preliminary

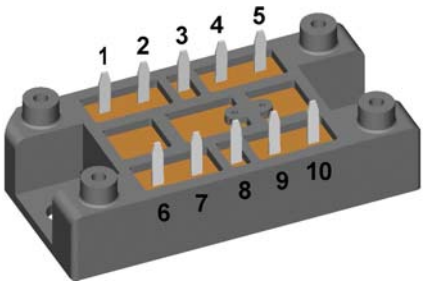
XPT IGBT Module

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

H~ Bridge, Buck / Boost - Combination

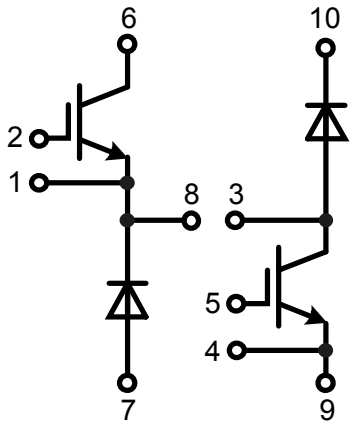
Part number

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 µsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x Ic
- Thin wafer technology combined with the XPT design results in a competitive low VCE(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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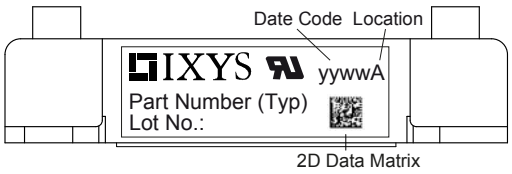
IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*					±20	V
V_{GEM}	*max. transient gate emitter voltage*					±30	V
I_{C25}	*collector current*		T_C = 25°C			85	A
I_{C80}			T_C = 80°C			60	A
P_{tot}	*total power dissipation*		T_C = 25°C			290	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 55A; 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 = 2mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.4	5.9	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 = 55 A			165		nC
$t_{d(on)}$	*turn-on delay time*				70		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*	inductive load	T_{VJ} = 125°C		250		ns
t_f	*current fall time*	V_{CE} = 600 V; I_C = 55 A			100		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 15 Ω			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				
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} = ±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*					0.5	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.30		K/W

Diode							
V_{RRM}	*max. repetitive 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 = 60A	T_{VJ} = 25°C			2.20	V
			T_{VJ} = 125°C		1.95		V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.3	mA
			T_{VJ} = 125°C		1.2		mA
Q_{rr}	*reverse recovery charge*				8		µC
I_{RM}	*max. reverse recovery current*	V_R = 600 V			60		A
t_{rr}	*reverse recovery time*	-di_F/dt = 1200 A/µs	T_{VJ} = 125°C		350		ns
E_{rec}	*reverse recovery energy*	I_F = 60A; V_{GE} = 0 V			2.5		mJ
R_{thJC}	*thermal resistance junction to case*					0.6	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.20		K/W

preliminary

Package V1-A-Pack				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal				100	A
T_{stg}	*storage temperature*			-40		125	°C
T_{VJ}	*virtual junction temperature*			-40		150	°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	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V

