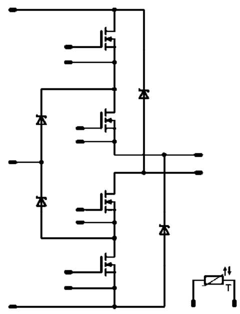
flowNPC1 **1200V/22mΩ**

Features
- neutral point clamped inverter
- reactive power capability
- SiC buck diode
- clip-in pcb mounting
- low inductance layout

flow1 12mm housing


Target Applications
- solar inverter
- UPS

Schematic


Types
- 10-PY06NRA021FS-M410FY

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Out Boost MOSFET				
Drain to source breakdown voltage	V_{DS}	T_j=25°C	600	V
DC drain current	I_D	T_j=$T_j$max	47 59	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max	544	A
Power dissipation	P_{tot}	T_j=$T_j$max	108 164	W
Gate-source peak voltage	V_{GS}	static/AC (f>1 Hz)	±20/±30	V
Maximum Junction Temperature	$T_j$max		150	°C
Out Boost FWD				
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25°C	1200	V
DC forward current	I_F	T_j=$T_j$max	24 28	A
Surge Peak Forward Current	I_{FSM}	10 ms sin 180° T_j=25°C Tj=150°C	170 170	A
Power dissipation	P_{tot}	T_j=$T_j$max	58 87	W
Maximum Junction Temperature	$T_j$max		175	°C

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck FWD					
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25℃		600	V
DC forward current	I_F	$T_j=T_j$max	T_h=80℃ T_c=80℃	24 32	A
Repetitive peak forward current	I_{FRM}	t_P=10 ms, Half Sine Wave, D=0.3	T_c=25℃	201	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max		39 58	W
Maximum Junction Temperature	$T_j$max			175	℃
Buck MOSFET					
Drain to source breakdown voltage	V_{DS}			600	V
DC drain current	I_D	$T_j=T_j$max	T_h=80℃ T_c=80℃	47 59	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max	Tc=25℃	544	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80℃ T_c=80℃	108 164	W
Gate-source peak voltage	Vgs	static/AC (f>1 Hz)		±20/±30	V
Maximum Junction Temperature	$T_j$max			150	℃
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	℃
Operation temperature under switching condition	T_{op}			-40…+(Tjmax - 25)	℃
Insulation Properties					
Insulation voltage	V_{is}	t=2s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm

Characteristic Values

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
Out Boost MOSFET										
Static drain to source ON resistance	$R_{DS(on)}$		10		60	Tj=25°C Tj=125°C		20,8 41,2		mΩ
Gate threshold voltage	$V_{(GS)th}$	$V_{GS}=V_{DS}$			0,00296	Tj=25°C Tj=125°C	2,4	3	3,6	V
Gate to Source Leakage Current	I_{gss}		20	0		Tj=25°C Tj=125°C			200	nA
Zero Gate Voltage Drain Current	I_{dss}		0	600		Tj=25°C Tj=125°C			10	μA
Turn On Delay Time	$t_{d(ON)}$	Rgoff=2 Ω Rgon=2 Ω	10	400	30	Tj=25°C Tj=125°C		49,2 49,6		ns
Rise Time	t_r					Tj=25°C Tj=125°C		11,4 14,6		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		267,6 327,8		
Fall time	t_f					Tj=25°C Tj=125°C		13,8 16,8		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,2768 0,4834		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,2285 0,3298		
Total gate charge	Q_g		0 to 10	480	89	Tj=25°C Tj=125°C		580		nC
Gate to source charge	Q_{gs}					Tj=25°C Tj=125°C		72		
Gate to drain charge	Q_{gd}					Tj=25°C Tj=125°C		300		
Input capacitance	C_{iss}	f=1MHz	0	100		Tj=25°C		13060		pF
Output capacitance	C_{oss}							720		
Gate resistor	r_G							0,35		Ω
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,65		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,43		
Out Boost FWD										
Forward voltage	V_F				35	Tj=25°C Tj=125°C		2,51 2,68		V
Reverse leakage current	I_{rm}			1200		Tj=25°C Tj=150°C			60 5500	μA
Peak recovery current	I_{RRM}	Rgon=2 Ω	10	400	30	Tj=25°C Tj=125°C		87,9 94,4		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		28,6 91,0		ns
Reverse recovery charge	Q_{rr}					Tj=25°C Tj=125°C		2,69 4,73		μC
Reverse recovered energy	E_{rec}					Tj=25°C Tj=125°C		0,89 1,58		mWs
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		9484 6335		A/μs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,65		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,09		
Buck FWD										
Diode forward voltage	V_F				30	Tj=25°C Tj=125°C		1,43 1,59		V
Peak reverse recovery current	I_{RRM}	Ron=2 Ω	10	400	30	Tj=25°C Tj=125°C		24 21		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		12 13		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		0,172 0,221		μC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		6880 4288		A/μs
Reverse recovered energy	Erec					Tj=25°C Tj=125°C		0,023 0,044		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						2,46		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,62		

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	
Buck MOSFET										
Static drain to source ON resistance	$R_{ds(on)}$		10		60	Tj=25°C Tj=125°C		21 41		mΩ
Gate threshold voltage	$V_{(GS)th}$			V_{DS}=V_{GS}	0,0005	Tj=25°C Tj=125°C	2,4	3	3,6	V
Gate to Source Leakage Current	I_{gss}		20	0		Tj=25°C Tj=125°C			200	nA
Zero Gate Voltage Drain Current	I_{dss}		0	600		Tj=25°C Tj=125°C			10000	nA
Turn On Delay Time	$t_{d(ON)}$	Rgoff=2 Ω Rgon=2 Ω	10	400	30	Tj=25°C Tj=125°C		31 30		ns
Rise Time	t_r					Tj=25°C Tj=125°C		8,2 9		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		224 246		
Fall time	t_f					Tj=25°C Tj=125°C		12 46		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,191 0,209		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,126 0,162		
Total gate charge	Q_g		0 to 10	480	89	Tj=25°C		580		nC
Gate to source charge	Q_{gs}							72		
Gate to drain charge	Q_{gd}							300		
Input capacitance	C_{iss}	f=1MHz	0	100		Tj=25°C		13060		pF
Output capacitance	C_{oss}							720		
Gate resistor	r_G							0,35		Ω
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,65		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,43		
Thermistor										
Rated resistance	R					Tj=25°C		22000		Ω
Deviation of R100	ΔR/R	R100=1486 Ω				Tc=100°C	-5		5	%
Power dissipation	P					Tj=25°C		200		mW
Power dissipation constant						Tj=25°C		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				Tj=25°C		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25°C		3996		K
Vincotech NTC Reference						Tj=25°C			B	

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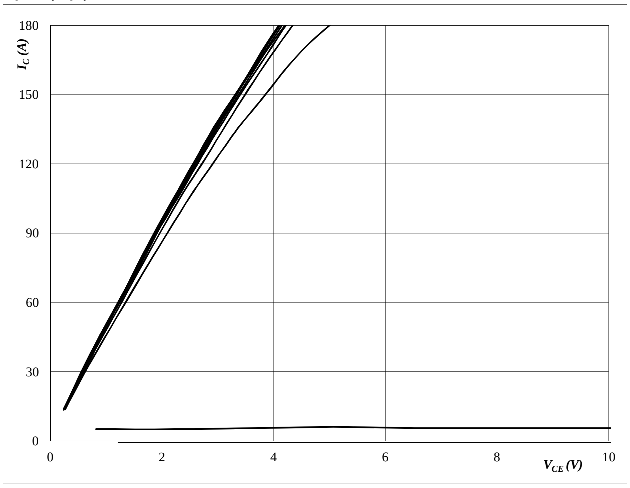
Figure 1 MOSFET

Typical output characteristics

$I_C = f(V_{CE})$



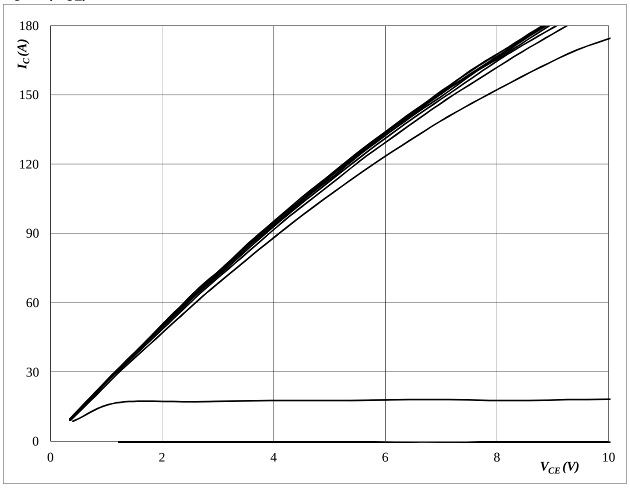
At

t_p =	250	µs
T_j =	25	℃
V_{GE} from	0 V to 20 V in steps of 2 V	

Figure 2 MOSFET

Typical output characteristics

$I_C = f(V_{CE})$



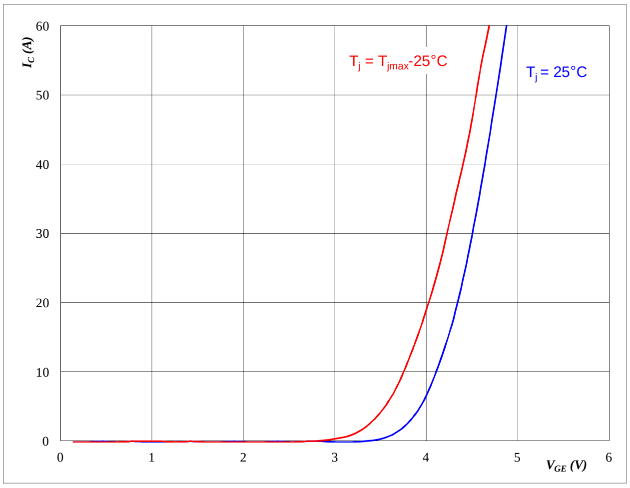
At

t_p =	250	µs
T_j =	125	℃
V_{GE} from	0 V to 20 V in steps of 2 V	

Figure 3 MOSFET

Typical transfer characteristics

$I_C = f(V_{GE})$



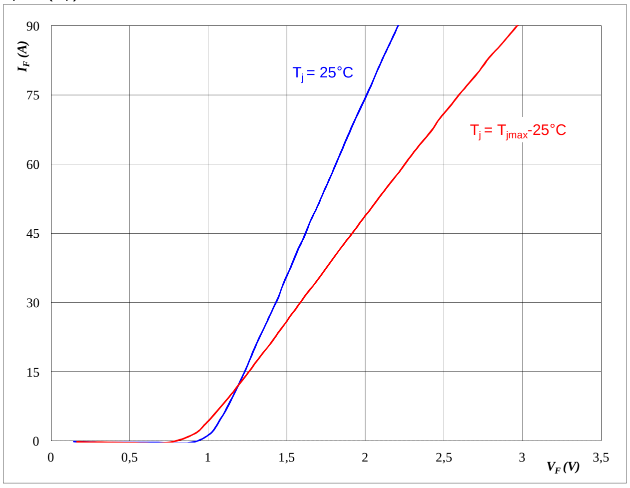
At

t_p =	250	µs
V_{CE} =	10	V

Figure 4 FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

t_p =	250	µs

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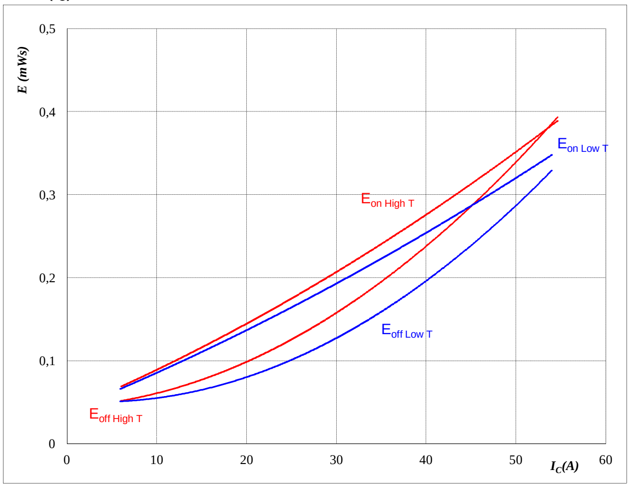
Figure 5 MOSFET

