Vincotech

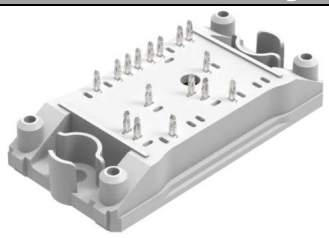
10-PC094PB065ME01-L637F06Y
datasheet

***fast* PACK 0 SiC** **900 V / 65 mΩ**

Features

- Dual half-bridge with Kelvin Emitter
- High efficient high speed SiC MOS
- Thermistor

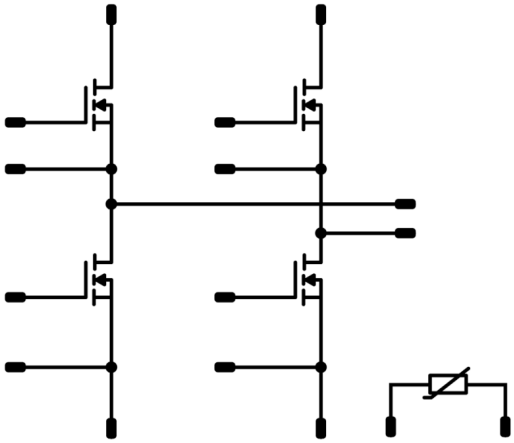
flow 0 12 mm housing



Target applications

- Power Supply

Schematic



Types

- 10-PC094PB065ME01-L637F06Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Half-Bridge Switch				
Drain-source voltage	V_{DSS}		900	V
Drain current	I_D	$T_j = T_{jmax}$ T_s = 80 °C	25	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	90	A
Avalanche energy, single pulse	E_{AS}	I_D = 22 A V_{DD} = 50 V	110	mJ
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	54	W
Gate-source voltage	V_{GSS}		-4 / 15	V
Gate-source voltage	V_{GSmax}	Dynamic*	-8 / 19	V
Maximum Junction Temperature	T_{jmax}		175	°C

*See figure 6. at page 5.

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
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
		AC Voltage t_p = 1 min	2500	V
Creepage distance			>12,7	mm
Clearance			9,57	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production

Characteristic Values

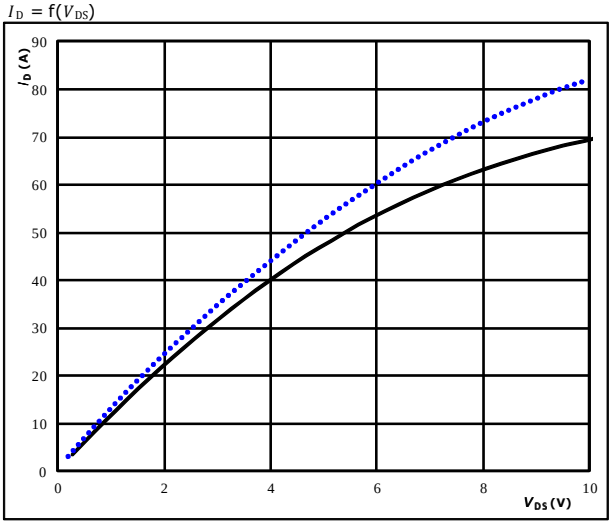
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Half-Bridge Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		15		20	25 125		62 78	78	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	V_{GS} = V_{DS}			0,005	25	1,7	2,4	3,5	V
Gate to Source Leakage Current	I_{GSS}		15	0		25			250	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	900		25			100	µA
Internal gate resistance	r_g							4,7		Ω
Gate charge	Q_g							30,4		
Gate to source charge	Q_{GS}		-4/15	400	20	25		7,5		nC
Gate to drain charge	Q_{GD}							12		
Short-circuit input capacitance	C_{iss}							660		
Short-circuit output capacitance	C_{oss}	f= 1MHz	0	600		25		60		pF
Reverse transfer capacitance	C_{rss}							4		
Reverse Diode Static										
Diode forward voltage	V_{SD}		-4		10	25		4,8		V
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,75		K/W
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

