



Vincotech

10-EZ124PA020MS-LQ18F78T

datasheet

fastPACK E1 SiC

1200 V / 20 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
- Power Supply
- UPS
- Welding & Cutting

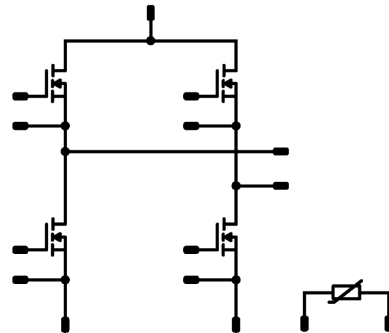
Types

- 10-EZ124PA020MS-LQ18F78T

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
Inverter Switch				
Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	66	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	130	W
Gate-source voltage	V_{GS}	static	-5 / 18	V
		dynamic	-10 / 22	V
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_E [A]	T_j [°C]	Min	Typ	Max	

Inverter Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		60	25 125 150		22,5 26,2 28,3	29,5 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,006	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			200	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			20	μA
Internal gate resistance	r_g							1		Ω
Gate charge	Q_g		-5/18	800	80	25		170		nC
Short-circuit input capacitance	C_{iss}	$f = 500 \text{ kHz}$	0	800	0	25		4000		pF
Short-circuit output capacitance	C_{oss}							224		
Reverse transfer capacitance	C_{rss}							10		
Diode forward voltage	V_{SD}		0		60	25		4,1		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{\text{paste}} = 3,4 \text{ W/mK}$ (PSX)						0,73		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	$t_{d(on)}$	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$	-5/18	600	60	25		35,81		ns	
						125		31,94			
						150		31,28			
Rise time	t_r					25		20,15		ns	
						125		16,05			
						150		15,3			
Turn-off delay time	$t_{d(off)}$					25		65,48		ns	
						125		74,84			
						150		77,11			
Fall time	t_f					25		16,92		ns	
						125		15,35			
						150		17,38			
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=0,351 \mu C$ $Q_{rFWD}=0,94 \mu C$ $Q_{rFWD}=1,13 \mu C$	25		1,05		mWs				
			125		1,18						
			150		1,22						
Turn-off energy (per pulse)	E_{off}		25		0,296		mWs				
			125		0,319						
			150		0,326						
Peak recovery current	I_{RRM}	$di/dt=3589 A/\mu s$ $di/dt=3995 A/\mu s$ $di/dt=3713 A/\mu s$	25		25,52		A				
			125		45,71						
			150		51,95						
Reverse recovery time	t_{rr}		25		33,67		ns				
			125		31,28						
			150		32,25						
Recovered charge	Q_r		25		0,351		μC				
			125		0,94						
			150		1,13						
Reverse recovered energy	E_{rec}		25		0,076		mWs				
			125		0,25						
			150		0,316						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		2163,82		A/ μs					
		125		3470,31							
		150		5788,73							



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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		k Ω
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 493 \Omega$				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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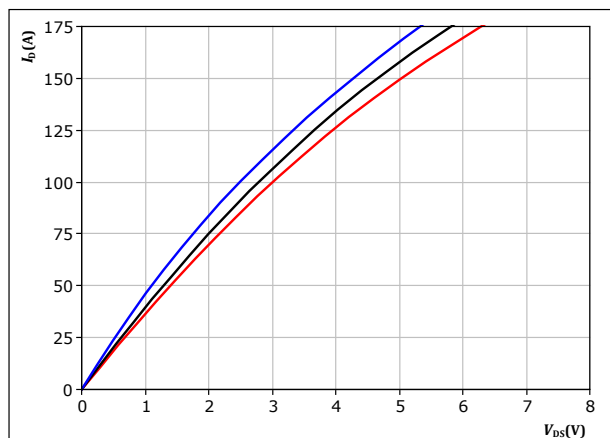
datasheet

Inverter Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

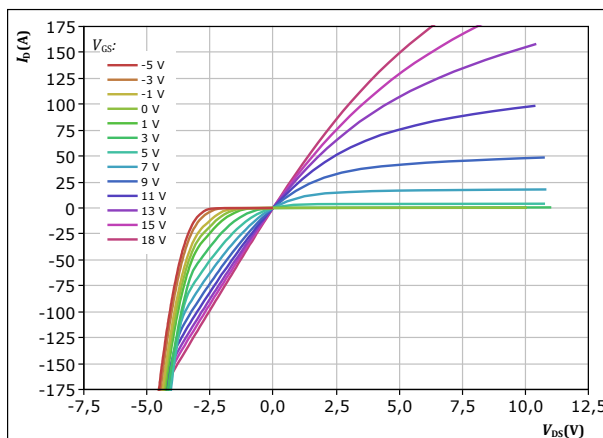


$t_p = 250 \mu s$
 $V_{GS} = 18 V$
 $T_j: 25 ^\circ C$
 $125 ^\circ C$
 $150 ^\circ C$

