Vincotech

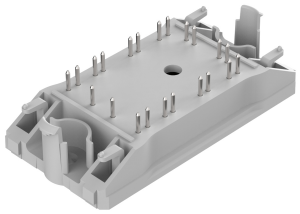
10-FZ12B2A080MR04-P629L82
datasheet

flowBOOST 0 dual SIC **1200 V / 80 mΩ**

Features

- SiC Power MOSFETs and Schottky Diodes
- Dual Boost Topology
- Bypass Diode
- Temperature sensor
- Low inductance housing

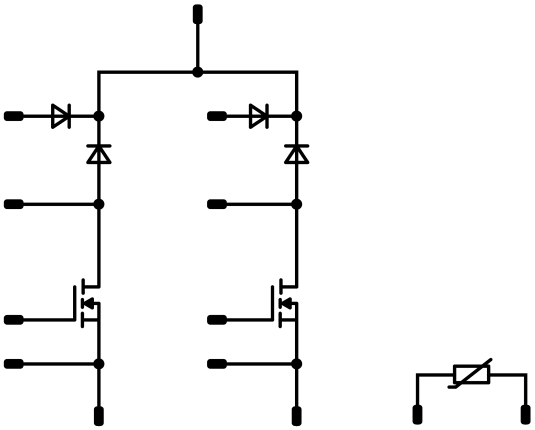
flow 0 12 mm housing



Target applications

- Solar Inverters

Schematic



Types

- 10-FZ12B2A080MR04-P629L82

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Boost Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ T_s = 80 °C	19	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	77	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	57	W
Gate-source voltage	V_{GSS}		-4 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	36	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	100	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 8,3 ms T_j = 150 °C	72	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	104	W
Maximum junction temperature	T_{jmax}		175	°C
ByPass Diode				
Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	33	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms T_j = 150 °C	200	A
Surge current capability	I^2t		200	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	44	W
Maximum junction temperature	T_{jmax}		150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Module Properties				
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…+(T_{jmax} - 25)	°C
Isolation Properties				
Isolation voltage	V_{isol}	DC Test Voltage* t_p = 2 s	6000	V
Isolation voltage	V_{isol}	AC Voltage t_p = 1 min	2500	V
Creepage distance			>12,7	mm
Clearance			9,55	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		18		10	25 125 150		80 127 144	100(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,0005	25	2,7	4	5,6	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		1	10	µA
Internal gate resistance	r_g							12		Ω
Gate charge	Q_g	V_{DD} = 600 V	18		10	25		60		nC
Gate to source charge	Q_{GS}							15		
Gate to drain charge	Q_{GD}							25		
Short-circuit input capacitance	C_{iss}	f = 1 Mhz	0	800	0	25		785		pF
Short-circuit output capacitance	C_{oss}							75		
Reverse transfer capacitance	C_{rss}							35		
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,67		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	0/18	700	16	25 125 150		12,8 12,16 11,84		ns
Rise time	t_r					25 125 150		6,72 6,72 6,72		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		53,76 62,72 64,96		ns
Fall time	t_f					25 125 150		21,3 22,3 20,74		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,128 µC Q_{rFWD}=0,131 µC Q_{rFWD}=0,132 µC				25 125 150		0,202 0,192 0,19		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,128 0,146 0,151		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				20	25 125 150		1,4 1,72 1,86	1,6(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		20 160	400	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,91		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt=3115 A/µs di/dt=3099 A/µs di/dt=3052 A/µs	0/18	700	16	25 125 150		13,7 14,12 14,16		A
Reverse recovery time	t_{rr}					25 125 150		11,92 12 12,31		ns
Recovered charge	Q_r					25 125 150		0,128 0,131 0,132		µC
Reverse recovered energy	E_{rec}					25 125 150		0,061 0,065 0,065		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2900 2869 2861		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
ByPass Diode										
Static										
Forward voltage	V_F				8	25 125		0,996 0,907	1,21(1) 1,1(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25			50	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,59		K/W
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P							5		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

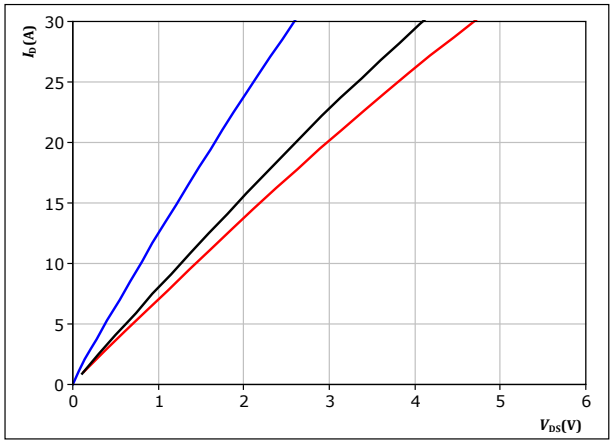
(2) Only valid with pre-applied Vincotech thermal interface material.

