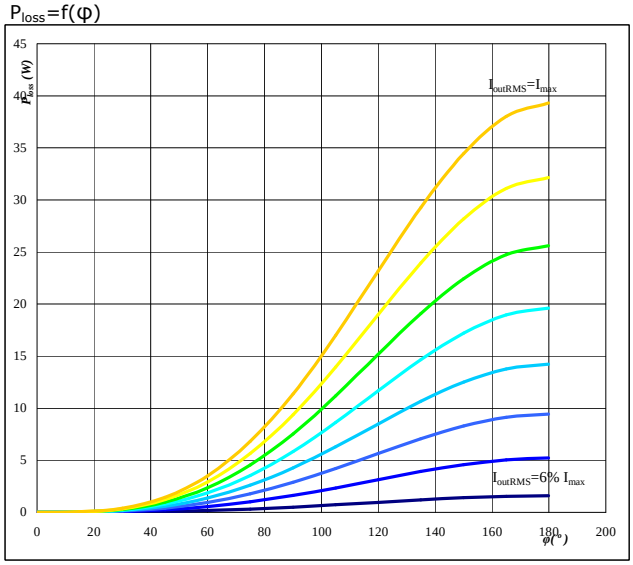


Conditions T_j= 150 °C
parameter I_{oRMS} from 5 A to 75 A
in steps of 10 A

Figure 16. **Boost FWD**

Typical average static loss as a function of phase displacement

P_{loss}=f(φ)

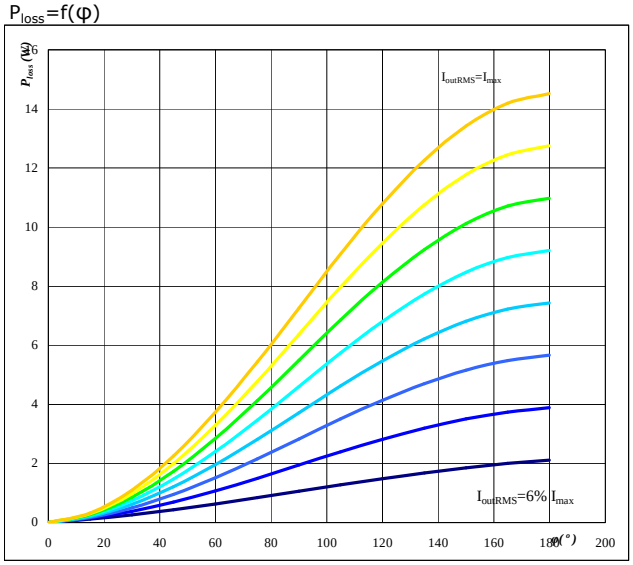


Conditions T_j= 150 °C
parameter I_{oRMS} from 5 A to 75 A
in steps of 10 A

Figure 17. **Boost IGBT**

Typical average switching loss as a function of phase displacement

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

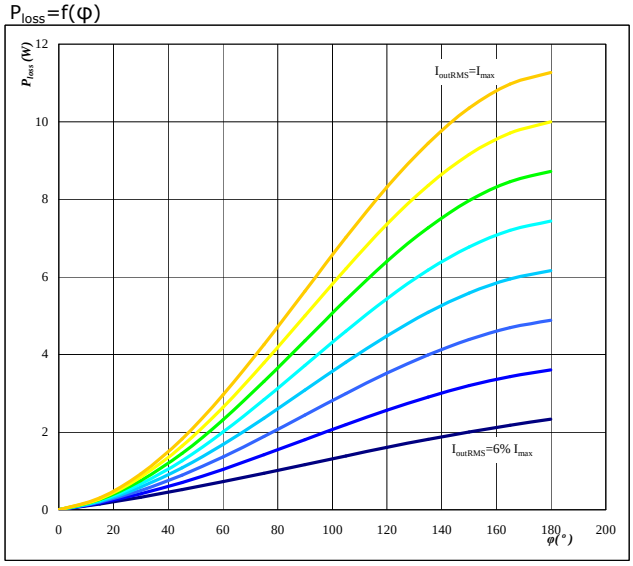


Conditions	T_j=	150	°C	f_{sw}=	20	kHz
	DC link=	700	V			
parameter	I_{oRMS}	from	5 A	to	75 A	
		in steps of	10 A	A		

