10-FZ07BIA030SG-P894E38
10-PZ07BIA030SG-P894E38Y
datasheet

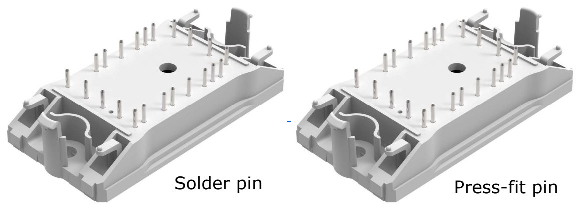
Vincotech

*flow*SOL 0 BI (TL) — 650 V / 30 A

Features

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

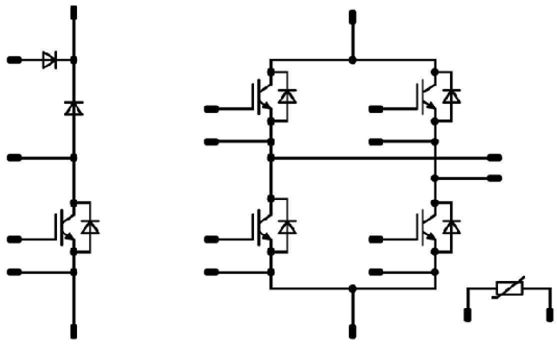
flow 0 12 mm housing



Target applications

- Power Supply
- Solar Inverters

Schematic



Types

- 10-FZ07BIA030SG-P894E38
- 10-PZ07BIA030SG-P894E38Y

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	30	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	70	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq$ 150 °C V_{GE} = 15 V		5 400	μs 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	14	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	30	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	70	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V		5 400	μs V
Maximum junction temperature	T_{jmax}			175	°C
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	14	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

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			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
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 pin / Press-fit pin		8,66 / 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
H-Bridge Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE} = V_{CE}			0,00043	25	4,2	5,1	5,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150	1,48	1,92 2,22 2,30	2,32	V
Collector-emitter cut-off current	I_{CES}		0	650		25			1,6	µA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		1900		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		55		pF
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,35		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	350	30	25 125 150		278 266 262		ns
Rise time	t_r					25 125 150		63 67 70		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		148 164 169		ns
Fall time	t_f					25 125 150		4 7 8		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 0,5 µC Q_{rFWD} = 1,5 µC Q_{rFWD} = 1,9 µC				25 125 150		1,12 1,60 1,77		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,232 0,343 0,382		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)						1,95		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 484 A/µs di/dt = 486 A/µs di/dt = 392 A/µs	±15	350	30	25 125 150		9 14 15		A
Reverse recovery time	t_{rr}					25 125 150		140 204 225		ns
Recovered charge	Q_r					25 125 150		0,548 1,54 1,87		µC
Reverse recovered energy	E_{rec}					25 125 150		0,092 0,250 0,306		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		419 88 95		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,00043	25	4,2	5,1	5,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125 150	1,48	1,92 2,22 2,30	2,32	V
Collector-emitter cut-off current	I_{CES}		0	650		25			1,6	µA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		1900		pF
Reverse transfer capacitance	C_{res}							55		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,35		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		93 81 78		ns
Rise time	t_r					25 125 150		56 61 64		
Turn-off delay time	$t_{d(off)}$					25 125 150		370 400 405		
Fall time	t_f					25 125 150		12 10 9		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 0,7 µC Q_{rFWD} = 1,6 µC Q_{rFWD} = 1,9 µC				25 125 150		1,26 1,85 2,01		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,488 0,624 0,632		

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 = 449 A/µs di/dt = 455 A/µs di/dt = 413 A/µs	15/0	400	30	25 125 150		10 15 15		A
Reverse recovery time	t_{rr}					25 125 150		139 191 205		ns
Recovered charge	Q_r					25 125 150		0,716 1,62 1,87		µC
Reverse recovered energy	E_{rec}					25 125 150		0,162 0,287 0,328		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		516 80 113		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

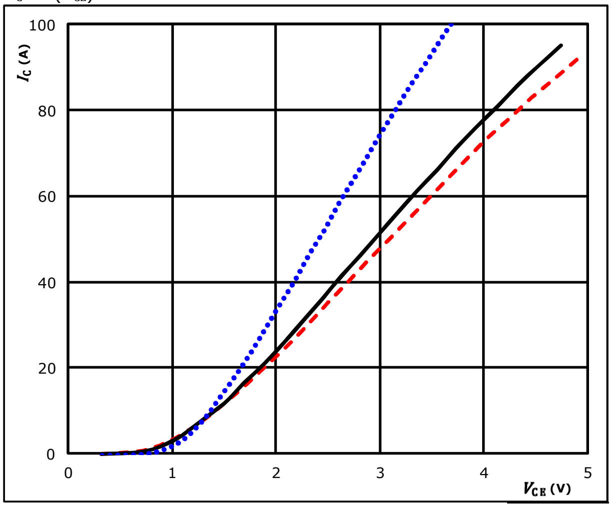
Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	Unit
ByPass Diode										
Static										
Forward voltage	V_{F}				35	25 125	0,8	1,17 1,13	1,6	V
Reverse leakage current	I_{r}			1600		25 145			50 1100	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,25		K/W
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

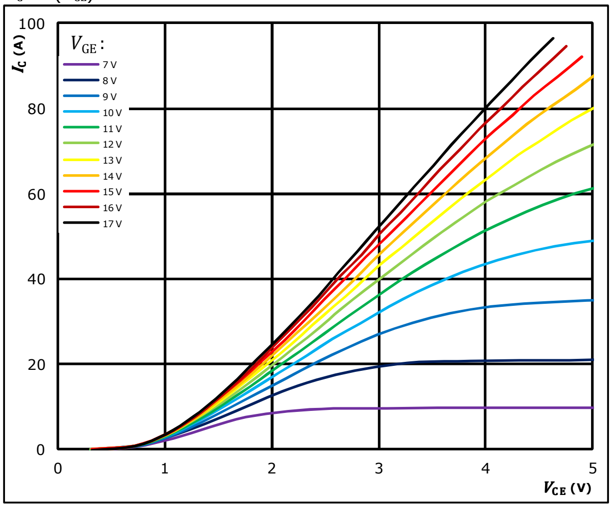
V_{GE} = 15 V

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

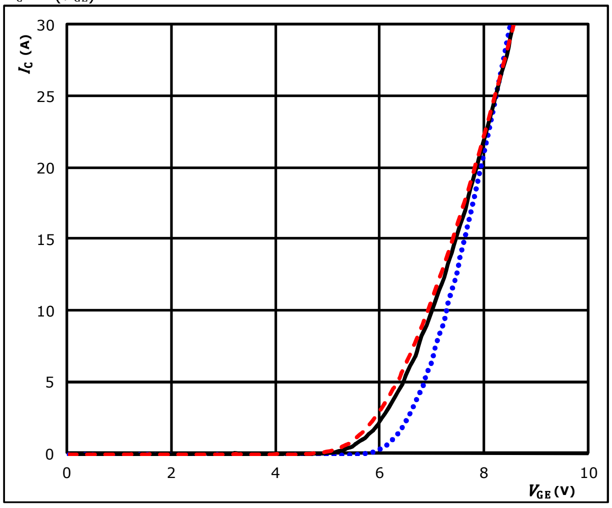
T_j = 150 °C

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

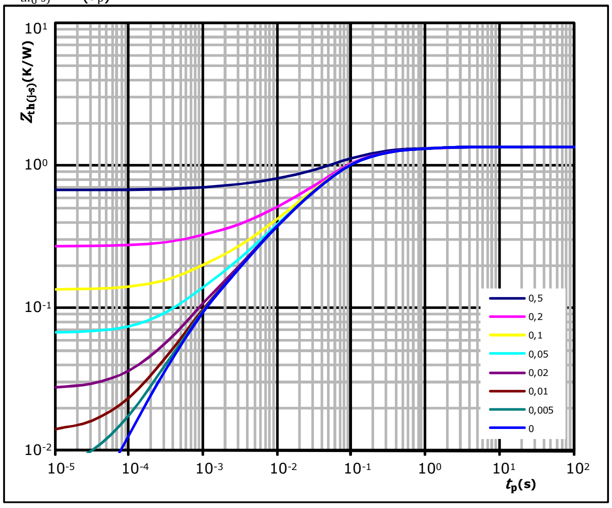
V_{CE} = 10 V

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,35 K/W

IGBT thermal model values

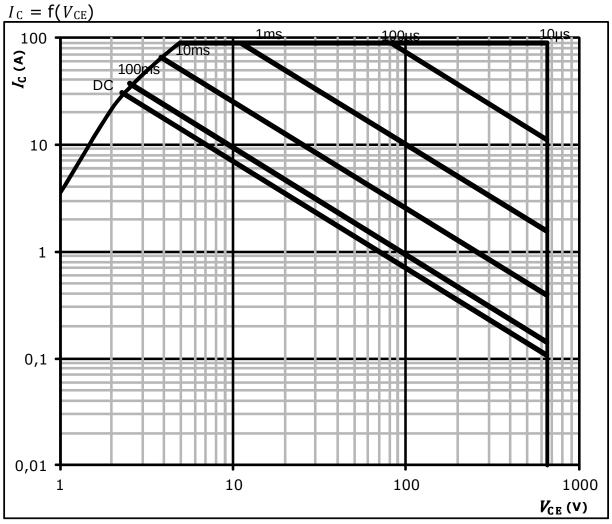
R (K/W)	τ (s)
1,08E-01	9,29E-01
2,99E-01	1,46E-01
6,53E-01	4,83E-02
2,20E-01	7,47E-03
6,40E-02	8,48E-04
8,48E-03	5,70E-04

