Vincotech

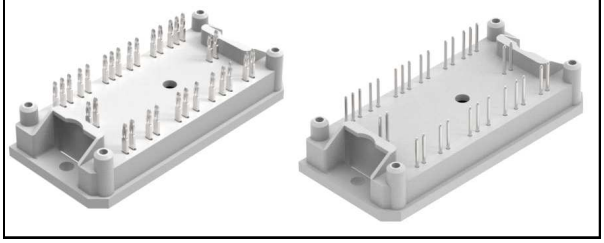
10-F1126PA075M7-L829F09
10-P1126PA075M7-L829F09Y
datasheet

flow PACK 1 — **1200 V / 75 A**

Features

- IGBT Mitsubishi gen 7 technology with low V_{CEsat} and improved EMC behavior
- Compact and low inductive design
- Built-in NTC

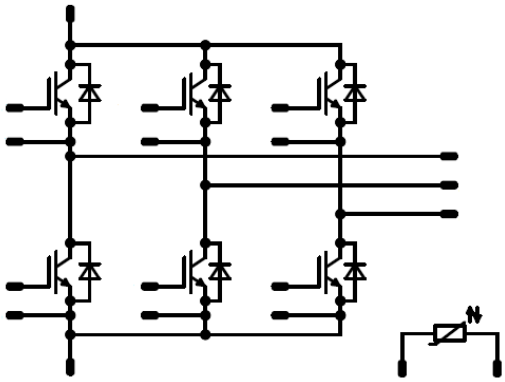
flow 1 17mm housing



Target applications

- Industrial Drives
- UPS

Schematic



Types

- 10-P1126PA075M7-L829F09Y
- 10-F1126PA075M7-L829F09

Maximum Ratings

T_j = 25 °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 °C	74	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 °C	135	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °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 °C	66	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	106	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
Creepage distance			min. 12,7	mm
Clearance			min. 12,7	mm
Comparative Tracking Index	CTI		> 200	

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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0075	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,55 1,70 1,75	2,05	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			110	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		
Reverse transfer capacitance	C_{res}							190		
Gate charge	Q_g		15	600	75	25		490		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,70		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 2 Ω R_{gon} = 2 Ω	±15	600	75	25 125 150		197 208 212		ns
Rise time	t_r					25 125 150		29 38 39		
Turn-off delay time	$t_{d(off)}$					25 125 150		203 233 242		
Fall time	t_f					25 125 150		86 113 111		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 8,5 µC Q_{rFWD} = 13,4 µC Q_{rFWD} = 15,3 µC				25 125 150		5,559 7,819 8,496		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,076 6,804 7,285		

Characteristic Values

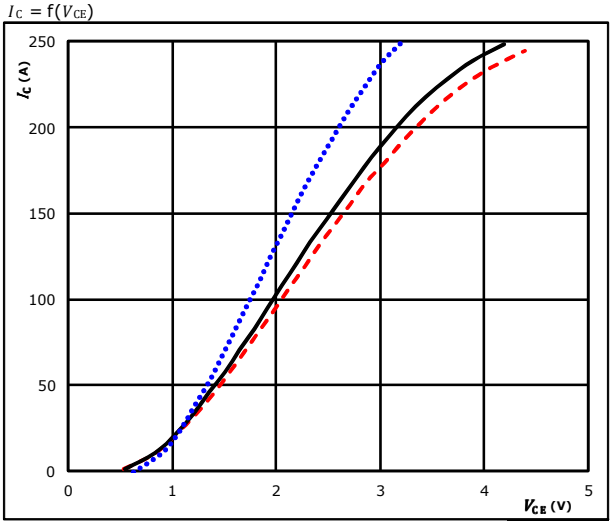
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Inverter Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,82 1,96 1,97	2,1	V
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,90		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 2268 A/µs di/dt = 1969 A/µs di/dt = 1970 A/µs	±15	600	75	25 125 150		75 77 78		A
Reverse recovery time	t_{rr}					25 125 150		278 432 459		ns
Recovered charge	Q_r					25 125 150		8,539 13,394 15,308		µC
Reverse recovered energy	E_{rec}					25 125 150		3,195 5,193 5,995		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		802 614 544		A/µs
Thermistor										
Rated resistance	R					25		4,7		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 426 Ω				100	-12		+11	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$					25		3500		K
B-value	$B_{(25/100)}$					25		3560		K
Vincotech NTC Reference									G	

