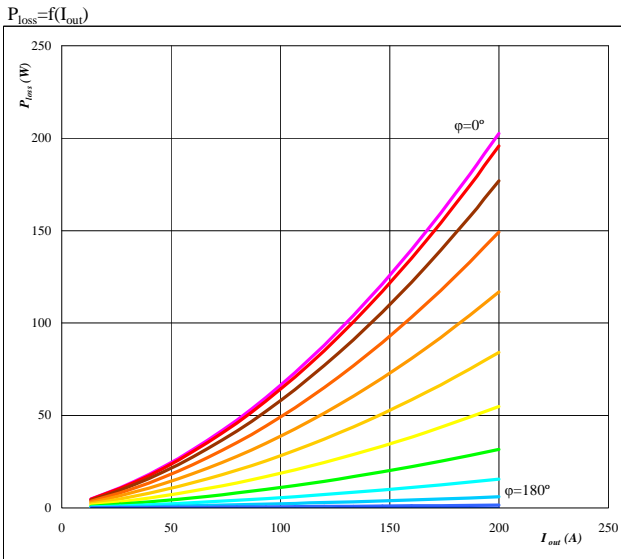


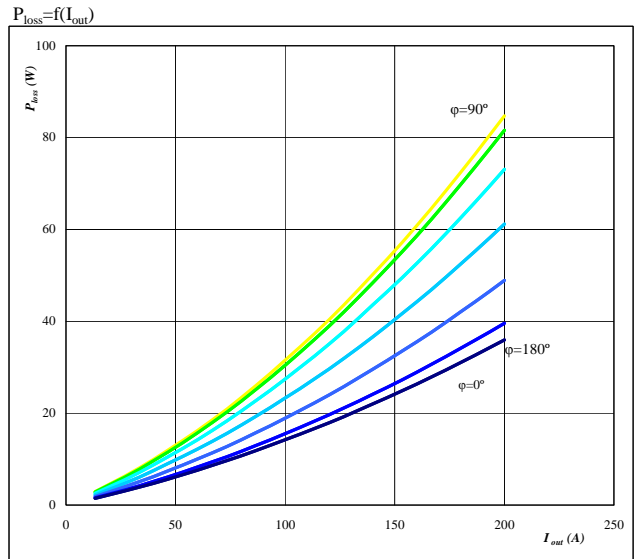
General conditions
V_{out} = 230 VAC

Half Bridge IGBT	
V _{GEon}	= 15 V
V _{GEoff}	= -15 V
R _{gon}	= 4 Ω
R _{goff}	= 4 Ω

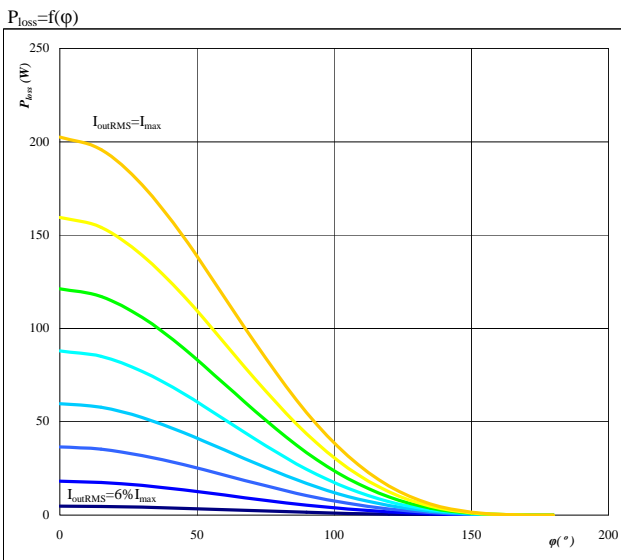
Neutral Point IGBT	
V _{GEon}	= 15 V
V _{GEoff}	= -15 V
R _{gon}	= 4 Ω
R _{goff}	= 4 Ω

Figure 1. Half Bridge IGBT
Typical average static loss as a function of output current I_{oRMS}


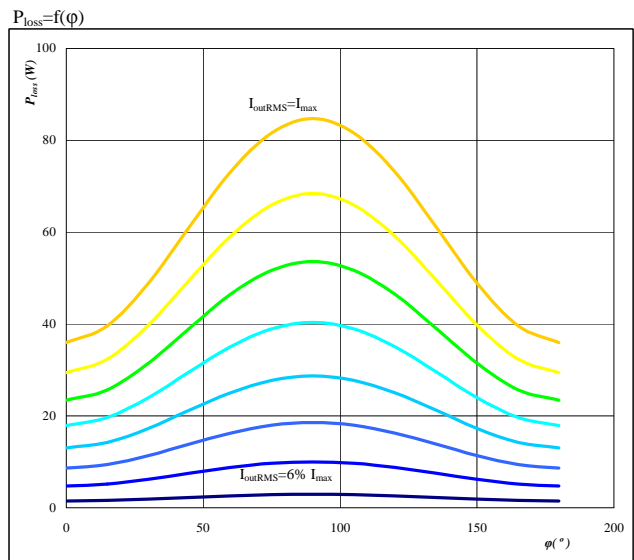
Conditions: T_j = 150 °C
 parameter: φ from 0° to 180°
 in 12 steps

