Vincotech

10-EY124PA010MS-LP40F78T
datasheet

fastPACK E2 SiC **1200 V / 10 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: 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

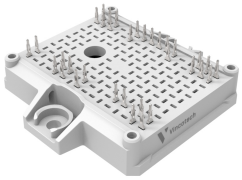
Target applications

- Charging Stations
- Energy Storage Systems
- Power Supply
- Solar Inverters
- UPS
- Welding & Cutting

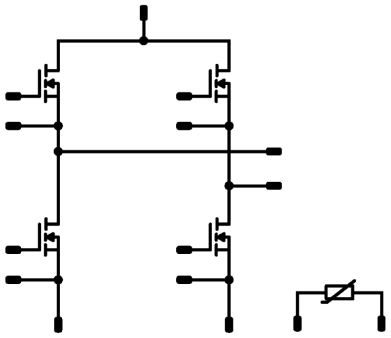
Types

- 10-EY124PA010MS-LP40F78T

flow E2 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
H-Bridge Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current (DC current)	I_D	T_j = T_{jmax} T_s = 80 °C	112	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	480	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	193	W
Gate-source voltage	V_{GSS}	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 s	6000	V
Creepage distance			>12,7	mm
Clearance			9,14	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	
H-Bridge Switch										
Static										
Drain-source on-state resistance(1)	$r_{DS(on)}$		18		120	25 175		10 16,34	15	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,012	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			300	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			30	µA
Internal gate resistance	r_g							0,667		Ω
Gate charge	Q_g		-5/18	800	120	25		324		nC
Short-circuit input capacitance	C_{iss}	f = 500 kHz	0	800	0	25		7800		pF
Short-circuit output capacitance	C_{oss}							405		
Reverse transfer capacitance	C_{rss}							18		
Diode forward voltage	V_{SD}		0		120	25		4,1		V
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,49		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} = 8 Ω R_{goff} = 8 Ω	-5/18	600	100	25 125 150		64,22 54,68 52,88		ns
Rise time	t_r					25 125 150		41,09 32,65 30,95		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		108,44 125,56 128,99		ns
Fall time	t_f					25 125 150		17,62 17,74 17,64		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,516 µC Q_{rFWD}=1,38 µC Q_{rFWD}=1,62 µC				25 125 150		3,06 3,01 3,09		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,755 0,814 0,842		mWs
Peak recovery current	I_{RRM}	di/dt=2290 A/µs di/dt=3109 A/µs di/dt=3772 A/µs				25 125 150		34,79 55,94 61,59		A
Reverse recovery time	t_{rr}					25 125 150		25,41 41,58 42,57		ns
Recovered charge	Q_r					25 125 150		0,516 1,38 1,62		µC
Reverse recovered energy	E_{rec}					25 125 150		0,049 0,247 0,308		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		4030,4 2773,4 2939,5		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	
Thermistor										
Static										
Rated resistance	R					25		5		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 493 Ω				100	-5		5	%
Power dissipation	P							245		mW
Power dissipation constant	d					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. ±2 %						3375		K
B-value	$B_{(25/100)}$	Tol. ±2 %						3437		K
Vincotech Thermistor Reference									K	

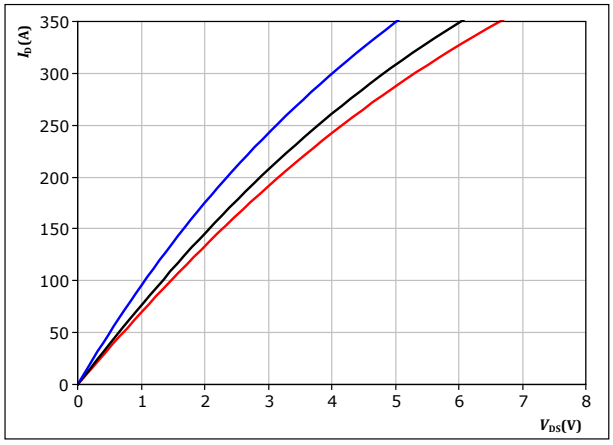
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

H-Bridge Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics including $R_{DD'+SS'}$

