Vincotech

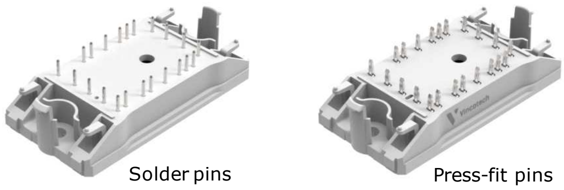
10-FZ07BIA030RW-P894E88
10-PZ07BIA030RW-P894E88Y
datasheet

flow **SOL 0 BI** — **650 V / 30 A**

Features

- Booster + H-Bridge
- Kelvin Emitter for improved switching performance
- Temperature sensor

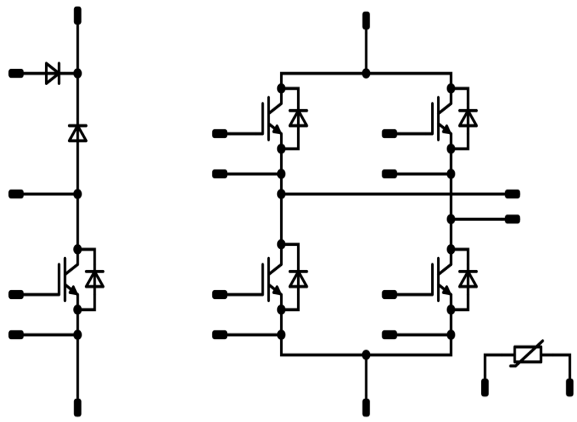
flow 0 12 mm housing



Target applications

- Power Supply
- Solar Inverters

Schematic



Types

- 10-FZ07BIA030RW-P894E88
- 10-PZ07BIA030RW-P894E88Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C		30	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	63	W
Gate-emitter voltage	V_{GES}		±30	V
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			15	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	49	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			10	A
Repetitive peak forward current	I_{FRM}			20	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	33	W
Maximum junction temperature	T_{jmax}			175	°C
ByPass Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1600	V
Continuous (direct) forward current	I_F			35	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	270	A
Surge current capability	I^2t			370	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	56	W
Maximum Junction Temperature	T_{jmax}			150	°C
H-Bridge Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C			30	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	63	W
Gate-emitter voltage	V_{GES}			±30	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			15	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	49	W
Maximum junction temperature	T_{jmax}			175	°C
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{jop}			-40…(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance		Solder pins		8,66	mm
		Press-fit pins		9,17	mm
Comparative Tracking Index	CTI			> 200	

*100 % tested in production

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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,02	25	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150		1,44 1,60 1,63	1,9	V
Collector-emitter cut-off current	I_{CES}		0	650		25			10	µA
Gate-emitter leakage current	I_{GES}		30	0		25			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	30		25		2530		pF
Output capacitance	C_{oes}							65		
Reverse transfer capacitance	C_{res}							46		
Gate charge	Q_g		15	400	30	25		84		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,50		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	15/0	400	30	25 125 150		51 45 43		ns
Rise time	t_r					25 125 150		18 19 19		
Turn-off delay time	$t_{d(off)}$					25 125 150		142 161 164		
Fall time	t_f					25 125 150		31 36 46		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 0,8 µC Q_{rFWD} = 1,9 µC Q_{rFWD} = 2,3 µC				25 125 150		0,449 0,692 0,765		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,406 0,553 0,596		

Vincotech

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datasheet

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)						1,95		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 2094 A/µs di/dt = 1870 A/µs di/dt = 1804 A/µs	15/0	400	30	25 125 150		35 51 54		A
Reverse recovery time	t_{rr}					25 125 150		44 94 100		ns
Recovered charge	Q_r					25 125 150		0,828 1,921 2,252		µC
Reverse recovered energy	E_{rec}					25 125 150		0,188 0,466 0,546		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		4484 1951 2277		A/µs
Boost Sw. Protection 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)						2,87		K/W

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]	Value Min	Value Typ	Value Max	Unit
ByPass Diode										
Static										
Forward voltage	V_F				35	25 125	0,8	1,17 1,13	1,6	V
Reverse leakage current	I_r			1600		25 145			50 1100	μA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,25		K/W

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
H-Bridge Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,02	25	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150		1,44 1,60 1,63	1,9	V
Collector-emitter cut-off current	I_{CES}		0	650		25			10	µA
Gate-emitter leakage current	I_{GES}		30	0		25			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							2530		
Output capacitance	C_{oes}	f = 1 Mhz	0	30		25		65		pF
Reverse transfer capacitance	C_{res}							46		
Gate charge	Q_g		15	400	30	25		84		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,50		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		129 122 119		
Rise time	t_r	R_{goff} = 8 Ω R_{gon} = 8 Ω				25 125 150		22 22 23		
Turn-off delay time	$t_{d(off)}$					25 125 150		67 76 79		ns
Fall time	t_f		±15	350	30	25 125 150		39 43 52		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 0,8 µC Q_{rFWD} = 1,8 µC Q_{rFWD} = 2,2 µC				25 125 150		0,431 0,642 0,718		
Turn-off energy (per pulse)	E_{off}					25 125 150		0,326 0,446 0,487		mWs

Characteristic Values

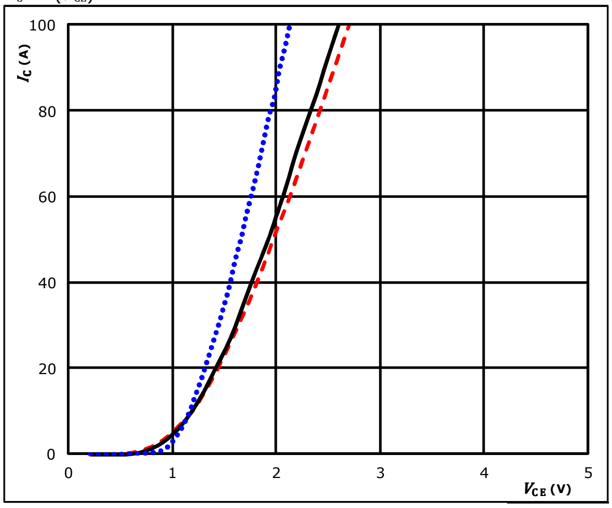
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
H-Bridge Diode										
Static										
Forward voltage	V_F				15	25 125 150		1,44 1,20 1,14		V
Reverse leakage current	I_R			650		25 150			5	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,95		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 1825 A/µs di/dt = 1611 A/µs di/dt = 1686 A/µs	±15	350	30	25 125 150		29 44 49		A
Reverse recovery time	t_{rr}					25 125 150		46 105 114		ns
Recovered charge	Q_r					25 125 150		0,755 1,841 2,218		µC
Reverse recovered energy	E_{rec}					25 125 150		0,146 0,385 0,468		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2636 1738 2119		A/µs
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	

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

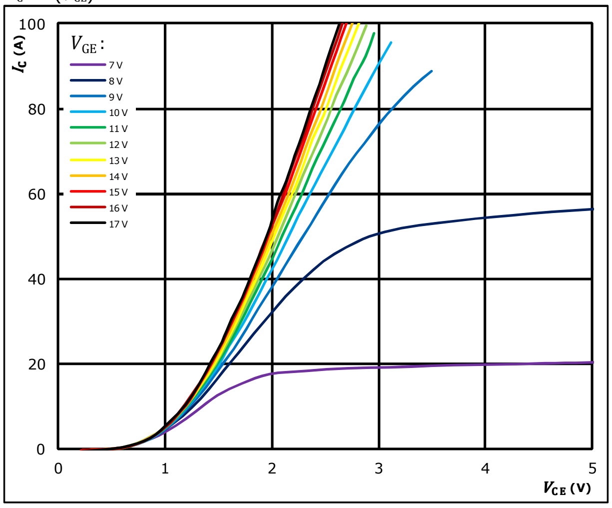


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

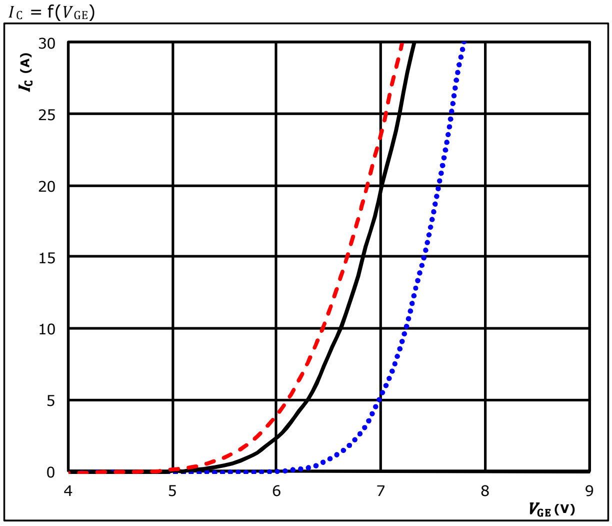


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

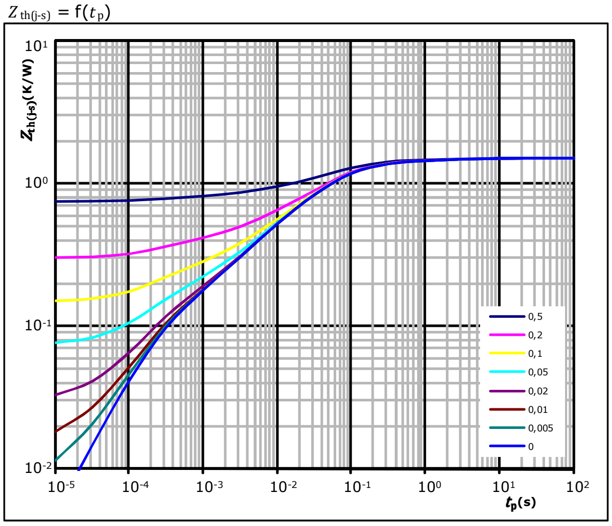


t_p = 100 µs
V_{CE} = 10 V
T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j-s)}$ = 1,50 K/W