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

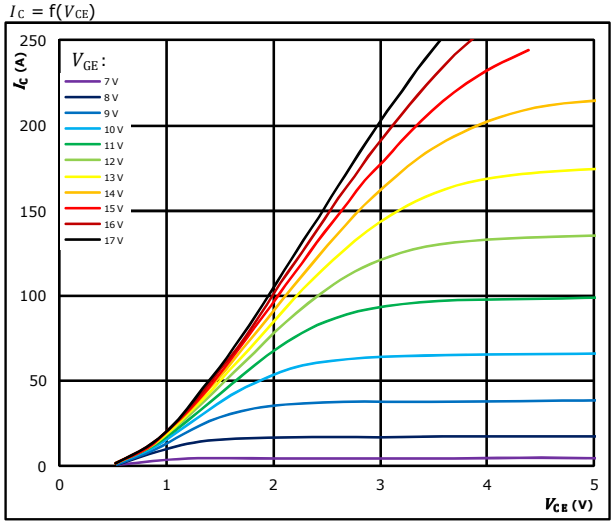


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

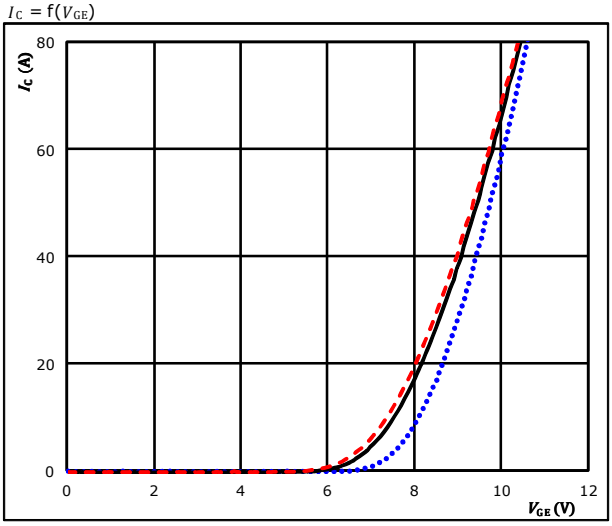


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{CE})$

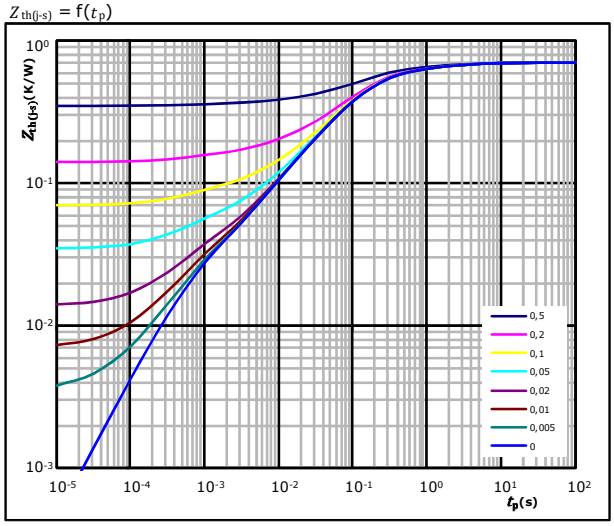


t_p =	100	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,70	K/W

IGBT thermal model values

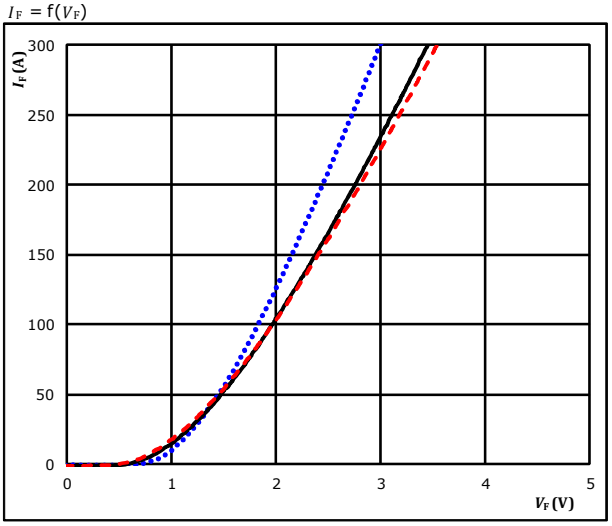
R (K/W)	τ (s)
3,63E-02	4,77E+00
9,31E-02	1,03E+00
3,22E-01	1,68E-01
1,83E-01	5,28E-02
4,91E-02	8,42E-03
2,13E-02	6,25E-04

Inverter Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



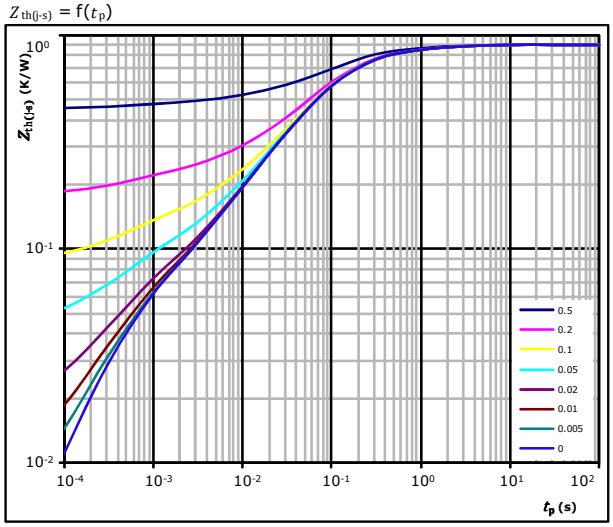
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,90 K/W

FWD thermal model values

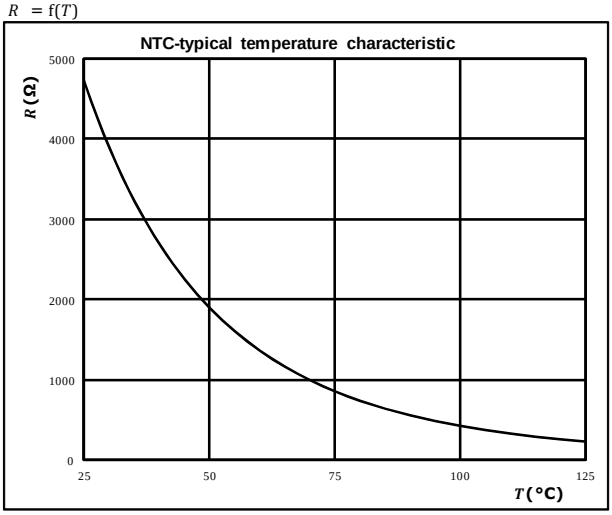
R (K/W)	τ (s)
6,37E-02	2,06E+00
1,71E-01	3,35E-01
4,76E-01	7,87E-02
1,11E-01	1,45E-02
3,47E-02	2,99E-03
4,20E-02	4,52E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

