Vincotech

10-EY128PA018MR02-PN19F03T
datasheet

***flow*DUAL E2 SiC** **1200 V / 18 mΩ**

Topology features

- 4x Half Bridge
- 4x Phase Output
- Common DC
- Kelvin Emitter for improved switching performance
- Temperature sensor

Component features

- Easy paralleling
- Low on-resistance
- Fast switching speed
- Fast recovery body diode

Housing features

- Base isolation: Al_2O_3
- 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

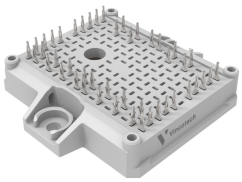
Target applications

- Charging Stations
- Energy Storage Systems
- Power Supply
- Solar Inverters

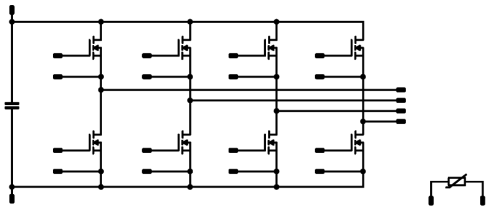
Types

- 10-EY128PA018MR02-PN19F03T

flow E2 12 mm housing



Schematic



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 (DC current)	I_D	T_j = T_{jmax} T_s = 80 °C	46	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	168	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	82	W
Gate-source voltage	V_{GSS}	static	-4 / 21	V
		dynamic	-4 / 23	V
Maximum Junction Temperature	T_{jmax}		175	°C
Capacitor (DC)				
Maximum DC voltage	V_{MAX}		1500	V
Operation Temperature	T_{op}		... 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
Creepage distance			>12,7	mm
Clearance			9,1	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		42	25 125 150		17,3 30,6 35,5	22,5[1]	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,0222	25	2,8	3,5	4,8	V
Gate to Source Leakage Current	I_{GSS}		21	0		25			200	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		2	160	µA
Internal gate resistance	r_g							0,5		Ω
Gate charge	Q_g		0/18	800	42	25		182		nC
Gate to source charge	Q_{GS}							40		
Gate to drain charge	Q_{GD}							48		
Short-circuit input capacitance	C_{iss}	f = 1 Mhz	0	800	0	25		4670		pF
Short-circuit output capacitance	C_{oss}							140		
Reverse transfer capacitance	C_{rss}							10		
Diode forward voltage	V_{SD}		0		42	25		3,3		V
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,15		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	±16	600	64	25 125 150		30,65 31,51 31,49		ns
Rise time	t_r					25 125 150		7,96 7,66 7,45		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		29,2 32,01 32,73		ns
Fall time	t_f					25 125 150		5,75 4,76 5,08		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,502 µC Q_{rFWD}=0,796 µC Q_{rFWD}=1,03 µC				25 125 150		0,453 0,455 0,493		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,148 0,149 0,148		mWs
Peak recovery current	I_{RRM}	di/dt=9370 A/µs di/dt=10126 A/µs di/dt=9537 A/µs				25 125 150		62,07 76,21 85,77		A
Reverse recovery time	t_{rr}					25 125 150		13,66 16,64 18,4		ns
Recovered charge	Q_r					25 125 150		0,502 0,796 1,03		µC
Reverse recovered energy	E_{rec}					25 125 150		0,248 0,436 0,562		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		13486,05 14554,33 17833,4		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	
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		132		nF
Tolerance							-10		10	%
Dissipation factor		f = 1 kHz				25		2,5		%
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		130		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	

(1) Value at chip level

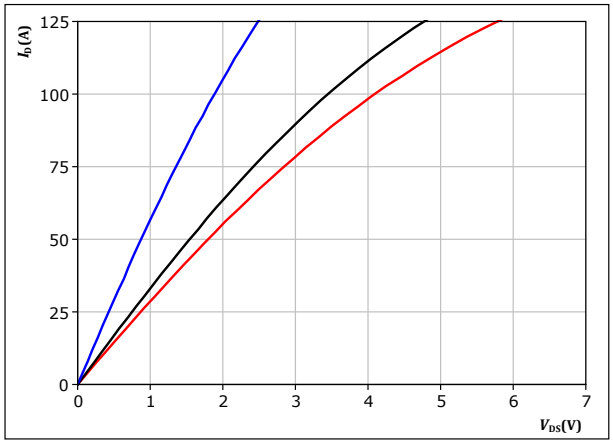
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

