Vincotech

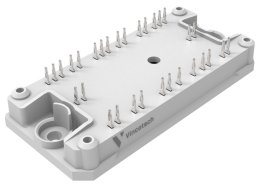
10-PG126PA010MR-L820F88T
datasheet

***flow*PACK 1** **1200 V / 10 mΩ**

Features

- 3 Phase Inverter
- Compact and low inductive design
- High frequency SiC MOSFET
- High power low inductive package
- Integrated NTC

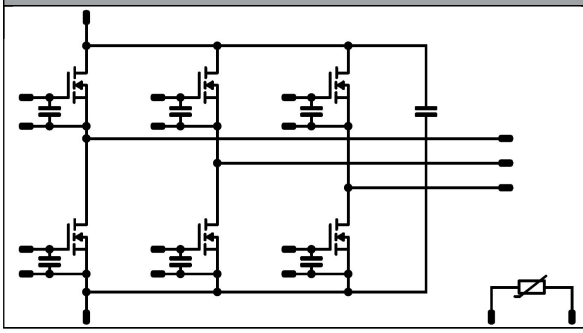
flow 1 12 mm housing



Target applications

- Charging Stations
- Power Supply

Schematic



Types

- 10-PG126PA010MR-L820F88T

Maximum Ratings

T_j = 25 °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} T_s = 80 °C	123	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	548	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	288	W
Gate-source voltage	V_{GSS}		-4 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C
Capacitor (DC)				
Maximum DC voltage	V_{MAX}		1000	V
Operation Temperature	T_{op}		-55 ... 125	°C
Capacitor (GS)				
Maximum DC voltage	V_{MAX}		25	V
Operation Temperature	T_{op}		0 ... 125	°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			min. 12,7	mm
Clearance			8,18	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	
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*	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	0/18	600	100	25 125 150		57,76 50,72 50,4		ns
Rise time	t_r					25 125 150		41,6 36,48 35,52		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		336,32 389,28 399,84		ns
Fall time	t_f					25 125 150		27,06 28,28 28,33		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=1,36 µC Q_{rFWD}=1,8 µC Q_{rFWD}=1,96 µC				25 125 150		5,56 5,3 5,32		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,51 4,97 5		mWs

*Only valid with pre-applied Vincotech thermal interface material.

Characteristic Values

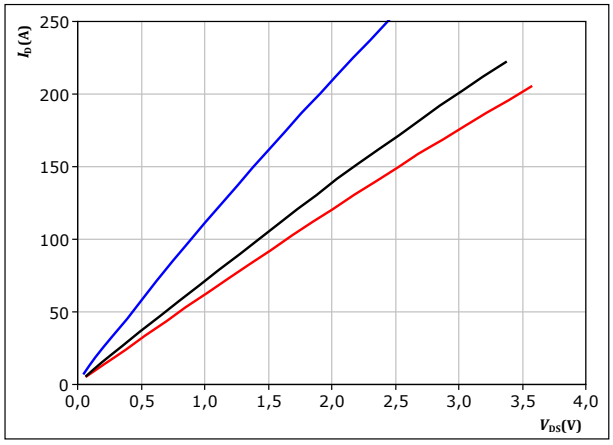
Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Capacitor (DC)										
Static										
Capacitance	C							94		nF
Tolerance							-20		20	%
Dissipation factor		f = 1 kHz				25		25		%
Capacitor (GS)										
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 Ω				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	

