



Vincotech

10-PZ124PA075ME03-L627F28Y

datasheet

fastPACK 0 SiC

1200 V / 75 mΩ

Features

- Compact and low inductive design
- High frequency SiC MOSFET
- High power low inductive package
- Integrated DC-capacitor
- Integrated NTC

Target applications

- Charging Stations
- Power Supply

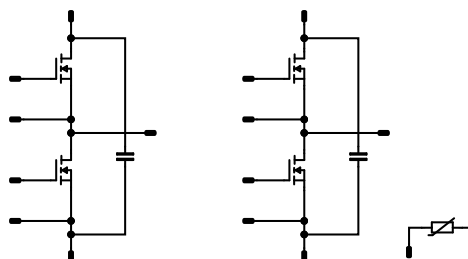
Types

- 10-PZ124PA075ME03-L627F28Y

flow 0 12 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Half-Bridge Switch				
Drain-source voltage	V_{DS}		1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	20	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	80	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	52	W
Gate-source voltage	V_{GS}		-4 / 15	V
		dynamic	-8 / 19	
Maximum Junction Temperature	T_{jmax}		175	°C

Capacitor (DC)

Maximum DC voltage	V_{MAX}		1000	V
Operation Temperature	T_{op}		0 ... 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* $t_p = 2\text{ s}$	6000	V
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			9,15	mm
Comparative Tracking Index	CTI		≥ 200	

*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	

Half-Bridge Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		15		20	25 125 150		82 105 117	90 ⁽¹⁾	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,005	25	1,7	2,5	4	V
Gate to Source Leakage Current	I_{GSS}		15	0		25		10	250	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		1	100	μA
Internal gate resistance	r_g							10,5		Ω
Gate charge	Q_g		-4/15	800	20	25		54		nC
Short-circuit input capacitance	C_{iss}	$f = 1 \text{ Mhz}$	0	1000	0	25		1350		pF
Short-circuit output capacitance	C_{oss}							58		
Reverse transfer capacitance	C_{rss}							3		
Diode forward voltage	V_{SD}		0		10	25		4,5		V

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{\text{paste}} = 3,4 \text{ W/mK}$ (PSX)						1,84		K/W
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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		
Dynamic											
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$	0/15	600	16	25		12,48		ns	
						125		11,2			
						150		10,88			
Rise time	t_r					25		8,32			ns
						125		7,04			
						150		7,36			
Turn-off delay time	$t_{d(off)}$					25		66,24			ns
						125		77,12			
						150		80,64			
Fall time	t_f					25		23,17			ns
						125		22,22			
						150		21,04			
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD}=0,174 \mu C$ $Q_{tFWD}=0,249 \mu C$ $Q_{tFWD}=0,301 \mu C$	25		0,282			mWs			
			125		0,295						
			150		0,315						
Turn-off energy (per pulse)	E_{off}		25		0,058			mWs			
			125		0,069						
			150		0,074						
Peak recovery current	I_{RRM}	$di/dt=1991 A/\mu s$ $di/dt=2360 A/\mu s$ $di/dt=2533 A/\mu s$	25		14,38			A			
			125		16,6						
			150		18,32						
Reverse recovery time	t_{rr}		25		29,91			ns			
			125		27,26						
			150		26,97						
Recovered charge	Q_r		25		0,174			μC			
			125		0,249						
			150		0,301						
Reverse recovered energy	E_{rec}		25		0,031			mWs			
			125		0,054						
			150		0,068						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$	25		1936			A/ μs				
		125		500,51							
		150		1838							



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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	

Capacitor (DC)

Static

Capacitance	C	DC bias voltage = 0 V				25		2,2		nF
Tolerance							-5		5	%
Dissipation factor		$f = 1$ kHz				25		1,5		%

Thermistor

Static

Rated resistance	R					25		22		k Ω
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P							5		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.



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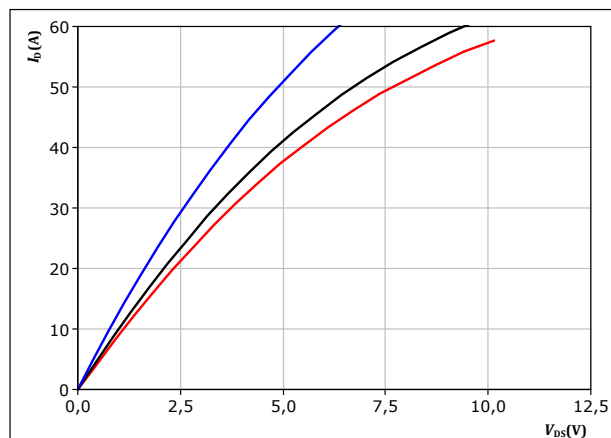
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Half-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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



