



**flowPACK 1 H6.5**

**650 V / 100 A**

**Features**

- Innovative H6.5 topology
- Optimized for bidirectional operation
- Integrated temperature sensor
- Low inductance housing

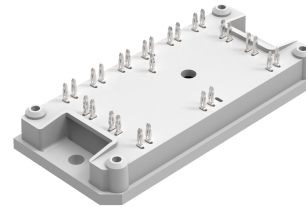
**Target applications**

- Energy Storage Systems

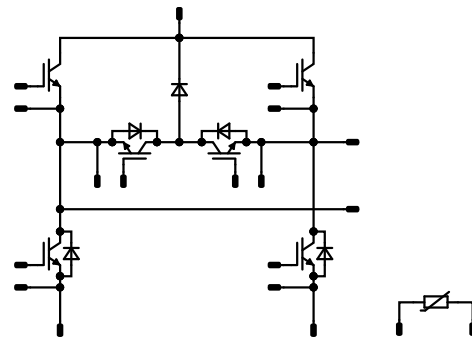
**Types**

- 10-PY07HVA100S501-L986F28Y

**flow 1 12 mm housing**



**Schematic**





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10-PY07HVA100S501-L986F28Y  
datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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### Buck Switch

Collector-emitter voltage	$V_{CES}$		650	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	82	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	117	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Maximum junction temperature	$T_{jmax}$		175	°C

### Buck Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	76	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	200	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	106	W
Maximum junction temperature	$T_{jmax}$		175	°C

### Boost Switch

Collector-emitter voltage	$V_{CES}$		650	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	82	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	117	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Maximum junction temperature	$T_{jmax}$		175	°C



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datasheet

## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Boost Diode</b>				
Peak repetitive reverse voltage	$V_{RRM}$		650	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	76	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	200	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	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* $t_p = 2\text{ s}$	6000	V
Isolation voltage	$V_{isol}$	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			8,17	mm
Comparative Tracking Index	CTI		≥ 200	

\*100 % tested in production



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### Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	

#### Buck Switch

##### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,001	25	3,2	4	4,8	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		100	25 125 150		1,39 1,48 1,51	1,75 <sup>(1)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	650		25			100	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			200	nA
Internal gate resistance	$r_g$							None		Ω
Input capacitance	$C_{ies}$							6200		pF
Output capacitance	$C_{oes}$	$f = 1$ Mhz	0	25		25		176		pF
Reverse transfer capacitance	$C_{res}$							24		pF
Gate charge	$Q_g$	$V_{CC} = 520$ V	15		100	25		240		nC

##### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,81		K/W
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##### Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		65,28 66,88 67,2		ns
Rise time	$t_r$					25 125 150		12,16 12,16 12,48		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		81,28 100,48 105,28		ns
Fall time	$t_f$					25 125 150		15,59 21,62 25,28		ns
Turn-on energy (per pulse)	$E_{on}$	$Q_{tFWD} = 3,25$ μC $Q_{tFWD} = 6,2$ μC $Q_{tFWD} = 7,14$ μC				25 125 150		0,758 0,942 1,05		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		1,48 2,07 2,26		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		

#### Buck Diode

##### Static

Forward voltage	$V_F$				100	25 125 150		1,61 1,58 1,57	1,92 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_r = 650$ V				25			5,3	μA

##### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,9		K/W
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##### Dynamic

Peak recovery current	$I_{RRM}$					25 125 150		107,21 141,75 149		A
Reverse recovery time	$t_{rr}$					25 125 150		49,76 77,14 86,9		ns
Recovered charge	$Q_r$	$di/dt=9667$ A/μs $di/dt=7145$ A/μs $di/dt=7301$ A/μs	±15	400	100	25 125 150		3,25 6,2 7,14		μC
Reverse recovered energy	$E_{rec}$					25 125 150		1,1 2,07 2,35		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		3838 3044 2923		A/μs



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### Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	

#### Boost Switch

##### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,001	25	3,2	4	4,8	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		100	25 125 150		1,39 1,48 1,51	1,75 <sup>(1)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	650		25			100	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			200	nA
Internal gate resistance	$r_g$							None		Ω
Input capacitance	$C_{ies}$							6200		pF
Output capacitance	$C_{oes}$	$f = 1$ Mhz	0	25		25		176		pF
Reverse transfer capacitance	$C_{res}$							24		pF
Gate charge	$Q_g$	$V_{CC} = 520$ V	15		100	25		240		nC

##### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,81		K/W
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##### Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		67,2 68,48 69,12		ns
Rise time	$t_r$					25 125 150		12,8 12,48 12,48		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		82,24 101,12 105,6		ns
Fall time	$t_f$					25 125 150		14,08 24,63 32,43		ns
Turn-on energy (per pulse)	$E_{on}$	$Q_{tFWD} = 3,26$ μC $Q_{tFWD} = 6,31$ μC $Q_{tFWD} = 7,26$ μC				25 125 150		0,571 1,02 1,13		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		1,48 2,13 2,37		mWs



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datasheet

### Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		$V_{GE}$ [V] $V_{GS}$ [V]	$V_{CE}$ [V] $V_{DS}$ [V] $V_F$ [V]	$I_C$ [A] $I_D$ [A] $I_F$ [A]	$T_j$ [°C]	Min	Typ	Max		
<b>Boost Diode</b>										
<b>Static</b>										
Forward voltage	$V_F$				100	25 125 150		1,61 1,58 1,57	1,92 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_r = 650$ V				25			5,3	μA
<b>Thermal</b>										
Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,9		K/W
<b>Dynamic</b>										
Peak recovery current	$I_{RRM}$					25 125 150		111,24 142,74 150,38		A
Reverse recovery time	$t_{rr}$					25 125 150		48,84 80,63 90,86		ns
Recovered charge	$Q_r$	$di/dt=7970$ A/μs $di/dt=6070$ A/μs $di/dt=6437$ A/μs	±15	400	100	25 125 150		3,26 6,31 7,26		μC
Reverse recovered energy	$E_{rec}$					25 125 150		1,16 2,12 2,4		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		5097 3124 2897		A/μs



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### Characteristic Values

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

### Thermistor

#### Static

Rated resistance	$R$					25		22		kΩ
Deviation of $R_{100}$	$A_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	$P$							5		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>(1)</sup> Value at chip level

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



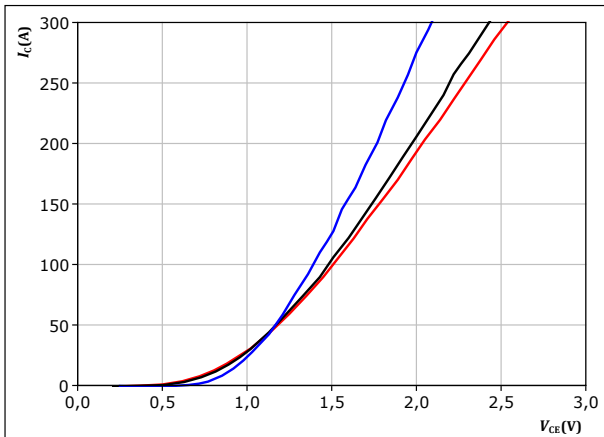


## Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

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



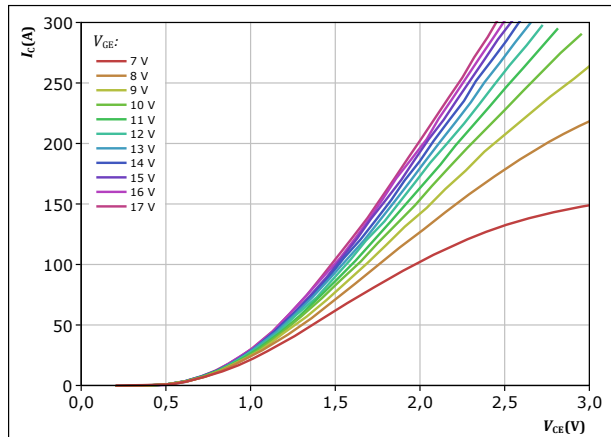
$t_p = 250 \mu s$   
 $V_{GE} = 15 V$

$T_j$ : 25 °C  
125 °C  
150 °C

figure 2. IGBT

Typical output characteristics

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

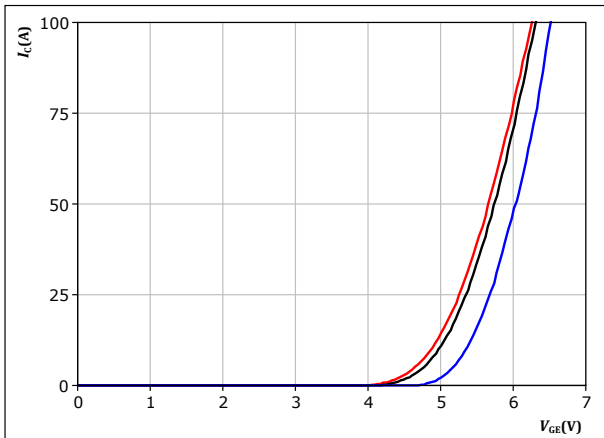


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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



