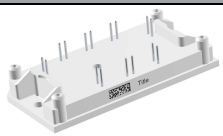
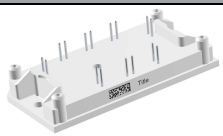
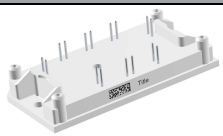
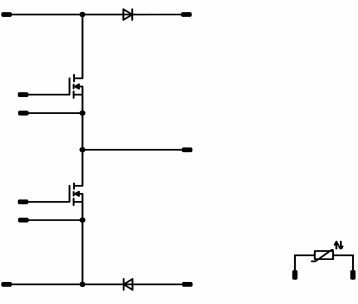
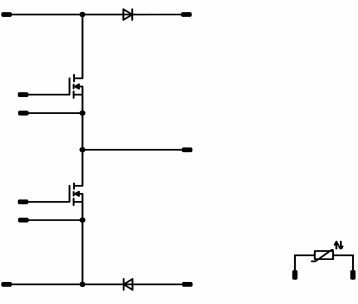
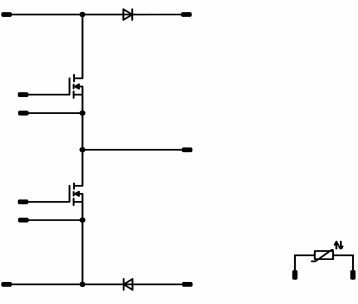




Vincotech

<i>flow BOOST 1 symmetric</i>	600 V / 19 mΩ				
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: left; padding: 2px;">Features</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;"> <ul style="list-style-type: none"> High efficiency symmetric boost Ultra fast switching frequency Low Inductance Layout </td> </tr> </tbody> </table>	Features	<ul style="list-style-type: none"> High efficiency symmetric boost Ultra fast switching frequency Low Inductance Layout 	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: left; padding: 2px;"><i>flow 1 17mm housing</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">  </td> </tr> </tbody> </table>	<i>flow 1 17mm housing</i>	
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<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: left; padding: 2px;">Target Applications</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;"> <ul style="list-style-type: none"> Solar UPS Power supply </td> </tr> </tbody> </table>	Target Applications	<ul style="list-style-type: none"> Solar UPS Power supply 	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: left; padding: 2px;">Schematic</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">  </td> </tr> </tbody> </table>	Schematic	
Target Applications					
<ul style="list-style-type: none"> Solar UPS Power supply 					
Schematic					
					
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ccc;"> <th style="text-align: left; padding: 2px;">Types</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;"> <ul style="list-style-type: none"> 10-F106BIB020FK-M285L </td> </tr> </tbody> </table>	Types	<ul style="list-style-type: none"> 10-F106BIB020FK-M285L 			
Types					
<ul style="list-style-type: none"> 10-F106BIB020FK-M285L 					

Maximum Ratings

$T_j=25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
-----------	--------	-----------	-------	------

Input Boost MOSFET

Drain to source breakdown voltage	V_{DS}		650	V
DC drain current	I_D	$T_j=T_{jmax}$ $T_s=80^{\circ}\text{C}$	80	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$ $T_s=80^{\circ}\text{C}$	172	W
Gate-source peak voltage	V_{GSS}		25	V
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$

Input Boost FWD

Peak Repetitive Reverse Voltage	V_{RRM}		600	V
Forward average current	I_{FAV}	$T_j=T_{jmax}$ $T_s=80^{\circ}\text{C}$	80	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$ $T_s=80^{\circ}\text{C}$	107	W
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$

Thermal Properties

Storage temperature	T_{stg}		-40...+125	$^{\circ}\text{C}$
Operation temperature under switching condition	T_{op}		-40...+($T_{jmax} - 25$)	$^{\circ}\text{C}$

Insulation Properties

Insulation voltage	V_{isol}	$t=2s$ DC voltage	4000	V
Creepage distance			min 12,7	mm
Clearance			min 12,7	mm
Comparative Tracking Index	CTI		>200	



Characteristic Values

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

Input Boost MOSFET

Static drain to source ON resistance	$r_{DS(on)}$		10		69	25 125		0,01 0,03	0,019	Ω
Gate threshold voltage	$V_{(GS)th}$		$V_{GS}=V_{GS}$			25 125	3	4	5	V
Gate to Source Leakage Current	I_{GSS}		± 25	0		25 125			200	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	650		25 125			2 200	μA
Integrated Gate resistor	r_g	$f=1\text{MHz}$				25 125		0,6		Ω
Turn On Delay Time	$t_{d(on)}$	$R_{gonn}=4\ \Omega$ $R_{gonn}=4\ \Omega$	± 10	400	69	25		158		ns
Rise Time	t_r					125		157		
Turn off delay time	$t_{d(off)}$					25		16		
Fall time	t_f					125		19		
Turn-on energy loss	E_{on}					25		130		
Turn-off energy loss	E_{off}	125		136		25		5		mWs
Total gate charge	Q_G	125		15		25		1,126		
Gate to source charge	Q_{GS}	$V_{DD}=520\text{ V}$	± 10		69	25		2,152		nC
Gate to drain charge	Q_{GD}					125		0,060		
Input capacitance	C_{iss}					125		0,150		
Output capacitance	C_{oss}	$f=1\text{MHz}$	0	100		25		400		pF
Reverse transfer capacitance	C_{rss}					125		12		
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material $\lambda=3,4\text{W/mK}$						0,41		K/W

Input Boost FWD

Forward voltage	V_F				120	25 125	1,4	1,43 1,26	1,83	V
Reverse leakage current	I_{rm}			600		25 125			20	μA
Peak recovery current	I_{RRM}	$R_{gonn}=4\ \Omega$	± 10	400	70	25		107		A
Reverse recovery time	t_{rr}					125		167		
Reverse recovery charge	Q_{rr}					25		35		
Reverse recovered energy	E_{rec}					125		59		
Peak rate of fall of recovery current	$(di_{rt}/dt)_{max}$					25		2,18		
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material $\lambda=3,4\text{W/mK}$				125		5,95		μC
						25		0,367		mWs
						125		1,043		mWs
						25		8564		A/ μs
						125		8366		A/ μs
								0,66		K/W

Thermistor

Rated resistance	R					25		22		k Ω
Deviation of R100	$\Delta_{R/R}$	$R_{100}=1486\ \Omega$				100	-12		+12	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	$Tol. \pm 3\%$				25		3950		K
B-value	$B_{(25/100)}$	$Tol. \pm 3\%$				25		3998		K
Vincotech NTC Reference									B	

