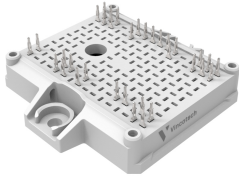
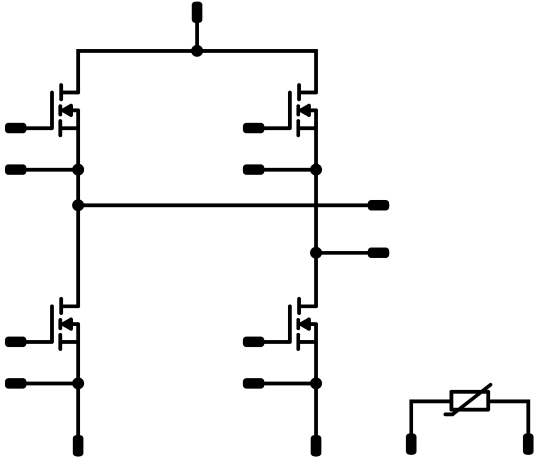




<b>fastPACK E2 SiC</b>		<b>1200 V / 15 mΩ</b>	
<b>Features</b>		<b>flow E2 12 mm housing</b>	
<ul style="list-style-type: none"><li>• Compact and low inductive design</li><li>• High frequency SiC MOSFET</li><li>• Integrated NTC</li></ul>			
<b>Target applications</b>		<b>Schematic</b>	
<ul style="list-style-type: none"><li>• Charging Stations</li><li>• Power Supply</li><li>• Welding &amp; Cutting</li></ul>			
<b>Types</b>			
<ul style="list-style-type: none"><li>• 10-EY124PA015MO-LP49F08T</li></ul>			



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**10-EY124PA015MO-LP49F08T**  
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)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	93	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	720	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	182	W
Gate-source voltage	$V_{GS}$		-5 / 20	V
		dynamic	-15 / 25	
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
Isolation voltage	$V_{isol}$	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			9,14	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		

### H-Bridge Switch

#### Static

Drain-source on-state resistance	$r_{DS(on)}$		20		95	25 125 150		13 17 19	18,67 <sup>(1)</sup>	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,03	25	1,8	2,97	4,3	V
Gate to Source Leakage Current	$I_{GSS}$		20	0		25			3000	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	1200		25			300	μA
Internal gate resistance	$r_g$							0,733		Ω
Gate charge	$Q_g$		-5/20	600	141	25		318		nC
Short-circuit input capacitance	$C_{iss}$	$f = 1$ Mhz	0	800	0	25		5343		pF
Short-circuit output capacitance	$C_{oss}$							420		
Reverse transfer capacitance	$C_{rss}$							36		
Diode forward voltage	$V_{SD}$		0		52,5	25		3,8		V

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,52		K/W
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10-EY124PA015MO-LP49F08T  
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		
<b>Dynamic</b>										
Turn-on delay time	$t_{d(on)}$					25 125 150		19,84 17,76 17,6		ns
Rise time	$t_r$					25 125 150		8,48 7,84 7,68		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		52,32 58,88 60,96		ns
Fall time	$t_f$					25 125 150		17,71 25,75 27,47		ns
Turn-on energy (per pulse)	$E_{on}$					25 125 150		0,727 0,742 0,766		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		0,352 0,411 0,424		mWs
Peak recovery current	$I_{RRM}$					25 125 150		134,91 182,27 196,95		A
Reverse recovery time	$t_{rr}$					25 125 150		20,64 22,74 23,9		ns
Recovered charge	$Q_r$					25 125 150		1,33 2,02 2,51		$\mu$ C
Reverse recovered energy	$E_{rec}$					25 125 150		0,494 0,788 1,07		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		18924 27197 28972		A/ $\mu$ s



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### Characteristic Values

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

### Thermistor

#### Static

Rated resistance	$R$					25		5		k $\Omega$
Deviation of $R_{100}$	$A_{R/R}$	$R_{100} = 493 \Omega$				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.

