

Six-Pack XPT IGBT

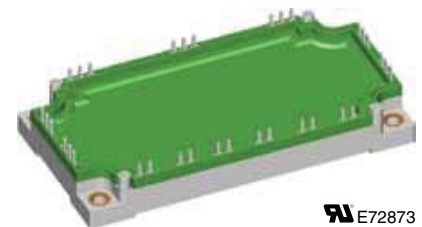
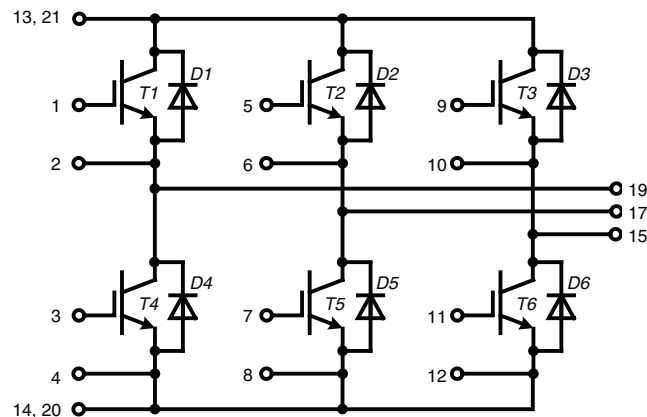
$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 155 \text{ A}$$

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

Part name (Marking on product)

MIXA101W1200EH



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
- Optimizes pin layout

Output Inverter T1 - T6

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{CES}	collector emitter voltage				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				155	A
I_{C80}					108	A
P_{tot}	total power dissipation				500	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 100 \text{ A}; V_{GE} = 15 \text{ V}$		1.8	2.1	V
				2.1		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 4 \text{ mA}; V_{GE} = V_{CE}$		5.4	6.0	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$		0.03	0.3	mA
				0.6		mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20 \text{ V}$			500	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 100 \text{ A}$		295		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600 \text{ V}; I_C = 100 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 7 \Omega$	$T_{VJ} = 125^\circ\text{C}$		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				8.5	mJ
E_{off}	turn-off energy per pulse				11	mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15 \text{ V}; R_G = 7 \Omega;$			300	A
			$T_{VJ} = 125^\circ\text{C}$ $V_{CEK} = 1200 \text{ V}$			
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	$R_G = 7 \Omega;$ non-repetitive		400		A
R_{thJC}	thermal resistance junction to case	(per IGBT)			0.25	K/W

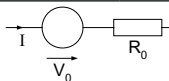
Output Inverter D1 - D6

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{RRM}	max. repetitive reverse voltage				1200	V
I_{F25}	forward current				135	A
I_{F80}					90	A
V_F	forward voltage	$I_F = 100 \text{ A}; V_{GE} = 0 \text{ V}$		1.95	2.2	V
				1.95		V
Q_{rr}	reverse recovery charge	$V_R = 600 \text{ V}$ $di_F/dt = -1600 \text{ A}/\mu\text{s}$ $I_F = 100 \text{ A}; V_{GE} = 0 \text{ V}$	$T_{VJ} = 125^\circ\text{C}$		12.5	μC
I_{RM}	max. reverse recovery current				100	A
t_{rr}	reverse recovery time				350	ns
E_{rec}	reverse recovery energy				4	mJ
R_{thJC}	thermal resistance junction to case	(per diode)			0.4	K/W

