Vincotech

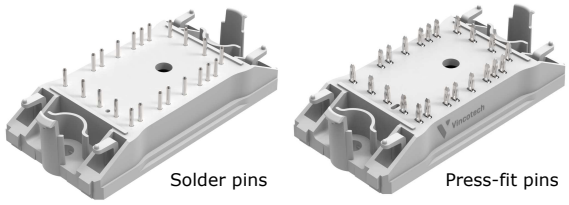
10-FZ07BIA030S5Y-P894E78
10-PZ07BIA030S5Y-P894E78Y
datasheet

flow SOL 0 BI — **650 V / 30 A**

Features

- High efficiency Solar Inverter with Booster
- Ultra fast switching frequency
- IGBT S5 H-bridge configuration
- IGBT H5 in Booster
- Low inductive design

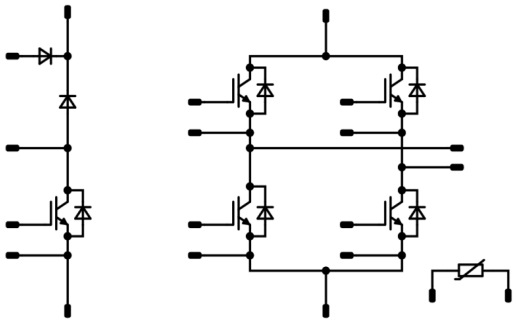
flow 0 12 mm housing



Target applications

- Solar Inverters

Schematic



Types

- 10-FZ07BIA030S5Y-P894E78
- 10-PZ07BIA030S5Y-P894E78Y

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	$T_j = T_{jmax}$ T_s = 80 °C	31	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	60	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
Boost Diode				
Peak Repetitive Reverse Voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	21	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	13	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	$T_j = T_{jmax}$ T_s = 80 °C	14	A
Repetitive peak forward current	I_{FRM}	T_j < 150 °C	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	$T_j = T_{jmax}$ T_s = 80 °C	46	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	$T_j = T_{jmax}$ T_s = 80 °C	36	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	64	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	21	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	13	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 / Press-fit pins	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	
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	25 125 150		1,67 1,80 1,84	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= 1MHz	0	25		25		2100		pF
Reverse transfer capacitance	C_{res}							7,7		
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)						1,57		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	15/0	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	15/0	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		1,102 2,280 2,721		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. 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					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	
ByPass Diode										
Static										
Forward voltage	V_F				35	25 125	0,8	1,17 1,13	1,4	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					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	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150		1,35 1,54 1,57	1,75	V
Collector-emitter cut-off current	I_{CES}		0	650		25			50	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							1800		
Output capacitance	C_{oes}	f= 1 MHz	0	25		25		55		pF
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)						1,48		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		63 64 64		
Rise time	t_r					25 125 150		8 9 9		
Turn-off delay time	$t_{d(off)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	400	30	25 125 150		82 102 106		ns
Fall time	t_f					25 125 150		26 50 56		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1 µC Q_{rFWD} = 2,4 µC Q_{rFWD} = 2,9 µC				25 125 150		0,515 0,751 0,817		
Turn-off energy (per pulse)	E_{off}					25 125 150		0,355 0,544 0,598		mWs

Characteristic Values

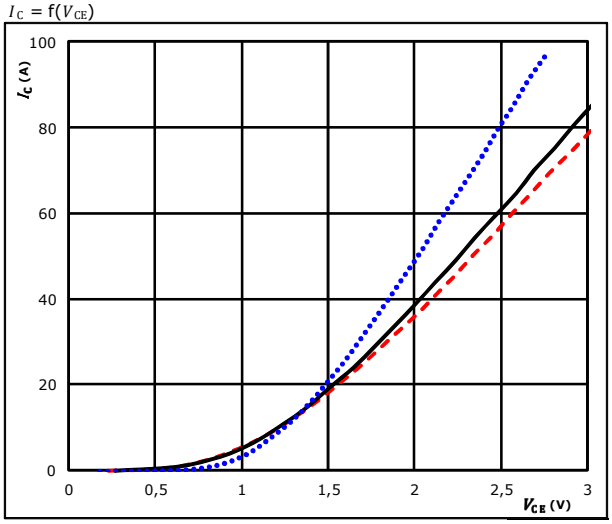
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
H-Bridge Diode										
Static										
Forward voltage	V_F				15	25 125 150		1,44 1,20 1,14		V
Reverse leakage current	I_r			650		25			5	µA
Thermal										
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 = 4059 A/µs di/dt = 3683 A/µs di/dt = 3801 A/µs	±15	400	30	25 125 150		47 68 75		A
Reverse recovery time	t_{rr}					25 125 150		60 94 99		ns
Recovered charge	Q_r					25 125 150		1,048 2,423 2,924		µC
Reverse recovered energy	E_{rec}					25 125 150		0,203 0,562 0,704		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5766 3731 4055		A/µs
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

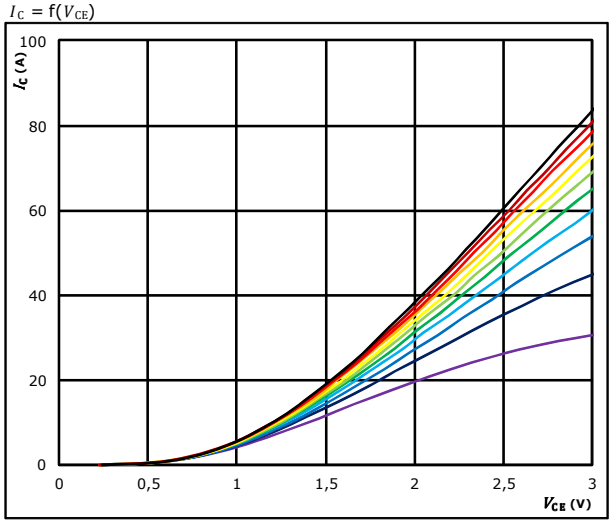


t_p =	250	µs	25 °C	
V_{GE} =	15	V	T_j: 125 °C	
			150 °C	

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

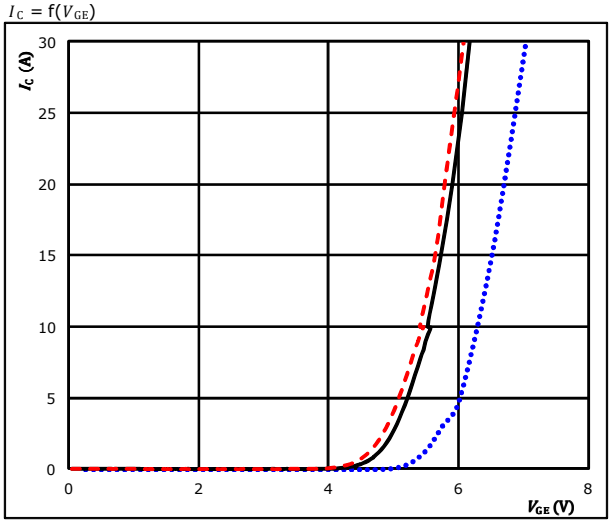


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

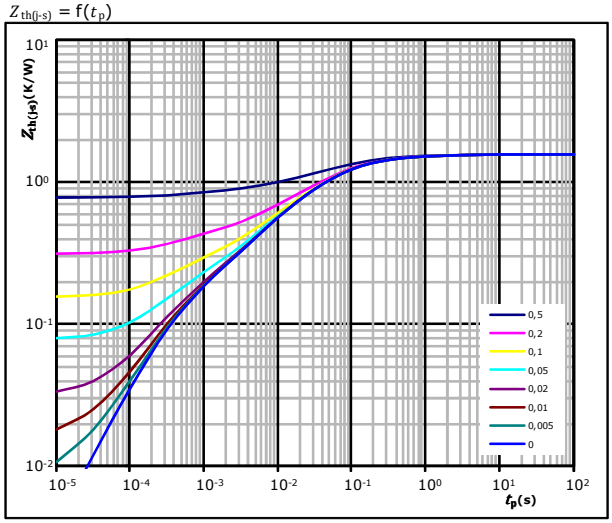


t_p =	100	µs	25 °C	
V_{CE} =	10	V	T_j: 125 °C	

figure 4. **IGBT**

Transient Thermal Impedance as function of Pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,57	K/W

IGBT thermal model values

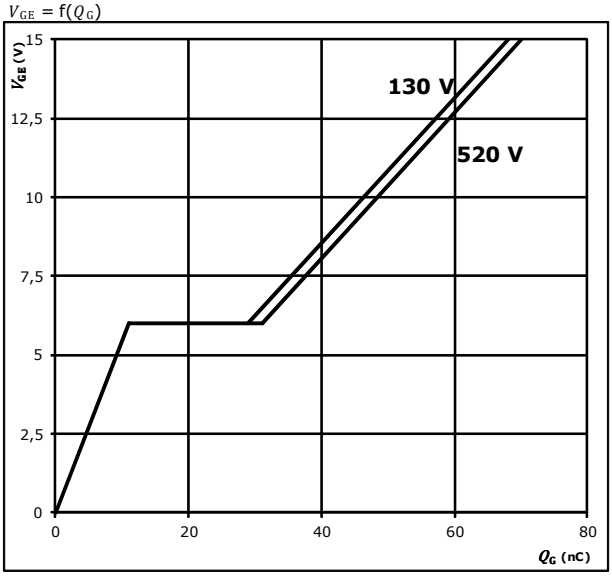
R (K/W)	τ (s)
7,66E-02	1,73E+00
2,00E-01	2,58E-01
6,54E-01	5,93E-02
3,77E-01	1,31E-02
1,51E-01	2,99E-03
1,13E-01	3,69E-04

