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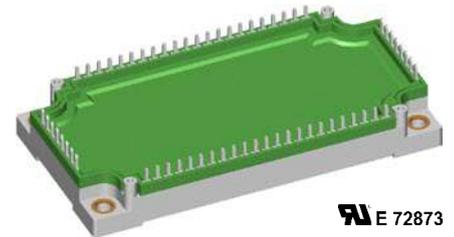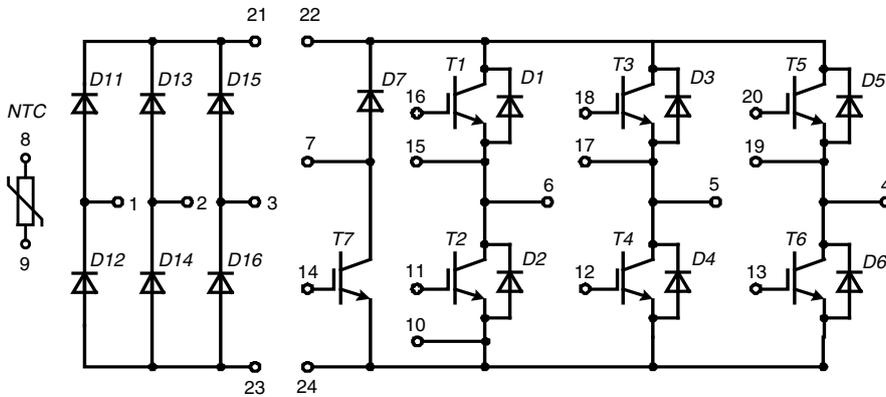# with Trench IGBT technology

Ⓤ E 72873

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			
			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

($T_{VJ} = 25°C$, unless otherwise specified)

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

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

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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 V_{CE} = 600 V; I_C = 50 A V_{GE} = ±15 V; R_G = 18 Ω			90		ns
t_r				50		ns
$t_{d(off)}$				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		min.	typ.	max.	
				Characteristic Values		
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; T_{VJ} = 125°C; V_R = 600 V; V_{GE} = 0 V			90		A
Q_{rr}				10		µC
t_{rr}				160		ns
E_{rec}				4		mJ
R_{thJC}	(per diode)				0.65	K/W

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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)

Symbol	Conditions		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 V_{CE} = 600 V; I_C = 35 A V_{GE} = ±15 V; R_G = 27 Ω			90		ns
t_r				50		ns
$t_{d(off)}$				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	$V_{CEK} \le$ V_{CES} - L_S di/dt				V
t_{SC} (SCSOA)	V_{CE} = 720 V; V_{GE} = ±15 V; R_G = 27 Ω $t_P \le$ 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

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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")

Input Rectifier Bridge D11 - D16

Fig. 1 Typ. forward current vs. voltage drop per diode
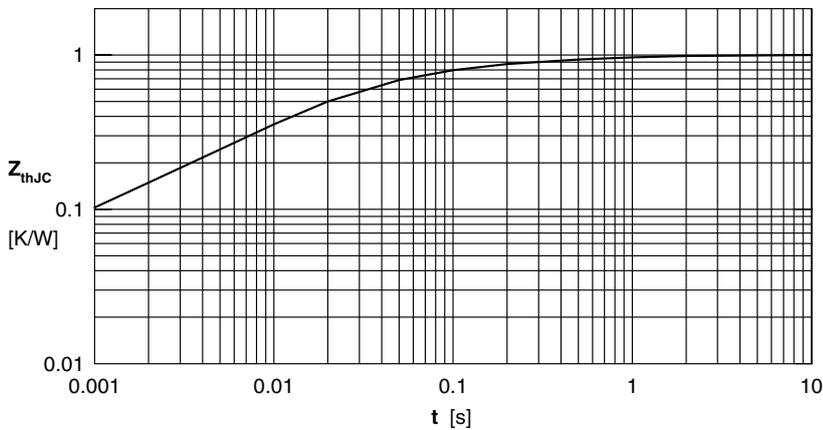
Fig. 2 Transient thermal impedance junction to case

