



**fast PACK 0 MOS**

**650 V / 80 mΩ**

**Features**

- High speed HBridge
- High efficiency MOS
- Enhanced body diode
- Integrated capacitors
- Thermistor

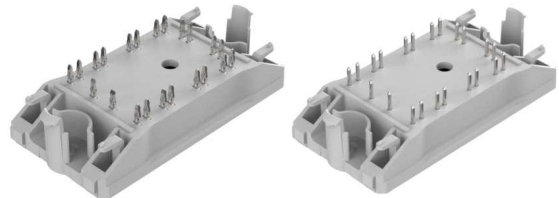
**Target applications**

- Power Supply
- Solar Inverters
- UPS
- Welding & Cutting

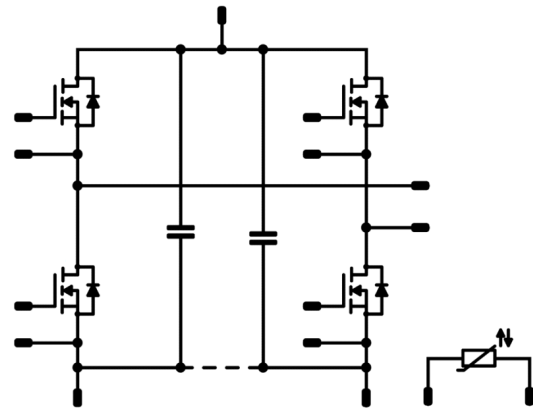
**Types**

- 10-FZ074PA080CR-L622F68
- 10-PZ074PA080CR-L622F68Y

**flow 0 12 mm housing**



**Schematic**





## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>H-Bridge Switch</b>				
Drain-source voltage	$V_{DSS}$		650	V
Drain current	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	18	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	137	A
Avalanche energy, single pulse	$E_{AS}$	$I_D = 8,7\text{ A}$ $V_{DD} = 50\text{ V}$	1160	mJ
Avalanche energy, repetitive	$E_{AR}$	$I_D = 8,7\text{ A}$ $V_{DD} = 50\text{ V}$	1,76	mJ
Avalanche current, repetitive	$I_{AR}$	$t_p$ limited by $T_{jmax}$ $P_{AV} = E_{AR} * f$	8,7	A
MOSFET dv/dt ruggedness	dv/dt	$V_{DS} = 0/480\text{ V}$	50	V/ns
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	87	W
Gate-source voltage	$V_{GSS}$		±20	V
Reverse diode dv/dt	dv/dt		50	V/ns
Maximum Junction Temperature	$T_{jmax}$		150	°C
<b>Capacitor (DC)</b>				
Maximum DC voltage	$V_{MAX}$		630	V
Operation Temperature	$T_{op}$		-55...+125	°C



### Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
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#### Module Properties

##### Thermal Properties

Storage temperature	$T_{stg}$		-40...+125	°C
Operation temperature under switching condition	$T_{top}$		-40...(T <sub>max</sub> - 25)	°C

##### Isolation Properties

Isolation voltage	$V_{isol}$	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			9,55	mm
Comparative Tracking Index	CTI		> 200	

\*100 % tested in production



## Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	

### H-Bridge Switch

#### Static

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Drain-source on-state resistance	$r_{DS(on)}$		10			17,6	25 125		78 159	80	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$				0,00176	25	3,5	4	4,5	V
Gate to Source Leakage Current	$I_{GSS}$		20	0			25			100	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	650			25			3,5	μA
Internal gate resistance	$r_g$								0,75		Ω
Gate charge	$Q_g$								167		nC
Gate to source charge	$Q_{GS}$		0	480	26,3	25			32		
Gate to drain charge	$Q_{GD}$								87		
Short-circuit input capacitance	$C_{iss}$								5030		pF
Short-circuit output capacitance	$C_{oss}$	$f = 1$ MHz	0	100		25			215		
Reverse transfer capacitance	$C_{rss}$								115		

#### Reverse Diode Static

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Diode forward voltage	$V_{SD}$					26,3	25		0,9		V

#### Dynamic

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$						25 125		369 325		ns
Rise time	$t_r$	$R_{goff} = 8 \Omega$ $R_{gon} = 128 \Omega$					25 125		155 171		
Turn-off delay time	$t_{d(off)}$		±15	350	20		25 125		189 200		
Fall time	$t_f$						25 125		10 10		
Turn-on energy (per pulse)	$E_{on}$	$Q_{FWD} = 1 \mu C$ $Q_{FWD} = 2,9 \mu C$					25 125		2,022 3,434		mWs
Turn-off energy (per pulse)	$E_{off}$						25 125		0,070 0,076		
Peak recovery current	$I_{RRM}$						25 125		13 23		A
Reverse recovery time	$t_{rr}$						25 125		130 232		ns
Recovered charge	$Q_r$	$di/dt = 116 A/\mu s$ $di/dt = 113 A/\mu s$	±15	350	20		25 125		0,978 2,949		μC
Reverse recovered energy	$E_{rec}$						25 125		0,027 0,067		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$						25 125		1269 2249		A/μs



### Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max		

#### Capacitor (DC)

Parameter	Symbol	Conditions	Value	Unit
Capacitance	$C$		150	nF
Tolerance			-10	+10 %
Dissipation factor		$f = 1$ kHz	25	2,5 %

