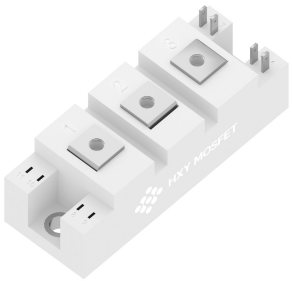
C3M15120HB1

SiC Power MOSFET N-Channel Enhancement Mode

Features

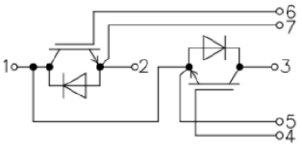
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes



module-HB

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Package Marking and Ordering Information

Ordering Part Number	Package	Brand
C3M15120HB1	module-HB	HXY MOSFET

Maximum Ratings (T_C = 25 ˚C unless otherwise specifed)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current T_C = 25°C， V_{GS} = 18V T_C = 100°C， V_{GS} = 18V	I_D	117 84	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	250	A
Avalanche energy, single pulse (L=10mH)	E_{AS}	1200	mJ
Gate-Source voltage	V_{GS}	-4/+18	V
Gate-Source voltage（Absolute maximum values）	V_{GSmax}	-8/+22	V
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C

●Example of acceptable V_{GS} waveform

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	V_{DSS}	1200	-	-	V	V_{GS}=0V, I_D=100uA
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	V_{DS}=V_{GS},I_D=10mA
Zero gate voltage drain current	I_{DSS}	- -	5 40	- -	μA	V_{DS}=1200V,V_{GS}=0V T_C=25°C T_C=175°C
Gate-source leakage current	I_{GSS}	-		100	nA	V_{GS}=18V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	15 30	23 -	mΩ	V_{GS}=18V, I_D=33.4A, T_J=25°C T_J=175°C
Drain-source on-state resistance	$R_{DS(on)}$	- -	20 32	30 -	mΩ	V_{GS}=15V, I_D=33.4A, T_J=25°C T_J=175°C
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	4837.8	-	pF	V_{DS} = 1000V V_{GS} = 0V T_J = 25°C V_{AC}=25mV f = 1MHz
Output Capacitance	C_{oss}	-	576.3	-		
Reverse Transfer Capacitance	C_{rss}	-	22.4	-		
Gate Total Charge	Q_G	-	189.5	-	nC	V_{DS} = 800V V_{GS} = -4/+18V I_D = 80A I_G=1mA
Gate-Source charge	Q_{gs}	-	40.9	-		
Gate-Drain charge	Q_{gd}	-	88.2	-		
Turn-On Switching Energy	E_{ON}	-	2.1	-	mJ	V_{DD} = 800V V_{GS} = -4/+18V I_D = 80A R_G = 5Ω L=100uH T_J = 25°C
Turn-Off Switching Energy	E_{OFF}	-	0.4	-		
Turn-on delay time	$t_{d(on)}$	-	62	-	ns	
Rise time	t_r	-	47.3	-		
Turn-off delay time	$t_{d(off)}$	-	86	-		
Fall time	t_f	-	15	-		
Gate resistance	R_G	-	0.87	-	Ω	V_{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		1.8		V	V_{GS}=-4V,I_{SD}=40A, T_J=25°C
			2.5			V_{GS}=-4V,I_{SD}=40A, T_J=175°C
Reverse Recovery Time	t_{rr}	-	245	-	ns	V_R = 800V I_D = 40A di/dt = 1000A/μS V_{GS}= -4V T_J = 25°C
Reverse Recovery Charge	Q_{rr}	-	1291	-	nC	
Reverse Recovery Energy	E_{REC}	-	622	-	uJ	
Peak Reverse Recovery Current	I_{rrm}	-	14	-	A	
Charge Time	t_A	-	40	-	ns	
DisCharge Time	t_B	-	205	-	ns	

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.4	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Typical Performance

Fig 1. Output Characteristic (T_J=-55℃)

