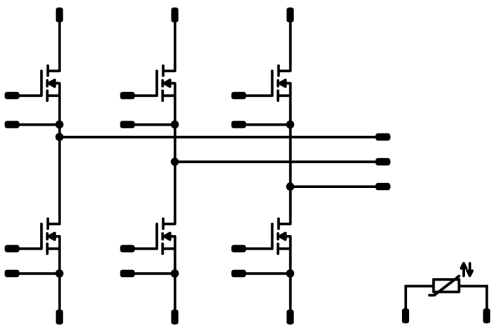




Vincotech

10-PY126PA020ME-L227F18Y

datasheet

flowPACK 1 SiC		1200 V / 20 mΩ
Features • Wolfspeed(Cree)™ Silicon Carbide Power MOSFET, C2M™ MOSFET Technology • Sixpack with three separated legs • Solderless Press-fit Mounting Technology	flow 1 12mm housing 	
Target applications • Battery Charger	Schematic 	
Types • 10-PY126PA020ME-L227F18Y		

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Inverter Switch				
Drain-source voltage	V_{DS}		1200	V
Drain current	I_D	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	53	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	320	A
Avalanche energy, single pulse	E_{AS}	$I_D = 80\text{ A}$ $V_{DD} = 50\text{ V}$	4000	mJ
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	104	W
Gate-source voltage	V_{GS}		-10/+25	V
Maximum Junction Temperature	T_{jmax}		150	°C



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10-PY126PA020ME-L227F18Y
datasheet

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_{jmax} - 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			min. 12,7	mm
Clearance			11,83	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



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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	

Inverter Switch

Static

Drain-source on-state resistance	$r_{DS(on)}$		20		80	25 125 150		22 33 35	26	mΩ
Gate-source threshold voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$			0,02	25	2,4	2,8		V
Gate to Source Leakage Current	I_{GSS}		20	0		25			500	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25		2	200	μA
Internal gate resistance	r_g							0,9		Ω
Gate charge	Q_g		-5/20	800	80	25		230		nC
Gate to source charge	Q_{GS}							56		
Gate to drain charge	Q_{GD}							74		
Short-circuit input capacitance	C_{iss}	$f = 1\text{MHz}$	0	1000		25		3786		pF
Short-circuit output capacitance	C_{oss}							300		
Reverse transfer capacitance	C_{rss}							20		

Reverse Diode Static

Diode forward voltage	V_{SD}		-5		40	25 125		3,3 3,1		V
Continuous Diode Forward Current	I_S					25			120	A

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4\text{ W/mK}$ (PSX)						0,67		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2\text{ }\Omega$	-5/16	600	60	25 125		31 30		ns
Rise time	t_r					25 125		9 9		
Turn-off delay time	$t_{d(off)}$					25 125		64 67		
Fall time	t_f					25 125		20 18		
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD} = 0,9\text{ }\mu\text{C}$ $Q_{rFWD} = 1,5\text{ }\mu\text{C}$				25 125		0,518 0,509		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,212 0,177		



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10-PY126PA020ME-L227F18Y

datasheet

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	

Thermistor

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



Vincotech

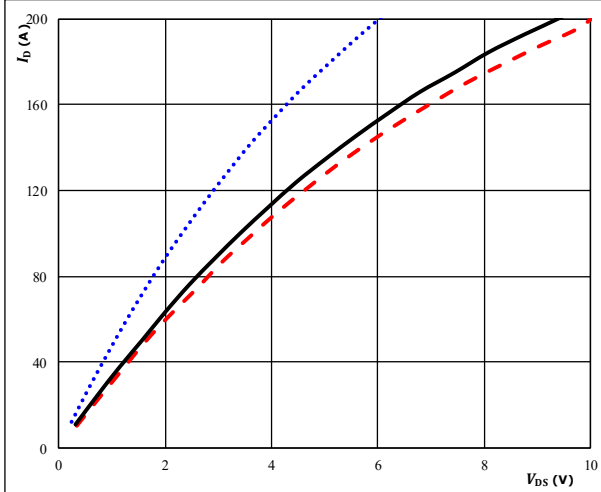
10-PY126PA020ME-L227F18Y datasheet

Inverter Switch Characteristics

figure 1. MOSFET

Typical output characteristics

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

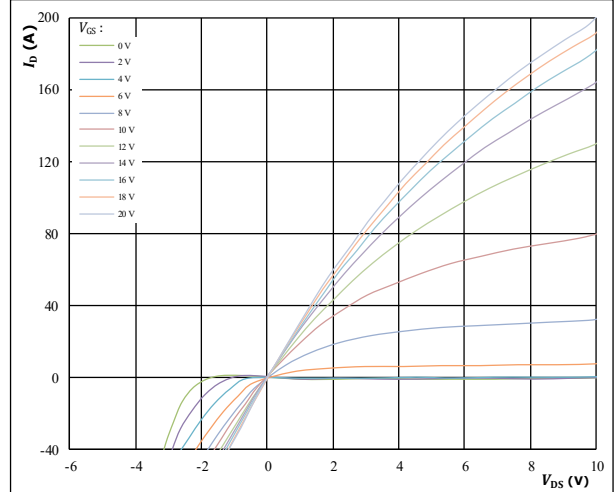


$t_p = 250 \mu s$
 $V_{GS} = 20 V$
 $T_j: 25^\circ C$ (dotted blue)
 $125^\circ C$ (solid black)
 $150^\circ C$ (dashed red)