Half-Bridge Switch Characteristics

figure 1. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

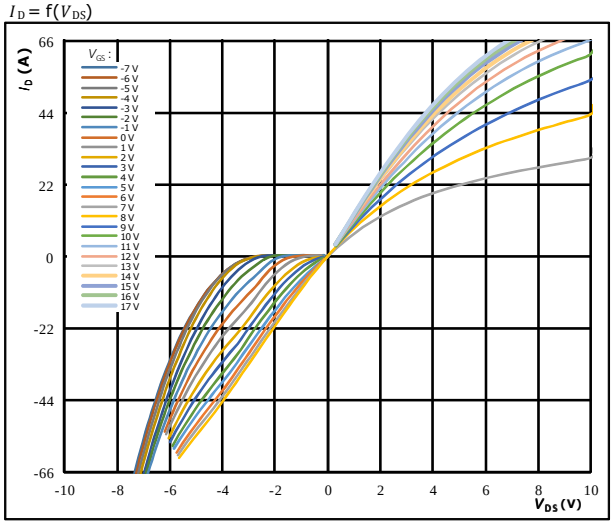


t_p =	250	µs	T_j:	25 °C	
V_{GS} =	16	V		125 °C	

figure 2. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

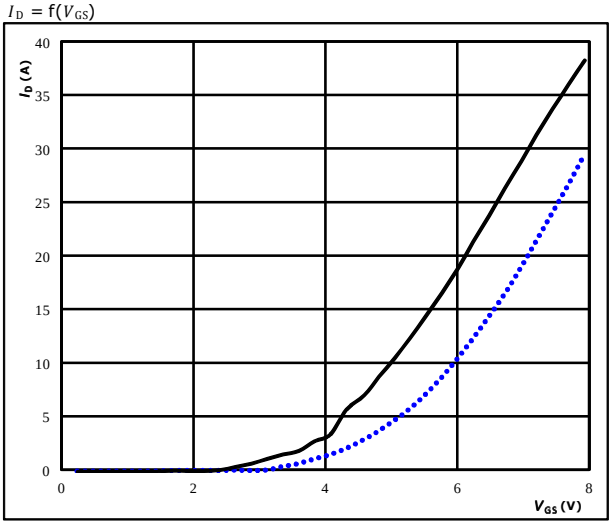


t_p =	250	µs
T_j =	125	°C
V_{GS} from	-7 V to 17 V in steps of 1 V	

figure 3. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

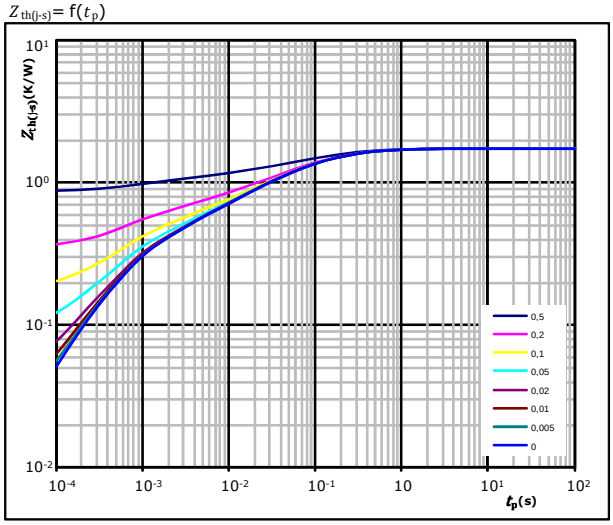


t_p =	100	µs	T_j:	25 °C	
V_{DS} =	10	V		125 °C	

figure 4. **MOSFET**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,75	K/W

MOSFET thermal model values

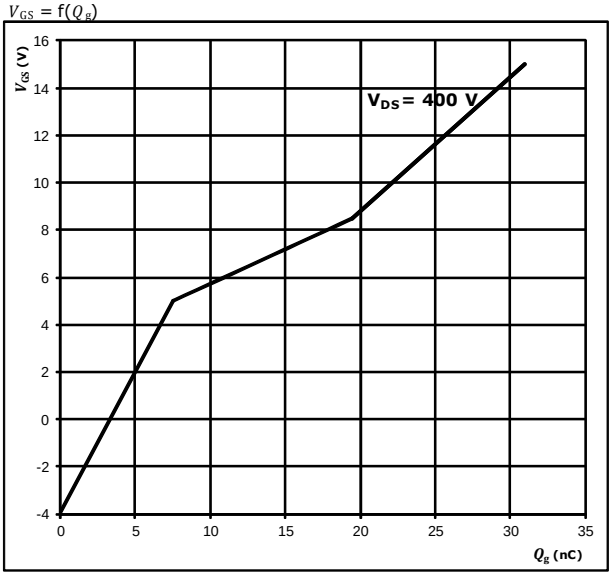
R (K/W)	τ (s)
1,68E-02	2,51E+00
2,14E-01	4,20E-01
6,08E-01	8,60E-02
4,08E-01	2,04E-02
2,18E-01	3,79E-03
2,87E-01	6,31E-04

Half-Bridge Switch Characteristics

figure 5. **MOSFET**

Gate voltage vs Gate charge

$V_{GS} = f(Q_g)$



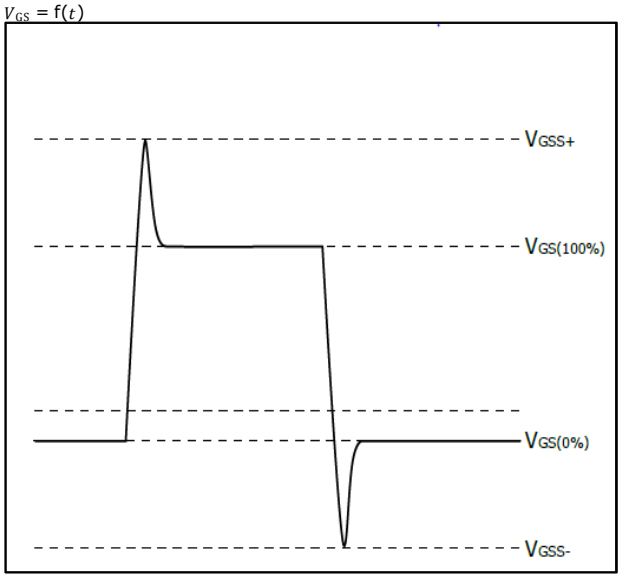
At

I_{DS} =	20	A
T_j =	25	°C

figure 6. **MOSFET**

Gate maximum operating boundaries

$V_{GS} = f(t)$



At

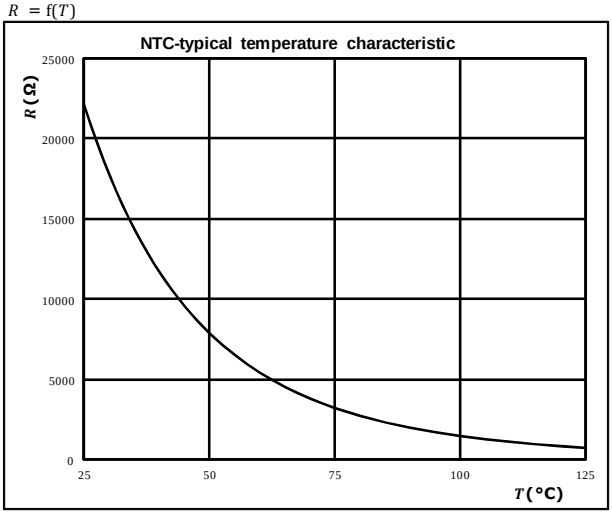
V_{GSS+} =	19 V
$V_{GS}(100\%)$ =	15 V
$V_{GS}(0\%)$ =	-4 V
V_{GSS-} =	-8 V