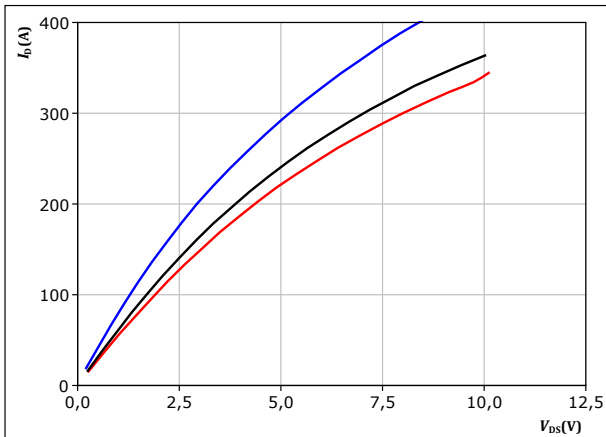


## H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

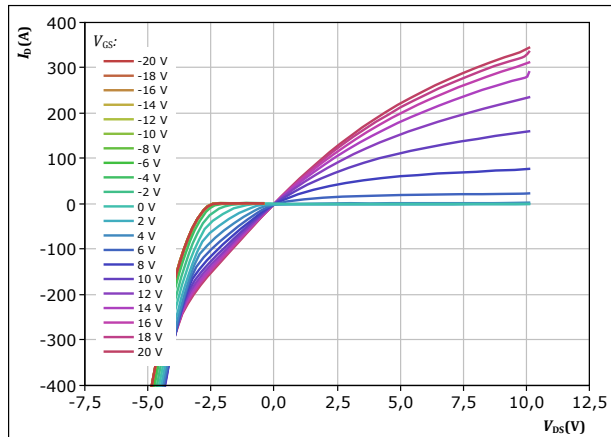


$t_p = 250 \mu s$   
 $V_{GS} = 20 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 2. MOSFET

Typical output characteristics

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

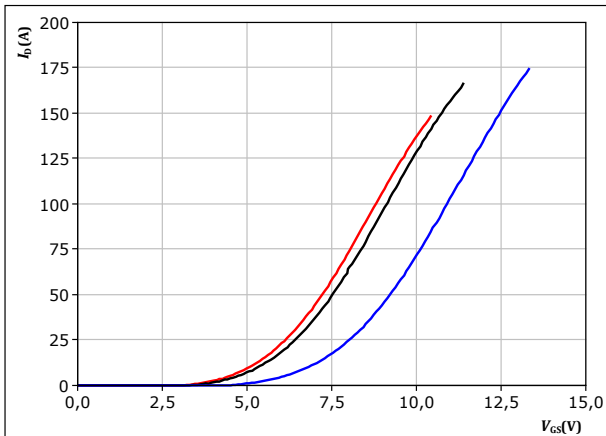


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GS}$  from -20 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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

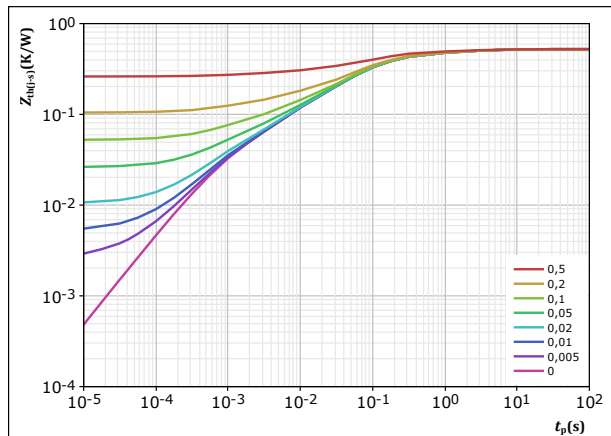


$t_p = 250 \mu s$   
 $V_{DS} = 10 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,523 \text{ K/W}$   
MOSFET thermal model values  

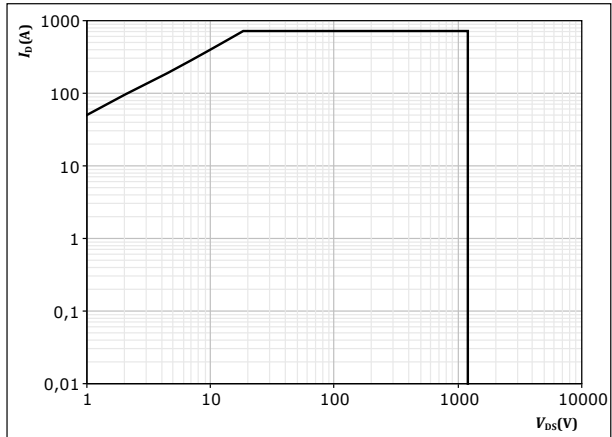
$R$ (K/W)	$\tau$ (s)
4,34E-02	3,63E+00
8,99E-02	5,11E-01
2,87E-01	7,60E-02
7,41E-02	8,05E-03
2,88E-02	8,16E-04



## H-Bridge Switch Characteristics

figure 5. MOSFET

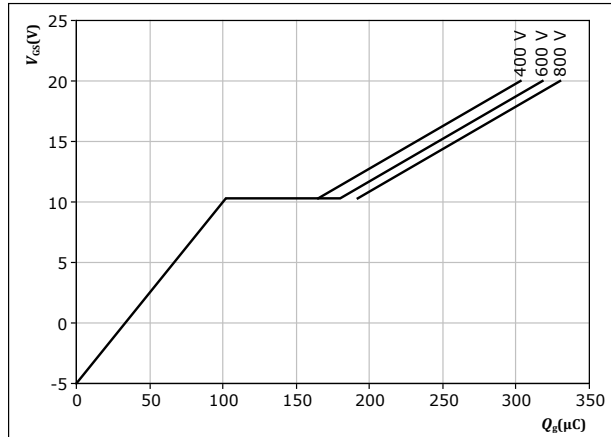
Safe operating area  
 $I_D = f(V_{DS})$



