CMT-PLA1BK12300MA DATASHEET

Version: 1.1
3-Oct-25
(Last Modification Date)

1200V/300A Half-Bridge IGBT Power Module

General description

The CMT-PLA1BK12300MA is a 1200V/300A half-bridge IGBT Power Module utilizing advanced Trench Gate Field Stop (TG-FS) technology. Designed and qualified for demanding industrial applications, it features low saturation voltage and delivers a continuous DC collector current up to 450A. It also features fast switching and short tail currents, as well as a free-wheeling diode optimized for fast and soft reverse recovery. The module is guaranteed for reliable operation across the full junction temperature range from -40 to +175°C (Tj).

Benefits

- Trench Gate Field Stop Technology
- VCE(sat) with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low Switching Losses

Features

- Specified from -40 to +175°C (Tj)
- Max Collector Voltage: 1200V
- DC Collector Current
  - @ T_C=90°C: 450A
  - @ T_C=125°C: > 300A
- Low Saturation Voltage
  - $V_{CE(sat)}$= 1.56V @ I_C=300A, Tj=25°C
  - $V_{CE(sat)}$= 1.78V @ I_C=300A, Tj=150°C
- Low Switching Energy
  - Eon= 32mJ at Tj=150°C
  - Eoff= 39.6mJ Tj=150°C
- Gate charge: Q_G=2.25µC
- Package: CPAK-62

Applications

- High Frequency Switching
- Medical Applications
- Motion/Servo Control
- UPS Systems

Absolute Maximum Ratings

IGBT

Parameter	Symbol	Condition	Value	Unit
Collector Emitter Voltage	V_{CES}	T_j=25°C	1200	V
Gate Emitter Voltage	V_{GES}		+/-20	V
DC Collector Current	I_C	T_C=25°C, T_{jmax}=175°C	630	A
DC Collector Current	I_C	T_C=90°C, T_{jmax}=175°C	450	A
DC Collector Current	I_C	T_C=125°C, T_{jmax}=175°C	325	A
Repetitive Peak Collector Current	I_{CM}	Tp=1ms	900	A
Power Dissipation per IGBT	P_{TOT}	T_C=25°C, T_{jmax}=175°C	2142	W
Junction Temperature	Tjmax		175	°C

Diode

Parameter	Symbol	Condition	Value	Unit
Repetitive Reverse Voltage	V_{RSM}	T_j=25°C	1200	V
Average Forward Current	$I_{F(AVG)}$		400	A
Repetitive Peak Forward Current	I_{FRM}	Tp=1ms	800	A
I^2t - value	I^2t	Tj =150°C, t=10ms, V_R=0V	39.2	kA^2s
Junction Temperature	Tjmax		175	°C

THERMAL RESISTANCE

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction-to-case thermal resistance	R_{thJC}	Per IGBT			0.07	°C/W
Junction-to-case thermal resistance	R_{thJFC}	Per Diode			0.12	