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

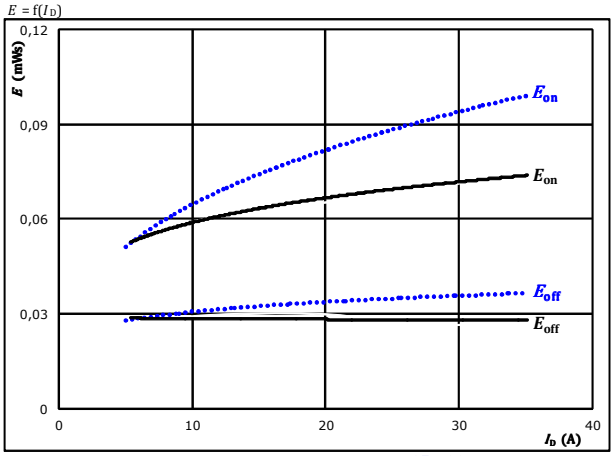


Half-Bridge Switching Characteristics

figure 1. MOSFET

Typical switching energy losses as a function of drain current

$E = f(I_D)$

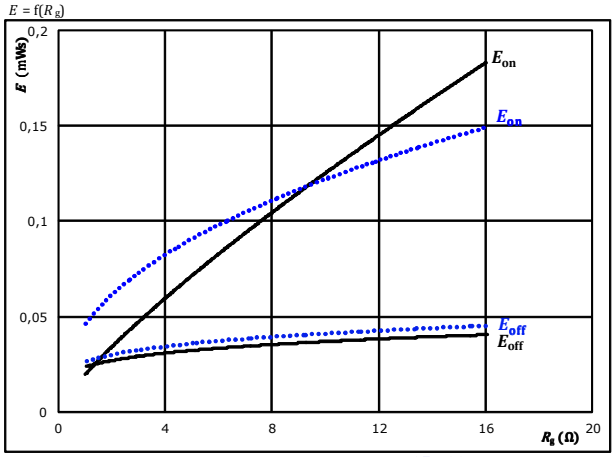


With an inductive load at — 25 °C
V_{DS} = 600 V — T_j: 125 °C
V_{GS} = -5/15 V
R_{gon} = 4 Ω
R_{goff} = 4 Ω

figure 2. MOSFET

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$

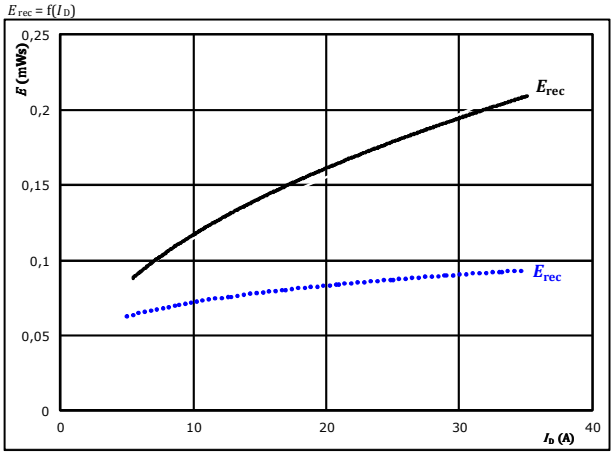


With an inductive load at — 25 °C
V_{DS} = 600 V — T_j: 125 °C
V_{GS} = -5/15 V
I_D = 20 A

figure 3. FWD

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$

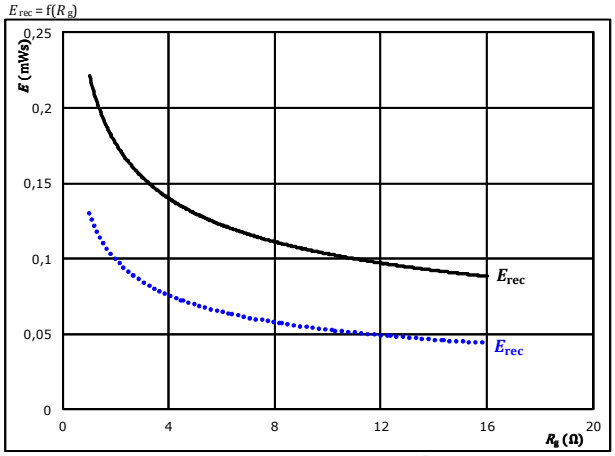


With an inductive load at — 25 °C
V_{DS} = 600 V — T_j: 125 °C
V_{GS} = -5/15 V
R_{gon} = 4 Ω

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



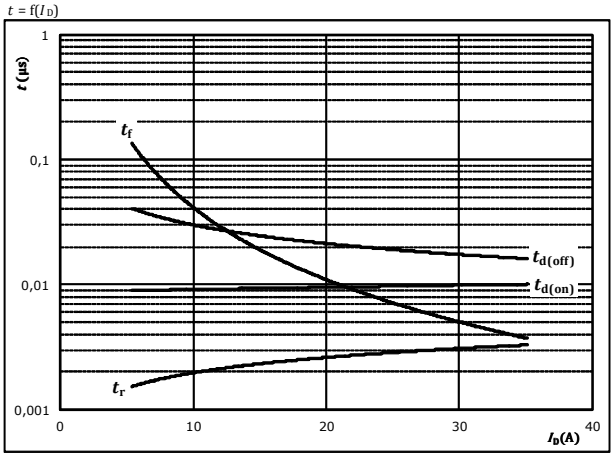
With an inductive load at — 25 °C
V_{DS} = 600 V — T_j: 125 °C
V_{GS} = -5/15 V
I_D = 20 A

