



BYD Microelectronics Co., Ltd.

BG50B12LX

IGBT Power Module

$V_{CE}=1200V$ $I_C=50A$

General Description

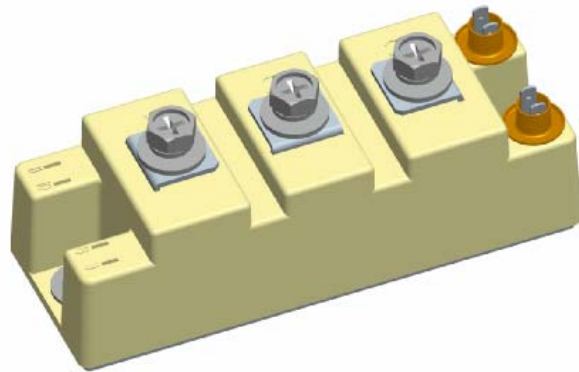
BYD IGBT Power Module BG50B12LX provides ultra low conduction loss as well as high short circuit capability, which introduce the advanced IGBT chip/FWD and improved connection, it is able to take on a perfect performance in various applications under 25KHz.

Features

- Half-bridge
- Low inductance
- Standard package
- High short circuit capability
- Ultra low conduction and switching loss
- Including fast&soft recovery anti-parallel FWD

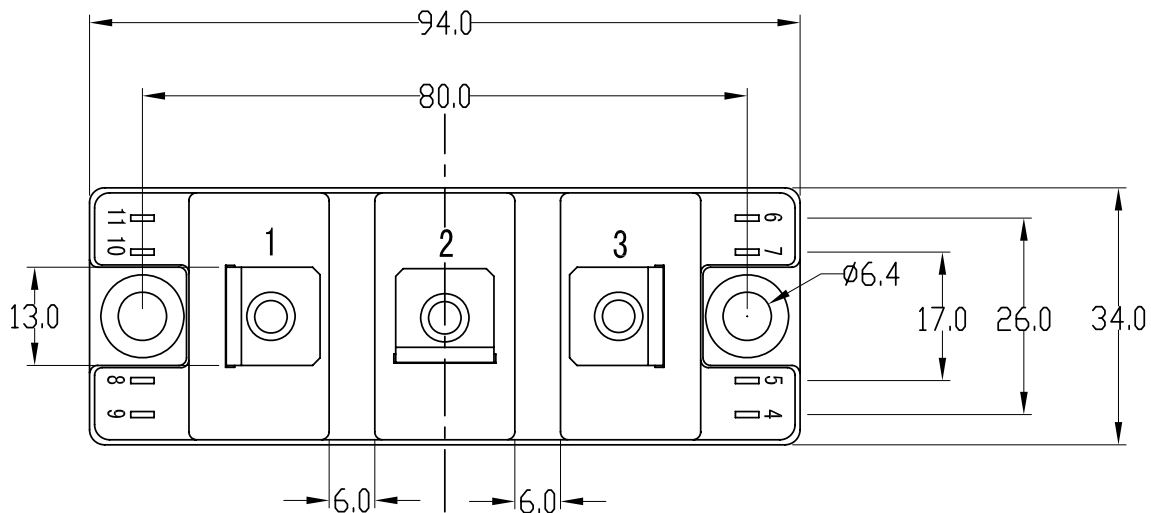
Applications

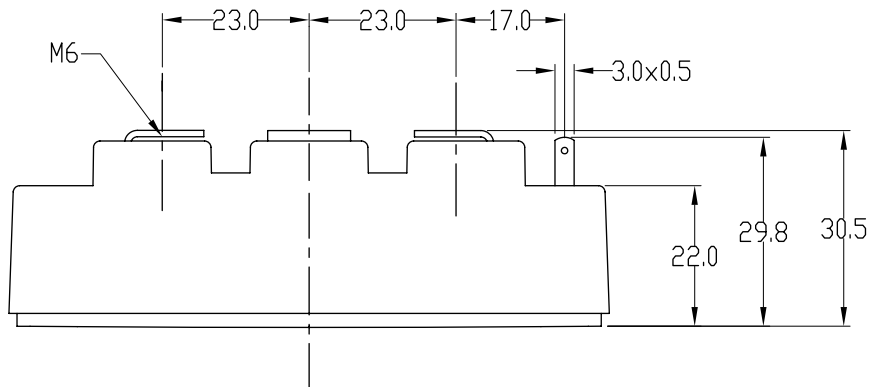
- AC motor control
- Inverters
- Servo
- UPS(Uninterruptible Power Supplies)
- Electric welding