Figure 18. **Boost FWD**

Typical average switching loss as a function of phase displacement

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

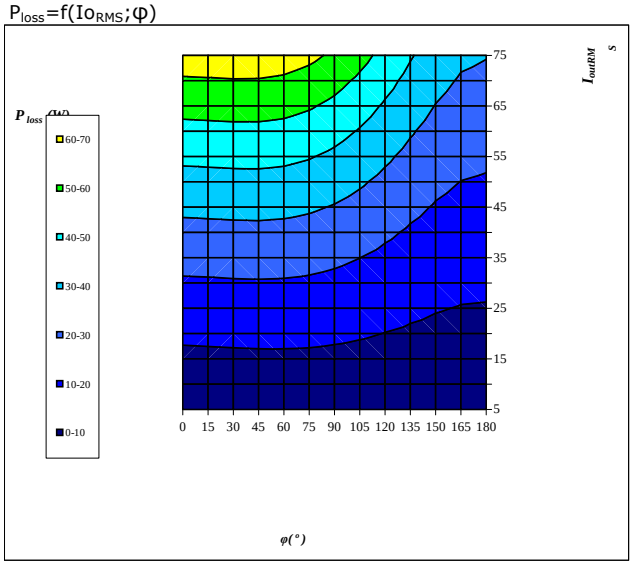


Conditions	T_j=	150	°C	f_{sw}=	20	kHz
	DC link=	700	V			
parameter	I_{oRMS}	from	5 A	to	75 A	
		in steps of	10 A	A		

