



Vincotech

## 30-F2127PA100SC-L179E09 datasheet

flow7PACK 2

1200 V / 100 A

### Topology features

- Inverter
- Brake Chopper
- Open Emitter configuration
- 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

### Housing features

- Base isolation:  $\text{Al}_2\text{O}_3$
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
- Thermo-mechanical push-and-pull force relief
- Solder pin

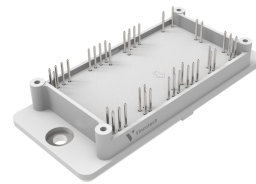
### Target applications

- Motor Drive
- Power Generation

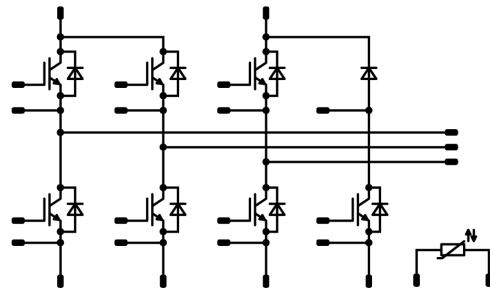
### Types

- 30-F2127PA100SC-L179E09

### flow 2 17 mm housing



### Schematic





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## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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### Inverter Switch

Collector-emitter voltage	$V_{CES}$		1200	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	118	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	307	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Short circuit ratings	$t_{SC}$	$V_{GE} = 15\text{ V}$ , $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	10	$\mu s$
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

### Inverter Diode

Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	96	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	200	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	176	W
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

### Brake Switch

Collector-emitter voltage	$V_{CES}$		1200	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	66	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	150	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	185	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Short circuit ratings	$t_{SC}$	$V_{GE} = 15\text{ V}$ , $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	10	$\mu s$
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$



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## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Brake Diode</b>				
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	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	87	W
Maximum junction temperature	$T_{jmax}$		175	°C

## Brake Sw. Protection Diode

Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s \leq 80\text{ °C}$	20 <sup>(1)</sup>	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	20	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	59	W
Maximum junction temperature	$T_{jmax}$		175	°C

<sup>(1)</sup> limited by  $I_{FRM}$

## 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* $t_p = 2\text{ s}$	6000	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 200	

\*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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0034	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	$V_{CEsat}$		15		100	25 125 150	1,58	1,88 2,19 2,27	2,07 <sup>(2)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	1200		25			2	µA
Gate-emitter leakage current	$I_{GES}$		20	0		25			240	nA
Internal gate resistance	$r_g$							2		Ω
Input capacitance	$C_{ies}$	$f = 1 \text{ Mhz}$	0	25		25		5600		pF
Reverse transfer capacitance	$C_{res}$							200		pF
Gate charge	$Q_g$		±15		0	25		760		nC

#### Thermal

Thermal resistance junction to sink <sup>(3)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,31		K/W
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#### Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	±15	600	100	25 150		103,8 107,8		ns
Rise time	$t_r$					25 150		17,6 23		ns
Turn-off delay time	$t_{d(off)}$					25 150		218,6 293,2		ns
Fall time	$t_f$					25 150		71,68 110,56		ns
Turn-on energy (per pulse)	$E_{on}$	$Q_{tFWD} = 9,32 \mu\text{C}$ $Q_{tFWD} = 18,66 \mu\text{C}$				25 150		4,04 6,73		mWs
Turn-off energy (per pulse)	$E_{off}$					25 150		5,25 8,77		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	25 150	1,35	1,83 1,87	2,05 <sup>(2)</sup>	V
Reverse leakage current	$I_R$	$V_r = 1200$ V				25			18	μA

#### Thermal

Thermal resistance junction to sink <sup>(3)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,54		K/W
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#### Dynamic

Peak recovery current	$I_{RM}$	$di/dt=6900$ A/μs $di/dt=5512$ A/μs	$\pm 15$	600	100	25 150		163,67 186,62		A
Reverse recovery time	$t_{rr}$					25 150		130,08 294,35		ns
Recovered charge	$Q_r$					25 150		9,32 18,66		μC
Reverse recovered energy	$E_{rec}$					25 150		3,87 7,96		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 150		8743 3702		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	

### Brake Switch

#### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0017	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	$V_{CEsat}$		15		50	25 150	1,58	1,85 2,28	2,07 <sup>(2)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	1200		25			1	µA
Gate-emitter leakage current	$I_{GES}$		20	0		25			120	nA
Internal gate resistance	$r_g$							4		Ω
Input capacitance	$C_{ies}$	$f = 1 \text{ Mhz}$	0	25		25		2800		pF
Reverse transfer capacitance	$C_{res}$							100		pF
Gate charge	$Q_g$		±15		0	25		380		nC

#### Thermal

Thermal resistance junction to sink <sup>(3)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,51		K/W
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#### Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$	±15	600	50	25 125 150		116,8 121,2 121,4		ns
Rise time	$t_r$					25 125 150		18 23,2 24,4		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		244,8 301 315,8		ns
Fall time	$t_f$					25 125 150		87,45 109,52 124,52		ns
Turn-on energy (per pulse)	$E_{on}$					25 125 150		2,39 3,19 3,43		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		2,96 4,36 4,8		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	

### Brake Diode

#### Static

Forward voltage	$V_F$				25	25 125 150	1,35	1,9 1,9 1,88	2,05 <sup>(2)</sup>	V
Reverse leakage current	$I_R$	$V_r = 1200$ V				25			5,2	µA

#### Thermal

Thermal resistance junction to sink <sup>(3)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,09		K/W
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#### Dynamic

Peak recovery current	$I_{RM}$	$di/dt=3279$ A/µs $di/dt=2629$ A/µs $di/dt=2485$ A/µs	$\pm 15$	600	50	25 125 150		54,29 52,86 54,28		A
Reverse recovery time	$t_{rr}$					25 125 150		158,7 311,99 336,58		ns
Recovered charge	$Q_r$					25 125 150		3,21 5,83 6,53		µC
Reverse recovered energy	$E_{rec}$					25 125 150		1,23 2,47 2,78		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		4114 1240 1190		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	

### Brake Sw. Protection Diode

#### Static

Forward voltage	$V_F$				10	25 150		1,35	1,77 1,69	2,05 <sup>(2)</sup>	V
Reverse leakage current	$I_R$	$V_r = 1200$ V				25				2,7	μA

#### Thermal

Thermal resistance junction to sink <sup>(3)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							1,62		K/W
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### Thermistor

#### Static

Rated resistance	$R$					25			22		kΩ
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 1484$ Ω				100	-5			5	%
Power dissipation	$P$					25			130		mW
Power dissipation constant	$d$					25			1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1$ %							3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1$ %							4000		K
Vincotech Thermistor Reference										I	

<sup>(2)</sup> Value at chip level

<sup>(3)</sup> Only valid with pre-applied Vincotech thermal interface material.



