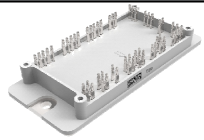
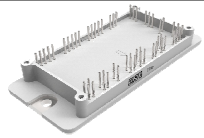
flow PIM 2 3rd — 1200 V / 50 A

Features

- 3~rectifier,BRC,Inverter, NTC
- Very Compact housing, easy to route
- IGBT4/ EmCon4 technology for low saturation losses and improved EMC behavior

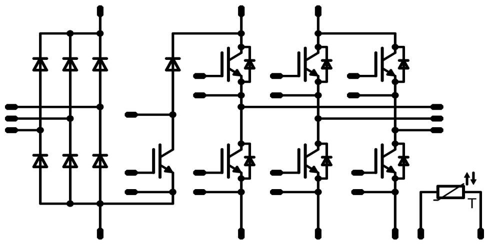
flow 2 housing

Target Applications

- Motor Drives
- Power Generation

Schematic



Types

- V23990-P768-A-PM
- V23990-P768-AY-PM

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Input Rectifier Diode					
Repetitive peak reverse voltage	V_{RRM}			1600	V
Forward current	I_{FAV}	DC current	T_h=80°C T_c=80°C	80 80	A
Surge forward current	I_{FSM}	t_p=10ms	T_j=25°C	700	A
I2t-value	I^2t			2450	A^2s
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80°C T_c=80°C	95 144	W
Maximum Junction Temperature	$T_j$max			150	°C
Inverter IGBT					
Collector-emitter break down voltage	V_{CE}			1200	V
DC collector current	I_C	T_j=$T_j$max	T_h=80°C T_c=80°C	60 75	A
Repetitive peak collector current	I_{Cpulse}	t_p limited by $T_j$max		150	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80°C T_c=80°C	163 247	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150°C V_{GE}=15V		10 900	μs V
Maximum Junction Temperature	$T_j$max			175	°C

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter FWD					
Peak Repetitive Reverse Voltage	VRRM			1200	V
DC forward current	I_F	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	60 80	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j max$		100	A
Power dissipation	P_{tot}	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	114 173	W
Maximum Junction Temperature	$T_j max$			175	°C
Brake IGBT					
Collector-emitter break down voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	44 45	A
Repetitive peak collector current	I_{Cpuls}	t_p limited by $T_j max$		105	A
Power dissipation	P_{tot}	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	130 198	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq 150°C$ $V_{GE}=15V$		10 900	μs V
Maximum Junction Temperature	$T_j max$			175	°C
Brake Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	10 10	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j max$		20	A
Brake Inverse Diode	P_{tot}	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	50 75	W
Maximum Junction Temperature	$T_j max$			175	°C
Brake FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	25 25	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j max$		50	A
Power dissipation	P_{tot}	$T_j=T_j max$	$T_h=80°C$ $T_c=80°C$	75 114	W
Maximum Junction Temperature	$T_j max$			175	°C

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Thermal properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{op}		-40…+Tjmax-25	°C
Insulation properties				
Insulation voltage	V_{is}	t=1min	4000	V_{DC}
Creepage distance			min 12,7	mm
Clearance			min 12,7	mm

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	Unit
Input Rectifier Diode										
Forward voltage	V_F				50	Tj=25°C Tj=125°C		1,1 1,05	1,7	V
Threshold voltage (for power loss calc. only)	V_{to}					Tj=25°C Tj=125°C		0,89 0,78		V
Slope resistance (for power loss calc. only)	r_t					Tj=25°C Tj=125°C		0,004 0,006		Ω
Reverse current	I_r			1500		Tj=25°C Tj=125°C			0,05 1,1	mA
Thermal resistance chip to heatsink	R_{thJH}	Thermal grease thickness≤50µm λ = 0,61 W/m·K						0,74		K/W
Thermal resistance chip to case	R_{thJC}							0,49		
Inverter IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0017	Tj=25°C Tj=150°C	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		50	Tj=25°C Tj=150°C		1,86 2,3	2,3	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	1200		Tj=25°C Tj=150°C			0,02	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25°C Tj=150°C			200	nA
Integrated Gate resistor	R_{gint}							4		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=8 Ω Rgon=8 Ω	±15	600	50	Tj=25°C Tj=150°C		104 100		ns
Rise time	t_r					Tj=25°C Tj=150°C		19 23,8		
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=150°C		220 295		
Fall time	t_f					Tj=25°C Tj=150°C		78 118		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=150°C		2,86 4,5		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=150°C		2,69 4,48		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25°C		2770		pF
Output capacitance	C_{oss}							205		
Reverse transfer capacitance	C_{rss}							160		
Gate charge	Q_{Gate}		±15	960		Tj=25°C		290		nC
Thermal resistance chip to heatsink	R_{thJH}	Thermal grease thickness≤50µm λ = 0,61 W/m·K						0,58		K/W
Thermal resistance chip to case	R_{thJC}							0,38		
Coupled thermal resistance transistor-transistor	$R_{thJHT-T}$							0,1		
Coupled thermal resistance diode-transistor	$R_{thJHD-T}$							0,13		
Inverter FWD										
Diode forward voltage	V_F				50	Tj=25°C Tj=150°C		1,75 1,71	2,2	V
Peak reverse recovery current	I_{RRM}	Rgon=8 Ω	±15	600	50	Tj=25°C Tj=150°C		65 82		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=150°C		162 313		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=150°C		4,62 9,95		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=150°C		2298 1106		A/µs
Reverse recovered energy	Erec					Tj=25°C Tj=150°C		1,92 3,98		mWs
Thermal resistance chip to heatsink	R_{thJH}	Thermal grease thickness≤50µm λ = 0,61 W/m·K						0,83		K/W
Thermal resistance chip to case	R_{thJC}							0,55		
Coupled thermal resistance transistor-diode	$R_{thJHT-D}$							0,12		

Characteristic Values

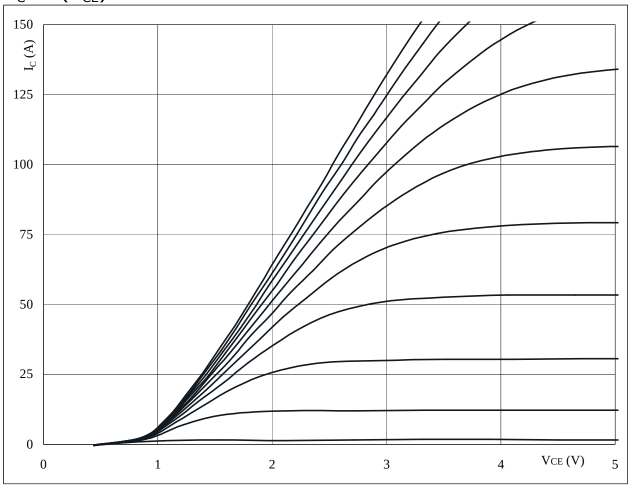
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Brake IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}$			0,0012	Tj=25°C Tj=150°C	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		35	Tj=25°C Tj=150°C		1,91 2,37	2,3	V
Collector-emitter cut-off incl diode	I_{CES}		0	1200		Tj=25°C Tj=150°C			0,25	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25°C Tj=150°C			200	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=16 Ω Rgon=16 Ω	±15	600	35	Tj=25°C Tj=150°C		92 84		ns
Rise time	t_r					Tj=25°C Tj=150°C		21 24		
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=150°C		182 253		
Fall time	t_f					Tj=25°C Tj=150°C		76 116		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=150°C		1,86 2,64		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=150°C		1,78 2,95		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25°C		1950		pF
Output capacitance	C_{oss}							155		
Reverse transfer capacitance	C_{rss}							115		
Gate charge	Q_{Gate}		±15	960		Tj=25°C		200		nC
Thermal resistance chip to heatsink	R_{thJH}	Thermal grease thickness≤50μm λ = 0,61 W/m·K						0,73		K/W
Thermal resistance chip to case	R_{thJC}							0,48		
Brake Inverse Diode										
Diode forward voltage	V_F				10	Tj=25°C Tj=150°C	1,1	1,89 1,8	2,1	V
Thermal resistance chip to heatsink	R_{thJH}	Thermal grease thickness≤50μm λ = 0,61 W/m·K						1,86		K/W
Thermal resistance chip to case	R_{thJC}							1,23		K/W
Brake FWD										
Diode forward voltage	V_F				25	Tj=25°C Tj=150°C		1,9 1,88	2,2	V
Reverse leakage current	I_r		±15	600	35	Tj=25°C Tj=150°C			10	μA
Peak reverse recovery current	I_{RRM}	Rgon=16 Ω	±15	600	35	Tj=25°C Tj=150°C		27,41 41,04		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=150°C		300 322		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=150°C		2,68 5,19		μC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=150°C		254 259		A/μs
Reverse recovery energy	E_{rec}					Tj=25°C Tj=150°C		2,68 5,19		mWs
Thermal resistance chip to heatsink	R_{thJH}	Thermal grease thickness≤50μm λ = 0,61 W/m·K						1,24		K/W
Thermal resistance chip to case	R_{thJC}							0,82		
Thermistor										
Rated resistance	R_{25}					Tj=25°C		22		kΩ
Deviation of R100	$D_{R/R}$	R100=1486 Ω				Tc=100°C	-12		12	%
Power dissipation	P					Tj=25°C		200		mW
Power dissipation constant						Tj=25°C		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				Tj=25°C		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25°C		3998		K
Vincotech NTC Reference									B	

