
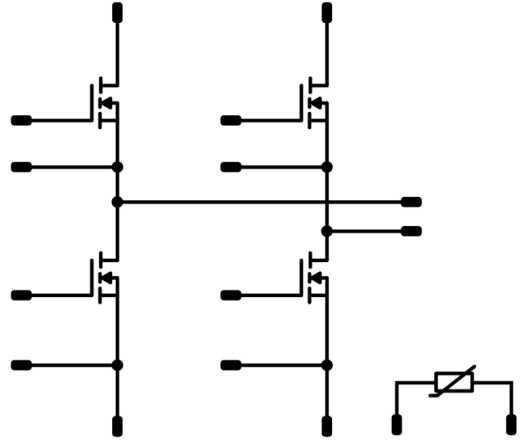




Vincotech

<i>fast</i> PACK 0 SiC	900 V / 65 mΩ
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Features</div> <ul style="list-style-type: none"> Dual half-bridge with Kelvin Emitter High efficient high speed SiC MOS Thermistor 	<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;"><i>flow</i> 0 12 mm housing</div> 
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Target applications</div> <ul style="list-style-type: none"> Power Supply 	<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Schematic</div> 
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Types</div> <ul style="list-style-type: none"> 10-PC094PB065ME01-L637F06Y 	

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Half-Bridge Switch				
Drain-source voltage	V_{DSS}		900	V
Drain current	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	25	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	90	A
Avalanche energy, single pulse	E_{AS}	$I_D = 22\text{ A}$ $V_{DD} = 50\text{ V}$	110	mJ
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	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.



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Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
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Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{top}		-40...(T _{max} - 25)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			9,57	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



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Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	I_C [A]	T_j [°C]	Min	Typ	

Half-Bridge Switch

Static

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
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		nC
Gate to source charge	Q_{GS}		-4/15	400	20	25			7,5		
Gate to drain charge	Q_{GD}								12		
Short-circuit input capacitance	C_{iss}								660		pF
Short-circuit output capacitance	C_{oss}	$f = 1\text{MHz}$	0	600		25			60		
Reverse transfer capacitance	C_{rss}								4		

Reverse Diode Static

Parameter	Symbol	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Diode forward voltage	V_{SD}		-4		10	25			4,8		V

Thermal

Parameter	Symbol	λ_{paste} [W/mK] (PSX)	$R_{th(j-s)}$	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	3,4			1,75		K/W

Thermistor

Parameter	Symbol	R_{100} [Ω]	B [K]	T [°C]	Min	Typ	Max	Unit
Rated resistance	R			25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	1484		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	

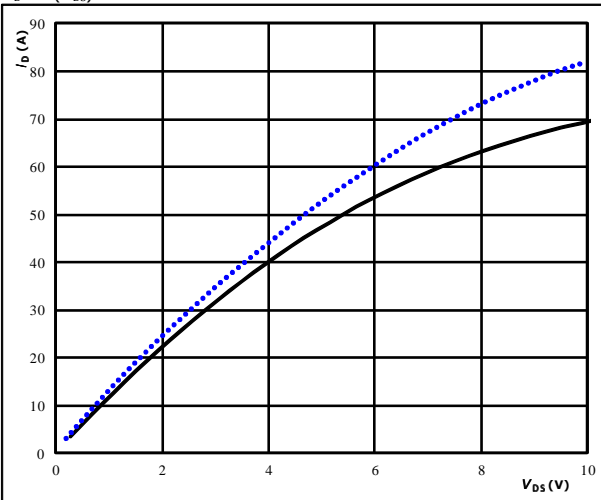


Half-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

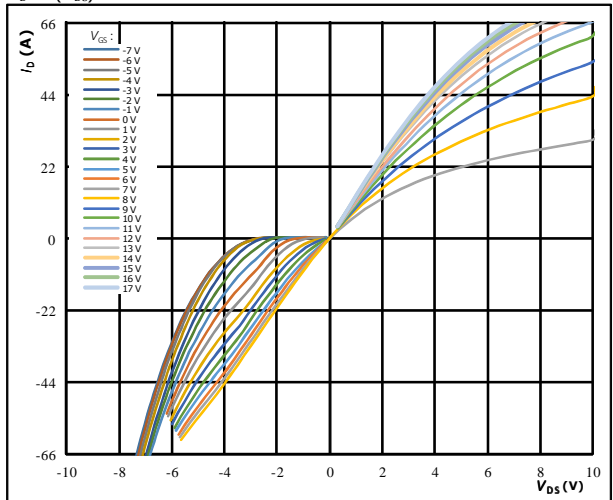


$t_p = 250 \mu s$
 $V_{GS} = 16 V$
 $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $125 \text{ } ^\circ C$ (solid black line)