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

Module

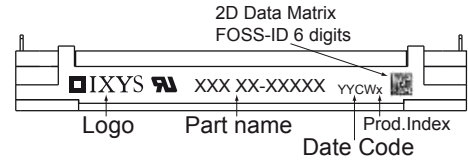
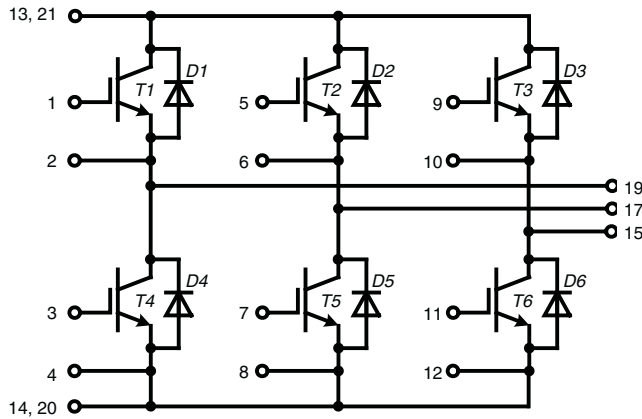
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
T_{VJ}	<i>operating temperature</i>		-40		125	°C
T_{VJM}	<i>max. virtual junction temperature</i>				150	°C
T_{stg}	<i>storage temperature</i>		-40		125	°C
V_{ISOL}	<i>isolation voltage</i>	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$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

Equivalent Circuits for Simulation


Symbol	Definitions	Conditions		Ratings			Unit
				min.	typ.	max.	
V_0	<i>IGBT</i>	T1 - T6	$T_{VJ} = 150^\circ\text{C}$			1.1	V
R_0						13.8	mΩ
V_0	<i>free wheeling diode</i>	D1 - D6	$T_{VJ} = 150^\circ\text{C}$			1.25	V
R_0						8.5	mΩ

