



**flowPHASE 1 SiC**

**1200 V / 16 mΩ**

**Features**

- High frequency SiC MOSFET
- High power low inductive package
- Integrated NTC

**Target applications**

- Charging Stations
- Industrial Drives
- Power Supply

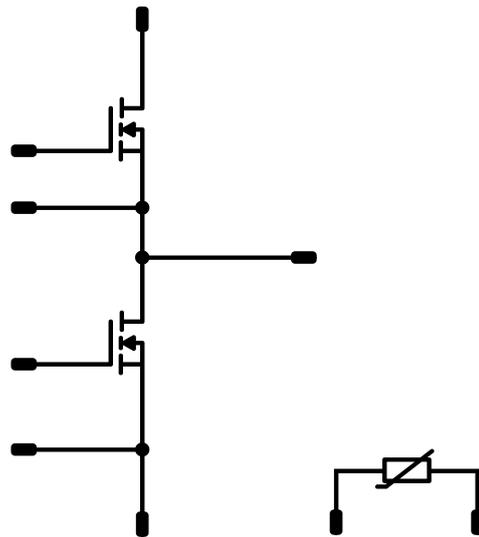
**Types**

- 10-EZ122PA016ME-LJ67F68T

**flow E1 12 mm housing**



**Schematic**





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**10-EZ122PA016ME-LJ67F68T**  
datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Half-Bridge Switch</b>				
Drain-source voltage	$V_{DS}$		1200	V
Drain current (DC current)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	83	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	240	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	168	W
Gate-source voltage	$V_{GS}$		-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			8,62	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		

### Half-Bridge Switch

#### Static

Drain-source on-state resistance	$r_{DS(on)}$	15		80	25 125 150	11,2	17 21 23	20,8 <sup>(1)</sup>	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	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 <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,57	K/W
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10-EZ122PA016ME-LJ67F68T  
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	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	0/15	600	65	25	16,96		ns	
						125	14,72			
						150	14,4			
Rise time	$t_r$					25	6,72			
						125	6,72		ns	
						150	6,4			
Turn-off delay time	$t_{d(off)}$					25	49,92			
						125	56		ns	
						150	57,6			
Fall time	$t_f$					25	21,48			
						125	26,48		ns	
						150	25,94			
Turn-on energy (per pulse)	$E_{on}$	$Q_{rFWD}=0,596 \mu C$ $Q_{tFWD}=1,11 \mu C$ $Q_{rFWD}=1,39 \mu C$	25	0,439		mWs				
			125	0,414						
			150	0,409						
Turn-off energy (per pulse)	$E_{off}$		25	0,173		mWs				
			125	0,189						
			150	0,195						
Peak recovery current	$I_{RRM}$		25	97,88		A				
			125	141,74						
			150	158,43						
Reverse recovery time	$t_{rr}$		25	12,51		ns				
			125	15,57						
			150	16,63						
Recovered charge	$Q_r$	$di/dt=12261 A/\mu s$ $di/dt=13138 A/\mu s$ $di/dt=13187 A/\mu s$	25	0,596		$\mu C$				
			125	1,11						
			150	1,39						
Reverse recovered energy	$E_{rec}$		25	0,152		mWs				
			125	0,321						
			150	0,459						
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$		25	25980		A/ $\mu s$				
			125	44921						
			150	49283						



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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		kΩ
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.

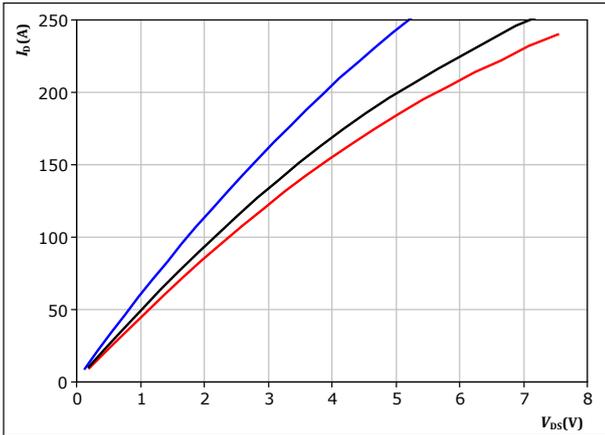


## Half-Bridge Switch Characteristics

**figure 1.** MOSFET

Typical output characteristics

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

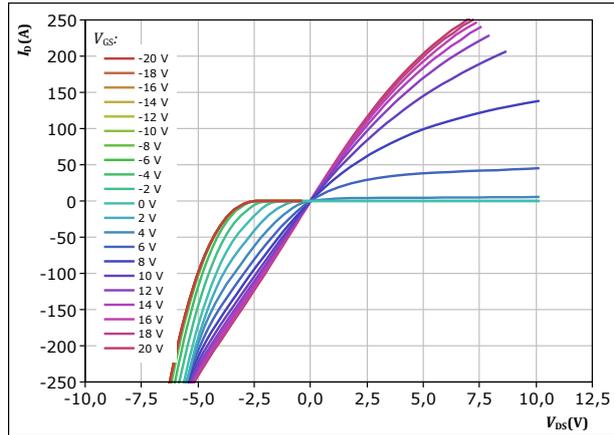


$t_p = 250 \mu s$   
 $V_{GS} = 14 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