figure 2. MOSFET

Typical output characteristics

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

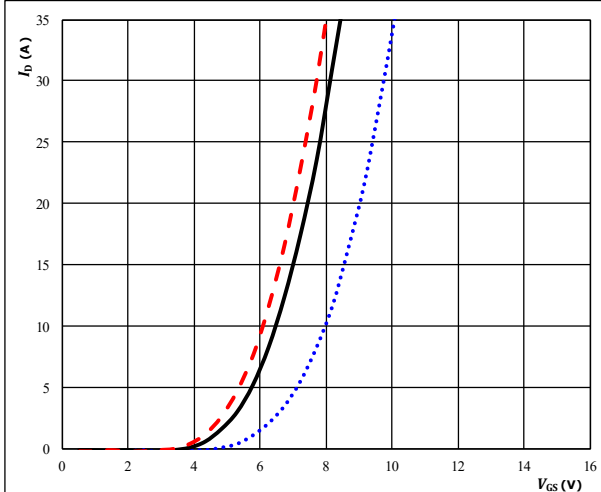


$t_p = 250 \mu s$
 $T_j = 150^\circ C$
 V_{GS} from 0 V to 20 V in steps of 2 V

figure 3. MOSFET

Typical transfer characteristics

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

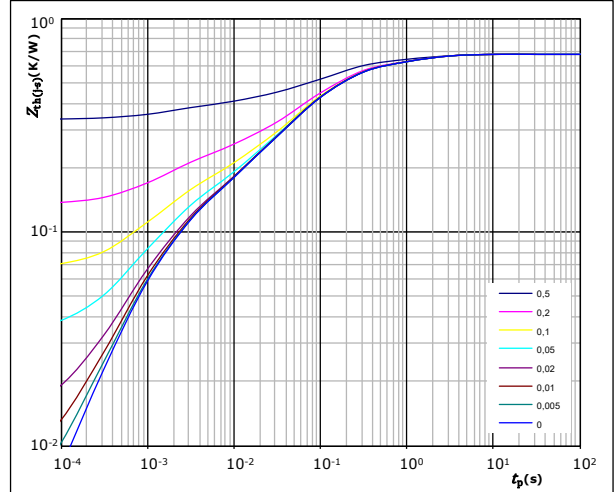


$t_p = 100 \mu s$
 $V_{DS} = 10 V$
 $T_j: 25^\circ C$ (dotted blue)
 $125^\circ C$ (solid black)
 $150^\circ C$ (dashed red)

figure 4. MOSFET

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,67 K/W$
MOSFET thermal model values

R (K/W)	τ (s)
1,01E-01	1,43E+00
2,02E-01	1,77E-01
2,13E-01	6,03E-02
7,84E-02	8,37E-03
7,99E-02	1,21E-03

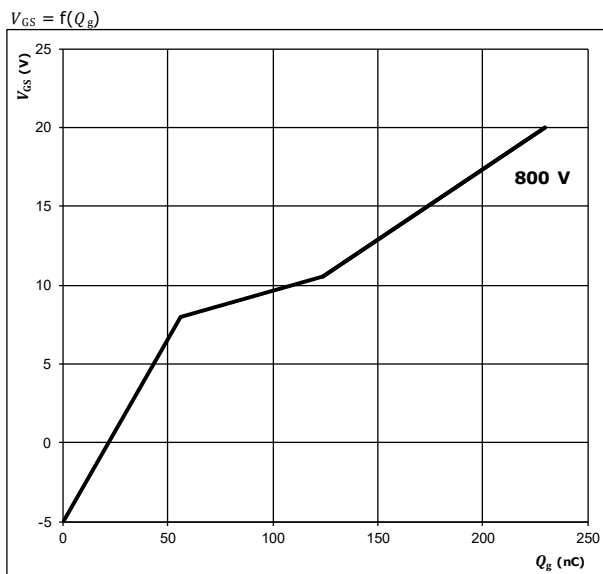


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Inverter Switch Characteristics

figure 5. MOSFET

Gate voltage vs Gate charge



At

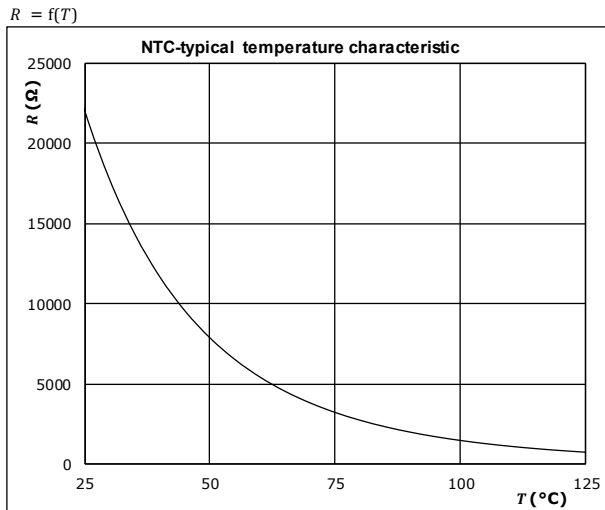
$I_c = 80$ A



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Thermistor Characteristics

figure 1. Thermistor
Typical NTC characteristic as a function of temperature





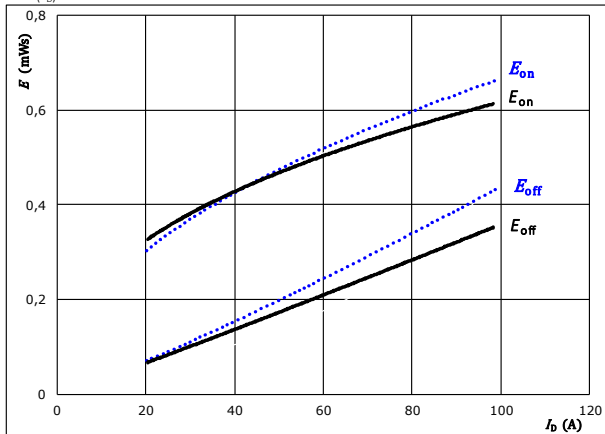
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Inverter Switching Characteristics