Output Inverter

Figure 1 Output inverter IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

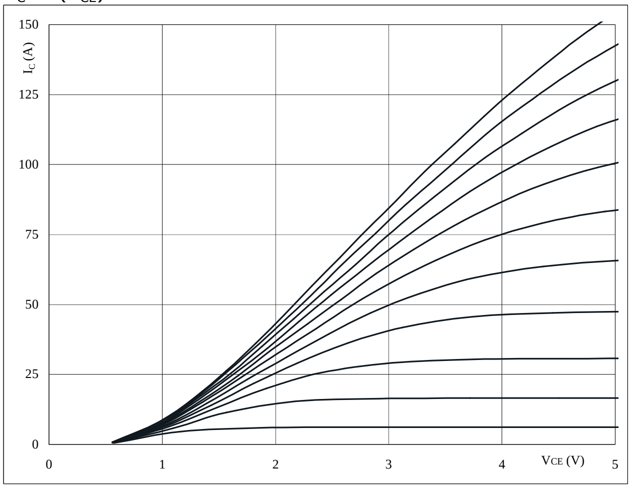
T_j = 25 °C

VGE from 7 V to 17 V in steps of 1 V

Figure 2 Output inverter IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

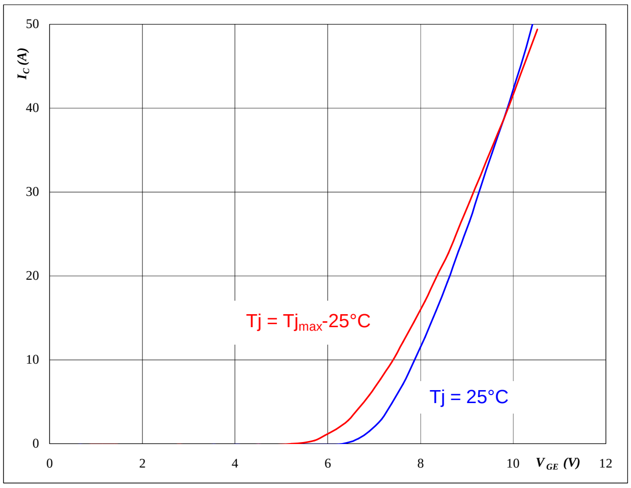
T_j = 150 °C

VGE from 7 V to 17 V in steps of 1 V

Figure 3 Output inverter IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



At

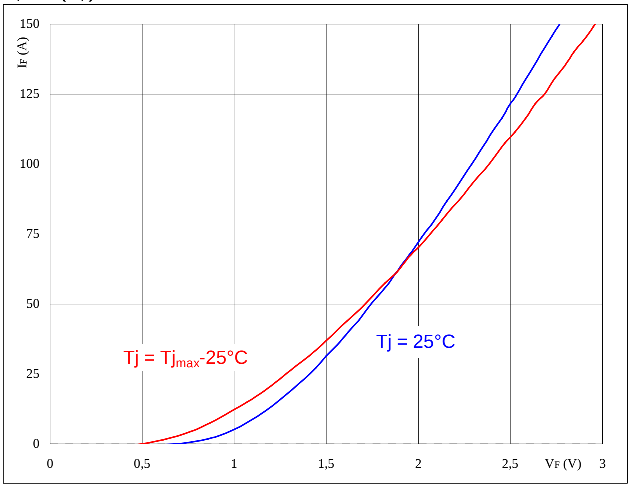
t_p = 250 µs

V_{CE} = 10 V

Figure 4 Output inverter FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

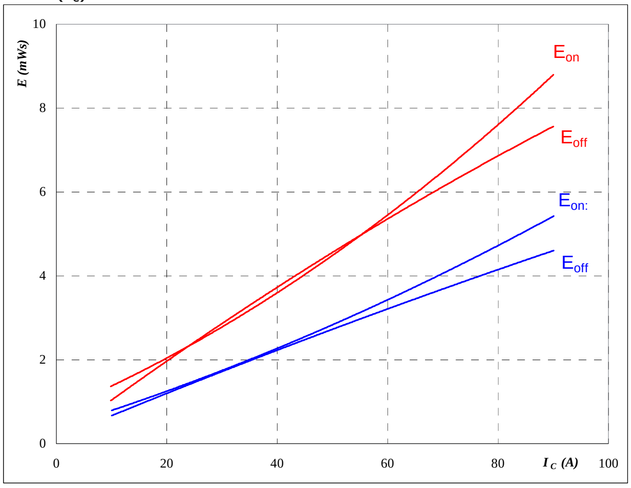
t_p = 250 µs

Output Inverter

Figure 5 Output inverter IGBT

Typical switching energy losses as a function of collector current

$E = f(I_c)$



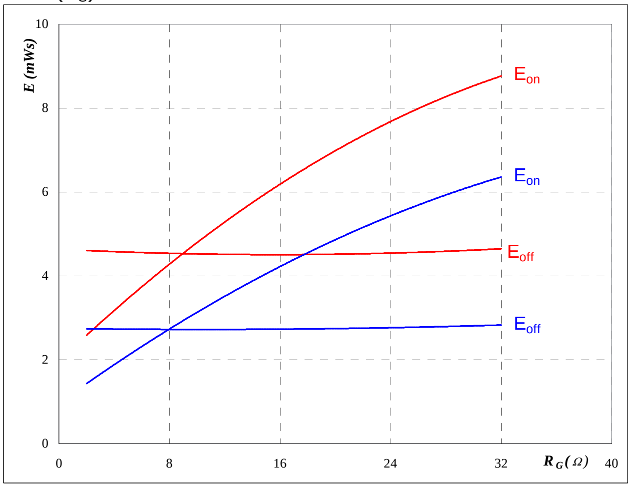
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

Figure 6 Output inverter IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



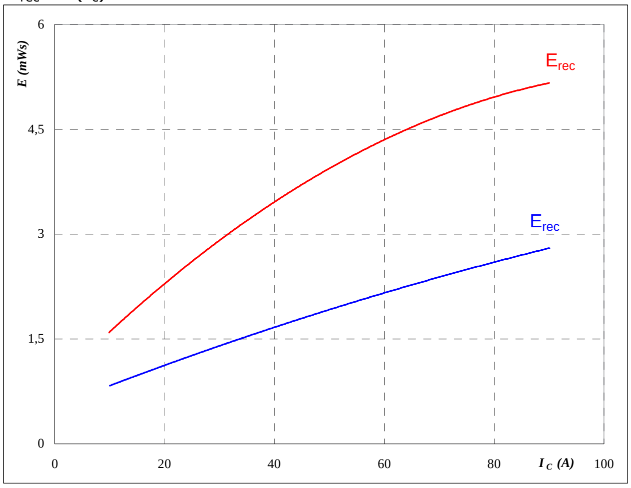
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

Figure 7 Output inverter IGBT

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_c)$



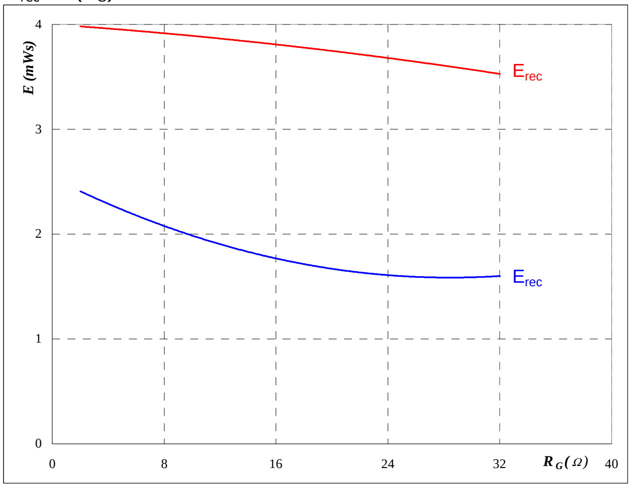
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

Figure 8 Output inverter IGBT

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

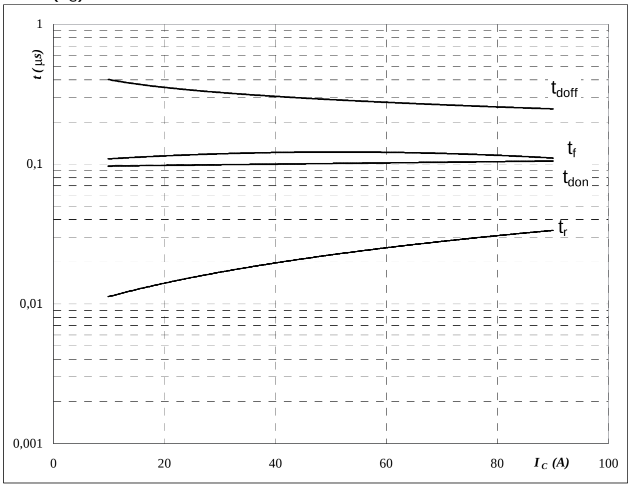
T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

Output Inverter

Figure 9 Output inverter IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



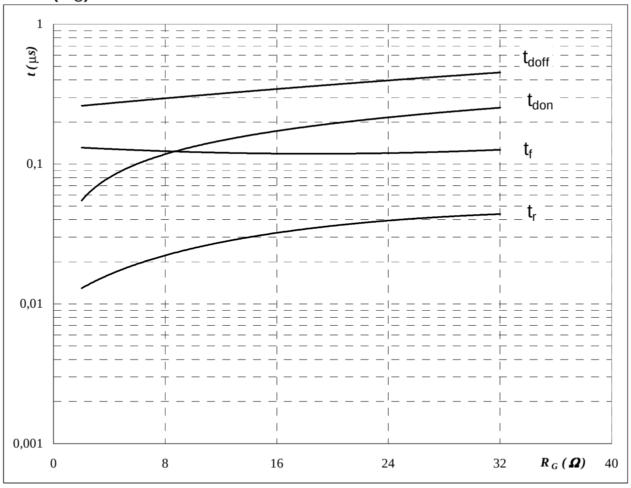
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

Figure 10 Output inverter IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



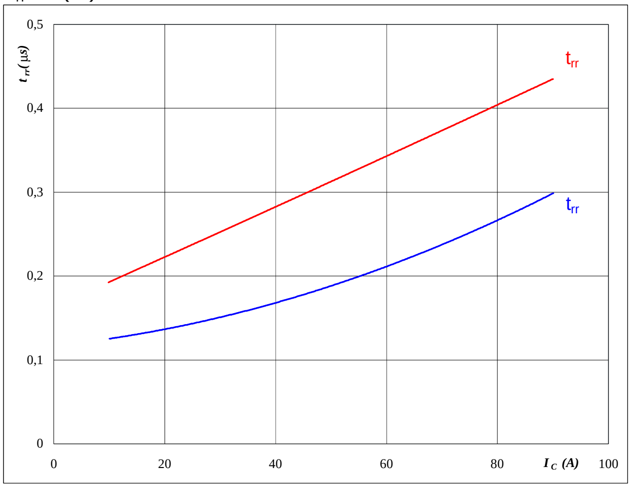
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

Figure 11 Output inverter FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(Ic)$



