



Vincotech

flowPACK 1		1200 V / 10 mΩ
Features		flow 1 12 mm housing
<ul style="list-style-type: none">• 3 Phase Inverter• Compact and low inductive design• High frequency SiC MOSFET• High power low inductive package• Integrated NTC		
Target applications		Schematic
<ul style="list-style-type: none">• Charging Stations• Power Supply		
Types		
<ul style="list-style-type: none">• 10-PG126PA010MR-L820F88T		



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Maximum Ratings

$T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Inverter Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current	I_D	$T_j = T_{jmax}$	123	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	548	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	288	W
Gate-source voltage	V_{GSS}		-4 / 22	V
Maximum Junction Temperature	T_{jmax}		175	$^\circ\text{C}$

Capacitor (DC)

Maximum DC voltage	V_{MAX}		1000	V
Operation Temperature	T_{op}		-55 ... 125	$^\circ\text{C}$

Capacitor (GS)

Maximum DC voltage	V_{MAX}		25	V
Operation Temperature	T_{op}		0 ... 125	$^\circ\text{C}$

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	$^\circ\text{C}$
Operation temperature under switching condition	T_{jop}		-40...+($T_{jmax} - 25$)	$^\circ\text{C}$

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				min. 12,7	mm
Clearance				8,18	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		100	25 125 150		9 14 16	12,5	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,04	25	2,7	3,9	5,6	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			400	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	0	0	25		4	40	µA
Internal gate resistance	r_g							1,75		Ω
Gate charge	Q_g	$V_{DD} = 600$ V	18		80	25		428		nC
Short-circuit input capacitance	C_{iss}	$f = 1$ Mhz	0	800	0	25		5348		pF
Short-circuit output capacitance	C_{oss}							304		
Reverse transfer capacitance	C_{rss}							108		

Thermal

Thermal resistance junction to sink*	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,33		K/W
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*Only valid with pre-applied Vincotech thermal interface material.

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$	0/18	600	100	25		57,76		
Rise time	t_r					125		50,72		ns
Turn-off delay time	$t_{d(off)}$					150		50,4		
Fall time	t_f		100			25		41,6		ns
Turn-on energy (per pulse)	E_{on}		25	125	125		36,48			
Turn-off energy (per pulse)	E_{off}				150		35,52			
					25		336,32			
					125		389,28			
					150		399,84			
					25		27,06			
					125		28,28			
					150		28,33		ns	
					25		5,56			
					125		5,3			
					150		5,32		mWs	
					25		5,51			
					125		4,97			
					150		5		mWs	



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Characteristic Values

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

Capacitor (DC)

Static

Capacitance	C							94		nF
Tolerance							-20		20	%
Dissipation factor		$f = 1$ kHz				25		25		%

Capacitor (GS)

Static

Capacitance	C							10		nF
Tolerance							-10		10	%

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P							5		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

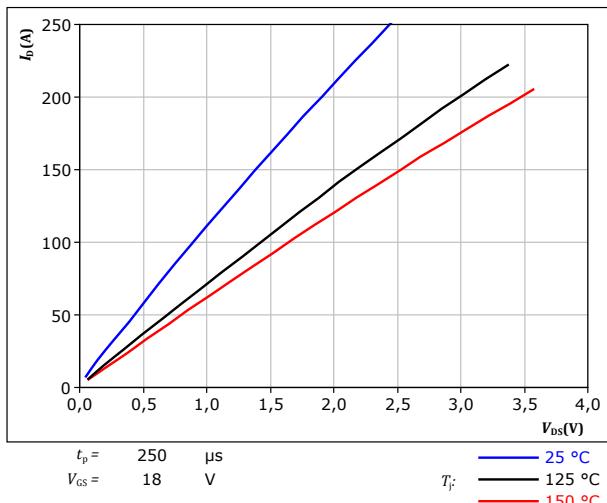


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Inverter Switch Characteristics

figure 1.

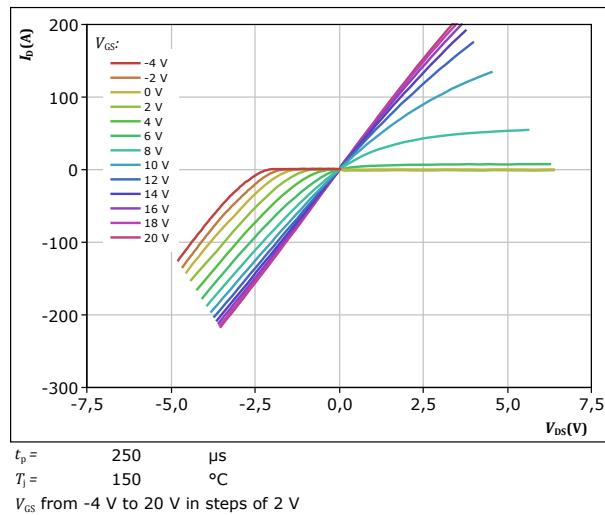
Typical output characteristics
 $I_D = f(V_{DS})$



MOSFET

figure 2.

