

flowNPC2 NPC Application 600V/200A

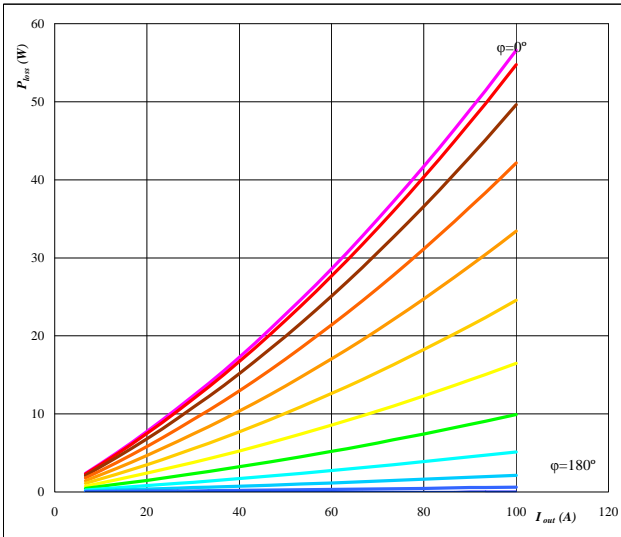
General conditions

V_{out} = 230 VAC

BUCK	
V _{GEon}	= 15 V
V _{GEoff}	= -15 V
R _{gon}	= 4 Ω
R _{goff}	= 4 Ω

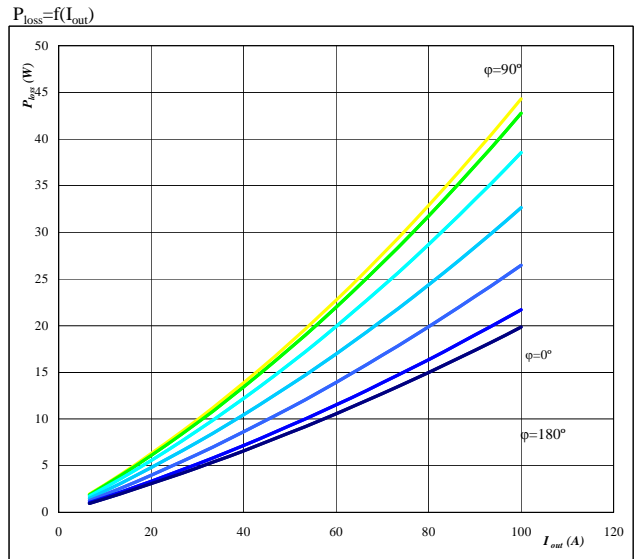
BOOST	
V _{GEon}	= 15 V
V _{GEoff}	= -15 V
R _{gon}	= 4 Ω
R _{goff}	= 4,015 Ω

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



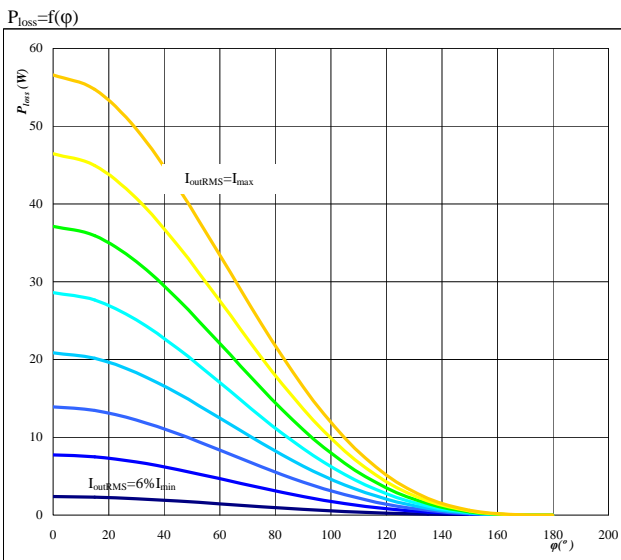
Conditions: T_j = 150 °C
parameter: φ from 0° to 180°
in 12 steps

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



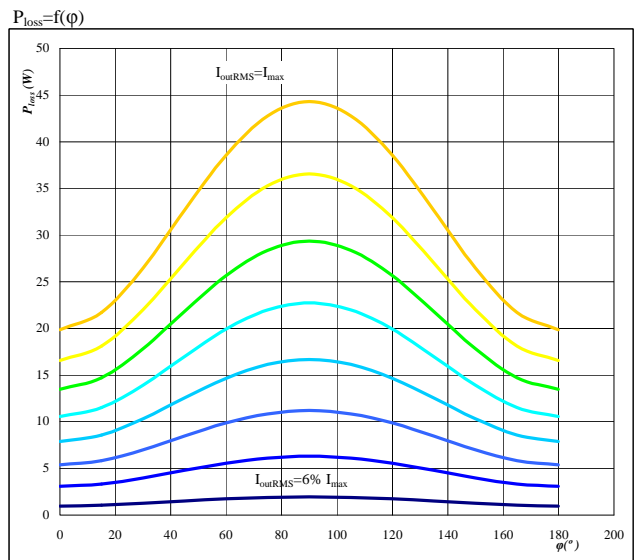
Conditions: T_j = 150 °C
parameter: φ from 0° to 180°
in 12 steps