#### Thermistor

Parameter	Symbol	Conditions	Value	Unit
Rated resistance	$R$		25	22 kΩ
Deviation of $R_{100}$	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$	100	-5 5 %
Power dissipation	$P$		25	5 mW
Power dissipation constant			25	1,5 mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1$ %	25	3962 K
B-value	$B_{(25/100)}$	Tol. $\pm 1$ %	25	4000 K
Vincotech NTC Reference				I

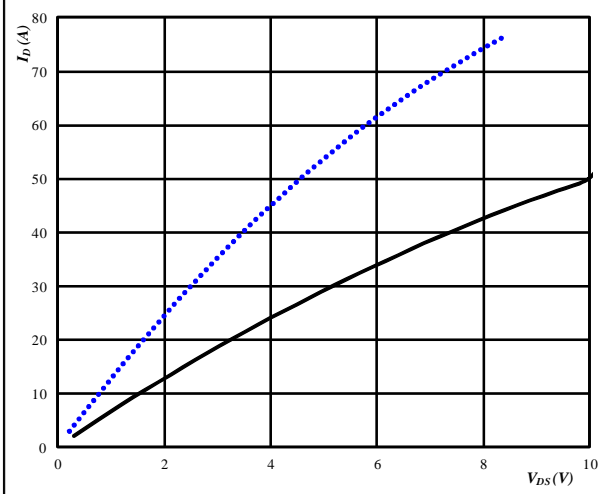


## H-Bridge Switch Characteristics

**figure 1. MOSFET**

**Typical output characteristics**

$I_D = f(V_{DS})$

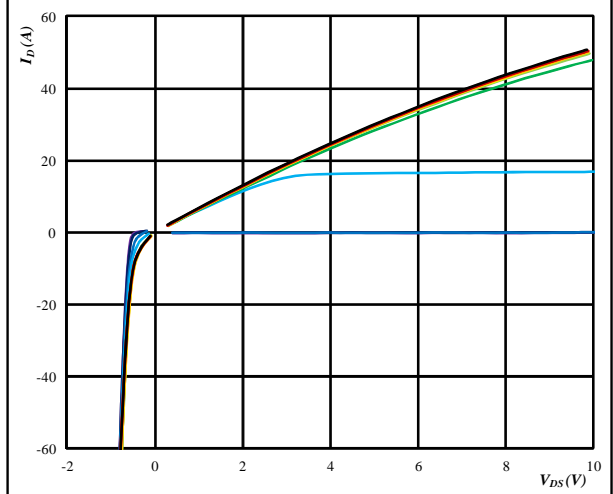


$t_p = 250 \mu s$   $T_j: 25 \text{ }^\circ C$  (dotted blue line)  
 $V_{GS} = 20 V$   $T_j: 125 \text{ }^\circ C$  (solid black line)

**figure 2. MOSFET**

**Typical output characteristics**

$I_D = f(V_{DS})$

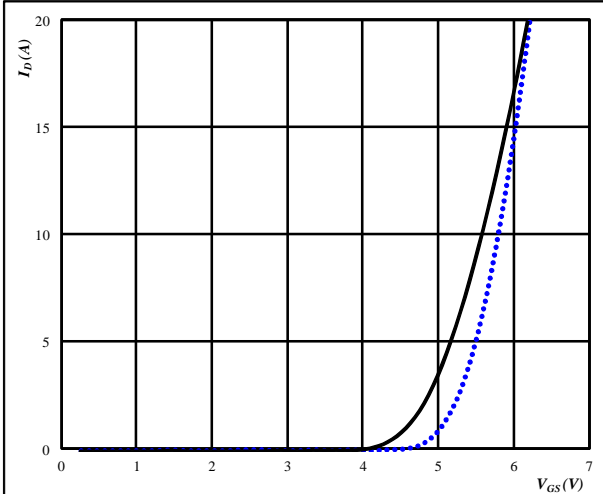


$t_p = 250 \mu s$   
 $T_j = 125 \text{ }^\circ C$   
 $V_{GS}$  from 0 V to 20 V in steps of 2 V

**figure 3. MOSFET**

**Typical transfer characteristics**

$I_D = f(V_{GS})$

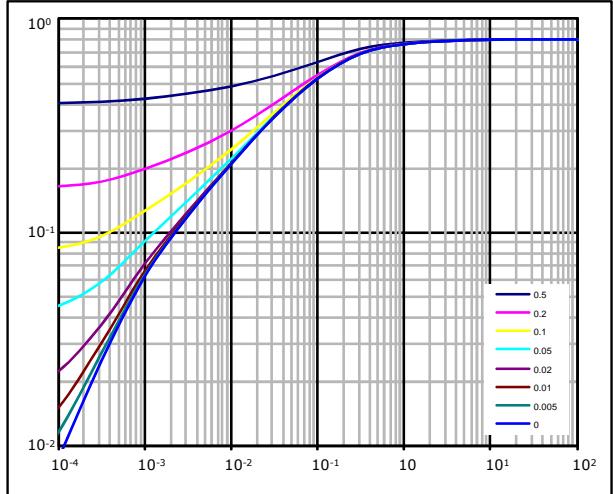


$t_p = 100 \mu s$   $T_j: 25 \text{ }^\circ C$  (dotted blue line)  
 $V_{DS} = 0 V$   $T_j: 125 \text{ }^\circ C$  (solid black line)

