TLW400M07S1PS

中恒微半导体
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➢ 产品外观 / **Appearance**

V_{CES} = 650V

$I_{C\ nom}$ = 400 A/ I_{CRM} =800 A

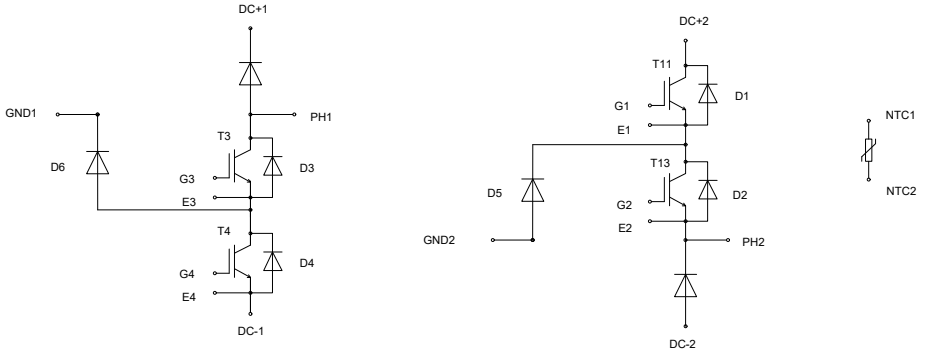
➢ 特性 / **Features**

a.	Neutral Point Clamped 3−Level Inverter Module	中性点钳位三电平逆变模块
b.	Low switching losses	低开关损耗
c.	Low Inductive Layout	低电感设计
d.	Integrated NTC temperature sensor	集成 NTC 温度传感器

➢ 用途 / **Applications**

a.	Solar Inverters	光伏逆变器
b.	Energy Storage System	能源储能系统
c.	3-Level Applications	三电平应用

➢ 电路拓扑 / **Circuit Topology**



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IGBT (T1, T2, T3, T4)

最大额定值/ Maximum Rated Values

集电极-发射极电压 Collector–Emitter voltage	T_J=25℃	V_{CES}	650	V
连续集电极直流电流 Continuous DC collector current	T_C = 100℃, T_j max = 175℃	$I_{c\ nom}$	400	A
集电极重复峰值电流 Repetitive peak collector current	T_P=1ms	I_{CRM}	800	A
栅极-发射极峰值电压 Gate-emitter peak voltage		V_{GES}	+/-30	V

电特性/ Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
集电极-发射极饱和电压 Collector–Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 400 A	T_J = 25℃ T_J = 125℃	$V_{CE(sat)}$		1.35 1.50		V
栅极-发射极阈值电压 Gate–Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C = 15 mA		$V_{GE(th)}$		4.50		V
总栅极电荷 Total Gate Charge	V_{CE} = 300 V, IC = 375 A, V_{GE} = ±15 V		Qg		3.12		uC
内部栅极电阻 Internal gate resistor	T_j = 25℃		R_{Gint}		1.35		Ω
输入电容 Input Capacitance	V_{CE} = 25 V V_{GE} = 0 V f = 1 MHz		C_{ies}		20.8		nF
输出电容 Output Capacitance			C_{res}		0.33		
集电极-发射极截止电流 Collector–Emitter Cut-off Current	V_{GE} = 0 V, V_{CE} = 650 V		I_{CES}			1.0	mA
栅极峰值电流 Gate Leakage Current	V_{GE} = 20 V, V_{CE} = 0 V		I_{GES}			500	nA
开通延迟时间 Turn–on Delay Time	V_{CE} = 400 V, I_C = 400 A, V_{GE} = +15/-8 V, R_G= 10Ω, Inductive Load	T_J = 25℃ T_J = 125℃	$t_{d(on)}$		430 455		ns
上升时间 Rise Time		T_J = 25℃ T_J = 125℃	t_r		200 220		
关断延迟时间 Turn–off Delay Time		T_J = 25℃ T_J = 125℃	$t_{d(off)}$		580 595		
下降时间 Fall Time		T_J = 25℃ T_J = 125℃	t_f		90 95		
开通损耗能量 Turn–on Switching Loss per Pulse		T_J = 25℃ T_J = 125℃	E_{on}		7.65 10.5		mJ
关断损耗能量 Turn off Switching Loss per Pulse		T_J = 25℃ T_J = 125℃	E_{off}		12.0 14.5		
芯片 – 外壳热阻 Thermal Resistance – chip–to–case	每个 IGBT / per IGBT		R_{thJC}		0.130		℃/W
开关状态下温度 Temperature under switching			$T_{j\ op}$	-40		150	℃