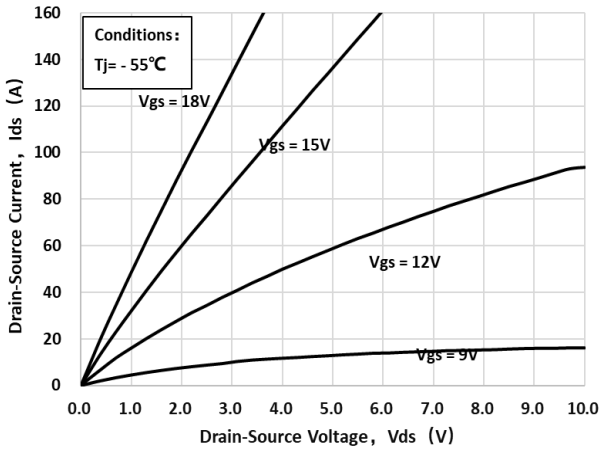


Fig 2. Output Characteristic (T_J=25℃)

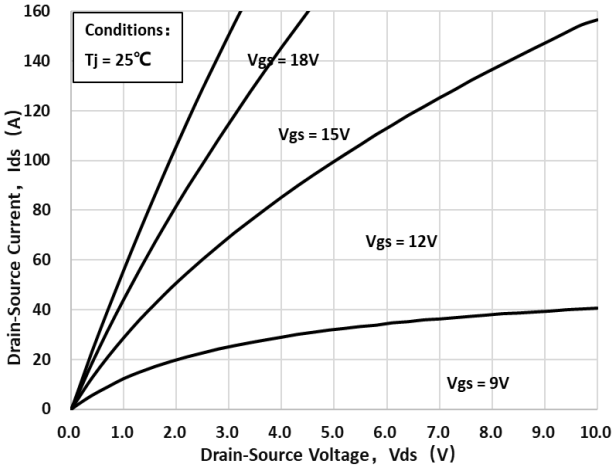


Fig 3. Output Characteristic (T_J=175℃)