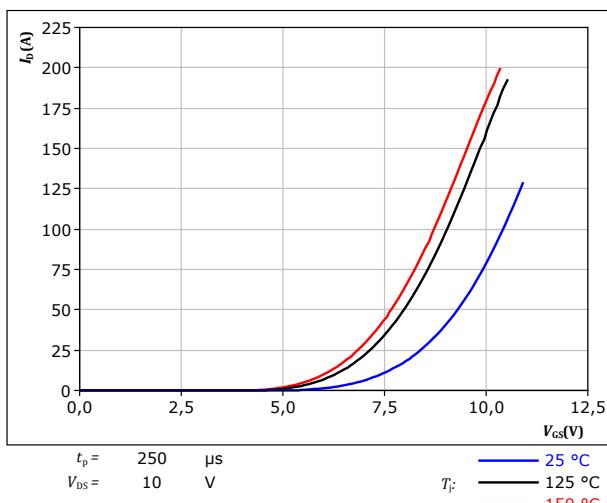
Typical output characteristics
 $I_D = f(V_{DS})$



MOSFET

figure 3.

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

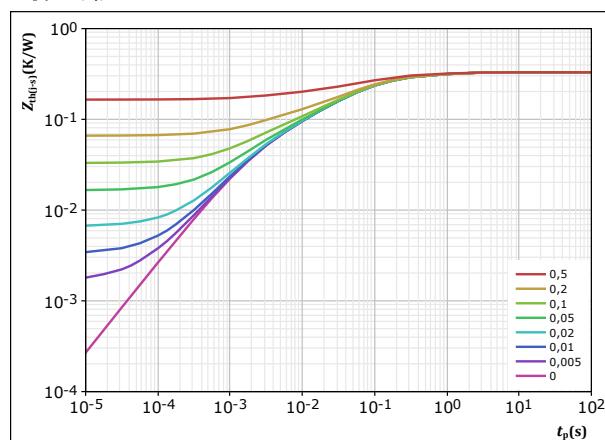


MOSFET

figure 4.

Transient thermal impedance as a function of pulse width

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

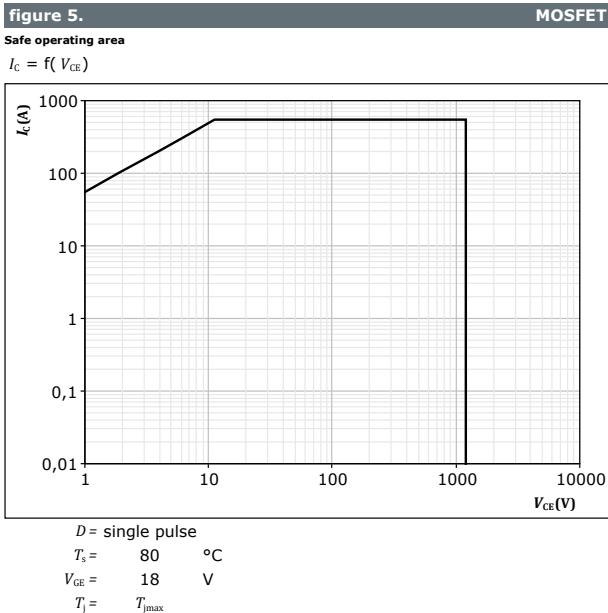


MOSFET



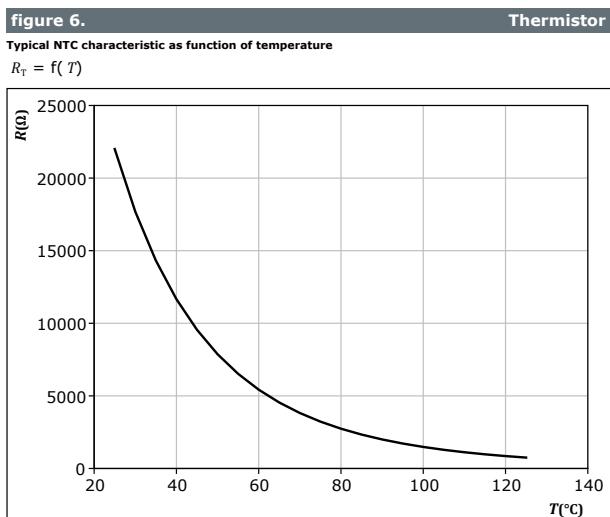
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Inverter Switch Characteristics





Thermistor Characteristics



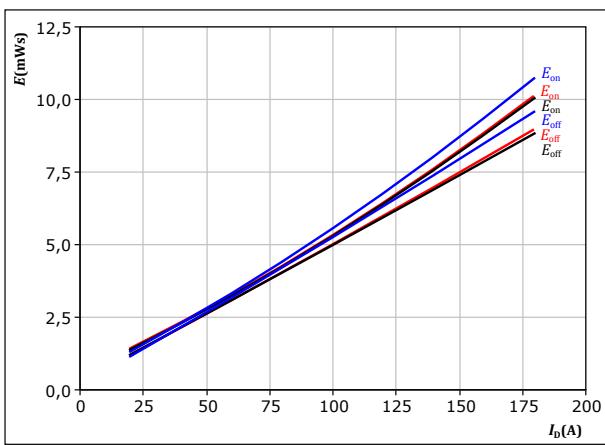


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Inverter Switching Characteristics

figure 7.