**figure 2.** MOSFET

Typical output characteristics

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

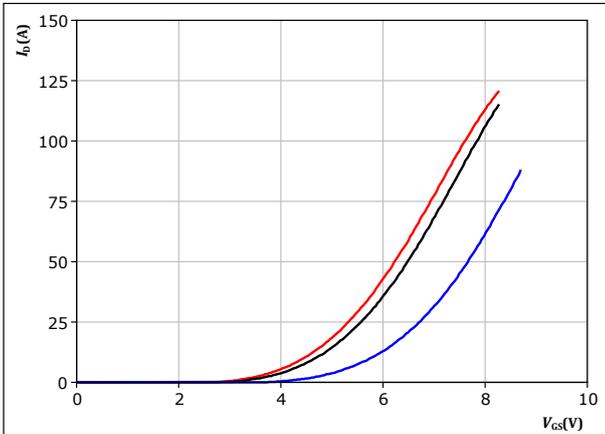


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GS}$  from -20 V to 20 V in steps of 2 V

**figure 3.** MOSFET

Typical transfer characteristics

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

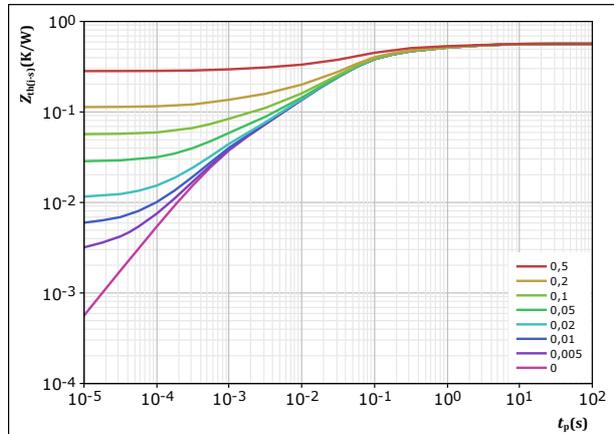


$t_p = 250 \mu s$   
 $V_{DS} = 10 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

**figure 4.** MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,566 \text{ K/W}$   
MOSFET thermal model values  

R (K/W)	$\tau$ (s)
6,00E-02	2,94E+00
9,00E-02	4,14E-01
3,09E-01	5,71E-02
7,27E-02	8,33E-03
3,36E-02	7,97E-04