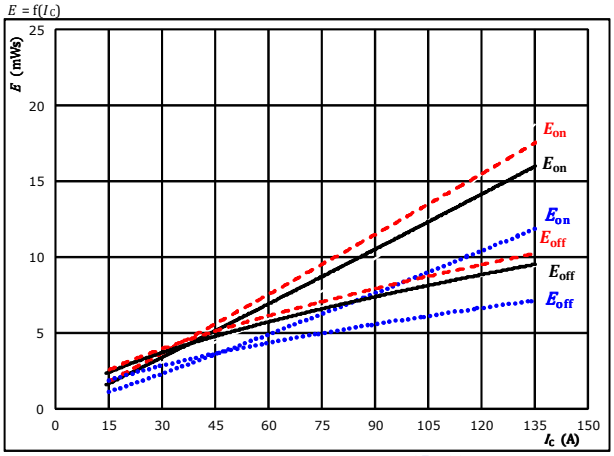


Inverter Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



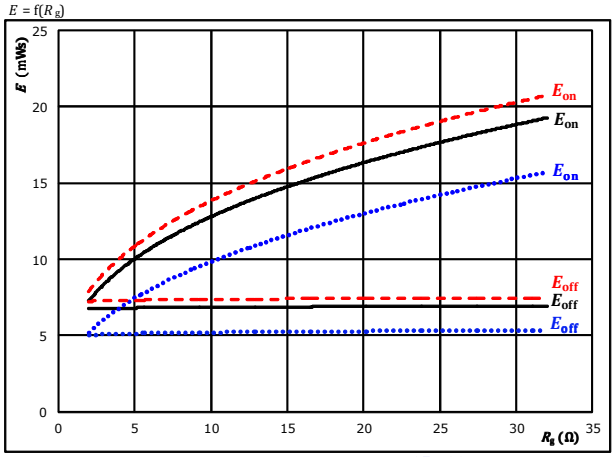
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
R_{gon} =	2	Ω		150 °C	
R_{goff} =	2	Ω			

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



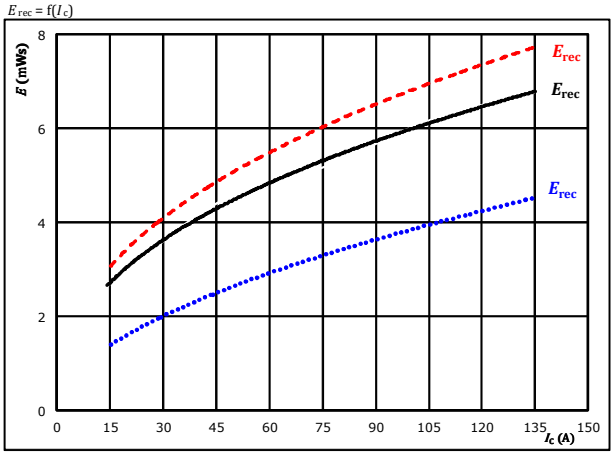
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	75	A		150 °C	

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



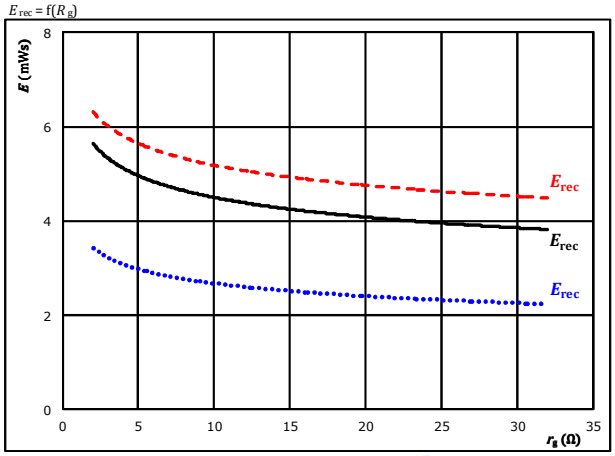
With an inductive load at

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

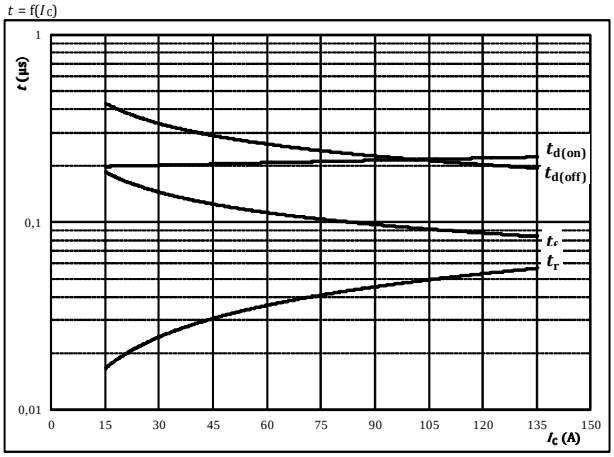
V_{CE} =	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	75	A		150 °C	