$I_D = f(V_{DS})$

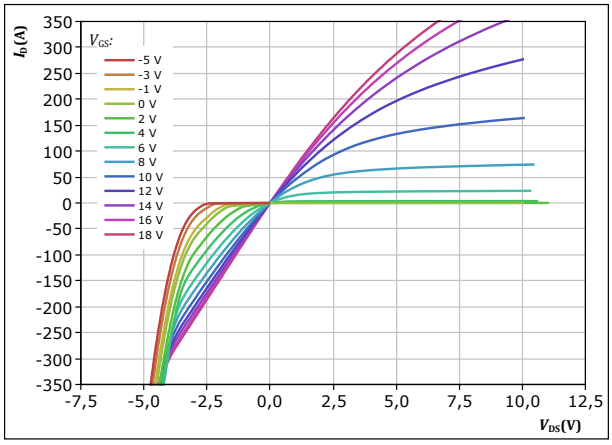


t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **MOSFET**

Typical output characteristics including $R_{DD'+SS'}$

$I_D = f(V_{DS})$



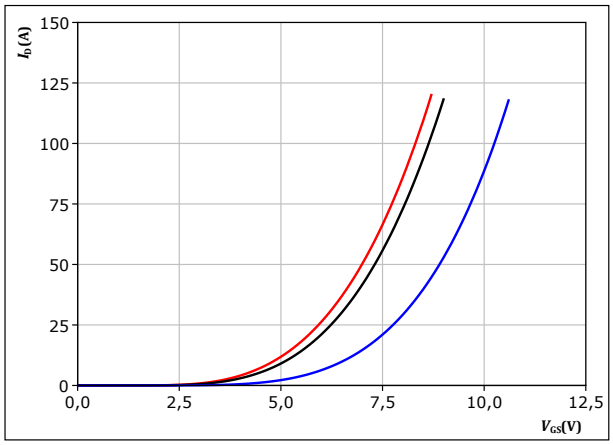
t_p =	250	µs
T_j =	150	°C

V_{GS} from -5 V to 18 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

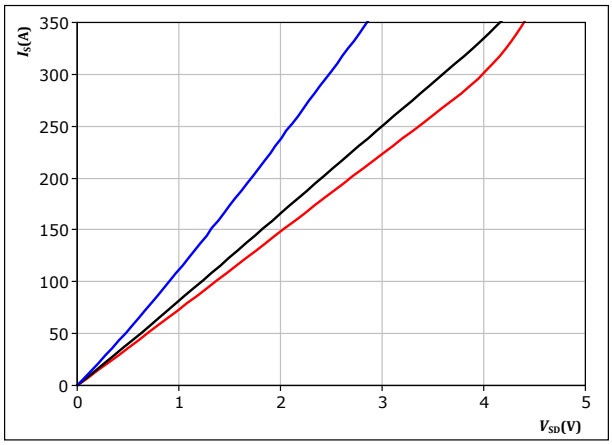


t_p =	250	µs		
V_{DS} =	23	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **MOSFET**

Typical reverse drain current characteristics including $R_{DD'+SS'}$

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



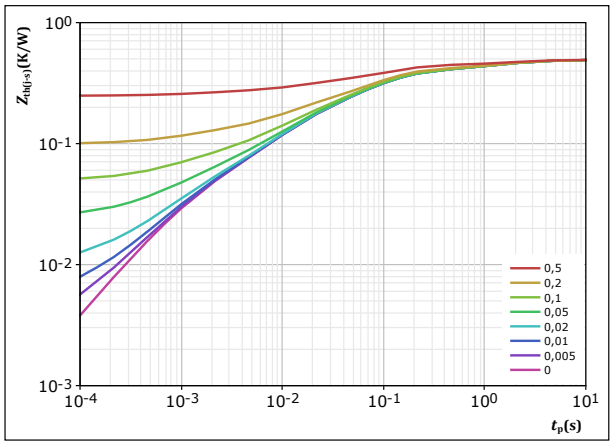
t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

H-Bridge 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	
$R_{th(j-s)}$ =	0,492	K/W

