



Vincotech

<i>flowSOL 0 BI (TL)</i>	650 V / 30 A
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Features</p> <ul style="list-style-type: none"> High efficiency Ultra fast switching frequency Low inductive design IGBT H5 + ultrafast Si diode in Boost and H-bridge </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Target applications</p> <ul style="list-style-type: none"> Transformerless solar inverters </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Types</p> <ul style="list-style-type: none"> 10-FZ07BIA030SM02-P894E58 10-PZ07BIA030SM02-P894E58Y </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><i>flow 0 12 mm housing</i></p> <div style="display: flex; justify-content: space-around; align-items: center;"> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Solder pin Press-fit pin </div> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Schematic</p> </div>

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
H-Bridge Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	29	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	90	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	57	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C



Vincotech

Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
H-Bridge Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	13	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	25	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Switch

Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	29	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	90	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	57	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C

Boost Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	13	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	25	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Sw.Prot. Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	10	A
Repetitive peak forward current	I_{FRM}		20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	39	W
Maximum junction temperature	T_{jmax}		175	°C



Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
ByPass Diode				
Peak repetitive reverse voltage	V_{RRM}		1600	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	35	A
Surge (non-repetitive) forward current	I_{FSM}	60 Hz Single Half Sine Wave	270	A
Surge current capability	I^2t	$t_p = 10\text{ ms}$ 50 Hz sine $T_j = 150\text{ °C}$	370	A ² s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	60	W
Maximum junction temperature	T_{jmax}		150	°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
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance		Solder pin	8,66	mm
		Press-fit pin	9,17	
Comparative Tracking Index	CTI		> 200	

*100 % tested in production



Characteristic Values

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

H-Bridge Switch

Static

Parameter	Symbol	Conditions	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$				0,0003	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15			30	25 125		1,63 1,65	2,22	V
Collector-emitter cut-off current	I_{CES}		0	650			25			40	μA
Gate-emitter leakage current	I_{GES}		20	0			25			120	nA
Internal gate resistance	r_g								none		Ω
Input capacitance	C_{ies}								1800		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25		25			45		
Reverse transfer capacitance	C_{res}								7		
Gate charge	Q_g		15	520	30		25		70		nC

Thermal

Parameter	Symbol	Conditions	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							1,67		K/W

Dynamic

Parameter	Symbol	Conditions	V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$						25 125 150		66 66 67		ns
Rise time	t_r	$R_{gon} = 16$ Ω $R_{goff} = 16$ Ω					25 125 150		7 9 10		
Turn-off delay time	$t_{d(off)}$						25 125 150		70 86 88		
Fall time	t_f		±15	400	30		25 125 150		4 10 13		
Turn-on energy (per pulse)	E_{on}	$Q_{t-FWD} = 1,1$ μC $Q_{t-FWD} = 2,4$ μC $Q_{t-FWD} = 3,5$ μC					25 125 150		0,659 0,963 1,04		
Turn-off energy (per pulse)	E_{off}						25 125 150		0,142 0,253 0,281		



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10-FZ07BIA030SM02-P894E58
10-PZ07BIA030SM02-P894E58Y
 datasheet

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

H-Bridge Diode

Static

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			15	25 125 150		1,44 1,20 1,14		V
Reverse leakage current	I_R		650		25			5	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,81	K/W

Dynamic

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}			±15	25 125 150		33 48 54		A
Reverse recovery time	t_{rr}		400	30	25 125 150		89 115 129		ns
Recovered charge	Q_r	$di/dt = 3260$ A/μs $di/dt = 2940$ A/μs $di/dt = 3459$ A/μs			25 125 150		1,08 2,37 3,50		μC
Reverse recovered energy	E_{rec}				25 125 150		0,198 0,481 0,888		mWs
Peak rate of fall of recovery current	$(di_{rt}/dt)_{max}$				25 125 150		2649 1253 1360		A/μs



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		
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0003	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125		1,63 1,65	2,22	V
Collector-emitter cut-off current	I_{CES}		0	650		25			40	μA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							1800		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25		25		45		
Reverse transfer capacitance	C_{res}							7		
Gate charge	Q_g		15	520	30	25		70		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,67		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		20 19 17		ns
Rise time	t_r	$R_{gon} = 16$ Ω $R_{goff} = 16$ Ω				25 125 150		8 9 10		
Turn-off delay time	$t_{d(off)}$		0 / 15	400	30	25 125 150		137 155 159		
Fall time	t_f					25 125 150		4 9 10		
Turn-on energy (per pulse)	E_{on}	$Q_{t-FWD} = 1,1$ μC $Q_{t-FWD} = 2,3$ μC $Q_{t-FWD} = 2,7$ μC				25 125 150		0,618 0,894 0,962		
Turn-off energy (per pulse)	E_{off}					25 125 150		0,172 0,305 0,326		mWs



Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

Boost Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			15		25 125 150		1,44 1,20 1,14		V
Reverse leakage current	I_R		650			25			5	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,81	K/W

Dynamic

Parameter	Symbol	dI/dt	V_{GS} [V]	V_{DS} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}					25 125 150		33 50 56		A
Reverse recovery time	t_{rr}					25 125 150		92 113 121		ns
Recovered charge	Q_r	$dI/dt = 2879$ A/μs $dI/dt = 2826$ A/μs $dI/dt = 2747$ A/μs	0 / 15	400	30	25 125 150		1,10 2,28 2,72		μC
Reverse recovered energy	E_{rec}					25 125 150		0,213 0,489 0,605		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2721 1492 1645		A/μs

Boost Sw.Prot. Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			10		25 125		1,67 1,56	1,87	V
Reverse leakage current	I_R		650			25			0,14	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	2,44	K/W

ByPass Diode

Static

Parameter	Symbol	V_{GS} [V]	V_{DS} [V]	I_D [A]	I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			13		25 125		0,99 0,90	1,21	V
Reverse leakage current	I_R		1600			25 150			50 1100	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,16	K/W



Vincotech

10-FZ07BIA030SM02-P894E58
10-PZ07BIA030SM02-P894E58Y
 datasheet

Characteristic Values

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

Thermistor

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

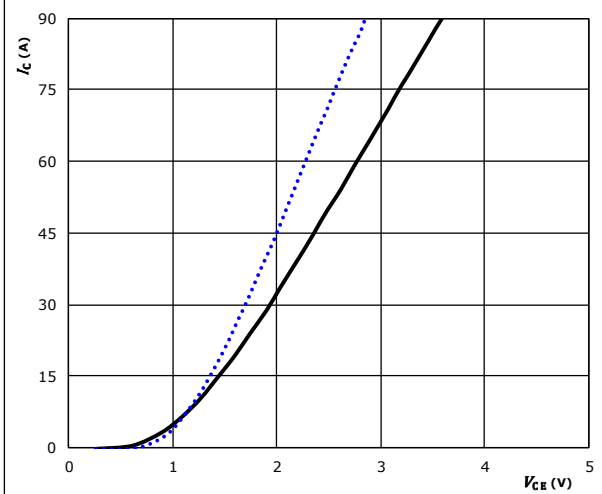


H-Bridge Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

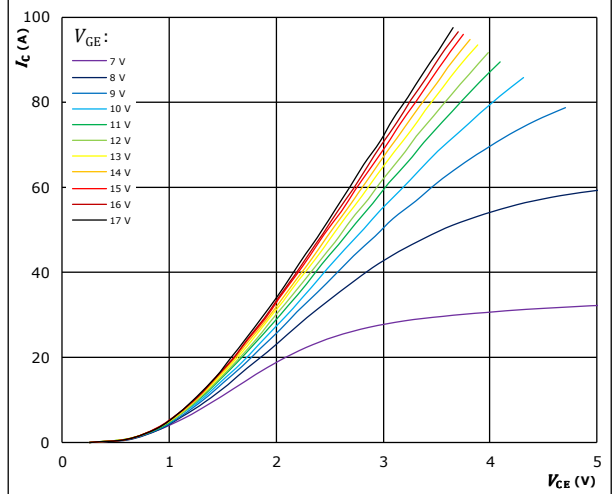


$t_p = 250 \mu\text{s}$ $T_j: 25 \text{ }^\circ\text{C}$ (dotted blue line)
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ\text{C}$ (solid black line)

figure 2. IGBT

Typical output characteristics

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

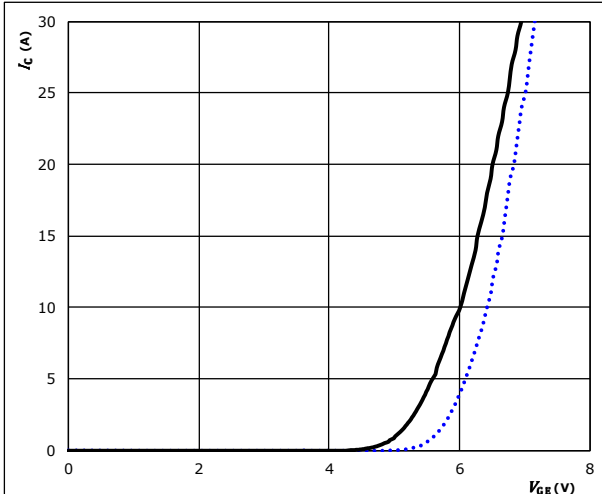


$t_p = 250 \mu\text{s}$
 $T_j = 125 \text{ }^\circ\text{C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

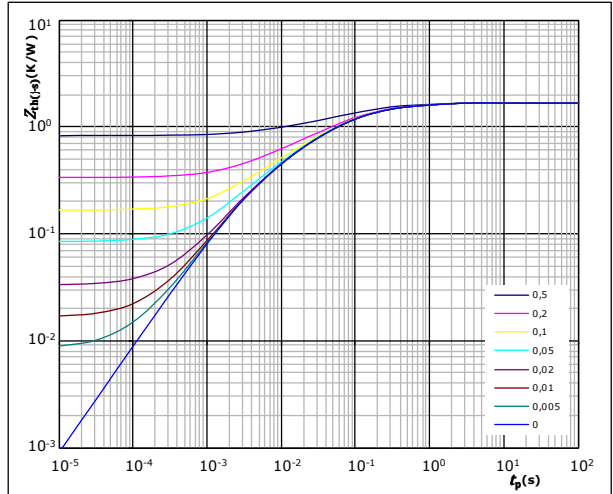


$t_p = 100 \mu\text{s}$ $T_j: 25 \text{ }^\circ\text{C}$ (dotted blue line)
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ\text{C}$ (solid black line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 1,67 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
1,80E-01	1,06E+00
3,72E-01	1,72E-01
6,39E-01	5,52E-02
3,20E-01	1,27E-02
1,54E-01	3,03E-03