Figure 19. **Boost IGBT**

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

$P_{loss}=f(Io_{RMS};\varphi)$

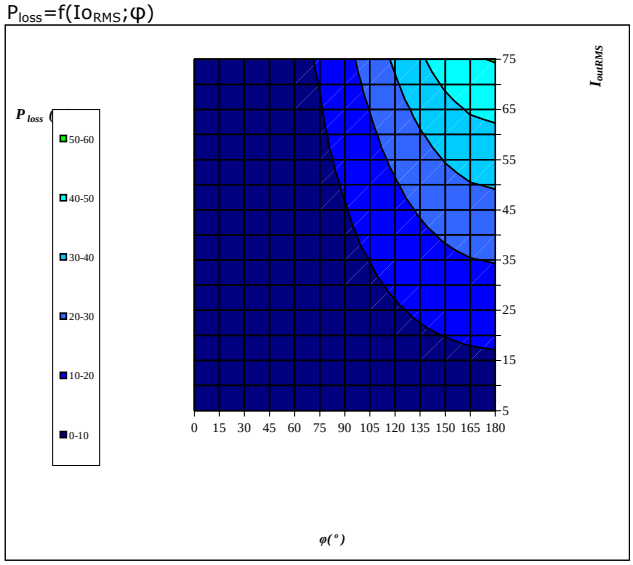


Conditions	T_j=	150	°C
	DC link=	700	V
	f_{sw}=	20	kHz

Figure 20. **Boost FWD**

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

$P_{loss}=f(Io_{RMS};\varphi)$

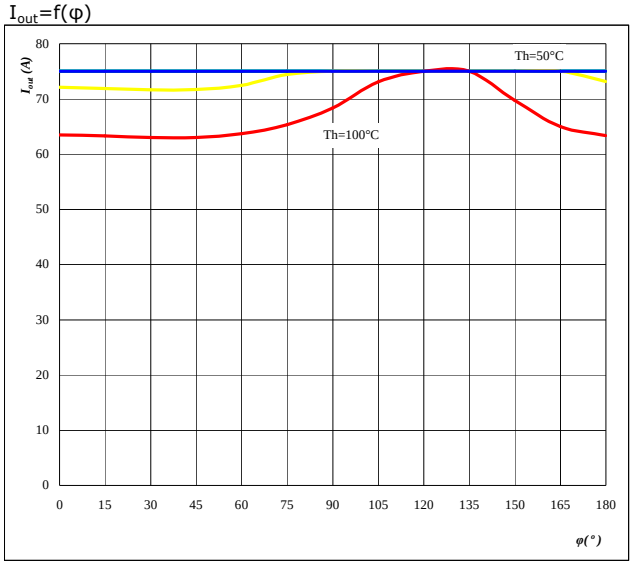


Conditions	T_j=	150	°C
	DC link=	700	V
	f_{sw}=	20	kHz

Figure 21. **Boost IGBT+FWD**

Typical available output current as a function of of phase displacement

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

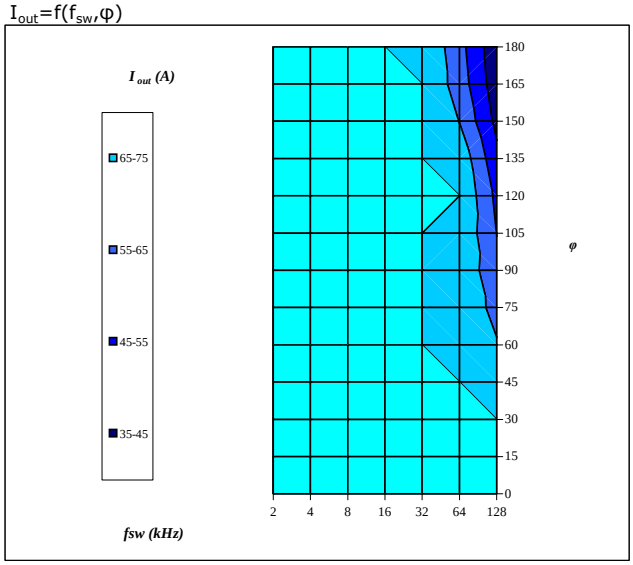


Conditions	T_j=	Tjmax-25	°C	f_{sw}=	20 kHz
	DC link=	700	V		
parameter:		Heatsink temp.			
	Th from	50	°C to	100	°C
	in	10	°C	steps	

Figure 22. **Boost IGBT+FWD**

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

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

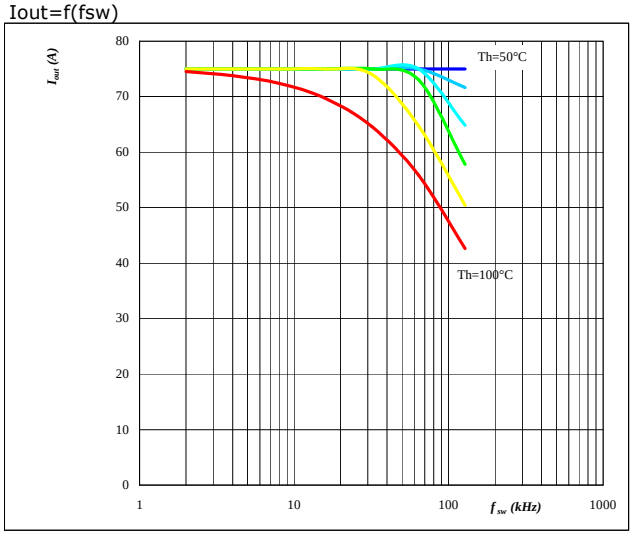


Conditions	T_j=	Tjmax-25	°C		
	DC link=	700	V		
	T_h=	80	°C		

Figure 23. **Boost IGBT+FWD**

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

Iout=f(fsw)

