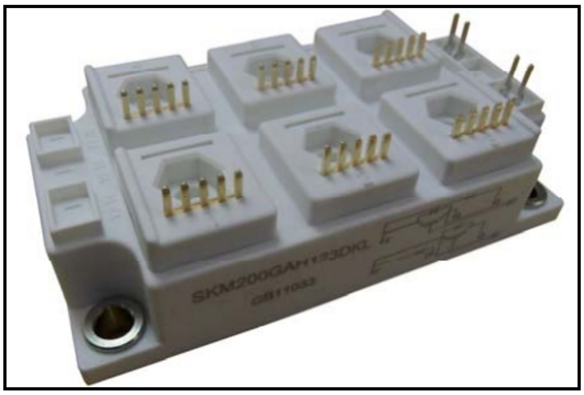
SKM200GAH123DKL

1200V 200A CHOPPER Module

August 2011 **PRELIMINARY** **RoHS Compliant**

FEATURES

- ☐ Ultra Low Loss
- ☐ High Ruggedness
- ☐ High Short Circuit Capability
- ☐ $V_{CE(sat)}$ With Positive Temperature Coefficient
- ☐ With Fast Free-Wheeling Diodes



APPLICATIONS

- ☐ AC and DC motor control
- ☐ AC servo and robot drives
- ☐ Power supplies
- ☐ Welding inverters

ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT-Inverter				
V_{CES}	Collector - Emitter Voltage	T_{vj}=25°C	1200	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	300	A
		T_C=80°C	200	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	400	A
P_{tot}	Power Dissipation Per IGBT		1040	W
Diode-Serial				
V_{RRM}	Repetitive Reverse Voltage	T_{vj}=25°C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	300	A
		T_C=80°C	200	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	400	A
I^2t		T_{vj} =45°C, t=10ms, V_R=0V	15312	A^2s
Reverse-Diode				
V_{RRM}	Repetitive Reverse Voltage	T_{vj}=25°C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	45	A
		T_C=80°C	30	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	60	A
I^2t		T_{vj} =45°C, t=10ms, V_R=0V	450	A^2s

ELECTRICAL AND THERMAL CHARACTERISTICS *T_C=25°C unless otherwise specified*

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
IGBT-Inverter						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=8mA	5.2	6	7	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=200A, V_{GE}=15V, T_{vj}=25°C		1.8		V
		I_C=200A, V_{GE}=15V, T_{vj}=125°C		2.0		V
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_{vj}=25°C			1	mA
		V_{CE}=1200V, V_{GE}=0V, T_{vj}=125°C			10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}±15V, T_{vj}=125°C	-400		400	nA
Q_{ge}	Gate Charge	V_{CE}=600V, I_C=200A , V_{GE}=±15V		2.1		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		14.9		nF
C_{res}	Reverse Transfer Capacitance			0.7		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=600V,I_C=200A, R_G =5.1Ω, V_{GE}=±15V, Inductive Load; T_{Vj} =25°C		130		ns
		T_{Vj} =125°C		140		ns
t_r	Rise Time	T_{Vj} =25°C		65		ns
		T_{Vj} =125°C		65		ns
$t_{d(off)}$	Turn - off Delay Time	V_{CC}=600V,I_C=200A, R_G =5.1Ω, V_{GE}=±15V, Inductive Load; T_{Vj} =25°C		430		ns
		T_{Vj} =125°C		500		ns
t_f	Fall Time	T_{Vj} =25°C		65		ns
		T_{Vj} =125°C		80		ns
E_{on}	Turn - on Energy	V_{CC}=600V,I_C=200A, R_G =5.1Ω, V_{GE}=±15V, Inductive Load; T_{Vj} =25°C		17.2		mJ
		T_{Vj} =125°C		24.8		mJ
E_{off}	Turn - off Energy	T_{Vj} =25°C		13.6		mJ
		T_{Vj} =125°C		21.6		mJ
I_{SC}	Short Circuit Current	t_{psc}≤10μS , V_{GE}=15V, T_{vj}=150°C V_{CC}=900V, $V_{CEMCHIP}$≤1200V		900		A
R_{thJC}	Junction-to-Case Thermal Resistance （ **Per IGBT**）				0.12	K /W
Diode-Serial						
V_F	Forward Voltage	I_F=200A , V_{GE}=0V, T_{Vj} =25°C		1.95		V
		I_F=200A , V_{GE}=0V, T_{Vj} =125°C		1.95		V
I_{RRM}	Max. Reverse Recovery Current	I_F=200A , V_R=600V di_F/dt=-2400A/μs T_{Vj} =125°C		155		A
Q_{rr}	Reverse Recovery Charge			17.5		μC
E_{rec}	Reverse Recovery Energy			8.5		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance （ **Per Diode**）				0.25	K /W
Reverse-Diode						
V_F	Forward Voltage	I_F=30A , V_{GE}=0V, T_{Vj} =25°C		1.53		V
		I_F=30A , V_{GE}=0V, T_{Vj} =125°C		1.52		V
I_{RRM}	Max. Reverse Recovery Current	I_F=30A , V_R=600V di_F/dt=-1000A/μs，T_{Vj} =125°C		60		A
Q_{rr}	Reverse Recovery Charge			5.5		μC
R_{thJCD}	Junction-to-Case Thermal Resistance （ **Per Diode**）				1.0	K /W

