



fastPACK E1 SiC

1200 V / 40 mΩ

Topology features

- Kelvin Emitter for improved switching performance
- Open Emitter configuration
- Temperature sensor

Component features

- High Blocking Voltage with low drain source on state resistance
- High speed SiC-MOSFET technology
- Resistant to Latch-up

Housing features

- Base isolation: Al₂O₃
- Convex shaped substrate for superior thermal contact
- Compact housing
- CTI600 housing material
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

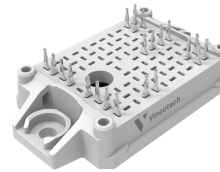
Target applications

- Charging Stations
- Solar Inverters
- UPS
- Welding & Cutting

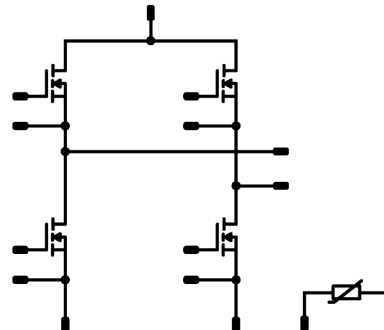
Types

- 10-EZ124PA030MS-LQ17F78T

flow E1 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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	41	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	160	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	78	W
Gate-source voltage	V_{GSS}		-5 / 18	V
		dynamic	-10 / 22	
Maximum Junction Temperature	T_{jmax}		175	°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
Creepage distance			>12,7	mm
Clearance			8,62	mm
Comparative Tracking Index	CTI		≥ 600	

*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 ⁽¹⁾	$r_{DS(on)}$		18		40	25 175		30 49		mΩ
			15			25 175		40 53		
Gate-source threshold voltage	$V_{GS(th)}$				0,004	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}	22	0			25			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	0	1200			25			10	μA
Internal gate resistance	r_g							2		Ω
Gate charge	Q_g	-5/18	800	40		25		108		nC
Short-circuit input capacitance	C_{iss}	$f = 500$ kHz						2600		pF
Short-circuit output capacitance	C_{oss}		0	800	0	25		135		
Reverse transfer capacitance	C_{rss}							6		
Diode forward voltage	V_{SD}	0		40		25		4,1		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,21		K/W
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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		
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		18,89 17,14 16,96		ns
Rise time	t_r					25 125 150		7,53 7,11 6,86		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		41,02 46,87 48,45		ns
Fall time	t_f					25 125 150		11,13 12,77 12,02		ns
Turn-on energy (per pulse)	E_{on}					25 125 150		0,274 0,317 0,327		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,088 0,094 0,097		mWs
Peak recovery current	I_{RRM}					25 125 150		36,92 59,77 67,84		A
Reverse recovery time	t_{rr}					25 125 150		13,16 17,42 18,06		ns
Recovered charge	Q_r					25 125 150		0,285 0,661 0,782		μ C
Reverse recovered energy	E_{rec}					25 125 150		0,091 0,282 0,347		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		8580,22 15306,96 19970,52		A/ μ s



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	T_j [°C]	Min	Typ	Max	

Thermistor

Static

Rated resistance	R					25		5		kΩ
Deviation of R100	$A_{R/R}$	$R_{100} = 499 \Omega$				100	3,2		3,3	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,3		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3380		K
Vincotech Thermistor Reference									V	

⁽¹⁾ Value at chip level

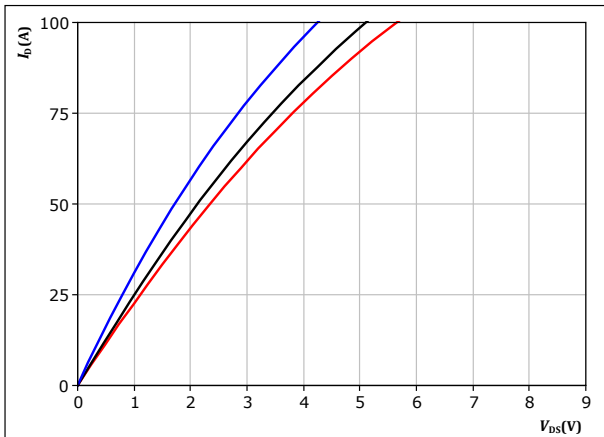
⁽²⁾ Only valid with pre-applied Vincotech thermal interface material.