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

Circuit Diagram

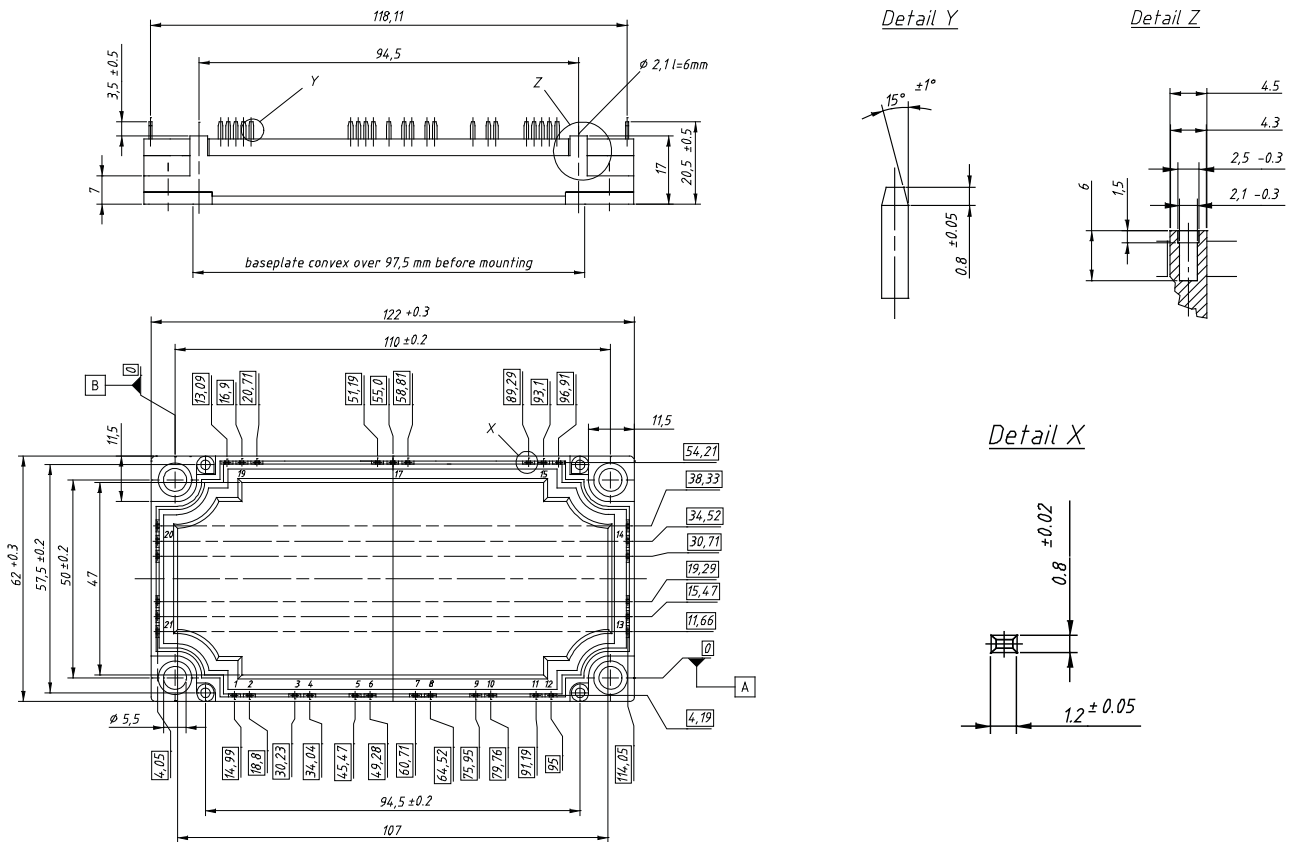


Part number

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

Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXA101W1200EH	MIXA101W1200EH	Box	5	511591

