



fastPACK 0 SiC

900 V / 35 mΩ

### Topology features

- Dual halfbridge
- Integrated DC capacitor
- Kelvin Emitter for improved switching performance
- Open Emitter configuration
- Temperature sensor

### Component features

- High Blocking Voltage with low drain source on state resistance
- High speed SiC-MOSFET technology
- Resistant to Latch-up

### Housing features

- Base isolation: Al<sub>2</sub>O<sub>3</sub>
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

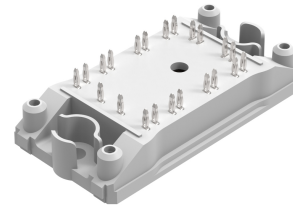
### Target applications

- Power Supply

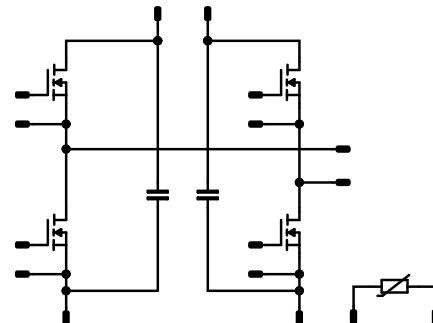
### Types

- 10-PC094PC035ME03-L629F46Y

### flow 0 12 mm housing



### Schematic





Vincotech

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>H-Bridge Switch</b>				
Drain-source voltage	$V_{DSS}$		900	V
Drain current (DC current)	$I_D$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	41	A
Peak drain current	$I_{DM}$	$t_p$ limited by $T_{jmax}$	180	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	76	W
Gate-source voltage	$V_{GSS}$		-4 / 15	V
		dynamic	-8 / 19	
Maximum Junction Temperature	$T_{jmax}$		175	°C

## Capacitor (DC)

Maximum DC voltage	$V_{MAX}$		1000	V
Operation Temperature	$T_{op}$		-55 ... 125	°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* $t_p = 2\text{ s}$	4000	V
Isolation voltage	$V_{isol}$	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			9,19	mm
Comparative Tracking Index	CTI		≥ 200	

\*100 % tested in production



Vincotech

### 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		

### H-Bridge Switch

#### Static

Drain-source on-state resistance	$r_{DS(on)}$		15		40	25 125 150		32,3 39,3 43	39 <sup>(1)</sup>	mΩ
Gate-source threshold voltage	$V_{GS(th)}$		0		0,01	25	1,8	2,1	3,5	V
Gate to Source Leakage Current	$I_{GSS}$		15	0		25		20	500	nA
Zero Gate Voltage Drain Current	$I_{DSS}$		0	900		25		2	200	μA
Internal gate resistance	$r_g$							1,75		Ω
Gate charge	$Q_g$							66		nC
Gate to source charge	$Q_{GS}$		-4/15	400	40	25		20		
Gate to drain charge	$Q_{GD}$							20		
Short-circuit input capacitance	$C_{iss}$							1520		pF
Short-circuit output capacitance	$C_{oss}$	$f = 1$ Mhz	0	600	0	25		140		
Reverse transfer capacitance	$C_{rss}$							10		
Diode forward voltage	$V_{SD}$		0		0	25		4,5		V

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,25		K/W
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----



Vincotech

10-PC094PC035ME03-L629F46Y  
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	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	-5/15	600	40	25		12,8		ns
						125		12,8		
						150		13,6		
Rise time	$t_r$					25		5,4		
						125		5		ns
						150		5		
Turn-off delay time	$t_{d(off)}$					25		42,6		
						125		42,8		ns
						150		43,4		
Fall time	$t_f$					25		10,9		
						125		11,7		ns
						150		10,8		
Turn-on energy (per pulse)	$E_{on}$	$Q_{rFWD}=0,455 \mu C$ $Q_{tFWD}=0,875 \mu C$ $Q_{rFWD}=0,825 \mu C$				25		0,459		mWs
						125		0,447		
						150		0,471		
Turn-off energy (per pulse)	$E_{off}$					25		0,082		mWs
						125		0,055		
						150		0,048		
Peak recovery current	$I_{RRM}$					25		53,52		A
						125		58,36		
						150		62,77		
Reverse recovery time	$t_{rr}$					25		14,5		ns
						125		14,6		
						150		15,4		
Recovered charge	$Q_r$	$di/dt=7340 A/\mu s$ $di/dt=7860 A/\mu s$ $di/dt=8440 A/\mu s$				25		0,455		$\mu C$
						125		0,875		
						150		0,825		
Reverse recovered energy	$E_{rec}$					25		0,028		mWs
						125		0,196		
						150		0,106		
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25		11000		A/ $\mu s$
						125		13700		
						150		15900		



### 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		

### Capacitor (DC)

#### Static

Capacitance	$C$	DC bias voltage = 0 V				25		94		nF
Tolerance							-20		20	%
Dissipation factor		$f = 1$ kHz				25		25		%

### Thermistor

#### Static

Rated resistance	$R$					25		22		k $\Omega$
Deviation of $R_{100}$	$A_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	$P$					25		130		mW
Power dissipation constant	$d$					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1$ %						3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1$ %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

(2) Only valid with pre-applied Vincotech thermal interface material.