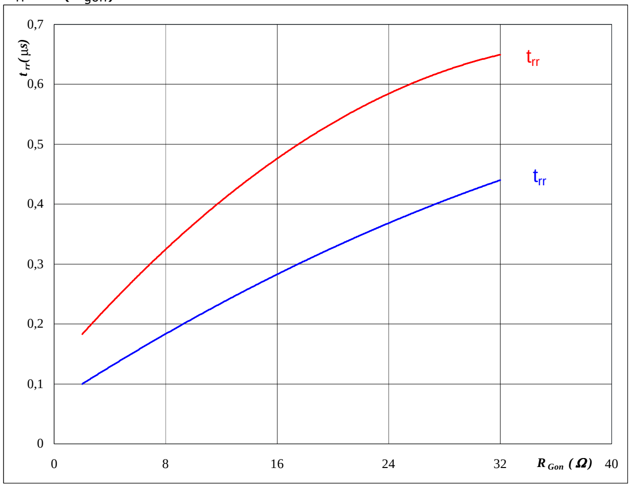
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

Figure 12 Output inverter FWD

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

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



At

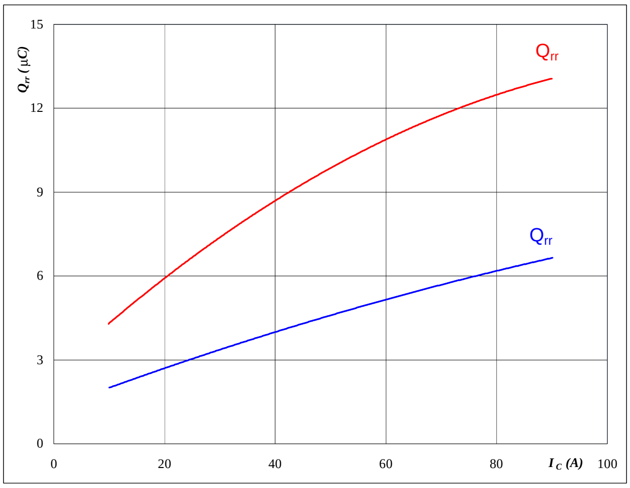
T_j =	25/150	°C
V_R =	600	V
I_F =	50	A
V_{GE} =	±15	V

Output Inverter

Figure 13 Output inverter FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(Ic)$



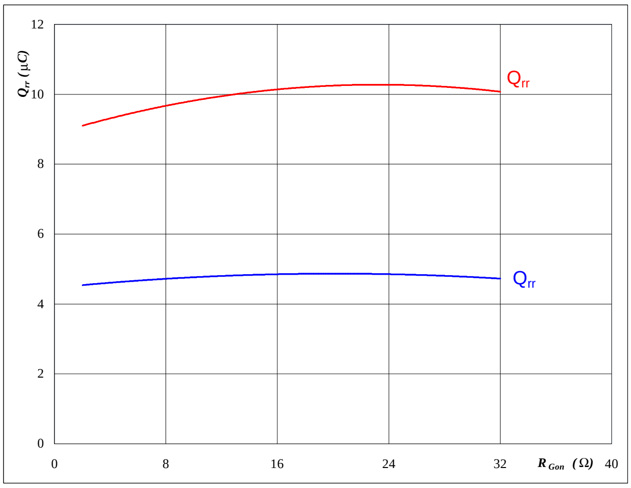
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

Figure 14 Output inverter FWD

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

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



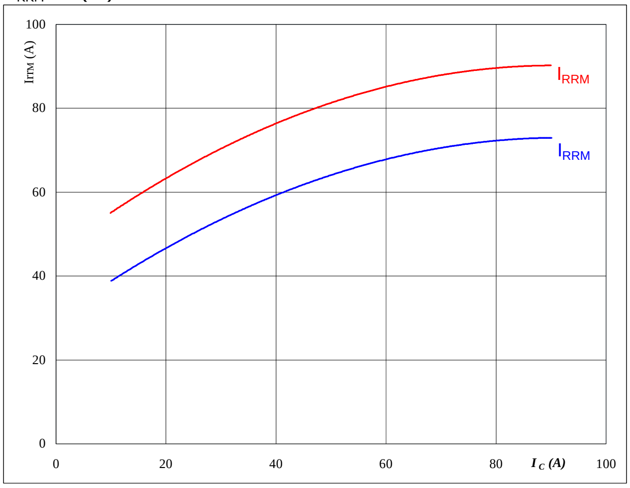
At

T_j =	25/150	°C
V_R =	600	V
I_F =	50	A
V_{GE} =	±15	V

Figure 15 Output inverter FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(Ic)$



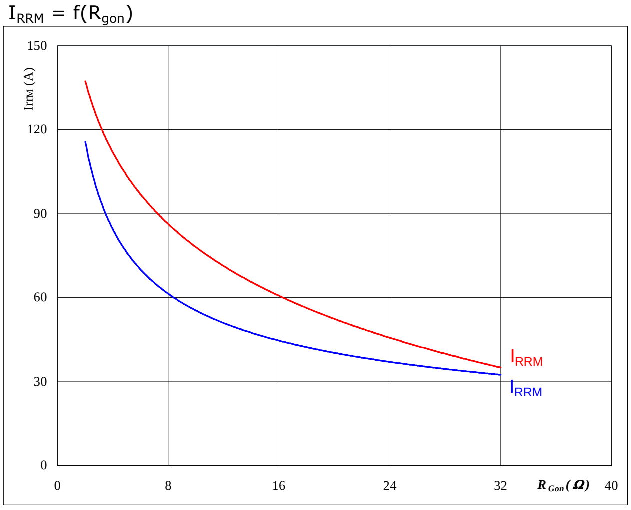
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

Figure 16 Output inverter FWD

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

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



At

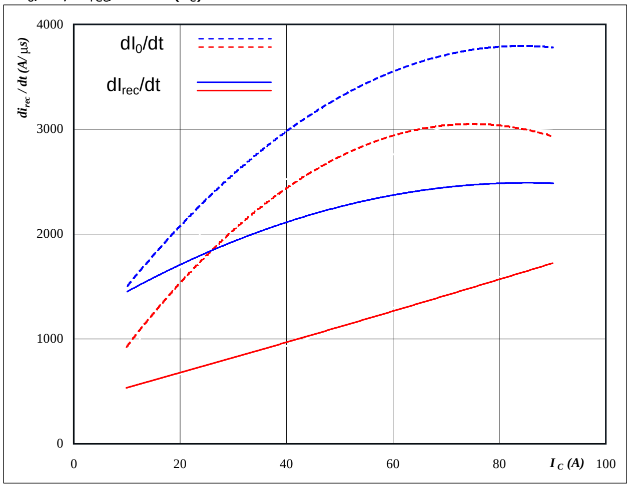
T_j =	25/150	°C
V_R =	600	V
I_F =	50	A
V_{GE} =	±15	V

Output Inverter

Figure 17 Output inverter FWD

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

$dI_0/dt, dI_{rec}/dt = f(I_C)$



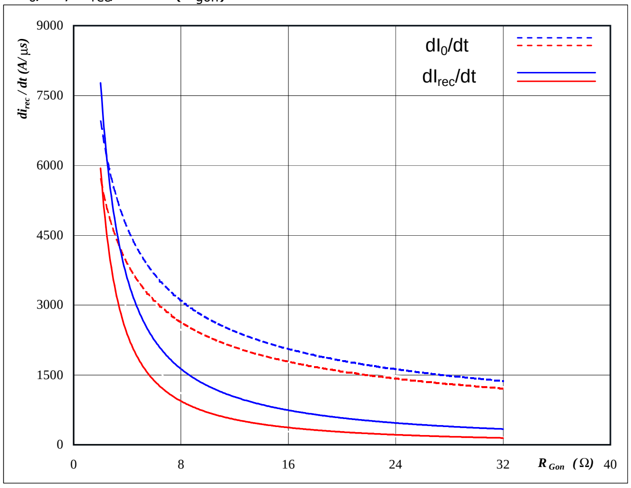
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

Figure 18 Output inverter FWD

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

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



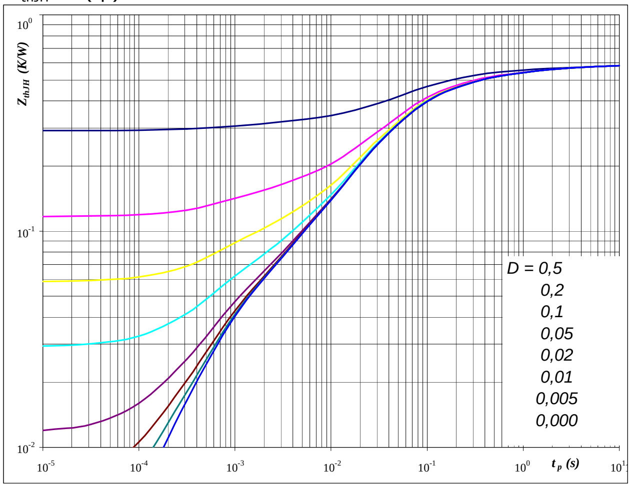
At

T_j =	25/150	°C
V_R =	600	V
I_F =	50	A
V_{GE} =	±15	V

Figure 19 Output inverter IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(tp)$



At

D = tp / T

R_{thJH} = 0,583 K/W — Single device heated

R_{thJH} = 0,68 K/W — All devices heated

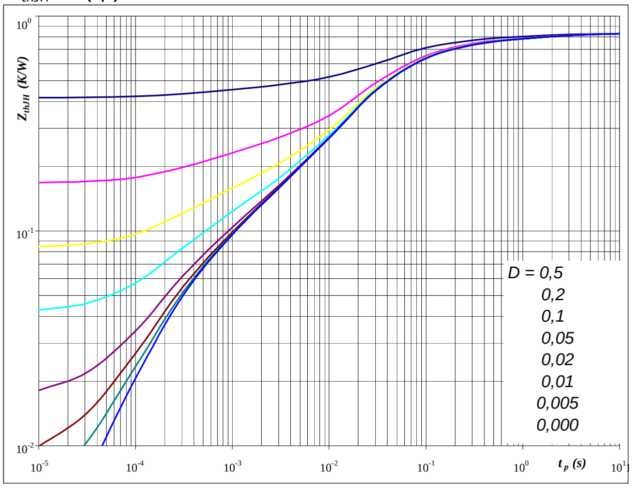
IGBT thermal model values

R (K/W)	Tau (s)	R (K/W)	Tau (s)
0,07	2,1E+00	0,17	2,1E+00
0,13	2,4E-01	0,13	2,4E-01
0,27	5,1E-02	0,27	5,1E-02
0,08	1,2E-02	0,08	1,2E-02
0,04	8,6E-04	0,04	8,6E-04

Figure 20 Output inverter FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(tp)$



