



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<sub>2</sub>O<sub>3</sub>
- 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

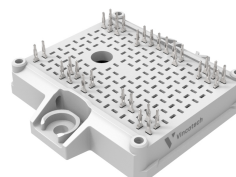
## Target applications

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

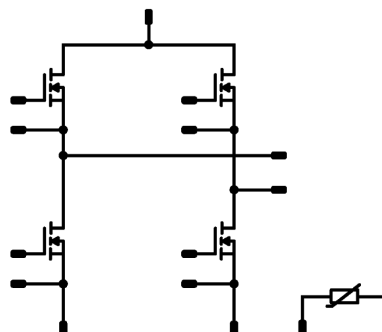
## Types

- 10-EY124PA010MS-LP40F78T

## flow E2 12 mm housing



## Schematic





Vincotech

**10-EY124PA010MS-LP40F78T**  
datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>H-Bridge Switch</b>				
Drain-source voltage	$V_{DS}$		1200	V
Drain current (DC current)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	112	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	480	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	193	W
Gate-source voltage	$V_{GS}$	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* $t_p = 2\text{ s}$	6000	V
Creepage distance			>12,7	mm
Clearance			9,14	mm
Comparative Tracking Index	CTI		≥ 600	

\*100 % tested in production



Vincotech

# 10-EY124PA010MS-LP40F78T

datasheet

## 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 <sup>(1)</sup>	$r_{DS(on)}$		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 <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,49		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----



Vincotech

# 10-EY124PA010MS-LP40F78T

datasheet

## 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	$t_{d(on)}$	$R_{gon} = 8\ \Omega$ $R_{goff} = 8\ \Omega$	-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)	$E_{on}$	$Q_{rFWD}=0,516\ \mu C$ $Q_{rFWD}=1,38\ \mu C$ $Q_{rFWD}=1,62\ \mu C$				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	$I_{RRM}$	$di/dt=2290\ A/\mu s$ $di/dt=3109\ A/\mu s$ $di/dt=3772\ A/\mu s$				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		$\mu C$
Reverse recovered energy	$E_{rec}$					25 125 150		0,049 0,247 0,308		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		4030,4 2773,4 2939,5		A/ $\mu s$



Vincotech

**10-EY124PA010MS-LP40F78T**  
datasheet

**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	$\Delta_{R/R}$	$R_{100} = 493 \Omega$				100	-5		5	%
Power dissipation	$P$							245		mW
Power dissipation constant	$d$					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 2 \%$						3375		K
B-value	$B_{(25/100)}$	Tol. $\pm 2 \%$						3437		K
Vincotech Thermistor Reference									K	

<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.



Vincotech

# 10-EY124PA010MS-LP40F78T

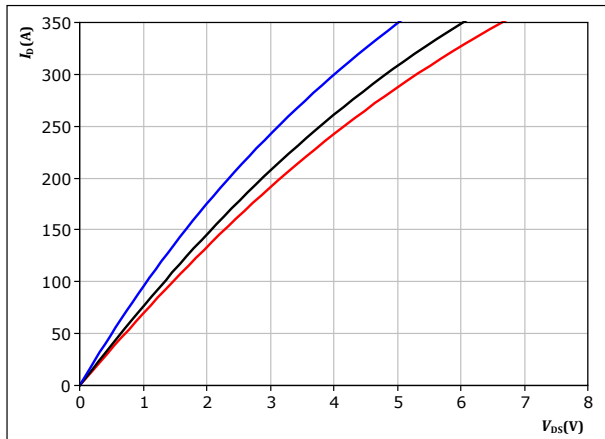
datasheet

## H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics including  $R_{DS(on)}$  and  $R_{DS(off)}$

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

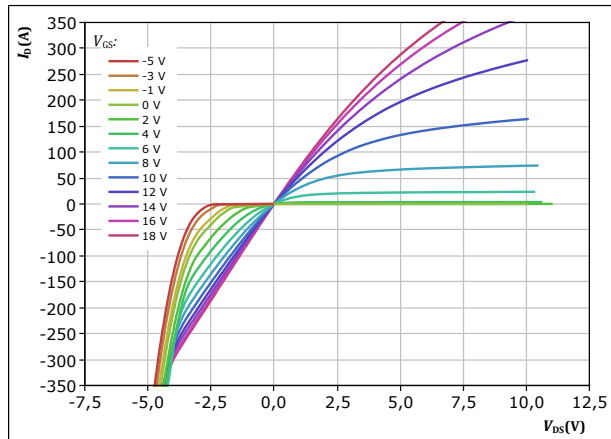


$t_p = 250 \mu s$   
 $V_{GS} = 18 V$   
 $T_j: 25 ^\circ C$   
 $125 ^\circ C$   
 $150 ^\circ C$