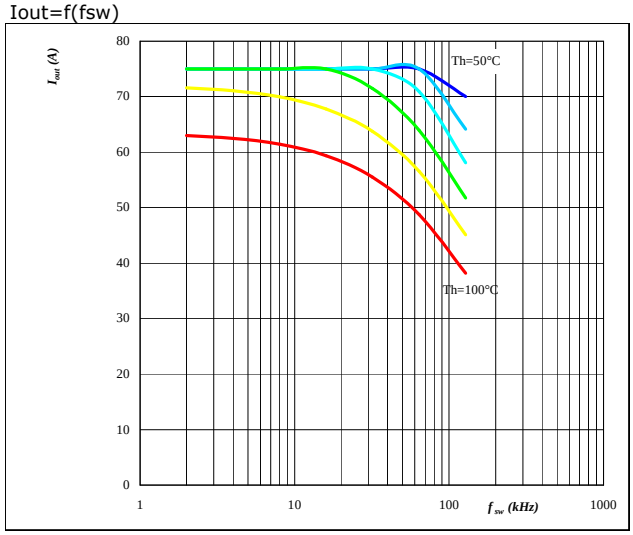


Conditions	T_j=	Tjmax-25	°C	φ=	90 °
	DC link=	700	V		
parameter:		Heatsink temp.			
	Th from	50	°C to	100	°C
	in	10	°C	steps	

Figure 24. **Boost IGBT+FWD**

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

Iout=f(fsw)

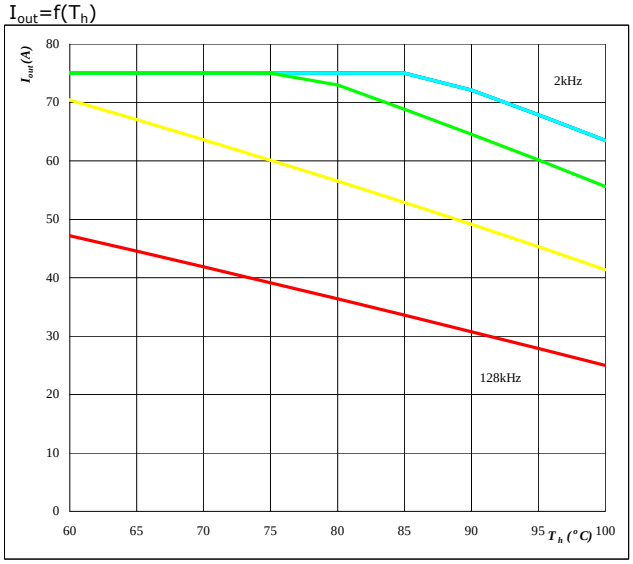


Conditions	T_j=	Tjmax-25	°C	φ=	90 °
	DC link=	700	V	$V_{out\ SC}$=	1 V
parameter:		Heatsink temp.			
	Th from	50	°C to	100	°C
	in	10	°C	steps	

Figure 25. **per MODULE**

Typical available output current as a function of heat sink temperature

$I_{out}=f(T_h)$

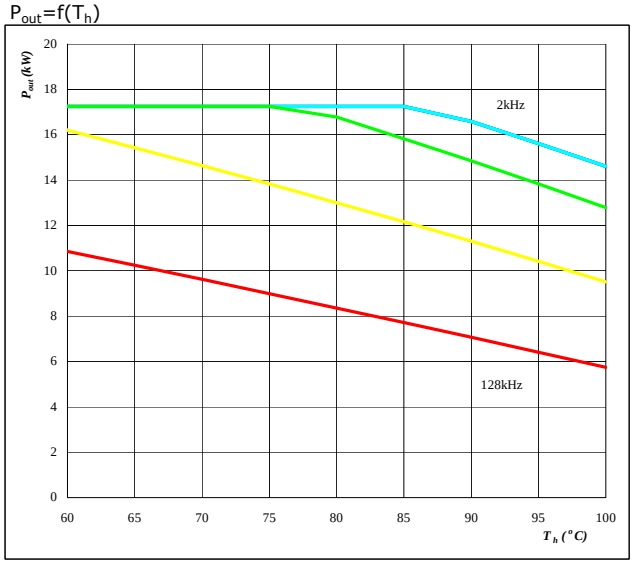


Conditions	T_j=	Tjmax-25	°C	
	DC link=	700	V	
	φ=	0	°	
parameter:		Switching freq.		
	fsw from	2	kHz to	128 kHz
	in steps of factor 2			