Boost Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

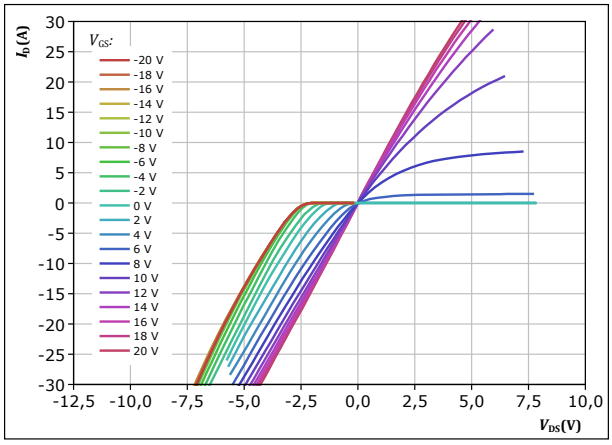


t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



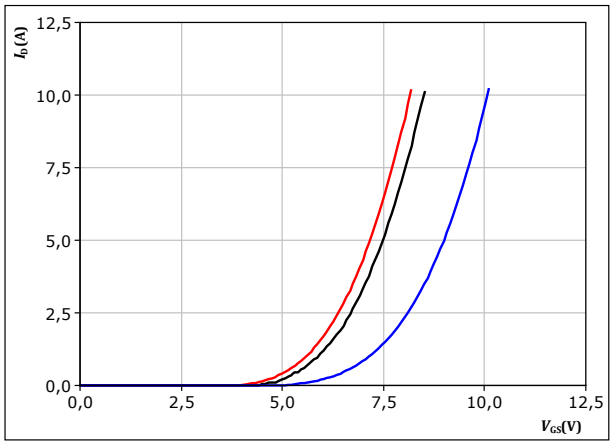
t_p =	250	µs
T_j =	150	°C

V_{GS} from -20 V to 20 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

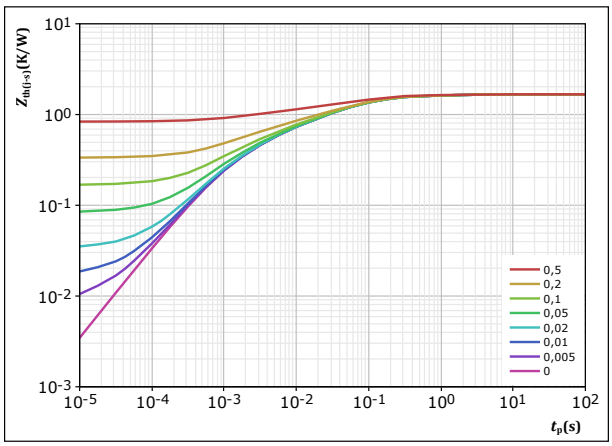


t_p =	250	µs		
V_{DS} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **MOSFET**

Transient thermal impedance as a function of pulse width

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



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

MOSFET thermal model values

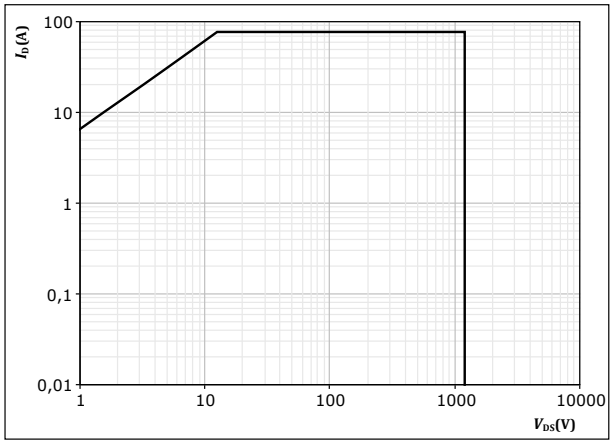
R (K/W)	τ (s)
4,56E-02	3,16E+00
1,12E-01	4,70E-01
5,96E-01	8,19E-02
3,80E-01	1,88E-02
3,05E-01	4,44E-03
2,31E-01	9,22E-04

Boost Switch Characteristics

figure 5. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$



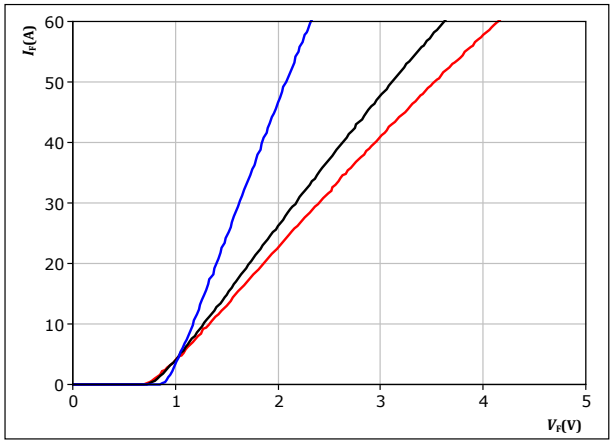
D =	single pulse	
T_s =	80	°C
V_{GS} =	18	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



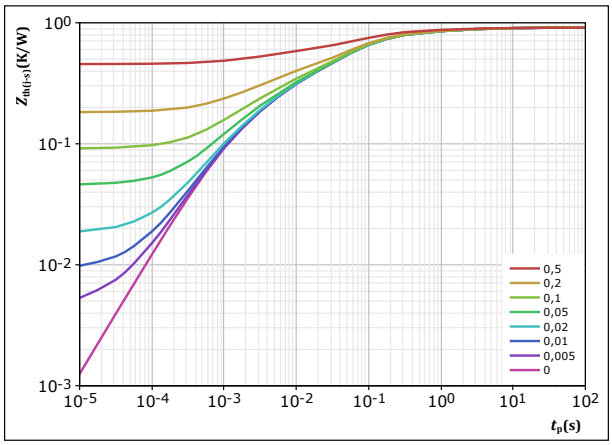
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,912 K/W

