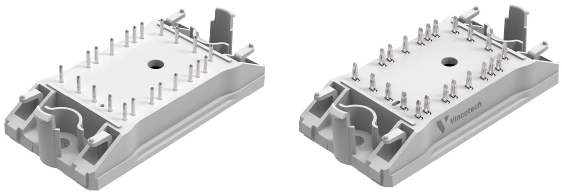
10-FZ07BIA030SM02-P894E58
10-PZ07BIA030SM02-P894E58Y
datasheet

flowSOL 0 BI (TL) | **650 V / 30 A**

Features

- High efficiency
- Ultra fast switching frequency
- Low inductive design
- IGBT H5 + ultrafast Si diode in Boost and H-bridge

flow 0 12 mm housing

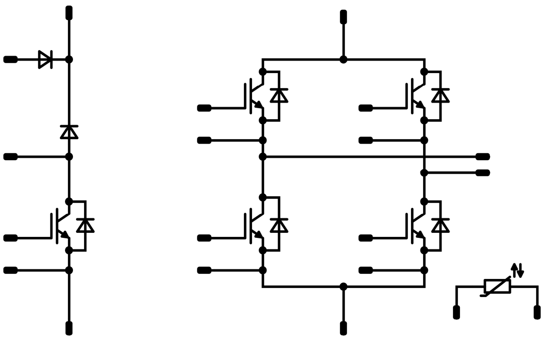


Solder pin   Press-fit pin

Target applications

- Transformerless solar inverters

Schematic



Types

- 10-FZ07BIA030SM02-P894E58
- 10-PZ07BIA030SM02-P894E58Y

Maximum Ratings

T_j = 25 °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 °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 °C	57	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
H-Bridge Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	13	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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 °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 °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 °C	13	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °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 °C	10	A
Repetitive peak forward current	I_{FRM}			20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	39	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °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 °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 ms 50 Hz sine	T_j = 150 °C	370	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	60	W
Maximum junction temperature	T_{jmax}			150	°C

Module Properties

Thermal Properties

Parameter	Symbol	Condition		Value	Unit
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…(T_{jmax} - 25)	°C

Isolation Properties

Parameter	Symbol	Condition		Value	Unit
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance		Solder pin Press-fit pin		8,66 9,17	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

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	
H-Bridge 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}	f = 1 Mhz	0	25		25		1800		pF
Output capacitance	C_{oes}							45		
Reverse transfer capacitance	C_{res}							7		
Gate charge	Q_g		15	520	30	25		70		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,67		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	±15	400	30	25 125 150		66 66 67		ns
Rise time	t_r					25 125 150		7 9 10		
Turn-off delay time	$t_{d(off)}$					25 125 150		70 86 88		
Fall time	t_f					25 125 150		4 10 13		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,1 µC Q_{rFWD} = 2,4 µC Q_{rFWD} = 3,5 µC				25 125 150		0,659 0,963 1,04		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,142 0,253 0,281		

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	
H-Bridge Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,81		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 3260 A/µs di/dt = 2940 A/µs di/dt = 3459 A/µs	±15	400	30	25 125 150		33 48 54		A
Reverse recovery time	t_{rr}					25 125 150		89 115 129		ns
Recovered charge	Q_r					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	$(di_{rf}/dt)_{max}$					25 125 150		2649 1253 1360		A/µs

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
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}	f= 1 Mhz	0	25		25		1800		pF
Output capacitance	C_{oes}							45		
Reverse transfer capacitance	C_{res}							7		
Gate charge	Q_g		15	520	30	25		70		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,67		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 16 Ω R_{goff} = 16 Ω	0 / 15	400	30	25 125 150		20 19 17		ns
Rise time	t_r					25 125 150		8 9 10		
Turn-off delay time	$t_{d(off)}$					25 125 150		137 155 159		
Fall time	t_f					25 125 150		4 9 10		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,1 μC Q_{rFWD} = 2,3 μC Q_{rFWD} = 2,7 μC				25 125 150		0,618 0,894 0,962		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,172 0,305 0,326		

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 Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,81		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 2879 A/µs di/dt = 2826 A/µs di/dt = 2747 A/µs	0 / 15	400	30	25 125 150		33 50 56		A
Reverse recovery time	t_{rr}					25 125 150		92 113 121		ns
Recovered charge	Q_r					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										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,44		K/W
ByPass Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,16		K/W

Characteristic Values

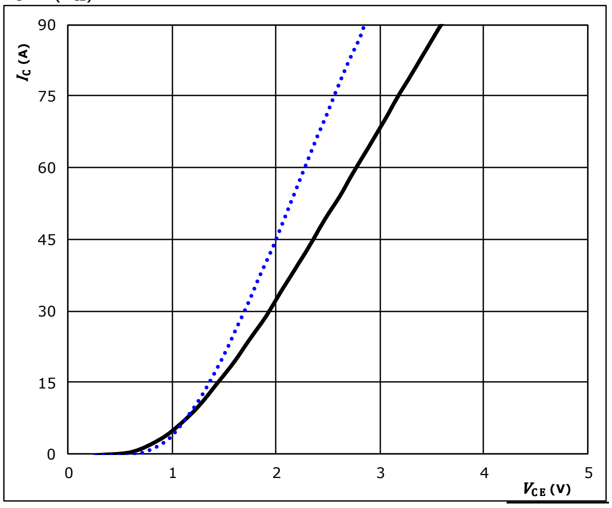
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-12		+14	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				25		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				25		3998		K
Vincotech NTC Reference									B	

H-Bridge Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

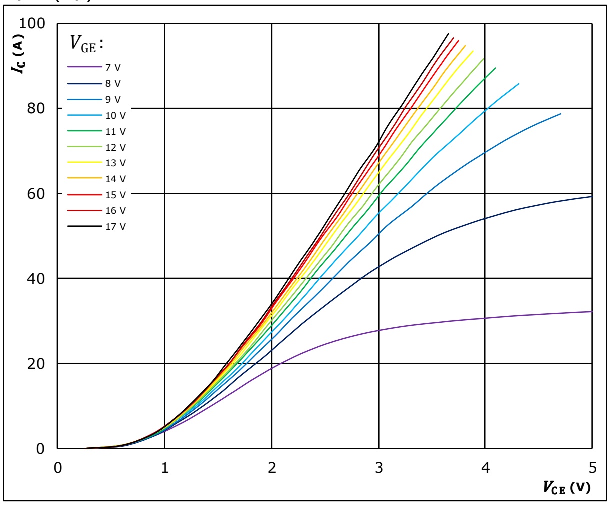


t_p =	250	µs	T_j:	25 °C	············
V_{GE} =	15	V		125 °C	———

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

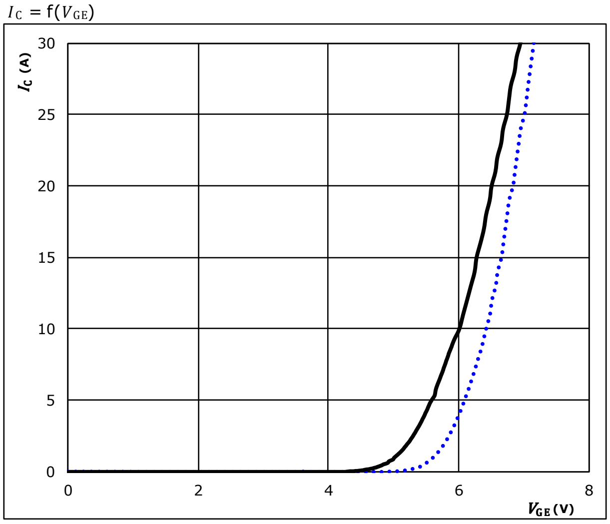
T_j = 125 °C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

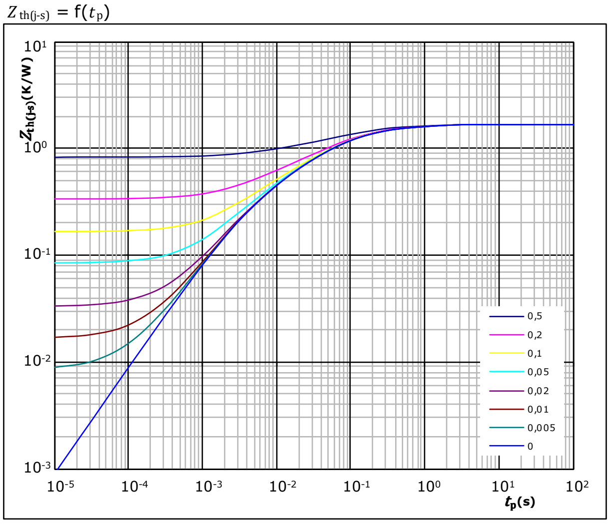


t_p =	100	µs	T_j:	25 °C	············
V_{CE} =	10	V		125 °C	———

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

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

IGBT thermal model values

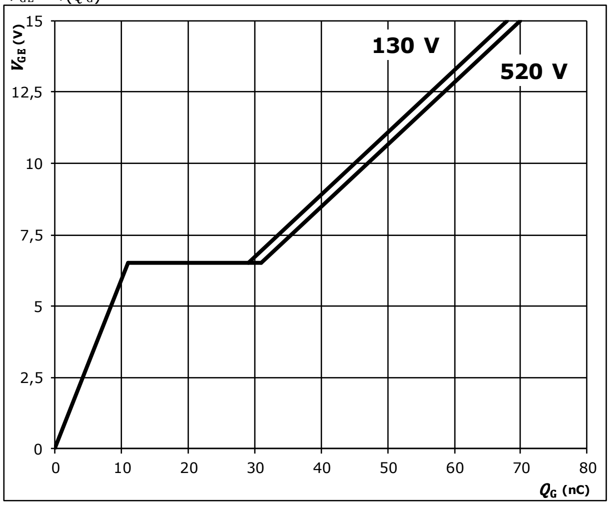
R (K/W)	τ (s)
1,80E-01	1,06E+00
3,72E-01	1,72E-01
6,39E-01	5,52E-02
3,20E-01	1,27E-02
1,54E-01	3,03E-03

