



**flowDUAL E1 SiC**

**1200 V / 11 mΩ**

**Topology features**

- Temperature sensor
- Half Bridge

**Component features**

- Fast intrinsic diode with low reverse recovery
- High blocking voltage with low on-resistance
- High speed switching with low capacitance

**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

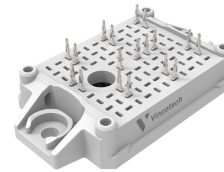
**Target applications**

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

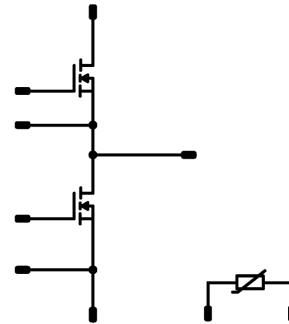
**Types**

- 10-EZ122PA011ME-LJ67F18T

**flow E1 12 mm housing**



**Schematic**





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## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Inverter Switch</b>				
Drain-source voltage	$V_{DS}$		1200	V
Drain current (DC current)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	114	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	416	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	219	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
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
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$V_F$ [V]	$T_j$ [°C]	Min	Typ	Max	

#### Inverter Switch

##### Static

Drain-source on-state resistance <sup>(1)</sup>	$r_{DS(on)}$		15		103,2	25 175	7,35	10,5 19,25	13,6	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$			0,02844	25	1,8	2,7	3,6	V
Gate to Source Leakage Current	$I_{GSS}$		15	0		25		40	1000	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	1200		25		4	200	μA
Internal gate resistance	$r_g$							1,48		Ω
Gate charge	$Q_g$		-4/15	800	103	25		372		nC
Short-circuit input capacitance	$C_{iss}$	$f = 100$ kHz	0	1000	0	25		9480		pF
Short-circuit output capacitance	$C_{oss}$							340		
Reverse transfer capacitance	$C_{rss}$							32		
Diode forward voltage	$V_{SD}$		0		51,6	25		4,8		V

##### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,43		K/W
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10-EZ122PA011ME-LJ67F18T  
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		32,71 30,05 29,45		ns
Rise time	$t_r$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$				25 125 150		15,83 14,29 14,27		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		106,79 116,38 118,84		ns
Fall time	$t_f$					25 125 150		13,5 13,68 13,7		ns
Turn-on energy (per pulse)	$E_{on}$	$Q_{rFWD}=1,31 \mu C$ $Q_{rFWD}=2,23 \mu C$ $Q_{rFWD}=2,91 \mu C$				25 125 150		1,73 1,71 1,78		mWs
Turn-off energy (per pulse)	$E_{off}$		-4/15	600	100	25 125 150		0,839 0,839 0,848		mWs
Peak recovery current	$I_{RRM}$					25 125 150		83,99 108,37 127,98		A
Reverse recovery time	$t_{rr}$					25 125 150		25 32,3 35,5		ns
Recovered charge	$Q_r$	$di/dt=9316 A/\mu s$ $di/dt=8553 A/\mu s$ $di/dt=8318 A/\mu s$				25 125 150		1,31 2,23 2,91		$\mu C$
Reverse recovered energy	$E_{rec}$					25 125 150		0,268 0,643 0,907		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		9177,81 9129,29 9986,11		A/ $\mu s$



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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		

### Thermistor

#### Static

Rated resistance	$R$				25		5		k $\Omega$
Deviation of R100	$A_{R/R}$	$R_{100} = 499 \Omega$			100	3,2		3,3	%
Power dissipation	$P$				25		130		mW
Power dissipation constant	$d$				25		1,3		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$					3380		K
Vincotech Thermistor Reference								V	

