Vincotech

10-EZ122PA016ME-LJ67F68T
datasheet

***flow*PHASE 1 SiC** | **1200 V / 16 mΩ**

Features

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

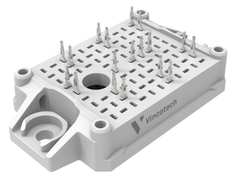
Target applications

- Charging Stations
- Industrial Drives
- Power Supply

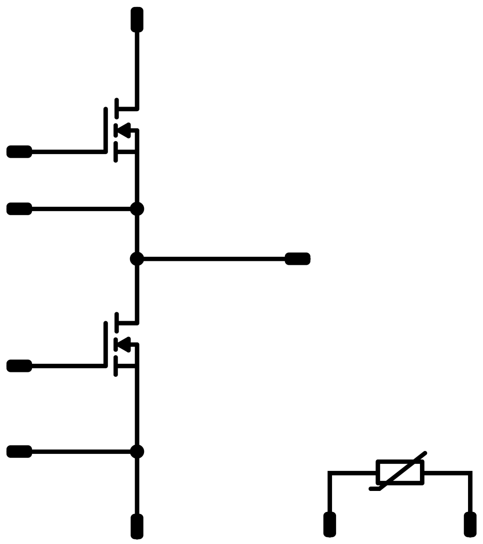
Types

- 10-EZ122PA016ME-LJ67F68T

flow E1 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Half-Bridge Switch					
Drain-source voltage	V_{DSS}			1200	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$	T_s = 80 °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 °C	168	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 s	6000	V
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				8,62	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

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[1]	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 [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,57		K/W

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω, R_{goff} = 2 Ω	0/15	600	65	25 125 150		16,96 14,72 14,4		ns
Rise time	t_r					25 125 150		6,72 6,72 6,4		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		49,92 56 57,6		ns
Fall time	t_f					25 125 150		21,48 26,48 25,94		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,596 µC Q_{rFWD}=1,11 µC Q_{rFWD}=1,39 µC				25 125 150		0,439 0,414 0,409		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,173 0,189 0,195		mWs
Peak recovery current	I_{RRM}	d*i*/d*t*=12261 A/µs d*i*/d*t*=13138 A/µs d*i*/d*t*=13187 A/µs				25 125 150		97,88 141,74 158,43		A
Reverse recovery time	t_{rr}					25 125 150		12,51 15,57 16,63		ns
Recovered charge	Q_r					25 125 150		0,596 1,11 1,39		µC
Reverse recovered energy	E_{rec}					25 125 150		0,152 0,321 0,459		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		25980 44921 49283		A/µs

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		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 493 Ω				100	-5		5	%
Power dissipation	P							245		mW
Power dissipation constant	d					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. ±2 %						3375		K
B-value	$B_{(25/100)}$	Tol. ±2 %						3437		K
Vincotech Thermistor Reference									K	

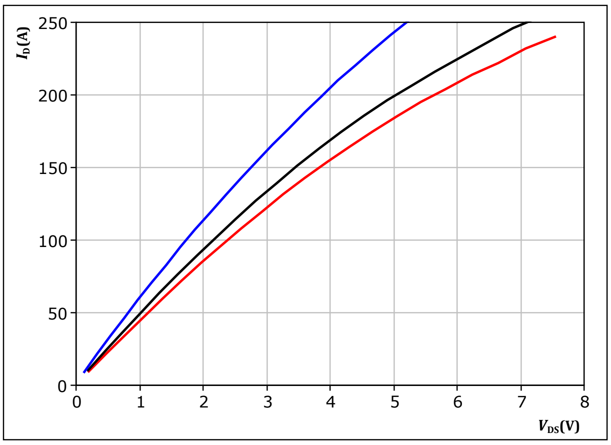
(1) Value at chip level
(2) Only valid with pre-applied Vincotech thermal interface material.

