



Vincotech

10-EY126PB020MS02-PJ17F78T

datasheet

flowPACK E2 SiC

1200 V / 20 mΩ

Topology features

- 3ph Inverter
- Low and high side Kelvin Emitter for improved switching performance
- MOSFET
- 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: AlN
- 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

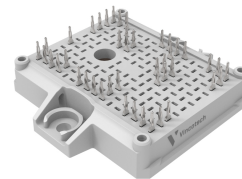
Target applications

- Charging Stations
- Servo Drives

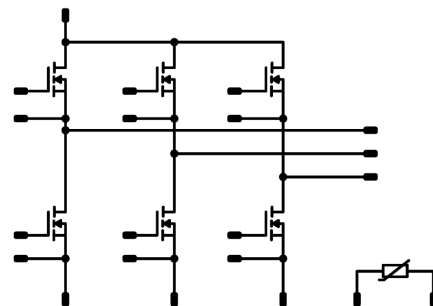
Types

- 10-EY126PB020MS02-PJ17F78T

flow E2 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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	98	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	194	W
Gate-source voltage	V_{GS}	static	0 / 18	V
		dynamic	-5 / 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			9,11	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	

Inverter Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		18		60	25 125 150		19 18,4 19,6	27,6 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,006	25	3,6	4,6	5,6	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			400	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			200	μA
Internal gate resistance	r_g							1,5		Ω
Gate charge	Q_g		0/18		60	25		370		nC
Short-circuit input capacitance	C_{iss}		0	10	0	25		8000		pF
Short-circuit output capacitance	C_{oss}							2600		
Reverse transfer capacitance	C_{rss}							220		

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,49		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	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	0/18	600	64	25		26,87		ns	
						125		22,74			
						150		22,16			
Rise time	t_r					25		18,84		ns	
						125		14,93			
						150		14,23			
Turn-off delay time	$t_{d(off)}$					25		68,01		ns	
						125		82,16			
						150		86,4			
Fall time	t_f					25		18,41		ns	
						125		23,16			
						150		23,02			
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=0,389 \mu C$ $Q_{rFWD}=0,947 \mu C$ $Q_{rFWD}=1,18 \mu C$	0/18	600	64	25		1,74		mWs	
		125					1,65				
		150					1,72				
Turn-off energy (per pulse)	E_{off}					25		0,317		mWs	
		125					0,316				
		150					0,331				
Peak recovery current	I_{RRM}	$di/dt=3096 A/\mu s$ $di/dt=3648 A/\mu s$ $di/dt=3988 A/\mu s$				25		29,42		A	
						125		42,38			
						150		47,37			
Reverse recovery time	t_{rr}					25		22,81		ns	
						125		41,99			
						150		42,19			
Recovered charge	Q_r		25		0,389		μC				
			125		0,947						
			150		1,18						
Reverse recovered energy	E_{rec}		25		0,026		mWs				
			125		0,168						
			150		0,222						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		4015,76		A/ μs					
		125		2076,02							
		150		1016,99							



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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 R100	$\Delta_{R/R}$	$R_{100} = 499 \Omega$				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.



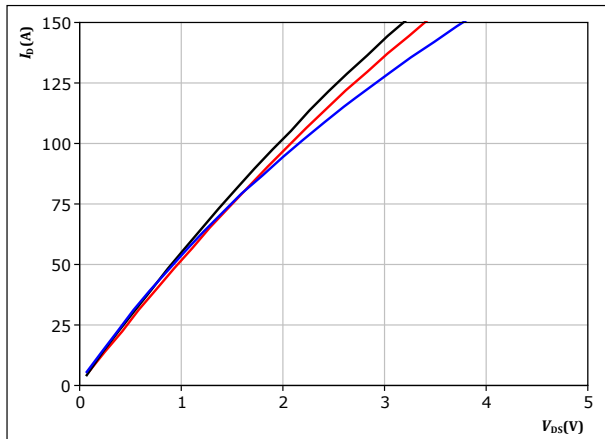
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Inverter Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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



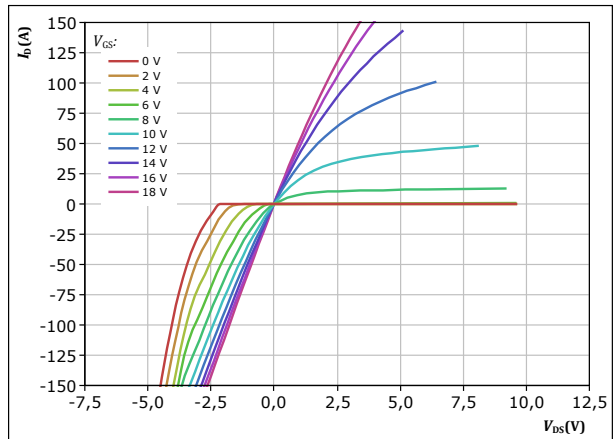
$t_p = 250 \mu s$
 $V_{GS} = 18 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 2. MOSFET

