



Vincotech

10-EZ124PA020MO-LQ18F08T

datasheet

fastPACK E1 SiC

1200 V / 20 m Ω

Features

- Compact and low inductive design
- High frequency SiC MOSFET
- Integrated NTC

Target applications

- Charging Stations
- Power Supply

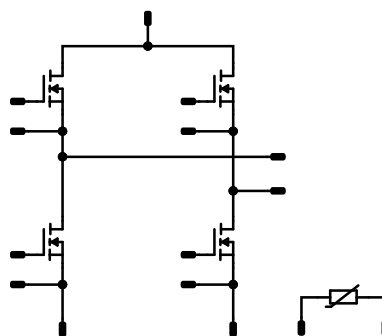
Types

- 10-EZ124PA020MO-LQ18F08T

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_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	63	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	480	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	117	W
Gate-source voltage	V_{GS}		-5 / 20	V
		dynamic	-15 / 25	
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
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	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	$r_{DS(on)}$		20		70	25 125 150		19 26 29	28 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,02	25	1,8	2,97	4,3	V
Gate to Source Leakage Current	I_{GSS}		20	0		25			2000	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			200	μA
Internal gate resistance	r_g							1,1		Ω
Gate charge	Q_g		-5/20	600	94	25		212		nC
Short-circuit input capacitance	C_{iss}	$f = 1 \text{ Mhz}$	0	800	0	25		3562		pF
Short-circuit output capacitance	C_{oss}							280		
Reverse transfer capacitance	C_{rss}							24		
Diode forward voltage	V_{SD}		0		35	25		3,8		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{\text{paste}} = 3,4 \text{ W/mK}$ (PSX)						0,81		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	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	0/20	600	64	25		19,2		ns	
						125		16,48			
						150		16,32			
Rise time	t_r					25		11,2			
						125		9,76		ns	
						150		9,76			
Turn-off delay time	$t_{d(off)}$					25		69,28			
						125		81,76		ns	
						150		85,28			
Fall time	t_f					25		21,48			
						125		22,56		ns	
						150		22,1			
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=1,1 \mu C$ $Q_{rFWD}=1,64 \mu C$ $Q_{rFWD}=1,87 \mu C$		25		0,65			mWs		
				125		0,563					
				150		0,575					
Turn-off energy (per pulse)	E_{off}			25		0,413					
				125		0,477			mWs		
				150		0,505					
Peak recovery current	I_{RRM}	$di/dt=6804 A/\mu s$ $di/dt=7566 A/\mu s$ $di/dt=7899 A/\mu s$		25		84			A		
				125		112,24					
				150		123,1					
Reverse recovery time	t_{rr}			25		27,43			ns		
				125		29,82					
				150		31,06					
Recovered charge	Q_r			25		1,1			μC		
				125		1,64					
				150		1,87					
Reverse recovered energy	E_{rec}			25		0,436					
				125		0,746			mWs		
				150		0,864					
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$		25		8667				A/ μs		
			125		11039						
			150		12088						



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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	

Thermistor

Static

Rated resistance	R					25		5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 493 \Omega$				100	-5		5	%
Power dissipation	P							245		mW
Power dissipation constant	d					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 2 \%$						3375		K
B-value	$B_{(25/100)}$	Tol. $\pm 2 \%$						3437		K
Vincotech Thermistor Reference									K	

⁽¹⁾ Value at chip level

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



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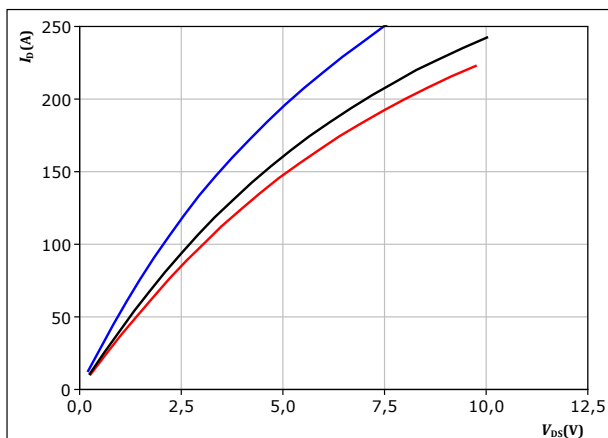
datasheet

H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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