$D =$  single pulse  
 $T_s = 80$  °C  
 $V_{GS} = 20$  V  
 $T_j = T_{jmax}$

figure 6. MOSFET

Gate voltage vs gate charge  
 $V_{GS} = f(Q_g)$



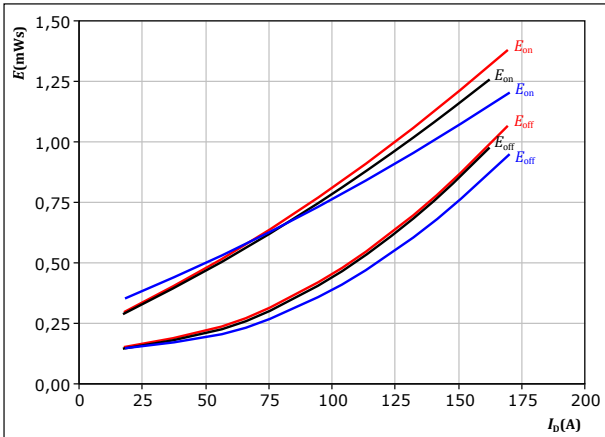
$I_D = 35$  A  
 $T_j = 25$  °C



## H-Bridge Switching Characteristics

**figure 7.** MOSFET

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

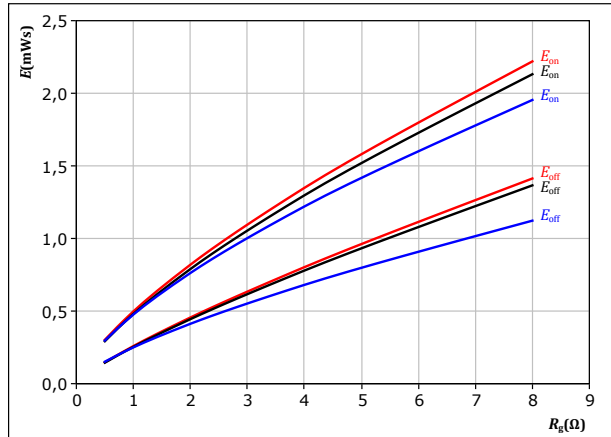


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-2/20	V		— 125 °C
$R_{gon} =$	2	$\Omega$		— 150 °C
$R_{goff} =$	2	$\Omega$		

**figure 8.** MOSFET

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

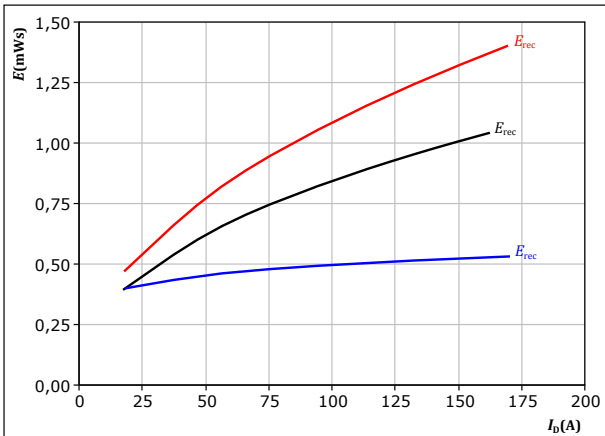


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-2/20	V		— 125 °C
$I_D =$	95	A		— 150 °C

**figure 9.** MOSFET

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

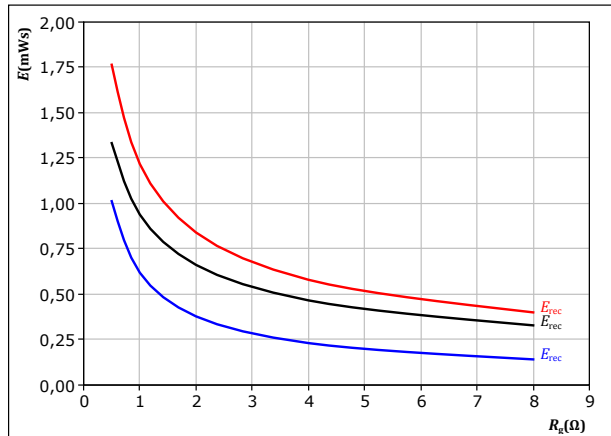


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-2/20	V		— 125 °C
$R_{gon} =$	2	$\Omega$		— 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
$V_{GS} =$	-2/20	V		— 125 °C
$I_D =$	95	A		— 150 °C