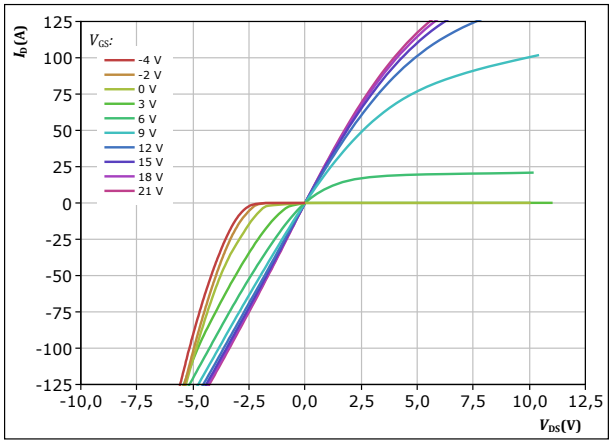


t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



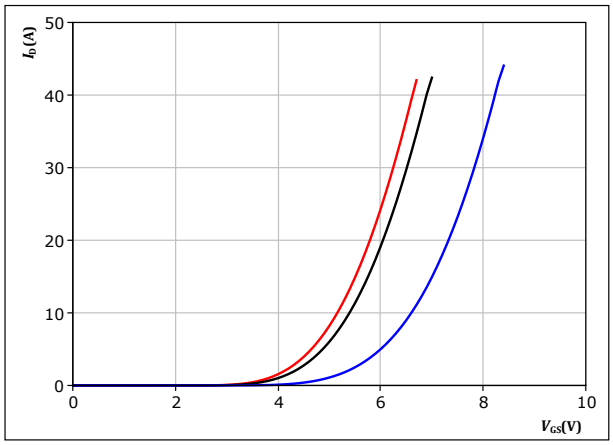
t_p =	250	µs
T_j =	150	°C

V_{GS} from -4 V to 21 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

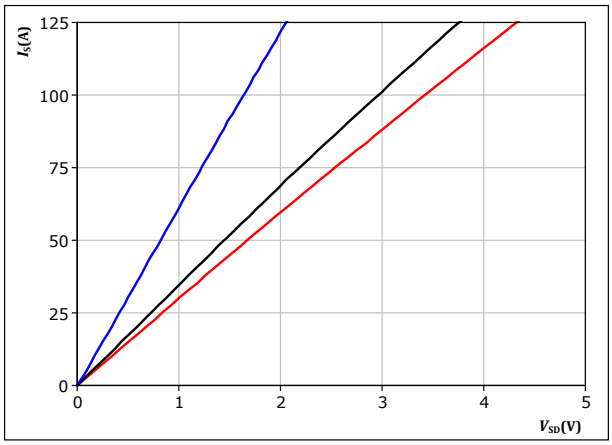


t_p =	250	µs		
V_{DS} =	10	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **MOSFET**

Typical reverse drain current characteristics

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



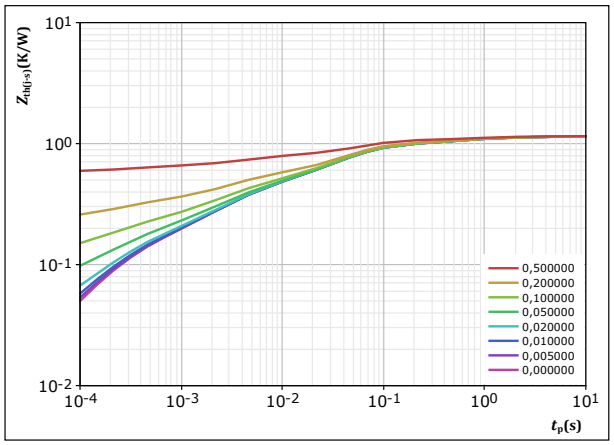
t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

Inverter Switch Characteristics

figure 5. **MOSFET**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,153	K/W

