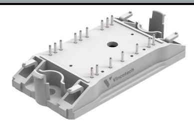
***flow* 2xBOOST 0 / *flow* 3xBOOST 0** **600 V / 41 mΩ**

Features

- High efficiency dual or triple booster
- Low Inductance Layout
- Ultra fast switching frequency

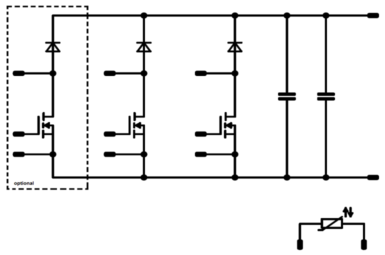
flow 0 12 mm housing



Target Applications

- Solar inverter

Schematic



Types

- 10-FZ063BA040MF-M575L08 (triple booster)
- 10-FZ06B2A040MF01-M575L28 (dual booster)

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Switch (T1*, T2, T3)					
Drain to source breakdown voltage	V_{DS}			600	V
DC drain current	I_D	$T_j = T_{jmax}$	T_s = 80 °C	32	A
Pulsed drain current	I_{Dpulse}	t_p limited by T_{jmax}		272	A
MOSFET dv/dt ruggedness	dv/dt	V_{DS}=0…480V		50	V/ns
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	97	W
Gate-source peak voltage	V_{GSS}			±20	V
Reverse diode dv/dt	dv/dt			15	V/ns
Maximum Junction Temperature	T_{jmax}			150	°C

*not assembled in 10-FZ06B2A040MF01-M575L28

Parameter	Symbol	Condition		Value	Unit
Boost Diode (D1*, D2, D3)					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	38	A
Repetitive peak forward current	I_{FSM}	60Hz Single Half-Sine Wave		300	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	57	W
Maximum Junction Temperature	T_{jmax}			175	°C

*not assembled in 10-FZ06B2A040MF01-M575L28

Parameter	Symbol	Condition		Value	Unit
DC Link Capacitance (C1, C2)					
Max.DC voltage	V_{MAX}		T_c = 25 °C	630	V
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(T_{jmax} - 25)	°C
Insulation Properties					
Insulation voltage	V_{is}	t = 2 s	DC Test Voltage*	6000	V
		t = 1 min	AC Voltage	2500	
Creepage distance				>12,7	mm
Clearance				>12,7	mm
Comparative tracking index	CTI			>200	

* 100% testen in production

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Boost Switch (T1*, T2, T3)										
Static drain to source ON resistance	$r_{DS(on)}$		10		44,4	25 125		41 85	51,8	mΩ
Gate threshold voltage	$V_{(GS)th}$	$V_{CE} = V_{GE}$			0,00296	25	2,4	3	3,6	V
Gate to Source Leakage Current	I_{GSS}		0	600		25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}		20	0		25			5000	nA
Turn On Delay Time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	0/10	400	15	25 125		35 33		ns
Rise Time	t_r					25 125		9 10		
Turn off delay time	$t_{d(off)}$					25 125		275 300		
Fall time	t_f					25 125		4 5		
Turn-on energy loss	E_{on}					25 125		0,18 0,34		mWs
Turn-off energy loss	E_{off}					25 125		0,07 0,08		
Total gate charge	Q_{GE}		0/10	480	44,4	25		290		nC
Gate to source charge	Q_{GS}					25		36		
Gate to drain charge	Q_{GD}					25		150		
Input capacitance	C_{iss}	f = 1 MHz	0	25		25		6530		pF
Output capacitance	C_{oss}							360		
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease thickness ≤ 50 µm λ = 1 W/mK						0,72		K/W
Boost Diode (D1*, D2, D3)										
Forward voltage	V_F				30	25 125		2,11 1,59	2,8	V
Reverse leakage current	I_{rm}			300		25			100	µA
Peak recovery current	I_{RRM}	R_{gon} = 8 Ω	0/10	300	30	25 125		17,57 29,54		A
Reverse recovery time	t_{rr}					25 125		14 32		ns
Reverse recovery charge	Q_{rr}					25 125		0,15 0,56		µC
Reverse recovered energy	E_{rec}					25 125		0,02 0,07		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		5321 1723		A/µs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease thickness ≤ 50 µm λ = 1 W/mK						1,67		K/W

*not assembled in 10-FZ06B2A040MF01-M575L28

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
DC Link Capacitance (C1, C2)										
C value	C							47		nF
Thermistor										
Rated resistance	R					25		22		Ω
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				25	-12		12	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol.±3%				25		3950		K
B-value	$B_{(25/100)}$	Tol.±3%				25		3998		K
Vincotech NTC Reference									B	

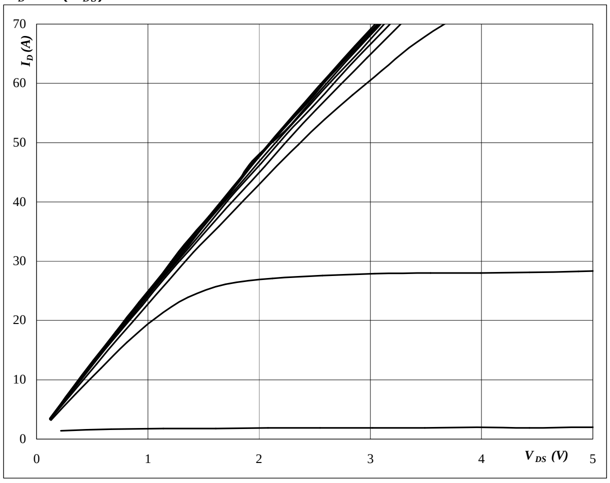
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 1. **Boost Switch (T1*, T2, T3)**

