



MiniSKiiP PACK 2

1200 V / 75 A

Topology features

- Inverter
- Kelvin Emitter for improved switching performance
- Temperature sensor

Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current
- Switching optimized for EMC

Housing features

- Base isolation: Al_2O_3
- Easy assembly in one mounting step
- Flexible PCB design w/o pin holes
- Rugged solderless spring contacts

Extra features

- Equivalent: SKiiP 26AC12T4V1

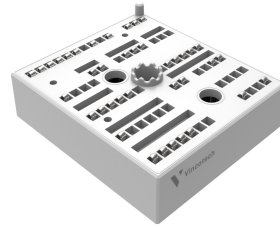
Target applications

- Industrial Drives

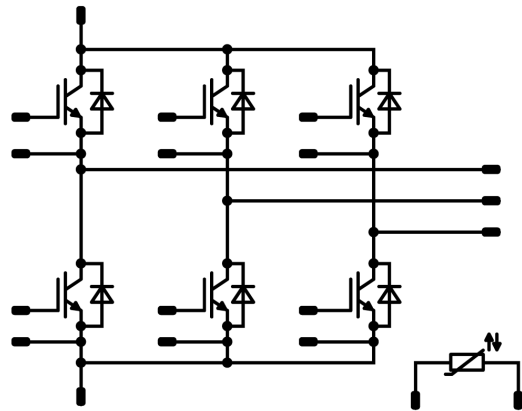
Types

- 80-M2126PA075M7-K719F70

MiniSKiiP® 2 16 mm housing



Schematic





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datasheet

Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Inverter Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	90	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	196	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	9,5	μs
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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	83	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	200	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$	440	A
Surge current capability	I^2t		968	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	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
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		≥ 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	0,0075	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,65 1,88 1,93	1,9 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							4		Ω
Input capacitance	C_{ies}	0	10		25			16000		pF
Output capacitance	C_{oes}							480		pF
Reverse transfer capacitance	C_{res}							190		pF
Gate charge	Q_g	$V_{CC} = 600$ V	0/15		75	25		570		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						0,49		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2$ Ω $R_{goff} = 2$ Ω	±15	600	75	25 125 150		200,03 210,67 213,3		ns
Rise time	t_r					25 125 150		49,99 57,87 60,37		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		194,97 228,24 236,62		ns
Fall time	t_f					25 125 150		85,8 116,19 121,12		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 7$ µC $Q_{tFWD} = 11,67$ µC $Q_{tFWD} = 13,24$ µC				25 125 150		7,33 9,85 10,67		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,35 7,32 7,9		mWs



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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 Diode

Static

Forward voltage	V_F				100	25 125 150		1,73 1,89 1,89	2,1 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			40	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 2,5$ W/mK (HPTP)						0,64		K/W
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Dynamic

Peak recovery current	I_{RM}	$di/dt=1241$ A/μs $di/dt=1028$ A/μs $di/dt=1064$ A/μs	± 15	600	75	25 125 150		49,24 56,08 58,34		A
Reverse recovery time	t_{rr}					25 125 150		299,23 445,17 491,62		ns
Recovered charge	Q_r					25 125 150		7 11,67 13,24		μC
Reverse recovered energy	E_{rec}					25 125 150		2,45 4,38 5,02		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		473,22 248,65 246,49		A/μs



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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	

Thermistor

Static

Rated resistance	R					25		1		k Ω
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 1670 \Omega$				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 ²
Vincotech Thermistor Reference									E	

⁽¹⁾ Value at chip level

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



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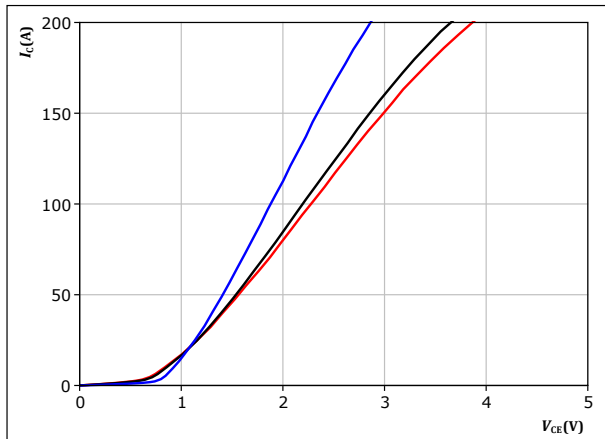
datasheet

Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

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



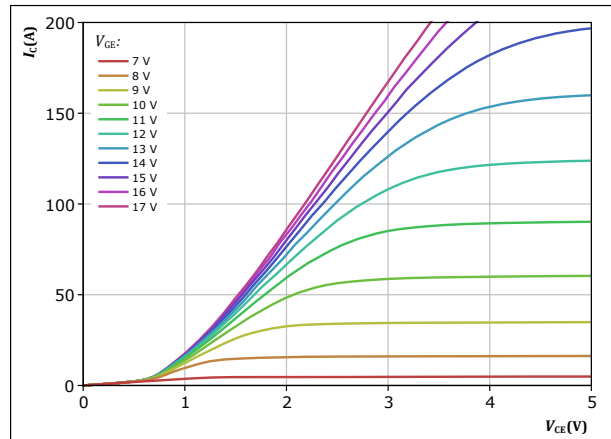
$t_p = 250 \mu s$
 $V_{GE} = 15 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 2. IGBT

Typical output characteristics

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

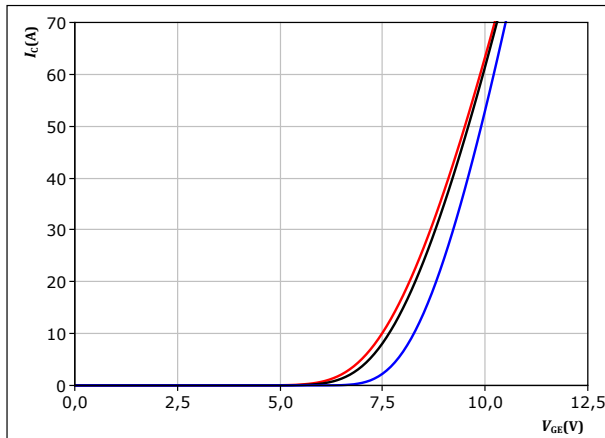


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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



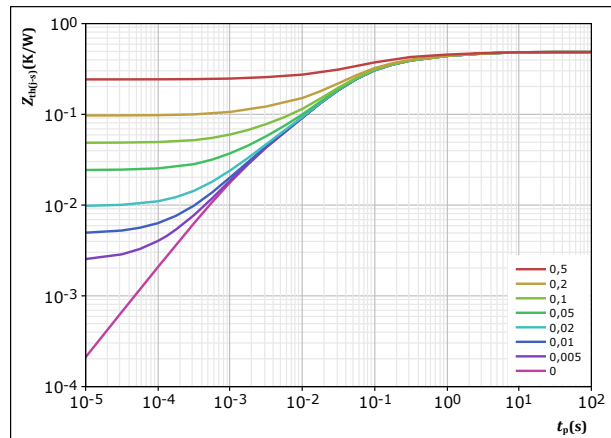
$t_p = 250 \mu s$
 $V_{CE} = 29 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,485 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
4,46E-02	3,29E+00
9,58E-02	4,86E-01
2,34E-01	7,16E-02
8,94E-02	1,82E-02
2,13E-02	1,68E-03



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datasheet

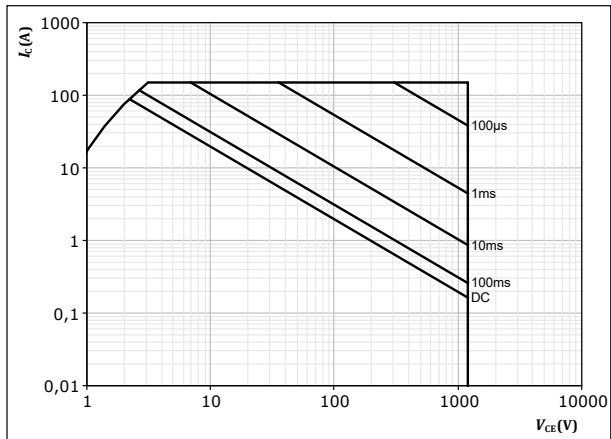
Inverter Switch Characteristics

figure 5.

IGBT

Safe operating area

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



$D =$ single pulse

$T_s = 80$ °C

$V_{GE} = 15$ V

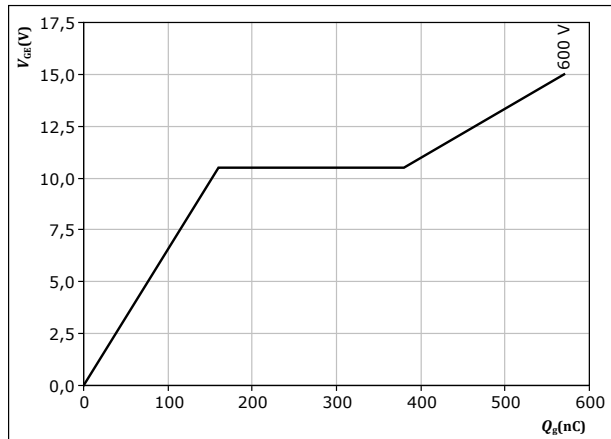
$T_j = T_{jmax}$

figure 6.