figure 2. MOSFET

Typical output characteristics

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

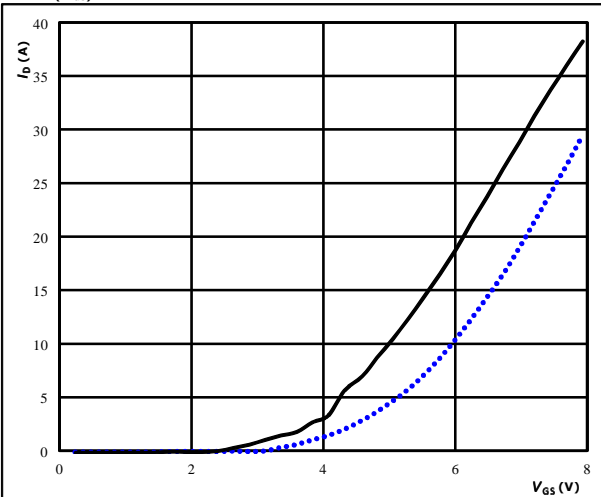


$t_p = 250 \mu s$
 $T_j = 125 \text{ } ^\circ C$
 V_{GS} from $-7 V$ to $17 V$ in steps of $1 V$

figure 3. MOSFET

Typical transfer characteristics

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

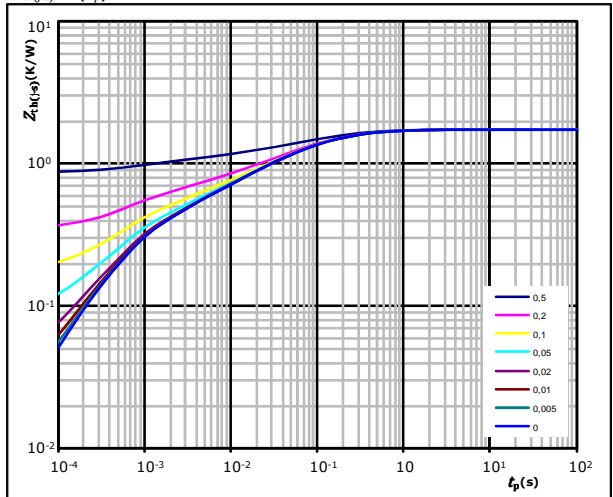


$t_p = 100 \mu s$
 $V_{DS} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $125 \text{ } ^\circ C$ (solid black line)

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,75 \text{ K/W}$
MOSFET thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
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



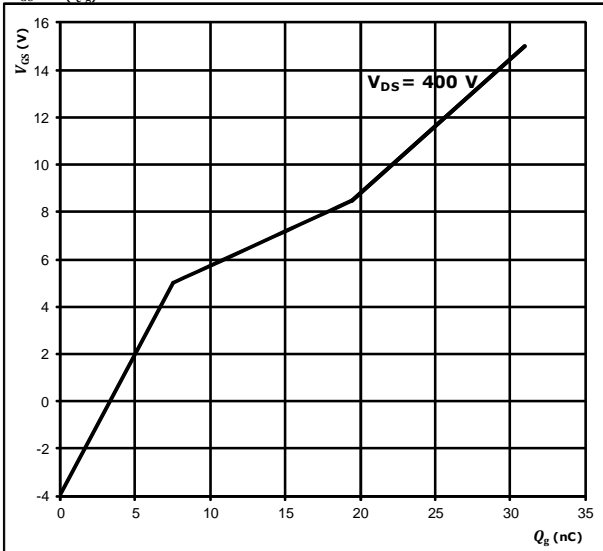
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Half-Bridge Switch Characteristics

figure 5. MOSFET

Gate voltage vs Gate charge

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



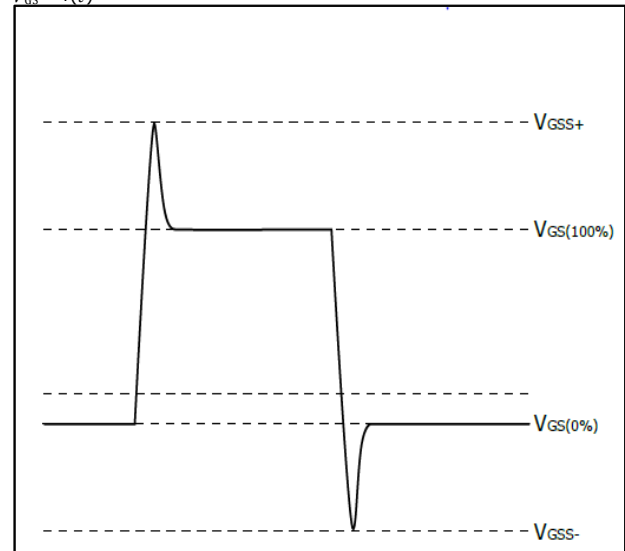
At

$I_{DS} = 20$ A
 $T_j = 25$ °C

figure 6. MOSFET

Gate maximum operating boundaries

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



At

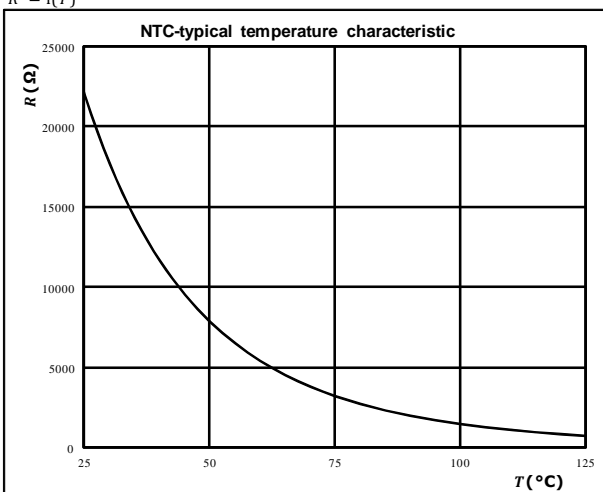
$V_{GS+} = 19$ V
 $V_{GS(100\%)} = 15$ V
 $V_{GS(0\%)} = -4$ V
 $V_{GS-} = -8$ V