H-Bridge Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



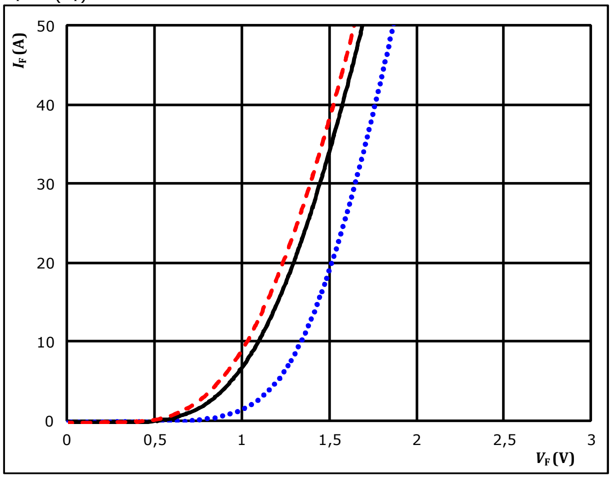
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

H-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



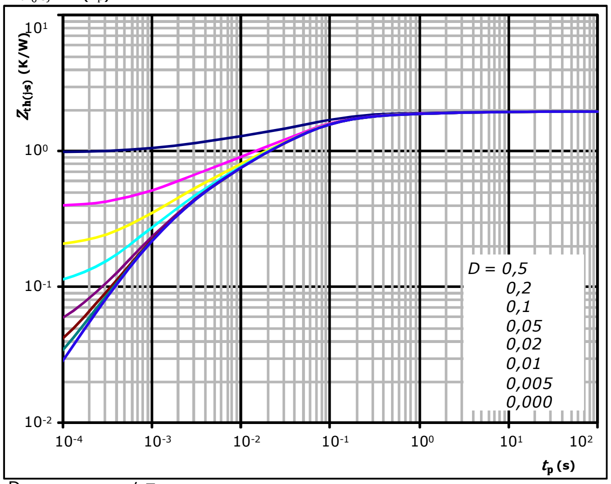
t_p = 250 µs

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

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

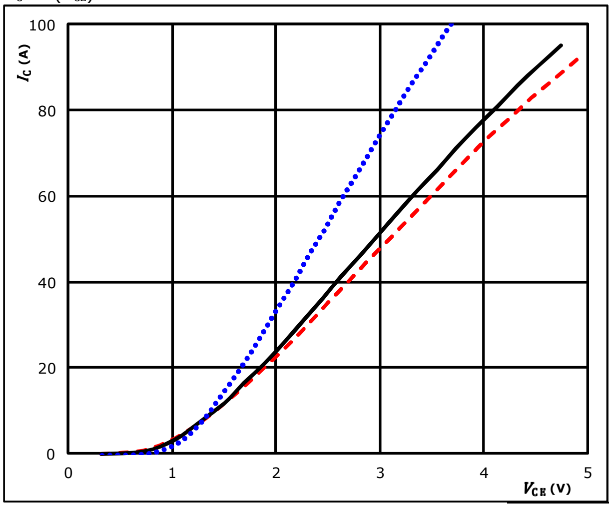
R (K/W)	τ (s)
6,76E-02	3,64E+00
1,40E-01	5,05E-01
6,86E-01	7,72E-02
5,59E-01	2,36E-02
3,18E-01	4,16E-03
1,83E-01	1,00E-03

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

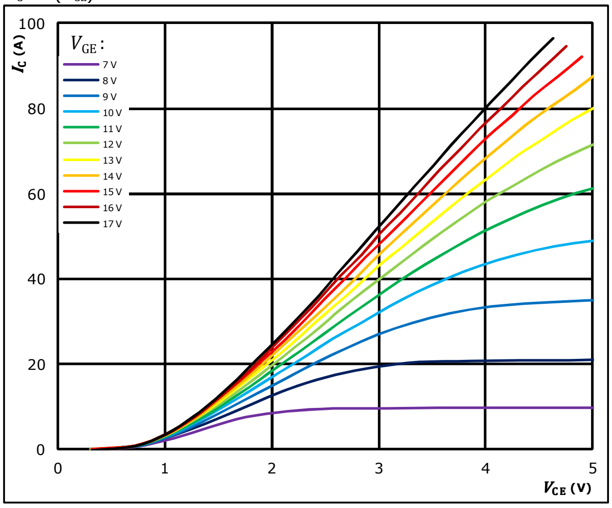


t_p =	250	µs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

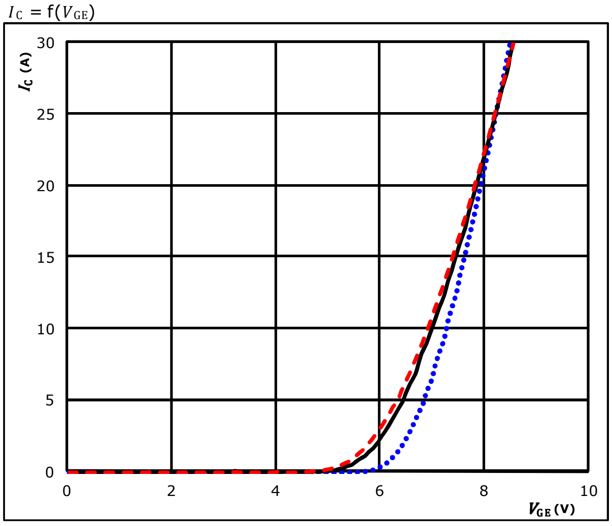


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

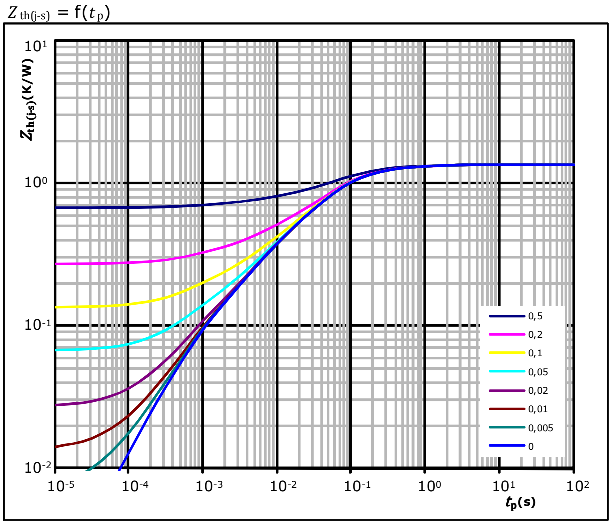


t_p =	100	µs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,35 K/W

IGBT thermal model values

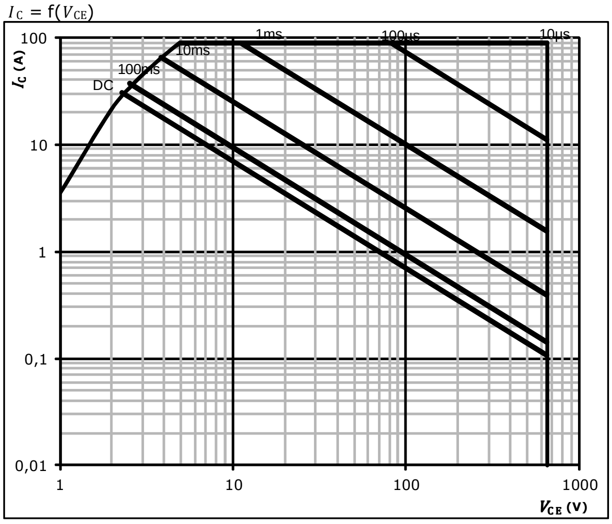
R (K/W)	τ (s)
1,08E-01	9,29E-01
2,99E-01	1,46E-01
6,53E-01	4,83E-02
2,20E-01	7,47E-03
6,40E-02	8,48E-04
8,48E-03	5,70E-04

Boost Switch Characteristics

figure 5.	**IGBT**

Safe operating area

$I_C = f(V_{CE})$



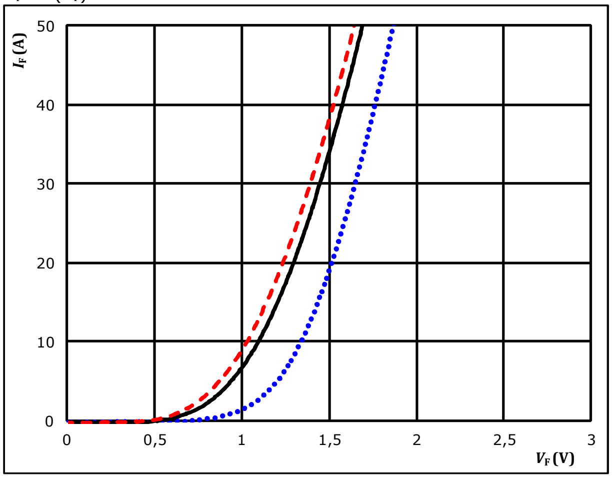
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



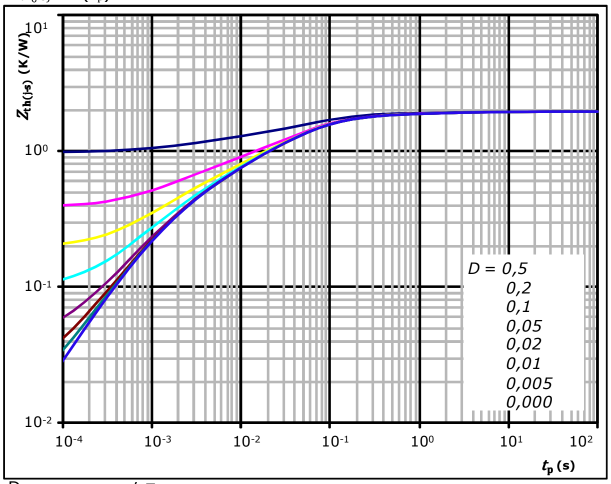
t_p = 250 μs

T_j: 25 °C · 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

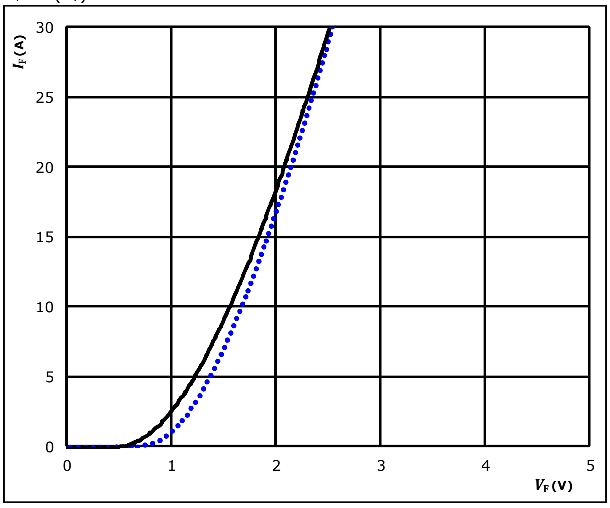
R (K/W)	τ (s)
6,76E-02	3,64E+00
1,40E-01	5,05E-01
6,86E-01	7,72E-02
5,59E-01	2,36E-02
3,18E-01	4,16E-03
1,83E-01	1,00E-03