H-Bridge Switch Characteristics

figure 1. MOSFET

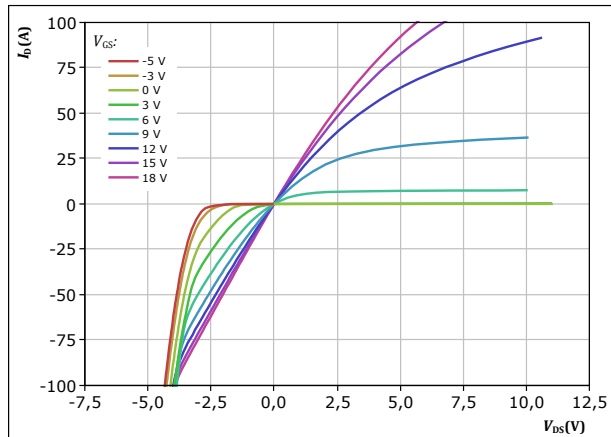
Typical output characteristics including $R_{DD'} + R_{SS'}$
 $I_D = f(V_{DS})$



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

figure 2. MOSFET

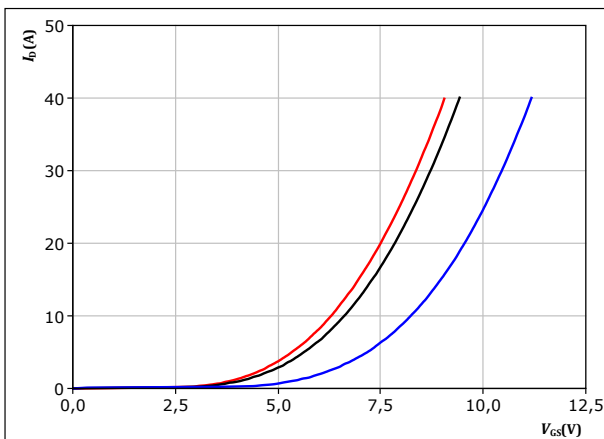
Typical output characteristics including $R_{DD'} + R_{SS'}$
 $I_D = f(V_{DS})$



$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GS} from -5 V to 18 V in steps of 3 V

figure 3. MOSFET

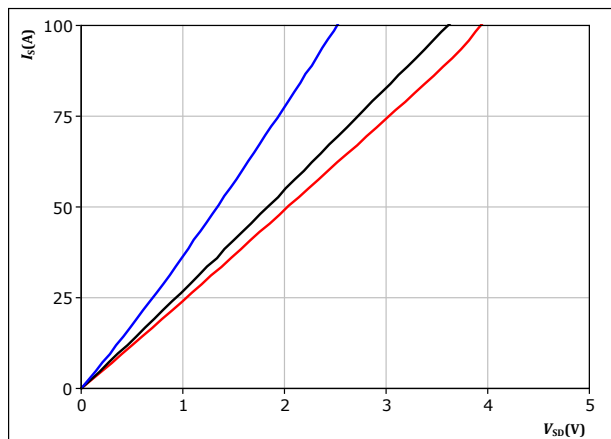
Typical transfer characteristics
 $I_D = f(V_{GS})$



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

figure 4. MOSFET

Typical reverse drain current characteristics including $R_{DSR} + R_{SS'}$
 $I_{SD} = f(V_{SD})$



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

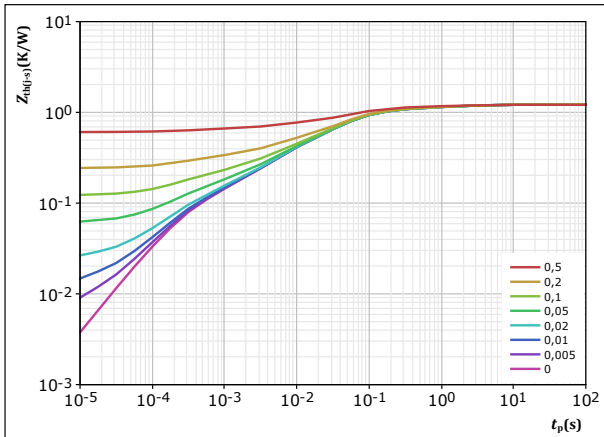


H-Bridge Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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



