

flowNPC 0 **NPC Application** 600V/ 75A

General conditions

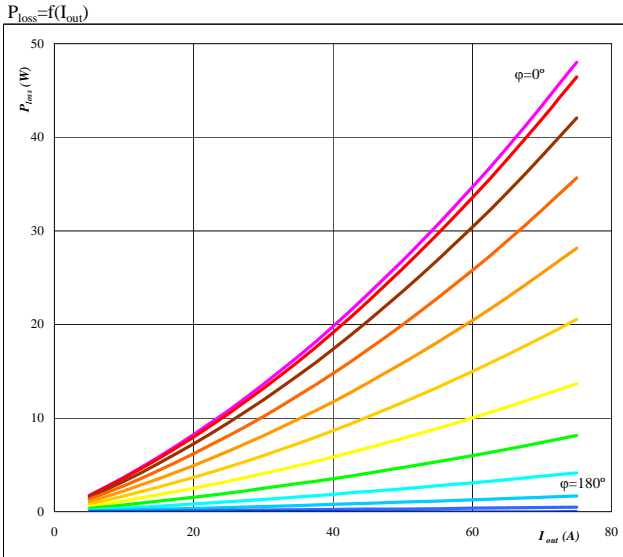
BUCK		
V_{GEon}	=	+ 15 V
V_{GEoff}	=	- 15 V
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

$V_{out} = 230 V_{AC}$

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

Figure 1. Buck MOSFET

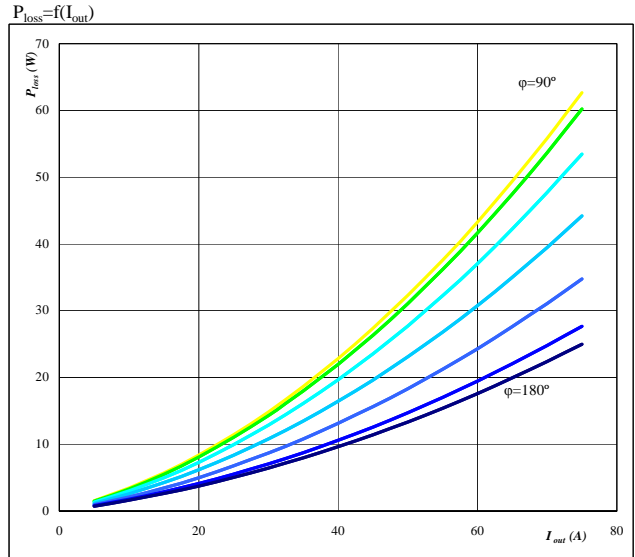
Typical average static loss as a function of output current I_{oRMS}



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: ϕ from 0° to 180°
in 12 steps

Figure 2. Buck FWD

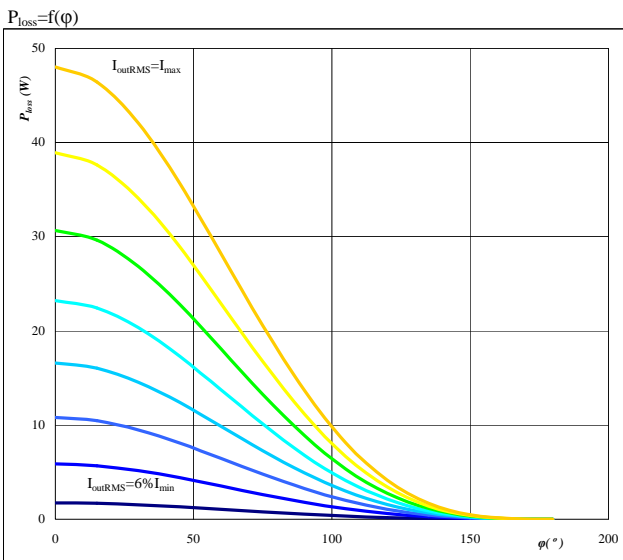
Typical average static loss as a function of output current I_{oRMS}



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: ϕ from 0° to 180°
in 12 steps

Figure 3. Buck MOSFET

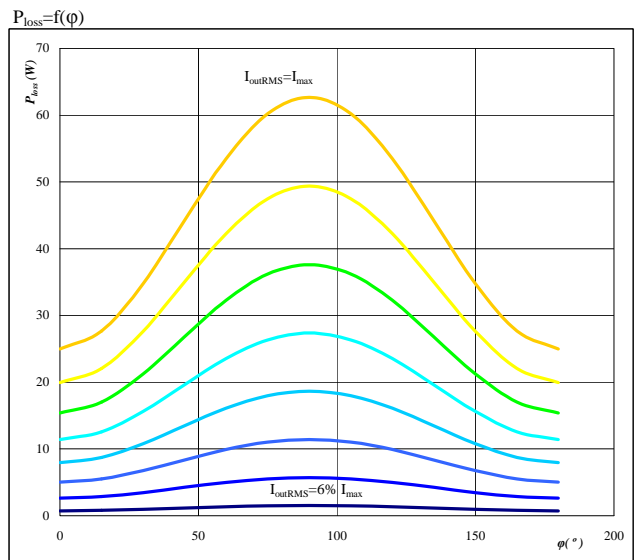
Typical average static loss as a function of phase displacement ϕ



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: I_{oRMS} from 5 A to 75 A
in steps of 10 A