IGBT Electrical characteristics

Unless otherwise stated, T_j =25°C.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V_{CE} =V_{GE}, I_C=18mA	5.0	5.8	6.5	V
Collector Emitter Saturation Voltage	$V_{CE(Sat)}$	I_C =300A, V_{GE}=15V, T_j=25°C		1.56		V
		I_C =300A, V_{GE}=15V, T_j=150°C		1.78		
		I_C =450A, V_{GE}=15V, T_j=25°C		1.85		
		I_C =450A, V_{GE}=15V, T_j=150°C		2.2		
Collector Leakage Current	I_{CES}	V_{CE} =1200V, V_{GE}=0V, T_j=25°C			0.5	mA
		V_{CE} =1280V, V_{GE}=0V, T_j=25°C			1	
Gate Leakage Current	I_{GES}	V_{CE} =0V, V_{GE}=+/-20V, T_j=25°C	-400		400	nA
Integrated Gate Resistor	R_{gint}			1.4		Ω
Gate Charge	Q_G	V_{CE} =600V, I_C=450A,		2.25		µC
Input Capacitance	C_{IES}	V_{CE} =25V, V_{GE} =0V, f = 1 MHz		33.5		nF
Reverse Transfer Capacitance	C_{RES}			1.5		
				1.5		
Input Capacitance	C_{IES}	V_{CE} =50V, V_{GE} =0V, f = 1 MHz		31.5		nF
Reverse Transfer Capacitance	C_{RES}			1.5		
Turn-on delay time	$T_{d(ON)}$	V_{CC}=600V; V_{GE}= +/-15V; I_C = 450A; R_G= 2.0Ω; Inductive load; T_j=25°C		100		ns
		T_j=150°C		130		
Rise time	T_r	T_j=25°C		78		
		T_j=150°C		86		
Turn-off delay time	$T_{d(OFF)}$	T_j=25°C		550		
		T_j=125°C		590		
Fall time	T_f	T_j=25°C		120		
		T_j=125°C		220		
Turn-On Switching Energy	E_{on}	T_j=125°C		39		mJ
		T_j=150°C		42		
Turn-Off Switching Energy	E_{off}	T_j=125°C		52		
		T_j=150°C		56		
Turn-On Switching Energy	E_{on}	V_{CC}=600V; V_{GE}= +/-15V; I_C = 300A; R_G= 2.0Ω; Tj=150°C; Inductive load		32		mJ
Turn-Off Switching Energy				39.3		
Short Circuit Current	E_{off}	tpsc≤10µs , V_{GE}=15V T_J=125℃,V_{CC}=800V		1700		A
Operating Junction temperature	T_{jop}		-40		150	°C

Anti-Parallel Diode Electrical Characteristics

Unless otherwise stated, T_j =25°C.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=300A; V_{GE}=0V; T_j=25°C;		1.66		V
		I_F=300A; V_{GE}=0V; T_j=125°C;		1.4		
		I_F=300A; V_{GE}=0V; T_j=150°C;		1.34		
		I_F=450A; V_{GE}=0V; T_j=25°C;		1.8		
		I_F=450A; V_{GE}=0V; T_j=125°C;		1.55		
		I_F=450A; V_{GE}=0V; T_j=150°C;		1.5		
Reverse Recovery Time	T_{rr}	I_F=450A; V_R=600V; dI_F/dt = -5300A/µS; T_j=150°C;		530		ns
Peak Reverse Recovery Current	I_{RRM}			485		A
Reverse Recovery Charge	Q_{RR}			133		µC
Reverse Recovery Energy	E_{rec}			59.5		mJ
Operating Junction temperature	T_{jop}		-40		150	°C

Module Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Storage Temperature	T_{st}		-40		125	°C
Isolation Breakdown Voltage	V_{isol}	AC, 50Hz(R.M.S), t=1minute		3		kV
Comparative Tracking Index	CTI		225			
Creepage distance	d_{Creep}	Terminal to heatsink		29		mm
		Terminal to terminal		23.3		mm
Clearance	d_{Clear}	Terminal to heatsink		23		Mm
		Terminal to terminal		10		mm
Mounting Torque		Baseplate to heatsink (M6 recommended)	3		5	Nm
		Terminal	2.5		5	Nm
Weight				300		g