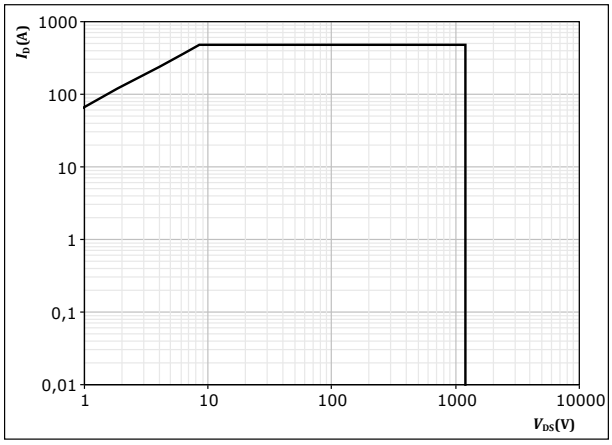
MOSFET thermal model values

R (K/W)	τ (s)
1,87E-02	8,73E+00
9,52E-02	1,23E+00
2,53E-01	8,17E-02
1,02E-01	1,12E-02
2,78E-02	1,03E-03

figure 6. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$



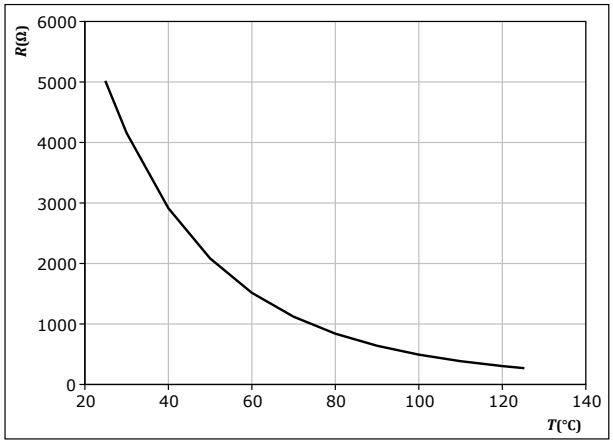
D =	single pulse	
T_s =	80	°C
V_{GS} =	18	V
T_j =	T_{jmax}	

Thermistor Characteristics

figure 7. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

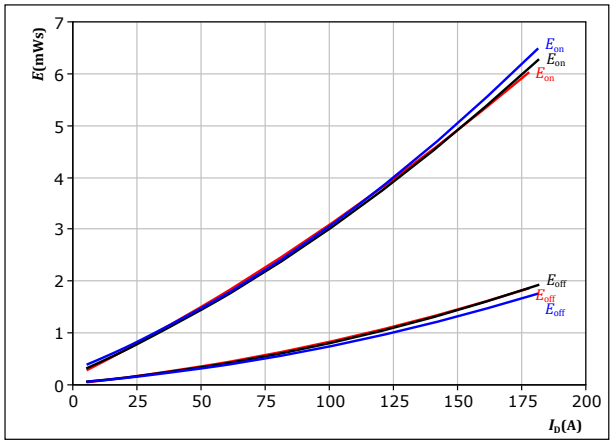


H-Bridge Switching Characteristics

figure 8. **MOSFET**

Typical switching energy losses as a function of drain current

E = f(I_D)



With an inductive load at

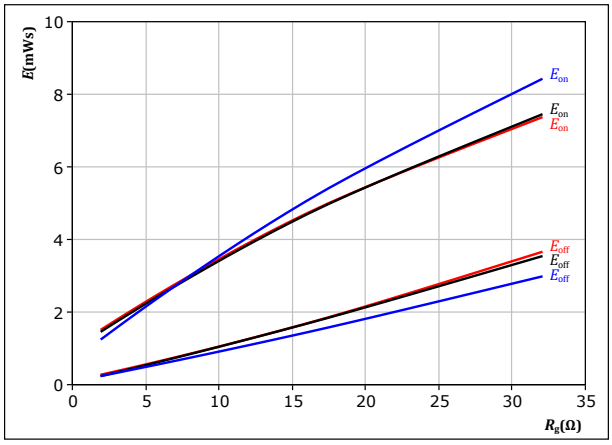
V_{DS} =	600	V
V_{GS} =	-5/18	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 9. **MOSFET**

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

E = f(R_g)



With an inductive load at

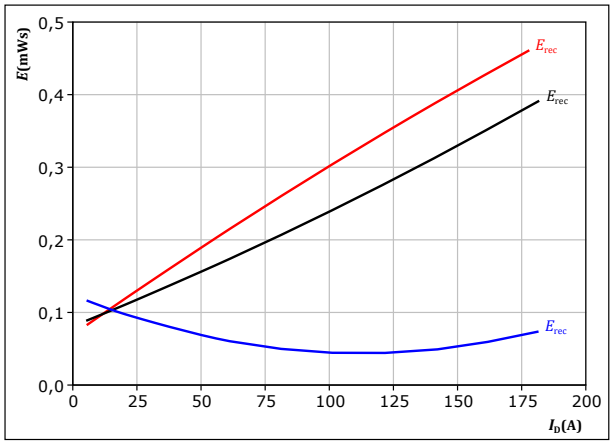
V_{DS} =	600	V
V_{GS} =	-5/18	V
I_D =	100	A

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

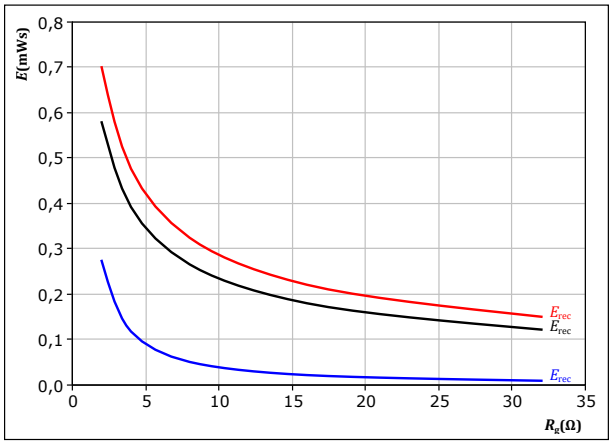
V_{DS} =	600	V
V_{GS} =	-5/18	V
R_{gon} =	8	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 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 =	100	A

