

XPT IGBT Module

preliminary

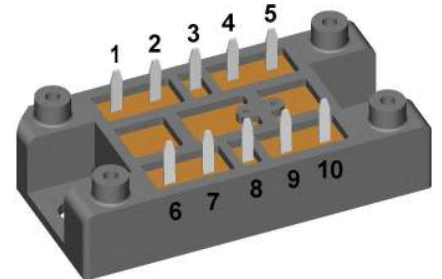
$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 85 \text{ A}$$

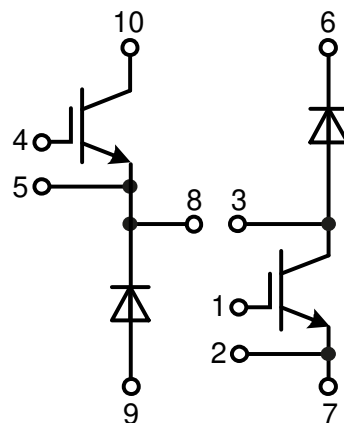
$$V_{CE(sat)} = 1.8 \text{ V}$$

H~ Bridge, Buck / Boost - Combination

Part number

MIXA60HU1200VA


Backside: isolated

 E72873


Features / Advantages:

- 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
 - low EMI
 - square RBSOA @ 3x I_c
- 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

Applications:

- Switched-mode power supplies
- Switched reluctance motor drive

Package: V1-A-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

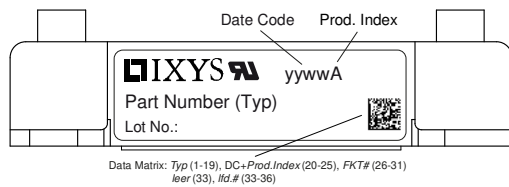
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IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
V_{CES}	collector emitter voltage				1200	V	
V_{GES}	max. DC gate voltage				±20	V	
V_{GEM}	max. transient gate emitter voltage				±30	V	
I_{C25}	collector current				85	A	
I_{C80}					60	A	
P_{tot}	total power dissipation				290	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 55 A; V_{GE} = 15 V$			1.8	V	
					2.1	V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 2 mA; V_{GE} = V_{CE}$	5.4	5.9	6.5	V	
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0 V$			0.5	mA	
					0.2	mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20 V$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600 V; V_{GE} = 15 V; I_C = 55 A$			165	nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600 V; I_C = 55 A$ $V_{GE} = \pm 15 V; R_G = 15 \Omega$			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	$V_{GE} = \pm 15 V; R_G = 15 \Omega$					
I_{CM}		$V_{CEmax} = 1200 V$			150	A	
SCSOA	short circuit safe operating area	$V_{CEmax} = 1200 V$					
t_{SC}	short circuit duration	$V_{CE} = 900 V; V_{GE} = \pm 15 V$			10	µs	
I_{SC}	short circuit current	$R_G = 15 \Omega; \text{non-repetitive}$			200	A	
R_{thJC}	thermal resistance junction to case				0.5	K/W	
R_{thCH}	thermal resistance case to heatsink				0.30	K/W	
Diode							
V_{RRM}	max. repetitive reverse voltage				1200	V	
I_{F25}	forward current				88	A	
I_{F80}					59	A	
V_F	forward voltage	$I_F = 60 A$			2.20	V	
					1.95	V	
I_R	reverse current	$V_R = V_{RRM}$			0.3	mA	
					1.2	mA	
Q_{rr}	reverse recovery charge	$V_R = 600 V$ $-di_F/dt = 1200 A/\mu s$ $I_F = 60 A; V_{GE} = 0 V$			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				0.6	K/W	
R_{thCH}	thermal resistance case to heatsink				0.2	K/W	

preliminary

Package V1-A-Pack		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			100	A
T_{VJ}	virtual junction temperature		-40		150	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				37		g
M_D	mounting torque		2		2.5	Nm
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	6.0			mm
$d_{Spb/Apb}$		terminal to backside	12.0			mm
V_{ISOL}	isolation voltage	t = 1 second	3600			V
		t = 1 minute	3000			V

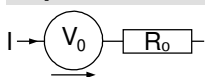

Part description

M = Module
 I = IGBT
 X = XPT IGBT
 A = Gen 1 / std
 60 = Current Rating [A]
 HU = H- Bridge, Buck / Boost - Combination
 1200 = Reverse Voltage [V]
 VA = V1-A-Pack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA60HU1200VA	MIXA60HU1200VA	Blister	24	518854

