

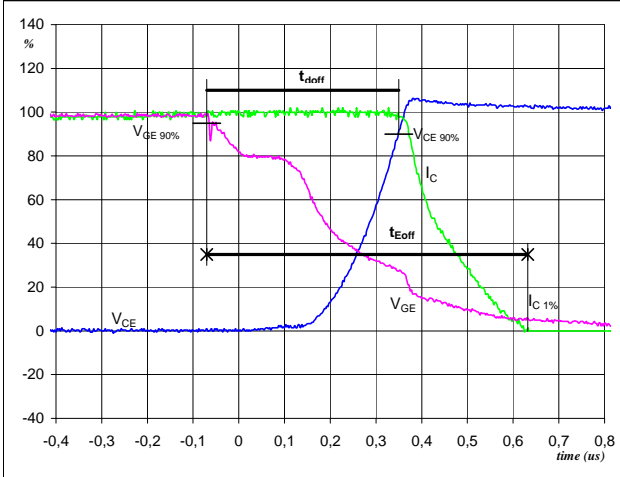
## Switching Definitions Output Inverter

**General conditions**

$T_j$	=	125 °C
$R_{gon}$	=	54 $\Omega$
$R_{goff}$	=	54 $\Omega$

**Figure 1** Output inverter IGBT

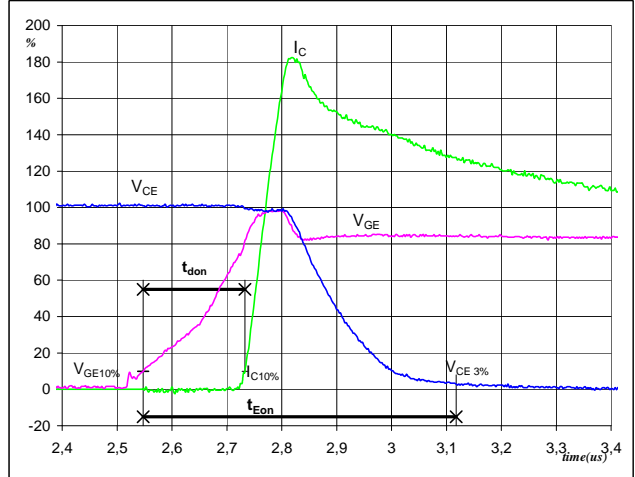
**Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$** 

 ( $t_{Eoff}$  = integrating time for  $E_{off}$ )


$V_{GE}$ (0%) =	-15	V
$V_{GE}$ (100%) =	15	V
$V_C$ (100%) =	600	V
$I_C$ (100%) =	15	A
$t_{doff}$ =	0,00	$\mu$ s
$t_{Eoff}$ =	0,70	$\mu$ s

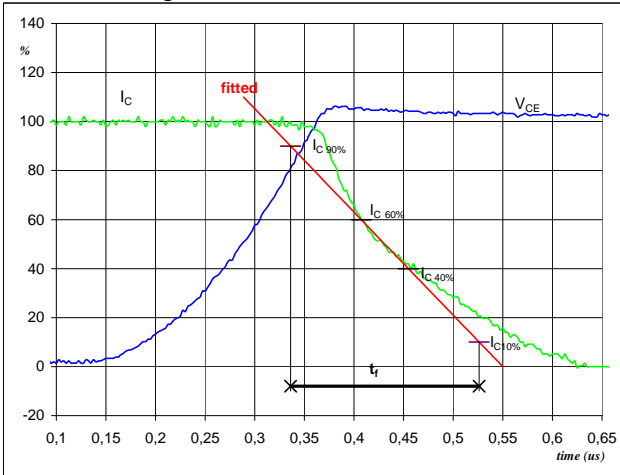
**Figure 2** Output inverter IGBT

**Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$** 

 ( $t_{Eon}$  = integrating time for  $E_{on}$ )


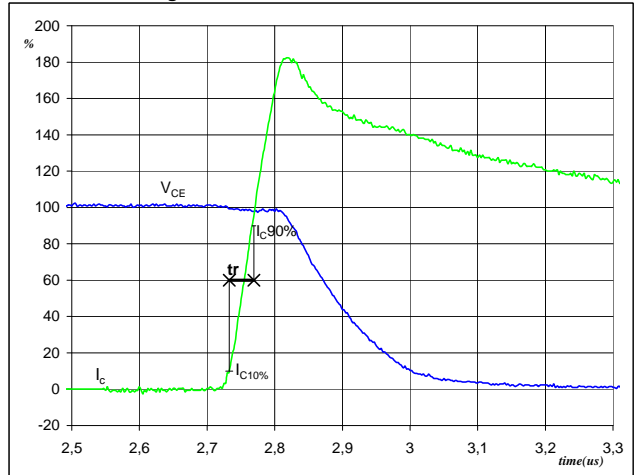
$V_{GE}$ (0%) =	-15	V
$V_{GE}$ (100%) =	15	V
$V_C$ (100%) =	600	V
$I_C$ (100%) =	15	A
$t_{don}$ =	0,00	$\mu$ s
$t_{Eon}$ =	0,57	$\mu$ s