Figure 4. Buck FWD

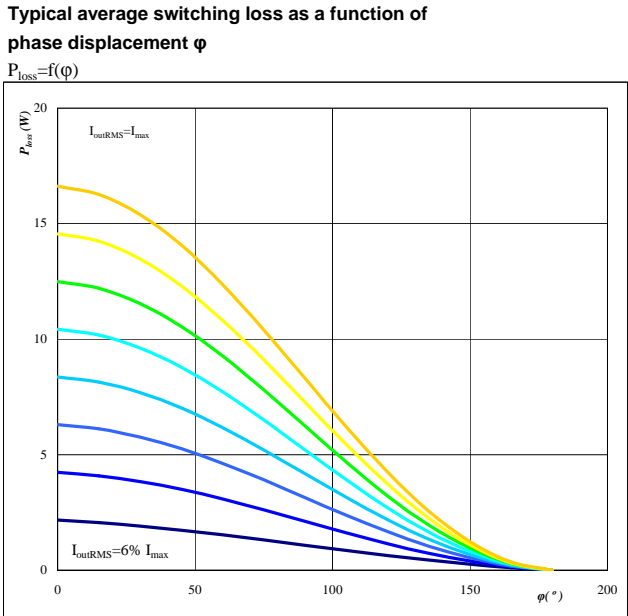
Typical average static loss as a function of phase displacement ϕ



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: I_{oRMS} from 5 A to 75 A
in steps of 10 A

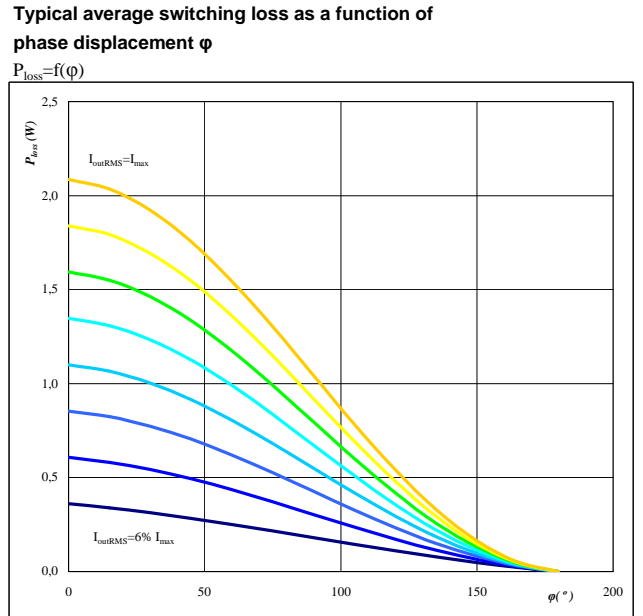
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Figure 5. Buck MOSFET



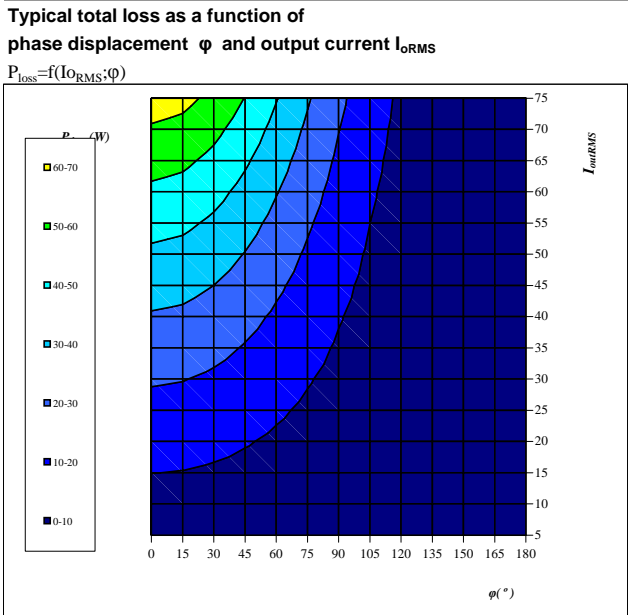
Conditions: $T_j = 125$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 5 A to 75 A
 in steps of 10 A

Figure 6. Buck FWD



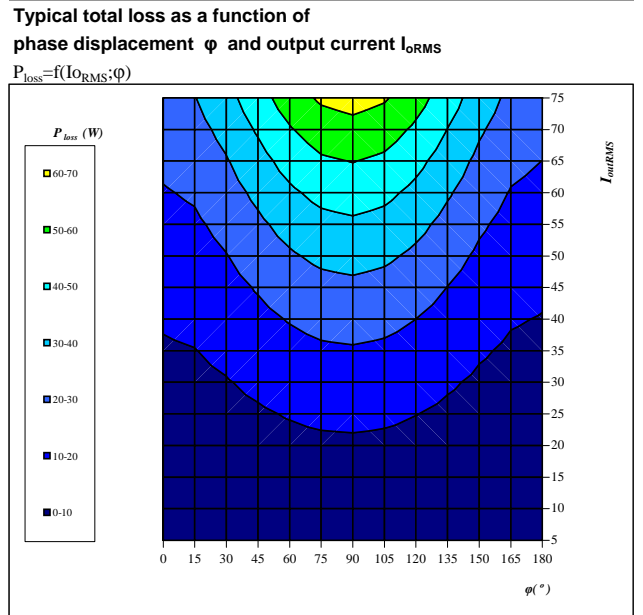
Conditions: $T_j = 125$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 5 A to 75 A
 in steps of 10 A