Typical output characteristics

$I_D = f(V_{DS})$



At

t_p = 250 µs

T_j = 25 °C

V_{GS} from 3 V to 13 V in steps of 1 V

figure 2. **Boost Switch (T1*, T2, T3)**

Typical output characteristics

$I_D = f(V_{DS})$

At

t_p = 250 µs

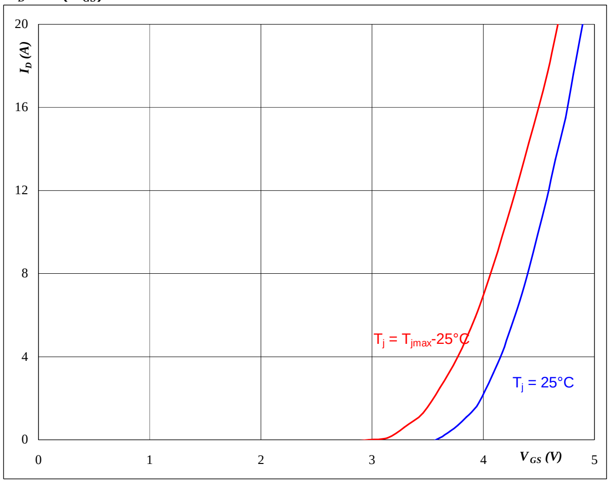
T_j = 125 °C

V_{GS} from 3 V to 13 V in steps of 1 V

figure 3. **Boost Switch (T1*, T2, T3)**

Typical transfer characteristics

$I_D = f(V_{GS})$



At

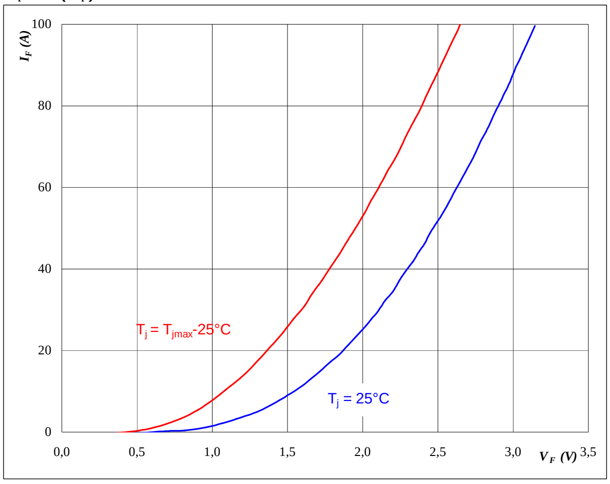
t_p = 250 µs

V_{DS} = 10 V

figure 4. **Boost Diode (D1*, D2, D3)**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

t_p = 250 µs

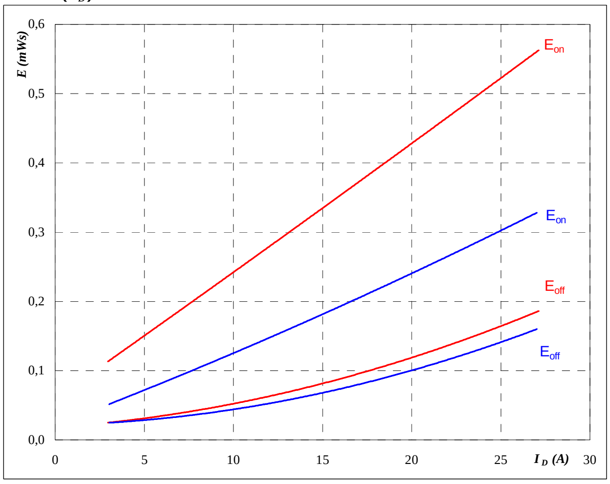
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 5. **Boost Switch (T1*, T2, T3)**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



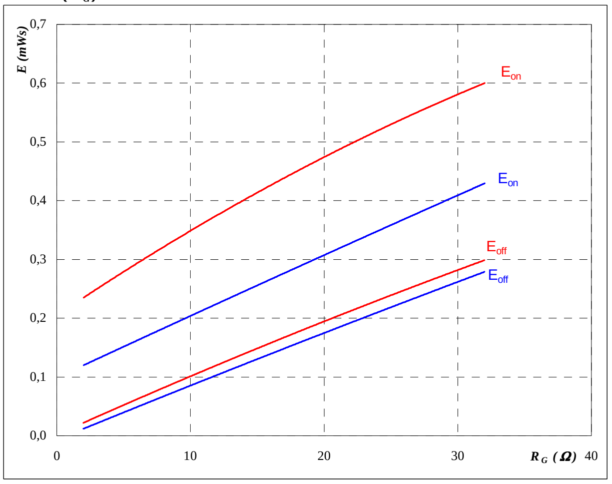
With an inductive load at

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. **Boost Switch (T1*, T2, T3)**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



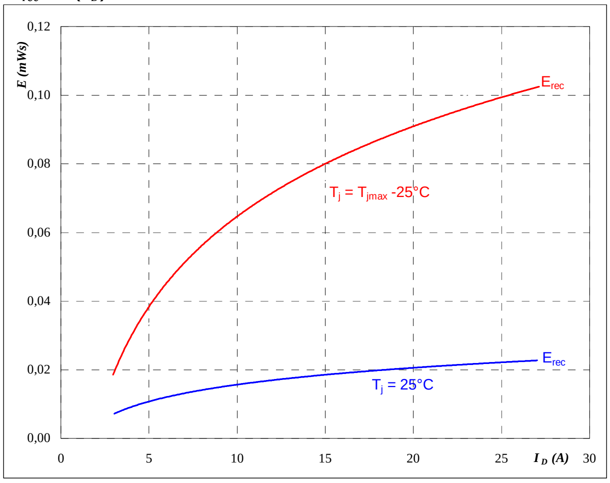
With an inductive load at

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	15	A

figure 7. **Boost Switch (T1*, T2, T3)**

Typical reverse recovery energy loss as a function of drain current

$E_{rec} = f(I_D)$



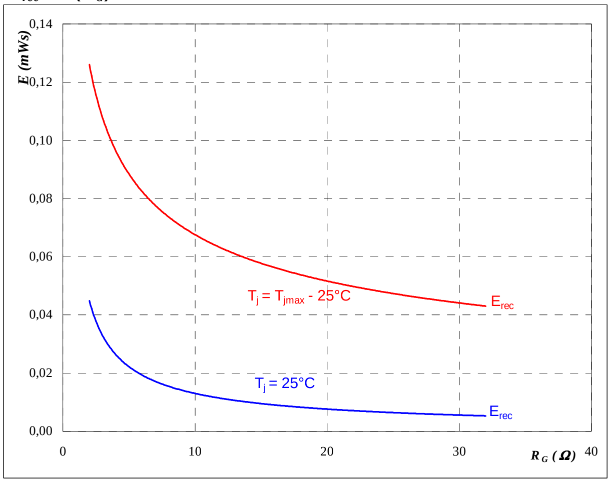
With an inductive load at

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 8. **Boost Switch (T1*, T2, T3)**

