

flowNPC0 NPC Application 600V/50A

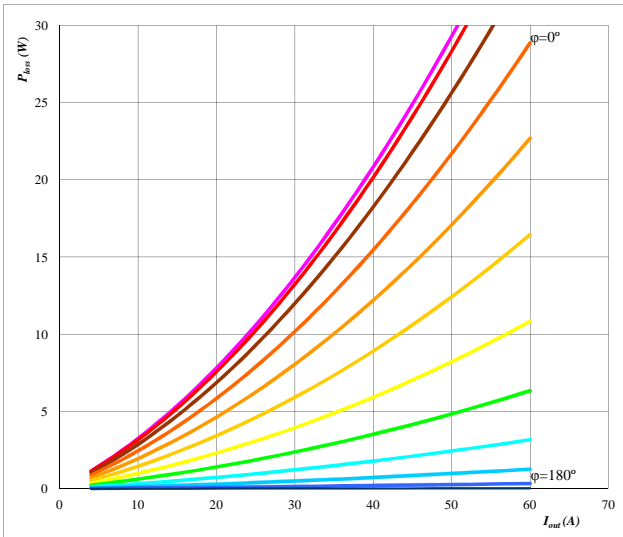
General conditions

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

$V_{out} = 230$ VAC

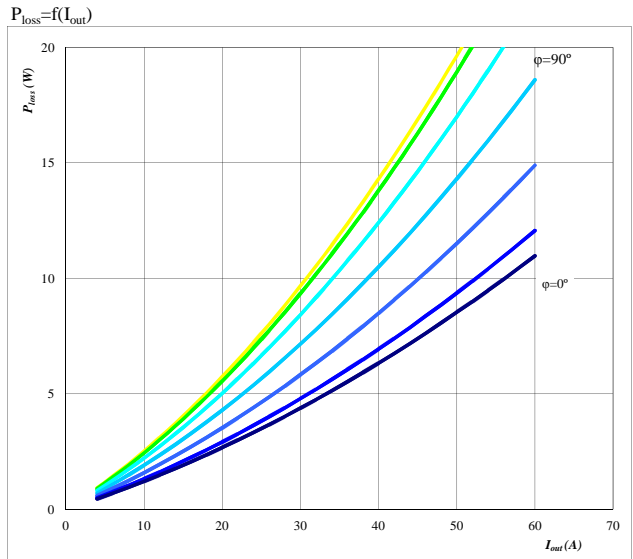
BOOST	
V_{GEon}	= 15 V
V_{GEoff}	= -15 V
R_{gon}	= 8 Ω
R_{goff}	= 8 Ω

Figure 1. Buck IGBT
Typical average static loss as a function of



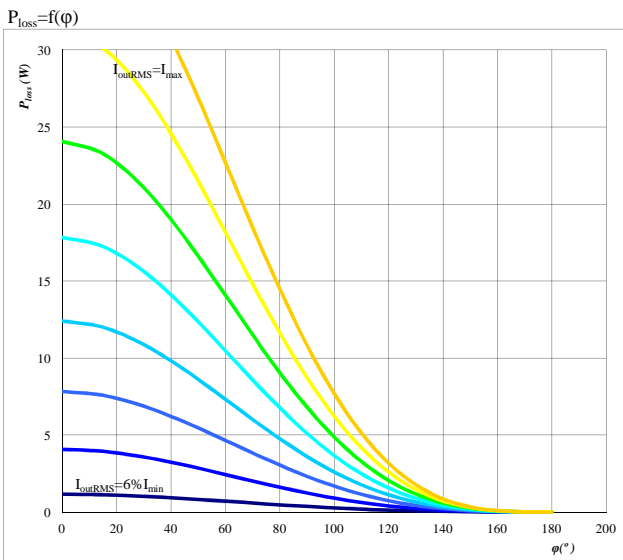
Conditions: $T_j = 150$ °C
parameter: ϕ from 0° to 180°
in 12 steps

Figure 2. Buck FWD
Typical average static loss as a function of output current I_{oRMS}



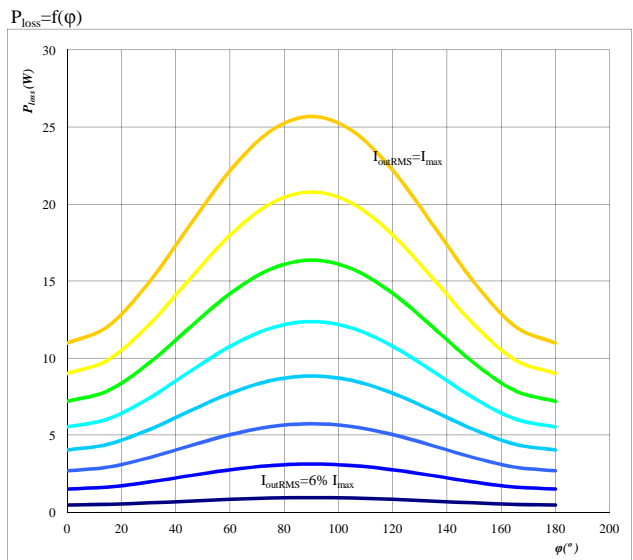
Conditions: $T_j = 150$ °C
parameter: ϕ from 0° to 180°
in 12 steps

