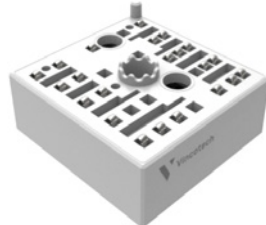
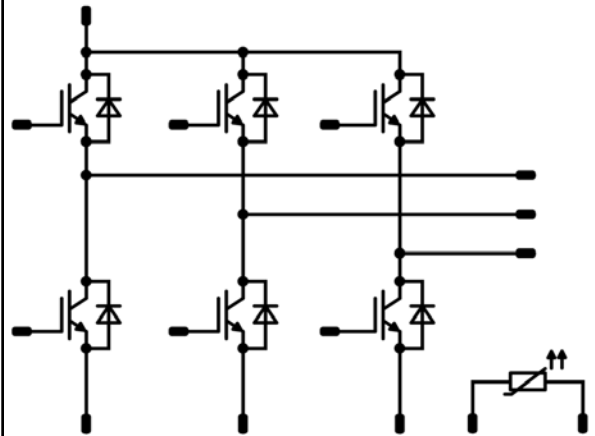




Vincotech

80-M1126PA015M7-K218F70

datasheet

MiniSKiP® PACK 1		1200 V / 15 A
Features • IGBT M7 with low V_{CEsat} and improved EMC behavior • Open emitter configuration • Solder-free spring contact technology • Built-in PTC	MiniSKiP® 1 	
Target applications • Industrial Drives	Schematic 	
Types • 80-M1126PA015M7-K218F70		

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Inverter Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	15	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	30	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	79	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C



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datasheet

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Inverter Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	15	A
Repetitive peak forward current	I_{FRM}		30	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	61	W
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* $t_p = 2\text{ s}$	5500	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance		With std lid For more informations see handling instructions	6,3	mm
Clearance		With std lid For more informations see handling instructions	6,3	mm
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



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80-M1126PA015M7-K218F70

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	

Inverter Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		15	25 125 150		1,70 1,95 2,01	1,95	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			60	µA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}		0	10		25		2900		pF
Output capacitance	C_{oes}							120		
Reverse transfer capacitance	C_{res}							34		
Gate charge	Q_g		15	600	15	25		1100		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 2,5 \text{ W/mK}$ (HPTP)						1,21		K/W
-------------------------------------	---------------	--	--	--	--	--	--	------	--	-----

Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 32 \Omega$ $R_{gon} = 32 \Omega$	± 15	600	15	25 125 150		196 191 190		ns
Rise time	t_r					25 125 150		60 63 64		
Turn-off delay time	$t_{d(off)}$					25 125 150		181 206 211		
Fall time	t_f					25 125 150		95 113 114		
Turn-on energy (per pulse)	E_{on}					25 125 150		1,685 2,106 2,209		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,987 1,327 1,411		



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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 Diode

Static

Forward voltage	V_F				15	25 125 150		1,63 1,74 1,73	2,1	V
Reverse leakage current	I_R			1200		25			30	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 2,5 \text{ W/mK}$ (HPTP)						1,55		K/W
-------------------------------------	---------------	--	--	--	--	--	--	------	--	-----

Dynamic

Peak recovery current	I_{RRM}	$di/dt = 181 \text{ A/}\mu\text{s}$ $di/dt = 205 \text{ A/}\mu\text{s}$ $di/dt = 175 \text{ A/}\mu\text{s}$	± 15	600	15	25 125 150		9 11 11		A
Reverse recovery time	t_{rr}					25 125 150		286 422 471		ns
Recovered charge	Q_r					25 125 150		1,496 2,463 2,684		μC
Reverse recovered energy	E_{rec}					25 125 150		0,497 0,913 1,000		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		77 49 44		A/μs

Thermistor

Rated resistance	R					25		1		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1670 \Omega$				100	-2		+2	%
R_{100}	R					100		1670		Ω
Power dissipation constant						25		0,76		mW/K
A-value	$A_{(25/50)}$					25		$7,635 \cdot 10^{-3}$		1/K
B-value	$B_{(25/100)}$					25		$1,731 \cdot 10^{-5}$		1/K ²
Vincotech PTC Reference									E	



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Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

