

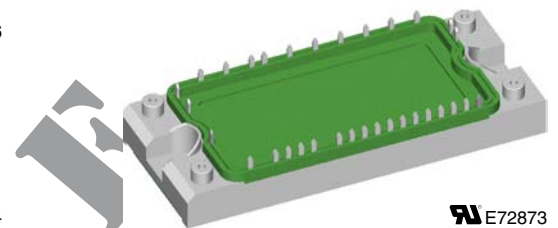
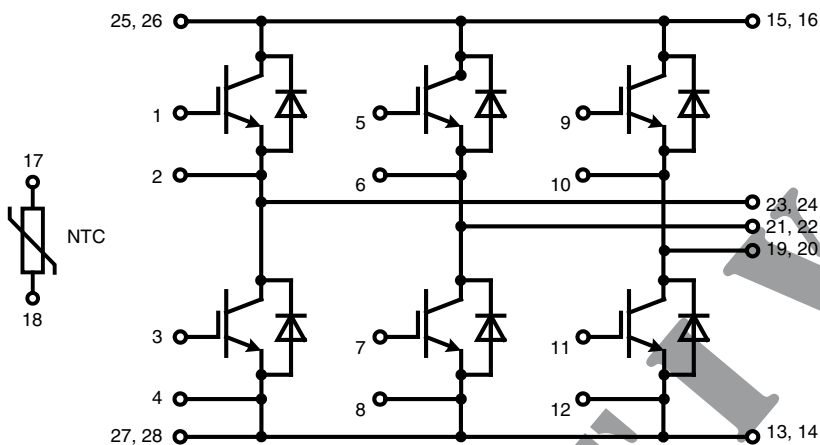
# Six-Pack

## Trench XPT IGBT

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

**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  $\mu\text{sec}$ .
  - very low gate charge
  - square RBSOA @  $3 \times I_C$
  - 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			Unit
			min.	typ.	max.	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			650	V
$V_{GES}$	max. DC gate voltage	continuous			$\pm 20$	V
$V_{GEM}$	max. transient collector gate voltage	transient			$\pm 30$	V
$I_{C25}$	collector current	$T_{VJ} = 175^{\circ}\text{C}$	$T_C = 25^{\circ}\text{C}$		71	A
$I_{C80}$			$T_C = 80^{\circ}\text{C}$		54	A
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			190	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 50\text{ A}; V_{GE} = 15\text{ V}$ (on die level)	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 150^{\circ}\text{C}$	1.55 1.85	1.80	V V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.8\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5.0	6.5	V
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 150^{\circ}\text{C}$	20 0.60	200	$\mu\text{A}$ mA
$I_{GES}$	gate emitter leakage current	$V_{CE} = 0\text{ V}; V_{GE} = \pm 20\text{ V}$			500	nA
$C_{ies}$	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$		tbd		nF
$Q_{G(on)}$	total gate charge	$V_{CE} = 300\text{ V}; V_{GE} = 0...15\text{ V}; I_C = 50\text{ A}$			130	nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 300\text{ V}; I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega$	$T_{VJ} = 150^{\circ}\text{C}$		25	ns
$t_r$	current rise time				45	ns
$t_{d(off)}$	turn-off delay time				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; $V_{GE} = \pm 15\text{ V}; R_G = 15\ \Omega; L = 100\ \mu\text{H}$ clamped inductive load;	$T_{VJ} = 150^{\circ}\text{C}$		100	A
$V_{CEK}$					650	V
$t_{sc}$ (SCSOA)	short circuit safe operating area	$V_{CE} = 360\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 15\ \Omega;$ non-repetitive	$T_{VJ} = 150^{\circ}\text{C}$		10	$\mu\text{s}$ 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**

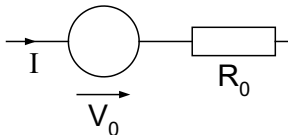
Symbol	Definitions	Conditions	Maximum Ratings		
			min.	max.	
$V_{RRM}$	max. repetitive reverse voltage			650	V
$I_{F25}$	forward current	$T_{VJ} = 175^{\circ}\text{C}$	$T_C = 25^{\circ}\text{C}$	55	A
$I_{F80}$			$T_C = 80^{\circ}\text{C}$	40	A

Symbol	Conditions	Characteristic Values				
		min.	typ.	max.		
$V_F$	forward voltage	$I_F = 50\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 150^{\circ}\text{C}$	1.7 1.9	2.0	V V
$Q_{RR}$	reverse recovery charge	$V_R = 325\text{ V}; I_F = 50\text{ A}$ $di_F/dt = -900\text{ A}/\mu\text{s}$	$T_{VJ} = 150^{\circ}\text{C}$		4.5	$\mu\text{C}$
$I_{RM}$	max. reverse recovery current				45	A
$t_{rr}$	reverse recovery time				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			Unit
			min.	typ.	max.	
$T_{VJ}$	operating temperature		-40		150	°C
$T_{VJM}$	max. virtual junction temperature				175	°C
$T_{stg}$	storage temperature		-40		125	°C
$V_{ISOL}$	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$	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
<b>Weight</b>				40		g
$R_{pin-chip}$	resistance pin to chip	$V = V_{CEsat} + 2 \cdot R \cdot I_C$ resp. $V = V_F + 2 \cdot R \cdot I_F$		6		mΩ

