Vincotech

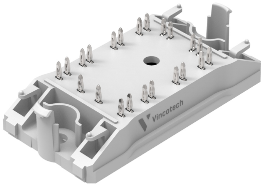
10-PZ124PA032ME03-L629F98Y
datasheet

fastPACK 0 SiC **1200 V / 32 mΩ**

Features

- Compact and low inductive design
- High frequency SiC MOSFET
- High power low inductive package
- Integrated DC-capacitor
- Integrated NTC

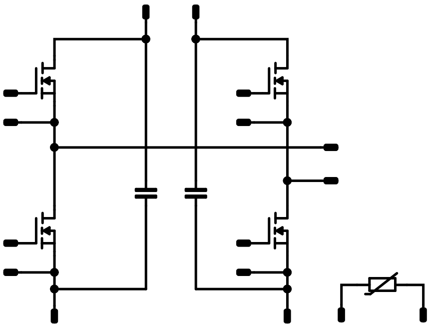
flow 0 12 mm housing



Target applications

- Charging Stations
- Power Supply

Schematic



Types

- 10-PZ124PA032ME03-L629F98Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit

H-Bridge Switch

Parameter	Symbol	Conditions	Value	Unit
Drain-source voltage	V_{DSS}		1200	V
Drain current	I_D	$T_j = T_{jmax}$ $T_s = 80$ °C	37	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80$ °C	70	W
Gate-source voltage	V_{GSS}		-4 / 15	V
		dynamic	-8 / 19	
Maximum Junction Temperature	T_{jmax}		175	°C

Capacitor (DC)

Parameter	Symbol	Conditions	Value	Unit
Maximum DC voltage	V_{MAX}		1000	V
Operation Temperature	T_{op}		0 … 125	°C

Module Properties

Thermal Properties

Parameter	Symbol	Conditions	Value	Unit
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…+(T_{jmax} - 25)	°C

Isolation Properties

Parameter	Symbol	Conditions	Value	Unit
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			min. 12,7	mm
Clearance			9,15	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**	
H-Bridge Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		15		40	25 125 150	22,4	34 42 47	41,6(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,0115	25	1,8	2,5	3,6	V
Gate to Source Leakage Current	I_{GSS}		15	0		25		10	250	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		1	19	µA
Internal gate resistance	r_{g}							1,7		Ω
Gate charge	Q_{g}		-4/15	800	40	25		118		nC
Short-circuit input capacitance	C_{iss}	f = 100 kHz	0	1000	0	25		3357		pF
Short-circuit output capacitance	C_{oss}							129		
Reverse transfer capacitance	C_{rss}							8		
Diode forward voltage	V_{SD}		0		20	25		4,6		V
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,36		K/W

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	
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	-4/15	600	32	25 125 150		17,8 16,6 16,8		ns
Rise time	t_r					25 125 150		6 5,8 5,4		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		42,6 46,6 48		ns
Fall time	t_f					25 125 150		19,42 18,65 20,84		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,325 μC Q_{rFWD}=0,344 μC Q_{rFWD}=0,401 μC				25 125 150		0,252 0,239 0,248		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,074 0,077 0,077		mWs
Peak recovery current	I_{RRM}	d*i*/d*t*=6518 A/μs d*i*/d*t*=6912 A/μs d*i*/d*t*=7217 A/μs				25 125 150		44,11 49,88 54,84		A
Reverse recovery time	t_{rr}					25 125 150		14,4 14,05 14,61		ns
Recovered charge	Q_r					25 125 150		0,325 0,344 0,401		μC
Reverse recovered energy	E_{rec}					25 125 150		0,169 0,209 0,256		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		7693 9638 10602		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**	
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		2,2		nF
Tolerance							-5		5	%
Dissipation factor		f = 1 kHz				25		1,5		%
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

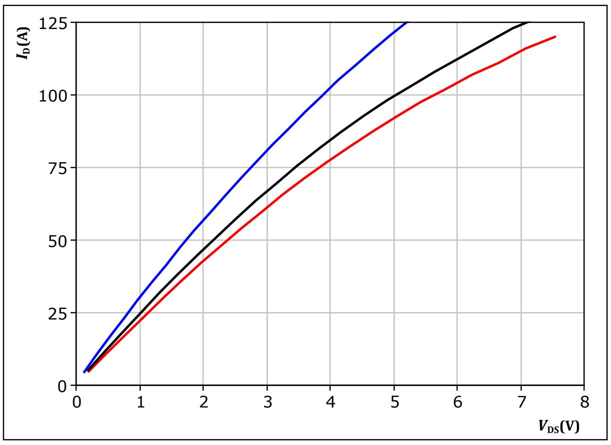
(2) Only valid with pre-applied Vincotech thermal interface material.