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} =	0/10	V
I_D =	15	A

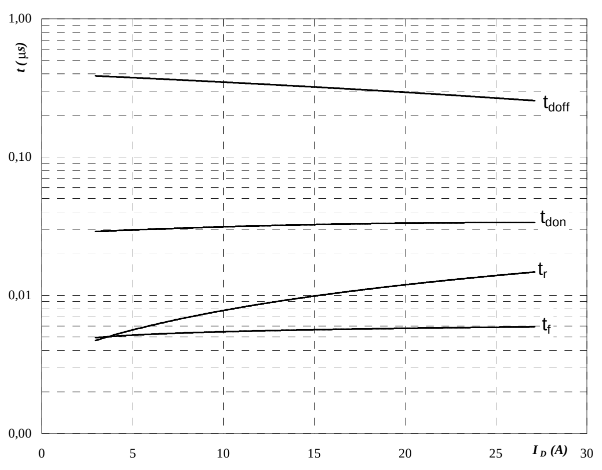
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 9. **Boost Switch (T1*, T2, T3)**

Typical switching times as a as a function of drain current

$t = f(I_D)$



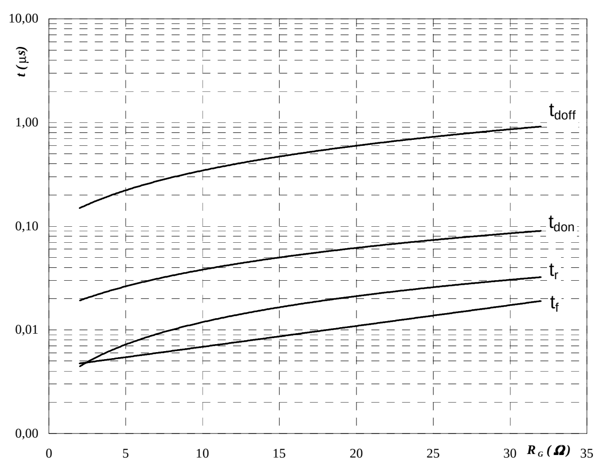
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 10. **Boost Switch (T1*, T2, T3)**

Typical switching times as a function of gate resistor

$t = f(R_G)$



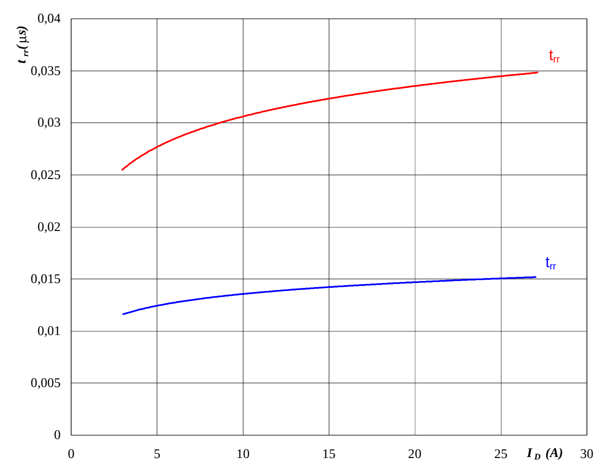
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
I_D =	15	A

figure 11. **Boost Diode (D1*, D2, D3)**

Typical reverse recovery time as a as a function of drain current

$t_{rr} = f(I_c)$



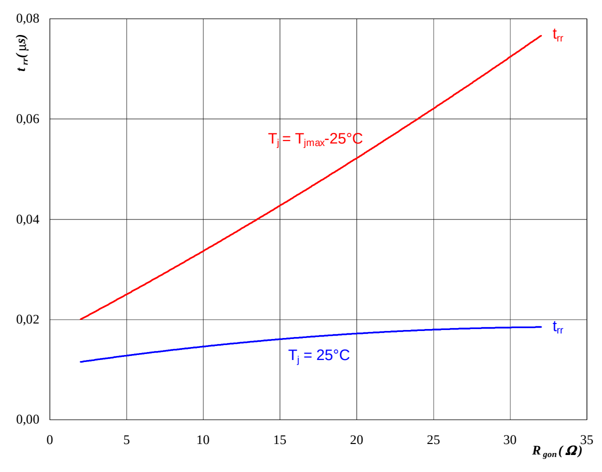
At

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω

figure 12. **Boost Diode (D1*, D2, D3)**

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 =	15	A
V_{GS} =	0/10	V

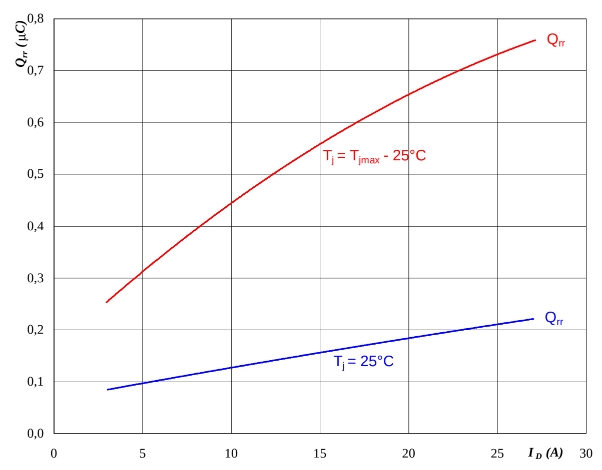
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 13. **Boost Diode (D1*, D2, D3)**