Inverter Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



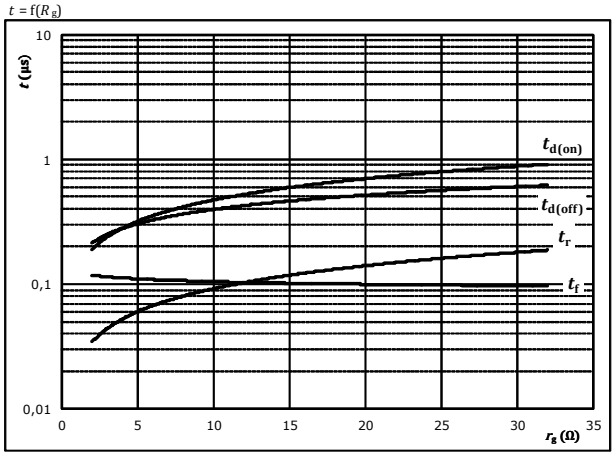
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



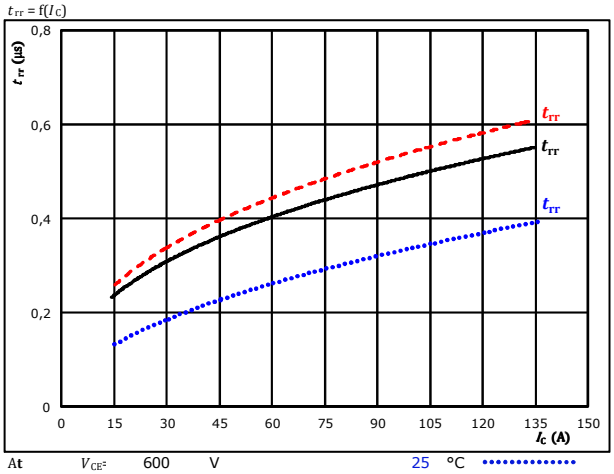
With an inductive load at

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

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



At

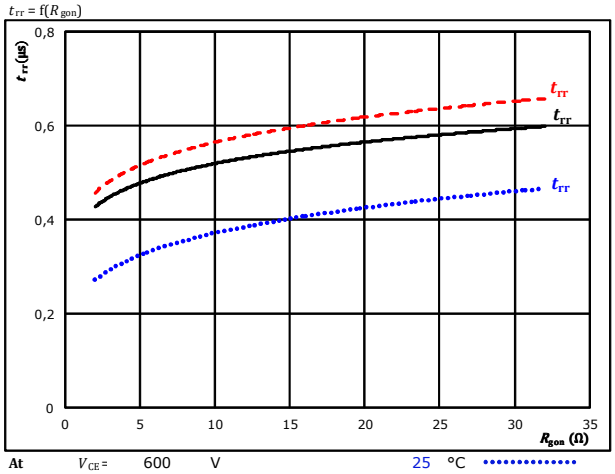
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 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
V_{GE} =	±15	V
I_C =	75	A

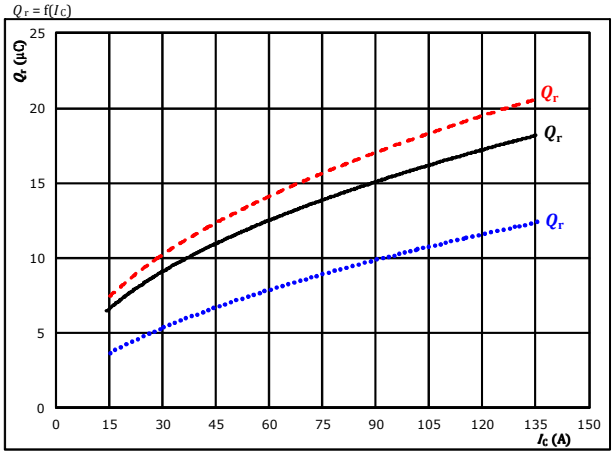
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

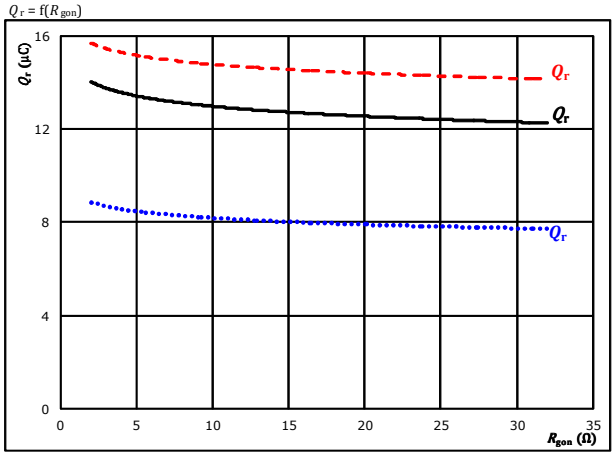


At						
	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	2	Ω		150 °C	

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

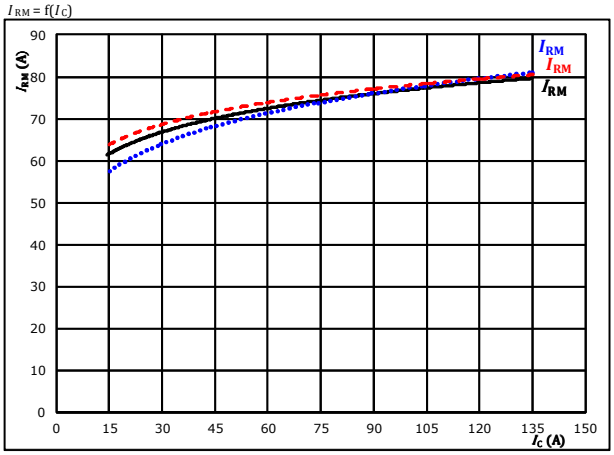


At						
	V_{CE}=	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	75	A		150 °C	