Inverter Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

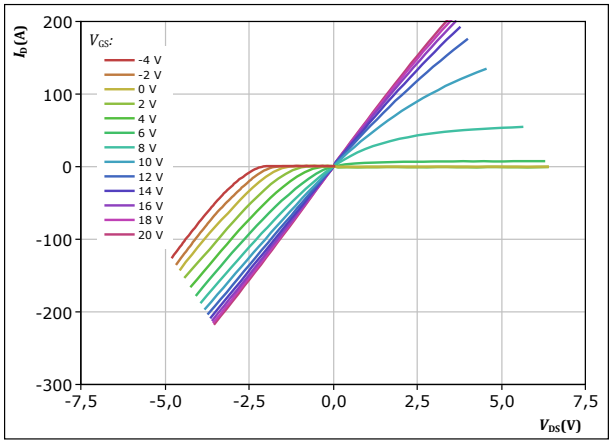


t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



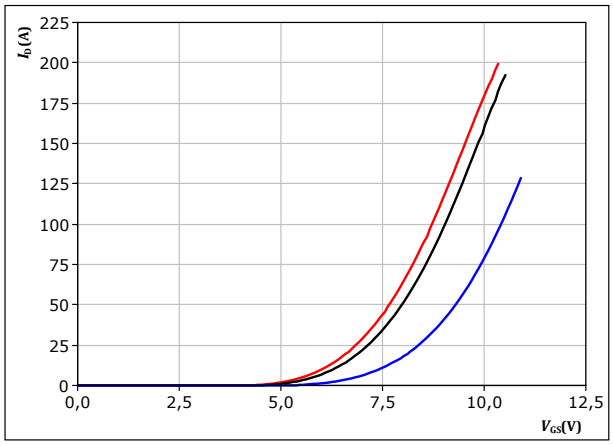
t_p =	250	µs
T_j =	150	°C

V_{GS} from -4 V to 20 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

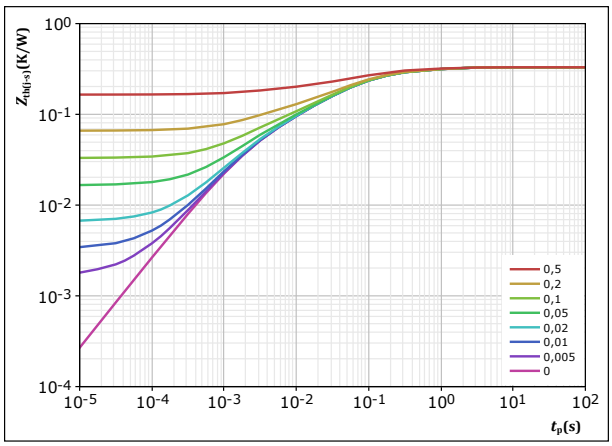


t_p =	250	µs		
V_{DS} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **MOSFET**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,33	K/W

IGBT thermal model values

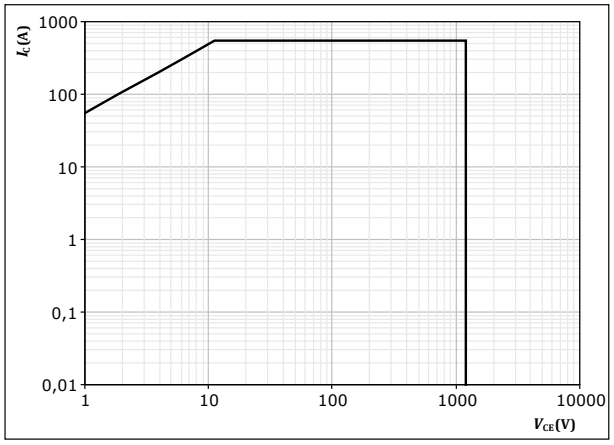
R (K/W)	τ (s)
3,79E-02	1,04E+00
9,70E-02	1,44E-01
1,13E-01	4,34E-02
5,03E-02	8,88E-03
3,16E-02	1,76E-03

Inverter Switch Characteristics

figure 5. **MOSFET**

Safe operating area

$I_C = f(V_{CE})$



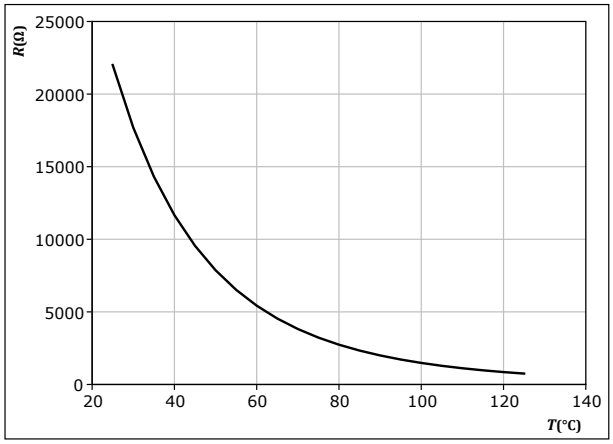
D =	single pulse	
T_s =	80	°C
V_{GE} =	18	V
T_j =	T_{jmax}	