H-Bridge Switch Characteristics

figure 5. IGBT

Gate voltage vs gate charge

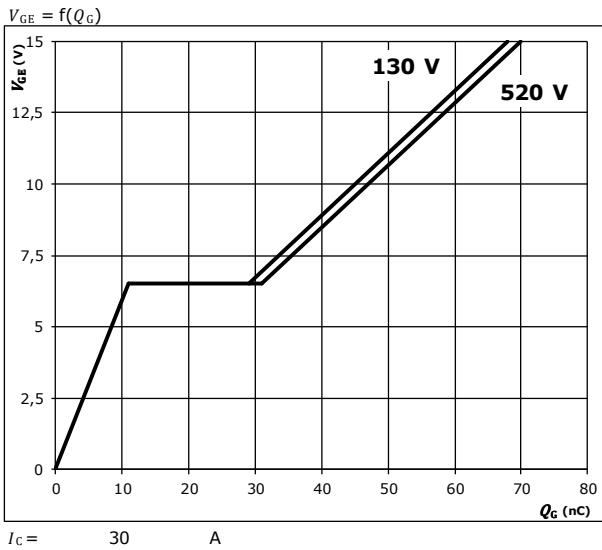
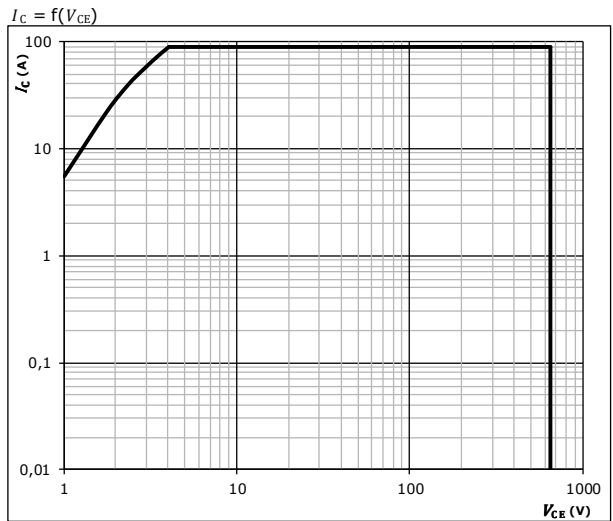


figure 6. IGBT

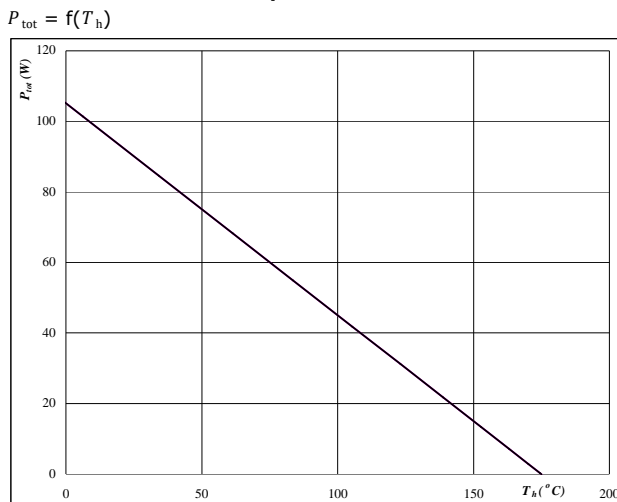
Safe operating area



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

figure 7. IGBT

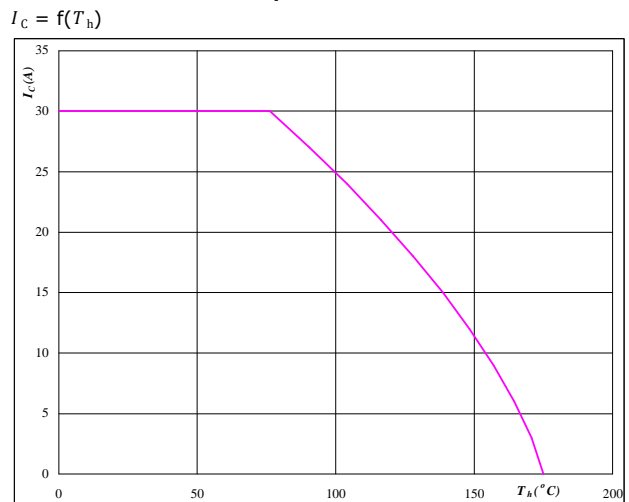
Power dissipation as a function of heatsink temperature



At
 $T_j = 175 \text{ } ^\circ\text{C}$

figure 8. IGBT

Collector current as a function of heatsink temperature



At
 $T_j = 175 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$

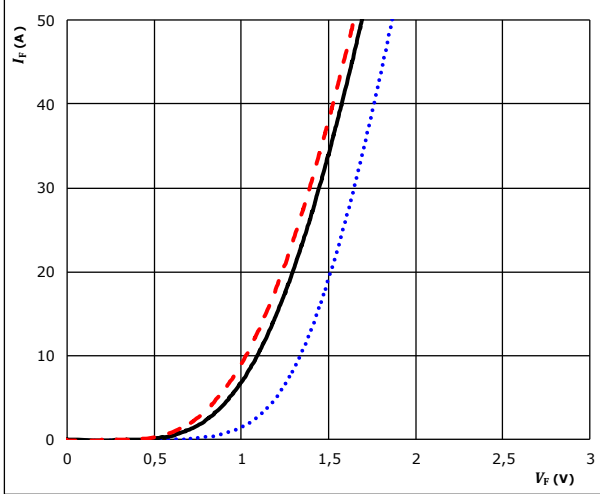


H-Bridge Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

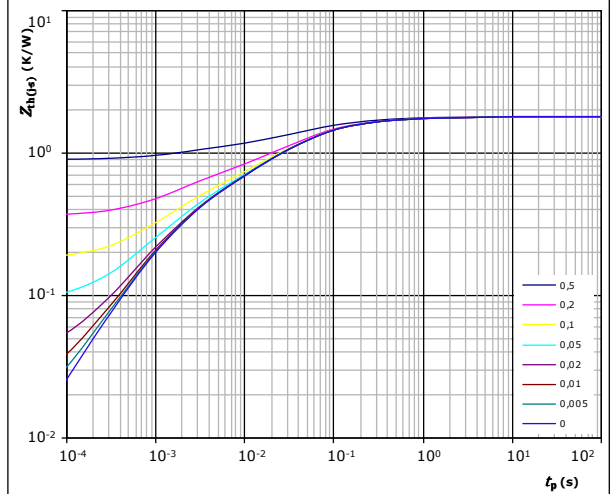


$t_p = 250 \mu s$
 $T_j:$ 25 °C
 125 °C ———
 150 °C - - - -

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



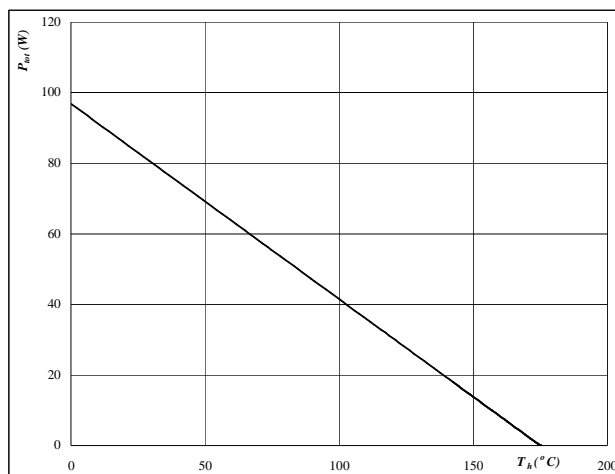
$D = t_p / T$
 $R_{th(\theta-s)} = 1,81 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
7,18E-02	2,84E+00
2,48E-01	2,83E-01
8,26E-01	5,02E-02
3,94E-01	8,85E-03
2,67E-01	1,33E-03

figure 3. FWD

Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$

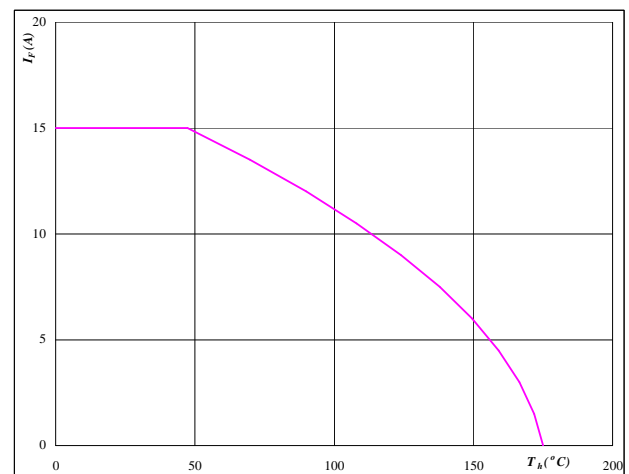


At
 $T_j = 175 \text{ °C}$

figure 4. FWD

Forward current as a function of heatsink temperature

$$I_F = f(T_h)$$



At
 $T_j = 175 \text{ °C}$

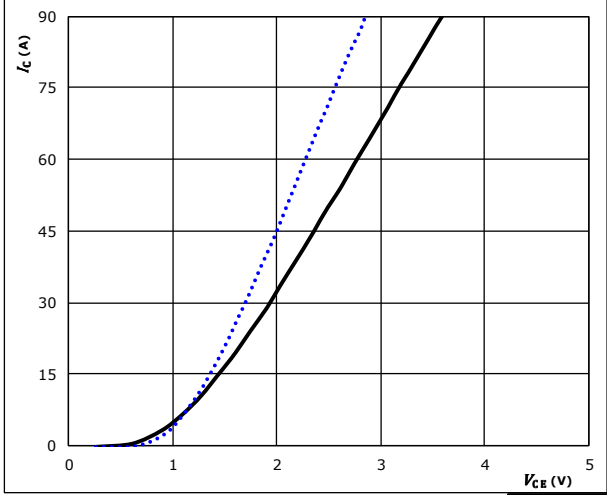


Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

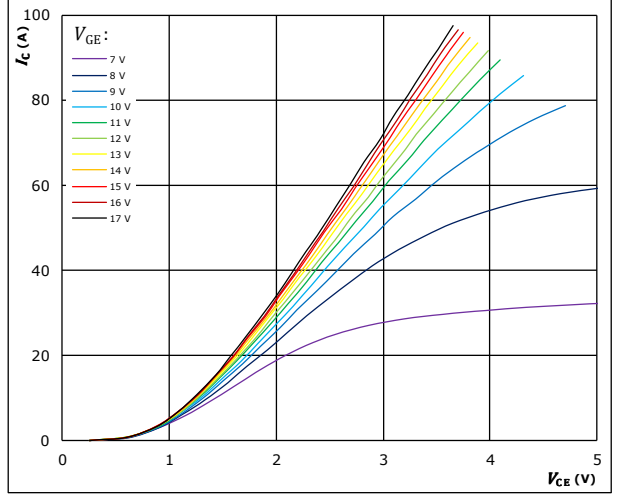


$t_p = 250 \mu s$ $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $V_{GE} = 15 V$ $T_j: 125 \text{ } ^\circ C$ (solid black line)

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

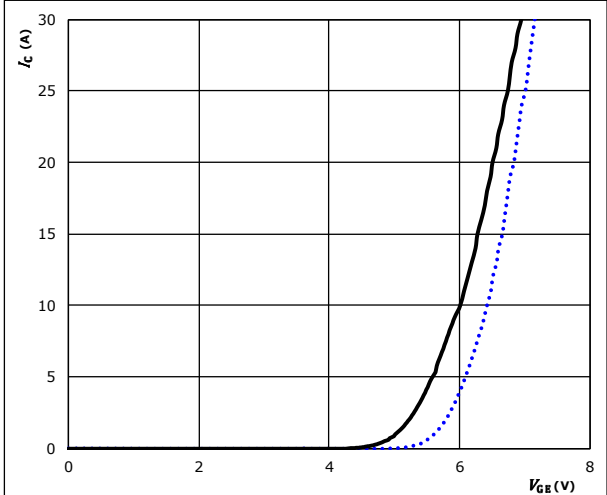


$t_p = 250 \mu s$
 $T_j = 125 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

