V23990-P649-G/H-PM

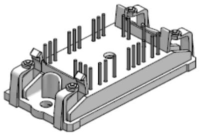
preliminary datasheet

flowCON 0 1200V / 50A

Features

- Input rectifier
- Optionally with brake chopper
- Vincotech clip-in housing

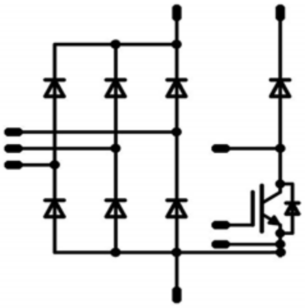
flow0 housing



Target Applications

- Motor drives
- UPS

Schematic



Types

- V23990-P649-G-PM with brake choper
- V23990-P649-H-PM without brake chopper

Maximum Ratings

Parameter	Symbol	Condition			Value	Unit
Input Rectifier Diode						
Repetitive peak reverse voltage	V_{RRM}	Tj=Tjmax			1600	V
Forward current per diode	I_{FAV}	DC current	T_j=$T_j$max	T_h=80°C	50	A
Surge forward current	I_{FSM}	t_p=10ms	half sine wave	T_j=45°C	600	A
I^2t-value	I^2t				1800	A^2s
Power dissipation per Diode	P_{tot}	T_j=$T_j$max		T_h=80°C	60	W
Maximum junction temperature	$T_j$max				150	°C

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Transistor BRC				
Collector-emitter break down voltage	V_{CE}		1200	V
DC collector current	I_C	$T_j=T_j$max $T_h=80°C$	25	A
Repetitive peak collector current	I_{cpuls}	t_p limited by $T_j$max	75	A
Power dissipation per IGBT	P_{tot}	$T_j=T_j$max $T_h=80°C$	57	W
Gate-emitter peak voltage	V_{GE}		±20	V
Short circuit ratings*	t_{SC} V_{CC}	$T_j≤150°C$ $V_{GE}=15V$	10 1200	µs V
Maximum junction temperature	$T_j$max		150	°C
BRC inverse diode				
Peak Repetitive Reverse Voltage	V_{RRM}	Tj=25°C	1200	V
DC forward current	I_F	$T_j=T_j$max $T_h=80°C$	6	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	6	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max $T_h=80°C$	18	W
Maximum junction temperature	$T_j$max		150	°C
Diode BRC				
Peak Repetitive Reverse Voltage	V_{RRM}	Tj=25°C	1200	V
DC forward current	I_F	$T_j=T_j$max $T_h=80°C$	15	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	30	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max $T_h=80°C$	33	W
Maximum junction temperature	$T_j$max		150	°C
Thermal properties				
Storage temperature	T_{stg}		-40...+125	°C
Operation temperature	T_{op}		-40...+110	°C

* It is recommended to not exceed 1000 short circuit situations in the lifetime of the module and to allow at least 1s between short circuits

Maximum Ratings

Parameter	Symbol	Condition		Value	Unit
Insulation properties					
Insulation voltage	V_{is}	t=2 s	Dc voltage	4000	V
Creepage distance				min 12.7	mm
Clearance				min 12.7	mm

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(°C)**	**Min**	**Typ**	**Max**	
Input Rectifier Bridge										
Forward voltage	V_F				50	Tj=25°C Tj=125°C	1	1,14 1,09	1,5	V
Threshold voltage (for power loss calc. only)	V_{to}					Tj=25°C Tj=125°C		0,90 0,77		V
Slope resistance (for power loss calc. only)	r_t					Tj=25°C Tj=125°C		5 7		mΩ
Reverse leakage current	I_r			1500		Tj=25°C Tj=125°C			0,02 3	mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness ≤50um λ= 0.61W/mK						1,17		K/W
Thermal resistance chip to case per chip	R_{thJC}							n.A.		K/W
Transistor BRC										
Gate emitter threshold voltage	$V_{GE(th)}$	VCE=VGE			0,001	Tj=25°C Tj=125°C	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		25	Tj=25°C Tj=125°C	1,3	1,63 1,84	2,2	V
Collector-emitter cut-off	I_{CES}		0	1200		Tj=25°C Tj=125°C			0,25	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25°C Tj=125°C			650	nA
Integrated Gate resistor	R_{gint}							8		Ω
Turn-on delay time	$t_{d(on)}$	Rgon=32Ohm Rgoff=16Ohm	15	600	25	Tj=25°C Tj=125°C		53		ns
Rise time	t_r					Tj=25°C Tj=125°C		21		ns
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=125°C		617		ns
Fall time	t_f					Tj=25°C Tj=125°C		183		ns
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		1,97		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		2,85		mWs
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25°C		1,808		nF
Output capacitance	C_{oss}							0,095		nF
Reverse transfer capacitance	C_{rss}							0,082		nF
Gate charge	Q_{Gate}		15	960	25	Tj=25°C		155		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness ≤50um λ= 0.61W/mK						1,24		K/W
Thermal resistance chip to case per chip	R_{thJC}							n.A.		K/W

