



fastPACK E2 SiC

1200 V / 80 A

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: AlN
- 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

Extra features

- AlN Substrate for enhanced thermal performance

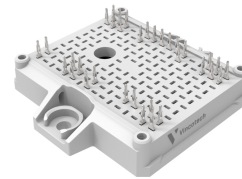
Target applications

- Charging Stations
- Power Supply
- UPS

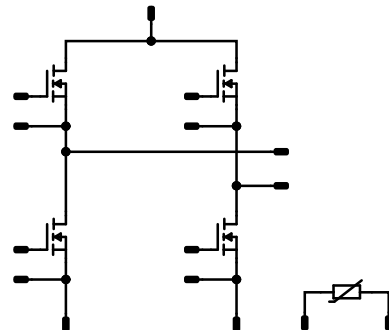
Types

- 10-EY124PA016ME01-LP49F16T

flow E2 12 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
H-Bridge Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	91	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	240	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	201	W
Gate-source voltage	V_{GSS}		-4 / 15	V
		dynamic	-8 / 19	
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			>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	$r_{DS(on)}$		15		80	25 125 150	11,2	17,1 21 23,2	20,8 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$	0		0,023	25	1,8	2,5	3,6	V
Gate to Source Leakage Current	I_{GSS}		15	0		25		20	500	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		2	38	μA
Internal gate resistance	r_g							0,85		Ω
Gate charge	Q_g		-4/15	800	80	25		236		nC
Short-circuit input capacitance	C_{iss}	$f = 100$ kHz	0	1000	0	25		6714		pF
Short-circuit output capacitance	C_{oss}							258		
Reverse transfer capacitance	C_{rss}							16		
Diode forward voltage	V_{SD}		0		40	25		4,6		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,47		K/W
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10-EY124PA016ME01-LP49F16T
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	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-4/15	600	64	25		19,84		ns
						125		18,88		
						150		18,56		
Rise time	t_r					25		6,72		
						125		6,4		ns
						150		6,4		
Turn-off delay time	$t_{d(off)}$					25		42,24		
						125		44,8		ns
						150		45,76		
Fall time	t_f					25		9,4		
						125		9,22		ns
						150		9,44		
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD}=0,776 \mu C$ $Q_{tFWD}=1,06 \mu C$ $Q_{rFWD}=1,17 \mu C$				25		0,365		mWs
						125		0,35		
						150		0,366		
Turn-off energy (per pulse)	E_{off}					25		0,125		
						125		0,118		mWs
						150		0,129		
Peak recovery current	I_{RRM}					25		95,84		A
						125		128,28		
						150		139,79		
Reverse recovery time	t_{rr}					25		15,39		
						125		17,51		ns
						150		18,71		
Recovered charge	Q_r	$di/dt=12690 A/\mu s$ $di/dt=13506 A/\mu s$ $di/dt=13627 A/\mu s$				25		0,776		μC
						125		1,06		
						150		1,17		
Reverse recovered energy	E_{rec}					25		0,387		
						125		0,544		mWs
						150		0,608		
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25		17483		$A/\mu s$
						125		27449		
						150		29479		



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit	
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	V_F [V]	I_D [A]	I_C [A]	I_F [A]		T_j [°C]

Thermistor

Static

Rated resistance	R					25		5		kΩ
Deviation of R100	$A_{R/R}$	$R_{100} = 493 \Omega$				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	

⁽¹⁾ Value at chip level

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

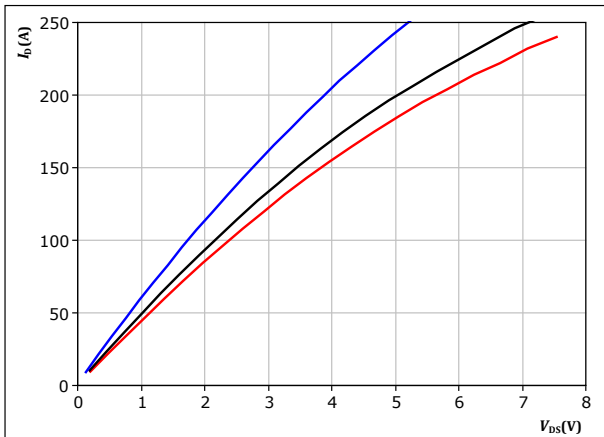


H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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