二极管/ Diode (D5,D6)

最大额定值/Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_j = 25℃	V_{RRM}	650	V
连续正向直流电流 Continuous DC forward current		I_F	400	A
正向重复峰值电流 Repetitive peak forward current	t_p= 1 ms	I_{FRM}	800	A

电特性/ Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
二极管正向电压 Diode Forward Voltage	I_F = 400 A, V_{GE} = 0 V	T_J = 25℃ T_J = 125℃	V_F		1.45 1.55		V
反向恢复电荷 Reverse Recovery Charge	I_C = 400 A, V_{CE} = 400 V, V_{GE} = +15/-8 V	T_J = 25℃ T_J = 125℃	I_{RM}		90 105		A
反向恢复峰值电流 Peak Reverse Recovery Current		T_J = 25℃ T_J = 125℃	Q_r		7.05 12.5		μC
反向恢复能量 Reverse Recovery Energy		T_J = 25℃ T_J = 125℃	E_{rec}		2.80 3.25		mJ
芯片 – 外壳热阻 Thermal Resistance – chip–to–case	每个二极管 / per diode		R_{thJC}		0.146		℃/W
开关状态下温度 Temperature under switching			$T_{j\,op}$	-40		150	℃

二极管/ Diode (D1, D2, D3, D4)

最大额定值/Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_j = 25℃	V_{RRM}	650	V
连续正向直流电流 Continuous DC forward current		I_F	150	A
正向重复峰值电流 Repetitive peak forward current	t_p= 1 ms	I_{FRM}	300	A

电特性/ Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
二极管正向电压 Diode Forward Voltage	I_F =150 A, V_{GE} = 0 V	T_J = 25℃ T_J = 125℃	V_F		1.50 1.60		V
芯片 – 外壳热阻 Thermal Resistance – chip–to–case	每个二极管 / per diode		R_{thJC}		0.366		℃/W
开关状态下温度 Temperature under switching			$T_{j\,op}$	-40		150	℃

二极管/ Diode (D7, D8)

最大额定值/Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_j = 25℃	V_{RRM}	1200	V
连续正向直流电流 Continuous DC forward current		I_F	400	A
正向重复峰值电流 Repetitive peak forward current	t_p= 1 ms	I_{FRM}	800	A

电特性/ Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
二极管正向电压 Diode Forward Voltage	I_F = 400 A	T_J = 25℃ T_J = 125℃	V_F		1.70 1.80		V
反向恢复峰值电流 Peak Reverse Recovery Current	I_C = 400 A, V_{CE} = 600 V, V_{GE} = +15/-8 V	T_J = 25℃ T_J = 125℃	I_{RRM}		85 105		A
反向恢复电荷 Reverse Recovery Charge		T_J = 25℃ T_J = 125℃	Q_{rr}		7.35 11.5		μC
反向恢复能量 Reverse Recovery Energy		T_J = 25℃ T_J = 125℃	E_{rec}		4.85 7.25		mJ
芯片 – 外壳热阻 Thermal Resistance – chip–to–case	每个二极管 / per diode		R_{thJC}		0.087		℃/W
在开关状态下温度 Temperature under switching			$T_{j\,op}$	-40		150	℃

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负温度系数热敏电阻/ NTC-Thermistor

特征值 / Characteristic Values

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
额定阻值 Rated resistance	T_C = 25℃	R_{25}		5		kΩ
阻值误差 Deviation of R100	T_C = 100℃, R_{100} = 1468 Ω	Δ R/R	-5		5	%
功率损耗 Power dissipation	T_C = 25℃	P25			20	mW
B 值/B – value	$R_2=R_{25}$ exp [$B_{25/50}$(1/T_2 – 1/(298.15K))]	$B_{25/50}$		3375		K
B 值/B – value	$R_2=R_{25}$ exp [$B_{25/80}$(1/T_2 – 1/(298.15K))]	$B_{25/80}$		3411		K
B 值/B – value	$R_2=R_{25}$ exp [$B_{25/100}$(1/T_2 – 1/(298.15K))]	$B_{25/100}$		3443		K

