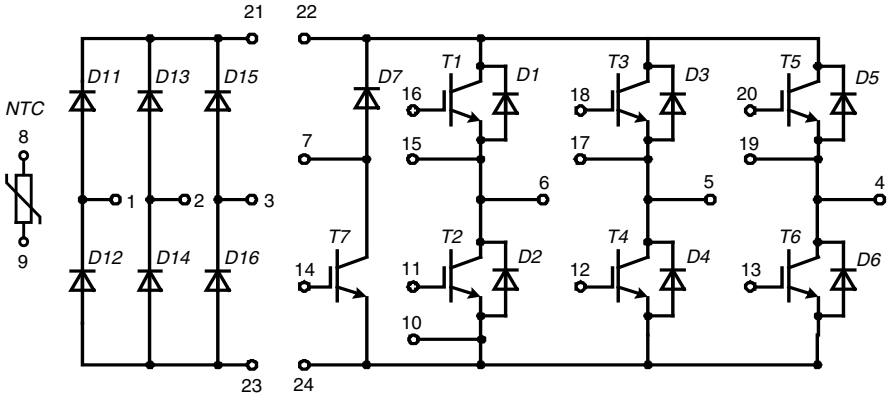
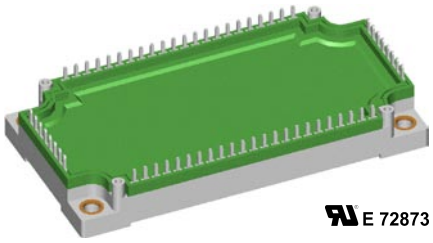
Converter - Brake - Inverter Module (CBI3) with Trench IGBT technology





Three Phase Rectifier	Brake Chopper	Three Phase Inverter
V_{RRM} = 1600 V	V_{CES} = 1200 V	V_{CES} = 1200 V
I_{FAVM} = 50 A	I_{C25} = 55 A	I_{C25} = 80 A
I_{FSM} = 850 A	$V_{CE(sat)}$ = 1.7 V	$V_{CE(sat)}$ = 1.7 V

Input Rectifier Bridge D11 - D16

Symbol	Conditions	Maximum Ratings	
V_{RRM}		1600	V
I_{FAV}	T_C = 80°C; sine 180°	50	A
I_{DAVM}	T_C = 80°C; rectangular; d = $^1/_3$; bridge	140	A
I_{FSM}	T_C = 25°C; t = 10 ms; sine 50 Hz	850	A
P_{tot}	T_C = 25°C	125	W

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 50 A;	T_{VJ} = 25°C		1.15	1.3	V
		T_{VJ} = 125°C		1.05		V
I_R	$V_R = V_{RRM}$;	T_{VJ} = 25°C			0.05	mA
		T_{VJ} = 125°C		0.8		mA
R_{thJC}	(per diode)				1.0	K/W

Application: AC motor drives with

- Input from single or three phase grid
- Three phase synchronous or asynchronous motor
- electric braking operation

Features

- High level of integration - only one power semiconductor module required for the whole drive
- IGBT technology with low saturation voltage, low switching losses and tail current, high RBSOA and short circuit ruggedness
- Epitaxial free wheeling diodes with Hiperfast and soft reverse recovery
- Industry standard package with insulated copper base plate and soldering pins for PCB mounting
- Temperature sense included

Output Inverter T1 - T6

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	1200	V
V_{GES}	Continuous	± 20	V
I_{C25}	T_C = 25°C	80	A
I_{C80}	T_C = 80°C	50	A
I_{CM}	T_C = 80°C; t_p = 1 ms	100	A
P_{tot}	T_C = 25°C	270	W

