



Vincotech

flowMNPC 4w

mixed voltage NPC Application

1200 V / 600 A

General conditions

half bridge IGBT	
V_{GEon}	= 15 V
V_{GEoff}	= -15 V
R_{gon}	= 7 Ω *
R_{goff}	= 7 Ω *

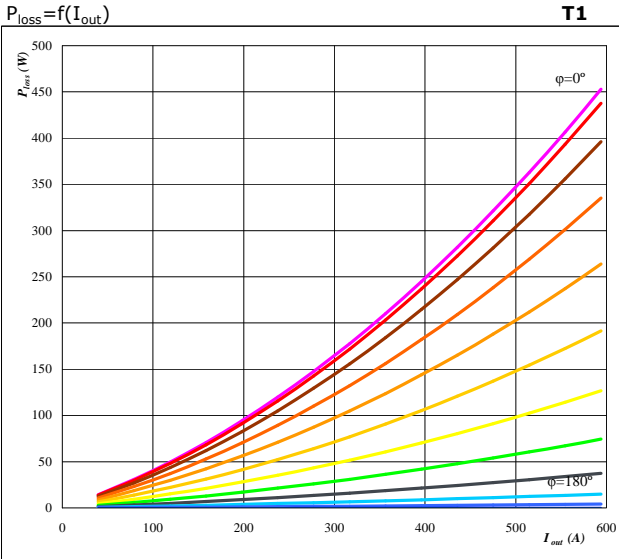
V_{out} = 230 VAC

* including chip gate resistor

neutral point IGBT	
V_{GEon}	= 15 V
V_{GEoff}	= -15 V
R_{gon}	= 2 Ω *
R_{goff}	= 2 Ω *

Figure 1. half bridge IGBT

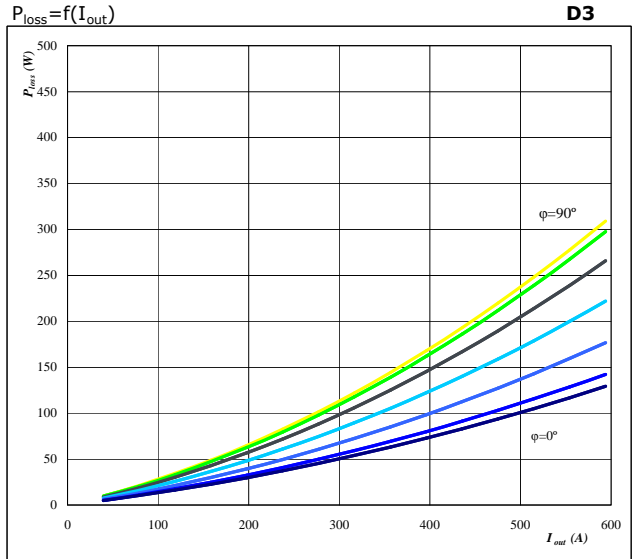
Typical average static loss as a function of output current I_{ORMS}



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

Figure 2. neutral point FWD

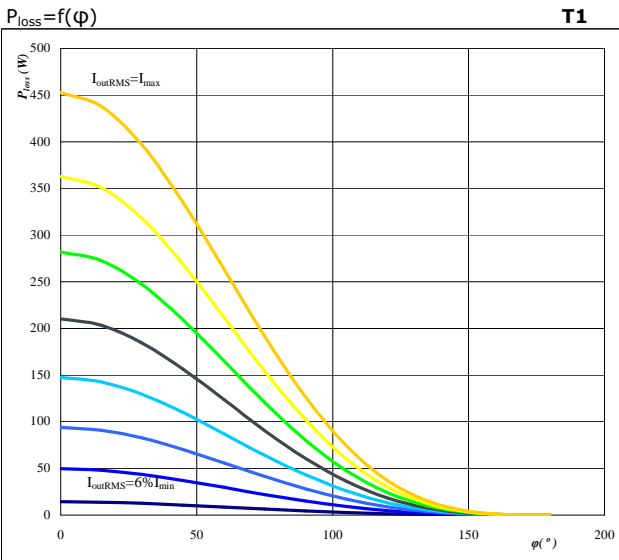
Typical average static loss as a function of output current I_{ORMS}



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

Figure 3. half bridge IGBT

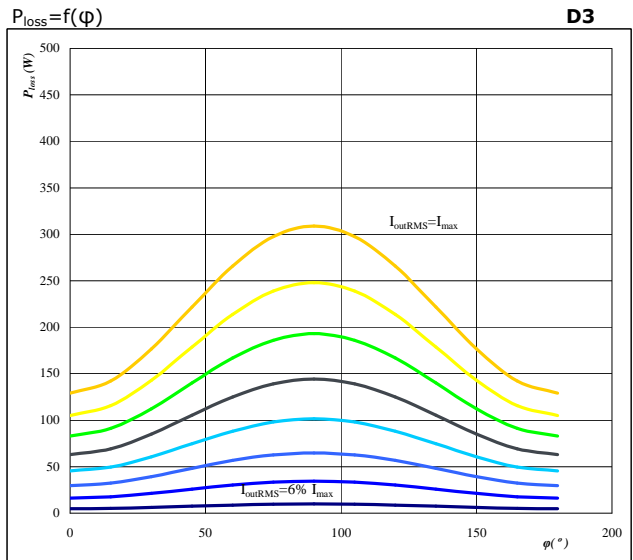
Typical average static loss as a function of phase displacement ϕ