$$D = \frac{t_p}{T}$$

$$R_{th(j-c)} = 1,212 \text{ K/W}$$

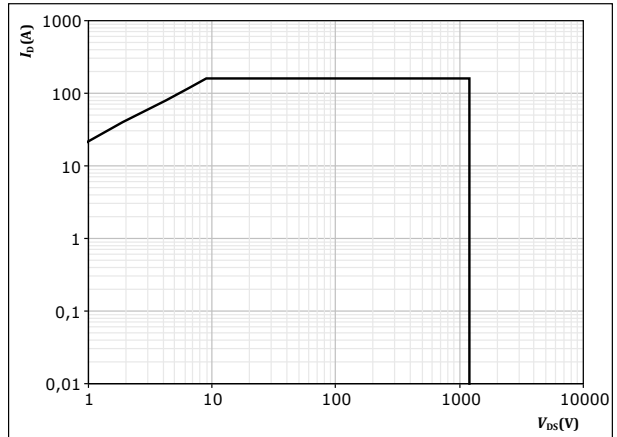
MOSFET thermal model values

R (K/W)	τ (s)
1,11E-01	1,92E+00
2,36E-01	1,61E-01
5,79E-01	3,90E-02
1,97E-01	4,33E-03
9,01E-02	2,81E-04

figure 6. MOSFET

Safe operating area

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



D = single pulse

$$T_s = 80 \text{ } ^\circ\text{C}$$

$$V_{GS} = 18 \text{ V}$$

$$T_i = T_{jmax}$$

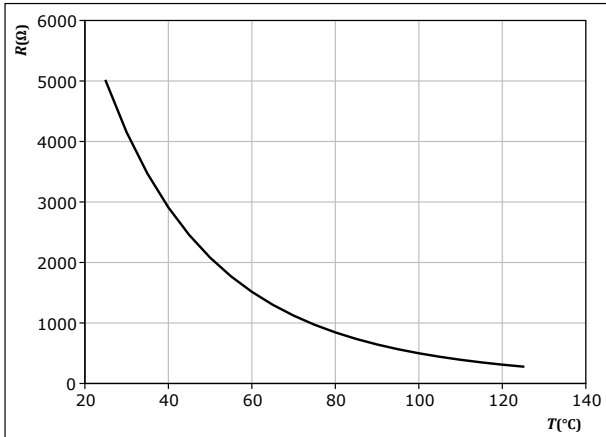


Thermistor Characteristics

figure 7. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

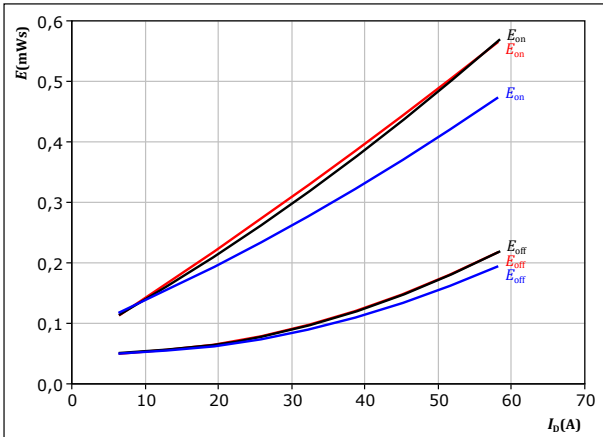




H-Bridge Switching Characteristics

figure 8. MOSFET

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

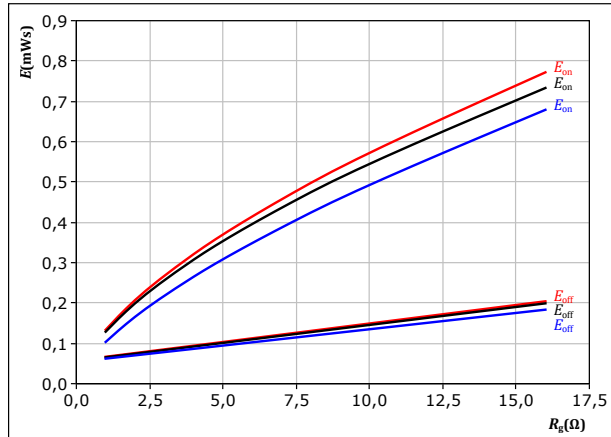


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-5/18	V		— 125 °C
$R_{gon} =$	4	Ω		— 150 °C
$R_{goff} =$	4	Ω		

figure 9. MOSFET

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

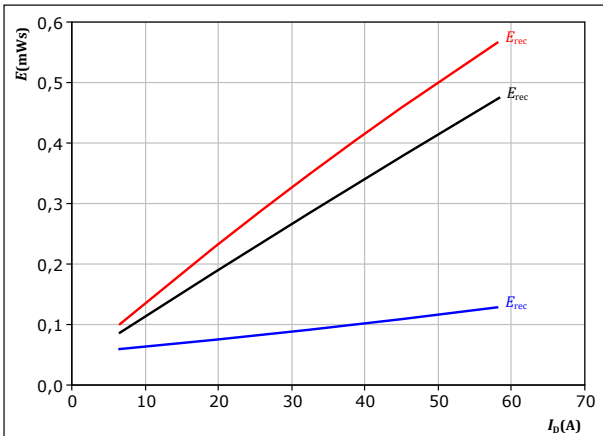


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-5/18	V		— 125 °C
$I_D =$	32	A		— 150 °C

figure 10. MOSFET

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

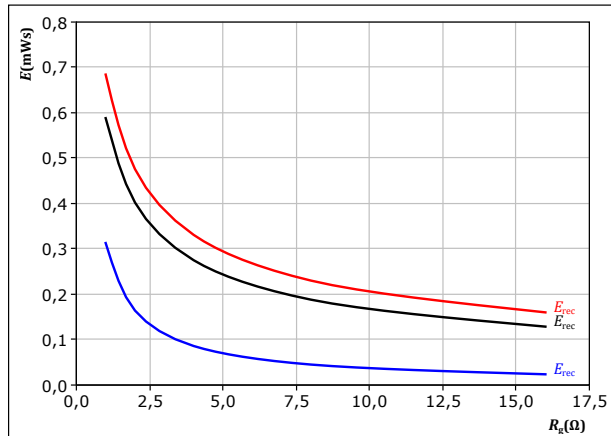


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-5/18	V		— 125 °C
$R_{gon} =$	4	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