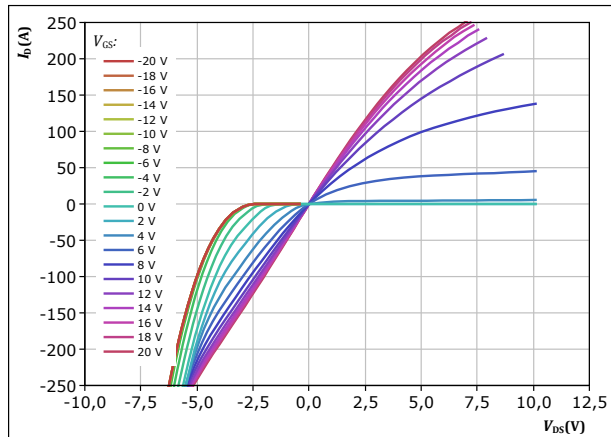
$t_p = 250 \mu s$
 $V_{GS} = 14 V$

T_j : 25 °C
125 °C
150 °C

figure 2. MOSFET

Typical output characteristics

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

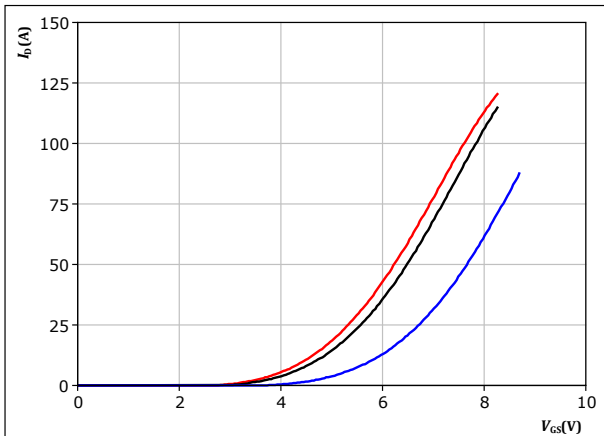


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GS} from -20 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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