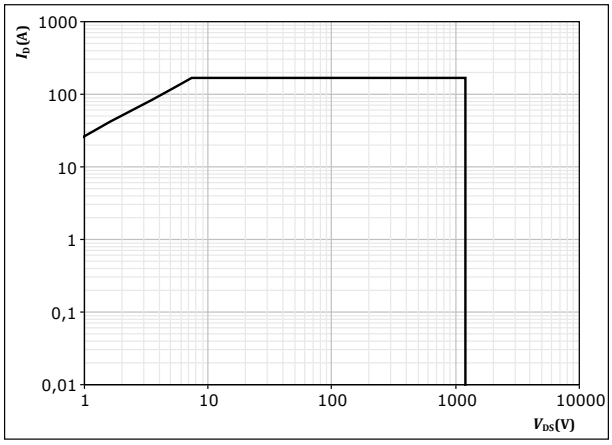
MOSFET thermal model values

R (K/W)	τ (s)
4,44E-02	6,88E+00
1,67E-01	5,58E-01
5,85E-01	4,19E-02
2,56E-01	2,85E-03
1,10E-01	2,21E-04

figure 6. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$

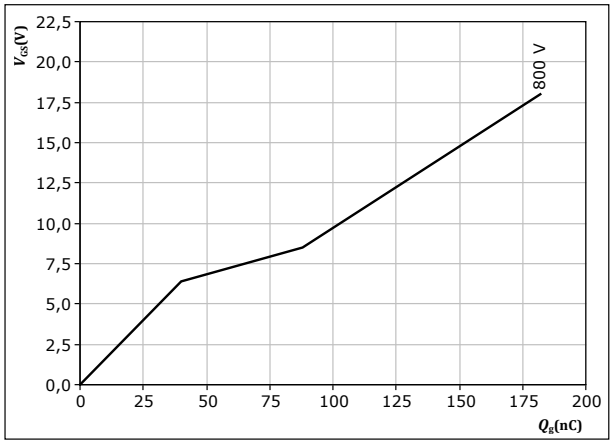


D =	single pulse	
T_s =	80	°C
V_{GS} =	18	V
T_j =	T_{jmax}	

figure 7. **MOSFET**

Gate voltage vs gate charge

$V_{GS} = f(Q_g)$



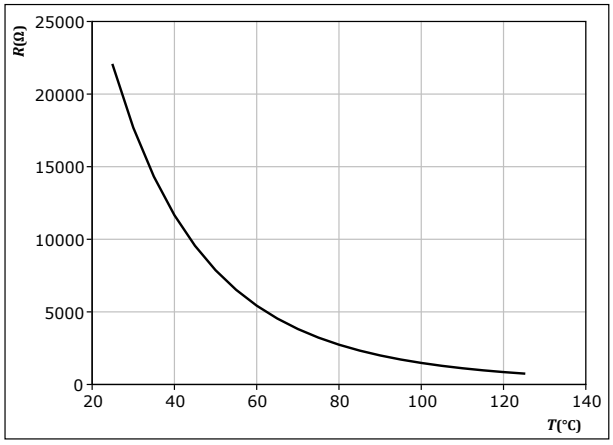
I_D =	42	A
T_j =	25	°C

Thermistor Characteristics

figure 8. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

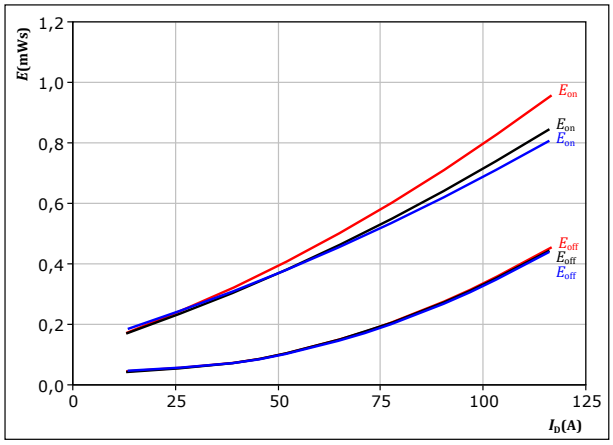


Inverter Switching Characteristics

figure 9. MOSFET

Typical switching energy losses as a function of drain current

$E = f(I_D)$



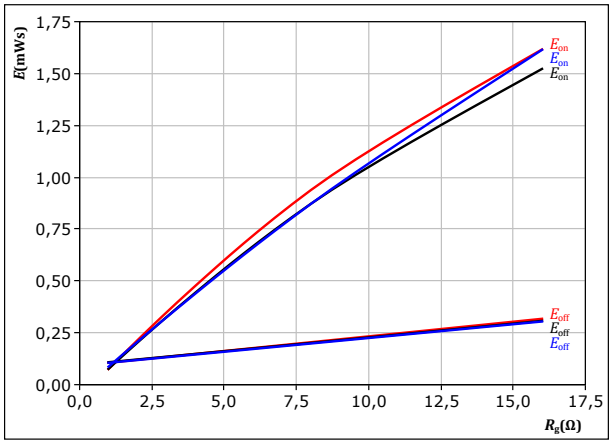
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	±16	V		125 °C
R_{gon} =	4	Ω		150 °C
R_{goff} =	4	Ω		

figure 10. MOSFET

Typical switching energy losses as a function of MOSFET turn on gate resistor

$E = f(R_g)$



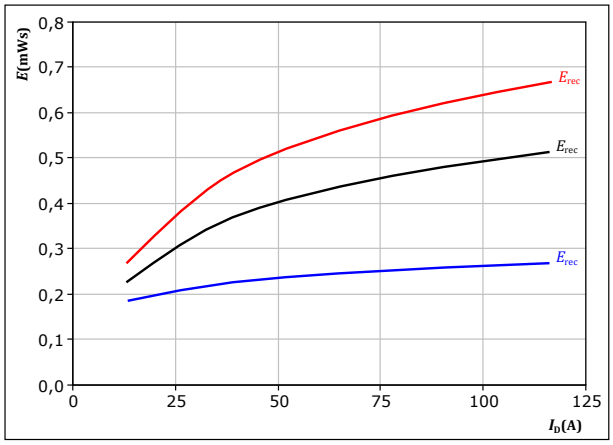
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	±16	V		125 °C
I_D =	64	A		150 °C

