flow **PIM 0 3rd gen** | **1200 V / 15 A**

Features

- 2 Clips housing in 12 and 17mm height
- Trench Fieldstop Technology IGBT4
- Optional w/o BRC

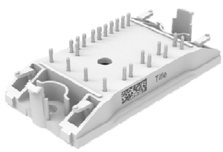
Target Applications

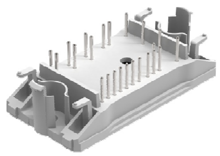
- Industrial Drives
- Embedded Generation

Types

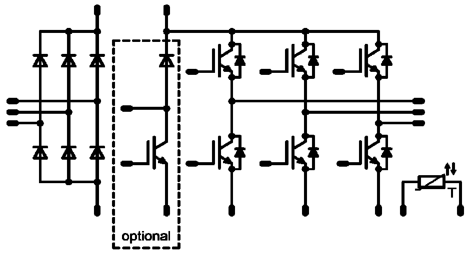
- V23990-P840-A48-PM
- V23990-P840-A49-PM
- V23990-P840-C48-PM
- V23990-P840-C49-PM

flow 0 housing


12mm housing


17mm housing

Schematic



Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Rectifier Diode					
Repetitive peak reverse voltage	V_{RRM}			1600	V
DC forward current	I_{FAV}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	27 30	A
Surge forward current	I_{FSM}	t_p = 10 ms		220	A
I²t-value	I^2t	t_p = 10 ms		200	A²s
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	33 50	W
Maximum Junction Temperature	T_{jmax}			150	°C
Inverter IGBT					
Collector-emitter break down voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	18 24	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}		45	A
Turn off safe operating area		V_{CE} ≤ 1200 V, $T_j \le T_{op}$ max		30	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	52 79	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V		10 800	μs V
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	20 25	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		30	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	38 57	W
Maximum Junction Temperature	T_{jmax}			175	°C
Brake IGBT					
Collector-emitter break down voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	12 15	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}		24	A
Turn off safe operating area		V_{CE} ≤ 1200 V, T_j ≤ T_{op} max		16	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	40 61	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V		10 800	μs V
Maximum Junction Temperature	T_{jmax}			175	°C
Brake FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	10 10	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		15	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	22 34	W
Maximum Junction Temperature	T_{jmax}			150	°C
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{is}	t = 2 s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm
Comparative tracking index	CTI			>200	

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 [°C]	Min	Typ	Max	Unit
Rectifier Diode										
Forward voltage	V_F				25	25 125		1,17 1,13	1,9	V
Threshold voltage (for power loss calc. only)	V_{to}				25	25 125		0,93 0,79		V
Slope resistance (for power loss calc. only)	r_t				25	25 125		9,78 13,37		mΩ
Reverse current	I_r			1600		25 145			0,05 1,1	mA
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,61		K/W
Inverter IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0005	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}				15	25 125	1,58	1,94 2,26	2,07	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	1200		25			0,002	mA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$					25 125		60 60		
Rise time	t_r					25 125		15 19		
Turn-off delay time	$t_{d(off)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	600	15	25 125		197 239		ns
Fall time	t_f					25 125		79 106		
Turn-on energy loss	E_{on}					25 125		0,88 1,25		mWs
Turn-off energy loss	E_{off}					25 125		0,88 1,24		
Input capacitance	C_{ies}							1000		
Output capacitance	C_{oss}	f = 1 MHz	0	25		25		100		pF
Reverse transfer capacitance	C_{rss}							56		
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,35		K/W
Inverter FWD										
Diode forward voltage	V_F				10	25 125	1,35	1,90 1,91	2,05	V
Peak reverse recovery current	I_{RRM}					25 125		13 16		A
Reverse recovery time	t_{rr}					25 125		282 433		ns
Reverse recovered charge	Q_{rr}	R_{gon} = 16 Ω	±15	600	15	25 125		1,59 2,75		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		129 109		A/μs
Reverse recovered energy	E_{rec}					25 125		0,65 1,16		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,83		K/W

Characteristic Values

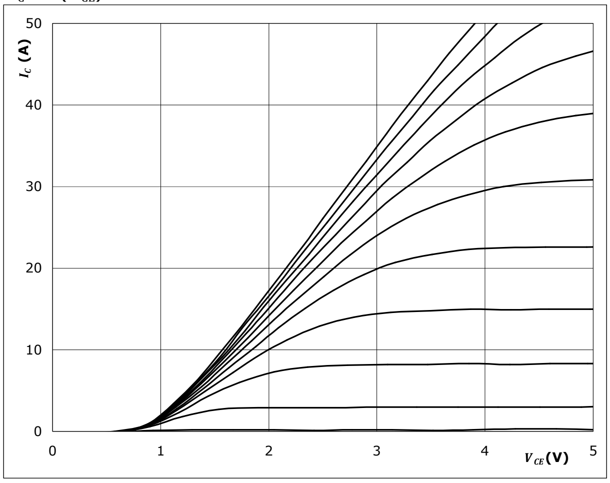
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j [°C]	Min	Typ	Max	
Brake IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0003	25	5	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}				8	25 125	1,58	1,87 2,22	2,07	V
Collector-emitter cut-off incl diode	I_{CES}		0	1200		25			0,001	mA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 32 Ω R_{gon} = 32 Ω	±15	600	8	25 125		71 72		ns
Rise time	t_r					25 125		20 24		
Turn-off delay time	$t_{d(off)}$					25 125		181 228		
Fall time	t_f					25 125		78 104		
Turn-on energy loss	E_{on}					25 125		0,50 0,71		mWs
Turn-off energy loss	E_{off}					25 125		0,43 0,62		
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		490		pF
Output capacitance	C_{oss}							50		
Reverse transfer capacitance	C_{rss}							30		
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,57		K/W
Brake FWD										
Diode forward voltage	V_F				7,5	25 125		1,67 1,61		V
Reverse leakage current	I_r			1200		25			250	µA
Peak reverse recovery current	I_{RRM}	R_{gon} = 32 Ω R_{gon} = 32 Ω	±15	600	8	25 125		9 10		A
Reverse recovery time	t_{rr}					25 125		258 427		ns
Reverse recovered charge	Q_{rr}					25 125		0,90 0,90		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		78 73		A/µs
Reverse recovery energy	E_{rec}					25 125		0,35 0,69		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						2,20		K/W
Thermistor										
Rated resistance	R					25		22000		Ω
Deviation of R100	$\Delta_{R/R}$	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	

