

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

$T_C=25^{\circ}\text{C}$ unless otherwise specified

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

SKM200GAH123DKL
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, T _{VJ} =25°C		130		ns
		R _G =5.1 Ω , T _{VJ} =125°C		140		ns
t _r	Rise Time	V _{GE} =± 15V, T _{VJ} =25°C		65		ns
		Inductive Load T _{VJ} =125°C		65		ns
t _{d(off)}	Turn - off Delay Time	V _{CC} =600V,I _C =200A, T _{VJ} =25°C		430		ns
		R _G =5.1 Ω , T _{VJ} =125°C		500		ns
t _f	Fall Time	V _{GE} =± 15V, T _{VJ} =25°C		65		ns
		Inductive Load T _{VJ} =125°C		80		ns
E _{on}	Turn - on Energy	V _{CC} =600V,I _C =200A, T _{VJ} =25°C		17.2		mJ
		R _G =5.1 Ω , T _{VJ} =125°C		24.8		mJ
E _{off}	Turn - off Energy	V _{GE} =± 15V, T _{VJ} =25°C		13.6		mJ
		Inductive Load 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

$T_C=25^{\circ}\text{C}$ unless otherwise specified

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

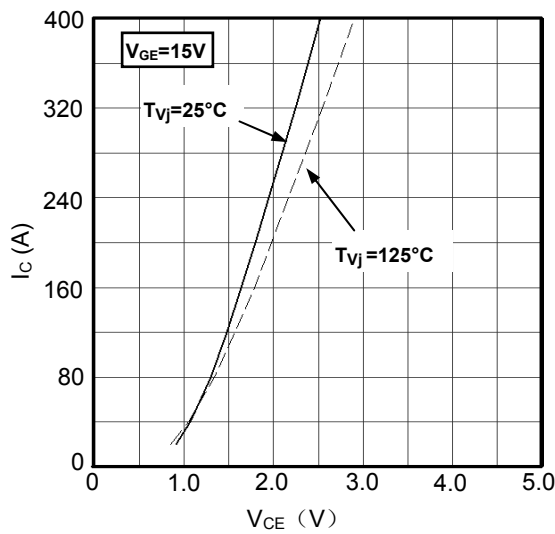


Figure1. Typical Output characteristics
IGBT-Inverter

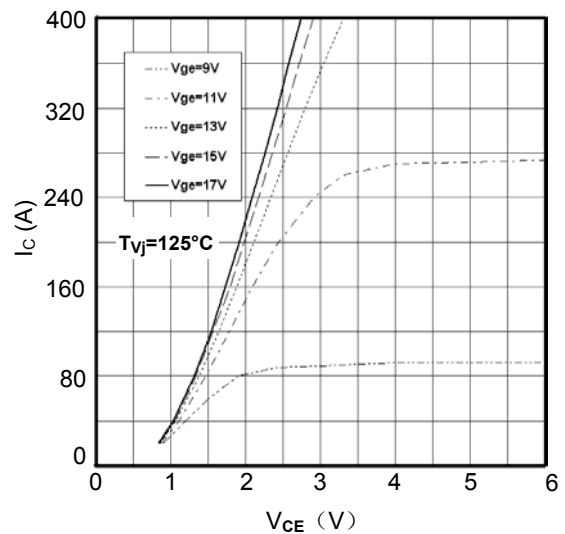