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



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

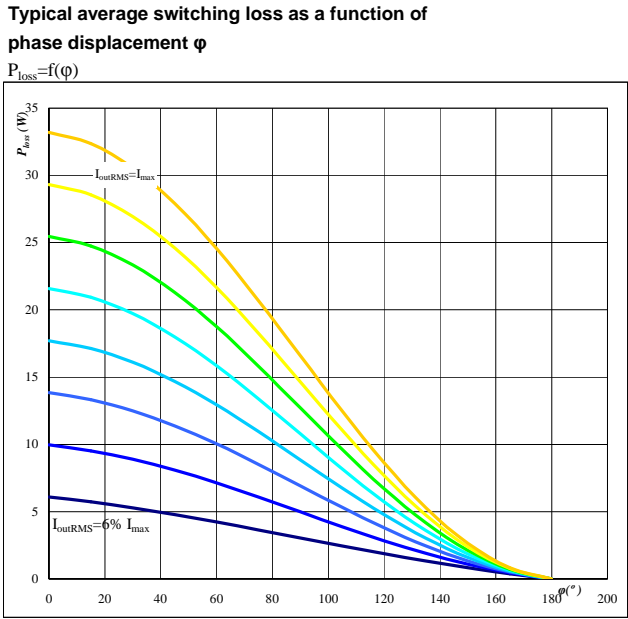
Figure 4. Buck FRED
Typical average static loss as a function of phase displacement φ



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

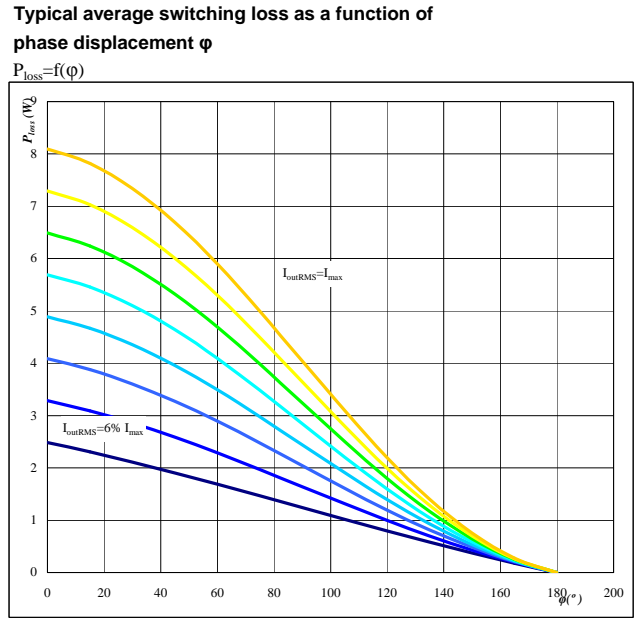
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Figure 5. Buck MOSFET



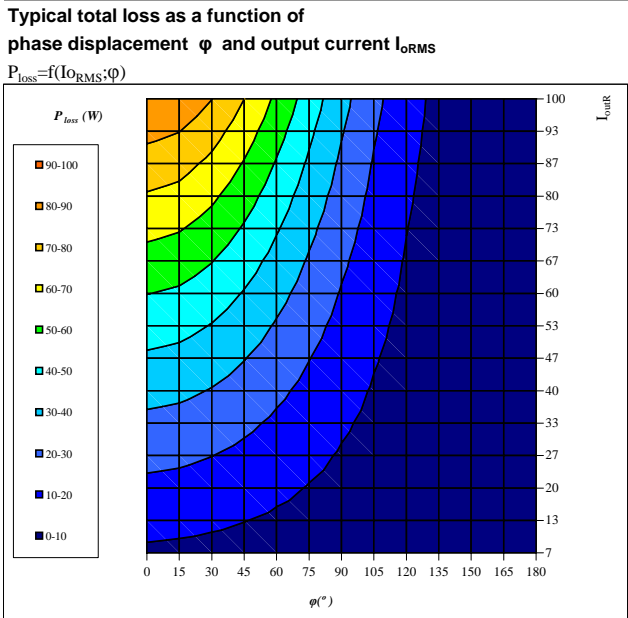
Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 6,67 A to 100 A
 in steps of 13 A

Figure 6. Buck FRED



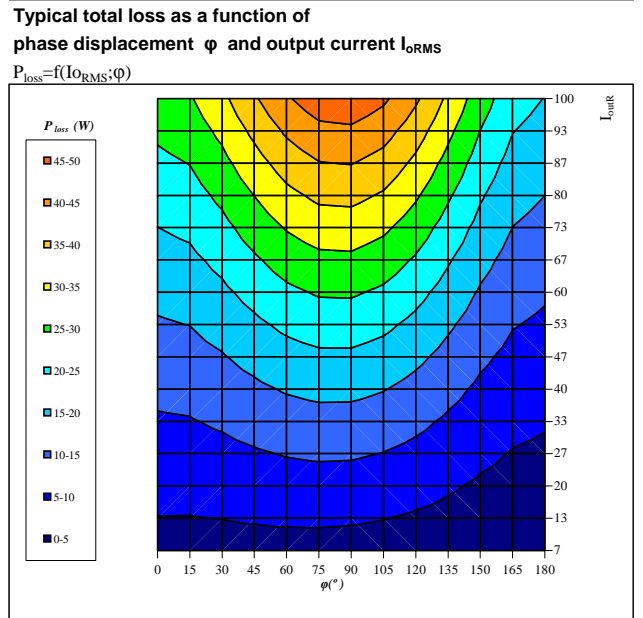
Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 6,67 A to 100 A
 in steps of 13 A