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### Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

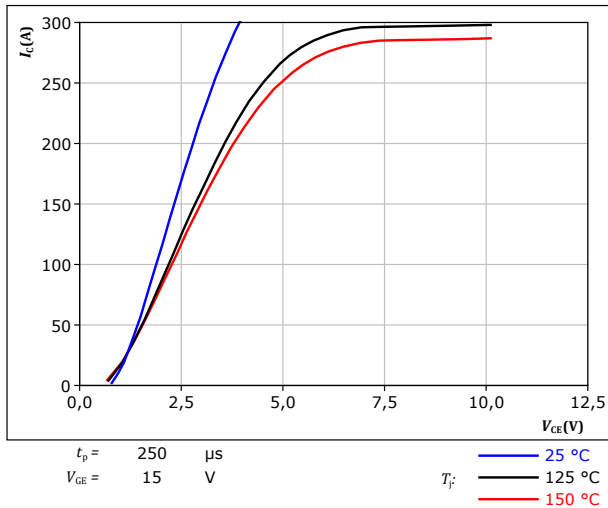


figure 2. IGBT

Typical output characteristics

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

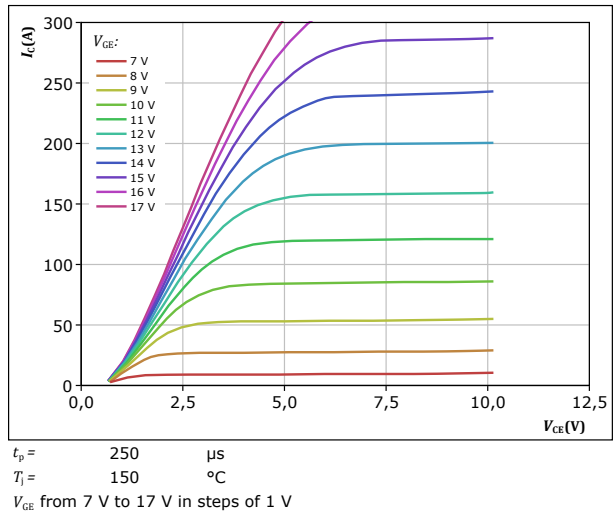


figure 3. IGBT

Typical transfer characteristics

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

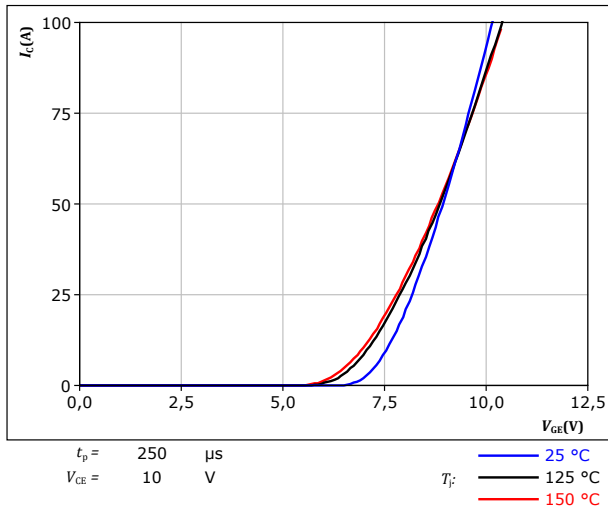
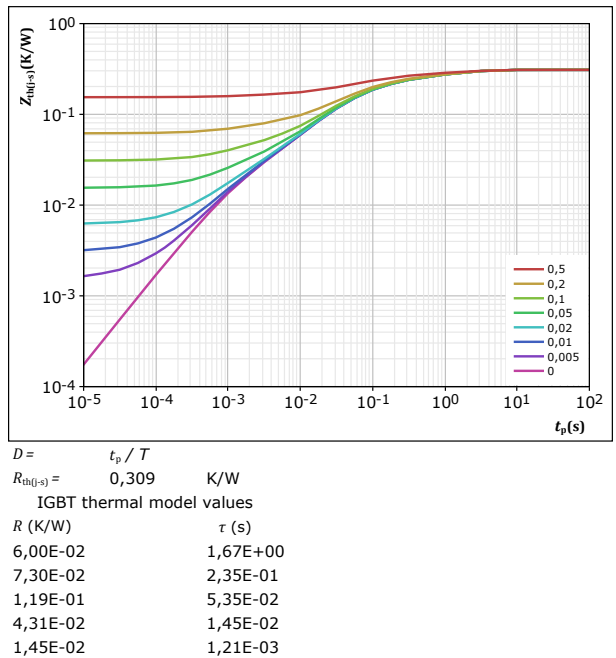


figure 4. IGBT

Transient thermal impedance as a function of pulse width

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





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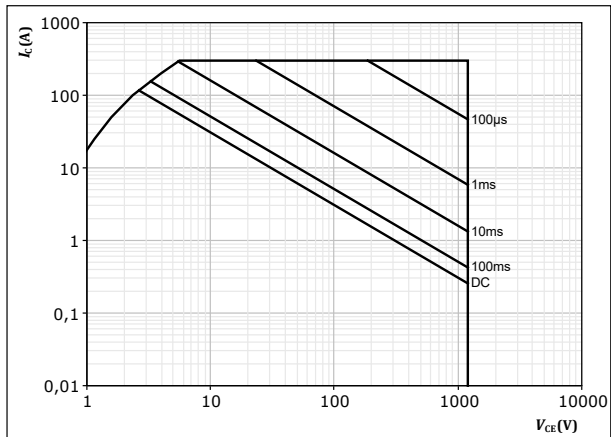
## Inverter Switch Characteristics

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 6.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

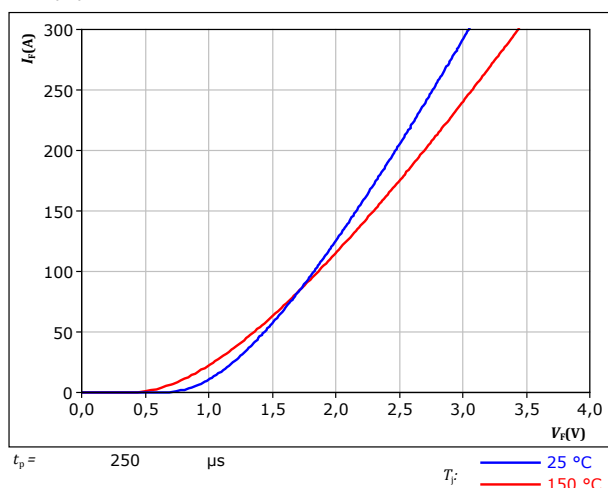
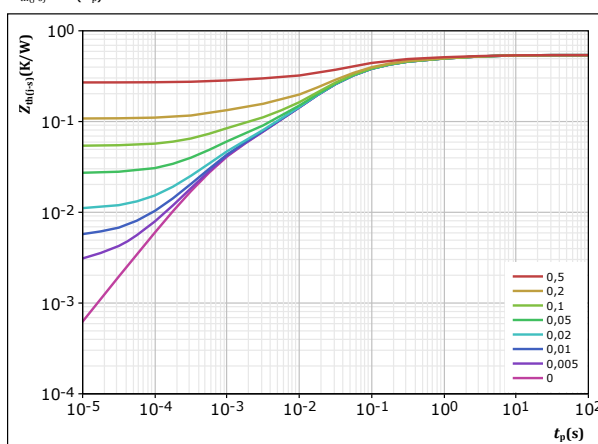


figure 7.

FWD

Transient thermal impedance as a function of pulse width

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



$D =$	$t_p / T$	
$R_{th(j-s)} =$	0,539	K/W
FWD thermal model values		
$R$ (K/W)	$\tau$ (s)	
3,25E-02	4,14E+00	
5,01E-02	9,90E-01	
1,38E-01	1,45E-01	
2,22E-01	3,37E-02	
5,69E-02	9,51E-03	
3,92E-02	7,97E-04	



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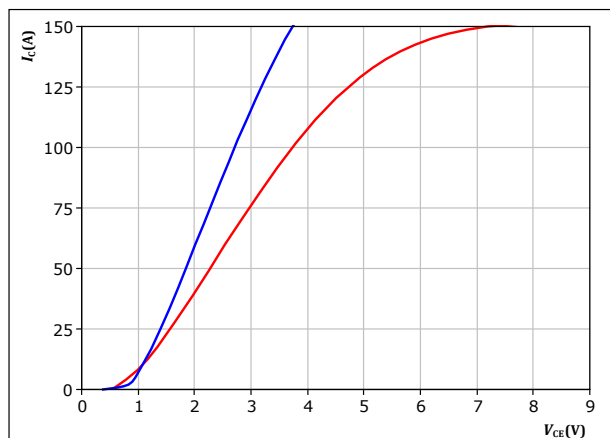
## Brake Switch Characteristics

figure 8.

