











































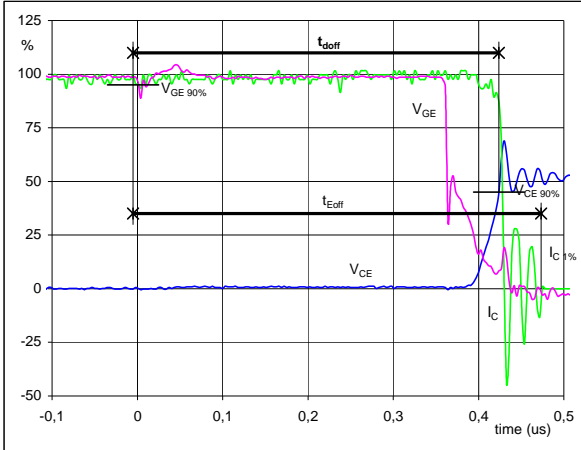


## Switching Definitions BUCK MOSFET&IGBT

General conditions			
	$T_j$	=	125°C
$R_{gon}$ IGBT	=	4 $\Omega$	
$R_{goff}$ IGBT	=	4 $\Omega$	
$R_{gon}$ MOSFET	=	4 $\Omega$	
$R_{goff}$ MOSFET	=	4 $\Omega$	
MOSFET turn off delayed time with 350 ns			

Figure 1 BUCK MOSFET

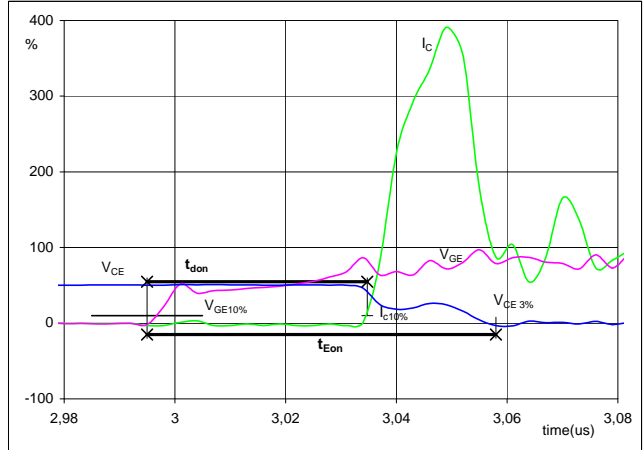
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$   
( $t_{Eoff}$  = integrating time for  $E_{off}$ )



$V_{GE}$ (0%) =	-15	V
$V_{GE}$ (100%) =	15	V
$V_C$ (100%) =	700	V
$I_C$ (100%) =	30	A
$t_{doff}$ =	0,42	$\mu$ s
$t_{Eoff}$ =	0,48	$\mu$ s

Figure 2 BUCK MOSFET

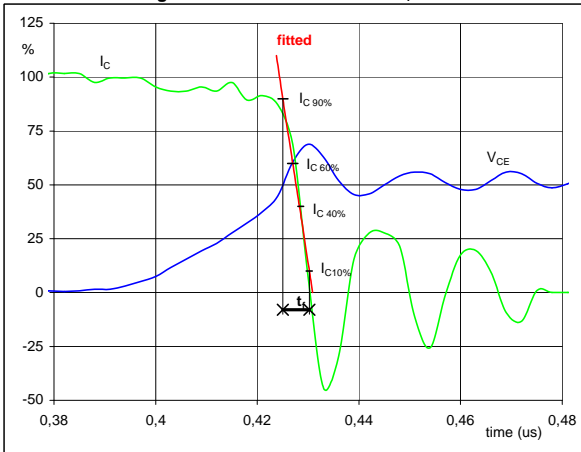
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$   
( $t_{Eon}$  = integrating time for  $E_{on}$ )



$V_{GE}$ (0%) =	-15	V
$V_{GE}$ (100%) =	15	V
$V_C$ (100%) =	700	V
$I_C$ (100%) =	30	A
$t_{don}$ =	0,04	$\mu$ s
$t_{Eon}$ =	0,06	$\mu$ s

