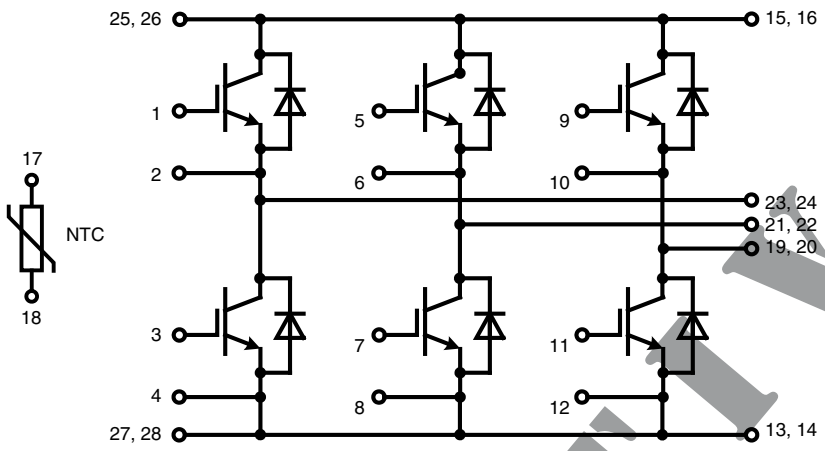
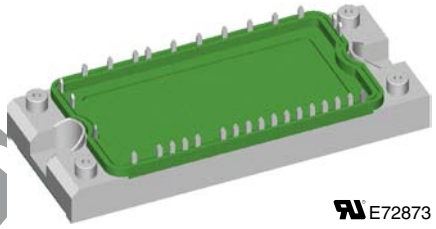
Six-Pack
Trench XPT IGBT

V_{CES} = 650 V
I_{C25} = 71 A
$V_{CE(sat)\ typ.}$ = 1.55 V

Part name (Marking on product)

MIXD50W650TED





E72873

Pin configuration see outlines.

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 µsec.
  - 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:

- "E2-Pack" standard outline
- Insulated copper base plate
- Soldering pins for PCB mounting
- Temperature sense included

IGBTs

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			650	V
V_{GES}	*max. DC gate voltage*	continuous				±20	V
V_{GEM}	*max. transient collector gate voltage*	transient				±30	V
I_{C25}	*collector current*	T_{VJ} = 175°C	T_C = 25°C			71	A
I_{C80}			T_C = 80°C			54	A
P_{tot}	*total power dissipation*		T_C = 25°C			190	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 50 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.55	1.80	V
		(on die level)	T_{VJ} = 150°C		1.85		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 0.8 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.0		6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C		20	200	µA
			T_{VJ} = 150°C		0.60		mA
I_{GES}	*gate emitter leakage current*	V_{CE} = 0 V; V_{GE} = ±20 V				500	nA
C_{ies}	*input capacitance*	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			tbd		nF
$Q_{G(on)}$	*total gate charge*	V_{CE} = 300 V; V_{GE} = 0...15 V; I_C = 50 A			130		nC
$t_{d(on)}$	*turn-on delay time*	inductive load	T_{VJ} = 150°C		25		ns
t_r	*current rise time*	V_{CE} = 300 V; I_C = 50 A			45		ns
$t_{d(off)}$	*turn-off delay time*	V_{GE} = ±15 V; R_G = 15 Ω			120		ns
t_f	*current fall time*				40		ns
E_{on}	*turn-on energy per pulse*				0.80		mJ
E_{off}	*turn-off energy per pulse*				1.20		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*				tbd		mJ
I_{CM}	*reverse bias safe operating area*	RBSOA; V_{GE} = ±15 V; R_G = 15 Ω; L = 100 µH				100	A
V_{CEK}		clamped inductive load;	T_{VJ} = 150°C			650	V
t_{SC}	*short circuit safe operating area*	V_{CE} = 360 V; V_{GE} = ±15 V;	T_{VJ} = 150°C			10	µs
(SCSOA)		R_G = 15 Ω; non-repetitive			200		A
R_{thJC}	*thermal resistance junction to case*	(per IGBT)				0.80	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per IGBT)			0.30		K/W