IGBT

Typical output characteristics

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



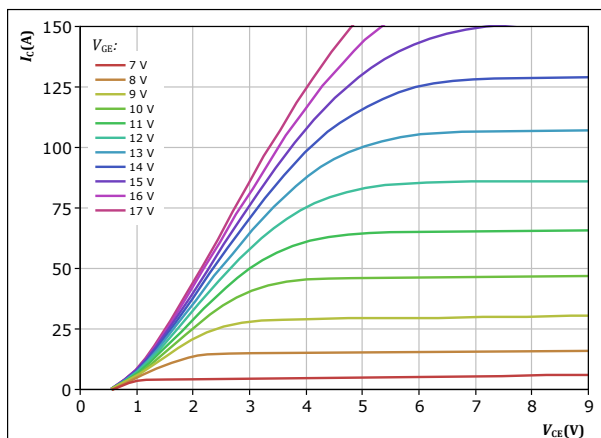
$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_J: 25 ^\circ C$   
 $150 ^\circ C$

figure 9.

IGBT

Typical output characteristics

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



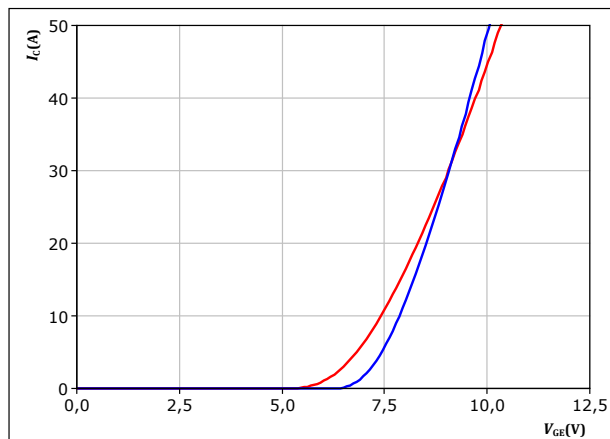
$t_p = 250 \mu s$   
 $T_J = 150 ^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 10.

IGBT

Typical transfer characteristics

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



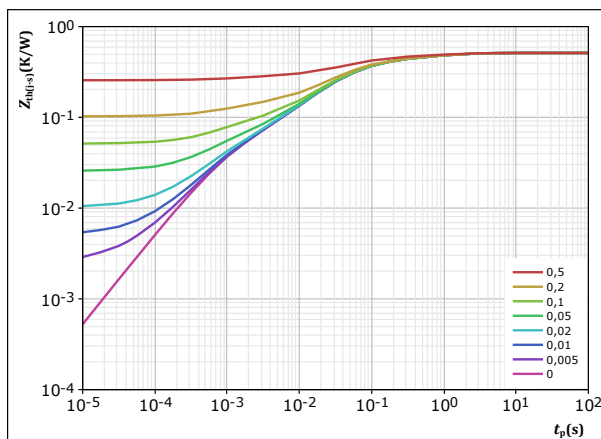
$t_p = 250 \mu s$   
 $V_{CE} = 10 V$   
 $T_J: 25 ^\circ C$   
 $150 ^\circ C$

figure 11.

IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,512 K/W$   
IGBT thermal model values  

$R (K/W)$	$\tau (s)$
7,12E-02	1,13E+00
1,15E-01	1,65E-01
2,22E-01	3,78E-02
6,59E-02	1,21E-02
3,86E-02	9,52E-04





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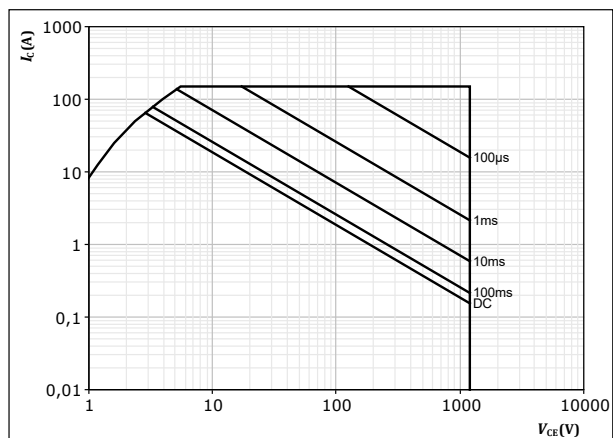
## Brake Switch Characteristics

figure 12.

IGBT

Safe operating area

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



D = single pulse

T<sub>s</sub> = 80 °C

V<sub>GE</sub> = 15 V

T<sub>j</sub> = T<sub>jmax</sub>



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## Brake Diode Characteristics

figure 13.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

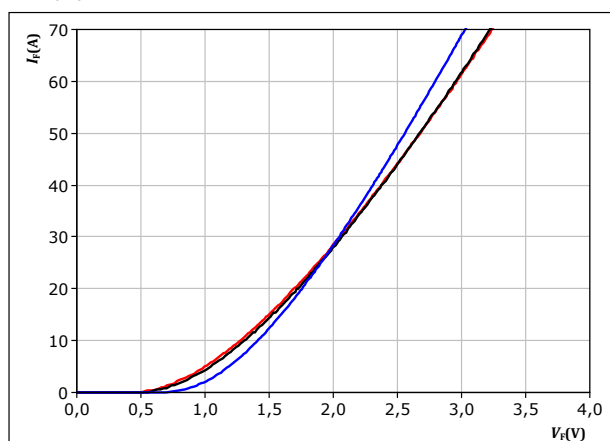
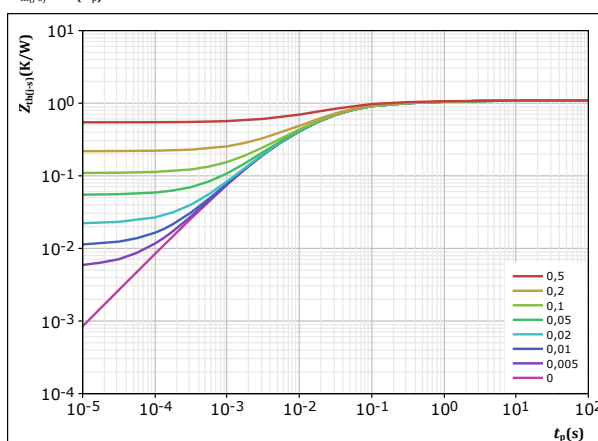


figure 14.

FWD

Transient thermal impedance as a function of pulse width

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





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### Brake Sw. Protection Diode Characteristics

figure 15.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

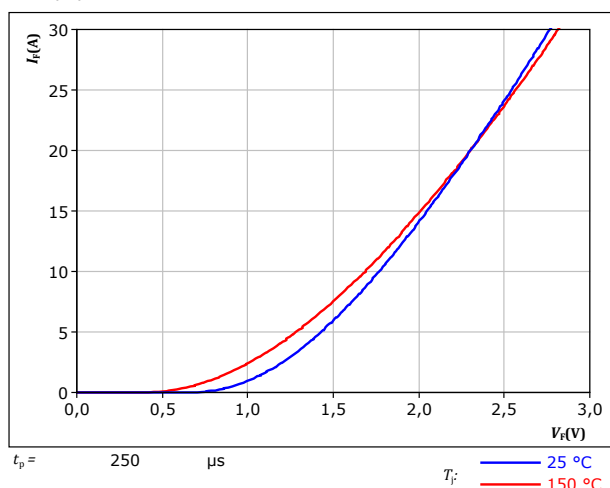
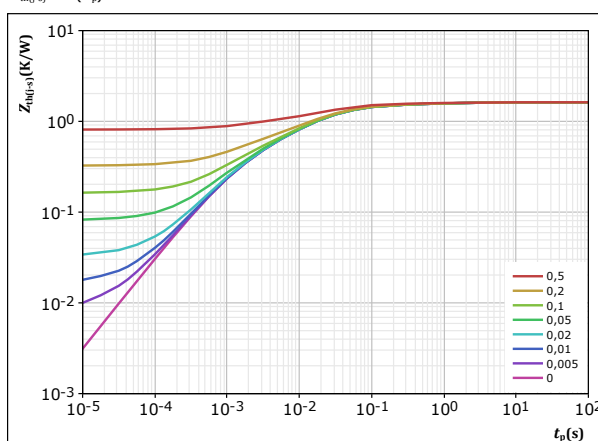


figure 16.