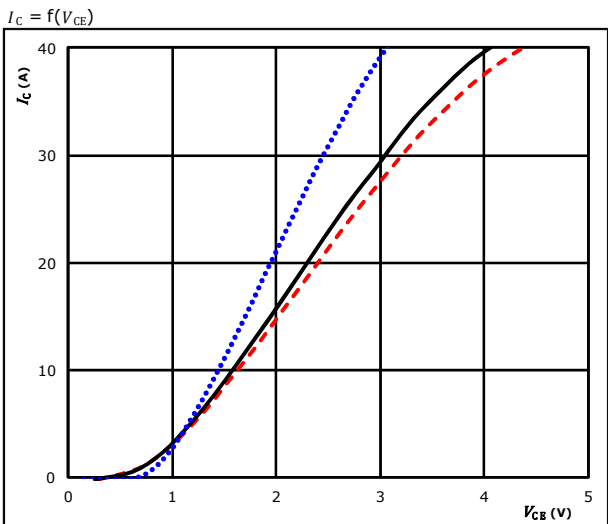


figure 2. IGBT

Typical output characteristics

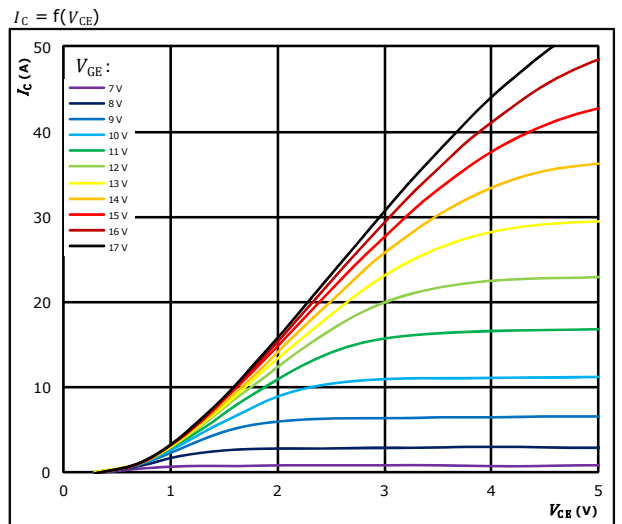


figure 3. IGBT

Typical transfer characteristics

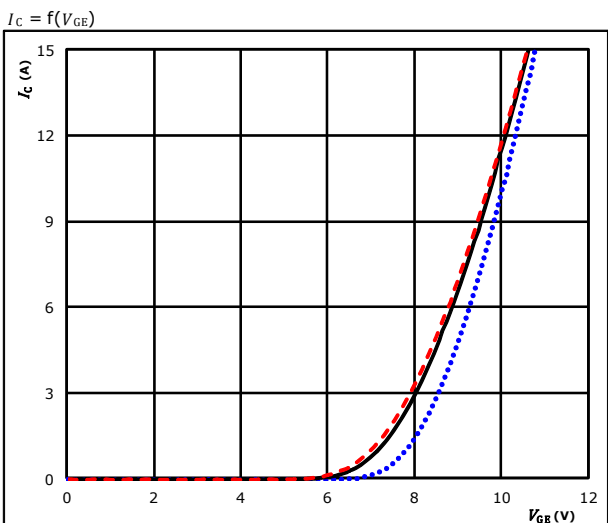
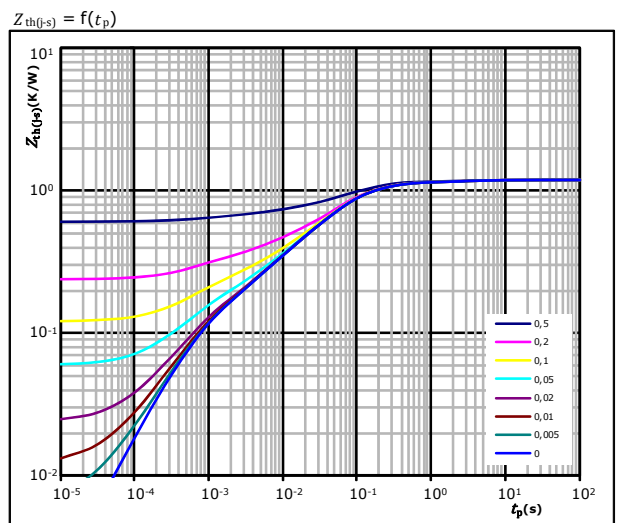


figure 4. IGBT

Transient thermal impedance as function of pulse duration



IGBT thermal model values

R (K/W)	τ (s)
3,71E-02	3,33E+00
1,06E-01	4,04E-01
6,09E-01	6,08E-02
2,26E-01	1,95E-02
1,28E-01	3,85E-03
1,02E-01	4,86E-04



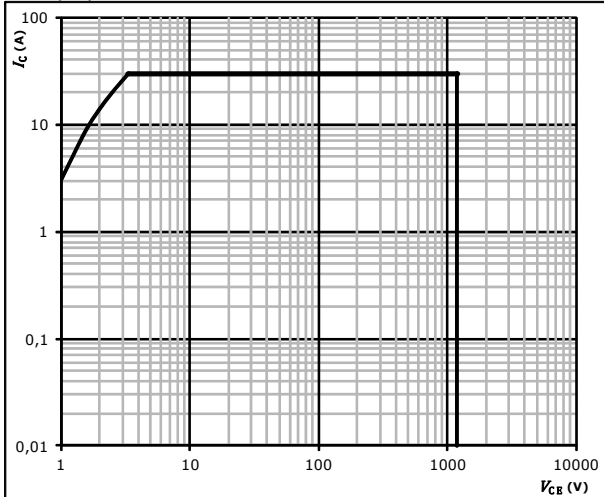
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Inverter Switch Characteristics

figure 5. IGBT

Safe operating area

$$I_C = f(V_{CE})$$



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



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Inverter Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

