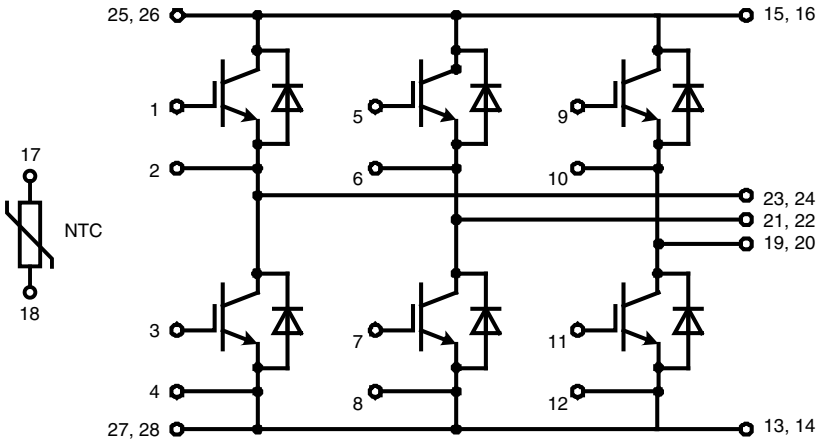
Six-Pack
XPT IGBT

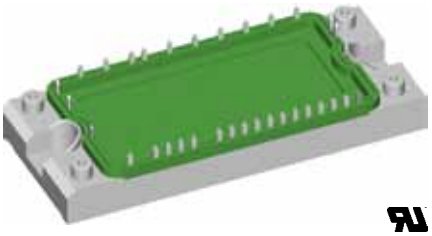
V_{CES} = 1200 V
I_{C25} = 85 A
$V_{CE(sat)}$ = 1.8 V

Preliminary data

Part name (Marking on product)

MIXA60W1200TED





E 72873

Pin configuration see outlines.

Features:

- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged XPT design (Xtreme light Punch Through) results in:
  - short circuit rated for 10 µsec.
  - very low gate charge
  - square RBSOA @ 3x I_C
  - low EMI
- Thin wafer technology combined with the XPT design results in a competitive low $V_{CE(sat)}$
- SONIC™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

Application:

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies

Package:

- "E2-Pack" standard outline
- Insulated copper base plate
- Soldering pins for PCB mounting
- Temperature sense included

Ouput Inverter T1 - T6

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*	continuous				±20	V
V_{GEM}	*max. transient collector gate voltage*	transient				±30	V
I_{C25}	*collector current*		T_C = 25°C			85	A
I_{C80}			T_C = 80°C			60	A
P_{tot}	*total power dissipation*		T_C = 25°C			290	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 55 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.8	2.1	V
			T_{VJ} = 125°C		2.1		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 2 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.4	6.0	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.5	mA
			T_{VJ} = 125°C		0.2		mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V				500	nA
$Q_{G(on)}$	*total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 50 A			165		nC
$t_{d(on)}$	*turn-on delay time*	inductive load V_{CE} = 600 V; I_C = 50 A V_{GE} = ±15 V; R_G = 15 Ω	T_{VJ} = 125°C		70		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*				250		ns
t_f	*current fall time*				100		ns
E_{on}	*turn-on energy per pulse*				4.5		mJ
E_{off}	*turn-off energy per pulse*				5.5		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 15 Ω;	T_{VJ} = 125°C V_{CEK} = 1200 V			150	A
SCSOA	*short circuit safe operating area*						
t_{SC}	*short circuit duration*	V_{CE} = 900 V; V_{GE} = ±15 V;	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 15 Ω; non-repetitive			200		A
R_{thJC}	*thermal resistance junction to case*	(per IGBT)				0.43	K/W

Output Inverter D1 - D6

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{RRM}	*max. repetitve reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			88	A
I_{F80}			T_C = 80°C			59	A
V_F	*forward voltage*	I_F = 60 A; V_{GE} = 0 V	T_{VJ} = 25°C		1.95	2.2	V
			T_{VJ} = 125°C		1.95		V
Q_{rr}	*reverse recovery charge*	V_R = 600 V di_F/dt = -1200 A/µs I_F = 60 A; V_{GE} = 0 V	T_{VJ} = 125°C		8		µC
I_{RM}	*max. reverse recovery current*				60		A
t_{rr}	*reverse recovery time*				350		ns
E_{rec}	*reverse recovery energy*				2.5		mJ
R_{thJC}	*thermal resistance junction to case*	(per diode)				0.6	K/W