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

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

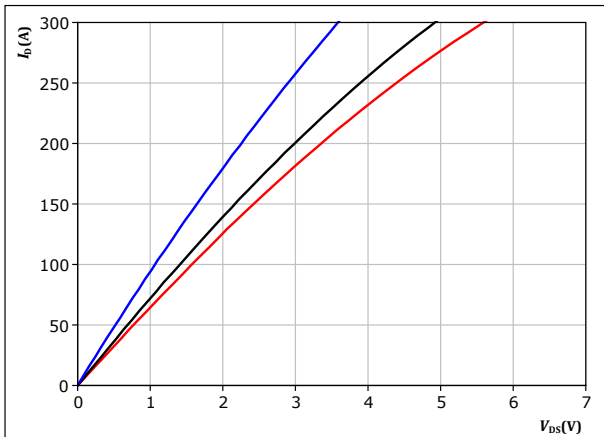


## Inverter Switch Characteristics

**figure 1.** MOSFET

Typical output characteristics including  $R_{DD'} + R_{SS'}$

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

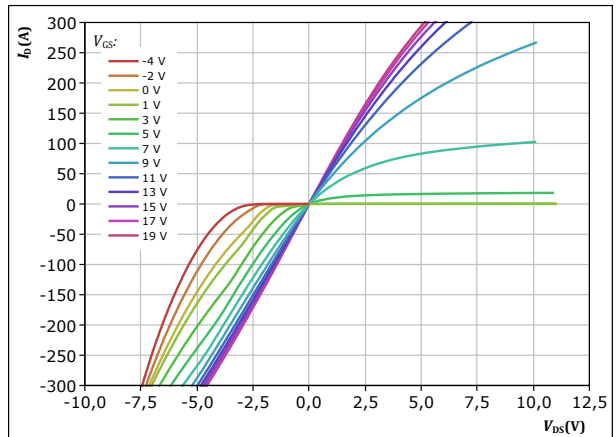


$t_p = 250 \mu s$   
 $V_{GS} = 15 V$   
 $T_j:$  — 25 °C  
— 125 °C  
— 150 °C

**figure 2.** MOSFET

Typical output characteristics including  $R_{DD'} + R_{SS'}$

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

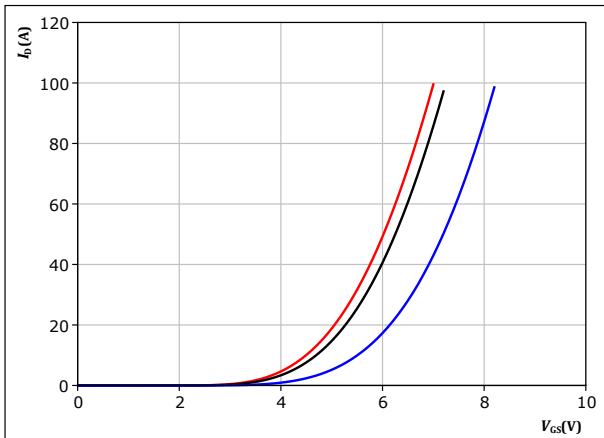


$t_p = 250 \mu s$   
 $T_j = 150 \text{ } ^\circ C$   
 $V_{GS}$  from -4 V to 19 V in steps of 2 V

**figure 3.** MOSFET

Typical transfer characteristics

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

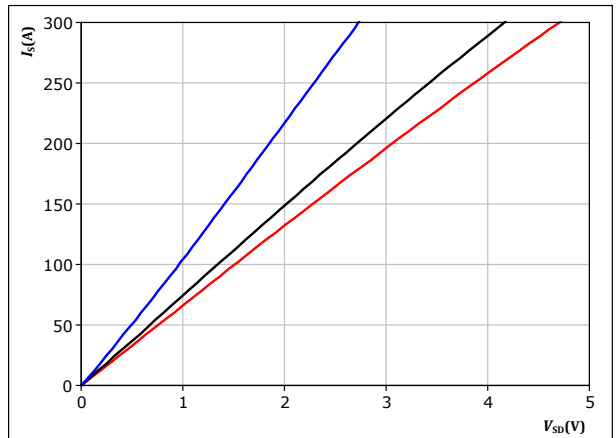


$t_p = 250 \mu s$   
 $V_{DS} = 7 V$   
 $T_j:$  — 25 °C  
— 125 °C  
— 150 °C

**figure 4.** MOSFET

Typical reverse drain current characteristics including  $R_{DD'} + R_{SS'}$

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



$t_p = 250 \mu s$   
 $V_{GS} = 15 V$   
 $T_j:$  — 25 °C  
— 125 °C  
— 150 °C



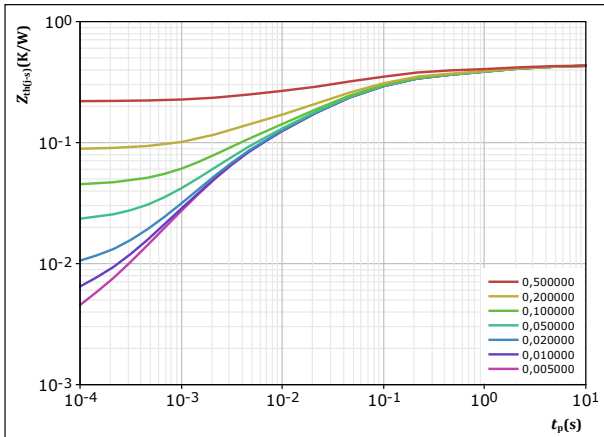
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## Inverter Switch Characteristics

**figure 5.** MOSFET

Transient thermal impedance as a function of pulse width

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



$$D = t_p / T$$

$$R_{th(j-c)} = 0,433 \text{ K/W}$$

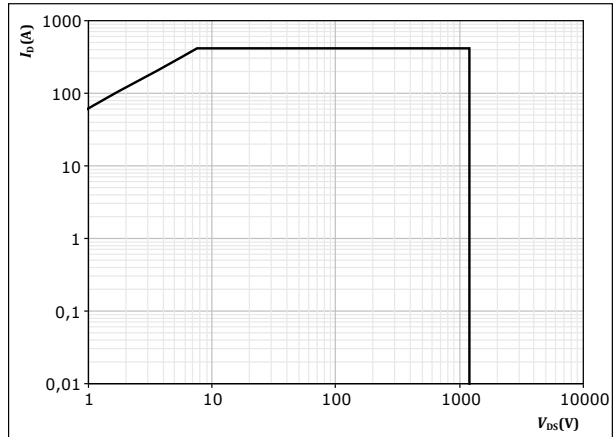
MOSFET thermal model values

R (K/W)	$\tau$ (s)
2,69E-02	7,98E+00
7,63E-02	1,04E+00
1,63E-01	8,43E-02
1,14E-01	1,81E-02
5,82E-02	2,63E-03