**figure 4. MOSFET**

**Transient thermal impedance as a function of pulse width**

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



$D = t_p / T$   
 $R_{th(\theta-s)} = 0,80 \text{ K/W}$

R (K/W)	Tau(s)
3,70E-02	4,80E+00
1,11E-01	1,06E+00
3,45E-01	2,27E-01
1,67E-01	8,51E-02
8,10E-02	1,25E-02
6,04E-02	1,03E-03

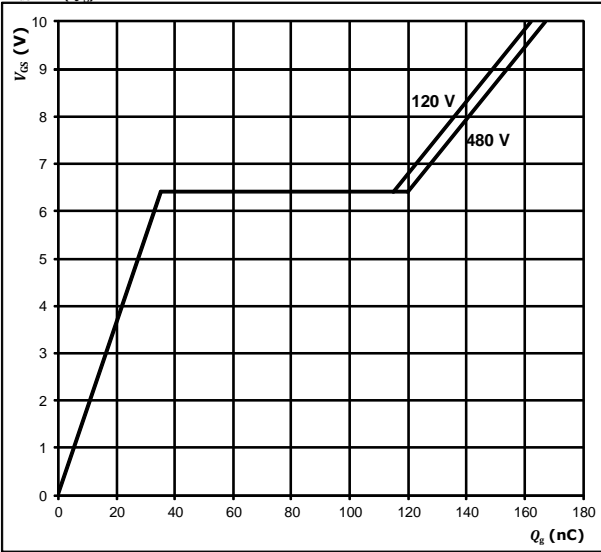


### H-Bridge Switch Characteristics

**figure 5.** MOSFET

**Gate voltage vs Gate charge**

$V_{GS} = f(Q_g)$



**At**  
 $I_C = 18$  A

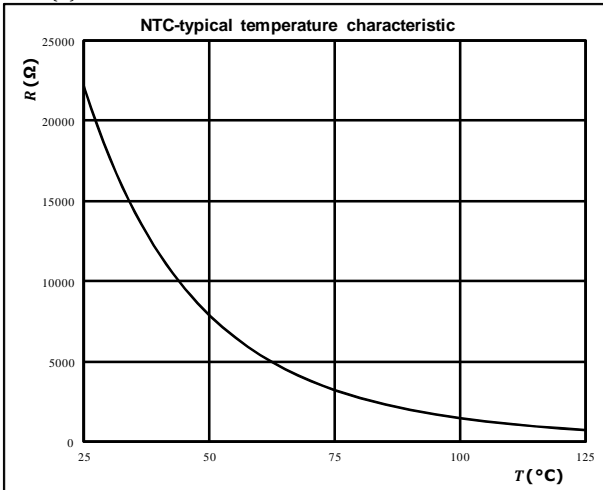


## Thermistor Characteristics

**figure 1.** Thermistor

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

$$R = f(T)$$



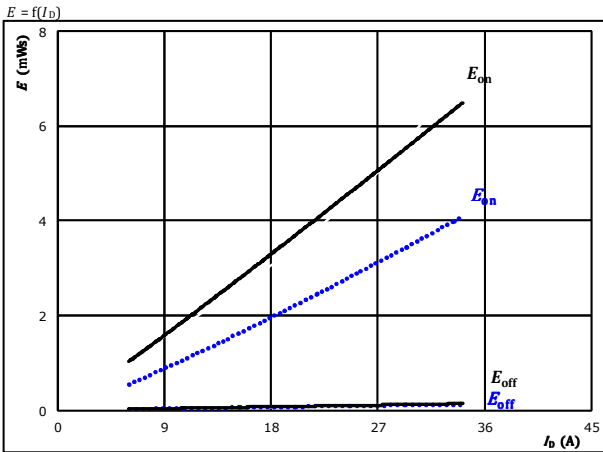




## H-Bridge Switching Characteristics

**figure 1.** MOSFET

Typical switching energy losses as a function of drain current

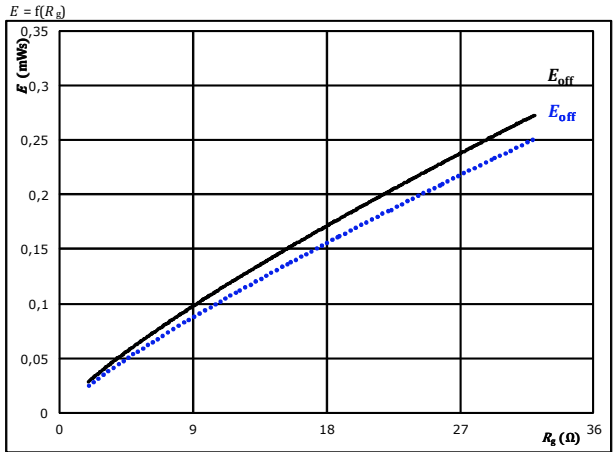


With an inductive load at  $T_j$ : 25 °C (dotted blue line) / 125 °C (solid black line)

$V_{DS} = 600$  V  
 $V_{GS} = \pm 15$  V  
 $R_{gon} = 128$   $\Omega$   
 $R_{goff} = 8$   $\Omega$