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



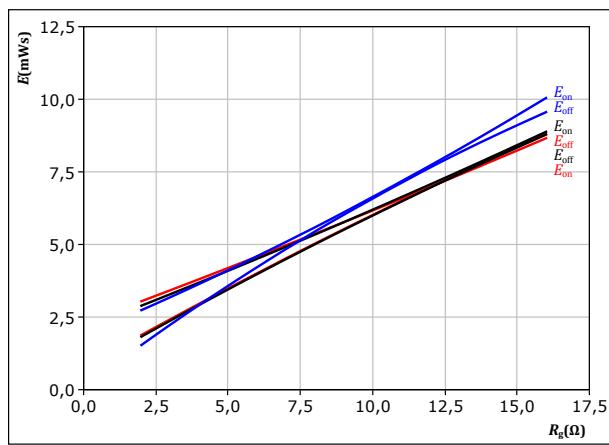
With an inductive load at

$V_{DS} = 600$ V $T_f:$ 25 °C
 $V_{GS} = 0/18$ V 125 °C
 $R_{gon} = 8$ Ω 150 °C
 $R_{goff} = 8$ Ω

MOSFET

figure 8.

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



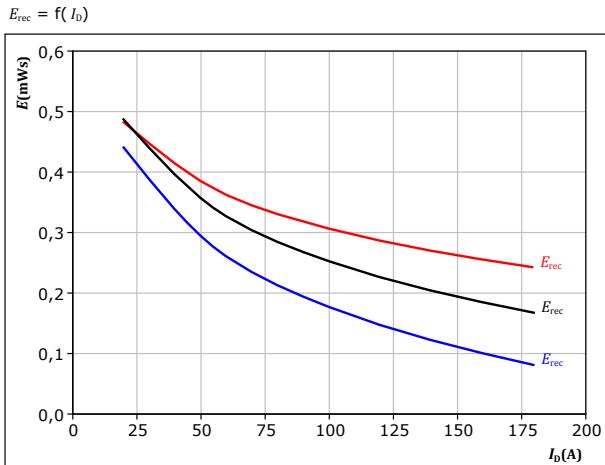
With an inductive load at

$V_{DS} = 600$ V $T_f:$ 25 °C
 $V_{GS} = 0/18$ V 125 °C
 $I_D = 100$ A 150 °C

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figure 9.

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



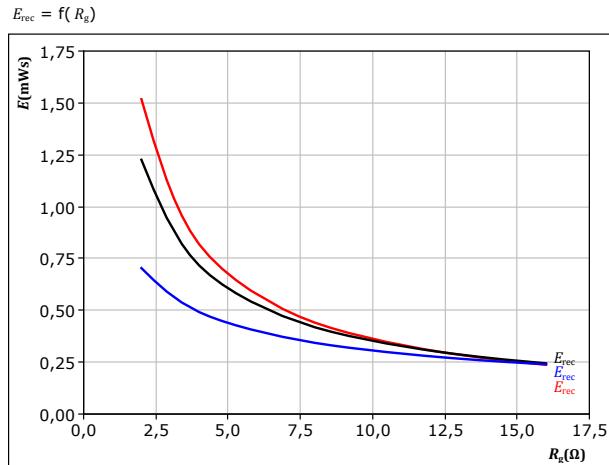
With an inductive load at

$V_{DS} = 600$ V $T_f:$ 25 °C
 $V_{GS} = 0/18$ V 125 °C
 $R_{gon} = 8$ Ω 150 °C

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figure 10.

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 $T_f:$ 25 °C
 $V_{GS} = 0/18$ V 125 °C
 $I_D = 100$ A 150 °C

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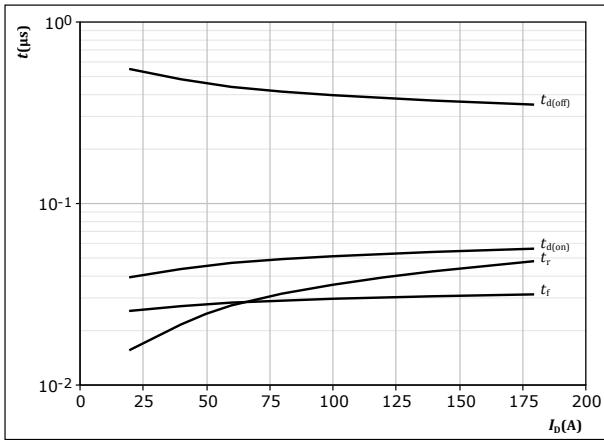
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Inverter Switching Characteristics

figure 11.

Typical switching times as a function of drain current

$$t = f(I_D)$$



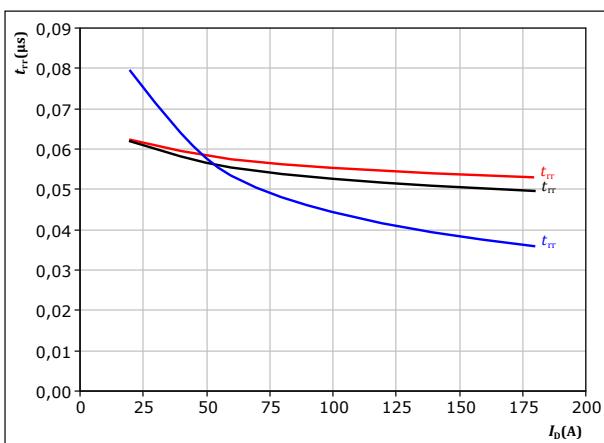
With an inductive load at

$T_j =$	150	°C
$V_{DS} =$	600	V
$V_{GS} =$	0/18	V
$R_{gon} =$	8	Ω
$R_{goff} =$	8	Ω

figure 13.