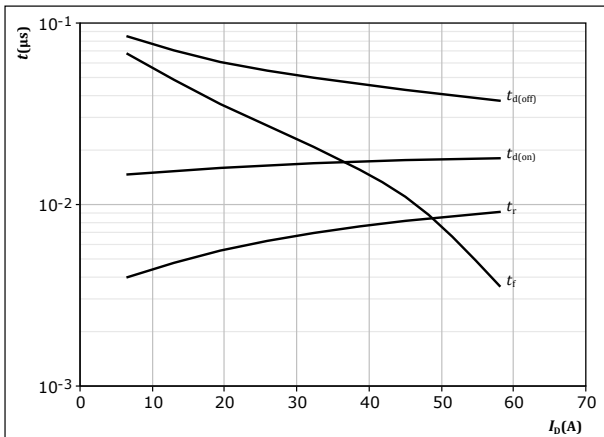
$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-5/18	V		— 125 °C
$I_D =$	32	A		— 150 °C



H-Bridge Switching Characteristics

figure 12. MOSFET

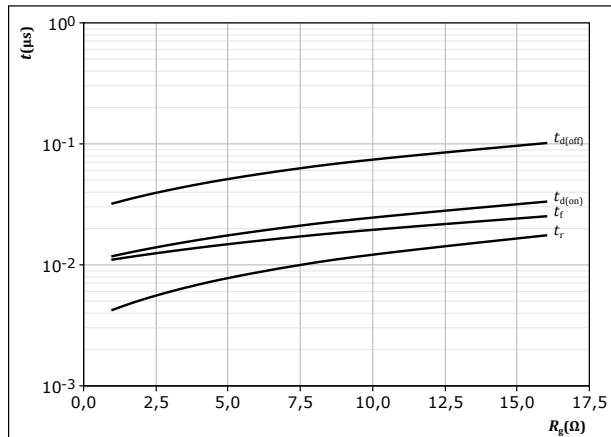
Typical switching times as a function of drain current
 $t = f(I_D)$



With an inductive load at
 $T_j = 150 \text{ } ^\circ\text{C}$
 $V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/18 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$
 $R_{goff} = 4 \text{ } \Omega$

figure 13. MOSFET

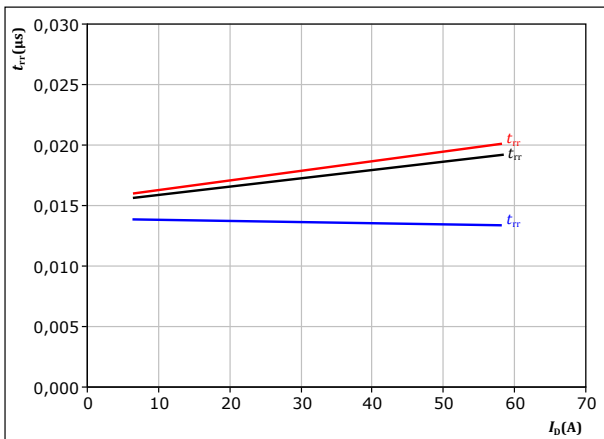
Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ } ^\circ\text{C}$
 $V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/18 \text{ V}$
 $I_D = 32 \text{ A}$

figure 14. MOSFET

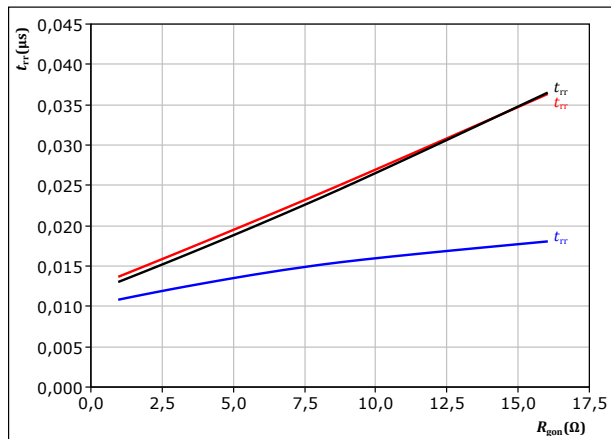
Typical reverse recovery time as a function of drain current
 $t_{rr} = f(I_D)$