figure 1. MOSFET

Typical switching energy losses as a function of drain current

$$E = f(I_D)$$



With an inductive load at

$V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

T_J :

25 °C

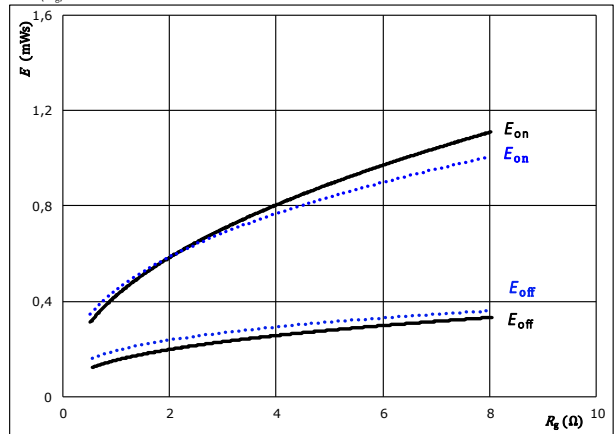
125 °C

.....
————

figure 2. MOSFET

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $I_D = 60$ A

T_J :

25 °C

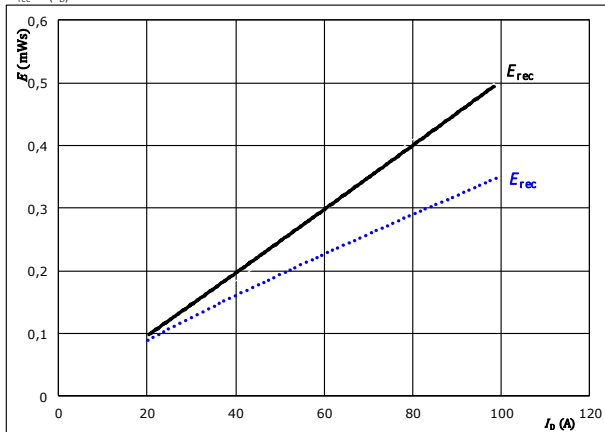
125 °C

.....
————

figure 3. FWD

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
 $V_{GS} = -5/16$ V
 $R_{gon} = 2$ Ω

T_J :

25 °C

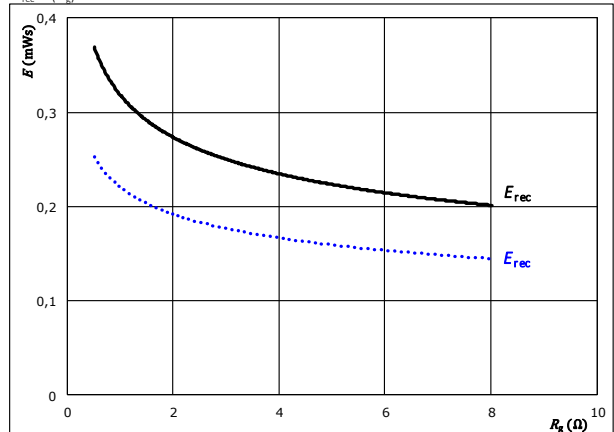
125 °C

.....
————

figure 4. FWD

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
 $V_{GS} = -5/16$ V
 $I_D = 60$ A

T_J :

25 °C

125 °C

.....
————



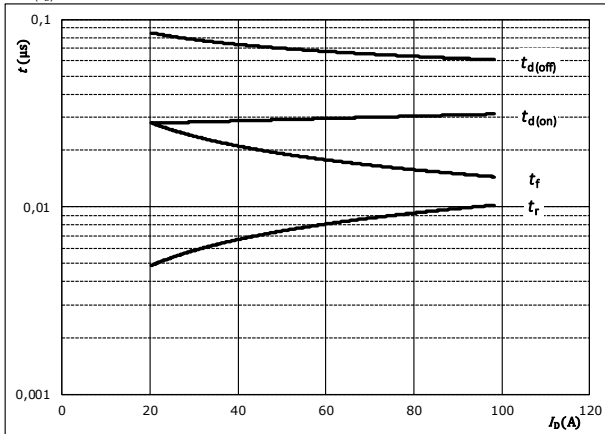
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Inverter Switching Characteristics

