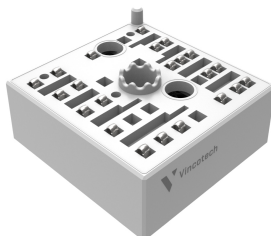
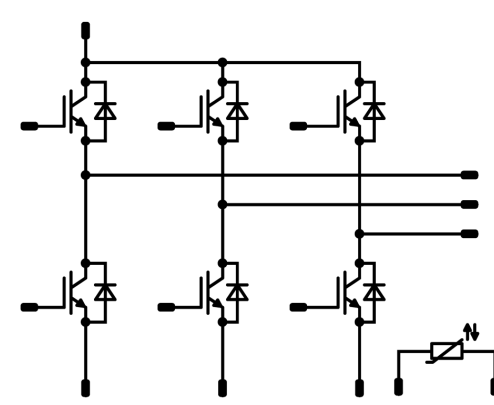




MiniSKiiP PACK 1	1200 V / 25 A
<b>Topology features</b> <ul style="list-style-type: none"><li>• Inverter</li><li>• Open Emitter configuration</li><li>• Temperature sensor</li></ul>	<b>MiniSKiiP® 1 16 mm housing</b> 
<b>Component features</b> <ul style="list-style-type: none"><li>• Easy paralleling</li><li>• Low turn-off losses</li><li>• Low collector emitter saturation voltage</li><li>• Positive temperature coefficient</li><li>• Short tail current</li><li>• Switching optimized for EMC</li></ul>	
<b>Housing features</b> <ul style="list-style-type: none"><li>• Base isolation: Al<sub>2</sub>O<sub>3</sub></li><li>• Easy assembly in one mounting step</li><li>• Flexible PCB design w/o pin holes</li><li>• Rugged solderless spring contacts</li></ul>	
<b>Extra features</b> <ul style="list-style-type: none"><li>• Equivalent: SKiiP 13AC12T4V1</li></ul>	
<b>Target applications</b> <ul style="list-style-type: none"><li>• Industrial Drives</li></ul>	
<b>Types</b> <ul style="list-style-type: none"><li>• 80-M1126PA025M7-K219F70</li></ul>	
	<b>Schematic</b> 



Vincotech

**80-M1126PA025M7-K219F70**  
datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Inverter Switch</b>				
Collector-emitter voltage	$V_{CES}$		1200	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	38	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	50	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	99	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Short circuit ratings	$t_{SC}$	$V_{GE} = 15\text{ V}$ , $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	$\mu\text{s}$
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

## Inverter Diode

Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	38	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	50	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	75	W
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

## Module Properties

### Thermal Properties

Storage temperature	$T_{stg}$		-40...+125	$^{\circ}\text{C}$
Operation temperature under switching condition	$T_{jop}$		-40...+( $T_{jmax} - 25$ )	$^{\circ}\text{C}$

### Isolation Properties

Isolation voltage	$V_{isol}$	DC Test Voltage* $t_p = 2\text{ s}$	5500	V
Isolation voltage	$V'_{isol}$	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		$\geq 600$	

\*100 % tested in production



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### 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		

#### Inverter Switch

##### Static

Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,0025	25	5,4	6	6,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		25	25 125 150		1,64 1,89 1,95	2,1 <sup>(1)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	1200		25			70	μA
Gate-emitter leakage current	$I_{GES}$		0	0		25			200	nA
Internal gate resistance	$r_g$							None		Ω
Input capacitance	$C_{ies}$							4800		pF
Output capacitance	$C_{oes}$		0	10		25		170		pF
Reverse transfer capacitance	$C_{res}$							57		pF
Gate charge	$Q_g$	$V_{CC} = 600$ V	0/15		25	25		180		nC

##### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						0,96		K/W
----------------------------------------------------	---------------	----------------------------------------	--	--	--	--	--	------	--	-----

##### Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		147,2 149,2 145,2		ns
Rise time	$t_r$					25 125 150		28,6 33,4 34		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		170,6 191,4 195,6		ns
Fall time	$t_f$					25 125 150		95,03 109,96 114,76		ns
Turn-on energy (per pulse)	$E_{on}$	$Q_{tFWD} = 2,54$ μC $Q_{tFWD} = 3,88$ μC $Q_{tFWD} = 4,28$ μC				25 125 150		2,06 2,66 2,82		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		1,67 2,18 2,29		mWs



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**80-M1126PA025M7-K219F70**  
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>Inverter Diode</b>										
<b>Static</b>										
Forward voltage	$V_F$				25	25 125 150		1,63 1,7 1,69	2,1 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_r = 1200$ V				25			35	μA
<b>Thermal</b>										
Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						1,26		K/W
<b>Dynamic</b>										
Peak recovery current	$I_{RRM}$					25 125 150		20,99 22,6 23,21		A
Reverse recovery time	$t_{rr}$					25 125 150		254,14 367,32 404,24		ns
Recovered charge	$Q_r$	$di/dt=645$ A/μs $di/dt=673$ A/μs $di/dt=633$ A/μs	±15	600	25	25 125 150		2,54 3,88 4,28		μC
Reverse recovered energy	$E_{rec}$					25 125 150		0,884 1,45 1,61		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		217,37 134,32 132,01		A/μs



