Vincotech

10-EZ124PA020MO-LQ18F08T
datasheet

fastPACK E1 SiC **1200 V / 20 mΩ**

Features

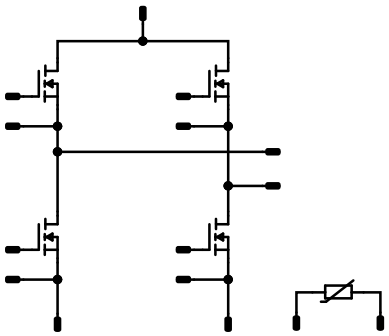
- Comapct and low inductive design
- High frequency SiC MOSFET
- Integrated NTC

flow E1 12 mm housing

Target applications

- Charging Stations
- Power Supply

Schematic



Types

- 10-EZ124PA020MO-LQ18F08T

Maximum Ratings

T_j = 25 °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 °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 °C	117	W
Gate-source voltage	V_{GSS}		-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 s	6000	V
Isolation voltage	V_{isol}	AC Voltage t_p = 1 min	2500	V
Creepage distance			>12,7	mm
Clearance			8,62	mm
Comparative Tracking Index	CTI		≥ 600	

*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	$r_{DS(on)}$		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 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]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,81		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	0/20	600	64	25 125 150		19,2 16,48 16,32		ns
Rise time	t_r					25 125 150		11,2 9,76 9,76		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		69,28 81,76 85,28		ns
Fall time	t_f					25 125 150		21,48 22,56 22,1		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=1,1 µC Q_{rFWD}=1,64 µC Q_{rFWD}=1,87 µC				25 125 150		0,65 0,563 0,575		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,413 0,477 0,505		mWs
Peak recovery current	I_{RRM}	di/dt=6804 A/µs di/dt=7566 A/µs di/dt=7899 A/µs				25 125 150		84 112,24 123,1		A
Reverse recovery time	t_{rr}					25 125 150		27,43 29,82 31,06		ns
Recovered charge	Q_r					25 125 150		1,1 1,64 1,87		µC
Reverse recovered energy	E_{rec}					25 125 150		0,436 0,746 0,864		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		8667 11039 12088		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	
Thermistor										
Static										
Rated resistance	R					25		5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 493 Ω				100	-5		5	%
Power dissipation	P							245		mW
Power dissipation constant	d					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. ±2 %						3375		K
B-value	$B_{(25/100)}$	Tol. ±2 %						3437		K
Vincotech Thermistor Reference									K	

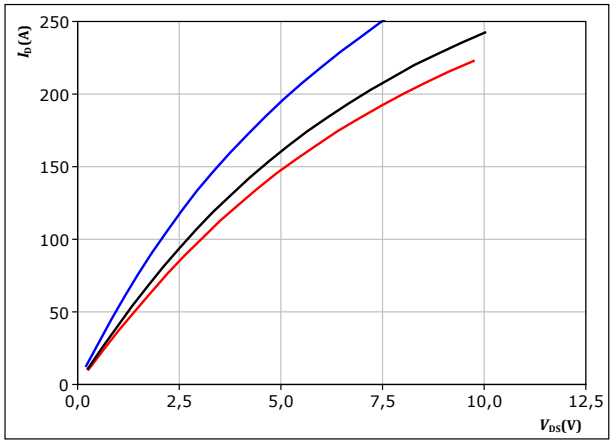
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