At

D = tp / T

R_{thJH} = 0,83 K/W — Single device heated

R_{thJH} = 0,83 K/W — All devices heated

FWD thermal model values

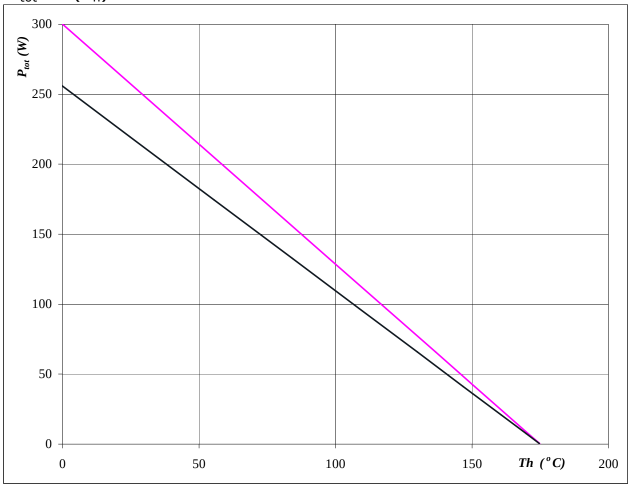
R (K/W)	Tau (s)	R (K/W)	Tau (s)
0,02	9,7E+00	0,02	9,7E+00
0,08	1,1E+00	0,08	1,1E+00
0,22	1,3E-01	0,22	1,3E-01
0,39	2,5E-02	0,39	2,5E-02
0,07	2,0E-03	0,07	2,0E-03
0,05	2,9E-04	0,05	2,9E-04

Output Inverter

Figure 21 Output inverter IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



At

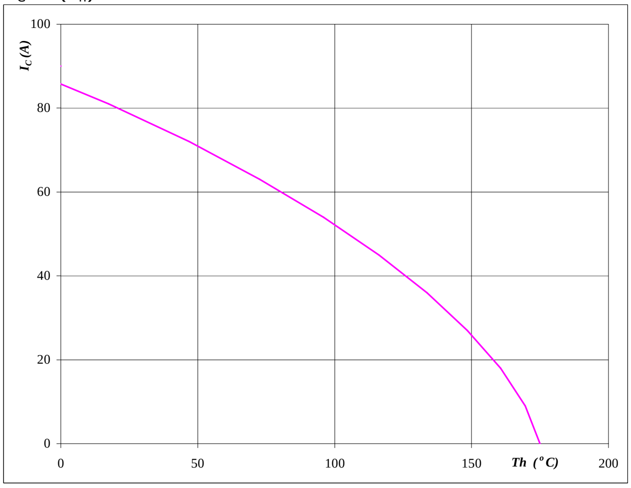
T_j = 175 °C

single heating
overall heating

Figure 22 Output inverter IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

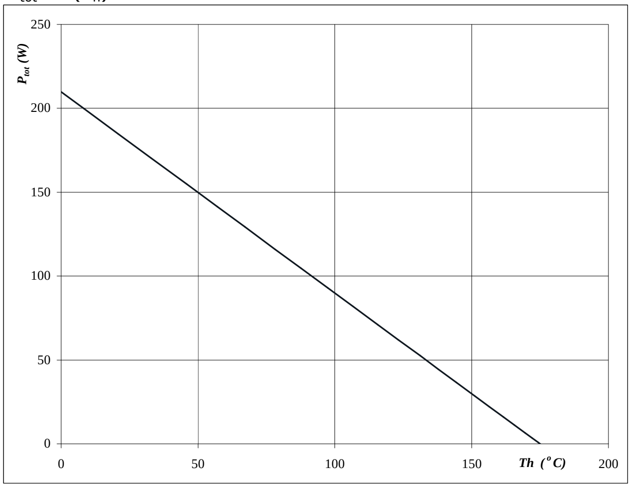
T_j = 175 °C

V_{GE} = 15 V

Figure 23 Output inverter FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



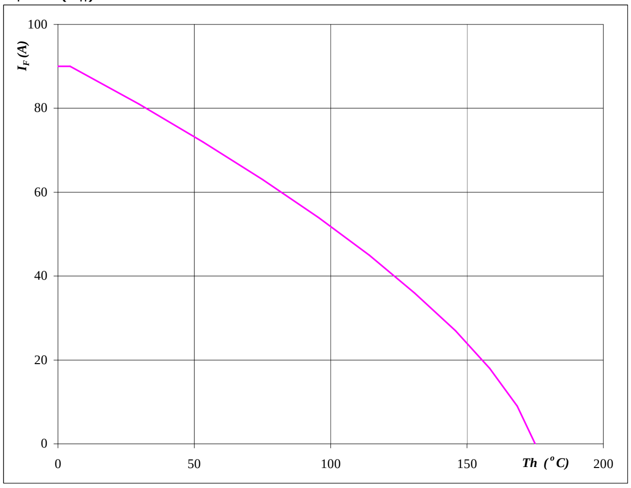
At

T_j = 175 °C

Figure 24 Output inverter FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

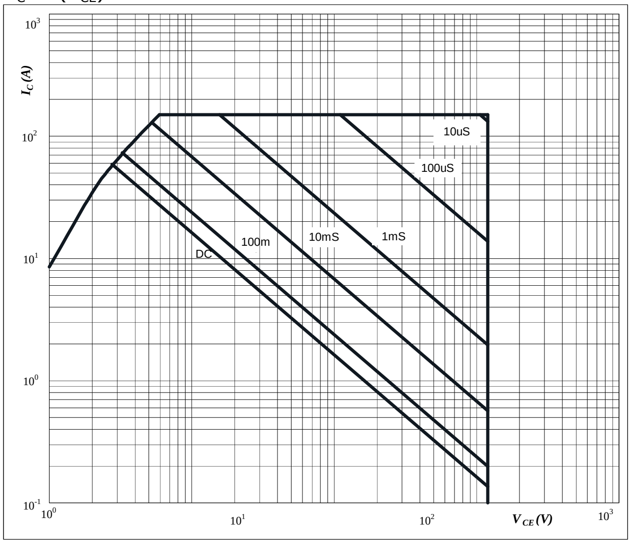
T_j = 175 °C

Output Inverter

Figure 25	Output inverter IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



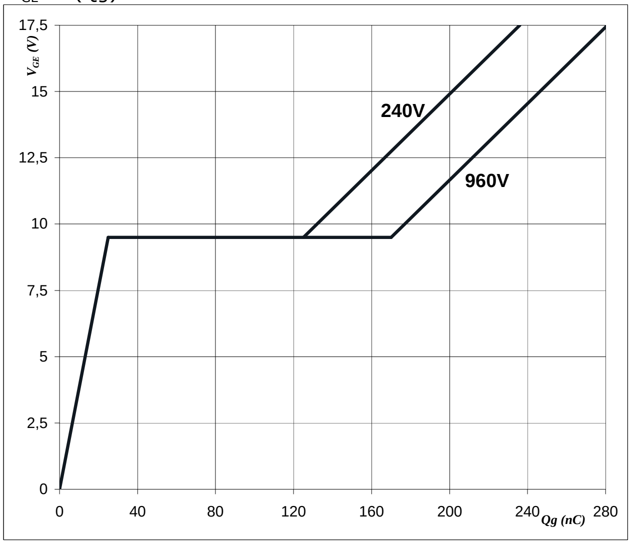
At

D =	single pulse	
Th =	80	ºC
V_{GE} =	±15	V
Tj =	T_{jmax}	ºC

Figure 26	Output inverter IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Qg)$



