Product Introduction

The CIM1500T450PMDA is a single IGBT module primarily designed fo motor control,smart grids,and high-reliability inverter applications.Featuring a dedicated form-factor design,it delivers excellent thermal cycling performance and a high withstand voltage of 4500V,making it a critical component for various high-voltage applications.

Typical Applications

- Traction Drives
- Module appearance
- Smart Grid
- High Reliability Inverter

Features

- AlSiC Baseplate
- AlN Substrates
- High Thermal Cycling Capability
- 10μs Short Circuit Withstand
- Collector-emitter curren up to 1500A(Tc=80℃)
- Collector-emitter saturation Voltage is 2.55V(type)

Circuit Configuration

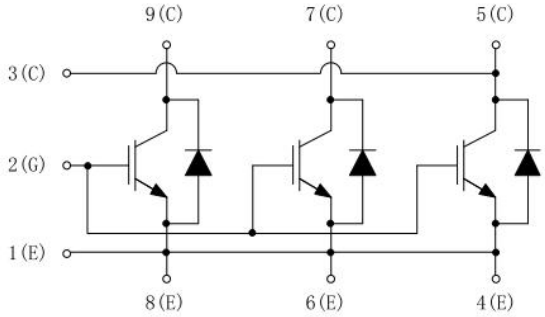


Figure 1 Circuit Configuration

Module Appearance

Figure 2. Module appearance

Absolute Maximum Ratings

Parameter	Symbol	Test Conditions	Value			Unit
			Min	Typ.	Max	
Collector-emitter voltage	V_{CES}	V_{GE} = 0V, T_C= 25 °C			4500	V
Gate-emitter voltage	V_{GES}	T_C= 25 °C			±20	V
Collector-emitter current	I_C	T_C = 80℃, Tvj max =150℃			1500	A
Peak collector current	$I_{C(PK)}$	t_P=1ms			3000	A
Max. transistor power dissipation	P_{max}	Tvj = 150°C, T_C = 25 °C			15.6	kW
Diode I^2t	I^2t	V_R =0V, T_P = 10ms, Tvj = 150 ℃			1040	kA^2s
Isolation voltage - per module	V_{ISO}	(Connected terminals to base plate), AC RMS,1 min, 50Hz, T_C= 25 °C			10.2	kV
Partial discharge - per module	Q_{PD}	IEC1287. V_1=6900V, V_2=5100V,50Hz RMS			10	pC

Thermal & Mechanical Data

Parameter	Symbol	Test Conditions	Value			Unit
			Min	Typ.	Max	
Creepage distance		Terminal to heatsink	-	60.0	-	mm
		Terminal to terminal	-	56.0	-	mm
Clearance		Terminal to heatsink	-	26.0	-	mm
		Terminal to terminal	-	26.0	-	mm
CTI (Comparative Tracking Index)				> 600		
Thermal resistance - IGBT	Rth(J-C) IGBT				8	K/kW
Thermal resistance - Diode	Rth(J-C) Diode				11.7	K/kW
Thermal resistance -case to heatsink (IGBT)	Rth(C-H) IGBT	Mounting torque 5Nm, with mounting grease 1W/m·°C		7		K/kW
Thermal resistance -case to heatsink (Diode)	Rth(C-H) Diode			8		K/kW
Operating junction temperature	Tvj op	IGBT	-40		150	℃
		Diode	-40		150	℃
Storage temperature range	Tstg		-40		150	℃
Screw torque	M	Mounting – M6			5	Nm
		Electrical connections –M4			2	Nm
		Electrical connections –M8			10	Nm

Electrical Characteristics(T_C= 25 °C unless otherwise stated)