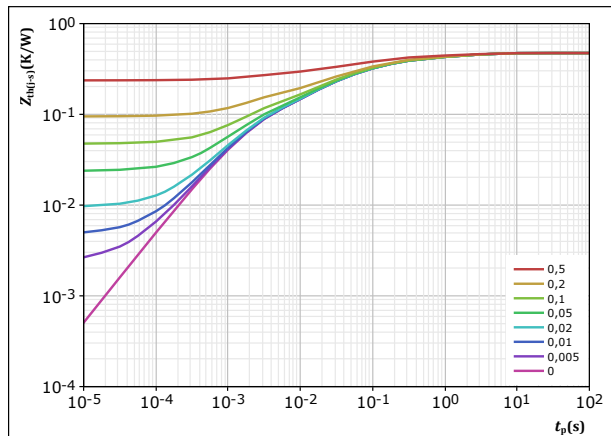
$t_p = 250 \mu s$
 $V_{DS} = 10 V$

T_j : 25 °C
125 °C
150 °C

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,474 \text{ K/W}$

MOSFET thermal model values

R (K/W)	τ (s)
5,06E-02	2,67E+00
5,76E-02	5,55E-01
1,56E-01	9,62E-02
1,33E-01	1,90E-02
7,64E-02	1,82E-03

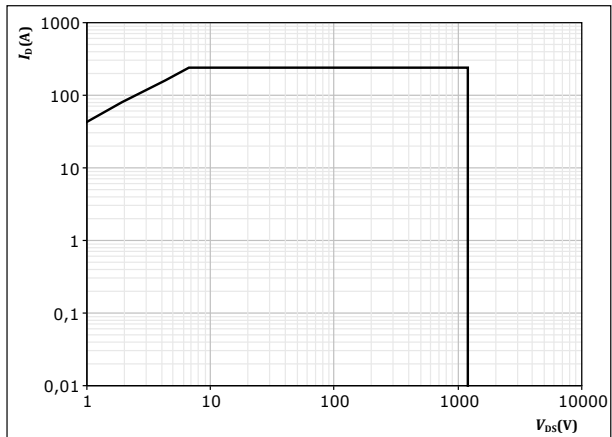


H-Bridge Switch Characteristics

figure 5. MOSFET

Safe operating area

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



$D =$ single pulse

$T_s = 80$ °C

$V_{GS} = 14$ V

$T_j = T_{jmax}$

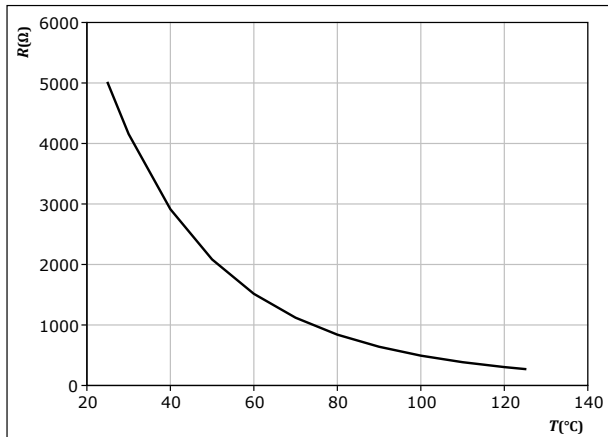


Thermistor Characteristics

figure 6. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

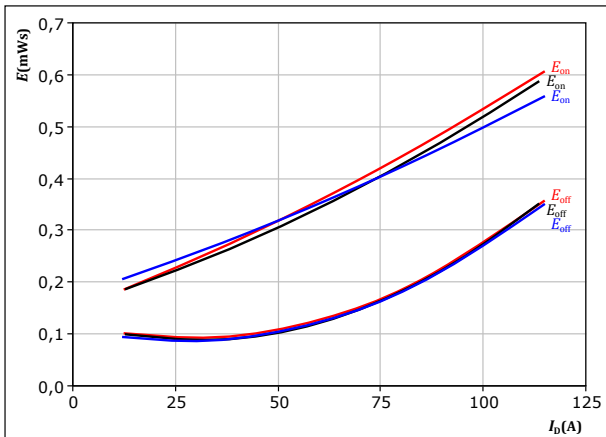




H-Bridge Switching Characteristics

figure 7. MOSFET

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

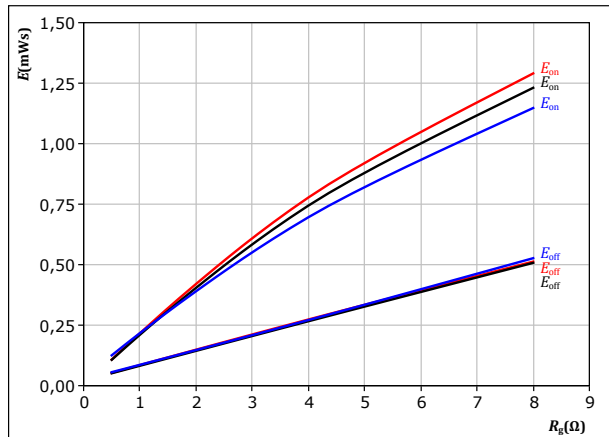


With an inductive load at

$V_{DS} = 600$ V	$T_j: 25$ °C
$V_{GS} = -4/15$ V	$T_j: 125$ °C
$R_{gon} = 2$ Ω	$T_j: 150$ °C
$R_{goff} = 2$ Ω	

figure 8. MOSFET

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

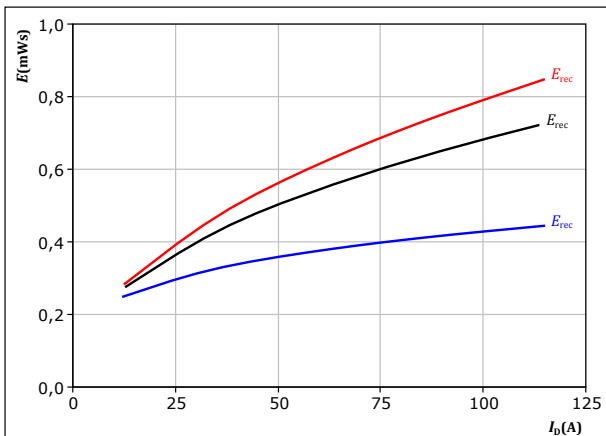


With an inductive load at

$V_{DS} = 600$ V	$T_j: 25$ °C
$V_{GS} = -4/15$ V	$T_j: 125$ °C
$I_D = 64$ A	$T_j: 150$ °C

figure 9. MOSFET

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

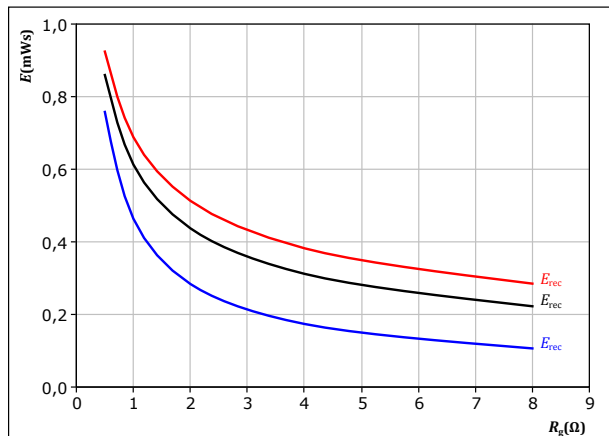


With an inductive load at

$V_{DS} = 600$ V	$T_j: 25$ °C
$V_{GS} = -4/15$ V	$T_j: 125$ °C
$R_{gon} = 2$ Ω	$T_j: 150$ °C