IGBT thermal model values

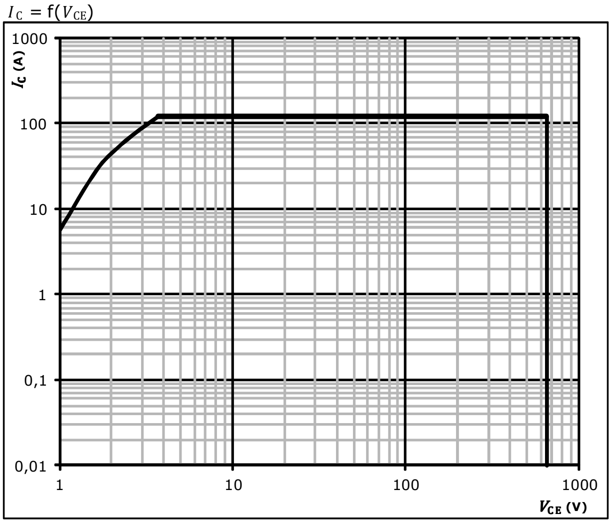
R (K/W)	τ (s)
5,92E-02	3,33E+00
1,11E-01	5,14E-01
4,91E-01	8,64E-02
4,45E-01	3,10E-02
2,28E-01	6,69E-03
7,55E-02	1,48E-03
9,11E-02	2,40E-04

Boost Switch Characteristics

figure 5.	IGBT

Safe operating area

$I_C = f(V_{CE})$



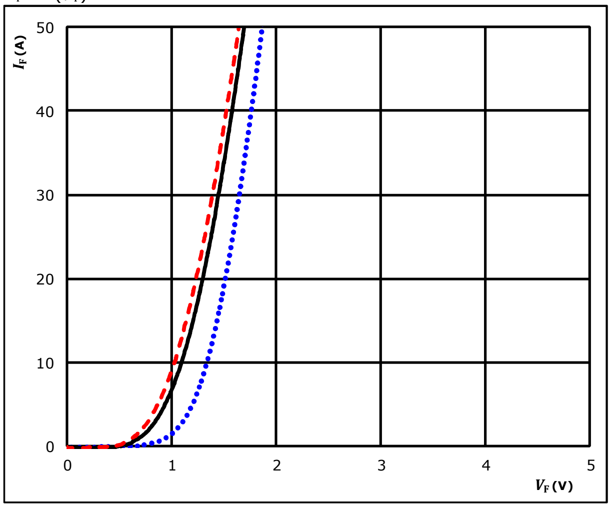
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$

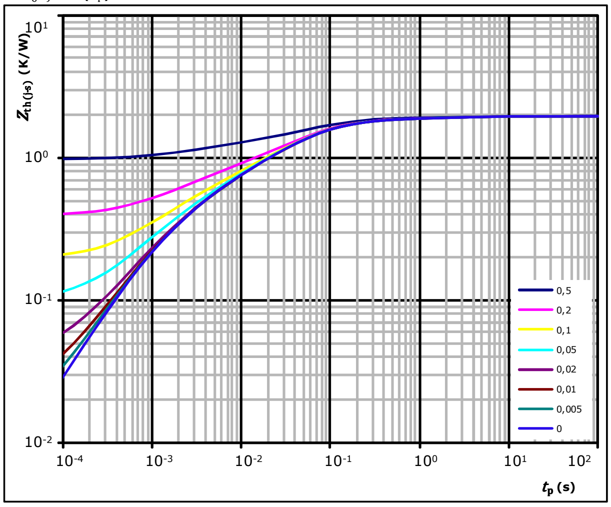


t_p =	250	µs	T_j:	25 °C	dotted
				125 °C	solid
				150 °C	dashed

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,95 K/W

FWD thermal model values

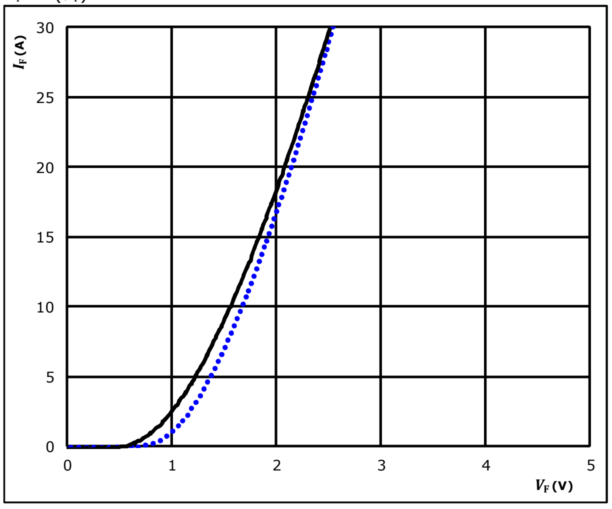
R (K/W)	τ (s)
6,76E-02	3,64E+00
1,40E-01	5,05E-01
6,86E-01	7,72E-02
5,59E-01	2,36E-02
3,18E-01	4,16E-03
1,83E-01	1,00E-03

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



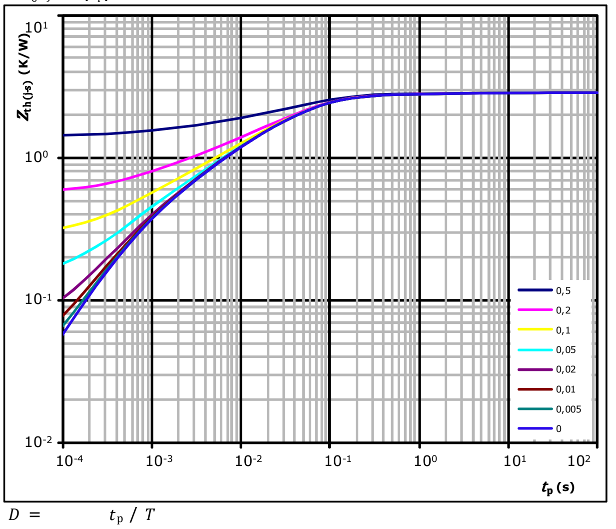
t_p = 250 µs

T_j: 25 °C (dotted), 125 °C (solid)

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 2,87 K/W

FWD thermal model values

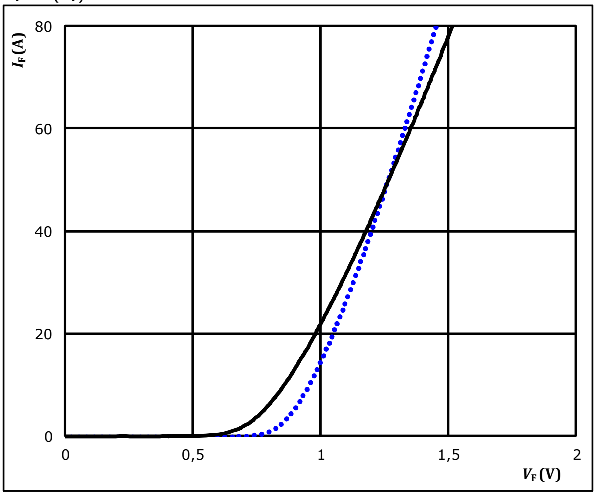
R (K/W)	τ (s)
6,53E-02	3,94E+00
1,48E-01	4,48E-01
1,31E+00	5,96E-02
7,32E-01	1,36E-02
4,04E-01	2,79E-03
2,11E-01	5,37E-04

ByPass Diode Characteristics

figure 1. **Rectifier Diode**

Typical forward characteristics

$I_F = f(V_F)$

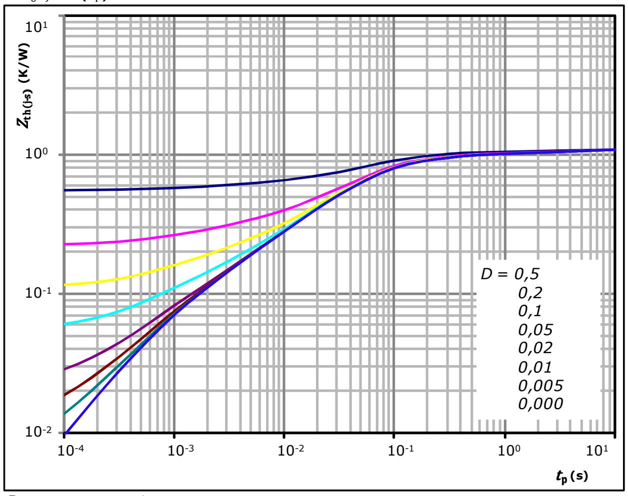


t_p =	250	μs		
		T_j:	25 °C	dotted
			125 °C	solid

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

$R_{th(j\text{-}s)}$ = 1,10 K/W

Diode thermal model values

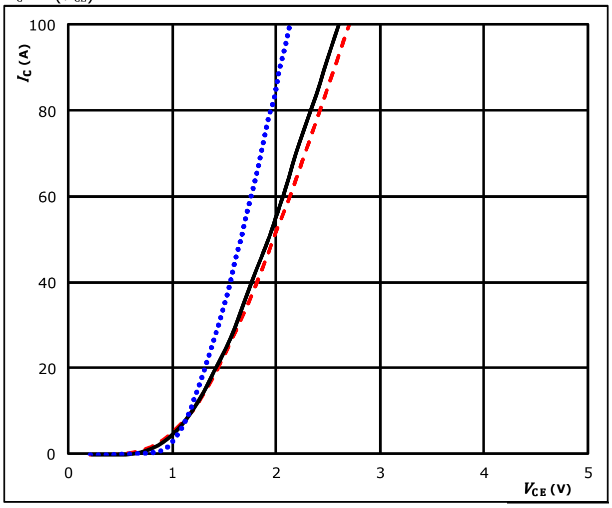
R (K/W)	τ (s)
1,03E-01	7,70E+00
1,17E-01	4,31E-01
5,19E-01	6,42E-02
2,38E-01	2,35E-02
7,64E-02	3,81E-03
4,71E-02	7,57E-04

H-Bridge Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

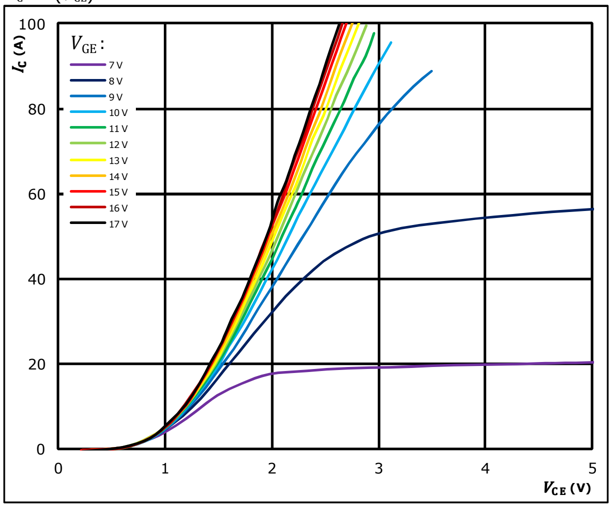


t_p =	250	µs		25	°C
V_{GE} =	15	V	T_j:	125	°C
				150	°C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