Typical output characteristics

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

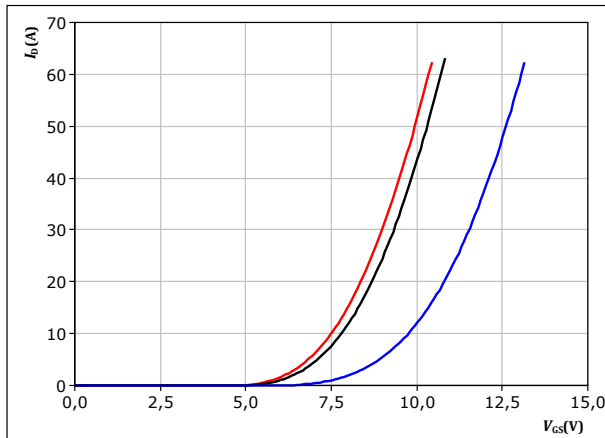


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GS} from 0 V to 18 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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



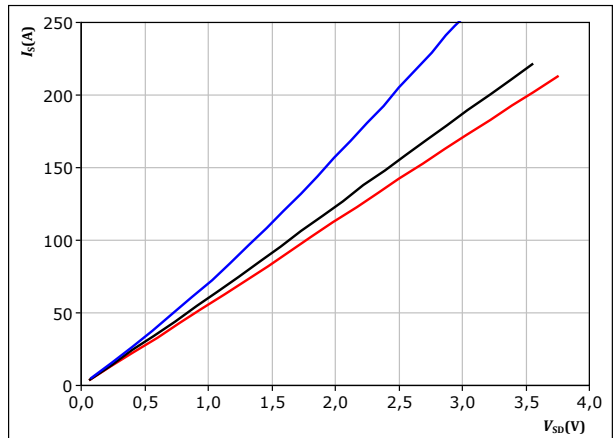
$t_p = 250 \mu s$
 $V_{DS} = 10 V$

T_j :
— 25 °C
— 125 °C
— 150 °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 °C
— 125 °C
— 150 °C



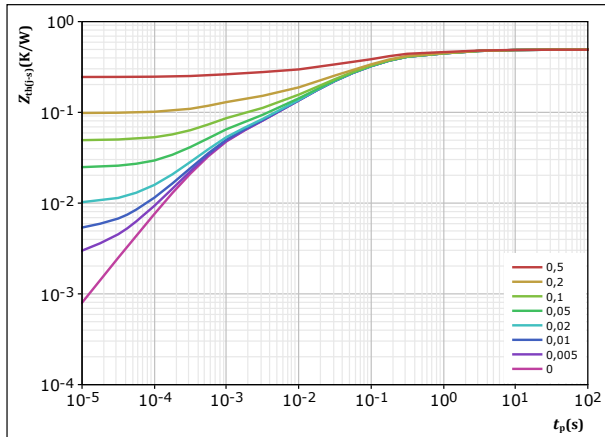
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Inverter Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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