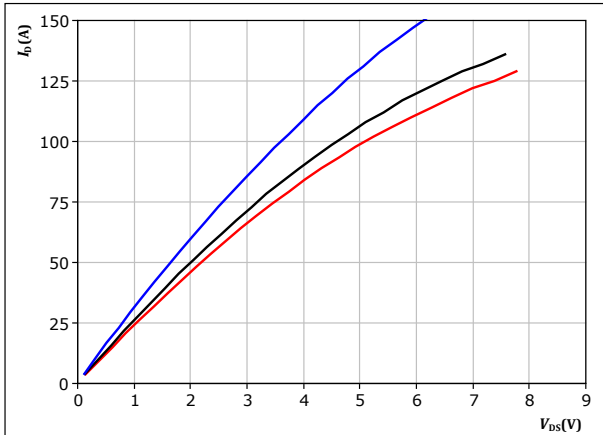


## H-Bridge Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

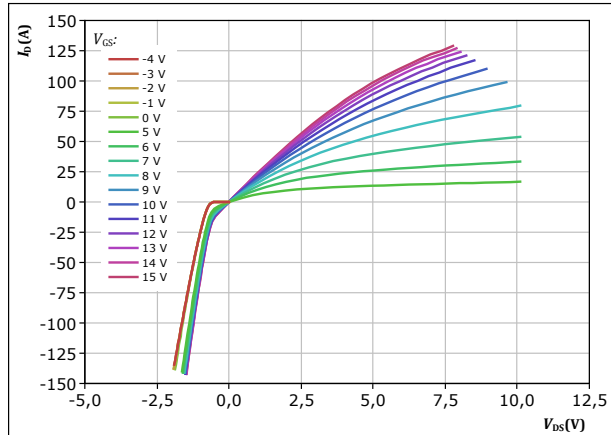


$t_p = 250 \mu s$   
 $V_{GS} = 15 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 2. MOSFET

Typical output characteristics

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

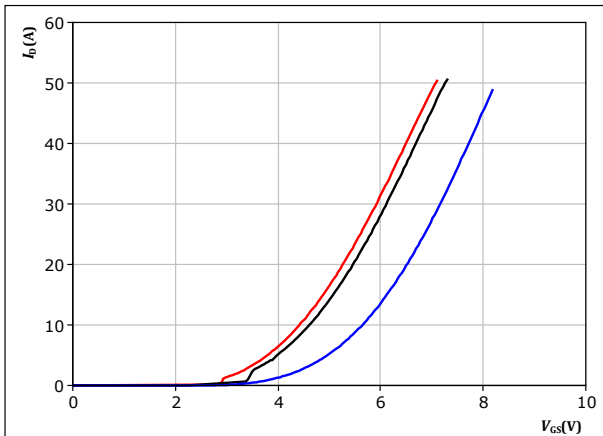


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GS}$  from -4 V to 15 V in steps of 1 V

figure 3. MOSFET

Typical transfer characteristics

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

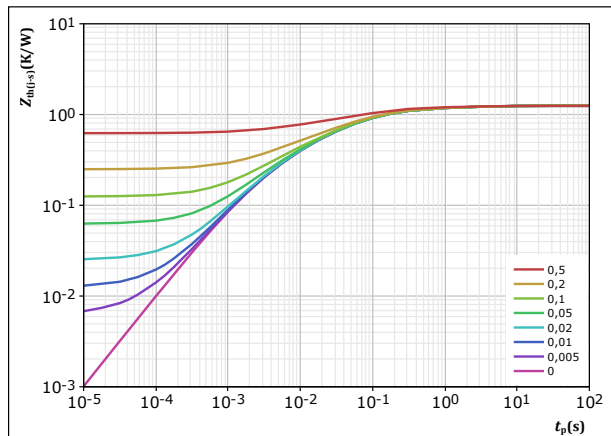


$t_p = 250 \mu s$   
 $V_{DS} = 10 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 1,247 \text{ K/W}$   
MOSFET thermal model values

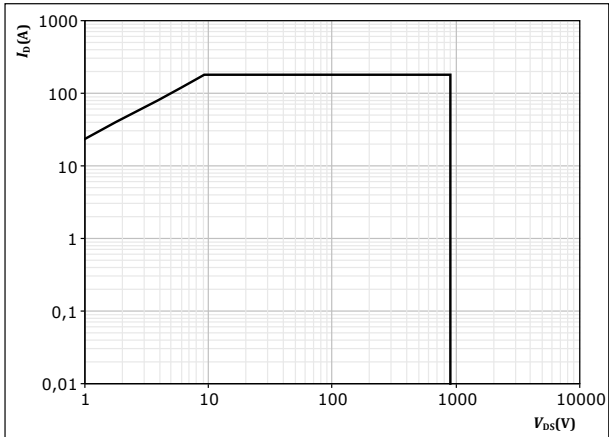
$R$ (K/W)	$\tau$ (s)
6,45E-02	3,56E+00
1,36E-01	5,08E-01
4,22E-01	9,62E-02
3,45E-01	2,46E-02
2,11E-01	5,94E-03
6,79E-02	1,44E-03