Figure 7. Buck MOSFET



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

Figure 8. Buck FRED



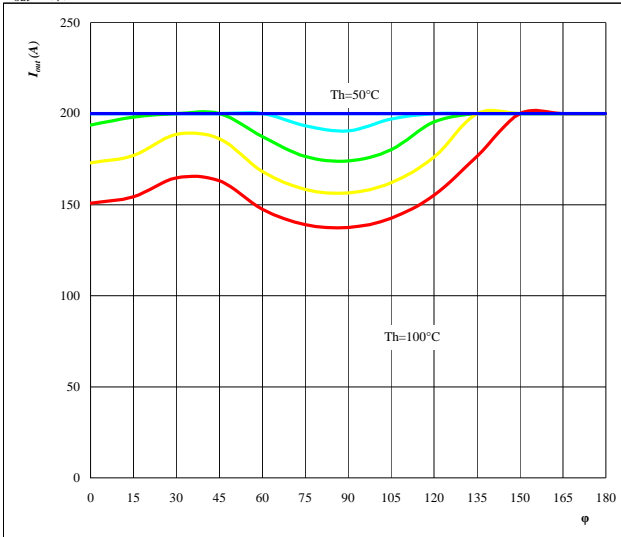
Conditions: $T_j = 150$ °C
 DC link = 700 V
 $f_{sw} = 20$ kHz

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Figure 9. for Buck MOSFET+FRED

Typical available output current as a function of phase displacement ϕ

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

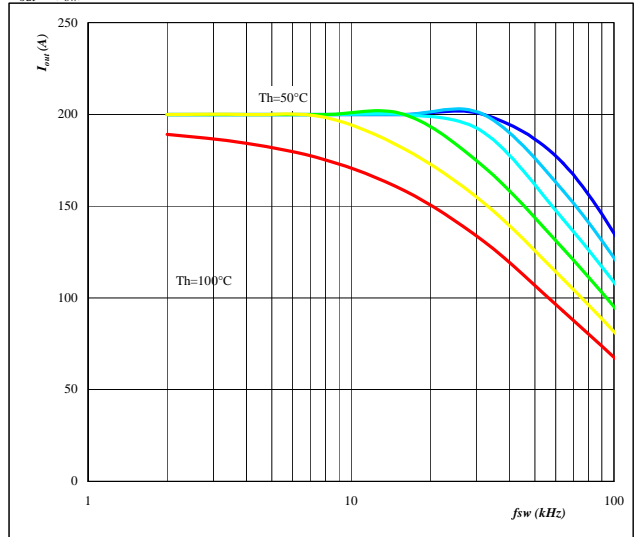


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$ $f_{sw} = 20 \text{ kHz}$
 DC link= 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 10. for Buck MOSFET+FRED

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

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

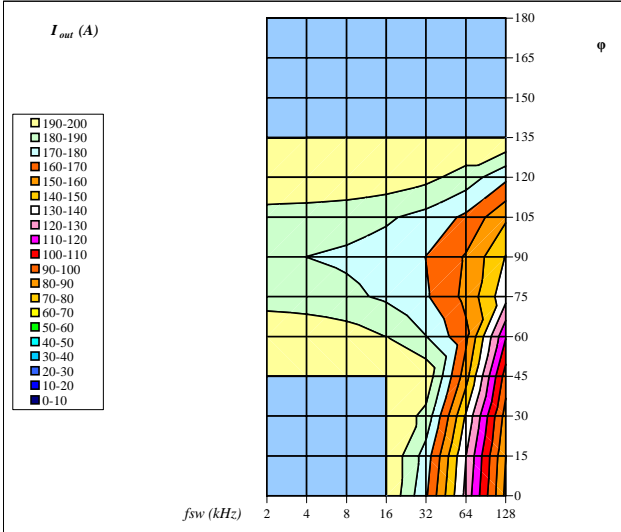


Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$ $\phi = 0^\circ$
 DC link= 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 11. for Buck IGBT+FRED

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

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



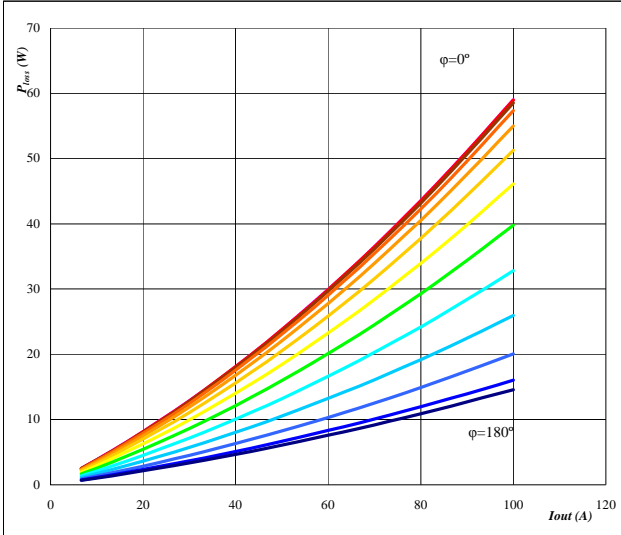
Conditions: $T_j = T_{jmax}-25 \text{ }^\circ\text{C}$
 DC link= 700 V
 $T_h = 80 \text{ }^\circ\text{C}$