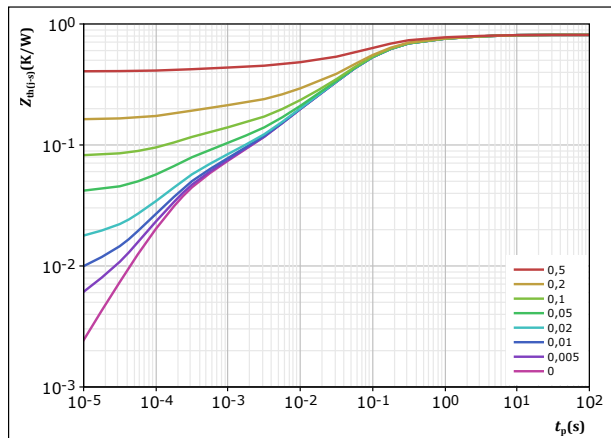
$t_p = 250 \mu s$   
 $V_{CE} = 10 V$

$T_j$ : 25 °C  
125 °C  
150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,812 K/W$

IGBT thermal model values

R (K/W)	$\tau$ (s)
4,67E-02	3,86E+00
8,18E-02	7,09E-01
3,18E-01	1,25E-01
2,26E-01	4,22E-02
8,12E-02	5,84E-03
2,54E-02	5,78E-04
3,27E-02	1,79E-04

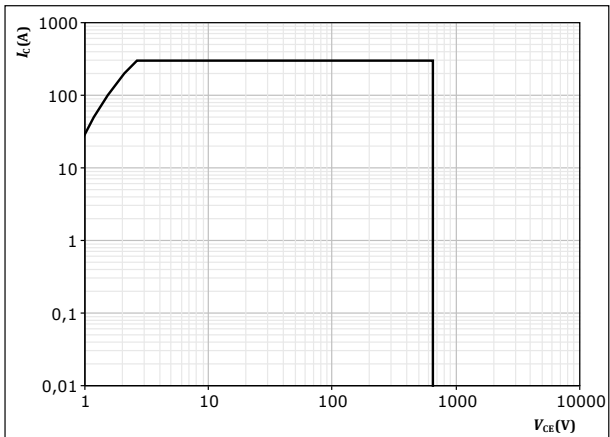


### Buck Switch Characteristics

figure 5. IGBT

Safe operating area

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



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



### Buck Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

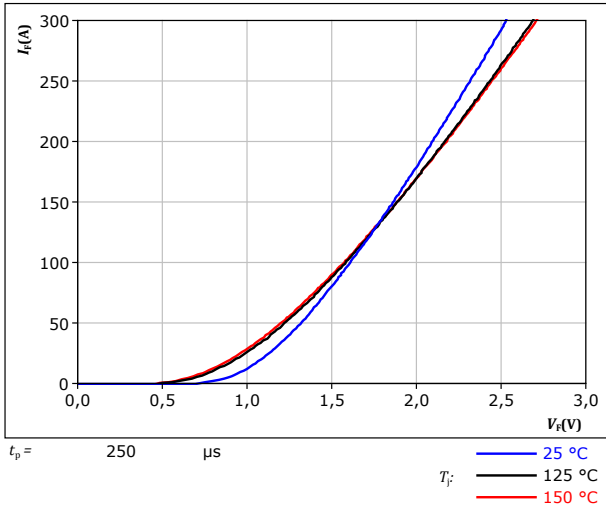
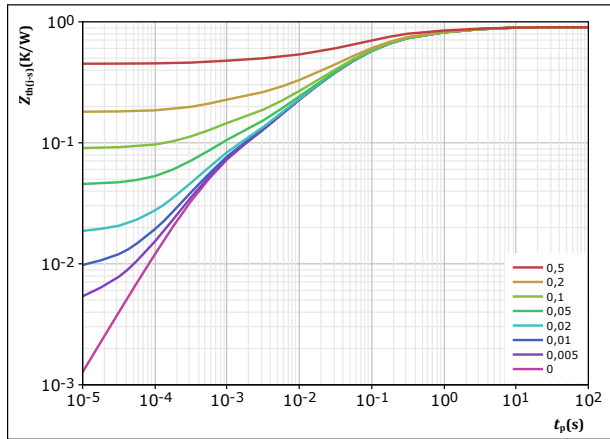


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$   
 $R_{th(j-s)} = 0,9 \text{ K/W}$   
 FWD thermal model values

R (K/W)	$\tau$ (s)
7,42E-02	3,64E+00
1,41E-01	5,85E-01
3,41E-01	1,04E-01
1,94E-01	2,64E-02
9,09E-02	6,04E-03
5,85E-02	5,72E-04