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

$$R_{th(j-s)} = 0,49 \text{ K/W}$$

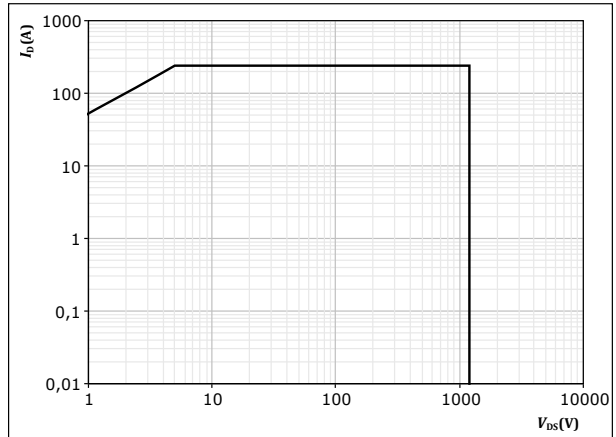
MOSFET thermal model values

R (K/W)	τ (s)
2,00E-02	6,02E+00
7,30E-02	1,00E+00
2,37E-01	9,43E-02
1,13E-01	1,23E-02
4,81E-02	7,00E-04

figure 6. MOSFET

Safe operating area

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



$D = \text{single pulse}$

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

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

$$T_j = T_{jmax}$$



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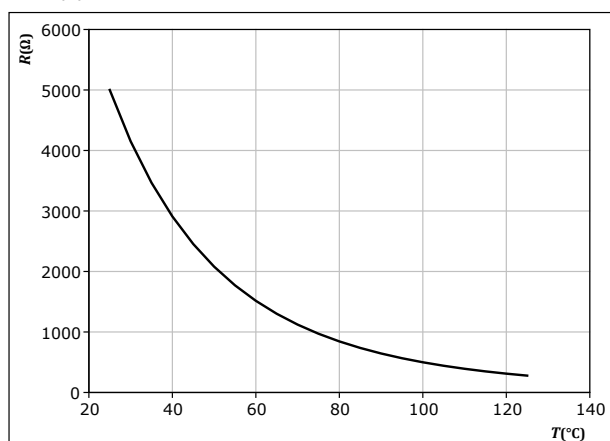
Thermistor Characteristics

figure 7.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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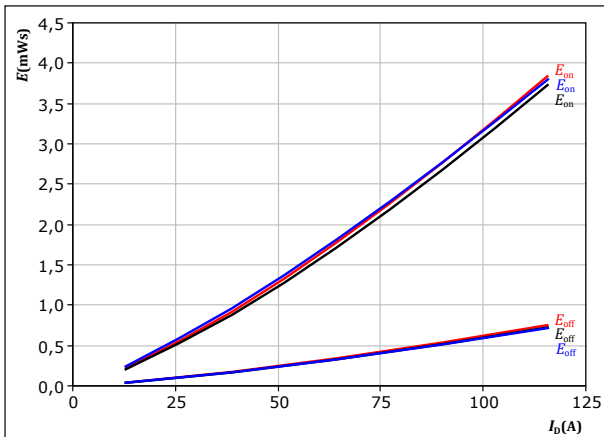
Inverter Switching Characteristics

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
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

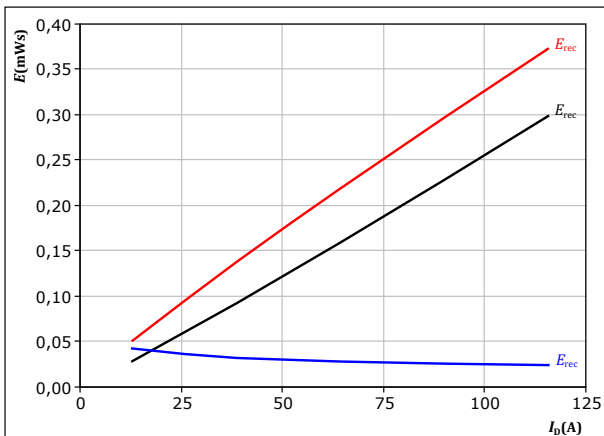
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω

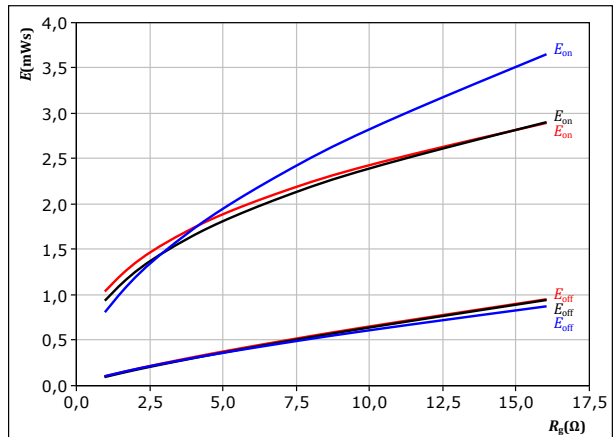
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = 0/18$ V
 $I_D = 64$ A

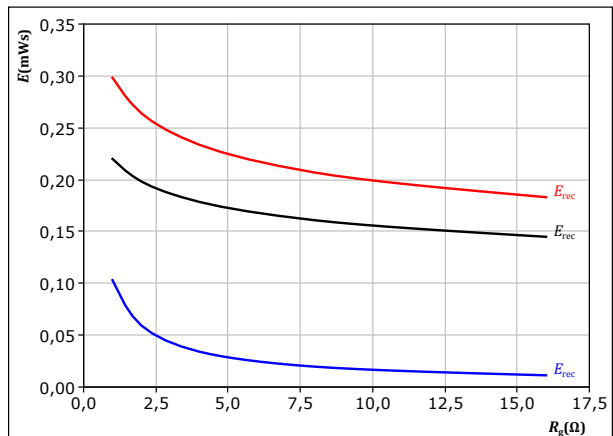
T_j : 25 °C
125 °C
150 °C

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
 $V_{GS} = 0/18$ V
 $I_D = 64$ A