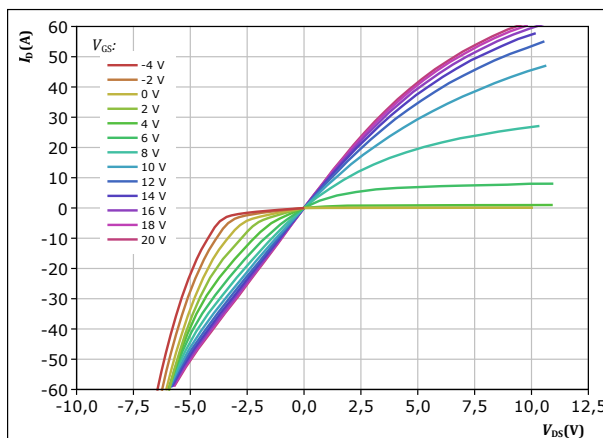
$t_p = 250 \mu s$
 $V_{GS} = 14 V$

T_j : 25 °C
125 °C
150 °C

figure 2. MOSFET

Typical output characteristics

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

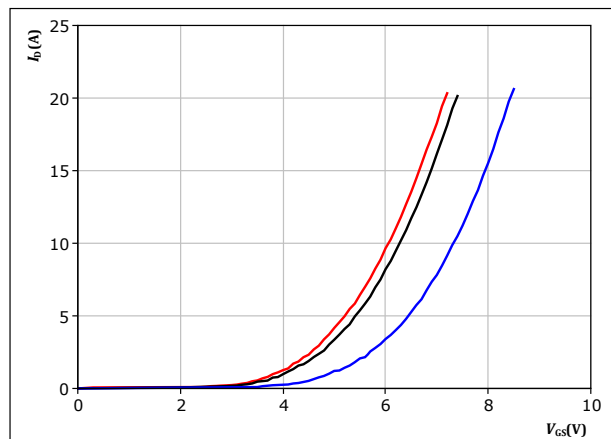


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GS} from -4 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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



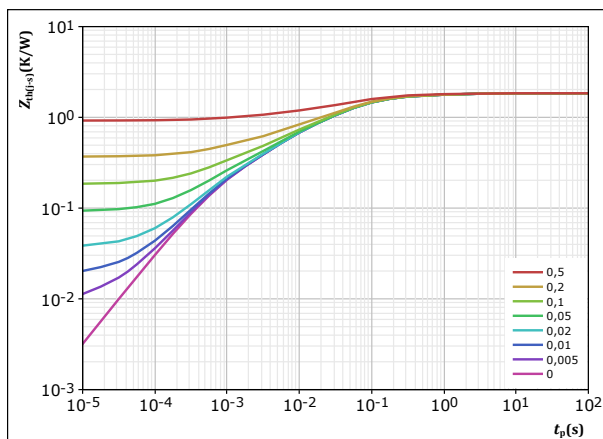
$t_p = 250 \mu s$
 $V_{DS} = 10 V$

T_j : 25 °C
125 °C
150 °C

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,843 K/W$
MOSFET thermal model values

$R (K/W)$	$\tau (s)$
1,10E-01	1,89E+00
4,15E-01	1,55E-01
7,53E-01	3,96E-02
4,02E-01	6,20E-03
1,64E-01	7,03E-04



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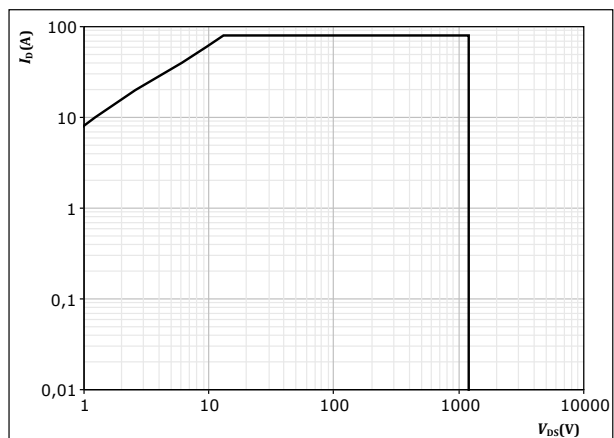
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Half-Bridge Switch Characteristics

figure 5. MOSFET

Safe operating area

$I_D = f(V_{DS})$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GS} = 14 \text{ V}$