Half-Bridge Switching Characteristics

figure 5. MOSFET

Typical switching times as a function of drain current

$t = f(I_D)$



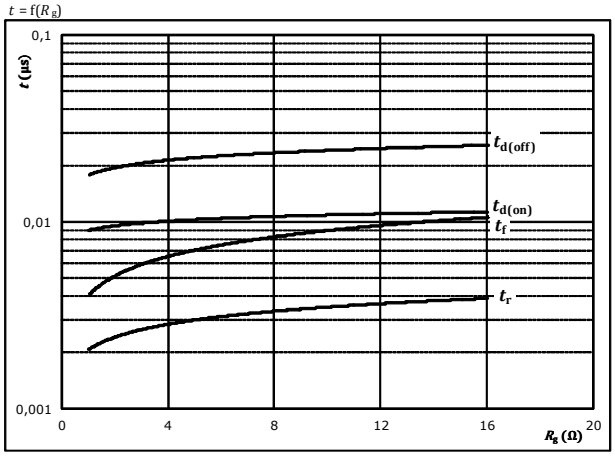
With an inductive load at

T_j =	125	°C
V_{DS} =	600	V
V_{GS} =	-5/15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. MOSFET

Typical switching times as a function of gate resistor

$t = f(R_g)$



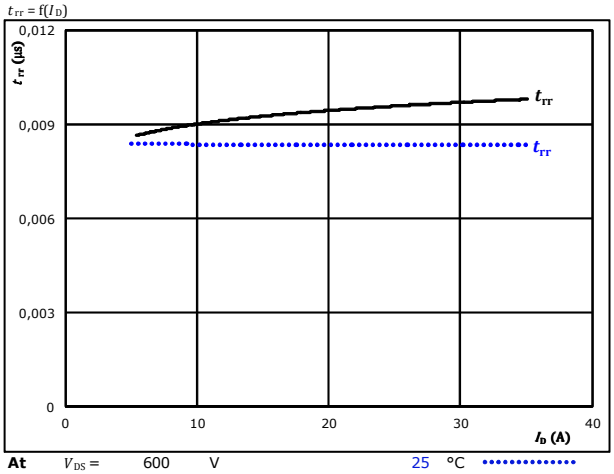
With an inductive load at

T_j =	125	°C
V_{DS} =	600	V
V_{GS} =	-5/15	V
I_D =	20	A

figure 7. FWD

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$

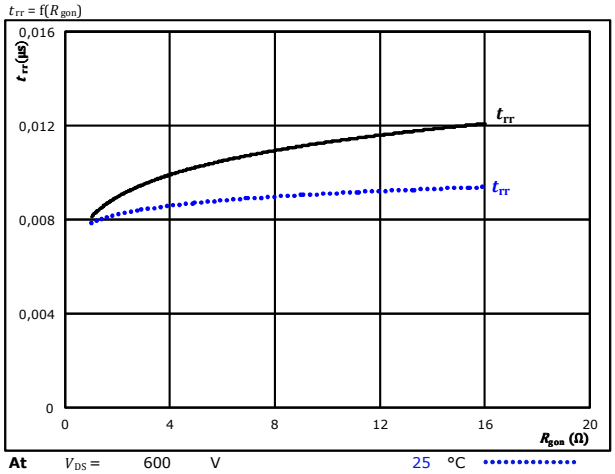


At	V_{DS} =	600	V	T_j:	25 °C
	V_{GS} =	-5/15	V		125 °C
	R_{gon} =	4	Ω		

figure 8. FWD

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

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



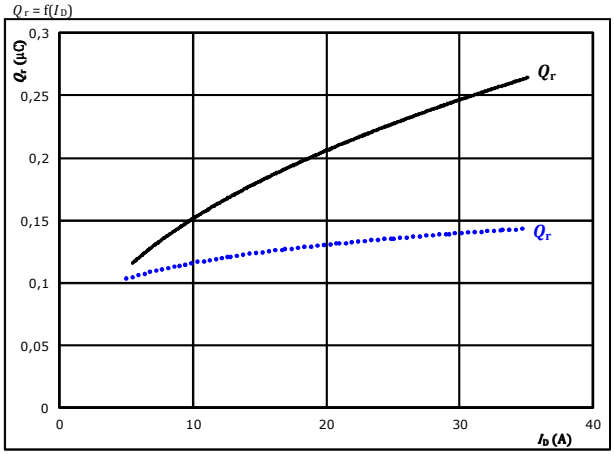
At	V_{DS} =	600	V	T_j:	25 °C
	V_{GS} =	-5/15	V		125 °C
	I_D =	20	A		