T_j : 25 °C
125 °C
150 °C



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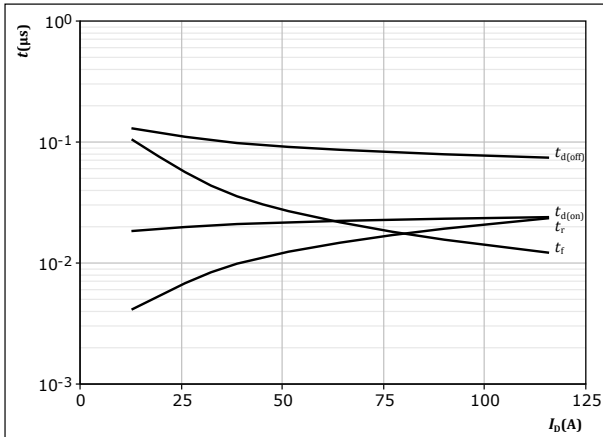
10-EY126PB020MS02-PJ17F78T
datasheet

Inverter Switching Characteristics

figure 12.

MOSFET

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



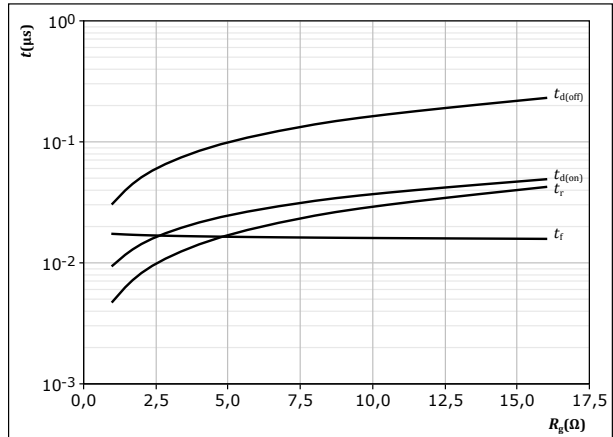
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 13.

MOSFET

Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_{g1})$



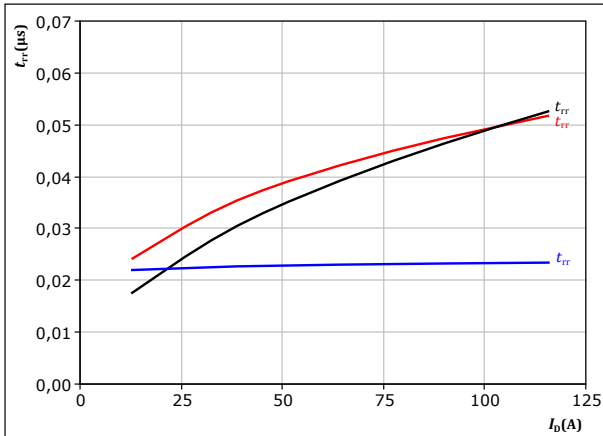
With an inductive load at

$T_j = 150$ °C
 $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 64$ A

figure 14.

MOSFET

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

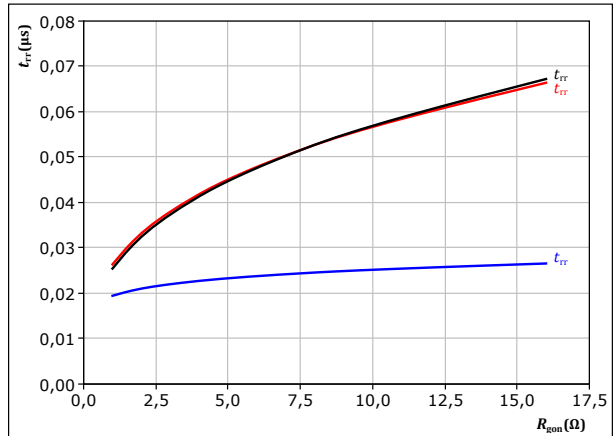


At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 15.