Conditions $T_j = 125$ °C
parameter I_{ORMS} from 39,6 A to 593 A
in steps of 79 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 39,6 A to 593 A
in steps of 79 A



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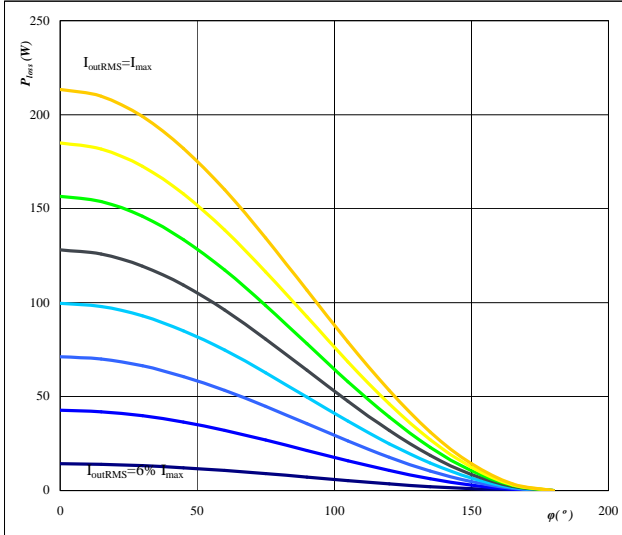
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Figure 5. half bridge IGBT

Typical average switching loss as a function of phase displacement φ

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

T1



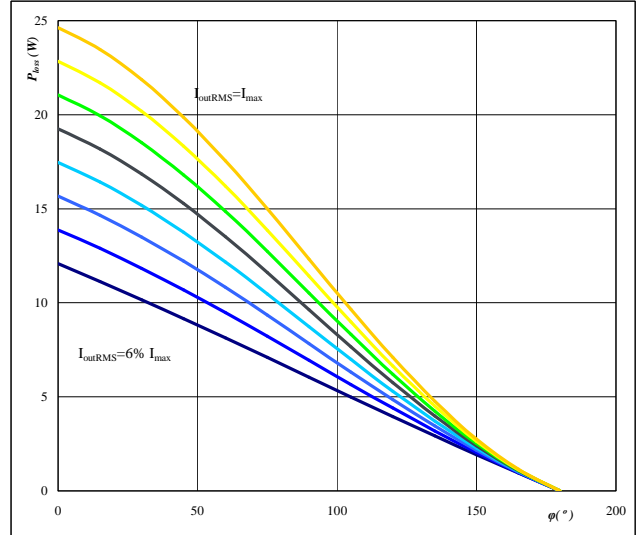
Conditions $T_j= 125 \text{ }^\circ\text{C}$
 $f_{sw}= 8 \text{ kHz}$
 DC link= 700 V
 parameter I_{ORMS} from 39,6 A to 593 A
 in steps of 79 A

Figure 6. neutral point FWD

Typical average switching loss as a function of phase displacement φ

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

D3



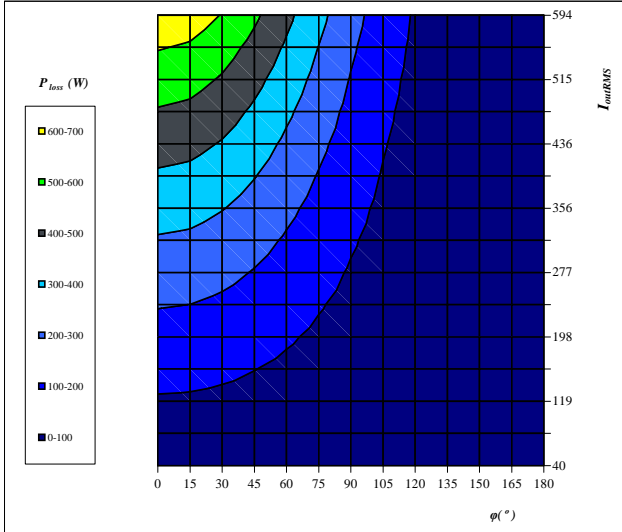
Conditions $T_j= 125 \text{ }^\circ\text{C}$
 $f_{sw}= 8 \text{ kHz}$
 DC link= 700 V
 parameter I_{ORMS} from 39,6 A to 593 A
 in steps of 79 A

Figure 7. half bridge IGBT

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

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

T1



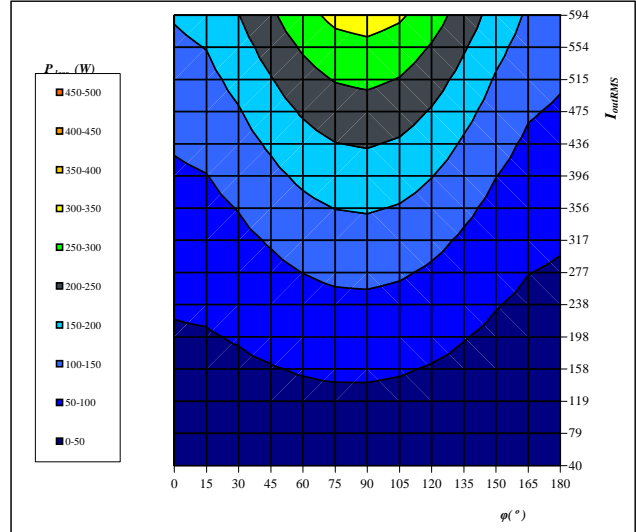
Conditions $T_j= 125 \text{ }^\circ\text{C}$
 DC link= 700 V
 $f_{sw}= 8 \text{ kHz}$