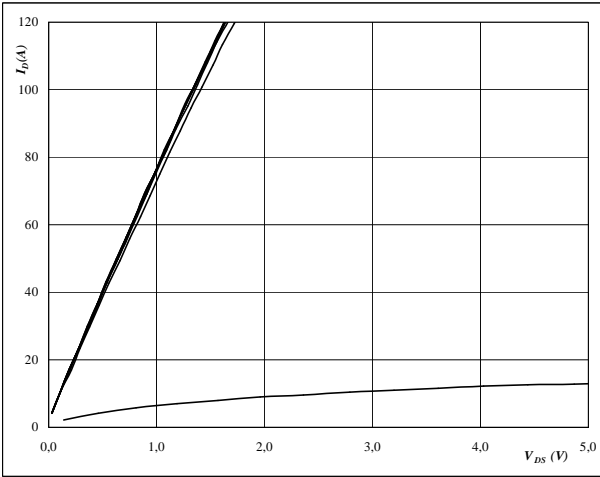


INPUT BOOST

Figure 1 BOOST MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



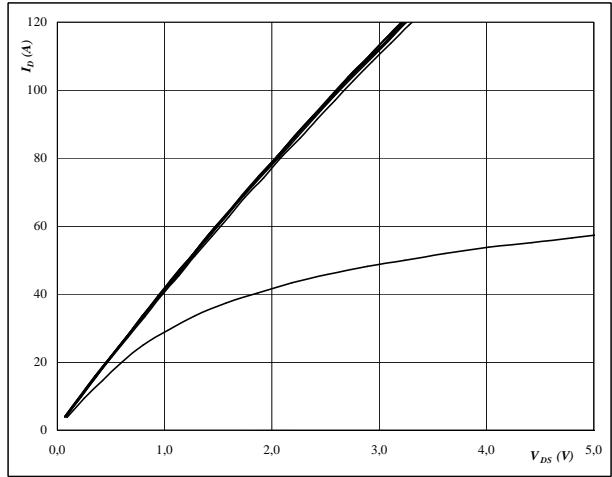
At

- $t_p = 250 \mu s$
- $T_j = 25 \text{ } ^\circ C$
- V_{GS} from 0 V to 20 V in steps of 2 V

Figure 2 BOOST MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



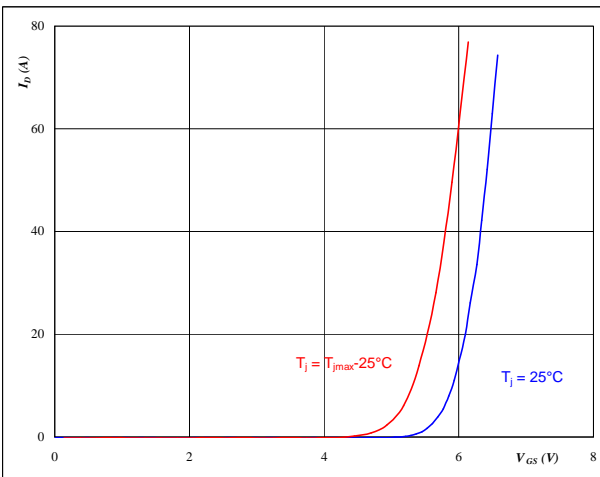
At

- $t_p = 250 \mu s$
- $T_j = 125 \text{ } ^\circ C$
- V_{GS} from 0 V to 20 V in steps of 2 V

Figure 3 BOOST MOSFET

Typical transfer characteristics

$I_D = f(V_{GS})$



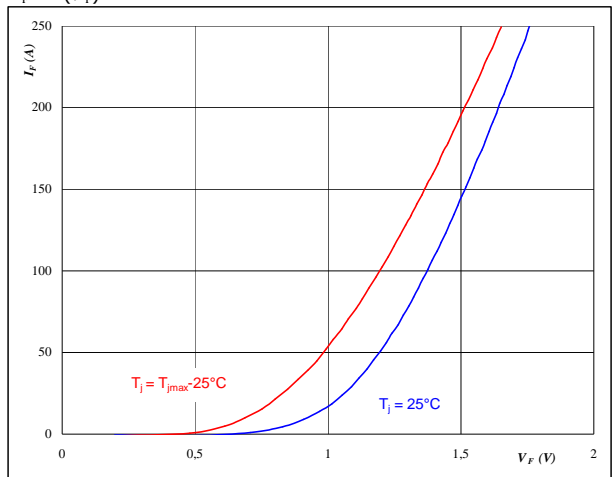
At

- $t_p = 250 \mu s$
- $V_{DS} = 10 V$

Figure 4 BOOST FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

- $t_p = 250 \mu s$

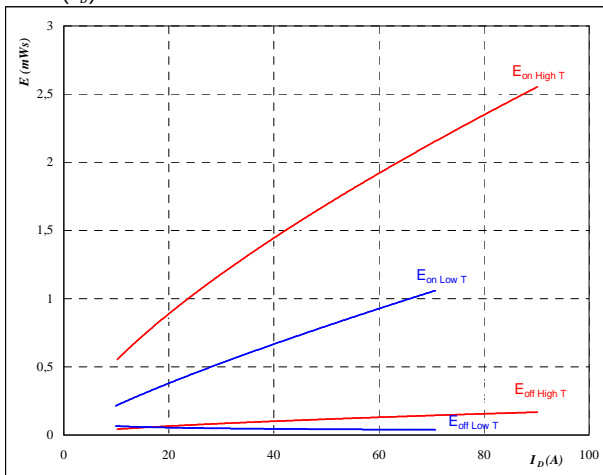


INPUT BOOST

Figure 5 BOOST MOSFET

Typical switching energy losses
as a function of drain current

$$E = f(I_D)$$



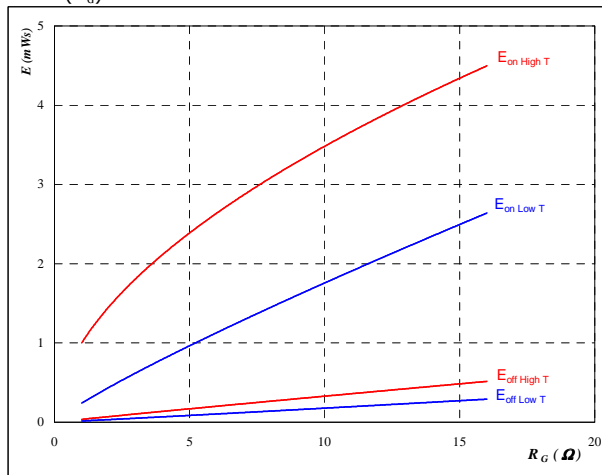
With an inductive load at

$T_j =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$R_{gon} =$	4	Ω
$R_{goff} =$	4	Ω