At $V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/18 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 15. MOSFET

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



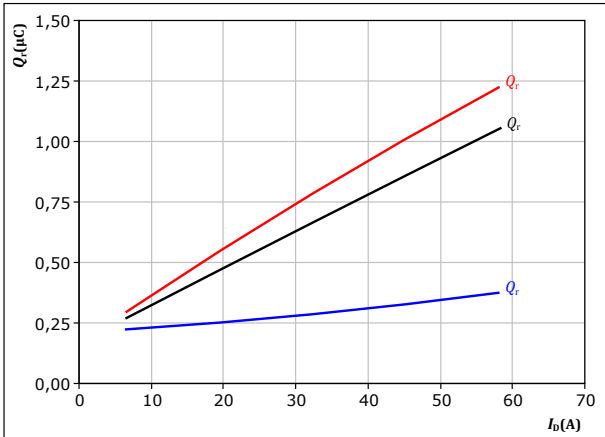
At $V_{DS} = 600 \text{ V}$
 $V_{GS} = -5/18 \text{ V}$
 $I_D = 32 \text{ A}$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C



H-Bridge Switching Characteristics

figure 16. MOSFET

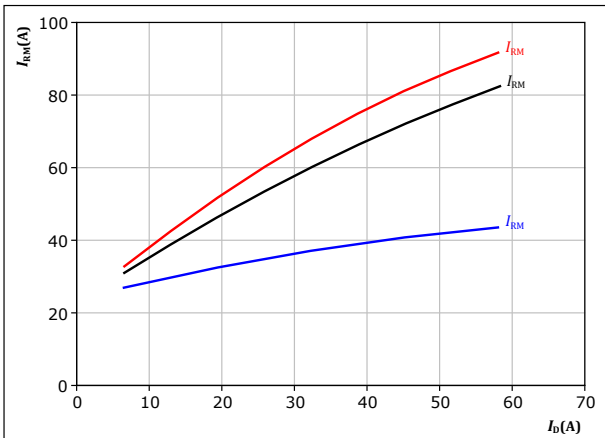
Typical recovered charge as a function of drain current
 $Q_r = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 18. MOSFET

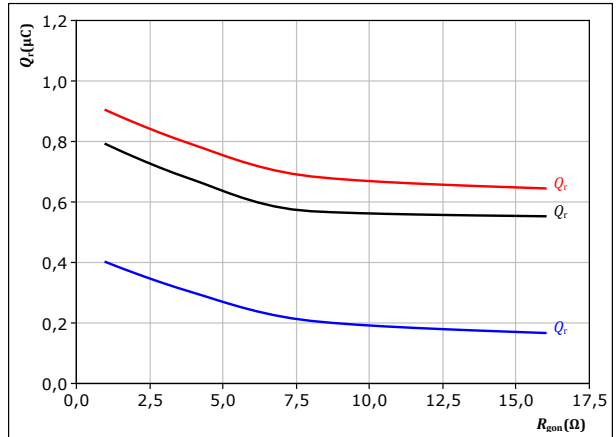
Typical peak reverse recovery current as a function of drain current
 $I_{RM} = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 17. MOSFET

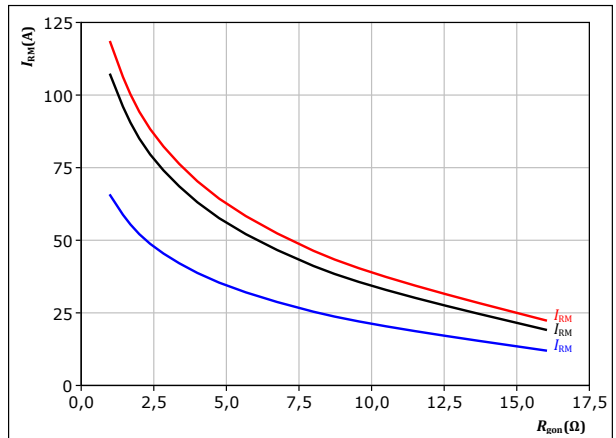
Typical recovered charge as a function of MOSFET turn on gate resistor
 $Q_r = f(R_{gon})$



At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 32$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 19. MOSFET

Typical peak reverse recovery current as a function of MOSFET turn on gate resistor
 $I_{RM} = f(R_{gon})$



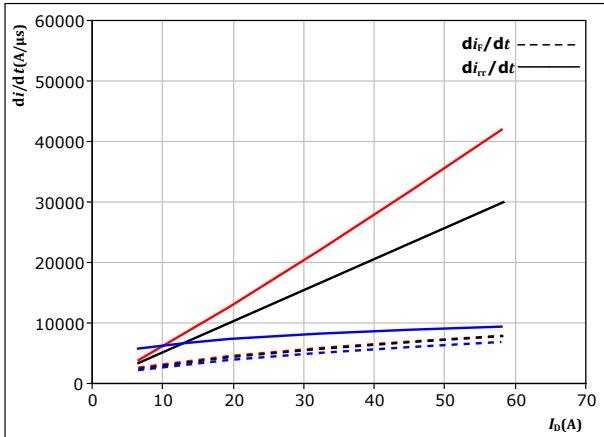
At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 32$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)