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

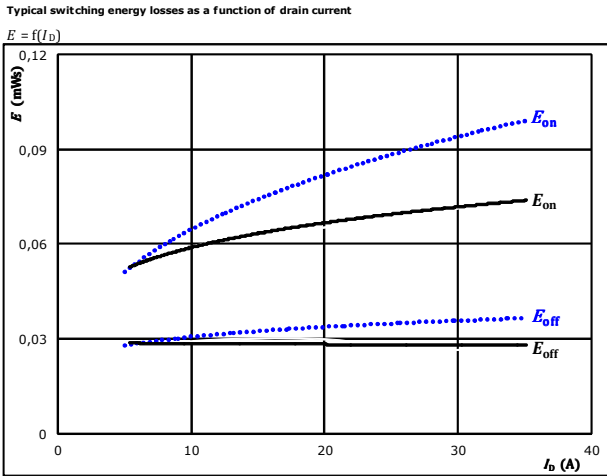
$$R = f(T)$$





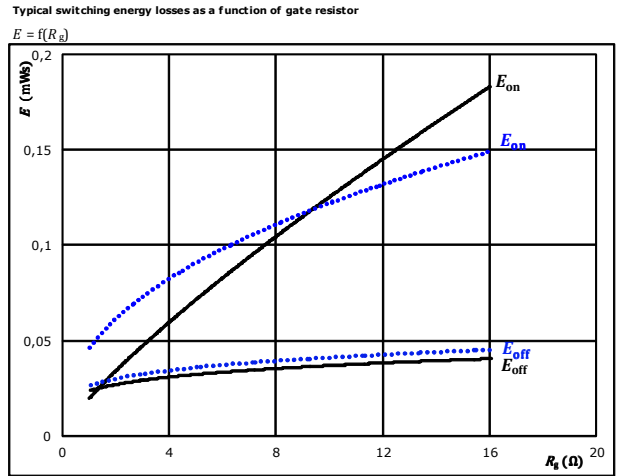
Half-Bridge Switching Characteristics

figure 1. MOSFET



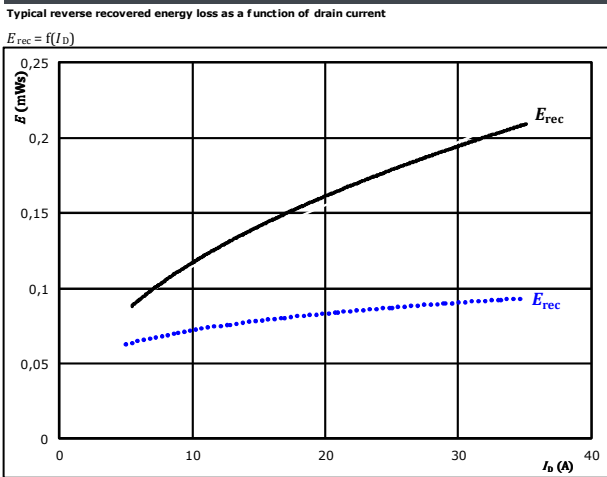
With an inductive load at
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)

figure 2. MOSFET



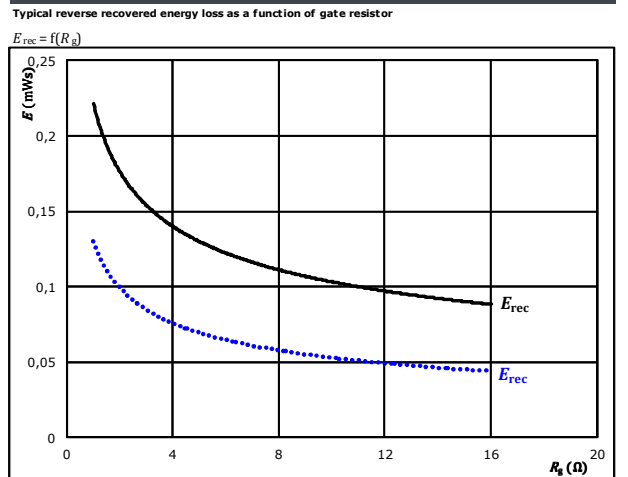
With an inductive load at
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 20$ A
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)

figure 3. FWD



With an inductive load at
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $R_{gon} = 4$ Ω
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)

figure 4. FWD



With an inductive load at
 $V_{DS} = 600$ V
 $V_{GS} = -5/15$ V
 $I_D = 20$ A
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)