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



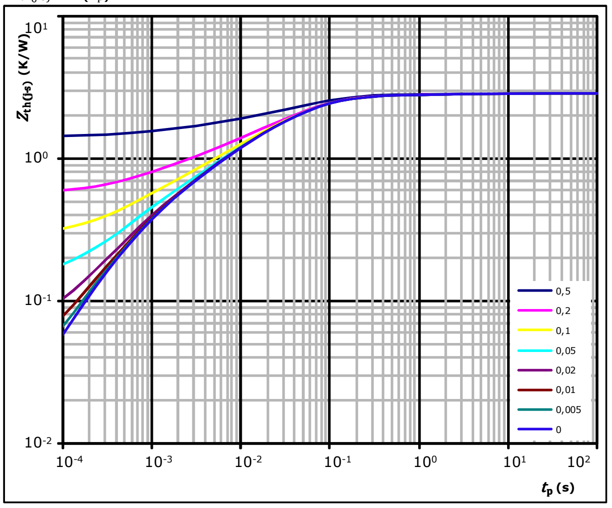
t_p = 250 µs

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

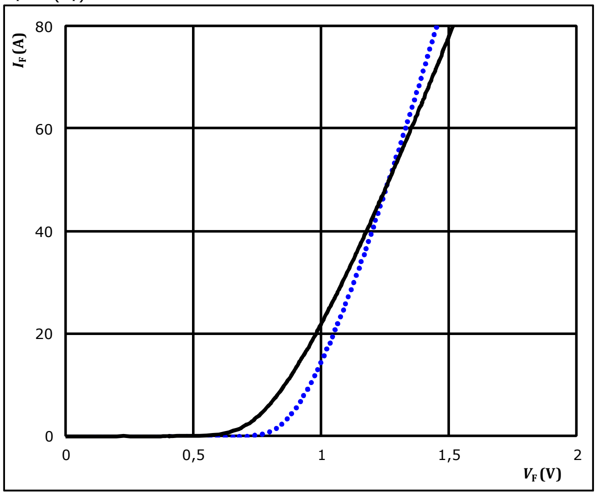
R (K/W)	τ (s)
6,53E-02	3,94E+00
1,48E-01	4,48E-01
1,31E+00	5,96E-02
7,32E-01	1,36E-02
4,04E-01	2,79E-03
2,11E-01	5,37E-04

ByPass Diode Characteristics

figure 1. **Bypass diode**

Typical forward characteristics

$I_F = f(V_F)$



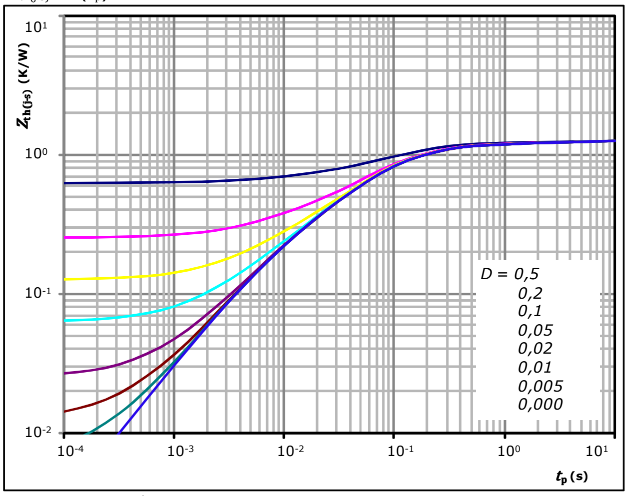
t_p = 250 µs

T_j:		
	25 °C	dotted
	125 °C	solid

figure 2. **Bypass diode**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

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

Diode thermal model values

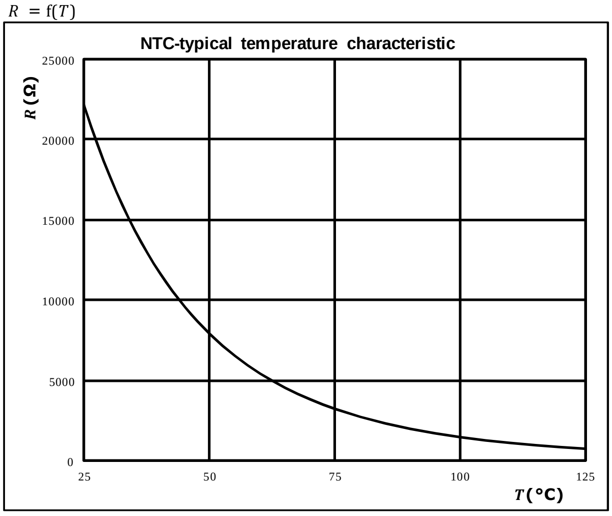
R (K/W)	τ (s)
8,00E-02	5,22E+00
1,56E-01	4,18E-01
6,95E-01	8,82E-02
2,23E-01	3,07E-02
9,97E-02	5,99E-03

NTC Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

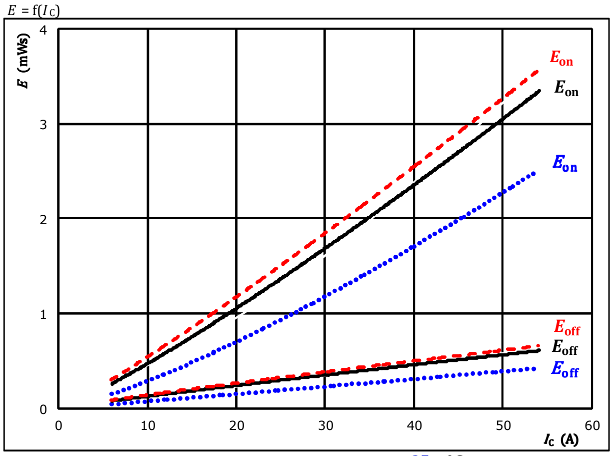


H-Bridge Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



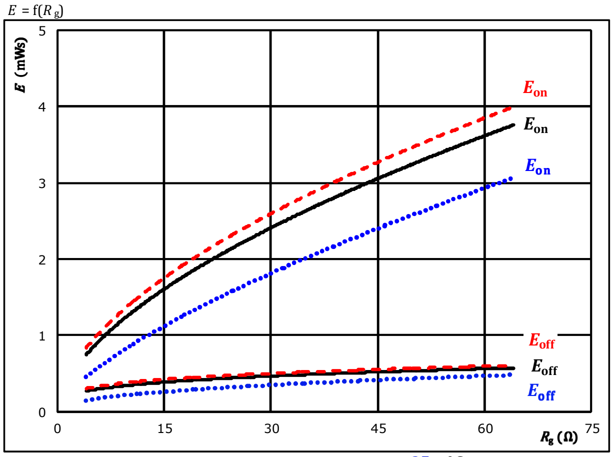
With an inductive load at

V_{CE} =	350	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

$E = f(R_g)$



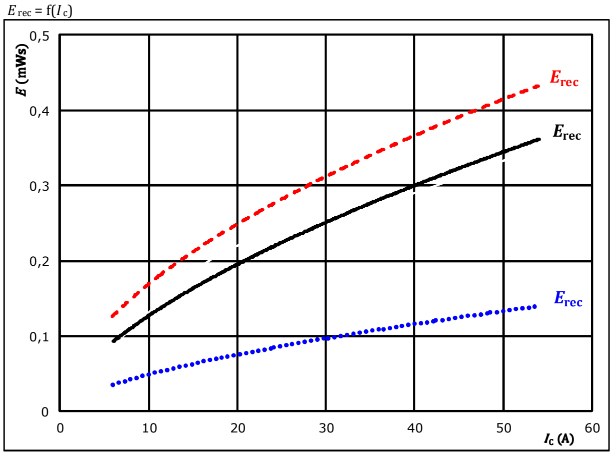
With an inductive load at

V_{CE} =	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

$E_{rec} = f(I_C)$



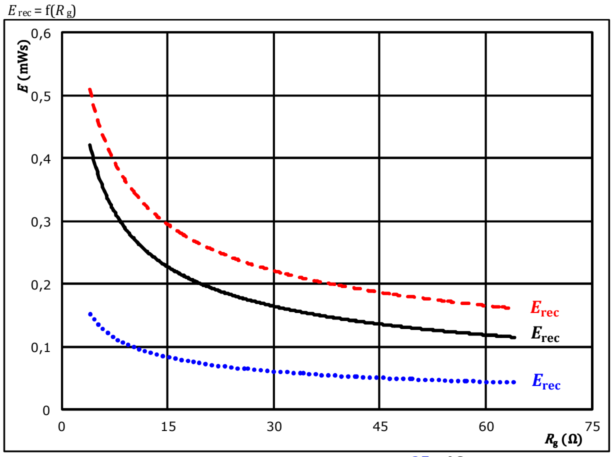
With an inductive load at

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

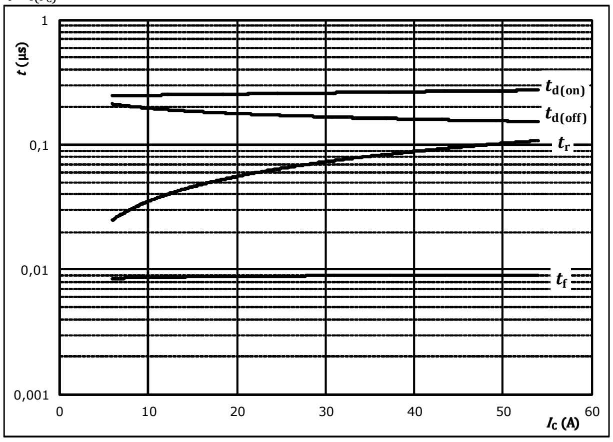
V_{CE} =	350	V	T_j:	25	°C	·············
V_{GE} =	±15	V		125	°C	————
I_C =	30	A		150	°C	– – – –