H-Bridge Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

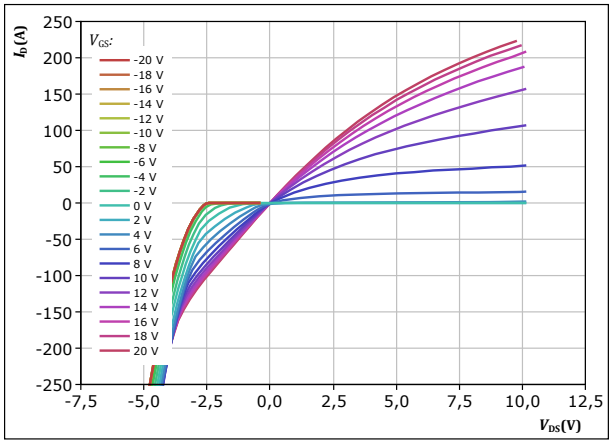


t_p =	250	µs		
V_{GS} =	20	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



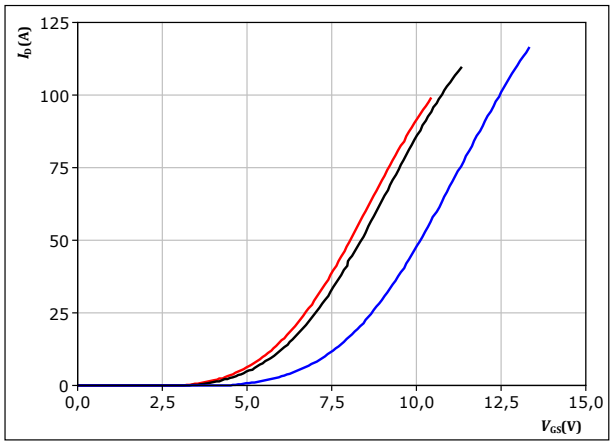
t_p =	250	µs
T_j =	150	°C

V_{GS} from -20 V to 20 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

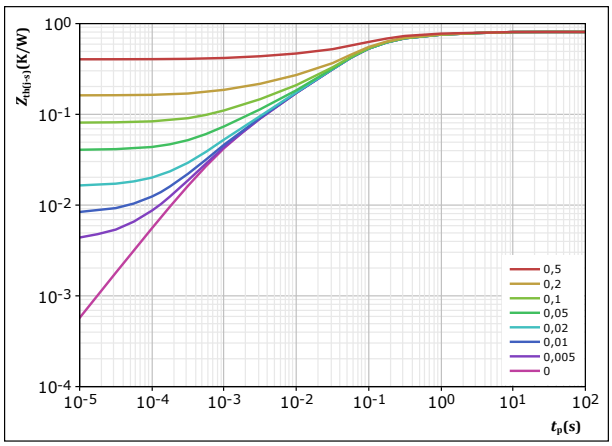


t_p =	250	µs		
V_{DS} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **MOSFET**

Transient thermal impedance as a function of pulse width

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



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

MOSFET thermal model values

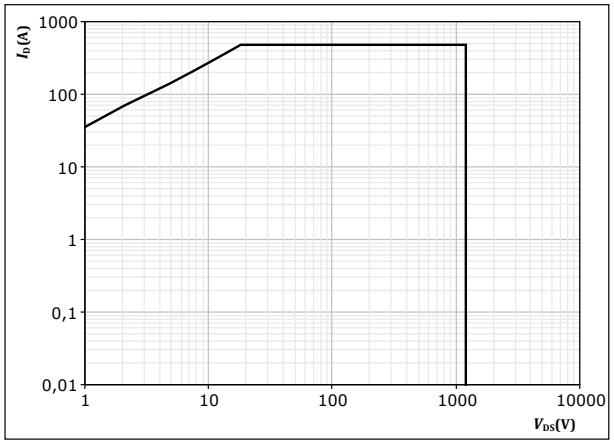
R (K/W)	τ (s)
7,15E-02	2,67E+00
1,80E-01	2,63E-01
4,43E-01	6,17E-02
8,03E-02	6,15E-03
3,45E-02	9,47E-04