figure 2. MOSFET

Typical output characteristics including  $R_{DS(on)}$  and  $R_{DS(off)}$

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

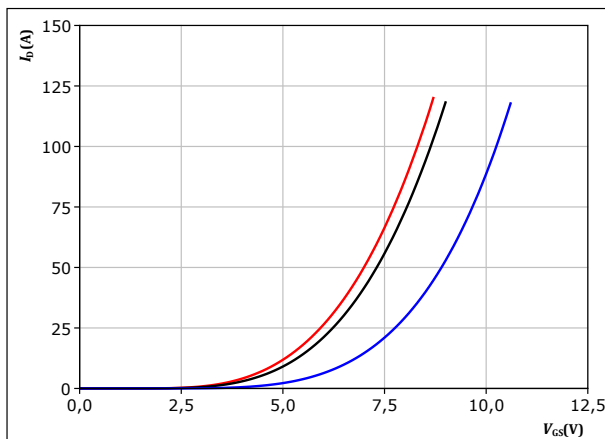


$t_p = 250 \mu s$   
 $T_j = 150 ^\circ C$   
 $V_{GS}$  from -5 V to 18 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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

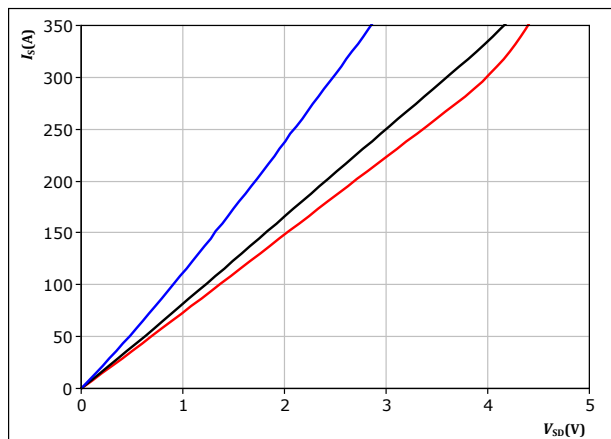


$t_p = 250 \mu s$   
 $V_{DS} = 23 V$   
 $T_j: 25 ^\circ C$   
 $125 ^\circ C$   
 $150 ^\circ C$

figure 4. MOSFET

Typical reverse drain current characteristics including  $R_{DS(on)}$  and  $R_{DS(off)}$

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



$t_p = 250 \mu s$   
 $V_{GS} = 18 V$   
 $T_j: 25 ^\circ C$   
 $125 ^\circ C$   
 $150 ^\circ C$

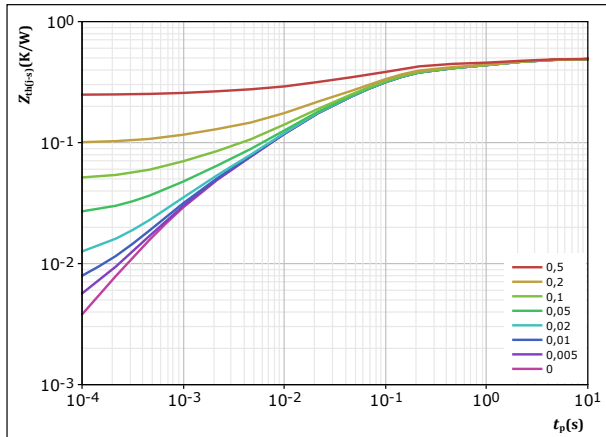


## H-Bridge Switch Characteristics

figure 5. MOSFET

Transient thermal impedance as a function of pulse width

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

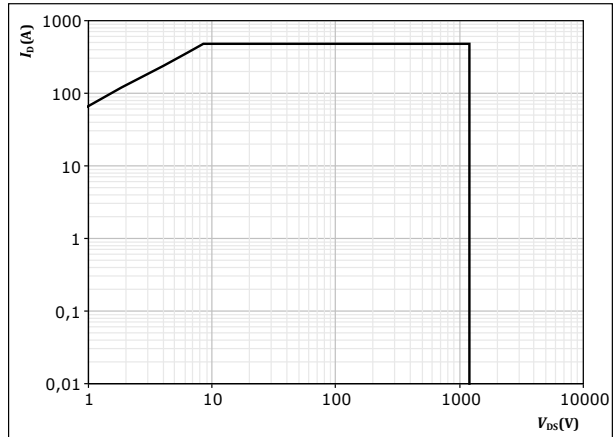


$D =$	$t_p / T$
$R_{th(j-a)} =$	0,492 K/W
MOSFET thermal model values	
$R$ (K/W)	$\tau$ (s)
1,87E-02	8,73E+00
9,52E-02	1,23E+00
2,53E-01	8,17E-02
1,02E-01	1,12E-02
2,78E-02	1,03E-03