IGBT

Gate voltage vs gate charge

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



$I_C = 75$ A

$T_j = 25$ °C



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Inverter Diode Characteristics

figure 7. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

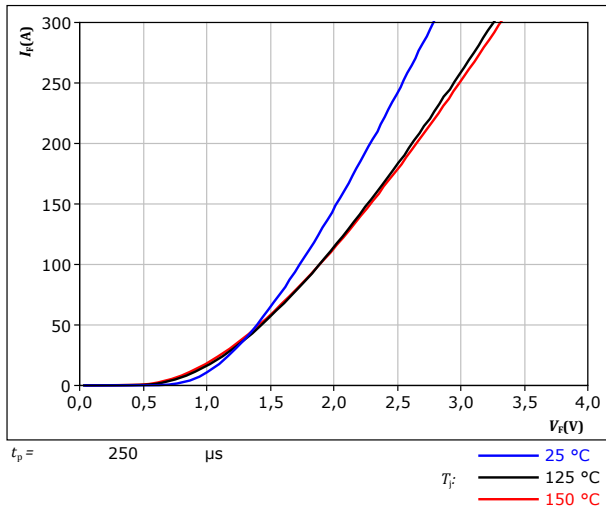
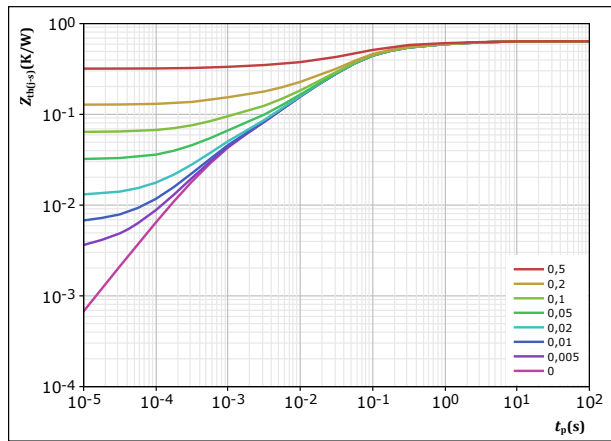


figure 8. FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T
$R_{th(j-s)} =$	0,638 K/W
FWD thermal model values	
R (K/W)	τ (s)
5,25E-02	2,69E+00
9,82E-02	3,95E-01
3,56E-01	6,01E-02
9,63E-02	8,86E-03
3,49E-02	6,87E-04



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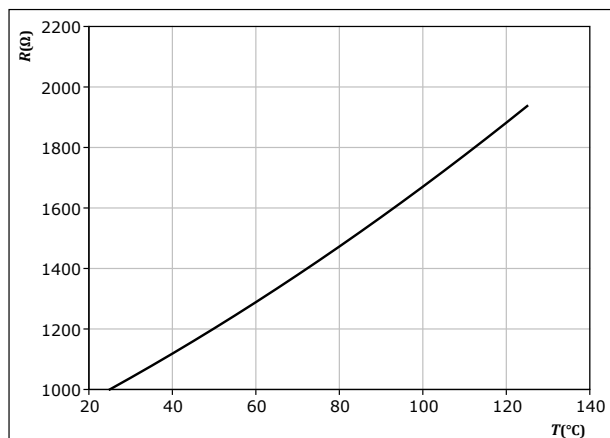
Thermistor Characteristics

figure 9.

Thermistor

Typical PTC characteristic as function of temperature

$$R_T = f(T)$$





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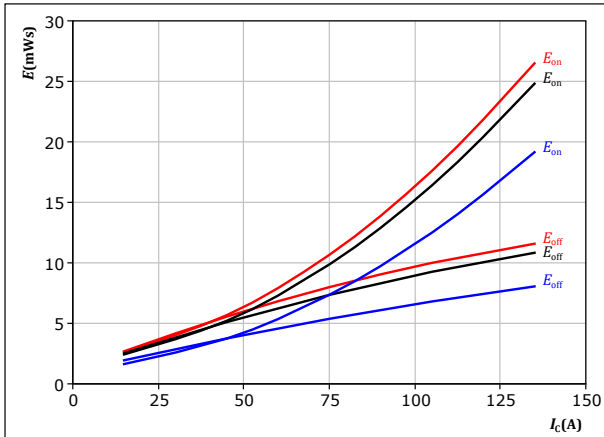
Inverter Switching Characteristics