**Figure 3** Output inverter IGBT

**Turn-off Switching Waveforms & definition of  $t_f$** 


$V_C$ (100%) =	600	V
$I_C$ (100%) =	15	A
$t_f$ =	0,00	$\mu$ s

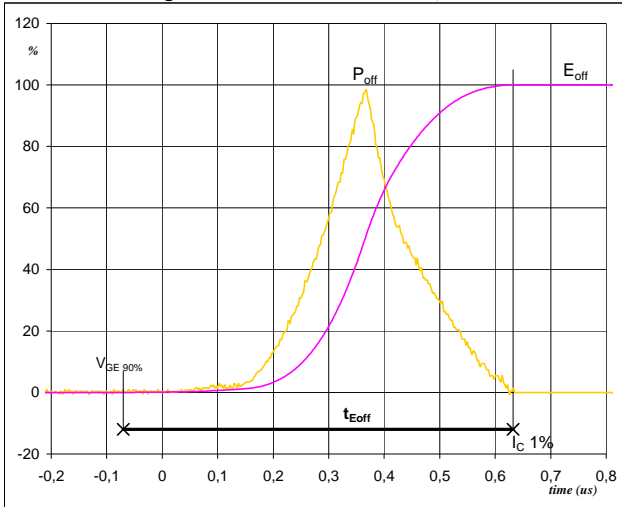
**Figure 4** Output inverter IGBT

**Turn-on Switching Waveforms & definition of  $t_f$** 


$V_C$ (100%) =	600	V
$I_C$ (100%) =	15	A
$t_f$ =	0,00	$\mu$ s

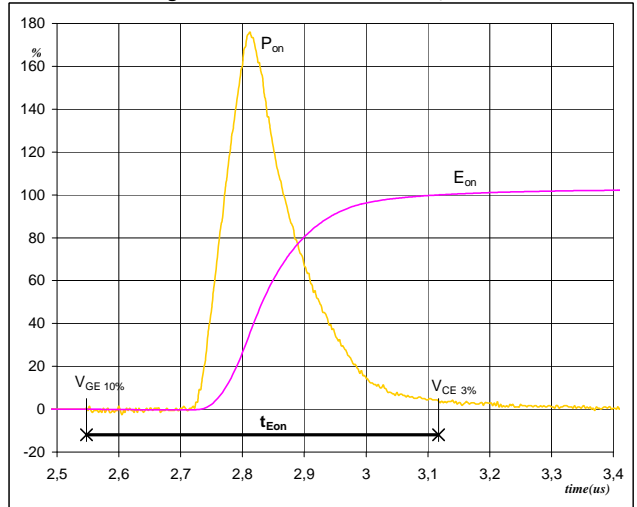
## Switching Definitions Output Inverter

**Figure 5** Output inverter IGBT

**Turn-off Switching Waveforms & definition of  $t_{Eoff}$** 


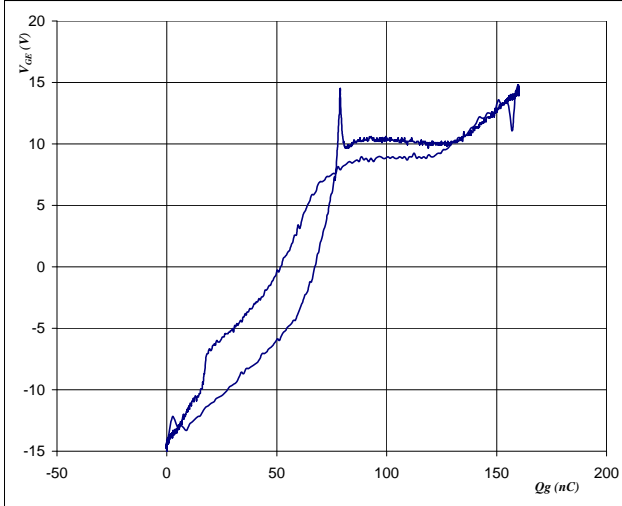
$P_{off} (100\%) = 8,95 \text{ kW}$   
 $E_{off} (100\%) = 0,00 \text{ mJ}$   
 $t_{Eoff} = 0,70 \text{ } \mu\text{s}$

