30-F2126PA150M7-L280F79

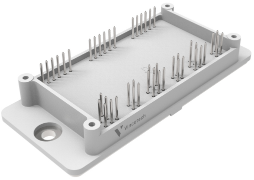
datasheet

***flow*PACK 2** **1200 V / 150 A**

Features

- IGBT Mitsubishi gen 7 technology with low VCEsat and improved EMC behavior
- Open emitter configuration
- Compact and low inductive design
- Built-in NTC

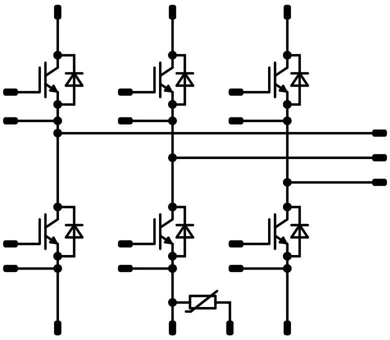
flow 2 17 mm housing



Target applications

- Industrial Drives
- Power Supply
- UPS

Schematic



Types

- 30-F2126PA150M7-L280F79

Maximum Ratings

T_j = 25 °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 °C	133	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	262	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}		175	°C
Inverter Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	110	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	186	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 s	4000	V
Isolation voltage	V_{isol}	AC Voltage t_p = 1 min	2500	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production

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	0,015	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,7 1,97 2,03	1,85(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							3		Ω
Input capacitance	C_{ies}		0	10		25		30000		pF
Output capacitance	C_{oes}							880		pF
Reverse transfer capacitance	C_{res}							320		pF
Gate charge	Q_g	V_{CC} = 600 V	15		150	25		1000		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,36		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 1 Ω R_{goff} = 1 Ω	±15	600	150	25 125 150		272,32 286,72 289,92		ns
Rise time	t_r					25 125 150		56,96 67,52 71,68		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		213,44 247,68 257,28		ns
Fall time	t_f					25 125 150		77,22 101,31 107,99		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=12,67 µC Q_{rFWD}=19,97 µC Q_{rFWD}=22,41 µC				25 125 150		12,94 17,49 18,9		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		10,74 14,49 15,62		mWs

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				150	25 125 150		1,79 1,9 1,9	2,1(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			40	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,51		K/W
Dynamic										
Peak recovery current	I_{RRM}	d*i*/d*t*=2539 A/µs d*i*/d*t*=2109 A/µs d*i*/d*t*=1948 A/µs	±15	600	150	25 125 150		99,4 100,85 102,41		A
Reverse recovery time	t_{rr}					25 125 150		323,02 483,58 529,5		ns
Recovered charge	Q_r					25 125 150		12,67 19,97 22,41		µC
Reverse recovered energy	E_{rec}					25 125 150		4,42 7,32 8,25		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		837,32 565,33 527,74		A/µs

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		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-12		14	%
Power dissipation	P							200		mW
Power dissipation constant	d					25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3 %						3950		K
B-value	$B_{(25/100)}$	Tol. ±3 %						3998		K
Vincotech Thermistor Reference									B	

(1) Value at chip level

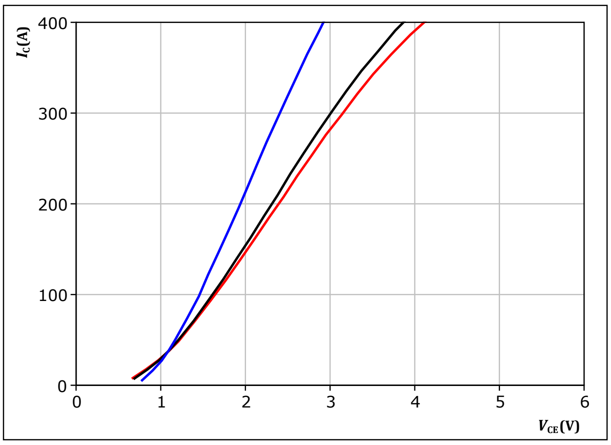
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