figure 11. MOSFET

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



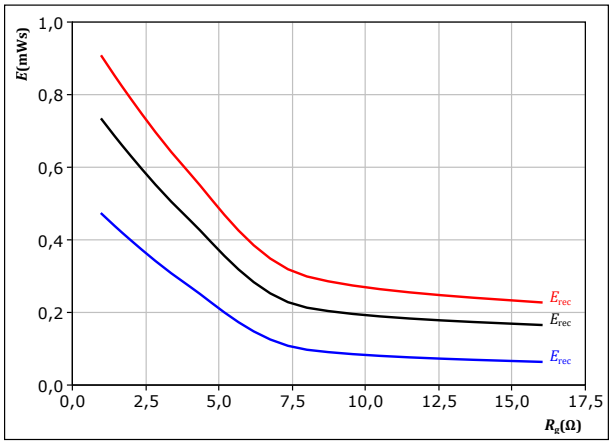
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	±16	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 12. 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

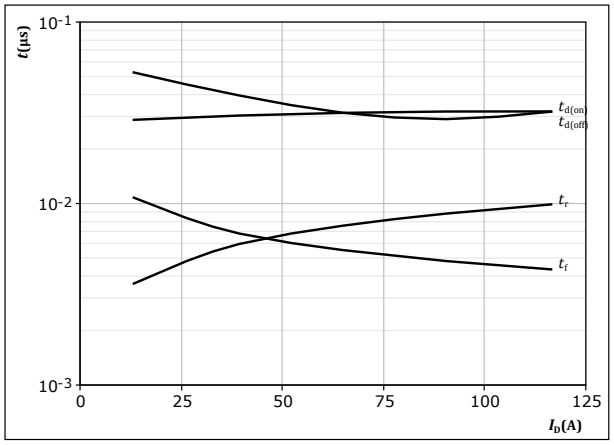
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	±16	V		125 °C
I_D =	64	A		150 °C

Inverter Switching Characteristics

figure 13. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



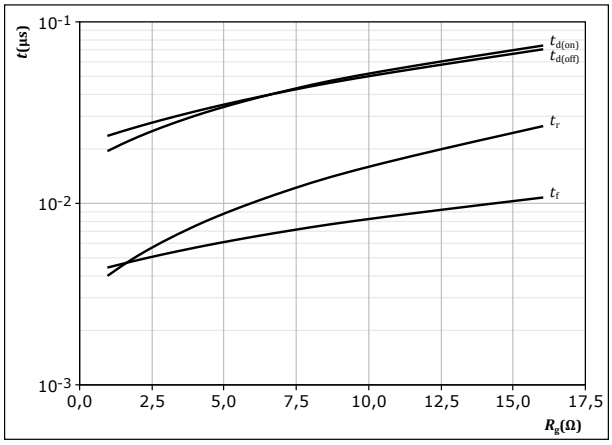
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	±16	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 14. **MOSFET**

Typical switching times as a function of MOSFET turn on gate resistor

$t = f(R_g)$



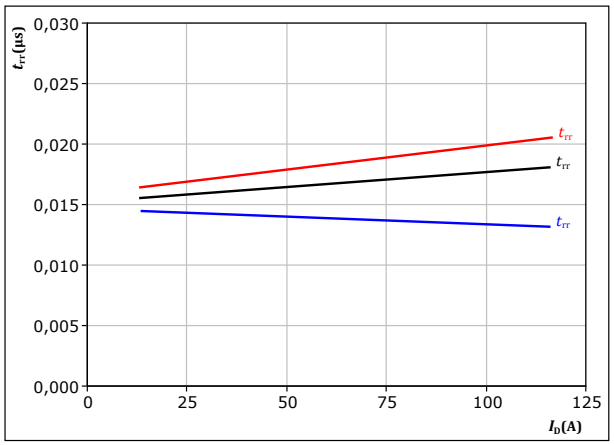
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	±16	V
I_D =	64	A

