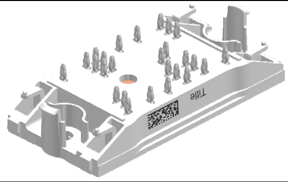
Vincotech

flow 3xPHASE-SiC — 1200 V / 80 mΩ

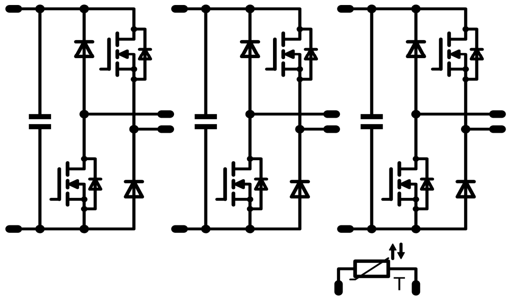
Features
- SiC-Power MOSFET´s and Schottky Diodes
- 3 phase inverter topology with split output
- Improved switching behavior (reduced turn on energy and X-conduction)
- Ultra Low Inductance with integrated DC-capacitors
- Switching frequency >100kHz
- Temperature sensor

flow 0 12mm housing



Target Applications
- Solar Inverter
- Charger
- Power Supply

Schematic



Types
- 10-PZ126PA080ME-M909F18Y

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
T1, T2, T3, T4, T5, T6					
Drain to source breakdown voltage	V_{DS}			1200	V
DC drain current	I_D	$T_j=T_jmax$	$T_h=80°C$ $T_c=80°C$	16 20	A
Pulsed drain current	I_{Dpulse}	t_p limited by T_jmax		60	A
Power dissipation	P_{tot}	$T_j=T_jmax$	$T_h=80°C$ $T_c=80°C$	39 59	W
Gate-source peak voltage	V_{GS}			-10/25	V
Maximum Junction Temperature	T_jmax			150	°C
D1, D2, D3, D4, D5, D6					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Forward average current	I_{FAV}	$T_j=T_jmax$	$T_h=80°C$ $T_c=80°C$	13 16	A
Non-Repetitive Peak Forward Surge Current	I_{FSM}	$t_p=10ms$	$T_j=25°C$	64	A
Repetitive Peak Forward Surge Current	I_{FRM}	t_p limited by T_jmax		39	A
Power dissipation per Diode	P_{tot}	$T_j=T_jmax$	$T_h=80°C$ $T_c=80°C$	34 51	W
Maximum Junction Temperature	T_jmax			175	°C

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
C1, C2, C3					
Max.DC voltage	V_{MAX}		Tc=25°C	1000	V
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(Tjmax - 25)	°C
Insulation Properties					
Insulation voltage		t=2s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance				min 9,9	mm

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
T1, T2, T3, T4, T5, T6										
Static drain to source ON resistance	$R_{DS(on)}$		20		20	Tj=25°C Tj=125°C		0,08 0,14		Ω
Gate threshold voltage	$V_{(GS)th}$	$V_{DS} = V_{GS}$		10	0,001	Tj=25°C Tj=125°C	1,7	2,2		V
Gate to Source Leakage Current	I_{gss}		20	0		Tj=25°C Tj=125°C			250	nA
Zero Gate Voltage Drain Current	I_{dss}		0	1200		Tj=25°C Tj=125°C			100	µA
Internal Gate Resistance	R_G	f=1MHz; V_{AC}=25mV						4,6		Ω
Total gate charge	Q_g		0/20	800	20	Tj=25°C		49,2		nC
Gate to source charge	Q_{gs}		0/20	800	20	Tj=25°C		10,8		nC
Gate to drain charge	Q_{gd}		0/20	800	20	Tj=25°C		18		nC
Input capacitance	C_{iss}	f=1MHz	0	1000		Tj=25°C		950		pF
Output capacitance	C_{oss}	f=1MHz	0	1000		Tj=25°C		80		pF
Reverse transfer capacitance	C_{rss}	f=1MHz	0	1000		Tj=25°C		6,5		pF
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						1,79		K/W
D1, D2, D3, D4, D5, D6										
Forward voltage	V_F				7,5	Tj=25°C Tj=125°C		1,45 1,75	1,8	V
Reverse leakage current	I_{rm}			1200		Tj=25°C Tj=125°C			250	µA
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						2,81		K/W

Single ended configuration

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
T1, T2, T3, T4, T5, T6										
Turn On Delay Time	$t_{d(ON)}$	Rgoff=4 Ω Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		11 11		ns
Rise Time	t_r	Rgoff=4 Ω Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		5 4		ns
Turn off delay time	$t_{d(OFF)}$	Rgoff=4 Ω Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		37 39		ns
Fall time	t_f	Rgoff=4 Ω Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		13 14		ns
Turn-on energy loss per pulse	E_{on}	Rgoff=4 Ω Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		0,112 0,103		mWs
Turn-off energy loss per pulse	E_{off}	Rgoff=4 Ω Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		0,058 0,058		mWs
D1, D2, D3, D4, D5, D6										
Peak recovery current	I_{RRM}	Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		18 19		A
Reverse recovery time	t_{rr}	Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		10 10		ns
Reverse recovery charge	Q_{rr}	Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		0,094 0,098		µC
Reverse recovered energy	E_{rec}	Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		0,026 0,031		mWs
Peak rate of fall of recovery current	di(rec)max /dt	Rgon=4 Ω	16	700	16	Tj=25°C Tj=125°C		4563 4485		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	

Half bridge configuration

D1, D2, D3, D4, D5, D6

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
Peak reverse recovery current	I_{RRM}	Rgon=4 Ω	-5/16	700	16	Tj=25°C Tj=125°C		26 34		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		16 15		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		0,232 0,234		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		6761 9363		A/µs
Reverse recovered energy	Erec					Tj=25°C Tj=125°C		0,084 0,081		mWs

T1, T2, T3, T4, T5, T6

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
Turn On Delay Time	$t_{d(ON)}$	Rgoff=4 Ω Rgon=4 Ω	-5/16	700	16	Tj=25°C Tj=125°C		14 13		ns
Rise Time	t_r					Tj=25°C Tj=125°C		4 4		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		45 48		
Fall time	t_f					Tj=25°C Tj=125°C		7 6		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,152 0,140		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,057 0,058		

Splitted output configuration

T1, T2, T3, T4, T5, T6

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	Rgoff=4 Ω Rgon=4 Ω	-8/16	700	16	Tj=25°C Tj=125°C		15 14		ns
Rise time	t_r					Tj=25°C Tj=125°C		4 3		
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=125°C		30 32		
Fall time	t_f					Tj=25°C Tj=125°C		17 13		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,058 0,042		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,075 0,074		

D1, D2, D3, D4, D5, D6

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
Peak reverse recovery current	I_{RRM}	Rgon=4 Ω	-8/16	700	16	Tj=25°C Tj=125°C		15 17		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		34 49		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		0,2 0,3		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		2741 3343		A/µs
Reverse recovery energy	E_{rec}					Tj=25°C Tj=125°C		0,04 0,05		mWs

C1, C2, C3

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
C value	C							47		nF

Thermistor

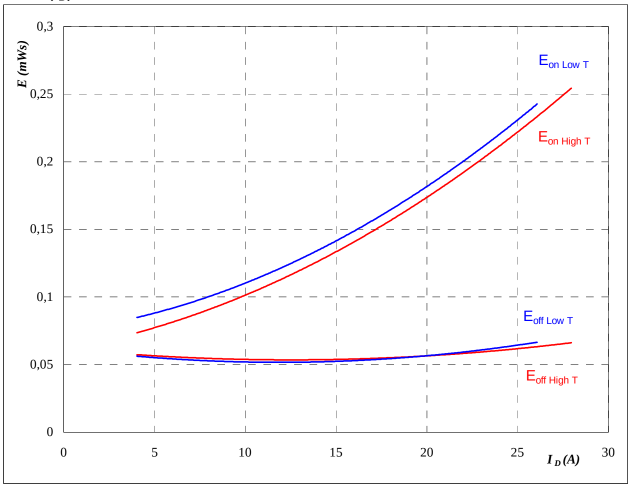
Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
Rated resistance	R					T=25°C		22000		Ω
Deviation of R100	ΔR/R	R100=1486 Ω				T=100°C	-5		5	%
Power dissipation	P					T=25°C		200		mW
Power dissipation constant						T=25°C		2		mW/K
B-value	B(25/50)	Tol. ±3%				T=25°C		3950		K
B-value	B(25/100)	Tol. ±3%				T=25°C		3996		K
Vincotech NTC Reference									B	

Half Bridge Configuration

Figure 1 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching energy losses as a function of drain current

$E = f(I_D)$



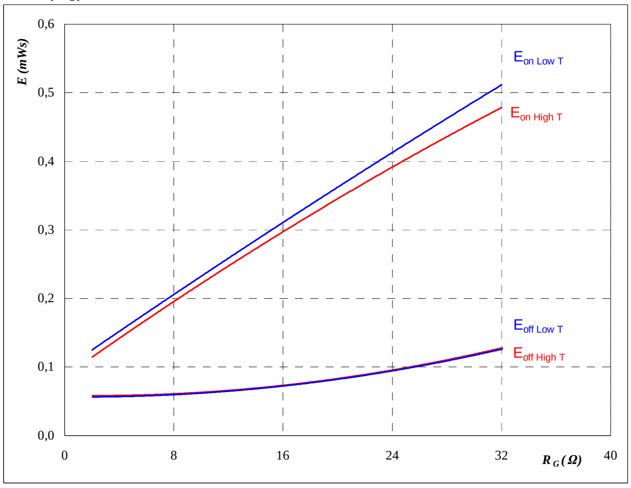
With an inductive load at

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 2 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



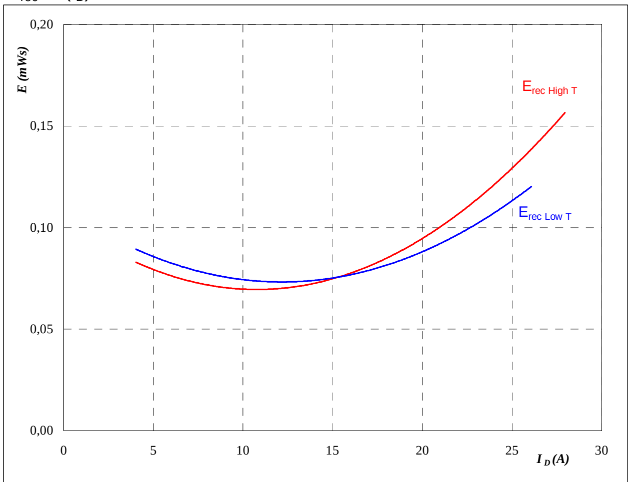
With an inductive load at

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
I_D =	16	A

Figure 3 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery energy loss as a function of drain current

$E_{rec} = f(I_D)$



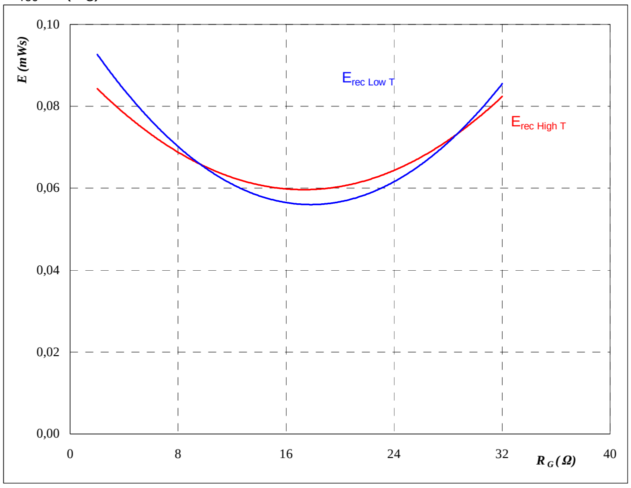
With an inductive load at

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω

Figure 4 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

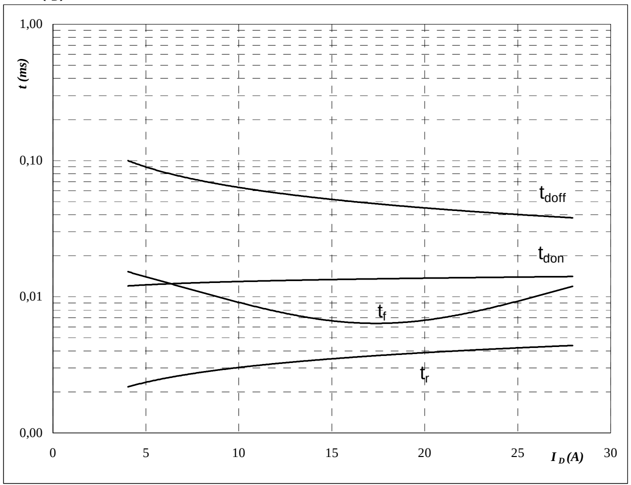
T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
I_D =	16	A

Half Bridge Configuration

Figure 5 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching times as a function of drain current

t = f(I_D)



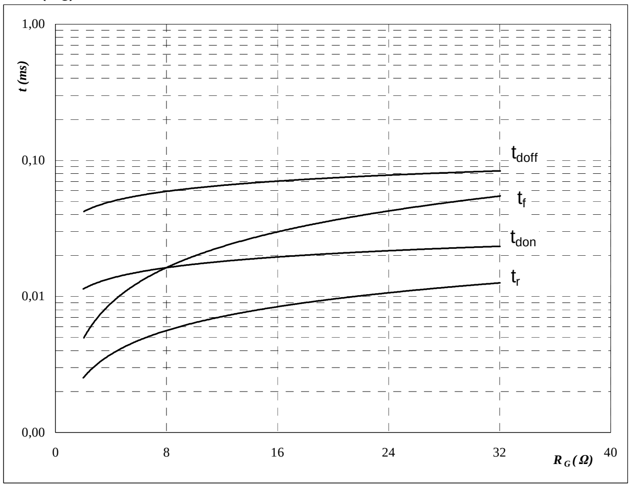
With an inductive load at

T_j =	125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching times as a function of gate resistor

t = f(R_G)



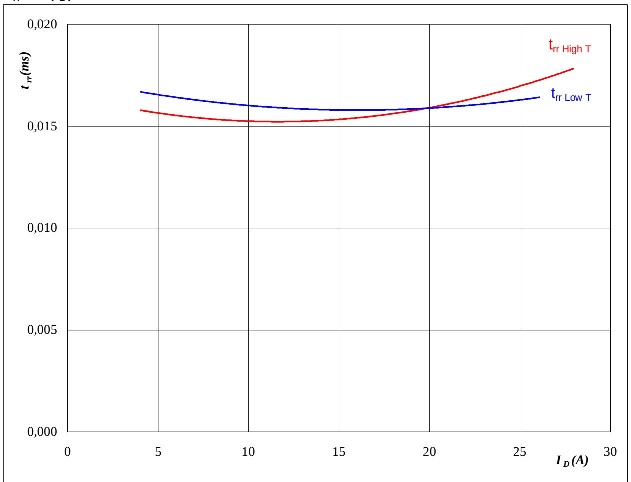
With an inductive load at

T_j =	125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
I_D =	16	A

Figure 7 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery time as a function of drain current

t_{rr} = f(I_D)