### H-Bridge Switch Characteristics

figure 5. MOSFET

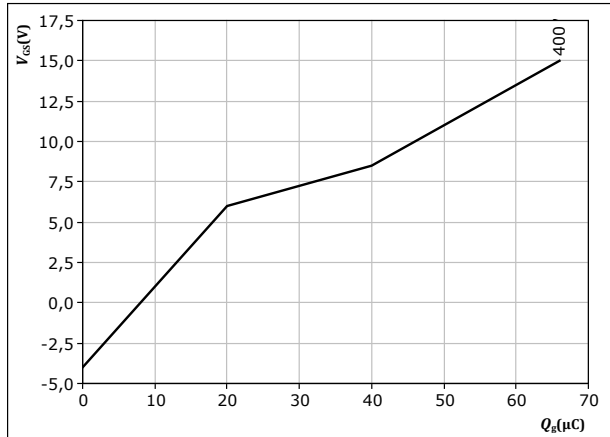
Safe operating area  
 $I_D = f(V_{DS})$



$D =$  single pulse  
 $T_s = 80$  °C  
 $V_{GS} = 15$  V  
 $T_j = T_{jmax}$

figure 6. MOSFET

Gate voltage vs gate charge  
 $V_{GS} = f(Q_g)$



$I_D = 20$  A  
 $T_j = 25$  °C

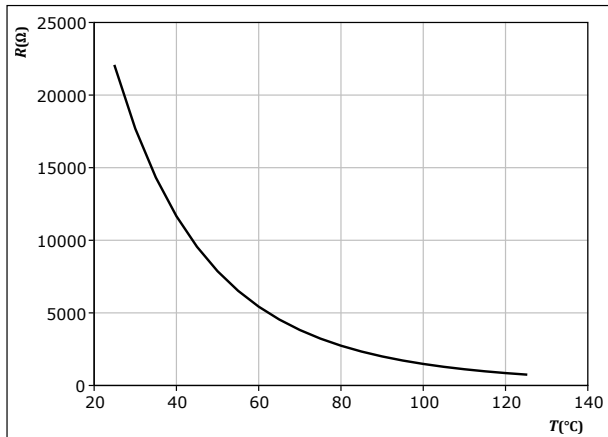


## Thermistor Characteristics

figure 7. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$



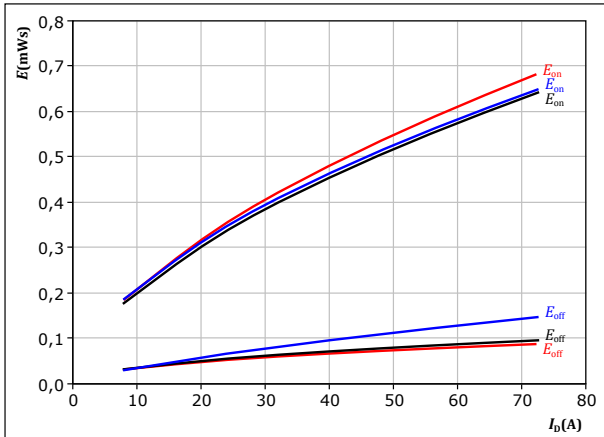




## H-Bridge Switching Characteristics

**figure 8.** MOSFET

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

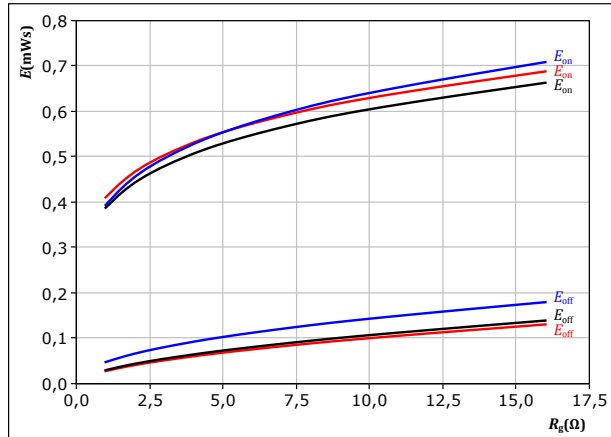


With an inductive load at  
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $R_{gon} = 4 \ \Omega$   
 $R_{goff} = 4 \ \Omega$

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

**figure 9.** MOSFET

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

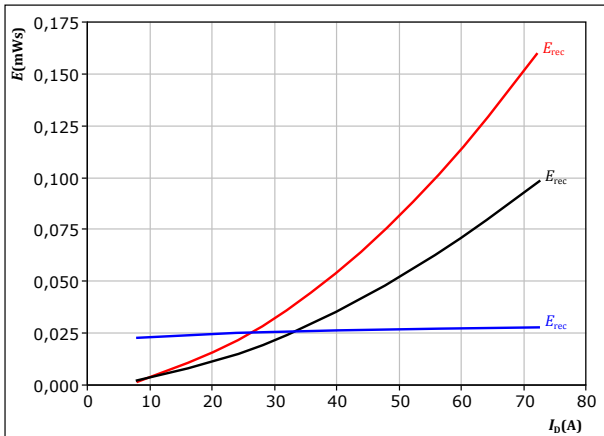


With an inductive load at  
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $I_D = 40 \text{ A}$