H-Bridge Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



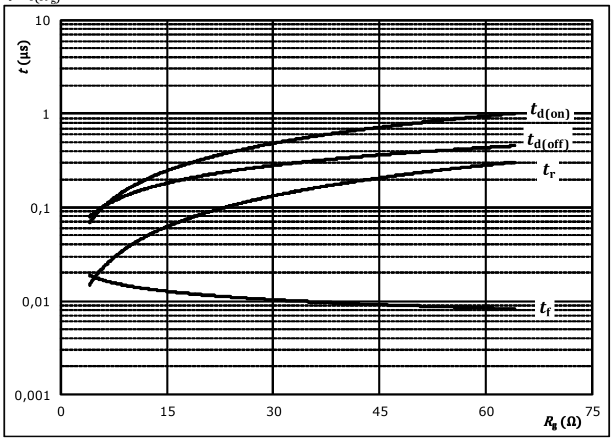
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



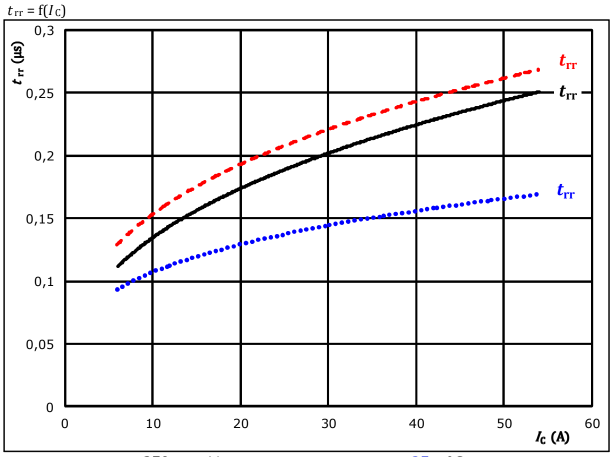
With an inductive load at

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

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

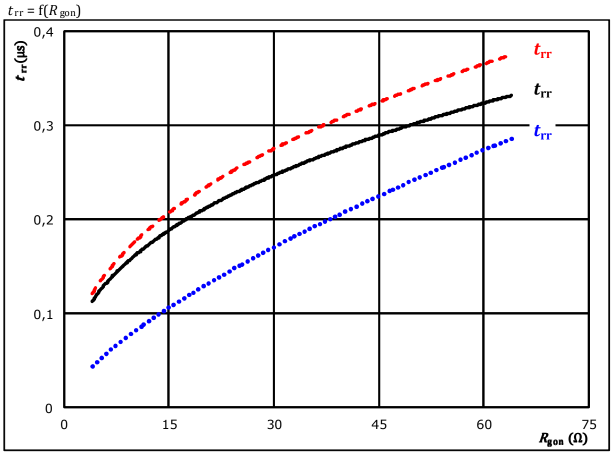


At V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	16	Ω		150	°C

figure 8. **FWD**

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

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



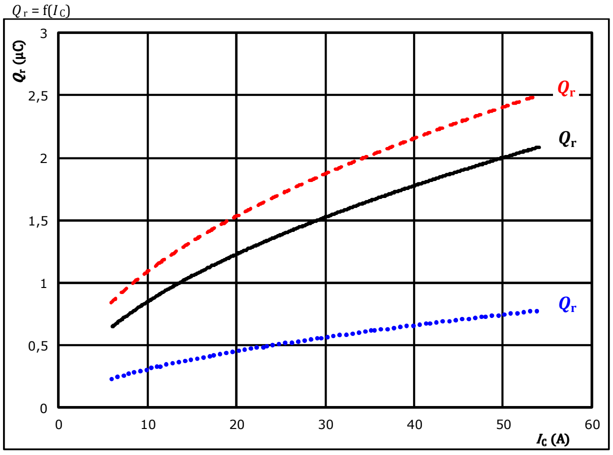
At V_{CE} =	350	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	30	A		150	°C

H-Bridge Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

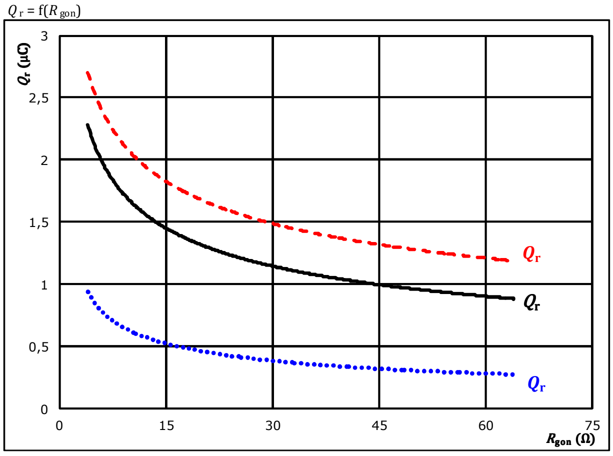


At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

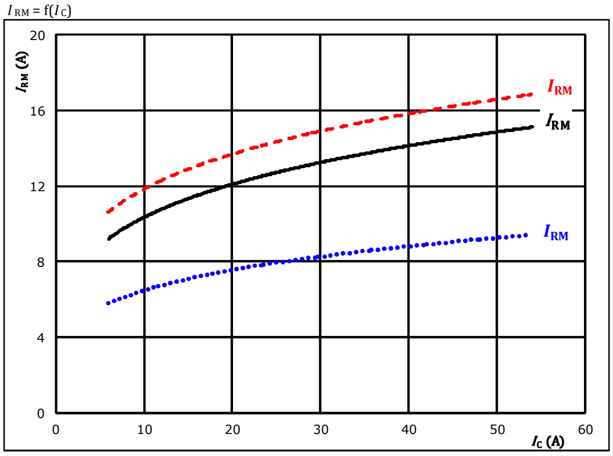


At					
V_{CE}=	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	30	A		150 °C	– – – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

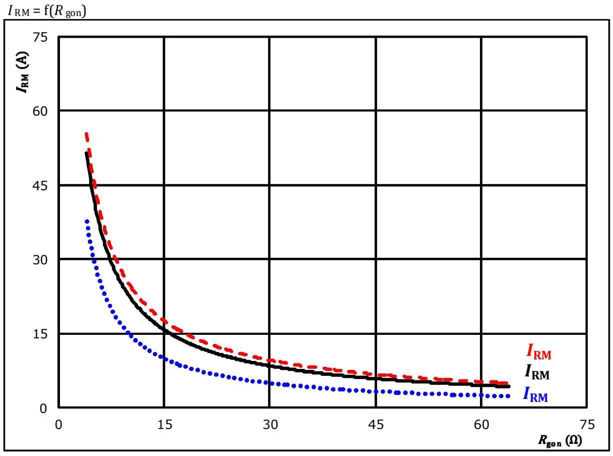


At					
V_{CE}:	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

figure 12. **FWD**

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

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



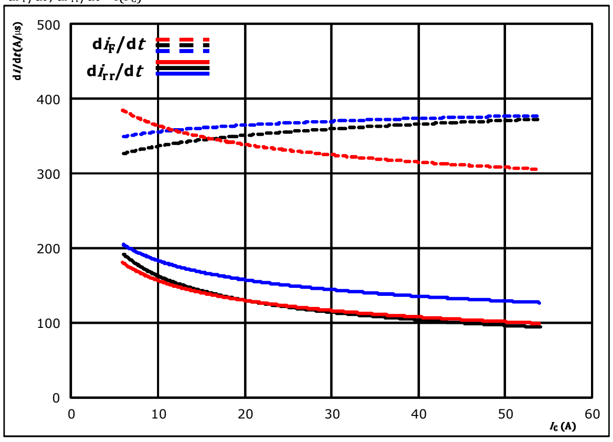
At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	30	A		150 °C	– – – –

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

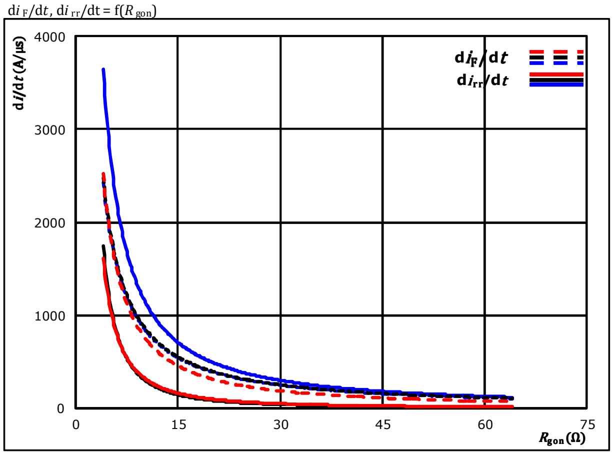


At					
V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	——
R_{gon} =	16	Ω		150 °C	– – –

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

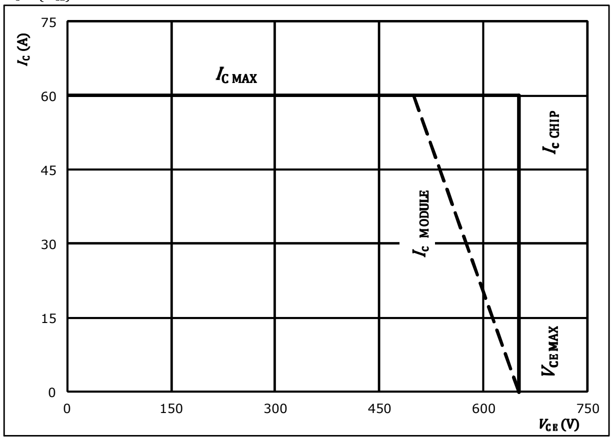


At					
V_{CE} =	350	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	——
I_C =	30	A		150 °C	– – –