Figure 3. Buck IGBT
Typical average static loss as a function of phase displacement ϕ



Conditions: $T_j = 150$ °C
parameter: I_{oRMS} from 4 A to 60 A
in steps of 8 A

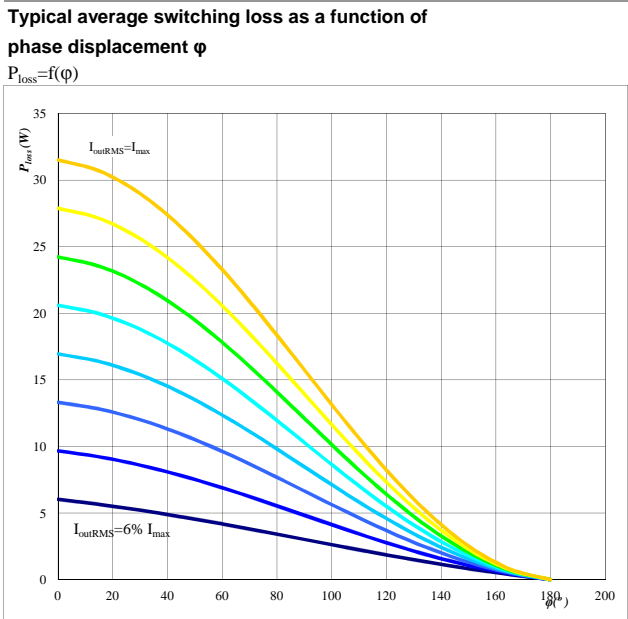
Figure 4. Buck FWD
Typical average static loss as a function of phase displacement ϕ



Conditions: $T_j = 150$ °C
parameter: I_{oRMS} from 4 A to 60 A
in steps of 8 A

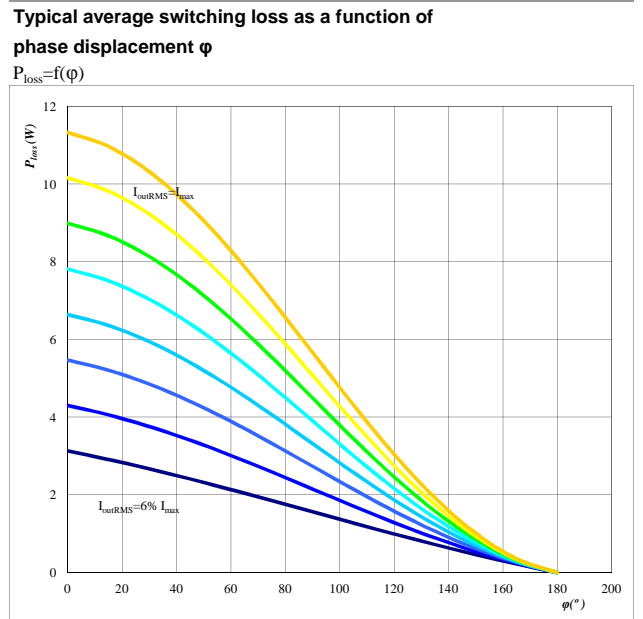
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Figure 5. Buck IGBT



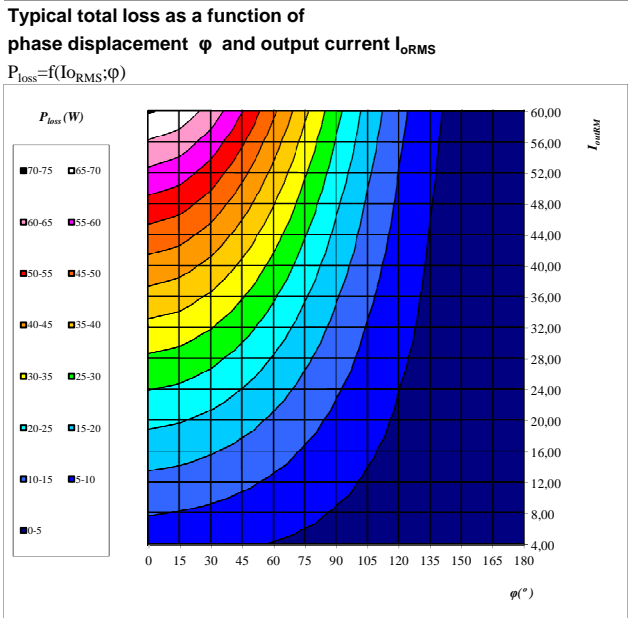
Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 4 A to 60 A
 in steps of 8 A

Figure 6. Buck FWD



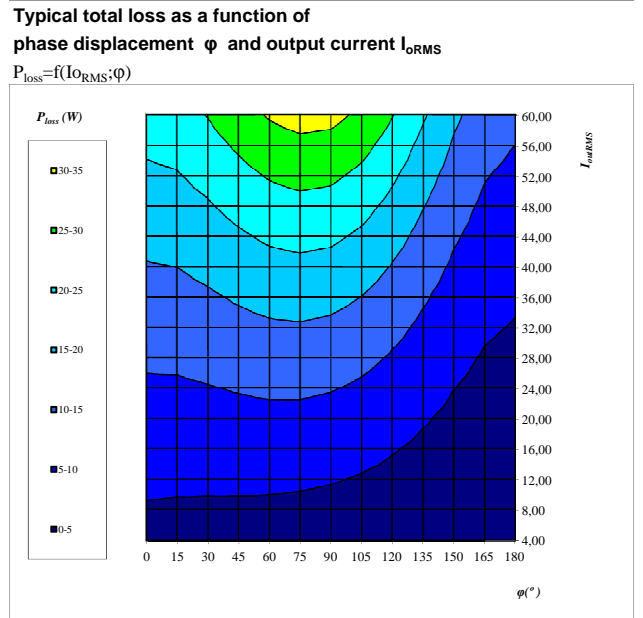
Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 4 A to 60 A
 in steps of 8 A

