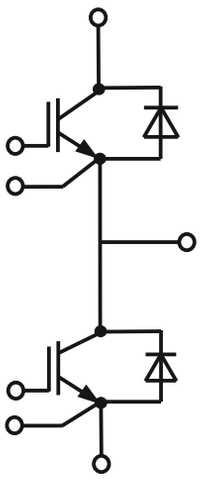
IGBT Module, 1200V/450A

Features

- 1200V 300A, $V_{CE(sat)}$=1.55V @25^{0}C
- Planar Field-stop Technology
- High RBSOA capability
- Low turn-off losses

Applications

- Inductive Heating
- Welding Machine
- High Frequency switching Application
- UPS System
- Power Supplies



IGBT,Inverter/IGBT, Maximum Rated Values				
Parameter	**Conditons**	**Symbol**	**Values**	**Units**
Collector-Emitter Voltage	T_{vj} = 25^{0}C	V_{CES}	1200	V
Total Power Dissipation	T_c = 25^{0}C, T_{vjmax} = 175^{0}C	P_{tot}	2240	W
Continuous DC Collector Current		$I_{C\ nom}$	450	A
	T_c = 80^{0}C, T_{vjmax} = 175^{0}C	I_C	560	
Repetitive Peak Collector Current	I_{CRM} =2x$I_{C\ nom}$	I_{CRM}	900	A
Gate-emitter peak voltage		V_{GES}	±20	V

Diode,Inverter Maximum Rated Values				
Parameter	**Conditons**	**Symbol**	**Values**	**Units**
Peak Repetitive Reverse Voltage	T_{vj} = 25^{0}C	V_{RRM}	1200	V
Continuous DC Forward Current		I_F	450	A
Repetitive Peak Forward Current	I_{FRM} =2xI_F	I_{FRM}	900	A

Module				
Parameter	**Conditons**	**Symbol**	**Values**	**Units**
Isolation Test Voltage	RMS, f=50Hz, t=1min	V_{iso}	3000	V
Material of Module Baseplate			Cu	
Internal Isolation	Basic insulation (class1,IEC61140)		Al_2O_3	
Creepage Distance	terminal to heatsink terminal to terminal		29.0 23.0	mm
Clearance	terminal to heatsink terminal to terminal		23.0 11.0	mm
Comparative Tracking Index		CTI	>200	