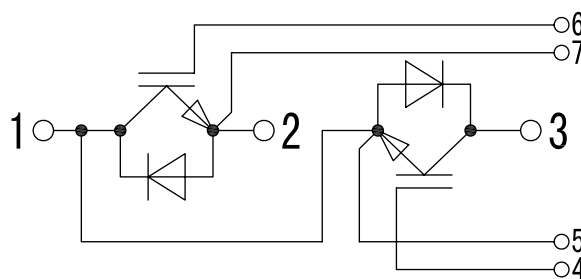
Package Outlines

Dimensions in mm





Circuit Diagram



Characteristic values

Parameter	Symbol	Conditions	Temperature	Value		Unit
Absolute Maximum Ratings						
				min	max	
Collector-emitter voltage	V_{CES}	$V_{GE}=0V$	$T_{vj}=25^{\circ}C$	—	1200	V
Continuous collector current	I_C	—	$T_{vj}=80^{\circ}C$	—	57	A
Peak collector current	I_{CM}	$t=1ms$	$T_{vj}=80^{\circ}C$	—	114	A
Gate-emitter voltage	V_{GES}	—	—	-20	20	V
IGBT short circuit SOA	t_{psc}	$V_{CC}=900V, V_{CEM} \le 1200V,$ $V_{GE} \le 15V$	$T_{vj} \le 125^{\circ}C$	—	10	μs
Junction temperature	T_{vj}	—	—	-40	150	$^{\circ}C$
Storage temperature range	T_{stg}	—	—	-40	125	$^{\circ}C$
Repetitive peak reverse voltage	V_{RRM}	—	—	—	1200	V
DC forward current	I_F	—	—	—	57	A
Isolation voltage	V_{isol}	$1min, f=50Hz$	—	—	2500	V

Characteristics							
IGBT				min	typ	max	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=2mA, V_{CE}=V_{GE}$	$T_{vj}=25^{\circ}C$	5	6.2	7	V
Collector cut-off current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	—	—	0.1	mA
			$T_{vj}=125^{\circ}C$	—	0.2	—	mA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=57A, V_{GE}=15V$	$T_{vj}=25^{\circ}C$	—	1.8	—	V
			$T_{vj}=125^{\circ}C$	—	2.0	—	V
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$	$T_{vj}=25^{\circ}C$	—	4.29	—	nF
Output capacitance	C_{oes}			—	0.3	—	nF
Reverse transfer capacitance	C_{res}			—	0.2	—	nF
Turn-on delay time	$t_{d(on)}$	$V_{CC}=600V, I_C=57A,$ $R_G=18\Omega, V_{GE}=\pm 15V,$ $L_{\sigma}=60nH,$ inductive load	$T_{vj}=25^{\circ}C$	—	270	—	ns
			$T_{vj}=125^{\circ}C$	—	290	—	ns
Rise time	t_r		$T_{vj}=25^{\circ}C$	—	60	—	ns
			$T_{vj}=125^{\circ}C$	—	60	—	ns
Turn-off delay time	$t_{d(off)}$		$T_{vj}=25^{\circ}C$	—	480	—	ns
			$T_{vj}=125^{\circ}C$	—	550	—	ns
Fall time	t_f		$T_{vj}=25^{\circ}C$	—	60	—	ns
			$T_{vj}=125^{\circ}C$	—	65	—	ns
Energy dissipation during turn-on time	E_{on}	$V_{CC}=600V, I_C=57A,$ $R_G=18\Omega, V_{GE}=\pm 15V,$ $L_{\sigma}=60nH,$ inductive load	$T_{vj}=25^{\circ}C$	—	6.0	—	mJ
			$T_{vj}=125^{\circ}C$	—	8.4	—	mJ
Energy dissipation during turn-off time	E_{off}	$V_{CC}=600V, I_C=57A,$ $R_G=18\Omega, V_{GE}=\pm 15V,$ $L_{\sigma}=60nH,$ inductive load	$T_{vj}=25^{\circ}C$	—	3.7	—	mJ
			$T_{vj}=125^{\circ}C$	—	5.8	—	mJ
Diode							
Forward voltage	V_F	$I_F=50A$	$T_{vj}=25^{\circ}C$	—	—	1.85	V
			$T_{vj}=150^{\circ}C$	—	—	1.9	V
Peak reverse recovery current	I_{RM}	$I_F=50A, V_{CC}=600V,$ $di/dt=900A/us,$ $L_{\sigma}=60nH,$ inductive load	$T_{vj}=125^{\circ}C$	—	57	—	A
Recovered charge	Q_{rr}		$T_{vj}=125^{\circ}C$	—	13.5	—	μC
Reverse recovery time	t_{rr}		$T_{vj}=125^{\circ}C$	—	170	—	ns
Reverse recovery energy	E_{rec}		$T_{vj}=125^{\circ}C$	—	5.85	—	mJ