H-Bridge Switch Characteristics

figure 5. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$

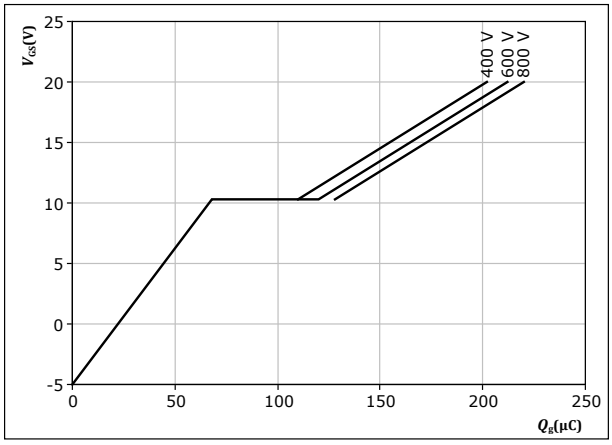


$D =$ single pulse
$T_s =$ 80 °C
$V_{GS} =$ 20 V
$T_j =$ T_{jmax}

figure 6. **MOSFET**

Gate voltage vs gate charge

$V_{GS} = f(Q_g)$



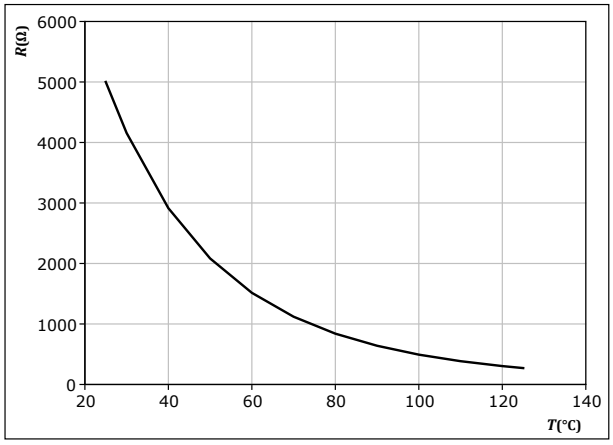
$I_D =$ 47 A
$T_j =$ 25 °C

Thermistor Characteristics

figure 7. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

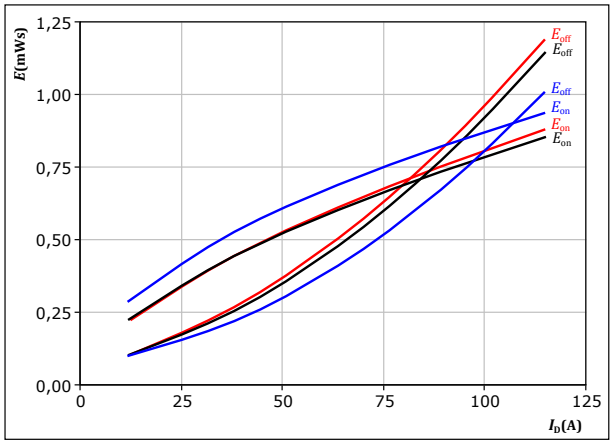


H-Bridge Switching Characteristics

figure 8. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



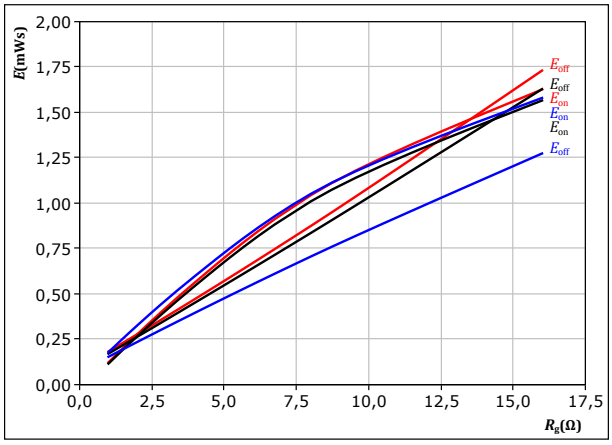
With an inductive load at

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

figure 9. **MOSFET**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



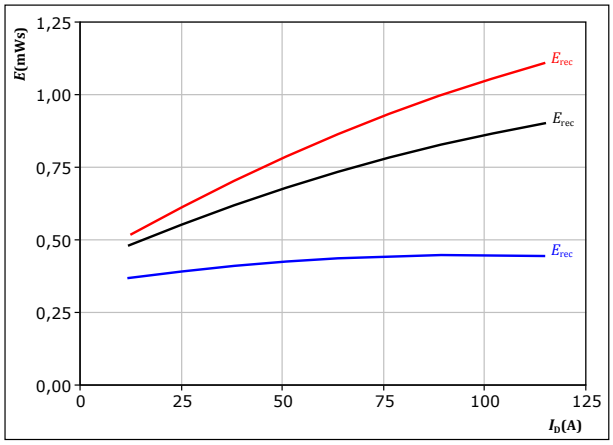
With an inductive load at

