flow PIM 0 — 1200 V / 8 A

Features

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

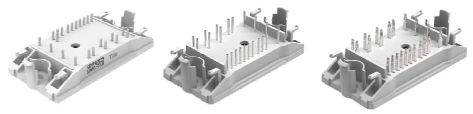
Target Applications

- Industrial Drives
- Embedded Generation

Types

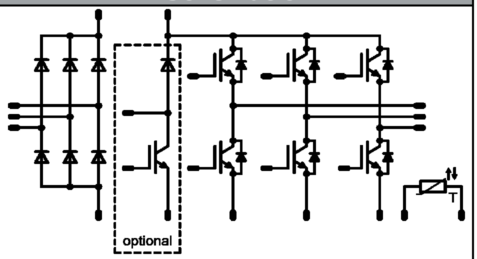
- V23990-P849-A58-PM
- V23990-P849-A59-PM
- V23990-P849-C58-PM
- V23990-P849-C59-PM
- V23990-P849-A59Y-PM

flow 0 housing



12 mm housing — solder pins; 17 mm housing — solder pins, press-fit pins

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	44	A
Surge (non-repetitive) forward current	I_{FSM}	t_p = 10 ms		370	A
I^2t-value	I^2t			370	A^{2}s
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	56	W
Maximum Junction Temperature	T_{jmax}			150	°C
Inverter Switch					
Collector-emitter breakdown voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	15	A
Repetitive peak 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	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

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	15	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		20	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	46	W
Maximum Junction Temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter breakdown voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	10	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		12	A
Turn off safe operating area		V_{CE} ≤ 1200 V, $T_j \leq T_{op\ max}$		8	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	47	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 Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	6	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		6	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	23	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}	DC Test Voltage*	t = 2 s	6000	V
		AC Voltage	t = 1 min	2500	V
Creepage distance				min 12,7	mm
Clearance		12 mm housing		9,7	mm
		17 mm housing		12,7	mm
Comparative tracking index	CTI			>200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Rectifier Diode										
Forward voltage	V_F				35	25 125		1,19 1,17	1,7	V
Threshold voltage (for power loss calc. only)	V_{to}				35	25 125		0,91 0,79		V
Slope resistance (for power loss calc. only)	r_t				35	25 125		8 11		mΩ
Reverse current	I_r			1600		25 145			0,05 1,1	mA
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,25		K/W
Inverter Switch										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0003	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}				8	25 125	1,6	1,87 2,20	2,1	V
Collector-emitter cut-off current 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 71		ns
Rise time	t_r					25 125		19 23		
Turn-off delay time	$t_{d(off)}$					25 125		194 236		
Fall time	t_f					25 125		79 108		
Turn-on energy loss	E_{on}					25 125		0,50 0,75		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 junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,57		K/W
Inverter Diode										
Diode forward voltage	V_F				10	25 125	1,35	1,70 1,66	2,05	V
Peak reverse recovery current	I_{RRM}	R_{gon} = 32 Ω	15	600	8	25 125		8,47 9,88		A
Reverse recovery time	t_{rr}					25 125		251 383		ns
Reverse recovered charge	Q_{rr}					25 125		0,89 1,57		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		84 69		A/μs
Reverse recovered energy	E_{rec}					25 125		0,34 0,63		mWs
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						2,07		K/W

Characteristic Values

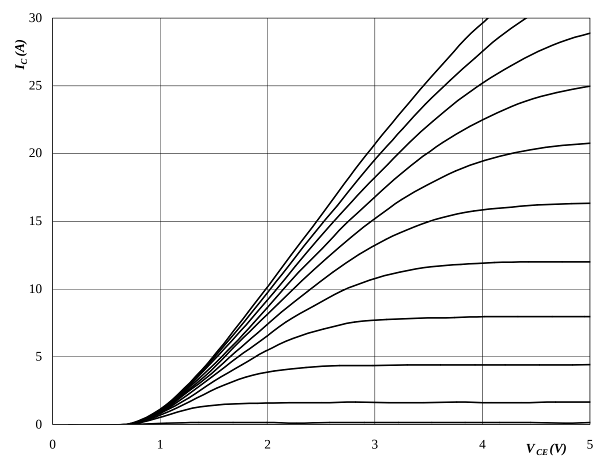
Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Brake Switch										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00015	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		4	25 125	1,6	1,96 2,17	2,1	V
Collector-emitter cut-off incl diode	I_{CES}		0	1200		25			500	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		93 90		
Rise time	t_r					25 125		19 24		ns
Turn-off delay time	$t_{d(off)}$	R_{goff} = 64 Ω R_{gon} = 64 Ω	15	600	4	25 125		184 226		
Fall time	t_f					25 125		71 99		
Turn-on energy loss	E_{on}					25 125		0,25 0,34		mWs
Turn-off energy loss	E_{off}					25 125		0,22 0,30		
Input capacitance	C_{ies}							250		
Output capacitance	C_{oss}	f = 1 MHz	0	25		25		25		pF
Reverse transfer capacitance	C_{rss}							15		
Gate charge	Q_G		15	960	4	25		26		nC
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						2,03		K/W
Brake Diode										
Diode forward voltage	V_F				4	25 125	1	1,91 1,84	2,35	V
Reverse leakage current	I_r			1200		25			250	µA
Peak reverse recovery current	I_{RRM}					25 125		4,22 4,65		A
Reverse recovery time	t_{rr}					25 125		268 446		ns
Reverse recovered charge	Q_{rr}	R_{gon} = 64 Ω	15	600	4	25 125		0,44 0,44		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		44 40		A/µs
Reverse recovery energy	E_{rec}					25 125		0,18 0,32		mWs
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						3,00		K/W
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1%				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1%				25		4000		K
Vincotech NTC Reference									I	