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


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

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


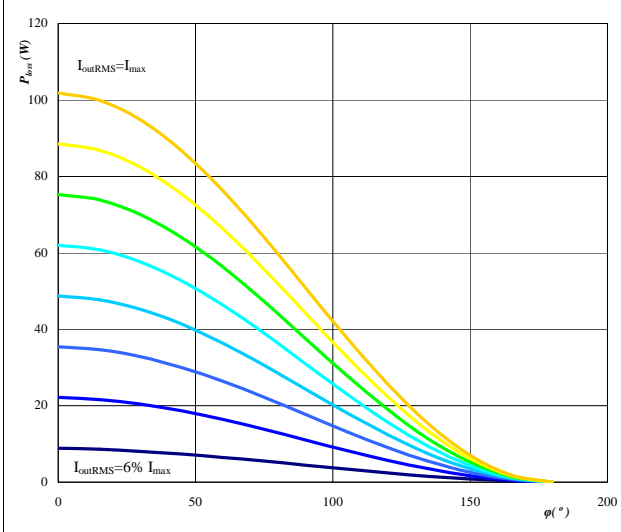
Conditions: T_j = 150 °C
 parameter: I_{oRMS} from 13,33 A to 200 A
 in steps of 27 A

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


Conditions: T_j = 125 °C
 parameter: I_{oRMS} from 13,33 A to 200 A
 in steps of 27 A

Figure 5. Half Bridge IGBT
Typical average switching loss as a function of phase displacement ϕ

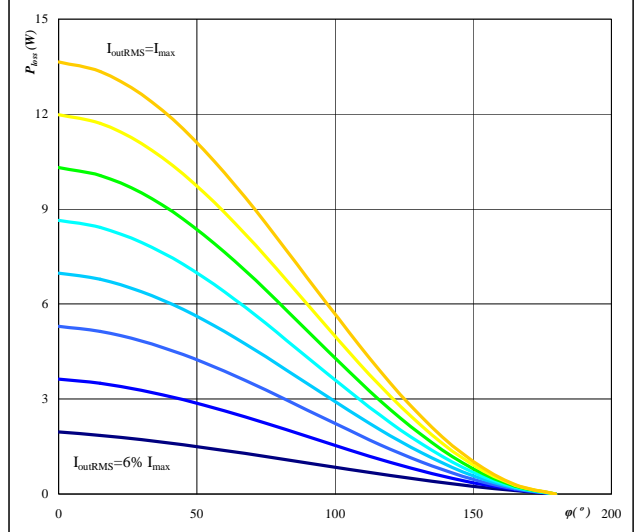
$$P_{\text{loss}}=f(\phi)$$



Conditions: $T_j= 150 \text{ }^\circ\text{C}$
 $f_{\text{sw}}= 16 \text{ kHz}$
 DC link= 700 V
 parameter: I_{ORMS} from 13,33 A to 200 A
 in steps of 27 A

Figure 6. Neutral Point FWD
Typical average switching loss as a function of phase displacement ϕ

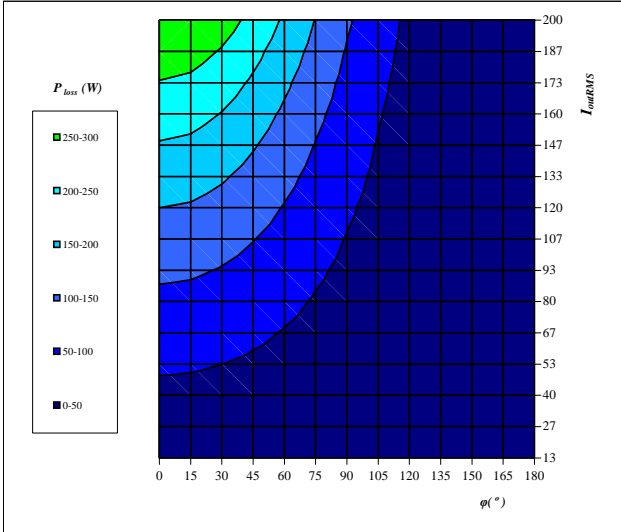
$$P_{\text{loss}}=f(\phi)$$



Conditions: $T_j= 125 \text{ }^\circ\text{C}$
 $f_{\text{sw}}= 16 \text{ kHz}$
 DC link= 700 V
 parameter: I_{ORMS} from 13,33 A to 200 A
 in steps of 27 A

Figure 7. Half Bridge IGBT
Typical total loss as a function of phase displacement ϕ and output current I_{ORMS}

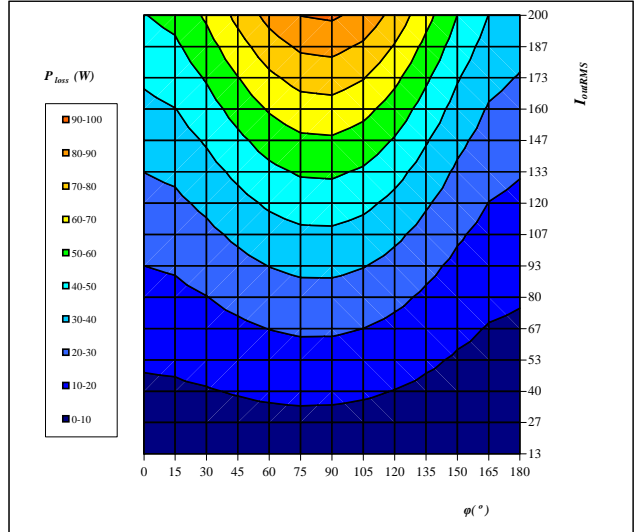
$$P_{\text{loss}}=f(I_{\text{ORMS}};\phi)$$