Half-Bridge Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})



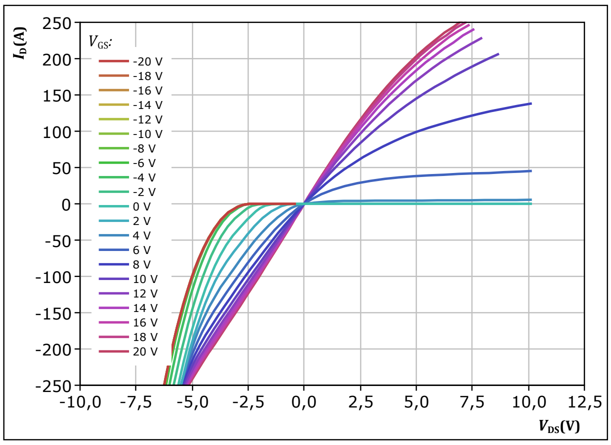
t_p =	250	µs
V_{GS} =	14	V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **MOSFET**

Typical output characteristics

I_D = f(V_{DS})



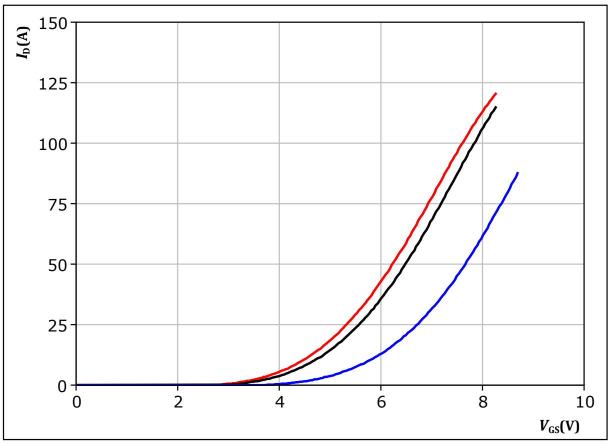
t_p =	250	µs
T_j =	150	°C

V_{GS} from -20 V to 20 V in steps of 2 V

figure 3. **MOSFET**

Typical transfer characteristics

I_D = f(V_{GS})



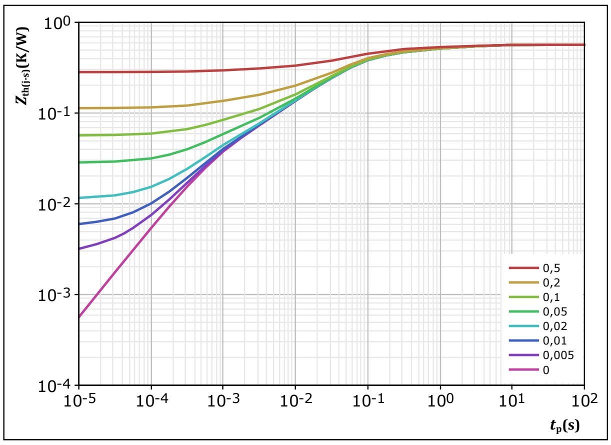
t_p =	250	µs
V_{DS} =	10	V

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	K/W

MOSFET thermal model values

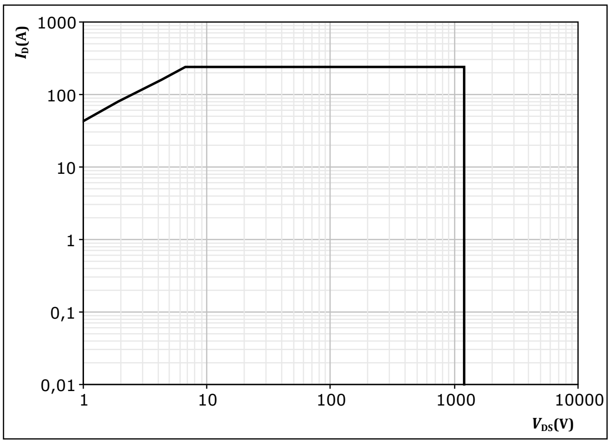
R (K/W)	τ (s)
6,00E-02	2,94E+00
9,00E-02	4,14E-01
3,09E-01	5,71E-02
7,27E-02	8,33E-03
3,36E-02	7,97E-04

Half-Bridge Switch Characteristics

figure 5.	MOSFET

Safe operating area

$I_D = f(V_{DS})$



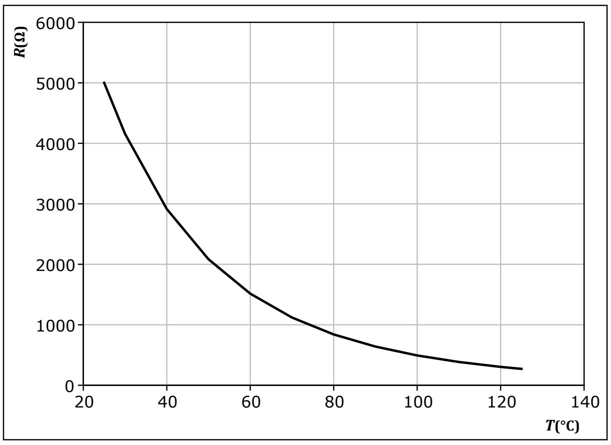
D =	single pulse	
T_s =	80	°C
V_{GS} =	14	V
T_j =	T_{jmax}	