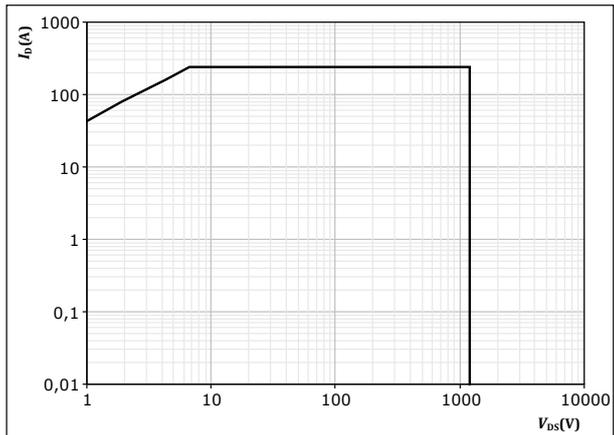


## Half-Bridge Switch Characteristics

figure 5. MOSFET

Safe operating area

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



$D =$  single pulse

$T_s = 80$  °C

$V_{GS} = 14$  V

$T_j = T_{jmax}$

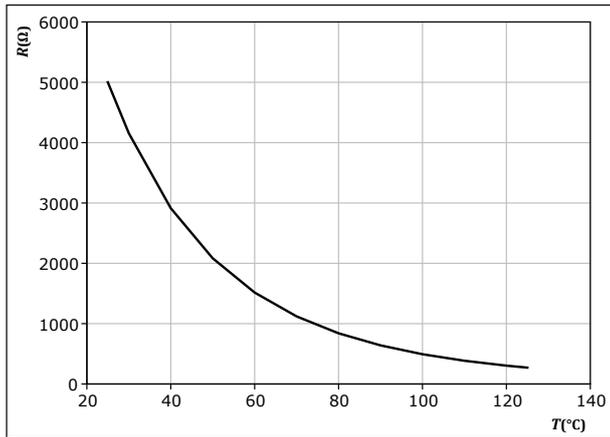


## Thermistor Characteristics

figure 6. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

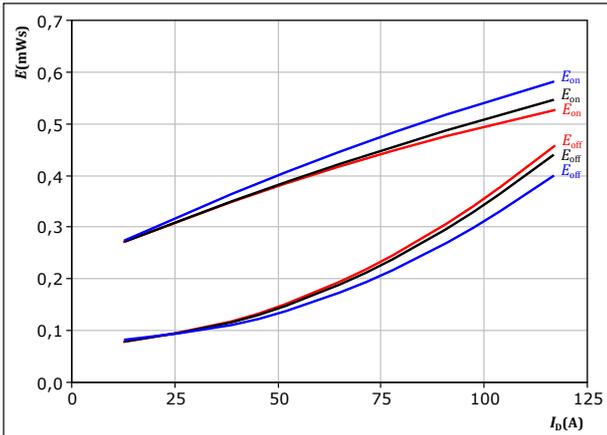




## Half-Bridge Switching Characteristics

**figure 7.** MOSFET

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

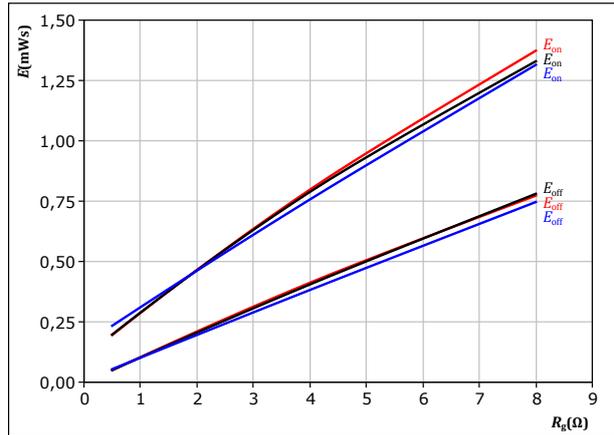


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	—	25 °C
$V_{GS} =$	0/15	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  
 $E = f(R_g)$

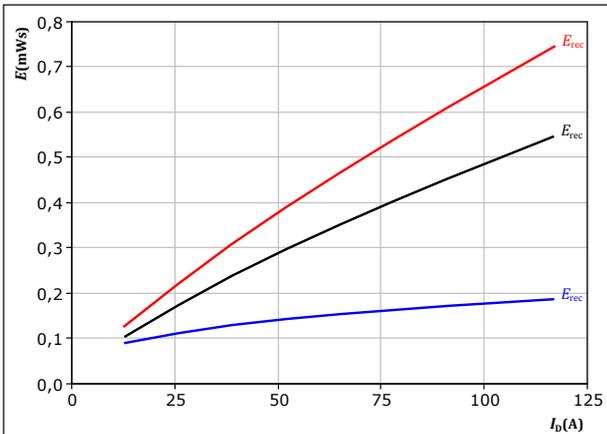


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	—	25 °C
$V_{GS} =$	0/15	V		—	125 °C
$I_D =$	65	A		—	150 °C

**figure 9.** MOSFET

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

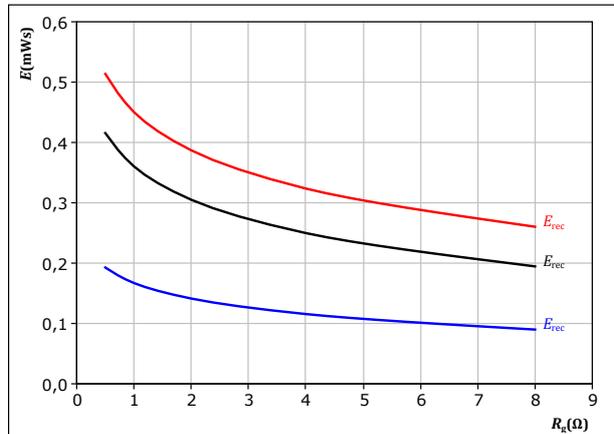


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	—	25 °C
$V_{GS} =$	0/15	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

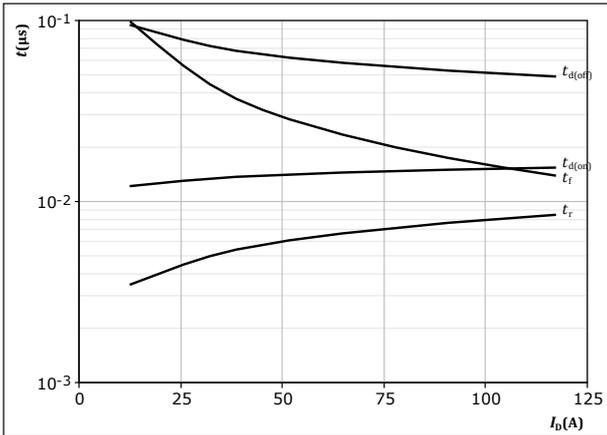
$V_{DS} =$	600	V	$T_j:$	—	25 °C
$V_{GS} =$	0/15	V		—	125 °C
$I_D =$	65	A		—	150 °C