**figure 6.** MOSFET

Safe operating area

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



D = single pulse

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

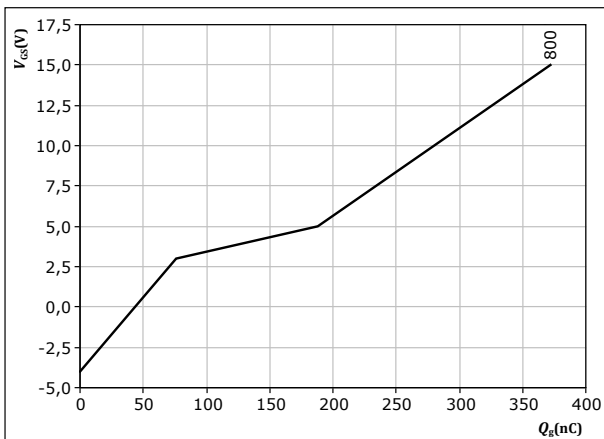
$$V_{GS} = 15 \text{ V}$$

$$T_j = T_{jmax}$$

**figure 7.** MOSFET

Gate voltage vs gate charge

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



$$I_D = 103.2 \text{ A}$$

$$T_j = 25 \text{ } ^\circ\text{C}$$

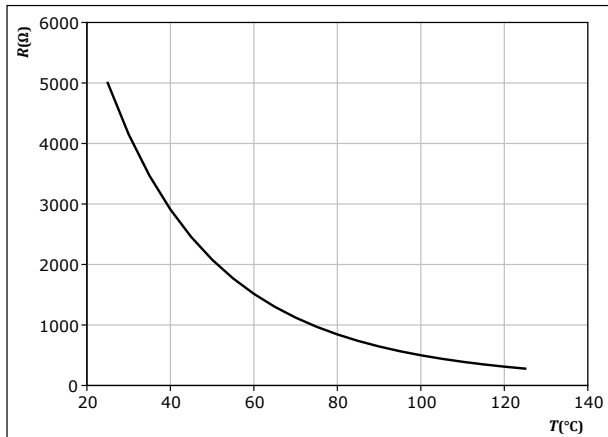


### Thermistor Characteristics

figure 8. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$



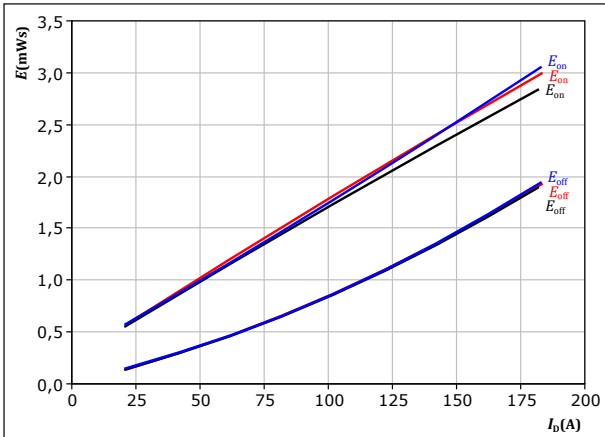




## Inverter Switching Characteristics

**figure 9.** MOSFET

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

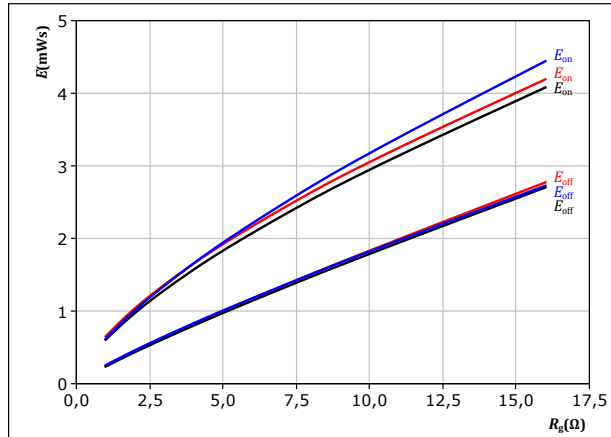


With an inductive load at

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

**figure 10.** MOSFET

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

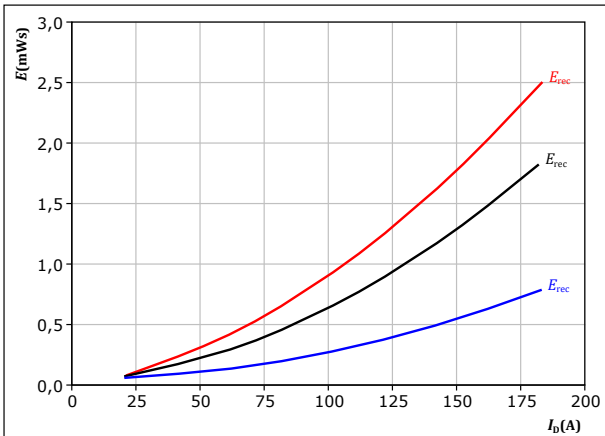


With an inductive load at

$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-4/15	V		— 125 °C
$I_D =$	100	A		— 150 °C