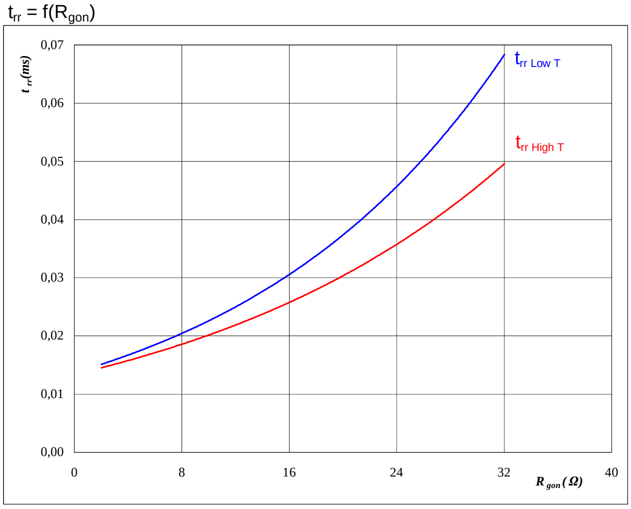
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω

Figure 8 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery time as a function of MOSFET turn on gate resistor

t_{rr} = f(R_{gon})



At

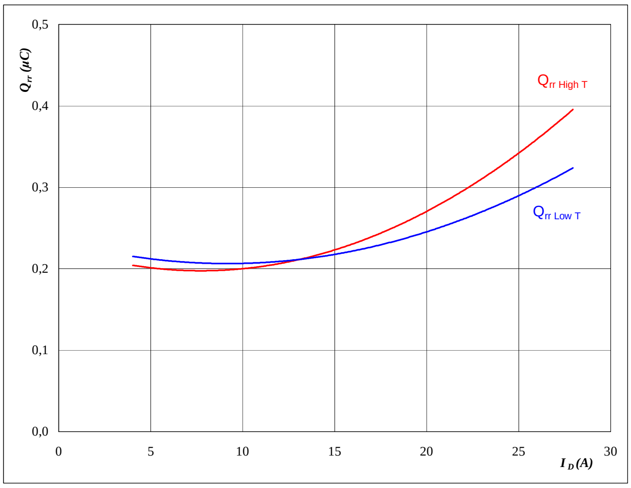
T_j =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	-5/16	V

Half Bridge Configuration

Figure 9 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery charge as a function of drain current

$Q_{rr} = f(I_D)$



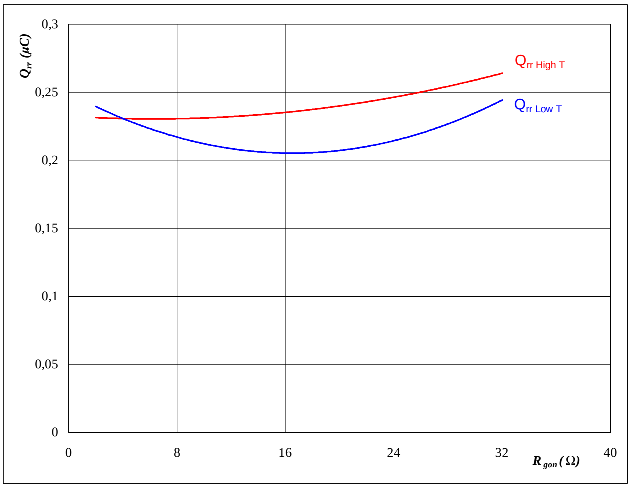
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω

Figure 10 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery charge as a function of MOSFET turn on gate resistor

$Q_{rr} = f(R_{gon})$



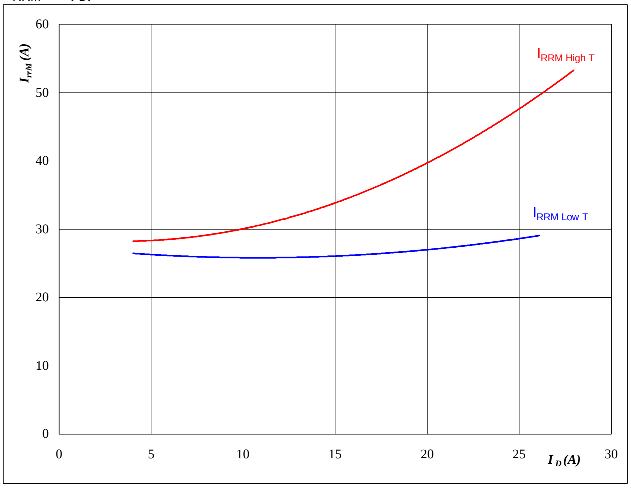
At

T_j =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	-5/16	V

Figure 11 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery current as a function of drain current

$I_{RRM} = f(I_D)$



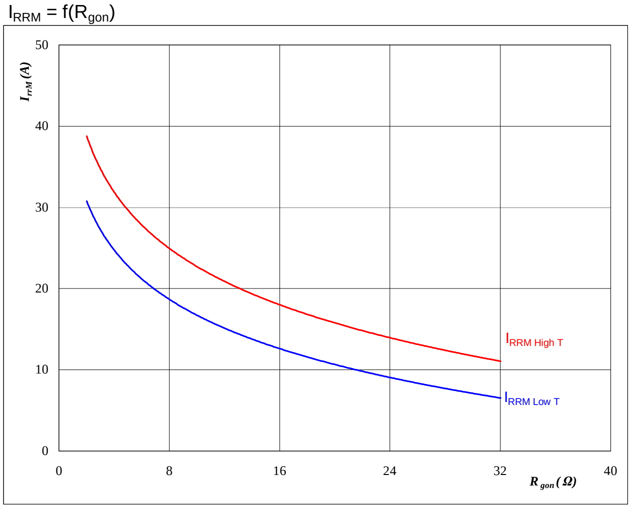
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω

Figure 12 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery current as a function of MOSFET turn on gate resistor

$I_{RRM} = f(R_{gon})$



At

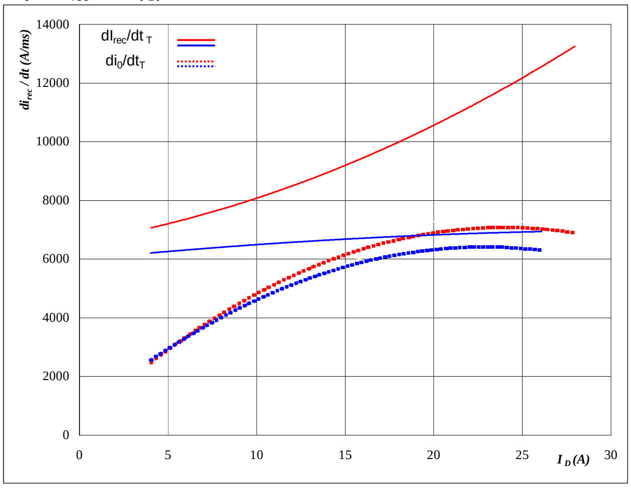
T_j =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	-5/16	V

Half Bridge Configuration

Figure 13 D1, D2, D3, D4, D5, D6 FWD

Typical rate of fall of forward and reverse recovery current as a function of drain current

$dI_0/dt, dI_{rec}/dt = f(I_D)$



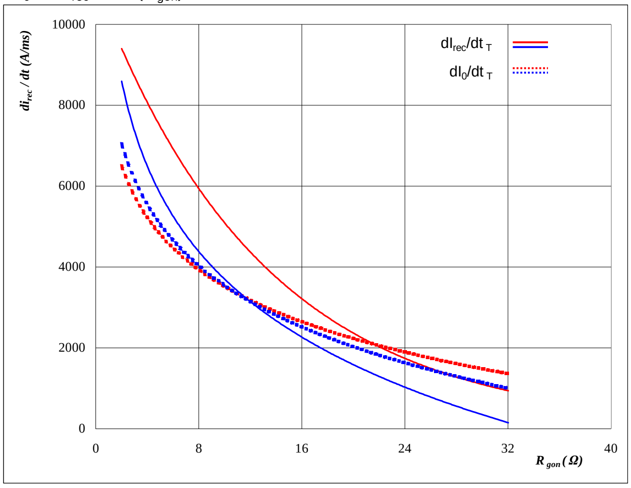
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	-5/16	V
R_{gon} =	4	Ω

Figure 14 D1, D2, D3, D4, D5, D6 FWD

Typical rate of fall of forward and reverse recovery current as a function of MOSFET turn on gate resistor

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



At

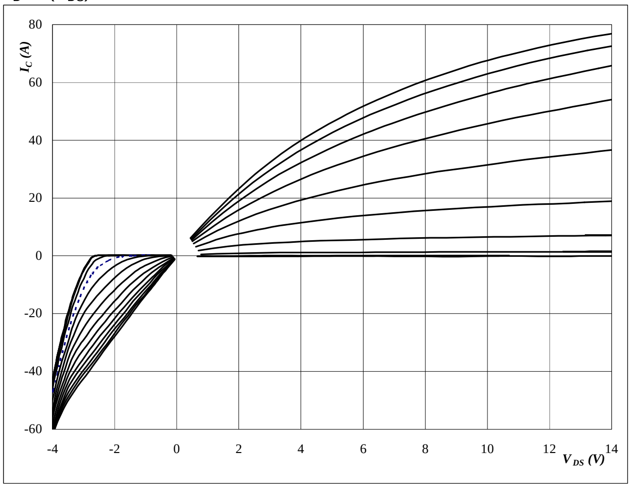
T_j =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	-5/16	V

T1, T2, T3, T4, T5, T6 / D1, D2, D3, D4, D5, D6

Figure 1 T1, T2, T3, T4, T5, T6 MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



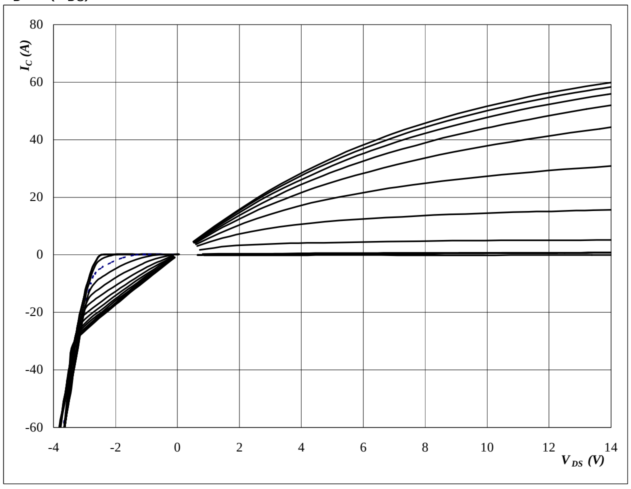
At

t_p =	250	µs
T_j =	25	°C
V_{GS} from	-4 V to 20 V in steps of 2 V	

Figure 2 T1, T2, T3, T4, T5, T6 MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



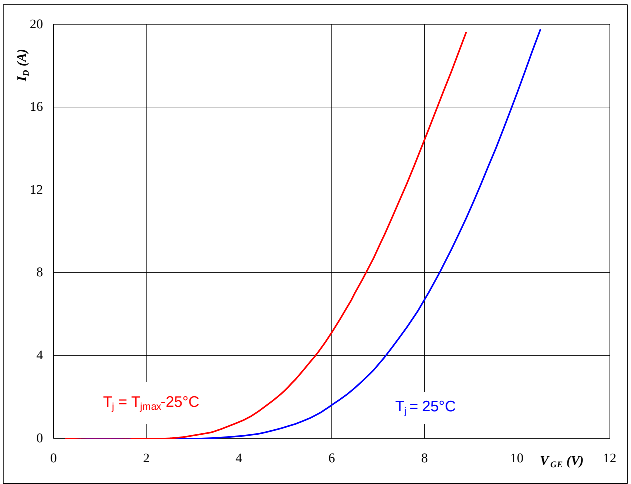
At

t_p =	250	µs
T_j =	125	°C
V_{GS} from	-4 V to 20 V in steps of 2 V	

Figure 3 T1, T2, T3, T4, T5, T6 MOSFET

Typical transfer characteristics

$I_D = f(V_{GS})$



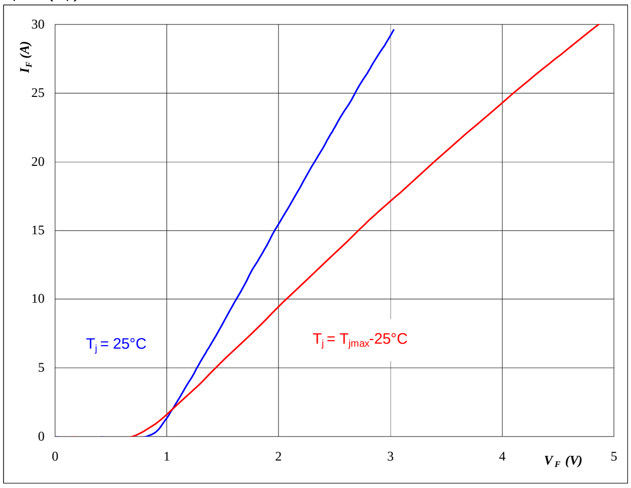
At

t_p =	250	µs
V_{DS} =	10	V

Figure 4 D1, D2, D3, D4, D5, D6 FWD

Typical diode forward current as
a function of forward voltage

$I_F = f(V_F)$



At

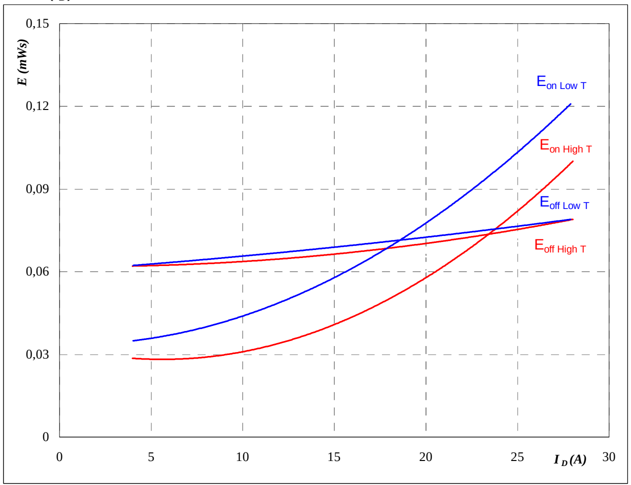
t_p =	250	µs

Splitted Configuration

Figure 5 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching energy losses as a function of drain current