Figure 6 BOOST MOSFET

Typical switching energy losses
as a function of gate resistor

$$E = f(R_G)$$



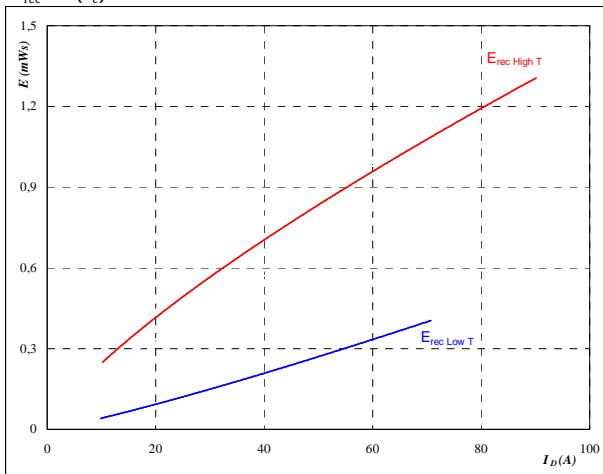
With an inductive load at

$T_j =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$I_D =$	70	A

Figure 7 BOOST FWD

Typical reverse recovery energy loss
as a function of drain current

$$E_{rec} = f(I_D)$$



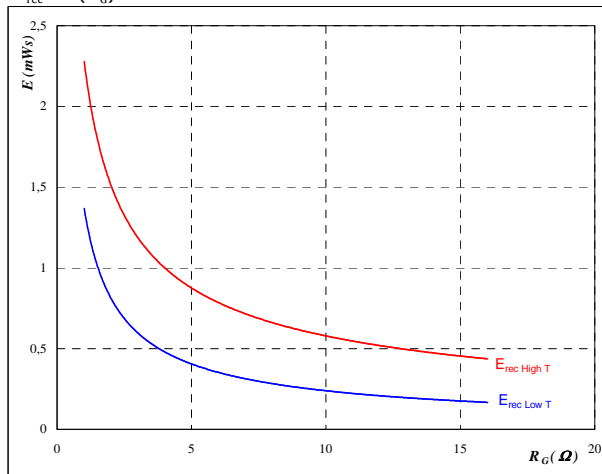
With an inductive load at

$T_j =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$R_{gon} =$	4	Ω
$R_{goff} =$	4	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	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$I_D =$	70	A

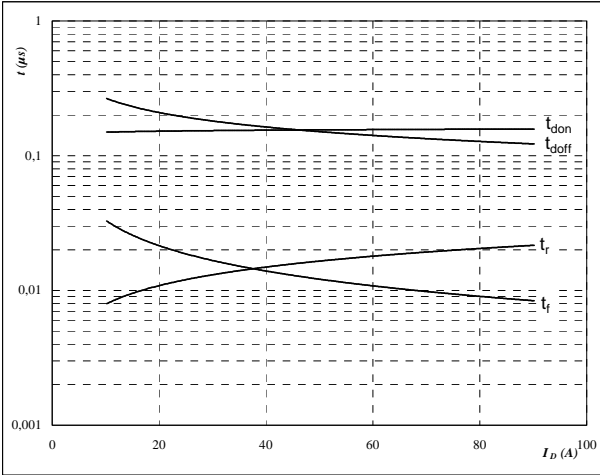


INPUT BOOST

Figure 9 BOOST MOSFET

Typical switching times as a function of drain current

$$t = f(I_D)$$



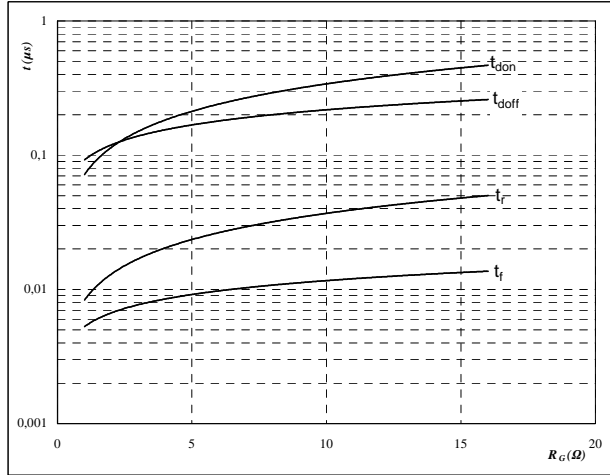
With an inductive load at

$T_j =$	125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$R_{gon} =$	4	Ω
$R_{goff} =$	4	Ω

Figure 10 BOOST MOSFET

Typical switching times as a function of gate resistor

$$t = f(R_G)$$



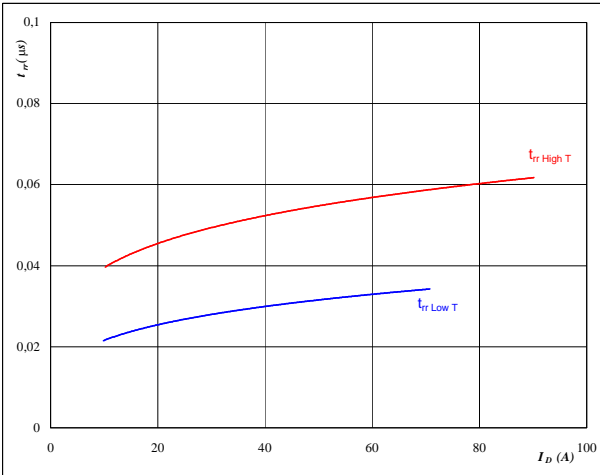
With an inductive load at

$T_j =$	125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$I_D =$	70	A

Figure 11 BOOST FWD

Typical reverse recovery time as a function of drain current

$$t_{rr} = f(I_D)$$



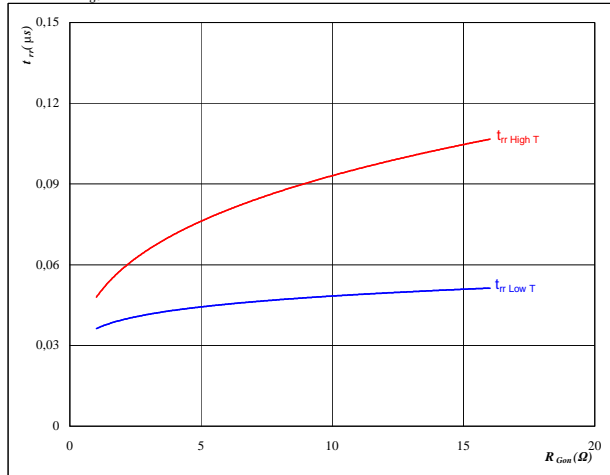
At

$T_j =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$R_{gon} =$	4	Ω

Figure 12 BOOST 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
$V_R =$	400	V
$I_F =$	70	A
$V_{GS} =$	±10	V