At

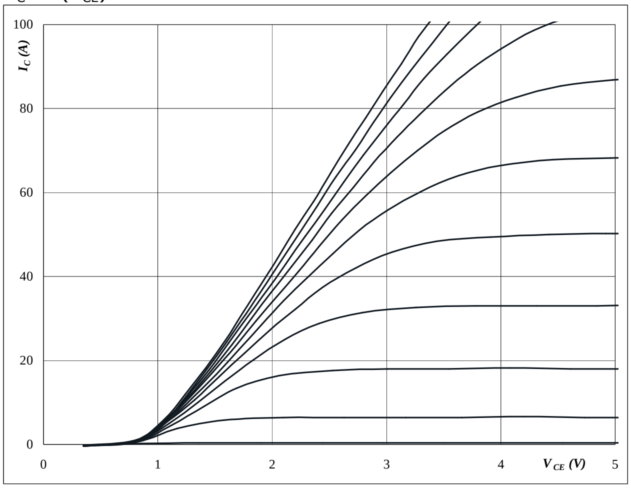
I_C =	50	A

Brake

Figure 1 Brake IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

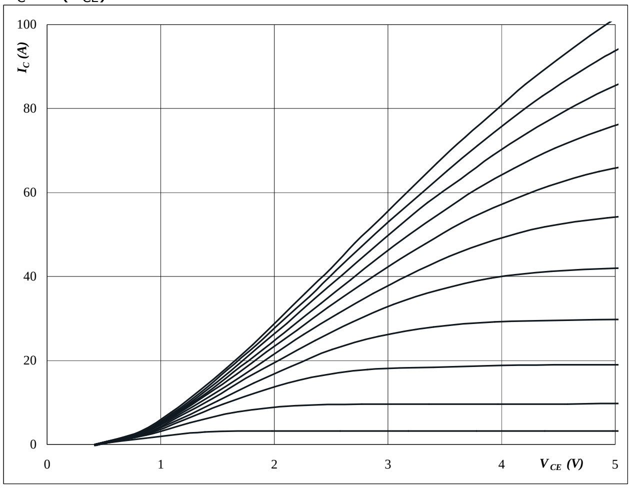
T_j = 25 °C

VGE from 7 V to 17 V in steps of 1 V

Figure 2 Brake IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

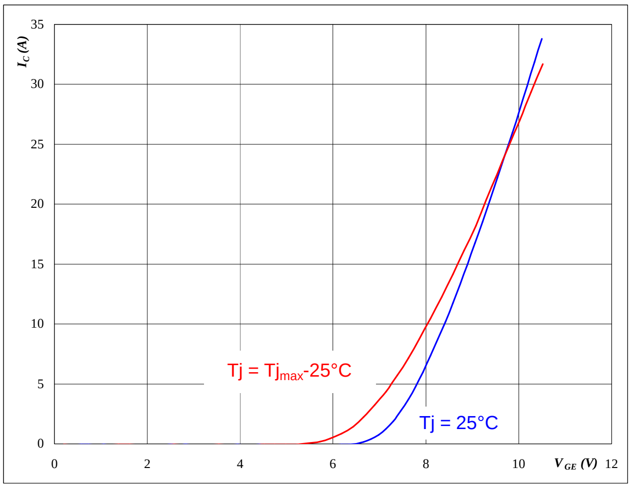
T_j = 150 °C

VGE from 7 V to 17 V in steps of 1 V

Figure 3 Brake IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



At

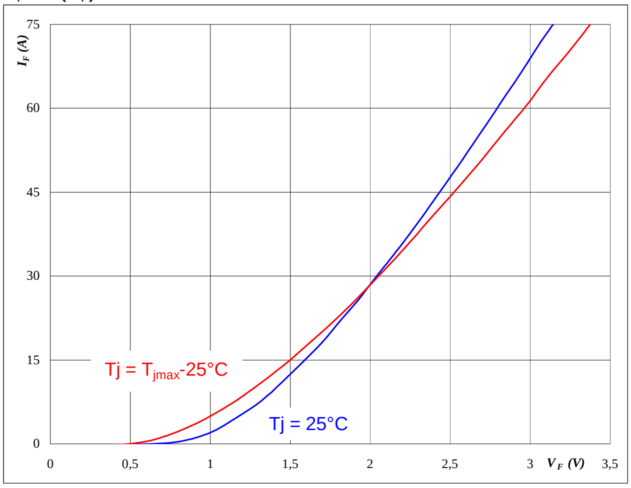
t_p = 250 µs

V_{CE} = 10 V

Figure 4 Brake FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

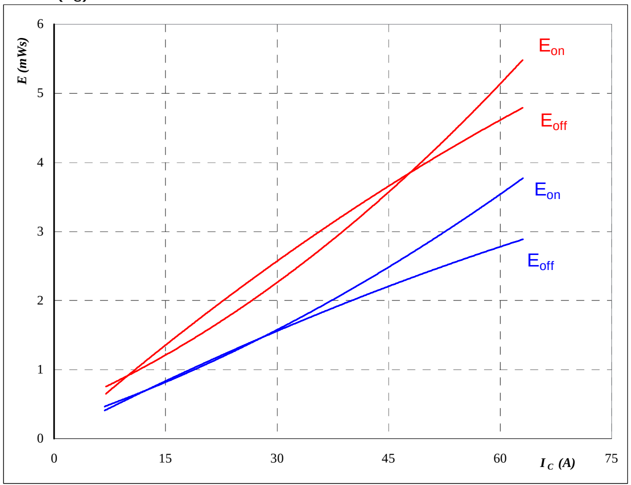
t_p = 250 µs

Brake

Figure 5	Brake IGBT

Typical switching energy losses as a function of collector current

E = f(I_C)



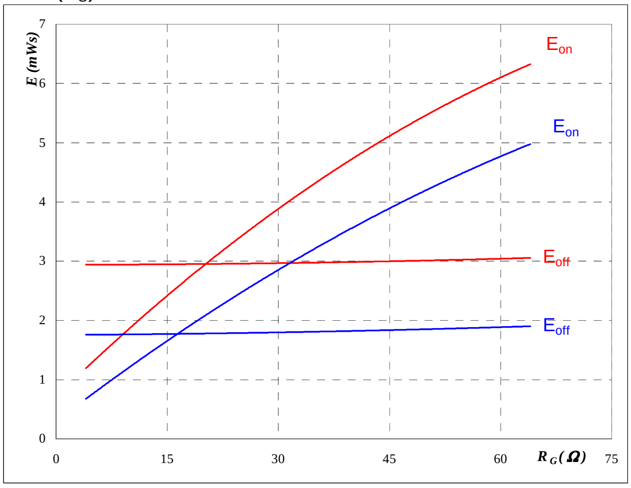
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 6	Brake IGBT

Typical switching energy losses as a function of gate resistor

E = f(R_G)



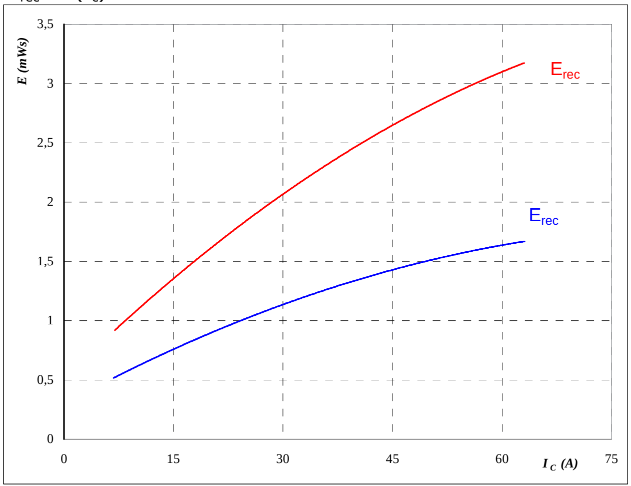
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	35	A

Figure 7	Brake IGBT

Typical reverse recovery energy loss as a function of collector current

E_{rec} = f(I_c)



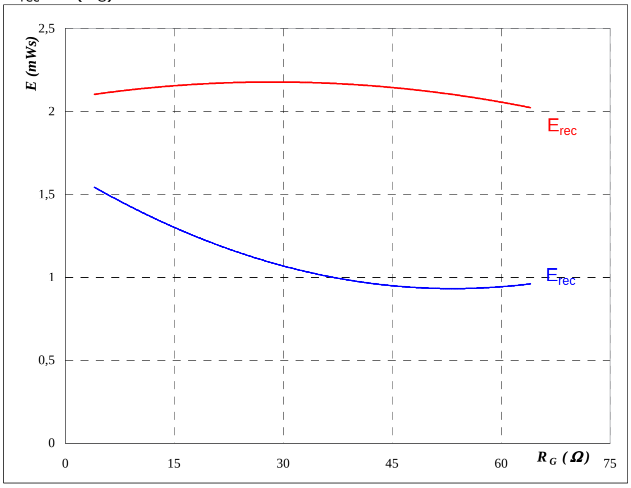
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 8	Brake IGBT

Typical reverse recovery energy loss as a function of gate resistor

E_{rec} = f(R_G)



With an inductive load at

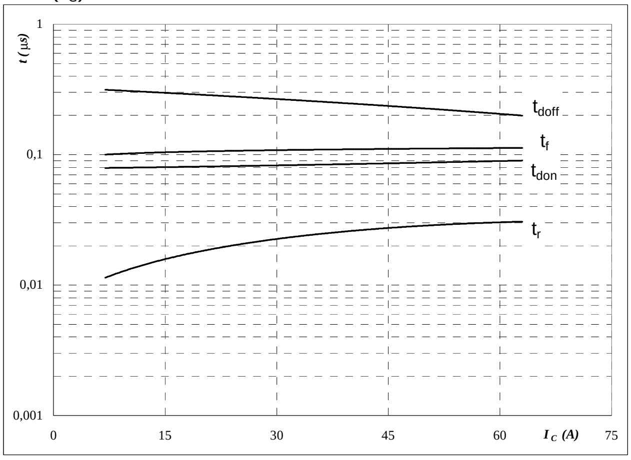
T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	35	A

Brake

Figure 9 Brake IGBT

Typical switching times as a function of collector current

t = f(I_C)



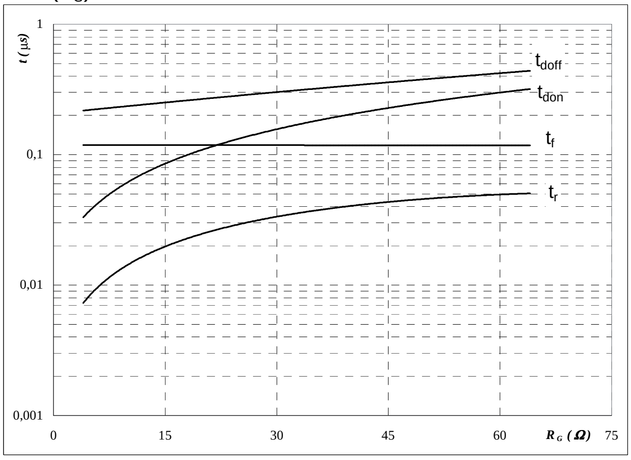
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 10 Brake IGBT

Typical switching times as a function of gate resistor

t = f(R_G)



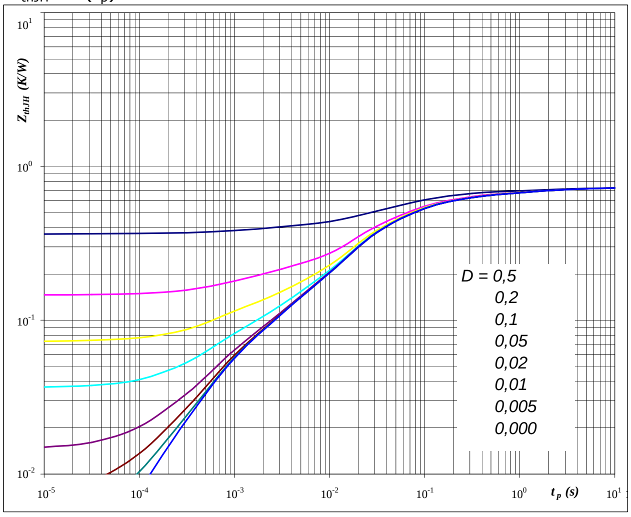
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	35	A

Figure 11 Brake IGBT

IGBT transient thermal impedance as a function of pulse width

Z_{thJH} = f(t_p)



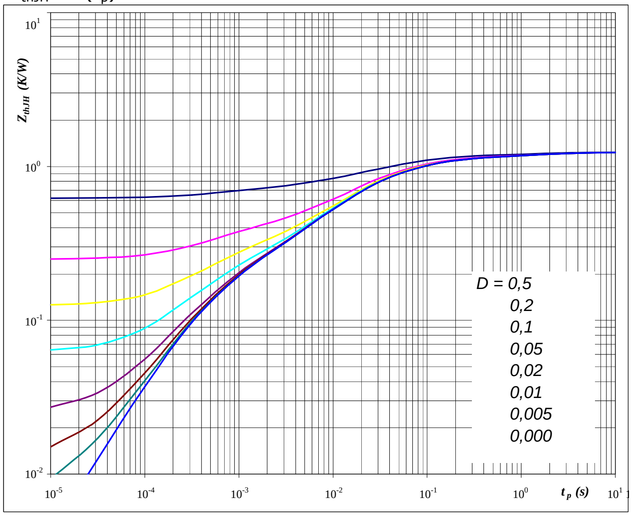
At

D =	tp / T	
R_{thJH} =	0,73	K/W

Figure 12 Brake IGBT

FWD transient thermal impedance as a function of pulse width

Z_{thJH} = f(t_p)