Typical Performance Characteristics

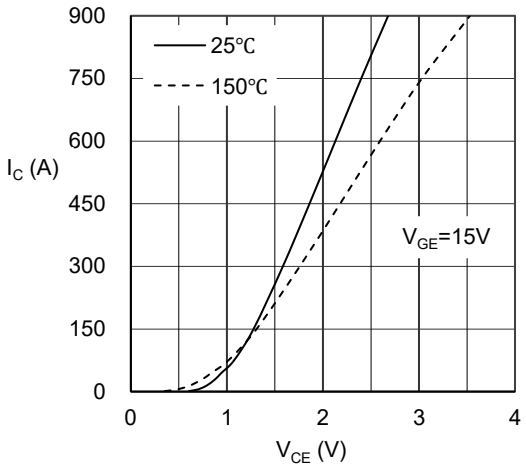


Figure 1: Typical Output Characteristics

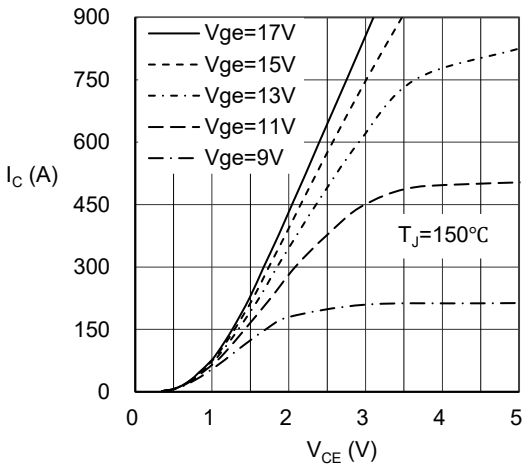


Figure 2: Typical Output Characteristics

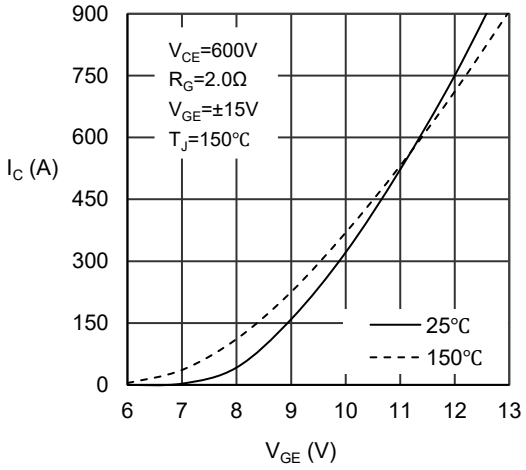


Figure 3: Typical Transfer characteristics

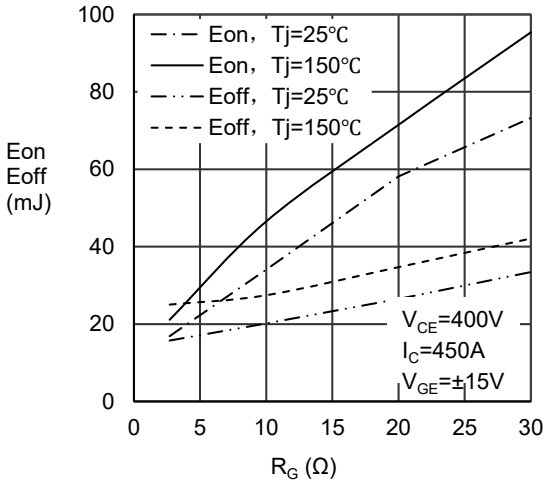


Figure 4: Switching energies vs R_G

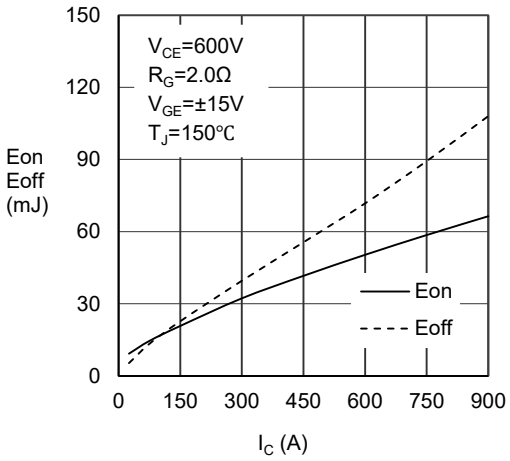


Figure 5: Switching energies vs Collector Current

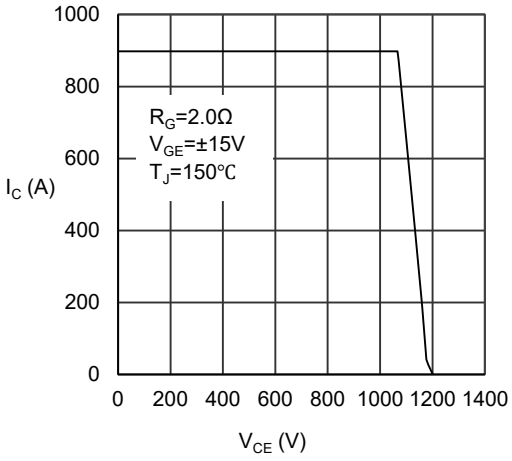


Figure 6: Reverse Bias Safe Operating Area

Typical Performance Characteristics (cnt'd)