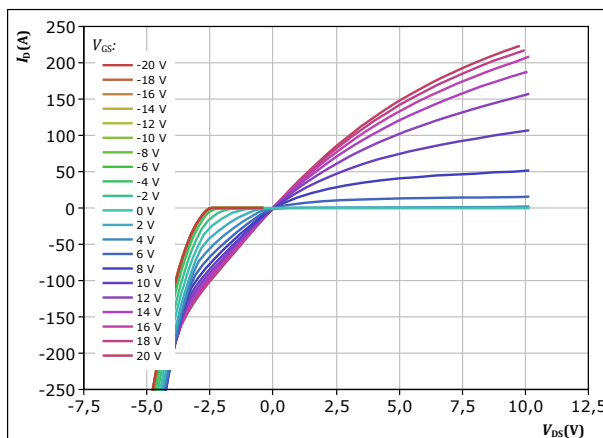
$t_p = 250 \mu s$
 $V_{GS} = 20 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 2. MOSFET

Typical output characteristics

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

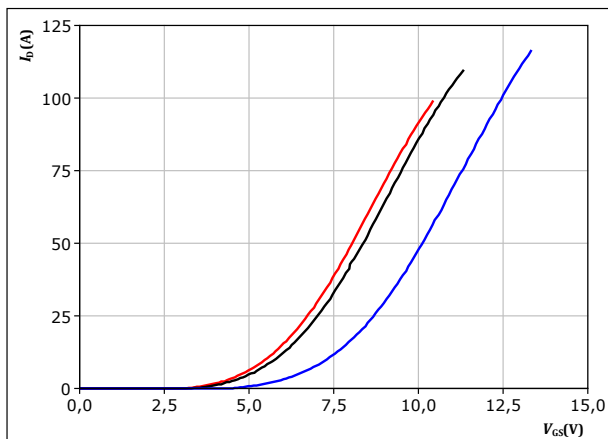


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GS} from -20 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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



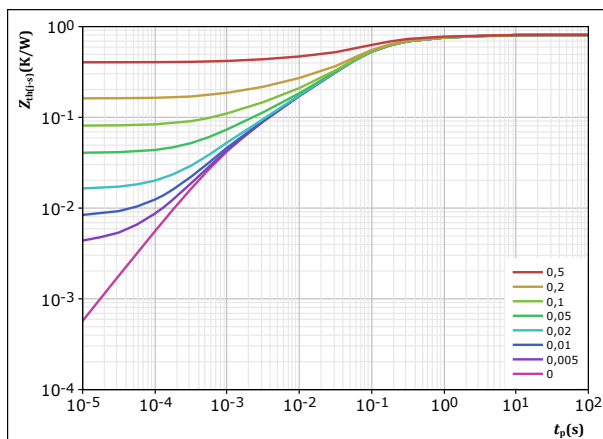
$t_p = 250 \mu s$
 $V_{DS} = 10 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,809 K/W$
MOSFET thermal model values

$R (K/W)$	$\tau (s)$
7,15E-02	2,67E+00
1,80E-01	2,63E-01
4,43E-01	6,17E-02
8,03E-02	6,15E-03
3,45E-02	9,47E-04



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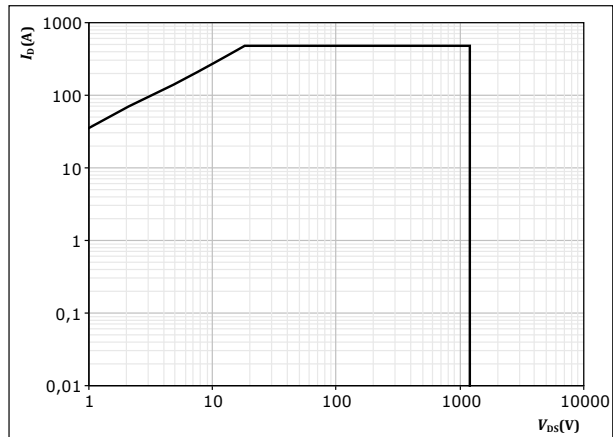
datasheet