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs Gate charge

$V_{GE} = f(Q_G)$



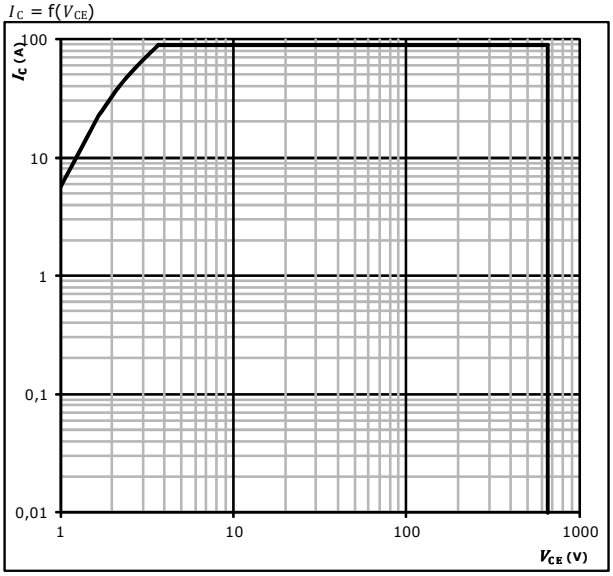
At

I_C = 30 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



At

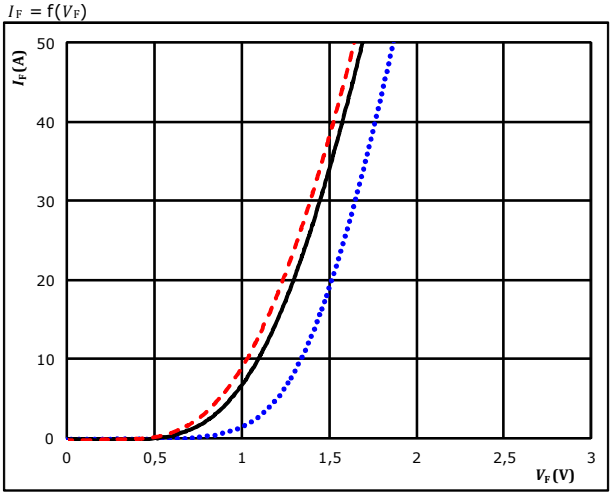
D =	single pulse	
T_s =	80	°C
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



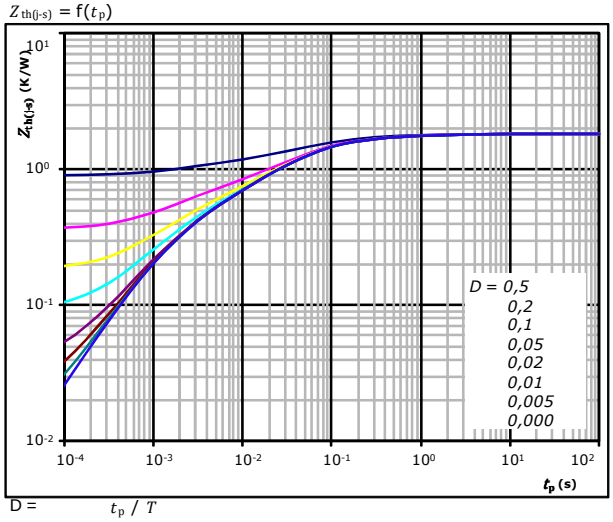
t_p = 250 µs

T_j: 25 °C, 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

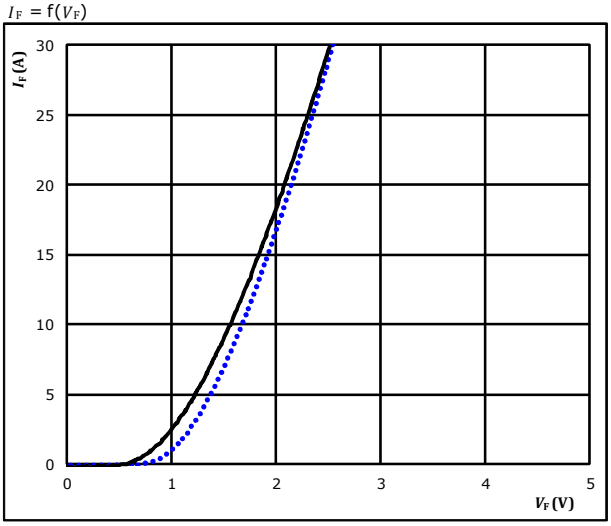
R (K/W)	τ (s)
7,18E-02	2,84E+00
2,48E-01	2,83E-01
8,26E-01	5,02E-02
3,94E-01	8,85E-03
2,67E-01	1,33E-03

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



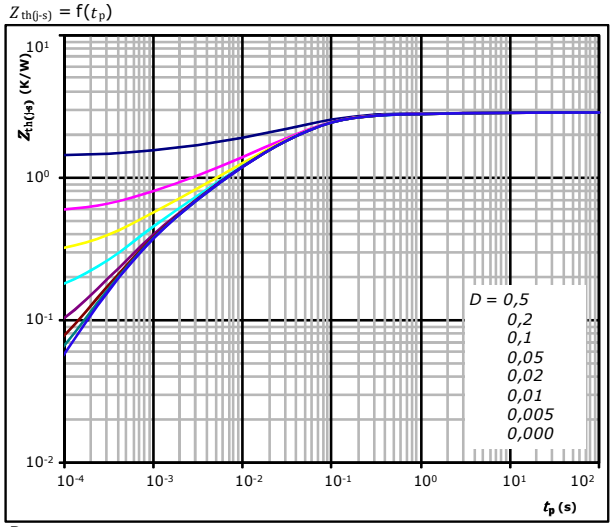
t_p = 250 µs

T_j: 25 °C, 125 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

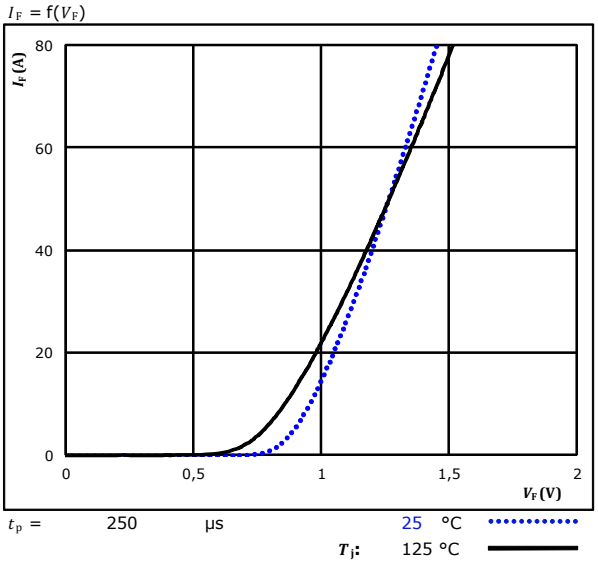
$R_{th(j-s)}$ = 2,87 K/W

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

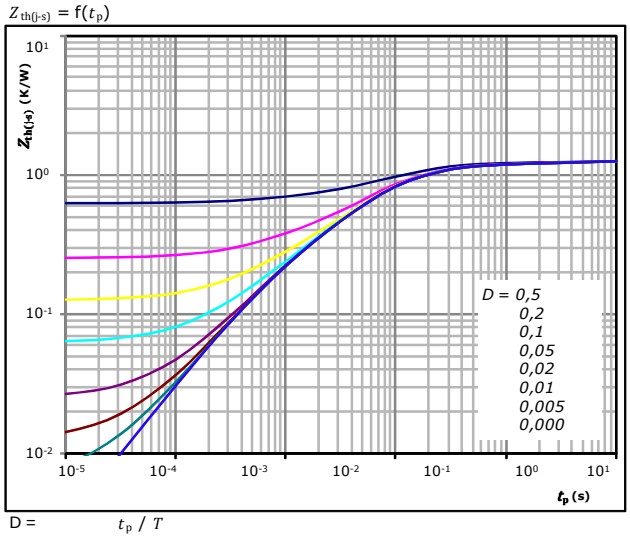
ByPass Diode Characteristics

figure 1. **Rectifier Diode**
Typical forward characteristics



t_p = 250 µs
T_j: 25 °C
125 °C

figure 2. **Rectifier Diode**
Transient thermal impedance as a function of pulse width



D = t_p / T
$R_{th(j-s)}$ = 1,25 K/W

Diode thermal model values

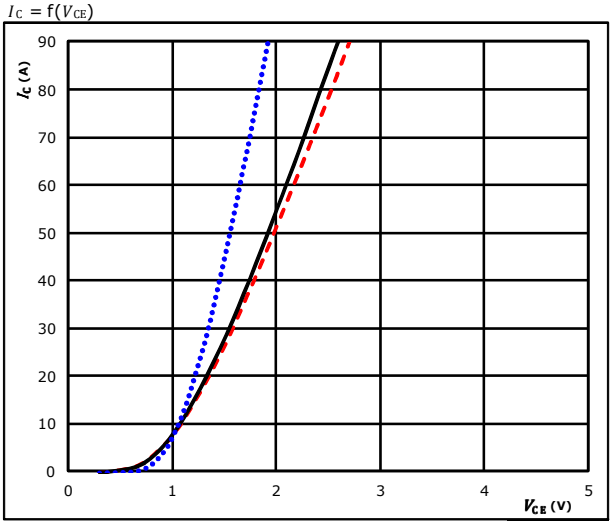
R (K/W)	τ (s)
8,00E-02	5,22E+00
1,56E-01	4,18E-01
6,95E-01	8,82E-02
2,23E-01	3,07E-02
9,97E-02	5,99E-03

H-Bridge Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

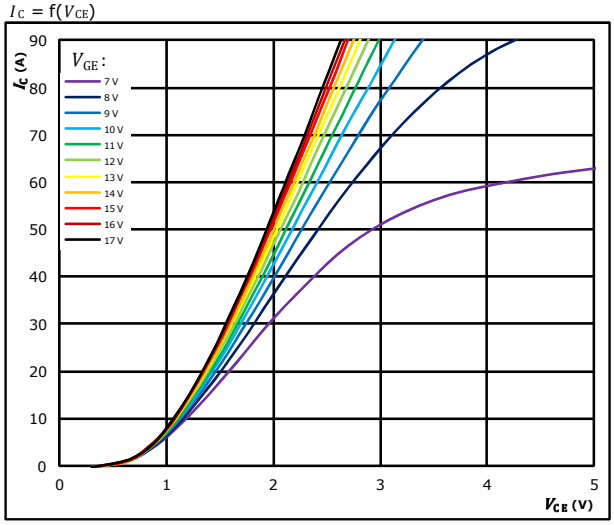


t_p =	250	µs	T_j:	25 °C
V_{GE} =	15	V		125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