Figure 8. neutral point FWD

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

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

D3



Conditions $T_j= 125 \text{ }^\circ\text{C}$
 DC link= 700 V
 $f_{sw}= 8 \text{ kHz}$



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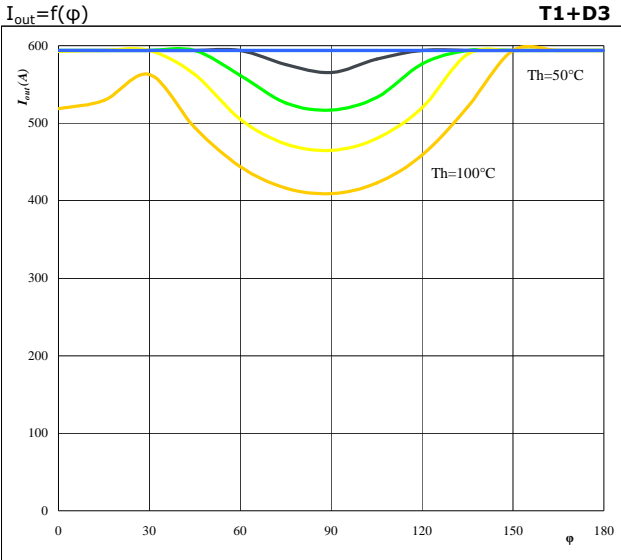
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Figure 9. for half bridge IGBT+ neutral point FWD

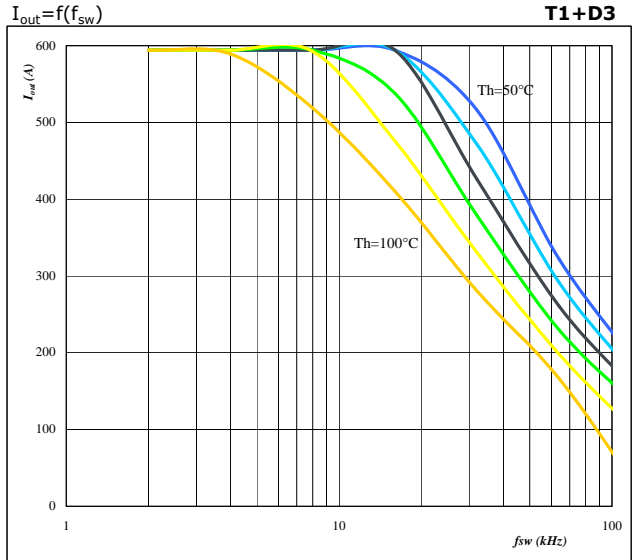
Typical available output current as a function of phase displacement φ



Conditions $T_j = 150$ °C $f_{sw} = 8$ 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

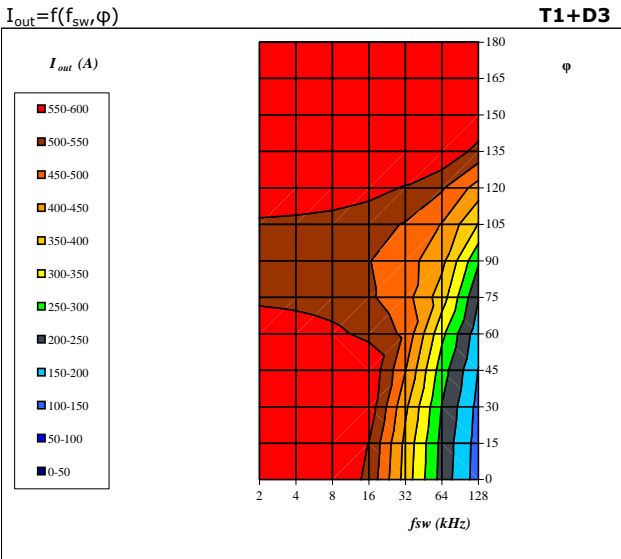
Typical available output current as a function of switching frequency f_{sw}



Conditions $T_j = 150$ °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



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



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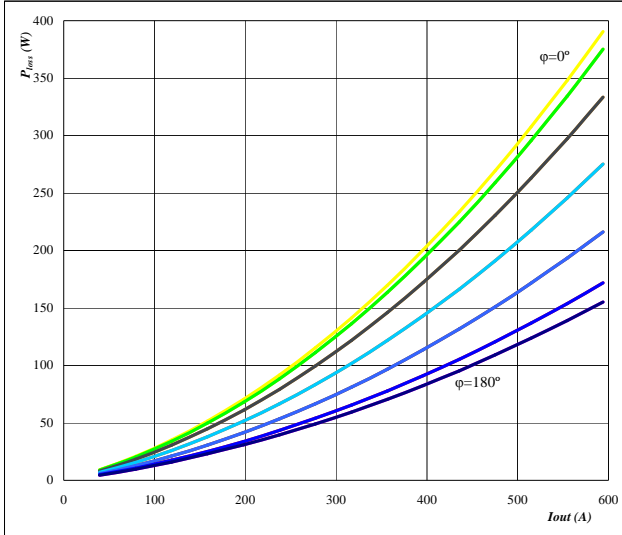
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Figure 12. neutral point IGBT