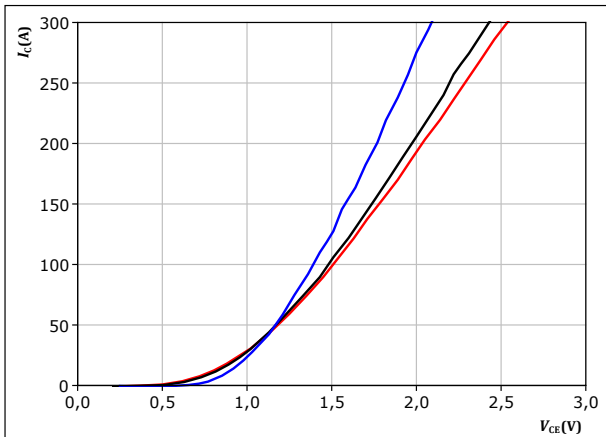


### Boost Switch Characteristics

**figure 8.** IGBT

Typical output characteristics

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

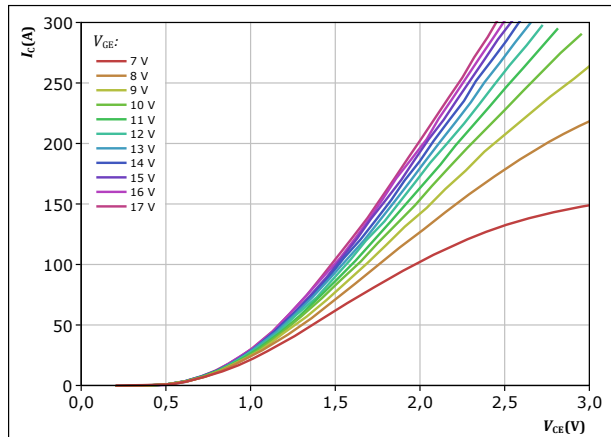


$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

**figure 9.** IGBT

Typical output characteristics

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

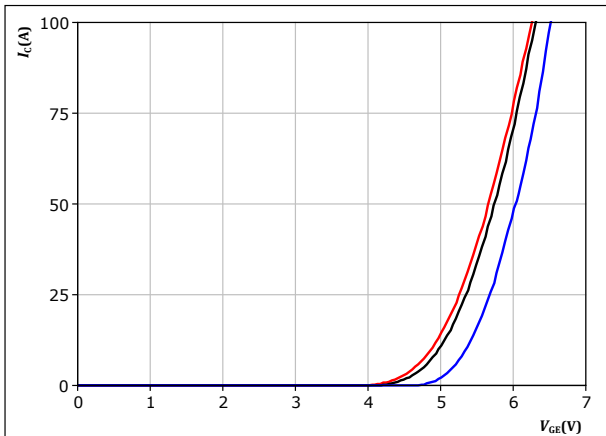


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 10.** IGBT

Typical transfer characteristics

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

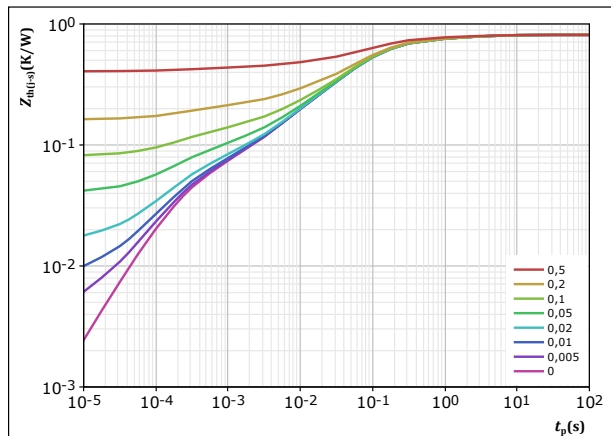


$t_p = 250 \mu s$   
 $V_{CE} = 10 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

**figure 11.** IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,812 \text{ K/W}$   
IGBT thermal model values  

R (K/W)	$\tau$ (s)
4,67E-02	3,86E+00
8,18E-02	7,09E-01
3,18E-01	1,25E-01
2,26E-01	4,22E-02
8,12E-02	5,84E-03
2,54E-02	5,78E-04
3,27E-02	1,79E-04

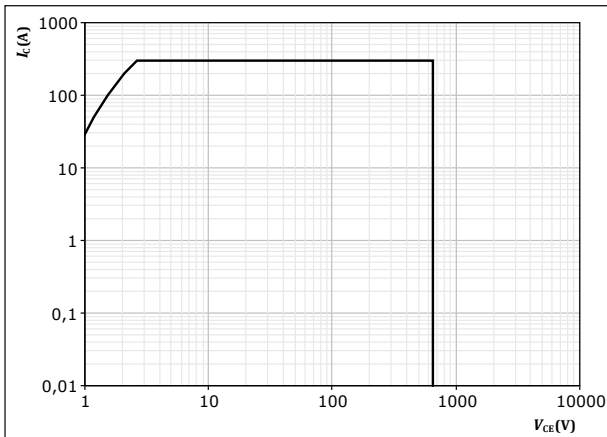


### Boost Switch Characteristics

figure 12. IGBT

Safe operating area

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



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



### Boost Diode Characteristics

figure 13. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

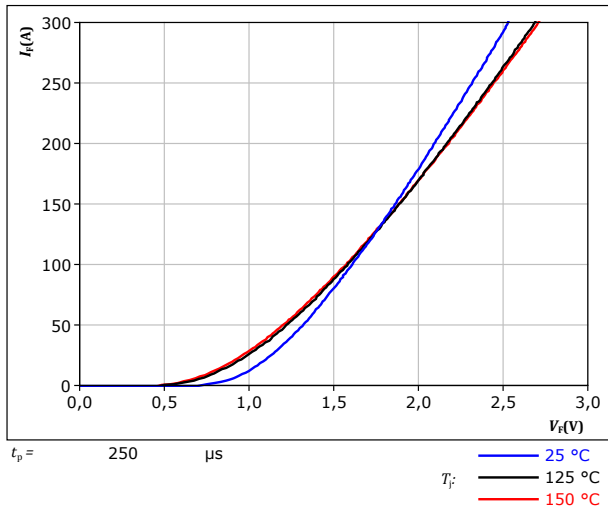
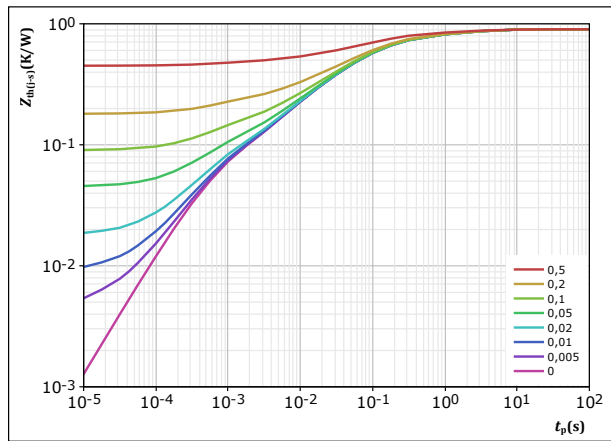


figure 14. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$   
 $R_{th(j-s)} = 0,9 \text{ K/W}$   
 FWD thermal model values

R (K/W)	$\tau$ (s)
7,42E-02	3,64E+00
1,41E-01	5,85E-01
3,41E-01	1,04E-01
1,94E-01	2,64E-02
9,09E-02	6,04E-03
5,85E-02	5,72E-04

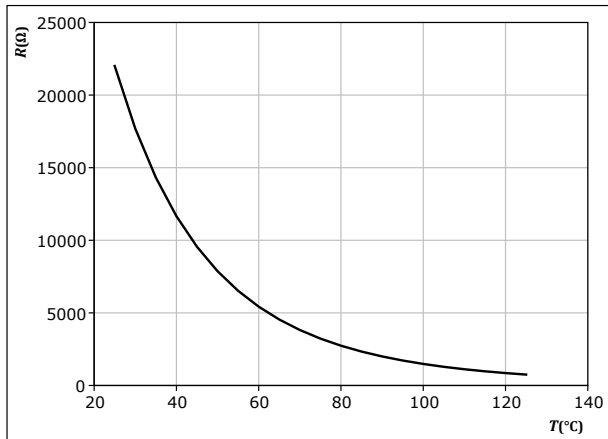


### Thermistor Characteristics

figure 15. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

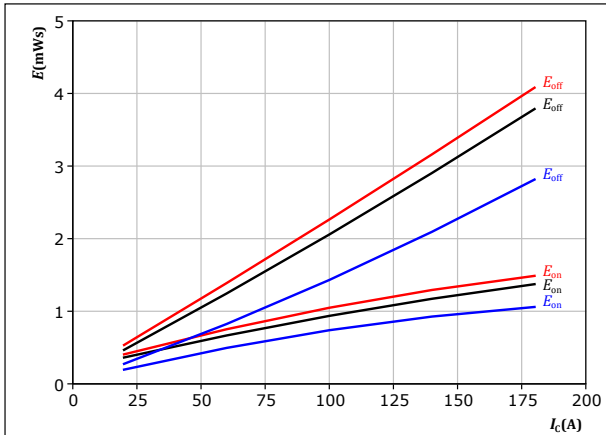




## Buck Switching Characteristics

**figure 16.** IGBT

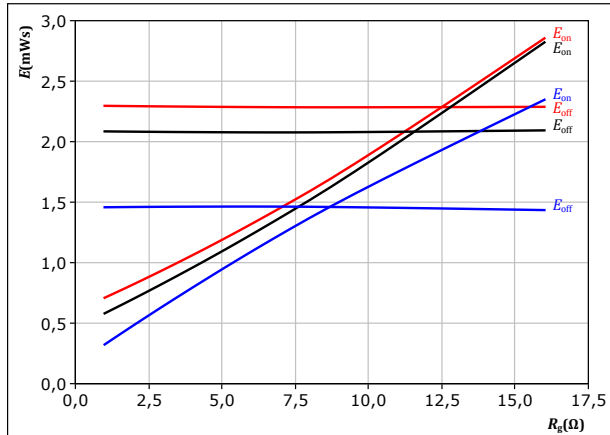
Typical switching energy losses as a function of collector current  
 $E = f(I_c)$



With an inductive load at  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $R_{goff} = 4$   $\Omega$   
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 17.** IGBT