Characteristic Values

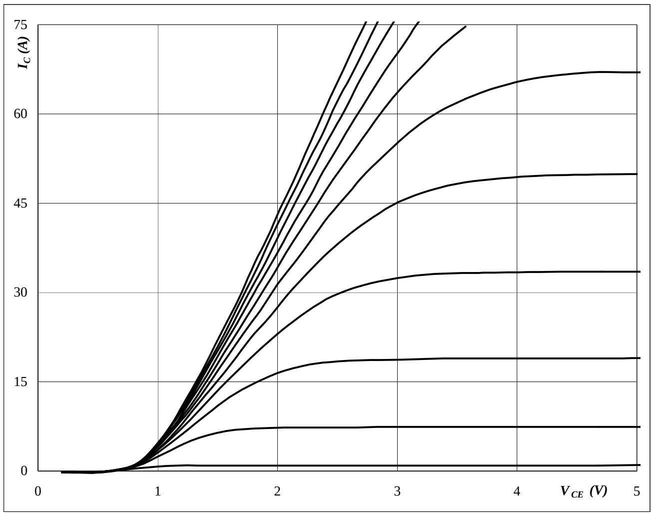
Parameter	Symbol	Conditions					Value			Unit
			V_{GE}(V) or V_{GS}(V)	V_r(V) or V_{CE}(V) or V_{DS}(V)	I_C(A) or I_F(A) or I_D(A)	T(°C)	Min	Typ	Max	
BRC inverse diode										
Diode forward voltage	V_F				3	Tj=25°C Tj=125°C	1	1,65 1,58	2,3	V
Reverse leakage current	I_r			1200		Tj=25°C Tj=125°C			250	µA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness ≤50um λ= 0.61W/mK						3,8		K/W
Thermal resistance chip to case per chip	R_{thJC}							n.A.		K/W
Diode BRC										
Diode forward voltage	V_F				25	Tj=25°C Tj=125°C	1	1,75 1,69	2,4	V
Reverse leakage current	I_r			1200		Tj=25°C Tj=125°C			250	µA
Peak reverse recovery current	I_{RRM}	Rgon=32Ohm Rgoff=16Ohm	15	600	25	Tj=25°C Tj=125°C		44,2		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		196		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		3,44		µC
Peak rate of fall of reverse recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		2371		A/µs
Reverse recovery energy	E_{rec}					Tj=25°C Tj=125°C		1,34		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness ≤50um λ= 0.61W/mK						2,11		K/W
Thermal resistance chip to case per chip	R_{thJC}							n.A.		K/W