figure 2. MOSFET

Typical output characteristics

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

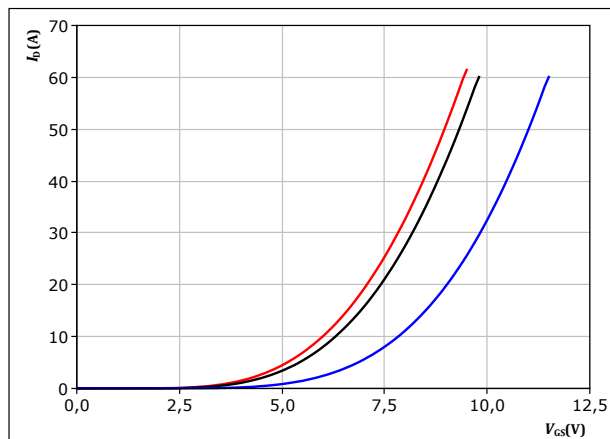


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GS} from -5 V to 18 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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

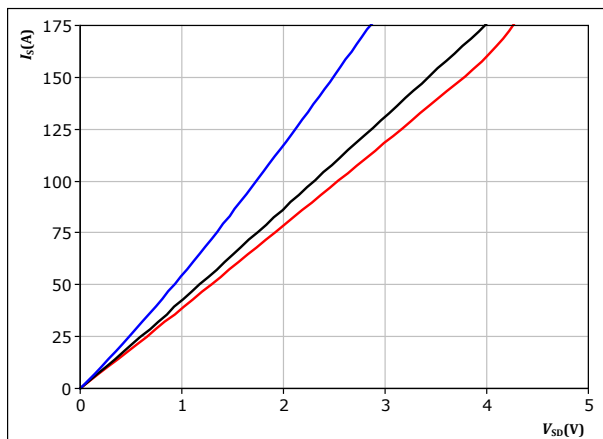


$t_p = 250 \mu s$
 $V_{DS} = 10 V$
 $T_j: 25 ^\circ C$
 $125 ^\circ C$
 $150 ^\circ C$

figure 4. MOSFET

Typical reverse drain current characteristics

$$I_{SD} = f(V_{SD})$$



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



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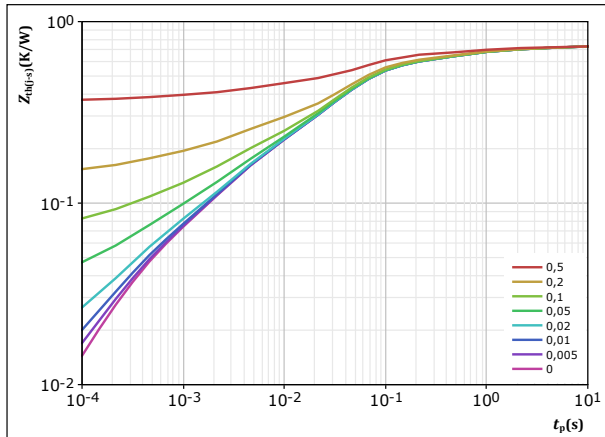
Inverter Switch Characteristics

figure 5.

MOSFET

Transient thermal impedance as a function of pulse width

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



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

$$R_{th(j-a)} = 0,73 \text{ K/W}$$

MOSFET thermal model values

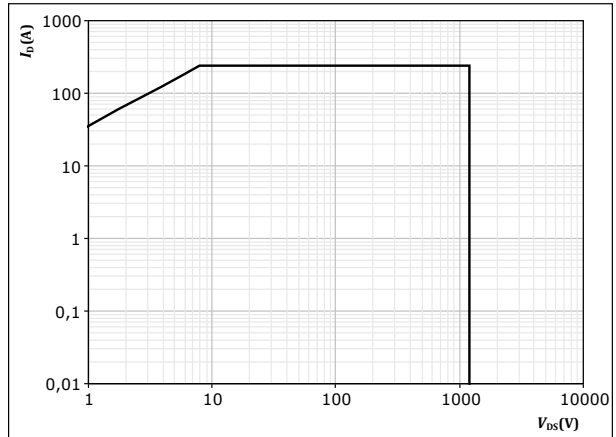
R (K/W)	τ (s)
4,84E-02	4,18E+00
1,30E-01	4,60E-01
4,12E-01	4,49E-02
1,06E-01	3,08E-03
3,67E-02	3,11E-04

figure 6.