**figure 2.** MOSFET

Typical switching energy losses as a function of gate resistor

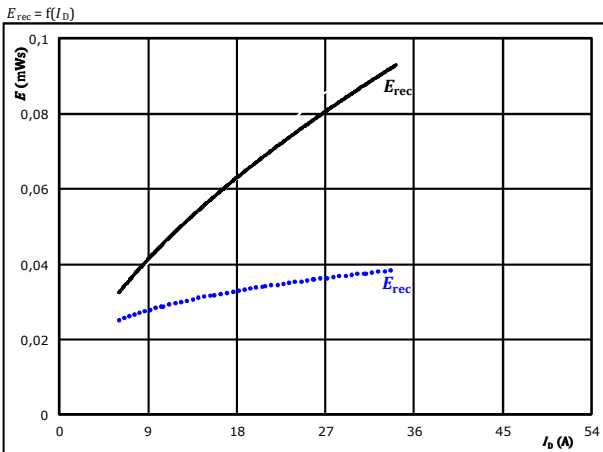


With an inductive load at  $T_j$ : 25 °C (dotted blue line) / 125 °C (solid black line)

$V_{DS} = 600$  V  
 $V_{GS} = \pm 15$  V  
 $I_D = 20$  A

**figure 3.** FWD

Typical reverse recovered energy loss as a function of drain current



With an inductive load at  $T_j$ : 25 °C (dotted blue line) / 125 °C (solid black line)

$V_{DS} = 600$  V  
 $V_{GS} = \pm 15$  V  
 $R_{gon} = 128$   $\Omega$

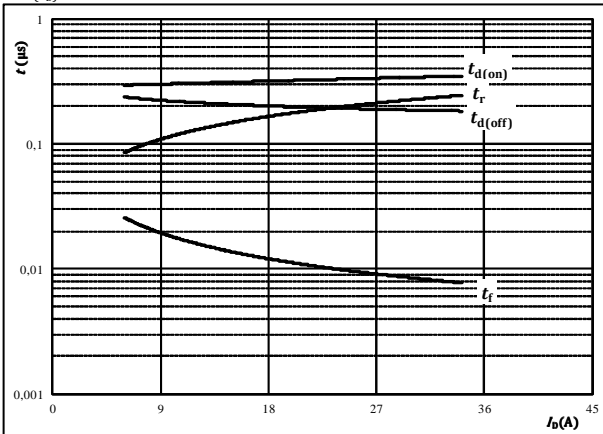


## H-Bridge Switching Characteristics

**figure 4. MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



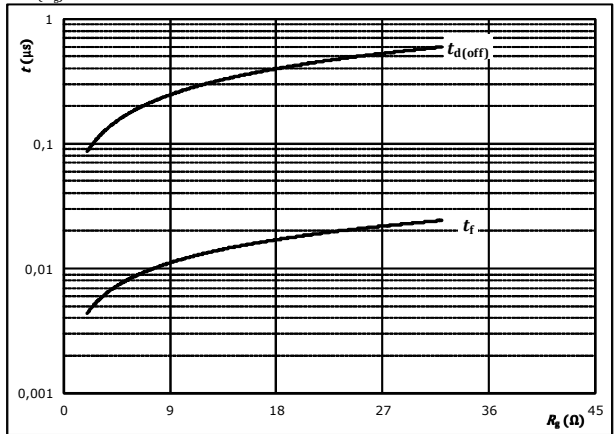
With an inductive load at

- $T_j = 125$  °C
- $V_{DS} = 600$  V
- $V_{GS} = \pm 15$  V
- $R_{g(on)} = 128$  Ω
- $R_{g(off)} = 8$  Ω

**figure 5. MOSFET**

Typical switching times as a function of gate resistor

$t = f(R_g)$



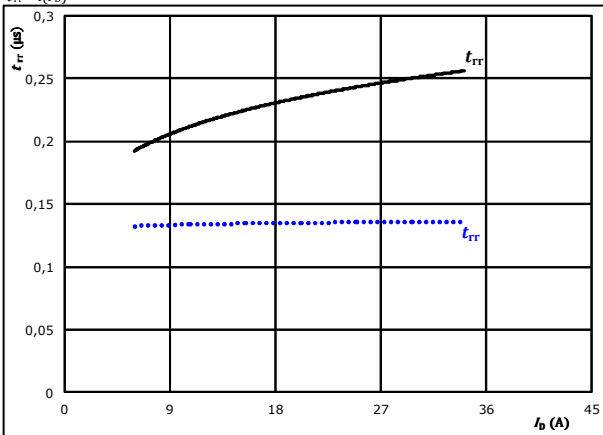
With an inductive load at

- $T_j = 125$  °C
- $V_{DS} = 600$  V
- $V_{GS} = \pm 15$  V
- $I_D = 20$  A

**figure 6. FWD**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



- At  $V_{DS} = 600$  V  $T_j = 25$  °C .....  
 $V_{GS} = \pm 15$  V  $T_j = 125$  °C —————  
 $R_{g(on)} = 128$  Ω