T_C = 25°C unless otherwise stated

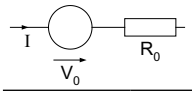
Temperature Sensor NTC

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
R_{25}	*resistance*		T_C = 25°C	4.75	5.0	5.25	kΩ
$B_{25/50}$					3375		K

Module

Symbol	Definitions	Conditions	Ratings min.	typ.	max.	Unit
T_{VJ}	*operating temperature*		-40		125	°C
T_{VJM}	*max. virtual junction temperature*				150	°C
T_{stg}	*storage temperature*		-40		125	°C
V_{ISOL}	*isolation voltage*	$I_{ISOL} \leq$ 1 mA; 50/60 Hz			3000	V~
CTI	*comparative tracking index*				-	
M_d	*mounting torque (M5)*		3		6	Nm
d_S	*creep distance on surface*		6			mm
d_A	*strike distance through air*		6			mm
$R_{pin\text{-}chip}$	*resistance pin to chip*			5		mΩ
R_{thCH}	*thermal resistance case to heatsink*	with heatsink compound		0.02		K/W
Weight				180		g

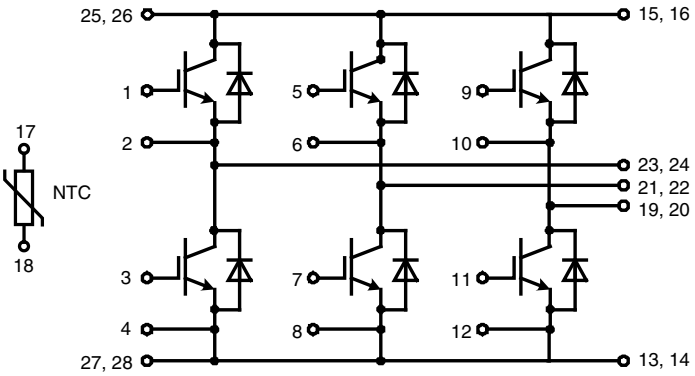
Equivalent Circuits for Simulation



Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_0	*IGBT*	T1 - T6	T_{VJ} = 150°C		1.1		V
R_0					25.1		mΩ
V_0	*free wheeling diode*	D1 - D6	T_{VJ} = 150°C		1.22		V
R_0					12.99		mΩ

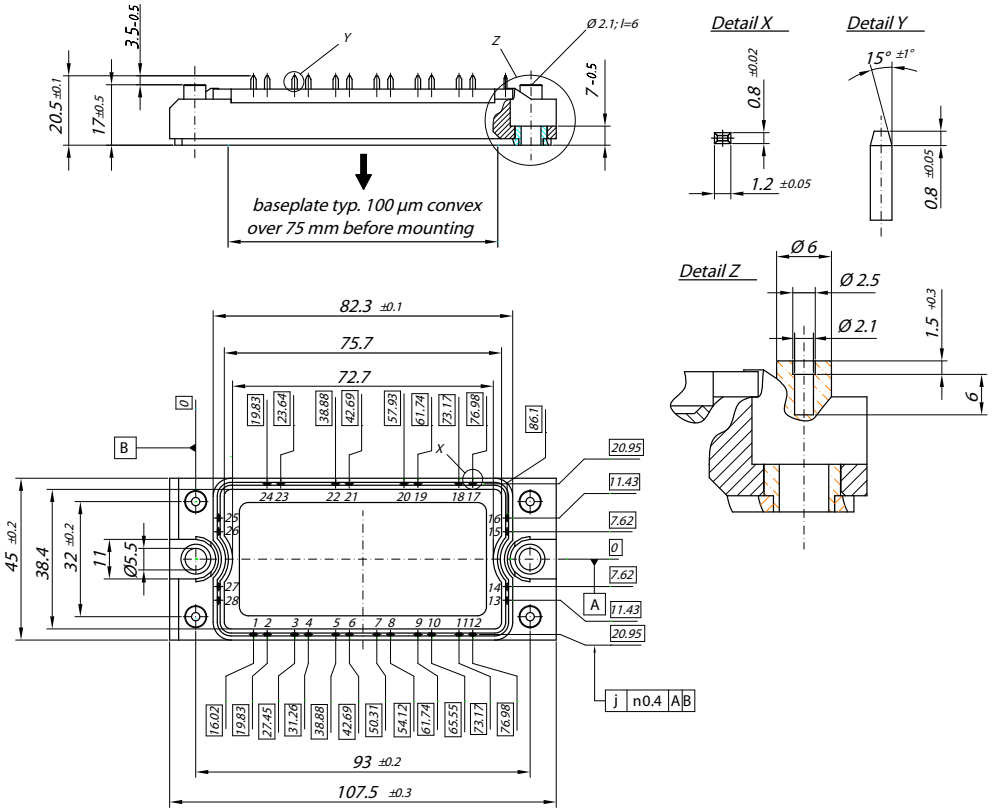
T_C = 25°C unless otherwise stated

Circuit Diagram



Outline Drawing

Dimensions in mm (1 mm = 0.0394“)