Figure 7. Buck MOSFET



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

Figure 8. Buck FWD



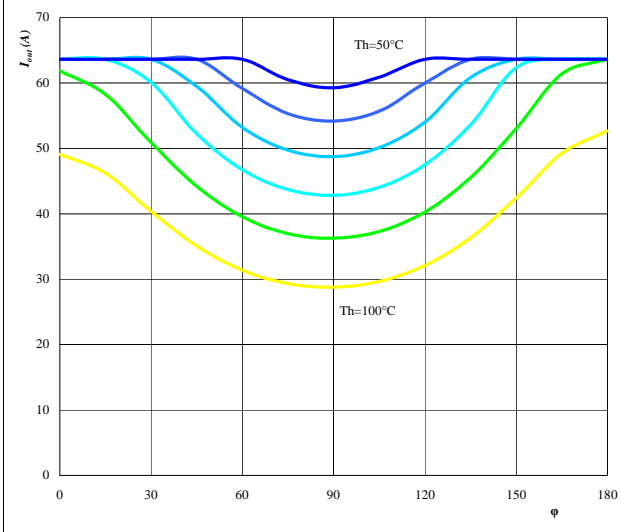
Conditions: $T_j = 125$ °C
 DC link = 700 V
 $f_{sw} = 20$ kHz

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Figure 9. for Buck MOSFET+FWD

Typical available output current as a function of phase displacement φ

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

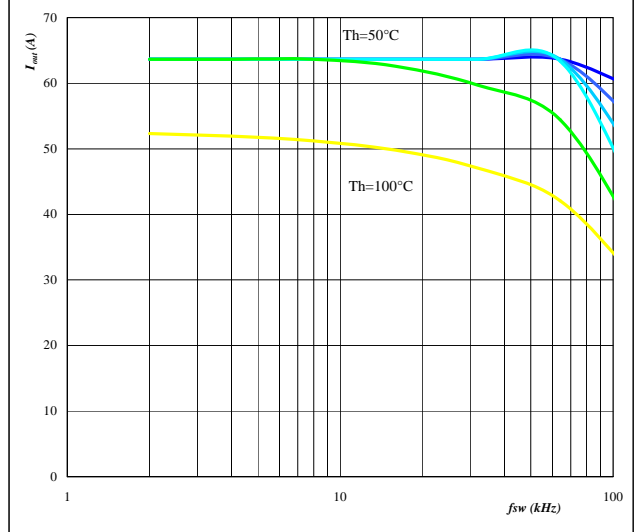


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$ $f_{sw} = 20 \text{ kHz}$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 10. for Buck MOSFET+FWD

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

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

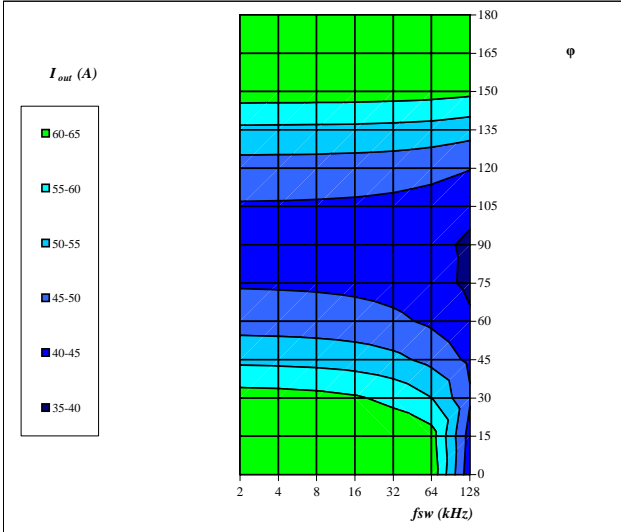


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$ $\varphi = 0 \text{ }^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 11. for Buck IGBT+FWD

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

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

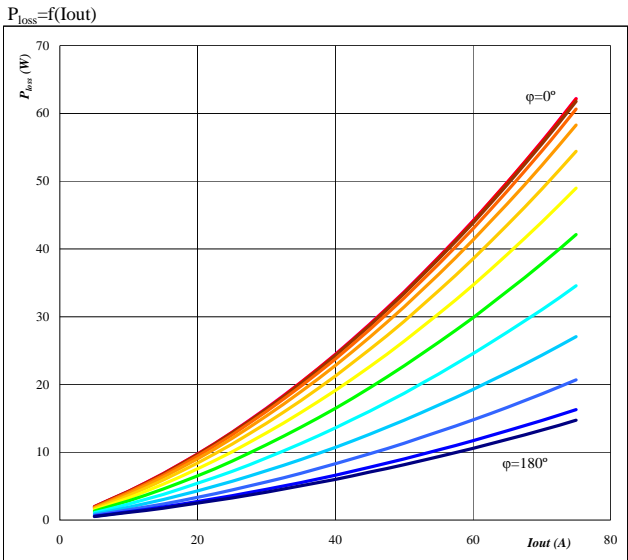


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$
 DC link = 700 V
 $T_h = 80 \text{ }^\circ\text{C}$