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{CE(sat)}$	I_C = 50 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.7	2.15	V
		T_{VJ} = 125°C		2.0		V
$V_{GE(th)}$	I_C = 2 mA; V_{GE} = V_{CE}		5	5.8	6.5	V
I_{CES}	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			2.7	mA
		T_{VJ} = 125°C		0.7		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V				400	nA
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			3.5		nF
Q_{Gon}	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 50 A			470		nC
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C			90		ns
t_r	V_{CE} = 600 V; I_C = 50 A			50		ns
$t_{d(off)}$	V_{GE} = ±15 V; R_G = 18 Ω			520		ns
t_f				90		ns
E_{on}				5		mJ
E_{off}				6.5		mJ
RBSOA	I_C = I_{CM}; V_{GE} = 15 V; R_G = 18 Ω; T_{VJ} = 125°C		$V_{CEK} \leq V_{CES}$ - L_S di/dt			V
t_{SC} **(SCSOA)**	V_{CE} = 720 V; V_{GE} = ±15 V; R_G = 18 Ω; $t_P \leq$ 10 µs; non-repetitive; T_{VJ} = 125°C			200		A
R_{thJC}					0.46	K/W

Output Inverter D1 - D6

Symbol	Conditions	Maximum Ratings	
I_{F25}	T_C = 25°C	100	A
I_{F80}	T_C = 80°C	50	A

Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_F	I_F = 50 A;	T_{VJ} = 25°C		2.1	2.6	V
		T_{VJ} = 125°C		1.6		V
I_{RM}	I_F = 60 A; di_F/dt = -1200 A/µs;			90		A
Q_{rr}	T_{VJ} = 125°C; V_R = 600 V; V_{GE} = 0 V			10		µC
t_{rr}				160		ns
E_{rec}				4		mJ
R_{thJC}	(per diode)				0.65	K/W

Brake Chopper T7

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	1200	V
V_{GES}	Continuous	± 20	V
I_{C25}	T_C = 25°C	55	A
I_{C80}	T_C = 80°C	35	A
I_{CM}	T_C = 80°C; t_p = 1 ms	70	A
P_{tot}	T_C = 25°C	200	W

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{CE(sat)}$	I_C = 35 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.7	2.15	V
		T_{VJ} = 125°C		2.0		V
$V_{GE(th)}$	I_C = 1.5 mA; V_{GE} = V_{CE}		5	5.8	6.5	V
I_{CES}	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.25	mA
		T_{VJ} = 125°C		0.3		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V				400	nA
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			2.5		nF
Q_{Gon}	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 35 A			330		nC
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C			90		ns
t_r	V_{CE} = 600 V; I_C = 35 A			50		ns
$t_{d(off)}$	V_{GE} = ±15 V; R_G = 27 Ω			520		ns
t_f				90		ns
E_{off}				4.8		mJ
RBSOA	I_C = I_{CM}; V_{GE} = 15 V; R_G = 27 Ω; T_{VJ} = 125°C		$V_{CEK} \leq V_{CES} - L_S$ di/dt			V
t_{SC} **(SCSOA)**	V_{CE} = 720 V; V_{GE} = ±15 V; R_G = 27 Ω; $t_P \leq$ 10 µs; non-repetitive; T_{VJ} = 125°C			140		A
R_{thJC}					0.62	K/W

Brake Chopper D7

Symbol	Conditions	Maximum Ratings	
V_{RRM}	T_{VJ} = 25°C to 150°C	1200	V
I_{F25}	T_C = 25°C	48	A
I_{F80}	T_C = 80°C	30	A