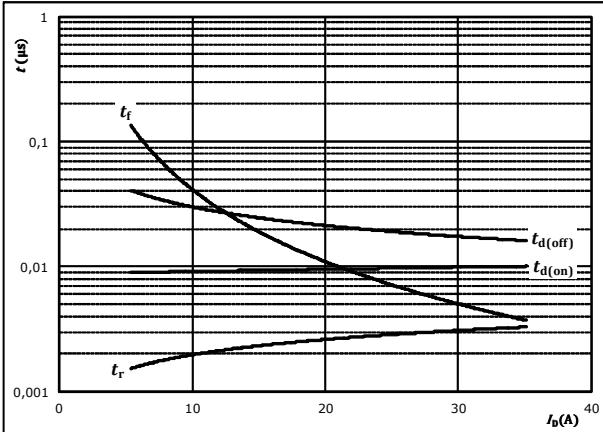


Half-Bridge Switching Characteristics

figure 5. MOSFET

Typical switching times as a function of drain current

$$t = f(I_D)$$



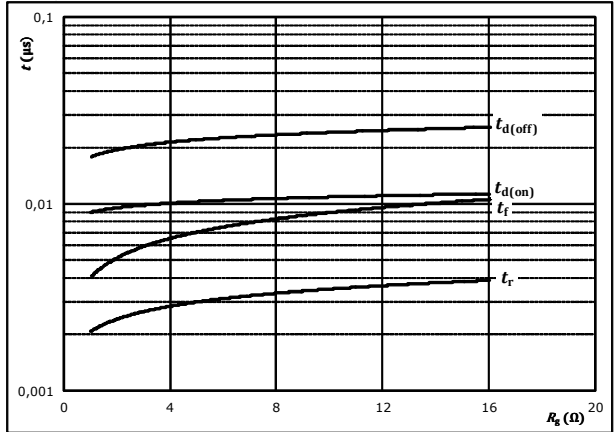
With an inductive load at

$T_J =$	125	°C
$V_{DS} =$	600	V
$V_{GS} =$	-5/15	V
$R_{g(on)} =$	4	Ω
$R_{g(off)} =$	4	Ω