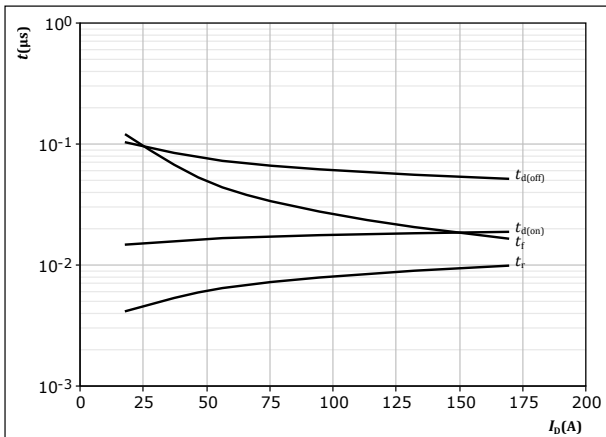




## H-Bridge Switching Characteristics

**figure 11.** MOSFET

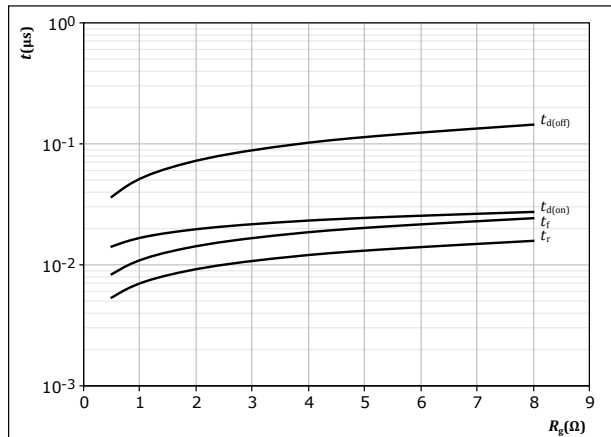
Typical switching times as a function of drain current  
 $t = f(I_D)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -2/20 \text{ V}$   
 $R_{gon} = 2 \text{ } \Omega$   
 $R_{goff} = 2 \text{ } \Omega$

**figure 12.** MOSFET

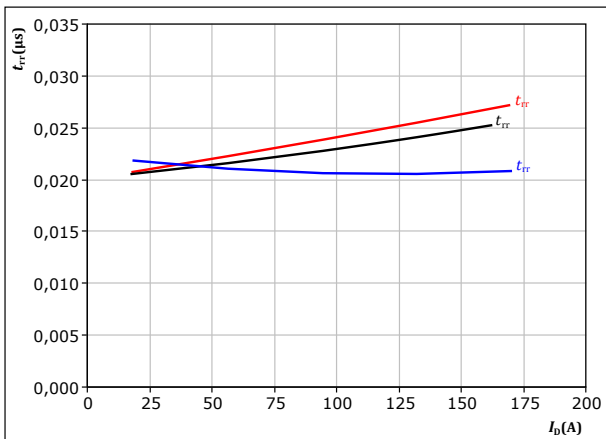
Typical switching times as a function of gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -2/20 \text{ V}$   
 $I_D = 95 \text{ A}$

**figure 13.** MOSFET

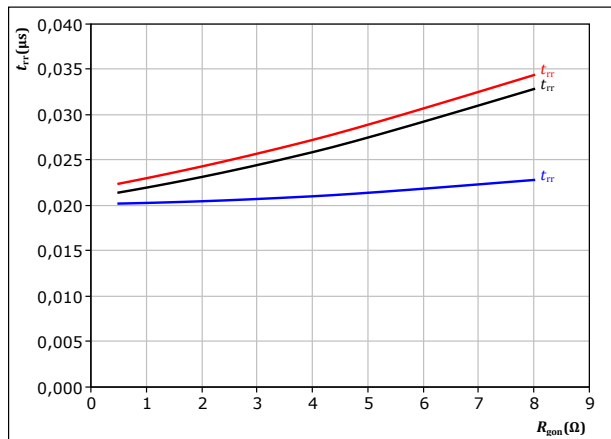
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



At  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -2/20 \text{ V}$   
 $R_{gon} = 2 \text{ } \Omega$   
 $T_j:$  — 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  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -2/20 \text{ V}$   
 $I_D = 95 \text{ A}$   
 $T_j:$  — 25 °C  
— 125 °C  
— 150 °C