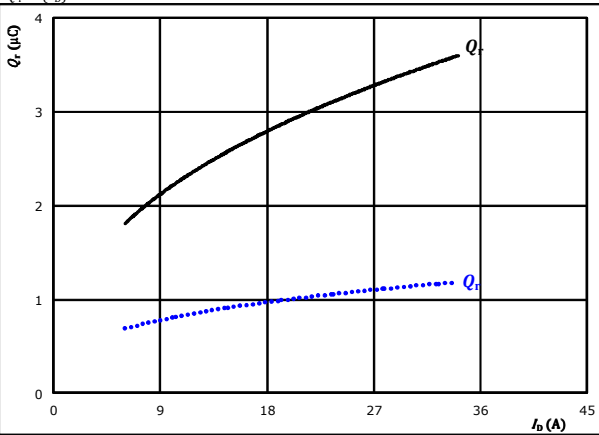


## H-Bridge Switching Characteristics

**figure 7.** FWD

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

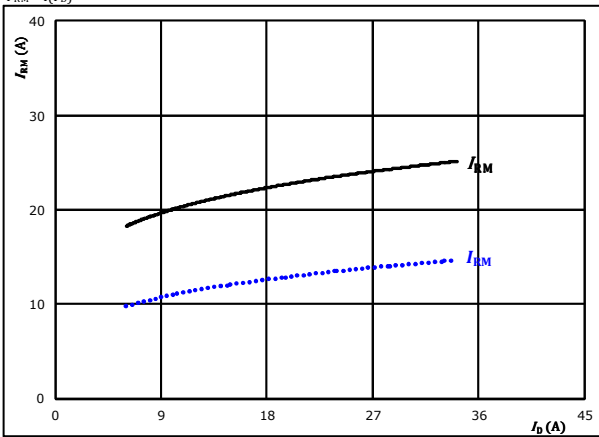


**At**  $V_{DS} = 600\text{ V}$   $V_{GS} = \pm 15\text{ V}$   $R_{gpn} = 128\ \Omega$   $T_j = 25\text{ °C}$  (dotted blue line)  
 $T_j = 125\text{ °C}$  (solid black line)

**figure 8.** FWD

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

$I_{RM} = f(I_D)$



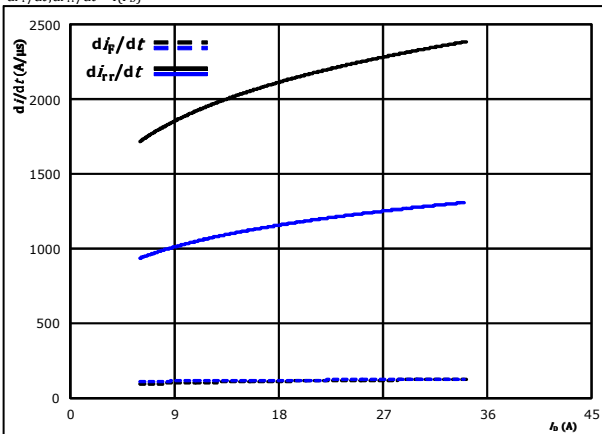
**At**  $V_{DS} = 600\text{ V}$   $V_{GS} = \pm 15\text{ V}$   $R_{gpn} = 128\ \Omega$   $T_j = 25\text{ °C}$  (dotted blue line)  
 $T_j = 125\text{ °C}$  (solid black line)



## H-Bridge Switching Characteristics

**figure 9.** FWD

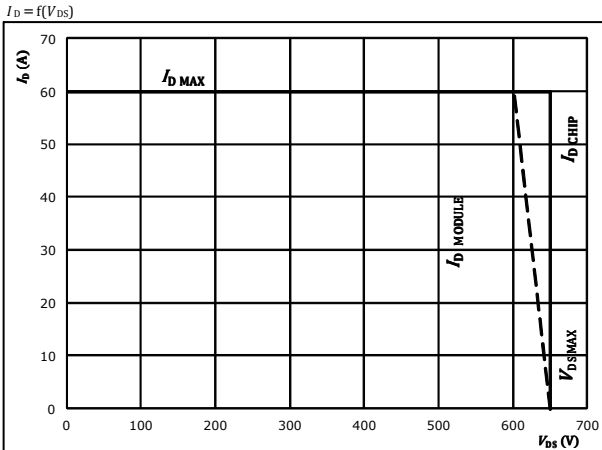
Typical rate of fall of forward and reverse recovery current as a function of drain current  
 $di_f/dt, di_{rr}/dt = f(I_D)$



At  $V_{DS} = 600$  V  $T_j = 25$  °C .....  
 $V_{GS} = \pm 15$  V  $T_j = 125$  °C ———  
 $R_{gon} = 128$  Ω

**figure 10.** MOSFET

Reverse bias safe operating area



At  $T_j = 150$  °C  
 $R_{gon} = 128$  Ω  
 $R_{goff} = 8$  Ω



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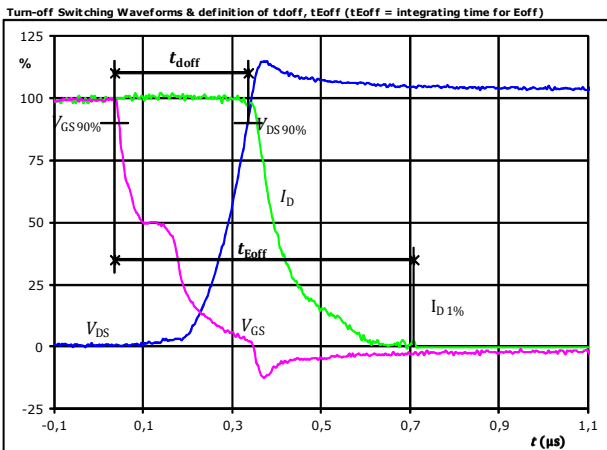
**10-FZ074PA080CR-L622F68**  
**10-PZ074PA080CR-L622F68Y**  
 datasheet