Inverter Charateristics

figure 1. **Inverter IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

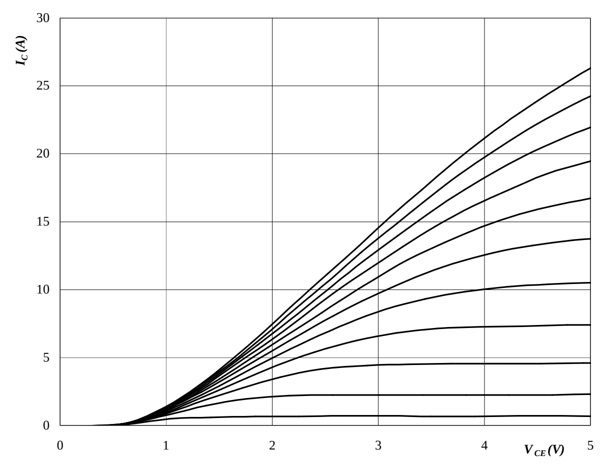
T_j = 25 °C

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

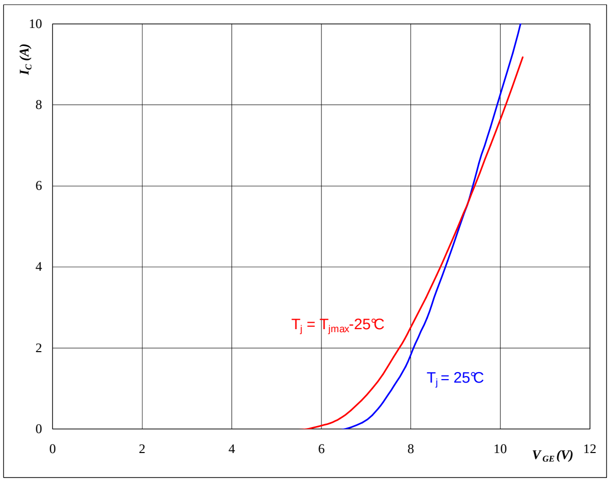
T_j = 125 °C

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

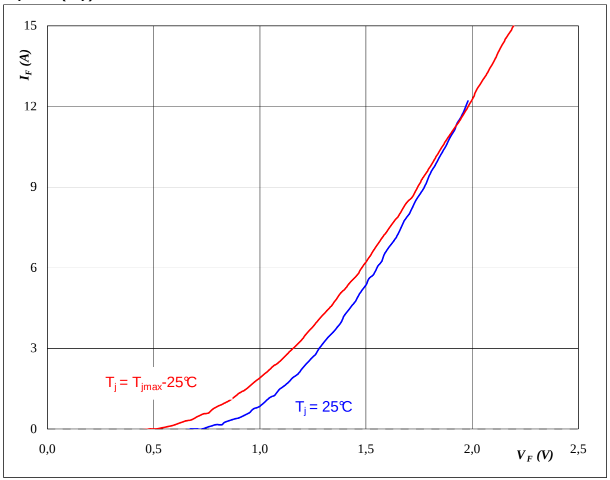
t_p = 250 µs

V_{CE} = 10 V

figure 4. **Inverter FWD**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

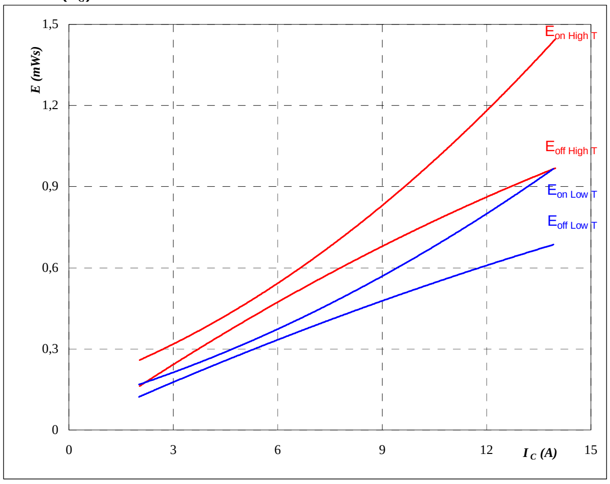
t_p = 250 µs

Inverter Charateristics

figure 5. **Inverter IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



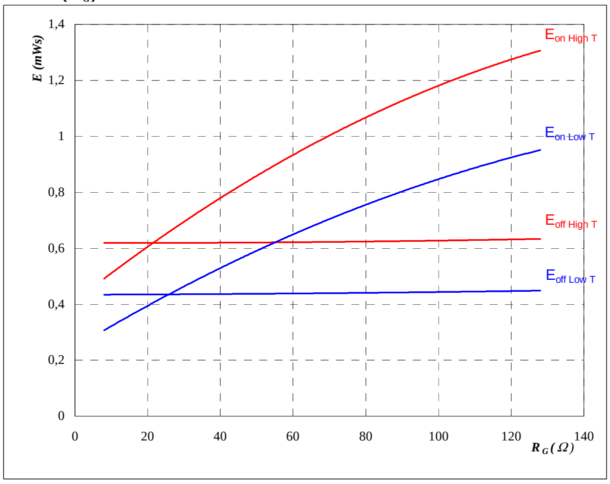
With an inductive load at

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

figure 6. **Inverter IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



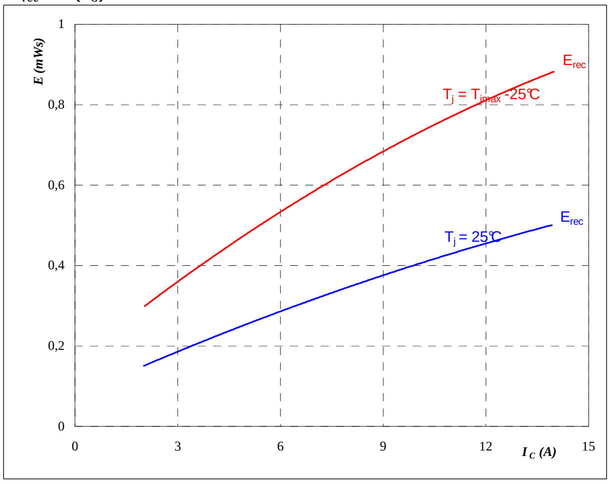
With an inductive load at

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

figure 7. **Inverter FWD**

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



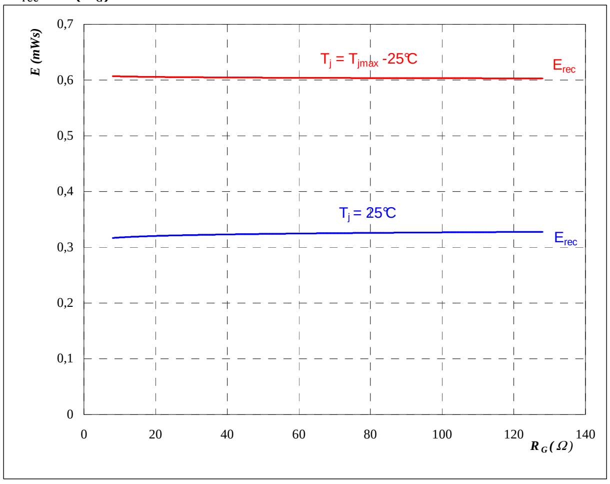
With an inductive load at

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

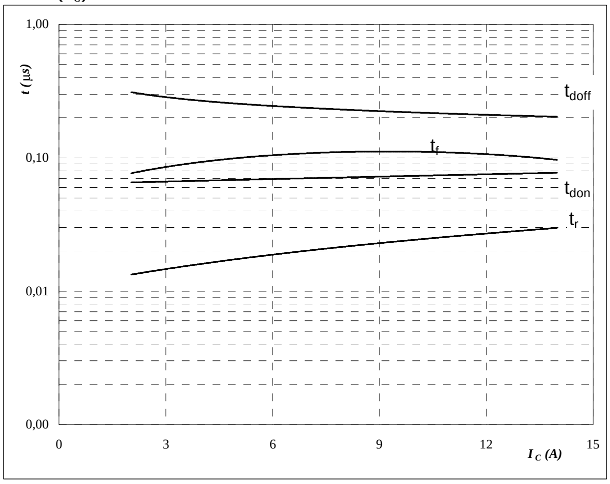
T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	8	A

Inverter Charateristics

figure 9. **Inverter IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



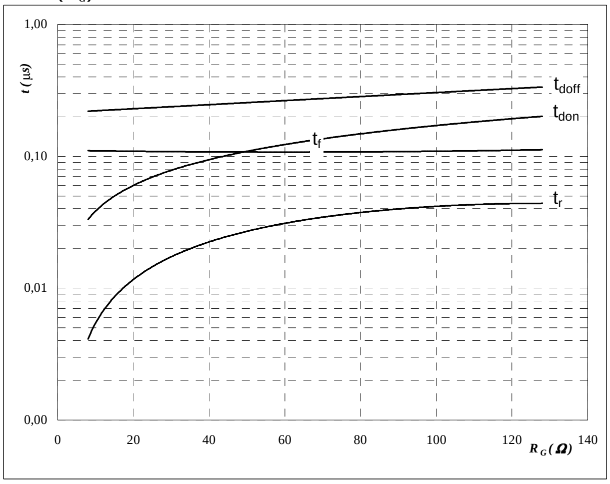
With an inductive load at

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

figure 10. **Inverter IGBT**

Typical switching times as a function of gate resistor

$t = f(R_G)$



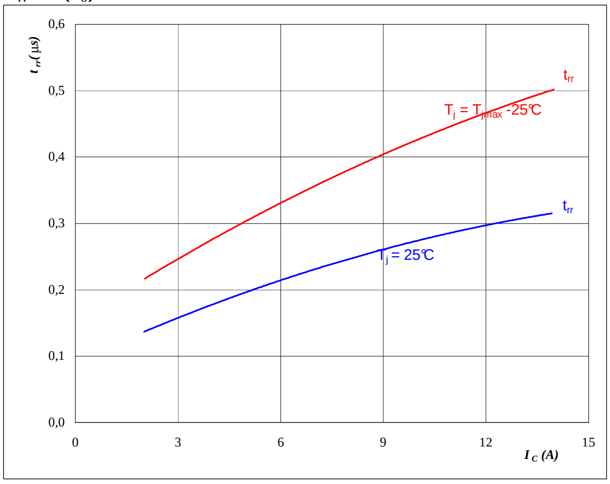
With an inductive load at

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

figure 11. **Inverter FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



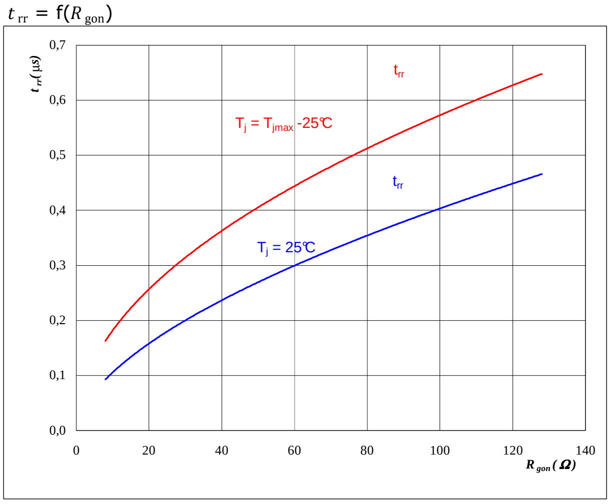
At

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

figure 12. **Inverter FWD**

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

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



At

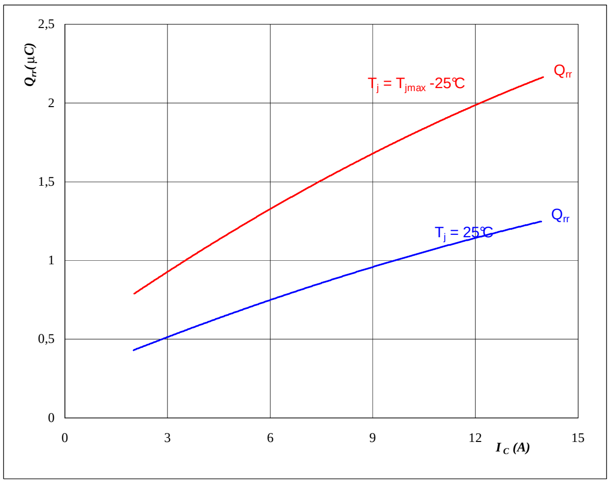
T_j =	25/125	°C
V_R =	600	V
I_F =	8	A
V_{GE} =	±15	V