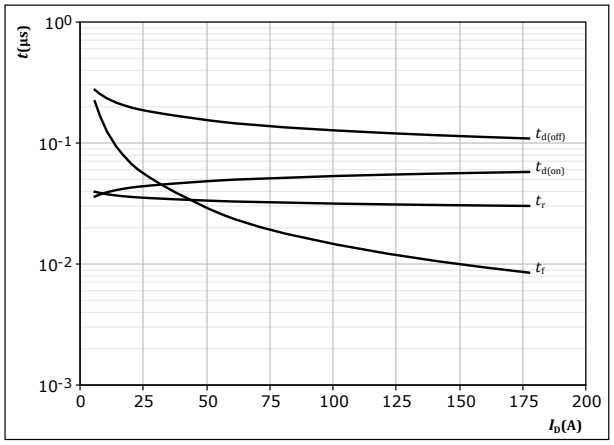
T_j: 25 °C, 125 °C, 150 °C

H-Bridge Switching Characteristics

figure 12. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



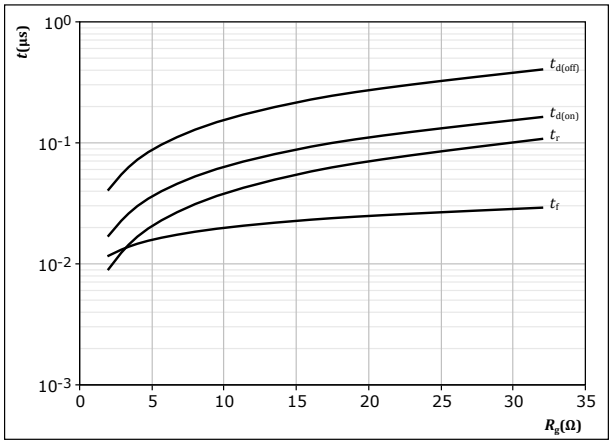
With an inductive load at

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

$t = f(R_g)$



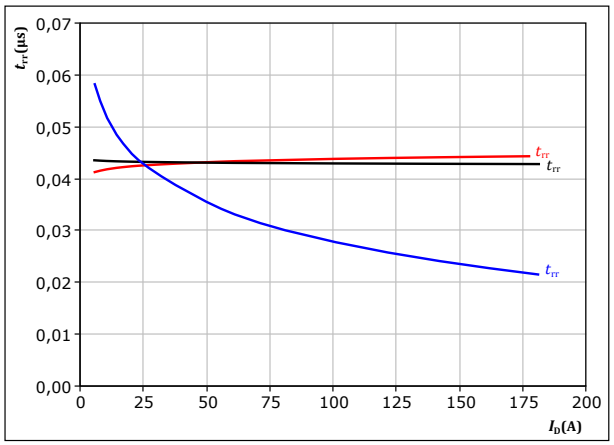
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	-5/18	V
I_D =	100	A