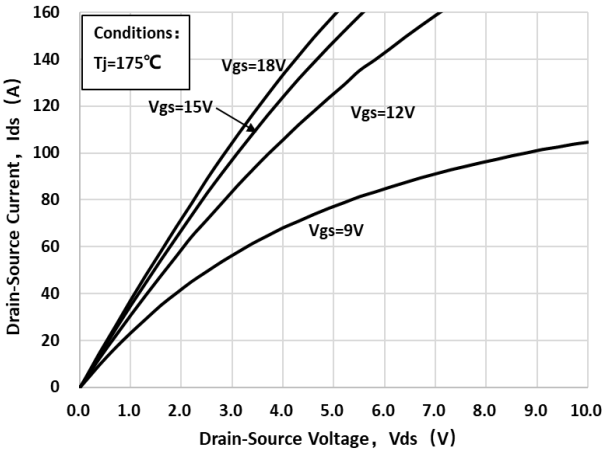


Fig 4: Rdson Vs Ids Characteristic

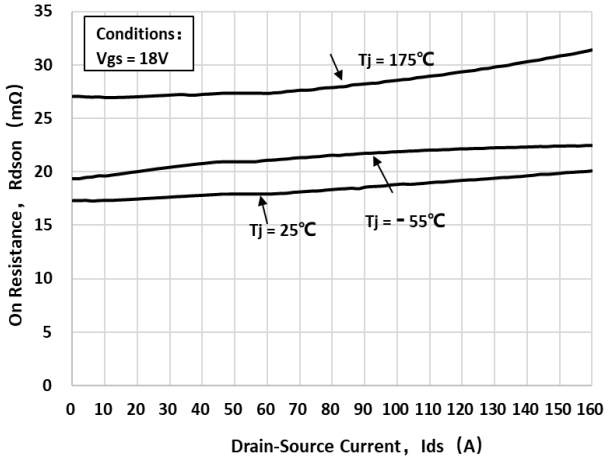


Fig 5: Rds(on) vs. Temperature

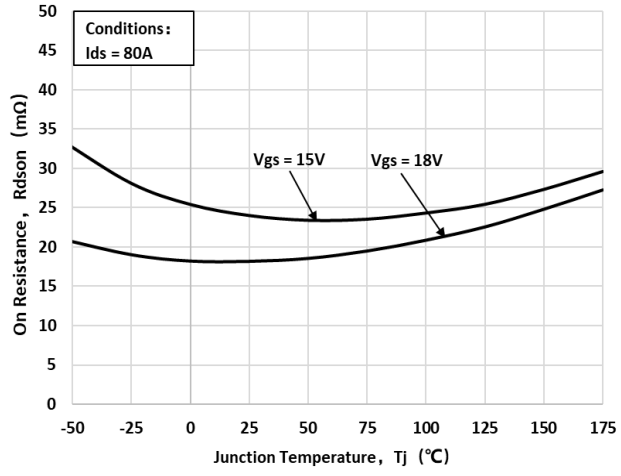


Fig 6: Transfer Characteristic

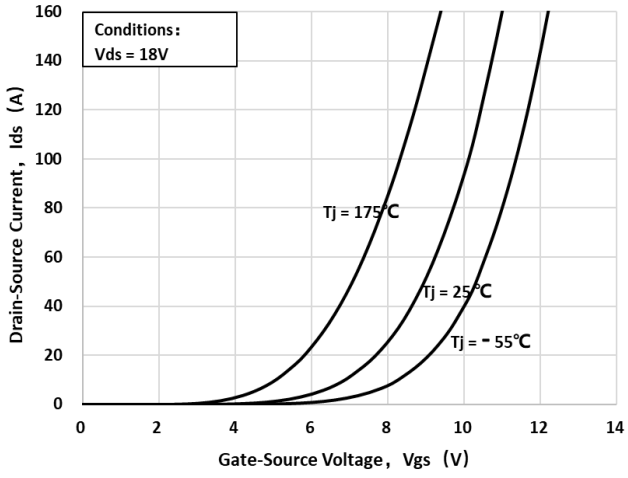


Fig 7: Body-diode Characteristic (T_J=-55℃)

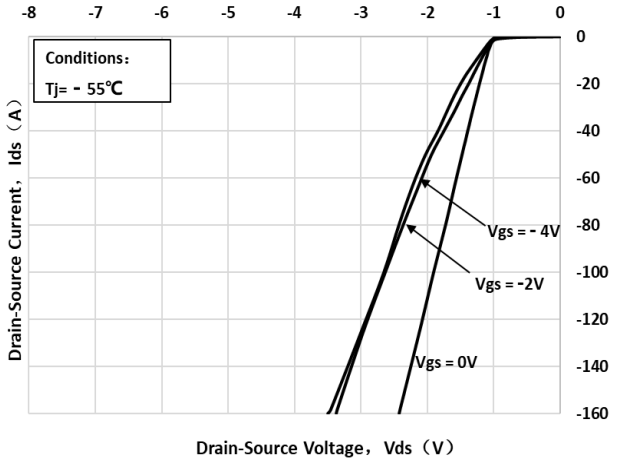


Fig 8: Body-diode Characteristic (T_J=25℃)

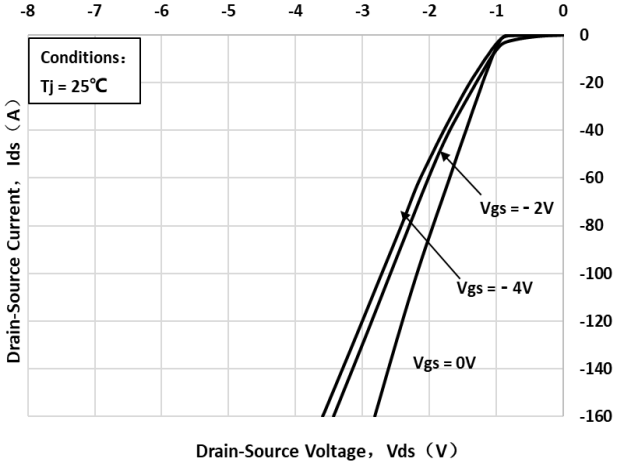


Fig 9: Body-diode Characteristic (T_J=175℃)