Inverter Charateristics

figure 13. **Inverter FWD**

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



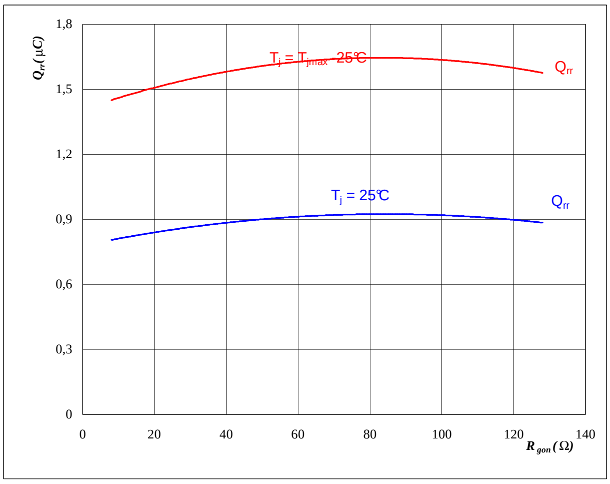
At

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

figure 14. **Inverter FWD**

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

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



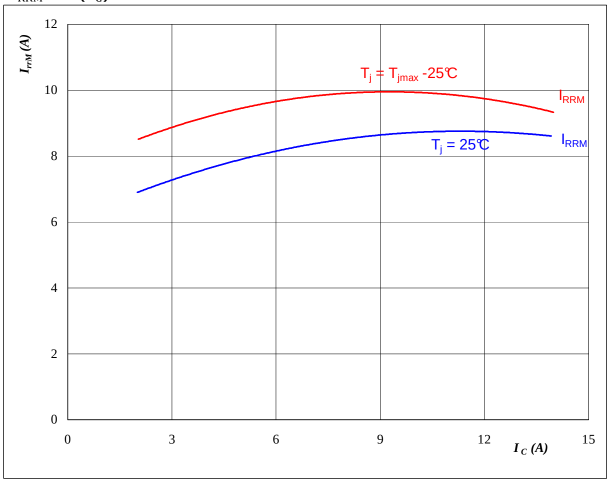
At

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

figure 15. **Inverter FWD**

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



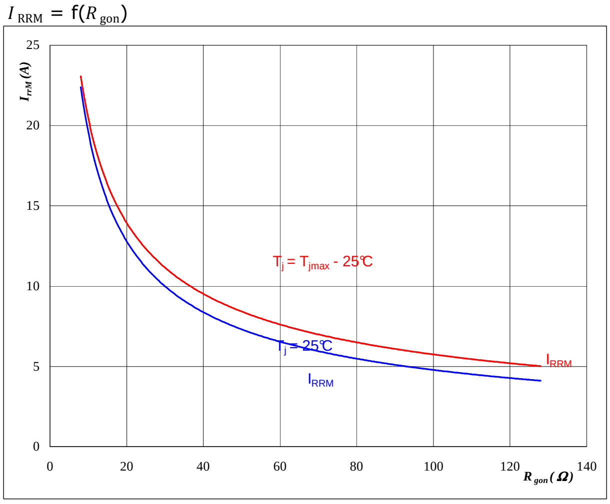
At

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

figure 16. **Inverter FWD**

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

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



At

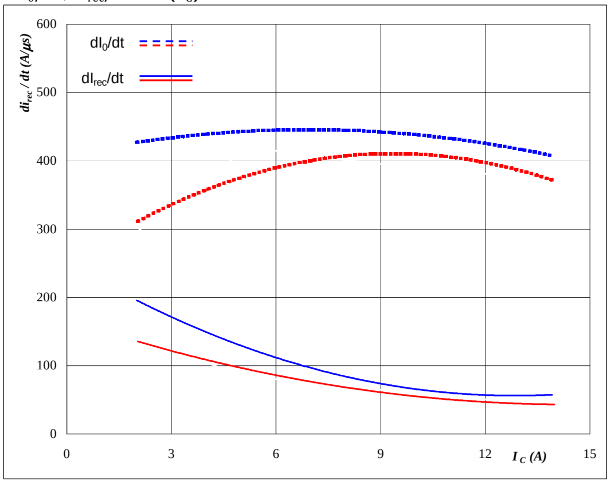
T_j =	25/125	°C
V_R =	600	V
I_F =	8	A
V_{GE} =	±15	V

Inverter Charateristics

figure 17. **Inverter FWD**

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

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



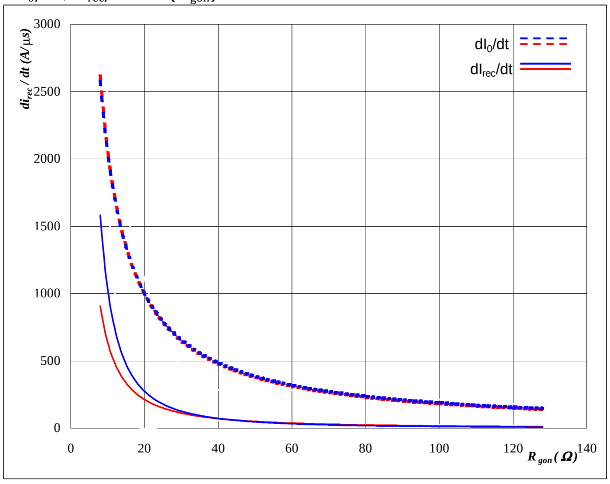
At

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

figure 18. **Inverter FWD**

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

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



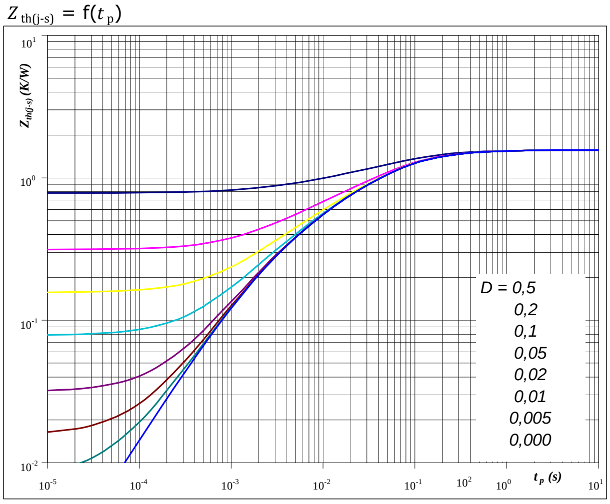
At

T_j =	25/125	°C
V_R =	600	V
I_F =	8	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	
$R_{th(j-s)}$ =	1,57	K/W

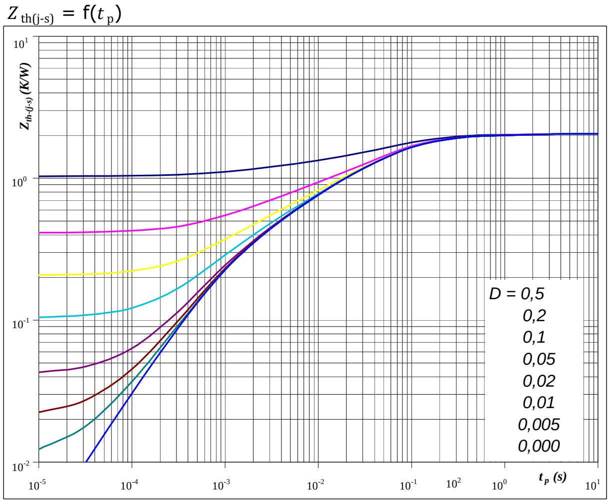
IGBT thermal model values

R (K/W)	Tau (s)
0,14	6,0E-01
0,63	7,7E-02
0,40	2,4E-02
0,29	6,2E-03
0,11	1,4E-03

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	
$R_{th(j-s)}$ =	2,07	K/W

FWD thermal model values

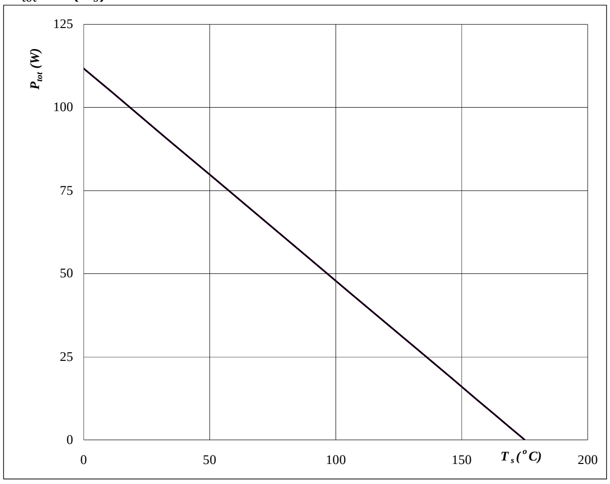
R (K/W)	Tau (s)
0,05	4,3E+00
0,16	5,0E-01
0,78	7,9E-02
0,53	2,7E-02
0,35	5,0E-03
0,20	9,1E-04