figure 6. MOSFET

Safe operating area

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



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



Vincotech

**10-EY124PA010MS-LP40F78T**  
datasheet

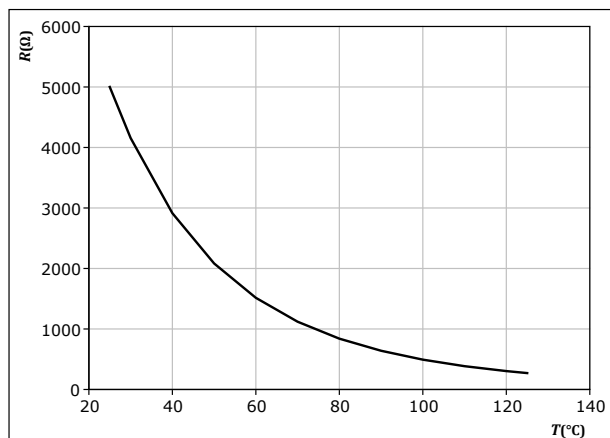
## Thermistor Characteristics

figure 7.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$







Vincotech

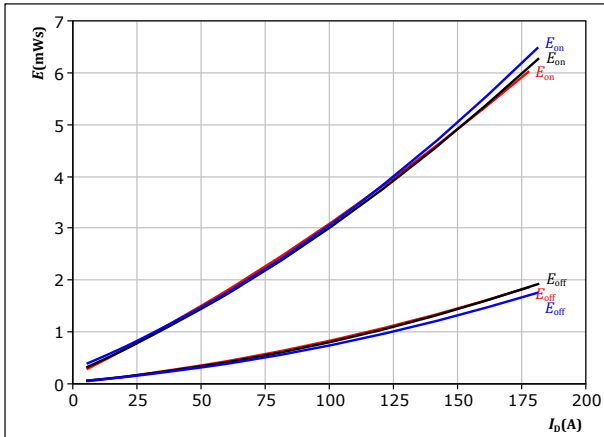
## H-Bridge Switching Characteristics

figure 8.

MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



With an inductive load at

$V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/18 \text{ V}$   
 $R_{gon} = 8 \text{ } \Omega$   
 $R_{goff} = 8 \text{ } \Omega$

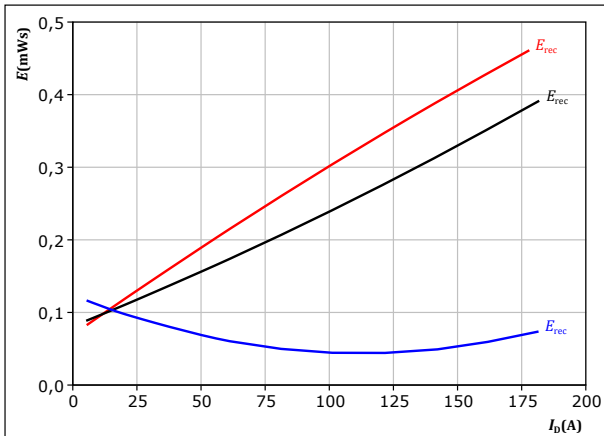
$T_j$ : 25 °C  
125 °C  
150 °C

figure 10.

MOSFET

Typical reverse recovered energy loss as a function of drain current

$$E_{rec} = f(I_D)$$



With an inductive load at

$V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/18 \text{ V}$   
 $R_{gon} = 8 \text{ } \Omega$