Figure2. Typical Output characteristics
IGBT-Inverter

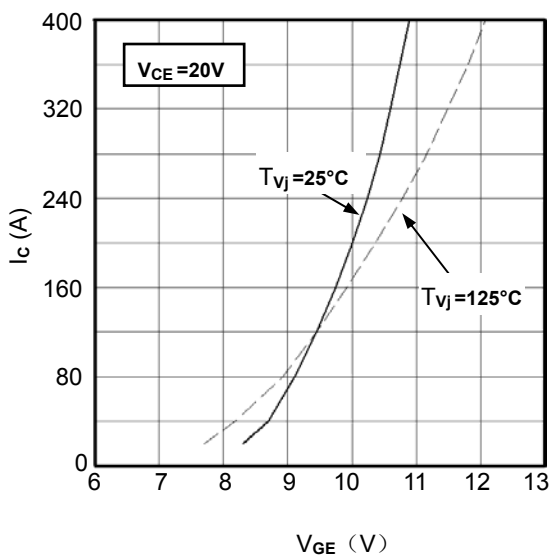


Figure3. Typical Transfer characteristics
IGBT-Inverter

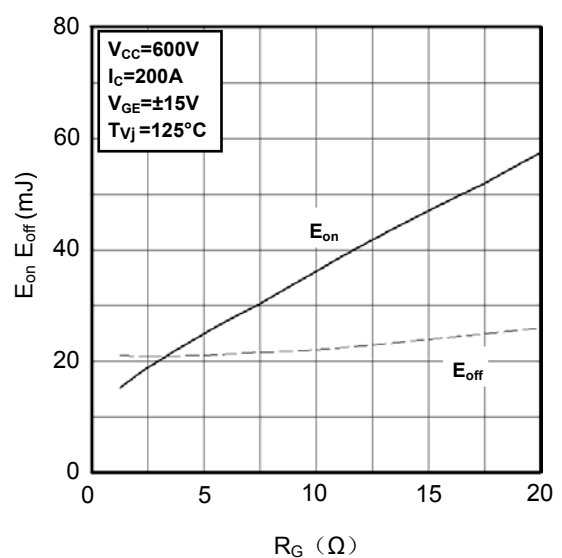


Figure4. Switching Energy vs. Gate Resistor
IGBT-Inverter

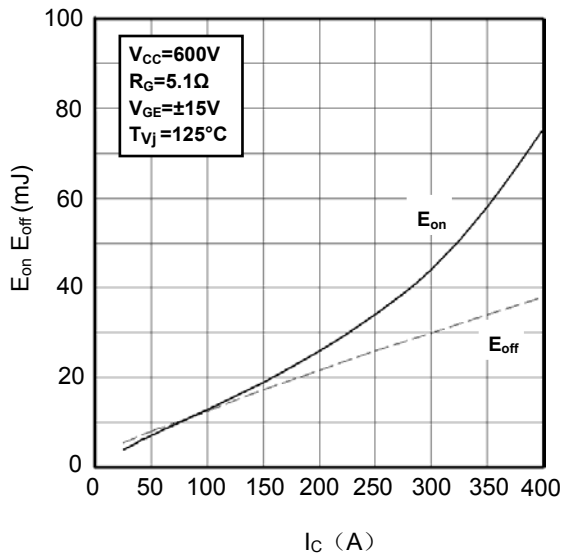


Figure5. Switching Energy vs. Collector Current IGBT-Inverter

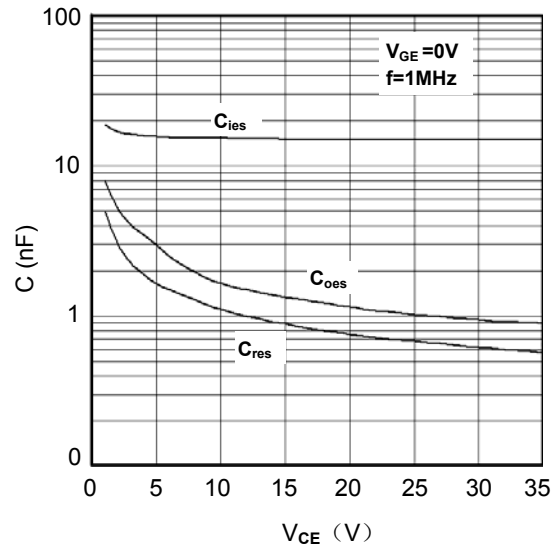


Figure6. Typical Capacitances vs. V_{CE} IGBT-Inverter

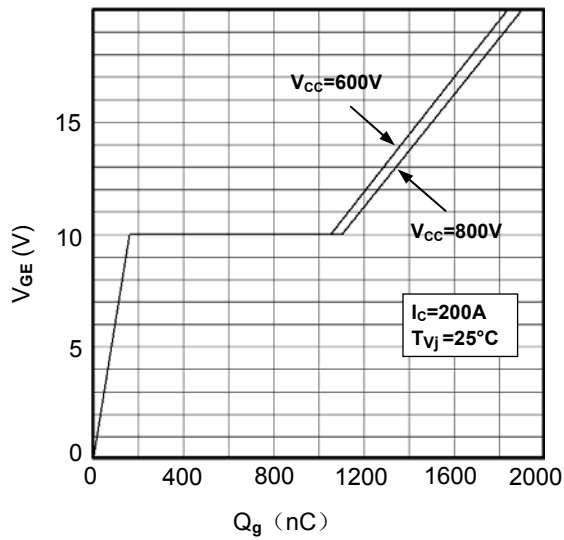


Figure7. Gate Charge characteristics IGBT-Inverter