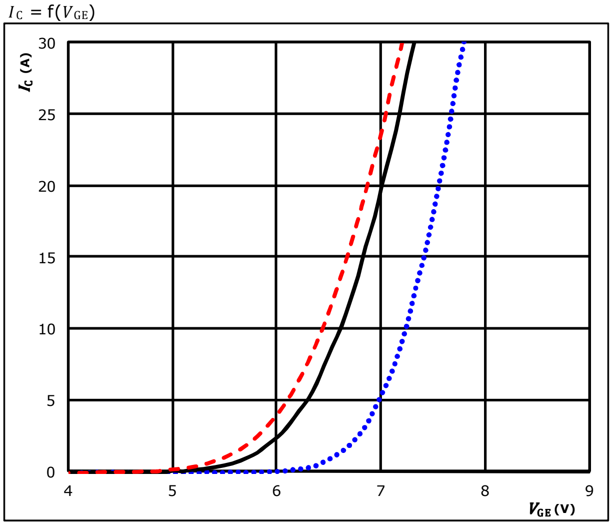


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

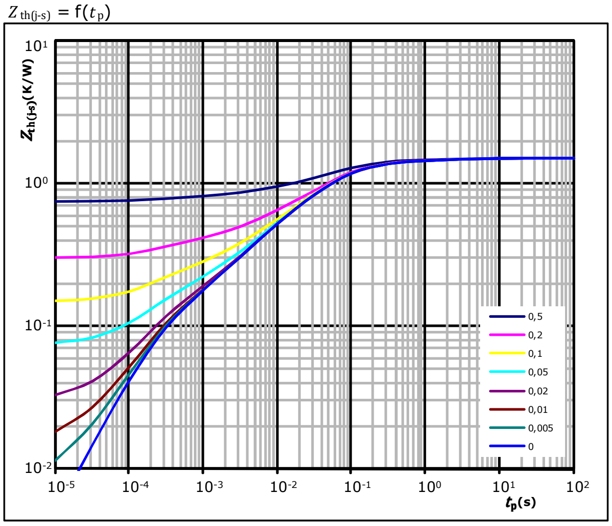


t_p =	100	µs		25	°C
V_{CE} =	10	V	T_j:	125	°C
				150	°C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,50 K/W

IGBT thermal model values

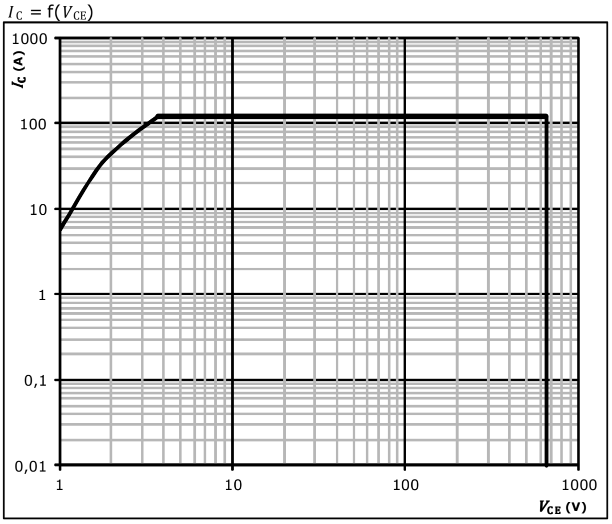
R (K/W)	τ (s)
5,92E-02	3,33E+00
1,11E-01	5,14E-01
4,91E-01	8,64E-02
4,45E-01	3,10E-02
2,28E-01	6,69E-03
7,55E-02	1,48E-03
9,11E-02	2,40E-04

H-Bridge Switch Characteristics

figure 5.	IGBT

Safe operating area

$I_C = f(V_{CE})$



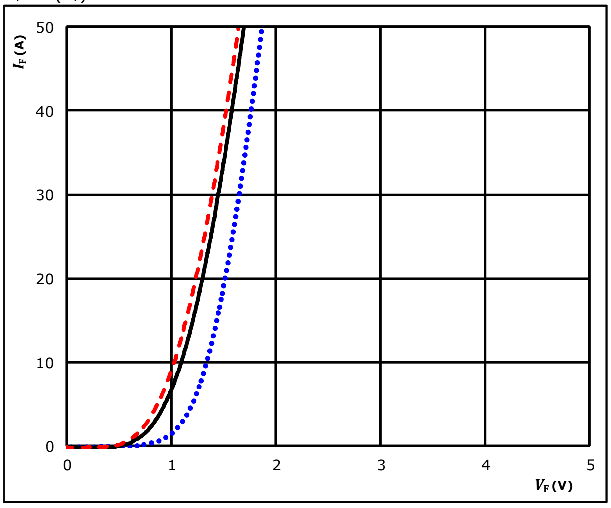
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

H-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



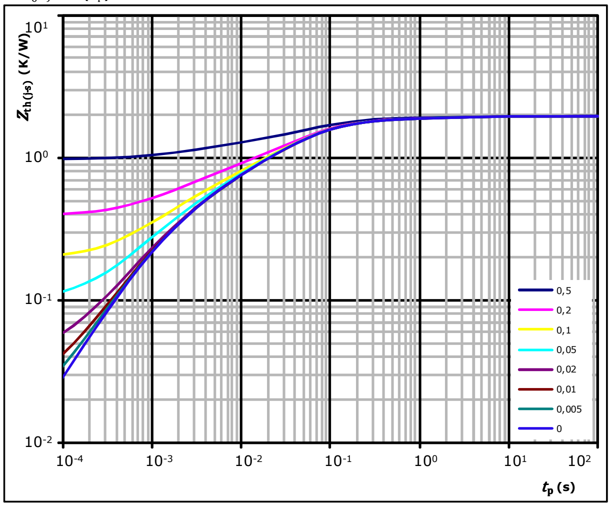
t_p = 250 µs

T_j: 25 °C
125 °C
150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,95 K/W

FWD thermal model values

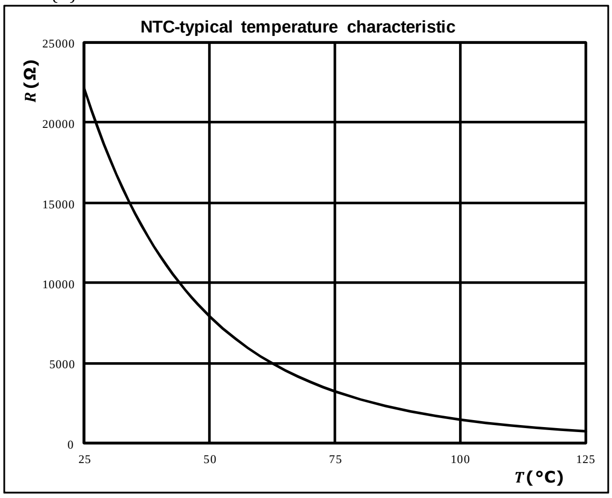
R (K/W)	τ (s)
6,76E-02	3,64E+00
1,40E-01	5,05E-01
6,86E-01	7,72E-02
5,59E-01	2,36E-02
3,18E-01	4,16E-03
1,83E-01	1,00E-03

NTC Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

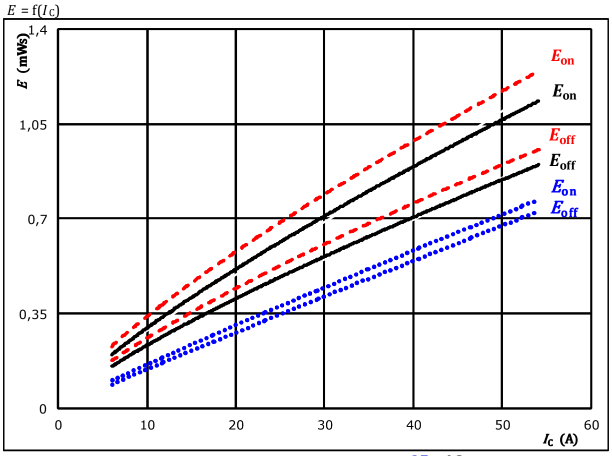


Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



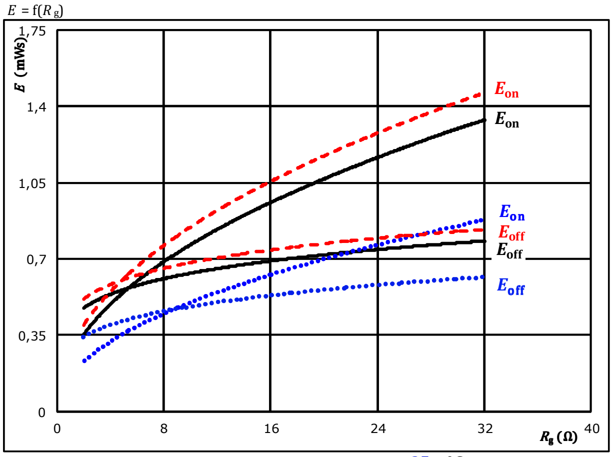
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	··········
V_{GE} =	15/0	V		125 °C	——
R_{gon} =	8	Ω		150 °C	– – –
R_{goff} =	8	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



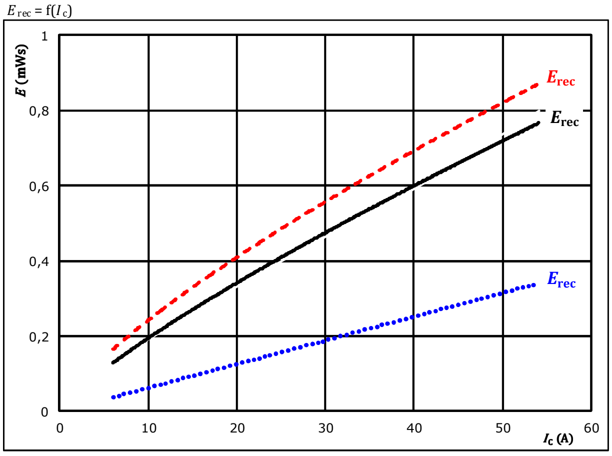
With an inductive load at

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

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



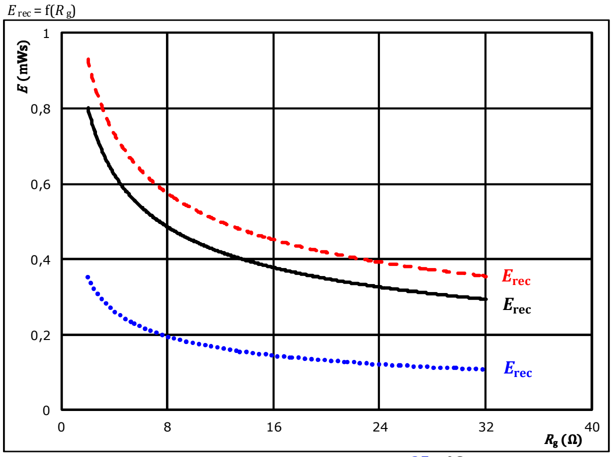
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	··········
V_{GE} =	15/0	V		125 °C	——
R_{gon} =	8	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