H-Bridge Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})

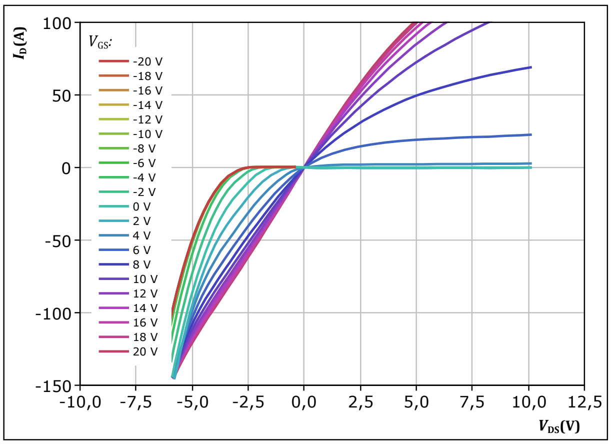


t_p = 250 μs
V_{GS} = 14 V
T_j:
25 °C
125 °C
150 °C

figure 2. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})

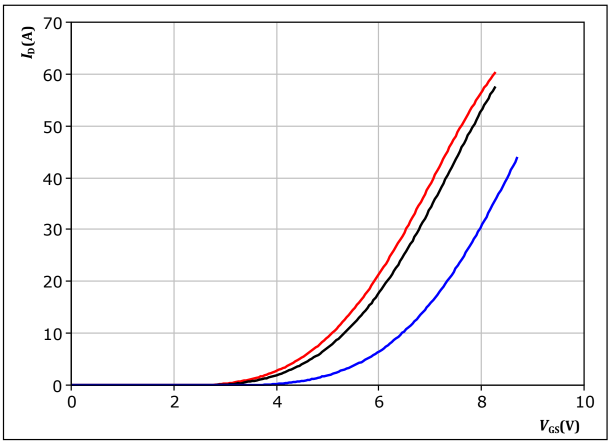


t_p = 250 μs
T_j = 150 °C
V_{GS} from -20 V to 20 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

I_D = f(V_{GS})

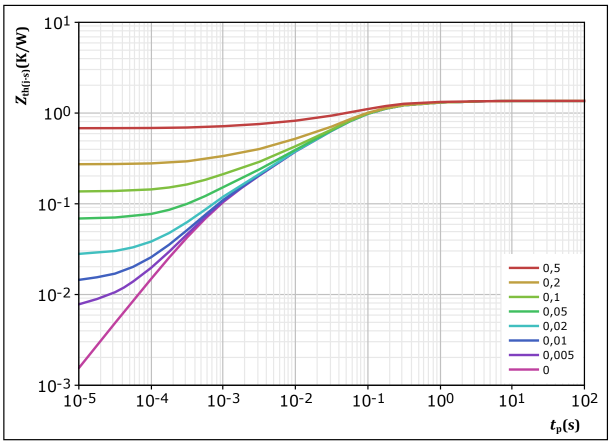


t_p = 250 μs
V_{DS} = 10 V
T_j:
25 °C
125 °C
150 °C

figure 4. **MOSFET**

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 1,362 K/W

MOSFET thermal model values

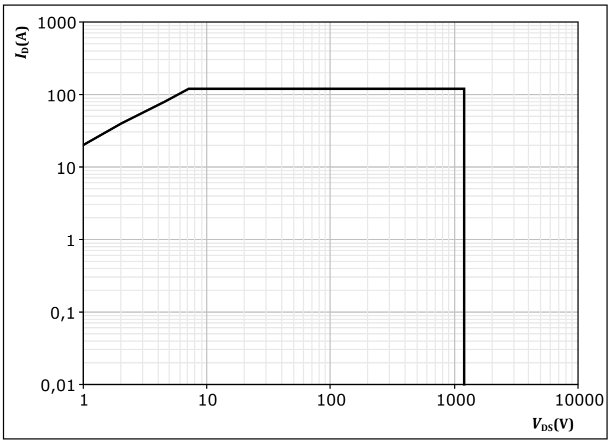
R (K/W)	τ (s)
7,53E-02	2,27E+00
2,27E-01	2,80E-01
7,32E-01	6,31E-02
2,40E-01	7,73E-03
8,78E-02	7,83E-04

H-Bridge Switch Characteristics

figure 5. **MOSFET**

Safe operating area

I_D = f(V_{DS})