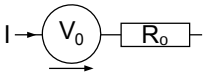


Part number

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

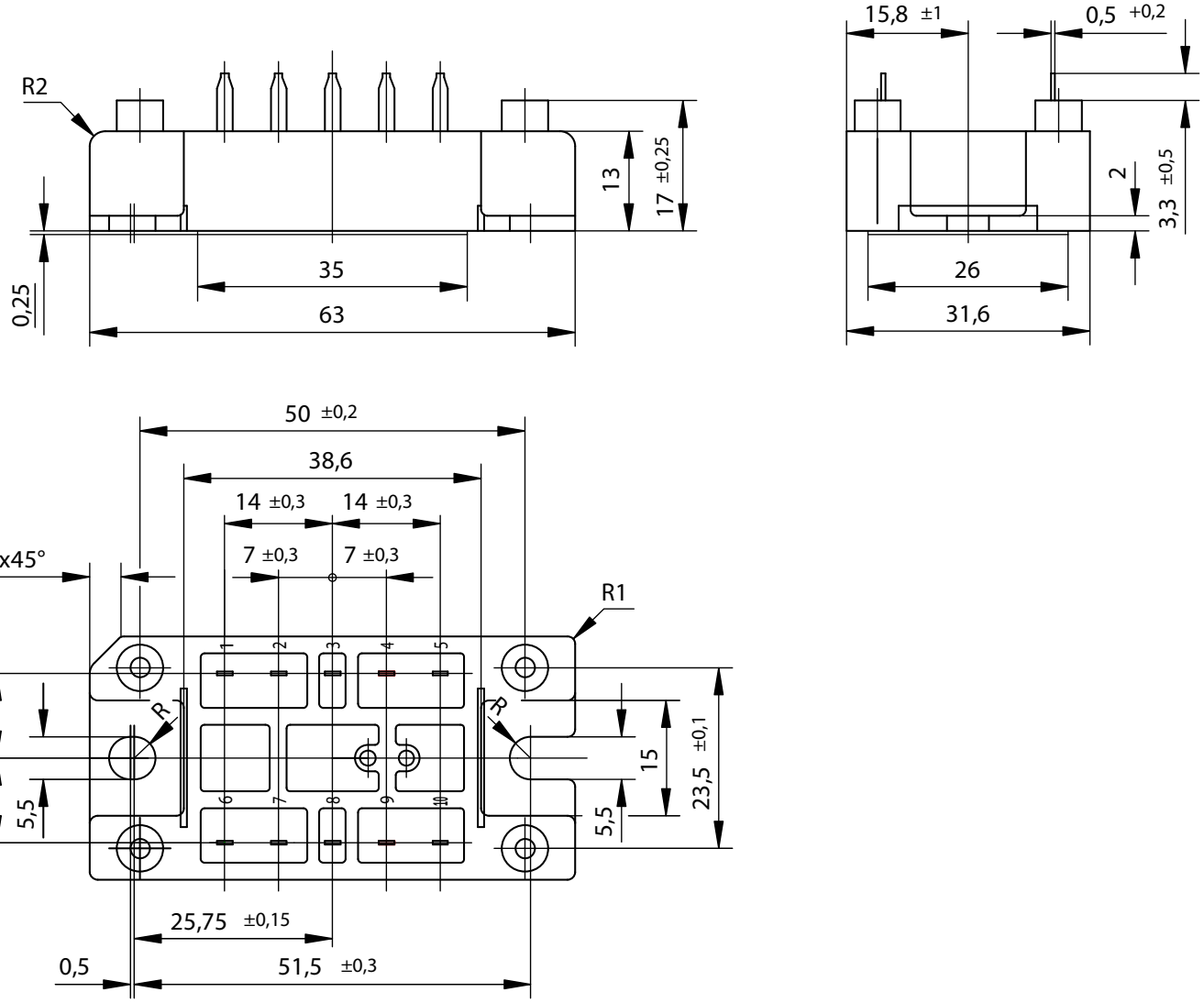
Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA60HU1200VA	MIXA60HU1200VA	Box	10	511602

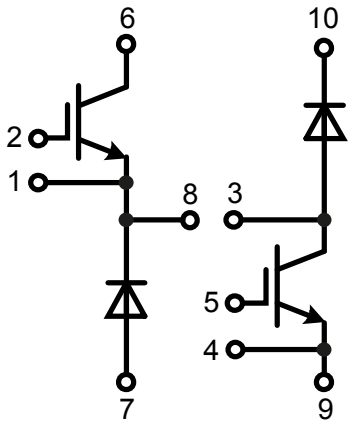
Equivalent Circuits for Simulation ** on die level* T_{VJ} = 150 °C



		IGBT	Diode	
$V_{0\,max}$	*threshold voltage*	1.1	1.22	V
$R_{0\,max}$	*slope resistance **	25.1	13	mΩ

