

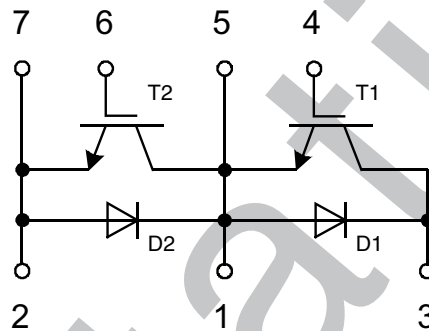
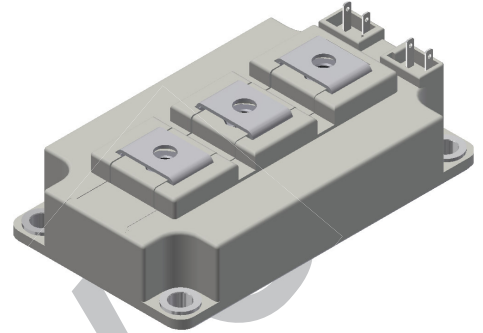
IGBT Module

$$\begin{aligned} V_{CES} &= 1200 \text{ V} \\ I_{C25} &= 612 \text{ A} \\ V_{CE(sat)} &= 1.75 \text{ V} \end{aligned}$$

Phase leg

Part number

MITH450PF1200LP



Features / Advantages:

- Trench IGBT
 - low $V_{CE(sat)}$
 - easy paralleling due to the positive temperature coefficient of the on-state voltage
 - $T_{vj} = 175^{\circ}\text{C}$
 - square RBSOA @ $2 \times I_C$
 - short circuit rated for 10 μsec .
 - low gate charge
 - low EMI
- Free wheeling diode
 - fast and soft reverse recovery
 - low operating forward voltage

Applications:

- AC motor drives
- Solar inverter
- Air-conditioning systems
- high power converters
- UPS

Package: Y3-M6

- Isolation Voltage: 4000 V~
- Industry standard outline
- RoHS compliant
- Copper base plate
- internally DCB isolated
- ultrasonic welded power terminals
- advanced power cycling

Terms & Conditions of usage

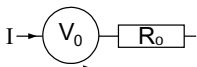
The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact the sales office, which is responsible for you. Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

- Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend
- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

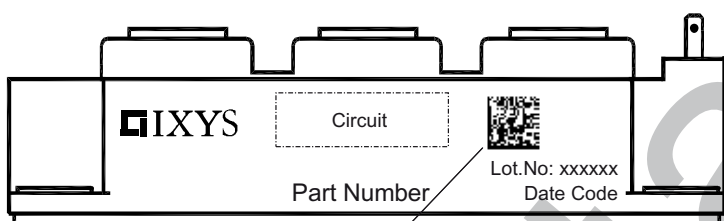
IGBT T1, T2				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
V_{GES}	max. DC gate voltage		-20		+20	V	
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$			612	A	
I_{C80}		$T_C = 80^{\circ}\text{C}$			467	A	
I_{CRM}	repetitive peak collector current	Pulse width and repetition rate should not be such that device junction temperature (T_J) does not exceed the max. rating of 175°C			1200	A	
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			2080	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 400\text{ A}; V_{GE} = 15\text{ V}$ on die level	$T_{VJ} = 25^{\circ}\text{C}$	1.75	2.2	V	
			$T_{VJ} = 150^{\circ}\text{C}$	2.20		V	
		$I_C = 400\text{ A}; V_{GE} = 15\text{ V}$ between power terminals	$T_{VJ} = 25^{\circ}\text{C}$	1.95	2.4	V	
			$T_{VJ} = 150^{\circ}\text{C}$	2.40		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 16\text{ mA}; V_{CE} = V_{GE}$	$T_{VJ} = 25^{\circ}\text{C}$	5.5	6	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = 1200\text{ V}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		100	300	μA
			$T_{VJ} = 150^{\circ}\text{C}$		2000		μA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}; V_{CE} = 0\text{ V}$			400	nA	
R_G	internal gate resistance			1.9		Ω	
C_{iss}	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$	24		nF	
C_{oss}	output capacitance			2360		pF	
C_{rss}	reverse transfer (Miller) capacitance			2356		pF	
Q_g	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = -8\text{ V}/15\text{ V};$ $I_C = 400\text{ A}$		4420		nC	
Q_{gs}	gate source charge					nC	
Q_{gd}	gate drain (Miller) charge					nC	
$t_{d(on)}$	turn-on delay time	Inductive switching $V_{CE} = 600\text{ V}; I_C = 400\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 3.0\text{ }\Omega$ (external)	$T_{VJ} = 150^{\circ}\text{C}$	350		ns	
t_r	current rise time			60		ns	
$t_{d(off)}$	turn-off delay time			700		ns	
t_f	current fall time			65		ns	
E_{on}	turn-on energy per pulse			39		mJ	
E_{off}	turn-off energy per pulse			42		mJ	
$E_{rec(off)}$	reverse recovery losses at turn-off					mJ	
$SCSOA$	short circuit safe operating area	$V_{CEmax} = 1200\text{ V}$	$T_{VJ} = 150^{\circ}\text{C}$				
t_{sc}	short circuit duration	$V_{CE} = 720\text{ V}; V_{GE} = \pm 15\text{ V}$			10	μs	
I_{sc}	short circuit current	non-repetitive				A	
R_{thJC}	thermal resistance junction to case	per IGBT			0.072	K/W	
R_{thJH}	thermal resistance junction to heatsink	with heatsink compound; IXYS test setup		0.10		K/W	