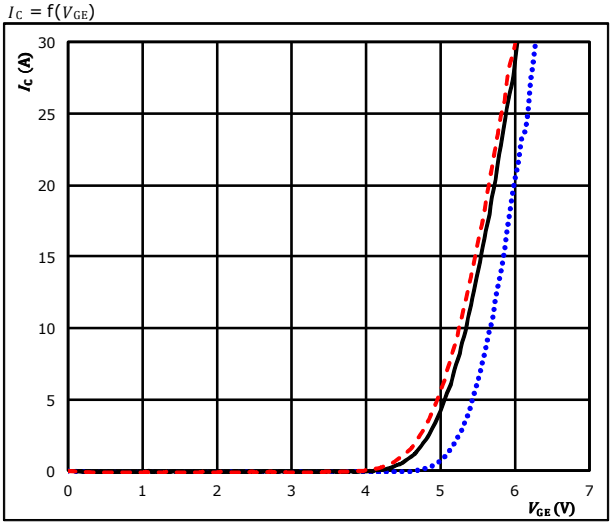


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

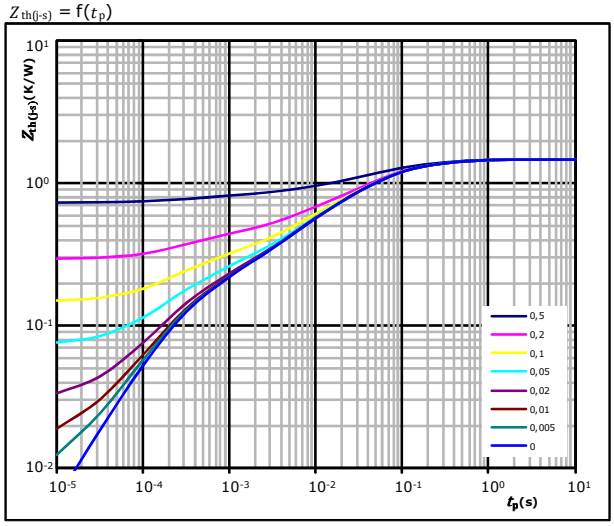


t_p =	100	µs	T_j:	25 °C
V_{CE} =	10	V		125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	1,48	K/W

IGBT thermal model values

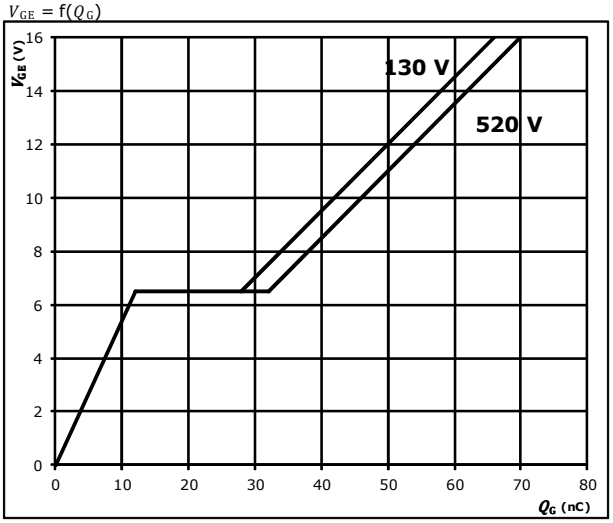
R (K/W)	τ (s)
2,13E-01	3,29E-01
7,18E-01	5,25E-02
3,25E-01	8,96E-03
8,82E-02	1,84E-03
1,41E-01	2,71E-04

H-Bridge Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

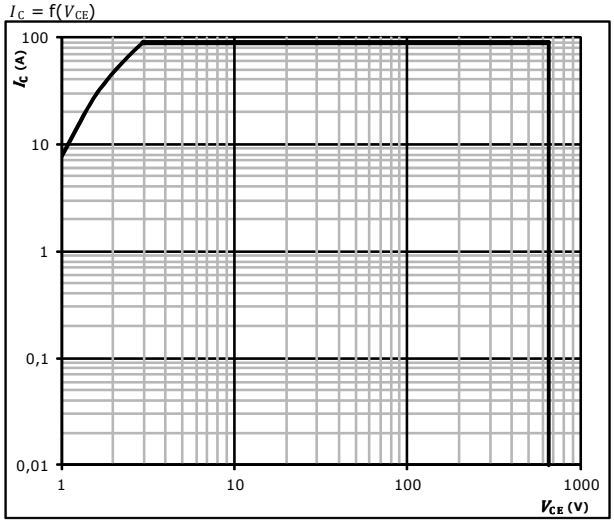


I_C= 30 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



D = single pulse

T_s = 80 °C

V_{GE} = ±15 V

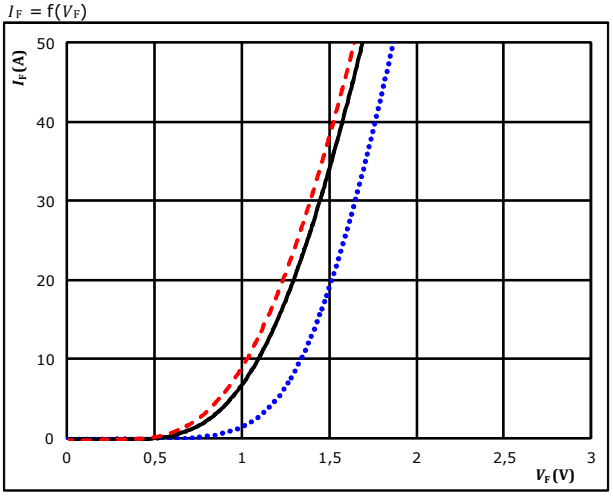
T_j = T_{jmax}

H-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



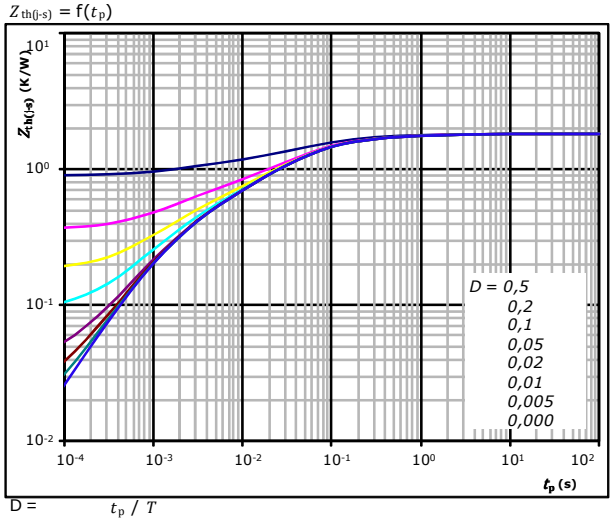
t_p = 250 µs

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

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

FWD thermal model values

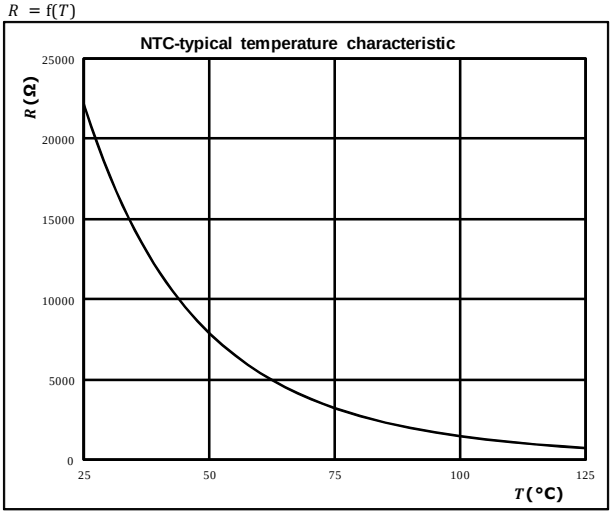
R (K/W)	τ (s)
7,18E-02	2,84E+00
2,48E-01	2,83E-01
8,26E-01	5,02E-02
3,94E-01	8,85E-03
2,67E-01	1,33E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

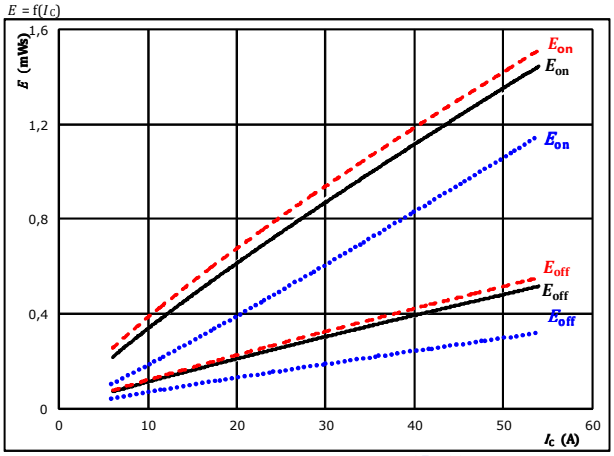


Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



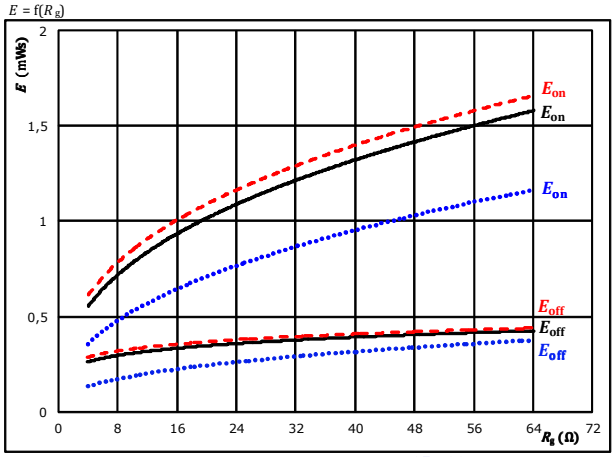
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



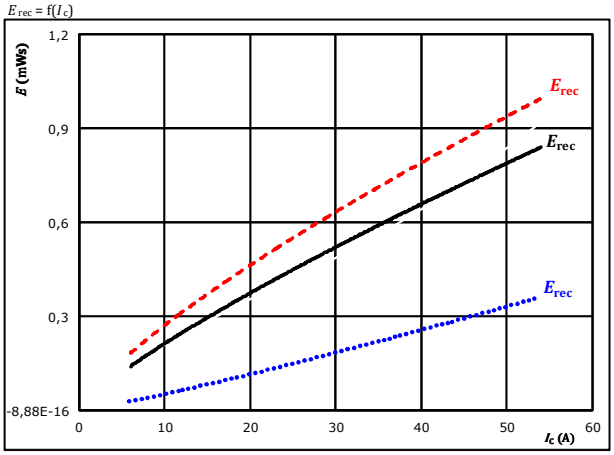
With an inductive load at

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

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



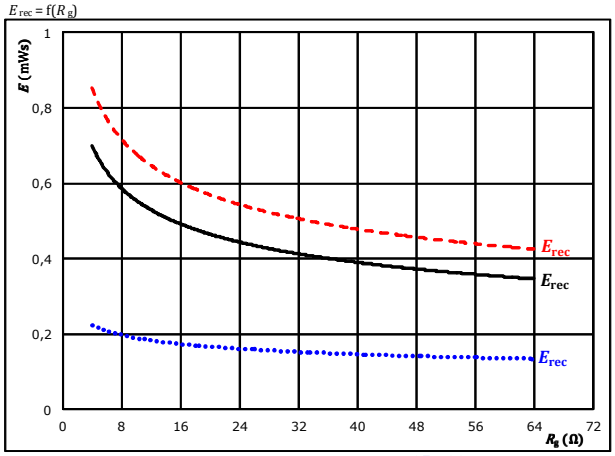
With an inductive load at

V_{CE} =	400	V	T_J:	25 °C	
V_{GE} =	15/0	V		125 °C	
R_{gon} =	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

