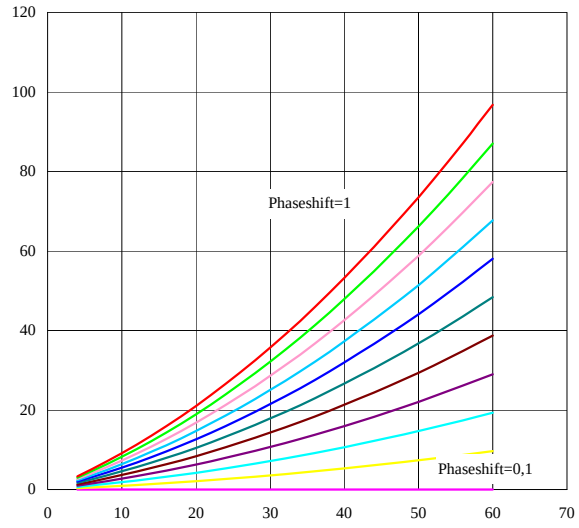
Output inverter application

Phase shifted ZVS, Vgeon= 15 V Vgeoff=0V Rgon= 4 ohms Rgoff= 2 ohms

Figure 1. Typical static loss of shifted switch as a function of output current

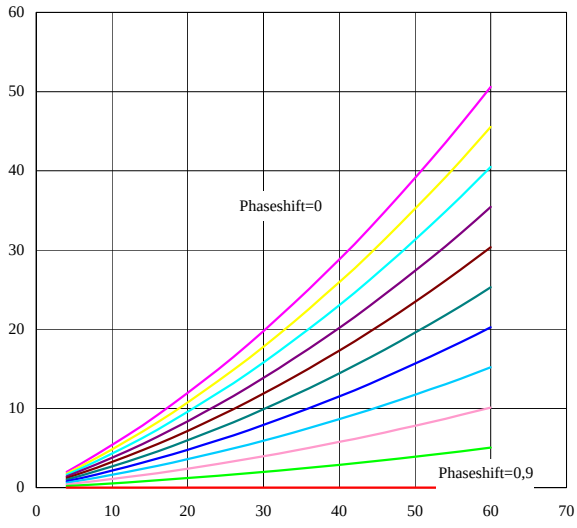
IGBT Ploss=f(Iout)



Conditions: Tj=125°C
Phaseshift
parameter Phaseshift from 0,10 to 1,00
in 0,10 steps

Figure 2. Typical static loss of shifted switch as a function of output current

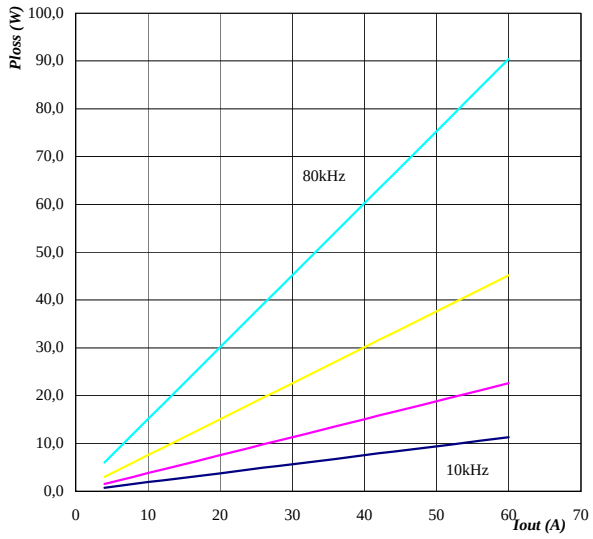
FRED Ploss=f(Iout)



Conditions: Tj=125°C
Phaseshift
parameter Phaseshift from 0,00 to 0,90
in 0,10 steps