Figure 3 BUCK MOSFET

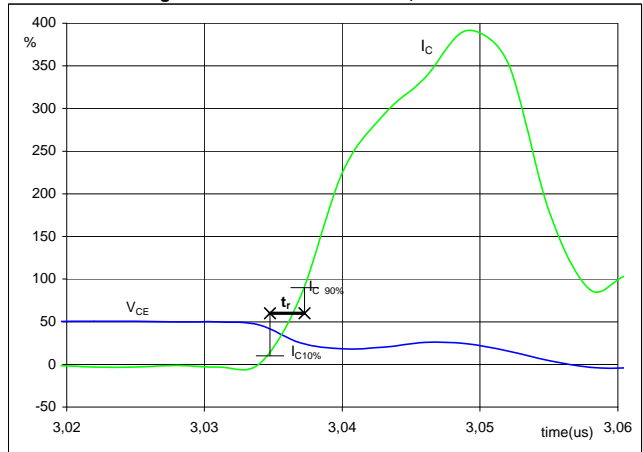
Turn-off Switching Waveforms & definition of  $t_t$



$V_C$ (100%) =	700	V
$I_C$ (100%) =	30	A
$t_t$ =	0,005	$\mu$ s

Figure 4 BUCK MOSFET

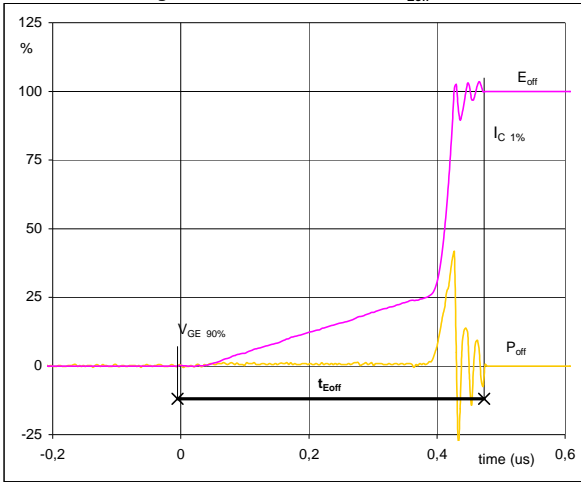
Turn-on Switching Waveforms & definition of  $t_t$



$V_C$ (100%) =	700	V
$I_C$ (100%) =	30	A
$t_t$ =	0,00	$\mu$ s

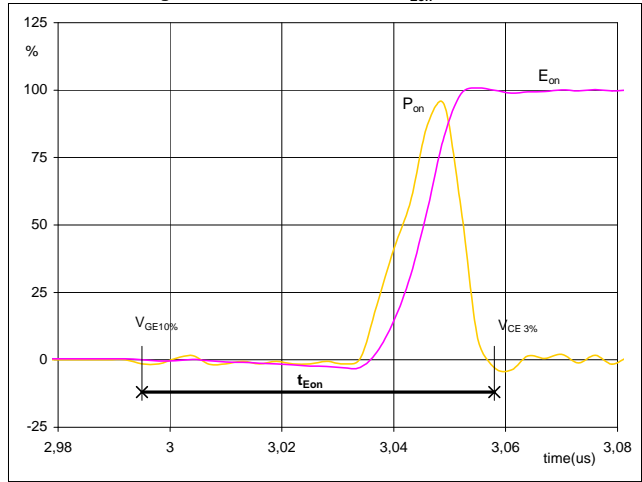
## Switching Definitions BUCK MOSFET

**Figure 5** BUCK MOSFET

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


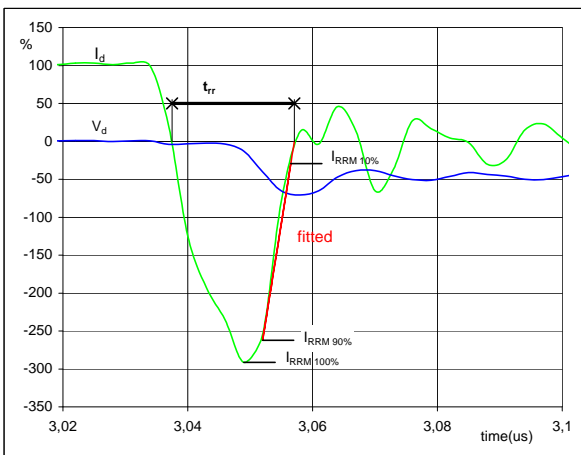
$P_{off} (100\%) =$	21,13	kW
$E_{off} (100\%) =$	0,22	mJ
$t_{Eoff} =$	0,48	$\mu s$