Product Marking

Part number

M = Module
I = IGBT
X = XPT
A = standard
60 = Current Rating [A]
W = Six-Pack
1200 = Reverse Voltage [V]
T = NTC
ED = E2-Pack

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXA60W1200 TED	MIXA60W1200TED	Box	6	507660

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

20100622c

Inverter T1 - T6

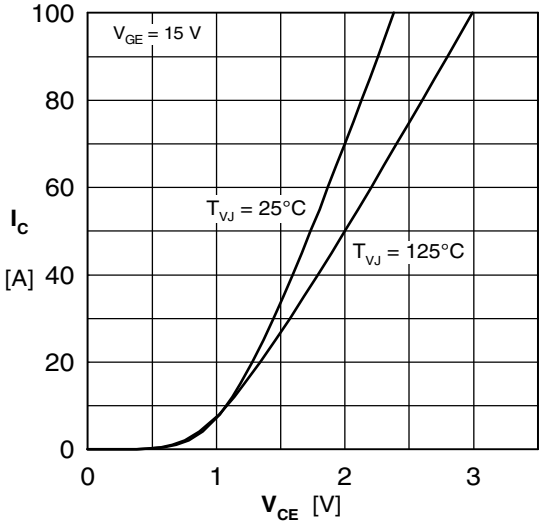


Fig. 1 Typ. output characteristics

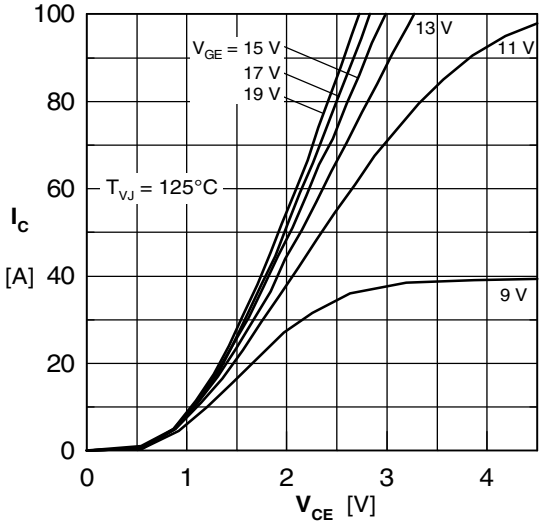


Fig. 2 Typ. output characteristics

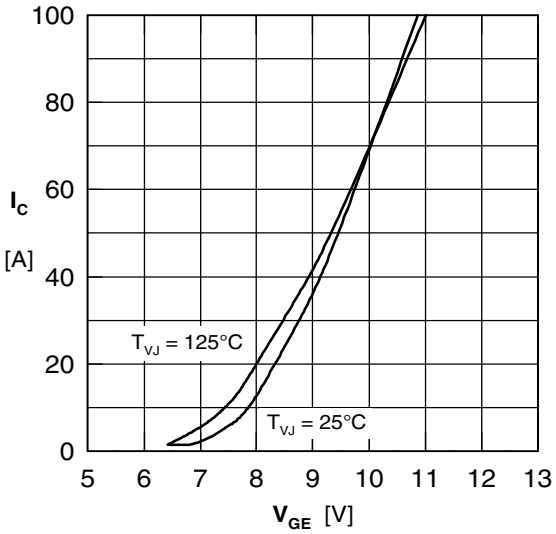


Fig. 3 Typ. tranfer characteristics

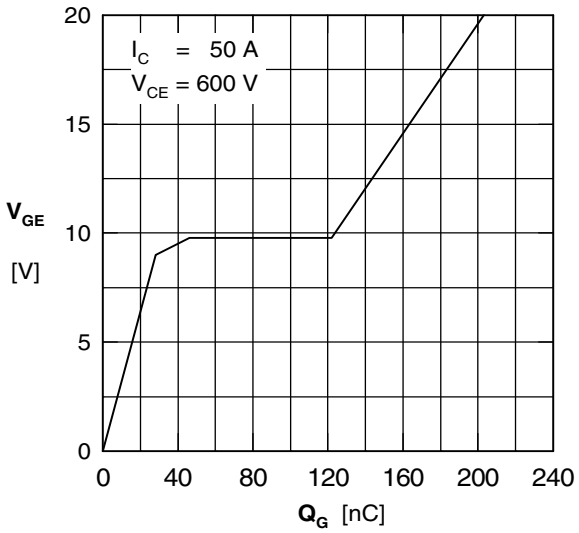


Fig. 4 Typ. turn-on gate charge

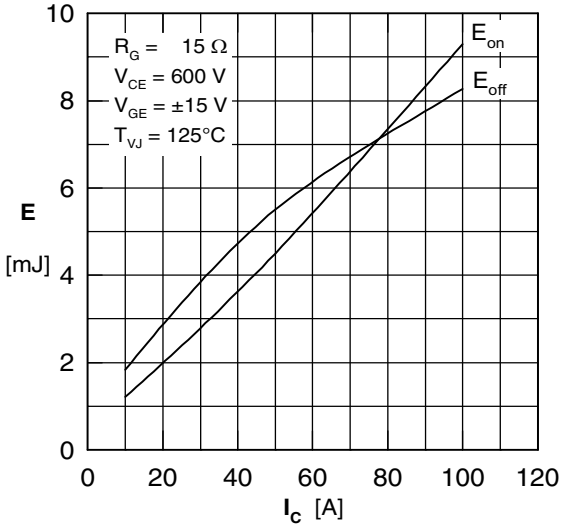