H-Bridge Switch Characteristics

figure 5. MOSFET

Safe operating area

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

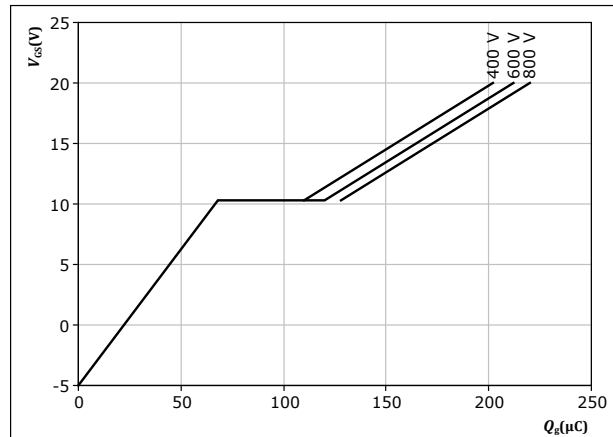


$D =$ single pulse
 $T_s = 80$ °C
 $V_{GS} = 20$ V
 $T_j = T_{jmax}$

figure 6. MOSFET

Gate voltage vs gate charge

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



$I_D = 47$ A
 $T_j = 25$ °C



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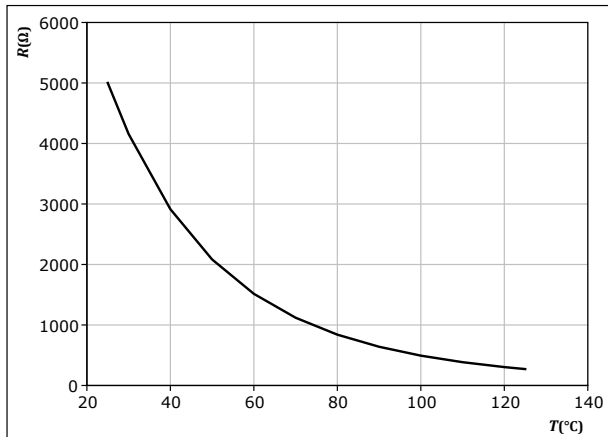
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Thermistor Characteristics

figure 7. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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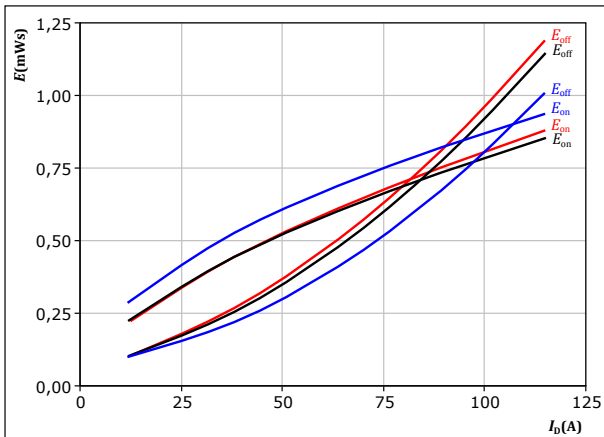
H-Bridge Switching Characteristics

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
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

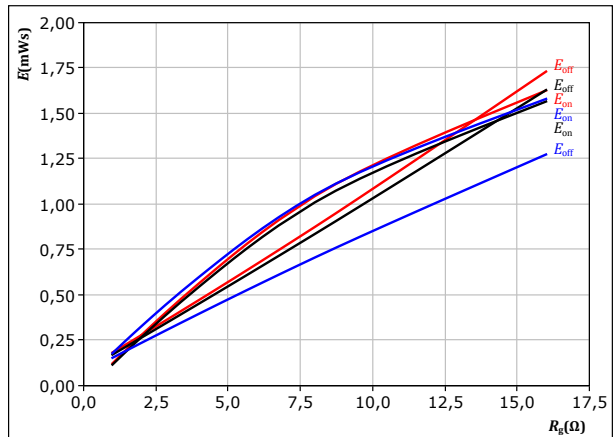
T_j : 25 °C
125 °C
150 °C

figure 9.

MOSFET

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $I_D = 64$ A

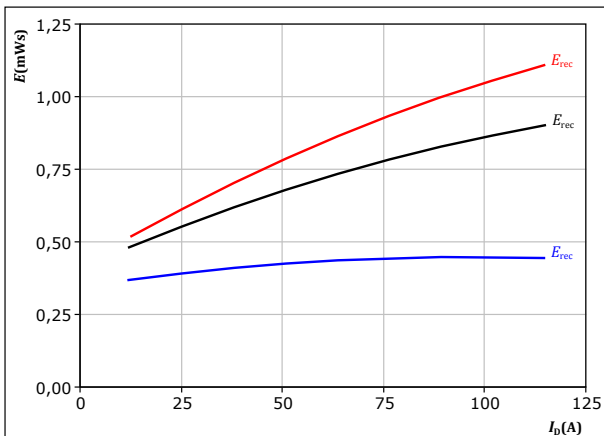
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω

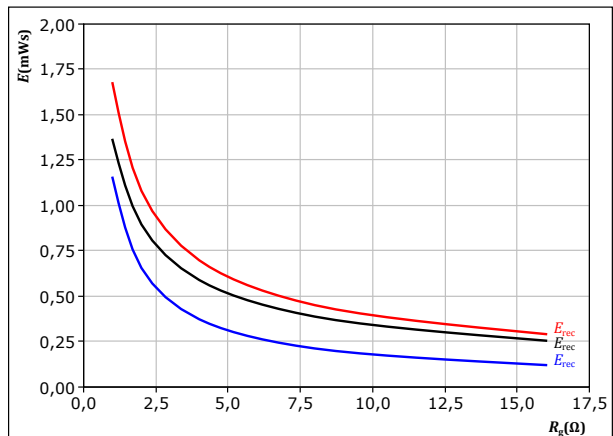
T_j : 25 °C
125 °C
150 °C

figure 11.

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
 $V_{GS} = 0/20$ V
 $I_D = 64$ A

T_j : 25 °C
125 °C
150 °C



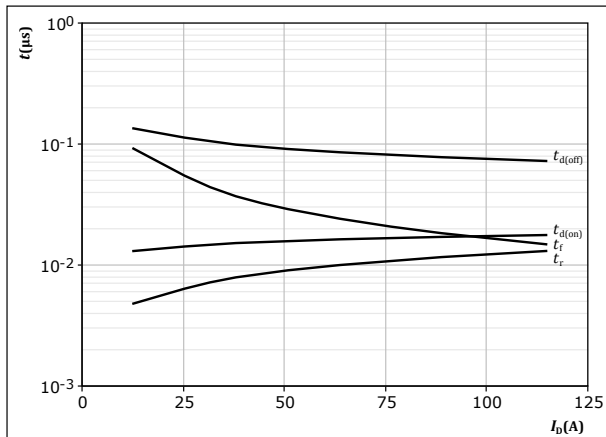
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H-Bridge Switching Characteristics

figure 12. MOSFET

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

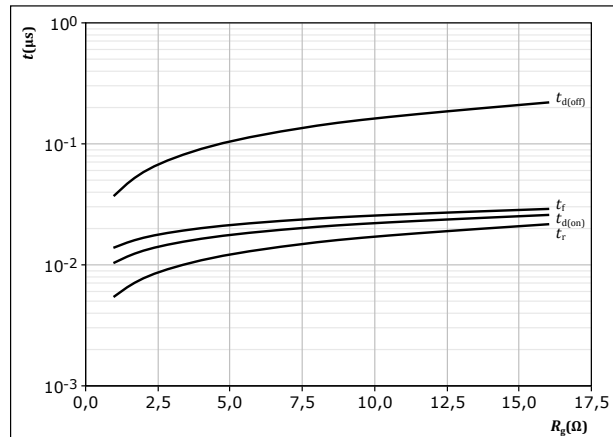


With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 13. MOSFET

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

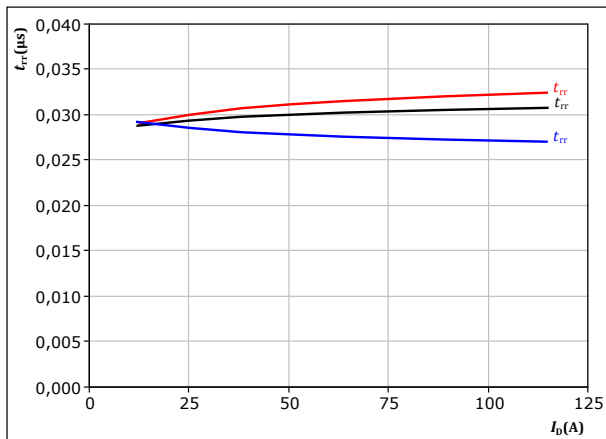


With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $I_D = 64$ A

figure 14. MOSFET

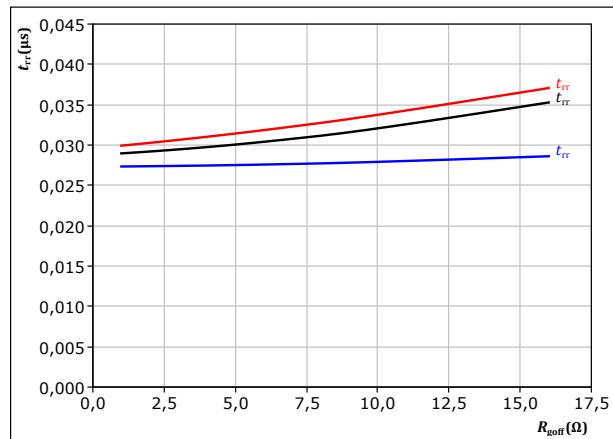
Typical reverse recovery time as a function of drain current
 $t_{rr} = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω
 $T_j: 25$ °C (blue), 125 °C (black), 150 °C (red)