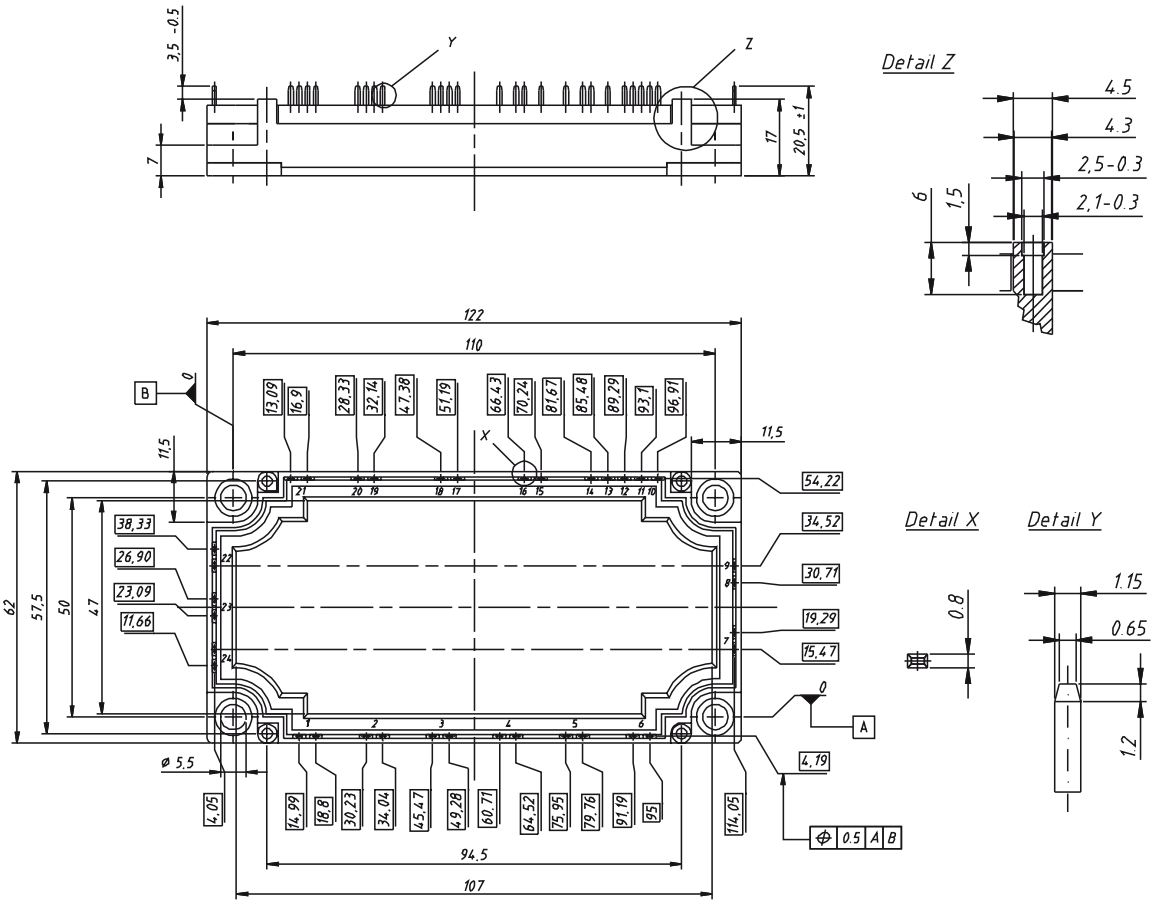
Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_F	I_F = 35 A;	T_{VJ} = 25°C		2.5	3.3	V
		T_{VJ} = 125°C		2.0		V
I_R	V_R = V_{RRM};	T_{VJ} = 25°C			0.25	mA
		T_{VJ} = 125°C		0.5		mA
R_{thJC}	(per diode)				1.2	K/W

Temperature Sensor NTC					
Symbol	**Conditions**	**Characteristic Values**			
		min.	**typ.**	**max.**	
R_{25}	T = 25°C	4.75	5.0	5.25	kΩ
$B_{25/50}$			3375		K

Module			
Symbol	**Conditions**	**Maximum Ratings**	
T_{VJ}	operating	-40...+125	°C
T_{JM}		+150	°C
T_{stg}		-40...+125	°C
V_{ISO}	$I_{ISOL} \leq 1$ mA; 50/60 Hz	2500	V~
M_d	Mounting torque (M5)	3 - 6	Nm