figure 5. MOSFET

Typical switching times as a function of drain current

$$t = f(I_D)$$



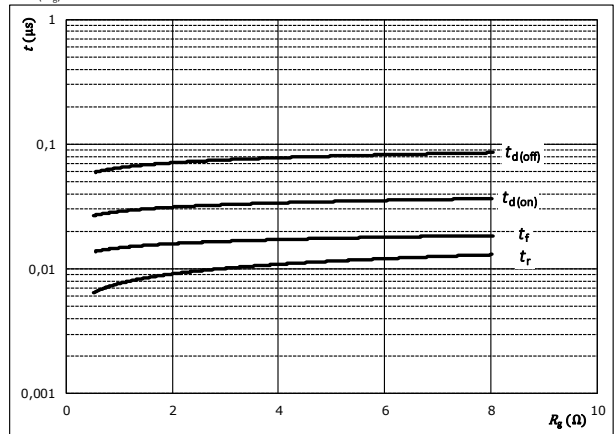
With an inductive load at

T_J	=	125	°C
V_{DS}	=	600	V
V_{GS}	=	-5/16	V
R_{gon}	=	2	Ω
R_{goff}	=	2	Ω

figure 6. MOSFET

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



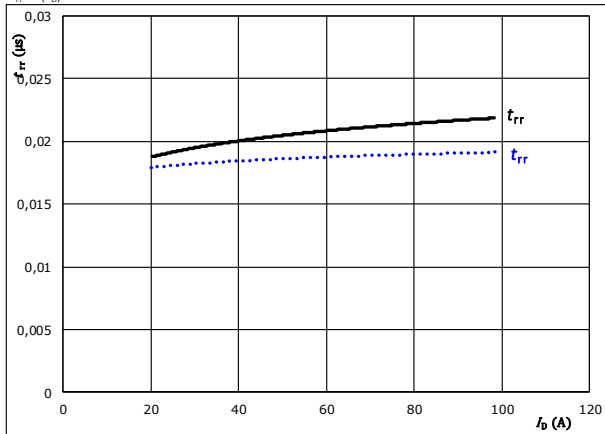
With an inductive load at

T_J	=	125	°C
V_{DS}	=	600	V
V_{GS}	=	-5/16	V
I_D	=	60	A

figure 7. FWD

Typical reverse recovery time as a function of drain current

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

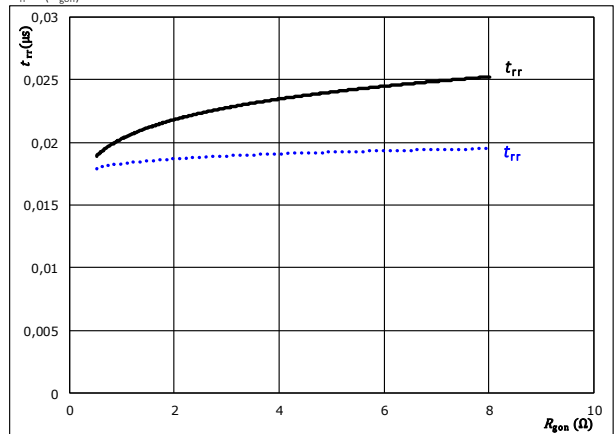


At	V_{DS}	=	600	V	T_J :	25 °C	
	V_{GS}	=	-5/16	V		125 °C	————
	R_{gon}	=	2	Ω			

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}	=	-5/16	V		125 °C	————
	I_D	=	60	A			



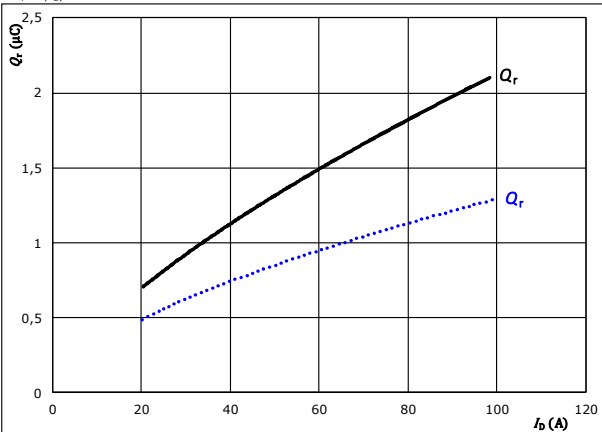
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Inverter Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of drain current

$$Q_r = f(I_D)$$

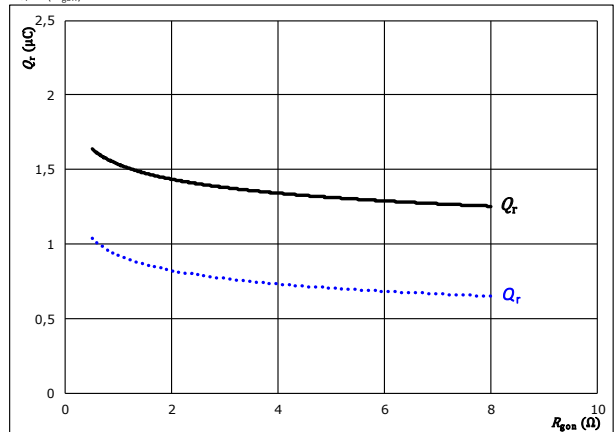


At $V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $R_{gon} = 2$ Ω
 $T_j: 25$ °C
 125 °C —

figure 10. FWD

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

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

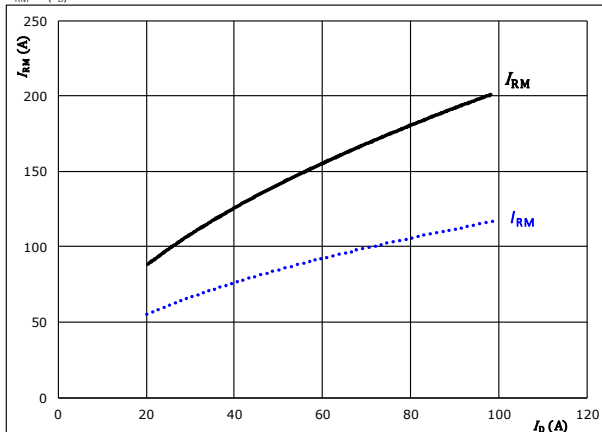


At $V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $I_D = 60$ A
 $T_j: 25$ °C
 125 °C —