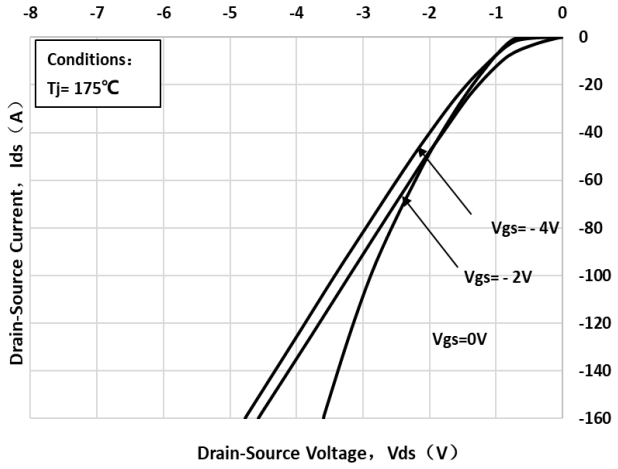


Fig 10: V_{TH} Vs T_J Temperature Characteristic

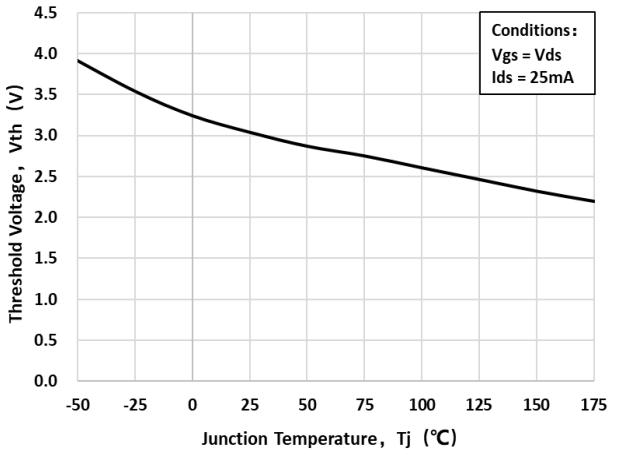


Fig 11: 3rd Quadrant Characteristic(T_J=-55℃)

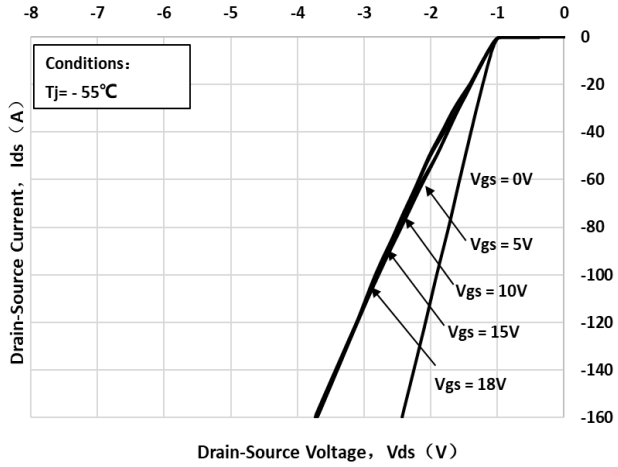


Fig 12: 3rd Quadrant Characteristic(T_J=25℃)