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Figure 12. Boost IGBT

Typical average static loss as a function of output current

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

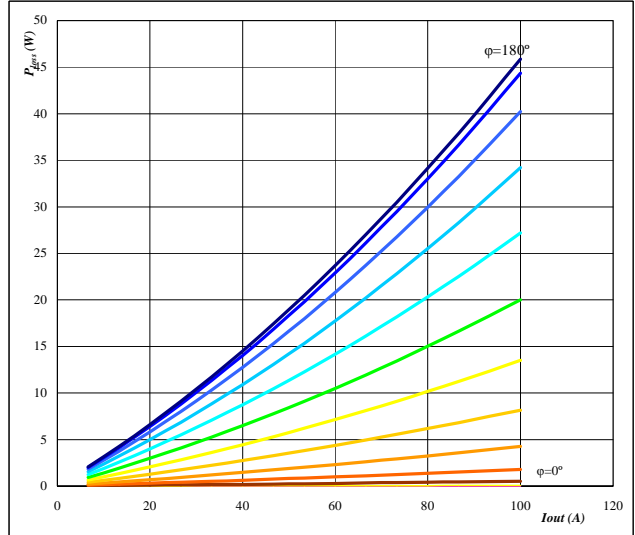


Conditions: $T_j = 150$ °C
parameter: ϕ from 0° to 180°
in 12 steps

Figure 13. Boost FRED

Typical average static loss as a function of output current

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

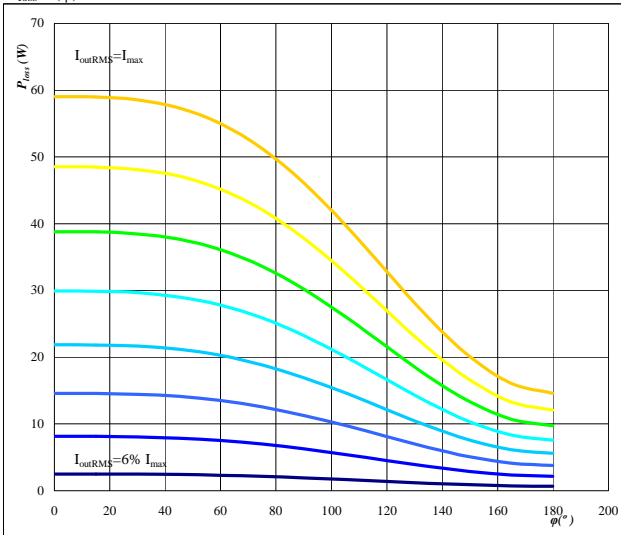


Conditions: $T_j = 150$ °C
parameter: ϕ from 0° to 180°
in 12 steps

Figure 14. Boost IGBT

Typical average static loss as a function of phase displacement

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

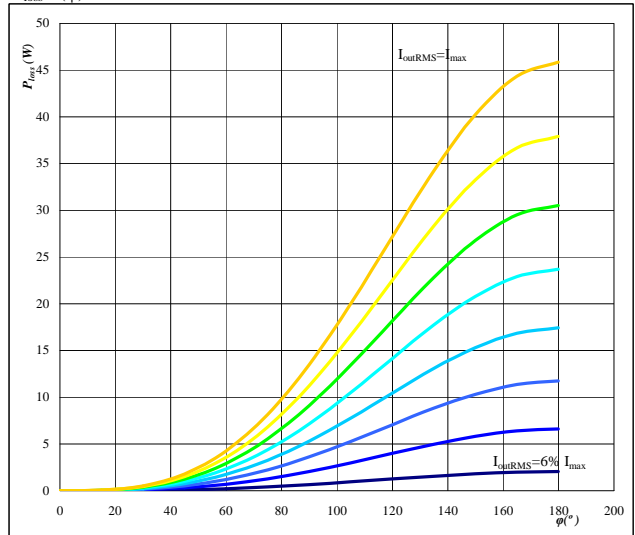


Conditions: $T_j = 150$ °C
parameter: I_{oRMS} from 7 A to 100 A
in steps of 13 A

Figure 15. Boost FRED

Typical average static loss as a function of phase displacement

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



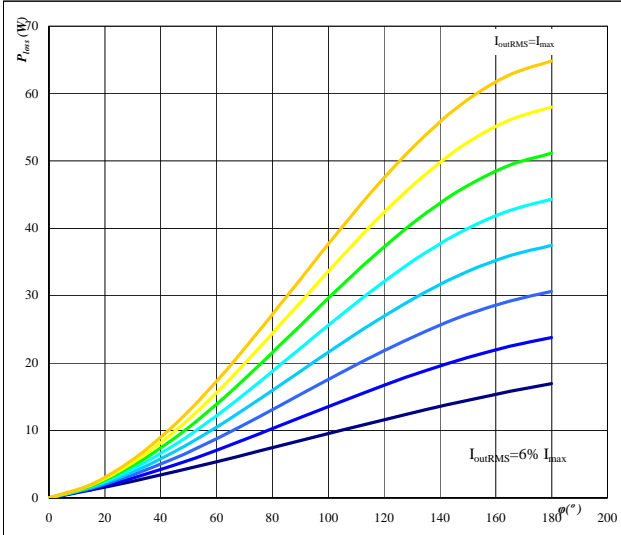
Conditions: $T_j = 150$ °C
parameter: I_{oRMS} from 7 A to 100 A
in steps of 13 A