Parameter	Symbol	Test Conditions		Value			Unit
				Min	Typ.	Max	
Collector cut-off current	I_{CES}	V_{GE} = 0V, V_{CE} = V_{CES}		-	-	1	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_C=125 °C		-	-	90	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_C=150 °C		-	-	120	mA
Gate leakage current	I_{GES}	V_{GE} = ±20V, V_{CE} = 0V		-	-	1	μA
Gate threshold voltage	$V_{GE\ (th)}$	I_C = 120mA, V_{GE} = V_{CE}		5.80	6.40	7.00	V
Collector-emitter saturation voltage	$V_{CE\ (sat)}$ (*1)	V_{GE} =15V, I_C = 1500A		-	2.55	2.95	V
		V_{GE} =15V, I_C = 1500A, Tvj = 125 °C		-	3.10	-	V
		V_{GE} =15V, I_C = 1500A, Tvj = 150 °C		-	3.20	-	V
Diode forward current	I_F	DC		-	1500	-	A
Diode peak forward current	I_{FRM}	t_P = 1ms		-	3000	-	A
Diode forward voltage	V_F (*1)	V_{GE} =15V, I_C = 1500A		-	2.50	2.90	V
		V_{GE} =15V, I_C = 1500A, Tvj = 125 °C		-	2.95	-	V
		V_{GE} =15V, I_C = 1500A, Tvj = 150 °C		-	2.95	-	V
Short circuit current	I_{SC}	Tvj = 150°C, V_{CC} = 3400V, V_{GE} ≤15V, Tp ≤10μs, $V_{CE(max)}$ = V_{CES} − $L^{(*2)}$ ×di/dt, IEC 60747-9		-	6800	-	A
Input capacitance	Ci_{es}	V_{CE} = 25V, V_{GE} = 0V, f = 100kHz			445		nF
Gate charge	Q_g	±15V			25.6		μC
Reverse transfer capacitance	Cr_{es}	V_{CE} = 25V, V_{GE} = 0V, f = 100kHz			0.27		nF
Module stray inductance	L_{sCE}				9		nH
Module lead resistance, terminal-chip	R_{CC+EE}				100		μΩ
internal gate resistor	R_{Gint}				1.5		Ω
Turn-off delay time	$T_{d(off)}$	I_C =1500A, V_{CE} =2800V, V_{GE} = ±15V, $R_{G(OFF)}$ = 3.3Ω , C_{GE} = 330nF, L_S = 70nH, dv/dt =3000V/μs (Tvj= 150 °C).	Tvj= 25℃	-	3015	-	ns
			Tvj= 125℃	-	3630	-	
			Tvj= 150℃	-	3775	-	
Fall time	T_f		Tvj= 25℃	-	740	-	ns
			Tvj= 125℃	-	1565	-	
			Tvj= 150℃	-	1870	-	
Turn-off energy loss	E_{OFF}		Tvj= 25℃	-	2965	-	mJ
			Tvj= 125℃	-	4620	-	
			Tvj= 150℃	-	5230	-	

Electrical Characteristics(T_C= 25 °C unless otherwise stated)