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

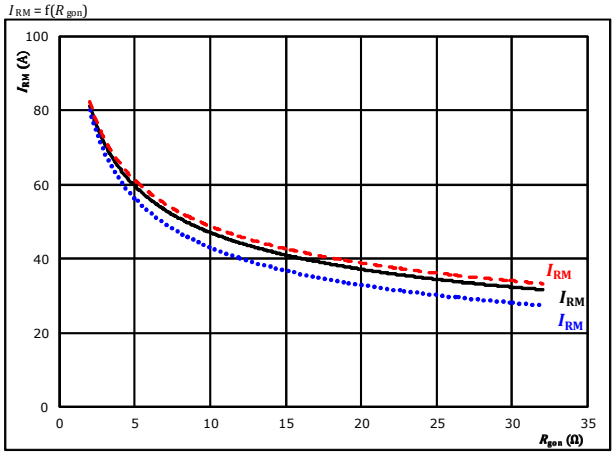


At						
	V_{CE}:	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	2	Ω		150 °C	

figure 12. **FWD**

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

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



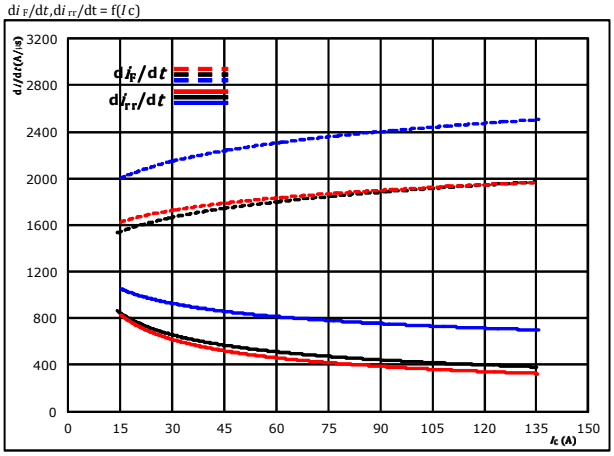
At						
	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	75	A		150 °C	

Inverter Switching Characteristics

figure 13. **FWD**

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

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

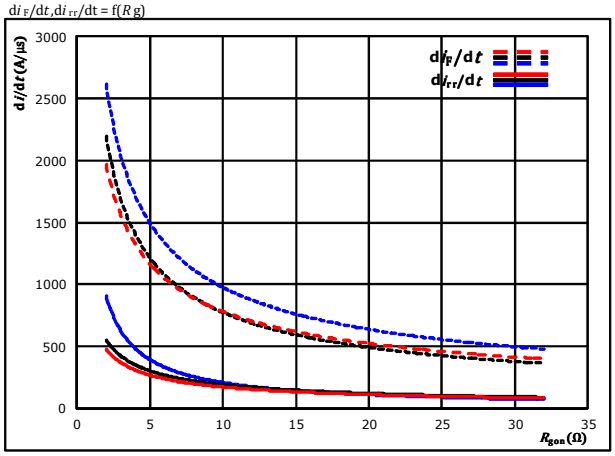


At						
V_{CE} =	600	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
R_{gon} =	2	Ω		150 °C	– – – –

figure 14. **FWD**

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

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



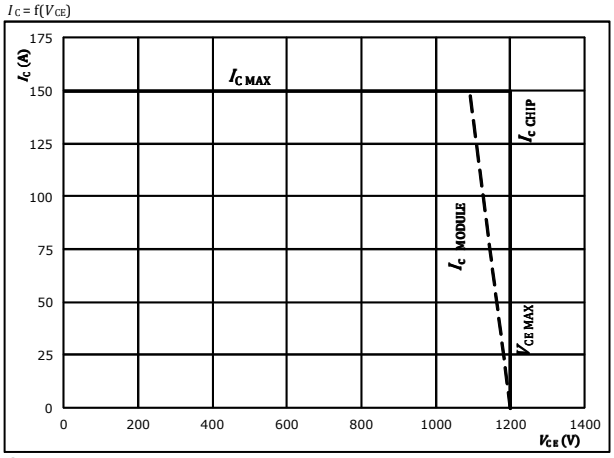
At						
V_{CE} =	600	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	– – – –