Figure 26. **per MODULE**

Typical available output power as a function of heat sink temperature

$P_{out}=f(T_h)$

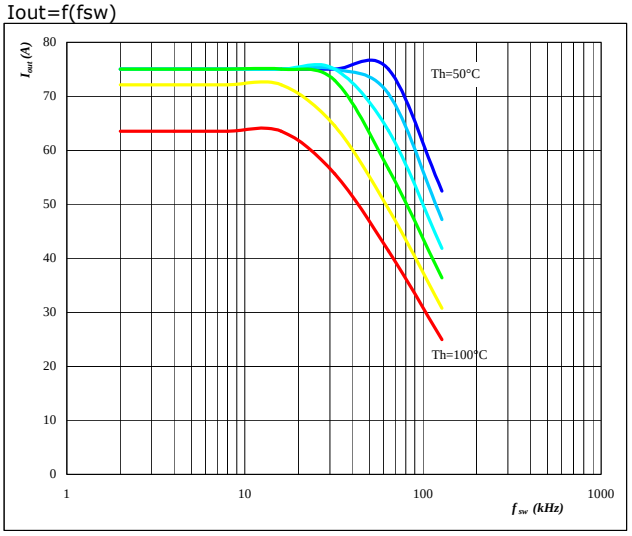


Conditions	T_j=	Tjmax-25	°C	
	DC link=	700	V	
	φ=	0	°	
parameter:		Switching freq.		
	fsw from	2	kHz to	128 kHz
	in steps of factor 2			

Figure 27. **per MODULE**

Typical available output current as a function of switching frequency

Iout=f(fsw)

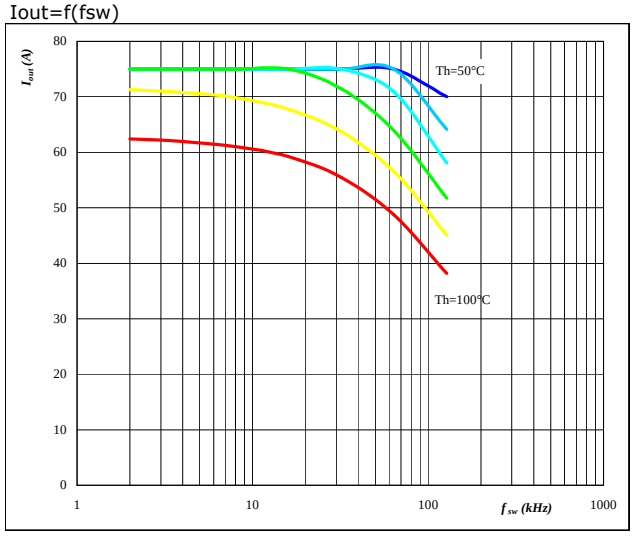


Conditions	T_j=	Tjmax-25	°C	φ=	0	°
	DC link=	700	V			
parameter:		Heatsink temp.				
	Th from	50	°C to	100		
	in	10	°C	steps		

Figure 28. **per MODULE**

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

Iout=f(fsw)