Typical switching energy losses
as a function of collector current

E = f(I_C)



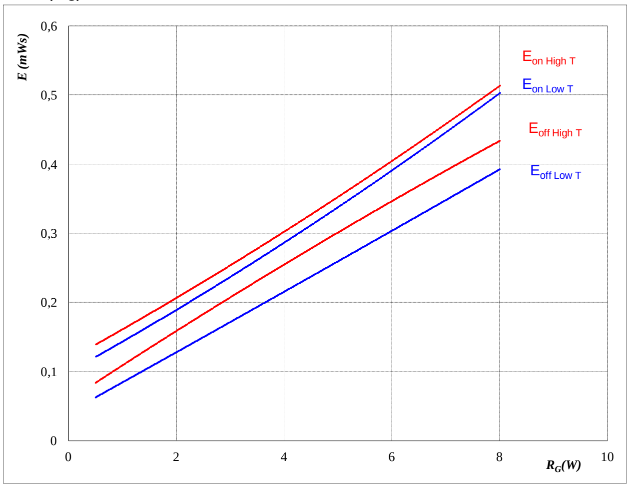
With an inductive load at

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 6 MOSFET

Typical switching energy losses
as a function of gate resistor

E = f(R_G)



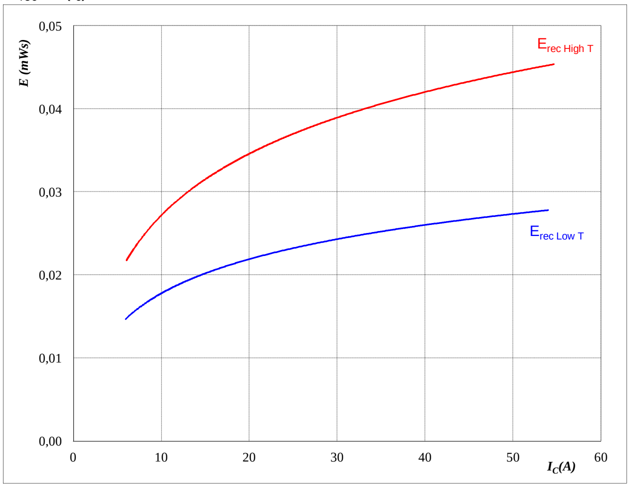
With an inductive load at

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
I_C =	30	A

Figure 7 FWD

Typical reverse recovery energy loss
as a function of collector current

E_{rec} = f(I_c)



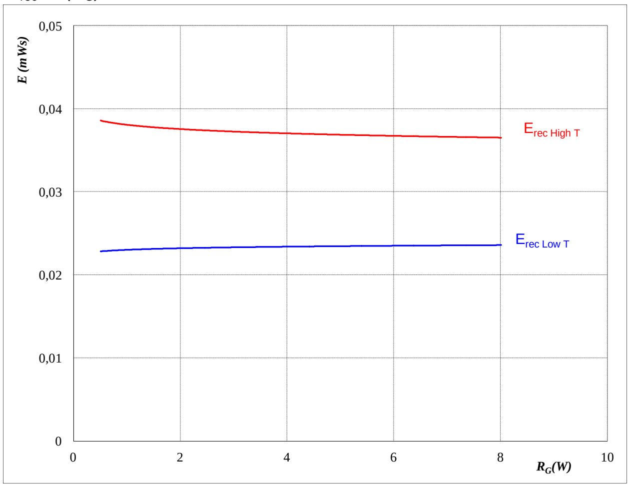
With an inductive load at

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 8 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	℃
V_{CE} =	400	V
V_{GE} =	10	V
I_C =	30	A

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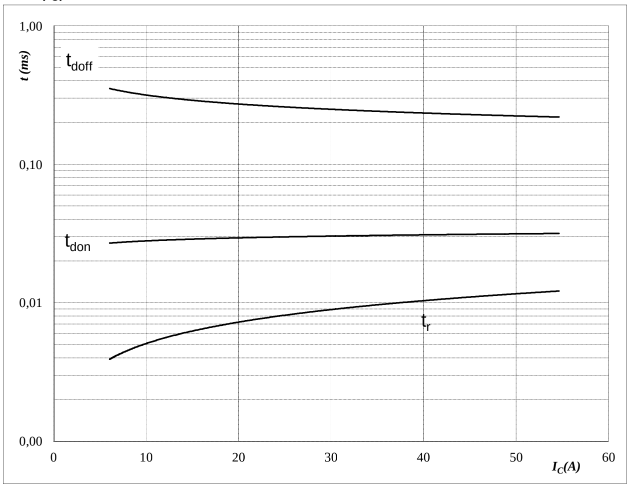
Figure 9 MOSFET

Typical switching times as a function of collector current

t = f(I_C)



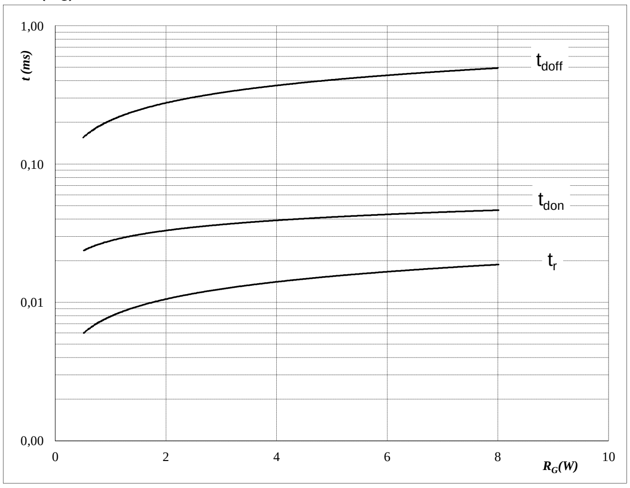
With an inductive load at

T_j =	125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 10 MOSFET

Typical switching times as a function of gate resistor

t = f(R_G)



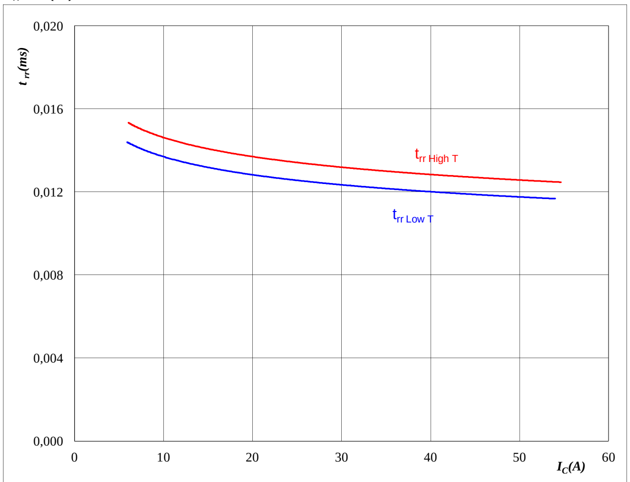
With an inductive load at

T_j =	125	℃
V_{CE} =	400	V
V_{GE} =	10	V
I_C =	30	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(Ic)



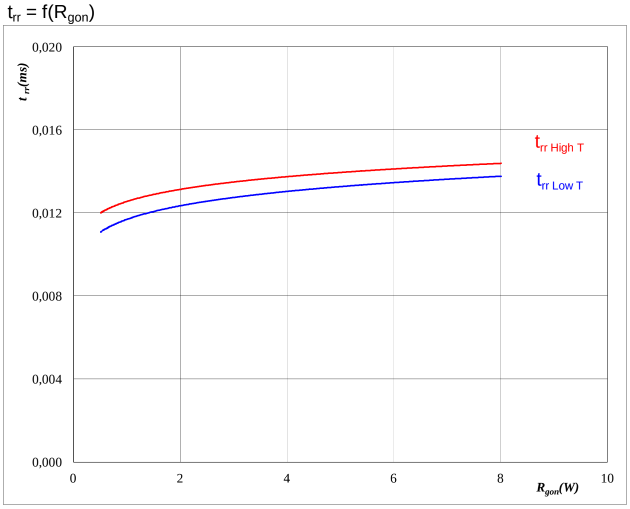
At

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 12 FWD

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

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



At

T_j =	25/125	℃
V_R =	400	V
I_F =	30	A
V_{GE} =	10	V

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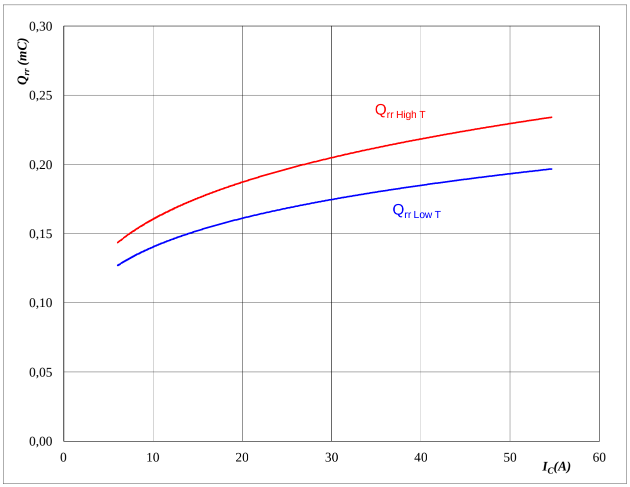
Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



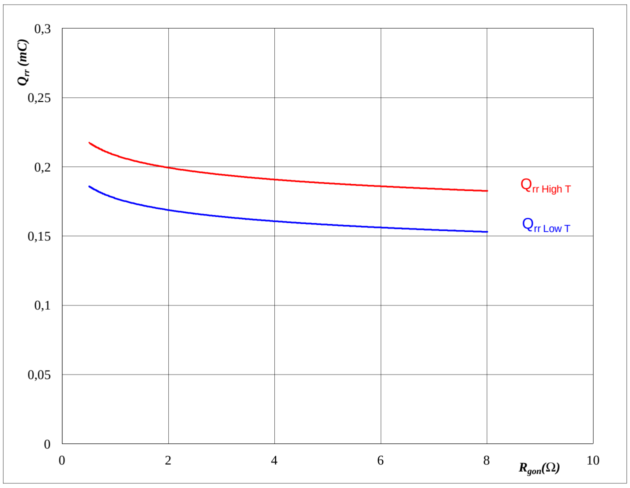
At

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 14 FWD

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

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



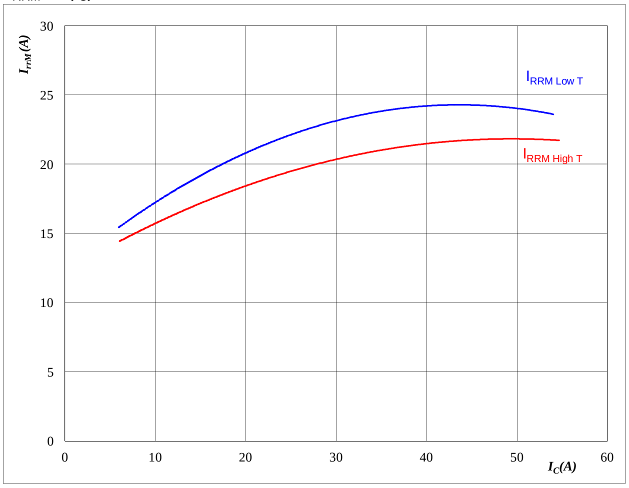
At

T_j =	25/125	℃
V_R =	400	V
I_F =	30	A
V_{GE} =	10	V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