MOSFET

Safe operating area

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



D = single pulse

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

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

$$T_j = T_{jmax}$$



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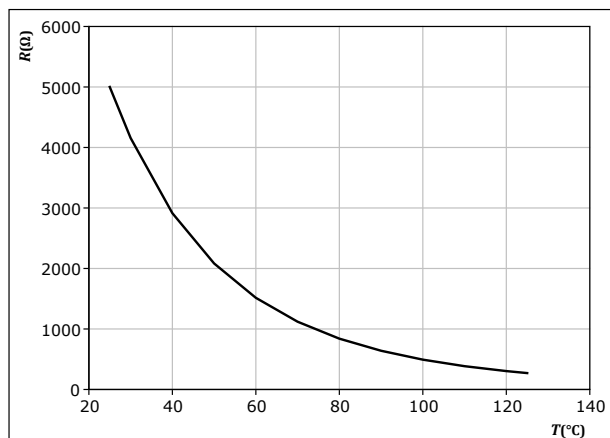
Thermistor Characteristics

figure 7.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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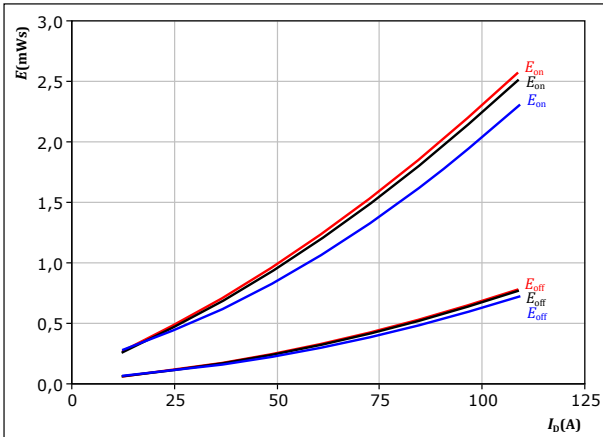
Inverter Switching Characteristics

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
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

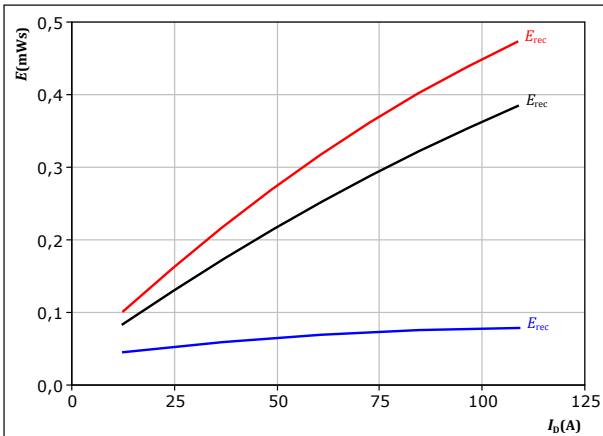
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω

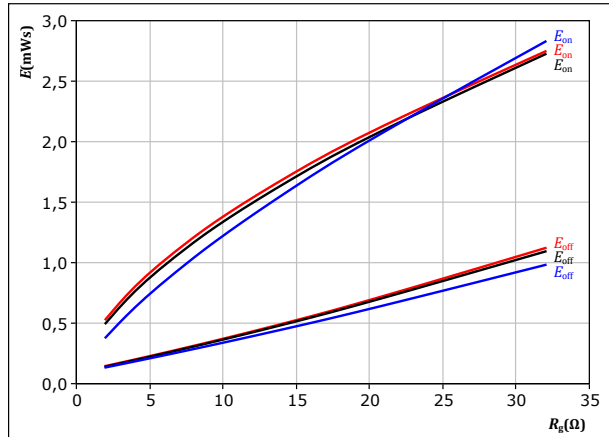
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = -5/18$ V
 $I_D = 60$ A

