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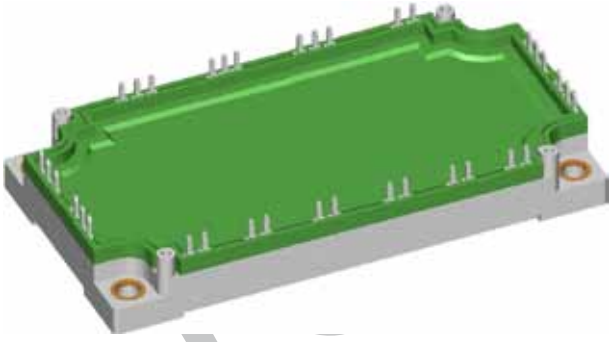
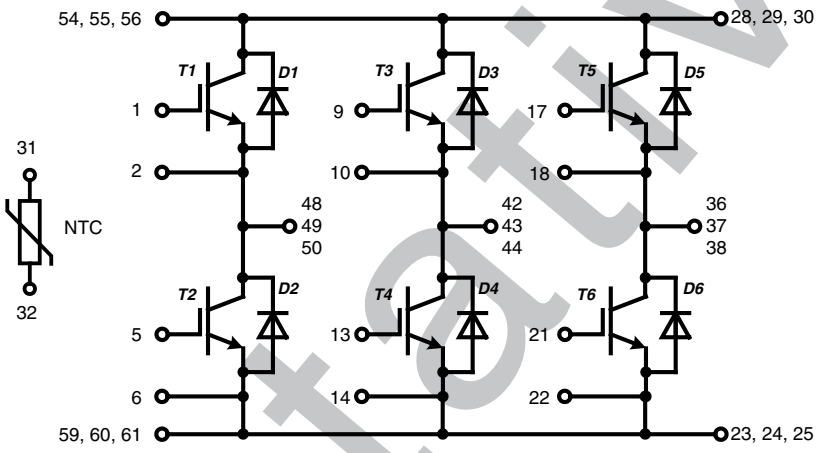
X2PT IGBT Module

V_{CES} = 1200 V
I_{C25} = 186 A
$V_{CE(sat)}$ = 1.7 V

6-Pack + NTC



Part number
MIXG120W1200TEH



E72873

Features / Advantages:

- X2PT - 2nd generation Xtreme light Punch Through
- Tvjm = 175°C
- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged X2PT design results in:
  - short circuit rated for 10 µsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 2x Ic
- Low $V_{CE(sat)}$ and low thermal resistance
- SONIC™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

Applications:

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

Package: E3-Pack

- Isolation Voltage: 4300 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Option:

- Phase Change Material printed on base plate

Inverter IGBT				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*			-20		+20	V
V_{GEM}	*max. transient gate emitter voltage*			-30		+30	V
I_{C25}	*collector current*		T_C = 25°C			186	A
I_{C80}			T_C = 80°C			140	A
I_{C100}			T_C = 100°C			120	A
P_{tot}	*total power dissipation*		T_C = 25°C			625	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 100 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.7	2.0	V
			T_{VJ} = 150°C		2.0		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 4 mA; V_{GE} = V_{GE}	T_{VJ} = 25°C	6		7	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES} ; V_{GE} = 0 V	T_{VJ} = 25°C				mA
			T_{VJ} = 150°C		2		mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V				500	nA
R_G	*internal gate resistance*				3.9		Ω
C_{iss}	*input capacitance*	V_{CE} = 100 V; V_{GS} = 0 V; f = 1 MHz					nF
C_{oss}	*output capacitance*						pF
C_{rss}	*reverse transfer (Miller) capacitance*						pF
Q_g	*total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 100 A					nC
Q_{gs}	*gate source charge*						nC
Q_{gd}	*gate drain (Miller) charge*						nC
$t_{d(on)}$	*urn-on delay time*	Inductive switching			80		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*				250		ns
t_f	*current fall time*	V_{CE} = 600 V; I_C = 100 A	T_{VJ} = 25°C		80		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 6.8 Ω (external)			6		mJ
E_{off}	*turn-off energy per pulse*				5.8		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*						mJ
$t_{d(on)}$	*turn-on delay time*	Inductive switching			100		ns
t_r	*current rise time*				50		ns
$t_{d(off)}$	*turn-off delay time*				300		ns
t_f	*current fall time*	V_{CE} = 600 V; I_C = 100 A	T_{VJ} = 150°C		100		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 6.8 Ω (external)			10.5		mJ
E_{off}	*turn-off energy per pulse*				8.2		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*						mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 6.8 Ω	T_{VJ} = 150°C				
I_{CM}		V_{CEmax} = 1200 V				200	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} = 150°C			10	µs
I_{SC}	*short circuit duration*	non-repetitive			600		A
R_{thJC}	*thermal resistance junction to case*					0.24	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			0.38		K/W