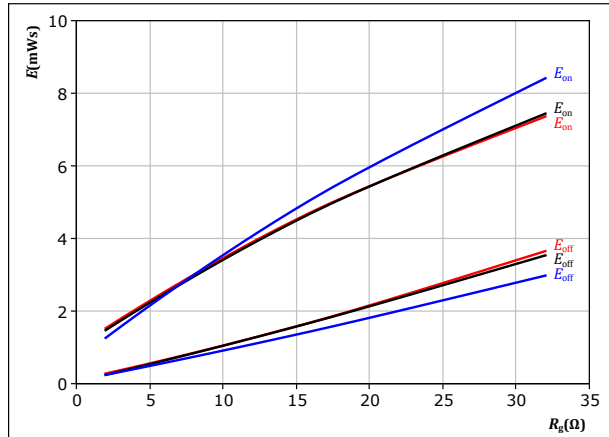
$T_j$ : 25 °C  
125 °C  
150 °C

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

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

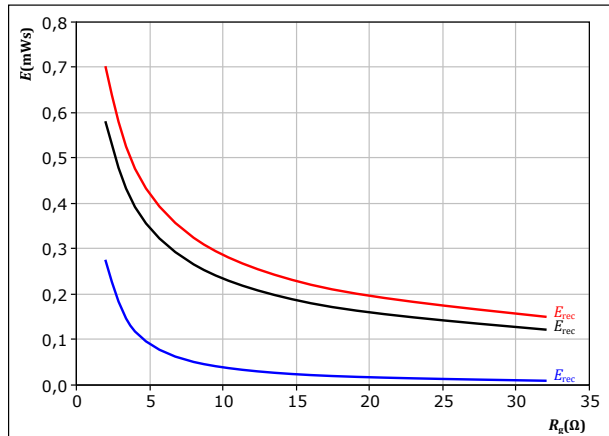
$T_j$ : 25 °C  
125 °C  
150 °C

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

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

$T_j$ : 25 °C  
125 °C  
150 °C



Vincotech

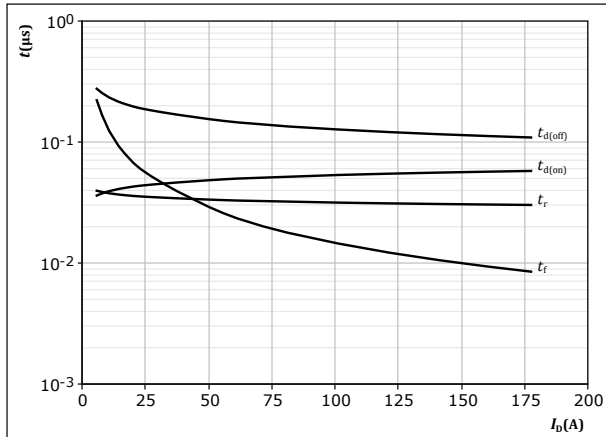
# 10-EY124PA010MS-LP40F78T

datasheet

## H-Bridge Switching Characteristics

figure 12. MOSFET

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

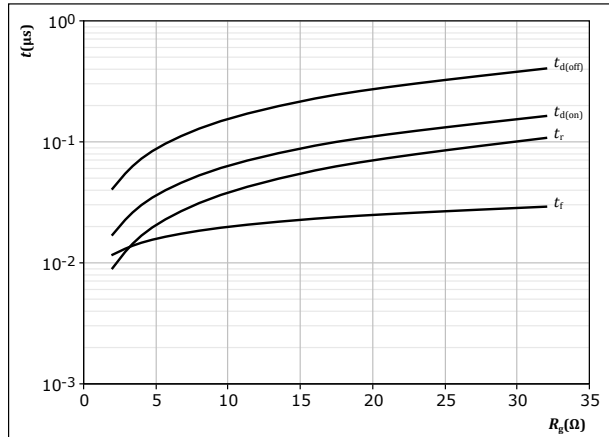


With an inductive load at

$T_j = 150$  °C  
 $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $R_{gon} = 8$   $\Omega$   
 $R_{goff} = 8$   $\Omega$

figure 13. MOSFET

Typical switching times as a function of MOSFET turn on gate resistor  
 $t = f(R_g)$

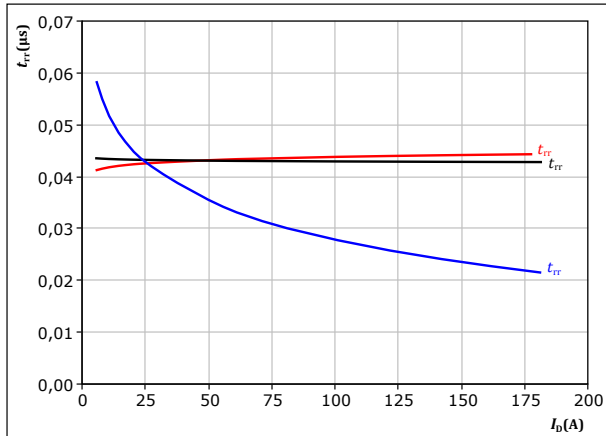


With an inductive load at

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

figure 14. MOSFET

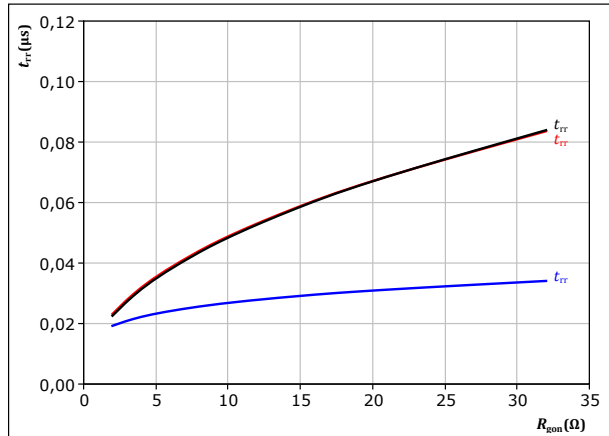
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