figure 10. 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

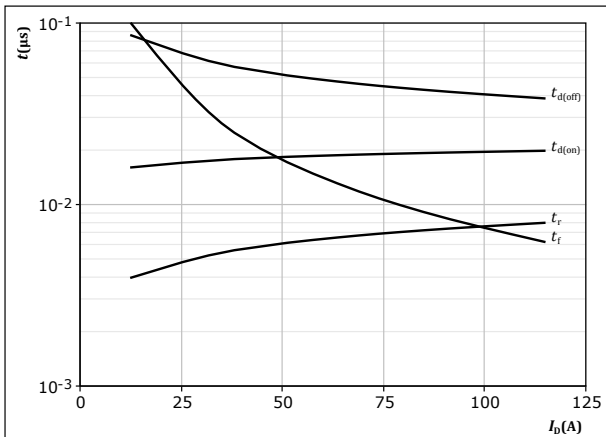
$V_{DS} = 600$ V	$T_j: 25$ °C
$V_{GS} = -4/15$ V	$T_j: 125$ °C
$I_D = 64$ A	$T_j: 150$ °C



H-Bridge Switching Characteristics

figure 11. MOSFET

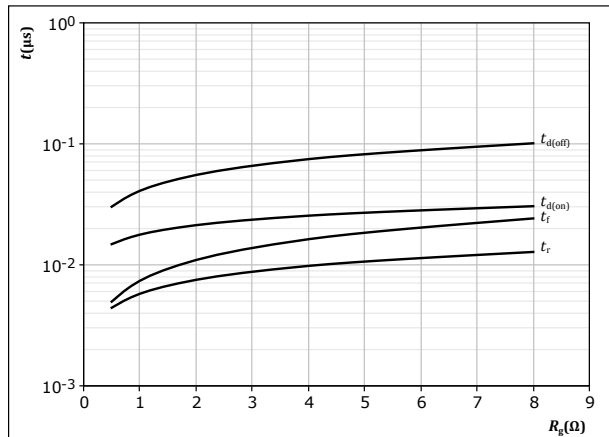
Typical switching times as a function of drain current
 $t = f(I_D)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{DS} = 600 \text{ V}$
 $V_{GS} = -4/15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$

figure 12. MOSFET

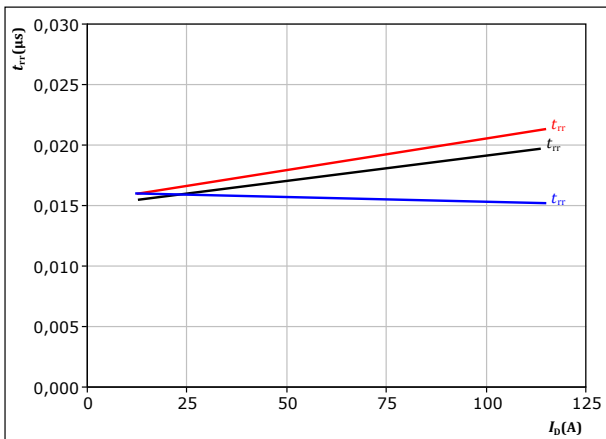
Typical switching times as a function of MOSFET turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{DS} = 600 \text{ V}$
 $V_{GS} = -4/15 \text{ V}$
 $I_D = 64 \text{ A}$

figure 13. MOSFET

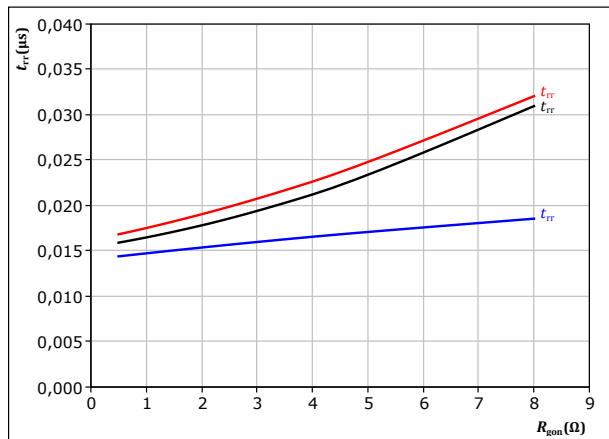
Typical reverse recovery time as a function of drain current
 $t_{rr} = f(I_D)$



At $V_{DS} = 600 \text{ V}$
 $V_{GS} = -4/15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 14. MOSFET

Typical reverse recovery time as a function of MOSFET turn on gate resistor
 $t_{rr} = f(R_{gon})$



At $V_{DS} = 600 \text{ V}$
 $V_{GS} = -4/15 \text{ V}$
 $I_D = 64 \text{ A}$
 T_j : — 25 °C
 — 125 °C
 — 150 °C