MODULE CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$T_{Vj\ max}$	Max. Junction Temperature				150	°C
$T_{Vj\ op}$	Operating Temperature		-40		125	°C
T_{stg}	Storage Temperature		-40		125	°C
V_{isol}	Insulation Test Voltage	AC, t=1min		3000		V
M_d	Mounting Torque	Recommended（M6）	3		5	N－m
Weight				300		g

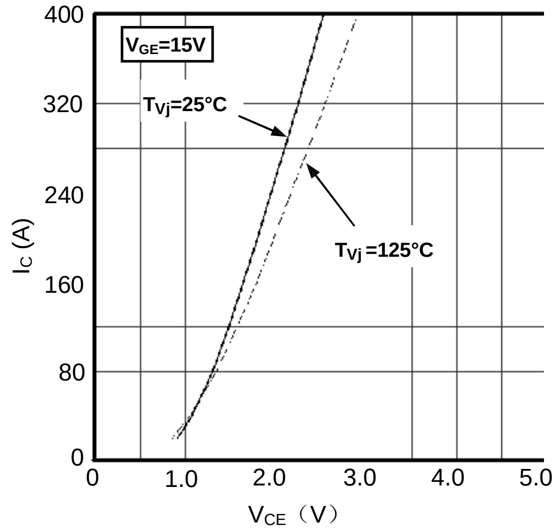


Figure1. Typical Output characteristics
IGBT-Inverter

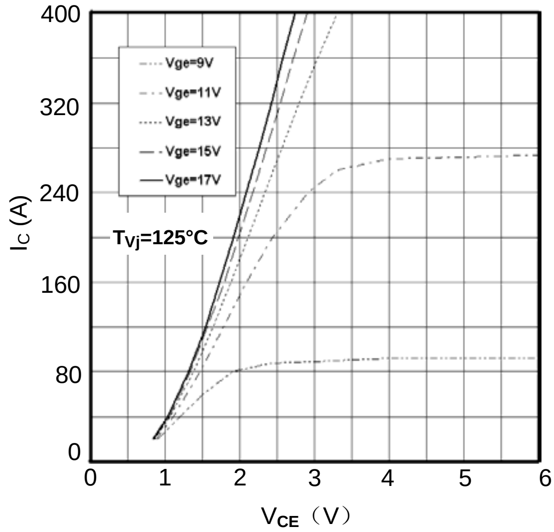