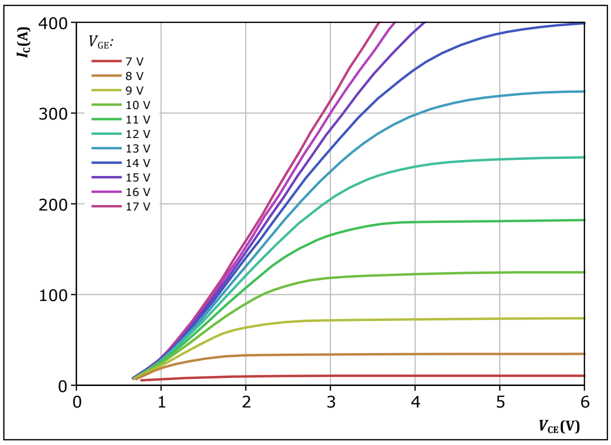
t_p = 250 µs
V_{GE} = 15 V

T_j:
25 °C
125 °C
150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

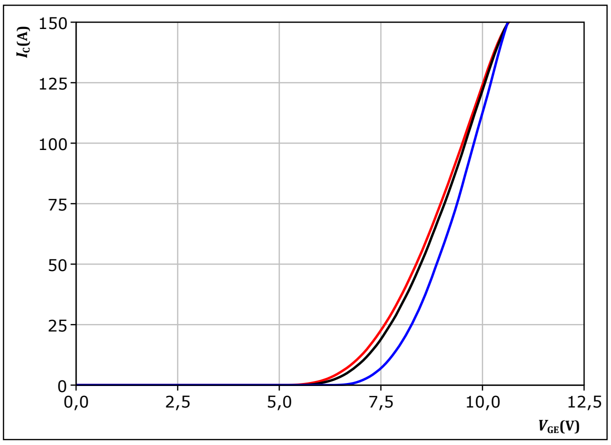


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



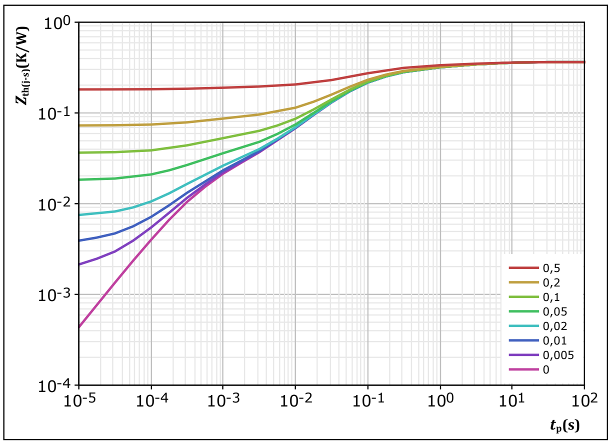
t_p = 250 µs
V_{CE} = 10 V

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
$R_{th(j-s)}$ = 0,363 K/W

IGBT thermal model values

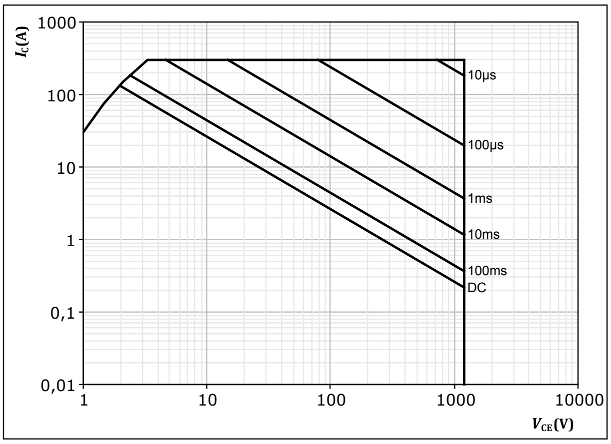
R (K/W)	τ (s)
2,95E-02	5,37E+00
4,05E-02	1,29E+00
7,26E-02	2,47E-01
1,38E-01	6,74E-02
5,86E-02	2,09E-02
9,31E-03	2,20E-03
1,43E-02	4,14E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})



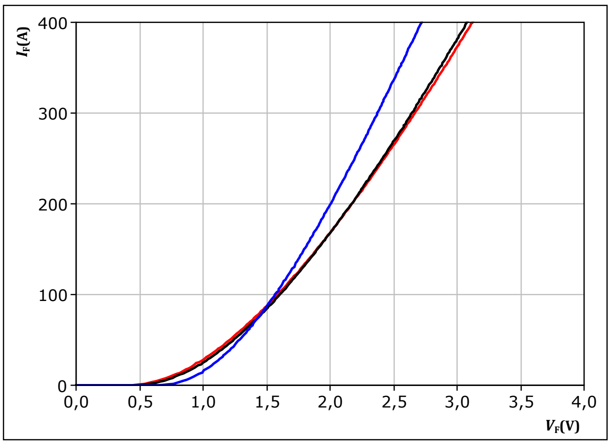
D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