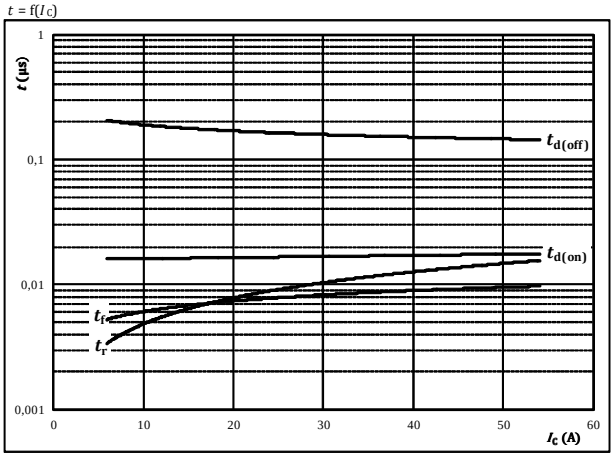
V_{CE} =	400	V	T_J:	25 °C	
V_{GE} =	15/0	V		125 °C	
I_C =	30	A		150 °C	

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



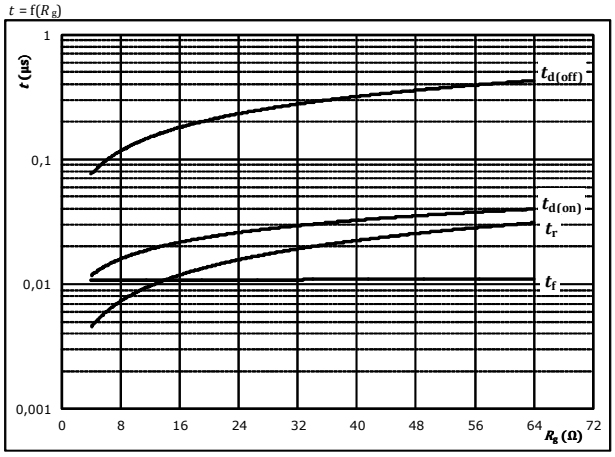
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



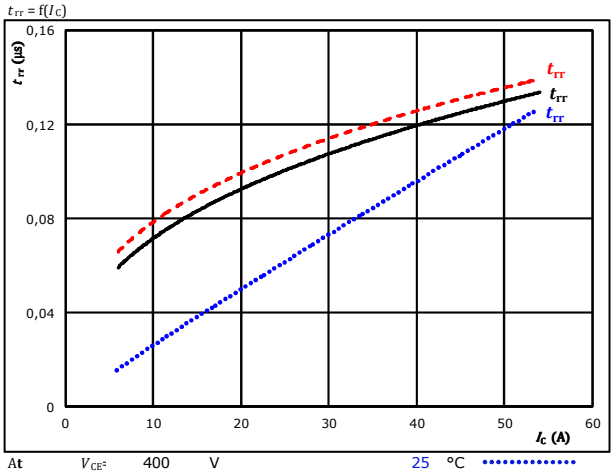
With an inductive load at

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

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

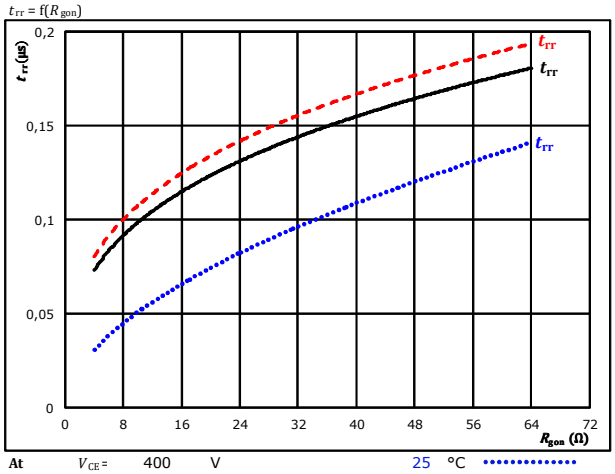


At					
V_{CE} =	400	V		25	°C
V_{GE} =	15/0	V	T_j:	125	°C
R_{gon} =	16	Ω		150	°C

figure 8. **FWD**

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

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



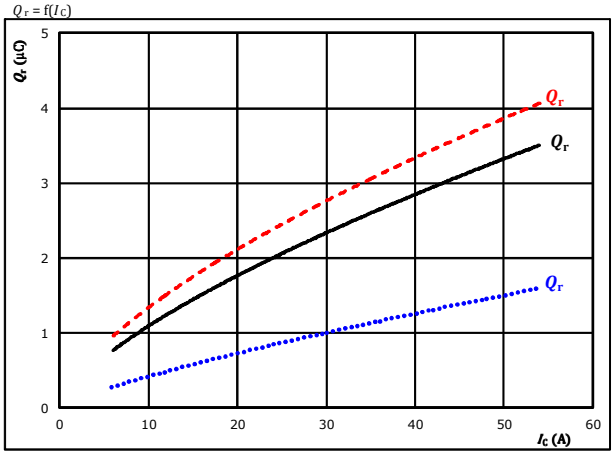
At					
V_{CE} =	400	V		25	°C
V_{GE} =	15/0	V	T_j:	125	°C
I_C =	30	A		150	°C

Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

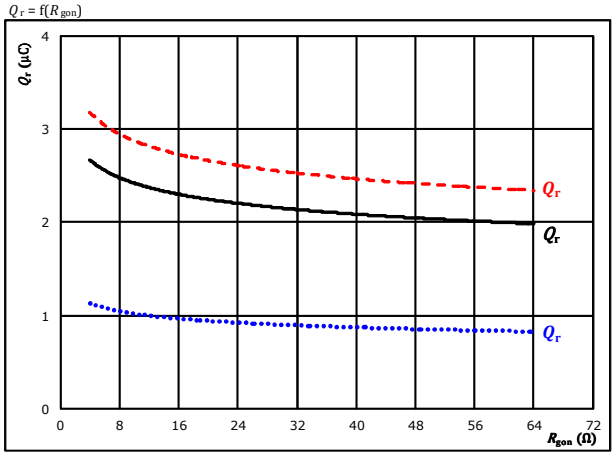


At						
	V_{CE} =	400	V		25 °C	
	V_{GE} =	15/0	V	T_j:	125 °C	
	R_{gon} =	16	Ω		150 °C	

figure 10. FWD

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

$Q_r = f(R_{gon})$

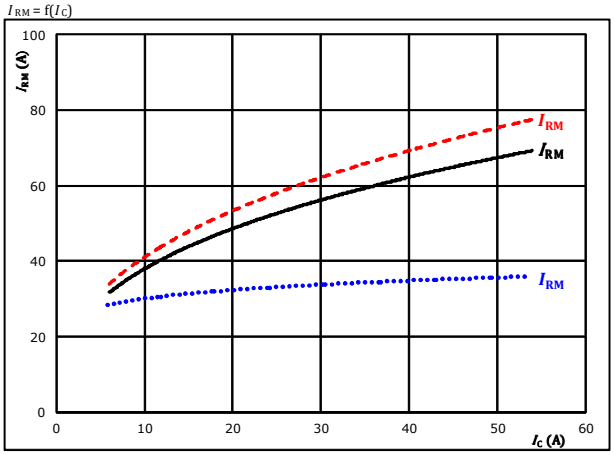


At						
	V_{CE}=	400	V		25 °C	
	V_{GE} =	15/0	V	T_j:	125 °C	
	I_C=	30	A		150 °C	

figure 11. FWD

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

$I_{RM} = f(I_C)$

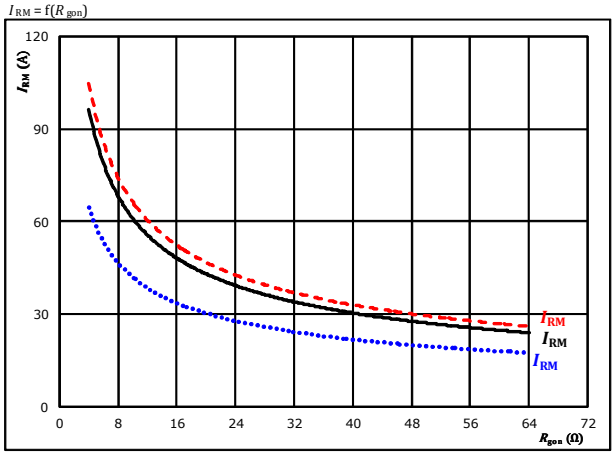


At						
	V_{CE}:	400	V		25 °C	
	V_{GE} =	15/0	V	T_j:	125 °C	
	R_{gon} =	16	Ω		150 °C	

figure 12. FWD

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

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



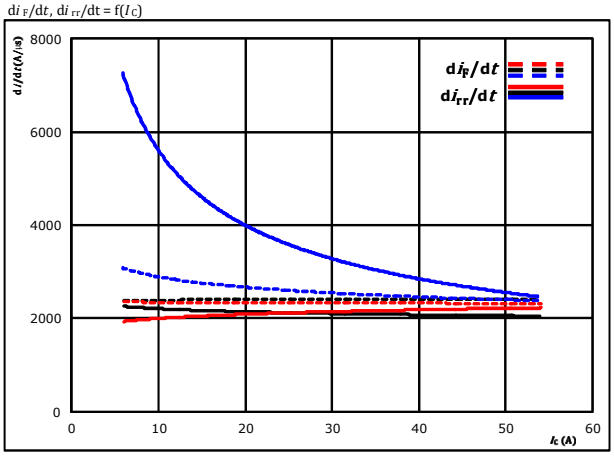
At						
	V_{CE} =	400	V		25 °C	
	V_{GE} =	15/0	V	T_j:	125 °C	
	I_C =	30	A		150 °C	