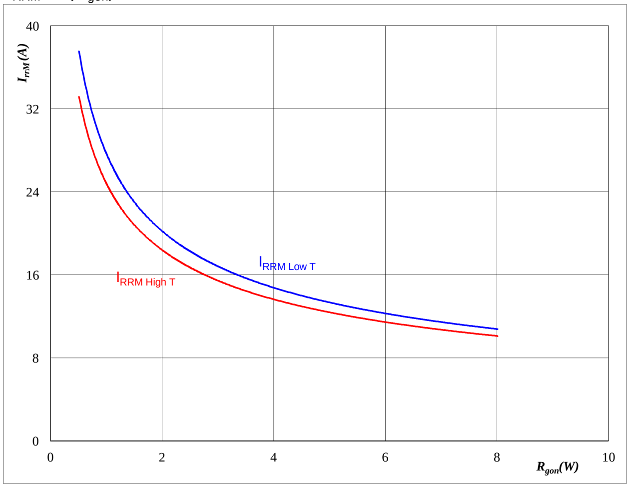
At

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 16 FWD

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

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



At

T_j =	25/125	℃
V_R =	400	V
I_F =	30	A
V_{GE} =	10	V

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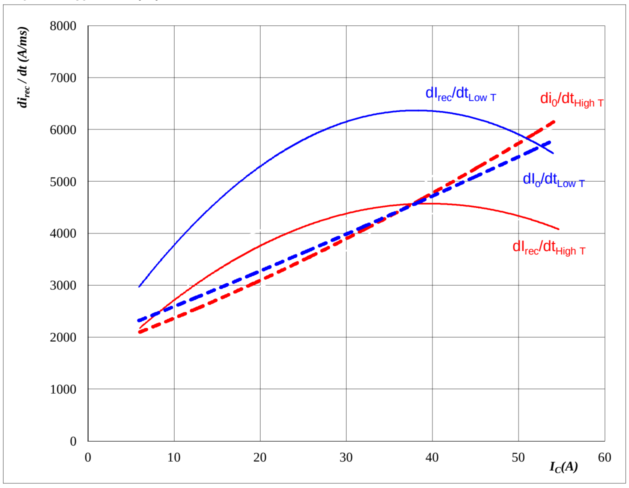
Figure 17 FWD

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

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



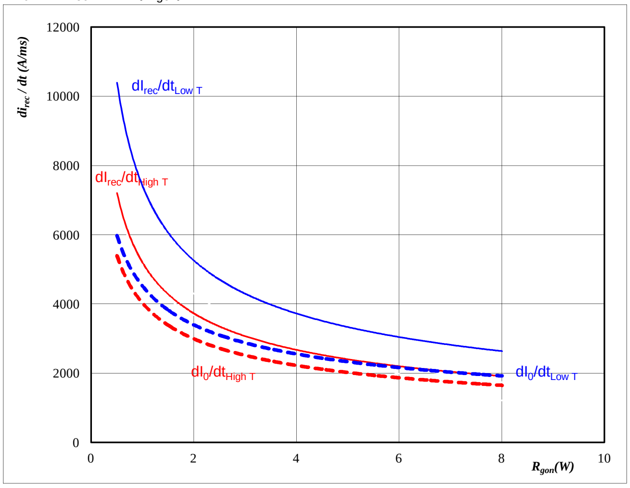
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 18 FWD

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

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



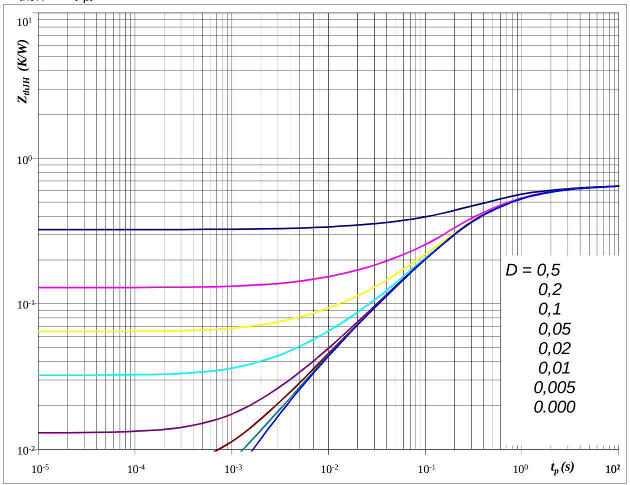
At

T_j =	25/125	°C
V_R =	400	V
I_F =	30	A
V_{GE} =	10	V

Figure 19 MOSFET

MOSFET transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T				
R_{thJH} =	0,65	K/W	R_{thJH} =	0,55	K/W

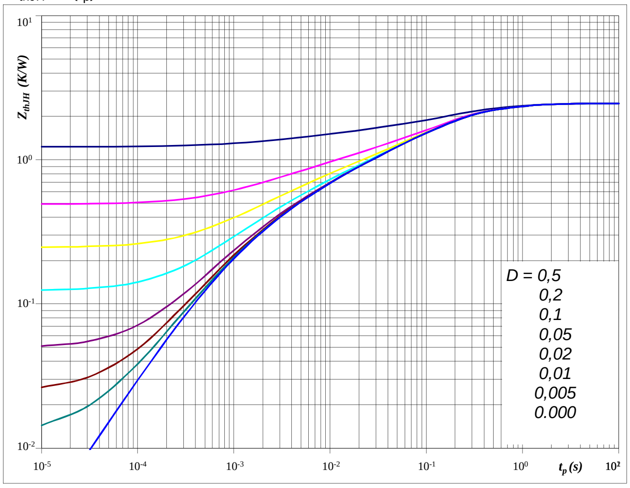
MOSFET thermal model values

Thermal grease R (C/W)	Thermal grease Tau (s)	Phase change interface R (C/W)	Phase change interface Tau (s)
0,12	2,641	0,10	2,245
0,20	0,608	0,17	0,517
0,28	0,200	0,23	0,170
0,05	0,027	0,04	0,023
0,01	0,004	0,01	0,004

Figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T				
R_{thJH} =	2,46	K/W	R_{thJH} =	2,09	K/W

FWD thermal model values

Thermal grease R (C/W)	Thermal grease Tau (s)	Phase change interface R (C/W)	Phase change interface Tau (s)
0,31	0,946	0,27	0,804
0,96	0,184	0,82	0,156
0,44	0,063	0,38	0,053
0,37	0,013	0,32	0,011
0,28	0,003	0,24	0,002
0,10	0,001	0,08	0,000

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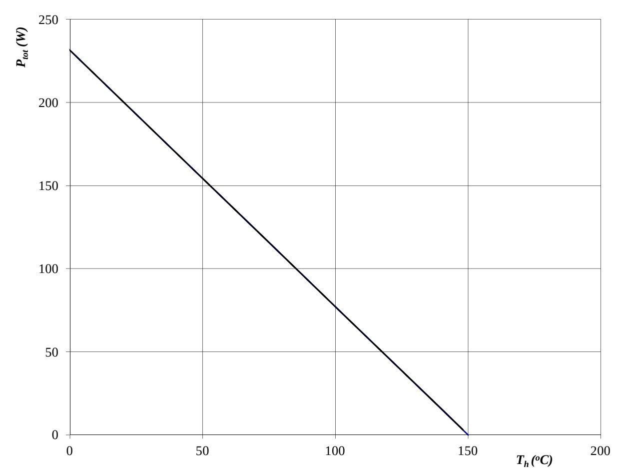
Figure 21 MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