H-Bridge Switching Characteristics

figure 20. MOSFET

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

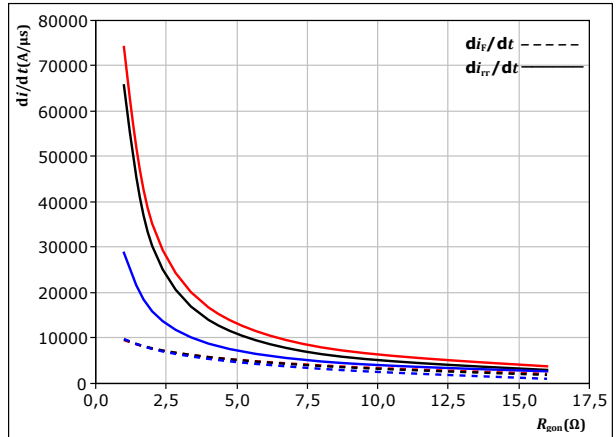


At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{g\text{on}} = 4$ Ω

$T_j = 25$ °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
 $di_f/dt, di_{rr}/dt = f(R_{g\text{on}})$



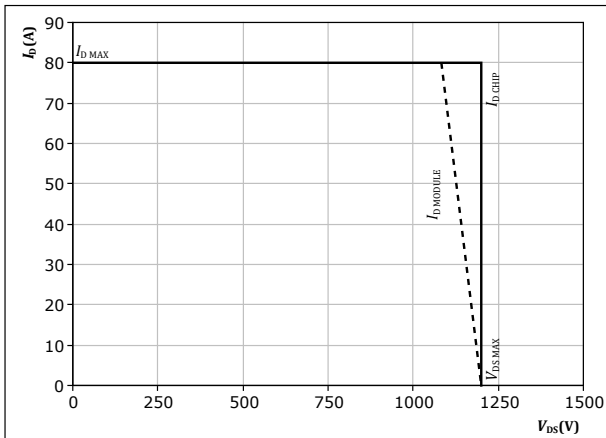
At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 32$ A

$T_j = 25$ °C
 125 °C
 150 °C

figure 22. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



At $T_j = 150$ °C
 $R_{g\text{on}} = 4$ Ω
 $R_{g\text{off}} = 4$ 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})