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Figure 16. Boost IGBT

Typical average switching loss as a function of phase displacement

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

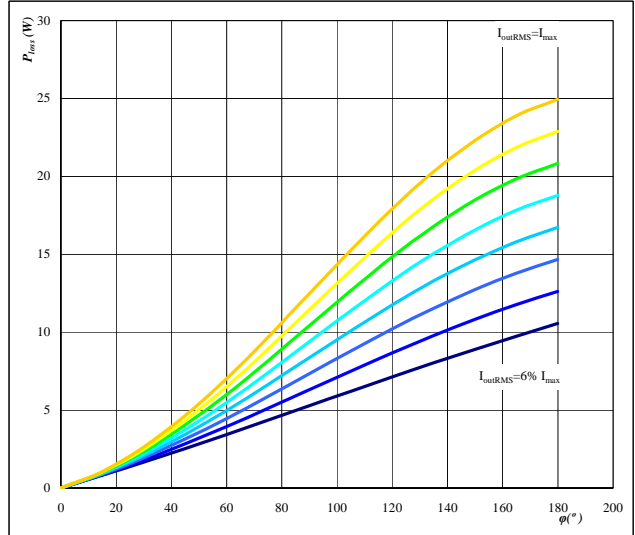


Conditions: $T_j = 150$ °C $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 7 A to 100 A
 in steps of 13 A A

Figure 17. Boost FRED

Typical average switching loss as a function of phase displacement

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

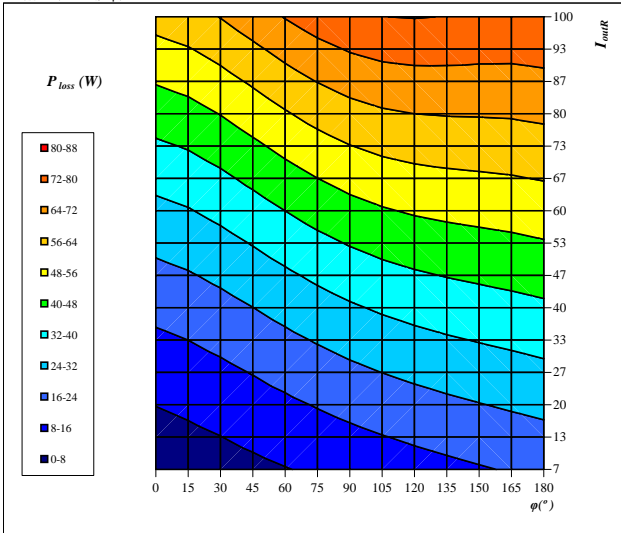


Conditions: $T_j = 150$ °C $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 7 A to 100 A
 in steps of 13 A A

Figure 18. Boost IGBT

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

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

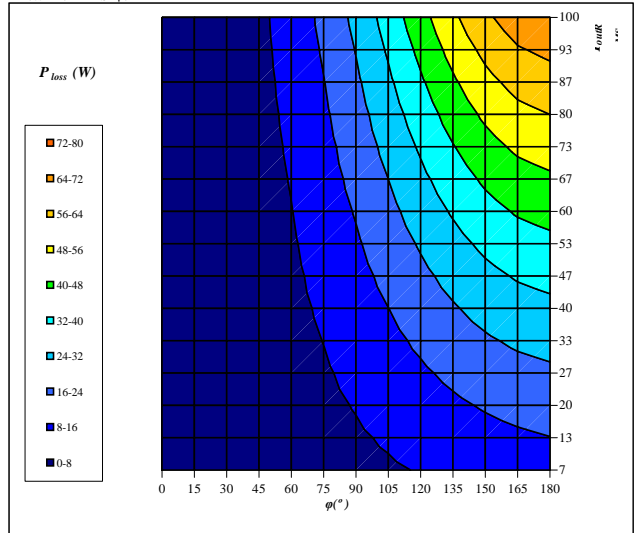


Conditions: $T_j = 150$ °C
 DC link = 700 V
 $f_{sw} = 20$ kHz

Figure 19. Boost FRED

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

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



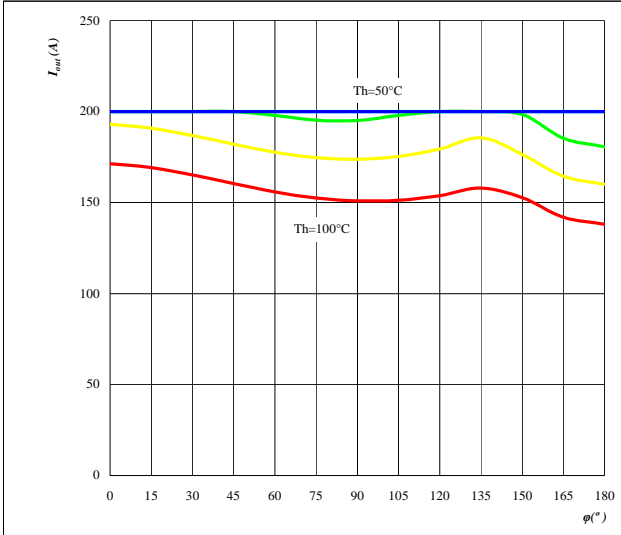
Conditions: $T_j = 150$ °C
 DC link = 700 V
 $f_{sw} = 20$ kHz