Figure 7. Buck IGBT



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

Figure 8. Buck FWD



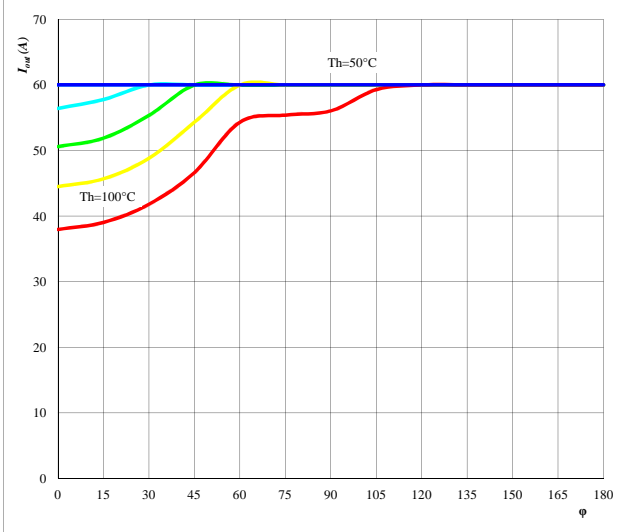
Conditions: $T_j = 150$ °C
 DC link = 700 V
 $f_{sw} = 20$ kHz

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Figure 9. for Buck IGBT+FWD

Typical available output current as a function of phase displacement ϕ

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

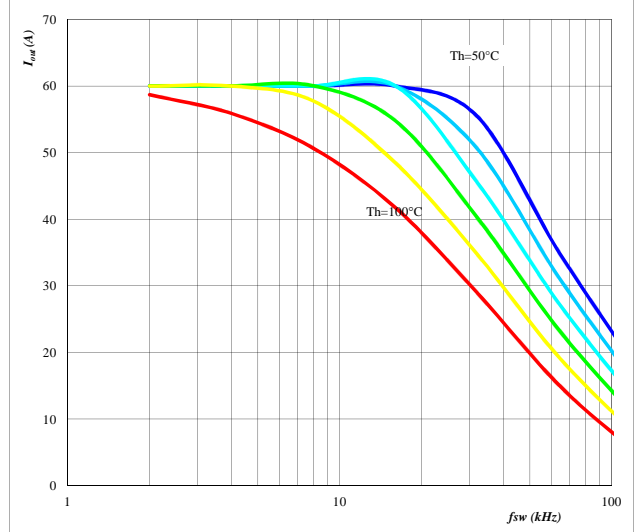


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$ $f_{sw} = 20 \text{ kHz}$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 10. for Buck IGBT+FWD

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

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

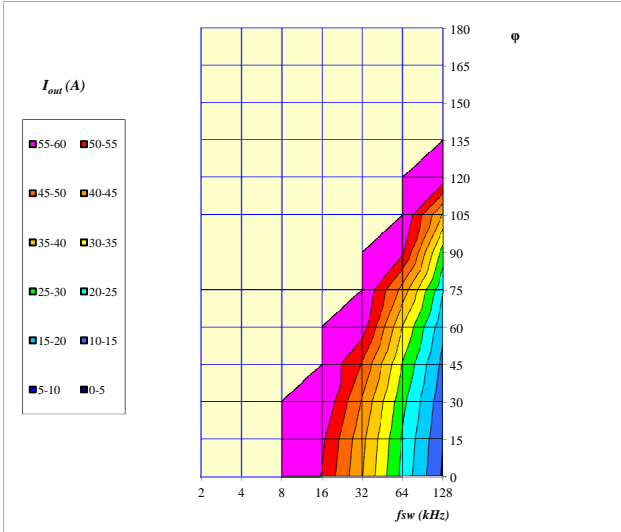


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$ $\phi = 0^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 11. for Buck IGBT+FWD