figure 11. FWD

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

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

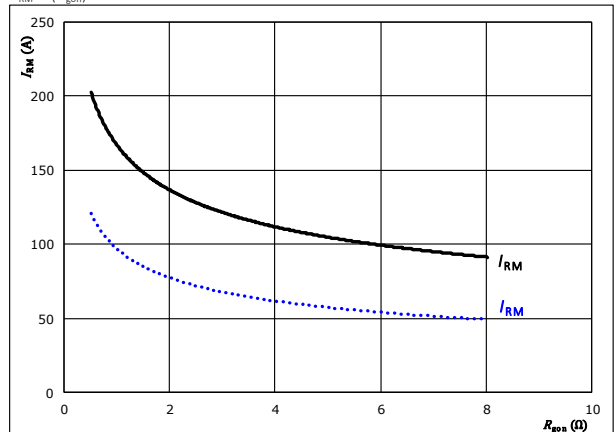


At $V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $R_{gon} = 2$ Ω
 $T_j: 25$ °C
 125 °C —

figure 12. FWD

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

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



At $V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $I_D = 60$ A
 $T_j: 25$ °C
 125 °C —



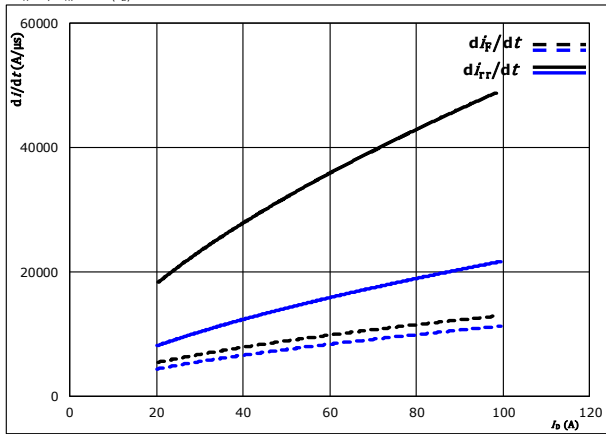
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Inverter Switching Characteristics

figure 13. FWD

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

$$di_f/dt, di_r/dt = f(I_D)$$

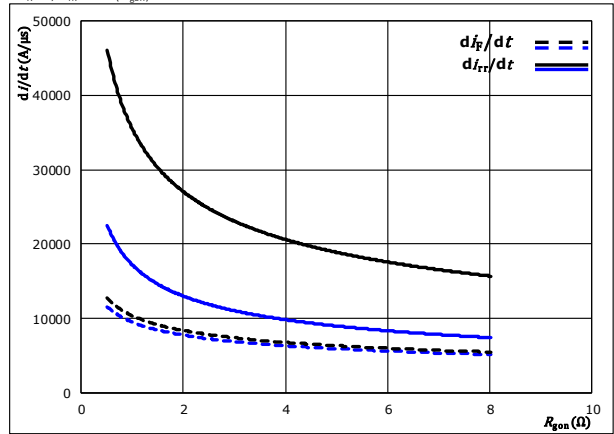


At $V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $R_{gon} = 2$ Ω
 $T_J: 25$ °C (dotted line)
 125 °C (solid line)

figure 14. FWD

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

$$di_f/dt, di_r/dt = f(R_{gon})$$

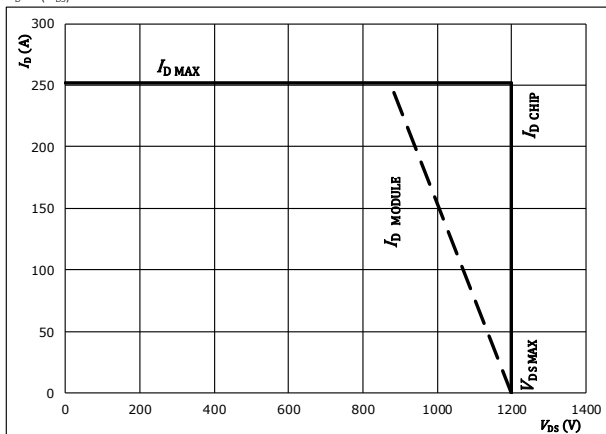


At $V_{DS} = 600$ V
 $V_{GS} = -5/16$ V
 $I_D = 60$ A
 $T_J: 25$ °C (dotted line)
 125 °C (solid line)

figure 15. MOSFET

Reverse bias safe operating area

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



At $T_J = 125$ °C
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω



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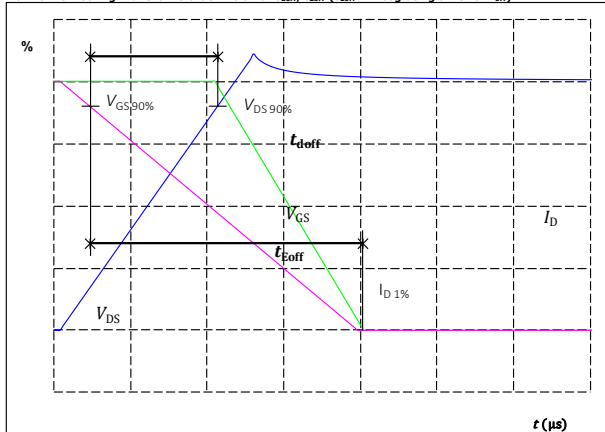
Inverter Switching Definitions