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

**figure 10.** MOSFET

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

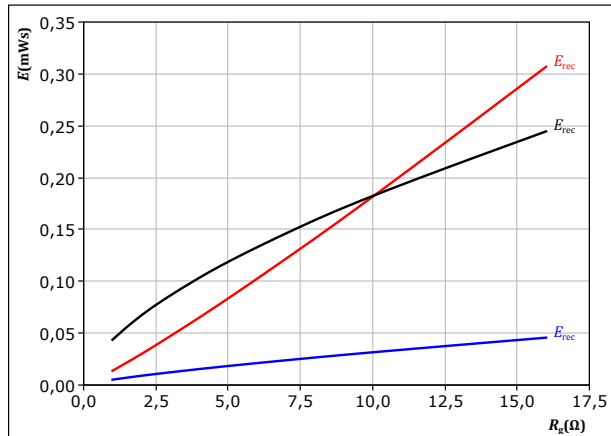


With an inductive load at  
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $R_{gon} = 4 \ \Omega$

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

**figure 11.** 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  
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $I_D = 40 \text{ A}$

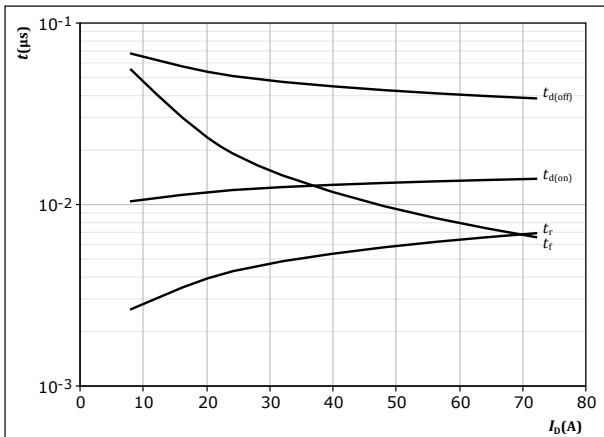
$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C



## H-Bridge Switching Characteristics

**figure 12.** MOSFET

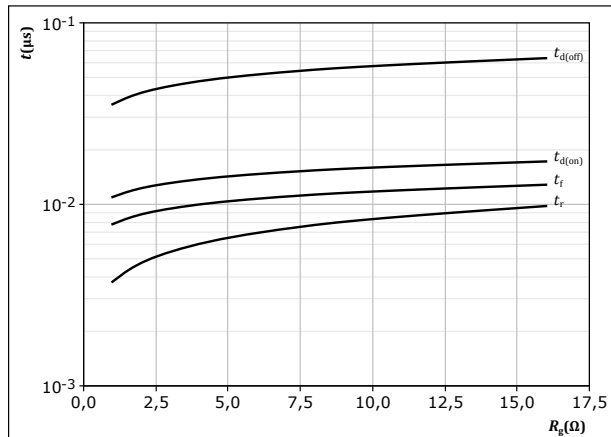
Typical switching times as a function of drain current  
 $t = f(I_D)$



With an inductive load at  
 $T_j = 150 \text{ } ^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $R_{gon} = 4 \text{ } \Omega$   
 $R_{goff} = 4 \text{ } \Omega$

**figure 13.** MOSFET

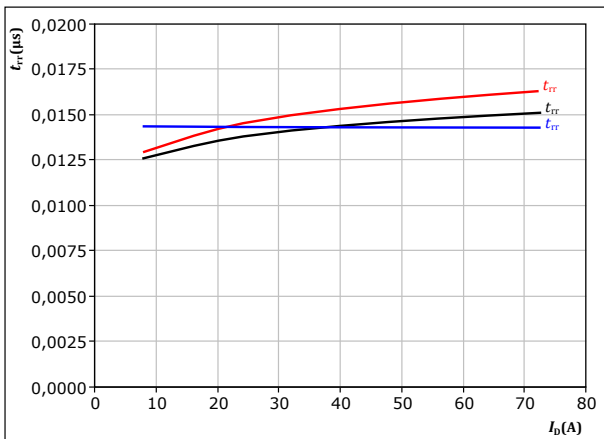
Typical switching times as a function of MOSFET turn on gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150 \text{ } ^\circ\text{C}$   
 $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $I_D = 40 \text{ A}$

**figure 14.** MOSFET

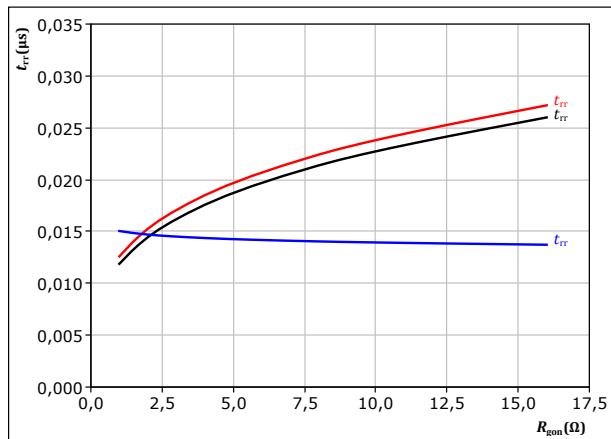
Typical reverse recovery time as a function of drain current  
 $t_{rr} = f(I_D)$