H-Bridge Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

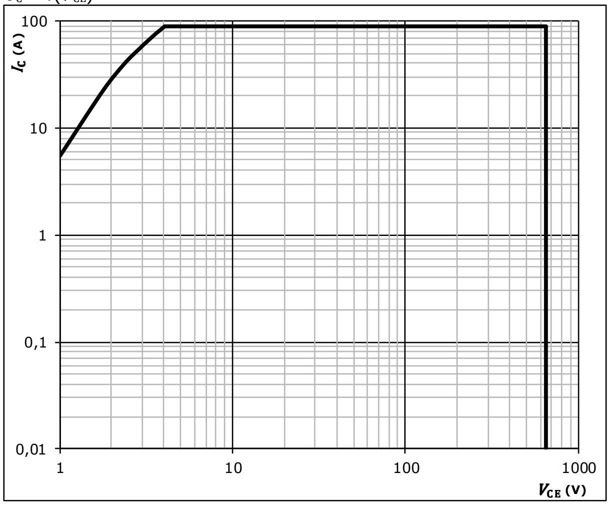


I_C = 30 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$

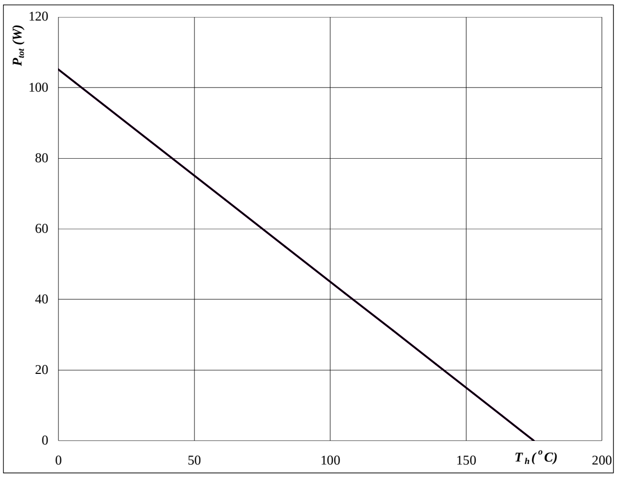


D = single pulse
T_s = 80 °C
V_{GE} = ±15 V
T_j = T_{jmax}

figure 7. **IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$

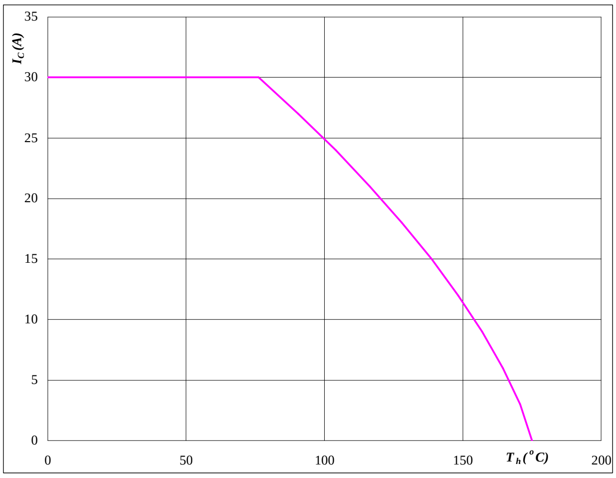


At
T_j = 175 °C

figure 8. **IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



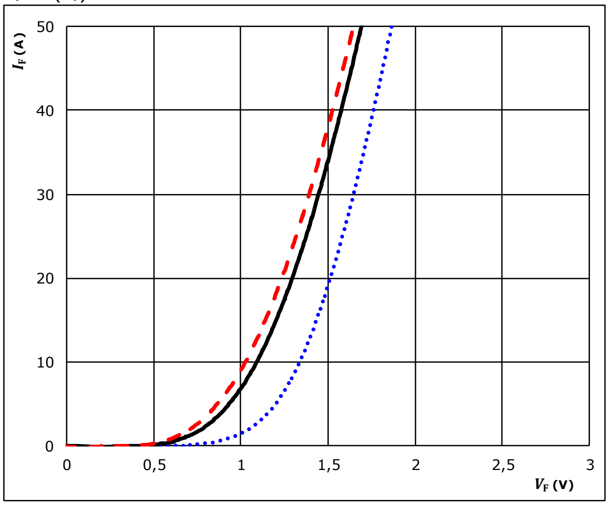
At
T_j = 175 °C
V_{GE} = 15 V

H-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



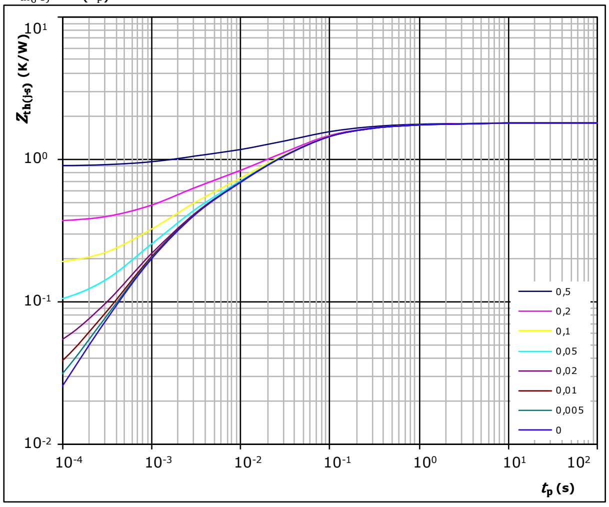
t_p = 250 µs

T_j: 25 °C; 125 °C; 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j\text{-}s)}$ = 1,81 K/W

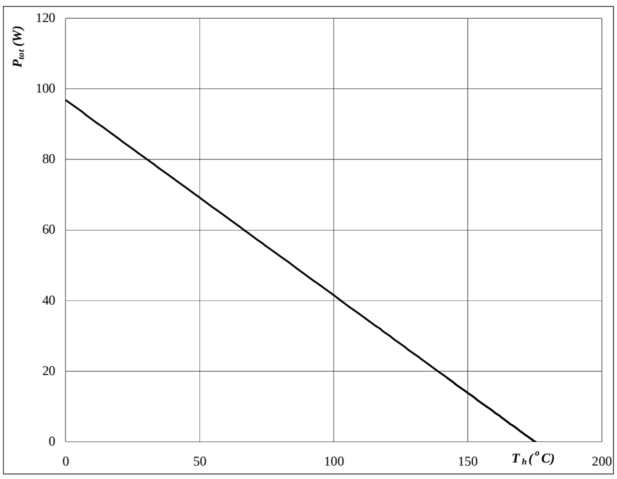
FWD thermal model values

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

$P_{tot} = f(T_h)$



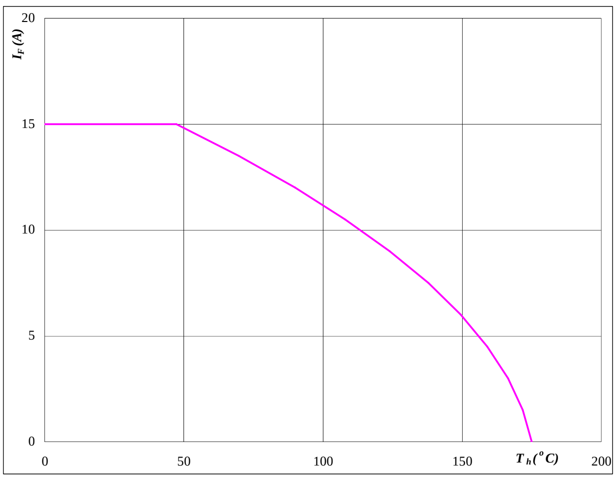
At

T_j = 175 °C

figure 4. **FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

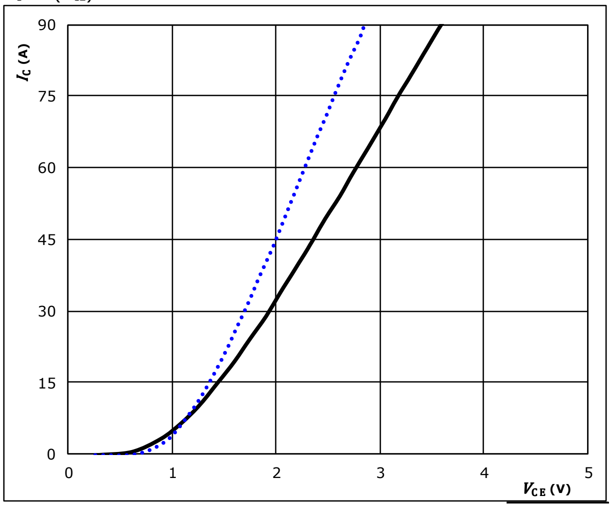
T_j = 175 °C

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

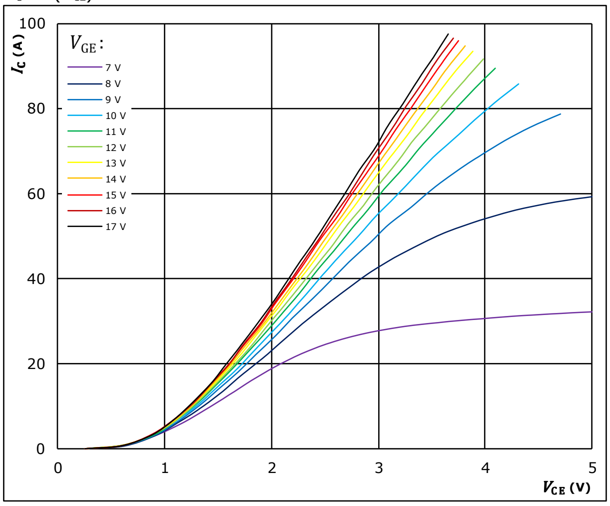


t_p =	250	μs	T_j:	25 °C (dotted)
V_{GE} =	15	V		125 °C (solid)

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

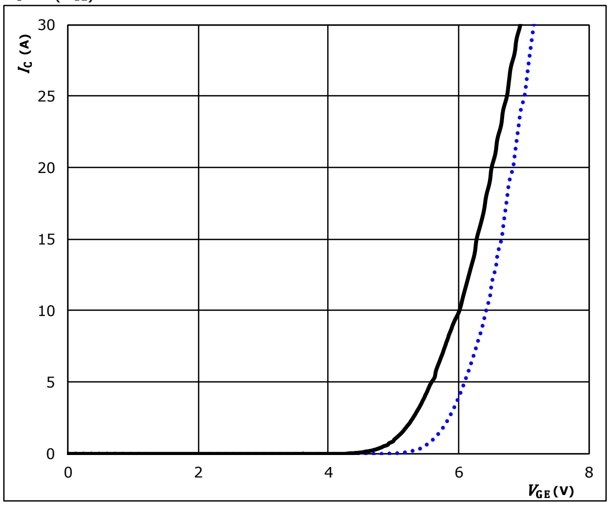


t_p =	250	μs
T_j =	125	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

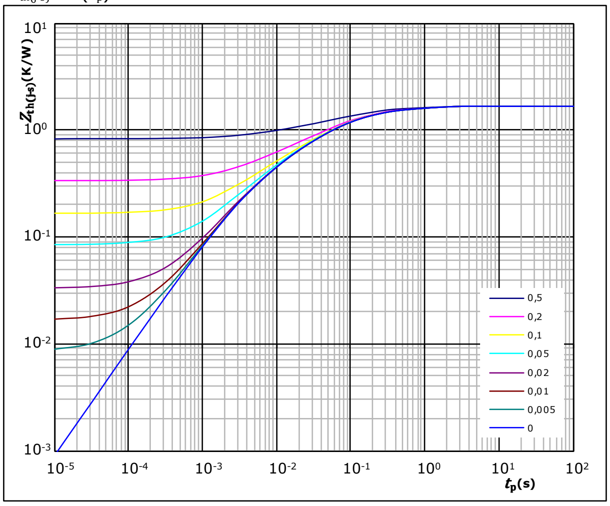


t_p =	100	μs	T_j:	25 °C (dotted)
V_{CE} =	10	V		125 °C (solid)