Diodes

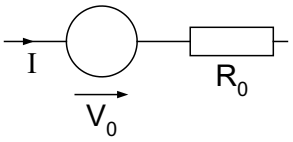
Symbol	Definitions	Conditions		Maximum Ratings	
V_{RRM}	*max. repetitive reverse voltage*			650	V
I_{F25}	*forward current*	T_{VJ} = 175°C	T_C = 25°C	55	A
I_{F80}			T_C = 80°C	40	A

Symbol	Conditions		Characteristic Values min.	typ.	max.	
V_F	*forward voltage*	I_F = 50 A	T_{VJ} = 25°C	1.7	2.0	V
			T_{VJ} = 150°C	1.9		V
Q_{RR}	*reverse recovery charge*	V_R = 325 V; I_F = 50 A		4.5		µC
I_{RM}	*max. reverse recovery current*			45		A
t_{rr}	*reverse recovery time*	di_F/dt = -900 A/µs	T_{VJ} = 150°C	150		ns
$E_{rec(off)}$	*reverse recovery losses at turn-off*			1.0		mJ
R_{thJC}	*thermal resistance junction to case*	(per diode)			1.2	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per diode)		0.4		K/W

Module

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
T_{VJ}	*operating temperature*			-40		150	°C
T_{VJM}	*max. virtual junction temperature*					175	°C
T_{stg}	*storage temperature*			-40		125	°C
V_{ISOL}	*isolation voltage*	$I_{ISOL} \leq 1$ mA; 50/60 Hz	1 min. 1 sec.			2500 3000	V~ V~
M_d	*mounting torque*	(M4)		2.0		2.2	Nm
d_S	*creep distance on surface*			11.5			mm
d_A	*strike distance through air*			10.0			mm
Weight					40		g
$R_{pin\text{-}chip}$	*resistance pin to chip*	$V = V_{CEsat} + 2 \cdot R \cdot I_C$ resp. $V = V_F + 2 \cdot R \cdot I_F$			6		mΩ

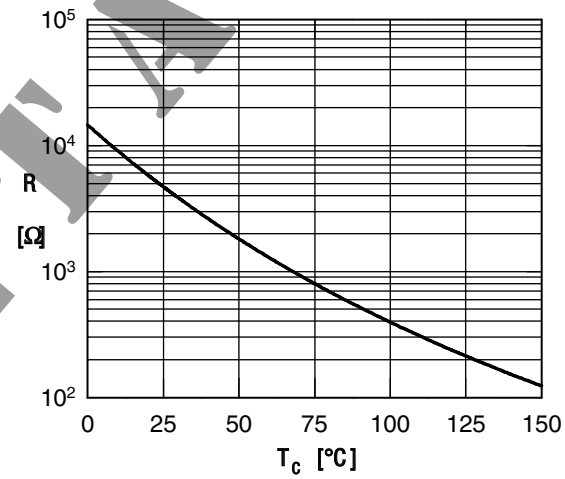
Equivalent Circuits for Simulation



Symbol	Definitions	Conditions	Ratings min.	typ.	max.	Unit
V_0	*IGBT*	$T_{VJ} = 175°C$		0.8		V
R_0				26		mΩ
V_0	*Diode*	$T_{VJ} = 175°C$		1.15		V
R_0				18		mΩ