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

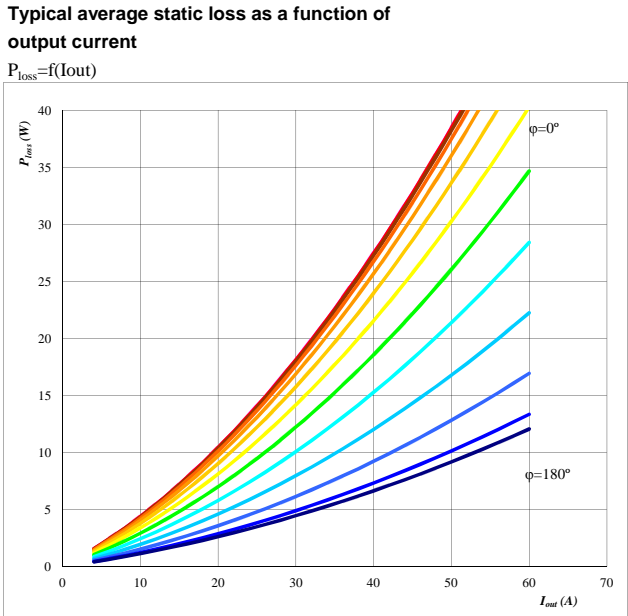
$I_{out}=f(f_{sw},\phi)$



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

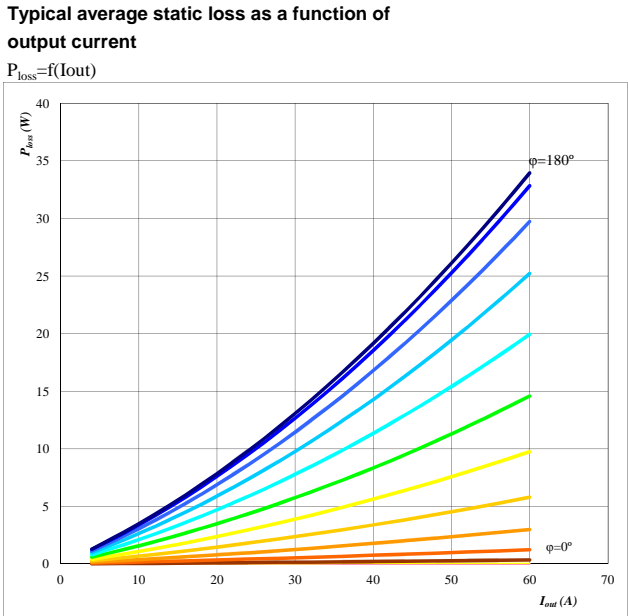
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Figure 12. Boost IGBT



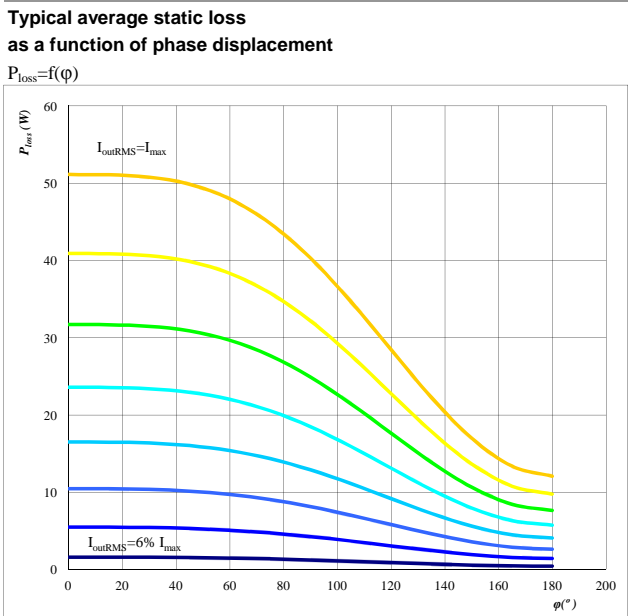
Conditions: $T_j = 150$ °C
 parameter: ϕ from 0° to 180°
 in 12 steps

Figure 13. Boost FWD



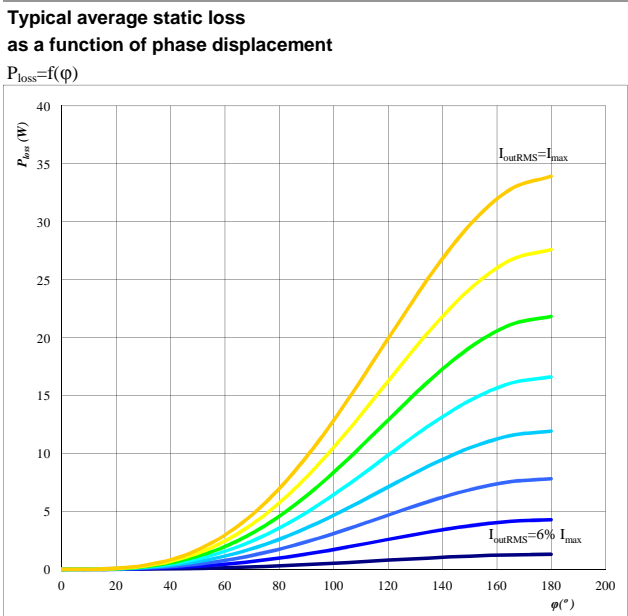
Conditions: $T_j = 150$ °C
 parameter: ϕ from 0° to 180°
 in 12 steps

Figure 14. Boost IGBT



Conditions: $T_j = 150$ °C
 parameter: I_{oRMS} from 4 A to 60 A
 in steps of 8 A