Conditions: $T_j= 150 \text{ }^\circ\text{C}$
 DC link= 700 V
 $f_{\text{sw}}= 16 \text{ kHz}$

Figure 8. Neutral Point FWD
Typical total loss as a function of phase displacement ϕ and output current I_{ORMS}

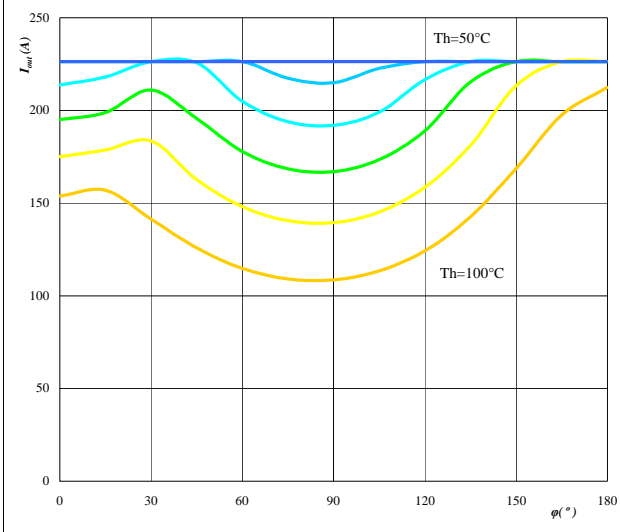
$$P_{\text{loss}}=f(I_{\text{ORMS}};\phi)$$



Conditions: $T_j= 125 \text{ }^\circ\text{C}$
 DC link= 700 V
 $f_{\text{sw}}= 16 \text{ kHz}$

Figure 9. for Half Bridge IGBT + Neutral Point FWD
Typical available output current as a function of phase displacement φ

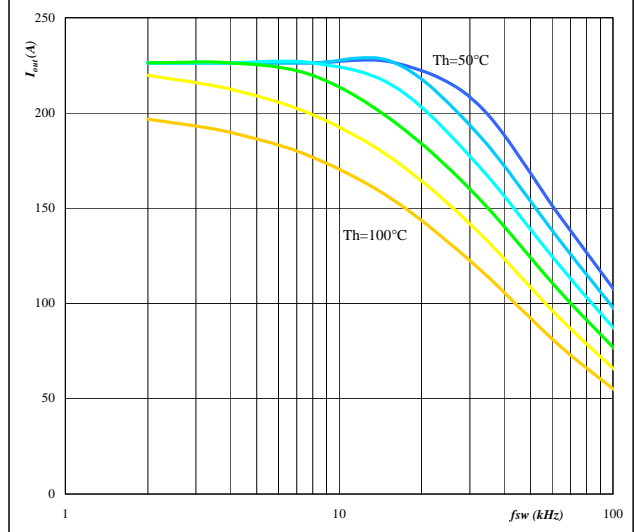
$$I_{out}=f(\varphi)$$



Conditions: $T_j = 150/125$ °C $f_{sw} = 16$ kHz
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 °C to 100 °C
 in 10 °C steps

Figure 10. for Half Bridge IGBT + Neutral Point FWD
Typical available output current as a function of switching frequency f_{sw}

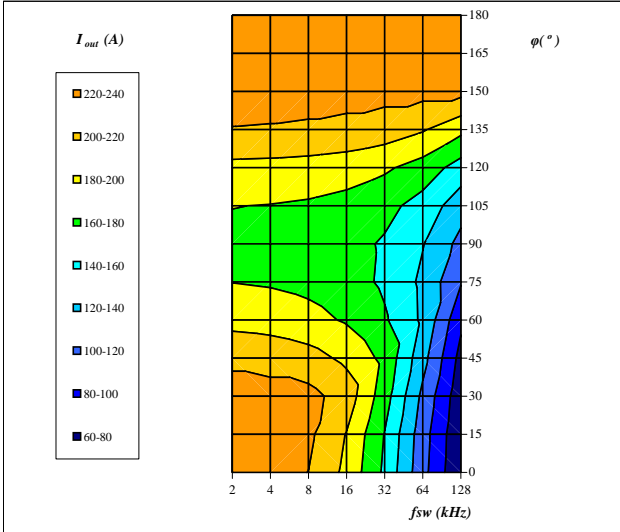
$$I_{out}=f(f_{sw})$$



Conditions: $T_j = 150/125$ °C $\varphi = 0$ °
 DC link = 700 V
 parameter: Heatsink temp.
 T_h from 50 °C to 100 °C
 in 10 °C steps

Figure 11. for Half Bridge IGBT + Neutral Point FWD
Typical available 50Hz output current as a function of f_{sw} and phase displacement φ