## Half-Bridge Switching Characteristics

**figure 11.** MOSFET

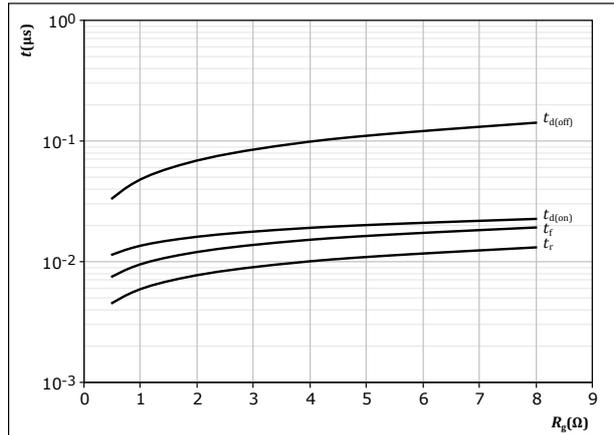
Typical switching times as a function of drain current  
 $t = f(I_D)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = 0/15 \text{ V}$   
 $R_{g(on)} = 2 \text{ } \Omega$   
 $R_{g(off)} = 2 \text{ } \Omega$

**figure 12.** MOSFET

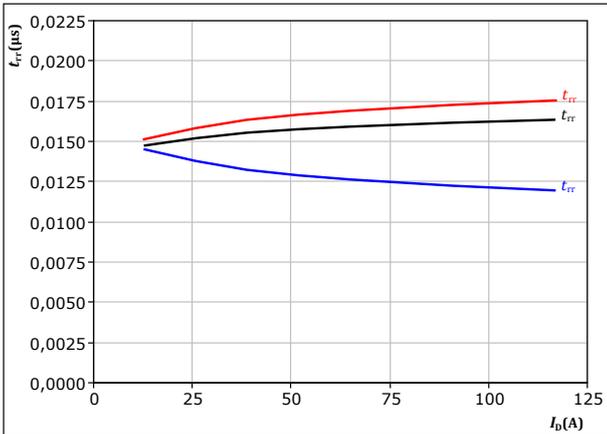
Typical switching times as a function of gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = 0/15 \text{ V}$   
 $I_D = 65 \text{ A}$

**figure 13.** MOSFET

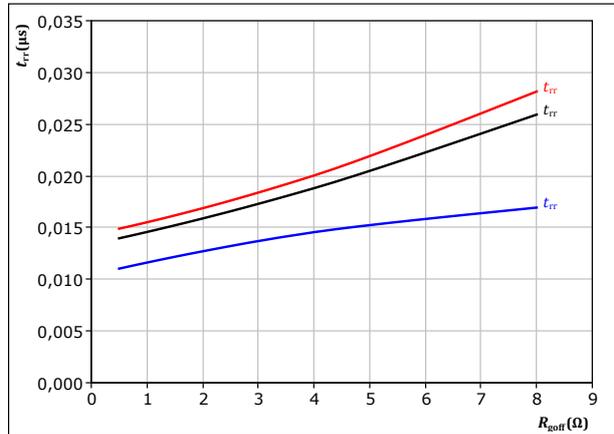
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



At  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = 0/15 \text{ V}$   
 $R_{g(on)} = 2 \text{ } \Omega$   
 $T_j:$  — 25 °C  
 — 125 °C  
 — 150 °C

**figure 14.** MOSFET

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



At  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = 0/15 \text{ V}$   
 $I_D = 65 \text{ A}$   
 $T_j:$  — 25 °C  
 — 125 °C  
 — 150 °C

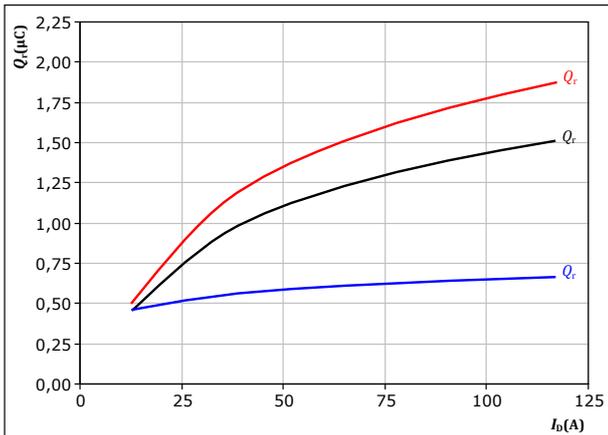


## Half-Bridge Switching Characteristics

**figure 15.** MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

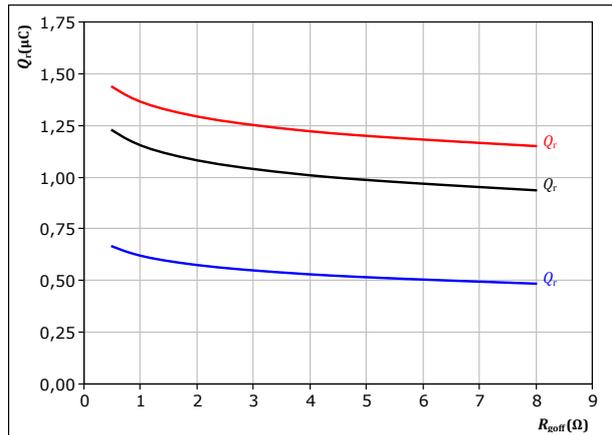


At  $V_{DS} = 600$  V  
 $V_{GS} = 0/15$  V  
 $R_{goff} = 2$  Ω  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 16.** MOSFET