figure 14. **MOSFET**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$

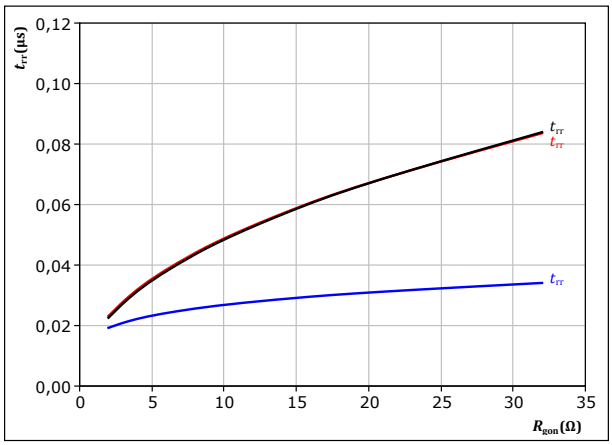


At	V_{DS} =	600	V	
	V_{GS} =	-5/18	V	T_j: 25 °C
	R_{gon} =	8	Ω	125 °C
				150 °C

figure 15. **MOSFET**

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

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



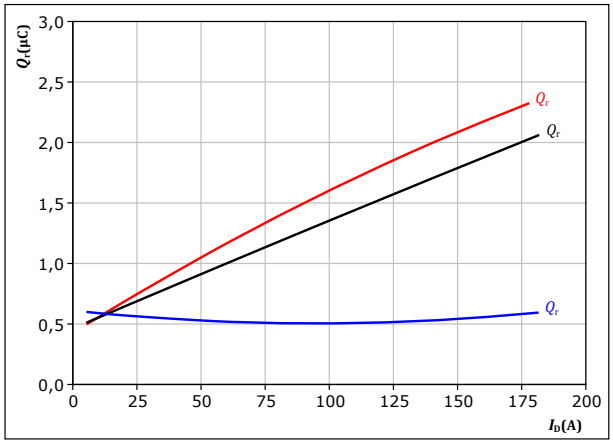
At	V_{DS} =	600	V	
	V_{GS} =	-5/18	V	T_j: 25 °C
	I_D =	100	A	125 °C
				150 °C

H-Bridge Switching Characteristics

figure 16. **MOSFET**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

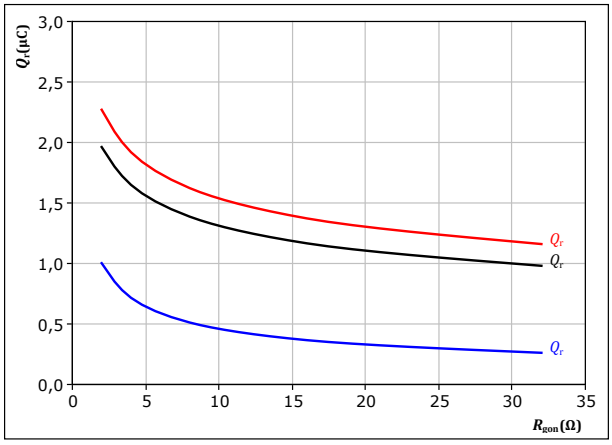


At				
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	-5/18	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 17. **MOSFET**

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

$Q_r = f(R_{gon})$

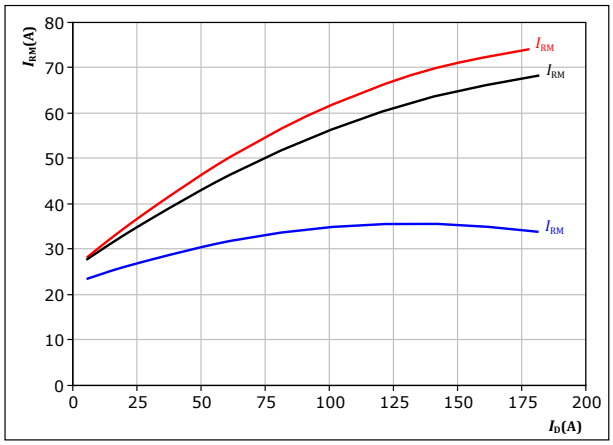


At				
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	-5/18	V		125 °C
I_D =	100	A		150 °C

figure 18. **MOSFET**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

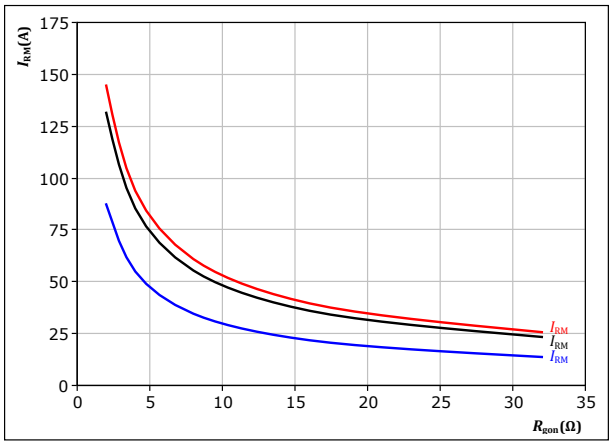


At				
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	-5/18	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 19. **MOSFET**

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

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



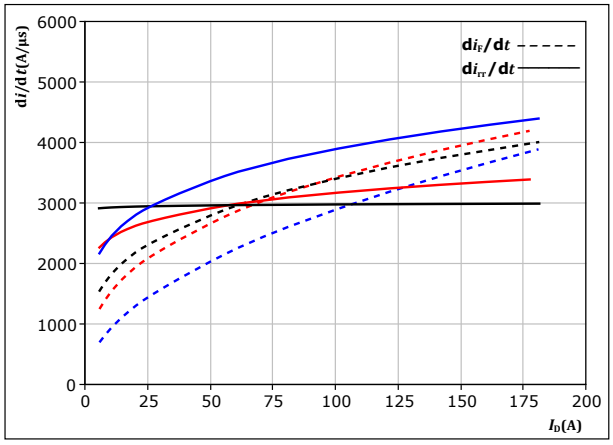
At				
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	-5/18	V		125 °C
I_D =	100	A		150 °C