$T_j = T_{jmax}$



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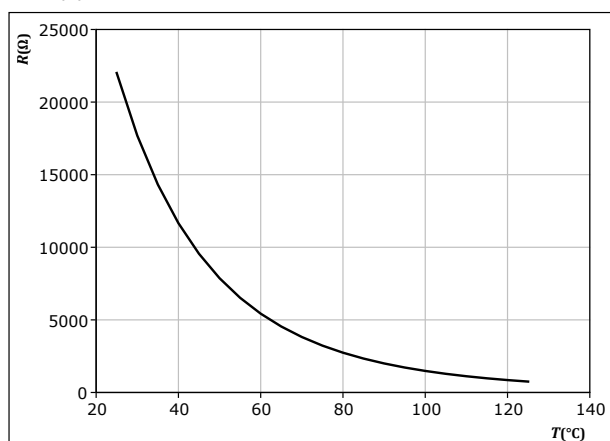
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Thermistor Characteristics

figure 6. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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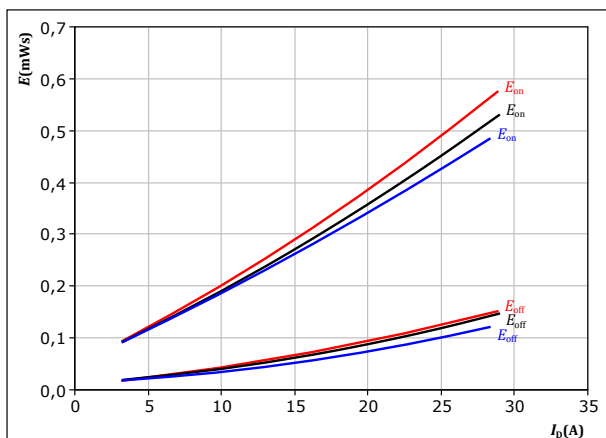
Half-Bridge Switching Characteristics

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
 $V_{GS} = 0/15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

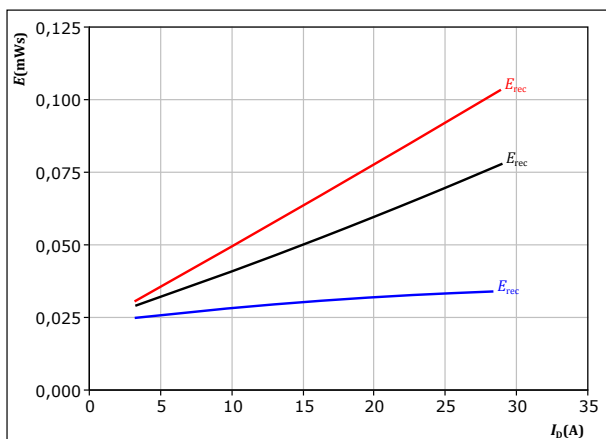
T_j :
— 25 °C
— 125 °C
— 150 °C

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
 $V_{GS} = 0/15$ V
 $R_{gon} = 8$ Ω

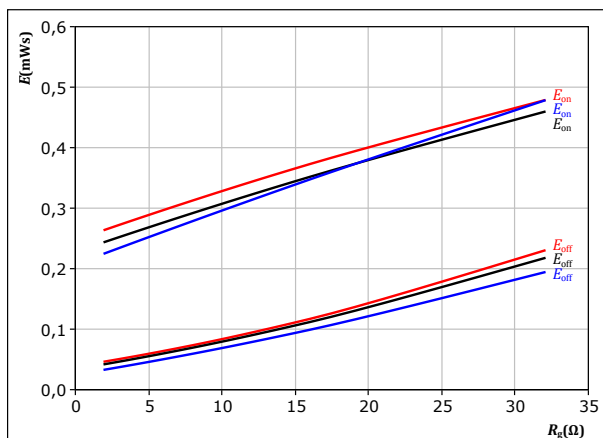
T_j :
— 25 °C
— 125 °C
— 150 °C

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
 $V_{GS} = 0/15$ V
 $I_D = 16$ A