Boost Switching Characteristics

figure 13. **FWD**

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

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

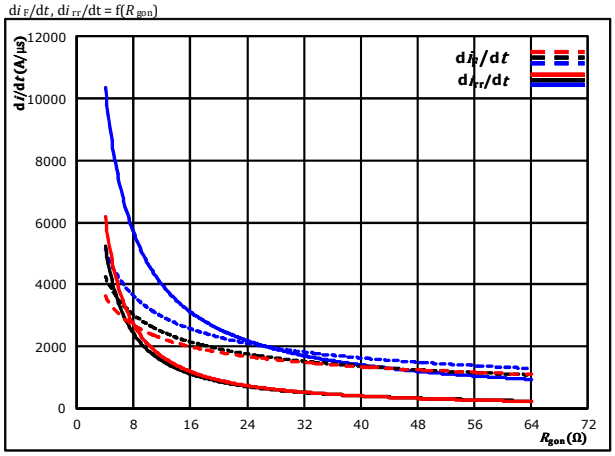


At						
V_{CE} =	400	V		25	°C	
V_{GE} =	15/0	V	T_j:	125	°C	
R_{gon} =	16	Ω		150	°C	

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

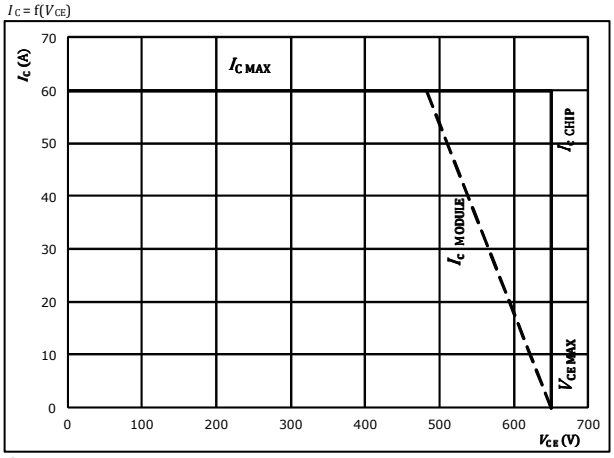


At						
V_{CE} =	400	V		25	°C	
V_{GE} =	15/0	V	T_j:	125	°C	
I_C =	30	A		150	°C	

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	16	Ω
R_{goff} =	16	Ω

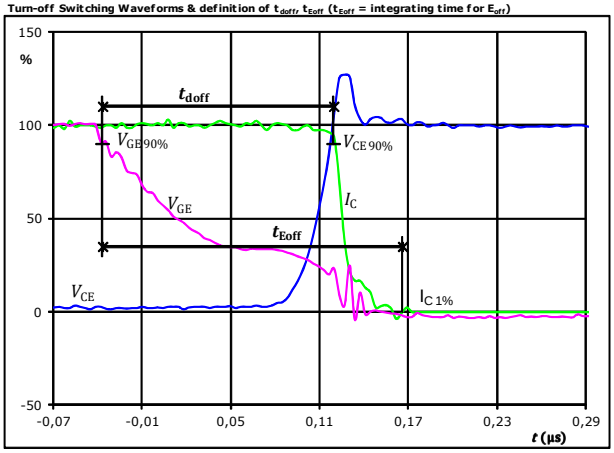
Boost Switching Definitions

General conditions

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

figure 1. IGBT

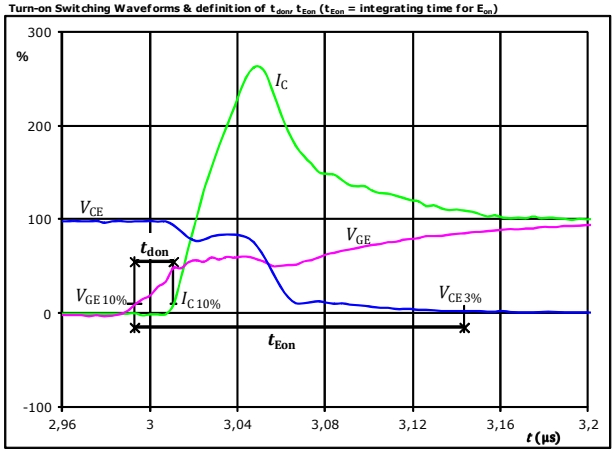
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,155	µs
t_{Eoff} =	0,202	µs

figure 2. IGBT

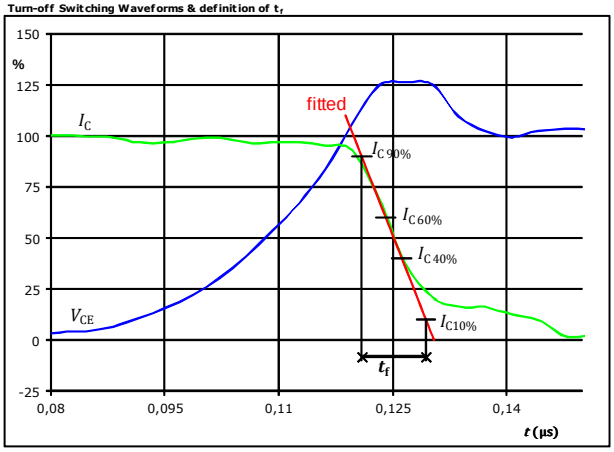
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{don} =	0,019	µs
t_{Eon} =	0,150	µs

figure 3. IGBT

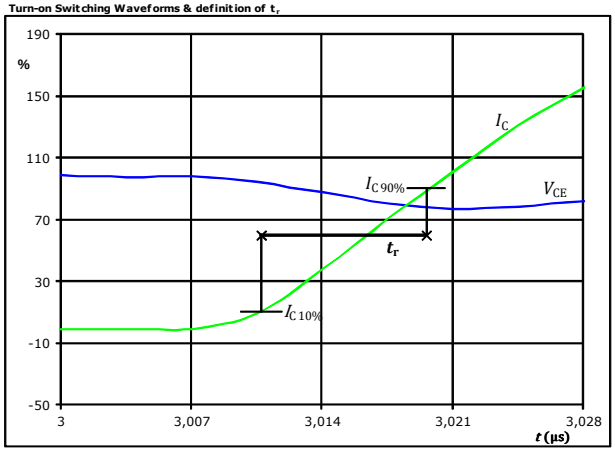
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_f =	0,009	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

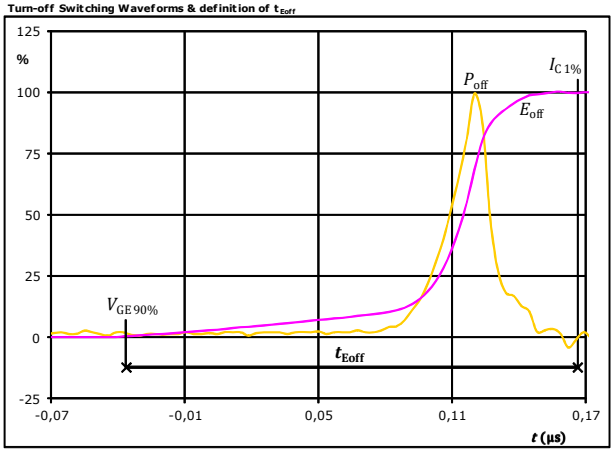


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_r =	0,009	µs

Boost Switching Characteristics

figure 5. **IGBT**

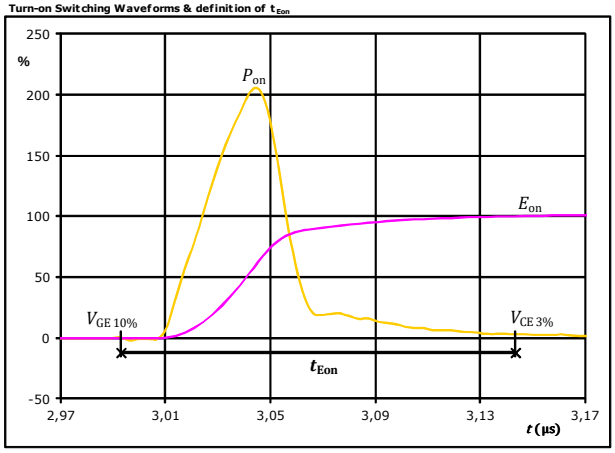
Turn-off Switching Waveforms & definition of t_{Eoff}



$P_{off}(100\%)$ =	12,06	kW
$E_{off}(100\%)$ =	0,31	mJ
t_{Eoff} =	0,20	µs

figure 6. **IGBT**

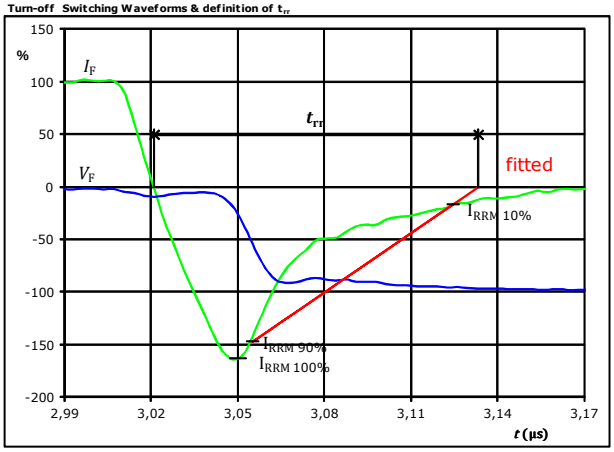
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on}(100\%)$ =	12,06	kW
$E_{on}(100\%)$ =	0,89	mJ
t_{Eon} =	0,15	µs

figure 7. **FWD**

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

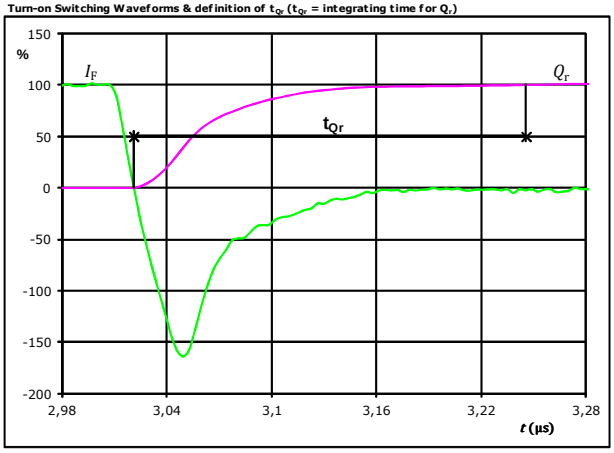


$V_F(100\%)$ =	400	V
$I_F(100\%)$ =	30	A
$I_{RRM}(100\%)$ =	-50	A
t_{rr} =	0,113	µs