$E = f(I_D)$



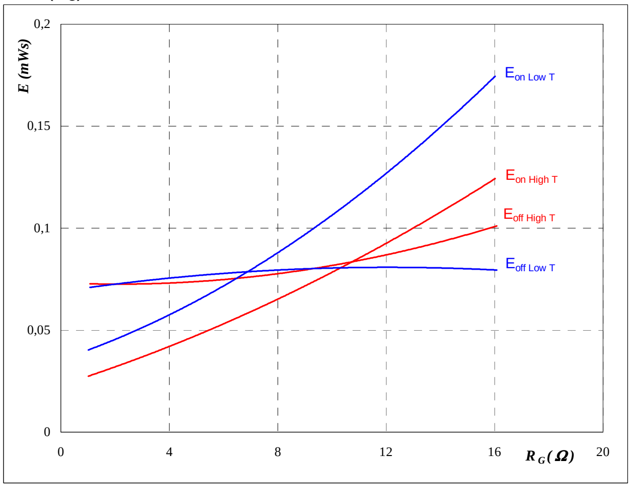
With an inductive load at

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



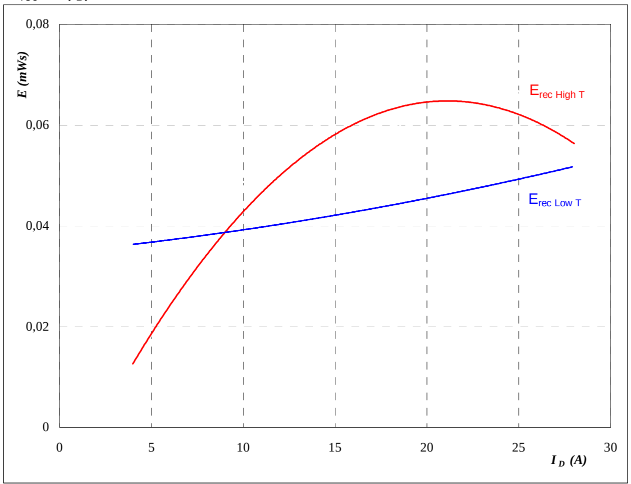
With an inductive load at

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
I_D =	16	A

Figure 7 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery energy loss as a function of drain current

$E_{rec} = f(I_D)$



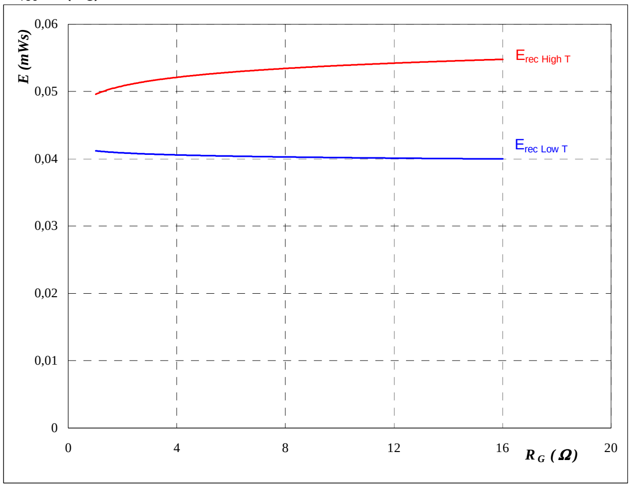
With an inductive load at

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω

Figure 8 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

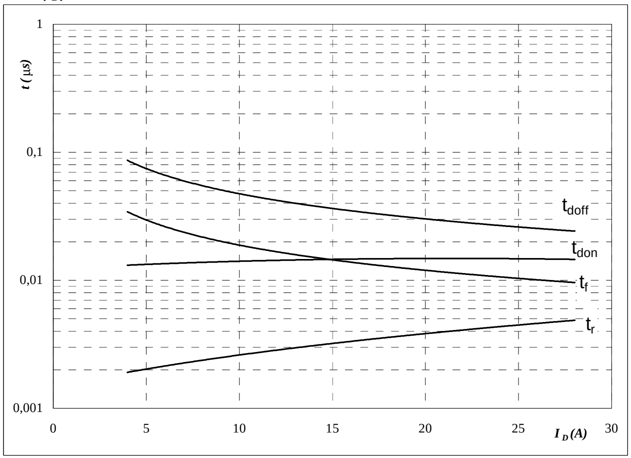
T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
I_D =	16	A

Splitted Configuration

Figure 9 — T1, T2, T3, T4, T5, T6 MOSFET

Typical switching times as a function of drain current

t = f(I_D)



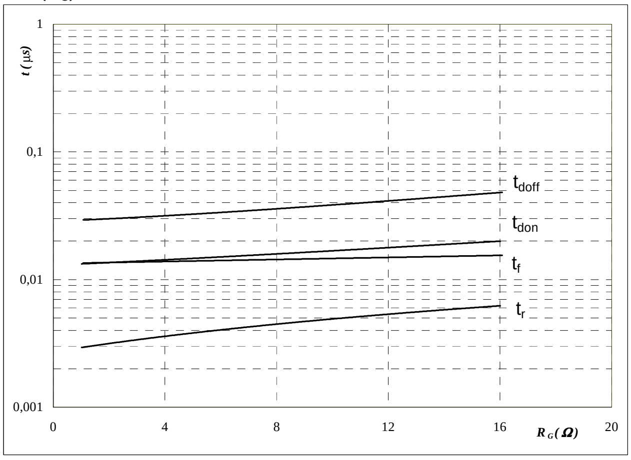
With an inductive load at

T_j =	126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 10 — T1, T2, T3, T4, T5, T6 MOSFET

Typical switching times as a function of gate resistor

t = f(R_G)



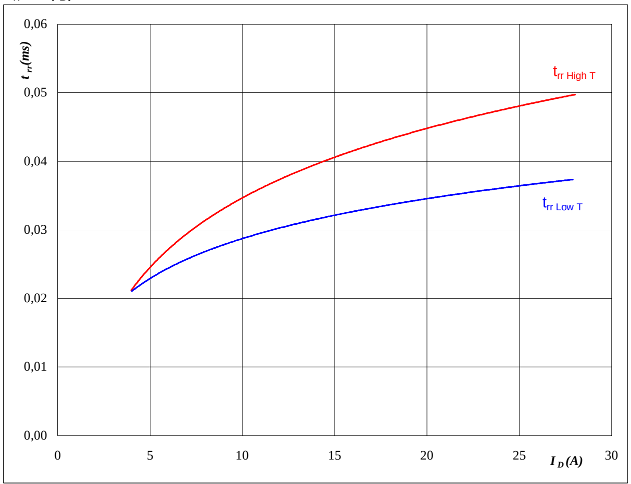
With an inductive load at

T_j =	126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
I_D =	16	A

Figure 11 — D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery time as a function of drain current

t_{rr} = f(I_D)



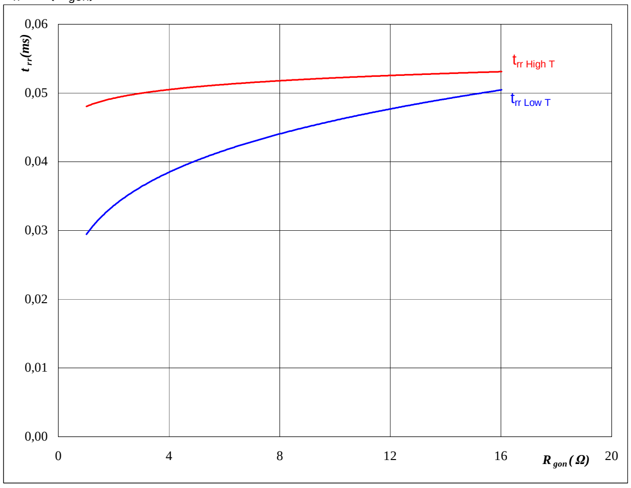
At

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω

Figure 12 — D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery time as a function of MOSFET turn on gate resistor

t_{rr} = f(R_{gon})



At

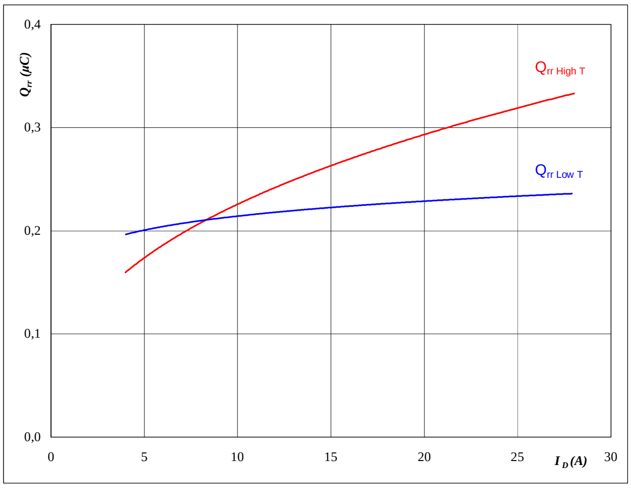
T_j =	25/126	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16/-8	V

Splitted Configuration

Figure 13	D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery charge as a function of drain current

$Q_{rr} = f(I_D)$



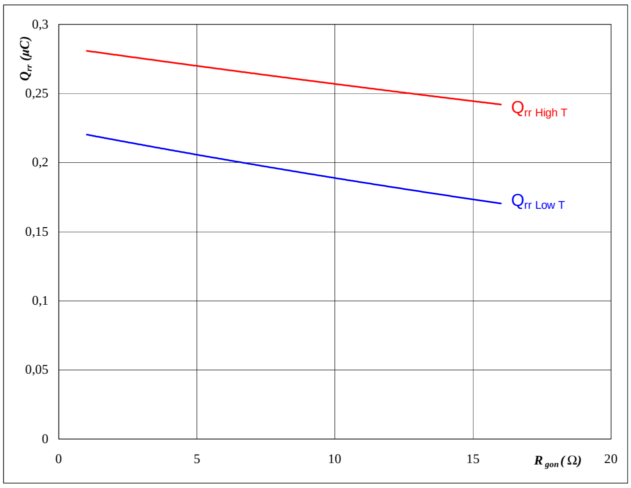
At

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω

Figure 14	D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery charge as a function of MOSFET turn on gate resistor

$Q_{rr} = f(R_{gon})$



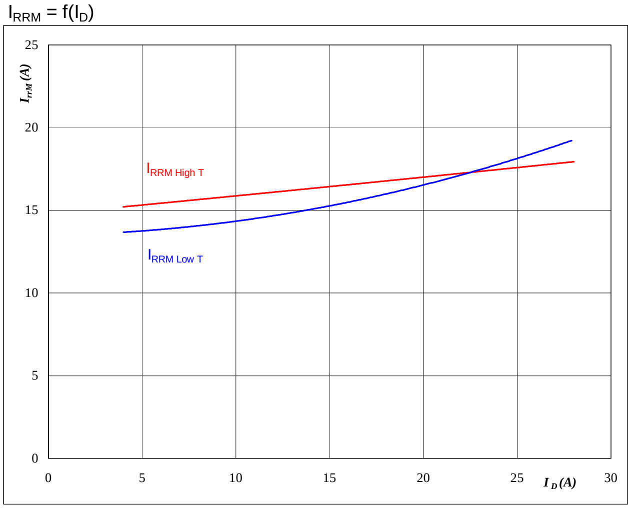
At

T_j =	25/126	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16/-8	V

Figure 15	D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery current as a function of drain current

$I_{RRM} = f(I_D)$



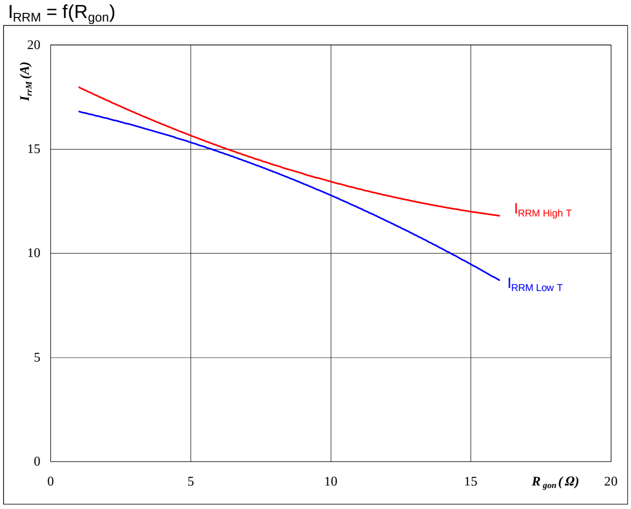
At

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω

Figure 16	D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery current as a function of MOSFET turn on gate resistor

$I_{RRM} = f(R_{gon})$



At

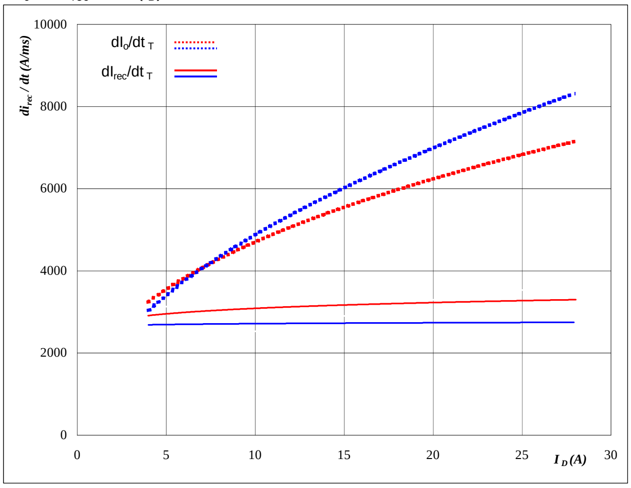
T_j =	25/126	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16/-8	V

Splitted Configuration

Figure 17 D1, D2, D3, D4, D5, D6 FWD

Typical rate of fall of forward and reverse recovery current as a function of drain current

$dI_0/dt, dI_{rec}/dt = f(I_D)$



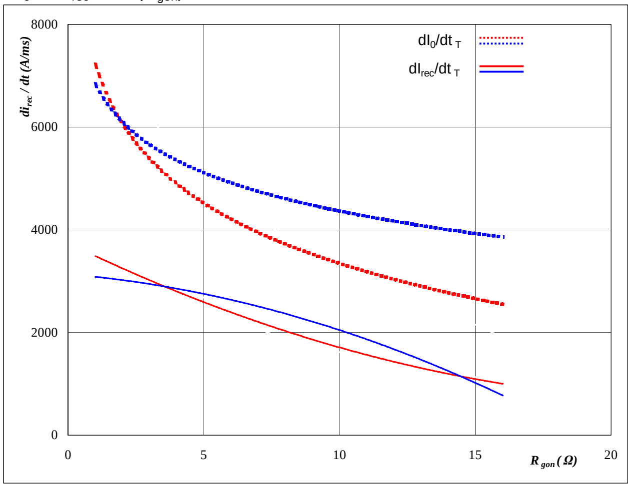
At

T_j =	25/126	°C
V_{DS} =	700	V
V_{GS} =	16/-8	V
R_{gon} =	4	Ω

Figure 18 D1, D2, D3, D4, D5, D6 FWD

Typical rate of fall of forward and reverse recovery current as a function of MOSFET turn on gate resistor