At  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $R_{gon} = 4 \text{ } \Omega$   
 $T_j: 25 \text{ } ^\circ\text{C}$   
 $125 \text{ } ^\circ\text{C}$   
 $150 \text{ } ^\circ\text{C}$

**figure 15.** MOSFET

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



At  $V_{DS} = 600 \text{ V}$   
 $V_{GS} = -5/15 \text{ V}$   
 $I_D = 40 \text{ A}$   
 $T_j: 25 \text{ } ^\circ\text{C}$   
 $125 \text{ } ^\circ\text{C}$   
 $150 \text{ } ^\circ\text{C}$

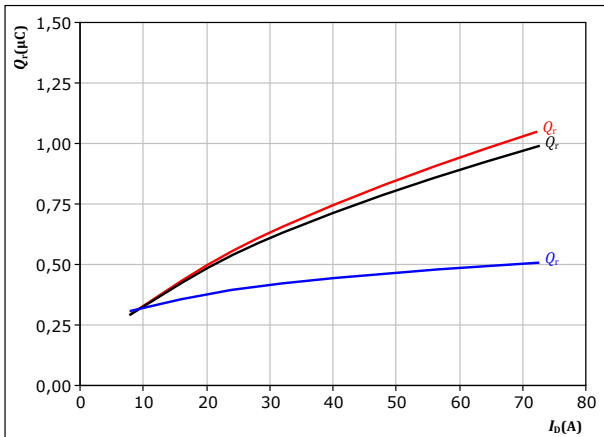


## H-Bridge Switching Characteristics

**figure 16.** MOSFET

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$



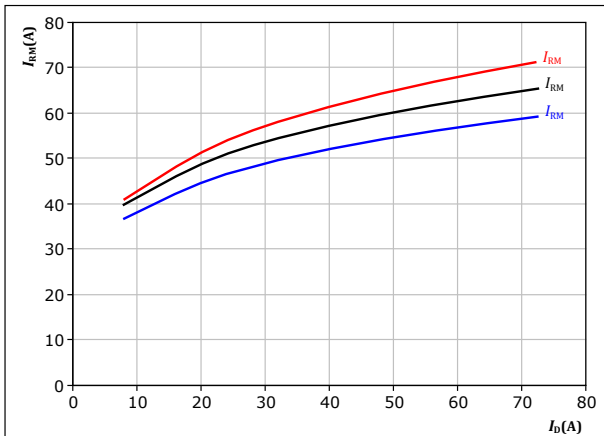
At  $V_{DS} = 600$  V  
 $V_{GS} = -5/15$  V  
 $R_{gon} = 4$   $\Omega$

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

**figure 18.** MOSFET

Typical peak reverse recovery current as a function of drain current

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



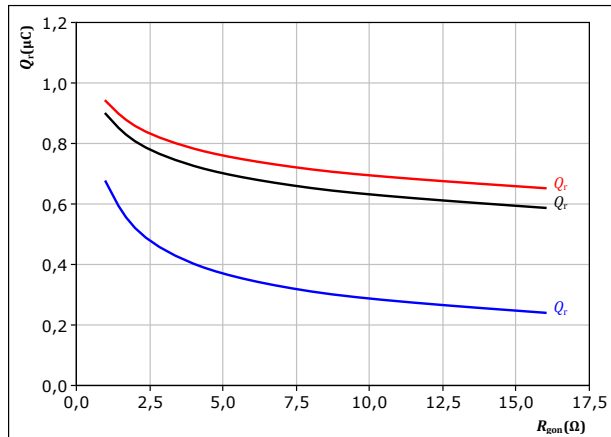
At  $V_{DS} = 600$  V  
 $V_{GS} = -5/15$  V  
 $R_{gon} = 4$   $\Omega$

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

**figure 17.** MOSFET

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

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



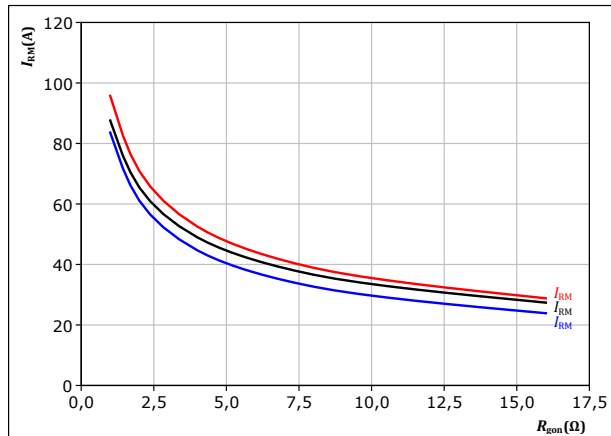
At  $V_{DS} = 600$  V  
 $V_{GS} = -5/15$  V  
 $I_D = 40$  A