Equivalent Circuits for Simulation

* on die level

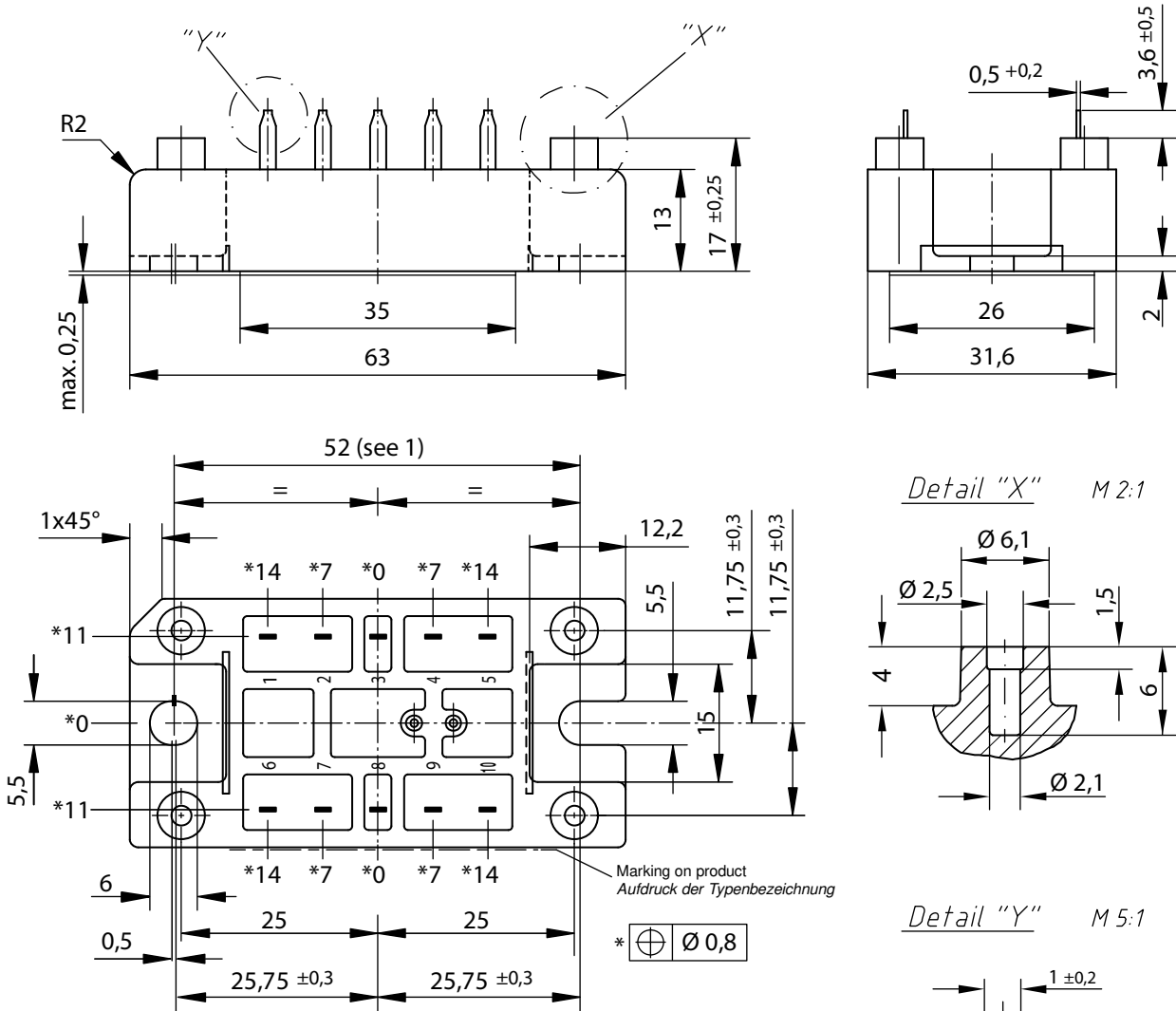
 $T_{VJ} = 150^{\circ}\text{C}$

 $V_{0\ max}$ threshold voltage

 $R_{0\ max}$ slope resistance *

	IGBT	Diode	
$V_{0\ max}$	1.1	1.22	V
$R_{0\ max}$	25.1	13	mΩ

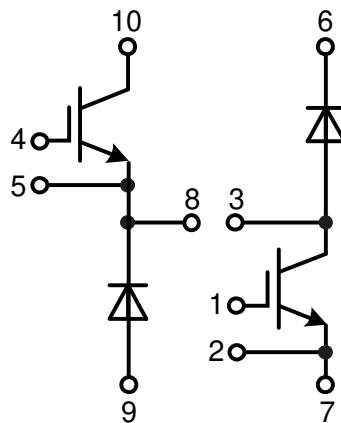


Outlines V1-A-Pack



Remarks / Bemerkungen:

1. Nominal distance mounting screws on heat sink: 52 mm / Nennabstand Befestigungsschrauben auf Kühlkörper: 52 mm
2. General tolerance / Allgemeintoleranz: DIN ISO 2768 -T1-c
3. Surface treatment of pins: tin plated (Sn) in hot dip / Oberflächenbehandlung der Pins: verzinkt (Sn) im Tauchbad
4. Detail X: EJOT PT® self-tapping screws (dimension K25) to be recommended for mounting on PCB
selbstschneidende Schraube (Größe K25) empfohlen für die PCB-Montage
Take care on the maximum screw length according to board thickness and the maximum hole depth of 6 mm^L
Bei der Wahl der Schraubenlänge die PCB-Dicke und die maximale Lochtiefe von 6mm beachten
Recommended mounting torque: 1.5 Nm / Empfohlenes Drehmoment: 1.5 Nm