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### Characteristic Values

Parameter	Symbol	Conditions					Values			Unit	
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$V_{CE}$ [V]	$V_F$ [V]	$I_D$ [A]	$I_C$ [A]	$I_F$ [A]		$T_j$ [°C]

### Thermistor

#### Static

Rated resistance	$R$					25		1		kΩ
Deviation of $R_{100}$	$A_{R/R}$	$R_{100} = 1670 \Omega$				100	-2		2	%
Maximum Current	$I_{max}$							3		mA
Power dissipation constant	$d$					25		0,76		mW/K
A-value	$A$							$7,635 \times 10^{-3}$		1/K
B-value	$B$							$1,73 \times 10^{-5}$		1/K <sup>2</sup>
Vincotech Thermistor Reference									E	

<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.

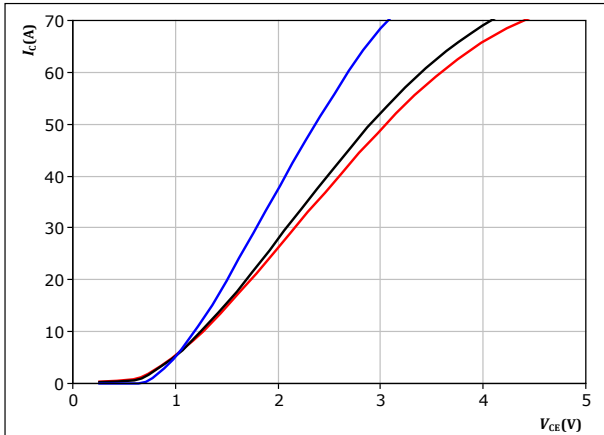


## Inverter Switch Characteristics

**figure 1.** IGBT

Typical output characteristics

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



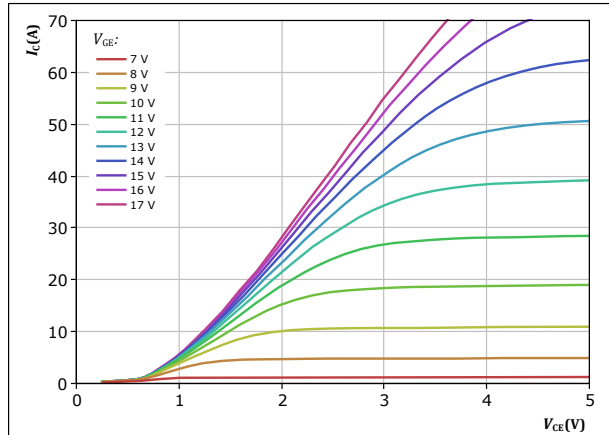
$t_p = 250 \mu s$   
 $V_{GE} = 15 V$

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

**figure 2.** IGBT

Typical output characteristics

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

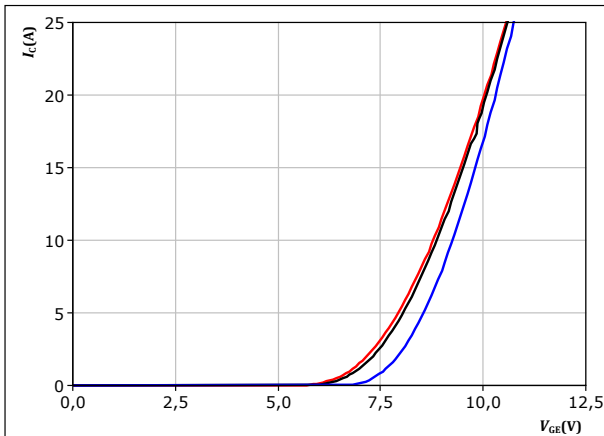


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 3.** IGBT

Typical transfer characteristics