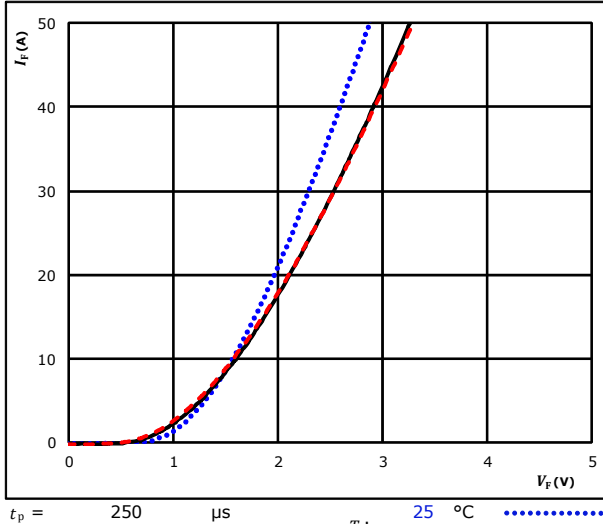
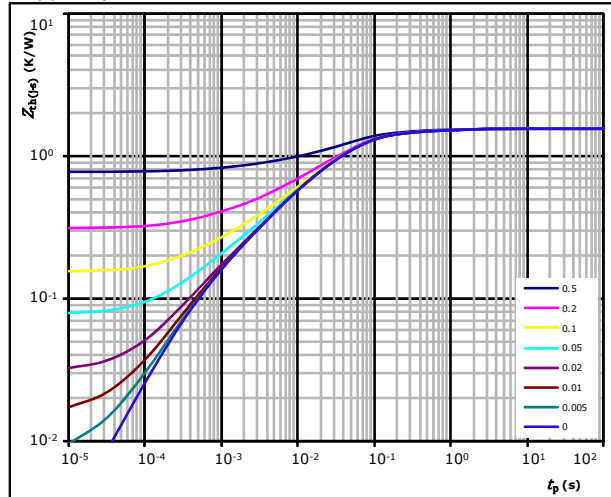


figure 2. FWD

Transient thermal impedance as a function of pulse width

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



FWD thermal model values

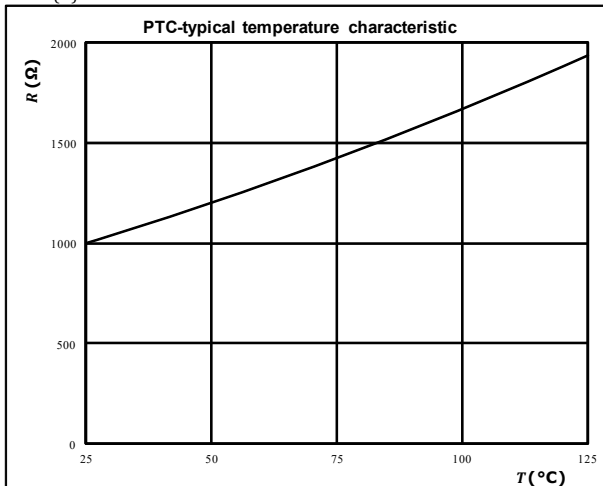
$R \text{ (K/W)}$	$\tau \text{ (s)}$
8,07E-02	1,12E+00
2,22E-01	1,47E-01
8,07E-01	3,59E-02
2,86E-01	6,71E-03
9,51E-02	1,49E-03
5,83E-02	3,63E-04

Thermistor Characteristics

figure 1. Thermistor

Typical PTC characteristic
as a function of temperature

$$R = f(T)$$





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Inverter Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