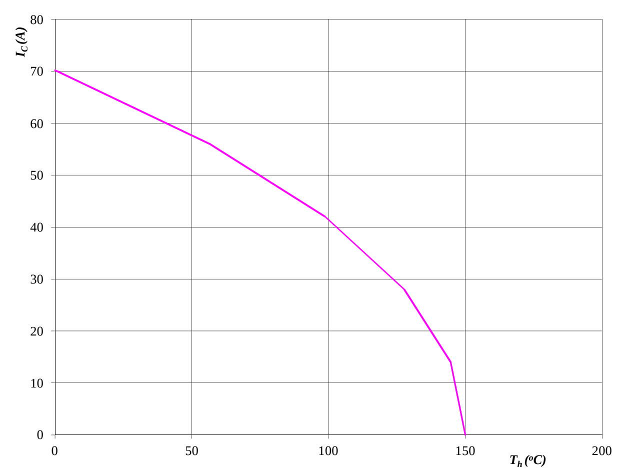
At

T_j = 150 ℃

Figure 22 MOSFET

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

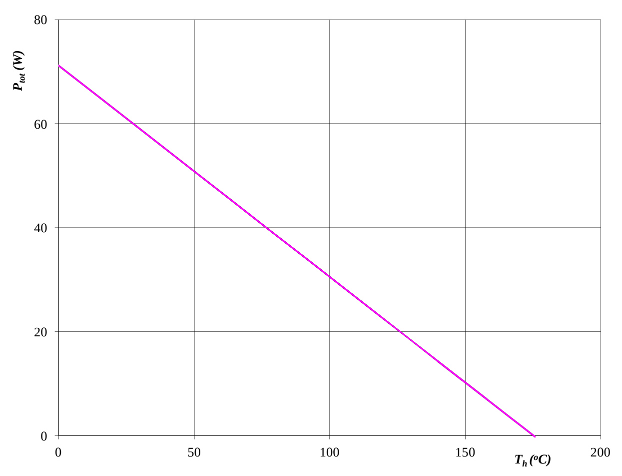
T_j = 150 ℃

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



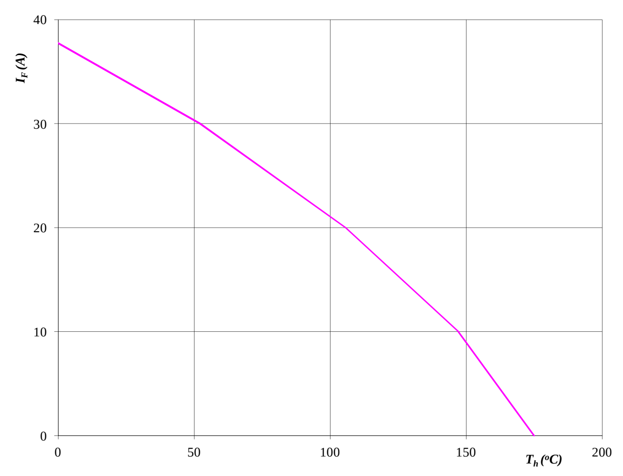
At

T_j = 175 ℃

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

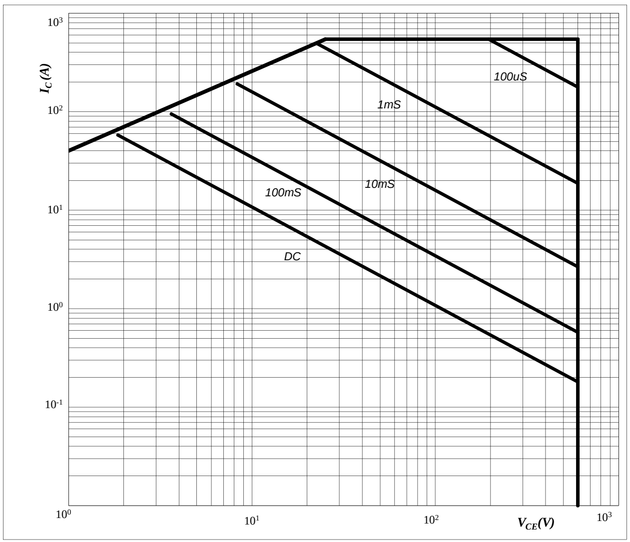
T_j = 175 ℃

BUCK

Figure 25 MOSFET

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



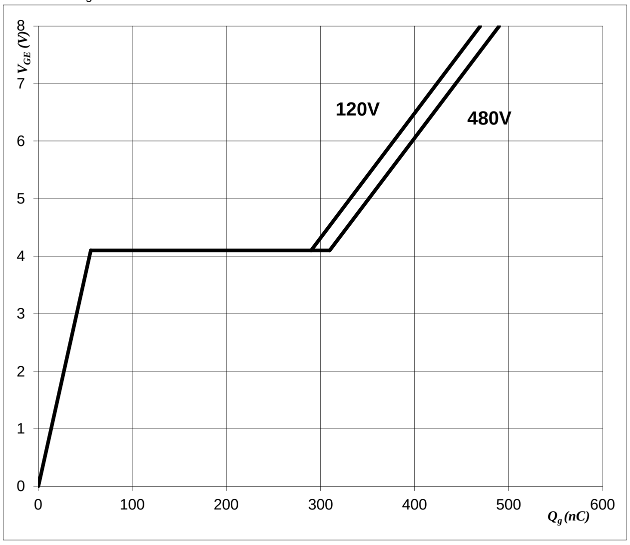
At

D =	single pulse	
Th =	80	ºC
V_{GE} =	10	V
T_j =	T_{jmax}	ºC

Figure 26 MOSFET

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



At

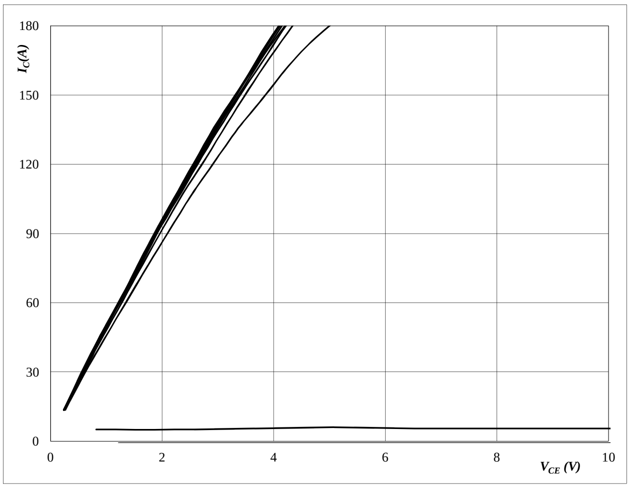
I_C =	89	A	pulsed

OUTPUT BOOST

Figure 1 BOOST MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



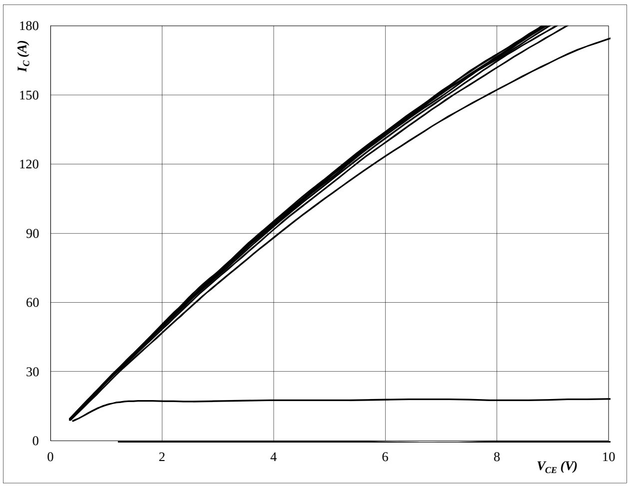
At

t_p =	250	µs
T_j =	25	°C
V_{GS} from	0 V to 20 V in steps of 2 V	

Figure 2 BOOST MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



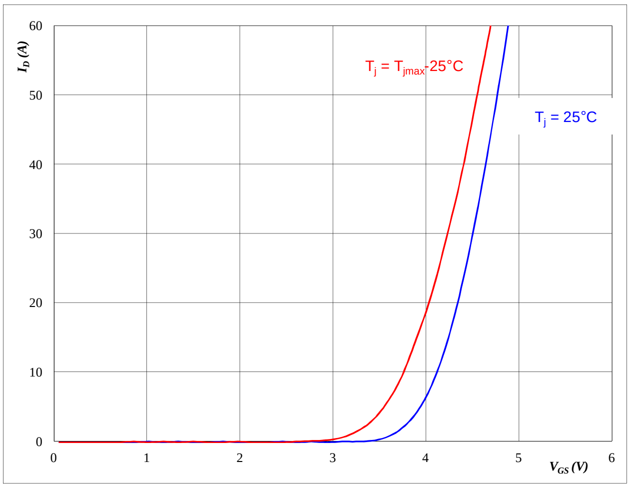
At

t_p =	250	µs
T_j =	126	°C
V_{GS} from	0 V to 20 V in steps of 2 V	

Figure 3 BOOST MOSFET

Typical transfer characteristics

$I_D = f(V_{GS})$



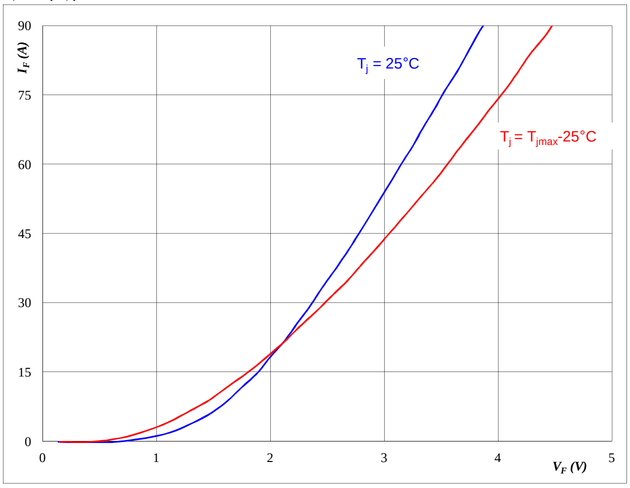
At

t_p =	250	µs
V_{DS} =	12	V

Figure 4 BOOST FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

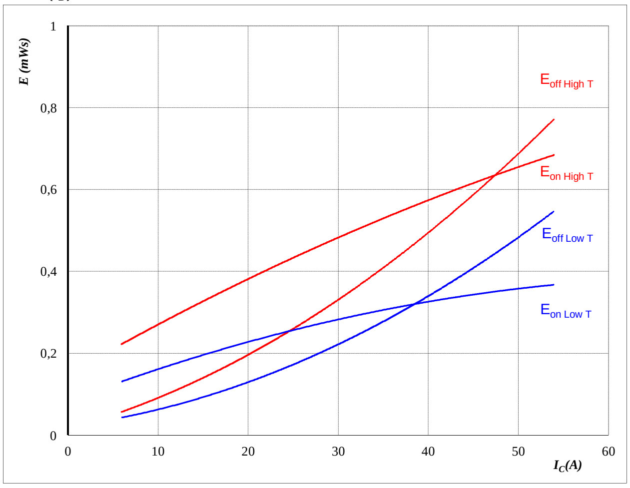
t_p =	250	µs

OUTPUT BOOST

Figure 5 BOOST MOSFET

Typical switching energy losses as a function of collector current

$E = f(I_D)$



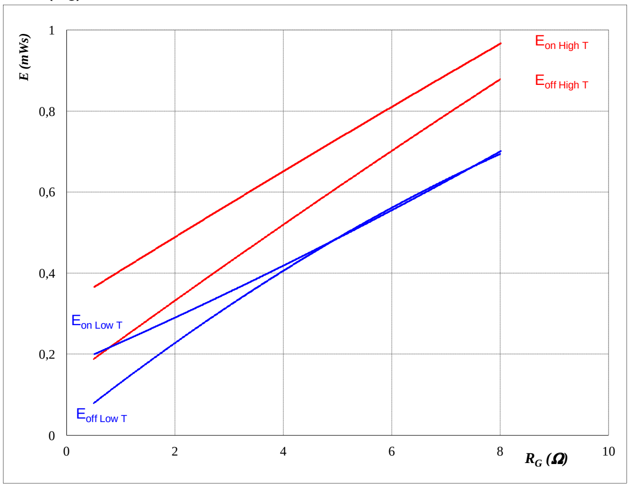
With an inductive load at

T_j =	25/125	℃
V_{DS} =	400	V
V_{GS} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 6 BOOST MOSFET

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



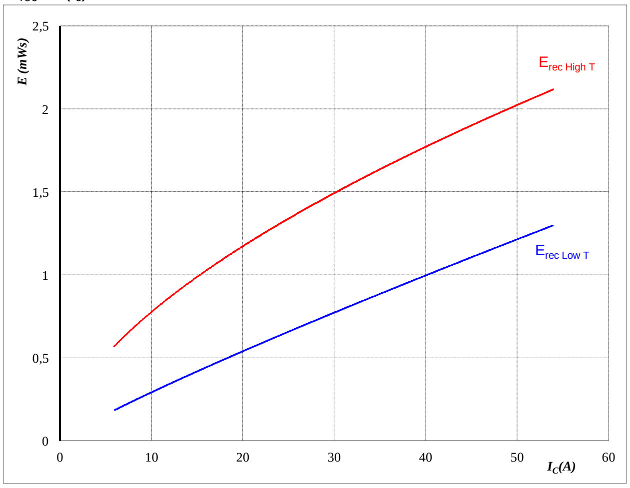
With an inductive load at

T_j =	25/125	℃
V_{DS} =	400	V
V_{GS} =	10	V
I_D =	30	A

Figure 7 BOOST FWD

Typical reverse recovery energy loss as a function of collector (drain) current

$E_{rec} = f(I_c)$



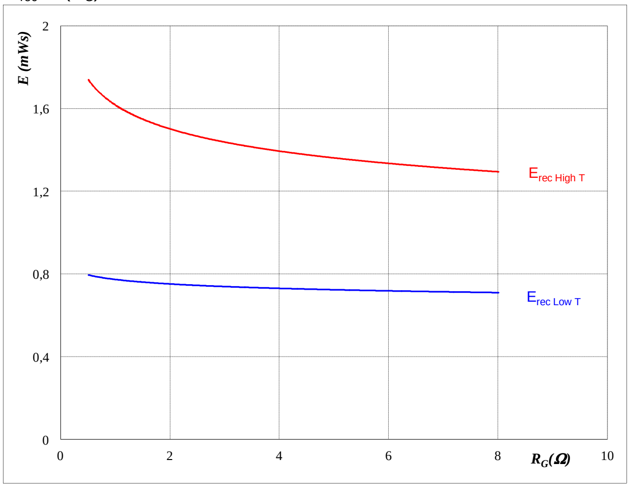
With an inductive load at

T_j =	25/125	℃
V_{DS} =	400	V
V_{GS} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 8 BOOST FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

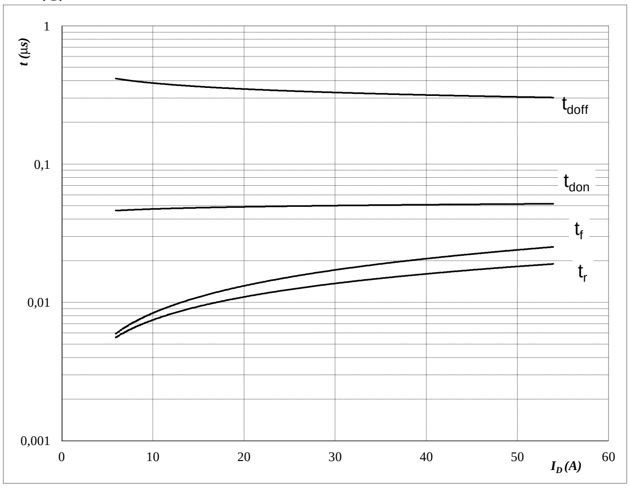
T_j =	25/125	℃
V_{DS} =	400	V
V_{GS} =	10	V
I_D =	30	A

OUTPUT BOOST

Figure 9 BOOST MOSFET

Typical switching times as a function of collector current

t = f(I_D)



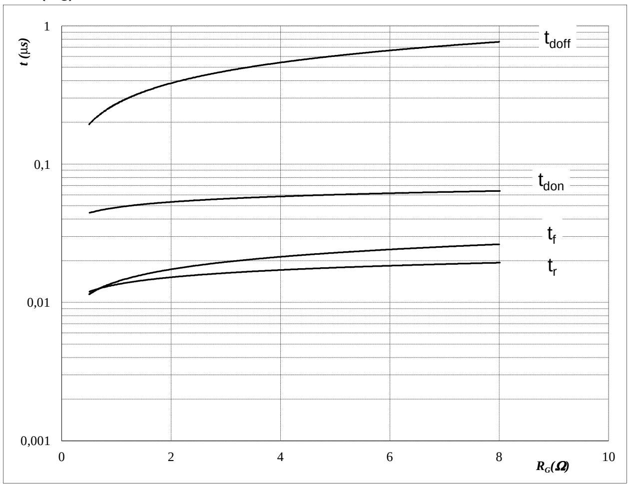
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 10 BOOST MOSFET

Typical switching times as a function of gate resistor

t = f(R_G)