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Figure 20. Boost IGBT+FRED

Typical available output current as a function of phase displacement

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

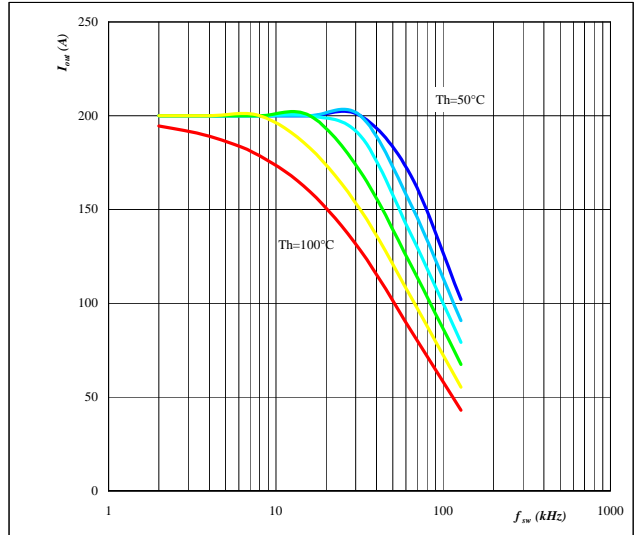


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$ $f_{sw} = 20 \text{ kHz}$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 21. Boost IGBT+FRED

Typical available output current as a function of switching frequency

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

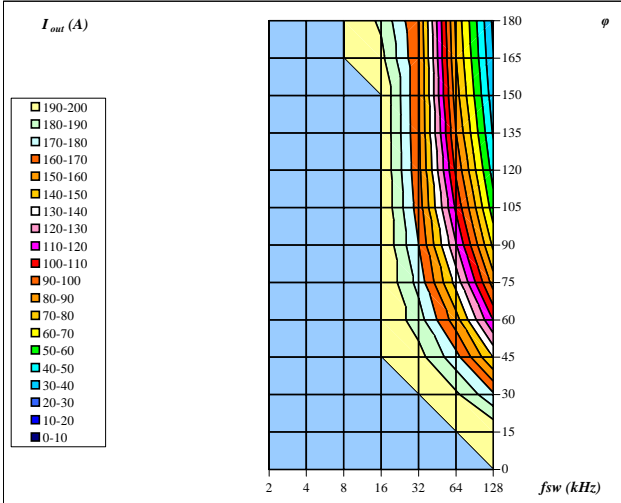


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$ $\varphi = 90^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 22. Boost IGBT+FRED

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

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



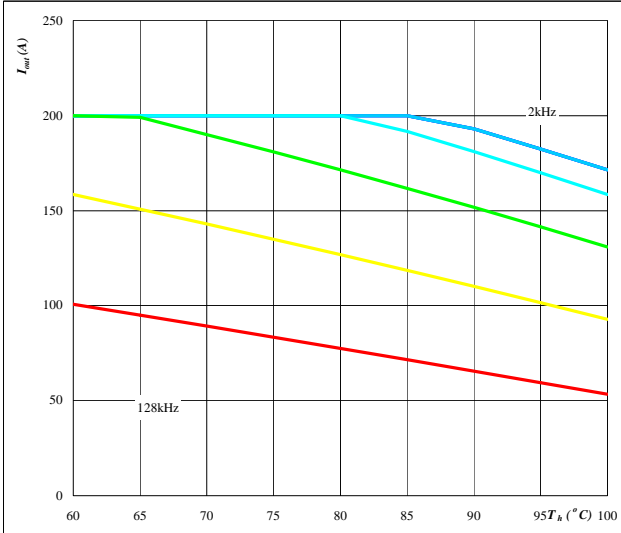
Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
 DC link = 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

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Figure 23. per MODULE

Typical available output current as a function of heat sink temperature

$I_{out}=f(T_h)$

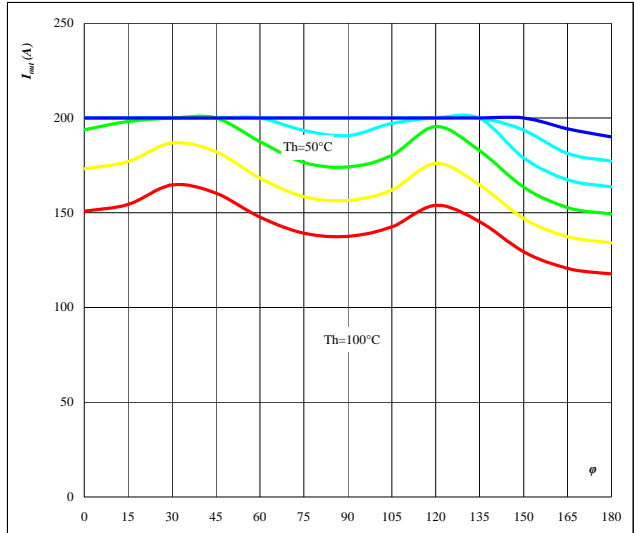


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
 DC link = 700 V
 $\varphi = 0^\circ$
 parameter: Switching freq.
 fsw from 2 kHz to 128 kHz
 in steps of factor 2