Figure 3. Typical switching loss as a function of output current

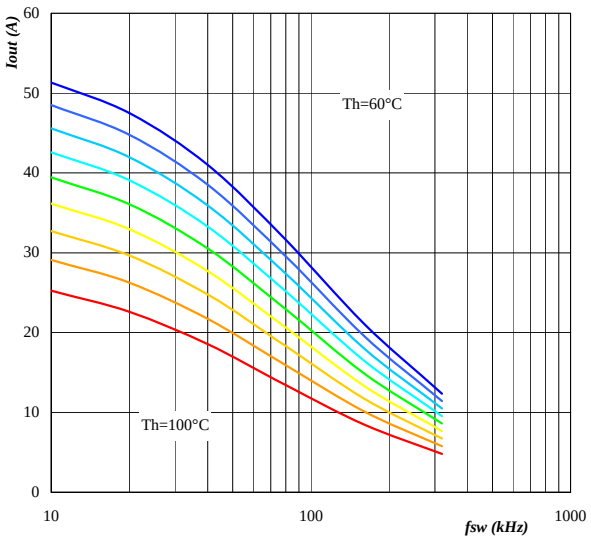
IGBT Ploss=f(Iout)



Conditions: Tj=125C
Ioutpk/Iout= 1,3 DC link= 300 V
Phaseshift= 1
Switching freq. fsw from 10 kHz to 80 kHz
parameter in * 2 steps

Figure 4. Typical available output current as a function of switching frequency

Phase Iout=f(fsw)



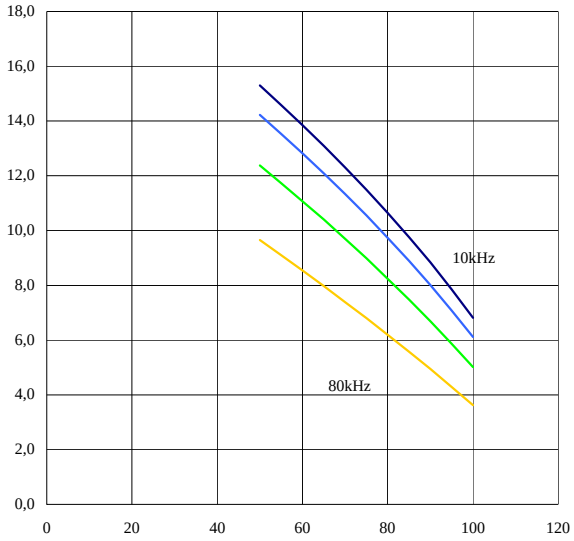
Conditions: Tj=125C
Ioutpk/Iout= 1,3 DC link= 300 V
Phaseshift= 1
Heatsink temp. Th from 60 °C to 100 °C
parameter in 5 °C steps

Output inverter application

Phase shifted ZVS, Vgeon= 15 V Vgeoff=0V Rgon= 4 ohms Rgoff= 2 ohms

Figure 5. Typical available electric peak output power as a function of heatsink temperature

Inverter Pout=f(Th)

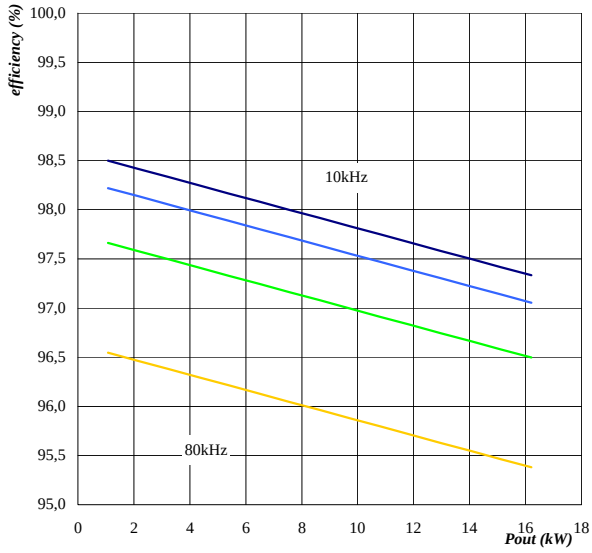


Conditions: Tj=125C
Ioutpk/Iout= 1,3 DC link= 300 V
Phaseshift= 1

Switching freq. parameter fsw from 10 kHz to 80 kHz in * 2 steps

Figure 6. Typical efficiency as a function of output power

Inverter efficiency=f(Pout)