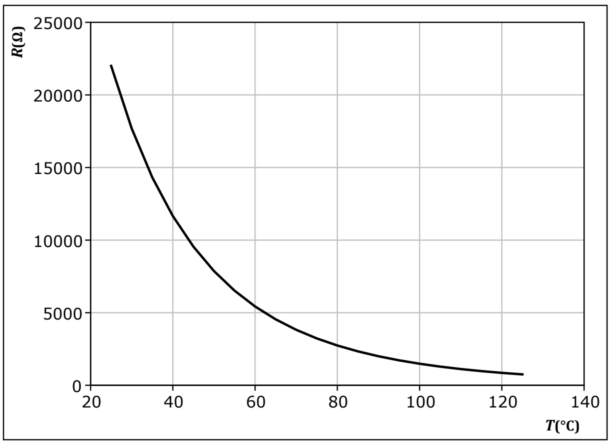
D = single pulse
T_s = 80 °C
V_{GS} = 14 V
T_j = T_{jmax}

Thermistor Characteristics

figure 6. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

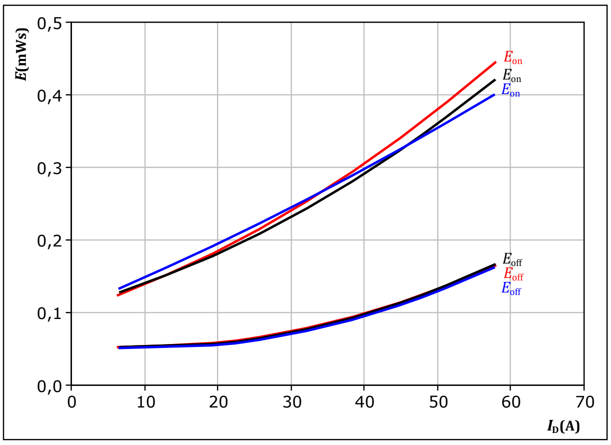


H-Bridge Switching Characteristics

figure 7. **MOSFET**

Typical switching energy losses as a function of drain current

E = f(I_D)



With an inductive load at

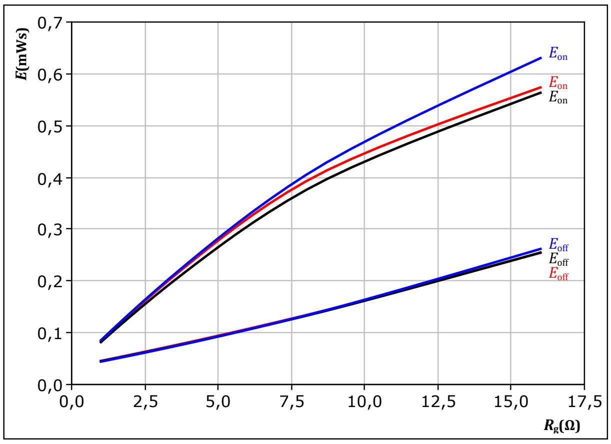
V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω
R_{goff} = 4 Ω

T_j:
25 °C
125 °C
150 °C

figure 8. **MOSFET**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



With an inductive load at

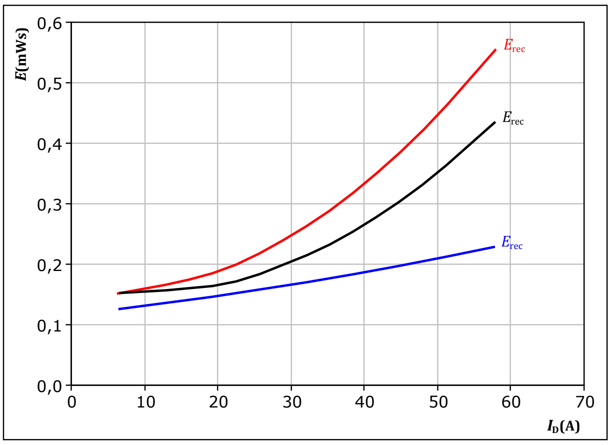
V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

T_j:
25 °C
125 °C
150 °C

figure 9. **MOSFET**

Typical reverse recovered energy loss as a function of drain current

E_{rec} = f(I_D)



With an inductive load at

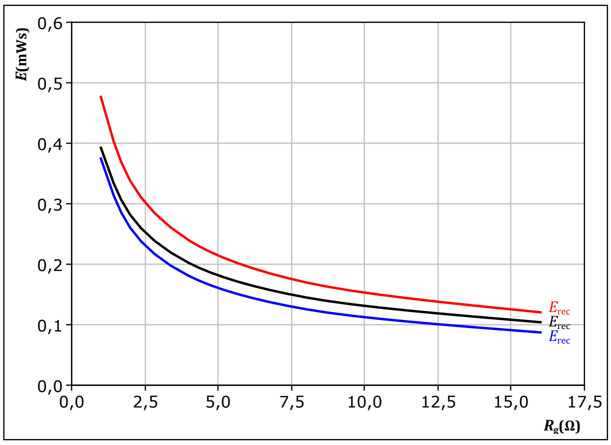
V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω

T_j:
25 °C
125 °C
150 °C

figure 10. **MOSFET**

Typical reverse recovered energy loss as a function of gate resistor

E_{rec} = f(R_g)



With an inductive load at

V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

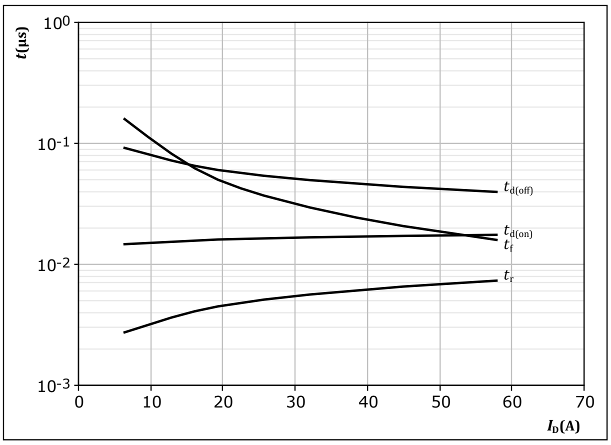
T_j:
25 °C
125 °C
150 °C

H-Bridge Switching Characteristics

figure 11. **MOSFET**

Typical switching times as a function of drain current

t = f(I_D)



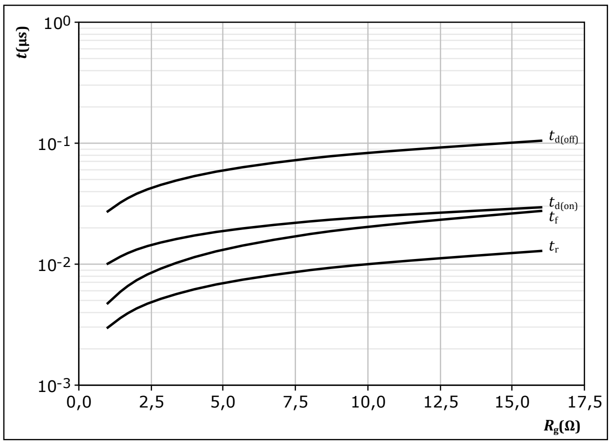
With an inductive load at

T_j = 150 °C
V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω
R_{goff} = 4 Ω

figure 12. **MOSFET**

Typical switching times as a function of gate resistor

t = f(R_g)



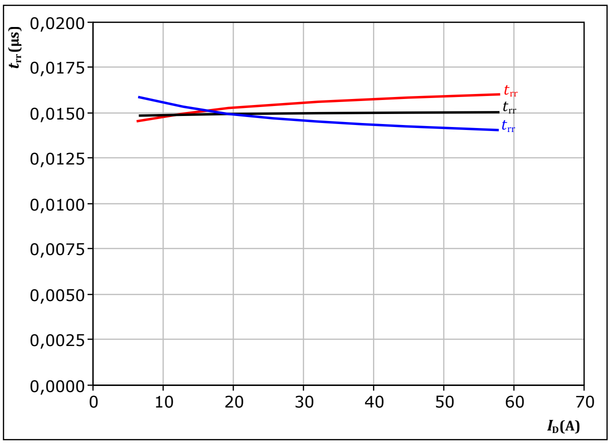
With an inductive load at

T_j = 150 °C
V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

figure 13. **MOSFET**

Typical reverse recovery time as a function of drain current

t_{rr} = f(I_D)



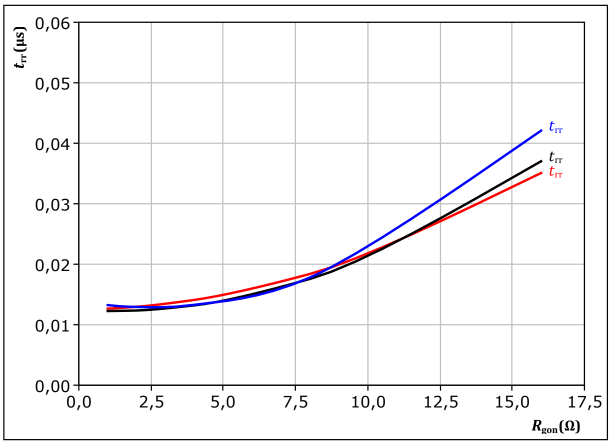
At V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω

T_j:
25 °C
125 °C
150 °C

figure 14. **MOSFET**

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

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



At V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

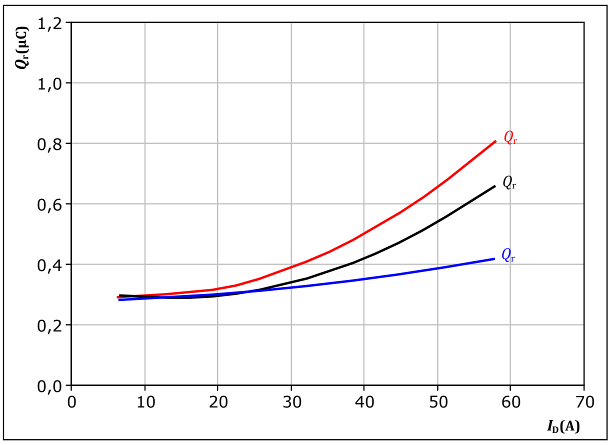
T_j:
25 °C
125 °C
150 °C

H-Bridge Switching Characteristics

figure 15. **MOSFET**

Typical recovered charge as a function of drain current

Q_r = f(I_D)



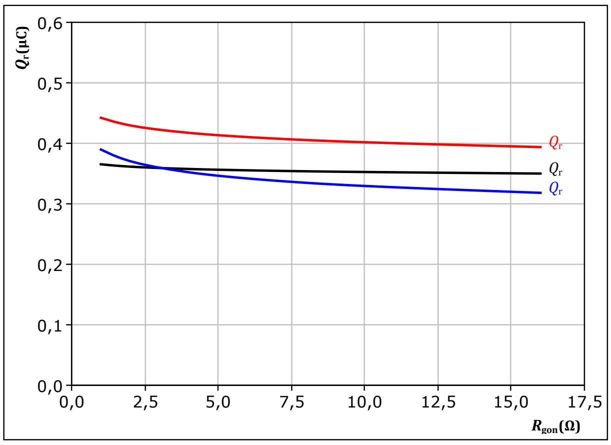
At V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω

T_j: 25 °C
125 °C
150 °C

figure 16. **MOSFET**

Typical recovered charge as a function of turn on gate resistor

Q_r = f(R_{gon})



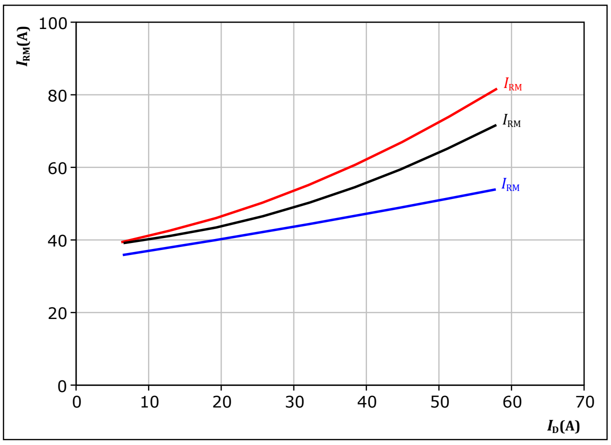
At V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

T_j: 25 °C
125 °C
150 °C

figure 17. **MOSFET**

Typical peak reverse recovery current as a function of drain current

I_{RM} = f(I_D)



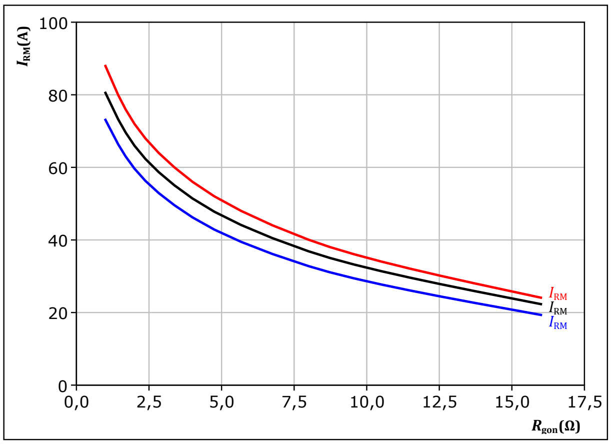
At V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω

T_j: 25 °C
125 °C
150 °C

figure 18. **MOSFET**

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

I_{RM} = f(R_{gon})