Figure2. Typical Output characteristics
IGBT-Inverter

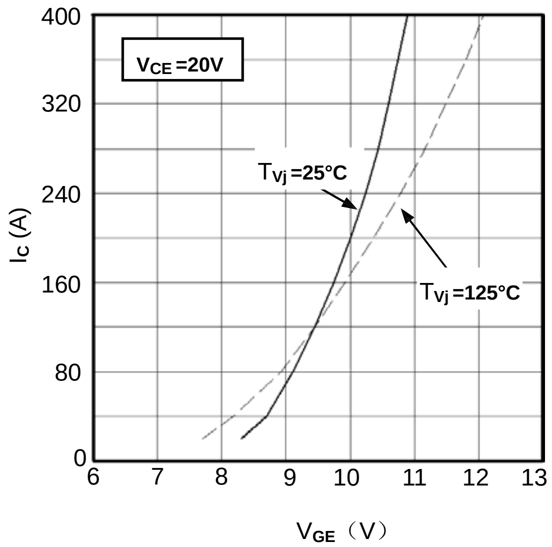


Figure3. Typical Transfer characteristics
IGBT-Inverter

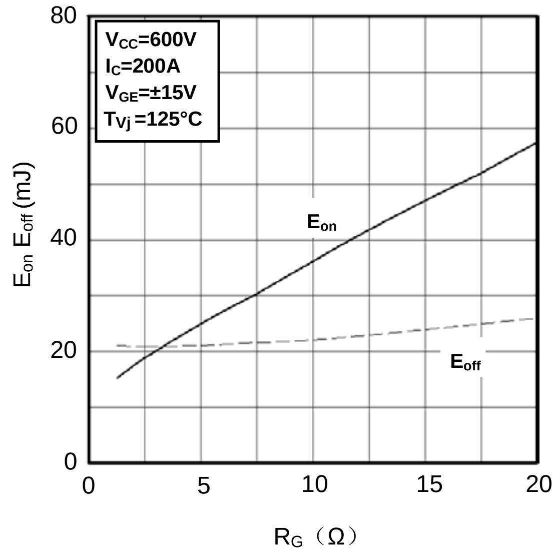


Figure4. Switching Energy vs. Gate Resistor
IGBT-Inverter

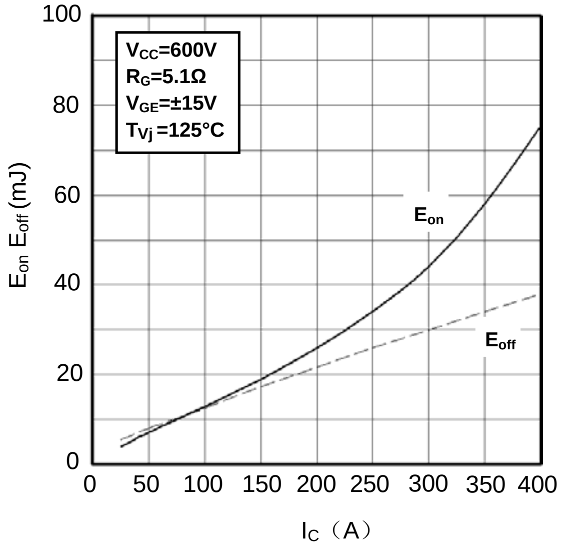


Figure5. Switching Energy vs. Collector Current
IGBT-Inverter

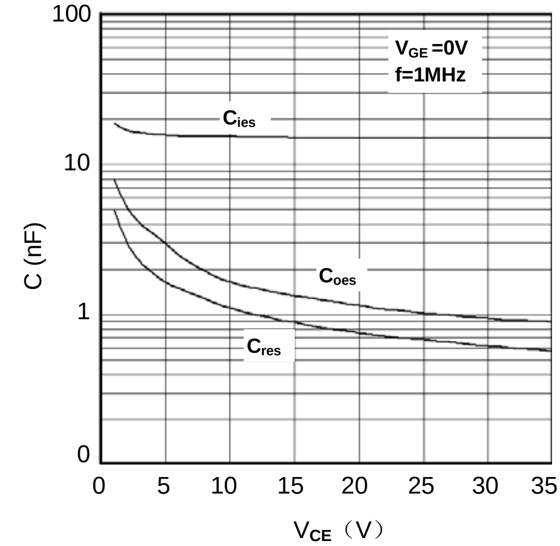


Figure6. Typical Capacitances vs. V_{CE}
IGBT-Inverter

