

Six-Pack XPT IGBT

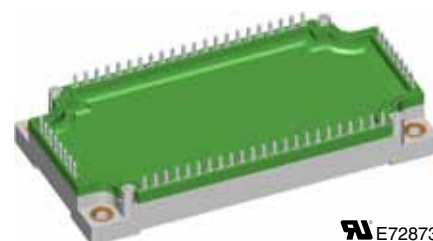
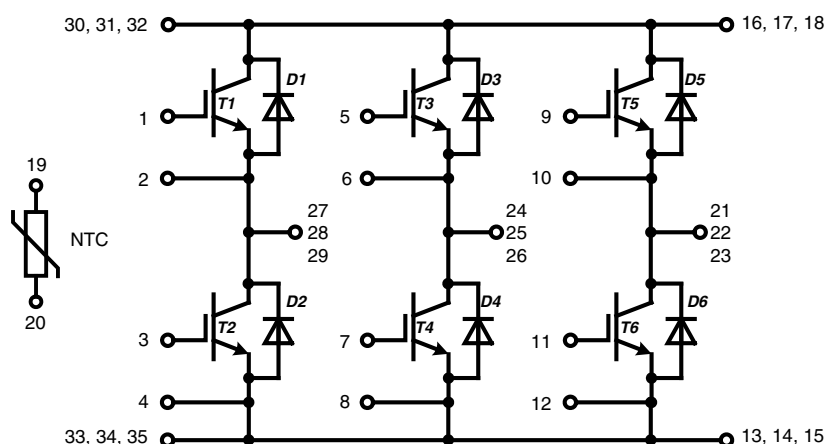
$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 220 \text{ A}$$

$$V_{CE(sat)} = 1.8 \text{ V}$$

Part name (Marking on product)

MIXA150W1200TEH



E72873

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 μ sec.
 - 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:

- "E3-Pack" standard outline
- Insulated copper base plate
- Soldering pins for PCB mounting
- Temperature sense included
- Optimizes pin layout

Output Inverter T1 - T6

				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			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	$T_C = 25^{\circ}\text{C}$			220	A
I_{C80}		$T_C = 80^{\circ}\text{C}$			150	A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			695	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 150\text{ A}; V_{GE} = 15\text{ V}$		1.8 2.1	2.1	V V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 6\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$ 5.4	6.0	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.05 1.0	0.5	mA mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 150\text{ A}$		470		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 150\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 4.7\text{ }\Omega$	$T_{VJ} = 125^{\circ}\text{C}$	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			14		mJ
E_{off}	turn-off energy per pulse			16		mJ
E_{rec}	diode turn-off energy per pulse			10		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 4.7\text{ }\Omega;$	$T_{VJ} = 125^{\circ}\text{C}$ $V_{CEK} = 1200\text{ V}$		450	A
SCSOA	short circuit safe operating area					
t_{sc}	short circuit duration	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$	$T_{VJ} = 125^{\circ}\text{C}$		10	μs
I_{sc}	short circuit current	$R_G = 4.7\text{ }\Omega;$ non-repetitive		600		A
R_{thJC}	thermal resistance junction to case	(per IGBT)			0.18	K/W

Output Inverter D1 - D6

				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_{RRM}	<i>max. repetitive reverse voltage</i>		$T_{VJ} = 25^{\circ}\text{C}$		1200	V
I_{F25}	<i>forward current</i>		$T_C = 25^{\circ}\text{C}$		190	A
I_{F80}			$T_C = 80^{\circ}\text{C}$		130	A
V_F	<i>forward voltage</i>	$I_F = 150\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.95 1.95	2.2	V V
Q_{rr}	<i>reverse recovery charge</i>	$V_R = 600\text{ V}$ $di_F/dt = -2500\text{ A}/\mu\text{s}$ $I_F = 150\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	20		μC
I_{RM}	<i>max. reverse recovery current</i>			175		A
t_{rr}	<i>reverse recovery time</i>			350		ns
E_{rec}	<i>reverse recovery energy</i>			10		mJ
R_{thJC}	<i>thermal resistance junction to case</i>	(per diode)			0.28	K/W

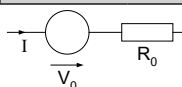
 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