Typical average static loss as a function of output current

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

T3



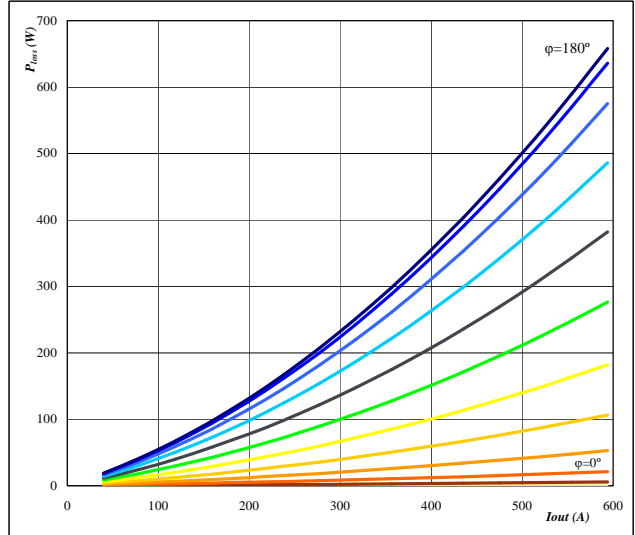
Conditions $T_j = 125$ °C
parameter ϕ from 0° to 180°
in 12 steps

Figure 13. half bridge FWD

Typical average static loss as a function of output current

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

D1



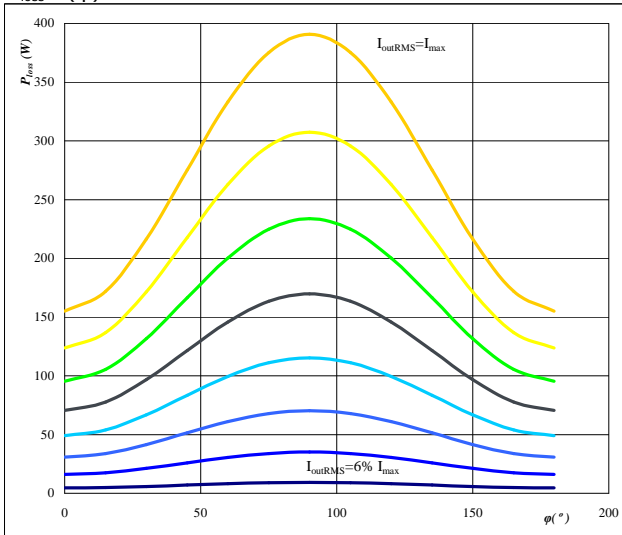
Conditions $T_j = 125$ °C
parameter ϕ from 0° to 180°
in 12 steps

Figure 14. neutral point IGBT

Typical average static loss as a function of phase displacement

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

T3



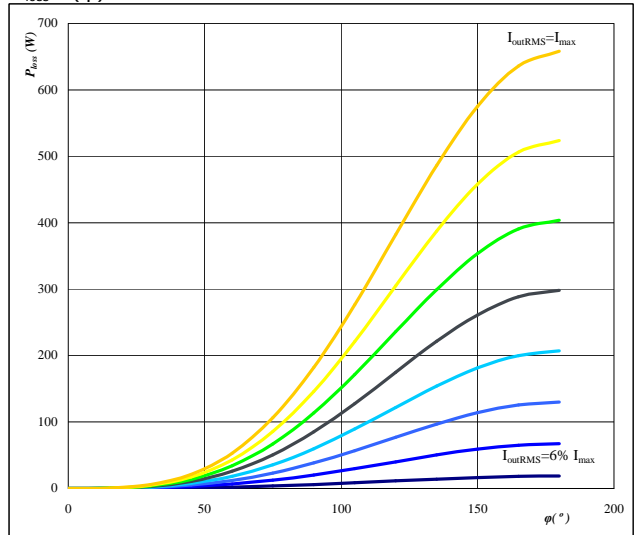
Conditions $T_j = 125$ °C
parameter I_{ORMS} from 40 A to 593 A
in steps of 79 A

Figure 15. half bridge FWD

Typical average static loss as a function of phase displacement

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

D1



Conditions $T_j = 125$ °C
parameter I_{ORMS} from 40 A to 593 A
in steps of 79 A



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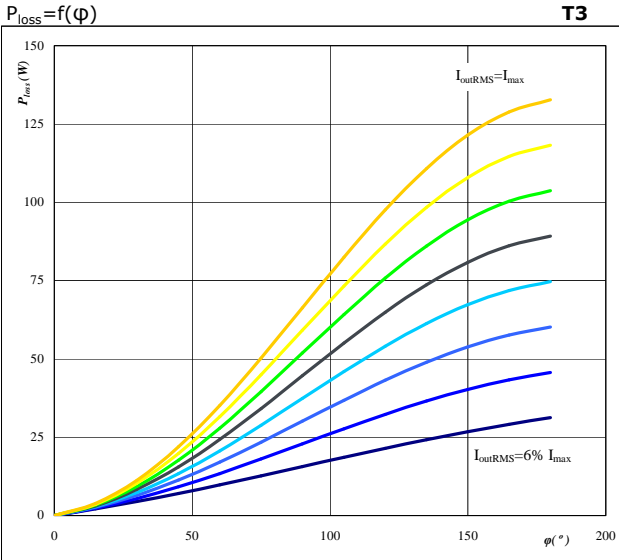
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Figure 16. neutral point IGBT