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Figure 12. Boost IGBT

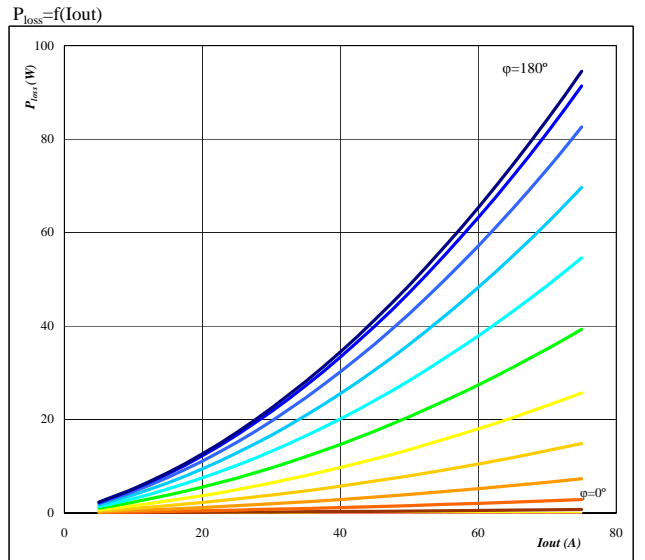
Typical average static loss as a function of output current



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: ϕ from 0° to 180°
in 12 steps

Figure 13. Boost FWD

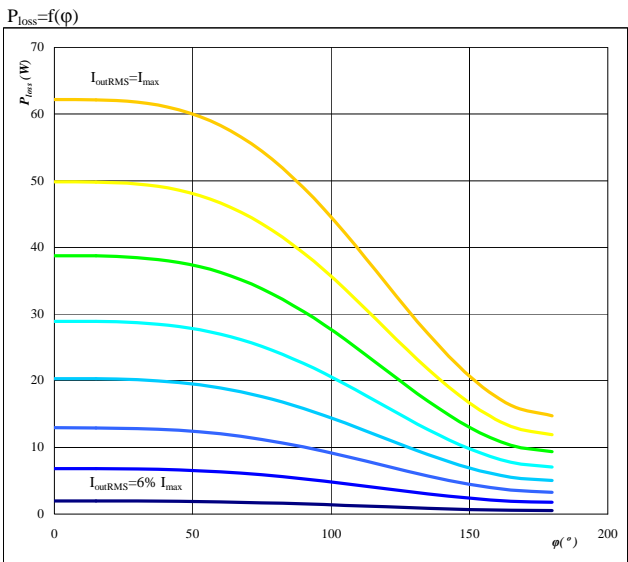
Typical average static loss as a function of output current



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: ϕ from 0° to 180°
in 12 steps

Figure 14. Boost IGBT

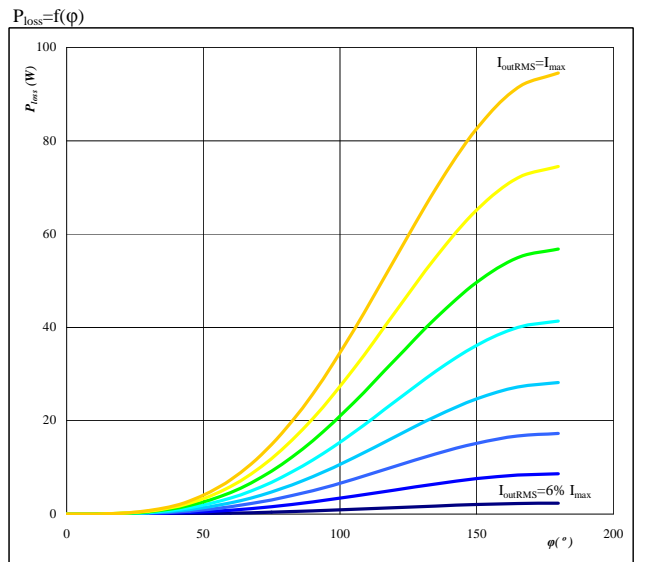
Typical average static loss as a function of phase displacement



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: I_{oRMS} from 5 A to 75 A
in steps of 10 A

Figure 15. Boost FWD

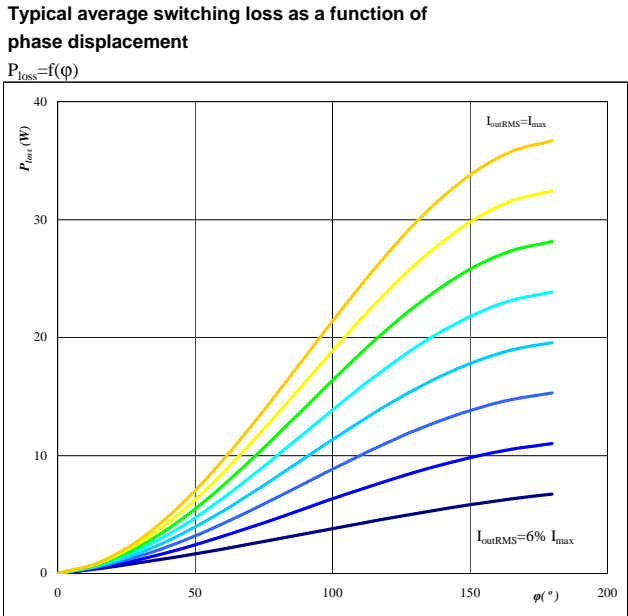
Typical average static loss as a function of phase displacement