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

figure 10. **MOSFET**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



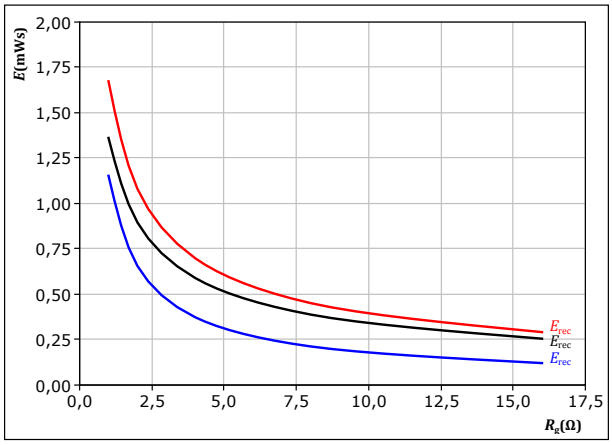
With an inductive load at

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

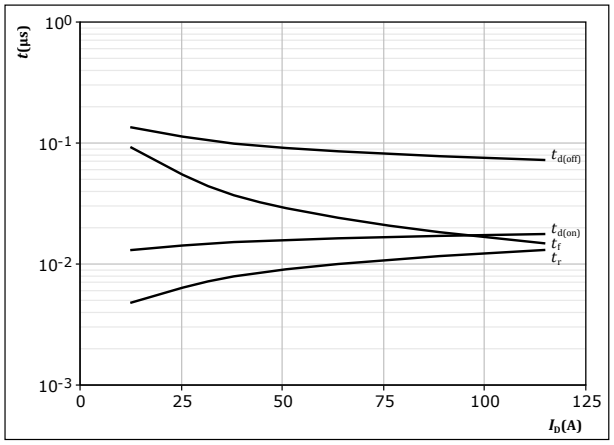
			T_j:	
V_{DS} =	600	V		25 °C
V_{GS} =	0/20	V		125 °C
I_D =	64	A		150 °C

H-Bridge Switching Characteristics

figure 12. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



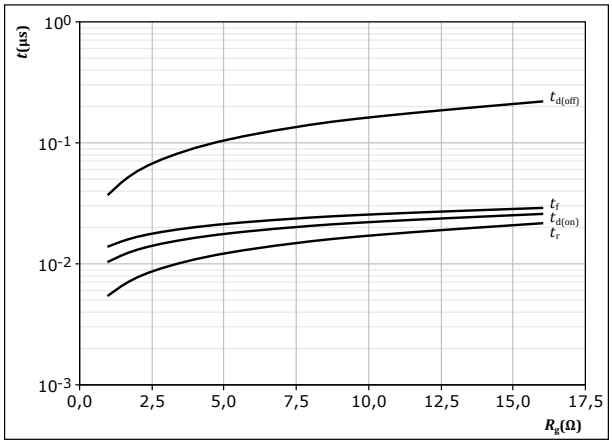
With an inductive load at

T_j =	150	°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

$t = f(R_g)$



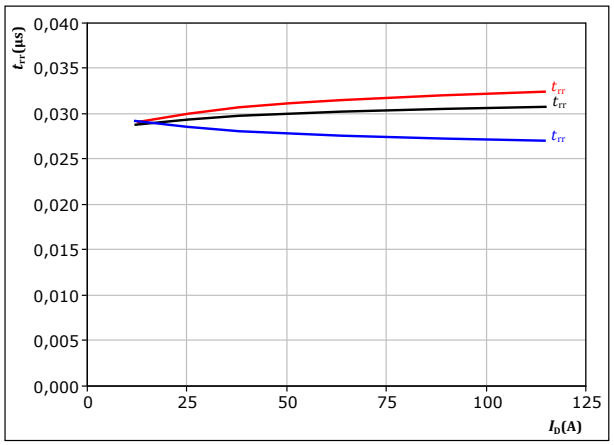
With an inductive load at

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

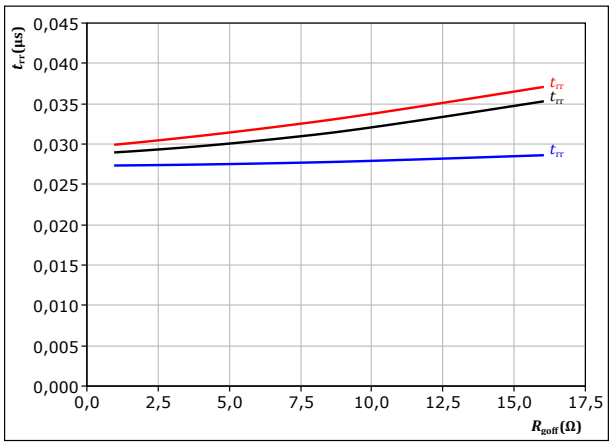
V_{DS} =	600	V
V_{GS} =	0/20	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