Half-Bridge Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

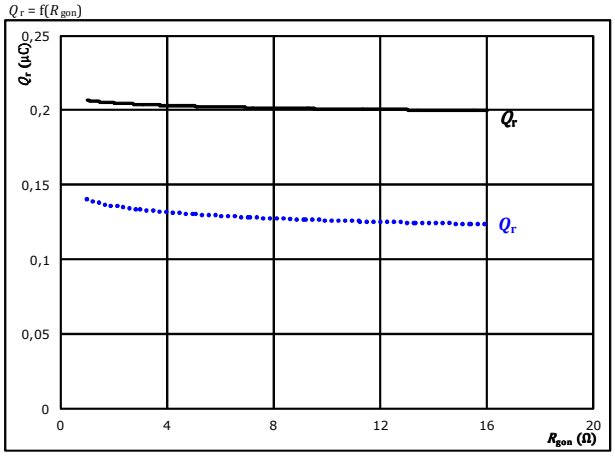


At						
	V_{DS} =	600	V		25 °C	
	V_{GS} =	-5/15	V	T_j:	125 °C	
	R_{gon} =	4	Ω			

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

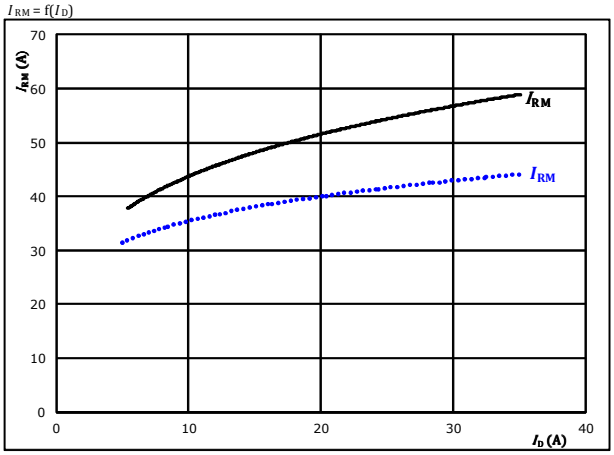


At						
	V_{DS} =	600	V		25 °C	
	V_{GS} =	-5/15	V	T_j:	125 °C	
	I_D =	20	A			

figure 11. **FWD**

Typical peak reverse recovery current current as a function of drain current

$I_{RM} = f(I_D)$

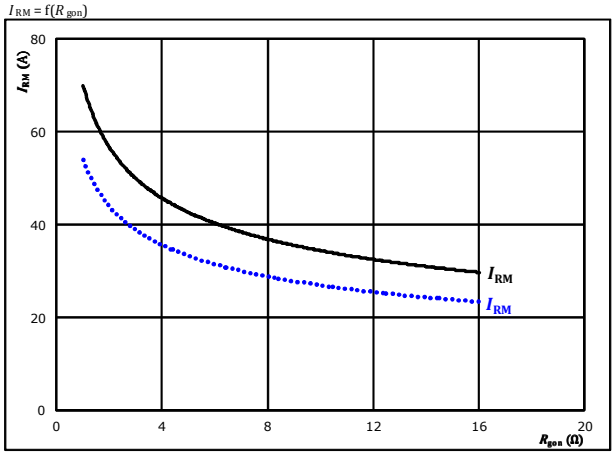


At						
	V_{DS} =	600	V		25 °C	
	V_{GS} =	-5/15	V	T_j:	125 °C	
	R_{gon} =	4	Ω			

figure 12. **FWD**

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

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



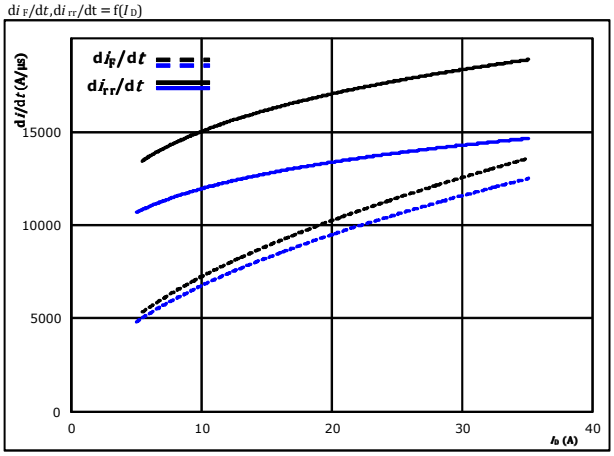
At						
	V_{DS} =	600	V		25 °C	
	V_{GS} =	-5/15	V	T_j:	125 °C	
	I_D =	20	A			

Half-Bridge Switching Characteristics

figure 13. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of drain current

$di_F/dt, di_{rr}/dt = f(I_D)$

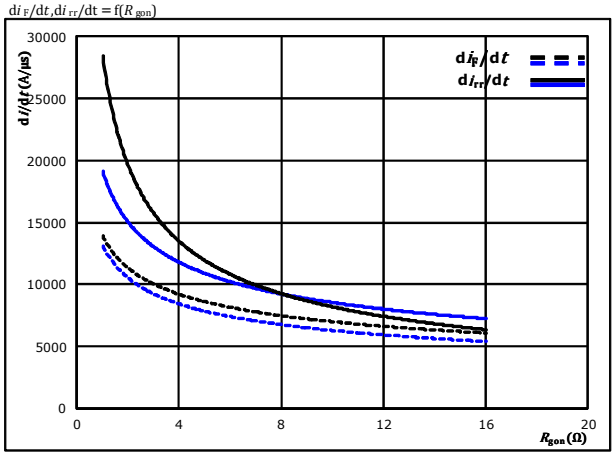


At	V_{DS} =	600	V		
	V_{GS} =	-5/15	V	T_j:	25 °C, 125 °C
	R_{gon} =	4	Ω		

figure 14. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of MOSFET turn on gate resistor