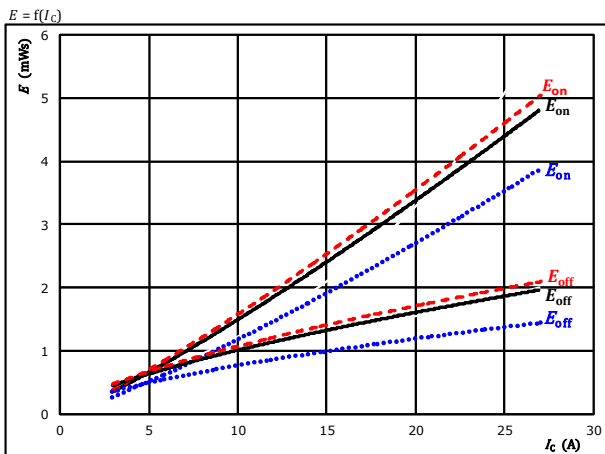


figure 2. IGBT

Typical switching energy losses as a function of gate resistor

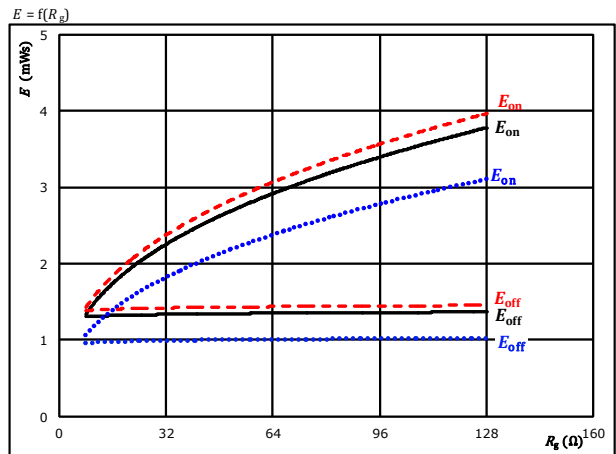


figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

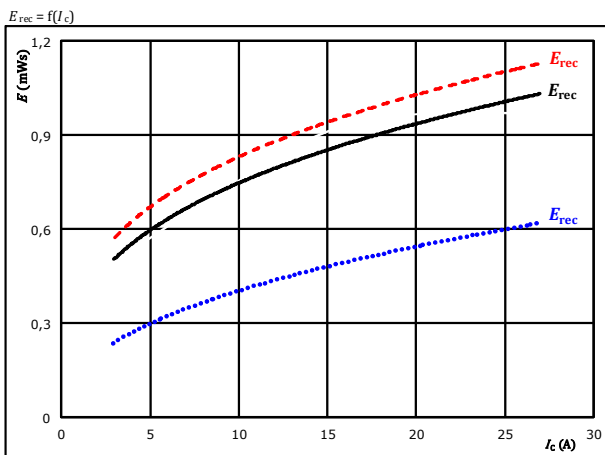
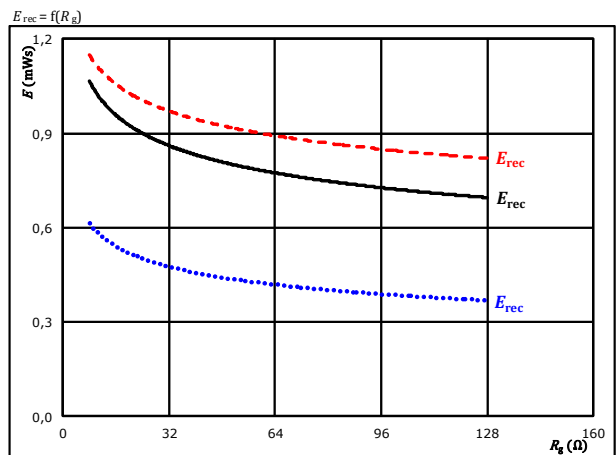


figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor





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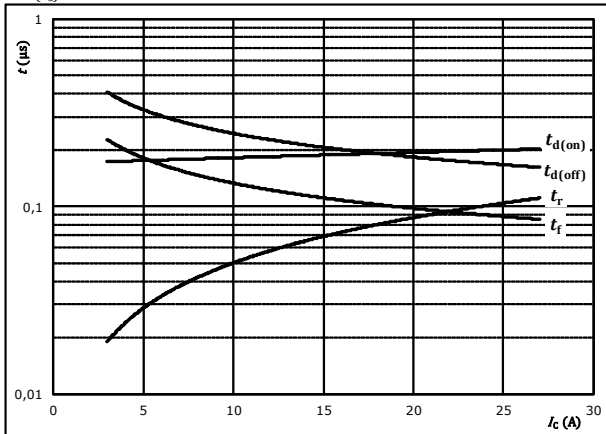
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Inverter Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



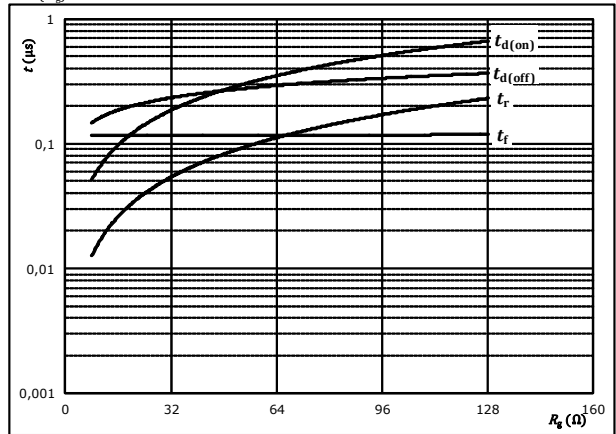
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{gon} =$	32	Ω
$R_{goff} =$	32	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



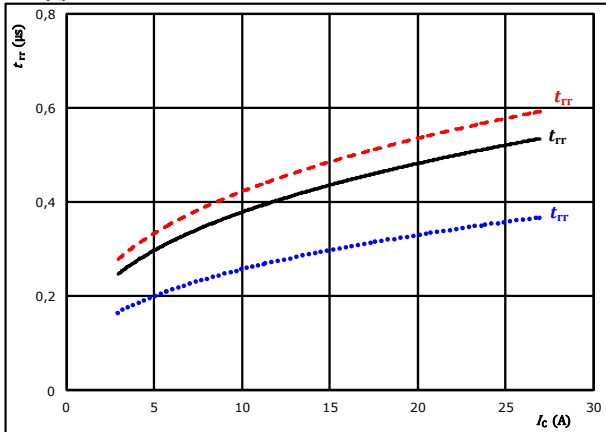
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	15	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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

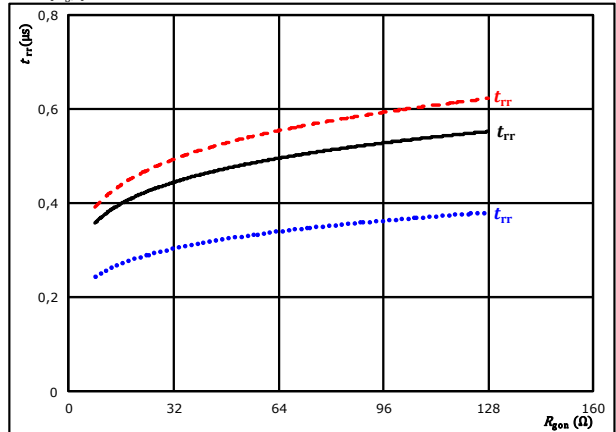


At	$V_{CE} =$	600	V	$T_j:$	25 °C	
	$V_{GE} =$	±15	V		125 °C	————
	$R_{gon} =$	32	Ω		150 °C	-----

figure 8. FWD

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

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



At	$V_{CE} =$	600	V	$T_j:$	25 °C	
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	15	A		150 °C	-----