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 K/W

IGBT thermal model values

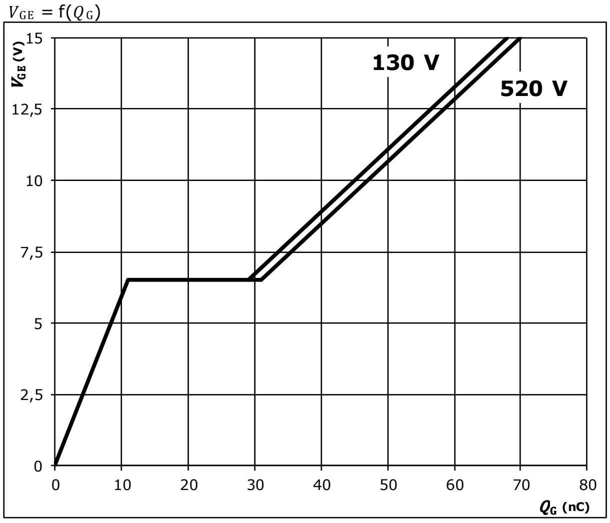
R (K/W)	τ (s)
1,80E-01	1,06E+00
3,72E-01	1,72E-01
6,39E-01	5,52E-02
3,20E-01	1,27E-02
1,54E-01	3,03E-03

Boost Switch Characteristics

figure 5. IGBT

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

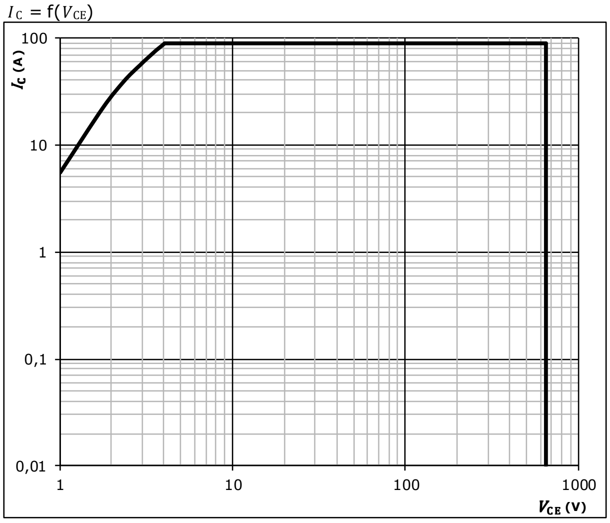


I_C = 30 A

figure 6. IGBT

Safe operating area

$I_C = f(V_{CE})$

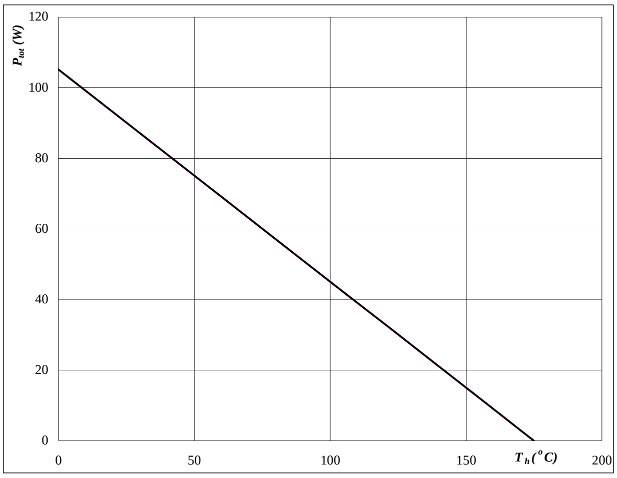


D = single pulse
T_s = 80 ºC
V_{GE} = ±15 V
T_j = T_{jmax}

figure 7. IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$

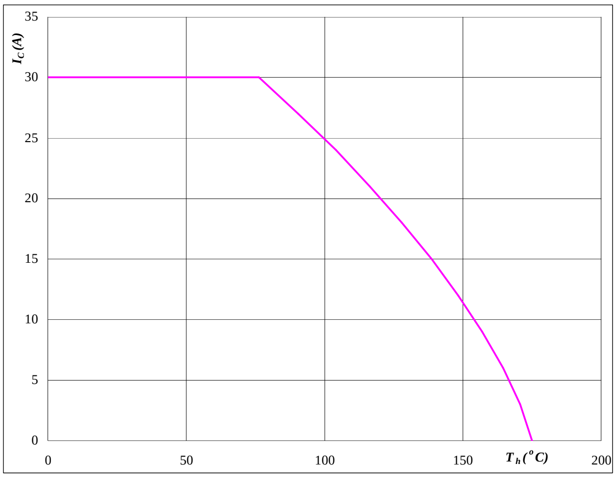


At
T_j = 175 °C

figure 8. IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



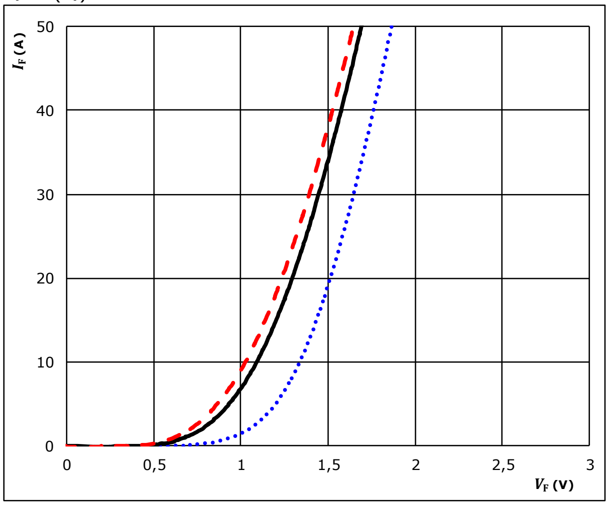
At
T_j = 175 °C
V_{GE} = 15 V

Boost Diode Characteristics

figure 1. FWD

Typical forward characteristics

$I_F = f(V_F)$



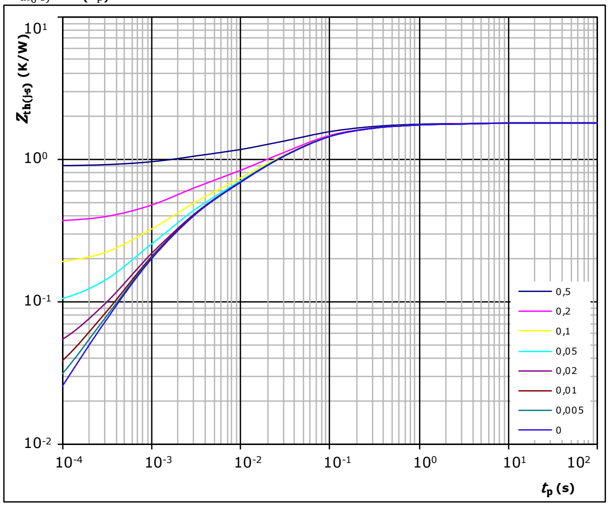
t_p = 250 μs

T_j: 25 °C; 125 °C; 150 °C

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,81 K/W

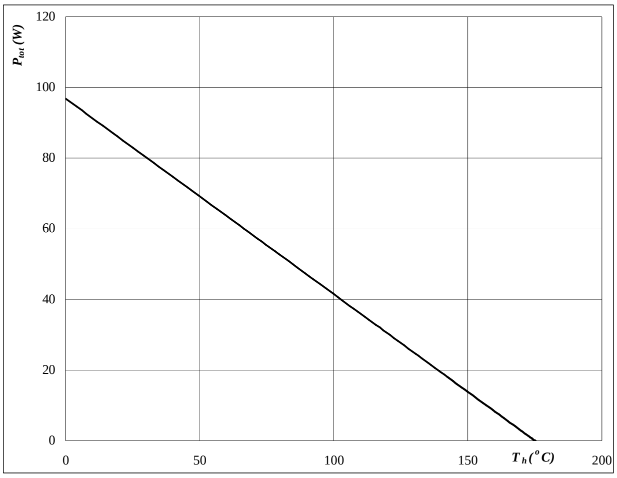
FWD thermal model values

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

$P_{tot} = f(T_h)$



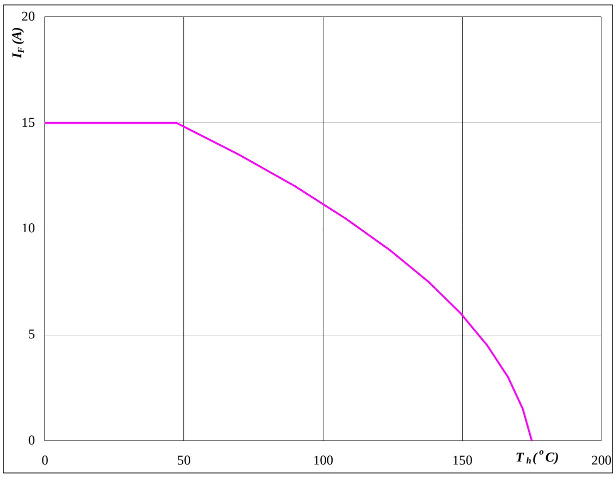
At

T_j = 175 °C

figure 4. FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

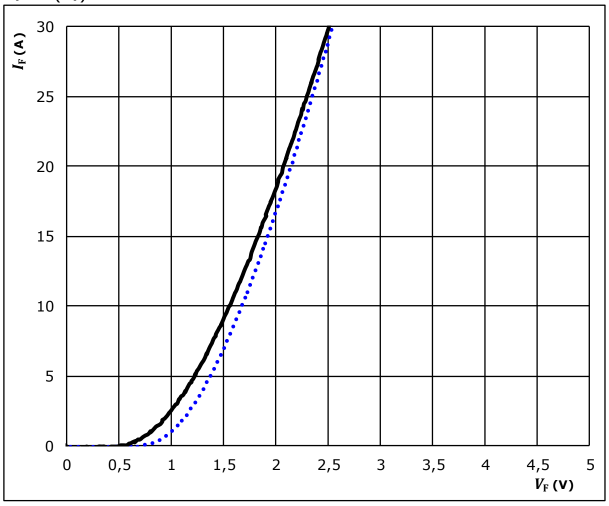
T_j = 175 °C

Boost Sw.Prot. Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



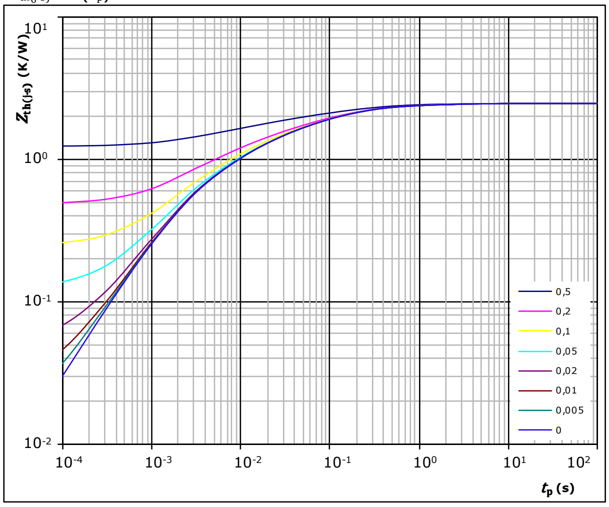
t_p = 250 μs

T_j: 25 °C (dotted line); 125 °C (solid line)