figure 6. MOSFET

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



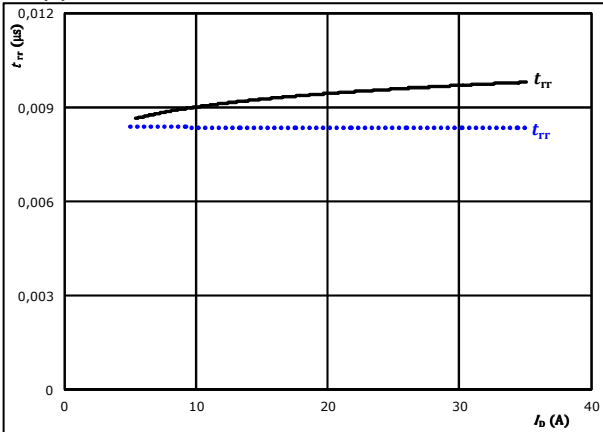
With an inductive load at

$T_J =$	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

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



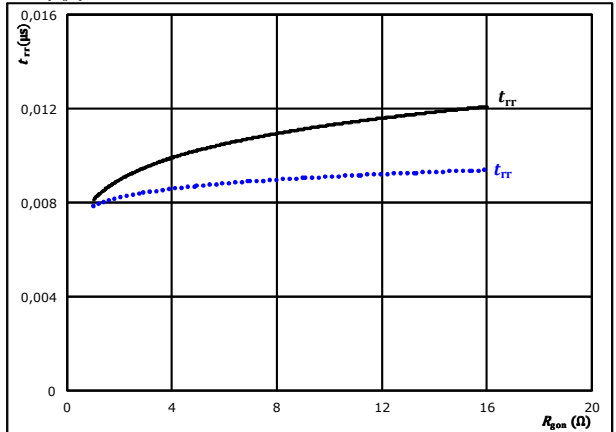
At

$V_{DS} =$	600	V	$T_J:$	25 °C
$V_{GS} =$	-5/15	V		125 °C	————
$R_{g(on)} =$	4	Ω			

figure 8. FWD

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

$$t_{rr} = f(R_{g(on)})$$



At

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

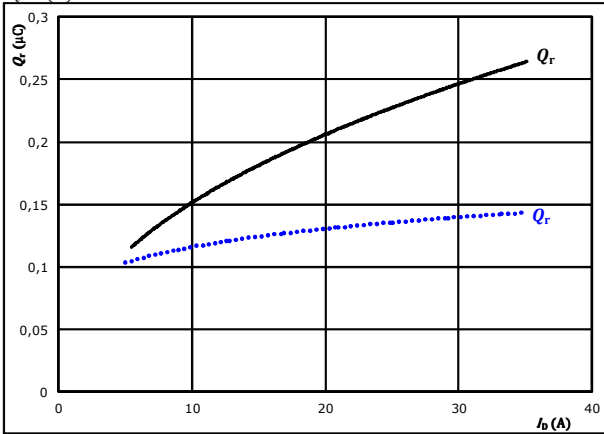


Half-Bridge Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

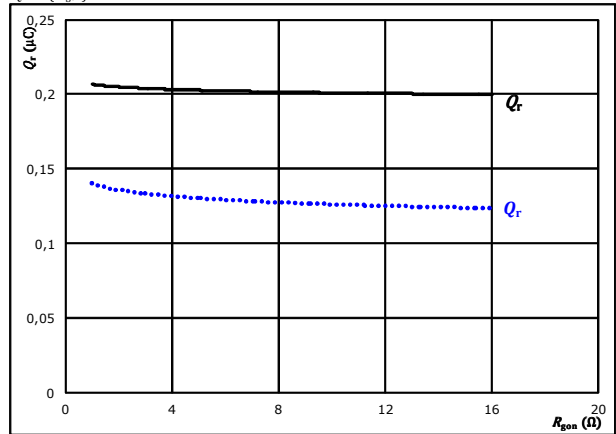


At $V_{DS} = 600$ V $T_j = 25$ °C (dotted blue line)
 $V_{GS} = -5/15$ V $T_j = 125$ °C (solid black line)
 $R_{gpn} = 4$ Ω

figure 10. FWD

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

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

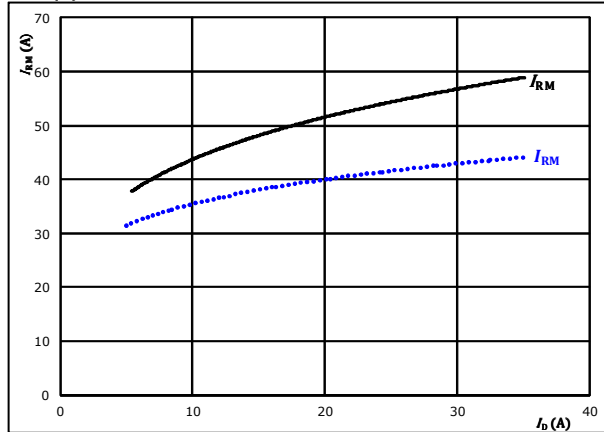


At $V_{DS} = 600$ V $T_j = 25$ °C (dotted blue line)
 $V_{GS} = -5/15$ V $T_j = 125$ °C (solid black line)
 $I_D = 20$ A

figure 11. FWD

Typical peak reverse recovery current as a function of drain current

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

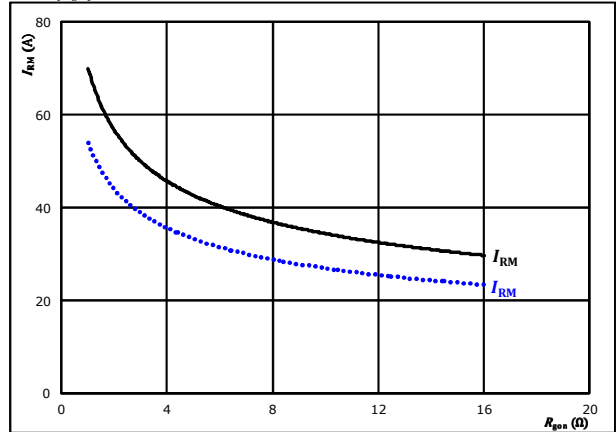


At $V_{DS} = 600$ V $T_j = 25$ °C (dotted blue line)
 $V_{GS} = -5/15$ V $T_j = 125$ °C (solid black line)
 $R_{gpn} = 4$ Ω

figure 12. FWD

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

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



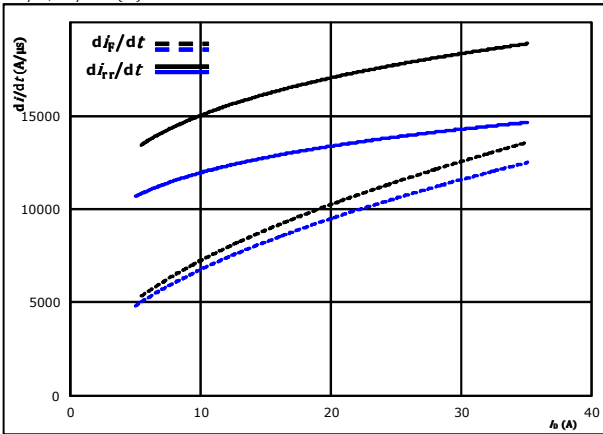
At $V_{DS} = 600$ V $T_j = 25$ °C (dotted blue line)
 $V_{GS} = -5/15$ V $T_j = 125$ °C (solid black line)
 $I_D = 20$ A



Half-Bridge Switching Characteristics

figure 13. FWD

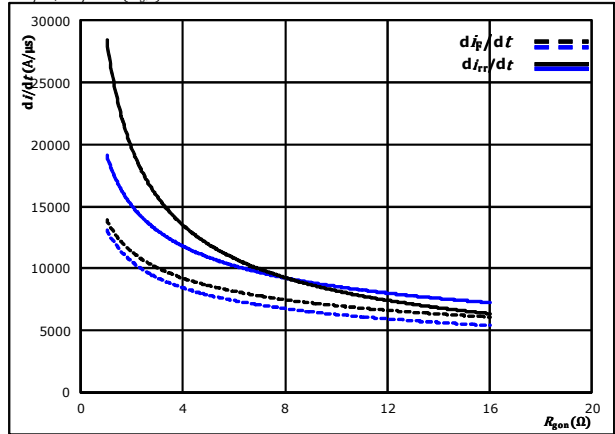
Typical rate of fall of forward and reverse recovery current as a function of drain current
 $di_f/dt, di_{rr}/dt = f(I_D)$