Typical reverse recovery time as a function of drain current

$$t_{rr} = f(I_D)$$



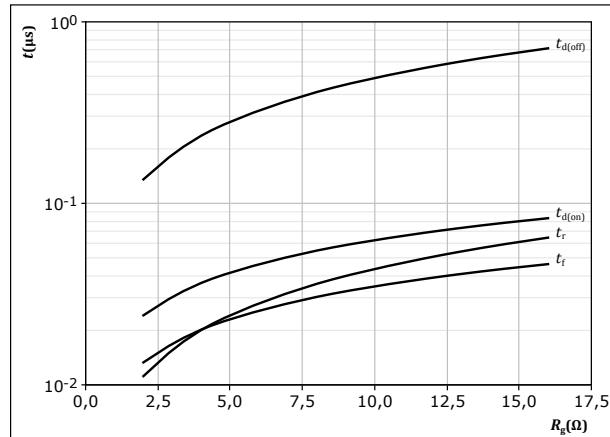
At	$V_{DS} =$	600	V
	$V_{GS} =$	0/18	V
	$R_{gon} =$	8	Ω

$T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 12.

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



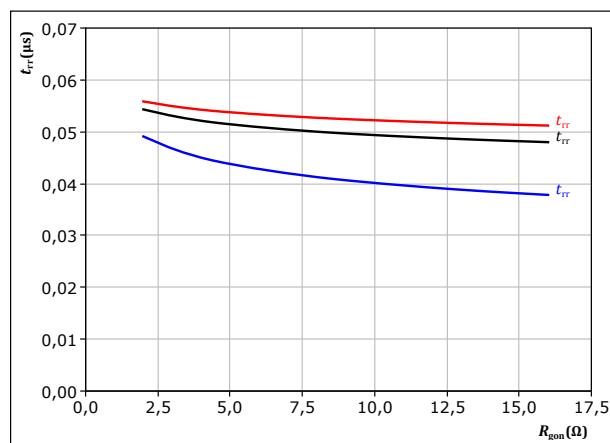
With an inductive load at

$T_j =$	150	°C
$V_{DS} =$	600	V
$V_{GS} =$	0/18	V
$I_D =$	100	A

figure 14.

Typical reverse recovery time as a function of turn on gate resistor

$$t_{rr} = f(R_{gon})$$



At	$V_{DS} =$	600	V
	$V_{GS} =$	0/18	V
	$I_D =$	100	A

$T_j:$ — 25 °C
— 125 °C
— 150 °C



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Inverter Switching Characteristics

figure 15.

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

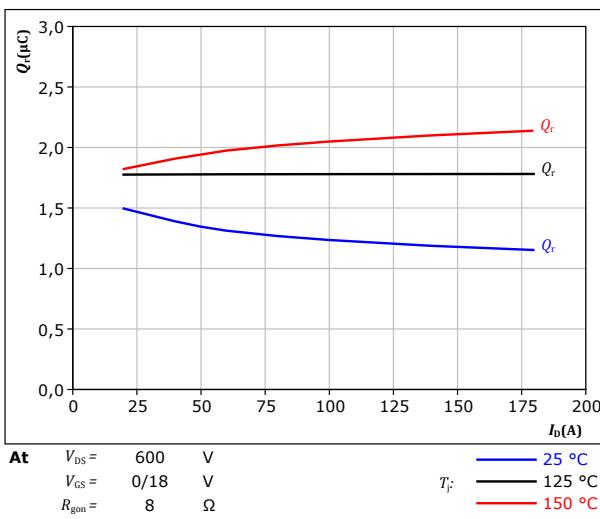


figure 17.

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

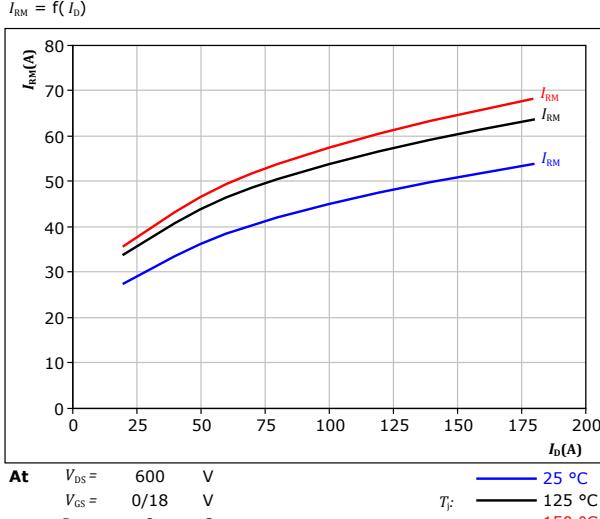


figure 16.

