RoHS **Compliant**



Key Parameters

: 1200 V Vces VCE(sat) * (typ) : 1.7 : 600 A Ic (max) IC(PK) (max) : 1200 A

Features

- Trench Gate, Generation 5, TMOS IGBT
- Cu Base with Enhanced Al₂O₃ Substrates
- 10µs Short Circuit Withstand

Applications

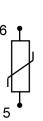
- **Motor Drives**
- Power Charging Equipment
- Renewable Energy Power Conversion
- High Reliability Inverters

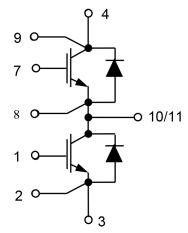
The MP005808 is a half bridge 1200V, trench gate, insulated gate bipolar transistor (IGBT) module with enhanced field stop and implantation technology. The IGBT has a wide reverse bias safe operating area (RBSOA) plus 10µs short circuit withstand. This device is optimised for traction drives and other applications requiring high thermal cycling capability.

The module incorporates an electrically isolated base plate and low inductance construction enabling circuit designers to optimise circuit layouts and utilise grounded heat sinks for safety.

Absolute Maximum Ratings

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.





Circuit configuration

T_{case} = 25°C unless stated otherwise.

Symbol	Parameter Test Conditions		Max.	Units
Vces	Collector-emitter voltage	VGE = 0V, TC = 25°C	1200	V
VGES	Gate-emitter voltage	TC = 25°C	±20]
Ic	Continuous collector current	TC = 88°C	600	_
IC(PK)	Peak collector current	tP = 1ms, TC = 133°C	1200	Α
P _{max}	Max. transistor power dissipation	TC = 25°C, Tvj = 175°C	3	kW
I²t	Diode I²t value	VR = 0, tp = 10ms, Tvj = 150°C	28.8	kA ² s
Visol	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V



^{*} Measured at the auxiliary terminals



Thermal and Mechanical Ratings

Internal insulation material : Al₂O₃ Baseplate material : Cu Creepage distance – Terminal to heatsink : 14.5mm Creepage distance – Terminal to terminal : 13mm Clearance - Terminal to heatsink : 12.5mm Clearance - Terminal to terminal : 10mm CTI (Comparative Tracking Index) : >200

Symbol	Parameter	Test Conditions	Min.	Max.	Units
Rth(j-c)	Thermal resistance– IGBT	Continuous dissipation -		49	
Rth(j-c)	Thermal resistance – diode	junction to case	-	77	00/10/1
Rth(c-h)	Thermal resistance – case to heatsink (IGBT)	(IGBT) Mounting torque 5Nm		34	°C/kW
Rth(c-h)	Thermal resistance – case to heatsink (Diode)	(with mounting grease: 1W/m °C)	-	40	
т.	Junction temperature –	IGBT	-40	150	°C
Tj	under switching conditions	Diode			
Fstg	Storage temperature range	-			
	Caranitarina	Mounting – M5	3	6	Nima
Screw torque		Electrical connections – M6	3	6	Nm

Electrical Characteristics

T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Conditions	Min.	Тур	Max.	Units	
		Vge = 0V, Vce = Vces			1		
Ices	Collector cut-off current	VGE = 0V, VCE = VCES, TC = 125°C			10 mA		
		Vge = 0V, Vce = Vces, Tc = 150°C			20	1	
Iges	Gate leakage current	VgE = ± 20V, VcE = 0V			0.5	μA	
VGE(TH)	Gate threshold voltage	Ic = 15mA, Vge = Vce	5	6	7		
		V _{GE} = 15V, I _C = 600A		1.7			
VcE(sat)	Collector-emitter saturation voltage	V _{GE} = 15V, I _C = 600A, T _j = 125°C		2		V	
		V _{GE} = 15V, I _C = 600A, T _j = 150°C		2.1			
lF	Diode forward current	DC		600			
Iгм	Diode maximum forward current	$t_p = 1 ms$		1200		A	
		I _F = 600A		1.9			
VF	Diode forward voltage	IF = 600A, T _j = 125°C		2.1		V	
		I _F = 600A, T _j = 150°C		2.1			
Cies	Input capacitance	Vce = 25V, Vge = 0V, f = 100kHz		57		nF	
Qg	Gate charge	±15V		6.1		μC	
Qres	Reverse transfer capacitance	Vce = 25V, Vge = 0V, f = 100kHz		1.8		nF	
Lм	Module inductance			22		nH	
RINT	Internal transistor resistance			1		mΩ	
SCData	Short circuit current, Isc	$ \begin{aligned} T_j &= 150^{\circ}C, \ V_{CC} = 800V \\ t_p &\leq 10 \mu s, \ V_{GE} \leq 15V \\ V_{CE \ (max)} &= V_{CES} - L^* \ x \ dI/dt \\ IEC \ 60747-9 \end{aligned} $		2800		А	





Note:

NTC-Thermistor Data

Symbol	Parameter	Test Conditions		Тур	Max.	Units
R ₂₅	Rated Resistance	Tc = 25°C		5		kΩ
ΔR/R	Deviation of R100	Tc = 100°C, R ₁₀₀ = 493Ω	-5		5	%
P ₂₅	Power Dissipation	Tc = 25°C			20	m/W
B _{25/50}		R ₂ = R ₂₅ exp [B _{25/50} (1/T2 – 1/(298.15K))]		3375		
B _{25/80}	B-value	R ₂ = R ₂₅ exp [B _{25/80} (1/T2 - 1/(298.15K))]		3411		K
B _{25/100}		R ₂ = R ₂₅ exp [B _{25/100} (1/T2 - 1/(298.15K))]		3433		

Electrical Characteristics

T_{case} = 25°C unless stated otherwise.

Symbol	Parameter	Test Co	nditions	Min.	Тур	Max.	Units
td(off)	Turn-off delay time				710		
tf	Fall time	Ic = 600A VcE = 600V VGE = ±15V	dv/dt = 3500V/μs		280		ns
Eoff	Turn-off energy loss				90		mJ
td(on)	Turn-on delay time	$R_{G(OFF)} = 0.5\Omega$ $R_{G(ON)} = 0.5\Omega$ $Ls \sim 40nH$			185		no
tr	Rise time		di/dt = 6000A/µs		92		ns
Eon	Turn-on energy loss				22		mJ
Qrr	Diode reverse recovery charge	IF = 600A VCE = 600V			52		μC
Irr	Diode reverse recovery current				365		Α
Erec	Diode reverse recovery energy	di/dt = 7	000A/µs		29		mJ

T_{case} = 125°C unless stated otherwise.

Symbol	Parameter	Test Conditions			Тур	Max.	Units
td(off)	Turn-off delay time				780		
tf	Fall time	Ic = 600A VcE = 600V VGE = ±15V	dv/dt = 3500V/μs di/dt = 6000A/μs		400		ns
Eoff	Turn-off energy loss				102		mJ
td(on)	Turn-on delay time	$R_{G(OFF)} = 0.5\Omega$ $R_{G(ON)} = 0.5\Omega$ $Ls \sim 40nH$			180		no
tr	Rise time				98		ns
Eon	Turn-on energy loss				32		mJ
Qrr	Diode reverse recovery charge	IF = 600A VcE = 600V di/dt = 6000A/µs			78		μC
Irr	Diode reverse recovery current				420		Α
Erec	Diode reverse recovery energy				43		mJ

^{*} L is the circuit inductance + LM

T_{case} = 150°C unless stated otherwise.

Symbol	Parameter	Test Conditions			Тур	Max.	Units
td(off)	Turn-off delay time				800		no
t f	Fall time	Ic = 600A VcE = 600V VGE = ±15V	dv/dt = 3500V/μs di/dt = 6000A/μs		430		ns
Eoff	Turn-off energy loss				105		mJ
td(on)	Turn-on delay time	$R_{G(OFF)} = 0.5\Omega$ $R_{G(ON)} = 0.5\Omega$ $Ls \sim 40nH$			180		
tr	Rise time				100		ns
Eon	Turn-on energy loss				34		mJ
Qrr	Diode reverse recovery charge	IF = 600A Vce = 600V			100		μC
Irr	Diode reverse recovery current				450		Α
Erec	Diode reverse recovery energy	di/dt = 6	di/dt = 6000A/µs		55		mJ