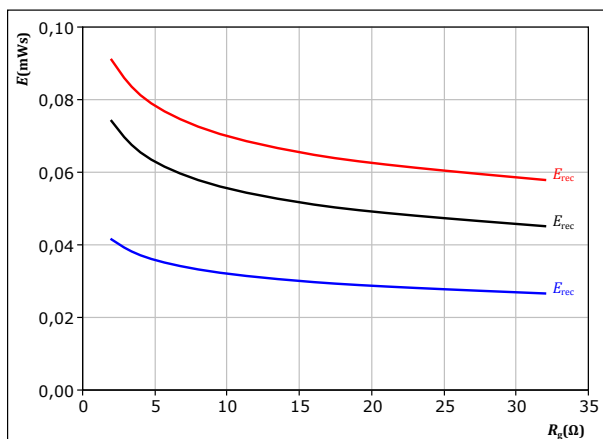
T_j :
— 25 °C
— 125 °C
— 150 °C

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
 $V_{GS} = 0/15$ V
 $I_D = 16$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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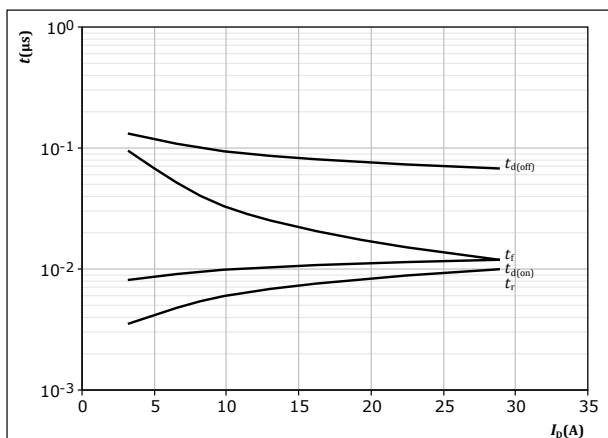
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Half-Bridge Switching Characteristics

figure 11. MOSFET

Typical switching times as a function of drain current

$$t = f(I_D)$$



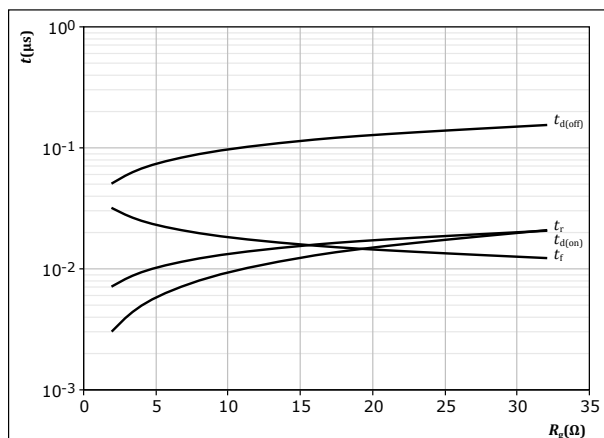
With an inductive load at

$T_j =$	150	°C
$V_{DS} =$	600	V
$V_{GS} =$	0/15	V
$R_{gon} =$	8	Ω
$R_{goff} =$	8	Ω

figure 12. MOSFET

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



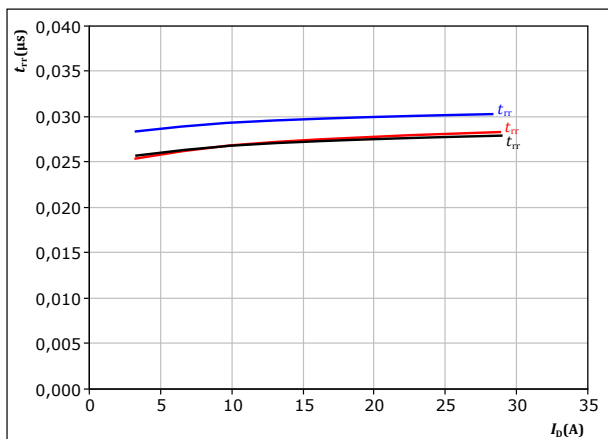
With an inductive load at

$T_j =$	150	°C
$V_{DS} =$	600	V
$V_{GS} =$	0/15	V
$I_D =$	16	A

figure 13. MOSFET

Typical reverse recovery time as a function of drain current

$$t_{rr} = f(I_D)$$

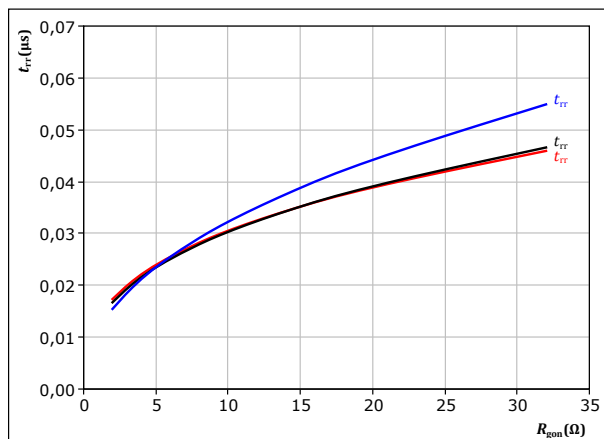


At	$V_{DS} =$	600	V	$T_j:$	25 °C
	$V_{GS} =$	0/15	V		125 °C
	$R_{gon} =$	8	Ω		150 °C