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 2,44 K/W

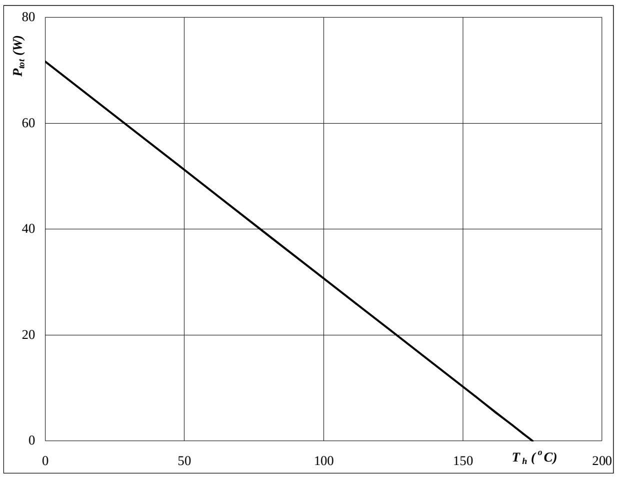
FWD thermal model values

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

$P_{tot} = f(T_h)$



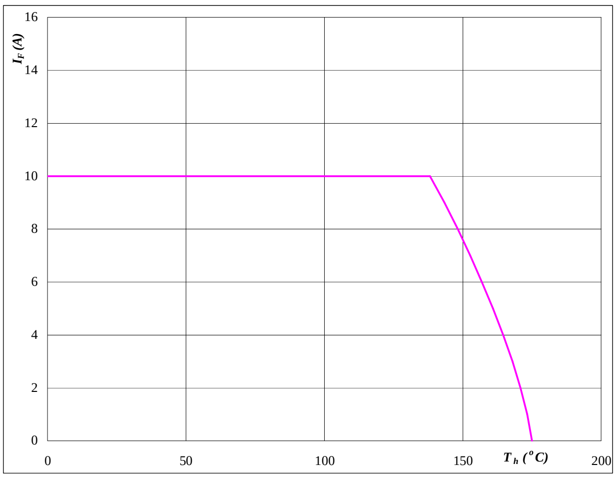
At

T_j = 175 ºC

Figure 4 **FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

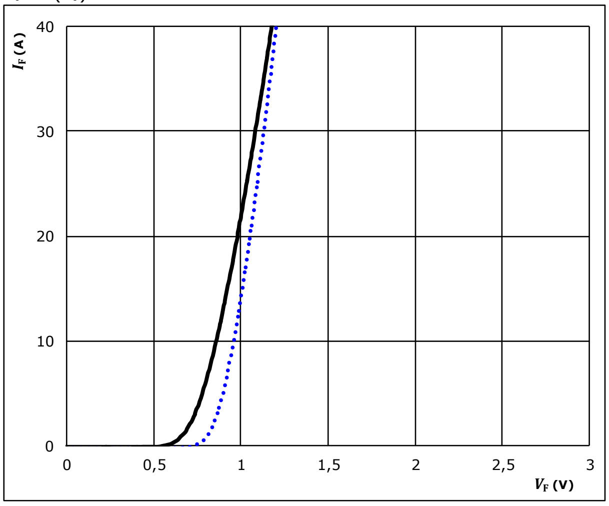
T_j = 175 ºC

ByPass Diode Characteristics

figure 1. **Rectifier Diode**

Typical forward characteristics

$I_F = f(V_F)$

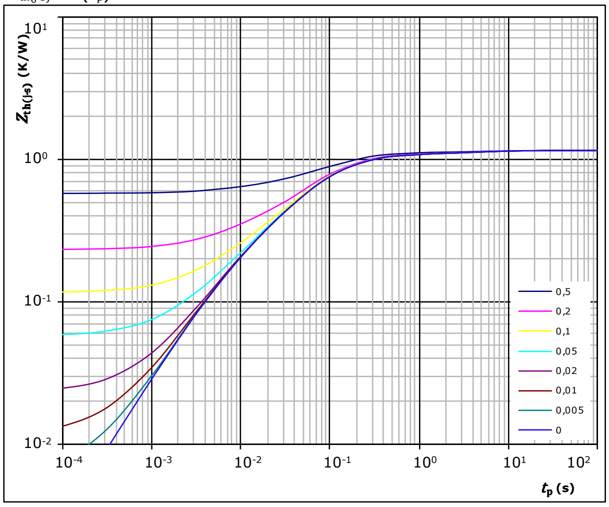


t_p =	250	μs	T_j:	25 °C	············
				125 °C	———

figure 2. **Rectifier Diode**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,16 K/W

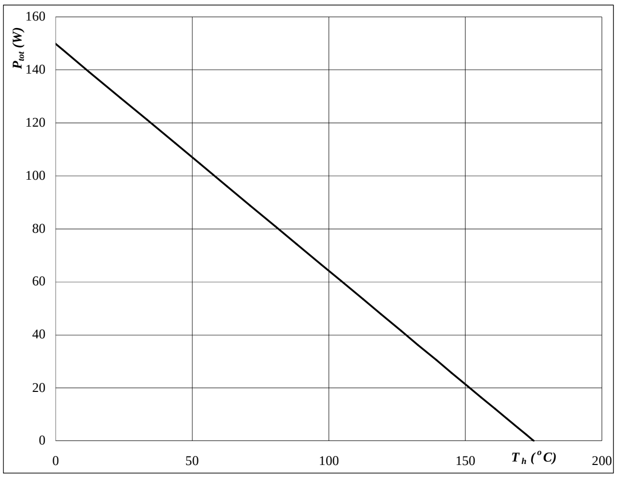
Diode thermal model values

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

$P_{tot} = f(T_h)$



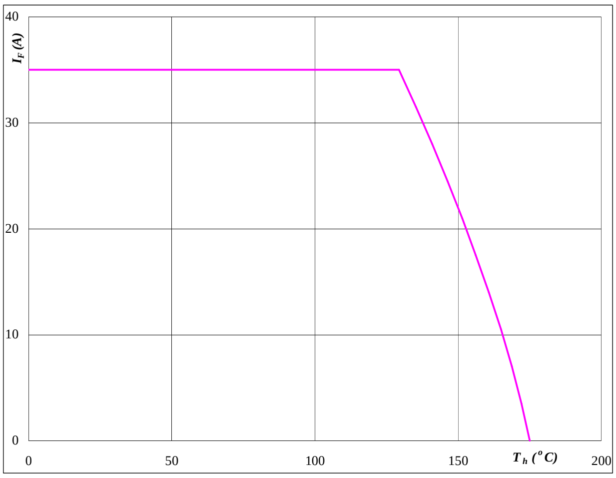
At

T_j = 175 ºC

Figure 4 **Rectifier diode**

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

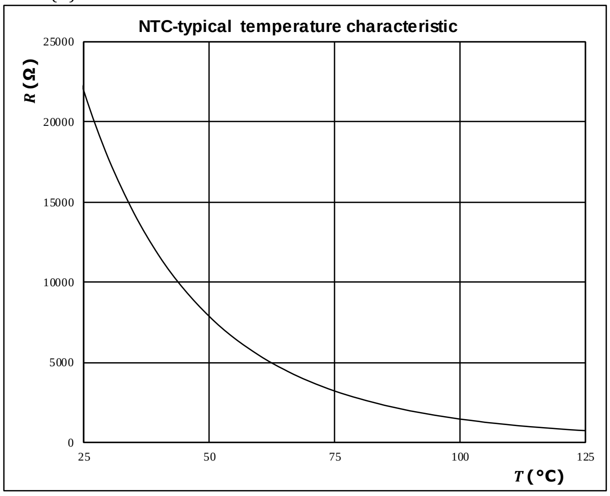
T_j = 175 ºC

Thermistor Characteristics

figure 1.	Thermistor

Typical NTC characteristic as a function of temperature

$R = f(T)$

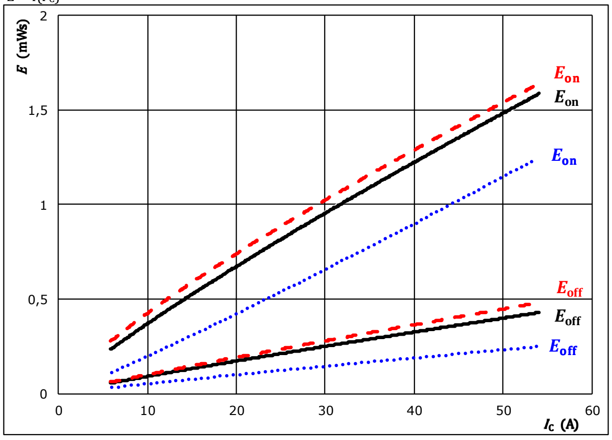


H-Bridge Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



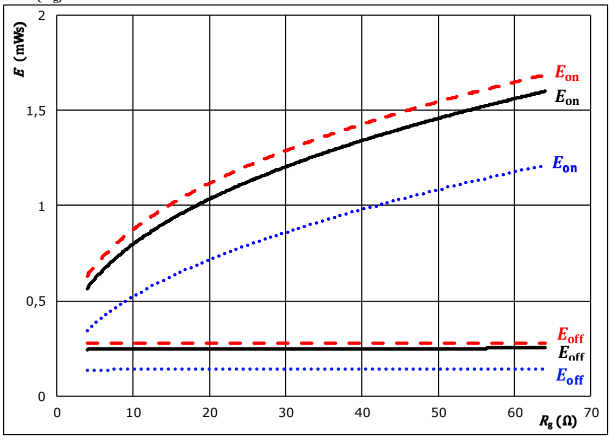
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C
R_{goff} =	16	Ω		