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

**figure 19.** 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  
 $V_{GS} = -5/15$  V  
 $I_D = 40$  A

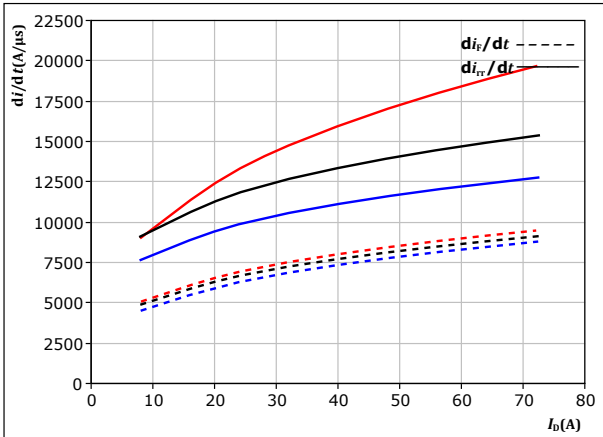
$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C



## H-Bridge Switching Characteristics

figure 20. MOSFET

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

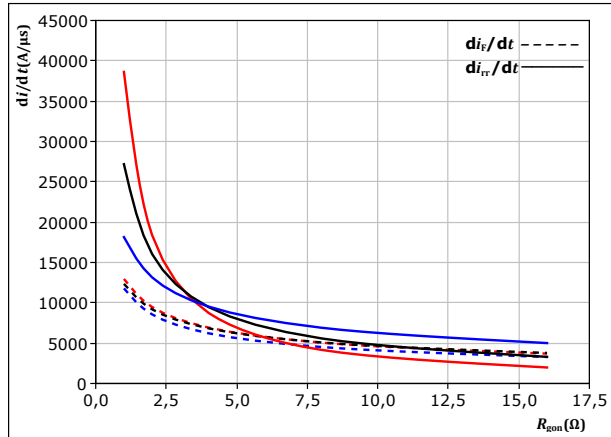


At  $V_{DS} = 600$  V  
 $V_{GS} = -5/15$  V  
 $R_{g(on)} = 4$   $\Omega$

$T_j = 25$  °C  
 $T_j = 125$  °C  
 $T_j = 150$  °C

figure 21. MOSFET

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



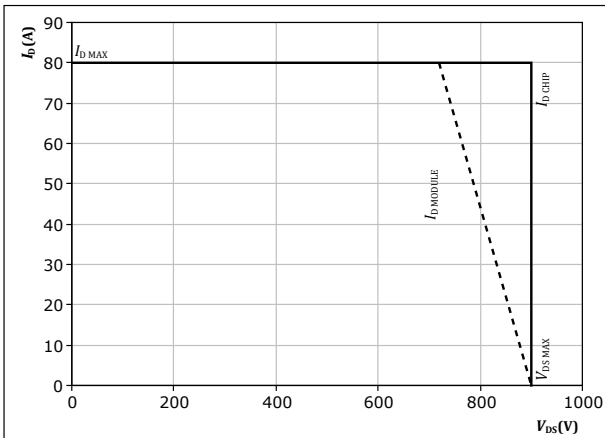
At  $V_{DS} = 600$  V  
 $V_{GS} = -5/15$  V  
 $I_D = 40$  A

$T_j = 25$  °C  
 $T_j = 125$  °C  
 $T_j = 150$  °C

figure 22. MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



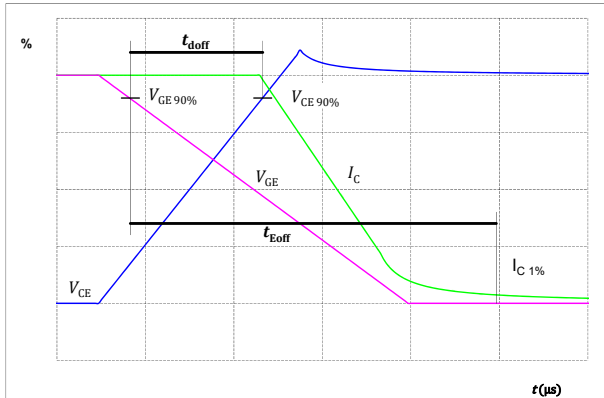
At  $T_j = 150$  °C  
 $R_{g(on)} = 4$   $\Omega$   
 $R_{g(off)} = 4$   $\Omega$



