IGBT Modules

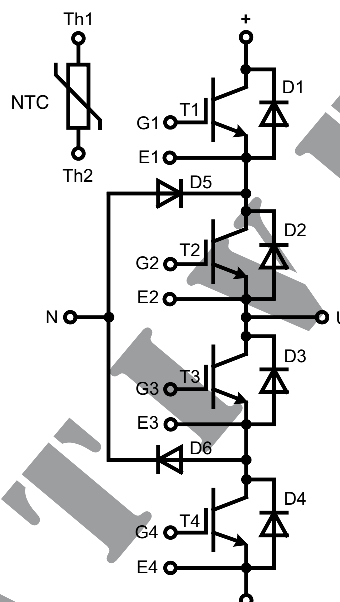
Multi Level

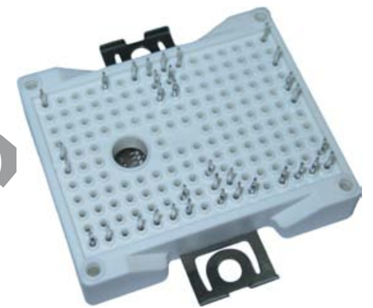
XPT IGBT Technology

I_{C80} (T1/T4) = 82 A
I_{C80} (T2/T3) = 110 A
V_{CES} = 650 V
$V_{CE(sat)\ typ.}$ = 1.5 V

Part name (Marking on product)

MIXD80PM650TMI





pending

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 @ 2x 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
- Optimized for solar applications
  - T2/T3 re-inforced

Application:

- AC motor control
- AC servo and robot drives
- UPS
- Solar

Package:

- Compatible to EASY2B package
- Pins for pressfit connection
- With DCB base

TENTATIVE

© 2014 IXYS All rights reserved

IGBTs T1 / T4

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			650	V
V_{GES}	*max. DC gate voltage*	continuous				±20	V
I_{C25}	*collector current*		T_C = 25°C			108	A
I_{C80}			T_C = 80°C			82	A
P_{tot}	*total power dissipation*		T_C = 25°C			275	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 75 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.5	1.7	V
			T_{VJ} = 150°C		1.75		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 1.2 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.0	5.8	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C		20	250	µA
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_{GE} = 0...15 V			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 = 75 A			45		ns
$t_{d(off)}$	*turn-off delay time*	V_{GE} = ±15 V; R_G = 10 Ω			120		ns
t_f	*current fall time*				40		ns
E_{on}	*turn-on energy per pulse*				0.9		mJ
E_{off}	*turn-off energy per pulse*				1.8		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 = 10 Ω; L = 100 µH				150	A
V_{CEK}		clamped inductive load;	T_{VJ} = 150°C			V_{CES}	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 = 10 Ω; non-repetitive			300		A
R_{thJC}	*thermal resistance junction to case*	(per IGBT)				0.55	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per IGBT)			0.18		K/W

Diodes D1 - D4

Symbol	Definitions	Conditions		Maximum Ratings	
V_{RRM}	*max. repetitive reverse voltage*			650	V
I_{F25}	*forward current*		T_C = 25°C	73	A
I_{F80}			T_C = 80°C	53	A

Symbol	Conditions			min.	typ.	max.	Unit
V_F	*forward voltage*	I_F = 75 A	T_{VJ} = 25°C		1.7	2.0	V
			T_{VJ} = 150°C		1.8		V
Q_{RR}	*reverse recovery charge*	V_R = 300 V; I_F = 75 A			7		µC
I_{RM}	*max. reverse recovery current*	di_F/dt = -1200 A/µs	T_{VJ} = 150°C		65		A
t_{rr}	*reverse recovery time*				150		ns
$E_{rec(off)}$	*reverse recovery losses at turn-off*				1.5		mJ
R_{thJC}	*thermal resistance junction to case*	(per diode)				1.0	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per diode)			0.35		K/W