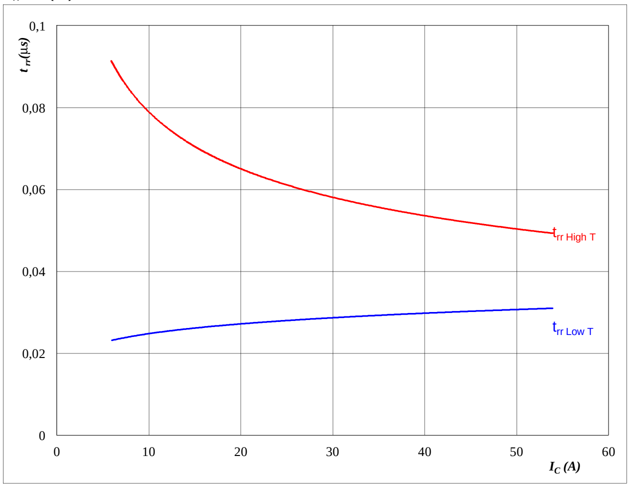
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	10	V
I_C =	30	A

Figure 11 BOOST FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(Ic)



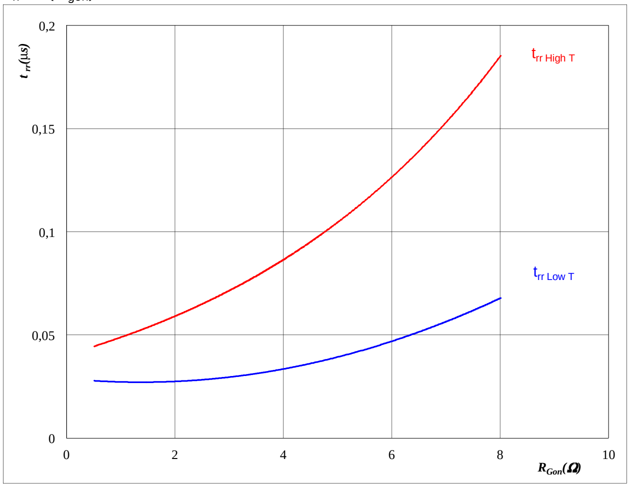
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 12 BOOST FWD

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

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



At

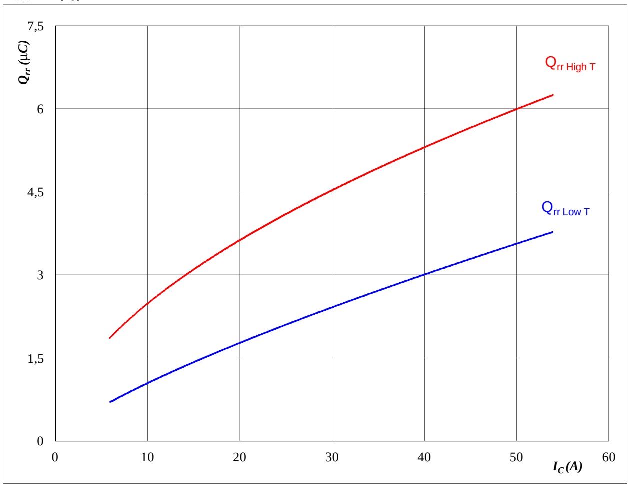
T_j =	25/125	°C
V_R =	400	V
I_F =	30	A
V_{GS} =	10	V

OUTPUT BOOST

Figure 13 BOOST FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



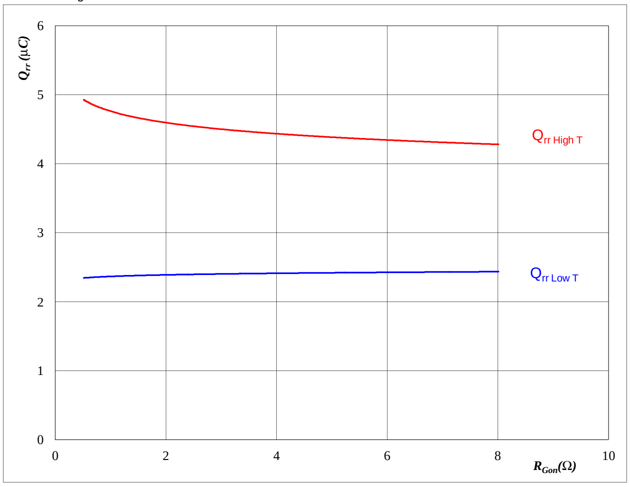
At

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 14 BOOST FWD

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

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



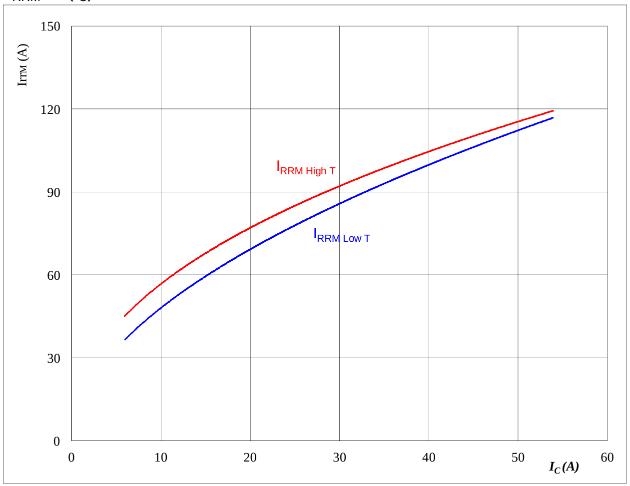
At

Tj =	25/125	℃
V_R =	400	V
I_F =	30	A
V_{GS} =	10	V

Figure 15 BOOST FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



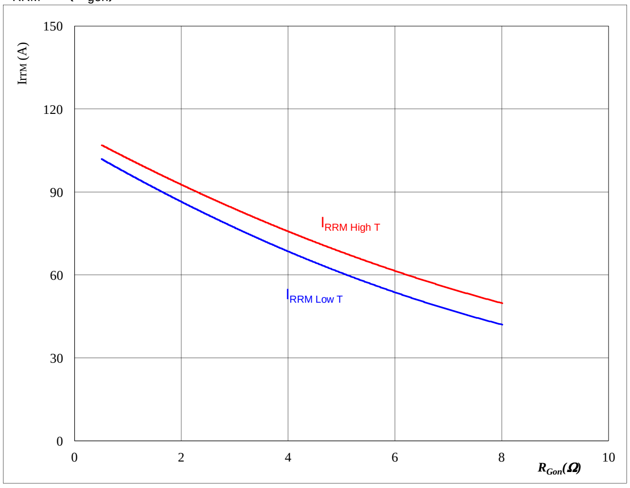
At

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 16 BOOST FWD

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

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



At

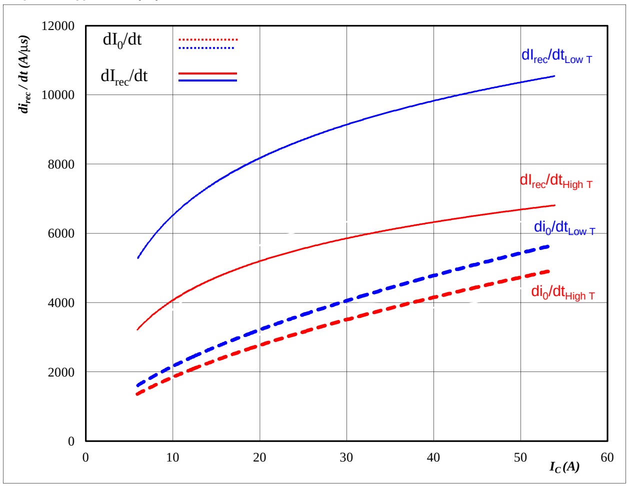
T_j =	25/125	℃
V_R =	400	V
I_F =	30	A
V_{GS} =	10	V

OUTPUT BOOST

Figure 17 BOOST FWD

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

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



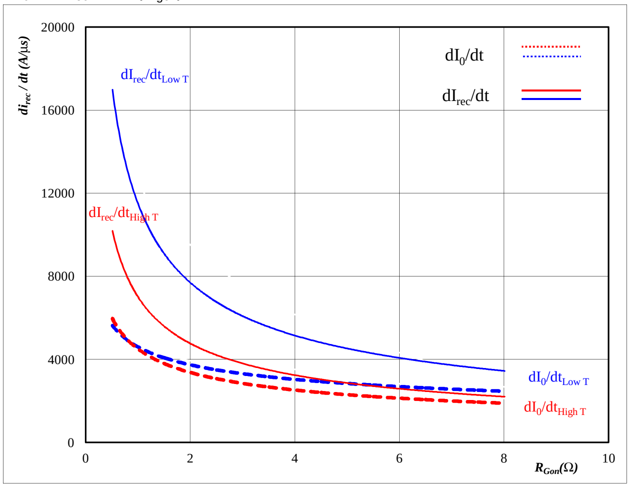
At

T_j =	25/125	℃
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 18 BOOST FWD

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

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



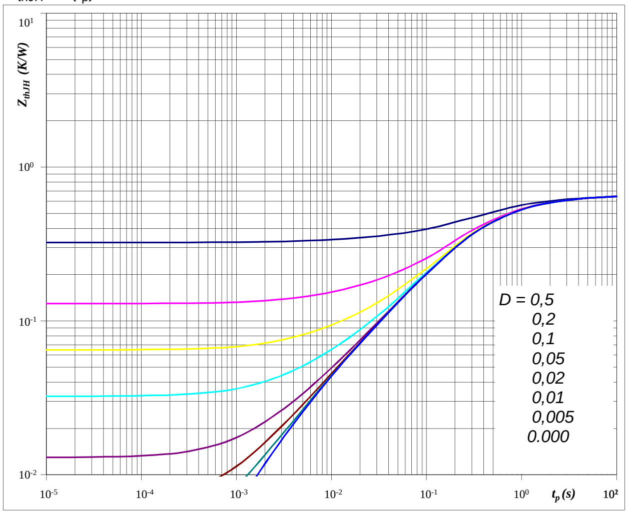
At

Tj =	25/125	℃
VR =	400	V
IF =	30	A
VGS =	10	V

Figure 19 BOOST MOSFET

MOSFET transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T				
R_{thJH} =	0,65	K/W	R_{thJH} =	0,55	K/W

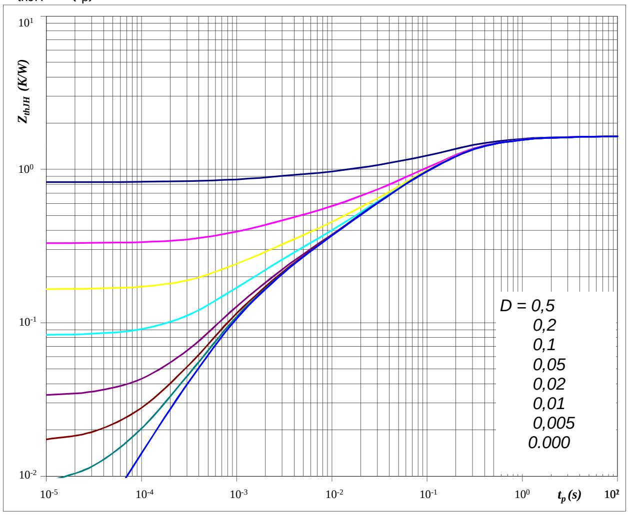
MOSFET thermal model values

Thermal grease R (C/W)	Thermal grease Tau (s)	Phase change interface R (C/W)	Phase change interface Tau (s)
0,12	2,641	0,10	2,245
0,20	0,608	0,17	0,517
0,28	0,200	0,23	0,170
0,05	0,027	0,04	0,023
0,01	0,004	0,01	0,004
0,21	0,003	0,18	0,003

Figure 20 BOOST FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T				
R_{thJH} =	1,65	K/W	R_{thJH} =	1,40	K/W