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

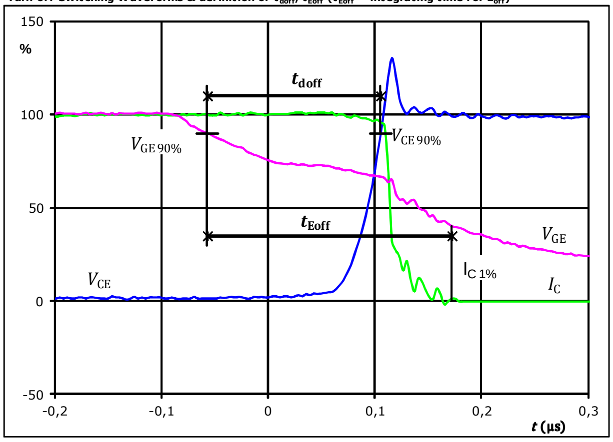
H-Bridge Switching Definitions

General conditions

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

figure 1. IGBT

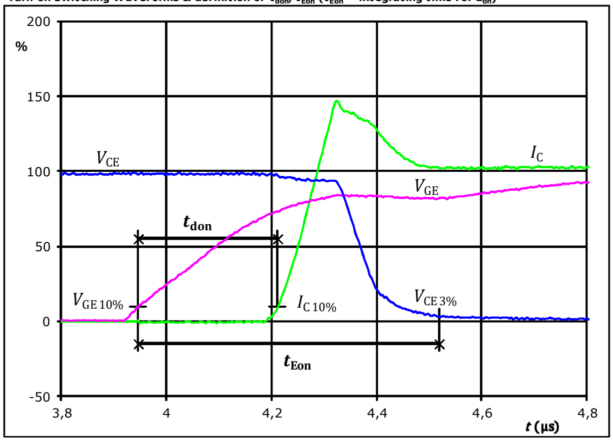
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,164	µs
t_{Eoff} =	0,229	µs

figure 2. IGBT

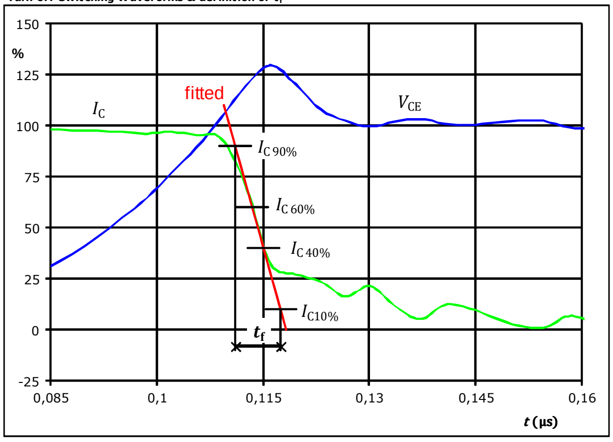
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_{don} =	0,266	µs
t_{Eon} =	0,572	µs

figure 3. IGBT

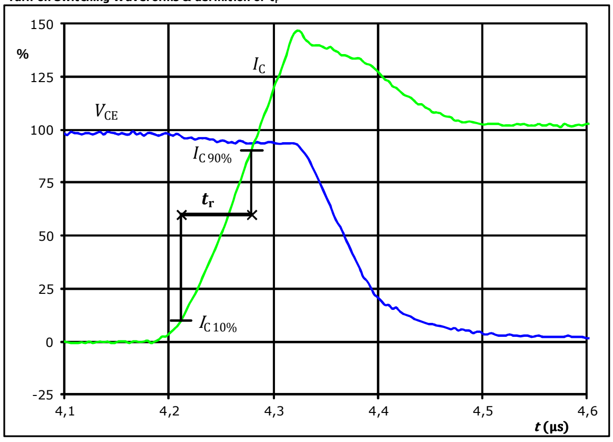
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_f =	0,007	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

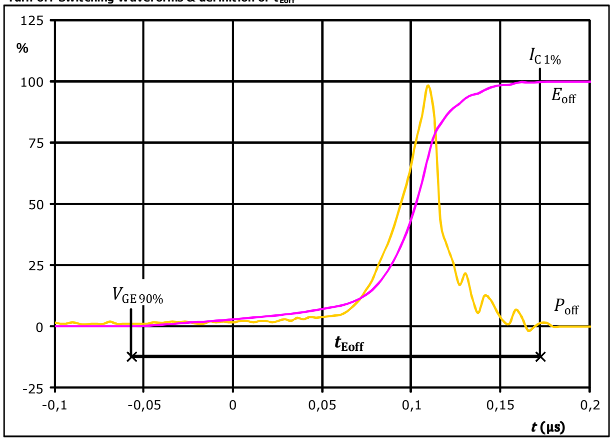


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	30	A
t_r =	0,067	µs

H-Bridge Switching Characteristics

figure 5. **IGBT**

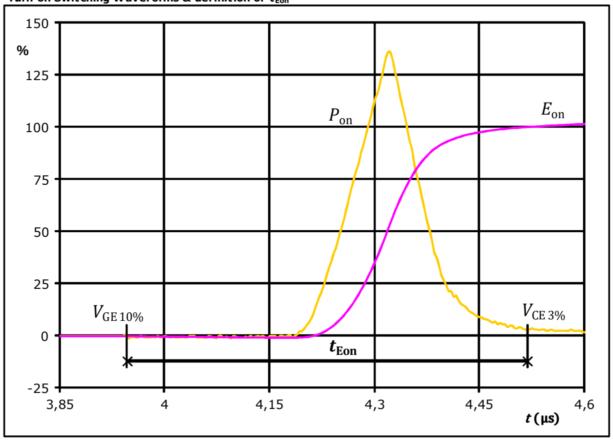
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	10,43	kW
E_{off} (100%) =	0,34	mJ
t_{Eoff} =	0,23	µs

figure 6. **IGBT**

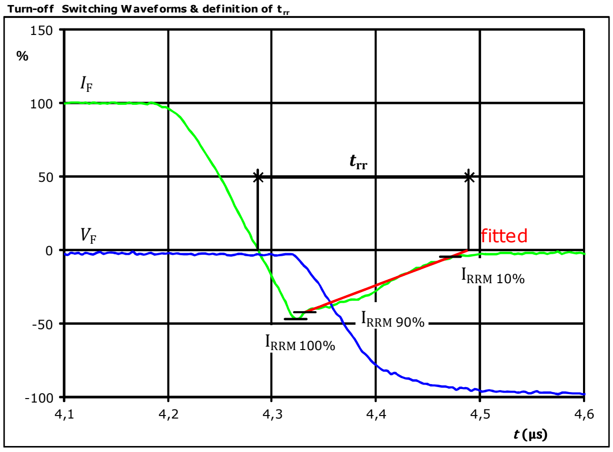
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	10,43	kW
E_{on} (100%) =	1,60	mJ
t_{Eon} =	0,57	µs

figure 7. **FWD**

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

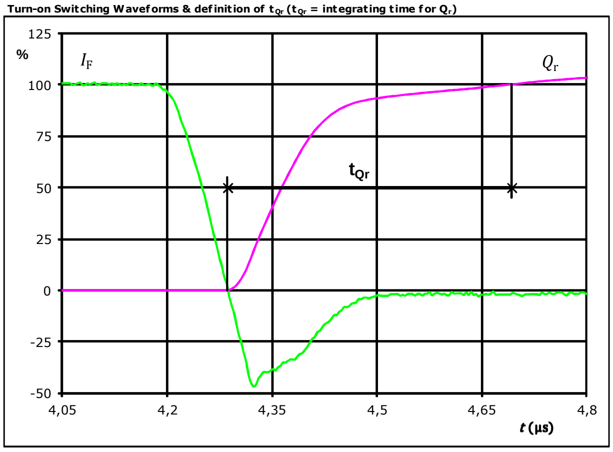


V_F (100%) =	350	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-14	A
t_{rr} =	0,204	µs

H-Bridge Switching Characteristics

figure 8. **FWD**

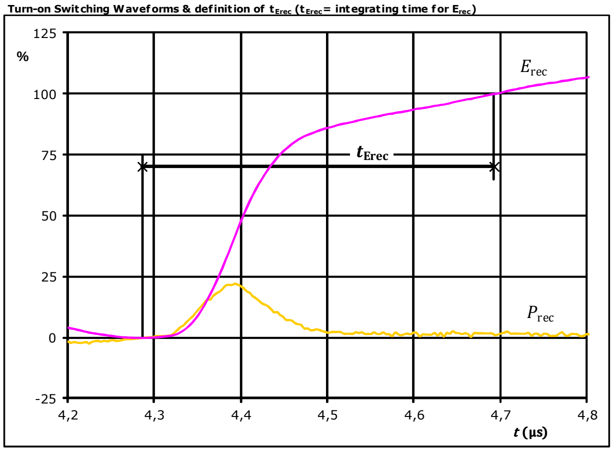
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	1,54	µC
t_{Qr} =	0,41	µs

figure 9. **FWD**

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



P_{rec} (100%) =	10,43	kW
E_{rec} (100%) =	0,25	mJ
t_{Erec} =	0,41	µs

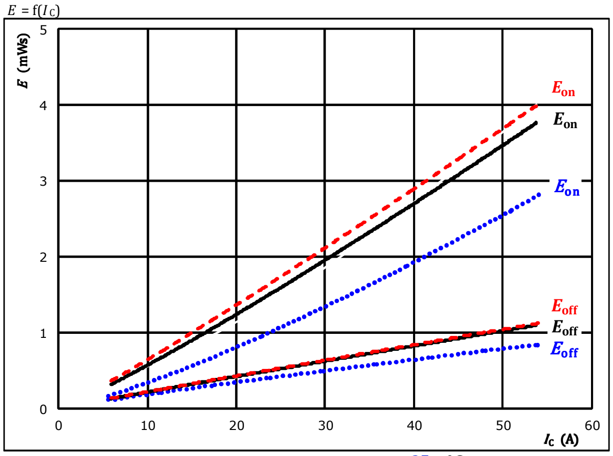
Vincotech

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



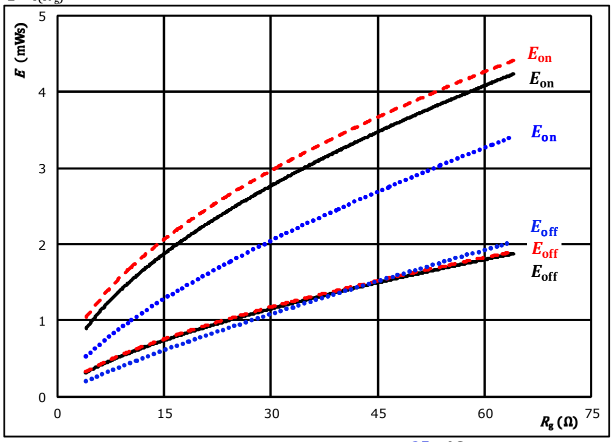
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	15/0	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