FWD

Transient thermal impedance as a function of pulse width

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





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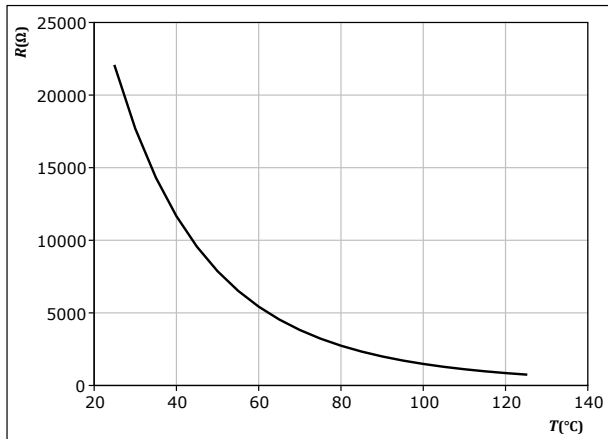
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## Thermistor Characteristics

**figure 17.** Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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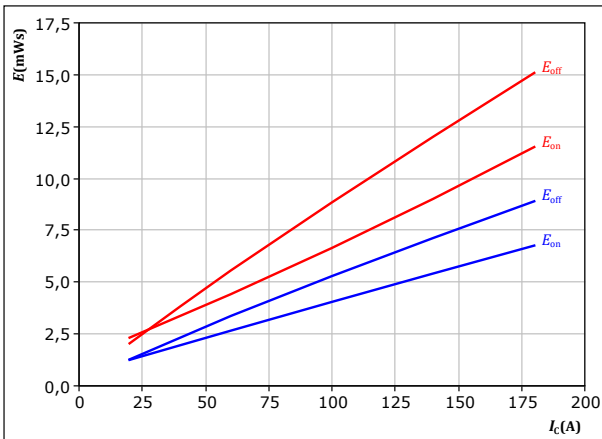
### Inverter Switching Characteristics

figure 18.

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  
 $R_{gon} = 4$   $\Omega$   
 $R_{goff} = 4$   $\Omega$

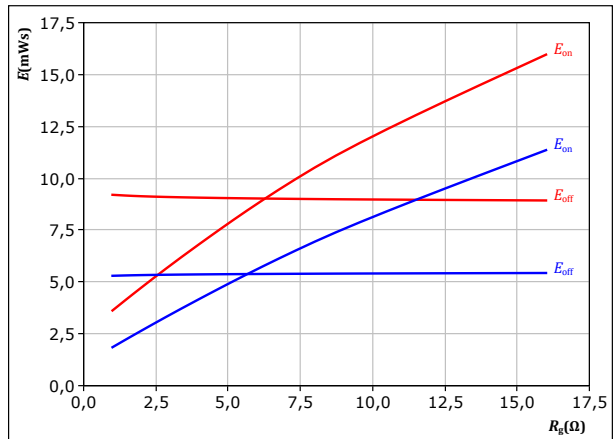
$T_j$ : — 25 °C  
— 150 °C

figure 19.

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  
 $I_c = 100$  A

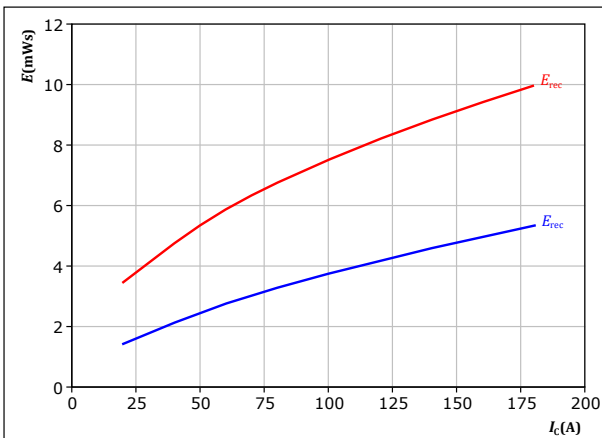
$T_j$ : — 25 °C  
— 150 °C

figure 20.

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  
 $R_{gon} = 4$   $\Omega$

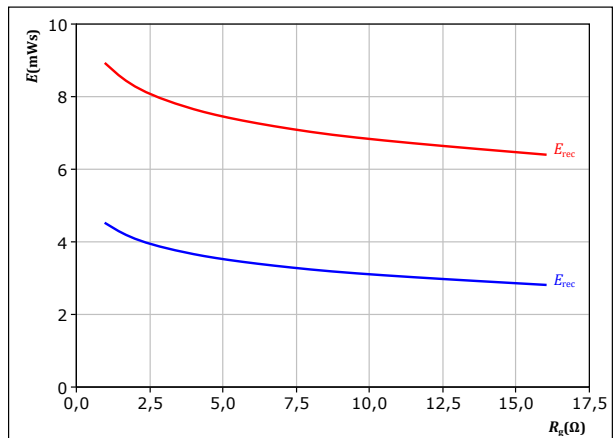
$T_j$ : — 25 °C  
— 150 °C

figure 21.

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  
 $I_c = 100$  A

$T_j$ : — 25 °C  
— 150 °C



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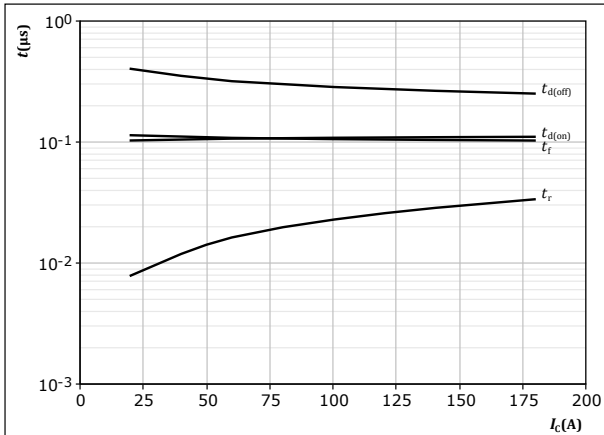
### Inverter Switching Characteristics

figure 22.

IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



With an inductive load at

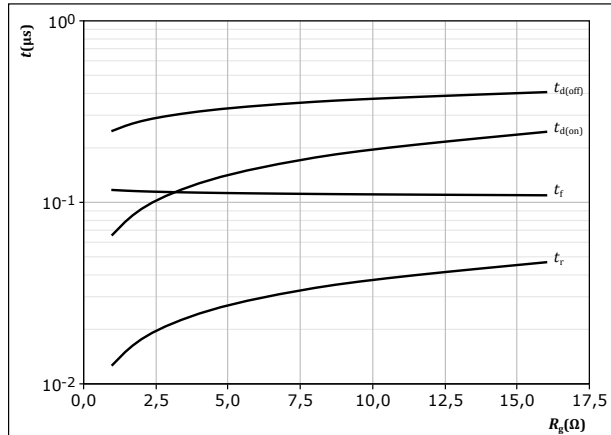
$T_j = 150$  °C  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $R_{goff} = 4$   $\Omega$

figure 23.