Inverter Charateristics

Figure 1 **Inverter IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

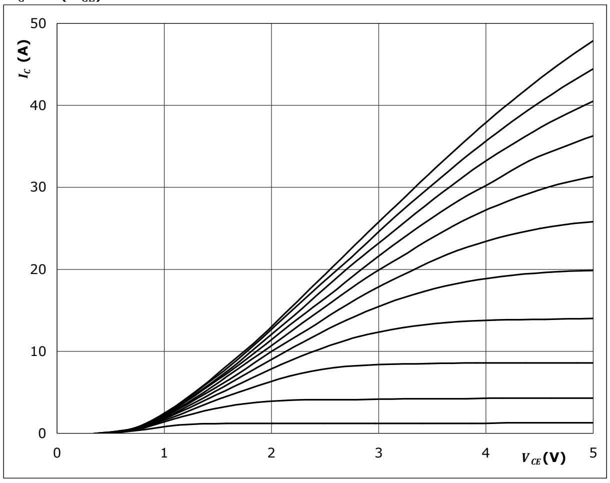
T_j = 25 °C

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

Figure 2 **Inverter IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

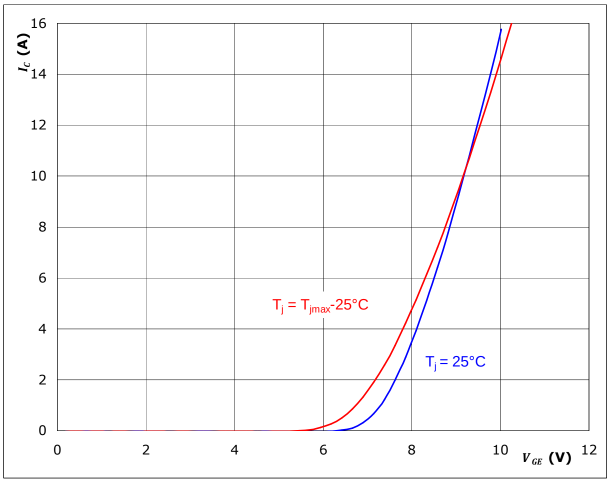
T_j = 125 °C

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

Figure 3 **Inverter IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



At

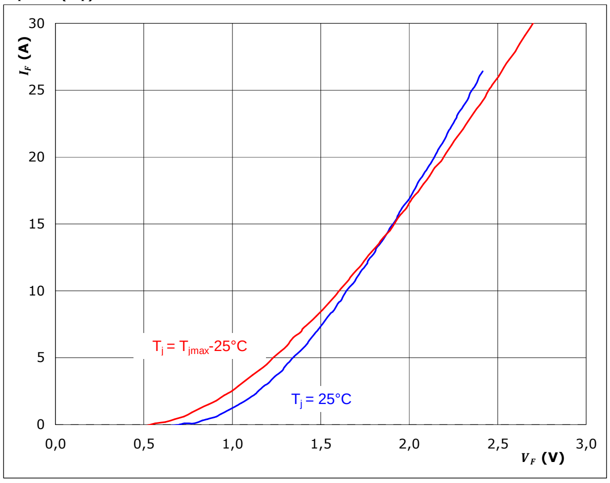
t_p = 250 µs

V_{CE} = 10 V

Figure 4 **Inverter FWD**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

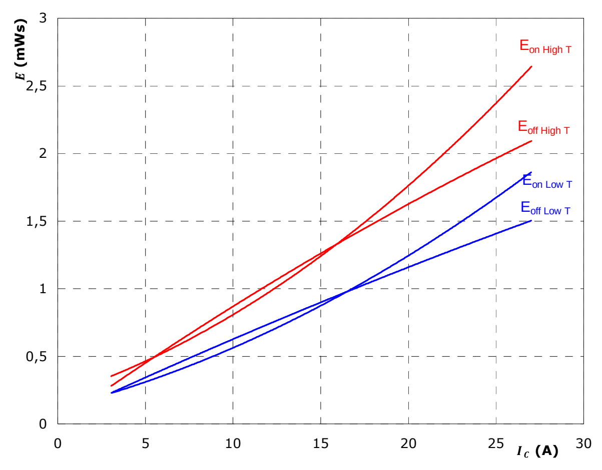
t_p = 250 µs

Inverter Charateristics

Figure 5 **Inverter IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



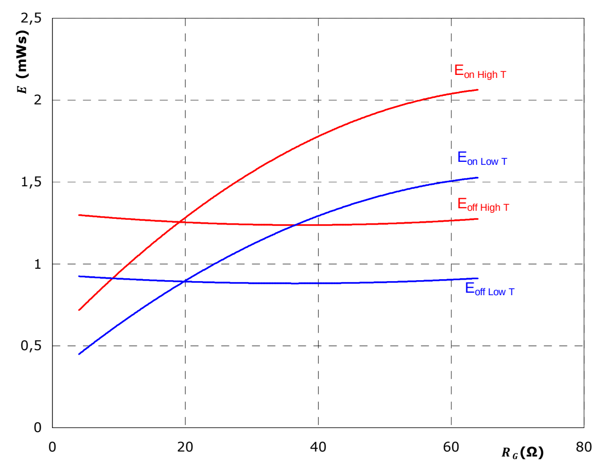
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 6 **Inverter IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



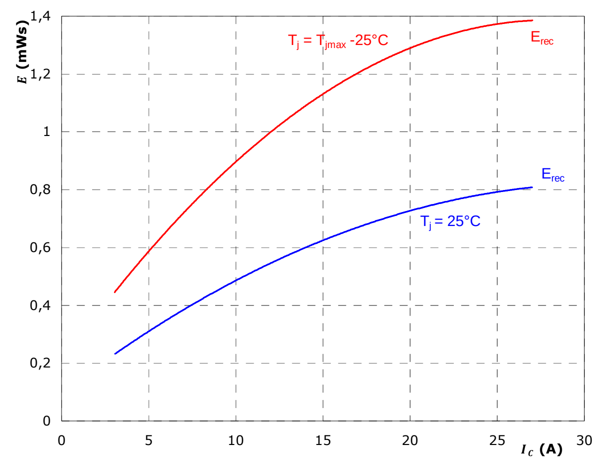
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	15	A

Figure 7 **Inverter FWD**

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



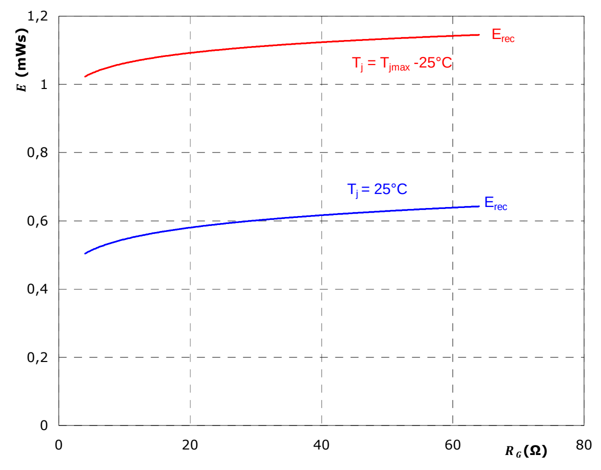
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 8 **Inverter FWD**

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

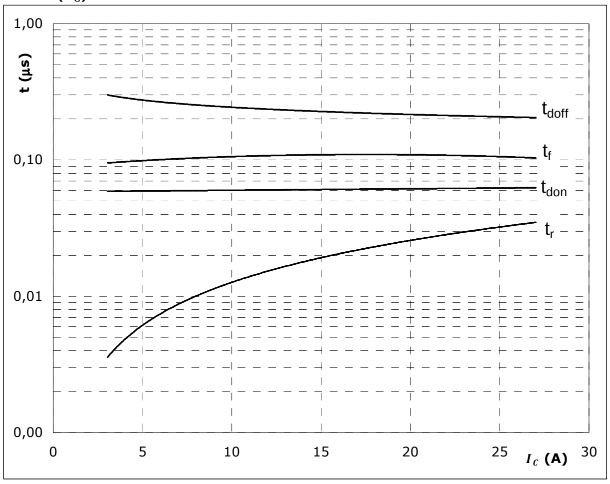
T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	15	A

Inverter Charateristics

Figure 9 **Inverter IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



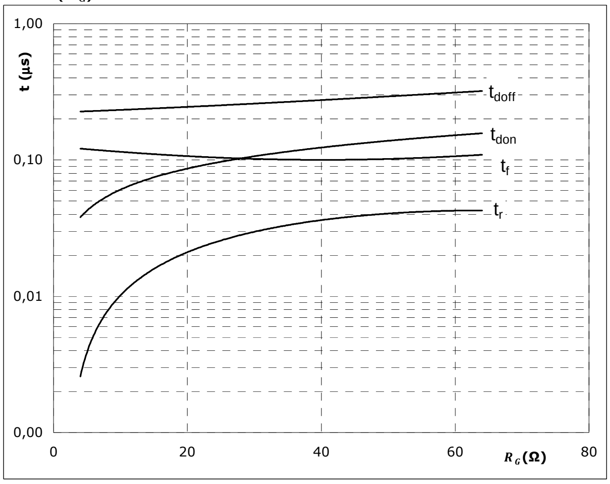
With an inductive load at

T_j =	125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 10 **Inverter IGBT**

Typical switching times as a function of gate resistor

$t = f(R_G)$



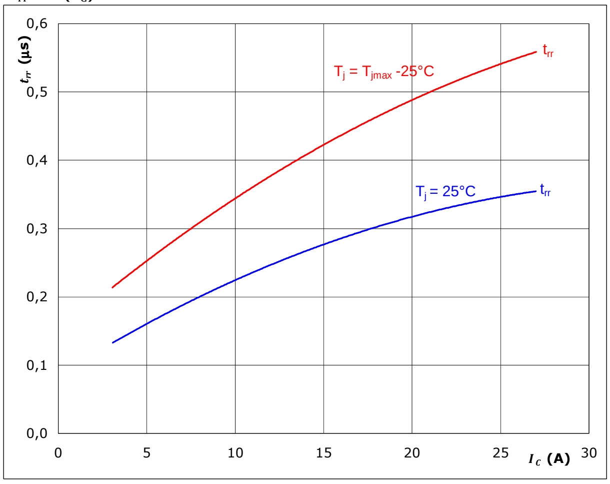
With an inductive load at

T_j =	125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	15	A

Figure 11 **Inverter FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



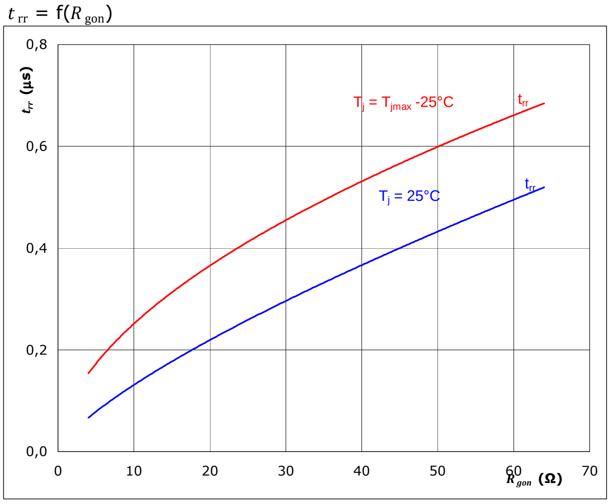
At

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 12 **Inverter FWD**

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

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



At

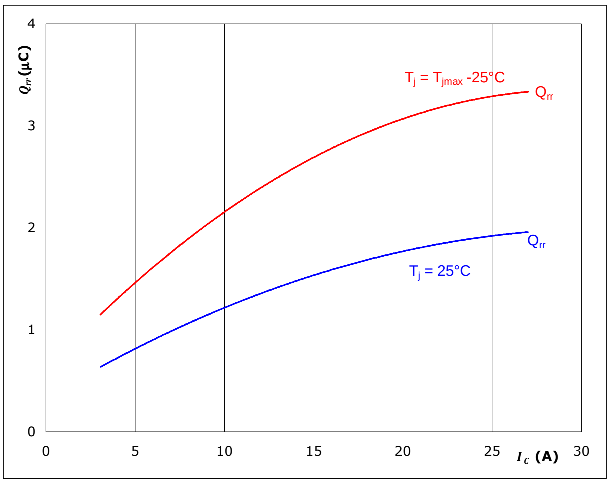
T_j =	25/125	°C
V_R =	600	V
I_F =	15	A
V_{GE} =	±15	V