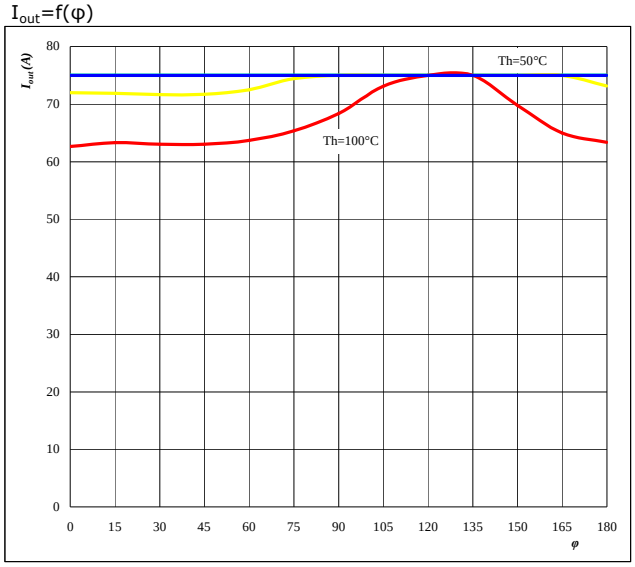


Conditions	T_j=	Tjmax-25	°C	φ=	90	°
	DC link=	700	V	Vout $_{SC}$=	1	V
parameter:		Heatsink temp.				
	Th from	50	°C to	100	°C	
	in	10	°C	steps		

Figure 29. **per MODULE**

Typical available output current as a function of phase displacement

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

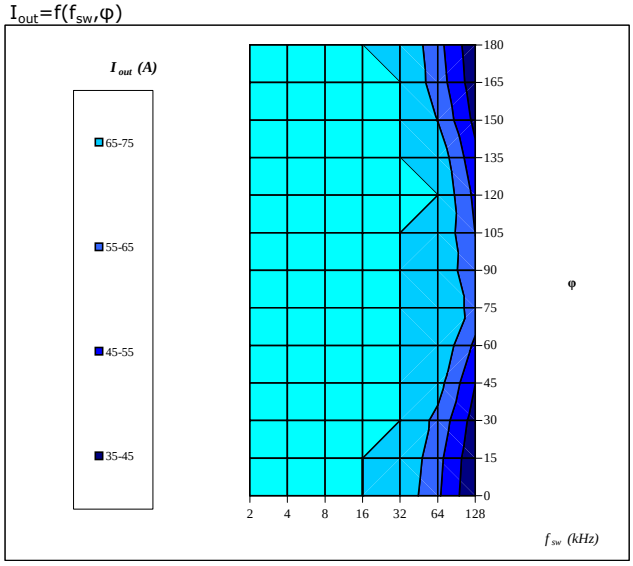


Conditions	T_j=	Tjmax-25	°C	
	DC link=	700	V	
	f_{sw}=	20	kHz	
parameter:		Heatsink temp.		
	Th from	50	°C to	100
	in	10	°C	steps

Figure 30. **per MODULE**

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

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

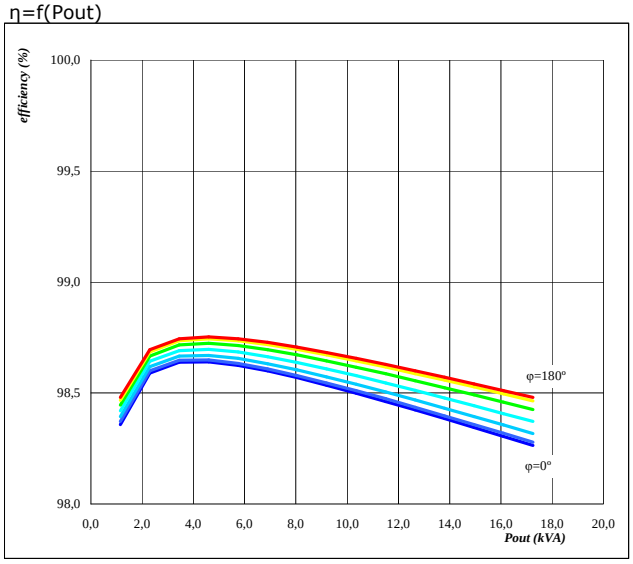


Conditions	T_j=	Tjmax-25	°C
	DC link=	700	V
	T_h=	80	°C

Figure 32. **per MODULE**

Typical efficiency as a function of output power

η=f(Pout)