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

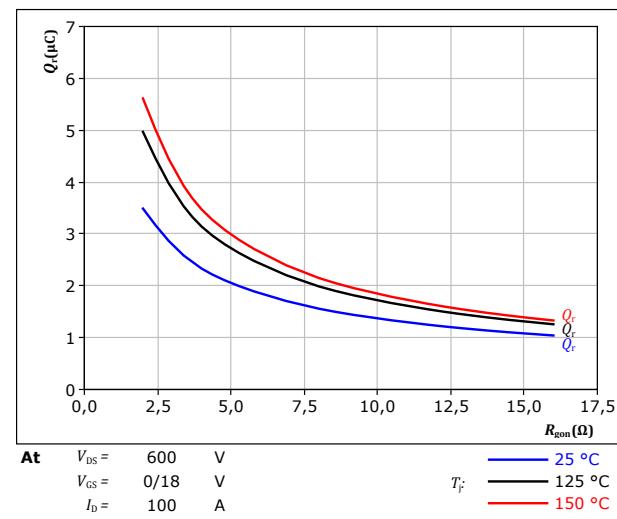
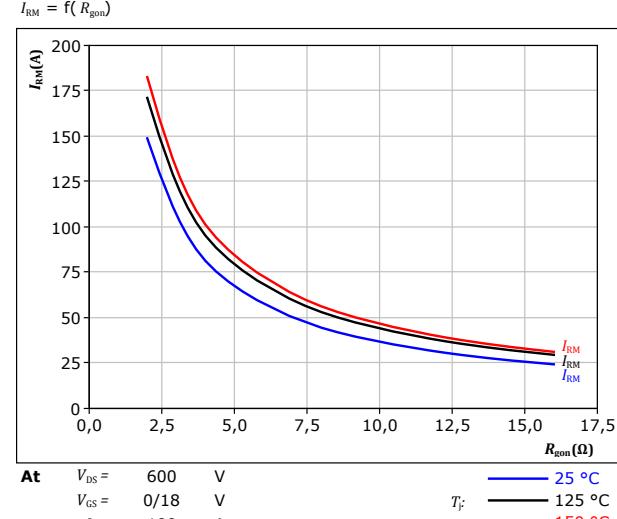


figure 18.

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





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Inverter Switching Characteristics

figure 19. MOSFET

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

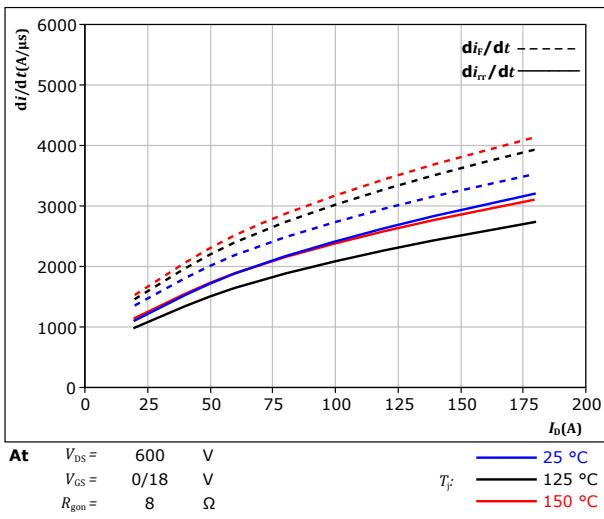


figure 20. MOSFET

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

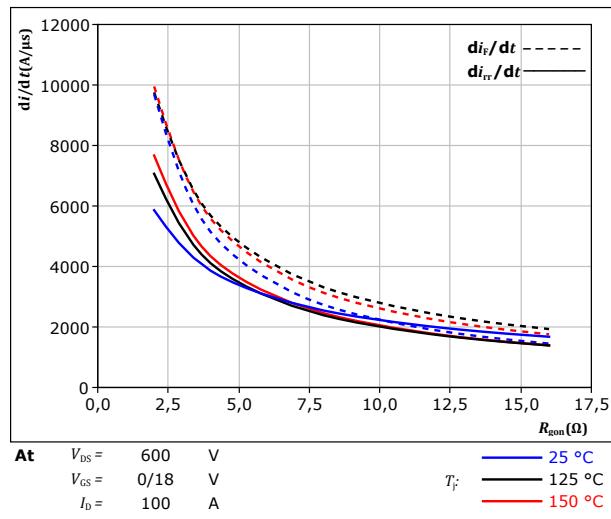
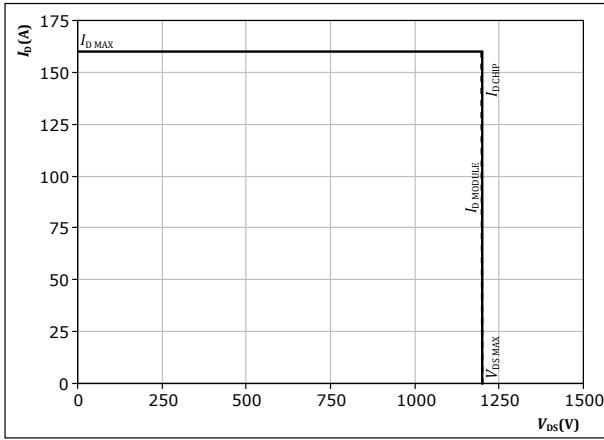


figure 21. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$





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Inverter Switching Definitions