Brake

Figure 1 Brake IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

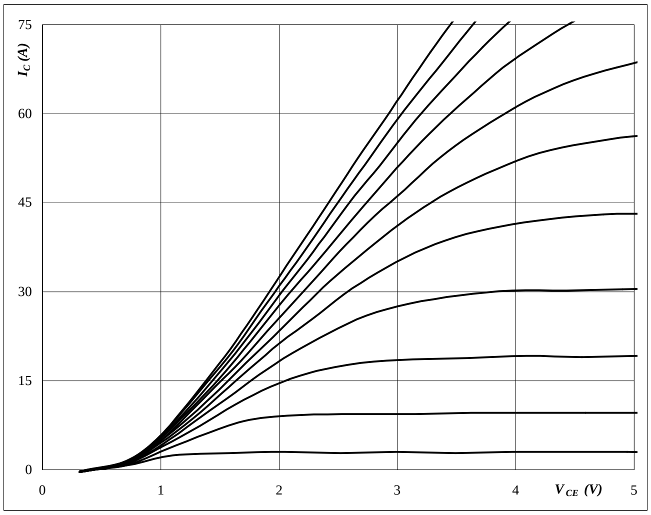
T_j = 25 °C

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

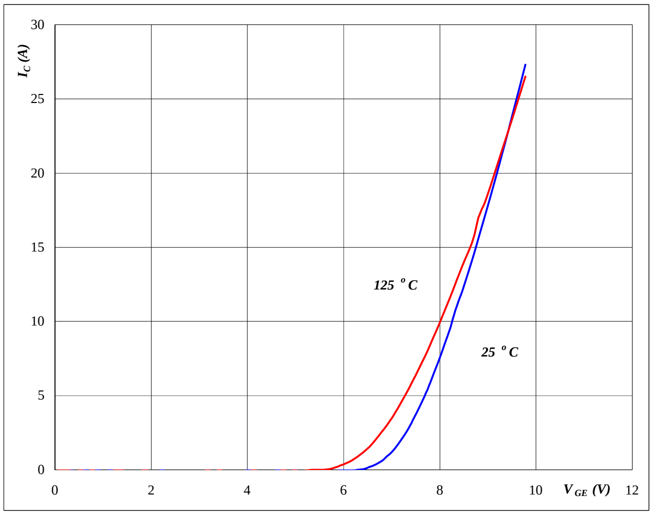
T_j = 125 °C

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

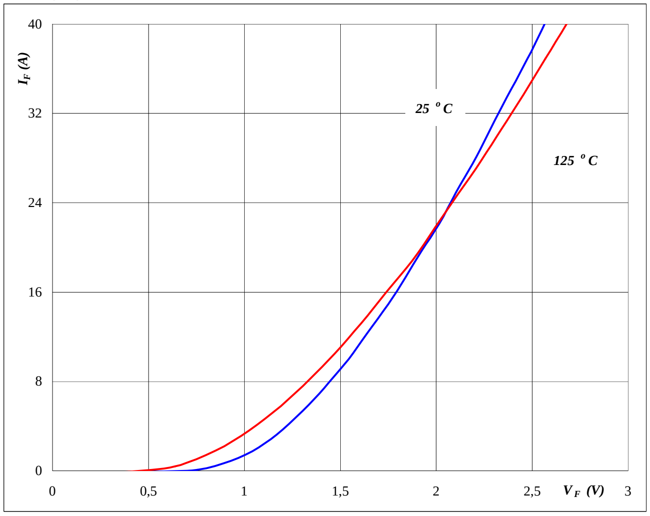
t_p = 250 µs

V_{CE} = 10 V

Figure 4 Brake FRED

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



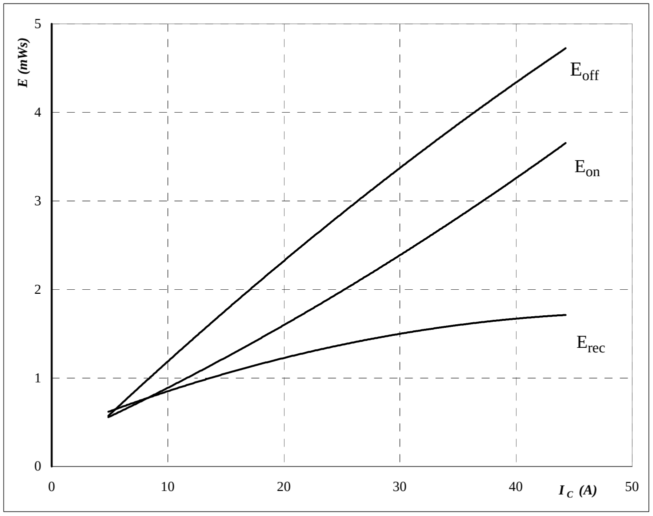
At

t_p = 250 µs

Brake

Figure 5 Brake IGBT

Typical switching energy losses
as a function of collector current
$E = f(I_C)$

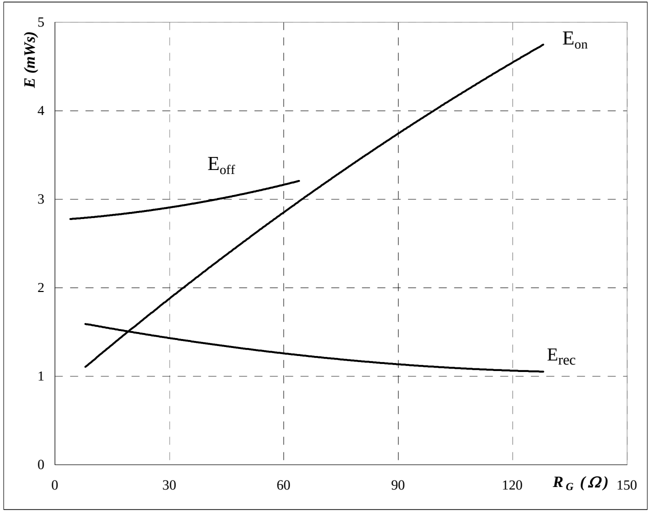


With an inductive load at

T_j = 125 °C
V_{CE} = 600 V