Inverter Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



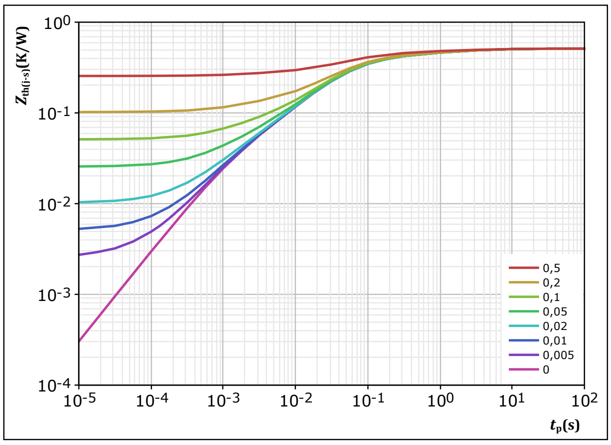
t_p = 250 μs

T_j:
- 25 °C
- 125 °C
- 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,511 K/W

FWD thermal model values

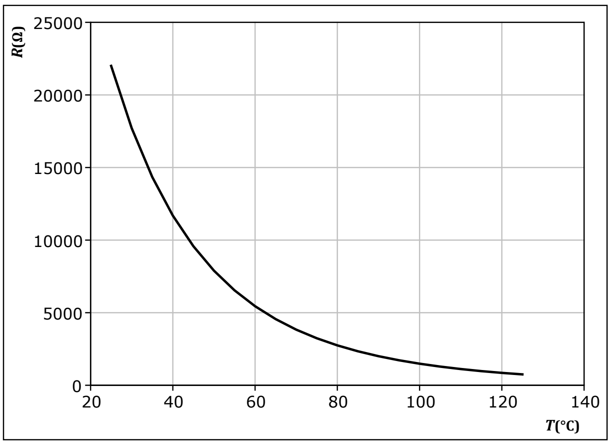
R (K/W)	τ (s)
3,20E-02	5,81E+00
5,21E-02	1,13E+00
1,20E-01	1,65E-01
2,21E-01	4,07E-02
6,16E-02	1,11E-02
2,49E-02	1,34E-03

Thermistor Characteristics

figure 8. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

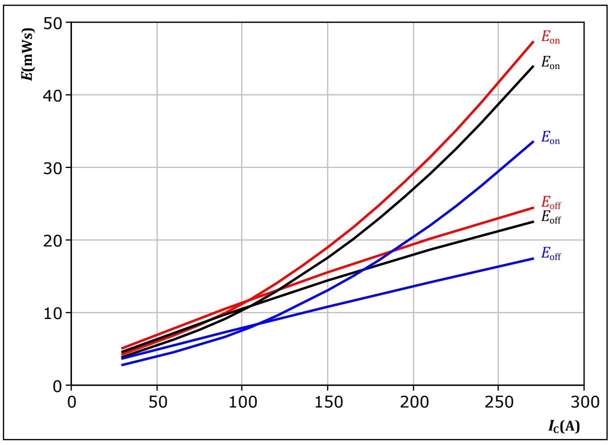


Inverter Switching Characteristics

figure 9. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

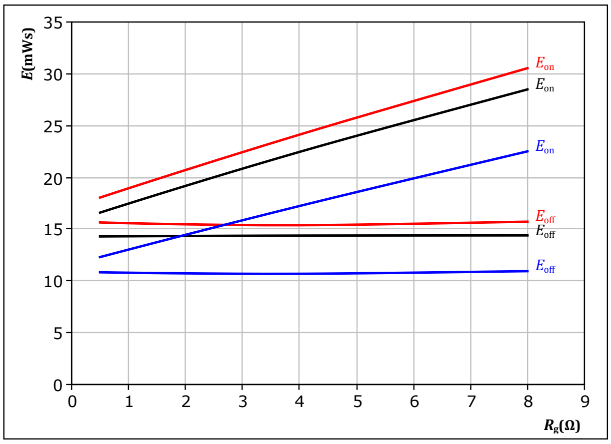
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 1 Ω
R_{goff} = 1 Ω

T_j:
25 °C
125 °C
150 °C

figure 10. **IGBT**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



With an inductive load at

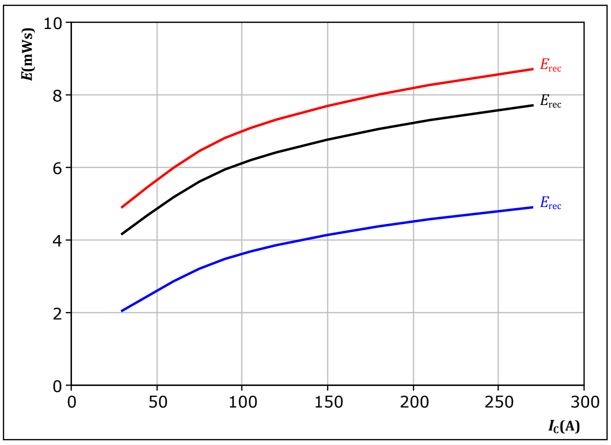
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 150 A