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

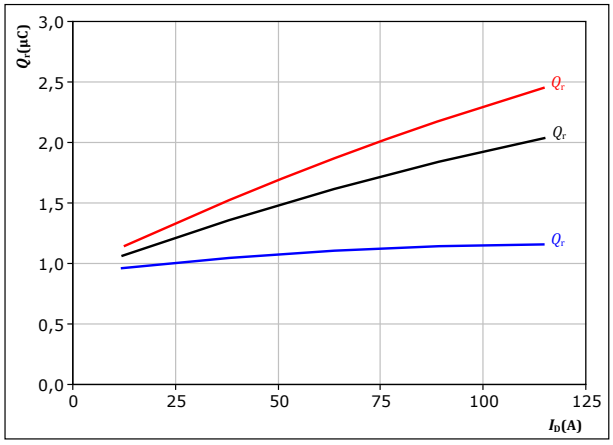
T_j: 25 °C, 125 °C, 150 °C

H-Bridge Switching Characteristics

figure 16. **MOSFET**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

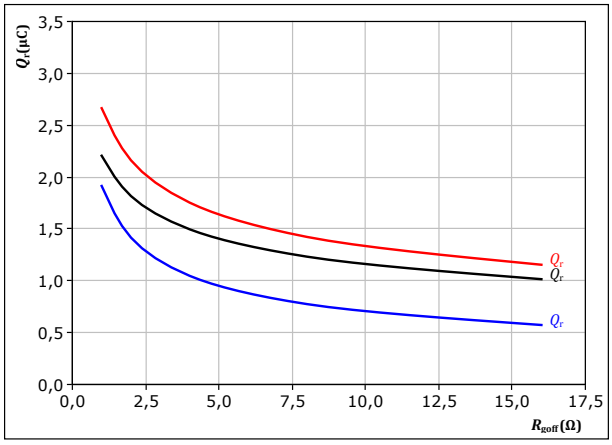


At					
	V_{DS} =	600	V		
	V_{GS} =	0/20	V	T_j:	25 °C, 125 °C, 150 °C
	R_{gon} =	4	Ω		

figure 17. **MOSFET**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$

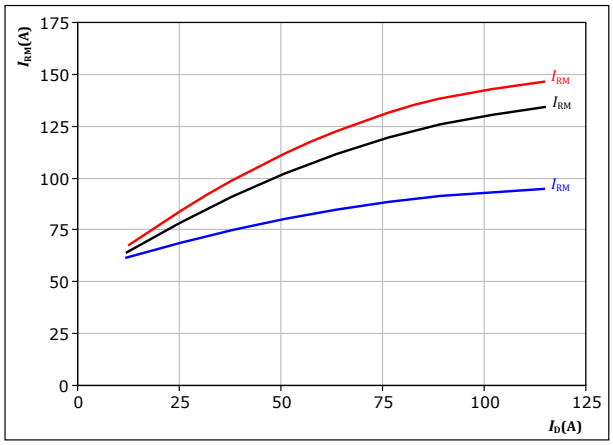


At					
	V_{DS} =	600	V		
	V_{GS} =	0/20	V	T_j:	25 °C, 125 °C, 150 °C
	I_D =	64	A		

figure 18. **MOSFET**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

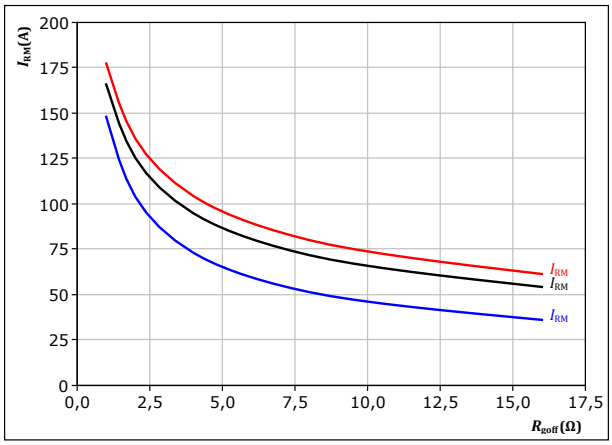


At					
	V_{DS} =	600	V		
	V_{GS} =	0/20	V	T_j:	25 °C, 125 °C, 150 °C
	R_{gon} =	4	Ω		