TENTATIVE

© 2014 IXYS All rights reserved

IGBTs T2 / T3

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
					Ratings		
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			650	V
V_{GES}	*max. DC gate voltage*	continuous				±20	V
I_{C25} I_{C80}	*collector current*		T_C = 25°C T_C = 80°C			147 110	A A
P_{tot}	*total power dissipation*		T_C = 25°C			375	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 100 A; V_{GE} = 15 V	T_{VJ} = 25°C T_{VJ} = 150°C		1.5 1.75	1.7	V V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 1.6 mA; $V_{GE} = V_{CE}$	T_{VJ} = 25°C	5.0	5.8	6.5	V
I_{CES}	*collector emitter leakage current*	$V_{CE} = V_{CES}$; V_{GE} = 0 V	T_{VJ} = 25°C		20	250	µA
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_{GE} = 0...15 V			180		nC
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off} $E_{rec(off)}$	*turn-on delay time* *current rise time* *turn-off delay time* *current fall time* *turn-on energy per pulse* *turn-off energy per pulse* *reverse recovery losses at turn-off*	inductive load V_{CE} = 300 V; I_C = 100 A V_{GE} = ±15 V; R_G = 8.2 Ω	T_{VJ} = 150°C		25 45 120 40 2 2.4 tbd		ns ns ns ns mJ mJ mJ
I_{CM} V_{CEK}	*reverse bias safe operating area*	RBSOA; V_{GE} = ±15 V; R_G = 8.2 Ω; L = 100 µH clamped inductive load;	T_{VJ} = 150°C			200 V_{CES}	A V
t_{SC} **(SCSOA)**	*short circuit safe operating area*	V_{CE} = 360 V; V_{GE} = ±15 V; R_G = 8.2 Ω; non-repetitive	T_{VJ} = 150°C		400	10	µs A
R_{thJC}	*thermal resistance junction to case*	(per IGBT)				0.40	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per IGBT)			0.13		K/W

Diodes D5 / D6

Symbol	Definitions	Conditions		Maximum Ratings	Unit
V_{RRM}	*max. repetitive reverse voltage*			650	V
I_{F25} I_{F80}	*forward current*		T_C = 25°C T_C = 80°C	114 83	A A

Symbol	Conditions			min.	typ.	max.	Unit
					Characteristic Values		
V_F	*forward voltage*	I_F = 100 A	T_{VJ} = 25°C T_{VJ} = 150°C		1.7 1.8	2.0	V V
I_R	*leakage current*	V_R = 650 V	T_{VJ} = 25°C		20	200	µA
Q_{RR} I_{RM} t_{rr} $E_{rec(off)}$	*reverse recovery charge* *max. reverse recovery current* *reverse recovery time* *reverse recovery losses at turn-off*	V_R = 300 V; I_F = 100 A di_F/dt = -1500 A/µs	T_{VJ} = 150°C		9.5 95 150 2.5		µC A ns mJ
R_{thJC}	*thermal resistance junction to case*	(per diode)				0.6	K/W
R_{thCH}	*thermal resistance case to heatsink*	(per diode)			0.2		K/W

TENTATIVE

IXYS reserves the right to change limits, test conditions and dimensions. 20140129

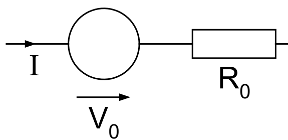
© 2014 IXYS All rights reserved

Module

Symbol	Definitions	Conditions	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			2500	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

(Ratings: min., typ., max.)

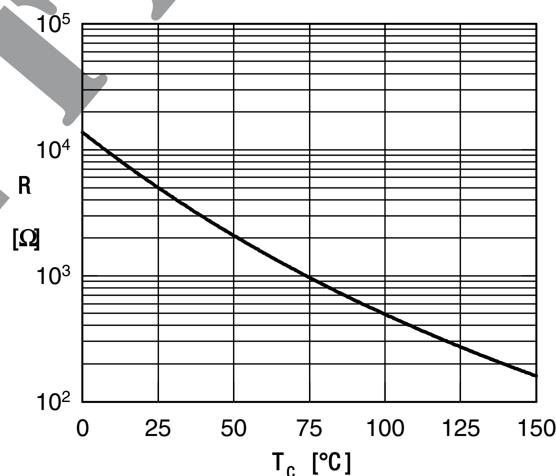
Equivalent Circuits for Simulation



Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_0	*IGBT T1/T4*	$T_{VJ} = 175°C$		0.8		V
R_0				16		mΩ
V_0	*IGBT T2/T3*	$T_{VJ} = 175°C$		0.8		V
R_0				12		mΩ
V_0	*Diode D1/D4*	$T_{VJ} = 175°C$		1.2		V
R_0				12		mΩ
V_0	*Diode D5/D6*	$T_{VJ} = 175°C$		1.2		V
R_0				9		mΩ