T_j:
25 °C
125 °C
150 °C

figure 11. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

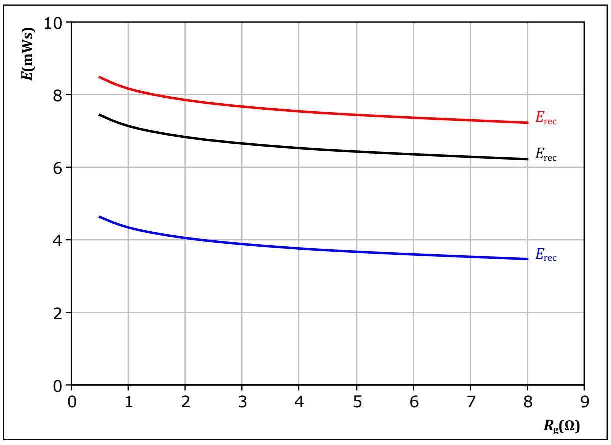
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 1 Ω

T_j:
25 °C
125 °C
150 °C

figure 12. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

E_{rec} = f(R_g)



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 150 A

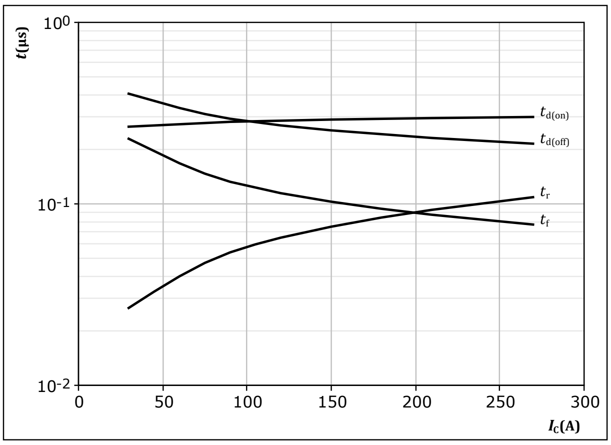
T_j:
25 °C
125 °C
150 °C

Inverter Switching Characteristics

figure 13. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



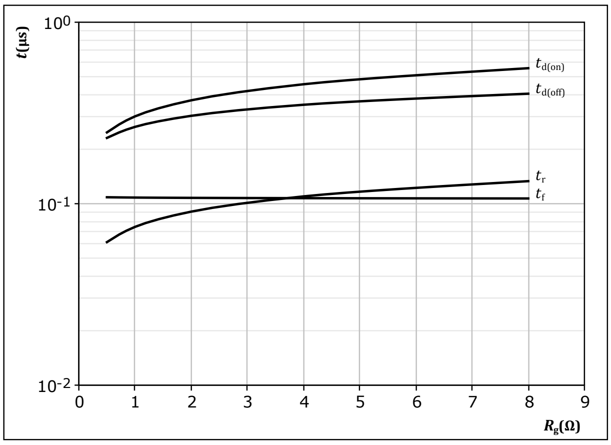
With an inductive load at

T_j = 150 °C
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 1 Ω
R_{goff} = 1 Ω

figure 14. **IGBT**

Typical switching times as a function of gate resistor

t = f(R_g)



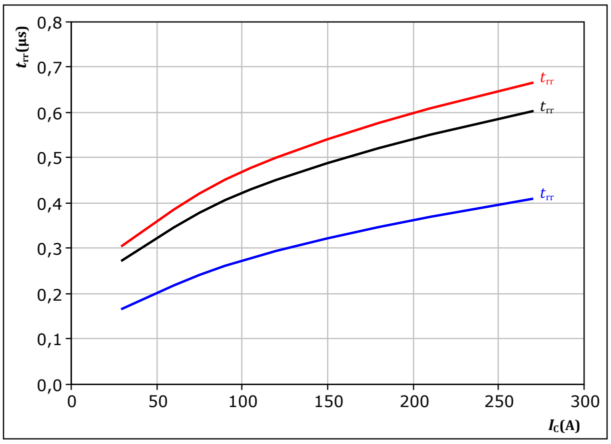
With an inductive load at

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

figure 15. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

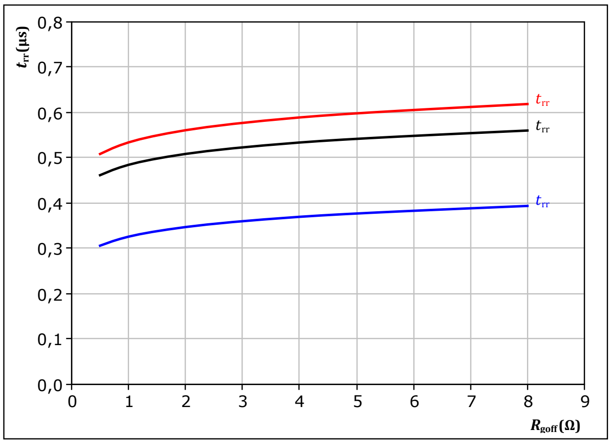
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 1 Ω

