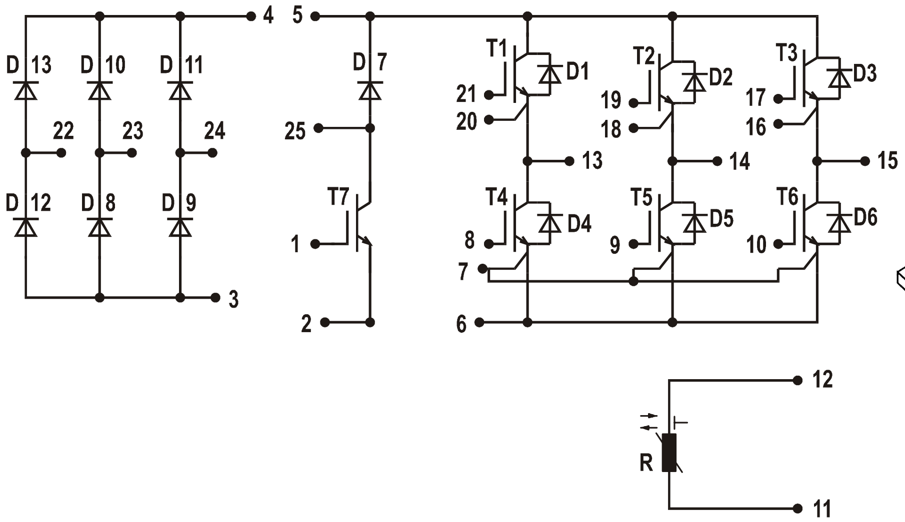
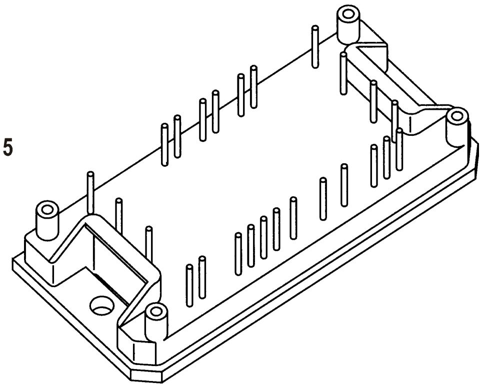
Converter - Brake - Inverter Module (CBI1)





Rectifier	Brake	Inverter
V_{RRM} = 1200V I_{FAVM} = 11 A I_{FSM} = 250 A	V_{CES} = 600 V I_{C25} = 11 A $V_{CE(sat)}$ = 2 V	V_{CES} = 600 V I_{C25} = 11 A $V_{CE(sat)}$ = 2 V

Input Rectifier Bridge D8 - D13

Symbol	Conditions	Maximum Ratings	
V_{RRM}		1200	V
I_F	T_{VJ} = 25°C	36	A
I_{FAVM}	T_{VJ} = 150°C; T_K = 70°C	11	A
I_{FSM}	T_{VJ} = 45°C; t = 10 ms sine 50 Hz	250	A
i²t	T_{VJ} = 125°C	310	A²s
T_{VJ}		+150	°C

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
I_R	V_{RRM} = 1200 V; T_{VJ} = 25°C T_{VJ} = 125°C			10 3	µA mA
V_F	I_F = 36 A		1.15	1.4	V
R_{thJC}	per die		1.4		°C/W

Features

- NPT IGBT technology
  Square RBSOA, no latchup
- Free wheeling diodes with Hiperfast and soft recovery behaviour
- Isolation voltage 2500 V~
- Built in temperature sense
- High level of integration: one module for complete drive system
- **D**irect **C**opper **B**onded Al_2O_3 ceramic base plate

Applications

- AC motor control
- AC servo and robot drives

Advantages

- No need of external isolation
- Easy to mount with two screws
- Package designed for wave soldering
- High temperature and power cycling capability

IXYS reserves the right to change limits, test conditions and dimensions.