Typical recovered charge as a function of turn off gate resistor

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

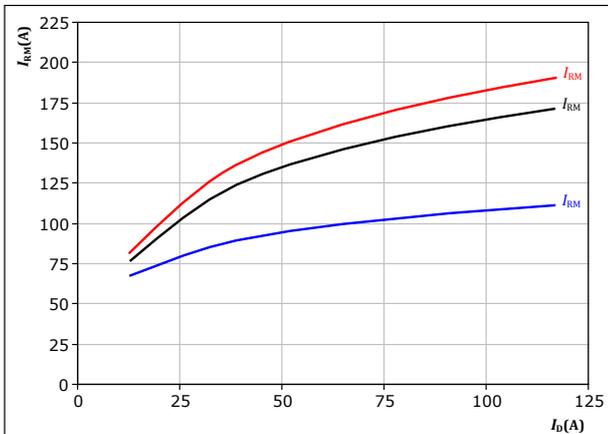


At  $V_{DS} = 600$  V  
 $V_{GS} = 0/15$  V  
 $I_D = 65$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 17.** MOSFET

Typical peak reverse recovery current as a function of drain current

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

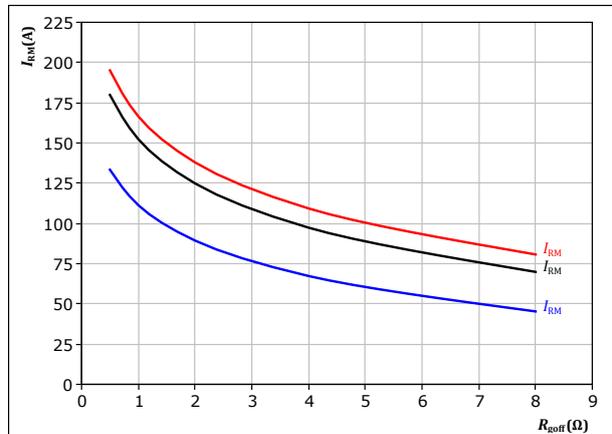


At  $V_{DS} = 600$  V  
 $V_{GS} = 0/15$  V  
 $R_{goff} = 2$  Ω  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 18.** MOSFET

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

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



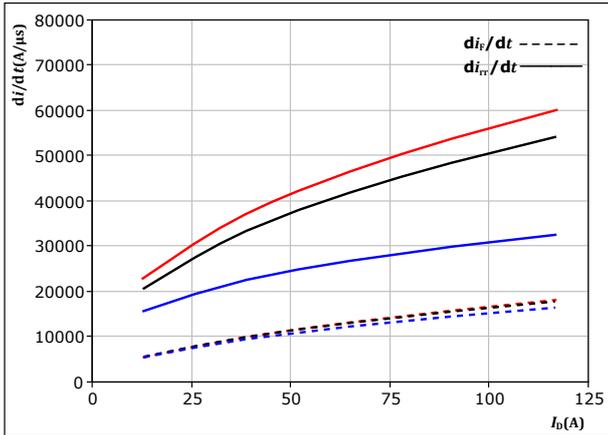
At  $V_{DS} = 600$  V  
 $V_{GS} = 0/15$  V  
 $I_D = 65$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)



## Half-Bridge Switching Characteristics

**figure 19.** MOSFET

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

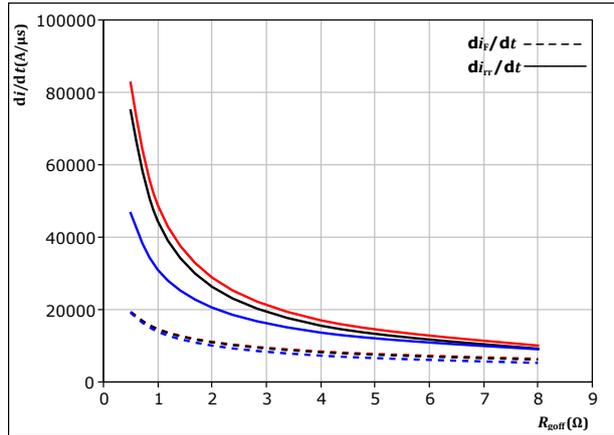


At  $V_{DS} = 600$  V  
 $V_{GS} = 0/15$  V  
 $R_{goff} = 2$   $\Omega$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