Temperature Sensor NTC

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



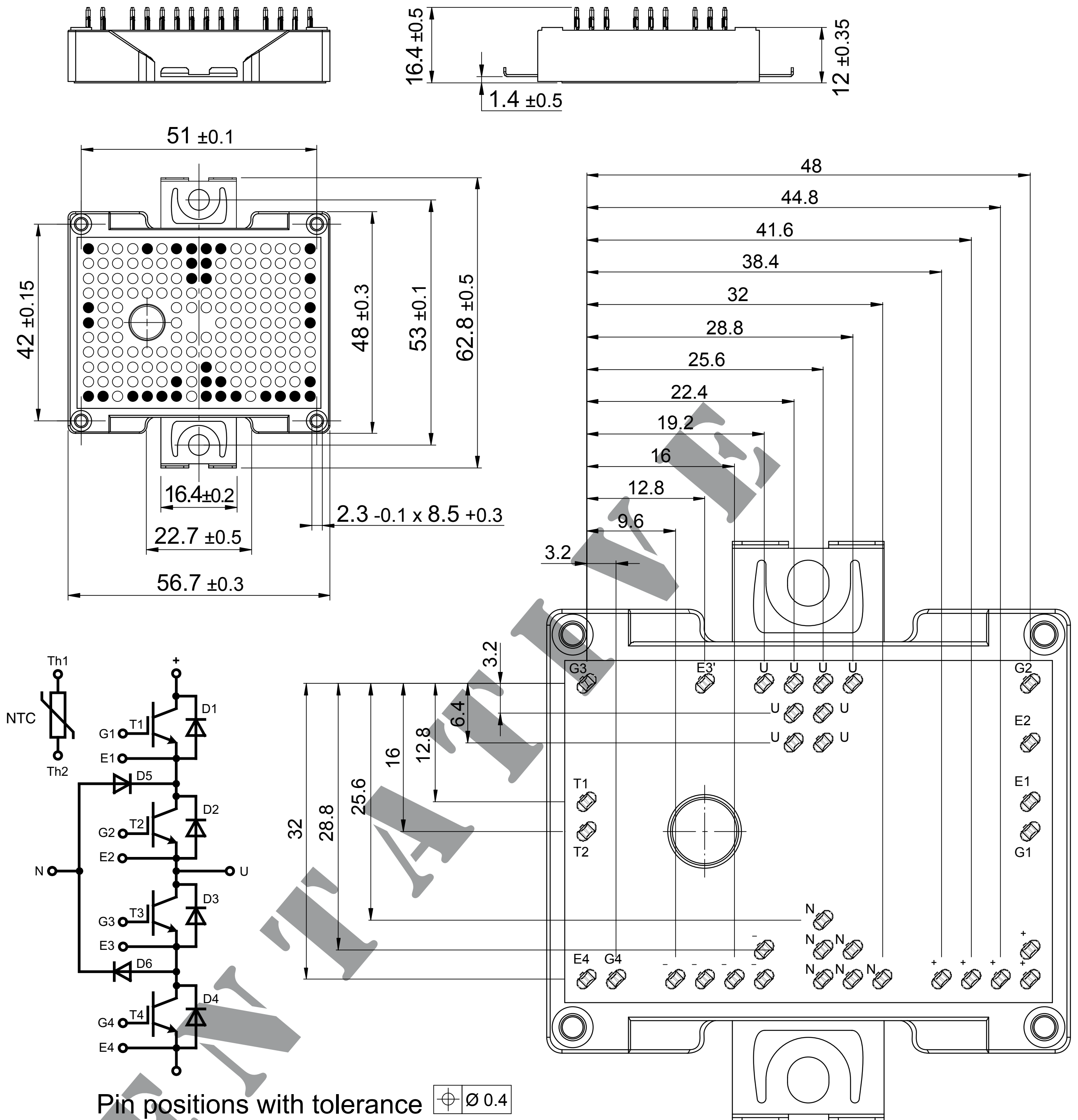
Typ. NTC resistance vs. temperature

TENTATIVE

IXYS reserves the right to change limits, test conditions and dimensions. 20140129

© 2014 IXYS All rights reserved

Outline Drawing Dimensions in mm (1 mm = 0.0394")



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXD80PM650TMI	MIXD80PM650TMI	Blister	20	514219

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

20140129

© 2014 IXYS All rights reserved