figure 19. **MOSFET**

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

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



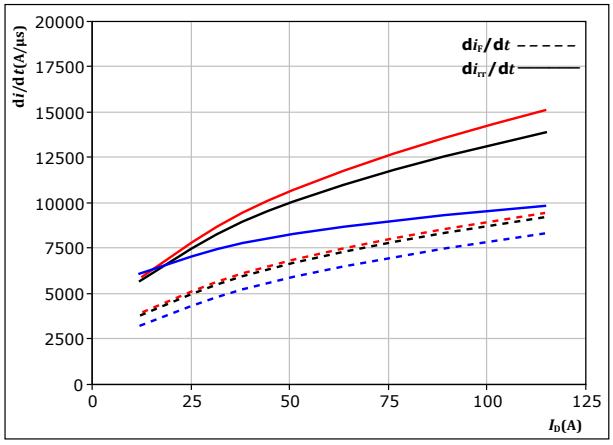
At					
	V_{DS} =	600	V		
	V_{GS} =	0/20	V	T_j:	25 °C, 125 °C, 150 °C
	I_D =	64	A		

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)

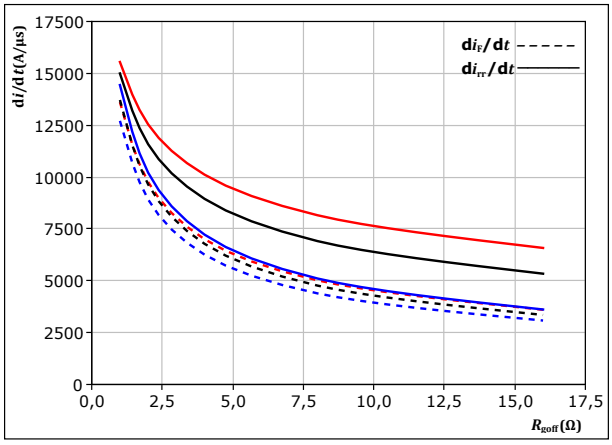


At				
	V_{DS} =	600	V	
	V_{GS} =	0/20	V	
	R_{gon} =	4	Ω	
	T_j:			25 °C
				125 °C
				150 °C

figure 21. **MOSFET**

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

di_F/dt, di_{rr}/dt = f(R_{goff})