Inverter Switching Characteristics

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

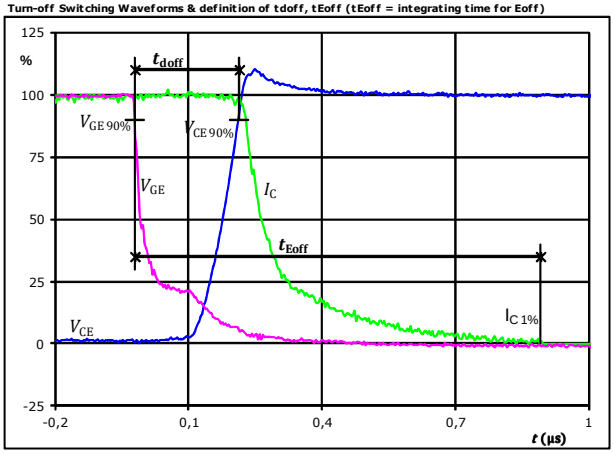
Inverter Switching Definitions

General conditions

T_j	=	**125 °C**
R_{gon}	=	**2 Ω**
R_{goff}	=	**2 Ω**

figure 1. **IGBT**

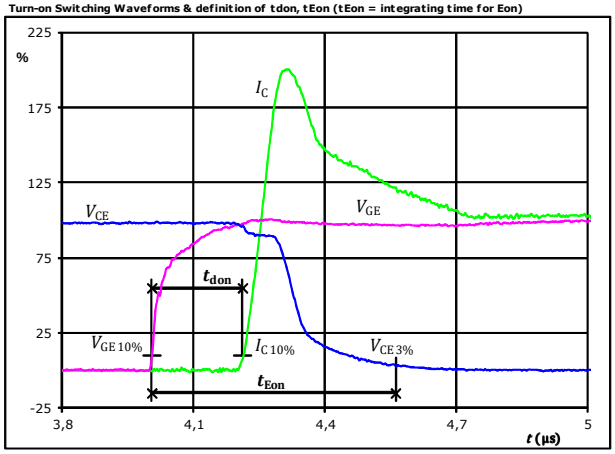
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_{doff} =	0,233	µs
t_{Eoff} =	0,913	µs

figure 2. **IGBT**

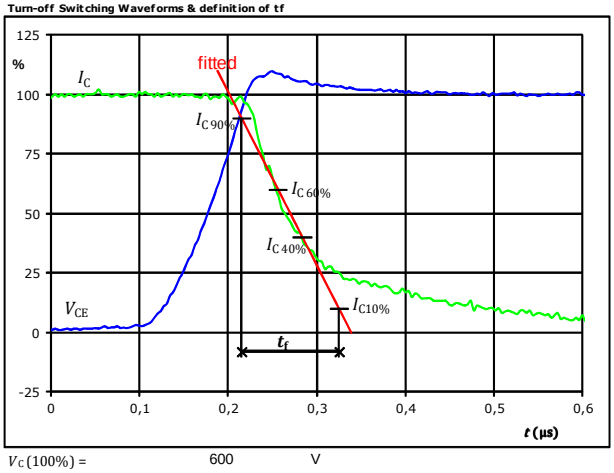
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_{don} =	0,208	µs
t_{Eon} =	0,556	µs

figure 3. **IGBT**

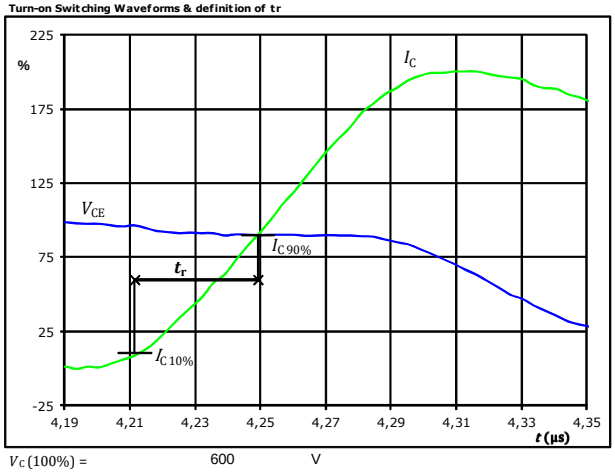
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_f =	0,113	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

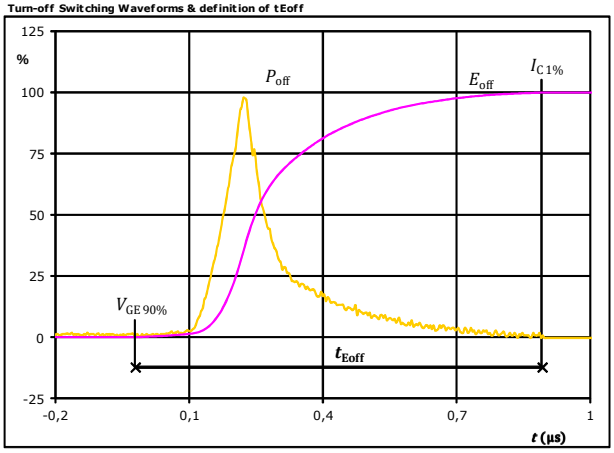


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_r =	0,038	µs

Inverter Switching Characteristics

figure 5. **IGBT**

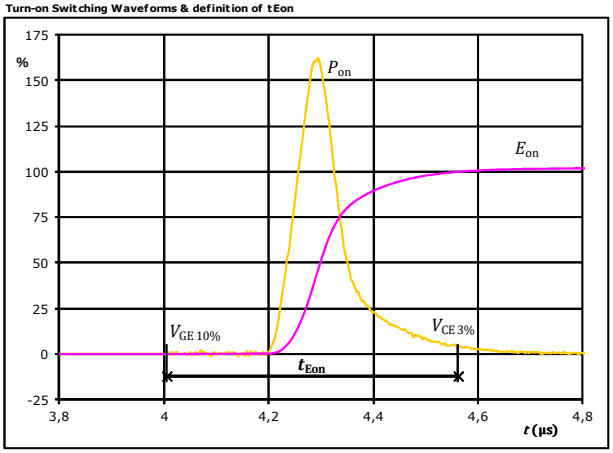
Turn-off Switching Waveforms & definition of tEoff