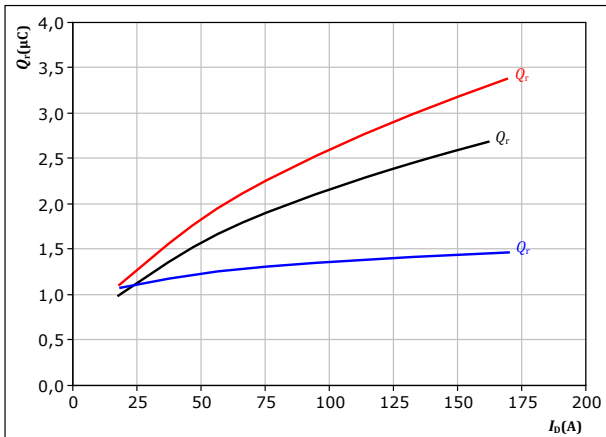


## H-Bridge Switching Characteristics

**figure 15.** MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



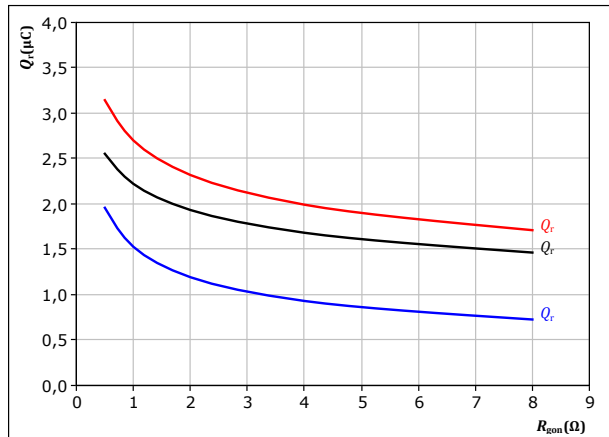
At  $V_{DS} = 600$  V  
 $V_{GS} = -2/20$  V  
 $R_{gson} = 2$   $\Omega$

$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C

**figure 16.** MOSFET

Typical recovered charge as a function of turn on gate resistor

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



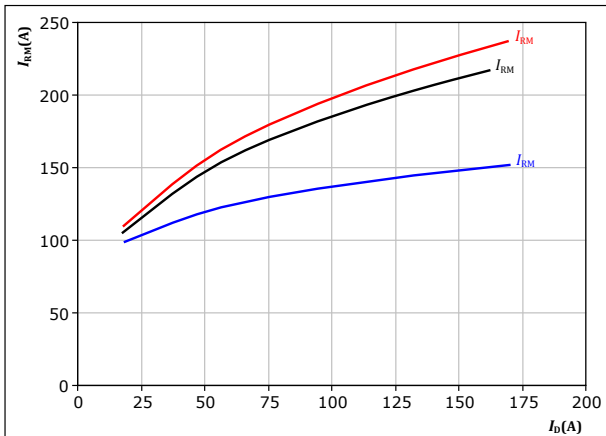
At  $V_{DS} = 600$  V  
 $V_{GS} = -2/20$  V  
 $I_D = 95$  A

$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C

**figure 17.** MOSFET

Typical peak reverse recovery current as a function of drain current

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



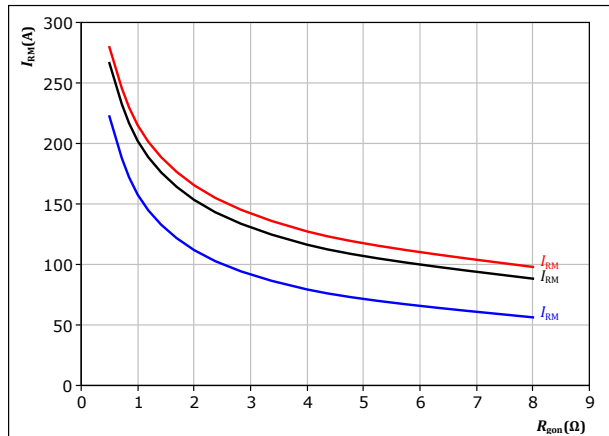
At  $V_{DS} = 600$  V  
 $V_{GS} = -2/20$  V  
 $R_{gson} = 2$   $\Omega$

$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C

**figure 18.** MOSFET

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

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



At  $V_{DS} = 600$  V  
 $V_{GS} = -2/20$  V  
 $I_D = 95$  A

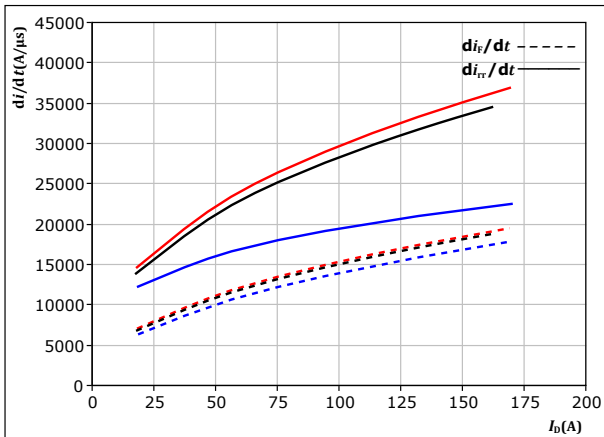
$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C