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



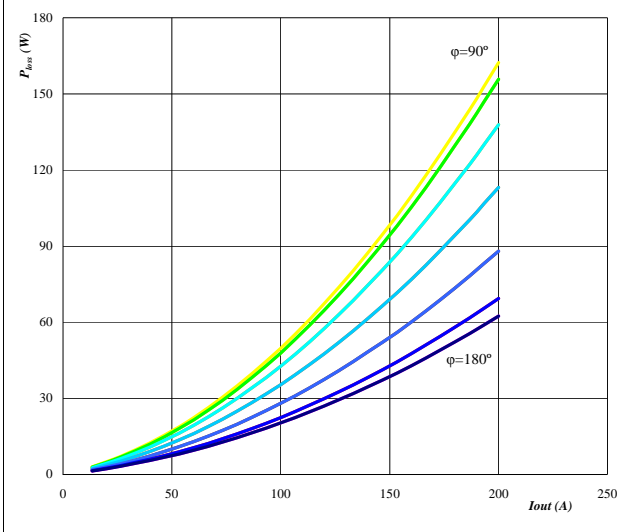
Conditions: $T_j = 150/125$ °C
 DC link = 700 V
 $T_h = 80$ °C

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Figure 12. neutral point IGBT
Typical average static loss as a function of output current

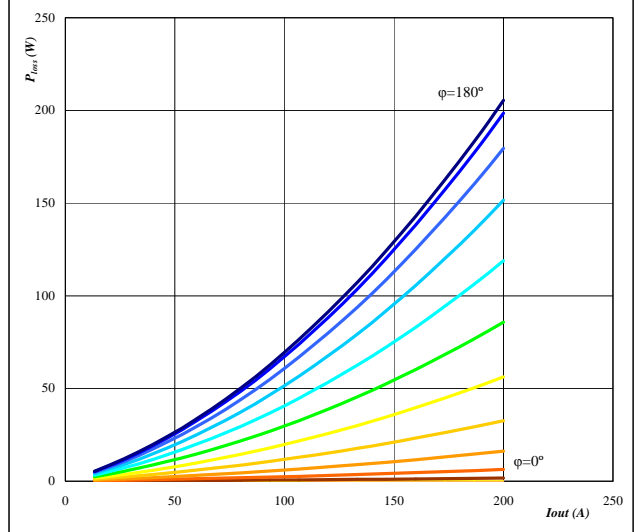
$$P_{\text{loss}} = f(I_{\text{out}})$$



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

Figure 13. half bridge FWD
Typical average static loss as a function of output current

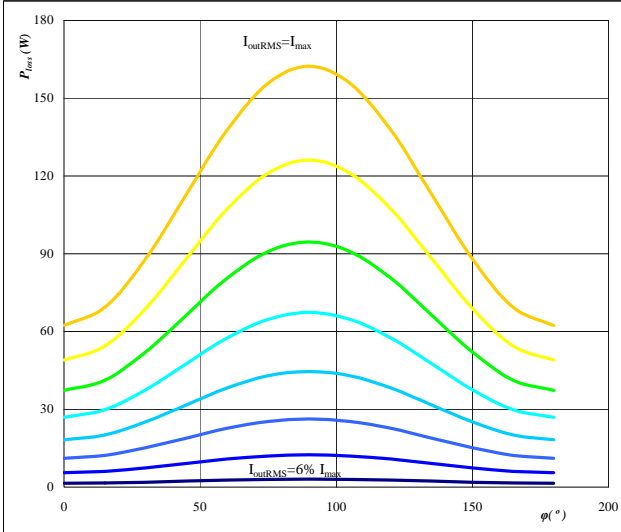
$$P_{\text{loss}} = f(I_{\text{out}})$$



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

Figure 14. neutral point IGBT
Typical average static loss as a function of phase displacement

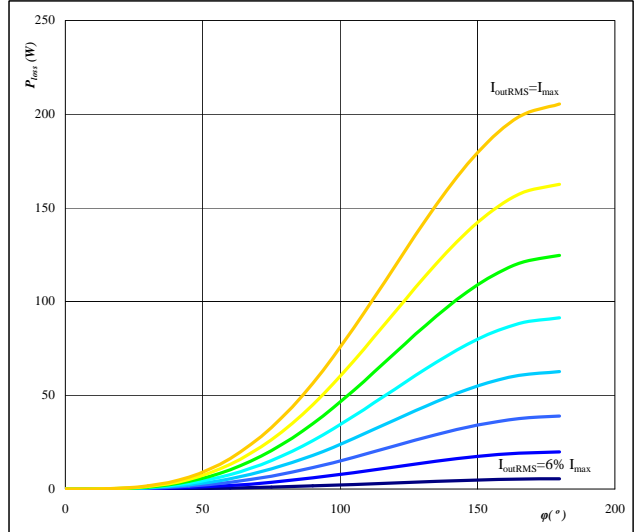
$$P_{\text{loss}} = f(\varphi)$$



Conditions: $T_j = 150$ °C
 parameter: I_{outRMS} from 13 A to 200 A
 in steps of 27 A

Figure 15. half bridge FWD
Typical average static loss as a function of phase displacement