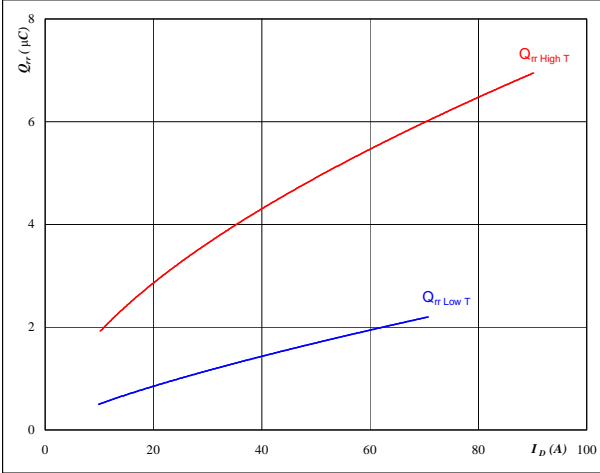


INPUT BOOST

Figure 13 BOOST FWD

Typical reverse recovery charge as a function of drain current

$$Q_{rr} = f(I_D)$$



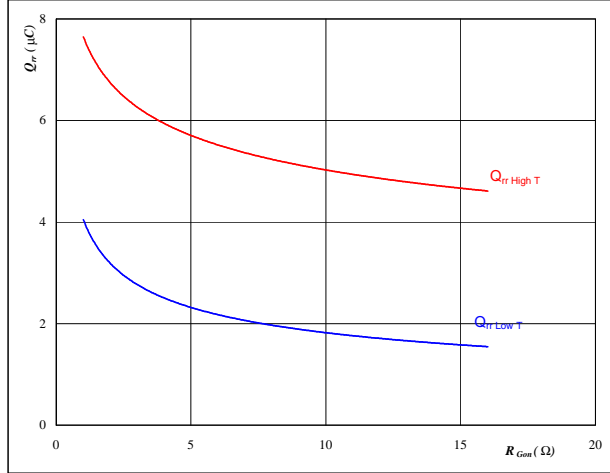
At

$T_j =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$R_{gon} =$	4	Ω

Figure 14 BOOST FWD

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

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



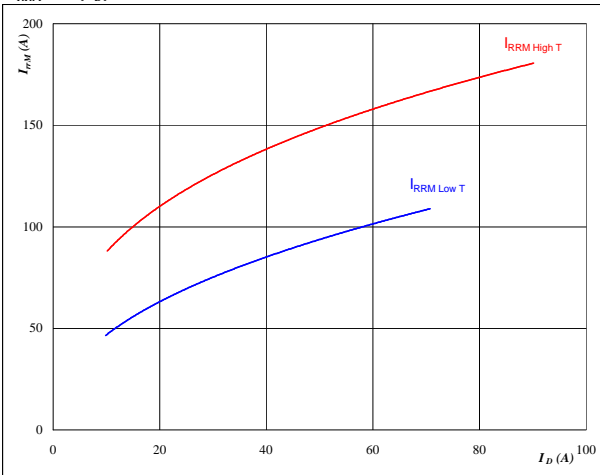
At

$T_j =$	25/125	°C
$V_R =$	400	V
$I_F =$	70	A
$V_{GS} =$	±10	V

Figure 15 BOOST FWD

Typical reverse recovery current as a function of drain current

$$I_{RRM} = f(I_D)$$



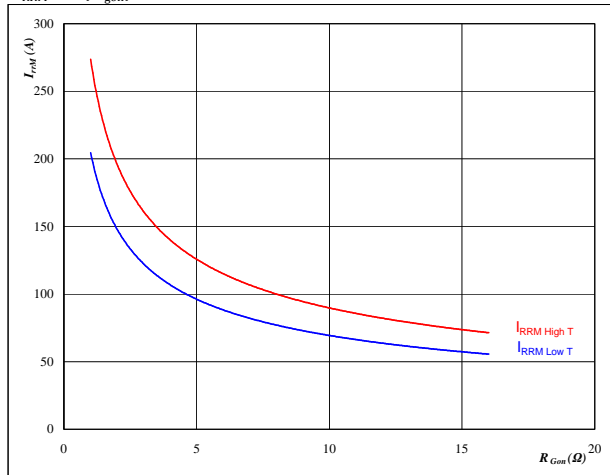
At

$T_j =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	±10	V
$R_{gon} =$	4	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	°C
$V_R =$	400	V
$I_F =$	70	A
$V_{GS} =$	±10	V

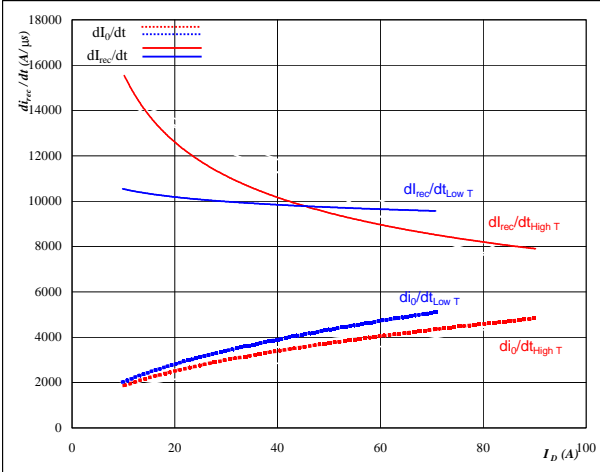


INPUT BOOST

Figure 17 BOOST FWD

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

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

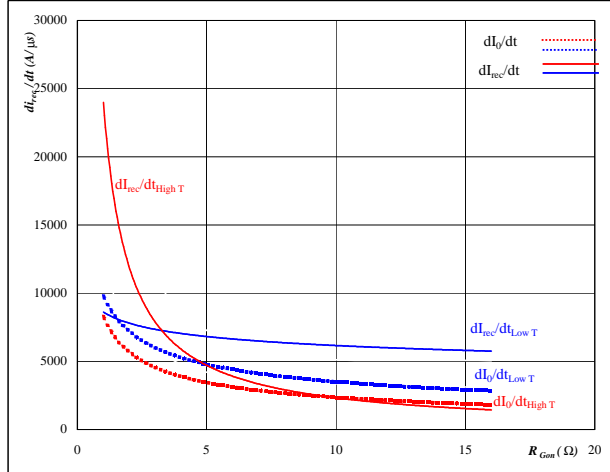


At
 $T_j = 25/125 \text{ } ^\circ\text{C}$
 $V_{DS} = 400 \text{ V}$
 $V_{GS} = \pm 10 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$