$E = f(R_g)$



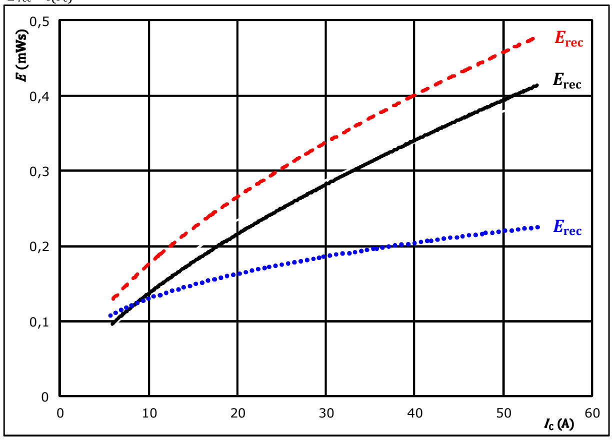
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	15/0	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

$E_{rec} = f(I_C)$



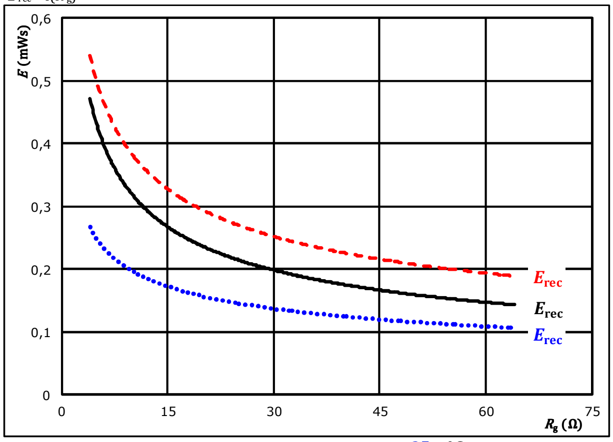
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	15/0	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

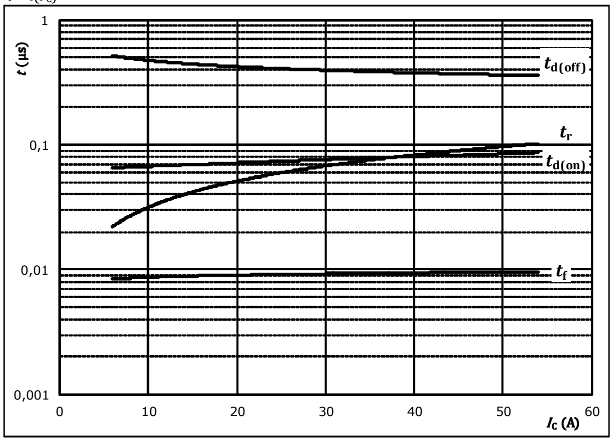
V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	15/0	V		125 °C	solid
I_C =	30	A		150 °C	dashed

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



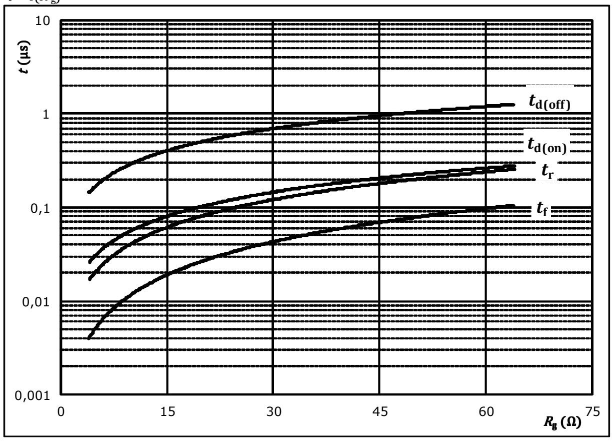
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



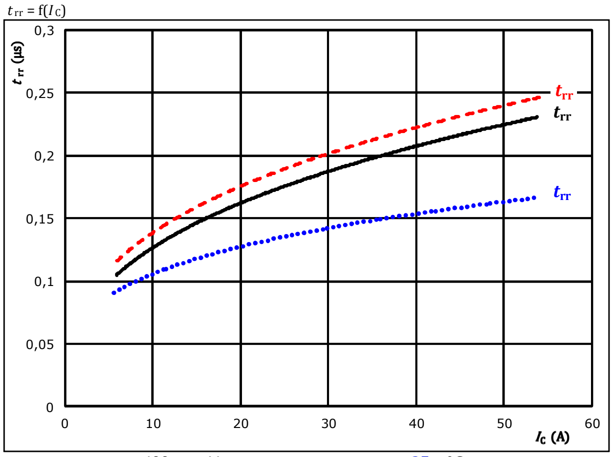
With an inductive load at

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

$t_{rr} = f(I_C)$

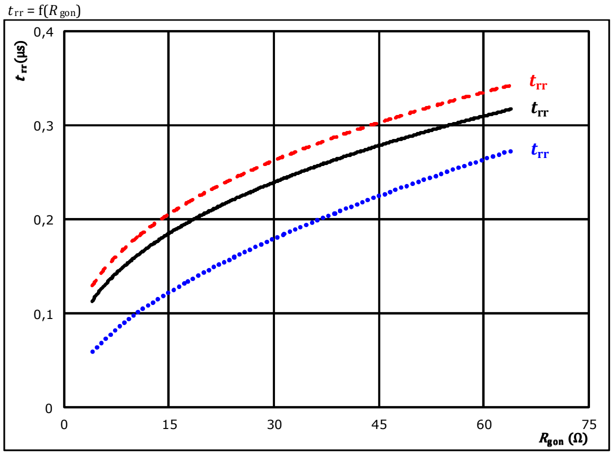


At						
V_{CE} =	400	V		25	°C	dotted (blue)
V_{GE} =	15/0	V	T_j:	125	°C	solid (black)
R_{gon} =	16	Ω		150	°C	dashed (red)

figure 8. **FWD**

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

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



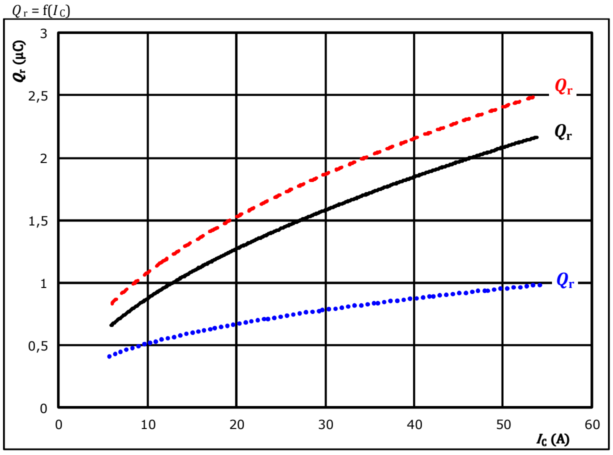
At						
V_{CE} =	400	V		25	°C	dotted (blue)
V_{GE} =	15/0	V	T_j:	125	°C	solid (black)
I_C =	30	A		150	°C	dashed (red)

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

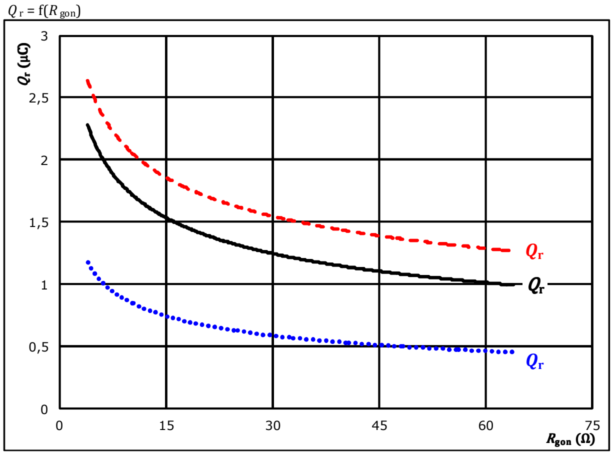


At					
V_{CE} =	400	V		25 °C	···········
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

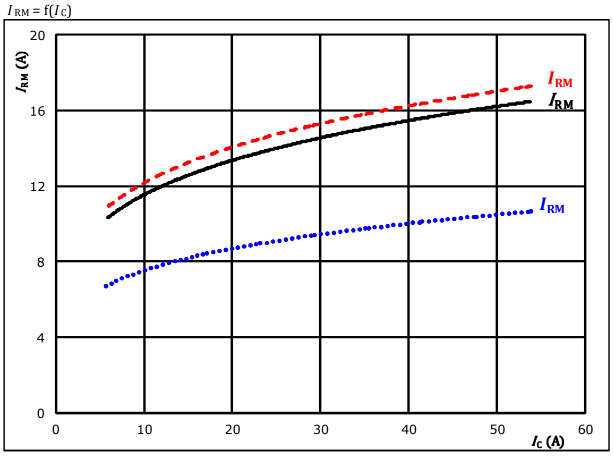


At					
V_{CE}=	400	V		25 °C	···········
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C=	30	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