IGBT

Typical switching times as a function of IGBT turn on gate resistor

$$t = f(R_g)$$



With an inductive load at

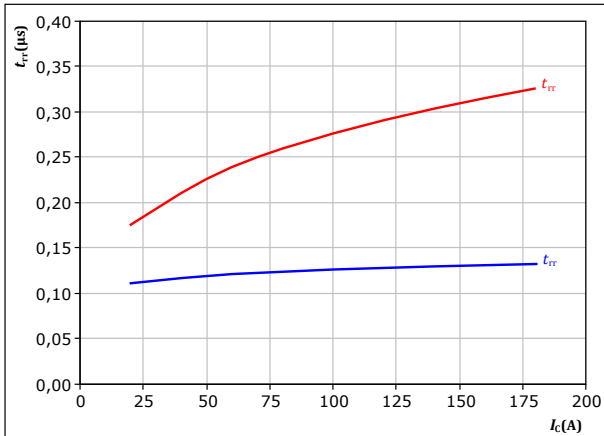
$T_j = 150$  °C  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 100$  A

figure 24.

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  
 $R_{gon} = 4$   $\Omega$

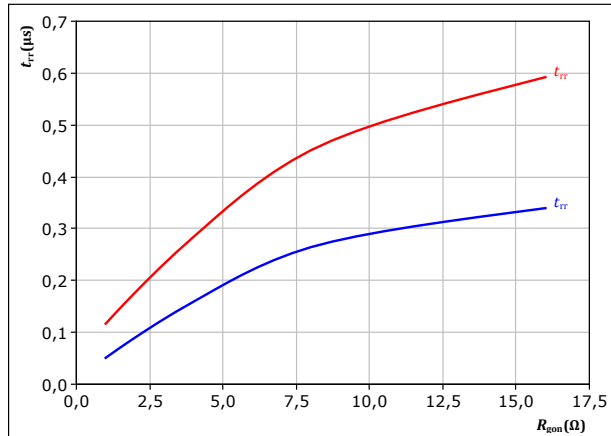
$T_j$ : — 25 °C  
— 150 °C

figure 25.

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  
 $I_C = 100$  A

$T_j$ : — 25 °C  
— 150 °C



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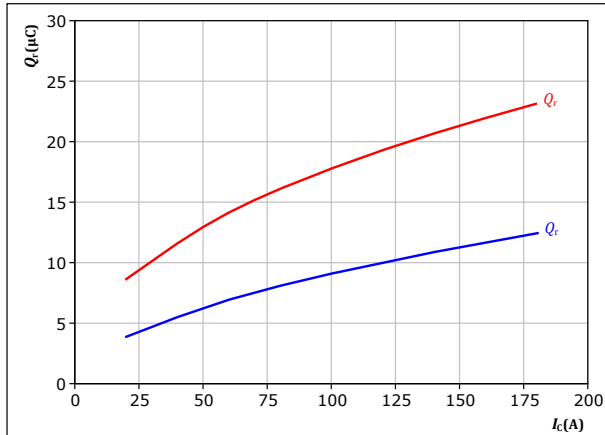
## Inverter Switching Characteristics

figure 26.

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  
 $R_{gon} = 4$  Ω

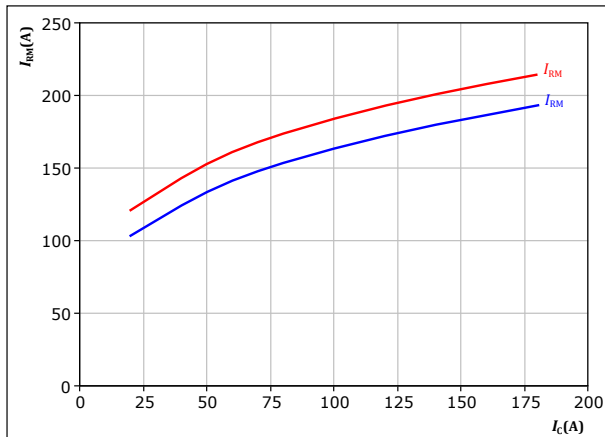
$T_j$ : — 25 °C  
— 150 °C

figure 28.

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  
 $R_{gon} = 4$  Ω

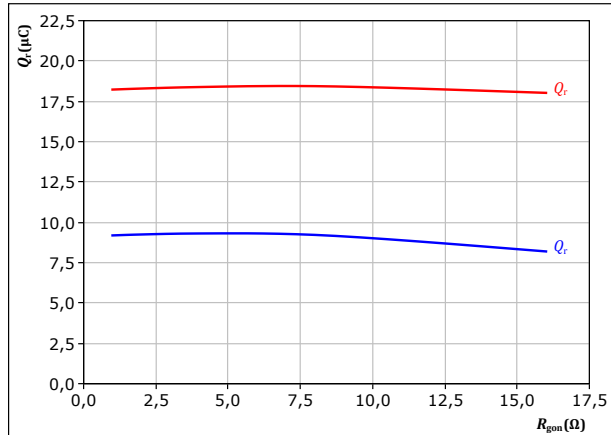
$T_j$ : — 25 °C  
— 150 °C

figure 27.

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  
 $I_c = 100$  A

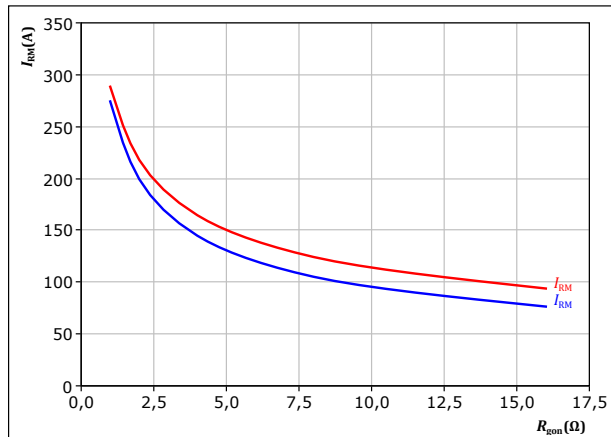
$T_j$ : — 25 °C  
— 150 °C

figure 29.

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  
 $I_c = 100$  A

$T_j$ : — 25 °C  
— 150 °C



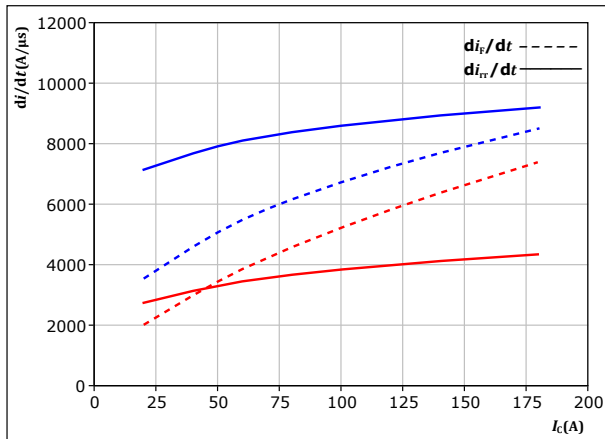
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datasheet