Inverter Charateristics

Figure 13 **Inverter FWD**

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



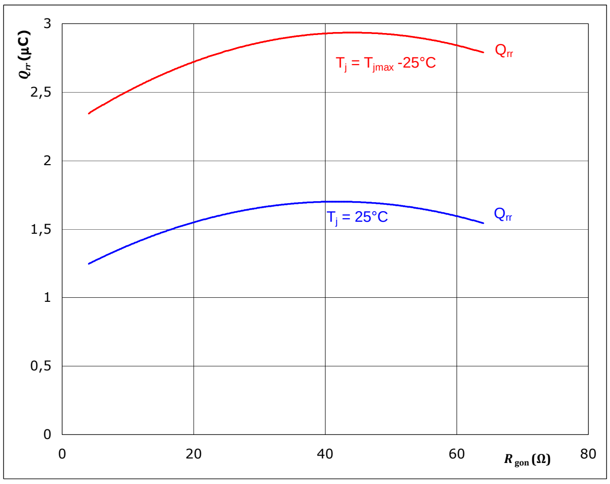
At

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 14 **Inverter FWD**

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

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



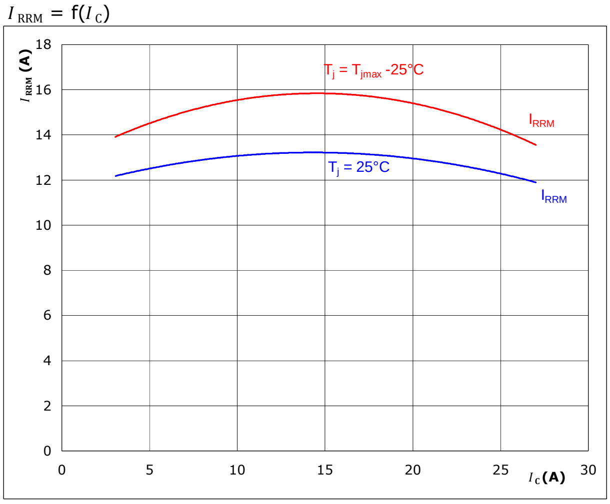
At

T_j =	25/125	°C
V_R =	600	V
I_F =	15	A
V_{GE} =	±15	V

Figure 15 **Inverter FWD**

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



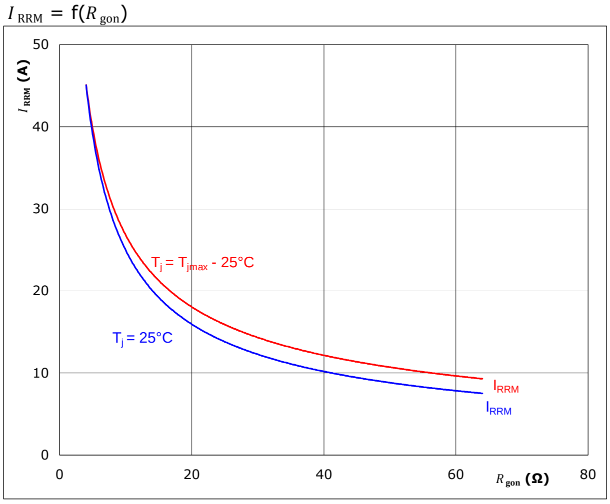
At

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 16 **Inverter FWD**

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

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



At

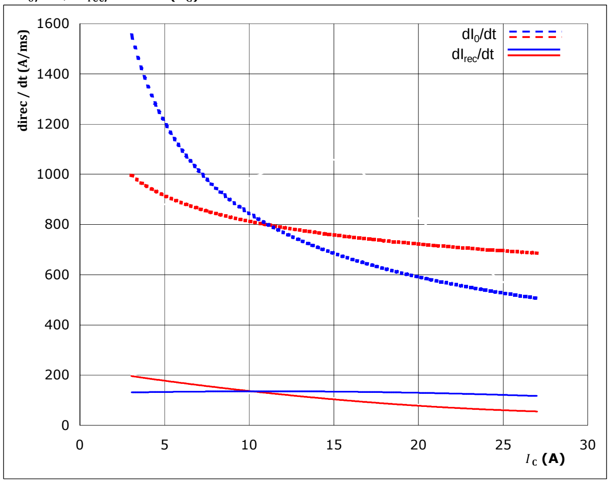
T_j =	25/125	°C
V_R =	600	V
I_F =	15	A
V_{GE} =	±15	V

Inverter Charateristics

Figure 17 **Inverter FWD**

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

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



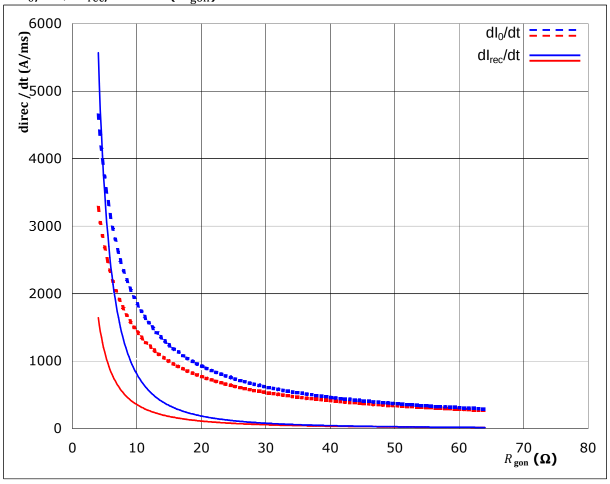
At

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω

Figure 18 **Inverter FWD**

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

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



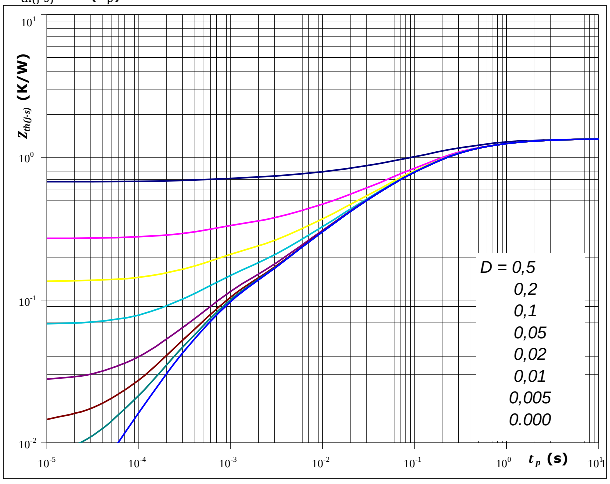
At

T_j =	25/125	°C
V_R =	600	V
I_F =	15	A
V_{GE} =	±15	V

Figure 19 **Inverter IGBT**

IGBT transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	1,35	K/W

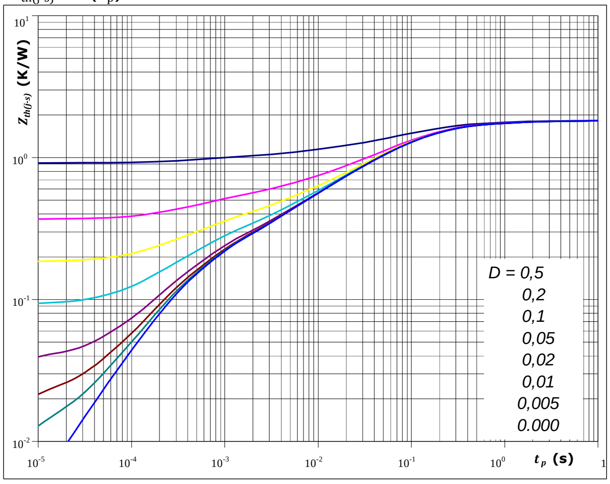
IGBT thermal model values

R (K/W)	Tau (s)
0,04	5,6E+00
0,21	8,7E-01
0,57	1,7E-01
0,31	3,4E-02
0,14	6,2E-03
0,08	5,5E-04

Figure 20 **Inverter FWD**

FWD transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	1,83	K/W

FWD thermal model values

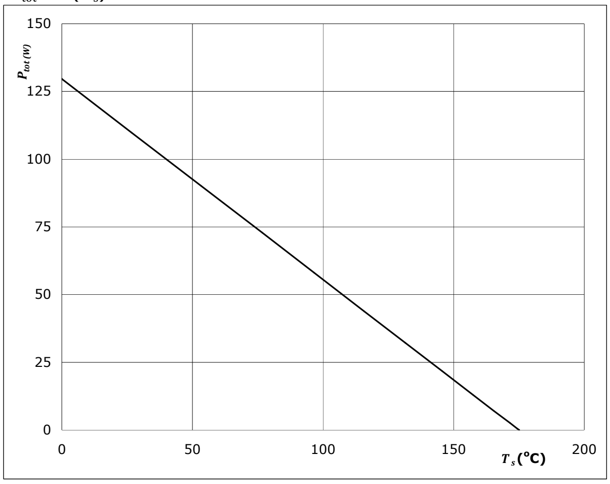
R (K/W)	Tau (s)
0,03	9,6E+00
0,19	8,2E-01
0,75	1,2E-01
0,50	2,6E-02
0,20	3,4E-03
0,16	3,8E-04