模块/ Module

绝缘配置 / Insulation Coordination

Parameter	Test Conditions	Symbol	Typ.	Unit
隔离试验电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min	V_{ISOL}	4.0	kV
内部隔离 Internal Isolation	Basic insulation (class 1, IEC 61140)		Al_2O_3	
爬电距离 Creepage distance	Terminal to heatsink Terminal to terminal	dCreep	9.0 9.0	mm
间距 Clearance	Terminal to heatsink Terminal to terminal	dClear	4.5 4.5	mm
相对漏电起痕指数 Comparative tracking index		CTI	> 200	

特征值 / Characteristic Values

Parameter	Symbol	Min	Typ	Max	Unit
杂散电感模块/ Stray inductance module	LsCE	-40	8.5		nH
储存温度/ Storage temperatu0re	Tstg	20		125	℃
夹具的安装力/ Mounting force per clamp	F			50	N
重量/ Weight	G		188		g

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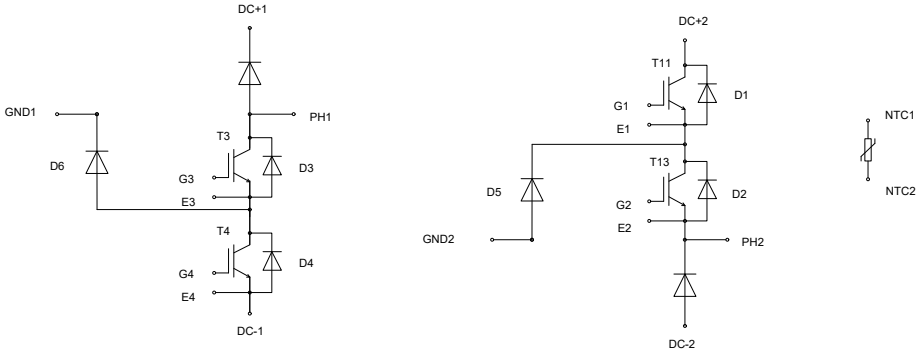
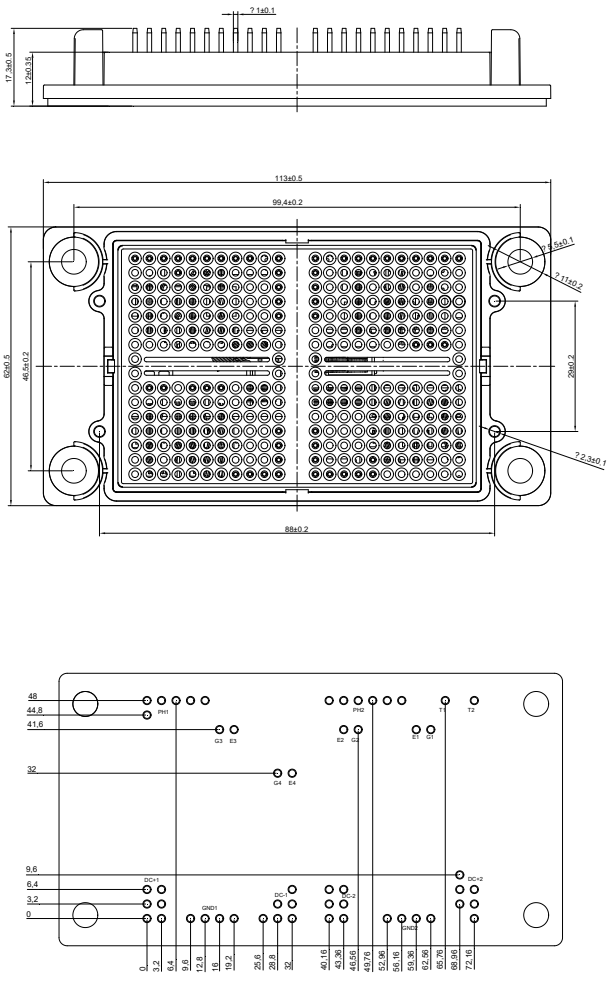
封装/Package

电路拓扑/Circuit Topology



封装尺寸 / Package outlines



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➢ 相关信息 / Related Information

封装信息 / Package Info.

产品列表 / Products list

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