figure 15. **MOSFET**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$

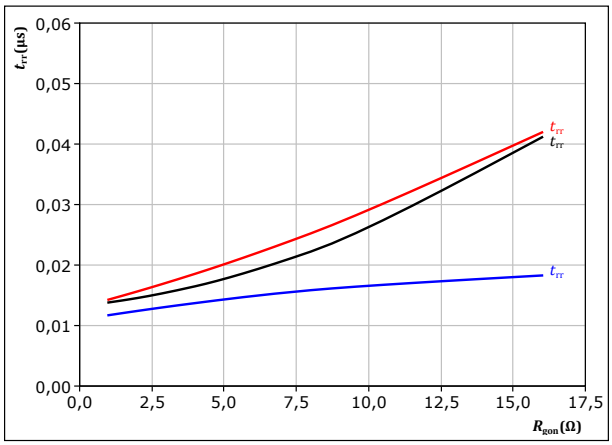


At	V_{DS} =	600	V	
	V_{GS} =	±16	V	T_j: 25 °C
	R_{gon} =	4	Ω	125 °C
				150 °C

figure 16. **MOSFET**

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

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



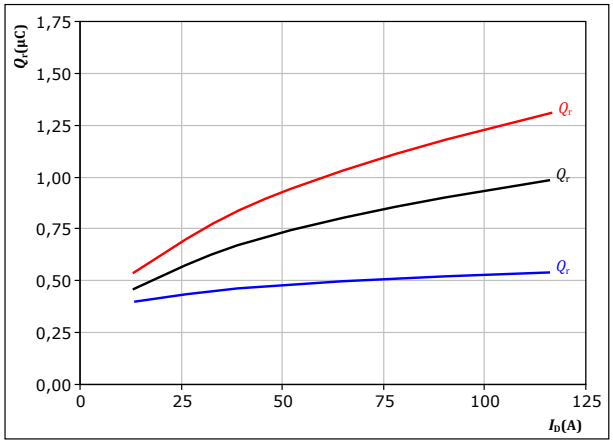
At	V_{DS} =	600	V	
	V_{GS} =	±16	V	T_j: 25 °C
	I_D =	64	A	125 °C
				150 °C

Inverter Switching Characteristics

figure 17. **MOSFET**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

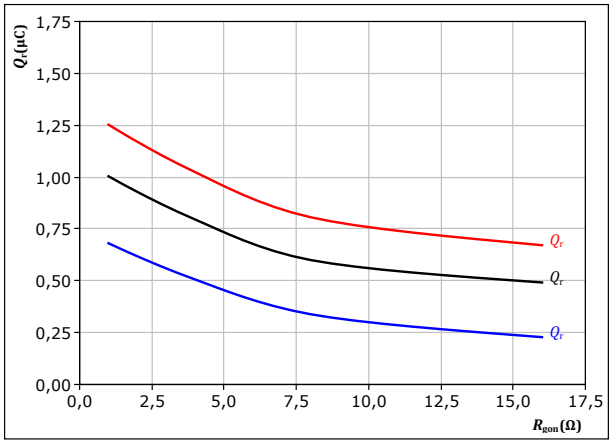


At					
	V_{DS} =	600	V		
	V_{GS} =	±16	V	T_j:	25 °C, 125 °C, 150 °C
	R_{gon} =	4	Ω		

figure 18. **MOSFET**

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

$Q_r = f(R_{gon})$

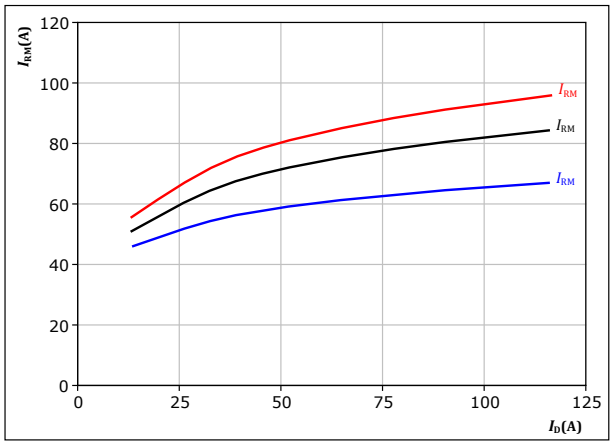


At					
	V_{DS} =	600	V		
	V_{GS} =	±16	V	T_j:	25 °C, 125 °C, 150 °C
	I_D =	64	A		

figure 19. **MOSFET**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

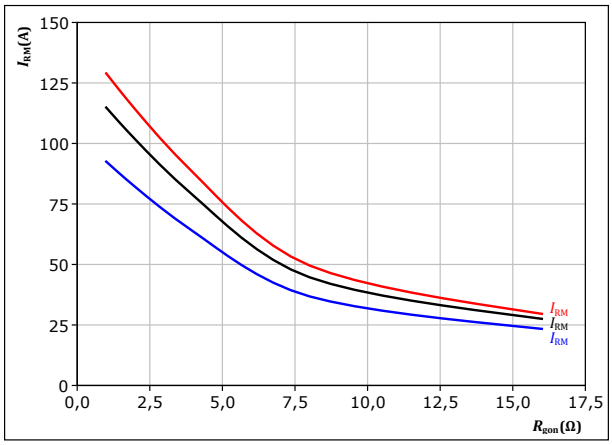


At					
	V_{DS} =	600	V		
	V_{GS} =	±16	V	T_j:	25 °C, 125 °C, 150 °C
	R_{gon} =	4	Ω		