Temperature Sensor NTC

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
R_{25}	resistance	$T_C = 25^{\circ}\text{C}$	4.75	5.0	5.25		k Ω
$B_{25/50}$				3375			K

Module

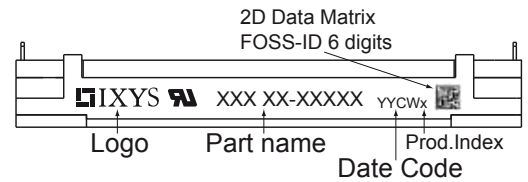
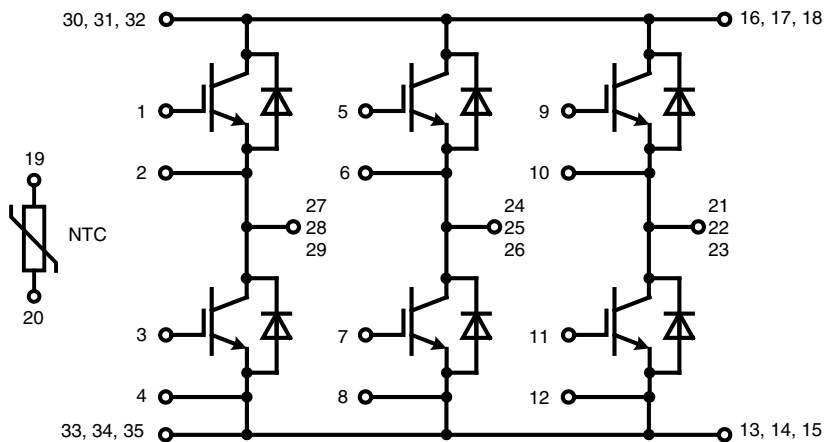
Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
T_{VJ}	operating temperature		-40		125		$^{\circ}\text{C}$
T_{VJM}	max. virtual junction temperature				150		$^{\circ}\text{C}$
T_{stg}	storage temperature		-40		125		$^{\circ}\text{C}$
V_{ISOL}	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$			3000		V~
CTI	comparative tracking index				200		
M_d	mounting torque (M5)		3		6		Nm
d_s	creep distance on surface		10				mm
d_A	strike distance through air		7.5				mm
$R_{pin-chip}$	resistance pin to chip			2.5			m Ω
R_{thCH}	thermal resistance case to heatsink	with heatsink compound		0.02			K/W
Weight				300			g

Equivalent Circuits for Simulation


Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_0	IGBT	T1 - T6	$T_{VJ} = 150^{\circ}\text{C}$		1.1		V
R_0					9.2		m Ω
V_0	free wheeling diode	D1 - D6	$T_{VJ} = 150^{\circ}\text{C}$		1.25		V
R_0					5.7		m Ω

$T_C = 25^{\circ}\text{C}$ unless otherwise stated

Circuit Diagram

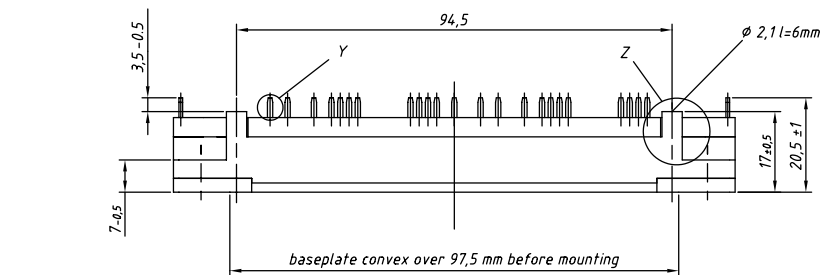


Part number

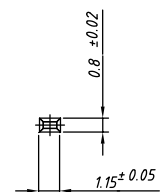
M = Module
 I = IGBT
 X = XPT
 A = standard
 150 = Current Rating [A]
 W = Six-Pack
 1200 = Reverse Voltage [V]
 T = NTC
 EH = E3-Pack

Outline Drawing

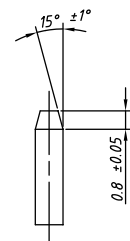
Dimensions in mm (1 mm = 0.0394")