## H-Bridge Switching Characteristics

**figure 19.** MOSFET

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

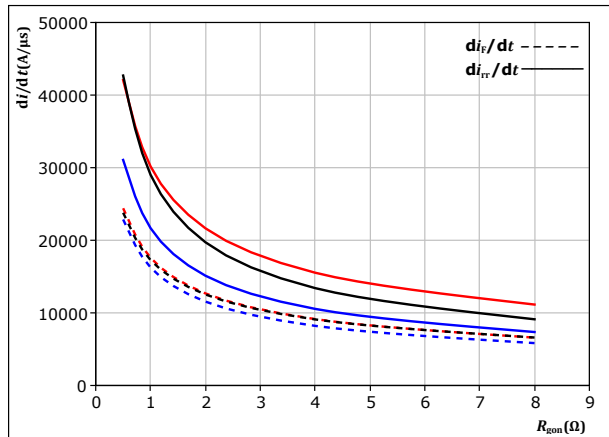


At  $V_{DS} = 600$  V  
 $V_{GS} = -2/20$  V  
 $R_{g(on)} = 2$  Ω

$T_j$ : 25 °C (blue)  
 125 °C (black)  
 150 °C (red)

**figure 20.** MOSFET

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



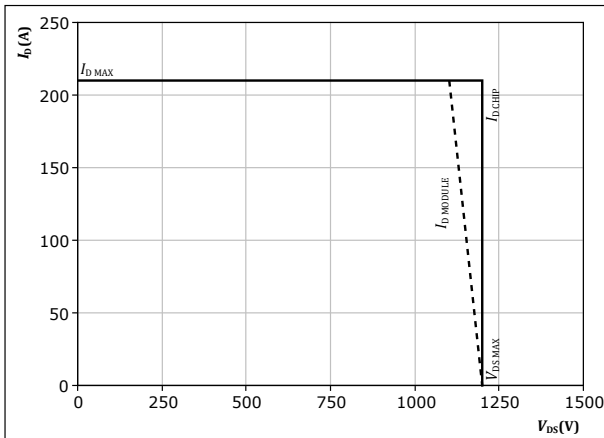
At  $V_{DS} = 600$  V  
 $V_{GS} = -2/20$  V  
 $I_D = 95$  A

$T_j$ : 25 °C (blue)  
 125 °C (black)  
 150 °C (red)

**figure 21.** MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



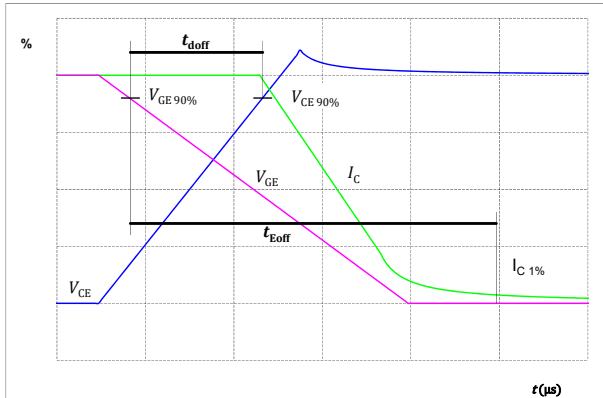
At  $T_j = 150$  °C  
 $R_{g(on)} = 2$  Ω  
 $R_{g(off)} = 2$  Ω