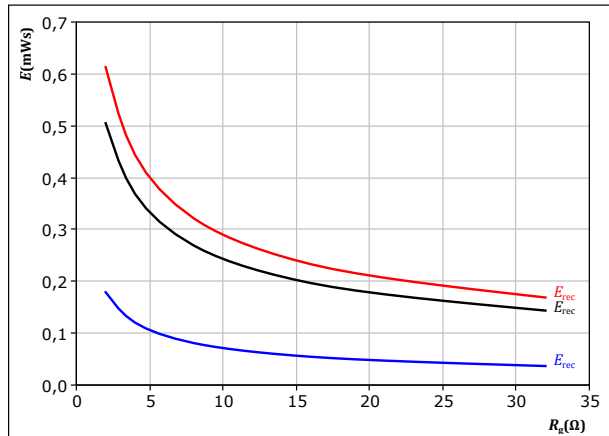
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = -5/18$ V
 $I_D = 60$ A

T_j : 25 °C
125 °C
150 °C



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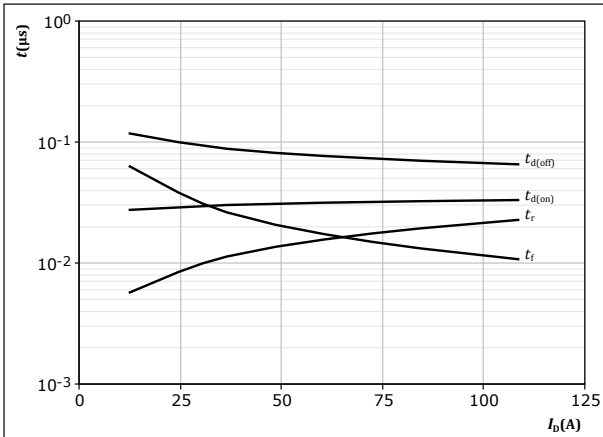
10-EZ124PA020MS-LQ18F78T datasheet

Inverter Switching Characteristics

figure 12.

MOSFET

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



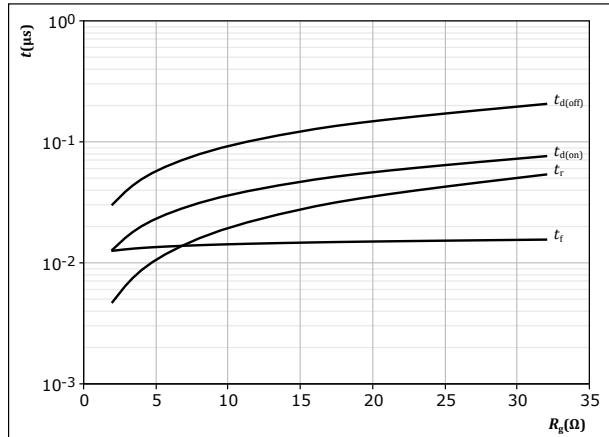
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

figure 13.

MOSFET

Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_{gon})$



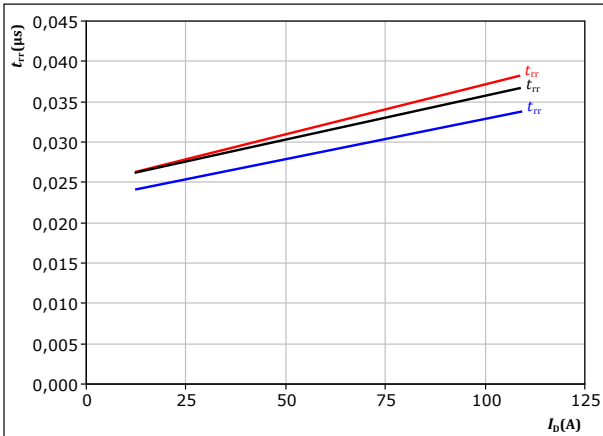
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 60$ A

figure 14.

MOSFET

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

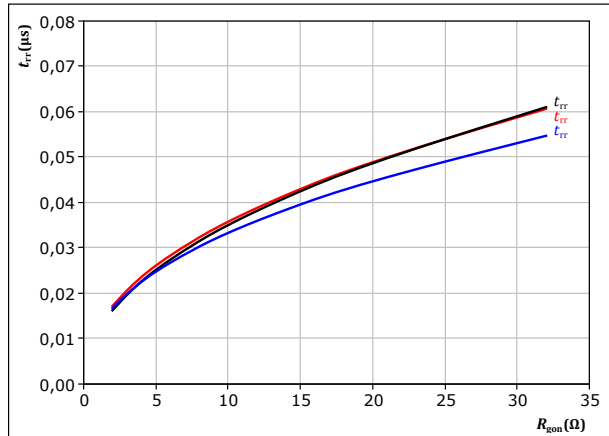


At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 15.