figure 15. MOSFET

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $I_D = 64$ A
 $T_j: 25$ °C (blue), 125 °C (black), 150 °C (red)



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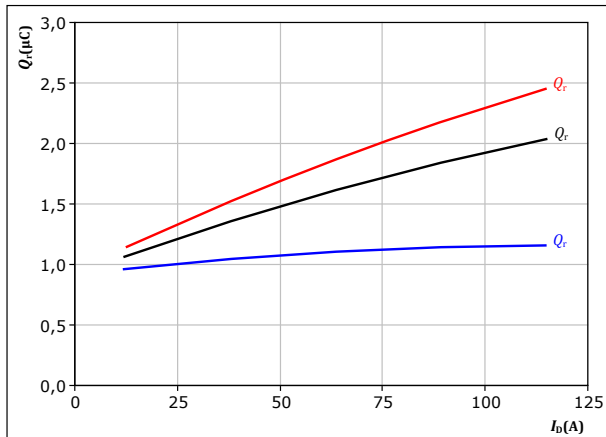
datasheet

H-Bridge Switching Characteristics

figure 16. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

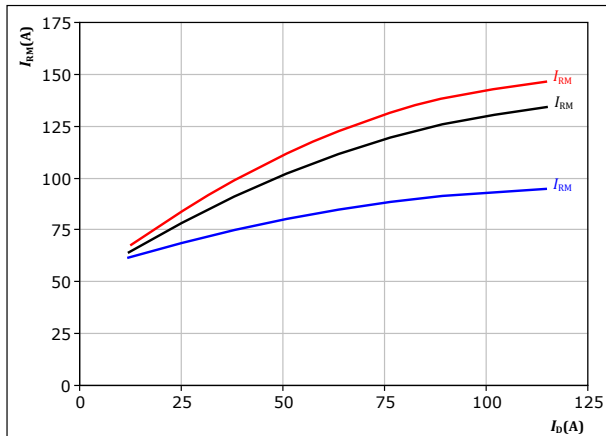


At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 18. MOSFET

Typical peak reverse recovery current as a function of drain current

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

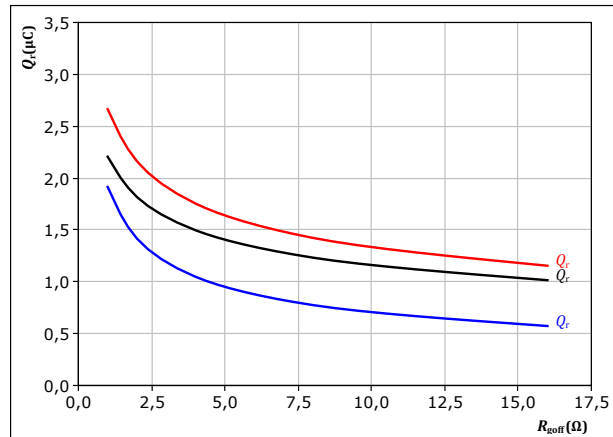


At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 17. MOSFET

Typical recovered charge as a function of turn off gate resistor

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

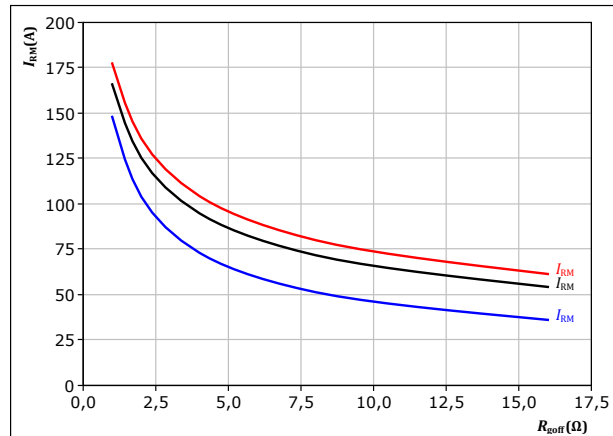


At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $I_D = 64$ A
 T_j : 25 °C
125 °C
150 °C

figure 19. MOSFET

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

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $I_D = 64$ A
 T_j : 25 °C
125 °C
150 °C