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

figure 14. FWD

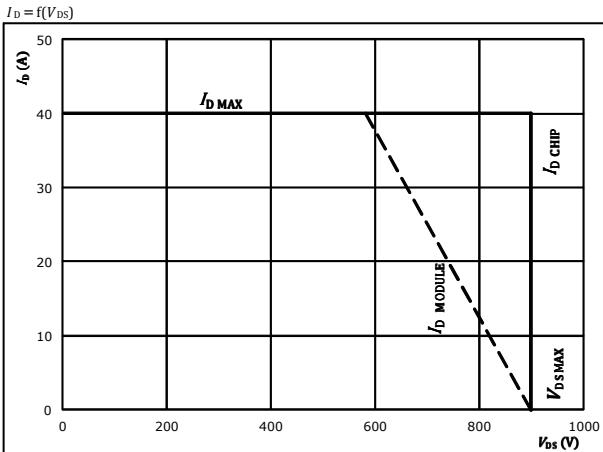
Typical rate of fall of forward and reverse recovery current as a function of MOSFET turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{gon})$



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

figure 15. MOSFET

Reverse bias safe operating area



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



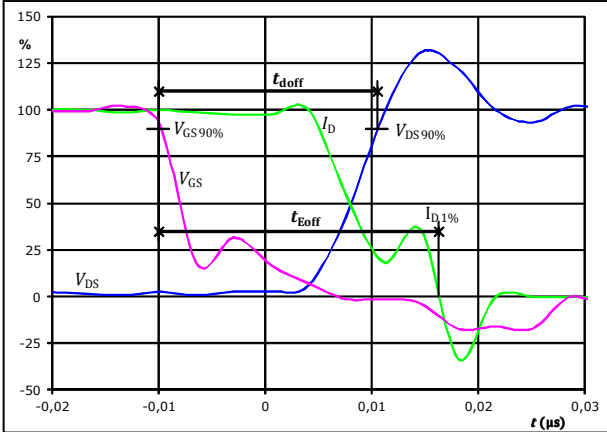
Half-Bridge Switching Definitions

General conditions

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

figure 1. MOSFET

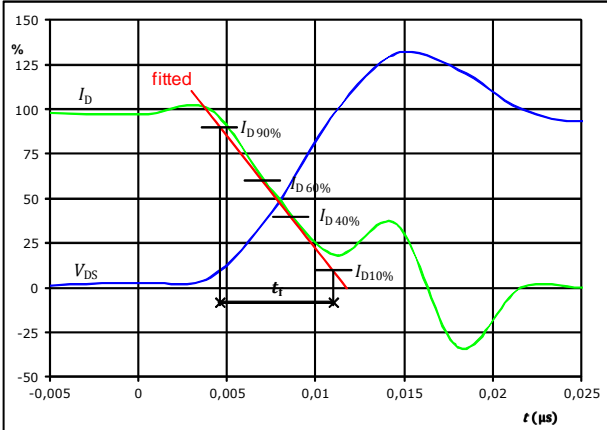
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GS}(0\%) =$	-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 3. MOSFET

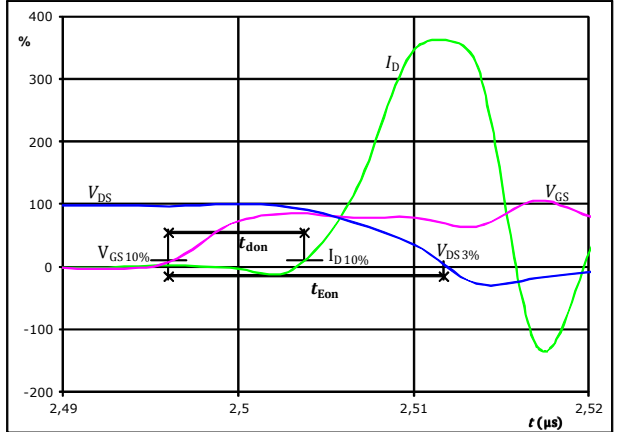
Turn-off Switching Waveforms & definition of t_f



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

figure 2. MOSFET

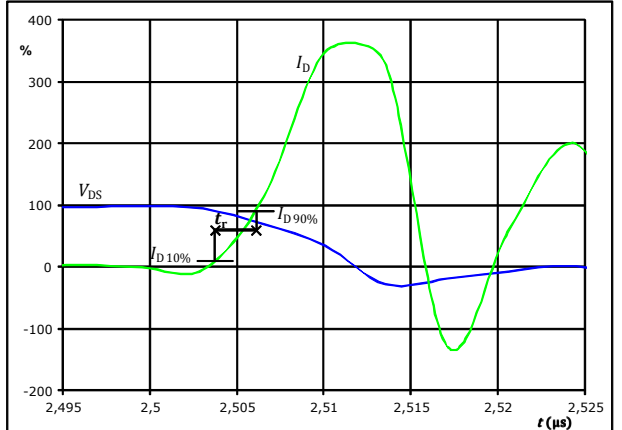
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GS}(0\%) =$	-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 4. MOSFET