Thermistor Characteristics

figure 6. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

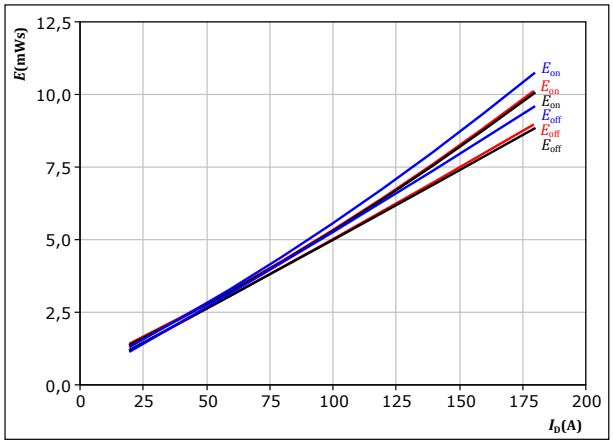


Inverter Switching Characteristics

figure 7. **MOSFET**

Typical switching energy losses as a function of drain current

E = f(I_D)



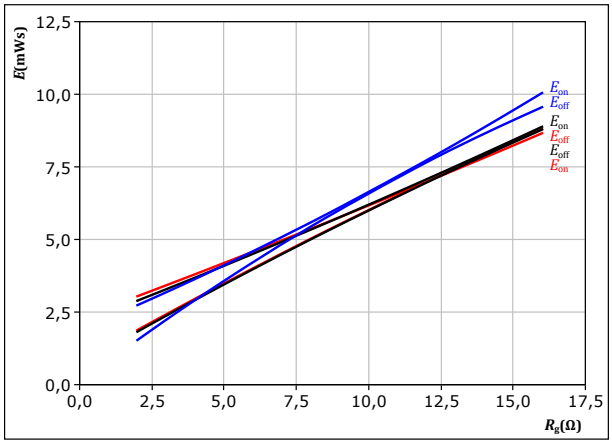
With an inductive load at

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

figure 8. **MOSFET**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



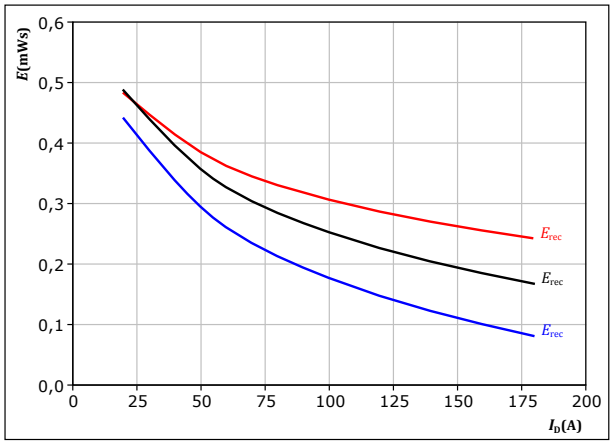
With an inductive load at

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

figure 9. **MOSFET**

Typical reverse recovered energy loss as a function of drain current

E_{rec} = f(I_D)



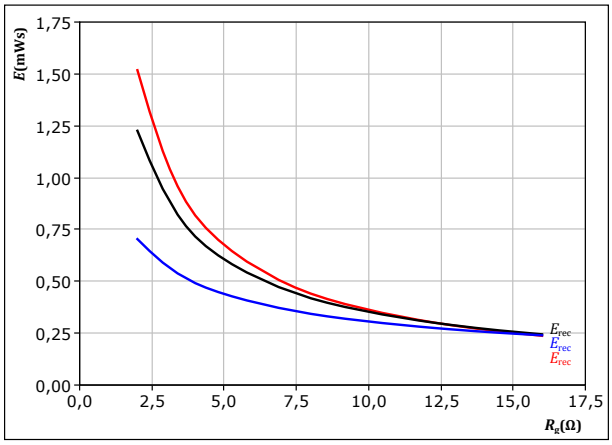
With an inductive load at

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

figure 10. **MOSFET**

Typical reverse recovered energy loss as a function of gate resistor

E_{rec} = f(R_g)