Typical reverse recovery charge as a function of drain current

$Q_{rr} = f(I_D)$



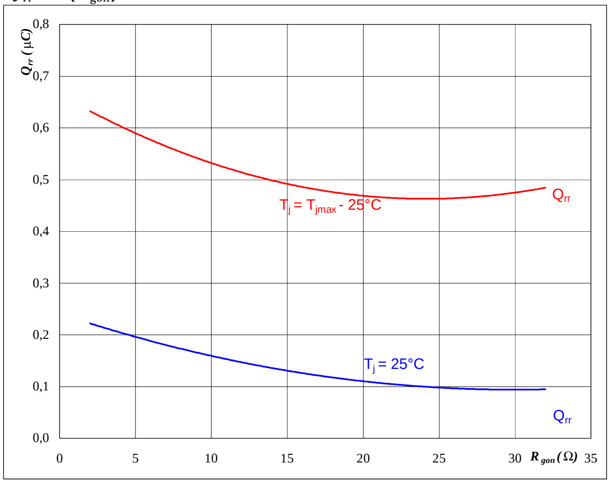
At

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω

figure 14. **Boost Diode (D1*, D2, D3)**

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

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



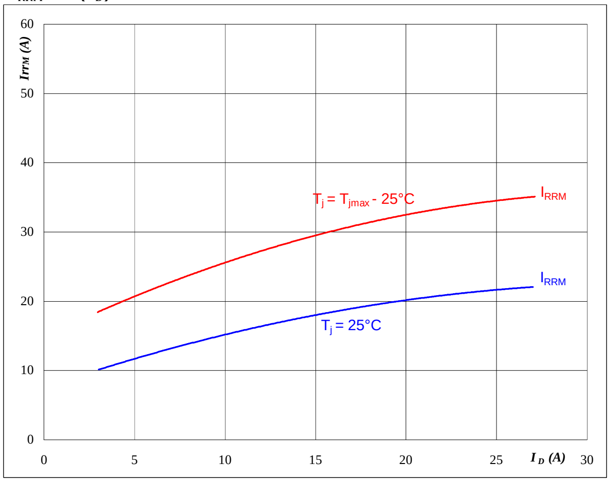
At

T_j =	25/125	°C
V_R =	400	V
I_F =	15	A
V_{GS} =	0/10	V

figure 15. **Boost Diode (D1*, D2, D3)**

Typical reverse recovery current as a function of drain current

$I_{RRM} = f(I_D)$



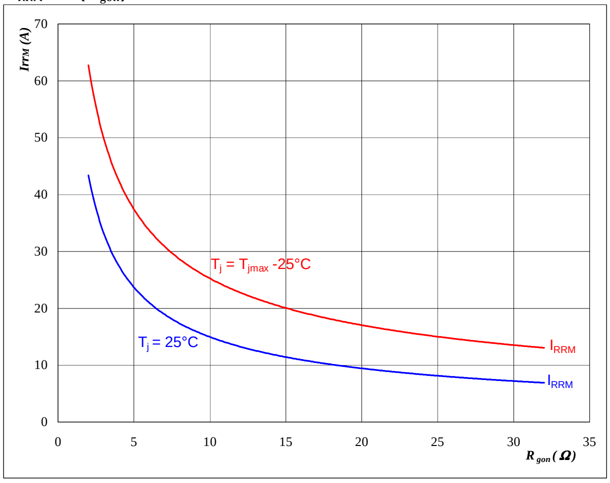
At

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω

figure 16. **Boost Diode (D1*, D2, D3)**

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 =	15	A
V_{GS} =	0/10	V

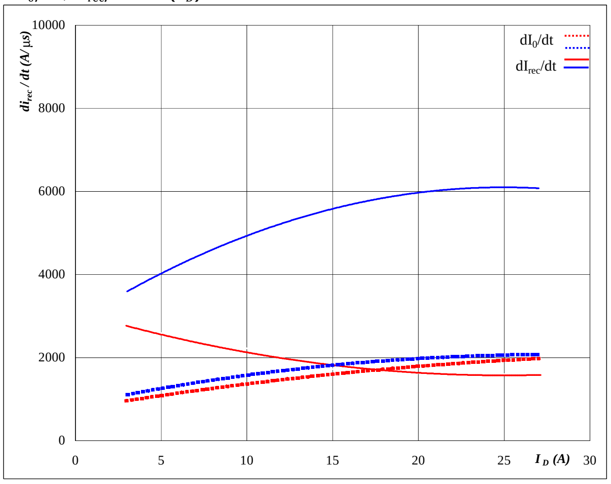
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 17. **Boost Diode (D1*, D2, D3)**

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

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



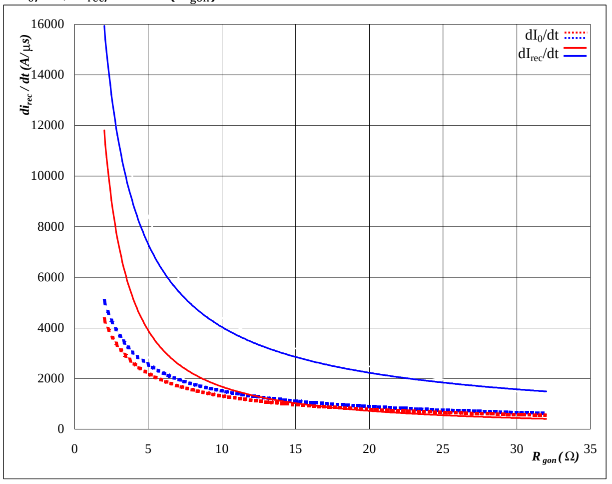
At

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	0/10	V
R_{gon} =	8	Ω

figure 18. **Boost Diode (D1*, D2, D3)**

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

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



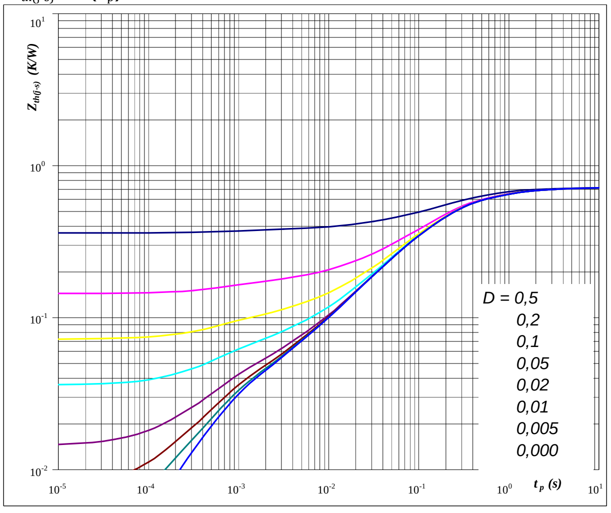
At

T_j =	25/125	°C
V_R =	400	V
I_F =	15	A
V_{GS} =	0/10	V

figure 19. **Boost Switch (T1*, T2, T3)**

MOSFET transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	0,72	K/W

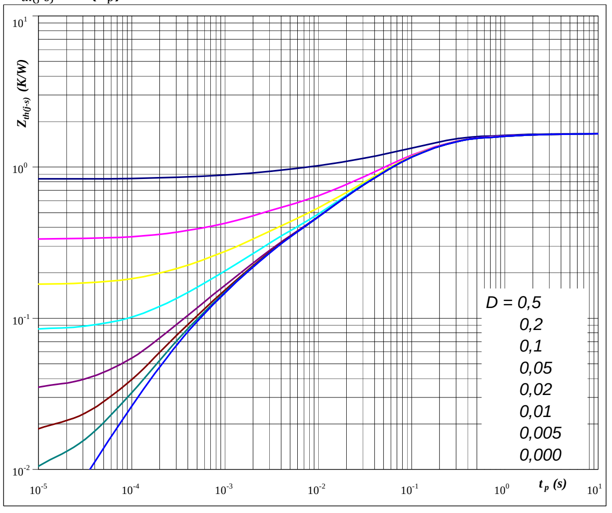
IGBT thermal model values

R (K/W)	τ (s)
1,89E-02	8,77E+00
1,06E-01	1,31E+00
3,52E-01	2,19E-01
1,64E-01	6,50E-02
4,91E-02	1,06E-02
3,08E-02	7,41E-04