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Output Inverter T1 - T6 / D1 - D6
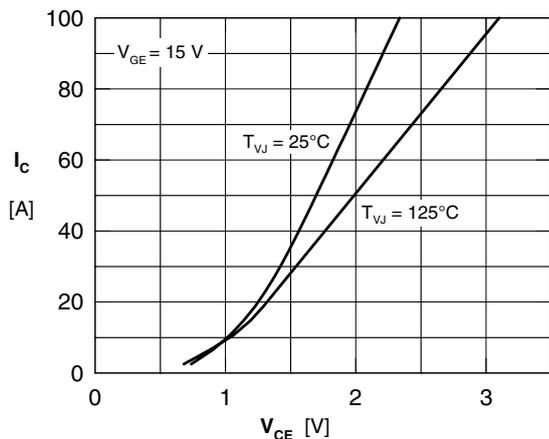
Fig. 3 Typical output characteristic
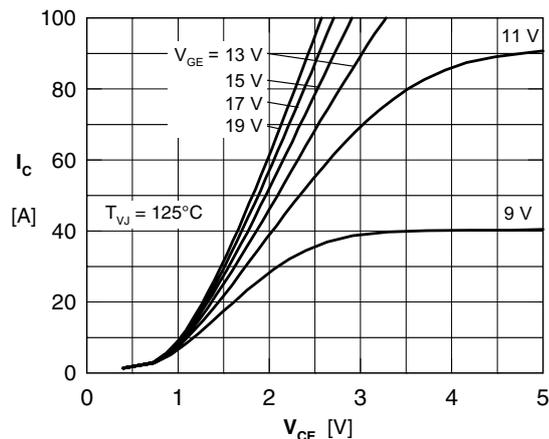
Fig. 4 Typical output characteristic
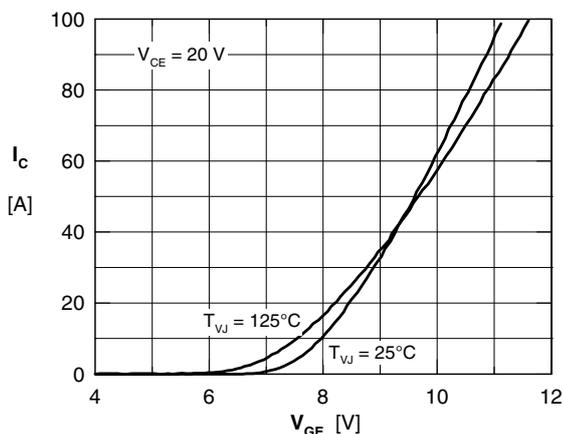
Fig. 5 Typical transfer characteristic
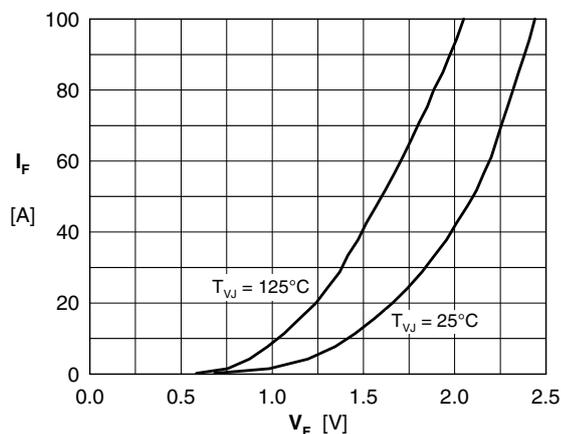
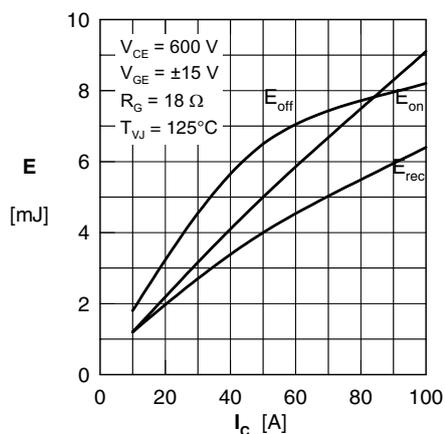Fig. 6 Typical forward characteristic
of free wheeling diode

Fig. 7 Typ. switching losses
vs. collector current
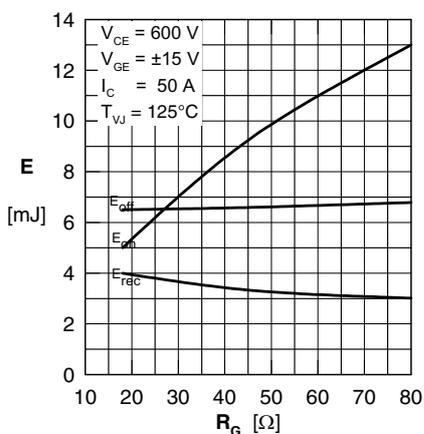
Fig. 8 Typ. switching losses
vs. gate resistance