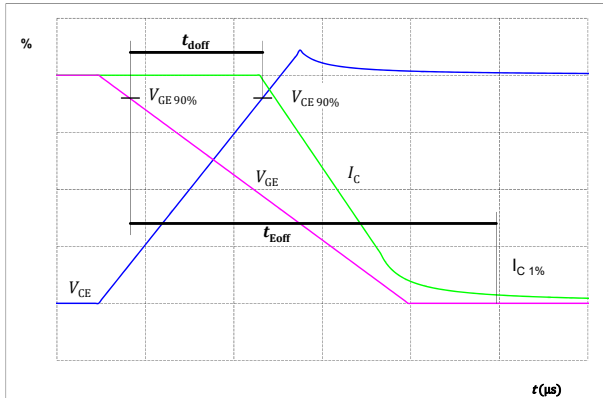


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

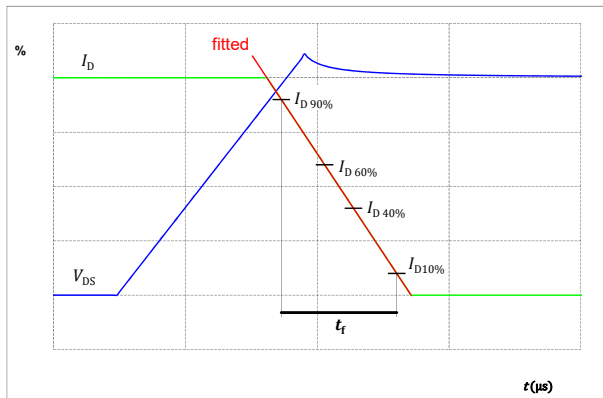


figure 24. MOSFET

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

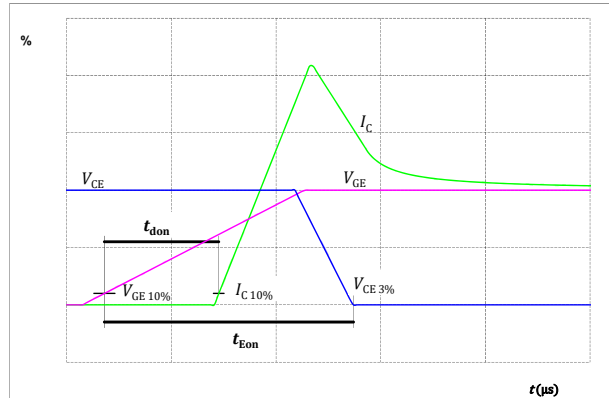
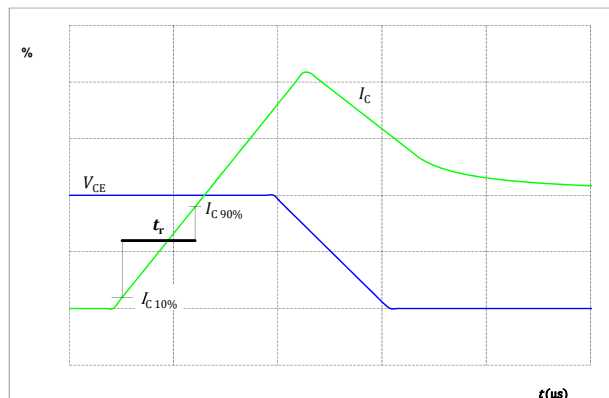


figure 26. MOSFET

Turn-on Switching Waveforms & definition of t_r





H-Bridge Switching Definitions

figure 27. FWD

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

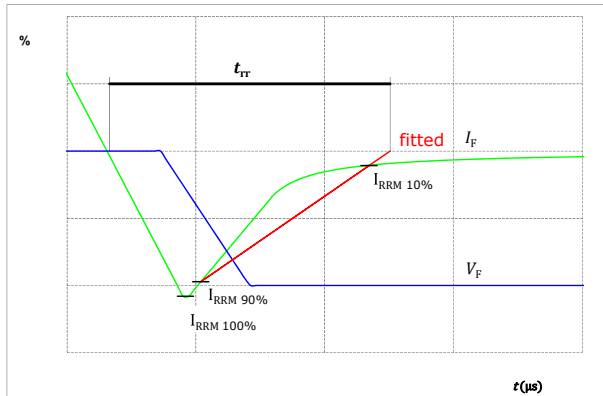


figure 28. FWD

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

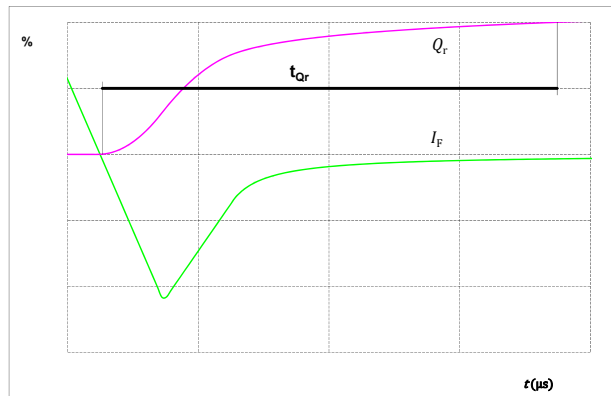
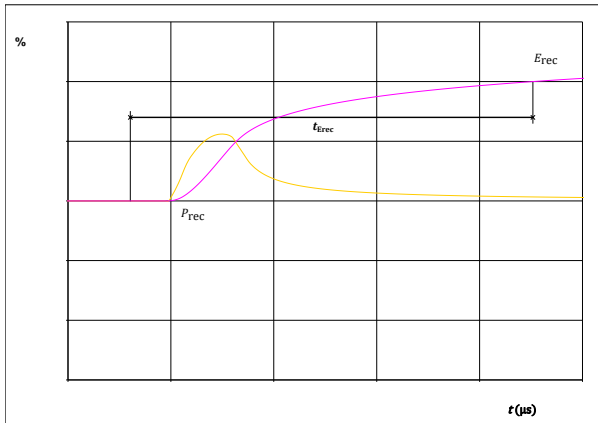


figure 29. FWD

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





Vincotech

10-EZ124PA030MS-LQ17F78T
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-EZ124PA030MS-LQ17F78T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EZ124PA030MS-LQ17F78T-/7/

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

Pin table [mm]			
Pin	X	Y	Function
1	32	3,2	DC-2
2	32	0	DC-2
3	28,8	3,2	G4
4	28,8	0	S4
5	12,8	0	T2
6	9,6	0	T1
7	0	0	AC2
8	0	3,2	AC2
9	0	6,4	S3
10	0	9,6	G3
11	0	16	G1
12	0	19,2	S1
13	0	22,4	AC1
14	0	25,6	AC1
15	28,8	25,6	S2
16	28,8	22,4	G2
17	32	25,6	DC-1
18	32	22,4	DC-1
19	22,4	12,8	DC+
20	25,6	12,8	DC+
21	28,8	12,8	DC+
22	32	12,8	DC+