## H-Bridge Switching Characteristics

### General conditions

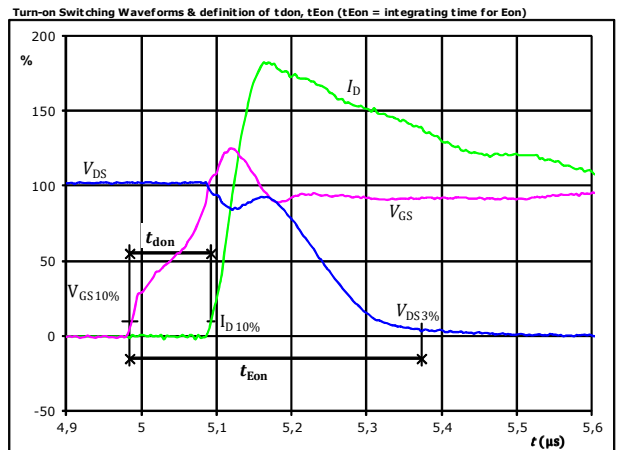
$T_j$	=	125 °C
$R_{gon}$	=	4 $\Omega$
$R_{goff}$	=	4 $\Omega$

**figure 1.** MOSFET



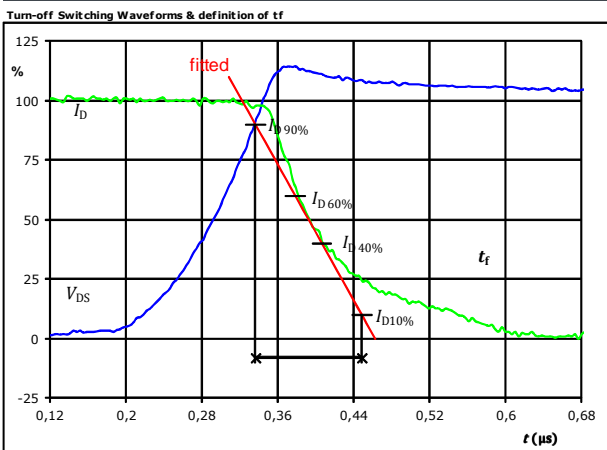
$V_{GS}(0\%)$	=	-15	V
$V_{GS}(100\%)$	=	15	V
$V_{DS}(100\%)$	=	600	V
$I_D(100\%)$	=	100	A
$t_{doff}$	=	0,291	$\mu s$
$t_{Eoff}$	=	0,673	$\mu s$

**figure 2.** MOSFET



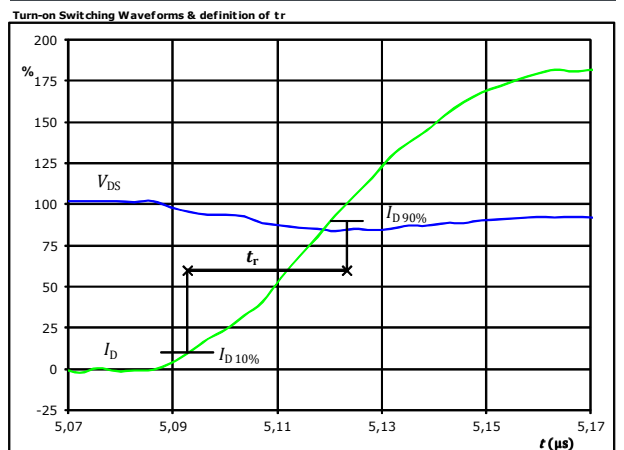
$V_{GS}(0\%)$	=	-15	V
$V_{GS}(100\%)$	=	15	V
$V_{DS}(100\%)$	=	600	V
$I_D(100\%)$	=	100	A
$t_{don}$	=	0,106	$\mu s$
$t_{Eon}$	=	0,388	$\mu s$