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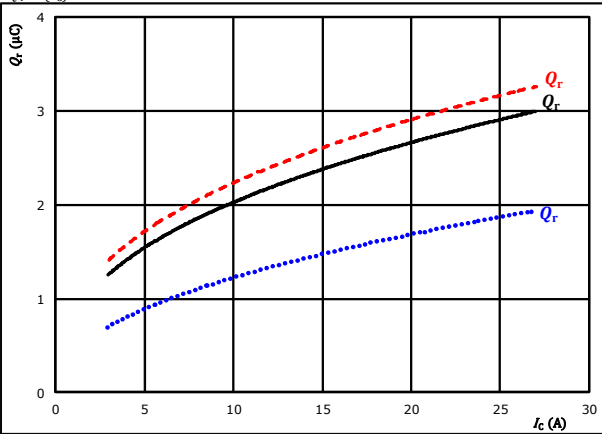
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Inverter Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

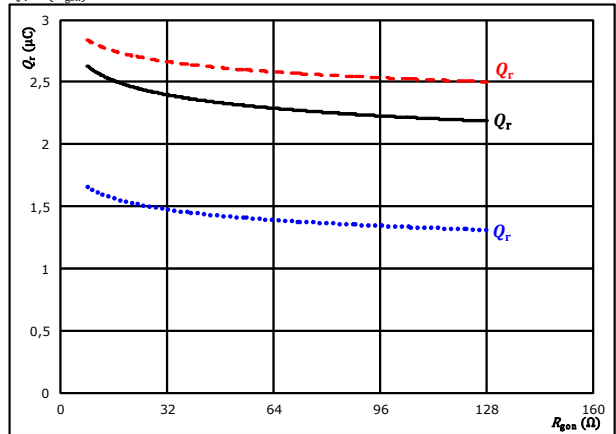


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 10. FWD

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

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

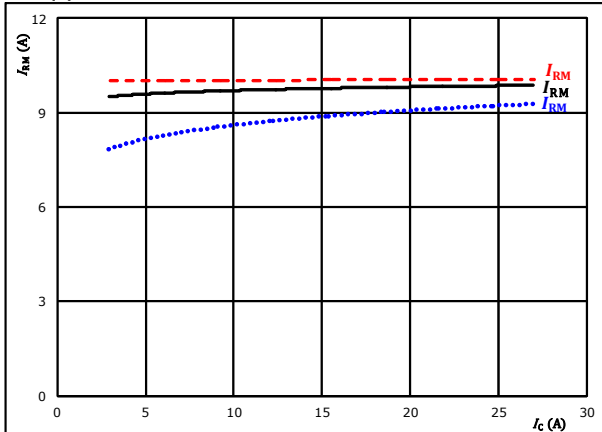


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

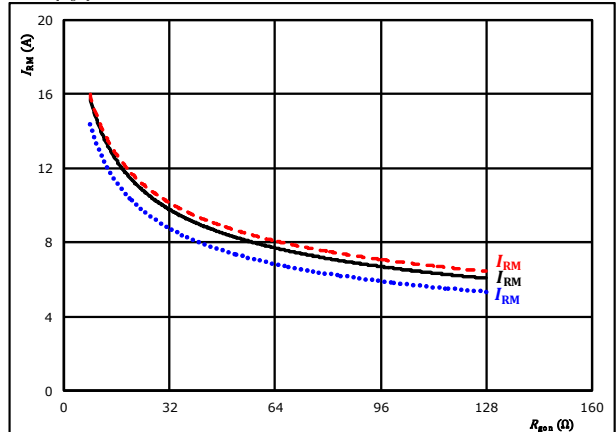


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 12. FWD

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

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



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)



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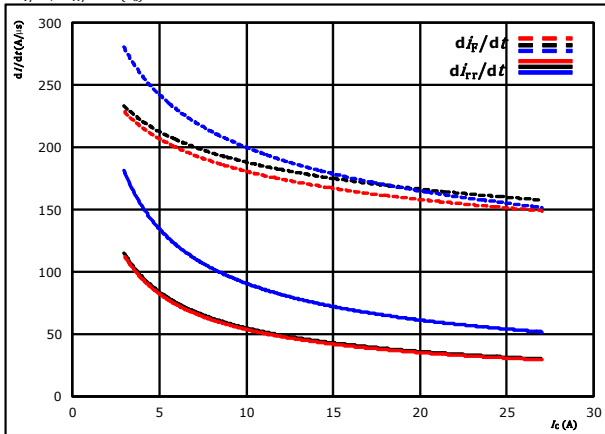
datasheet

Inverter Switching Characteristics

figure 13. FWD

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

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

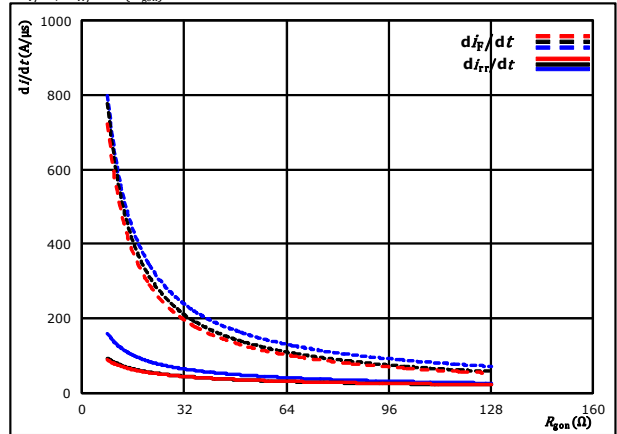


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 14. FWD

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

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

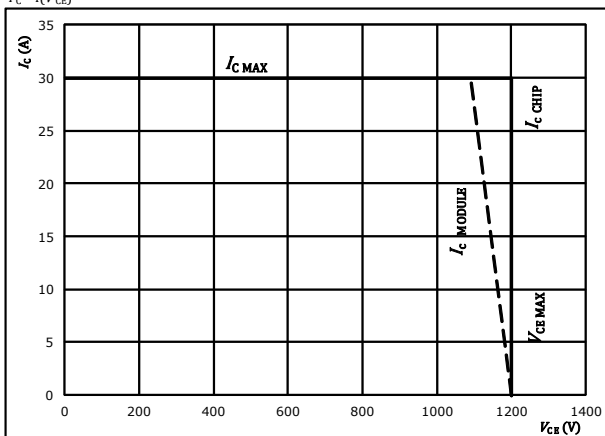


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 15$ A
 $T_j = 25$ °C
 125 °C
 150 °C