figure 22. MOSFET

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

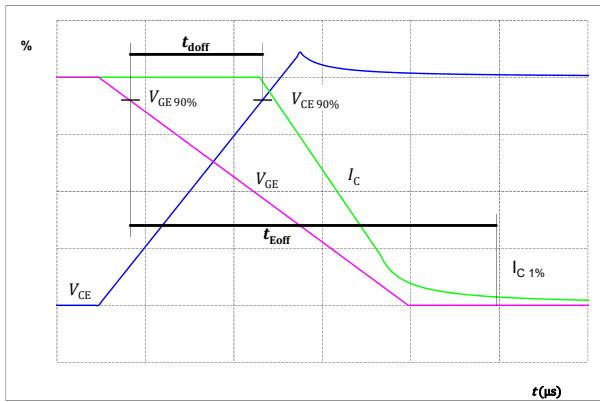


figure 23. MOSFET

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

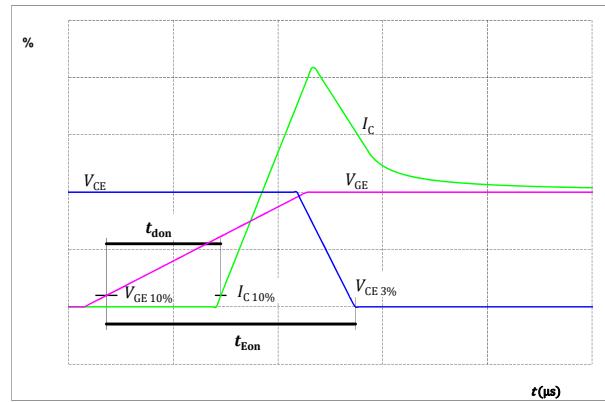


figure 24. MOSFET

Turn-off Switching Waveforms & definition of t_f

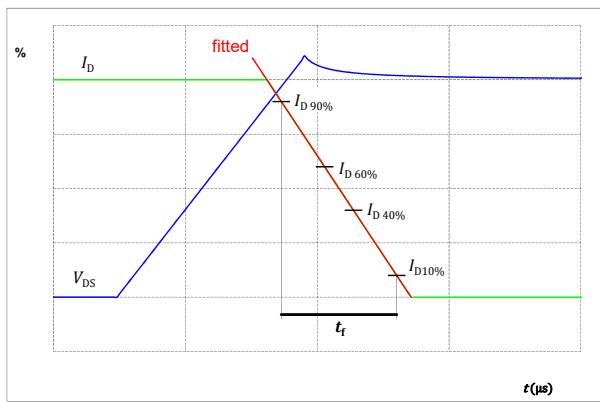
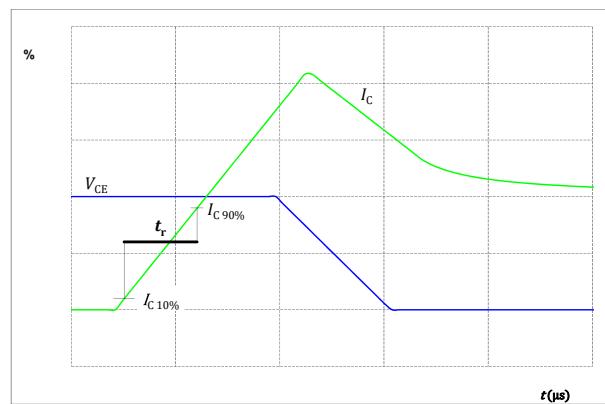


figure 25. MOSFET

Turn-on Switching Waveforms & definition of t_r





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Inverter Switching Definitions

figure 26.

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

FWD

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

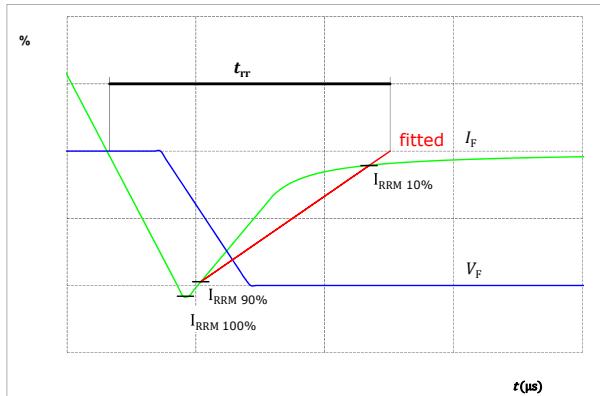


figure 27.

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

FWD

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

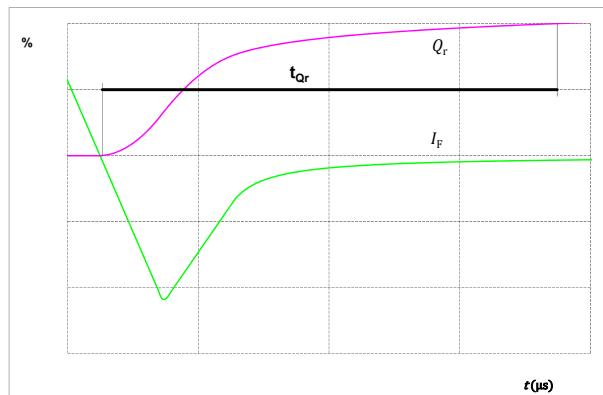
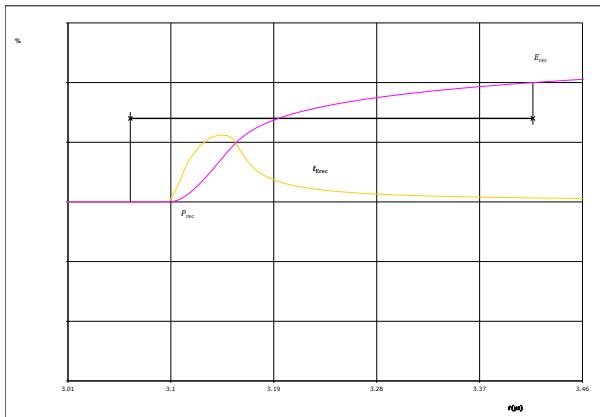