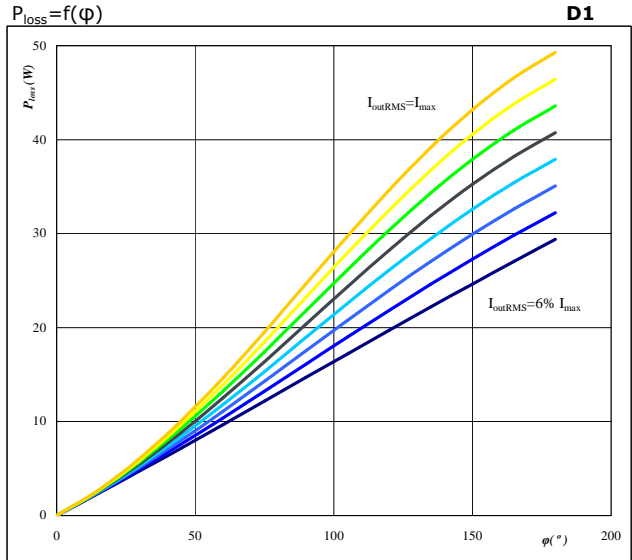
Typical average switching loss as a function of phase displacement



Conditions $T_j = 125$ °C $f_{sw} = 8$ kHz
DC link = 700 V
parameter I_{oRMS} from 40 A to 593 A
in steps of 79 A A

Figure 17. half bridge FWD

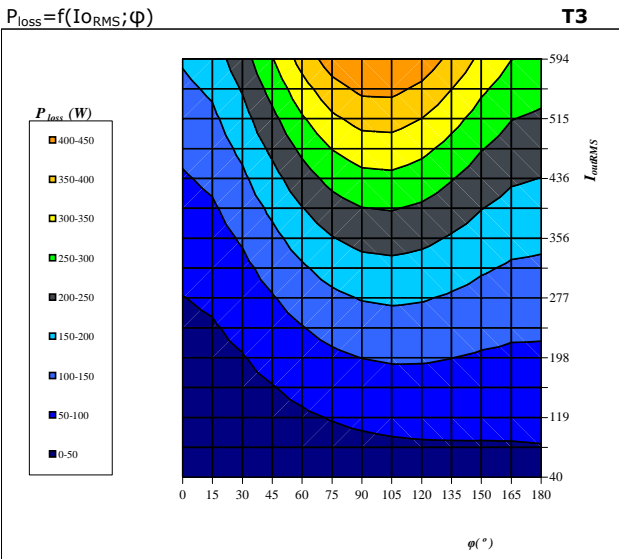
Typical average switching loss as a function of phase displacement



Conditions $T_j = 125$ °C $f_{sw} = 8$ kHz
DC link = 700 V
parameter I_{oRMS} from 40 A to 593 A
in steps of 79 A A

Figure 18. neutral point IGBT

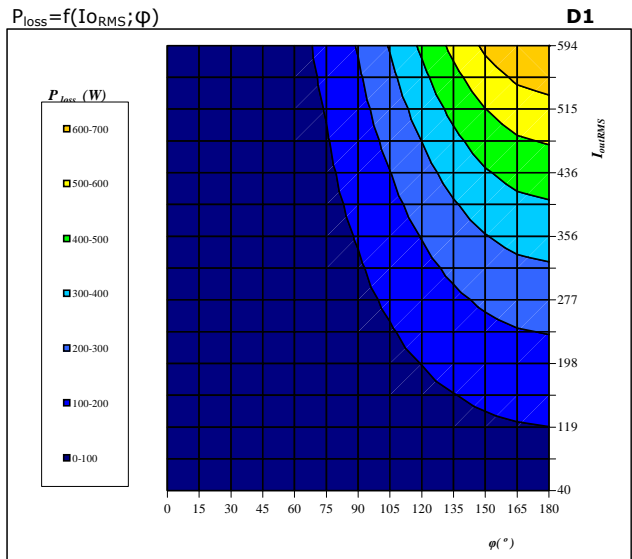
Typical total loss as a function of phase displacement and I_{outRMS}