figure 15. IGBT

Reverse bias safe operating area

$$I_C = f(V_{CE})$$



At $T_j = 175$ °C
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω



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datasheet

Inverter Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	32 Ω
R_{goff}	=	32 Ω

figure 1. IGBT

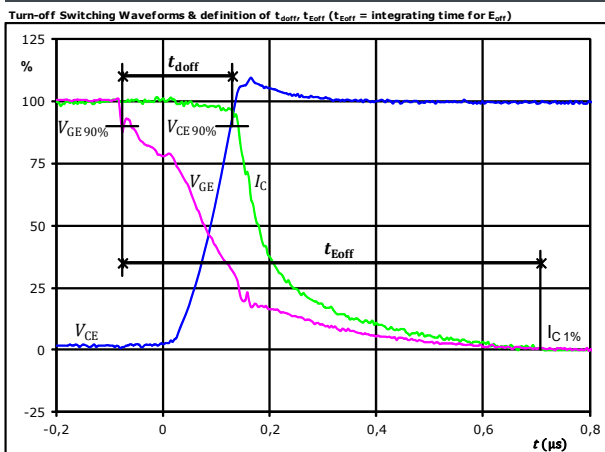


figure 2. IGBT

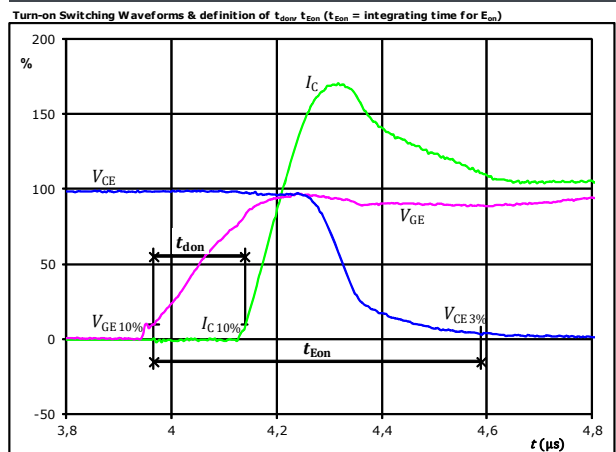


figure 3. IGBT

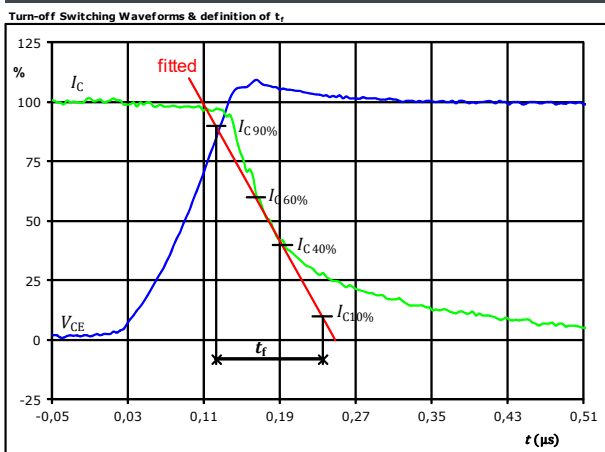
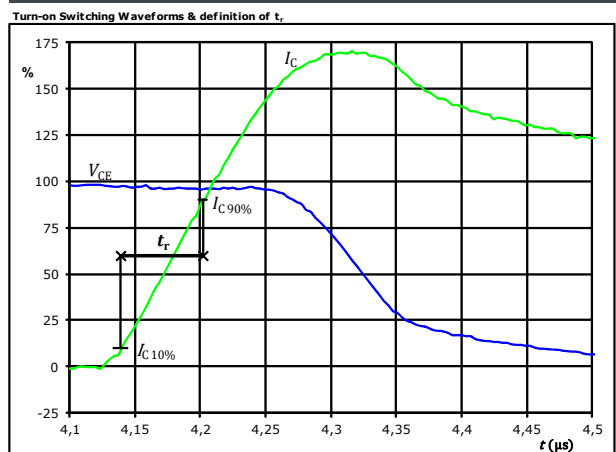


figure 4. IGBT





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Inverter Switching Characteristics