T_j:
25 °C
125 °C
150 °C

figure 16. **FWD**

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

t_{rr} = f(R_{goff})



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 150 A

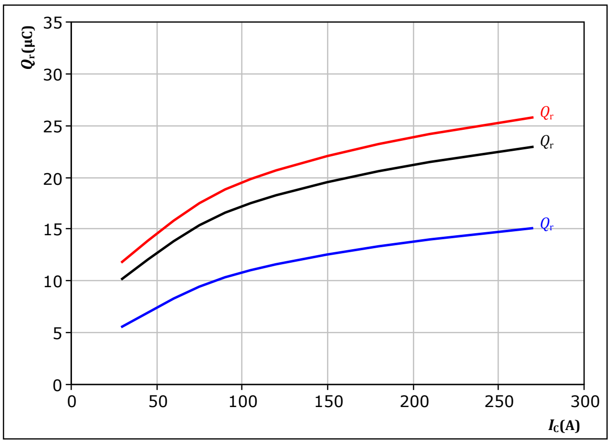
T_j:
25 °C
125 °C
150 °C

Inverter Switching Characteristics

figure 17. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



With an inductive load at

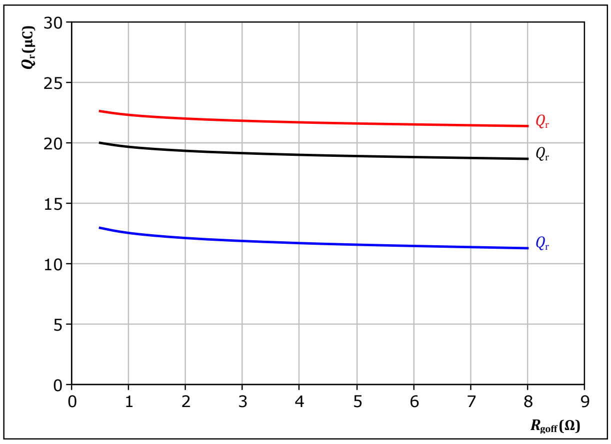
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 1 Ω

T_j:
25 °C
125 °C
150 °C

figure 18. **FWD**

Typical recovered charge as a function of turn off gate resistor

Q_r = f(R_{goff})



With an inductive load at

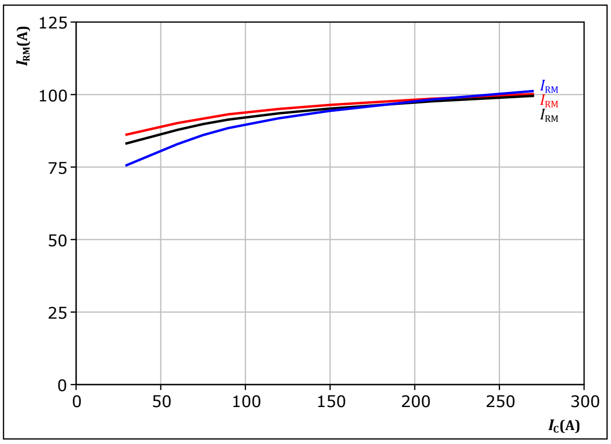
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 150 A

T_j:
25 °C
125 °C
150 °C

figure 19. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



With an inductive load at

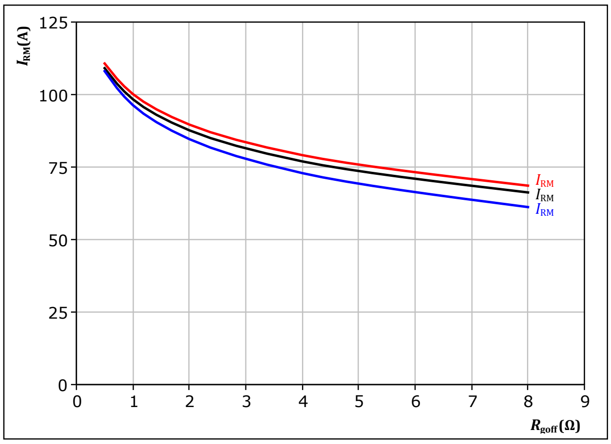
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 1 Ω

T_j:
25 °C
125 °C
150 °C

figure 20. **FWD**

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

I_{RM} = f(R_{goff})