Boost Switching Characteristics

figure 8. **FWD**

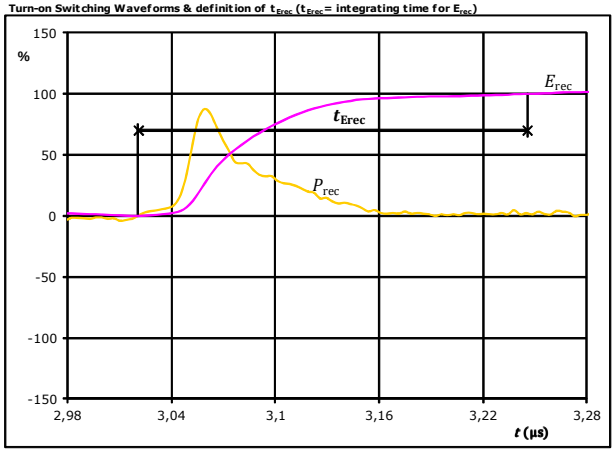
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	2,28	µC
t_{Qr} =	0,22	µs

figure 9. **FWD**

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



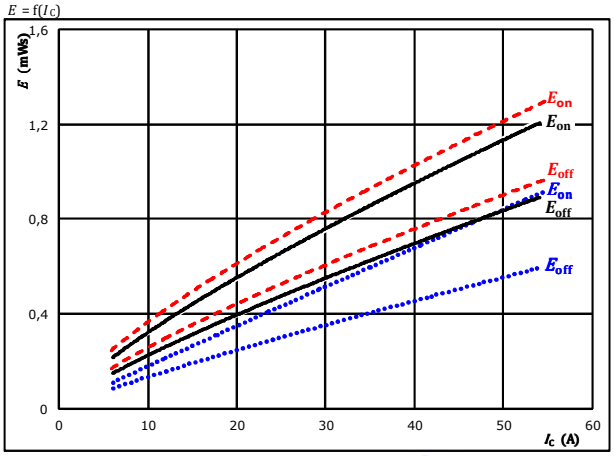
P_{rec} (100%) =	12,06	kW
E_{rec} (100%) =	0,49	mJ
t_{Erec} =	0,22	µs

H-Bridge Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



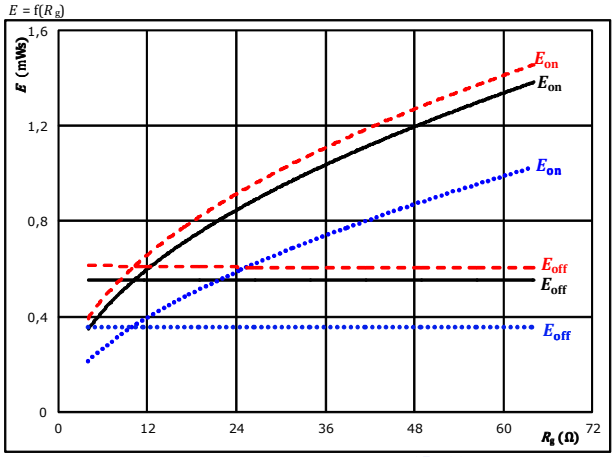
With an inductive load at

V_{CE} =	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

$E = f(R_g)$



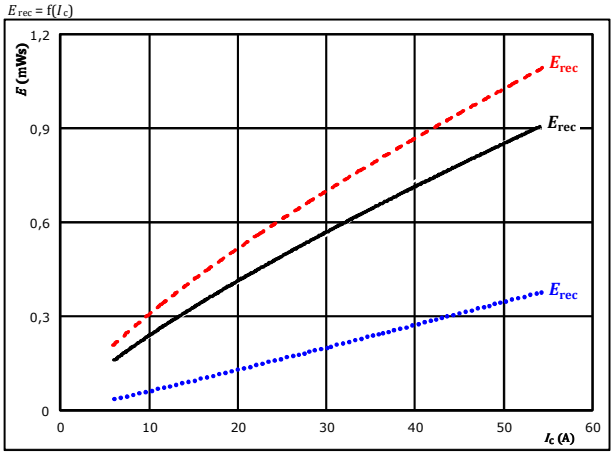
With an inductive load at

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

$E_{rec} = f(I_C)$



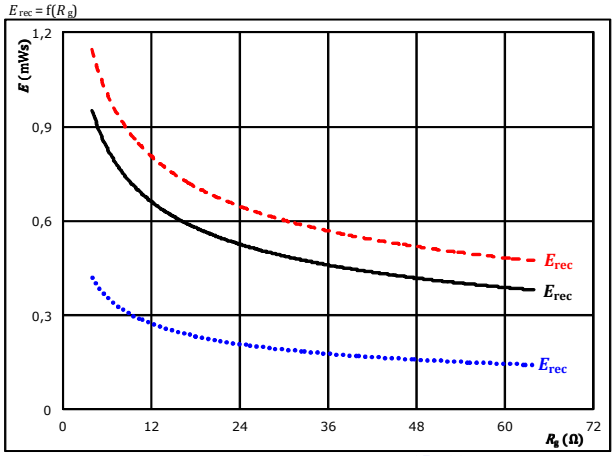
With an inductive load at

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

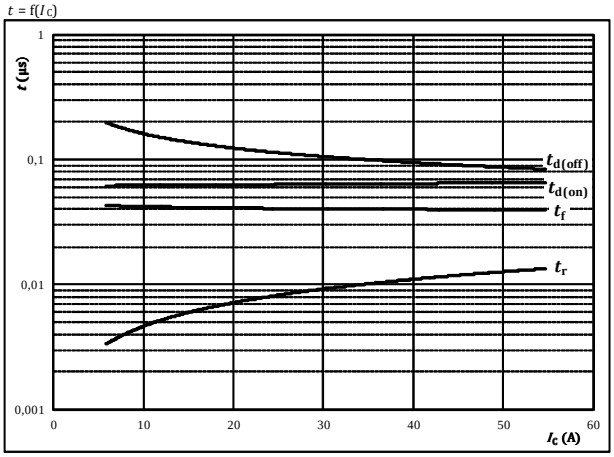
V_{CE} =	400	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	30	A		150 °C	

H-Bridge Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



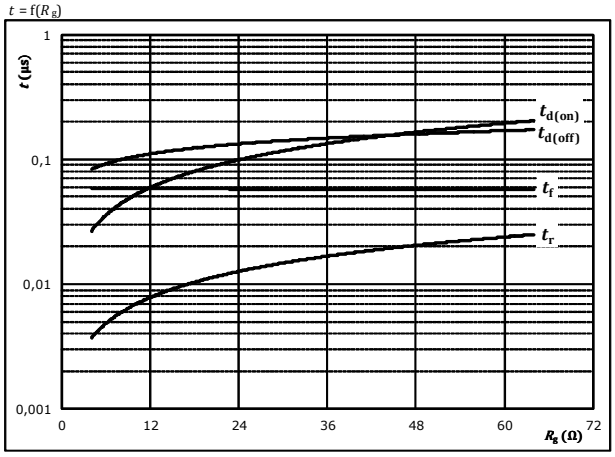
With an inductive load at

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

$t = f(R_g)$



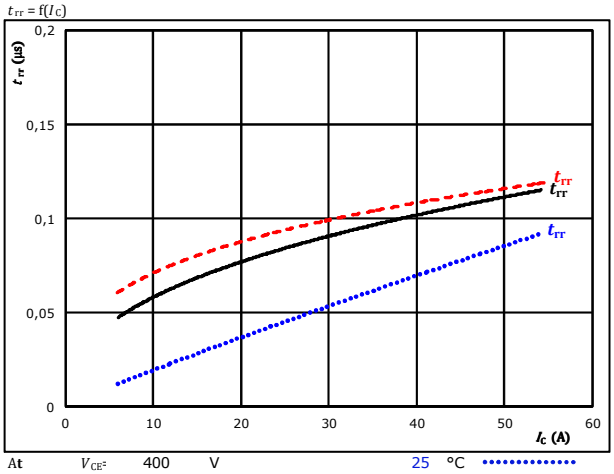
With an inductive load at

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

$t_{rr} = f(I_C)$



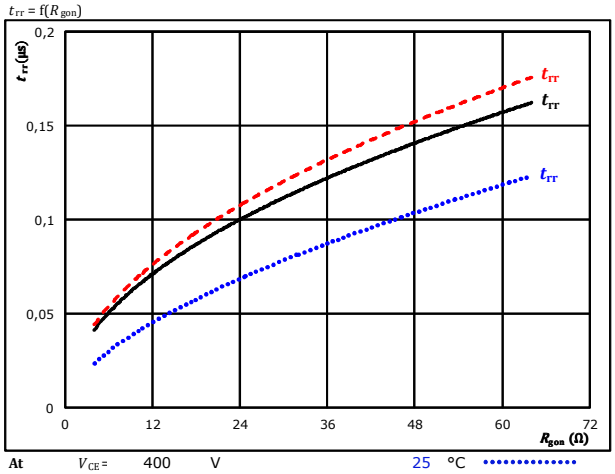
At

V_{CE} =	400	V	T_j:	25 °C	
V_{GE} =	±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

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



At

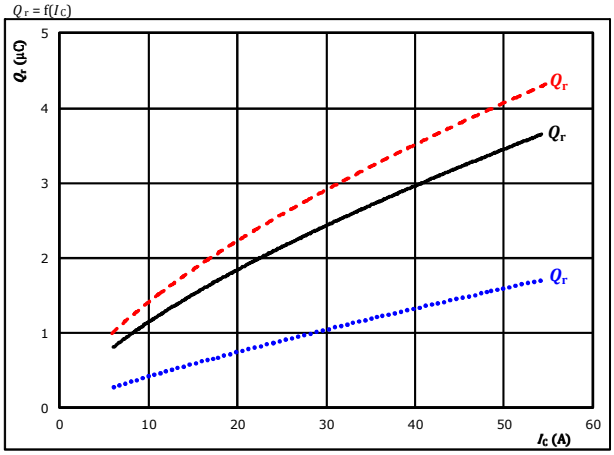
V_{CE} =	400	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	30	A		150 °C	