Temperature Sensor NTC

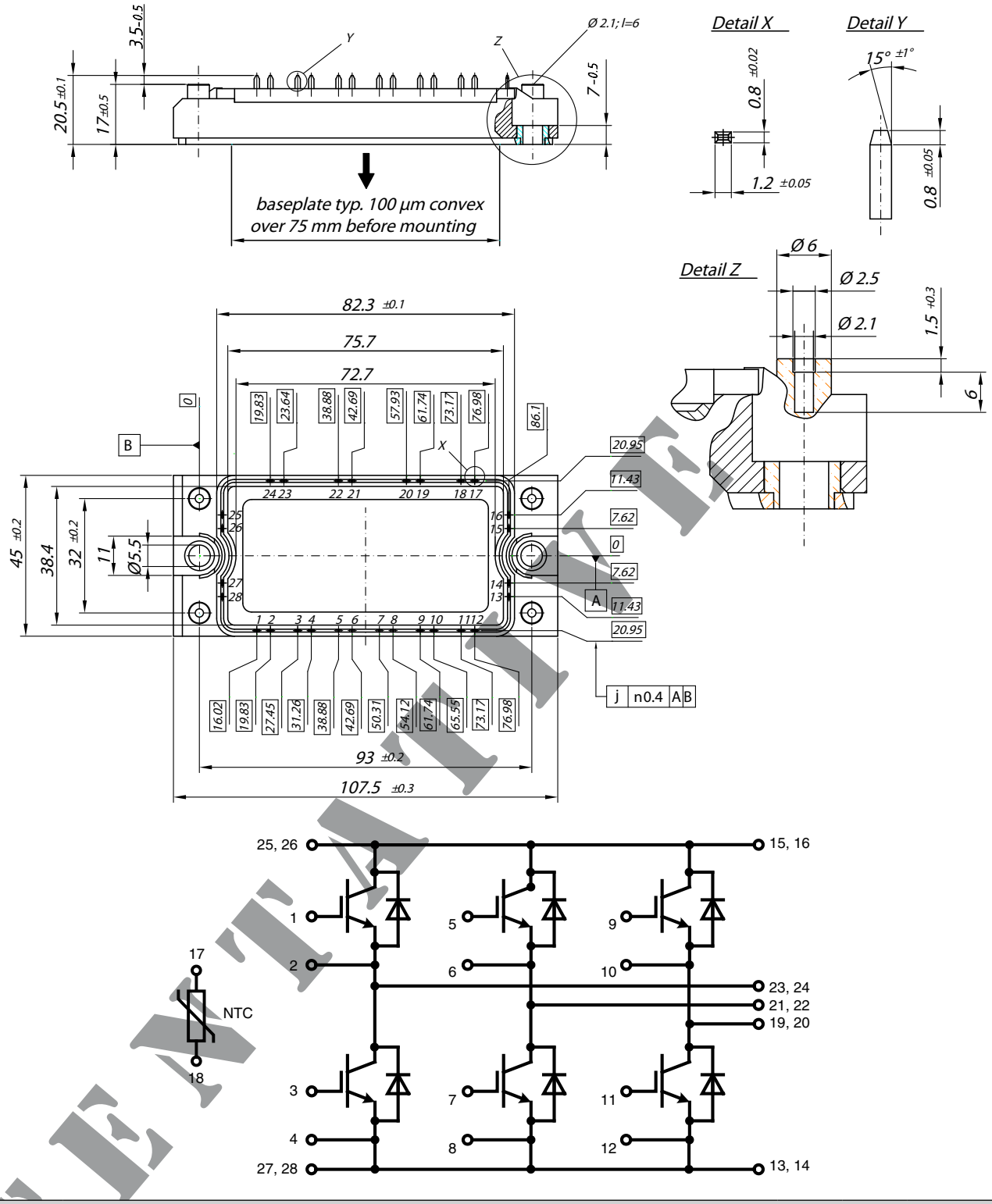
Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
R_{25}	*resistance*	$T_C =$	25°C	4.75	5.0	5.25	kΩ
$B_{25/50}$					3375		K



Typ. NTC resistance vs. temperature

Outline Drawing

Dimensions in mm (1 mm = 0.0394“)



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXD50W650TED	MIXD50W650TED	Box	6	tbd

IXYS reserves the right to change limits, test conditions and dimensions.

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