Thermistor Characteristics

figure 6.	Thermistor

Typical NTC characteristic as function of temperature

$R_T = f(T)$

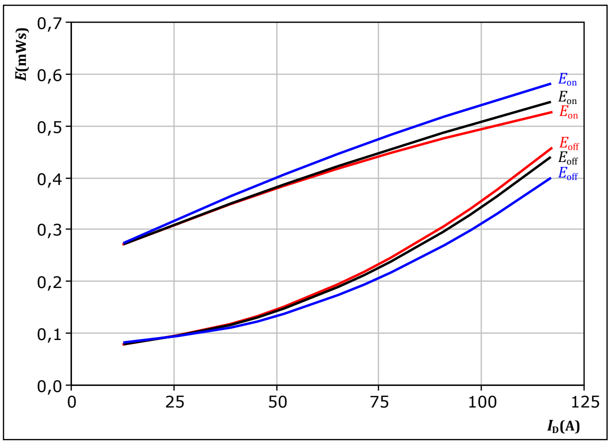


Half-Bridge Switching Characteristics

figure 7. **MOSFET**

Typical switching energy losses as a function of drain current

E = f(I_D)



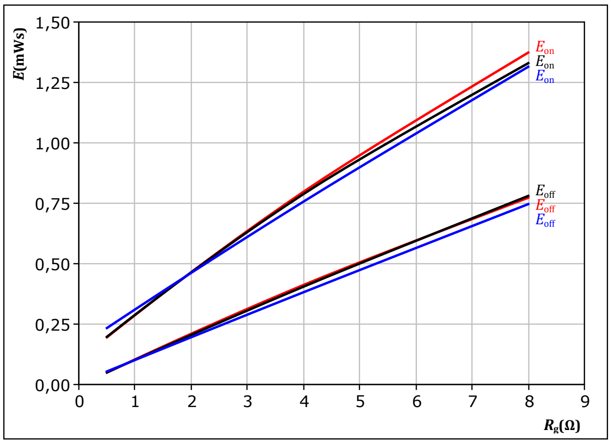
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 8. **MOSFET**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



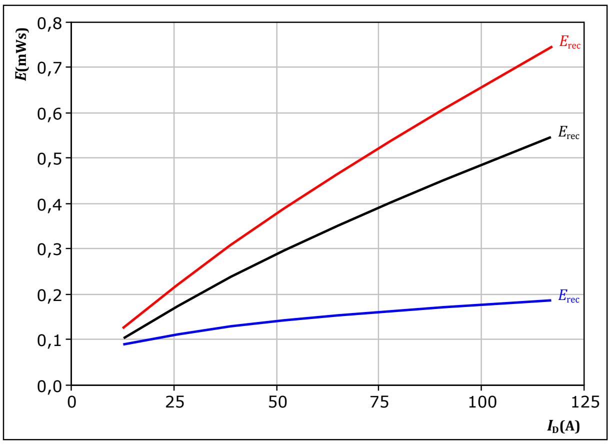
With an inductive load at

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)



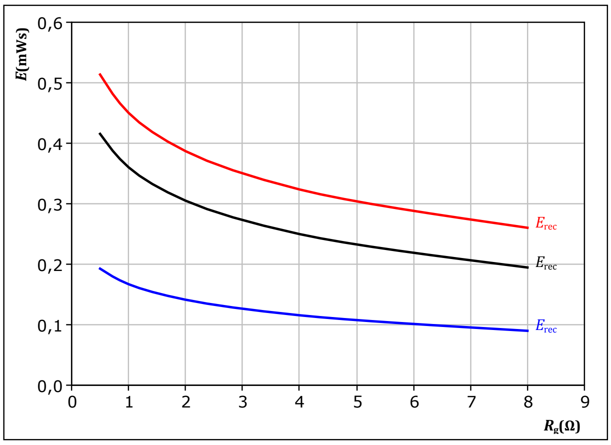
With an inductive load at

V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
R_{gon} =	2	Ω		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