MOSFET

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 64$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)



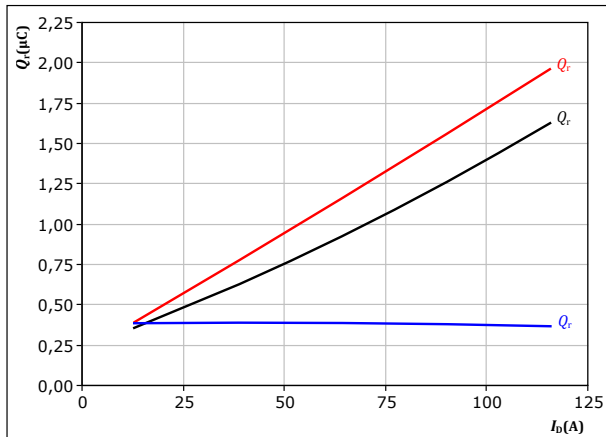
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Inverter Switching Characteristics

figure 16. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

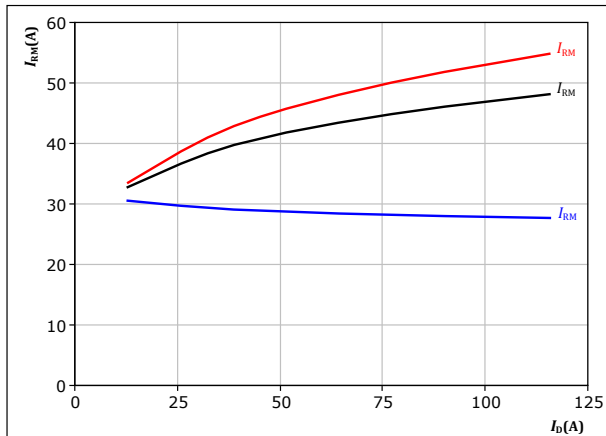


At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 18. MOSFET

Typical peak reverse recovery current as a function of drain current

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

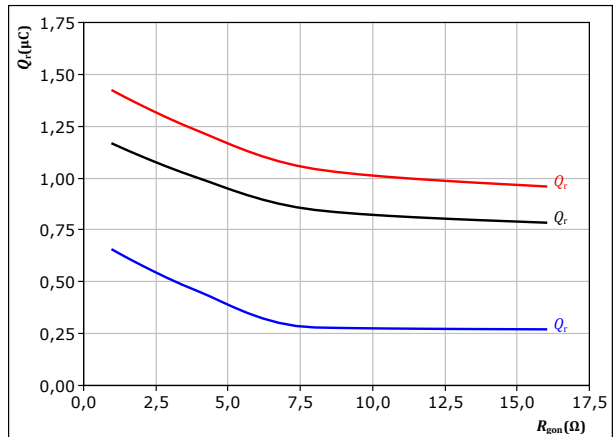


At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C
125 °C
150 °C

figure 17. MOSFET

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

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

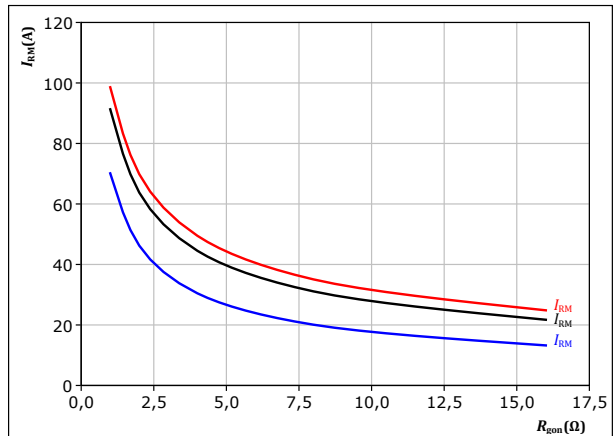


At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 64$ A
 T_j : 25 °C
125 °C
150 °C

figure 19. MOSFET

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

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 64$ A
 T_j : 25 °C
125 °C
150 °C

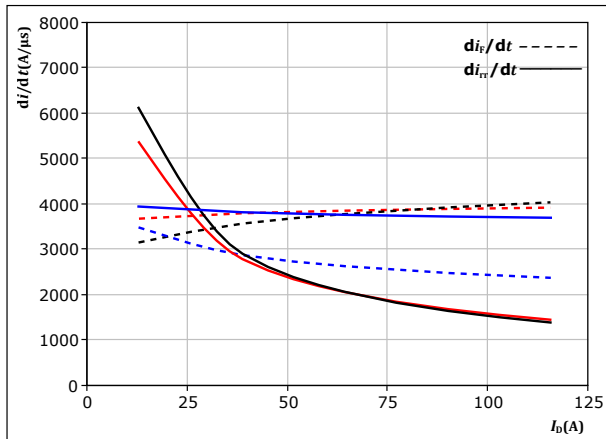


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Inverter Switching Characteristics