Figure 18 BOOST FWD

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

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

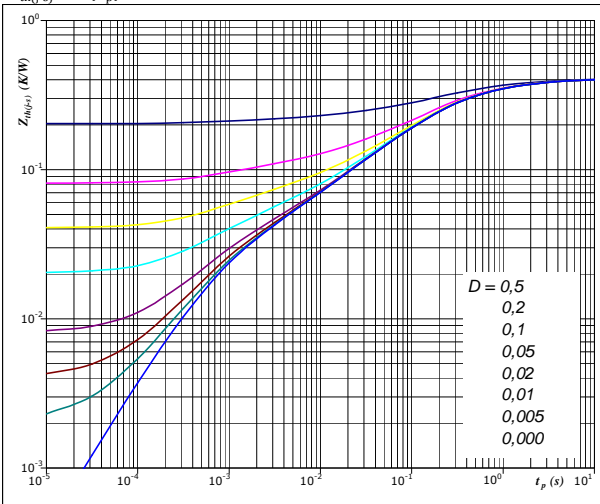


At
 $T_j = 25/125 \text{ } ^\circ\text{C}$
 $V_R = 400 \text{ V}$
 $I_F = 70 \text{ A}$
 $V_{GS} = \pm 10 \text{ V}$

Figure 19 BOOST MOSFET

MOSFET transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



At
 $D = t_p / T$
 $R_{th(j-s)} = 0,41 \text{ K/W}$

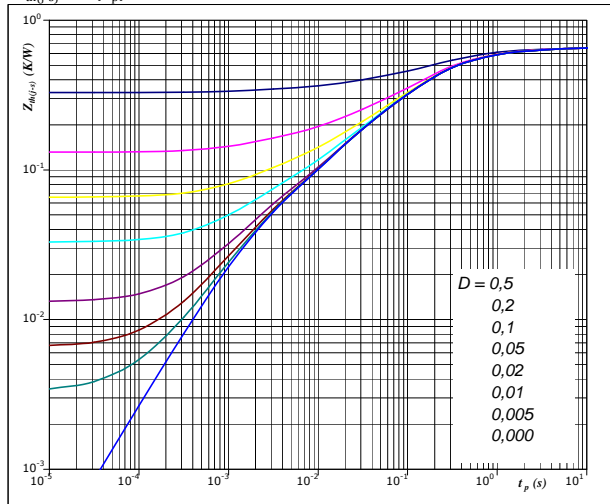
MOSFET thermal model values

R (K/W)	Tau (s)
3,22E-02	5,52E+00
7,42E-02	1,05E+00
1,52E-01	2,31E-01
7,06E-02	7,51E-02
4,18E-02	1,64E-02
1,94E-02	2,60E-03

Figure 20 BOOST FWD

FWD transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



At
 $D = t_p / T$
 $R_{th(j-s)} = 0,66 \text{ K/W}$

FWD thermal model values

R (K/W)	Tau (s)
3,46E-02	5,31E+00
1,02E-01	9,80E-01
3,07E-01	2,08E-01
1,10E-01	6,00E-02
6,93E-02	1,40E-02
3,32E-02	1,76E-03