## Inverter Switching Characteristics

figure 30. FWD

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



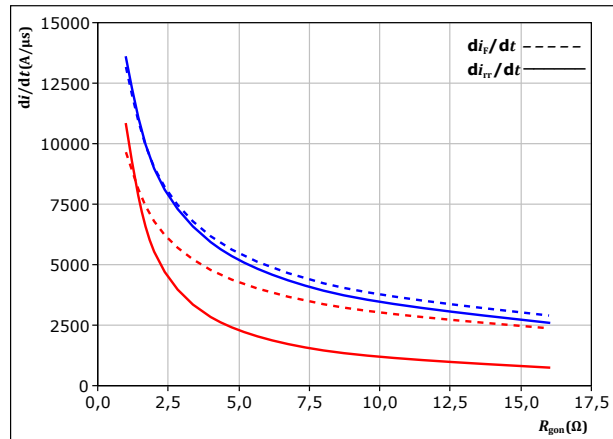
With an inductive load at

$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$  Ω

$T_j$ : 25 °C (blue)  
150 °C (red)

figure 31. 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

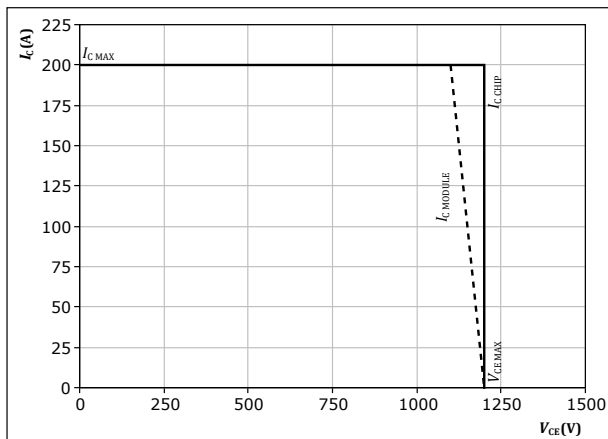
$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 100$  A

$T_j$ : 25 °C (blue)  
150 °C (red)

figure 32. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At  $T_j = 150$  °C  
 $R_{gon} = 4$  Ω  
 $R_{goff} = 4$  Ω





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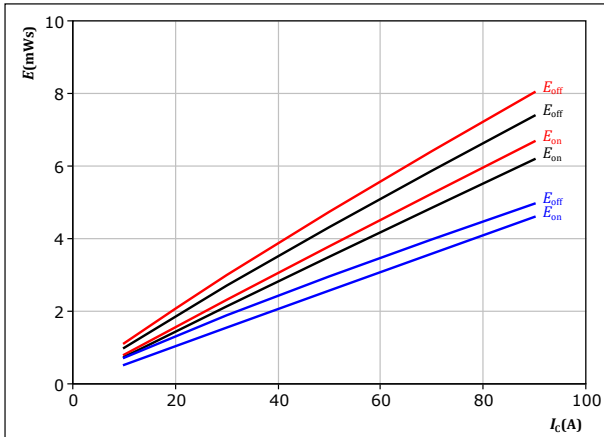
### Brake Switching Characteristics

figure 33.

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  
 $R_{gon} = 8$   $\Omega$   
 $R_{goff} = 8$   $\Omega$

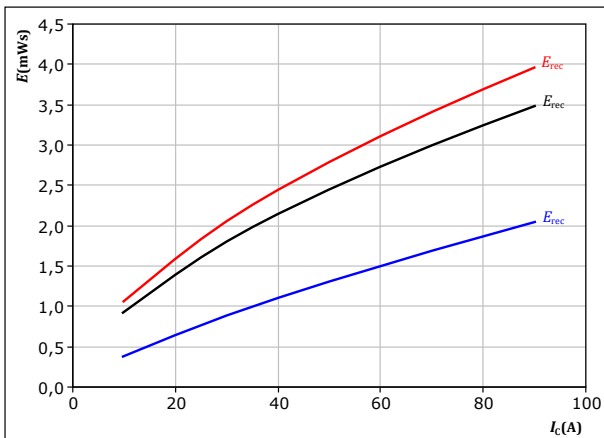
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 35.

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  
 $R_{gon} = 8$   $\Omega$

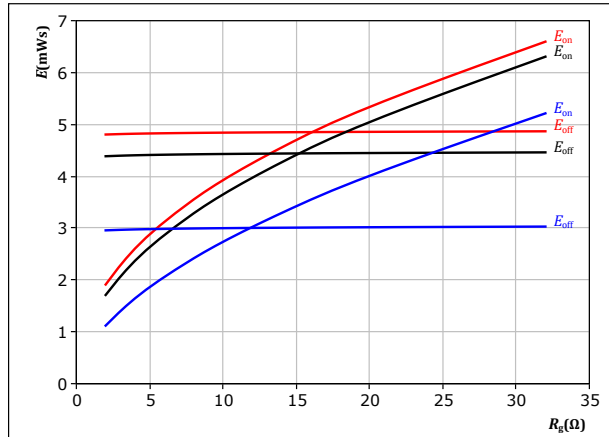
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 34.

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  
 $I_c = 50$  A

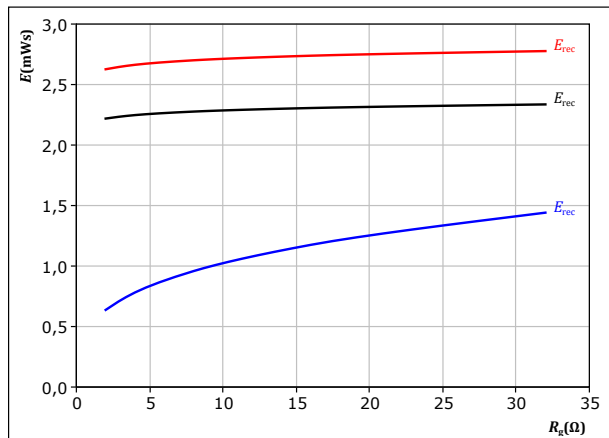
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 36.

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  
 $I_c = 50$  A

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



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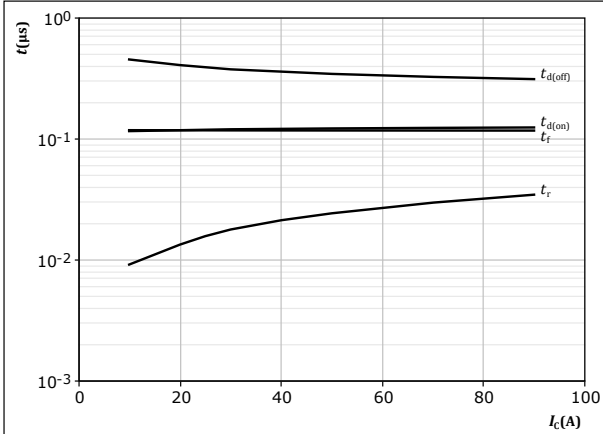
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datasheet

## Brake Switching Characteristics

figure 37.

IGBT

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



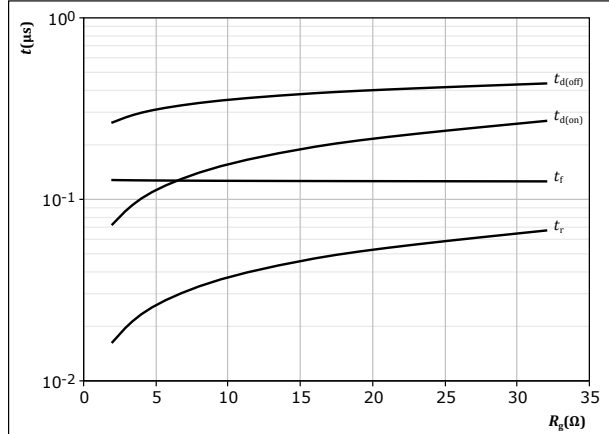
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 8$   $\Omega$   
 $R_{goff} = 8$   $\Omega$

figure 38.