MOSFET

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



At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 60$ A
 $T_j:$ — 25 °C
— 125 °C
— 150 °C



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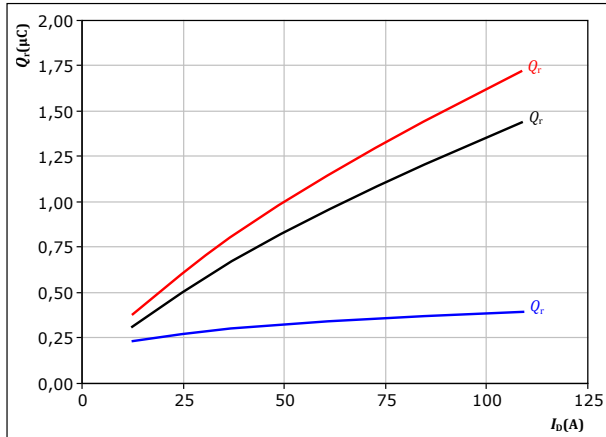
10-EZ124PA020MS-LQ18F78T datasheet

Inverter Switching Characteristics

figure 16. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

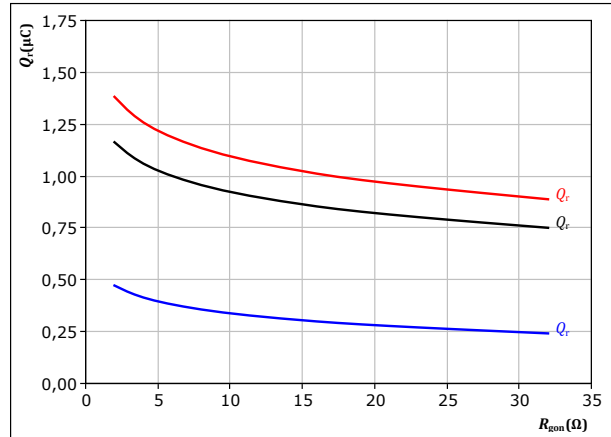


At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 17. MOSFET

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

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

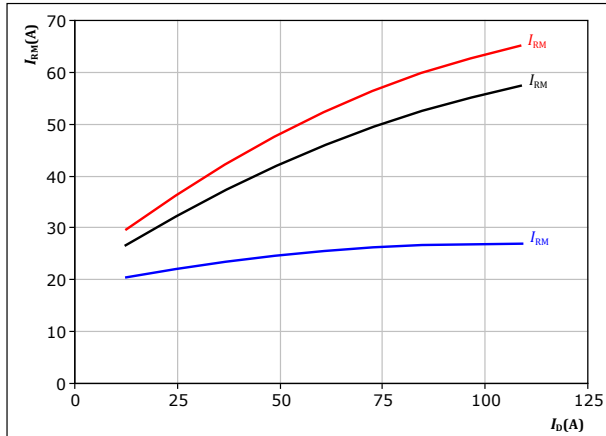


At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 60$ A
 T_j : 25 °C
125 °C
150 °C

figure 18. MOSFET

Typical peak reverse recovery current as a function of drain current

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

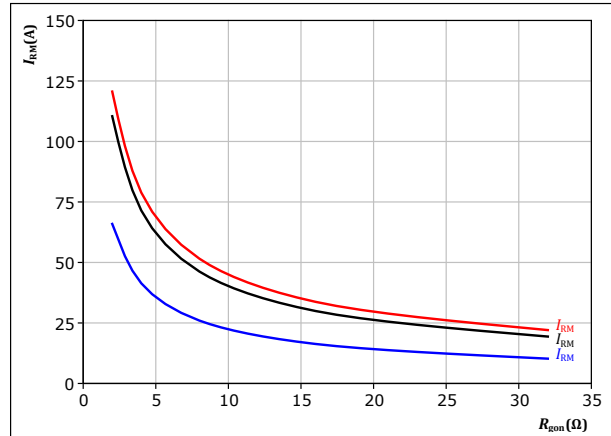


At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 19. MOSFET

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

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



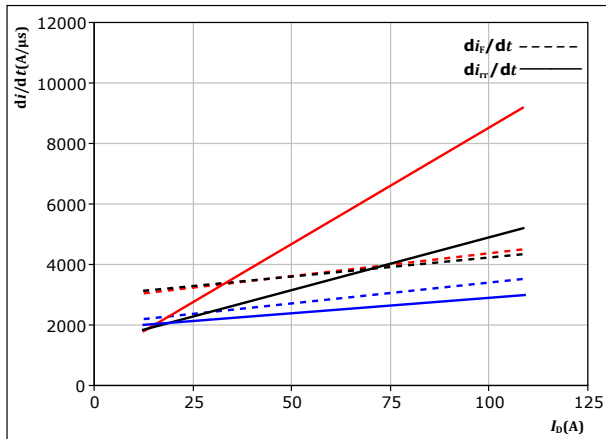
At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 60$ A
 T_j : 25 °C
125 °C
150 °C