$di_F/dt, di_{rr}/dt = f(R_{gon})$

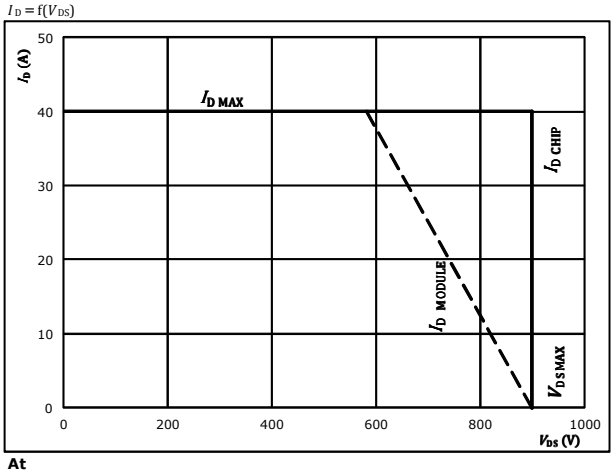


At	V_{DS} =	600	V		
	V_{GS} =	-5/15	V	T_j:	25 °C, 125 °C
	I_D =	20	A		

figure 15. **MOSFET**

Reverse bias safe operating area

$I_D = f(V_{DS})$



At

T_j =	175	°C	
R_{gon} =	4	Ω	
R_{goff} =	4	Ω	

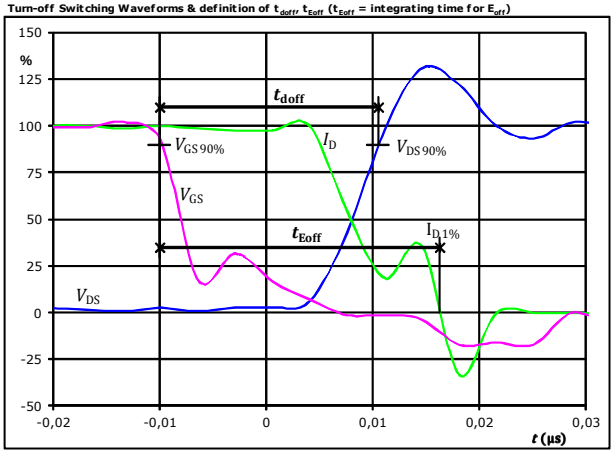
Half-Bridge Switching Definitions

General conditions

T_j	=	**125 °C**
R_{gon}	=	**4 Ω**
R_{goff}	=	**4 Ω**

figure 1. MOSFET

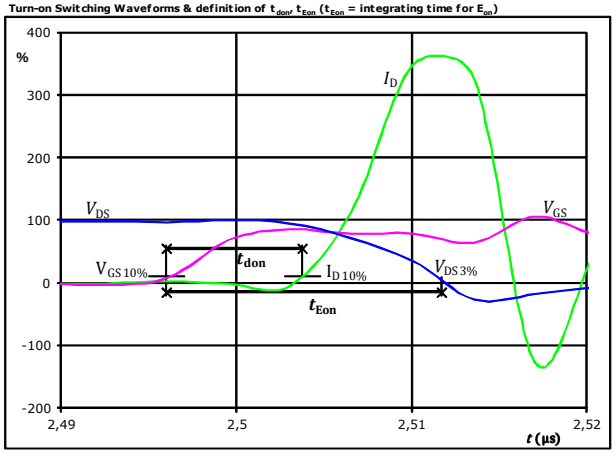
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GS}(0\%)$ =	-5	V
$V_{GS}(100\%)$ =	15	V
$V_{DS}(100\%)$ =	600	V
$I_D(100\%)$ =	20	A
t_{doff} =	0,020	µs
t_{Eoff} =	0,026	µs

figure 2. MOSFET

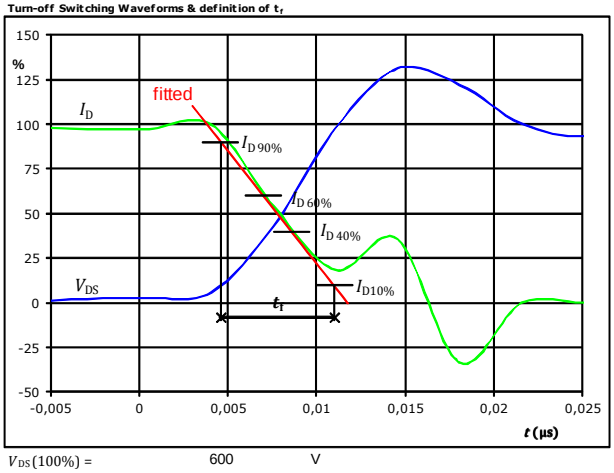
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GS}(0\%)$ =	-5	V
$V_{GS}(100\%)$ =	15	V
$V_{DS}(100\%)$ =	600	V
$I_D(100\%)$ =	20	A
t_{don} =	0,010	µs
t_{Eon} =	0,016	µs

figure 3. MOSFET

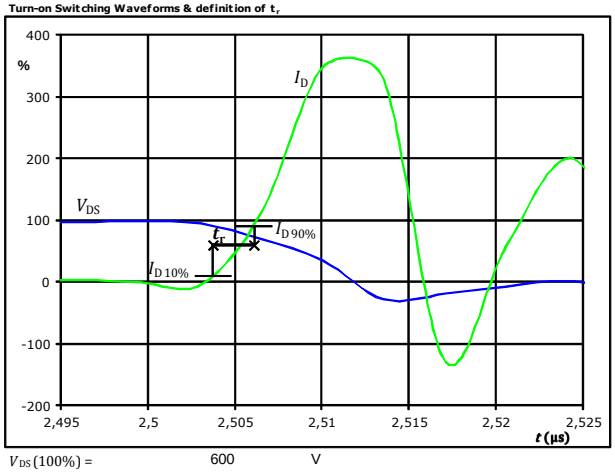
Turn-off Switching Waveforms & definition of t_f



$V_{DS}(100\%)$ =	600	V
$I_D(100\%)$ =	20	A
t_f =	0,005	µs

figure 4. MOSFET

Turn-on Switching Waveforms & definition of t_r

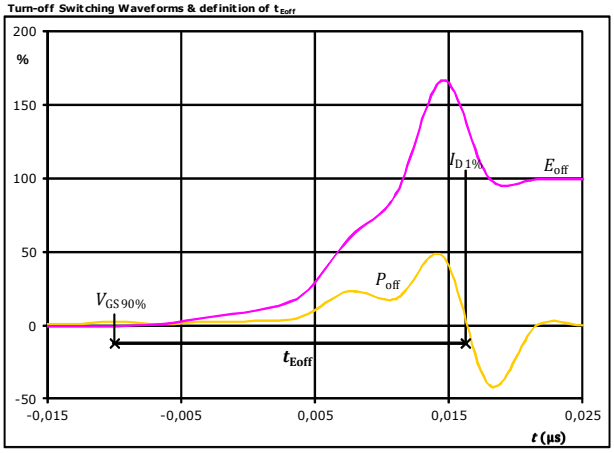


$V_{DS}(100\%)$ =	600	V
$I_D(100\%)$ =	20	A
t_r =	0,003	µs

Half-Bridge Switching Characteristics

figure 5. **MOSFET**

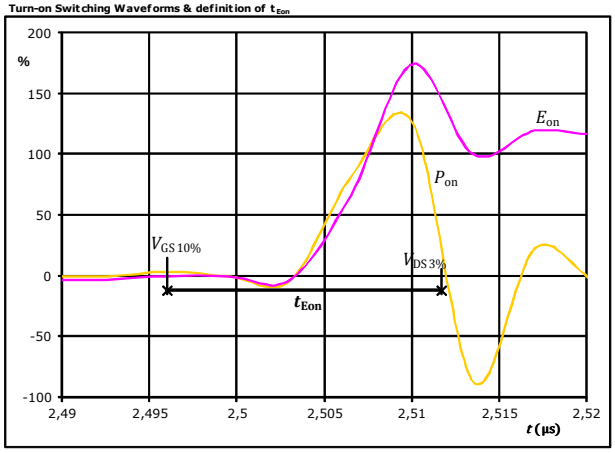
Turn-off Switching Waveforms & definition of t_{Eoff}