IGBT

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



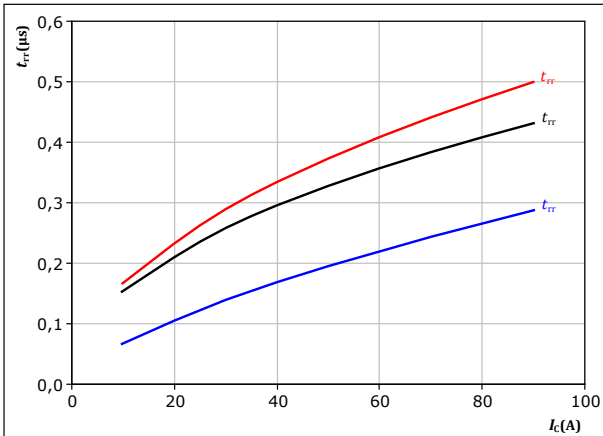
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 50$  A

figure 39.

FWD

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



With an inductive load at

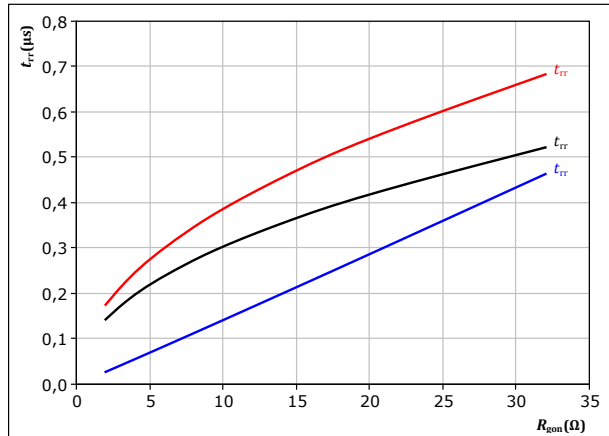
$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 8$   $\Omega$

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

figure 40.

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  
 $I_C = 50$  A

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



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datasheet

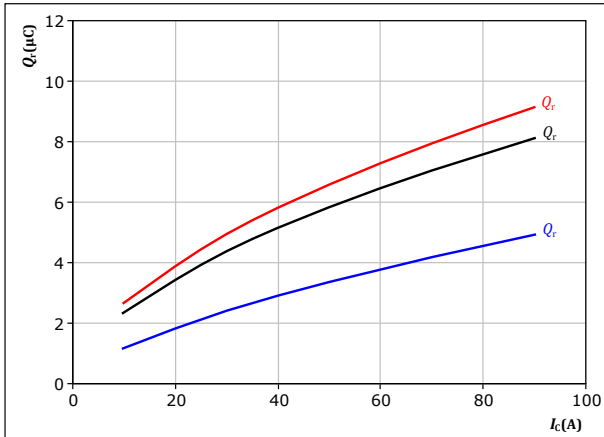
## Brake Switching Characteristics

figure 41.

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  
 $R_{gon} = 8$  Ω

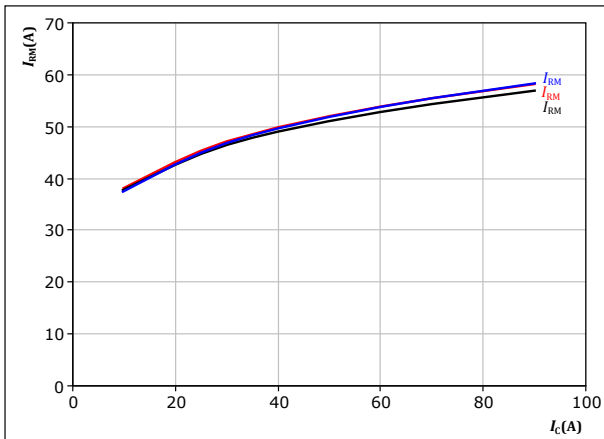
$T_j$ : 25 °C  
125 °C  
150 °C

figure 43.

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  
 $R_{gon} = 8$  Ω

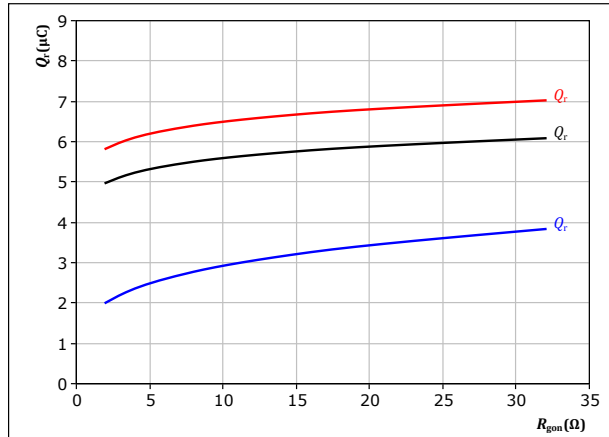
$T_j$ : 25 °C  
125 °C  
150 °C

figure 42.

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  
 $I_c = 50$  A

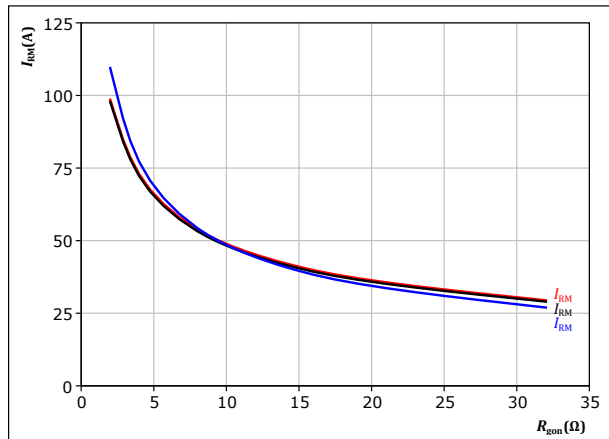
$T_j$ : 25 °C  
125 °C  
150 °C

figure 44.

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  
 $I_c = 50$  A

$T_j$ : 25 °C  
125 °C  
150 °C



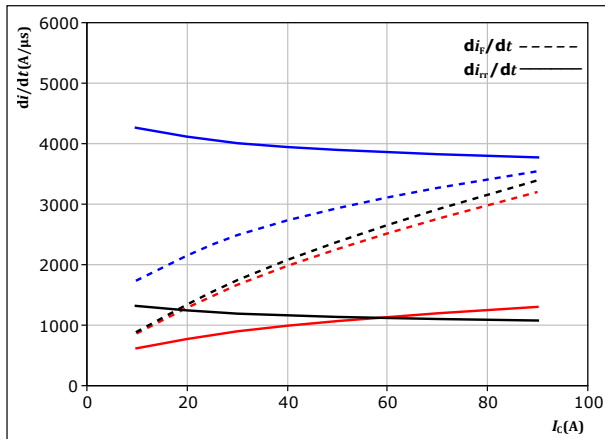
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datasheet

## Brake Switching Characteristics

figure 45. FWD

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



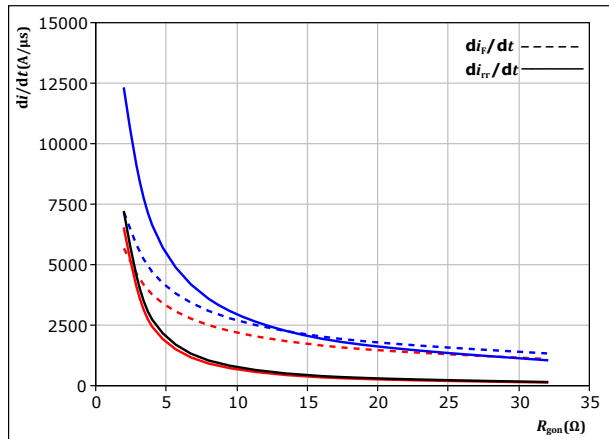
With an inductive load at

$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 8 \text{ } \Omega$

$T_j$ : 25 °C  
125 °C  
150 °C

figure 46. 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

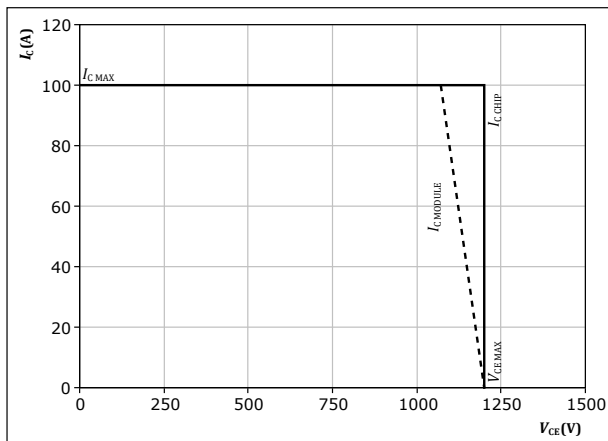
$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_C = 50 \text{ A}$