Inverter Switching Characteristics

figure 20. MOSFET

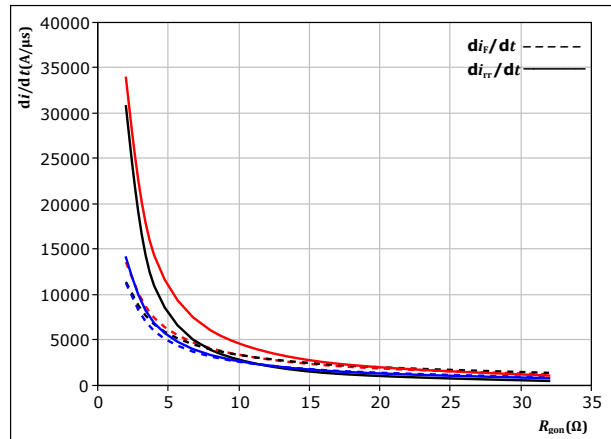
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_r/dt = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $R_{gon} = 8$ Ω
 $T_j = 25$ °C
125 °C
150 °C

figure 21. MOSFET

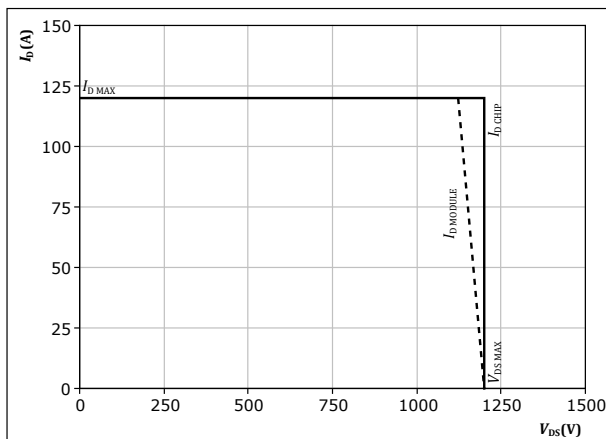
Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



At $V_{DS} = 600$ V
 $V_{GS} = -5/18$ V
 $I_D = 60$ 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
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω



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Inverter Switching Definitions