Outlines V1-A-Pack





IGBT

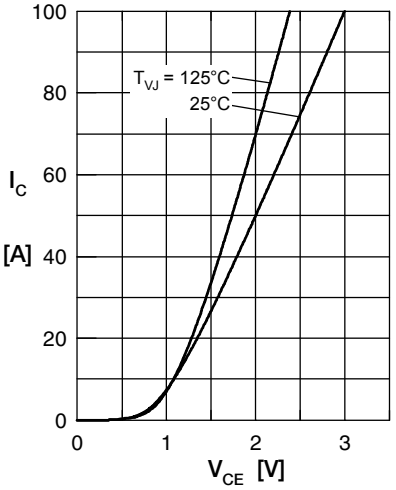


Fig. 1 Typ. output characteristics

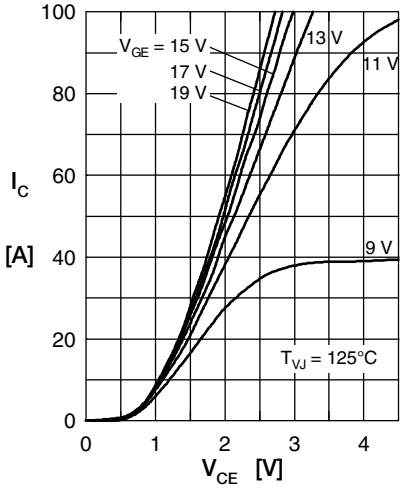


Fig. 2 Typ. output characteristics

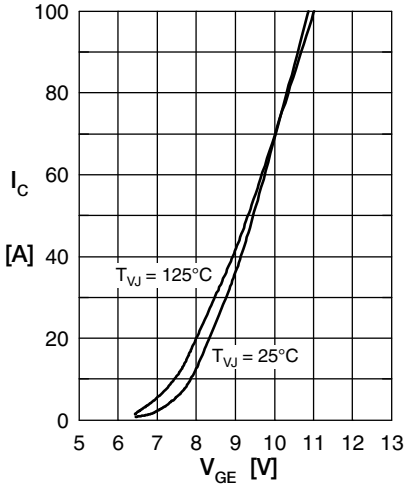


Fig. 3 Typ. transfer characteristics

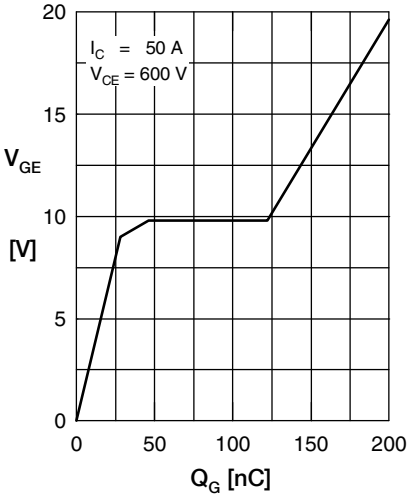


Fig. 4 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

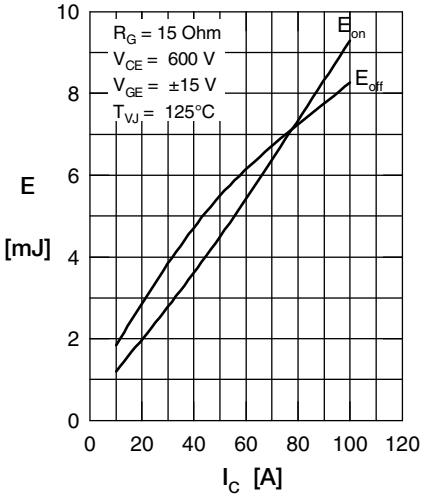


Fig. 5 Typ. recovery time t_{rr} versus $-di_F/dt$

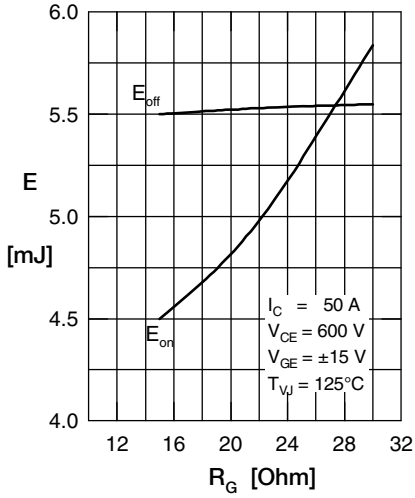


Fig. 6 Typ. peak forward voltage V_{FR} and t_{fr} versus di_F/dt

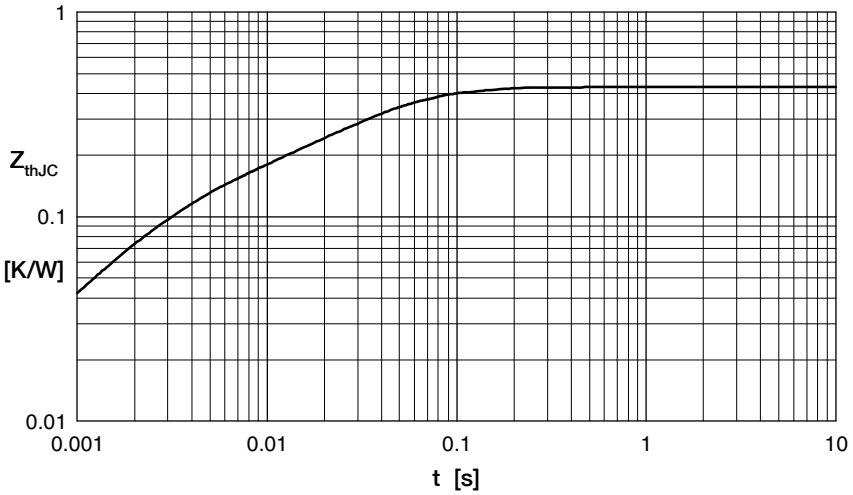


Fig. 7 Transient thermal impedance junction to case