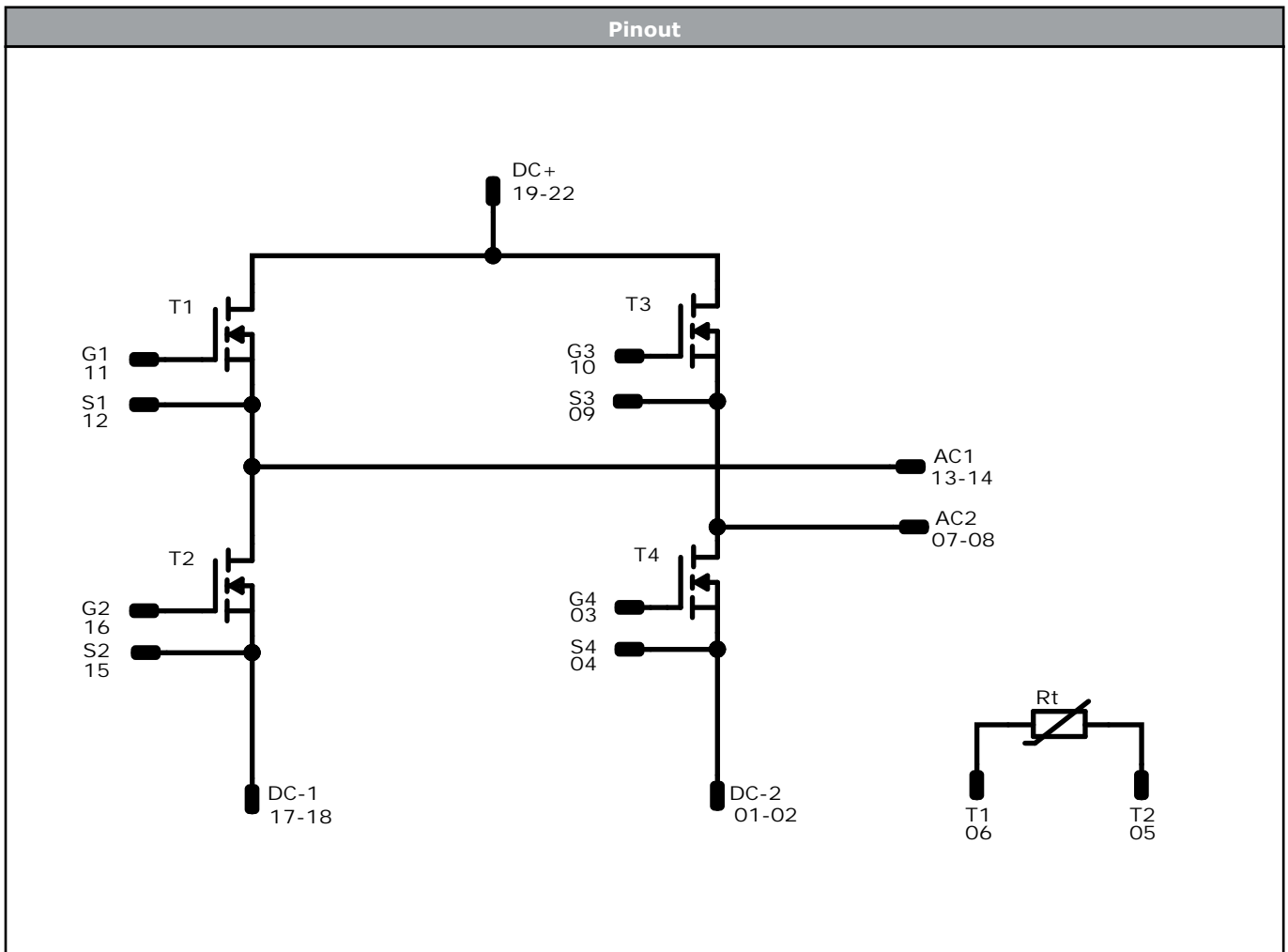
Outline

center of press-fit pin head
 pin head type TT PCB plated through-hole Ø 1mm +0.09 / -0.06
 for further PCB design rules refer to the latest handling instruction

Tolerance of pinposition: ±0.1mm at the end of pins
 Dimension of coordinate axis is only offset without tolerance



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T2, T1, T4, T3	MOSFET	1200 V	30 mΩ	H-Bridge Switch	
Rt	Thermistor			Thermistor	



Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow</i> E1 packages see vincotech.com website.

Package data
Package data for <i>flow</i> E1 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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=175^{\circ}C$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-EZ124PA030MS-LQ17F78T-D1-14	20 Feb. 2025	Initial Release	

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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.