$P_{off}(100\%)$ =	45,36	kW
$E_{off}(100\%)$ =	6,80	mJ
t_{Eoff} =	0,91	µs

figure 6. **IGBT**

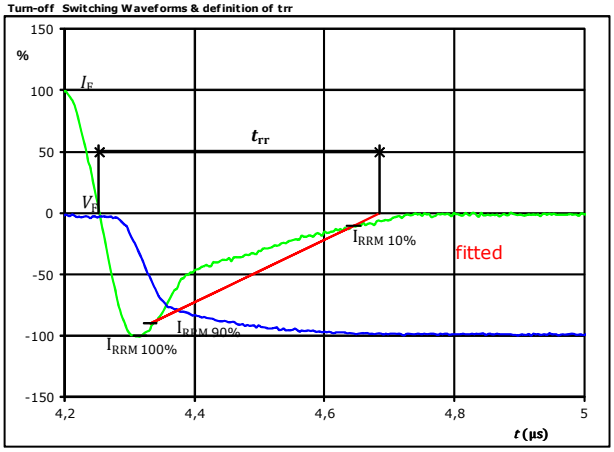
Turn-on Switching Waveforms & definition of tEon



$P_{on}(100\%)$ =	45,36	kW
$E_{on}(100\%)$ =	7,82	mJ
t_{Eon} =	0,56	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

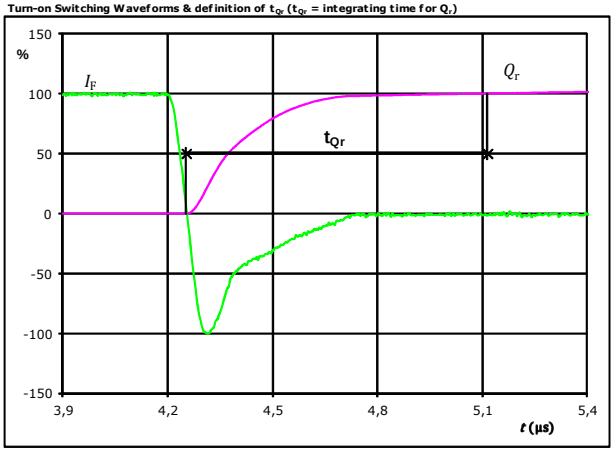


$V_F(100\%)$ =	600	V
$I_F(100\%)$ =	76	A
$I_{RRM}(100\%)$ =	-77	A
t_{rr} =	0,432	µs

Inverter Switching Characteristics

figure 8. **FWD**

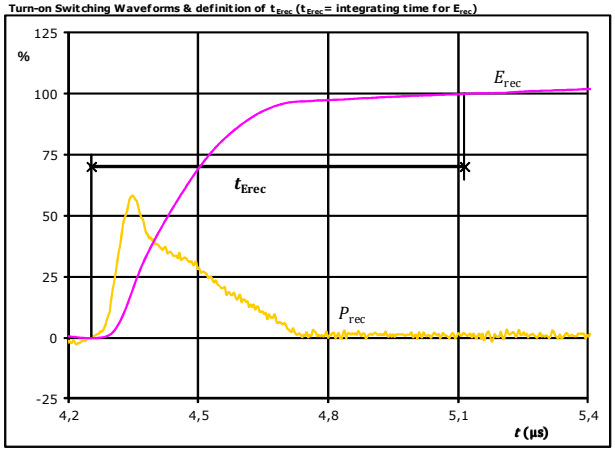
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	76	A
Q_r (100%) =	13,39	µC
t_{Qr} =	0,86	µs

figure 9. **FWD**

Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec})



P_{rec} (100%) =	45,36	kW
E_{rec} (100%) =	5,19	mJ
t_{Erec} =	0,86	µs

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Ordering Code & Marking

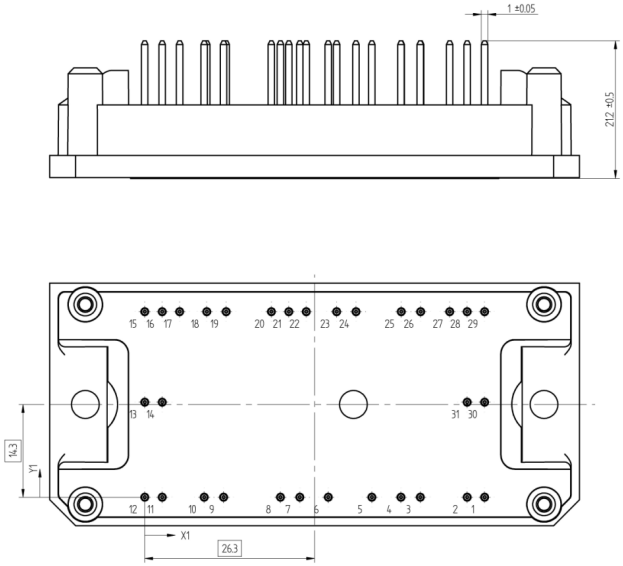
Version	Ordering Code
without thermal paste 17mm housing with Press-fit pins	10-P1126PA075M7-L829F09Y
with thermal paste 17mm housing with Press-fit pins	10-P1126PA075M7-L829F09Y-/3/
without thermal paste 17mm housing with solder pins	10-F1126PA075M7-L829F09