figure 14. MOSFET

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

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



At	$V_{DS} =$	600	V	$T_j:$	25 °C
	$V_{GS} =$	0/15	V		125 °C
	$I_D =$	16	A		150 °C



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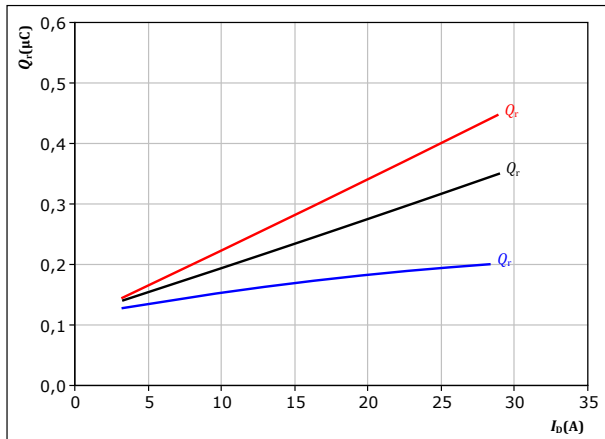
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Half-Bridge Switching Characteristics

figure 15. MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

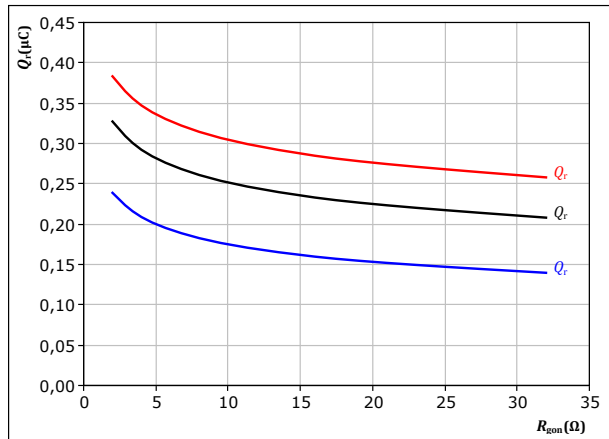


At $V_{DS} = 600$ V
 $V_{GS} = 0/15$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 16. MOSFET

Typical recovered charge as a function of turn on gate resistor

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

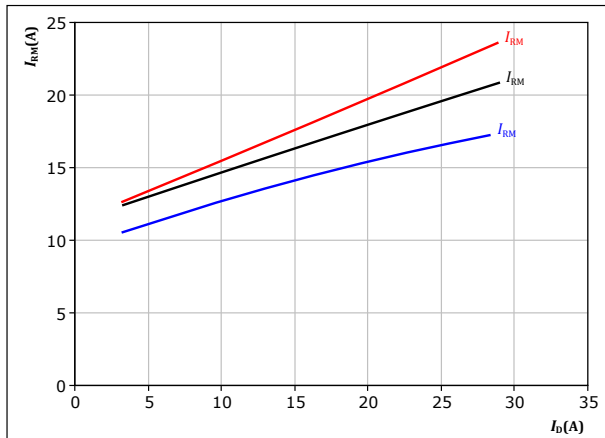


At $V_{DS} = 600$ V
 $V_{GS} = 0/15$ V
 $I_D = 16$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 17. MOSFET

Typical peak reverse recovery current as a function of drain current

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

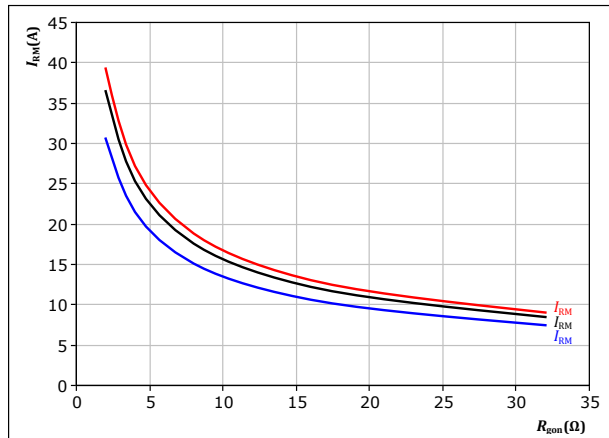


At $V_{DS} = 600$ V
 $V_{GS} = 0/15$ V
 $R_{gon} = 8$ Ω
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)

figure 18. MOSFET

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

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



At $V_{DS} = 600$ V
 $V_{GS} = 0/15$ V
 $I_D = 16$ A
 T_j : 25 °C (blue), 125 °C (black), 150 °C (red)