figure 20. MOSFET

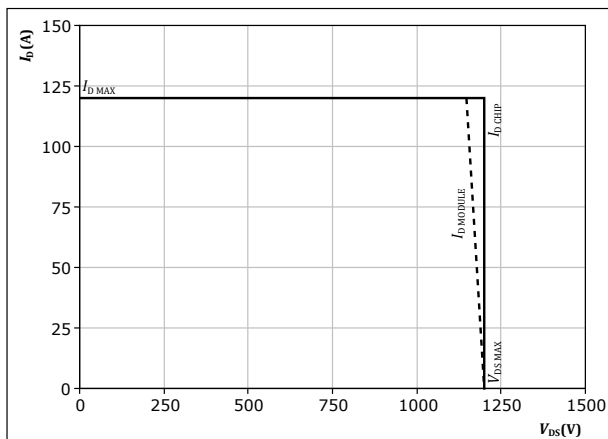
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_r/dt = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $R_{gon} = 4$ Ω
 $T_j:$ 25 °C
125 °C
150 °C

figure 22. MOSFET

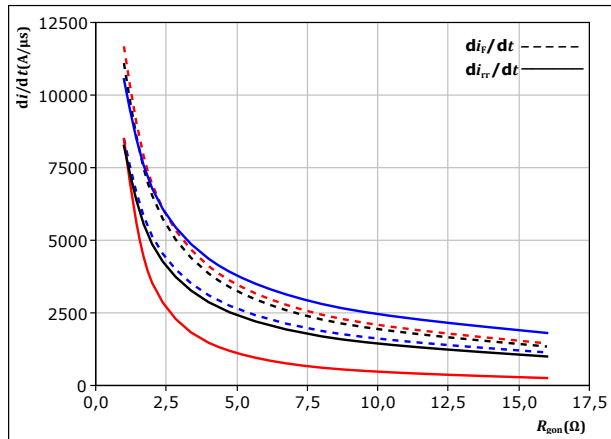
Reverse bias safe operating area
 $I_D = f(V_{DS})$



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 on gate resistor
 $di_f/dt, di_r/dt = f(R_{gon})$



At $V_{DS} = 600$ V
 $V_{GS} = 0/18$ V
 $I_D = 64$ A
 $T_j:$ 25 °C
125 °C
150 °C



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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})