At

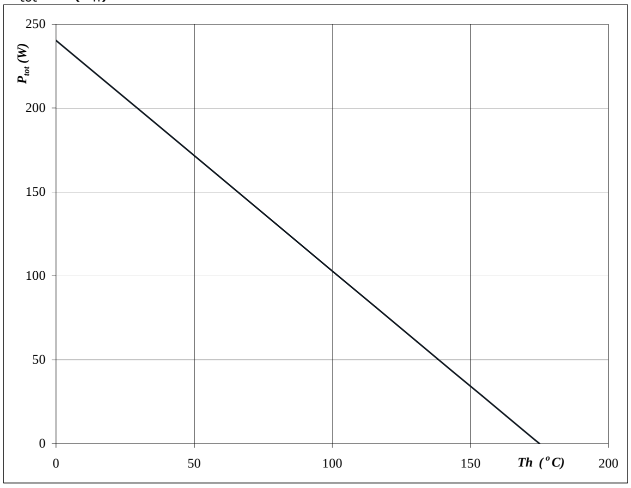
D =	tp / T	
R_{thJH} =	1,24	K/W

Brake

Figure 13 Brake IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



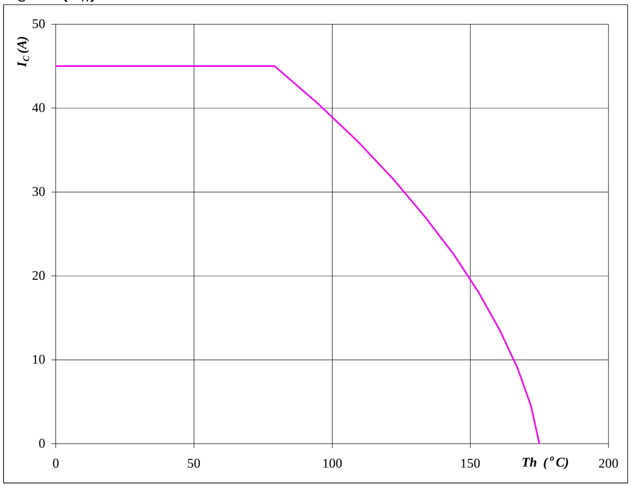
At

T_j = 175 °C

Figure 14 Brake IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

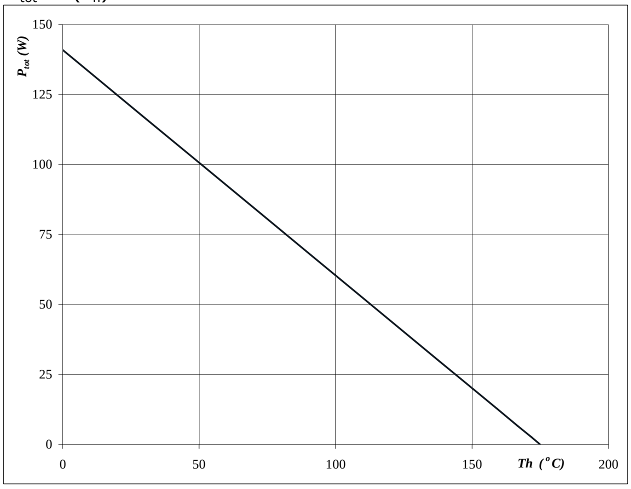
T_j = 175 °C

V_{GE} = 15 V

Figure 15 Brake FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



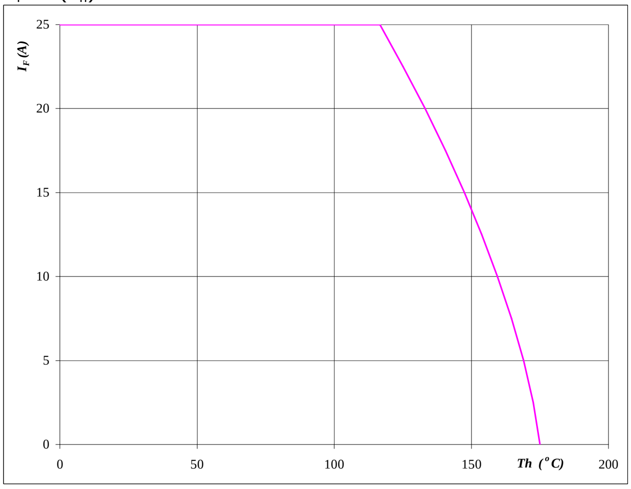
At

T_j = 175 °C

Figure 16 Brake FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

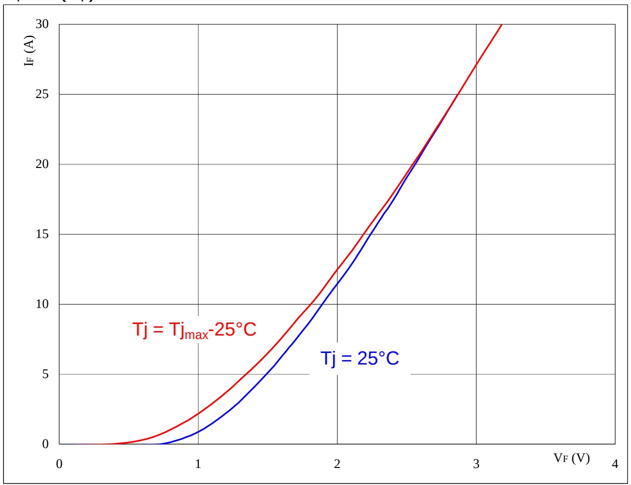
T_j = 175 °C

Brake Inverse Diode

Figure 1 Brake inverse diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



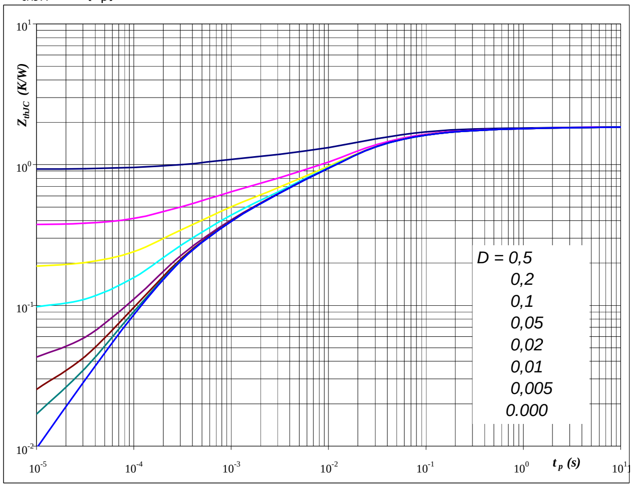
At

t_p = 250 µs

Figure 2 Brake inverse diode

Diode transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

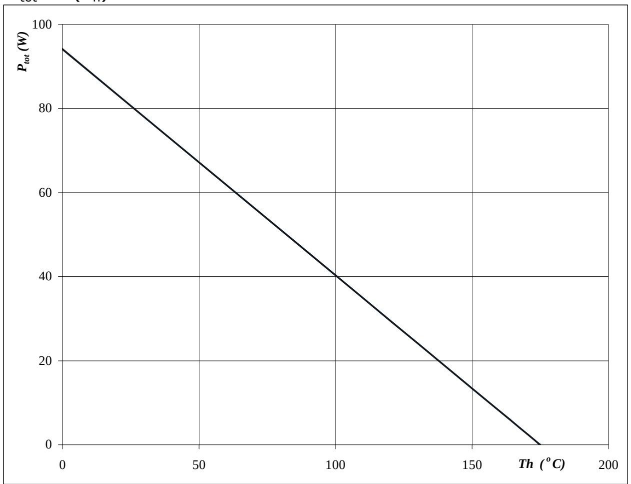
D = tp / T

R_{thJH} = 1,86 K/W

Figure 3 Brake inverse diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



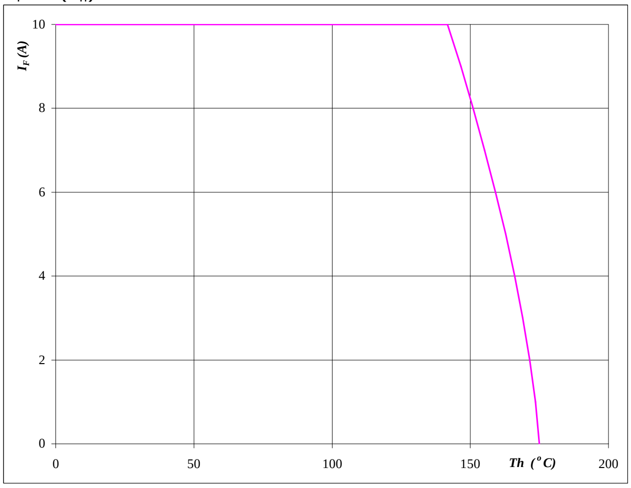
At

T_j = 175 ºC

Figure 4 Brake inverse diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

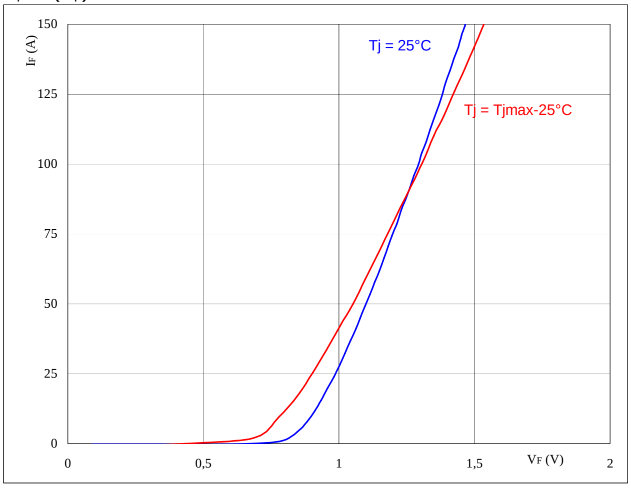
T_j = 175 ºC

Input Rectifier Bridge

Figure 1 Rectifier diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



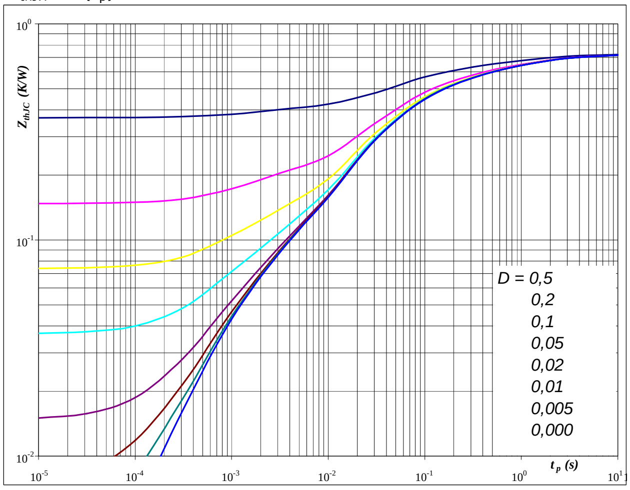
At

t_p = 250 µs

Figure 2 Rectifier diode

Diode transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

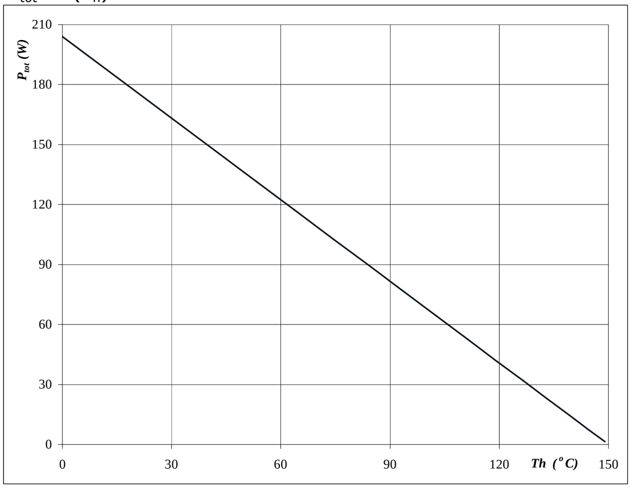
D = tp / T

R_{thJH} = 0,74 K/W