At  $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $R_{gon} = 8$   $\Omega$   
 $T_j$ : 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  
 $V_{GS} = -5/18$  V  
 $I_D = 100$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)



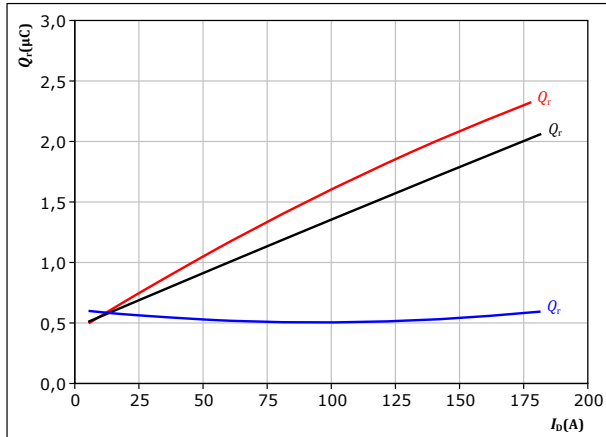
Vincotech

## H-Bridge Switching Characteristics

figure 16. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

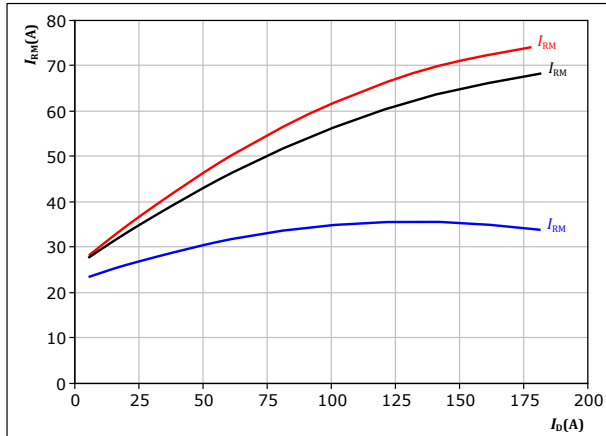


At  $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $R_{gon} = 8$   $\Omega$   
 $T_j$ : 25 °C  
125 °C  
150 °C

figure 18. MOSFET

Typical peak reverse recovery current as a function of drain current

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

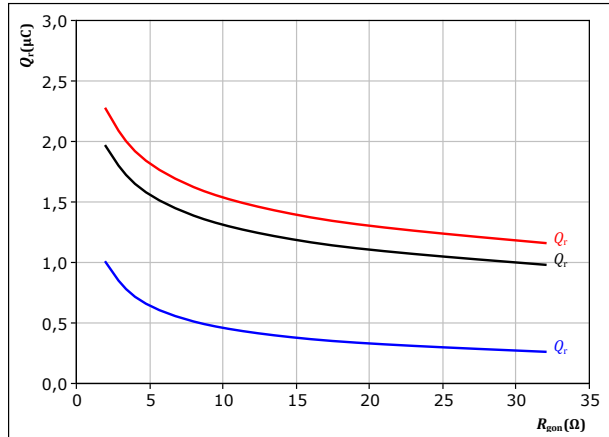


At  $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $R_{gon} = 8$   $\Omega$   
 $T_j$ : 25 °C  
125 °C  
150 °C

figure 17. MOSFET

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

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

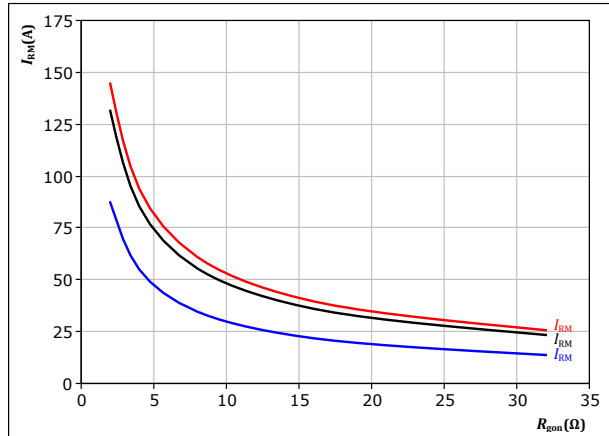


At  $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $I_D = 100$  A  
 $T_j$ : 25 °C  
125 °C  
150 °C

