



fastPACK 0 SiC

1200 V / 36 mΩ

Topology features

- Kelvin Emitter for improved switching performance
- Integrated DC capacitor
- Open Emitter configuration
- Temperature sensor

Component features

- Easy paralleling
- Low on-resistance
- Fast switching speed
- Fast recovery body diode

Housing features

- Base isolation: Al₂O₃
- Clip-in, reliable mechanical connection, qualified for wave soldering
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

- Charging Stations
- Power Supply

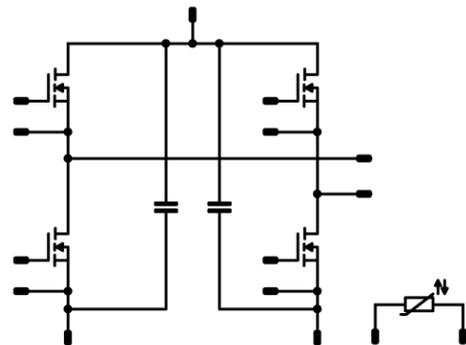
Types

- 10-PZ124PA036MR-L629F18Y

flow 0 12 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
H-Bridge Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	28	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	84	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	57	W
Gate-source voltage	V_{GSS}		-4 / 21	V
		dynamic	-4 / 23	
Maximum Junction Temperature	T_{jmax}		175	°C

Capacitor (DC)

Maximum DC voltage	V_{MAX}		1000	V
Operation Temperature	T_{op}		-55 ... 125	°C

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* $t_p = 2\text{ s}$	6000	V
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			9,15	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production



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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	$r_{DS(on)}$		18		21	25 125 150		34,8 56,4 65	45 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,0111	25	2,8	3,5	4,8	V
Gate to Source Leakage Current	I_{GSS}		21	0		25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		1	80	μA
Internal gate resistance	r_g							1		Ω
Gate charge	Q_g							91		nC
Gate to source charge	Q_{GS}		0/18	800	21	25		20		
Gate to drain charge	Q_{GD}							24		
Short-circuit input capacitance	C_{iss}							2335		pF
Short-circuit output capacitance	C_{oss}	$f = 1$ Mhz	0	800	0	25		70		
Reverse transfer capacitance	C_{rss}							5		
Diode forward voltage	V_{SD}		0		21	25		3,3		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,67		K/W
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Vincotech

10-PZ124PA036MR-L629F18Y
datasheet

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	$t_{d(on)}$					25 125 150		23,66 24,1 24,25		ns
Rise time	t_r	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$				25 125 150		9,16 8,85 8,87		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		22,68 25,6 26,37		ns
Fall time	t_f					25 125 150		5,26 4,81 4,95		ns
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=0,143 \mu C$ $Q_{tFWD}=0,256 \mu C$ $Q_{rFWD}=0,345 \mu C$	± 16	600	30	25 125 150		0,292 0,302 0,327		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,047 0,047 0,049		mWs
Peak recovery current	I_{RRM}					25 125 150		20,46 22,24 23,57		A
Reverse recovery time	t_{rr}				25 125 150		12,47 20,96 22,23		ns	
Recovered charge	Q_r	$di/dt=3697 A/\mu s$ $di/dt=3631 A/\mu s$ $di/dt=4134 A/\mu s$				25 125 150		0,143 0,256 0,345		μC
Reverse recovered energy	E_{rec}					25 125 150		0,027 0,079 0,117		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		4788,08 1225,34 2042,95		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		10		nF
Tolerance							-10		10	%
Dissipation factor		$f = 1$ kHz				25		0,1		%

Thermistor

Static

Rated resistance	R					25		22		k Ω
Deviation of R100	$A_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		130		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.