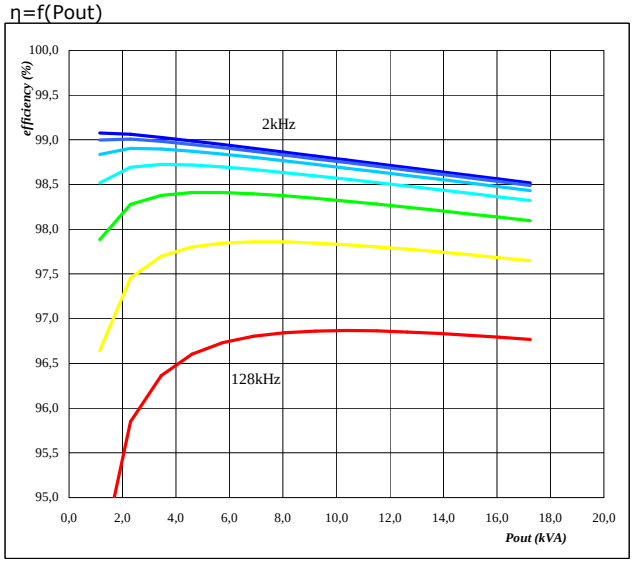


Conditions	T_j=	150	°C	
	f_{sw}=	20	kHz	
	DC link=	700	V	
parameter:		phase displacement		
	φ	from	0 °	to 180 °
	in steps of 30 °			

Figure 33. **per MODULE**

Typical efficiency as a function of output power

η=f(Pout)

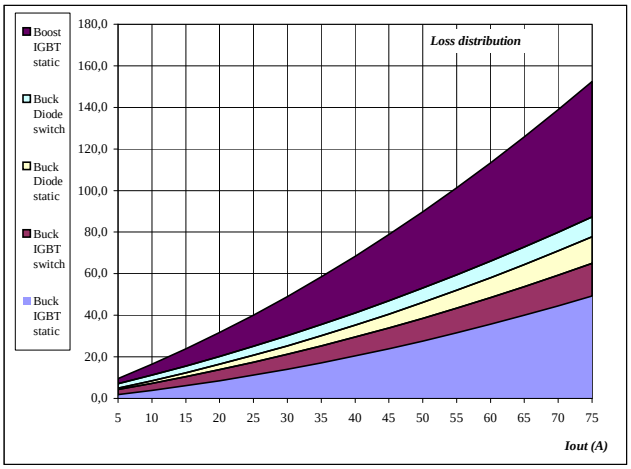


Conditions	T_j=	150	°C	φ= 0 °
	DC link=	700	V	
parameter:		Switching freq.		
	fsw from	2	kHz to	128 kHz
	in steps of factor 2			

Figure 34. **per MODULE**

Typical loss distribution as a function of output current

$P_{out}=f(T_h)$

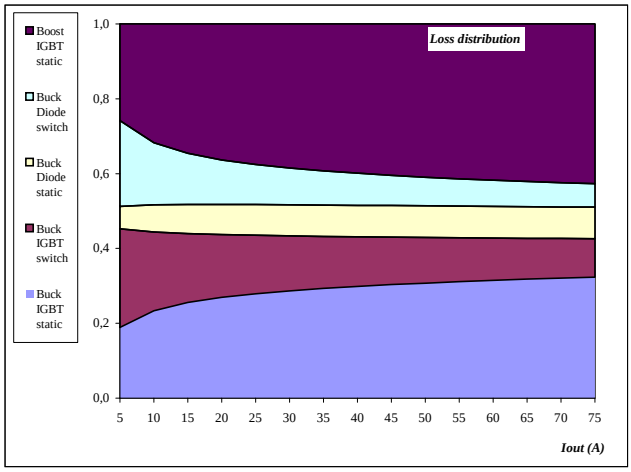


Conditions:			
	T_j=	150	°C
	f_{sw}=	20	kHz
	DC link=	700	V
	φ=	0 °	

Figure 35. **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 °