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



Vincotech

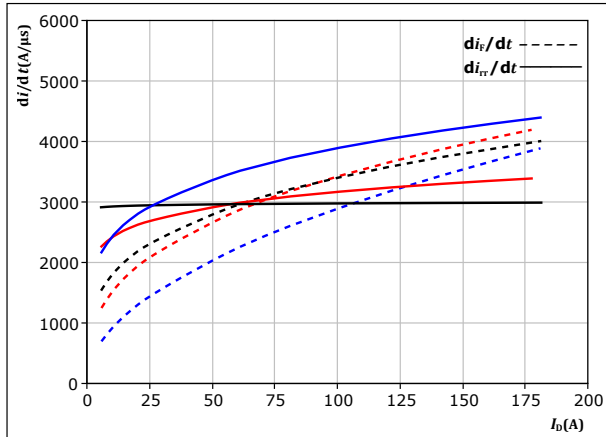
# 10-EY124PA010MS-LP40F78T

datasheet

## H-Bridge Switching Characteristics

figure 20. MOSFET

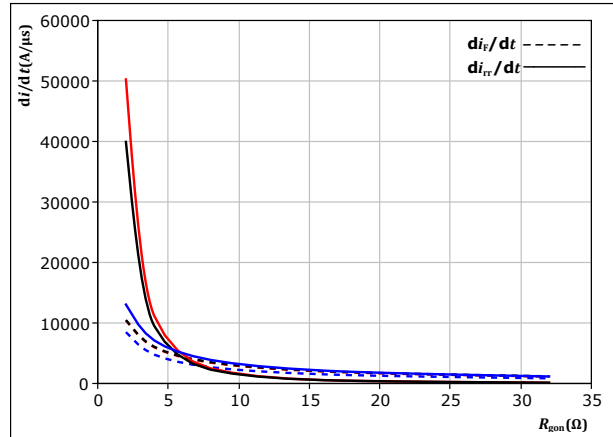
Typical rate of fall of forward and reverse recovery current as a function of drain current  
 $di_f/dt, di_r/dt = f(I_D)$



At  $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $R_{gon} = 8$  Ω  
 $T_j = 25^\circ\text{C}$   
 $T_j = 125^\circ\text{C}$   
 $T_j = 150^\circ\text{C}$

figure 21. MOSFET

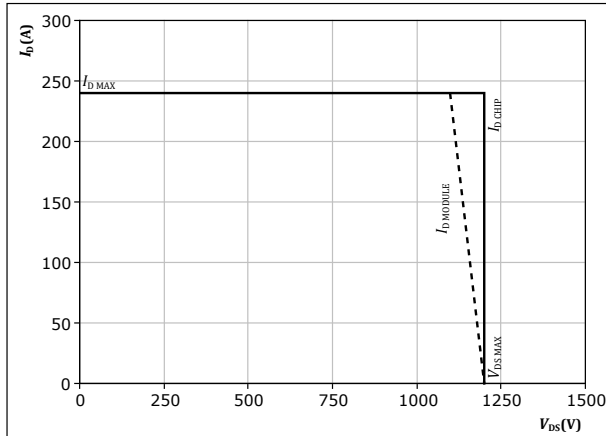
Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor  
 $di_f/dt, di_r/dt = f(R_{gon})$



At  $V_{DS} = 600$  V  
 $V_{GS} = -5/18$  V  
 $I_D = 100$  A  
 $T_j = 25^\circ\text{C}$   
 $T_j = 125^\circ\text{C}$   
 $T_j = 150^\circ\text{C}$