figure 20. **Boost Diode (D1*, D2, D3)**

FWD transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	1,67	K/W

FWD thermal model values

R (K/W)	τ (s)
6,19E-02	3,60E+00
2,39E-01	4,21E-01
8,36E-01	8,48E-02
3,20E-01	1,50E-02
1,67E-01	1,83E-03
4,64E-02	2,72E-04

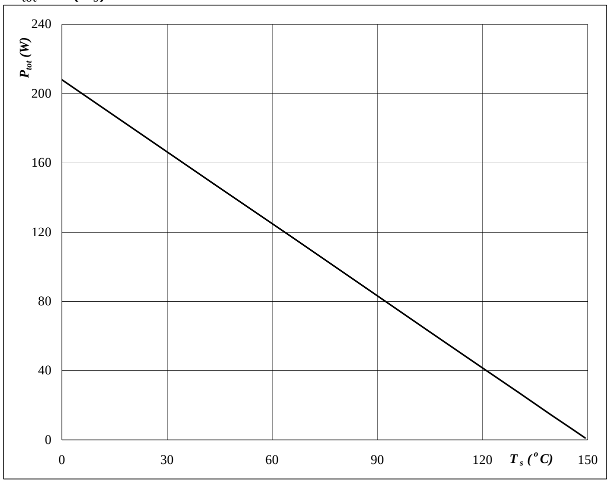
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 21. **Boost Switch (T1*, T2, T3)**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



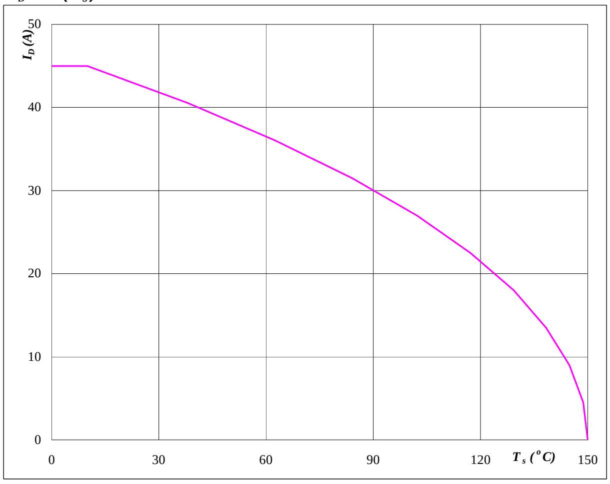
At

T_j = 150 ºC

figure 22. **Boost Switch (T1*, T2, T3)**

Collector/Drain current as a function of heatsink temperature

$I_D = f(T_s)$



At

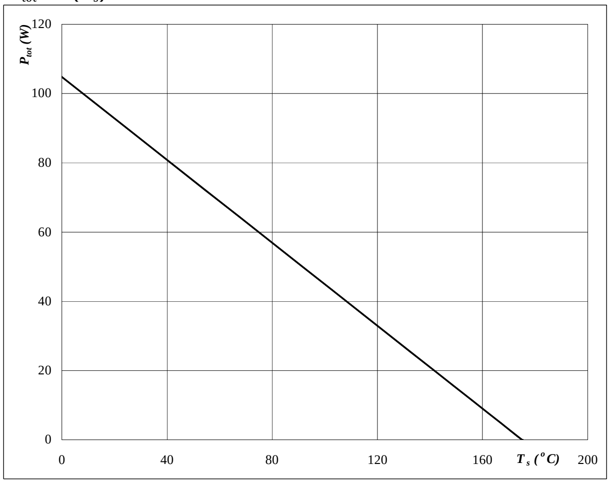
T_j = 150 ºC

V_{GS} = 10 V

figure 23. **Boost Diode (D1*, D2, D3)**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



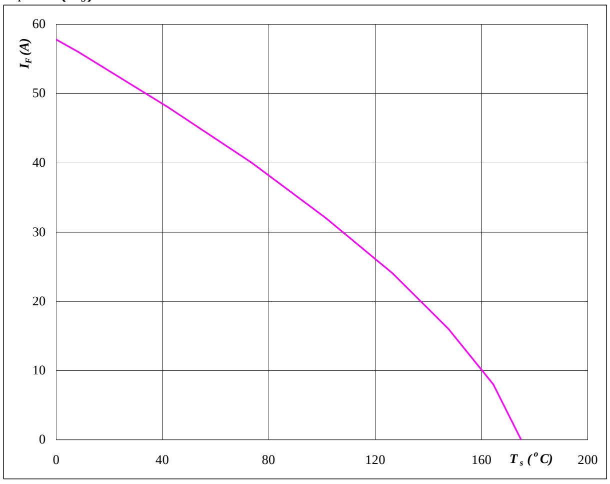
At

T_j = 175 ºC

figure 24. **Boost Diode (D1*, D2, D3)**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

T_j = 175 ºC

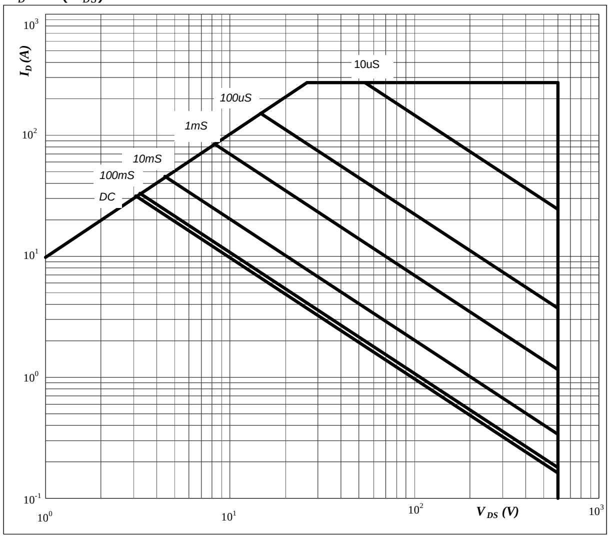
Boost Switch (T1*, T2, T3) / Boost Diode (D1*, D2, D3)