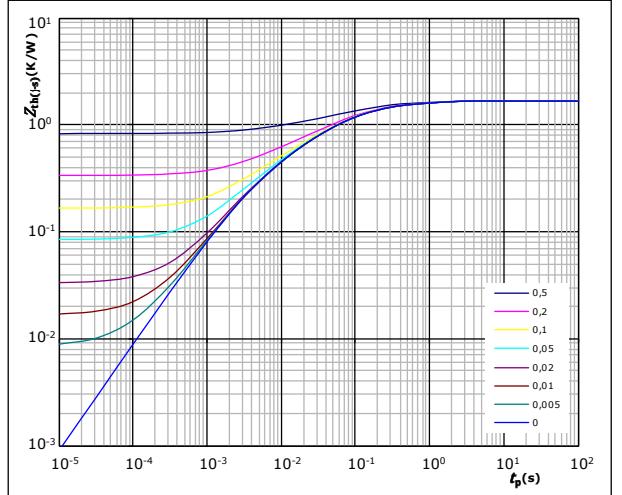


$t_p = 100 \mu s$ $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $V_{CE} = 10 V$ $T_j: 125 \text{ } ^\circ C$ (solid black line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 1,67 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
1,80E-01	1,06E+00
3,72E-01	1,72E-01
6,39E-01	5,52E-02
3,20E-01	1,27E-02
1,54E-01	3,03E-03



Boost Switch Characteristics

figure 5. IGBT

Gate voltage vs gate charge

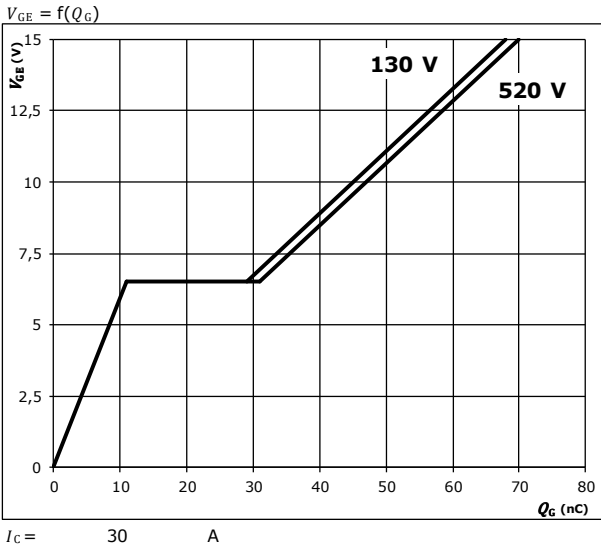
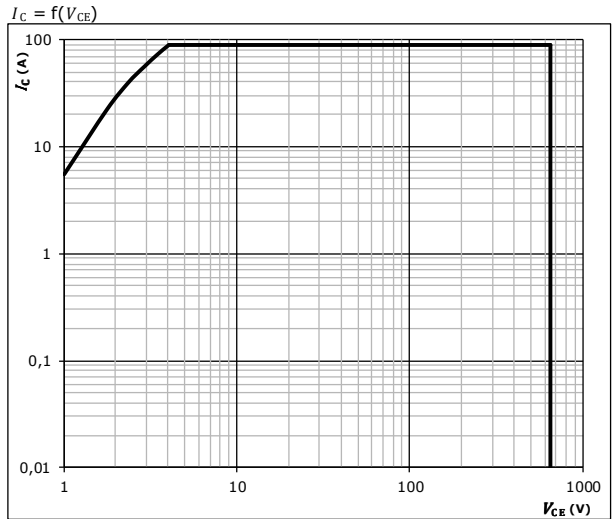


figure 6. IGBT

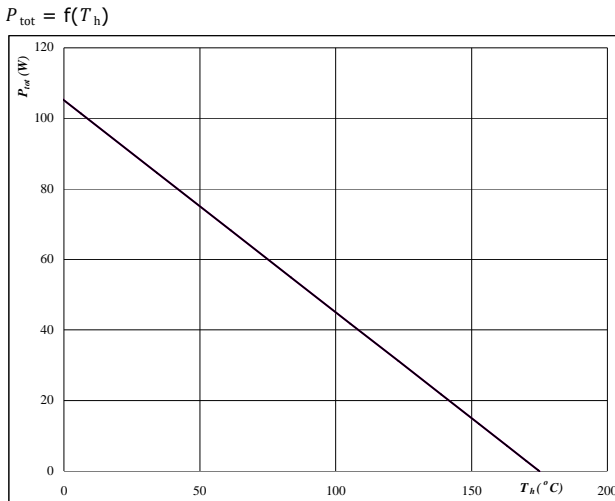
Safe operating area



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

figure 7. IGBT

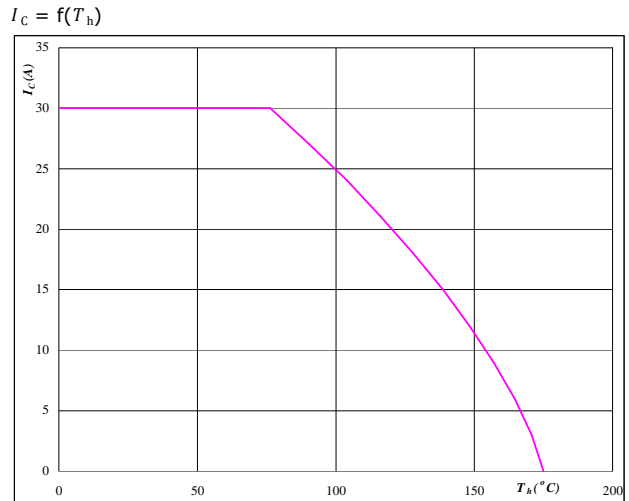
Power dissipation as a function of heatsink temperature



At
 $T_j = 175 \text{ }^\circ\text{C}$

figure 8. IGBT

Collector current as a function of heatsink temperature



At
 $T_j = 175 \text{ }^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$

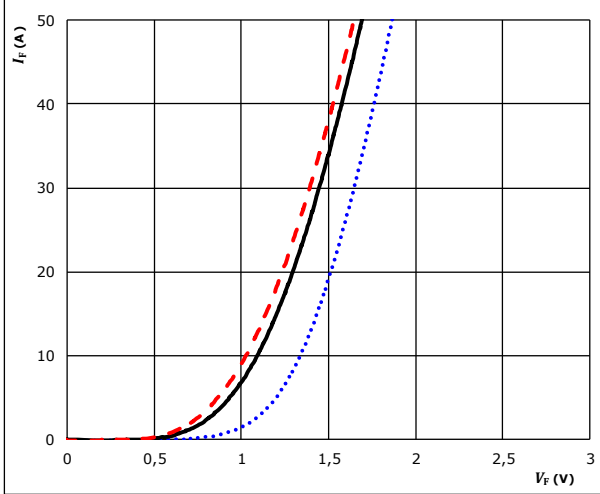


Boost Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

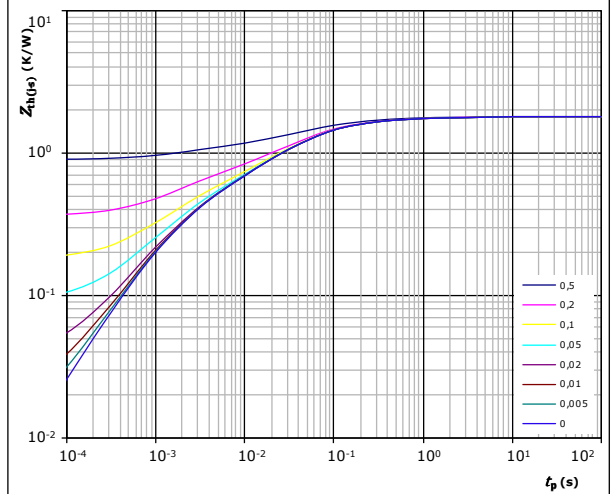


$t_p = 250 \mu s$
 $T_j:$ 25 °C
 125 °C ———
 150 °C - - - -

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



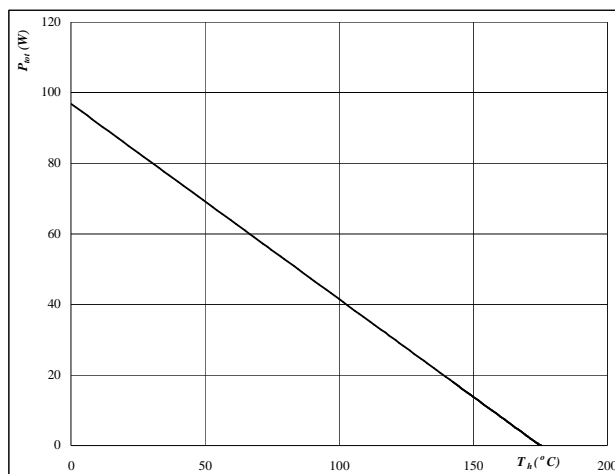
$D = t_p / T$
 $R_{th(\theta-s)} = 1,81 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
7,18E-02	2,84E+00
2,48E-01	2,83E-01
8,26E-01	5,02E-02
3,94E-01	8,85E-03
2,67E-01	1,33E-03

figure 3. FWD

Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$

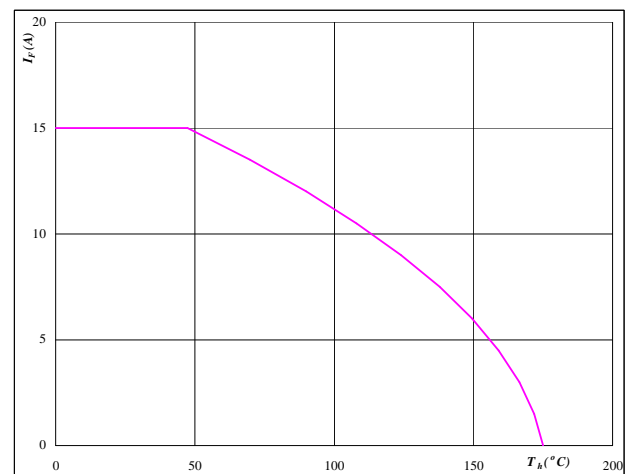


At
 $T_j = 175 \text{ °C}$

figure 4. FWD

Forward current as a function of heatsink temperature

$$I_F = f(T_h)$$



At
 $T_j = 175 \text{ °C}$

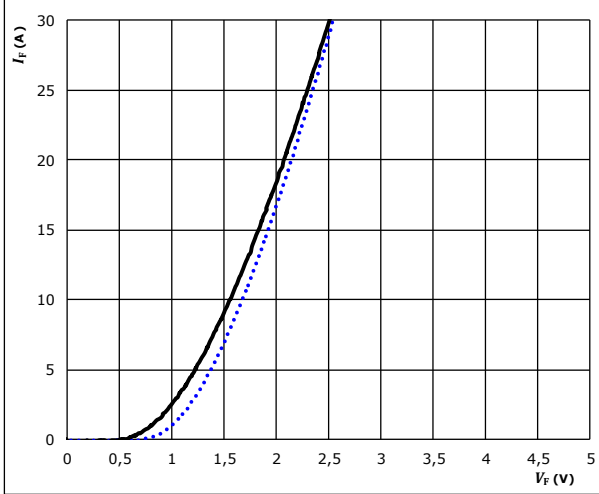


Boost Sw.Prot. Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

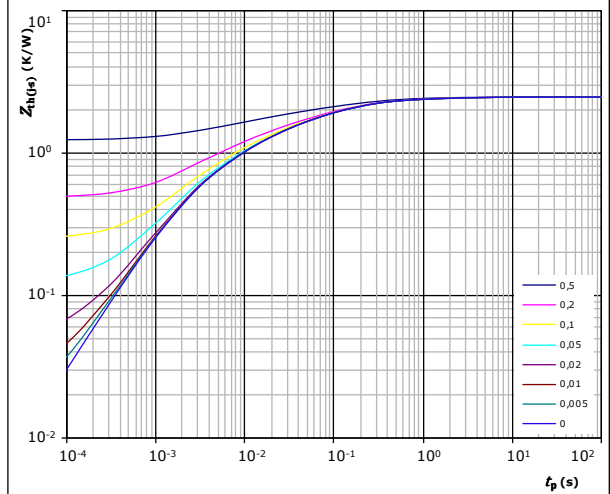


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ\text{C}$ (dotted blue line) $125 \text{ }^\circ\text{C}$ (solid black line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(\theta-s)} = 2,44 \text{ K/W}$