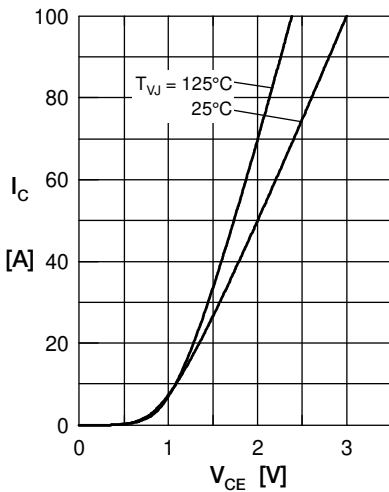
IGBT


Fig. 1 Typ. output characteristics

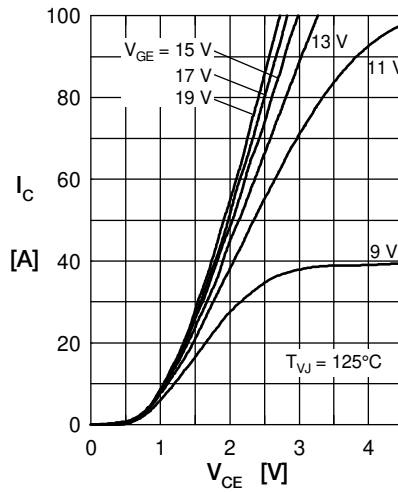


Fig. 2 Typ. output characteristics

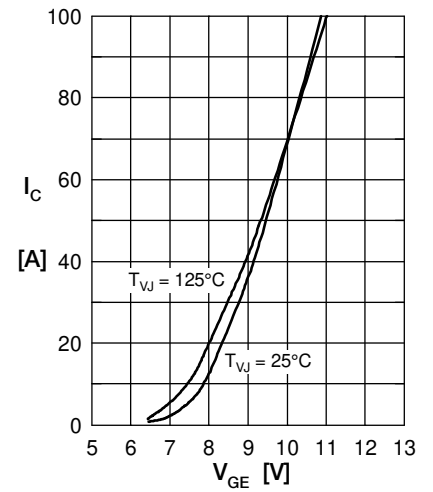