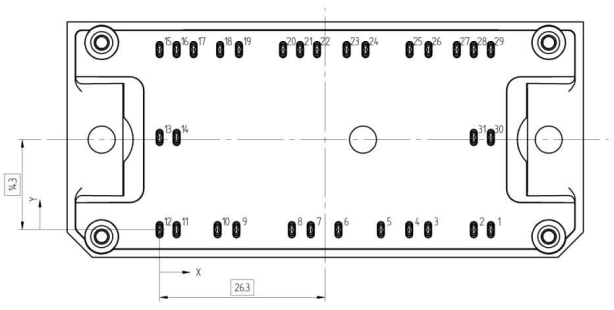
		Name		Date code	UL & VIN	Lot	Serial
Text		NN-NNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
		Type&Ver	**Lot number**	**Serial**	**Date code**		
Datamatrix		TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]

Pin	X	Y	Function
1	52,6	0	DC-
2	49,9	0	DC-
3	42,65	0	G6
4	39,65	0	S6
5	35,15	0	NTC1
6	28,4	0	NTC2
7	24	0	G4
8	21	0	S4
9	12,2	0	G2
10	9,2	0	S2
11	2,7	0	DC-
12	0	0	DC-
13	0	14,65	DC+
14	2,7	14,65	DC+
15	0	28,6	U
16	2,7	28,6	U
17	5,4	28,6	U
18	9,6	28,6	S1
19	12,6	28,6	G1
20	19,6	28,6	V
21	22,3	28,6	V
22	25	28,6	V
23	29,7	28,6	S3
24	32,7	28,6	G3
25	39,7	28,6	S5
26	42,7	28,6	G5
27	47,2	28,6	W
28	49,9	28,6	W
29	52,6	28,6	W
30	52,6	14,65	DC+
31	49,9	14,65	DC+





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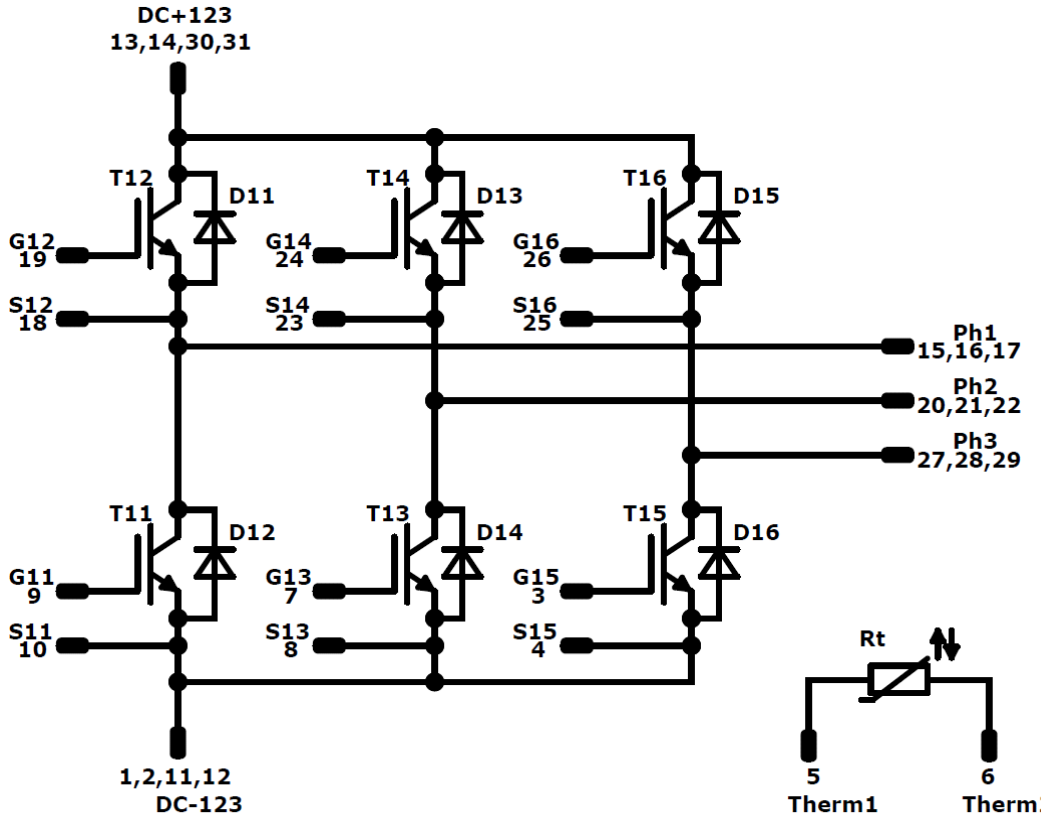
Pinout



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	Thermistor			NTC	

Vincotech

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

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 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-x1126PA075M7-L829F09x-D1-14	07 Mar. 2017		