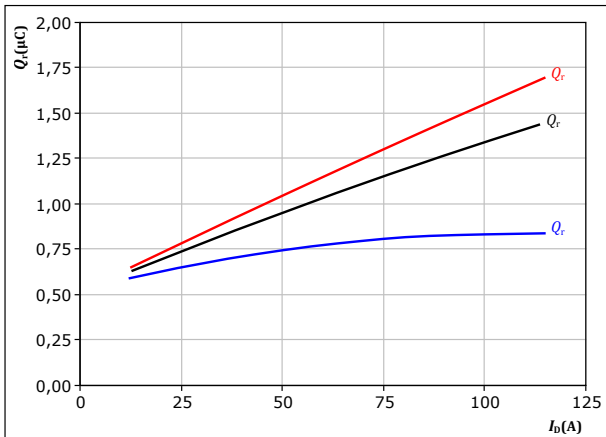


H-Bridge Switching Characteristics

figure 15. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



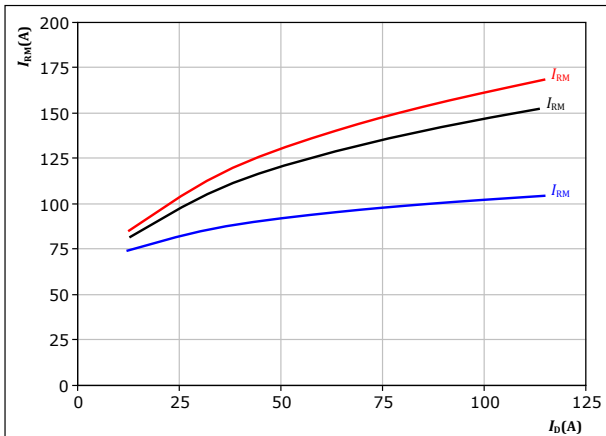
At $V_{DS} = 600$ V
 $V_{GS} = -4/15$ V
 $R_{gon} = 2$ Ω

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

figure 17. MOSFET

Typical peak reverse recovery current as a function of drain current

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



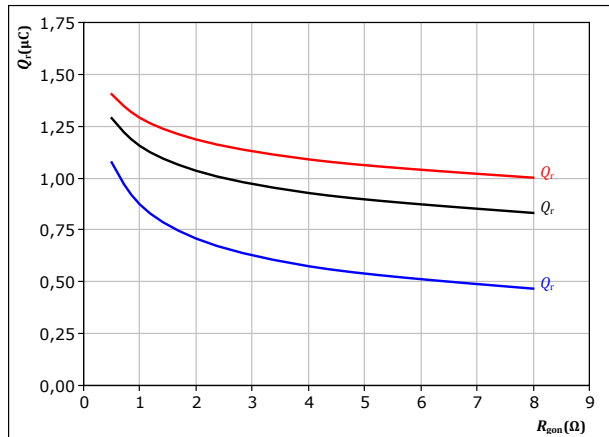
At $V_{DS} = 600$ V
 $V_{GS} = -4/15$ V
 $R_{gon} = 2$ Ω

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

figure 16. MOSFET

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

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



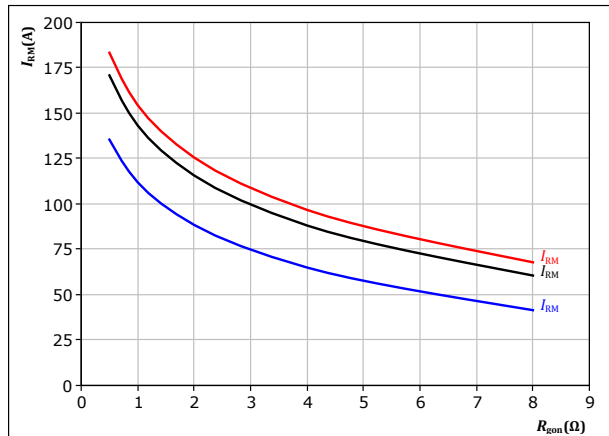
At $V_{DS} = 600$ V
 $V_{GS} = -4/15$ V
 $I_D = 64$ A

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

figure 18. 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
 $V_{GS} = -4/15$ V
 $I_D = 64$ A