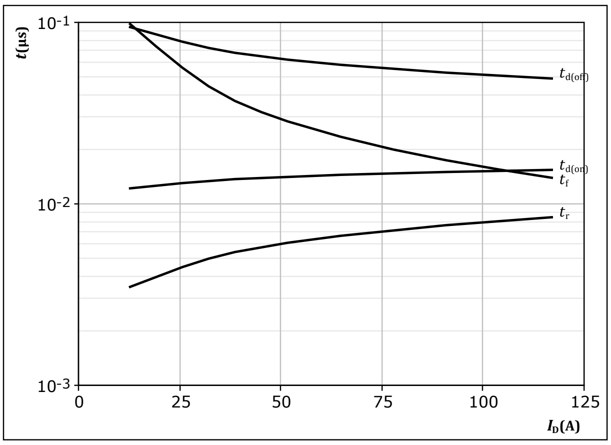
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
I_D =	65	A		150 °C

Half-Bridge Switching Characteristics

figure 11. **MOSFET**

Typical switching times as a function of drain current

t = f(I_D)



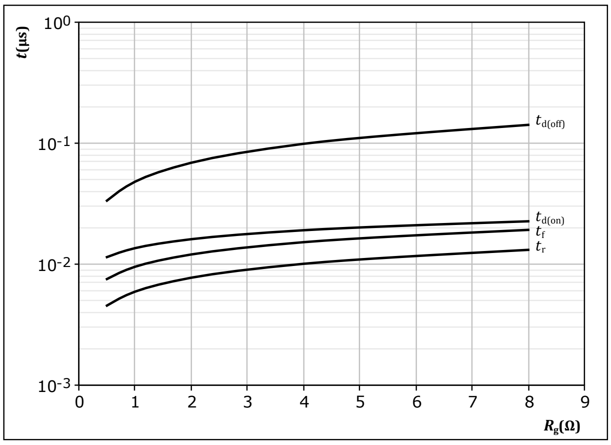
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	0/15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 12. **MOSFET**

Typical switching times as a function of gate resistor

t = f(R_g)



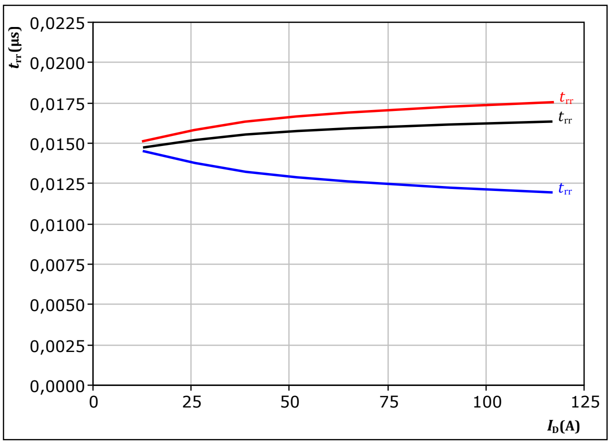
With an inductive load at

T_j =	150	°C
V_{DS} =	600	V
V_{GS} =	0/15	V
I_D =	65	A

figure 13. **MOSFET**

Typical reverse recovery time as a function of drain current

t_{rr} = f(I_D)



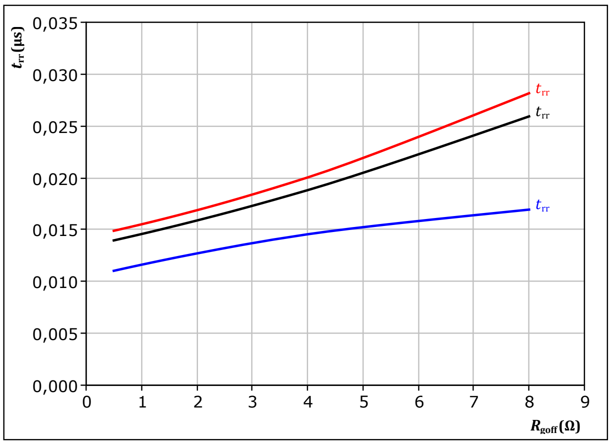
At			
	V_{DS} =	600	V
	V_{GS} =	0/15	V
	R_{gon} =	2	Ω

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_{goff})