Figure 15. Boost FWD



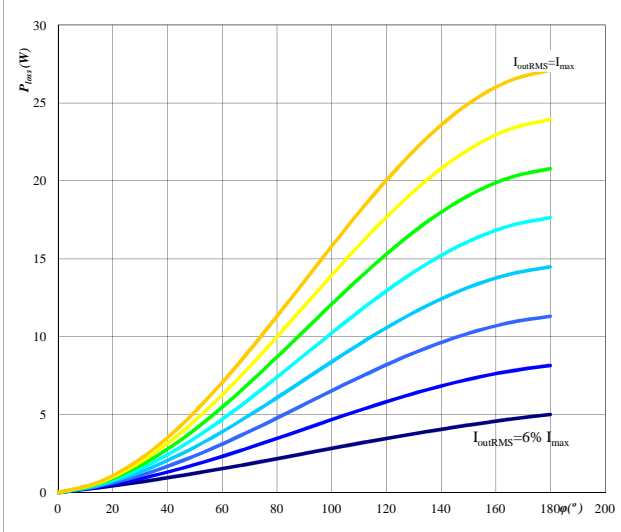
Conditions: $T_j = 150$ °C
 parameter: I_{oRMS} from 4 A to 60 A
 in steps of 8 A

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Figure 16. Boost IGBT

Typical average switching loss as a function of phase displacement

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

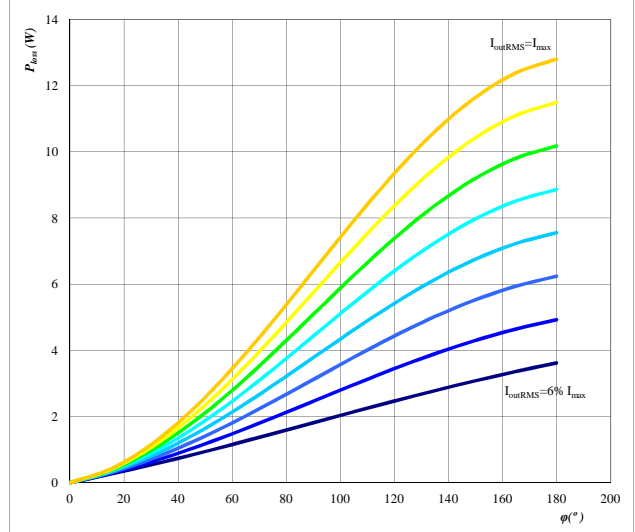


Conditions: $T_j = 150$ °C $f_{sw} = 20$ kHz
DC link = 700 V
parameter: I_{oRMS} from 4 A to 60 A
in steps of 8 A A

Figure 17. Boost FWD

Typical average switching loss as a function of phase displacement

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

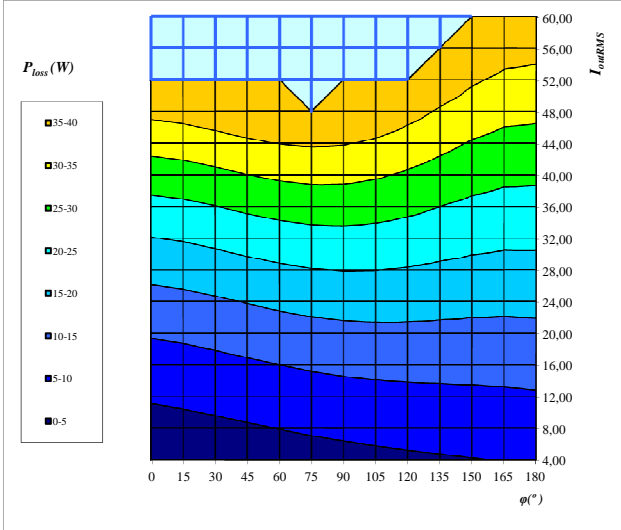


Conditions: $T_j = 150$ °C $f_{sw} = 20$ kHz
DC link = 700 V
parameter: I_{oRMS} from 4 A to 60 A
in steps of 8 A A

Figure 18. Boost IGBT

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

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

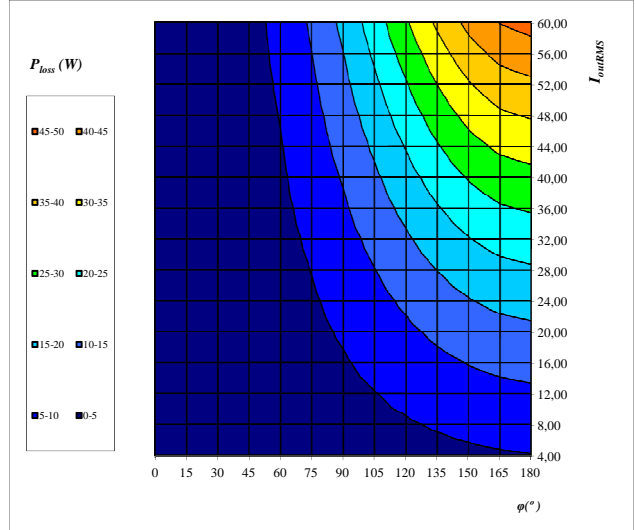


Conditions: $T_j = 150$ °C
DC link = 700 V
 $f_{sw} = 20$ kHz

Figure 19. Boost FWD

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

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



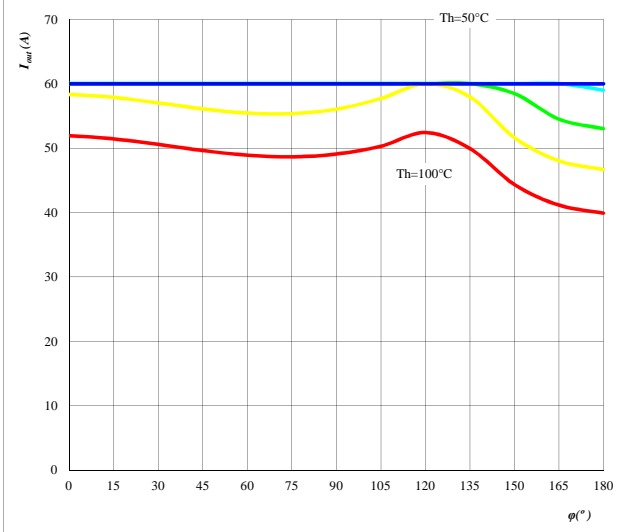
Conditions: $T_j = 150$ °C
DC link = 700 V
 $f_{sw} = 20$ kHz