Diode D1, D2				Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$				1200	V
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$				468	A
I_{F80}		$T_C = 80^{\circ}\text{C}$				338	A
V_F	forward voltage	$I_F = 400\text{ A}; V_{GE} = 0\text{ V}$ on die level	$T_{VJ} = 25^{\circ}\text{C}$		1.90	2.20	V
			$T_{VJ} = 150^{\circ}\text{C}$		1.90		V
		$I_F = 400\text{ A}; V_{GE} = 0\text{ V}$ between power terminals	$T_{VJ} = 25^{\circ}\text{C}$		2.10	2.40	V
			$T_{VJ} = 150^{\circ}\text{C}$		2.10		V
I_R	reverse current * not applicable, see I_{ces} at IGBT	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$			*	mA
			$T_{VJ} = 150^{\circ}\text{C}$			*	mA
Q_{RM}	reverse recovery charge	$V_R = 600\text{ V}, I_F = 500\text{ A},$ $-di_F/dt = 5000\text{ A}/\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$		30		μC
I_{RM}	max. reverse recovery current				380		A
t_{rr}	reverse recovery time				200		ns
E_{rec}	reverse recovery energy				10		mJ
Q_{RM}	reverse recovery charge	$V_R = 600\text{ V}, I_F = 500\text{ A},$ $-di_F/dt = 5000\text{ A}/\mu\text{s}$	$T_{VJ} = 125^{\circ}\text{C}$		70		μC
I_{RM}	max. reverse recovery current				540		A
t_{rr}	reverse recovery time				350		ns
E_{rec}	reverse recovery energy				30		mJ
R_{thJC}	thermal resistance junction to case	with heatsink compound; IXYS test setup				0.15	K/W
R_{thJH}	thermal resistance junction to heatsink				0.21		K/W

Equivalent Circuits for Simulation *on die level

			IGBT T1, T2	Diode D1, D2	
$V_{0\text{ max}}$	threshold voltage	$T_{VJ} = 150^{\circ}\text{C}$	0.98	1.2	V
$R_{0\text{ max}}$	slope resistance *		3.8	2	m Ω
$V_{0\text{ max}}$	threshold voltage	$T_{VJ} = 175^{\circ}\text{C}$			V
$R_{0\text{ max}}$	slope resistance *				m Ω

Package Y3-M6			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					340	g
M_s	mounting torque for screws to heatsink	M6 to heatsink	3		5	Nm
M_T	mounting torque for terminal screws	M6 to terminals	2.5		5	Nm
V_{ISOL}	isolation voltage	t = 1 minute, 50 / 60 Hz, RMS	4000			V
$R_{terminal-chip}$	resistance terminal to chip			0.5		mΩ
C_P	coupling capacity per switch	between shorted pins of switch and back side metallization				pF

**Part number**

M = Module
 I = IGBT
 T = Trench IGBT
 H = Gen 5
 450 = Current Rating [A]
 PF = phase leg
 1200 = Reverse Voltage [V]
 LP = Y3-M6

Data Matrix: *Typ* (1-19), *DC+Prod.Index* (20-25), *FKT#* (26-31)
leer (33), *lfd.#* (33-36)

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MITH450PF1200LP	MITH450PF1200LP			

Outlines Y3-M6