FWD thermal model values

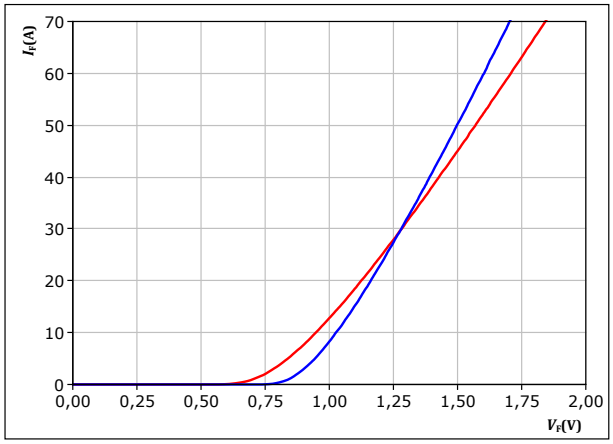
R (K/W)	τ (s)
3,15E-02	7,38E+00
7,85E-02	1,07E+00
2,38E-01	1,48E-01
3,00E-01	4,36E-02
1,79E-01	5,44E-03
8,39E-02	9,94E-04

ByPass Diode Characteristics

figure 8. **Rectifier**

Typical forward characteristics

$I_F = f(V_F)$



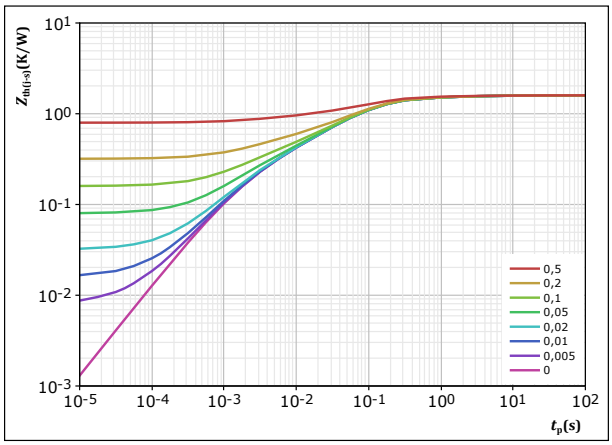
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 9. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,594 K/W

Rectifier thermal model values

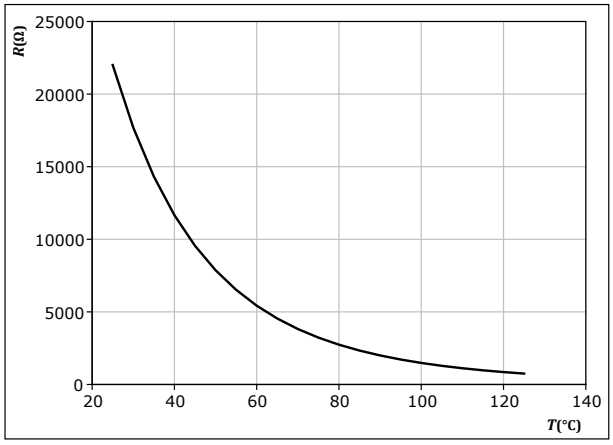
R (K/W)	τ (s)
3,44E-02	9,66E+00
1,12E-01	1,22E+00
5,81E-01	1,45E-01
4,89E-01	5,05E-02
2,38E-01	9,26E-03
1,22E-01	1,79E-03
1,81E-02	7,88E-04

Thermistor Characteristics

figure 10. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

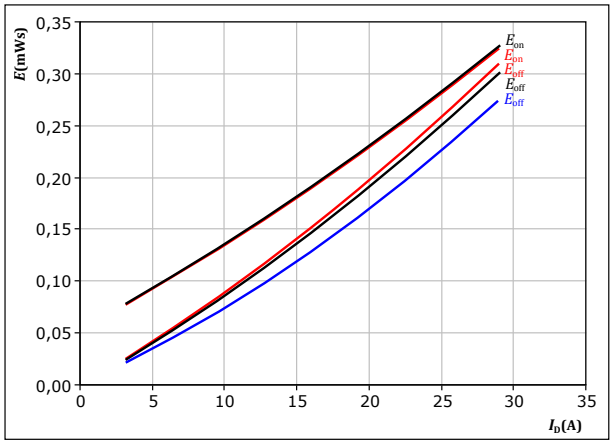


Boost Switching Characteristics

figure 11. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



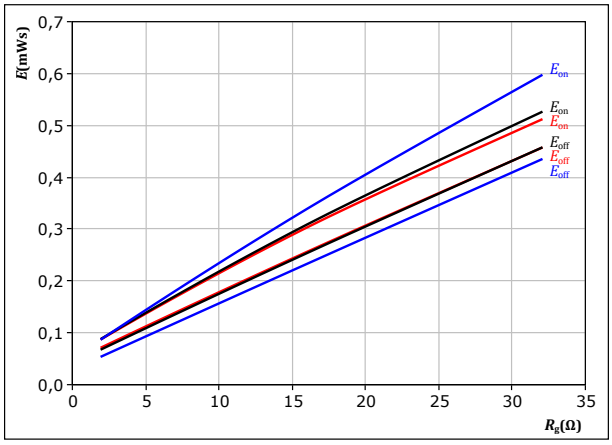
With an inductive load at

V_{DS} =	700	V	T_j: 25 °C
V_{GS} =	0/18	V	125 °C
R_{gon} =	8	Ω	150 °C
R_{goff} =	8	Ω	