figure 22. MOSFET

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



At  $T_j = 150^\circ\text{C}$   
 $R_{gon} = 8$  Ω  
 $R_{goff} = 8$  Ω



Vincotech

# 10-EY124PA010MS-LP40F78T datasheet

## H-Bridge Switching Definitions

figure 23. MOSFET

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

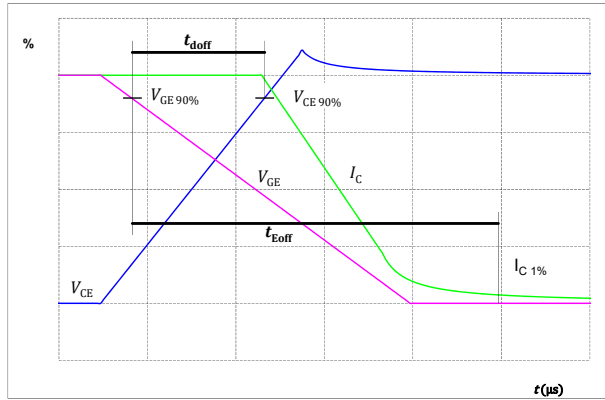


figure 24. MOSFET

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  $t_f$

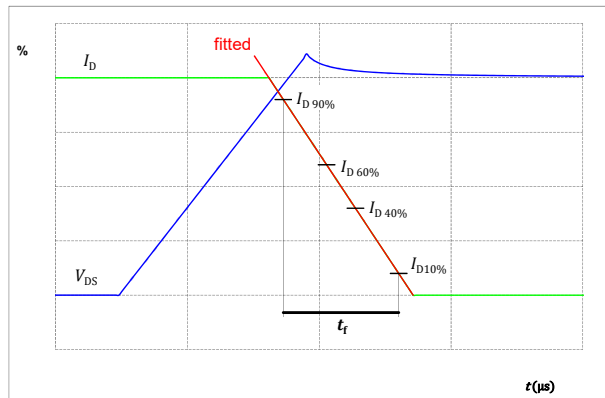
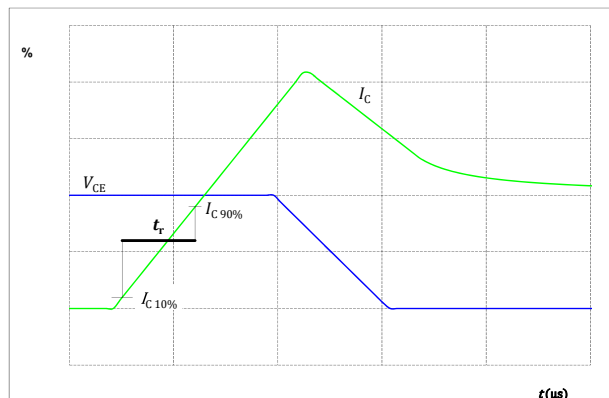


figure 26. MOSFET

Turn-on Switching Waveforms & definition of  $t_r$





Vincotech

## H-Bridge Switching Definitions

figure 27. FWD

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

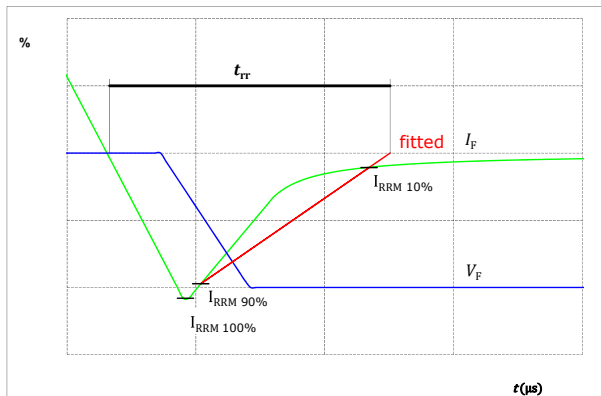


figure 28. FWD

Turn-on Switching Waveforms & definition of  $t_{Qr}$  ( $t_{Qr}$  = integrating time for  $Q_r$ )

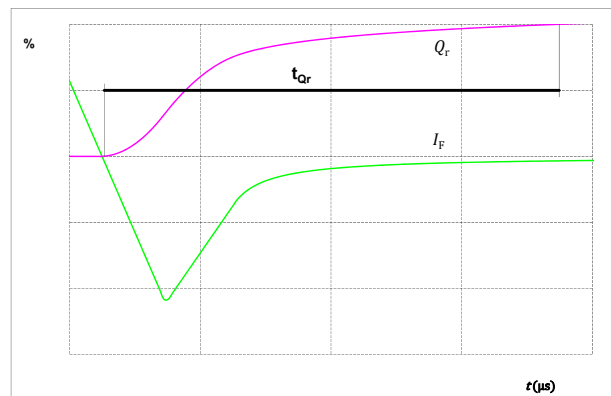
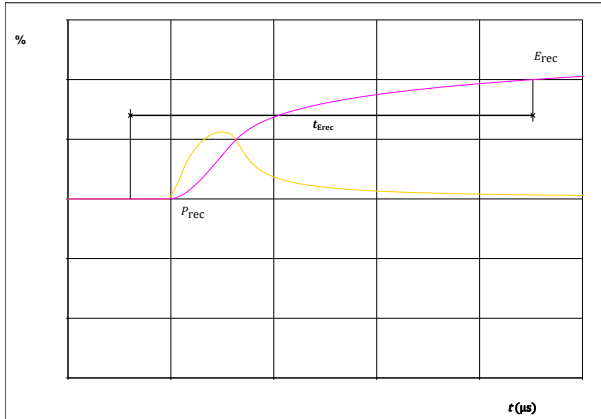


figure 29. FWD


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-EY124PA010MS-LP40F78T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EY124PA010MS-LP40F78T-/7/