With an inductive load at

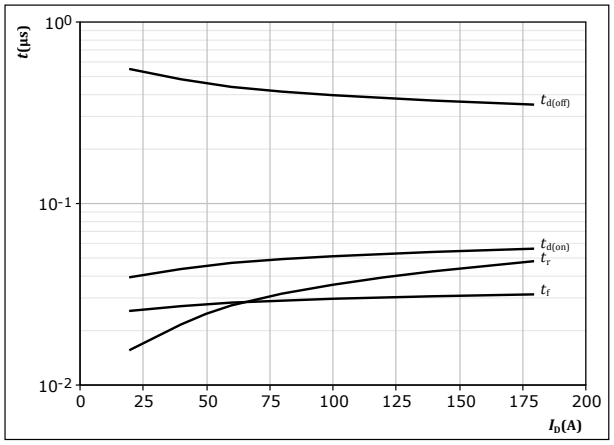
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/18	V		125 °C
I_D =	100	A		150 °C

Inverter Switching Characteristics

figure 11. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



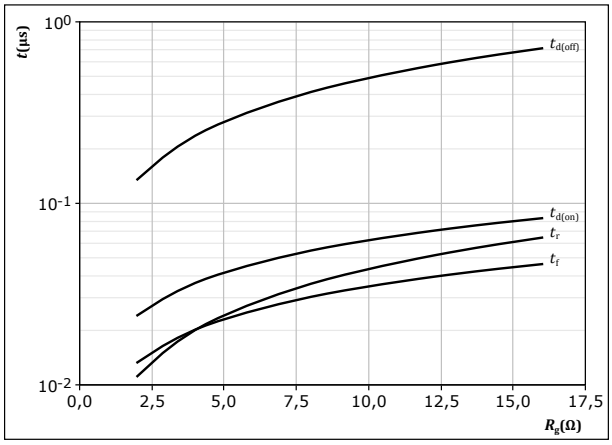
With an inductive load at

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

figure 12. **MOSFET**

Typical switching times as a function of gate resistor

$t = f(R_g)$



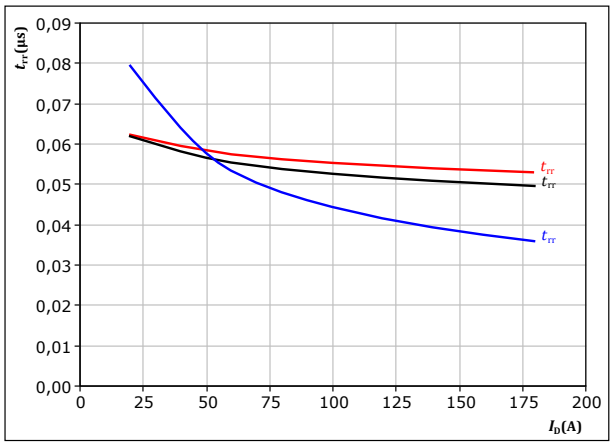
With an inductive load at

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

figure 13. **MOSFET**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



At

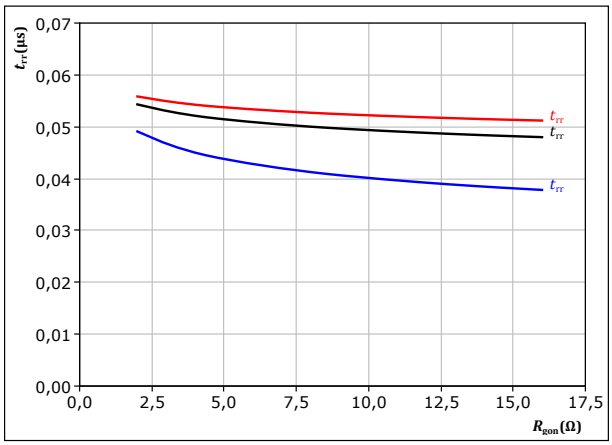
V_{DS} =	600	V
V_{GS} =	0/18	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 14. **MOSFET**