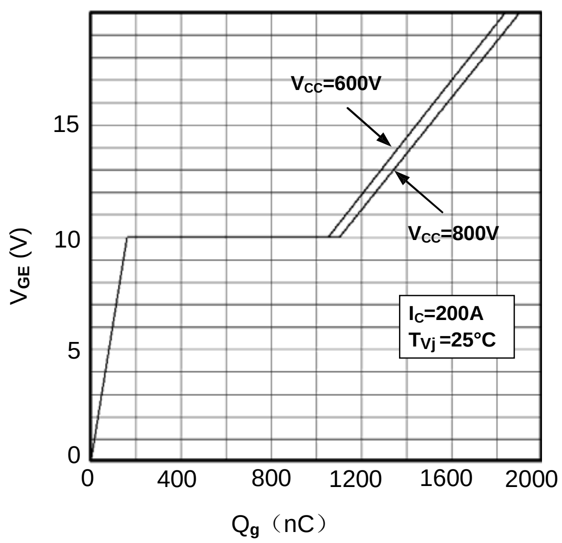


Figure7. Gate Charge characteristics
IGBT-Inverter

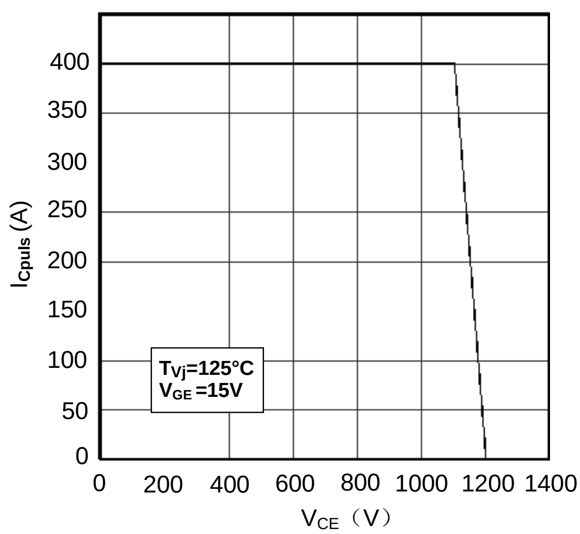


Figure8. Reverse Biased Safe Operating Area
IGBT-Inverter

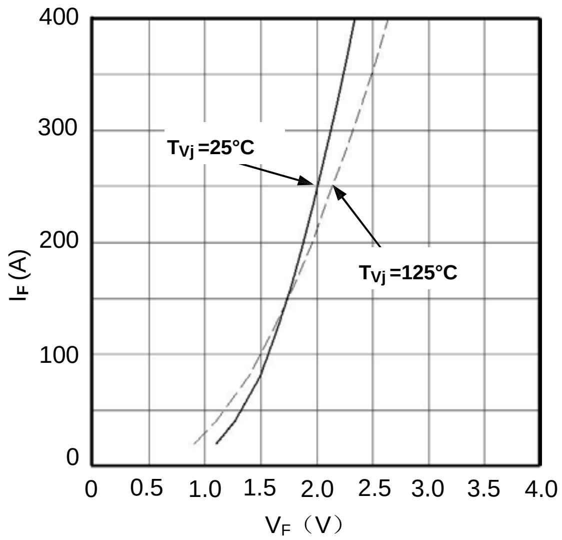


Figure9. Diode Forward Characteristics
Diode-Serial

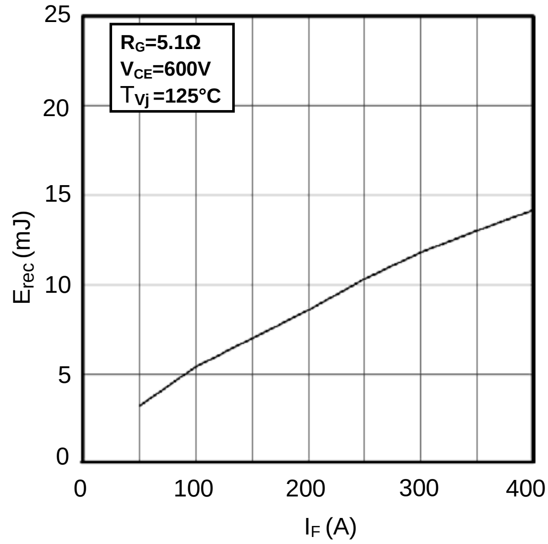


Figure10. Switching Energy vs. I_F
Diode-Serial

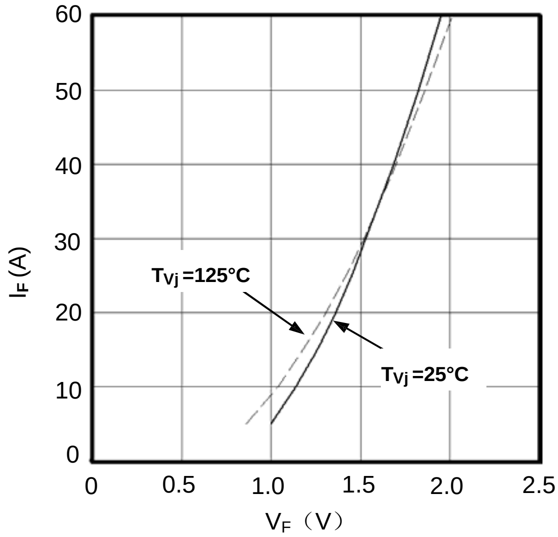
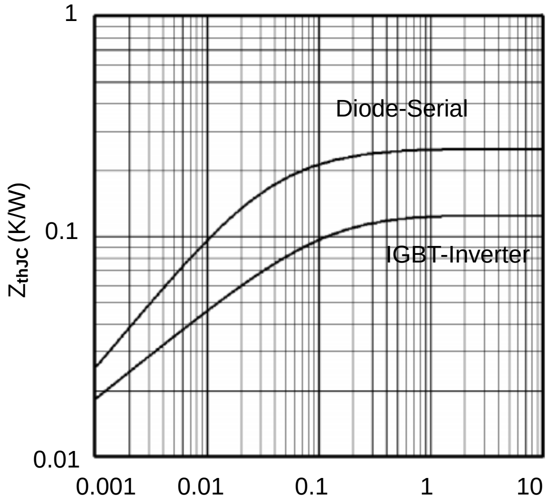