Thermal-Mechanical Specifications							
Parameter	Symbol	Conditions	min	typ	max	Unit	
IGBT thermal resistance junction to case	$R_{th(j-c)}$	per switch	—	—	0.256	K/W	
Diode thermal resistance junction to case	$R_{th(j-c)}$		—	—	0.576	K/W	
IGBT thermal resistance case to heat-sink	$R_{th(c-s)}$	IGBT per switch, I grease = 1W/m x K	—	0.024	—	K/W	
Diode thermal resistance case to heat-sink	$R_{th(c-s)}$	Diode per switch, I grease = 1W/m x K	—	0.048	—	K/W	
Dimensions	L x W x H	Typical , see outline drawing	94 x 34 x 30.5			mm	
Clearance distance in air	da	according to IEC 60664-1 and EN 50124-1	Term. to base:	—	—	28	mm
			Term. to term:	4.5	—	—	
Surface creepage distance	ds	according to IEC 60664-1 and EN 50124-1	Term. to base:	—	20	—	mm
			Term. to term:	—	10	—	
Mass	m	—	—	210	—	gr	

Thermal and mechanical properties according to IEC 60747 – 15

Characterization curves

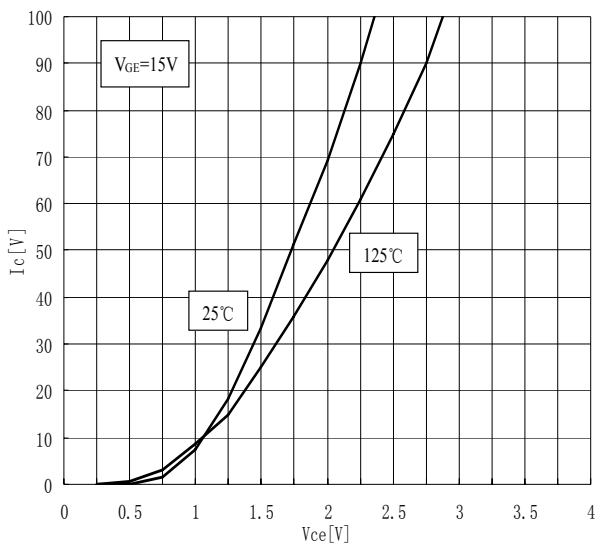


Fig.1 Typical Output Characteristics

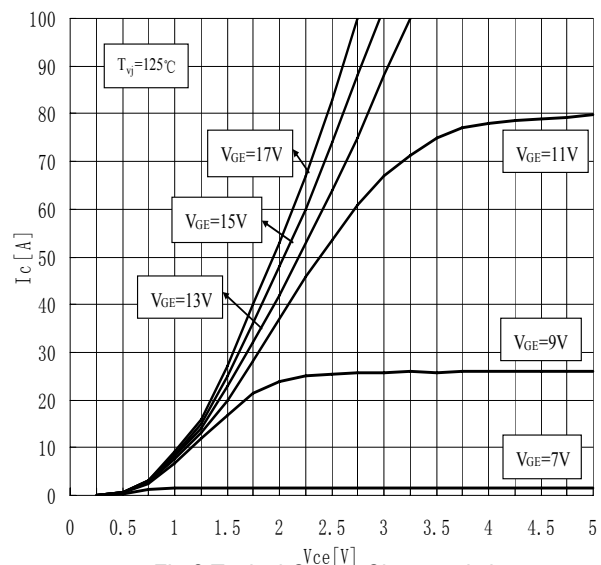