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

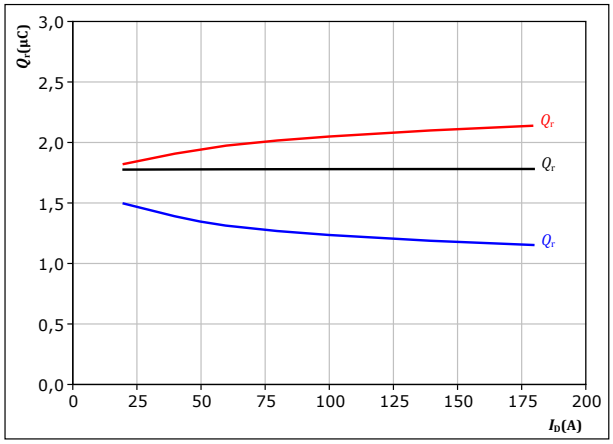
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 15. **MOSFET**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

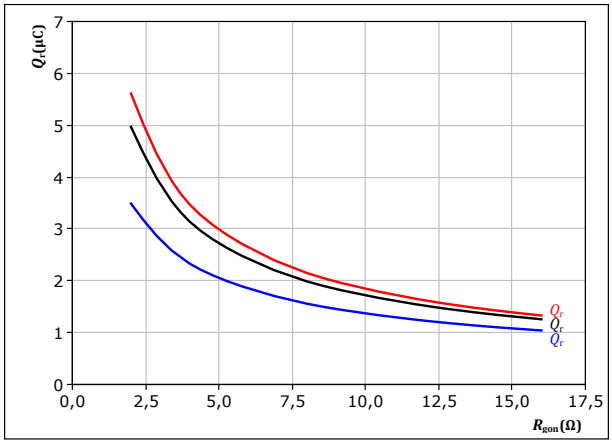


At				
V_{DS} =	600	V		
V_{GS} =	0/18	V	T_j:	25 °C
R_{gon} =	8	Ω		125 °C
				150 °C

figure 16. **MOSFET**

Typical recovered charge as a function of turn on gate resistor

$Q_r = f(R_{gon})$

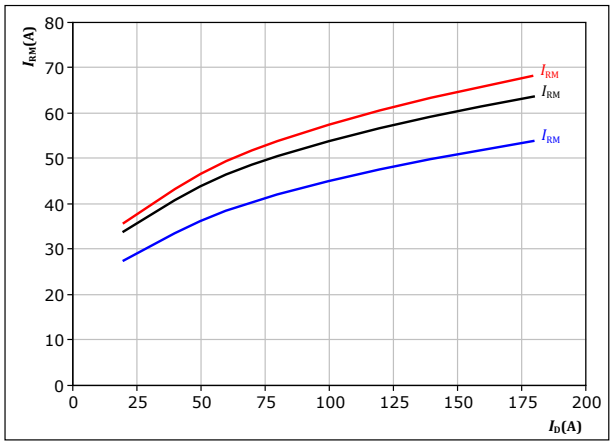


At				
V_{DS} =	600	V		
V_{GS} =	0/18	V	T_j:	25 °C
I_D =	100	A		125 °C
				150 °C

figure 17. **MOSFET**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

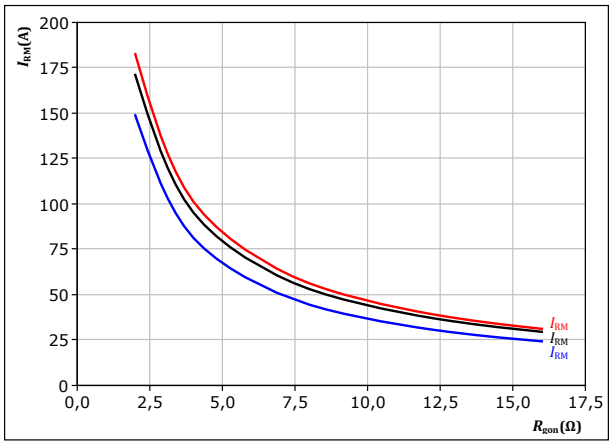


At				
V_{DS} =	600	V		
V_{GS} =	0/18	V	T_j:	25 °C
R_{gon} =	8	Ω		125 °C
				150 °C