## H-Bridge Switching Definitions

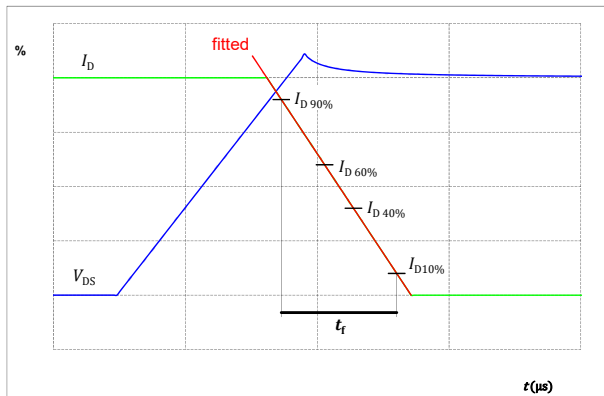
**figure 23.** MOSFET

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



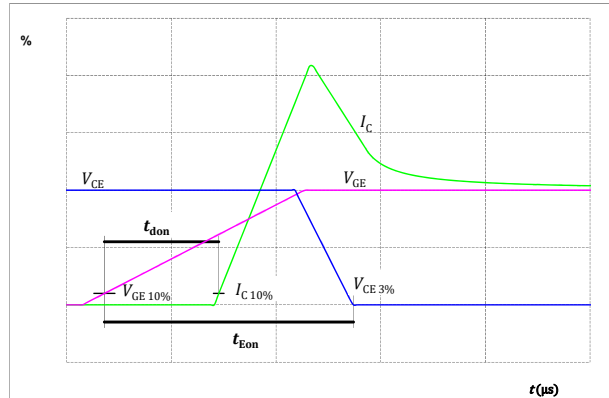
**figure 25.** MOSFET

Turn-off Switching Waveforms & definition of  $t_f$



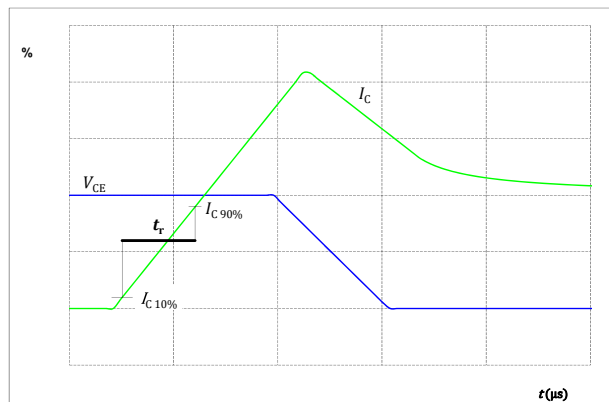
**figure 24.** MOSFET

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



**figure 26.** MOSFET

Turn-on Switching Waveforms & definition of  $t_r$





## H-Bridge Switching Definitions

figure 27. FWD

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

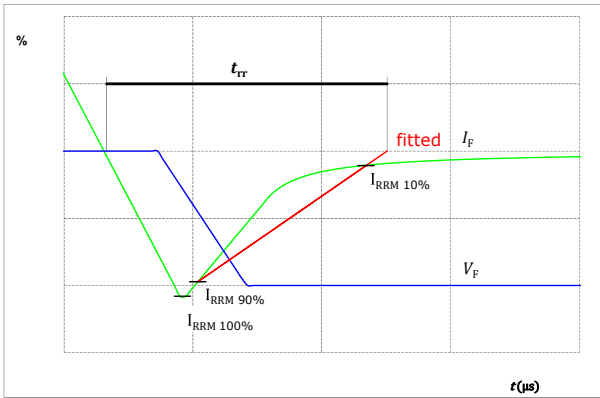


figure 28. FWD

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

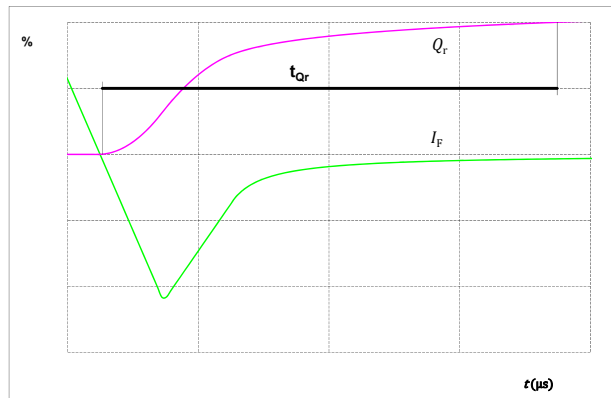
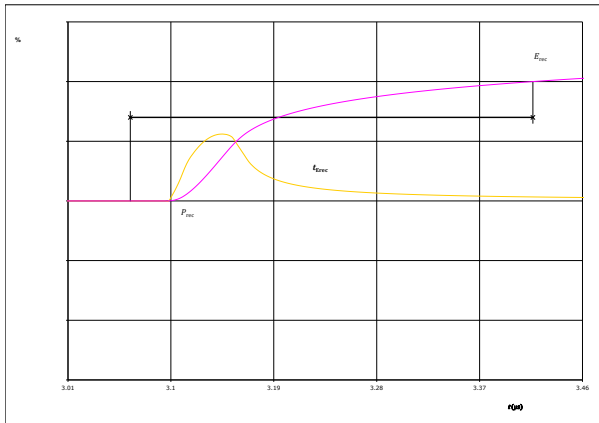


figure 29. FWD

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





Vincotech

**10-PC094PC035ME03-L629F46Y**  
datasheet

Ordering Code	
<b>Version</b>	<b>Ordering Code</b>
Without thermal paste	10-PC094PC035ME03-L629F46Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PC094PC035ME03-L629F46Y-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PC094PC035ME03-L629F46Y-/3/

Marking						
	<b>Text</b>	<b>Name</b> NN-NNNNNNNNNNNNNNNNNNNNNN- TTTTTTVV	<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> TTTTTTVV	<b>Lot number</b> LLLLL	<b>Serial</b> SSSS	<b>Date code</b> WWYY	