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



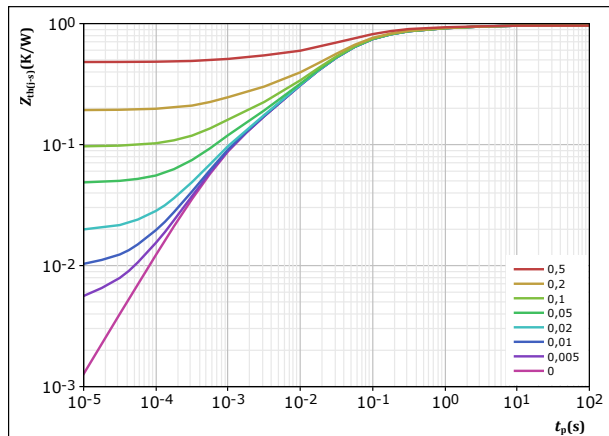
$t_p = 250 \mu s$   
 $V_{CE} = 10 V$

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

**figure 4.** IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,962 \text{ K/W}$

IGBT thermal model values

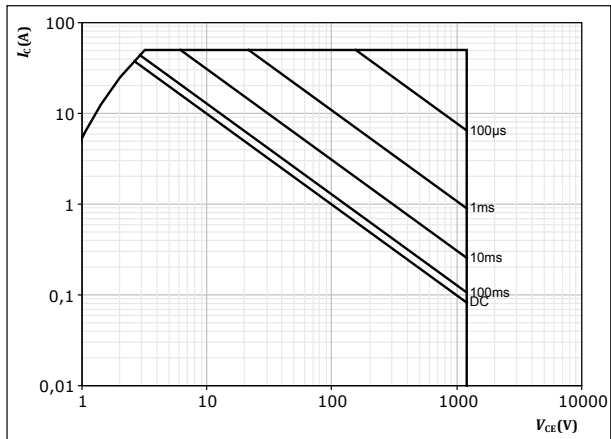
$R$ (K/W)	$\tau$ (s)
5,98E-02	2,45E+00
1,06E-01	3,48E-01
4,69E-01	5,68E-02
2,39E-01	1,10E-02
8,79E-02	9,03E-04



## Inverter Switch Characteristics

**figure 5.** IGBT

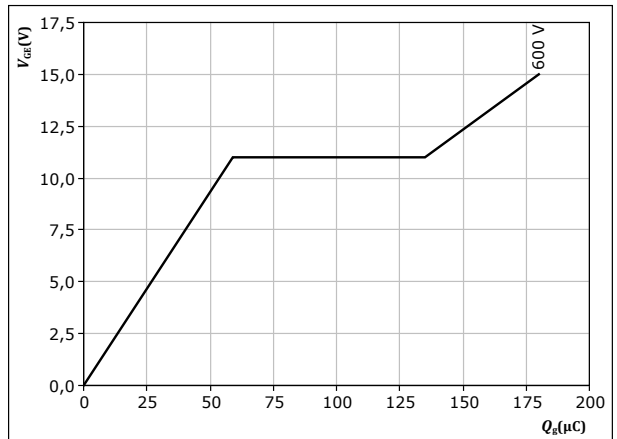
Safe operating area  
 $I_C = f(V_{CE})$



$D =$  single pulse  
 $T_s = 80 \text{ } ^\circ\text{C}$   
 $V_{GE} = 15 \text{ V}$   
 $T_j = T_{jmax}$

**figure 6.** IGBT

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



$I_C = 25 \text{ A}$   
 $T_j = 25 \text{ } ^\circ\text{C}$



### Inverter Diode Characteristics

figure 7. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

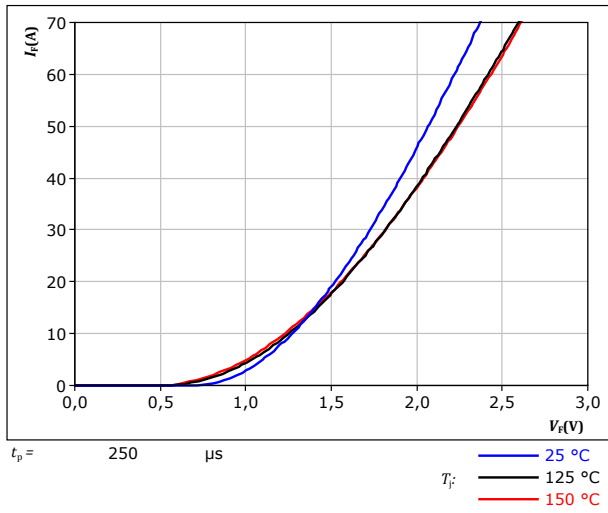
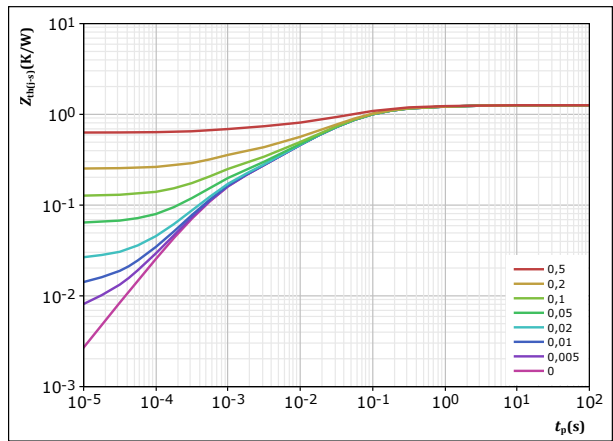


figure 8. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 1,26$  K/W  
 FWD thermal model values

R (K/W)	$\tau$ (s)
7,18E-02	1,82E+00
2,80E-01	1,58E-01
5,13E-01	3,97E-02
2,46E-01	7,61E-03
1,49E-01	6,66E-04