**figure 3.** MOSFET



$V_{DS}(100\%)$	=	600	V
$I_D(100\%)$	=	100	A
$t_f$	=	0,111	$\mu s$

**figure 4.** MOSFET

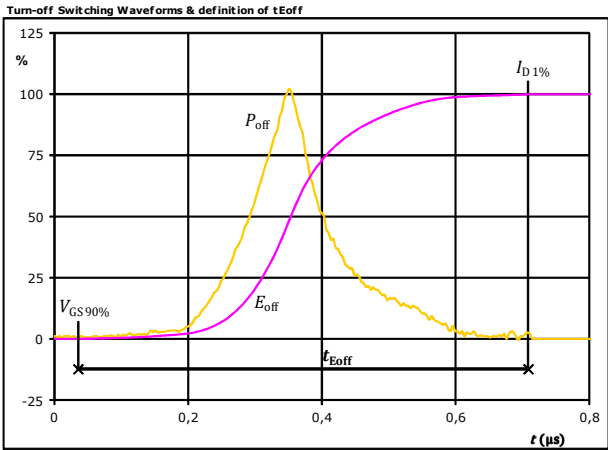


$V_{DS}(100\%)$	=	600	V
$I_D(100\%)$	=	100	A
$t_r$	=	0,027	$\mu s$



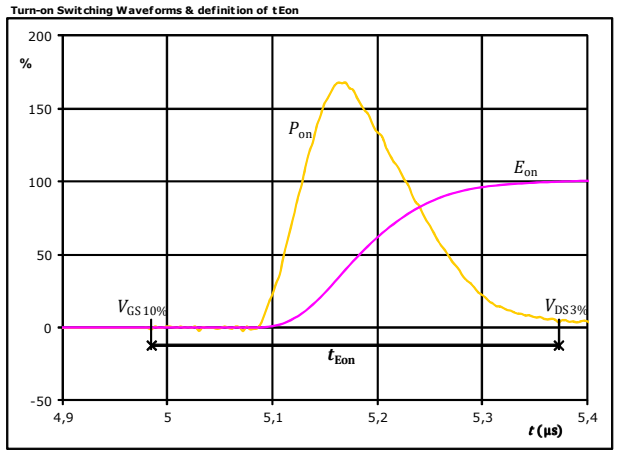
## H-Bridge Switching Characteristics

**figure 5.** MOSFET



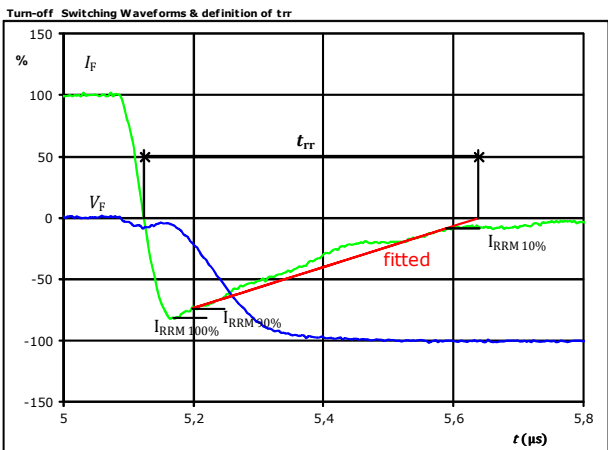
$P_{off}(100\%) =$	59,91	kW
$E_{off}(100\%) =$	8,87	mJ
$t_{Eoff} =$	0,67	$\mu$ s

**figure 6.** MOSFET



$P_{on}(100\%) =$	59,91	kW
$E_{on}(100\%) =$	12,48	mJ
$t_{Eon} =$	0,39	$\mu$ s

**figure 7.** FWD



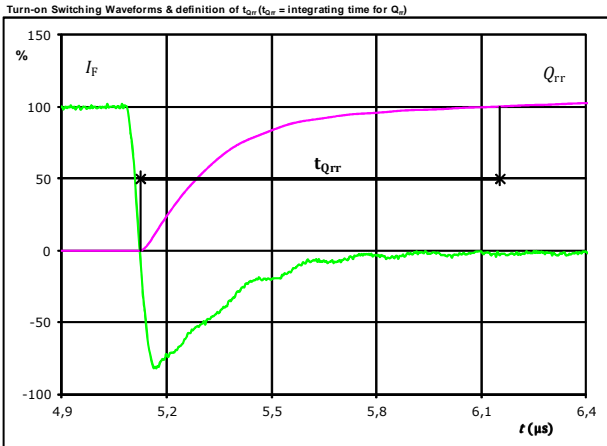
$V_F(100\%) =$	600	V
$I_F(100\%) =$	100	A
$I_{RRM}(100\%) =$	-83	A
$t_{rr} =$	0,510	$\mu$ s



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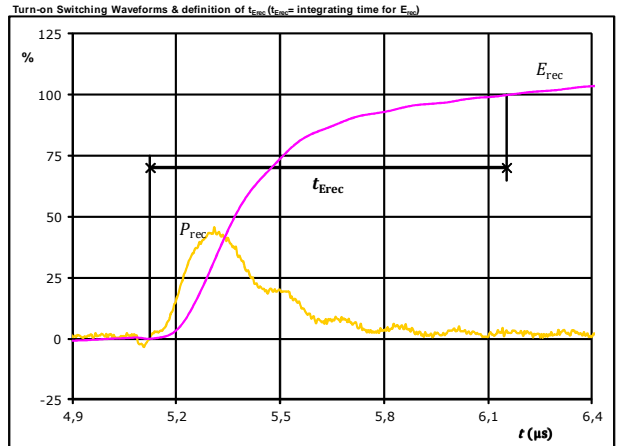
## H-Bridge Switching Characteristics

**figure 8.** FWD



$I_F$ (100%) =	100	A
$Q_{rr}$ (100%) =	20,73	$\mu\text{C}$
$t_{Qrr}$ =	1,03	$\mu\text{s}$

**figure 9.** FWD



$P_{rec}$ (100%) =	59,91	kW
$E_{rec}$ (100%) =	7,85	mJ
$t_{Erec}$ =	1,03	$\mu\text{s}$