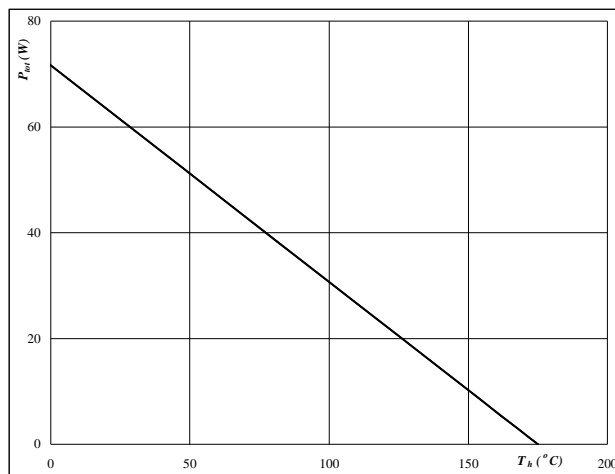
FWD thermal model values

R (K/W)	τ (s)
5,82E-02	5,62E+00
1,74E-01	6,53E-01
5,97E-01	1,47E-01
5,84E-01	3,86E-02
6,14E-01	8,85E-03
4,16E-01	1,98E-03

Figure 3 FWD

Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$

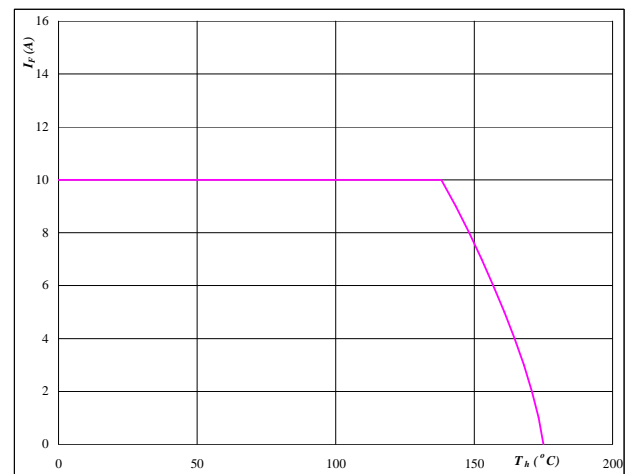


At $T_j = 175 \text{ }^\circ\text{C}$

Figure 4 FWD

Forward current as a function of heatsink temperature

$$I_F = f(T_h)$$



At $T_j = 175 \text{ }^\circ\text{C}$

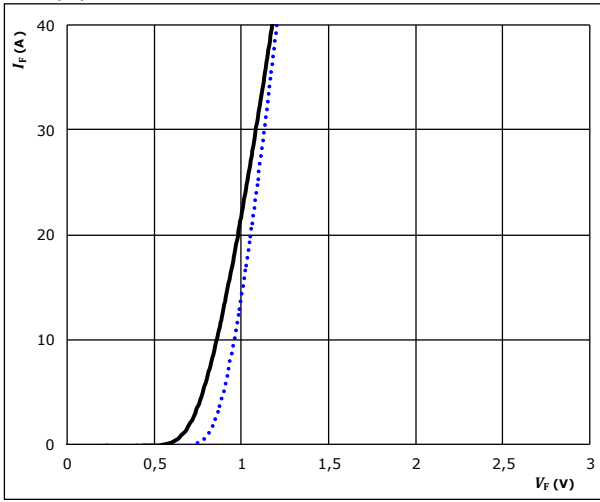


ByPass Diode Characteristics

figure 1. Rectifier Diode

Typical forward characteristics

$$I_F = f(V_F)$$

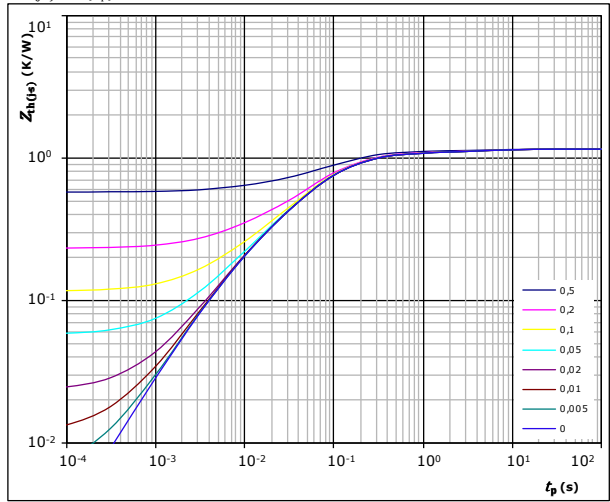


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ\text{C}$ (dotted blue line) $125 \text{ }^\circ\text{C}$ (solid black line)

figure 2. Rectifier Diode

Transient thermal impedance as a function of pulse width

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



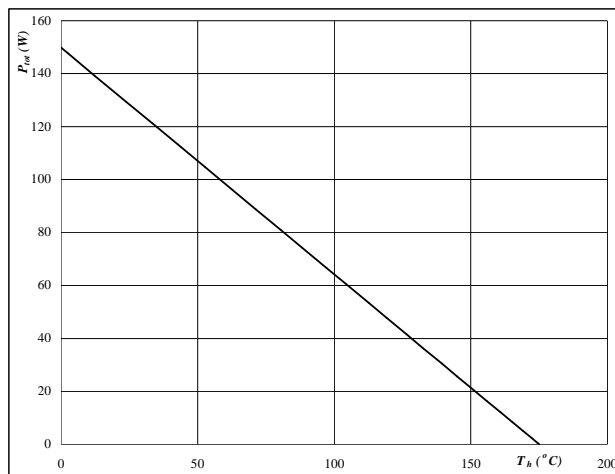
$D = t_p / T$
 $R_{th(\theta-s)} = 1,16 \text{ K/W}$
 Diode thermal model values

R (K/W)	τ (s)
5,14E-02	1,28E+01
1,22E-01	9,21E-01
5,42E-01	1,28E-01
3,74E-01	2,87E-02
9,37E-02	2,38E-03

Figure 3 Rectifier diode

Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$

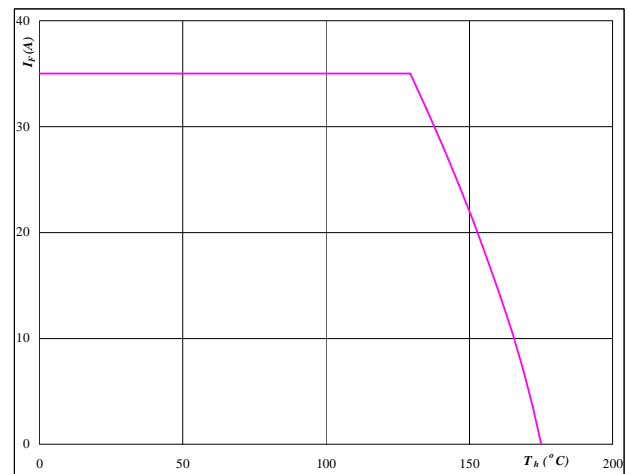


At
 $T_j = 175 \text{ }^\circ\text{C}$

Figure 4 Rectifier diode

Forward current as a function of heatsink temperature

$$I_F = f(T_h)$$



At
 $T_j = 175 \text{ }^\circ\text{C}$

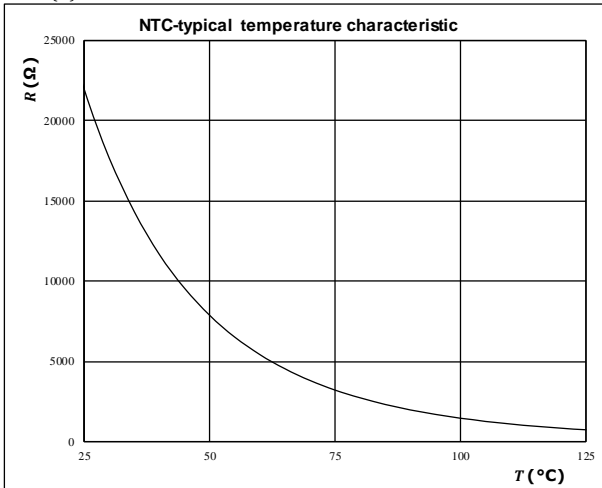


Thermistor Characteristics

figure 1. Thermistor

**Typical NTC characteristic
as a function of temperature**

$$R = f(T)$$

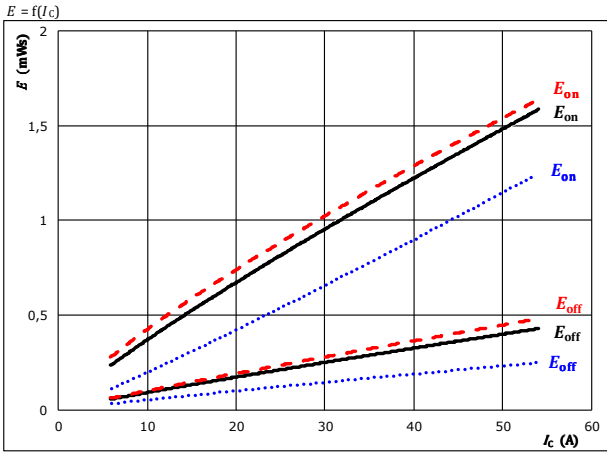




H-Bridge Switching Characteristics

figure 1. IGBT

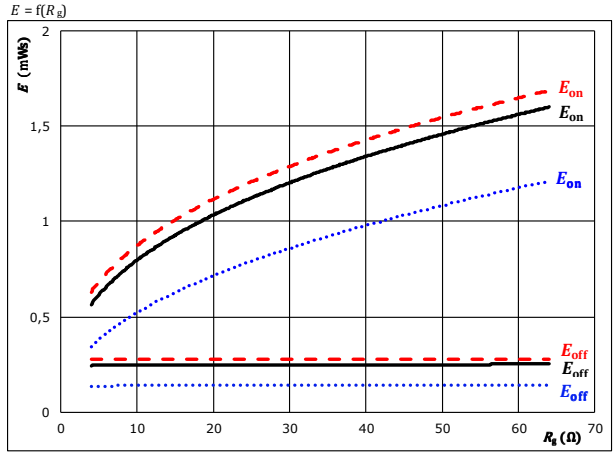
Typical switching energy losses as a function of collector current



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $R_{g\text{on}} = 16$ Ω
 $R_{g\text{off}} = 16$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 2. IGBT

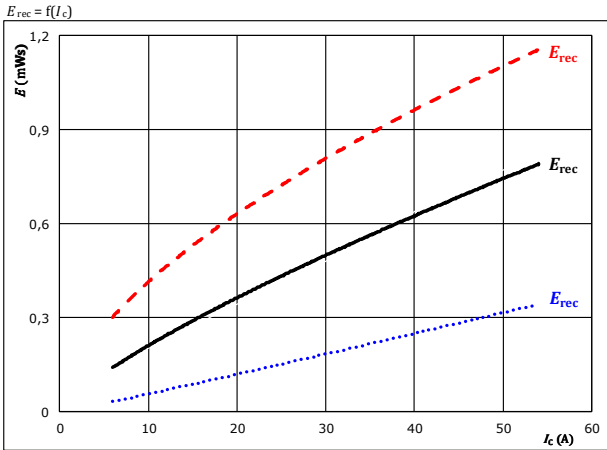
Typical switching energy losses as a function of gate resistor



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $I_C = 30$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 3. FWD