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 150 A

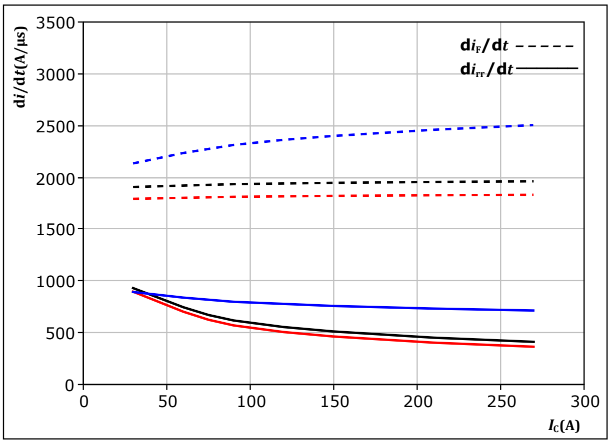
T_j:
25 °C
125 °C
150 °C

Inverter Switching Characteristics

figure 21. **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)



With an inductive load at

V_{CE} = 600 V

V_{GE} = ±15 V

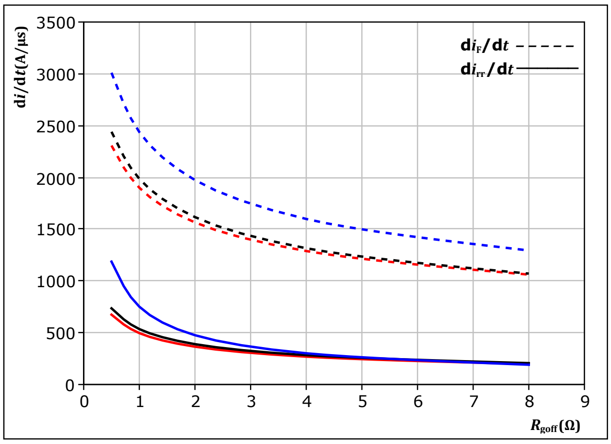
R_{gon} = 1 Ω

T_j: 25 °C; 125 °C; 150 °C

figure 22. **FWD**

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

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



With an inductive load at

V_{CE} = 600 V

V_{GE} = ±15 V

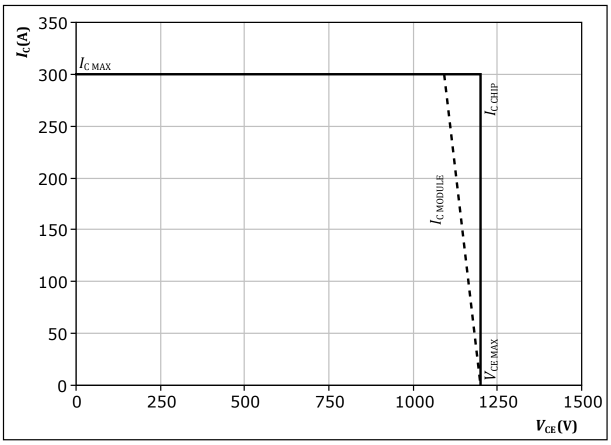
I_C = 150 A

T_j: 25 °C; 125 °C; 150 °C

figure 23. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At T_j = 150 °C

R_{gon} = 1 Ω

R_{goff} = 1 Ω

Inverter Switching Definitions

figure 24. **IGBT**

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