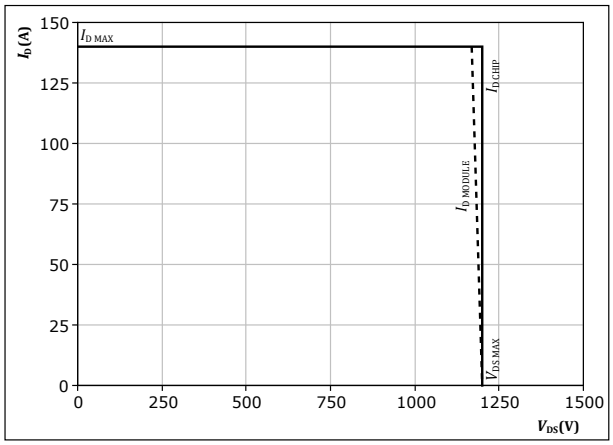


At				
	V_{DS} =	600	V	
	V_{GS} =	0/20	V	
	I_D =	64	A	
	T_j:			25 °C
				125 °C
				150 °C

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

H-Bridge Switching Definitions

figure 23. MOSFET

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

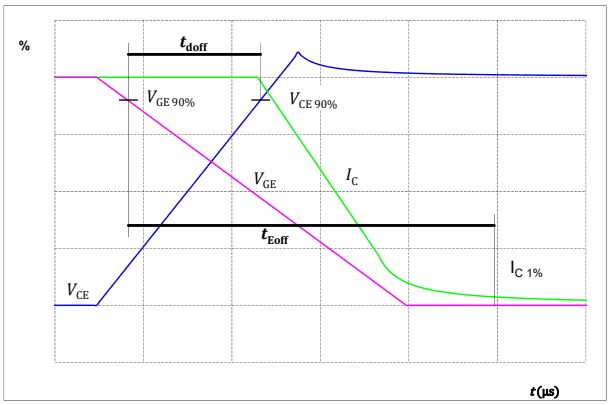


figure 24. MOSFET

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

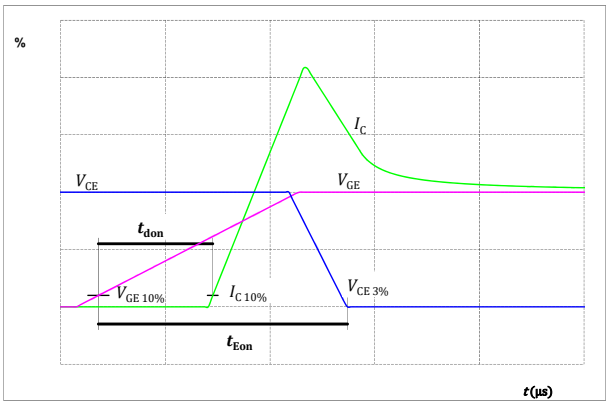


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

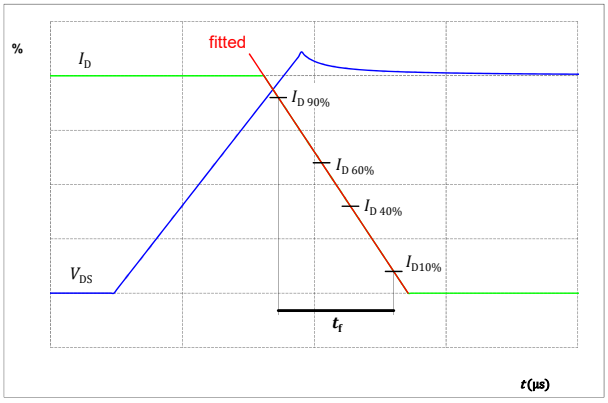
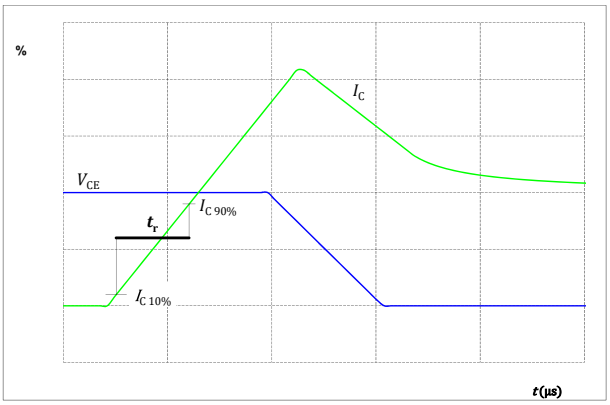


figure 26. MOSFET

Turn-on Switching Waveforms & definition of t_r



H-Bridge Switching Definitions

figure 27. **FWD**

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

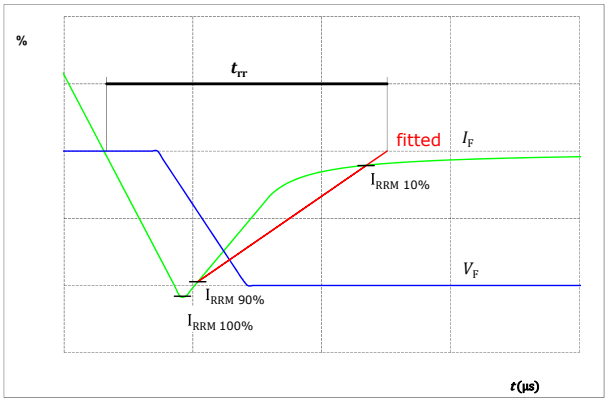


figure 28. **FWD**

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

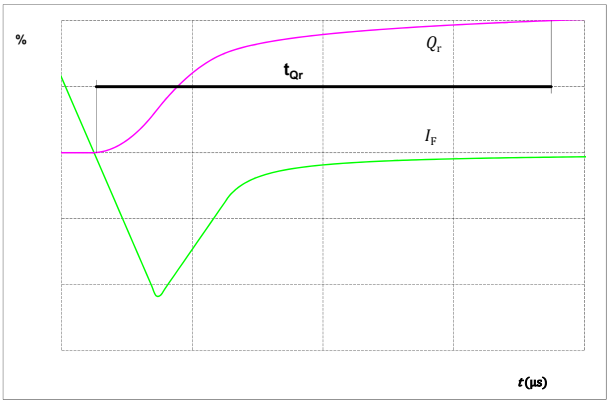
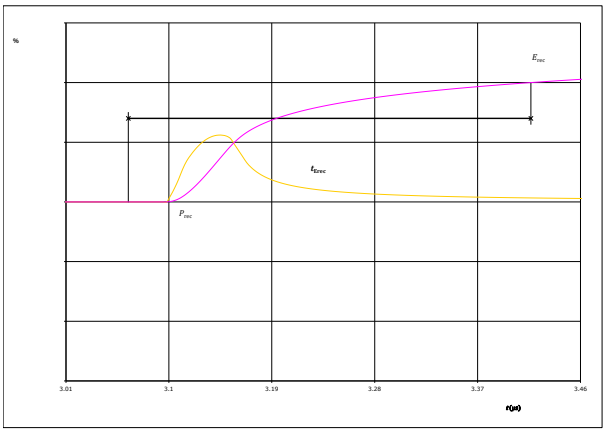