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Characteristics Values

IGBT						
Parameter	**Conditons**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Collector- Emitter Saturation Voltage	I_C =450A, V_{GE} = 15V T_{vj} = 25°C I_C =450A, V_{GE} = 15V T_{vj} =125°C I_C =450A, V_{GE} = 15V T_{vj} =150°C I_C =450A, V_{GE} = 15V T_{vj} =175°C	V_{CEsat}		1.55 1.70 1.85 1.90	1.70	V
Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 18 mA T_{vj} = 25°C	$V_{GE(th)}$	5.0	6.0	7.0	V
Gate Charge	V_{CE}= 600V V_{GE} = -8V/15V T_{vj} = 25°C	Q_G		3.9		uC
Internal Gate Resistor	T_{vj} = 25°C	R_{Gint}		1.30		Ω
Input Capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 100KHz, T_{vj} = 25°C	C_{ies}		105		nF
Reverse Transfer Capacitance		C_{res}		0.27		
Collector-Emitter Cutoff Current	V_{CE} = 1200V, V_{GE} = 0V, T_{vj} = 25°C	I_{CES}			100	uA
Gate-emitter Leakage current	V_{CE} = 0V, V_{GE} = 20V, T_{vj} = 25°C	I_{GES}			100	nA
Turn-on Delay Time Inductive Load	I_C =450A, V_{CE} = 600V T_{vj} = 25°C V_{GE} = 15V/-8V T_{vj} =125°C R_{Gon}=1.0Ω, T_{vj} =150°C T_{vj} =175°C	t_{don}		240 245 270 270		ns
Rise Time Inductive Load	I_C =450A, V_{CE}= 600V T_{vj} = 25°C V_{GE} = 15V/-8V T_{vj} =125°C R_{Gon}=1.0Ω, T_{vj} =150°C T_{vj} =175°C	t_r		70 85 90 95		ns
Turn-off Delay Time Inductive Load	I_C =450A, V_{CE} = 600V T_{vj} = 25°C V_{GE} = 15V/-8V T_{vj} =125°C R_{Goff} =1.0Ω, T_{vj} =150°C T_{vj} =175°C	t_{doff}		415 460 470 480		ns
Fall Time Inductive Load	I_C =450A, V_{CE} = 600V T_{vj} = 25°C V_{GE} = 15V/-8V T_{vj} =125°C R_{Goff} =1.0Ω, T_{vj} =150°C T_{vj} =175°C	t_f		115 195 220 240		ns
Turn-on Energy Loss per Pulse	I_C =450A, V_{CE} = 600V T_{vj} = 25°C L_σ =45nH, V_{GE} = 15V/-8V T_{vj} =125°C R_{Gon} =1.0Ω, T_{vj} =150°C dv/dt=3900A/µs T_{vj} =175°C	E_{on}		33.5 49.5 54.5 62.0		mJ
Turn-off Energy Loss per Pulse	I_C =450A, V_{CE} = 600V T_{vj} = 25°C L_σ =45nH, V_{GE} =15/-8V T_{vj} =125°C R_{Goff} =1.0Ω, T_{vj} =150°C dv/dt=4600A/µs T_{vj} =175°C	E_{off}		34.5 48.5 51.0 54.5		mJ
Thermal Resistance Junction to case	Per IGBT	$R_{th\,JC}$		0.067		K/W
Temprature under switching conditions		$T_{vj\,op}$	-40		175	°C
SC Data	V_{CE} = 600V, V_{GE} =15/-8V, t_p ≤10us, T_{vj} = 25°C	I_{sc}		2700		A
	V_{CE} = 600V, V_{GE} =15/-8V, t_p ≤10us, T_{vj} =150°C			2000		

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Characteristics Values

Diode							
Parameter	**Conditons**		**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Forward Voltage	I_F =450A, V_{GE} = 0V I_F =450A, V_{GE} = 0V I_F =450A, V_{GE} = 0V I_F =450A, V_{GE} = 0V	T_{vj} = 25^{0}C T_{vj} =125^{0}C T_{vj} =150^{0}C T_{vj} =175^{0}C	V_F		1.90 1.85 1.85 1.70	2.40	V
Peak Reverse Recovery Current	I_F =450A, V_R = 600V -di$_F$/dt=5200A/us (T_{vj} =175^{0}C) V_{GE} = - 8V	T_{vj} = 25^{0}C T_{vj} =125^{0}C T_{vj} =150^{0}C T_{vj} =175^{0}C	I_{RM}		235 265 270 295		A
Recovery Charge	I_F =450A, V_R = 600V -di$_F$/dt=5200A/us (T_{vj} =175^{0}C) V_{GE} = - 15V	T_{vj} = 25^{0}C T_{vj} =125^{0}C T_{vj} =150^{0}C T_{vj} =175^{0}C	Q_R		17.0 42.5 50.0 62.0		uC
Reverse Recovery Energy	I_F =450A, V_R = 600V -di$_F$/dt=5200A/us(T_{vj} =175^{0}C) V_{GE} = - 15V	T_{vj} = 25^{0}C T_{vj} =125^{0}C T_{vj} =150^{0}C T_{vj} =175^{0}C	E_{rec}		7.5 17.0 20.0 26.0		mJ
Thermal Resistance Junction to case	Per Diode		$R_{th\ JC}$		0.090		K/W
Temprature under switching conditions			$T_{vj\ op}$	-40		175	^{0}C

Module						
Parameter	**Conditons**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Stray Induction Module		L_{sCE}		20		nH
Module Lead Resistance Terminals-Chip	T_C = 25^{0}C per switch	$R_{CC'+EE'}$		0.50		mΩ
Storage Temerature		T_{stg}	-40		125	^{0}C
Mounting torque	Terminal M6	F	4.0		6.0	Nm
	Module M6		4.0		6.0	
Weight		W			320	g

1:- Terminal impedance is not included.