**figure 11.** MOSFET

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

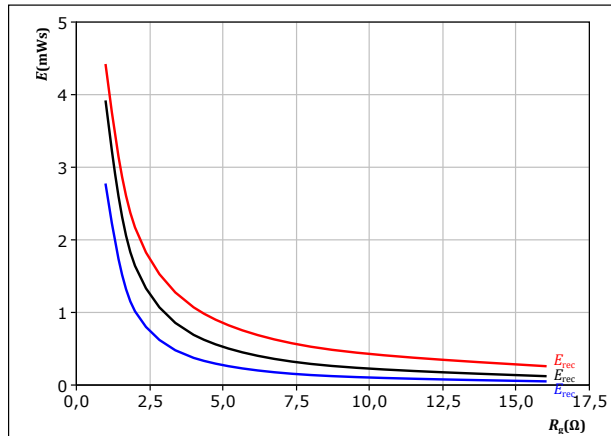


With an inductive load at

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

**figure 12.** 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

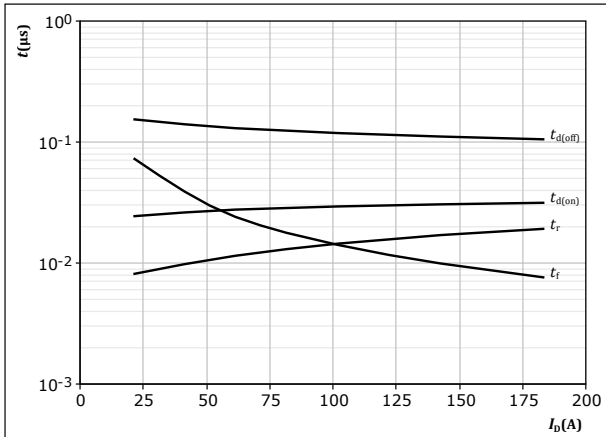
$V_{DS} =$	600	V	$T_j:$	— 25 °C
$V_{GS} =$	-4/15	V		— 125 °C
$I_D =$	100	A		— 150 °C



## Inverter Switching Characteristics

**figure 13.** MOSFET

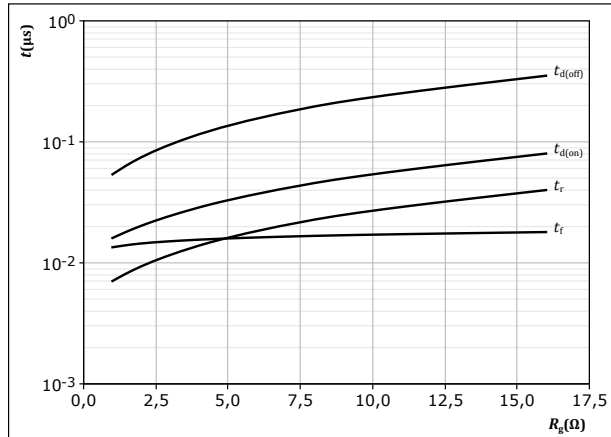
Typical switching times as a function of drain current  
 $t = f(I_D)$



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

**figure 14.** MOSFET

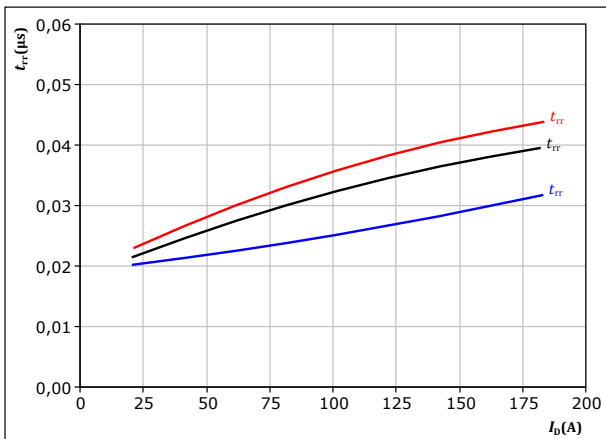
Typical switching times as a function of MOSFET turn on gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -4/15 \text{ V}$   
 $I_D = 100 \text{ A}$