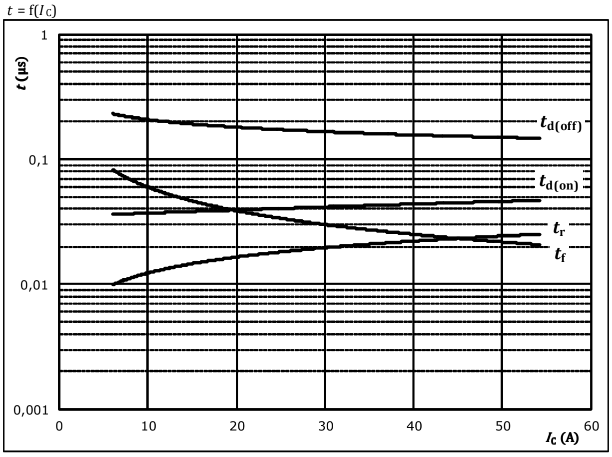
V_{CE} =	400	V	T_j:	25 °C	··········
V_{GE} =	15/0	V		125 °C	——
I_C =	30	A		150 °C	– – –

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



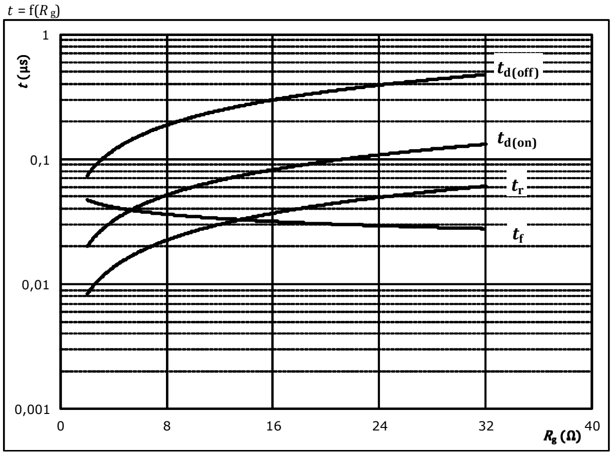
With an inductive load at

T_j =	150	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



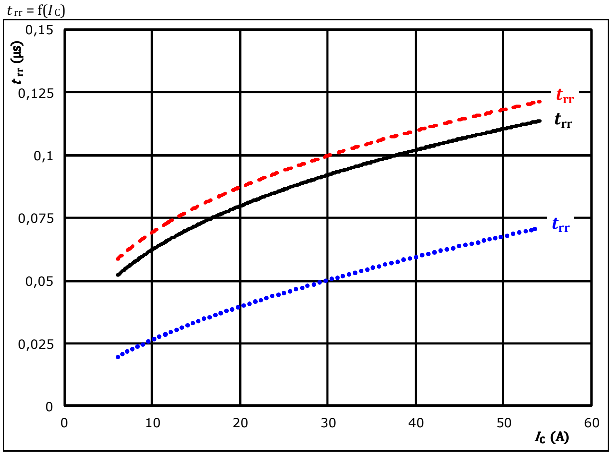
With an inductive load at

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

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

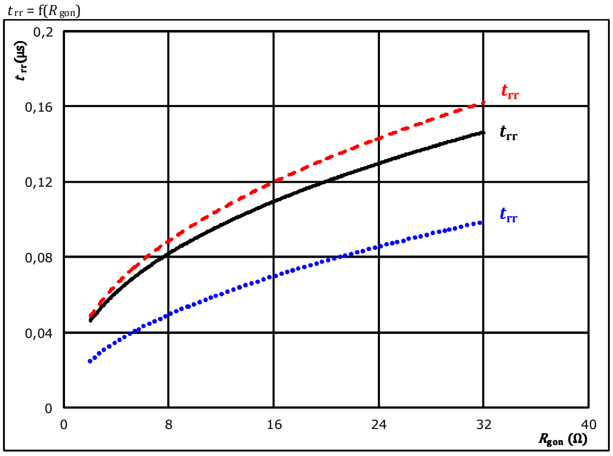


At					
V_{CE}=	400	V		25 °C	···········
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

figure 8. **FWD**

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

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



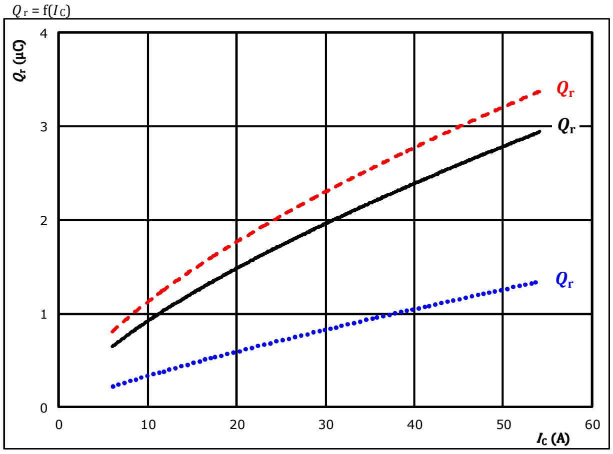
At					
V_{CE} =	400	V		25 °C	···········
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C =	30	A		150 °C	– – –

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

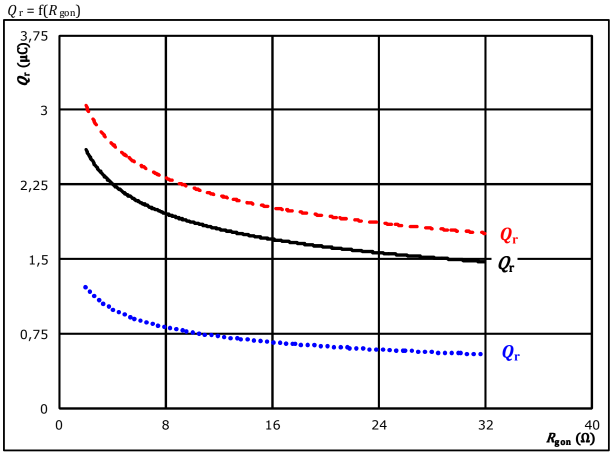


At					
V_{CE} =	400	V		25	°C (dotted)
V_{GE} =	15/0	V	T_j:	125	°C (solid)
R_{gon} =	8	Ω		150	°C (dashed)

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

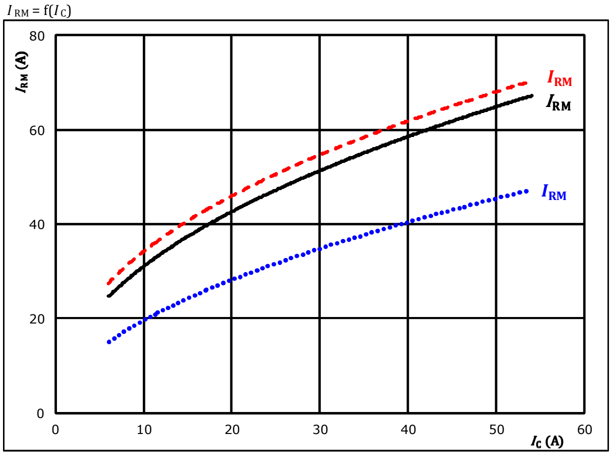


At					
V_{CE}=	400	V		25	°C (dotted)
V_{GE} =	15/0	V	T_j:	125	°C (solid)
I_C=	30	A		150	°C (dashed)

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

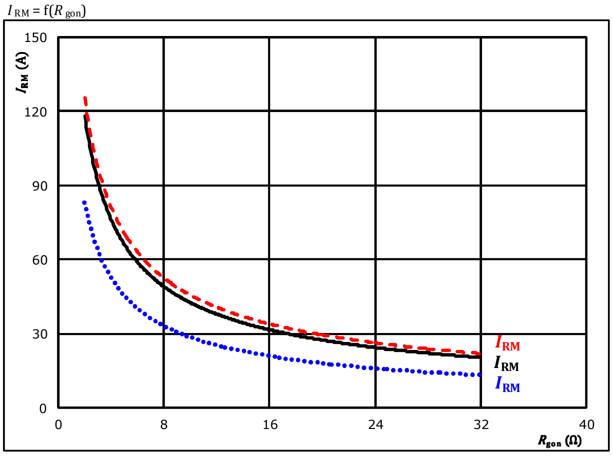


At					
V_{CE}:	400	V		25	°C (dotted)
V_{GE} =	15/0	V	T_j:	125	°C (solid)
R_{gon} =	8	Ω		150	°C (dashed)

figure 12. **FWD**

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

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



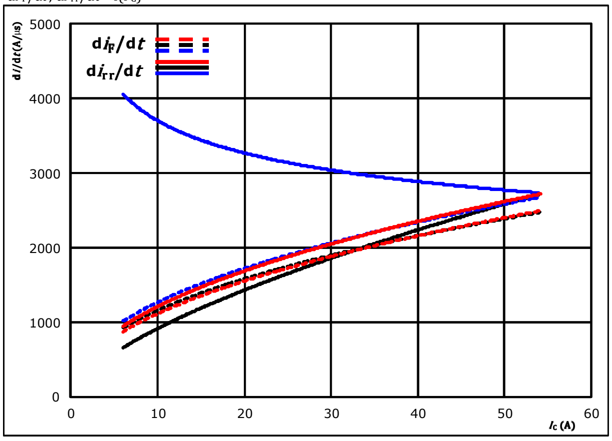
At					
V_{CE} =	400	V		25	°C (dotted)
V_{GE} =	15/0	V	T_j:	125	°C (solid)
I_C =	30	A		150	°C (dashed)

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

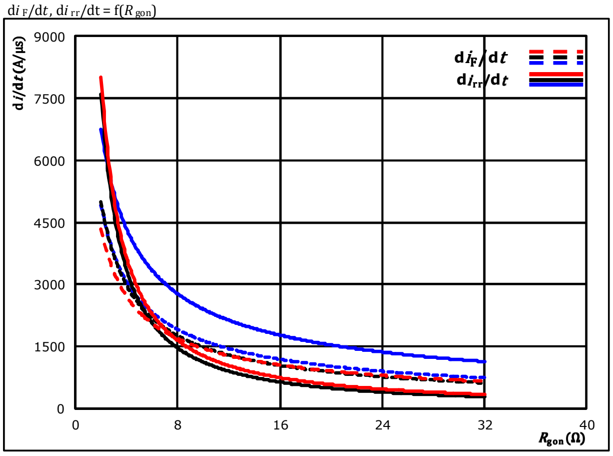


At					
V_{CE} =	400	V		25 °C	··········
V_{GE} =	15/0	V	T_j:	125 °C	——
R_{gon} =	8	Ω		150 °C	– – –