figure 12. **MOSFET**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



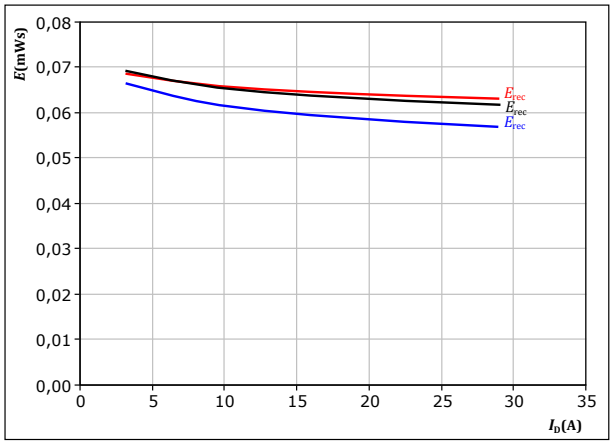
With an inductive load at

V_{DS} =	700	V	T_j: 25 °C
V_{GS} =	0/18	V	125 °C
I_D =	16	A	150 °C

figure 13. **FWD**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



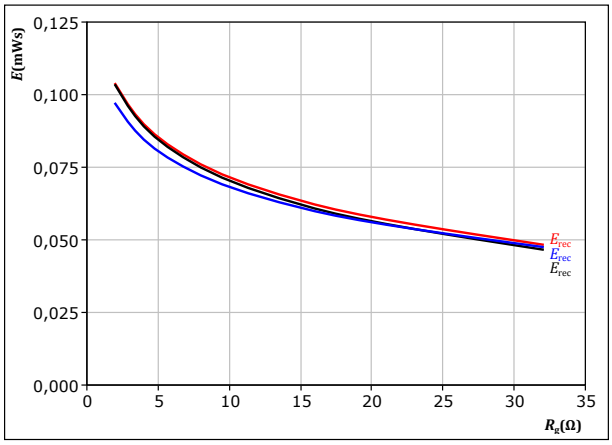
With an inductive load at

V_{DS} =	700	V	T_j: 25 °C
V_{GS} =	0/18	V	125 °C
R_{gon} =	8	Ω	150 °C

figure 14. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

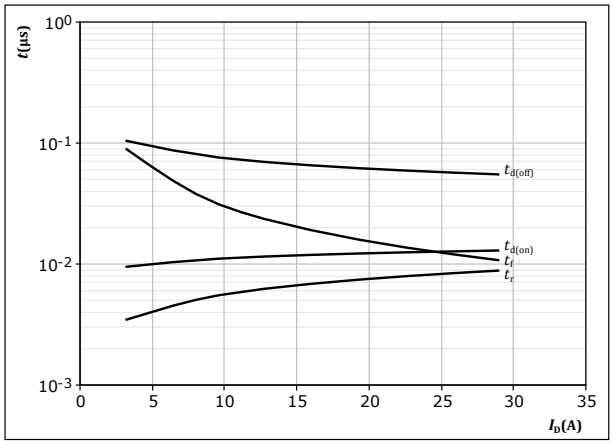
V_{DS} =	700	V	T_j: 25 °C
V_{GS} =	0/18	V	125 °C
I_D =	16	A	150 °C

Boost Switching Characteristics

figure 15. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



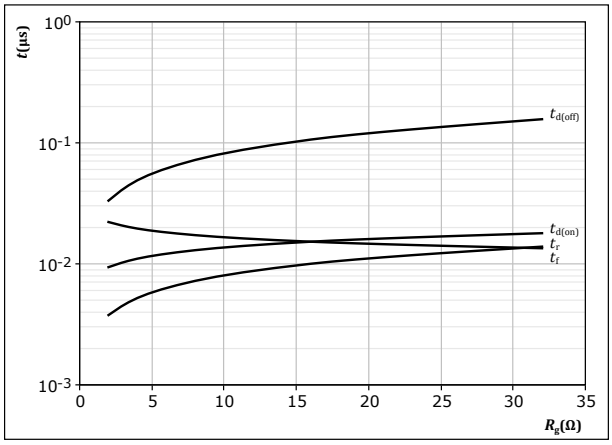
With an inductive load at

T_j =	150	°C
V_{DS} =	700	V
V_{GS} =	0/18	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 16. **MOSFET**