Fig. 5 Typ. switching energy vs. collector current

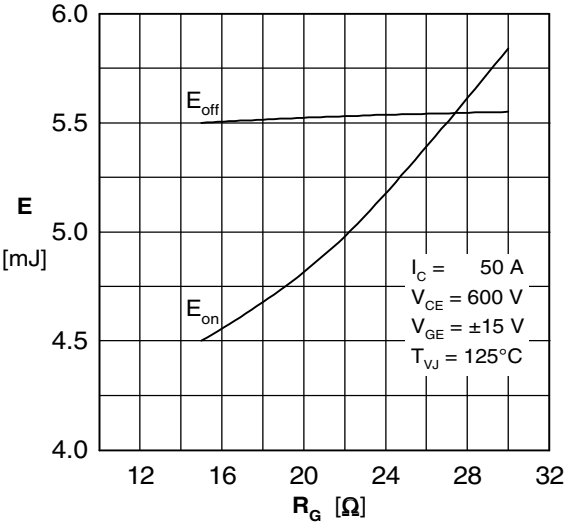


Fig. 6 Typ. switching energy vs. gate resistance

Inverter D1 - D6

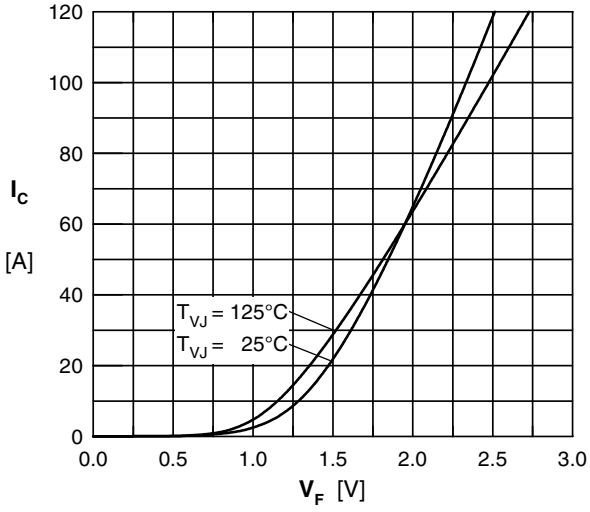


Fig. 7 Typ. Forward current versus V_F

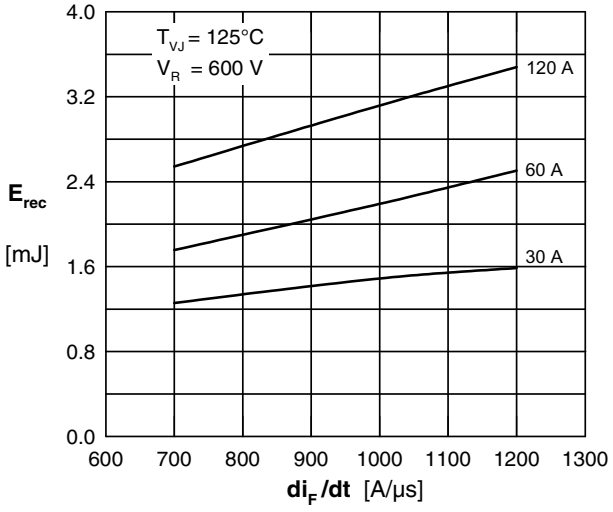


Fig. 8 Typ. recovery energy E_{rec} versu versus di/dt

	IGBT		FRD	
	R_i	τ_i	R_i	τ_i
1	0.1	0.0025	0.137	0.0025
2	0.05	0.03	0.1	0.03
3	0.21	0.03	0.233	0.03
4	0.07	0.08	0.13	0.08

NTC

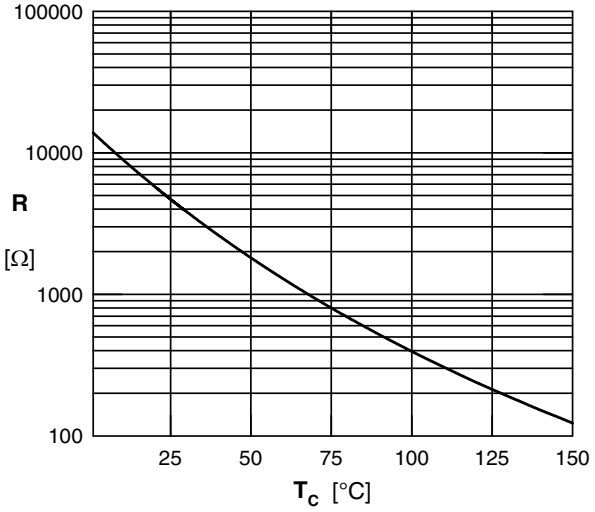


Fig. 9 Typ. NTC resistance versus temperature

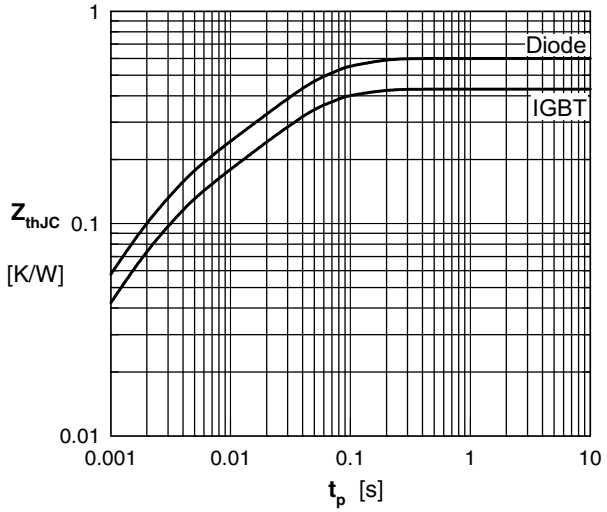


Fig. 10 Typ. transient thermal impedance