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



At

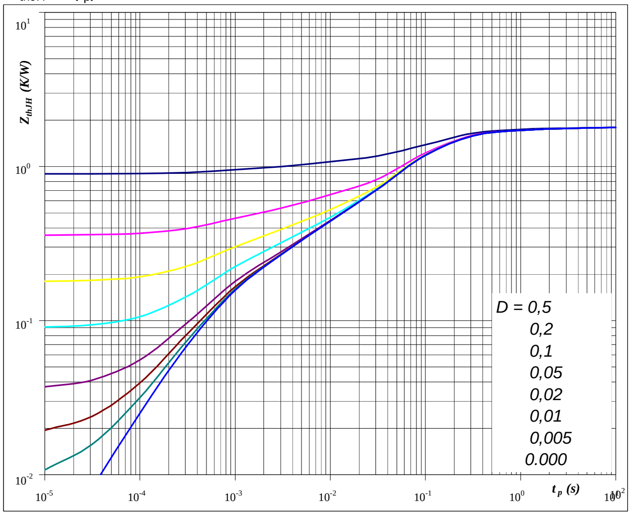
T_j =	25/126	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16/-8	V

T1, T2, T3, T4, T5, T6 / D1, D2, D3, D4, D5, D6

Figure 19 T1, T2, T3, T4, T5, T6 MOSFET

MOSFET transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	tp / T	
R_{thJH} =	1,79	K/W

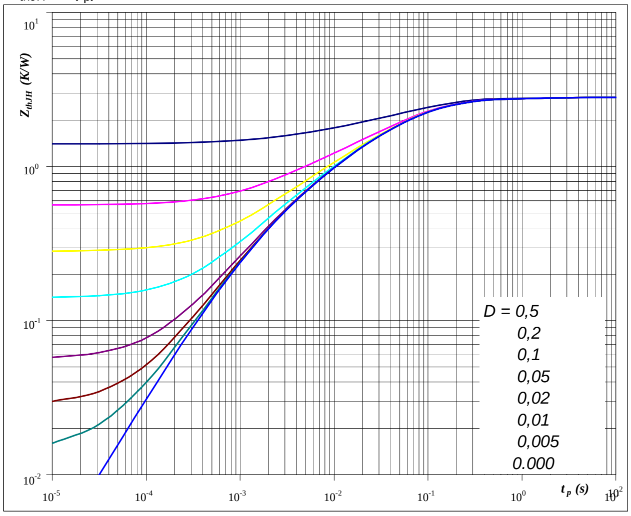
MOSFET thermal model values

R (K/W)	Tau (s)
0,12	1,7E+00
0,33	2,5E-01
1,01	7,6E-02
0,19	5,1E-03
0,14	6,5E-04

Figure 20 D1, D2, D3, D4, D5, D6 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	tp / T	
R_{thJH} =	2,81	K/W

FWD thermal model values

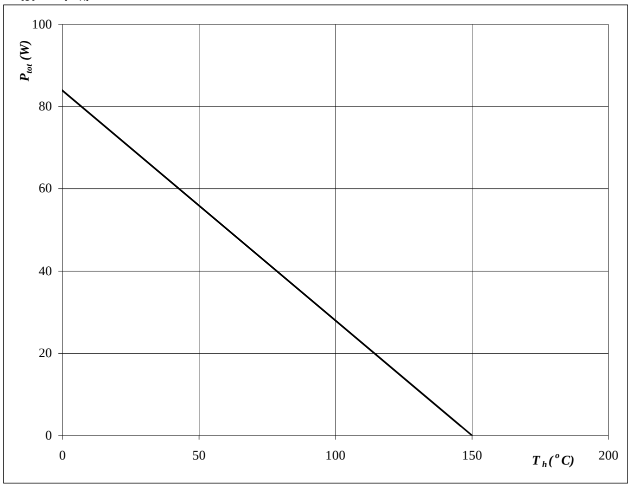
R (K/W)	Tau (s)
0,08	2,3E+00
0,21	3,3E-01
1,43	6,8E-02
0,71	1,2E-02
0,33	2,4E-03
0,05	5,2E-04

T1, T2, T3, T4, T5, T6 / D1, D2, D3, D4, D5, D6

Figure 21 T1, T2, T3, T4, T5, T6 MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



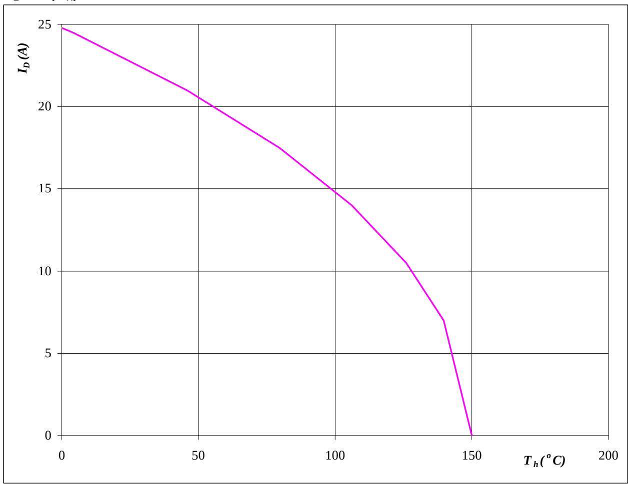
At

T_j = 150 ºC

Figure 22 T1, T2, T3, T4, T5, T6 MOSFET

Drain current as a function of heatsink temperature

$I_D = f(T_h)$



At

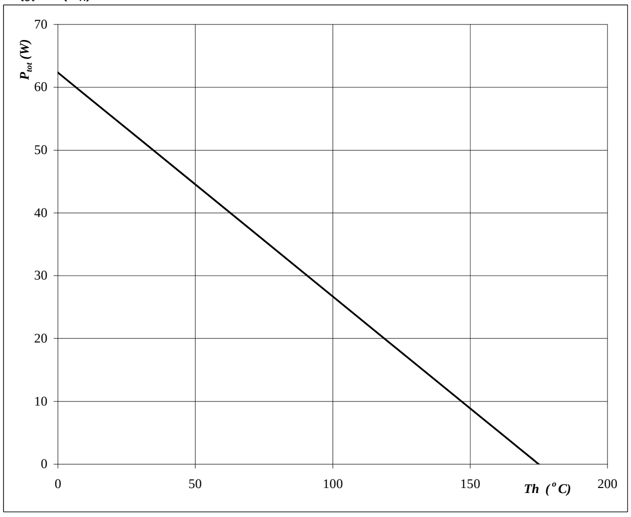
T_j = 150 ºC

V_{GE} = 15 V

Figure 23 D1, D2, D3, D4, D5, D6 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



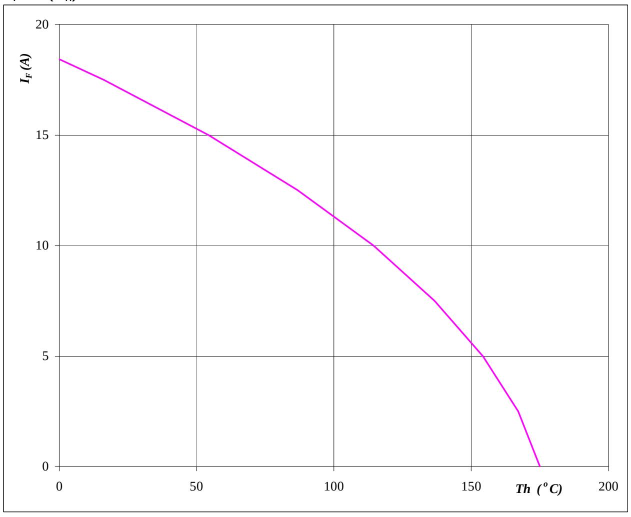
At

T_j = 175 ºC

Figure 24 D1, D2, D3, D4, D5, D6 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

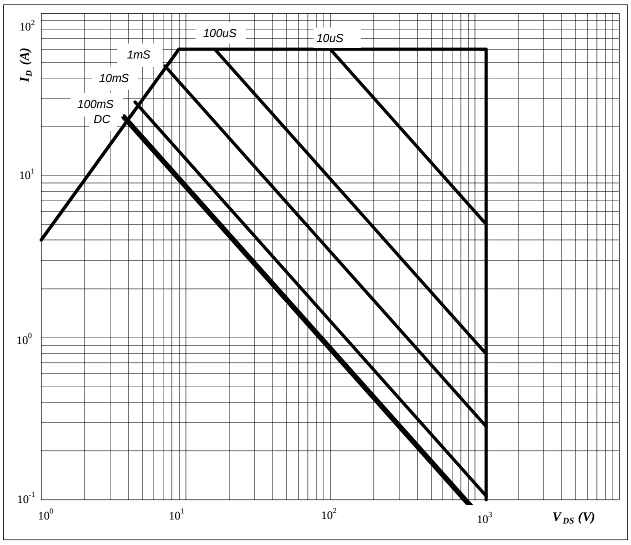
T_j = 175 ºC

T1, T2, T3, T4, T5, T6

Figure 25 T1, T2, T3, T4, T5, T6 MOSFET

Safe operating area as a function of drain-source voltage

$I_D = f(V_{DS})$



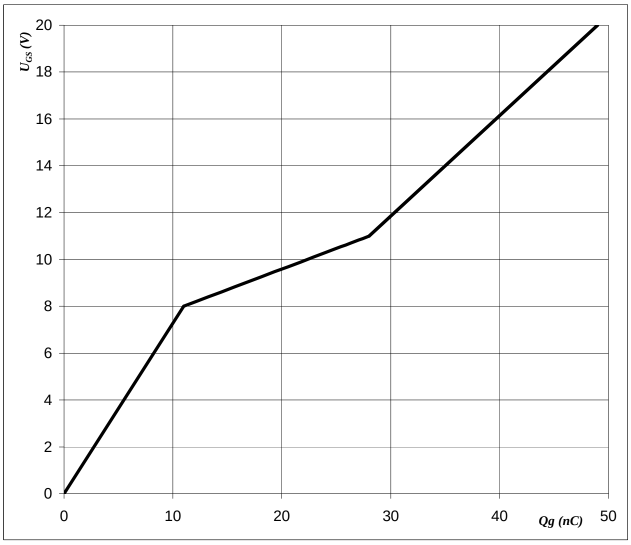
At

D =	single pulse	
T_h =	80	ºC
V_{GS} =	16	V
T_j =	T_{jmax}	ºC

Figure 26 T1, T2, T3, T4, T5, T6 MOSFET

Gate voltage vs Gate charge

$V_{GS} = f(Qg)$



At

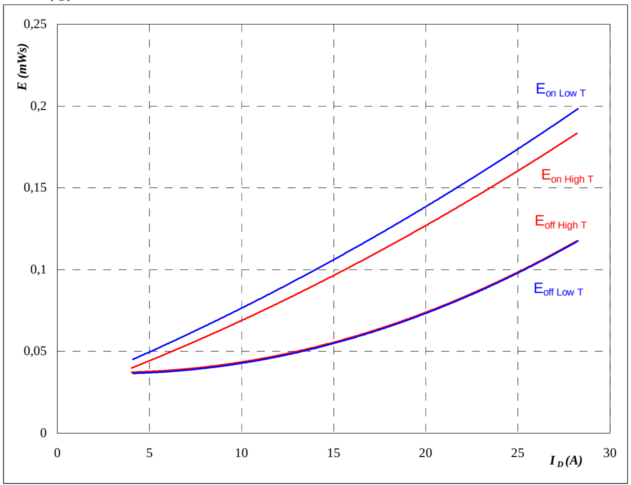
I_{DS} =	20	A
V_{DS}=	800	V
I_{GS}=	10	mA
T_j =	25	ºC

Booster Configuration

Figure 1 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching energy losses as a function of drain current

$E = f(I_D)$



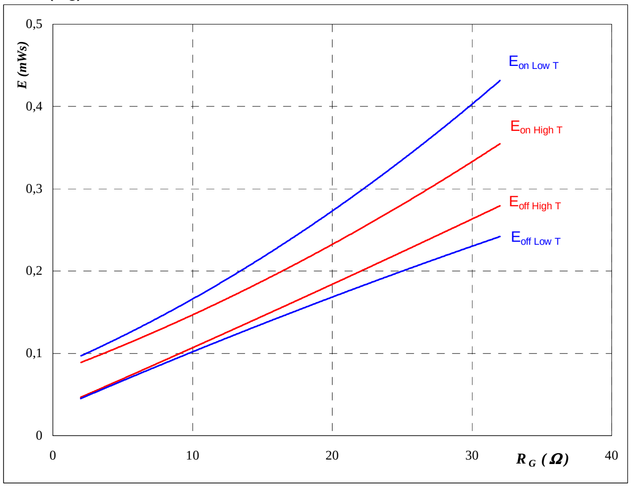
With an inductive load at

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 2 T1, T2, T3, T4, T5, T6 MOSFET

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



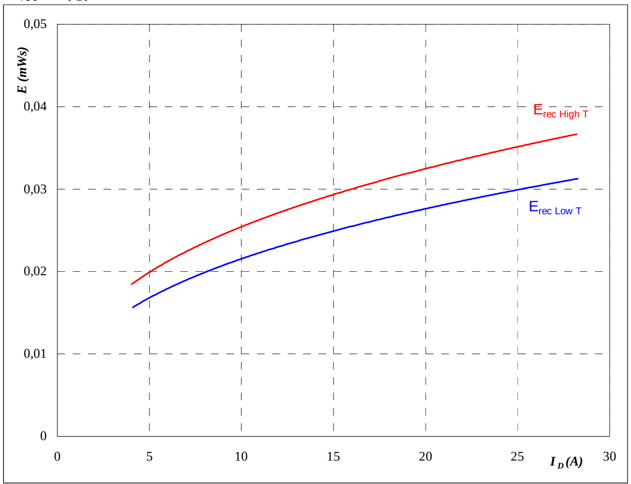
With an inductive load at

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
I_D =	16	A

Figure 3 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery energy loss as a function of drain current

$E_{rec} = f(I_D)$



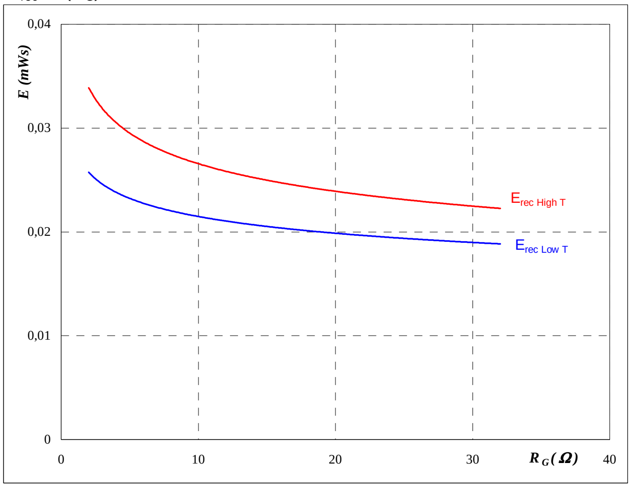
With an inductive load at

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 4 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