Typical switching times as a function of gate resistor

$t = f(R_g)$



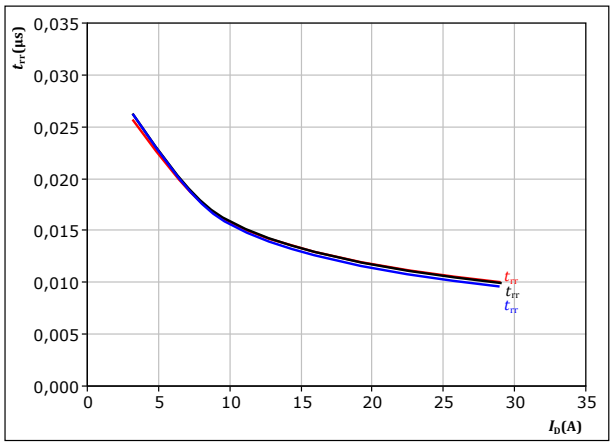
With an inductive load at

T_j =	150	°C
V_{DS} =	700	V
V_{GS} =	0/18	V
I_D =	16	A

figure 17. **FWD**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



At

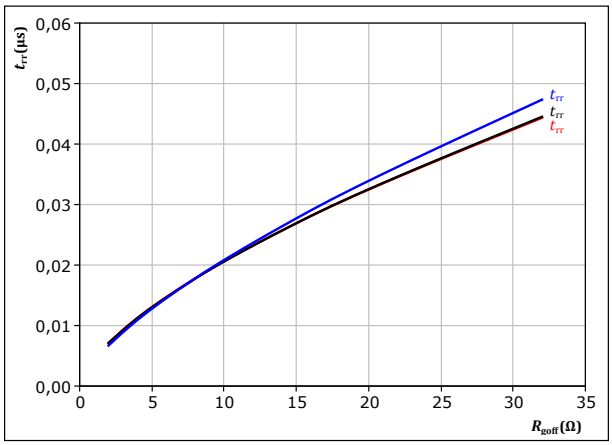
V_{DS} =	700	V
V_{GS} =	0/18	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 18. **FWD**

Typical reverse recovery time as a function of turn off gate resistor

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



At

V_{DS} =	700	V
V_{GS} =	0/18	V
I_D =	16	A

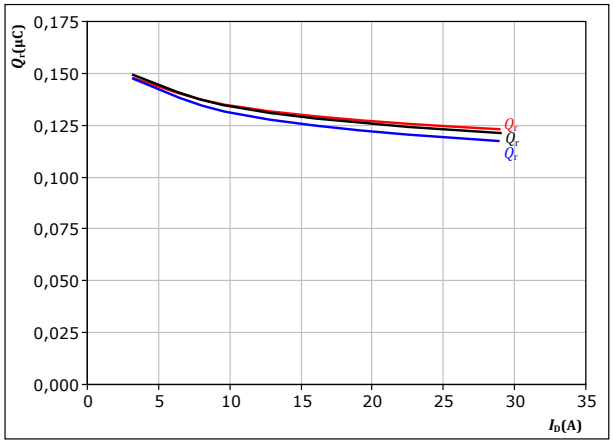
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 19. **FWD**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

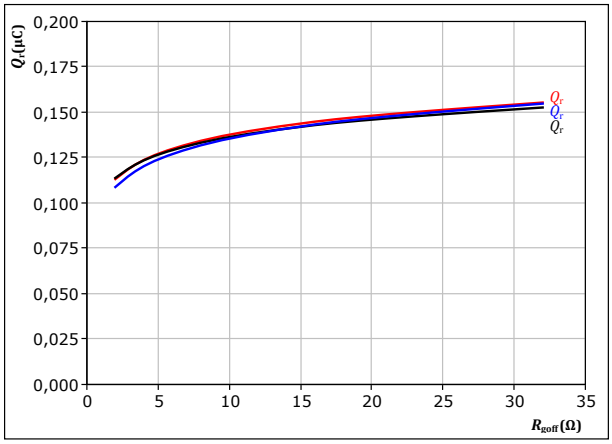


At					
	V_{DS} =	700	V		
	V_{GS} =	0/18	V	T_j:	25 °C, 125 °C, 150 °C
	R_{gon} =	8	Ω		

figure 20. **FWD**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$

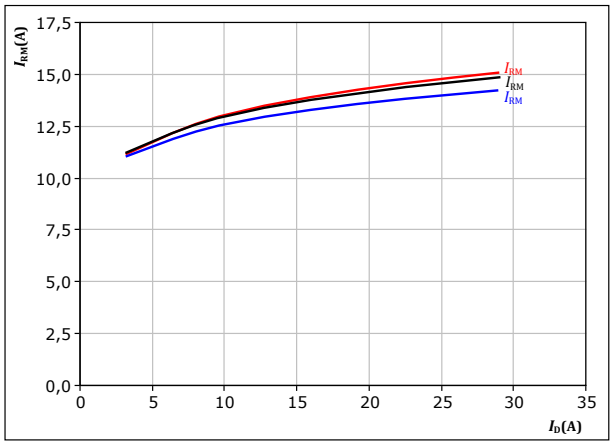


At					
	V_{DS} =	700	V		
	V_{GS} =	0/18	V	T_j:	25 °C, 125 °C, 150 °C
	I_D =	16	A		

figure 21. **FWD**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

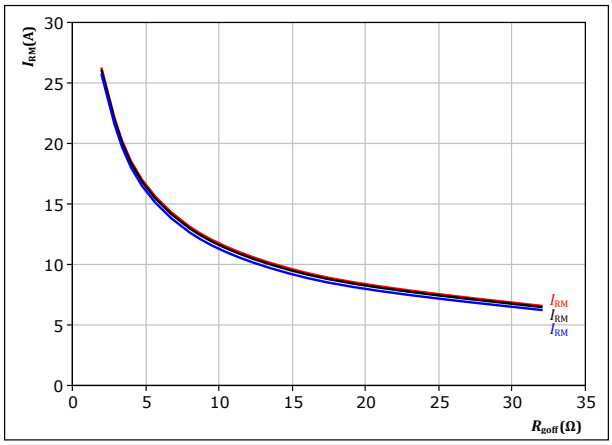


At					
	V_{DS} =	700	V		
	V_{GS} =	0/18	V	T_j:	25 °C, 125 °C, 150 °C
	R_{gon} =	8	Ω		