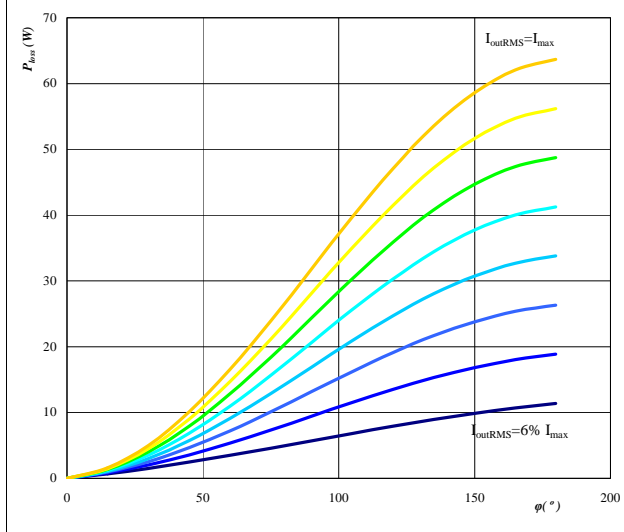
$$P_{\text{loss}} = f(\varphi)$$



Conditions: $T_j = 125$ °C
 parameter: I_{outRMS} from 13 A to 200 A
 in steps of 27 A

Figure 16. neutral point IGBT
Typical average switching loss as a function of phase displacement

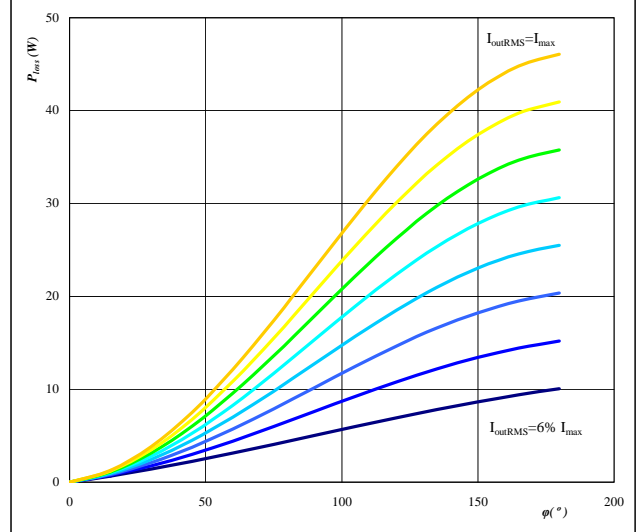
$$P_{loss}=f(\varphi)$$



Conditions: $T_j = 150$ °C $f_{sw} = 16$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 13 A to 200 A
 in steps of 27 A A

Figure 17. half bridge FWD
Typical average switching loss as a function of phase displacement

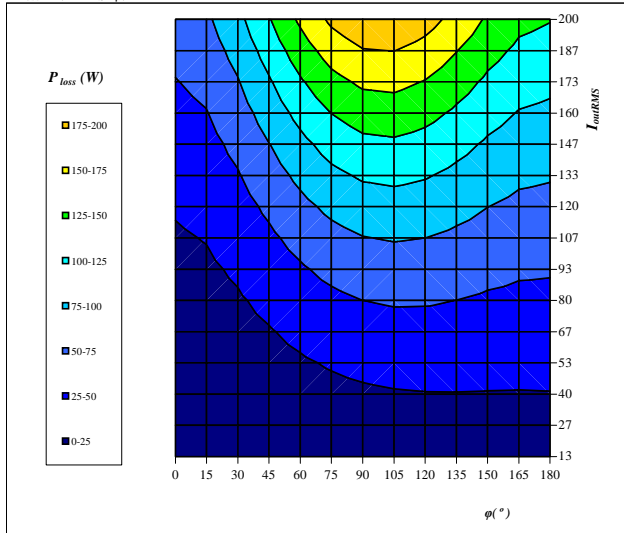
$$P_{loss}=f(\varphi)$$



Conditions: $T_j = 125$ °C $f_{sw} = 16$ kHz
 DC link = 700 V
 parameter: I_{oRMS} from 13 A to 200 A
 in steps of 27 A A

Figure 18. neutral point IGBT
Typical total loss as a function of phase displacement and I_{outRMS}

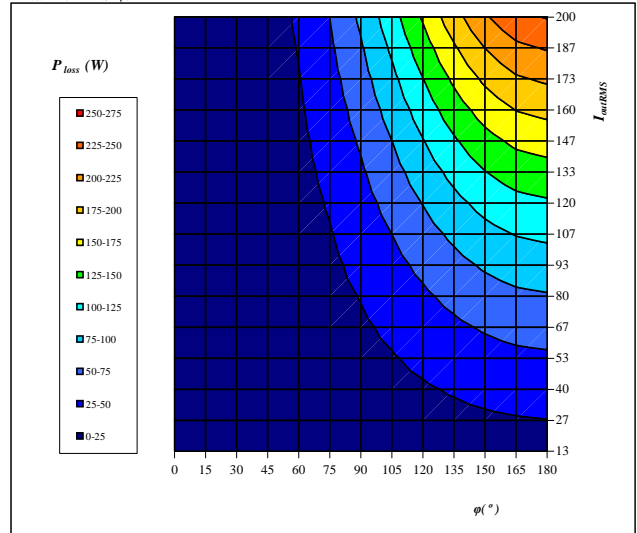
$$P_{loss}=f(I_{oRMS};\varphi)$$



Conditions: $T_j = 150$ °C
 DC link = 700 V
 $f_{sw} = 16$ kHz

Figure 19. half bridge FWD
Typical total loss as a function of phase displacement and I_{outRMS}