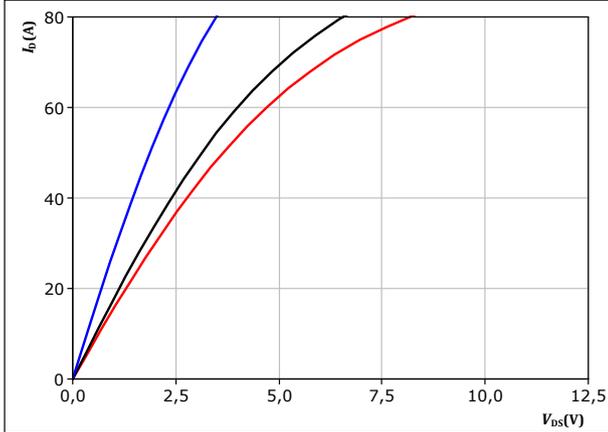


H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

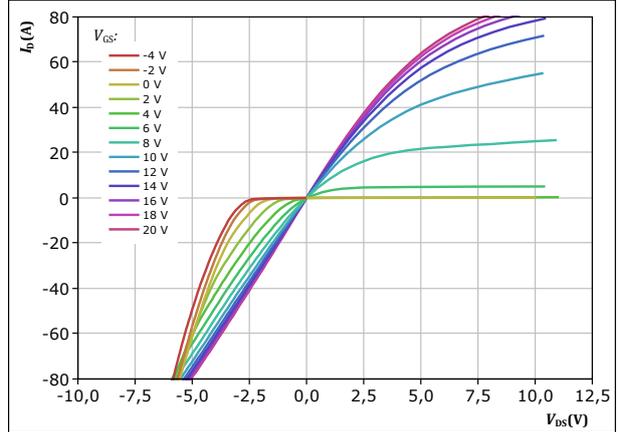


$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 2. MOSFET

Typical output characteristics

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

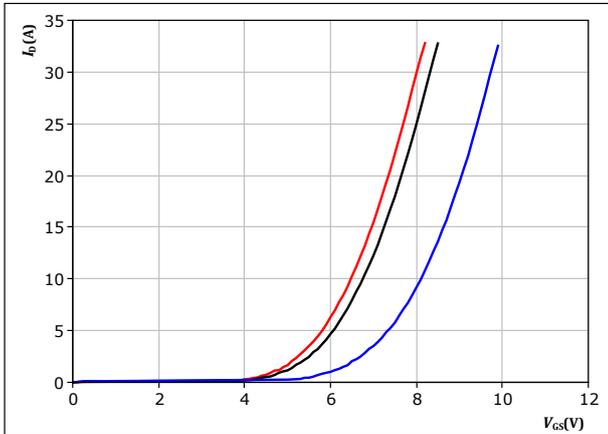


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ\text{C}$
 V_{GS} from -4 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

$$I_D = f(V_{GS})$$

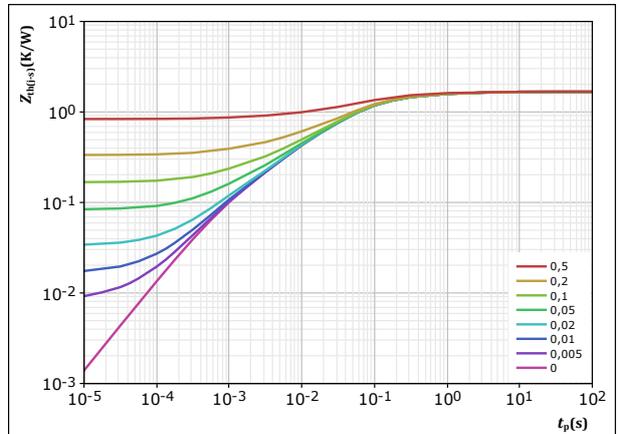


$t_p = 250 \mu s$
 $V_{DS} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,672 \text{ K/W}$
MOSFET thermal model values