figure 22. **FWD**

Typical peak reverse recovery current as a function of turn off gate resistor

$I_{RM} = f(R_{goff})$



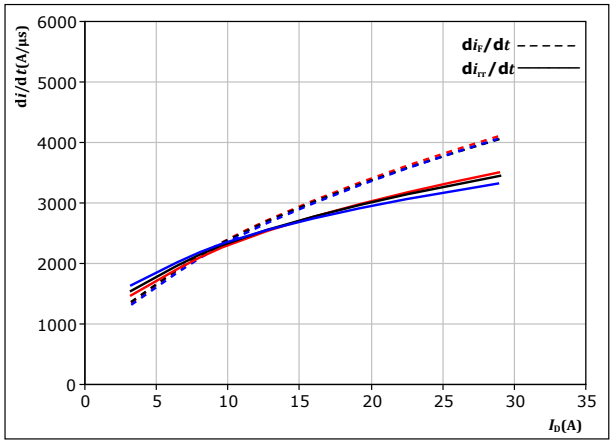
At					
	V_{DS} =	700	V		
	V_{GS} =	0/18	V	T_j:	25 °C, 125 °C, 150 °C
	I_D =	16	A		

Boost Switching Characteristics

figure 23. **FWD**

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

di_F/dt, di_{rr}/dt = f(I_D)

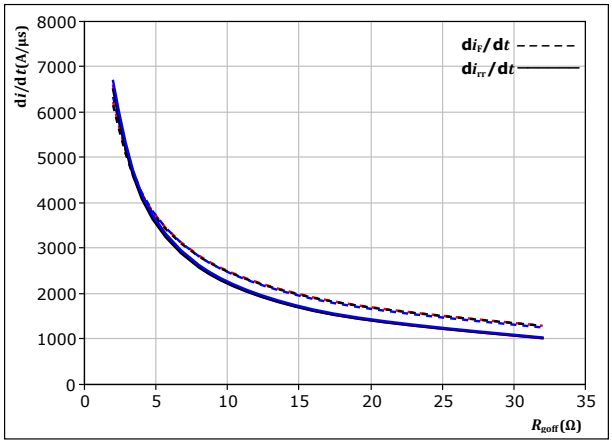


At	V_{DS} =	700	V		
	V_{GS} =	0/18	V	T_j:	25 °C
	R_{gon} =	8	Ω		125 °C
					150 °C

figure 24. **FWD**

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

di_F/dt, di_{rr}/dt = f(R_{goff})