General conditions

T_J	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. MOSFET

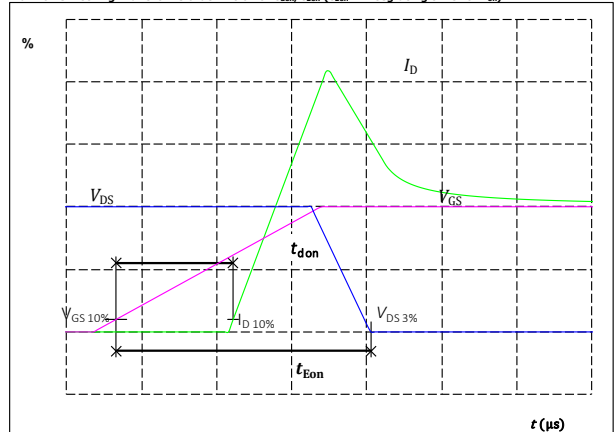
Turn-off Switching Waveforms & definition of t_{doff} , t_{eff} (t_{eff} = integrating time for E_{off})



$V_{GS}(0\%) =$	-5	V
$V_{GS}(100\%) =$	16	V
$V_{DS}(100\%) =$	600	V
$I_D(100\%) =$	60	A
$t_{doff} =$	0,067	μs

figure 2. MOSFET

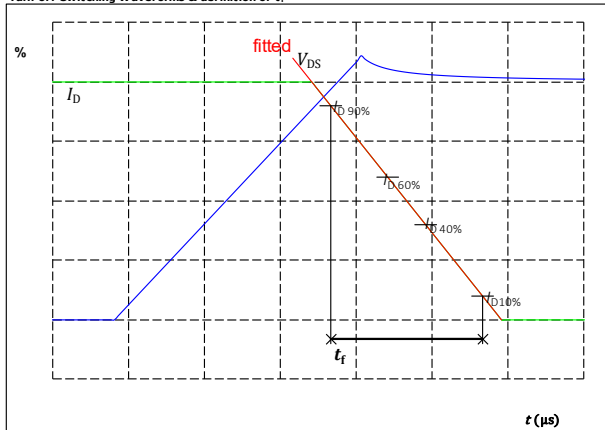
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GS}(0\%) =$	-5	V
$V_{GS}(100\%) =$	16	V
$V_{DS}(100\%) =$	600	V
$I_D(100\%) =$	60	A
$t_{don} =$	0,030	μs

figure 3. MOSFET

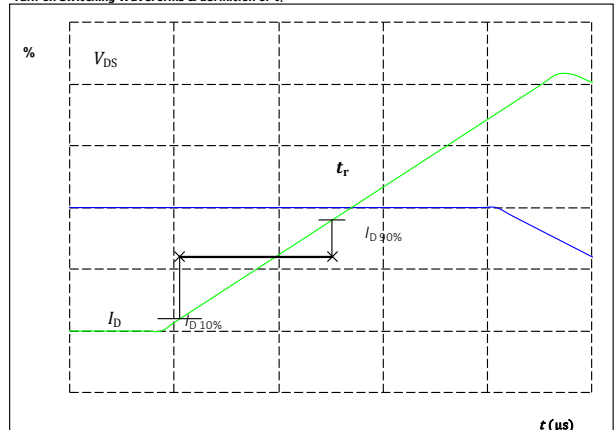
Turn-off Switching Waveforms & definition of t_f



$V_{DS}(100\%) =$	600	V
$I_D(100\%) =$	60	A
$t_f =$	0,018	μs

figure 4. MOSFET

Turn-on Switching Waveforms & definition of t_r



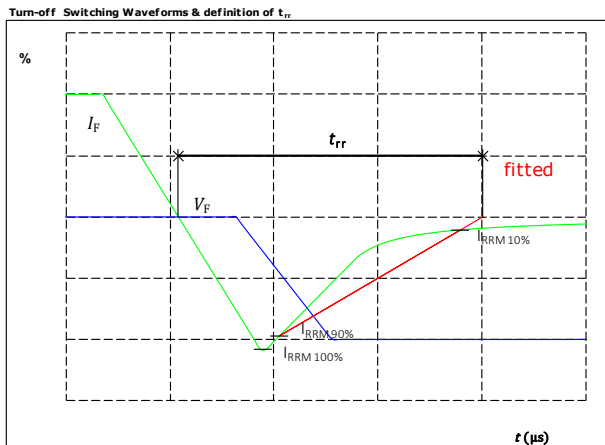
$V_{DS}(100\%) =$	600	V
$I_D(100\%) =$	60	A
$t_r =$	0,009	μs