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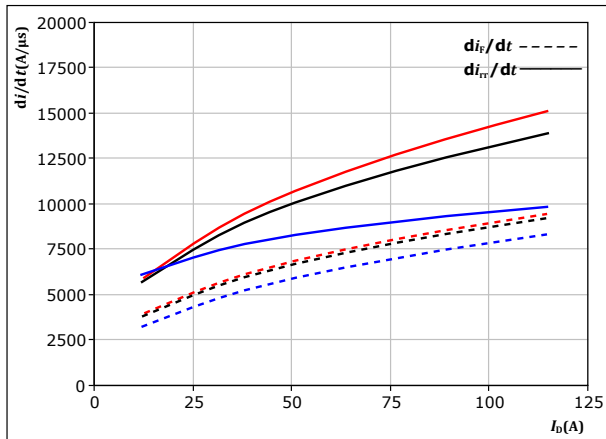
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datasheet

H-Bridge Switching Characteristics

figure 20. MOSFET

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

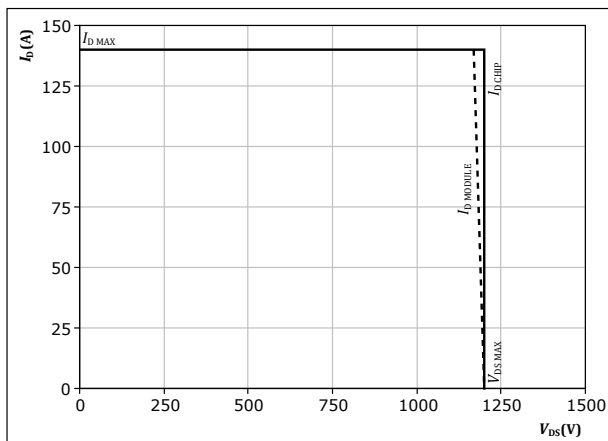


At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $R_{gon} = 4$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 22. MOSFET

Reverse bias safe operating area

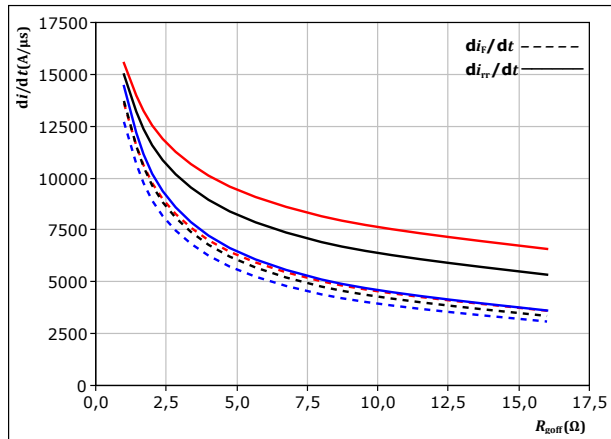
$I_D = f(V_{DS})$



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

figure 21. MOSFET

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor
 $di_f/dt, di_r/dt = f(R_{goff})$