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

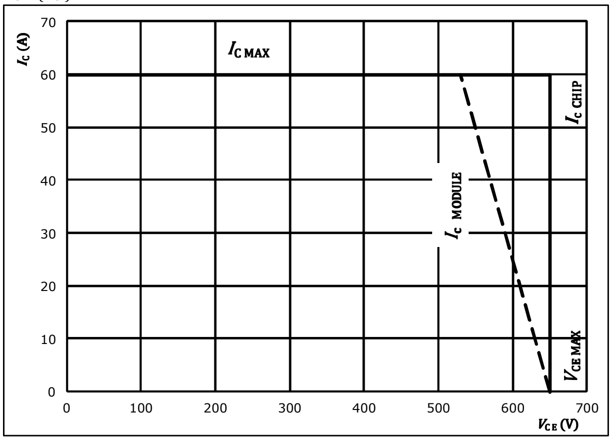


At					
V_{CE} =	400	V		25 °C	··········
V_{GE} =	15/0	V	T_j:	125 °C	——
I_C=	30	A		150 °C	– – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	8	Ω
R_{goff} =	8	Ω

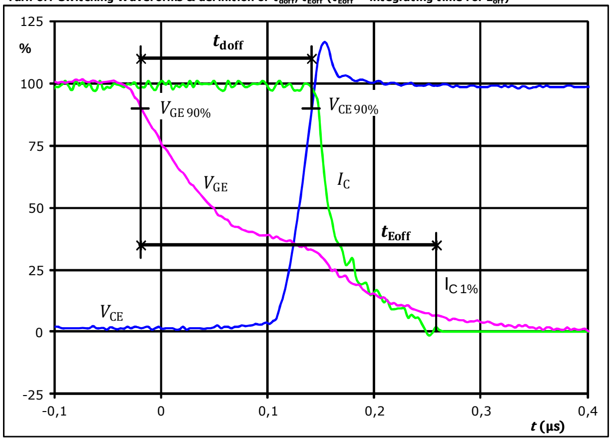
Boost Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

figure 1. IGBT

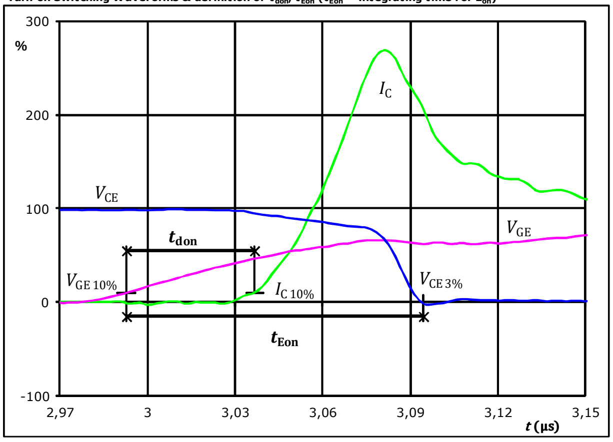
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,161	µs
t_{Eoff} =	0,277	µs

figure 2. IGBT

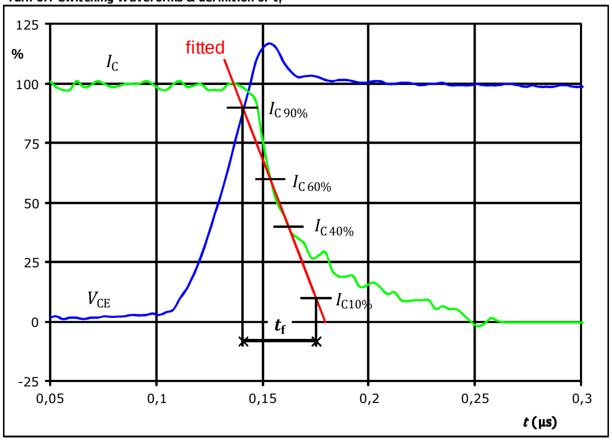
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{don} =	0,045	µs
t_{Eon} =	0,102	µs

figure 3. IGBT

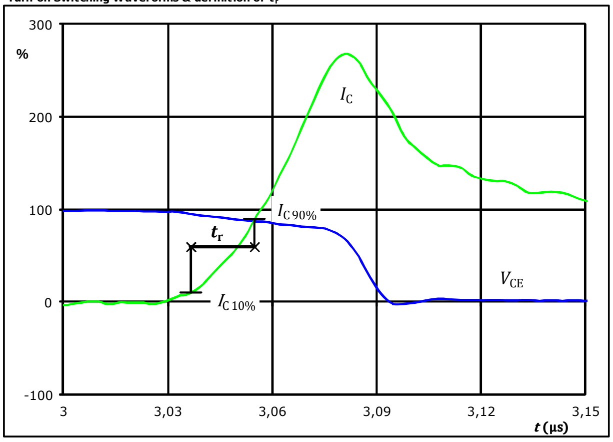
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_f =	0,036	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

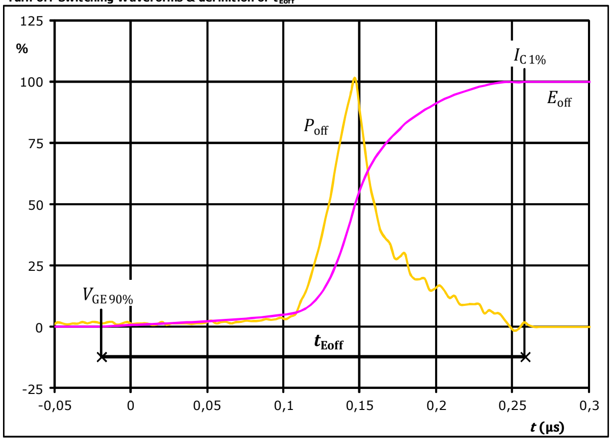


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_r =	0,019	µs

Boost Switching Characteristics

figure 5. **IGBT**

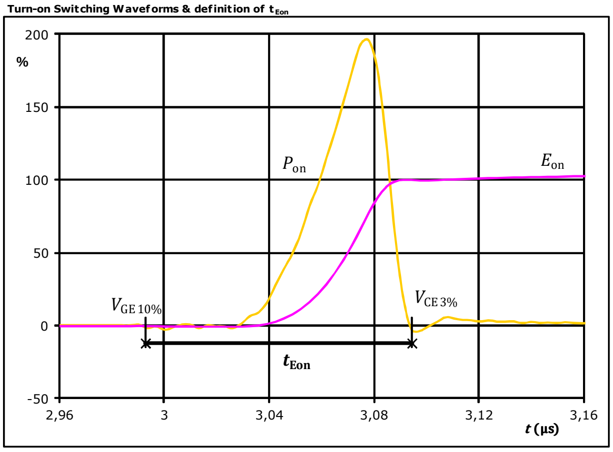
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	12,07	kW
E_{off} (100%) =	0,55	mJ
t_{Eoff} =	0,28	µs

figure 6. **IGBT**

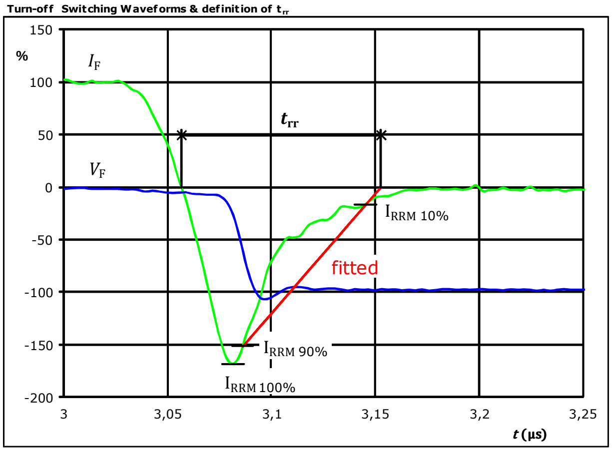
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	12,07	kW
E_{on} (100%) =	0,69	mJ
t_{Eon} =	0,10	µs

figure 7. **FWD**

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

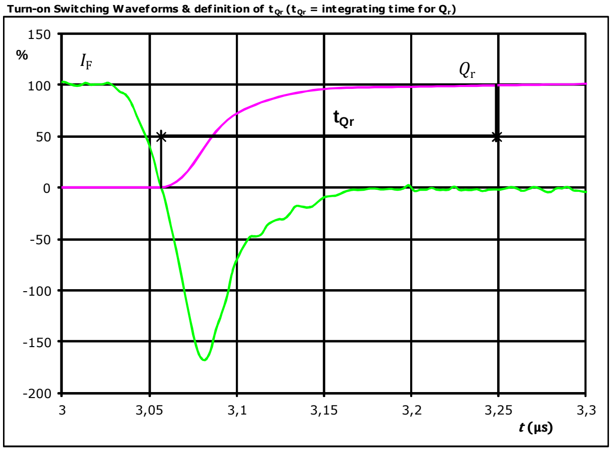


V_F (100%) =	400	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-51	A
t_{rr} =	0,094	µs

Boost Switching Characteristics

figure 8. **FWD**

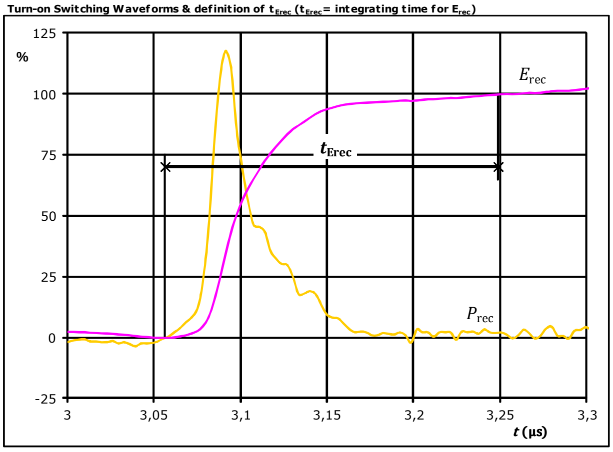
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	1,92	µC
t_{Qr} =	0,19	µs

figure 9. **FWD**

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



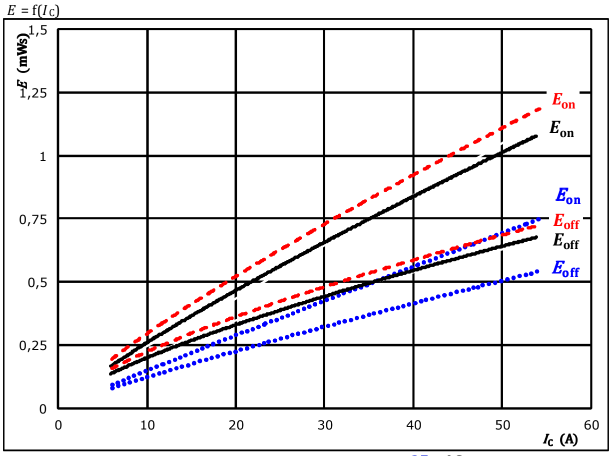
P_{rec} (100%) =	12,07	kW
E_{rec} (100%) =	0,47	mJ
t_{Erec} =	0,19	µs