R (K/W)	τ (s)
1,22E-01	2,51E+00
3,62E-01	2,54E-01
8,39E-01	5,37E-02
2,77E-01	7,82E-03
7,32E-02	8,42E-04

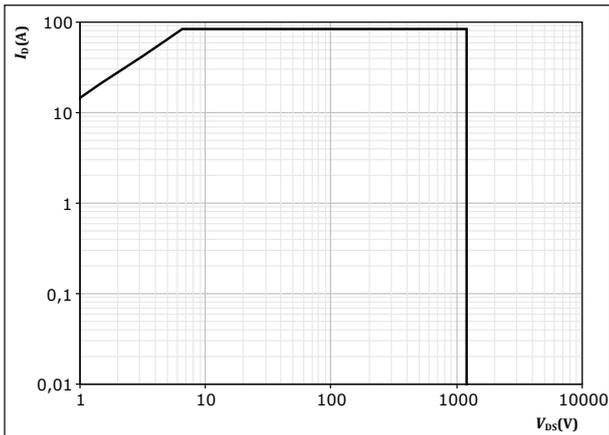


H-Bridge Switch Characteristics

figure 5. MOSFET

Safe operating area

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

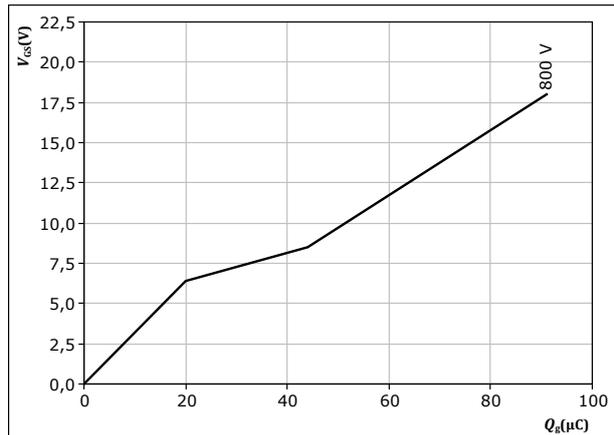


$D =$ single pulse
 $T_s = 80$ °C
 $V_{GS} = 18$ V
 $T_j = T_{jmax}$

figure 6. MOSFET

Gate voltage vs gate charge

$$V_{GS} = f(Q_g)$$



$I_D = 21$ A
 $T_j = 25$ °C

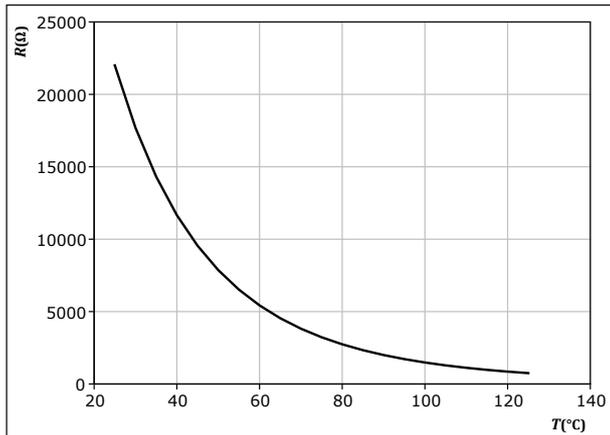


Thermistor Characteristics

figure 7. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

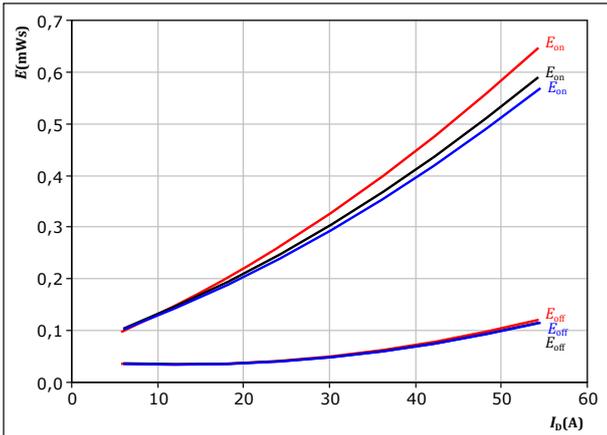




H-Bridge Switching Characteristics

figure 8. MOSFET

Typical switching energy losses as a function of drain current
 $E = f(I_D)$

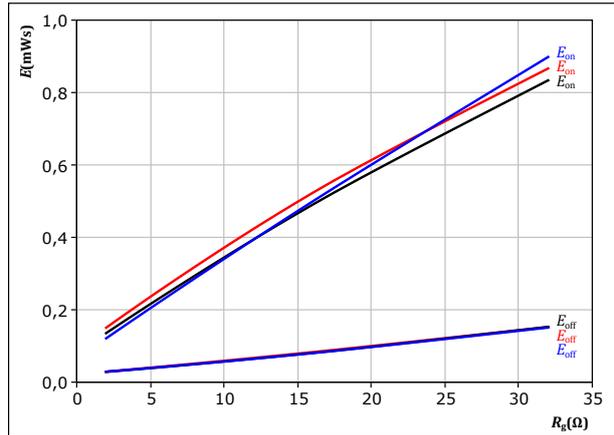


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	±16	V		125 °C
$R_{gon} =$	8	Ω		150 °C
$R_{goff} =$	8	Ω		

figure 9. MOSFET

Typical switching energy losses as a function of MOSFET turn on gate resistor
 $E = f(R_g)$

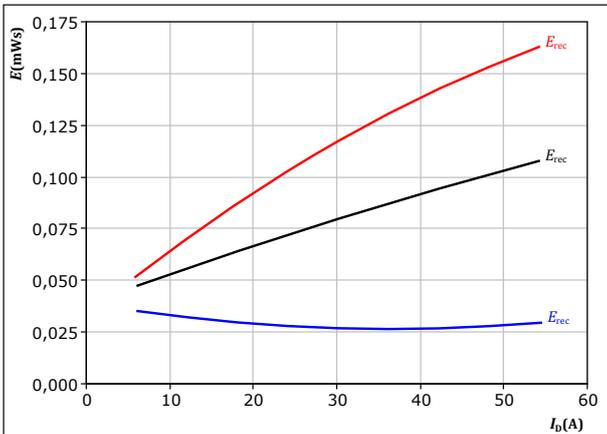


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	±16	V		125 °C
$I_D =$	30	A		150 °C

figure 10. MOSFET

Typical reverse recovered energy loss as a function of drain current
 $E_{rec} = f(I_D)$