Conditions: $T_j = 125 \text{ }^\circ\text{C}$
parameter: I_{oRMS} from 5 A to 75 A
in steps of 10 A

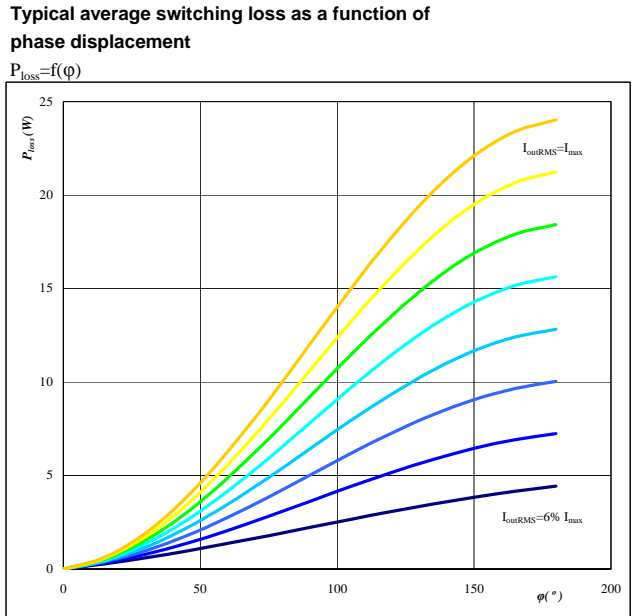
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Figure 16. Boost IGBT



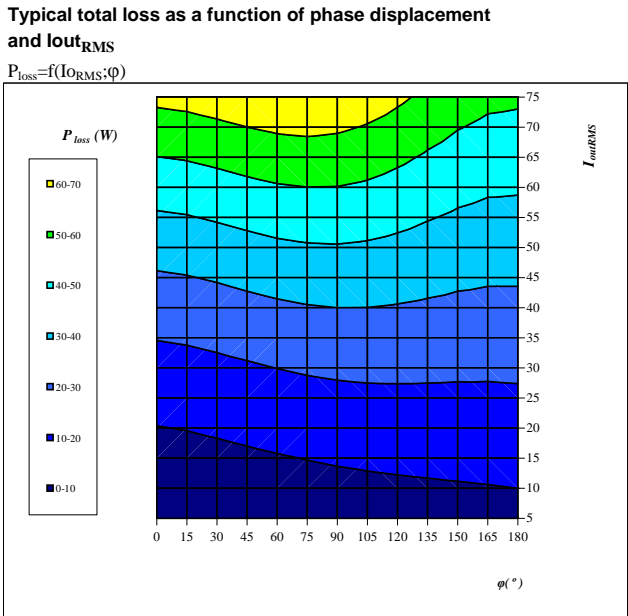
Conditions: $T_j= 125 \text{ }^\circ\text{C}$ $f_{sw}= 20 \text{ kHz}$
 DC link= 700 V
 parameter: I_{oRMS} from 5 A to 75 A
 in steps of 10 A A

Figure 17. Boost FWD



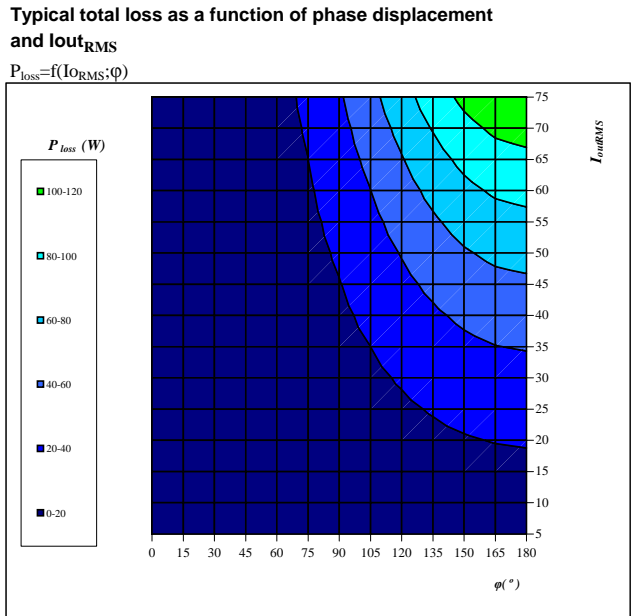
Conditions: $T_j= 125 \text{ }^\circ\text{C}$ $f_{sw}= 20 \text{ kHz}$
 DC link= 700 V
 parameter: I_{oRMS} from 5 A to 75 A
 in steps of 10 A A

Figure 18. Boost IGBT



Conditions: $T_j= 125 \text{ }^\circ\text{C}$
 DC link= 700 V
 $f_{sw}= 20 \text{ kHz}$