H-Bridge Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



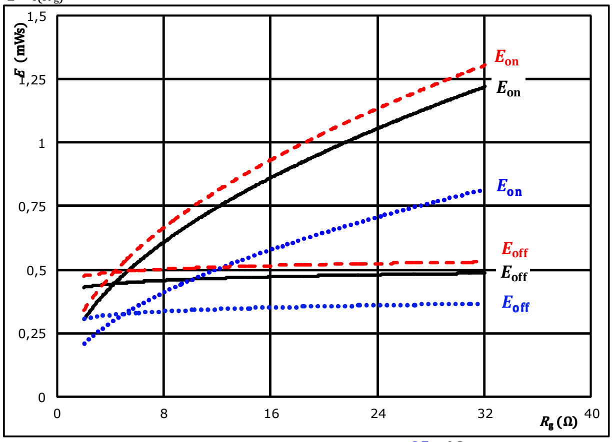
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C	············
V_{GE} =	±15	V	125 °C	———
R_{gon} =	8	Ω	150 °C	– – –
R_{goff} =	8	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



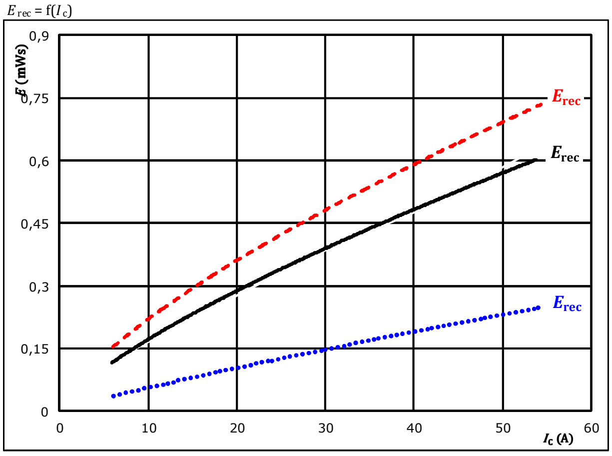
With an inductive load at

V_{CE} =	350	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

$E_{rec} = f(I_C)$



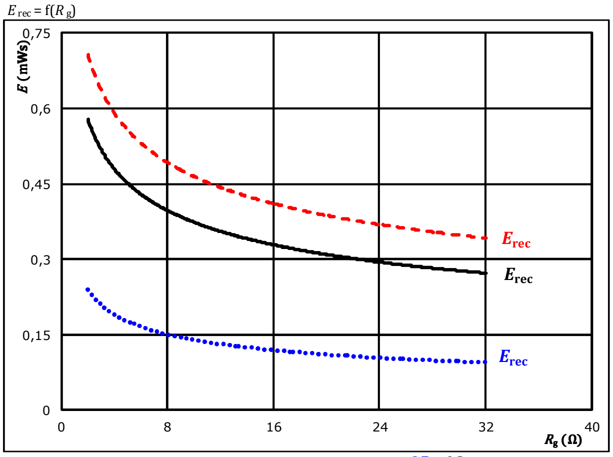
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C	············
V_{GE} =	±15	V	125 °C	———
R_{gon} =	8	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

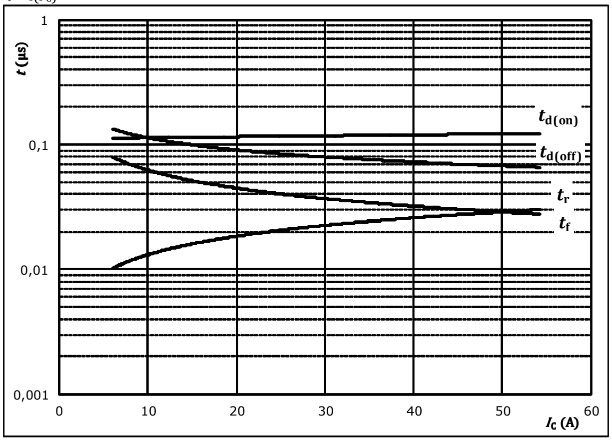
V_{CE} =	350	V	T_j: 25 °C	············
V_{GE} =	±15	V	125 °C	———
I_C =	30	A	150 °C	– – –

H-Bridge Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



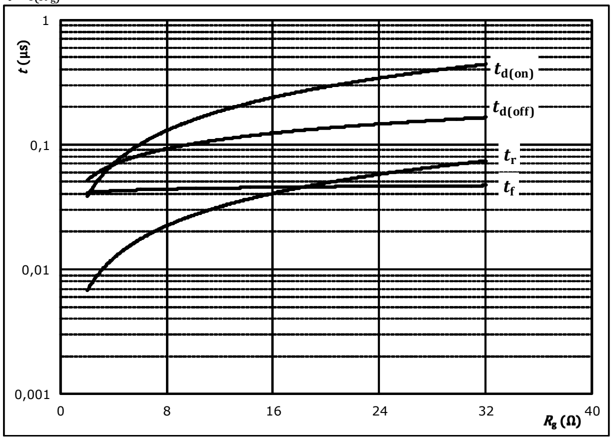
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



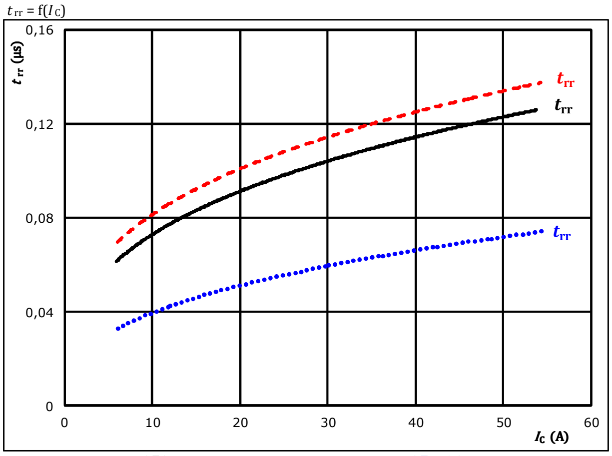
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	30	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

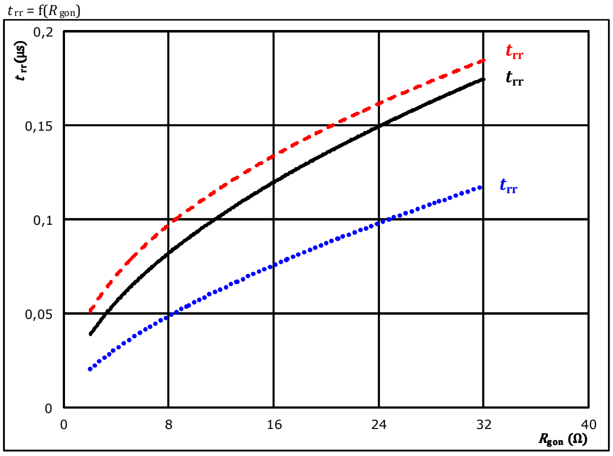


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	8	Ω		150 °C	dashed

figure 8. FWD

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

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



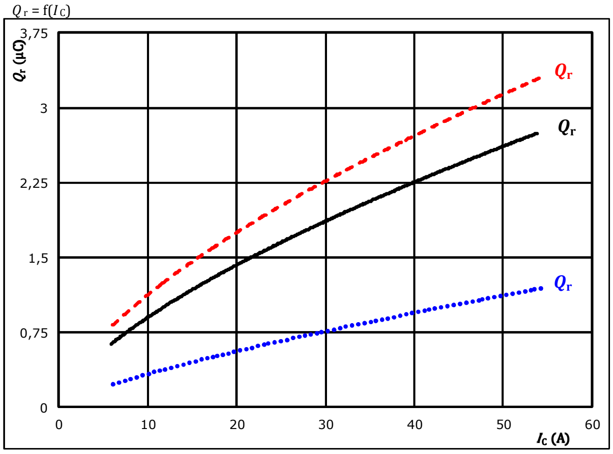
At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	30	A		150 °C	dashed