Inverter Charateristics

Figure 21 **Inverter IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



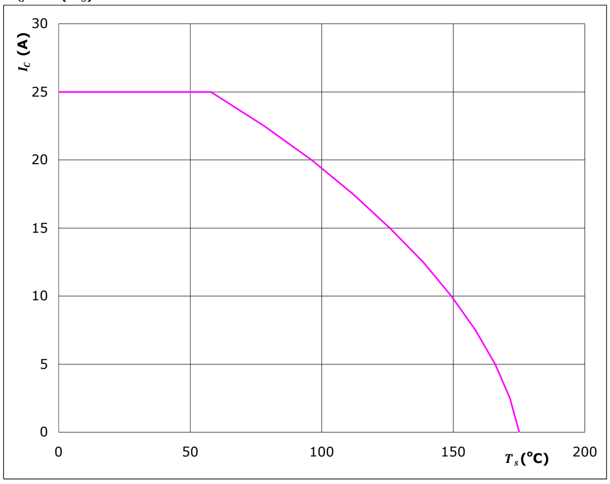
At

T_j = 175 °C

Figure 22 **Inverter IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

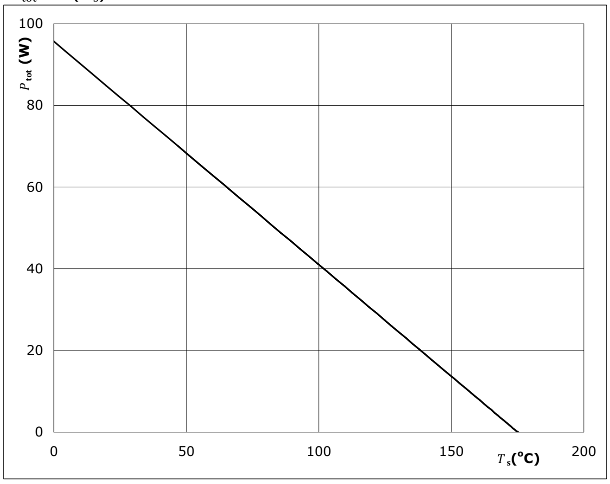
T_j = 175 °C

V_{GE} = 15 V

Figure 23 **Inverter FWD**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



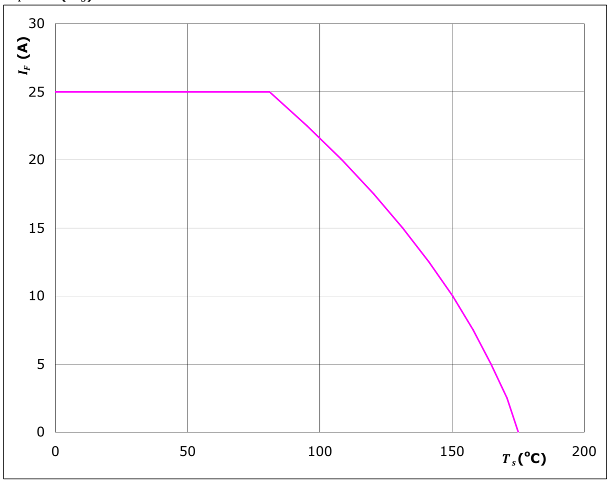
At

T_j = 175 °C

Figure 24 **Inverter FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

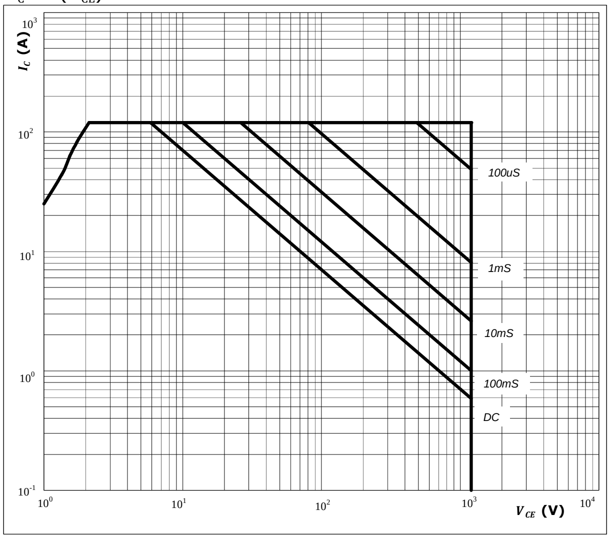
T_j = 175 °C

Inverter Charateristics

Figure 25 **Inverter IGBT**

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



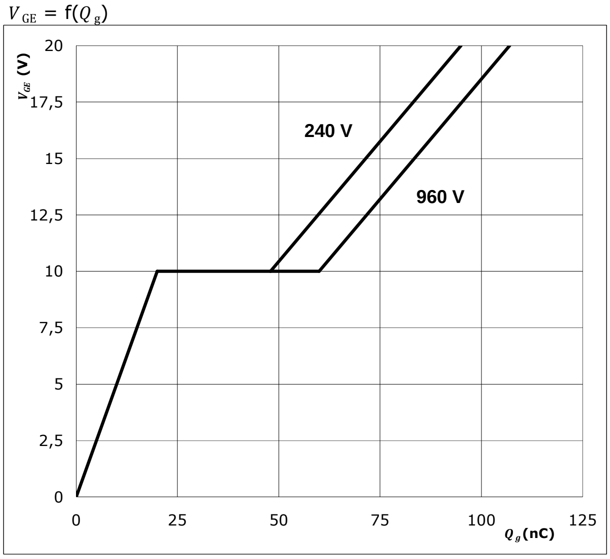
At

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

Figure 26 **Inverter IGBT**

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



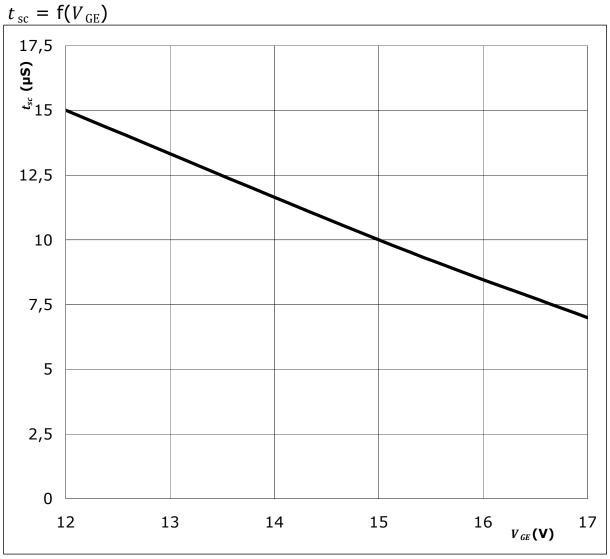
At

I_C =	15	A

Figure 27 **Inverter IGBT**

Short circuit withstand time as a function of gate-emitter voltage

$t_{sc} = f(V_{GE})$



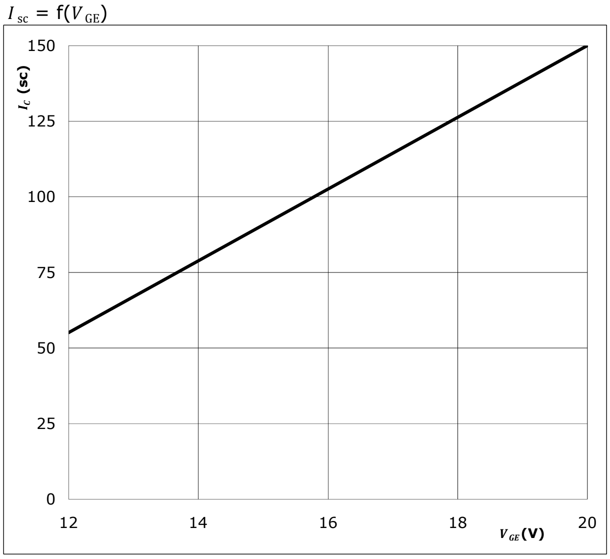
At

V_{CE} =	1200	V
T_j ≤	175	ºC

Figure 28 **Inverter IGBT**

Typical short circuit collector current as a function of gate-emitter voltage

$I_{sc} = f(V_{GE})$



At

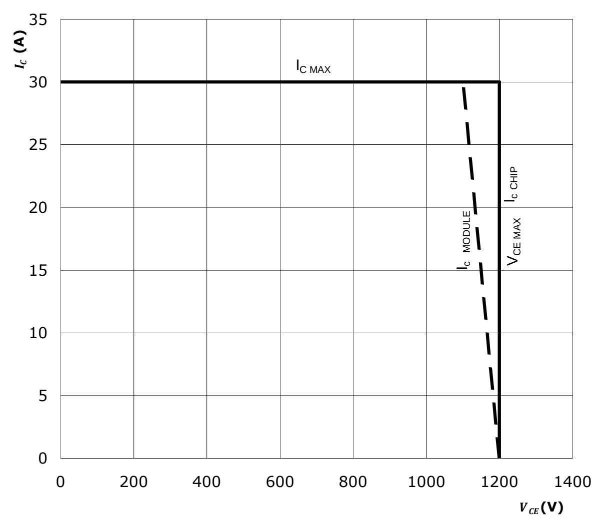
V_{CE} ≤	1200	V
T_j =	175	ºC

Inverter Charateristics

Figure 29	**Inverter IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

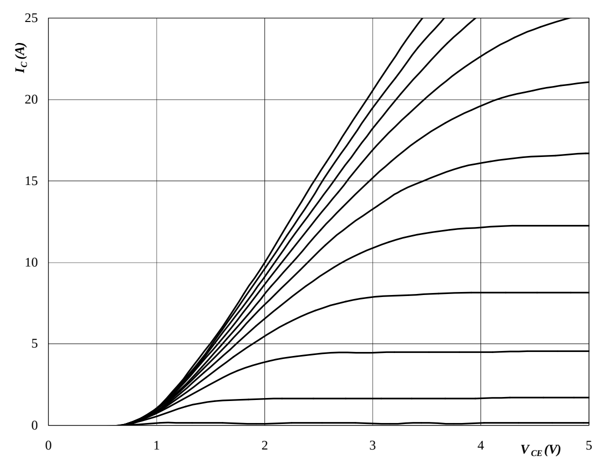
T_j = T_{jmax}-25 ºC

Brake Charateristics

Figure 1	Brake IGBT

Typical output characteristics

I_C = f(V_{CE})