Inverter Charateristics

figure 21. **Inverter IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



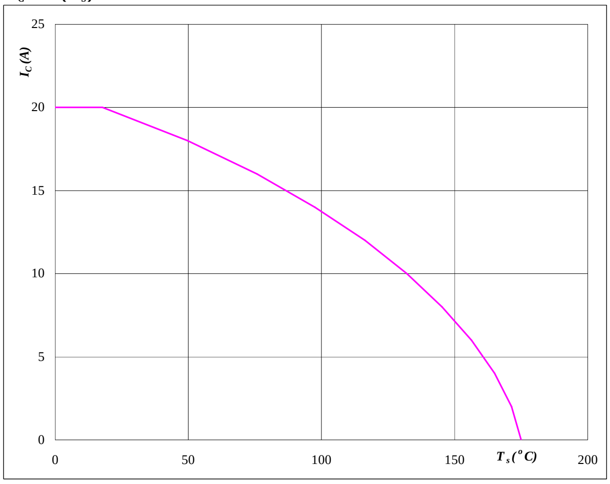
At

T_j = 175 °C

figure 22. **Inverter IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

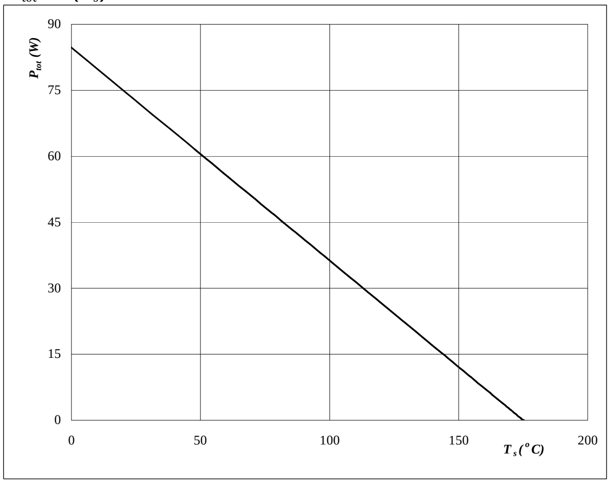
T_j = 175 °C

V_{GE} = 15 V

figure 23. **Inverter FWD**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



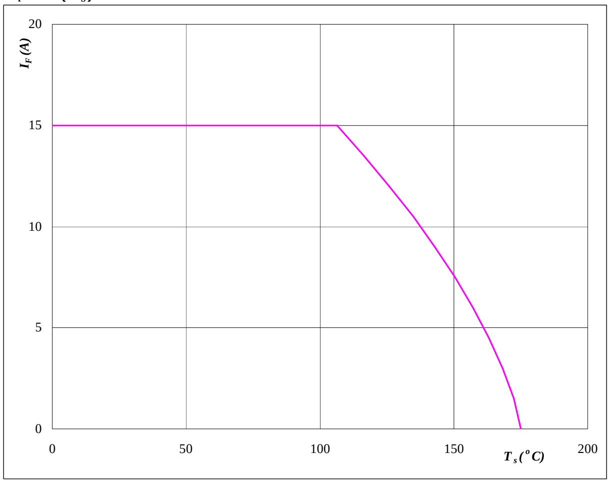
At

T_j = 175 °C

figure 24. **Inverter FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

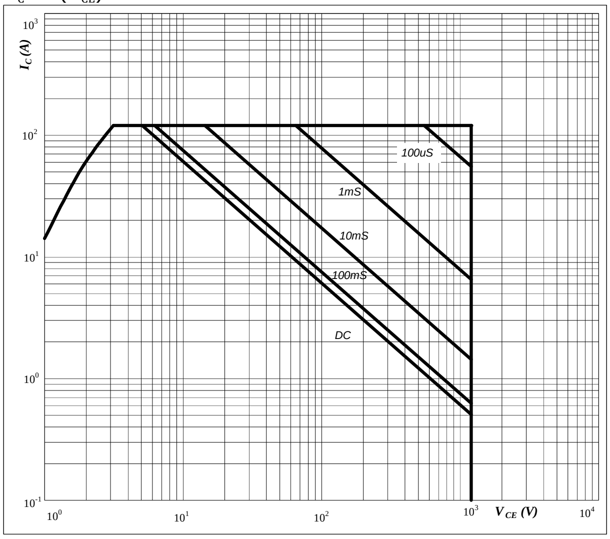
T_j = 175 °C

Inverter Charateristics

figure 25. **Inverter IGBT**

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



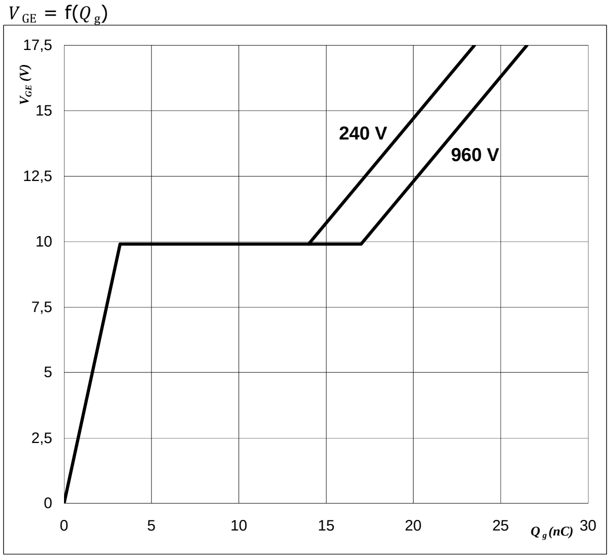
At

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

figure 26. **Inverter IGBT**

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



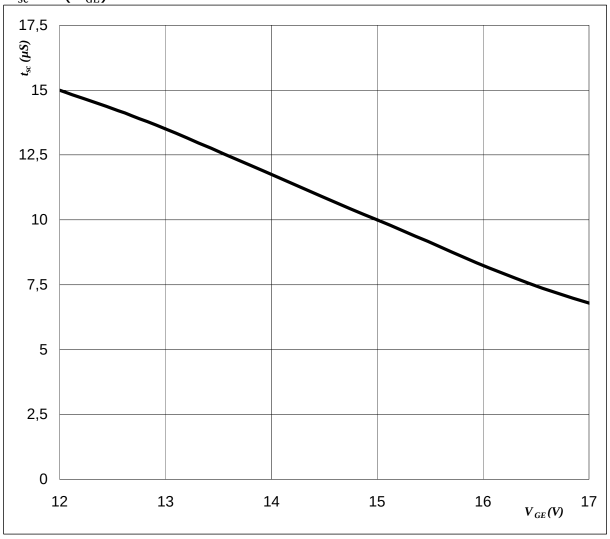
At

I_C =	8	A

figure 27. **Inverter IGBT**

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

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



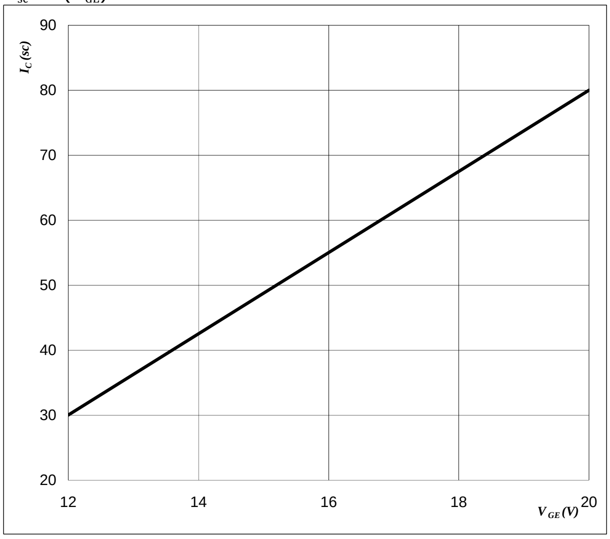
At

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

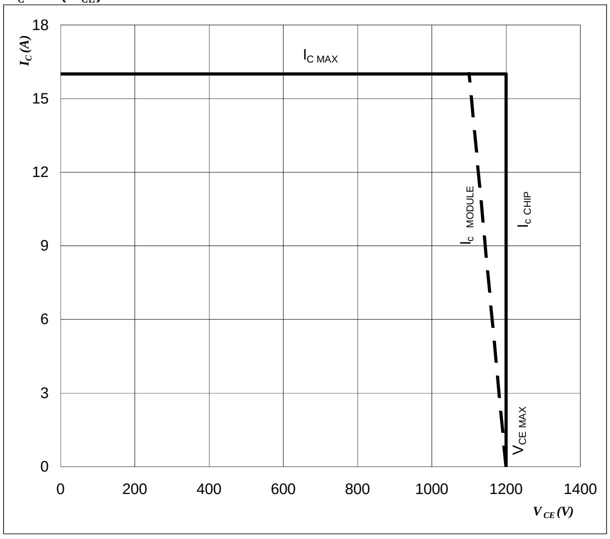
V_{CE} ≤	1200	V
T_j =	175	ºC

Inverter Charateristics

figure 29.	Inverter IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

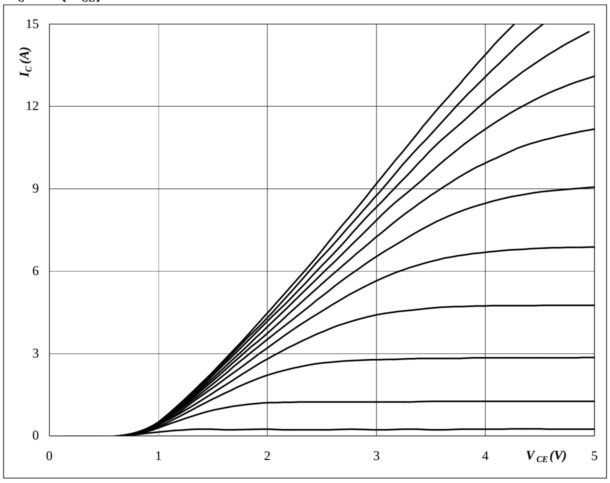