$T_j$ : 25 °C  
125 °C  
150 °C

figure 47. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At  $T_j = 150 \text{ } ^\circ\text{C}$   
 $R_{gon} = 8 \text{ } \Omega$   
 $R_{goff} = 8 \text{ } \Omega$



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## Switching Definitions

figure 48. IGBT

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



figure 49. IGBT

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



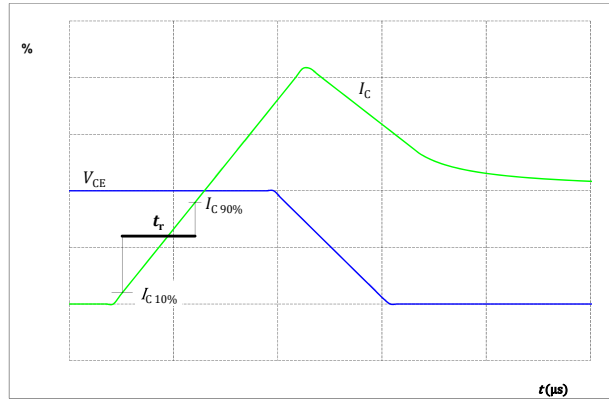
figure 50. IGBT

Turn-off Switching Waveforms & definition of  $t_f$



figure 51. IGBT

Turn-on Switching Waveforms & definition of  $t_r$





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## Switching Definitions

figure 52.

FWD

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



figure 53.

FWD

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





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# 30-F2127PA100SC-L179E09

datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	30-F2127PA100SC-L179E09
With thermal paste (3,4 W/mK, PSX-P7)	30-F2127PA100SC-L179E09-/3/

Marking						
	Text	Name	Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNN- TTTT	WWYY	UL VIN	LLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
		TTTTTTVV	LLLL	SSSS	WWYY	

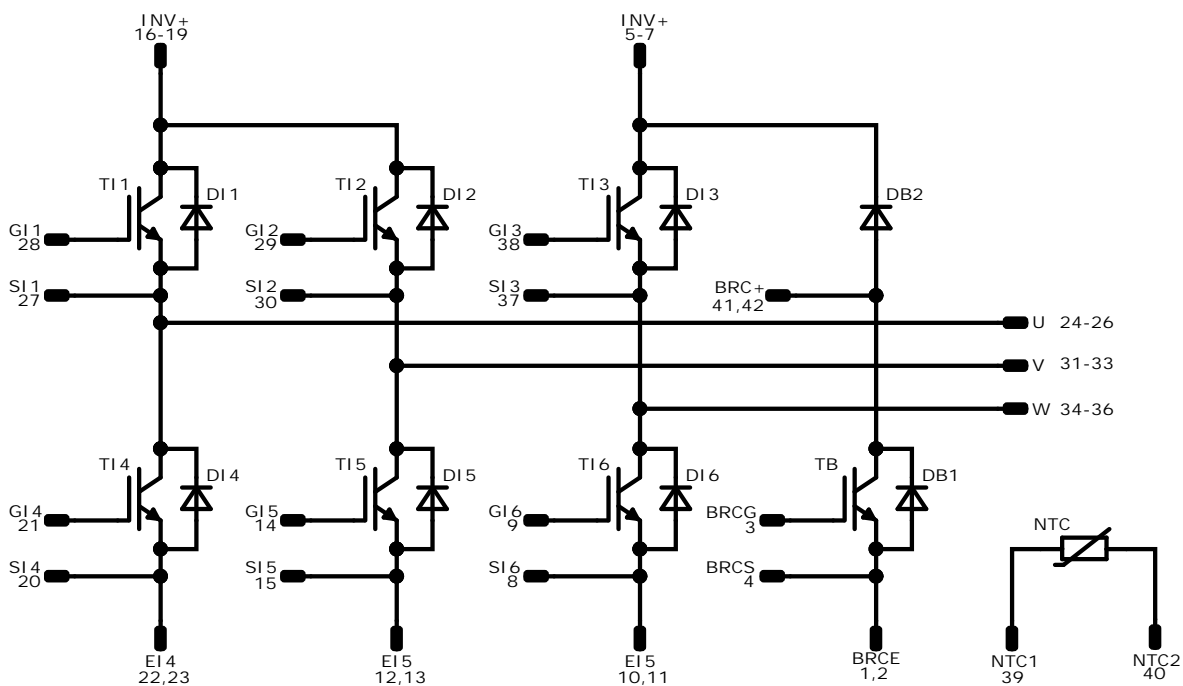
Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	70,9	6	BRCE	
2	70,9	3	BRCE	
3	70,9	0	BRCE	
4	67,9	0	BRCS	
5	56,8	3	INV+	
6	56,8	0	INV+	
7	54,1	0	INV+	
8	46	0	SI6	
9	43	0	GI6	
10	40	3	EI6	
11	40	0	EI6	
12	34,9	3	EI5	
13	34,9	0	EI5	
14	31,9	0	GI5	
15	28,9	0	SI5	
16	18,8	0	INV+	
17	18,8	3	INV+	
18	16,1	0	INV+	
19	16,1	3	INV+	
20	6	0	SI4	
21	3	0	GI4	
22	0	3	EI4	
23	0	0	EI4	
24	0	34,1	U	
25	0	36,9	U	
26	3	36,9	U	
27	6	36,9	SI1	
28	9	36,9	GI1	
29	20	36,9	GI2	
30	23	36,9	SI2	
31	26	36,9	V	
32	29	36,9	V	
33	29	34,1	V	
34	40	34,1	W	
35	40	36,9	W	
36	43	36,9	W	
37	46	36,9	SI3	
38	49	36,9	GI3	
39	64,65	37,05	NTC1	
40	71,05	37,05	NTC2	
41	70,2	21,5	BRC+	
42	70,2	18,5	BRC+	

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



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Pinout



Identification


ID	Component	Voltage	Current	Function	Comment
TB	IGBT	1200 V	50 A	Brake Switch	
DB2	FWD	1200 V	25 A	Brake Diode	
DB1	FWD	1200 V	10 A	Brake Sw. Protection Diode	
TI4, TI1, TI5, TI2, TI6, TI3	IGBT	1200 V	100 A	Inverter Switch	
DI1, DI4, DI2, DI5, DI3, DI6	FWD	1200 V	100 A	Inverter Diode	
NTC	Thermistor			Thermistor	





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**30-F2127PA100SC-L179E09**  
datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow 2</i> packages see vincotech.com website.				
Package data				
Package data for <i>flow 2</i> 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 $T_{j,sp}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
30-F2127PA100SC-L179E09-D6-14	7 Sep. 2021	Thermistor change New datasheet format	
30-F2127PA100SC-L179E09-D7-14	15 Mar. 2026	Correct swapped coordinates of Pin16-19, Pin 32-33. Module is unchanged	

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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.