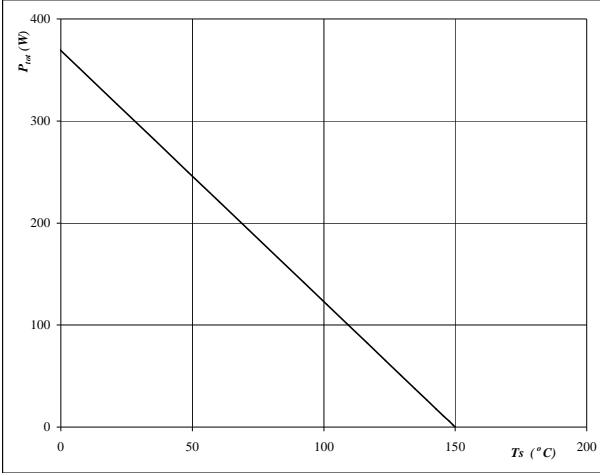


INPUT BOOST

Figure 21 BOOST MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$

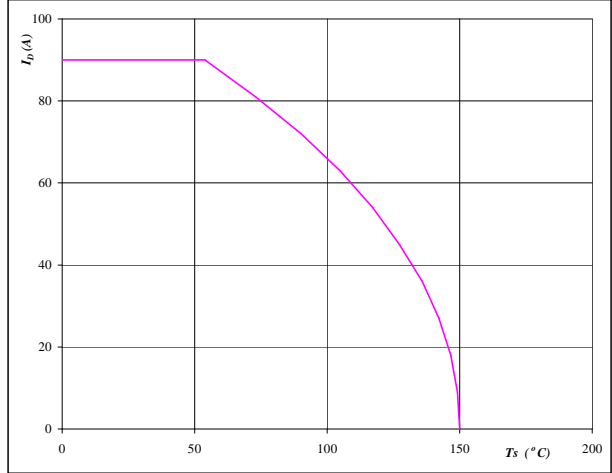


At
 $T_j = 150$ °C

Figure 22 BOOST MOSFET

Drain current as a function of heatsink temperature

$I_D = f(T_s)$

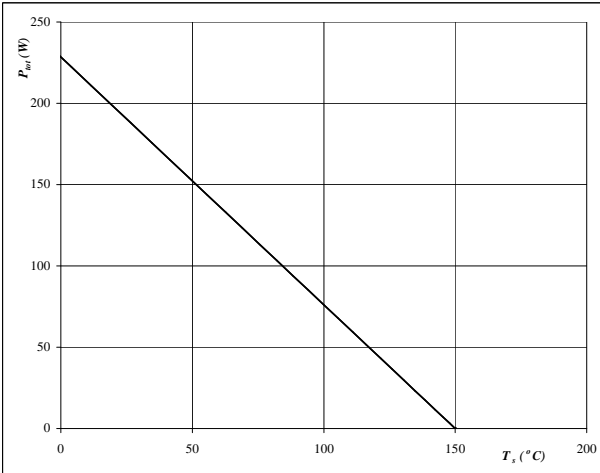


At
 $T_j = 150$ °C
 $V_{GS} = 10$ V

Figure 23 BOOST FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$

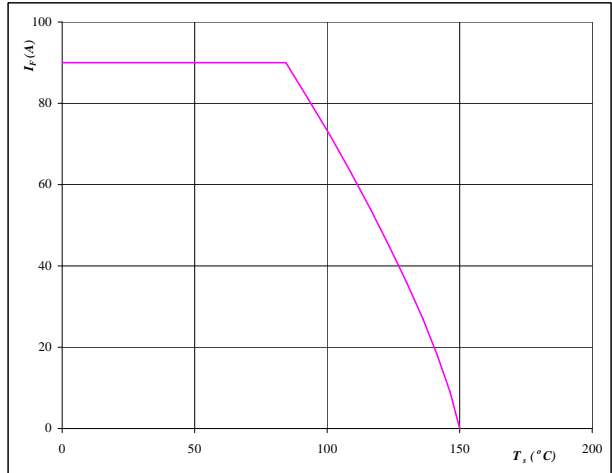


At
 $T_j = 150$ °C

Figure 24 BOOST FWD

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At
 $T_j = 150$ °C

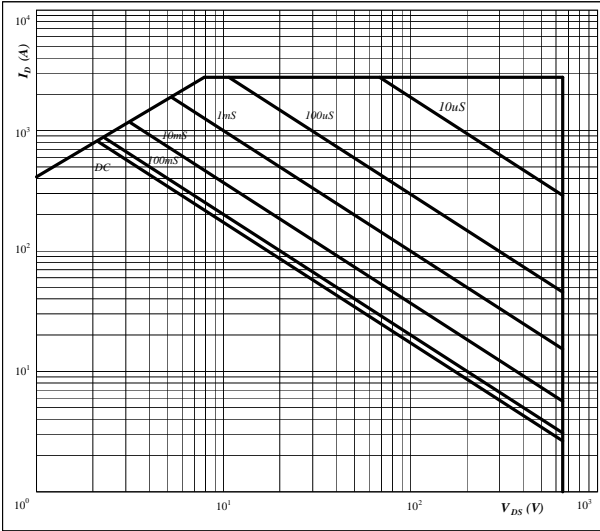


INPUT BOOST

Figure 25 BOOST MOSFET

Safe operating area as a function of drain-source voltage

$I_D = f(V_{DS})$

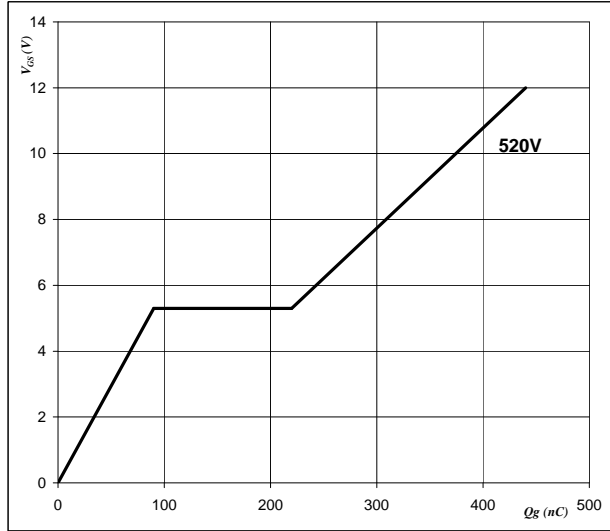


At
 $D =$ single pulse
 $T_h =$ 80 °C
 $V_{GS} =$ ±10 V
 $T_j =$ T_{jmax} °C

Figure 26 BOOST MOSFET

Gate voltage vs Gate charge

$V_{GS} = f(Q_g)$



At
 $I_D =$ 69 A

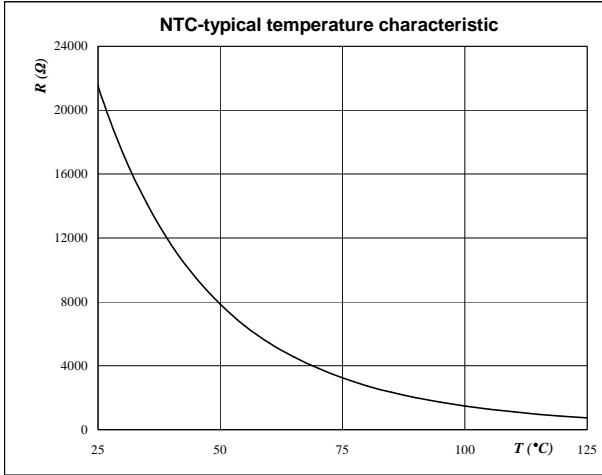


Thermistor

Figure 1 Thermistor

**Typical NTC characteristic
as a function of temperature**

$$R_T = f(T)$$





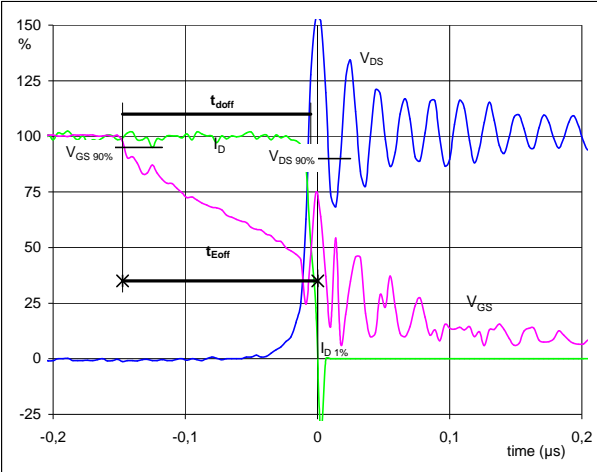
Switching Definitions Input Boost

General conditions

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

Figure 1 Boost MOSFET

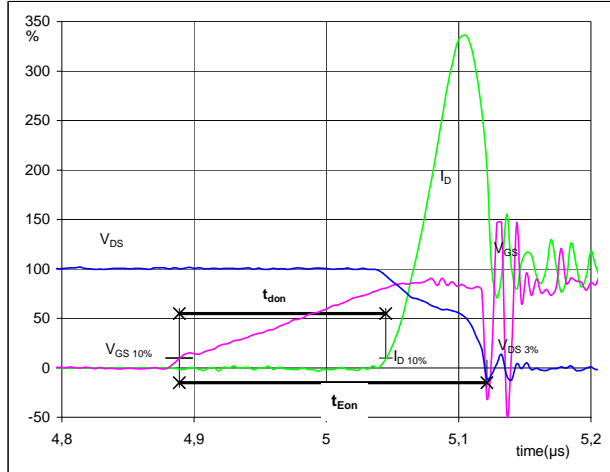
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GS} (0%) =	-10	V
V_{GS} (100%) =	10	V
V_D (100%) =	400	V
I_D (100%) =	70	A
t_{doff} =	0,14	μs
t_{Eoff} =	0,15	μs