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



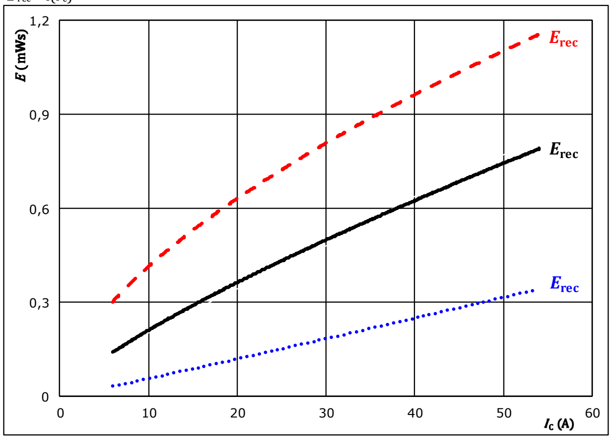
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	30	A		150 °C

figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



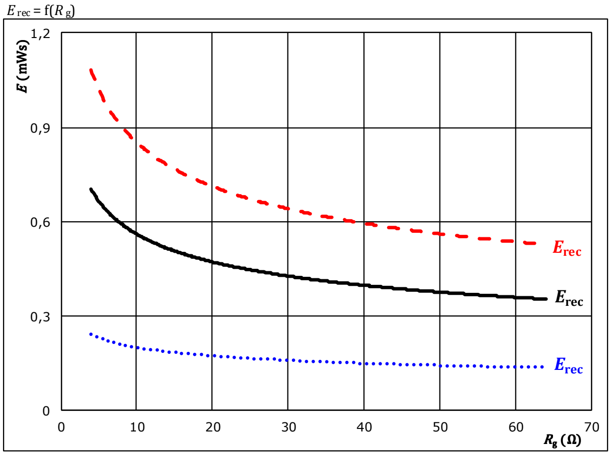
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

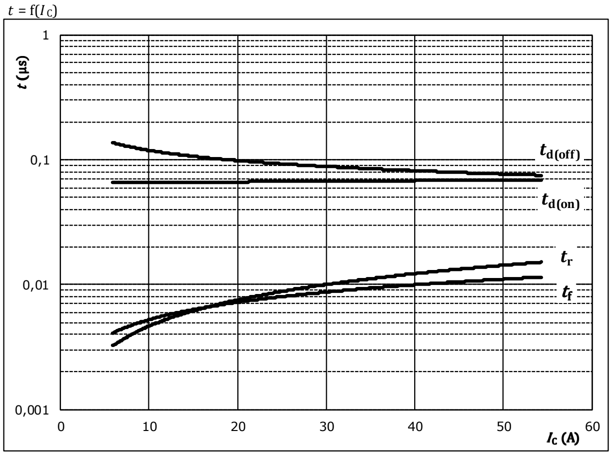
V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	30	A		150 °C

H-Bridge Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



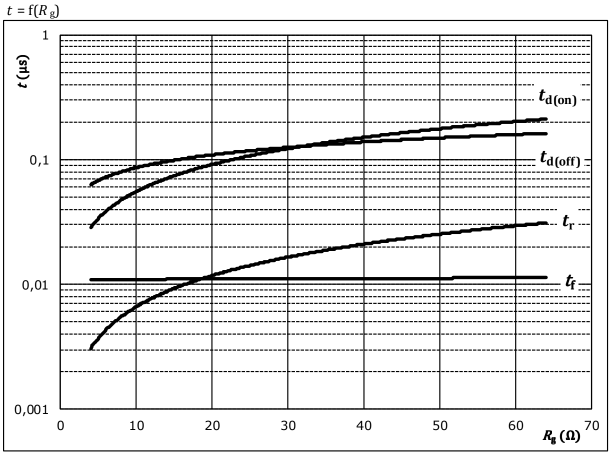
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



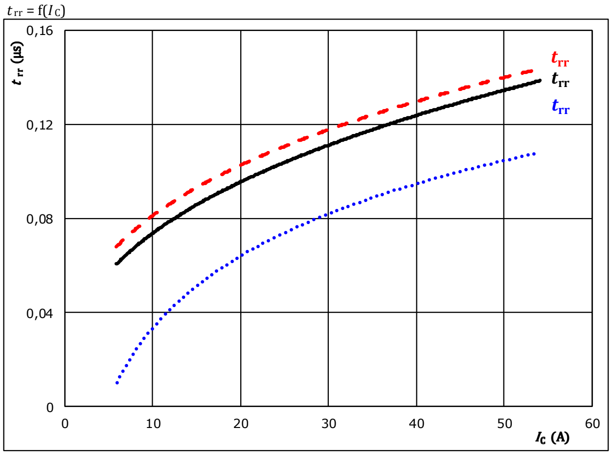
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	±15	V
I_C =	30	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



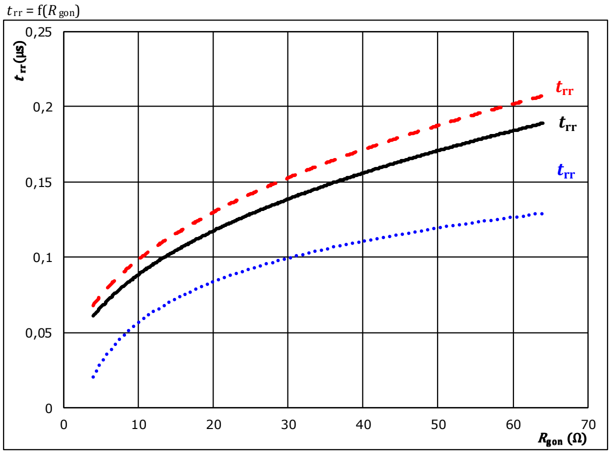
With an inductive load at

V_{CE}=	400	V		25 °C	········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

figure 8. **FWD**

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

$t_{rr} = f(R_{gon})$



With an inductive load at

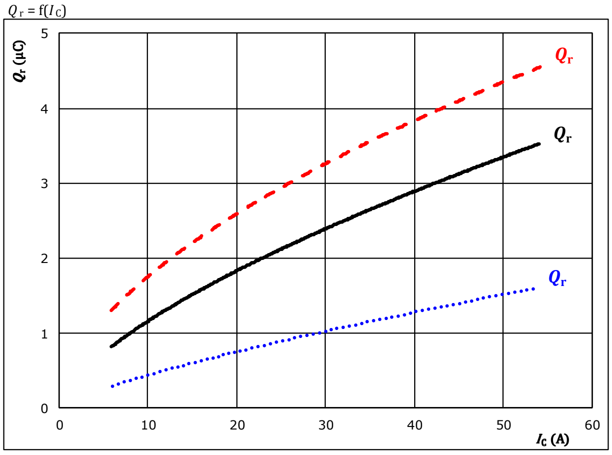
V_{CE} =	400	V		25 °C	········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	30	A		150 °C	– – –

H-Bridge Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



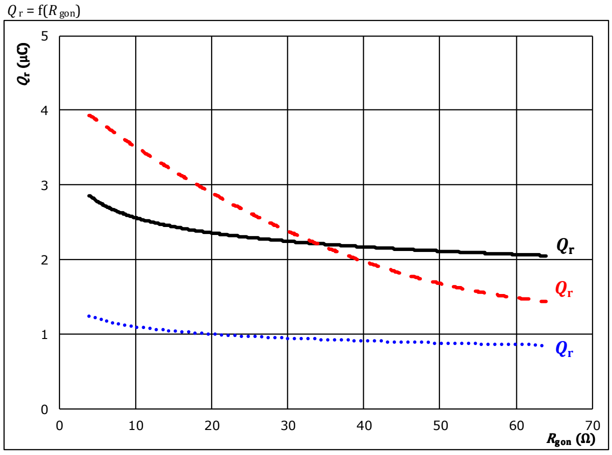
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



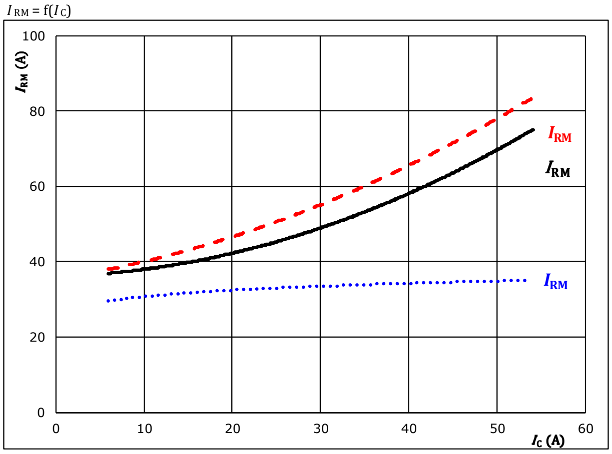
With an inductive load at

V_{CE}=	400	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C=	30	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



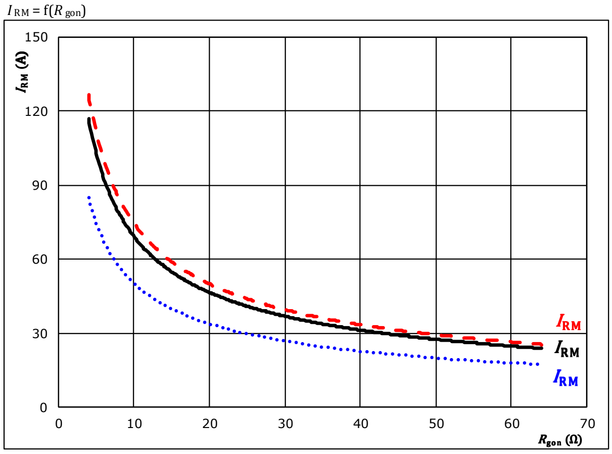
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

figure 12. **FWD**

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

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



With an inductive load at

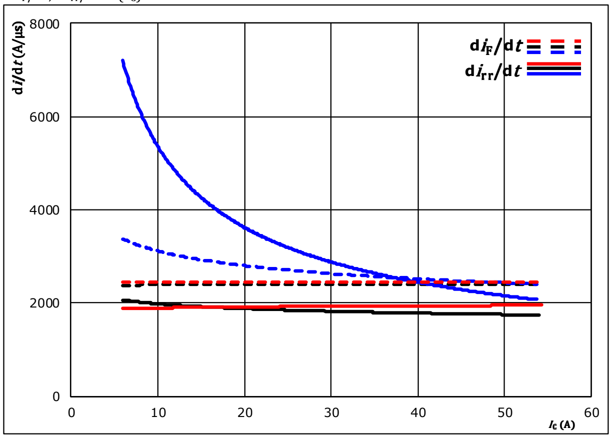
V_{CE} =	400	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	30	A		150 °C	– – –

H-Bridge Switching Characteristics

figure 13. **FWD**

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

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



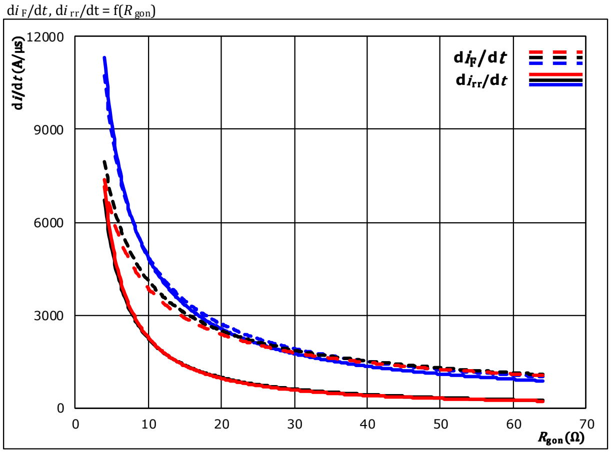
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 14. **FWD**