At V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

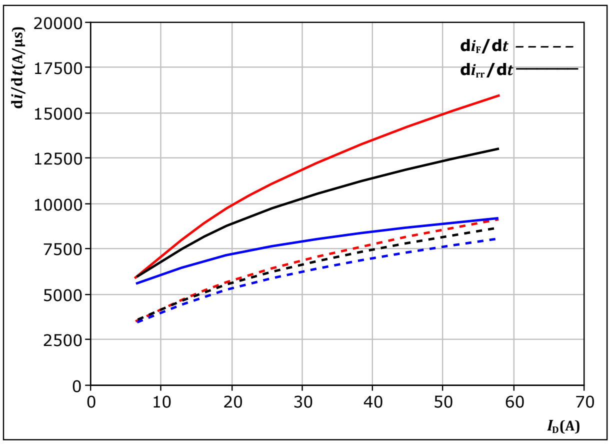
T_j: 25 °C
125 °C
150 °C

H-Bridge Switching Characteristics

figure 19. **MOSFET**

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

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



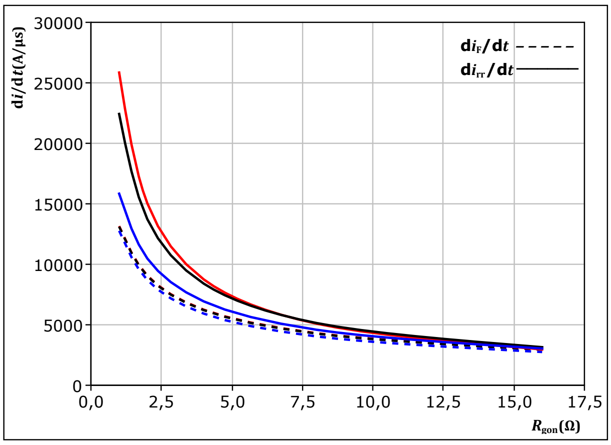
At V_{DS} = 600 V
V_{GS} = -4/15 V
R_{gon} = 4 Ω

T_j: 25 °C
125 °C
150 °C

figure 20. **MOSFET**

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

$di_F/dt,\ di_{rr}/dt = f(\ R_{gon})$



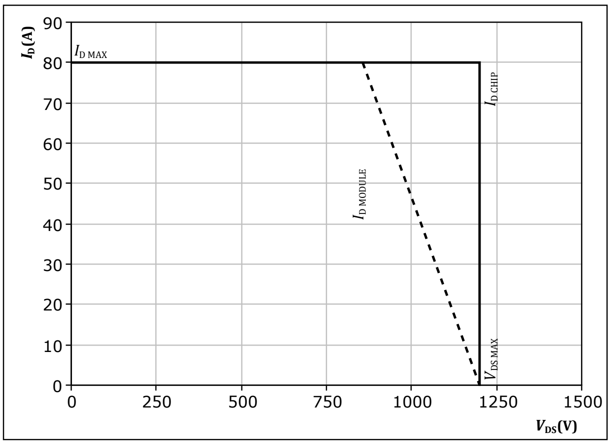
At V_{DS} = 600 V
V_{GS} = -4/15 V
I_D = 32 A