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Figure 20. Boost IGBT+FWD

Typical available output current as a function of phase displacement

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

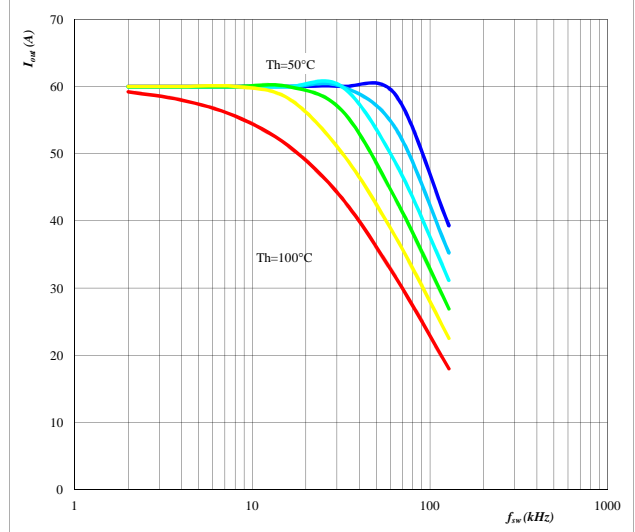


Conditions: $T_j = T_{jmax}-25 \text{ } ^\circ\text{C}$ $f_{sw} = 20 \text{ kHz}$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 21. Boost IGBT+FWD

Typical available output current as a function of switching frequency

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

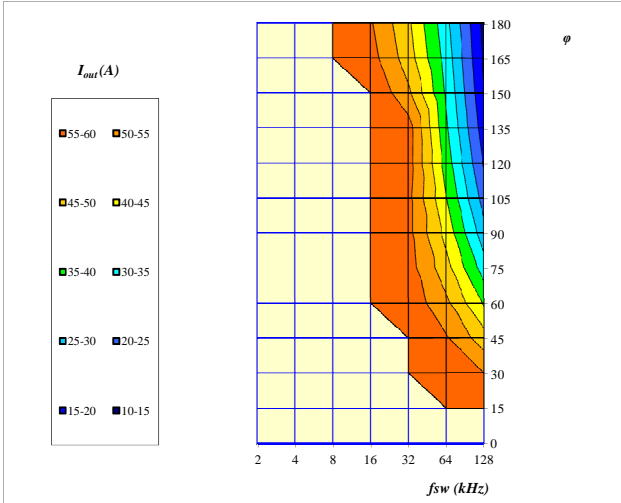


Conditions: $T_j = T_{jmax}-25 \text{ } ^\circ\text{C}$ $\varphi = 90^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 22. Boost IGBT+FWD

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

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



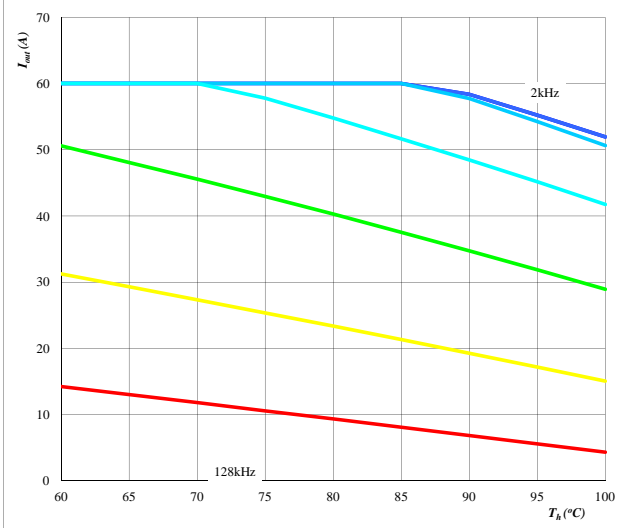
Conditions: $T_j = T_{jmax}-25 \text{ } ^\circ\text{C}$
 DC link = 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

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Figure 23. per MODULE

Typical available output current as a function of heat sink temperature

$I_{out}=f(T_h)$

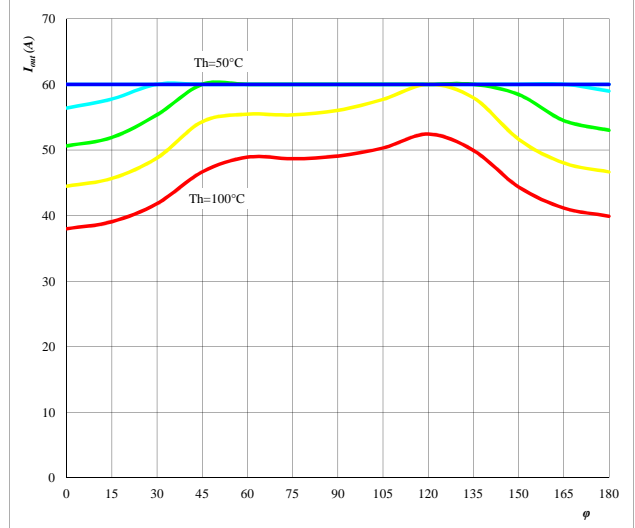


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
DC link = 700 V
 $\varphi = 0^\circ$
parameter: Switching freq.
fsw from 2 kHz to 128 kHz
in steps of factor 2