$P_{off}(100\%)$ =	12,05	kW
$E_{off}(100\%)$ =	0,03	mJ
t_{Eoff} =	0,03	µs

figure 6. **MOSFET**

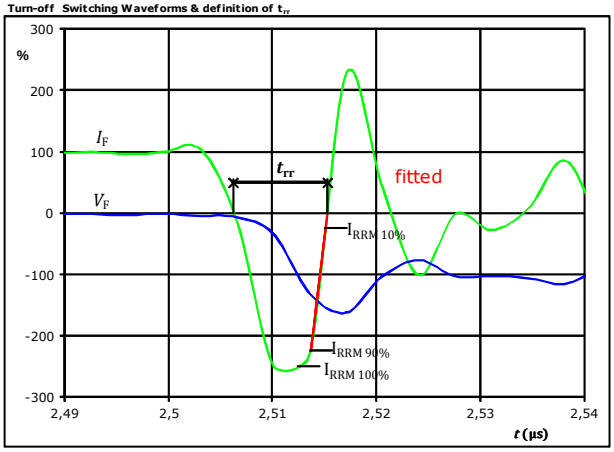
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on}(100\%)$ =	12,05	kW
$E_{on}(100\%)$ =	0,07	mJ
t_{Eon} =	0,02	µs

figure 7. **FWD**

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

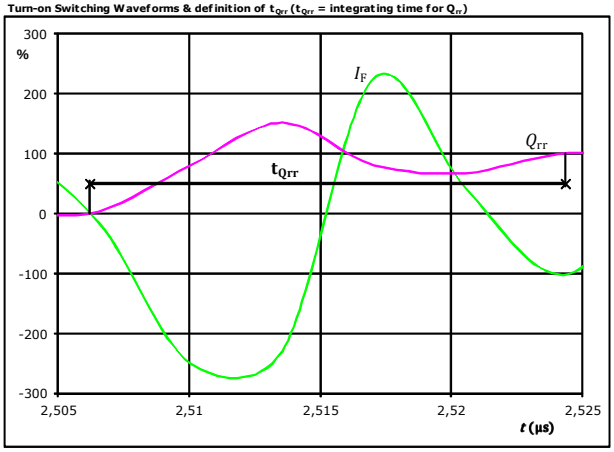


$V_F(100\%)$ =	600	V
$I_F(100\%)$ =	20	A
$I_{RRM}(100\%)$ =	-52	A
t_{rr} =	0,009	µs

Half-Bridge Switching Characteristics

figure 8. **FWD**

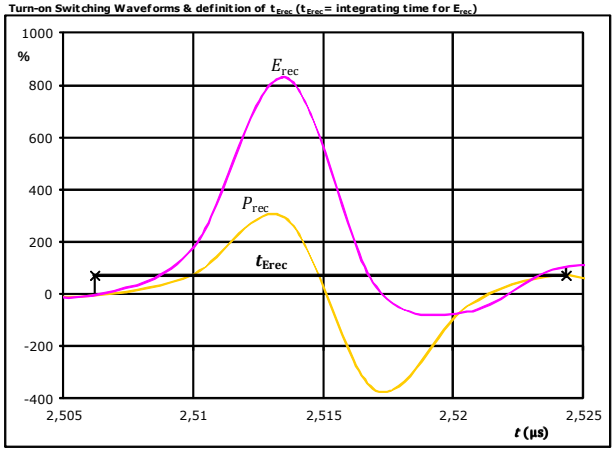
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_F (100%) =	20	A
Q_{rr} (100%) =	0,20	µC
t_{Qrr} =	0,02	µs

figure 9. **FWD**

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



P_{rec} (100%) =	12,05	kW
E_{rec} (100%) =	0,16	mJ
t_{Erec} =	0,02	µs

Vincotech

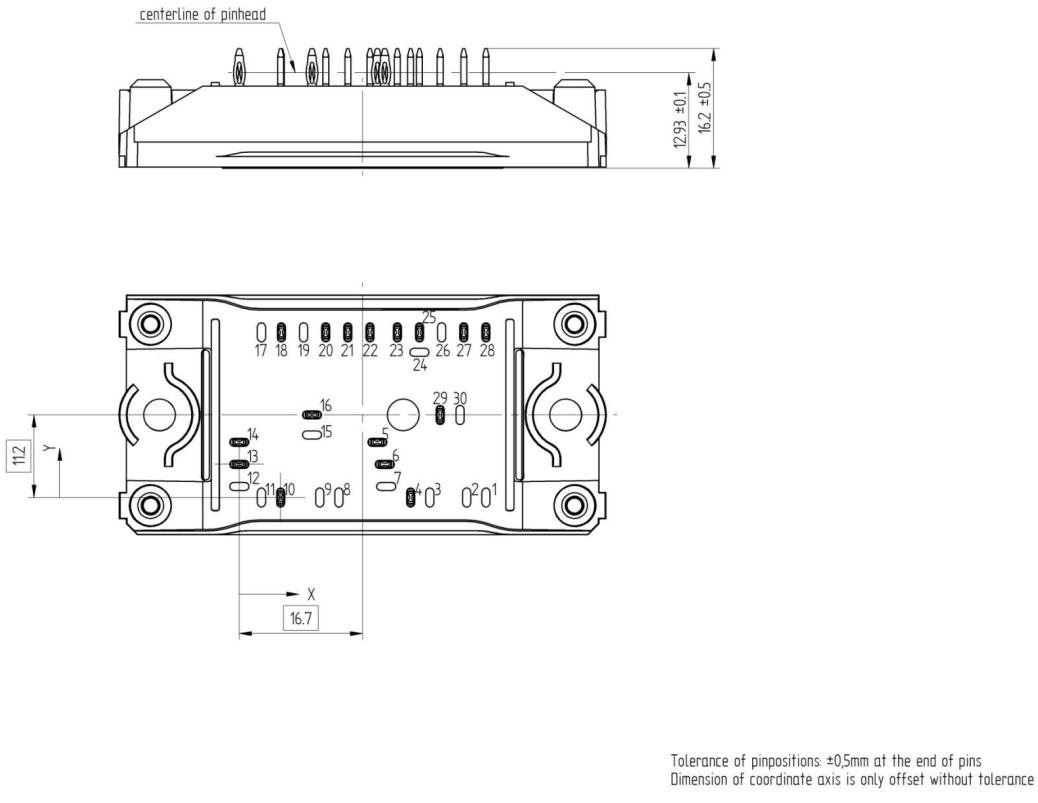
Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing with press-fit pin	10-PC094PB065ME01-L637F06Y
with thermal paste 12 mm housing with press-fit pin	10-PC094PB065ME01-L637F06Y-/3/