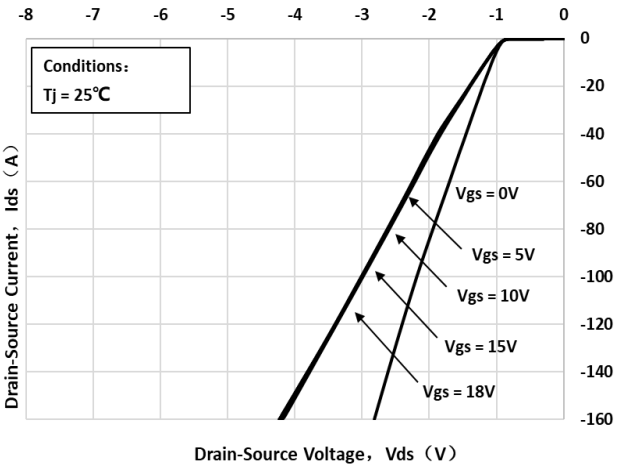


Fig 13: 3rd Quadrant Characteristic(T_J=175℃)

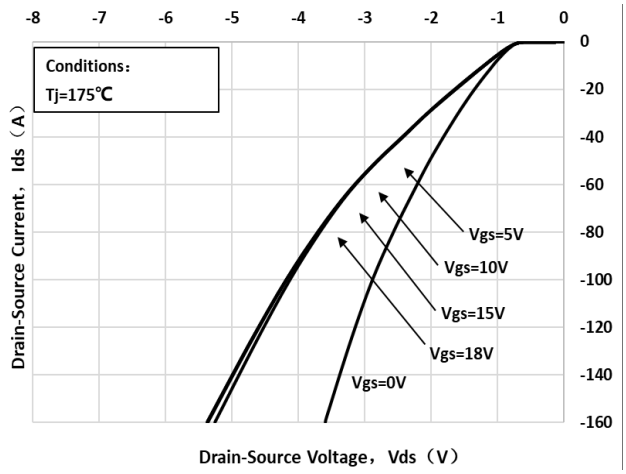


Fig 14: Gate Charge Characteristics

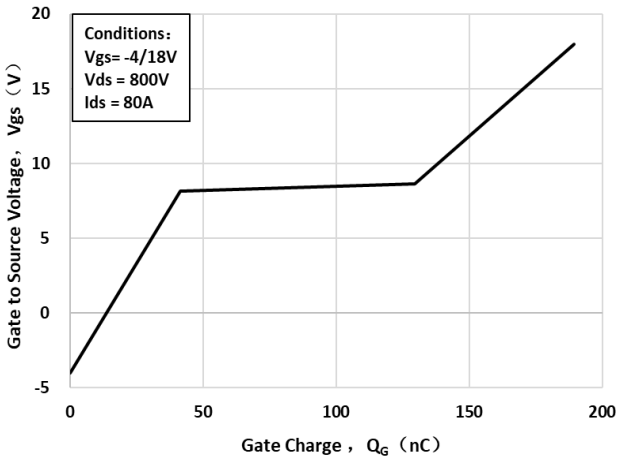
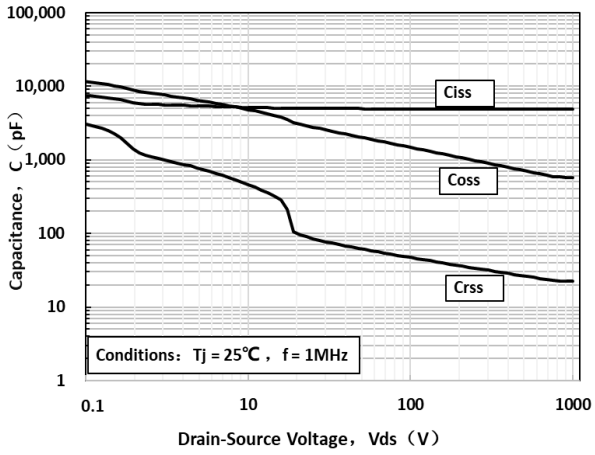