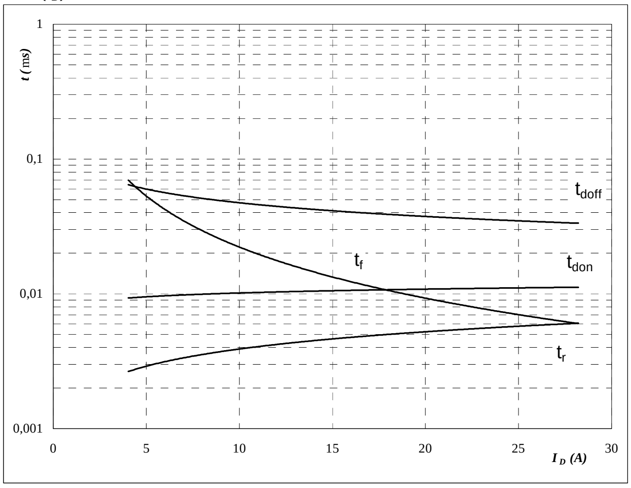
T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
I_D =	16	A

Booster Configuration

Figure 5	T1, T2, T3, T4, T5, T6 MOSFET

Typical switching times as a function of drain current

$t = f(I_D)$



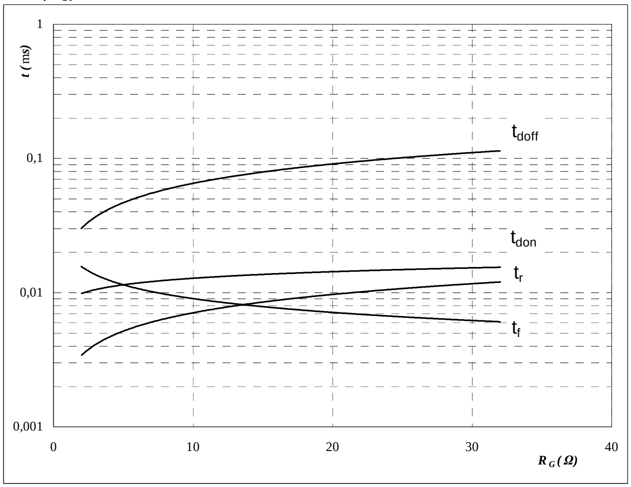
With an inductive load at

T_j =	125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6	T1, T2, T3, T4, T5, T6 MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



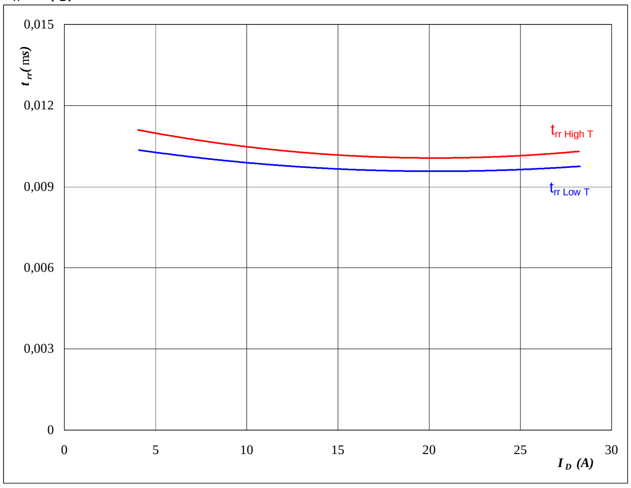
With an inductive load at

T_j =	125	°C
V_{DS} =	700	V
V_{GS} =	16	V
I_C =	16	A

Figure 7	D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



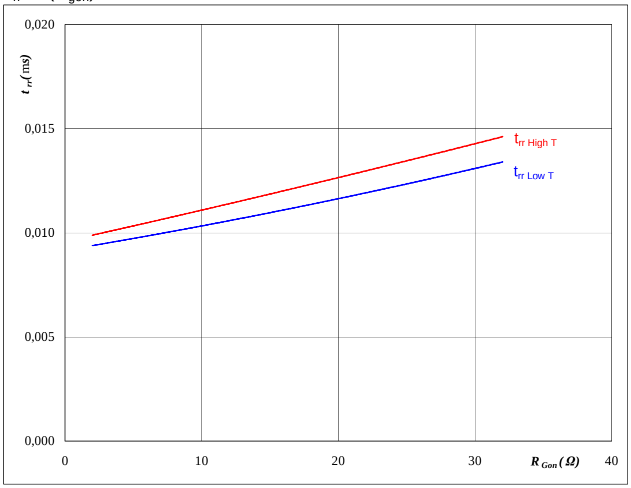
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω

Figure 8	D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery time as a function of MOSFET turn on gate resistor

$t_{rr} = f(R_{gon})$



At

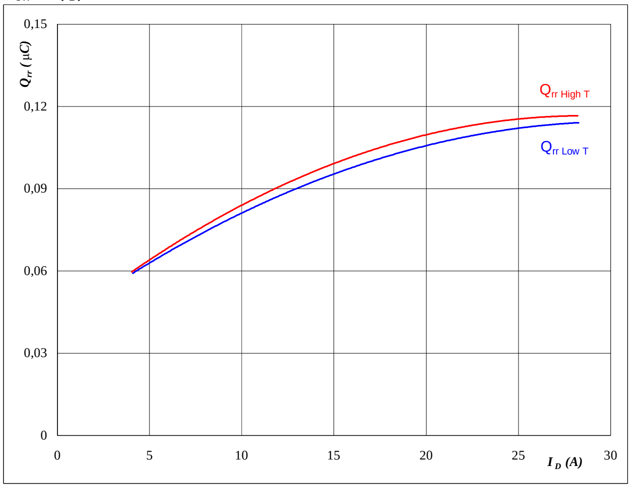
T_j =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16	V

Booster Configuration

Figure 9 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery charge as a function of drain current

$Q_{rr} = f(I_D)$



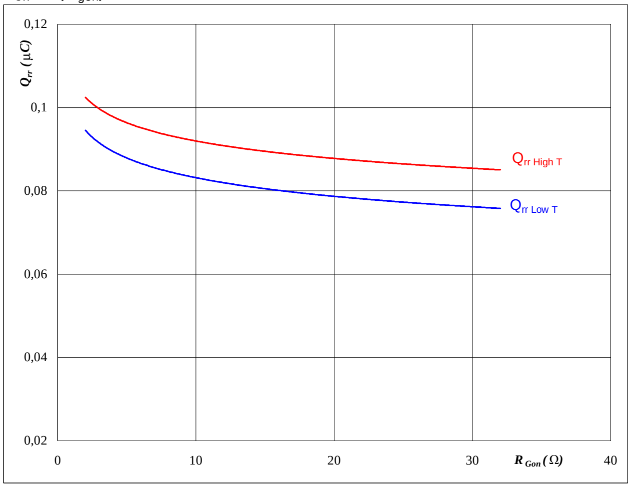
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω

Figure 10 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery charge as a function of MOSFET turn on gate resistor

$Q_{rr} = f(R_{gon})$



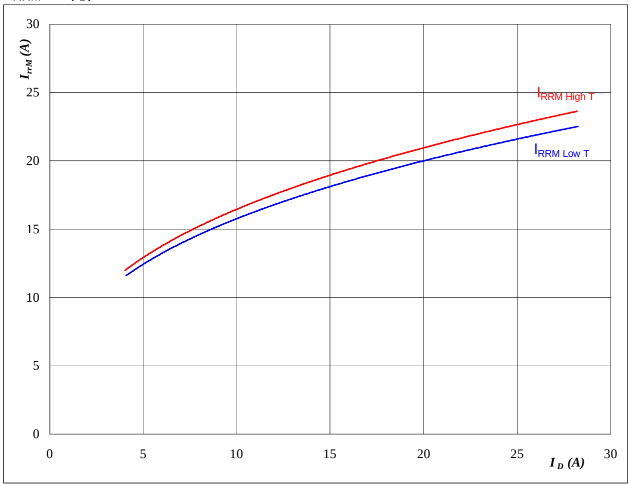
At

Tj =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16	V

Figure 11 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery current as a function of drain current

$I_{RRM} = f(I_D)$



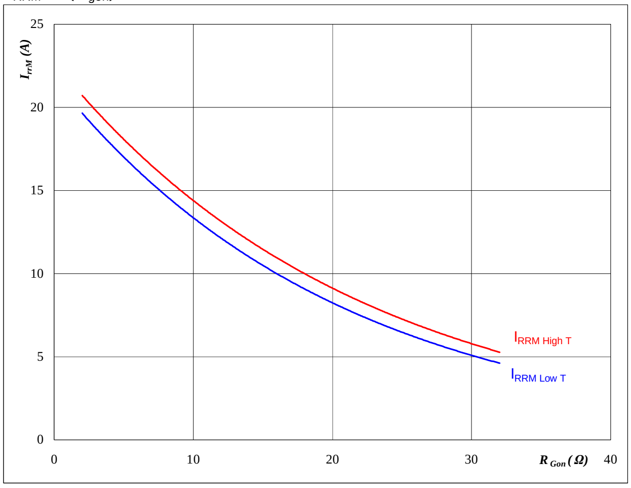
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω

Figure 12 D1, D2, D3, D4, D5, D6 FWD

Typical reverse recovery current as a function of MOSFET turn on gate resistor

$I_{RRM} = f(R_{gon})$



At

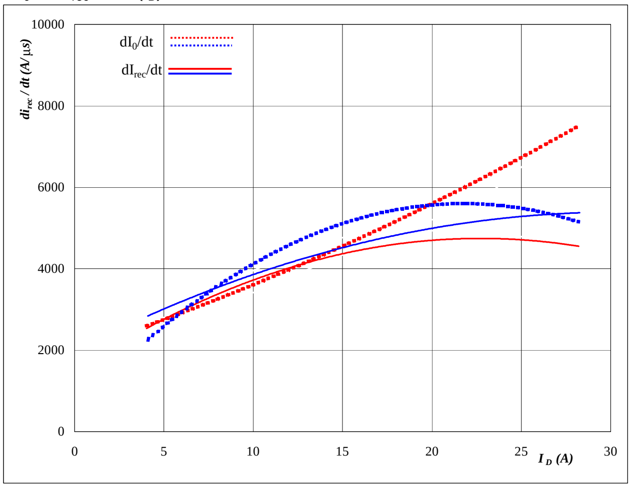
T_j =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16	V

Booster Configuration

Figure 13 D1, D2, D3, D4, D5, D6 FWD

Typical rate of fall of forward and reverse recovery current as a function of drain current

$dI_0/dt, dI_{rec}/dt = f(I_D)$



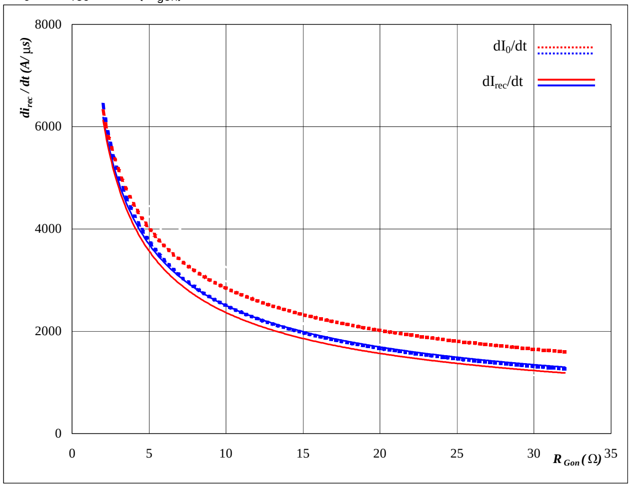
At

T_j =	25/125	°C
V_{DS} =	700	V
V_{GS} =	16	V
R_{gon} =	4	Ω

Figure 14 D1, D2, D3, D4, D5, D6 FWD

Typical rate of fall of forward and reverse recovery current as a function of MOSFET turn on gate resistor

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



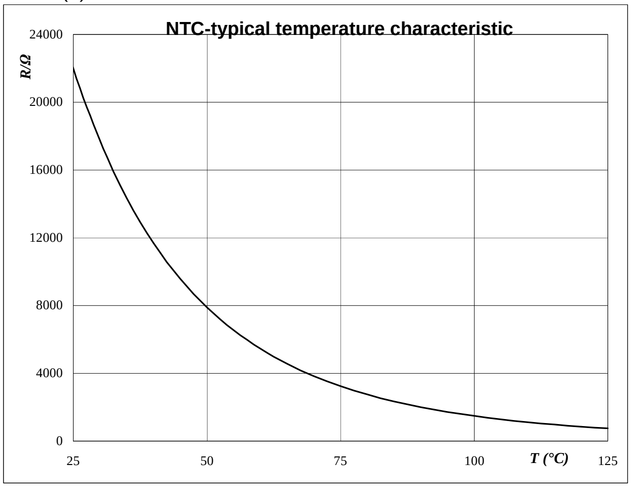
At

Tj =	25/125	°C
V_R =	700	V
I_F =	16	A
V_{GS} =	16	V

Thermistor

Figure 1	Thermistor

Typical NTC characteristic
as a function of temperature
$R_T = f(T)$



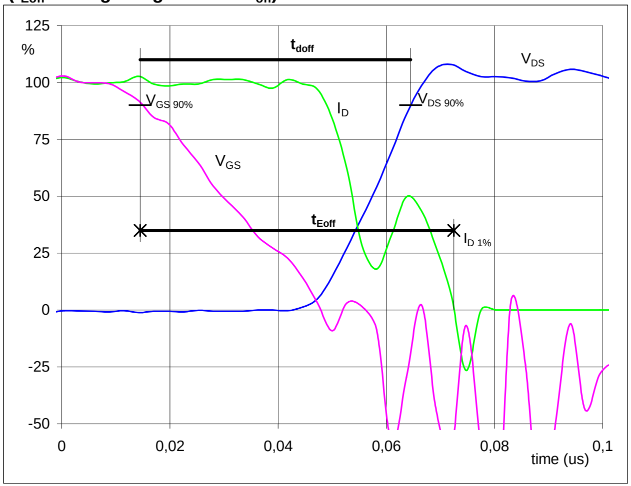
Switching Definitions Half Bridge Configuration

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

Figure 1 T1, T2, T3, T4, T5, T6 MOSFET

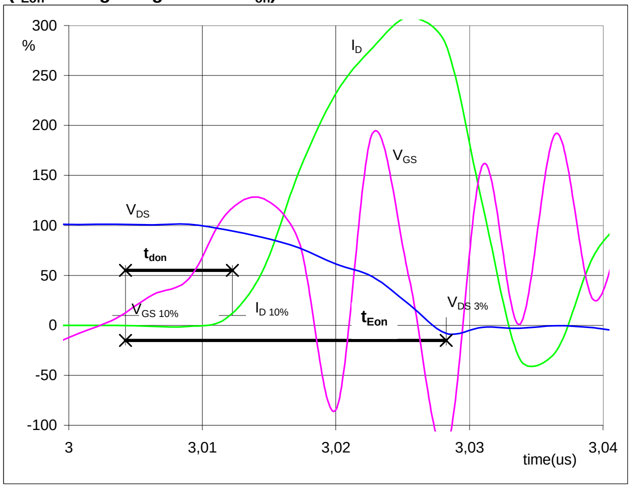
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	16	V
V_D (100%) =	700	V
I_D (100%) =	16	A
t_{doff} =	0,048	μs
t_{Eoff} =	0,058	μs