H-Bridge 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_{rr}/dt = f(I_D)

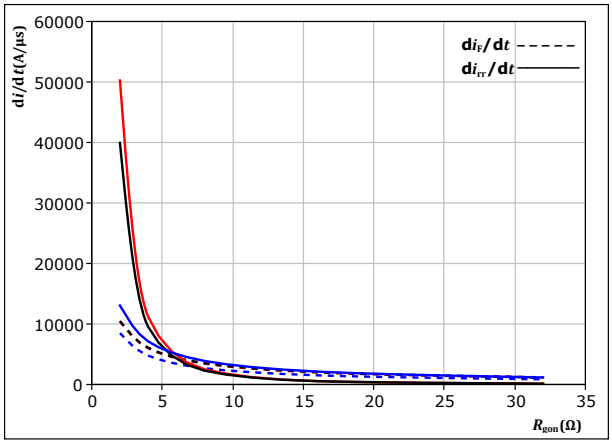


At					
	V_{DS} =	600	V		
	V_{GS} =	-5/18	V	T_j:	25 °C
	R_{gon} =	8	Ω		125 °C
					150 °C

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_{rr}/dt = f(R_{gon})

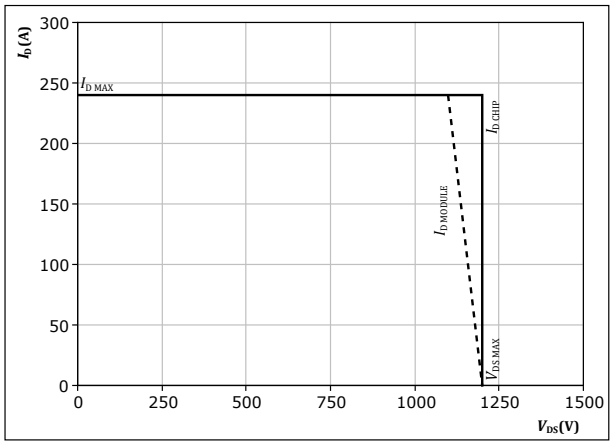


At					
	V_{DS} =	600	V		
	V_{GS} =	-5/18	V	T_j:	25 °C
	I_D =	100	A		125 °C
					150 °C

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

H-Bridge Switching Definitions

figure 23. MOSFET

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

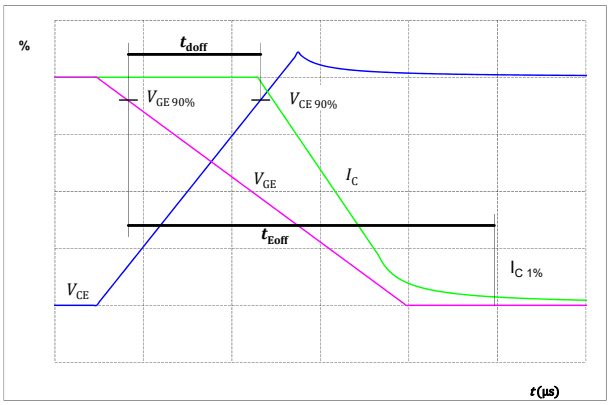


figure 24. MOSFET

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

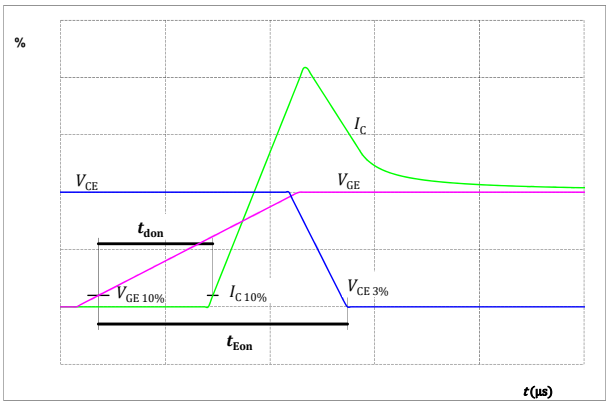


figure 25. MOSFET