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

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

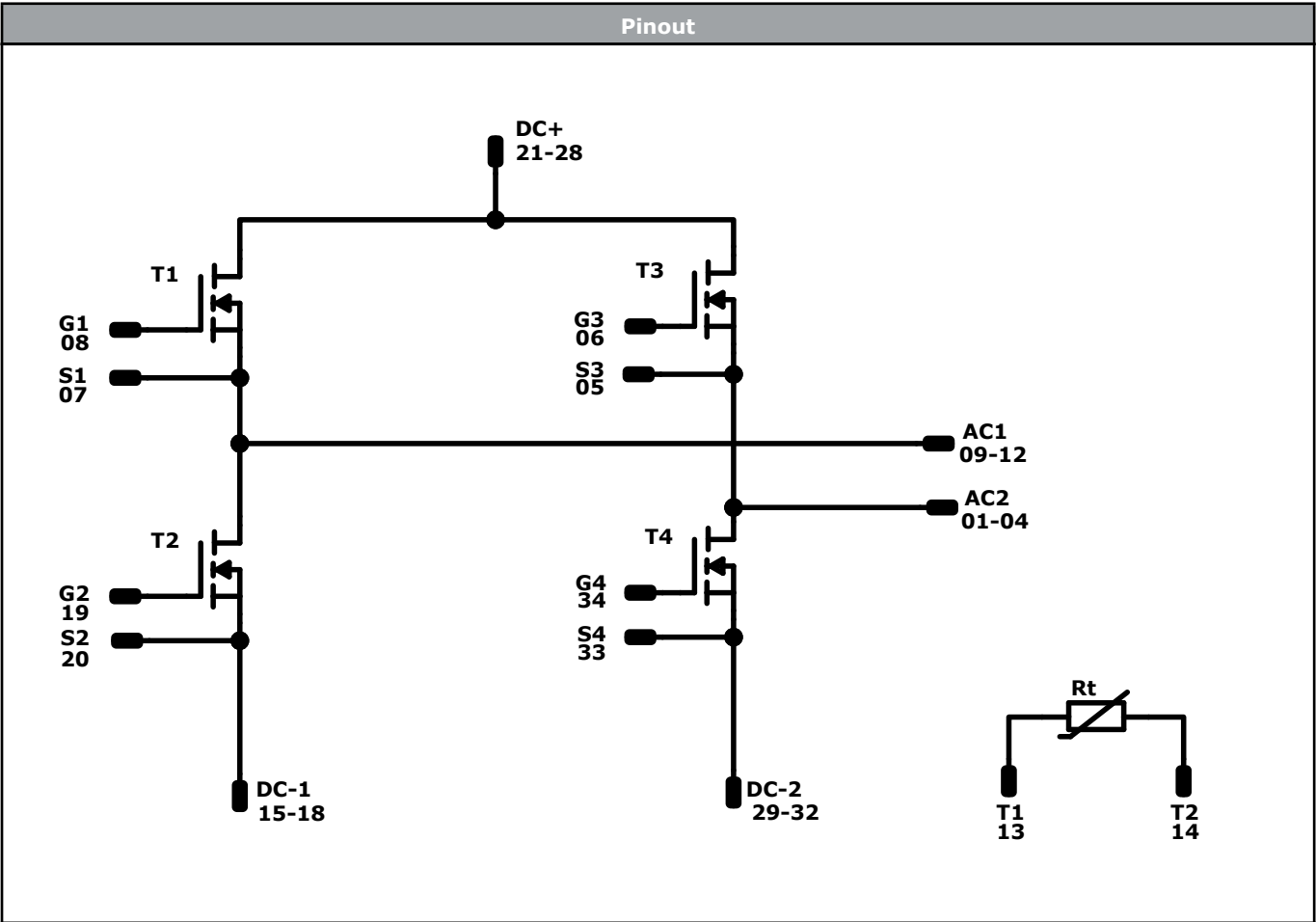
center of press-fit pin head  
pin head type "T": PCB plated-through-hole Ø 1mm <0,09 / -0,06  
for further PCB design rules refer to the latest handling instruction

28,8 ±0,1  
48 ±0,1  
3,2 ±0,05

28,8  
48  
3,2

±0,1  
X  
Y  
%

Tolerance of pins/pinholes: +0,05mm at the end of pins  
Dimension of coordinate axis is only offset without tolerance




Identification					
ID	Component	Voltage	Current	Function	Comment
T2, T1, T4, T3	MOSFET	1200 V	10 mΩ	H-Bridge Switch	
Rt	Thermistor			Thermistor	





Vincotech

**10-EY124PA010MS-LP40F78T**  
datasheet

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-EY124PA010MS-LP40F78T-D1-14	26 Oct. 2025	Initial Release	

**DISCLAIMER**

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

**LIFE SUPPORT POLICY**

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.