$T_j =$ T_{jmax}-25 ºC

Brake Charateristics

figure 1. **Brake IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

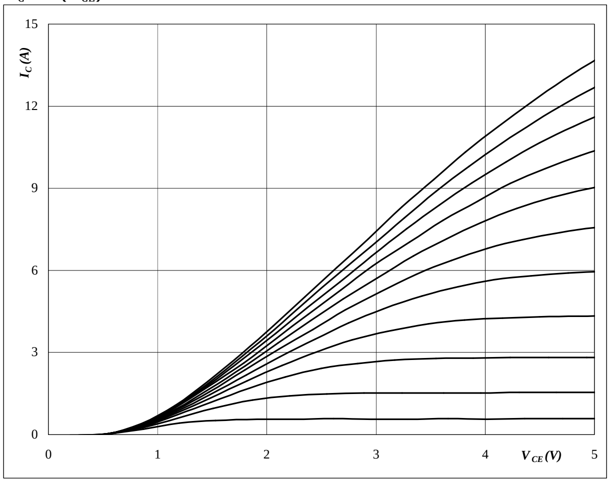
T_j = 25 °C

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

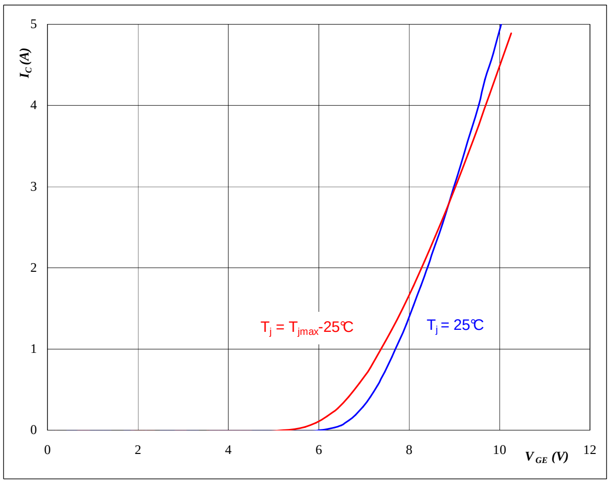
T_j = 125 °C

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

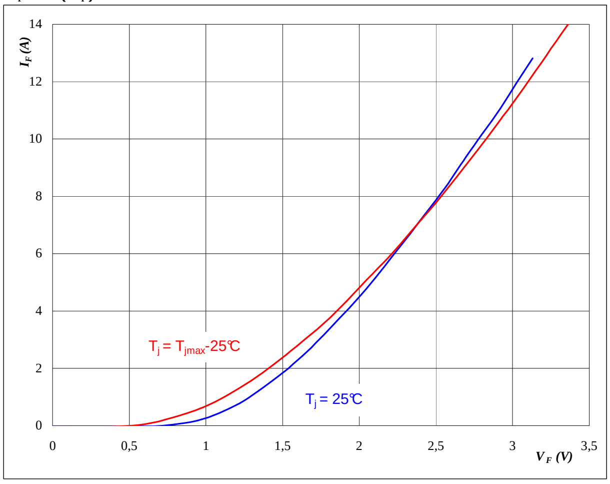
t_p = 250 µs

V_{CE} = 10 V

figure 4. **Brake FWD**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

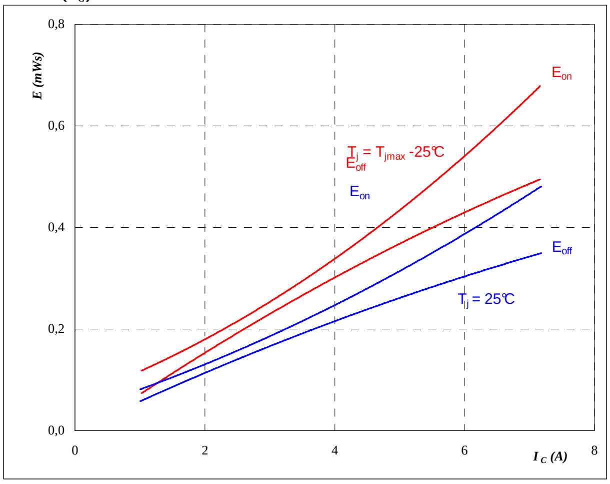
t_p = 250 µs

Brake Charateristics

figure 5. **Brake IGBT**

Typical switching energy losses
as a function of collector current

$E = f(I_C)$



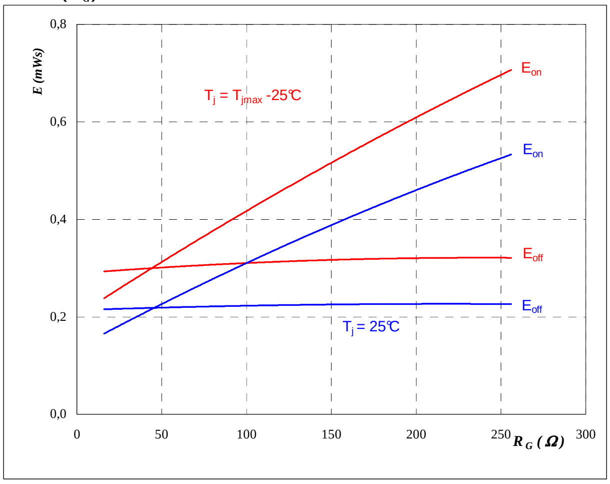
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	64	Ω
R_{goff} =	64	Ω

figure 6. **Brake IGBT**

Typical switching energy losses
as a function of gate resistor

$E = f(R_G)$



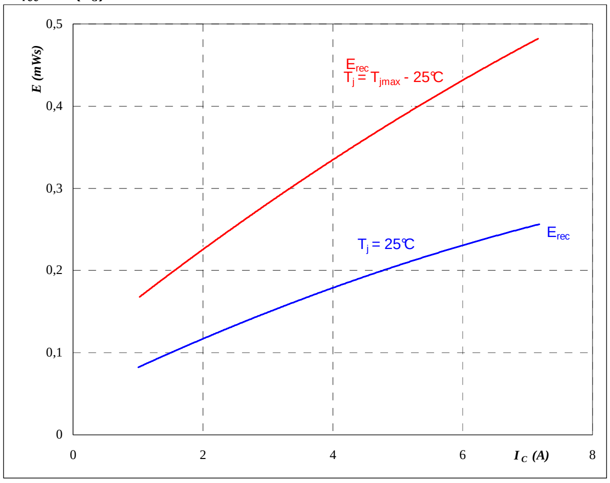
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	4	A

figure 7. **Brake FWD**

Typical reverse recovery energy loss
as a function of collector current

$E_{rec} = f(I_C)$



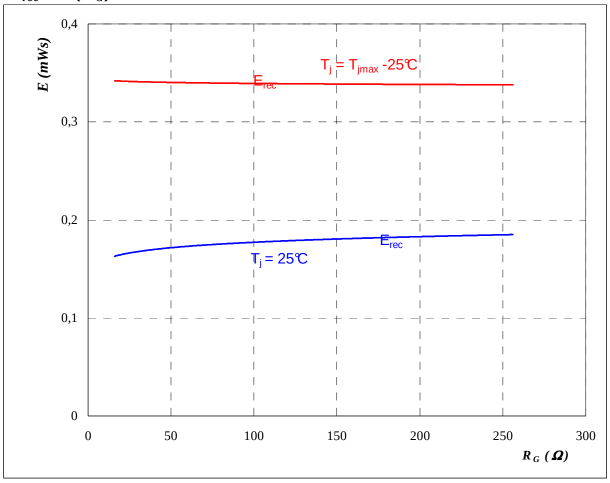
With an inductive load at

T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	64	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

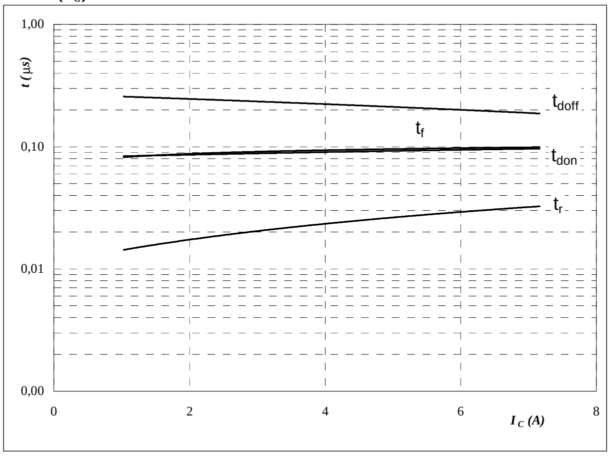
T_j =	25/125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	4	A