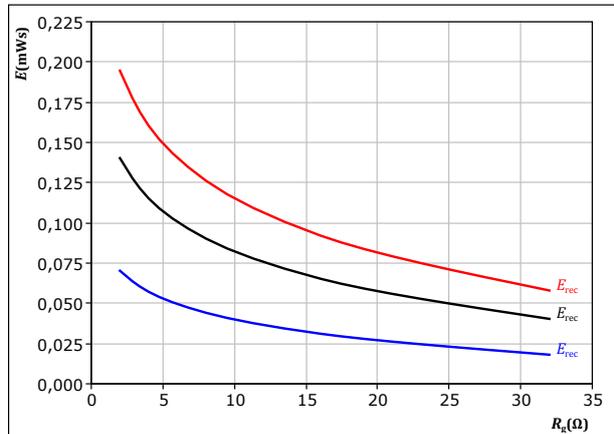


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	±16	V		125 °C
$R_{gon} =$	8	Ω		150 °C

figure 11. MOSFET

Typical reverse recovered energy loss as a function of MOSFET turn on gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at

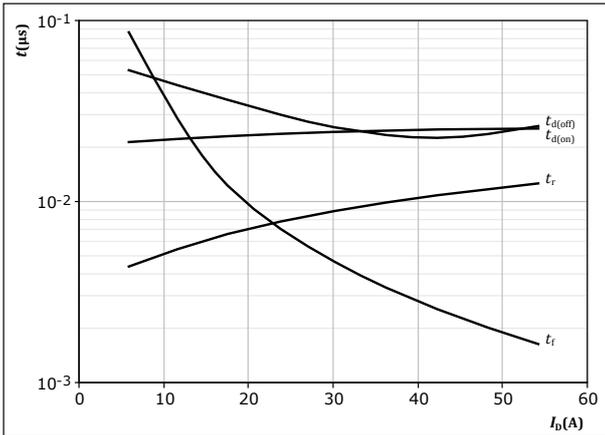
$V_{DS} =$	600	V	$T_j:$	25 °C
$V_{GS} =$	±16	V		125 °C
$I_D =$	30	A		150 °C



H-Bridge Switching Characteristics

figure 12. MOSFET

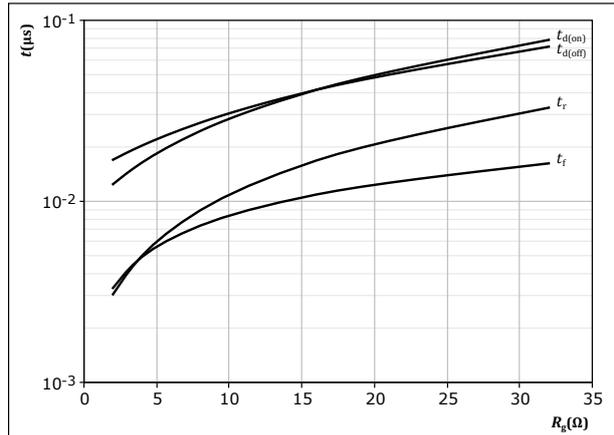
Typical switching times as a function of drain current
 $t = f(I_D)$



With an inductive load at
 $T_j = 150 \text{ } ^\circ\text{C}$
 $V_{DS} = 600 \text{ V}$
 $V_{GS} = \pm 16 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $R_{goff} = 8 \text{ } \Omega$

figure 13. MOSFET

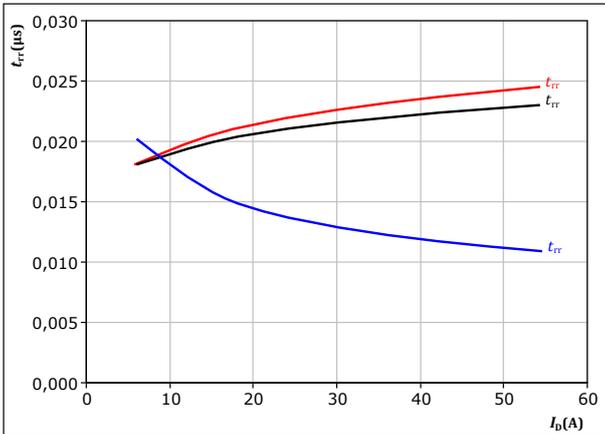
Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ } ^\circ\text{C}$
 $V_{DS} = 600 \text{ V}$
 $V_{GS} = \pm 16 \text{ V}$
 $I_D = 30 \text{ A}$

figure 14. MOSFET

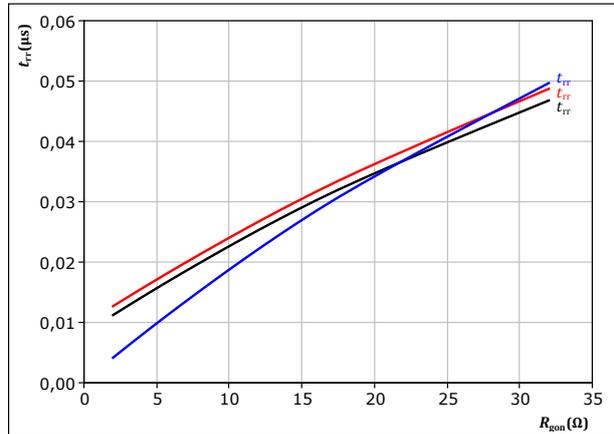
Typical reverse recovery time as a function of drain current
 $t_{rr} = f(I_D)$