Pin table [mm]				Outline
Pin	X	Y	Function	
1	0	22,5	G11	
2	2,9	22,5	S11	
3	8,3	22,5	DC-1	
4	10,8	22,5	DC-1	
5	19,6	22,5	DC+1	
6	22,1	22,5	DC+1	
7	29,1	22,5	S12	
8	32	22,5	G12	
9	33,5	17,8	Ph1	
10	33,5	15,3	Ph1	
11	33,5	7,2	Ph2	
12	33,5	4,7	Ph2	
13	32	0	G14	
14	29,1	0	S14	
15	22,1	0	DC+2	
16	19,6	0	DC+2	
17	10,8	0	DC-2	
18	8,3	0	DC-2	
19	2,9	0	S13	
20	0	0	G13	
21	0	8	Therm1	
22	0	14,5	Therm2	

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

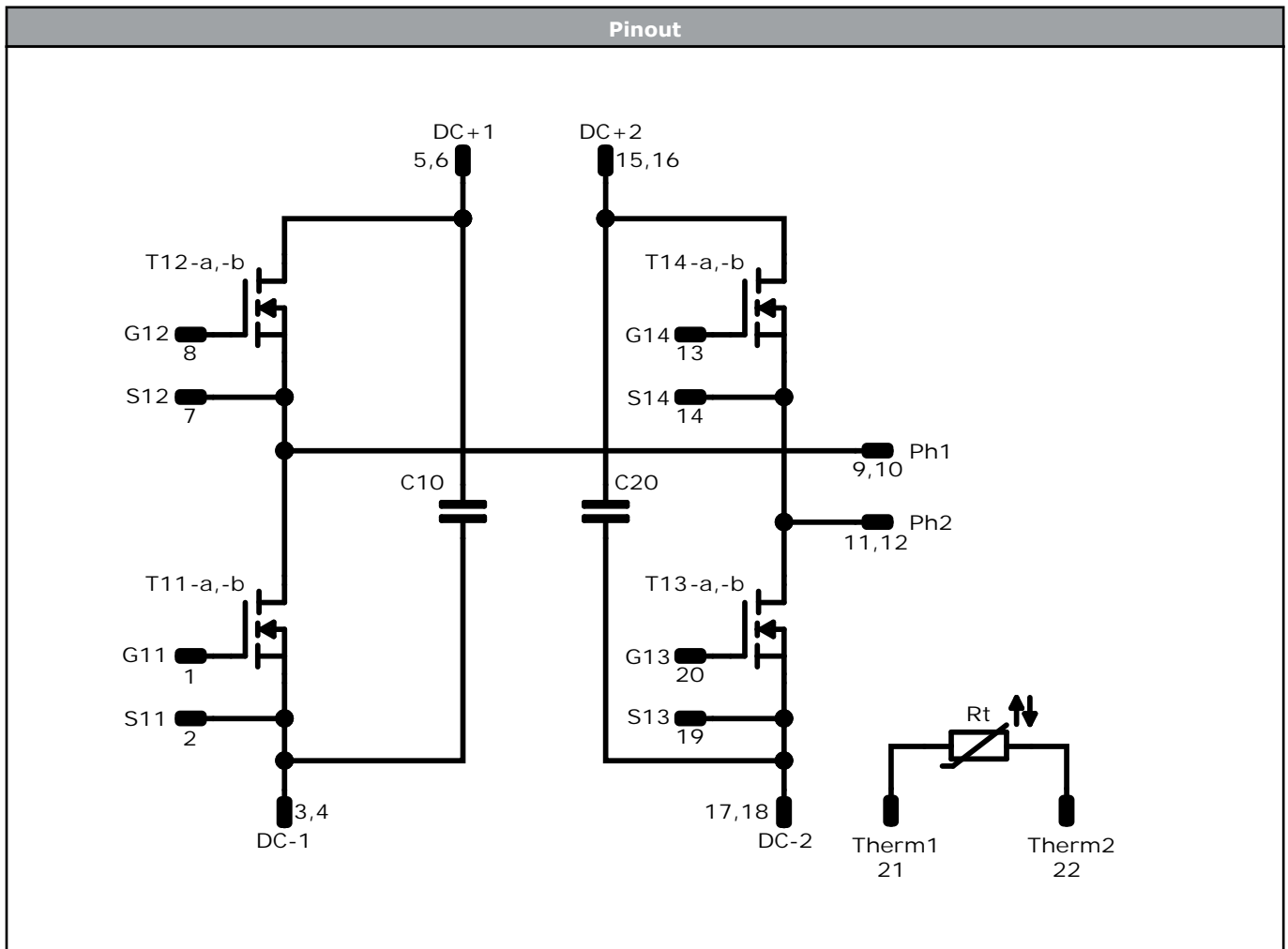
105  
Y  
X  
16,75

109,50  
16,75

Tolerance of positions: ±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	32,5 mΩ	H-Bridge Switch	
C10, C20	Capacitor	1000 V		Capacitor (DC)	
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.

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-PC094PC035ME03-L629F46Y-D1-14	1 May. 2022		

**DISCLAIMER**

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

**LIFE SUPPORT POLICY**

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.