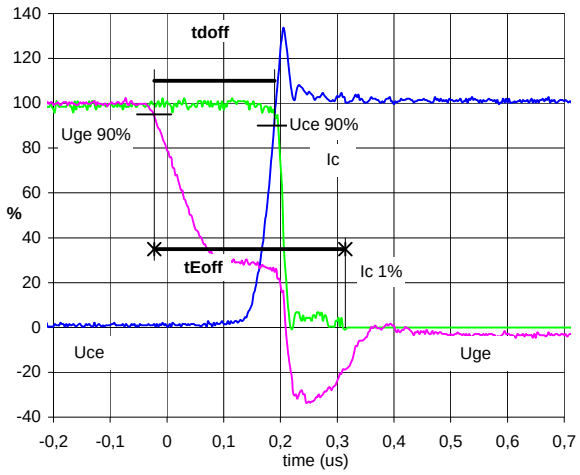
Conditions: Tj=125C
Ioutpk/Iout= 1,3 DC link= 300 V
Phaseshift= 1

Switching freq. parameter fsw from 10 kHz to 80 kHz in * 2 steps

Switching definitions

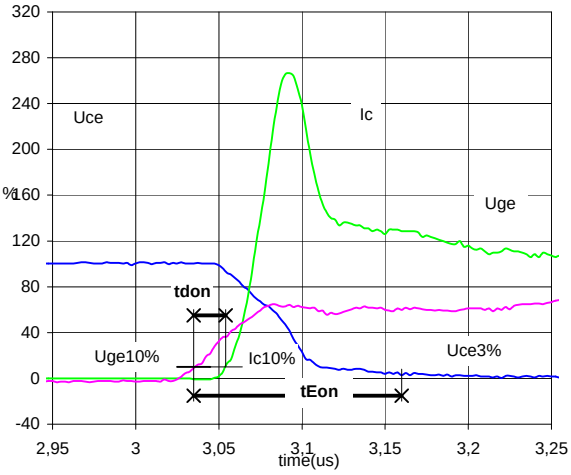
General conditions: Tj= 125 °C Rgon= 4 ohms Rgoff= 2,0 ohms

Figure 1. **Turn-off Switching Waveforms & definition of tdoff, t_{Eoff}**
(t_{Eoff} = integrating time for E_{off})
Output inverter IGBT



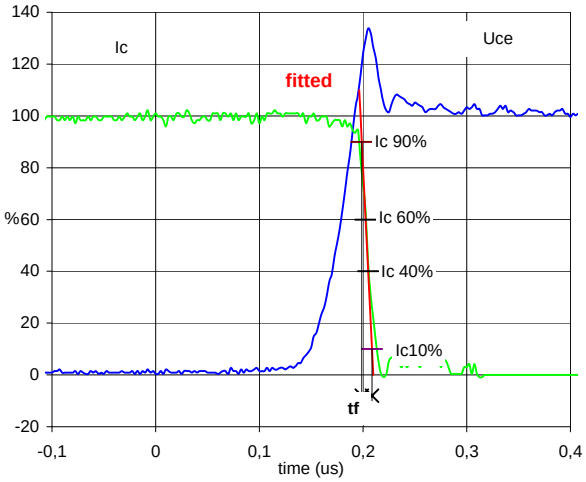
Uge(0%)= 0 V
Uge(100%)= 15 V
Uc(100%)= 400 V
Ic(100%)= 60 A
tdoff= 0,21 us
t_{Eoff}= 0,34 us

Figure 2. **Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}**
(t_{Eon} = integrating time for E_{on})
Output inverter IGBT



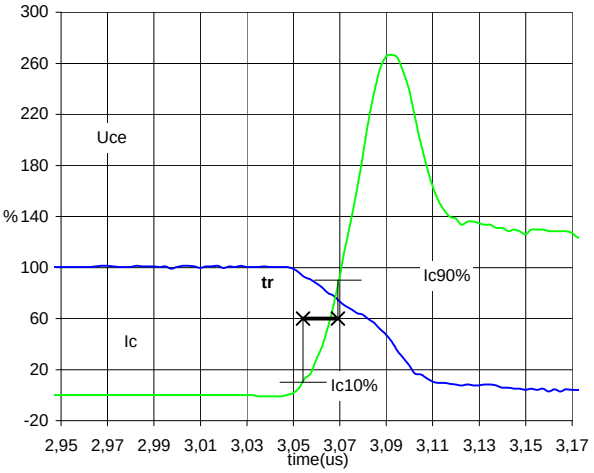
Uge(0%)= 0 V
Uge(100%)= 15 V
Uc(100%)= 400 V
Ic(100%)= 59,7 A
tdon= 0,02 us
t_{Eon}= 0,12 us