## H-Bridge Switching Definitions

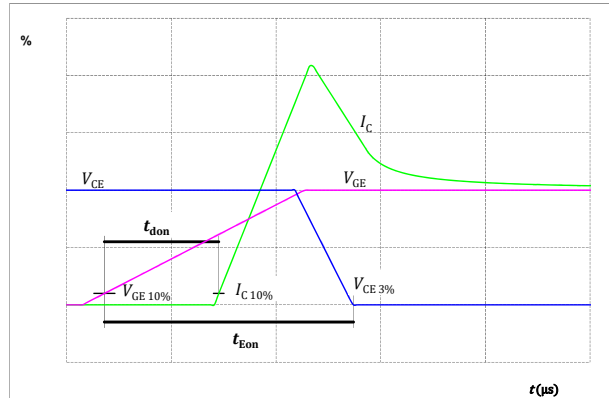
**figure 22.** MOSFET

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



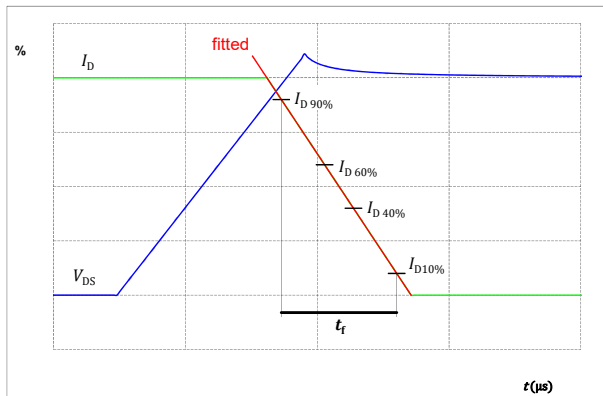
**figure 23.** MOSFET

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



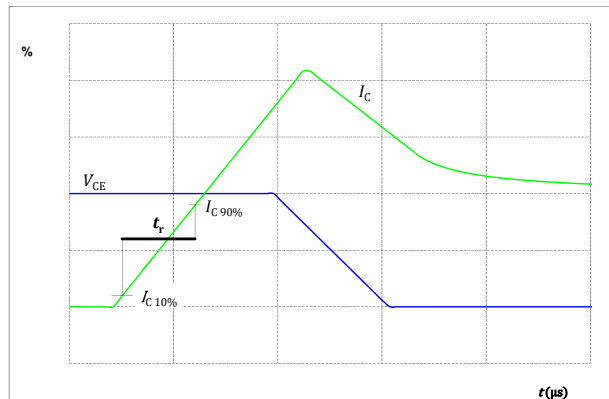
**figure 24.** MOSFET

Turn-off Switching Waveforms & definition of  $t_f$



**figure 25.** MOSFET

Turn-on Switching Waveforms & definition of  $t_r$





## H-Bridge Switching Definitions

figure 26. FWD

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

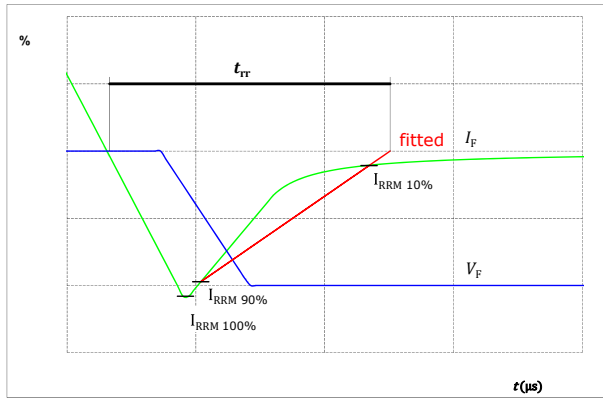


figure 27. FWD

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

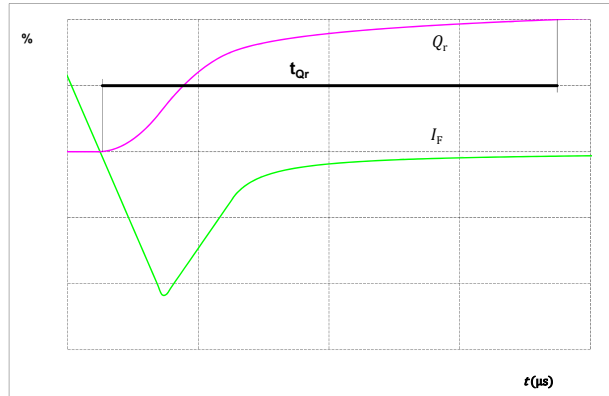
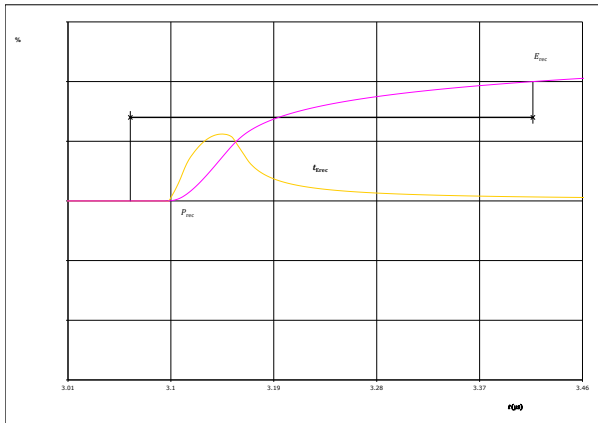


figure 28. FWD

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






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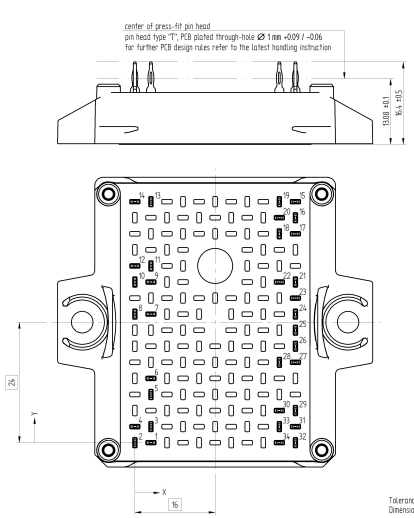
**10-EY124PA015MO-LP49F08T**  
datasheet

Ordering Code	
<b>Version</b>	<b>Ordering Code</b>
Without thermal paste	10-EY124PA015MO-LP49F08T
With thermal paste	10-EY124PA015MO-LP49F08T-/3/