031

© 2000 IXYS All rights reserved

Output Inverter T1 - T6, D1 - D6

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C	600	V
V_{CGR}	T_{VJ} = 25°C; R_{GE} = 20kΩ	600	V
V_{GE}	T_{VJ} = 25°C	±20	V
I_C	T_C = 25°C T_C = 90°C	11 8	A A
I_{CM}	t_p = 1 ms = 1% duty cycle; T_C = 25°C T_C = 90°C	22 16	A A
t_{SC}	IGBT V_{CE} = 600 V; T_{VJ} = 125°C non-repetitive	10	µs
P_{tot}	T_C = 25°C	45	W
T_{VJ} T_{VJ}	Free-Wheeling Diode IGBT	+150 +150	°C °C

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
I_{CES}	V_{GE} = 0 V; V_{CE} = 600 V			20	µA
I_{GES}	V_{CE} = 0 V; V_{GE} = 25 V			100	nA
$V_{GE(th)}$	V_{GE} = V_{CE}; I_C = 0.5 mA	3	4	5	V
$V_{(BR)CES}$	V_{GE} = 0 V; I_C = 0.5 mA; T_{VJ} = -40°C	600			V
$V_{CE(sat)}$	V_{GE} = 15 V; I_C = 6 A; T_{VJ} = 25°C T_{VJ} = 150°C		2 2.3	2.5 2.8	V V
t_f t_r $t_{d(on)}$ $t_{d(off)}$ E_{off} E_{on}	Inductive load, T_{VJ} = 150°C V_{CC} = 400 V; I_C = 6 A R_G = 50 Ω; V_{GE} = ±15 V		75 30 50 250 0.21 0.25	110 45 80 375 	ns ns ns ns mJ mJ
C_{iss} C_{oss} C_{rss}	V_{GE} = 0 V V_{CE} = 25 V f = 1 MHz		350 40 25	435 50 30	pF pF pF
g_{fs}	V_{CE} = 20 V; I_C = 6 A	4.2			S
Q_g	V_{CC} = 400 V; I_C = 6 A pulse; V_{GE} = 15 V		32.5		nC
V_F	I_F = 10 A; V_{GE} = 0 V; T_{VJ} = 25°C T_{VJ} = 150°C		2 1.8		V V
t_{rr}	I_F = 10 A; V_R = -300 V; V_{GE} = 0 V di_F/dt = -350 A/µs; T_{VJ} = 150°C		0.2		µs
Q_r	I_F = 10 A; V_R = -300 V; T_{VJ} = 25°C di_F/dt = -350 A/µs; V_{GE}= 0 V; T_{VJ} = 125°C		0.3 0.9		µC µC
I_r				250	µA
R_{thJC}	IGBT (per die) Diode (per die)		2.3 2.3		°C/W °C/W

© 2000 IXYS All rights reserved

Brake Chopper T7, D7

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C	600	V
V_{CGR}	T_{VJ} = 25°C; R_{GE} = 20kΩ	600	V
V_{GE}	T_{VJ} = 25°C	±20	V
I_C	T_C = 25°C T_C = 90°C	11 8	A A
I_{CM}	t_p = 1 ms = 1% duty cycle; T_C = 25°C T_C = 90°C	22 16	A A
t_{SC}	IGBT V_{CE} = 600 V; T_{VJ} = 125°C non-repetitive	10	µs
P_{tot}	T_C = 25°C	45	W
T_{VJ} T_{VJ}	Free-Wheeling Diode IGBT	+150 +150	°C °C