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F3L400R07ME4_B22 F4-50R07W2H3_B51 FB15R06W1E3 FB20R06W1E3_B11 FD1000R33HE3-K FD400R33KF2C-K FD401R17KF6C_B2 FD-DF80R12W1H3_B52 FF200R06YE3 FF300R12KE4_E FF450R12ME4P FF600R12IP4V FP10R06W1E3_B11 FP20R06W1E3 FP50R12KT3 FP75R07N2E4_B11 FS10R12YE3 FS150R07PE4 FS150R12PT4 FS200R12KT4R FS50R07N2E4_B11 FZ1000R33HE3 FZ1800R17KF4 DD250S65K3 DF1000R17IE4 DF1000R17IE4D_B2 DF1400R12IP4D DF200R12PT4_B6 DF400R07PE4R_B6 BSM75GB120DN2_E3223c-Se F3L300R12ME4_B22 F3L75R07W2E3_B11 F4-50R12KS4_B11 F475R07W1H3B11ABOMA1 FD1400R12IP4D FD200R12PT4_B6 FD800R33KF2C-K FF1200R17KP4_B2 FF300R17KE3_S4 FF300R17ME4_B11 FF401R17KF6C_B2 FF650R17IE4D_B2 FF900R12IP4D FF900R12IP4DV STGIF7CH60TS-L FP50R07N2E4_B11 FS100R07PE4 FS150R07N3E4_B11 FS150R17N3E4 FS150R17PE4