**Figure 6** Output inverter IGBT

**Turn-on Switching Waveforms & definition of  $t_{Eon}$** 


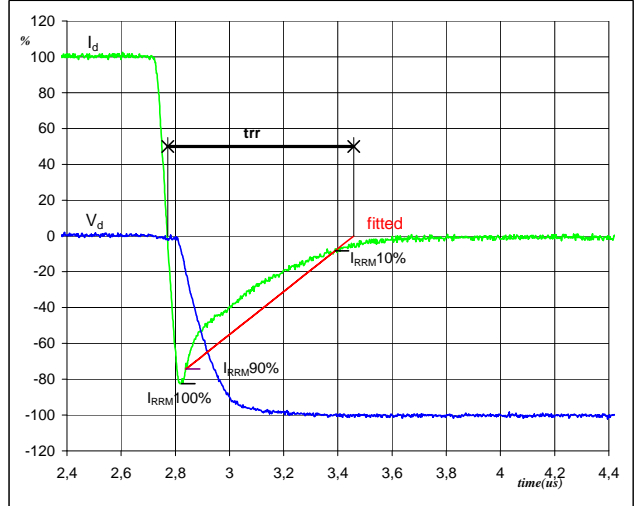
$P_{on} (100\%) = 8,95 \text{ kW}$   
 $E_{on} (100\%) = 0,00 \text{ mJ}$   
 $t_{Eon} = 0,57 \text{ } \mu\text{s}$

**Figure 7** Output inverter FWD

**Gate voltage vs Gate charge (measured)**


$V_{GEoff} = -15 \text{ V}$   
 $V_{GEon} = 15 \text{ V}$   
 $V_C (100\%) = 600 \text{ V}$   
 $I_C (100\%) = 15 \text{ A}$   
 $Q_g = 160,30 \text{ nC}$

**Figure 8** Output inverter IGBT

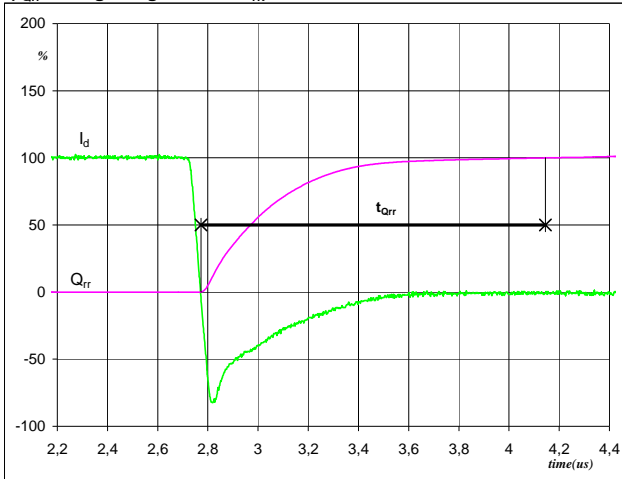
**Turn-off Switching Waveforms & definition of  $t_{rr}$** 


$V_d (100\%) = 600 \text{ V}$   
 $I_d (100\%) = 15 \text{ A}$   
 $I_{RRM} (100\%) = 0 \text{ A}$   
 $t_{rr} = 0,00 \text{ } \mu\text{s}$

## Switching Definitions Output Inverter

**Figure 9** Output inverter FWD

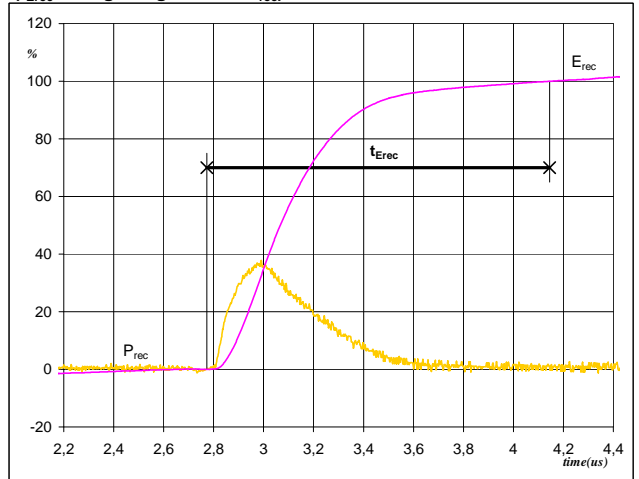
Turn-on Switching Waveforms & definition of  $t_{Qrr}$   
 ( $t_{Qrr}$  = integrating time for  $Q_{rr}$ )



$I_d$ (100%) =	15	A
$Q_{rr}$ (100%) =	0,00	$\mu\text{C}$
$t_{Qrr}$ =	1,37	$\mu\text{s}$

**Figure 10** Output inverter FWD

Turn-on Switching Waveforms & definition of  $t_{Erec}$   
 ( $t_{Erec}$  = integrating time for  $E_{rec}$ )



$P_{rec}$ (100%) =	8,95	kW
$E_{rec}$ (100%) =	0,00	mJ
$t_{Erec}$ =	1,37	$\mu\text{s}$