Figure 24. per MODULE

Typical available output current as a function of phase displacement

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

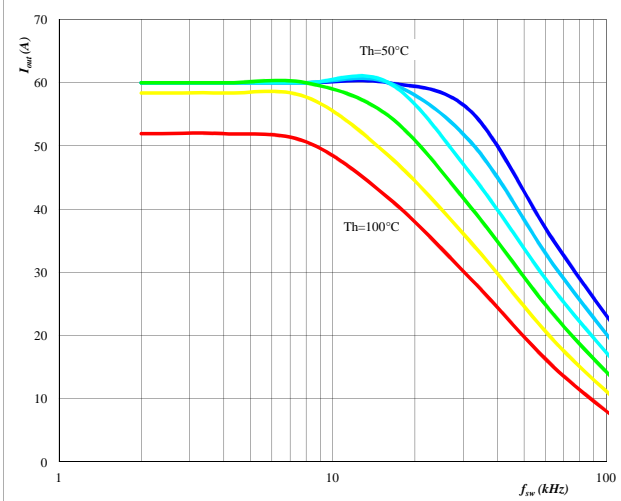


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
DC link = 700 V
fsw = 20 kHz
parameter: Heatsink temp.
Th from 50 °C to 100 °C
in 10 °C steps

Figure 25. per MODULE

Typical available output current as a function of switching frequency

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

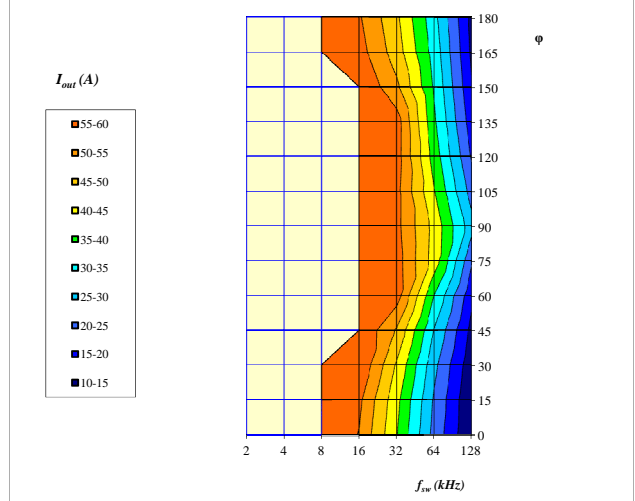


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$ $\varphi = 0^\circ$
DC link = 700 V
parameter: Heatsink temp.
Th from 50 °C to 100 °C
in 10 °C steps

Figure 26. per MODULE

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

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



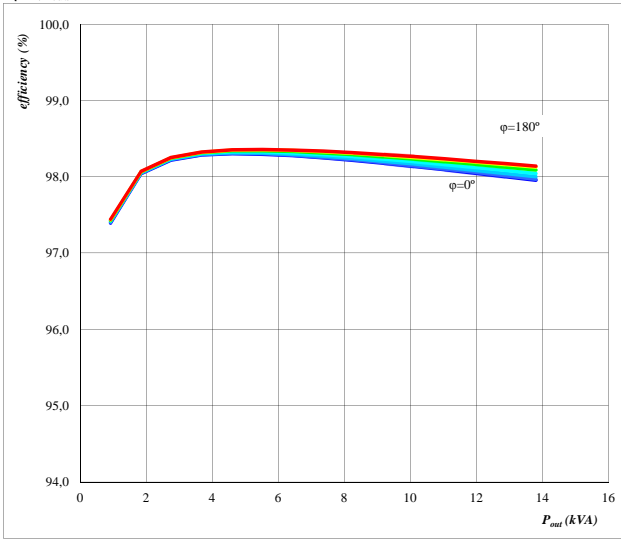
Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
DC link = 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

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Figure 27. per MODULE

Typical efficiency as a function of output power

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

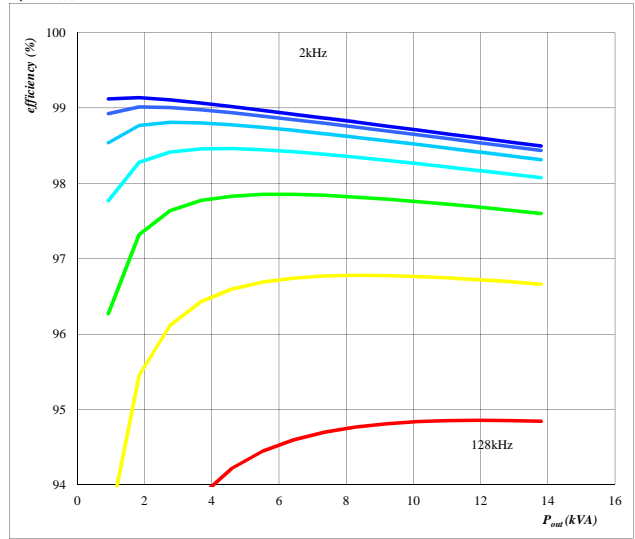


Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: phase displacement φ from 0° to 180° in steps of 30°