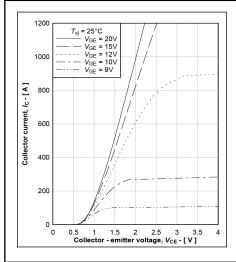


Fig. 3 Typical IGBT output characteristics, $I_C = f(V_{CE})$

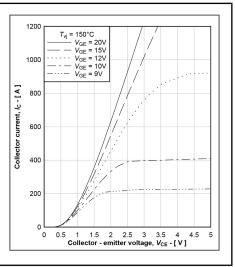


Fig. 4 Typical IGBT output characteristics, $I_C = f(V_{CE})$

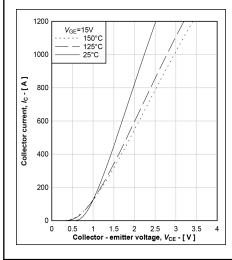


Fig. 5 Typical IGBT output characteristics, $I_C = f(V_{CE})$

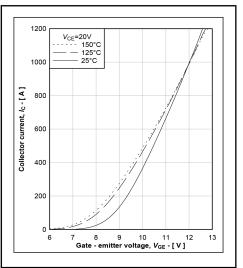


Fig. 6 Typical IGBT transfer characteristics, $I_C = f(V_{GE})$



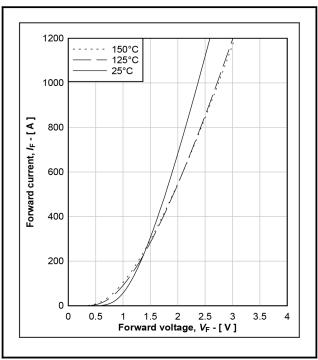


Fig. 7 Diode typical forward characteristics, $I_F = f(V_F)$

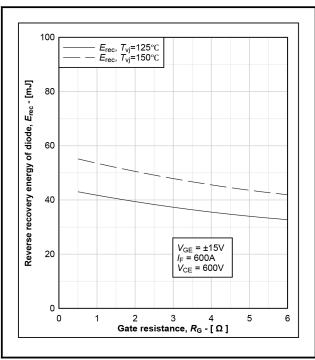


Fig. 8 Typical FRD E_{rec} , $E_{rec} = f(R_G)$

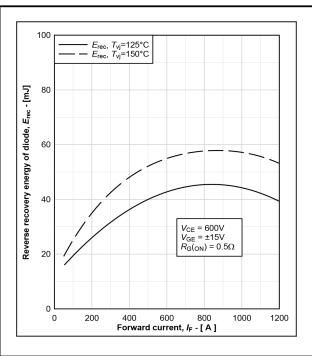


Fig. 9 Typical FRD E_{rec} , $E_{rec} = f(I_F)$

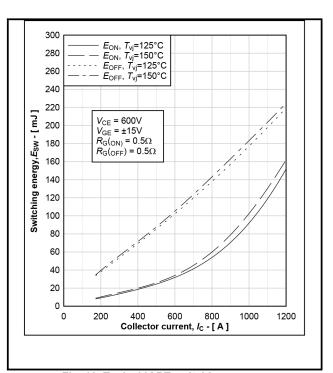


Fig. 10 Typical IGBT switching energy, $E_{ON} = f(I_C), E_{OFF} = f(I_C)$



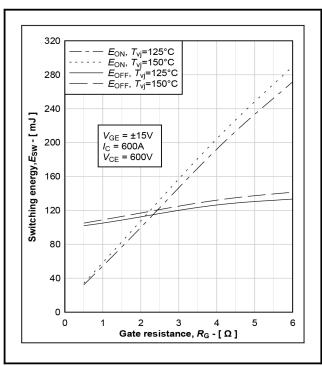


Fig. 11 Typical IGBT switching energy $E_{ON} = f(R_G)$, $E_{OFF} = fR_G$)

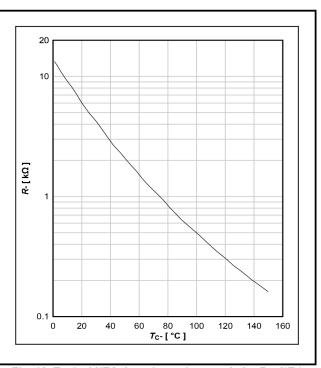


Fig. 12 Typical NTC thermistor characteristic, $R = f(T_c)$

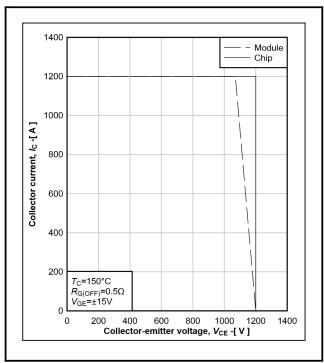


Fig. 13 Reverse bias safe operating area of IGBT, $I_C = f(V_{CE})$

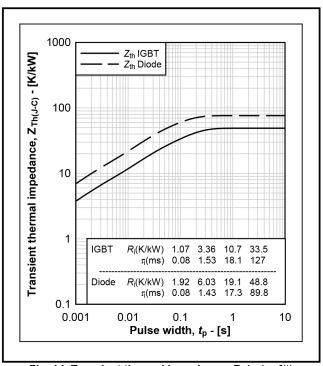
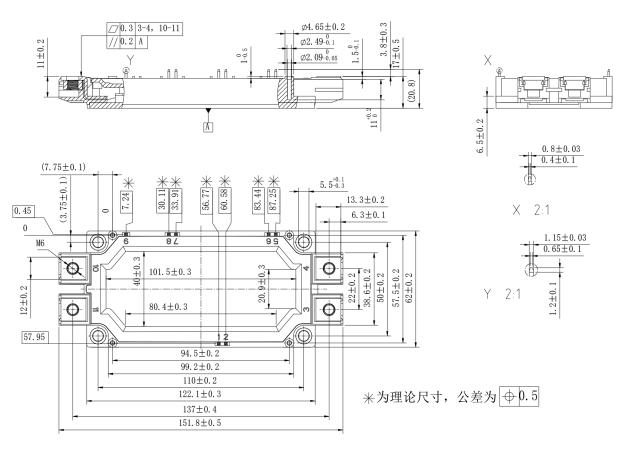


Fig. 14 Transient thermal impedance, $Z_{th}(J-C) = f(t)$





Nominal Weight: 345g

Part Number Table

Description	Part Number	
Half Bridge IGBT Module, 1200V, 600A, M1 Case Code	MPIM600M112TG5	

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