figure 28.

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

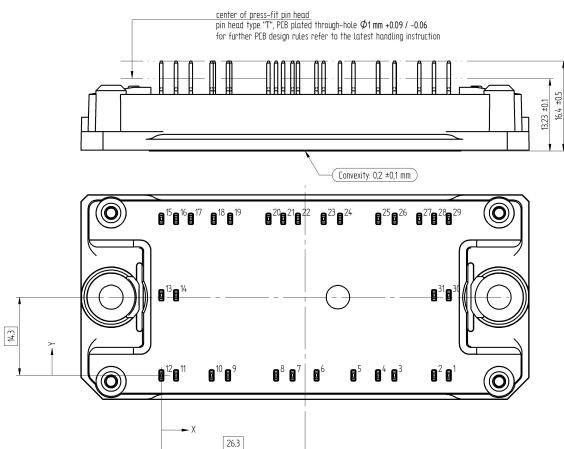
FWD

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



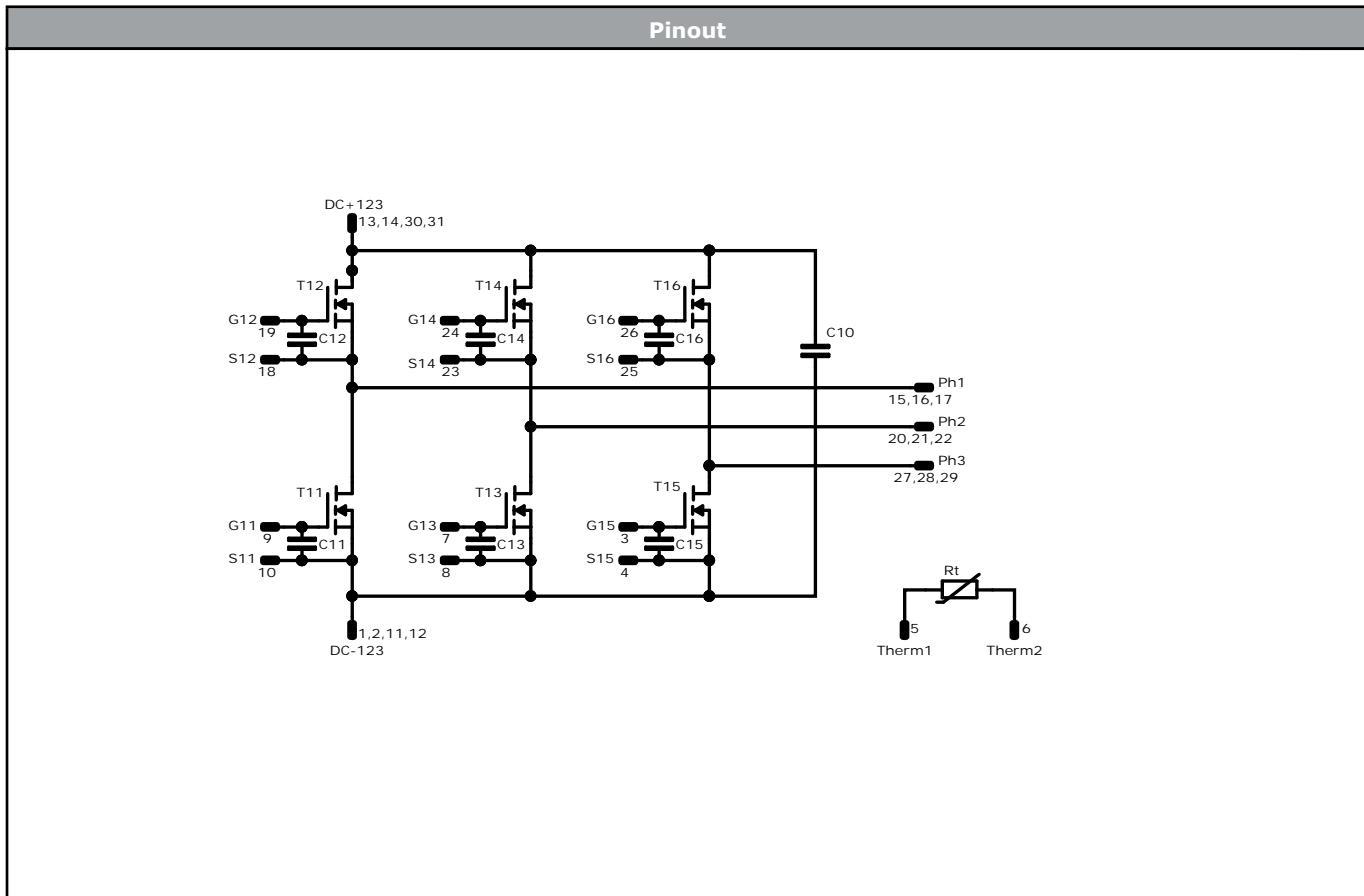


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Ordering Code																																							
Version			Ordering Code																																				
Without thermal paste				10-PG126PA010MR-L820F88T																																			
With thermal paste				10-PG126PA010MR-L820F88T-/3/																																			
Marking																																							
	Text	Name NN-NNNNNNNNNNNNN- YYYYJJ	Date code WWYY	UL & VIN UL VIN	Lot LLLL	Serial SSSS																																	
		Type&Ver TTTTTTVV	Lot number LLLLL	Serial SSSS	Date code WWYY																																		
Outline																																							
<table border="1"><thead><tr><th>Pin table [mm]</th></tr></thead><tbody><tr><td>Pin X Y Function</td></tr><tr><td>1 52,6 0 DC-123</td></tr><tr><td>2 49,9 0 DC-123</td></tr><tr><td>3 42,65 0 G15</td></tr><tr><td>4 39,65 0 S15</td></tr><tr><td>5 35,15 0 Therm1</td></tr><tr><td>6 28,4 0 Therm2</td></tr><tr><td>7 24 0 G13</td></tr><tr><td>8 21 0 S13</td></tr><tr><td>9 12,2 0 G11</td></tr><tr><td>10 9,2 0 S11</td></tr><tr><td>11 2,7 0 DC-123</td></tr><tr><td>12 0 0 DC-123</td></tr><tr><td>13 0 14,65 DC+123</td></tr><tr><td>14 2,7 14,65 DC+123</td></tr><tr><td>15 0 28,6 Ph1</td></tr><tr><td>16 2,7 28,6 Ph1</td></tr><tr><td>17 5,4 28,6 Ph1</td></tr><tr><td>18 9,6 28,6 S12</td></tr><tr><td>19 12,6 28,6 G12</td></tr><tr><td>20 19,6 28,6 Ph2</td></tr><tr><td>21 22,3 28,6 Ph2</td></tr><tr><td>22 25 28,6 Ph2</td></tr><tr><td>23 29,7 28,6 S14</td></tr><tr><td>24 32,7 28,6 G14</td></tr><tr><td>25 39,7 28,6 S16</td></tr><tr><td>26 42,7 28,6 G16</td></tr><tr><td>27 47,2 28,6 Ph3</td></tr><tr><td>28 49,9 28,6 Ph3</td></tr><tr><td>29 52,6 28,6 Ph3</td></tr><tr><td>30 52,6 14,65 DC+123</td></tr><tr><td>31 49,9 14,65 DC+123</td></tr></tbody></table>	Pin table [mm]	Pin X Y Function	