Diode

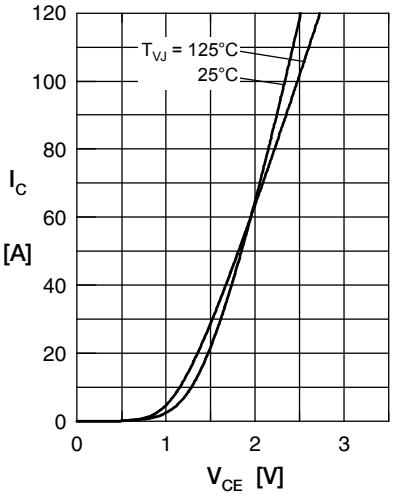


Fig. 1 Typ. Forward current versus V_F

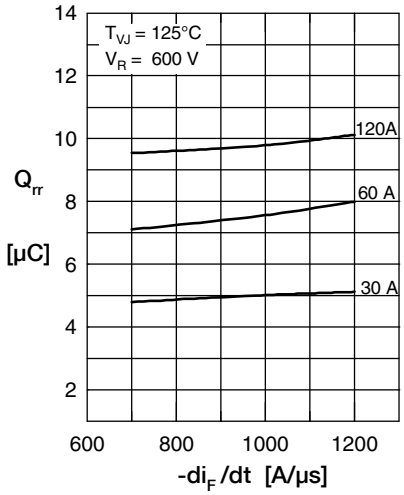


Fig. 2 Typ. reverse recovery charge Q_{rr} versus di/dt

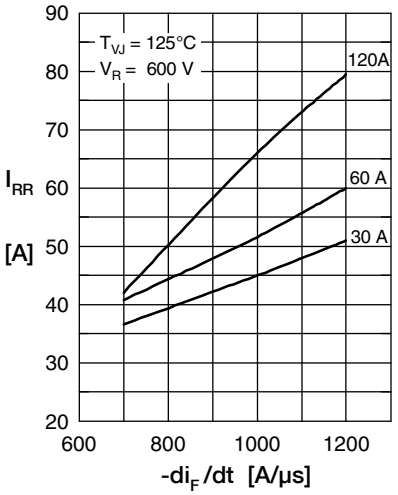


Fig. 3 Typ. peak reverse current I_{RM} versus di/dt

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

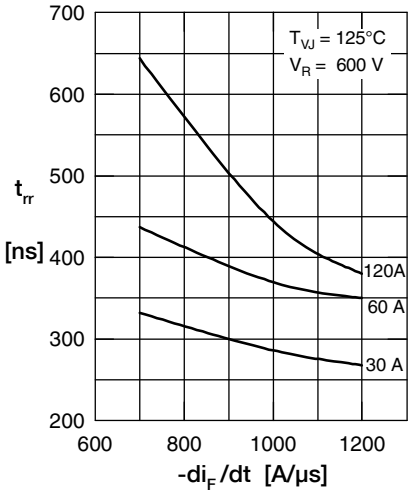


Fig. 5 Typ. recovery time t_{rr} versus -di_F/dt

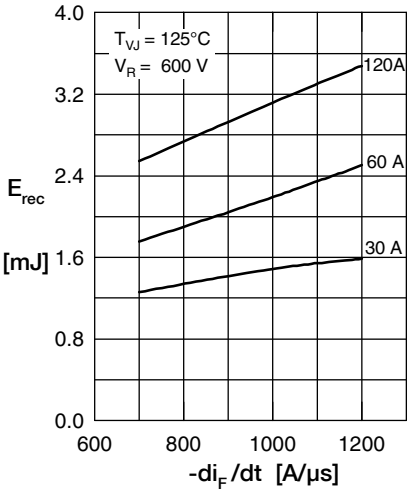


Fig. 6 Typ. recovery energy E_{rec} versus -di/dt

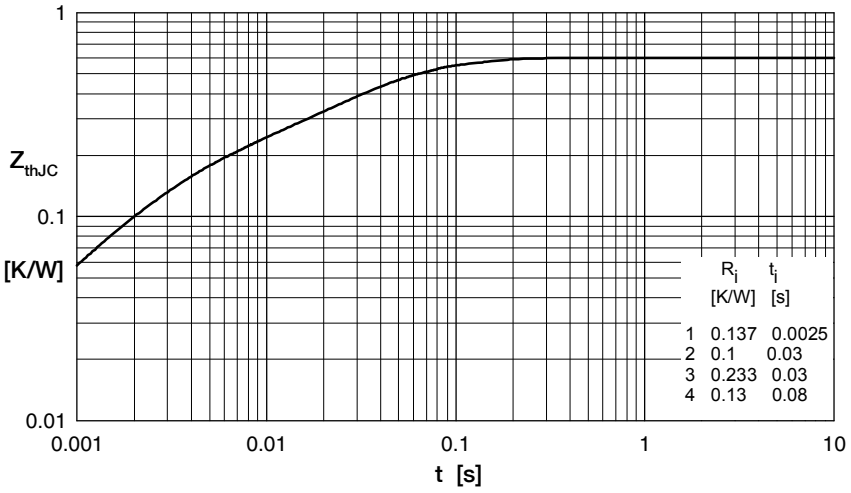


Fig. 7 Transient thermal impedance junction to case