H-Bridge Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

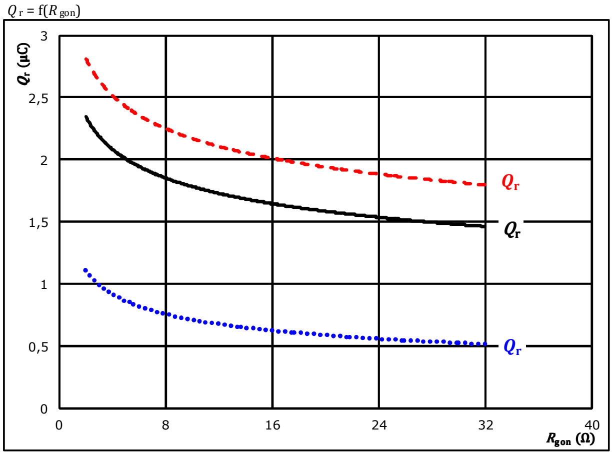


At V_{CE} = 350 V, V_{GE} = ±15 V, R_{gon} = 8 Ω; T_j: 25 °C, 125 °C, 150 °C

figure 10. FWD

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

$Q_r = f(R_{gon})$

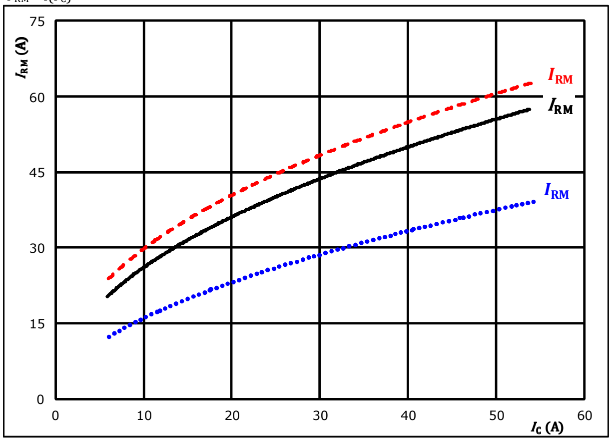


At V_{CE} = 350 V, V_{GE} = ±15 V, I_C = 30 A; T_j: 25 °C, 125 °C, 150 °C

figure 11. FWD

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

$I_{RM} = f(I_C)$

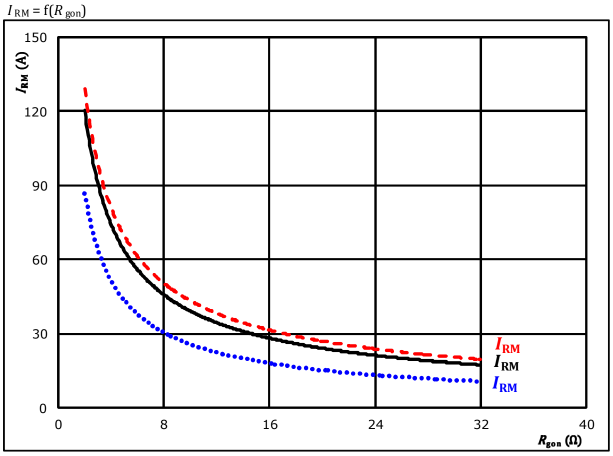


At V_{CE} = 350 V, V_{GE} = ±15 V, R_{gon} = 8 Ω; T_j: 25 °C, 125 °C, 150 °C

figure 12. FWD

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

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



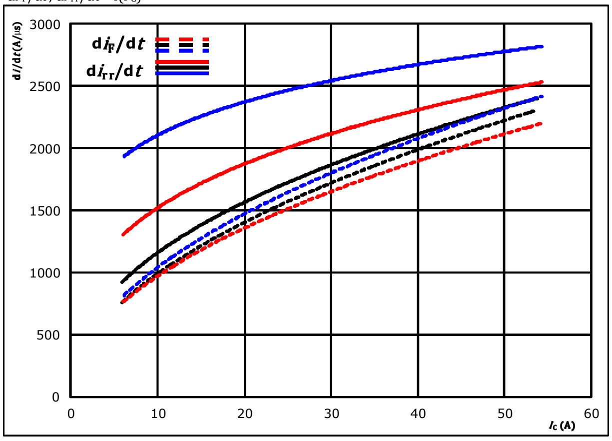
At V_{CE} = 350 V, V_{GE} = ±15 V, I_C = 30 A; T_j: 25 °C, 125 °C, 150 °C

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)

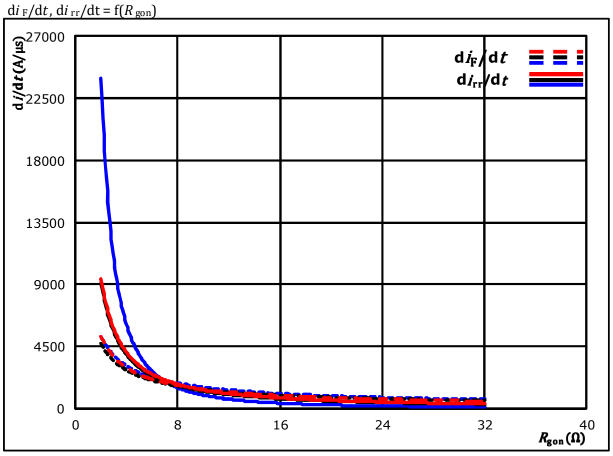


At						
V_{CE} =	350	V		25	°C	•••••••••
V_{GE} =	±15	V	T_j:	125	°C	———
R_{gon} =	8	Ω		150	°C	– – –

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})

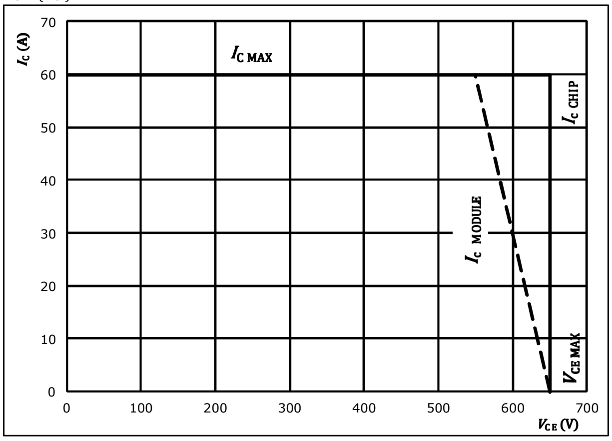


At						
V_{CE} =	350	V		25	°C	•••••••••
V_{GE} =	±15	V	T_j:	125	°C	———
I_C =	30	A		150	°C	– – –

figure 15. IGBT

Reverse bias safe operating area

I_C = f(V_{CE})



At		
T_j =	175	°C
R_{gon} =	8	Ω
R_{goff} =	8	Ω

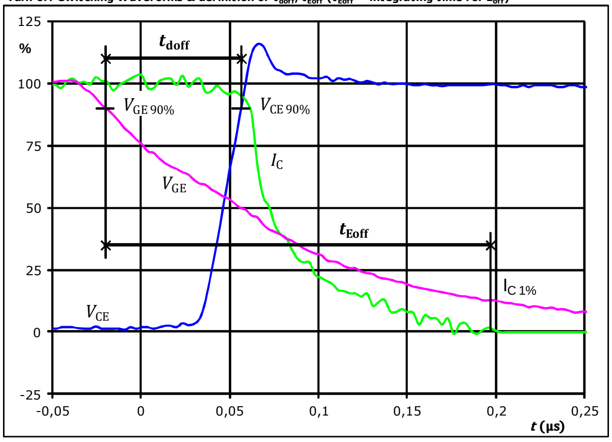
H-Bridge Switching Definitions

General conditions

T_j	=	**125 °C**
R_{gon}	=	**8 Ω**
R_{goff}	=	**8 Ω**

figure 1. **IGBT**

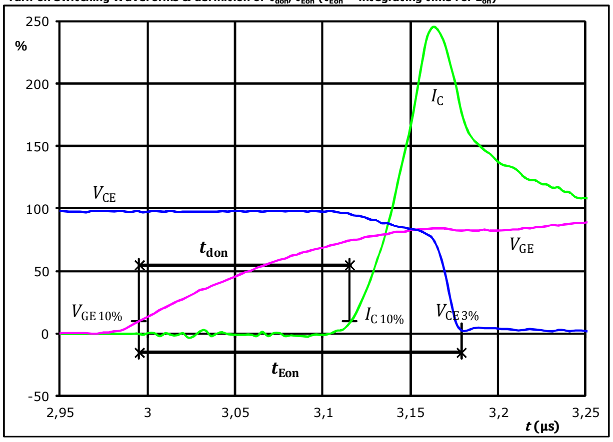
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,076	µs
t_{Eoff} =	0,217	µs

figure 2. **IGBT**

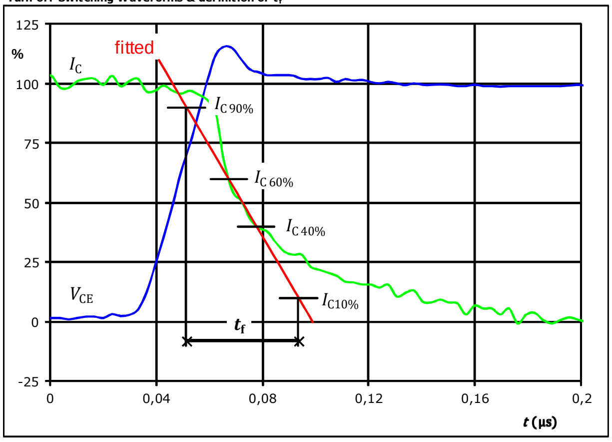
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_{don} =	0,122	µs
t_{Eon} =	0,184	µs

figure 3. **IGBT**

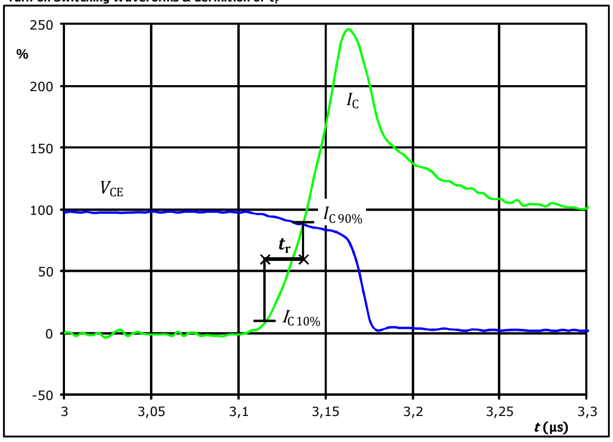
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_f =	0,043	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

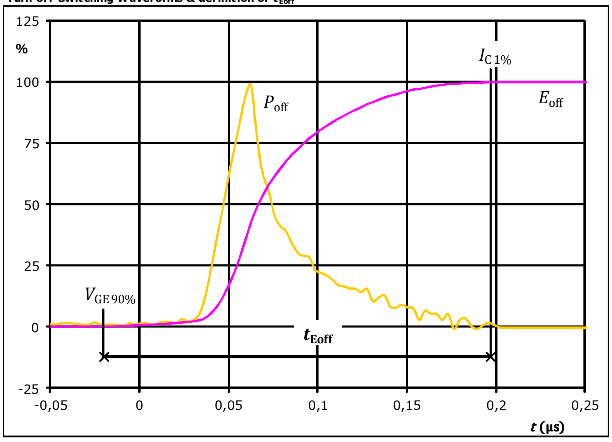


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_r =	0,022	µs

H-Bridge Switching Characteristics

figure 5.	IGBT

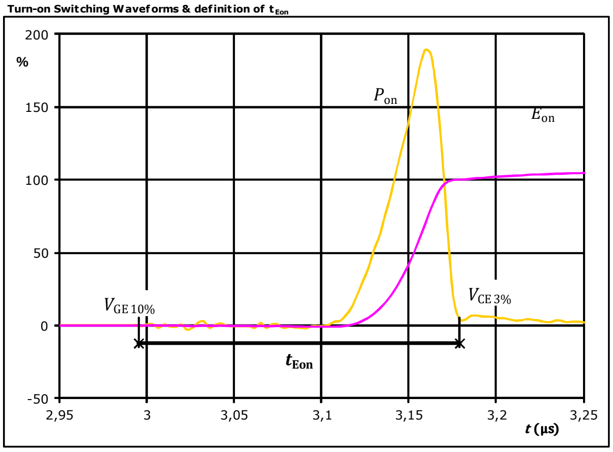
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	10,47	kW
E_{off} (100%) =	0,45	mJ
t_{Eoff} =	0,22	µs