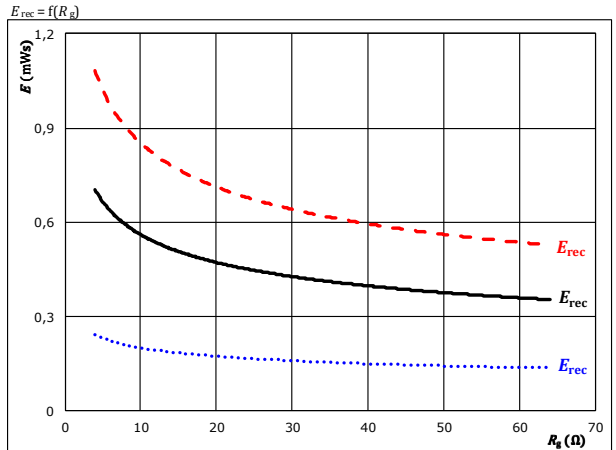
Typical reverse recovered energy loss as a function of collector current



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $R_{g\text{on}} = 16$ Ω
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $I_C = 30$ A
 T_j : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

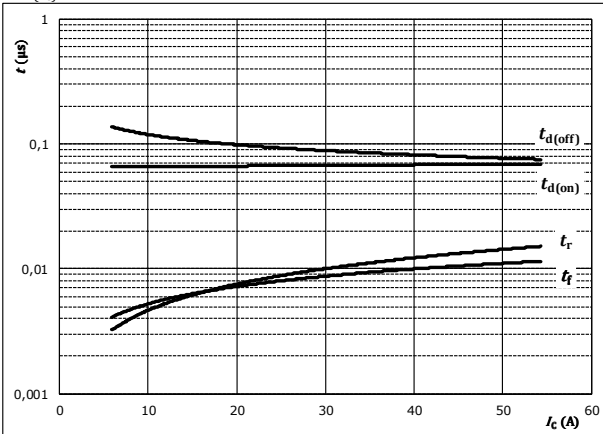


H-Bridge Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



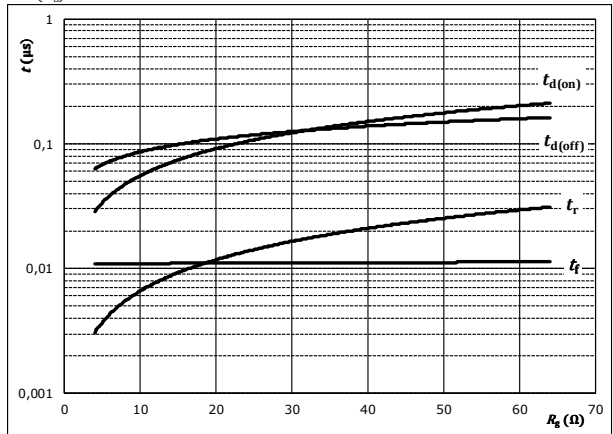
With an inductive load at

- $T_j = 150$ °C
- $V_{CE} = 400$ V
- $V_{GE} = \pm 15$ V
- $R_{g\text{on}} = 16$ Ω
- $R_{g\text{off}} = 16$ Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



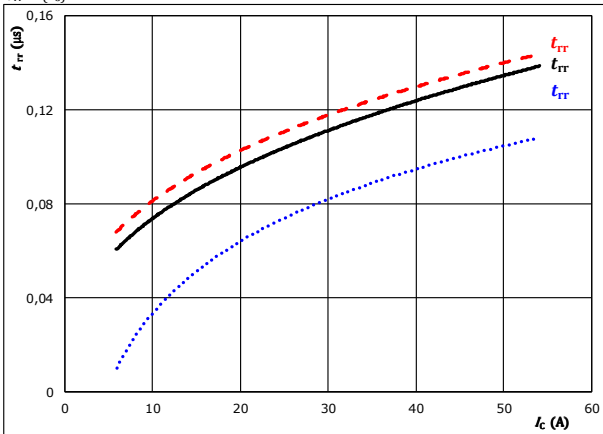
With an inductive load at

- $T_j = 150$ °C
- $V_{CE} = 400$ V
- $V_{GE} = \pm 15$ V
- $I_c = 30$ A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$



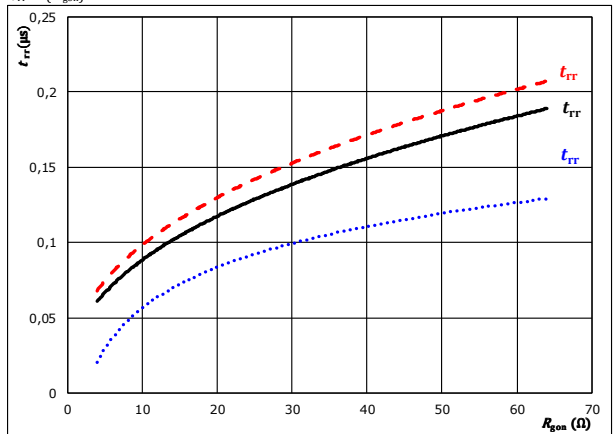
With an inductive load at

- $V_{CE} = 400$ V
- $V_{GE} = \pm 15$ V
- $R_{g\text{on}} = 16$ Ω
- $T_j: 25$ °C (dotted blue)
- $T_j: 125$ °C (solid black)
- $T_j: 150$ °C (dashed red)

figure 8. FWD

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

$$t_{rr} = f(R_{g\text{on}})$$



With an inductive load at

- $V_{CE} = 400$ V
- $V_{GE} = \pm 15$ V
- $I_c = 30$ A
- $T_j: 25$ °C (dotted blue)
- $T_j: 125$ °C (solid black)
- $T_j: 150$ °C (dashed red)

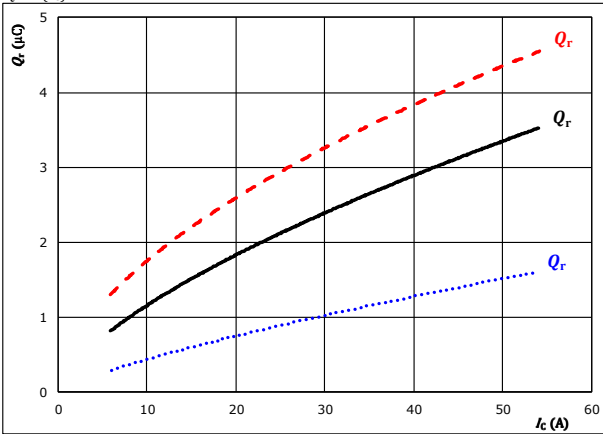


H-Bridge Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

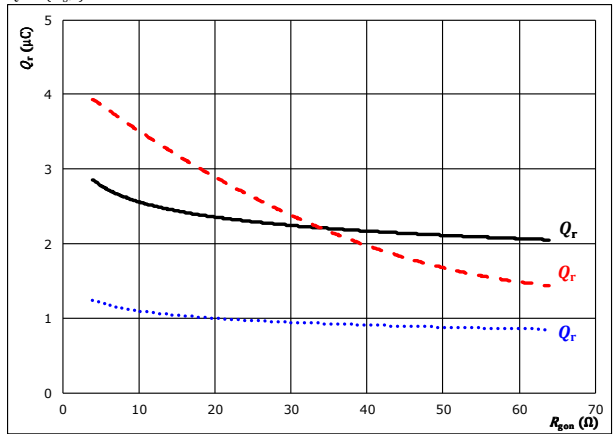


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $R_{gpn} = 16$ Ω
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 10. FWD

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

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

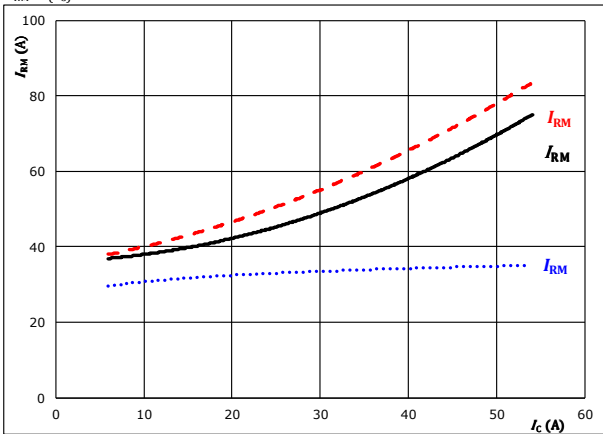


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $I_c = 30$ A
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 11. FWD

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

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

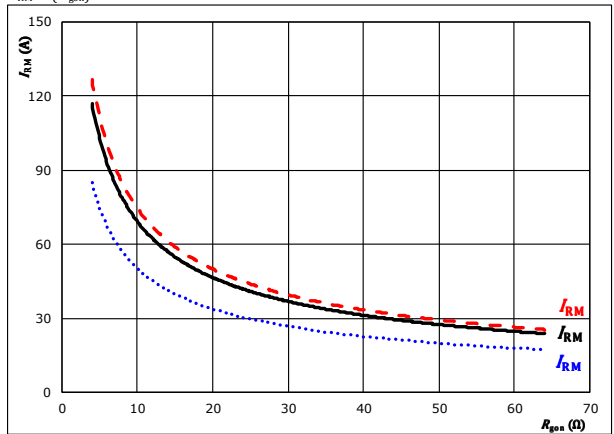


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $R_{gpn} = 16$ Ω
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 12. FWD

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

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



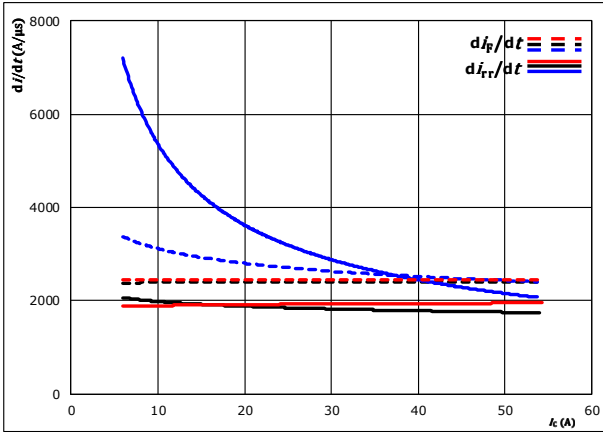
With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $I_c = 30$ A
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)



H-Bridge Switching Characteristics

figure 13. FWD

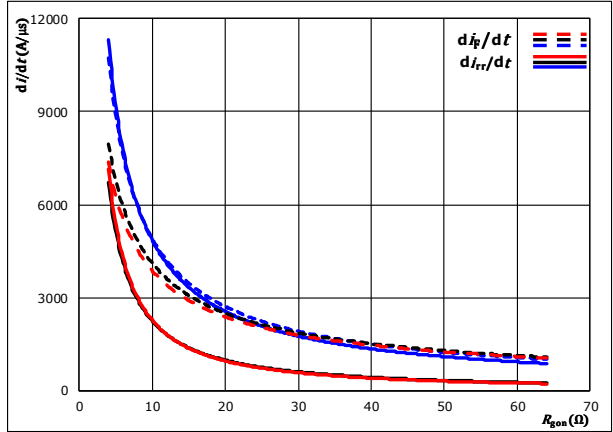
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $R_{g(on)} = 16$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 14. FWD