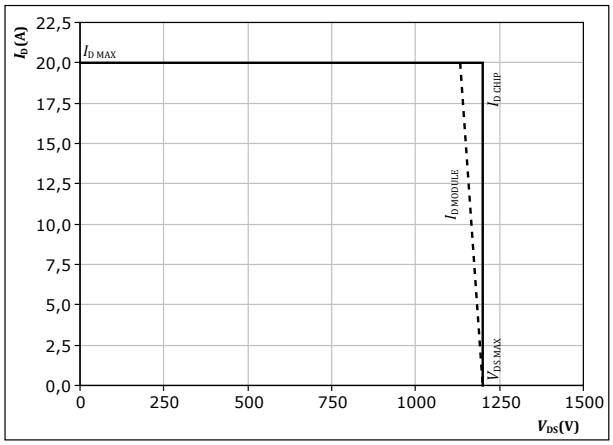


At	V_{DS} =	700	V		
	V_{GS} =	0/18	V	T_j:	25 °C
	I_D =	16	A		125 °C
					150 °C

figure 25. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



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

Boost Switching Definitions

figure 26. MOSFET

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

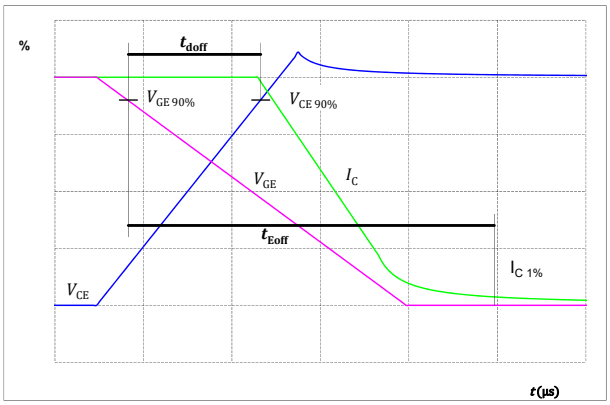


figure 27. MOSFET

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

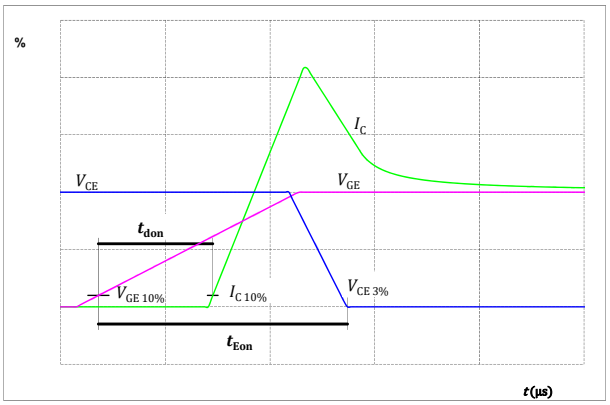


figure 28. MOSFET

Turn-off Switching Waveforms & definition of t_f

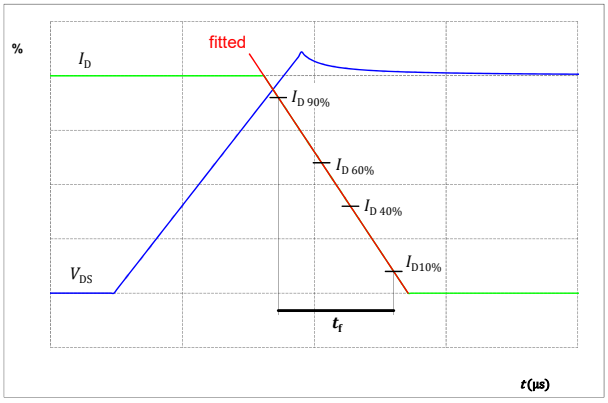
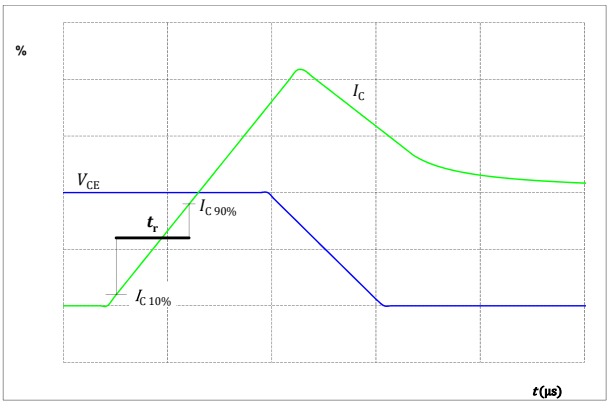


figure 29. MOSFET

Turn-on Switching Waveforms & definition of t_r



Boost Switching Definitions

figure 30. **FWD**

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

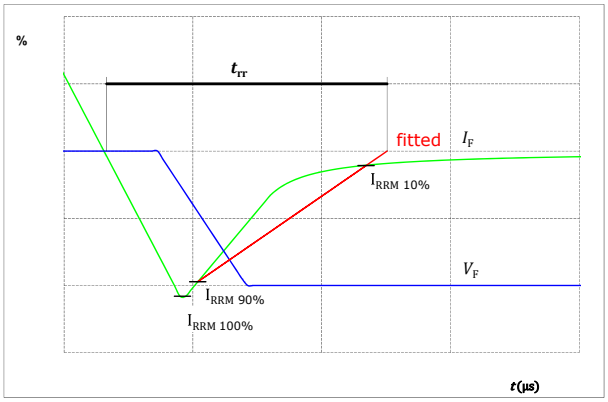


figure 31. **FWD**

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

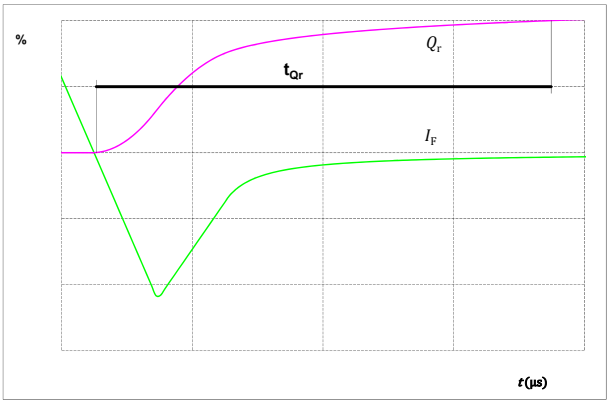
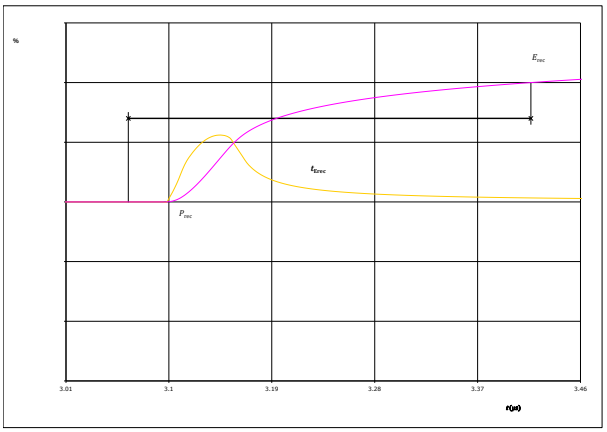


figure 32. **FWD**

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



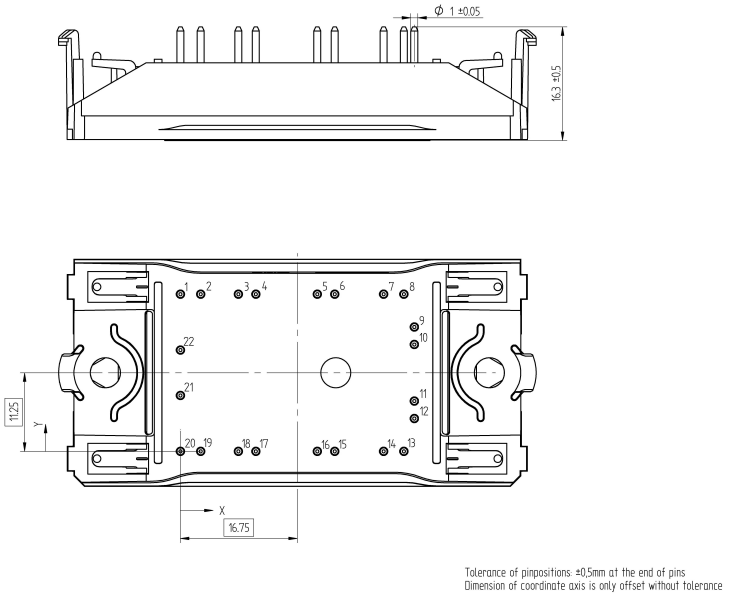
Ordering Code	
Version	**Ordering Code**
Without thermal paste	10-FZ12B2A080MR04-P629L82
With thermal paste (4,4 W/mK, PTM6000)	10-FZ12B2A080MR04-P629L82-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-FZ12B2A080MR04-P629L82-/3/