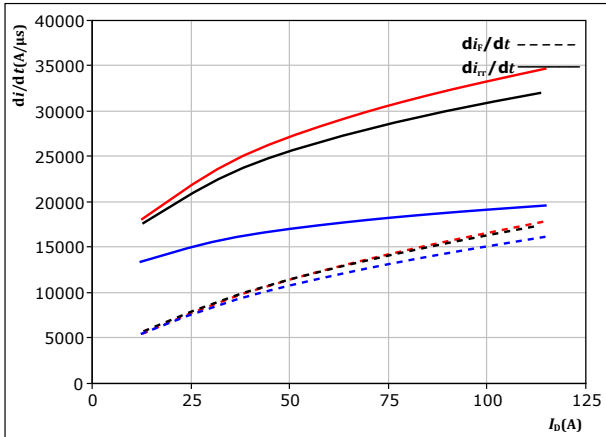
T_j : 25 °C (blue)
 125 °C (black)
 150 °C (red)



H-Bridge Switching Characteristics

figure 19. MOSFET

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

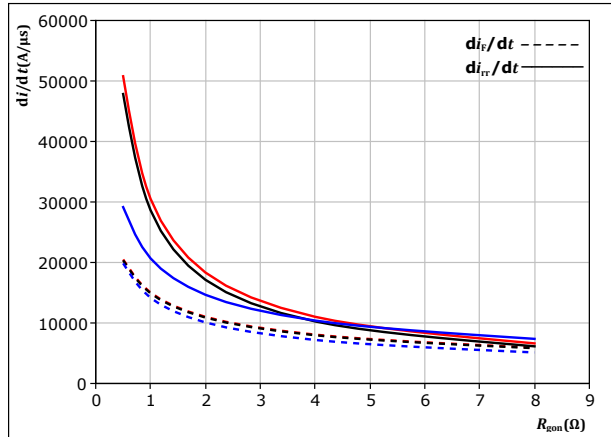


At $V_{DS} = 600$ V
 $V_{GS} = -4/15$ V
 $R_{g(on)} = 2$ Ω

$T_j = 25$ °C
 $T_j = 125$ °C
 $T_j = 150$ °C

figure 20. MOSFET

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



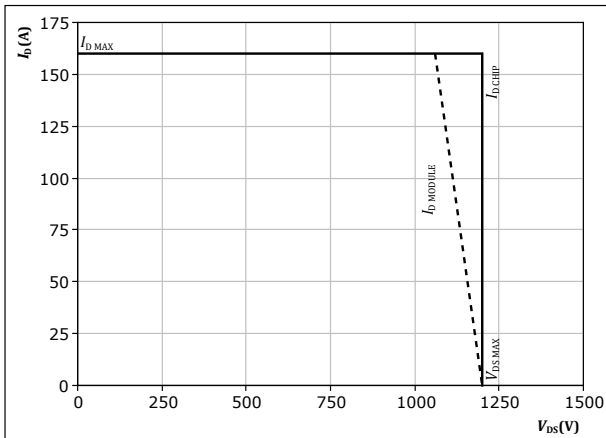
At $V_{DS} = 600$ V
 $V_{GS} = -4/15$ V
 $I_D = 64$ A

$T_j = 25$ °C
 $T_j = 125$ °C
 $T_j = 150$ °C

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})