1 52,6 0 DC-123	2 49,9 0 DC-123	3 42,65 0 G15	4 39,65 0 S15	5 35,15 0 Therm1	6 28,4 0 Therm2	7 24 0 G13	8 21 0 S13	9 12,2 0 G11	10 9,2 0 S11	11 2,7 0 DC-123	12 0 0 DC-123	13 0 14,65 DC+123	14 2,7 14,65 DC+123	15 0 28,6 Ph1	16 2,7 28,6 Ph1	17 5,4 28,6 Ph1	18 9,6 28,6 S12	19 12,6 28,6 G12	20 19,6 28,6 Ph2	21 22,3 28,6 Ph2	22 25 28,6 Ph2	23 29,7 28,6 S14	24 32,7 28,6 G14	25 39,7 28,6 S16	26 42,7 28,6 G16	27 47,2 28,6 Ph3	28 49,9 28,6 Ph3	29 52,6 28,6 Ph3	30 52,6 14,65 DC+123	31 49,9 14,65 DC+123	 <p>center of press-fit pin head pin head type "T", PCB plated through-hole Ø1 mm ±0.09 / -0.06 for further PCB design rules refer to the latest handling instruction</p> <p>Convexity: 0.2 ±0.1 mm</p> <p>Tolerance of pinpositions ±0.4mm at the end of pins (Dimension of coordinate axis is only offset without tolerance)</p>					
Pin table [mm]																																							
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21 22,3 28,6 Ph2																																							
22 25 28,6 Ph2																																							
23 29,7 28,6 S14																																							
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29 52,6 28,6 Ph3																																							
30 52,6 14,65 DC+123																																							
31 49,9 14,65 DC+123																																							



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	MOSFET	1200 V	10 mΩ	Inverter Switch	
C10	Capacitor	1000 V		Capacitor (DC)	
C11, C12, C13, C14, C15, C16	Capacitor	25 V		Capacitor (GS)	
Rt	Thermistor			Thermistor	

**10-PG126PA010MR-L820F88T**

datasheet

Vincotech**Packaging instruction**

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

Handling instructions for flow 1 packages see vincotech.com website.

Package data

Package data for flow 1 packages see 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-PG126PA010MR-L820F88T-D1-14	20 Apr. 2020	Initial Release	

DISCLAIMER

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Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.