*not assembled in 10-FZ06B2A040MF01-M575L28

figure 25. **Boost Switch (T1*, T2, T3)**

Safe operating area as a function of drain-source voltage

$I_D = f(V_{DS})$



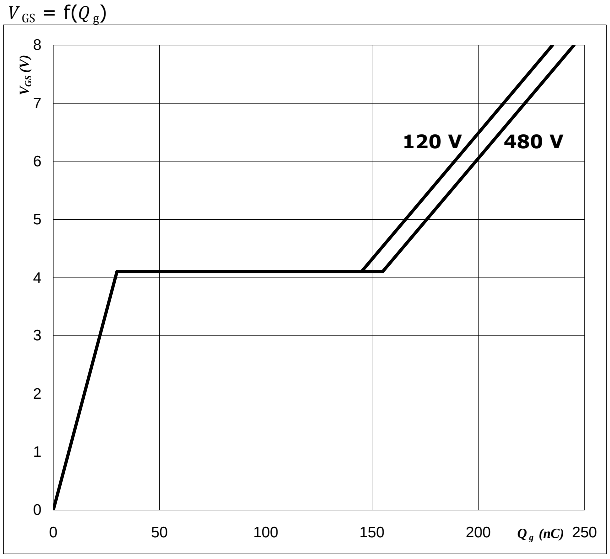
At

D =	single pulse	
T_s =	80	ºC
V_{GS} =	0/10	V
T_j =	T_{jmax}	

figure 26. **Boost Switch (T1*, T2, T3)**

Gate voltage vs Gate charge

$V_{GS} = f(Q_g)$



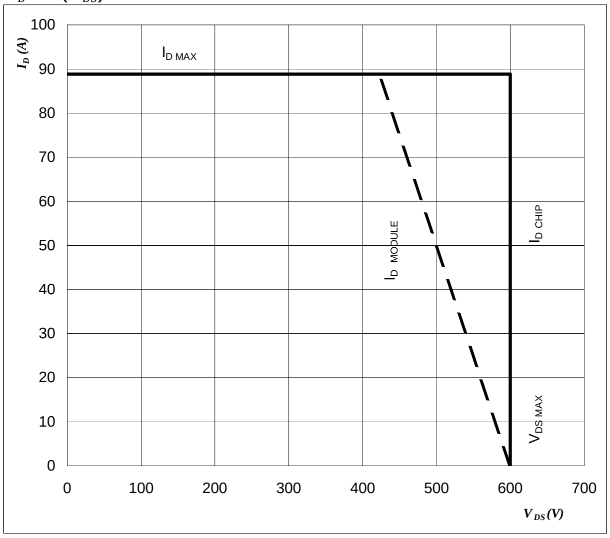
At

I_D =	50	A

figure 27. **Boost Switch (T1*, T2, T3)**

Reverse bias safe operating area

$I_D = f(V_{DS})$



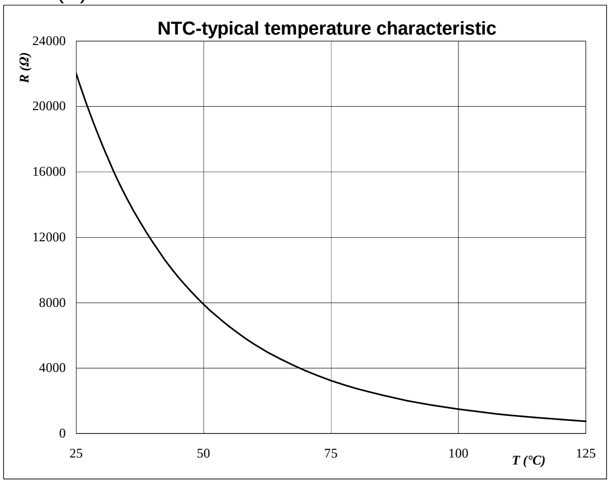
At

T_j =	150 °C
R_{gon} =	8 Ω
R_{goff} =	8 Ω

Thermistor

figure 1.	Thermistor

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



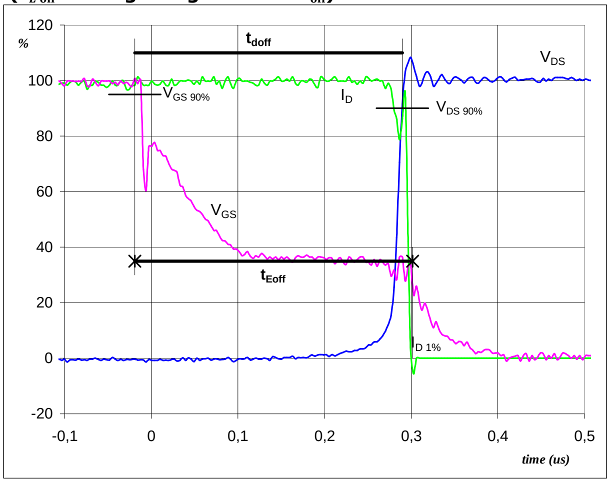
Switching Definitions Boost

General conditions

T_j	=	125 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

figure 1. Boost Switch

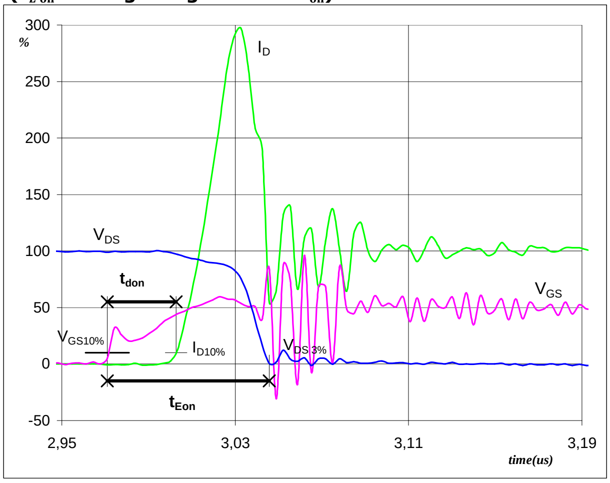
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} ($t_{E\,off}$ = integrating time for E_{off})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	10	V
V_D (100%) =	400	V
I_D (100%) =	15	A
t_{doff} =	0,30	μs
$t_{E\,off}$ =	0,32	μs