figure 29. **FWD**

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



Ordering Code

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

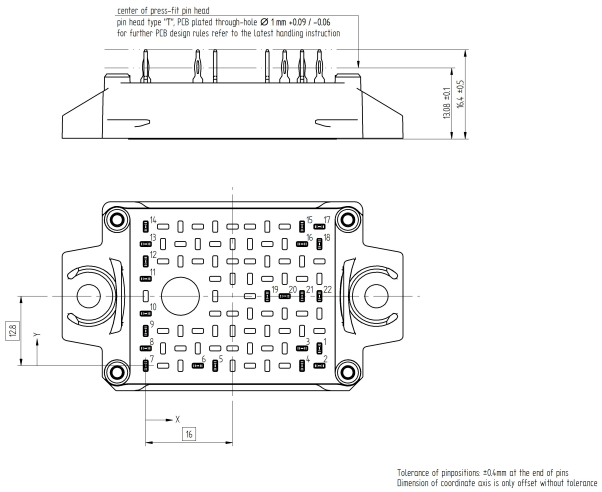
Marking

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

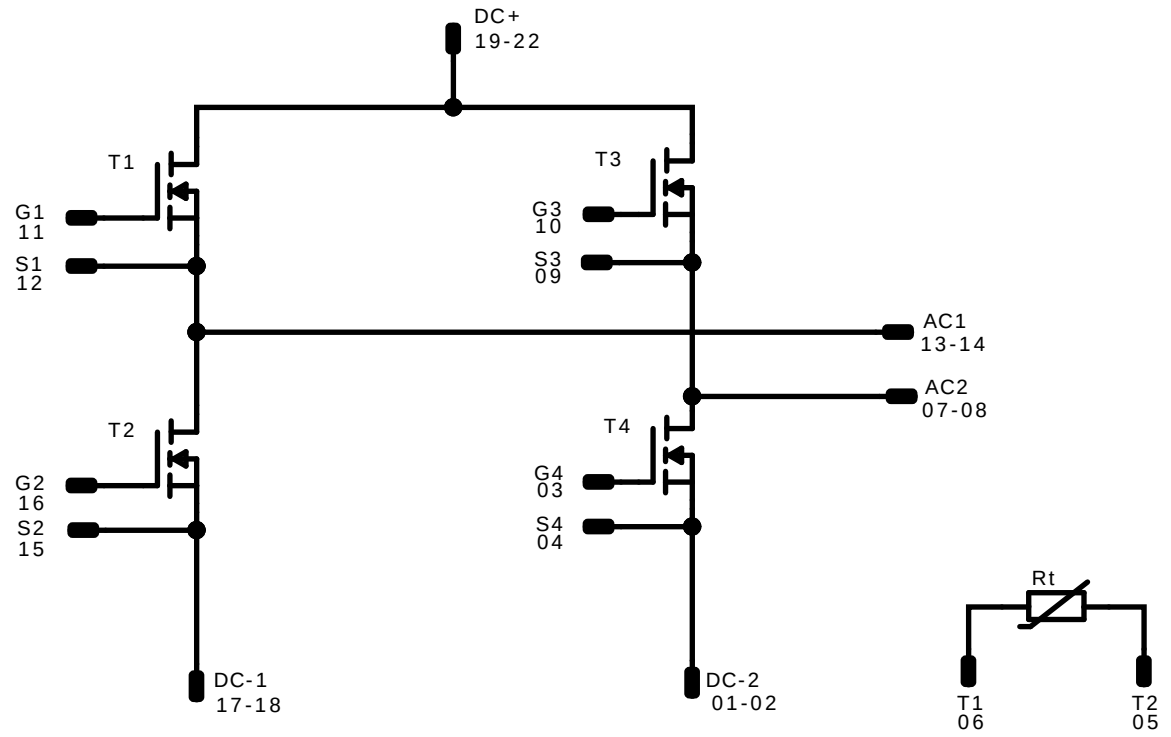
Outline

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+



Pinout



Identification

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

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

Handling instruction
Handling instructions for *flow* E1 packages see vincotech.com website.

Package data
Package data for *flow* 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	