figure 20. **MOSFET**

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

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



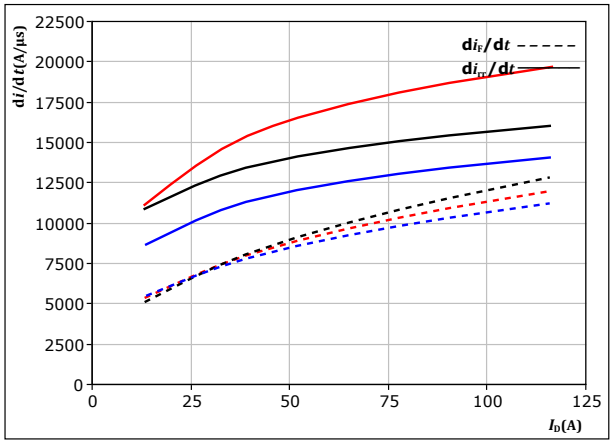
At					
	V_{DS} =	600	V		
	V_{GS} =	±16	V	T_j:	25 °C, 125 °C, 150 °C
	I_D =	64	A		

Inverter Switching Characteristics

figure 21. **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)

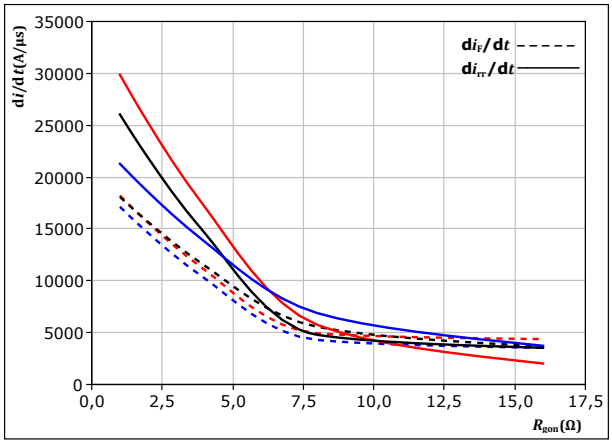


At	V_{DS} =	600	V		
	V_{GS} =	±16	V	T_j:	25 °C
	R_{gon} =	4	Ω		125 °C
					150 °C

figure 22. **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})

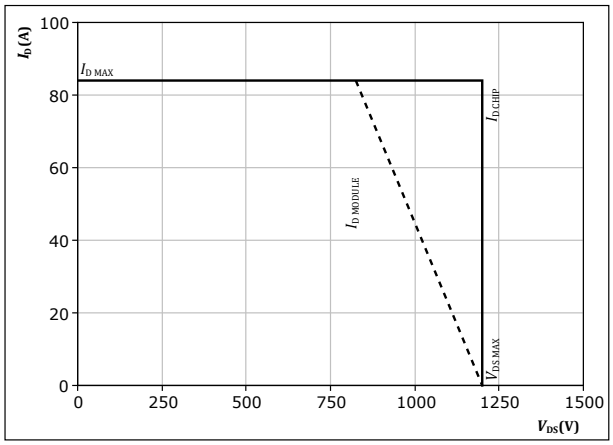


At	V_{DS} =	600	V		
	V_{GS} =	±16	V	T_j:	25 °C
	I_D =	64	A		125 °C
					150 °C

figure 23. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At	T_j =	150	°C
	R_{gon} =	4	Ω
	R_{goff} =	4	Ω