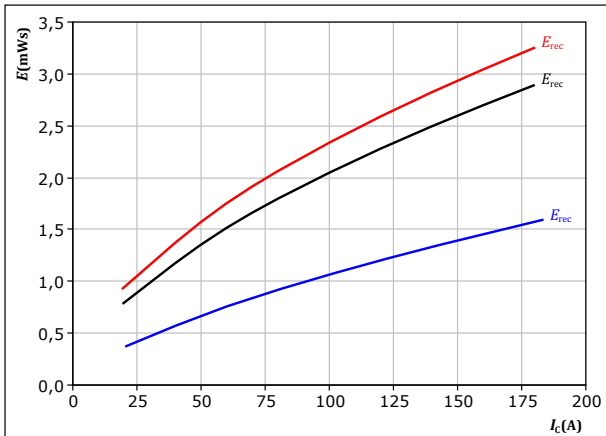
Typical switching energy losses as a function of gate resistor  
 $E = f(R_g)$



With an inductive load at  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 18.** FWD

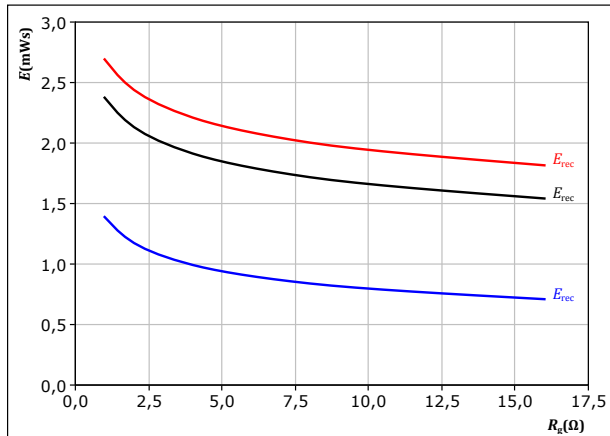
Typical reverse recovered energy loss as a function of collector current  
 $E_{rec} = f(I_c)$



With an inductive load at  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 19.** FWD

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



With an inductive load at  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

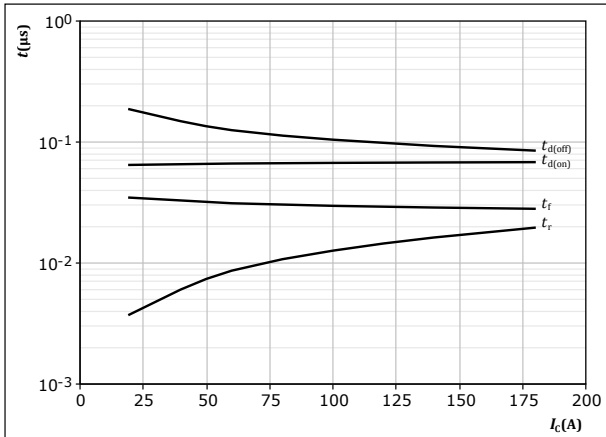




## Buck Switching Characteristics

**figure 20.** IGBT

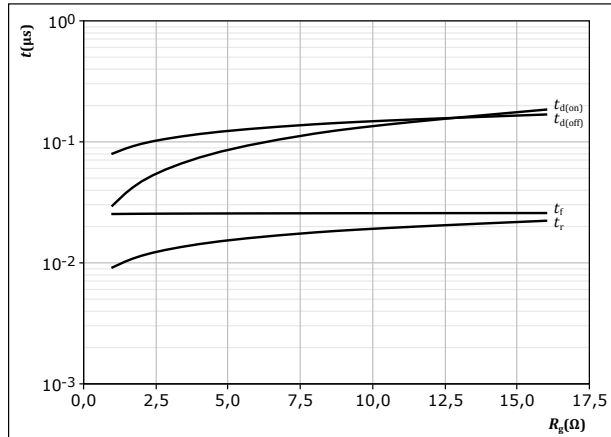
Typical switching times as a function of collector current  
 $t = f(I_c)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{CE} = 400 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 4 \text{ } \Omega$   
 $R_{goff} = 4 \text{ } \Omega$

**figure 21.** IGBT

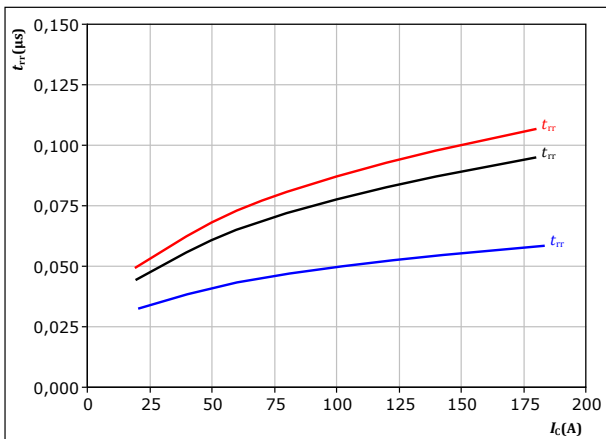
Typical switching times as a function of gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150 \text{ }^\circ\text{C}$   
 $V_{CE} = 400 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 100 \text{ A}$

**figure 22.** FWD

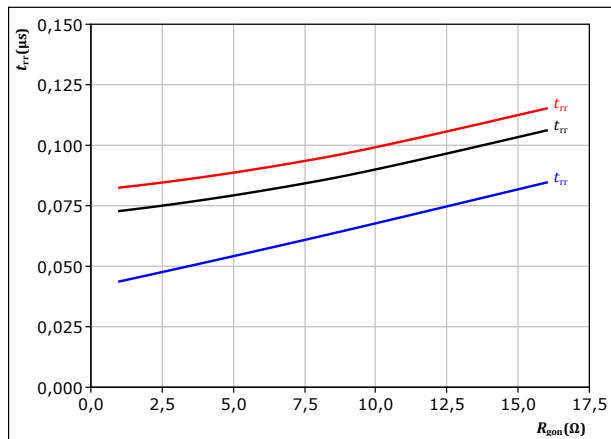
Typical reverse recovery time as a function of collector current  
 $t_{rr} = f(I_c)$



With an inductive load at  
 $V_{CE} = 400 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 4 \text{ } \Omega$   
 $T_j:$  — 25 °C  
— 125 °C  
— 150 °C

**figure 23.** FWD

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



With an inductive load at  
 $V_{CE} = 400 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 100 \text{ A}$   
 $T_j:$  — 25 °C  
— 125 °C  
— 150 °C

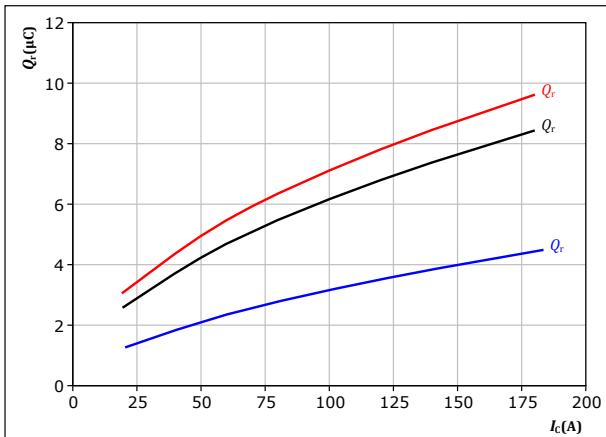


## Buck Switching Characteristics

**figure 24.** FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

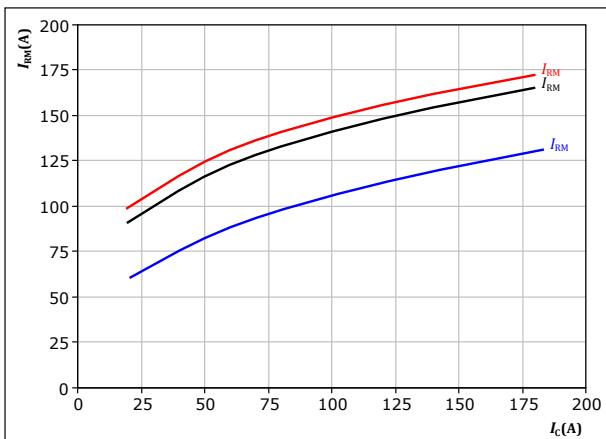
$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$