Conditions $T_j = 125$ °C
DC link = 700 V
 $f_{sw} = 8$ kHz

Figure 19. half bridge FWD

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



Conditions $T_j = 125$ °C
DC link = 700 V
 $f_{sw} = 8$ kHz



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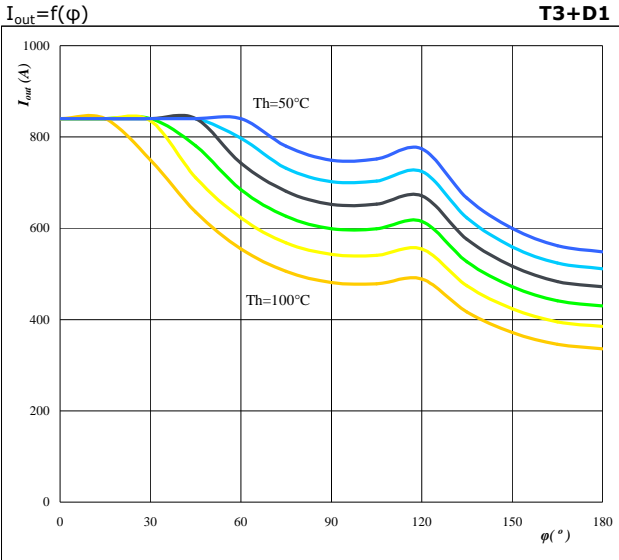
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Figure 20. for neutral point IGBT+ half bridge FWD

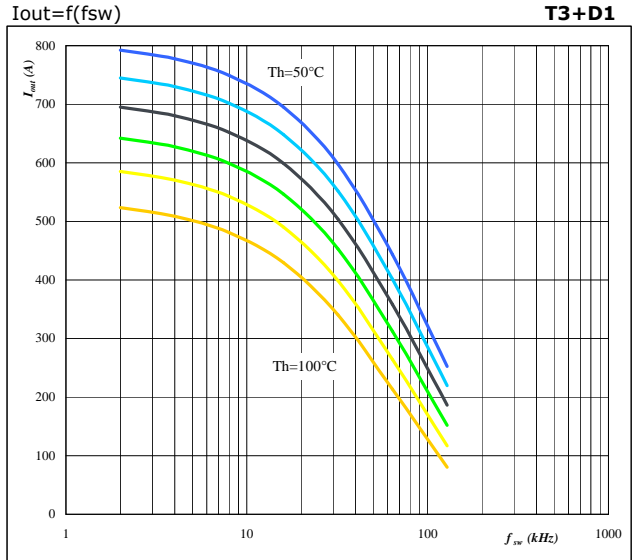
Typical available output current as a function of phase displacement



Conditions $T_j = 150$ °C $f_{sw} = 8$ kHz
 DC link = 700 V
 parameter: Heatsink temp.
 Th from 50 °C to 100 °C
 in 10 °C steps

Figure 21. for neutral point IGBT+ half bridge FWD

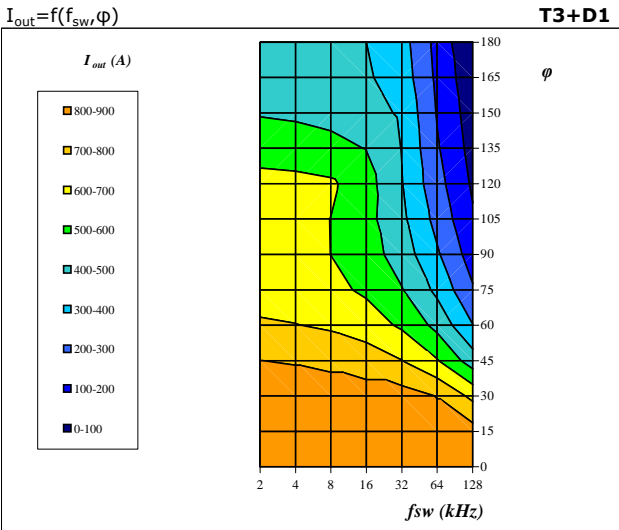
Typical available output current as a function of switching frequency



Conditions $T_j = 150$ °C $\phi = 90^\circ$
 DC link = 700 V
 parameter: Heatsink temp.
 Th from 50 °C to 100 °C
 in 10 °C steps

Figure 22. for neutral point IGBT+ half bridge FWD

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



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



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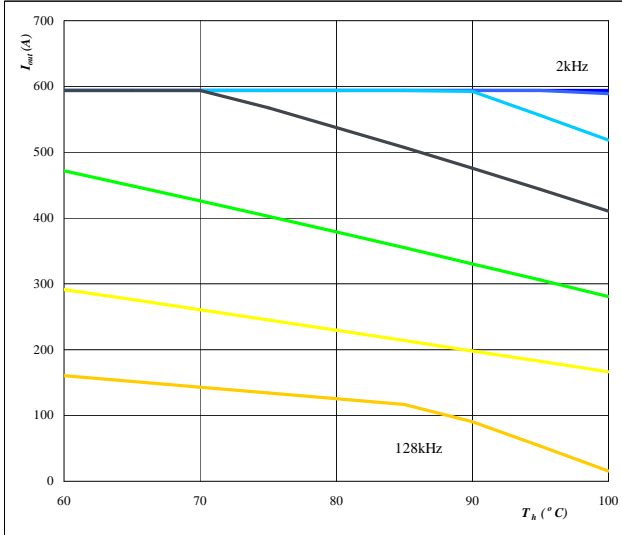
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Figure 23. per PHASE