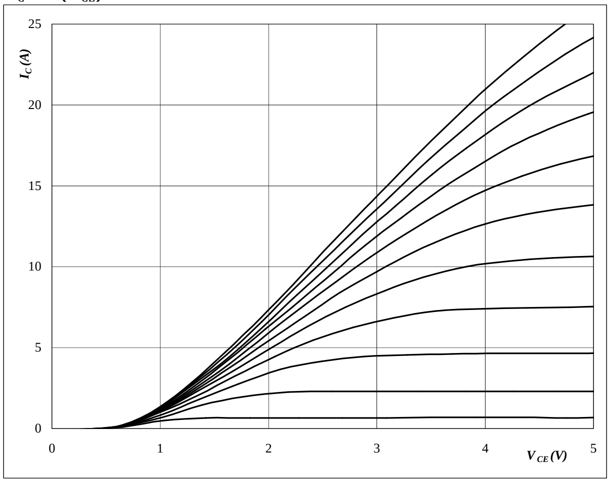
At

t_p = 250 μs
T_j = 25 °C
V_{GE} from 7 V to 17 V in steps of 1 V

Figure 2	Brake IGBT

Typical output characteristics

I_C = f(V_{CE})



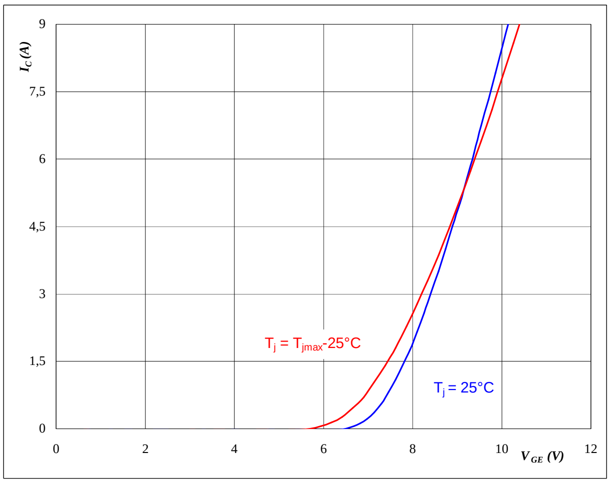
At

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

Figure 3	Brake IGBT

Typical transfer characteristics

I_C = f(V_{GE})



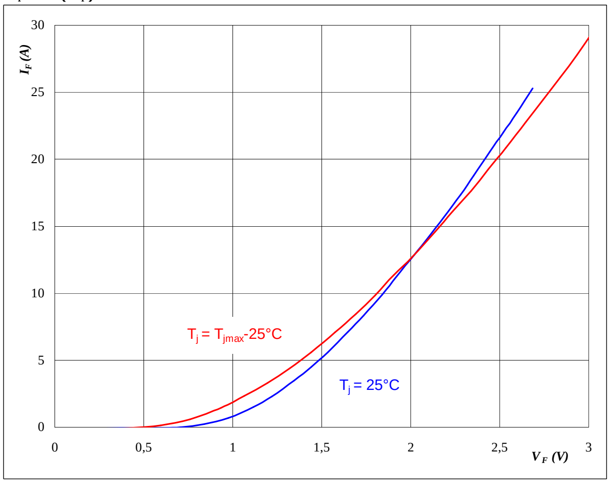
At

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

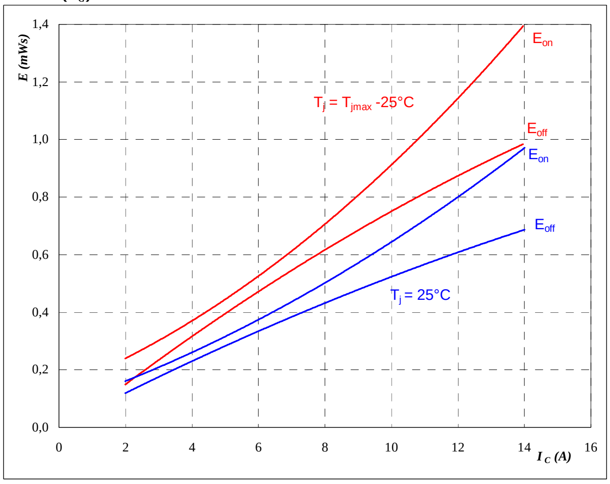
t_p = 250 μs

Brake Charateristics

Figure 5 **Brake IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



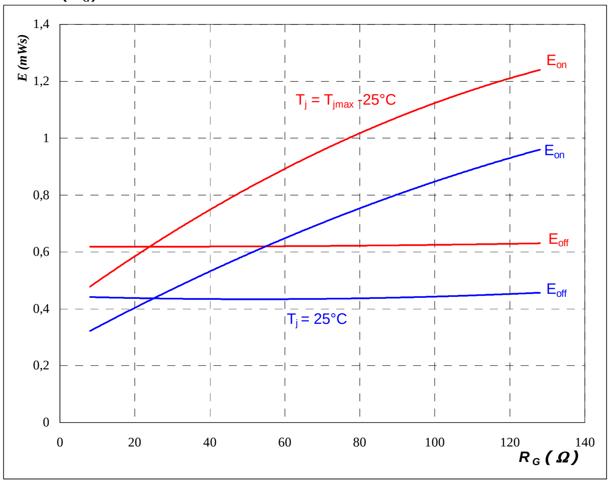
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	32	Ω
R_{goff} =	32	Ω

Figure 6 **Brake IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



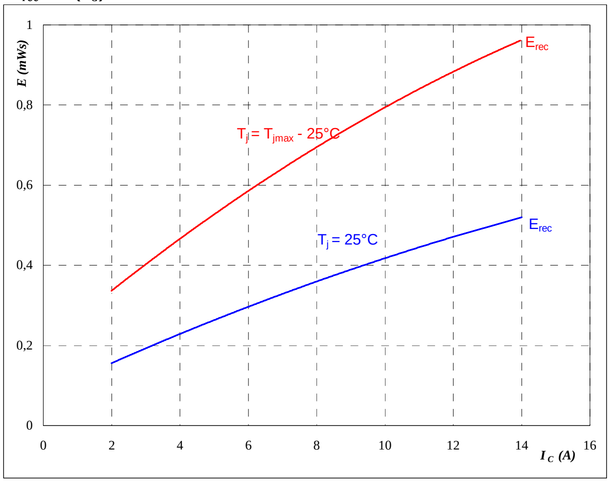
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	8	A

Figure 7 **Brake FWD**

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



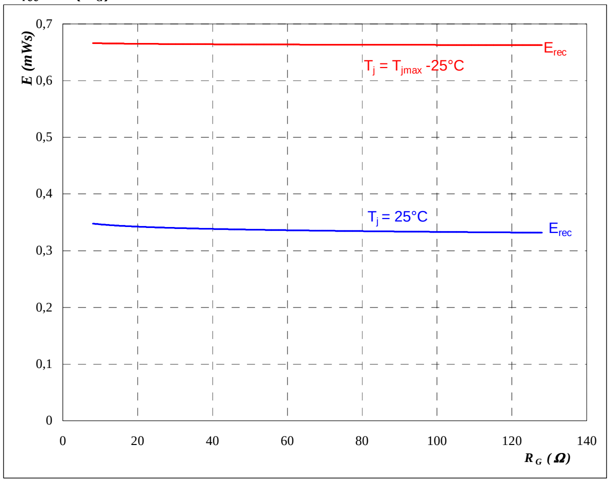
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	32	Ω

Figure 8 **Brake FWD**

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

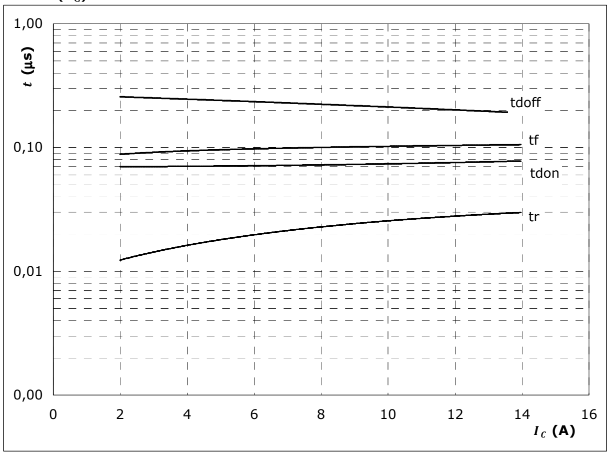
T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	8	A

Brake Charateristics

Figure 9 **Brake IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



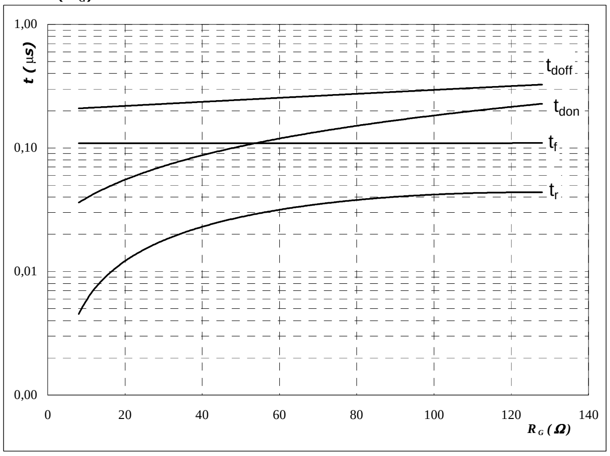
With an inductive load at

T_j =	125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	32	Ω
R_{goff} =	32	Ω