**figure 20.** MOSFET

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



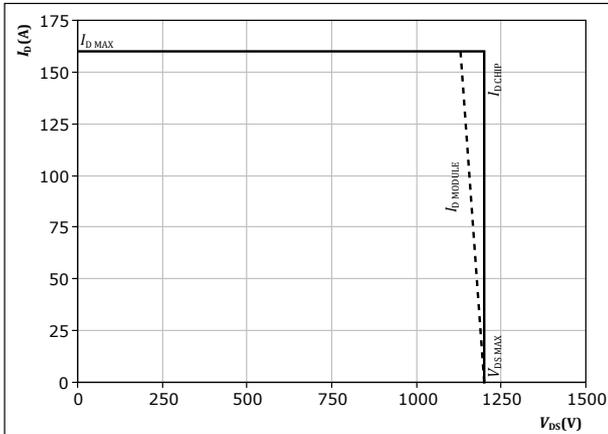
At  $V_{DS} = 600$  V  
 $V_{GS} = 0/15$  V  
 $I_D = 65$  A

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

**figure 21.** MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



At  $T_j = 150$  °C  
 $R_{goff} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$



## Half-Bridge Switching Definitions

figure 22. MOSFET

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

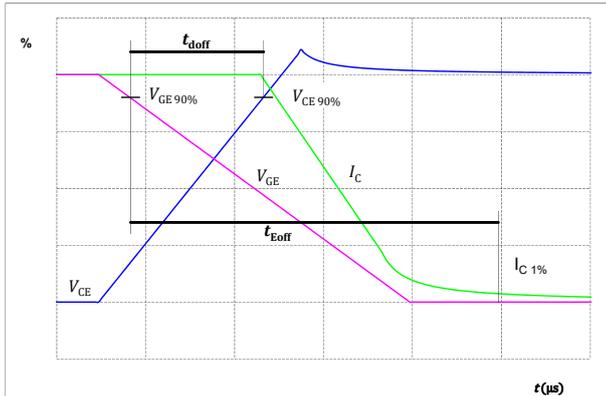


figure 23. MOSFET

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

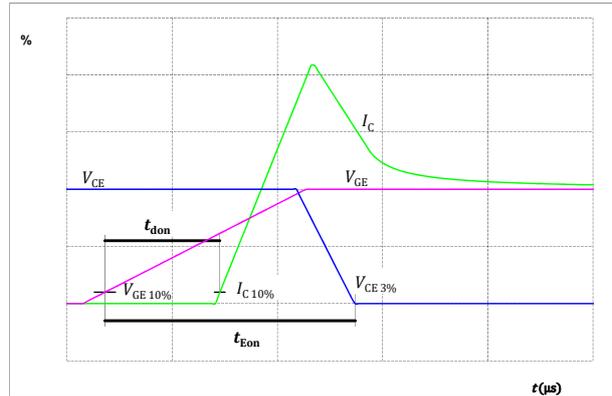


figure 24. MOSFET

Turn-off Switching Waveforms & definition of  $t_f$

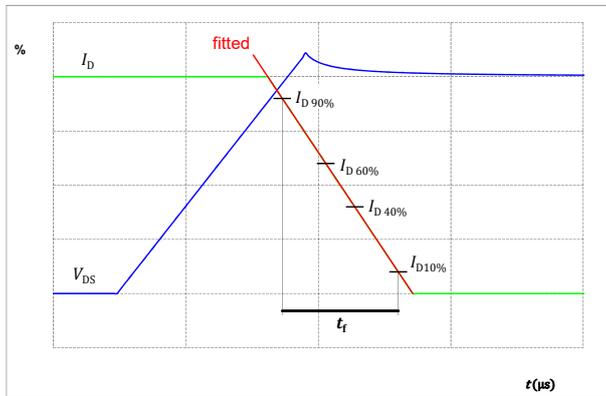
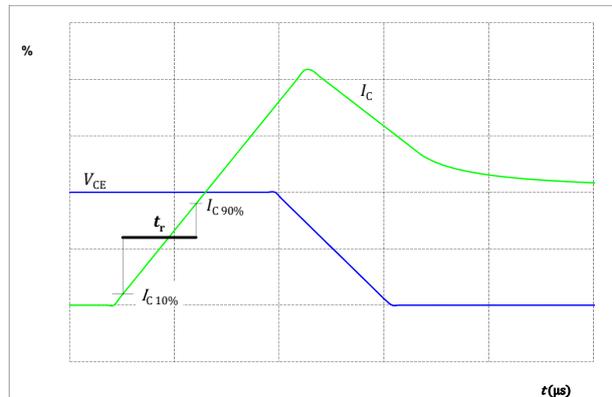