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
I_{CES}	V_{GE} = 0 V; V_{CE} = 600 V			20	µA
I_{GES}	V_{CE} = 0 V; V_{GE} = 25 V			100	nA
$V_{GE(th)}$	V_{GE} = V_{CE}; I_C = 0.5 mA	3	4	5	V
$V_{(BR)CES}$	V_{GE} = 0 V; I_C = 0.5 mA; T_{VJ} = -40°C	600			V
$V_{CE(sat)}$	V_{GE} = 15 V; I_C = 6 A; T_{VJ} = 25°C T_{VJ} = 150°C		2 2.3	2.5 2.8	V V
t_f t_r $t_{d(on)}$ $t_{d(off)}$ E_{off} E_{on}	Inductive load, T_{VJ} = 150°C V_{CC} = 400 V; I_C = 6 A R_G = 50 Ω; V_{GE} = ±15 V		75 30 50 250 0.21 0.25	110 45 80 375 	ns ns ns ns mJ mJ
C_{iss} C_{oss} C_{rss}	V_{GE} = 0 V V_{CE} = 25 V f = 1 MHz		350 40 25	435 50 30	pF pF pF
g_{fs}	V_{CE} = 20 V; I_C = 6 A	4.2			S
Q_g	V_{CC} = 400 V; I_C = 6 A pulse; V_{GE} = 15 V		32.5		nC
V_F	I_F = 10 A; V_{GE} = 0 V; T_{VJ} = 25°C T_{VJ} = 150°C		2 1.8		V V
t_{rr}	I_F = 10 A; V_R = -300 V; V_{GE} = 0 V di_F/dt = -350 A/µs; T_{VJ} = 150°C		0.2		µs
Q_r	I_F = 10 A; V_R = -300 V; T_{VJ} = 25°C di_F/dt = -350 A/µs; V_{GE}= 0 V; T_{VJ} = 125°C		0.3 0.9		µC µC
I_r				250	µA
R_{thJC}	IGBT (per die) Diode (per die)		2.3 2.3		°C/W °C/W

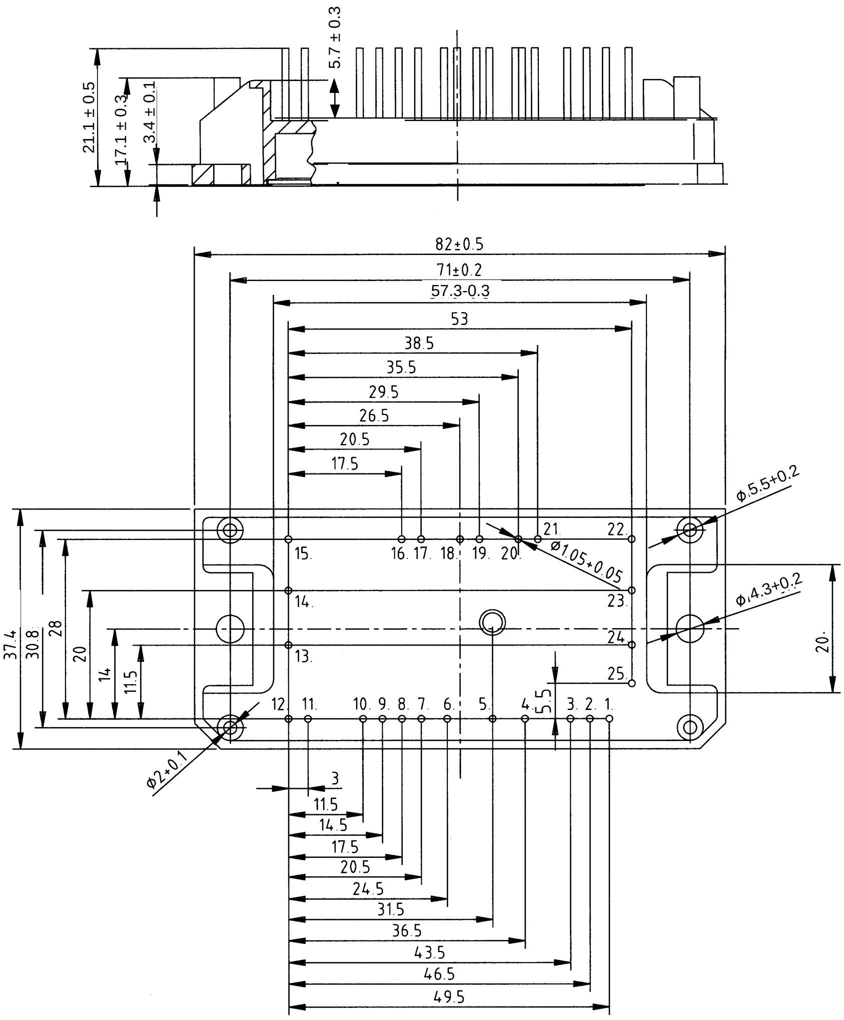
© 2000 IXYS All rights reserved

Module			
Symbol	**Conditions**	**Maximum Ratings**	
T_{stg}		-40...+125	°C
V_{ISOL}	I_{ISOL} ≤ 1 mA; 50/60 Hz; t = 1 min	2500	V~
M_d	Mounting torque (M4)	2.0 - 2.2 18 - 20	Nm lb.in.
d_S d_A	Creepage distance on surface Strike distance in air	12.7 12.7	mm mm
Weight	typ.	42	g