Figure 10 **Brake IGBT**

Typical switching times as a function of gate resistor

$t = f(R_G)$



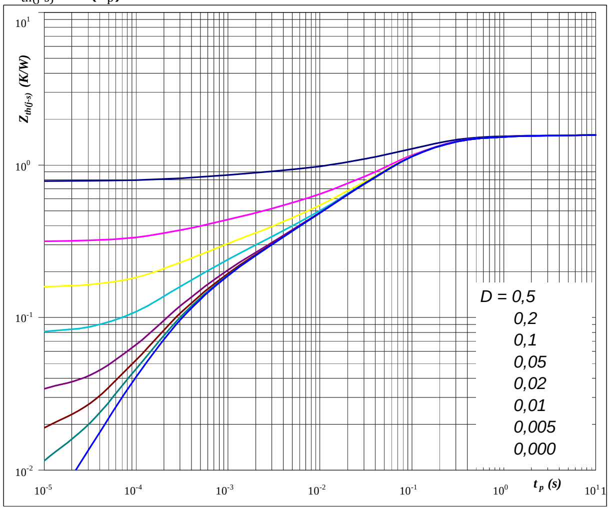
With an inductive load at

T_j =	125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	8	A

Figure 11 **Brake IGBT**

IGBT transient thermal impedance as a function of pulse width

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



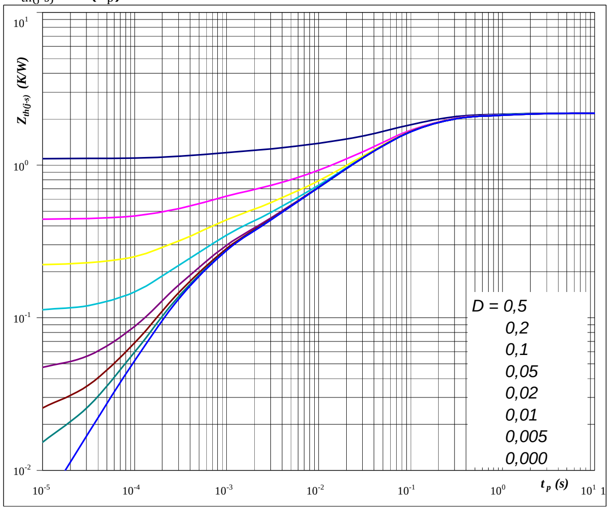
At $D = t_p / T$

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

Figure 12 **Brake FWD**

FWD transient thermal impedance as a function of pulse width

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



At $D = t_p / T$

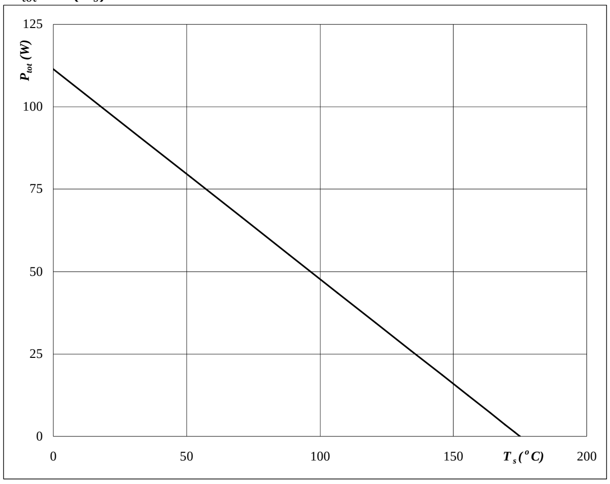
$R_{th(j-s)}$ = 2,20 K/W

Brake Charateristics

Figure 13 **Brake IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



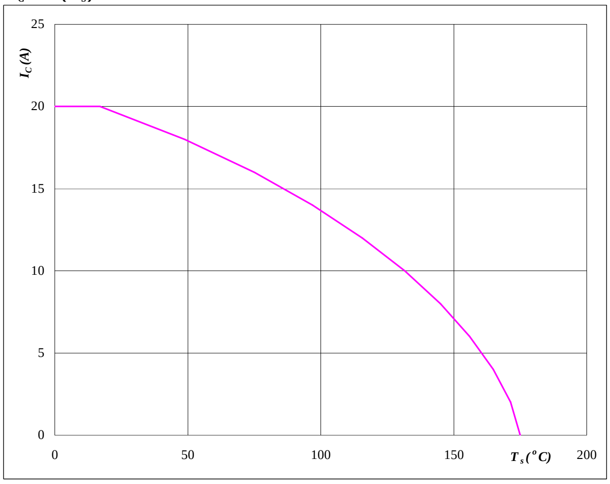
At

T_j = 175 ºC

Figure 14 **Brake IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

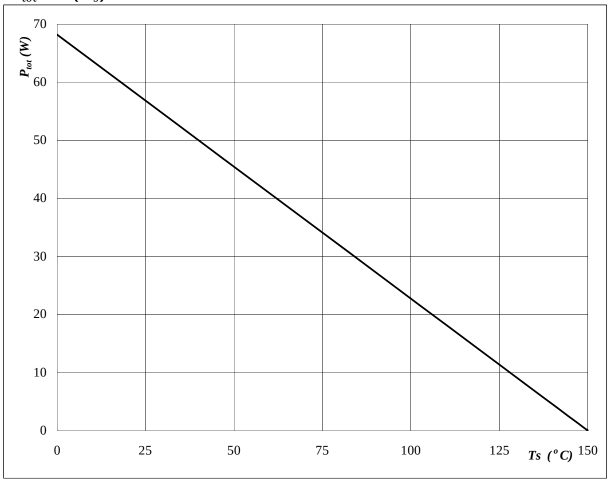
T_j = 175 ºC

V_{GE} = 15 V

Figure 15 **Brake FWD**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



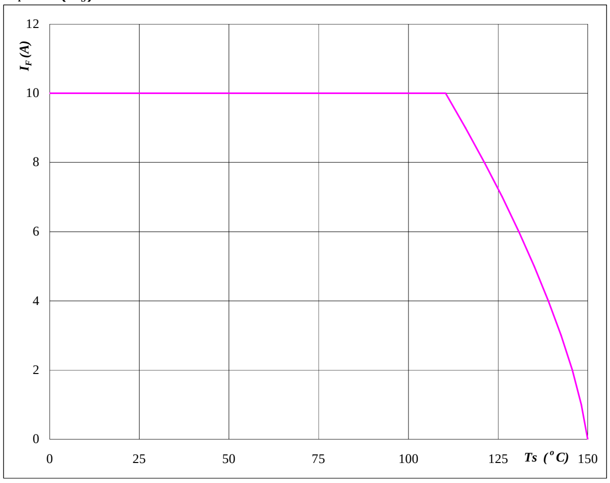
At

T_j = 150 ºC

Figure 16 **Brake FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

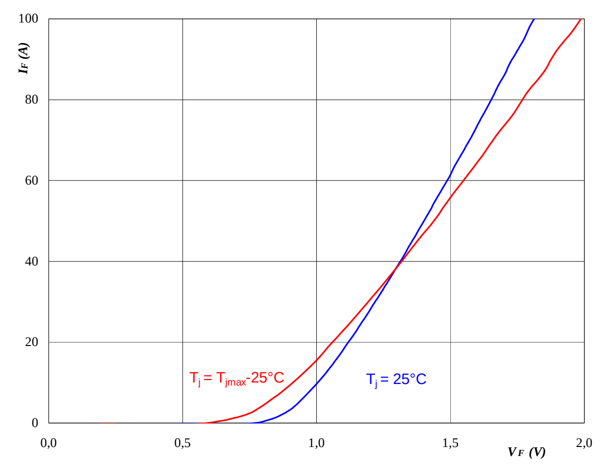
T_j = 150 ºC

Rectifier Diode

Figure 1 **Rectifier Diode**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



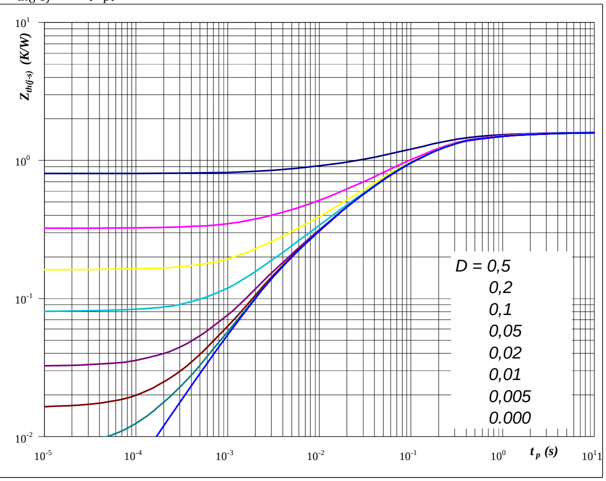
At

t_p = 250 µs

Figure 2 **Rectifier Diode**

Diode transient thermal impedance as a function of pulse width

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



At $D = t_p / T$

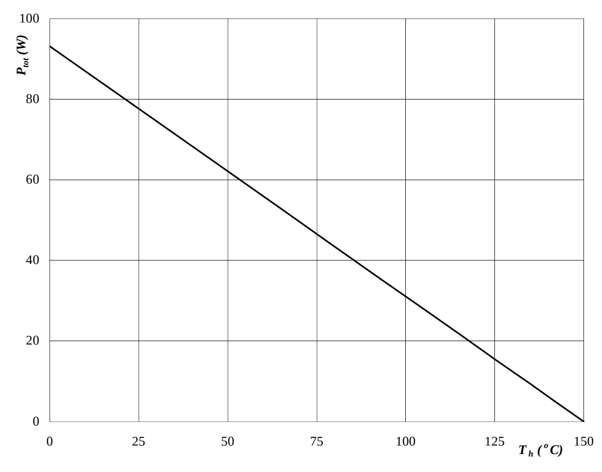
$D = t_p / T$

$R_{th(j-s)}$ = 1,61 K/W

Figure 3 **Rectifier Diode**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