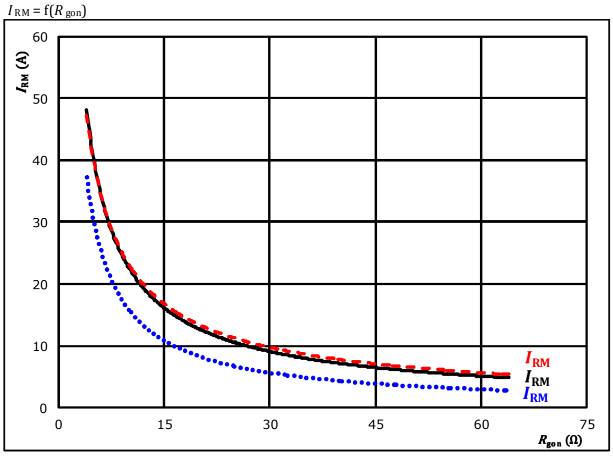


At					
V_{CE}:	400	V		25 °C	···········
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

figure 12. **FWD**

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

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



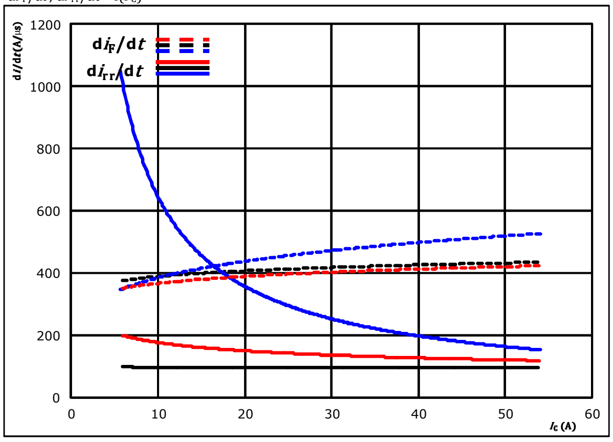
At					
V_{CE} =	400	V		25 °C	···········
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C =	30	A		150 °C	– – –

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

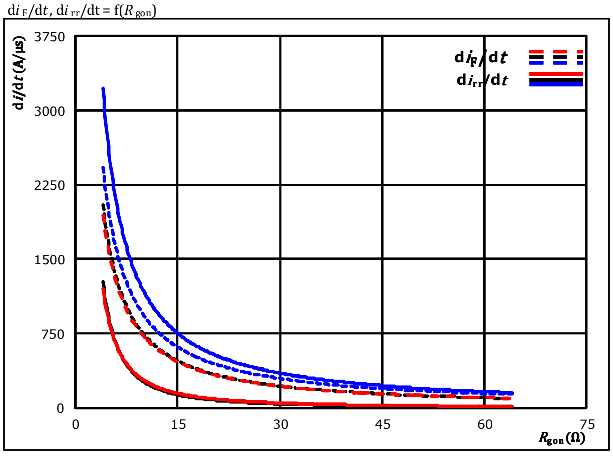


At						
V_{CE} =	400	V		25	°C	dotted
V_{GE} =	15/0	V	T_j:	125	°C	solid
R_{gon} =	16	Ω		150	°C	dashed

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

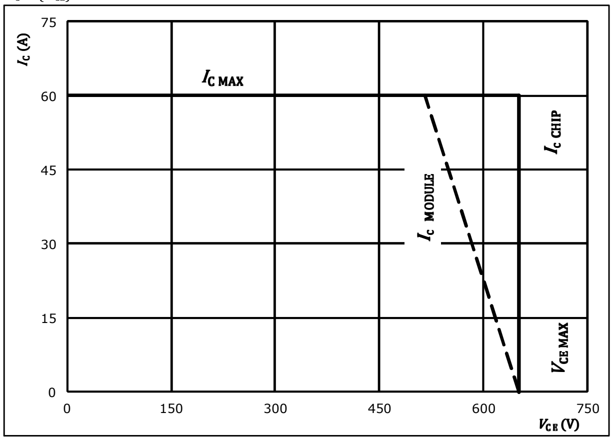


At						
V_{CE} =	400	V		25	°C	dotted
V_{GE} =	15/0	V	T_j:	125	°C	solid
I_C=	30	A		150	°C	dashed

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

Vincotech

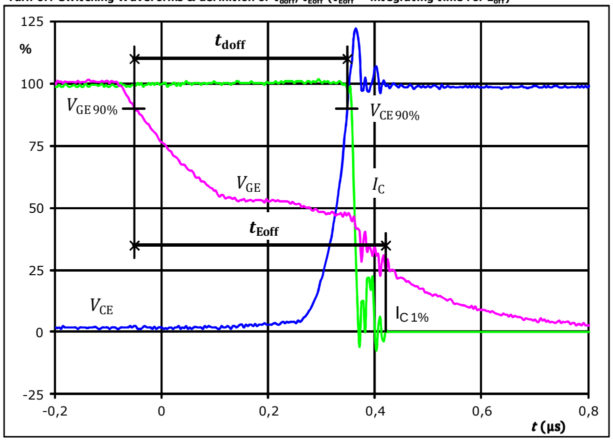
Boost Switching Definitions

General conditions

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

figure 1. IGBT

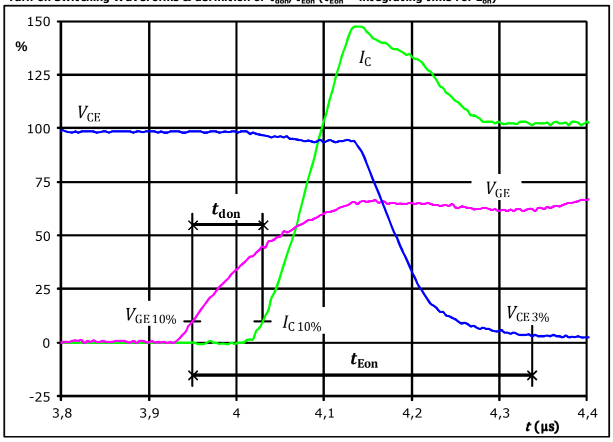
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{doff} =	0,400	µs
t_{Eoff} =	0,471	µs

figure 2. IGBT

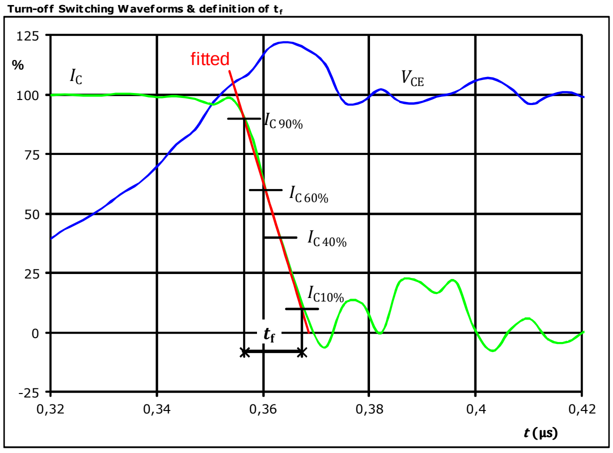
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_{don} =	0,081	µs
t_{Eon} =	0,387	µs

figure 3. IGBT

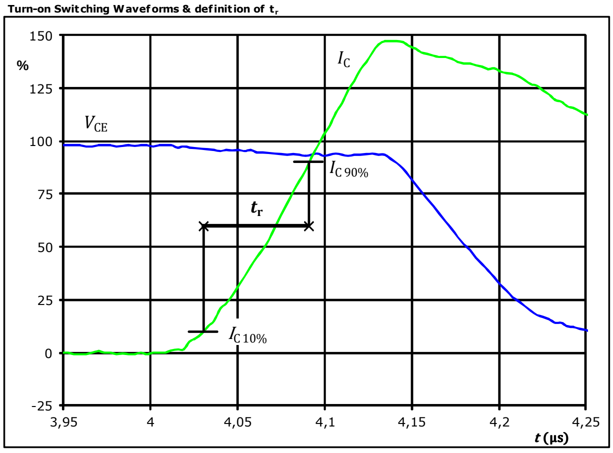
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_f =	0,010	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