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

**figure 26.** FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

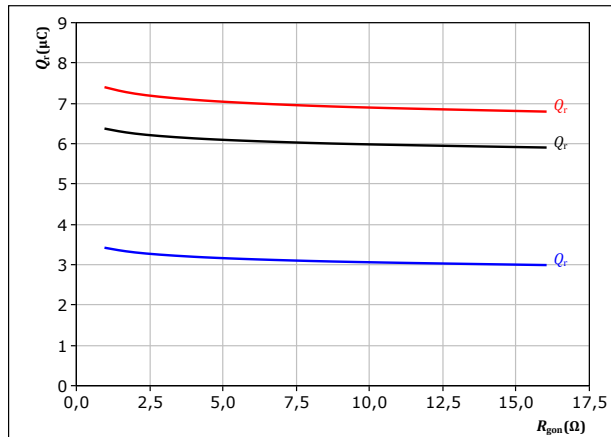
$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$

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

**figure 25.** FWD

Typical recovered charge as a function of turn on gate resistor

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



With an inductive load at

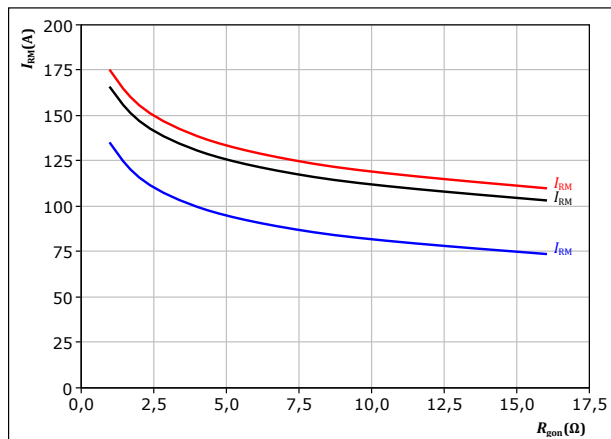
$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A

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

**figure 27.** FWD

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

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



With an inductive load at

$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A

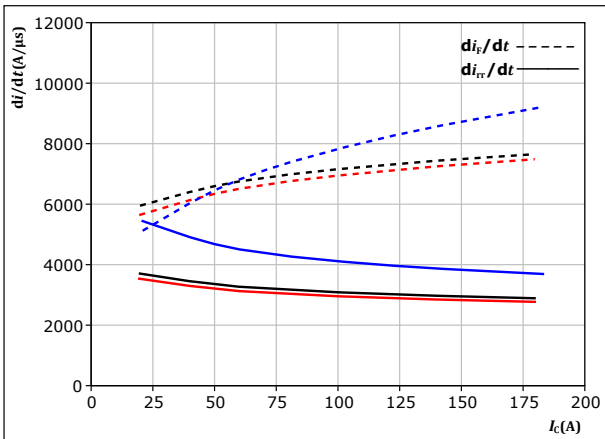
$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C



## Buck Switching Characteristics

**figure 28.** FWD

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



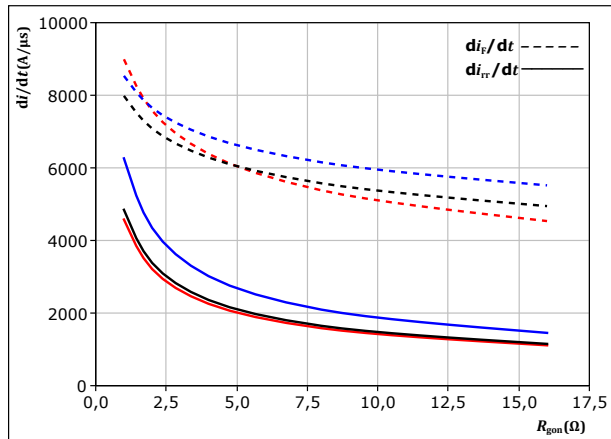
With an inductive load at

$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$

$T_j$ : 25 °C  
 125 °C  
 150 °C

**figure 29.** FWD

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



With an inductive load at

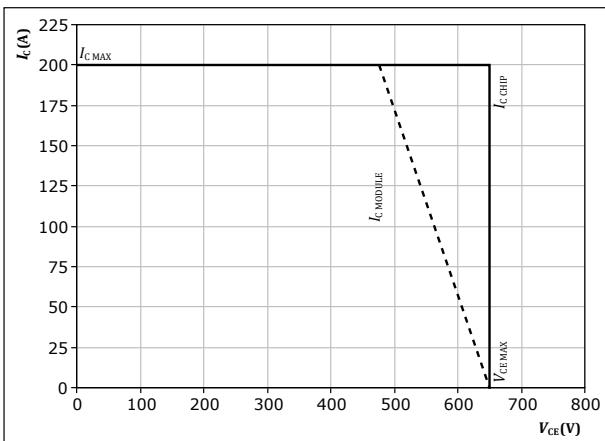
$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A

$T_j$ : 25 °C  
 125 °C  
 150 °C

**figure 30.** IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



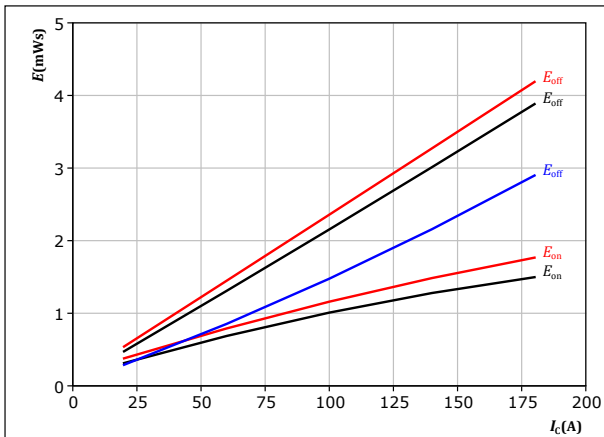
At  $T_j = 150$  °C  
 $R_{gon} = 4$   $\Omega$   
 $R_{goff} = 4$   $\Omega$



## Boost Switching Characteristics

**figure 31.** IGBT

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

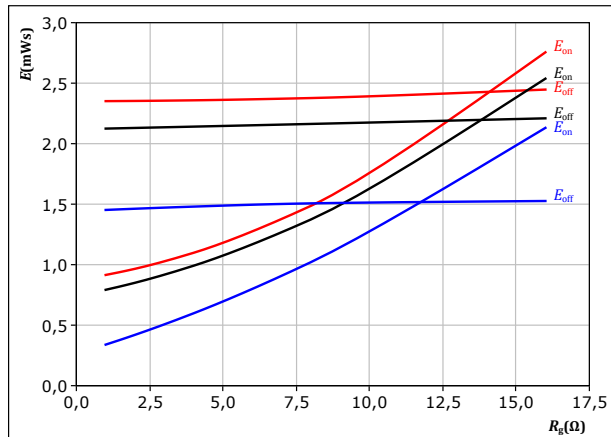


With an inductive load at

$V_{CE} = 400$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$R_{g(on)} = 4$ Ω	$T_j = 150$ °C
$R_{g(off)} = 4$ Ω	

**figure 32.** IGBT

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

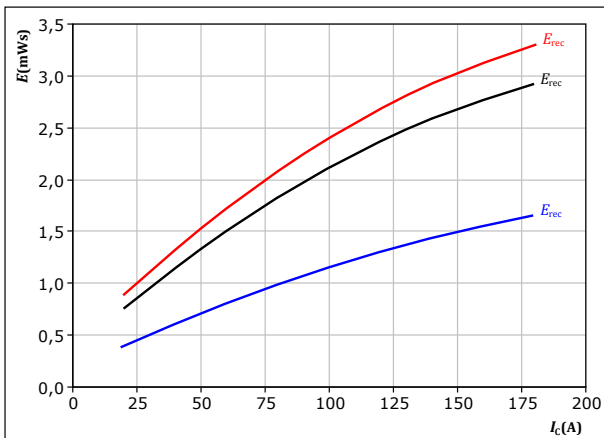


With an inductive load at

$V_{CE} = 400$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$I_c = 100$ A	$T_j = 150$ °C