figure 2. Boost Switch

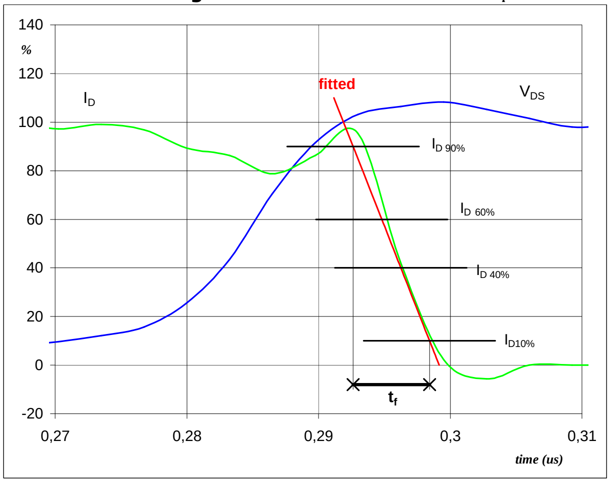
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} ($t_{E\,on}$ = integrating time for E_{on})



V_{GS} (0%) =	0	V
V_{GS} (100%) =	10	V
V_D (100%) =	400	V
I_D (100%) =	15	A
t_{don} =	0,03	μs
$t_{E\,on}$ =	0,07	μs

figure 3. Boost Switch

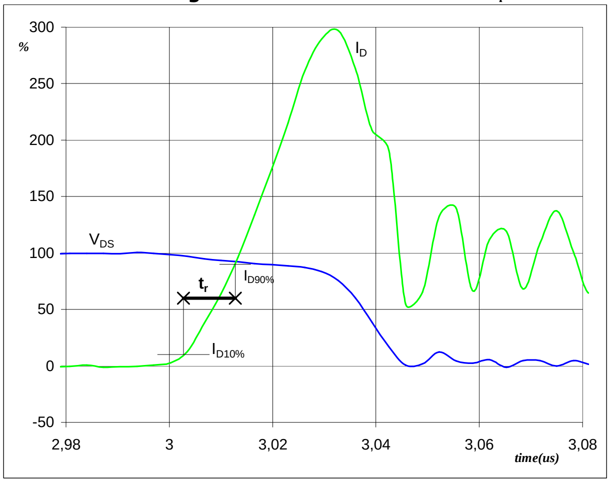
Turn-off Switching Waveforms & definition of t_f



V_D (100%) =	400	V
I_D (100%) =	15	A
t_f =	0,00	μs

figure 4. Boost Switch

Turn-on Switching Waveforms & definition of t_r

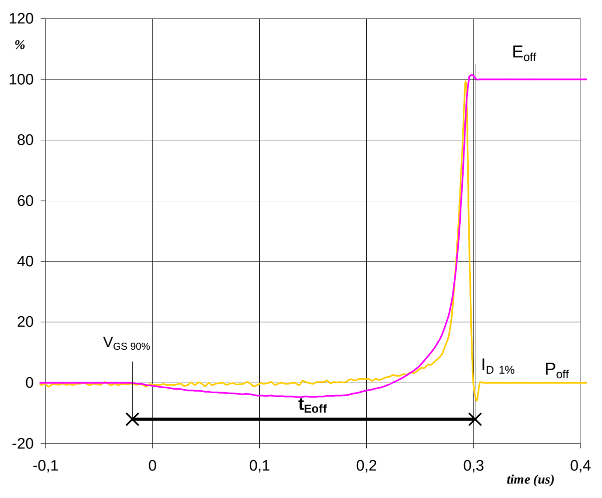


V_D (100%) =	400	V
I_D (100%) =	15	A
t_r =	0,01	μs

Switching Definitions Boost

figure 5. **Boost Switch**

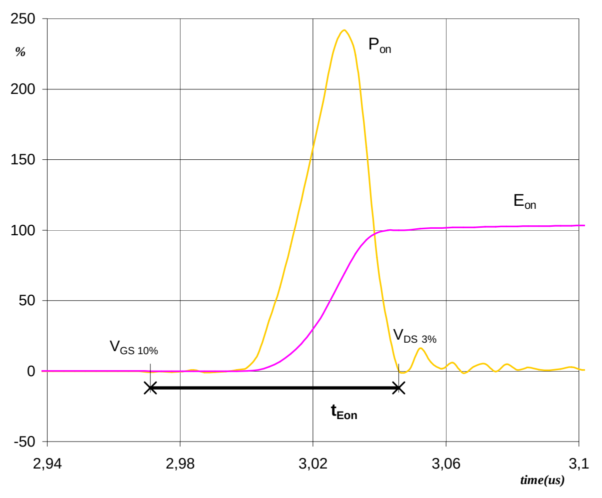
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	6,02	kW
E_{off} (100%) =	0,08	mJ
$t_{E\,off}$ =	0,32	µs

figure 6. **Boost Switch**

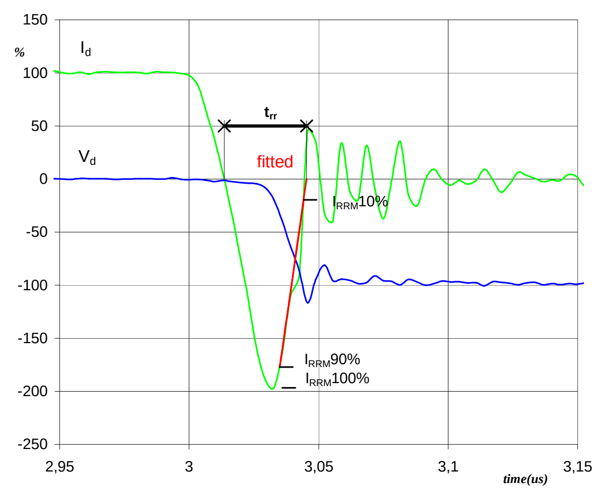
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	6,02	kW
E_{on} (100%) =	0,34	mJ
$t_{E\,on}$ =	0,07	µs