Typical available output current as a function of heat sink temperature

$I_{out}=f(T_h)$

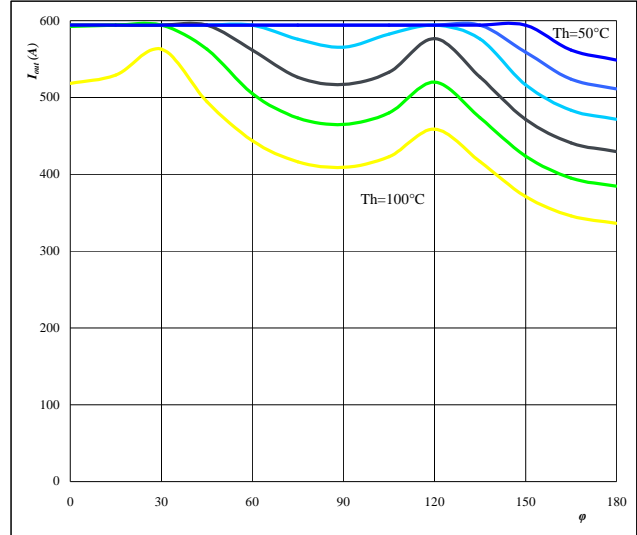


Conditions $T_j= 150$ °C
DC link= 700 V
 $\phi= 0$ °
parameter: Switching freq.
fsw from 2 kHz to 128 kHz
in steps of factor 2

Figure 24. per PHASE

Typical available output current as a function of phase displacement

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

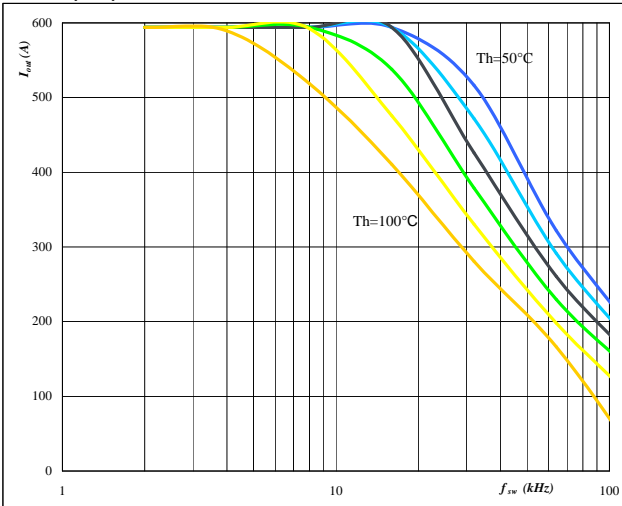


Conditions $T_j= 150$ °C
DC link= 700 V
fsw= 8 kHz
parameter: Heatsink temp.
Th from 50 °C to 100 °C
in 10 °C steps

Figure 25. per PHASE

Typical available output current as a function of switching frequency

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

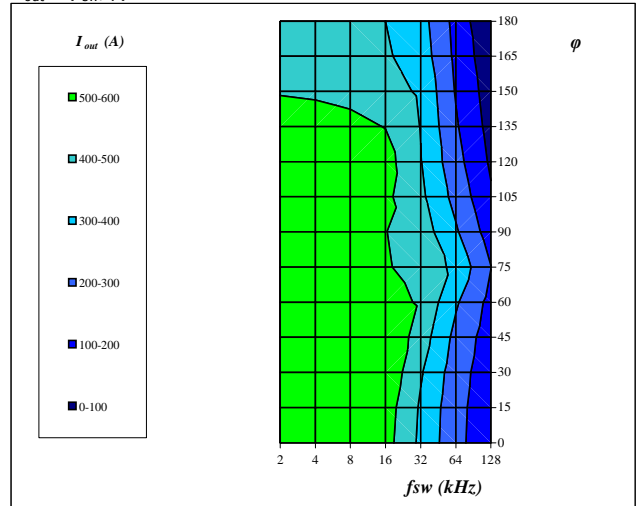


Conditions $T_j= 150$ °C $\phi= 0$ °
DC link= 700 V
parameter: Heatsink temp.
Th from 50 °C to 100 °C
in 10 °C steps

Figure 26. per PHASE

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

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



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



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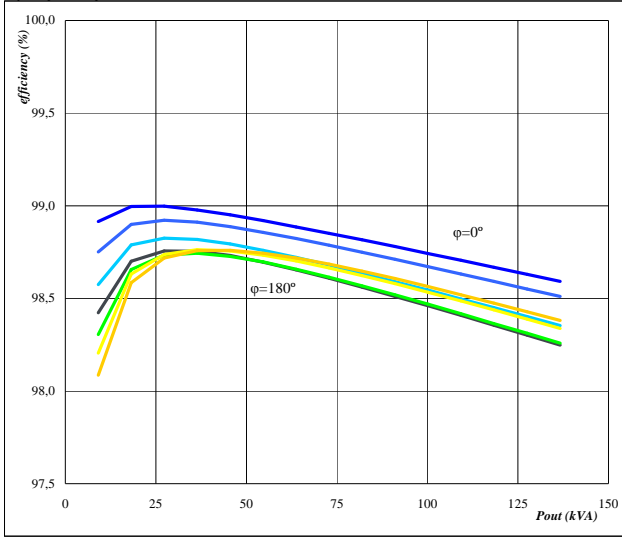
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Figure 27. per PHASE