figure 18. **MOSFET**

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

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



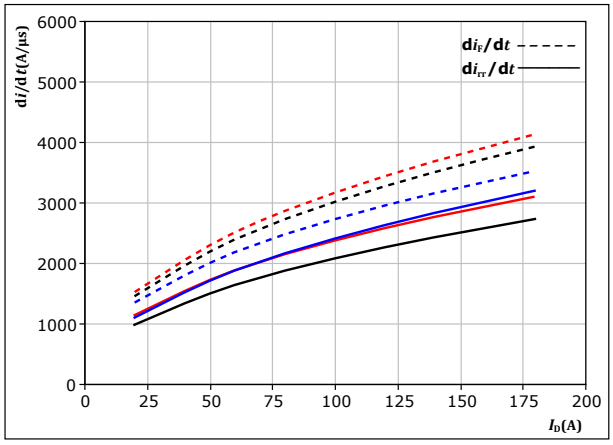
At				
V_{DS} =	600	V		
V_{GS} =	0/18	V	T_j:	25 °C
I_D =	100	A		125 °C
				150 °C

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)

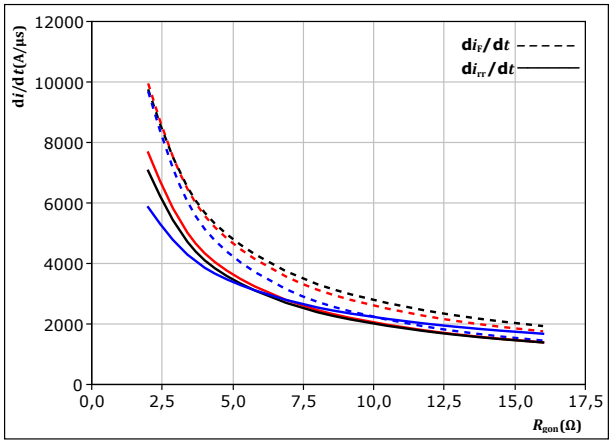


At				
V_{DS} =	600	V		
V_{GS} =	0/18	V	T_j:	25 °C
R_{gon} =	8	Ω		125 °C
				150 °C

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})

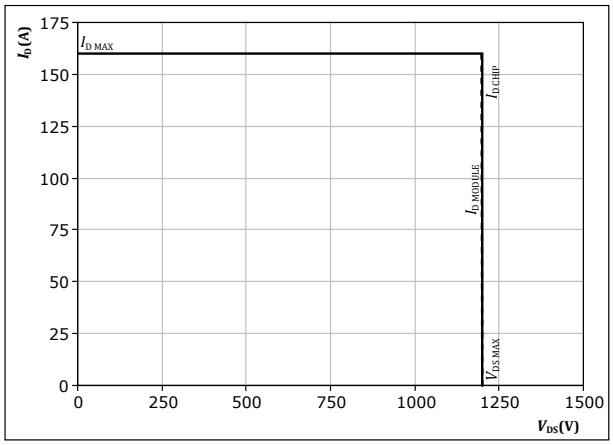


At				
V_{DS} =	600	V		
V_{GS} =	0/18	V	T_j:	25 °C
I_D =	100	A		125 °C
				150 °C

figure 21. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At			
T_j =	150	°C	
R_{gon} =	8	Ω	
R_{goff} =	8	Ω	