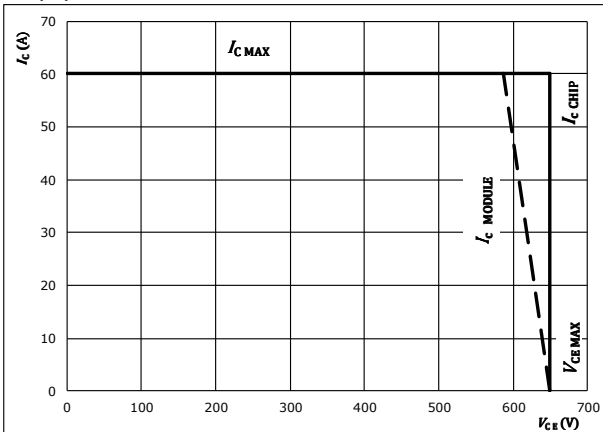
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = \pm 15$ V
 $I_C = 30$ A
 $T_j = 25$ °C
 125 °C
 150 °C

figure 15. IGBT

Reverse bias safe operating area
 $I_C = f(V_{CE})$



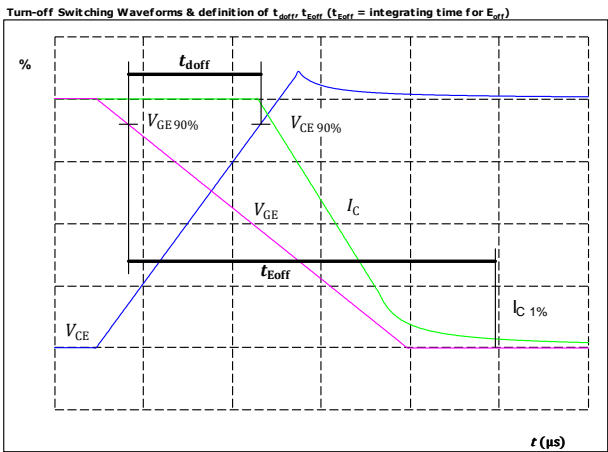
At
 $T_j = 125$ °C
 $R_{g(on)} = 16$ Ω
 $R_{g(off)} = 16$ Ω



H-Bridge Switching Definitions

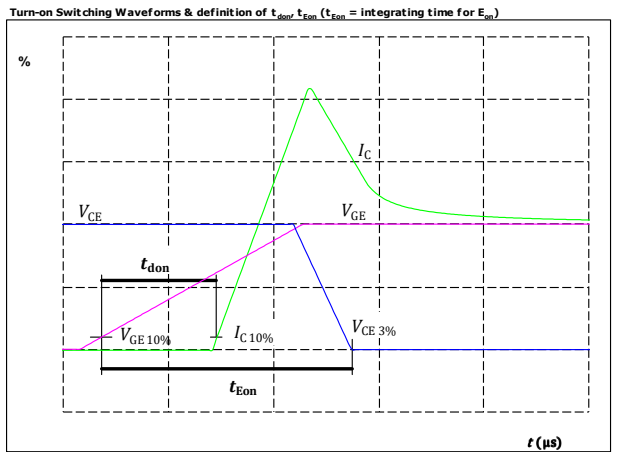
General conditions		
T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

figure 1. IGBT



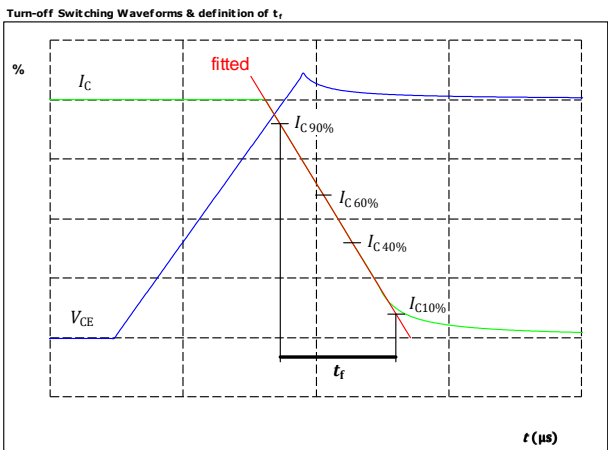
$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_{doff} =$	86	ns

figure 2. IGBT



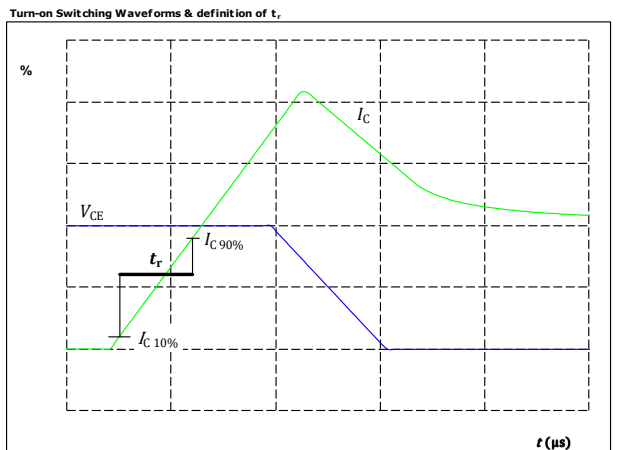
$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_{don} =$	66	ns

figure 3. IGBT



$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_f =$	10	ns

figure 4. IGBT



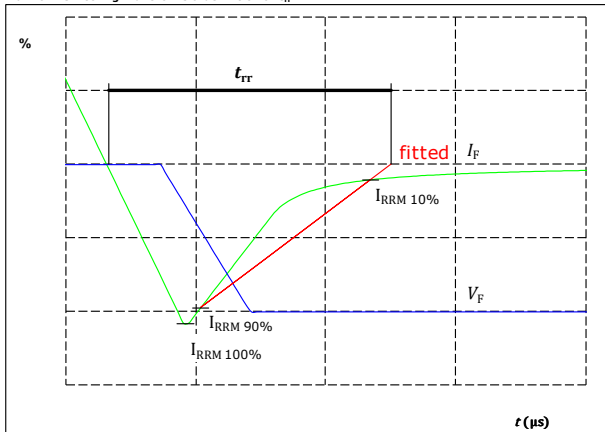
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_r =$	9	ns



Vincotech

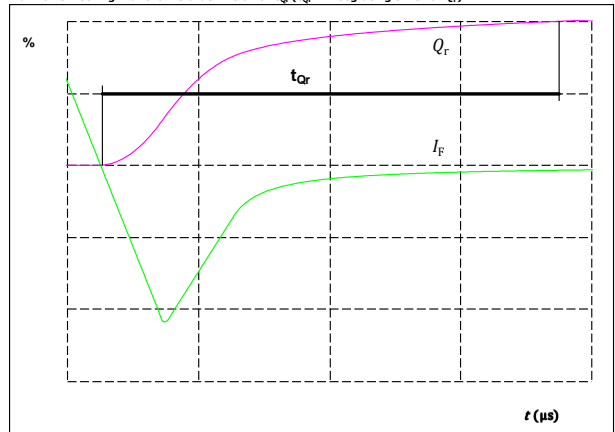
H-Bridge Switching Characteristics

figure 5. FWD
 Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	400	V
$I_F(100\%) =$	30	A
$I_{RRM}(100\%) =$	48	A
$t_{rr} =$	115	ns

figure 6. FWD
 Turn-on Switching Waveforms & definition of t_{Qr} ($t_{Qr} =$ integrating time for Q_r)



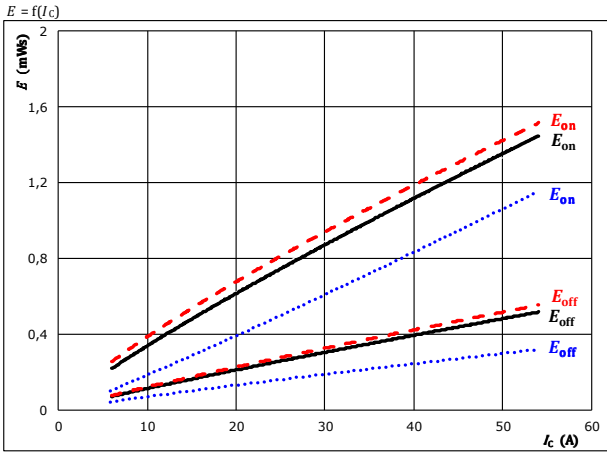
$I_F(100\%) =$	30	A
$Q_r(100\%) =$	2,37	μC



Boost Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

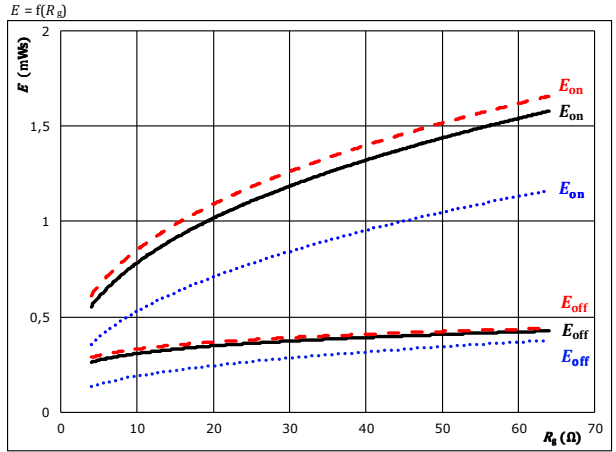


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $R_{gon} = 16$ Ω
 $R_{goff} = 16$ Ω

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

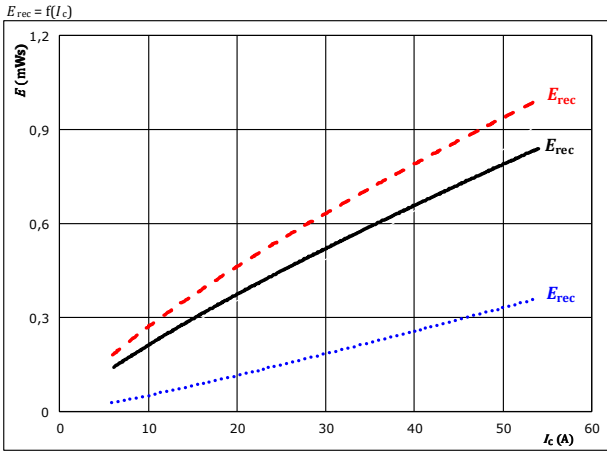


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $I_c = 30$ A

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

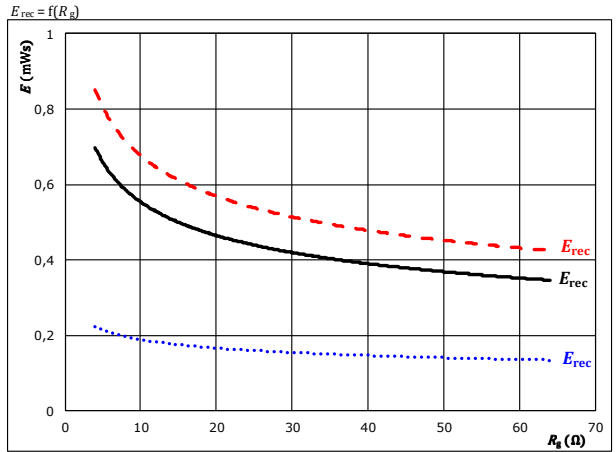


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $R_{gon} = 16$ Ω

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $I_c = 30$ A

T_j : 25 °C (dotted blue line)
 125 °C (solid black line)
 150 °C (dashed red line)