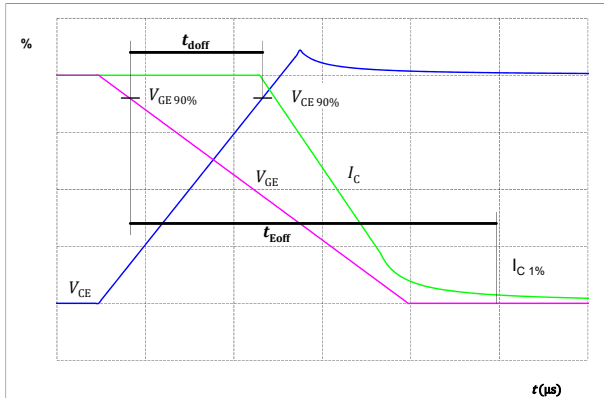


figure 24. MOSFET

Turn-off Switching Waveforms & definition of t_f

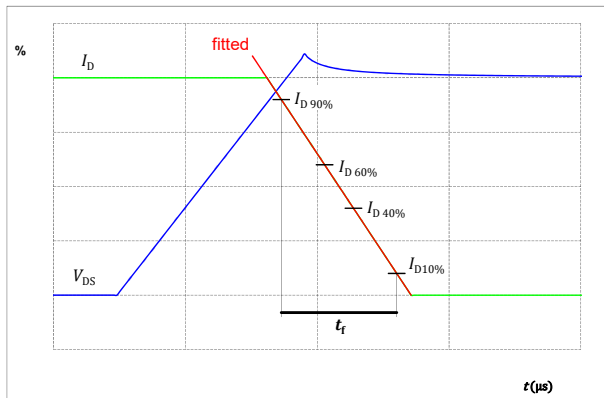


figure 23. MOSFET

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

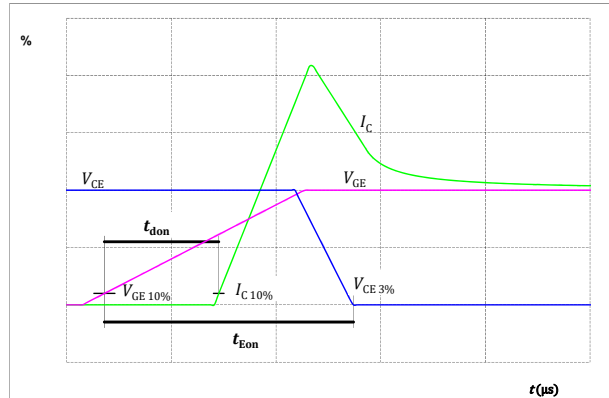
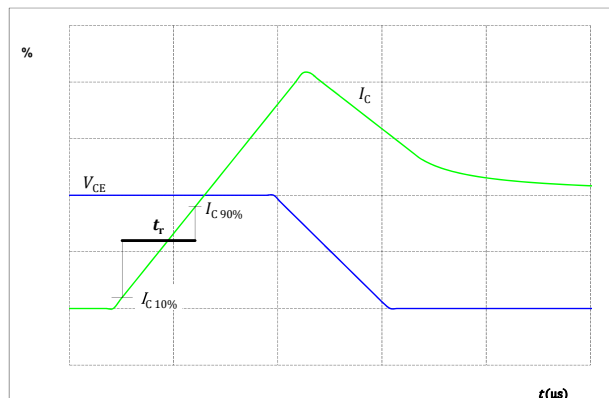


figure 25. MOSFET

Turn-on Switching Waveforms & definition of t_r





H-Bridge Switching Definitions

figure 26. FWD

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

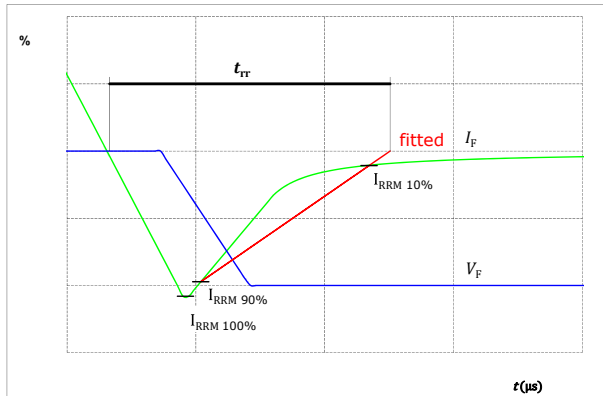


figure 27. FWD

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

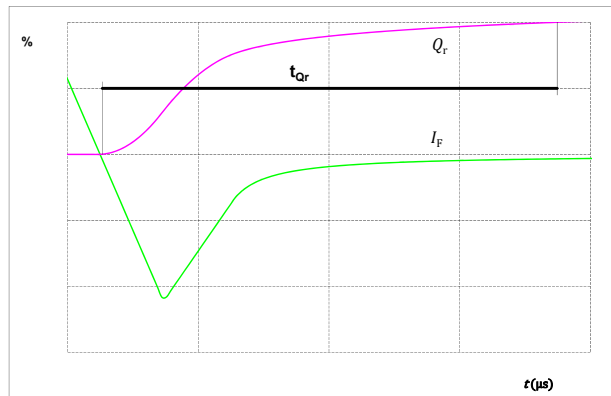
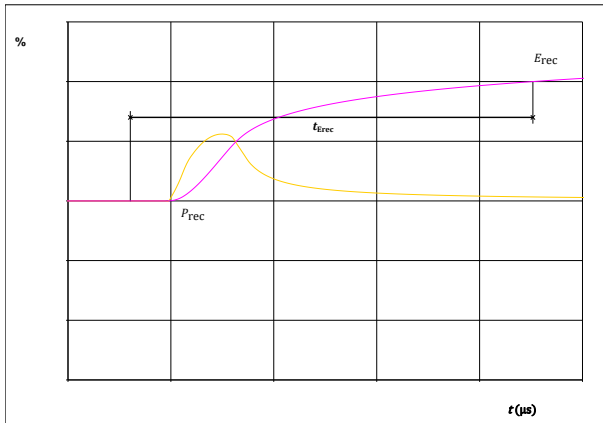


figure 28. FWD

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





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10-EY124PA016ME01-LP49F16T
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-EY124PA016ME01-LP49F16T
With thermal paste (3,4 W/mK, PSX-P7)	10-EY124PA016ME01-LP49F16T-/3/

Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTTTV	Lot number LLLLL	Serial SSSS	Date code WWYY	