Inverter Switching Definitions

figure 24. MOSFET

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

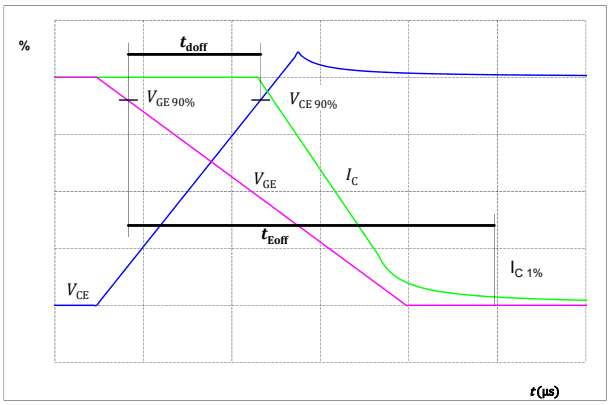


figure 25. MOSFET

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

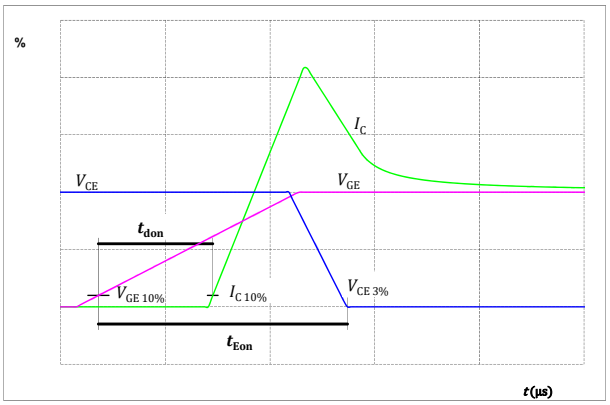


figure 26. MOSFET

Turn-off Switching Waveforms & definition of t_f

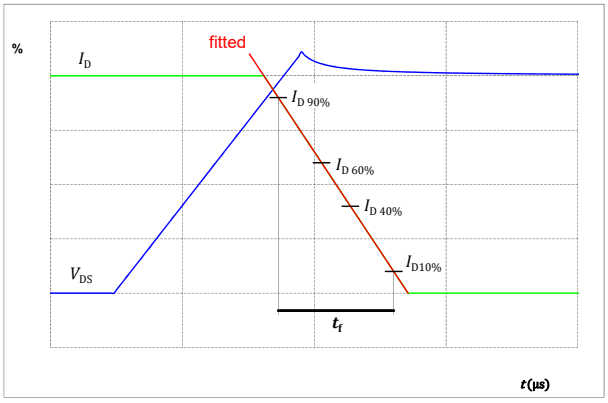
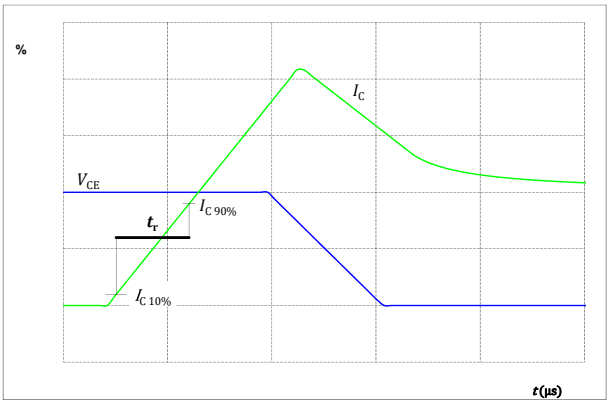


figure 27. MOSFET

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 28. **FWD**

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

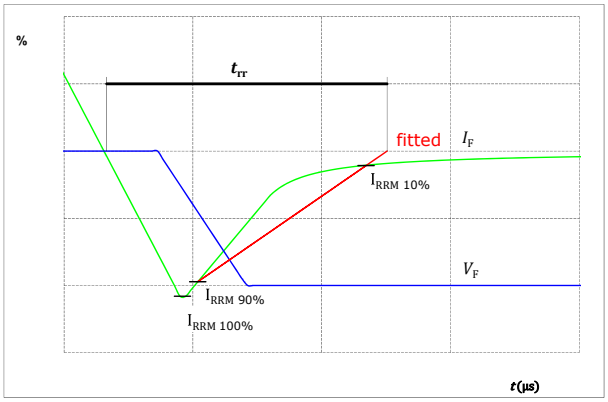


figure 29. **FWD**

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

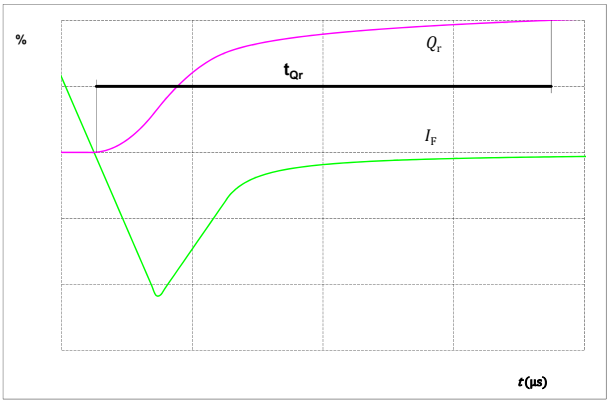
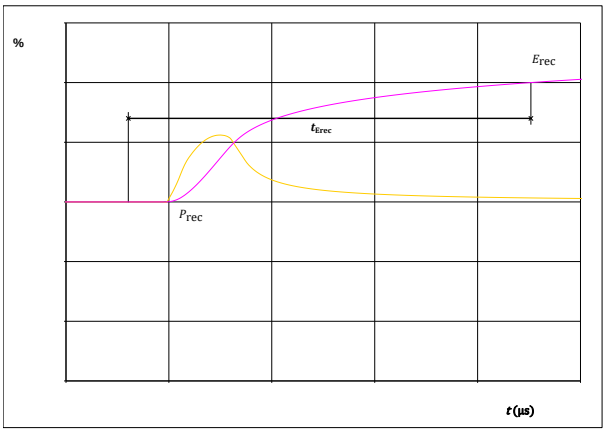


figure 30. **FWD**

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



Ordering Code

Version	Ordering Code
Without thermal paste	10-EY128PA018MR02-PN19F03T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EY128PA018MR02-PN19F03T-/7/