Figure 19. Boost FWD



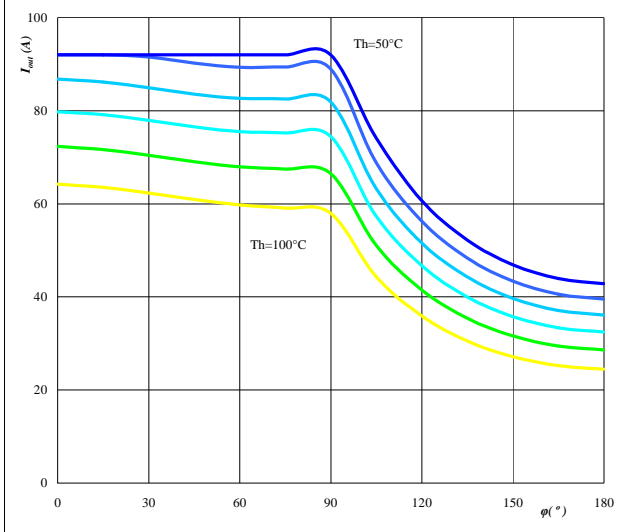
Conditions: $T_j= 125 \text{ }^\circ\text{C}$
 DC link= 700 V
 $f_{sw}= 20 \text{ kHz}$

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Figure 20. Boost IGBT+FWD

Typical available output current as a function of phase displacement

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

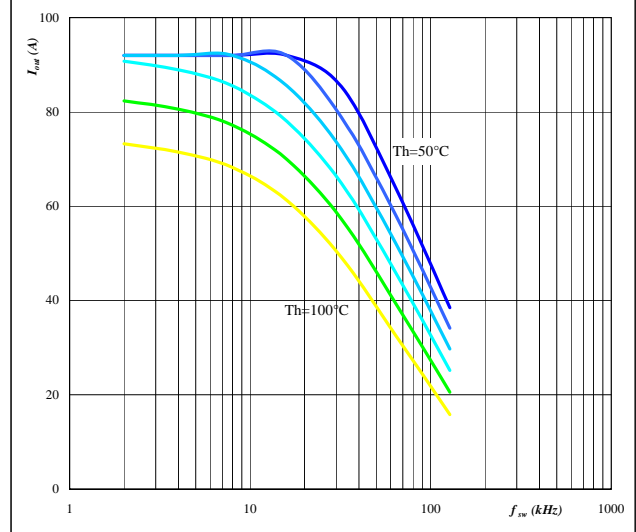


Conditions: $T_j = T_{jmax} - 25 \text{ }^\circ\text{C}$ $f_{sw} = 20 \text{ kHz}$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 21. Boost IGBT+FWD

Typical available output current as a function of switching frequency

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

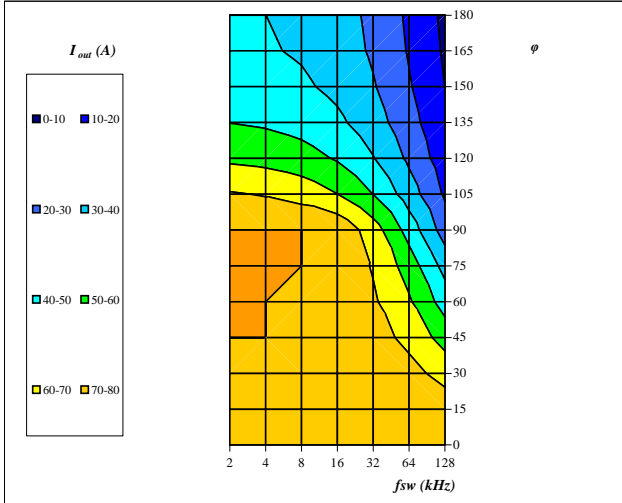


Conditions: $T_j = T_{jmax} - 25 \text{ }^\circ\text{C}$ $\varphi = 90^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 22. Boost IGBT+FWD

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

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



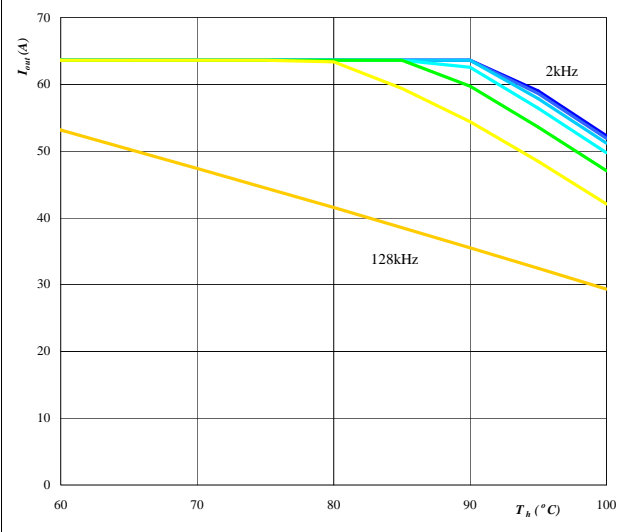
Conditions: $T_j = T_{jmax} - 25 \text{ }^\circ\text{C}$
 DC link = 700 V
 $T_h = 80 \text{ }^\circ\text{C}$