T_j: 25 °C
125 °C
150 °C

figure 21. **MOSFET**

Reverse bias safe operating area

$I_D = f(\ V_{DS})$



At T_j = 150 °C
R_{gon} = 4 Ω
R_{goff} = 4 Ω

H-Bridge Switching Definitions

figure 22. **MOSFET**

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

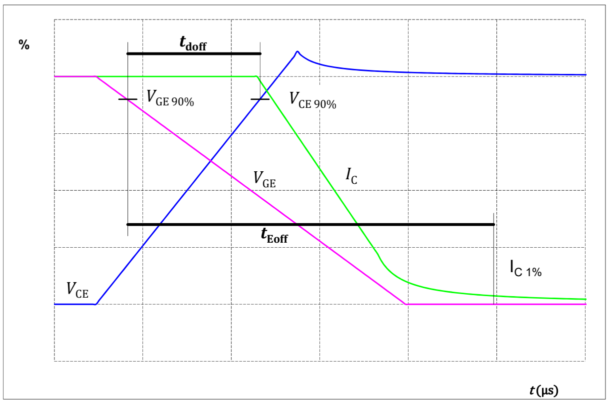


figure 23. **MOSFET**

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

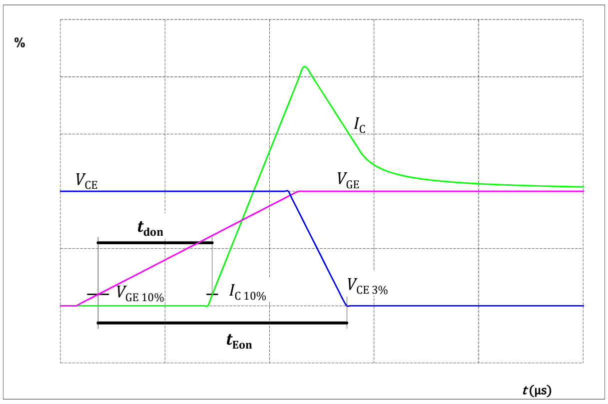


figure 24. **MOSFET**

Turn-off Switching Waveforms & definition of t_f

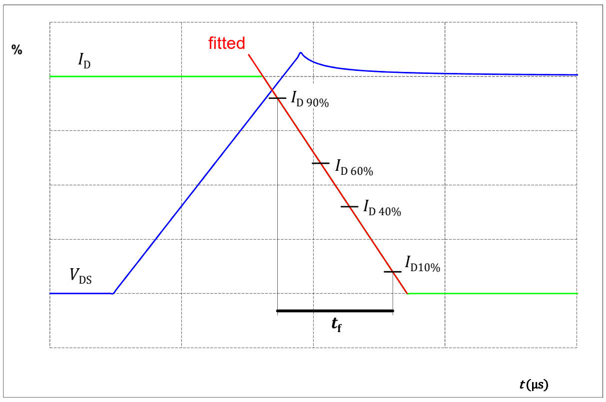
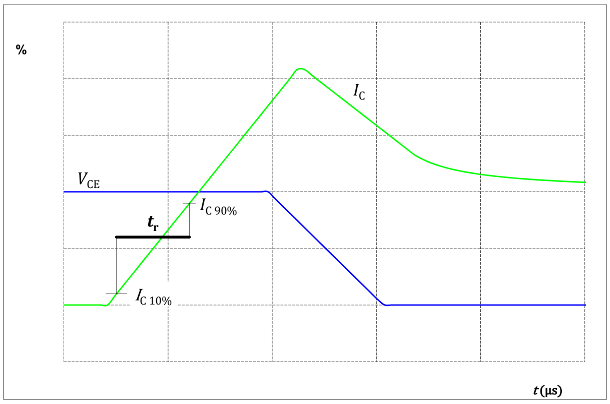


figure 25. **MOSFET**

Turn-on Switching Waveforms & definition of t_r



H-Bridge Switching Definitions

figure 26. **FWD**

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

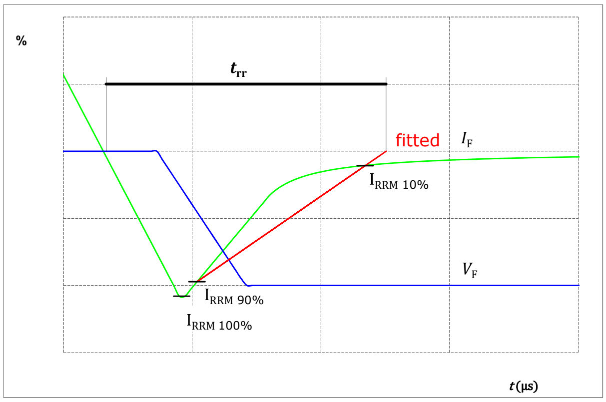


figure 27. **FWD**

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

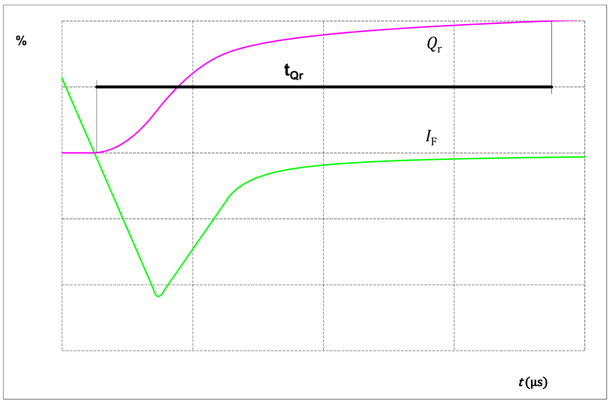
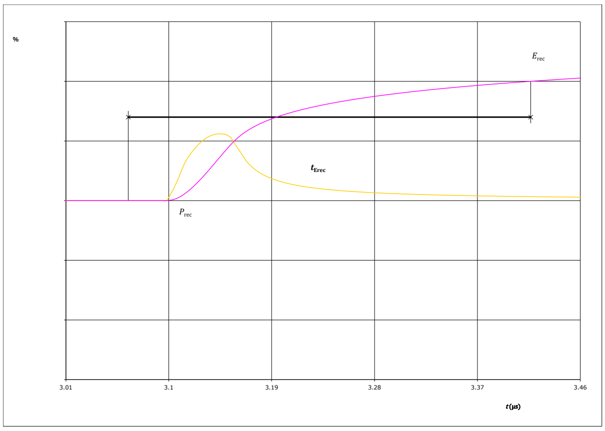


figure 28. **FWD**

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



Ordering Code

Version	Ordering Code
Without thermal paste	10-PZ124PA032ME03-L629F98Y
With thermal paste	10-PZ124PA032ME03-L629F98Y-/3/