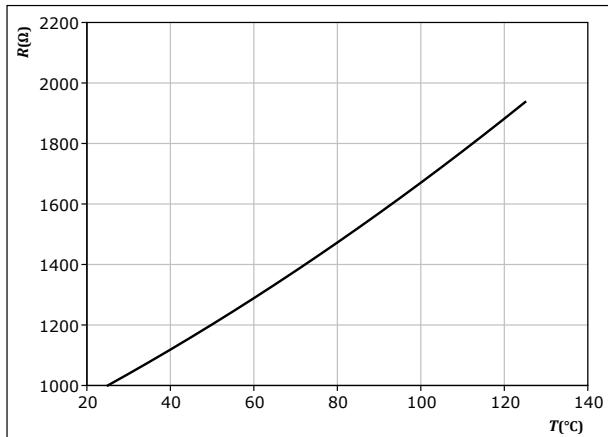


## Thermistor Characteristics

figure 9. Thermistor

Typical PTC characteristic as function of temperature

$$R_T = f(T)$$

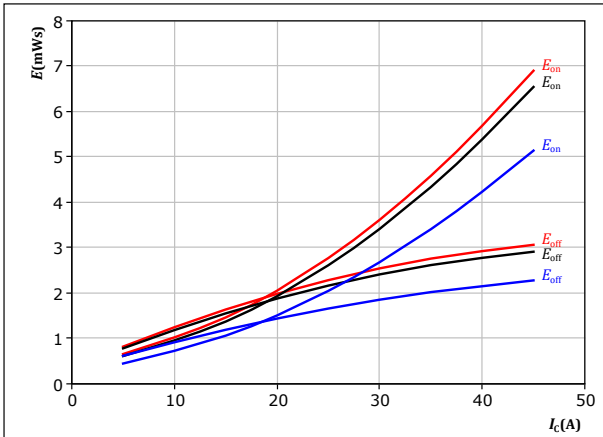




## Inverter Switching Characteristics

**figure 10.** IGBT

Typical switching energy losses as a function of collector current  
 $E = f(I_c)$

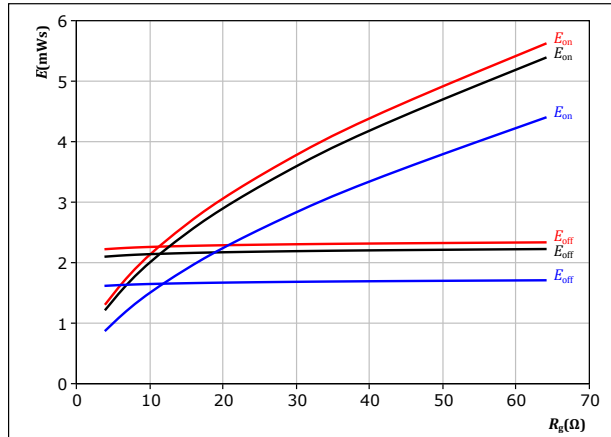


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$   $\Omega$   
 $R_{goff} = 16$   $\Omega$

$T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 11.** IGBT

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

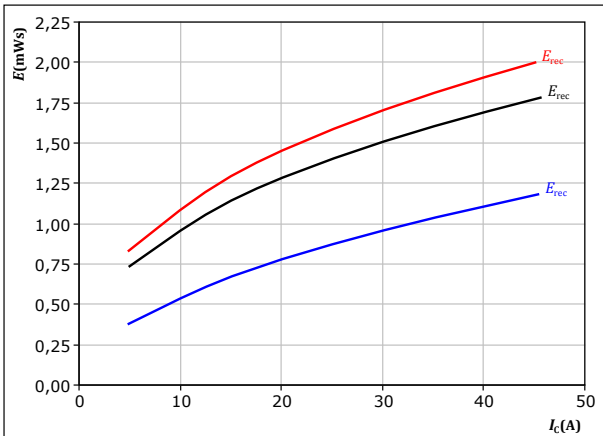


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 25$  A

$T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 12.** FWD

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

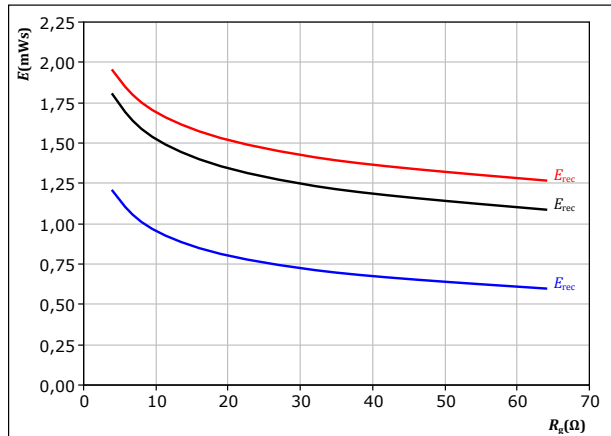


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$   $\Omega$

$T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 13.** FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor  
 $E_{rec} = f(R_g)$



With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 25$  A

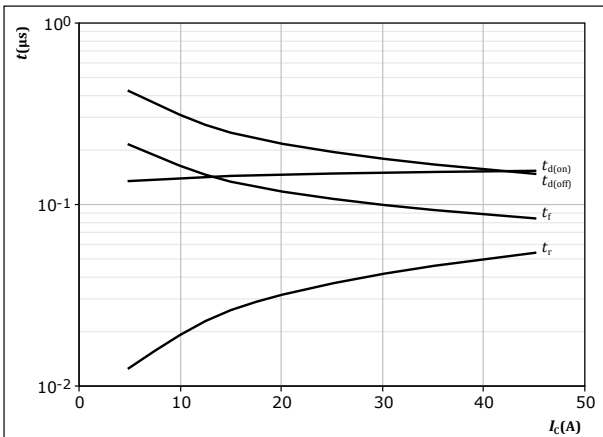
$T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)