Figure 2 T1, T2, T3, T4, T5, T6 MOSFET

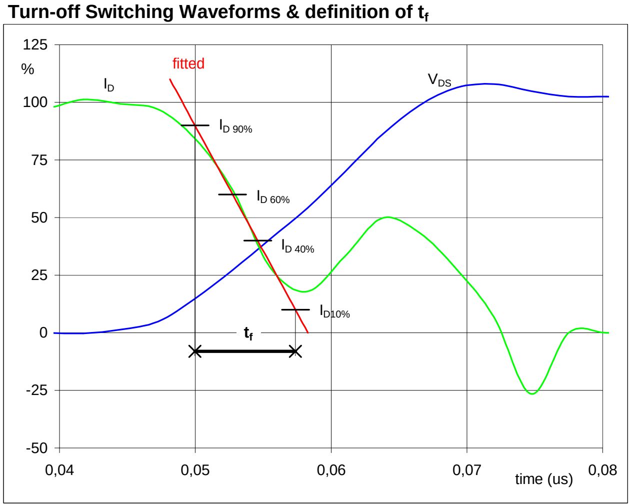
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	16	V
V_D (100%) =	700	V
I_D (100%) =	16	A
t_{don} =	0,013	μs
t_{Eon} =	0,024	μs

Figure 3 T1, T2, T3, T4, T5, T6 MOSFET

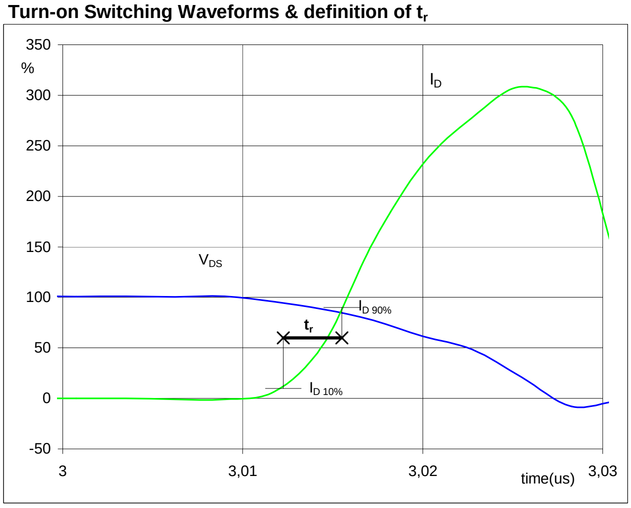
Turn-off Switching Waveforms & definition of t_f



V_D (100%) =	700	V
I_D (100%) =	16	A
t_f =	0,006	μs

Figure 4 T1, T2, T3, T4, T5, T6 MOSFET

Turn-on Switching Waveforms & definition of t_r

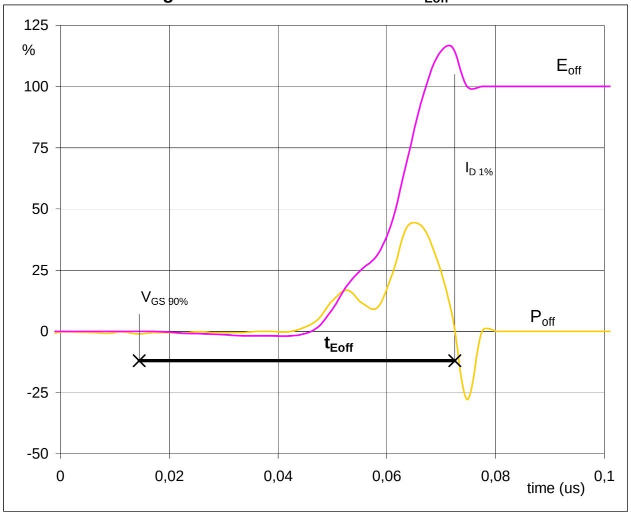


V_D (100%) =	700	V
I_D (100%) =	16	A
t_r =	0,004	μs

Switching Definitions Half Bridge Configuration

Figure 5 T1, T2, T3, T4, T5, T6 MOSFET

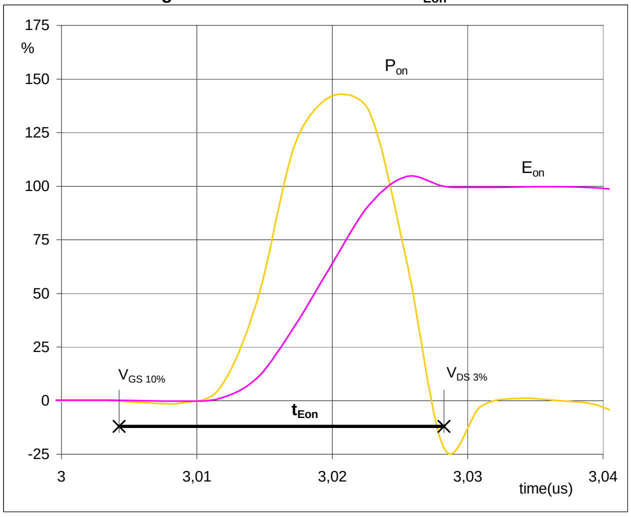
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	11,17	kW
E_{off} (100%) =	0,06	mJ
t_{Eoff} =	0,058	μs

Figure 6 T1, T2, T3, T4, T5, T6 MOSFET

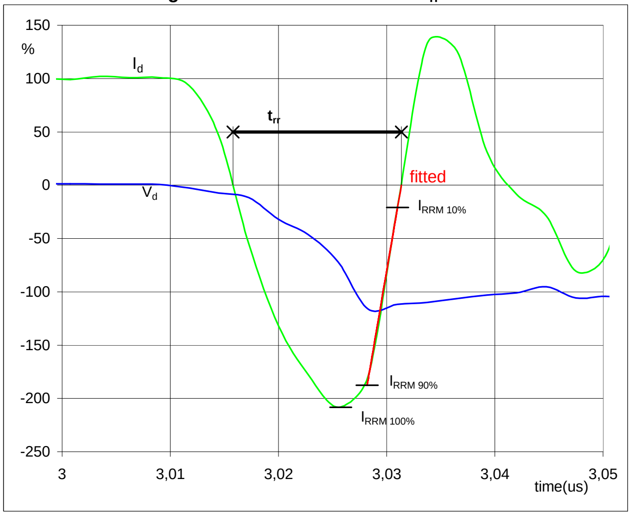
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	11,17	kW
E_{on} (100%) =	0,14	mJ
t_{Eon} =	0,024	μs

Figure 7 D1, D2, D3, D4, D5, D6 FWD

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

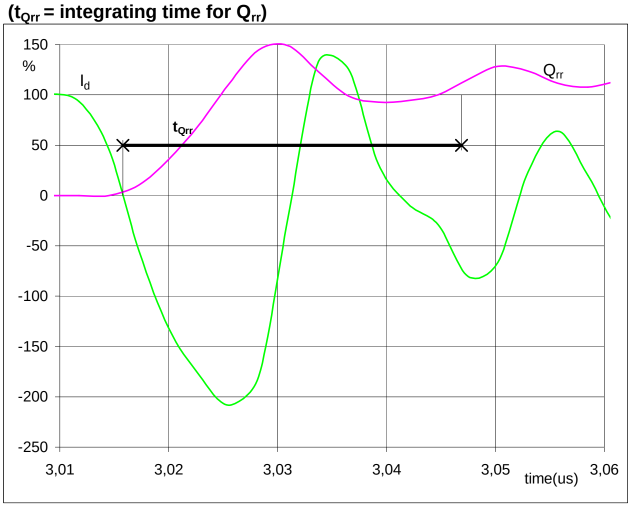


V_d (100%) =	700	V
I_d (100%) =	16	A
I_{RRM} (100%) =	-34	A
t_{rr} =	0,015	μs

Switching Definitions Half Bridge Configuration

Figure 8 D1, D2, D3, D4, D5, D6 FWD

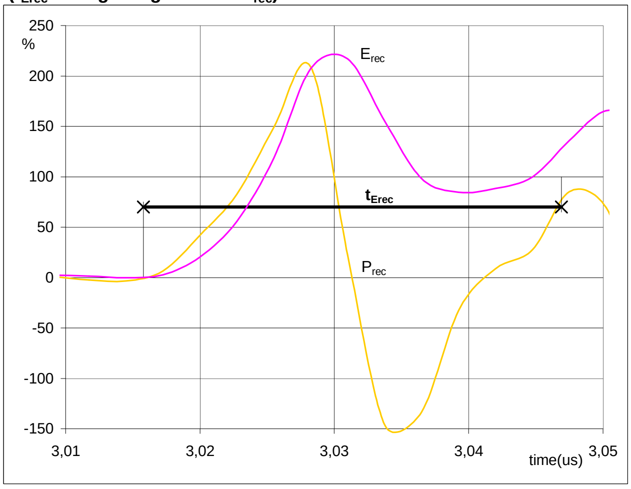
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	16	A
Q_{rr} (100%) =	0,23	μC
t_{Qrr} =	0,031	μs

Figure 9 D1, D2, D3, D4, D5, D6 FWD

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

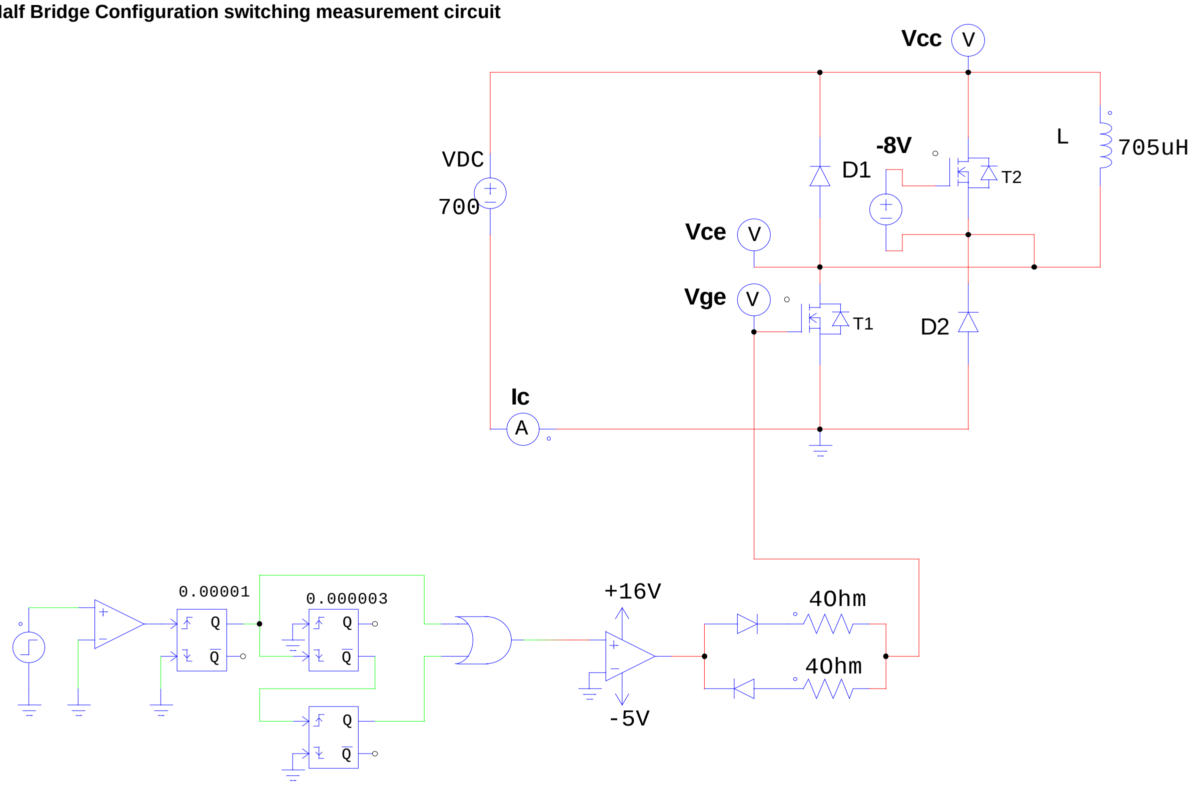


P_{rec} (100%) =	11,17	kW
E_{rec} (100%) =	0,08	mJ
t_{Erec} =	0,031	μs

Measurement circuit

Figure 10

Half Bridge Configuration switching measurement circuit



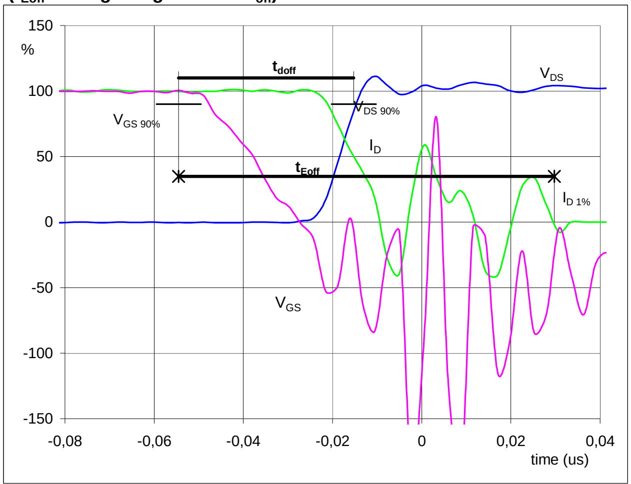
Switching Definitions Splitted Configuration

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

Figure 1 — T1, T2, T3, T4, T5, T6 MOSFET

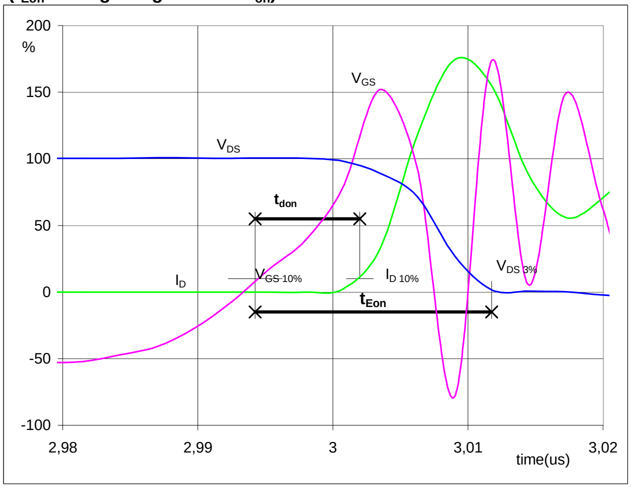
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	16	V
V_D (100%) =	700	V
I_D (100%) =	16	A
t_{doff} =	0,032	µs
t_{Eoff} =	0,084	µs

Figure 2 — T1, T2, T3, T4, T5, T6 MOSFET

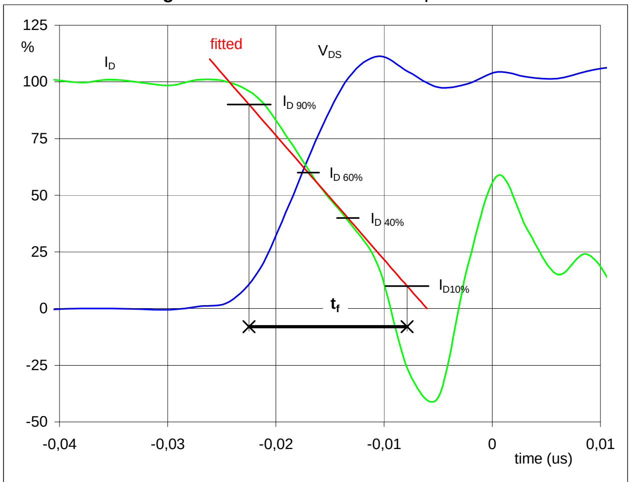
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	16	V
V_D (100%) =	700	V
I_D (100%) =	16	A
t_{don} =	0,014	µs
t_{Eon} =	0,017	µs