V_{GE} = 15 V
R_{gon} = 32 Ω
R_{goff} = 16 Ω

Figure 6 Brake IGBT

Typical switching energy losses
as a function of gate resistor
$E = f(R_G)$

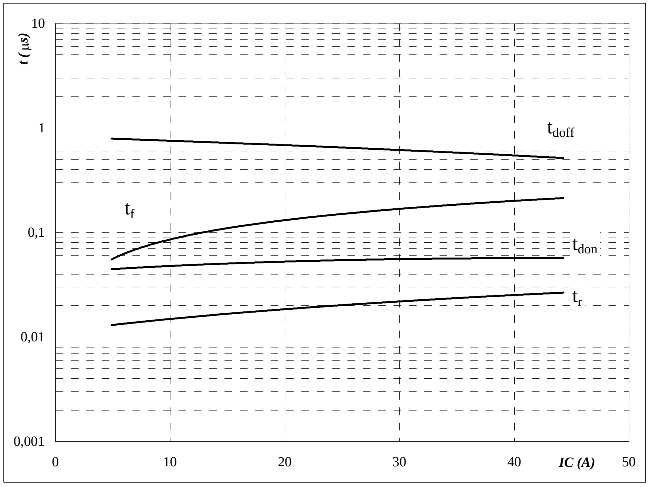


With an inductive load at

T_j = 125 °C
V_{CE} = 600 V
V_{GE} = 15 V
I_C = 24 A

Figure 7 Brake IGBT

Typical switching times as a
function of collector current
$t = f(I_C)$

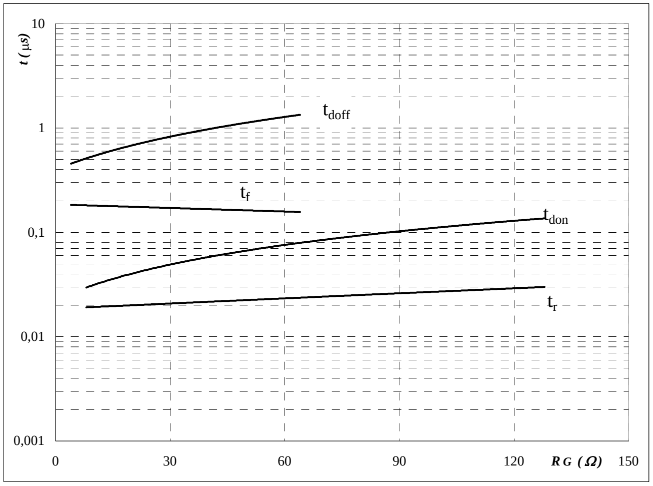


With an inductive load at

T_j = 125 °C
V_{CE} = 600 V
V_{GE} = 15 V
R_{gon} = 32 Ω
R_{goff} = 16 Ω

Figure 8 Brake IGBT

Typical switching times as a
function of gate resistor
$t = f(R_G)$



With an inductive load at

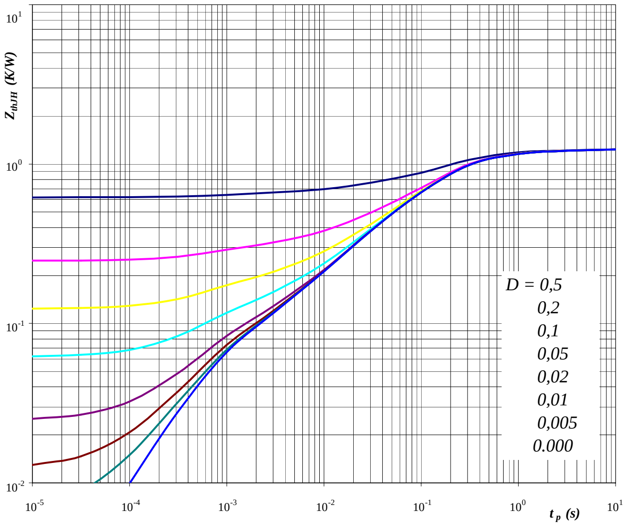
T_j = 125 °C
V_{CE} = 600 V
V_{GE} = 15 V
I_C = 24 A