## Inverter Switching Characteristics

**figure 14.** IGBT

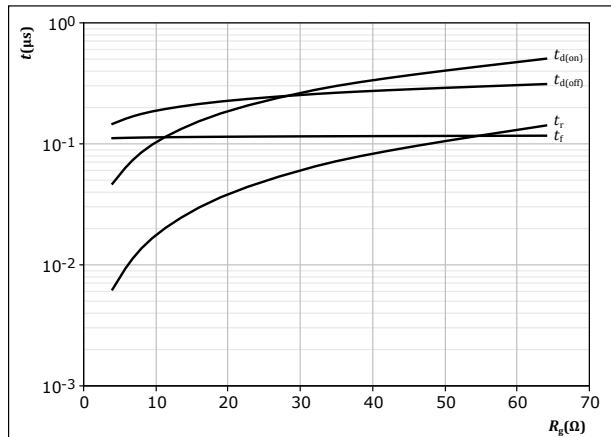
Typical switching times as a function of collector current  
 $t = f(I_c)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \text{ } \Omega$   
 $R_{goff} = 16 \text{ } \Omega$

**figure 15.** IGBT

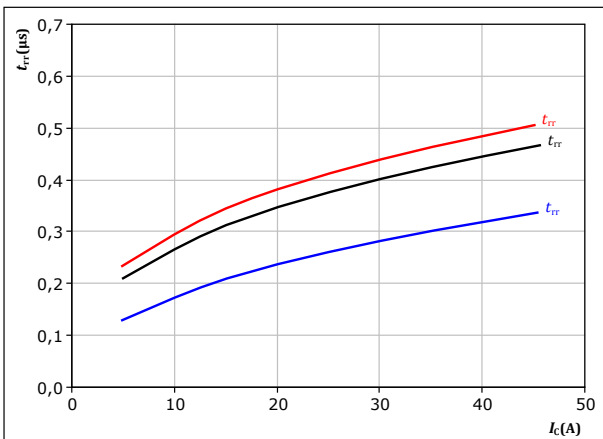
Typical switching times as a function of IGBT turn on gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 25 \text{ A}$

**figure 16.** FWD

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

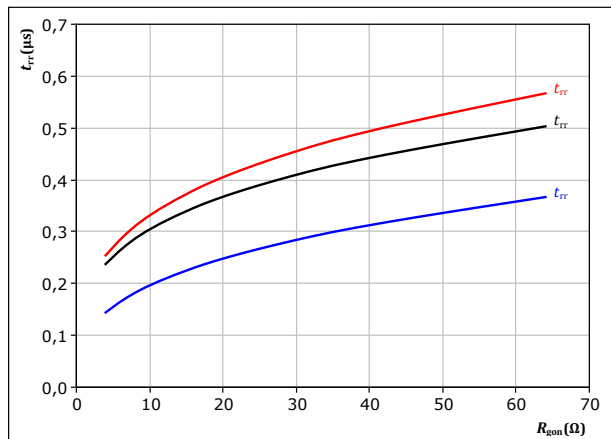


With an inductive load at  
 $V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \text{ } \Omega$

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

**figure 17.** FWD

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



With an inductive load at  
 $V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 25 \text{ A}$

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

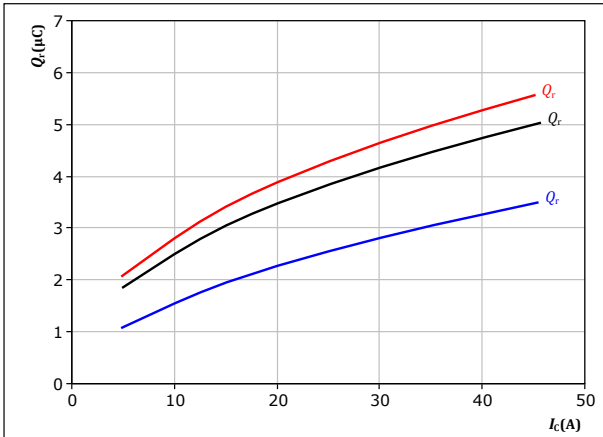


## Inverter Switching Characteristics

figure 18. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

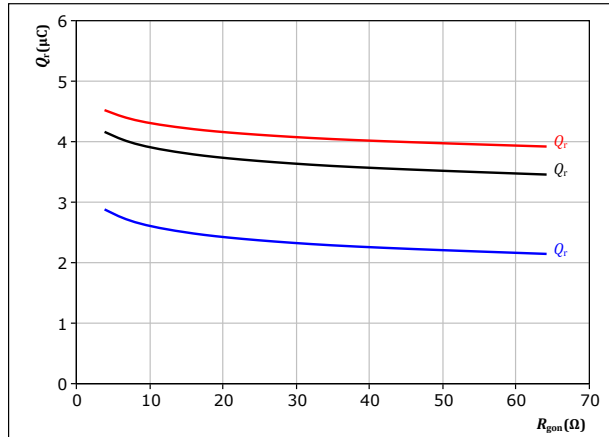
$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \ \Omega$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