Temperature Sensor R			
Symbol	**Conditions**	**Maximum Ratings**	
R	T_{amb} = 20°C	4.7	kΩ

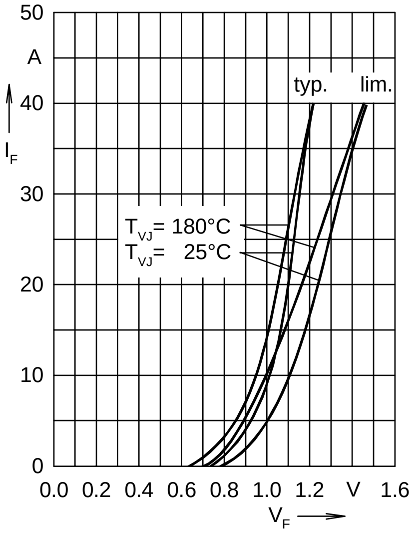
For additional data see C620/4.7k 5% S+M NTC thermistor catalog

Dimensions in mm (1 mm = 0.0394")

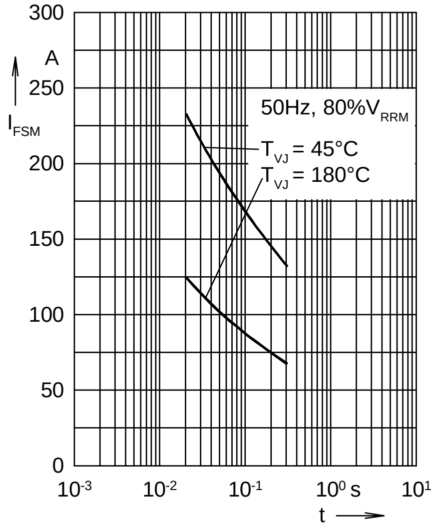


© 2000 IXYS All rights reserved

Input Rectifier Bridge D8 - D13

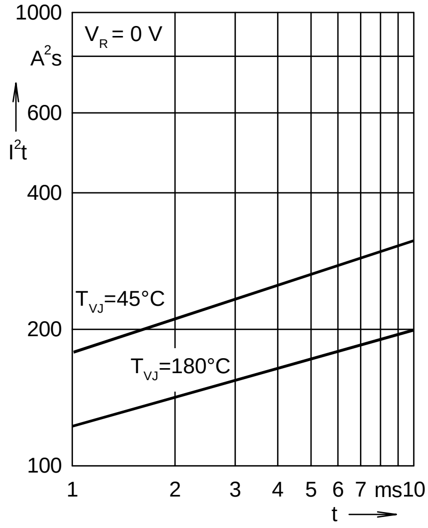


Forward characteristics

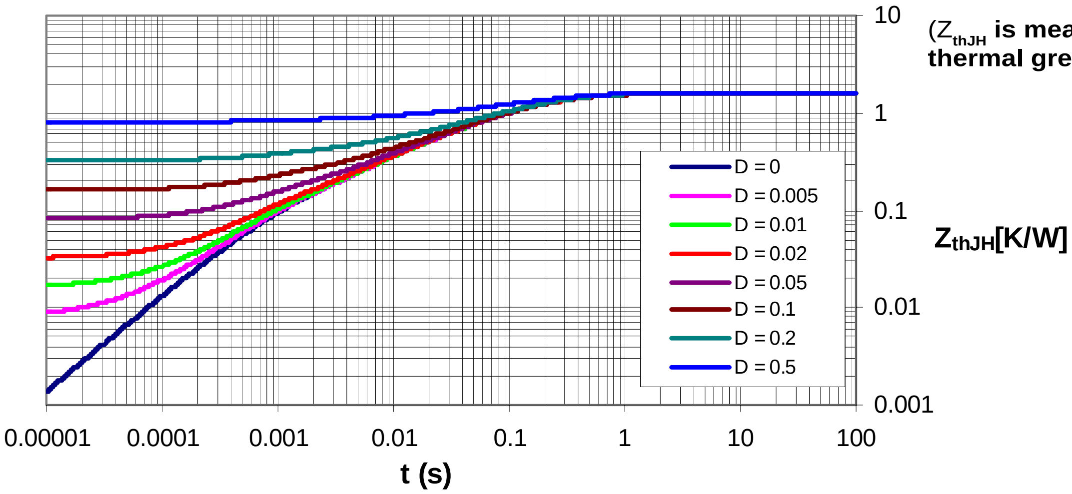


Surge overload current

I_{FSM}: crest value, t: duration



I^2t versus time (1-10 ms)