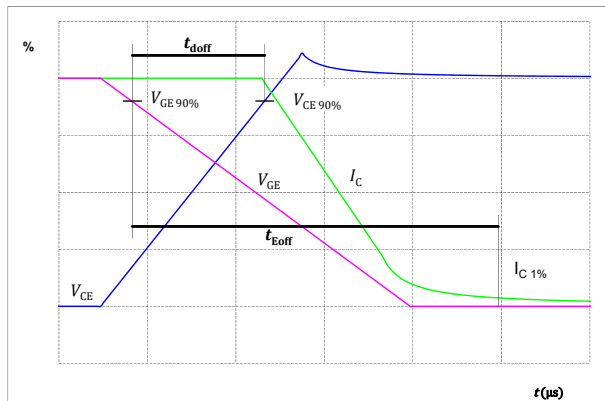


figure 24. MOSFET

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

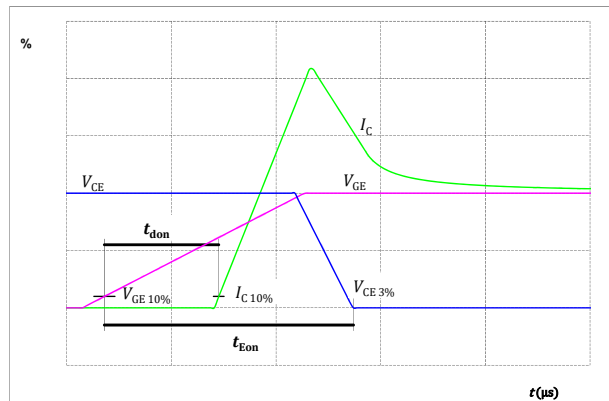


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

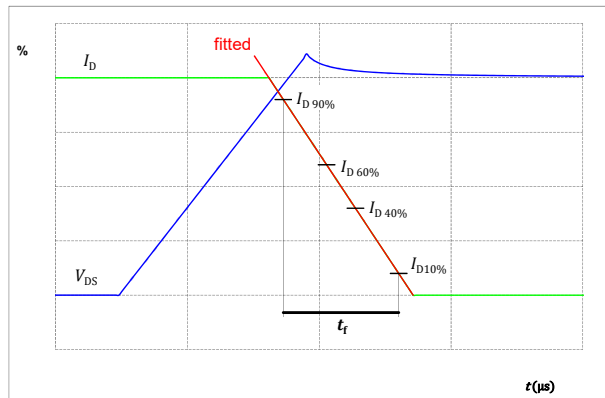
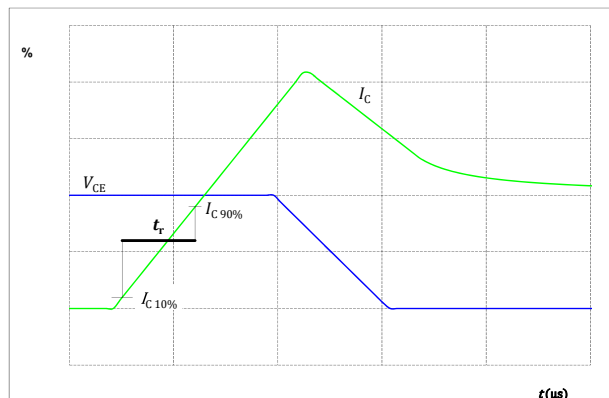


figure 26. MOSFET

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)

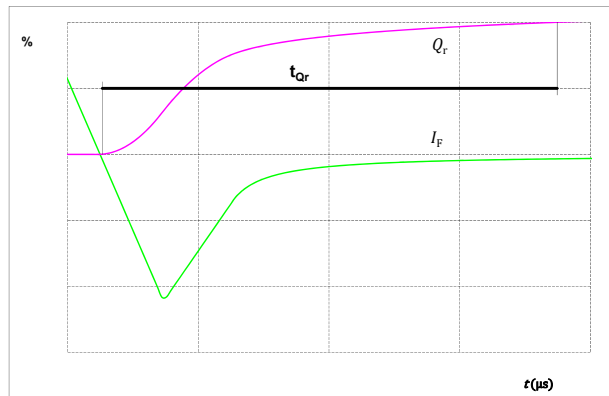
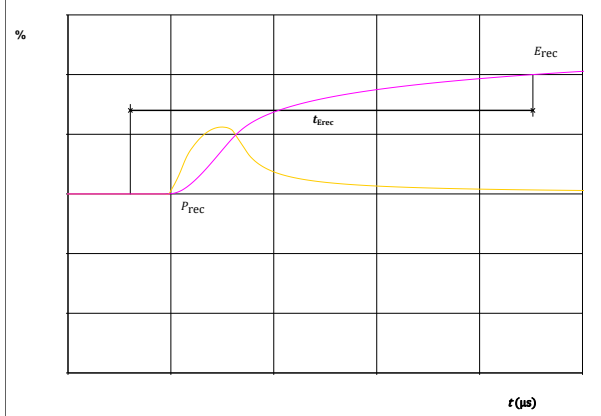


figure 29.

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-EY126PB020MS02-PJ17F78T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EY126PB020MS02-PJ17F78T-/7/

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

Pin table [mm]

