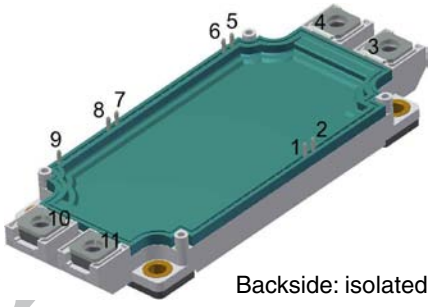
XPT IGBT Module

V_{CES} = 2x 650 V
I_{C25} = 750 A
$V_{CE(sat)}$ = 1.5 V

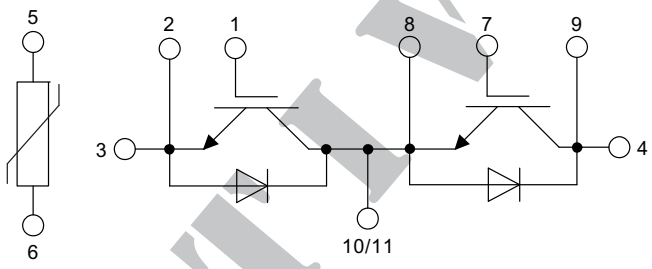
Phase leg + free wheeling Diodes + NTC

Part number
MIXD600PF650TSF



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 µsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 2x Ic
- Trench XPT design
  - low V_{CEsat}
  - low E_{off}
- Temperature sense included
- SONIC™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

Applications:

- AC motor drives
- Pums, fans
- Air-conditioning system
- Inverter and power supplies
- UPS

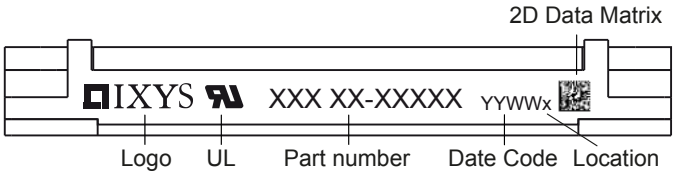
Package: SimBus F

- Isolation Voltage: 3000 V~
- 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	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C to 125°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			850	A
I_{C80}			T_C = 80°C			640	A
P_{tot}	*total power dissipation*		T_C = 25°C			1500	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 600 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.5	1.7	V
	(on die level)		T_{VJ} = 125°C		1.7		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 9.6 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5	5.8	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			1.8	mA
			T_{VJ} = 150°C		2		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			960		nC
$t_{d(on)}$	*turn-on delay time*	inductive load V_{CE} = 300 V; I_C = 600 A; L_S = 30 nH V_{GE} = ±15 V; R_G = 3.3 Ω	T_{VJ} = 150°C		80		ns
t_r	*current rise time*				100		ns
$t_{d(off)}$	*turn-off delay time*				250		ns
t_f	*current fall time*				60		ns
E_{on}	*turn-on energy per pulse*				15		mJ
E_{off}	*turn-off energy per pulse*				25		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 3.3 Ω	T_{VJ} = 150°C				
I_{CM}		V_{CEmax} = 650 V				1200	A
SCSOA	*short circuit safe operating area*	V_{CEmax} = 650 V					
t_{SC}	*short circuit duration*	V_{CE} = 360 V; V_{GE} = ±15 V;	T_{VJ} = 150°C			10	µs
I_{SC}	*short circuit current*	R_G = 3.3 Ω; non-repetitive			2400		A
R_{thJC}	*thermal resistance junction to case*					0.073	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			820	A
I_{F80}			T_C = 80°C			590	A
V_F	*forward voltage*	I_F = 600 A	T_{VJ} = 25°C		1.60	1.90	V
	(on die level)		T_{VJ} = 150°C		1.70		V
Q_{rr}	*reverse recovery charge*	V_R = 300 V $-di_F/dt$ = 4600 A/µs I_F = 600 A; V_{GE} = 0 V	T_{VJ} = 150°C		33		µC
I_{RM}	*max. reverse recovery current*				350		A
t_{rr}	*reverse recovery time*				170		ns
E_{rec}	*reverse recovery energy*				tbd		mJ
R_{thJC}	*thermal resistance junction to case*					0.085	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.04		K/W

Package SimBus F			Ratings			
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				A
T_{stg}	*storage temperature*		-40		125	°C
T_{op}	*opertation temperature*		-40		150	°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 /*	terminal to terminal	12.7			mm
$d_{Spb/Apb}$	*striking distance through air*	terminal to backside	10.0			mm
V_{ISOL}	*isolation voltage*	50/60 Hz, RMS, $I_{ISOL} \leq 1$ mA t = 1 second	3000			V
		t = 1 minute	2500			V
$R_{term-chip}$	*resistance terminal to chip*	$V = V_{CEsat} + 2 \cdot R_{term-chip} \cdot I_C$ resp. $V = V_F + 2 \cdot R_{term-chip} \cdot I_F$		0.65		mΩ

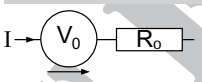


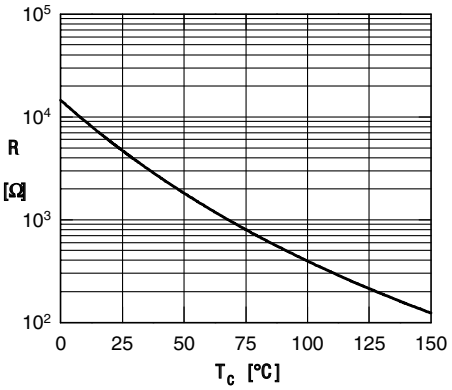
Part number

M = Module
I = IGBT
X = XPT
D = Trench 1 / std
600 = Current Rating [A]
PF = Phase leg + free wheeling diode
650 = Reverse Voltage [V]
T = NTC
SF = SimBus F

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXD600PF650TSF	MIXD600PF650TSF	Box	3	

Temperature Sensor NTC						
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
R_{25}	*resistance*	$T_{VJ} = 25°C$	4.75	5.0	5.25	kΩ
$B_{25/50}$	*temperature coefficient*			3375		K

Equivalent Circuits for Simulation	*on die level	$T_{VJ} = 175°C$		
		IGBT	Diode	
$V_{0\ max}$	*threshold voltage*	0.8	1.2	V
$R_{0\ max}$	*slope resistance* *	2.0	1.0	mΩ



Typ. NTC resistance vs. temperature

Outlines SimBus F