Brake

Figure 9

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



With

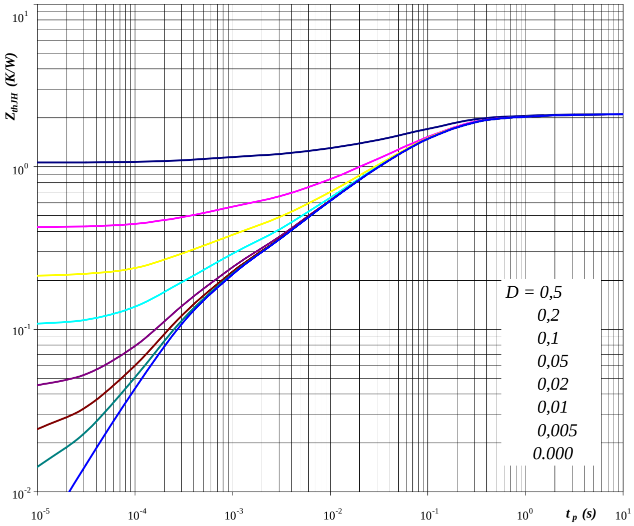
D = tp / T

R_{thJH} = 1,24 K/W

Figure 10

FRED transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



With

D = tp / T

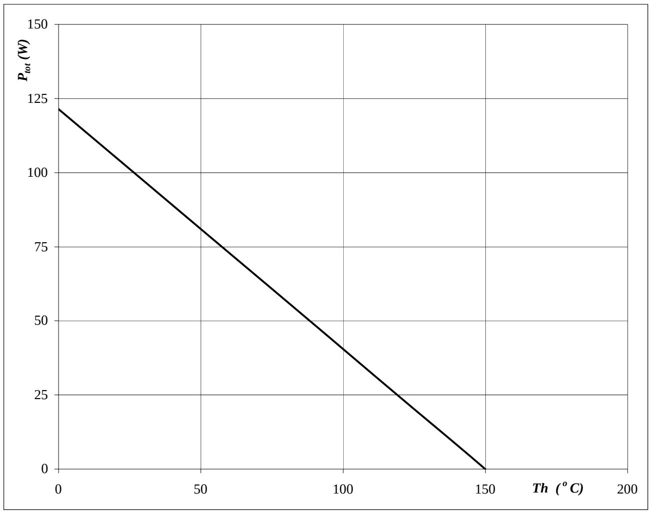
R_{thJH} = 2,11 K/W

Brake

Figure 11 Brake IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$

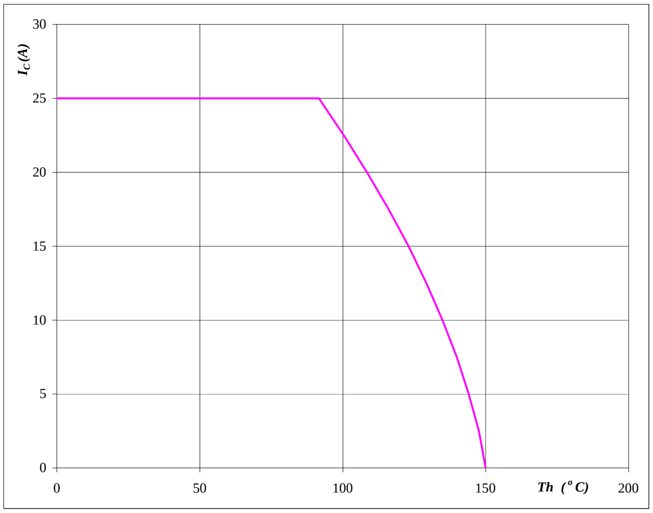


At
T_j = 150 ºC

Figure 12 Brake IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$

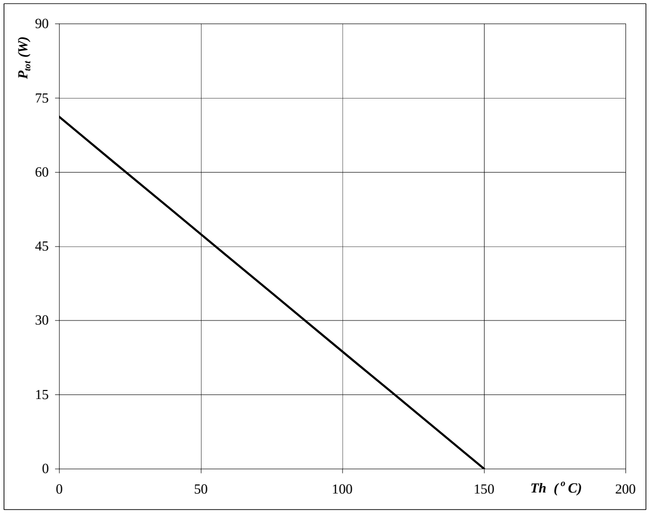


At
T_j = 150 ºC
V_{GE} = 15 V

Figure 13 Brake FRED

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$

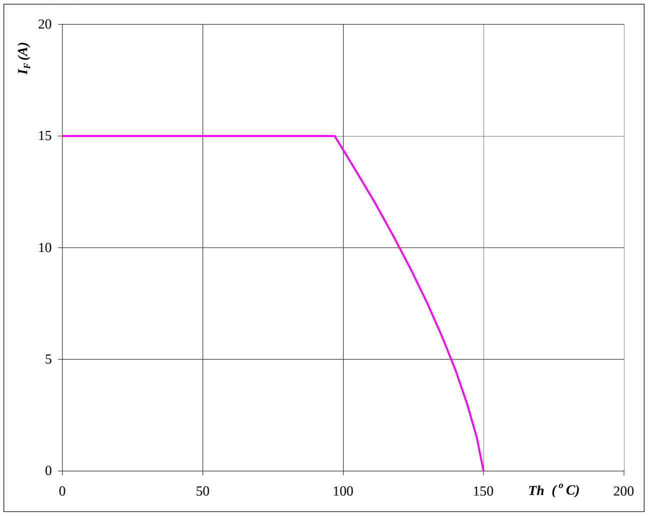