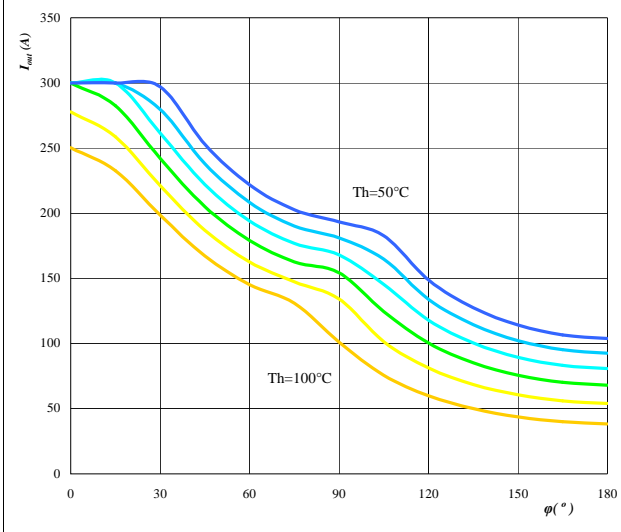
$$P_{loss}=f(I_{oRMS};\varphi)$$



Conditions: $T_j = 125$ °C
 DC link = 700 V
 $f_{sw} = 16$ kHz

Figure 20. for Neutral Point IGBT + half bridge FWD
Typical available output current as a function of phase displacement

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

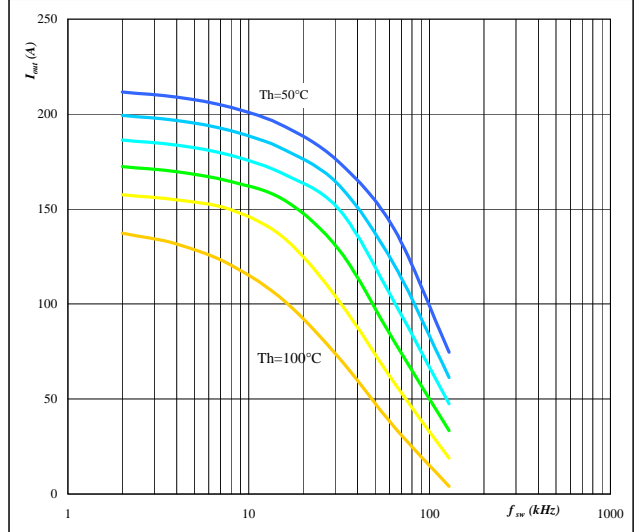


Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$ $f_{sw} = 16 \text{ kHz}$
 DC link = 700 V

parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 21. for Neutral Point IGBT + half bridge FWD
Typical available output current as a function of switching frequency

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

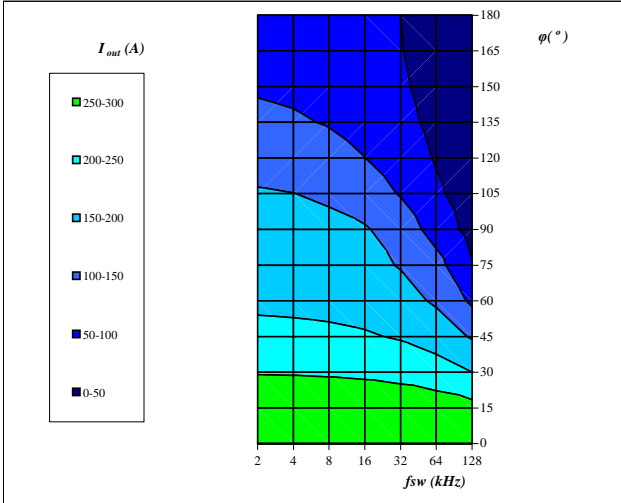


Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$ $\varphi = 90^\circ$
 DC link = 700 V

parameter: Heatsink temp.
 T_h from 50 $^\circ\text{C}$ to 100 $^\circ\text{C}$
 in 10 $^\circ\text{C}$ steps

Figure 22. for Neutral Point IGBT + half bridge FWD
Typical available 50Hz output current as a function of fsw and phase displacement

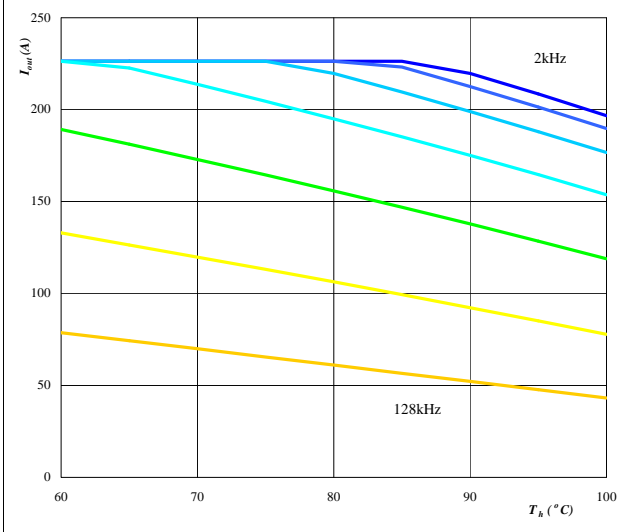
$$I_{out}=f(f_{sw},\varphi)$$



Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 DC link = 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

Figure 23. per PHASE
Typical available output current as a function of heat sink temperature