Inverter Switching Definitions

figure 22. MOSFET

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

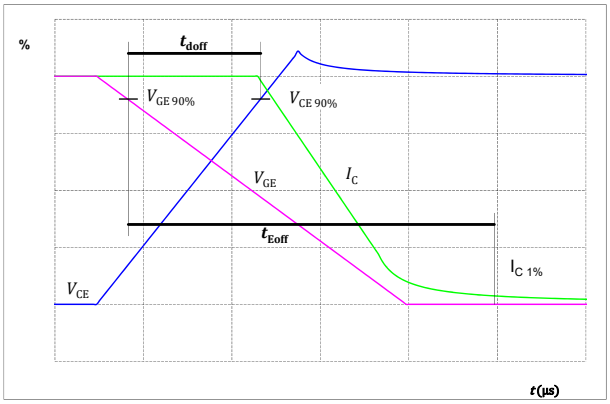


figure 23. MOSFET

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

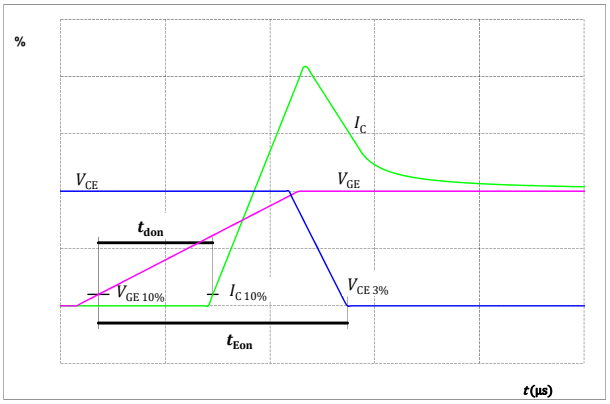


figure 24. MOSFET

Turn-off Switching Waveforms & definition of t_f

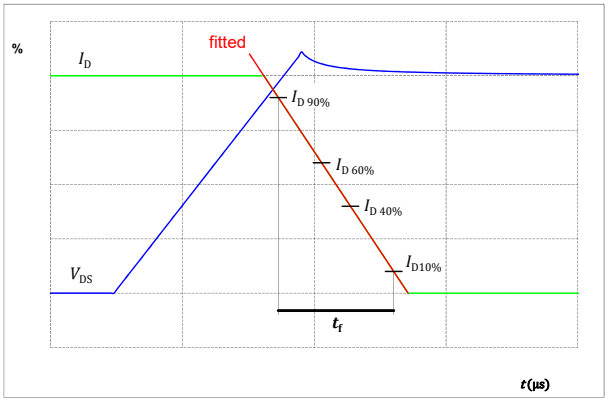
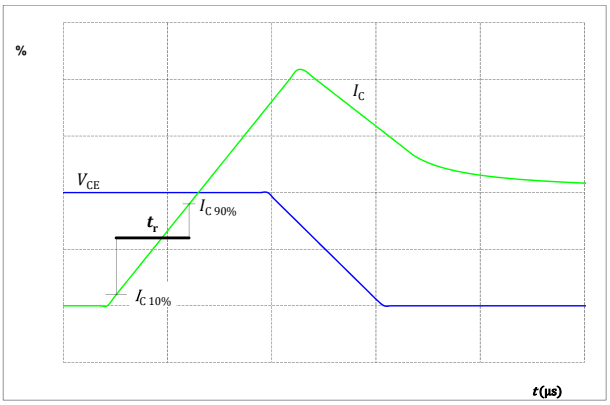