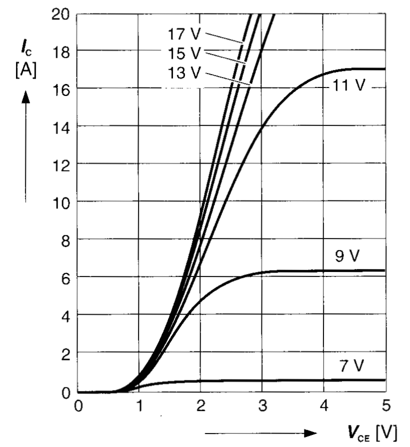
(Z_{thJH} is measured using 50 µm thermal grease)

Transient thermal resistance junction to heatsink

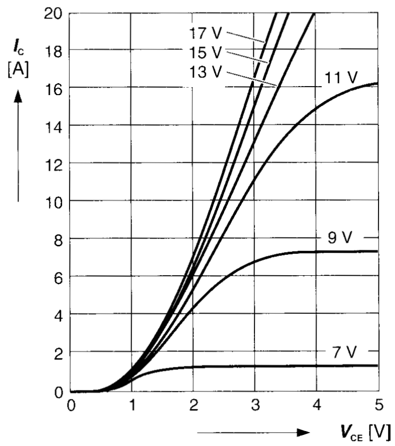
© 2000 IXYS All rights reserved

Output Inverter T1 - T6, D1 - D6

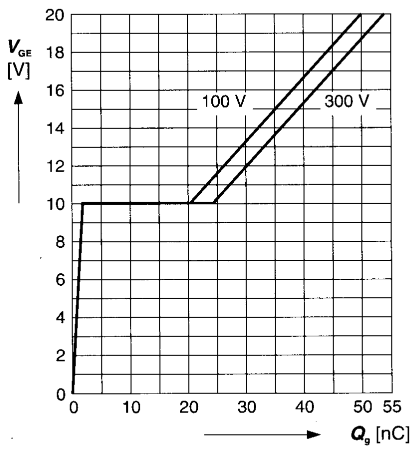
Typ. output characteristics
$I_C = f(V_{CE})$
parameter: t_p = 250 µs; T_j = 25 °C



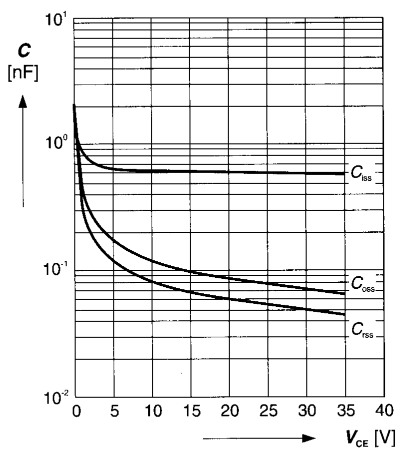
Typ. output characteristics
$I_C = f(V_{CE})$
parameter: t_p = 250 µs; T_j = 125 °C



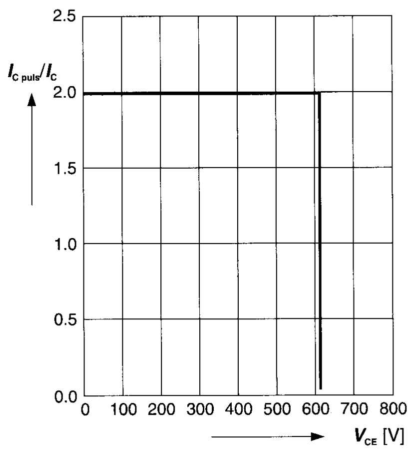
Typ. gate charge
$V_{GE} = f(Q_g)$
parameter: $I_{C\ puls}$ = 10 A