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Figure 23. per MODULE

Typical available output current as a function of heat sink temperature

$I_{out}=f(T_h)$

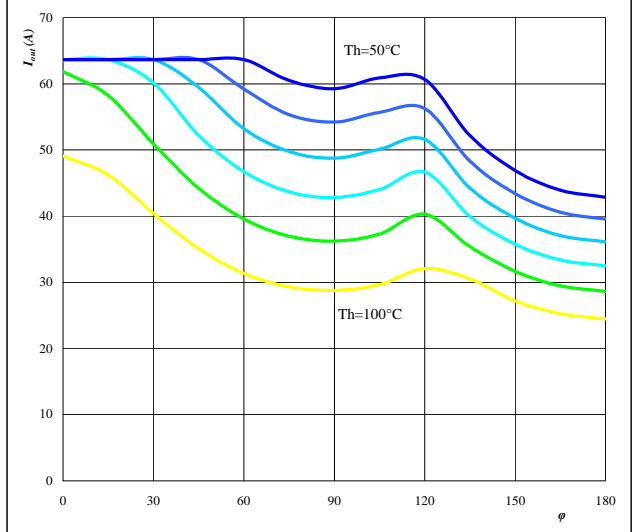


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
DC link= 700 V
 $\varphi = 0^\circ$
parameter: Switching freq.
fsw from 2 kHz to 128 kHz
in steps of factor 2

Figure 24. per MODULE

Typical available output current as a function of phase displacement

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

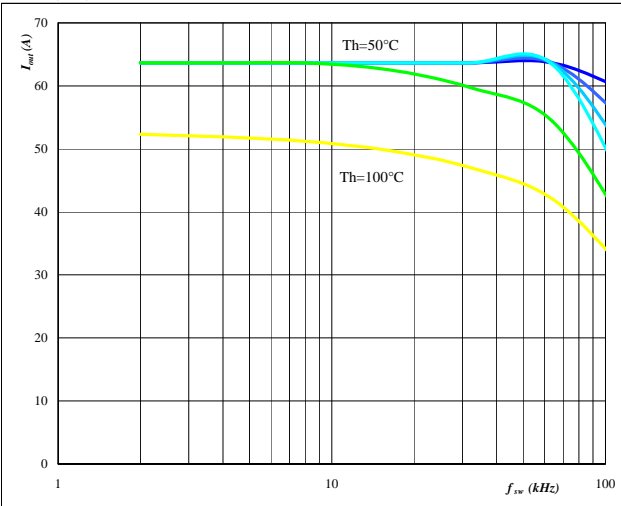


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
DC link= 700 V
fsw= 20 kHz
parameter: Heatsink temp.
Th from 50 °C to 100 °C
in 10 °C steps

Figure 25. per MODULE

Typical available output current as a function of switching frequency

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

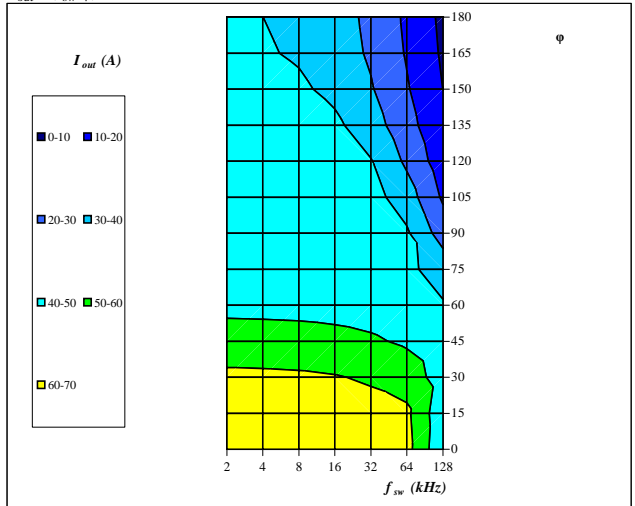


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$ $\varphi = 0^\circ$
DC link= 700 V
parameter: Heatsink temp.
Th from 50 °C to 100 °C
in 10 °C steps

Figure 26. per MODULE

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

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

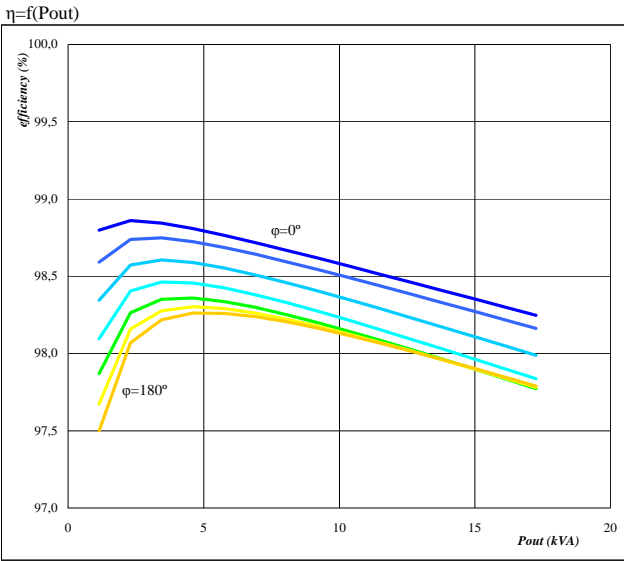


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
DC link= 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