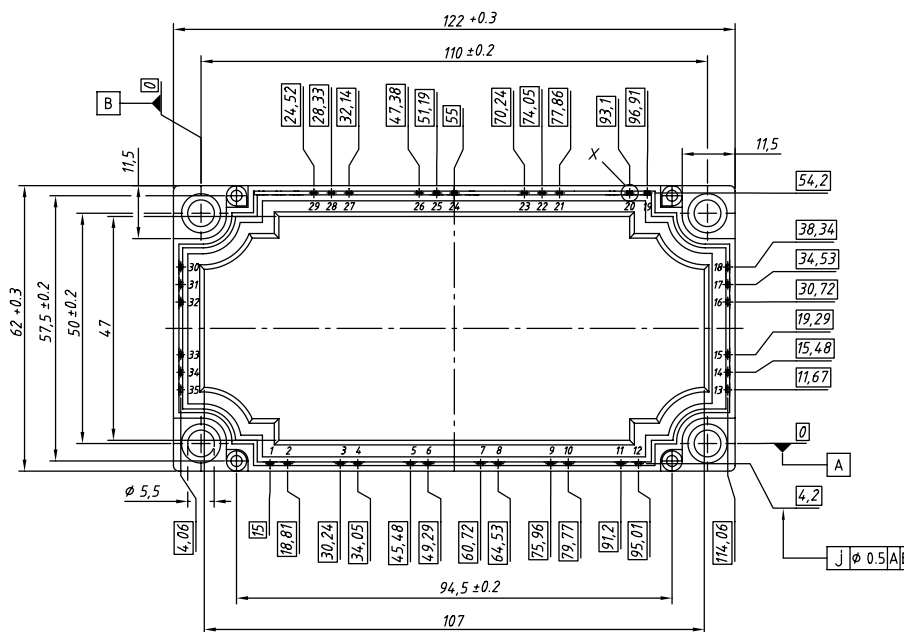
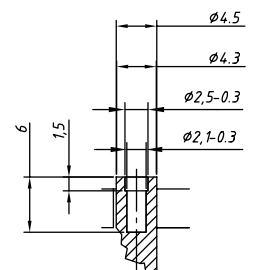
Detail X