figure 5. IGBT

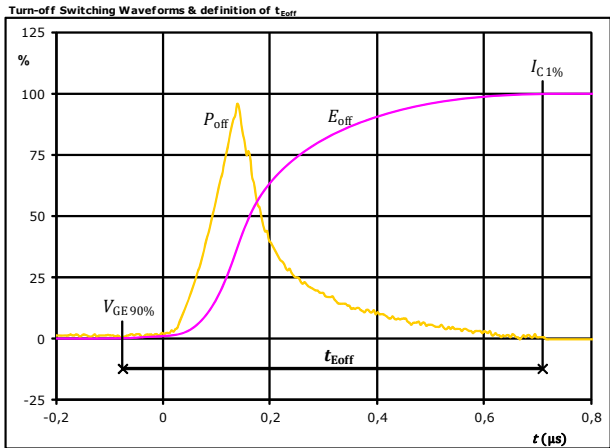


figure 6. IGBT

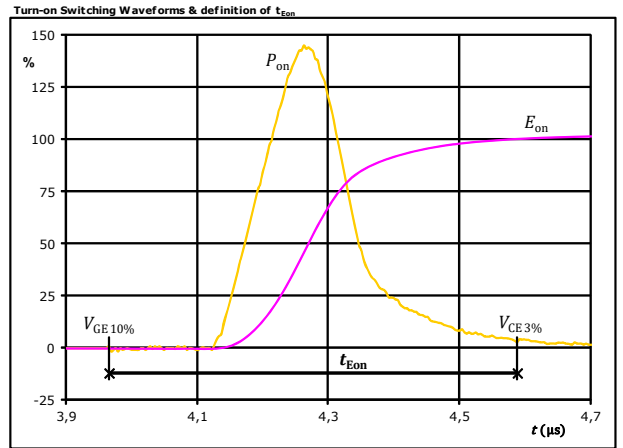
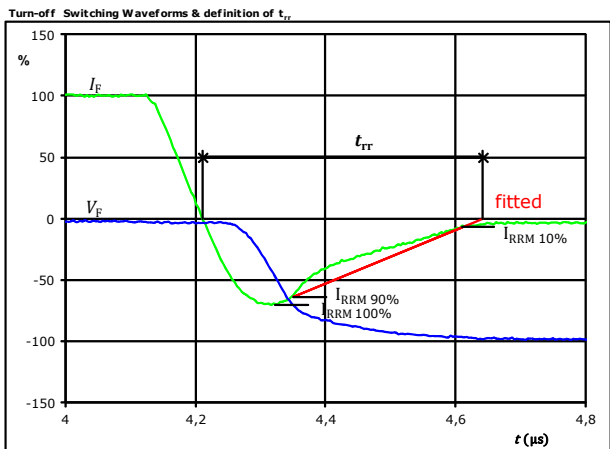


figure 7. FWD





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datasheet

Inverter Switching Characteristics

figure 8. FWD

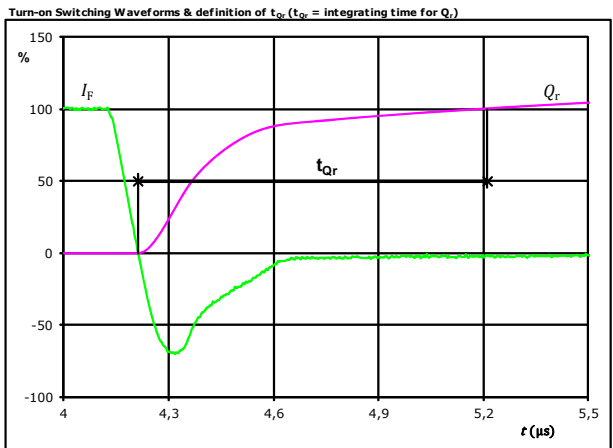
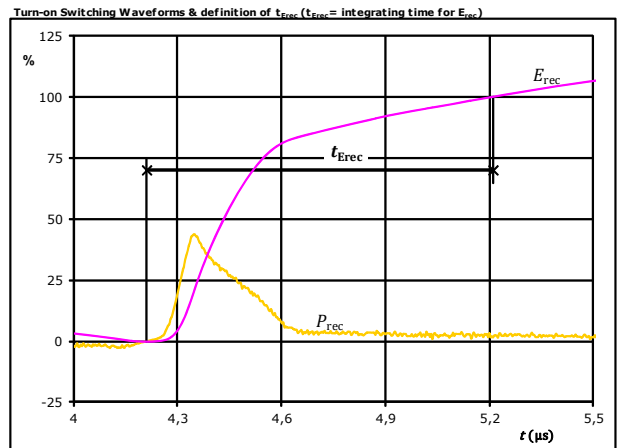


figure 9. FWD





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80-M1126PA015M7-K218F70

datasheet

Ordering Code & Marking							
Version			Ordering Code				
With std lid (6.5mm height) + no thermal grease			80-M1126PA015M7-K218F70-/0A/				
With thin lid (2.8mm height) + no thermal grease			80-M1126PA015M7-K218F70-/0B/				
With std lid (6.5mm height) + thermal grease (0,8 W/mK, P12, silicone-based)			80-M1126PA015M7-K218F70-/1A/				
With thin lid (2.8mm height) + thermal grease (0,8 W/mK, P12, silicone-based)			80-M1126PA015M7-K218F70-/1B/				
With std lid (6.5mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)			80-M1126PA015M7-K218F70-/4A/				
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)			80-M1126PA015M7-K218F70-/4B/				
With std lid (6.5mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)			80-M1126PA015M7-K218F70-/5A/				
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)			80-M1126PA015M7-K218F70-/5B/				
NN-NNNNNNNNNNNNNN TTTTTWWVWVYY UL VIN LLLLL SSSS 	Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNN-TTTTTTW		WVYY	UL VIN	LLLLL	SSSS
		Datamatrix	Type&Ver	Lot number	Serial	Date code	
		TTTTTTTWV	LLLLL	SSSS	WVYY		