FWD thermal model values

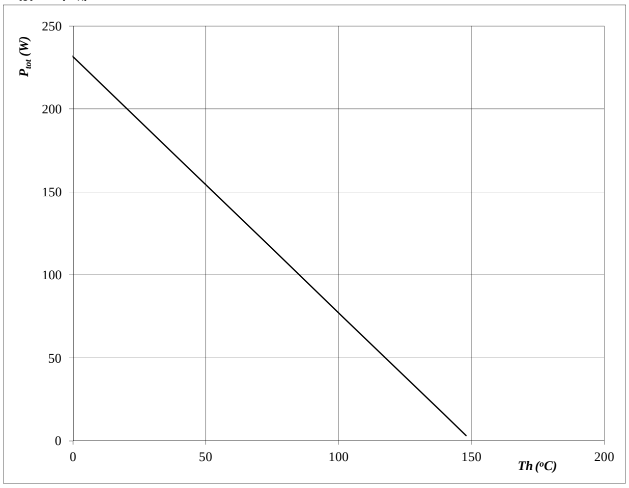
Thermal grease R (C/W)	Thermal grease Tau (s)	Phase change interface R (C/W)	Phase change interface Tau (s)
0,05	4,87	0,04	4,142
0,28	0,58	0,24	0,495
0,79	0,14	0,67	0,118
0,25	0,03	0,21	0,028
0,17	0,01	0,15	0,006
0,12	0,00	0,10	0,001

OUTPUT BOOST

Figure 21	BOOST MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



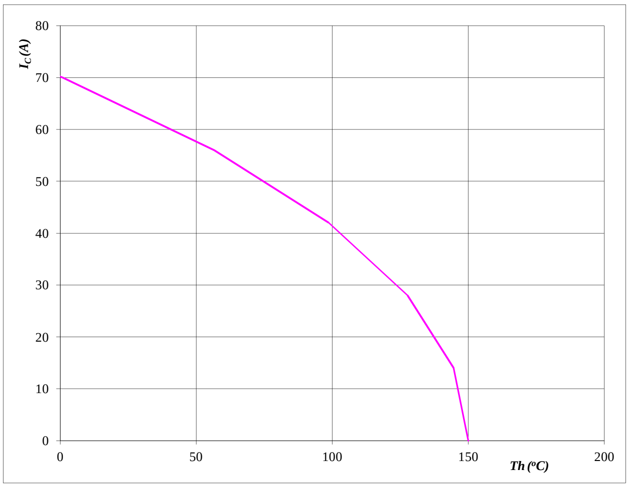
At

T_j = 150 ºC

Figure 22	BOOST MOSFET

Collector/Drain current as a function of heatsink temperature

$I_C = f(T_h)$



At

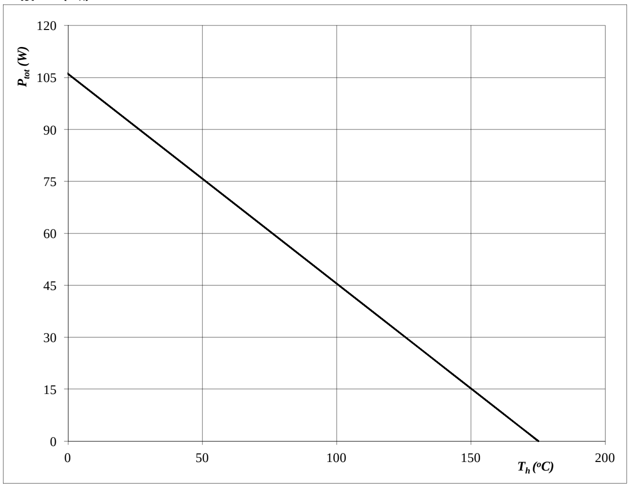
T_j = 150 ºC

V_{GS} = 10 V

Figure 23	BOOST FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



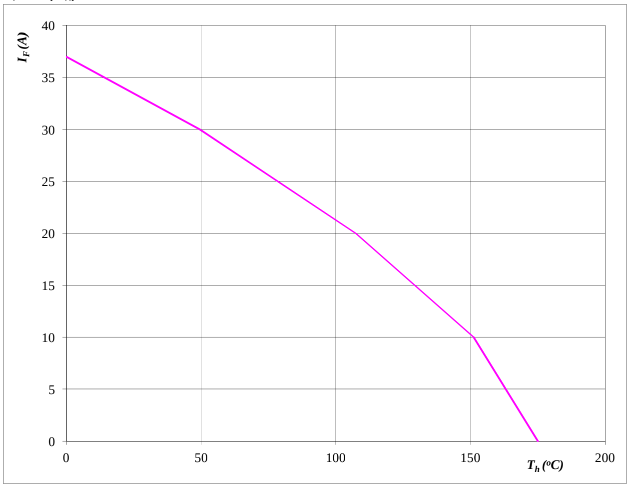
At

T_j = 175 ºC

Figure 24	BOOST FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

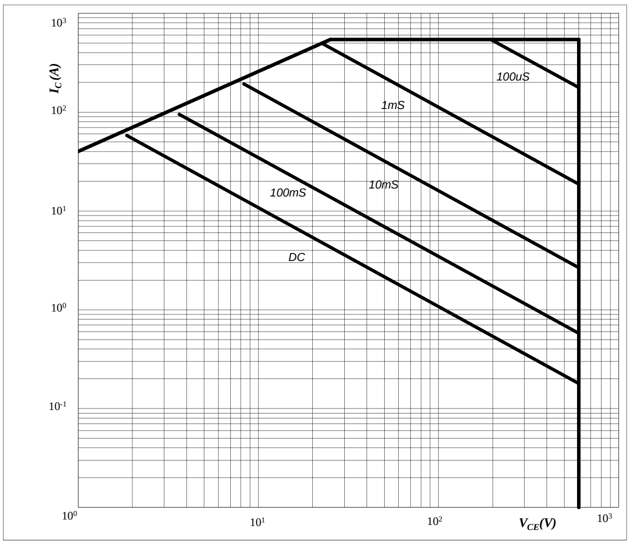
T_j = 175 ºC

OUTPUT BOOST

Figure 25 BOOST MOSFET

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



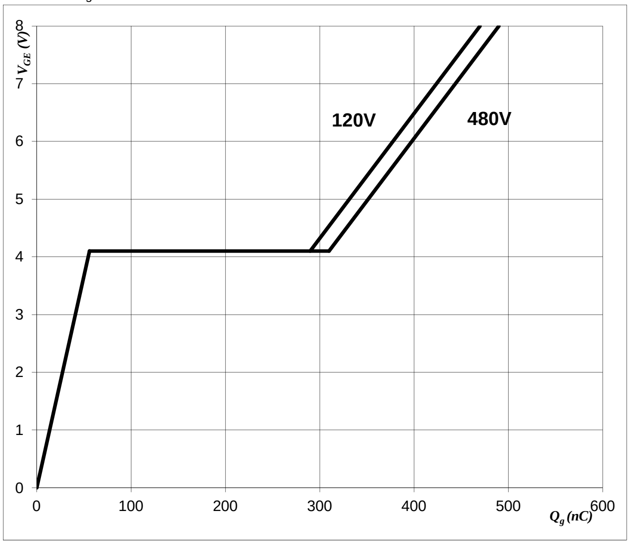
At

D =	single pulse	
Th =	80	ºC
V_{GE} =	10	V
T_j =	T_{jmax}	ºC

Figure 26 BOOST MOSFET

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



At

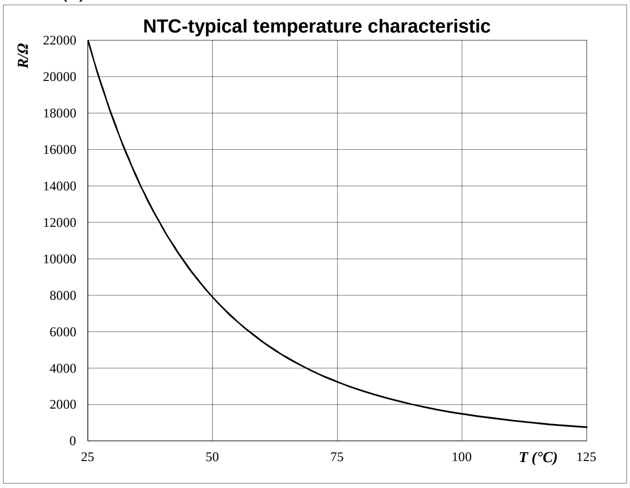
I_C =	89	A	pulsed

Thermistor

Figure 1 Thermistor

Typical NTC characteristic
as a function of temperature

R_T = f(T)



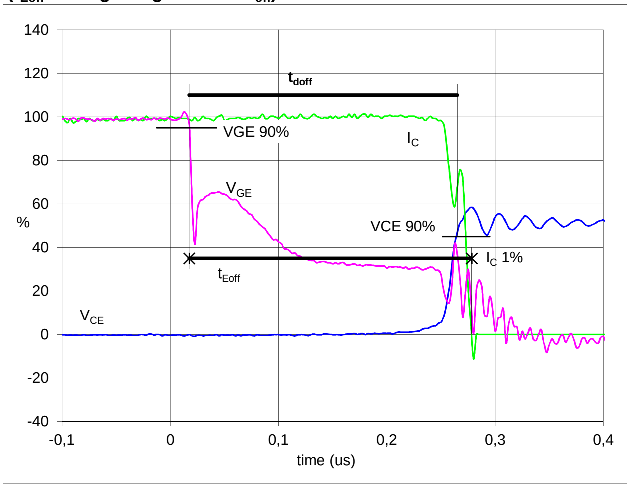
Switching Definitions BUCK MOSFET

General conditions

T_j	**=**	**125 °C**
R_{gon}	**=**	**2 Ω**
R_{goff}	**=**	**2 Ω**

Figure 1 BUCK MOSFET

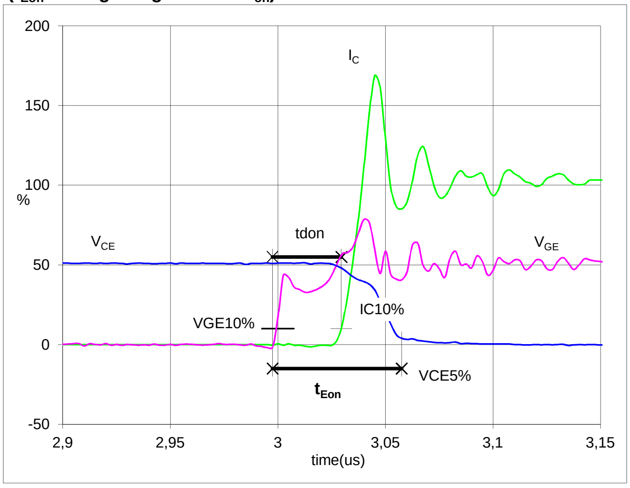
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	800	V
I_C (100%) =	30	A
t_{doff} =	0,25	μs
t_{Eoff} =	0,26	μs

Figure 2 BUCK MOSFET

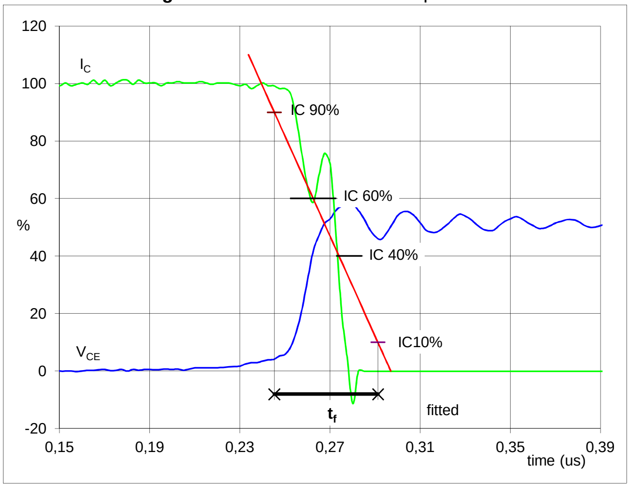
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	800	V
I_C (100%) =	30	A
t_{don} =	0,03	μs
t_{Eon} =	0,06	μs