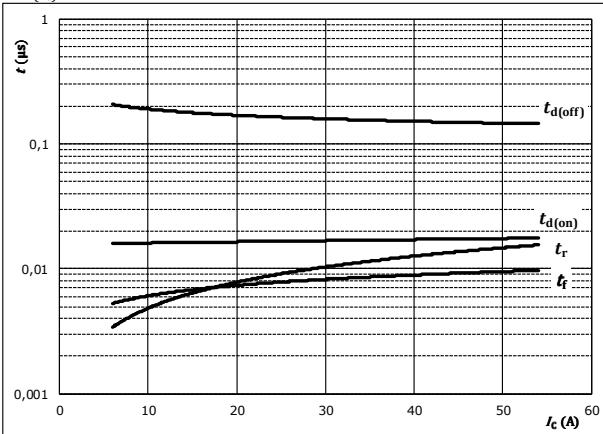


Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



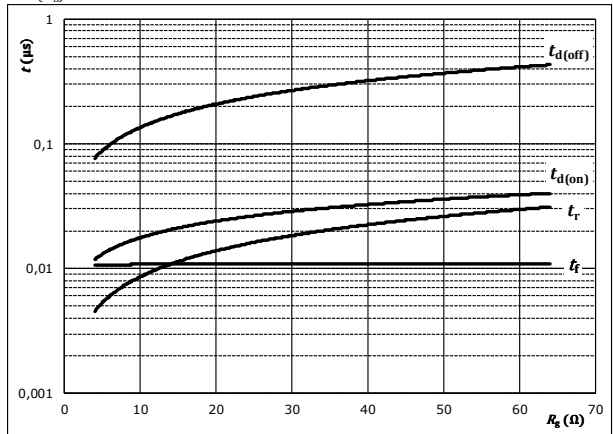
With an inductive load at

- $T_j = 150$ °C
- $V_{CE} = 400$ V
- $V_{GE} = 0 / 15$ V
- $R_{g(on)} = 16$ Ω
- $R_{g(off)} = 16$ Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



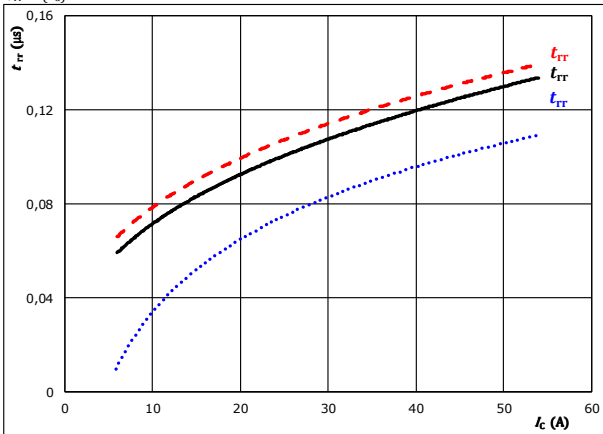
With an inductive load at

- $T_j = 150$ °C
- $V_{CE} = 400$ V
- $V_{GE} = 0 / 15$ V
- $I_C = 30$ A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$



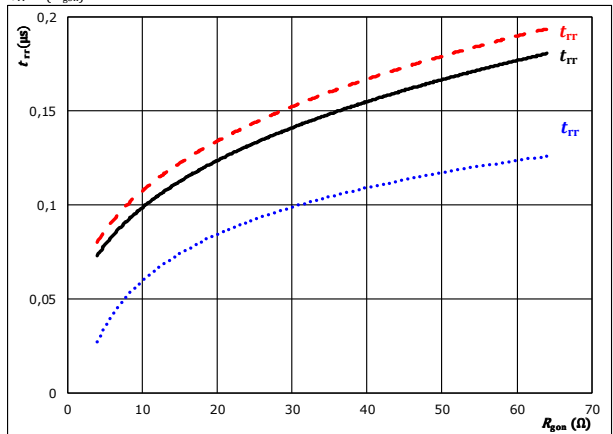
With an inductive load at

- $V_{CE} = 400$ V
- $V_{GE} = 0 / 15$ V
- $R_{g(on)} = 16$ Ω
- $T_j: 25$ °C (dotted blue)
- $T_j: 125$ °C (solid black)
- $T_j: 150$ °C (dashed red)

figure 8. FWD

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

$$t_{rr} = f(R_{g(on)})$$



With an inductive load at

- $V_{CE} = 400$ V
- $V_{GE} = 0 / 15$ V
- $I_C = 30$ A
- $T_j: 25$ °C (dotted blue)
- $T_j: 125$ °C (solid black)
- $T_j: 150$ °C (dashed red)

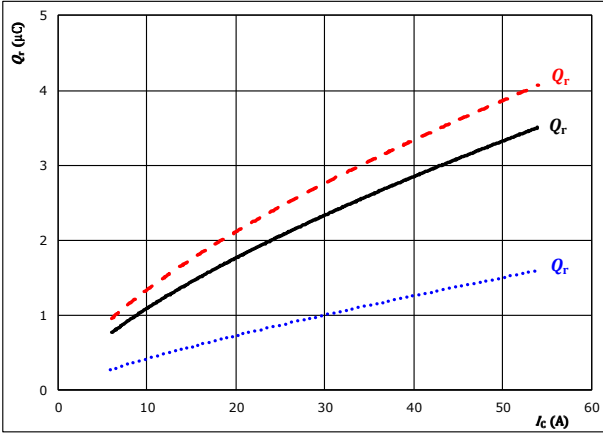


Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

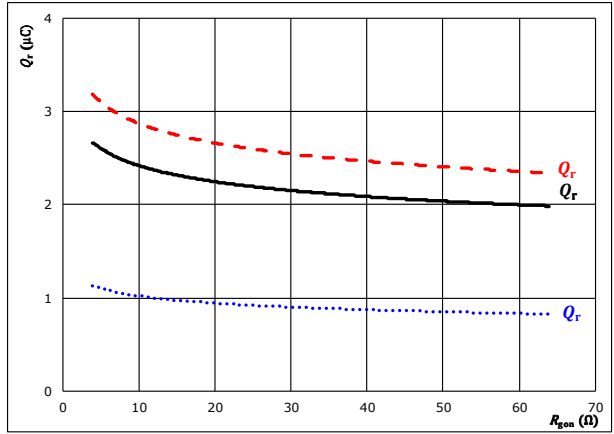


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $R_{gpn} = 16$ Ω
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 10. FWD

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

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

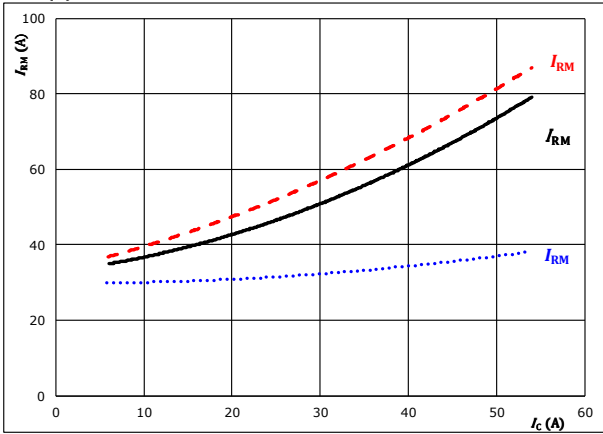


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $I_c = 30$ A
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 11. FWD

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

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

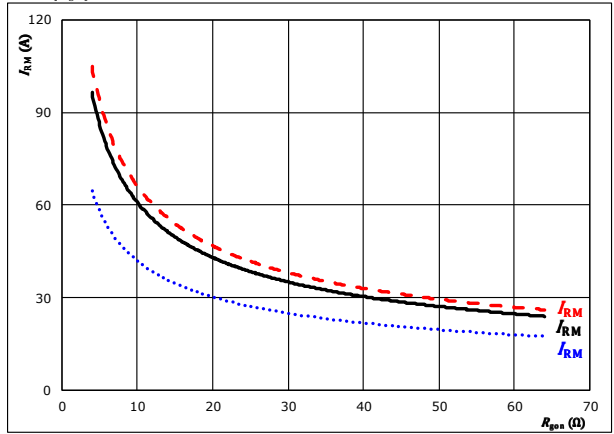


With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $R_{gpn} = 16$ Ω
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

figure 12. FWD

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

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



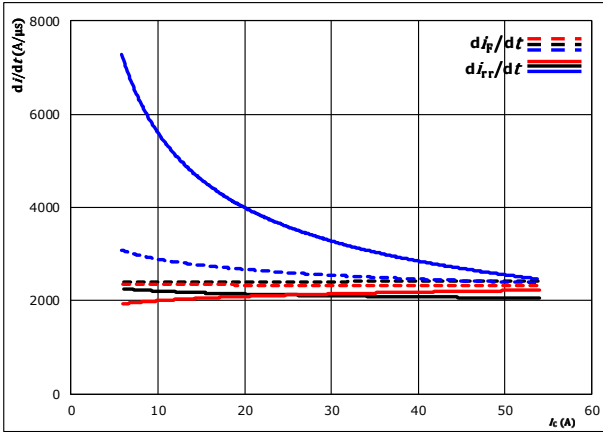
With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $I_c = 30$ A
 T_j : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)



Boost Switching Characteristics

figure 13. FWD

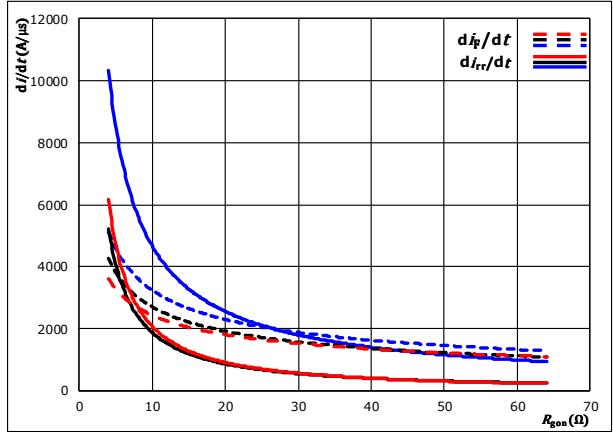
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $R_{gpn} = 16$ Ω
 $T_j = 25$ °C
 125 °C
 150 °C

figure 14. FWD

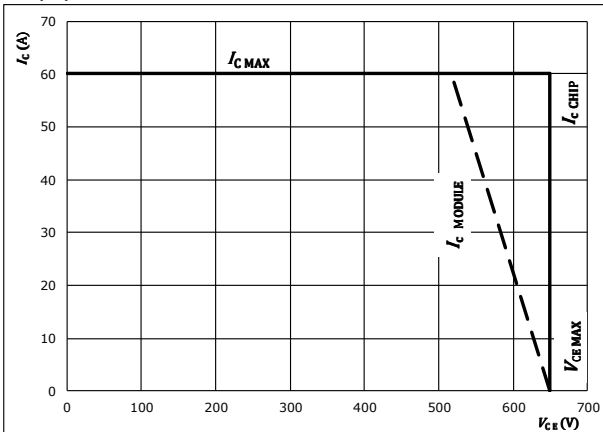
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{gpn})$