At $V_{DS} = 600 \text{ V}$
 $V_{GS} = \pm 16 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $T_j: 25 \text{ } ^\circ\text{C}$
 $125 \text{ } ^\circ\text{C}$
 $150 \text{ } ^\circ\text{C}$

figure 15. MOSFET

Typical reverse recovery time as a function of MOSFET turn on gate resistor
 $t_{rr} = f(R_{gon})$



At $V_{DS} = 600 \text{ V}$
 $V_{GS} = \pm 16 \text{ V}$
 $I_D = 30 \text{ A}$
 $T_j: 25 \text{ } ^\circ\text{C}$
 $125 \text{ } ^\circ\text{C}$
 $150 \text{ } ^\circ\text{C}$

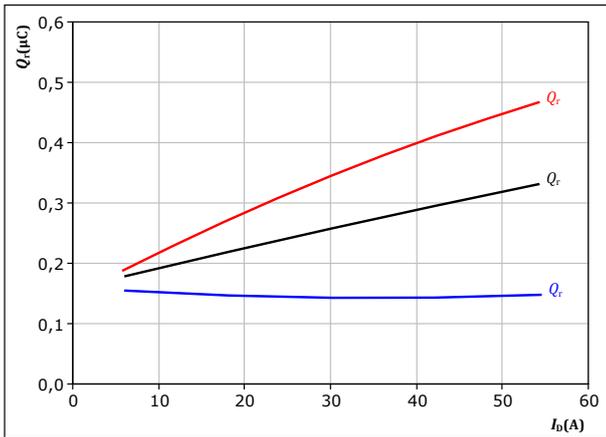


H-Bridge Switching Characteristics

figure 16. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



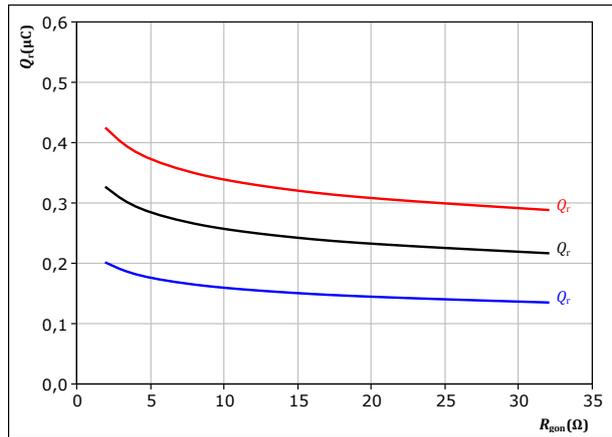
At $V_{DS} = 600$ V
 $V_{GS} = \pm 16$ V
 $R_{gson} = 8$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 17. MOSFET

Typical recovered charge as a function of MOSFET turn on gate resistor

$$Q_r = f(R_{gson})$$



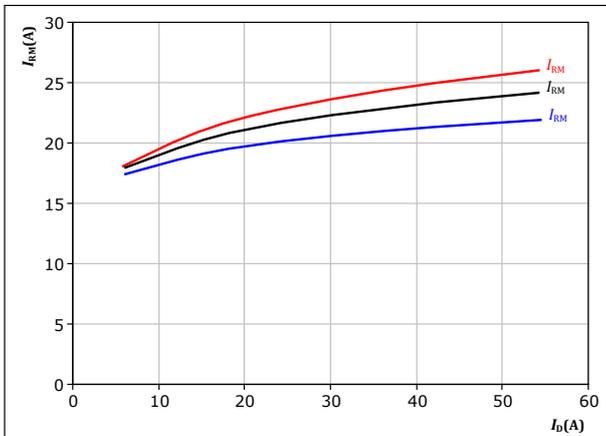
At $V_{DS} = 600$ V
 $V_{GS} = \pm 16$ V
 $I_D = 30$ A

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 18. MOSFET

Typical peak reverse recovery current as a function of drain current

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



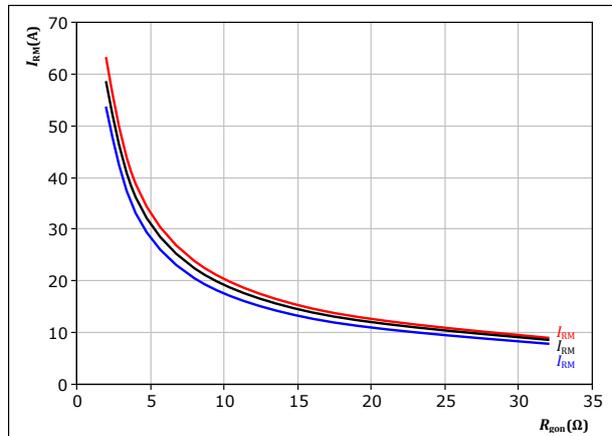
At $V_{DS} = 600$ V
 $V_{GS} = \pm 16$ V
 $R_{gson} = 8$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 19. MOSFET