Figure 2 Boost MOSFET

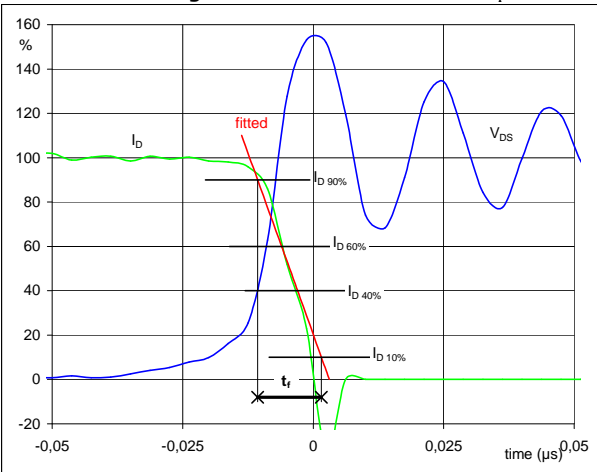
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GS} (0%) =	-10	V
V_{GS} (100%) =	10	V
V_D (100%) =	400	V
I_D (100%) =	70	A
t_{don} =	0,16	μs
t_{Eon} =	0,23	μs

Figure 3 Boost MOSFET

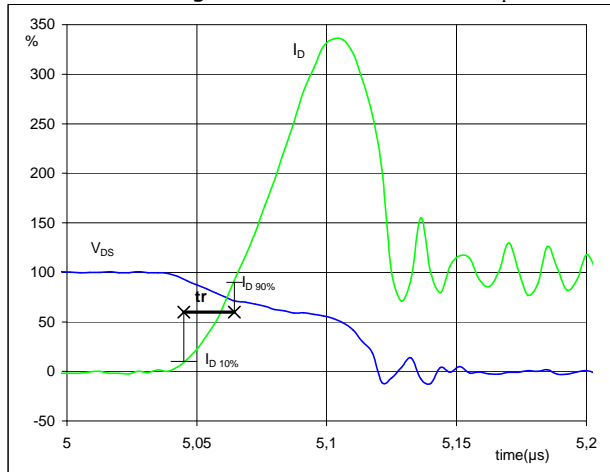
Turn-off Switching Waveforms & definition of t_f



V_D (100%) =	400	V
I_D (100%) =	70	A
t_f =	0,02	μs

Figure 4 Boost MOSFET

Turn-on Switching Waveforms & definition of t_r

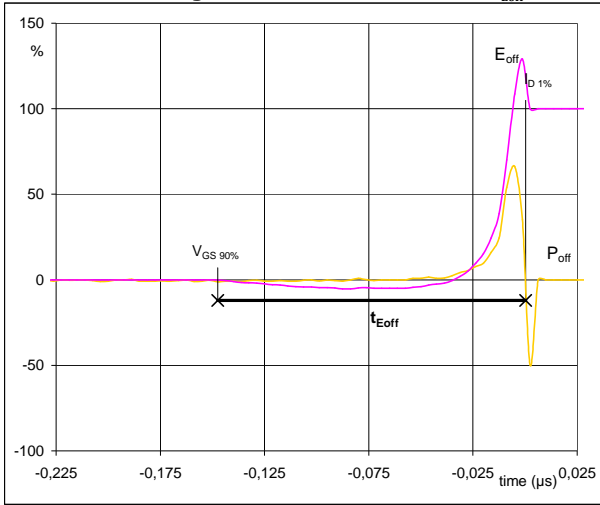


V_D (100%) =	400	V
I_D (100%) =	70	A
t_r =	0,02	μs



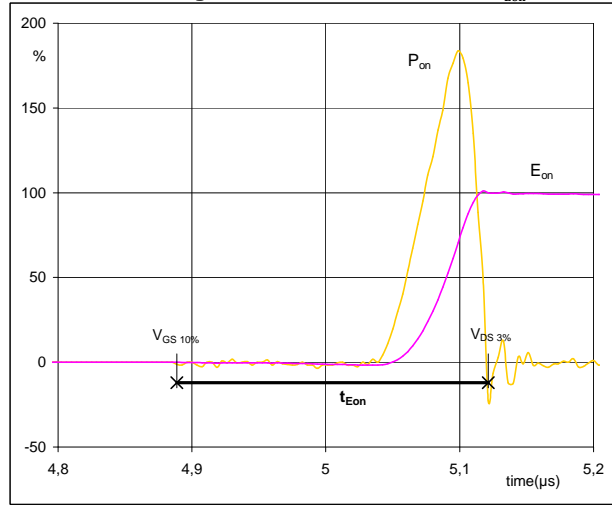
Switching Definitions BUCK MOSFET

Figure 5 Boost MOSFET
Turn-off Switching Waveforms & definition of t_{Eoff}



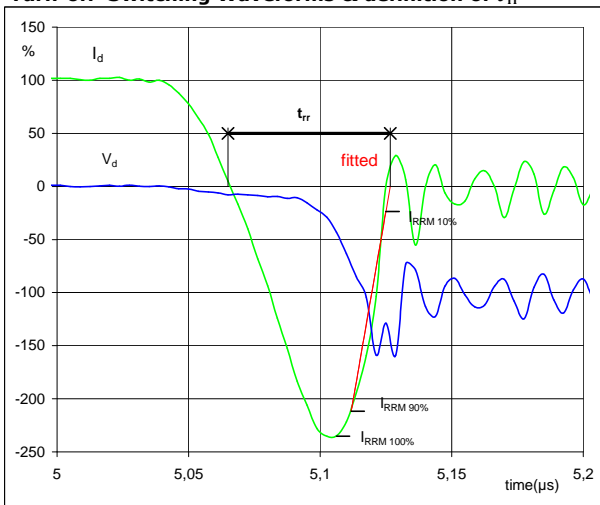
$P_{off} (100\%) = 27,95 \text{ kW}$
 $E_{off} (100\%) = 0,15 \text{ mJ}$
 $t_{Eoff} = 0,15 \text{ }\mu\text{s}$

Figure 6 Boost MOSFET
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on} (100\%) = 27,95 \text{ kW}$
 $E_{on} (100\%) = 2,15 \text{ mJ}$
 $t_{Eon} = 0,23 \text{ }\mu\text{s}$