**Figure 6** BUCK MOSFET

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


$P_{on} (100\%) =$	21,13	kW
$E_{on} (100\%) =$	0,22	mJ
$t_{Eon} =$	0,06	$\mu s$

**Figure 7** BUCK MOSFET

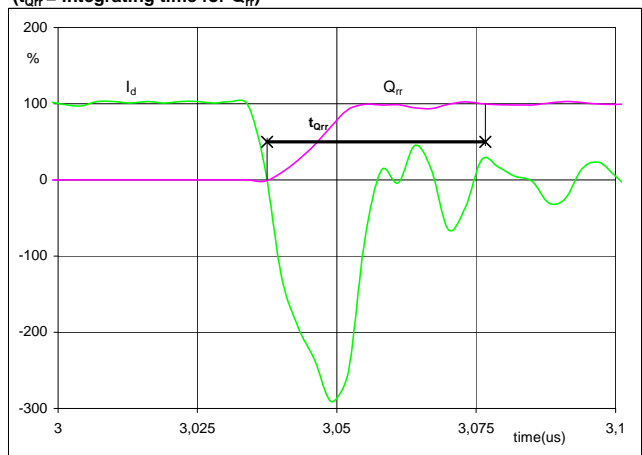
**Turn-off Switching Waveforms & definition of  $t_{rr}$** 


$V_d (100\%) =$	700	V
$I_d (100\%) =$	30	A
$I_{RRM} (100\%) =$	-87	A
$t_{rr} =$	0,02	$\mu s$

**Figure 8** BUCK FWD

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

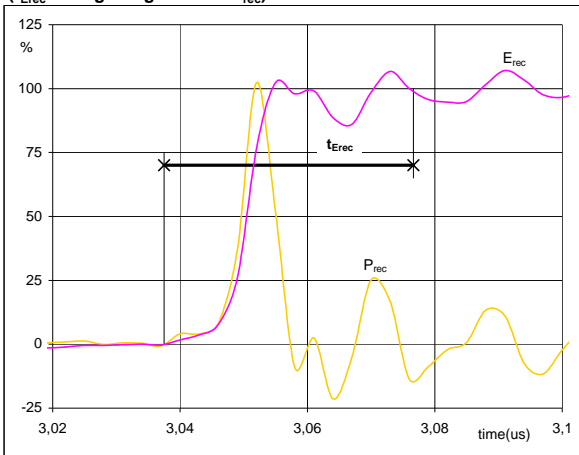
**( $t_{Qrr}$  = integrating time for  $Q_{rr}$ )**



$I_d (100\%) =$	30	A
$Q_{rr} (100\%) =$	1,10	$\mu C$
$t_{Qrr} =$	0,04	$\mu s$

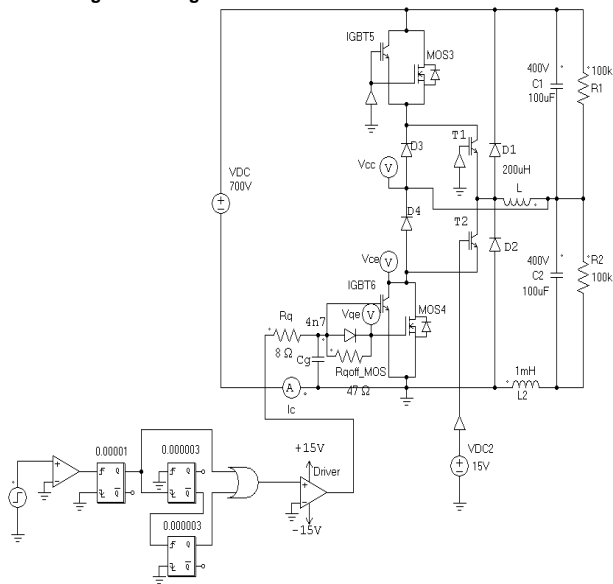
## Switching Definitions BUCK MOSFET

**Figure 9** Output inverter FWD

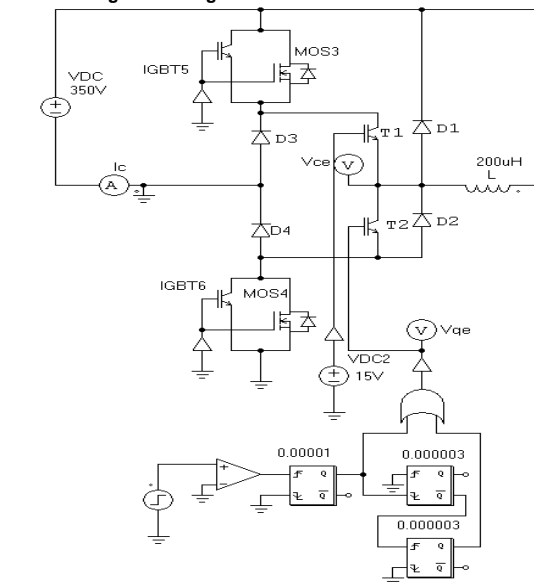
**Turn-on Switching Waveforms & definition of  $t_{Erec}$** 
 $(t_{Erec} = \text{integrating time for } E_{rec})$ 