Fig. 3 Typ. transfer characteristics

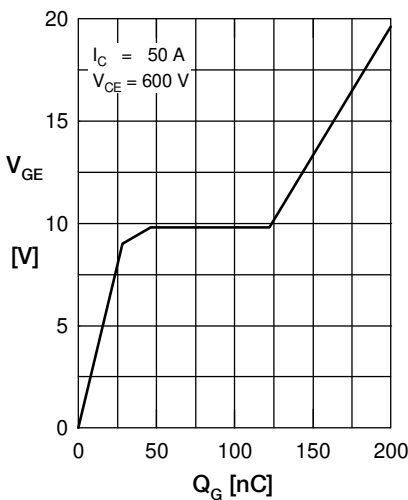
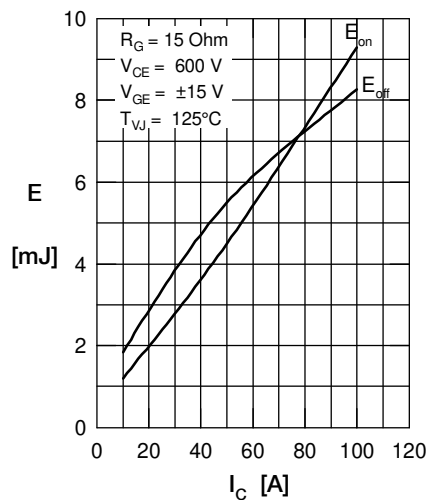
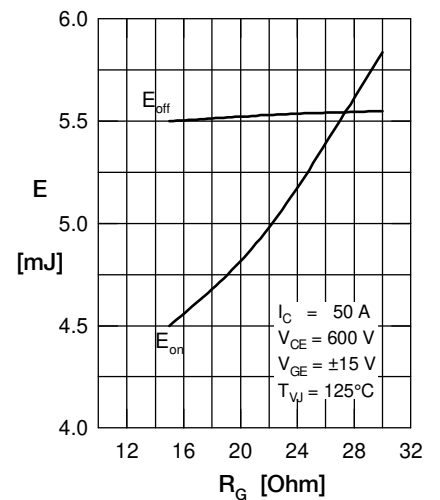
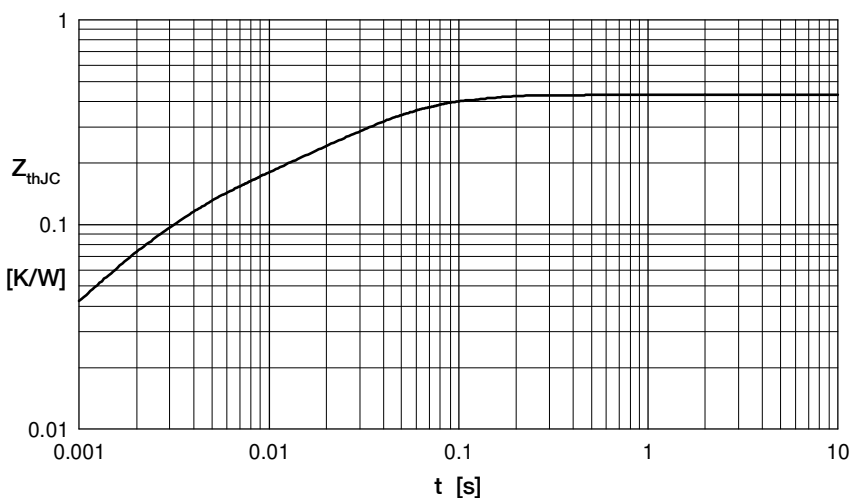