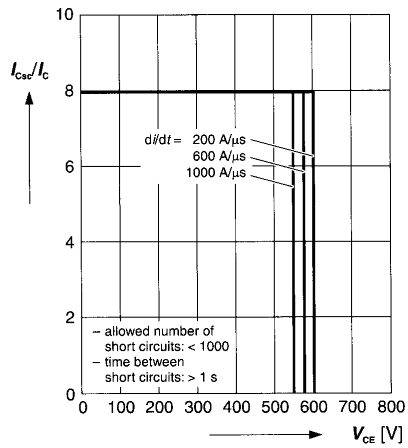
Typ. capacitances
$C = f(V_{CE})$
parameter: V_{GE} = 0 V ; f = 1 MHz



Reverse biased safe operating area
$I_{C\ puls} = f(V_{CE})$, T_j = 150 °C
parameter: V_{GE} = 15 V



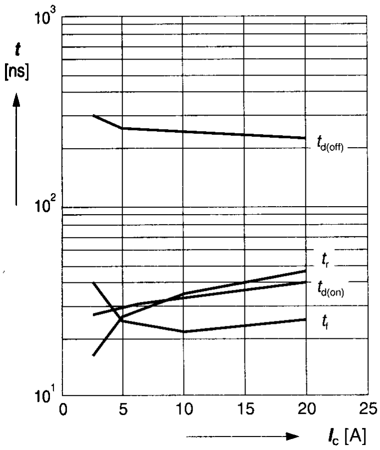
Short circuit safe operating area
$I_{Csc} = f(V_{CE})$, T_j = 150 °C
parameter: V_{GE} = ± 15 V ; t_{sc} ≤ 10 µs; L < 60 nH



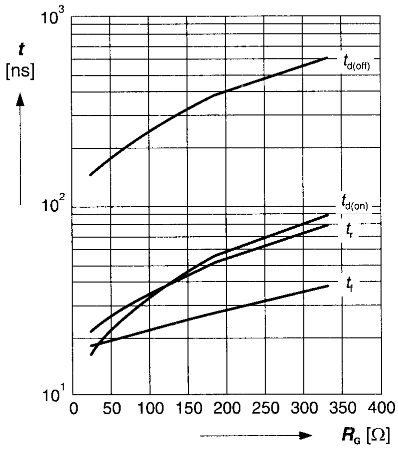
© 2000 IXYS All rights reserved

Output Inverter T1 - T6, D1 - D6

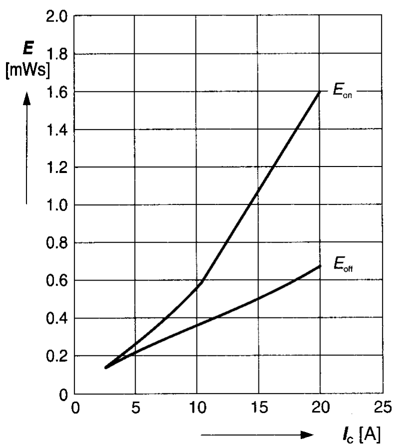
Typ. switching time
$t = f(I_C)$, inductive load, T_j = 125 °C
parameter: V_{CE} = 300 V; V_{GE} = ± 15 V; R_G = 100 Ω



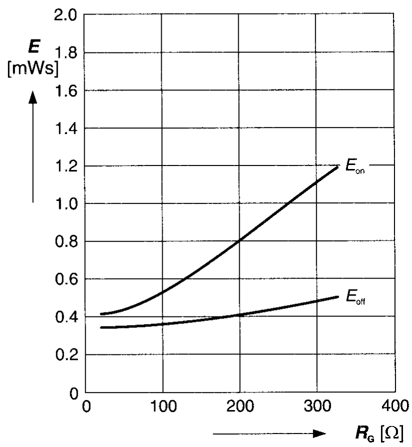
Typ. switching time
$t = f(R_G)$, inductive load, T_j = 125 °C
parameter: V_{CE} = 300 V; V_{GE} = ± 15 V; I_C = 10 A