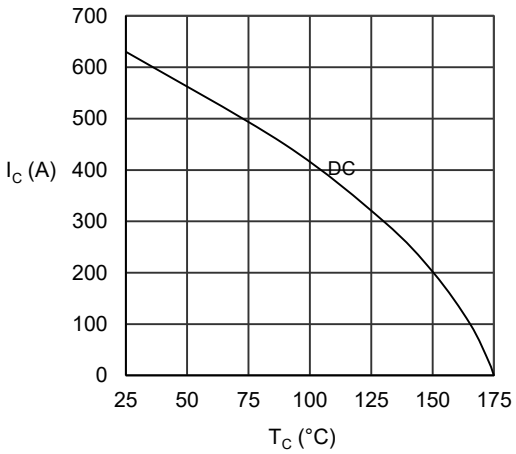


Figure 7: Collector Current vs T_{Case} - IGBT

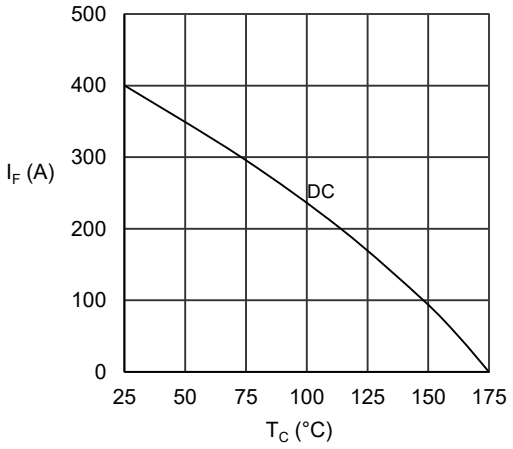


Figure 8: Forward Current vs T_{Case} - Diode

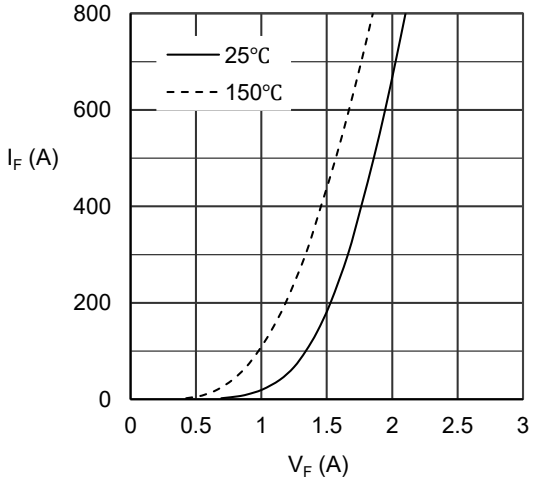


Figure 9: Diode Forward Characteristics

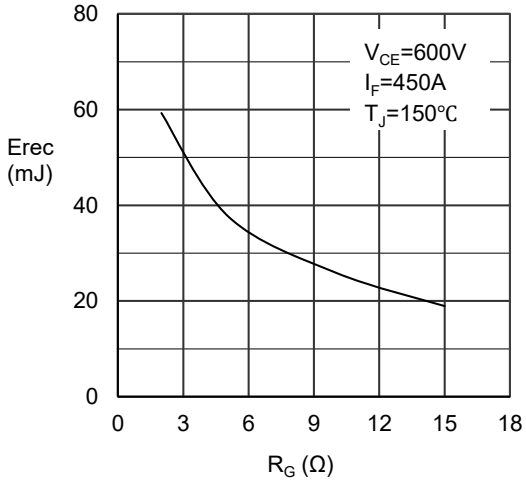


Figure 10: Transient Thermal Impedance

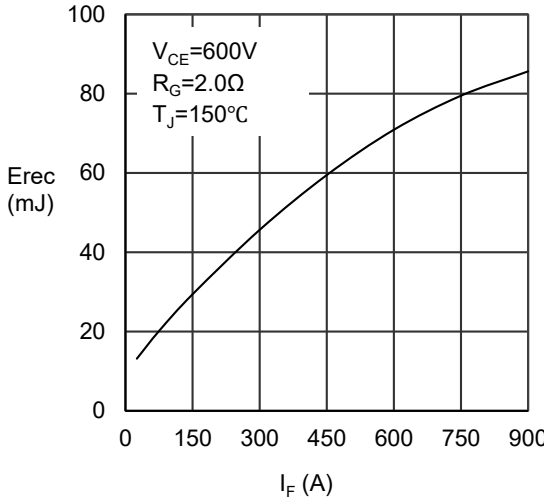


Figure 11: Reverse Recovery Energy vs I_F

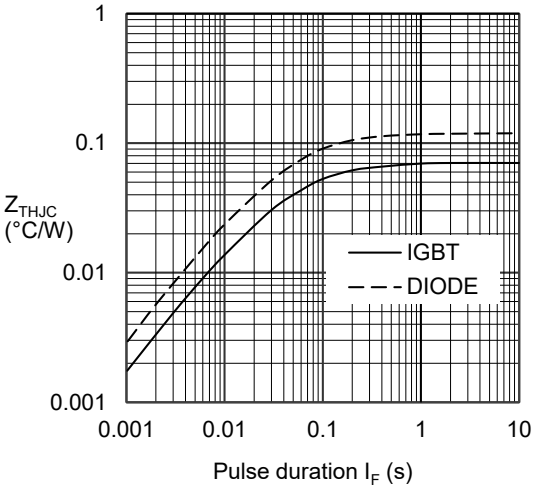
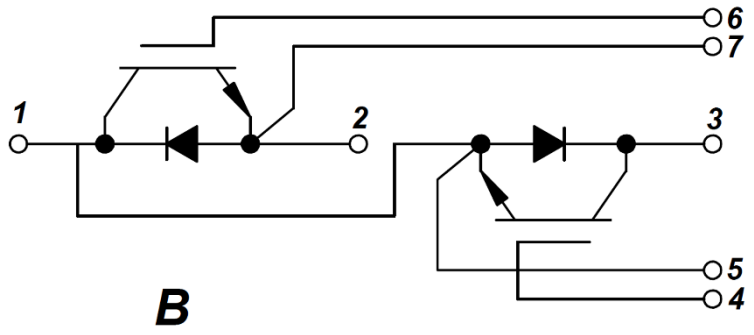
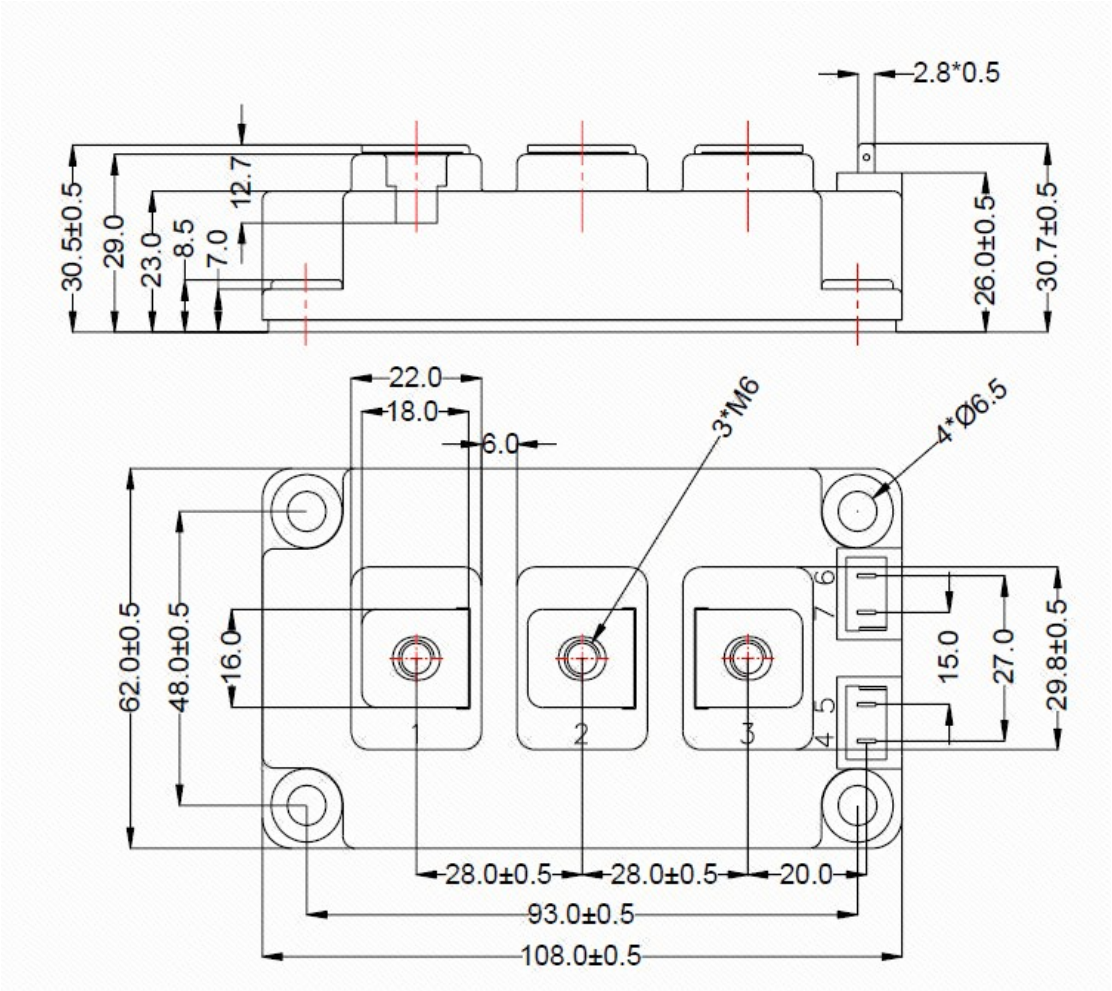


Figure 12: Transient Thermal Impedances

Package Configuration



Package Dimensions (in mm)



Ordering Information

Product Name	Ordering Reference	Package	Marking
CMT-PLA1BK12300MA	CMT-PLA1BK12300MA	CPAK-62	CMT-PLA1BK12300MA

Contact & Ordering

CISSOID S.A.

Headquarters and contact EMEA:	CISSOID S.A. – Rue Francqui, 11 – 1435 Mont Saint Guibert - Belgium T : +32 10 48 92 10 Email : sales@cissoid.com
Sales Representatives:	**Visit our website: http://www.cissoid.com**

Disclaimer

Neither CISSOID, nor any of its directors, employees or affiliates make any representations or extend any warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, and the absence of latent or other defects, whether or not discoverable. In no event shall CISSOID, its directors, employees and affiliates be liable for direct, indirect, special, incidental or consequential damages of any kind arising out of the use of its circuits and their documentation, even if they have been advised of the possibility of such a damage. The circuits are provided "as is". CISSOID has no obligation to provide maintenance, support, updates, or modifications.