**figure 15.** MOSFET

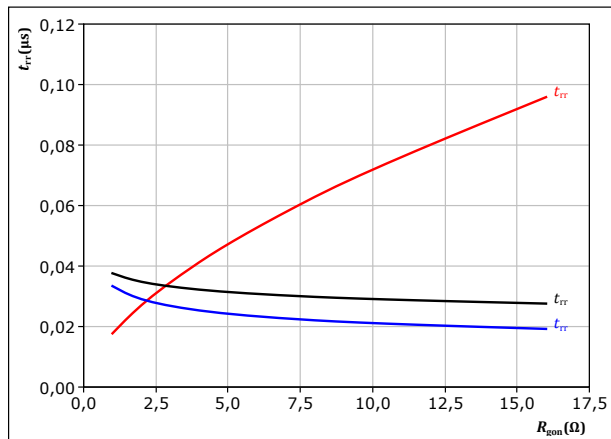
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



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

**figure 16.** MOSFET

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



At  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -4/15 \text{ V}$   
 $I_D = 100 \text{ A}$   
 $T_j$ : — 25 °C  
— 125 °C  
— 150 °C

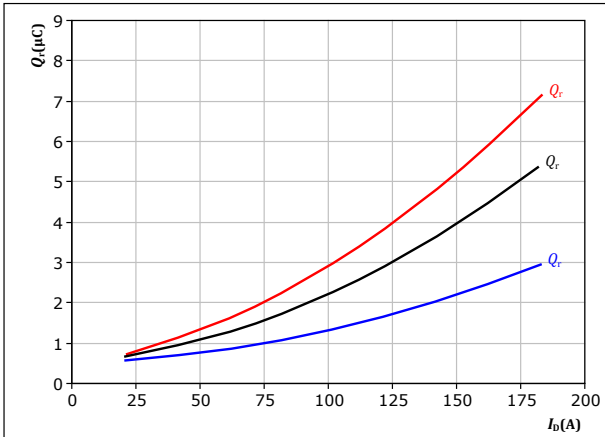


## Inverter Switching Characteristics

**figure 17.** MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



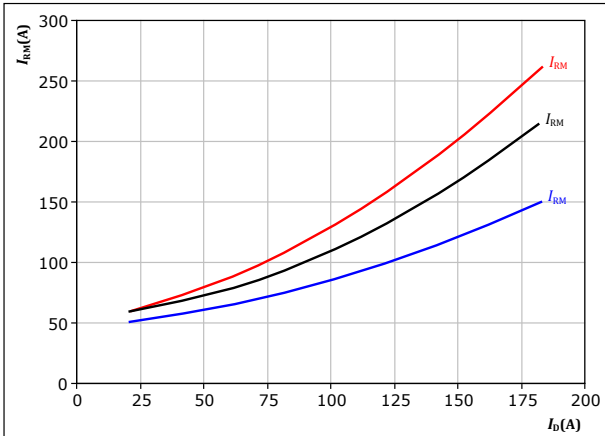
At  $V_{DS} = 600$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 4$   $\Omega$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

**figure 19.** MOSFET

Typical peak reverse recovery current as a function of drain current

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



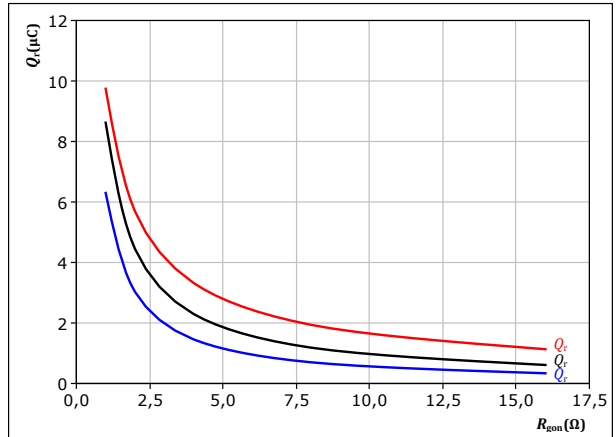
At  $V_{DS} = 600$  V  
 $V_{GS} = -4/15$  V  
 $R_{gon} = 4$   $\Omega$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

**figure 18.** MOSFET

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

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



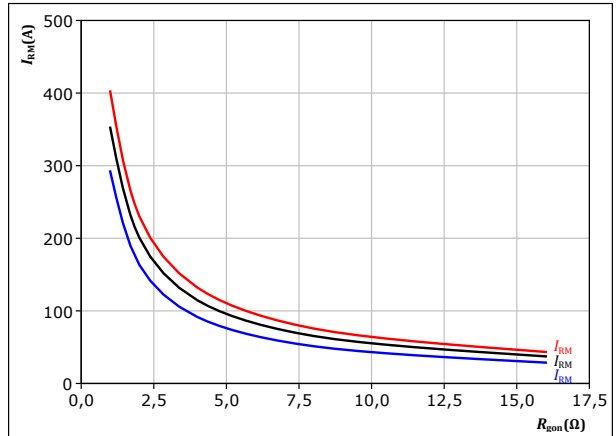
At  $V_{DS} = 600$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 100$  A