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

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



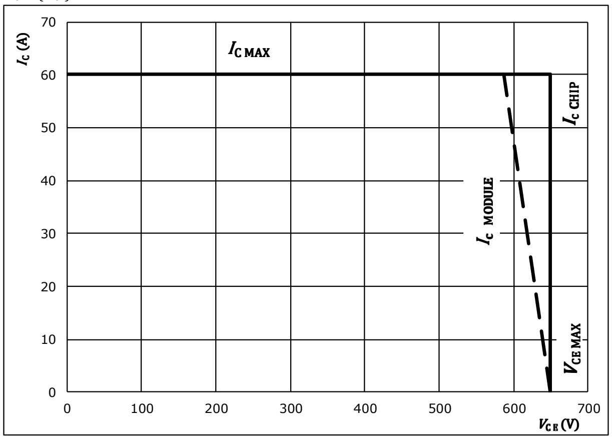
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C=	30	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

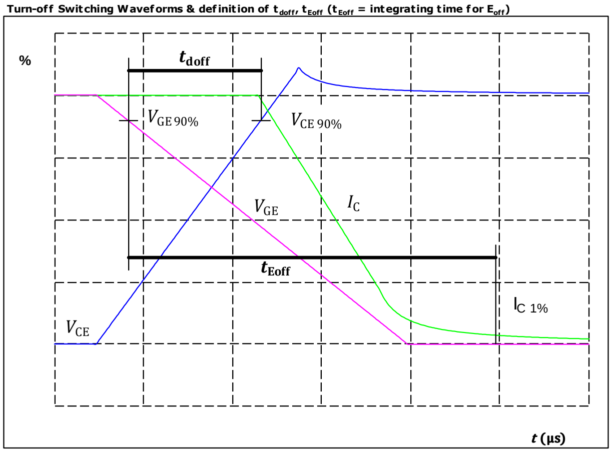
T_j =	125	°C
R_{gon} =	16	Ω
R_{goff} =	16	Ω

H-Bridge Switching Definitions

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

figure 1. IGBT

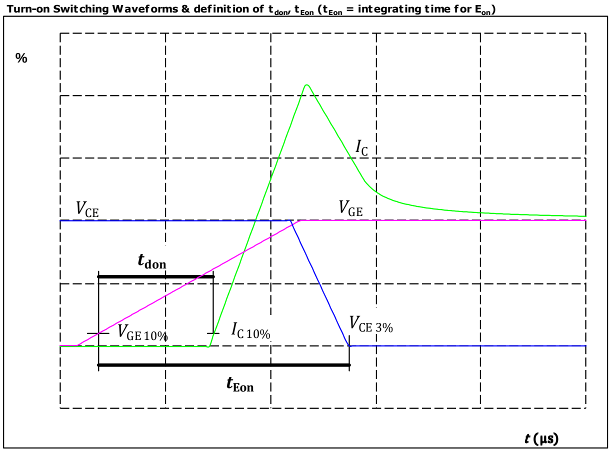
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



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

figure 2. IGBT

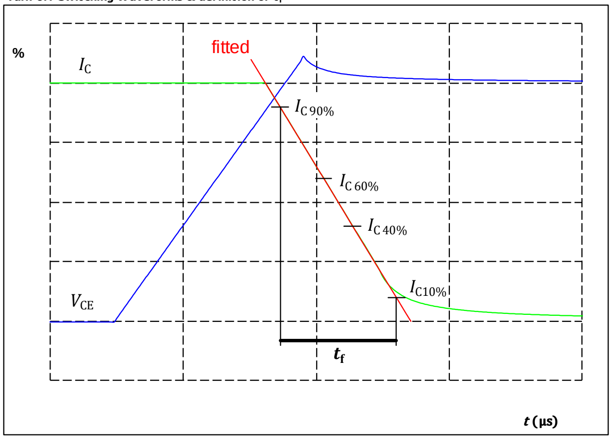
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



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

figure 3. IGBT

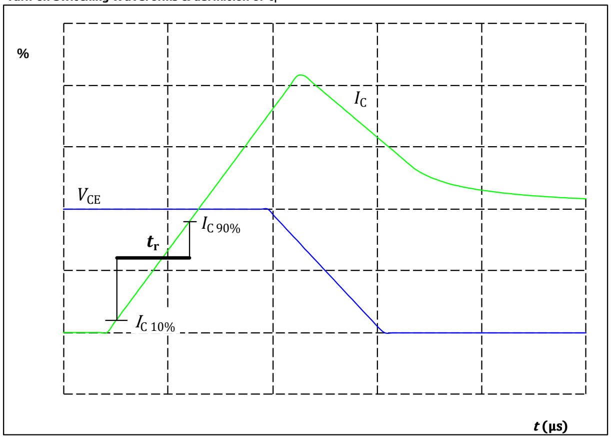
Turn-off Switching Waveforms & definition of t_f



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

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

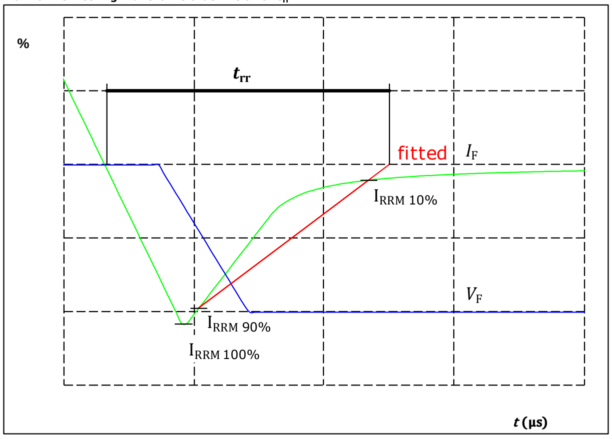


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_r =	9	ns

H-Bridge Switching Characteristics

figure 5. **FWD**

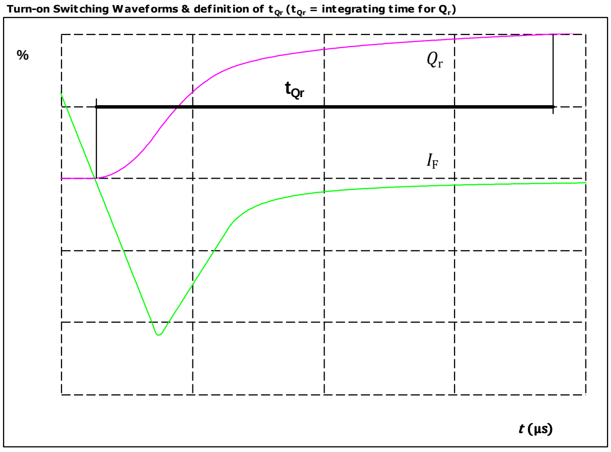
Turn-off Switching Waveforms & definition of t_{rr}



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)



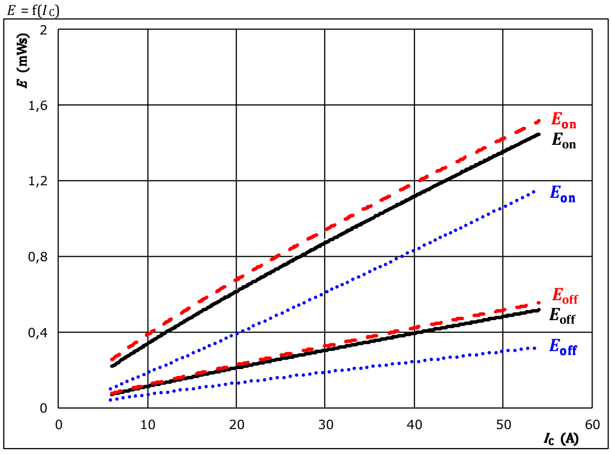
I_F (100%) =	30	A
Q_r (100%) =	2,37	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



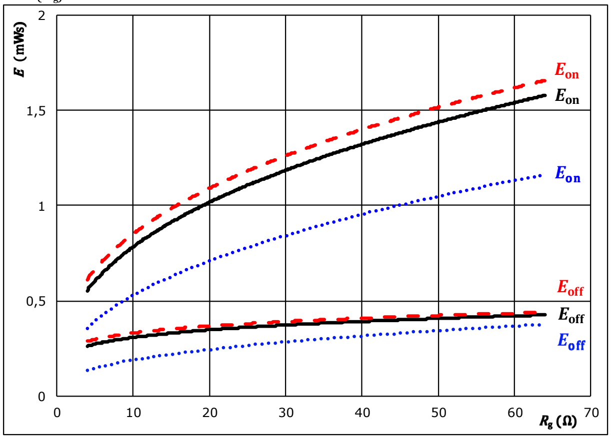
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C (dotted)
V_{GE} =	0 / 15	V		125 °C (solid)
R_{gon} =	16	Ω		150 °C (dashed)
R_{goff} =	16	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



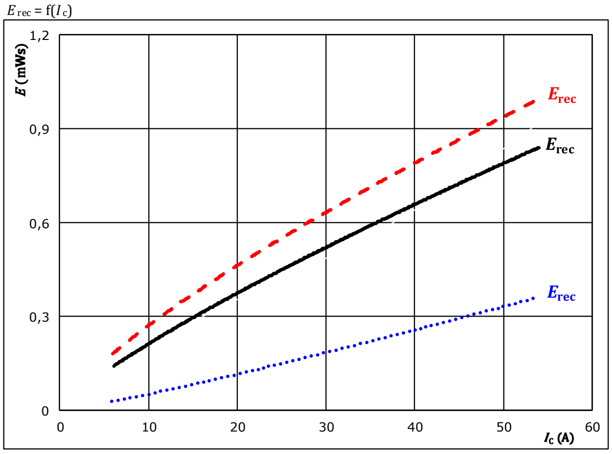
With an inductive load at

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

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



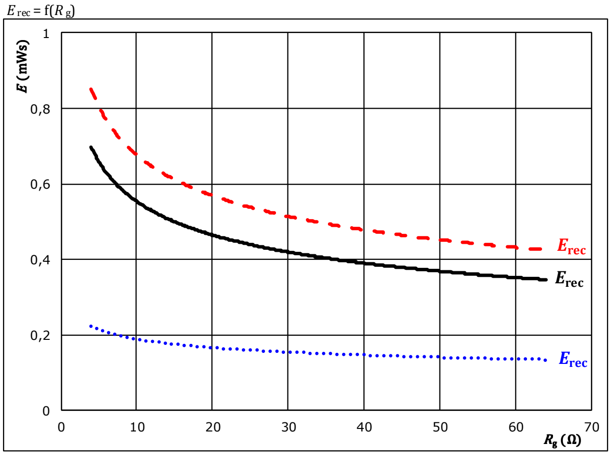
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C (dotted)
V_{GE} =	0 / 15	V		125 °C (solid)
R_{gon} =	16	Ω		150 °C (dashed)