Figure 3 BUCK MOSFET

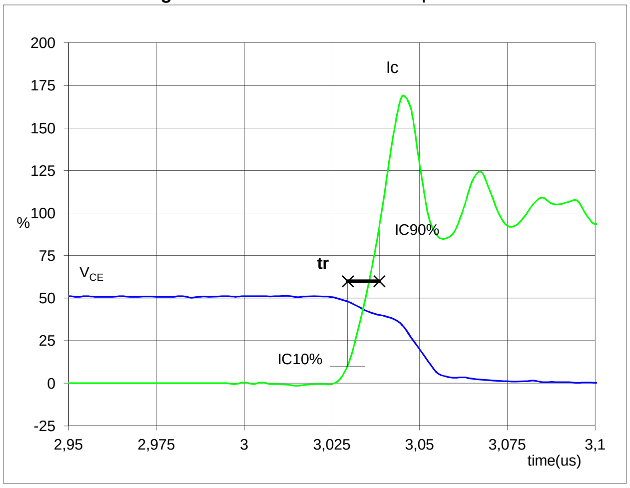
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	800	V
I_C (100%) =	30	A
t_f =	0,046	μs

Figure 4 BUCK MOSFET

Turn-on Switching Waveforms & definition of t_r

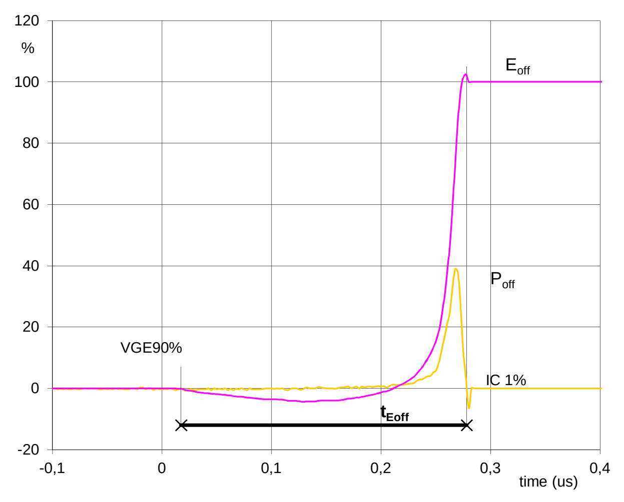


V_C (100%) =	800	V
I_C (100%) =	30	A
t_r =	0,009	μs

Switching Definitions BUCK MOSFET

Figure 5 BUCK MOSFET

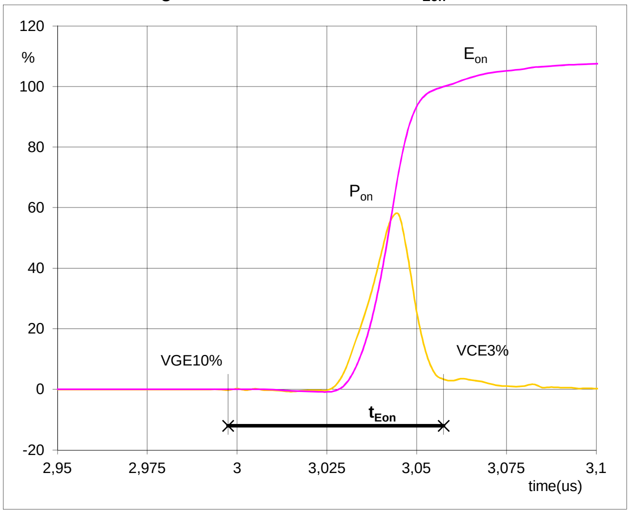
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	24,06	kW
E_{off} (100%) =	0,16	mJ
t_{Eoff} =	0,26	μs

Figure 6 BUCK MOSFET

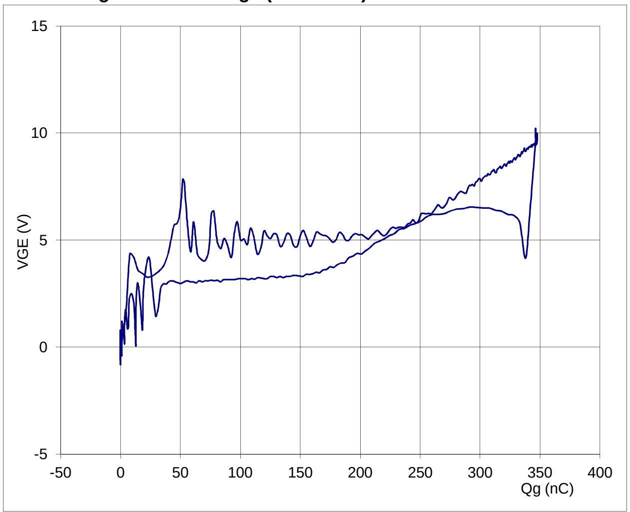
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	24,06	kW
E_{on} (100%) =	0,21	mJ
t_{Eon} =	0,06	μs

Figure 7 BUCK MOSFET

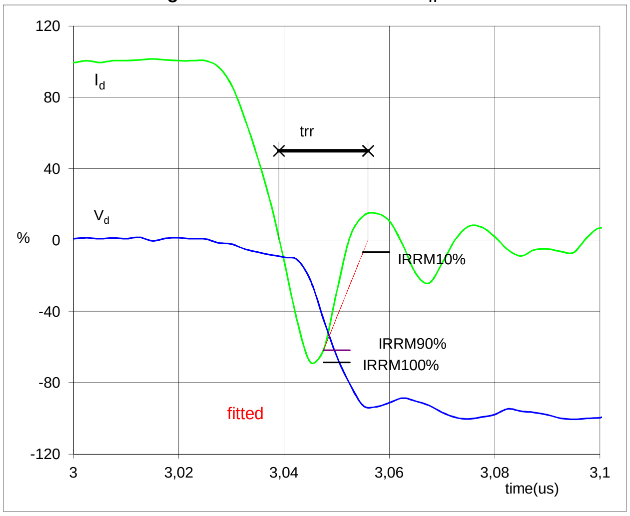
Gate voltage vs Gate charge (measured)



V_{GEoff} =	0	V
V_{GEon} =	10	V
V_C (100%) =	800	V
I_C (100%) =	30	A
Q_g =	347,26	nC

Figure 8 BUCK FWD

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

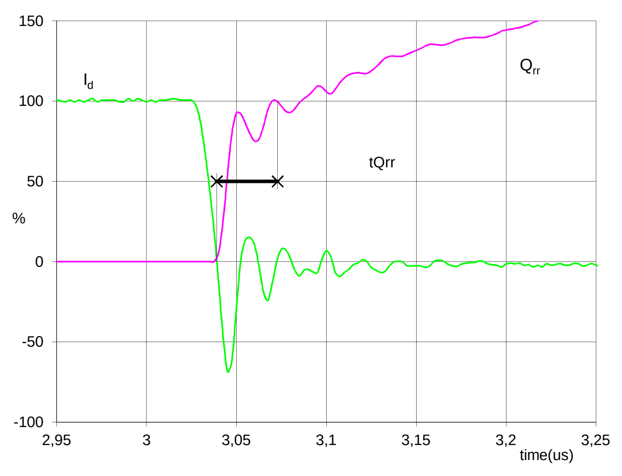


V_d (100%) =	800	V
I_d (100%) =	30	A
I_{RRM} (100%) =	-21	A
t_{rr} =	0,013	μs

Switching Definitions BUCK MOSFET

Figure 9	BUCK FWD

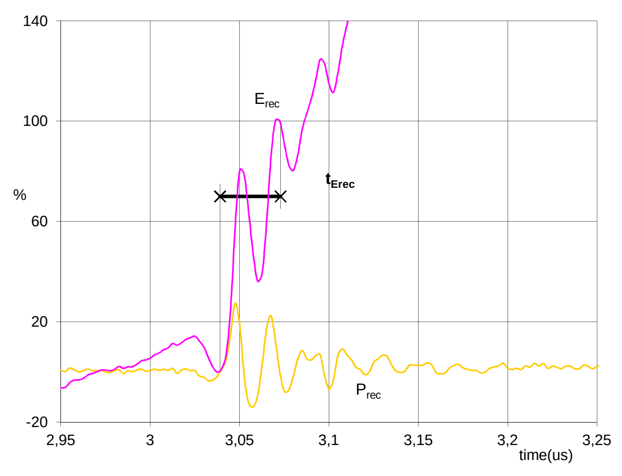
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	30	A
Q_{rr} (100%) =	0,22	μC
t_{Qrr} =	0,03	μs

Figure 10	BUCK FWD

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



P_{rec} (100%) =	24,06	kW
E_{rec} (100%) =	0,04	mJ
t_{Erec} =	0,03	μs

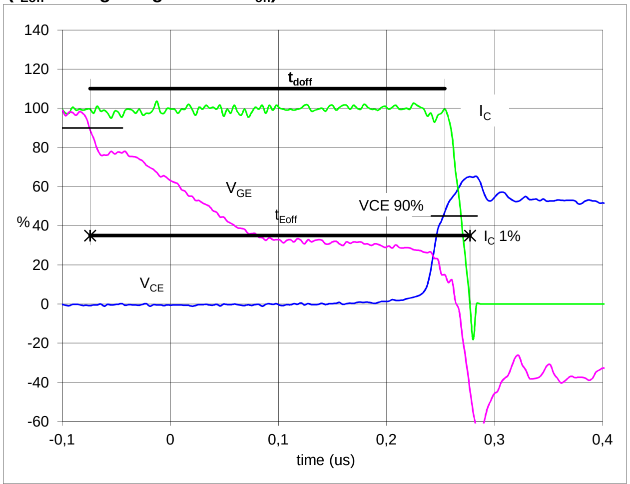
Switching Definitions BOOST MOSFET

General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

Figure 1 BOOST MOSFET

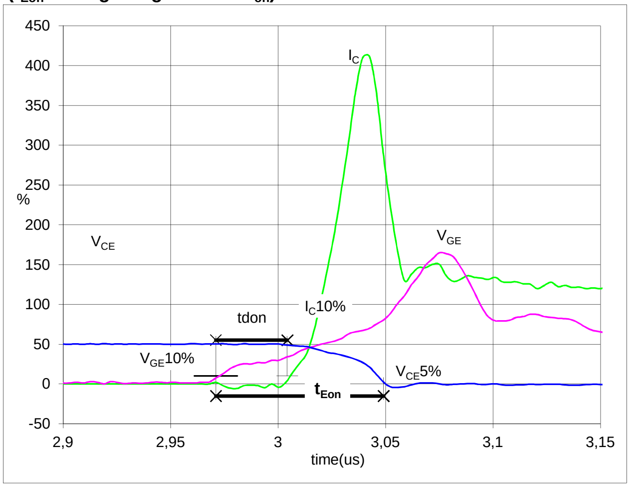
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	800	V
I_C (100%) =	30	A
t_{doff} =	0,33	μs
t_{Eoff} =	0,35	μs

Figure 2 BOOST MOSFET

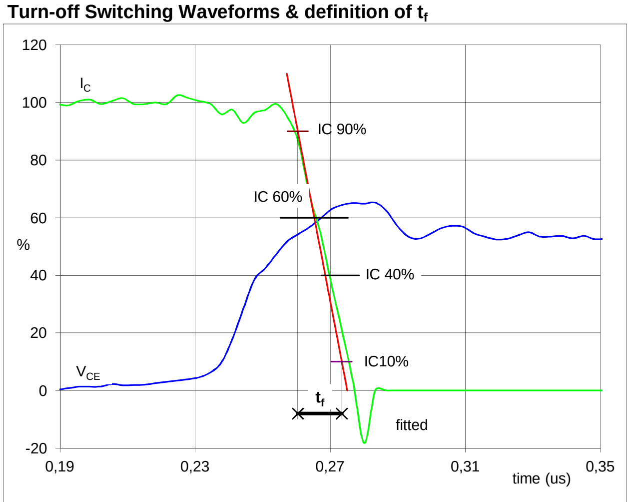
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	800	V
I_C (100%) =	30	A
t_{don} =	0,05	μs
t_{Eon} =	0,08	μs