H-Bridge Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

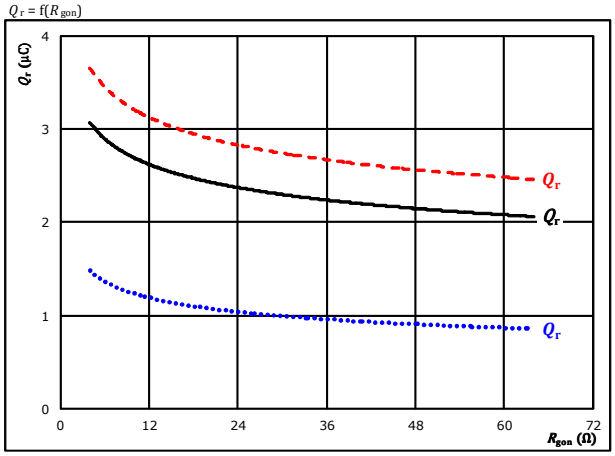


At						
	V_{CE} =	400	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	16	Ω		150 °C	

figure 10. FWD

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

$Q_r = f(R_{gon})$

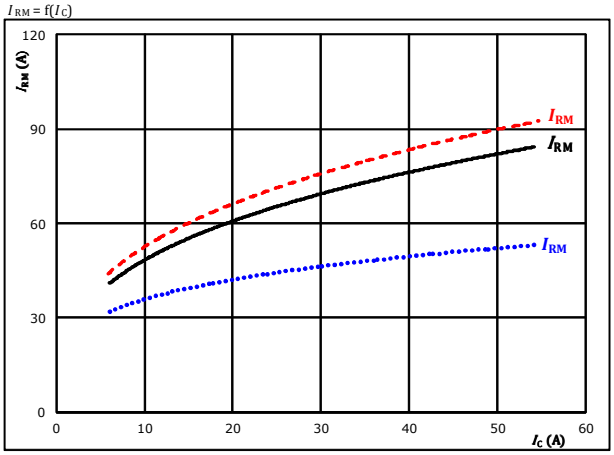


At						
	V_{CE}=	400	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	30	A		150 °C	

figure 11. FWD

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

$I_{RM} = f(I_C)$

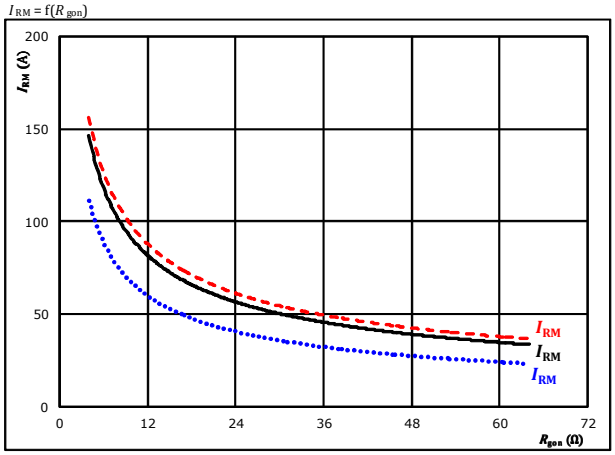


At						
	V_{CE}:	400	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	16	Ω		150 °C	

figure 12. FWD

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

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



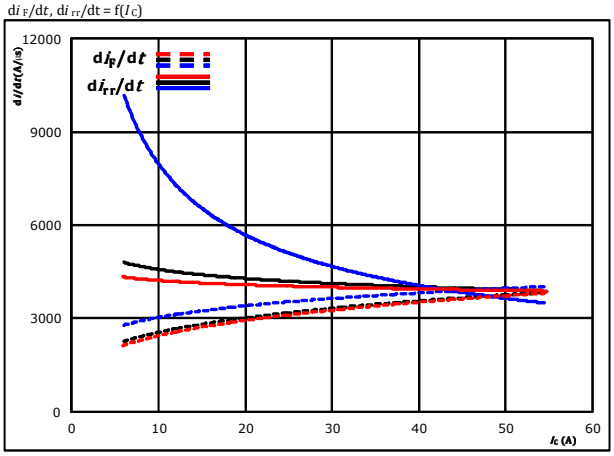
At						
	V_{CE} =	400	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	30	A		150 °C	

H-Bridge Switching Characteristics

figure 13. **FWD**

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

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

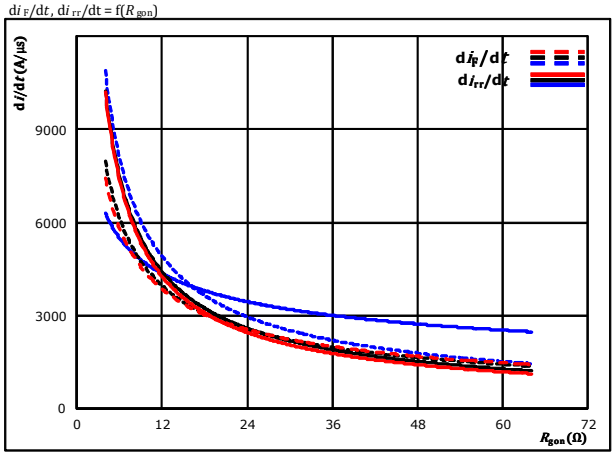


At						
V_{CE} =	400	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

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

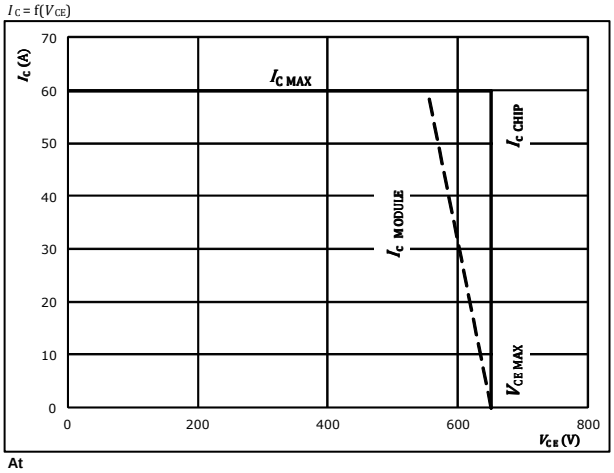


At						
V_{CE} =	400	V	T_j:	25 °C	•••••••••••••••
V_{GE} =	±15	V		125 °C	———
I_C =	30	A		150 °C	– – – –

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	16	Ω
R_{goff} =	16	Ω

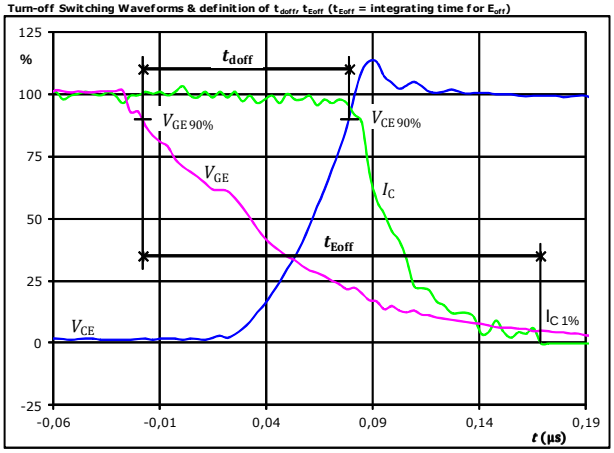
H-Bridge Switching Definitions

General conditions

T_j	=	**150 °C**
R_{gon}	=	**16 Ω**
R_{goff}	=	**16 Ω**

figure 1. IGBT

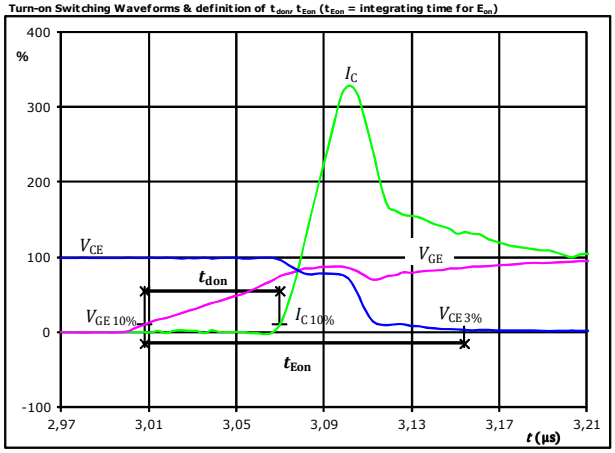
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,102	µs
t_{Eoff} =	0,186	µs

figure 2. IGBT

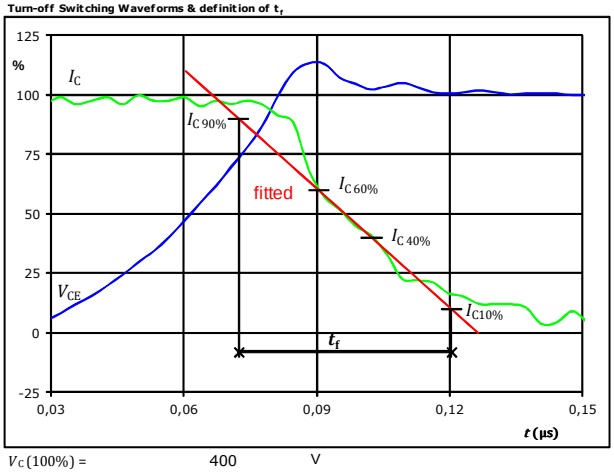
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{don} =	0,064	µs
t_{Eon} =	0,146	µs

figure 3. IGBT

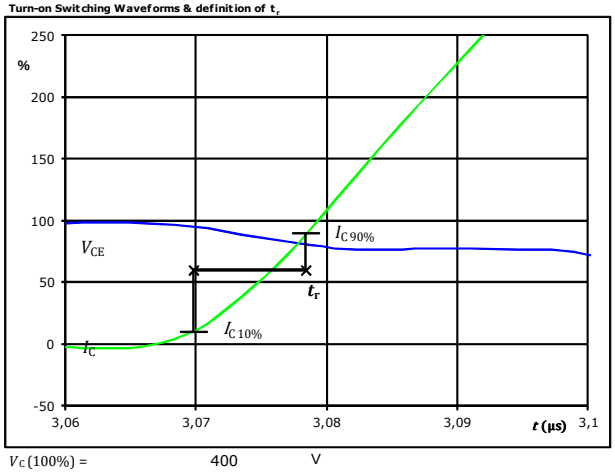
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_f =	0,050	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

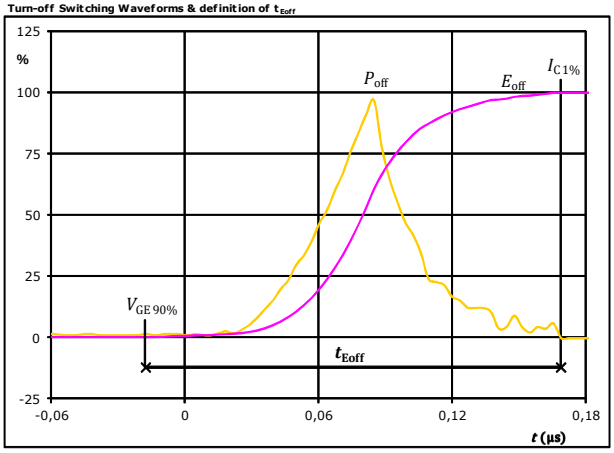


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_r =	0,009	µs

H-Bridge Switching Characteristics

figure 5. **IGBT**

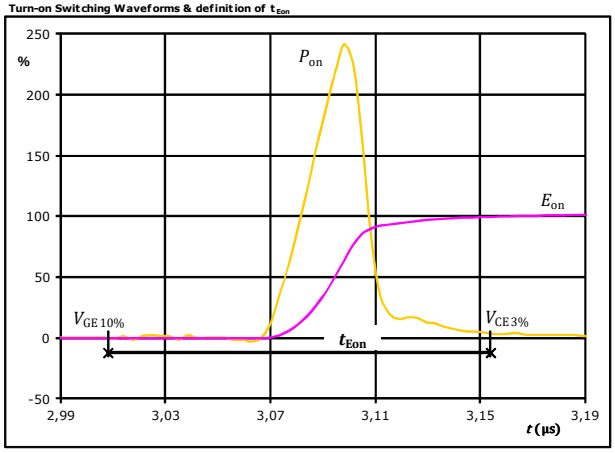
Turn-off Switching Waveforms & definition of t_{Eoff}