figure 10.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$

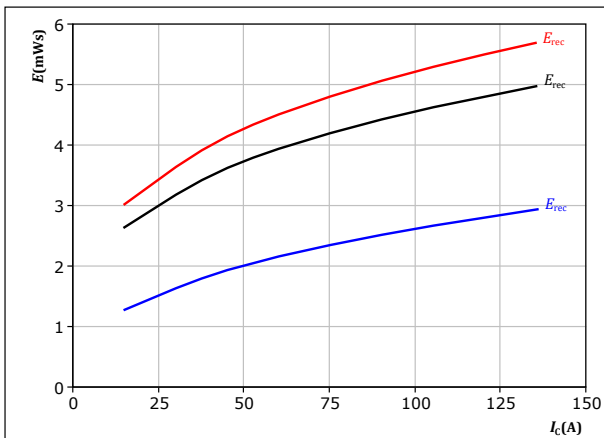
T_j : — 25 °C
— 125 °C
— 150 °C

figure 12.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$

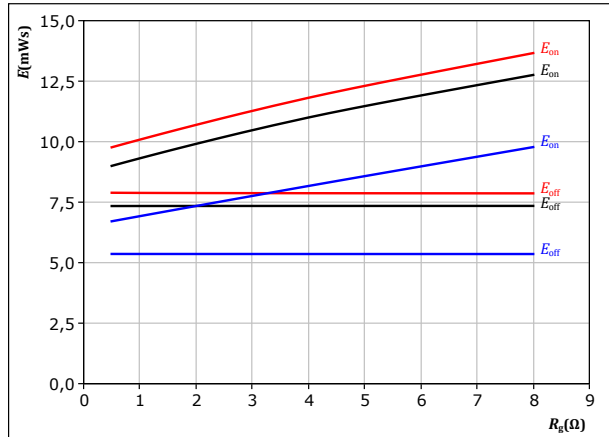
T_j : — 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 75 \text{ A}$

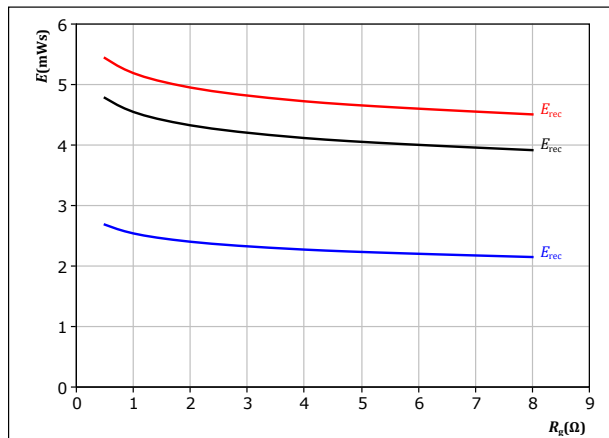
T_j : — 25 °C
— 125 °C
— 150 °C

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

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 75 \text{ A}$

T_j : — 25 °C
— 125 °C
— 150 °C



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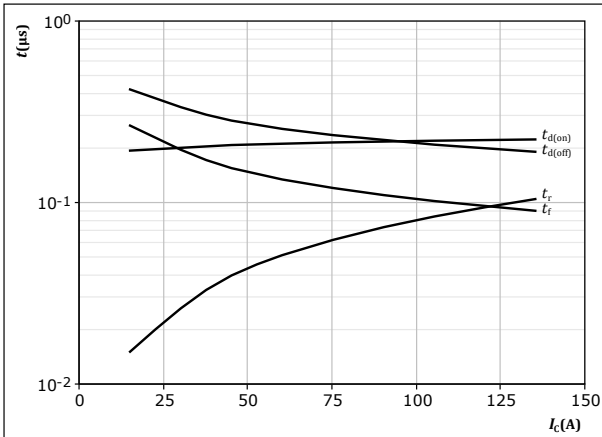
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datasheet

Inverter Switching Characteristics

figure 14.

IGBT

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



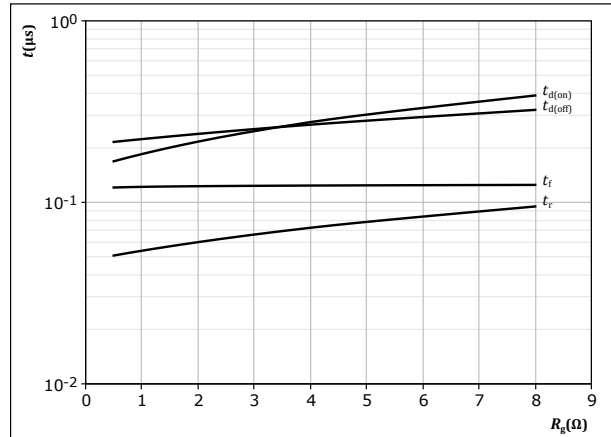
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

figure 15.

IGBT

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



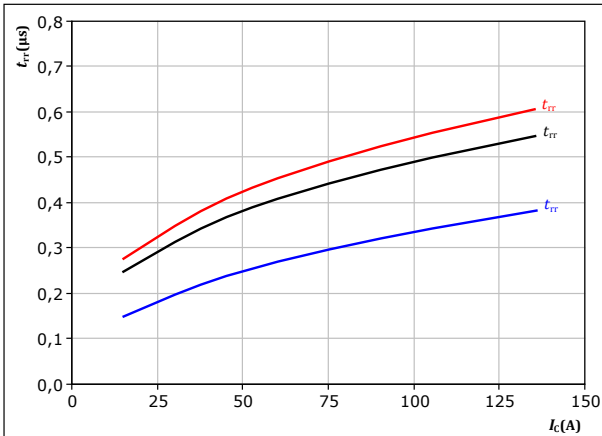
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 75$ A

figure 16.