Figure11. Diode Forward Characteristics
Reverse-Diode



Rectangular Pulse Duration (seconds)
Figure12. Transient Thermal Impedance

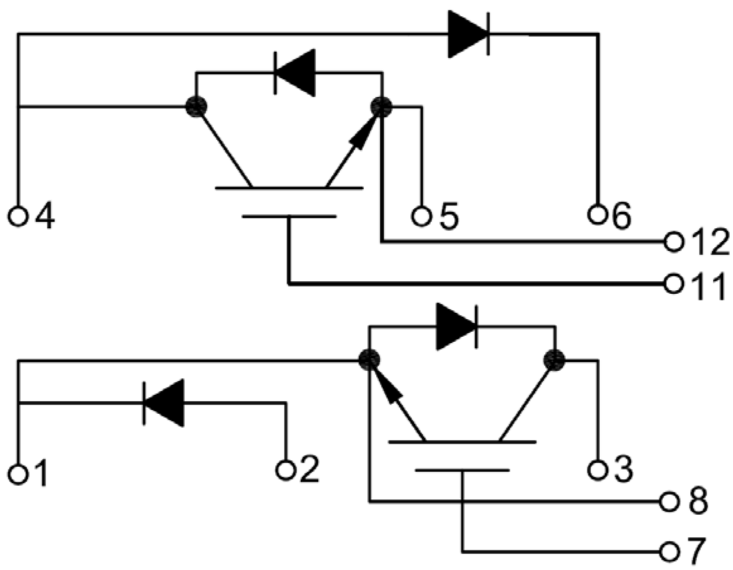
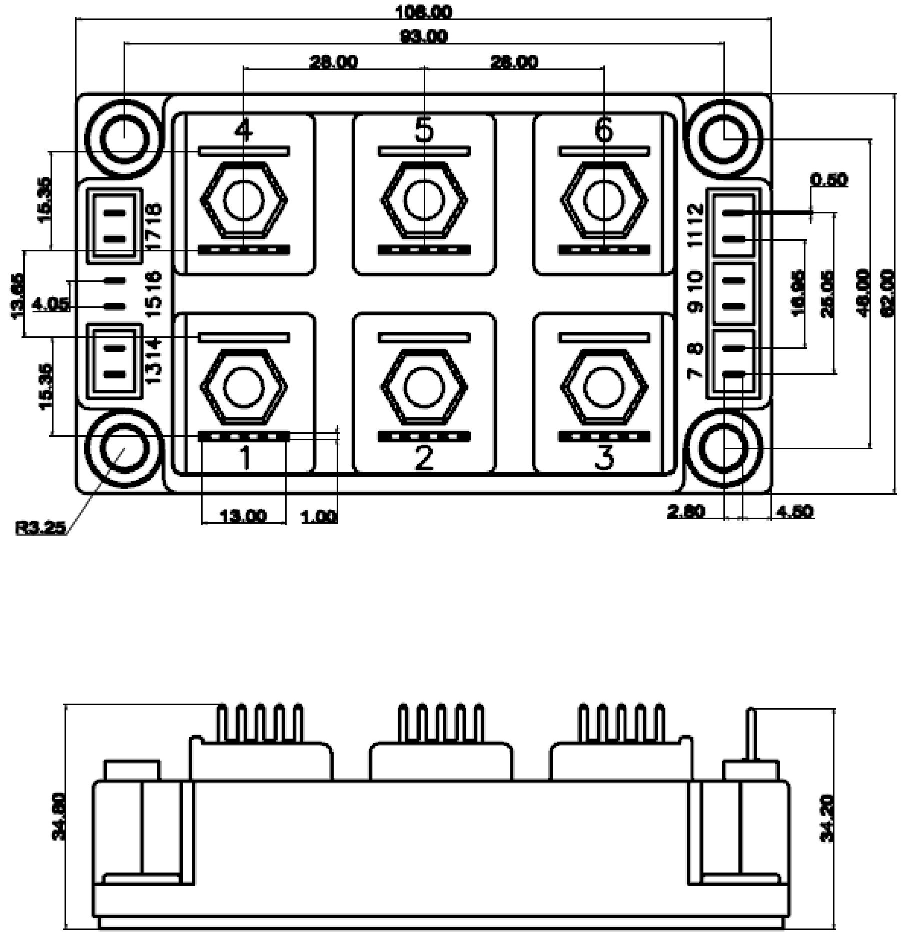


Figure13. Circuit Diagram



Dimensions (mm) Figure14.
Package Outline