Brake Charateristics

figure 9.	Brake IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



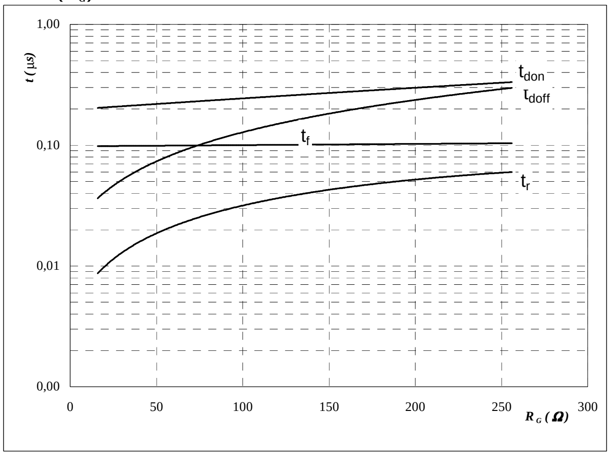
With an inductive load at

T_j =	125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	64	Ω
R_{goff} =	64	Ω

figure 10.	Brake IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



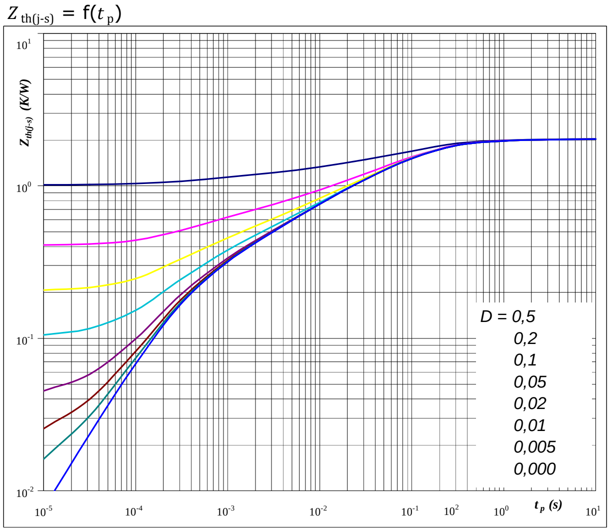
With an inductive load at

T_j =	125	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	4	A

figure 11.	Brake IGBT

IGBT transient thermal impedance as a function of pulse width

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



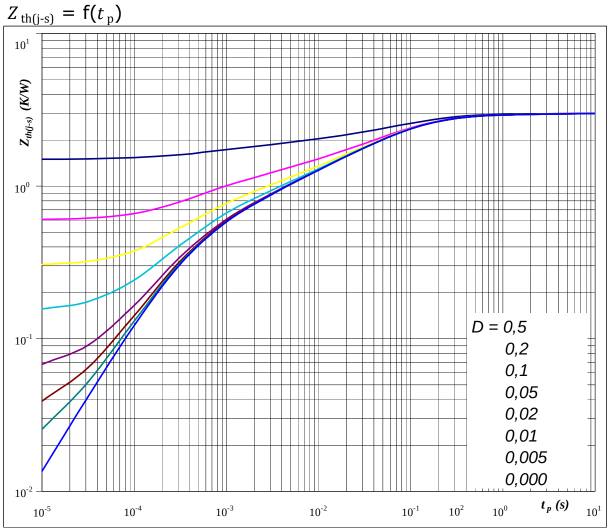
At $D = t_p / T$

$R_{th(j-s)}$ = 2,03 K/W

figure 12.	Brake FWD

FWD transient thermal impedance as a function of pulse width

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



At $D = t_p / T$

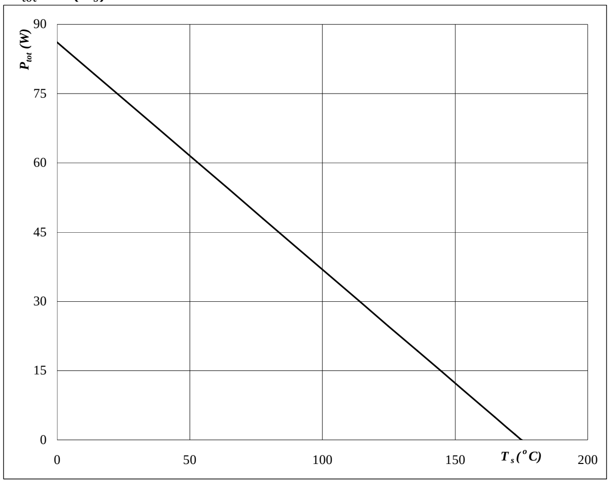
$R_{th(j-s)}$ = 3,00 K/W

Brake Charateristics

figure 13.	**Brake IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



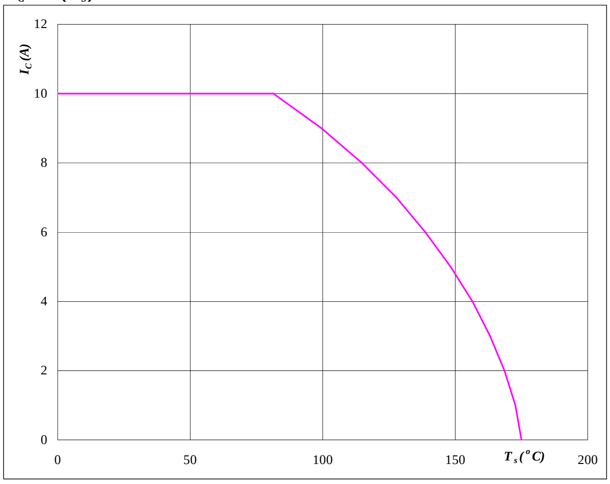
At

T_j = 175 ºC

figure 14.	**Brake IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

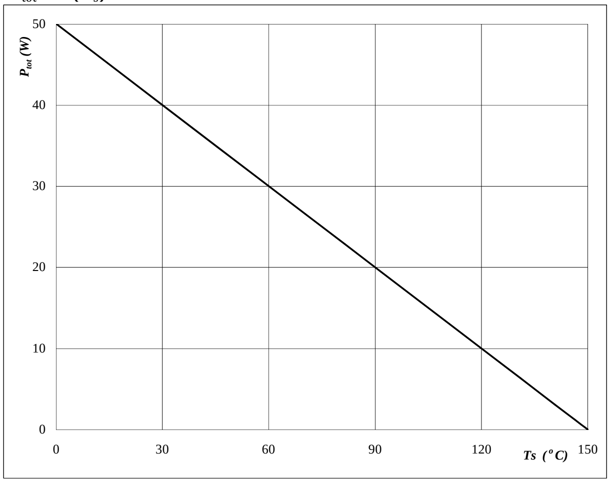
T_j = 175 ºC

V_{GE} = 15 V

figure 15.	**Brake FWD**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



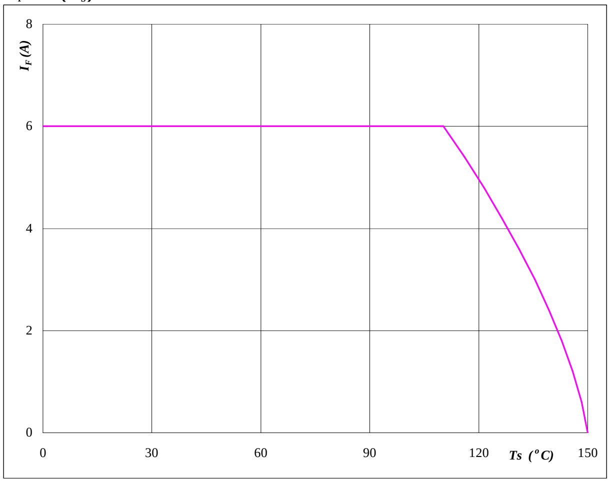
At

T_j = 150 ºC

figure 16.	**Brake FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

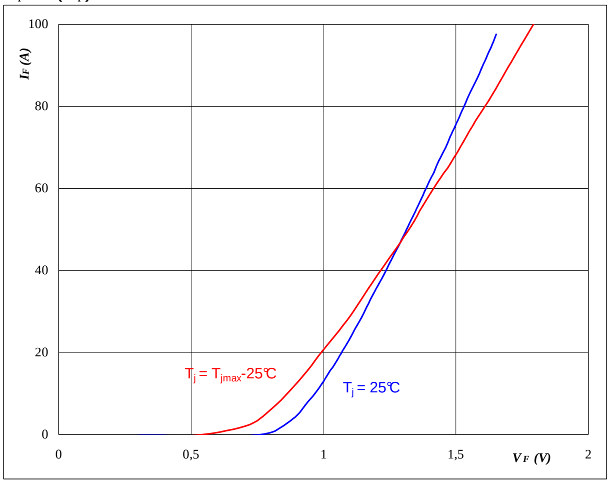
T_j = 150 ºC

Rectifier Charateristics

figure 1. **Rectifier Diode**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



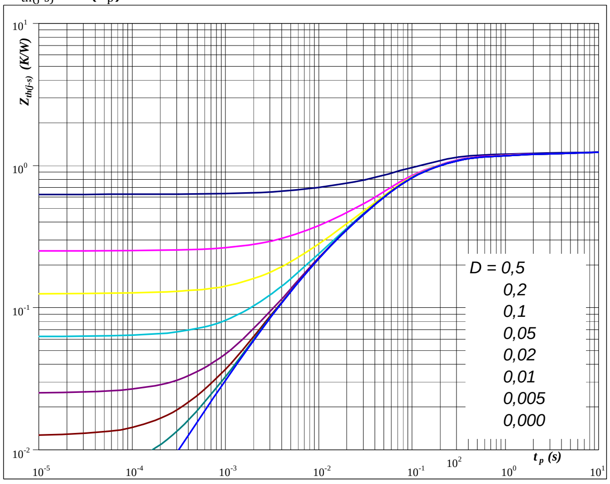
At

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 $D = t_p / T$

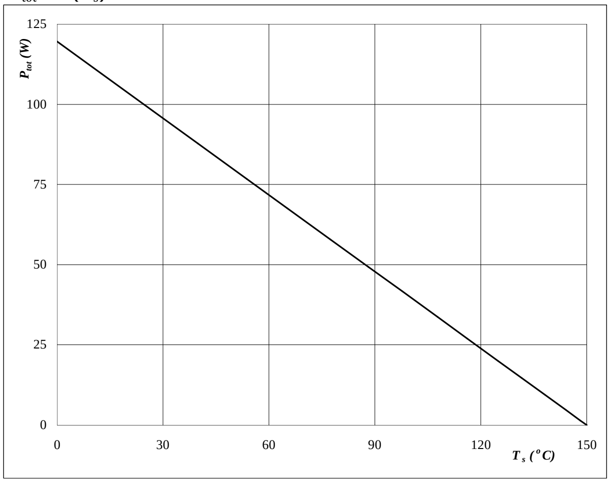
$D = t_p / T$

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

figure 3. **Rectifier Diode**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