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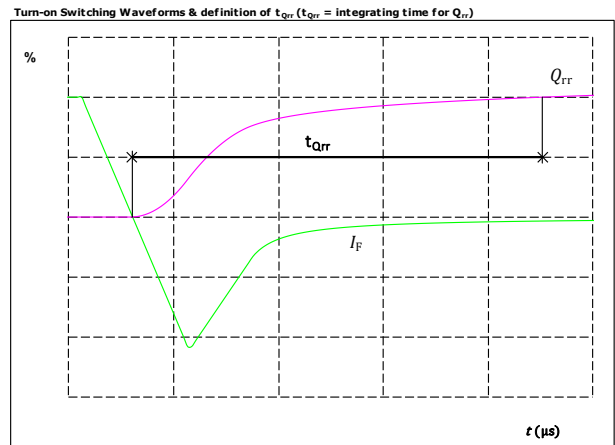
Inverter Switching Characteristics

figure 7. FWD



$V_F (100\%) =$	600	V
$I_F (100\%) =$	60	A
$I_{RRM} (100\%) =$	156	A
$t_{rr} =$	0,021	μs

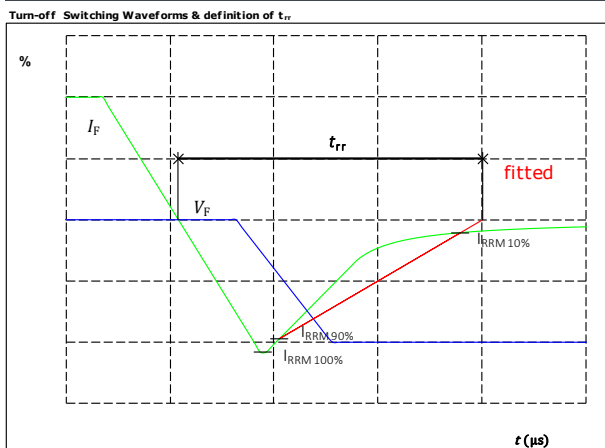
figure 8. FWD



$I_F (100\%) =$	60	A
$Q_{rr} (100\%) =$	1,48	μC

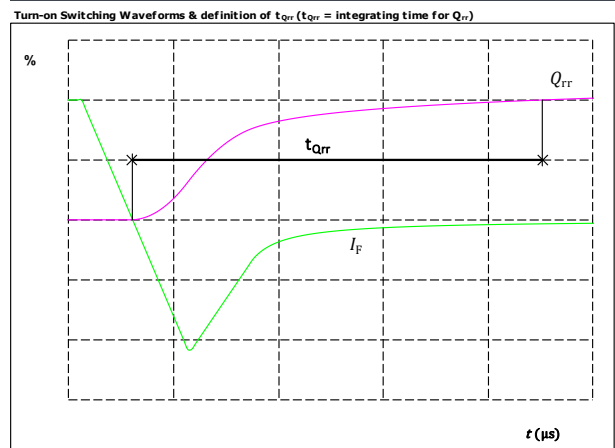
Inverter Switching Characteristics

figure 7. FWD



$V_F (100\%) =$	600	V
$I_F (100\%) =$	60	A
$I_{RRM} (100\%) =$	156	A
$t_{rr} =$	0,021	μs

figure 8. FWD



$I_F (100\%) =$	60	A
$Q_{rr} (100\%) =$	1,48	μC

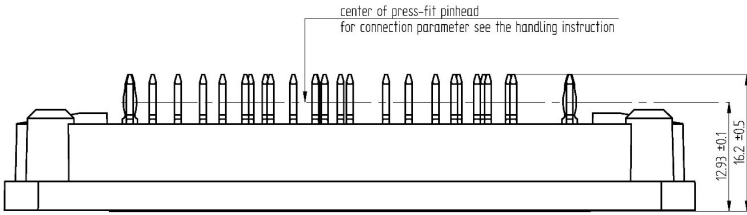
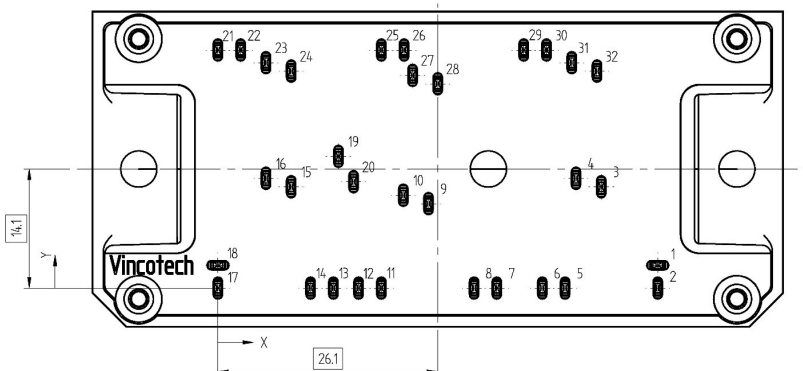


10-PY126PA020ME-L227F18Y

datasheet

Vincotech

Ordering Code & Marking										
Version				Ordering Code						
without thermal paste 12mm housing with Press-fit pins				10-PY126PA020ME-L227F18Y						
with thermal paste 12mm housing with Press-fit pins				10-PY126PA020ME-L227F18Y-/3/						
				Text		Name	Date code	UL & VIN	Lot	Serial
						NN-NNNNNNNNNNNNNN-TTTTITV	WWYY	UL VIN	LLLLL	SSSS
				Datamatrix	Type&Ver	Lot number	Serial	Date code		
					TTTTITV	LLLLL	SSSS	WWYY		