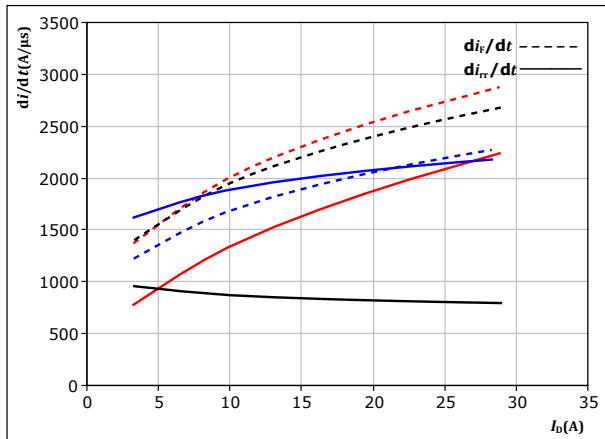
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Half-Bridge Switching Characteristics

figure 19. MOSFET

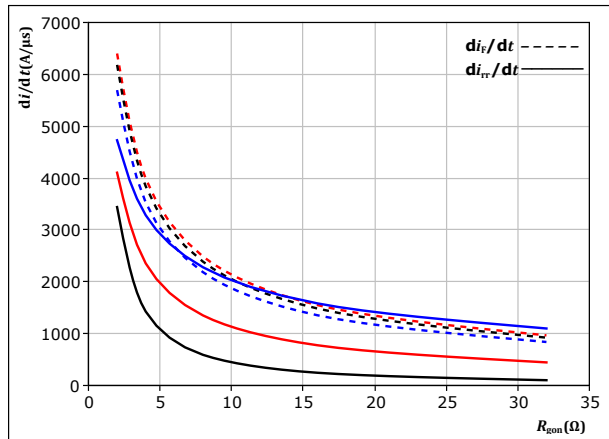
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_r/dt = f(I_D)$



At $V_{DS} = 600$ V
 $V_{GS} = 0/15$ V
 $R_{gon} = 8$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 20. MOSFET

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

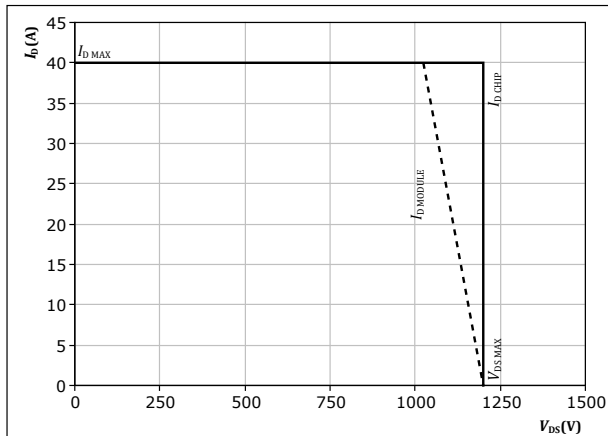


At $V_{DS} = 600$ V
 $V_{GS} = 0/15$ V
 $I_D = 16$ A
 $T_j = 25$ °C
 125 °C
 150 °C

figure 21. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



At $T_j = 150$ °C
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω



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Half-Bridge Switching Definitions