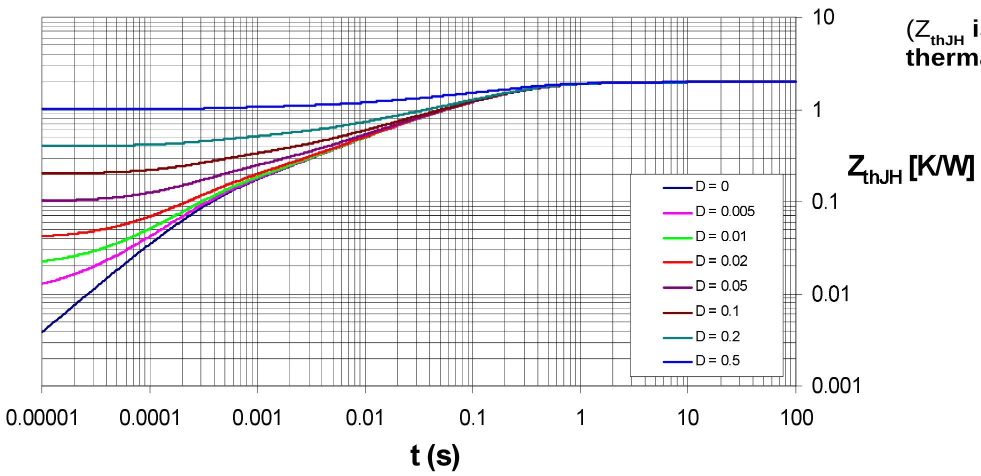
Typ. switching losses
$E = f(I_C)$, inductive load, T_j = 125 °C
parameter: V_{CE} = 300 V; V_{GE} = ± 15 V; R_G = 100 Ω



Typ. switching losses
$E = f(R_G)$, inductive load, T_j = 125 °C
parameter: V_{CE} = 300 V; V_{GE} = ± 15 V; I_C = 10 A



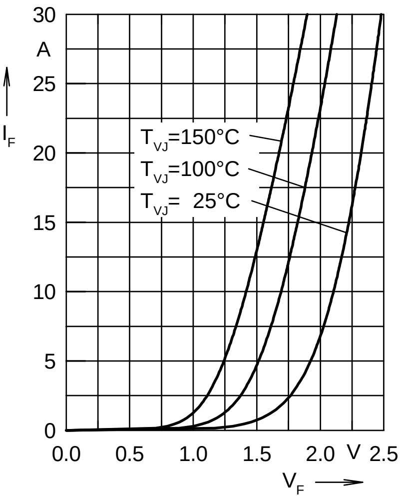
Transient thermal resistance junction to heatsink



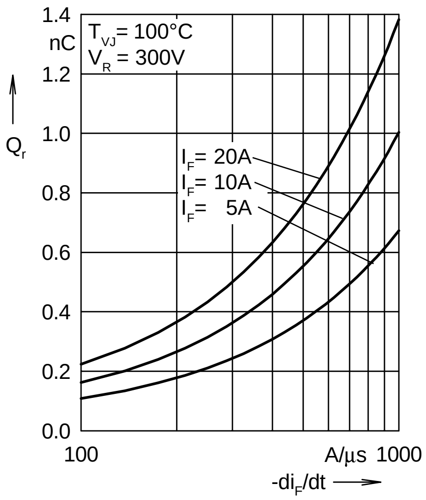
(Z_{thJH} is measured using 50 µm thermal grease)