Marking

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

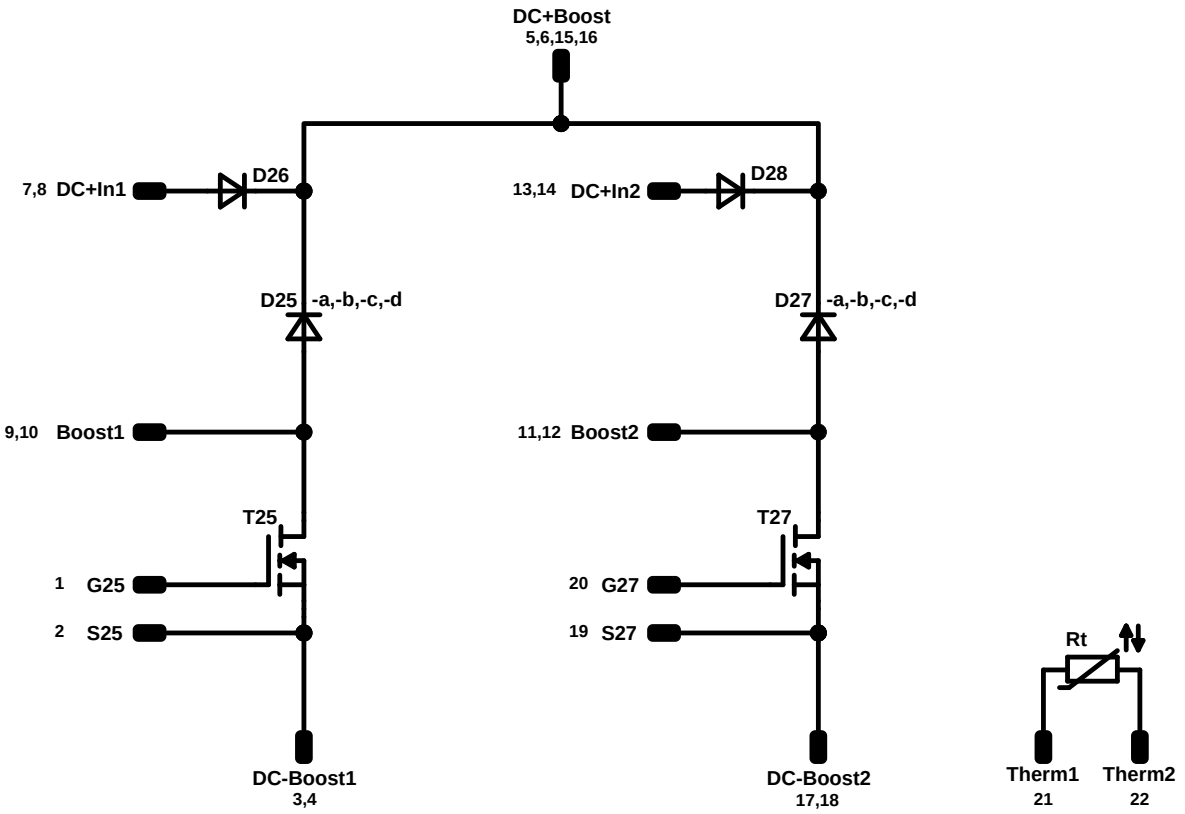
Outline

Pin table [mm]			
Pin	X	Y	Function
1	0	22,5	G25
2	2,9	22,5	S25
3	8,3	22,5	DC-Boost1
4	10,8	22,5	DC-Boost1
5	19,6	22,5	DC+Boost
6	22,1	22,5	DC+Boost
7	29,1	22,5	DC+In1
8	32	22,5	DC+In1
9	33,5	17,8	Boost1
10	33,5	15,3	Boost1
11	33,5	7,2	Boost2
12	33,5	4,7	Boost2
13	32	0	DC+In2
14	29,1	0	DC+In2
15	22,1	0	DC+Boost
16	19,6	0	DC+Boost
17	10,8	0	DC-Boost2
18	8,3	0	DC-Boost2
19	2,9	0	S27
20	0	0	G27
21	0	8	Therm1
22	0	14,5	Therm2



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
T25, T27	MOSFET	1200 V	80 mΩ	Boost Switch	
D25, D27	FWD	1200 V	20 A	Boost Diode	
D26, D28	Rectifier	1600 V	25 A	ByPass Diode	
Rt	Thermistor			Thermistor	

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.

Vincotech thermistor reference
See Vincotech thermistor reference table at 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-FZ12B2A080MR04-P629L82-D1-14	12 Jun. 2020		
10-FZ12B2A080MR04-P629L82-D2-14	20 Jul. 2021	Update of maximum current ratings ($I_{D,}$ I_F)	2