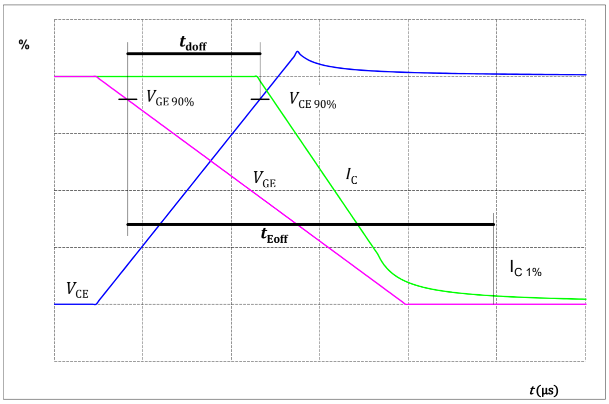


figure 25. **IGBT**

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

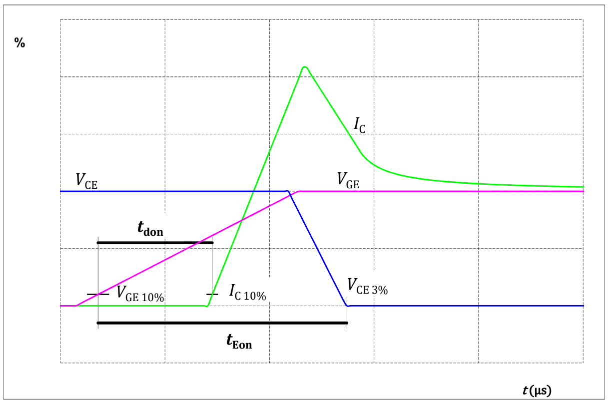


figure 26. **IGBT**

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

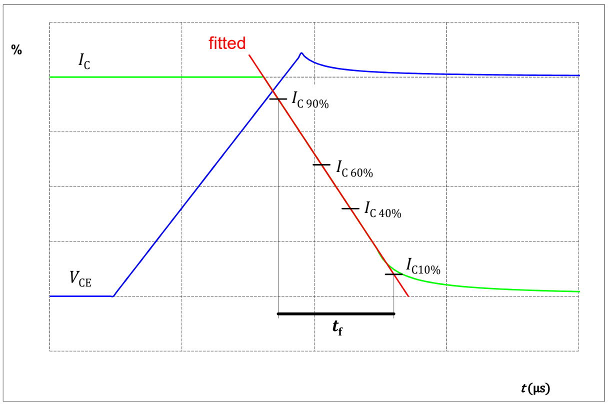
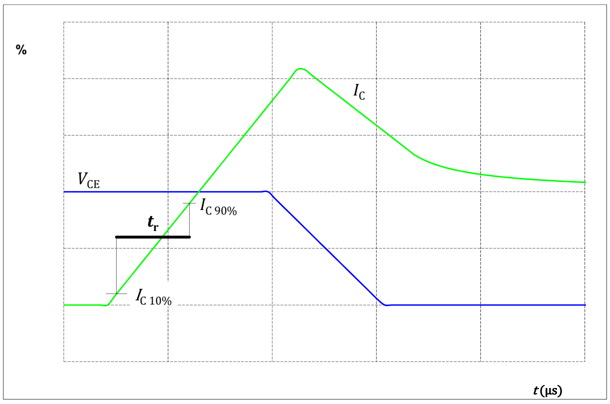


figure 27. **IGBT**

Turn-on Switching Waveforms & definition of t_{r}



Inverter Switching Definitions

figure 28. **FWD**

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

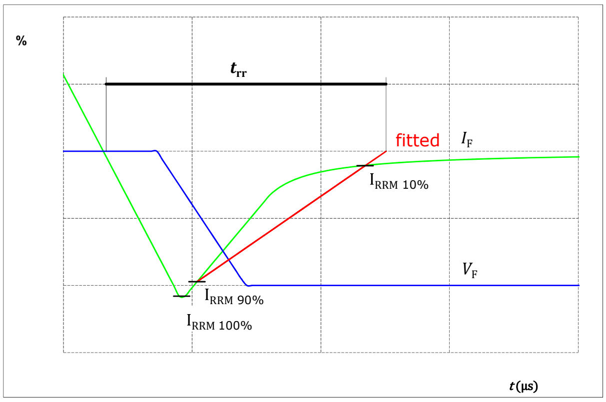
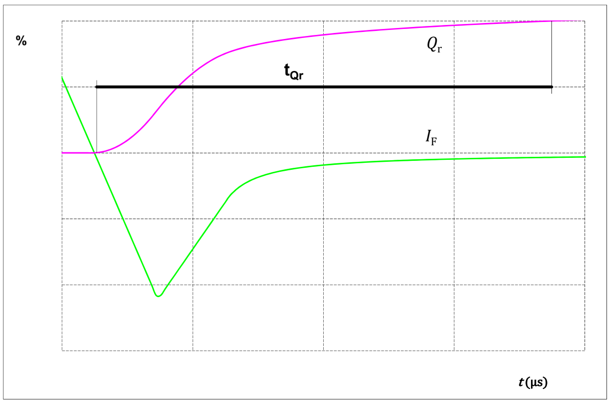


figure 29. **FWD**

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



Ordering Code

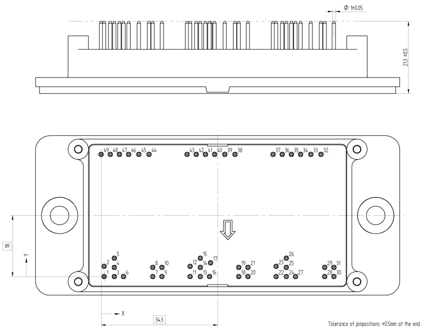
Version	Ordering Code
Without thermal paste	30-F2126PA150M7-L280F79
With thermal paste (3,4 W/mK, PSX-P7)	30-F2126PA150M7-L280F79-/3/