Symbol	**Conditions**	**Characteristic Values**			
		min.	**typ.**	**max.**	
$R_{therm-chip}$	Resistance terminal to chip		5		mΩ
d_S	Creepage distance on surface	6			mm
d_A	Strike distance in air	6			mm
R_{thCH}	with heatsink compound		0.01		K/W
Weight			300		g

Dimensions in mm (1 mm = 0.0394")



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

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Input Rectifier Bridge D11 - D16

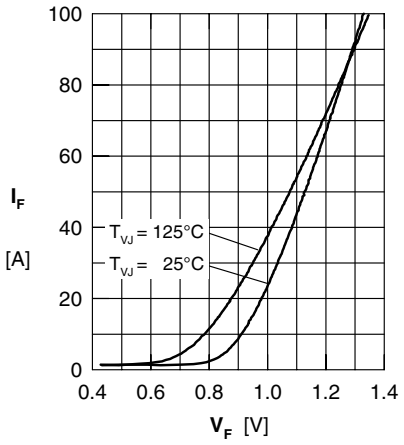

Fig. 1 Typ. forward current vs. voltage drop per diode

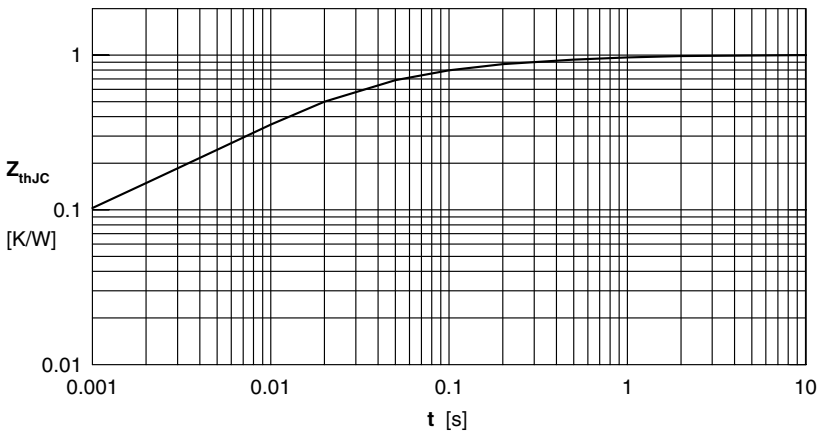

Fig. 2 Transient thermal impedance junction to case