Turn-on Switching Waveforms & definition of t_r



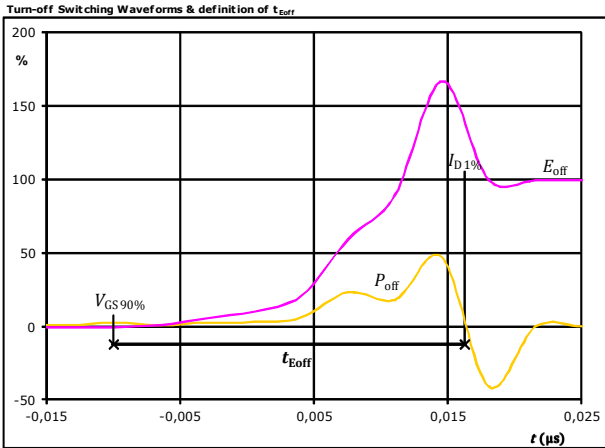
$V_{DS}(100\%) =$	600	V
$I_D(100\%) =$	20	A
$t_r =$	0,003	μs



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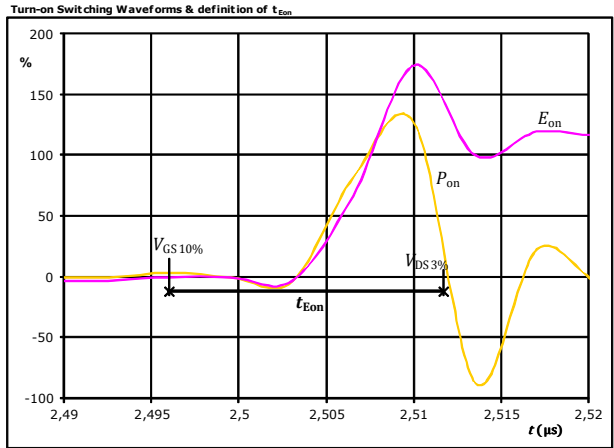
Half-Bridge Switching Characteristics

figure 5. MOSFET



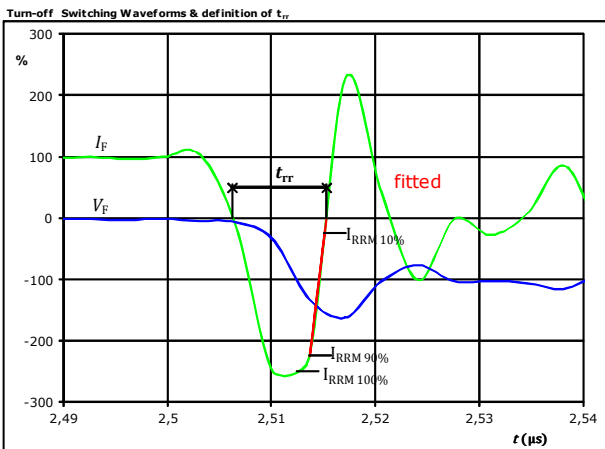
$P_{off}(100\%) =$	12,05	kW
$E_{off}(100\%) =$	0,03	mJ
$t_{Eoff} =$	0,03	µs

figure 6. MOSFET



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

figure 7. FWD



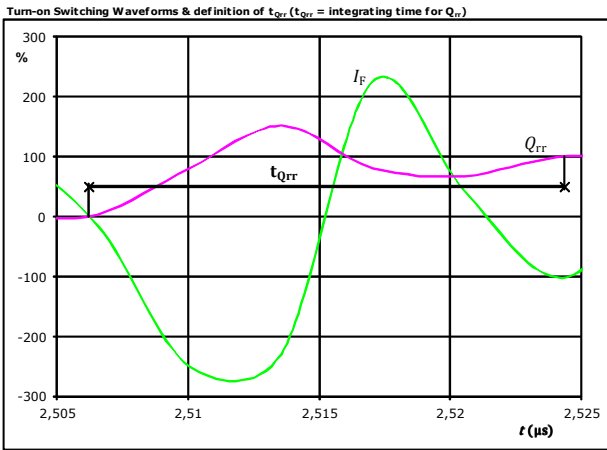
$V_F(100\%) =$	600	V
$I_F(100\%) =$	20	A
$I_{RRM}(100\%) =$	-52	A
$t_{rr} =$	0,009	µs