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

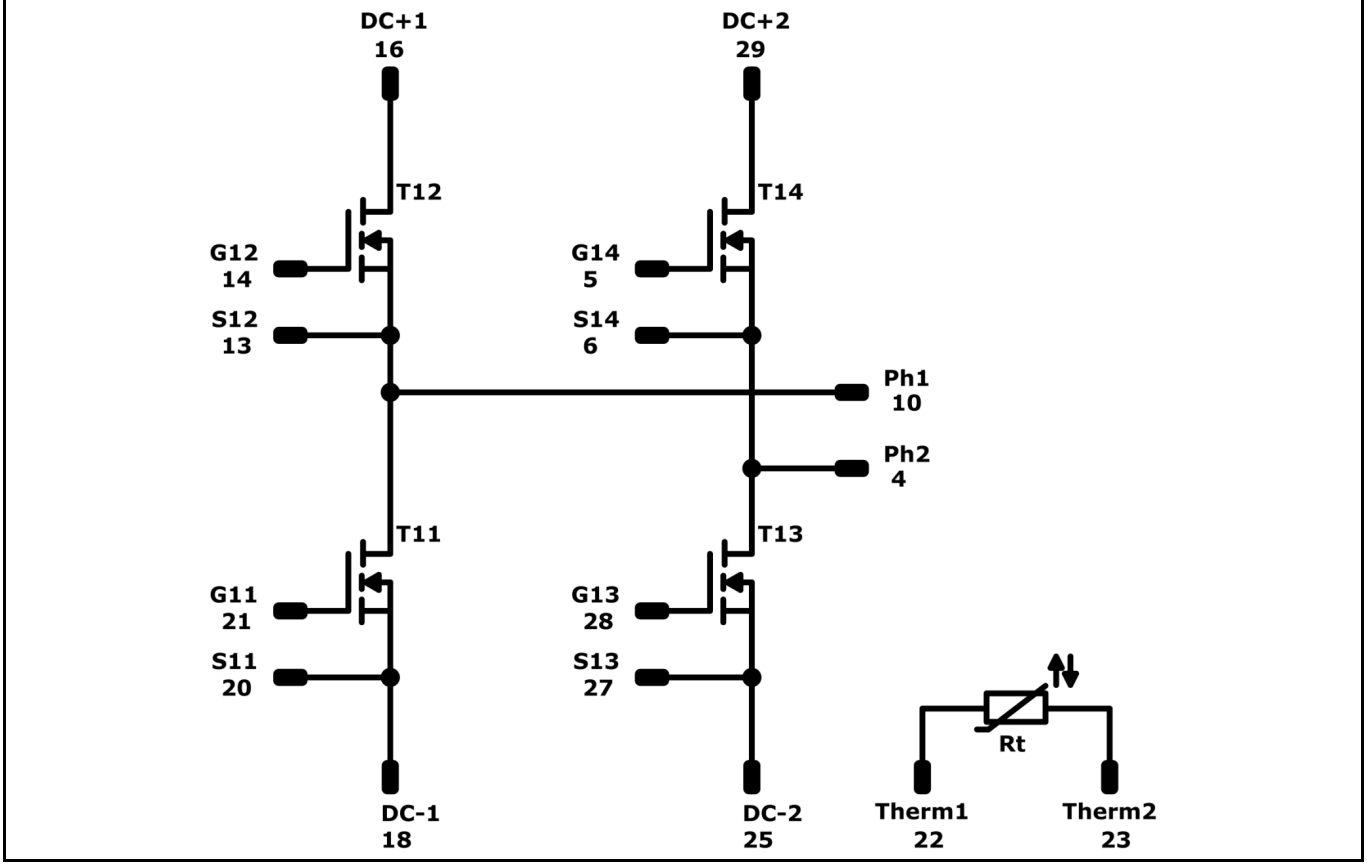
Outline

Pin table			
Pin	X	Y	Function
1	not assembled		
2			
3			
4	23,2	0	Ph2
5	18,7	7,5	G14
6	19,7	4,5	S14
7	not assembled		
8			
9			
10	5,6	0	Ph1
11	not assembled		
12			
13	0	4,5	S12
14	0	7,5	G12
15	not assembled		
16	9,85	11,2	DC+1
17	not assembled		
18	5,7	22,4	DC-1
19	not assembled		
20	11,7	22,4	S11
21	14,7	22,4	G11
22	17,7	22,4	Therm1
23	21,4	22,4	Therm2
24	not assembled		
25	24,4	22,4	DC-2
26	not assembled		
27	30,4	22,4	S13
28	33,4	22,4	G13
29	27,2	11,2	DC+2
30	not assembled		



Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification					
ID	**Component**	**Voltage**	**Current**	**Function**	**Comment**
T11, T12, T13, T14	MOSFET	900 V	65 mΩ	Half-Bridge Switch	
Rt	NTC			Thermistor	

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

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 packages see 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-PC094PB065ME01-L637F06Y-D1-14	16 Oct. 2017		