Figure 3 BOOST MOSFET

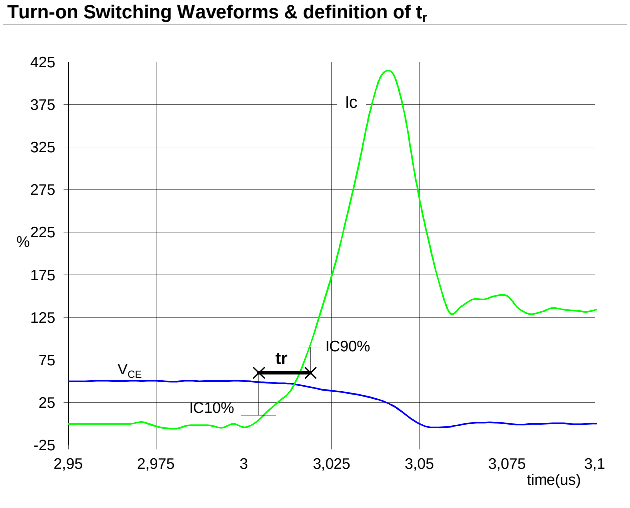
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	800	V
I_C (100%) =	30	A
t_f =	0,02	μs

Figure 4 BOOST MOSFET

Turn-on Switching Waveforms & definition of t_r

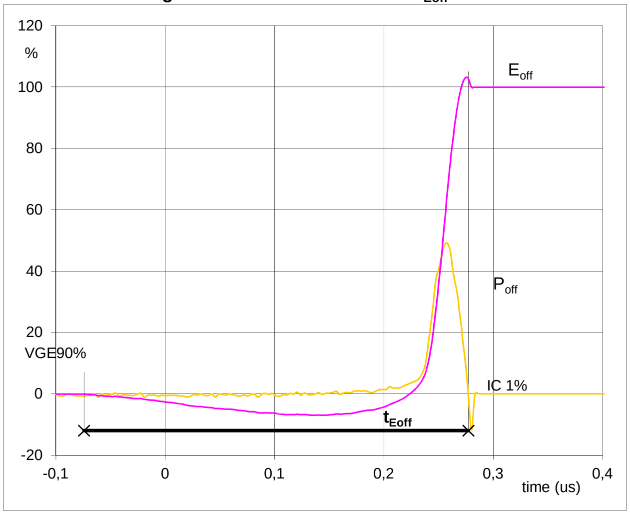


V_C (100%) =	800	V
I_C (100%) =	30	A
t_r =	0,02	μs

Switching Definitions BOOST MOSFET

Figure 5 BOOST MOSFET

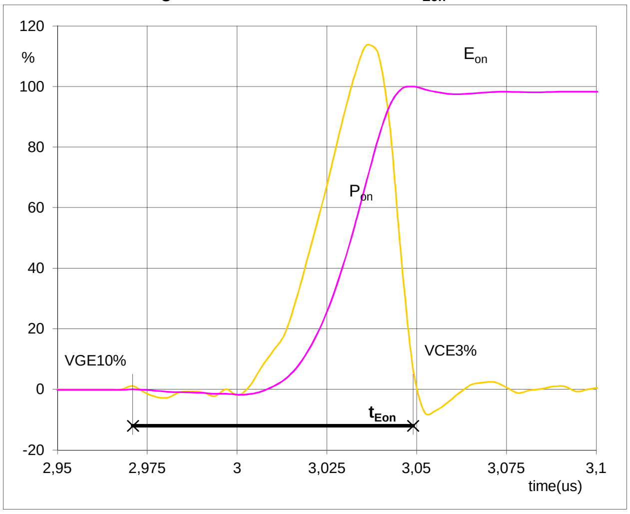
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	23,95	kW
E_{off} (100%) =	0,33	mJ
t_{Eoff} =	0,35	μs

Figure 6 BOOST MOSFET

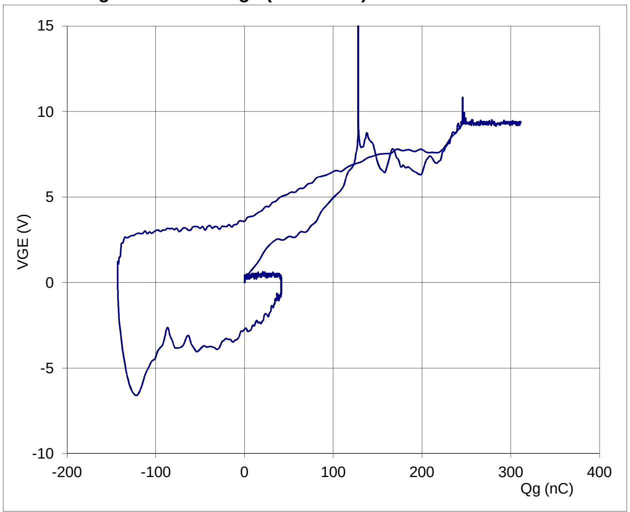
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	23,95	kW
E_{on} (100%) =	0,48	mJ
t_{Eon} =	0,08	μs

Figure 7 BOOST MOSFET

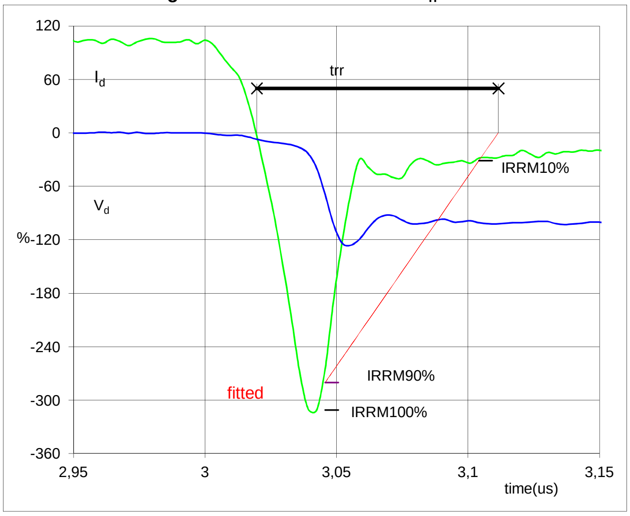
Gate voltage vs Gate charge (measured)



V_{GEoff} =	0	V
V_{GEon} =	10	V
V_C (100%) =	800	V
I_C (100%) =	30	A
Q_g =	373,03	nC

Figure 8 BOOST FWD

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

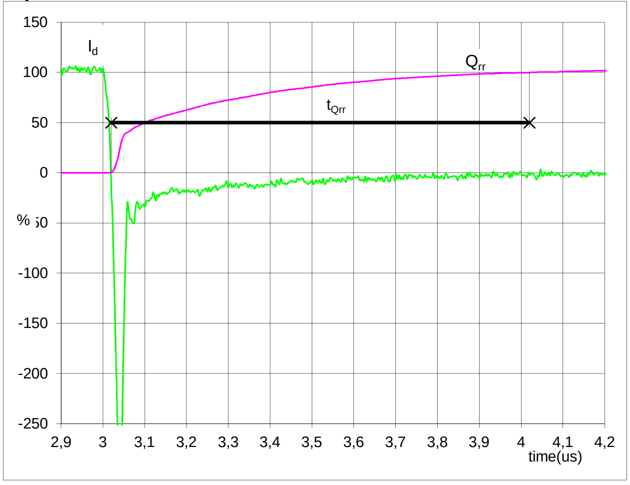


V_d (100%) =	800	V
I_d (100%) =	30	A
I_{RRM} (100%) =	-94	A
t_{rr} =	0,09	μs

Switching Definitions BOOST MOSFET

Figure 9 BOOST FWD

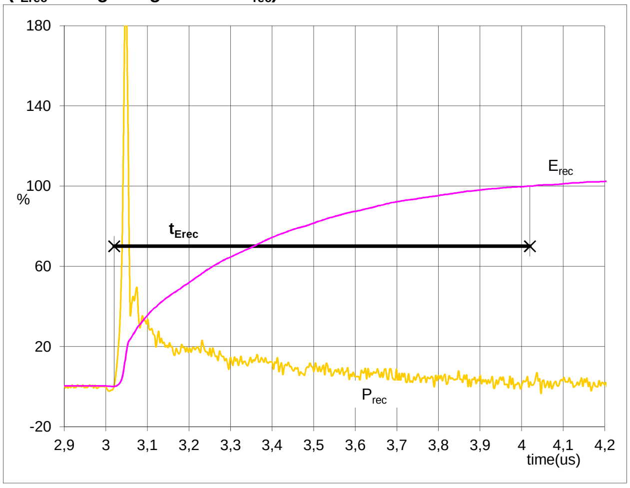
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	30	A
Q_{rr} (100%) =	4,73	μC
t_{Qrr} =	1,00	μs

Figure 10 BOOST FWD

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



P_{rec} (100%) =	23,95	kW
E_{rec} (100%) =	1,58	mJ
t_{Erec} =	1,00	μs

Ordering Code and Marking - Outline - Pinout

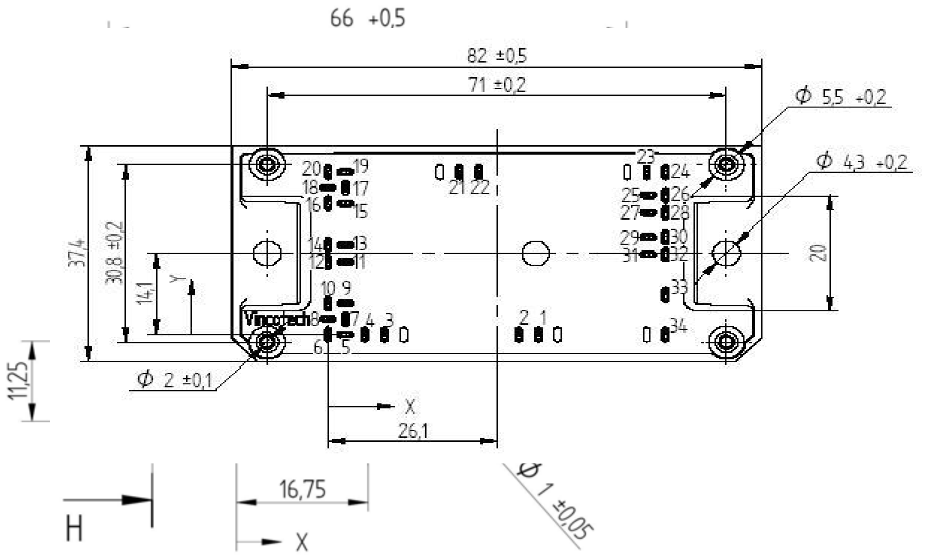
Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-PY06NRA021FS-M410FY	M410FY	M410FY

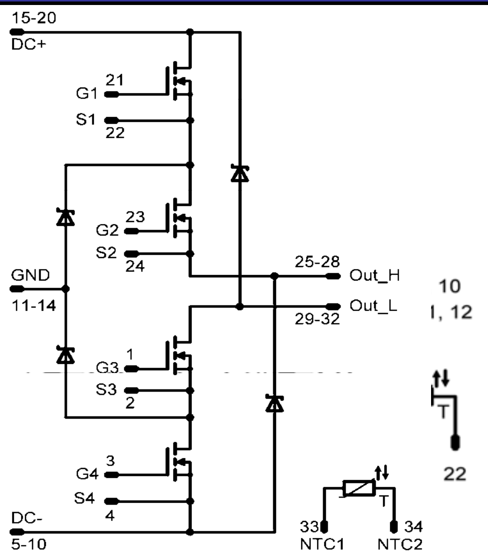
Outline

Hole Table		
Hole	X	Y
1	32,5	0
2	29,5	0
3	8,7	0
4	5,7	0
5	2,7	0
6	0	0
7	2,7	2,7
8	0	2,7
9	2,7	5,4
10	0	5,4
11	2,7	12,6
12	0	12,6
13	2,7	15,6
14	0	15,6
15	2,7	22,8
16	0	22,8
17	2,7	25,5
18	0	25,5
19	2,7	28,2
20	0	28,2
21	20,3	28,2
22	23,3	28,2
23	49,2	28,2
24	52,2	28,2
25	49,5	24,2
26	52,2	24,2
27	49,5	21,2
28	52,2	21,2

Hole Table		
Hole	X	Y
29	49,5	16,9
30	52,2	16,9
31	49,5	13,9
32	52,2	13,9
33	52,2	6,9
34	52,2	0



Pinout



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