**figure 33.** FWD

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

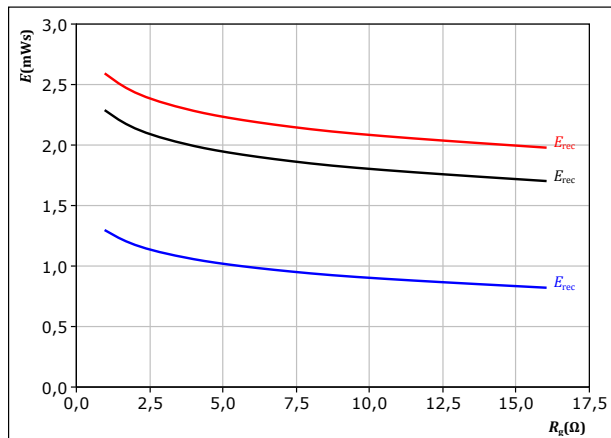


With an inductive load at

$V_{CE} = 400$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$R_{g(on)} = 4$ Ω	$T_j = 150$ °C

**figure 34.** FWD

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



With an inductive load at

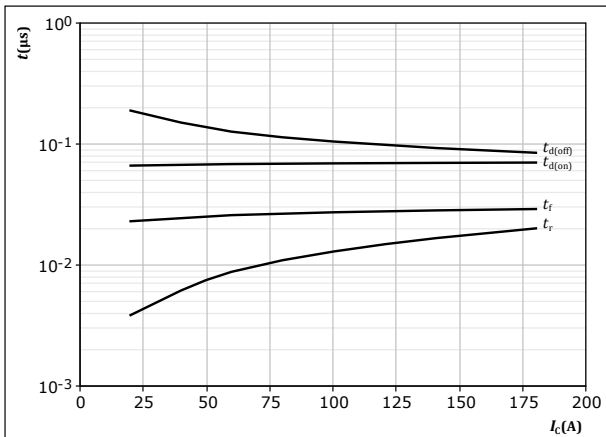
$V_{CE} = 400$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$I_c = 100$ A	$T_j = 150$ °C



## Boost Switching Characteristics

**figure 35.** IGBT

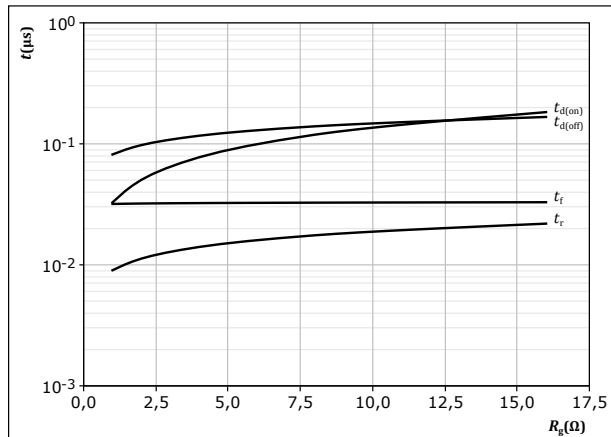
Typical switching times as a function of collector current  
 $t = f(I_c)$



With an inductive load at  
 $T_j = 150$  °C  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $R_{goff} = 4$   $\Omega$

**figure 36.** IGBT

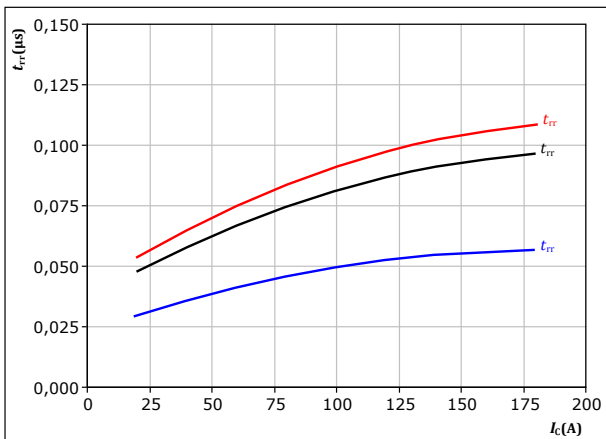
Typical switching times as a function of gate resistor  
 $t = f(R_g)$



With an inductive load at  
 $T_j = 150$  °C  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A

**figure 37.** FWD

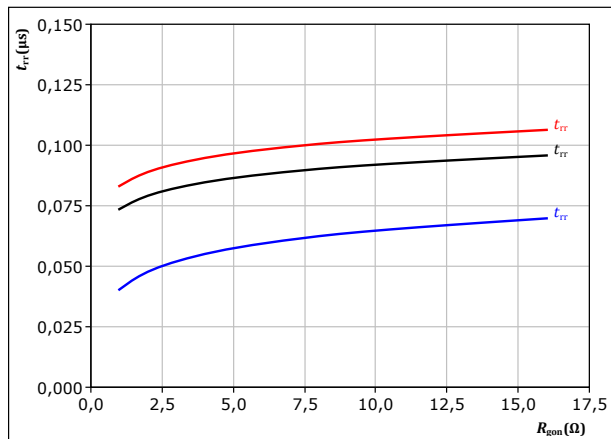
Typical reverse recovery time as a function of collector current  
 $t_{rr} = f(I_c)$



With an inductive load at  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)

**figure 38.** FWD

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



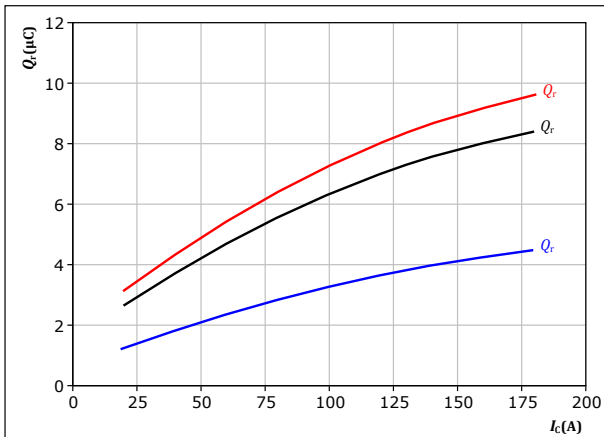
With an inductive load at  
 $V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A  
 $T_j$ : 25 °C (blue), 125 °C (black), 150 °C (red)