FWD

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



With an inductive load at

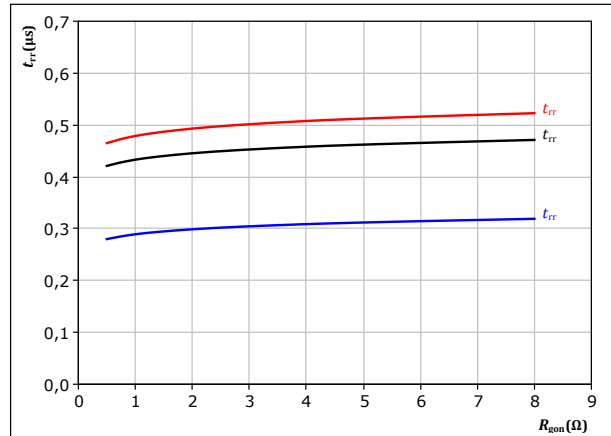
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 75$ A

T_j : — 25 °C
— 125 °C
— 150 °C



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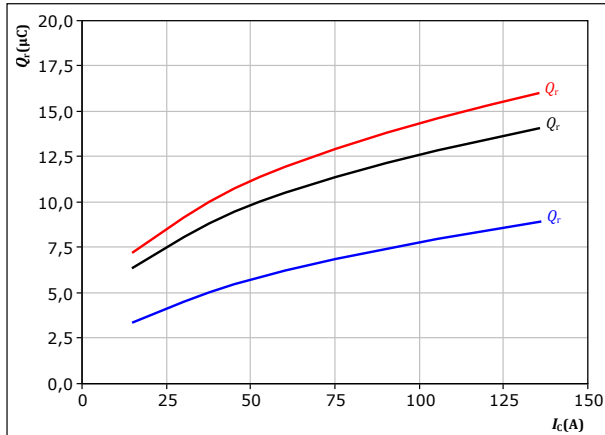
Inverter Switching Characteristics

figure 18.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

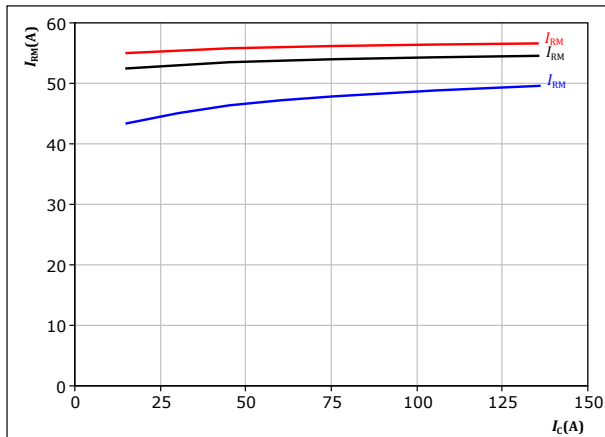
T_j : 25 °C
125 °C
150 °C

figure 20.

FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

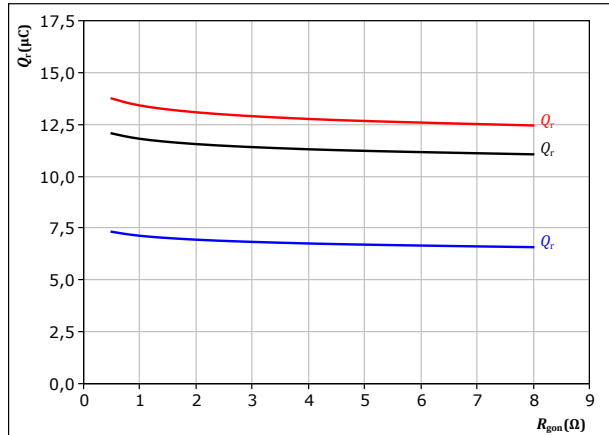
T_j : 25 °C
125 °C
150 °C

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 75$ A

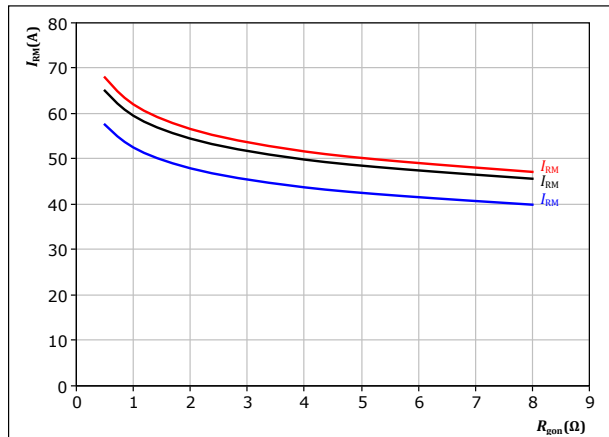
T_j : 25 °C
125 °C
150 °C

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

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 75$ A

T_j : 25 °C
125 °C
150 °C



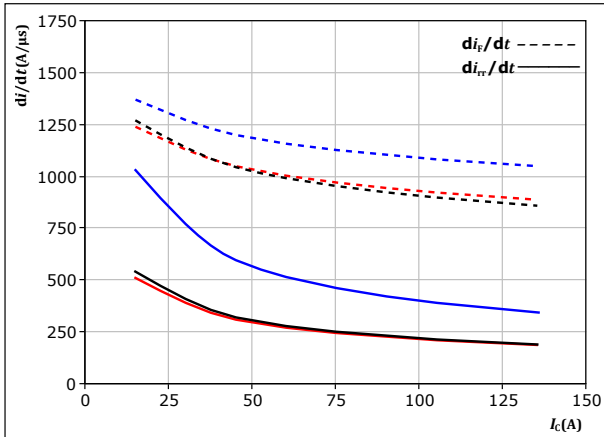
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datasheet

Inverter Switching Characteristics

figure 22. FWD

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

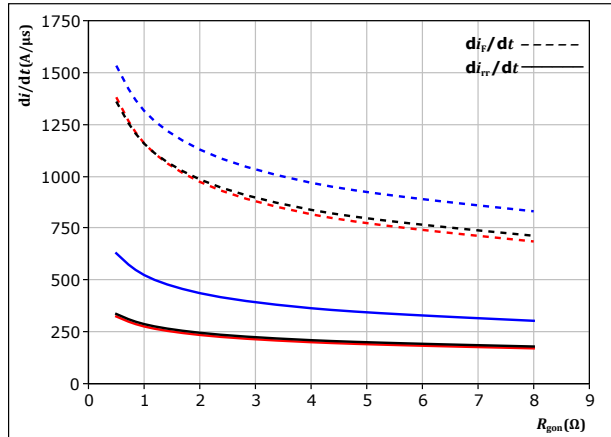


With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 23. FWD

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



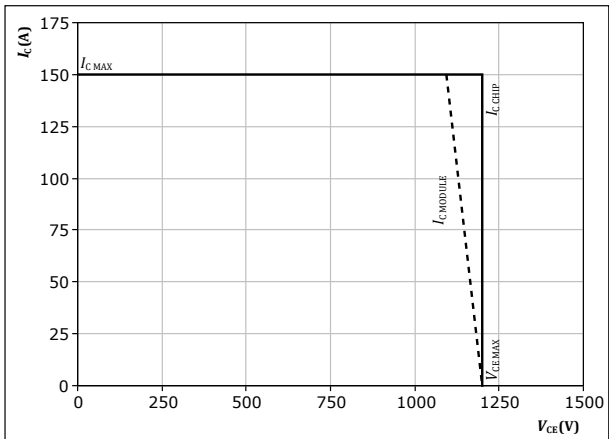
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 75$ A
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 24. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



At $T_j = 150$ °C
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω



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Inverter Switching Definitions