Fig.2 Typical Output Characteristic

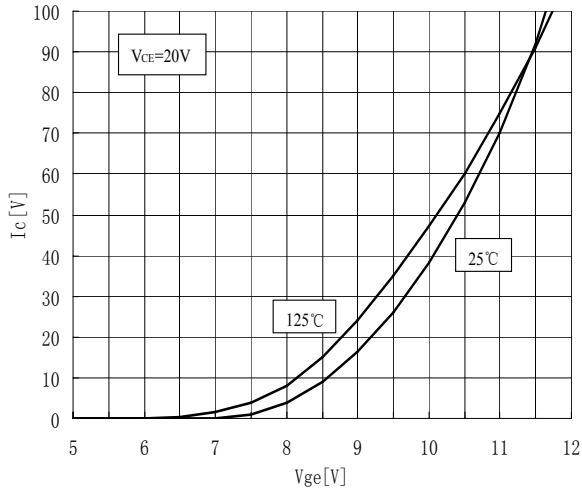


Fig.3 Typical Transfer Characteristics

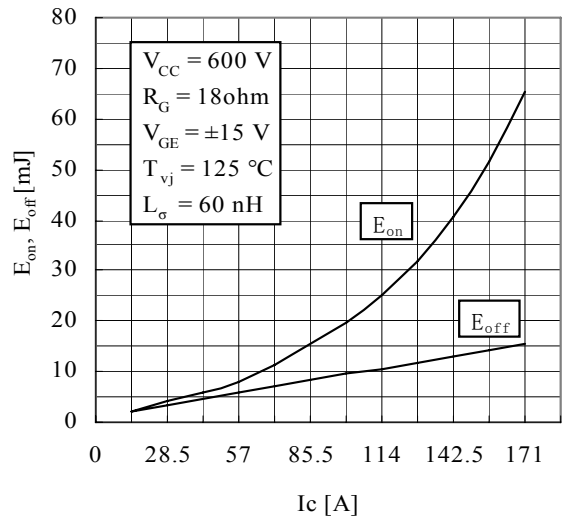


Fig.4 Switching Loss vs. Collector current

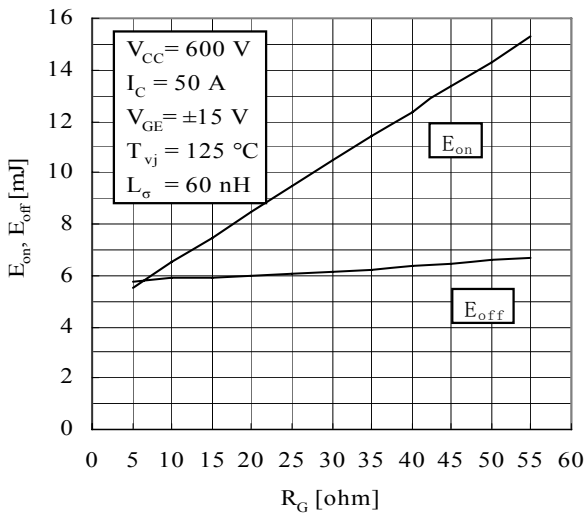


Fig.5 Switching Loss vs. Gate Resistor

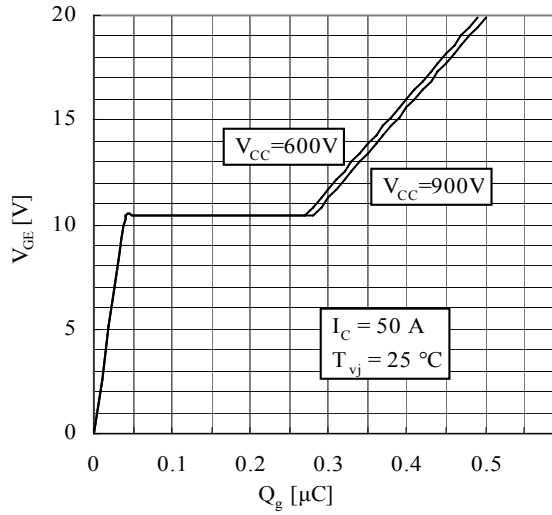


Fig.6 Typical Gate Charge Characteristics

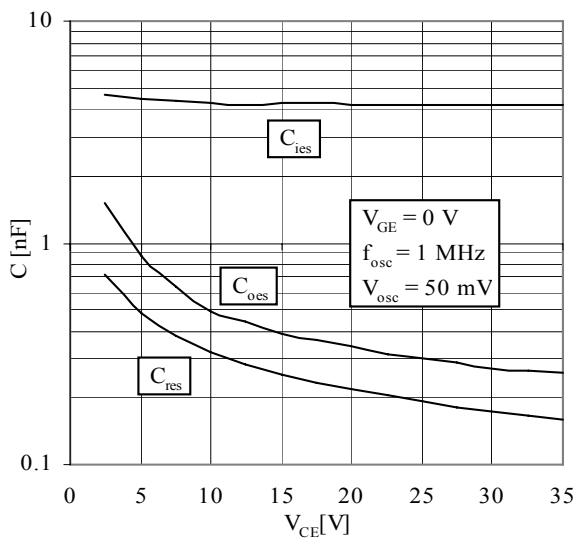


Fig.7 Typical Capacitances vs Collector-Emitter Voltage (chip level)

Attention

- 1、In order to reduce the contact resistance, we suggest add thermal grease between base and heat-sink, which thickness is about 0.1mm.
- 2、When installing the module, please wear a electrostatic bracelet to prevent the gate breakdown and the imbalance power may damage the internal chip, even to damage the module.
- 3、This is an electrostatic sensitive device, please observe the international standard IEC 60747-1, chap. IX.

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