At
T_j = 150 ºC

Figure 14 Brake FRED

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



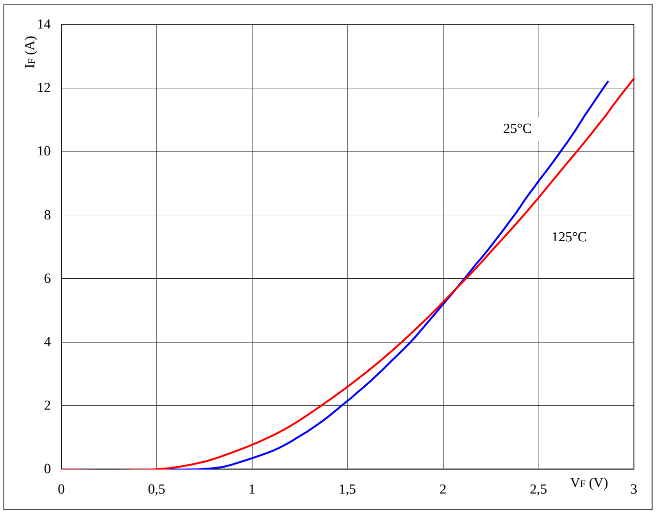
At
T_j = 150 ºC

Brake Inverse Diode

Figure 1 Brake inverse diode

Typical diode forward current as
a function of forward voltage

$I_F = f(V_F)$



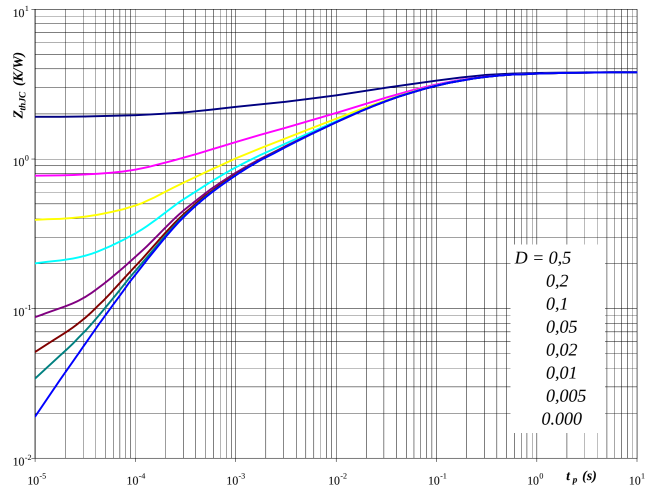
At

t_p = 250 µs

Figure 2 Brake inverse diode

Diode transient thermal impedance
as a function of pulse width

$Z_{thJH} = f(t_p)$



With

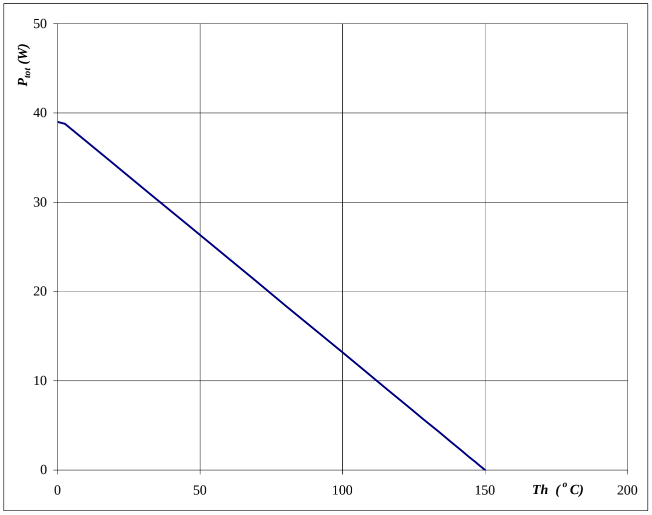
D = tp / T

R_{thJH} = 3,80 K/W

Figure 3 Brake inverse diode

Power dissipation as a
function of heatsink temperature

$P_{tot} = f(T_h)$



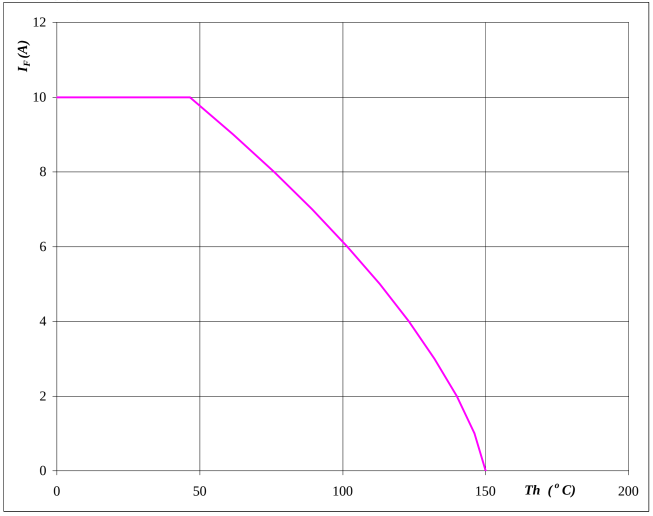