Turn-off Switching Waveforms & definition of t_f

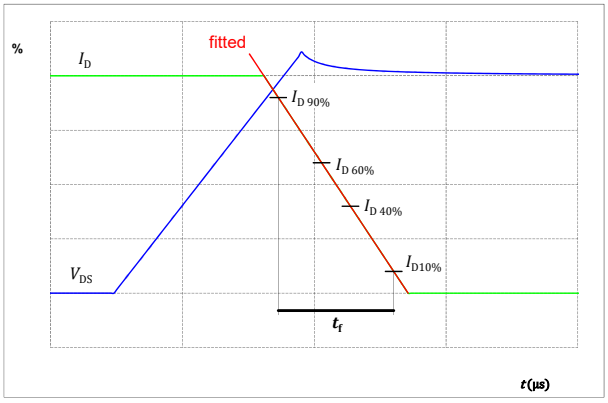
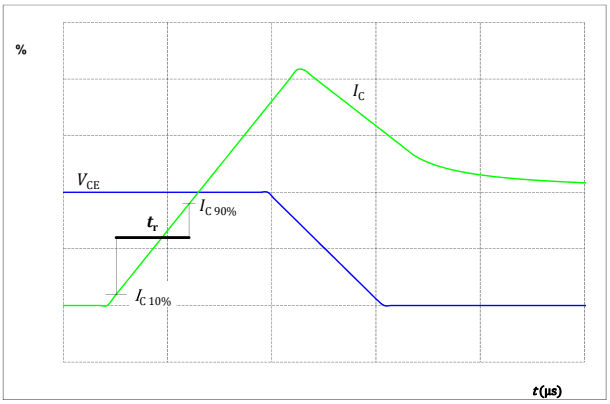


figure 26. MOSFET

Turn-on Switching Waveforms & definition of t_r



H-Bridge Switching Definitions

figure 27. **FWD**

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

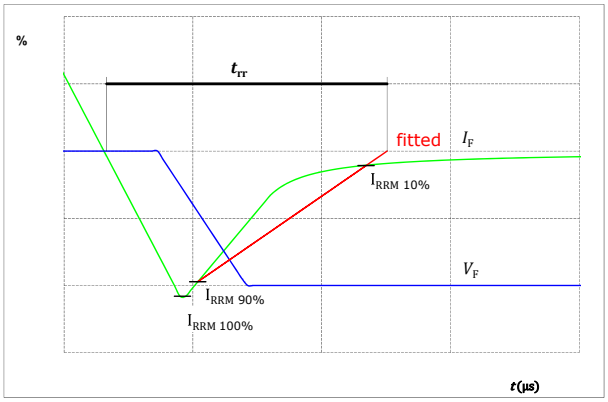


figure 28. **FWD**

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

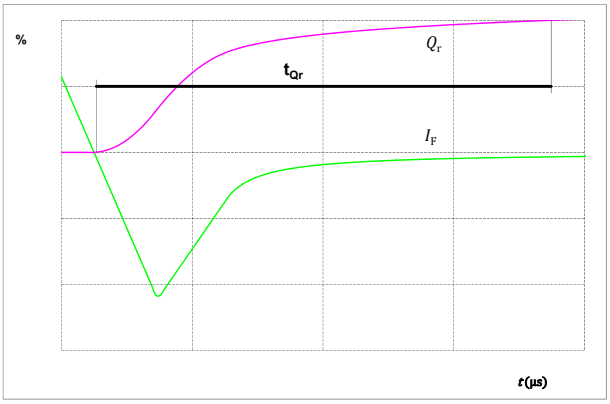
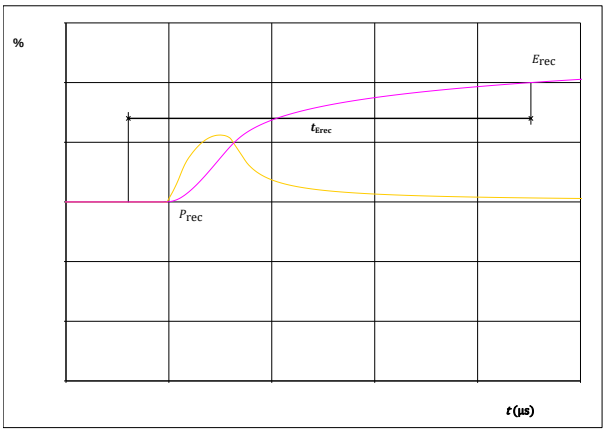


figure 29. **FWD**

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



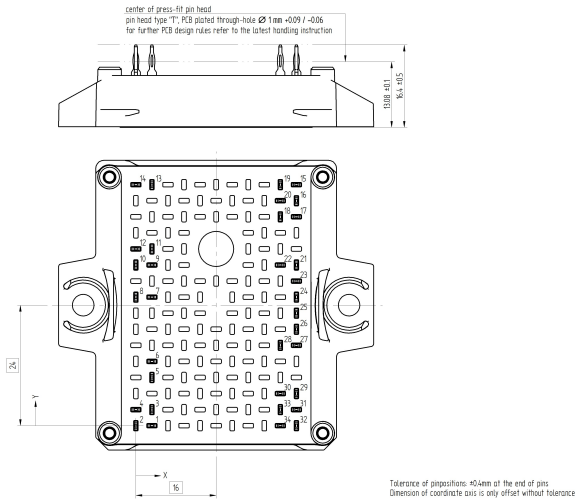
Ordering Code	
Version	**Ordering Code**
Without thermal paste	10-EY124PA010MS-LP40F78T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EY124PA010MS-LP40F78T-/7/