Figure 3. **Turn-off Switching Waveforms & definition of t_f**
Output inverter IGBT



Uc(100%)= 400 V
Ic(100%)= 60 A
t_f= 0,012 us

Figure 4. **Turn-on Switching Waveforms & definition of t_r**
Output inverter IGBT



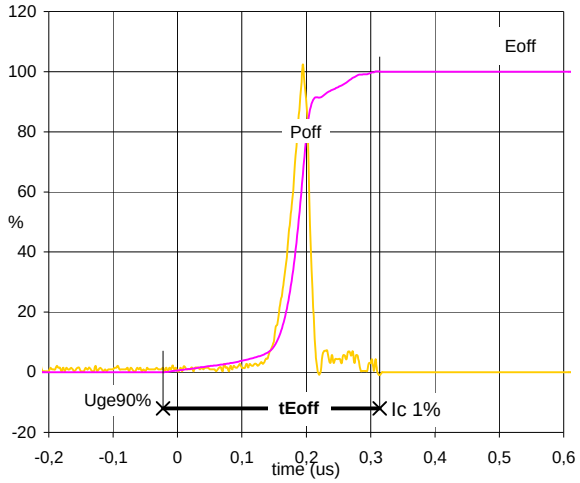
Uc(100%)= 400 V
Ic(100%)= 59,7 A
t_r= 0,016 us

Switching definitions

General conditions: Tj= 125 °C Rgon= 4 ohms Rgoff= 2,0 ohms

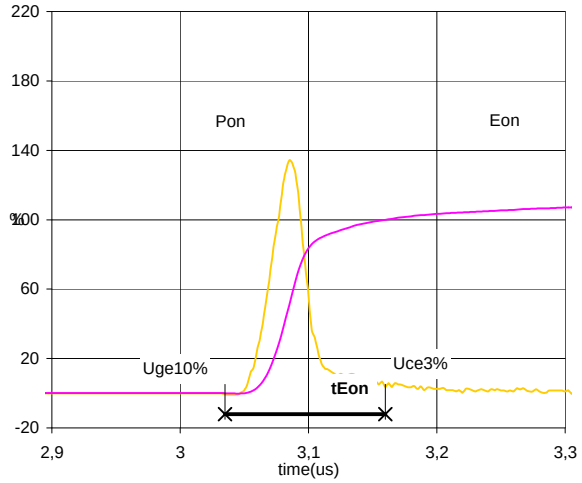
Switching definitions

Figure 5. Turn-off Switching Waveforms & definition of t_{Eoff}
Output inverter IGBT



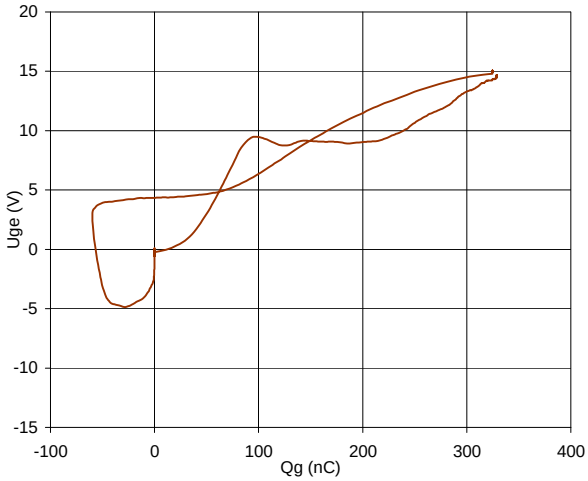
Poff(100%)= 23,88 kW
Eoff(100%)= 0,97 mJ
t_{Eoff}= 0,34 us

Figure 6. Turn-on Switching Waveforms & definition of t_{Eon}
Output inverter IGBT