figure 22. MOSFET

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

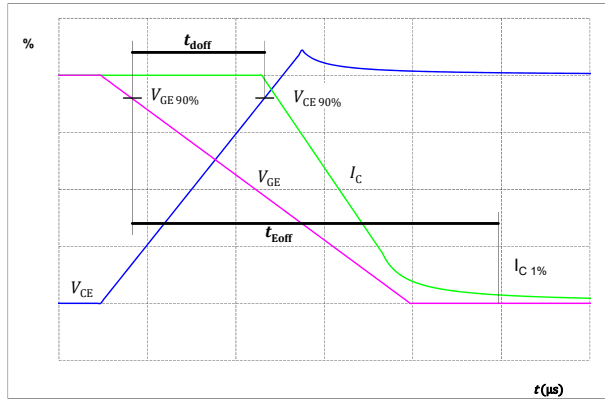


figure 23. MOSFET

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

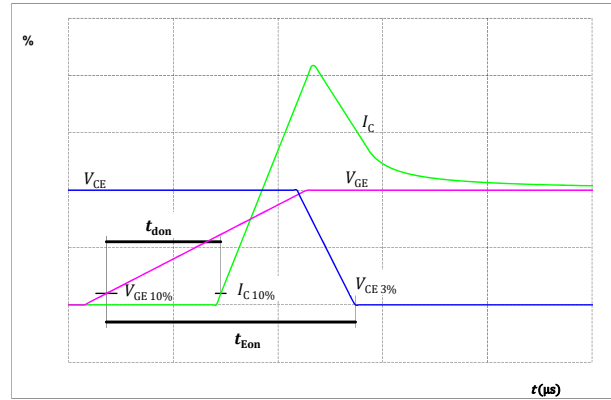


figure 24. MOSFET

Turn-off Switching Waveforms & definition of t_f

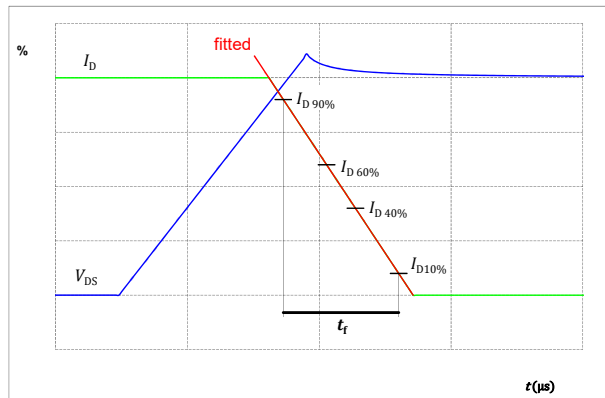
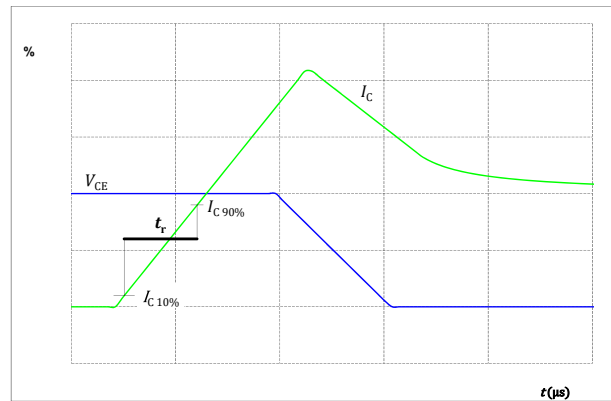


figure 25. MOSFET

Turn-on Switching Waveforms & definition of t_r





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Half-Bridge Switching Definitions

figure 26. FWD

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

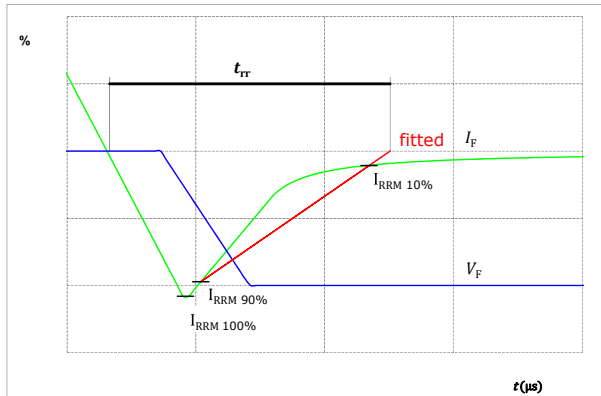


figure 27. FWD

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

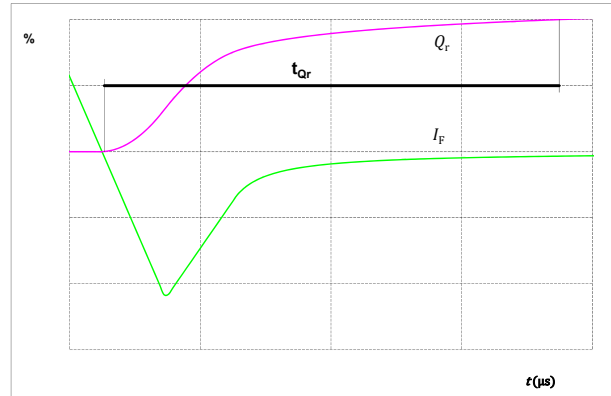
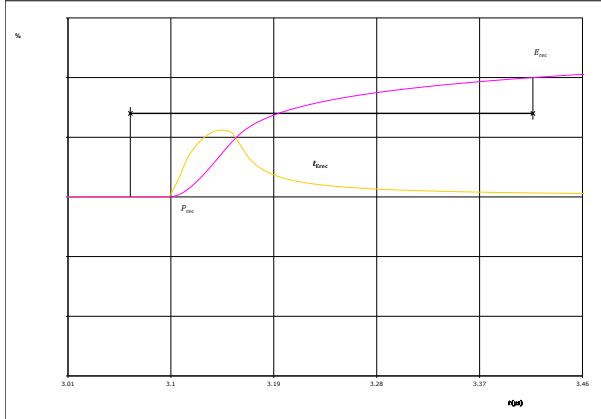