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

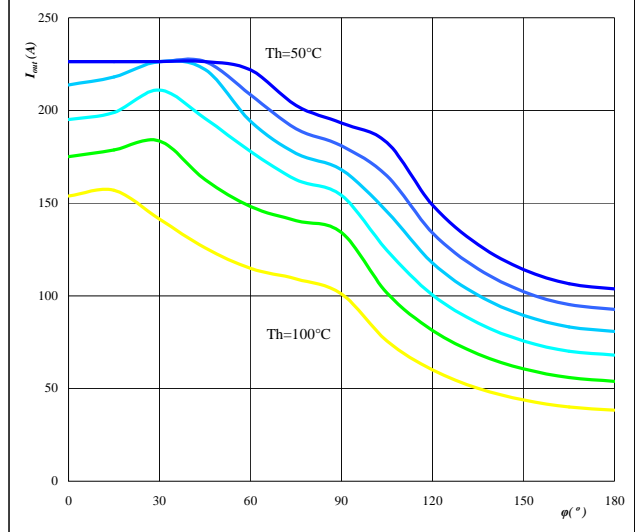


Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 DC link= 700 V
 $\phi = 0^\circ$

parameter: Switching freq.
 fsw from 2 kHz to 128 kHz
 in steps of factor 2

Figure 24. per PHASE
Typical available output current as a function of phase displacement

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

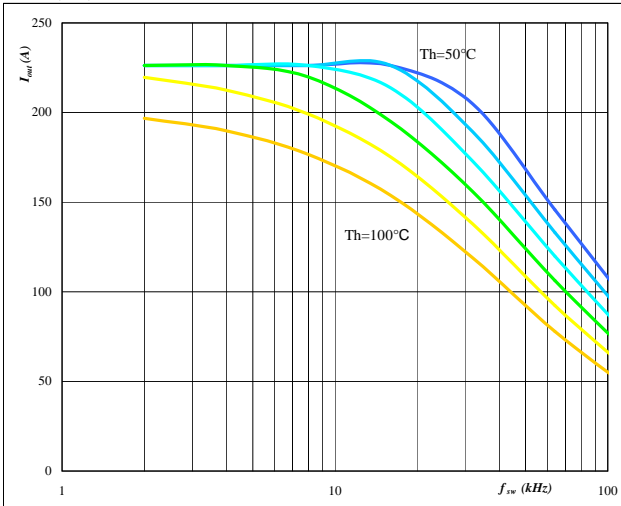


Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 DC link= 700 V
 $f_{sw} = 16 \text{ kHz}$

parameter: Heatsink temp.
 Th from 50 °C to 100 °C
 in 10 °C steps

Figure 25. per PHASE
Typical available output current as a function of switching frequency

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

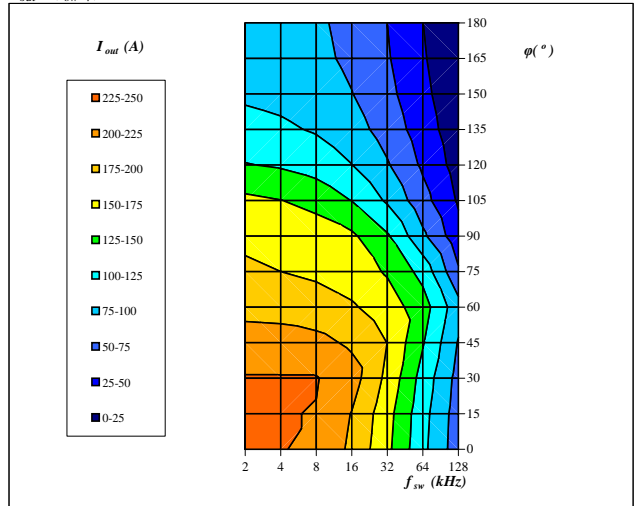


Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$ $\phi = 0^\circ$
 DC link= 700 V

parameter: Heatsink temp.
 Th from 50 °C to 100 °C
 in 10 °C steps

Figure 26. per PHASE
Typical available 50Hz output current as a function of fsw and phase displacement

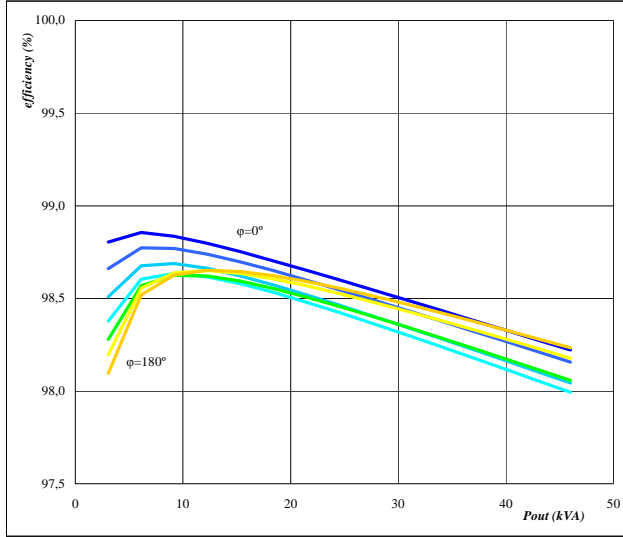
$$I_{out}=f(f_{sw},\phi)$$



Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 DC link= 700 V
 $T_h = 80 \text{ } ^\circ\text{C}$

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Figure 27. per PHASE
Typical efficiency as a function of output power