figure 19. FWD

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

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



With an inductive load at

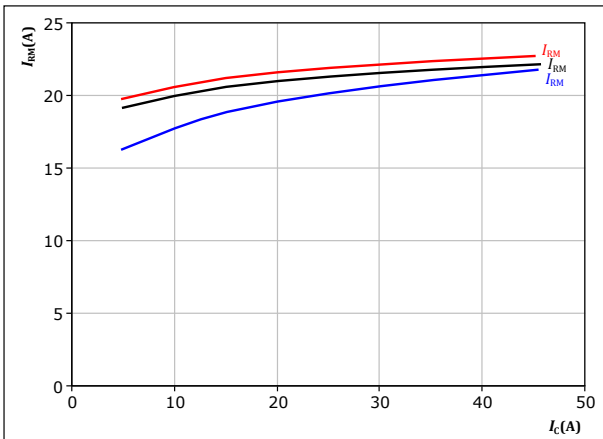
$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 25 \text{ A}$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

figure 20. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

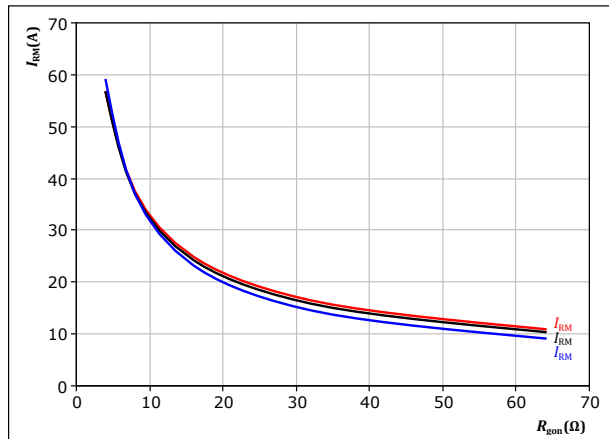
$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \ \Omega$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

figure 21. FWD

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

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



With an inductive load at

$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 25 \text{ A}$

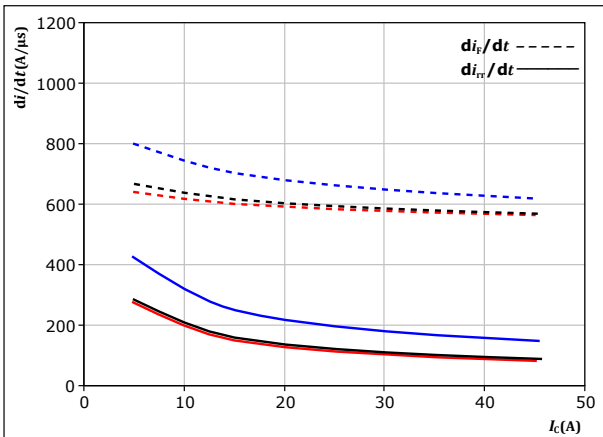
$T_j$ : — 25 °C  
— 125 °C  
— 150 °C



## Inverter Switching Characteristics

**figure 22.** FWD

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

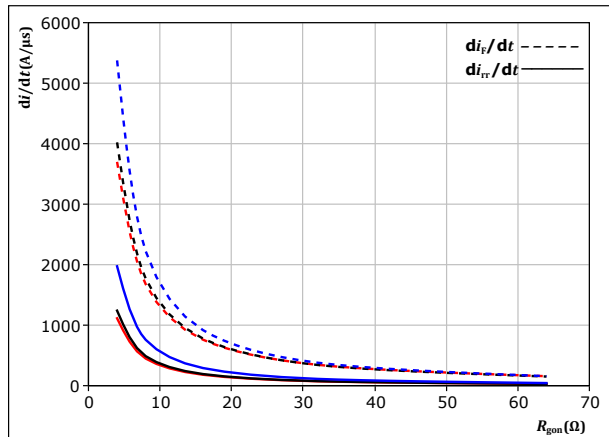


With an inductive load at

$V_{CE} = 600$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$R_{gon} = 16$ Ω	$T_j = 150$ °C