Fig 17: Capacitance Characteristics



Test Circuit & Waveform

Figure A. Definition of switching times

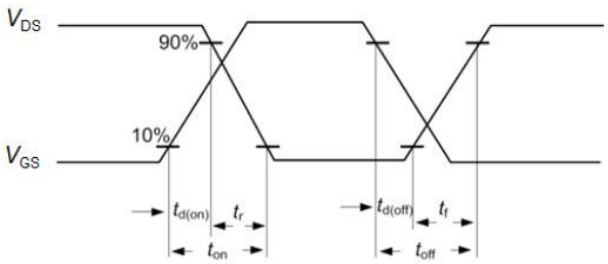


Figure B. Dynamic test circuit

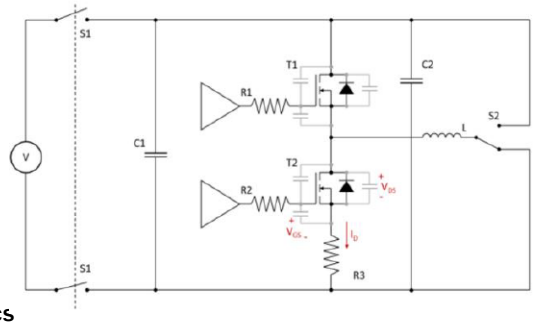


Figure C. Definition of body diodeswitching characteristics

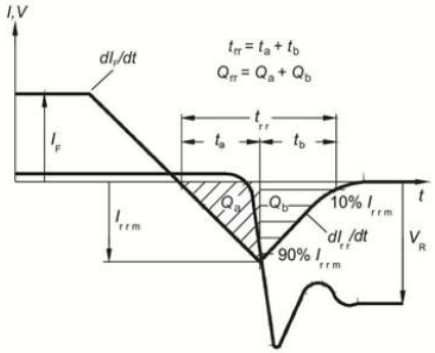
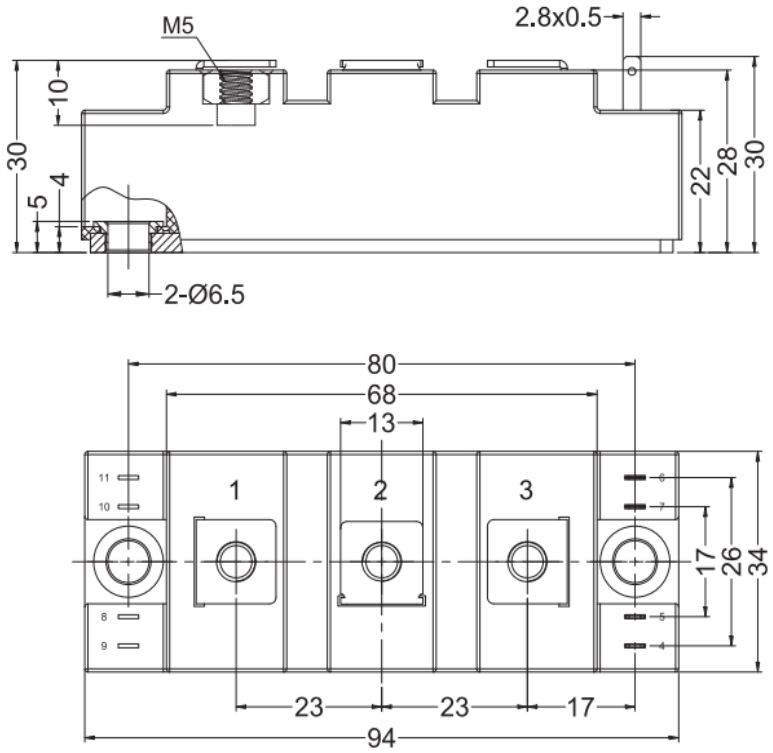


Figure C. **Definition of diode switching characteristics**

Package Dimensions

Package module-HB



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