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

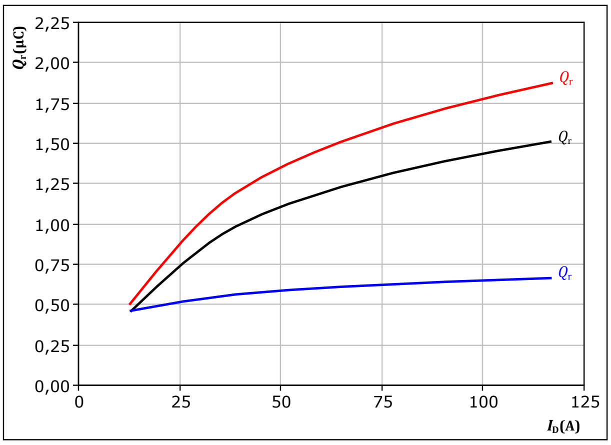
T_j: 25 °C, 125 °C, 150 °C

Half-Bridge Switching Characteristics

figure 15. **MOSFET**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

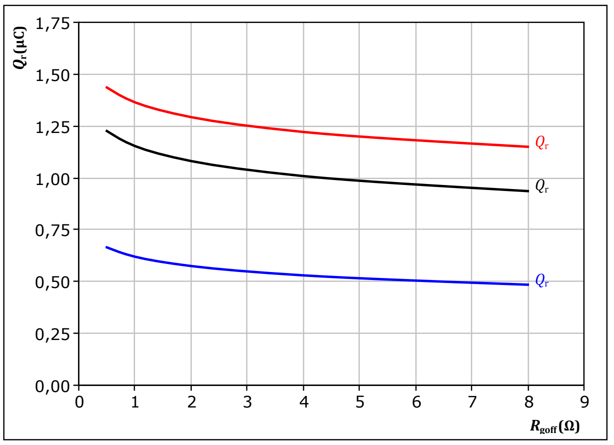


At				T_j:	
	V_{DS} =	600	V		25 °C
	V_{GS} =	0/15	V		125 °C
	R_{gon} =	2	Ω		150 °C

figure 16. **MOSFET**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$

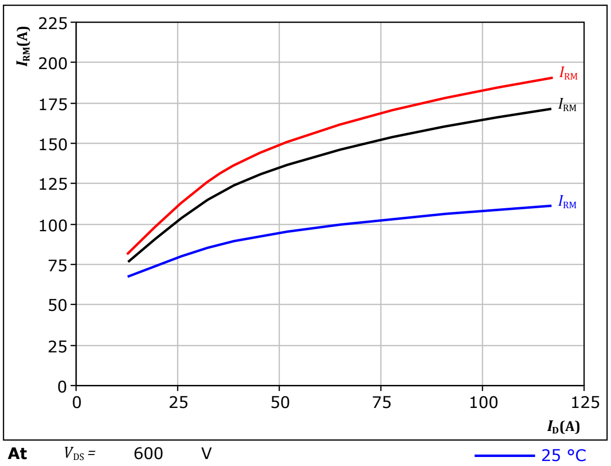


At				T_j:	
	V_{DS} =	600	V		25 °C
	V_{GS} =	0/15	V		125 °C
	I_D =	65	A		150 °C

figure 17. **MOSFET**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

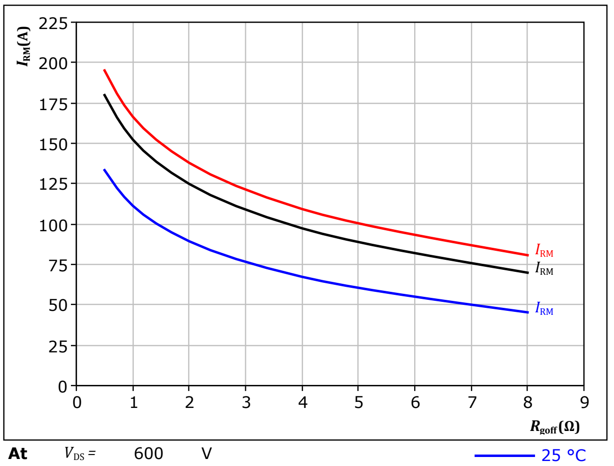


At				T_j:	
	V_{DS} =	600	V		25 °C
	V_{GS} =	0/15	V		125 °C
	R_{gon} =	2	Ω		150 °C