figure 25. IGBT

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

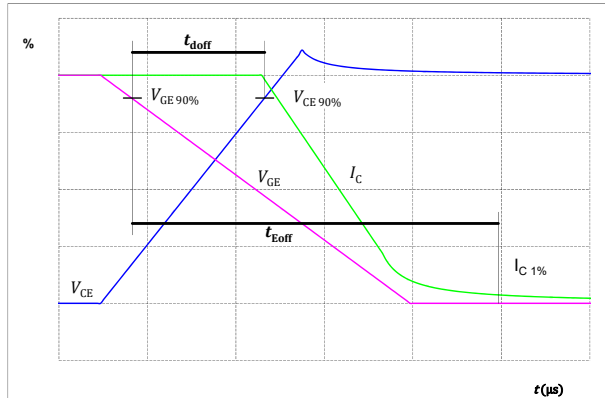


figure 26. IGBT

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

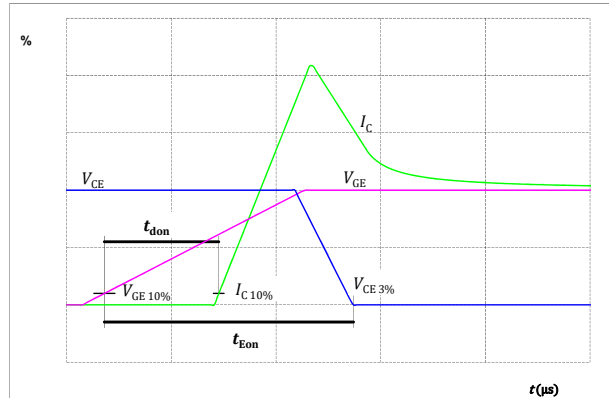


figure 27. IGBT

Turn-off Switching Waveforms & definition of t_f

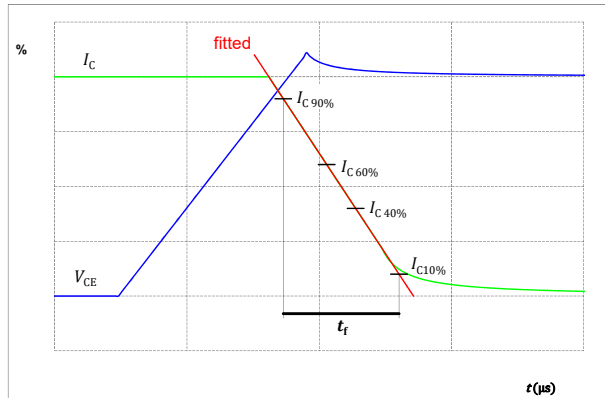
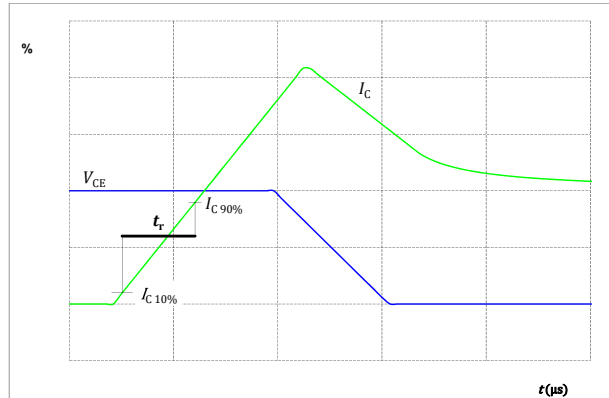


figure 28. IGBT

Turn-on Switching Waveforms & definition of t_r





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datasheet

Inverter Switching Definitions

figure 29.

FWD

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

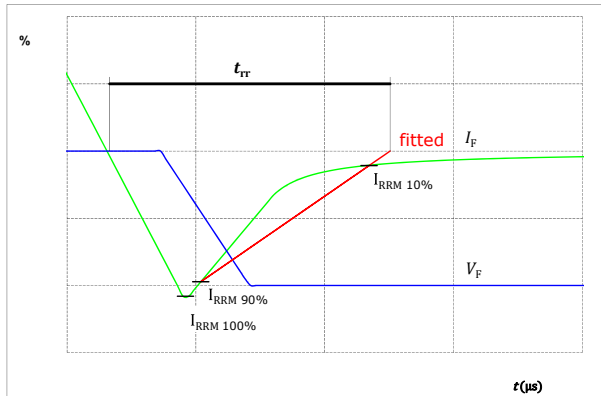
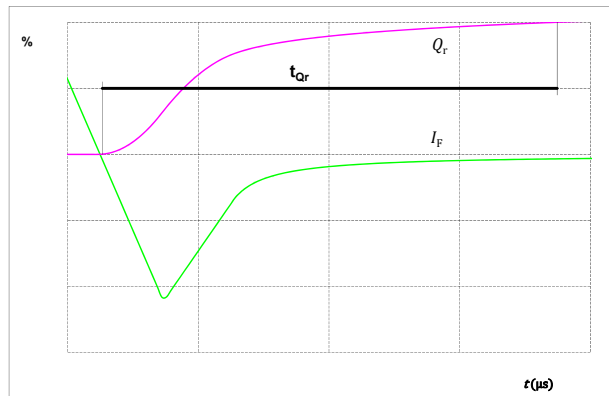


figure 30.

FWD

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





datasheet

Outline							
Pin table [mm]							
Pin	X	Y	Function	34	not assembled		
1	24,38	-21,8	DC+123	35	0,03	9	Ph1
2	24,38	-18,6	DC+123	36	0,03	12,2	Ph1
3	24,38	-15,4	DC+123	37	0,03	15,4	Ph1
4	24,38	-12,2	DC+123	38	0,03	18,6	Ph1
5	24,38	-9	DC+123	39	0,03	21,8	Ph1
6	not assembled			40	-8,5	-21,8	Ph3
7	not assembled			41	not assembled		
8	24,38	12,2	Therm1	42	not assembled		
9	not assembled			43	not assembled		
10	not assembled			44	-12,22	-9	Ph2
11	24,38	21,8	Therm2	45	-12,22	-5,8	Ph2
12	not assembled			46	not assembled		
13	not assembled			47	-12,22	3,9	Ph2
14	not assembled			48	-12,22	7,1	Ph2
15	not assembled			49	-12,22	10,3	Ph2
16	13,42	-21,8	G16	50	not assembled		
17	not assembled			51	not assembled		
18	not assembled			52	not assembled		
19	not assembled			53	-24,38	-21,8	G15
20	not assembled			54	-24,38	-18,6	S15
21	not assembled			55	-24,38	-15,4	DC-123
22	8,38	2,6	S14	56	-24,38	-12,2	DC-123
23	8,38	5,8	G14	57	-24,38	-9	DC-123
24	not assembled			58	-24,38	-5,8	S13
25	not assembled			59	not assembled		
26	8,38	18,6	S12	60	-24,38	0,7	G13
27	8,38	21,8	G12	61	not assembled		
28	2,46	-21,8	S16	62	-24,38	7,1	DC-123
29	2,46	-18,6	Ph3	63	-24,38	15,4	DC-123
30	2,46	-15,4	Ph3	64	-24,38	18,6	S11
31	2,46	-12,2	Ph3	65	-24,38	21,8	G11
32	2,46	-9	Ph3				
33	not assembled						