Output Inverter T1 - T6 / D1 - D6

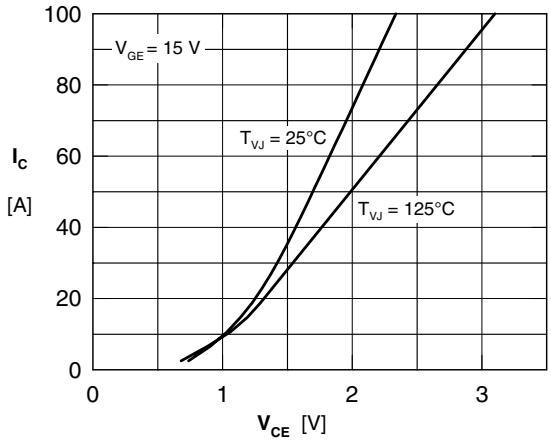

Fig. 3 Typical output characteristic

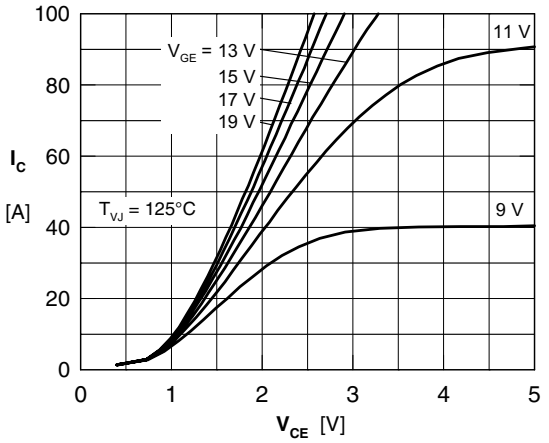

Fig. 4 Typical output characteristic

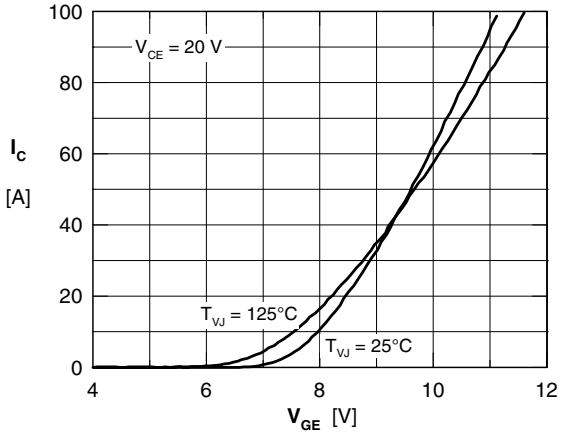

Fig. 5 Typical transfer characteristic

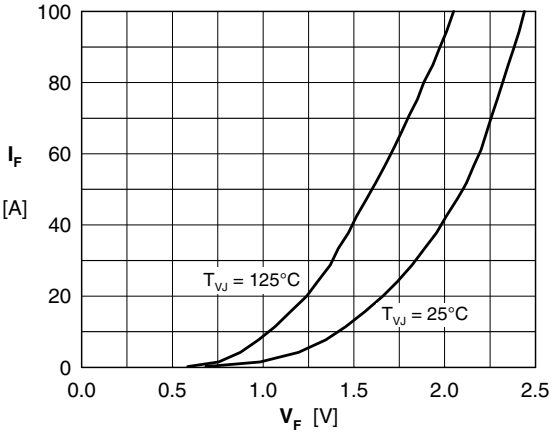

Fig. 6 Typical forward characteristic of free wheeling diode

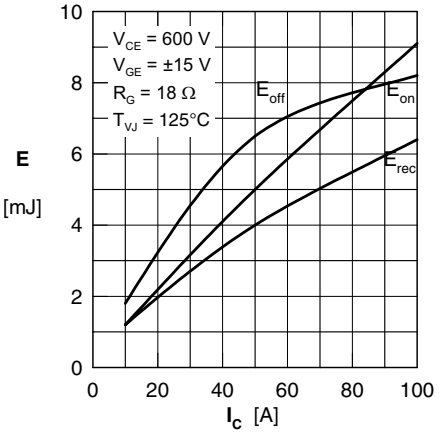

Fig. 7 Typ. switching losses vs. collector current

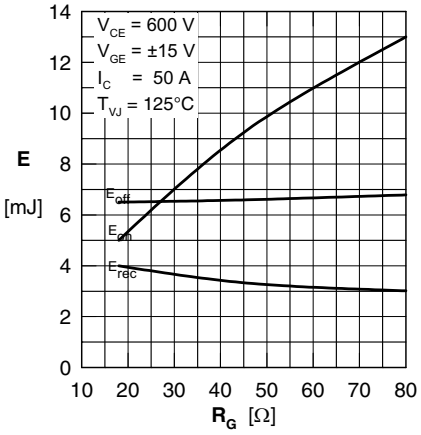

Fig. 8 Typ. switching losses vs. gate resistance

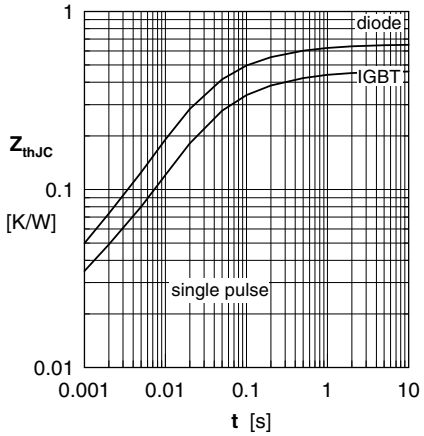

Fig. 9 Transient thermal impedance