Figure 3 Rectifier diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



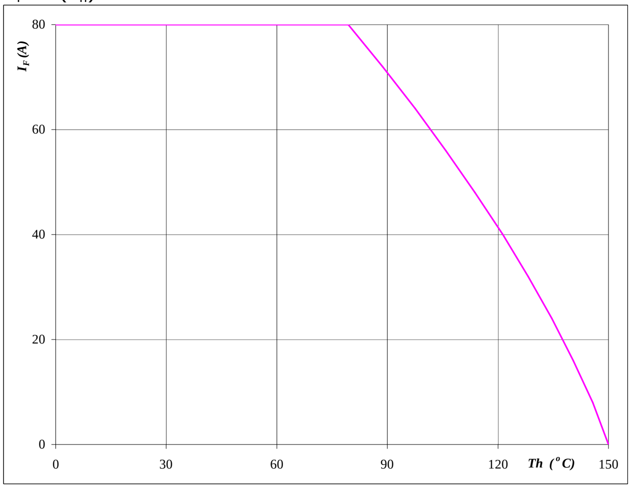
At

T_j = 150 ºC

Figure 4 Rectifier diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

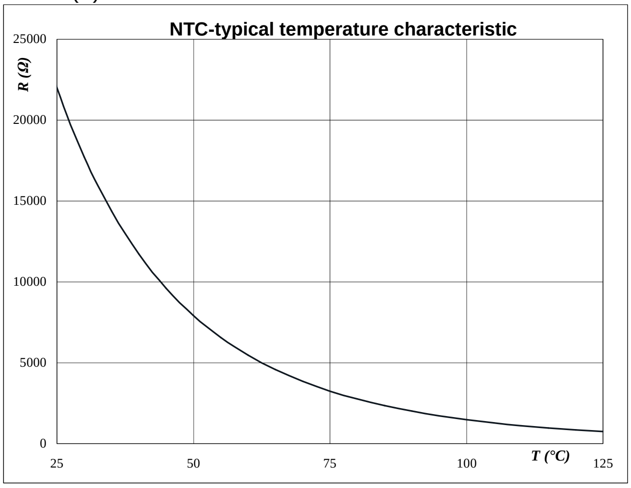
T_j = 150 ºC

Thermistor

Figure 1 Thermistor

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$



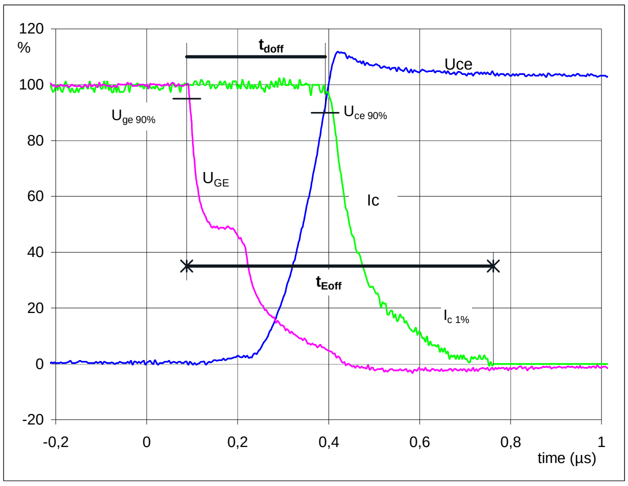
Switching Definitions Output Inverter

General conditions

T_j	=	150 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

Figure 1 Output inverter IGBT

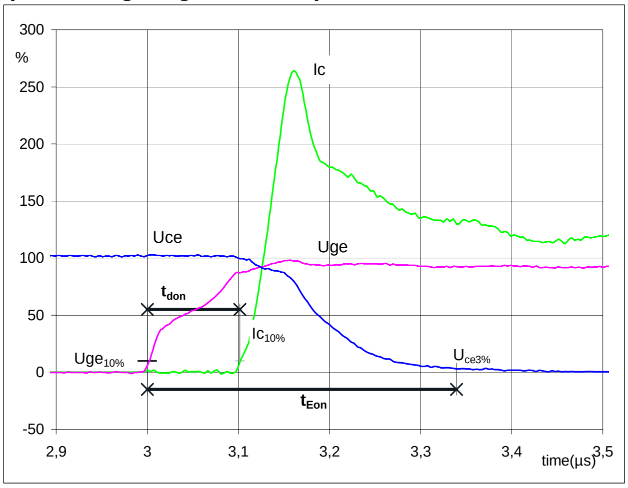
Turn-off Switching Waveforms & definition of tdoff, tEoff
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	50	A
t_{doff} =	0,30	µs
t_{Eoff} =	0,67	µs

Figure 2 Output inverter IGBT

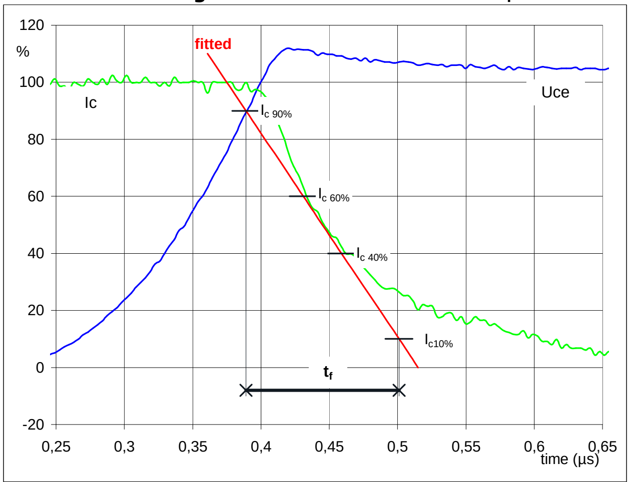
Turn-on Switching Waveforms & definition of tdon, tEon
(tEon = integrating time for Eon)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	50	A
t_{don} =	0,10	µs
t_{Eon} =	0,34	µs

Figure 3 Output inverter IGBT

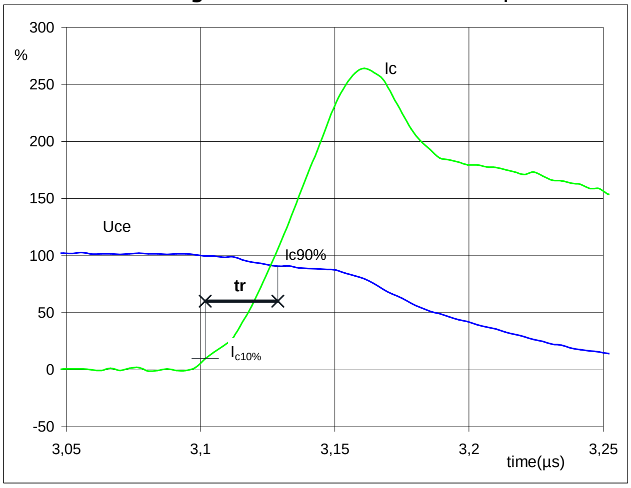
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	600	V
I_C (100%) =	50	A
t_f =	0,12	µs

Figure 4 Output inverter IGBT

Turn-on Switching Waveforms & definition of t_r

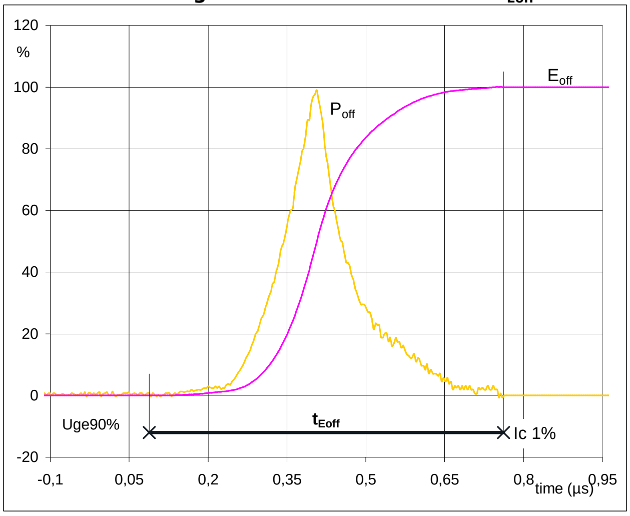


V_C (100%) =	600	V
I_C (100%) =	50	A
t_r =	0,02	µs

Switching Definitions Output Inverter

Figure 5 Output inverter IGBT

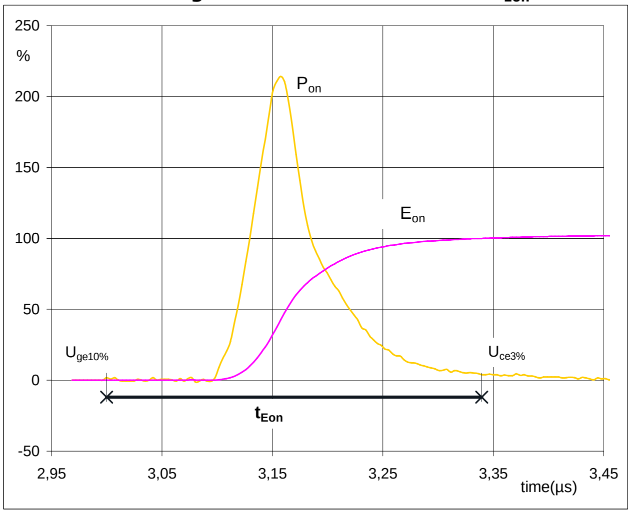
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	29,95	kW
E_{off} (100%) =	4,48	mJ
t_{Eoff} =	0,67	µs