### Equivalent Circuits for Simulation

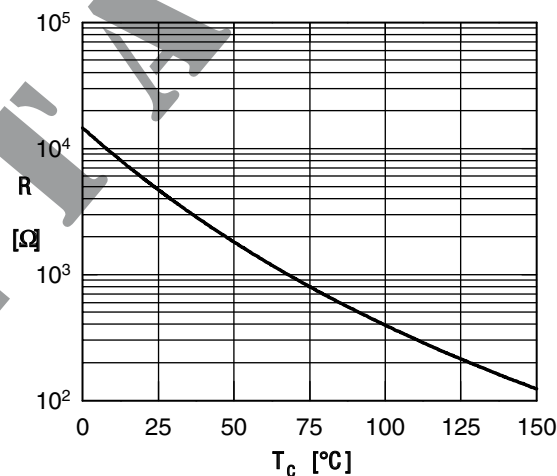


### Ratings

Symbol	Definitions	Conditions	min.	typ.	max.	Unit
$V_0$	IGBT	$T_{VJ} = 175^\circ\text{C}$		0.8		V
$R_0$				26		mΩ
$V_0$	Diode	$T_{VJ} = 175^\circ\text{C}$		1.15		V
$R_0$				18		mΩ

### Temperature Sensor NTC

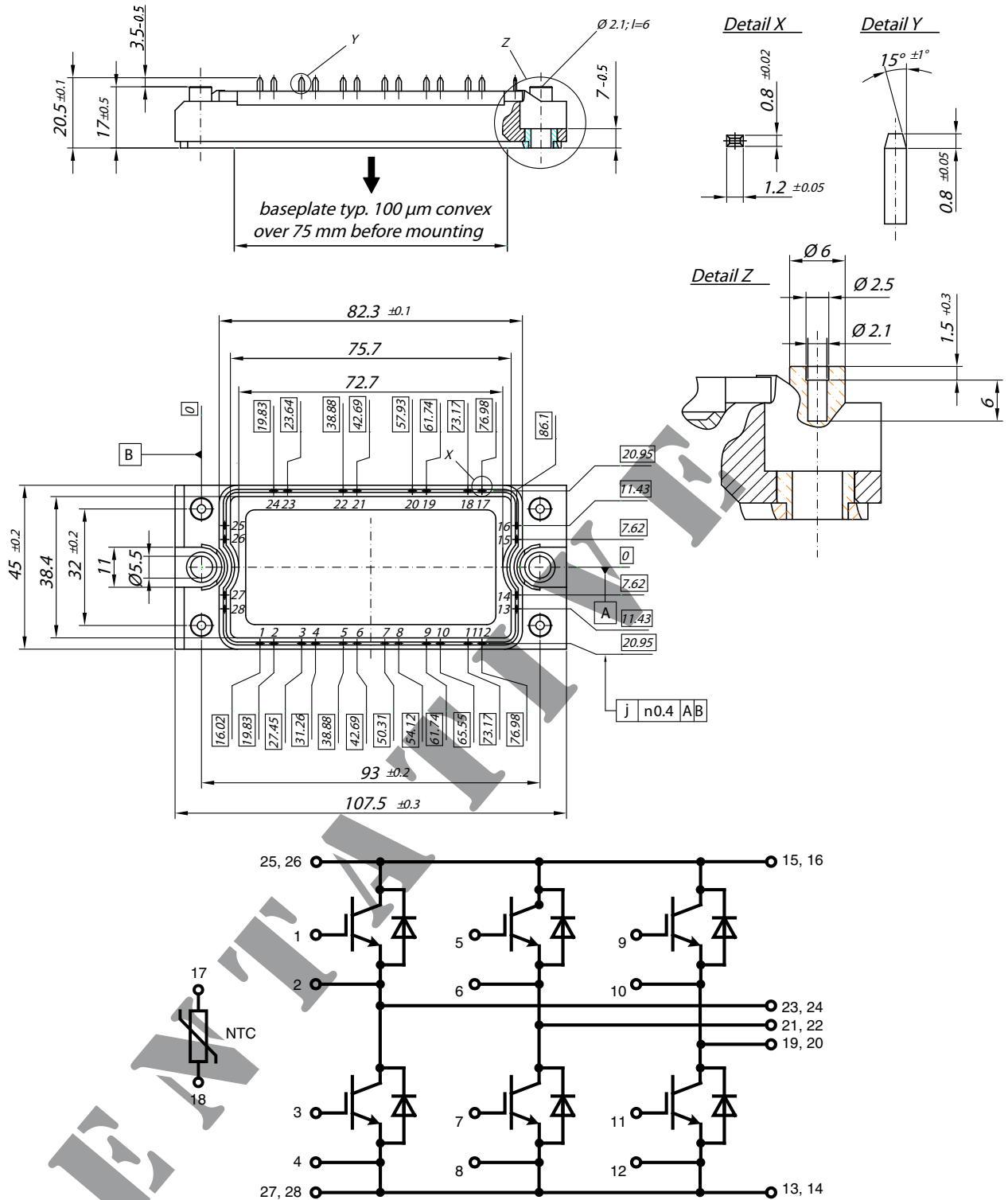
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
$R_{25}$	resistance	$T_c = 25^\circ\text{C}$	4.75	5.0	5.25	kΩ
$B_{25/50}$				3375		K



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