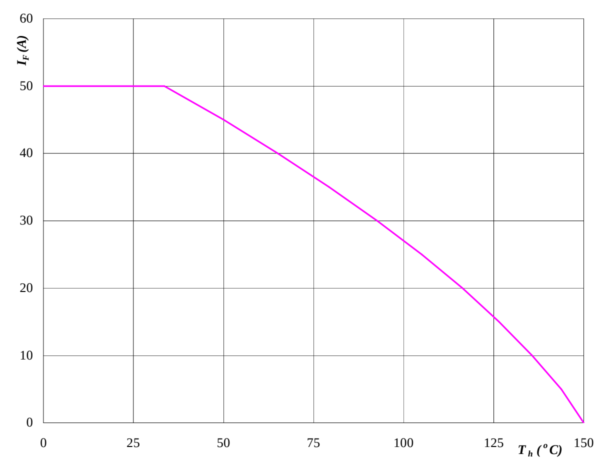
At

T_j = 150 ºC

Figure 4 **Rectifier Diode**

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

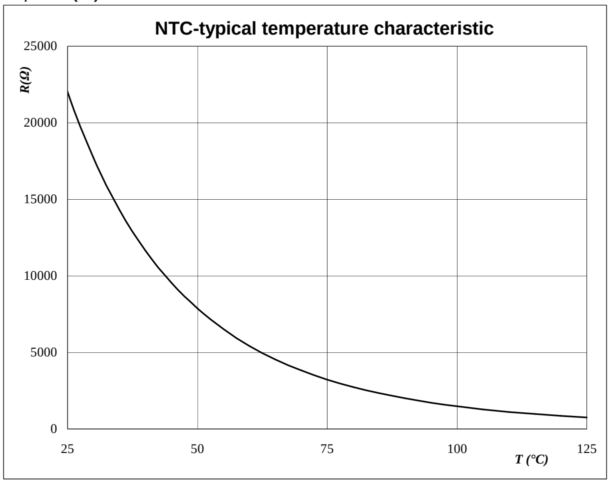
T_j = 150 ºC

Thermistor

Figure 1	Thermistor

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$



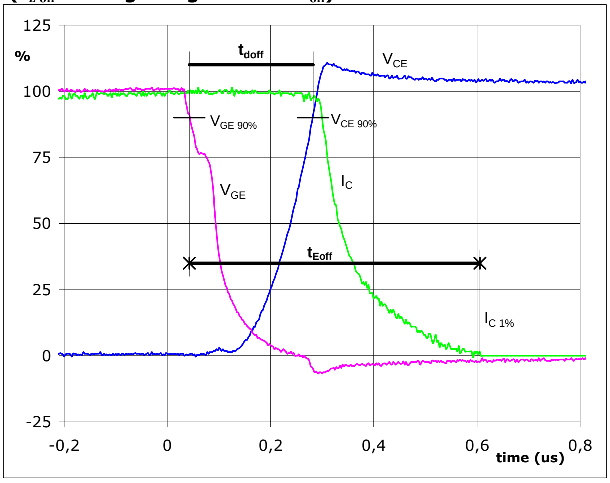
Inverter Switching Definitions

General conditions

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

Figure 1 Inverter IGBT

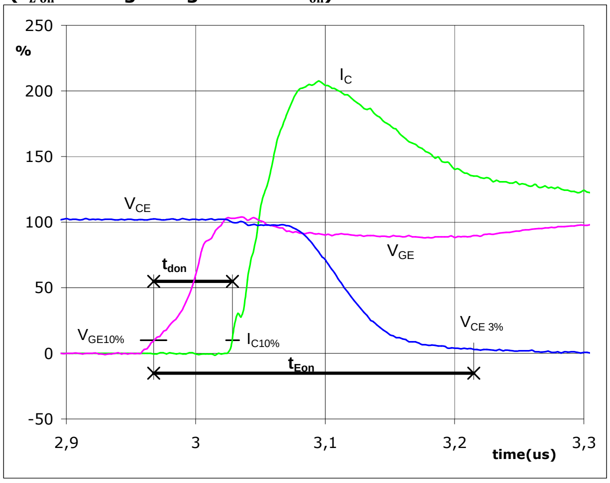
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	15	A
t_{doff} =	0,24	µs
$t_{E\,off}$ =	0,56	µs

Figure 2 Inverter IGBT

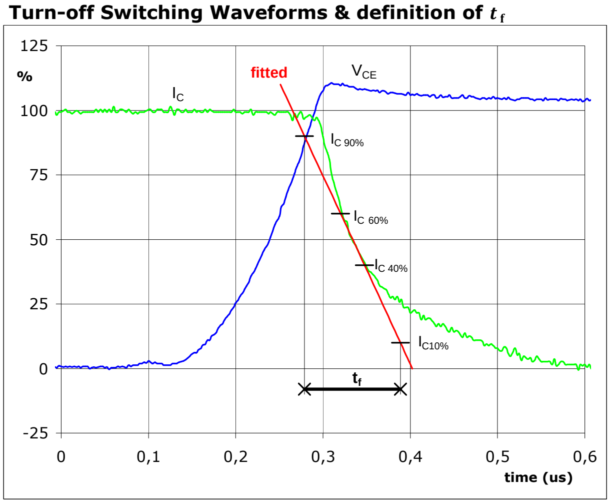
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	15	A
t_{don} =	0,06	µs
$t_{E\,on}$ =	0,25	µs

Figure 3 Inverter IGBT

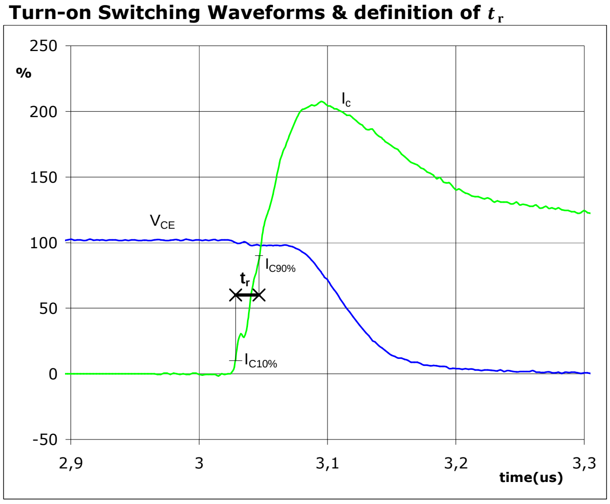
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	600	V
I_C (100%) =	15	A
t_f =	0,11	µs

Figure 4 Inverter IGBT

Turn-on Switching Waveforms & definition of t_r

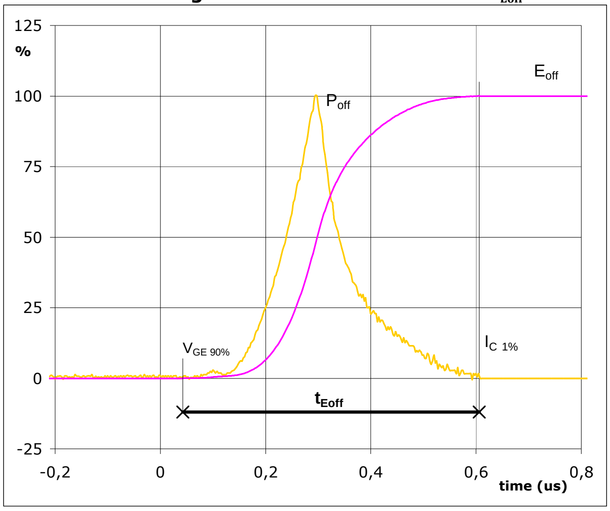


V_C (100%) =	600	V
I_C (100%) =	15	A
t_r =	0,02	µs

Inverter Switching Definitions

Figure 5 Inverter IGBT

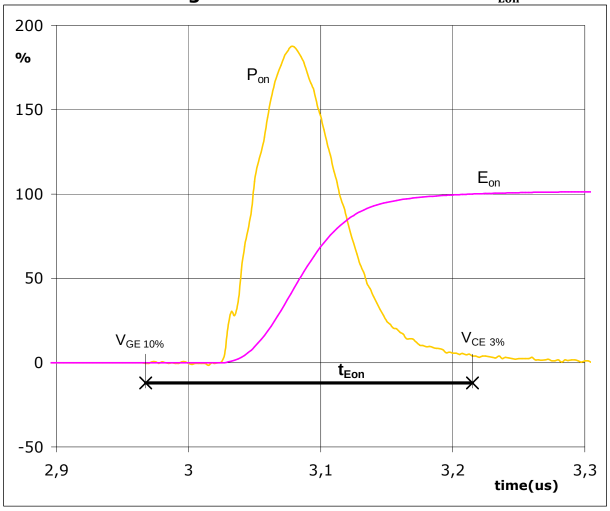
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	9,00	kW
E_{off} (100%) =	1,24	mJ
$t_{E\,off}$ =	0,56	µs