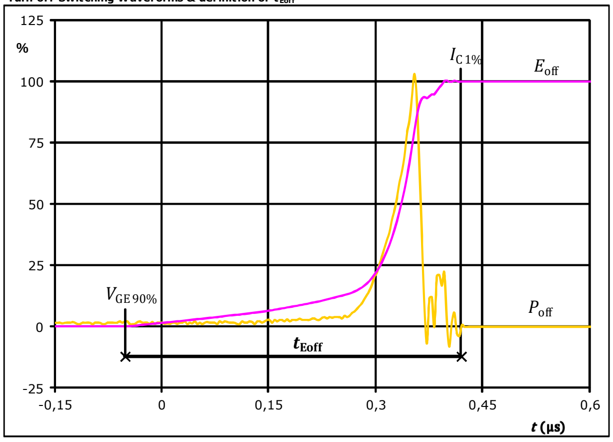


$V_C(100\%)$ =	400	V
$I_C(100\%)$ =	30	A
t_r =	0,061	µs

Boost Switching Characteristics

figure 5. **IGBT**

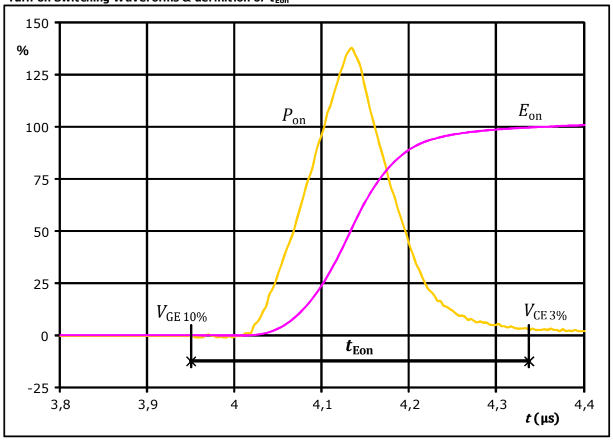
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	11,92	kW
E_{off} (100%) =	0,62	mJ
t_{Eoff} =	0,47	µs

figure 6. **IGBT**

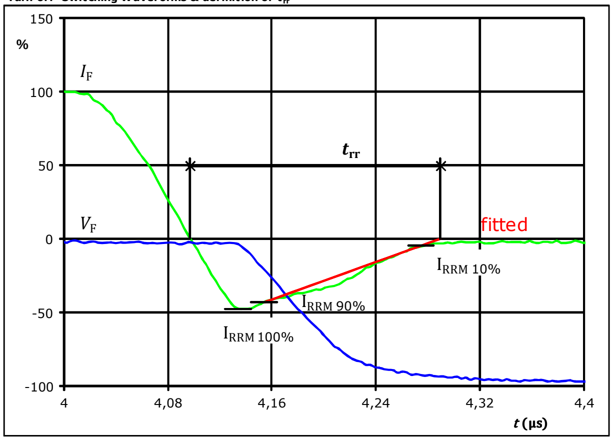
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	11,92	kW
E_{on} (100%) =	1,85	mJ
t_{Eon} =	0,39	µs

figure 7. **FWD**

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

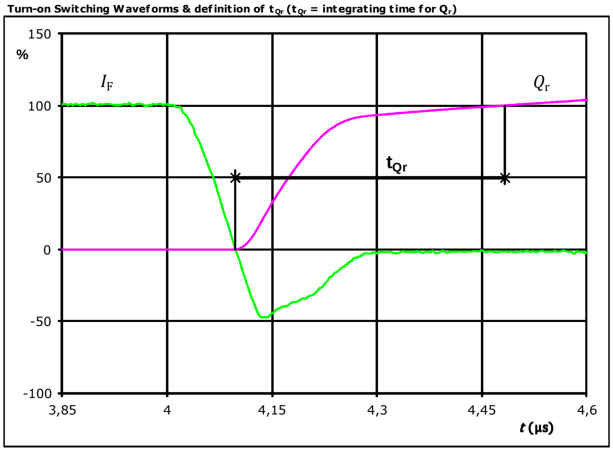


V_F (100%) =	400	V
I_F (100%) =	30	A
I_{RRM} (100%) =	-15	A
t_{rr} =	0,191	µs

Boost Switching Characteristics

figure 8. **FWD**

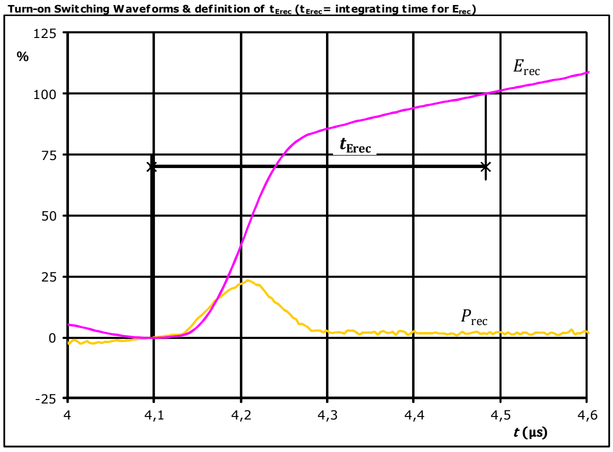
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	30	A
Q_r (100%) =	1,62	µC
t_{Qr} =	0,39	µs

figure 9. **FWD**

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



P_{rec} (100%) =	11,92	kW
E_{rec} (100%) =	0,29	mJ
t_{Erec} =	0,39	µs

10-FZ07BIA030SG-P894E38
10-PZ07BIA030SG-P894E38Y
datasheet

Vincotech

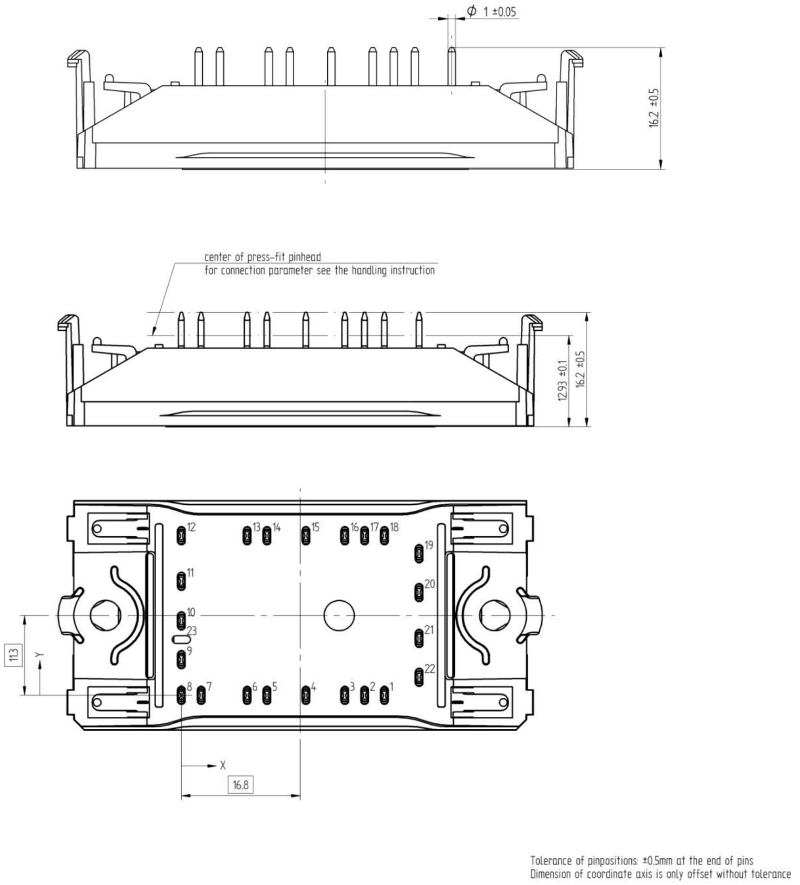
Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FZ07BIA030SG-P894E38
without thermal paste 12 mm housing with press-fit pins	10-PZ07BIA030SG-P894E38Y
with thermal paste 12 mm housing with solder pins	10-FZ07BIA030SG-P894E38-/3/
with thermal paste 12 mm housing with press-fit pins	10-PZ07BIA030SG-P894E38Y-/3/

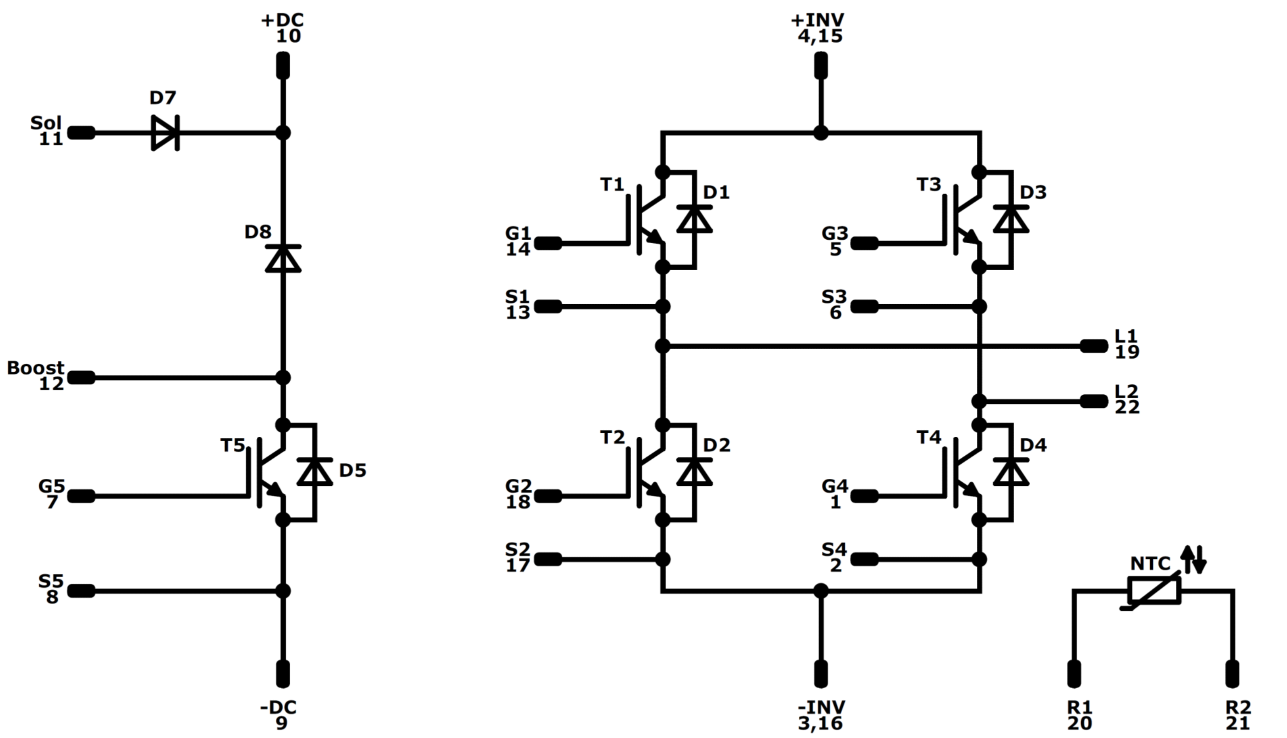
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	Lot number	Serial	Date code		
Datamatrix	TTTTTTTVV	LLLLL	SSSS	WWYY		

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		



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. Protection 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-xZ07BIA030SG-P894E38x-D1-14	08 Jan. 2018		