Transistor T1 - T6

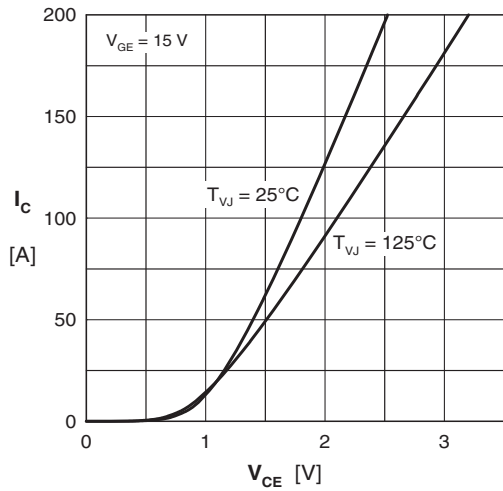


Fig. 1 Typ. output characteristics

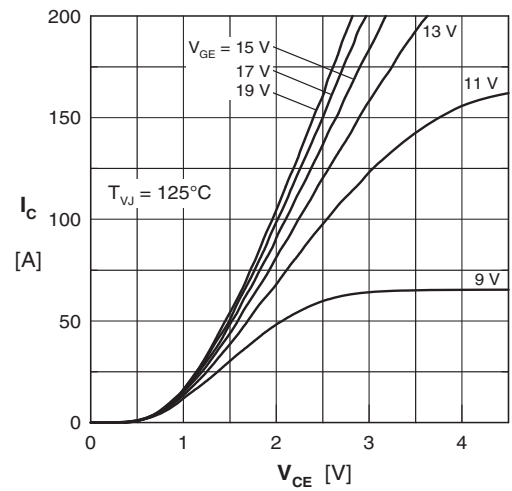


Fig. 2 Typ. output characteristics

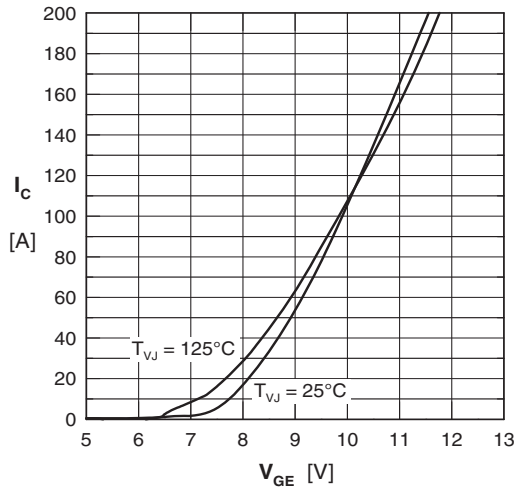


Fig. 3 Typ. transfer characteristics

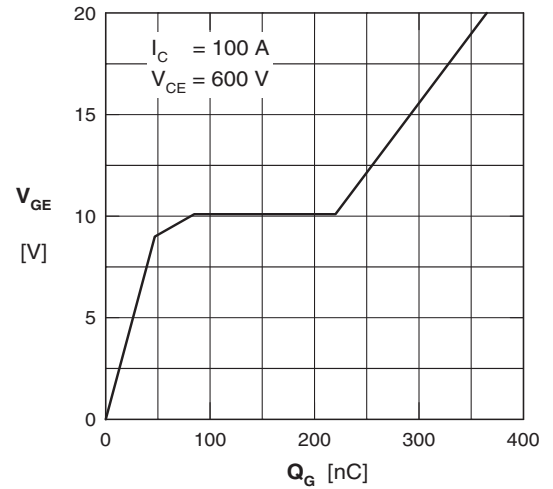


Fig. 4 Typ. turn-on gate charge

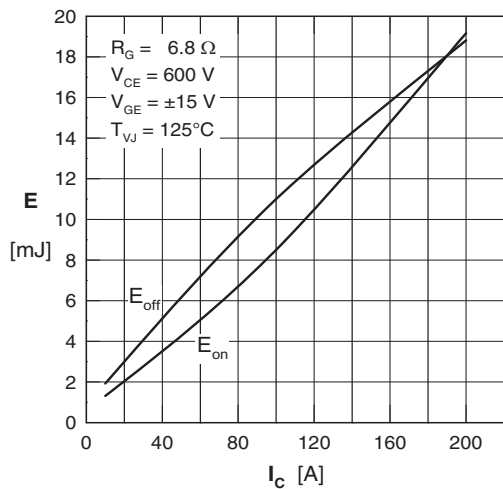


Fig. 5 Typ. switching energy vs. collector current

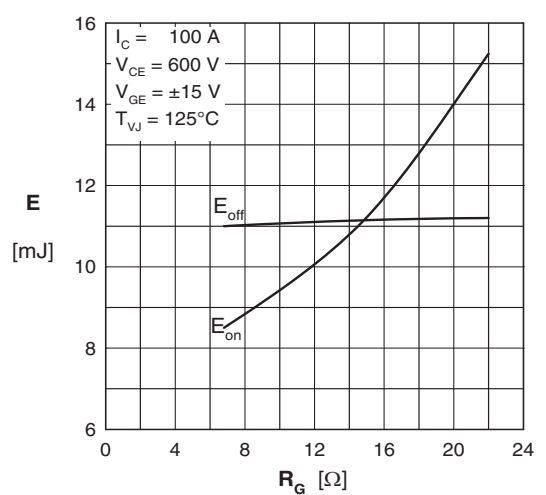


Fig. 6 Typ. switching energy vs. gate resistance

Inverter D1 - D6