Figure 24. per MODULE

Typical available output current as a function of phase displacement

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

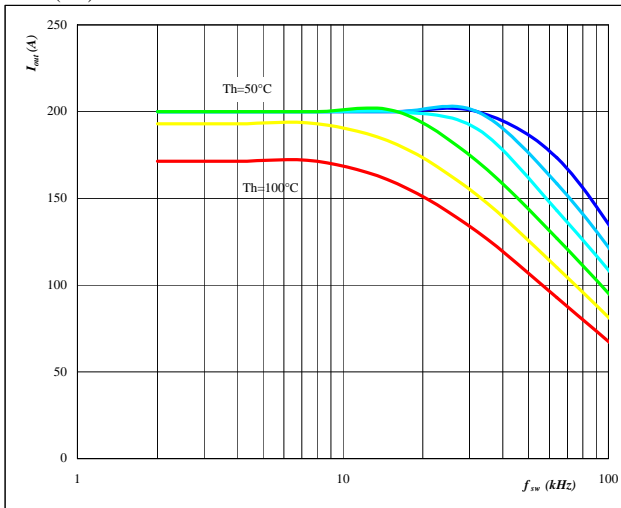


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
 DC link = 700 V
 $f_{sw} = 20 \text{ kHz}$
 parameter: Heatsink temp.
 Th from 50 °C to 100 °C
 in 10 °C steps

Figure 25. per MODULE

Typical available output current as a function of switching frequency

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

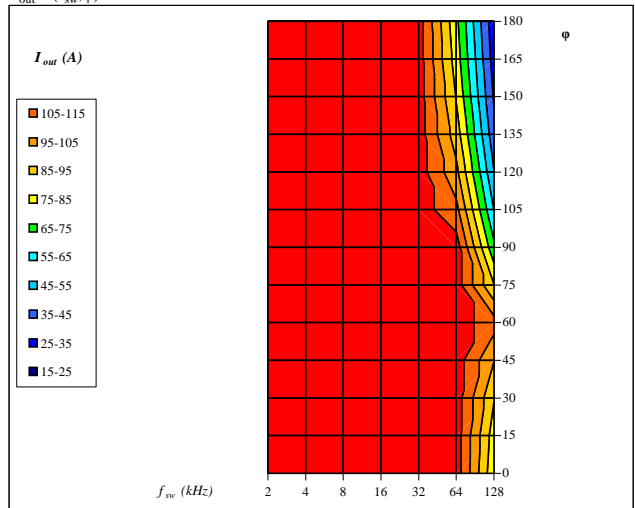


Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$ $\varphi = 0^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 Th from 50 °C to 100 °C
 in 10 °C steps

Figure 26. per MODULE

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

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



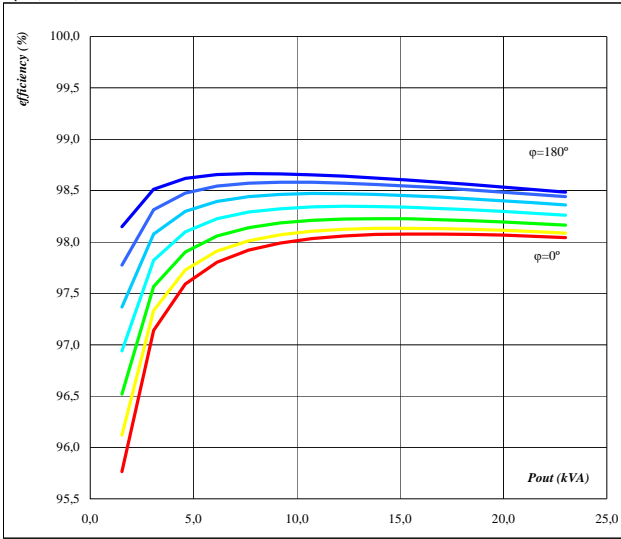
Conditions: $T_j = T_{jmax} - 25 \text{ } ^\circ\text{C}$
 DC link = 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

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Figure 27. per MODULE

Typical efficiency as a function of output power

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

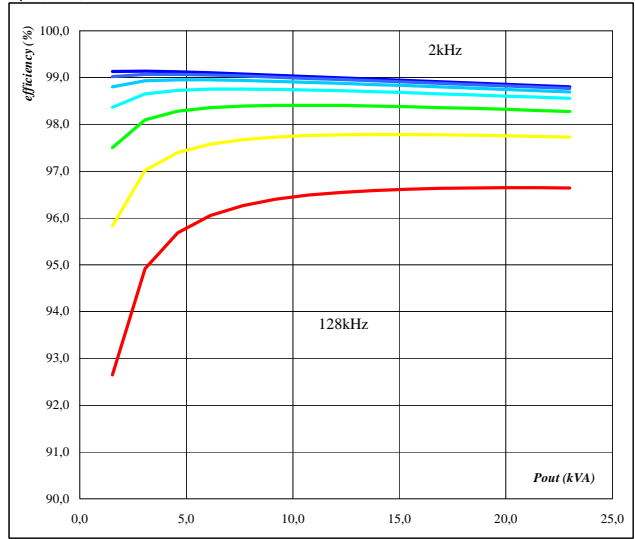


Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 parameter: phase displacement φ from 0° to 180° in steps of 30°