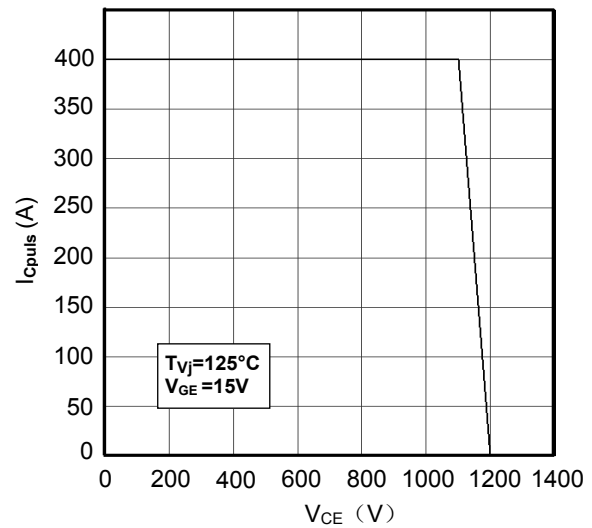


Figure8. Reverse Biased Safe Operating Area IGBT-Inverter

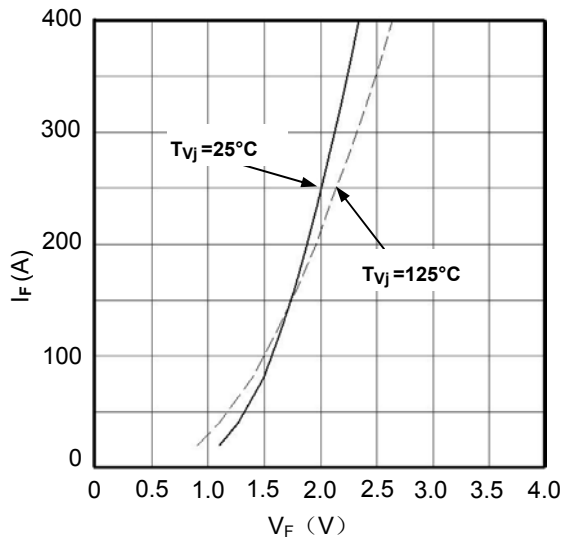


Figure9. Diode Forward Characteristics Diode-Serial

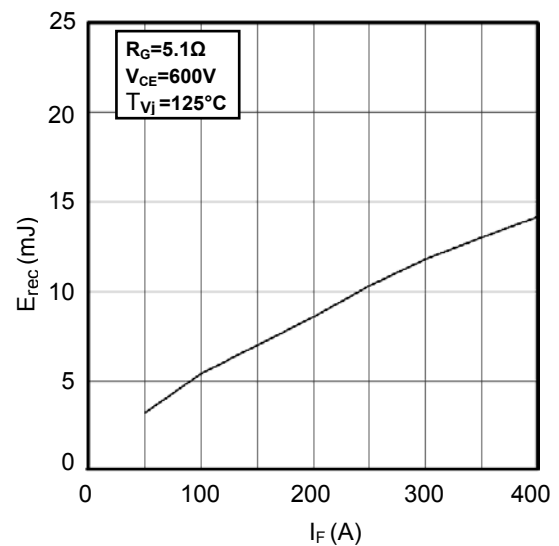


Figure10. Switching Energy vs. I_F Diode-Serial

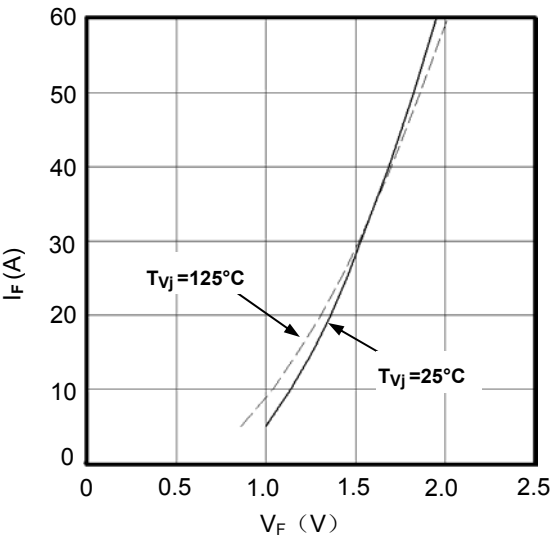
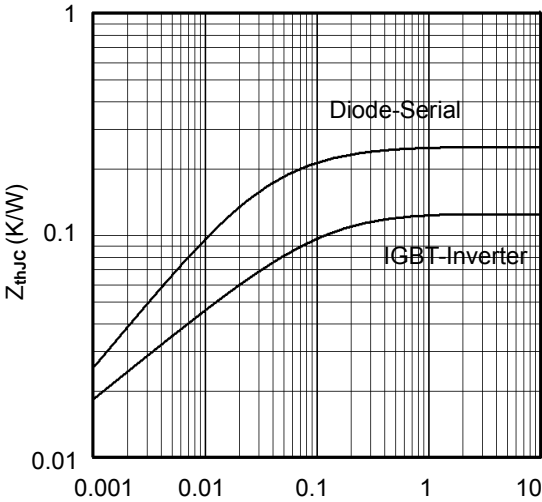


Figure11. Diode Forward Characteristics
Reverse-Diode



Rectangular Pulse Duration (seconds)
Figure12. Transient Thermal Impedance

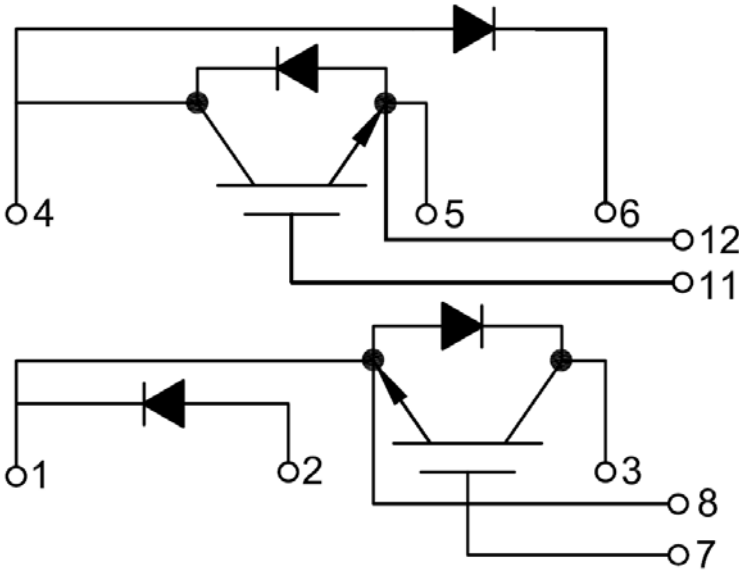


Figure13. Circuit Diagram