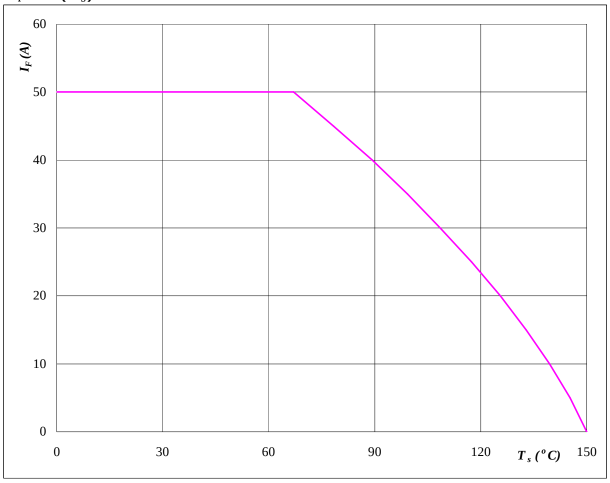
At

T_j = 150 ºC

figure 4. **Rectifier Diode**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



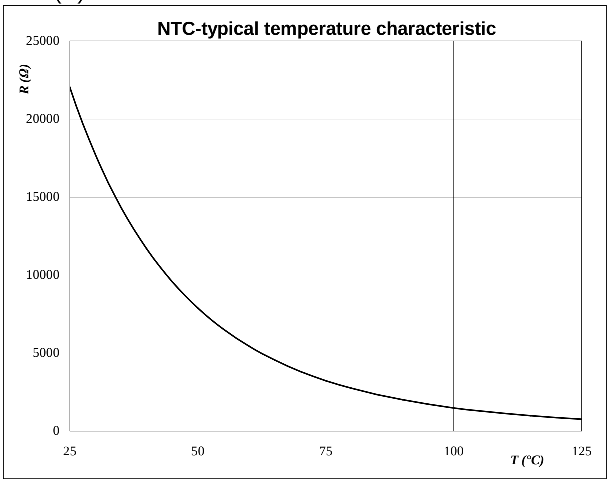
At

T_j = 150 ºC

Thermistor

figure 1.	Thermistor

Typical NTC characteristic
as a function of temperature
$R = \mathrm{f}(T)$



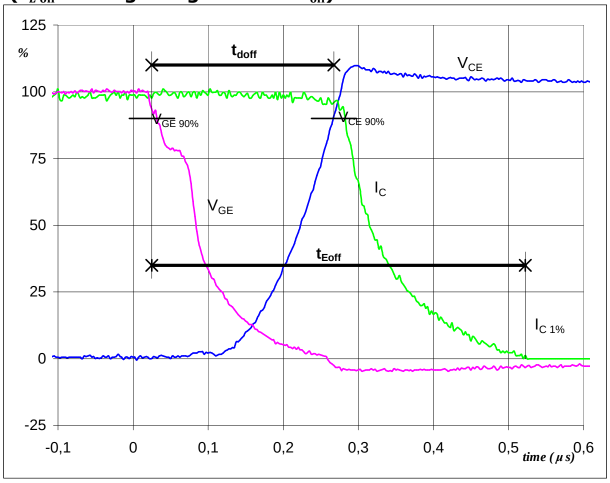
Inverter Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	32 Ω
R_{goff}	=	32 Ω

figure 1. **Inverter IGBT**

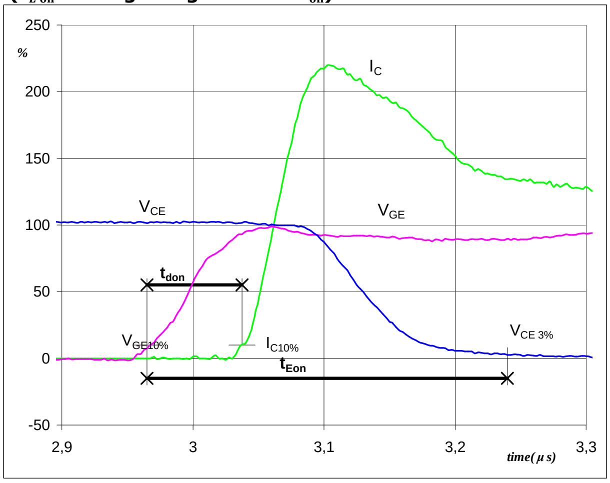
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	8	A
t_{doff} =	0,24	μs
$t_{E\,off}$ =	0,50	μs

figure 2. **Inverter IGBT**

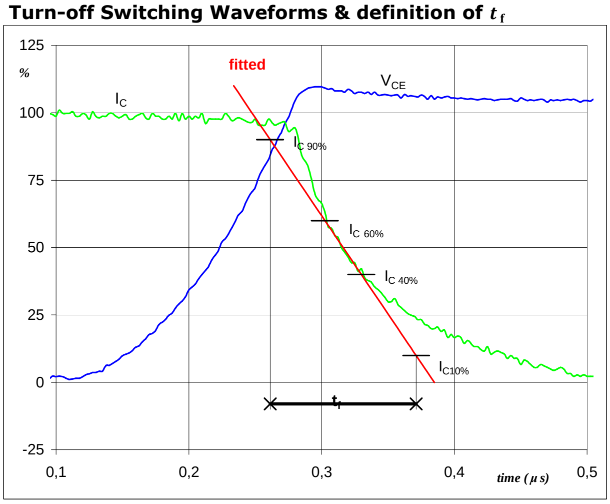
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	8	A
t_{don} =	0,07	μs
$t_{E\,on}$ =	0,27	μs

figure 3. **Inverter IGBT**

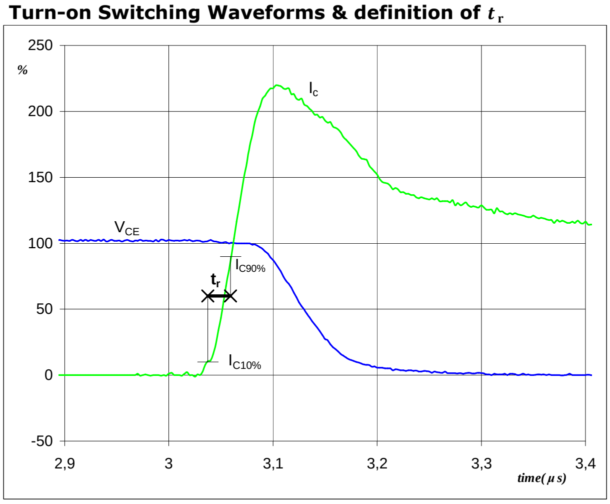
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	600	V
I_C (100%) =	8	A
t_f =	0,11	μs

figure 4. **Inverter IGBT**

Turn-on Switching Waveforms & definition of t_r

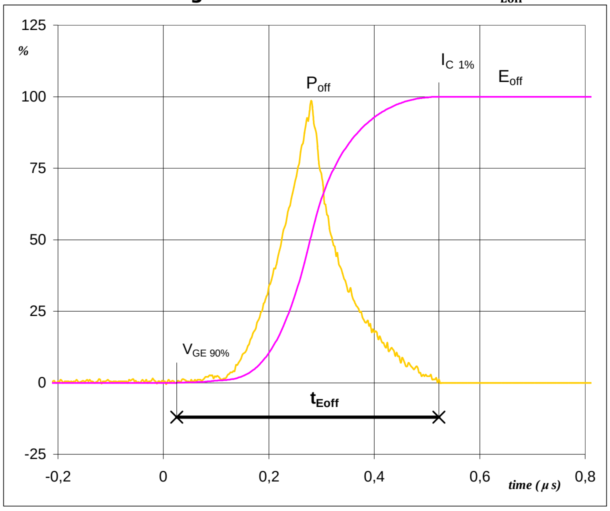


V_C (100%) =	600	V
I_C (100%) =	8	A
t_r =	0,02	μs

Inverter Switching Definitions

figure 5. **Inverter IGBT**

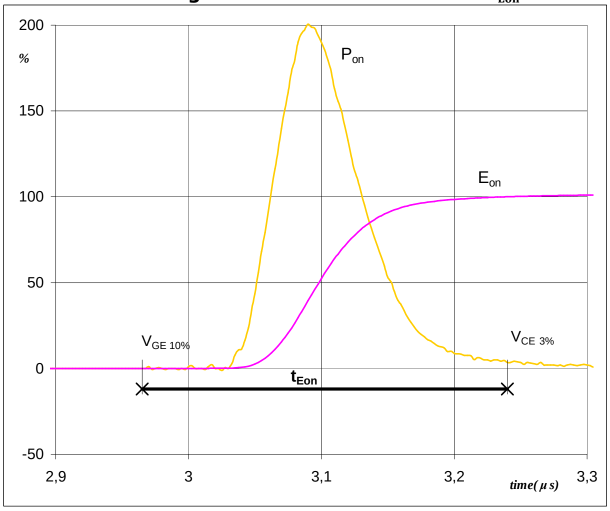
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	4,93	kW
E_{off} (100%) =	0,62	mJ
$t_{E\,off}$ =	0,50	µs