figure 18. **MOSFET**

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

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



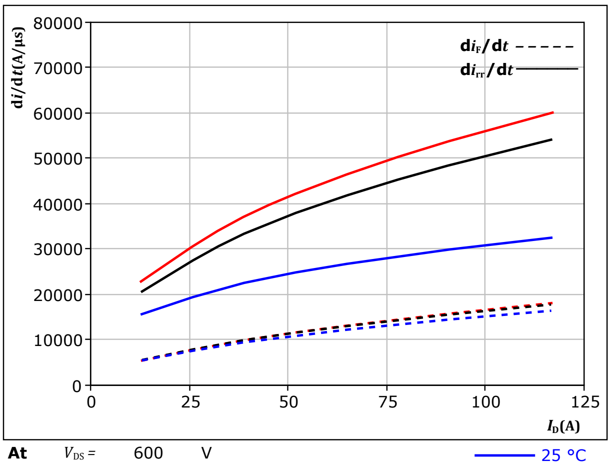
At				T_j:	
	V_{DS} =	600	V		25 °C
	V_{GS} =	0/15	V		125 °C
	I_D =	65	A		150 °C

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)

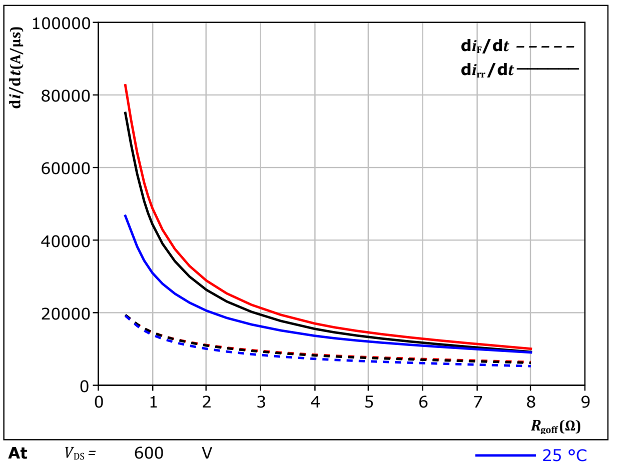


At				
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
R_{gon} =	2	Ω		150 °C

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})

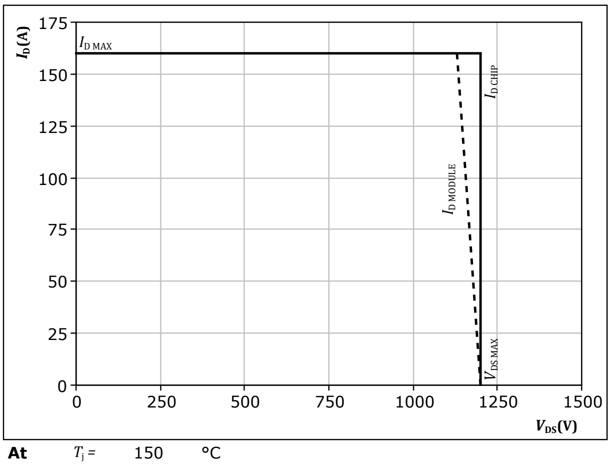


At				
V_{DS} =	600	V	T_j:	25 °C
V_{GS} =	0/15	V		125 °C
I_D =	65	A		150 °C

figure 21. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At		
T_j =	150	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Half-Bridge Switching Definitions