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

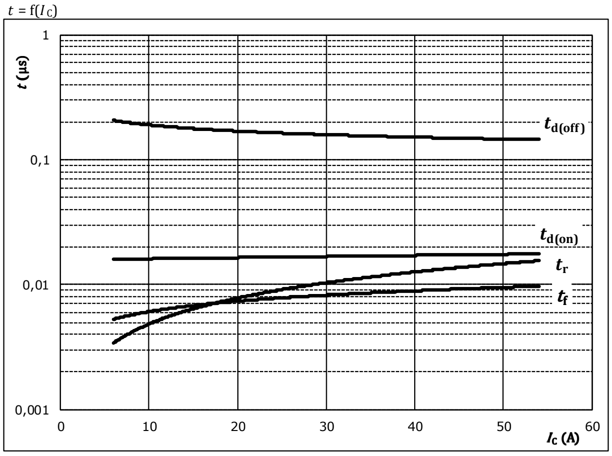
V_{CE} =	400	V	T_j:	25 °C (dotted)
V_{GE} =	0 / 15	V		125 °C (solid)
I_C =	30	A		150 °C (dashed)

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



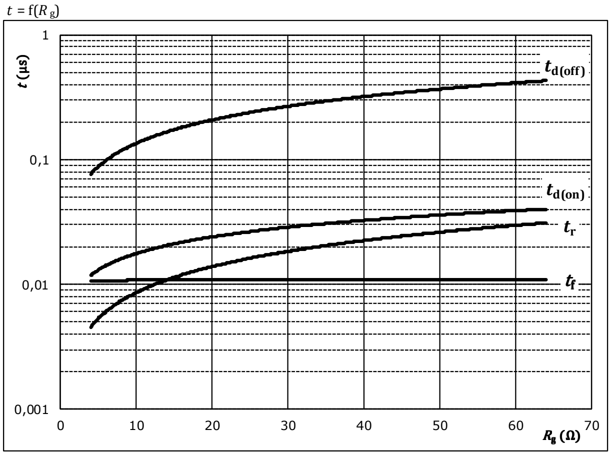
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	0 / 15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



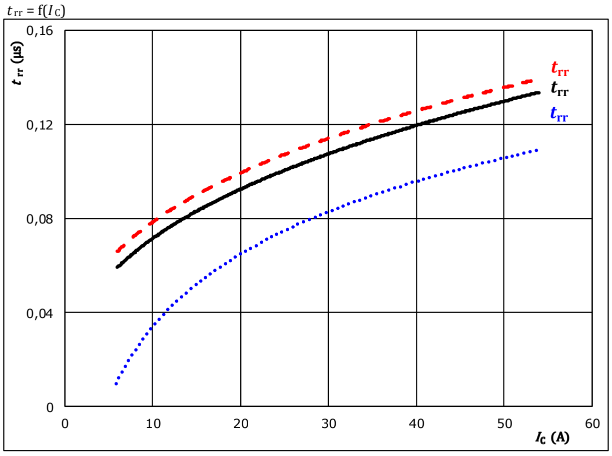
With an inductive load at

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

$t_{rr} = f(I_C)$



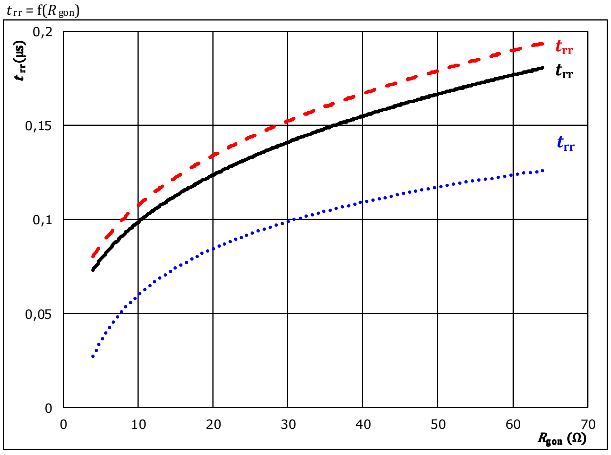
With an inductive load at

V_{CE}=	400	V	T_j:	25 °C	··········
V_{GE} =	0 / 15	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

figure 8. **FWD**

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

$t_{rr} = f(R_{gon})$



With an inductive load at

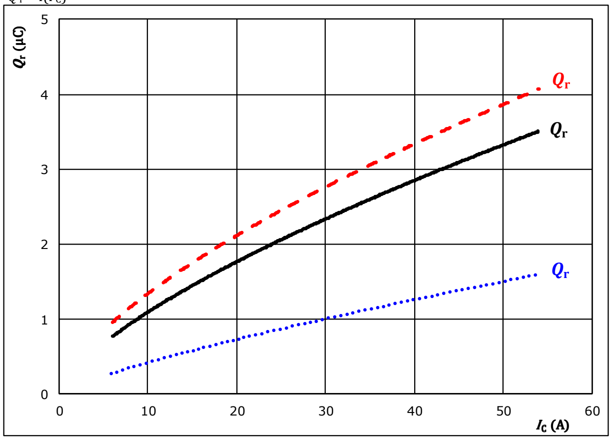
V_{CE} =	400	V	T_j:	25 °C	··········
V_{GE} =	0 / 15	V		125 °C	———
I_C =	30	A		150 °C	– – –

Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



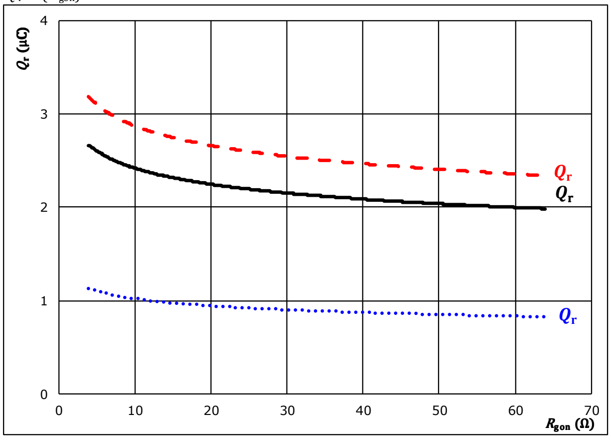
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 10. FWD

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

$Q_r = f(R_{gon})$



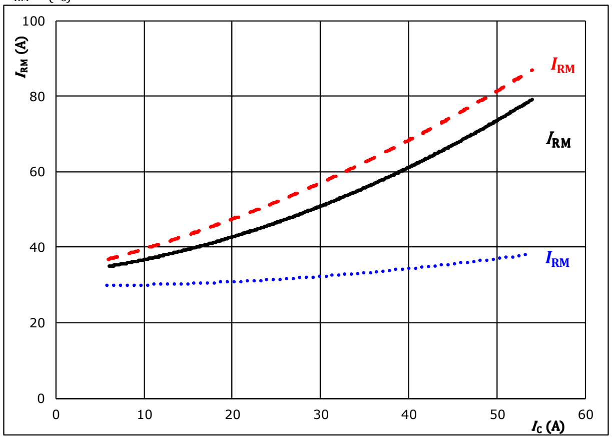
With an inductive load at

V_{CE}=	400	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C=	30	A		150 °C

figure 11. FWD

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

$I_{RM} = f(I_C)$



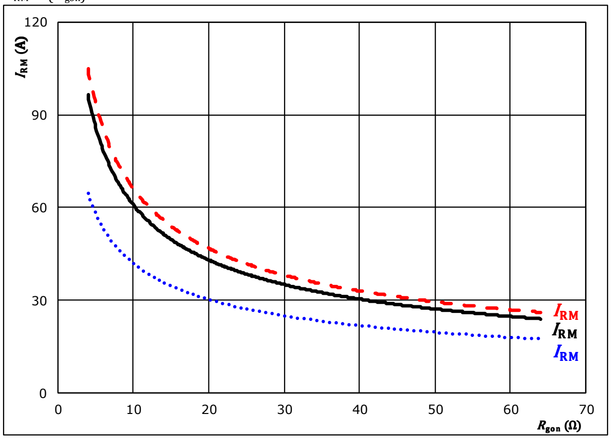
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 12. FWD

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

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



With an inductive load at

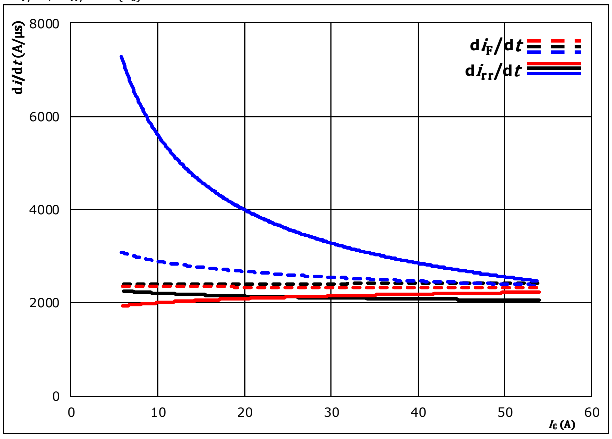
V_{CE}=	400	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C=	30	A		150 °C

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



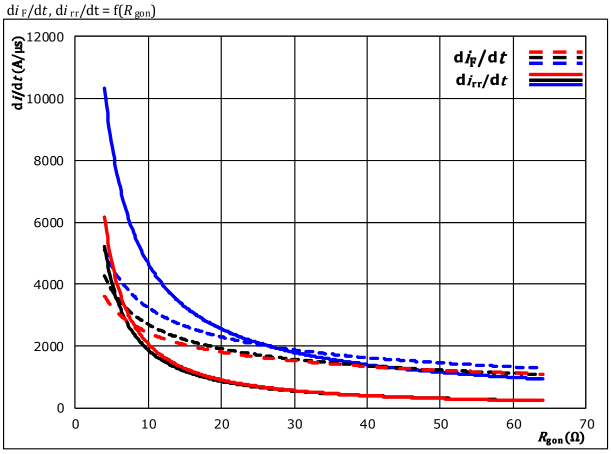
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
R_{gon} =	16	Ω		150 °C

figure 14. **FWD**

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

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



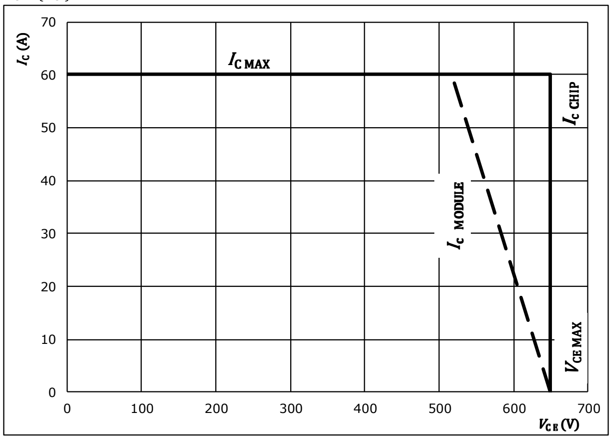
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C
V_{GE} =	0 / 15	V		125 °C
I_C=	30	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