$P_{off}(100\%)$ =	12,05	kW
$E_{off}(100\%)$ =	0,54	mJ
t_{Eoff} =	0,19	µs

figure 6. **IGBT**

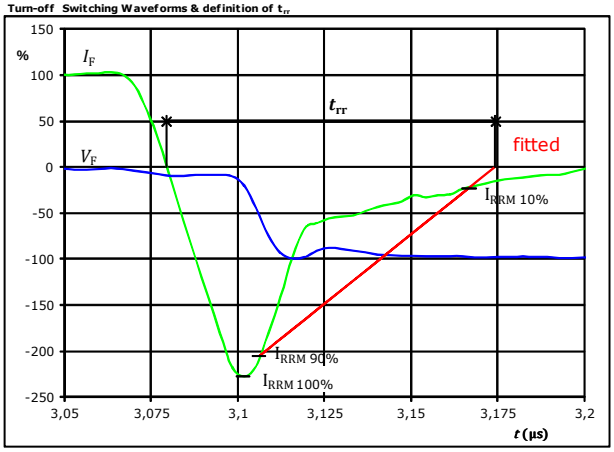
Turn-on Switching Waveforms & definition of t_{Eon}



$P_{on}(100\%)$ =	12,05	kW
$E_{on}(100\%)$ =	0,75	mJ
t_{Eon} =	0,15	µs

figure 7. **FWD**

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

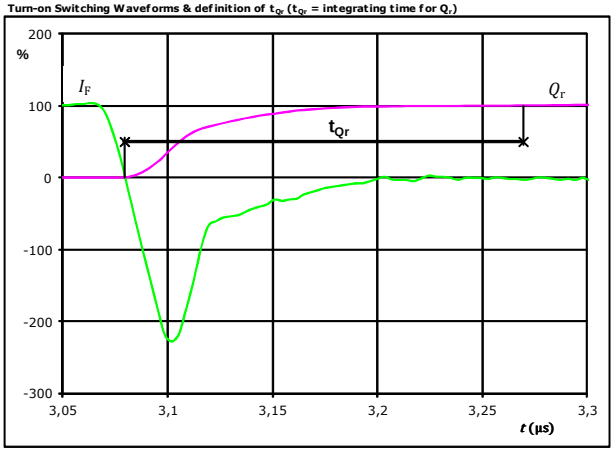


$V_F(100\%)$ =	400	V
$I_F(100\%)$ =	30	A
$I_{RRM}(100\%)$ =	-68	A
t_{rr} =	0,094	µs

H-Bridge Switching Characteristics

figure 8. FWD

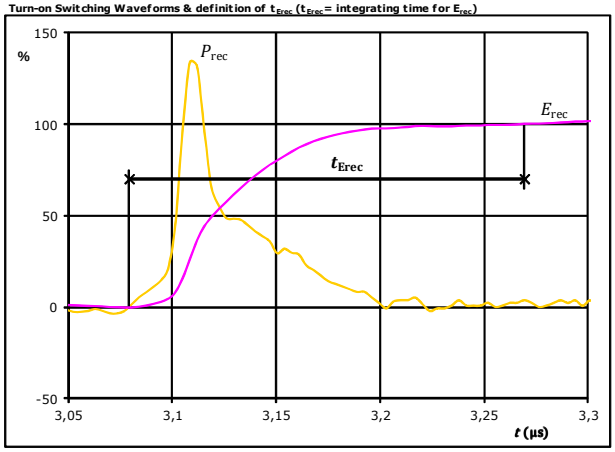
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	2,42	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%) =	12,05	kW
E_{rec} (100%) =	0,56	mJ
t_{Erec} =	0,19	µs

Ordering Code & Marking

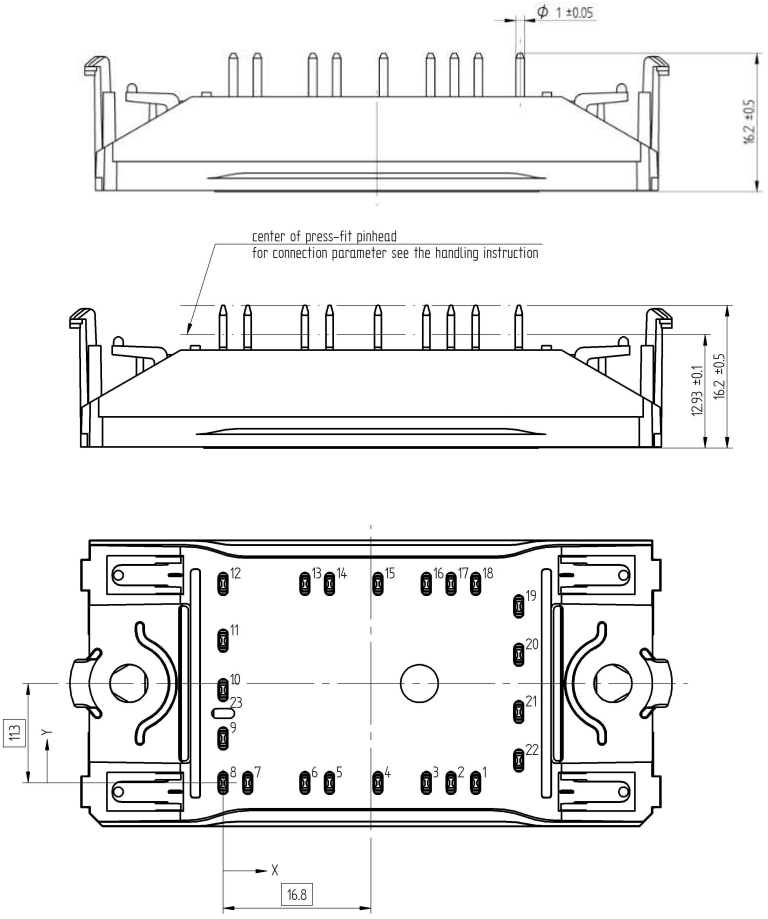
Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FZ07BIA030S5Y-P894E78
with thermal paste 12 mm housing with solder pins	10-FZ07BIA030S5Y-P894E78-/3/
without thermal paste 12 mm housing with press-fit pins	10-PZ07BIA030S5Y-P894E78Y
with thermal paste 12 mm housing with press-fit pins	10-PZ07BIA030S5Y-P894E78Y-/3/

	Name	Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNN-TTTTTTVV	WWYY	UL VIN	LLLLL	SSSS

	Type&Ver	Lot number	Serial	Date code		
Datamatrix	TTTTTTVV	LLLLL	SSSS	WWYY		

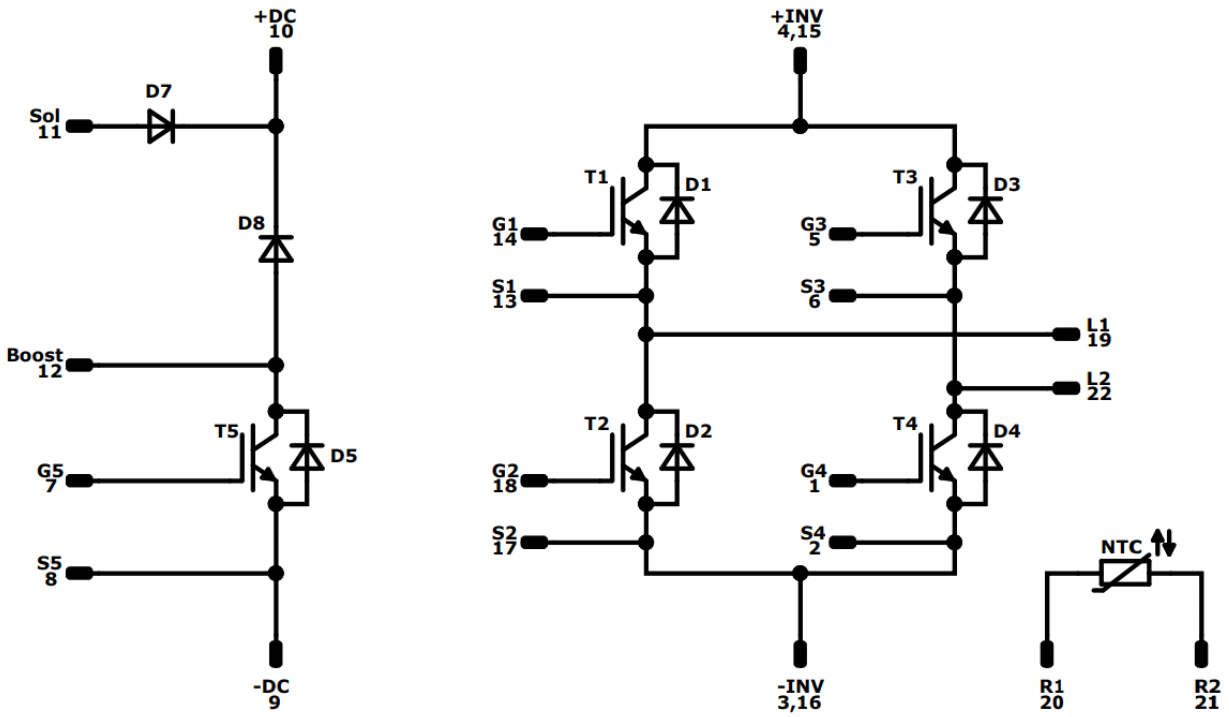
Outline

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		



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	Rectifier	1600 V	35 A	ByPass Diode	
T1-T4	IGBT	650 V	30 A	H-Bridge Switch	
D1-D4	FWD	650 V	15 A	H-Bridge 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-xZ07BIA030S5Y-P894E78x-D2-14	25 Apr. 2018	Press fit version added	