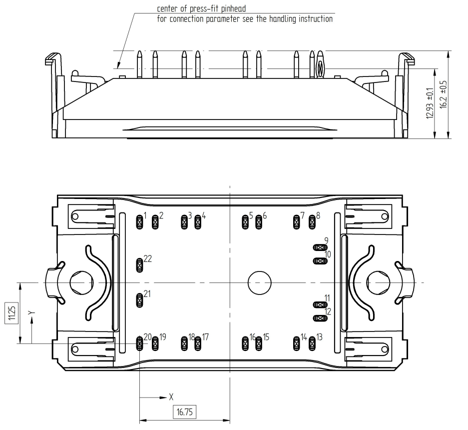
Marking

<table>
<tr><td rowspan="4"> </td><td rowspan="2">Text</td><td colspan="2">Name</td><td>Date code</td><td>UL & VIN</td><td>Lot</td><td>Serial</td></tr>
<tr><td colspan="2">NN-NNNNNNNNNNNNNN-TTTTTTVV</td><td>WWYY</td><td>UL VIN</td><td>LLLLL</td><td>SSSS</td></tr>
<tr><td rowspan="2">Datamatrix</td><td>Type&Ver</td><td>Lot number</td><td>Serial</td><td>Date code</td><td></td><td></td></tr>
<tr><td>TTTTTTTVV</td><td>LLLLL</td><td>SSSS</td><td>WWYY</td><td></td><td></td></tr>
</table>

Outline

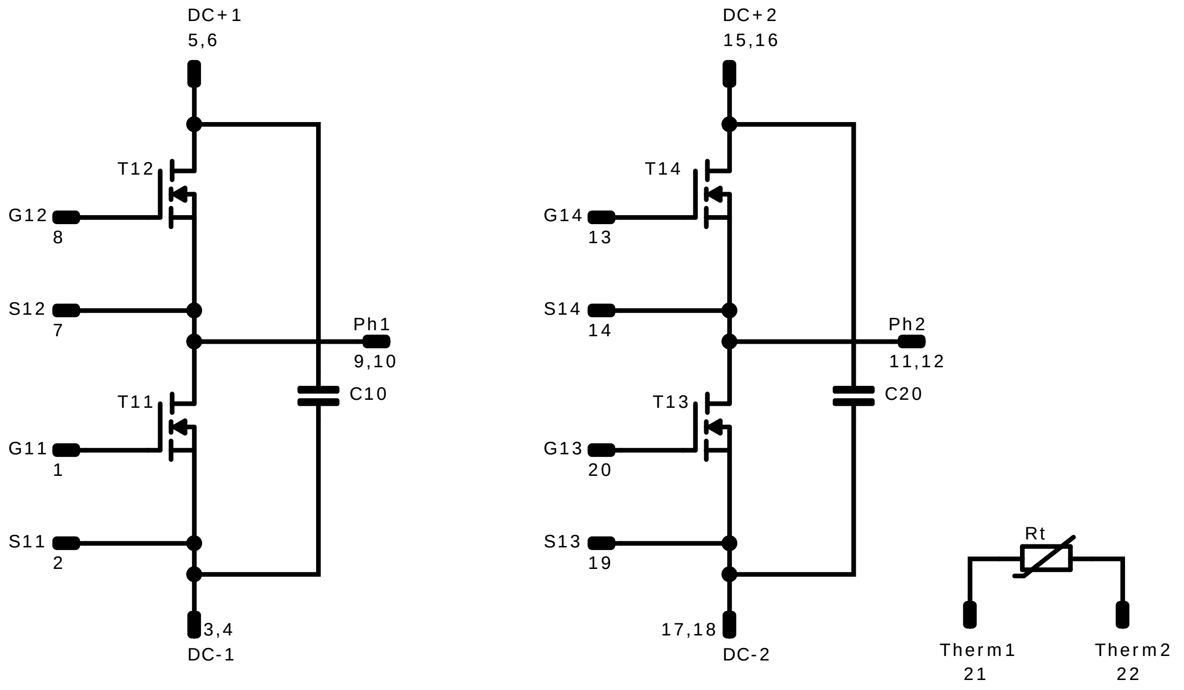
Pin table [mm]

Pin	X	Y	Function
1	0	22,5	G11
2	2,9	22,5	S11
3	8,3	22,5	DC-1
4	10,8	22,5	DC-1
5	19,6	22,5	DC+1
6	22,1	22,5	DC+1
7	29,1	22,5	S12
8	32	22,5	G12
9	33,5	17,8	Ph1
10	33,5	15,3	Ph1
11	33,5	7,2	Ph2
12	33,5	4,7	Ph2
13	32	0	G14
14	29,1	0	S14
15	22,1	0	DC+2
16	19,6	0	DC+2
17	10,8	0	DC-2
18	8,3	0	DC-2
19	2,9	0	S13
20	0	0	G13
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
T11, T12, T13, T14	MOSFET	1200 V	32 mΩ	H-Bridge Switch	
C10, C20	Capacitor	1000 V		Capacitor (DC)	
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-PZ124PA032ME03-L629F98Y-D1-14	4 Sep. 2020		

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As used herein:

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.