2:- Tvj op> 150^{0}C is only allowed for operation at overload conditions

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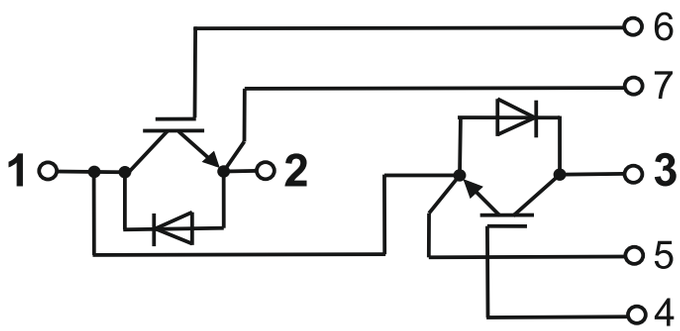
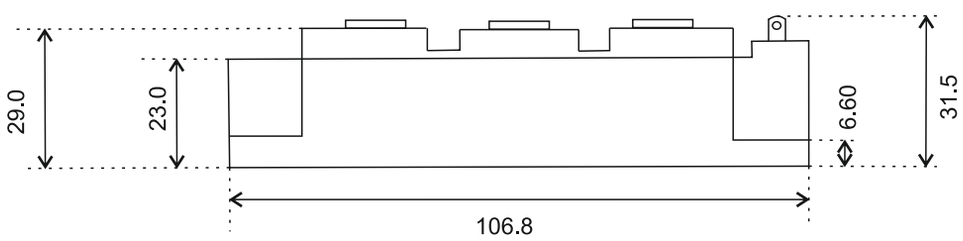
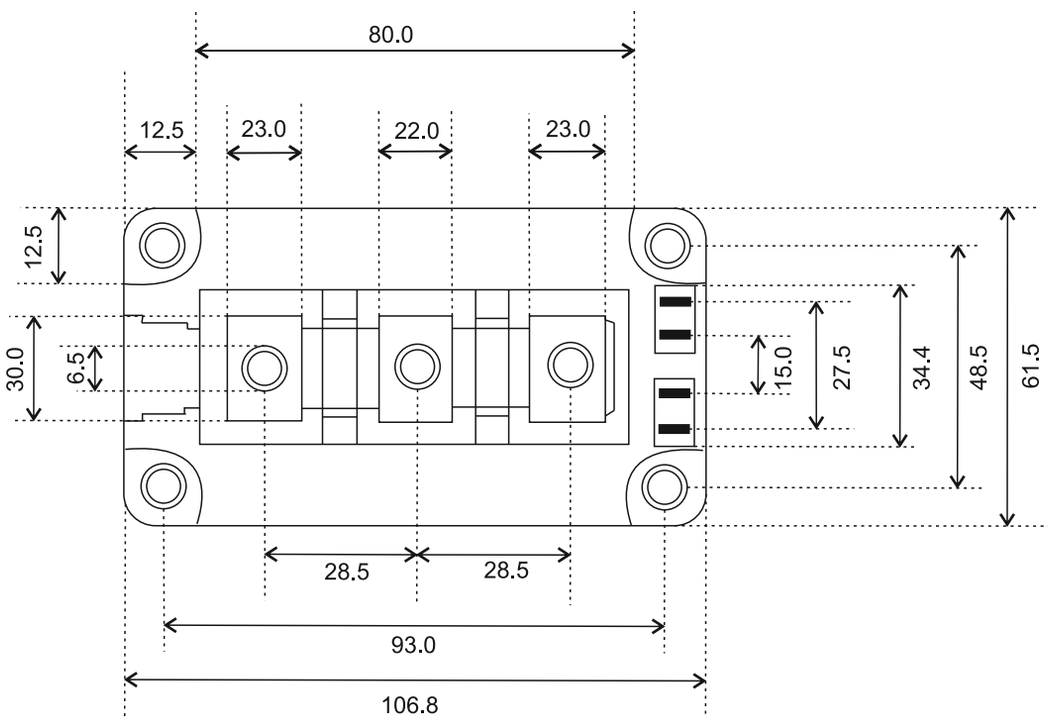
Circuit Schematic



Package Outline

(All dimensions in mm)





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