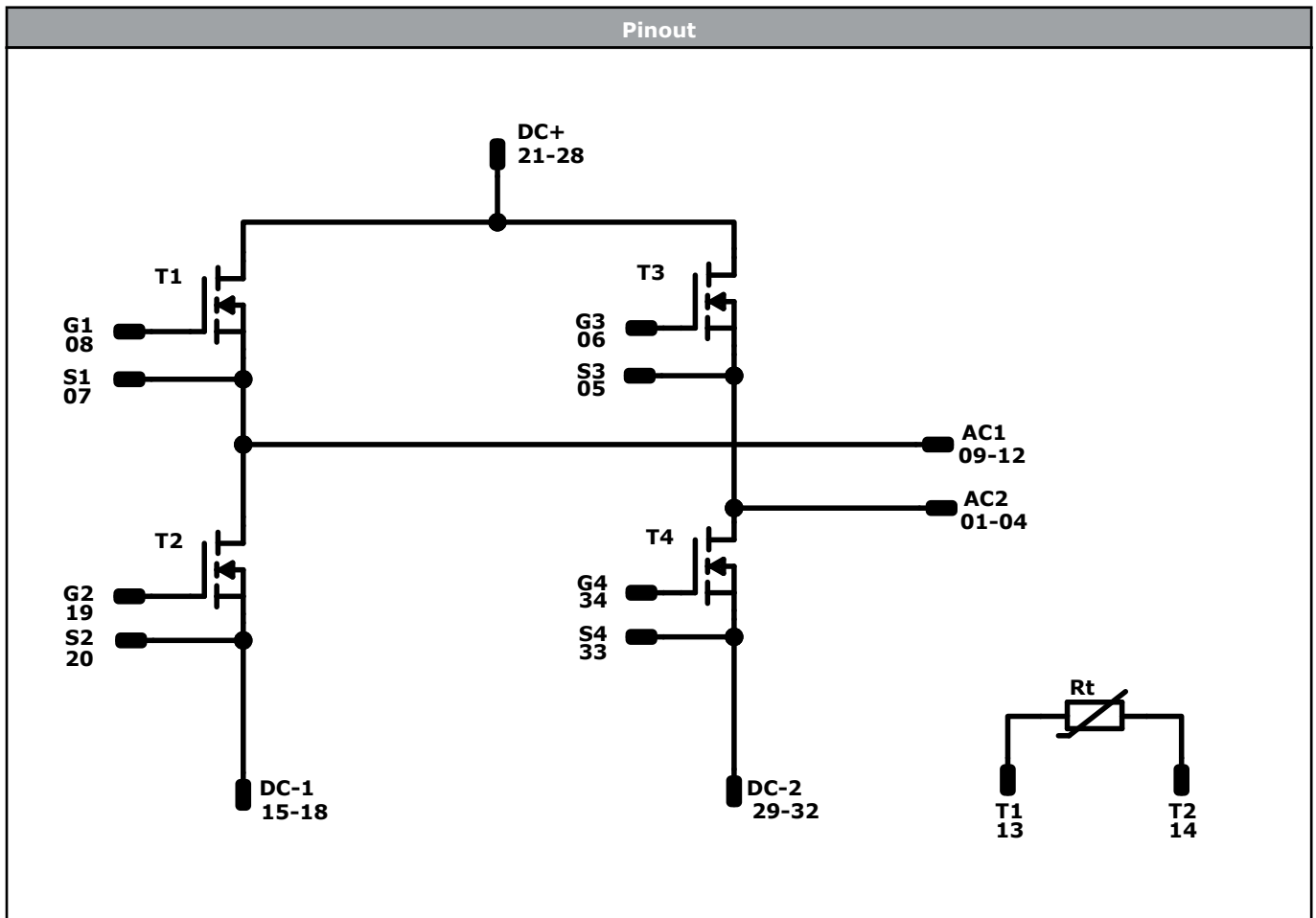
Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	3,2	0	AC2	
2	0	0	AC2	
3	3,2	3,2	AC2	
4	0	3,2	AC2	
5	3,2	9,6	S3	
6	3,2	12,8	G3	
7	3,2	25,6	S1	
8	0	25,6	G1	
9	3,2	32	AC1	
10	0	32	AC1	
11	3,2	35,2	AC1	
12	0	35,2	AC1	
13	3,2	48	T1	
14	0	48	T2	
15	32	48	DC-1	
16	32	44,8	DC-1	
17	32	41,6	DC-1	
18	28,8	41,6	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	

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



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14	MOSFET	1200 V	16 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. 

Document No.:	Date:	Modification:	Pages
10-EY124PA016ME01-LP49F16T-D1-14	5 May. 2023		

DISCLAIMER

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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.