

tentative

XPT IGBT Module

$$V_{CES} = 2 \times 650 \text{ V}$$

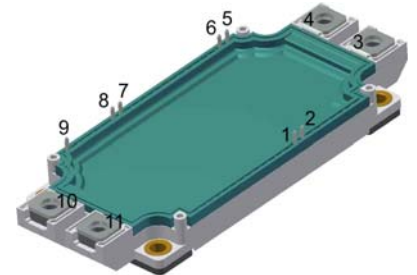
$$I_{C25} = 720 \text{ A}$$

$$V_{CE(sat)} = 1.65 \text{ V}$$

Phase leg + free wheeling Diodes + NTC

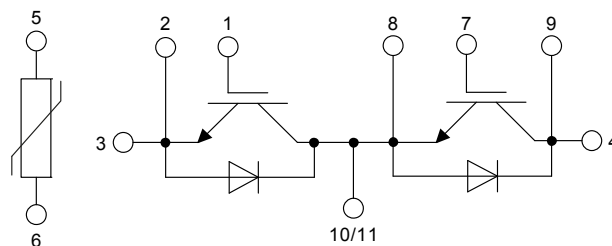
Part number

MIXA600PF650TSF



Backside: isolated

 E72873



Features / Advantages:

- High level of integration - only one power semiconductor module required for the whole drive
- 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 $V_{CE(sat)}$
- Temperature sense included
- SONIC™ diode
 - fast and soft reverse recovery
 - low operating forward voltage

Applications:

- AC motor drives
- Pumps, Fans
- Air-conditioning system
- Inverter and power supplies
- UPS

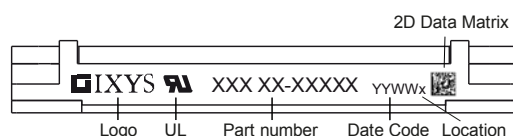
Package: SimBus F

- Isolation Voltage: 3000V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling

IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V _{CES}	collector emitter voltage	T _{VJ} = 25°C				650	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				720	A
I _{C80}		T _C = 80°C				490	A
P _{tot}	total power dissipation	T _C = 25°C				1750	W
V _{CE(sat)}	collector emitter saturation voltage	I _C = 600A; V _{GE} = 15 V	T _{VJ} = 25°C T _{VJ} = 150°C		1.65 1.85	1.8	V V
V _{GE(th)}	gate emitter threshold voltage	I _C = 9.6mA; V _{GE} = V _{CE}	T _{VJ} = 25°C	4	4.8	5.5	V
I _{CES}	collector emitter leakage current	V _{CE} = V _{CES} ; V _{GE} = 0 V	T _{VJ} = 25°C T _{VJ} = 150°C			1.8	mA mA
I _{GES}	gate emitter leakage current	V _{GE} = ±20 V				1.5	µA
Q _{G(on)}	total gate charge	V _{CE} = 300 V; V _{GE} = 15 V; I _C = 600 A			840		nC
t _{d(on)}	turn-on delay time	inductive load V _{CE} = 300V; I _C = 600A V _{GE} = ±15 V; R _G = 1.3 Ω	T _{VJ} = 150°C		30		ns
t _r	current rise time				50		ns
t _{d(off)}	turn-off delay time				100		ns
t _f	current fall time				40		ns
E _{on}	turn-on energy per pulse				6		mJ
E _{off}	turn-off energy per pulse				22.8		mJ
RBSOA	reverse bias safe operating area	V _{GE} = ±15 V; R _G = 1.3 Ω V _{CEmax} = 650V	T _{VJ} = 150°C				
I _{CM}						1200	A
SCSOA	short circuit safe operating area	V _{CEmax} = 650 V V _{CE} = 360V; V _{GE} = ±15 V R _G = 1.3 Ω; non-repetitive	T _{VJ} = 150°C				
t _{sc}	short circuit duration					10	µs
I _{sc}	short circuit current				2400		A
R _{thJC}	thermal resistance junction to case					0.085	K/W
R _{thCH}	thermal resistance case to heatsink				0.05		K/W
Diode							
V _{RRM}	max. repetitive reverse voltage	T _{VJ} = 25°C				650	V
I _{F25}	forward current	T _C = 25°C				490	A
I _{F80}		T _C = 80°C				340	A
V _F	forward voltage	I _F = 600A	T _{VJ} = 25°C T _{VJ} = 125°C		1.70	1.90	V V
I _R	reverse current	V _R = V _{RRM}	T _{VJ} = 25°C T _{VJ} = 125°C			*	mA mA
* not applicable, see Ices value above						*	
Q _{rr}	reverse recovery charge	V _R = 300 V -di _F /dt = 0 A/µs I _F = 600A; V _{GE} = 0 V	T _{VJ} = 125°C		tbd		µC
I _{RM}	max. reverse recovery current				tbd		A
t _{rr}	reverse recovery time				tbd		ns
E _{rec}	reverse recovery energy				tbd		mJ
R _{thJC}	thermal resistance junction to case					0.095	K/W
R _{thCH}	thermal resistance case to heatsink				0.04		K/W

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Package SimBus F			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal				A
T_{stg}	storage temperature		-40		125	°C
T_{VJ}	virtual junction temperature		-40		175	°C
Weight				350		g
M_D	mounting torque		3		6	Nm
M_T	terminal torque		3		6	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	12.7			mm
$d_{Spb/Apb}$		terminal to backside	10.0			mm
V_{ISOL}	isolation voltage	t = 1 second	3000			V
		t = 1 minute	2500			V
$R_{pin-chip}$	resistance pin to chip	$V = V_{CEsat} + 2 \cdot R \cdot I_C$ resp. $V = V_F + 2 \cdot R \cdot I_F$		0.65		mΩ



Part number

M = Module
 I = IGBT
 X = XPT IGBT
 A = Gen 1 / std
 600 = Current Rating [A]
 PF = Phase leg + free wheeling Diodes
 650 = Reverse Voltage [V]
 T = Thermistor \ Temperature sensor
 SF = SimBus F

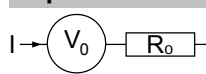
Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA600PF650TSF	MIXA600PF650TSF	Box	3	513794

Temperature Sensor NTC

Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	resistance	$T_{VJ} = 25^\circ$	4.75	5	5.25	kΩ
$B_{25/50}$	temperature coefficient			3375		K

Equivalent Circuits for Simulation

* on die level

 $T_{VJ} = 175^\circ\text{C}$  $V_{0\max}$ threshold voltage $R_{0\max}$ slope resistance *

IGBT

Diode

1.1

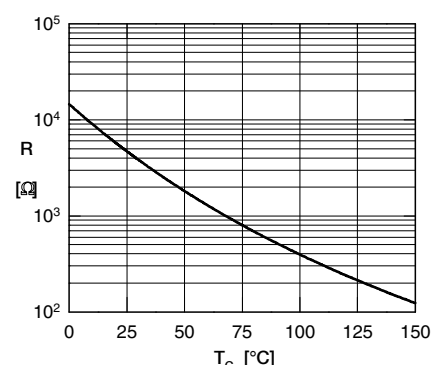
1.21

V

1.8

1

mΩ



Typ. NTC resistance vs. temperature