Detail Y



Detail Z



Transistor T1 - T6

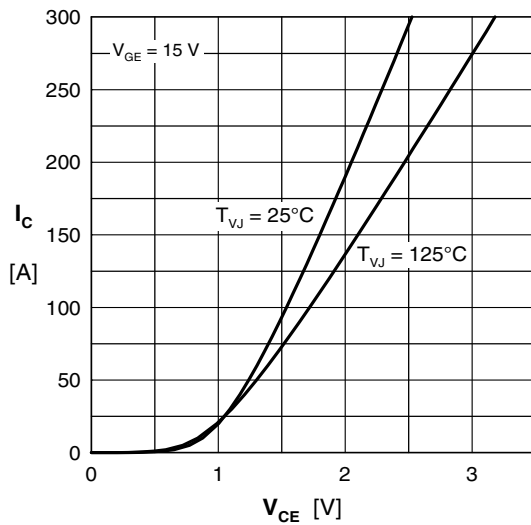


Fig. 1 Typ. output characteristics

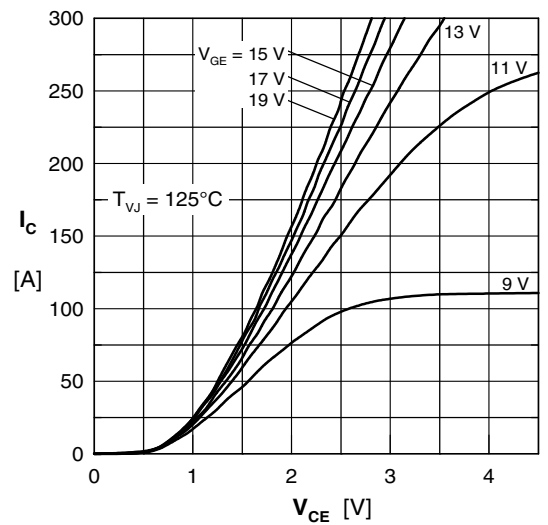


Fig. 2 Typ. output characteristics

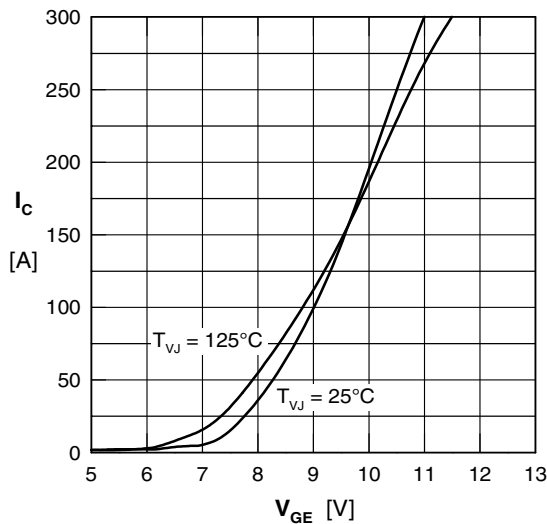


Fig. 3 Typ. transfer characteristics

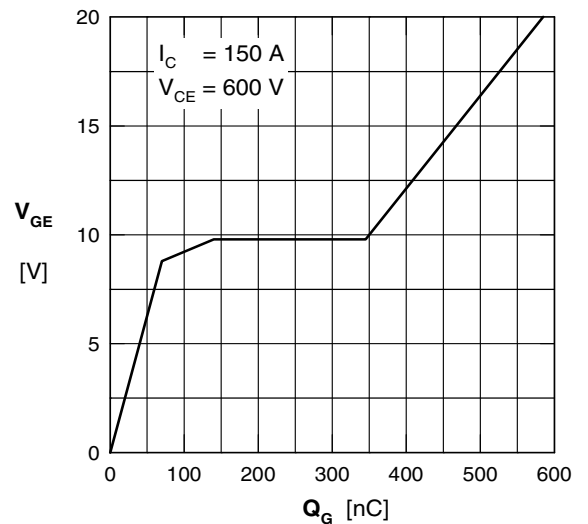


Fig. 4 Typ. turn-on gate charge

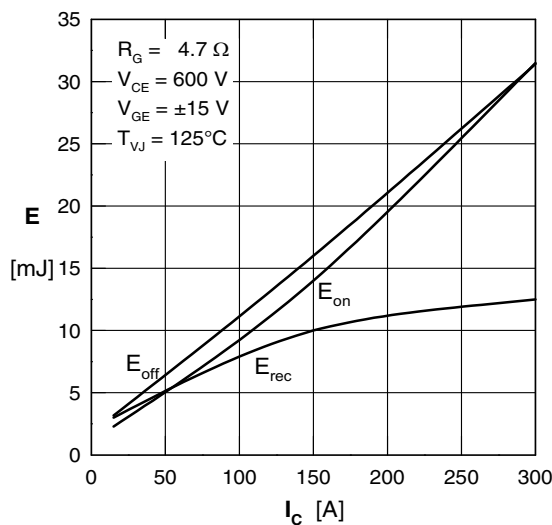


Fig. 5 Typ. switching energy vs. collector current