figure 25. MOSFET

Turn-on Switching Waveforms & definition of  $t_r$





## Half-Bridge Switching Definitions

figure 26. FWD

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

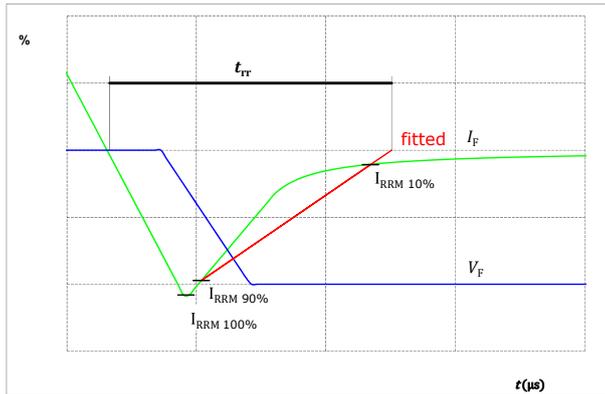


figure 27. FWD

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

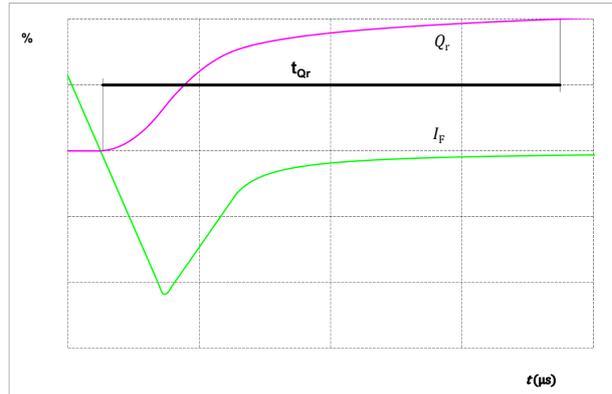
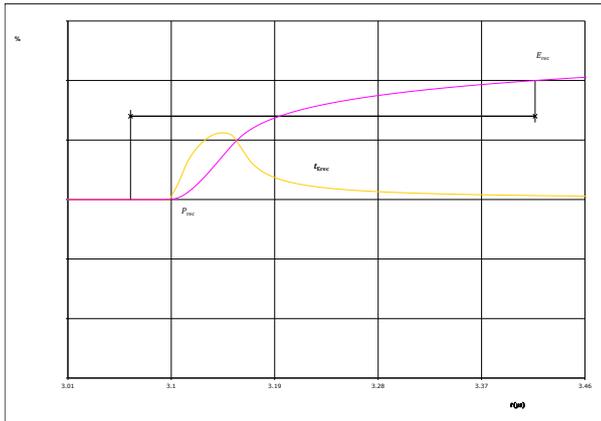


figure 28. FWD

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

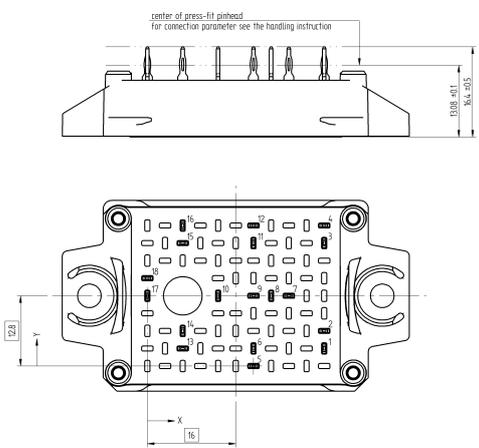




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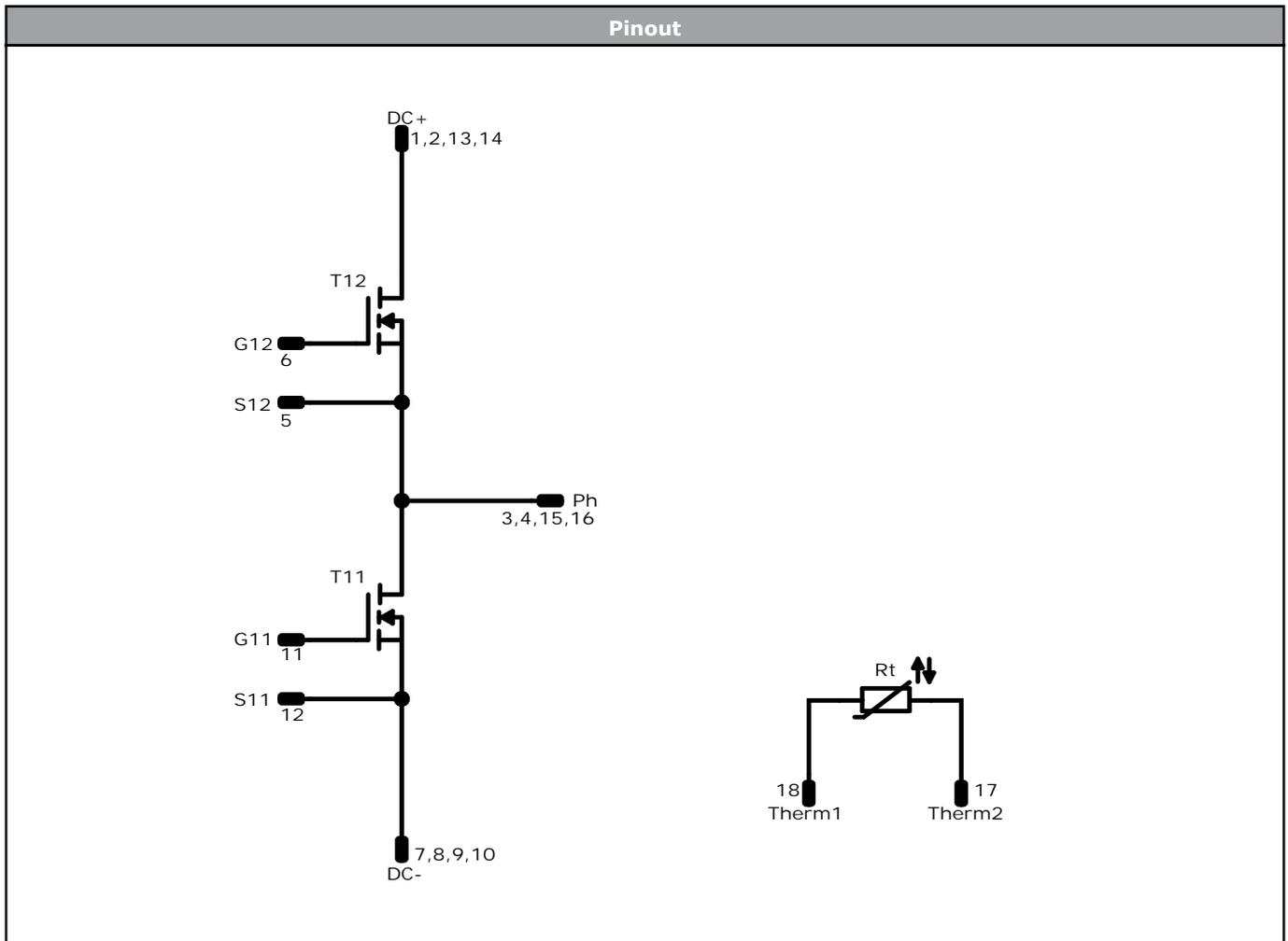
Ordering Code	
<b>Version</b>	<b>Ordering Code</b>
Without thermal paste	10-EZ122PA016ME-LJ67F68T
With thermal paste	10-EZ122PA016ME-LJ67F68T-/3/