Figure 3 — T1, T2, T3, T4, T5, T6 MOSFET

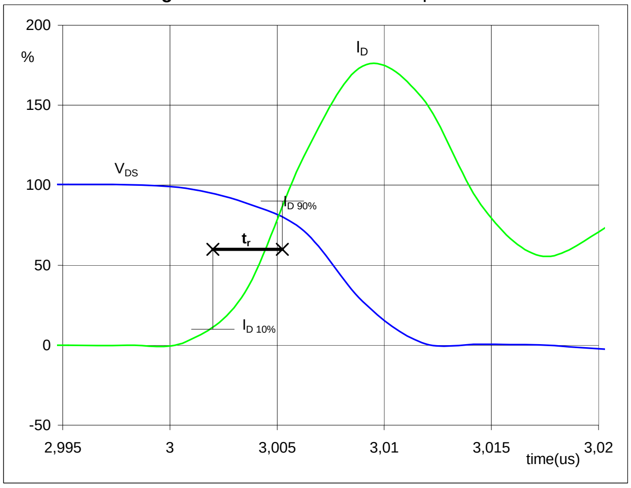
Turn-off Switching Waveforms & definition of t_f



V_D (100%) =	700	V
I_D (100%) =	16	A
t_f =	0,013	µs

Figure 4 — T1, T2, T3, T4, T5, T6 MOSFET

Turn-on Switching Waveforms & definition of t_r

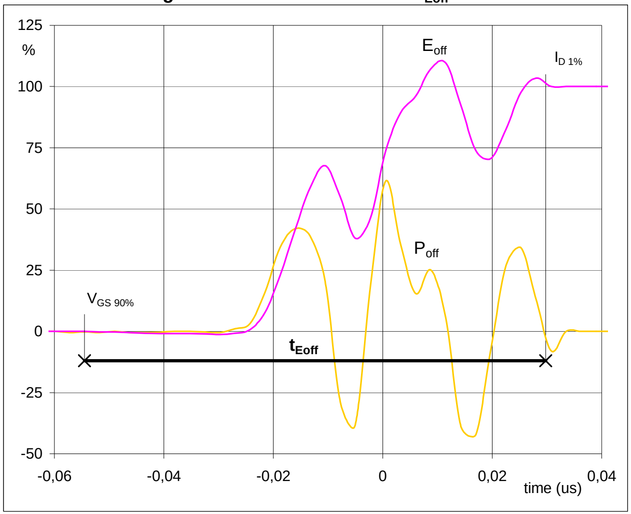


V_D (100%) =	700	V
I_D (100%) =	16	A
t_r =	0,003	µs

Switching Definitions Splitted Configuration

Figure 5 T1, T2, T3, T4, T5, T6 MOSFET

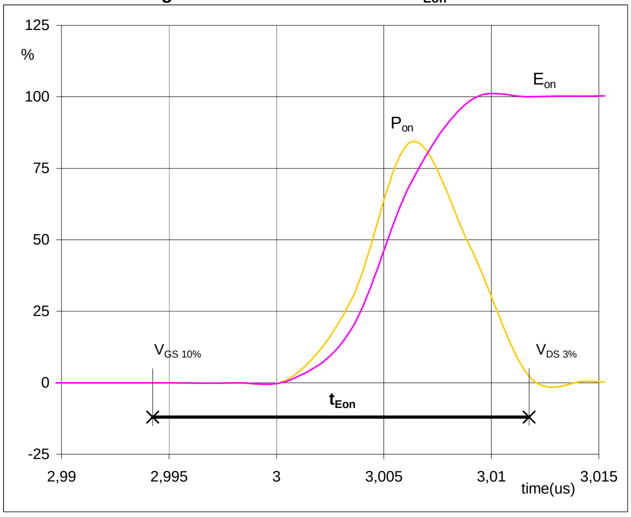
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	11,19	kW
E_{off} (100%) =	0,074	mJ
t_{Eoff} =	0,084	μs

Figure 6 T1, T2, T3, T4, T5, T6 MOSFET

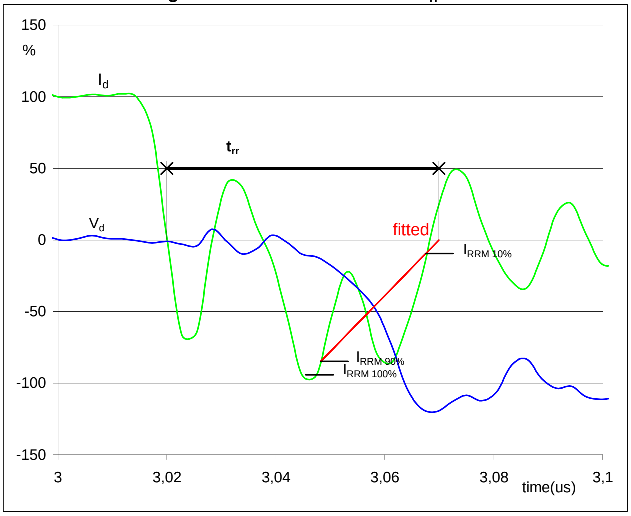
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	11,19	kW
E_{on} (100%) =	0,041	mJ
t_{Eon} =	0,017	μs

Figure 7 D1, D2, D3, D4, D5, D6 FWD

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

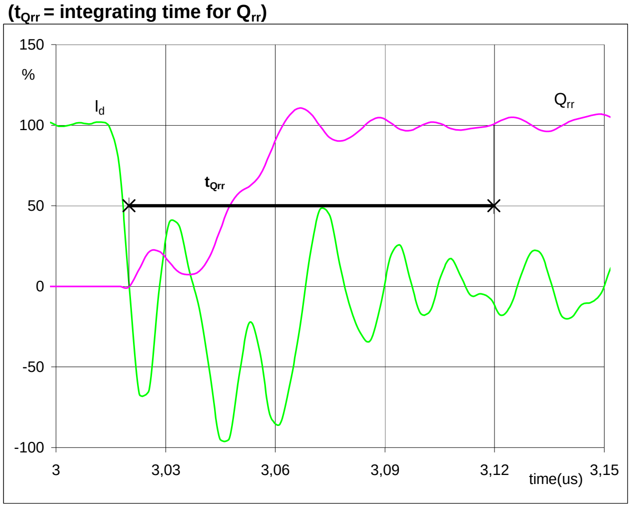


V_d (100%) =	700	V
I_d (100%) =	16	A
I_{RRM} (100%) =	-17	A
t_{rr} =	0,049	μs

Switching Definitions Splitted Configuration

Figure 8 D1, D2, D3, D4, D5, D6 FWD

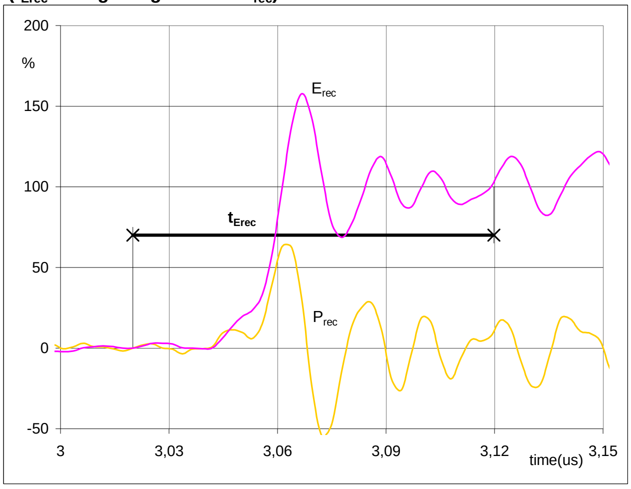
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	16	A
Q_{rr} (100%) =	0,27	μC
t_{Qrr} =	0,100	μs

Figure 9 D1, D2, D3, D4, D5, D6 FWD

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

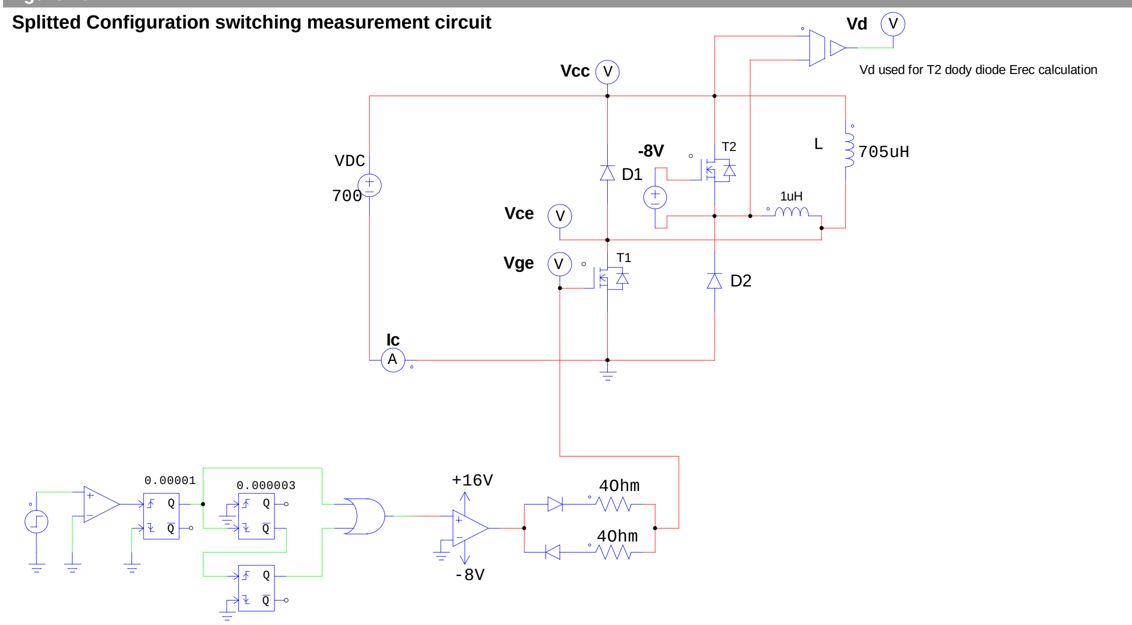


P_{rec} (100%) =	11,19	kW
E_{rec} (100%) =	0,05	mJ
t_{Erec} =	0,100	μs

Measurement circuit

Figure 10

Splitted Configuration switching measurement circuit

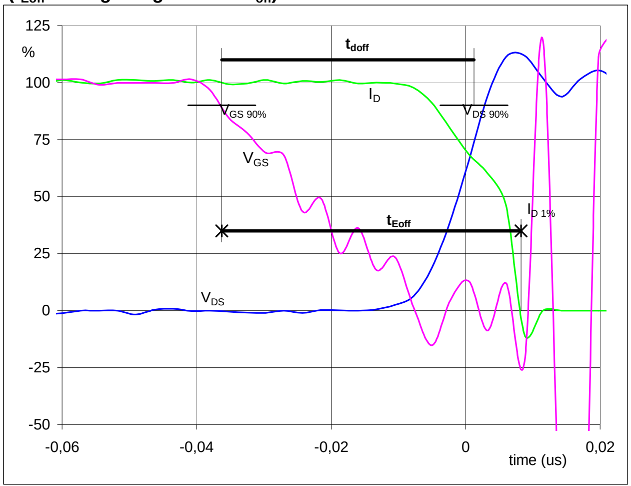


Switching Definitions Booster Configuration

General conditions		
T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

Figure 1 T1, T2, T3, T4, T5, T6 MOSFET

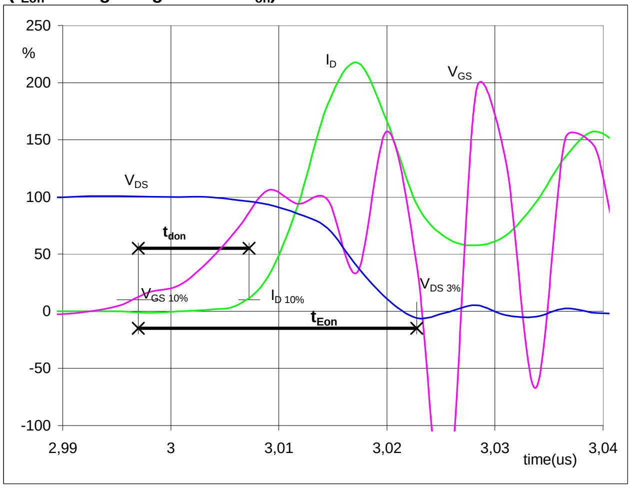
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	16	V
V_D (100%) =	700	V
I_D (100%) =	16	A
t_{doff} =	0,039	µs
t_{Eoff} =	0,044	µs

Figure 2 T1, T2, T3, T4, T5, T6 MOSFET

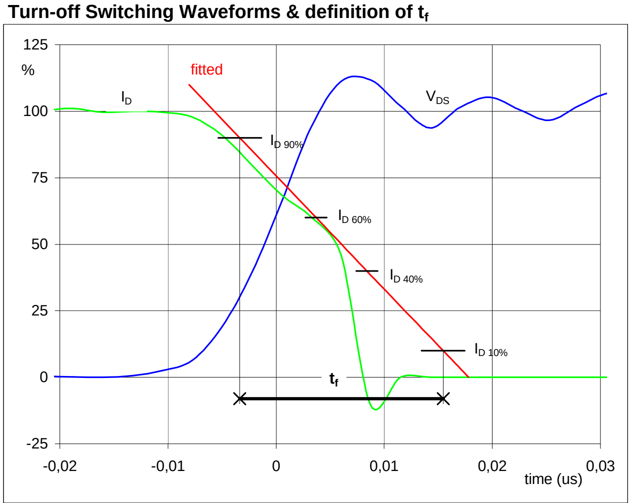
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	16	V
V_D (100%) =	700	V
I_D (100%) =	16	A
t_{don} =	0,011	µs
t_{Eon} =	0,026	µs

Figure 3 T1, T2, T3, T4, T5, T6 MOSFET

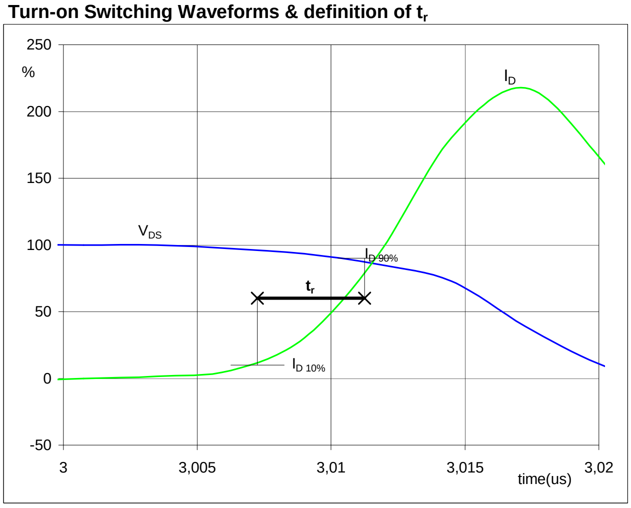
Turn-off Switching Waveforms & definition of t_f