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Figure 27. per MODULE

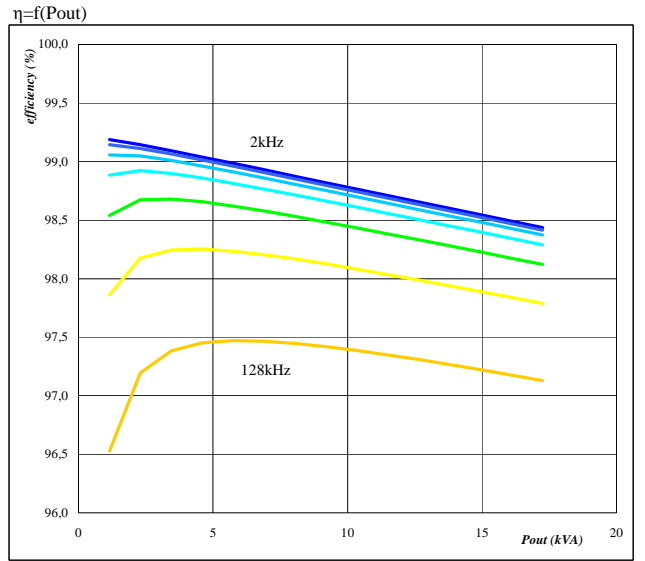
Typical efficiency as a function of output power



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

Figure 28. per MODULE

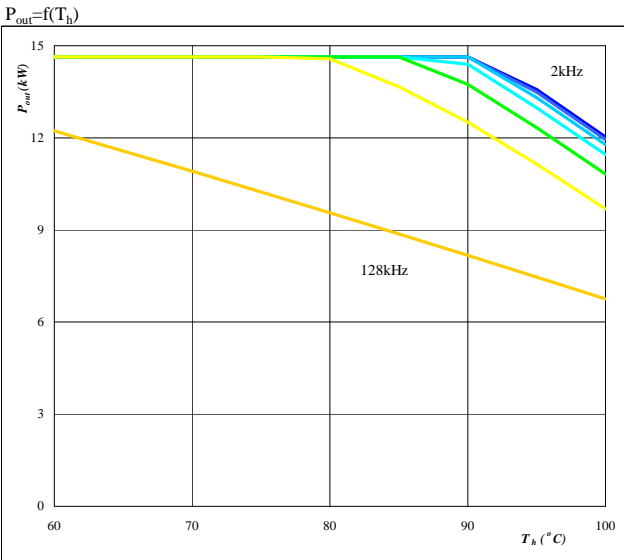
Typical efficiency as a function of output power



Conditions: $T_j = 125 \text{ }^\circ\text{C}$ $\varphi = 0^\circ$
 DC link = 700 V
 parameter: Switching freq. f_{sw} from 2 kHz to 128 kHz in steps of factor 2

Figure 29. per MODULE

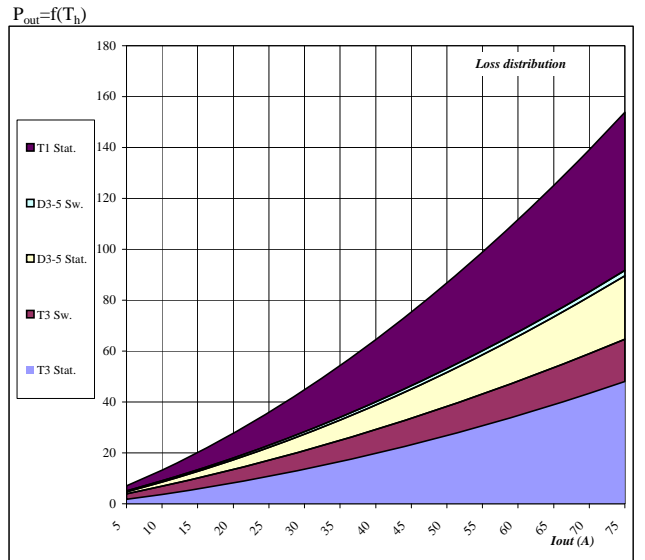
Typical available output power as a function of heat sink temperature



Conditions: $T_j = T_{jmax} - 25 \text{ }^\circ\text{C}$
 DC link = 700 V
 $\varphi = 0^\circ$
 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

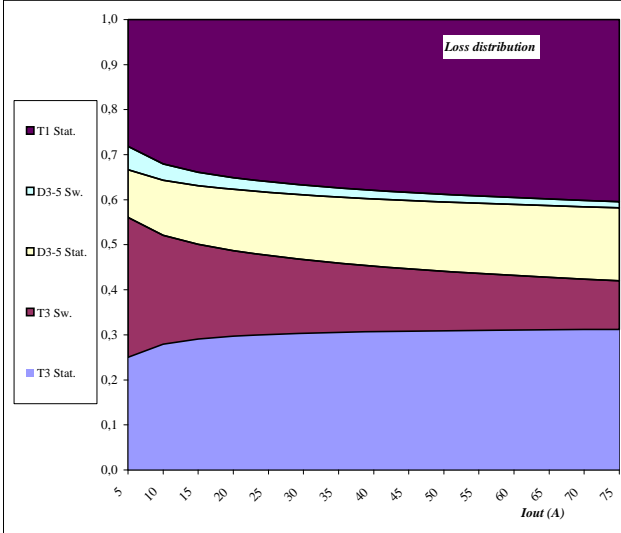


Conditions: $T_j = 125 \text{ }^\circ\text{C}$
 $f_{sw} = 20 \text{ kHz}$
 DC link = 700 V
 $\varphi = 0^\circ$

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Figure 31. per MODULE

Typical relativ loss distribution as a function of output current

$$P_{out} = f(T_h)$$



Conditions:

$T_j =$	125	°C
$f_{sw} =$	20	kHz
DC link =	700	V
$\varphi =$	0°	

Figure 32. per MODULE