## Boost Switching Characteristics

**figure 39.** FWD  
Typical recovered charge as a function of collector current

$Q_r = f(I_c)$



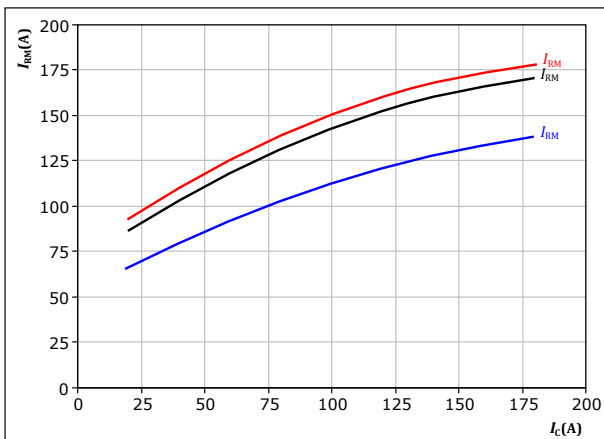
With an inductive load at

$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$

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

**figure 41.** FWD  
Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_c)$



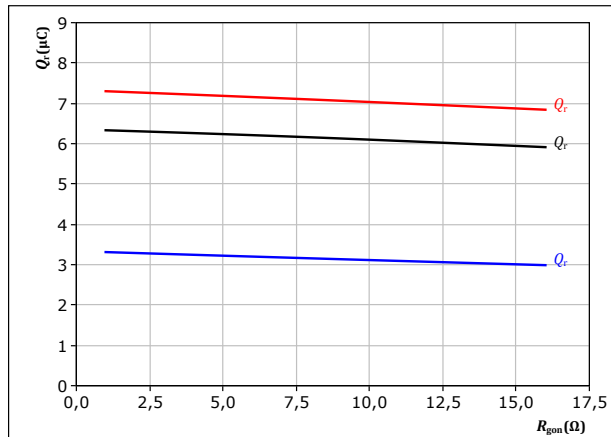
With an inductive load at

$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$

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

**figure 40.** FWD  
Typical recovered charge as a function of turn on gate resistor

$Q_r = f(R_{gon})$



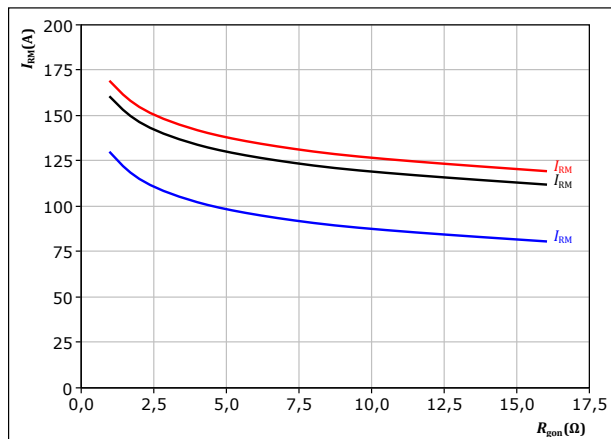
With an inductive load at

$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A

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

**figure 42.** FWD  
Typical peak reverse recovery current as a function of turn on gate resistor

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



With an inductive load at

$V_{CE} = 400$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A

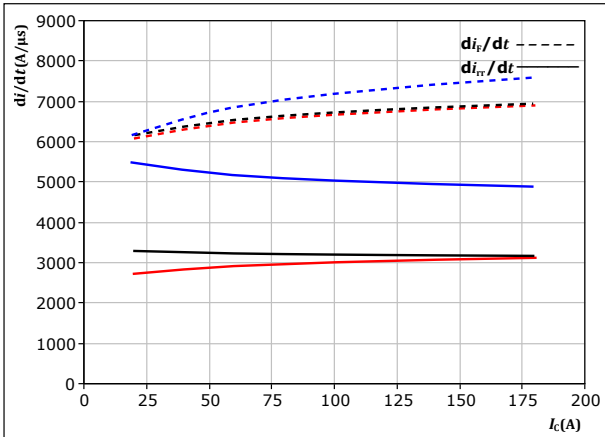
$T_j$ : — 25 °C  
 — 125 °C  
 — 150 °C



## Boost Switching Characteristics

**figure 43.** FWD

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



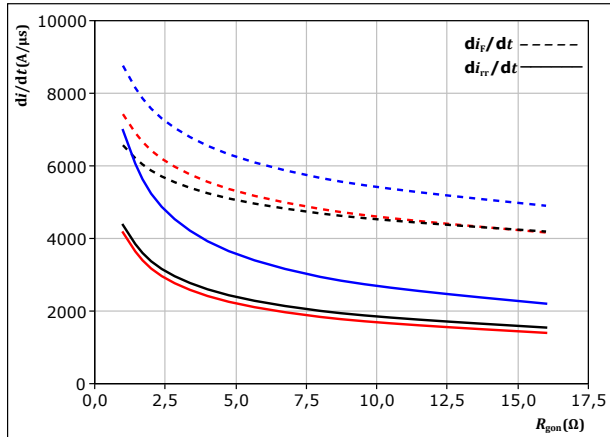
With an inductive load at

$V_{CE} = 400 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 4 \text{ } \Omega$

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

**figure 44.** 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

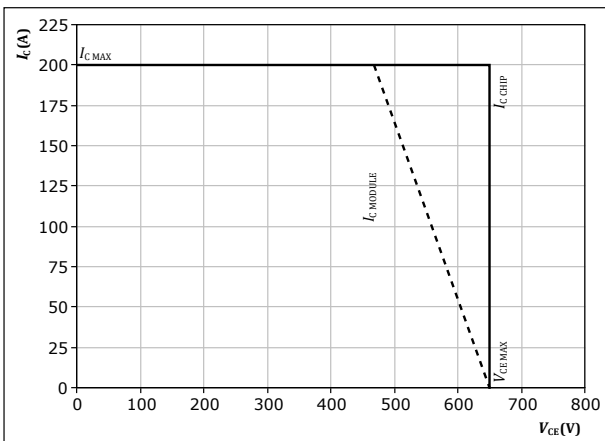
$V_{CE} = 400 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_C = 100 \text{ A}$

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

**figure 45.** IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



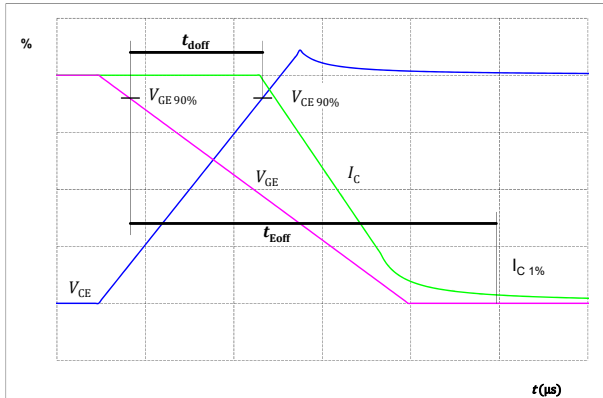
At  $T_j = 150 \text{ } ^\circ\text{C}$   
 $R_{gon} = 4 \text{ } \Omega$   
 $R_{goff} = 4 \text{ } \Omega$