figure 22. **MOSFET**

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

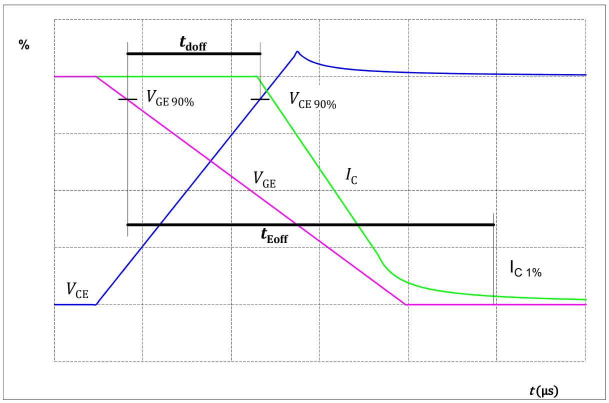


figure 23. **MOSFET**

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

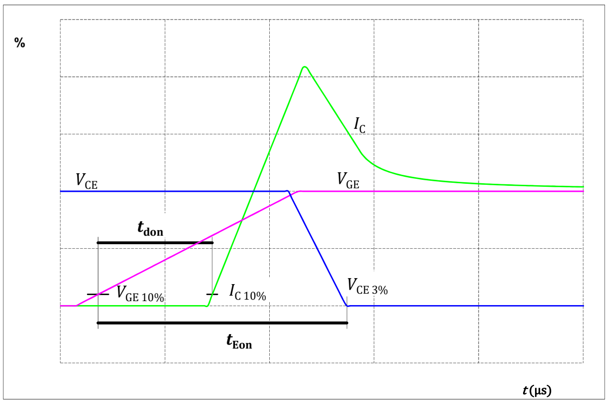


figure 24. **MOSFET**

Turn-off Switching Waveforms & definition of t_f

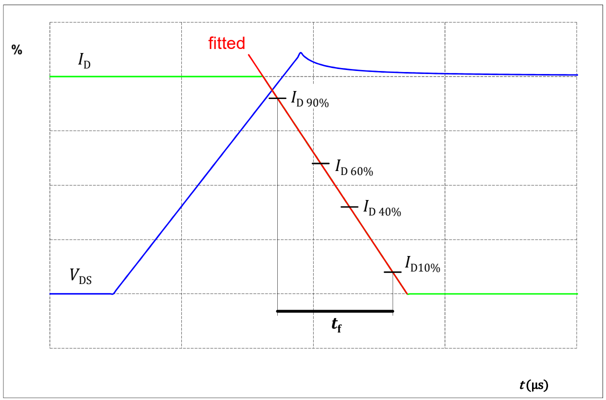
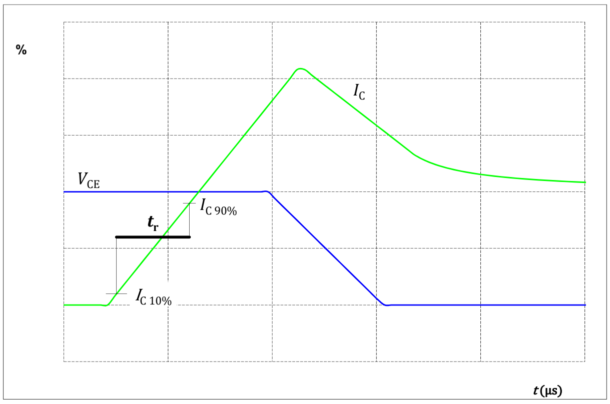


figure 25. **MOSFET**

Turn-on Switching Waveforms & definition of t_r



Half-Bridge Switching Definitions

figure 26. **FWD**

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

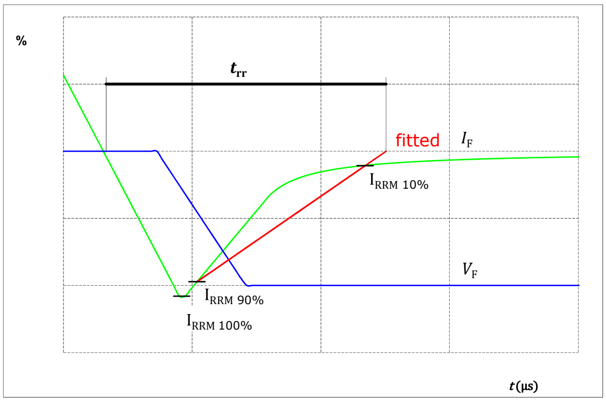


figure 27. **FWD**

Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})

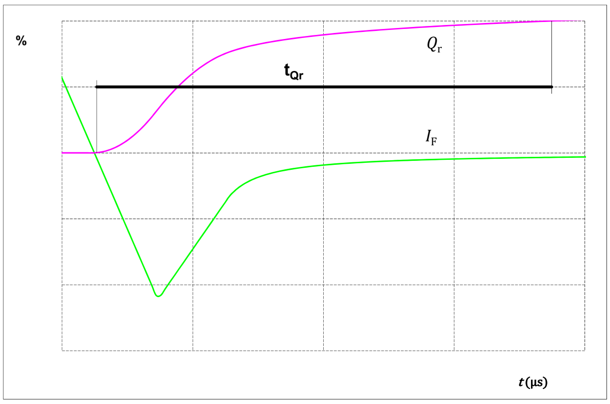
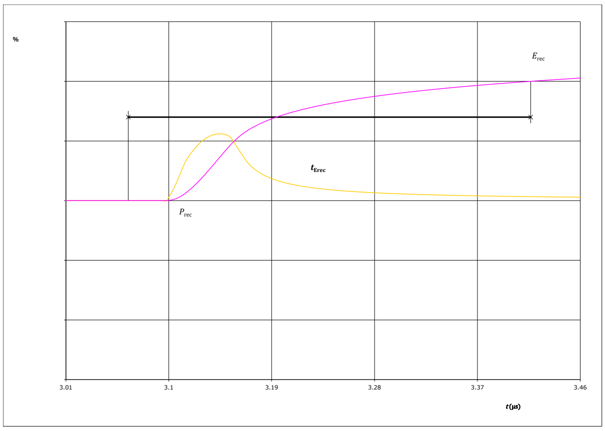