Marking

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

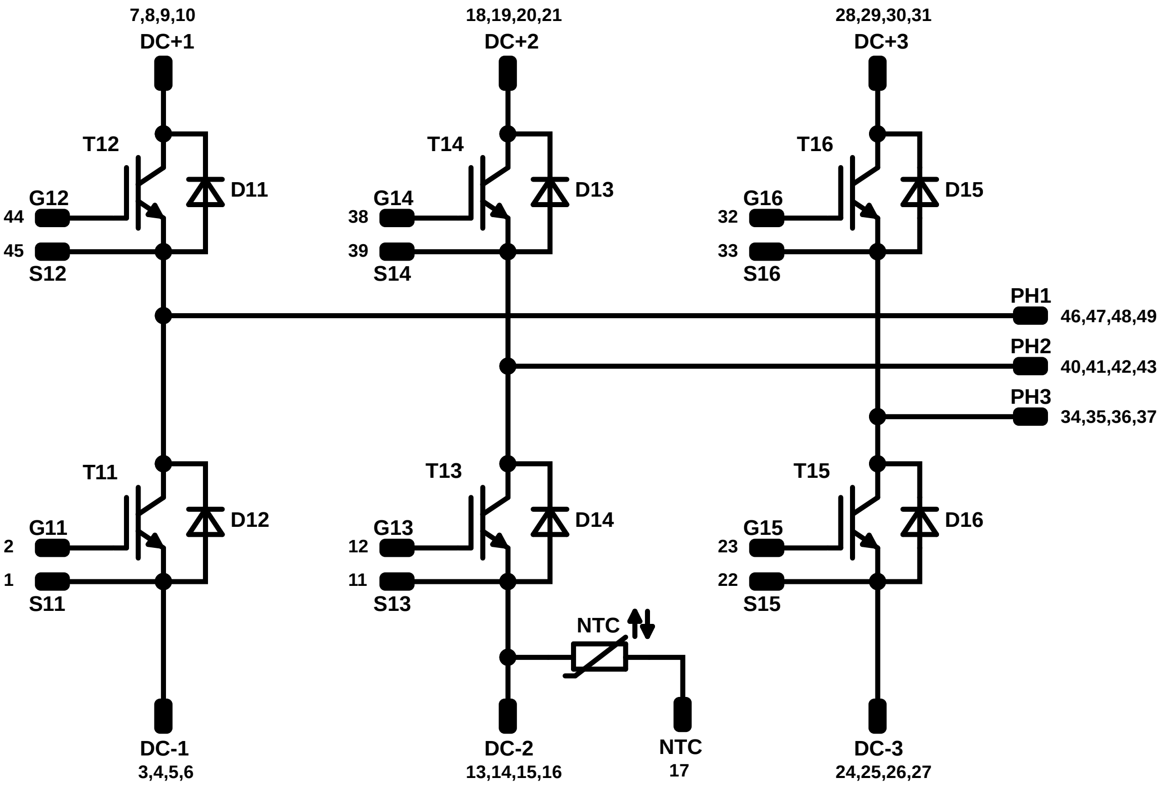
Outline

Pin table [mm]							
Pin	X	Y	Function	26	54,5	5,4	DC-3
1	0,9	0	S11	27	57,2	0	DC-3
2	0,9	3	G11	28	65,8	0	DC+3
3	3,9	0	DC-1	29	65,8	2,7	DC+3
4	3,9	2,7	DC-1	30	68,5	0	DC+3
5	3,9	5,4	DC-1	31	68,5	2,7	DC+3
6	6,6	0	DC-1	32	64,7	36	G16
7	15,2	0	DC+1	33	61,7	36	S16
8	15,2	2,7	DC+1	34	58,7	36	PH3
9	17,9	0	DC+1	35	56	36	PH3
10	17,9	2,7	DC+1	36	53,3	36	PH3
11	26,2	0	S13	37	50,6	36	PH3
12	26,2	3	G13	38	39,4	36	G14
13	29,2	0	DC-2	39	36,4	36	S14
14	29,2	2,7	DC-2	40	33,4	36	PH2
15	29,2	5,4	DC-2	41	30,7	36	PH2
16	31,9	0	DC-2	42	28	36	PH2
17	32,2	4,05	NTC	43	25,3	36	PH2
18	40,5	0	DC+2	44	14,1	36	G12
19	40,5	2,7	DC+2	45	11,1	36	S12
20	43,2	0	DC+2	46	8,1	36	PH1
21	43,2	2,7	DC+2	47	5,4	36	PH1
22	51,5	0	S15	48	2,7	36	PH1
23	51,5	3	G15	49	0	36	PH1
24	54,5	0	DC-3				
25	54,5	2,7	DC-3				



Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	150 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1200 V	150 A	Inverter Diode	
NTC	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-F2126PA150M7-L280F79-D4-14	5 Sep. 2021	New Datasheet format, module is unchanged Separate datasheet for pressfit pin version Correct Static Values at Characteristics Values	

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LIFE SUPPORT POLICY

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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.