Figure 28. per MODULE

Typical efficiency as a function of output power

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

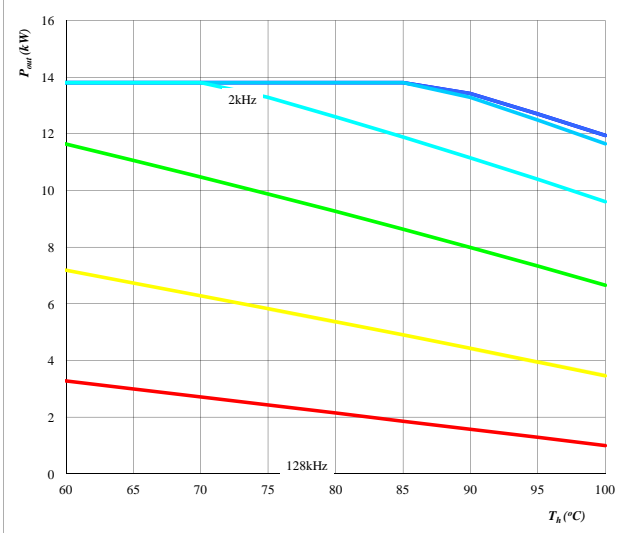


Conditions: $T_j = 150$ °C $\varphi = 0$ °
 DC link = 700 V
 parameter: Switching freq. f_{sw} from 2 kHz to 128 kHz in steps of factor 2

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
 $\varphi = 0$ °
 parameter: Switching freq. f_{sw} from 2 kHz to 128 kHz in steps of factor 2

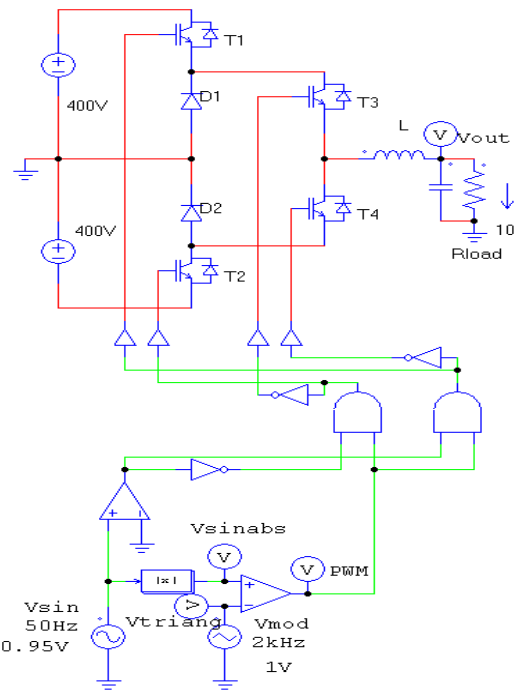
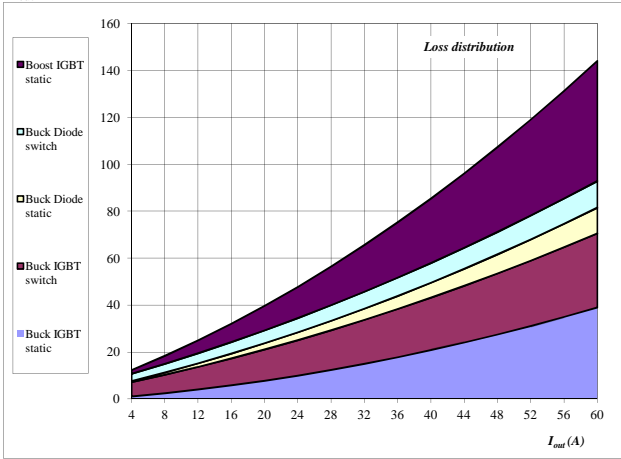


Figure 30. per MODULE

Typical loss distribution as a function of output current

$P_{out}=f(T_h)$



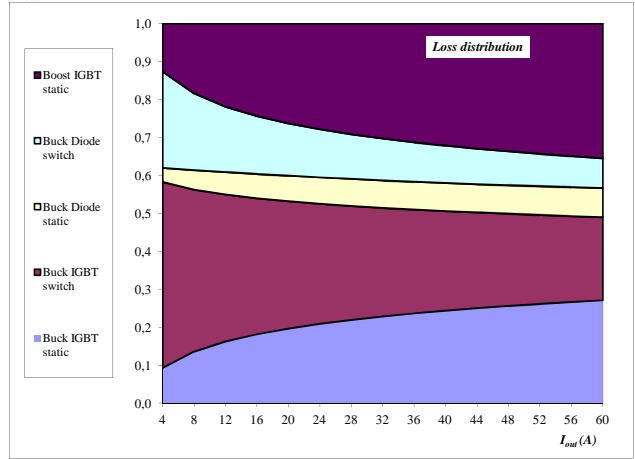
Conditions:

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°	