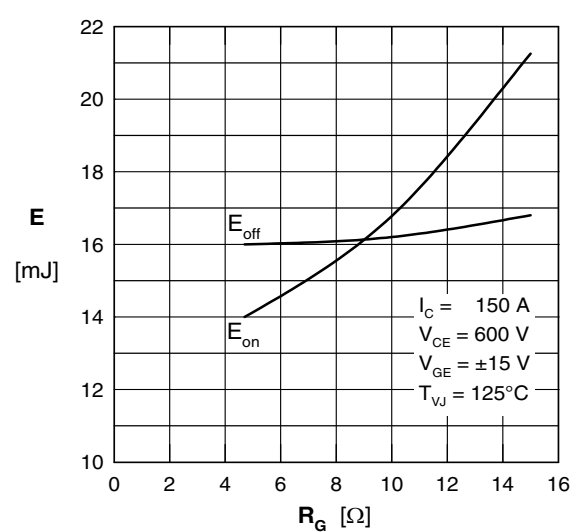


Fig. 6 Typ. switching energy vs. gate resistance

Inverter D1 - D6

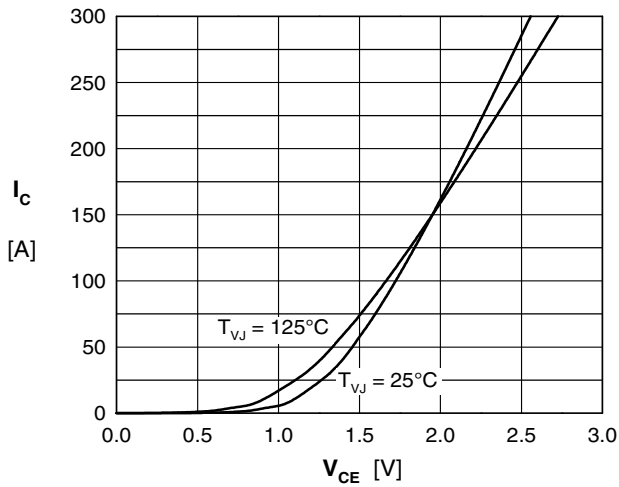


Fig.7 Typical forward characteristics

Inverter Transistor & Diode

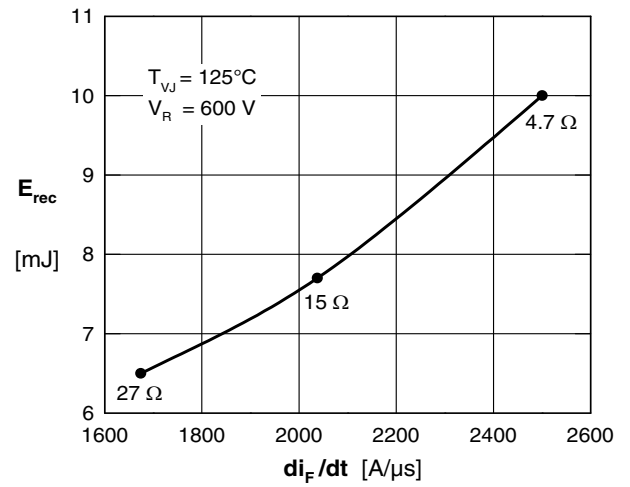


Fig. 8 Typ. recovery energy E_{rec} versus di_F/dt

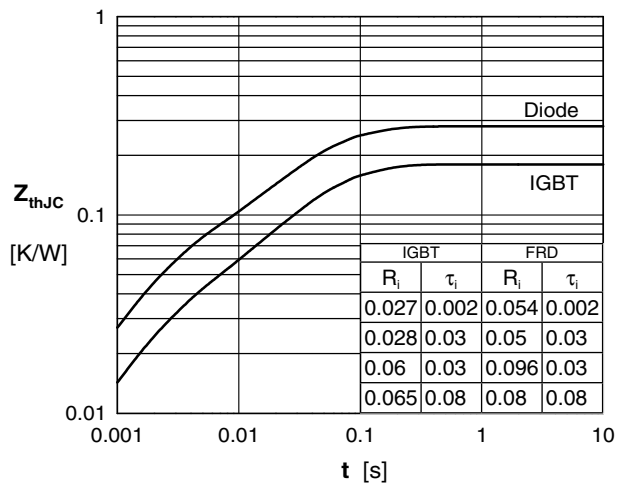


Fig. 9 Typ. transient thermal impedance

NTC

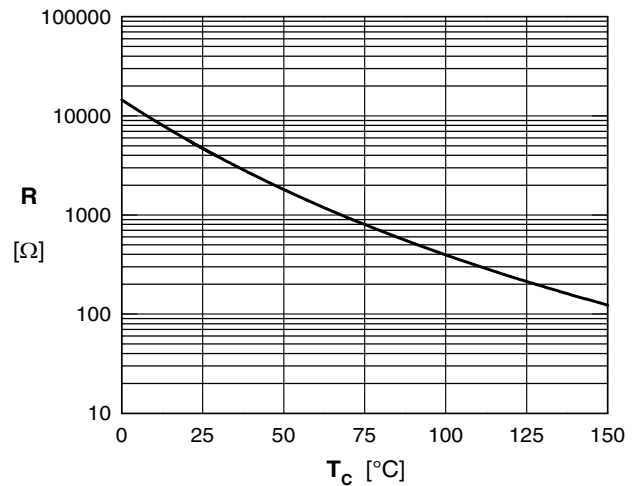


Fig. 10 Typ. NTC resistance vs. temperature