At

T_j = 150 ºC

Figure 4 Brake inverse diode

Forward current as a
function of heatsink temperature

$I_F = f(T_h)$



At

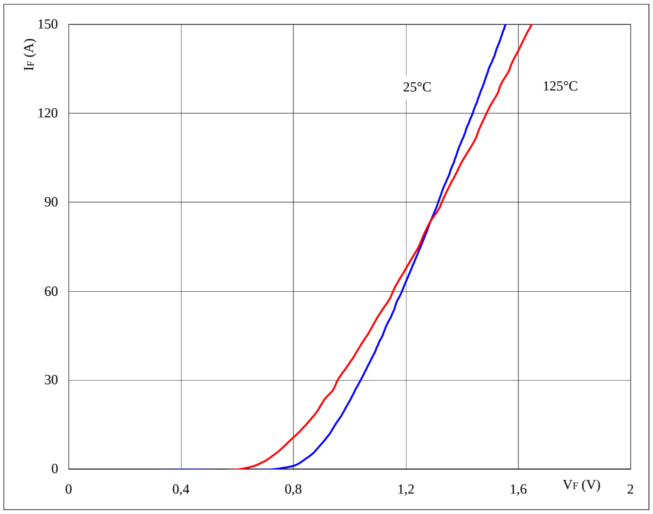
T_j = 150 ºC

Input Rectifier Bridge

Figure 1 Rectifier diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



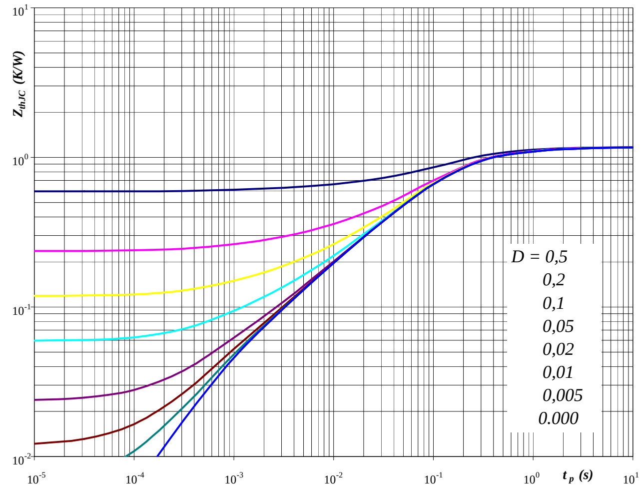
At

t_p = 250 µs

Figure 2 Rectifier diode

Diode transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



With

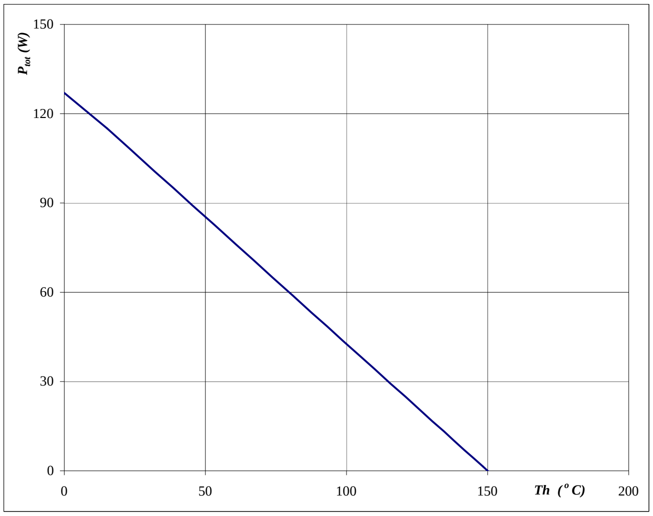
D = tp / T ű

R_{thJH} = 1,17 K/W

Figure 3 Rectifier diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



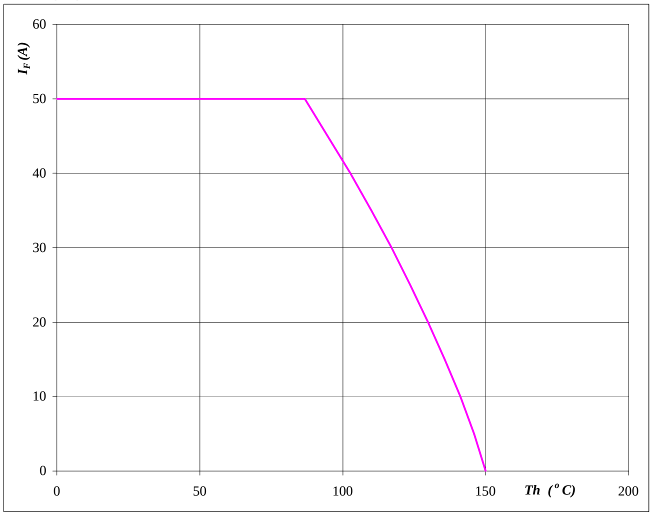
At

T_j = 150 ºC

