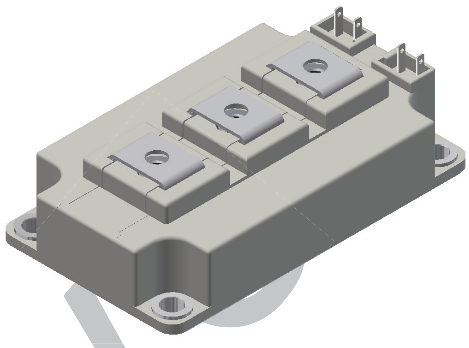
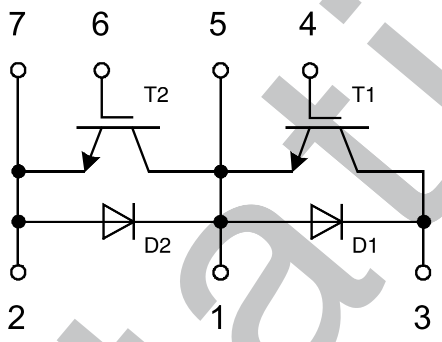
IGBT Module

V_{CES}	=	1200 V
I_{C25}	=	612 A
$V_{CE(sat)}$	=	1.75 V

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
  - Tvjm = 175°C
  - square RBSOA @ 2x Ic
  - 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

IGBT T1, T2				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
I_{C25}	*collector current*		T_C = 25°C			612	A
I_{C80}			T_C = 80°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°C			2080	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 400 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.75	2.2	V
		on die level	T_{VJ} = 150°C		2.20		V
		I_C = 400 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.95	2.4	V
		between power terminals	T_{VJ} = 150°C		2.40		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 16 mA; V_{CE} = V_{GE}	T_{VJ} = 25°C	5.5	6	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = 1200 V; V_{GE} = 0 V	T_{VJ} = 25°C		100	300	µA
			T_{VJ} = 150°C		2000		µA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V; V_{CE} = 0 V				400	nA
R_G	*internal gate resistance*				1.9		Ω
C_{iss}	*input capacitance*	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz	T_{VJ} = 25°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 V; V_{GE} = -8 V/15 V; I_C = 400A			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 V; I_C = 400 A V_{GE} = ±15 V; R_G = 3.0 Ω (external)	T_{VJ} = 150°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 V					
t_{SC}	*short circuit duration*	V_{CE} = 720 V; V_{GE} = ±15 V	T_{VJ} = 150°C			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

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

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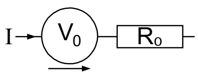
Diode D1, D2

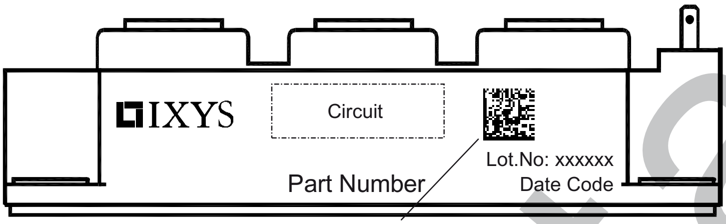
Symbol	Definitions	Conditions		min.	typ.	max.	
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			468	A
I_{F80}			T_C = 80°C			338	A
V_F	*forward voltage*	I_F = 400 A; V_{GE} = 0 V	T_{VJ} = 25°C		1.90	2.20	V
		on die level	T_{VJ} = 150°C		1.90		V
		I_F = 400 A; V_{GE} = 0 V	T_{VJ} = 25°C		2.10	2.40	V
		between power terminals	T_{VJ} = 150°C		2.10		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, I_F = 500 A,	T_{VJ} = 25°C		30		µC
I_{RM}	*max. reverse recovery current*				380		A
t_{rr}	*reverse recovery time*	-di_F/dt = 5000 A/µs			200		ns
E_{rec}	*reverse recovery energy*				10		mJ
Q_{RM}	*reverse recovery charge*	V_R = 600 V, I_F = 500 A,	T_{VJ} = 125°C		70		µC
I_{RM}	*max. reverse recovery current*				540		A
t_{rr}	*reverse recovery time*	-di_F/dt = 5000 A/µs			350		ns
E_{rec}	*reverse recovery energy*				30		mJ
R_{thJC}	*thermal resistance junction to case*					0.15	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			0.21		K/W

Equivalent Circuits for Simulation *on die level



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

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



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

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

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

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Outlines Y3-M6