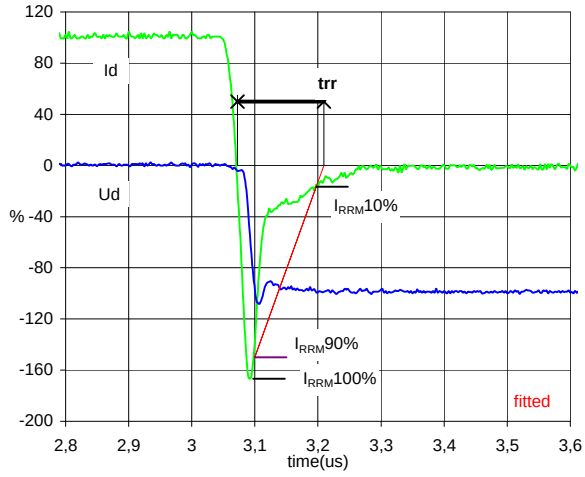
Pon(100%)= 23,9 kW
Eon(100%)= 1,11 mJ
t_{Eon}= 0,12 us

Figure 7. Gate voltage vs Gate charge
Output inverter IGBT



Ugeoff= 0 V
Ugeon= 15 V
Uc(100%)= 400 V
Ic(100%)= 60 A
Qg= 328,7 nC

Figure 8. Turn-off Switching Waveforms & definition of t_{rr}
Output inverter FRED



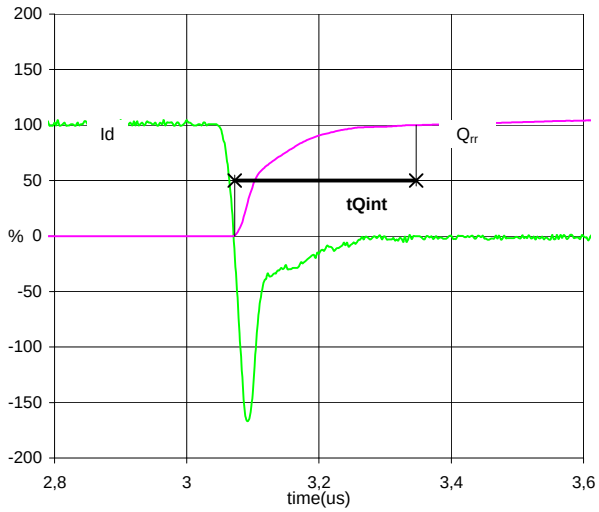
Ud(100%)= 400 V
Id(100%)= 59,7 A
I_{RRM}(100%)= 100 A
trr= 0,13 us

Switching definitions

General conditions: Tj= 125 °C Rgon= 4 ohms Rgoff= 2,0 ohms

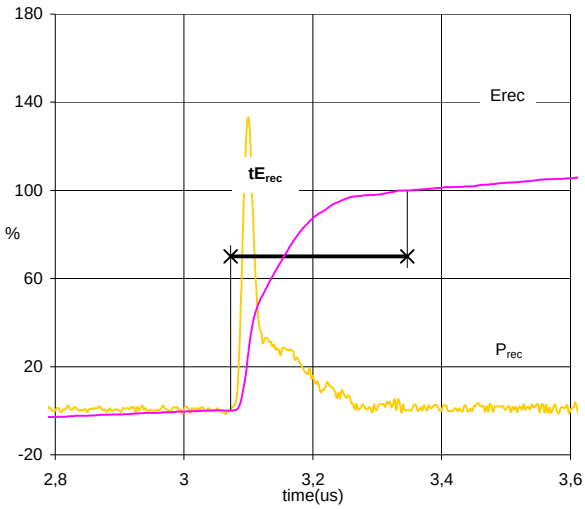
Switching definitions

Figure 9. Turn-on Switching Waveforms & definition of t_{Qrr}
(tQrr= integrating time for Qrr)
Output inverter FRED



Id(100%)= 60 A
Qrr(100%)= 4,492 uC
tQint= 0,27 us

Figure 10. Turn-on Switching Waveforms & definition of t_{Erec}
(t_{Erec}= integrating time for E_{rec})
Output inverter FRED



Prec(100%)= 23,9 kW
Erec(100%)= 1,32 mJ
tErec= 0,27 us