© 2000 IXYS All rights reserved

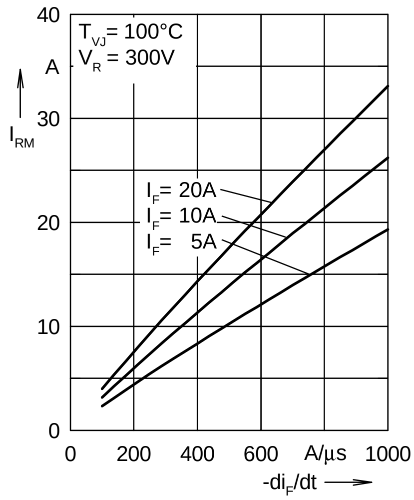
Output Inverter D1 - D6



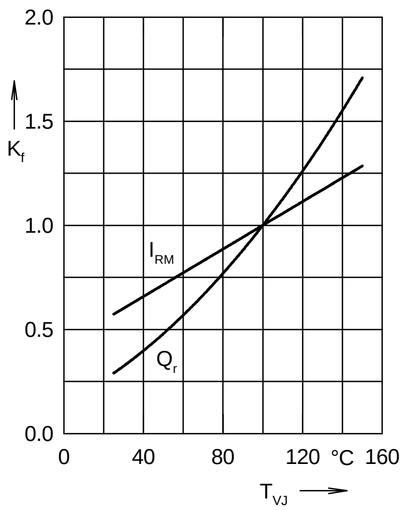
Forward current I_F versus V_F



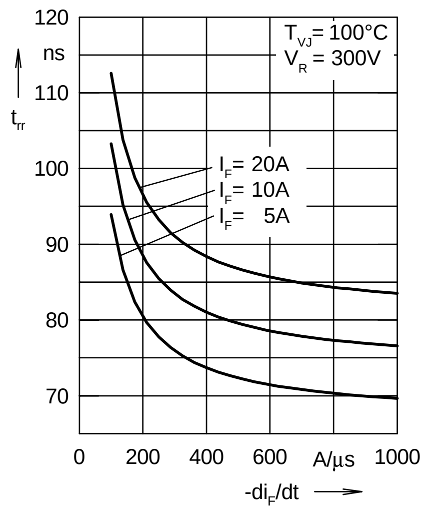
Reverse recovery charge Q_r versus $-di_F/dt$



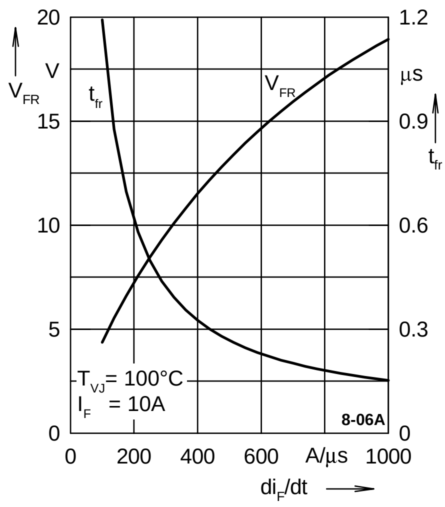
Peak reverse current I_{RM} versus $-di_F/dt$



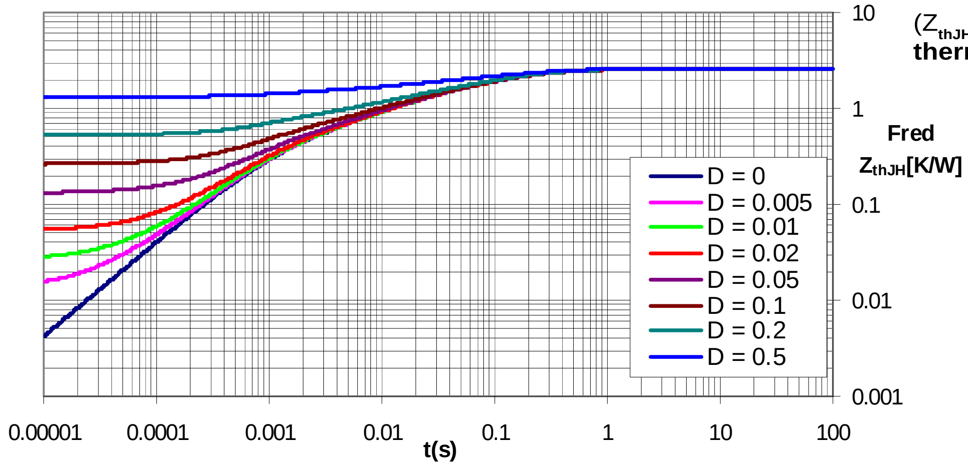
Dynamic parameters Q_r, I_{RM} versus T_{VJ}



Recovery time t_{rr} versus $-di_F/dt$



Peak forward voltage V_{FR} and t_{fr} versus di_F/dt



(Z_{thJH} is measured using 50 µm thermal grease)

Transient thermal resistance junction to heatsink

© 2000 IXYS All rights reserved