V_D (100%) =	700	V
I_D (100%) =	16	A
t_f =	0,014	µs

Figure 4 T1, T2, T3, T4, T5, T6 MOSFET

Turn-on Switching Waveforms & definition of t_r

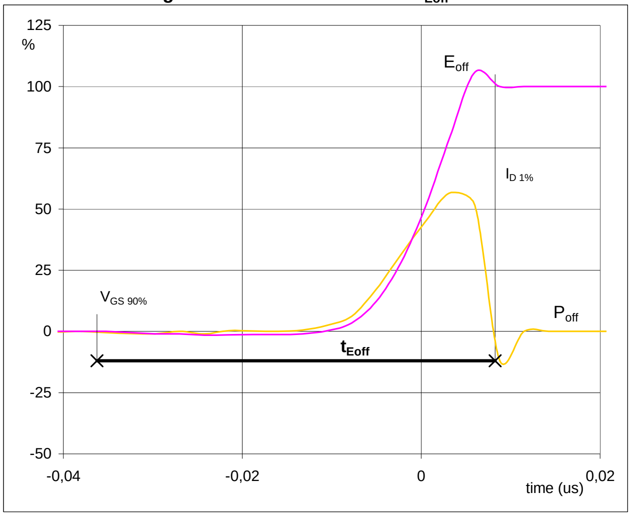


V_D (100%) =	700	V
I_D (100%) =	16	A
t_r =	0,004	µs

Switching Definitions Booster Configuration

Figure 5 T1, T2, T3, T4, T5, T6 MOSFET

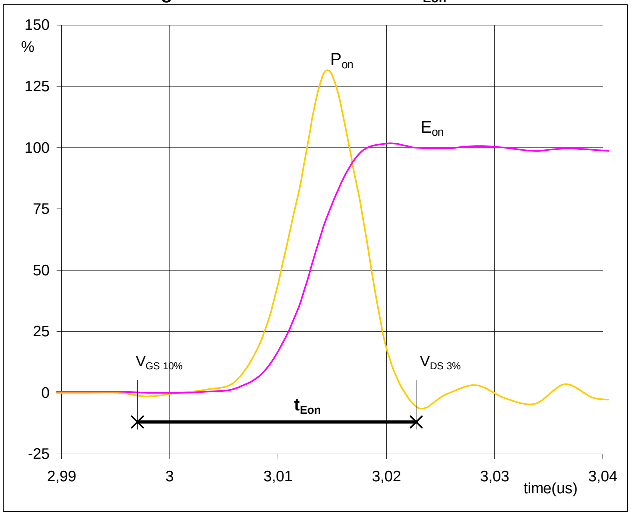
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	11,15	kW
E_{off} (100%) =	0,06	mJ
t_{Eoff} =	0,044	μs

Figure 6 T1, T2, T3, T4, T5, T6 MOSFET

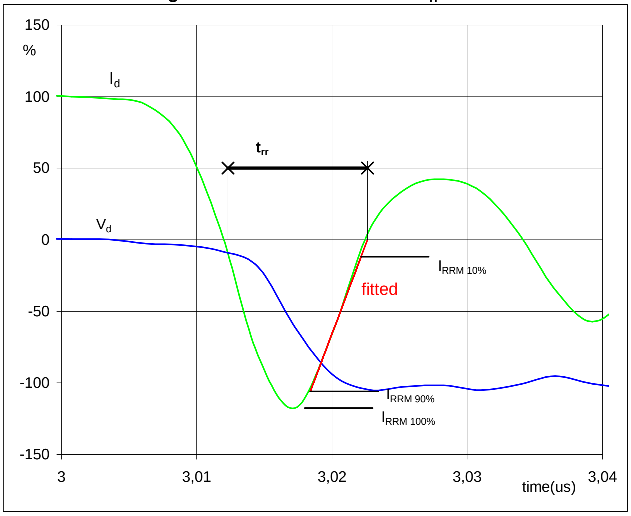
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	11,15	kW
E_{on} (100%) =	0,10	mJ
t_{Eon} =	0,026	μs

Figure 7 D1, D2, D3, D4, D5, D6 FWD

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

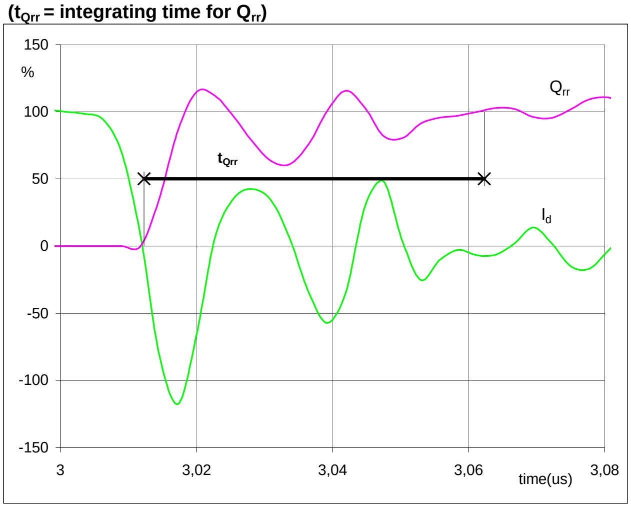


V_d (100%) =	700	V
I_d (100%) =	16	A
I_{RRM} (100%) =	-19	A
t_{rr} =	0,010	μs

Switching Definitions Booster Configuration

Figure 8 D1, D2, D3, D4, D5, D6 FWD

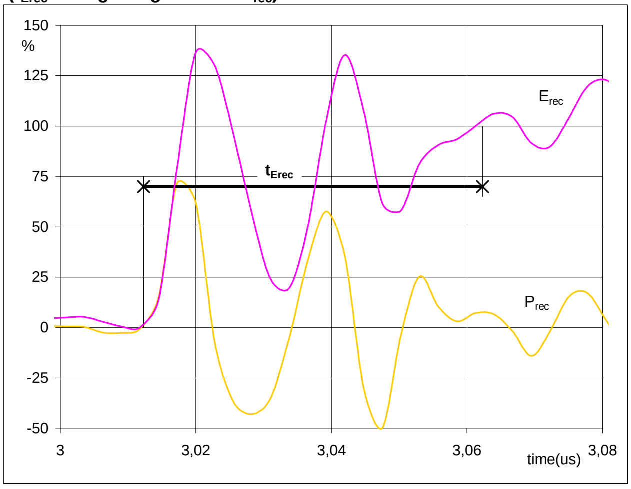
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	16	A
Q_{rr} (100%) =	0,10	µC
t_{Qrr} =	0,050	µs

Figure 9 D1, D2, D3, D4, D5, D6 FWD

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

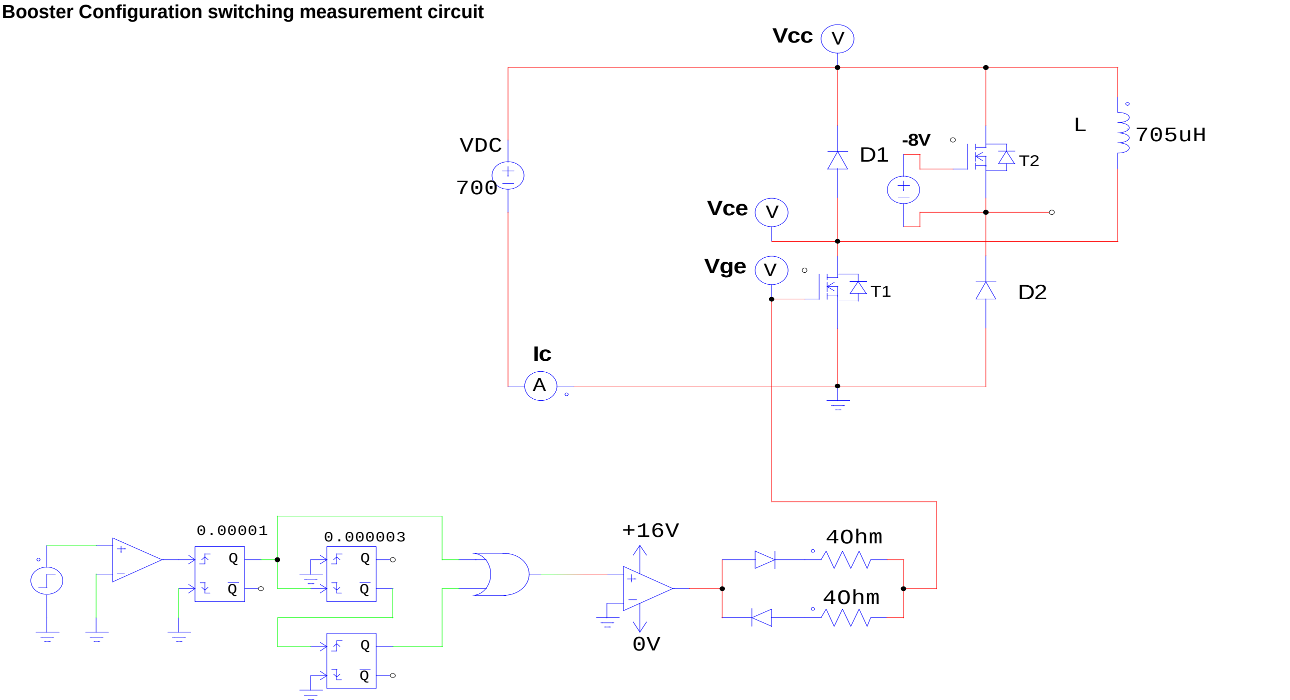


P_{rec} (100%) =	11,15	kW
E_{rec} (100%) =	0,03	mJ
t_{Erec} =	0,050	µs

Measurement circuit

Figure 10

Booster Configuration switching measurement circuit



Ordering Code and Marking - Outline - Pinout

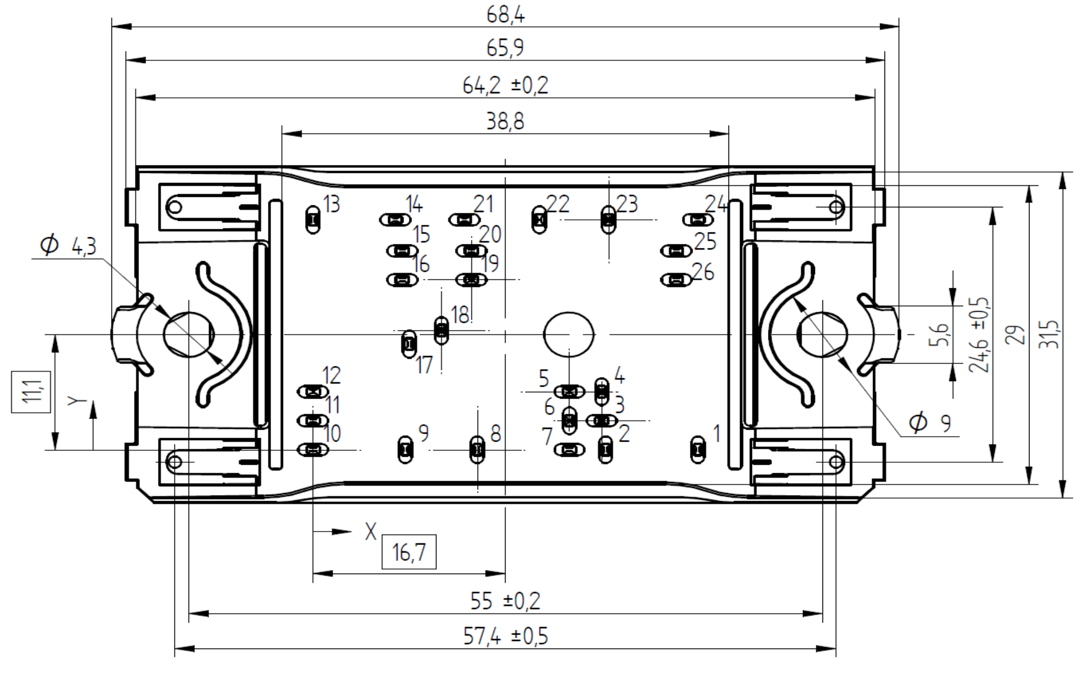
Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
w/o thermal paste 12mm housing Press-fit pin	10-PZ126PA080ME-M909F18Y	M909F18Y	M909F18Y

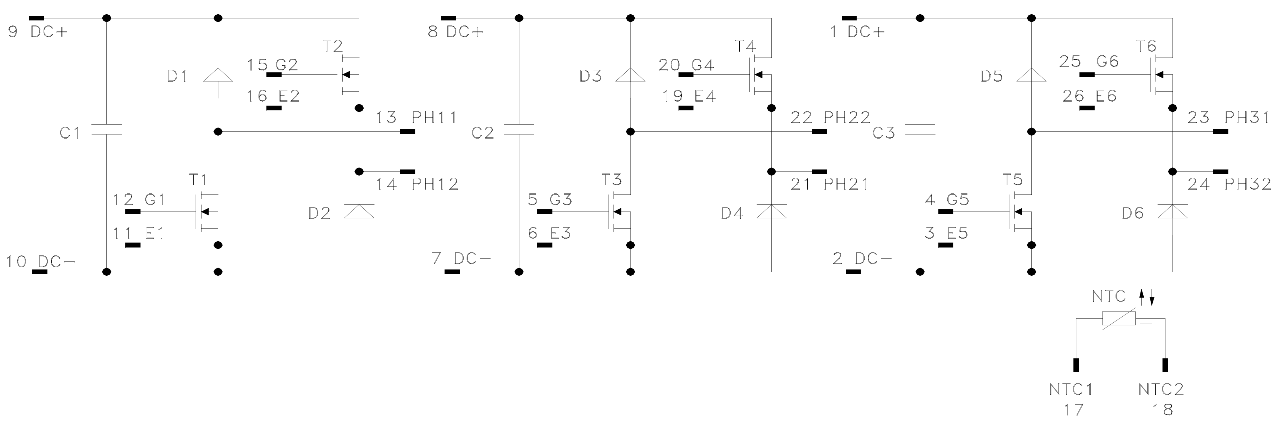
Outline

Pin table

Pin	X	Y
1	33,4	0
2	25,4	0
3	25,05	2,8
4	25,05	5,6
5	22,25	5,6
6	22,25	2,8
7	22,25	0
8	14,25	0
9	8	0
10	0	0
11	0	2,8
12	0	5,6
13	0	22,2
14	7,15	22,2
15	7,75	19,2
16	7,75	16,4
17	8,35	10,2
18	11,15	11,5
19	13,75	16,4
20	13,75	19,2
21	13,15	22,2
22	19,65	22,2
23	25,65	22,2
24	33,4	22,2
25	31,55	19,2
26	31,55	16,4



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.