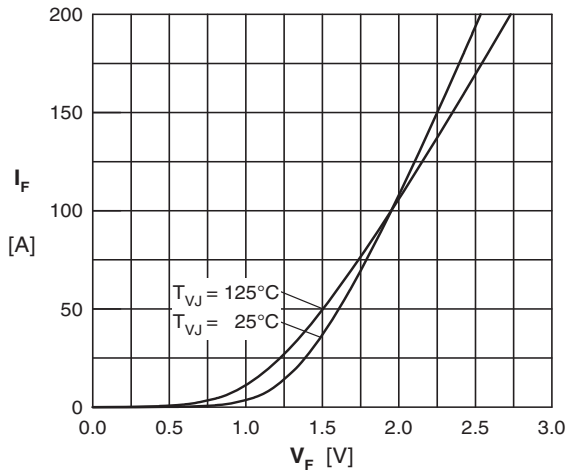


Fig. 7 Typ. Forward current versus V_F

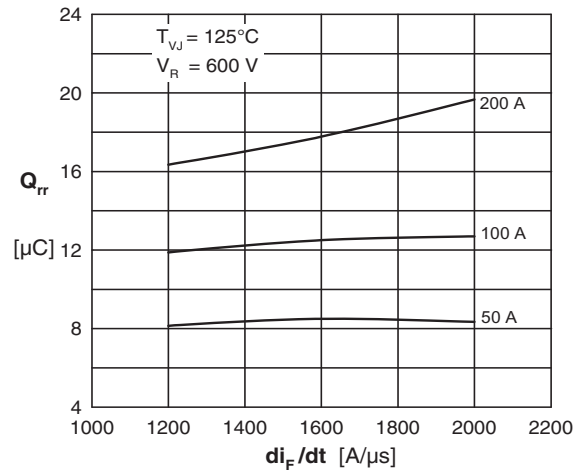


Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt

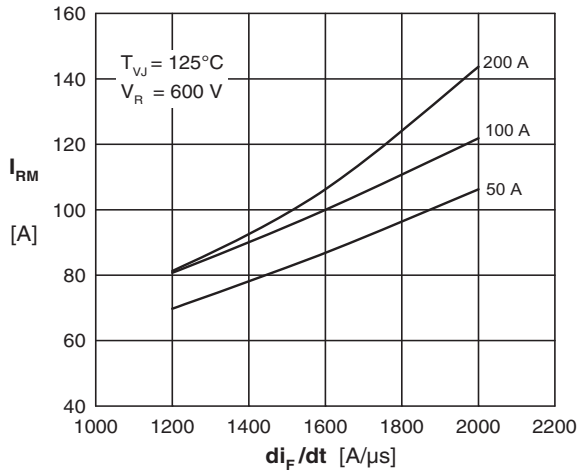


Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt

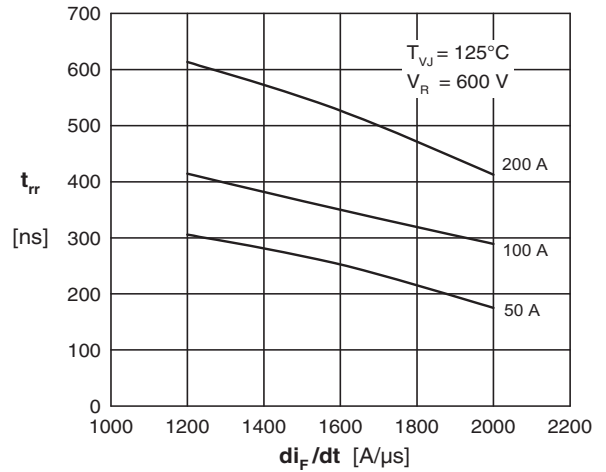


Fig. 10 Typ. recovery time t_{rr} versus di/dt

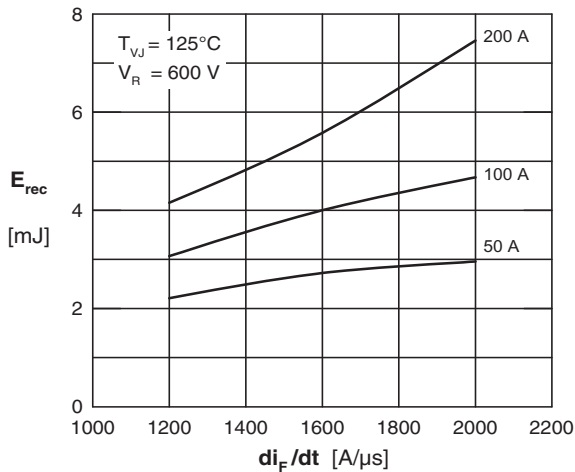


Fig. 11 Typ. recovery energy E_{rec} versus di/dt

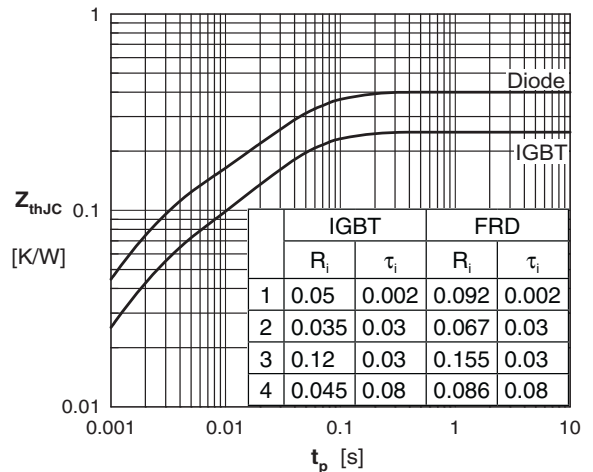


Fig. 12 Typ. transient thermal impedance