Marking						
	<b>Text</b>	<b>Name</b> NN-NNNNNNNNNNNNNN- TTTTTWWYY UL VIN LLLLL SSSS	<b>Date code</b> WWYY	<b>UL &amp; VIN</b> UL VIN	<b>Lot</b> LLLLL	<b>Serial</b> SSSS
	<b>Datamatrix</b>	<b>Type&amp;Ver</b> TTTTTTTV	<b>Lot number</b> LLLLL	<b>Serial</b> SSSS	<b>Date code</b> 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

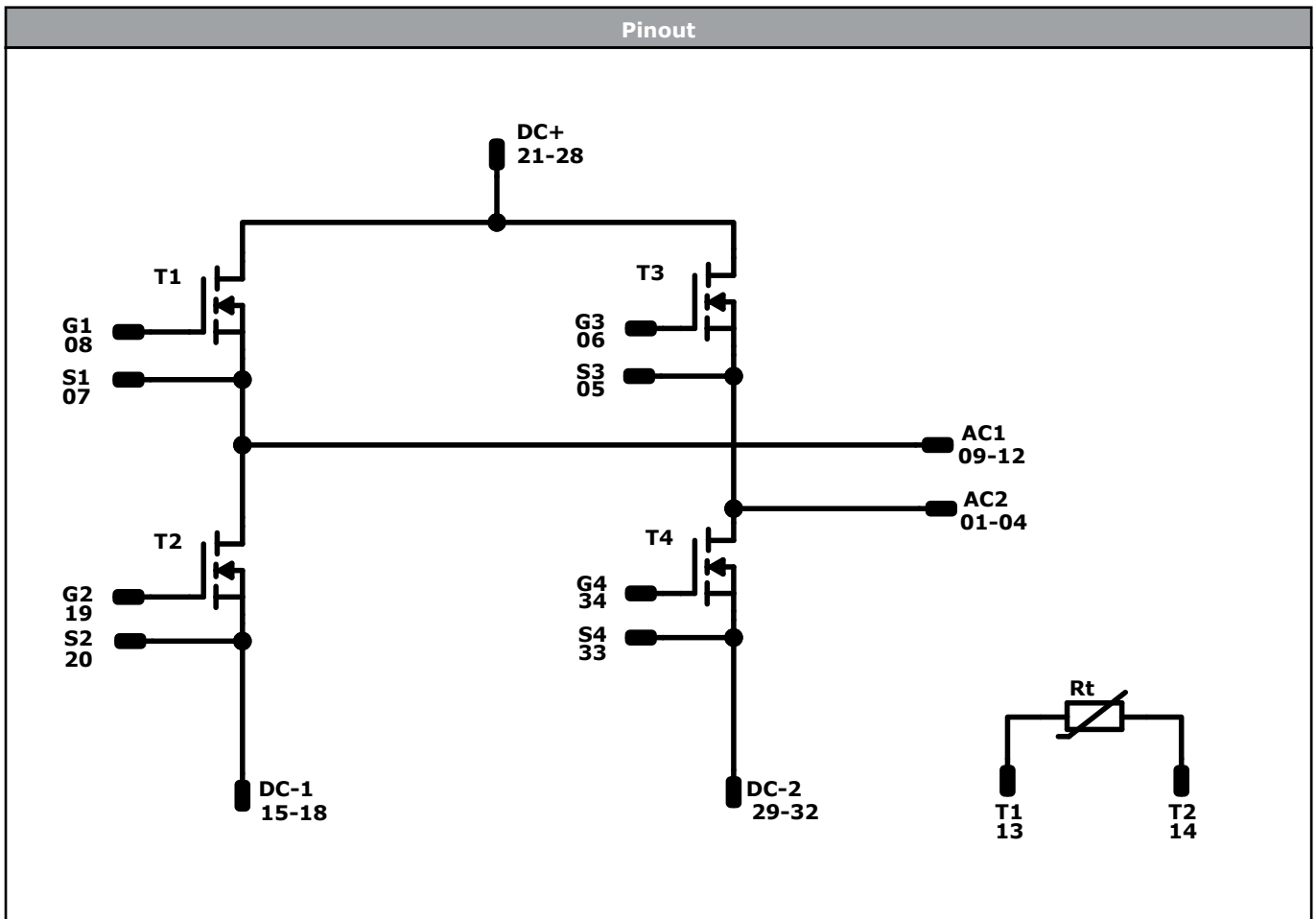


center of press-fit pin head  
pin head type "1", PCB plated through-hole  $\varnothing 1\text{mm} \pm 0,09 \text{ mm}$   
for further PCB design rules refer to the latest handling instruction

Tolerance of pinposition:  $\pm 0,4\text{mm}$  at the end of pins  
Dimension of coordinate axis is only offset without tolerance



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T2, T1, T4, T3	MOSFET	1200 V	13 mΩ	H-Bridge Switch	
Rt	Thermistor			Thermistor	




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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website. 

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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.