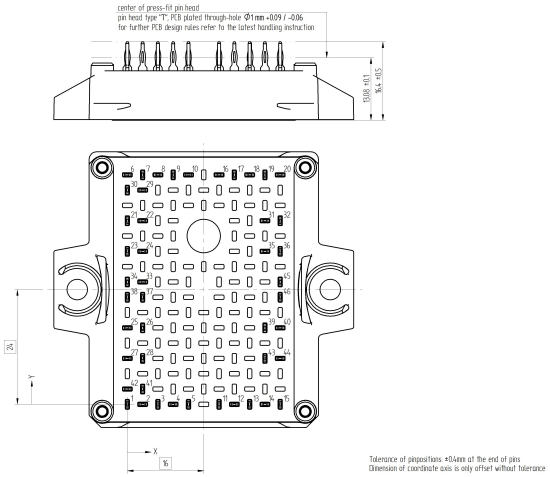
Marking

	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		

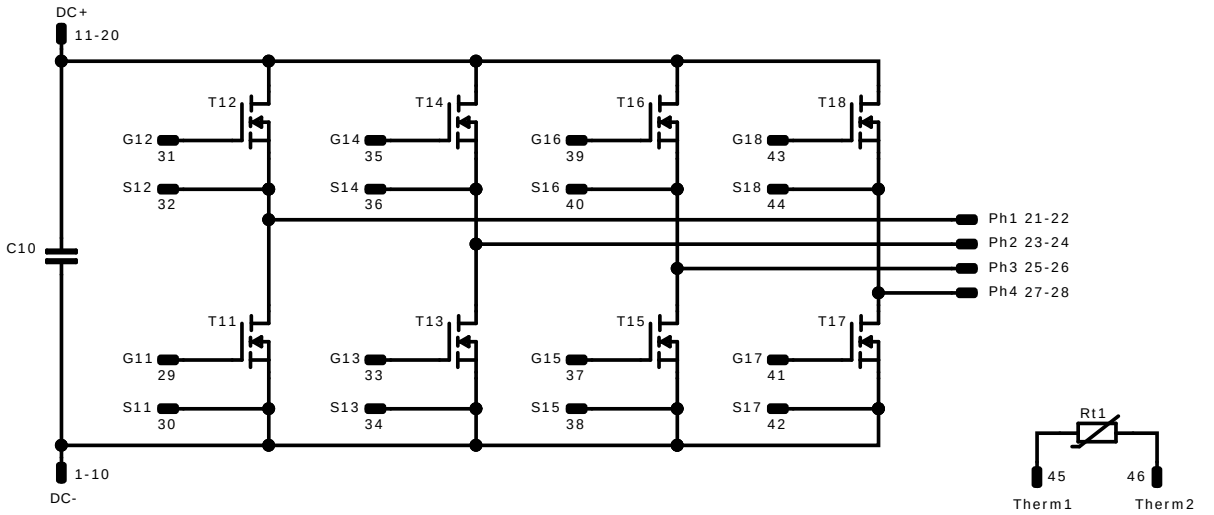
Outline

Pin table [mm]

Pin	X	Y	Function
1	0	0	DC-
2	3,2	0	DC-
3	6,4	0	DC-
4	9,6	0	DC-
5	12,8	0	DC-
6	0	48	DC-
7	3,2	48	DC-
8	6,4	48	DC-
9	9,6	48	DC-
10	12,8	48	DC-
11	19,2	0	DC+
12	22,4	0	DC+
13	25,6	0	DC+
14	28,8	0	DC+
15	32	0	DC+
16	19,2	48	DC+
17	22,4	48	DC+
18	25,7	48	DC+
19	28,8	48	DC+
20	32	48	DC+
21	0	38,4	Ph1
22	3,2	38,4	Ph1
23	0	32	Ph2
24	3,2	32	Ph2
25	0	16	Ph3
26	3,2	16	Ph3
27	0	9,6	Ph4
28	3,2	9,65	Ph4
29	3,2	44,8	G11
30	0	44,8	S11
31	28,8	38,4	G12
32	32	38,4	S12
33	3,2	25,6	G13
34	0	25,6	S13
35	28,8	32	G14
36	32	32	S14
37	3,2	22,4	G15
38	0	22,4	S15
39	28,8	16	G16
40	32	16	S16
41	3,2	3,2	G17
42	0	3,2	S17
43	28,8	9,6	G18
44	32	9,6	S18
45	32	25,6	Therm1
46	32	22,4	Therm2



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16, T17, T18	MOSFET	1200 V	18 mΩ	Inverter Switch	
C10	Capacitor	1500 V		Capacitor (DC)	
Rt1	Thermistor			Thermistor	

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

Handling instruction
Handling instructions for *flow* E2 packages see vincotech.com website.

Package data
Package data for *flow* 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 $T_{j,op}$=175°C and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-EY128PA018MR02-PN19F03T-D1-14	17 Jun. 2025	Initial Release	