**figure 23.** FWD

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

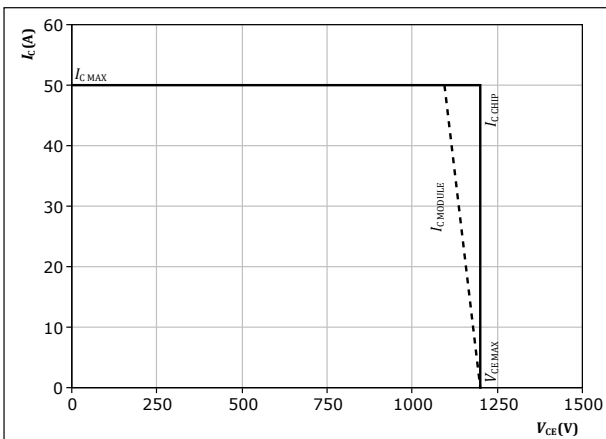


With an inductive load at

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

**figure 24.** IGBT

Reverse bias safe operating area  
 $I_C = f(V_{CE})$

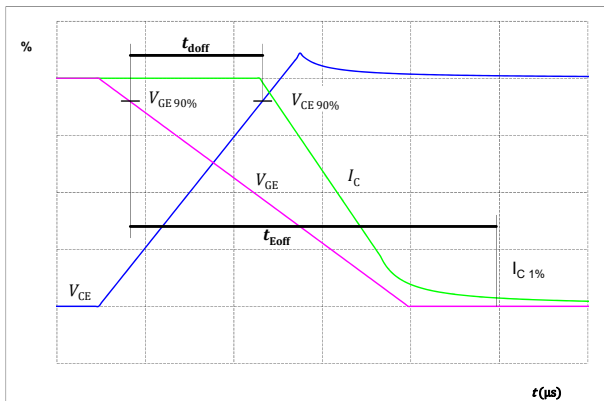


At  $T_j = 150$  °C  
 $R_{gon} = 16$  Ω  
 $R_{goff} = 16$  Ω



## Inverter Switching Definitions

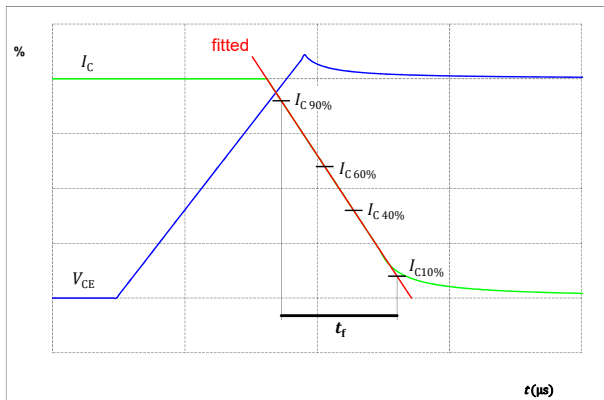
**figure 25. IGBT**  
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$  ( $t_{Eoff}$  = integrating time for  $E_{off}$ )



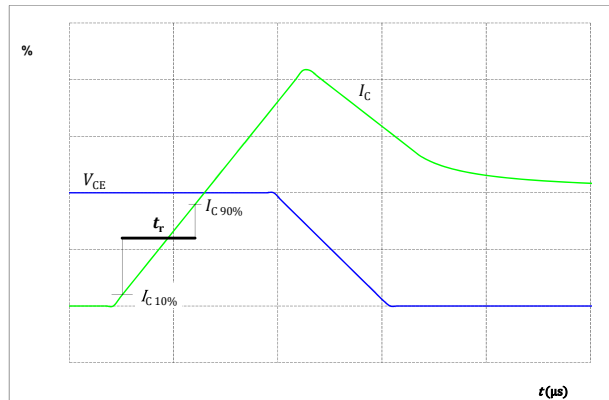
**figure 26. IGBT**  
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$  ( $t_{Eon}$  = integrating time for  $E_{on}$ )



**figure 27. IGBT**  
Turn-off Switching Waveforms & definition of  $t_f$



**figure 28. IGBT**  
Turn-on Switching Waveforms & definition of  $t_r$





### Inverter Switching Definitions

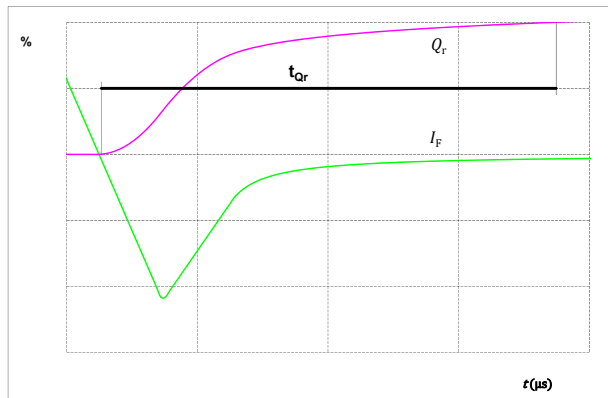
figure 29. FWD

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




figure 30. FWD

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

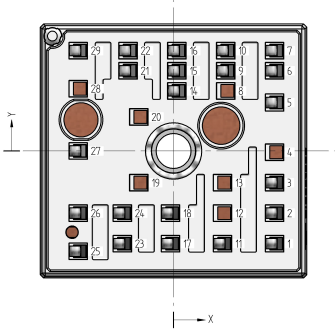




Ordering Code	
Version	Ordering Code
With std lid (6.5mm height) + no thermal grease	80-M1126PA025M7-K219F70-/0A/
With thin lid (2.8mm height) + no thermal grease	80-M1126PA025M7-K219F70-/0B/
With std lid (6.5mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M1126PA025M7-K219F70-/1A/
With thin lid (2.8mm height) + thermal grease (0,8 W/mK, P12, silicone-based)	80-M1126PA025M7-K219F70-/1B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M1126PA025M7-K219F70-/4A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, TG20032, silicone-free)	80-M1126PA025M7-K219F70-/4B/
With std lid (6.5mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M1126PA025M7-K219F70-/5A/
With thin lid (2.8mm height) + thermal grease (2,5 W/mK, HPTP, silicone-based)	80-M1126PA025M7-K219F70-/5B/