 Fig. 4 Dynamic parameters
 Q_r, I_{RM} versus T_{VJ}

 Fig. 5 Typ. recovery time
 t_{rr} versus $-di_F/dt$

 Fig. 6 Typ. peak forward voltage
 V_{FR} and t_{rr} versus di_F/dt


Fig. 7 Transient thermal impedance junction to case



Diode

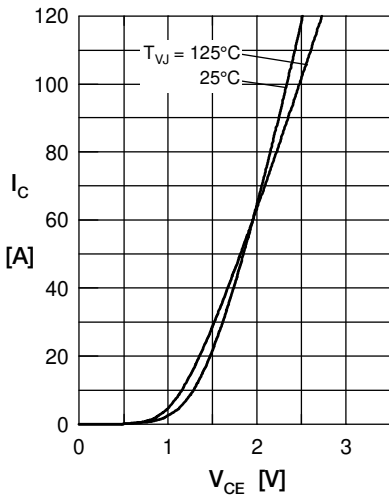


Fig. 1 Typ. Forward current versus V_F

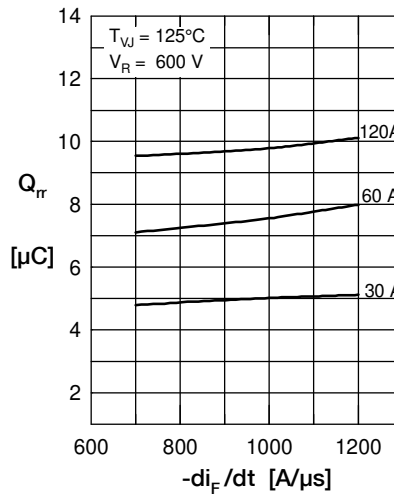


Fig. 2 Typ. reverse recovery charge Q_{rr} versus di/dt

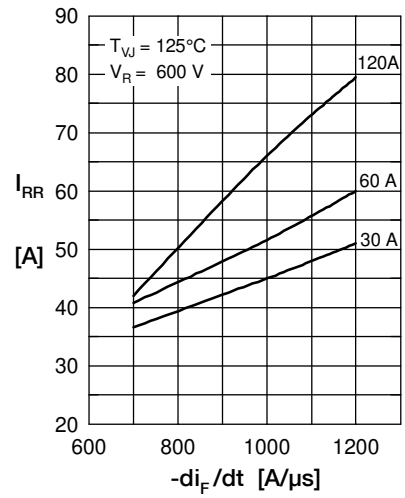


Fig. 3 Typ. peak reverse current I_{RM} versus di/dt

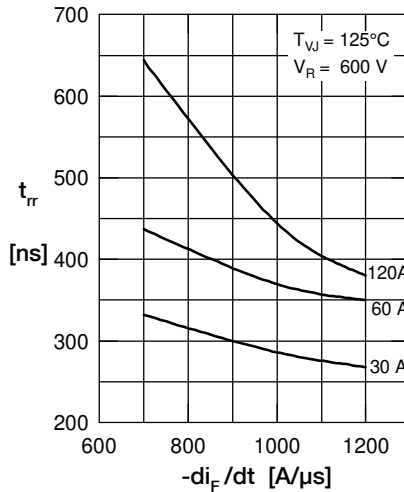


Fig. 4 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

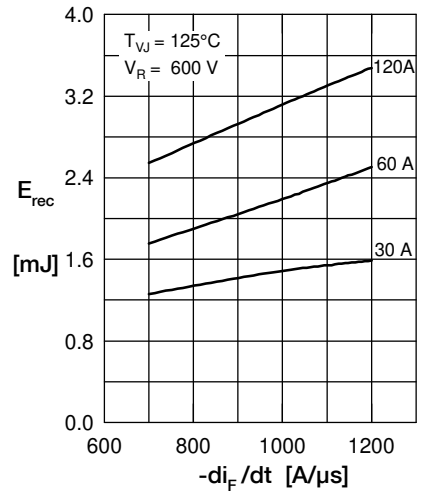


Fig. 5 Typ. recovery time t_{rr} versus $-di_F/dt$

Fig. 6 Typ. recovery energy E_{rec} versus $-di/dt$

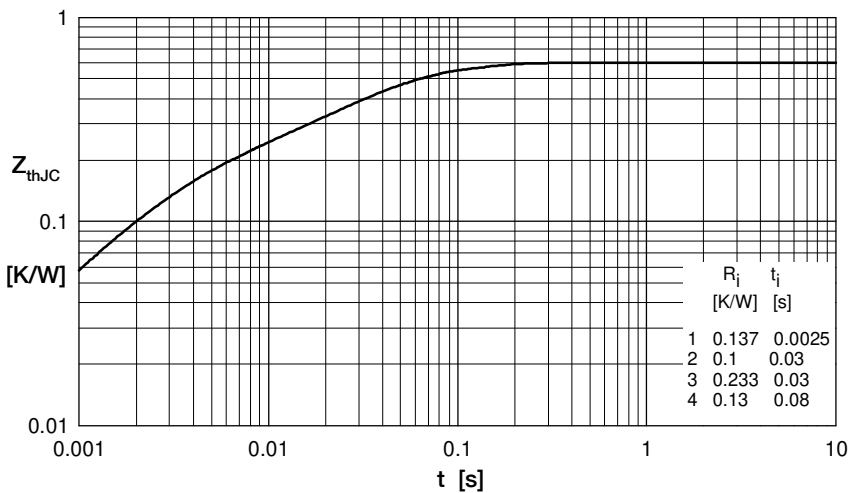


Fig. 7 Transient thermal impedance junction to case