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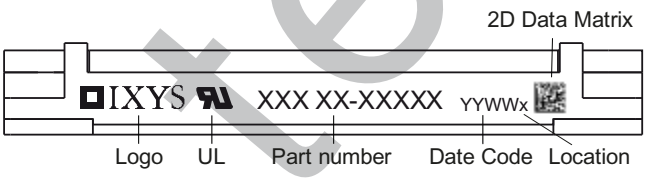
Inverter Diode				Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			180	A
I_{F80}			T_C = 80°C			135	A
I_{F100}			T_C = 100°C			115	
V_F	*forward voltage*	I_F = 120 A	T_{VJ} = 25°C			2.2	V
			T_{VJ} = 150°C		1.9		V
I_R	*reverse current*	$V_R = V_{RRM}$	T_{VJ} = 25°C			*	mA
	* not applicable, see Ices at IGBT		T_{VJ} = 150°C		*		mA
Q_{RM}	*reverse recovery charge*	V_R = 600 V					µC
I_{RM}	*max. reverse recovery current*	$-di_F/dt$ = 2400 A/µs	T_{VJ} = 25°C				A
t_{rr}	*reverse recovery time*	I_F = 120 A					ns
E_{rec}	*reverse recovery energy*						mJ
Q_{RM}	*reverse recovery charge*	V_R = 600 V			16		µC
I_{RM}	*max. reverse recovery current*	$-di_F/dt$ = 2400 A/µs	T_{VJ} = 150°C		120		A
t_{rr}	*reverse recovery time*	I_F = 120 A			350		ns
E_{rec}	*reverse recovery energy*				5		mJ
R_{thJC}	*thermal resistance junction to case*					0.30	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			0.45		K/W

Package	E3-Pack			Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal				300	A
T_{stg}	*storage temperature*			-40		125	°C
T_{op}	*operation temperature*			-40		150	°C
T_{VJ}	*virtual junction temperature*			-40		175	°C
Weight					270		g
M_D	*mounting torque*			3		6	Nm
d_{Spp}	*creepage distance on surface*		*terminal to terminal*	6			mm
d_{Spb}			*terminal to backside*	12			mm
d_{App}	*striking distance through air*		*terminal to terminal*	6			mm
d_{Apb}			*terminal to backside*	12			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50 / 60 Hz, RMS; $I_{ISOL} \leq$ 1 mA	4300			V
		t = 1 minute		3600			V
$R_{pin\text{-}chip}$	*resistance pin to chip*	$V = V_{CEsat} + 2 \cdot R \cdot I_C$ resp. $V = V_F + 2 \cdot R \cdot I_F$			2.5		mΩ
C_P	*coupling capacity per switch*	between shorted pins of switch and back side metallization					pF



Part number

M = Module
I = IGBT
X = XPT IGBT
G = Gen 2 / std
120 = Current Rating [A]
W = 6-pack
1200 = Reverse Voltage [V]
T = Thermistor
EH = E3-Pack

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXG120W1200TEH	MIXG120W1200TEH	Box	5	518143
with Phase Change Material	MIXG120W1200TEH -PC	MIXG120W1200TEH	Blister	12	

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

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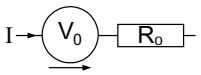
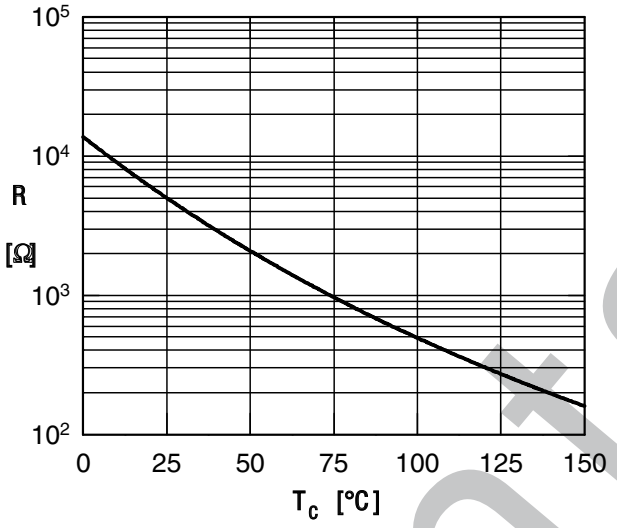
Equivalent Circuits for Simulation **on die level*



			IGBT	FW Diode	
$V_{0\ max}$	*threshold voltage*	T_{VJ} = 125°C			V
$R_{0\ max}$	*slope resistance **				mΩ
$V_{0\ max}$	*threshold voltage*	T_{VJ} = 175°C	1.2	1.2	V
$R_{0\ max}$	*slope resistance **		11.6	7.5	mΩ