figure 6.	IGBT

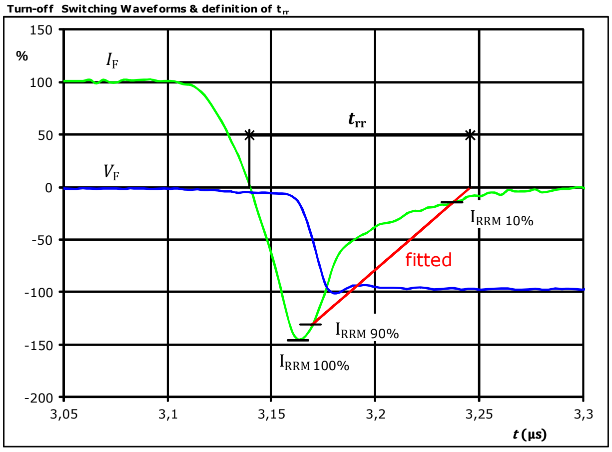
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	10,47	kW
E_{on} (100%) =	0,64	mJ
t_{Eon} =	0,18	µs

figure 7.	FWD

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

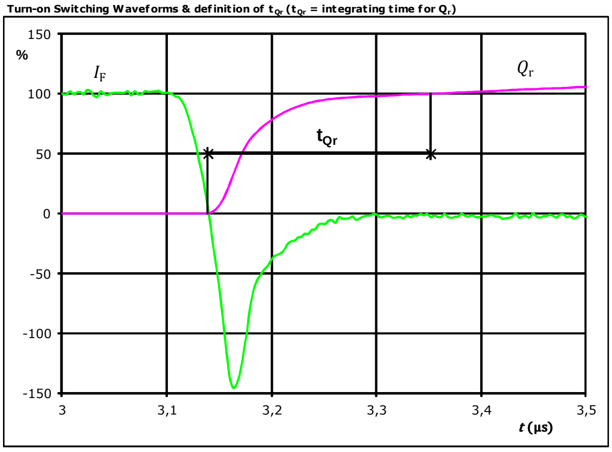


V_F (100%) =	350	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-44	A
t_{rr} =	0,105	µs

H-Bridge Switching Characteristics

figure 8. **FWD**

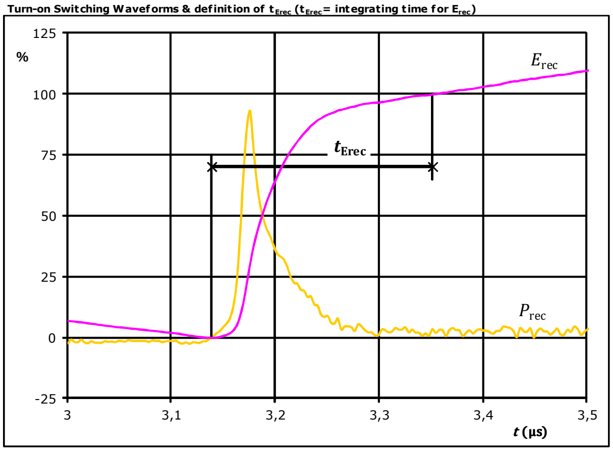
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	1,84	µC
t_{Qr} =	0,21	µs

figure 9. **FWD**

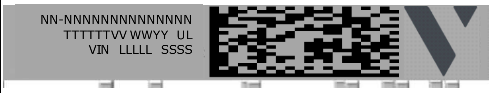
Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec})



P_{rec} (100%) =	10,47	kW
E_{rec} (100%) =	0,39	mJ
t_{Erec} =	0,21	µs

Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FZ07BIA030RW-P894E88
with thermal paste 12 mm housing with solder pins	10-FZ07BIA030RW-P894E88-/3/
without thermal paste 12 mm housing with press-fit pins	10-PZ07BIA030RW-P894E88Y
with thermal paste 12 mm housing with press-fit pins	10-PZ07BIA030RW-P894E88Y-/3/

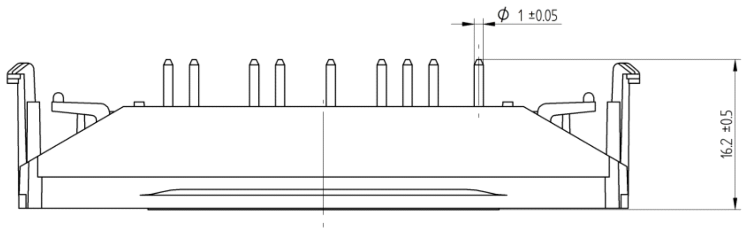


	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

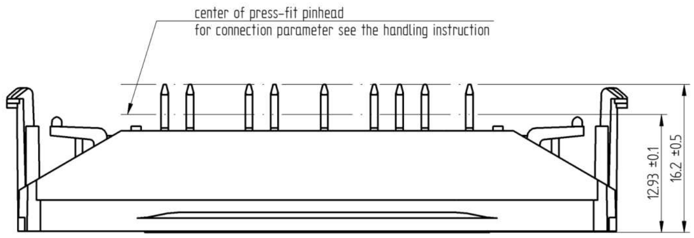
Outline

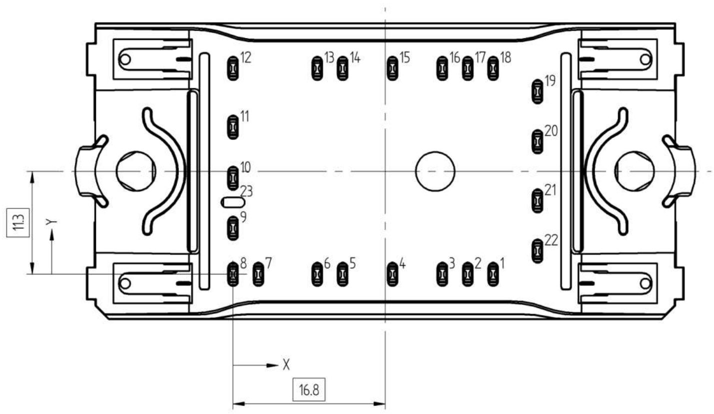
Pin	X	Y	Function
1	28,7	0	G4
2	25,9	0	S4
3	23,1	0	-INV
4	17,6	0	+INV
5	12,1	0	G3
6	9,3	0	S3
7	2,8	0	G5
8	0	0	S5
9	0	5,05	-DC
10	0	10,55	+DC
11	0	16,15	Sol
12	0	22,6	Boost
13	9,3	22,6	S1
14	12,1	22,6	G1
15	17,6	22,6	+INV
16	23,1	22,6	-INV
17	25,9	22,6	S2
18	28,7	22,6	G2
19	33,6	20,05	L1
20	33,6	14,55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

Solder pins



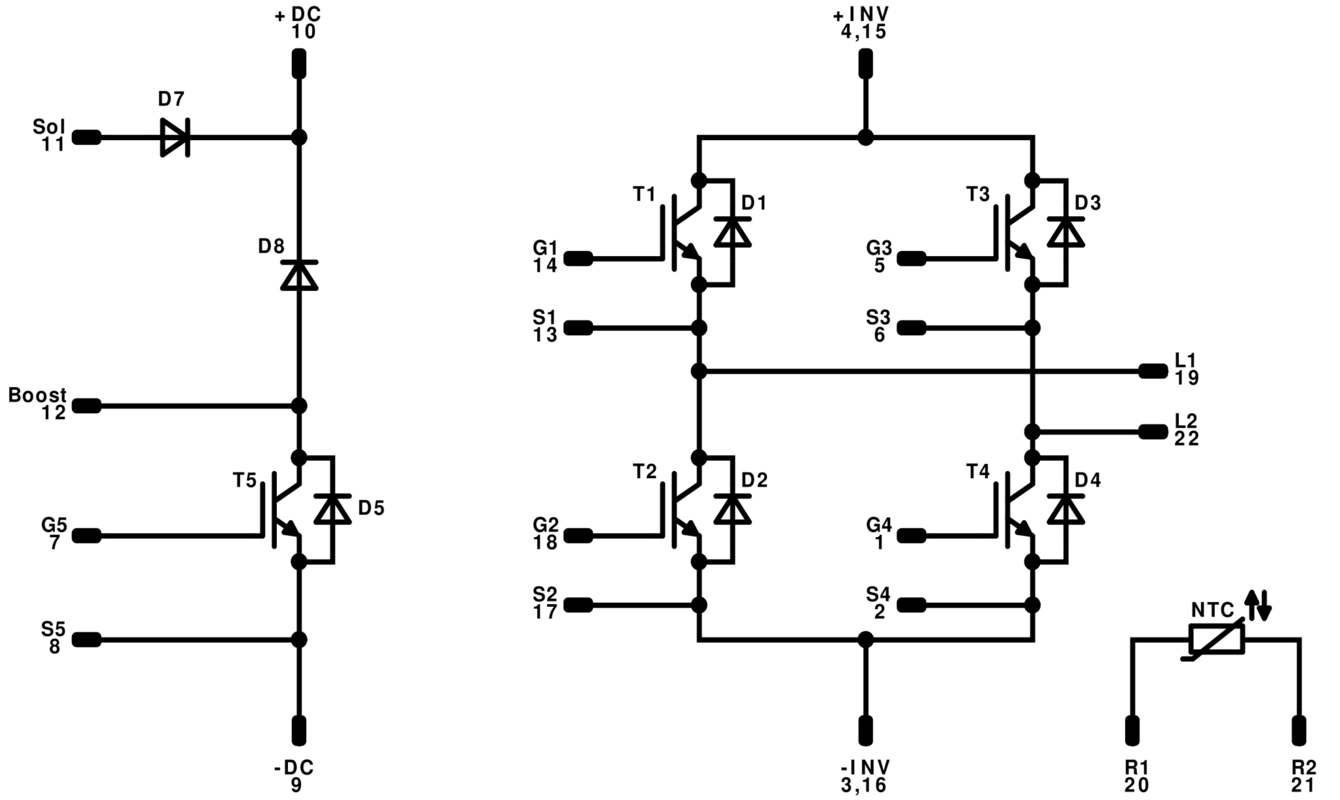
Press-fit pins





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

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T5	IGBT	650 V	30 A	Boost Switch	
D8	FWD	650 V	15 A	Boost Diode	
D5	FWD	650 V	10 A	Boost Sw. Protection Diode	
D7	FWD	1600 V	35 A	ByPass Diode	
T1, T2, T3, T4	IGBT	650 V	30 A	H-Bridge Switch	
D1, D2, D3, D4	FWD	650 V	15 A	H-Bridge Diode	
NTC	Thermistor			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-xZ07BIA030RW-P894E88x-D1-14	19 Dec. 2017		