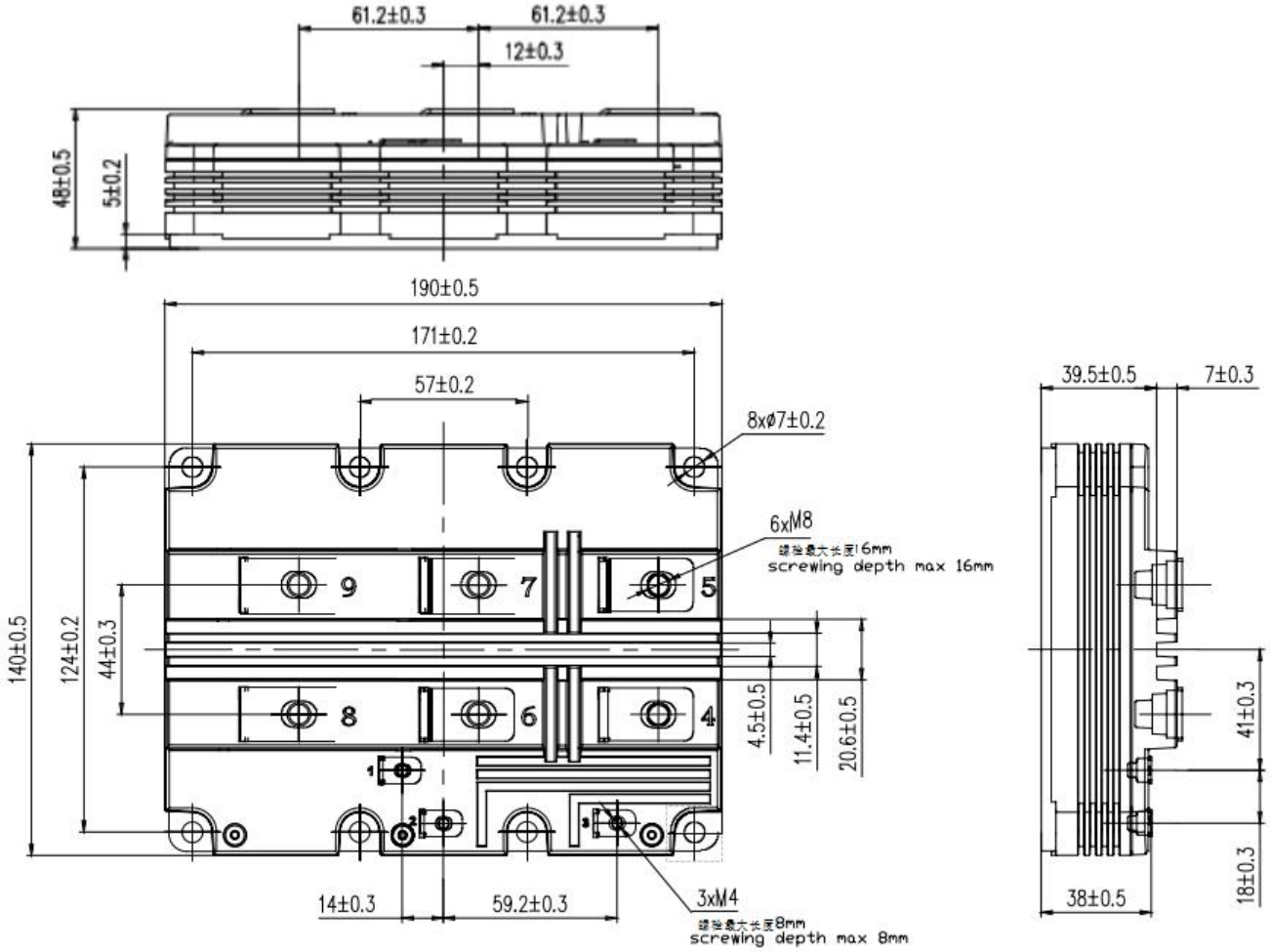
Parameter	Symbol	Test Conditions		Value			Unit
				Min	Typ.	Max	
Turn-on delay time	$t_{d(on)}$	I_C =1500A, V_{CE} =2800V, V_{GE} = ±15V, $R_{G(ON)}$ = 1.0Ω , C_{GE} = 330nF, L_S = 70nH, di/dt =3600A/μs (Tvj= 150 °C).	Tvj= 25℃	-	1075	-	ns
			Tvj= 125℃	-	1135	-	
			Tvj= 150℃	-	1165	-	
Rise time	Tr		Tvj= 25℃	-	360	-	ns
			Tvj= 125℃	-	360	-	
			Tvj= 150℃	-	365	-	
Turn-on energy loss	E_{ON}		Tvj= 25℃	-	5415	-	mJ
			Tvj= 125℃	-	6710	-	
			Tvj= 150℃	-	7345	-	
Diode reverse recovery charge	Q_{rr}	I_F =1500A, V_{CE} = 2800V, - di_F/dt = 3600A/us (Tvj= 150°C).	Tvj= 25℃	-	1130	-	μC
			Tvj= 125℃	-	1745	-	
			Tvj= 150℃	-	1990	-	
Diode reverse recovery current	I_{rr}		Tvj= 25℃	-	1295	-	A
			Tvj= 125℃	-	1350	-	
			Tvj= 150℃	-	1365	-	
Diode reverse recovery energy	E_{rec}		Tvj= 25℃	-	1495	-	mJ
			Tvj= 125℃	-	2665	-	
			Tvj= 150℃	-	3100	-	

Note:

1、 (*1) indicates it is measured at the auxiliary busbar terminal)

2、 (*2) indicates *L* is the circuit stray inductance plus L_{sCE}).

Module outlines



ORDERING GUIDE

Model	Package	Marking	PackagingMethod	Note
CIM1500T450PMDA	Module	CIM1500T450PMDA		

Note: This document is subject to change without notice

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