Figure 6 Output inverter IGBT

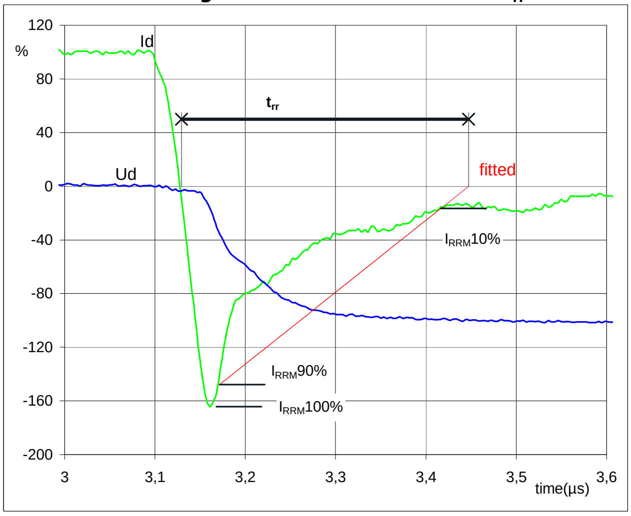
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	29,95	kW
E_{on} (100%) =	4,50	mJ
t_{Eon} =	0,34	µs

Figure 7 Output inverter FWD

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

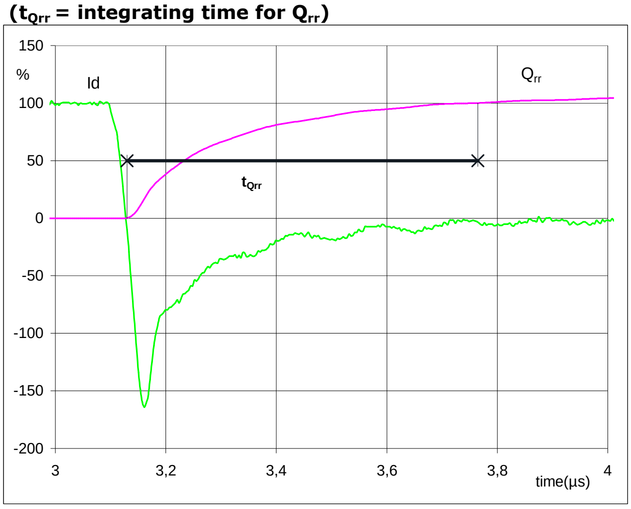


V_d (100%) =	600	V
I_d (100%) =	50	A
I_{RRM} (100%) =	-82	A
t_{rr} =	0,31	µs

Switching Definitions Output Inverter

Figure 8	Output inverter FWD

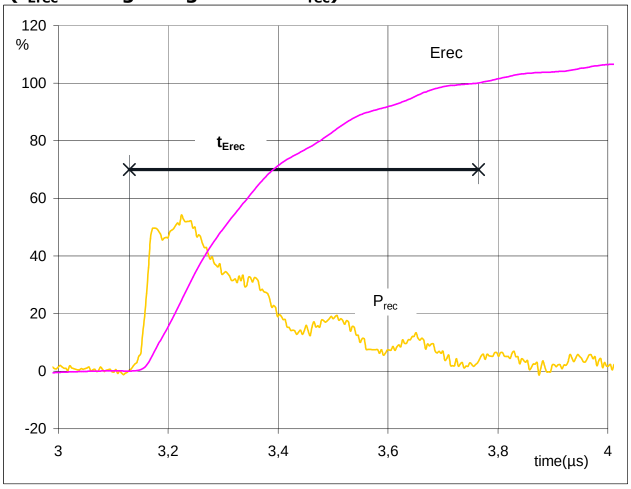
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	50	A
Q_{rr} (100%) =	9,95	µC
t_{Qint} =	0,64	µs

Figure 9	Output inverter FWD

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



P_{rec} (100%) =	29,95	kW
E_{rec} (100%) =	3,98	mJ
t_{Erec} =	0,64	µs

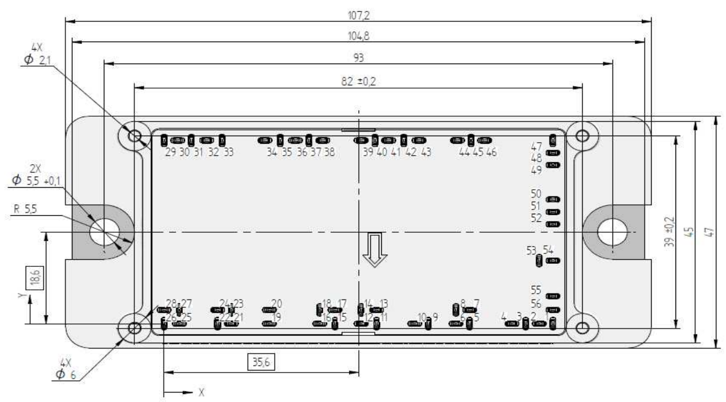
Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste with solder pins	V23990-P768-A-PM	P768A	P768A
without thermal paste with Press-fit pins	V23990-P768-AY-PM	P768AY	P768AY
with thermal paste with solder pins	V23990-P768-A-/3/-PM	P768A	P768A-/3/
with thermal paste with Press-fit pins	V23990-P768-AY-/3/-PM	P768AY	P768AY-/3/

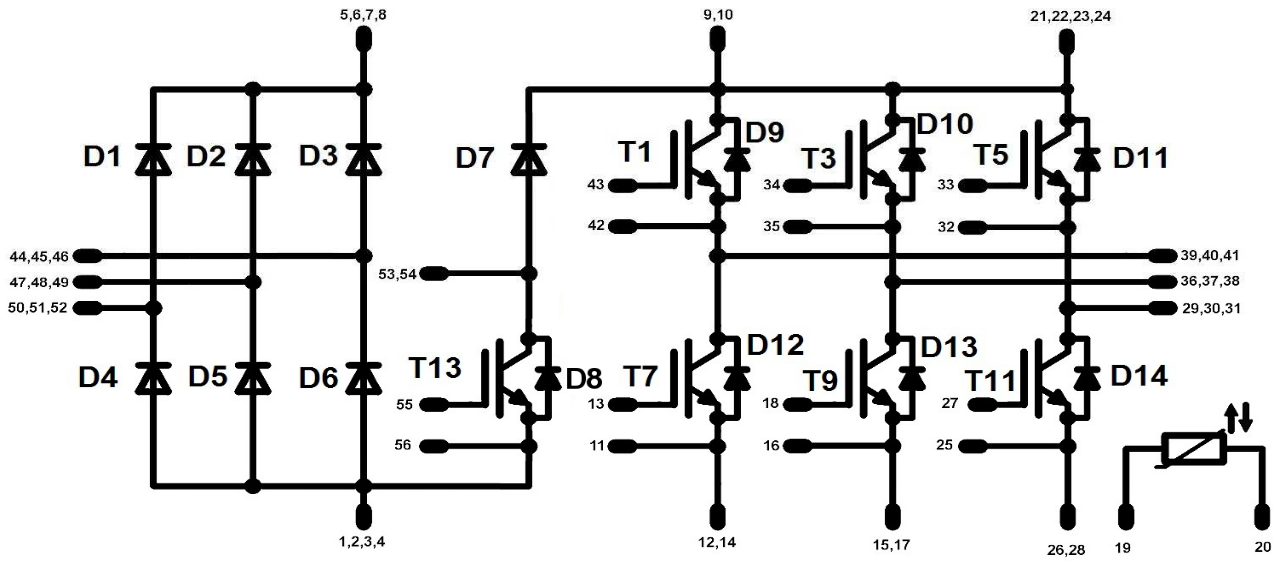
Outline

Pin table

Pin		X	Y	Pin		X	Y
1	DC-	71,2	0	30	U	2,5	37,2
2	DC-	68,7	0	31	U	5	37,2
3	DC-	66,2	0	32	E	7,8	37,2
4	DC-	63,7	0	33	G	10,6	37,2
5	DC+	55,95	0	34	G	18,45	37,2
6	DC+	53,45	0	35	E	21,25	37,2
7	DC+	55,95	2,8	36	V	24,05	37,2
8	DC+	53,45	2,8	37	V	26,55	37,2
9	DC+	48,4	0	38	V	29,05	37,2
10	DC+	45,9	0	39	W	36,1	37,2
11	E	38,9	0	40	W	38,6	37,2
12	DC-	36,1	0	41	W	41,1	37,2
13	G	38,9	2,8	42	E	43,9	37,2
14	DC-	36,1	2,8	43	G	46,7	37,2
15	DC-	31,3	0	44	L1	53,7	37,2
16	E	28,5	0	45	L1	56,2	37,2
17	DC-	31,3	2,8	46	L1	58,7	37,2
18	G	28,5	2,8	47	L2	71,2	37,2
19	R1	19,3	0	48	L2	71,2	34,7
20	R2	19,3	2,8	49	L2	71,2	32,2
21	DC+	12,3	0	50	L3	71,2	25,2
22	DC+	9,8	0	51	L3	71,2	22,7
23	DC+	12,3	2,8	52	L3	71,2	20,2
24	DC+	9,8	2,8	53	BrC	71,2	12,8
25	E	2,8	0	54	BrC	68,7	12,8
26	DC-	0	0	55	BrG	71,2	5,6
27	G	2,8	2,8	56	BrE	71,2	2,8
28	DC-	0	2,8				
29	U	0	37,2				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1,T3,T5 T7,T9,T11	IGBT	1200V	50A	Inverter Switch	
D9,D10,D11, D12,D13,D14	FWD	1200V	50A	Inverter Diode	
T13	IGBT	1200V	50A	Brake Switch	
D7	FWD	1200V	25A	Brake Diode	
D8	FWD	1200V	10A	Brake Protection Diode	
D1,D2,D3,D4,D5,D6	Rectifier	1600V	50A	Rectifier	
NTC	NTC	-	-	Thermistor	

DISCLAIMER

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LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.