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

**figure 20.** 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  
 $I_D = 100$  A

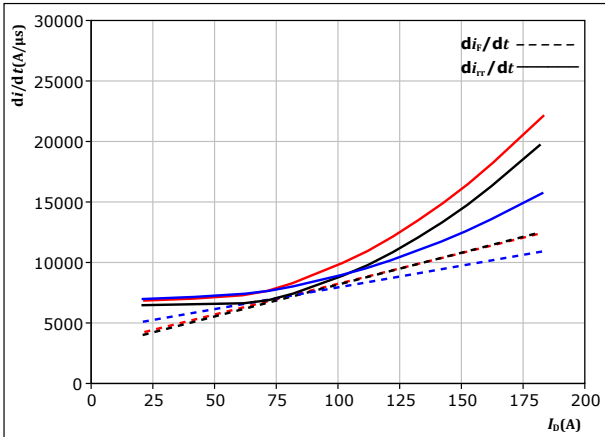
$T_j$ : — 25 °C  
— 125 °C  
— 150 °C



## Inverter Switching Characteristics

figure 21. MOSFET

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

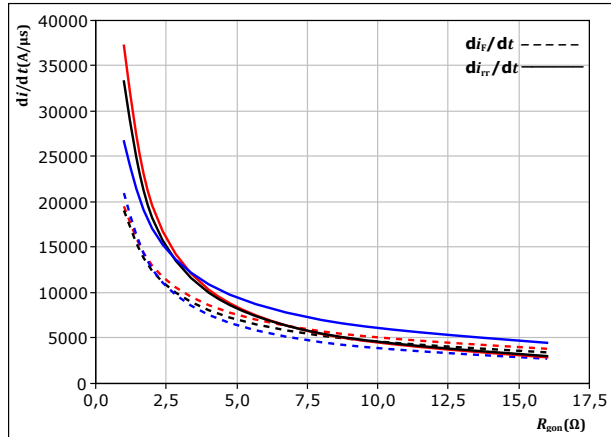


At  $V_{DS} = 600$  V  
 $V_{GS} = -4/15$  V  
 $R_{g\text{on}} = 4$   $\Omega$

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

figure 22. MOSFET

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



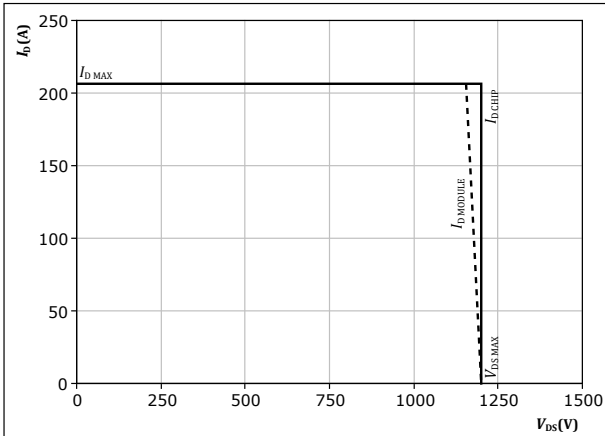
At  $V_{DS} = 600$  V  
 $V_{GS} = -4/15$  V  
 $I_D = 100$  A

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

figure 23. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



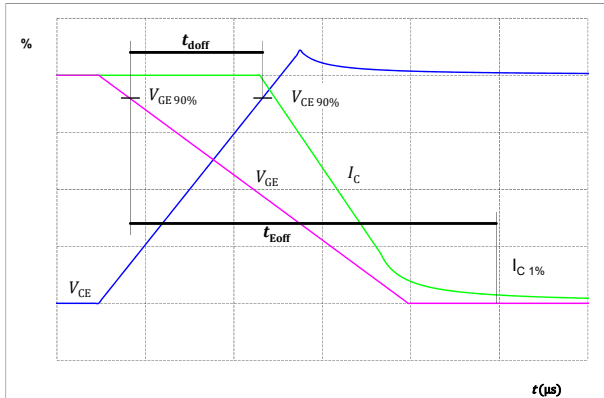
At  $T_j = 150$  °C  
 $R_{g\text{on}} = 4$   $\Omega$   
 $R_{g\text{off}} = 4$   $\Omega$