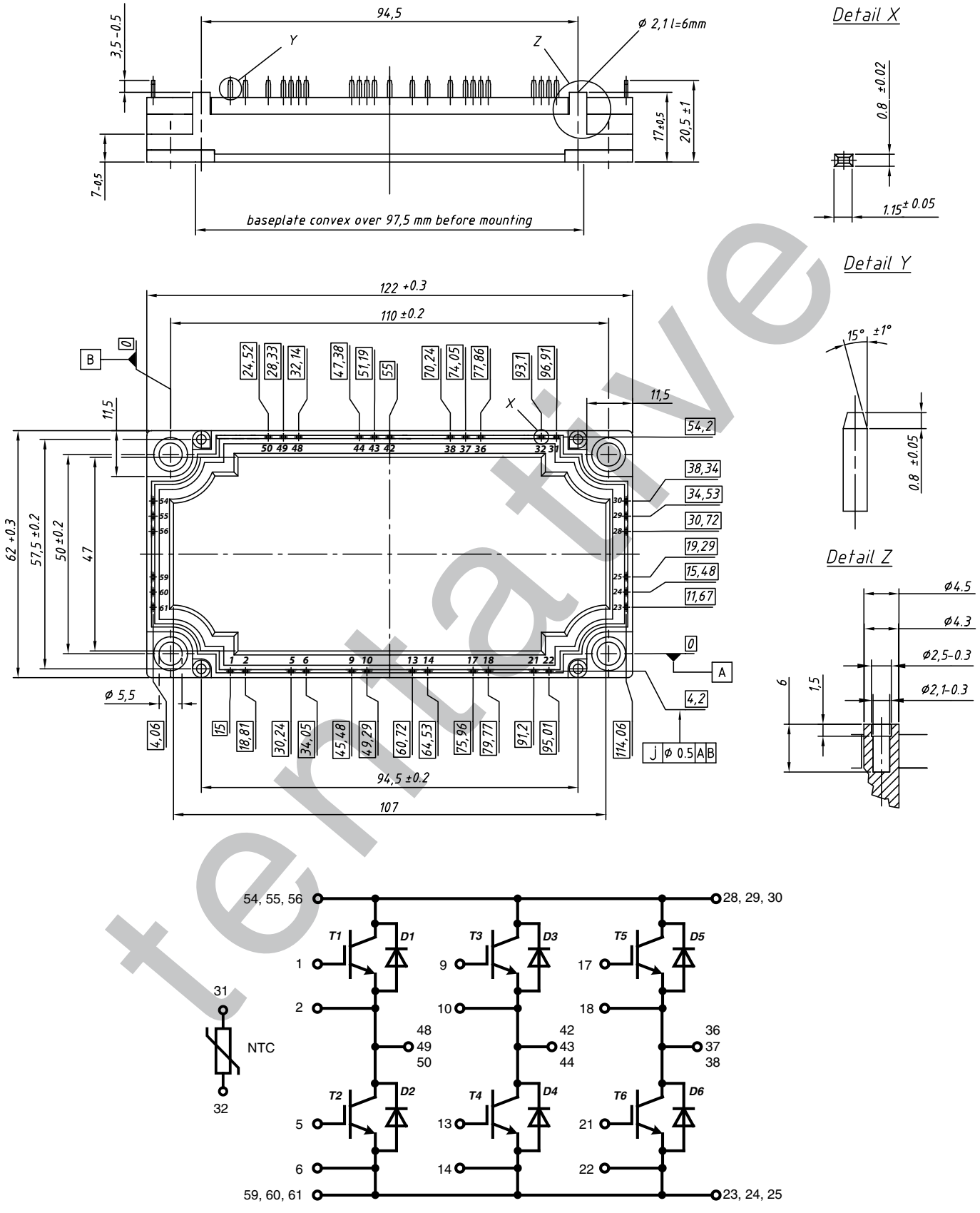
Temperature Sensor NTC

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



Typ. NTC resistance vs. temperature

Outlines E3-Pack



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F3L400R07ME4_B22 FB20R06W1E3_B11 FD300R12KS4_B5 FD400R33KF2C-K FF200R06YE3 FF600R12IP4V FF900R12IE4V FP06R12W1T4_B3 FP10R06W1E3_B11 FP15R12W2T4 FP20R06W1E3 FP40R12KT3G FP75R07N2E4_B11 FS10R12YE3 FS150R07PE4 FS150R12PT4 FS15R12VT3 FS200R12KT4R FS20R06W1E3_B11 FS50R06KE3 FS50R07N2E4 FS50R07N2E4_B11 FZ1600R17HP4_B2 DD250S65K3 DF1000R17IE4 APTGT100A60T1G APTGT75DA60T1G BSM300GB120DLC BSM75GB120DN2_E3223c-Se F3L200R07PE4 F3L200R12W2H3_B11 F3L300R12ME4_B22 F3L75R07W2E3_B11 F4-50R12KS4_B11 F475R07W1H3B11ABOMA1 FD1400R12IP4D FD400R12KE3_B5 FD800R33KF2C-K FF1200R17KP4_B2 FF150R12ME3G FF150R17ME3G FF225R12MS4 FF300R17KE3_S4 FF300R17ME4_B11 FF600R12IE4 FF650R17IE4D_B2 FF900R12IP4D FF900R12IP4DV FP10R12W1T4_B3 FP30R06W1E3_B11