Fig. 9 Transient thermal
impedance

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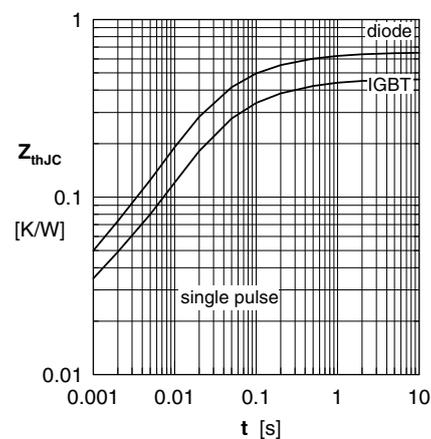
Brake Chopper T7 / D7
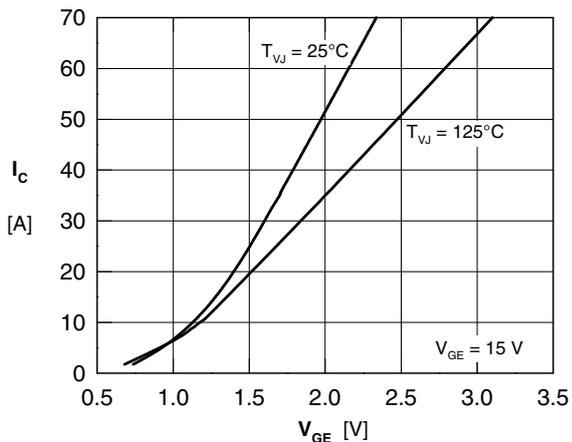
Fig. 10 Typical output characteristics
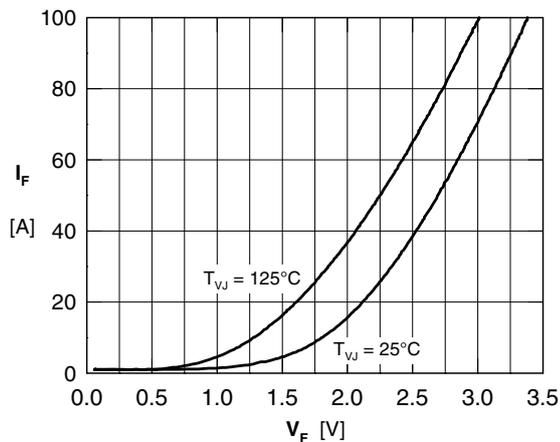
Fig. 11 Typical forward characteristics of free wheeling diode
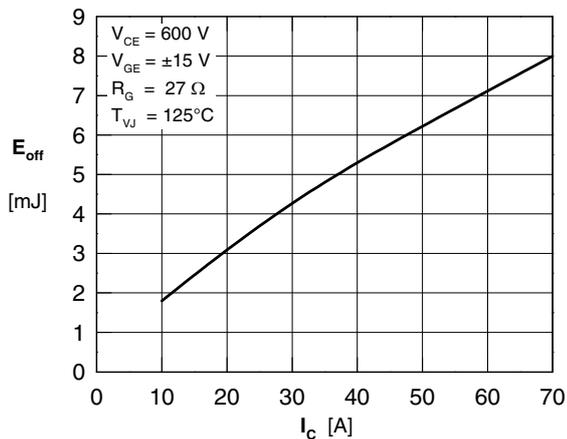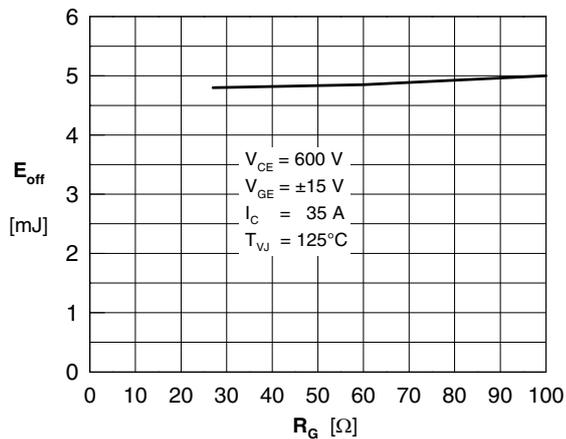

Fig. 12 Typ. turn off energy vs. collector current

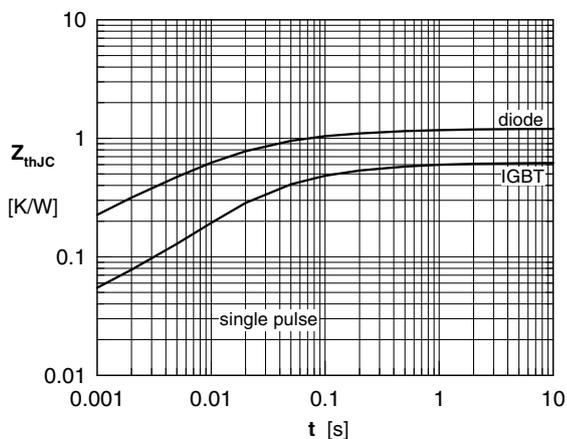Fig. 13 Typ. turn off energy versus gate
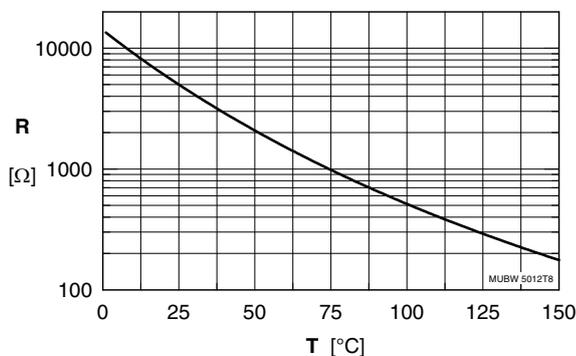

Fig. 14 Transient thermal impedance

Temperature Sensor NTC

Fig. 15 Typ. termistor resistance versus temperature

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