At $V_{DS} = 600$ V
 $V_{GS} = 0/20$ V
 $I_D = 64$ A
 $T_j = 25$ °C
 125 °C
 150 °C



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datasheet

H-Bridge Switching Definitions

figure 23. MOSFET

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

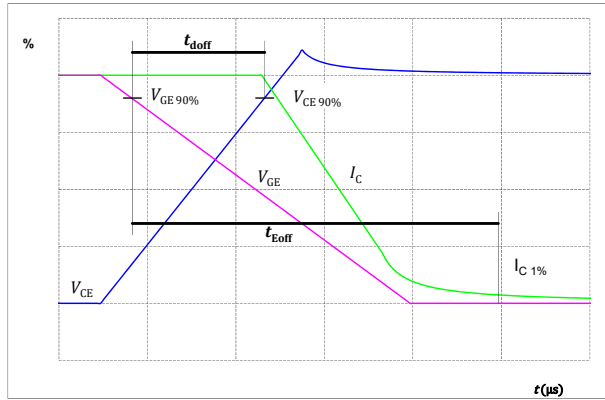


figure 24. MOSFET

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

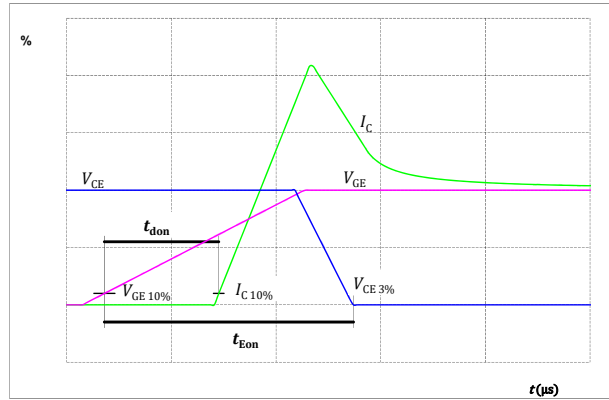


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

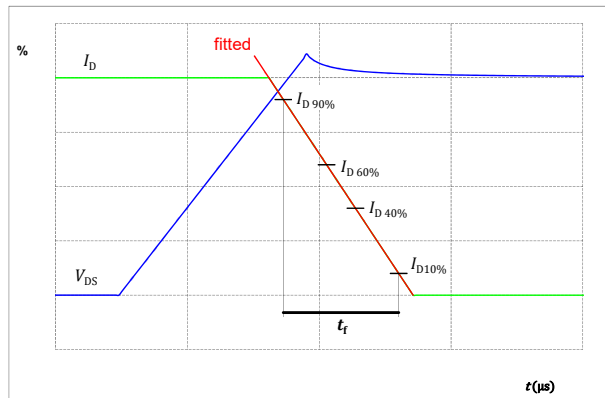
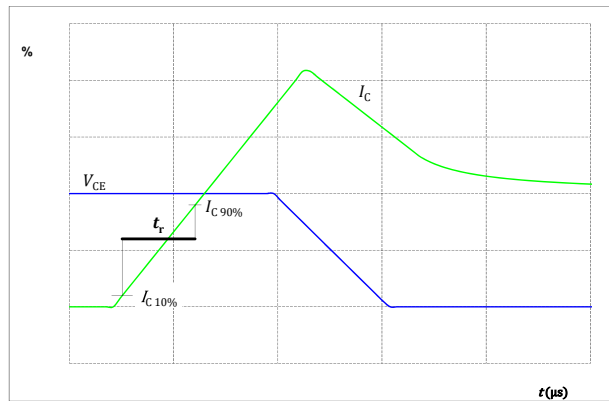


figure 26. MOSFET

Turn-on Switching Waveforms & definition of t_r





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H-Bridge Switching Definitions