figure 6. **Inverter IGBT**

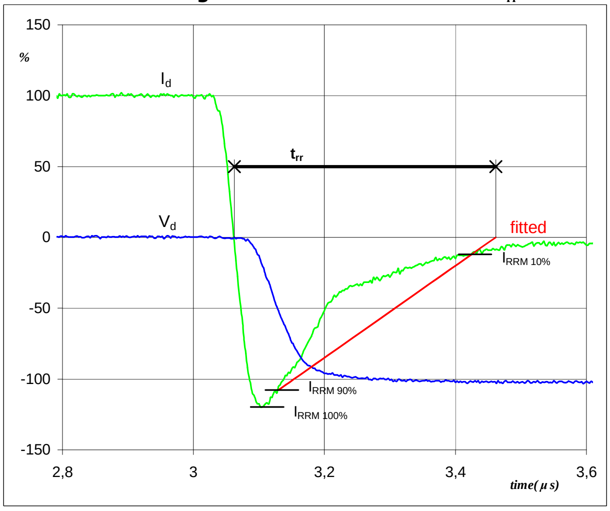
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	4,93	kW
E_{on} (100%) =	0,75	mJ
$t_{E\,on}$ =	0,27	µs

figure 7. **Inverter FWD**

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

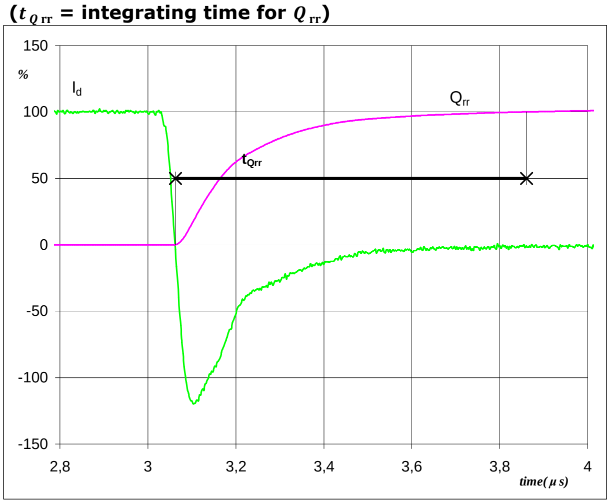


V_d (100%) =	600	V
I_d (100%) =	8	A
I_{RRM} (100%) =	-10	A
t_{rr} =	0,38	µs

Inverter Switching Definitions

figure 8. **Inverter FWD**

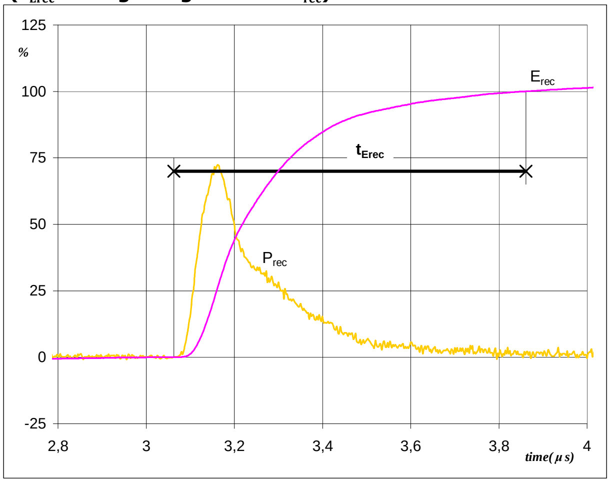
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	8	A
Q_{rr} (100%) =	1,57	µC
$t_{Q rr}$ =	0,80	µs

figure 9. **Inverter FWD**

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



P_{rec} (100%) =	4,93	kW
E_{rec} (100%) =	0,63	mJ
$t_{E rec}$ =	0,80	µs

Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

Version	Ordering Code
with brake without thermal paste 12 mm housing	V23990-P849-A58-PM
without brake without thermal paste 12 mm housing	V23990-P849-C58-PM
with brake without thermal paste 17 mm housing	V23990-P849-A59-PM
with brake without thermal paste with press-fit pins 17 mm housing	V23990-P849-A59Y-PM
without brake without thermal paste 17 mm housing	V23990-P849-C59-PM
with brake with thermal paste 12 mm housing	V23990-P849-A58-/3/-PM
without brake with thermal paste 12 mm housing	V23990-P849-C58-/3/-PM
with brake with thermal paste 17 mm housing	V23990-P849-A59-/3/-PM
with brake with thermal paste with press-fit pins 17 mm housing	V23990-P849-A59Y-/3/-PM
without brake with thermal paste 17 mm housing	V23990-P849-C59-/3/-PM

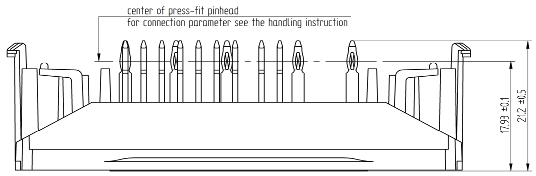
VIN WWYY
NNNNNNNVV UL
LLLLL SSSS

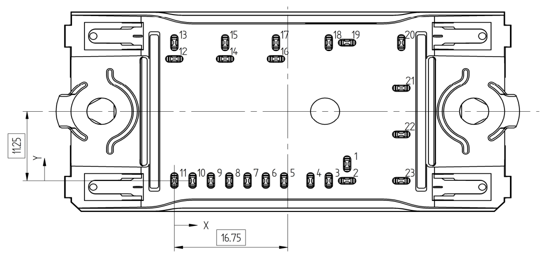
Text	VIN	Name&Ver		UL	Lot	Serial
	VIN	NNNNNNNNNVV		UL	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

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
P849-A5*	-
P849-C5*	4,5,20

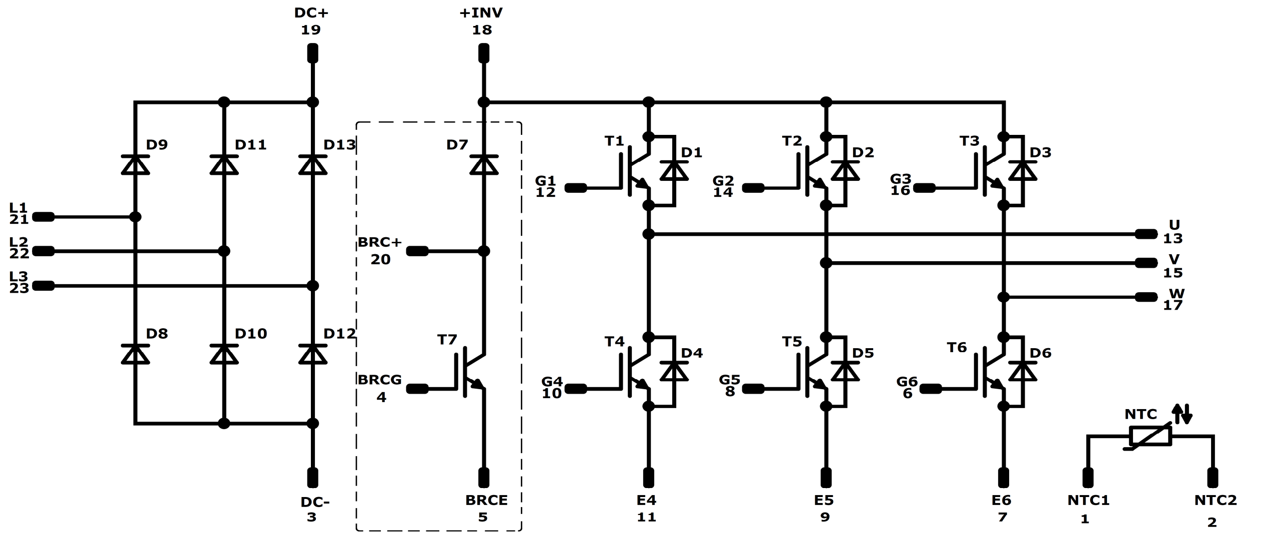




Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Ordering Code and Marking - Outline - Pinout

Pinout



Identification					
ID	**Component**	**Voltage**	**Current**	**Function**	**Comment**
T1-T6	IGBT	1200 V	8 A	Inverter Switch	
D1-D6	FWD	1200 V	10 A	Inverter Diode	
T7	IGBT	1200 V	4 A	Brake Switch	
D7	FWD	1200 V	4 A	Brake Diode	
D8-D13	Diode	1200 V	35 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.

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
V23990-P849-x5x-D8-14	20 Jul. 2017	NTC values, press-fit version	

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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.