Figure 8 Input Boost FWD
Turn-off Switching Waveforms & definition of t_{tr}



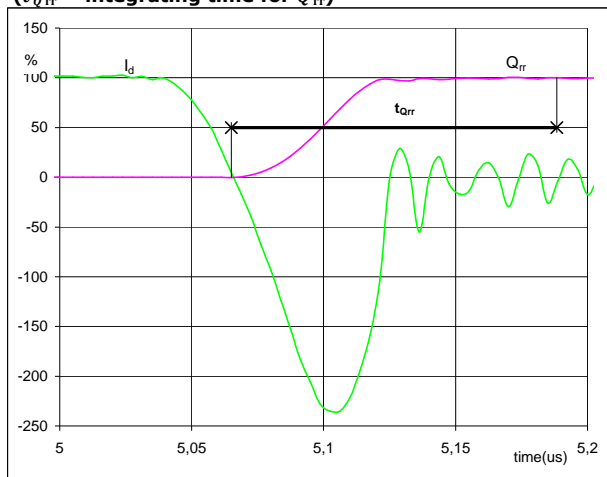
$V_d (100\%) = 400 \text{ V}$
 $I_d (100\%) = 70 \text{ A}$
 $I_{RRM} (100\%) = -167 \text{ A}$
 $t_{tr} = 0,06 \text{ }\mu\text{s}$



Switching Definitions BUCK MOSFET

Figure 9 Input Boost FWD

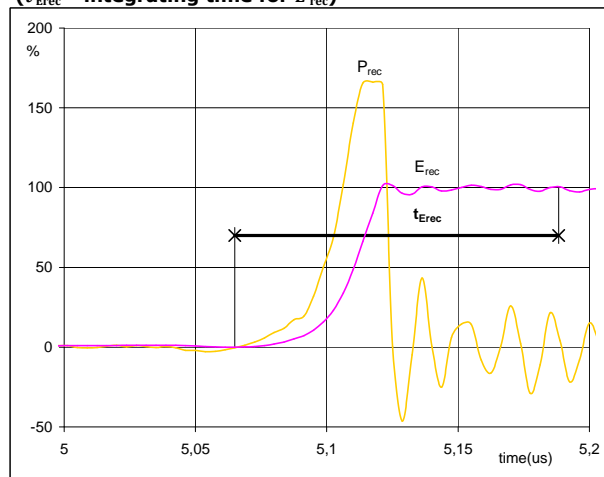
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	70	A
Q_{rr} (100%) =	5,95	μC
t_{Qrr} =	0,12	μs

Figure 10 Input Boost FWD

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



P_{rec} (100%) =	27,95	kW
E_{rec} (100%) =	1,04	mJ
t_{Erec} =	0,12	μs



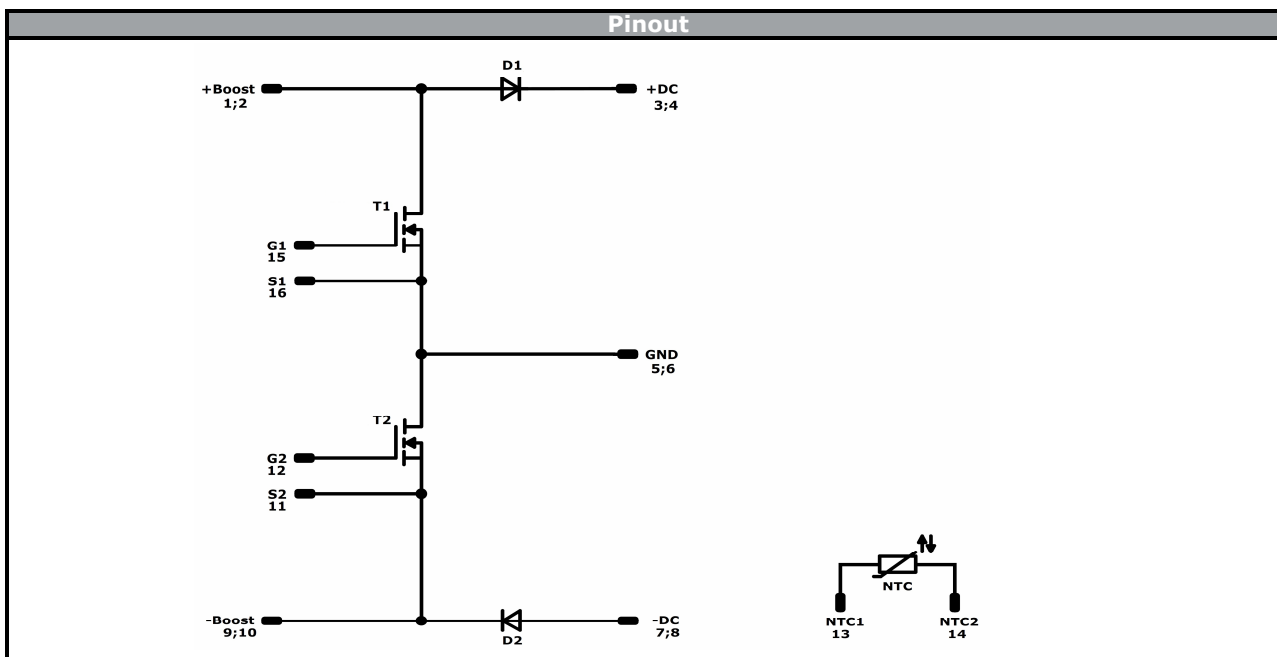
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Ordering Code and Marking - Outline - Pinout - Identification

Ordering Code & Marking			
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	10-F106BIB020FK-M285L	M285L	M285L

Pin table			
Pin	X	Y	Function
1	52,2	7,9	+BOOST
2	52,2	5,2	+BOOST
3	40,15	0	+DC
4	37,45	0	+DC
5	27,45	0	GND
6	24,75	0	GND
7	14,75	0	-DC
8	12,05	0	-DC
9	0	5,2	-BOOST
10	0	7,9	-BOOST
11	12,05	28,2	S2
12	12,05	25,2	G2
13	24,45	28,2	NTC1
14	27,45	28,2	NTC2
15	39,85	28,2	G1
16	39,85	25,2	S1

Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Identification					
ID	Component	Voltage	Current	Function	Comment
T1,T2	MOSFET	650 V	19 mΩ	Input Boost Switch	
D1,D2	FWD	600 V	120 A	Input Boost Diode	
NTC	NTC			Thermistor	

**Packaging instruction**

Standard packaging quantity (SPQ)	100	>SPQ	Standard	<SPQ	Sample
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Handling instruction

Handling instructions for *flow* 1 packages see vincotech.com website.

Package data

Package data for *flow* 1 packages see vincotech.com website.

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.