Typical efficiency as a function of output power

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



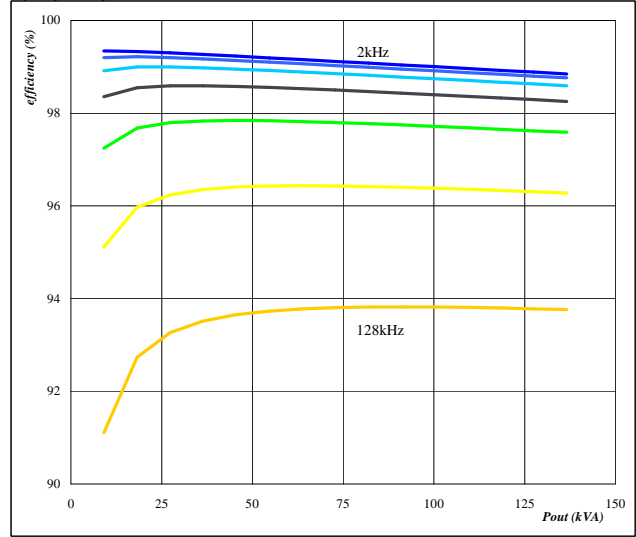
Conditions $T_j = 125$ °C
 $f_{sw} = 8$ kHz
DC link = 700 V

parameter: phase displacement
 ϕ from 0 ° to 180 °
in steps of 30 °

Figure 28. per PHASE

Typical efficiency as a function of output power

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



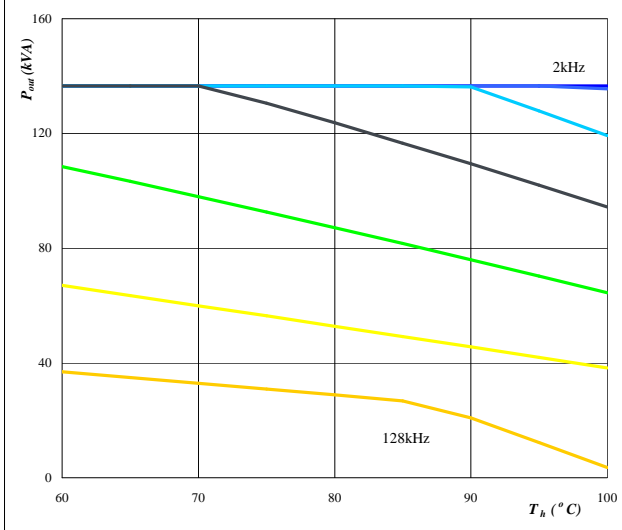
Conditions $T_j = 125$ °C $\phi = 0$ °
DC link = 700 V

parameter: Switching freq.
fsw 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

$P_{out} = f(T_h)$



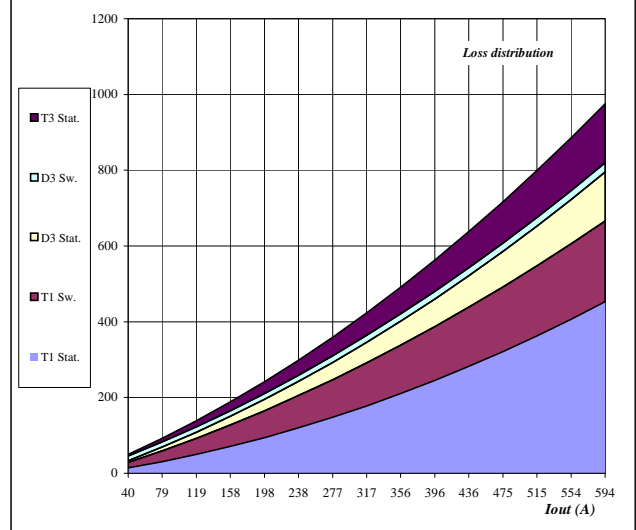
Conditions $T_j = 125$ °C
DC link = 700 V
 $\phi = 0$ °

parameter: Switching freq.
fsw 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 $T_j = 125$ °C
 $f_{sw} = 8$ kHz
DC link = 700 V
 $\phi = 0$ °



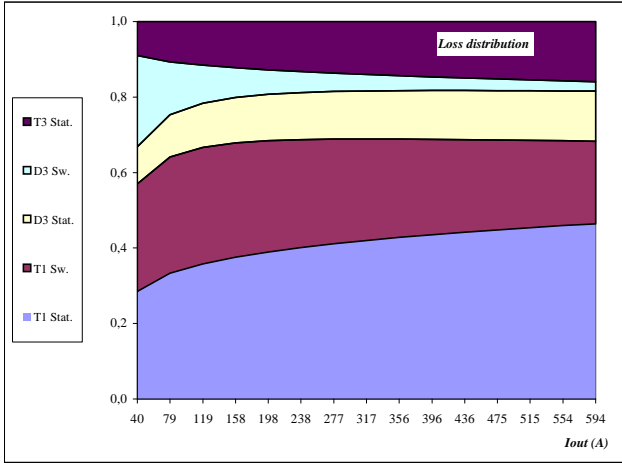
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Figure 31. Typical relative loss distribution as a function of output current
 $P_{out}=f(T_n)$



Conditions $T_j=$ 125 °C
 $f_{sw}=$ 8 kHz
 DC link= 700 V
 $\phi=$ 0 °