$P_{rec} (100\%) =$	21,13	kW
$E_{rec} (100\%) =$	0,19	mJ
$t_{Erec} =$	0,04	$\mu\text{s}$

## Measurement circuits

**Figure 11**
**BUCK stage switching measurement circuit**


$C_g$  is included in the module

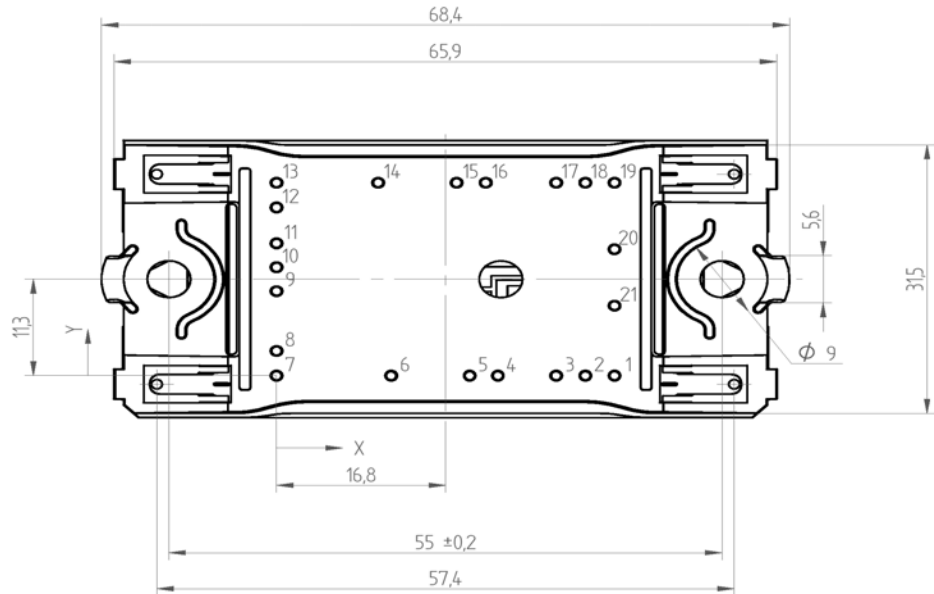
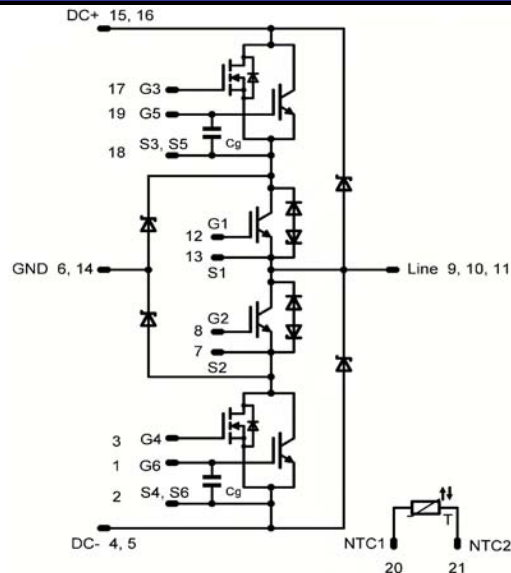
**Figure 12**
**BOOST stage switching measurement circuit**


**Ordering Code and Marking - Outline - Pinout**
**Ordering Code & Marking**

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing with PressFIT	10-PZ06NRA069FP03-P967F78Y	P967F78Y	P967F78Y
without thermal paste 12mm housing	10-FZ06NRA069FP03-P967F78	P967F78	P967F78

**Outline**

Pin	X	Y
1	33,6	0
2	30,7	0
3	27,8	0
4	22	0
5	19,2	0
6	11,4	0
7	0	0
8	0	2,9
9	0	9,9
10	0	12,7
11	0	15,5
12	0	19,7
13	0	22,6
14	10,1	22,6
15	17,9	22,6
16	20,8	22,6
17	27,8	22,6
18	30,7	22,6
19	33,6	22,6
20	33,6	14,8
21	33,6	8,2


**Pinout**




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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.