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

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



At $V_{DS} = 600$ V
 $V_{GS} = \pm 16$ V
 $I_D = 30$ A

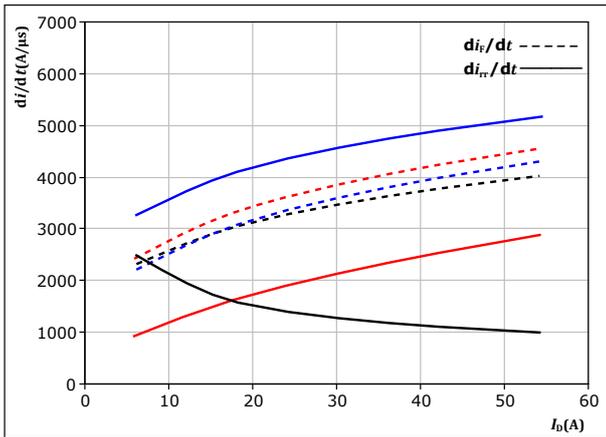
T_j : — 25 °C
 — 125 °C
 — 150 °C



H-Bridge Switching Characteristics

figure 20. MOSFET

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

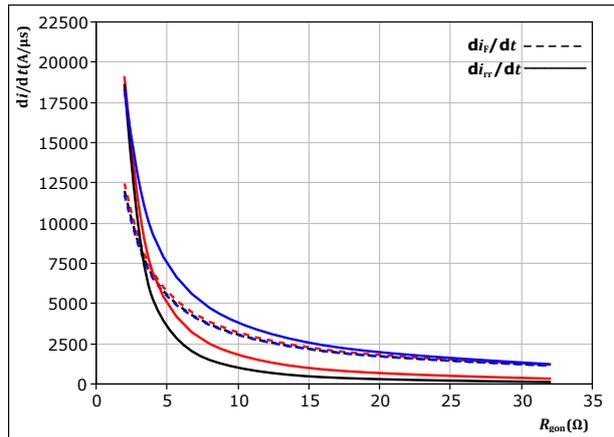


At $V_{DS} = 600$ V
 $V_{GS} = \pm 16$ V
 $R_{g(on)} = 8$ Ω

T_j : 25 °C
 125 °C
 150 °C

figure 21. MOSFET

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



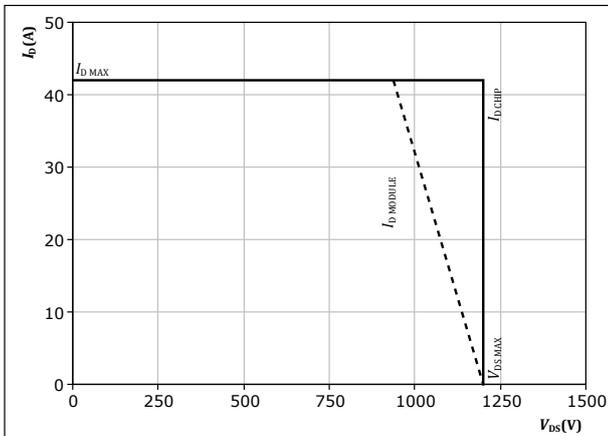
At $V_{DS} = 600$ V
 $V_{GS} = \pm 16$ V
 $I_D = 30$ A