figure 7. **Boost Diode**

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

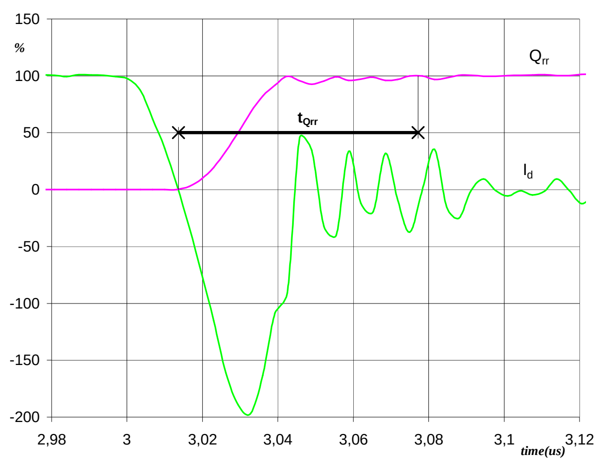


V_d (100%) =	400	V
I_d (100%) =	15	A
I_{RRM} (100%) =	-30	A
t_{rr} =	0,03	µs

Switching Definitions Boost

figure 8. **Boost Diode**

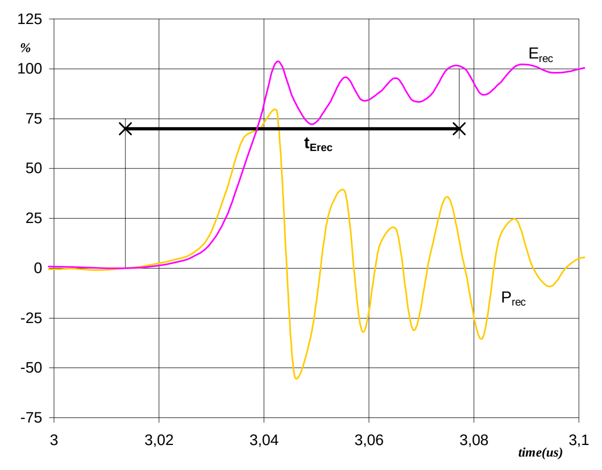
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	15	A
Q_{rr} (100%) =	0,56	μC
$t_{Q\,rr}$ =	0,06	μs

figure 9. **Boost Diode**

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



P_{rec} (100%) =	6,02	kW
E_{rec} (100%) =	0,08	mJ
$t_{E\,rec}$ =	0,06	μs

Ordering Code & Marking

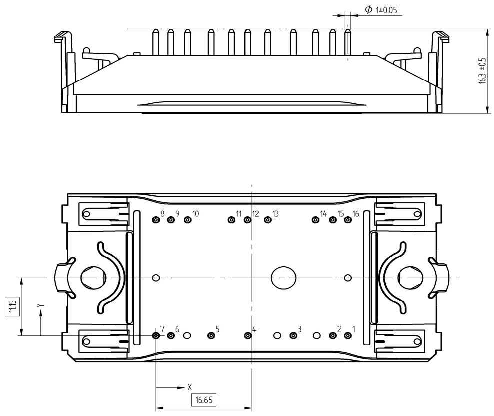
Version	Ordering Code
without thermal paste 12 mm housing with solder pins (triple booster)	10-FZ063BA040MF-M575L08
without thermal paste 12 mm housing with solder pins (dual booster)	10-FZ06B2A040MF01-M575L28

	Name	Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV	WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	**Lot number**	**Serial**	**Date code**	
Datamatrix	TTTTTTTVV	LLLLL	SSSS	WWYY	

Outline

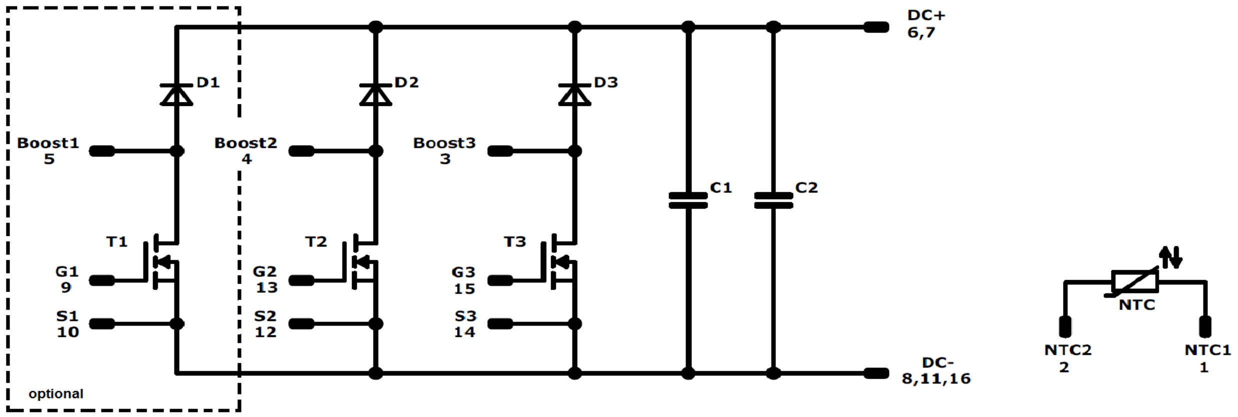
Pin table [mm]			
Pin	**X**	**Y**	**Function**
1	33,3	0	NTC1
2	30,7	0	NTC2
3	23,85	0	Boost3
4	15,95	0	Boost2
5	9,6	0	Boost1
6	2,6	0	DC+
7	0	0	DC+
8	0	22,3	DC-
9	2,6	22,3	G1
10	5,5	22,3	S1
11	13,1	22,3	DC-
12	15,9	22,3	S2
13	19,4	22,3	G2
14	27,7	22,3	S3
15	30,7	22,3	G3
16	33,3	22,3	DC-

Pinout variation	
Module subtype	**Not assembled pins**
M575L28	5, 9, 10



Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1*, T2, T3	MOSFET	600 V	41 mΩ	Boost Switch	
D1*, D2, D3	FWD	600 V	30 A	Boost Diode	
C1, C2	Capacitor	630 V		DC Link Capacitance	
NTC	NTC			Thermistor	

*not assembled in 10-FZ06B2A040MF01-M575L28

Packaging instruction			
Standard packaging quantity (SPQ)	**135**	>SPQ Standard	<SPQ Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-FZ06xxA040MFxx-M575Lx8-D4-14	20 Jul. 2017		