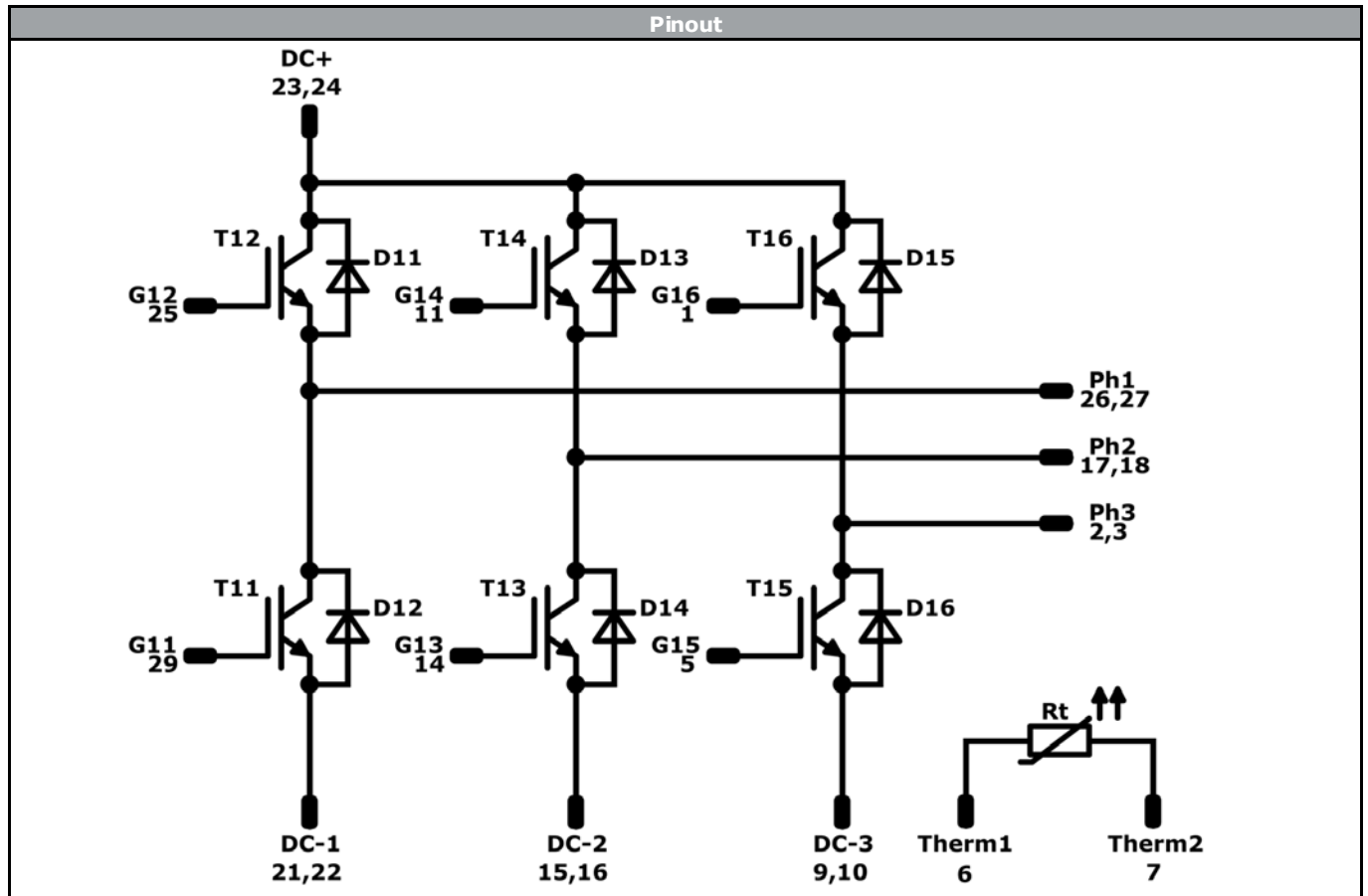
PCB pad table				
Pin	X	Y	Function	
1	15,93	-14,6	G16	
2	15,93	-9,8	Ph3	
3	15,93	-5	Ph3	
4	Not assembled			
5	15,93	7,62	G15	
6	15,93	12,62	Therm1	
7	15,93	15,8	Therm2	
8	Not assembled			
9	8,23	12,62	DC-3	
10	8,23	15,8	DC-3	
11	7,73	-14,6	G14	
12	Not assembled			
13	Not assembled			
14	0,53	9,45	G13	
15	0,53	12,62	DC-2	
16	0,53	15,8	DC-2	
17	-0,47	-14,6	Ph2	
18	-0,47	-9,8	Ph2	
19	Not assembled			
20	Not assembled			
21	-7,17	12,62	DC-1	
22	-7,17	15,8	DC-1	
23	-8,07	-14,6	DC+	
24	-8,07	-9,8	DC+	
25	-15,02	-15,8	G12	
26	-15,02	-9,8	Ph1	
27	-15,02	0	Ph1	
28	Not assembled			
29	-15,02	15,8	G11	

The diagram shows a rectangular package outline with a central circular feature. Pins are numbered 1 through 29, with some pins (1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27) having corresponding symbols. Pins 4, 8, 12, 19, and 20 are marked as 'Not assembled'. The X and Y axes are shown at the bottom, with the origin at the center of the package.

Pad positions refers to center point. For more informations on pad design please see package data



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Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	15 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	15 A	Inverter Diode	
Rt	PTC			Thermistor	



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80-M1126PA015M7-K218F70
datasheet

Packaging instruction			
Standard packaging quantity (SPQ) 120	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for MiniSkiiP® 1 packages see vincotech.com website.

Package data
Package data for MiniSkiiP® 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. 

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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.