Pin layout diagram showing a 65-pin connector with dimensions and functions. The diagram includes a coordinate system with X and Y axes. Pins are numbered 1 to 65. Functions are indicated by letters: DC (DC voltage), Ph (Phase), S (Signal), and G (Ground).

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

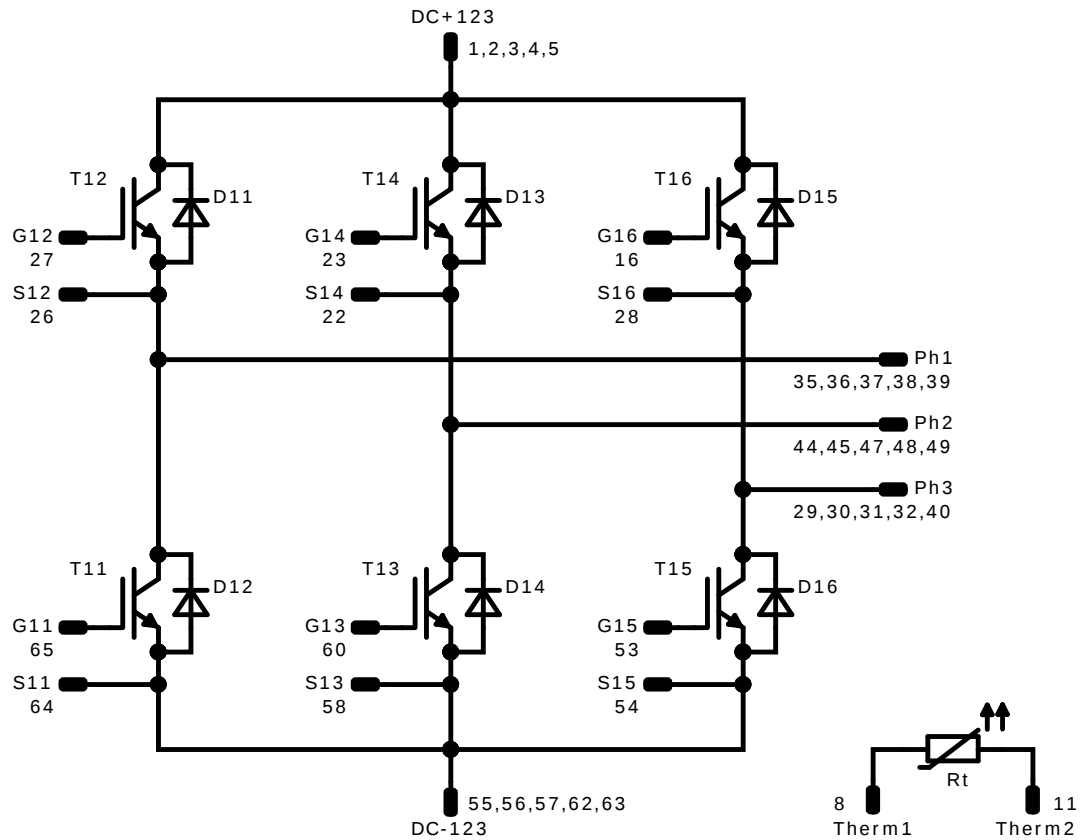


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80-M2126PA075M7-K719F70

datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	75 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	100 A	Inverter Diode	
Rt	PTC			Thermistor	



Vincotech

80-M2126PA075M7-K719F70
datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 72	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for MiniSKiiP® 2 packages see vincotech.com website.				
Package data				
Package data for MiniSKiiP® 2 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 UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,sp}=150^{\circ}\text{C}$ and up to 2500VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
80-M2126PA075M7-K719F70-D3-14	22 Feb. 2024	New Datasheet format, module is unchanged Correct tau values of thermal characteristic Updated dynamic characteristic	
80-M2126PA075M7-K719F70-D4-14	22 Jul. 2026	Add Surge Current capabilities of the Inverter Diode	

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