figure 25. MOSFET

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 26. **FWD**

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

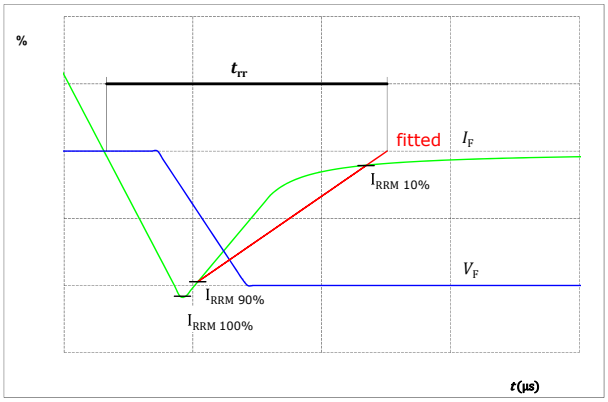


figure 27. **FWD**

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

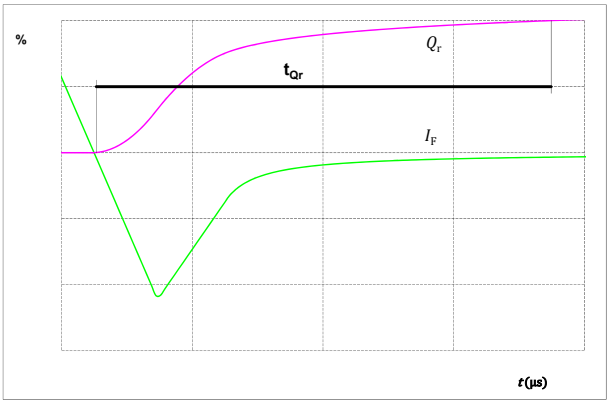
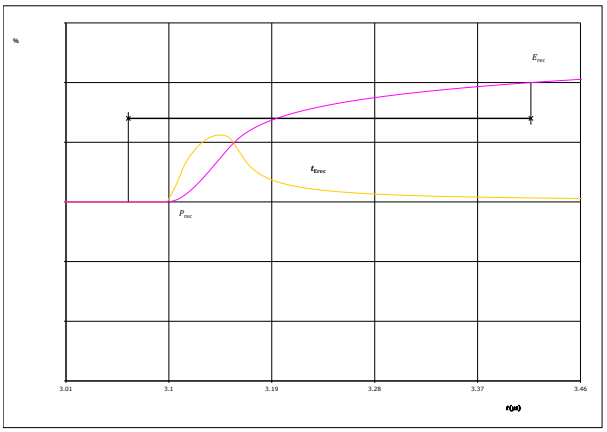


figure 28. **FWD**

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



Ordering Code

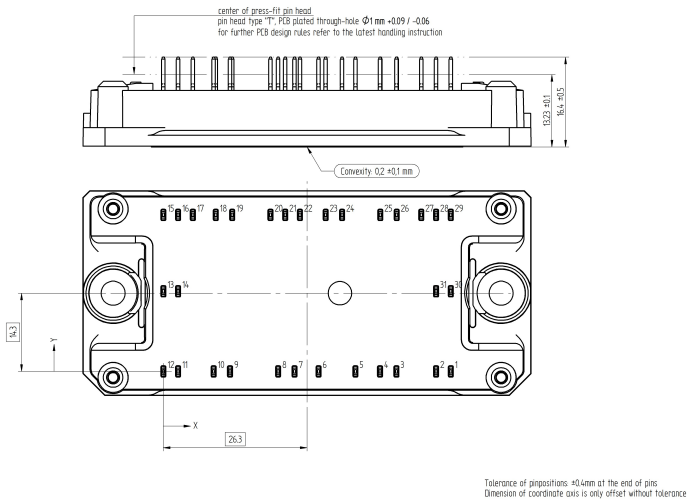
Version	Ordering Code
Without thermal paste	10-PG126PA010MR-L820F88T
With thermal paste	10-PG126PA010MR-L820F88T-/3/

Marking

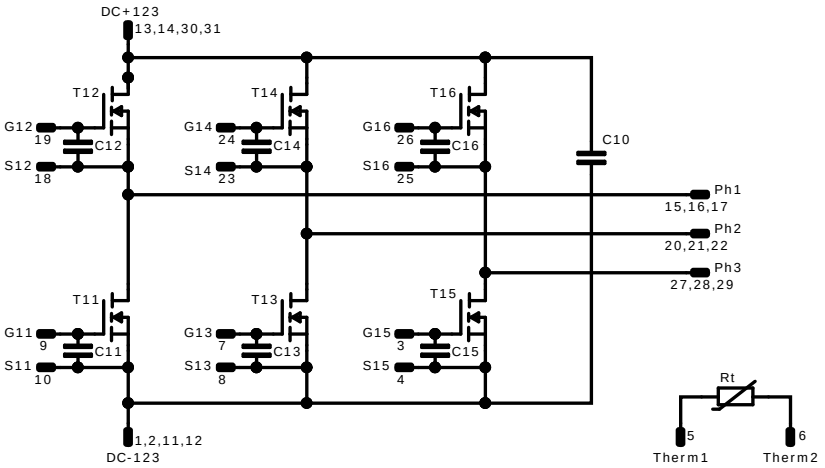
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	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



Pinout



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	

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

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	