Pin table				Outline			
Pin	X	Y	Functions				
1	52,2	2,7	DC-3				
2	52,2	0	DC-3				
3	45,5	12	G15				
4	42,5	13	S15				
5	41,2	0	DC+3				
6	38,5	0	DC+3				
7	33,1	0	DC+2				
8	30,4	0	DC+2				
9	25	10	G13				
10	22	11	S13				
11	19,4	0	DC-2				
12	16,7	0	DC-2				
13	13,7	0	DC-1				
14	11	0	DC-1				
15	8,7	12	G11				
16	5,7	13	S11				
17	0	0	DC+1				
18	0	2,7	DC+1				
19	14,3	15,6	THERM2				
20	16,1	12,6	THERM1				
21	0	28,2	PH1				
22	2,7	28,2	PH1				
23	5,7	26,7	S12				
24	8,7	25,7	G12				
25	19,4	28,2	PH2				
26	22,1	28,2	PH2				
27	23,1	25,2	S14				
28	26,1	24,2	G14				
29	36,3	28,2	PH3				
30	39	28,2	PH3				
31	42	26,7	S16				
32	45	25,7	G16				

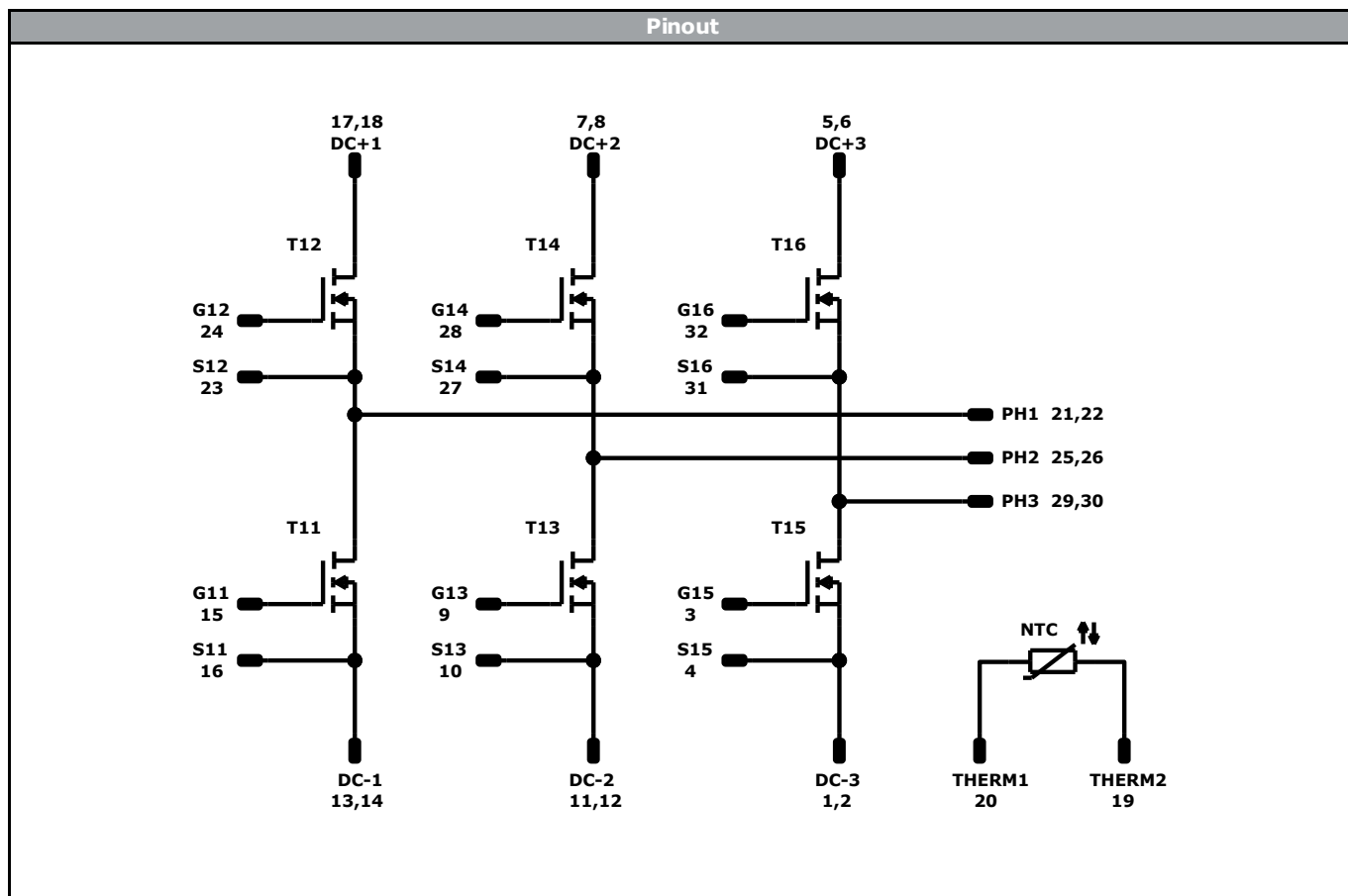
Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech

10-PY126PA020ME-L227F18Y

datasheet



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	MOSFET	1200 V	20 mΩ	Inverter Switch	
NTC	NTC			Thermistor	



Vincotech

10-PY126PA020ME-L227F18Y
datasheet

Packaging instruction			
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow</i> 1 packages see vincotech.com website.

Package data
Package data for <i>flow</i> 1 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-PY126PA020ME-L227F18Y-D2-14	13 Aug. 2018	Isolation Voltage updated	2
		Clearance value corrected	2
		Update Thermistor characteristics	4,7
		Correct energy loss characteristics	8
		Correct recovery time characteristics	9

DISCLAIMER

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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.