figure 27. FWD

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

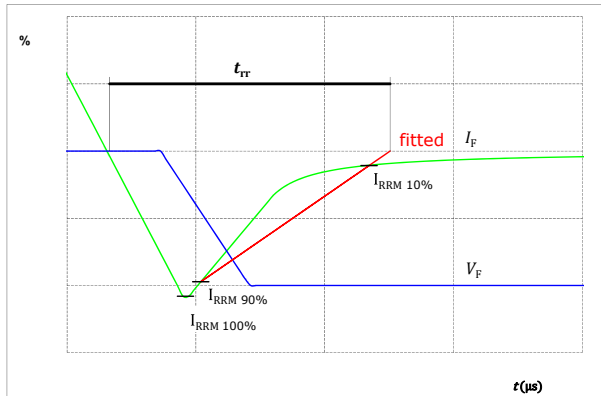


figure 28. FWD

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

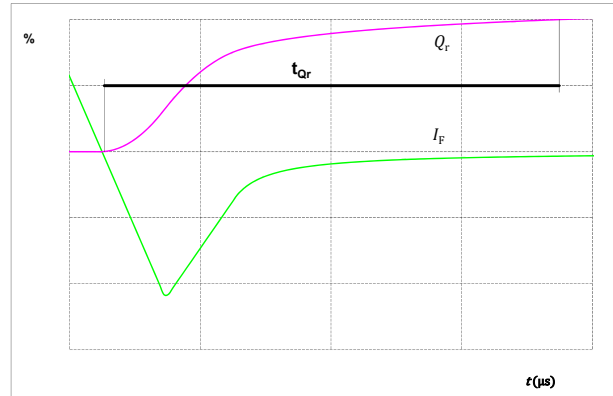
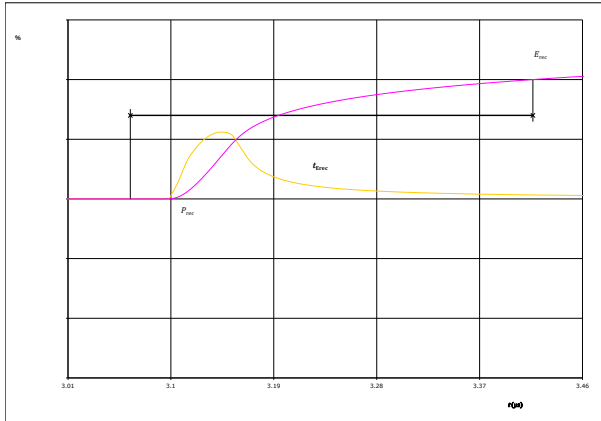


figure 29. FWD

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





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datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-EZ124PA020MO-LQ18F08T
With thermal paste (3,4 W/mK, PSX-P7)	10-EZ124PA020MO-LQ18F08T-/3/

Marking						
	Text	Name	Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNNNN- TTTTWWYY	WWYY	UL VIN	LLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
		TTTTTTTV	LLLL	SSSS	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+

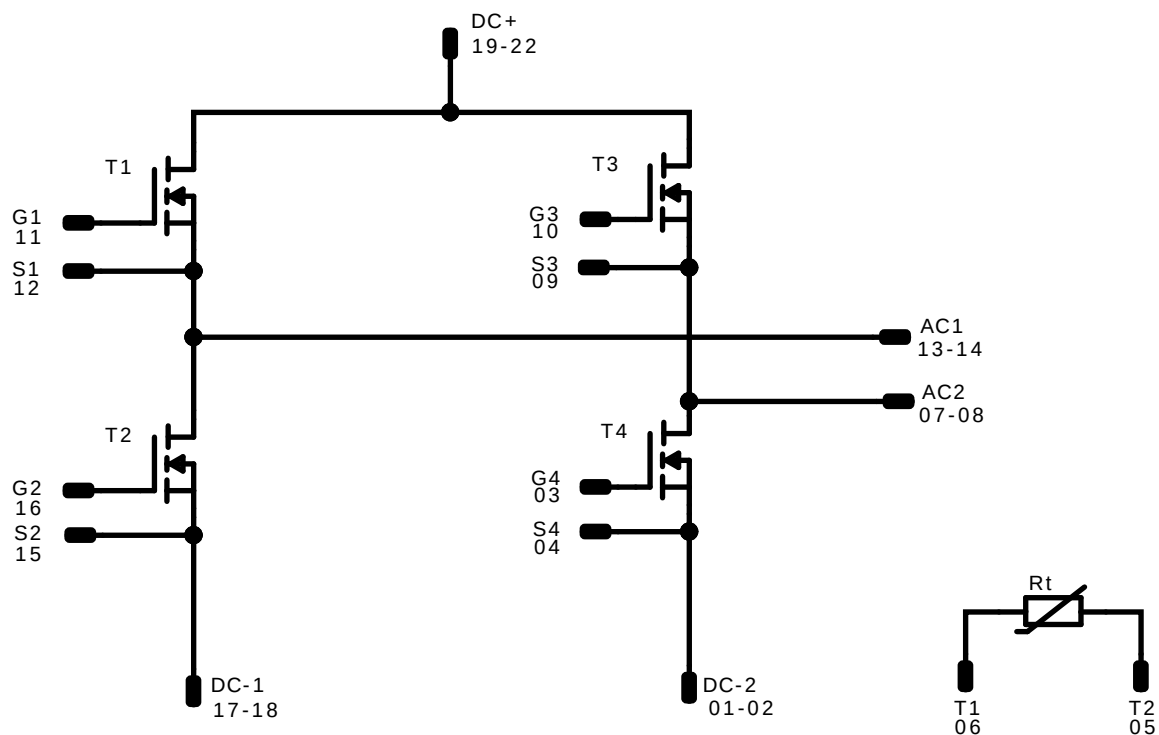


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datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T2, T1, T4, T3	MOSFET	1200 V	19,5 mΩ	H-Bridge Switch	
Rt	Thermistor			Thermistor	



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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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-EZ124PA020MO-LQ18F08T-D3-14	5 Aug. 2021	Update of Outline & Pinout drawings	

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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.