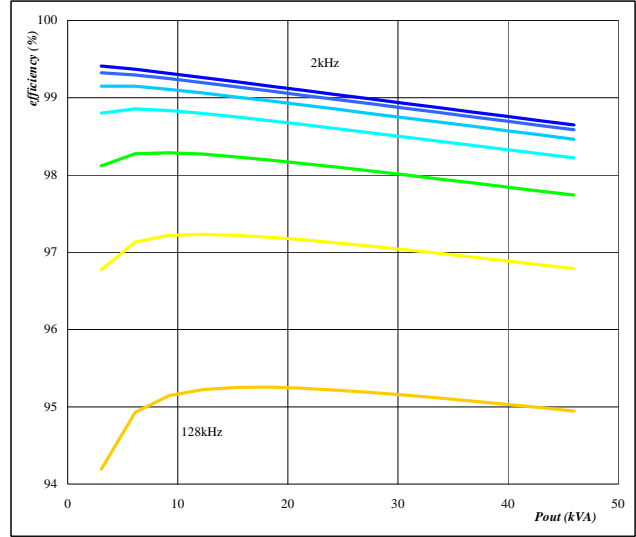
$$\eta=f(P_{out})$$



Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 $f_{sw} = 16 \text{ kHz}$
 DC link = 700 V
 parameter: phase displacement φ from 0° to 180°
 in steps of 30°

Figure 28. per PHASE
Typical efficiency as a function of output power

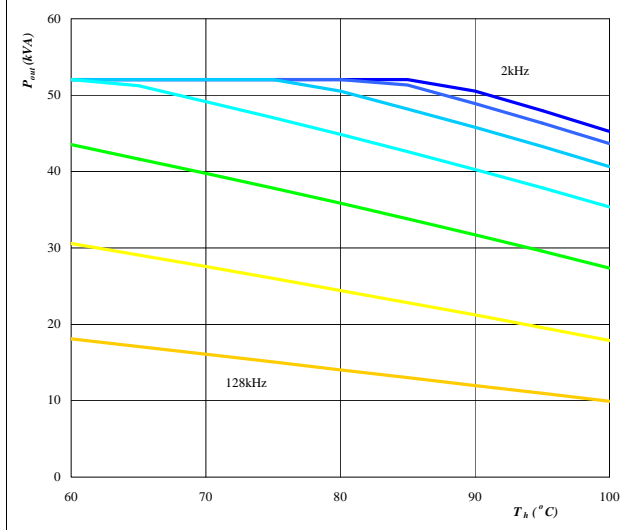
$$\eta=f(P_{out})$$



Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$ $\varphi = 0^\circ$
 DC link = 700 V
 parameter: Switching freq. f_{sw} from 2 kHz to 128 kHz
 in steps of factor 2

Figure 29. per PHASE
Typical available output power as a function of heat sink temperature

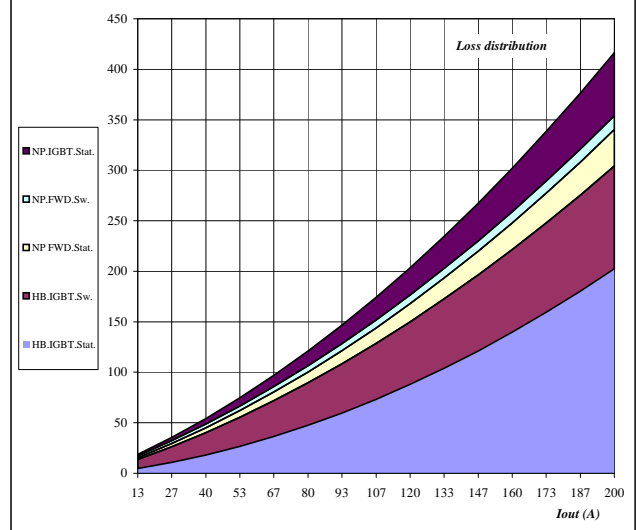
$$P_{out}=f(T_h)$$



Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 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 PHASE
Typical loss distribution as a function of output current

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

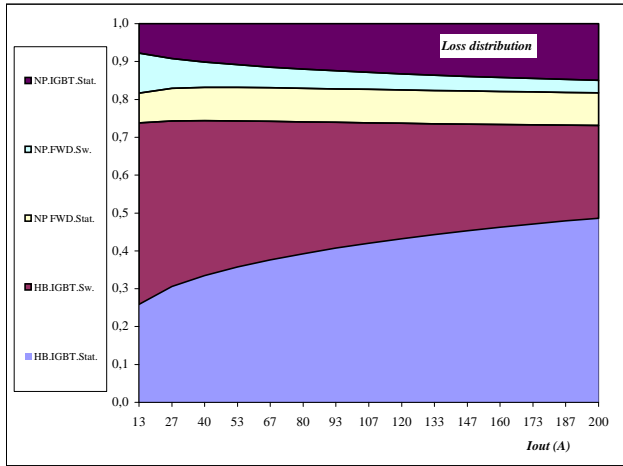


Conditions: $T_j = 150/125 \text{ } ^\circ\text{C}$
 $f_{sw} = 16 \text{ kHz}$
 DC link = 700 V
 $\varphi = 0^\circ$

Figure 31. per PHASE

Typical relativ loss distribution as a function of output current

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



Conditions:

T_j	=	150/125	°C
f_{sw}	=	16	kHz
DC link	=	700	V
φ	=	0°	

Figure 32.
Schematic