T_j : 25 °C
 125 °C
 150 °C

figure 22. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



At $T_j = 150$ °C
 $R_{g(on)} = 8$ Ω
 $R_{g(off)} = 8$ Ω



H-Bridge Switching Definitions

figure 23. MOSFET

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

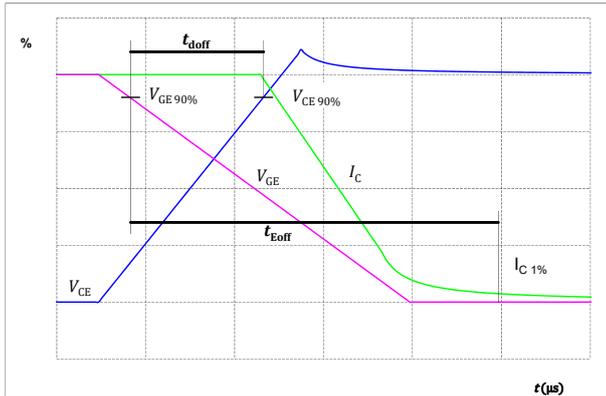


figure 24. MOSFET

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

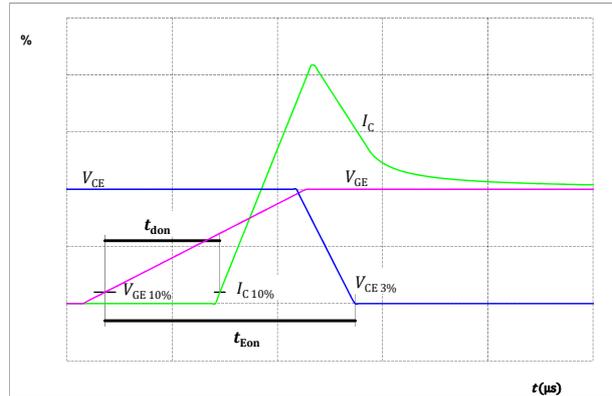


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

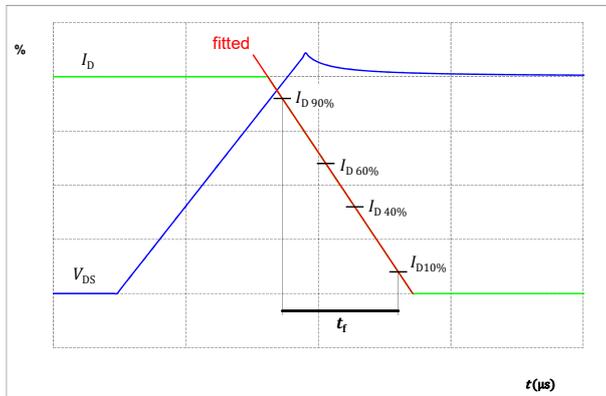
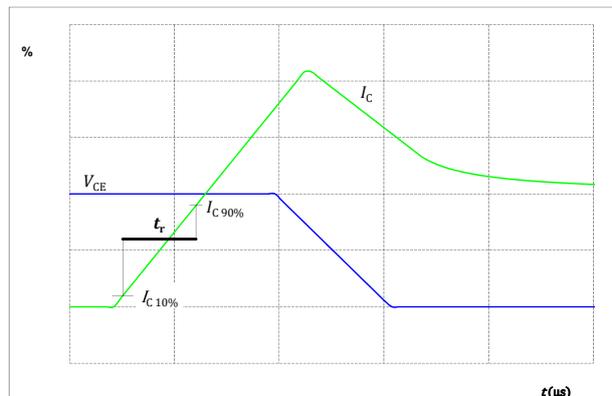


figure 26. MOSFET

Turn-on Switching Waveforms & definition of t_r





H-Bridge Switching Definitions

figure 27. FWD

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

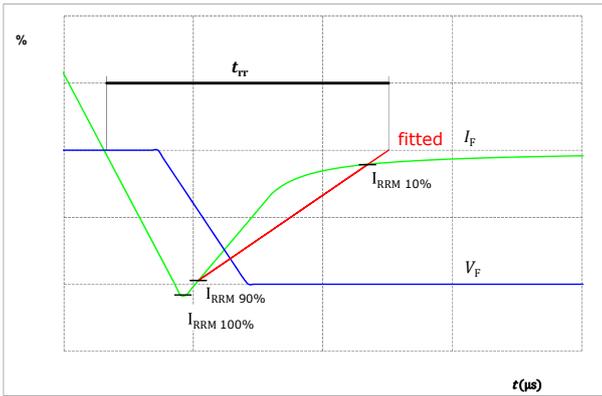


figure 28. FWD

Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)

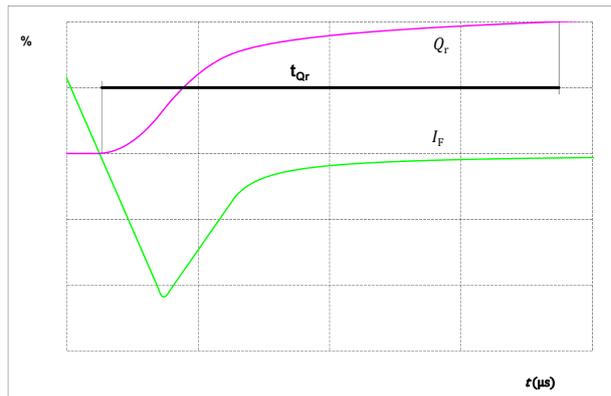
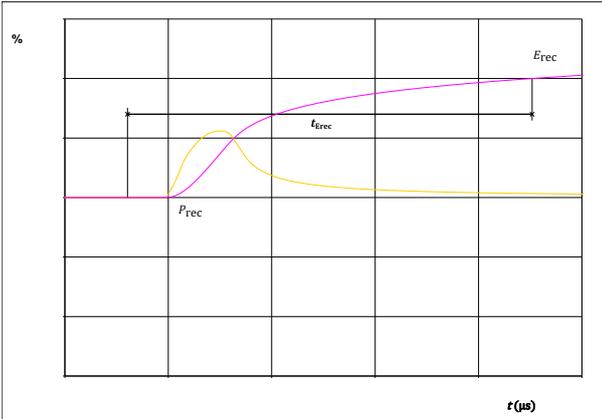


figure 29. FWD

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





Vincotech

10-PZ124PA036MR-L629F18Y
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-PZ124PA036MR-L629F18Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PZ124PA036MR-L629F18Y-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PZ124PA036MR-L629F18Y-/3/