Figure 4 Rectifier diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

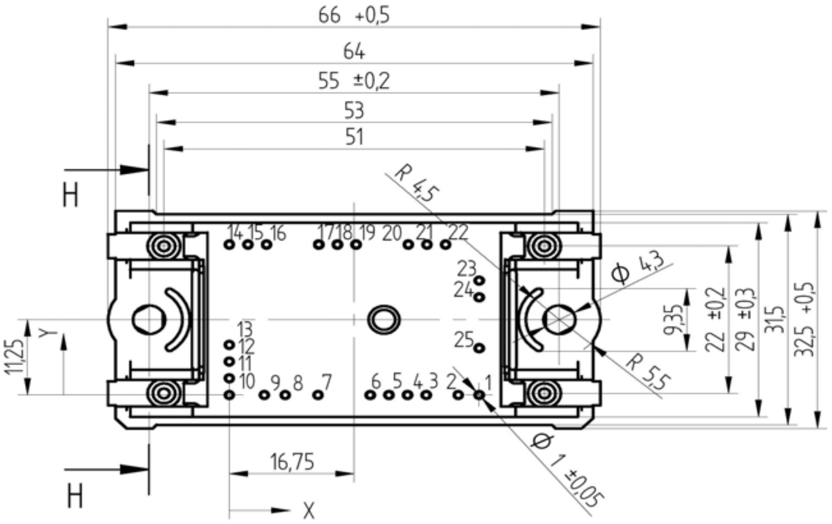
T_j = 150 ºC

Package Outline and Pinout

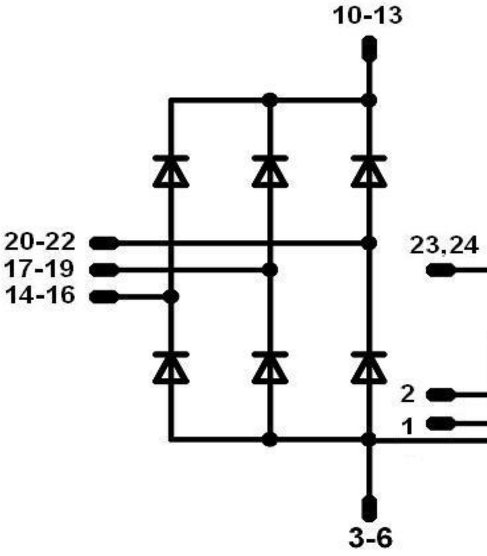
Outline

Pin Table

Pin	X	Y
1	33,5	0
2	30,7	0
3	26,4	0
4	23,9	0
5	21,4	0
6	18,9	0
7	11,9	0
8	7,5	0
9	4,7	0
10	0	0
11	0	2,5
12	0	5
13	0	7,5
14	0	22,5
15	2,5	22,5
16	5	22,5
17	12	22,5
18	14,5	22,5
19	17	22,5
20	24	22,5
21	26,5	22,5
22	29	22,5
23	33,5	17,1
24	33,5	14,6
25	33,5	7



Pinout



PRODUCT STATUS DEFINITIONS

Datasheet Status	**Product Status**	**Definition**
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.
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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.