Marking						
Text	Name		Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNN- TTTTTTTV		WWYY	UL VIN	LLLLL
Datamatrix		Type&Ver	Lot number	Serial	Date code	
	TTTTTTTV	LLLLL	SSSS	WWYY		

Outline				
Pin table [mm]				
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	

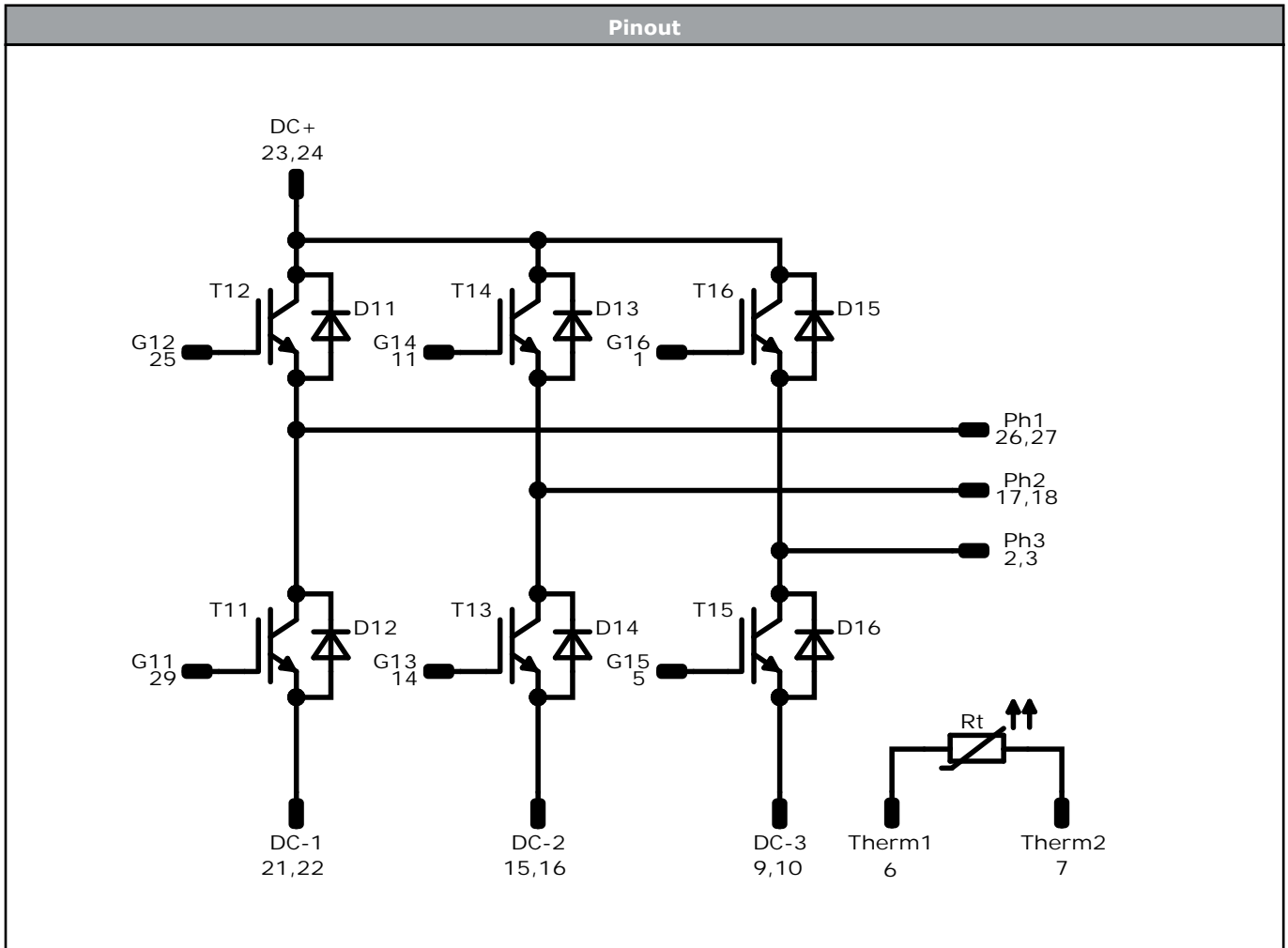


Pad positions refers to center point. For more informations on pad design please see package data





Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	25 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	25 A	Inverter Diode	
Rt	Thermistor			Thermistor	




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.

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
80-M1126PA025M7-K219F70-D2-14	24 Apr. 2022	New Datasheet format, module is unchanged Correct tau values of thermal characteristics	

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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.