Marking						
	<b>Text</b>	<b>Name</b> NN-NNNNNNNNNNNNNN- TTTTTV	<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	

Outline																																																																																			
<table border="1"> <thead> <tr> <th colspan="4">Pin table [mm]</th> </tr> <tr> <th>Pin</th> <th>X</th> <th>Y</th> <th>Function</th> </tr> </thead> <tbody> <tr><td>1</td><td>32</td><td>3,2</td><td>DC+</td></tr> <tr><td>2</td><td>32</td><td>6,4</td><td>DC+</td></tr> <tr><td>3</td><td>32</td><td>22,4</td><td>Ph</td></tr> <tr><td>4</td><td>32</td><td>25,6</td><td>Ph</td></tr> <tr><td>5</td><td>19,2</td><td>0</td><td>S12</td></tr> <tr><td>6</td><td>19,2</td><td>3,2</td><td>G12</td></tr> <tr><td>7</td><td>25,6</td><td>12,8</td><td>DC-</td></tr> <tr><td>8</td><td>22,4</td><td>12,8</td><td>DC-</td></tr> <tr><td>9</td><td>19,2</td><td>12,8</td><td>DC-</td></tr> <tr><td>10</td><td>12,8</td><td>12,8</td><td>DC-</td></tr> <tr><td>11</td><td>19,2</td><td>22,4</td><td>G11</td></tr> <tr><td>12</td><td>19,2</td><td>25,6</td><td>S11</td></tr> <tr><td>13</td><td>6,4</td><td>3,2</td><td>DC+</td></tr> <tr><td>14</td><td>6,4</td><td>6,4</td><td>DC+</td></tr> <tr><td>15</td><td>6,4</td><td>22,4</td><td>Ph</td></tr> <tr><td>16</td><td>6,4</td><td>25,6</td><td>Ph</td></tr> <tr><td>17</td><td>0</td><td>12,8</td><td>Therm2</td></tr> <tr><td>18</td><td>0</td><td>16</td><td>Therm1</td></tr> </tbody> </table>				Pin table [mm]				Pin	X	Y	Function	1	32	3,2	DC+	2	32	6,4	DC+	3	32	22,4	Ph	4	32	25,6	Ph	5	19,2	0	S12	6	19,2	3,2	G12	7	25,6	12,8	DC-	8	22,4	12,8	DC-	9	19,2	12,8	DC-	10	12,8	12,8	DC-	11	19,2	22,4	G11	12	19,2	25,6	S11	13	6,4	3,2	DC+	14	6,4	6,4	DC+	15	6,4	22,4	Ph	16	6,4	25,6	Ph	17	0	12,8	Therm2	18	0	16	Therm1
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Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	MOSFET	1200 V	16 mΩ	Half-Bridge Switch	
Rt	Thermistor			Thermistor	



Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow</i> E1 packages see vincotech.com website.

Package data
Package data for <i>flow</i> E1 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-EZ122PA016ME-LJ67F68T-D1-14	19 May, 2021		

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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.