figure 23. MOSFET

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

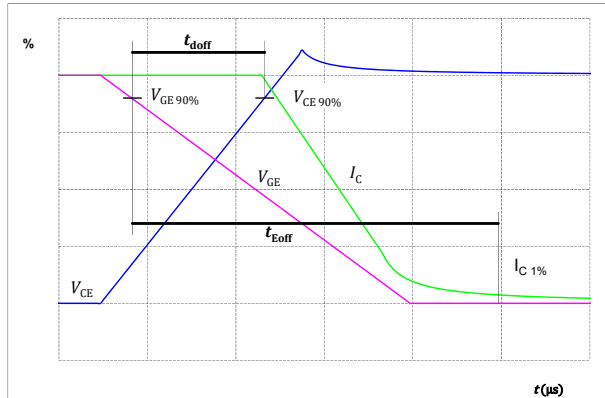


figure 24. MOSFET

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

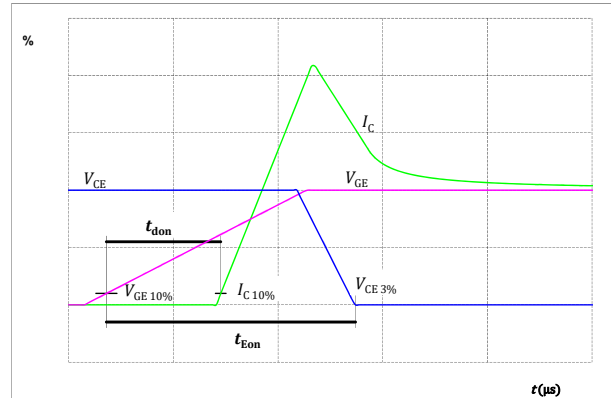


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

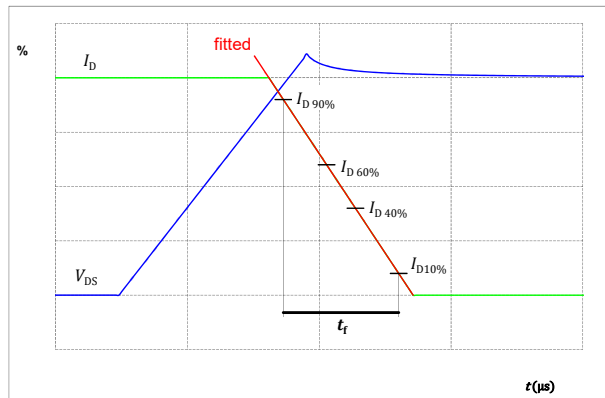
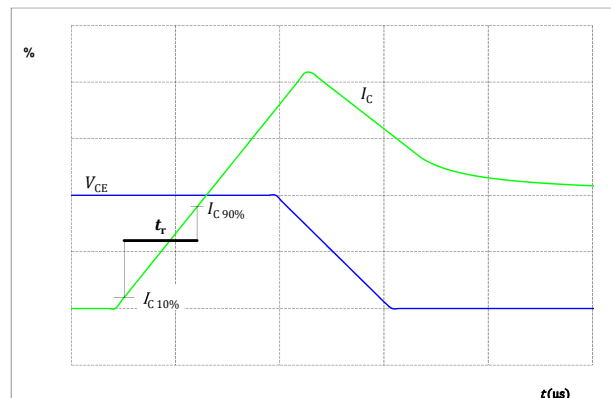


figure 26. MOSFET

Turn-on Switching Waveforms & definition of t_r





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Inverter Switching Definitions

figure 27. FWD

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

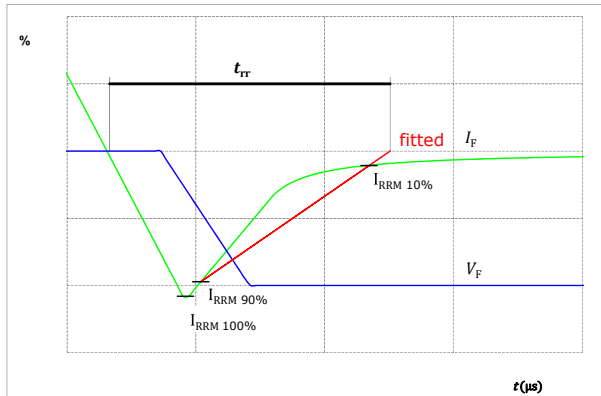


figure 28. FWD

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

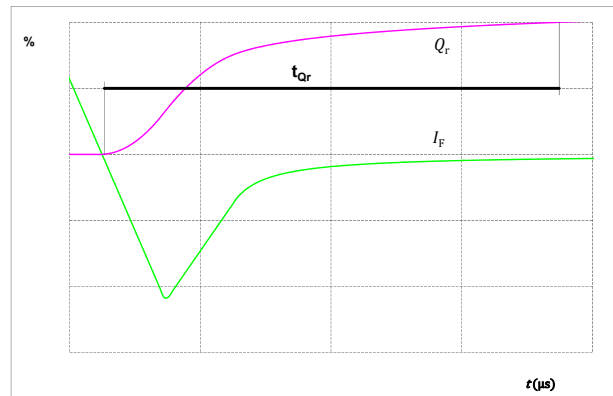
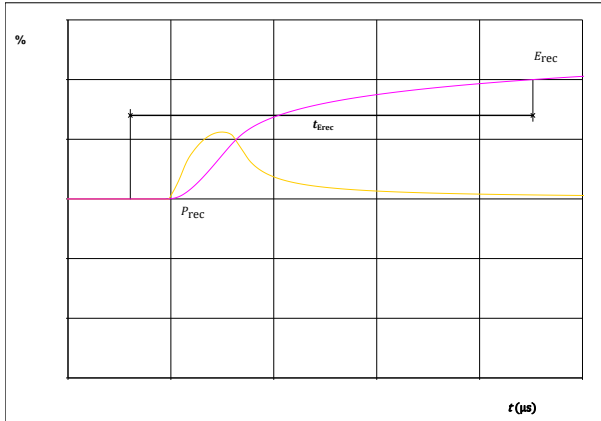


figure 29. FWD



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





datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-EZ124PA020MS-LQ18F78T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EZ124PA020MS-LQ18F78T-/7/

Marking							
<div><div>NN-NNNNNNNNNNNNNN TTTTTTVVVWYY UL VIN LLLLL SSSS</div><div></div><div></div></div>	Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNN- TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
		TTTTTTTVV	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+

center of press-fit pin head
pin head type "T": PCB picked through-hole $\varnothing 1\text{mm} \pm 0,09\text{mm}$
for further PCB design rules refer to the latest handling instruction