Vincotech

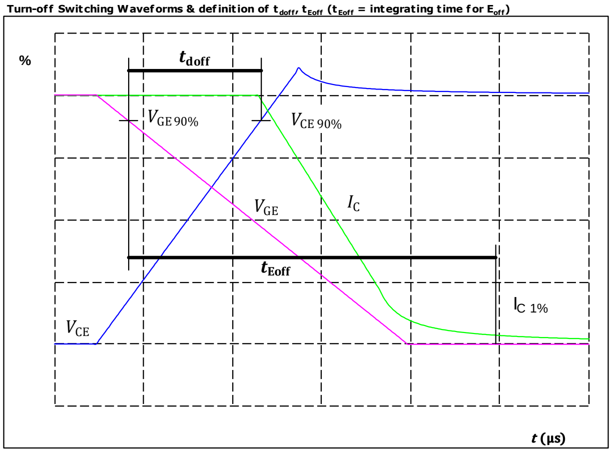
10-FZ07BIA030SM02-P894E58
10-PZ07BIA030SM02-P894E58Y
datasheet

Boost Switching Definitions

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

figure 1. IGBT

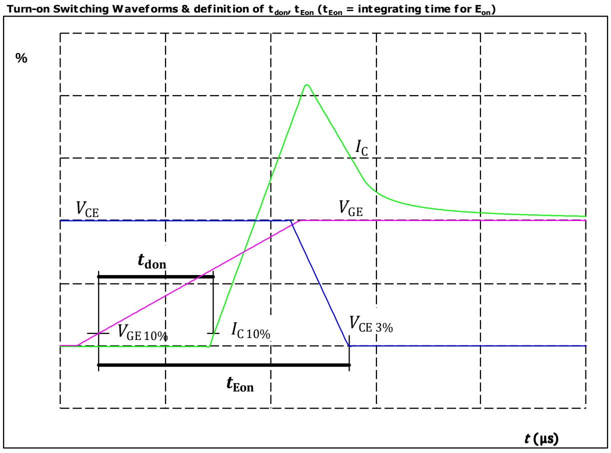
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



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

figure 2. IGBT

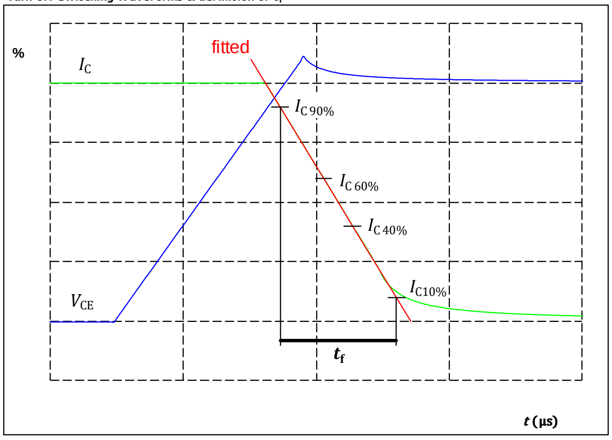
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



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

figure 3. IGBT

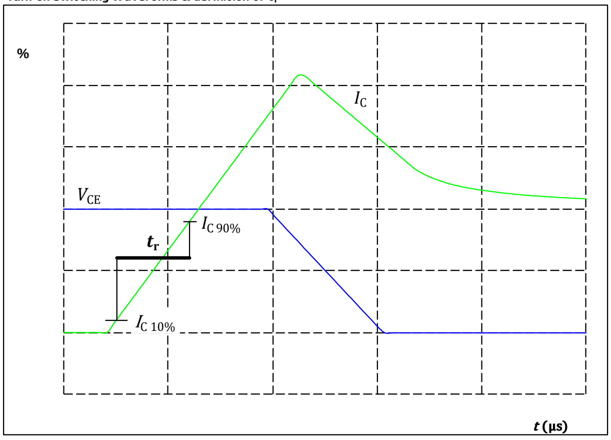
Turn-off Switching Waveforms & definition of t_f



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

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

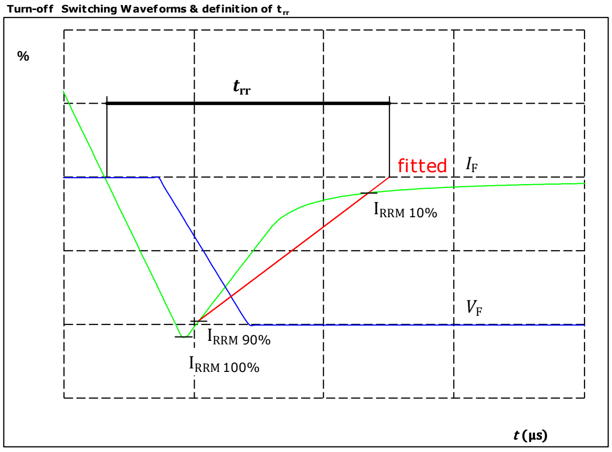


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_r =	9	ns

Boost Switching Characteristics

figure 5. **FWD**

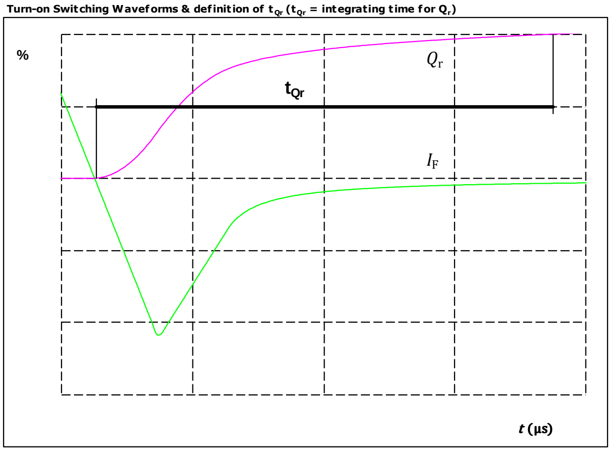
Turn-off Switching Waveforms & definition of t_{rr}



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

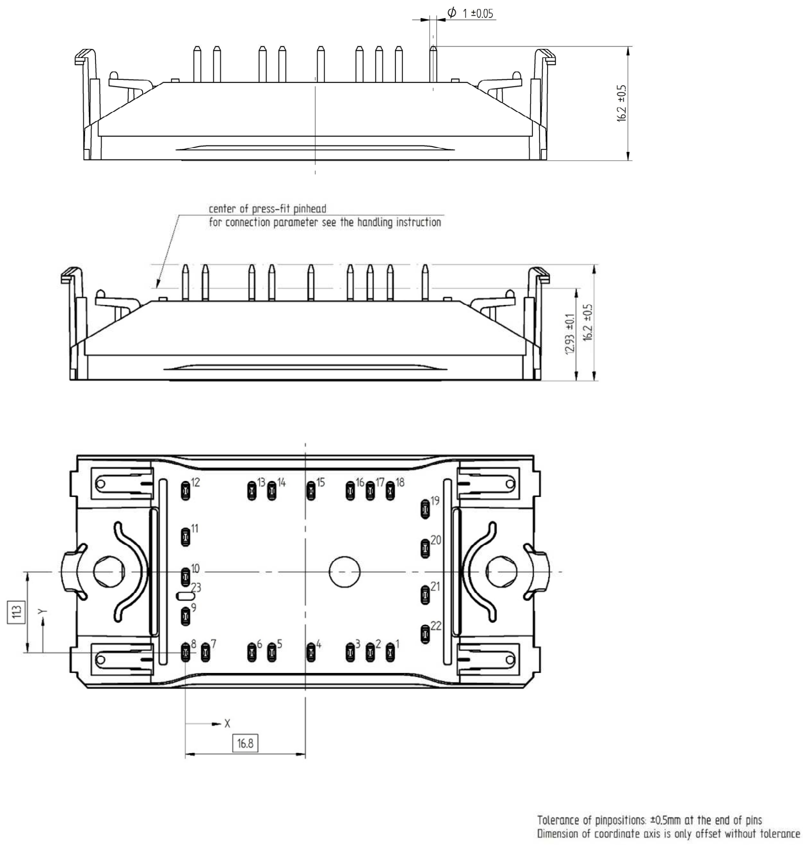
Ordering Code & Marking

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/

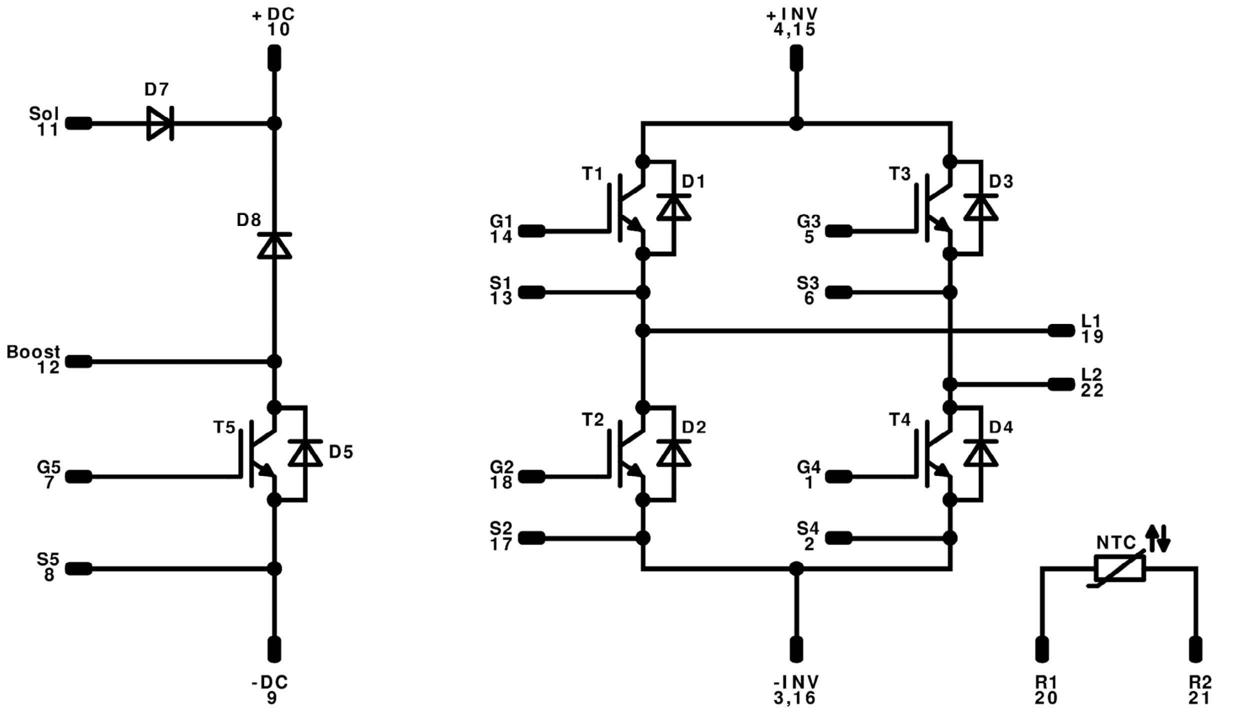
Text	Name		Date code	UL & VIN	Lot	Serial
	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

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		



Pinout



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	

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

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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