Figure 6 Inverter IGBT

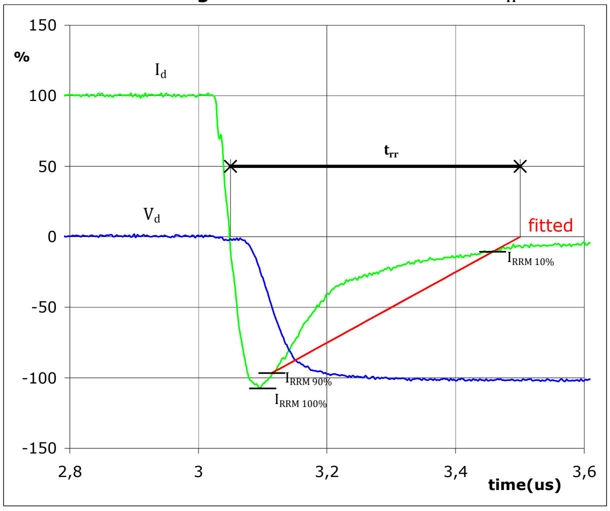
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	9,00	kW
E_{on} (100%) =	1,25	mJ
$t_{E\,on}$ =	0,25	µs

Figure 7 Inverter FWD

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

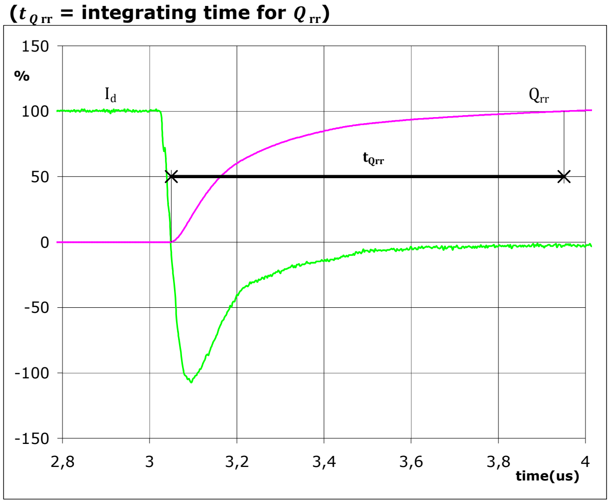


V_d (100%) =	600	V
I_d (100%) =	15	A
I_{RRM} (100%) =	-16	A
t_{rr} =	0,43	µs

Inverter Switching Definitions

Figure 8 Inverter FWD

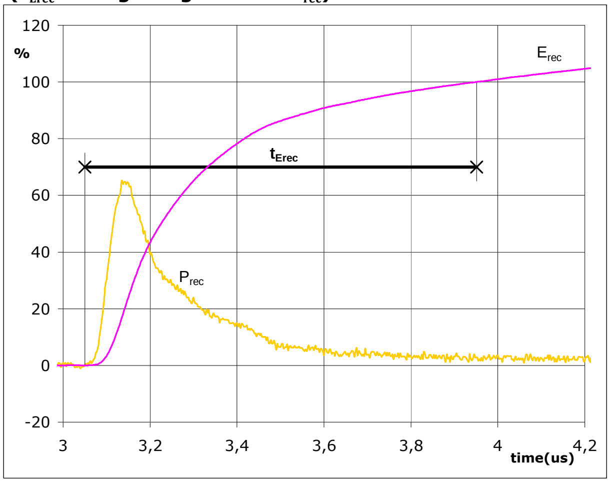
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_D (100%) =	15	A
Q_{rr} (100%) =	2,75	μC
$t_{Q\,rr}$ =	0,90	μs

Figure 9 Inverter FWD

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



P_{rec} (100%) =	9,00	kW
E_{rec} (100%) =	1,16	mJ
$t_{E\,rec}$ =	0,90	μs

Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

Version	Ordering Code
with brake without thermal paste 12mm housing	V23990-P840-A48-PM
without brake without thermal paste 12mm housing	V23990-P840-C48-PM
with brake without thermal pastee 17mm housing	V23990-P840-A49-PM
without brake without thermal paste 17mm housing	V23990-P840-C49-PM

	Name	Date code	UL & VIN	Lot	Serial
Text	NNNNNNNNNNVV	WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	**Lot number**	**Serial**	**Date code**	
Datamatrix	TTTTTTTVV	LLLLL	SSSS	WWYY	

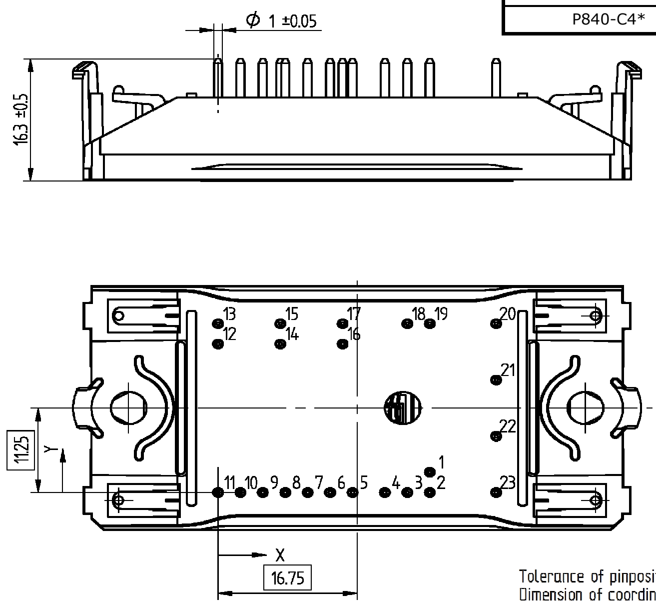
Outline

Pin table

Pin	X	Y	Function
1	25,5	2,7	NTC1
2	25,5	0	NTC2
3	22,8	0	-DC
4	20,1	0	BRCG
5	16,2	0	BRCE
6	13,5	0	G6
7	10,8	0	E6
8	8,1	0	G5
9	5,4	0	E5
10	2,7	0	G4
11	0	0	E4
12	0	19,8	G1
13	0	22,5	U
14	7,5	19,8	G2
15	7,5	22,5	V
16	15	19,8	G3
17	15	22,5	W
18	22,8	22,5	+INV
19	25,5	22,5	+DC
20	33,5	22,5	BRC+
21	33,5	15	L1
22	33,5	7,5	L2
23	33,5	0	L3

Pinout variation

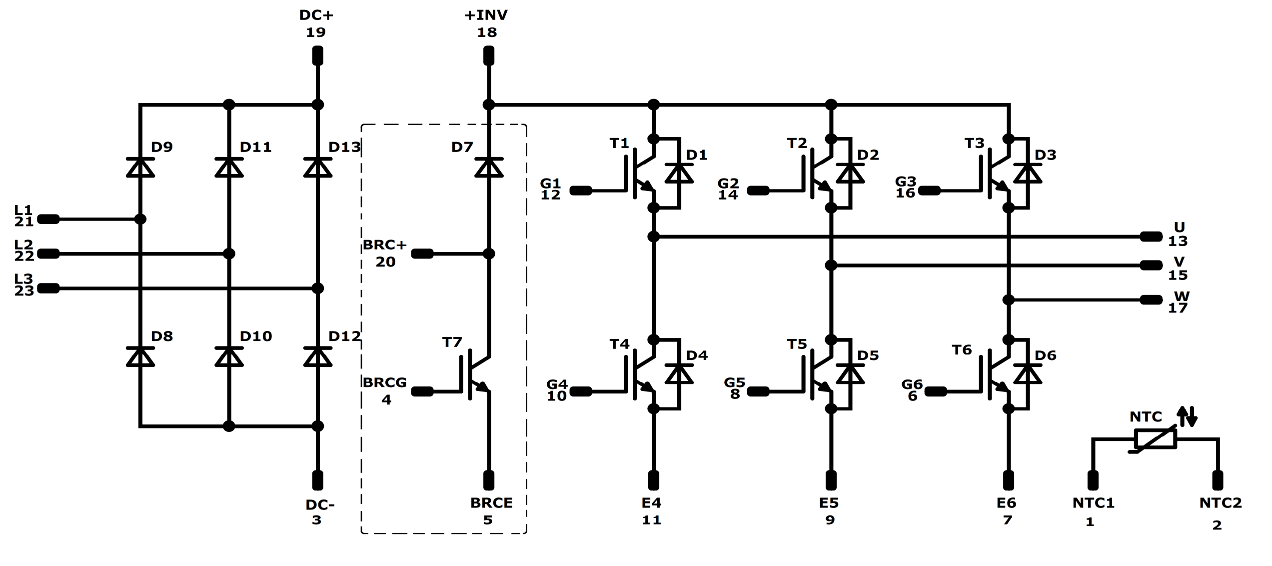
Modul subtype	Not assembled pins
P840-A4*	-
P840-C4*	4,5,20



Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Ordering Code and Marking - Outline - Pinout

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1, T2, T3, T4, T5, T6	IGBT	1200 V	15 A	Inverter Switch	
D1, D2, D3, D4, D5, D6	FWD	1200 V	15 A	Inverter Diode	
T7	IGBT	1200 V	8 A	Brake Switch	
D7	FWD	1200 V	7,5 A	Brake Diode	
D8, D9, D10, D11, D12, D13	Diode	1600 V	25 A	Rectifier	
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.

Document No.:	Date:	Modification:	Pages
V23990-P840-*4*-PM-D7-14	19 Mar. 2016	New style, NTC changed	All

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.