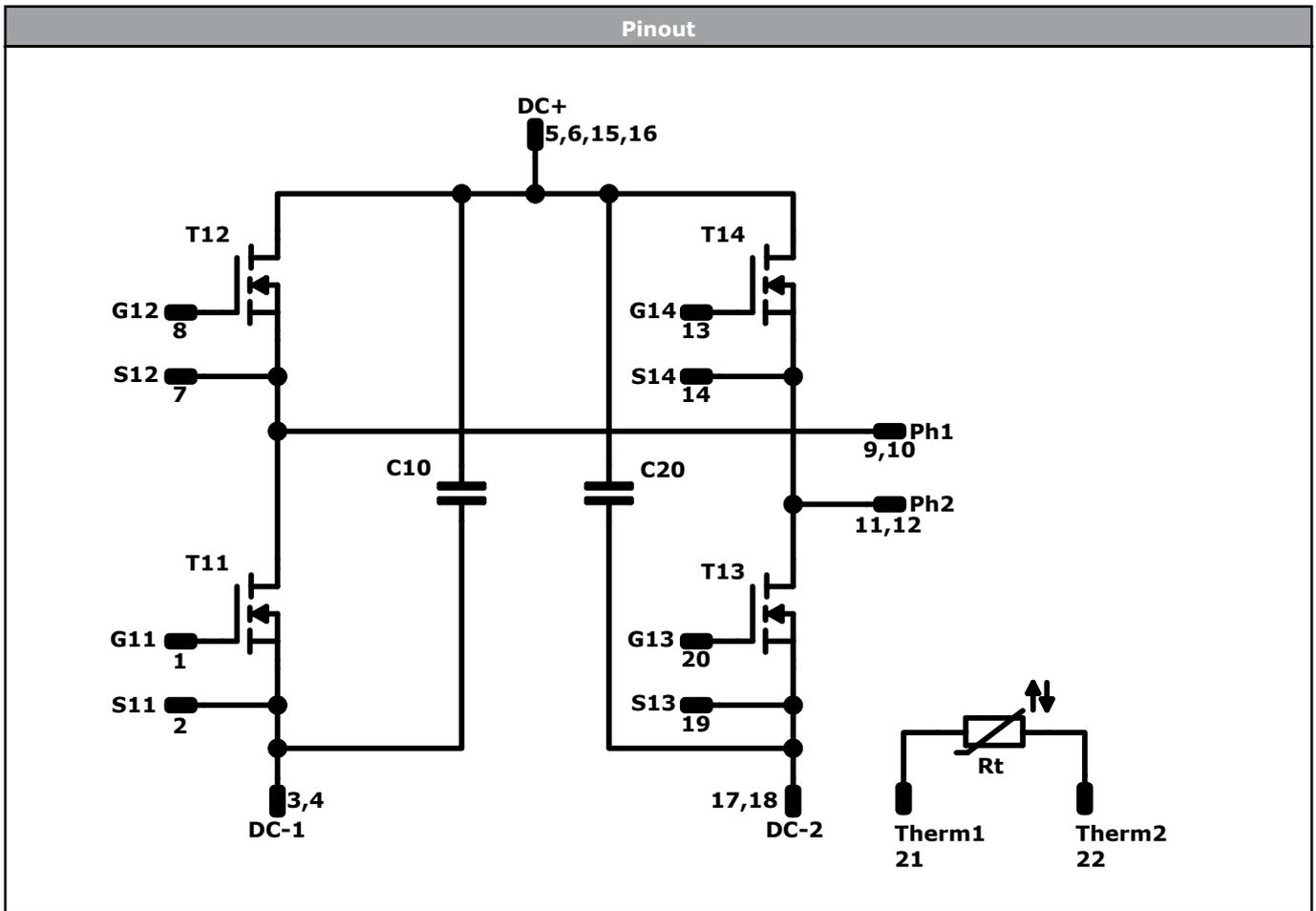
Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTIVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTIVV	Lot number LLLLL	Serial SSSS	Date code WWYY	

Pin table [mm]				Outline	
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		

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



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14	MOSFET	1200 V	36 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 <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</i> 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-PZ124PA036MR-L629F18Y-D1-14	2 May. 2023	Initial release	

DISCLAIMER

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