**10-FZ074PA080CR-L622F68**  
**10-PZ074PA080CR-L622F68Y**  
 datasheet

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Ordering Code & Marking							
Version			Ordering Code				
without thermal paste 12 mm housing with solder pins			10-FZ074PA080CR-L622F68				
with thermal paste 12 mm housing with solder pins			10-FZ074PA080CR-L622F68-/3/				
without thermal paste 12 mm housing with press-fit pins			10-PZ074PA080CR-L622F68Y				
with thermal paste 12 mm housing with press-fit pins			10-PZ074PA080CR-L622F68Y-/3/				
NN-NNNNNNNNNNNN TTTTUV WWYY UL VIN LLLL SSSS		Text	Name	Date code	UL & VIN	Lot	Serial
			NN-NNNNNNNNNNNN-TTTTUV WWYY UL VIN LLLL SSSS	WWYY	UL VIN	LLLLL	SSSS
Datamatrix		Text	Type&Ver	Lot number	Serial	Date code	
			TTTTTUV	LLLLL	SSSS	WWYY	

Pin table			
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+
6	22,1	22,5	DC+
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+
16	19,6	0	DC+
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

**Outline**

center of press-fit pinhead  
for connection parameter see the handling instruction

12,93 ±0,1  
16,2 ±0,5

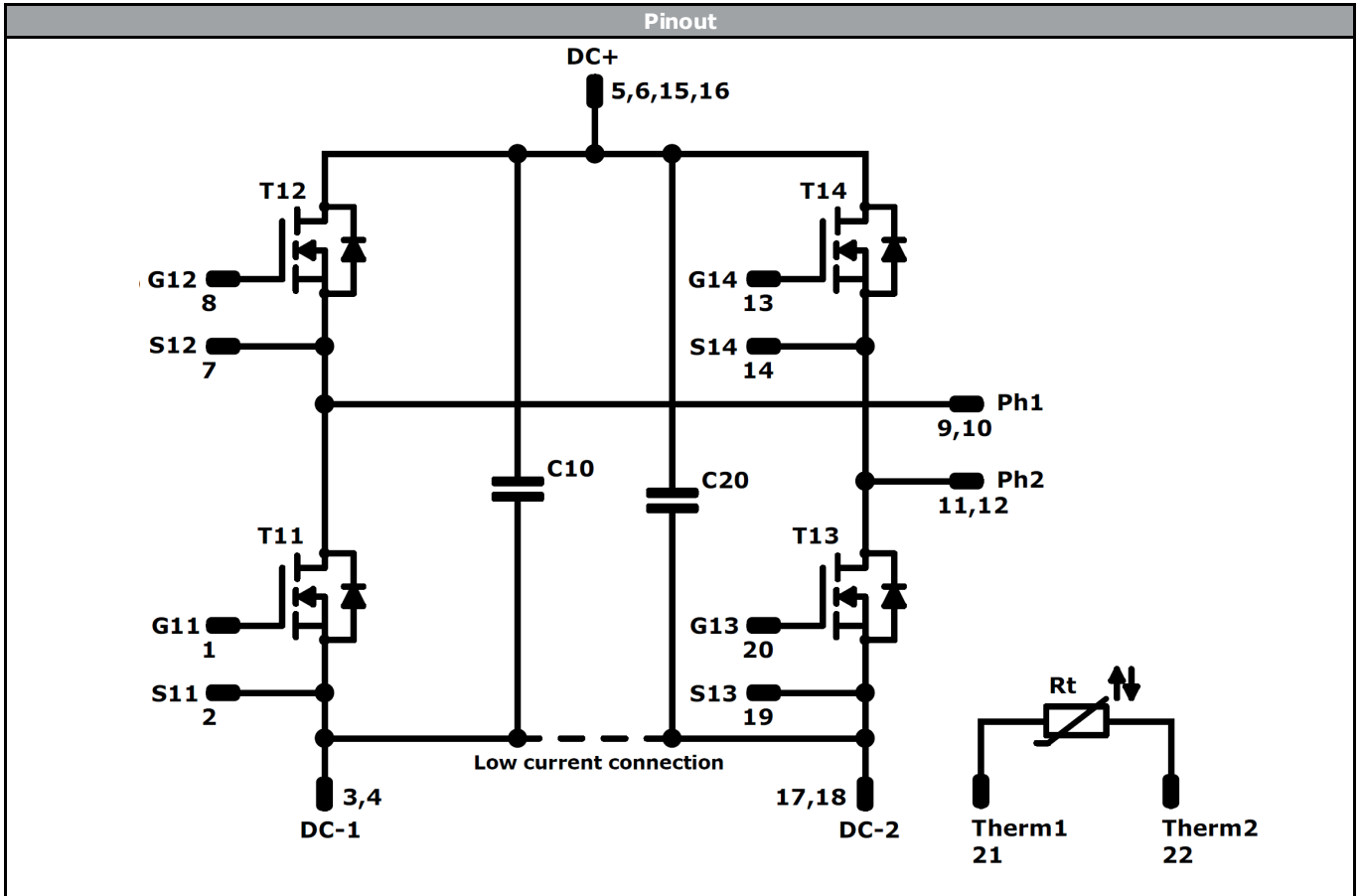
11,25  
16,75

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





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<b>Identification</b>					
<b>ID</b>	<b>Component</b>	<b>Voltage</b>	<b>Current</b>	<b>Function</b>	<b>Comment</b>
T11-T14	MOSFET	650 V	80 mΩ	H-Bridge Switch	
C10 , C20	Capacitor			Capacitor (DC)	
Rt	NTC			Thermistor	




Vincotech

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

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</i> 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-xZ074PA080CR-L622F68x-D1-14	12 Jul. 2017		

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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.