## Inverter Switching Definitions

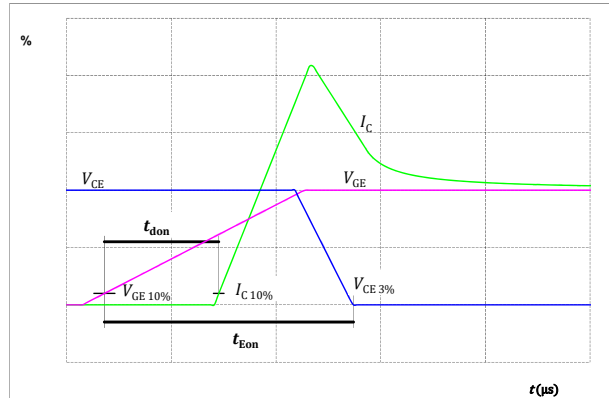
**figure 24.** MOSFET

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



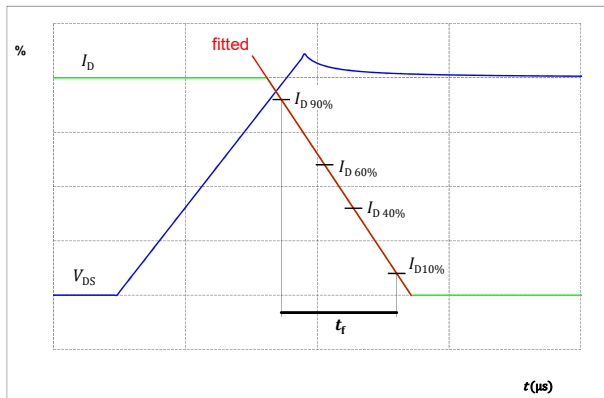
**figure 25.** MOSFET

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



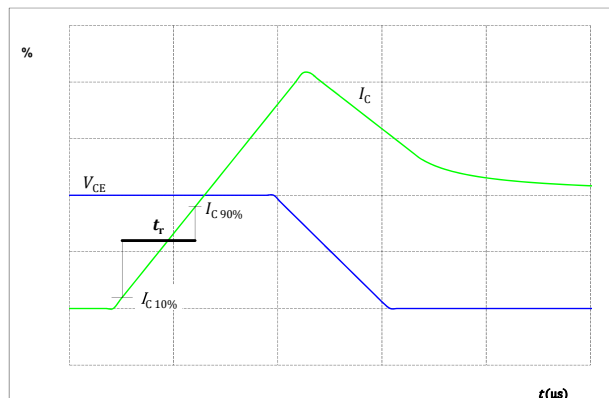
**figure 26.** MOSFET

Turn-off Switching Waveforms & definition of  $t_f$



**figure 27.** MOSFET

Turn-on Switching Waveforms & definition of  $t_r$





### Inverter Switching Definitions

figure 28. FWD

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

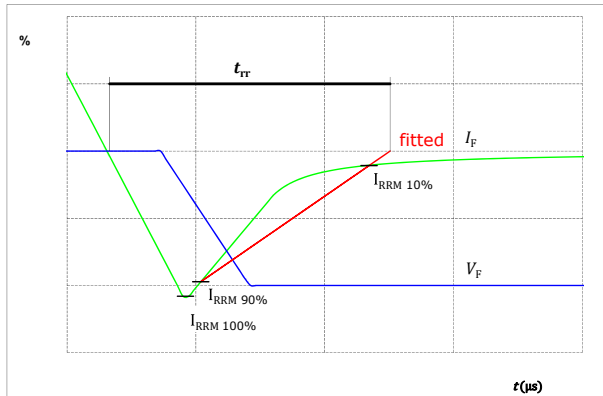


figure 29. FWD

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

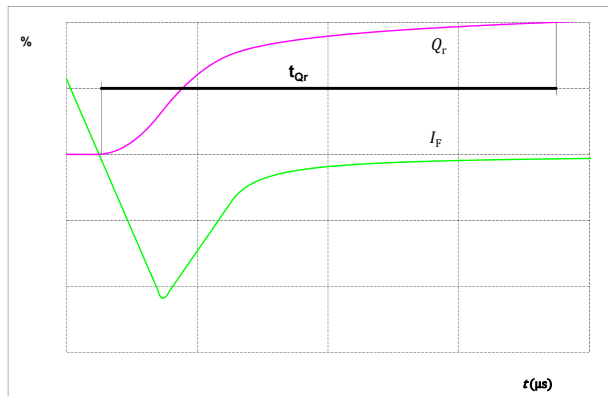
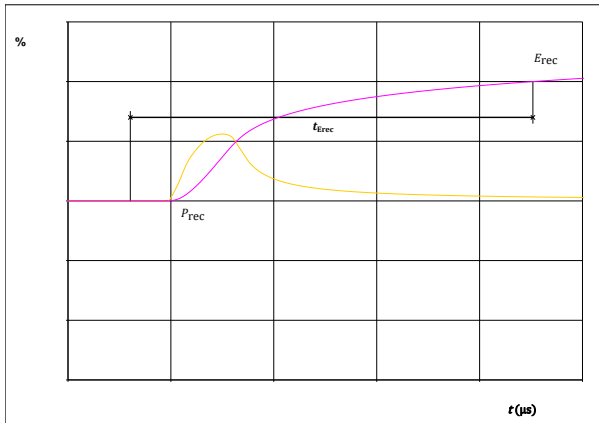


figure 30. FWD


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



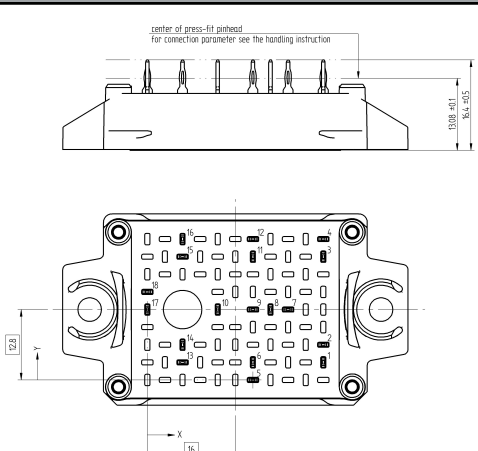


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Ordering Code	
<b>Version</b>	<b>Ordering Code</b>
Without thermal paste	10-EZ122PA011ME-LJ67F18T
With thermal paste (5,2 W/mK, PTM6000HV)	10-EZ122PA011ME-LJ67F18T-/7/