With an inductive load at
 $V_{CE} = 400$ V
 $V_{GE} = 0 / 15$ V
 $I_c = 30$ A
 $T_j = 25$ °C
 125 °C
 150 °C

figure 15. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CE})$



At
 $T_j = 125$ °C
 $R_{gpn} = 16$ Ω
 $R_{goff} = 16$ Ω

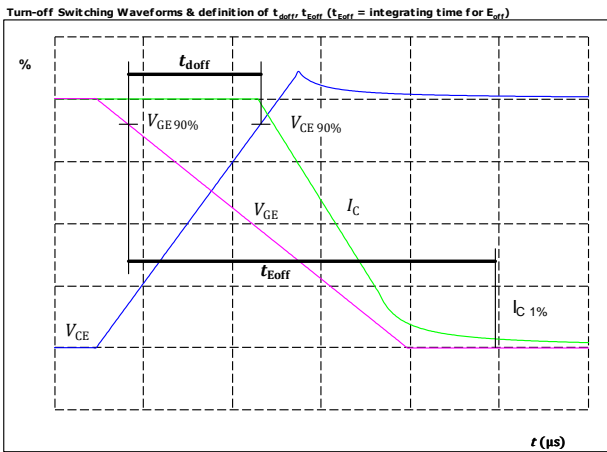


Boost Switching Definitions

General conditions

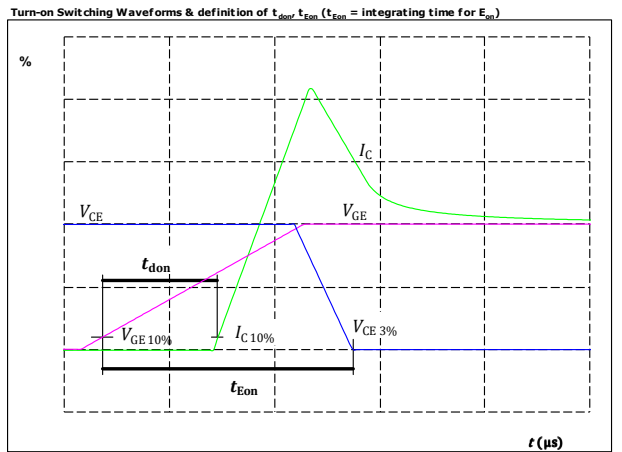
T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

figure 1. IGBT



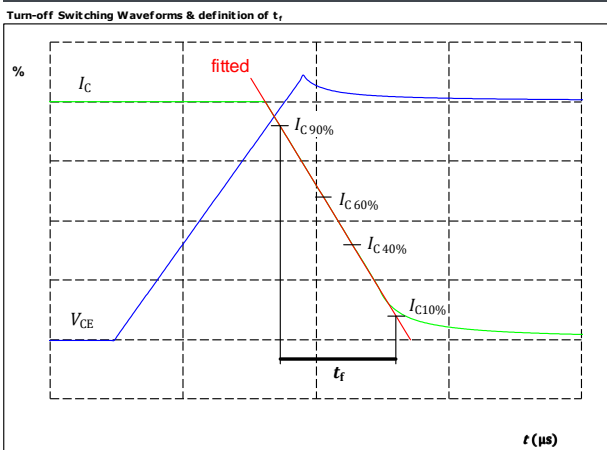
$V_{CE}(0\%) =$	0	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_{doff} =$	155	ns

figure 2. IGBT



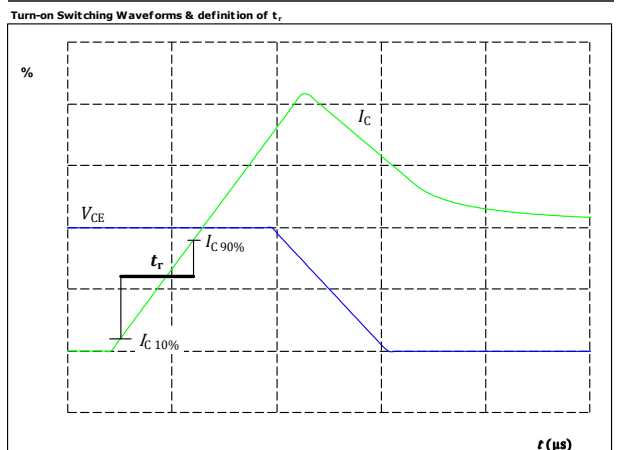
$V_{CE}(0\%) =$	0	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_{don} =$	19	ns

figure 3. IGBT



$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_f =$	9	ns

figure 4. IGBT



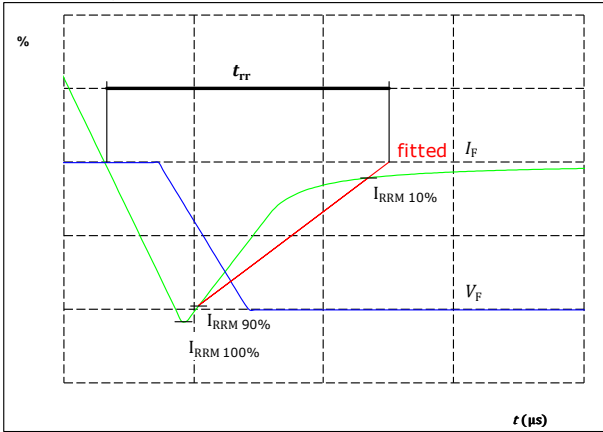
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$t_r =$	9	ns



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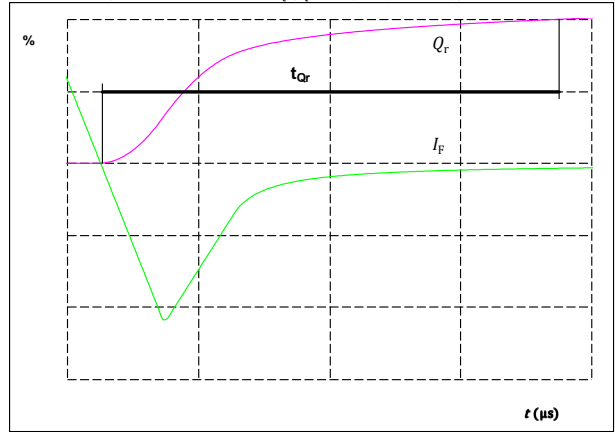
Boost Switching Characteristics

figure 5. FWD
 Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	400	V
$I_F(100\%) =$	30	A
$I_{RRM}(100\%) =$	50	A
$t_{rr} =$	113	ns

figure 6. FWD
 Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



$I_F(100\%) =$	30	A
$Q_r(100\%) =$	2,28	μC



10-FZ07BIA030SM02-P894E58
10-PZ07BIA030SM02-P894E58Y
 datasheet

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Ordering Code & Marking								
Version			Ordering Code					
without thermal paste 12 mm housing with solder pins			10-FZ07BIA030SM02-P894E58					
with thermal paste 12 mm housing with solder pins			10-FZ07BIA030SM02-P894E58-/3/					
without thermal paste 12 mm housing with Press-fit pins			10-PZ07BIA030SM02-P894E58Y					
with thermal paste 12 mm housing with Press-fit pins			10-PZ07BIA030SM02-P894E58Y-/3/					
NN-NNNNNNNNNNNN TTTTITV WWYY UL VIN LLLL SSSS			Text	Name	Date code	UL & VIN	Lot	Serial
				NN-NNNNNNNNNNNN-TTTTITV	WWYY	UL VIN	LLLL	SSSS
			Datamatrix	Type&Ver	Lot number	Serial	Date code	
			TTTTITV	LLLL	SSSS	WWYY		

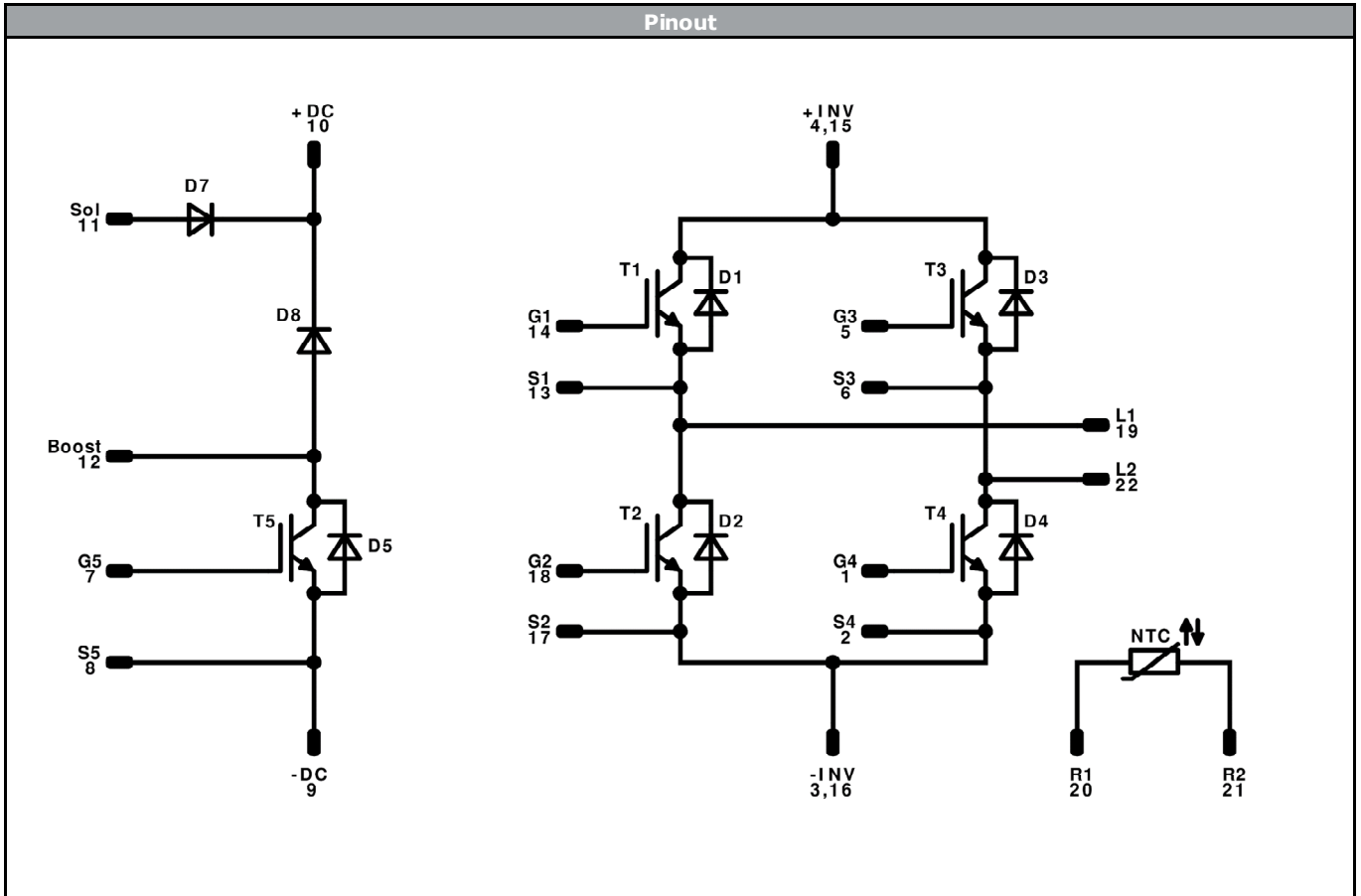
Pin table			
Pin	X	Y	Function
1	28,7	0	G4
2	25,9	0	S4
3	23,1	0	-INV
4	17,6	0	+INV
5	12,1	0	G3
6	9,3	0	S3
7	2,8	0	G5
8	0	0	S5
9	0	5,05	-DC
10	0	10,55	+DC
11	0	16,15	Sol
12	0	22,6	Boost
13	9,3	22,6	S1
14	12,1	22,6	G1
15	17,6	22,6	+INV
16	23,1	22,6	-INV
17	25,9	22,6	S2
18	28,7	22,6	G2
19	33,6	20,05	L1
20	33,6	14,55	R1
21	33,6	8,05	R2
22	33,6	2,55	L2
23	Not assembled		

Outline

Technical drawings showing the component's outline. The top view shows 22 pins numbered 1 to 22. Dimensions include a width of 16.8 mm and a height of 11.3 mm. A note indicates: "Tolerance of pinpositions: ±0.5mm at the end of pins. Dimension of coordinate axis is only offset without tolerance." Another note points to the center of press-fit pinhead: "center of press-fit pinhead for connection parameter see the handling instruction".



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Identification					
ID	Component	Voltage	Current	Function	Comment
T1, T2, T3, T4	IGBT	650 V	30 A	H-Bridge Switch	
D1, D2, D3, D4	FWD	650 V	15 A	H-Bridge Diode	
T5	IGBT	650 V	30 A	Boost Switch	
D8	FWD	650 V	15 A	Boost Diode	
D5	FWD	650 V	10 A	Boost Sw.Prot. Diode	
D7	Rectifier	1600 V	35 A	ByPass Diode	
NTC	NTC			Thermistor	




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Packaging instruction			
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</i> 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-FZ07BIA030SM02-P894E58-D4-14	17 Sep. 2018	Corrected Power dissipation graphs and max current ratings, Added boost dynamic parameters	1,2,3,6,7, 9-16,23-28

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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.