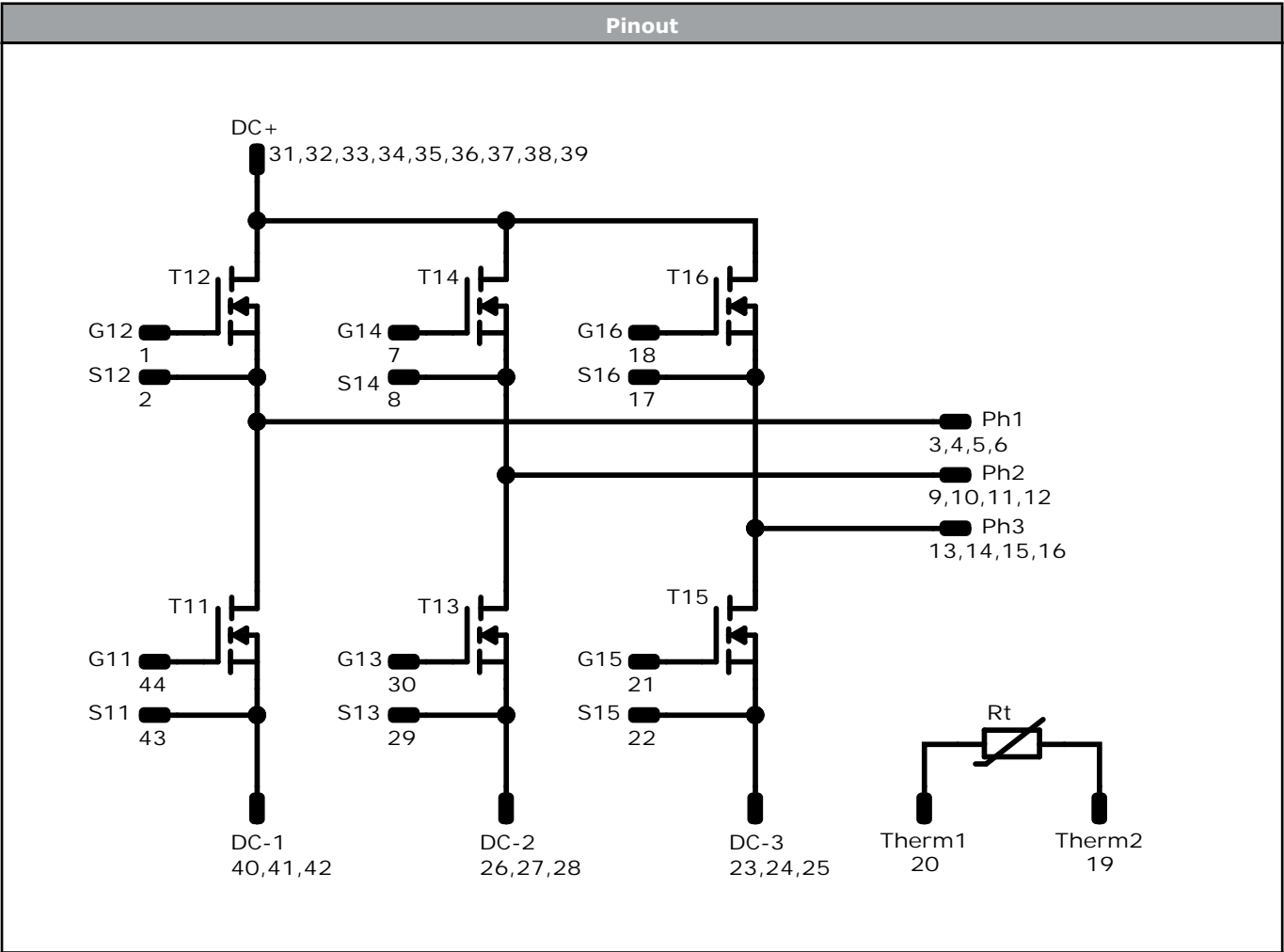
Pin	X	Y	Function
1	6,4	0	G12
2	3,2	0	S12
3	0	0	Ph1
4	0	3,2	Ph1
5	0	6,4	Ph1
6	0	9,6	Ph1
7	6,4	19,2	G14
8	3,2	19,2	S14
9	0	19,2	Ph2
10	0	22,4	Ph2
11	0	25,6	Ph2
12	0	28,8	Ph2
13	3,2	38,4	Ph3
14	0	38,4	Ph3
15	0	41,6	Ph3
16	0	44,8	Ph3
17	0	48	S16
18	3,2	48	G16
19	12,8	48	Therm2
20	22,4	48	Therm1
21	25,6	48	G15
22	28,8	48	S15
23	32	48	DC-3
24	32	44,8	DC-3
25	32	41,6	DC-3
26	32	25,6	DC-2
27	32	22,4	DC-2
28	32	19,2	DC-2
29	32	16	S13
30	28,8	19,2	G13
31	22,4	12,8	DC+
32	19,2	12,8	DC+
33	16	12,8	DC+
34	19,2	16	DC+
35	22,4	16	DC+
36	25,6	32	DC+
37	22,4	32	DC+
38	22,4	35,2	DC+
39	25,6	35,2	DC+
40	32	6,4	DC-1
41	32	3,2	DC-1
42	32	0	DC-1
43	28,8	0	S11
44	25,6	0	G11

Outline

Technical drawing of the PCB showing top and bottom views. The top view includes dimensions: 115,8 ± 0,1 mm for the overall width, 44,8 ± 0,1 mm for the central width, and 48 mm for the distance between mounting holes. The bottom view shows a square footprint with mounting holes at the corners and a central circular feature. A note specifies: 'center of press-fit pin head, pin head type TT: PCB plated through-hole Φ1mm ±0,09 / ±0,06 for further PCB design rules refer to the latest handling instruction'. A tolerance note at the bottom right states: 'Tolerance of prepositions: ±0,1mm 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, T15, T16	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> E2 packages see vincotech.com website.				
Package data				
Package data for <i>flow</i> E2 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-EY126PB020MS02-PJ17F78T-D2-14	12 Aug. 2024	Correct Rth (AIN)	
10-EY126PB020MS02-PJ17F78T-D3-14	16 Apr. 2026	Correct Vgs of the Inverter Switch	

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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.