Marking

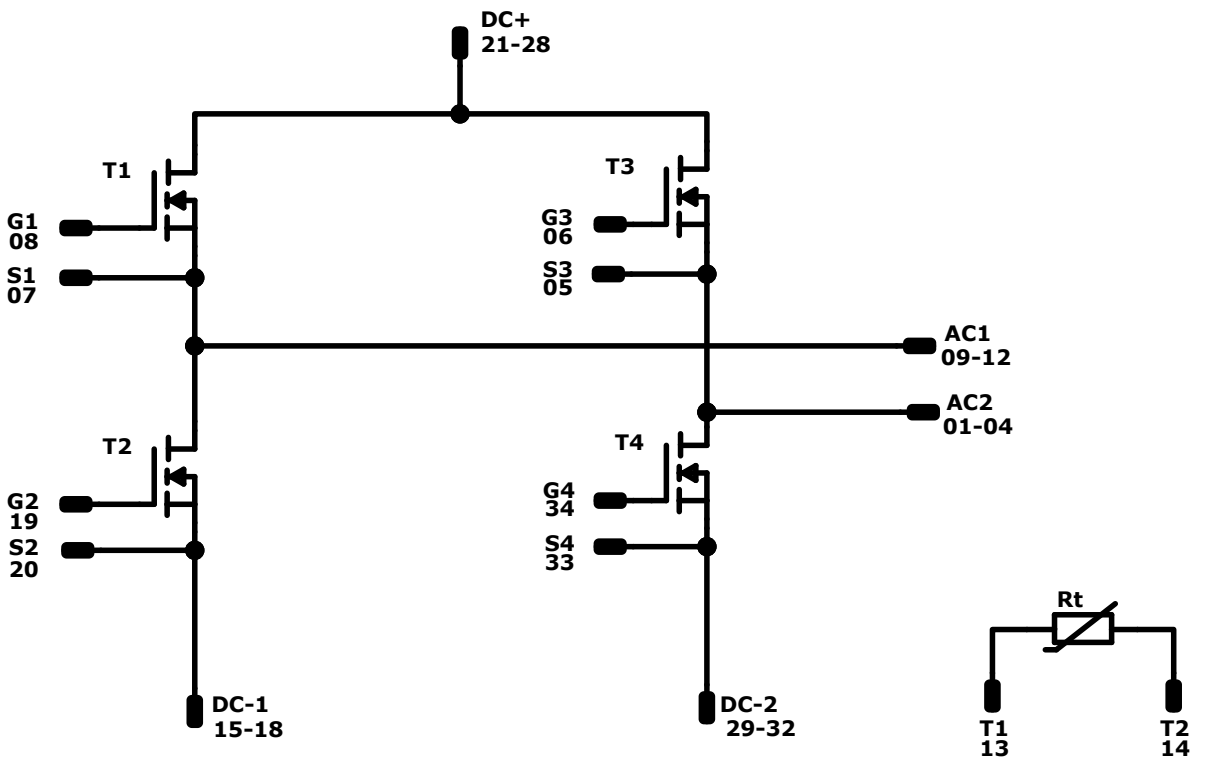
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	3,2	0	AC2
2	0	0	AC2
3	3,2	3,2	AC2
4	0	3,2	AC2
5	3,2	9,6	S3
6	3,2	12,8	G3
7	3,2	25,6	S1
8	0	25,6	G1
9	3,2	32	AC1
10	0	32	AC1
11	3,2	35,2	AC1
12	0	35,2	AC1
13	3,2	48	T1
14	0	48	T2
15	32	48	DC-1
16	32	44,8	DC-1
17	32	41,6	DC-1
18	28,8	41,6	DC-1
19	28,8	48	G2
20	28,8	44,8	S2
21	32	32	DC+
22	28,8	32	DC+
23	32	28,8	DC+
24	32	25,6	DC+
25	32	22,4	DC+
26	32	19,2	DC+
27	32	16	DC+
28	28,8	16	DC+
29	32	6,4	DC-2
30	28,8	6,4	DC-2
31	32	3,2	DC-2
32	32	0	DC-2
33	28,8	3,2	S4
34	28,8	0	G4



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T2, T1, T4, T3	MOSFET	1200 V	10 mΩ	H-Bridge Switch	
Rt	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-EY124PA010MS-LP40F78T-D1-14	26 Oct. 2025	Initial Release	