Marking						
	<b>Text</b>	<b>Name</b> NN-NNNNNNNNNNNNNN- TTTTTVV	<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]				Outline
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	



center of press-fit pinhead  
For connection parameter see the handling instruction

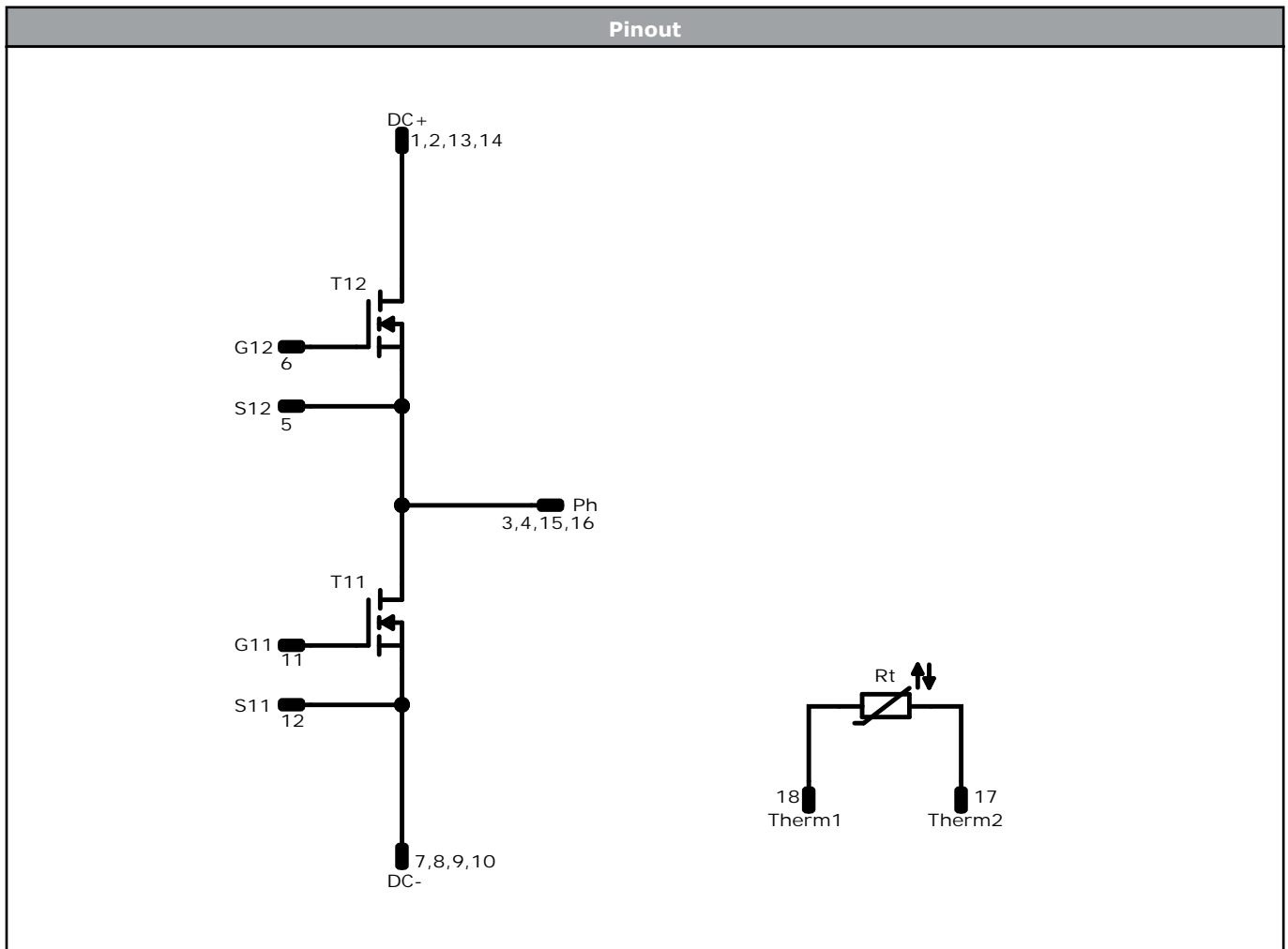
0,381 ±0,012  
0,64 ±0,012

2,8  
16

Tolerance of pinpositions: ±0,4mm at the end of pins  
Dimension of coordinate axis is only offset without tolerance



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Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	MOSFET	1200 V	10,5 mΩ	Inverter 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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=175^{\circ}C$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
10-EZ122PA011ME-LJ67F18T-D1-14	20 Feb. 2025	Initial Release	

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