## Switching Definitions

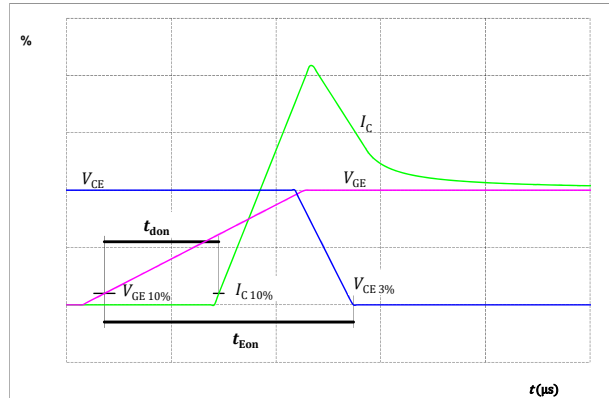
**figure 46.** IGBT

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



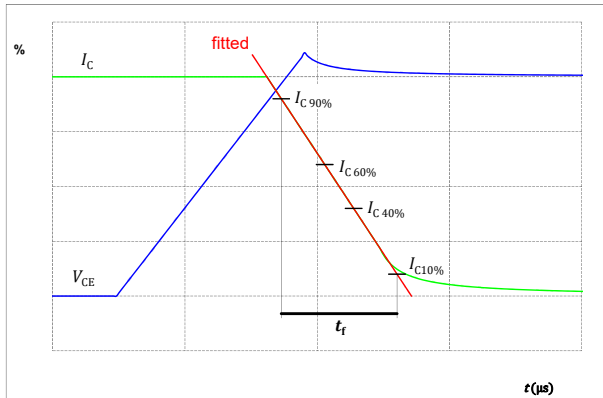
**figure 47.** IGBT

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



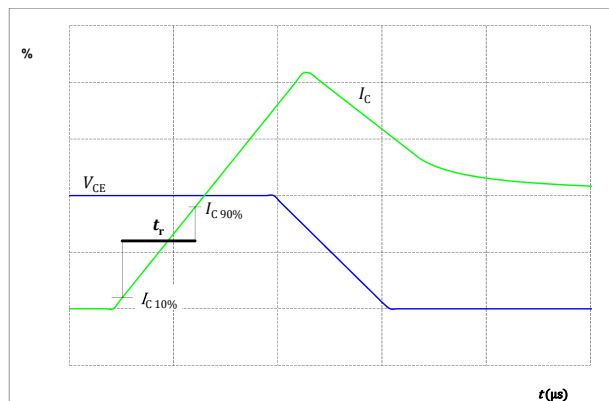
**figure 48.** IGBT

Turn-off Switching Waveforms & definition of  $t_f$



**figure 49.** IGBT

Turn-on Switching Waveforms & definition of  $t_r$







### Switching Definitions

figure 50. FWD

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

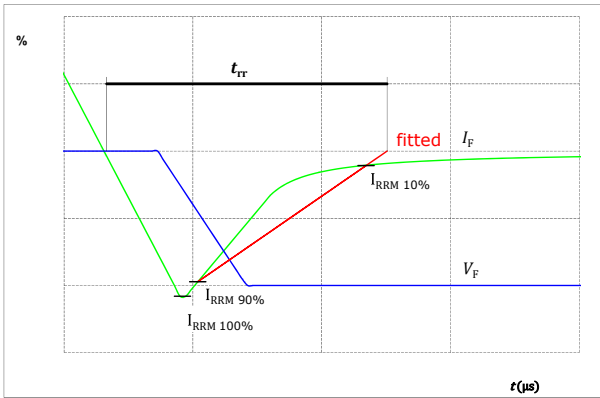
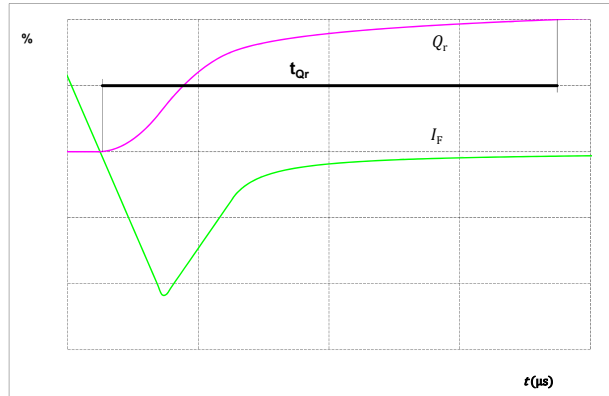


figure 51. FWD

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





# 10-PY07HVA100S501-L986F28Y

datasheet

Vincotech

Ordering Code	
<b>Version</b>	<b>Ordering Code</b>
Without thermal paste	10-PY07HVA100S501-L986F28Y
With thermal paste (PSX)	10-PY07HVA100S501-L986F28Y-/3/
With thermal paste (PTM)	10-PY07HVA100S501-L986F28Y-/7/

Marking						
	<b>Text</b>	<b>Name</b> NN-NNNNNNNNNNNNNN- TTTTTTVV	<b>Date code</b> WWYY	<b>UL &amp; VIN</b> UL VIN	<b>Lot</b> LLLLL	<b>Serial</b> SSSS
	<b>Datamatrix</b>	<b>Type&amp;Ver</b> TTTTTTVV	<b>Lot number</b> LLLLL	<b>Serial</b> SSSS	<b>Date code</b> WWYY	

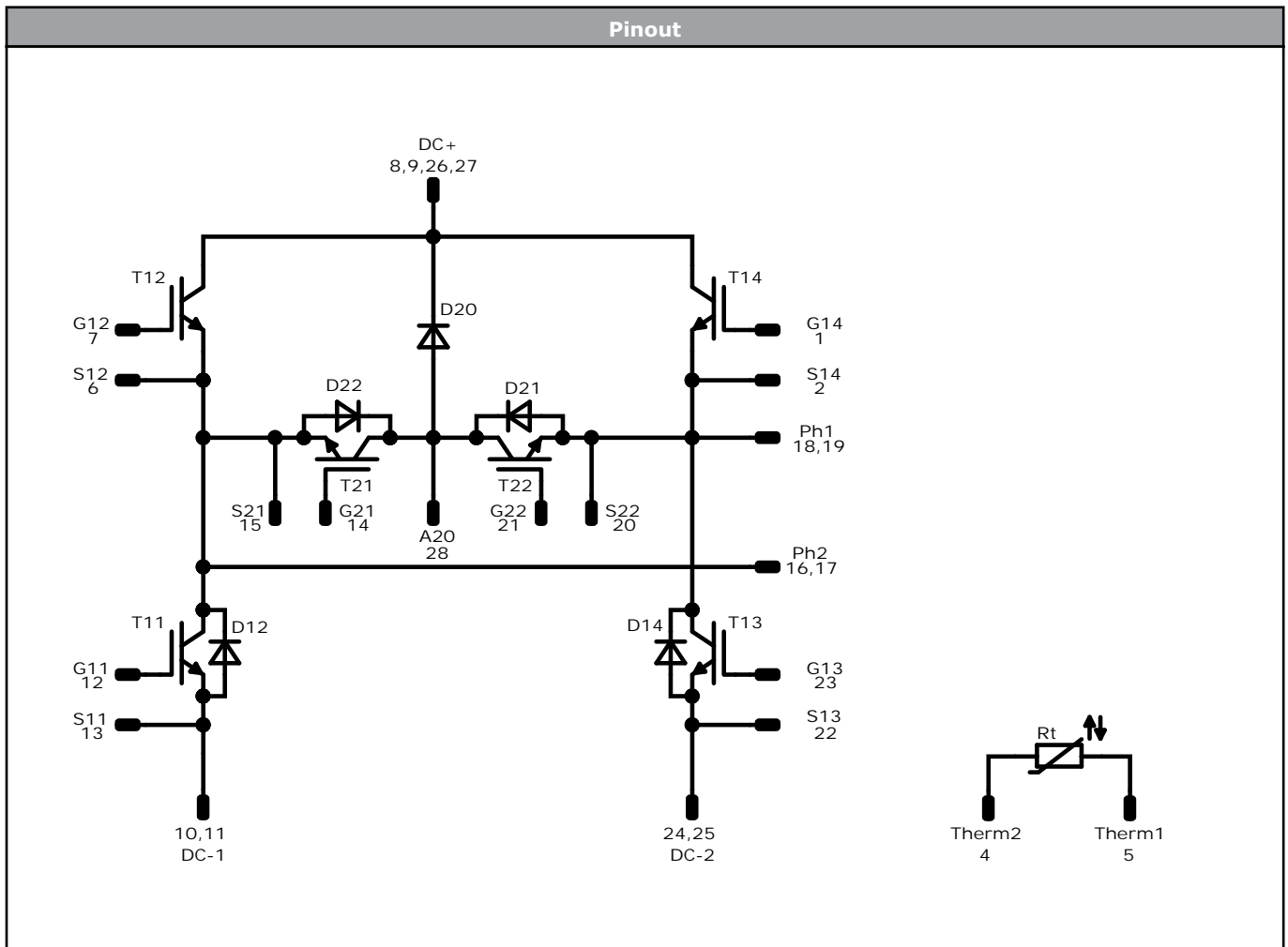
Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	52,2	0	G14	
2	49,2	0	S14	
3	not assembled			
4	26,1	0	Therm2	
5	23,1	0	Therm1	
6	3	0	S12	
7	0	0	G12	
8	0	8	DC+	
9	0	10,5	DC+	
10	0	17,7	DC-1	
11	0	20,2	DC-1	
12	0	28,2	G11	
13	3	28,2	S11	
14	10	28,2	G21	
15	13	28,2	S21	
16	20,35	28,2	Ph2	
17	22,85	28,2	Ph2	
18	29,35	28,2	Ph1	
19	31,85	28,2	Ph1	
20	39,2	28,2	S22	
21	42,2	28,2	G22	
22	49,2	28,2	S13	
23	52,2	28,2	G13	
24	52,2	20,2	DC-2	
25	52,2	17,7	DC-2	
26	52,2	10,5	DC+	
27	52,2	8	DC+	
28	26,1	22,1	A20	

center of press-fit pinhead  
for connection parameter see the handling instruction

Tolerance of pinpositions: ±0.5mm at the end of pins  
Dimension of coordinate axis is only offset without tolerance



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T13, T12, T14	IGBT	650 V	100 A	Buck Switch	
D21, D22	FWD	650 V	100 A	Buck Diode	
T21, T22	IGBT	650 V	100 A	Boost Switch	
D12, D14, D20	FWD	650 V	100 A	Boost Diode	
Rt	Thermistor			Thermistor	




Vincotech

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

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website. 

Document No.:	Date:	Modification:	Pages
10-PY07HVA100S501-L986F28Y-D1-14	16 Mar. 2021		

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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.