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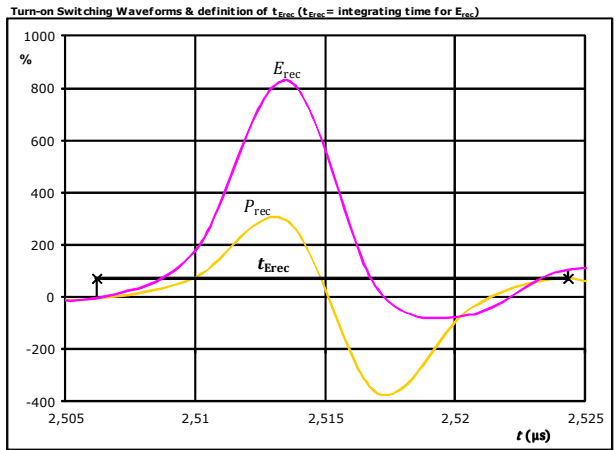
Half-Bridge Switching Characteristics

figure 8. FWD



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

figure 9. FWD



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



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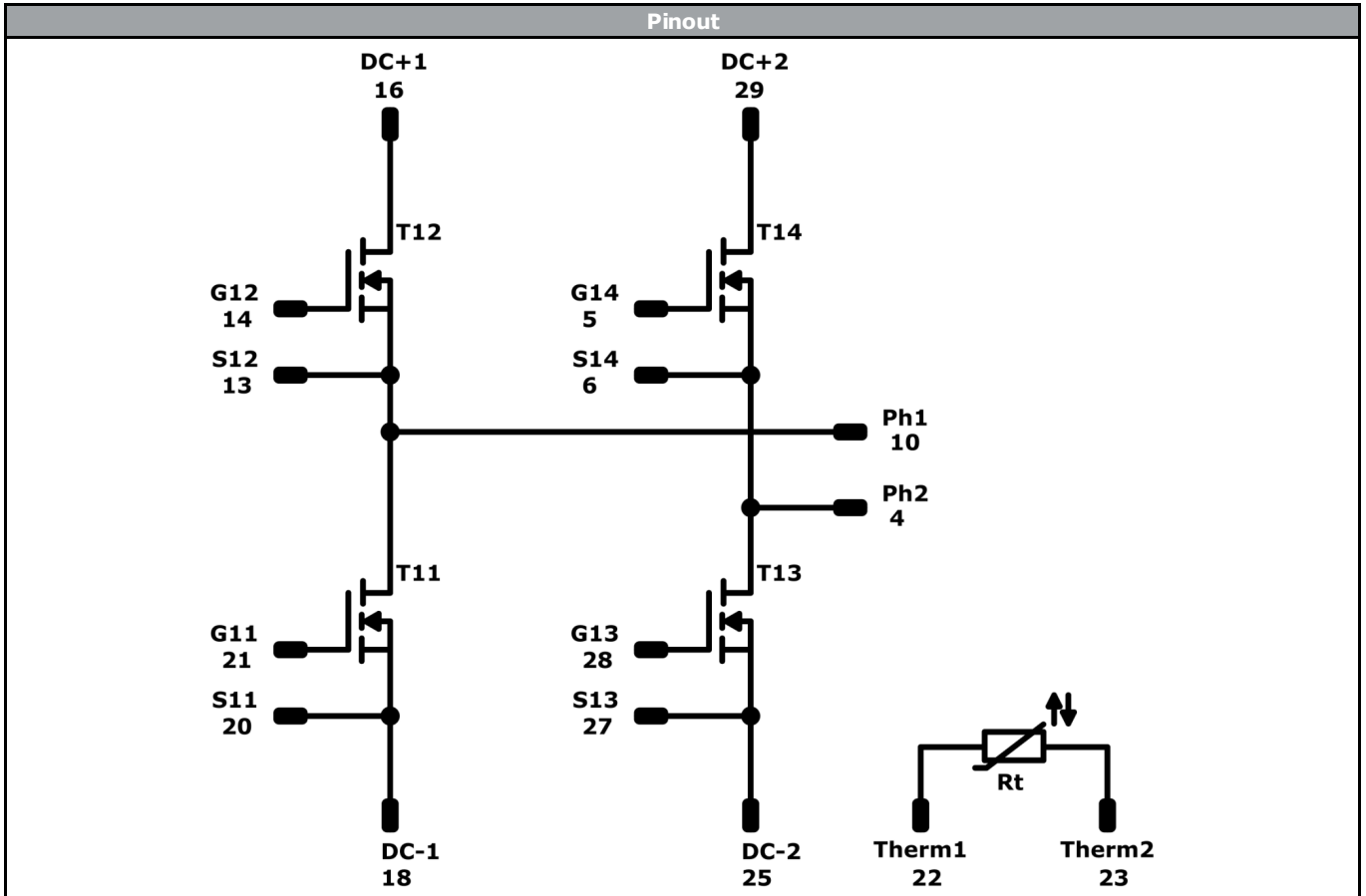
Ordering Code & Marking						
Version			Ordering Code			
without thermal paste 12 mm housing with press-fit pin			10-PC094PB065ME01-L637F06Y			
with thermal paste 12 mm housing with press-fit pin			10-PC094PB065ME01-L637F06Y-/3/			
NN-NNNNNNNNNNNNNN TTTTUVVWWYY UL VIN LLLLL SSSS						
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNN-TTTTUVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTUV	LLLLL	SSSS	WWYY		

Pin table				Outline	
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



Vincotech



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




Vincotech

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.

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		

DISCLAIMER

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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.