figure 28. **FWD**

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



Vincotech

Ordering Code

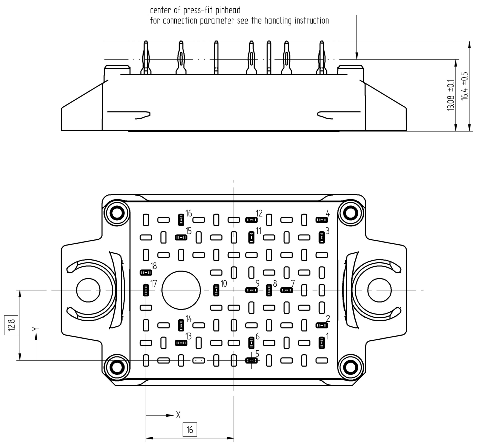
Version	Ordering Code
Without thermal paste	10-EZ122PA016ME-LJ67F68T
With thermal paste	10-EZ122PA016ME-LJ67F68T-/3/

Marking

	**Text**	**Name**	**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNN-TTTTTTVV	WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**	
		TTTTTTTVV	LLLLL	SSSS	WWYY	

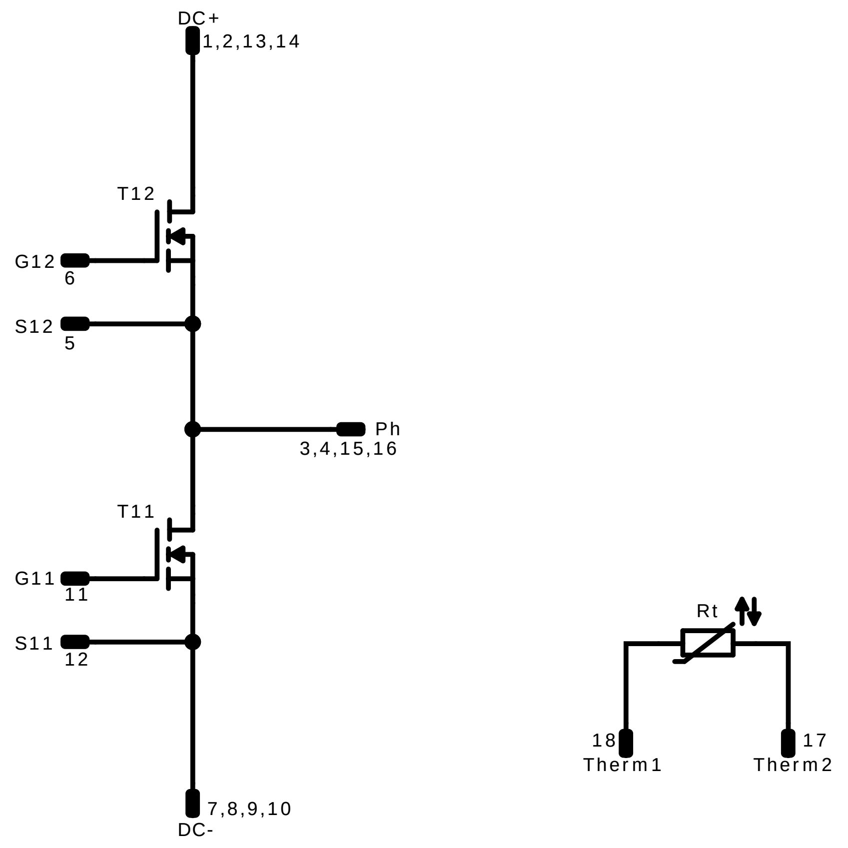
Outline

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



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

Pinout



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 *flow* E1 packages see vincotech.com website.

Package data
Package data for *flow* 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		