Figure 28. per MODULE

Typical efficiency as a function of output power

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

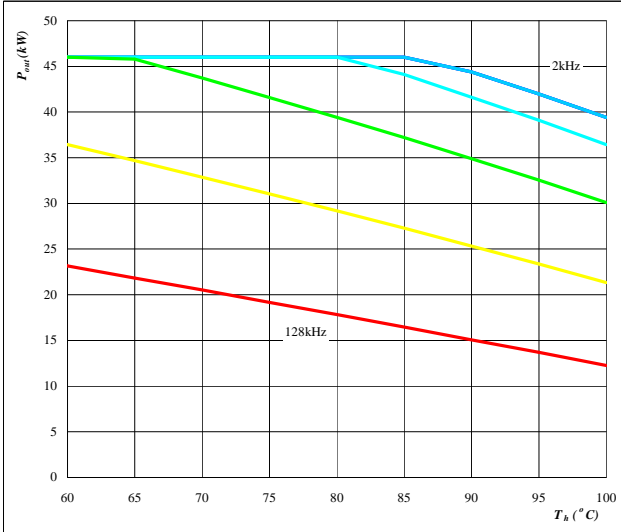


Conditions: $T_j = 150$ °C $\varphi = 0$ °
 DC link = 700 V
 parameter: Switching freq. f_{sw} from 2 kHz to 128 kHz in steps of factor 2

Figure 29. per MODULE

Typical available output power as a function of heat sink temperature

$P_{out}=f(T_h)$

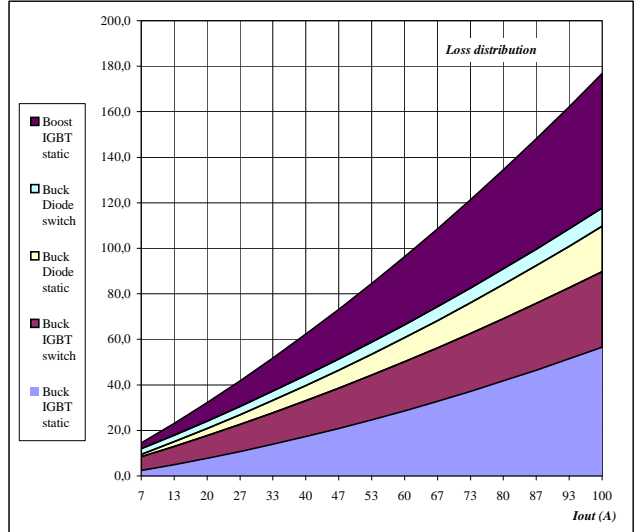


Conditions: $T_j = T_{jmax}-25$ °C
 DC link = 700 V
 $\varphi = 0$ °
 parameter: Switching freq. f_{sw} from 2 kHz to 128 kHz in steps of factor 2

Figure 30. per MODULE

Typical loss distribution as a function of output current

$P_{out}=f(T_h)$



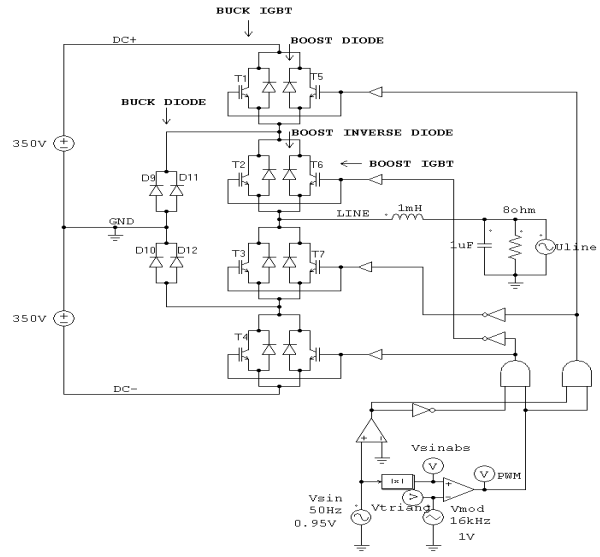
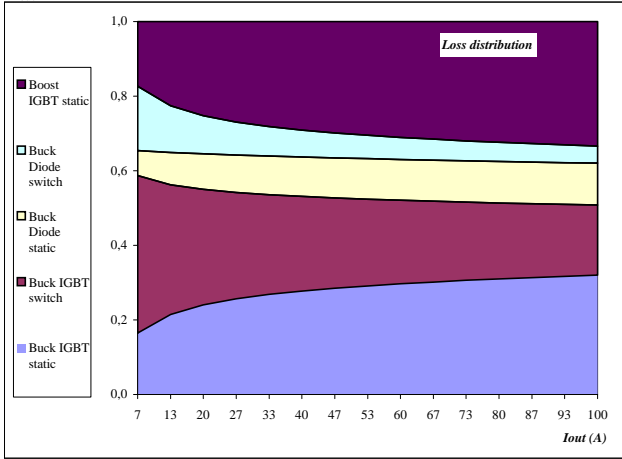
Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 $\varphi = 0$ °

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Figure 31. **per MODULE**

Typical relativ loss distribution as a function of output current

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



Conditions: $T_j = 150$ °C
 $f_{sw} = 20$ kHz
 DC link = 700 V
 $\phi = 0^\circ$

PRODUCT STATUS DEFINITIONS

Datasheet Status	Product Status	Definition
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data may be published at a later date. Vincotech reserves the right to make changes at any time without notice in order to improve design. The data contained is exclusively intended for technically trained staff.
Final	Full Production	This datasheet contains final specifications. Vincotech reserves the right to make changes at any time without notice in order to improve design. The data contained is exclusively intended for technically trained staff.

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