138,5 ± 0,5
16,4 ± 0,5

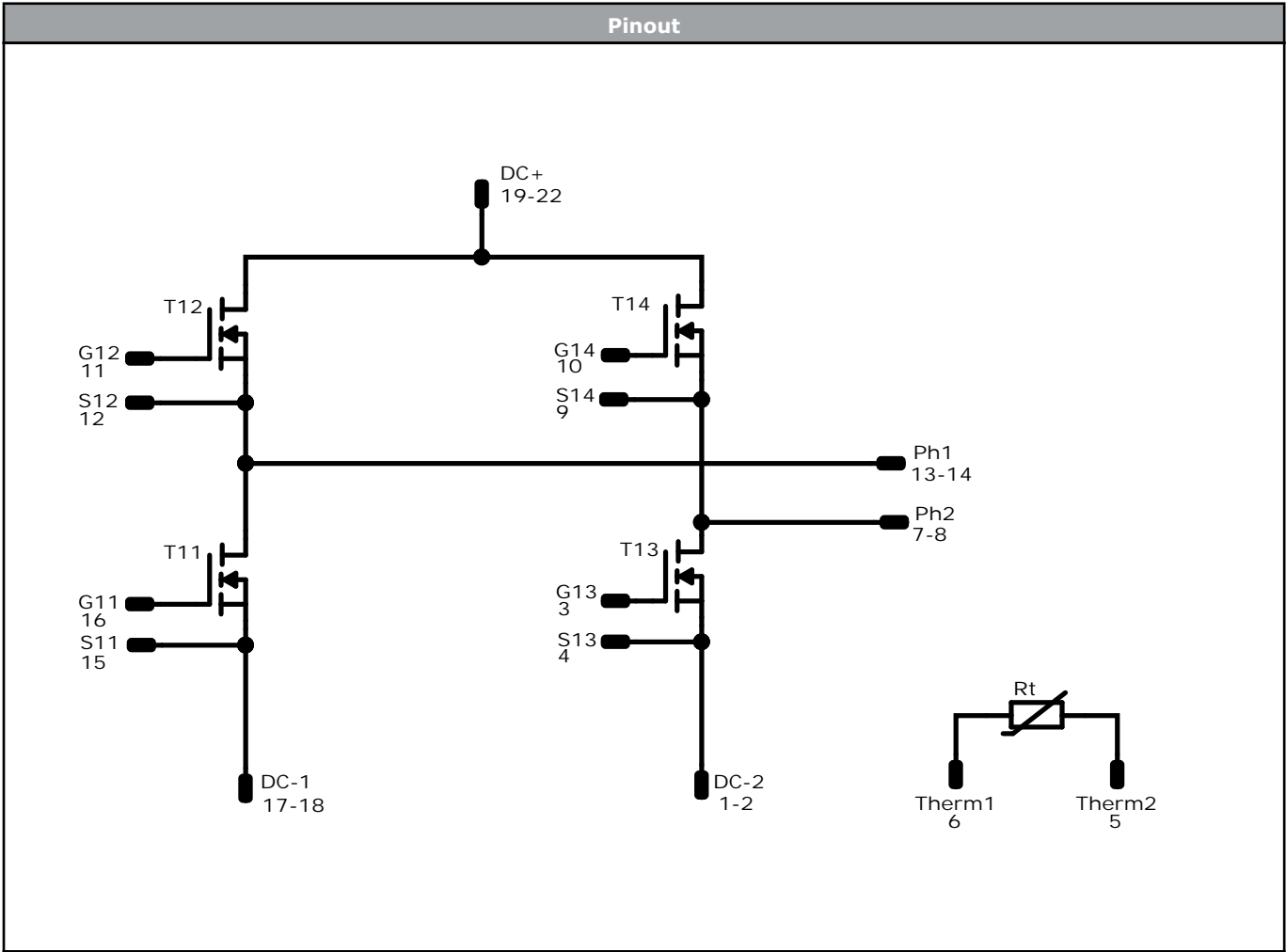
126
Y
X
16

Tolerance of pinpositions: $\pm 0,4\text{mm}$ at the end of pins
Dimension of coordinate axis is only offset without tolerance



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datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14	MOSFET	1200 V	20 mΩ	Inverter 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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,sp}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-EZ124PA020MS-LQ18F78T-D1-14	6 Aug. 2025	Initial Release	

DISCLAIMER

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