figure 28. FWD

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





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datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-PZ124PA075ME03-L627F28Y
With thermal paste	10-PZ124PA075ME03-L627F28Y-/3/

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

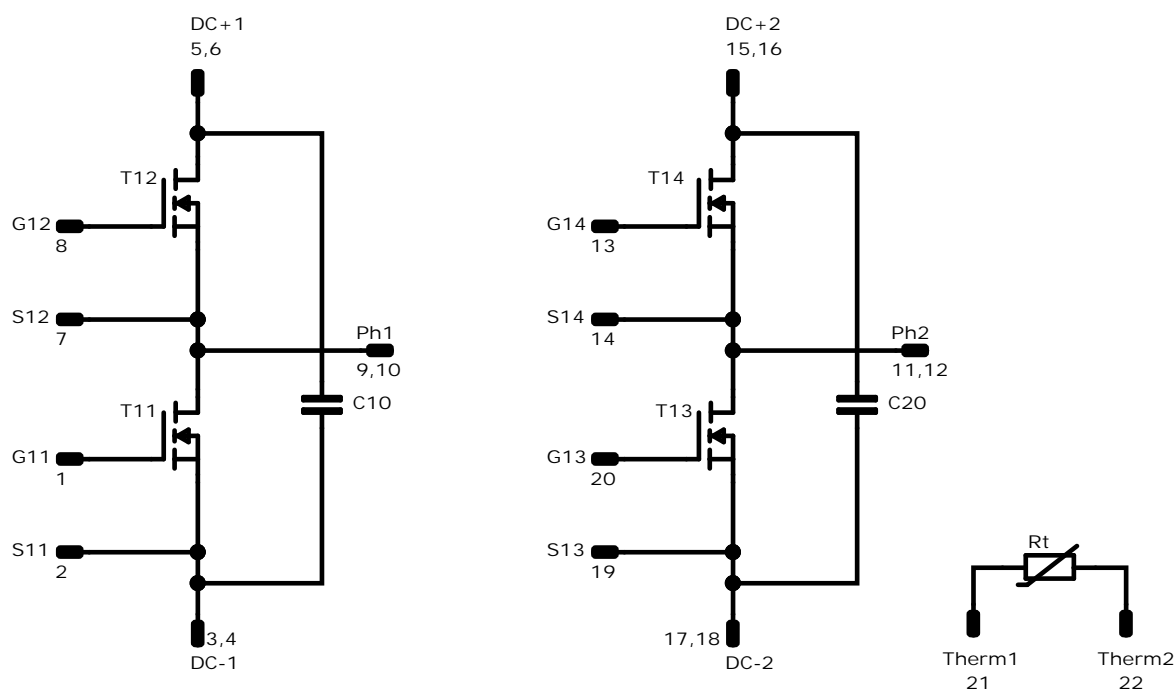
Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	0	22,5	G11	
2	2,9	22,5	S11	
3	8,3	22,5	DC-1	
4	10,8	22,5	DC-1	
5	19,6	22,5	DC+1	
6	22,1	22,5	DC+1	
7	29,1	22,5	S12	
8	32	22,5	G12	
9	33,5	17,8	Ph1	
10	33,5	15,3	Ph1	
11	33,5	7,2	Ph2	
12	33,5	4,7	Ph2	
13	32	0	G14	
14	29,1	0	S14	
15	22,1	0	DC+2	
16	19,6	0	DC+2	
17	10,8	0	DC-2	
18	8,3	0	DC-2	
19	2,9	0	S13	
20	0	0	G13	
21	0	8	Therm1	
22	0	14,5	Therm2	

Tolerance of pinpositions +0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



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Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14	MOSFET	1200 V	75 mΩ	Half-Bridge Switch	
C10, C20	Capacitor	1000 V		Capacitor (DC)	
Rt	Thermistor			Thermistor	



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Packaging instruction				
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</i> 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-PZ124PA075ME03-L627F28Y-D1-14	12 Nov. 2020		

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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.